Fermilab Research Program 2006

Workbook

March 2006

Roy Rubinstein

Fermi National Accelerator Laboratory
Batavia, Illinois

Operated by Universities Research Association, Inc.
Under Contract with the United States Department of Energy

Price $5.00

INTRODUCTION

This is the 32nd in the venerable tradition of Fermilab's annual Research Program Workbook. It gives information on the Laboratory's research activities, including summaries of Fermilab experiments and their publications; also provided are various statistics on the program.

It is a pleasure to thank the experiment spokespersons for providing summaries and personnel lists; Jud Parker for the upkeep of the databases from which much of the information is derived; Jeff Appel for his advice and encouragement; and Jackie Coleman who, as for the past two and a half decades, takes all of the disparate pieces and successfully makes a Workbook out of them.

TABLE OF CONTENTS

SECTION I. STATISTICS ON FERMILAB PROPOSALS

The status of Fermilab proposals is summarized in this Section of the Workbook. All proposals are classified into one of the following categories:

	Categories	Definitions
Approved Proposals	Completed	Approved proposals that have completed data-taking.
	Remaining	Approved proposals either running or waiting for data-taking.
	Inactive	Approved proposals which are now unlikely to ever be completed.
Pending Proposals	Unconsidered	Relatively new proposals awaiting consideration
	Deferred	Proposals for which consideration has been postponed for a specific reason
	"Not Approved"	Proposals for which a conventional decision cannot be made.
Obsolete Proposals	Rejected	Proposals rejected from further consideration
	Withdrawn/Inactive	Proposals that were not considered at the request of the spokesperson or that are no longer being considered for other reasons.

At the present time, 957 proposals have been received. Table 1 and Figure 1 show the number of proposals in each category each year since 1970.

TABLE 1. STATUS OF PROPOSALS AT FERMILAB

	Aug 1970	Jul 1971	Jul 1972	Jul 1973	Jul 1974	Jul 1975	Jul 1976	Jul 1977	Jul 1978	Jul 1979	Jul 1980	Jul 1981	Jul 1982	Jul 1983	Jul 1984	Jul 1985	Jul 1986	Jul 1987	Jul 1988	Jul 1989	Jul 1990	Jul 1991	Jul 1992	Jul 1993	Jul 1994	Jul 1995	Jul 1996	Jul 1997	Jul 1998	Jul 1999	Jul 2000	Jul 2001	Jul 2002	Jul 2003	Jul 2004	Jul 2005	Mar 2006
APPROVED PROPOSALS																																				
Completed and Data Analysis	0	0	0	16	57	97	152	190	234	248	264	278	295	297	300	310	324	326	339	341	348	355	383	389	389	389	396	396	403	405	412	415	417	418	419	424	431
Remaining and Inactive	21	53	70	75	89	121	100	82	57	52	41	41	29	33	43	48	39	42	34	43	38	34	20	24	28	30	25	34	30	32	31	31	32	36	41	43	46
Subtotals	21	53	70	91	146	218	252	272	291	300	305	319	324	330	343	358	363	368	373	384	386	389	403	413	417	419	421	430	433	437	443	446	449	454	460	467	477
PENDING PROPOSALS																																				
Unconsidered	23	16	19	10	0	2	6	12	6	6	13	27	16	25	11	8	8	13	13	11	21	50	36	17	6	8	9	11	11	15	7	5	7	8	5	5	3
Deferred	29	35	39	43	54	45	25	24	11	2	10	7	9	11	2	0	1	0	0	0	0	0	2	3	1	1	0	0	0	0	1	1	1	1	1	1	1
"Not Approved"	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
Subtotals	52	51	58	53	54	47	31	36	17	8	23	34	26	37	14	9	10	14	14	12	22	51	39	21	8	10	10	12	12	16	9	7	9	10	7	7	8
OBSOLETE PROPOSALS																																				
Rejected	8	15	20	42	65	85	135	166	185	189	191	210	221	229	231	234	236	237	239	241	242	243	245	247	251	250	250	250	251	251	255	256	257	257	258	258	259
Withdrawn/Inactive	1	33	35	47	61	71	80	93	114	127	131	139	147	149	159	163	166	168	169	168	169	170	173	191	196	198	201	202	206	209	210	210	210	213	213	213	213
Subtotals	9	48	55	89	126	156	215	259	299	316	322	349	368	378	390	397	402	405	408	409	411	413	418	438	447	448	451	452	457	460	465	466	467	470	471	471	472
TOTAL NUMBER OF	82	152	183	233	326	421	498	567	607	624	650	702	718	745	747	764	775	787	795	805	819	853	860	872	872	877	882	894	902	913	917	919	925	934	938	945	957

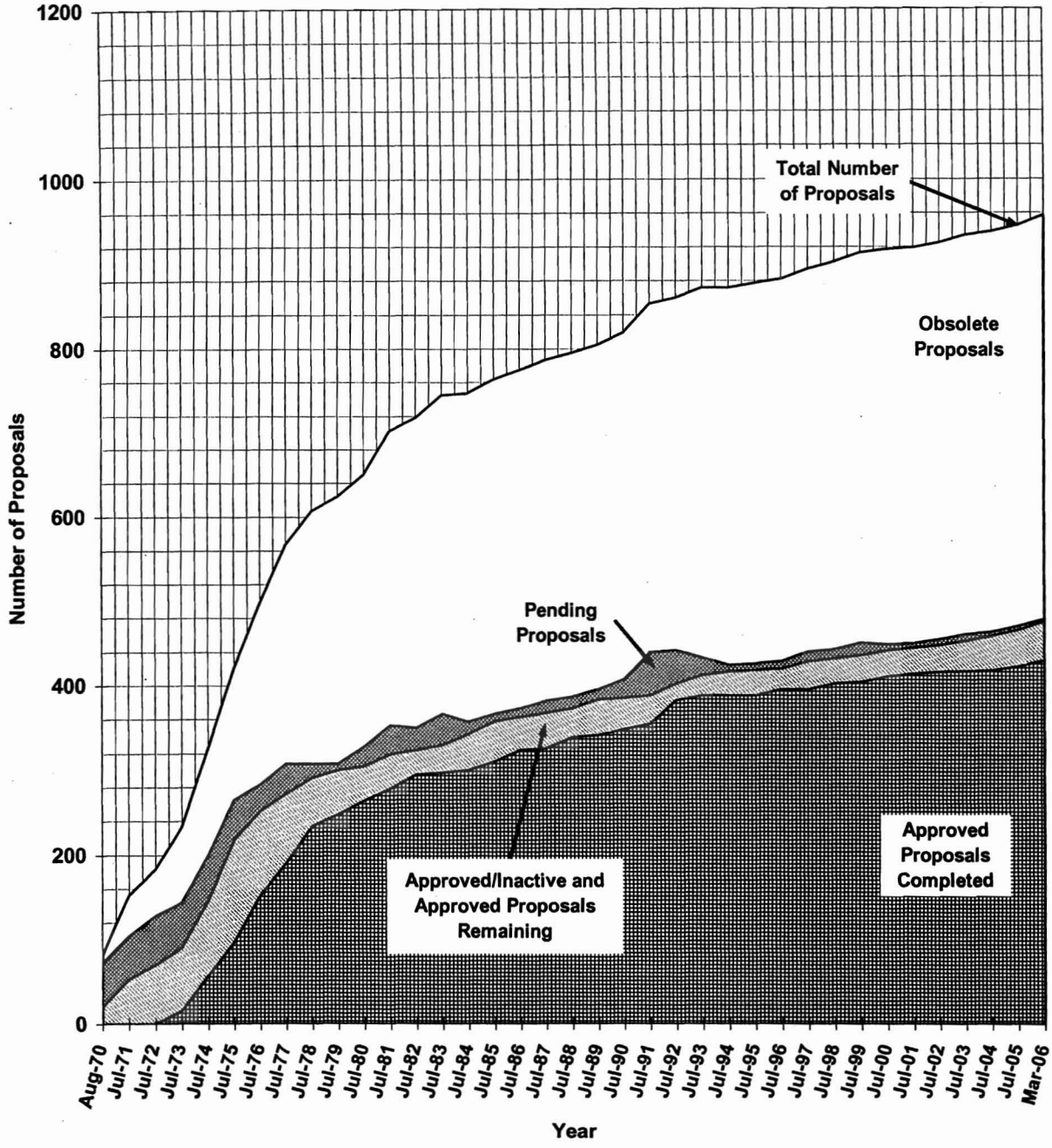


Figure 1. Growth of the Fermilab research program. The total number of approved experiments is obtained by adding the numbers shown as completed and those remaining and approved/inactive. Pending proposals are those which are unconsidered, deferred or "not approved;" obsolete proposals are rejected or withdrawn/inactive. Note that in this figure "Approved Proposals Completed" includes experiments still analyzing data.

SECTION II. ACCELERATOR PERFORMANCE

This Section gives summaries of Tevatron operation for the current 980 GeV × 980 GeV $\bar{p}p$ Collider run (Run II) which started in 2001, and also (Figure 5) a comparison of the integrated luminosities for Collider Runs Ia, Ib, and II.

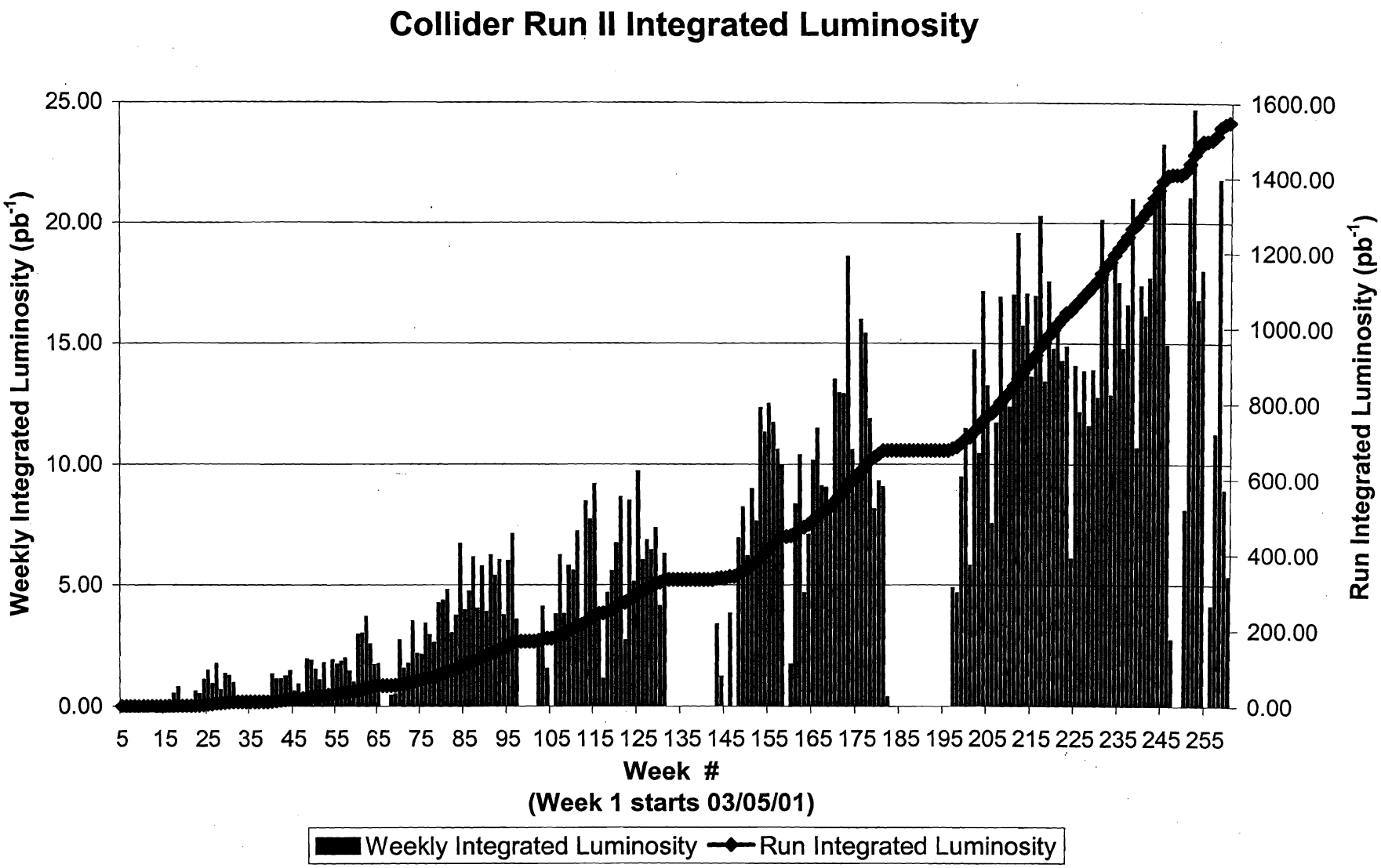


Figure 2. Tevatron Collider operation during the current running period, which started in 2001 - luminosity per week and integrated luminosity.

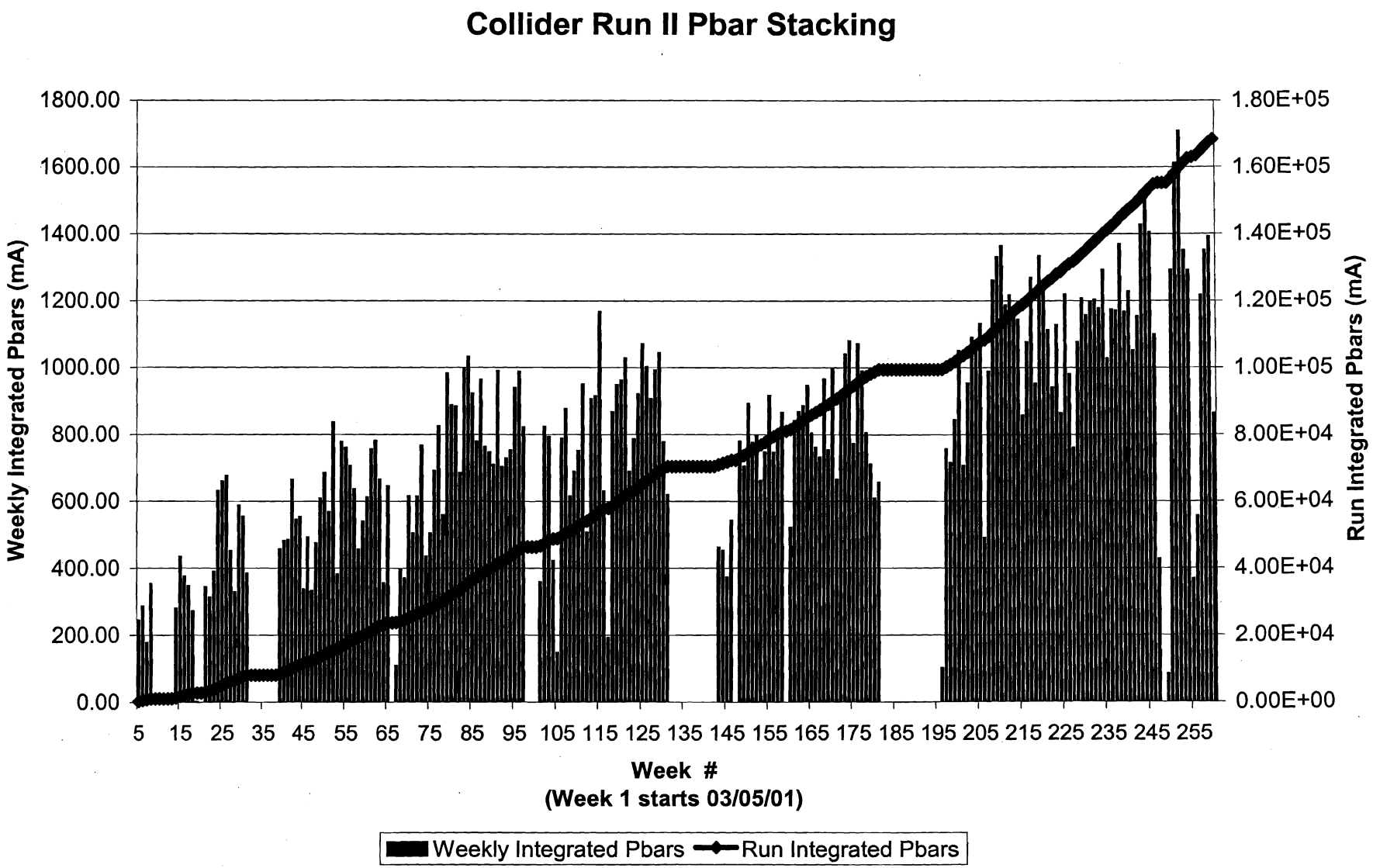


Figure 3. Tevatron Collider operation during the current running period, which started in 2001 - antiproton stacking per week and integrated stacking.

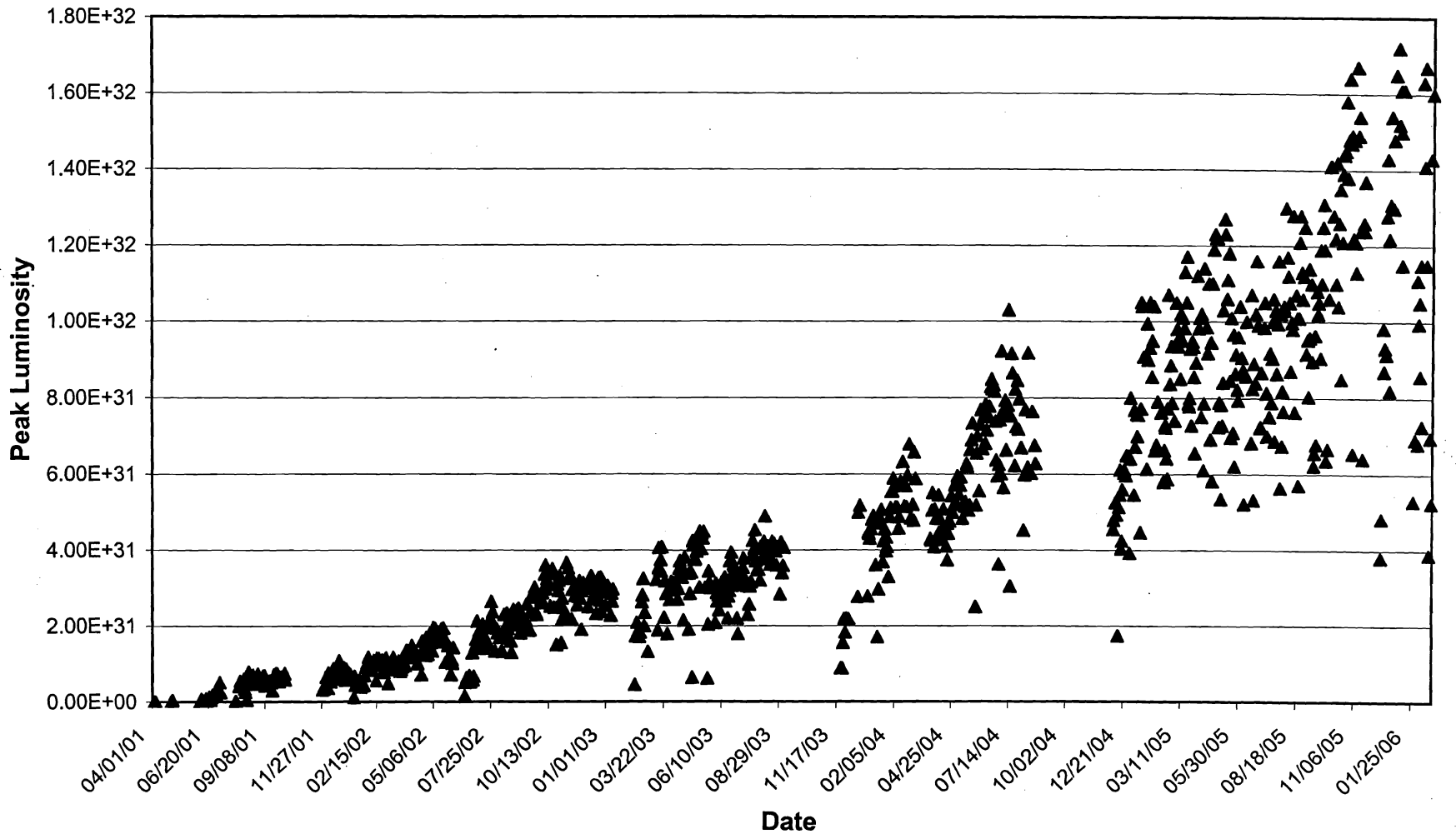


Figure 4. Tevatron Collider operation during the current running period, which started in 2001 - daily peak luminosity.

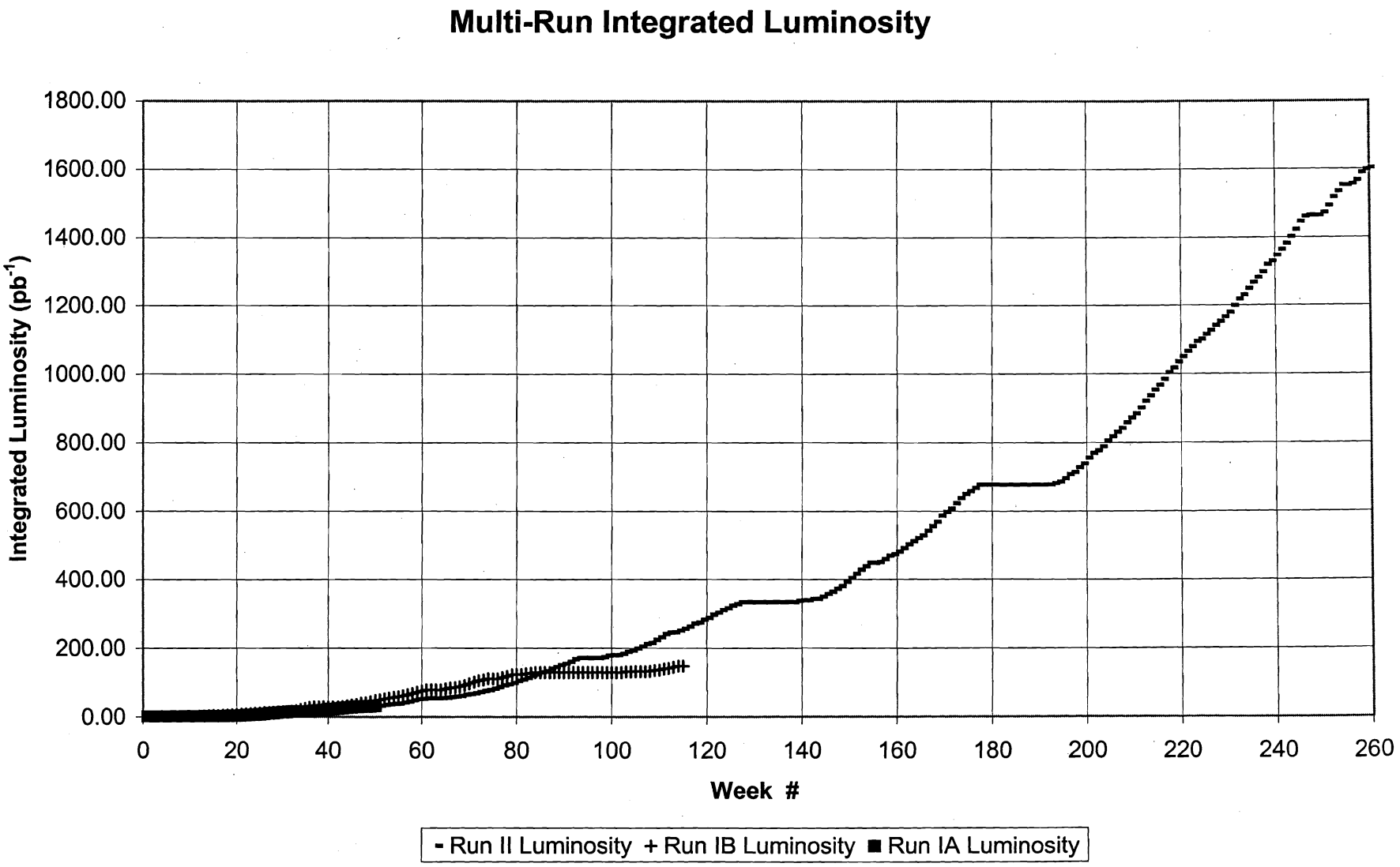


Figure 5. Comparison of the integrated luminosities for Collider Runs Ia, Ib, and II.

SECTION III. FERMILAB BEAM PROPERTIES AND EXPERIMENT LOCATION

The locations of all Fermilab fixed-target area beamlines are shown in Figure 6; Figure 7 gives the locations of Collider experiments.

The currently approved neutrino experiments use beams from the Booster (for experiment E-944, MiniBooNE) and the Main Injector (the NuMI beam for experiment E-875, MINOS). The locations of these experiments are shown on the overall Fermilab accelerator schematic layout in Figure 8, and their expected beam fluxes are shown in Figures 9 and 10. The test beam MT is located in the Meson Area.

Table 2 gives the number of 120 GeV Main Injector protons/hour that can be expected under various operating scenarios, and Figure 11 shows some expected secondary beam fluxes using the Main Injector. Some more detailed information on the MT test beam is given on page 19, and in Table 3 and Figure 12.

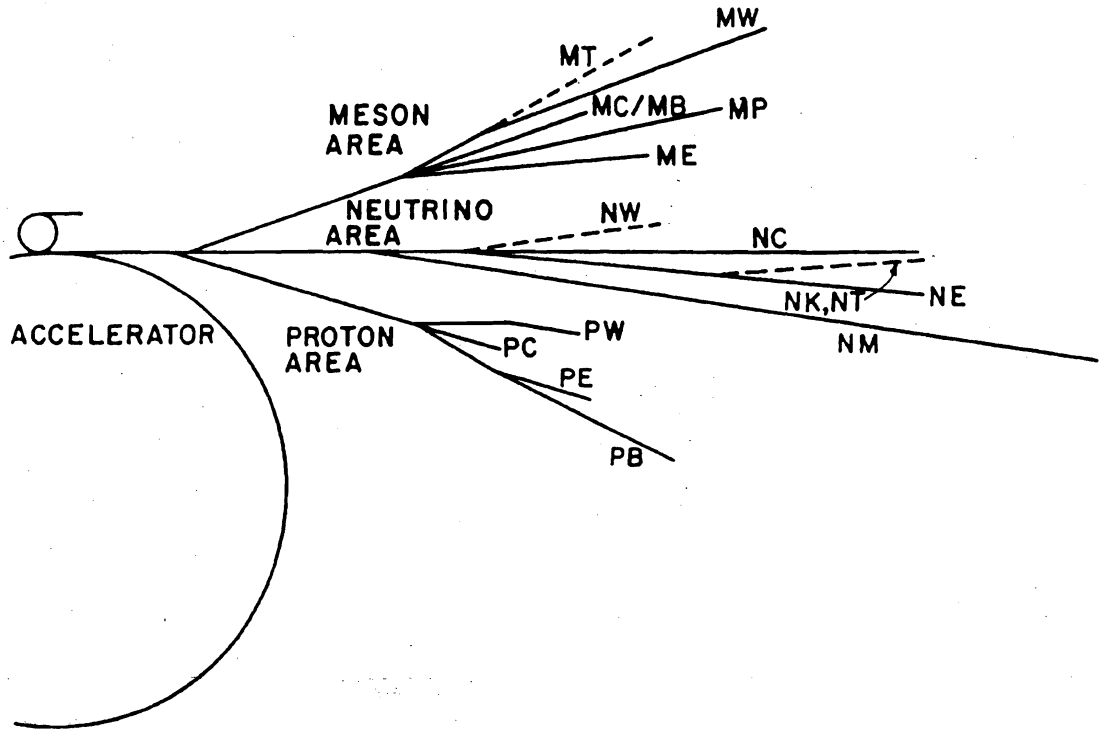


Figure 6. Layout of Fermilab Fixed Target area beams.

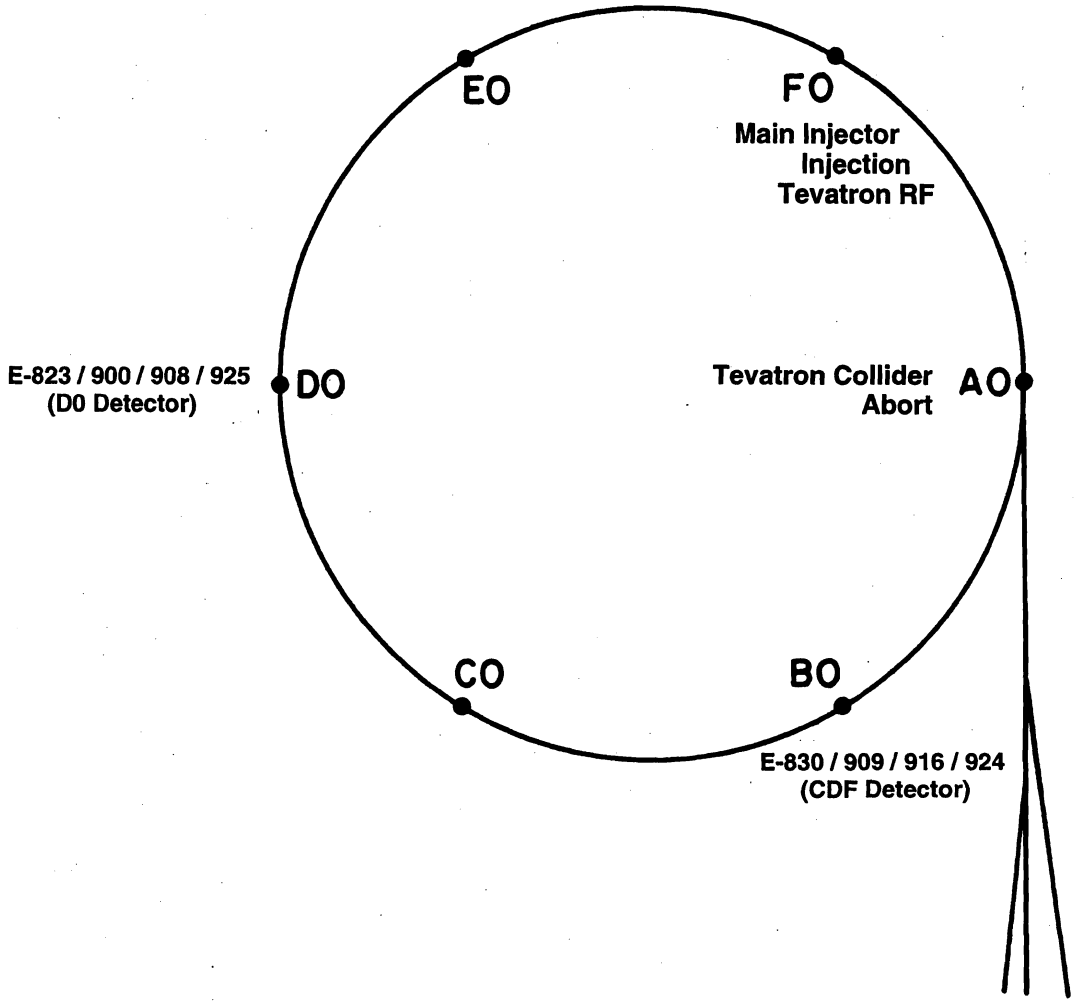


Figure 7. Locations in the Tevatron of the approved $p\bar{p}$ Collider experiments.

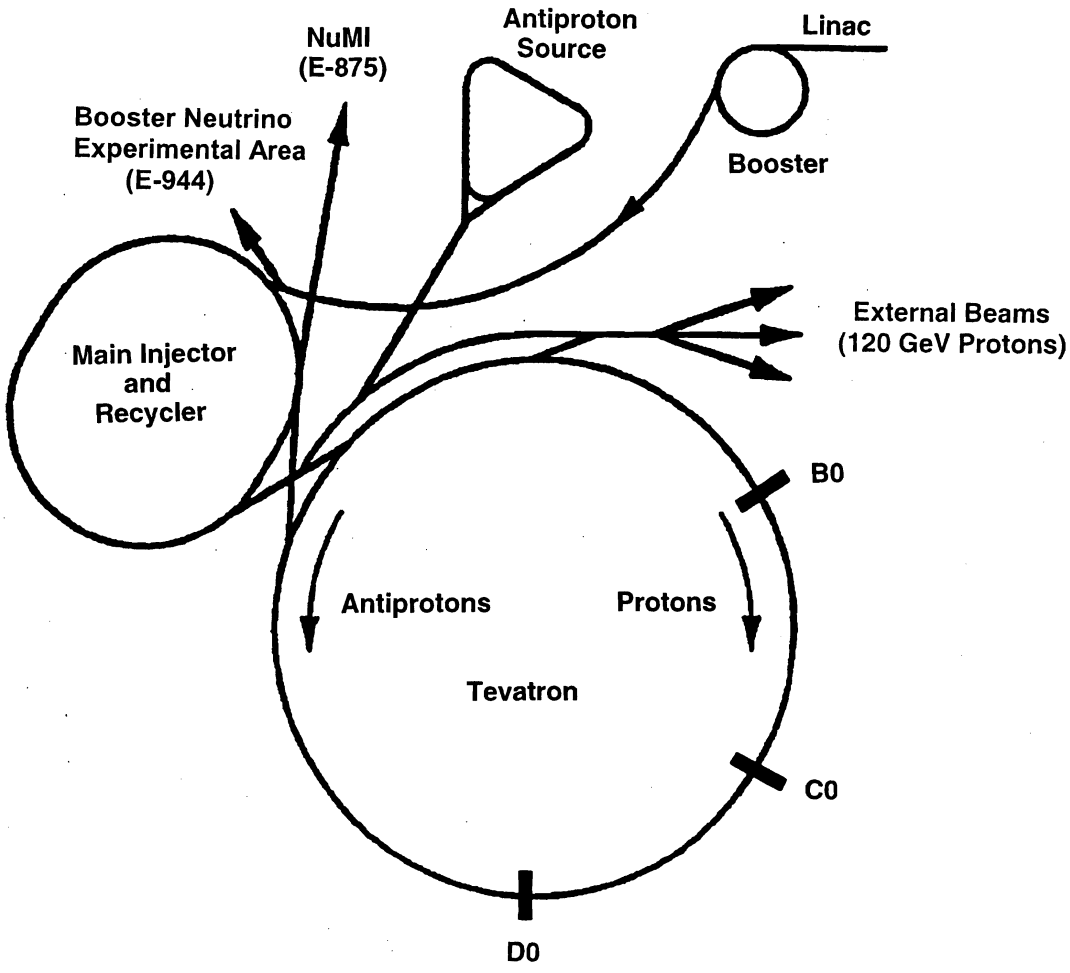


Figure 8. Schematic layout of Fermilab accelerators with present and future experimental areas.

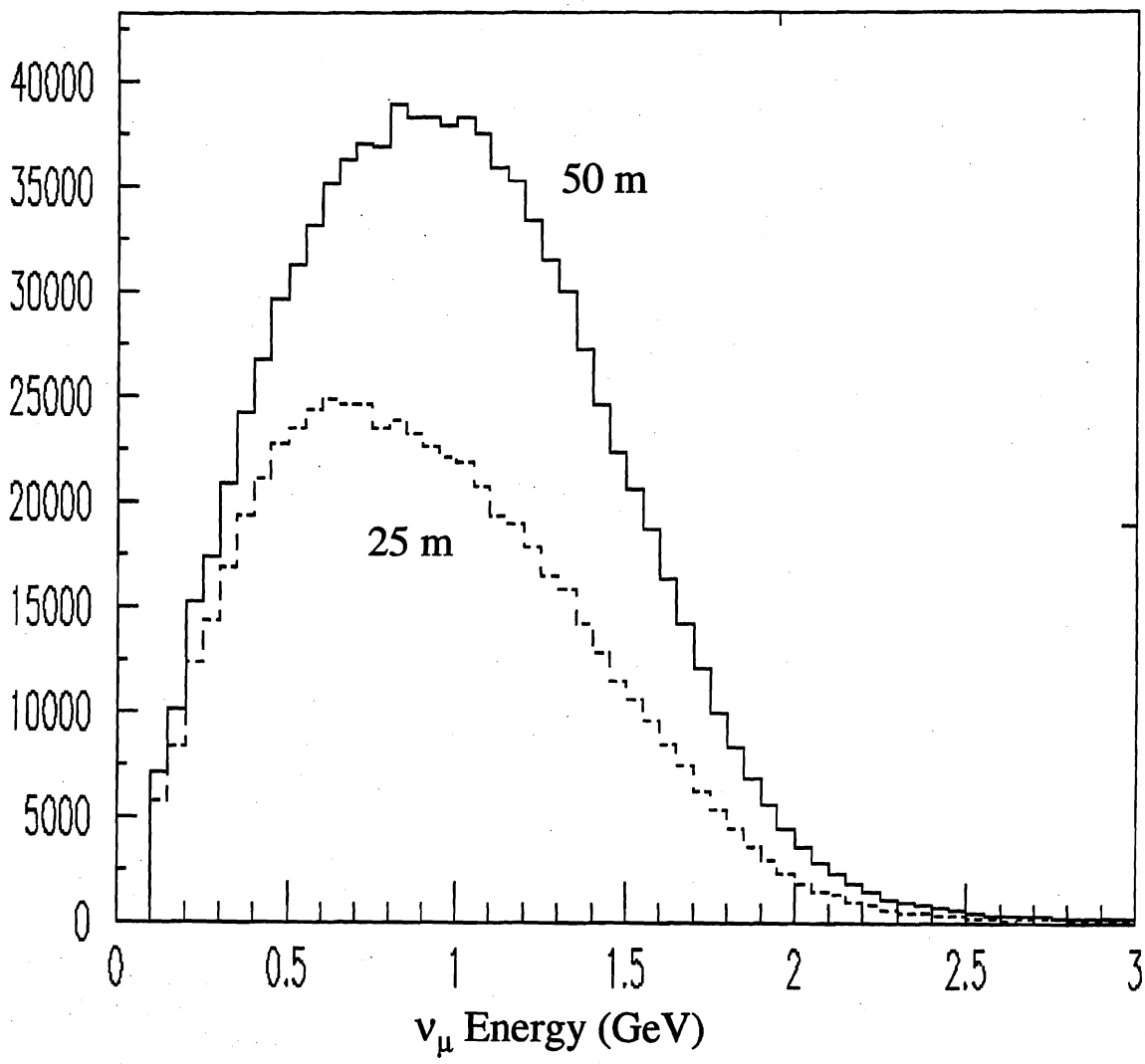


Figure 9. Predicted neutrino flux at the MiniBooNE detector, for 4.7×10^9 protons on a beryllium target, through a 2.5 m-radius circle at 541 m from the target. The data are for a single magnetic-focusing horn. MiniBooNE expects to run with both a 25 m and a 50 m decay pipe.

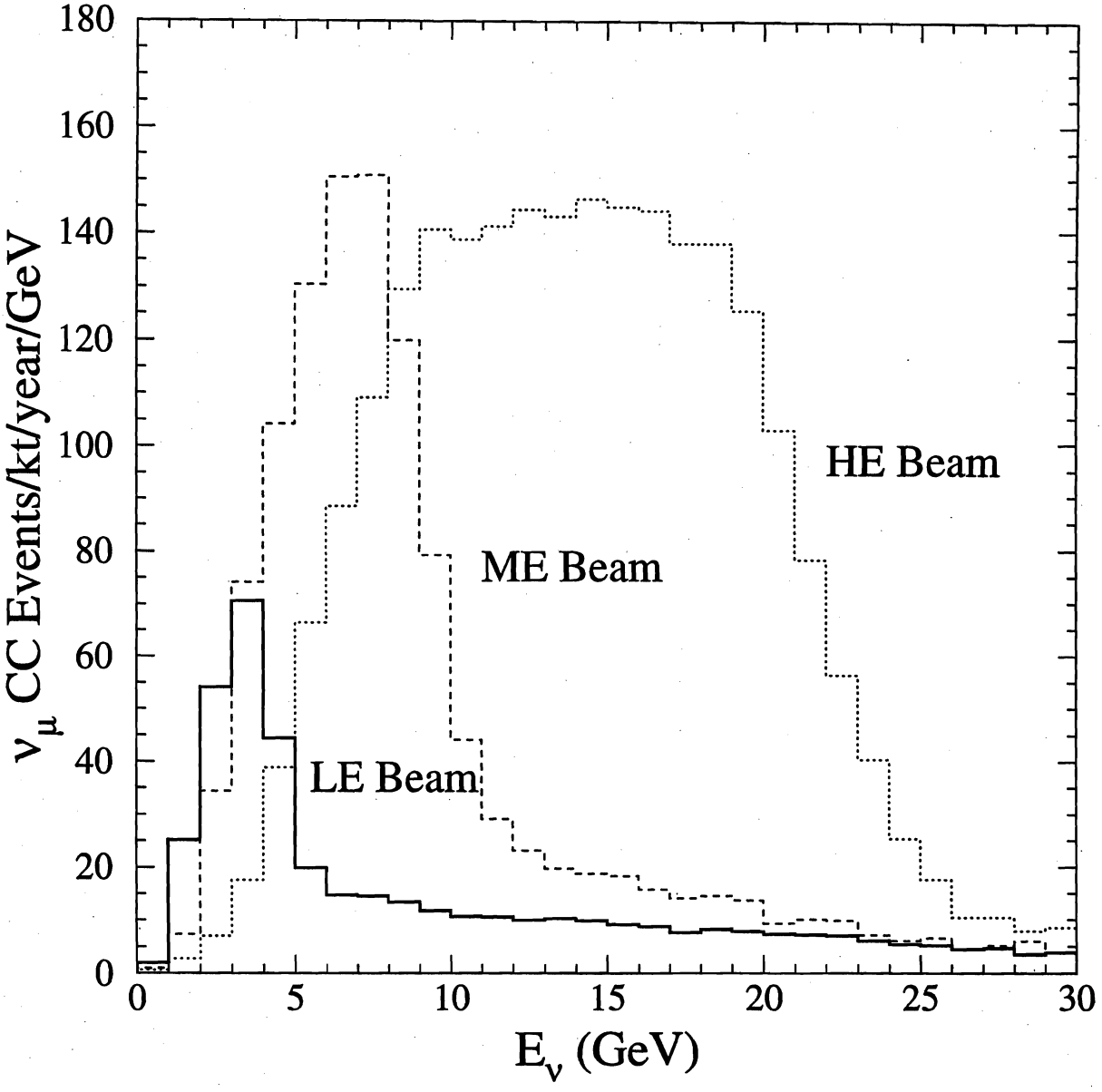


Figure 10. Neutrino event rate at Soudan, Minnesota, for the MINOS experiment. Three beam tunes are shown; the most desirable tune depends on what the neutrino masses actually turn out to be. NuMI plans to begin operations with the LE tune. Rates are based on 3.7×10^{20} protons per year from the Main Injector; the MINOS detector mass will be 5.4 kilotons.

TABLE 2. PROTONS PER HOUR UNDER VARIOUS MODES OF OPERATION

Mode	Cycle Time	Protons/Hour		
		AP Target	Fast Spill	Slow Spill
Antiproton Production	*	1.2×10^{16}	--	--
Fast Spill	1.866	--	5.8×10^{16}	--
Slow Spill	2.866	--	--	3.8×10^{16}
Mixed: AP+Fast Spill	2.000	0.9×10^{16}	4.5×10^{16}	--
Mixed: AP+Slow Spill	3.000	0.6×10^{16}	--	3.0×10^{16}

[Assumptions: 6×10^{10} protons per bunch; additional time is required for bunch manipulations and turning off magnetic switch at F17 in mixed modes.]

* 2.4 sec (current)
1.6 sec (future)

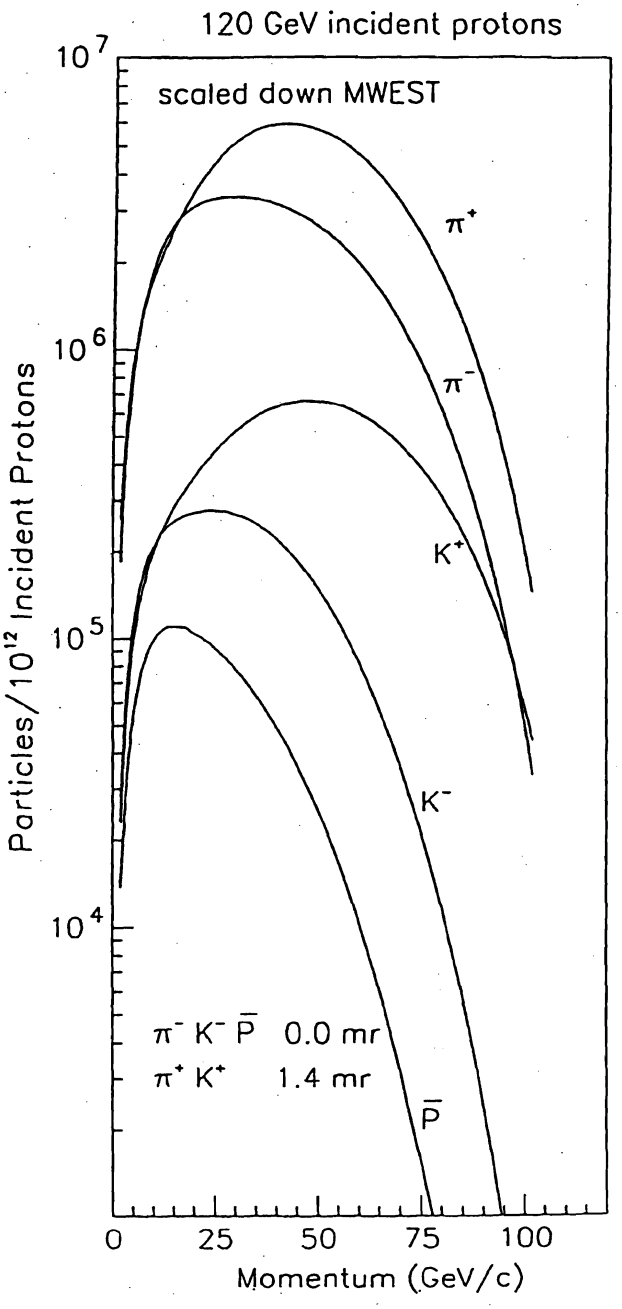


Figure 11. Main Injector: Fluxes scaled from the 800 GeV MW beamline.

Meson Test Beam Facility

The Meson Test Beam Facility, shown in Figure 12, is a shielded user experimental area located in the Meson Detector Building at Fermilab, with approximately six locations in line where users can set up equipment for testing. It uses 120 GeV protons from the Main Injector on a 40-inch aluminum target to produce a general-purpose unseparated secondary beam. The proton spill length is 4.0 seconds, with normally one spill per two minutes. Some running is possible at a higher repetition rate, if approved by the Accelerator Division.

The beamline can be tuned to 120 GeV to provide non-interacting Main Injector beam protons. The intensity for this tune is administratively limited to less than 700 kHz; the highest rate that has been achieved so far is about 100 kHz. Beam momenta below 66 GeV can also be obtained, with rates depending on the specific momentum (on the order of 50 kHz for 66 GeV down to a few hundred Hz for 5 GeV). The composition of the beam is mostly protons for the higher momentum tunes and mostly pions below 40 GeV. The lowest momentum tunes will have a high proportion of electrons. The spot size is typically a cm for 120 GeV beam and a few cm for the secondary beams.

Beam particle identification is available, using two threshold Cerenkov counters. There are secondary targets in the beamline, as well as sweeper magnets and converters, that can be used to attempt to deliver a larger fraction of electrons in the beam; however, electrons from the primary target will have a higher rate. Finally, there is a beam absorber in the middle of the user areas such that only muons can be delivered downstream of that point.

There are two major sections for users: the upstream, smaller section called MT6A (or MT6-section 1), which has two experimental areas, and the downstream, larger area called MT6B (or MT6-section 2), which has four experimental areas. One of the areas in each section is a sheltered, air-conditioned hut for cleaner operations. Each area has gas delivery and exhaust lines leading to it. Each area also has a limited number of high voltage and signal cables going to it, and the user can install more.

There are a total of six MWPC stations scattered throughout the facility. Three of these are read out by the accelerator control system on a spill by spill basis, and show the current conditions of the beam to the accelerator operators. The other three MWPC stations, located in MT6B, are for use by experimenters for particle tracking. In addition, there are four planes of silicon detectors for particle tracking and four scintillation counters along the beamline for triggering purposes. For use of the test beam, and information on support available, the test beam coordinator, Erik Ramberg (ramberg@fnal.gov) should be contacted.

Table 3 gives some Meson Test particle rates.

TABLE 3. MESON TEST PARTICLE RATES

Particle Energy (GeV)	MT6SC2 rate normalized to 1×10^{12} protons/spill (from MI to SY 120)[1]	Electron Fraction[2]
120	400-450K	0
66	35-40K	~0
33	30K	~0.7%
16	17K	~10%
8	2.5-5.0K[3]	~30%
4	220-330[3] 700[4]	~60%
3	160	

Notes

The spill length is 4 sec. Flattop for beam extraction is 4 sec. At present, one spill every two minutes is allocated to SY120.

At lower energies, especially at 8 GeV and below, proper tuning is very crucial for higher rate as evidenced from the large rate variation.

Shielding limit in MTest is

a. 2×10^{12} protons/2.9 sec from M02 to M03 pinhole collimator
b. 2×10^{7} particles/2.9 sec from M03 pinhole collimator and downstream.

[1] Beam shared by MCenter and MTest. Thus the actual protons used for secondary particle production in MTest is less than the total from MI. If MTest gets all the beam, the rate can be increased by ~25-33%.

[2] Information from Erik Ramberg and test beam users.

[3] Although a large variation in measured rate is shown for 8 and 4 GeV, the larger of the numbers is a better estimate of the baseline measured rate.

[4] Effect of proper tuning.

MT6 Test Beam User Areas

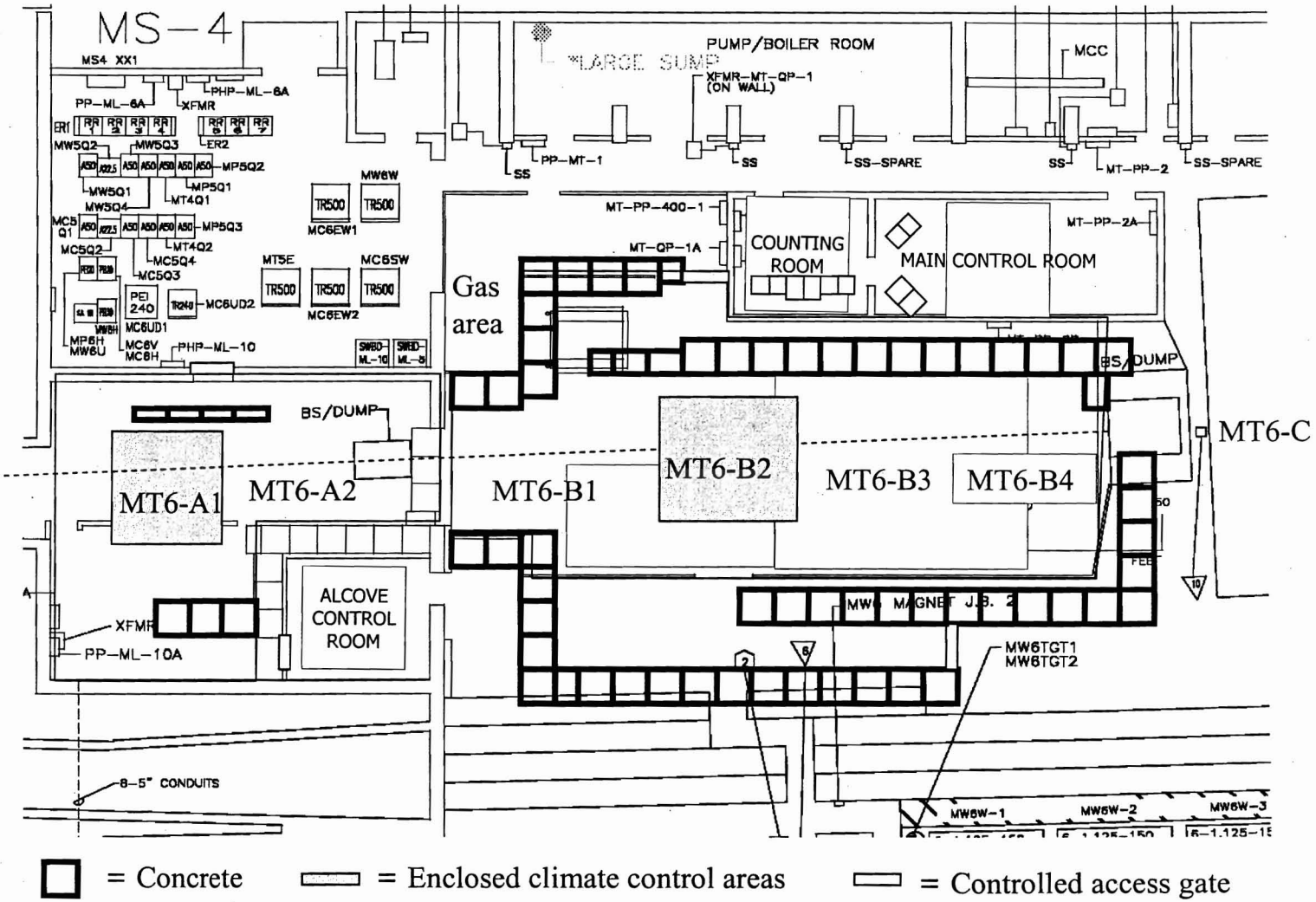


Figure 12. Layout of Meson Test Beam Facility.

SECTION IV. FERMILAB COMPUTING FACILITIES

The Computing Division provides services to advance the scientific mission of the Laboratory through innovative developments and operations in the areas of computational physics and simulation; data analysis, storage, access, and acquisition; general scientific, engineering, technical, and administrative computing; computer security, and networking.

The Computing Division provides significant development and operational support for Run II computing. Developments are continuing to support the petabytes of data and significant increase in data analyses over the next few years. Developments are focused on providing centralized data storage and processing at Fermilab as well as distributed data distribution and management infrastructures to enable remote sites of the collaborations to fully contribute to the data analysis. Additionally, the Computing Division has responsibilities in the development and operation of MiniBooNE and MINOS offline computing. The Computing Division contributes to developments for the Run II accelerator upgrade in areas of instrumentation, data acquisition, databases and analysis.

Support and development are provided for the International Linear Collider and general accelerator simulation. Support for SDSS, CDMS and Auger continues, as well as analysis computing for completed experiments including KTeV and E-871. The Computing Division is also providing support for the Laboratory's collaboration on SNAP and the recently approved Dark Energy Survey (DES) and MINERvA experiments.

The Computing Division provides the home for the LHC CMS experiment Tier-1 regional center and is supporting the construction and development of the necessary hardware and software computational infrastructures. This includes support for the US-CMS physics community test beam activities, simulated data production, algorithm development and testing, and the LHC Physics Center (LPC). US-CMS is making significant progress in development of a completely distributed computing model using Grid technologies, incorporating the CERN Tier-0, Fermilab and other regional center Tier-1's and many university Tier 2 centers in the US and elsewhere. This requires significant research and development of Grid technologies that contributes to the "Open Science Grid" (OSG). Collaboration with computer science groups and universities in the US continues to grow as well as with the LHC Computing Grid project at CERN and other peer institutions and projects in Europe.

The Division continues to provide the coordination and tools for computer security. The Kerberos-based authentication system has been extended to the Windows domain throughout the Laboratory. Initial support for the Public Key Infrastructure (PKI) for peer collaborative computing (e.g. on the Grid) has been introduced. Continued attention to good computer security and timely and

appropriate response to reported and detected incidents remains a high priority, through a coordinated program across the Laboratory.

Systems currently supported centrally by the Computing Division include the Linux PC farms, central general-purpose interactive and batch clusters. The Division has increased its support for Linux cluster analysis servers while continuing the support of SMP computing for Run II analysis. The Computing Division provides central services for specific applications, as well as for all Fermilab users for a Linux distribution repository, cvs code repositories, mass storage systems, email, Web servers, operations, repair and licensing support.

The Computing Division provides building and central support for dedicated experiment systems, which are housed in the Feynman Computing Center and the recently completed Grid Computing Center. Dedicated special-purpose systems are developed and supported, such as the high-performance integrated Linux cluster for lattice QCD calculations housed in the Lattice Computing Center. The multiprocessor farm systems composed of over 5000 PCs running Linux dominate the production computing capacity at the Laboratory and allow fast cost-effective event reconstruction and Monte Carlo calculations. In addition, the Computing Division provides central infrastructure for technical and office computing. The Computing Division provides centralized storage and data movement capabilities to all experiments and users. Nearly three petabytes of data (1 petabyte = 1 million gigabytes) are now stored in the central tape libraries. The distributed disk cache system, Dcache, a collaborative development between Fermilab and DESY, moves up to 100 Terabytes a day for CDF, D0, MINOS and CMS data acquisition, processing and analysis systems, and is being extended to serve the application needs of the experimental program. The Run II and Fermilab-developed Sequential Access using Meta-Data (SAM) distributed processing and meta-data system is in production use at over 25 sites in the U.S., Europe and beyond. It has been adopted by both Run II experiments and is being adopted by MINOS to serve their distributed data management and access needs. Extensions of SAM to incorporate standard Grid technologies in collaboration with a local SBIR and the University of Wisconsin Computer Science Department are in process.

The DOE ESNET OC-12 Wide Area Network (WAN) connection is in production. The Fermilab dark fiber WAN connection to Starlight has been commissioned, and serves as a high bandwidth R&D path and backup to the production OC-12 link. An externally-funded initiative, "Lambda Station," is exploiting the Starlight link to develop advanced network techniques. The Fermilab campus network continues to be upgraded in response to experiment data distribution and access needs.

The Computing Division continues its support for the maintenance of the Run II experiment trigger, data acquisition and online systems. The Division is participating in research and development for the NOvA data acquisition and trigger systems, as well as for SNAP and future neutrino physics initiatives in collaboration with the experiments' university colleagues.

The Division provides support for experiment databases that are used to record and reference the comprehensive set of data-taking parameters, configuration, calibration and data processing information as well as documents. It supports application interfaces to these databases for experiments including CDF, D0, and MINOS. The Division develops and supports common packages for experiment code frameworks, detector simulation tools and physics generators, analysis and data persistency tools. Development and support for collaborative tools is provided through the development and support of the Control Room Logbook, and extensions of video-conferencing support, in particular for Run II, MINOS and CMS.

Contributions, including leadership, continue in several externally-funded collaborative projects. The DOE Scientific Discovery through Advanced Computing (SciDAC) accelerator simulation, theory QCD calculations, distributed mass-storage interfaces, and Particle Physics Data Grid projects are all providing added value to the Laboratory program, and the recent roadmap for a national grid infrastructure for science, the Open Science Grid, is now the strategic direction for both US ATLAS as well as US CMS and the Fermilab Computing Division. These initiatives contribute to and benefit from collaboration and cooperation with outside scientific and computer science groups. The Division continues to participate in NSF ITR projects for application Grids and is working with funding agencies to continue and advance this effort. The Division also engages in advanced research and development of technologies needed by experiments and other clients, especially in areas of storage management, data handling and access, efficient use of commodity computing, and ensuring the production and operability qualities of all its deployed and supported services.

SECTION V. MAJOR RESEARCH ACTIVITIES DURING 2005 AND 2006

Information on the Fermilab research program during 2005 and early 2006 is given in the following pages. Figure 13 shows when beam was delivered to the experiments; Table 4 describes the major research activities in a little more detail.

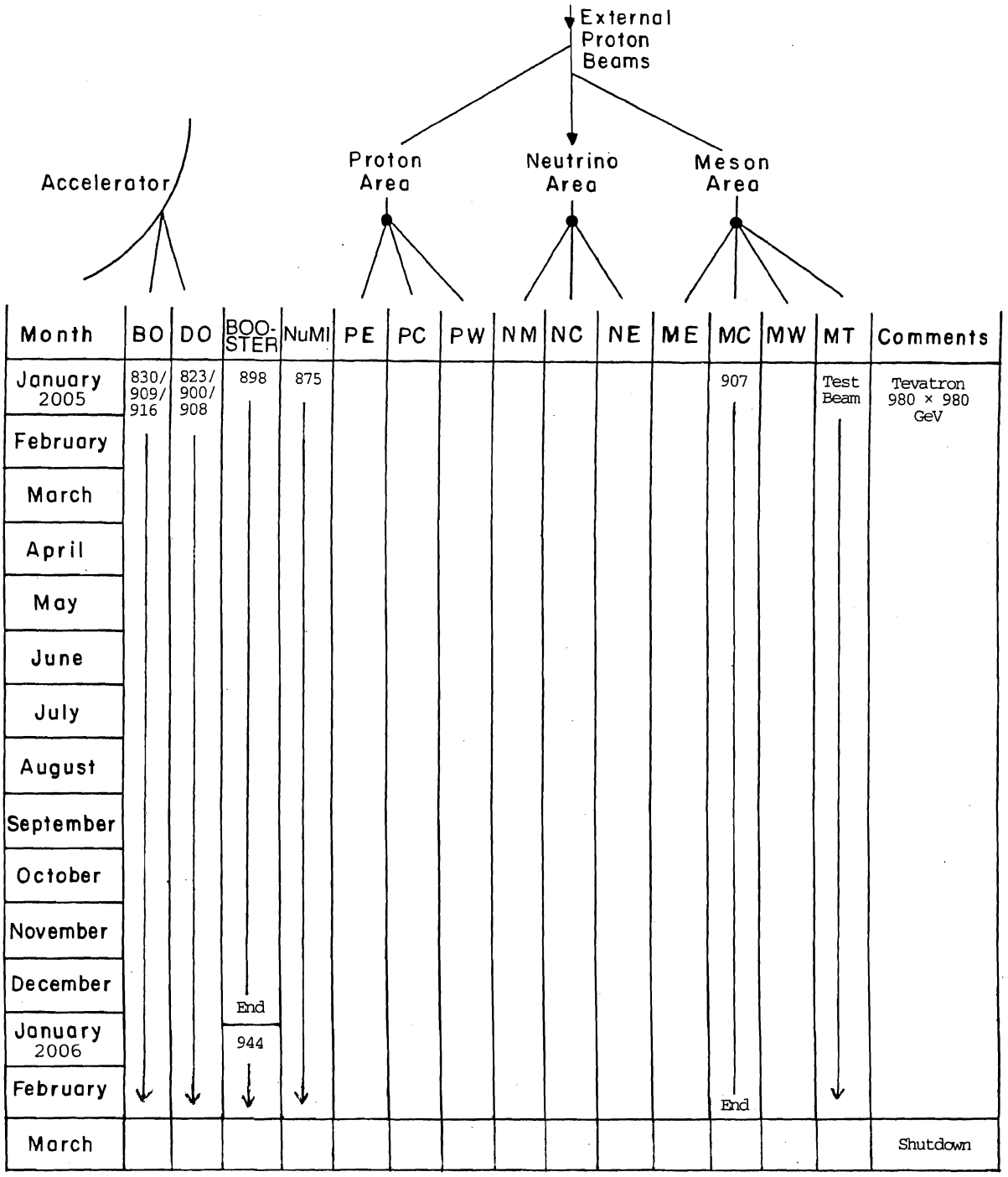


Figure 13. Major experiments running at Fermilab in 2005 and 2006 (through March).

TABLE 4. DESCRIPTION OF MAJOR RESEARCH ACTIVITIES DURING 2005 AND 2006 (through March)

EXP. #	AREA
	BOOSTER
898	MiniBooNE – neutrino data-taking and analysis
944	MiniBooNE Extension – antineutrino data-taking
	MAIN INJECTOR
875	MINOS – startup and data-taking
907	MIPP – data-taking and analysis
	COLLIDER
830 / 909 / 916	CDF – data-taking
823 / 900 / 908	D0 – data-taking

SECTION VI. FERMILAB RESEARCH PROGRAM

This Section contains information on the Fermilab research program for the next few years. The Situation Report, given on the following two pages, is a summary of the current status of the experimental program. Figure 14, based on the Situation Report, illustrates by beam line the major approved experiments using the Fermilab accelerator complex that have not yet completed data-taking. Figure 15 illustrates significant Fermilab activities other than those shown in Figure 14.

Fermi National Accelerator Laboratory
Experiment Program Situation Report as of March 1, 2006

The Experimental Program situation at Fermilab is summarized below. The experiments are listed by experimental area and beamline under categories that best describe their status as of March 1, 2006. The experimental area names are abbreviated as follows: Meson Area (**MA**); Neutrino Area (**NA**); Proton Area (**PA**); Collision Area (**COL**); Accumulator Ring (**ACCUM RING**); Debuncher Ring (**DBNCHR RING**); Booster Accelerator (**BOOSTR**); Unspecified (**UNSPEC BEAM**); Main Injector (**MI**); and A0 Facility (**A0 Facility**).

Total number of approved experiments - 477

Beam Area & Line		Experiment	Spokesperson(s)	
EXPERIMENTS THAT ARE COMPLETED (418)				**Completion Date**
(Note: Only experiments which were completed since January 1, 2002 are listed.)				
NA	NC	NEUTRINO #815	(BERNSTEIN, SHAEVITZ)	MAR 01, 2005
COL	B-0	CDF UPGRADE #775	(KIM, RISTORI)	MAR 01, 2005
		CDF HARD DIFFRACTION STUDIES #876	(ALBROW)	FEB 01, 2004
	C-0	BTEV R&D #897	(BUTLER, STONE)	JAN 01, 2002
	D-0	D-0 DETECTOR #740	(GRANNIS, MONTGOMERY)	MAR 01, 2005
MAIN INJECTOR		MINOS VETO SHIELD PROTOTYPE #T928	(MICHAEL, WOJCICKI)	JUL 22, 2003
MI	MT	RICE TEST #T926	(BEAN)	MAY 15, 2005
		BTEV MUON DETECTOR TEST #T931	(JOHNS)	FEB 15, 2005
		BTEV RICH TEST #T935	(ARTUSO)	JAN 15, 2005
		PPAC #T941	(NORBECK)	JAN 15, 2005
		MONOLITHIC ACTIVE PIXEL DETECTOR #T943	(VARNER)	JAN 15, 2005
OTHER		SEARCH FOR LOW MASS MONOPOLES #882	(KALBFLEISCH)	FEB 01, 2004
		RECYCLER ELECTRON COOLING #901	(NAGAITSEV)	MAY 31, 2004
A0 FACILITY		PLASMA WAKE-FIELD ACCELERATOR TEST #890	(ROSENZWEIG)	FEB 01, 2004
EXPERIMENTS THAT ARE ANALYZING DATA (13)				**Last Run**
MA	MC	CP VIOLATION #871	(DUKES, LUK)	JAN 21, 2000
NA	NM	CP VIOLATION #799	(TSCHIRHART)	JAN 17, 2000
		CP VIOLATION #832	(BLUCHER)	JAN 17, 2000
PA	PB	HEAVY QUARK PHOTOPRODUCTION #831	(CUMALAT, MORONI)	AUG 25, 1997
	PC	LARGE-X BARYON SPECTROMETER#781	(RUSS)	SEP 03, 1997
	PW	TAU NEUTRINO #872	(TZANAKOS, PAOLONE)	SEP 03, 1997
ACCUM RING		CHARMONIUM STATES #835	(CESTER, PORDES)	NOV 08, 2000
MI	MC	PARTICLE PRODUCTION #907	(RAJA)	FEB 27, 2006
	MT	BTEV PIXEL DETECTOR TEST #T927	(BUTLER, STONE)	JUL 18, 2005
	MT	BTEV STRAW TESTS #T930	(BUTLER, STONE)	MAY 15, 2005
	MT	BTEV EM CALORIMETER TEST #T933	(SEMENOV)	JUL 04, 2005
BOOSTER		MINIBOONE #898	(CONRAD, LOUIS)	JAN 23, 2006
OTHER		SLOAN DIGITAL SKY SURVEY #885	(KENT)	JUN 30, 2005
EXPERIMENTS THAT ARE IN PROGRESS (18)				
MA	MT	VACUUM STRAW TRACKER #T950	(WAH)	
		ALICE EMCal #T951	(AWES)	
COL	B-0	CDF UPGRADE #830	(KIM, ROSER)	
		CDF INNER SILICON AND TOF #909	(KIM, ROSER)	
		CDF MINIPLUGS #916	(KIM, ROSER)	
	D-0	D0 DETECTOR UPGRADE #823	(BLAZEY, WYATT)	
		D0 FORWARD PROTON DETECTOR #900	(BLAZEY, WYATT)	
		D0 SILICON TRACK TRIGGER #908	(BLAZEY, WYATT)	
MI	MT	US-CMS PIXEL DETECTOR TEST #T936	(WORM)	
	NUMI	NEUTRINO OSCILLATIONS #875	(WOJCICKI)	
		MINOS VETO SHIELD #934	(WOJCICKI)	
		PEANUT #T952	(NIWA)	
BOOSTER		MINIBOONE EXTENSION #944	(BRICE, VAN DE WATER)	
OTHER		AUGER PROJECT R&D #881	(MANTSCH)	
		DARK MATTER SEARCH #891	(BAUER)	
		COUPP #T945	(COLLAR)	
		SDSS-II #949	(KENT)	
A0 FACILITY		EXPERIMENTS AT THE A0 PHOTOINJECTOR #886	(PIOT)	

Fermi National Accelerator Laboratory
Experiment Program Situation Report as of March 1, 2006

(Continued)

EXPERIMENTS THAT ARE TO BE SETUP WITHIN A YEAR (7)

MA	MT	CERENKOV TEST #T953	(NORBECK)
MA	MT	RPC TEST #T955	(UNDERWOOD)
MA	MT	ILC MUON DETECTOR #T956	(ABRAMS)
MA	MT	TAIL-CATCHER/MUON #T957	(ZUTSHI)
COL	B-0	CDF RUN IIB UPGRADE #924	(KIM, ROSER)
COL	D-0	D0 RUN IIB UPGRADE #925	(BLAZEY, WYATT)
MI	MT	DIAMOND DETECTOR TEST #T932	(WORM)

OTHER APPROVED EXPERIMENTS (8)

MI	NUMI	NOVA #929	(FELDMAN, MESSIER)
MI	NUMI	HIGH-STATISTICS NEUTRINO SCATTERING #938	(MCFARLAND-PORTER, MORFIN)
MI	UNSPEC	ANTI(D-QUARK)/ANTI(U-QUARK) DIST#906	(GEESAMAN, REIMER)
BOOSTER		SCIBOONE #954	(NAKAYA, WASCKO)
OTHER		CMS AT FERMILAB #892	(GREEN)
OTHER		LHC ACCELERATOR #893	(KERBY)
OTHER		US CMS SILICON TRACKER #919	(GREEN)
OTHER		DARK ENERGY SURVEY #939	(ANNIS, FLAUGHER)

PENDING PROPOSALS (3)

COL	B-0	CDF FORWARD DETECTORS #920	(ALBROW)
UNSPEC BEAM		MUON COOLING R&D #904	(GEER)
OTHER		SUPERCDMS #947	(BAUER)

Collider

B0 —	830/909/916/924 Kim / Ristori	ANL, Barcelona, Baylor, Bologna, Brandeis, UC/Davis, UCLA, UCSB, UCSD, Cantabria, Carnegie Mellon, Chicago, CIEMAT, Duke, Fermilab, Florida, Frascati, Geneva, Glasgow, Harvard, Helsinki, Illinois, IPP/McGill/Toronto, ITEP, JINR, Johns Hopkins, Karlsruhe, KEK, Korea Center for HEP, LBNL, Liverpool, Michigan, Michigan State, MIT, New Mexico, Northwestern, Ohio State, Okayama, Osaka City, Oxford, Padova, Paris VI, Pennsylvania, Pisa, Pittsburgh, Purdue, Rochester, Rockefeller, Rome, Rutgers, Taiwan, Texas A&M, Trieste/Udine, Tsukuba, Tufts, Univ. Coll. London, Waseda, Wayne State, Wisconsin, Yale	CDF Detector
D0 —	823/900/908/925 Blazey / Wyatt	Aachen, Alberta, los Andes, Arizona, BNL, Bonn, Boston, Brown, Buenos Aires, UC/Riverside, CBPF, Charles, CINVESTAV, Clermont-Ferrand, Columbia, CSU/Fresno, Czech Acad. Sci., Czech Tech, Delhi, Estadual Paulista, Fermilab, Florida State, Freiburg, Grenoble, Ho Chi Minh City, IHEP/Beijing, IHEP/Protvino, Illinois/Chicago, Imperial Coll., Indiana, Iowa State, ITEP, JINR, Kansas, Kansas State, Korea, Lancaster, Langston, LBNL & UC/Berkeley, Louisiana Tech, Ludwig-Maximillians, Lyon, Mainz, Manchester, Marseille, Maryland, McGill, Michigan, Michigan State, Mississippi, Moscow State, Nebraska, Nijmegen/NIKHEF, NIKHEF/Amsterdam, Northeastern, Northern Illinois, Northwestern, Notre Dame, Oklahoma, Oklahoma State, Orsay, Panjab, Paris VI & VII, PNPI, Princeton, Quito, Rice, Rio de Janeiro, Rochester, Saclay, Simon Fraser, Southern Methodist, Strasbourg, Sung Kyun Kwan, SUNY/Buffalo, SUNY/Stony Brook, Swedish Consortium, Tata, Texas/Arlington, Univ. Coll. Dublin, UST/China, Virginia, Washington, Wuppertal, York, Zurich	D0 Detector

Booster

—	944 Brice / Van de Water	Alabama, Bucknell, Cincinnati, Colorado, Columbia, Embry Riddle, Fermilab, Indiana, LANL, Louisiana State, Michigan, Princeton, St. Mary's, Western Illinois, Yale	MiniBooNE
—	954 Nakaya / Wascko	Barcelona, Colorado, Columbia, Fermilab, ICRR Tokyo, KEK, Kyoto, LANL, Louisiana State, Rome, Valencia	SciBooNE

Main Injector

—	875/934 Wojcicki	ANL, Athens, Benedictine, BNL, Caltech, Cambridge, Campinas, Fermilab, Collège de France, Harvard, IHEP/Protvino, IIT, Indiana, ITEP, Lebedev, LLNL, Minnesota, Minnesota/Duluth, Oxford, Pittsburgh, Rutherford, São Paulo, South Carolina, Stanford, Sussex, Texas A&M, Texas/Austin, Tufts, Univ. Coll. London, Western Washington, William & Mary, Wisconsin	MINOS
—	906 Geesaman / Reimer	Abilene Christian, ANL, Colorado, Fermilab, Illinois, JLab, LANL, Rutgers, Texas A&M, Valparaiso	$\bar{d}(x) / \bar{u}(x)$ Distribution
—	938 McFarland / Morfin	Athens, UC/Irvine, Dortmund, Fermilab, Hampton, IIT, INR Moscow, James Madison, JLab, Northern Illinois, Peru/PUC, Peru/UNI, Pittsburgh, Rochester, Rutgers, St. Xavier, Tufts, William & Mary	MINERvA
—	929 Feldman / Messier	ANL, Athens, UCLA, Caltech, Fermilab, Collège de France, Harvard, Indiana, ITEP, Michigan State, Minnesota, Minnesota/Duluth, Northern Illinois, Ohio, Ohio State, Oxford, Rio de Janeiro, Rutherford, South Carolina, Southern Methodist, Stanford, Texas, Texas A&M, Tufts, Virginia, Washington, William & Mary	NOvA

Figure 14. Fermilab experimental program, showing all major approved particle physics experiments that have not yet completed data-taking.

Accelerator R&D

Linear Collider	Kephart	ANL, BNL, Cornell, DESY, Fermilab, JLab, LBNL, LLNL, Northern Illinois, SLAC
Photoinjector Laboratory (FNPL)	Edwards	UCLA, Chicago, DESY, Fermilab, Georgia, Illinois, INFN/Milano, LBNL, Northern Illinois (NICADD), Rochester
MuCool	Bross	ANL, UCLA, Chicago, Fermilab, IIT, Illinois, JLab, KEK, LBNL, Mississippi, Muons Inc., Northern Illinois, Northwestern, Osaka, Oxford
LHC Accelerator Research Program (LARP)	Peggs	BNL, Fermilab, LBNL, SLAC
High-Field Superconducting Magnets	Zlobin	Fermilab, Wisconsin
High Intensity Neutrino Source	Apollinari	ANL, BNL, Fermilab, LBNL

US CMS

US CMS	Newman (CMS – Della Negra)	Boston, Brown, UC/Davis, UCLA, UC/Riverside, UC/San Diego, UCSB, Caltech, Carnegie Mellon, Colorado, Cornell, Fairfield, Fermilab, Florida, Florida International, Florida State, Florida Tech, Illinois/Chicago, Iowa, Iowa State, Johns Hopkins, Kansas, Kansas State, LLNL, Maryland, Minnesota, Mississippi, MIT, Nebraska/Lincoln, Northeastern, Northwestern, Notre Dame, Ohio State, Princeton, Puerto Rico, Purdue, Purdue/Calumet, Rice, Rochester. Rockefeller, Rutgers, SUNY/Buffalo, Texas A&M, Texas Tech, Vanderbilt, Virginia, VPI, Wisconsin, Yale

Particle Astrophysics

Auger	Watson	Aachen, Adelaide, Alcala de Henares, Bahia, Bariloche/IAFE, Bonn, UCLA, Campinas, Case Western Reserve, Catania, CBPF, Charles, Chicago, CINVESTAV, Collège de France, Colorado, Colorado State, Dwingeloo, Fermilab, Fluminense, Gran Sasso, Grenoble, Groningen, Hanoi, IK/Karlsruhe, IPE/Karlsruhe, IEKP/Karlsruhe, IPN/Orsay, Krakow, LAL/Orsay La Plata, L'Aquila, Lecce, Leeds, Lodz, Louisiana State, Madrid, Michigan Tech, Milano, Minnesota, Napoli, Nebraska, New Mexico, Nijmegen, NIKHEF, Northeastern, Nova Gorica, Ohio State, Paris VI, Penn State, Puebla, Roma II, San Nicolas de Hidalgo, Santana-Bahia, Santiago de Compostela, São Paulo, Sudoeste Bahiano, Tandar, Torino, UNAM, Utah, UTN Mendoza and San Rafael, Siegen, UFRJ, Wuppertal
SDSS	Weinberg	Amer. Mus. Nat. History, Astrophys. Inst. Potsdam, Basel, Cambridge, Case Western Reserve, Chicago, Drexel, Fermilab, Inst. for Adv. Study, Japan Participation Group, Johns Hopkins, Joint Inst. Nucl. Astrophys.(Mich. State/Notre Dame/Chicago), Kavli Inst. (SLAC/Stanford), Korean Scientist Group, LAMOST, LANL, Max Planck/Garching, Max Planck/Heidelberg, New Mexico State, Ohio State, Pittsburgh, Portsmouth, Princeton, US Naval Observatory, Washington
CDMS	Sadoulet / Cabrera	Brown, UC/Berkeley, UC/Santa Barbara, Case Western Reserve, Colorado/Denver, Fermilab, Florida, LBNL, Minnesota, NIST/Boulder, Santa Clara, Stanford
DES	Annis / Flaugher	Cambridge, Chicago, Edinburgh, Fermilab, IEEC/Barcelona, IFAE/Barcelona, Illinois, LBNL, Michigan, NOAO/CTIO, Portsmouth, Univ. Coll. London

Scientific Simulations

Lattice QCD	Sugar	ANL, Arizona, Baylor, Boston, BNL, UC/Davis, UC/San Diego, UC/Santa Barbara, Carnegie Mellon, Colorado, Columbia, Cornell, Duke, Fermilab, Florida State, George Washington, Illinois, Indiana, JLab, Kentucky, LANL, MIT, Ohio State, Pacific, Pittsburgh, Utah, Virginia, Washington, Washington/St. Louis
Accelerator Modeling	Ko / Ryne	BNL, UC/Davis, UCLA, Fermilab, LANL, Maryland, LBNL, Sandia, SLAC, USC, Stanford, Tech-X Corp

Figure 15. Significant Fermilab activities other than the major approved particle physics experiments using the Fermilab accelerator complex.

SECTION VII. SUMMARIES OF APPROVED EXPERIMENTS

Summaries are given in this Section of major approved experiments which have not yet completed data-taking, and also those major experiments still carrying out a significant analysis effort. Most were prepared recently by the experiment spokesperson(s).

This section also includes summaries of significant experimental physics activities in which Fermilab physicists are involved, but which are not particle physics experiments at Fermilab accelerators. (Note that in the user/institution statistics, only the Fermilab physicists on these activities are included.)

Statistics on Fermilab users are given in Table 5, together with information on how they are derived.

TABLE 5. DATA ON FERMILAB USERS

The data given below are based on the following:

1. Data on Fermilab users are updated annually, generally about January/ February of each year.

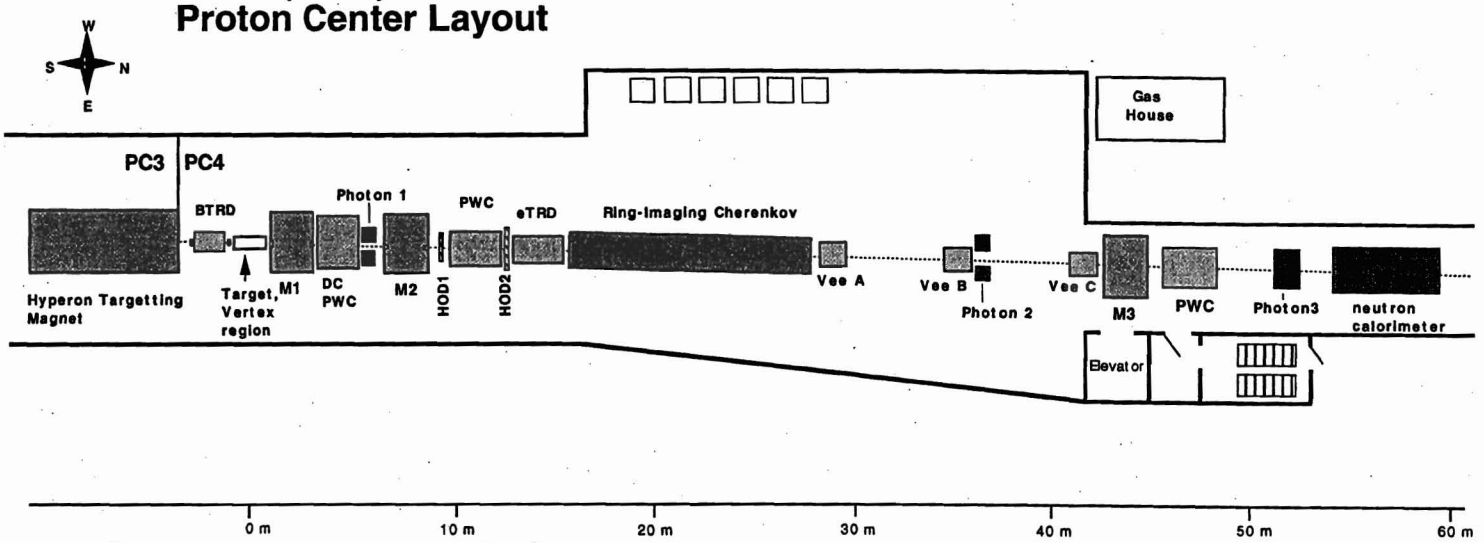
2. Fermilab experiments included in the list are those approved by the Laboratory, and in any of the stages from approval to data analysis, as given in the Experimental Program Situation Report on pages 30-31. The experiment personnel is supplied by the experiment spokespersons, and is divided into physicists or graduate students. Also included are Fermilab physicists who are involved in significant experimental physics activities which are not particle physics experiments at Fermilab accelerators and are listed in the Situation Report; this includes such activities as collaboration on astrophysics experiments and on the CMS experiment at the CERN LHC.

3. Although a user or an institution may be involved in more than one experiment, he/she/it is only counted once in any totals.

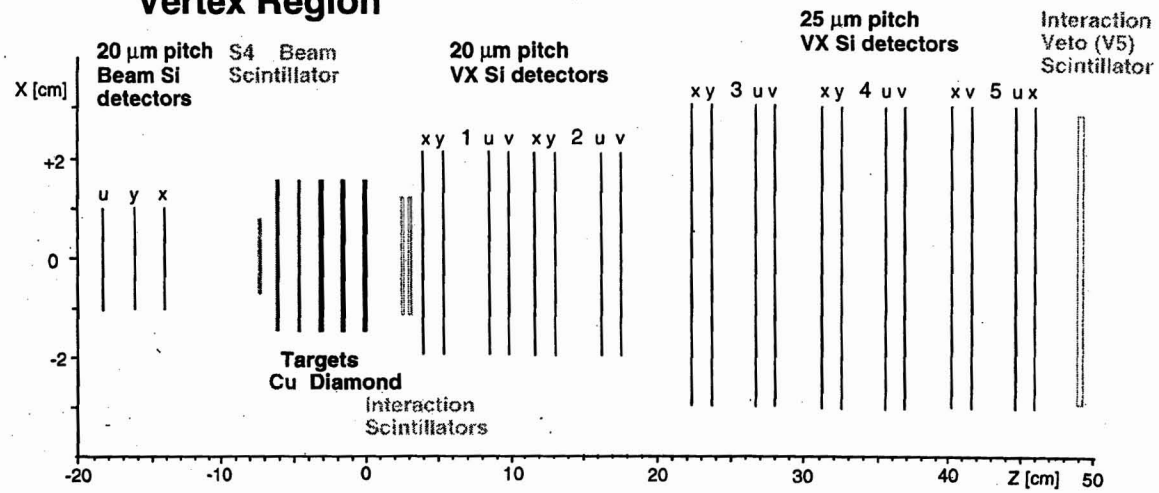
4. When experiments pass into the data analysis stage, students may graduate and move to other experiments and/or institutions, as also may more senior researchers. For experiments in the data analysis stage, we list users and institutions as at the end of the data-taking phase.

	Physicists	Students	Subtotal	Institutions
US				
University	639	344	983	99
Industry	0	0	0	0
National Lab.	378	5	383	8
Subtotal	1017	349	1366	107
Non-US				
University	480	219	699	101
Industry	0	0	0	0
National Lab.	198	47	245	21
Subtotal	678	266	944	122
Total	1695	615	2310	229

Selex (E781)
Proton Center Layout



Vertex Region



E-781 (Russ) Study of Charm Baryon Physics

Bogazici (Turkey), Bristol (United Kingdom), Carnegie Mellon, CBPF (Brazil), Fermilab, Hawaii, IHEP/Beijing (China), IHEP/Protvino (Russia), Iowa, ITEP (Russia), Moscow State (Russia), MPI/Heidelberg (Germany), Paraiba (Brazil), PNPI (Russia), Rochester, INFN/Rome (Italy), Rome (Italy), San Luis Potosi (Mexico), São Paulo (Brazil), Tel Aviv (Israel), INFN/Trieste (Italy), Trieste (Italy)

Status: *Data Analysis*

The Fermilab fixed-target program has long been concerned with understanding the physics of charm hadron production and decays. The aim of E-781 (SELEX) was to complement previous or contemporaneous work in hadroproduction and photoproduction by emphasizing physics at large Feynman-x, where the charm hadron carries off a large fraction of the incident beam momentum. Most charm hadroproduction experiments have used only pion beams and worked near $x_F = 0$, where production of all types of secondary particles is maximal. Charm mesons are by far the dominant charm species in these experiments. Empirical observations of the strange hyperons indicate that the baryon/meson ratio increases at large x_F. E-781 is unique in its ability to see whether this feature of hadroproduction also holds true for heavy quark systems like charm. There are also important features of charm hadroproduction that may depend on the incident beam particle. E-781, using different beam hadrons from the Fermilab hyperon beam, is the only experiment that can address these issues.

E-781 employed a novel impact-parameter software trigger to select charm candidates for writing to tape. Charm particles have a short but finite decay length. A high-resolution vertex detector close to the production point can select charm candidates based on the miss-distance of the decay tracks evaluated at the primary production vertex. E-781 built a 50,000 strip silicon vertex detector system to reconstruct on-line all high-momentum (>15 GeV/c) tracks from each interaction with 6 micron resolution. Events were recorded on tape only when the reconstruction indicated that these tracks did NOT come from a single primary vertex. The goal was to take a large data set with a loose hardware trigger but to avoid huge software overheads in extracting physics. The full spectrometer, shown in the accompanying figure, includes a two-stage magnetic spectrometer and excellent particle identification information from the downstream Ring-Imaging Cerenkov Counter. This is especially important for identifying charm baryon decays in the large x_F region.

Physics questions for charm studies have to do both with production and decay mechanisms. In charm baryon decays, the charm quark may decay or interact through exchange mechanisms with the light quarks. Unlike meson decays, there is no helicity suppression for exchanges, and a rich spectrum of quasi-two-body decay modes may occur. Do they? There is little experimental

information on the question. Such a study requires good charged-particle identification and good photon detection. Comparison of non-leptonic and semi-leptonic decays is also important. E-781 has good photon coverage, electron tagging and fast charged-particle identification. We expect to make new studies of the higher-order corrections to the charm decay mechanisms explored by combining Heavy Quark Effective Theory and perturbative QCD.

Strong interaction physics can be studied in the production of charm hadrons. Strange hyperons show intriguing polarization effects in strong production. What happens for charm baryons? E-781 expects to measure polarizations. There are open questions about possible direct charm content of non-charmed mesons and nucleons, as well as color-drag effects in production at large x_F. Such studies demand comparisons between different beam hadrons and also good acceptance at large x_F. E-781 is designed to make these studies and has presented preliminary reports of systematic behavior of this type.

The physics potential of the experiment touches many little-known areas of heavy quark physics. The focus on charm baryons is especially appropriate for a hadron machine. The experiment recorded events from 15 billion inelastic collisions during the 1996-97 fixed-target period. We developed a run-time Data Summary Tape (DST) strategy for the first-level processing pass, akin to the skimming pass of the Tevatron Collider experiments. We identified interesting events during initial track reconstruction and wrote out condensed records having only physics information and identifiers for those events. Sample charm mass plots from this condensed output file can be seen in the figure. This has worked well. Initial physics results have been presented at conferences and have been submitted to journals. Topics range from total cross section measurements to precision charm hadron lifetimes to new features of charm hadroproduction.

E-781 analysis continues. In 2002 we reported the first observation of Double-Charm baryons. This exciting result was part of the original experimental proposal. We extracted the small, clean sample of events using the standard E-781 analysis tools that were developed for single-charm studies. Subsequently two independent E-781 analyses have confirmed the effect in our data. We have continued to study other decay modes and are preparing a report describing a new decay mode of the original state. In addition, we have reported the observation of an intriguing new spectroscopy in the double-charm system at conferences. In single-charm baryon physics, we have the world's largest sample of Ω_c baryons and are preparing papers on the production mechanism and a lifetime measurement from these data. We have published the first observation of an unusual charm-strange meson at 2632 MeV. This state is not seen in photoproduction. This fact, combined with its large relative branching ratio to $D_s^+\eta$, has prompted theoretical speculation that it may be a 4-quark state. Exciting new physics continues to emerge from E-781.

Publications

Observation of the Cabibbo Suppressed Decay $\Xi_c^+ \rightarrow pK^-\pi^+$, S. Y. Jun et al., Phys. Rev Lett. 84, 1857 (2000).

Total Cross-Section Measurements with π^-, Σ^- and Protons on Nuclei and Nucleons Around 600 GeV/c, U. Dersch et al., Nucl. Phys. B579, 277 (2000).

Radiative Decay Width of the A(2)(1320)-Meson, V. V. Molchanov et al., Phys. Lett. B521, 171 (2001).

Measurement of the Σ^- Charge Radius by Σ^- Electron Elastic Scattering, I. Eschrich et al., Phys. Lett. B522, 233 (2001).

Measurement of the D_s Lifetime, M. Iori et al., Phys. Lett. B523, 22 (2001).

Precision Measurements of the Λ_c^+ and D^0 Lifetimes, A. Kushnirenko et al., Phys. Rev. Lett. 86, 5243 (2001).

First Observation of the Doubly Charmed Baryon χcc^+, M. Mattson et al., Phys. Rev. Lett. 89, 112002 (2002).

Hadronic Production of Λ_c from 600 GeV/c π^-, Σ^- and p Beams, F. G. Garcia et al., Phys. Lett. B528, 49 (2002).

First Measurement of $\pi^-e \rightarrow \pi^-e\gamma$ Pion Virtual Compton Scattering, A. Ocherashvili et al., Phys. Rev. C66, 034613 (2002).

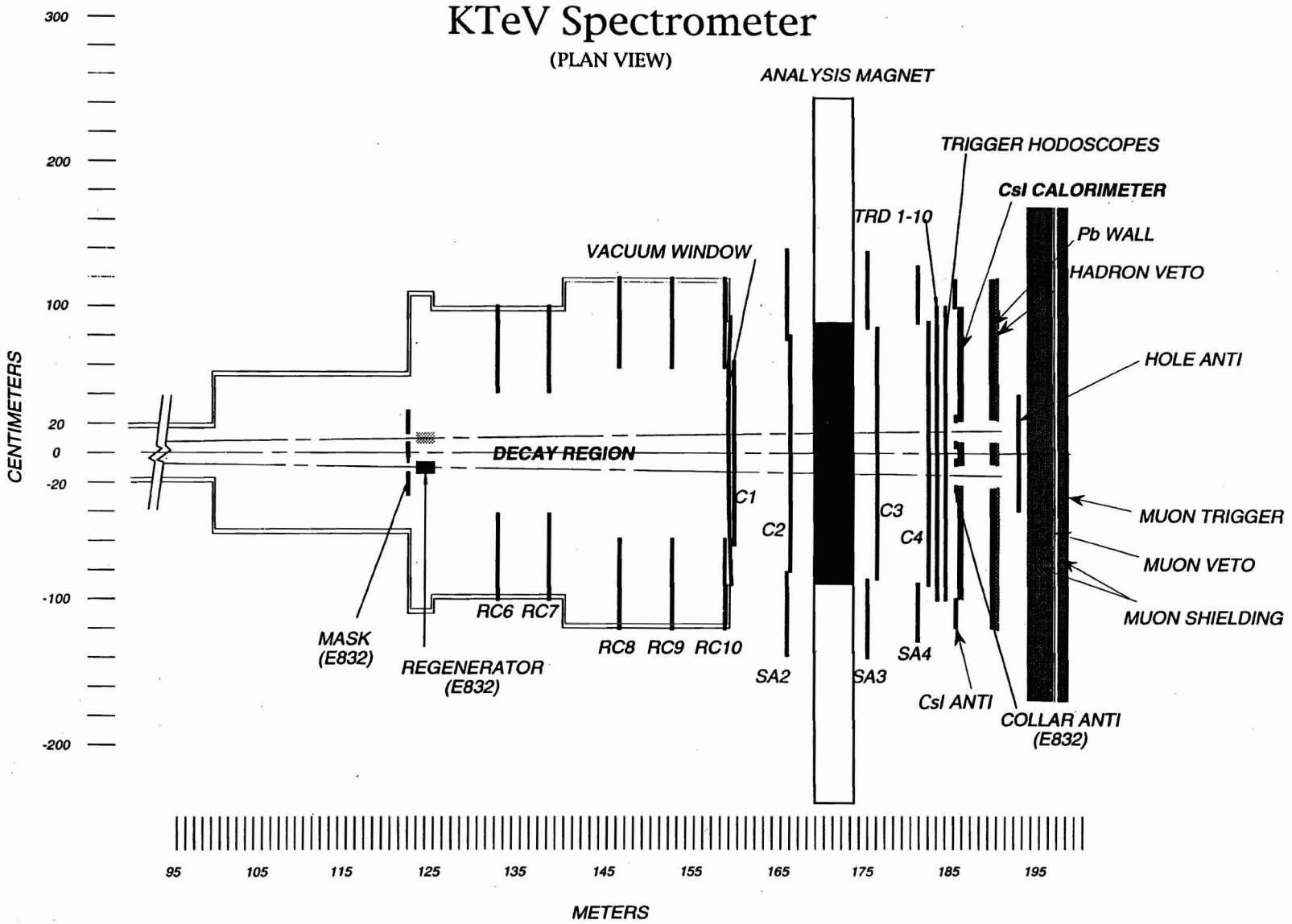
Production Asymmetry of D_s Mesons from 600 GeV/c Σ^- and π^- Beams, M. Kaya et al., Phys. Lett. B558, 34 (2003).

First Observation of a Narrow Charm-Strange Meson D_{SJ}^+ (2632) $\rightarrow D_s^+\eta$ and D^0K^+, Phys. Rev. Lett. 93, 242001 (2004).

Upper Limit on the Decay Σ^- (1385) $\rightarrow \Sigma^-\gamma$ and Cross Section for $\gamma\Sigma^- \rightarrow \Lambda\pi^-$, Phys. Lett. B590, 161 (2004).

Theses

U. Dersch, Max Planck Institute für Kernphysik, Germany
I. Eschrich, Max Planck Institute für Kernphysik, Germany
F. Garcia, Univ. of São Paulo, Brazil
M. Kaya, Univ. of Iowa
H. Kruger, Max Planck Institute für Kernphysik, Germany
A. Kushnirenko, Carnegie Mellon Univ.
P. Mathew, Carnegie Mellon Univ.
K. Nelson, Univ. of Iowa
A. Ocherashvili, Tel Aviv Univ., Israel
P. Pogodin, Univ. of Iowa
J. Simon, Max Planck Institute für Kernphysik, Germany
K. Vorwalter, Max Planck Institute für Kernphysik, Germany
M. Srivastava, Univ. of São Paulo
M. Mattson, Carnegie Mellon University
U. Akgun, Univ. of Iowa
A. S. Ayan, Univ. of Iowa


KTeV Spectrometer
(PLAN VIEW)
ANALYSIS MAGNET
TRIGGER HODOSCOPES
CsI CALORIMETER
TRD 1-10
Pb WALL
HADRON VETO
VACUUM WINDOW
HOLE ANTI
DECAY REGION
C1
C2
C3
C4
MUON TRIGGER
MUON VETO
MUON SHIELDING
RC6 RC7
RC8 RC9 RC10
MASK
(E832)
REGENERATOR
(E832)
SA2
SA3
SA4
CsI ANTI
COLLAR ANTI
(E832)
CENTIMETERS
300
200
100
20
0
-20
-100
-200
95
105
115
125
135
145
155
165
175
185
195
METERS

E-799 (Tschirhart) / E-832 (Blucher) Rare Decays of K_L^0 and a Search for Direct CP Violation in $K_L^0 \to 2\pi$

Arizona, UCLA, UC/San Diego, Campinas (Brazil), Chicago, Colorado, Elmhurst, Fermilab, Osaka (Japan), Rice, Rutgers, Sao Paulo (Brazil), Virginia, Wisconsin

Status: *Data Analysis*

KTeV (Kaons at the Tevatron) consists of two experiments: E-799II and E-832. E-799 is an experiment to search for rare K_L decays, such as $K_L \to \pi^0 l^+ l^-$ (l = e, μ, ν), and many other multibody rare decays, to a sensitivity of 10^{-10}, an order of magnitude improvement over previous searches. The goal of E-832 is a measurement of the direct CP violation parameter Re(ε'/ε) with a precision of 1×10^{-4}, a factor of six improvement over previous experiments at FNAL (E-731) and CERN (NA31).

To achieve the required level of statistical and systematic uncertainty in ε'/ε, KTeV (E-832) used the same double-beam technique as E-731 with a new detector and beamline. Following the primary target, collimators and sweeping magnets are used to form two almost parallel neutral beams. A fully active regenerator is placed in one of the beams 122m from the production target, at the upstream end of the decay region, to provide a source of K_S for the experiment. The regenerator is moved from one beam to the other each minute to eliminate many possible systematic errors in normalization and detector response. All four $K \to \pi\pi$ decays are detected simultaneously. The detector consists of a large vacuum decay region instrumented with photon veto counters, a drift chamber spectrometer, a pure CsI electromagnetic calorimeter, and a large hodoscope behind 4m of steel for muon detection. Compared to E-731, KTeV also has an improved trigger and data acquisition system. The final stage of the trigger includes full event reconstruction and filtering before data are written to tape. For E-799 data collection, the regenerator is not used, and an extensive TRD system is moved into the beam upstream of the CsI calorimeter.

The experiment first took about 10 months of data divided between E-799 and E-832 during the 1996-97 fixed-target run. After some detector modifications to improve systematic data quality and data-taking efficiency, KTeV collected data again in the 1999 fixed-target run. The 1999 run doubled the E-832 data sample from 1996-97 and almost tripled the E-799 data sample. The full data sample (1996+1997+1999) will allow E-832 to reduce the statistical error on ε'/ε to 1×10^{-4}. The combined (1997+1999) E-799 rare decay data set corresponds to a flux of about 6×10^{11} K_L decays and a large number of cascade (hyperon) decays. This rich data set together with high precision electromagnetic calorimetry and excellent particle ID (TRD system) provides access to rare kaon decay sensitivities in the 10^{-10} range.

KTeV has published 34 papers based on the data samples collected from both the 1996-97 and 1999 runs. These papers are listed below.

In 1999, the first ε'/ε result based on 1/4 of the 1996-1997 E-832 data sample (1/8 of the full KTeV data sample) was announced, definitively establishing the existence of direct CP violation. In June 2001, KTeV presented an improved measurement of ε'/ε based on the 1996-1997 data sample: Re $(\varepsilon'/\varepsilon) = (20.7 \pm 2.8) \times 10^{-4}$. This analysis also included precise measurements of the K_S lifetime, the K_S-K_L mass difference, and the relative phases of the CP-violating and CP-conserving amplitudes; most of these measurements represent significant improvements over the best previous experiments. A long article describing this work was published in Physical Review D. Another notable result based on the 1996-1997 E-832 data sample is a precise measurement of the semileptonic charge asymmetry (δ_l) using about 300 million $K_L \to \pi e \nu$ events. In 2004 the E-832 experiment reported a new measurement of the CKM matrix element $|V_{us}|$ based on precision measurement of the six major K_L branching fractions and form factors. This new measurement resolved a long-standing tension in the unitarity sum of the first row of the CKM matrix. Analysis of the full E-832 data sample (1996+1997+1999) is progressing, and as mentioned above, the full data sample will allow E-832 to reduce the statistical error on ε'/ε to 1×10^{-4}; significant work will be required to reduce the systematic error to a similar level.

The KTeV experiment E-799 Phase II is a continuation of the rare kaon decay search experiment E-799. The first phase of E-799 ran using an upgraded E-731 detector between October 1991 and January 1992, in the Meson Center beamline. Published results from the first phase of E-799 are listed below:

Decay Mode	E-799I BR results	Paper
$\pi^0 \to ee$	$(7.6\ ^{+3.9}_{-2.8}\ \pm0.5) \times10^{-8}$	PRL 71, 34 (1993)
$K_L \to \pi^0 ee$	$< 4.3) \times10^{-9}$	PRL 71, 3918 (1993)
$K_L \to \pi^0 \mu\mu$	$< 5.1) \times10^{-9}$	PRL 71, 3914 (1993)
$\pi^0 \to \mu e$	$< 8.6) \times10^{-9}$	PL B320, 407 (1994)
$K_L \to eeee$	$(3.96 \pm 0.78 \pm 0.32) \times10^{-8}$	PRL 72, 3000 (1994)
$K_L \to \pi^0 \nu\bar{\nu}$	$< 5.8) \times10^{-5}$	PRL 72, 3758 (1994)
$K_L \to \pi^0\pi^0\gamma$	$< 2.3) \times10^{-4}$	PR D50, 1874 (1994)
$K_L \to ee\gamma\gamma$	$(6.5 \pm 1.2 \pm 0.6) \times10^{-7}$	PRL 73, 2169 (1994)
Λ, $\bar{\Lambda}$ polarization		PL B338, 403 (1994)
$K_L \to \mu\mu\gamma$	$(3.23 \pm 0.23 \pm 0.19) \times10^{-7}$	PRL 74, 3323 (1995)
$K_L \to ee\mu\mu$	$(2.9\ ^{+6.7}_{-2.4}\ ) \times10^{-9}$	PRL 76, 4312 (1996)
$K_L \to \pi^0 \mu e$	$< 3.2) \times10^{-9}$	PL B432, 30 (1998).

Using the KTeV detector, E-799 Phase II has dramatically improved on these Phase I results, typically by a factor of 50 in sensitivity, and a number of new phenomena have been observed. The main goal of E-799II was to improve the sensitivity of the searches for the $K_L \to \pi^0 l^+ l^-$ decay modes, which have

partial widths closely related in the Standard Model to ε'/ε. Results for $K_L \to \pi^0 e^+ e^-$ have now been published for the entire E-799II data set, and results for $K_L \to \pi^0 \mu^+ \mu^-$ from the full data set will be published in 2005. Another exciting result from E-799II has been the observation of a very large CP-violating angular asymmetry in the decay $K_L \to \pi^+ \pi^- e^+ e^-$. This asymmetry, in the angle between the hadronic and leptonic planes, was predicted in 1992, and E-799II has measured it to be approximately 14% after correcting for acceptance (which actually makes the raw observed asymmetry larger, at about 23%). The asymmetry is caused by interference between CP-violating and CP-conserving amplitudes which happen to be of comparable size for this mode. The asymmetry is also odd under time reversal, but is not necessarily T-violating, because of the existence of both absorptive and dispersive amplitudes for this process.

Publications

Search for Light Gluinos Via the Spontaneous Appearance of $\pi^+\pi^-$ Pairs with an 800 GeV/c Proton Beam at Fermilab, J. Adams et al., Phys. Rev. Lett. 79, 4083 (1997).

Measurement of the Branching Fraction of the Decay $K_L \to \pi^+\pi^-e^+e^-$, J. Adams et al., Phys. Rev. Lett. 80, 4123 (1998)

Search for the Decay $K_L \to \pi^0 \nu\bar{\nu}$, J. Adams et al., Phys. Lett. B447, 240 (1999).

Observation of $\Xi^0 \to \Sigma^+ e^- \bar{\nu}$, A. Affolder et al., Phys. Rev. Lett. 82, 3751 (1999).

Observation of Direct CP Violation in K_S, $K_L \to \pi\pi$ Decays, A. Alavi-Harati et al., Phys. Rev. Lett. 83, 22 (1999).

Measurement of the Decay $K_L \to \pi^0\gamma\gamma$, A. Alavi-Harati et al., Phys. Rev. Lett. 83, 917 (1999).

Measurement of the Branching Ratio of $\pi^0 \to e^+e^-$ Using $K_L \to 3\pi^0$ Decays in Flight, A. Alavi-Harati et al., Phys. Rev. Lett. 83, 922 (1999).

Light Gluino Search for Decays Containing $\pi^+\pi^-$ or $\pi^0\pi^0$ from a Neutral Hadron Beam at Fermilab, A. Alavi-Harati et al., Phys. Rev. Lett. 83, 2128 (1999).

Observation of CP Violation in $K_L \to \pi^+\pi^-e^+e^-$ Decays, A. Alavi-Harati et al., Phys. Rev. Lett. 84, 408 (2000).

Search for the Decay $K_L \to \pi^0 \nu\bar{\nu}$ Using $\pi^0 \to e^+e^-\gamma$, A. Alavi-Harati et al., Phys. Rev. D61, 72006 (2000).

Search for the Weak Decay of a Lightly Bound H^0 Dibaryon, A. Alavi-Harati et al., Phys. Rev. Lett. 84, 2593 (2000).

Observation of the Decay $K_L \to \mu^+\mu^-\gamma\gamma$, A. Alavi-Harati et al., Phys. Rev. D62, 112001 (2000).

Search for the Decay $K_L \to \pi^0\mu^+\mu^-$, A. Alavi-Harati et al., Phys. Rev. Lett. 84, 5279 (2000).

Study of the Decay $K_L \to \pi^+\pi^-\gamma$, A. Alavi-Harati et al., Phys. Rev. Lett. 86, 761 (2001).

Search for the Decay $K_L \to \pi^0e^+e^-$, A. Alavi-Harati et al., Phys. Rev. Lett. 86, 397 (2001).

A Measurement of the Branching Ratio of $K_L \to e^+e^-\gamma\gamma$, A. Alavi-Harati et al., Phys. Rev. D64, 012003 (2001).

First Observation of the Decay $K_L \to \pi^0e^+e^-\gamma$, A. Alavi-Harati et al., Phys. Rev. Lett. 87, 021801 (2001).

A Measurement of the Branching Ratio and Asymmetry of the Decay $\Xi^0 \to \Sigma^0\gamma$, A. Alavi-Harati et al., Phys. Rev. Lett. 86, 3239 (2001).

Measurements of the Rare Decay $K_L \to e^+e^-e^+e^-$, A. Alavi-Harati et al., Phys. Rev. Lett. 86, 5425 (2001).

First Measurement of Form-Factors of the Decay $\Xi^0 \to \Sigma^+e^-\bar{\nu}_e$, A. Alavi-Harati et al. Phys. Rev. Lett. 87, 132001 (2001).

A New Measurement of the Radiative Ke3 Branching Ratio and Photon Spectrum, A. Alavi-Harati et al., Phys. Rev. D64, 112004 (2001).

Branching Ratio Measurement of the Decay $K_L \to e^+e^-\mu^+\mu^-$, A. Alavi-Harati et al., Phys. Rev. Lett. 87, 111802 (2001).

Measurement of the Branching Ratio and Form Factor of $K_L \to \mu^+\mu^-\gamma$, A. Alavi-Harati et al., Phys. Rev. Lett. 87, 071801 (2001).

Radiative Decay Width Measurements of Neutral Kaon Excitations Using the Primakoff Effect, A. Alavi-Harati et al., Phys. Rev. Lett. 89, 072001 (2002).

A Measurement of the K_L Charge Asymmetry, A. Alavi-Harati et al., Phys. Rev. Lett. 88, 181601 (2002).

Search for the $K_L \to \pi^0\pi^0e^+e^-$ Decay in the KTeV Experiment, A. Alavi-Harati et al., Phys. Rev. Lett. 89, 211801 (2002).

Measurements of Direct CP Violation, CPT Symmetry, and Other Parameters in the Neutral Kaon System, A. Alavi-Harati et al., Phys. Rev. D67, 012005, (2003).

Measurements of the Decay $K_L \to e^+e^-\mu^+\mu^-$, A. Alavi-Harati et al., Phys. Rev. Lett. 90, 141801 (2003).

Search for the Rare Decay $K_L \to \pi^0e^+e^-$, A. Alavi-Harati et al., Phys. Rev. Lett. 93, 021805 (2004).

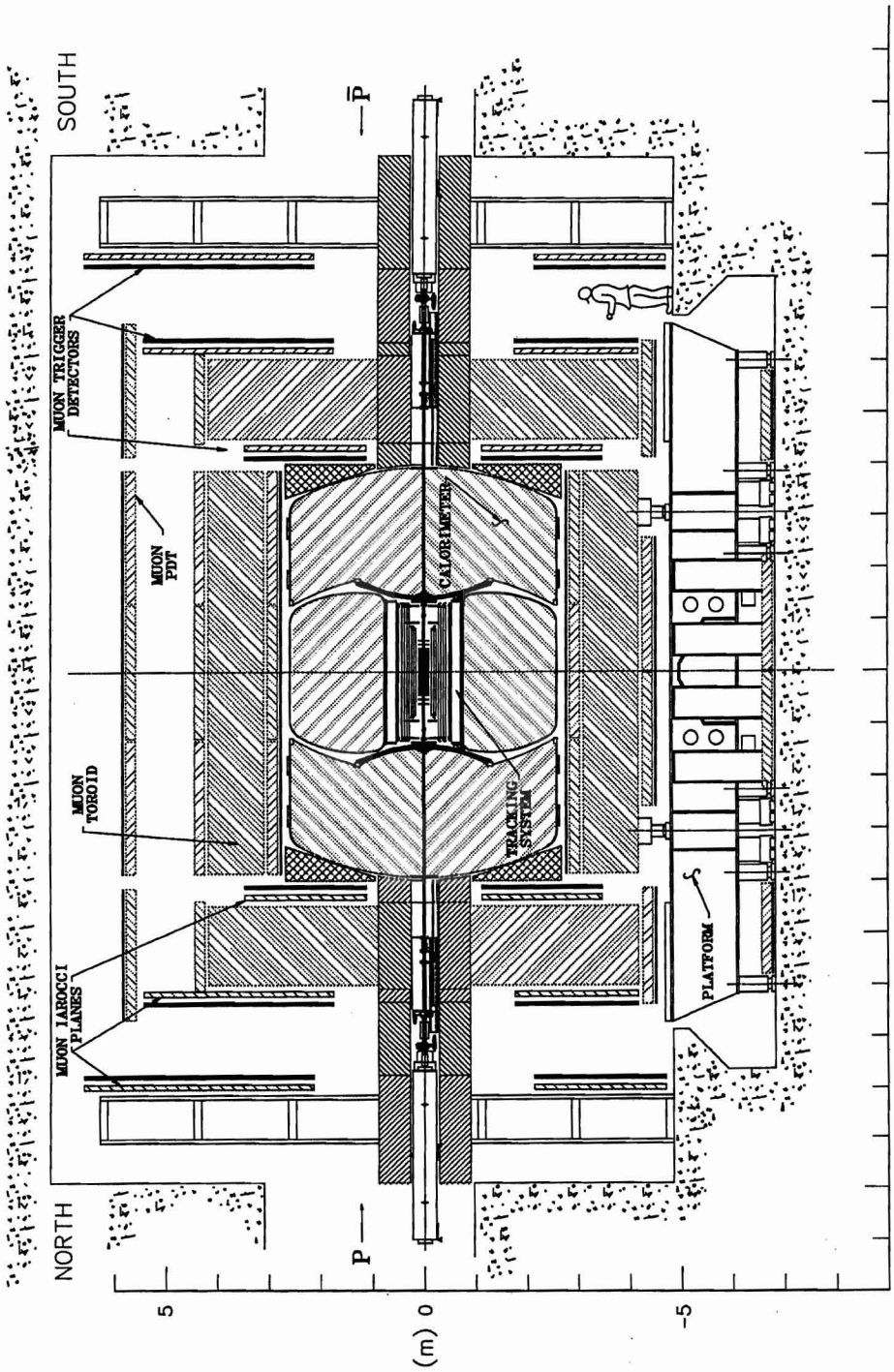
A Determination of the CKM Parameter $|V_{us}|$, T. Alexopoulos et al., Phys. Rev. Lett. 93, 181802 (2004).

Measurements of K_L Branching Fractions and the CP Violation Parameter $|\eta_{+-}|$, T. Alexopoulos et al., Phys. Rev. D70, 092006 (2004).

Measurements of Semileptonic K_L Decay Form Factors, T. Alexopoulos et al., Phys. Rev. D70, 092007 (2004).

Measurements of the Branching Fractions and Decay Distributions for $K_L \to \pi\mu\nu\gamma$ and $K_L \to \pi e\nu\gamma$, T.Alexopoulos et al., Phys. Rev. D71, 012001 (2005).

Observation of the Decay $\Xi^0 \to \Sigma^+\mu^-\nu_\mu$, E. Abouzaid et al., Phys. Rev. Lett. 95, 081801 (2005).



Side view of the DØ detector for Run II

E-823 / 900 / 908 / 925 (Blazey / Wyatt) Study of Events in $\bar{p}p$ Collisions at 2 TeV in the D0 Detector

Aachen (Germany), Acad. Sci. (Czech Rep.), Alberta (Canada), los Andes (Colombia), Arizona, BNL, Bonn (Germany), Boston, Brown, Buenos Aires (Argentina), UC/Riverside, CBPF (Brazil), Charles (Czech Rep.), CINVESTAV (Mexico), Clermont-Ferrand (France), Columbia, CSU/Fresno, Czech Tech (Czech Rep.), Delhi (India), University College Dublin (Ireland), Estadual Paulista (Brazil), Fermilab, Florida State, Freiburg (Germany), Grenoble (France), Ho Chi Minh City (Vietnam), IHEP/Beijing (China), IHEP/Protvino (Russia), Illinois/Chicago, Imperial College (United Kingdom), Indiana, Iowa State, ITEP (Russia), JINR (Russia), Kansas, Kansas State, Korea (Korea), Lancaster (United Kingdom), Langston, LBNL and UC/Berkeley, LMU Munich (Germany), Louisiana Tech, Lyon (France), Mainz (Germany), Manchester (United Kingdom), Marseille (France), Maryland, McGill (Canada), Michigan, Michigan State, Mississippi, Moscow State (Russia), Nebraska, Nijmegen/NIKHEF (Netherlands), NIKHEF/Amsterdam (Netherlands), Northeastern, Northern Illinois, Northwestern, Notre Dame, Oklahoma, Oklahoma State, Orsay (France), Panjab (India), Paris VI and VII (France), PNPI (Russia), Princeton, Rice, Rio de Janeiro (Brazil), Rochester, Saclay (France), San Francisco de Quito (Ecuador), Simon Fraser (Canada), Southern Methodist, Strasbourg (France), SungKyunKwan (Korea), SUNY/Buffalo, SUNY/Stony Brook, Swedish Consortium (Sweden), Tata (India), Texas/Arlington, UST (China), Virginia, Washington, Wuppertal (Germany), York (Canada), Zurich (Switzerland)

Status: *E-823 - Data-Taking*
E-900 - Data-Taking
E-908 - Data-Taking
E-925 - No Data Yet

The D0 detector is a large, hermetic, 4π detector at Fermilab designed for the study of proton-antiproton collisions with a center-of-mass energy of 2.0 TeV. The detector stresses identification of leptons, photons, jets, and missing transverse energy for high-p_T physics. D0 is an international collaboration representing the efforts of over 675 physicists and Ph.D. students from 88 institutions whose goal is to study a diverse range of particle physics topics. The Run I D0 experiment (E-740) successfully completed data-taking in 1996, collecting ~120 pb^{-1} of data at $\sqrt{s}$ = 1.80 TeV, including a small fraction at 0.63 TeV. The Run II D0 experiment (E-823) achieved a major milestone in 2005 by recording more than 1 fb^{-1} of data at 1.96 TeV.

The D0 Run II detector (E-823) has been completed and represents a major upgrade of the Run I detector. The detector has been designed to operate at instantaneous luminosities near $2\times10^{32}cm^{-2}s^{-1}$ with bunch spacings as short as 132 ns. To meet the challenges of such a high-rate environment, the entire central tracking system has been replaced with a silicon microvertex detector, a scintillating-fiber tracker, a solenoid magnet, and central and forward preshower detectors. The new tracking detectors have enhanced pattern recognition and triggering opportunities for lepton, photon and jet final states. The entire Run II physics menu has been significantly enhanced by the new detectors.

The silicon micro-vertex detector (SMT) consists of 792,000 channels and subtends an active area of 4.7 m^2. It provides precise tracking in the region $|\eta| < 3$. The silicon tracker consists of silicon disks and barrels formed into six disk/barrel modules. Each barrel module consists of four (radial) layers of detector ladder assemblies which provide coverage for large angle tracks. Three-dimensional reconstruction of tracks at forward rapidities is performed using the disks. The SMT was constructed at the Fermilab Silicon Detector Facility and installed in D0 in late 2000.

The central scintillating-fiber tracker (CFT), an innovative design based on visible light photon counters (VLPC), is also currently in operation. The fiber tracker consists of 72,000 835-micron fibers arranged into eight radial layers. It provides an off-line momentum measurement for charged particles with $|\eta| < 2$ and fast trigger information for tracks with $|\eta| < 1.6$. The single-channel noise rate, quantum efficiency and photo-electron yield all meet design specifications. Combining fiber and silicon tracker information provides a charged-particle momentum measurement with a resolution of $\Delta p/p = 2\%$ at $p_T = 1$ GeV/c degrading to 10-18% for central 100 GeV/c tracks. The superconducting solenoid magnet has been successfully installed, tested and mapped at its design field of 2.0 Tesla.

Sandwiched between the solenoid and central calorimeter is the central preshower detector (CPS) which was installed simultaneously with the solenoid. The central preshower consists of 7280 channels of 6.6 mm scintillating triangular fibers and will enable efficient triggering on electrons and photons in a high-rate environment. Similarly, separate forward preshower (FPS) detectors enhance electron and photon triggering in the region $1.5 \leq |\eta| \leq 2.5$. The FPS detectors consist of 14,968 channels of finely segmented triangular scintillator strips with embedded wavelength shifting fibers. Both the CPS and FPS are instrumented with VLPCs.

The tracking detectors are surrounded by a hermetic liquid argon sampling calorimeter with uranium and copper/steel absorber. The calorimeter is contained in three cryostats (a central barrel and two endcaps). The calorimeter is nearly compensating and finely segmented to identify electrons, photons, muons, and jets. The electromagnetic (EM) calorimeter covers $|\eta| < 3$ and hadronic calorimetry extends to $|\eta| < 4.4$; the large acceptance provides excellent measurement of the missing transverse energy. The segmentation in $\Delta\eta \times \Delta\phi = 0.1 \times 0.1$ (0.05×0.05 at EM shower maximum); for Run I, the energy resolution was $\sim 15\%/\sqrt{E}$ for electrons and photons (with a small constant term) and $\sim 85\%/\sqrt{E}$ for jets. The calorimeter readout electronics has been upgraded to a switched capacitor array design and the shaping times have been re-optimized to cope with shorter beam crossing. The calorimeter is now in operation.

Outside the calorimeter cryostats is the upgraded muon tracking system. An independent measurement of the muon momentum is performed in the magnetized iron toroids using planes of mini-drift tubes in the forward region and proportional drift tubes in the central region. Fast muon triggering is achieved using layers of scintillator trigger counters which can be combined with

fiber tracker information to enable triggering on low p_T ($\geq$ 1.5 GeV/c) muons. The muon tracker and trigger are now operating well within specifications.

The Forward Proton Detector (FPD, E-900) consists of momentum spectrometers which make use of the accelerator magnets along with points measured on the track of the scattered proton (or antiproton) to calculate track momentum and scattering angle. Tracks are measured using scintillator fiber detectors (read out by multi-channel phototubes) located in Roman pots, which are stainless steel containers that allow the detectors to function outside of the machine vacuum but close to the beam. Particles traverse thin steel windows at the entrance and exit of each pot. The pots are remotely controlled and can be moved close to the beam (within a few mm) during stable beam conditions and retracted otherwise.

The FPD includes 18 Roman pots. A dipole spectrometer consists of two Roman pot detectors located after bending dipoles about 57 meters downstream of the interaction point on the outgoing antiproton arm and measures antiprotons of all angles that have lost a few percent of the beam momentum. The Roman pots comprising the quadrupole spectrometers are located adjacent to the electrostatic separators on both the proton and antiproton sides and use the low-beta quadrupoles as the primary analyzing magnet. They have acceptance for a large range of proton momenta and angle. The FPD is now fully installed, instrumented, and in routine operation. Elastic scattering of protons and antiprotons has been observed.

The upgraded D0 detector contains approximately one million channels. The data readout is initiated by a multi-level trigger with each level having increased complexity and decision time. The Level 1 trigger is designed for an accept rate of 2-5 kHz depending on the chosen L1 deadtime. Calorimeter-based triggers utilize analog hardware to compute fast energy sums to identify localized electromagnetic and hadronic activity and the presence of missing E_T. Track finding in the CFT and muon tracker are performed by parallel application of field programmable gate arrays; electron candidates can be selected using azimuthal matching between the CFT and CPS.

The Level 2 trigger, which has a 1 kHz accept rate, enables more sophisticated reconstruction and fully exploits correlations between the tracking detectors, calorimeter and muon systems; for example η - ϕ matching between the preshower and calorimeter. The Level 2 trigger capability has been supplemented by a Silicon Track Trigger (E-908). This device discriminates on tracks measured using the silicon microvertex detector which do not emanate from the primary vertex. Such tracks are efficient indicators of heavy flavor, i.e. b and c quark production. This enhances the triggering capabilities for Higgs bosons and top and bottom (s)quarks. It will also enable triggering on $Z \rightarrow b\bar{b}$, which is a key calibration channel for top and Higgs physics. The STT proposal was approved in early 1999. Component production and installation are complete, and the trigger is now integrated into the physics menu.

The Level 3 trigger uses a commodity-based PC farm of about 200 nodes running with Linux. The availability of fully digitized information permits sophisticated software reconstruction algorithms to be applied. The Level 3 accept rate is 50-100 Hz.

The current detector is limited in the instantaneous and integrated luminosities at which it can operate. The present silicon tracker is insufficiently radiation-hard to withstand more than about 5-7 fb^{-1}. It will therefore need to be augmented during Run II. The Run IIb Upgrade Project (E-925) includes an additional radiation-hard inner layer for the silicon tracker, called Layer-Zero. The additional samples from Layer-Zero will improve b-tagging and ameliorate radiation damage to the current inner layers. The upgrade will also substantially improve the calorimeter and track triggers and CFT front-end electronics in order to handle increased occupancy from higher instantaneous luminosities.

The physics goals of D0 involve direct searches for particles and forces not yet known, including both those that are predicted or expected (like the Higgs boson and supersymmetry) and those that would come as a surprise. At the same time we confront the Standard Model through precise measurements of the strong interaction, through measurements of the quark mixing matrix, and through precise measurements of the electroweak force and the properties of the W and Z bosons and the top quark.

D0 has six analysis groups dedicated to electroweak physics, studies of the top quark, studies of the bottom quark, searches for Higgses, searches for new phenomena beyond the Standard Model, and elucidation of the strong force. The physics groups presented about fifty analyses at the summer 2005 conferences. By the end of 2005 the collaboration had submitted a total of 30 papers for publication based on Run II data. These analyses included as much as 600 pb^{-1} of luminosity. Analyses with 1 fb^{-1} of data are well underway and will be presented at the summer 2006 conferences. More details from the six analysis groups follow.

With the higher luminosity and the higher center-of-mass energy available in Run II of the Tevatron, the collaboration has embarked on a number of searches for new phenomena. The main searches are organized around manifestations of additional space-time dimensions, for supersymmetric particles, for leptoquarks and for new gauge bosons (which may arise, for instance, from unified theories), and for signs of compositeness of quarks and leptons. The final states investigated cover a wide range of topologies, from high transverse momentum lepton pairs to jets and missing E_T, from multi-lepton to lepton+jets final states. The searches exploit in particular the excellent capabilities of the D0 detector in terms of calorimeter hermeticity and resolution and angular coverage for lepton identification.

Searches for additional space-time dimensions look for deviations from the Drell-Yan spectrum at high di-muon, di-electron or di-photon masses, which could be due to the exchange of gravitons. These deviations can be as

spectacular as narrow resonances, or simply a broad enhancement that becomes more and more pronounced as the mass increases. The results obtained place the strongest constraints to date on some models of large extra dimensions. The same di-lepton final states have also been used to set limits on the masses of new gauge bosons and on the scale of compositeness well beyond those previously explored, as well as to further constrain technicolor theories.

Supersymmetric partners of the Standard Model particles have been searched for in a variety of model frameworks. Gauge-mediated supersymmetry predicts that the final states may contain two energetic photons and large missing transverse energy carried away by light gravitinos. The absence of any signal has allowed D0 to extend the exclusion domains for such theories well beyond those established at LEP and in Run I of the Tevatron. In the framework of Supergravity, the most promising avenues are the searches for strongly produced squarks and gluinos on one hand, and for the electroweak associated production of charginos and neutralinos on the other. In the first case, the signatures range from an energetic acoplanar jet pair to multi-jets with missing E_T. In the second, leptonic decays of the charginos and neutralinos lead to tri-lepton topologies, also with missing E_T arising from the pair of the lightest supersymmetric particles terminating the decay chains. Both of these searches now probe domains that were inaccessible at LEP, well beyond those explored in Run I. The sensitivity of the trilepton search has been greatly improved as signals with all three charged leptons (e, μ, and τ) and high momentum tracks are now included.

Anomaly-mediated supersymmetry might lead to quasi-stable charginos. These would appear as massive stable particles appearing in the detector as slow-moving high transverse momentum particles reconstructed as muons. The timing information from the scintillators of the muon system has been used to search for such a signature, and mass limits have been set, again well beyond those previously existing. Finally, in R-parity violating models, the lightest supersymmetric particle would be unstable, which leads to final states containing many leptons or jets, but only moderate missing E_T. A variety of models have been explored, and improved mass limits have been set.

Leptoquarks could be pair produced at the Tevatron. The final states expected consist of *i*) two leptons and two jets, *ii*) a lepton, two jets and missing E_T, or *iii*) an acoplanar pair of jets. All these possibilities have been considered, and the previously excluded mass range has been significantly extended in the case of first generation leptoquarks (where the leptons are electrons). Finally, an investigation of the heavy flavour content of jets produced in association with a W boson has been conducted, and the possible anomaly reported in Run I has not been substantiated by this analysis.

The Tevatron Collider continues to be the world's only source of top quarks. Though it was discovered ten years ago (in 1995) by the CDF and D0 collaborations, we still know relatively little about the top quark because the measurements performed in Run I were limited by the size of the available data set. In Run II, the improved detector performance and larger integrated

luminosity allow for the first time precision measurements in the top quark sector, which will hopefully unveil its true nature. With a mass of the order of the electroweak scale, there is the intriguing possibility that the top quark may play a special role in the mechanism of electroweak symmetry breaking and open a window to new physics phenomena.

Five years after the beginning of Run II, the large available data sets and level of understanding of the detector achieved are allowing us to extend our knowledge of the top quark. Many of the currently existing measurements at D0 are based on data sets four times that of Run I measurements. In order to fully outline the top quark profile, a precise understanding of the production mechanisms is mandatory. D0 has performed measurements of the top pair production cross section in all final states (dilepton, lepton+jets and alljets) and makes use of several techniques (event topology, b-tagging, etc.) to discriminate signal from backgrounds. The single most precise measurement, lepton+jets using b-tagging, determines the cross section with a relative uncertainty of approximately 19% - already exceeding the 28% precision from the combination of all available D0 measurements in Run I.

At a hadron collider, top quarks can also be produced singly via the electroweak interaction, which provides a sensitive probe of the t-W-b vertex, thus allowing a model-independent measurement of the CKM matrix element $|V_{tb}|$. Such single top production has never been observed, due to the overwhelming W+jets background. The most recent limits from D0 are the world's best and start placing constraints on some new physics models. With the much larger Run II datasets that will soon be available, we look forward to observing single top production.

One of the high priorities for Run II is the precise determination of the top quark mass since, together with the W mass, it can be used to constrain the mass of the postulated Higgs boson. Present analyses exceed in accuracy the single most precise measurement in Run I (also from D0). The goal is to achieve a total uncertainty on the top quark mass of 2 GeV by the end of Run II. The large (approximately 400 events/fb^{-1}) and relatively pure (signal-to-background ratio ~3) samples of top quarks selected in the lepton+jets channel requiring at least one b-tagged jet are also being used to search for anomalous production of top quark. Other top properties under investigation include W boson helicity in top decay, the ratio of top decays to b quarks and any quark, and top charge.

With respect to the Higgs boson, searches are underway for Standard Model, supersymmetric, and exotic models Higgses. We have started searching for the Standard Model Higgs, with the final states expected both for lower mass and higher mass Higgs bosons. Our first SM Higgs search in the WH and WW* channels have been published. Preliminary results with ~300-400 pb^{-1} have been presented for the WH, ZH, WW*, and WWW* channels. The limits obtained are still about an order of magnitude away from the SM cross sections but will improve as more data is accumulated and analysis methods are enhanced. A pioneering analysis of inclusive Z+b production, which is one of the most important backgrounds to Higgs production in the ZH mode, was

undertaken and has been published. This also happens to be the first experimental probe into the b quark density of the proton. Measurements of Z+jets production and W+jets production properties, with and without b-jets, are also in progress.

Higgs in the Minimal Supersymmetric Model (MSSM) can be easier to detect if tan β (a parameter of the MSSM) is large, due to enhanced production of the Higgs in association with one or two b quarks, with the Higgs itself decaying into a pair of b quarks. A novel technique of background estimation purely from the data was pioneered for this analysis. A result that excludes large regions of parameter space in the tan β vs Higgs mass plane has been presented to the community. We are also pursuing analyses with taus in the final state in the MSSM scenarios, and we expect these to complement the 3 and 4 b-quark final state results. Searches for exotic models of electroweak symmetry breaking include a search for doubly charged Higgs bosons (the first D0 Run II publication), technicolor particles produced in association with W bosons, and a fermiophobic Higgs that would decay to two photons.

At the Tevatron, W and Z bosons are produced abundantly. When decaying to electrons and muons, these particles provide clean, well-understood experimental signatures. Furthermore, W and Z production cross sections and their properties are well predicted by theory. Therefore, these particles provide standard tools for understanding electron and muon identification, and help determine the momentum scale and resolution of the detector. In D0, we have measured W and Z production cross sections in both electron and muon channels. These measurements are used for an indirect determination of the W width. The direct measurement of this quantity has also been carried out by studying the shape of the tail of the W transverse mass distribution. The Z production cross section measurement has also been performed in the $Z \rightarrow \tau\tau$ channel for the first time at the Tevatron. This published measurement demonstrates D0's ability to efficiently identify τ leptons and lays the foundation for searches of new particles decaying to taus.

In the Standard Model, interactions between gauge bosons (W, Z and γ) are precisely defined by SU(2)×U(1) gauge structure. Studying associated production of di-bosons provides an excellent test of the SM. The measured production cross sections at D0 for WW, Wγ, Zγ and WZ are all in agreement with the SM predictions and have been published. These measurements along with the kinematic properties of the final state particles are used to set limits on anomalous triple gauge boson couplings. The limits are the most stringent from the Tevatron and with respect to LEP limits are improved.

As mentioned already, precise measurements of the W boson and top quark masses are understood to be among the most important measurements that Tevatron experiments can deliver. These quantities provide an indirect limit on the Higgs boson mass through radiative corrections, and thus can serve as a guide in Higgs particle searches. To fully benefit from the large W data sample available at the Tevatron, it is crucial to precisely calibrate the

calorimeter response. This complex task has been completed, clearing the way for measurement of the W mass.

The heavy flavor physics group has capitalized on the excellent performance of the upgraded D0 charged-particle tracking, vertexing, and extensive muon coverage to arrive at a set of highly competitive results. The Tevatron is the only operating accelerator capable of producing the heavier B states such as B_s^0, Λ_b, and B_c, and our results cover all these states plus results on the lighter B^+ and B^0 that are competitive and complementary to those from the B factories. Our heavy flavor program covers production, lifetimes, mixing of neutral B states, spectroscopy, branching ratios, and rare decays.

In the area of production, a measurement of the differential cross section of Y(1S), with large reach to the forward region, has been published. Future prospects include the same for J/ψ production, measuring the polarization at production of both these states, as well as the b-jet cross section at large transverse momentum and the b cross section via fully exclusive states. Lifetimes in fully reconstructed exclusive states via $B_s^0 \rightarrow J/\psi\phi$ and $\Lambda_b \rightarrow J/\psi\Lambda$ have been reported in two publications, and the former is the world's best single exclusive B_s^0 lifetime measurement.

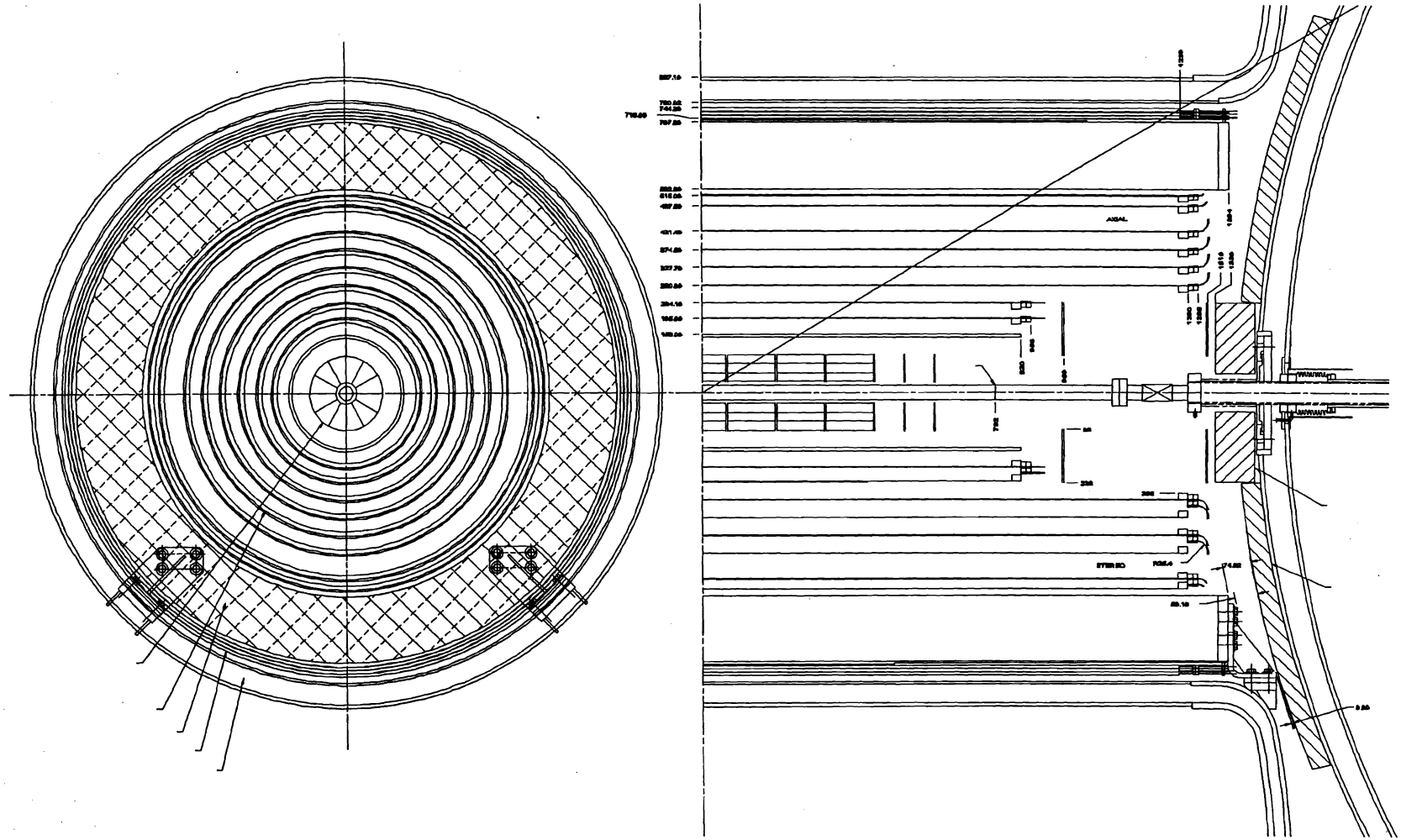
A novel technique using the ratio of $B \rightarrow D^0\mu X$ and $B \rightarrow D^*\mu X$ event yields as a function of visible proper decay length has been published. A preliminary result using the world's largest sample of the elusive B_c meson through the decay into $J/\psi\mu X$ shows its lifetime to be substantially shorter than the other B hadrons, as expected. Future analyses will explore fully exclusive decays of the B_c. Mixing (also discussed below) in the B_s^0 sector can give rise to a difference in lifetimes between CP eigenstates that has been published in the predominantly CP-even mode $B_s^0 \rightarrow J/\psi\phi$, and complemented by a preliminary result on the B_s^0 lifetime through its semileptonic decay which is an equal mix of CP-even and CP-odd eigenstates. There are prospects to explore CP violation in the $J/\psi\phi$ channel.

On the topic of spectroscopy, the observation and production properties of the X(3872) particle, which is either an exotic hybrid or molecular state, or a charmonium state with unusual properties, have been reported in a publication. Work continues on measuring its more detailed properties. We have published preliminary results on the orbitally excited D** and D_s** states observed through $B \rightarrow D_s^{**}\mu X$ decays, and also on B** states where the first measurements of the mass splitting between doublet members have been reported. Rare decays can provide first insights on new physics, and we have published a contemporaneously world's best limit on the branching ratio of the flavor-changing neutral-current (FCNC) decay $B_s^0 \rightarrow \mu^+\mu^-$ and have a preliminary result on the sensitivity for $B_s^0 \rightarrow \mu^+\mu^-\phi$. In the charm sector, preliminary searches for the FCNC decay $D_s \rightarrow \mu^+\mu^-\pi$ have been presented.

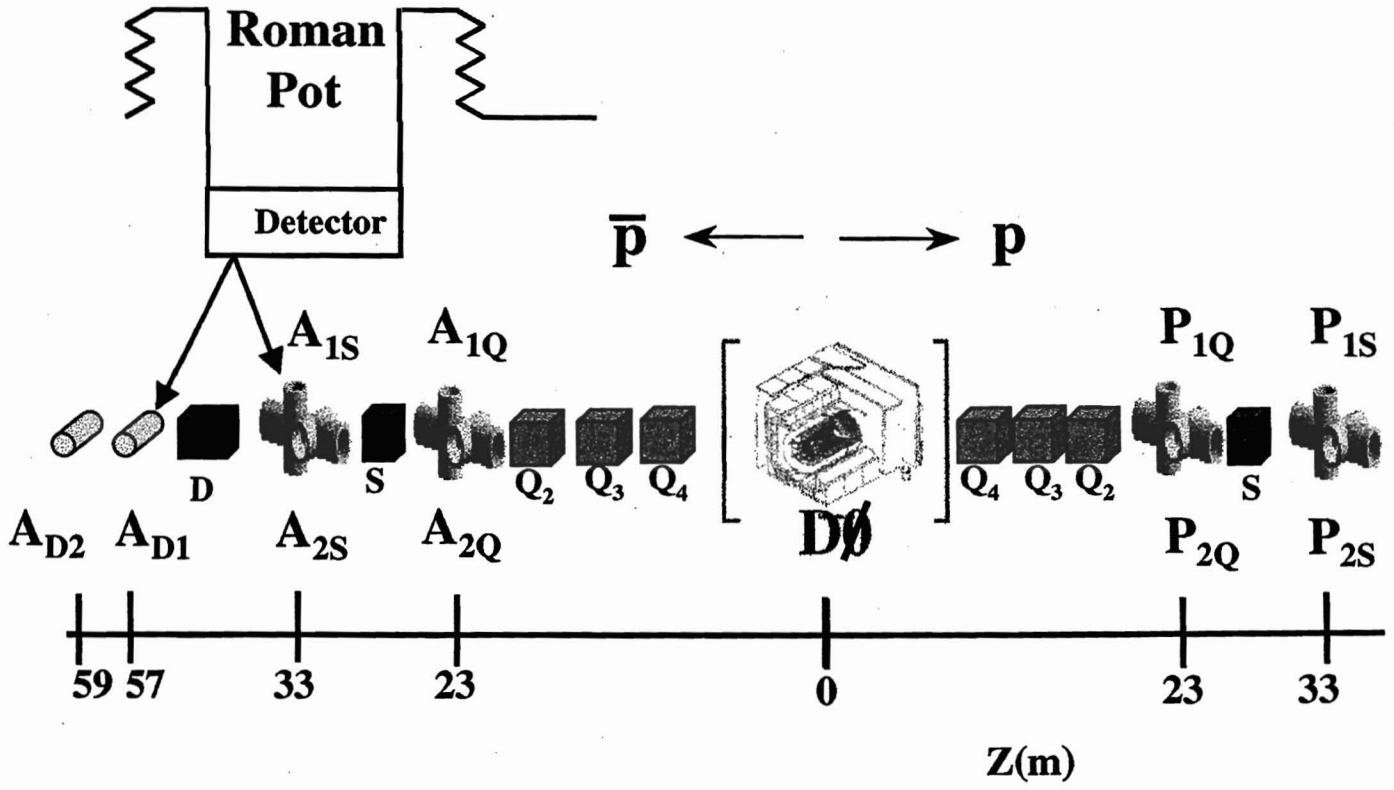
Finally, one of the most crucial B measurements to come from the Tevatron will be that of B_s^0 oscillations. This will allow further understanding of CP violation with an independent constraint in the relevant unitarity triangle.

We now have a preliminary numerical limit on the frequency of B_s^0 oscillations through one of the world's largest sample of reconstructed $B_s^0 \rightarrow D_s \mu X$ decays. Our future reach for oscillation measurements will be greatly enhanced by including additional flavor tags, additional D_s semileptonic modes with electrons (also benefiting many of the analyses above), exclusive hadronic decays, and improvements of triggers at Level 3.

The increased Run II center-of-mass energy offers the opportunity to investigate quantum chromodynamics in new kinematic domains. As luminosity has accrued, the inclusive jet cross section is continually updated; jets with transverse energies above 600 GeV are now routinely observed. The inclusive jet measurement explores the structure of the proton and is a sensitive search for quark substructure. It will help to constrain the gluon content of the proton at large x, where it is very poorly known. A measurement of the azimuthal de-correlation of jets in di-jet production has provided a novel test of perturbative QCD and resulted in the first Tevatron Run II QCD publication. The analysis of the isolated photon cross section has been submitted. With the Forward Proton Spectrometer completely included in the detector readout, we expect results on diffractive physics within the year.



The Run II configuration of the tracking system. Shown are the central silicon vertex tracker, the central scintillating fiber tracker, and the central and forward preshower detectors.



Components of the Forward Proton Detector

Publications

Hadron and Electron Response in a Uranium Liquid Argon Calorimeter from 10-150 GeV, Nucl. Instr. and Meth. A269, 492 (1988).

Hadron and Electron Response of Uranium/Liquid Argon Calorimeter Modules for the D0 Detector, Nucl. Instr. and Meth., A280, 36 (1989).

Beam Tests of the D0 Uranium Liquid Argon End Calorimeters, Nucl. Instr. and Meth. A324, 53 (1993).

The D0 Detector, Nucl. Instr. and Meth. A338, 185 (1994).

First Generation Leptoquark Search in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 72, 965 (1994).

Search for the Top Quark in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 72, 2138 (1994).

Rapidity Gaps Between Jets in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 72, 2332 (1994).

Search for High Mass Top Quark Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 74, 2422 (1995).

Observation of the Top Quark, Phys. Rev. Lett. 74, 2632 (1995).

Inclusive μ and b-Quark Production Cross Sections in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 74, 3548 (1995).

Search for Squarks and Gluinos in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 75, 618 (1995).

Search for W Boson Pair Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 75, 1023 (1995).

Limits on the Anomalous $ZZ\gamma$ and $Z\gamma\gamma$ Couplings in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 75, 1028 (1995).

Measurement of the $WW\gamma$ Gauge Boson Coupling in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 75, 1034 (1995).

W and Z Boson Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 75, 1456 (1995).

A Study of the Strong Coupling Constant Using W + Jets Processes, Phys. Rev. Lett. 75, 3226 (1995).

Top Quark Search with the D0 1992-93 Data Sample, Phys. Rev. D52, 4877 (1995).

Transverse Energy Distributions within Jets in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Lett. B357, 500 (1995).

Search for Heavy W Bosons in 1.8 TeV $\bar{p}p$ Collisions, Phys. Lett. B358, 405 (1995).

Second Generation Leptoquark Search in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 75, 3618 (1995).

A Detailed Study of Plastic Scintillating Strips with Axial Wavelength Shifting Fiber and VLPC Readout, Nucl. Instr. and Meth. A366, 263 (1995).

Studies of Topological Distributions of Inclusive Three- and Four-Jet Events in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1800 GeV with the D0 Detector, Phys. Rev. D53, 6000 (1996).

Jet Production via Strongly-Interacting Color-Singlet Exchange in $\bar{p}p$ Collisions, Phys. Rev. Lett. 76, 734 (1996).

Search for Light Top Squarks in $\bar{p}p$ Collisions at 1.8 TeV, Phys. Rev. Lett. 76, 2222 (1996).

Search for $\tilde{W}_1\tilde{Z}_2$ Production Via Trilepton Final States in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 76, 2228 (1996).

Search for Right-Handed W Bosons and Heavy W' in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 76, 3271 (1996).

The Azimuthal Decorrelation of Jets Widely Separated in Rapidity, Phys. Rev. Lett. 77, 595 (1996).

Search for Anomalous WW and WZ Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 77, 3303 (1996).

J/Psi Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Lett. B370, 239 (1996).

Measurement of the W Boson Mass, Phys. Rev. Lett. 77, 3309 (1996).

Search for Additional Neutral Gauge Bosons, Phys. Lett. B385, 471 (1996).

The Isolated Photon Cross Section in the Central and Forward Rapidity Region in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 77, 5011 (1996).

A New Detector Technique Using Triangular Scintillating Strips to Achieve Precise Position Measurements for Minimum Ionizing Particles, Nucl. Instr. and Meth. A378, 131 (1996).

Limits on Anomalous WWγ Couplings from $\bar{p} \rightarrow W\gamma$+X Events at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 78, 3634 (1997).

Search for a Fourth Generaton Charge -1/3 Quark Via Flavor Changing Neutral Current Decay, Phys. Rev. Lett. 78, 3818 (1997).

Search for Diphoton Events with Large Missing Transverse Energy in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 78, 2070 (1997).

Study of the ZZγ and Z$\gamma\gamma$ Couplings in Z($\rightarrow \nu\nu$)γ Production, Phys. Rev. Lett. 78, 3640 (1997).

Direct Measurement of the Top Quark Mass, Phys. Rev. Lett. 79, 1197 (1997).

Studies of Gauge Boson Pair Production and Trilinear Couplings, Phys. Rev. D56, 6742 (1997).

Measurement of the Top Quark Pair Production Cross Section in $\bar{p}p$ Collisions, Phys. Rev. Lett. 79, 1203 (1997).

Limits on WWZ and WWγ Couplings from $\bar{p}p \rightarrow e\nu jjX$ Events at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 79, 1441 (1997).

Search for Scalar Leptoquark Pairs Decaying to Electrons and Jets in $\bar{p}p$ Collisions, Phys. Rev. Lett. 79, 4321 (1997).

Color Coherent Radiation in Multijet Events from $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Lett. B414, 419 (1997).

Scintillation Counters for the D0 Muon Upgrade, Nucl. Instr. and Meth. A401, 45 (1997).

Experimental Search for Chargino and Neutralino Production in Supersymmetry Models with a Light Gravitino, Phys. Rev. Lett. 80, 442 (1998).

Measurement of Dijet Angular Distributions and Search for Quark Compositeness, Phys. Rev. Lett. 80, 666 (1998).

Search for the Trilepton Signature from the Associated Production of SUSY $\tilde{\chi}_1^{\pm}\tilde{\chi}_2^0$ Gauginos, Phys. Rev. Lett. 80, 1591 (1998).

Search for First Generation Scalar Leptoquark Pairs in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 80, 2051 (1998).

Measurement of the Top Quark Mass Using Dilepton Events, Phys. Rev. Lett. 80, 2063 (1998).

Search for Top Squark Pair Production in the Dielectron Channel, Phys. Rev. D57, 589 (1998).

Zγ Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV and Limits on Anomalous ZZγ and Z$\gamma\gamma$ Couplings, Phys. Rev. D57, 3817 (1998).

Direct Measurement of Top Quark Mass by the D0 Collaboration, Phys. Rev. D58, 052001 (1998).

A Measurement of the W Boson Mass, Phys. Rev. D58, 092003 (1998).

Determination of the Mass of the W Boson Using the D0 Detector at the Tevatron, Phys. Rev. D58, 12002 (1998).

A Measurement of the W Boson Mass at the Fermilab $\bar{p}p$ Collider, Phys. Rev. Lett. 80, 3008 (1998).

Search for the Decay $b \rightarrow s\mu\mu$, Phys. Lett. B423, 419 (1998).

Measurement of the Shape of the Transverse Momentum Distribution of W Bosons Produced in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 80, 5498 (1998).

Limits on WWγ and WWZ Couplings from W Boson Pair Production, Phys. Rev. D58, Rapid Communications, 051101 (1998).

Search for Charge 1/3 Third Generation Leptoquarks in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 81, 38 (1998).

Limits on Anomalous WWγ and WWZ Couplings, Phys. Rev. D58, Rapid Communications, 31102 (1998).

Search for Heavy Pointlike Dirac Monopoles, Phys. Rev. Lett. 81, 524 (1998).

The D0 Detector at TeV33, FERMILAB PUB-98/124-E, hep-ex/9804011.

Combined Limits on First Generation Leptoquarks from the CDF and D0 Experiments, FERMILAB PUB-98/312-E, hep-ex/9810015.

Determination of the Absolute Jet Energy Scale in the D0 Calorimeters, Nucl. Instr. and Meth. A424, 352 (1999).

Small Angle J/Psi Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 83, 35 (1999).

Search for Squarks and Gluinos in Single-Photon Events with Jets and Large Missing Transverse Energy in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 82, 29 (1999).

Probing Hard Color-Singlet Exchange in $\bar{p}p$ Collisions at $\sqrt{s}$ = 630 GeV and 1800 GeV, Phys. Lett. B440, 189 (1998).

Search for Nonstandard Higgs Bosons Using High Mass Photon Pairs in $\bar{p}p \rightarrow \gamma\gamma$ + 2 Jets at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 82, 2244 (1999).

The Inclusive Jet Cross Section in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 82, 2451, (1999).

The Dijet Mass Spectrum and a Search for Quark Compositeness in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 82, 2457 (1999).

Measurement of the Top Quark Pair Production Cross Section in $\bar{p}p$ Collisions using Multijet Final States, Phys. Rev. D60, 012001 (1999).

Search for Bottom Squarks in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D60, Rapid Communications, 031101 (1999).

Measurement of the Top Quark Mass in the Dilepton Channel, Phys. Rev. D60, 052001 (1999).

Measurement of the High-Mass Drell-Yan Cross Section and Limits on Quark-Electron Compositeness Scales, Phys. Rev. Lett. 82, 4769 (1999).

Search for Charged Higgs Bosons in Decays of Top Quark Pairs, Phys. Rev. Lett. 82, 4975 (1999).

Measurement of the Top Quark Pair Production Cross Section in the All-Jets Decay Channel, Phys. Rev. Lett. 83, 1908 (1999).

Measurement of W and Z Boson Production Cross Sections, Phys. Rev. D60, 052003 (1999).

Studies of WW and WZ Production and Limits on Anomalous WWγ and WWZ Couplings, Phys. Rev. D60, 072002 (1999).

Evidence of Color Coherence Effects in W + Jets Events from $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Lett. B464, 145 (1999).

Search for Squarks and Gluinos in Events Containing Jets and a Large Imbalance in Transverse Momentum, Phys. Rev. Lett. 83, 4937 (1999).

Search for Second Generation Leptoquark Pairs Decaying into μν + Jets in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 83, 2896 (1999).

Search for R-parity Violation Supersymmetry in the Dielectron Channel, Phys. Rev. 83, 4476 (1999).

Combining the Top Quark Mass Results for Run I from CDF and D0, FERMILAB-TM-2084 (1999).

The $b\bar{b}$ Production Cross Section and Angular Correlations in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Lett. B487, 264 (2000).

Measurement of the Inclusive Differential Cross Section for Z Bosons as a Function of Transverse Momentum Produced in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D61, 032004 (2000).

Extraction of the Width of the W Boson from Measurements of $\sigma(p\bar{p} \rightarrow W + X) \times Br(W \rightarrow e\nu)$ and $\sigma(p\bar{p} \rightarrow Z + X) \times Br(Z \rightarrow ee)$ and Their Ratio, Phys. Rev. D61, 072001 (2000).

A Measurement of the W Boson Mass Using Electrons at Large Rapidities, Phys. Rev. Lett. 84, 222 (2000).

Search for Second Generation Leptoquarks in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 84, 2088 (2000).

The Isolated Photon Cross-Section in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 84, 2786 (2000).

Differential Production Cross Section of Z Bosons as a Function of Transverse Momentum at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 84, 2792 (2000).

Small Angle Muon and Bottom Quark Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 84, 5478 (2000).

Limits on Anomalous $WW\gamma$ and WWZ Couplings from WW/WZ $\rightarrow$ evjj Production, Phys. Rev. D62, 052005 (2000).

Search for New Physics in e mu X Data at D0 Using Sleuth: A Quasi-Model-Independent Search Strategy for New Physics, Phys. Rev. D62, 92004 (2000).

A Measurement of the W Boson Mass Using Large Rapidity Electrons, Phys. Rev. D62, 092006 (2000).

Limits on Quark Compositeness from High Energy Jets in $\bar{p}p$ Collisions at 1.8 TeV, Phys. Rev. D62, Rapid Communications, 031101 (2000).

A Measurement of the W $\rightarrow$ tau nu Production Cross Section in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 84, 5710 (2000).

Probing BFKL Dynamics in Dijet Cross Section at Large Rapidity Intervals in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1800 and 630 GeV, Phys. Rev. Lett. 84, 5722 (2000).

Spin Correlation in tt-bar Production from $\bar{p}p$ Collisions at $\sqrt{s}$ = 1800 GeV, Phys. Rev. Lett. 85, 256 (2000).

Search for R-Parity Violation in Multilepton Final States in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D62, Rapid Communications, 071701 (2000).

Cross Section for b Jet Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 85, 5068 (2000).

A Search for Dilepton Signature from Minimal Low-energy Supergravity $\bar{p}p$ Collisions at 1800 GeV, Phys. Rev. D Rapid Comm. 63, 091102 (2001).

Search for Electroweak Production of Single Top Quarks in $\bar{p}p$ Collisions, Phys. Rev. D Rapid Comm. 63, 031101 (2001).

Search for Large Extra Dimensions in Dielectron and Diphoton Production, Phys. Rev. Lett. 86, 1156 (2001).

The Ratio of Jet Cross Sections at $\sqrt{s}$ = 630 GeV and 1800 GeV, Phys. Rev. Lett. 86, 2523 (2001).

Ratios of Multijet Cross Sections in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1800 GeV, Phys. Rev. Lett. 86, 1955 (2001).

Measurement of the Angular Distribution of Electrons from W $\rightarrow$ ev Decays Observed in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D63, 072001 (2001).

Differential Cross Section for W Boson Production as a Function of Transverse Momentum in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Lett. B513, 292 (2001).

Inclusive Jet Production in $\bar{p}p$ Collisions, Phys. Rev. Lett. 86, 1707 (2001).

A Quasi-Model-Independent Search for New High p_T Physics at D0, Phys. Rev. Lett. 86, 3712 (2001).

A Quasi-Model-Independent Search for New Physics at Large Transverse Momentum, Phys. Rev. D64, 012004 (2001).

High-p_T Jets in $\bar{p}p$ Collisions at $\sqrt{s}$ = 630 and 1800 GeV, Phys. Rev. D64, 032003 (2001).

Search for Heavy Particles Decaying into Electron-Positron Pairs in $\bar{p}p$ Collisions, Phys. Rev. Lett. 87, 061802 (2001).

Search for First-Generation Scalar and Vector Leptoquarks, Phys. Rev. D64, 092004 (2001).

Search for New Physics Using QUAERO: A General Interface to D0 Data, Phys. Rev. Lett. 87, 012004 (2001).

Search for Single Top Production at D0 Using Neural Networks, Phys. Lett. B517, 282 (2001).

Measurement of the Ratio of Differential Cross Sections for W and Z Boson Production as a Function of Transverse Momentum, Phys. Lett. B517, 299 (2001).

The Ratio of Isolated Photon Cross Sections in $\bar{p}p$ Collisions at $\sqrt{s}$ = 630 and 1800 GeV, Phys. Rev. Lett. 87, 251805 (2001).

Direct Search for Charged Higgs Bosons in Decays of Top Quarks, Phys. Rev. Lett. 88, 151803 (2001).

A Search for the Scalar Top Quark in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 88, 171802 (2002).

The Inclusive Jet Cross Section in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV Using the k_T Algorithm, Phys. Lett. B525, 211 (2002).

Hard Single Diffraction in $\bar{p}p$ Collisions at $\sqrt{s}$ = 630 and 1800 GeV, Phys. Lett. B531, 52 (2002).

Search for Leptoquark Pairs Decaying to $\nu\nu$+Jets in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 88, 191801 (2002).

Search for R-Parity Violating Supersymmetry in Dimuon and Four-Jets Channel, Phys. Rev. Lett. 89, 171801 (2002).

Subjet Multiplicity of Gluon and Quark Jets Reconstructed Using the k_T Algorithm in $\bar{p}p$ Collisions, Phys. Rev. D65, 052008 (2002).

A Direct Measurement of the W Boson Width, Phys. Rev. D66, 032008 (2002).

Improved W Boson Mass Measurement with the D0 Detector, Phys. Rev. D66, 012001 (2002).

Search for mSUGRA in Single-Electron Events with Jets and Large Missing Transverse Energy in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D66, 112001 (2002).

Search for the Production of Single Sleptons Through R-Parity Violation in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 89, 261801 (2002).

$t\bar{t}$ Production Cross Section in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D67, 012004 (2003).

Multiple Jet Production at Low Transverse Energies in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D67, 052001 (2003).

Search for Large Extra Dimensions in the Monojet + MET Channel with the DZero Detector, Phys. Rev. Lett. 90, 251802 (2003).

Observation of Diffractively Produced W and Z Bosons in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Lett. B574, 169 (2003).

Search for Narrow ttbar Resonances in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 92, 221801 (2004).

Search for 3- and 4-Body Decays of the Scalar Top Quark in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Lett. B581, 147 (2004).

Search for New Particles in the Two-Jet Decay Channel with the D0 Detector, PRD Rapid Comm. 69, 111101 (2004).

An Improved Measurement of the Top Quark Mass, Nature 429, 638 (2004).

Search for Pair Production of Light Scalar Top Quarks in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 93, 011801 (2004).

Combination of CDF and D0 Results on W Boson Mass and Width, Phys. Rev. D70, 092008 (2004).

Search for Doubly-Charged Higgs Boson Pair Production in the Decay to $\mu^+\mu^+\mu^-\mu^-$ in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 93, 141801 (2004).

Observation and Properties of the X(3872) Decaying to $J/\psi\ \pi^+\pi^-$ in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 93, 162002 (2004).

Search for Supersymmetry with Gauge-Mediated Breaking in Diphoton Events at DZero, Phys. Rev. Lett. 94, 041801 (2005).

Measurement of the B_s^0 Lifetime in the Exclusive Decay Channel $B_s^0 \rightarrow J/\psi\phi$, Phys. Rev. Lett. 94, 042001 (2005).

A Search for the Flavor-Changing Neutral Current Decay $B_s^0 \rightarrow \mu^+\mu^-$ in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 94, 071802 (2005).

Measurement of Dijet Azimuthal Decorrelations at Central Rapidities in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 94, 221801 (2005).

Measurement of the Ratio of B^+ and B^0 Meson Lifetimes, Phys. Rev. Lett. 94, 182001 (2005).

Measurement of the Lambda-B Lifetime in the Decay Lambda-B $\rightarrow$ J/psi Lambda with the D0 Detector, Phys. Rev. Lett. 94, 102001 (2005).

A Search for Wbb and WH Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 94, 091802 (2005).

Measurement of the WW Production Cross Section in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 94, 151801 (2005).

A Measurement of the Ratio of Inclusive Cross Sections $\bar{p}p \rightarrow Zb/\bar{p}p \rightarrow Zj$ at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 94, 161801 (2005).

A Search for Anomalous Heavy-Flavor Quark Production in Association with W Bosons, Phys. Rev. Lett. 94, 152002 (2005).

First Measurement of $\sigma(p\bar{p} \rightarrow Z) \times Br(Z \rightarrow \tau\tau)$ at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. D71, 072004 (2005).

Search for First-Generation Scalar Leptoquarks in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. D Rapid Comm. 71, 071104 (R) (2005).

Study of $Z\gamma$ Events and Limits on Anomalous $ZZ\gamma$ and $Z\gamma\gamma$ Couplings in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 95, 051802 (2005).

Measurement of Inclusive Differential Cross Sections for Υ(1S) Production in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 94, 232001 (2005).

Measurement of the $\bar{p}p \rightarrow W\gamma + X$ Cross Section and Limits on Anomalous $WW\gamma$ Couplings at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. D Rapid Comm. 71, 091108 (2005).

Production of WZ Events in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.96 TeV and Limits on Anomalous WWZ Couplings, Phys. Rev. Lett. 95, 141802 (2005).

Search for Neutral Supersymmetric Higgs Bosons in Multijet Events at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 95, 151801 (2005).

Measurement of the $t\bar{t}$ Cross Section in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.96 TeV Using Kinematic Characteristics of Lepton Plus Jets Events, Phys. Lett. B626, 45 (2005).

Measurement of the $t\bar{t}$ Cross Section in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.96 TeV Using Lepton Plus Jets Events with Lifetime b-Tagging, Phys. Lett. B626, 35 (2005).

Search for Supersymmetry Via Associated Production of Charginos and Neutralinos in Final States with Three Leptons, Phys. Rev. Lett. 95, 151805 (2005).

Search for Randall-Sundrum Gravitons in Dilepton and Diphoton Final States, Phys. Rev. Lett. 95, 091801 (2005).

Search for Right-Handed W Bosons in Top Quark Decay, Phys. Rev. D Rapid Comm. 72, 011104 (R) (2005).

Search for Single Top Quark Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Lett. B622, 265 (2005).

Measurement of the $t\bar{t}$ Production Cross Section in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.96 TeV in Dilepton Final States, Phys. Lett. B626, 55 (2005).

Search for Large Extra Spatial Dimensions in Dimuon Production at DZero, Phys. Rev. Lett. 95, 161602 (2005).

Measurement of the Lifetime Difference in the B_s System, Phys. Rev. Lett. 95, 171801 (2005).

Measurement of Semileptonic Branching Fractions of B Mesons to Narrow D** States, Phys. Rev. Lett. 95, 171803 (2005).

Search for the Higgs Boson in $H \rightarrow WW(*)$ Decays in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 96, 011801 (2006).

Ph.D. Theses

F. Feinstein	Univ. Paris Sud	December 1987
T. Behnke	SUNY/Stony Brook	August 1989
D. Pizzuto	SUNY/Stony Brook	December 1991
R. Astur	Michigan State University	June 1992
S. Rajagopalan	Northwestern University	June 1992
J. Bantley	Northwestern University	June 1992
J. Kotcher	New York University	October 1992
B. Pi	Michigan State University	November 1992
T. Heuring	SUNY/Stony Brook	May 1993
T. Geld	University of Michigan	May 1993
S. Durston	University of Rochester	June 1993
A. Milder	University of Arizona	August 1993
J. Yu	SUNY/Stony Brook	August 1993
D. Norman	University of Maryland	September 1993
J. Cochran	SUNY/Stony Brook	December 1993
A. Pluquet	Saclay/Univ. Paris	January 1994
R. Hirosky	University of Rochester	January 1994
J. Thompson	SUNY/Stony Brook	April 1994
J. Borders	University of Rochester	April 1994
Q. Zhu	New York University	April 1994
R. Hall	University of California/Riverside	May 1994
M. Paterno	SUNY/Stony Brook	May 1994

B. May	University of Arizona	August 1994
D. Chakraborty	SUNY/Stony Brook	September 1994
M. Pang	Iowa State University	November 1994
V. Balamurali	University of Notre Dame	November 1994
G. Landsberg	SUNY/Stony Brook	November 1994
B. Abbott	Purdue University	December 1994
R. Demina	Northeastern University	December 1994
C. Murphy	Indiana University	April 1995
H. Johari	Northeastern University	April 1995
S. Snyder	SUNY/Stony Brook	May 1995
D. Elvira	Buenos Aires	May 1995
C. Gerber	Buenos Aires	May 1995
G. Lima	LAFEX/CBPF	May 1995
G. Eppley	Rice University	May 1995
M. Goforth	Florida State University	June 1995
J. Jiang	SUNY/Stony Brook	June 1995
J. Yang	New York University	June 1995
A. Smith	University of Arizona	August 1995
S. Fahey	Michigan State University	August 1995
R. Madden	Florida State University	August 1995
V. Oguri	LAFEX/CBPF	August 1995
P. Rubinov	SUNY/Stony Brook	August 1995
T. Huehn	University of California/Riverside	September 1995
H. Xu	Brown University	September 1995
J. Balderston	University of Hawaii	October 1995
E. James	University of Arizona	November 1995
C. Kim	Korea University	December 1995
C. Cretsinger	University of Rochester	December 1995
Y. Liu	Northwestern University	December 1995
A. Goldschmidt	University of California/Berkeley	January 1996
D. Fein	University of Arizona	February 1996
E. Amidi	Northwestern University	February 1996
C. Yoshikawa	University of Hawaii	March 1996
M. Sosebee	University of Texas/Arlington	March 1996
M. Kelly	University of Notre Dame	April 1996
F. Nang	Brown University	April 1996
J.-F. Lebrat	University of Paris XI	May 1996
H. Li	SUNY/Stony Brook	May 1996
G. Alvarez	University of Indiana	June 1996
S. Chang	Northeastern University	August 1996
T. Hu	SUNY/Stony Brook	August 1996
E. Flattum	Michigan State University	August 1996
S. Glenn	University of California/Davis	August 1996
J. McKinley	Michigan State University	August 1996
E. Won	University of Rochester	October 1996
D. Vititoe	University of Arizona	October 1996
J. Jaques	University of Notre Dame	October 1996
M. Martin	University of Barcelona	October 1996
A. Belyaev	Moscow State Univ.	November 1996
T. Fahland	Brown University	December 1996
K. Fatyga	University of Rochester	December 1996
R. Kehoe	University of Notre Dame	January 1997
I. Adam	Columbia University	February 1997
A. Sanchez-Hernandez	CINVESTAV	February 1997
P. Grudberg	University of California/Berkeley	February 1997
D. Cullen-Vidal	Brown University	March 1997
C. Shaffer	Florida State University	March 1997
E. Varnes	University of California/Berkeley	April 1997
S. Jun	Northwestern University	May 1997
T. Joffe-Minor	Northwestern University	May 1997

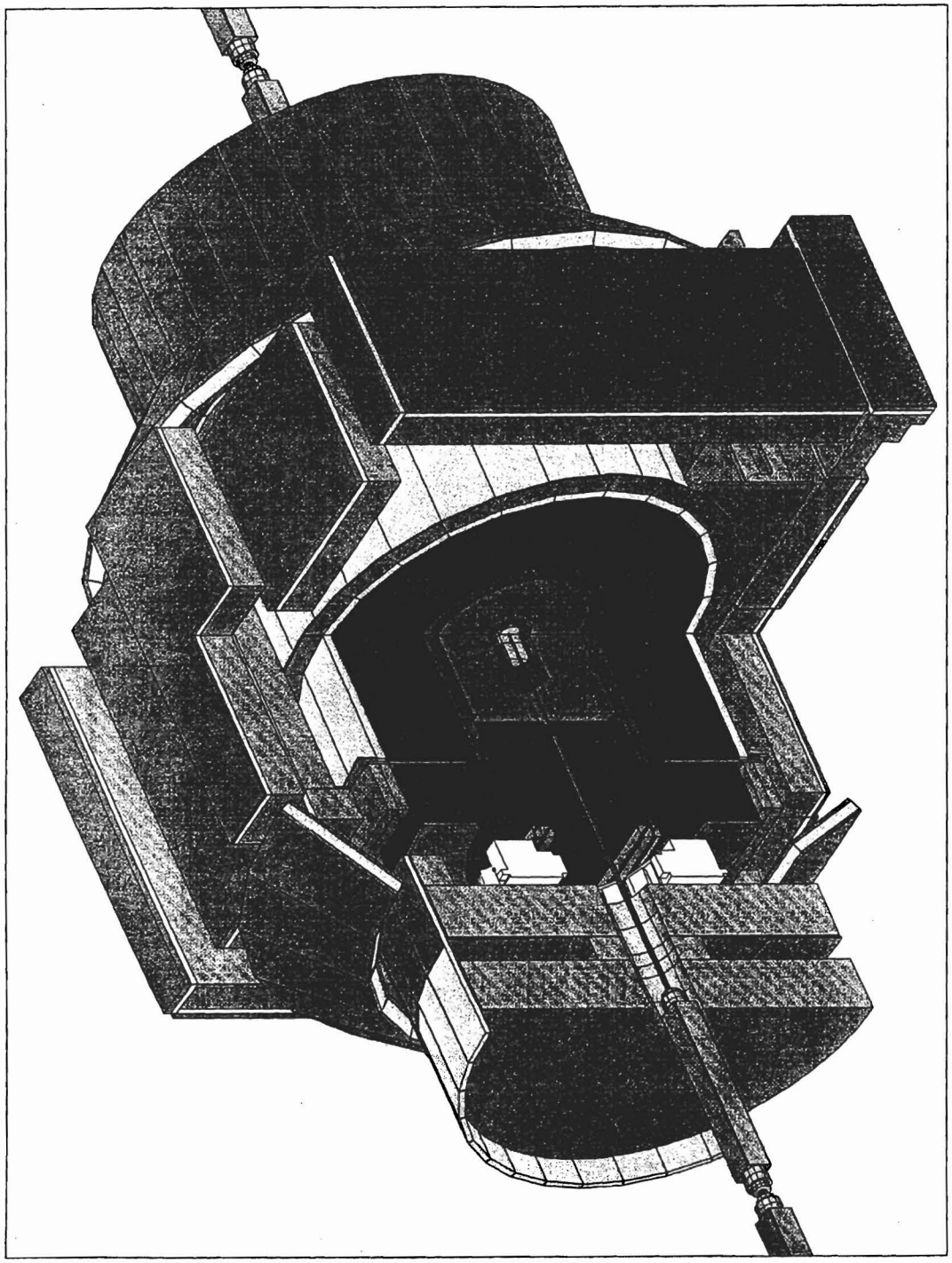
J. Tarazi	University of California/Irvine	June 1997
A. Lyon	University of Maryland	June 1997
A. Narayanan	University of Arizona	July 1997
T. Taylor Thomas	Northwestern University	September 1997
P. Tamburello	University of Maryland	September 1997
H. Shankar	Tata Institute	September 1997
M. Bhattacharjee	Delhi University	October 1997
J. Gonzalez-Solis	CINVESTAV	October 1997
A. Hernandez-Montoya	CINVESTAV	October 1997
S. Jerger	Michigan State University	October 1997
B. Lauer	Iowa State University	October 1997
L. Magana-Mendoza	CINVESTAV	October 1997
G. Wang	Florida State University	November 1997
D. Wirjawan	Texas A&M University	December 1997
S. Chopra	University of Michigan	December 1997
W. Chen	SUNY/Stony Brook	December 1997
V. Bhatnagar	Panjab University	December 1997
D. Casey	University of Rochester	December 1997
F. Hsieh	University of Michigan	January 1998
A. Snajder	LAFEX/CBPF	February 1998
Y. Yu	Seoul National University	February 1998
P. Bloom	University of California/Davis	February 1998
T. McKibben	University of Illinois/Chicago	February 1998
W. Carvalho	LAFEX/CBPF	March 1998
J. Perkins	University of Texas/Arlington	April 1998
T. Hu	University of Indiana	April 1998
K. S. Hahn	University of Rochester	April 1998
P. Gartung	University of California/Riverside	September 1998
J. Krane	University of Nebraska	November 1998
G. Di Loreto	Michigan State University	November 1998
R. Genik	Michigan State University	November 1998
N. Parua	University of Mumbai	November 1998
D. Karmgard	Florida State University	March 1999
A. Gupta	Tata Institute	April 1999
K. Mauritz	Iowa State University	May 1999
J. McDonald	Florida State University	May 1999
K. Frame	Michigan State University	May 1999
E. Smith	University of Oklahoma	May 1999
S. Choi	University of California/Riverside	August 1999
G. Gomez	University of Maryland	August 1999
H. Singh	University of California/Riverside	September 1999
G. Steinbrueck	University of Oklahoma	September 1999
L. Babukhadia	University of Arizona	October 1999
K. Davis	University of Arizona	October 1999
R. Snihur	Northwestern University	December 1999
E. Popkov	University of Notre Dame	April 2000
L. Coney	University of Notre Dame	April 2000
D. Shpakov	SUNY/Stony Brook	July 2000
Z. Casilum	SUNY/Buffalo	October 2000
S. Negroni	Univ. de la Mediterranée	October 2000
B. Knuteson	University of California/Berkeley	December 2000
A. Green	Iowa State University	April 2001
J. Estrada	University of Rochester	July 2001
Y. Kulik	SUNY/Stony Brook	August 2001
L. Dudko	Moscow State University	September 2001
T. Goss	Texas A&M University	September 2001
Q. Xu	University of Michigan	September 2001
A. Abdessalam	LAL, Orsay	October 2001
R. Oliver	LPNHE-Paris	October 2001
C. Hays	Columbia University	December 2001

Y. Huang	University of Michigan	December 2001
C. Lundstedt	University of Nebraska	December 2001
J. Zhou	Iowa State University	December 2001
R. Illingworth	Imperial College	March 2002
A. Patwa	SUNY/Stony Brook	March 2002
F. Deliot	CEA-Saclay	April 2002
M. Ridel	Univ. Paris Sud/LAL	April 2002
H. Zheng	University of Notre Dame	April 2002
D. Bauer	Imperial College	August 2002
A. Besson	Joseph Fourier-Grenoble	October 2002
P. Demine	ISN Grenoble	December 2002
B. Connolly	Florida State University	February 2003
M. Petteni	Imperial College	February 2003
G. Hesketh	University of Manchester	March 2003
S. Jain	Tata Institute	March 2003
F. Villeneuve-Seguier	Univ. de la Méditerranée, Marseille	March 2003
S. Baffioni	Univ. de la Méditerranée, Marseille	April 2003
F. Beaudette	LAL, Orsay	April 2003
C. Hebert	University of Kansas	April 2003
Q. Yu	Louisiana Tech	April 2003
R. Kaur	Panjab University	May 2003
S. Grinstein	Universidad de Buenos Aires	August 2003
F. Canelli	University of Rochester	August 2003
C. Luo	Indiana University	September 2003
M. Gao	Columbia University	September 2003
A. Kupco	Charles University	September 2003
A. Melnitchouk	Brown University	September 2003
O. Peters	Universiteit van Amsterdam	October 2003
Y. Coadou	Uppsala University	October 2003
J. Molina	CBPF/Rio de Janeiro	November 2003
T. Christiansen	LMU, Munich	December 2003
C-H. Han	University of Michigan	December 2003
D. Whiteson	University of California/Berkeley	December 2003
M. Klute	University of Bonn	February 2004
G. Davis	University of Rochester	March 2004
R. Hooper	University of Notre Dame	March 2004
L. Phaf	University of Amsterdam	March 2004
A. Schwartzman	Universidad de Buenos Aires	March 2004
S. Duensing Nelson	University of Nijmegen	April 2004
S. Beauceron	Université Paris VI	May 2004
A. Cothenet	CPPM, Marseille	May 2004
S. Fu	Columbia University	May 2004
M. Hohlfeld	University of Mainz	May 2004
A. Haas	University of Washington	June 2004
T. Anh	Université Paris VI	July 2004
D. Evans	Lancaster University	July 2004
A. Khanov	University of Rochester	July 2004
N. Lahrichi	DAPNIA/Saclay	July 2004
A. Yurkewicz	Michigan State University	August 2004
X. Zhang	University of Oklahoma	August 2004
S. Greder	Strasbourg	October 2004
A. Zabi	LAL, Orsay	October 2004
J. Zhu	University of Maryland	October 2004
A. Askew	Rice University	November 2004
J. Huang	Indiana University	November 2004
R. McCroskey	University of Arizona	November 2004
P. Balm	University of Amsterdam	December 2004
S. Kesisoglou	Brown University	December 2004
S. Fatakia	Boston University	January 2005
W. Fisher	Princeton University	January 2005

E. Nurse	University of Manchester	February 2005
D. Cho	University of Rochester	February 2005
Y. Mutaf	SUNY/Stony Brook	February 2005
T. Golling	University of Bonn	February 2005
K. Black	Boston University	February 2005
C. Barnes	Imperial College London	March 2005
F. Blekman	University of Amsterdam	April 2005
J. Kozminski	Michigan State University	April 2005
E. Busato	Université Paris VI	April 2005
A-C. Le Bihan	Université Louis Pasteur	April 2005
M. Eads	Northern Illinois University	April 2005
N. Xuan	University of Notre Dame	May 2005
M. Das	Louisiana Tech University	May 2005
M. Agelou	Université Paris VI	May 2005
D. Wijngaarden	University of Nijmegen/NIKHEF	June 2005
J-R. Vlimant	Université Paris VI	June 2005
M. Buehler	University of Illinois/Chicago	July 2005
A-M. Magnan	Univ. Joseph Fourier, Grenoble	July 2005
R. Gelhaus	Univ. of California/Riverside	August 2005
X. Song	Northern Illinois University	August 2005
M. Strang	University of Texas/Arlington	August 2005
U. Blumenschein	University of Freiburg	August 2005
M. Binder	LMU/Munich	September 2005
P. Podesta Lerma	CINVESTAV	October 2005
R. Bernhard	University of Zurich	October 2005
J. Gardner	University of Kansas	October 2005
L. Feligioni	Boston University	November 2005
P. Schieferdecker	LMU/Munich	November 2005
K. Chan	University of Rochester	November 2005
P. Mal	Tata Inst. of Fundamental Research	November 2005
T. Bose	Columbia University	December 2005

M.S. Theses

P. Singh	Northern Illinois University	July 1996
J. Yetter	Northern Illinois University	October 1996
M. Mason	Univ. of California/Riverside	June 1998
B. Bhattacharjee	Northern Illinois University	May 1999



E-830

E-830 / 909 / 916 / 924 (Kim / Roser) Collider Detector at Fermilab (CDF)

Academia Sinica (Taiwan), ANL, Barcelona (Spain), Baylor, Bologna (Italy), Brandeis, UC/Davis, UCLA, UC/San Diego, UC/Santa Barbara, Cantabria (Spain), Carnegie Mellon, Chicago, CIEMAT (Spain), Duke, Fermilab, Florida, Frascati (Italy), Geneva (Switzerland), Glasgow (United Kingdom), Harvard, Helsinki (Finland), Illinois, IPP/McGill/Toronto (Canada), ITEP (Russia), JINR (Russia), Johns Hopkins, Karlsruhe (Germany), KEK (Japan), Korea Ctr. for HEP (Korea), LBNL, Liverpool (United Kingdom), Michigan, Michigan State, MIT, New Mexico, Northwestern, Ohio State, Okayama (Japan), Osaka City (Japan), Oxford (United Kingdom), Padova (Italy), Paris VI (France), Pennsylvania, Pisa (Italy), Pittsburgh, Purdue, Rochester, Rockefeller, Rome (Italy), Rutgers, Texas A&M, Trieste/Udine (Italy), Tsukuba (Japan), Tufts, Univ. Coll. London (United Kingdom), Waseda (Japan), Wayne State, Wisconsin, Yale

Status: *E-830 - Data-Taking*
E-909 - Data-Taking
E-916 - Data-Taking
E-924 - No Data Yet

The Collider Detector at Fermilab (CDF) is a general purpose detector system designed to explore the physics of 2 TeV proton-antiproton collisions at the Fermilab Tevatron Collider.

I. General Background

The heart of the CDF central detector is a 5.0-meter-long, 1.5-meter-radius, 1.4 Tesla superconducting solenoid. Tracking systems in the magnetic field provide momentum analysis of charged particles. The solenoid is surrounded by scintillator-based calorimeters in the central region covering the angular range 30^o to 150^o with respect to the Tevatron beams. In the detector which operated until February 1996, two "plug" gas calorimeters in the ends of the solenoid extended the calorimeter coverage down to 10^o. In all regions the calorimeters are divided into electromagnetic and hadronic sections and have a projective tower geometry to measure energy flow in fine bins of pseudorapidity and azimuth. Muon chambers are located behind the calorimeters. The original CDF detector has undergone several upgrades. E-775 was the experiment using the CDFI detector, acquiring data during a Tevatron data-taking period from March 1992 until February 1996 (Run I). Section II below describes the detector upgrades for E-775, and some of the major physics results obtained from the data analysis. From 1996 to 2001 there was a second major upgrade of the CDF detector (CDFII). This started commissioning in the summer of 2000, and first data-taking in March 2001 as experiment E-830. The upgrade and status of Run II data-taking are described in Section III below.

II. The CDFI Detector and Tevatron Run I (E-775)

E-775 is the upgraded version of CDF for Collider Runs Ia and Ib. For Run Ia the highlights of the upgrade included:

1. The addition of a 4-layer, 46,000 channel silicon microstrip vertex detector, the SVX. This device was installed around a new 1.5 inch diameter beam pipe and enabled the reconstruction of secondary vertices, opening up a new field of precise b physics measurements and b-tags for top quark identification.

2. A new set of time-projection chambers with 4 cm drift spaces replacing the old 15 cm drift devices in order to cope with higher luminosity.

3. The muon coverage was considerably improved by:

   a) new chambers and scintillators (CMX) to extend the coverage from pseudorapidity of 0.6 to 1.0; and

   b) additional steel and new chambers to drastically improve the punchthrough background in the central region.

4. New front-end electronics were added to the gas calorimeters and tracking chambers to cope with higher luminosity. These allowed lower gas gain operation and improved noise performance. The outer regions of the CTC were also equipped with dE/dx readout.

5. The throughput of the data acquisition was considerably improved by adding new event builders and more computing power in Level 3. As a result the output to tape increased from 1.2 to 8 Hz.

6. The offline environment was improved by adding 1000 Mips to the farms and acquiring a 1.2 Tbyte robotic storage device.

For Run Ib, the upgrades included:

1. A new radiation-hard Silicon Vertex Detector.

2. The DAQ bandwidth was increased by adding VME-based scanners and an Ultranet hub to connect the readout scanners to the Level 3 processors.

3. New Level 2 processors were installed to increase the speed, flexibility, and power of the trigger.

4. A diffractive spectrometer featuring Roman pots was added.

In Collider Run Ia, CDF rolled into the B0 Collision Hall at the end of March 1992, and the first collisions were seen in May 1992. During Run Ia, the E-775 detector functioned well, taking data at luminosities up to $9\times10^{30}cm^{-2}sec^{-1}$ with 90 percent livetime and an overall data-taking efficiency of 71 percent. A total data sample of 21.4 pb^{-1} was collected by the end of the run in June 1993.

During Collider Run Ib, the detector continued to function well, taking data at luminosities up to $\sim20\times10^{30}cm^{-2}sec^{-1}$ with 90 percent livetime and an

overall data-taking efficiency of about 80 percent. Data-taking began on January 19, 1994, and by February 20, 1996, a total integrated luminosity of ≈ 90 pb^{-1} had been recorded.

A total of 377 papers on CDF results have been published or submitted, and 382 students have written theses on CDF analyses. Some highlights of the Run I physics program include:

1. First evidence of top quark production followed by its discovery (simultaneously with D0). After the discovery, measurements of the top quark mass, production and decay properties rapidly followed.

2. World-class measurements of the spectroscopy and lifetimes of b quark states, including B^0 mixing, CP violation measurements in the $B^0\bar{B}^0$ sector and the discovery of the B_c meson.

3. Measurement of W mass and width, triboson couplings, and Drell-Yan cross section.

4. Observation of excess over QCD calculations of very high E_T jet production, and other QCD measurements in jet physics, photon physics, and diffractive phenomena.

5. New limits on SUSY particles, Higgs boson, leptoquarks, new gauge bosons, and other exotic states.

III. <u>The CDFII Detector and Tevatron Run II (E-830)</u>

E-830 (also known as CDFII) is the upgraded version of CDF for Collider Run II where the bunch spacing will be 396 ns and the luminosity in excess of 2×10^{32}cm^{-2}sec^{-1}. The full scope of the upgrade is described in the Technical Design Report (TDR), available as a Fermilab publication. The highlights of the upgrades for Run IIa include:

1. Replacing the gas calorimeters with scintillating tile-based plug calorimeter extending to $|\eta|$ of 3.6.

2. Replacing the SVX with a five-layer, double-sided SVXII that covers the entire luminous region.

3. Adding two additional layers of silicon detectors (ISL) at larger radii. The combination of the SVXII and ISL will allow precise 3D tracking out to $|\eta|$ of 2.

4. Replacing the CTC with a smaller drift cell version, the COT, which will reduce the drift time to less than the 396 ns bunch spacing.

5. Replacing all the front-end electronics to cope with the shorter bunch spacing. The principal elements include:

a) pipelined front ends and buffering for L2 decisions resulting in virtually deadtimeless operation; and

b) new ASICs for ADCs and TDCs.

6. New trigger system comprising:

a) all digital trigger;

b) new track processor allowing high resolution tracking decisions in L1; and

c) Level 2 trigger based on SVXII to allow secondary vertex triggers at L2.

7. Extended muon coverage out to $|\eta|$ of 1.5 including:

a) new counters and chambers on the muon toroids now moved closer to the interaction region;

b) new counters covering the region just outside the CMX; and

c) covering missing azimuthal regions in the CMX and central muon coverage.

8. New DAQ components with higher throughput at all levels.

9. Extended offline environment that includes:

a) code migration toward object-oriented models;

b) data handling to cope with petabyte-scale datasets; and

c) enhanced computing power in farms.

With the 2 fb^{-1} expected for Run IIa, the anticipated physics program is truly exciting and features:

1. Top quark mass, production, and decay measurements at the few percent level.

2. Observation of CP violation in the b quark sector.

3. Precision mass, lifetime, and spectroscopy measurements of b quark states including B_s mixing and B_c properties.

4. W mass measurement to better than 40 MeV.

5. Jet and photon measurements out to very high E_T.

6. Searches for SUSY particles, Higgs bosons, and other exotic states.

Run IIa began on March 1, 2001. We have collected approximately 1.2 fb^{-1} to date. A total of 61 papers on the Run II CDF results have been submitted or published, and 62 students have received their Ph.D.'s on this data.

CDF as E-909

E-909 is a proposal to upgrade the baseline E-830 experiment with the following detectors:

1. An additional single-sided silicon microstrip detector layer positioned very closed (R ~1.5cm) to the beamline.

2. A time-of-flight (TOF) detector consisting of 216 scintillator bars located between the COT and the solenoid.

With the inclusion of these new detectors, CDF significantly increased its physics reach in the area of CP violation in the B sector and B_s mixing. These proposals received Stage II approval by the Fermilab Director in 1999 and are now installed and operating in the CDFII detector.

CDF as E-916

E-916 is a proposal for a diffractive physics program at CDF. The upgrades for this physics include beam shower counters, a Roman pot detector, and mini-plug calorimeters. This proposal was presented to the Fermilab Director and Physics Advisory Committee (PAC) in November 1999 and received Stage I approval by the Fermilab Director in July 2000. The miniplug calorimeters and Roman Pots are now installed and are taking data.

The CDFII detector is now fully operational and collecting physics data for all of our five broad analysis areas: heavy flavor physics (beauty and charm); top quark physics; QCD with jets and photons, diffractive phenomena; electroweak physics with W and Z bosons and di-bosons; searches for new phenomena (SUSY particles, Higgs bosons, etc.). A three-level trigger system used to select the basic physics objects is working well. We make selection cuts on jets, electrons, muons, photons, neutrinos (via missing energy), and beauty and charm hadrons from semileptonic decays and displaced secondary vertices. The latter is accomplished with a level-two silicon vertex trigger (SVT) which has opened a whole new area of heavy flavor physics at CDF. Data-taking efficiency has now reached about 90 percent (recorded integrated luminosity over that delivered.)

The physics goals of the CDFII experiment are broad and fundamental:

- Make tests of the Standard Model via precision studies of top quarks and W bosons.

- Explore the smallest distance scales with high E_T jets and photons.

- Search for supersymmetric particles.

- Search for Higgs Bosons as the source of electroweak symmetry breaking.
- Search for sources of CP violation beyond the Standard Model.
- Search for phenomena predicted by extra dimensions.

A CDF physicist opened the Lepton-Photon Conference in 2003 that was held at Fermilab. The talk was a summary of top quark results from CDF and D0. CDF presented the top cross section results from several decay modes and using multiple methods. CDF also presented measurements of the top mass using both the lepton+jets channel and the dilepton channel. Searches for new particles including the Higgs, extra dimensions, and supersymmetry were also presented. The first results on charm and bottom using the unique CDF two-track secondary vertex trigger were presented also. CDF is now concentrating on publishing the first 1000 pb^{-1} of recorded data, roughly ten times that of Run I. The detector is working extremely well, and the collaboration is excited about increasing the data sample sizes. We are now exploring the energy frontier more deeply than ever before.

The Run IIb CDF Detector Upgrade Project (E-924)

The running conditions for Collider Run II originally specified that the CDF detector must be capable of handling peak luminosity up to $2\times10^{32}cm^{-2}sec^{-1}$, bunch spacing as small as 132 ns, and an integrated luminosity of 2 fb^{-1}. Since that time, the operating plans for the Collider program have changed. Currently, it is anticipated that 8 fb^{-1} will be collected by 2009, and an instantaneous luminosity of $3\times10^{32}cm^{-2}sec^{-1}$ will be seen at a bunch spacing of 396 ns. These harsher operating conditions motivated a set of upgrades, to handle the increased length of the run and the higher complexity of events in high luminosity operation. Although the scope of this upgrade has evolved with time, we are currently upgrading the following components of the detector:

- The Central Preshower Detector will be replaced by a new device which uses scintillator and photomultiplier tubes.
- Timing information will be read out from all the electromagnetic calorimetry.
- The time-to-digital convertors used for the Central Outer Tracker will be modified to enable quicker reset and readout of the devices.
- The Level 2 trigger infrastructure will be replaced by a more modern system to provide quicker decisions and easier long-term maintenance.
- The Track Trigger, which is used to incorporate the Central Outer Tracker into the Level 1 trigger is being upgraded to include the stereo readout layers in the trigger decision.
- The Event Builder will be upgraded to increase the data throughput and rate of trigger acceptances.

- The Silicon Vertex Trigger will be upgraded to provide finer segmentation and greater speed for trigger decisions.
- Level 3 and data acquisition computers will be upgraded with more modern, and consquently much faster, processors.

The Run IIb project has recently been completed, and the emphasis is now on commissioning and optimizing our systems to take maximal advantage of these new systems. This program will maintain CDF's operation through the high luminosity expected during 2006-2009.

Publications

The CDF Detector: An Overview, Nucl. Instr. and Meth. A271, 387 (1988).

Transverse Momentum Distributions of Charged Particles Produced in $\bar{p}p$ Interactions at $\sqrt{s}$ = 630 and 1800 GeV, Phys. Rev. Lett. 61, 1819 (1988).

Measurement of the Inclusive Jet Cross Section in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 62, 613 (1989).

Measurement of W-Boson Production in 1.8-TeV $\bar{p}p$ Collisions, Phys. Rev. Lett. 62, 1005 (1989).

Limits on the Masses of Supersymmetric Particles from 1.8 TeV $\bar{p}p$ Collisions, Phys. Rev. Lett. 62, 1825 (1989).

Dijet Angular Distributions from $\bar{p}p$ Collisions at $\sqrt{s}$ =1.8 TeV, Phys. Rev. Lett. 62, 3020 (1989).

Measurement of the Mass and Width of the Z^0 Boson at the Fermilab Tevatron, Phys. Rev. Lett. 63, 720 (1989).

Search for Heavy Stable Particles in 1.8 TeV $\bar{p}p$ Collisions at the Fermilab Collider, Phys. Rev. Lett. 63, 1447 (1989).

K_S^0 Production in $\bar{p}p$ Interactions at $\sqrt{s}$ = 630 and 1800 GeV, Phys. Rev. D, Rapid Communication, 40, 3791 (1989).

A Search for the Top Quark in the Reaction $\bar{p}p \rightarrow e$ + Jets at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 64, 142 (1990).

A Search for New Heavy Quarks in Electron-Muon Events at the Fermilab Tevatron Collider, Phys. Rev. Lett. 64, 147 (1990).

Measurement of the Ratio $\sigma(W \rightarrow e\,\nu) / \sigma(Z \rightarrow ee)$ in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 64, 152 (1990).

Two Jet Differential Cross Section in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 Tev, Phys. Rev. Lett. 64, 157 (1990).

A Measurement of D* Production in Jets from $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 64, 348 (1990).

Jet Fragmentation Properties in $\bar{p}p$ Collisions at $\sqrt{s}$ =1.8 TeV, Phys. Rev. Lett. 65, 968 (1990).

A Measurement of the W Boson Mass, Phys. Rev. Lett. 65, 2243 (1990).

Search for a Light Higgs Boson at the Tevatron Proton-Antiproton Collider, Phys. Rev. D, Rapid Communication, 41, 1717 (1990).

The Two Jet Invariant Mass Distribution at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D, Rapid Communication, 41, 1722 (1990).

Pseudorapidity Distributions of Charged Particles Produced in $\bar{p}p$ Interactions at $\sqrt{s}$ = 630 and 1800 GeV, Phys. Rev. D41, 2330 (1990).

Measurement of the W Boson P_T Distribution in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 66, 2951 (1991).

Measurement of the Z Boson P_T Distribution in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 67, 2937 (1991).

A Determination of $\sin^2\theta_W$ from the Forward-Backward Asymmetry in $p\bar{p} \rightarrow Z^0X \rightarrow e^+e^-X$ Interactions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 67, 1502 (1991).

Measurement of the e^+e^- Invariant Mass Distribution in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 67, 2418 (1991).

Search for $W' \rightarrow e\nu$ and $W' \rightarrow \mu\nu$ in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 67, 2609 (1991).

Measurement of $B^0\bar{B}^0$ Mixing at the Fermilab Tevatron Collider, Phys. Rev. Lett. 67, 3351 (1991).

A Measurement of the W Boson Mass in 1.8 TeV $\bar{p}p$ Collisions, Phys. Rev. D43, 2070 (1991).

Top Quark Search in the Electron + Jets Channel in Proton-Antiproton Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D43, 664 (1991).

A Measurement of $\sigma(W \rightarrow e\nu)$ and $\sigma(Z^0 \rightarrow e^+e^-)$ in $\bar{p}p$ Collisions at $\sqrt{s}$ =1800 GeV, Phys. Rev. D44, 29 (1991).

Measurement of QCD Jet Broadening in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D44, 601 (1991).

A Lower Limit on the Top Quark Mass from Events with Two Leptons in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 68, 447 (1992).

Inclusive Jet Cross Section in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 68, 1104 (1992).

Lepton Asymmetry in W Decays from $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 68, 1458 (1992).

A Search for New Gauge Bosons in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 68, 1463 (1992).

Measurement of the Isolated Prompt Photon Cross Section in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 68, 2734 (1992).

Measurement of the Ratio $\sigma B(W \rightarrow \tau\nu) / \sigma B(W \rightarrow e\nu)$ in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, as a Test of Lepton Universality, Phys. Rev. Lett. 68, 3398 (1992).

A Measurement of the B Meson and b Quark Cross Section at $\sqrt{s}$ = 1.8 TeV Using the Exclusive Decay $B^{+-} \rightarrow J/\psi\, K^{+-}$, Phys. Rev. Lett. 68, 3403 (1992).

A Measurement of the Production and Muonic Decay Rate of W and Z Bosons in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 69, 28 (1992).

Limit on the Rare Decay $W^{+-} \rightarrow \gamma + p^{+-}$ in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 69, 2160 (1992).

The Dijet Angular Distribution at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 69, 2897 (1992).

Search for Squarks and Gluinos from $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 69, 3439 (1992).

Inclusive J/ψ, ψ' and b-Quark Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 69, 3704 (1992).

Topology of Three Jet Events in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D45, 1448 (1992).

Properties of Events with Large Total Transverse Energy Produced in Proton-Antiproton Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D45, 2249 (1992).

A Limit on the Top Quark Mass from Proton-Antiproton Collisions at $\sqrt{s}$ = 1800 GeV, Phys. Rev. D45, 3921 (1992).

Limits on the Production of Massive Stable Charged Particles, Phys. Rev. D46, R1889 (1992).

A Measurement of Jet Shapes in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 70, 713 (1993).

Search for $\Lambda_b \rightarrow J/\psi\, \Lambda^0$ in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D47, R2639 (1993).

Comparison of Jet Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 546 and 1800 GeV, Phys. Rev. Lett. 70, 1376 (1993).

Measurement of the Cross Section for Production of Two Isolated Prompt Photons in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 70, 2232 (1993).

A Measurement of Jet Multiplicity in W Events Produced in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 70, 4042 (1993).

A Study of Four-Jet Events and Evidence for Double Parton Interactions in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D47, 4857 (1993).

A Measurement of the Bottom Quark Production Cross Section Using Semileptonic Decay Electrons in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 71, 500 (1993).

Measurement of the Dijet Mass Distribution in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D48, 998 (1993).

A Prompt Photon Cross Section Measurement in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D48, 2998 (1993).

The Center-of-Mass Angular Distribution from Prompt Photons Produced in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 71, 679 (1993).

Observation of the Decay $B_s^0 \rightarrow J/\psi\phi$ in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 71, 1685 (1993).

A Measurement of the Bottom Quark Production Cross Section in 1.8 Tev $p\bar{p}$ Collisions Using Muons from b-Quark Decays, Phys. Rev. Lett. 71, 2396 (1993).

Search for Quark Compositeness, Axigluons and Heavy Particles Using the Dijet Invariant Mass Spectrum Observed in $p\bar{p}$ Collisions, Phys. Rev. Lett. 71, 2542 (1993).

Inclusive χ_c and b-Quark Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 71, 2537 (1993).

A Search for First-Generation Leptoquarks in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV at CDF, Phys. Rev. D48, R3939 (1993).

Measurement of the Average Lifetime of B-hadrons Produced in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 71, 3421 (1993).

Measurement of Drell-Yan Electron and Muon Pair Differential Cross-Sections in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D49, R1 (1994).

Evidence for Top Quark Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D50, 2966 (1994).

A Measurement of the B Meson and b Quark Cross Sections at $\sqrt{s}$ = 1.8 TeV Using the Exclusive Decay $B^0 \rightarrow$ J/Psi $K^*(892)^0$, Phys. Rev. D50, 4252 (1994).

Measurement of Small Angle Antiproton-Proton Elastic Scattering at $\sqrt{s}$ = 546 and 1800 GeV, Phys. Rev. D50, 5518 (1994).

Measurement of the $\bar{p}p$ Single Diffraction Dissociation at $\sqrt{s}$ = 546 and 1800 GeV, Phys. Rev. D50, 5535 (1994).

Measurement of the Antiproton-Proton Total Cross Section at $\sqrt{s}$ = 546 and 1800 GeV, Phys. Rev. D50, 5550 (1994).

A Search for the Top Quark Decaying to a Charged Higgs in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 72, 1977 (1994).

Search for Excited Quarks in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 72, 3004 (1994).

Measurement of the B^+ and B^0 Meson Lifetimes, Phys. Rev. Lett. 72, 3456 (1994).

Measurement of the Ratio $\sigma B(W \rightarrow e\nu) / \sigma B(Z \rightarrow e^+e^-)$ in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 73, 220 (1994).

Evidence for Top Quark Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 73, 225 (1994).

Evidence for Color Coherence in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D50, 5562 (1994).

W Boson + Jet Angular Distribution in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 73, 2296 (1994).

A Precision Measurement of the Prompt Photon Cross Section in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 73, 2662 (1994).

Search for the Top Quark Decaying to a Charged Higgs Boson in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 73, 2667 (1994).

A Direct Measurement of the W Boson Width, Phys. Rev. Lett. 74, 341 (1995).

The Charge Asymmetry in W-Boson Decays Produced in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 74, 850 (1995).

Observation of Rapidity Gaps in $\bar{p}p$ Collisions at 1.8 TeV, Phys. Rev. Lett. 74, 855 (1995).

Measurement of W-Photon Couplings with CDF in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 74, 1936 (1995).

Limits on Z-Photon Couplings from $p\bar{p}$ Interactions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 74, 1941 (1995).

Search for New Gauge Bosons Decaying into Dielectrons in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D51, 949 (1995).

Observation of Top Quark Production in $\bar{p}p$ Collisions with CDF Detector at Fermilab, Phys. Rev. Lett. 74, 2626 (1995).

Search for Charged Bosons Heavier than the W in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1800 GeV, Phys. Rev. Lett. 74, 2900 (1995).

Kinematical Evidence for Top Pair Production in W + Multijet Events in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D51, 4623 (1995).

Search for New Particles Decaying to Dijets in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 74, 3538 (1995).

Measurement of the B_s Meson Lifetime, Phys. Rev. Lett. 74, 4988 (1995).

A Measurement of the Ratio $\sigma \cdot B(p\bar{p} \rightarrow W \rightarrow e\nu) / \sigma \cdot B(p\bar{p} \rightarrow Z^0 \rightarrow ee)$ in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1800 GeV, Phys. Rev. D52, 2624 (1995).

Measurement of the W Boson Mass, Phys. Rev. Lett. 75, 11 (1995).

Properties of High-Mass Multijet Events at the Fermilab Proton-Antiproton Collider, Phys. Rev. Lett. 75, 608 (1995).

Search for Squarks and Gluinos Via Radiative Decays of Neutralinos in Proton-Antiproton Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 75, 613 (1995).

Identification of Top Quarks Using Kinematical Variables, Phys. Rev. D52, R2605 (1995).

Measurement of the W Boson Mass, Phys. Rev. D52, 4784 (1995).

A Search for Second Generation Leptoquarks in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 75, 1012 (1995).

Limits on WWZ and WWγ Couplings from WW and WZ Production in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 75, 1017 (1995).

Measurement of the B Meson Differential Cross-Section, $d\sigma/d_{pT}$, in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 75, 1451 (1995).

Measurement of the Polarization in the Decays $B_d \rightarrow J/\psi\ K^{*0}$ and $B_s \rightarrow J/\psi\phi$, Phys. Rev. Lett. 75, 3068 (1995).

Study of $t\bar{t}$ Production in $p\bar{p}$ Collisions Using Total Transverse Energy, Phys. Rev. Lett. 75, 3997 (1995).

Υ Production in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 75, 4358 (1995).

Measurement of Correlated μ-$\bar{b}$ Jet Cross Sections in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D53, 1051 (1996).

Search for Gluino and Squark Cascade Decays at the Fermilab Tevatron Collider, Phys. Rev. Lett. 76, 2006 (1996).

Reconstruction of $B^0 \rightarrow J/\psi K^0_s$ and Measurement of Ratios of Branching Ratios Involving $B \rightarrow J/\psi K^{(*)}$, Phys. Rev. Lett. 76, 2015 (1996).

Search for the Rare Decay $W^{\pm} \rightarrow \pi^{\pm} + \gamma$, Phys. Rev. Lett. 76, 2852 (1996).

Measurement of $\sigma B(W \rightarrow e\nu)$ and $\sigma B(Z^0 \rightarrow e^+e^-)$ in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 76, 3070 (1996).

Measurement of the Mass of the B^0_s Meson, Phys. Rev. D53, 3496 (1996).

Search for Chargino-Neutralino Production in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 76, 4307 (1996).

Search for Charged Higgs Decays of the Top Quark Using Hadronic Tau Decays, Phys Rev. D54, 735 (1996).

Measurement of the B^- and $\bar{B}^0$ Meson Lifetimes Using Semileptonic Decays, Phys. Rev. Lett. 76, 4462 (1996).

Search for Flavor-Changing Neutral Current B Meson Decays in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 76, 4675 (1996).

Inclusive Jet Cross Section in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 77, 438 (1996).

Properties of Jets in Z Boson Events from 1.8 TeV $\bar{p}p$ Collisions, Phys. Rev. Lett. 77, 448 (1996).

Measurement of Λ^0_b Lifetime Using $\Lambda^0_b \rightarrow \Lambda^+_c l^- \bar{\nu}$, Phys. Rev. Lett. 77, 1439 (1996).

Forward-Backward Charge Asymmetry of Electron Pairs Above the Z^0 Pole, Phys. Rev. Lett. 77, 2616 (1996).

Measurement of the Lifetime of the B^0_s Meson Using the Exclusive Decay Mode $B^0_s \rightarrow J/\psi\phi$, Phys. Rev. Lett. 77, 1945 (1996).

Further Properties of High-Mass Multijet Events at the Fermilab Proton-Antiproton Collider, Phys. Rev. D54, 4221 (1996).

Ratios of Bottom Meson Branching Fractions Involving J/ψ Mesons and Determination of b Quark Fragmentation Fractions, Phys. Rev. D54, 6596 (1996).

Measurement of the $\gamma + D^{*\pm}$ Cross Section in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 77, 5005 (1996).

Measurement of Dijet Angular Distributions at CDF, Phys. Rev. Lett. 77, 5336 (1996).

Measurement of the Branching Fraction $B(B^+_u \rightarrow J/\psi\pi^+)$ and Search for $B^+_c \rightarrow J/\psi\pi^+$, Phys. Rev. Lett. 77, 5176 (1996).

Observation of $\Lambda^0_b \rightarrow J/\psi\Lambda$ at the Fermilab Proton-Antiproton Collider, Phys. Rev. D55, 1142 (1997).

Measurement of $b\bar{b}$ Production Correlations, $B^0\bar{B}^0$ Mixing, and a Limit on ε_B in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D55, 2546 (1997).

Observation of Diffractive W-Boson Production at the Tevatron, Phys. Rev. Lett. 78, 2698 (1997).

Search for Third Generation Leptoquarks in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 78, 2906 (1997).

Evidence for W^+W^- Production in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 78, 4536 (1997).

Search for Charged Higgs Decays of the Top Quark Using Hadronic Decays of the Tau Lepton, Phys. Rev. Lett. 79, 357 (1997).

Search for New Particles Decaying to Dijets at CDF, Phys. Rev. D55, Rapid Communications, R5263 (1997).

J/ψ and $\psi(2S)$ Production in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 79, 572 (1997).

Production of J/ψ Mesons from χ_c Meson Decays in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 79, 578 (1997).

Measurement of Double Parton Scattering in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 79, 584 (1997).

Search for Gluinos and Squarks at the Fermilab Tevatron Collider, Phys. Rev. D56, Rapid Communications, R1357 (1997).

First Observation of the All Hadronic Decay of $t\bar{t}$ Pairs, Phys. Rev. Lett. 79, 1992 (1997).

Search for New Gauge Bosons Decaying into Dileptons in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 79, 2192 (1997).

Limits on Quark-Lepton Compositeness Scales from Dileptons Produced in 1.8 TeV $p\bar{p}$ Collisions, Phys. Rev. Lett. 79, 2198 (1997).

Measurement of Diffractive Dijet Production at the Tevatron, Phys. Rev. Lett. 79, 2636 (1997).

Properties of Six-Jet Events with Large Six-Jet Mass at the Fermilab Proton-Antiproton Collider, Phys. Rev. D56, 2532 (1997).

Double Parton Scattering in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D56, 3811 (1997).

The $\mu\tau$ and $e\tau$ Decays of Top Quark Pairs Produced in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 79, 3585 (1997).

Search for New Particles Decaying into $b\bar{b}$ and Produced in Association with W Bosons Decaying into $e\nu$ or $\mu\nu$ at the Tevatron, Phys. Rev. Lett. 79, 3819 (1997).

Search for First Generation Leptoquark Pair Production in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV Phys. Rev. Lett. 79, 4327 (1997).

Properties of Jets in W Boson Events from 1.8 TeV $\bar{p}p$ Collisions, Phys. Rev. Lett. 79, 4760 (1997).

Properties of Photon Plus Two-Jet Events in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D57, 67 (1998).

Dijet Production by Color-Singlet Exchange at the Fermilab Tevatron, Phys. Rev. Lett. 80, 1156 (1998).

The Jet Pseudorapidity Distribution in Direct Photon Events in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D57, 1359 (1998).

Measurement of the $B^0\bar{B}^0$ Oscillation Frequency in $p\bar{p}$ Collisions using π-B Meson Charge-Flavor Correlations at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 80, 2057 (1998).

Search for Flavor-Changing Neutral Current Decays of the Top Quark in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 80, 2525 (1998).

Measurement of the Top Quark Mass, Phys. Rev. Lett. 80, 2767 (1998).

Measurement of the $t\bar{t}$ Production Cross Section in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 80, 2773 (1998).

Measurement of the Top Quark Mass and $t\bar{t}$ Production Cross Section from Dilepton Events at the Collider Detector at Fermilab, Phys. Rev. Lett. 80, 2779 (1998).

Measurement of the Differential Cross Section for Events with Large Total Transverse Energy in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 80, 3461 (1998).

Measurement of B Hadron Lifetimes Using J/ψ Final States at CDF, Phys. Rev. D57, 5382 (1998).

Observation of Hadronic W Decays in $t\bar{t}$ Events with the Collider Detector at Fermilab, Phys. Rev. Lett. 80, 5720 (1998).

Search for the Decays $B_d^0 \rightarrow \mu^+\mu^-$ and $B_s^0 \rightarrow \mu^+\mu^-$ in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D57, R3811 (1998).

Searches for New Physics in Diphoton Events in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 81, 1791 (1998).

Search for Chargino-Neutralino Associated Production at the Fermilab Tevatron Collider, Phys. Rev. Lett. 80, 5275 (1998).

Search for the Rare Decay $W^{\pm} \rightarrow \pi^{\pm} + \gamma$ in Proton-Antiproton Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D58, Rapid Communications, 031101 (1998).

Observation of $B^+ \rightarrow \psi(2S)K^+$ and $B^0 \rightarrow \psi(2S)K^*(892)^0$ Decays and Measurements of B-Meson Branching Fractions into J/ψ and ψ(2S) Final States, Phys. Rev. D58, 072001 (1998).

Search for the Rare Decay $W^{\pm} \rightarrow D_s^{\pm}\gamma$ in Proton-Antiproton Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D58, 091101 (1998).

Observation of B_c Mesons in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D58, 112004 (1998).

Measurement of the $\sigma(W + \geq 1 \text{ Jet})/\sigma(W)$ Cross Section Ratio from $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett 81, 1367 (1998).

Search for Long-Lived Parents of Z^0 Bosons in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D58, Rapid Communications, 051102 (1998).

Observation of the B_c Meson in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 81, 2432 (1998).

Measurement of the B^- and $\bar{B}^0$ Meson Lifetimes Using Semileptonic Decays, Phys. Rev. D58, 092002 (1998).

Measurement of the CP-Violation Parameter sin(2β) in $B_d^0/\bar{B}_d^0 \rightarrow J/\psi K_s^0$ Decays, Phys. Rev. Lett. 81, 4806 (1998).

Search for Second Generation Leptoquarks in the Dimuon Plus Dijet Channel of $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 81, 4806 (1998).

Search for Higgs Bosons Produced in Association with a Vector Boson in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 81, 5748 (1998).

Events with a Rapidity Gap Between Jets in $\bar{p}p$ Collisions at $\sqrt{s}$ = 630 GeV, Phys. Rev. Lett. 81, 5278 (1998).

Search for the Decays B_s^0, $B_d^0 \rightarrow e^{\pm}\mu^{\mp}$ and Pati-Salam Leptoquarks, Phys. Rev. Lett. 81, 5742 (1998).

Measurement of the Top Quark Mass with the Collider Detector at Fermilab, Phys. Rev. Lett. 82, 281 (1999).

Search for New Particles Decaying to $b\bar{b}$ in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 82, 2038 (1999).

Measurement of the B_d^0-$\bar{B}_d^0$ Flavor Oscillation Frequency and Study of Same Side Tagging of B Mesons in $p\bar{p}$ Collisions, Phys. Rev. D59, 032001 (1999).

Measurement of the B_s^0 Meson Lifetime Using Semileptonic Decays, Phys. Rev. D59, 034021 (1999).

Measurement of Z^0 and Drell-Yan Production Cross Section Using Dimuons in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D59, 052002 (1999).

Kinematics of $t\bar{t}$ Events at CDF, Phys. Rev. D59, 092001 (1999).

Searches for New Physics in Diphoton Events in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D59, 092002 (1999).

Search for Third-Generation Leptoquarks from Technicolor Models in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 82, 3206 (1999).

A Search for B_s^0-$\bar{B}_s^0$ Oscillations Using the Semileptonic Decay $B_s^0 \rightarrow \phi l^+ X\nu$, Phys. Rev. Lett. 82, 3576 (1999).

Measurement of the B_d^0-$\bar{B}_d^0$ Oscillation Frequency Using Dimuon Data in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D60, 051101 (1999).

Search for R-parity Violating Supersymmetry Using Like-Sign Dielectrons in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 83, 2133 (1999).

Measurement of B^0-$\bar{B}^0$ Flavor Oscillation Frequency Using Jet-Charge and Lepton Flavor Tagging in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D60, 072003 (1999).

Measurement of the Associated $\gamma + \mu^{\pm}$ Production Cross Section in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D60, 092003 (1999).

A Measurement of b Quark Fragmentation Fractions in the Production of Strange and Light B Mesons in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D60, 092005 (1999).

Search for a Technicolor ω_T Particle in Events with a Photon and a b-quark Jet at CDF, Phys. Rev. Lett. 83, 3124 (1999).

Search for the Flavor-Changing Neutral Current Decays $B^+ \rightarrow \mu^+\mu^-K^+$ and $B^0 \rightarrow \mu^+\mu^-K^{*0}$, Phys. Rev. Lett. 83, 3378 (1999).

Measurement of the B^0-$\bar{B}^0$ Oscillation Frequency using l^-D^{*+} Pairs and Lepton Flavor Tags, Phys. Rev. D60, 112004 (1999).

Measurement of the Helicity of W Bosons in Top Quark Decays, Phys. Rev. Lett. 84, 216 (2000).

Observation of Diffractive b-quark Production at the Fermilab Tevatron, Phys. Rev. Lett. 84, 232 (2000).

Measurement of $b\bar{b}$ Rapidity Correlations in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D61, 032001 (2000).

Search for a Fourth-Generation Quark More Massive than the Z^0 Boson in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 84, 835 (2000).

The Transverse Momentum and Total Cross Section of e^+e^- Pairs in the Z-boson Region from $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 84, 845 (2000).

Search for Color Singlet Technicolor Particles in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 84, 1110 (2000).

Measurement of b Quark Fragmentation Fractions in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 84, 1663 (2000).

Production of $\Upsilon(1S)$ Mesons from χ_b Decays in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 84, 2094 (2000).

Search for Scalar Top Quark Production in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 84, 5273 (2000).

Search for Scalar Top and Scalar Bottom Quarks in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 84, 5704 (2000).

Search for a W' Boson Via the Decay Mode $W' \rightarrow \mu\nu_\mu$ in 1.8 TeV $p\bar{p}$ Collisions, Phys. Rev. Lett. 84, 5716 (2000).

A Measurement of sin2β from $B \rightarrow J/\psi K_s^0$ with the CDF Detector, Phys. Rev. D61, 072005 (2000).

A Measurement of the Differential Dijet Mass Cross Section in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D61, 091101 (2000).

Search for the Charged Higgs boson in the Decays of Top Quark Pairs in the eτ and μτ Channels at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D62, 12004 (2000).

Limits on Gravitino Production and New Processes with Large Missing Transverse Energy in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 85, 1378 (2000).

Search for Second and Third Generation Leptoquarks Including Production Via Technicolor Interactions in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 85, 2056 (2000).

Search for New Particles Decaying to $t\bar{t}$ in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 85, 2062 (2000).

Measurement of J/ψ and ψ(2S) Polarization in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 85, 2886 (2000).

Direct Measurement of the W Boson Width in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 85, 3347 (2000).

Dijet Production by Double Pomeron Exchange at the Fermilab Tevatron, Phys. Rev. Lett. 85, 4215 (2000).

Measurement of the Decay Amplitudes of $B^0 \rightarrow J/\psi K^{*0}$ and $B_s^0 \rightarrow J/\psi\phi$ Decays, Phys. Rev. Lett. 85, 4668 (2000).

Measurement of dσ/dy for High Mass Drell-Yan e^+e^- Pairs from $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D63, Rapid Communications, 011101 (2000).

Measurement of the Top Quark Mass with the Collider Detector at Fermilab, Phys. Rev. D63, 032003 (2001).

Tests of Enhanced Leading Order QCD in W Boson Plus Jets Events from 1.8 TeV $\bar{p}p$ Collisions, Phys. Rev. D63, 072003 (2001).

Search for Supersymmetric Partner of the Top Quark in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D63, 091101 (2001).

Measurement of the Two-Jet Differential Cross Section in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1800 GeV, Phys. Rev. D64, 012001 (2001).

First Measurement of the Ratio $(t \rightarrow Wb)/B(t \rightarrow Wq)$ and Associated Limit on the CKM Element $|V_{tb}|$, Phys. Rev. Lett. 86, 3233 (2001).

Production of χ_{c1} and χ_{c2} in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 86, 3963 (2001).

Measurement of the Inclusive Jet Cross Section in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D64, 032001 (2001).

Measurement of the $t\bar{t}$ Production Cross Section in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D64, 032002 (2001).

Measurement of the W Boson Mass with the Collider Detector at Fermilab, Phys. Rev. D64, 052001 (2001).

Observation of Orbitally Excited B Mesons in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D64, 072002 (2001).

Search for Neutral Supersymmetric Higgs Bosons in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett.86, 4472 (2001).

Measurement of the Top Quark p_T Distribution, Phys. Rev. Lett. 87, 102001 (2001).

Double Diffraction Dissociation at the Fermilab Tevatron Collider, Phys. Rev. Lett. 87, 141802 (2001).

Cross Section and Heavy Quark Composition of $\gamma + \mu$ Events Produced in $p\bar{p}$ Collisions, Phys. Rev. D65, 012003 (2001).

Measurement of $d\sigma/dM$ and Forward-Backward Charge Asymmetry for High-Mass Drell-Yan e^+e^- Pairs from $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 87, 131802 (2001).

Search for Quark-Lepton Compositeness and a Heavy W' Boson Using the ev Channel in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 87, 231803 (2001).

Observation of Diffractive J/ψ Production at the Fermilab Tevatron, Phys. Rev. Lett. 87, 241802 (2001).

Search for Gluinos and Squarks Using Like-Sign Dileptons in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 87, 251803 (2001).

Search for Gluinos and Scalar Quarks in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV Using the Missing Energy Plus Multijets Signature, Phys. Rev. Lett. 88, 041801 (2002).

Measurement of the Strong Coupling Constant from Inclusive Jet Production at the Tevatron $p\bar{p}$ Collider, Phys. Rev. Lett. 88, 042001 (2002).

Search for Narrow Diphoton Resonances and for $\gamma\gamma$ + W/Z Signatures in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D64, 092002 (2001).

Charged Particle Multiplicity in Jets in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 87, 211804 (2001).

Measurement of the B^+ Total Cross Section and B^+ Differential Cross Section $d\sigma/dp_T$ in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D65, 052005 (2002).

Searches for New Physics in Events with a Photon and b-quark Jet at CDF, Phys. Rev. D65, 052006 (2002).

Study of the Heavy Flavor Content of Jets Produced in Assocation with W Bosons in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D65, 052007 (2002).

Soft and Hard Interactions in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1800 and 630 GeV, Phys. Rev. D65, 072005 (2002).

Search for Single-Top-Quark Production in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D65, 091102 (2002).

Charged Jet Evolution and the Underlying Event in Proton-Antiproton Collisions at 1.8 TeV, Phys. Rev. D65, 092002 (2002).

A Study of $B^0 \rightarrow J/\psi K^{(*)0}\pi^+\pi^-$ Decays with the Collider Detector at Fermilab, Phys. Rev. Lett. 88, 071801 (2002).

Search for New Heavy Particles in the WZ^0 Final State in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 88, 071806 (2002).

Diffractive Dijet Production at $\sqrt{s}$ = 630 and 1800 GeV at the Fermilab Tevatron, Phys. Rev. Lett. 88, 151802 (2002).

Search for the Decay $B_s \rightarrow \mu^+\mu^-\phi$ in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D65, 111101 (2002).

Comparison of the Isolated Direct Photon Cross Section in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV and $\sqrt{S}$ = 0.63 TeV, Phys. Rev. D65, 112003 (2002).

Search for New Physics in Photon-Lepton Events in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D66, 012004 (2002).

Measurement of B Meson Lifetimes Using Fully Reconstructed B Decays Produced in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D65, 092009 (2002).

Υ Production and Polarization in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 88, 161802 (2002).

Measurement of the Ratio of b Quark Production Cross Sections in $\bar{p}p$ Collisions at $\sqrt{s}$ = 630 GeV and $\sqrt{s}$ = 1.800 GeV, Phys. Rev. D66, 032002 (2002).

Branching Ratio Measurements of Exclusive B^+ Decays to Charmonium with the Collider Detector at Fermilab, Phys. Rev. D66, 052002 (2002).

Cross Section for Forward J/ψ Production in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D66, 092001 (2002).

Search for Radiative b-Hadron Decays in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D66, 112002 (2002).

Search for New Physics in Photon-Lepton Events in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 89, 041802 (2002).

Limits on Extra Dimensions and New Particle Production in the Exclusive Photon and Missing Energy Signature in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 89, 281801 (2002).

Momentum Distribution of Charged Particles in Jets in Dijet Events in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV and Comparisons to Perturbative QCD Predictions, Phys. Rev. D68, 012003 (2003).

Search for a W Boson Decaying to a Top and Bottom Quark Pair in 1.8 TeV $p\bar{p}$ Collisions, Phys. Rev. Lett. 90, 081802 (2003).

Search for Long-Lived Charged Massive Particles in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 90, 131801 (2003).

Search for Associated Production of Upsilon and Vector Boson in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 90, 221803 (2003).

Search for Supersymmetric Partner of the Top Quark in Dilepton Events from $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 90, 251801 (2003).

Central Pseudorapidity Gaps in Events with a Leading Antiproton at the Fermilab Tevatron $\bar{p}p$ Collider, Phys. Rev. Lett. 91, 011802 (2003).

Measurement of the Mass Difference $m(D_s^+)$-$m(D^+)$ at CDF II, Phys. Rev. D68, 072004 (2003).

Search for Lepton Flavor Violating Decays of a Heavy Neutral Particle in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 91, 171602 (2003).

Measurement of Prompt Charm Meson Production Cross Sections in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 91, 241804 (2003).

Search for the Flavor-Changing Neutral Current Decay $D^0 \rightarrow \mu^+\mu^-$ in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. D68, 091101 (2003).

Search for Pair Production of Scalar Top Quarks in R-Parity Violating Decay Modes in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 92, 051803 (2004).

Measurement of the Average Time-Integrated Mixing Probability of b-Flavored Hadrons Produced at the Tevatron, Phys. Rev. D69, 012002 (2004).

Optimized Search for Single-Top-Quark Production at the Tevatron, Phys. Rev. D69, 052003 (2004).

Heavy Flavor Properties of Jets Produced in $p\bar{p}$ Interactions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D69, 072004 (2004).

Search for Kaluza-Klein Gravitron Emission in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV Using the Missing Energy Signature, Phys. Rev. Lett. 92, 121802 (2004).

Inclusive Search for Anomalous Production of High-p_T Like-Sign Lepton Pairs in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 93, 061802 (2004).

Observation of the Narrow State X(3872) $\rightarrow$ J/ψ$\pi^+\pi^-$ in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 93, 072001 (2004).

Inclusive Double Pomeron Exchange at the Fermilab Tevatron $\bar{p}p$ Collider, Phys. Rev. Lett. 93, 141601 (2004).

Measurement of the $t\bar{t}$ Production Cross Section in $p\bar{p}$ Collisions at 1.96 TeV Using Dilepton Events, Phys. Rev. Lett. 93, 142001 (2004).

Measurement of the Polar-Angle Distribution of Leptons from W Boson Decay as a Function of the W Transverse Momentum in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D70, 032004 (2004).

The Underlying Event in Hard Interactions at the Tevatron $\bar{p}p$ Collider, Phys. Rev. D70, 072002 (2004).

Direct Photon Cross Section with Conversions at CDF, Phys. Rev. D70, 074008 (2004).

Combination of CDF and D0 Results on W Boson Mass and Width, Phys. Rev. D70, 092008 (2004).

Search for $B_s^0 \rightarrow \mu^+\mu^-$ and $B_d^0 \rightarrow \mu^+\mu^-$ Decays in $p\bar{p}$ Collisions at 1.96 TeV, Phys. Rev. Lett. 93, 032001 (2004).

Search for Doubly-Charged Higgs Bosons Decaying to Dileptons in $p\bar{p}$ Collisions at 1.96 TeV, Phys. Rev. Lett. 93, 221802 (2004).

Search for Electroweak Single Top Quark Production in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. D71, 012005 (2005).

Measurement of the W Boson Polarization in Top Decay at CDF at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D71, 031101 (R) (2005).

Measurement of the J/ψ Meson and b-Hadron Production Cross Sections in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1960 GeV, Phys. Rev. D71, 032001 (2005).

Comparison of Three-Jet Events in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV to Predictions from a Next-to-Leading Order QCD Calculation, Phys. Rev. D71, 032002 (2005).

Measurement of Wγ and Zγ Production in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 94, 041803 (2005).

Search for Anomalous Production of Diphoton Events with Missing Transverse Energy at CDF and Limits on Gauge-Mediated Supersymmetry-Breaking Model, Phys. Rev. D71, 031104 (2005).

First Measurements of Inclusive W and Z Cross Sections from Run II of the Fermilab Tevatron Collider, Phys. Rev. Lett. 94, 091803 (2005).

Search for Excited and Exotic Electrons in the eγ Decay Channel in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 94, 101802 (2005).

Analysis of Decay-Time Dependence of Angular Distributions in $B_s^0 \rightarrow J/\psi\phi$ and $B_d^0 \rightarrow J/\psi K^{*0}$ Decays and Measurement of the Lifetime Difference between B_s Mass Eigenstates, Phys. Rev. Lett. 94, 101803 (2005).

Measurement of Partial Widths and Search for Direct CP Violation in D^0 Meson Decays to K^-K^+ and $\pi^-\pi^+$, Phys. Rev. Lett. 94, 122001 (2005).

Measurement of Charged Particle Multiplicities in Gluon and Quark Jets in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 94, 171802 (2005).

Measurement of the Moments of the Hadronic Invariant Mass Distribution in Semileptonic B Decays, Phys. Rev. D71, 051103 (2005).

Measurement of the Forward-Backward Charge Asymmetry from W $\rightarrow$ eν Production in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. D71, 051104 (2005).

Measurement of the Forward-Backward Charge Asymmetry of Electron-Positron Pairs in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. D71, 052002 (2005).

Measurement of the $t\bar{t}$ Production Cross Section in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV using Lepton + Jet Events with Secondary Vertex b-Tagging, Phys. Rev. D71, 052003 (2005).

Search for ZZ and ZW Production in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. D71, 091105 (2005).

Measurements of Bottom Anti-Bottom Azimuthal Production Correlations in Proton-Antiproton Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D71, 092001 (2005).

Search for Scalar Leptoquark Pairs Decaying to $\nu\bar{\nu}$ $q\bar{q}$ in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. D71, 112001 (2005).

Measurement of the W^+W^- Production Cross Section in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV Using Dilepton Events, Phys. Rev. Lett. 94, 211801 (2005).

Search for Anomalous Kinematics in $t\bar{t}$ Dilepton Events at CDF II, Phys. Rev. Lett. 95, 022001 (2005).

Measurement of the Cross Section for Prompt Diphoton Production in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 95, 022003 (2005).

First Evidence for $B_s^0 \rightarrow \phi\phi$ Decay and Measurements of Branching Ratio and A_{CP} for $B^+ \rightarrow \phi K^+$, Phys. Rev. Lett. 95, 031801 (2005).

Search for Higgs Bosons Decaying into $b\bar{b}$ and Produced in Association with a Vector Boson in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. Lett. 95, 051801 (2005).

Search for Long-Lived Doubly-Charged Higgs Bosons in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 95, 071801 (2005).

Measurement of B(t $\rightarrow$ Wb)/B(t $\rightarrow$ Wq) at the Collider Detector at Fermilab, Phys. Rev. Lett. 95, 102002 (2005).

Measurement of the $t\bar{t}$ Production Cross Section in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV Using Lepton Plus Jets Events with Semileptonic B Decays to Muons, Phys. Rev. D72, 032002 (2005).

Measurement of the Cross Section for $t\bar{t}$ Production for $p\bar{p}$ Collisions Using the Kinematics of Lepton + Jets Events, Phys. Rev. D72, 052003 (2005).

Search for New Physics Using High Mass Tau Pairs from 1.96 TeV $p\bar{p}$ Collisions, Phys. Rev. Lett. 95, 131801 (2005).

Search for $B_s^0 \rightarrow \mu^+\mu^-$ and $B_d^0 \rightarrow \mu^+\mu^-$ Decays in $p\bar{p}$ Collisions with CDF II, Phys. Rev. Lett. 95, 221805 (2005).

Search for New High Mass Particles Decaying to Lepton Pairs in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 95, 252001 (2005).

Search for $\Lambda_b^0 \rightarrow p\pi$ and $\Lambda_b^0 \rightarrow pK$ Decays in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. D72, 051104 (2005).

Search for First-Generation Scalar Leptoquarks in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. D72, 051107 (2005).

K_s^0 and Λ^0 Production Studies in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1800 and 630 GeV, Phys. Rev. D72, 052001 (2005).

A Search for Supersymmetric Higgs Bosons in the Di-Tau Decay Mode in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D72, 072004 (2005).

Search for W and Z Bosons in the Reaction $\bar{p}p \rightarrow$ 2 Jets + γ at $\sqrt{s}$ = 1.8 TeV, Phys. Rev. D73, 012001 (2006).

Search for Neutral Higgs Bosons of the Minimal Supersymmetric Standard Model Decaying to τ Pairs in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 96, 011802 (2006).

Precision Top Quark Mass Measurement in the Lepton + Jets Topology in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 96, 022004 (2006).

Search for Charged Higgs Bosons from Top Quark Decays in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, Phys. Rev. Lett. 96, 042003 (2006).

Measurement of b Hadron Masses in Exclusive J/ψ Decays with the CDF Detector, submitted to Phys. Rev. Lett., Fermilab-Pub-05-316-E.

Measurements of the Inclusive W and Z Cross Sections in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, submitted to Phys. Rev. D, Fermilab-Pub-05-360-E.

Measurement of the Ratios of Branching Fractions $B(B_s^0 \to D_s^- \pi^+)/B(B^0 \to D^- \pi^+)$ and $B(B^+ \to \bar{D}^0 \pi^+)/B(B^0 \to D^- \pi^+)$, submitted to Phys. Rev. Lett., Fermilab-Pub-05-415-E.

Measurement of the Azimuthal Angle Distributions of Leptons from W Boson Decays as a Function of the W Transverse Momentum in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, submitted to Phys. Rev. D, Fermilab-Pub-05-063-E.

Direct Search for Dirac Magnetic Monopoles in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, submitted to Phys. Rev. Lett., Fermilab-Pub-05-444-E.

Top Quark Mass Measurement Using the Template Method in the Lepton + Jets Channel at CDF II, submitted to Phys. Rev. D, Fermilab-Pub-05-472-E.

A Search for $t \to \tau\nu q$ in $t\bar{t}$ Production, submitted to Phys. Rev. Lett., Fermilab-Pub-05-484-E.

Measurement of the Helicity of W Bosons in Top-Quark Decays, submitted to Phys. Rev. Lett., Fermilab-Pub-05-504-E.

Evidence for the Exclusive Decay $B_c^{\pm} \to J/\psi\pi^{\pm}$ and Measurement of the Mass of the $B_c^{\pm}$ Meson, submitted to Phys. Rev. Lett., Fermilab-Pub-05-216-E.

Measurement of the Top Quark Mass with the Dynamical Likelihood Method Using Lepton Plus Jets Events with b-Tags in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, submitted to Phys. Rev. D, Fermilab-Pub-05-533-E.

Measurement of the Inclusive Jet Cross Section in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV Using a Cone-Based Jet Algorithm, submitted to Phys. Rev. Lett., Fermilab-Pub-05-559-E.

Measurement of $\sigma_{\Lambda_b^0}/\sigma_{\bar{B}^0} \times B(\Lambda_b^0 \to \Lambda_c^+ \pi^-)/B(\bar{B}^0 \to D^+\pi^-)$ in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, submitted to Phys. Rev. Lett., Fermilab-Pub-05-574-E.

Measurement of the Dipion Mass Spectrum in $X(3872) \to J/\psi\pi^+\pi^-$ Decays, submitted to Phys. Rev. Lett., Fermilab-Pub-05-535-E.

Search for Second-Generation Scalar Leptoquarks in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, submitted to Phys. Rev. D, Fermilab-Pub-05-546-E.

Search for $H \to b\bar{b}$ Produced in Association with W Bosons in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, submitted to Phys. Rev. Lett., Fermilab-Pub-05-549-E.

Top Quark Mass Measurement from Dilepton Events at CDF II, submitted to Phys. Rev. Lett., Fermilab-Pub-05-551-E.

Measurement of the Inclusive Jet Cross Section Using the K_T Algorithm in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, submitted to Phys. Rev. Lett., Fermilab-Pub-05-555-E.

Search for Anomalous Semileptonic Decay of Heavy Flavor Hadrons Produced in Association with a W Boson at CDF II, submitted to Phys. Rev. D Rapid Comm., Fermilab-Pub-05-560-E.

Measurement of Mass and Width of the Excited Charmed Meson States D_1^0 and D_2^{*0} at CDF, submitted to Phys. Rev. D Rapid Comm., Fermilab-Pub-05-552-E.

A Search for Scalar Bottom Quarks from Gluino Decays in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, submitted to Phys. Rev. Lett., Fermilab-Pub-05-553-E.

Measurement of the Top Quark Mass Using Template Methods on Dilepton Events in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV, submitted to Phys. Rev. D, Fermilab-Pub-06-019-E.

Observation of $B_s^0 \to \psi(2S)\phi$ and Measurement of Ratio of Branching Fractions $B(B_s^0 \to \psi(2S)\,\phi)/B(B_s^0 \to J/\psi\phi)$, submitted to Phys. Rev. Lett., Fermilab-Pub-06-021-E.

Theses

G. Chiarelli	University of Pisa	March 1985
M. Sekiguchi	University of Tsukuba	
S. E. Kuhlmann	Purdue University	August 1988
D. A. Smith	University of Illinois	December 1988
T. K. Westhusing	University of Illinois	December 1988
R. D. St. Denis	Harvard University	December 1988
M. Miller	University of Pennsylvania	December 1988
Y. Morita	University of Tsukuba	January 1989
D. N. Brown	Harvard University	June 1989
R. M. Carey	Harvard University	July 1989
M. H. Schub	Purdue University	August 1989
R. M. Harris	Lawrence Berkeley Laboratory	August 1989
B. L. Flaugher	Rutgers University	October 1989
J. E. Skarha	University of Wisconsin	1989
B. Hubbard	Lawrence Berkeley Laboratory	November 1989
A. Byon	Purdue University	December 1989
G. Redlinger	University of Chicago	1989
Y. Tsay	University of Chicago	1989
W. Trischuk	Harvard University	April 1990
F. Snider	University of Chicago	March 1990
M. Contreras	Brandeis University	April 1990
H. Keutelian	University of Illinois	May 1990
S. Leone	University of Pisa	June 1990
P. Hu	Rutgers University	June 1990
S. Kanda	University of Tsukuba	June 1990
P. Schlabach	University of Illinois	August 1990
J. Walsh	University of Pennsylvania	1990
T. Mimashi	University of Tsukuba	September 1990
P. Hurst	University of Illinois	October 1990
P. Derwent	University of Chicago	November 1990
T. Hessing	Texas A&M University	December 1990
B. L. Winer	Lawrence Berkeley Laboratory	February 1991
G. Punzi	Scuola Normale Superiore Pisa	February 1991
J. Ng	Harvard University	May 1991
A. Roodman	University of Chicago	June 1991
L. DeMortier	Brandeis University	September 1991
F. Ukegawa	University of Tsukuba	September 1991
L. Song	University of Pennsylvania	October 1991
D. Connor	University of Pennsylvania	November 1991
K. Byrum	University of Wisconsin	December 1991
V. Scarpine	University of Illinois	December 1991
R. Hughes	University of Pennsylvania	January 1992
L. Markosky	University of Wisconsin	January 1992
M. Ninomiya	University of Tsukuba	January l992
Y. Seiya	University of Tsukuba	January 1992
S. Ogawa	University of Tsukuba	January 1992
L. Nakae	Brandeis University	April l992
R. Markeloff	University of Wisconsin	August 1992
D. Gerdes	University of Chicago	September 1992
L. Keeble	Texas A&M University	September 1992
B. T. Huffman	Purdue University	December 1992
S. Vejcik	Johns Hopkins University	August 1992
S. M. Moulding	Brandeis University	February 1993
P. A. Maas	University of Wisconsin	August 1993
M. Incagli	University of Pisa	October 1993
V. Bolognesi	University of Pisa	October 1993
R. Drucker	Univ. of California/Berkeley	November 1993

D. Benjamin	Tufts University	November 1993
J. Lamoureux	University of Wisconsin	December 1993
C. Boswell	Johns Hopkins University	December 1993
R. Schwartz	University of Illinois	December 1993
C. Luchini	University of Illinois	December 1993
C. Jessop	Harvard University	December 1993
M. Roach-Bellino	Tufts University	January 1994
D. Kardelis	University of Illinois	January 1994
S. Dell'Agnello	University of Pisa	February 1994
S. Leone	University of Pisa	February 1994
M. Cobal	University of Pisa	February 1994
B. Farhat	Mass. Institute of Technology	February 1994
R. Mattingly	Brandeis University	March 1994
T. Chikamatsu	University of Tsukuba	April 1994
W. Wester	Univ. of California/Berkeley	April 1994
M. W. Bailey	Purdue University	May 1994
S. Kopp	University of Chicago	May 1994
M. Dickson	University of Rochester	May 1994
M. Takano	University of Tsukuba	June 1994
A. Spies	John Hopkins University	July 1994
J. Tonnison	Purdue University	August 1994
Y. Cen	University of Pennsylvania	August 1994
B. Badgett	University of Michigan	September 1994
D. Saltzberg	University of Chicago	October 1994
N. Turini	University of Bologna	November 1994
T. Song	University of Michigan	December 1994
J. Wang	University of Chicago	December 1994
G. Watts	University of Rochester	December 1994
M. Vondracek	University of Illinois	December 1994
R. Oishi	University of Tsukuba	January 1995
D. Lucchesi	University of Pisa	February 1995
R. Keup	University of Illinois	February 1995
C. Anway-Wiese	Univ. of California/Los Angeles	June 1995
J. Romano	University of Chicago	August 1995
C. Hawk	Rutgers University	October 1995
E. Meschi	Scuola Normale Superiore, Pisa	October 1995
D. Glenzinski	Johns Hopkins University	November 1995
S. Hauger	Duke University	December 1995
D. Neuberger	Univ. of California/Los Angeles	December 1995
S. Rolli	Pavia University	January 1996
H. Mitsushio	University of Tsukuba	January 1996
R. Hans	Yale University	January 1996
G. Tartarelli	University of Milan	January 1996
P. Azzi	University of Padova	February 1996
M. Gallinaro	University of Rome	February 1996
M. Kruse	Purdue University	February 1996
I. Yu	Yale University	February 1996
T. Asakawa	University of Tsukuba	February 1996
F. Azfar	University of Pennsylvania	March 1996
A. Martin	University of Illinois	April 1996
G. Houk	University of Pennsylvania	April 1996
J. Tseng	Johns Hopkins University	May 1996
A. Maghakian	Rockefeller University	May 1996
D. Kestenbaum	Harvard University	May 1996
T. Baumann	Harvard University	May 1996
P. Yeh	National Taiwan University	June 1996
Y. Kato	Osaka University	June 1996
T. Ino	University of Tsukuba	June 1996
G. Sganos	University of Toronto	June 1996

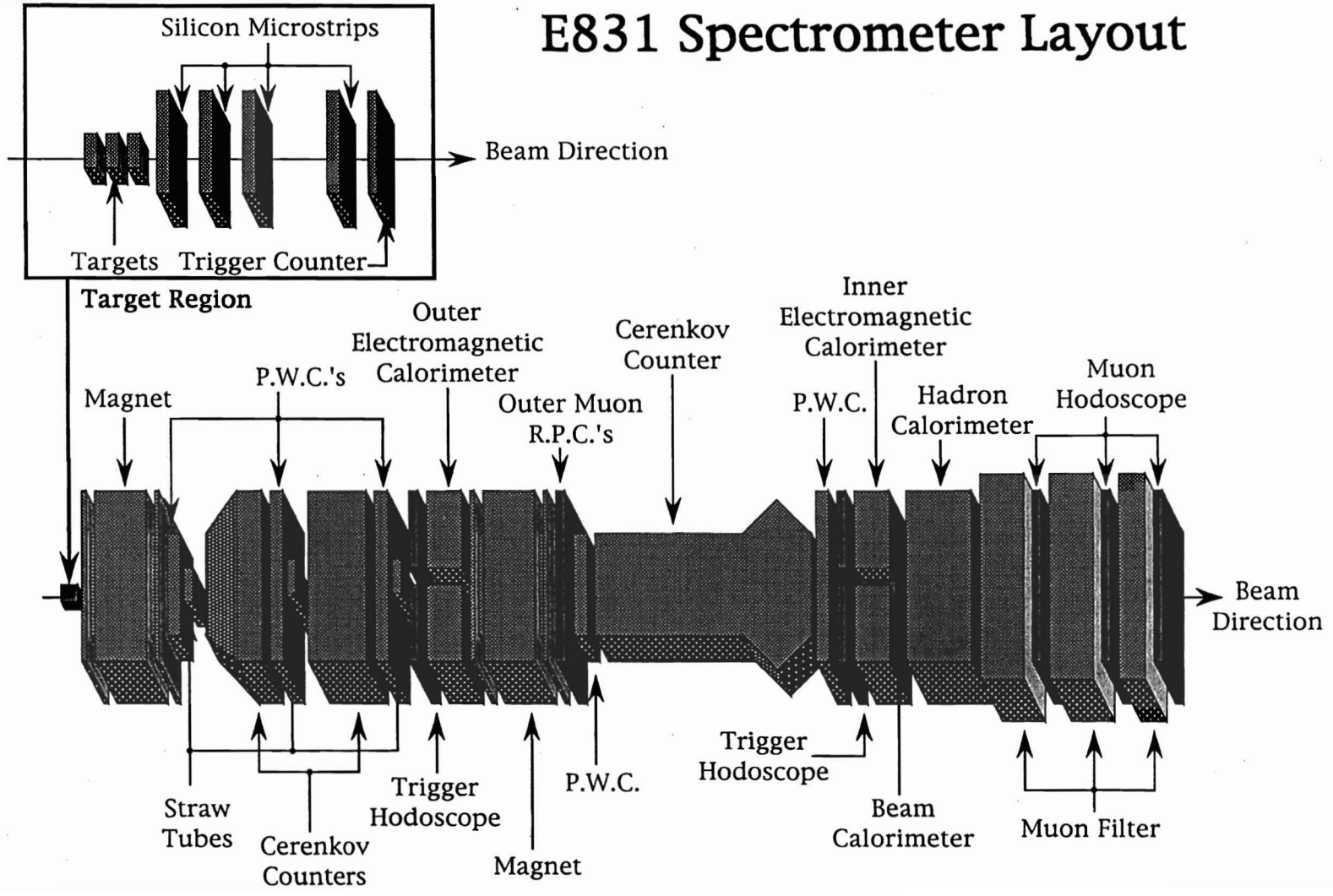
J. Cammerata	John Hopkins University	August 1996
L. Zhang	University of Wisconsin	August 1996
E. Hayashi	University of Tsukuba	September 1996
M. Pillai	University of Rochester	September 1996
F. Keyvan	Univ. of California/Los Angeles	September 1996
S. Metzler	University of Pennsylvania	December 1996
P. Koehn	University of Rochester	December 1996
F. Qun	University of Rochester	December 1996
S. Aota	University of Tsukuba	January 1997
M. Shimojima	University of Tsukuba	January 1997
T. Daniels	Massachusetts Institute of Technology	April 1997
W. Bokhari	Massachusetts Institute of Technology	April 1997
C. C. Miao	University of Michigan	May 1997
M. Peters	University of California/Berkeley	May 1997
C. Couyoumtzelis	University of Geneva	June 1997
A. Titov	Rockefeller University	June 1997
T. Kuwabara	University of Tsukuba	June 1997
H. Sato	University of Tsukuba	June 1997
M. Hohlmann	University of Chicago	August 1997
D. Cronin-Hennessy	Duke University	August 1997
T. Takano	University of Tsukuba	September 1997
K. Tollefson	University of Rochester	October 1997
S. Bagdasarov	Rockefeller University	October 1997
O. Long	University of Pennsylvania	November 1997
P. Maksimovic	Massachusetts Institute of Technology	November 1997
K. Burkett	University of Michigan	December 1997
H. Kambara	University of Geneva	December 1997
B. Tannenbaum	University of New Mexico	December 1997
D. Toback	University of Chicago	December 1997
E. Kuns	Rutgers University	December 1997
A. Warburton	University of Toronto	December 1997
E. Cocca	University of Pisa	January 1998
J. Suzuki	University of Tsukuba	January 1998
M. Okabe	University of Tsukuba	January 1998
S. Vandenbrink	University of Pittsburgh	January 1998
N. Busetti	University of Padova	February 1998
W. Ashmanskas	University of California/Berkeley	May 1998
L. Scodellaro	University of Padova	July 1998
M. Scardellato	University of Padova	July 1998
R. Rossin	University of Padova	July 1998
A. Bocci	University of Pisa	July 1998
K. Hoffman	Purdue University	July 1998
J. Olsen	University of Wisconsin	August 1998
L. Groer	Rutgers University	October 1998
A. Gordon	Harvard University	November 1998
J. Dittmann	Duke University	December 1998
H. Ikeda	University of Tsukuba	January 1999
H. Minato	University of Tsukuba	January 1999
B. Hinrichsen	University of Toronto	January 1999
T. Handa	Hiroshima University	January 1999
H. Kim	University of Toronto	January 1999
W. Taylor	University of Toronto	January 1999
D. Vucinic	Massachusetts Institute of Technology	February 1999
K. Kelley	Massachusetts Institute of Technology	February 1999
N. Eddy	University of Michigan	February 1999
N. Moggi	University of Pavia	April 1999
K. Karr	Tufts University	May 1999
E. Guillian	University of Michigan	May 1999
A. Akopian	Rockefeller University	June 1999

P. Chang	National Tsing Hua University	June 1999
N. Bruner	University of New Mexico	July 1999
A. Hardman	Purdue University	August 1999
J. Wahl	University of Chicago	August 1999
J. Done	Texas A&M University	August 1999
A. Koengeter	University of Karlsruhe	November 1999
T. Kikuchi	University of Tsukuba	December 1999
K. Kordas	McGill University	December 1999
S. Pappas	Yale University	December 1999
K. Terashi	University of Tsukuba	January 2000
J. Guimaraes da Costa	University of Michigan	January 2000
J. Cassada	University of Rochester	January 2000
A. Scott	Univ. of California/Los Angeles	February 2000
T. Keaffaber	Purdue University	May 2000
J. Steele	University of Wisconsin	May 2000
D. Winn	University of Michigan	May 2000
C. Mesropian	Rockefeller University	June 2000
J. Liu	University of Rochester	June 2000
T. Shah	Massachusetts Institute of Technology	July 2000
R. Cropp	University of Toronto	August 2000
M. Spiropulu	Harvard University	August 2000
T. Speer	University of Geneva	September 2000
A. Robinson	University of Toronto	September 2000
J. Berryhill	University of Chicago	December 2000
P. Gatti	University of Padova	December 2000
M. P. Giordani	University of Padova	December 2000
M. Tanaka	University of Tsukuba	January 2001
C.-Y. P. Ngan	University of Rochester	February 2001
G. Latino	University of Cassino	February 2001
H. Nakada	University of Tsukuba	March 2001
A. Safonov	University of Florida	April 2001
S. Bailey	Harvard University	April 2001
M. J. Kim	Kyungpook National University	April 2001
L. Christofek	University of Illinois	May 2001
D. Partos	Brandeis University	May 2001
R. Haas	University of Florida	May 2001
A. Solodsky	Rockefeller University	May 2001
C. Hill	University of California/Davis	September 2001
A. Cerri	Scuola Normale Superiore of Pisa	October 2001
T. Gao	University of Pennsylvania	October 2001
F. Strumia	University of Geneva	December 2001
C. Smith	Johns Hopkins University	January 2002
L. Scodellaro	Padova University	February 2002
A. Taffard	University of Liverpool	March 2002
S. Murgia	Michigan State University	May 2002
J. Carlson	University of Michigan	May 2002
M. Martin	University of Oxford	May 2002
S. Wolinski	University of Michigan	May 2002
C. Hall	Harvard University	May 2002
A. Heiss	Karlsruhe University	June 2002
L. Cerrito	University College London	June 2002
M. Brozovic	Duke University	August 2002
C. Ciobanu	Ohio State University	August 2002
Y. Miyazaki	Osaka City University	September 2002
C. Sanchez	Ohio State University	
A. Affolder	University of California/Berkeley	December 2002
A. Brandl	University of New Mexico	December 2002
O. Lobban	Texas Tech. University	Deember 2002
A. Pompos	Purdue University	December 2002

T. Pratt	Oxford University	January 2003
R. Rossin	Universita di Roma "La Sapienza"	January 2003
P. Schemitz	Universitat Karlsruhe	January 2003
S. Menzemer	Universitat Karlsruhe	January 2003
M. Kirk	Brandeis University	February 2003
H. Niu	Brandeis University	February 2003
H. Takano	University of Tsukuba	April 2003
C. Chen	University of Pennsylvania	May 2003
A. Gresele	University of Bologna	May 2003
M. Krasberg	University of Michigan	May 2003
K. Hatakeyama	Rockefeller University	June 2003
H. Stadie	Universitat Karlsruhe	July 2003
C. Neu	Ohio State University	July 2003
J. Lancaster	Duke University	August 2003
K. Lannon	University of Illinois	September 2003
R. Madrak	Harvard University	September 2003
G. Manca	Oxford University	December 2003
A. Connolly	University of California/Berkeley	December 2003
J. Chung	Ohio State University	December 2003
G. Veramendi	University of California/Berkeley	December 2003
T. Pauly	Oxford University	December 2003
Y. Le	Johns Hopkins University	December 2003
K. Yi	Johns Hopkins University	December 2003
S. Tsuno	University of Tsukuba	January 2004
H. Ray	University of Michigan	March 2004
K. Ikado	Waseda University	March 2004
D. Goldstein	Univ. of California/Los Angeles	March 2004
I. Furic	Massachusetts Institute of Technology	March 2004
D. Tsybychev	University of Florida	March 2004
B. Kilminster	University of Rochester	April 2004
A. Varganov	University of Michigan	April 2004
S. Waschke	University of Glasgow	April 2004
A. Korn	Massachusetts Institute of Technology	May 2004
M. Worcester	Univ. of California/Los Angeles	June 2004
H. Gerberich	Duke University	July 2004
S. Farrington	University of Glasgow	August 2004
D. Ryan	Tufts University	August 2004
K. Anikeev	Massachusetts Institute of Technology	September 2004
M. Coca	University of Rochester	September 2004
M. Mulhearn	Massachusetts Institute of Technology	September 2004
M. Kirby	Duke University	October 2004
R. Napora	Johns Hopkins University	October 2004
Y. Liu	University of Geneva	November 2004
M. Karagoz Unel	Northwestern University	December 2004
G. Flanagan	Michigan State University	December 2004
A. Ivanov	University of Rochester	December 2004
C. Rott	Purdue University	December 2004
H. Bachacou	Univ. of California/Berkeley	December 2004
T. Vickey	Univ. of Illinois/Urbana-Champaign	December 2004
M. J. Turner	University of Liverpool	December 2004
M. S. Kim	Kyungpook National University	December 2004
R. Marginean	University of Ohio	December 2004
J. Kang	University of Michigan	December 2004
D. Ryan	Tufts University	January 2005
K. Ikado	Waseda University	February 2005
A. Robson	Oxford University	February 2005
C. Rott	Purdue University	March 2005
H. Gerberich	Duke University	March 2005
M. Kim	Kyungpook National University	March 2005

Z. Wan	Rutgers University	April 2005
S-S. Yu	University of Pennsylvania	April 2005
N. Tanimoto	Okayama University	April 2005
T. Unverhau	Glasgow University	April 2005
T. Vickey	University of Illinois	April 2005
A. Bocci	Rockefeller University	April 2005
S. Demers Konezny	University of Rochester	May 2005
E. Brubaker	University of California/Berkeley	May 2005
K. Sato	University of Tsukuba	May 2005
A. Ivanov	University of Rochester	May 2005
A. Pranko	University of Florida	May 2005
D. Tsybychev	University of Florida	May 2005
T. Ogawa	Waseda University	May 2005
K. Yorita	Waseda University	May 2005
A. Rakitin	Massachusetts Institute of Technology	July 2005
J. Piedra	Universidad de Cantabria	August 2005
S. Rappoccio	Harvard University	August 2005
A. Giurgiu	Carnegie Mellon University	September 2005
N. Pozzobon	University of Pisa	September 2005
G. Veramendi	University of Tsukuba	September 20065
Y. Ishizawa	University of Tsukuba	September 2005
N. Goldschmidt	University of Michigan	November 2005
J.-F. Arguin	University of Toronto	December 2005
A. Gajjar	University of Liverpool	December 2005
R. Eusebi	University of Rochester	December 2005
D. McGivern	University College London	December 2005
H. Hayward	University of Liverpool	December 2005
C. Liu	Yale University	December 2005
B. Stelzer	University of Toronto	January 2006
S. Uozumi	University of Tsukuba	January 2006
S. Amerio	University of Padova	January 2006
A. Kovalev	University of Pennsylvania	January 2006
V. Krutelyov	Texas A&M University	January 2006
D. Usynin	University of Pennsylvania	January 2006

E831 Spectrometer Layout



E-831 (Cumalat / Moroni) A High Statistics Study of States Containing Heavy Quarks Using the Wideband Photon Beam and the E-687 Multiparticle Spectrometer

UC / Davis, CBPF (Brazil), CINVESTAV (Mexico), Colorado, Fermilab, INFN / Frascati (Italy), Illinois / Champaign, Korea (Korea), INFN / Milano (Italy), Milano (Italy), North Carolina, INFN / Pavia (Italy), Pavia (Italy), Puebla (Mexico), Puerto Rico / Mayaguez, South Carolina, Tennessee, Vanderbilt, Wisconsin, Yeonsei (Korea)

Status: *Data Analysis*

E-831 (FOCUS) is a high-intensity photoproduction experiment that is designed to study the production and decay of charmed particles. The experiment enjoyed a successful data-taking period during 1996 and 1997. The spectrometer has excellent particle identification with three Cerenkov counters, two electromagnetic calorimeters, and several scintillator arrays for muon detection. A scintillating fiber calorimeter is used to identify neutrons and to determine the energy of the hadronic event. The vertex region contains segmented BeO targets interleaved with silicon strip detectors. The vertex region is followed by 12 planes of silicon strip detectors.

The physics of the experiment involves high-precision studies of D semileptonic decays with an emphasis on the determination of form factors and CKM matrix elements $|V_{cd}|$ and $|V_{cs}|$, QCD studies of Double D events, a measurement of the absolute branching fraction for the D^0 meson, searches for D^0 mixing using hadronic and semileptonic final states, and searches for CP violation, rare and forbidden decays, fully leptonic decays of the D^+, and a systematic investigation of charm baryons and their lifetimes.

In 2005 we published thirteen papers. They include measurements of the q^2 dependence (both parametrically and non-parametrically) of $D^0 \to K^-\mu^+\nu$ and $D^0 \to \pi^-\mu^+\nu$, the first analysis of $D^0 \to K^0\pi^-\mu^+\nu$, a measurement of the branching ratio of $D^0 \to \pi^-\mu^+\nu$ to $D^0 \to K^-\mu^+\nu$, a study of $D^0 \to K_sK_sX$ decay channels, a four-body amplitude analysis of $D^0 \to K^+K^-\pi^+\pi^-$, and a measurement of the doubly Cabibbo-suppressed decay channel $D^0 \to K^+\pi^-$ and a search for charm mixing. We developed a new application of genetic programming to High Energy Physics and used the technique to search for doubly Cabibbo-suppressed decays of the Λ_c^+ and the D_s^+. We also studied the line shape of $D^+ \to K^-\pi^+\mu^+\nu$ decays and made a new measurement of the K*(892) mass and width. Other analyses include a search for strongly decaying charm pentaquark states, the first search for T-violation in charm meson decays, the best measurement of the D_s^+ lifetime, and a study of Λ_c^+ Cabibbo- favored decays.

In addition to these papers we have three more papers accepted for publication, namely the first non-parametric measurement of D^+ semileptonic form factors, a study of CP violation and decay asymmetry parameters in $\Lambda_c^+ \to \Lambda\pi^+$ decays, and a new branching fraction measurement of $(D^+ \to \rho^0\mu^+\nu)$ relative to $(D^+ \to \overline{K}^{*0}\mu^+\nu)$.

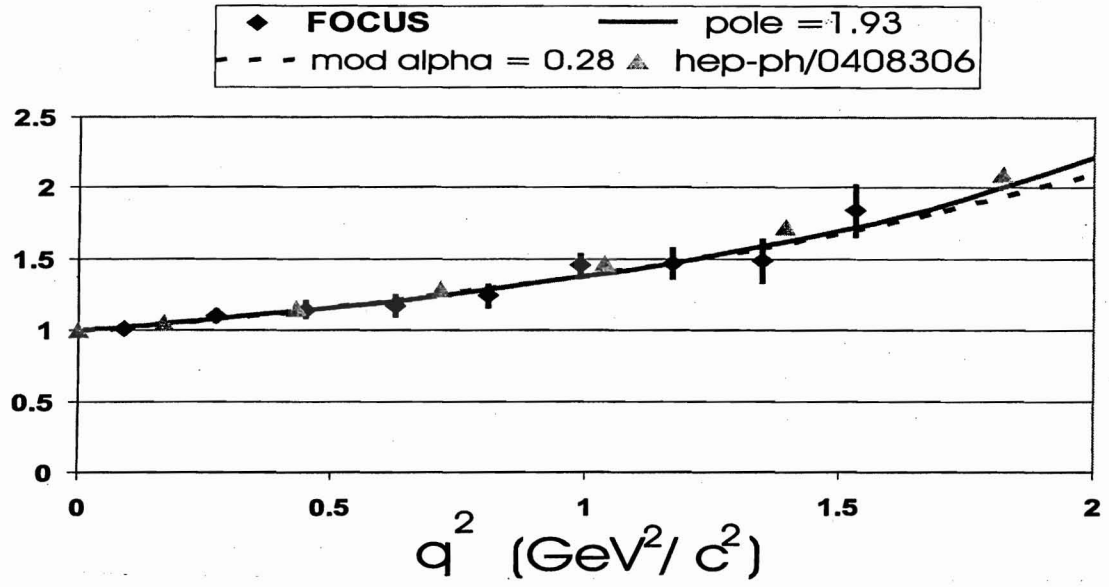


Figure 1. The background subtracted form factor for $D^0 \to K^-\mu^+\nu$, $f_+^{(K)}(q^2)$, (diamonds with error bars) is compared to a pole form with $m_{pole} = 1.93$ GeV/c^2 (solid curve), a modified pole form with $\alpha = 0.28$ (dashed curve), and unquenched, Lattice QCD, calculations given in reference above (triangles with no error bars). The form factor is usually assumed to have a form $f_+^{(K)}(q^2) = \frac{f_+(0)}{1-q^2/m_{pole}^2}$. The modified form factor is $f_+^{(K)}(q^2) = \frac{f_+(0)}{(1-q^2/m_{D_s^*}^2)(1-\alpha\, q^2/m_{D_s^*}^2)}$.

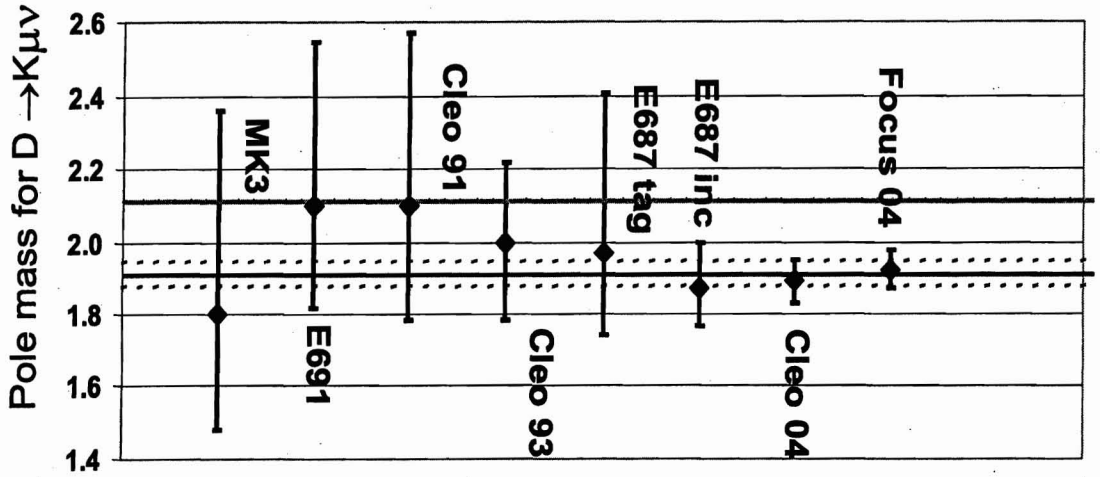


Figure 2. Summary of m_{pole} measurements. All data are consistent with a weighted average pole mass of $m_{pole} = 1.91 \pm 0.04$ GeV/c^2. The upper solid line shows the spectroscopic pole mass at $m_{D_s^*}$. The lower solid line and the two dashed lines represent the weighted average and its error. The weighted average of all data is 5.1σ lower than $m_{D_s^*}$.

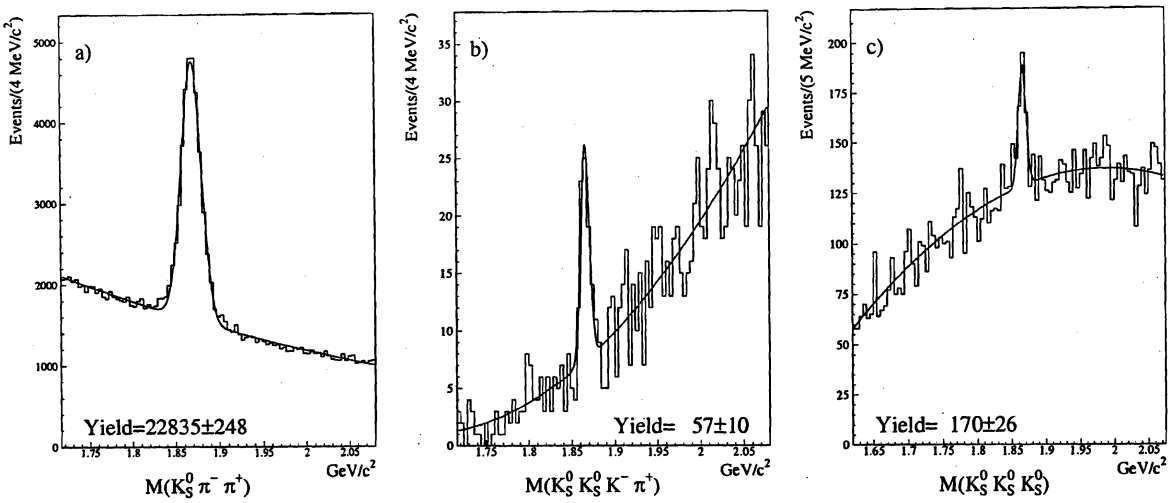


Figure 3. Invariant mass distribution for various D^0 final states: (a) Reconstructed mass of $D^0 \rightarrow K^0_s \pi^+ \pi^-$. There are 22835 ± 248 events with a sigma of 11.4 MeV/c^2. (b) Reconstructed mass of $D^0 \rightarrow K^0_s K^0_s K^\pm \pi^\mp$. There are 57 ± 10 events with a sigma of 5.0 MeV/c^2 and represents the first observation of this decay channel. (c) Reconstructed mass of $D^0 \rightarrow K^0_s K^0_s K^0_s$. There are 170 ± 26 events with a sigma of 5.6 MeV/c^2.

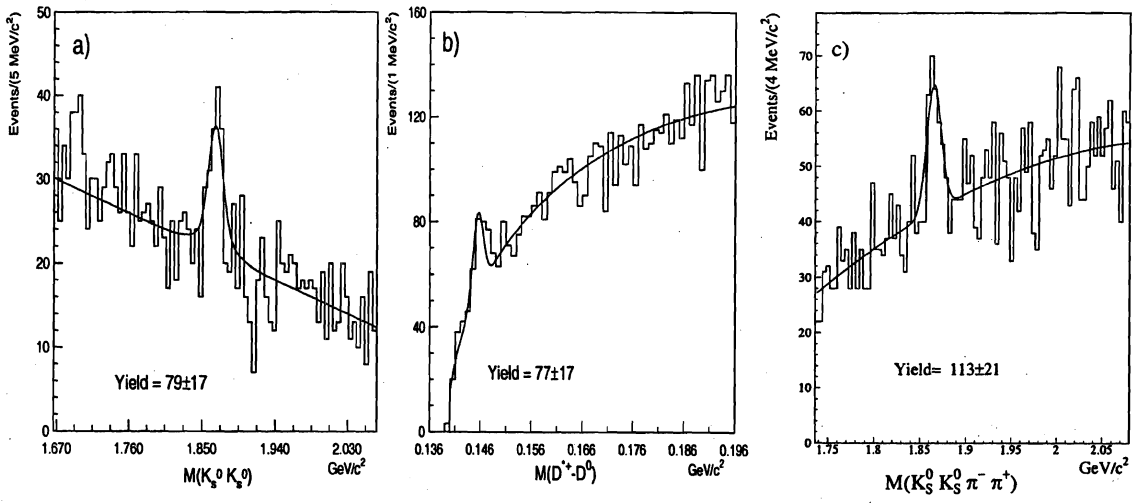


Figure 4. Invariant mass distribution for various D^0 final states: (a) Reconstructed mass of $D^0 \rightarrow K^0_s K^0_s$ with a $D^{*+} - D^0$ mass difference cut. There are 79 ± 17 events with a sigma of 12.5 MeV/c^2. (b) Reconstructed mass of $D^{*+} - D^0$; $D^0 \rightarrow K^0_s K^0_s$. There are 77 ± 17 events in the mass difference plot demonstrating consistency with (a). (c) Reconstructed mass of $D^0 \rightarrow K^0_s K^0_s \pi^+ \pi^-$. There are 113 ± 21 events.

Table 1. $D^0 \rightarrow K^0_s K^0_s X$ Branching Fractions.

Decay Mode	This Experiment	PDG 2004
$\frac{\Gamma(D^0 \rightarrow K^0_S K^0_S K^\pm \pi^\mp)}{\Gamma(D^0 \rightarrow \overline{K}^0 \pi^+ \pi^-)}$	0.0106 ± 0.0019 ± 0.0010	-
$\frac{\Gamma(D^0 \rightarrow K^0_S K^0_S K^0_S)}{\Gamma(D^0 \rightarrow \overline{K}^0 \pi^+ \pi^-)}$	0.0179 ± 0.0027 ± 0.0026	0.0154 ± 0.0025
$\frac{\Gamma(D^0 \rightarrow K^0 \overline{K}^0)}{\Gamma(D^0 \rightarrow \overline{K}^0 \pi^+ \pi^-)}$	0.0144 ± 0.0032 ± 0.0016	0.0119 ± 0.0033
$\frac{\Gamma(D^0 \rightarrow K^0_S K^0_S \pi^+ \pi^-)}{\Gamma(D^0 \rightarrow \overline{K}^0 \pi^+ \pi^-)}$	0.0208 ± 0.0035 ± 0.0021	0.031 ± 0.010 ± 0.008

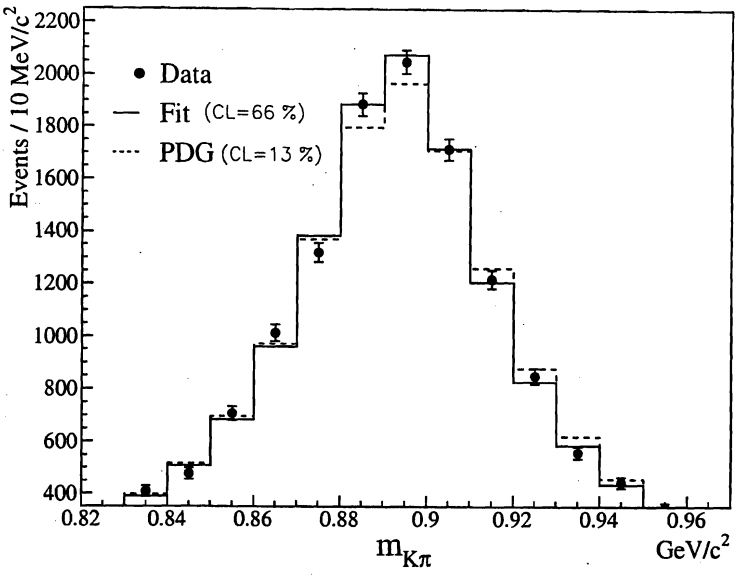


Figure 5. The $m_{K\pi}$ spectrum in data (error bars) compared to the NR model with free K*(892)^0 parameters (solid histogram) and the NR model with K*(892)^0 parameters fixed to the PDG values (dashed histogram).

Table 2. Summary of results on K*(892)^0 parameters and contributions from non-K*(892)^0 sources in the decay $D^+ \to K^-\pi^+\mu^+\nu$ obtained from the NR model. Fit result is compared to the current world averages and to the model with only K*(892)^0. Limits on $\overline{K}^{*0}(1430)^0$ and $\overline{K}^{*0}(1680)^0$ contributions account for unseen decay modes. Note that the FOCUS result for the mass and width of the K*(892)^0 is lower than the PDG averaged values.

	$K^*(892)^0$ only	FOCUS result	Current values
$m_{K^*(892)^0}$ (MeV/c^2)	895.61 ± 0.32	$895.41 \pm 0.32^{+0.35}_{-0.43}$	896.10 ± 0.27 [PDG]
$\Gamma_{K^*(892)^0}$ (MeV/c^2)	50.26 ± 0.81	$47.79 \pm 0.86^{+1.32}_{-1.06}$	50.70 ± 0.60 [PDG]
r_0 (GeV^{-1})	14.1 ± 5.7	$3.96 \pm 0.54^{+1.31}_{-0.90}$	3.40 ± 0.67 [LASS]
$\frac{\Gamma(D^+\to K^-\pi^+\mu^+\nu)_{\rm NR}}{\Gamma(D^+\to K^-\pi^+\mu^+\nu)}$ (%)		$5.30 \pm 0.74^{+0.99}_{-0.96}$	8.3 ± 2.9 [E687]
$\frac{\Gamma(D^+\to \overline{K}^*(1680)^0\mu^+\nu)}{\Gamma(D^+\to K^-\pi^+\mu^+\nu)}$		< 4.0% @ 90% CL	
$\frac{\Gamma(D^+\to \overline{K}_0^*(1430)^0\mu^+\nu)}{\Gamma(D^+\to K^-\pi^+\mu^+\nu)}$		< 0.64% @ 90% CL	
Confidence level (%)	0.21	66.0	

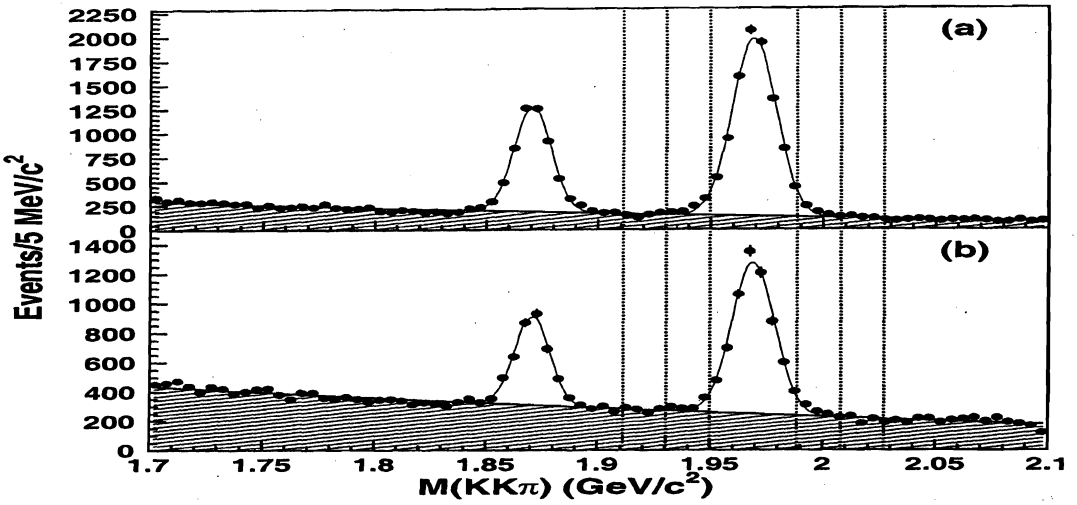


Figure 6. The $K^+K^-\pi^+$ invariant mass distributions for the (a) $\phi(1020)\pi^+$ and (b) $\overline{K}^{*0}(892)K^+$ decay modes. The data is given by the points while the line gives the fit with the hatched region showing the fitted background level. The vertical dotted lines give the D_s^+ signal and the sideband regions.

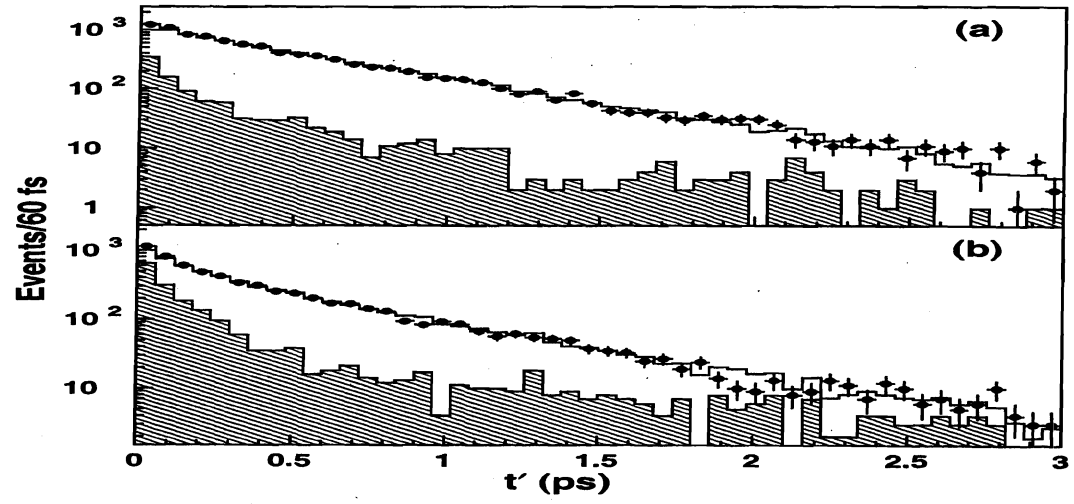


Figure 7. The lifetime distributions for all decays in the data signal region (points), and the fit (histogram). The shaded distribution shows the lifetime distribution of the background component in the signal region. The data and fit are shown for Run Periods A and B combined in the same plot for the two decay modes (a) $\phi(1020)\pi$ and (b) $\overline{K}^*(892)^0K$.

Table 3. Comparison of D_s^+ lifetime measurements and $\tau(D)_s^+/\tau(D^0)$ ratios. The PDG value of the D^0 lifetime is used in the ratios, except for the FOCUS ratio for which the FOCUS measurement is used.

Experiment	$\tau(D_s^+)$ fs	$\tau(D_s^+)/\tau(D^0)$
E687	$475 \pm 20 \pm 7$	1.158 ± 0.052
E791	$518 \pm 14 \pm 7$	1.262 ± 0.038
CLEO II.5	$486.3 \pm 15.0^{+4.9}_{-5.1}$	1.185 ± 0.039
SELEX	$472.5 \pm 17.2 \pm 6.6$	1.152 ± 0.045
FOCUS (this result)	$507.4 \pm 5.5 \pm 5.1$	1.239 ± 0.017

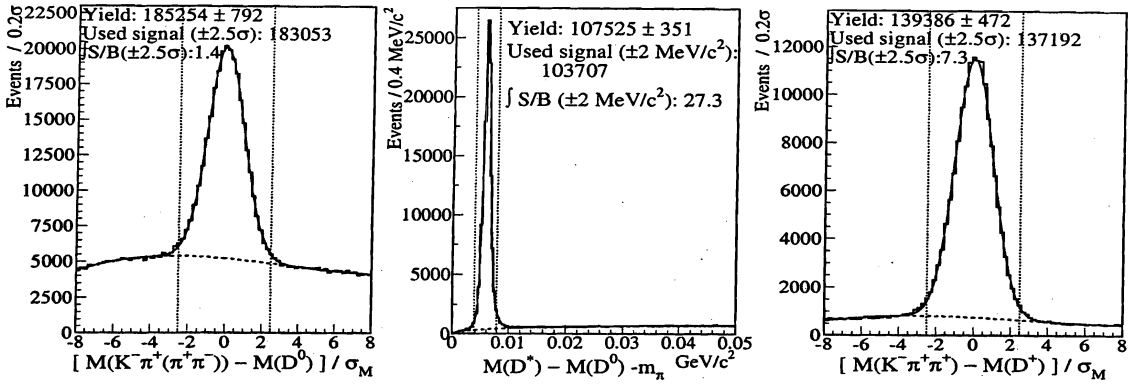


Figure 8. The normalized mass plots of $D^0 \to K^-\pi^+$ and $D^0 \to K^-\pi^+\pi^-\pi^+$ candidates (left) and $D^+ \to K^-\pi^+\pi^+$ candidates (right) are fit with a single Gaussian for the signal and a quadratic polynomial for the background. The energy release plot for D^{*+} candidates of D^0 events (middle) is fit with a double Gaussian for the signal plus a threshhold function $\alpha Q^{1/2} + \beta Q^{3/2}$ for the background. Events inside the vertical lines are selected for analysis.

Table 4. Summary of upper limits (UL) on pentaquark yields and cross sections including systematic uncertainties. Results represent the maximum UL over the mass range.

Decay Mode	Natural Width (MeV/c^2)	95% CL UL on Yield	95% CL UL on $\sigma\left(\Theta_c^0\right) \cdot \mathrm{BR}\left(\Theta_c^0 \to D\,p\right) / \sigma\left(D\right)$
$\Theta_c \to D^{*-} p$	0	25	4.2×10^{-4}
	16.6	44	7.5×10^{-4}
$\Theta_c \to D^{-} p$	0	31	5.0×10^{-4}
	16.6	41	7.1×10^{-4}

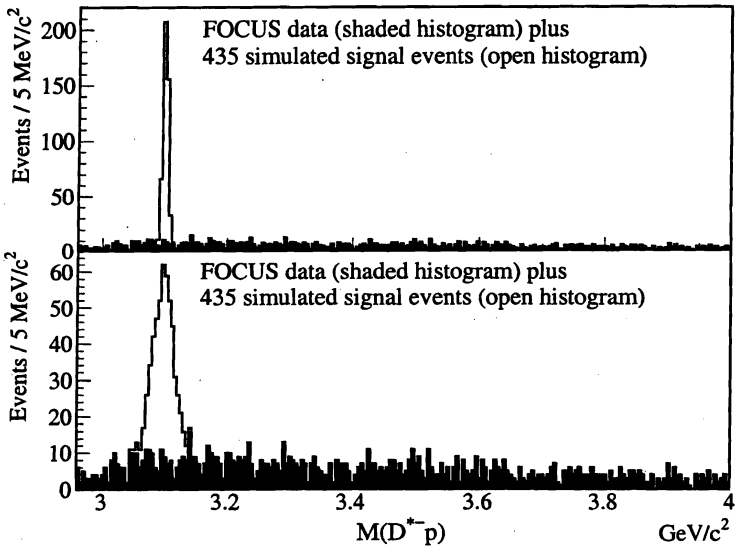


Figure 9. The FOCUS data plus a simulated Gaussian signal of 435 events based on the observed production at H1 of a charmed pentaquark. The top plot shows the signal with a width due to experimental resolution (σ = 4.15 MeV/c^2) only while the bottom plot shows the signal with a width due to the experimental resolution plus the maximum natural width (at 95% CL) based on the H1 data (σ = 4.15 $\oplus$ 16.6 = 17.1 MeV/c^2).

Publications

A Hadronic Tile Calorimeter Report, Nucl. Inst. and Meth. A409, 561 (1998).

Description and Performance of the FOCUS Calorimeter, Nucl. Inst. and Meth. A434, 271 (1999).

A Measurement of Lifetime Differences in the Neutral D-meson System, Phys. Lett. B485, 62 (2000).

Measurements of the Σ_c^0 and Σ_c^{++} Mass Splittings, Phys. Lett. B488, 218 (2000).

Search for CP Violation in D^0 and D^+ Decays, Phys. Lett. B491, 232 (2000).

Study of the Decay $D^0 \to K^+\pi^-$, Phys. Rev. Lett. 86, 2955 (2001).

Measurement of the Relative Branching Ratio BR $(\Xi_c^+ \to pK^-\pi^+)$ / BR $(\Xi_c^+ \to \Xi^-\pi^+\pi^+)$, Phys. Lett. B512, 277 (2001).

A Measurement of the Branching Ratios of D^+ and D_s^+ Hadronic Decays to Four-Body Final States Containing a K_s, Phys. Rev. Lett. 87, 162001 (2001).

Evidence for a Narrow Dip Structure at 1.9 GeV/c^2 in $3\pi^+3\pi^-$ Diffractive Photoproduction, Phys. Lett. B514, 240 (2001).

A New Measurement of the Ξ_c^+ Lifetime, Phys. Lett. B523, 53 (2001).

Cerenkov Particle Identification in FOCUS, Nucl. Inst. and Meth. A484, 270 (2002).

Reconstruction of Vees, Kinks, Ξ^-'s, and Ω^-'s in the FOCUS Spectrometer, Nucl. Instr. and Meth. A484, 174 (2002).

Search for CP Violation in the Decays $D^+ \to K_s\pi^+$ and $D^+ \to K_sK^+$, Phys. Rev. Lett. 88, 041602 (2002).

Measurement of Natural Widths of Σ_c^+ and Σ_c^{++} Baryons, Phys. Lett. B525, 205 (2002).

A High Statistics Measurement of the Λ_c^+ Lifetime, Phys. Rev. Lett. 88, 161801 (2002).

Evidence for New Interference Phenomena in the Decay $D^+ \to K^-\pi^+\mu^+\nu$, Phys. Lett. B535, 43 (2002).

New Measurements of the D^0 and D^+ Lifetimes, Phys. Lett. B537, 192 (2002).

Measurements of Relative Branching Ratios of Λ_c^+ Decays into States Containing Σ, Phys. Lett. B540, 25 (2002).

Measurement of the D^+ and D_s^+ Decays into $K^+K^-K^+$, Phys. Lett. B541, 227 (2002).

New Measurements of the $\Gamma(D^+ \to \overline{K}{}^{*0}\mu^+\nu)/\Gamma(D^+ \to K^-\pi^+\pi^+)$ and $\Gamma(D_s^+ \to \phi\mu^+\nu)/\Gamma(D_s^+ \to \phi\pi^+)$ Branching Ratios, Phys. Lett. B541, 243 (2002).

A New Measurement of the Ξ_c^0 Lifetime, Phys. Lett. B541, 211 (2002).

New Measurements of the $D^+ \to \overline{K}{}^{*0}\mu^+\nu$ Form-Factor Ratios, Phys. Lett. B544, 89 (2002).

Observation of a 1750-MeV/c^2 Enhancement in the Diffractive Photoproduction of K^+K^-, Phys. Lett. B545, 50 (2002).

A Study of the Cabibbo-Suppressed Decays $D^0 \to \pi^+\pi^-$ and $D^0 \to K^+K^-$, Phys. Lett. B555, 167 (2003).

Charm System Tests of CPT and Lorentz Invariance with FOCUS, Phys. Lett. B556, 7 (2003).

A Measurement of the Ω_c^0 Lifetime, Phys. Lett. B561, 41 (2003).

Study of Hadronic Five-Body Decays of Charmed Mesons, Phys. Lett. B561, 225 (2003).

The Target Silicon Detector for the FOCUS Spectrometer, Nucl. Instr. and Meth. A516, 364 (2003).

Studies of Correlations Between D and anti-D Mesons in High-Energy Photo-production, Phys. Lett. B566, 51 (2003).

Measurements of Ξ_c^+ Branching Ratios, Phys. Lett. B571, 139 (2003).

Search for Rare and Forbidden 3-Body Decays of the Charmed Mesons D^+ and D_s^+, Phys. Lett. B572, 21 (2003).

Study of the Decay Mode $D^0 \to K^-K^-K^+\pi^+$, Phys. Lett. B575, 190 (2003).

Study of Hadronic Five-Body Decays of Charmed Mesons Involving a K_s^0, Phys. Lett. B586, 191 (2004).

Charm-AntiCharm Baryon Production Asymmetries in Photon Nucleon Interactions, Phys. Lett. B581, 39 (2004).

Dalitz Plot Analysis of D_s^+ and D^+ Decay to $\pi^+\pi^-\pi^+$ Using the K-Matrix Formalism, Phys. Lett. B585, 200 (2004).

Measurement of Masses and Widths of Excited Charm Mesons D_2^* and Evidence for Broad States, Phys. Lett. B586, 11 (2004).

New Measurements of the $D_s^+ \to \phi\mu^+\nu$ Form Factor Ratios, Phys. Lett. B586, 183 (2004).

Measurements of Six-Body Hadronic Decays of the D^0 Charmed Meson, Phys. Lett. B586, 21 (2004).

Measurement of the Ratio of the Vector to Pseudoscalar Charm Semileptonic Decay Rate $\Gamma(D^+ \to \overline{K}^{*0}\mu^+\nu)/\Gamma(D^+ \to \overline{K}^0\mu^+\nu)$, Phys. Lett. B598, 33 (2004).

Study of the Doubly and Singly Cabibbo Suppressed Decays $D^+ \to K^+\pi^+\pi^-$ and $D_s^+ \to K^+\pi^+\pi^-$, Phys. Lett. B601, 10 (2004).

Measurements of the Q^2 Dependence of the $D^0 \to K^-\mu^+\nu$ and $D^0 \to \pi^-\mu^+\nu$ Form Factors, Phys. Lett. B607, 233 (2005).

Analysis of the Semileptonic Decay $D^0 \to \overline{K}^0\pi^-\mu^+\nu$, Phys. Lett. B607, 67 (2005).

Measurement of the Branching Ratio of the Decay $D^0 \to \pi^-\mu^+\nu$ Relative to $D^0 \to K^-\mu^+\nu$, Phys. Lett. B607, 51 (2005).

A Study of $D^0 \to K_s^0 K_s^0$ X Decay Channels, Phys. Lett. B607, 59 (2005).

Study of the $D^0 \to K^+K^-\pi^+\pi^-$ Decay, Phys. Lett. B610, 225 (2005).

Measurement of the Doubly Cabibbo Suppressed Decay $D^0 \to K^+\pi^-$ and a Search for Charm Mixing, Phys. Lett. B618, 23 (2005).

Application of Genetic Programming to High Energy Physics Event Selection, Nucl. Instr. Meth. A551, 504 (2005).

Hadronic Mass Spectrum Analysis of $D^+ \to K^-\pi^+\mu^+\nu$ Decay and Measurement of the $K^*(892)^0$ Mass and Width, Phys. Lett. B621, 72 (2005).

A Measurement of the D_s^+ Lifetime, Phys. Rev. Lett. 95, 052003 (2005).

Study of Λ_c^+ Cabibbo Favored Decays Containing a Lambda Baryon in the Final State, Phys. Lett. B624, 22 (2005).

Search for T Violation in Charm Meson Decays, Phys. Lett. B622, 239 (2005).

Search for a Strongly Decaying Neutral Charmed Pentaquark, Phys. Lett. B622, 229 (2005).

Search for $\Lambda_c^+ \to PK^+\pi^-$ and $D_s^+ \to K^+K^+\pi^-$ Using Genetic Programming Event Selection, Phys. Lett. B624, 166 (2005).

A Non-Parametric Approach to the $D^+ \to \overline{K}^{*0}\mu^+\nu$ Form-Factors, E-Print Archive: Hep-Ex/0509027.

Study of the Decay Asymmetry Parameter and CP Violation Parameter in the $\Lambda_c^+ \to \Lambda\pi^+$ Decay, E-Print Archive: Hep-Ex/0509042.

New Measurement of $Br(D^+ \to \rho^0\mu^+\nu)$ / $Br(D^+ \to \overline{K}^{*0}\mu^+\nu)$ Branching Ratio, E-Print Archive: Hep-Ex/0511022.

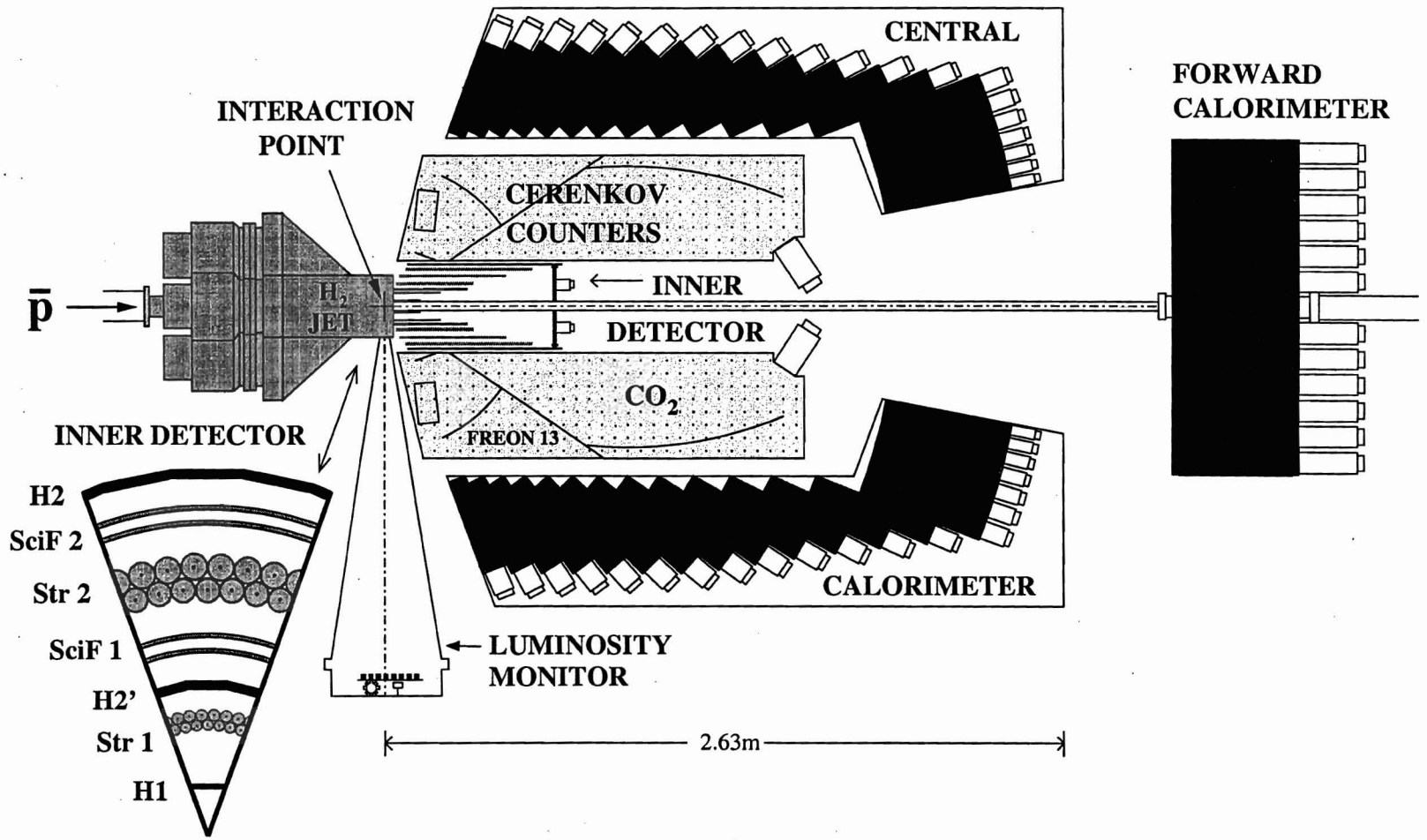
Ph.D. Theses

M. Boschini, University of Milano, 1998.
F. Prelz, University of Milano, 1998.
A. Calandrino, University of Milano, 1999.
E. Casimiro, CINVESTAV, 1999.
E. Vaandering, University of Colorado, 2000.
L. Agostino, University of Pavia, 2000.
P. Dini, University of Milano, 2000.
M. Merlo, University of Pavia, 2000.
M. Mezzadri, University of Milano, 2000.
A. Rahimi, University of Illinois, 2000.
I. Segoni, University of Pavia, 2000.
J. M. Link, University of California/Davis, 2001.
C. Cawlfield, University of Illinois/Urbana, 2001.
B. R. Ko, Korea University, 2001.
C. Pontoglio, INFN and University of Milano, 2001.
S. Erba, INFN and University of Milano, 2001.
L. Edera, INFN and University of Milano, 2001.
S. Barberis, INFN and University of Milano, 2001.
L. Milazzo, University of Milano, 2001.
M. Rovere, University of Milano, 2001.
E. Ramirez, University of Colorado, 2002.
D. Engh, Vanderbilt University, 2002.
M. Hosack, Vanderbilt University, 2002.
J. W. Kwak, Korea University, 2002.
A. Kryemadhi, Indiana University, 2002.
A. Cerutti, INFN and University of Milano, 2002.
R. Mitchell, University of Tennessee, 2002.
A. Ettorre, University of Pavia, 2002.
G. Sani, University of Pavia, 2002.
D. Pegna, University of Pavia, 2002.
S. Carillo, CINVESTAV, 2003.
E. Simili, University of Milano, 2003.
L. Agostino, University of Colorado, 2004.
A. Kryemadhi, Indiana University, 2004.
A. Massafferri, CBPF, 2004.
I. Segoni, University of Colorado, 2004.
C. Uribe, BUAP, 2004.
L. Edera, University of Milano
S. Erba, University of Milano
F. Vazquez, CINVESTAV, Mexico
D. Pegna, University of Pavia

M.S. Theses

L. Mendez, University of Puerto Rico, 1997.
D. Olaya, University of Puerto Rico, 1998.
E. Ramirez, University of Puerto Rico, 1998.
C. Rivera, University of Puerto Rico, 1998.
E. Montiel, University of Puerto Rico, 1999.
A. Mirles, University of Puerto Rico, 2000.
C. Chang, Korea University, 2001.
H. Hernandez, University of Puerto Rico, 2002.
A. Paris, University of Puerto Rico, 2002.
J. Quinones, University of Puerto Rico, 2002.
E. Luiggi, University of Puerto Rico, 2003.
M. Penagos, University of Puerto Rico, 2003.
C. Castromonte, CBPF, 2004.

E835 EQUIPMENT LAYOUT (Y2K)



E-835 (Cester / Pordes) Study of Charmonium States Formed in Proton-Antiproton Annihilation Using the Fermilab Antiproton Accumulator

UC / Irvine, Fermilab, INFN / Ferrara (Italy), Ferrara (Italy), INFN / Genova (Italy), Genova (Italy), Minnesota, Northwestern, INFN / Torino (Italy), Torino (Italy)

Status: *Data Analysis*

Experiment E-835 was a continuation of E-760, the study of charmonium states formed in $\bar{p}p$ annihilation (see www-e835.fnal.gov). The $\bar{p}p$ annihilations were produced in the Fermilab Antiproton Source where the circulating antiproton beam interacted with a hydrogen gas-jet target. The experiment used a non-magnetic detector with full azimuthal coverage and polar angle coverage from 3 degrees to 65 degrees in the lab frame; the detector was optimized for the identification of electromagnetic final states from charmonium decays. The masses and widths of the decaying states were determined from an excitation curve obtained by varying the $\bar{p}$ beam energy. This technique allows the masses of charmonium states to be measured to an accuracy of 0.1 MeV/c^2; resonance widths as small as 0.1 MeV can also be determined.

E-835 took ~150 pb^{-1} of data during the 1996-97 fixed-target run and a further ~100 pb^{-1} in 2000. The year 2000 data-taking concentrated on improving the mass and width measurements of the χ_0, on further attempts to confirm the $^1P_1$ signal reported by E-760, and on a study of ψ' decay modes. The analysis is largely completed.

Publications

Measurements of the Magnetic Form Factor of the Proton in the Timelike Region at Large Momentum Transfer, M. Ambrogiani et al., Phys. Rev. D60, 032002 (1999).

Study of the χ_{c0} State of Charmonium Formed in Antiproton-Proton Annihilations, M. Ambrogiani et al., Phys. Rev. Lett. 83, 2902 (1999).

Measurement of the Branching Ratios $\psi' \to e^+e^-$; $\psi' \to J/\psi\pi^0\pi^0$, and $\psi' \to J/\psi\eta$, M. Ambrogiani et al., Phys. Rev. D62, 032004 (2000).

Study of the $\gamma\gamma$ Decays of the χ_{c2} and χ_{c0} Charmonium Resonances, M. Ambrogiani et al., Phys. Rev. D62, 052002 (2000).

Search for the η_c' (2^1S_0) Charmonium Resonance, M. Ambrogiani et al., Phys. Rev. D64, 052003 (2000).

Study of the Angular Distributions of the Reactions $\bar{p}p \to \chi_{c1}, \chi_{c2} \to J/\psi\gamma \to e^+e^-\gamma$, M. Ambrogiani et al., Phys. Rev. D65, 052002 (2002).

New Measurements of the Resonance Parameters of the χ_{c0} State of Charmonium, S. Bagnasco et al., Phys. Lett. B533, 237 (2002).

Measurements of the Magnetic Form-Factor of the Proton for Timelike Momentum Transfers, M. Andreotti et al., Phys. Lett. B559, 20 (2003).

Measurement of the Resonance Parameters of the Charmonium Ground State, η_c (1^1S_0), M. Ambrogiani et al., Phys. Lett. B566, 45 (2003).

Interference Study of the χ_{c0} (1^3P_0) in the Reaction $\bar{p}p \rightarrow \pi^0\pi^0$, M. Andreotti et al., Phys. Rev. Lett. 91, 091801 (2003).

Measurement of the Two-Photon Decay of the χ_{c0} State of Charmonium, M. Andreotti et al., Phys. Lett. B584, 16 (2004).

Measurement of the Angular Distribution in $\bar{p}p \rightarrow \psi' \rightarrow e^+e^-$, M. Ambrogiani et al., Phys. Lett. B610, 177 (2005).

Measurement of the Branching Ratios $\psi' \rightarrow e^+e^-$, $\psi' \rightarrow J/\psi\pi\pi$, and $\psi' \rightarrow J/\psi\eta$, M. Andreotti et al., Phys. Rev. D71, 032006 (2005).

Measurement of the Resonance Parameters of the χ_{c1} and χ_{c2} States of Charmonium Formed in Antiproton-Proton Annihilation, M. Andreotti et al., Nucl. Phys. B717, 34 (2005).

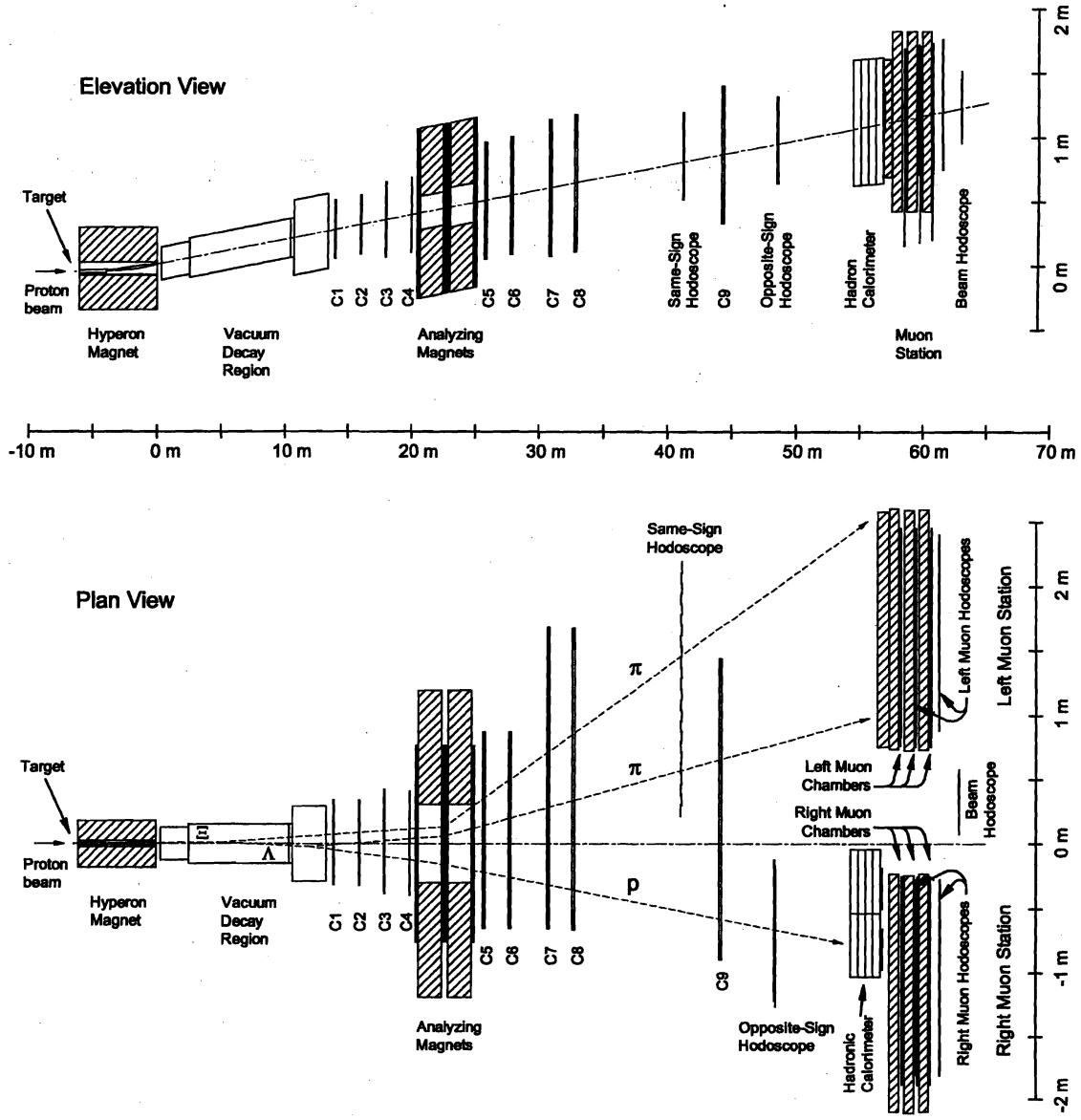
Results of a Search for the h_c ($^1P_1$) State of Charmonium in the η_c and $J/\psi\pi^0$ Decay Modes, M. Andreotti et al., Phys. Rev. D72, 032001 (2005).

A Study of $\bar{p}p \rightarrow$ Two Neutral Pseudoscalar Mesons at the χ_{c0} Formation Energy, M. Andreotti et al., Phys. Rev. D72, 112002 (2005).

Ph.D. Theses

G. Stancari, University of Ferrara, Italy
W. Baldini, University of Ferrara, Italy
M. Ambrogiani, University of Ferrara, Italy
R. McTaggart, Pennsylvania State University
T. Pedlar, Northwestern University
M. Stancari, University of California/Irvine
M. Obertino, University of Torino, Italy
M. Graham, University of Minnesota
T. Vidnovic, University of Minnesota
M. Negrini, University of Ferrara
P. Rumerio, Northwestern University
S-H. Seo, University of Minnesota
D. Joffe, Northwestern University
G. Lasio, University of California/Irvine
G. Cibinetto, University of Ferrara

E-871



Elevation and plan views of the HyperCP spectrometer. The 1999 configuration is shown. Superimposed on the plan view are the charged tracks of a $\Xi \rightarrow \Lambda\pi \rightarrow p\pi\pi$ decay. For clarity, enclosures, support structures, and helium bags are not shown. Transverse dimensions have been exaggerated by a factor of ten.

E-871 (Dukes / Luk) HyperCP: Search for CP Violation in Charged-Hyperon Decays

Academia Sinica (Taiwan), UC/Berkeley, Fermilab, Guanajuato (Mexico), IIT, Lausanne (Switzerland), LBNL, Michigan, South Alabama, Virginia

Status: *Data Analysis*

Discovered 40 years ago by Cronin and Fitch, who were awarded the Nobel Prize for their work, CP violation has remained a mysterious and puzzling aspect of particle physics. Its origin is unknown, and although it is a tiny effect in the laboratory, its implications are profound: CP violation is thought to be responsible for the nearly absolute asymmetry between matter and antimatter in the universe, indeed, why there is any matter at all in the universe. But it is widely believed that the CP violation observed thus far (in only the decays of the K_L and B_d mesons) is too feeble to produce the asymmetry between matter and antimatter in the universe. Other sources are needed, perhaps from physics beyond that in the Standard Model. To quote Bigi and Sanda from their recent book, *CP Violation*:

> *"We are willing to stake our reputation on the prediction that dedicated and comprehensive studies of CP violation will reveal the presence of New Physics."*

The goal of HyperCP is to search for new sources of CP violation in the decays of charged Ξ and Λ hyperons. These are sensitive to certain sources of CP violation that kaon decays, for example, are not. The signature for the CP asymmetry is a difference between the angular distributions of the Λ and $\bar{\Lambda}$ decay products, where the Λ and $\bar{\Lambda}$ have been produced from Ξ^- and $\bar{\Xi}^+$ decays. The HyperCP spectrometer was designed to have a sensitivity in the CP asymmetry of about 2×10^{-4}, three orders of magnitude better than the experimental limit at the time. Current theoretical predictions range from a high of several times 10^{-3} in some supersymmetric models of CP violation, to a low of about 10^{-5} in Standard Model calculations.

The HyperCP sensitivity goals demand a large number of events, and hence an extremely high-rate spectrometer was built in the short space of two years, one capable of recording up to 100,000 events per second. The spectrometer accumulated the largest dataset ever taken – 231 *billion* events – in two running periods: 1997 and 1999. The primary event reconstruction (of over 30,000 tapes) was done on the Fermilab computer farms and completed in the summer of 2001. This work involved reconstructing a dataset 25 times larger than the total amount of data on all of the Web sites in the world at the time. It resulted in by far the largest sample of hyperon decays ever taken as well as the largest sample of charged-kaon decays.

The scope of the physics topics that HyperCP addresses goes beyond CP violation in hyperon decays. The complete HyperCP physics menu includes: 1) a

high-precision search for CP violation in charged Ξ and Λ decays; 2) the measurement of the branching ratios in the flavor-changing neutral-current (FCNC) decays: $K^+ \to \pi^+\mu^+\mu^-$ and $K^- \to \pi^-\mu^+\mu^-$; 3) the search for the θ^+ (1.54) pentaquark; 4) the search for the decay $\Sigma^+ \to p\mu^+\mu^-$; 5) the search for the lepton-number-violating decay $\Xi^- \to p\mu^-\mu^-$; 6) the search for the $|\Delta S| = 2$ decays $\Omega^- \to \Lambda\pi^-$, and $\Xi^0 \to p\pi^-$; 7) the precise measurement of the Ω^- and $\bar{\Omega}^+$ α decay parameters and the corresponding CP asymmetry; 8) the precise measurement of the α, β, and γ parameters in $\Xi^- \to \Lambda\pi^-$ decays; 9) the measurement of the Λ-π^- strong phase shift; 10) the measurement of the branching ratio $\Omega^- \to \Xi^-\pi^+\pi^-$; and 11) the search for the FCNC decays $\Omega^- \to \Xi^-\mu^+\mu^-$ and $\Omega^- \to \Xi^-e^+e^-$.

The analysis of the data has produced thirteen refereed publications. A few highlights follow. Results from the main goal of the experiment, the search for CP violation in charged Ξ and Λ hyperon decays, has recently been published. No CP violation was found in an analysis of 17% of the dataset, a factor of 20 improvement over the best previous result. This new measurement is beginning to constrain some supersymmetric predictions of the asymmetry. HyperCP has reported the first unambiguous evidence of parity violation in the decays of the Ω^- and the $\bar{\Omega}^+$ from an analysis of about five million Ω^- and two million $\bar{\Omega}^+$ events. Of the various searches for rare and forbidden hyperon decays HyperCP has made, perhaps the most interesting is the evidence for the decay $\Sigma^+ \to p\mu^+\mu^-$. The three found events constitute the smallest branching ratio ever observed in a baryon decay. These events have a narrow dimuon mass, suggesting that perhaps the decay proceeds by a hitherto unknown neutral intermediate state of mass 214.3 ± 0.5 MeV/c^2. HyperCP also reported one of the first high-statistics precision mass resolution non-observations of the θ^+ (1.54) pentaquark. Other searches for rare and forbidden hyperon decays, such as the search for $\Delta S = 2$ decays and lepton-number violation, are many orders of magnitude more sensitive than previous results.

Although the HyperCP spectrometer was designed to detect hyperons, it accumulated an enormous sample of charged-kaon decays. The collaboration's first publication, a new measurement of the branching ratio of the FCNC decay $K^+ \to \pi^+\mu^+\mu^-$, as well as the first observation of the conjugate decay, $K^- \to \pi^-\mu^+\mu^-$, resolved an outstanding disagreement between two BNL experiments for this important test of chiral perturbation theory.

Publications

A High-Throughput Data Acquisition System for the HyperCP Experiment, Y.-C. Chen et al., Nucl. Instr. and Meth. A455, 424 (2000).

Upgraded DAQ System for the HyperCP Experiment, C. White et al., Nucl. Instr. and Meth. A474, 67 (2001).

Tripling the Data Set for the HyperCP Experiment, C. White et al., IEEE Trans. Nucl. Sci. 49, 568 (2002).

Observation of the Decay $K^- \to \pi^-\mu^+\mu^-$ and Measurements of the Branching Ratios for $K^\pm \to \pi^\pm\mu^+\mu^-$, H. K. Park et al., Phys. Rev. Lett. 88, 111801 (2002).

New Measurement of $\Xi^- \to \Lambda\pi^-$ Decay Parameters, M. Huang et al., Phys. Rev. Lett. 93, 011802 (2004).

High Statistics Search for the θ^+ (1.54) Pentaquark State, M. J. Longo et al., Phys. Rev. D70, 111101 (R) (2004).

Search for CP Violation in Charged-Ξ and Λ Hyperon Decays, T. Holmstrom et al., Phys. Rev. Lett. 93, 262001 (2004).

Evidence for the Decay $\Sigma^+ \to p\mu^+\mu^-$, H. K. Park et al., Phys. Rev. Lett. 94, 021801 (2005).

Measurement of the α Asymmetry Parameter for the $\Omega^- \to \Lambda K^-$ Decay, Y. C. Chen et al., Phys. Rev. D71, 051102 (R) (2005).

Search for $\Delta s=2$ Nonleptonic Hyperon Decays, C. G. White et al., Phys. Rev. Lett. 94, 101804 (2005).

HyperCP: A High-Rate Specrometer for the Study of Charged Hyperon and Kaon Decays, R. A. Burnstein et al., Nucl. Instr. and Meth. A541, 516 (2005).

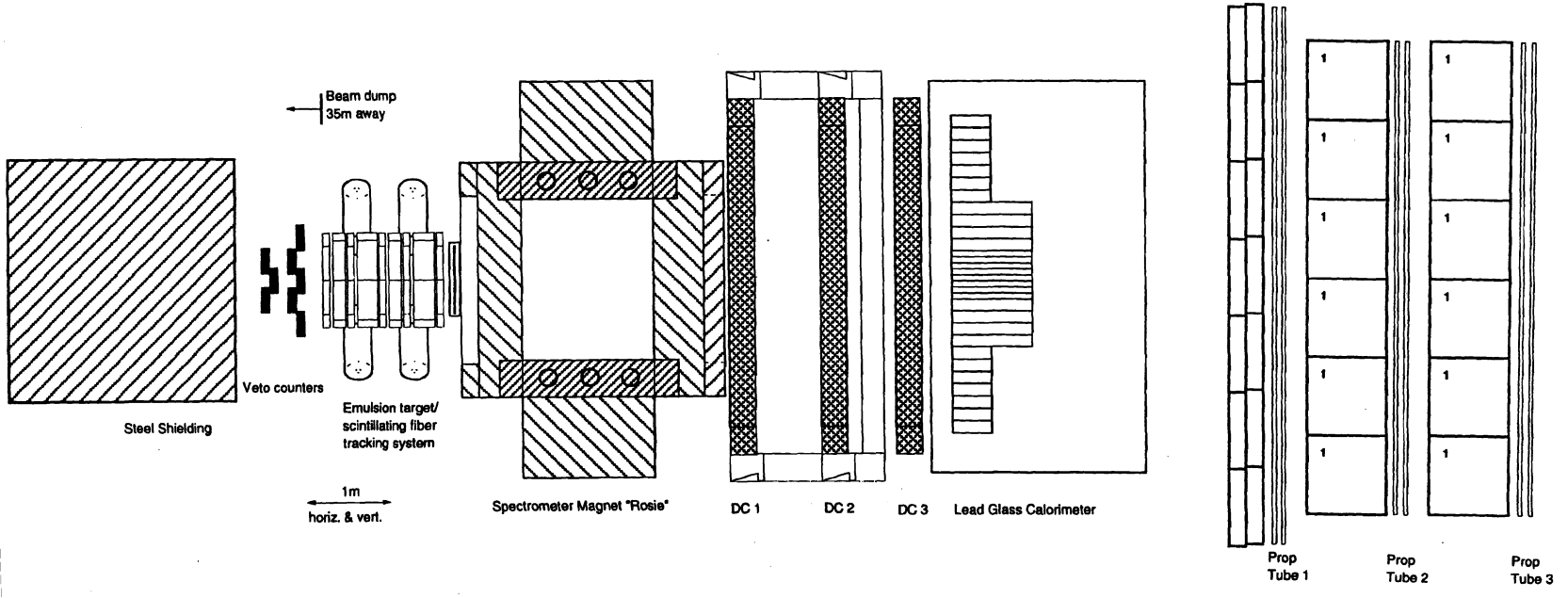
Search for the Lepton-Number-Violating Decay $\Xi^- \to p\mu^-\mu^-$, D. Rajaram et al., Phys. Rev. Lett. 94, 181801 (2005).

Observation of Parity Violation in the $\Omega^- \to \Lambda K^-$ Decay, L. C. Lu, et al., Phys. Lett. B617, 11 (2005).

Theses

D. Rajaram, University of Virginia (1996)
Z. del Cid, University of Guanajuato (2000)
M. Morales, University of Guanajuato (2000)
W.-S. Choong, University of California/Berkeley (2000)
N. Leros, Université de Lausanne (2001)
D. Rajaram , Illinois Institute of Technology (2002)
M. Huang, University of Virginia (2003)
T. Holmstrom, University of Virginia (2003)

E-872 Spectrometer Plan View



E-872 (Tzanakos / Paolone) Direct Observation of the Tau-Neutrino

Aichi (Japan), Athens (Greece), UC/Davis, Changwon Nat'l (Korea), Collège de France (France), Fermilab, Gyeongsang (Korea), Kansas State, Kobe (Japan), Kon-kuk (Korea), Korean Nat'l (Korea), Minnesota, Nagoya (Japan), Osaka Sci. Ed. Inst. (Japan), Pittsburgh, South Carolina, Toho (Japan), Tufts, Utsunomiya (Japan)

Status: *Data Analysis*

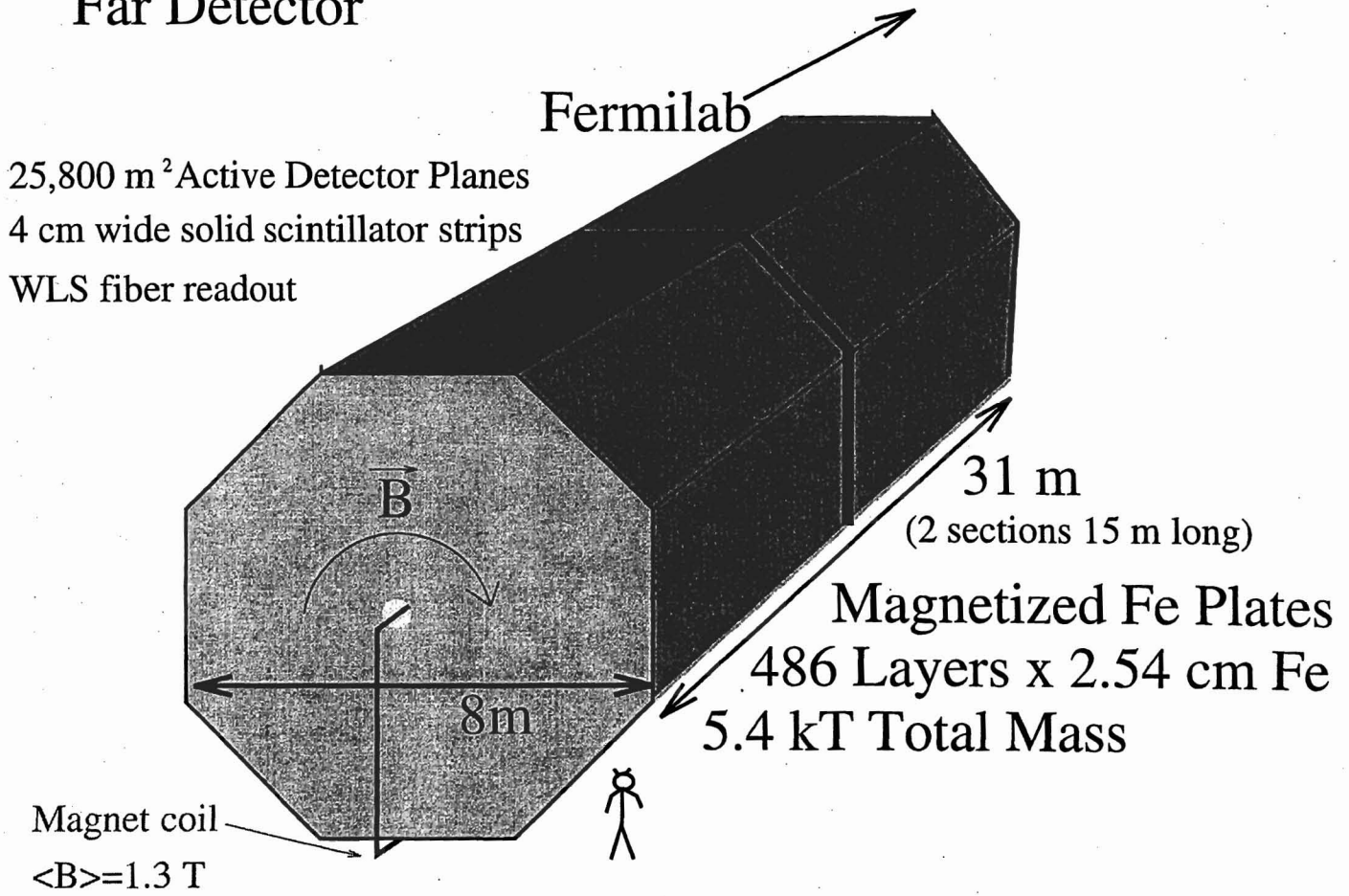
Since the discovery of the tau lepton in 1975, the desire to detect the ν_τ was strong, but the experiments that were proposed were technically very challenging and expensive. The use of emulsion, as active targets, in conjunction with its specially designed beam, has enabled DONUT to overcome most of the technical problems. Although there was strong experimental and theoretical evidence for the existence of a third neutrino, its direct confirmation was an important result. In July 2000, after three years of analysis, four events identified as tau-neutrino interactions were found in a sample of 203 neutrino interactions in an emulsion target/detector. These results were published early in 2001. A new upper limit to the tau-neutrino magnetic moment was also published using this data.

Tau neutrinos, produced in the beam dump using 800 GeV protons, originated mostly in the leptonic decay of the D_S (charm-strange) meson in the decay sequence $D_S \rightarrow \tau + \nu_\tau$ and $\tau \rightarrow \nu_\tau$+X. Both the D_S and the daughter τ decay in the dump, each decay producing one ν_τ. Their charged-current interactions are found directly by observing τ lepton production and its subsequent decay in the emulsion target. The data run was from April to September 1997 and a total of 4.5×10^{17} protons were used in the beam dump to make neutrinos.

Two years were spent in developing emulsion scanning techniques necessary for insuring high efficiency in locating the interactions in the emulsion. Because the emulsion targets were very thick, 6 cm, the older method of following tracks from the spectrometer was less reliable because of secondary interactions, electron showers, and scattering. A new method was employed for most of the events. In this method, automatic emulsion scanning stations were programmed to find all tracks in a *volume* of emulsion surrounding the interaction prediction. This data was then processed by finding all vertices (at least two tracks) in this volume. This powerful method was possible only because of the increased speed of the emulsion scanning stations. The spatial precision achieved for the emulsion data was 0.3 microns in the transverse coordinates, which provided a powerful rejection against background signals.

Presently, the collaboration is completing the analysis on the final set of events. A final paper based on the complete sample will be submitted in summer 2006.

MINOS (Main Injector Neutrino Oscillation Search)
Far Detector



E-875 / 934 (Wojcicki) Main Injector Neutrino Oscillation Search

ANL, Athens (Greece), Benedictine, BNL, Caltech, Cambridge (United Kingdom), Campinas (Brazil), Fermilab, Collège de France (France), Harvard, IHEP / Protvino (Russia), IIT, Indiana, ITEP (Russia), Lebedev (Russia), LLNL, Minnesota, Minnesota / Duluth, Oxford (United Kingdom), Pittsburgh, Rutherford (United Kingdom), São Paulo (Brazil), South Carolina, Stanford, Sussex (United Kingdom), Texas A&M, Texas / Austin, Tufts, Univ. College London (United Kingdom), Western Washington, William & Mary, Wisconsin

Status: *Data-taking*

The goal of the Main Injector Neutrino Oscillation Search (MINOS) experiment is a comprehensive investigation of neutrino oscillations, down to a level of about 10^{-3} eV^2 in Δm^2 and 10^{-2} in $\sin^2(2\theta)$, using neutrinos produced by the Fermilab Main Injector beam and a large new detector located at the Soudan Mine in Minnesota, some 735 km away. A "near detector" located at Fermilab will monitor the beam and enable a comparison to be made between neutrino interactions in detectors at two quite different distances from the neutrino source.

Neutrino physics presents today one of the most promising avenues to probe for extensions of the Standard Model. A priori, no fundamental reason exists why neutrinos should have zero mass or why there should be no mixing between different neutrino species. Thus, the existence of neutrino oscillations is quite plausible, maybe even likely, on theoretical grounds. The existence of this phenomenon has received first experimental indications from the observations of a deficit of solar neutrinos and from the ν_μ/ν_e anomaly in the interactions of atmospheric neutrinos observed by large underground experiments. Detailed observations by the SuperKamiokande experiment on the angular distributions of atmospheric neutrinos provided strong support for the oscillations interpretation and reduced the range of possible oscillation parameters. The accelerator K2K experiment in Japan appears to confirm that conclusion. The SNO experiment in Canada looking at solar neutrino interactions in heavy water and the KamLAND experiment in Japan looking at reactor neutrinos have provided not only convincing evidence for solar neutrino oscillations but also quantitative understanding of the oscillation parameters for that phenomenon.

This MINOS experiment makes use of several independent measurements to investigate neutrino oscillations. The comparison of rates and energy spectra at the two detectors for the ν_μ charged-current events can conclusively verify the oscillation hypothesis and will be used to measure the oscillation parameters, Δm^2 and $\sin^2(2\theta)$. The comparison of NC and CC interaction rates can determine the relative contributions of the modes $\nu_\mu \rightarrow \nu_\tau$ and $\nu_\mu \rightarrow \nu_{sterile}$. The study of event shapes allows us to search for the $\nu_\mu \rightarrow \nu_e$ mode and to improve on the CHOOZ limit if no events are found.

The MINOS experiment uses two very similar detectors, one at Fermilab and one in Minnesota's Soudan mine, 735 km away. Both detectors consist of assemblies of 1 inch-thick magnetized steel planes, interleaved with planes of 4 cm wide strips of plastic scintillator. The 1 kT near detector at Fermilab has 4.8 m wide steel planes; the 5.4 kT far detector at Soudan has 8 m wide planes arranged in two supermodules. The steel planes in both detectors are magnetized toroidally with an average field of 1.3 T. We estimate that, in the absence of oscillations, the far detector would record about 1,500 charged-current ν_μ interactions annually using the low-energy beam configuration.

The existing underground physics laboratory in the Soudan Mine has been expanded to house the new MINOS far detector. Excavation of the new laboratory began in May 1999, and installation of the far detector began in July 2001. The far detector was completed in July 2003, when it began taking data on cosmic rays and atmospheric neutrinos. Site excavation for the construction of the underground NuMI beam facility at Fermilab was completed in November 2002 and outfitting of the underground enclosures and construction of service buildings was finished in early 2004. The installation of beamline components was completed in December 2004. Neutrino beam commissioning began in January 2005 and data-taking, with both the near detector and the far detector, began in March 2005.

In May 2003 the MINOS Collaboration submitted its proposed five-year run plan to the Laboratory. The plan is based on the best current values of oscillation parameters from atmospheric neutrino experiments and includes MINOS sensitivity calculations that are more reliable than those presented previously. A possible value of Δm^2 that is lower than previously thought, would require significantly more protons on the NuMI target, 25×10^{20} in the initial five-year run, than requested previously. With this exposure Δm^2 would be measured to about 20% and a search for $\nu_\mu \rightarrow \nu_e$ oscillations would improve on the sensitivity of the CHOOZ experiment by about a factor of two.

Status and Accomplishments

November 1998:	NuMI/MINOS Project baselined by the Department of Energy.
February 1999:	DOE CD-3a (start limited construction) approved.
May 1999:	DOE CD-3b (continue construction at Fermilab) approved.
May 1999:	Excavation of far detector lab started at Soudan.
October 1999:	Near detector electronics design upgraded for fast extraction.
March 2000:	Excavation of NuMI beamline tunnels and halls started at Fermilab.
November 2000:	Excavation of far detector cavern completed at Soudan.
July 2001:	Beneficial occupancy of far detector cavern.
July 2001:	Installation of MINOS far detector begins.
August 2001:	First cosmic ray muon tracks recorded by far detector.
October 2001:	First run of MINOS calibration detector completed in CERN test beam.
January 2002:	Tunnel boring machine excavation completed.
March 2002:	First atmospheric neutrino event recorded by far detector.

April 2002:	NuMI beam decay pipe installation begins.
July 2002:	Supermodule 1 magnet coil installed and commissioned.
August 2002:	Near detector hall excavation completed.
September 2002:	Second calibration detector run completed in CERN test beam.
October 2002:	NuMI target hall excavation completed.
November 2002:	Underground excavation completed at Fermilab.
May 2003:	Five-year run plan proposal submitted.
July 2003:	MINOS far detector and veto shield installation completed.
July 2003:	Begin atmospheric neutrino and antineutrino data acquisition.
October 2003:	Third and final calibration detector run completed at CERN.
October 2003:	Beneficial occupancy of NuMI Pre-target and Target Hall areas.
March 2004:	Beneficial occupancy of the Near Detector Hall.
April 2004:	Begin installation of Near Detector.
May 2004:	Complete NuMI decay pipe vacuum commissioning.
June 2004:	First cosmic-ray muon tracks observed in Near Detector.
August 2004:	Complete installation of Near Detector planes.
August 2004:	Complete installation of hadron absorber.
November 2004:	Complete installation of NuMI proton beam extraction channel.
November 2004:	Complete installation of NuMI target and horns.
December 2004:	First protons extracted into NuMI beamline to hadron absorber.
December 2004:	Near Detector magnet coil energized.
January 2005:	First neutrino events in near detector.
March 2005:	Data-taking begins with NuMI beam neutrinos.
March 2005:	First NuMI neutrino events recorded by the far detector
December 2005:	Paper on atmospheric neutrino measurements with the far detector submitted to Physical Review D.
December 2005:	Total exposure exceeds 1×10^{20} protons on the NuMI target.

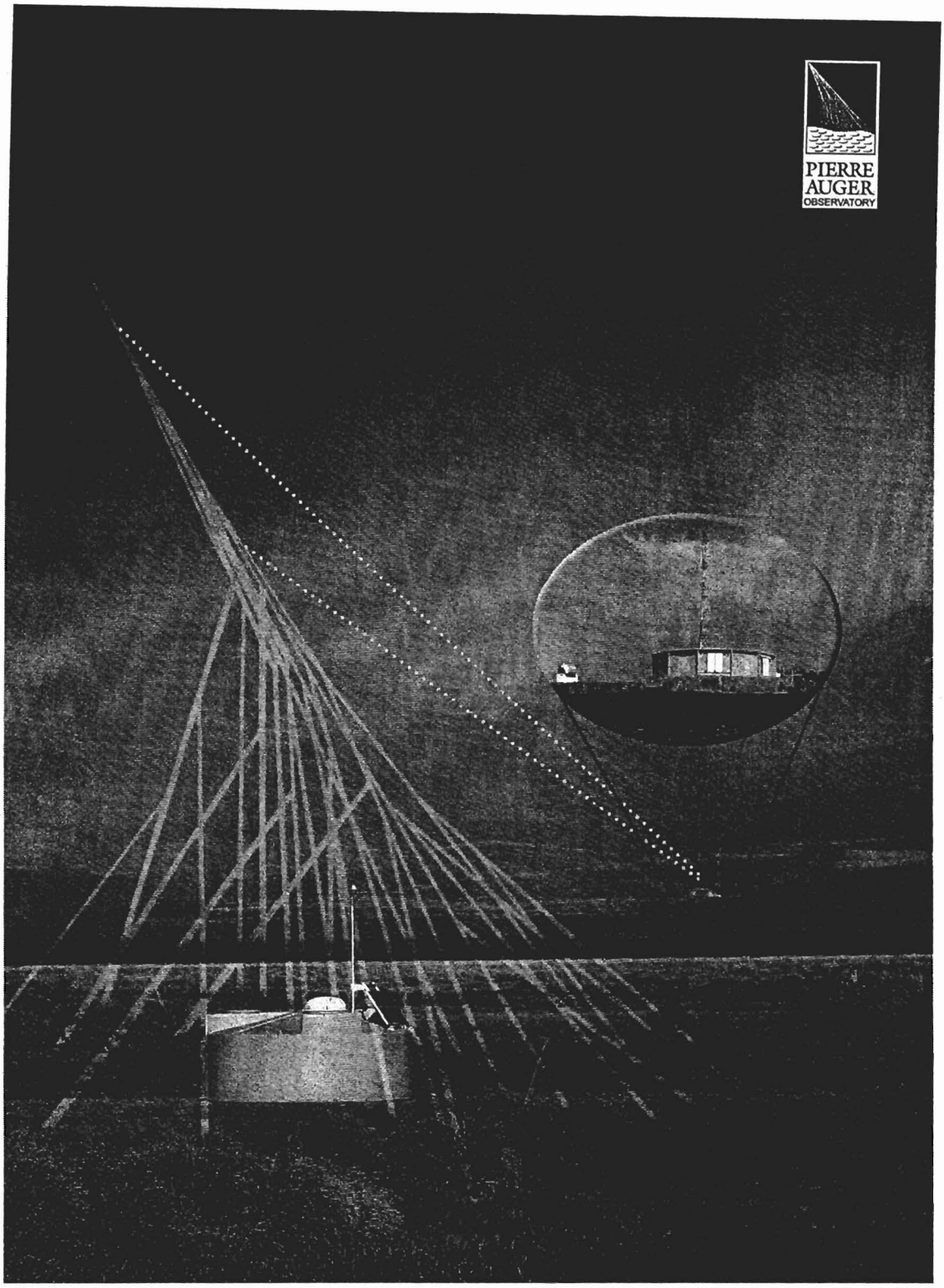


Illustration of the detector systems used in the Pierre Auger Project. Self-contained particle detectors are spaced on a 1.5 km grid over the surface. The air showers are also observed on dark nights using air fluorescence telescopes (inset).

E-881 (Mantsch) The Pierre Auger Project - A Study of the Highest-Energy Cosmic Rays

Fermilab
(and institutions in 15 countries)

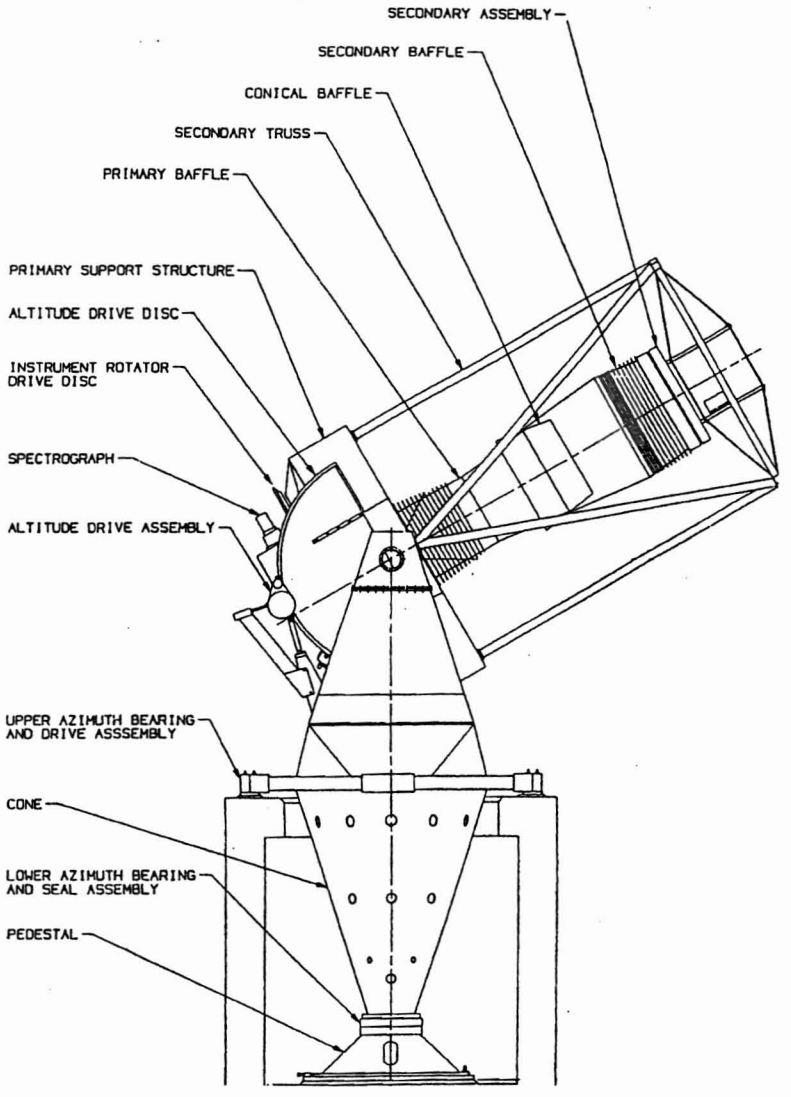
Status: *Data-Taking*

Over the past thirty years cosmic ray air shower detectors have recorded a number of events with energies greater that 10^{20} eV. These super-high-energy events are extraordinary for two reasons. First, there are no known acceleration mechanisms that can produce particles of these energies. Second, the attenuation length for cosmic rays with energy greater than 1.5×10^{19} eV is less than about 30 Mpc. This attenuation (known as the Greisen-Zatsepin-Kuzmin cut off) results from the interaction of cosmic ray particles with the cosmic microwave background. Thus particles of these energies can only reach the earth if they are produced relatively nearby. The high magnetic rigidity of these particles also means that they suffer little deflection from magnetic fields in the galaxy and in intergalactic space. Yet none of the particles observed points back to a possible astrophysical source within the distance limit imposed by the background radiation.

The Pierre Auger Project is a broadly-based international effort by 15 countries to make a high statistics, full sky study of cosmic rays at the highest energies. Two air shower detectors will be built, one to be placed in the Northern Hemisphere and one in the Southern Hemisphere. Each installation will consist of an array of 1600 particle detectors spread over 3000 km^2. Each installation will also have 24 atmospheric fluorescence telescopes viewing the volume above the surface array. These two air shower detector techniques working together form a powerful instrument for this research. The detectors perform very well indeed, better than expected. It now appears likely we will be able to reconstruct air showers at zenith angles almost to the horizon. This enhanced aperture will not only increase the experiment's cosmic ray event rate but also its physics possibilities including neutrinos and other exotics that approach from near the horizon.

Construction of the southern site of the Auger Observatory is approaching completion. More than 1170 (of 1600) surface detector stations are deployed and 900 operational, while 18 (of 24) of the fluorescence telescopes are installed and operational. Completion is expected in 2006. The first large data set containing more than 100,000 events has been analyzed and the first results presented at the International Cosmic Ray Conference and other conferences during the summer of 2005.

E-885


SECONDARY ASSEMBLY
SECONDARY BAFFLE
CONICAL BAFFLE
SECONDARY TRUSS
PRIMARY BAFFLE
PRIMARY SUPPORT STRUCTURE
ALTITUDE DRIVE DISC
INSTRUMENT ROTATOR DRIVE DISC
SPECTROGRAPH
ALTITUDE DRIVE ASSEMBLY
UPPER AZIMUTH BEARING AND DRIVE ASSSEMBLY
CONE
LOWER AZIMUTH BEARING AND SEAL ASSEMBLY
PEDESTAL

E-885 / 949 (Kent) Sloan Digital Sky Survey

Fermilab
(and American Museum of Natural History, Astrophysical Institute Potsdam [Germany], Basel [Switzerland], Cambridge [United Kingdom], Case Western Reserve, Chicago, Drexel, Institute for Advanced Study, Japan Participation Group [Japan], Johns Hopkins, Joint Institute for Nuclear Astrophysics [Michigan State / Notre Dame / Chicago], Kavli Institute [SLAC / Stanford], Korean Scientist Group [Korea], LAMOST [China], LANL, Max-Planck / Garching [Germany], Max-Planck / Heidelberg [Germany], New Mexico State, Ohio State, Pittsburgh, Portsmouth [United Kingdom], Princeton, US Naval Observatory, Washington)

Status: E-885: *Data Analysis*
E-949: *Data-Taking*

The Sloan Digital Sky Survey (SDSS) intends to reveal large-scale structure in the distribution of galaxies with a spatial extent and precision in its determination that greatly exceed current capabilities. This map of the large-scale distribution of galaxies will serve to constrain models for the origin and evolution of that structure, and thereby to address fundamental questions in cosmology and astrophysics, including the amount and distribution of mass with respect to the luminous material in the universe.

Beginning in July 2005, a new undertaking, SDSS-II, commenced. SDSS-II has three components. The first, called LEGACY, will complete the SDSS survey of the extragalactic universe, obtaining images and distances of nearly a million galaxies and quasars over a contiguous swath of sky in the Northern Hemisphere and over selected swaths in the Southern Hemisphere. The second, called SEGUE (the Sloan Extension for Galactic Understanding and Exploration), will map the structure and stellar makeup of the Milky Way Galaxy, gathering data on how the Milky Way formed and evolved. The final component includes an intensive study of type Ia supernovae, which can be used to precisely measure distances and map the rate of expansion of the universe. The goal of this study is to verify and quantify the existence of cosmological dark energy.

A wide-field 2.5-m telescope (see adjacent figure) dedicated to this project is operating at Apache Point Observatory (APO), near Sunspot, New Mexico. The imaging system and the spectroscopic system share the same focal plane via an instrument exchange mechanism (see Figures 1 and 2). The unique data products include the multi-band imaging survey (there are five wave bands covering the visible spectral range, the data from which are collected nearly simultaneously), and the inclusion of quasar candidates along with the galaxies.

In connection with the planning for SDSS-II, the survey goals for sky coverage in imaging and spectroscopy were re-baselined starting in January 2005. The current goals for LEGACY are 1418 square degrees of imaging and 744 plates (or 450,000 objects) for spectroscopy. The goals for SEGUE are 3572 square degrees of imaging and 660 plates (or 267,000 objects) for spectroscopy.

The goals for Supernovae are 150-180 well measured objects suitable for cosmological studies.

Observing was conducted every month in 2005 except for a six-week shutdown during the summer months. Through the end of 2005, the survey has collected 59% of its three-year baseline imaging data and 26% of its spectroscopic baseline data. The lag in spectroscopic data collection is a reflection of the fact that the spectroscopic survey inherently lags the imaging survey by about a year. A total of 2256 plates have been designed and drilled from the processed imaging data. Including reprocessing, about 127 terabytes of data have been processed.

One release of data to the public, DR4, was made in 2005. This release includes essentially all imaging and spectroscopic data obtained up to June, 2004. The data volume is about 12 terabytes and consists of images of 141 million objects and spectra of 850,000 galaxies, quasars and stars. The distribution is done via file servers that are hosted and accessed through Fermilab (the Data Archive Server) and a database that is cohosted at both Fermilab and Johns Hopkins University (the Catalog Archive Server). The next data release is scheduled for 2006.

The SDSS collaboration has published over 50 papers in refereed journals over the past year. Additionally, over 80 papers have been published by other members of the astronomical community based upon public SDSS data over the same time period. Sample highlights of results obtained in the past year include the discovery of baryon acoustic oscillations in the correlation function of red galaxies and the measurement of gravitational lensing in the number counts of distant quasars by nearby galaxies. These experiments introduce new methods for testing cosmological models, and they provide additional evidence that 70% of the universe is in the form of "dark energy".

Fermilab continues to be responsible for the maintenance of the data acquisition systems and certain hardware systems at APO. During 2005, a major upgrade was made to the data acquisition systems, replacing obsolete computing equipment with modern machines. Fermilab also operates the data processing systems, oversees improvements and upgrades to the data processing pipelines and hardware systems, and exports data distribution to collaboration members and the public.

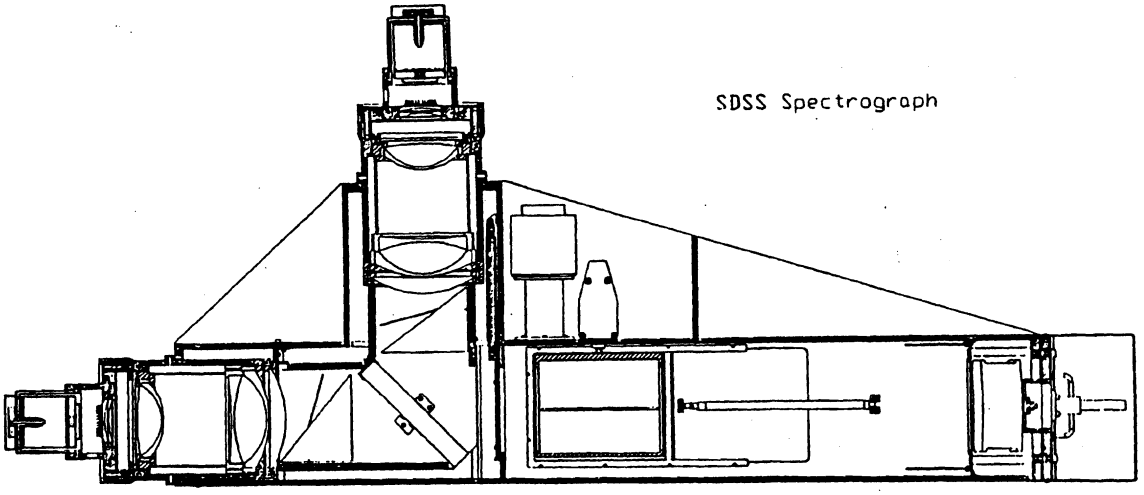


Figure 1

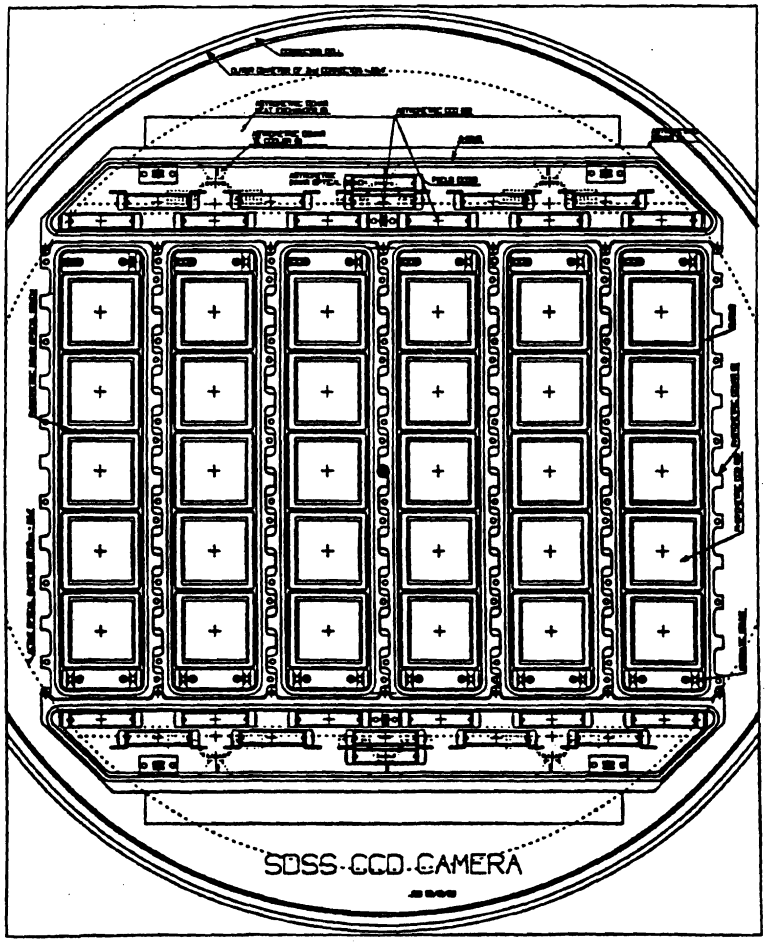


Figure 2

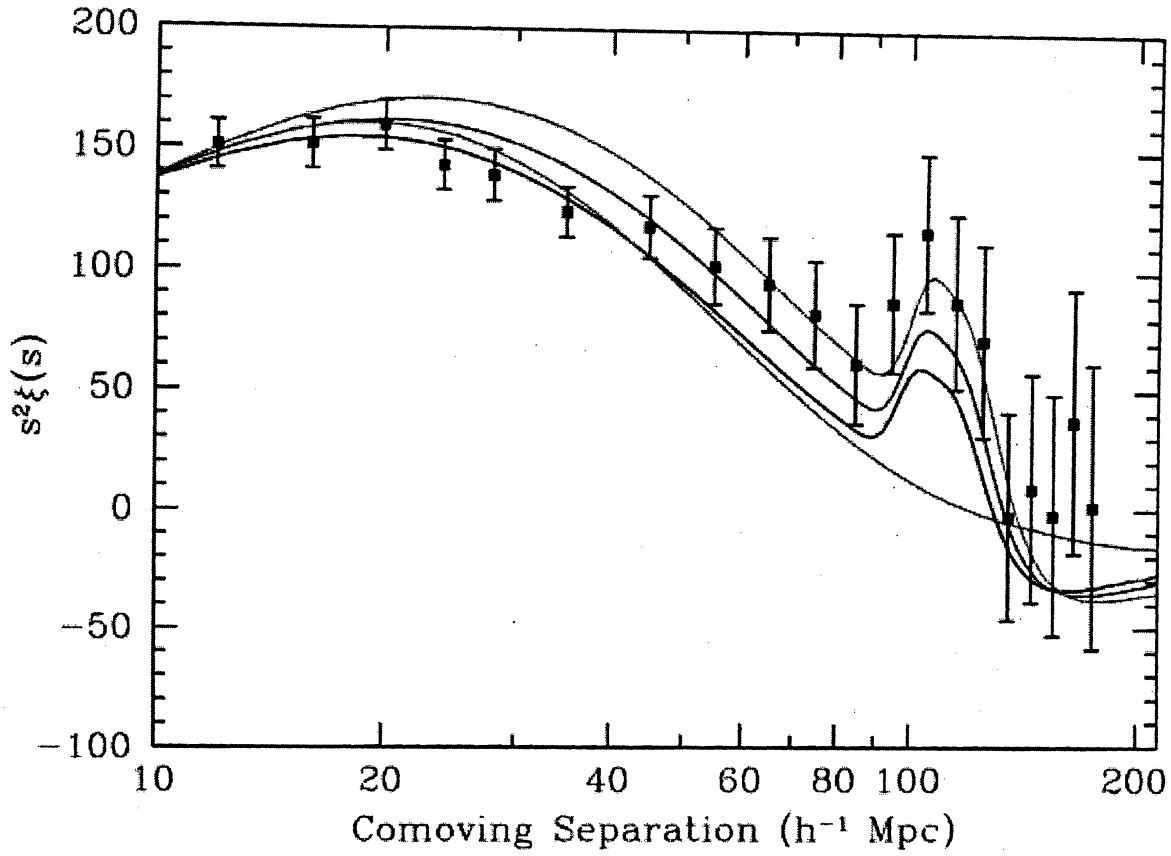


Figure 3. A plot of the correlation between red galaxies as a function of their separation. The peak at a comoving separation of 100 Mpc is the signature of baryon acoustic oscillations imposed on matter at an early epoch of the universe when the microwave background radiation was emitted.

Publications

High-Redshift Quasars Found in Sloan Digital Sky Survey Commissioning Data III. A Color-Selected Sample at i* < 20 in the Fall Equatorial Stripe, X. Fan et al., Astronomical Journal 121, 31 (2001).

High-Redshift Quasars Found in Sloan Digital Sky Survey Commissioning Data IV. Luminosity Function from the Fall Equatorial Stripe Sample, X. Fan et al., Astronomical Journal 121, 54 (2001).

High-Redshift Quasars Found in Sloan Digital Sky Survey Commissioning Data V. Hobby-Eberly Telescope Observations, D. P. Schneider et al., Astronomical Journal 121, 1232 (2001).

The First Hour of Extragalactic Data of the Sloan Digital Sky Survey Spectroscopic Commissioning: The Coma Cluster, F. Castander et al., Astronomical Journal 121, 2331 (2001).

Colors of 2625 Quasars at 0 < z < 5 Measured in the Sloan Digital Sky Survey Photometric System, G. Richards et al., Astronomical Journal 121, 2308 (2001).

The Luminosity Function of Galaxies in SDSS Commissioning Data, M. Blanton et al., Astronomical Journal 121, 2358 (2001).

Detection of Massive Tidal Tails around the Globular Cluster Palomar 5 with Sloan Digital Sky Survey Commissioning Data, M. Odenkirchen et al., Astrophysical Journal Lett. 548, 165 (2001).

A New Very Cool White Dwarf Discovered by the Sloan Digital Sky Survey, H. Harris et al., Astrophysical Journal Lett. 549, 109 (2001).

Stellar Population Studies with the SDSS I. The Vertical Distribution of Stars in the Milky Way, B. Chen et al., Astrophysical Journal 553, 184 (2001).

Weak-Lensing Measurements of 42 SDSS/RASS Galaxy Clusters, E. Sheldon et al., Astrophysical Journal 554, 881 (2001).

High-Redshift Quasars Found in Sloan Digital Sky Survey Commissioning Data VI. Sloan Digital Sky Survey Spectrograph Observations, S. Anderson, Astronomical Journal 122, 503 (2001).

Composite Quasar Spectra from the Sloan Digital Sky Survey, D. Vanden Berk et al., Astronomical Journal 122, 549 (2001).

Statistical Properties of Bright Galaxies in the SDSS Photometric System, K. Shimasaku et al., Astronomical Journal 122, 1238 (2001).

Galaxy Number Counts from the Sloan Digital Sky Survey Commissioning Data, N. Yasuda et al., Astronomical Journal 122, 1104 (2001).

Photometric Redshifts from Reconstructed Quasar Templates, T. Budavari et al., Astronomical Journal 122, 1163, (2001).

Photometric Redshifts of Quasars, G. Richards et al., Astronomical Journal 122, 1151 (2001).

Spectroscopic Target Selection for the Sloan Digital Sky Survey: The Luminous Red Galaxy Sample, D. Eisenstein et al., Astronomical Journal 122, 2267 (2001).

A Photometricity and Extinction Monitor at the Apache Point Observatory, D. Hogg et al., Astronomical Journal 122, 2129 (2001).

New Insights on the Draco Dwarf Spheroidal Galaxy from SDSS: a Larger Radius and No Tidal Tails, M. Odenkirchen et al., Astronomical Journal 122, 2538 (2001).

Evidence for Reionization at z~6: Detection of a Gunn-Peterson Trough in a z=6.28 Quasar, R. Becker et al., Astronomical Journal 122, 2850 (2001).

A Survey of z>5.8 Quasars in the Sloan Digital Sky Survey I: Discovery of Three New Quasars and the Spatial Density of Luminous Quasars at z~6, X. Fan et al., Astronomical Journal 122, 2833 (2001).

Color Separation of Galaxy Types in the Sloan Digital Sky Survey Imaging Data, I. Strateva et al., Astronomical Journal 122, 1861 (2001).

Solar System Objects Observed in the SDSS Commissioning Data, Z. Ivezic etal., Astronomical Journal 122, 2749 (2001).

Sloan Digital Sky Survey Multicolor Observations of GRB010222, B. Lee et al., Astrophysical Journal 561, 183 (2001).

Broad Absorption Line Quasars in the Sloan Digital Sky Survey with VLA-FIRST Radio Detections, K. Menou et al., Astrophysical Journal 561, 645 (2001).

Spectroscopic Target Selection in the Sloan Digital Sky Survey: The Main Galaxy Sample, M. Strauss et al., Astronomical Journal 124, 1810 (2002).

Spectroscopic Target Selection in the Sloan Digital Sky Survey: The Quasar Sample, G. Richards et al., Astronomical Journal 123, 2945 (2002).

The u'g'r'i'z' Standard Star Network, J. Smith et al., Astronomical Journal 123, 2121 (2002).

Sloan Digital Sky Survey: Early Data Release, C. Stoughton et al., Astronomical Journal 123, 485 (2002).

Color Confirmation of Asteroid Families, Z. Ivezic et al., Astronomical Journal 124, 2943 (2002).

The Redshift of the Lensing Galaxy in PMN J0134-0931, P. Hall et al., Astrophysical Journal Lett. 575, L51, (2002).

Kinematic Study of the Disrupting Globular Cluster Palomar 5 using VLT Spectra, M. Odenkirchen et al., Astronomical Journal 124, 1497 (2002).

Cosmological Information from Quasar-Galaxy Correlations Induced by Weak Lensing, B. Menard et al., Astronomy & Astrophysics 386,784 (2002).

Faint High Latitude Carbon Stars Discovered by the Sloan Digital Sky Survey: Methods and Initial Results, B. Margon et al., Astronomical Journal 124, 1651 (2002).

Composite Luminosity Functions of the Sloan Digital Sky Survey Cut and Enhance Galaxy Cluster Catalog, T. Goto et al., Publ. Astronomical Society of the Pacific 54, 515 (2002).

The Luminosity Density of Red Galaxies, D. Hogg et al., Astronomical Journal 124, 646 (2002).

Exploratory Chandra Observations of the Three Highest Redshift Quasars, W. Brandt et al., Astrophysical Journal 569, 5 (2002).

Optical and Radio Properties of Extragalactic Sources Observed by the FIRST Survey and the SDSS, Z. Ivezic et al., Astronomical Journal 124, 2364 (2002).

Comparison of Positions and Magnitudes of Asteroids Observed in the Sloan Digital Sky Survey with those Predicted for Known Asteroids, M. Juric et al., Astronomical Journal 124, 1776 (2002).

Characterization of M, L and T Dwarfs in Sloan Digital Sky Survey, S. Hawley et al., Astronomical Journal 123, 3409 (2002).

LOTIS, Super-LOTIS, SDSS and Tautenburg Observations of GRB010921, H. Park et al., Astrophysical Journal Lett. 571, 131 (2002).

VLT Optical and Near-IR Observations of the z=6.28 Quasar 1030+0524, L. Pentericci et al., Astronomical Journal 123, 2151 (2002).

Unusual Broad Absorption Line Quasars from the Sloan Digital Sky Survey, P. Hall et al., Astrophysical Journal Suppl. 141, 267 (2002).

Dynamical Confirmation of SDSS Weak Lensing Scaling Laws, T. McKay et al., Astrophysical Journal Lett. 571, 85 (2002).

SDSS J124602.54+011318.8: A Highly Luminous Optical Transient at a Redshift of 0.385, D. Vanden Berk et al., Astrophysical Journal 576, 673 (2002).

Higher Order Moments of the Angular Distribution of Galaxies, I. Szapudi et al., Astrophysical Journal 570, 75 (2002).

An SDSS Survey for Resolved Milky Way Satellite Galaxies I: Detection Limits, B. Willman et al., Astronomical Journal 123, 848 (2002).

The Sloan Digital Sky Survey Quasar Catalog I. Early Data Release, D. Schneider et al., Astronomical Journal 123, 567 (2002).

The Angular Clustering of Galaxy Pairs, L. Infante et al., Astrophysical Journal 567, 155 (2002).

L Dwarfs Found in Sloan Digital Sky Survey Commissioning Data II. Hobby-Eberly Telescope Observations, D. Schneider et al., Astronomical Journal 123, 458 (2002).

The Ghost of Sagittarius and Lumps in the Halo of the Milky Way, H. Newberg et al., Astrophysical Journal 569, 245 (2002).

The Cut & Enhance Method: Selecting Clusters of Galaxies from the SDSS Commissioning Data, T. Goto et al., Astronomical Journal 123, 1807 (2002).

Towards Spectral Classification of L and T Dwarfs: Infrared and Optical Spectroscopy and Analysis, T. Geballe et al., Astrophysical Journal 564, 466 (2002).

Infrared Photometry of Late M, L, and T Dwarfs, S. Leggett et al., Astrophysical Journal 564, 452 (2002).

The 3D Power Spectrum from Early SDSS Angular Clustering, S. Dodelson et al., Astrophysical Journal 572, 140 (2002).

The Angular Power Spectrum of Galaxies from Early SDSS Data, M. Tegmark et al., Astrophysical Journal 571, 191 (2002).

The Angular Correlation Function of Galaxies from Early SDSS Data, A. Connolly et al., Astrophysical Journal 579, 42 (2002).

Analysis of Systematic Effects and Statistical Uncertainties in Angular Clustering of Galaxies from Early SDSS Data, R. Scranton et al., Astrophysical Journal 579, 48 (2002).

Galaxy Clustering in Early SDSS Redshift Data, I. Zehavi et al., Astrophysical Journal 571, 172 (2002).

Cataclysmic Variables from SDSS I. The First Results, P. Szkody et al., Astronomical Journal 123, 430 (2002).

Detecting Clusters of Galaxies in the Sloan Digital Sky Survey I: Monte Carlo Comparison of Cluster Detection Algorithms, R. Kim et al., Astronomical Journal 123, 20 (2002).

Three-Dimensional Genus Statistics of Galaxies in the SDSS Early Data Release, C. Hikage et al., Publications Astronomical Society Japan 54, 707 (2002).

A Matched-Filter Analysis of the Tidal Tails Around the Globular Cluster Palomar 5, C. Rockosi et al., Astronomical Journal 124, 349 (2002).

Two-Dimensional Topology of the Sloan Digital Sky Survey, F. Hoyle et al., Astrophysical Journal 580, 663 (2002).

A Gravitationally Lensed Quasar with Quadruple Images Separated by 14.62 Arcseconds, N. Inada et al., Nature 426, 810 (2003).

The Morphology-Density Relation in the Sloan Digital Sky Survey, T. Goto et al., Monthly Notices Royal Astronomical Society 346, 601 (2003).

Sagittarius Tidal Debris 90 kpc from the Galactic Center, H. Newberg et al., Astrophysical Journal Lett. 596, 191 (2003).

Continuum and Emission Line Properties of Broad Absorption Line Quasars, T. Reichard et al., Astronomical Journal 126, 2594 (2003).

The Extended Tails of Palomar 5: A Ten Degree Arc of Globular Cluster Tidal Debris, M. Odenkirchen et al., Astronomical Journal 126, 2385 (2003).

The Sloan Digital Sky Survey Quasar Catalog II. First Data Release, D.P. Schneider et al., Astronomical Journal 126, 2579 (2003).

SDSS J0903+5028: A New Gravitational Lens, D. Johnston et al., Astronomical Journal 126, 2281 (2003).

Discovery of Eight New Extremely Metal-Poor Galaxies in the Sloan Digital Sky Survey, A. Kniazev et al., Astrophysical Journal Lett. 593, 73 (2003).

Magnetic White Dwarfs from the SDSS. The First Data Release, G. Schmidt et al., Astrophysical Journal 595, 1101 (2003).

A Merged Catalog of Clusters of Galaxies from Early SDSS Data, N. Bahcall et al., Astrophysical Journal Suppl. 148, 243 (2003).

Cataclysmic Variables from SDSS II. The Second Year, P. Szkody et al., Astronomical Journal 126, 1499 (2003).

Investigating the SDSS Cataclysmic Variable SDSS J132723.39+652854.2, M. Wolfe et al., Publications Astronomical Society Pacific 115, 1118 (2003).

A Large, Uniform Sample of X-ray Emitting AGNs: Selection Approach and an Initial Catalog from the ROSAT All-Sky and Sloan Digital Sky Surveys, S. Anderson et al., Astronomical Journal 126, 2209 (2003).

An Initial Survey of White Dwarfs in the Sloan Digital Sky Survey, H. Harris et al., Astronomical Journal 126, 1023 (2003).

Minkowski Functionals of SDSS Galaxies I: Analysis of Excursion Sets, C. Hikage et al., Publications Astronomical Society Japan 55, 911 (2003).

Candidate Type II Quasars from the Sloan Digital Sky Survey: I. Selection and Optical Properties of a Sample at 0.3<0.83, N. Zakamska et al., Astronomical Journal 126, 2125 (2003).

Double-Peaked Low-Ionization Emission Lines in Active Galactic Nuclei, I. Strateva et al., Astronomical Journal 126, 1720 (2003).

SDSS White Dwarfs with Spectra Showing Atomic Oxygen and/or Carbon Lines, J. Liebert et al., Astronomical Journal 126, 2521 (2003).

The Environment of Passive Spiral Galaxies in the SDSS, T. Goto et al., Publications Astronomical Society Japan 55, 757 (2003).

The Size Distribution of Galaxies in the Sloan Digital Sky Survey, S. Shen et al., Monthly Notices Royal Astronomical Society 343, 978 (2003).

The Velocity Dispersion Function of Early-Type Galaxies, R. Sheth et al., Astrophysical Journal 594, 225 (2003).

VLT+UVES Spectorscopy of the CaII LoBAL Quasar SDSS 0300+0048, P. Hall et al., Astrophysical Journal 593, 189 (2003).

Observing the Dark Matter Density Profile of Isolated Galaxies, F. Prada et al., Astrophysical Journal 598, 260 (2003).

A Low Latitude Halo Stream around the Milky Way, B. Yanny et al., Astrophysical Journal 588, 824 (2003).

Angular Clustering with Photometric Redshifts in the Sloan Digital Sky Survey: Bimodality in the Clustering Properties of Galaxies, T. Budavari et al., Astrophysical Journal 595, 59 (2003).

A Survey of z>5.7 Quasars in the Sloan Digital Sky Survey II: Discovery of Three Additional Quasars at z>6, X. Fan et al., Astronomical Journal 125, 1649 (2003).

The Overdensities of Galaxy Environments as a Function of Luminosity and Color, D. Hogg et al., Astrophysical Journal Lett. 585, 5 (2003).

The Sloan Digital Sky Survey: The Cosmic Spectrum and Star-Formation History, K. Glazebrook et al., Astrophysical Journal 587, 55 (2003).

Hdelta-Selected Galaxies in the Sloan Digital Sky Survey I: The Catalog, T. Goto et al., Publications Astronomical Society Japan 55, 771 (2003).

Red and Reddened Quasars in the Sloan Digital Sky Survey, G. Richards et al., Astronomical Journal 126, 1131 (2003).

Determining the Lensing Fractions of SDSS Quasars: Methods and Results from the EDR, B. Pindor et al., Astronomical Journal 125, 2325 (2003).

Average Spectra of Massive Galaxies in the SDSS, D. Eisenstein et al., Astrophysical Journal 585, 594 (2003).

SDSS Catalog of Stars in the Draco Dwarf Spheroidal Galaxy, H. Rave et al., Astrophysical Journal Suppl. 145, 245 (2003).

A Catalog of Broad Absorption Line Quasars from the Sloan Digital Sky Survey Early Data Release, T. Reichard et al., Astronomical Journal 125, 1711 (2003).

Selection of Metal-Poor Giant Stars using the Sloan Digital Sky Survey Photometric System, A. Helmi et al., Astrophysical Journal 586, 195 (2003).

The Galaxy Luminosity Function and Luminosity Density at Redshift z=<0.1, M. Blanton et al., Astrophysical Journal 592, 819 (2003).

Luminosity Function of Morphologically Classified Galaxies in the SDSS Survey, O. Nakamura et al., Astronomical Journal 125, 1682 (2003).

A First Look at White - M dwarf Pairs in SDSS, S. Raymond et al., Astronomical Journal 125, 2621 (2003).

The Broadband Optical Properties of Galaxies with Redshifts 0.2<z<0.22, M. Blanton et al., Astrophysical Journal 594, 186 (2003).

The Application of Photometric Redshifts to the SDSS Early Data Release, I. Csabai et al., Astronomical Journal 125, 580 (2003).

Galaxy Star-Formation as a Function of Environment in the Early Data Release of the Sloan Digital Sky Survey, P. Gomez et al., Astrophysical Journal 584, 210 (2003).

Two Rare Magnetic Cataclysmic Variables with Extreme Cyclotron Features Identified in the Sloan Digital Sky Survey, P. Szkody et al., Astrophysical Journal 583, 902 (2003).

The Cluster Mass Function from Early SDSS Data: Cosmological Implications, N. Bahcall et al., Astrophysical Journal 585, 182 (2003).

SDSS J092455.87+021924.9: an Interesting Gravitationally Lensed Quasar from the Sloan Digital Sky Survey, N. Inada et al., Astronomical Journal 126, 666 (2003).

A Feature at z ~ 3.2 in the Evolution of the Ly-alpha Forest Optical Depth, M. Bernardi et al., Astronomical Journal 125, 32 (2003).

Estimating Fixed-Frame Galaxy Magnitudes in the SDSS, M. Blanton et al., Astronomical Journal 125, 2348 (2003).

Early-type Galaxies in the SDSS IV: Colors and Chemical Evolution, M. Bernardi et al., Astronomical Journal 125, 1882 (2003).

Early-type Galaxies in the SDSS III: The Fundamental Plane, M. Bernardi et al., Astronomical Journal 125, 1866 (2003).

Early-type Galaxies in the SDSS II: Correlations Between Observables, M. Bernardi et al., Astronomical Journal 125, 1849 (2003).

Early-type Galaxies in the SDSS I: The Sample, M. Bernardi et al., Astronomical Journal 125, 1817 (2003).

The Environmental Dependence of Galaxy Properties in the Local Universe: Dependence on Luminosity, Local Density, and System Richness, M. Tanaka et al., Astronomical Journal 128, 2677 (2004).

Spectral Classification of Quasars in the Sloan Digital Sky Survey: {Eigenspectra;} Redshift and Luminosity Effects, C. Yip et al., Astronomical Journal 128, 2603 (2004).

Efficient Photometric Selection of Quasars from the Sloan Digital Sky Survey: 100000 z<3 Quasars from Data Release One, G. Richards et al., Astrophysical Journal Suppl. 155, 257 (2004).

Distributions of Galaxy Spectral Types in the Sloan Digital Sky Survey, C. Yip et al., Astronomical Journal 128, 585 (2004).

Dust Reddening in SDSS Quasars, P. Hopkins et al., Astronomical Journal 128, 1112 (2004).

An Empirical Algorithm for Broad-band Photometric Redshifts of Quasars from the Sloan Digital Sky Survey, M. Weinstein et al., Astrophysical Journal Suppl. 155, 243 (2004).

Discovery of New Ultracool White Dwarfs in the Sloan Digital Sky Survey, E. Gates et al., Astrophysical Journal Lett. 612, 129 (2004).

Cataclysmic Variables from SDSS III. The Third Year, P. Szkody et al., Astronomical Journal 128, 1882 (2004).

A Survey of z>5.7 Quasars in the Sloan Digital Sky Survey III: Discovery of Five Additional Quasars, X. Fan et al., Astronomical Journal 128, 515 (2004).

Three-point Correlation Functions of SDSS Galaxies in Redshift Space: Morphology, Color and Luminosity Dependence, I. Kayo et al., Publ. Astronomical Society Japan 56, 415 (2004).

ROSAT-SDSS Galaxy Clusters Survey. I. The Catalog and the Correlation of Xray and Optical Properties, P. Popesso et al., Astronomy and Astrophysics 423, 449 (2004).

Andromeda IX: A New Dwarf Spheroidal Satellite of M31, D. Zucker et al., Astrophysical Journal Lett. 612, 121 (2004).

A Catalog of Spectroscopically Identified White Dwarf Stars in the First Data Release of the Sloan Digital Sky Survey, S. Kleinman et al., Astrophysical Journal 607, 426 (2004).

Near-Infrared Photometry and Spectroscopy of L and T Dwarfs: the Effects of Temperature, Clouds, and Gravity, G. Knapp et al., Astronomical Journal 127, 3553 (2004).

Microlensing of the Broad Emission Line Region in the Quadruple Lens SDSS J1004+4112, G. Richards et al., Astrophysical Journal 610, 679 (2004).

Spectroscopic Properties of Cool Stars in the SDSS: An Analysis of Magnetic Activity and a Search for Subdwarfs, A. West et al., Astronomical Journal 128, 426 (2004).

The Environmental Dependence of the Relations between Stellar Mass, Structure, Star Formation and Nuclear Activity in Galaxies, G. Kauffmann et al., Mon. Not. Royal Astronomical Society 347, 731 (2004).

A New Giant Stellar Structure Near the Outer Halo of M31: Satellite or Stream?, D. Zucker et al., Astrophysical Journal Lett. 612, 117 (2004).

Spatial Variations of Galaxy Number Counts in the SDSS I.: Extinction, Large-Scale Structure and Photometric Homogeneity, M. Fukugita et al., Astronomical Journal 127, 3155 (2004).

The H alpha Luminosity Function of Morphologically Classified Galaxies in the Sloan Digital Sky Survey, O. Nakamura et al., Astronomical Journal 127, 2511 (2004).

Observations and Theoretical Implications of the Large Separation Lensed Quasar SDSS J1004+4112, M. Oguri et al., Astrophysical Journal 605, 78 (2004).

The Physical Properties of Star Forming Galaxies in the Low Redshift Universe, J. Brinchmann et al., Mon. Not. Royal Astronomical Society 351, 1151 (2004).

The Galaxy-Mass Correlation Function Measured from Weak Lensing in the SDSS, E. Sheldon et al., Astronomical Journal 127, 2544 (2004).

A Strategy for Finding Near Earth Objects with the SDSS Telescope, S. Raymond et al., Astronomical Journal 127, 28888 (2004).

Cosmological Parameters from Eigenmode Analysis of Sloan Digital Sky Survey, A. Pope et al., Astrophysical Journal 607, 655 (2004).

Faint High-Latitude Carbon Stars Discovered by the Sloan Digital Sky Survey: An Initial Catalog, R. Downes et al., Astronomical Journal 127, 2838 (2004).

Cosmological Parameters from SDSS and WMAP, M. Tegmark et al., Phys. Rev. D69, 103501 (2004).

SDSS J1335+-118: A New Two-Image Gravitational Lens, M. Oguri et al., Publ. Astronomical Society Japan 56, 399 (2004).

An Improved Proper Motion Catalog Combining USNO-B and SDSS, J. Munn et al., Astronomical Journal 127, 3034 (2004).

L' and M' Photometry of Ultracool Dwarfs, D. Golimowski et al., Astronomical Journal 127, 3516 (2004).

Blue Horizontal Branch Stars in the Sloan Digital Sky Survey: II. Kinematics of the Galactic Halo, E. Sirko et al., Astronomical Journal 127, 914 (2004).

Blue Horizontal Branch Stars in the Sloan Digital Sky Survey: I. Sample Selection and Structure in the Galactic Halo, E. Sirko et al., Astronomical Journal 127, 899 (2004).

Detection of Intergalactic HeII Absorption at Redshift 3.5, W. Zheng et al., Astronomical Journal 127, 656 (2004).

SDSS J15517.35+6346220.0: A Newly Discovered Gravitationally Lensed Quasar, B. Pindor et al., Astronomical Journal 127, 1318 (2004).

VLT + UVES Spectroscopy of the Low-Ionization Intrinsic Absorber in SDSS J001130.56+005550.7, D. Hutsemekers et al., Astronomy and Astrophysics 415, 77 (2004).

Sloan Digital Sky Survey Spectroscopic Lens Search: I. Discovery of Intermediate-Redshift Star-Forming Galaxies Behind Foreground Luminous Red Galaxies, A. Bolton et al., Astronomical Journal 127, 1860 (2004).

The Ensemble Photometric Variability of ~2500 Quasars in the Sloan Digital Sky Survey, D. Vanden Berk et al., Astrophysical Journal 601, 692 (2003).

A Snapshot Survey for Gravitational Lenses Among z>=4.0 Quasars: I. The z>5.7 Sample, G. Richards et al., Astronomical Journal 127, 1305 (2004).

Halos Around the Edge-On Disk Galaxies in the SDSS, S. Zibetti et al., Mon. Not. Royal Astronomical Society 347, 556 (2004).

The Dependence on Environment of the Color-Magnitude Relation of Galaxies, D. Hogg et al., Astrophysical Journal Lett. 601, 29 (2004).

Stellar and Dynamical Masses of Ellipticals in the Sloan Digital Sky Survey, N. Padmanabhan et al., New Astronomy 9(5), 329 (2004).

The Three-Dimensional Power Spectrum of Galaxies from the Sloan Digital Sky Survey, M. Tegmark et al., Astrophysical Journal 606, 702 (2004).

Star Formation Rate Indicators in the Sloan Digital Sky Survey, A. Hopkins et al., Astrophysical Journal 599, 971 (2003).

Quantifying the Bimodal Color-Magnitude Distribution of Galaxies, I. Baldry et al., Astrophysical Journal 600, 681 (2004).

The Host Galaxies of AGN, G. Kauffmann et al., Mon. Not. Royal Astronomical Society 346, 1055 (2003).

Galaxy Types in the Sloan Digital Sky Survey Using Supervised Artificial Neural Networks, N. Ball et al., Mon. Not. Royal Astronomical Society 348(3), L1038 (2004).

Selection and Photometric Properties of K+A Galaxies, A. Quintero et al., Astrophysical Journal 602, 109 (2004).

On Departures from a Power Law in the Galaxy Correlation Function, I. Zehavi et al., Astrophysical Journal 608, 16 (2004).

The Near-IR Properties and Contiuum Shape of High Redshift Quasars from the Sloan Digital Sky Survey, L. Pentericci et al., Astronomy and Astrophysics 410, 75 (2003).

The Dependence of Star Formation History and Internal Structure on Stellar Mass for 80,000 Low Redshift Galaxies, G. Kauffmann et al., Mon. Not. Royal Astronomical Society 341, 54 (2003).

Stellar Masses and Star Formation Histories for 80,000 Galaxies from the Sloan Digital Sky Survey, G. Kauffmann et al., Mon. Not. Royal Astronomical Society 341, 33 (2003).

Sloan Digital Sky Survey Imaging of Low Galactic Latitude Fields: Technical Summary and Data Release, D. Finkbeiner et al., Astronomical Journal 128, 2577 (2004).

The Second Data Release of the Sloan Digital Sky Survey, K. Abazajian et al., Astronomical Journal 128, 502 (2004).

SDSS Data Management and Photometric Quality Assessment, Z. Ivezic et al., Astronomische Nachrichten 325, 583 (2004).

Ultracompact AM CVn Binaries from the Sloan Digital Sky Survey: Three Candidates Plus the First Confirmed Eclipsing System, S. Anderson et al., Astronomical Journal 130, 2236 (2005).

SDSS J0246-0825: A New Gravitationally Lensed Quasar from the Sloan Digital Sky Survey, N. Inada et al., Astronomical Journal 130, 1967 (2005).

Photometric Accretion Signatures Near the Substellar Boundary, P. McGehee et al., Astronomical Journal 130, 1752 (2005).

The SDSS View of the Palomar-Green Bright Quasar Survey, S. Jester et al., Astronomical Journal 130, 873 (2005).

New Low Accretion-Rate Magnetic Binary Systems and Their Significance for the Evolution of Cataclysmic Variables G., D. Schmidt et al., Astrophysical Journal 630, 1037 (2005).

Magnetic White Dwarfs from the SDSS II. The Second and Third Data Releases, K. Vanlandingham et al., Astronomical Journal 130, 734 (2005).

Dark Matter and Stellar Mass in the Luminous Regions of Disk Galaxies, J. Pizagno et al., Astrophysical Journal 633, 844 (2005).

Eleven New DAVs from the Sloan Survey, F. Mullally et al., Astrophysical Journal 625, 966 (2005).

The Color Selection of Quasars from Redshifts 5 to 10: Cloning and Discovery, K. Chiu et al., Astronomical Journal 130, 13 (2005).

Detection of Cosmic Magnification with the Sloan Digital Sky Survey, R. Scranton et al., Astrophysical Journal 633, 589 (2005).

Spectral Variability of Quasars in the Sloan Digital Sky Survey. I: Wavelength Dependence, B. Wilhite et al., Astrophysical Journal 633, 638 (2005).

Detection of the Baryon Acoustic Peak in the Large-Scale Correlation Function of SDSS Luminous Red Galaxies, D. Eisenstein et al., Astrophysical Journal 633, 560 (2005).

The Nature of Nearby Counterparts to Intermediate Redshift Luminous Compact Blue Galaxies. II CO Observations, C. Garland et al., Astrophysical Journal 624, 714 (2005).

Cataclysmic Variables from SDSS IV. 2003 Year, P. Szkody et al., Astronomical Journal 129, 2386 (2005).

Systematic Errors in Weak Lensing: Application to SDSS Galaxy-Galaxy Weak Lensing, R. Mandelbaum et al., Mon. Not. Royal Astronomical Society 361, 1287 (2005).

SDSS ~J210014.12+004446.0: A New Dwarf Nova with Quiescent Superhumps?, J. Tramposch et al., Publ. Astronomical Society Pacific 117, 262 (2005).

The SDSS u-band Galaxy Survey: Luminosity Functions and Evolution, I. Baldry et al., Mon. Not. Royal Astronomical Society 358, 441 (2005).

Active Galactic Nuclei in the Sloan Digital Sky Survey: II. Emission-Line Luminosity Function, L. Hao et al., Astronomical Journal 129, 1795 (2005).

Active Galactic Nuclei in the Sloan Digital Sky Survey: I. Sample Selection, L. Hao et al., Astronomical Journal 129, 1783 (2005).

Large Scale Clustering of Sloan Digital Sky Survey Quasars: Impact of the Baryon Density and the Cosmological Constant, K. Yahata et al., Publ. Astronomical Society Japan 57, 529 (2005).

An Empirical Calibration of the Completeness of the SDSS Quasar Survey, D. Vanden Berk et al., Astronomical Journal 129, 2047 (2005).

The Sloan Digital Sky Survey Quasar Catalog III. Third Data Release, D. Schneider et al., Astronomical Journal 130, 367 (2005).

Intergalactic Stars in z~0.25 Galaxy Clusters: Systematic Properties from Stacking of Sloan Digital Sky Survey Imaging Data, S. Zibetti et al., Mon. Not. Royal Astronomical Society 358, 949 (2005).

The RASS-SDSS Galaxy Cluster Survey. III Scaling Relations of Galaxy Clusters, P. Popesso et al., Astronomy and Astrophysics 433, 431 (2005).

The Intermediate-Scale Clustering of Luminous Red Galaxies, I. Zehavi et al., Astrophysical Journal 621, 22 (2005).

The Small-Scale Clustering of Luminous Red Galaxies Via Cross-Correlation Techniques, D. Eisenstein et al., Astrophysical Journal 619, 178 (2005).

Cosmic Homogeneity Demonstrated with Luminous Red Galaxies, D. Hogg et al., Astrophysical Journal 624, 54 (2005).

XMM-Newton and Optical Follow-up Observations of Three New Polars from the Sloan Digital Sky Survey, L. Homer et al., Astrophysical Journal 620, 929 (2005).

A Comprehensive Model for the Monoceros Tidal Stream, J. Penarrubia et al., Astrophysical Journal 626, 128 (2005).

Colors, Magnitudes and Velocity Dispersions in Early-Type Galaxies: Implications for Galaxy Ages and Metallicities, M. Bernardi et al., Astronomical Journal 129, 61 (2005).

The Nature of Nearby Counterparts to Intermediate Redshift Luminous Compact Blue Galaxies I. Optical/H I Properties and Dynamical Masses, C. Garland et al., Astrophysical Journal 615, 689 (2004).

A New Milky Way Companion: Unusual Globular Cluster or Extreme Dwarf Satellite?, B. Willman et al., Astronomical Journal 129, 2692 (2005).

Candidate Type II Quasars from the SDSS: III. Spectropolarimetry Reveals Hidden Type I Nuclei, N. Zakamska et al., Astronomical Journal 129, 1212 (2005).

XMM-Newton Observations of the Extremely Low Accretion Rate Polars SDSSJ155331.12 + 551614.5 and SDSSJ132411.57 + 032050.5, P. Szkody et al., Astronomical Journal 128, 2443 (2004).

Discovery of Two Gravitationally Lensed Quasars with Image Separations of 3 Arcseconds from the Sloan Digital Sky Survey, M. Oguri et al., Astrophysical Journal 622, 106 (2005).

NYU-VAGC: A Galaxy Catalog Based on New Public Surveys, M. Blanton et al., Astronomical Journal 129, 2562 (2005).

Optically Identified BL Lacertae Objects from the Sloan Digital Sky Survey, M. Collinge et al., Astronomical Journal 129, 2542 (2005).

The Properties and Luminosity Function of Extremely Low Luminosity Field Galaxies, M. Blanton et al., Astrophysical Journal 631, 208 (2005).

Spectroscopic Properties of Void Galaxies in the Sloan Digital Sky Survey, R. Rojas et al., Astrophysical Journal 624, 571 (2005).

RASS-SDSS Galaxy Clusters Survey.II. A Unified Picture of the Cluster Luminosity Function, P. Popesso et al., Astronomy and Astrophysics 433, 415 (2005).

The Luminosity and Color Dependence of the Galaxy Correlation Function, I. Zehavi et al., Astrophysical Journal 63, 1 (2005).

Cosmological Parameter Analysis Including SDSS Ly-Alpha Forest and Galaxy Bias: Constraints on the Primordial Spectrum of Fluctuations, Neutrino Mass, and Dark Energy, U. Seljak et al., Phys. Rev. D71, 103515 (2005).

Calibrating Photometric Redshifts of Luminous Red Galaxies, N. Padmanabhan et al., Mon. Not. Royal Astronomical Society 359, 237 (2005).

Cosmology and the Halo Occupation Distribution from Small-Scale Galaxy Clustering in the Sloan Digital Sky Survey, K. Abazajian et al., Astrophysical Journal 625, 613 (2005).

Distributions of Galaxy Spectral Types in the Sloan Digital Sky Survey, C. Yip et al., Astronomical Journal 128, 585 (2004).

SDSS Galaxy Bias Determination from Halo Mass-Bias Relation and Its Cosmological Implications, U. Seljak et al., Phys. Rev. D71, 043511 (2005).

Cross-Correlation of CMB with Large-Scale Structure: Weak Gravitational Lensing, C. Hirata et al., Phys. Rev. D70, 103501 (2004).

Galaxy-Galaxy Weak Lensing in SDSS: Intrinsic Alignments and Shear Calibration Errors, C. Hirata et al., Mon. Not. Royal Astronomical Society 353, 529 (2004).

A Gravitationally Lensed Quasar with Quadruple Images Separated by 14.62 Arcseconds, N. Inada et al., Nature 426, 810 (2003).

The Luminosity Function of Void Galaxies in the Sloan Digital Sky Survey, F. Hoyle et al., Astrophysical Journal 620, 618 (2005).

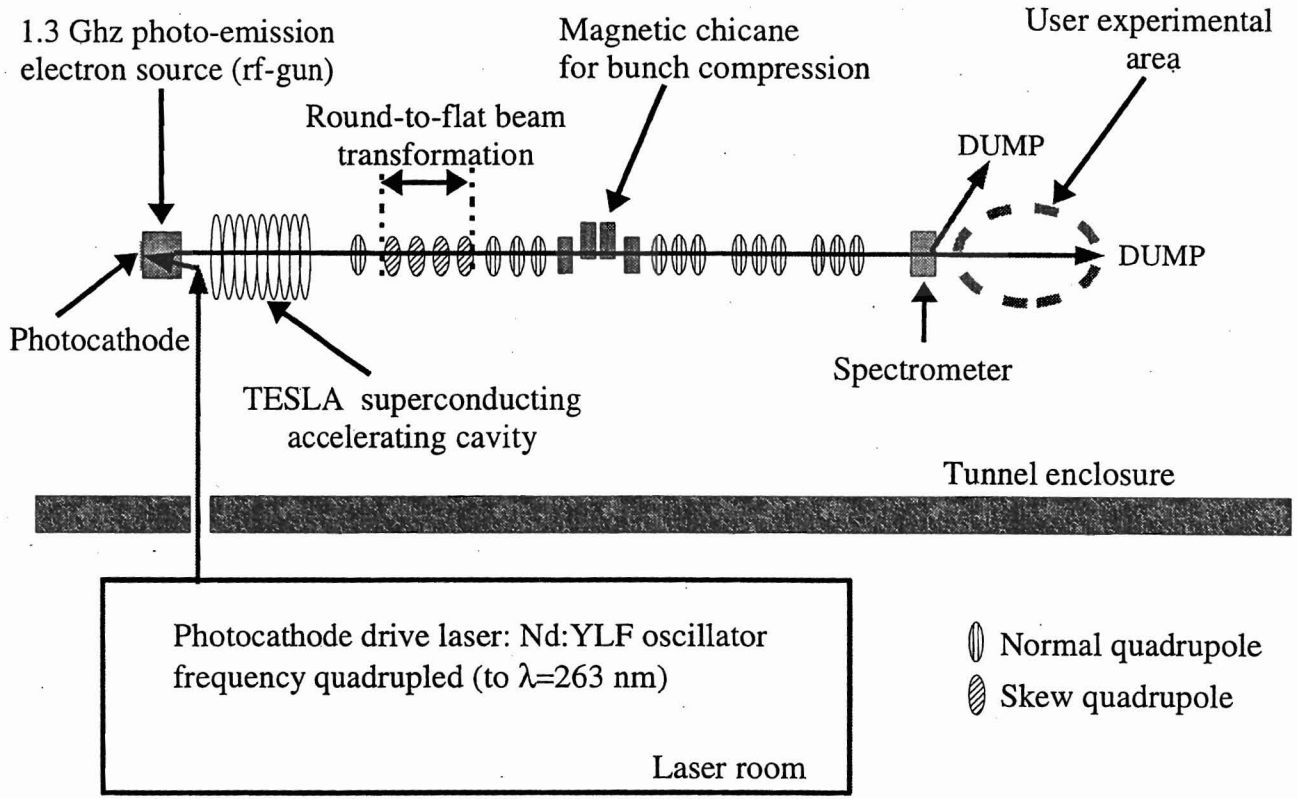
A Map of the Universe, J. R. Gott et al., Astrophysical Journal 624, 463 (2005).

A Lyman-Alpha-Only AGN from the Sloan Digital Sky Survey, P. Hall et al., Astronomical Journal 127, 3146 (2004).

The Morphology-Density Relatin in the Sloan Digital Sky Survey, T. Goto et al., Mon. Not. Royal Astronomical Society 346, 601 (2003).

Relationship Between Environment and the Broad-Band Optical Properties of Galaxies in the SDSS, M. Blanton et al., Astrophysical Journal 629, 143 (2005).

The Third Data Release of the Sloan Digital Sky Survey, K. Abazajian et al., Astronomical Journal 129, 1755 (2004).


1.3 Ghz photo-emission
electron source (rf-gun)
Magnetic chicane
for bunch compression
User experimental
area
Round-to-flat beam
transformation
DUMP
DUMP
Photocathode
TESLA superconducting
accelerating cavity
Spectrometer
Tunnel enclosure
Photocathode drive laser: Nd:YLF oscillator
frequency quadrupled (to λ=263 nm)
Laser room
Normal quadrupole
Skew quadrupole

E-886 (Piot) Advanced Accelerator Physics Experiments at the Fermilab/NICADD Photoinjector Laboratory (FNPL)

UCLA, Chicago, DESY (Germany), Fermilab, Georgia, Illinois, INFN/Milan (Italy), Michigan State, Northern Illinois, Rochester

Status: *Data-Taking*

The Fermilab/NICADD[1] Photoinjector Laboratory (FNPL), jointly operated by Northern Illinois University and Fermilab, is available for experiments by any interested group. Proposals for new experiments are evaluated by the FNPL Advisory Committee chaired by K.-J. Kim of the University of Chicago (see http://nicadd.niu.edu/fnpl for details).

Existing Equipment and Capabilities

The FNPL consists of a 1½ cell L-band rf-gun equipped with a high quantum efficiency Cesium-Telluride photocathode, allowing the photoemission of electron bunches with charge up to approximately 15 nC. The generated bunches are further accelerated, up to 16 MeV, by a downstream TESLA-type superconducting accelerating cavity operating with a nominal accelerating gradient of approximately 12 MV/m. Downstream of the TESLA cavity, the beamline includes a set of quadrupole and steering dipole elements for beam focusing and orbit correction, a skew quadrupole channel that allows the generation of flat beam using an incoming angular-momentum-dominated beam. The beamline also incorporates a magnetic bunch compressor chicane which can enhance the bunch peak current up to approximately 2.5 kA. The diagnostics for measuring transverse beam properties consist of electromagnetic beam position monitors, optical transition radiation screens (for measuring beam transverse density) and three emittance measurement stations based on the multi-slit mask technique. The bunch length measurement is performed by a streak camera that streaks optical transition radiation pulses emitted by the bunch. An alternative frequency-domain bunch length diagnostic based on Martin-Puplett interferometry of coherent transition radiation is also available. Downstream of the beamline, the beam can be bent in a dispersive section, to measure the beam energy distribution, or transported in a straight-ahead user experimental area.

The FNPL facility can be operated remotely and to date teams from LBNL and DESY have used this capability to remotely perform beam physics experiments.

1 NICADD is an acronym for Northern Illinois Center for Accelerator and Detector Development

Research activities for 2005

Theory and simulations:

Modeling and numerical studies have primarily focused on the beam dynamics associated with flat beam generation along with improved numerical tools for optimizing the flat beam production. Our best result indicates that FNPL, in its present configuration, should be able to generate a flat beam with a transverse emittance ratio above 300 (for a bunch charge of 0.5 nC). The impacts of space-charge force and beamline errors on the round-to-flat beam transformation were addressed and the corresponding limits on the ratio of vertical-to-horizontal emittances were evaluated. We also studied the sensitivities of flat-beam emittances on several systematic factors such as errors on quadrupole strengths and alignments.

The inverse Cherenkov acceleration proposal was simulated using a 40 MeV incoming electron beam. Results show that a clear signature of electron/laser interaction will be measurable.

The magnetic bunch compressor chicane was simulated with various programs including the newly developed version of IMPACT-T of NIU (which uses a wavelet-based Poisson solver). These simulations were performed to support an on-going experiment on longitudinal dynamics measurements (bunch length and momentum compaction of bunch compressor)

Experimental activities:

The photocathode drive-laser improvements started in 2004 were continued: a new Nd::YLF diode-pumped oscillator was installed. The whole laser was rebuilt (components such as chirping fiber and compression gratings were removed) and extensively commissioned. The laser upgrade resulted in great improvements in laser performances: the bunch duration (after conversion in the ultraviolet) is 2 ps (rms), and the laser energy fluctuation was greatly improved. The laser upgrade also included the installation of a new pulse stacker that allows stacking of four (extendable to eight) uv laser pulses. This stacker allows the production of quasi-uniform time-profiles. In addition, a single-shot autocorrelator based on second-harmonic generation was installed for on-line monitoring of the infra-red laser pulse. The streak camera was recalibrated and a 30% change in the calibration factor was found (attributed to aging).

General beam dynamics studies were performed after the laser upgrade. Transverse emittances were measured for different operating conditions and for two scenarios of laser configuration: one single uv Gaussian pulse and four stacked uv Gaussian pulses. In the FNPL beamline, a weak (20%) decrease of the transverse emittance was observed for the latter case. The electron bunch duration was systematically measured as a function of charge and compared to numerical simulations.

The flat beam experiment continued, and significant progress was reported. We finally demonstrated the generation of a flat-beam with a transverse emittance ratio of 100 for a bunch charge of 0.5 nC. Still, we believe the present limitation is of an instrumental nature: the smaller flat-beam emittance is expected to be approximately 0.2 mm-mrad, a value we are not able to measure experimentally due to spurious dispersion which cannot be corrected in the present configuration of FNPL. We experimentally verified that the larger flat-beam emittance is linearly dependent on the initial canonical angular momentum.

We continue investigating the limitations of the bunch length diagnostic based on Martin-Puplett interferometry of coherent transition radiation (CTR). The capability of generating two electron bunches located in the same rf-bucket was used to test the resolution of this CTR-based bunch length diagnostic. Parametric studies for various spacing between the two bunches are presently underway.

An experiment aiming to measure the beam divergence and/or energy spread using the optical transition radiation (OTR) interference technique was installed. In this experiment, the interference pattern of the OTR radiation produced by two thin mica foils separated by 1 mm is analyzed to infer the electron beam parameters. The experiment was installed and is in the commissioning phase.

A team from UCLA completed an experiment aimed at focusing the electron beam by a plasma lens operating in the under-dense regime. The lens focused a 15 MeV, 16 nC beam with initial dimensions 500 μm (rms radius) and 5 mm (rms longitudinal) onto an OTR screen 2 cm downstream of the lens. The average transverse area of the plasma-focused electron beam was typically demagnified by a factor of 22. The light from the OTR screen was imaged into a streak camera in order to directly measure the correlation between time and transverse beam size within the bunch. The experiment was then decommissioned.

A team from UIUC installed a kicker system. The objective of the first phase of this experiment is to investigate the use of FNPL beam to measure the rise-time of the kicker. If successful, a fast kicker developed for the ILC damping ring will be installed and characterized. The experiment, which involved the installation of a new spectrometer beamline, was commissioned and preliminary data were taken.

A novel low-level rf (LLRF) control system designed by DESY personnel was successfully tested at FNPL. This LLRF control system, which regulates the field phase and amplitude of superconducting cavities, is based on field programmable gate array (FPGA) technology. This technology enables a higher number of operations per cycle compared to conventional DSP-based technology and thereby has potential for the development of more refined regulation algorithms.

In parallel with the FNPL experimental program, we worked on the development of a polarized electron source based on an rf-gun, the major challenge being to sustain the high-quality vacuum (10^{-11} torr) needed for operating a Gallium Arsenide photocathode in the rf-gun. Such a low pressure can be reached by cooling the rf-gun to nitrogen temperature.

Publications

Electro-Optic Measurement of the Wake Fields of a Relativistic Electron Beam, M. J. Fitch et al., Phys. Rev. Lett. 87, 034801 (2001).

Etude Experimentale du Photo-injecteur de Fermilab, J. P. Carneiro, Ph.D. Thesis, Universite Paris XI (fnalpubs.fnal.gov/cgi-bin/theses.pl), 2001.

Electro-Optic Sampling of Transient Electric Fields from Charged Particle Beams, M. J. Fitch, Ph.D. Thesis, University of Rochester (fnalpubs.fnal.gov/cgi-bin/theses.pl), 2001.

Angular Momentum Measurement of the FNPL Electron Beam, Y.-E. Sun, et al., presented at PAC 2003, Portland, OR.

Emittance Compensation Studies of Photoinjector Beams with Angular Momentum, S. Lidia, presented at PAC 2003, Portland, OR.

Notes on Sub-Picosecond Bunch Length Measurement at Fermilab A0/NICADD Photoinjector, D Mihalcea, preprint NICADD-0010 (2003).

Recent Improvements in the ASTRA Tracking Code, K. Flöttmann, et al., presented at PAC 2003, Portland, OR.

The UCLA/NICADD Plasma Density Transition Trapping Experiment, M. Thompson et al, presented at PAC 2003, Portland, OR.

Generation of Angular-Momentum-Dominated Electron Beam from a Photo-injector, Y.-E Sun et al., Phys. Rev. Spec. Topics-Accelerators and Beams 7, 123501-1 (2004).

Limiting Effects in the Round-to-Flat Beam Transformation, Y.-E Sun et al., 22nd Int'l Linear Accel. Conf. (LINAC 2004), Lubeck, Germany, August 2004. Fermilab-Conf-04-212-AD.

Progress Report on the Flat Beam Experiment at Fermilab/NICADD Photoinjector Laboratory, Y.-E Sun et al., 22nd Int'l Linear Accel. Conf. (LINAC 2004), Lubeck, Germany, August 2004. Fermilab-Conf-04-192-AD.

Investigation of the Longitudinal Beam Dynamics in a Photoinjector Using a Two-Macroparticle Model, R. Tikhoplav et al., 22nd Int'l Linear Accel. Conf. (LINAC 2004), Lubeck, Germany, August 2004. Fermilab-Conf-04-191-AD.

Status of the UCLA/NICADD Plasma Density Transition Trapping Experiment, M. C. Thompson et al., Proc. 11th Advanced Accel. Concept Workshop (AAC 2004), Stony Brook, NY, June 2004. AIP Conf. Proceeding 737, 440 (2004)

On Using NEA Cathodes in an RF Gun, M. Huening, 9th European Particle Accelerator Conference (EPAC 2004), Lucerne, Switzerland, July 2004.

Energy Loss of a High-Charge Bunched Electron Beam in Plasma: Analysis, N. Barov et al., Phys. Rev. Spec. Topics-Accelerators and Beams 7, 061301-1 (2004).

Angular-Momentum-Dominated and Flat-Beam Generation Y.-E Sun, Ph.D. Thesis, University of Chicago (Fermilab-Thesis No. 2005-17 fnalpubs.fnal.gov/cgi-bin/theses.pl) (2005).

The UCLA/FNPL Time Resolved Underdense Plasma Lens Experiment, M.C. Thompson, et al. Proc. 2005 PAC, Knoxville TN, 3003 (2005).

Time Dependent Quantum Efficiency and Dark Current Measurements in an RF Photocathode Injector with a High Quantum Efficiency Cathode, R.P. Fliller, H. Edwards, and W. Hartung, Proc. 2005 PAC, Knoxville TN, 2681 (2005).

Progress on Using NEA Cathodes in an RF Gun, R.P. Fliller, et al., Proc. 2005 PAC, Knoxville TN, 2708 (2005).

Production of Transverse Controllable Laser Density Distribution in Fermilab/NICADD Photoinjector, J. Li, et al., Proc. 2005 PAC, Knoxville TN, 2783 (2005).

Longitudinal Electron Bunch Diagnostics Using Coherent Transition Radiation, D. Mihalcea et al., Proc. 2005 PAC, Knoxville TN, 4254 (2005).

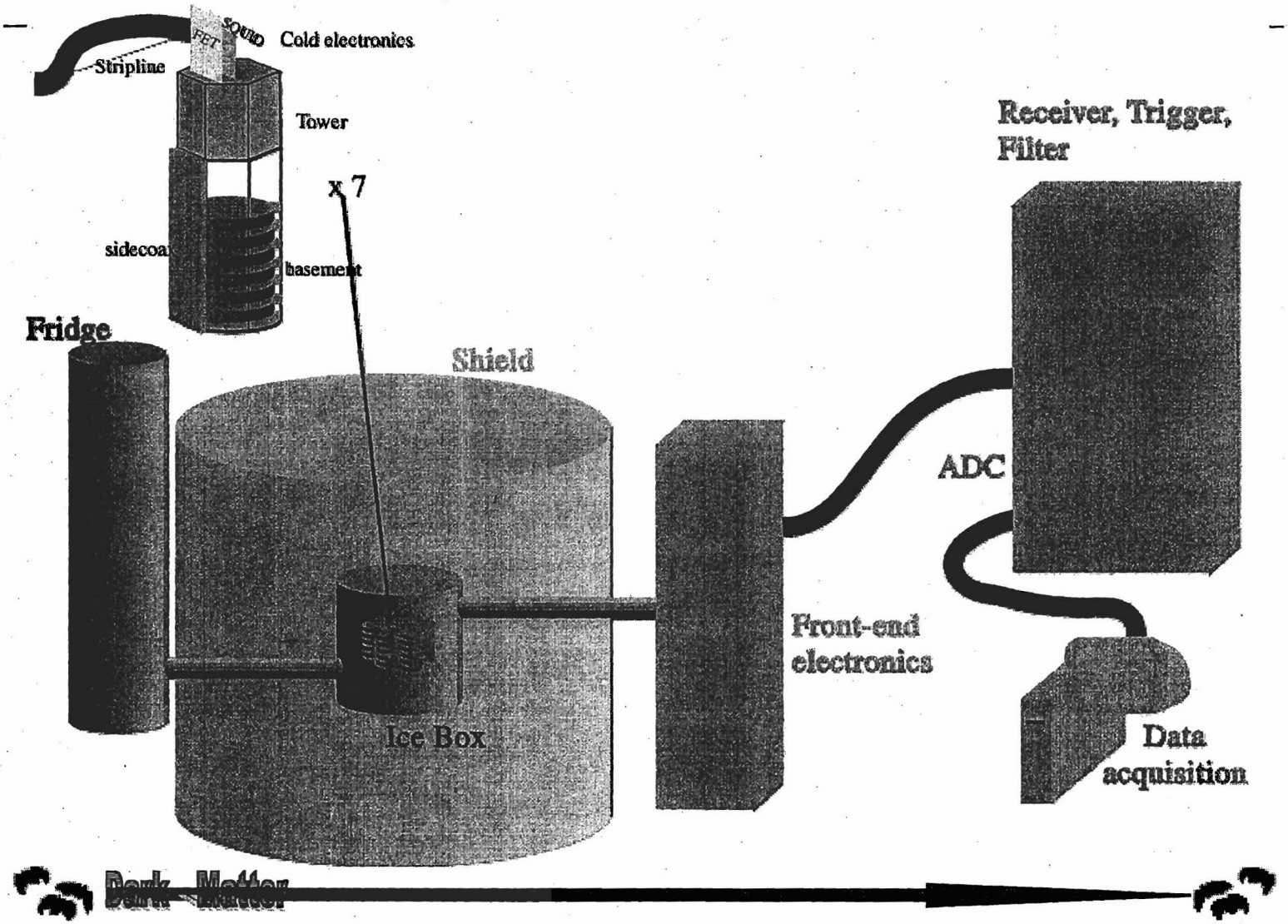
Effects on Flat-Beam Generation from Space-Charge Force and Beamline Errors, Y.-E Sun, K.-J. Kim and P. Piot, Proc. 2005 PAC, Knoxville TN, 3774 (2005).

Upgrade of the Fermilab/NICADD Photoinjector Laboratory, P. Piot et al., Proc. 2005 PAC, Knoxville TN, 2848 (2005).

Simulation of the Laser Acceleration Experiment at the Femilab/NICADD Photoinjector Laboratory, P. Piot et al., Proc. 2005 PAC, Knoxville TN, 2503 (2005).

Photoinjector Production of a Flat Beam with Transverse Emittance Ratio of 100, P. Piot, Y.-E Sun and K.-J. Kim, Submitted to Phys. Rev. Spec. Topics - Accelerators and Beams (December 2005).

E-891 Cryogenic Dark Matter Search (CDMS)



E-891 (Bauer) Cryogenic Dark Matter Search (CDMS)

Fermilab
(and Brown, UC/Berkeley, UC/Santa Barbara, Case Western Reserve, Colorado/Denver, Florida, LBNL, Minnesota, NIST/Boulder, Santa Clara, Stanford)

Status: *Data-Taking*

The CDMS collaboration is building a detector to search for cold dark matter. There are good reasons to believe that most of the matter in the universe is "seen" only gravitationally, and does not emit or absorb substantial amounts of electromagnetic radiation at any known wavelength. The nature of this "dark matter" is unknown. However, there is some evidence that suggests that the dark matter consists of as yet undiscovered weakly interacting massive particles (WIMPs) that were produced in the early universe. If this is true, then we are immersed in a sea of relic WIMPs which occasionally interact with atomic nuclei as they traverse the Earth. The direct observation of the interaction of WIMPs in a terrestrial detector would solve the "dark matter problem," enable the properties of the dark matter to be measured, and advance our understanding of the physics of elementary particles and the evolution of the early universe.

This experiment is an upgraded version of the Cryogenic Dark Matter Search experiment (CDMS I) which ran at a shallow underground site on the Stanford campus. The CDMS experiment utilizes a new class of elementary particle detectors based on the propagation and detection of phonons in silicon or germanium crystals at temperatures below 0.1K. CDMS is one of the first experiments capable of searching for WIMPs with properties and fluxes consistent with current expectations from particle physics and cosmology. CDMS II is located in the low background environment of the Soudan mine in Minnesota.

Status

In April 2005, we presented the results based on the first full year of data from the search for dark matter WIMPS with CDMS II, running at the Soudan Underground Laboratory in northern Minnesota. We obtained limits on the WIMP-nucleon, spin-independent, cross-section that are a factor of 10 better than any others in the world. Three papers have been accepted for publication in Physical Review Letters and Physical Review D.

Unfortunately, after successful installation of the remaining CDMS II detector payload, we encountered a serious problem with our dilution refrigerator that took the first 8 months of 2005 to repair. Upon cooling the system down, we found that the cryogenics reached a base temperature of 40 mK but the detectors remained at about 200 mK. This was traced to vibrational

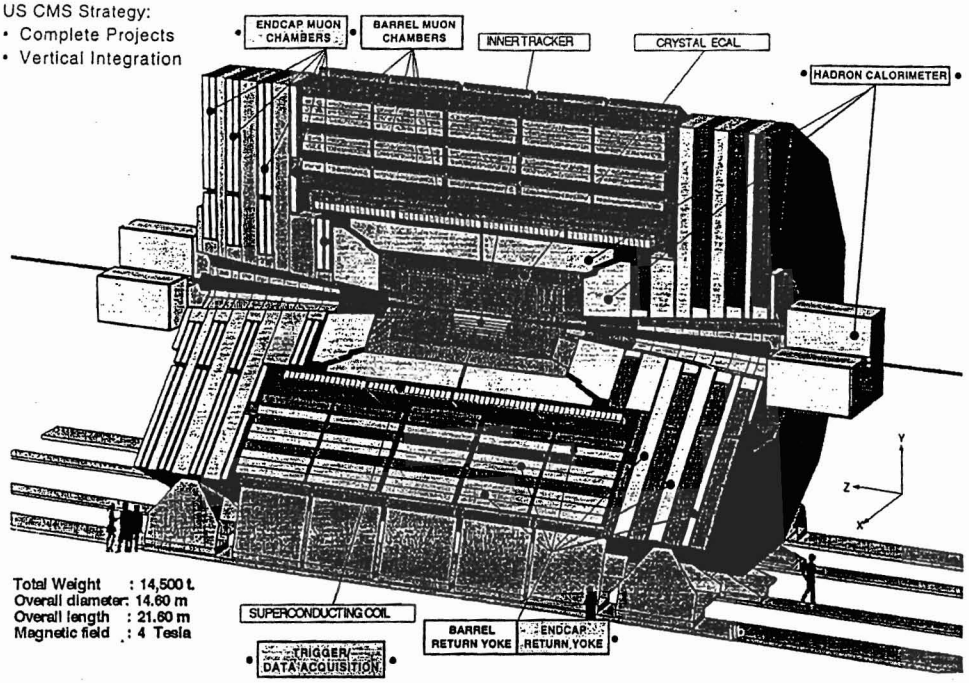
heating coming from the cryocooler we had installed on the system to remove excess heat from the striplines that carry the electrical signals from the detectors to room temperature electronics. We have now designed and built a vibration isolator to correct this problem and are nearly ready to cool down the system again at year's end.

We expect to be taking data throughout 2006 and 2007, resulting in an additional improvement of a factor of 10 in sensitivity to WIMPs. This will probe deeply into the predicted region for the neutralino, a WIMP candidate expected from Supersymmetry. Detection of WIMPs with CDMS II would clearly establish that they constitute most of the matter of the universe.

E-892

US CMS Management Responsibilities

US CMS Strategy:
- Complete Projects
- Vertical Integration

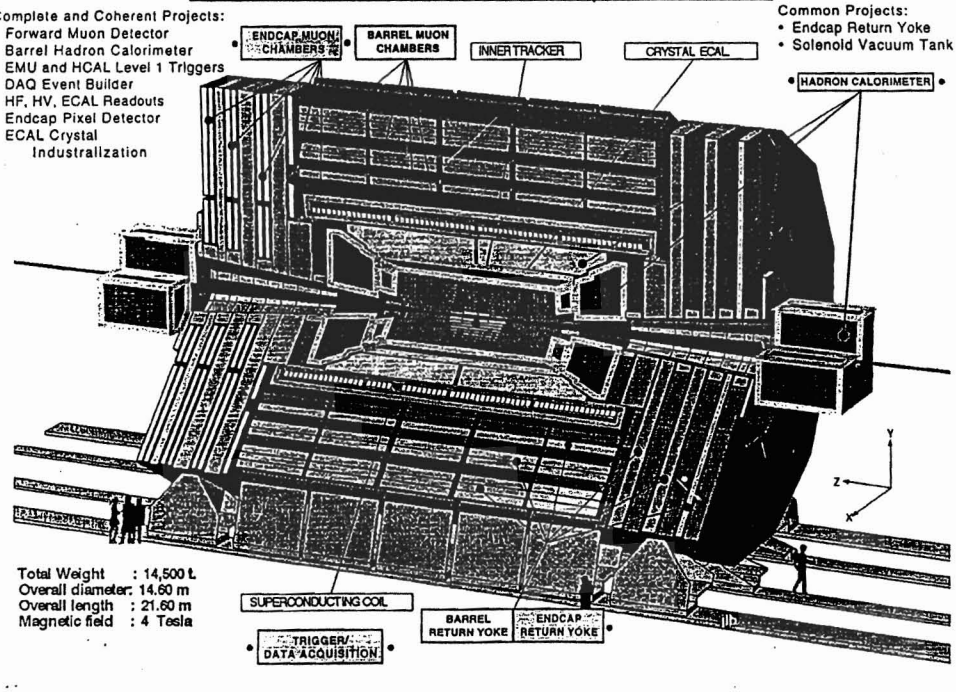


Total Weight : 14,500 t.
Overall diameter: 14.60 m
Overall length : 21.60 m
Magnetic field : 4 Tesla

US CMS Construction Responsibilities

Complete and Coherent Projects:
- Forward Muon Detector
- Barrel Hadron Calorimeter
- EMU and HCAL Level 1 Triggers
- DAQ Event Builder
- HF, HV, ECAL Readouts
- Endcap Pixel Detector
- ECAL Crystal Industrialization

Common Projects:
- Endcap Return Yoke
- Solenoid Vacuum Tank



Total Weight : 14,500 t.
Overall diameter: 14.60 m
Overall length : 21.60 m
Magnetic field : 4 Tesla

E-892 / 919 (Green) The US CMS Collaboration at Fermilab

Fermilab
(and 45 other US institutions)

Status: *No Data Yet*

The Compact Muon Solenoid (CMS) is one of two high p_t experiments to be built at the CERN Large Hadron Collider (LHC). The primary physics goal of CMS is to explore electroweak symmetry breaking – the origin of mass. To that end, the basic philosophy of CMS is to enclose the tracking and calorimetry inside a strong **S**olenoidal magnet. This design allows for a **C**ompact design allowing optimal **M**uon detection without compromise to the electromagnetic calorimetry because of inert material. In general CMS is optimized for electrons, photons, muons, neutrinos and jets. The Higgs decay modes, $H \rightarrow ZZ \rightarrow l^+l^-l^+l^-$, imply an emphasis on lepton detection. At the high luminosities to be used at the LHC, the charged lepton of choice is the muon due to its relatively clean signature. Neutrinos and jets may also be used in higher-rate but also higher-background signatures, $H \rightarrow ZZ \rightarrow llvv$, $H \rightarrow WW \rightarrow jjlv$.

There are about 2000 physicists in the CMS Collaboration who plan to build the detector for a cost of around 500 M Swiss Francs. The detector is to be built from 1997 until data-taking in 2007. The composition of CMS is roughly 50% physicists from member states, 20% from Russia and other non-member states, and 30% US groups. The US CMS Collaboration consists of about 500 physicists and engineers from 46 institutions. The collective goal of this group is to pursue high energy physics at the energy frontier which will be available at CMS. We find the physics opportunities compelling.

Test beam data has been taken each year since 1995 by subgroups of US CMS involved in Hadron Calorimetry (HCAL), Endcap Muon Chambers (EMU), Electro-magnetic Calorimetry (ECAL) and Tracking. The Fermilab group is particularly active in HCAL, EMU and silicon strip tracking. All subsystems have produced full Technical Design Reports, and have fabricated preproduction prototypes. The CMS Fermilab group is heavily involved in test beam R&D, in engineering design, and in detector construction and commissioning.

Fermilab has also accepted to act as the "host laboratory" for the US CMS collaboration. Therefore, Fermilab will provide a focal point for US CMS. The Project Management of US CMS is centralized and located at Fermilab. The intent is to utilize existing infrastructure at Fermilab. In addition, the fact that Fermilab is the location of the US HEP hadronic collider program, means that the synergy between CDF and D0 and CMS design and construction is available. For example, high-rate triggering and data acquisition is an area where Fermilab will contribute expertise and experience to CMS.

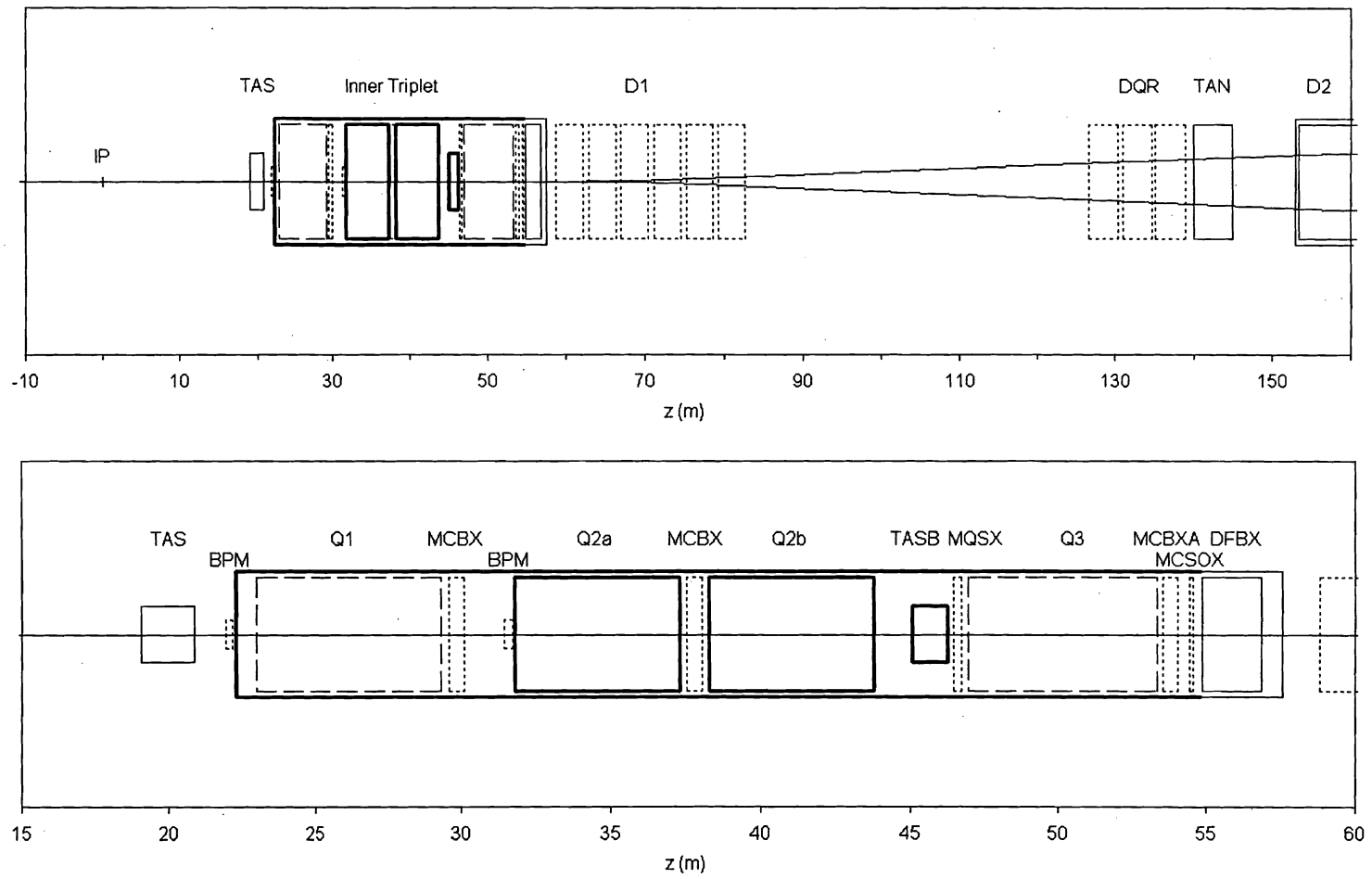
In turn, working on CMS will enhance the art of detector building in the US, especially in the demanding environment found in high-luminosity hadron colliders. The operational experience obtained at CDF and D0 is crucial in ensuring a realistic detector design for CMS. In addition, the use of Fermilab facilities by university groups represents a low-cost way for Fermilab to support university groups within the US CMS Collaboration. A good example is the production of silicon strip detectors and pixel detectors for CMS.

Fermilab has considerable experience operating computing farms of workstations as a cost effective method of providing analysis power to CDF and D0. It is thought that this expertise will translate well to support of US CMS. Clearly, the decade-long experience of Fermilab in the running of the US hadron collider experimental program makes it a natural nucleation point. Fermilab will be a "Tier 1" center for the analysis and distribution of CMS data for the US CMS collaboration.

Experience on existing hadron collider experiments at Fermilab and CERN and on the R&D associated with the SSC makes it possible for US physicists to have a major impact on the design of CMS. US physicists have been assigned distinct and coherent managerial and construction responsibilities as seen in the accompanying figures. We are the managers for the HCAL, EMU, and trigger subsystems. Fermilab also hosts the LHC Physics Center in Wilson Hall.

The US groups also take proportional responsibilities for the costs of common projects, such as the solenoid. Specifically, US physicists have positions of responsibility for the solenoid vacuum vessel and the endcap steel return yoke. In addition, Fermilab has completed procurement of the conductor and stabilizing aluminum for the solenoid. The aim is to provide in-kind contributions to CMS, but bid and bought in the US.

The experiment is presently scheduled to commence in 2007. It will subsequently have at least a decade lifetime, the LHC being at present the sole facility in the world capable of addressing the physics at the TeV mass scale. A Memorandum of Understanding (MOU) for CMS has been signed by US and CERN representatives which defines the US deliverables. A plan for a ten-fold luminosity increase of the LHC is being formulated. That upgrade should extend the useful life of the LHC by another decade. US CMS physicists will be fully engaged in the design and fabrication of the upgrade.



Block diagram of one half of an LHC interaction region (optics version 6.5). Fermilab-provided equipment is shown in bold outlines, that provided by other US national laboratories in light outlines, and by CERN in dotted lines.

E-893 (Kerby) Design and Construction of Interaction Regions at the CERN Large Hadron Collider (LHC)

Fermilab
(BNL, LBNL)

Status: *No Data Yet*

The US contribution to the construction of the Large Hadron Collider (LHC) at CERN consists of the design and fabrication of specialized equipment and the providing of technical support by three US national laboratories, Fermilab, Brookhaven National Laboratory (BNL) and Lawrence Berkeley National Laboratory (LBNL), and of providing CERN with agreed-upon products manufactured in the US. The contribution through the national laboratories, called the US LHC Accelerator Project, is the design and construction of the final focus systems for the four interaction regions IRs 1, 2, 5, and 8; superconducting beam separation-recombination dipoles for the RF straight section in IR4; production testing of the superconducting wire and cable for the main LHC magnets and technical support for the development and production of the cable for the main magnets; and accelerator physics calculations to support the design of the US-provided hardware and on other topics where the US has special expertise. Fermilab is working on the interaction regions and accelerator physics. Fermilab is also the lead laboratory for the Project: the Project Management Office is at Fermilab and the Fermilab Director is responsible for oversight of the Project.

The parameters of the Project are defined in the International Cooperation Agreement between CERN and the US DOE and its Accelerator Protocol, which were signed in December 1997, the Implementing Arrangement between the three US national laboratories and the LHC Project at CERN, which was signed in July 1998, and the US LHC Accelerator Project Management Plan, which was signed in October 1998. The Project Baseline was approved following the DOE baseline review in February 1998.

The layout drawing shows one half of an LHC interaction region. It consists of four strong (operating gradient up to 215 T/m), large-aperture (70 mm) superconducting quadrupoles (Q1-Q3), correction magnets (MCBX, MQSX and MCSOX), a cryogenic feed and lead box (DFBX), absorbers (TAS and TAN) to protect the superconducting magnets from particles resulting from the p-p collisions at the high luminosity interaction regions at IR 1 (ATLAS) and IR 5 (CMS), single-aperture (D1) and twin-aperture (D2) beam separation-recombination dipoles, and beam position monitors (BPM). (DQR is a dump resistor for the arc magnets.) The drawing shows the layout at IRs 1 and 5, where D1 is made from 6 conventional magnets. The layout at IRs 2 and 8 is the same except that D1 is a single superconducting magnet, D2 is 32 m closer to the IP, and the absorbers are absent. The components shown in the layout come from several sources. Half the quadrupoles are made by Fermilab and the other half by KEK; the correction magnets, conventional D1, and the BPMs are

provided by CERN; the TAS and TAN are built by LBNL; LBNL and Fermilab are jointly responsible for the DFBX, the TASB is Fermilab's responsibility; and the superconducting D1 and D2 are built by BNL. Fermilab will build all of the quadrupole cryostats and will install all of the quadrupoles and associated correction coils into them. Fermilab is responsible for the overall system design and system integration of the inner triplet system, including the D1 when it is superconducting.

The high-gradient quadrupoles are among the most challenging magnets required for the LHC. Figure 1 is a cross-section of the magnet[1] currently in production at Fermilab. These magnets are required to operate at a gradient 50% higher than the low-beta quadrupoles in the Tevatron Collider. Their field quality must be excellent, with field errors less than 1 part in 10^4 within a radius of 17 mm. Tracking studies[2] carried out at Fermilab and BNL have shown that under collision conditions these quadrupoles are the main determinant of the dynamic aperture of the LHC. In addition, these magnets will be subject to substantial heating due to the interaction of secondary particles from p-p collisions at the interaction point. The development, construction and testing of these very challenging quadrupoles ensures that Fermilab and the US HEP program remain at the cutting edge of superconducting accelerator magnet technology. Thus this project looks forward to machines beyond the LHC as well as to the LHC itself. Design and prototype work for the next generation of LHC Upgrades is starting under the auspices of the LHC Accelerator Research Project.

The R&D program for the high-gradient quadrupoles is complete. Nine model magnets[3] and one full-scale prototype[4] have been built and tested. Series production of the quadrupoles for LHC is nearly complete. Currently seven LQXB (Q2) assemblies[5], consisting of two quadrupoles and a correction magnet in a common cryostat, are either at CERN or in transit. In addition, seven LQXA (Q1) assemblies, consisting of KEK quadrupoles and a corrector in a common cryostat, are at CERN, and six LQXC (Q3) assembly, consisting of a KEK quadrupole and multiple correctors, are at CERN or en route. The first triplet, at IR8, is currently being installed in the tunnel by CERN personnel with Fermilab participation as shown in figure 2. Production and test of the remaining assemblies will be complete in early 2006.

References

1. US LHC Accelerator Project Technical Design Handbook, February 1998, http://www-td.fnal.gov/LHC/UsLhc_accel_docs/USLHCPublic/USLHC_TDH.pdf.
2. J. Wei, W. Fischer, V. Ptitsin, R. Ostojic, J. Strait, Interaction Region Local Correction for the Large Hadron Collider, presented at PAC 1999, New York; N. Gelfand, A Calculation of the Dynamic Aperture of the LHC, presented at PAC 1999, New York.
3. N. Andreev at al., Status of the LHC Inner Triplet Quadrupole Program at Fermilab, presented at the 2000 Applied Superconductivity Conference, September 2000, Virginia Beach, VA.
4. R. Bossert et al., Field Measurement of a Fermilab-Built Full Scale Prototype Quadrupole Magnet for the LHC Interaction Regions, presented at MT-17, September 2001, Geneva, Switzerland.
5. G. V. Velev et al., Field Quality Measurements of the LQXB Inner Triplet Quadrupoles for LHC, presented at the 2004 Applied Superconductivity Conference, Jacksonville, FL.

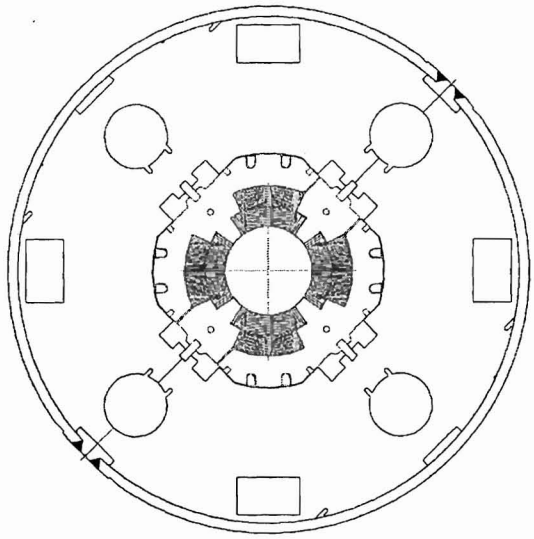


Figure 1. Cross-section of the LHC interaction region quadrupole under development at Fermilab.

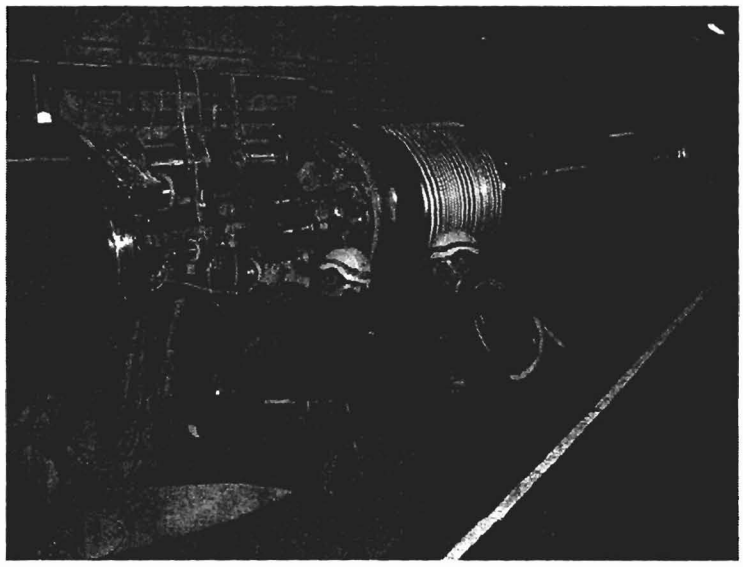
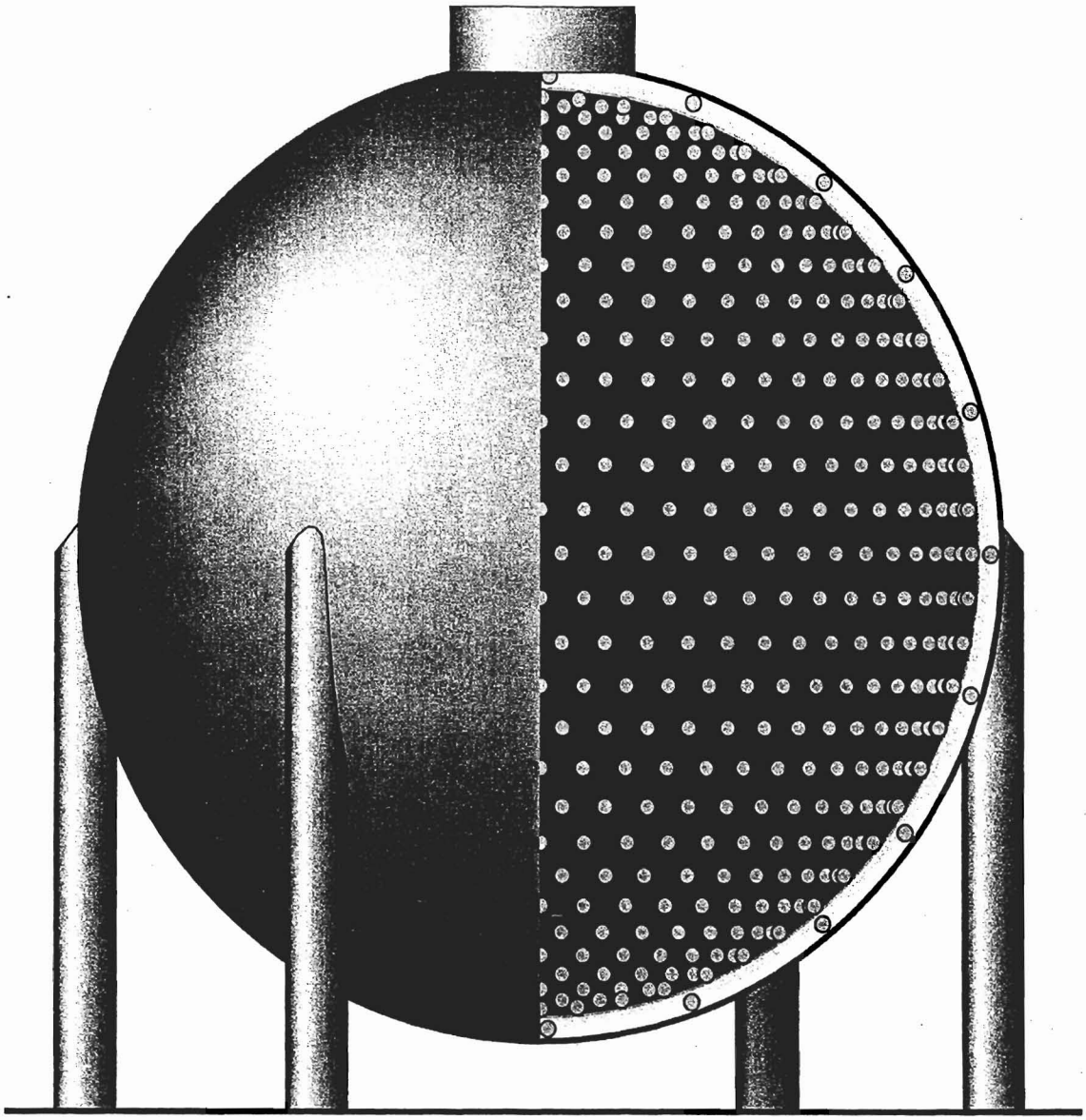


Figure 2. LQXB and LQXA Quadrupole Interconnect work in the LHC Tunnel, CERN.

E-898



Schematic drawing of the BooNE spherical tank

E-898 (Conrad / Louis) / E-944 (Brice / Van de Water)
Booster Neutrino Experiment

Alabama, Bucknell, Cincinnati, Colorado, Columbia, Embry Riddle, Fermilab, Indiana, LANL, Louisiana State, Michigan, Princeton, St. Mary's, Western Illinois, Yale

Status: E-898: *Data Analysis*
E-944: *Data-Taking*

The MiniBooNE experiment is motivated by the LSND observation, which has been interpreted as $\bar{\nu}_\mu \rightarrow \bar{\nu}_e$, and by the atmospheric neutrino deficit which may be ascribed to ν_μ oscillations. MiniBooNE is a single detector experiment designed to: obtain ~500 events per year if the LSND signal is due to $\nu_\mu \rightarrow \nu_e$ oscillations, establishing the oscillation signal at the >5σ level; extend the search for $\nu_\mu \rightarrow \nu_e$ oscillations significantly beyond what has been studied previously if no signal is observed; search for ν_μ disappearance to address the atmospheric neutrino deficit with a signal that is a suppression of the reconstructed 500,000 $\nu_\mu C \rightarrow \mu N$ events per year; and test CP and CPT violation in the lepton sector if oscillations are observed by running with separate ν_μ and $\bar{\nu}_\mu$ beams.

The detector consists of a spherical tank 20 feet in radius, as shown in the accompanying figure. An inner structure at 5.7 m radius supports 1280 8-inch phototubes (10% coverage) pointed inward and optically isolated from the outer region of the tank. The vessel is filled with 800 t of mineral oil, resulting in a 445 t fiducial volume. The outer volume serves as a veto shield for identifying particles both entering and leaving the detector, with 240 phototubes mounted on the support structure facing outwards. The detector is located 500 m from the Booster neutrino source.

The neutrino beam, constructed using the 8 GeV proton Booster at Fermilab, consists of a Be target within a focusing system, followed by a ~50 m-long pion decay volume. The low-energy, high-intensity and 1μs time-structure of a neutrino beam produced from the Booster beam are ideal for this experiment. The Booster is a highly reliable machine, with a downtime of ~1.5%, thus we assume that the Booster can reliably deliver protons for a typical run which is two-thirds of a calendar year. The sensitivities discussed above assume the experiment receives 5 Hz for 2×10^7s running at 5×10^{12} protons per pulse. This Booster experiment is compatible with the Fermilab Collider and Main Injector programs. The Booster must run at 7.5 Hz to accommodate the MiniBooNE, NuMI and Collider programs simultaneously. The Fermilab Booster is capable of running at 15 Hz.

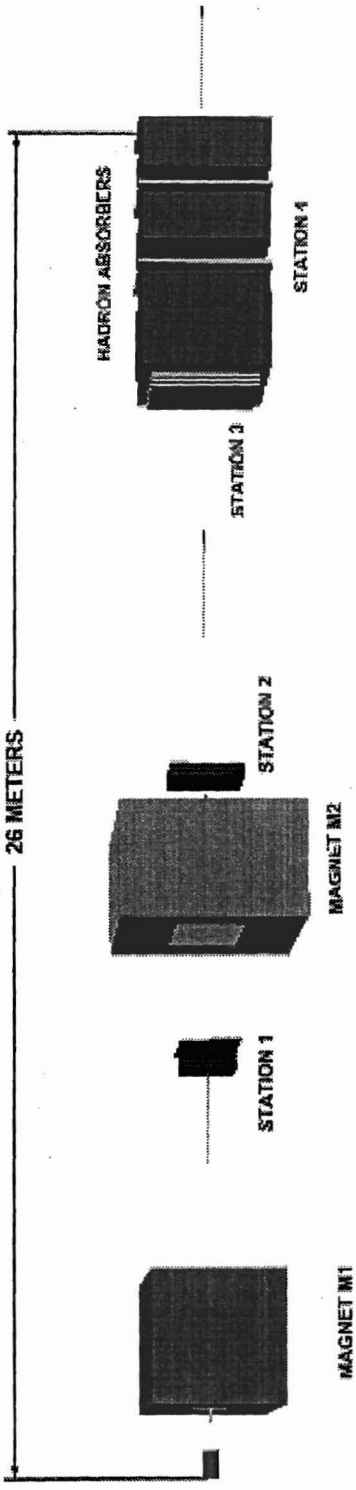
The detector was filled with oil in May 2002, and then began taking cosmic-ray data. The beamline was completed in late August 2002, and the first neutrino-induced events were observed over Labor Day weekend 2002. As of January 2006, about 7×10^{20} POT and over 700,000 neutrino events have been recorded. The detector, horn, and neutrino beamline are all working well. The

Booster proton intensity has been slowly increasing, and at present the Booster is running typically at 4×10^{12} ppp and 5 pulses per second, which is close to the goal of 9×10^{16} pph. During the summer/fall 2004 shutdown, improvements were made to the Booster, and the focusing system was replaced. More improvements are expected during the spring 2006 shutdown.

There has been considerable progress in the analysis of the data. The reconstructed event position, angular, and energy resolutions are all consistent with expectations, and π^0s are being reconstructed with the correct mass and the expected width. Furthermore, the experiment is clearly reconstructing charged-current quasi-elastic events, neutral-current π^0 events, and neutral-current elastic events. These classes of events are interesting in their own right; they show that the experiment is working well, and they are on the direct path to the analysis of the oscillation data. Non-oscillation physics results have been presented in 2005, while the first oscillation results should be ready during 2006.

On January 9, 2006, the neutrino run was terminated, and the horn power supply polarity was switched. This signals the start of anti-neutrino running (E-944), which will last through 2006. The anti-neutrino data set anticipated will be the world's largest by an order of magnitude, and will allow important measurements of anti-neutrino cross sections and systematic checks of the neutrino oscillation analysis.

E-906


26 METERS
MAGNET M1
STATION 1
MAGNET M2
STATION 2
STATION 3
HADRON ABSORBERS
STATION 4

E-906 (Geesaman / Reimer) Drell-Yan Measurement of the Anti-quark Sea

Abilene Christian, ANL, Colorado, Fermilab,
Illinois, JLab, LANL, Rutgers, Texas A&M, Valparaiso

Status: *No Data Yet*

Experiment E-906 will measure the asymmetry between anti-up and anti-down quarks in the proton. This experiment is motivated by the observation of E-866/NuSea that showed a large difference between the anti-up and anti-down distributions as a function of Bjorken-x, the momentum carried by the struck quark. The new experiment is designed to be able to reach much larger values of x than previous experiments. The distribution of these sea quarks and the asymmetry between anti-up and anti-down quarks provides important clues to the origin of the proton's sea, and in particular, the way in which both perturbative and non-perturbative processes conspire to generate the proton's sea quarks.

The sea quarks in the proton are probed using the Drell-Yan process, in which a quark (or anti-quark) in the beam annihilates with an anti-quark (or quark) in the target, producing a pair of oppositely charged muons, which are detected in the apparatus. The acceptance of the detector is designed to primarily see events involving the target anti-quarks. By changing between hydrogen (proton) and deuterium (proton and neutron) targets, the experiment will be able to compare the proton and neutron's sea quark distributions and with the addition of isospin symmetry, extract the ratio of anti-down to anti-up quarks in the proton.

Additionally, by collecting Drell-Yan data with nuclear targets, the experiment will be able to measure the energy loss of quarks traveling through cold nuclear matter. Previous measurements have shown that this energy loss is much smaller than expected, and were only able to set upper limits on the energy loss. E-906 will be able to measure this energy loss and distinguish between competing models of the energy loss process. The nuclear target data is also important to understand any systematic effects in the deuterium measurements.

E-906 will use a beam of 120 GeV protons extracted from the Main Injector. The Drell-Yan cross section with the lower-energy 120 GeV proton beam is *larger* than the cross section at 800 GeV, giving the experiment greater statistical reach. At the same time, the primary background, muons from J/ψ decays, is reduced at the lower beam energy.

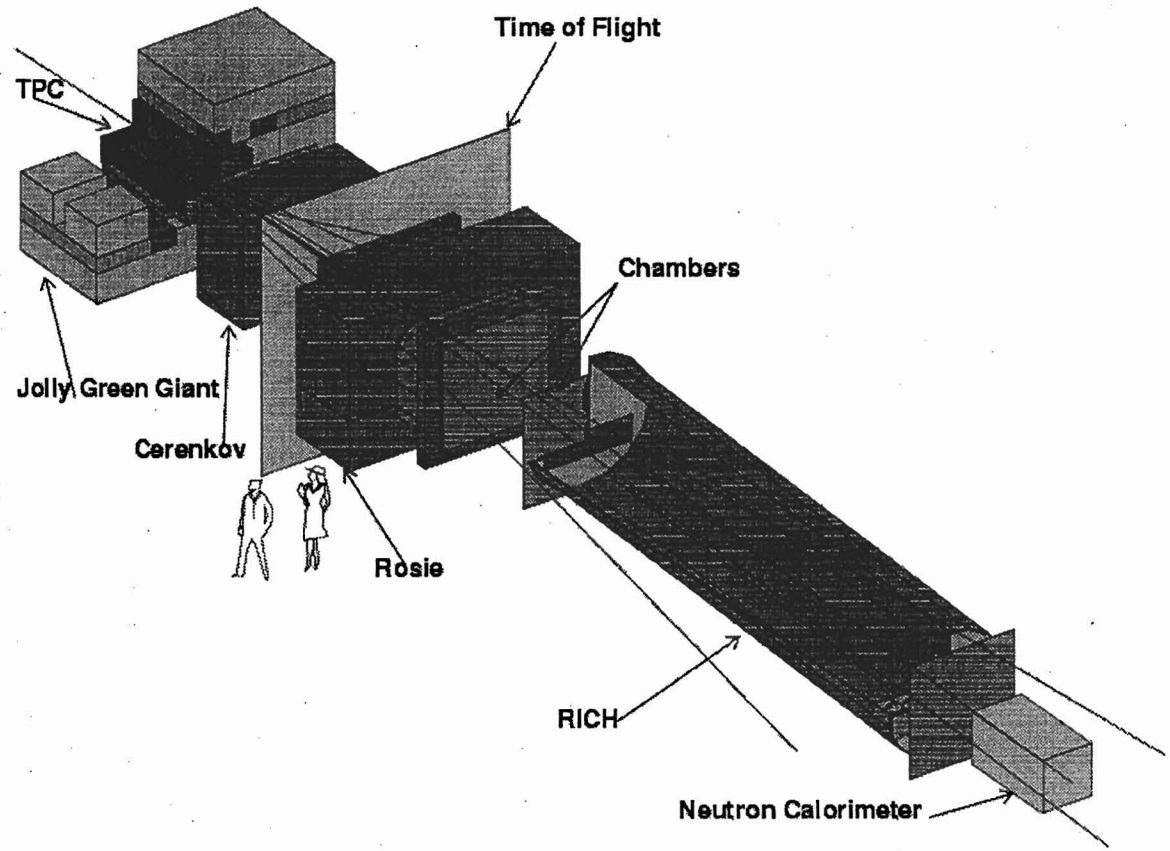
The apparatus is a two-magnet spectrometer. The upstream magnet focuses the muon pair into the detector and sweeps other particles produced in the collision out of the way. Inside this magnet will be a large wall of material, through which the muons are able to pass, and in which other particles will

interact. Downstream of the magnet are tracking chambers, trigger hodoscopes and a second magnet, used to measure the momentum loss of each of the muons. At the downstream end of the experiment is additional material that absorbs hadrons and electrons. A final set of tracking chambers will identify the muons. Overall, the apparatus is approximately 26 m long and the final tracking stations are approximately 3 m^2. The general layout of the detector resembles a shortened version of the E-866/NuSea spectrometer and much of the detector is being reused from previous experiments; however, the vastly different energy of the proton beams requires that a new magnet be constructed to focus the muons.

E-907

MIPP

Main Injector Particle Production Experiment



E-907 (Raja) MIPP – Main Injector Particle Production Experiment

BNL, Chicago, Colorado, Elmhurst, Fermilab, Harvard, IIT, Indiana, Iowa, LLNL, Michigan, Purdue, South Carolina, Virginia

Status: *Data Analysis*

The MIPP experiment proposes to measure particle production off various nuclear targets using Main Injector primary and secondary beams. Momentum-analyzed secondary beams of $\pi^{\pm}$, $K^{\pm}$, and $p^{\pm}$ are tagged using Cerenkov counters and made to interact on various nuclear targets placed upstream of a Time Projection Chamber (TPC). The particles from the interaction are identified using a combination of techniques that involve dE/dx in the TPC, a time-of-flight system, a multi-cell Cerenkov detector and a ring-imaging Cerenkov system. This provides charged-particle identification at the three standard deviation level for most of the final state phase space. The momentum of the particles is measured using two large-aperture magnets, the Jolly Green Giant and Rosie. There is a forward calorimeter that detects forward-going neutrons and photons. The TPC is expected to take data at a rate of ≈60Hz. These capabilities will make MIPP data of unprecedented statistical and systematic accuracy.

The physics topics to be addressed by MIPP are many-fold. The data using hydrogen targets will be used to test scaling relations of inclusive particle spectra, as well as to revive the study of non-perturbative QCD. One can look for exotic resonances such as glueballs in these data. Data on nuclear targets will be used to study the enhancement of strange particles seen in experiment E-910 at Brookhaven. A high-statistics measurement of this effect will help us resolve the question whether the strange particle enhancement seen in nucleus-nucleus collisions at CERN is due to quark-gluon plasma or due to nuclear rescattering effects. MIPP data will thus be of relevance in understanding RHIC data. Medium-energy nuclear physics will also benefit from MIPP data since nuclear scaling rules such as "y-scaling" and "super-scaling" can be tested.

Particle production from the full MINOS target has been measured, enabling that experiment to predict the neutrino fluxes at both the near and the far detector better and control the systematics in the neutrino oscillation measurement. Measurements of inclusive spectra from MIPP will in addition be used to improve the showering models in Monte Carlo programs such as GEANT and MARS.

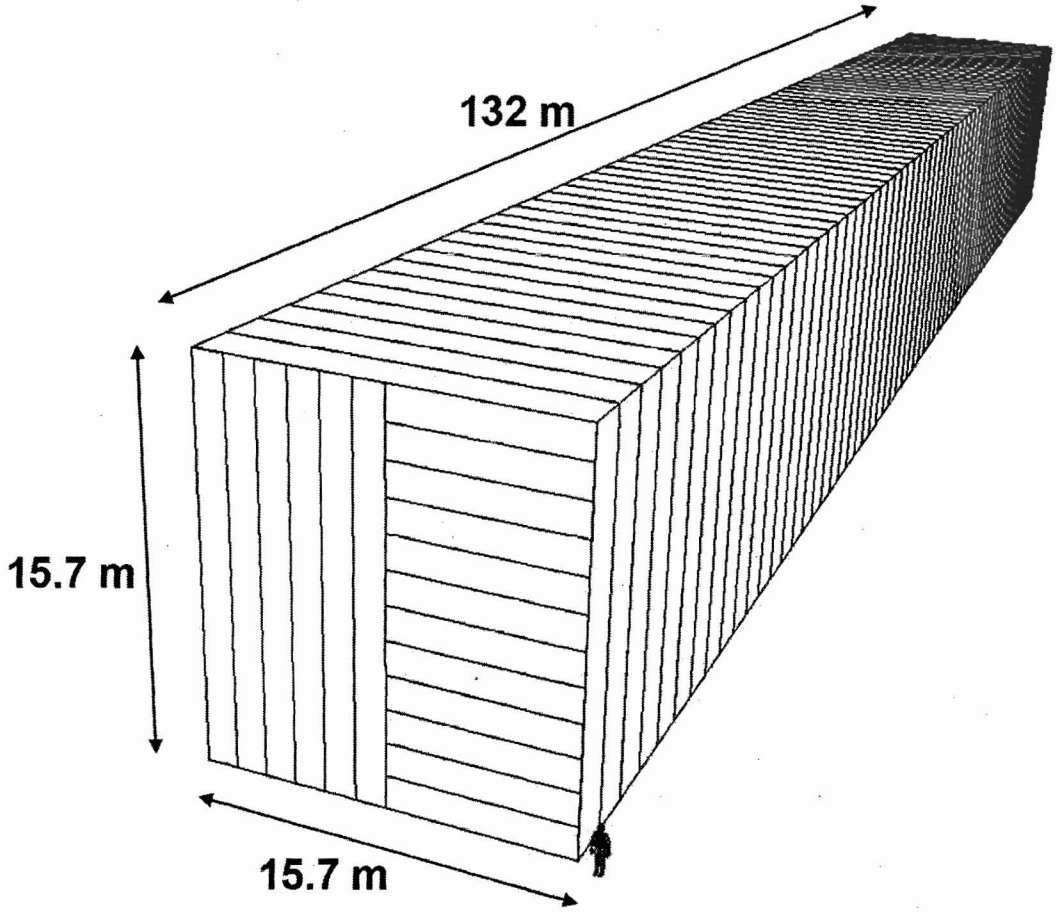
Finally, proton-nucleus cross sections from MIPP can be used to pin down the scattering models used in proton radiography. Proton radiography can be briefly described as being similar to a CAT scan using protons as a probe and is of relevance to the nuclear stockpile stewardship program of the nation.

MIPP makes extensive use of existing hardware. The TPC, the Cerenkov detectors, wire chambers and calorimeter are recycled from previous experiments. This enables the total cost of building and operating the experiment to be ≈$3.5 million. Fermilab has built the beamline for the experiment and will make the requisite amount of running time available. Funding for putting the experiment together came from other sources, primarily from Lawrence Livermore National Laboratory as well as universities funded by the DOE.

Current Status

MIPP is currently taking physics data and plans to run till the planned shutdown in March 2006. The collaboration is continuing to develop its offline analysis algorithms and hopes to have publishable results by the end of 2006. To date, MIPP has collected 23 million events on various thin nuclear targets that include H_2, Be, C, Al, Cu, Ag, Bi and U as well as the full NuMI target.

E-929



Schematic drawing of the NOvA far detector showing 62 blocks of 32 planes. The cut-away view of the front plane shows the alternating layers of horizontal and vertical extrusion modules.

E-929 (Feldman / Messier) NuMI Off-Axis ν_e Appearance Experiment (NOvA)

ANL, Athens (Greece), UCLA, Caltech, Fermilab, Collège de France (France), Harvard, Indiana, ITEP (Russia), Michigan State, Minnesota, Minnesota/Duluth, Northern Illinois, Ohio, Ohio State, Oxford (United Kingdom), Rio de Janeiro (Brazil), Rutherford (United Kingdom), South Carolina, Southern Methodist, Stanford, Texas, Texas A&M, Tufts, Virginia, Washington, William & Mary

Status: *No Data Yet*

NOvA is a second-generation neutrino oscillation experiment on the NuMI beam line. Its primary physics goal is the study of $\nu_\mu \rightarrow \nu_e$ oscillations with approximately an order of magnitude more sensitivity than that of the MINOS experiment. The study of $\nu_\mu \rightarrow \nu_e$ oscillations allows the measurement of $\sin^2(2\theta_{13})$, the ordering of the neutrino masses, and CP violation. The 3-σ discovery sensitivity to $\sin^2(2\theta_{13})$ will be between 0.01 and 0.02, depending on the other parameters. NOvA has been optimized for the measurement of the mass ordering, which requires a very long baseline experiment. Other NOvA physics goals include the precision measurement of the dominant atmospheric parameters, $\sin^2(2\theta_{23})$ and Δm_{32}^2, and the detection of galactic supernovae.

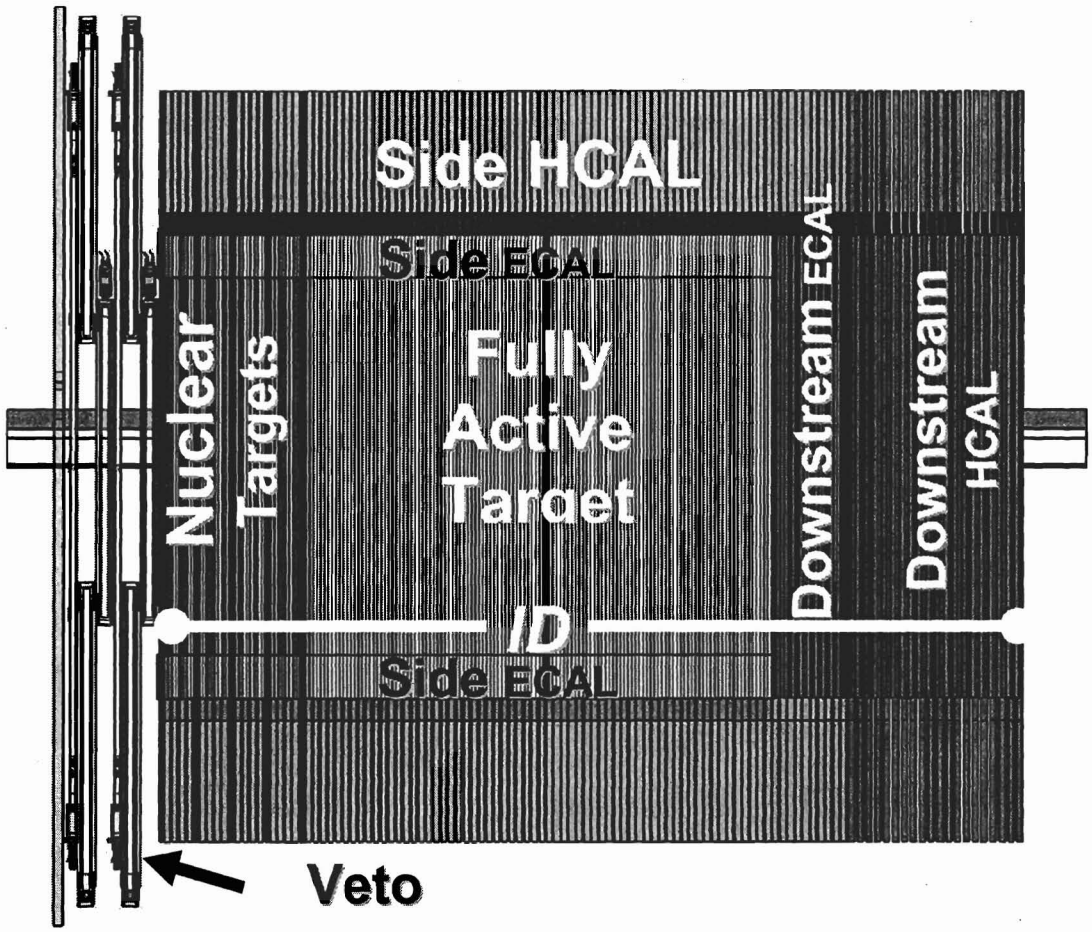
NOvA is a two-detector experiment, with the near detector at Fermilab in the NuMI access tunnel upstream of the MINOS access shaft, and the far detector 810 km from Fermilab near Ash River, Minnesota. The detectors are placed approximately 15 mrad off of the axis of the NuMI beamline. The off-axis position allows for more flux at the oscillation maximum and less background from neutral current and ν_e charged current events.

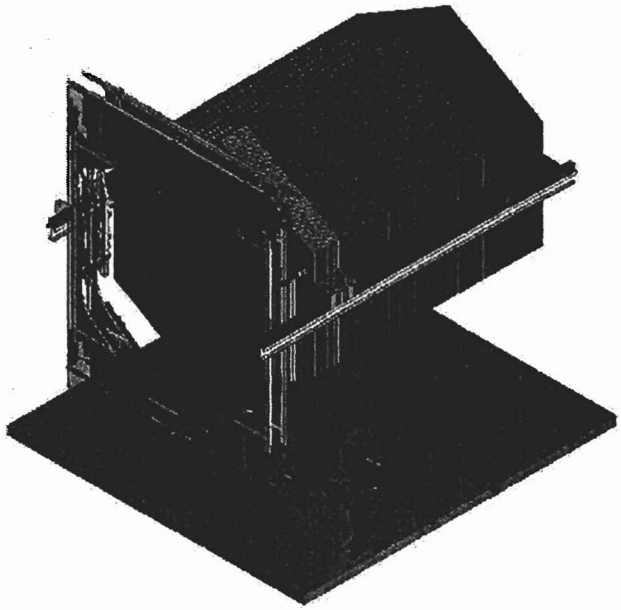
The NOvA far detector has a mass of 30 kT and is composed solely of liquid scintillator contained in PVC extrusion modules. Each extrusion module is 15.7 m long and has 32 cells. The cell dimensions are 3.9 cm transverse and 6 cm longitudinal. There are 12 extrusions per plane and 1984 planes, with planes alternating in horizontal and vertical orientations. Each cell is read out by a U-shaped wavelength-shifting fiber, both of whose ends terminate on the same pixel of a 32-pixel avalanche photodiode.

The NOvA near detector design is identical to that of the far detector except that the extrusion modules are shorter to accommodate the restrictions of the NuMI access tunnel. The planes are 2 extrusion modules wide and 3 extrusion modules tall. There are 202 planes divided into an 8-plane veto region, a 112-plane fiducial region, a 72-plane shower containment region, and a 10 plane muon tagger. The muon tagger has 10 cm of iron in front of each plane of extrusion modules.

NOvA received Stage I approval in April 2005. In 2006, it is preparing a Conceptual Design Report and a Technical Design Report in preparation for a FY2008 project start. With that start, NOvA would begin taking data on the partial far detector in October 2010 and on the full far detector in July 2011.

E-938





A side-view schematic of the MINERvA detector and an outline to illustrate shape and scale.

E-938 (McFarland / Morfín) The MINERνA Experiment

Athens (Greece), UC/Irvine, Dortmund (Germany), Fermilab, Hampton, IIT, INR Moscow (Russia), James Madison, JLab, Northern Illinois, Pittsburgh, PUCP (Peru), Rochester, Rutgers, St. Xavier, Tufts, UNI (Peru), William & Mary

Status: *No Data Yet*

The NuMI neutrino facility, designed for the MINOS neutrino oscillation experiment, will yield several orders of magnitude more events per kg of detector per year of exposure than the higher-energy Tevatron neutrino beam. This dramatic increase in intensity will allow us to initiate a vigorous neutrino scattering research program at a detector, located close to the production target. One can now perform statistically significant experiments with much lighter and more fine-grained detector/targets than the massive iron, marble and other high–A detector materials used in the past.

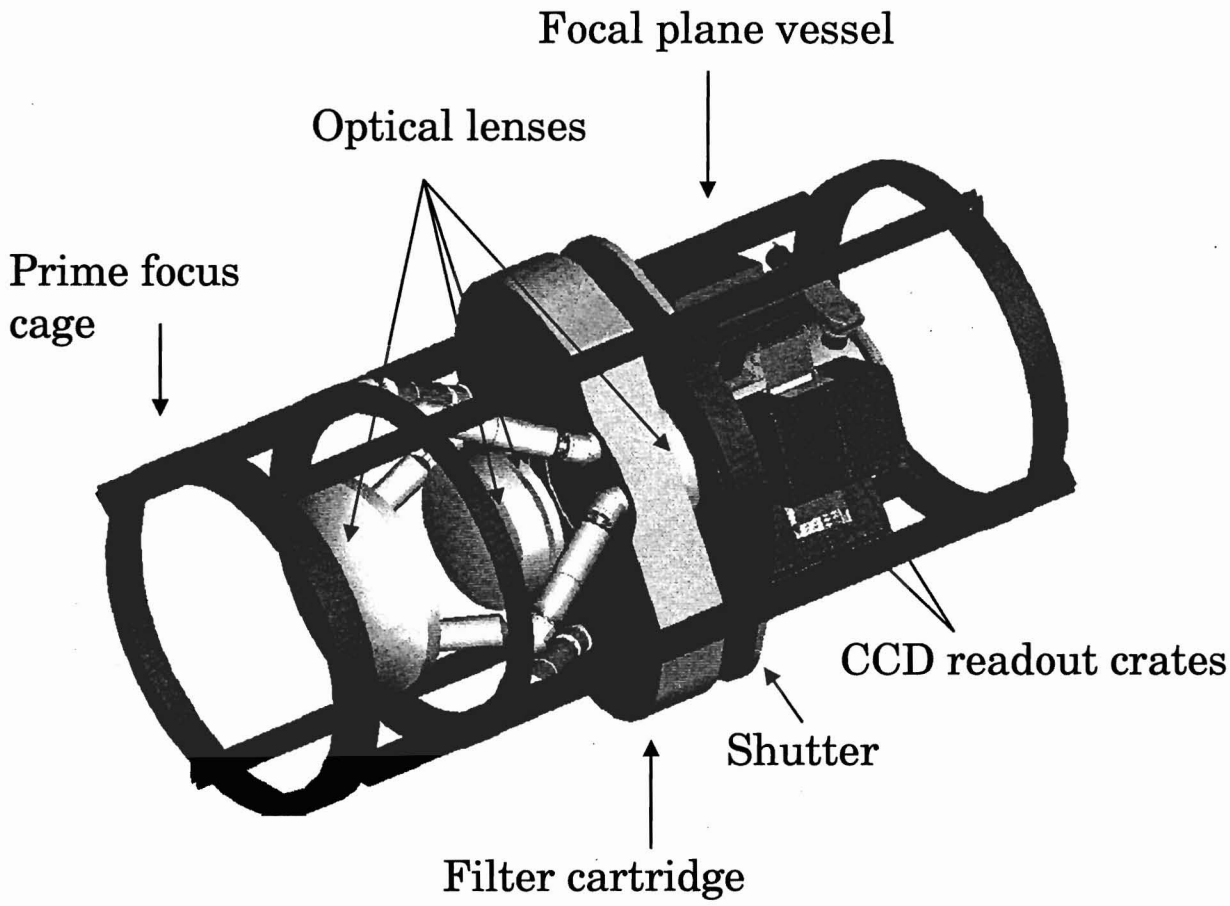
To take advantage of the NuMI beam and facility, a collaboration of elementary particle and nuclear physics groups and institutions named MINERνA (Main INjector ExpeRiment ν--A) has been formed. The overall goal of the MINERνA experiment is to perform a high-statistics neutrino-nucleus scattering experiment using a relatively compact and active target/detector consisting of a central section of essentially solid scintillator bars. This central detector is surrounded on all sides by an electromagnetic calorimeter and a hadronic calorimeter/muon-identifier. The detector has the approximate overall shape of a hexagon (to permit three stereo views) with a cross-section of 3.55m minor and 4.10m major axis. The length, with upstream veto counters, is 5.2m. The active plastic scintillator volume is 6.1 tons allowing variable-sized fiducial volumes depending on the physics channel being studied. At the upstream end of the detector are nuclear targets consisting of C, Fe and Pb. Significant vertex-reconstruction accuracy without excessive granularity can be achieved by the use of triangular-shaped extruded plastic scintillator (CH) bars with an optical fiber run through a centrally located hole for readout. Recent work at the Fermilab Scintillator R&D Facility has shown that using light division across triangularly-shaped scintillator strips of width 3cm and height 1.7cm can yield coordinate resolutions of a few millimeters. The orientations of the scintillator strips are alternated so that efficient pattern recognition and tracking can be performed.

The MINERνA detector will be placed as close as possible to the upstream face of the MINOS near detector in order to use that detector's magnetic field and steel as an external muon-identifier and spectrometer for the forward-going muons, and as a calorimeter for any hadronic energy exiting the central detector. With a comparatively simple and straightforward active detector technology, the most complicated parts of MINERνA are the photosensors and their associated readout electronics. The photosensor chosen, a multi-anode photomultiplier tube (MAPMT), is an incremental design improvement from the one used in the

MINOS near detector, and we expect much of the experience gained by the MINOS collaboration with these detectors to be applicable. For the front-end digitization and timing, a scheme based on D0 TriP-TASIC has been chosen.

Since MINERνA will run parasitically to the MINOS and, possibly, the NOνA experiments, expected event rates depend on the NuMI beam configuration chosen by these experiments and the number of protons-on-target delivered by the Main Injector. For a total of 16×10^{20} protons on target, the event rates in the active plastic range from thousands for the weak analog of deeply virtual Compton scattering, tens of thousands for coherent pion production and exclusive strange particle production channels, close to a million for quasi-elastic and resonance production, to several million deeply-inelastic scattering events.

E-939



The Dark Energy Survey instrument including the prime focus cage and some of its contents. The overall length is 3.543 m and the diameter is 1.575 m.

E-939 (Annis / Flaugher) The Dark Energy Survey (DES)

Fermilab
(and Cambridge [United Kingdom], Chicago, Edinburgh [United Kingdom], IEEC [Spain], IFAE [Spain], Illinois, LBNL, Michigan, NOAO / CTIO, Portsmouth [United Kingdom], University College London [United Kingdom])

Status: *No Data Yet*

Since the discovery of the Hubble expansion acceleration in 1999 and the confirmation in 2001 (in which E-885/SDSS played a major role) that the majority of the energy density in the universe is neither baryons nor dark matter, the need for some form of dark energy has been clear. The nature of dark energy is unknown. The observations suggest that Einstein's field equation must be modified: either something is missing from the matter-energy sector – a cosmological constant many orders of magnitude too small or a light scalar field otherwise unknown to physics – or in the space-time sector – extra dimensions, perhaps, or general relativity breaking down at cosmological scales. Each of these possibilities would be a fundamental, exciting discovery.

The primary scientific goal of the DES is to measure the DE equation of state parameter w to a precision of a few percent using four independent and complementary techniques: galaxy cluster counting, measurement of the galaxy angular power spectrum, weak lensing, and using Type Ia supernovae.

The physics of the experiment involves building galaxy maps as a function of photometric redshift. The maps provide means to measure angular diameter distances using features seen in the angular power spectrum of galaxies. The count of clusters found in the maps constrains the volume element, matter power spectrum, and growth factor, the latter a cosmology-dependent growth of structure parameter. Maps of shear constructed from the galaxy maps allow various weak lensing projects which again constrain the volume element, matter power spectrum, and growth factor but with different assumptions and systematics. Type Ia supernovae provide a means to measure the luminosity distance. Each of these four measurements will have a statistical precision of 5-20%. Our plan to combine the four to obtain the best constraint on w is a strength of the DES. Each technique has different systematic errors, and furthermore, if there is a convincing difference between the geometrical and growth factor techniques the evidence will point to a modification of gravity rather than an underlying scalar field.

The design of the experiment aims at precision galaxy maps to z~1. The DES is a 5 year, 4-band (g,r,i,z) imaging survey of 5000 deg.^{2} in the South Galactic Cap. The multiple-tiling survey strategy is designed to reach galaxies at 10s magnitude limits of g,r,i,z = 24.7, 24.3, 24.1, 23.9, and obtain <2% photometric calibrations. The resulting catalogs will contain 300 million galaxies with photometric redshifts and at a surface density of 10-20 galaxies/arcmin^2.

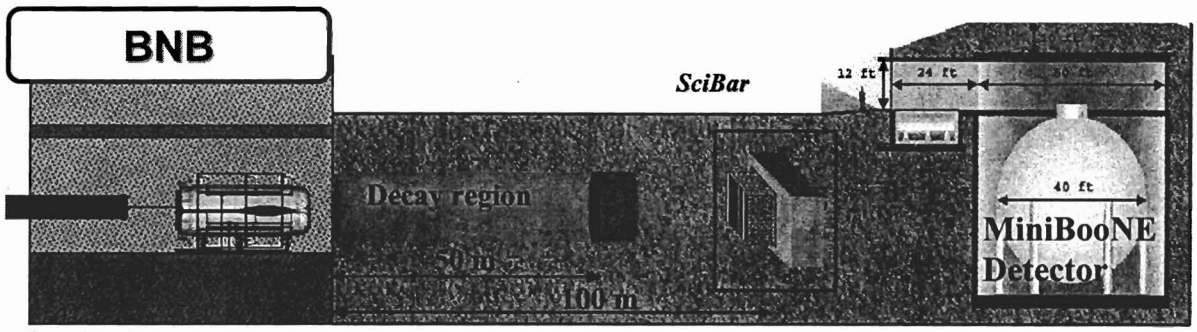
The DES area is chosen specifically to overlap the planned 4000 deg.^{2} Sunyaev-Zel'dovich effect cluster survey to be carried out by the South Pole Telescope (SPT), allowing a particularly powerful combination of DES photometric redshifts and SPT cluster mass estimates. Finally a time-domain survey of a 40 deg.^{2} area will obtain a large sample, ~2000, of Type Ia supernovae, at redshifts of z = 0.3-0.8.

The primary new instrumentation for DES is the Dark Energy Camera, which is a new optical corrector and 3 deg.^{2} CCD mosaic camera for the existing CTIO Blanco 4m telescope. The focal plane will consist of 62 2K×4K CCD modules (0.27"/pixel) arranged in a hexagon that is inscribed within the field-of-view. Focus, guide and alignment CCDs are located at the edge of the focal plane. Since high QE in the near infrared is important in acquiring complete galaxy samples at z ~ 1, we use the new technology of 250 mm thick fully-depleted CCDs, providing ~10 times higher QE at 1 micron over standard astronomical devices. The figure shows the prime focus cage, optical corrector, and focal plane camera.

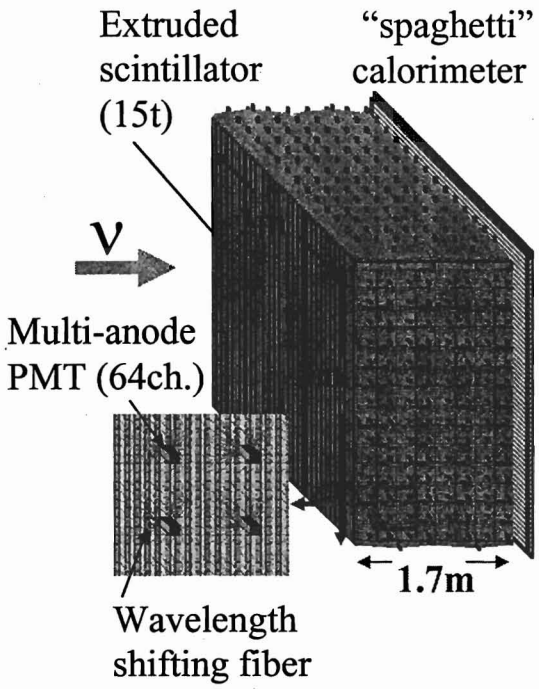
Over the last year we have enlarged and deepened our collaboration as the Barcelona consortium, the UK consortium, and the University of Michigan have joined our endeavor. We have built a CCD testing lab, and acquired, packaged and tested the first of our full-depletion CCDs using Monsoon readout electronics. The corrector optics design has moved from proof of concept to ready for a preliminary design review. Our understanding of the Blanco telescope and the means by which we may monitor and improve its performance has deepened dramatically by the use of optical design programs and astronomical images in conjunction with on-telescope metrology. The simulation team has produced the first round of mock survey realizations with which to test analysis and data reduction methods. The data management team has embarked on the first data challenge. The collaboration as a whole has written a set of white papers describing how we will meet our challenging analysis problems.

The Dark Energy Camera is scheduled to be completed and installed on the Blanco 4m telescope in 2009. The Dark Energy Survey, the data-taking activity, will proceed over the subsequent five years. The survey will produce an archive that will be available to the public a year after the images are collected. The DES proposal is available at www.darkenergysurvey.org.

E-954



Schematic layout of SciBooNE
The detector sits on the Booster neutrino beamline (BNB) axis, 100 m from the target.



SciBar Detector Schematic
The detector is 15 tons of extruded scintillator, arranged in planes of x and y oriented strips. Each strip is optically isolated from its neighbor and read out by one anode of a multi-anode PMT.

E-954 (Nakaya / Wascko) SciBar Booster Neutrino Experiment (SciBooNE)

Barcelona (Spain), Colorado, Columbia, Fermilab, ICRR (Japan), KEK (Japan), Kyoto (Japan), LANL, Louisiana State, Rome (Italy), Valencia (Spain)

Status: *No Data Yet*

The SciBooNE collaboration has formed to bring the K2K SciBar detector to the Fermilab Booster Neutrino Beam (BNB) to perform a suite of neutrino and antineutrino cross-section measurements needed for the next generation of neutrino oscillation experiments.

SciBooNE consists of three detector subsystems: SciBar, the electron catcher (EC), and the muon range detector (MRD). SciBar is a fully active neutrino vertex detector which measures the direction and deposited energy of final state particle tracks. Directly downstream of SciBar is the EC, a lead electromagnetic calorimeter designed to tag π^0s and intrinsic ν_es. Downstream of the EC is the MRD, which measures the energy of stopping muons. The detector will be placed on-axis in the BNB, 100m from the neutrino target.

There are ~15,000 plastic scintillator strips in SciBar, each 1.3 cm × 2.5 cm × 300 cm, in total. The scintillators are arranged vertically and horizontally to construct a 3 m × 3 m × 1.7 m volume with a total mass of 15 tons, and a fiducial mass of 9.38 tons. Each strip has a single wavelength-shifting (WLS) fiber running down the center, attached to a 64-channel multi-anode PMT (MA-PMT). Custom electronics provide charge information from each anode and timing information from each MA-PMT.

The EC consists of 32 (vertical) and 30 (horizontal) modules of the so-called "spaghetti calorimeter" from the CHORUS experiment. Each module is made of 1 mm diameter scintillating fibers embedded in the grooves of 1.9 mm thick lead foils. Each module is 4.0 cm × 8.2 cm × 262 cm, and is read out by two 1" PMTs on both sides. The EC has a thickness of 11 X_0 along the beam direction, giving it a very high efficiency. The energy resolution of the EC is $14\%/\sqrt{E_e}$.

The MRD consists of 12 planes of 275 cm × 305 cm × 5 cm iron plates interspersed with plastic scintillators, 0.6 cm thick in the beam direction. This scintillator is sufficient to detect MIPs with high efficiency, and 60 cm of iron is sufficient to stop muons up to 1 GeV/c.

The fine granularity of SciBar allows detailed reconstruction of final states not possible with large volume Cherenkov calorimeters, like MiniBooNE or Super-K. Additionally, the BNB neutrino energy spectrum is a close match to the expected T2K energy spectrum in a region where cross sections are expected

to vary dramatically with energy. As a result, SciBooNE will provide cross-section measurements in an energy range complementary to MINERνA and complete our knowledge of neutrino cross sections over the entire energy range of interest to the upcoming off-axis experiments.

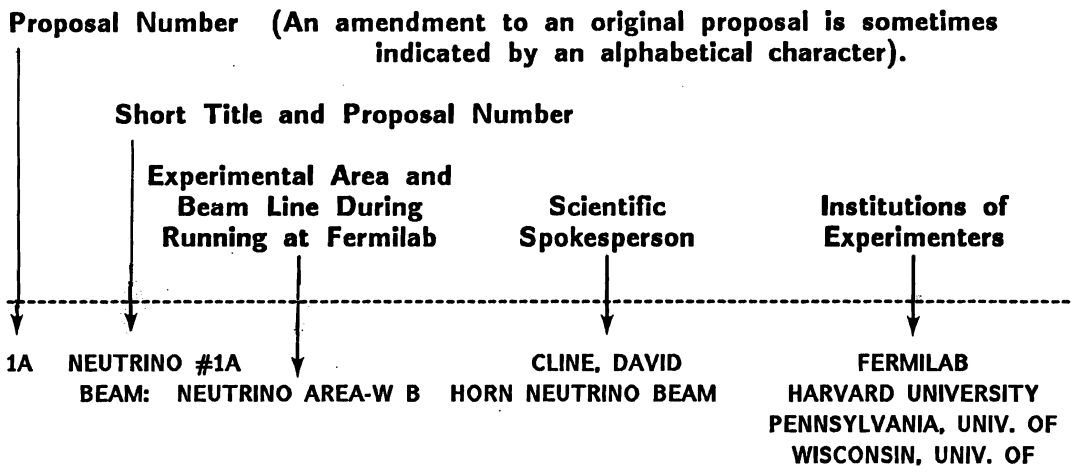
SECTION VIII. MASTER LIST OF PROPOSALS

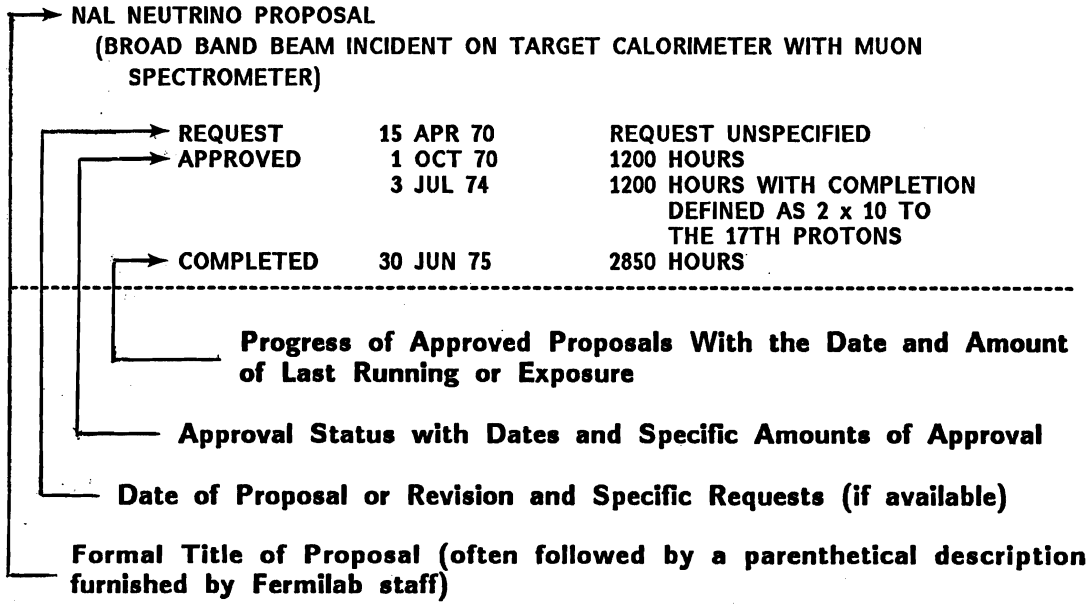
The Master List of proposals contains an entry for each proposal submitted to Fermilab; a typical entry is explained on the next page. In addition to the formal title of the proposal and a brief parenthetical explanation, the name of the spokesperson and a list of participating institutions are included. In the lower part of each entry the specific requests for running time to complete the experiment are listed together with approval action by the Laboratory. For approved proposals only, the amount of running time granted is given together with the current status and extent of beam time used so far.

Most of the information about each proposal stored in the Program Planning Office data file is given in the Master List; lists of proposals shown elsewhere in this Workbook are based on the information contained in the Master List.

For proposals with number below 700, only those which are approved or unconsidered or deferred are listed in the following pages; those with obsolete status (rejected or withdrawn/inactive) are omitted, which explains the gaps in the sequential listing. The complete listing is given starting with proposal 700.

EXPLANATION OF A TYPICAL ENTRY IN THE MASTER LIST





Note: For proposals having a number below 700, only the approved proposals are listed.
Total number of proposals - 957 ... Total number of approved & pending proposals - 477

1A NEUTRINO #1A — David B. Cline — FERMILAB, HARVARD UNIVERSITY, UNIVERSITY OF PENNSYLVANIA, UNIVERSITY OF WISCONSIN - MADISON

BEAM: Neutrino Area - Wide Band Horn
NAL NEUTRINO PROPOSAL.
(Broad band beam incident on target calorimeter with muon spectrometer.)

Request	15 Apr, 70	Unspecified	
Approval	1 Oct, 70	1,200 Hours	
	3 Jul, 74	1,200 Hours	with completion of the experiment defined as 20,000 events with 2 x 10 to the 17th protons on a horn-focused beam
Completed	30 Jun, 75	2,850 Hours	

2B 30-INCH HYBRID #2B — Gerald A. Smith — DUKE UNIVERSITY, FERMILAB, IOWA STATE UNIVERSITY, UNIVERSITY OF MARYLAND, MICHIGAN STATE UNIVERSITY, NOTRE DAME UNIVERSITY, PURDUE UNIVERSITY, UNIVERSITY OF TORONTO (CANADA), UNIVERSITY OF WISCONSIN - MADISON

BEAM: Neutrino Area - 30 in. Hadron Beam
STUDY OF MULTIPARTICLE P-P AND PI-P INTERACTIONS FROM 100 GEV/C TO 400 GEV/C WITH A 30-INCH BUBBLE CHAMBER-OPTICAL SPARK CHAMBER HYBRID SYSTEM.

Request	11 May, 70	Unspecified	but to include an exposure for study of p - p and pi- - p interactions from 75 to 300 GeV	
	29 Apr, 71	500 K Pix		
Approval	1 May, 71	450 K Pix	100K pix of p - p @ 200 GeV	ANL/Fermilab, MSU, ISU, MD
			100K pix of p - p @ 300 GeV)	
			120K pix of pi minus - p @ 200 GeV	Duke, Toronto, Notre Dame
			50K pix of pi minus - p @ 100 GeV)	
			80K pix of pi plus - p @ 100 GeV	Purdue, Wisconsin
Completed	22 Apr, 74	479 K Pix	114K pix of p - p @ 200	
			105K pix of p - p @ 300	
			123K pix of pi- - p @ 200	
			54K pix of pi- - p @ 100	
			83K pix of pi+ - p @ 100	
			bonus pix: 350K pix from #37A, #121A, #125, #137, #138, #141A, #143, #252	

---

3 MONOPOLE #3 — Philippe Eberhard — LAWRENCE BERKELEY LABORATORY

BEAM: Neutrino Area - Miscellaneous
PROPOSAL FOR A SEARCH FOR MAGNETIC MONOPOLES AT NAL.
(Ferromagnetic target located in a beam dump.)

Request	20 May, 70	Target Exposure(s) to 1 x 10 to 18th protons
Approval	1 Aug, 70	Target Exposure(s)
Completed	4 Sep, 74	4 Targets Exposed

---

4 NEUTRON CROSS SECTION #4 — Michael J. Longo — LAWRENCE BERKELEY LABORATORY, UNIVERSITY OF MICHIGAN - ANN ARBOR

BEAM: Meson Area - M3 Beam
NEUTRON TOTAL CROSS SECTIONS UP TO 300 GEV.
(Total cross sections on H2, D2, heavy nuclei to < 2%.)

Request	20 May, 70	300 Hours	with 100 hours for tune up and 200 hours for data to measure total cross sections
Approval	1 Aug, 70	400 Hours	
Completed	20 Mar, 74	1,450 Hours	

---

7 ELASTIC SCATTERING #7 — Donald I. Meyer — ARGONNE NATIONAL LABORATORY, FERMILAB, INDIANA UNIVERSITY, UNIVERSITY OF MICHIGAN - ANN ARBOR

BEAM: Meson Area - M1 Beam
PROPOSAL TO MEASURE PI+(-) - P AND P-P DIFFERENTIAL ELASTIC SCATTERING CROSS SECTIONS FROM 50 TO 170 GEV/C.
(In addition, data will be taken on K+(-) - p and pbar - p simultaneously; t from 0.1 - 2.0 or 3.0.)

Request	10 Jun, 70	1,600 Hours	
Approval	1 Aug, 70	800 Hours	
Completed	28 Jan, 75	2,350 Hours	

---

8 NEUTRAL HYPERON #8 — Lee G. Pondrom — UNIVERSITY OF MICHIGAN - ANN ARBOR, RUTGERS UNIVERSITY, UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M2 Beam
EXPERIMENTS IN A NEUTRAL HYPERON BEAM.
(Beam survey, delta s = 2 decay search, and lambda - p scattering.)

Request	12 Jun, 70	260 Hours	for data
Approval	1 Aug, 70	400 Hours	
Completed	22 Mar, 76	2,450 Hours	

---

12 NEUTRON BACKWARD SCATTERING #12 — Neville W. Reay — CARELTON UNIVERSITY (CANADA), MICHIGAN STATE UNIVERSITY, OHIO STATE UNIVERSITY

BEAM: Meson Area - M3 Beam
A STUDY OF NEUTRON-PROTON CHARGE-EXCHANGE SCATTERING IN THE MOMENTUM RANGE 50-300 GEV/C.
(u from 0.002 - 1.0.)

Request	15 Jun, 70	760 Hours	
Approval	1 Aug, 70	600 Hours	with priority lower than exp #4
Completed	2 Dec, 74	1,300 Hours	

14A PROTON-PROTON INELASTIC #14A — Paolo Franzini — COLUMBIA UNIVERSITY, SUNY AT STONY BROOK

BEAM: Neutrino Area - Miscellaneous
PROPOSAL TO STUDY INELASTIC HIGH-ENERGY PROTON-PROTON COLLISIONS IN THE DIFFRACTIVE REGION.
(t from 0.001 - 0.07 and missing mass to 10 GeV.)

Request	15 Jun, 70	200 Hours	
Approval	1 Mar, 71	150 Hours	with low priority
Completed	21 Jun, 73	140 Hours	

21A **NEUTRINO #21A** — Barry C. Barish — CALIFORNIA INSTITUTE OF TECHNOLOGY; FERMILAB

BEAM: Neutrino Area - Dichromatic
NEUTRINO PHYSICS AT VERY HIGH ENERGIES.
(Dichromatic beam incident on target calorimeter with muon spectrometer.)

Request	15 Jun, 70	750 Hours	
Approval	1 Aug, 70	1,200 Hours	
	26 Jun, 74	1,200 Hours	with the inclination for the completion of exp# 21A (approximately 400 hours) to have a lower priority than running for exp# 320
	11 Nov, 74	1,200 Hours	with remaining running to be coordinated with exp# 254
Completed	2 Nov, 75	2,450 Hours	

---

22 **MULTIGAMMA #22** — George B. Collins — BROOKHAVEN NATIONAL LABORATORY; VIRGINIA TECH

BEAM: Meson Area - M2 Beam
EXPERIMENTAL PROPOSAL TO THE NATIONAL ACCELERATOR LABORATORY FOR A SEARCH FOR MULTIGAMMA EVENTS FROM MAGNETIC MONOPOLE PAIRS.

Request	15 Jun, 70	100 Hours	for data
Approval	1 Aug, 70	200 Hours	for hadron beam use only
Completed	26 Jun, 74	350 Hours	

25A **PHOTON TOTAL CROSS SECTION #25A** — David O. Caldwell — UNIV. OF CALIFORNIA, SANTA BARBARA; FERMILAB; LEBEDEV PHYSICAL INST. (RUSSIA); UNIVERSITY OF TORONTO (CANADA)

BEAM: Proton Area - East
MEASUREMENT OF THE TOTAL PHOTOABSORPTION CROSS SECTION ON H, D, C, CU, AND PB FOR PHOTON ENERGIES FROM 14 TO 300 GEV, AND A SEARCH FOR THE PHOTOPRODUCED MONOPOLE.

Request	15 Jun, 70	400 Hours	for data
Approval	1 Aug, 71	600 Hours	with 200 hours for tuning, 400 hours for data
	26 Oct, 76	1,000 Hours	with additional 400 hours for the experiment to continue data taking until 30 Nov 1976
Completed	30 Nov, 76	1,850 Hours	

---

26 **MUON #26** — Louis N. Hand — UNIV. OF CALIFORNIA, SAN DIEGO; CORNELL UNIVERSITY; LAWRENCE BERKELEY LABORATORY; MICHIGAN STATE UNIVERSITY

BEAM: Neutrino Area - Muon/Hadron Beam
HIGH MOMENTUM TRANSFER INELASTIC MUON SCATTERING AND TEST OF SCALE INVARIANCE AT NAL.

Request	15 Jun, 70	Unspecified	
Approval	1 Aug, 70	500 Hours	
	6 Aug, 73	500 Hours	defined as 3 x 10 to the 17th protons
Completed	16 Apr, 74	900 Hours	

27A **NEUTRON DISSOCIATION #27A** — Jerome L. Rosen — FERMILAB; UNIVERSITY OF MASSACHUSETTS; NORTHWESTERN UNIVERSITY; UNIVERSITY OF ROCHESTER

BEAM: Meson Area - M3 Beam
PROPOSAL TO STUDY THE COHERENT DISSOCIATION OF NEUTRONS.

Request	15 Jun, 70	Unspecified	
Approval	1 Mar, 71	200 Hours	for low priority Stage I running
Completed	24 Apr, 74	850 Hours	

28A **15-FOOT NEUTRINO/H2&NE #28A** — William F. Fry — CERN (SWITZERLAND); UNIVERSITY OF HAWAII AT MANOA; LAWRENCE BERKELEY LABORATORY; UNIVERSITY OF WISCONSIN - MADISON

BEAM: Neutrino Area - Wide Band Horn
SEARCH FOR HEAVY LEPTONS AND HARD PENETRATING RADIATION IN THE NEUTRINO BEAM; STUDY DIFFRACTION SCATTERING OF NEUTRINOS AND DEEP INELASTIC MUON-NEUTRINO SCATTERING IN A NEON BUBBLE CHAMBER AT NAL; TEST OF DELTA S=DELTA Q RULE @ HIGH MOMENTUM

Request	15 Jun, 70	1,000 K Pix	to include 500K pix with the primary protons incident on the hadron shield and 500K pix with normal targetry
Approval	1 Dec, 71	100 K Pix	with 50K pix of neutrinos in neon (greater than or equal to 30%) with the constraint that running conditions yield at least 10,000 events; and 50K pix of neutrinos using special targeting
	9 May, 75	100 K Pix	total of neutrinos in the 22% neon mixture under horn focusing conditions
Completed	11 Jun, 75	97 K Pix	

31A **15-FOOT ANTI-NEUTRINO/H2 #31A** — Malcolm Derrick — ARGONNE NATIONAL LABORATORY; CARNEGIE-MELLON UNIVERSITY; PURDUE UNIVERSITY

BEAM: Neutrino Area - Wide Band Horn
PROPOSAL TO INVESTIGATE MUON-ANTINEUTRINO INTERACTIONS IN HYDROGEN AT NAL.

Request	15 Jun, 70	1,000 K Pix	requiring a total exposure of 10 to the 19th protons with 10 to the 13th protons per pulse on target
Approval	1 Dec, 71	200 K Pix	maximum with the constraint that the running conditions yield at least 7,000 antineutrino interactions
Completed	13 Aug, 77	211 K Pix	

---

34 **DETECTOR DEVELOPMENT #34** — Richard W. Huggett — LOUISIANA STATE UNIVERSITY; MAX-PLANCK INSTITUTE (GERMANY)

BEAM: Neutrino Area - Miscellaneous
NUCLEAR-ELECTROMAGNETIC CASCADE DEVELOPMENT STUDY.
(Ionization spectrometer development.)

Request	15 Jun, 70	400 Hours	in two calibration runs
Approval	1 Aug, 70	Parasitic Running	
Completed	26 Jun, 74	50 Hours	

36A **PROTON-PROTON SCATTERING #36A** — Rodney L. Cool — FERMILAB; JINR, DUBNA (RUSSIA); UNIVERSITY OF ROCHESTER; ROCKEFELLER UNIVERSITY

BEAM: Internal Target Area (C-0)
A PROPOSAL TO STUDY SMALL ANGLE P-P SCATTERING AT VERY HIGH ENERGIES.
(Using a gas jet target and the internal proton beam.)

Request	15 Jun, 70	550 Hours	
Approval	1 Feb, 71	500 Hours	
Completed	24 Jun, 73	700 Hours	

37A **30-INCH P-P @ 300 #37A** — Ernest I. Malamud — CALIFORNIA INSTITUTE OF TECHNOLOGY; UNIV. OF CALIFORNIA, LOS ANGELES; FERMILAB; INDIANA UNIVERSITY

BEAM: Neutrino Area - 30 in. Hadron Beam
MULTIBODY FINAL STATES IN PP COLLISIONS UP TO 500 GEV.

Request	15 Jun, 70	250 K Pix	of p - p interactions at 100,200,300,400,500 GeV in 15-foot chamber
	3 May, 71	100 K Pix	of p - p interactions at one fixed high energy in 30-inch chamber
Approval	26 Aug, 71	50 K Pix	in bare chamber with events where there is downstream spark chamber data to be shared with exp #2B
Completed	1 Jun, 73	51 K Pix	

45A **15-FOOT NEUTRINO/H2 #45A** — Frank A. Nezrick — FERMILAB; UNIVERSITY OF HAWAII AT MANOA; LAWRENCE BERKELEY LABORATORY; UNIVERSITY OF MICHIGAN - ANN ARBOR

BEAM: Neutrino Area - Wide Band Horn
PROPOSAL TO STUDY NEUTRINO INTERACTIONS WITH PROTONS USING THE 15-FOOT BUBBLE CHAMBER AT NAL.

Request	15 Jun, 70	200 K Pix	with 10 to the 13th protons/pulse of at least 200 GeV
	19 Jul, 71	500 K Pix	with 10 to the 13th protons/pulse at 350 GeV
Approval	17 Dec, 71	300 K Pix	maximum with the constraint that the running conditions yield on the order of 15,000 events of neutrinos in hydrogen
Completed	13 Jan, 76	162 K Pix	

48 **MUON SEARCH #48** — Robert K. Adair — BROOKHAVEN NATIONAL LABORATORY; FERMILAB; YALE UNIVERSITY

BEAM: Proton Area - Center
A MEASUREMENT OF THE INTENSITY AND POLARIZATION OF MUONS PRODUCED DIRECTLY BY THE INTERACTIONS OF PROTONS WITH NUCLEI.

Request	15 Jun, 70	200 Hours	
Approval	1 Dec, 70	200 Hours	for an exploratory experiment
Completed	1 Dec, 75	500 Hours	

51A **MISSING MASS #51A** — Eberhard Von Goeler — NORTHEASTERN UNIVERSITY

BEAM: Meson Area - M2 Beam
MASS SPECTRA AND DECAY MODES FOR HADRONS WITH MASSES UP TO 15 GEV.

Request	15 Jun, 70	850 Hours	
Approval	14 Aug, 73	300 Hours	with low priority
Completed	23 Oct, 74	800 Hours	

53A **15-FOOT NEUTRINO/H2&NE #53A** — Charles Baltay — BROOKHAVEN NATIONAL LABORATORY; COLUMBIA UNIVERSITY

BEAM: Neutrino Area - Wide Band Horn
SEARCH FOR THE INTERMEDIATE BOSON, LEPTON PAIR PRODUCTION, AND A STUDY OF DEEPLY INELASTIC REACTIONS UTILIZING HIGH ENERGY NEUTRINO INTERACTIONS IN LIQUID NEON.

Request	15 Jun, 70	1,000 K Pix	of neutrino interactions in 15-foot with 70% neon and 30% deuterium and with inserted plate
	6 Jul, 71	1,000 K Pix	with 900K pix of neutrino interactions in neon with single plate and 100K pix in hydrogen with two plates
	16 Jun, 76	200 K Pix	requested increase of the approved picture total from 100K to 200K
	25 Jan, 78	450 K Pix	to include an increase of 300K beyond the approximately 150K pix presently available for the experiment; at least 150K pix additional are requested during the summer or fall of 1978
	19 Jun, 78	450 K Pix	to include an increase of 300K pix; this follows rejection of the
Approval	17 Dec, 71	100 K Pix	in neon or plates to yield at least 20,000 events total including
	29 Jun, 76	150 K Pix	total including about 50K pix already taken
	28 Jun, 78	450 K Pix	total including an extension for 300K pix
Completed	9 Mar, 81	440 K Pix	

61 **POLARIZED SCATTERING #61** — Owen Chamberlain — ARGONNE NATIONAL LABORATORY; FERMILAB; HARVARD UNIVERSITY; LAWRENCE BERKELEY LABORATORY; SUFFOLK UNIVERSITY; YALE UNIVERSITY

BEAM: Meson Area - M1 Beam
A PROPOSAL TO MEASURE POLARIZATION IN P P, PI- P, AND PI+ P ELASTIC SCATTERING AT 50, 100, AND 150 GEV/C.

Request	15 Jun, 70	1,100 Hours	for setup, tests, and data
	10 Mar, 77	1,600 Hours	to include additional time for 4 weeks of data at 300 GeV and 1 week at 100 GeV; running requires accelerator operation at those energies
Approval	1 Aug, 70	800 Hours	
	24 Jun, 77	1,200 Hours	with an attempt to provide 300 GeV data under the condition that the running not interfere with other major laboratory programs
Completed	26 Oct, 77	1,900 Hours	

63A **PHOTON SEARCH #63A** — James K. Walker — FERMILAB; UNIVERSITY OF HAWAII AT MANOA; NORTHERN ILLINOIS UNIVERSITY

BEAM: Internal Target Area (C-0)
SURVEY OF PARTICLE PRODUCTION IN PROTON COLLISIONS AT NAL.
(Photon production in proton collisions at the Internal Target Area; see also exp #284.)

Request	15 Jun, 70	Unspecified	
Approval	17 Dec, 70	400 Hours	
	19 Oct, 73	400 Hours	with understanding that additional photon production data would be taken at 60, 50, 40, 30, and 20 mrads
Completed	13 Mar, 75	2,600 Hours	

67A **PROTON-PROTON MISSING MASS #67A** — Felix Sannes — FLORIDA STATE UNIVERSITY; RUTGERS UNIVERSITY; UPSALA COLLEGE

BEAM: Internal Target Area (C-0)
SEARCH FOR BARYON RESONANCES UP TO 10 GEV MASS PRODUCED IN P + P TO P + MM WITH A RESOLUTION OF + OR - 25 MEV.
(Using a gas jet target and the internal proton beam.)

Request	15 Jun, 70	Unspecified	
Approval	1 Feb, 71	100 Hours	
Completed	8 Aug, 73	600 Hours	

69A ELASTIC SCATTERING #69A — Joseph Lach — FERMILAB; RUTHERFORD-APPLETON LABS.(ENGLAND); YALE UNIVERSITY

BEAM: Meson Area - M6 Beam
ELASTIC SCATTERING OF THE LONG-LIVED HADRONS.
(Small angle scattering to t of 0.2 and coulomb interference.)

Request	15 Jun, 70	380 Hours	of 'ideal time' to make coulomb interference measurements with stable particles and diffraction peak measurements with hyperons
	1 Dec, 70	180 Hours	of 'ideal time' to make coulomb interference measurements with stable particles; also see exp# 97 and 497
Approval	15 Sep, 70	600 Hours	
Completed	3 Mar, 76	2,800 Hours	

70 LEPTON #70 — Leon M. Lederman — COLUMBIA UNIVERSITY; FERMILAB

BEAM: Proton Area - Center
STUDY OF LEPTON PAIRS FROM PROTON-NUCLEAR INTERACTIONS; SEARCH FOR INTERMEDIATE BOSONS AND LEE-WICK STRUCTURE.

Request	23 Jun, 70	2,800 Hours	to include about 1,700 hours for study of single lepton production and 1,100 hours for study of lepton pairs
Approval	1 Dec, 70	600 Hours	
Completed	1 Dec, 74	2,800 Hours	

72 QUARK #72 — Lawrence B. Leipuner — BROOKHAVEN NATIONAL LABORATORY; YALE UNIVERSITY

BEAM: Meson Area - M4 Beam
EXPERIMENTAL PROPOSAL TO NAL -- QUARK SEARCH.
(By measuring ionization energy loss.)

Request	15 Jun, 70	100 Hours	for data taking
Approval	1 Aug, 70	200 Hours	
Completed	11 Jun, 73	500 Hours	

75 QUARK #75 — Taiji Yamanouchi — FERMILAB; NEW YORK UNIVERSITY

BEAM: Meson Area - M2 Beam
A PROPOSAL TO SEARCH FOR FRACTIONALLY CHARGED QUARKS.
(Measurement of ionization and total energy of fractionally charged particles using momentum selection.)

Request	29 Jun, 70	200 Hours	for tests and data taking
Approval	1 Sep, 70	200 Hours	
Completed	8 Sep, 73	1,050 Hours	

76 MONOPOLE #76 — Richard A. Carrigan — FERMILAB

BEAM: Neutrino Area - Miscellaneous
SEARCH FOR MAGNETIC MONOPOLES PRODUCED AT NAL.
(Employing a beam-dump target.)

Request	15 Jun, 70	Parasitic Running
Approval	1 Sep, 70	Target Exposure(s) with parasitic running
Completed	1 Dec, 74	5 Targets Exposed

81A NUCLEAR CHEMISTRY #81A — Sheldon Kaufman — ARGONNE NATIONAL LABORATORY; BROOKHAVEN NATIONAL LABORATORY; CARNEGIE-MELLON UNIVERSITY; UNIVERSITY OF CHICAGO; UNIV. OF ILLINOIS, CHICAGO CIRCLE; PURDUE UNIVERSITY; RBL, ORSAY (FRANCE)

BEAM: Meson Area - Miscellaneous
PRELIMINARY SURVEY OF 200 GEV PROTON INTERACTIONS WITH COMPLEX NUCLEI.
(Nuclear chemistry analysis.)

Request	9 Jul, 70	Parasitic Running
Approval	1 Aug, 70	Target Exposure(s)
Completed	1 Oct, 78	197 Bombardment(s)

82 K ZERO REGENERATION #82 — Valentine L. Telegdi — UNIV. OF CALIFORNIA, SAN DIEGO; UNIVERSITY OF CHICAGO; SLAC; UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M4 Beam
PROPOSAL TO INVESTIGATE REGENERATION OF NEUTRAL K-MESONS AT VERY HIGH ENERGIES.
(See exp #425.)

Request	13 Jul, 70	1,000 Hours	for preliminary run and data taking
Approval	15 Sep, 70	800 Hours	
	22 Nov, 74	1,100 Hours	total including additional 300 hours with complex nuclear targets
Completed	5 Jul, 75	3,500 Hours	

86A PION DISSOCIATION #86A — Henry J. Lubatti — LAL, ORSAY (FRANCE); UNIVERSITY OF WASHINGTON

BEAM: Meson Area - M1 Beam
A PROPOSAL TO STUDY INELASTIC DIFFRACTIVE PROCESSES BY OBSERVING COHERENT PRODUCTION OF MULTI-PION FINAL STATES FROM HE NUCLEI.
(Using a streamer chamber.)

Request	24 Jul, 70	1,050 Hours	for setup, tests and data taking
Approval	28 May, 71	800 Hours	with low priority
Completed	22 Mar, 76	800 Hours	

87A PHOTOPRODUCTION #87A — Thomas A. O'Halloran, Jr. — COLUMBIA UNIVERSITY; FERMILAB; UNIVERSITY OF HAWAII AT MANOA; UNIVERSITY OF ILLINOIS, CHAMPAIGN

BEAM: Proton Area - East
PROPOSAL TO SEARCH FOR HEAVY LEPTONS AND INTERMEDIATE BOSONS FROM PHOTON-NUCLEON AND PHOTON-NUCLEI COLLISIONS.

Request	30 Jul, 70	Unspecified	
	25 Feb, 71	4,400 Hours	for setup, tests, and data taking
Approval	1 Aug, 71	600 Hours	
	13 Nov, 75	1,100 Hours	with an extension of 500 hours of data taking
	28 Jul, 77	3,100 Hours	with an additional 2,000 hours for study of charmed baryon production
Completed	7 May, 78	4,800 Hours	

90 EMULSION/PROTONS @ 200 #90 — Wladyslaw Wolter — INP, KRAKOW (POLAND)

BEAM: Meson Area - Miscellaneous
CRACOW NUCLEAR EMULSION EXPOSURES.

Request	23 Jun, 70	Emulsion Exposure
Approval	1 Aug, 70	Emulsion Exposure
Completed	20 Sep, 72	4 Stack(s)

95A **PHOTON SEARCH #95A** — Bradley B. Cox — FERMILAB, JOHNS HOPKINS UNIVERSITY

BEAM: Proton Area - West
PROPOSAL FOR EXAMINATION OF WIDE ANGLE GAMMA RAYS AT NAL.
(Single and digamma production by proton-nucleon collisions.)

Request	26 Oct, 70	100 Hours	of data taking with parasitic beam used for setup
	12 Oct, 76	3,100 Hours	for further study of diphoton spectra
Approval	1 Jun, 71	400 Hours	
	5 Jan, 77	1,650 Hours	with an extension in an effort to approach the 12.5 weeks of running which was requested
	12 Sep, 77	1,950 Hours	with approval of an additional 3 weeks of running at 200/300 GeV
Completed	17 Oct, 77	3,400 Hours	

---

96 **ELASTIC SCATTERING #96** — David Ritson — ARGONNE NATIONAL LABORATORY, UNIVERSITY OF BARI (ITALY), BROWN UNIVERSITY, CERN (SWITZERLAND), CORNELL UNIVERSITY, FERMILAB, MASSACHUSETTS INST. OF TECHNOLOGY, NORTHEASTERN UNIVERSITY, STANFORD UNIVERSITY

BEAM: Meson Area - M6 Beam
FOCUSING SPECTROMETER FACILITY.
(Measure elastic scattering and quasi elastic scattering of pi+(-), K+(-), p+(-) on H2 and D2 up to 200 GeV/c with t up to 1.5.)

Request	3 Dec, 70	1,000 Hours	for check out and data taking
Approval	1 Dec, 70	800 Hours	
Completed	17 Feb, 75	2,550 Hours	

---

98 **MUON #98** — Herbert L. Anderson — UNIVERSITY OF CHICAGO, HARVARD UNIVERSITY, UNIVERSITY OF ILLINOIS, CHAMPAIGN, UNIVERSITY OF OXFORD (ENGLAND)

BEAM: Neutrino Area - Muon/Hadron Beam
MUON-PROTON INELASTIC SCATTERING EXPERIMENT AT THE NATIONAL ACCELERATOR LABORATORY.
(Using a large aperture magnet to detect scattered muons and charged hadrons.)

Request	2 Dec, 70	1,600 Hours	for tests and data taking
Approval	19 Jan, 71	400 Hours	of initial running with H2 (100 hours of parasitic testing)
	6 Aug, 73	400 Hours	with approval for both D2 and H2
	26 Jun, 74	800 Hours	with additional 400 hours for data taking
Completed	17 Feb, 75	1,800 Hours	

---

99 **ASSOCIATED PRODUCTION #99** — Robert E. Diebold — ARGONNE NATIONAL LABORATORY, FERMILAB, SLAC, STANFORD UNIVERSITY

BEAM: Meson Area - M6 Beam
A STUDY OF PI+ P TO K+ SIGMA+ AND PI+ P TO K+ Y-STAR+ USING THE FOCUSING SPECTROMETER FACILITY.
(Incident momenta from 20 - 120 GeV/c, t from 0.04 - 0.6.)

Request	3 Dec, 70	500 Hours	for tests and data taking
Approval	25 Nov, 74	500 Hours	
Completed	24 Jan, 78	750 Hours	

100A **PARTICLE SEARCH #100A** — Pierre A. Piroue — UNIVERSITY OF CHICAGO, PRINCETON UNIVERSITY

BEAM: Proton Area - East
A PROPOSAL TO STUDY PARTICLE PRODUCTION AT HIGH TRANSVERSE MOMENTA.
(Measurement of particle production at 90 degrees in c.m. from proton interactions with nuclei.)

Request	4 Dec, 70	500 Hours	for data taking
Approval	1 Feb, 71	500 Hours	
Completed	4 Apr, 74	1,150 Hours	

---

103 **EMULSION/PROTONS @ 200 #103** — David T. King — UNIVERSITY OF TENNESSEE, KNOXVILLE

BEAM: Meson Area - Miscellaneous
INTRA-NUCLEAR CASCADE PRODUCED BY 200 GEV PROTONS.

Request	21 Dec, 70	Emulsion Exposure	
Approval	1 Feb, 71	Emulsion Exposure	
Completed	20 Sep, 72	1 Stack(s)	

---

104 **TOTAL CROSS SECTION #104** — Thaddeus F. Kycia — BROOKHAVEN NATIONAL LABORATORY, FERMILAB, MAX-PLANCK INSTITUTE (GERMANY), ROCKEFELLER UNIVERSITY, UNIVERSITY OF WASHINGTON

BEAM: Meson Area - M1 Beam
MEASUREMENT OF TOTAL CROSS SECTIONS ON HYDROGEN AND DEUTERIUM.
(Of pi+-, K+-, p, pbar.)

Request	8 Jan, 71	700 Hours	for tests and data taking
	16 Jun, 76	1,300 Hours	total with additional 600 hours for completion of cross section data and particle search exp# 354
Approval	8 Mar, 71	700 Hours	
	29 Jun, 76	1,300 Hours	including an additional 600 hours for the remainder of exp# 104 and exp# 354
Completed	22 Dec, 77	2,650 Hours	

---

105 **EMULSION/PROTONS @ 200 #105** — Prince K. Malhotra — JAMMU UNIVERSITY (INDIA), PANJAB UNIVERSITY (INDIA), TATA INSTITUTE (INDIA)

BEAM: Meson Area - Miscellaneous
A PROPOSAL TO STUDY SOME CHARACTERISTICS OF PROTON-NUCLEON AND PROTON-NUCLEUS COLLISIONS AT 400 GEV USING NUCLEAR EMULSIONS.

Request	14 Jan, 71	Emulsion Exposure	
Approval	1 Apr, 71	Emulsion Exposure	
Completed	20 Sep, 72	1 Stack(s)	

---

108 **BEAM DUMP #108** — Miguel Awschalom — FERMILAB

BEAM: Meson Area - M2 Beam
A BEAM DUMP EXPERIMENT.
(Study of shielding including hadron cascade development, muon attenuation, radioactivity.)

Request	4 Feb, 71	40 Hours	for irradiation
Approval	1 Mar, 71	40 Hours	
Completed	2 Jun, 75	350 Hours	

110A MULTIPARTICLE #110A — Alexander R. Dzierba

CALIFORNIA INSTITUTE OF TECHNOLOGY
UNIV. OF CALIFORNIA, LOS ANGELES
FERMILAB
UNIV. OF ILLINOIS, CHICAGO CIRCLE
INDIANA UNIVERSITY
MAX-PLANCK INSTITUTE (GERMANY)

BEAM: Meson Area - M6 Beam
PROPOSAL TO STUDY MULTIPARTICLE PERIPHERAL PHYSICS AT NAL.
(Using a large wire chamber magnetic spectrometer.)

Request	15 Feb, 71	400 Hours	for test run and overview
	10 Aug, 72	900 Hours	for tests and data taking
	21 Oct, 76	900 Hours	for data taking
Approval	5 Apr, 72	800 Hours	
	16 Nov, 73	600 Hours	with understanding that approximately 200 hours of previously approved 800 hours of running will be used for exp# 260
	18 Nov, 76	1,000 Hours	with expectation that 800 hours will be used for data taking and 2 weeks for tuneup of beam and equipment
Completed	9 Apr, 78	1,600 Hours	

---

111 PION CHARGE EXCHANGE #111 — Alvin V. Tollestrup

CALIFORNIA INSTITUTE OF TECHNOLOGY
LAWRENCE BERKELEY LABORATORY

BEAM: Meson Area - M2 Beam
PROPOSAL TO STUDY PI- P TO PI0 N AND PI- P TO ETA N AT HIGH ENERGY.

Request	15 Feb, 71	450 Hours	for tests and data taking
Approval	1 Feb, 71	400 Hours	
Completed	19 Sep, 74	1,800 Hours	

---

114 EMULSION/PROTONS @ 200 #114 — Piyare L. Jain

SUNY AT BUFFALO

BEAM: Meson Area - Miscellaneous
STUDY OF 200-500 GEV PROTON AND PION INTERACTION WITH NUCLEAR EMULSION.

Request	24 Feb, 71	Emulsion Exposure	
Approval	1 Mar, 72	Emulsion Exposure	
Completed	20 Sep, 72	1 Stack(s)	

---

115 LONG-LIVED PARTICLES #115 — M. Lynn Stevenson

LAWRENCE BERKELEY LABORATORY

BEAM: Neutrino Area - Miscellaneous
SEARCH FOR LONG-LIVED PARTICLES
(Tau greater than or approximately equal 0.1 msec; analysis of particles from a beam dump.)

Request	1 Mar, 71	Parasitic Running	
Approval	26 Aug, 71	Parasitic Running	
Completed	23 Nov, 74	6 Hours	

---

116 EMULSION/PROTONS @ 200 #116 — Jacques D. Hebert

UNIVERSITY OF BARCELONA (SPAIN)
CRN, STRASBOURG (FRANCE)
FERMILAB
UNIVERSITY OF LYON (FRANCE)
MCGILL UNIVERSITY (CANADA)
UNIVERSITY OF MONTREAL (CANADA)
UNIVERSITY OF OTTAWA (CANADA)
UNIVERSITY OF VALENCIA (SPAIN)

BEAM: Meson Area - Miscellaneous
INTERACTION OF HIGH ENERGY PROTONS IN NUCLEAR EMULSIONS LOADED WITH B 10 AND LIF.

Request	31 Mar, 71	Emulsion Exposure	
Approval	1 Apr, 71	Emulsion Exposure	
Completed	20 Sep, 72	5 Stack(s)	

117A EMULSION/PROTONS @ 200 #117A — Osamu Kusumoto

KINKI UNIVERSITY (JAPAN)
KOBE UNIVERSITY (JAPAN)
OSAKA CITY UNIVERSITY (JAPAN)
OSAKA SCIENCE EDUC. INST. (JAPAN)
WAKAYAMA MEDICAL COLLEGE (JAPAN)

BEAM: Meson Area - Miscellaneous
PHENOMOLOGICAL STUDY OF 200 AND 500 GEV/C PROTON-PROTON COLLISIONS IN EMULSION.

Request	2 Mar, 71	Emulsion Exposure	
Approval	1 Apr, 71	Emulsion Exposure	
Completed	20 Sep, 72	11 Stack(s)	

118A INCLUSIVE SCATTERING #118A — George W. Brandenburg

UNIVERSITY OF BARI (ITALY)
BROWN UNIVERSITY
FERMILAB
MASSACHUSETTS INST. OF TECHNOLOGY

BEAM: Meson Area - M6 Beam
HADRON SPECTRA FROM HIGH ENERGY INTERACTIONS.
(Single particle inclusive spectra from pions, kaons, and protons using single arm spectrometer.)

Request	3 Mar, 71	950 Hours	for tests and data taking
	20 Jun, 73	1,200 Hours	total with additional 250 hours of data taking
	22 Oct, 76	950 Hours	with an additional 350 hours to extend existing measurements; see proposal #513
Approval	25 Nov, 74	600 Hours	
	18 Nov, 76	950 Hours	with additional 350 hours for continued data taking
Completed	20 Jul, 77	2,550 Hours	

---

120 PHOTON SEARCH #120 — David B. Cline

UNIVERSITY OF CHICAGO
HARVARD UNIVERSITY
UNIVERSITY OF WISCONSIN - MADISON

BEAM: Internal Target Area (C-0)
EARLY PI ZERO PARTICLE PRODUCTION SURVEY WITH THE GAS JET TARGET.
(Also direct photon production using the internal proton beam.)

Request	9 Mar, 71	Unspecified	
Approval	1 Jun, 71	200 Hours	
Completed	29 May, 73	1,200 Hours	

121A 30-INCH PI+ & P - P @ 100 #121A — Richard L. Lander

UNIV. OF CALIFORNIA, DAVIS
LAWRENCE BERKELEY LABORATORY

BEAM: Neutrino Area - 30 in. Hadron Beam
A PROPOSAL TO SEARCH FOR VERY HEAVY STRANGE PARTICLES USING A SMALL HYDROGEN BUBBLE CHAMBER.

Request	11 Mar, 71	100 K Pix	
	17 May, 71	200 K Pix	total with 50K at each of four incident proton momenta, 100, 200, 300, and 400 GeV/c
Approval	26 Aug, 71	50 K Pix	in bare chamber with events where there is downstream spark chamber data to be shared with exp #2B
Completed	23 Jan, 74	104 K Pix	

---

125 30-INCH PI- - P @ 100 #125 — Douglas R. O. Morrison

CERN (SWITZERLAND)

BEAM: Neutrino Area - 30 in. Hadron Beam
PROPOSAL TO STUDY PI- P REACTIONS AT 60 AND 200 GEV/C IN THE 30-INCH.

Request	7 May, 71	100 K Pix	
Approval	27 Aug, 71	50 K Pix	in bare chamber with events where there is downstream spark chamber data to be shared with exp #2B
Completed	28 Aug, 73	53 K Pix	

137 **30-INCH PI- - P @ 200 #137** — Fred Russell Huson — UNIV. OF CALIFORNIA, BERKELEY
BEAM: Neutrino Area - 30 in. Hadron Beam — FERMILAB
STUDY OF PI- + P INTERACTIONS AT HIGH ENERGY. — LAWRENCE BERKELEY LABORATORY

Request	4 May, 71	50 K Pix	
Approval	26 Aug, 71	50 K Pix	in bare chamber with events where there is downstream spark chamber data to be shared with exp #2B
Completed	10 Mar, 73	48 K Pix	

138 **30-INCH P-P @ 400 #138** — Jack C. Vander Velde — UNIVERSITY OF MICHIGAN - ANN ARBOR
BEAM: Neutrino Area - 30 in. Hadron Beam — UNIVERSITY OF ROCHESTER
STUDY OF MULTIPARTICLE PRODUCTION IN A 30-INCH BUBBLE CHAMBER.

Request	10 May, 71	240 K Pix	total; combined experiment from proposals #62 and #80
Approval	26 Aug, 71	50 K Pix	in bare chamber with events where there is downstream spark chamber data to be shared with exp #2B
Completed	26 Aug, 75	52 K Pix	

141A **30-INCH P-P @ 200 #141A** — Thomas H. Fields — ARGONNE NATIONAL LABORATORY
BEAM: Neutrino Area - 30 in. Hadron Beam — FERMILAB
STUDY OF PP INTERACTIONS IN THE ANL 30-INCH HYDROGEN BUBBLE CHAMBER AT NAL. — IOWA STATE UNIVERSITY
UNIVERSITY OF MARYLAND
MICHIGAN STATE UNIVERSITY

Request	25 Jun, 71	50 K Pix	
Approval	26 Aug, 71	50 K Pix	in bare chamber with events where there is downstream spark chamber data to be shared with exp #2B
Completed	27 Nov, 72	67 K Pix	

142 **SUPER-HEAVY ELEMENTS #142** — Raymond W. Stoughton — ARGONNE NATIONAL LABORATORY
BEAM: Neutrino Area - Miscellaneous — OAK RIDGE NATIONAL LABORATORY
PROPOSAL FOR A SEARCH FOR SUPERHEAVY ELEMENTS BY IRRADIATIONS AT NAL.

Request	12 Jul, 71	Parasitic Running with a total of 10 to the 18th protons on target	
Approval	26 Aug, 71	Target Exposure(s)	
Completed	4 Jun, 75	1 Target(s)	

143A **30-INCH PI- - P @ 300 #143A** — George R. Kalbfleisch — BROOKHAVEN NATIONAL LABORATORY
BEAM: Neutrino Area - 30 in. Hadron Beam — CASE WESTERN RESERVE UNIVERSITY
PROPOSAL FOR A RAPID SYSTEMATIC STUDY OF ALL INTERACTIONS IN A PI- - P EXPOSURE OF THE BARE 30-INCH CHAMBER AT 120 GEV/C.

Request	12 Jul, 71	50 K Pix	
Approval	26 Aug, 71	50 K Pix	in bare chamber with events where there is downstream spark chamber data to be shared with exp #2B
Completed	10 Apr, 74	51 K Pix	

147 **SUPER-HEAVY ELEMENTS #147** — Monique DeBeauvais — CRN, STRASBOURG (FRANCE)
BEAM: Meson Area - Miscellaneous — UNIVERSITY OF OTTAWA (CANADA)
PROPOSAL OF AN EXPERIMENT ON THE FISSION OF VERY HEAVY NUCLEI INDUCED BY 200 GEV PROTONS.

Request	9 Jul, 71	Target Exposure(s)	
Approval	6 Aug, 73	Target Exposure(s)	
Completed	11 Jun, 75	4 Exposure(s)	

152B **PHOTOPRODUCTION #152B** — Clemens A. Heusch — UNIV. OF CALIFORNIA, SANTA CRUZ
BEAM: Proton Area - East
PROPOSAL TO BUILD AN ELECTRON-PHOTON FACILITY AT NAL AND TO MEASURE PHOTON SCATTERING AT HIGH ENERGIES.
(Measurement of total cross sections, elastic and inelastic scattering meson production, and a search for new particles.)

Request	19 Jul, 71	300 Hours	with actual data taking of 160 hours
	23 Jun, 72	490 Hours	total with an additional 190 hours of data taking
Approval	4 Mar, 74	350 Hours	with understanding that there will be a collaborative effort in development and construction of equipment with exp# 263
	28 Jun, 78	1,800 Hours	approximately with the experiment to be considered complete by the time of the fall 1978 shutdown
Completed	13 Nov, 78	1,950 Hours	

154 **30-INCH HYBRID #154** — Irwin A. Pless — BROWN UNIVERSITY
BEAM: Neutrino Area - 30 in. Hadron Beam — FERMILAB
TEST OF PROPORTIONAL WIRE CHAMBERS IN HYBRID SYSTEMS. — ILLINOIS INSTITUTE OF TECHNOLOGY
UNIVERSITY OF ILLINOIS, CHAMPAIGN
INDIANA UNIVERSITY
JOHNS HOPKINS UNIVERSITY
MASSACHUSETTS INST. OF TECHNOLOGY
OAK RIDGE NATIONAL LABORATORY
RUTGERS UNIVERSITY
STEVENS INSTITUTE OF TECHNOLOGY
UNIVERSITY OF TENNESSEE, KNOXVILLE
YALE UNIVERSITY

Request	23 Jun, 71	2,000 K Pix	
Approval	27 Aug, 71	20 K Pix	with understanding that work will be done in two phases. Phase I - design, construction, installation, and initial operation of upstream tagging system Phase II - use of downstream PWC's for feasibility test run of 20K pix
	6 Aug, 73	120 K Pix	with additional 100K pix to be taken with single type incident particles at a given energy
Completed	13 Mar, 74	105 K Pix	of pi- - p @ 150 GeV

155 **15-FOOT EMI TEST #155** — Vincent Z. Peterson — UNIVERSITY OF HAWAII AT MANOA; LAWRENCE BERKELEY LABORATORY

BEAM: Neutrino Area - Wide Band Horn
PROPOSAL TO DEVELOP A PHASE I EXTERNAL MUON IDENTIFIER (EMI) FOR USE WITH THE NAL 30 CUBIC METER BUBBLE CHAMBER.

Request	15 Jul, 71	Test Running	
Approval	27 Aug, 71	Parasitic Running	with understanding that completion of Phase I will include tests in neutrino beam with 15-ft bubble chamber in operation and number of pix to be determined at a later date
	17 Dec, 71	Parasitic Running	with 100K pix to be taken from exp# 45A exposures taken when EMI was operating; film containing about 200 events to be delivered as soon as feasible to aid in preliminary tuneup and checking
	26 Jun, 74	50 K Pix	with formal approval for dedicated pictures to follow successful analysis of 200 events from exp# 45A exposures
Completed	30 Nov, 74	14 K Pix	

156 **EMULSION/PROTONS @ 200 #156** — Kiyoshi Niu — AICHI UNIV. OF EDUCATION (JAPAN); KWANSEI GAKUIN UNIVERSITY (JAPAN); NAGOYA UNIVERSITY (JAPAN); UNIVERSITY OF TOKYO (JAPAN); YOKOHAMA NATIONAL UNIV. (JAPAN)

BEAM: Meson Area - Miscellaneous
STUDY OF SECONDARY PARTICLES PRODUCED BY 200 AND 500 GEV PROTONS IN EMULSION CHAMBERS.

Request	15 Aug, 71	Emulsion Exposure	
Approval	1 Sep, 71	Emulsion Exposure	
Completed	20 Sep, 72	13 Stack(s)	

161 **30-INCH P - P&NE @ 300 #161** — James Mapp — UNIVERSITY OF WISCONSIN - MADISON

BEAM: Neutrino Area - 30 in. Hadron Beam
PROPOSAL TO SURVEY HIGH ENERGY PROTON COLLISIONS IN NEON AND TO SEARCH FOR ANOMALOUS PHOTON BUNDLES AT NAL.

Request	13 Oct, 71	50 K Pix
Approval	6 Aug, 73	50 K Pix
Completed	25 Jun, 74	51 K Pix

163A **30-INCH PI- - P&NE @ 200 #163A** — William D. Walker — DUKE UNIVERSITY; UNIVERSITY OF NORTH CAROLINA

BEAM: Neutrino Area - 30 in. Hadron Beam
PROPOSAL FOR A STUDY OF THE INTERACTION OF HIGH ENERGY PI- WITH NEON.

Request	4 Dec, 71	50 K Pix
Approval	19 Jul, 72	50 K Pix
Completed	18 Jun, 74	52 K Pix

171 **EMULSION/PROTONS @ 200 #171** — Jere J. Lord — UNIVERSITY OF WASHINGTON

BEAM: Meson Area - Miscellaneous
PROPOSED EMULSION EXPERIMENT SEARCH FOR SHORT LIVED PARTICLES AT HIGH ENERGIES.

Request	10 May, 72	Emulsion Exposure	
Approval	1 Aug, 72	Emulsion Exposure	
Completed	20 Sep, 72	6 Stack(s)	

172 **15-FOOT ANTI-NEUTRINO/H2&NE#172** — Henry J. Lubatti — UNIV. OF CALIFORNIA, BERKELEY; UNIVERSITY OF HAWAII AT MANOA; LAWRENCE BERKELEY LABORATORY; UNIVERSITY OF WASHINGTON

BEAM: Neutrino Area - Wide Band Horn
ANTINEUTRINO INTERACTIONS IN THE 15-FOOT H2-NEON BUBBLE CHAMBER.

Request	16 May, 72	50 K Pix
Approval	19 Jul, 72	50 K Pix
Completed	25 May, 76	49 K Pix

177A **PROTON-PROTON ELASTIC #177A** — Jay Orear — CORNELL UNIVERSITY; LEBEDEV PHYSICAL INST. (RUSSIA); MCGILL UNIVERSITY (CANADA); NORTHEASTERN UNIVERSITY

BEAM: Proton Area - West
EARLY MEASUREMENT OF HIGH ENERGY P P LARGE ANGLE ELASTIC SCATTERING.

Request	12 Jun, 72	100 Hours	for initial run
	27 Oct, 72	700 Hours	total with additional 600 hours for data
Approval	13 Aug, 73	100 Hours	for Phase I; counter tests to demonstrate success of proposed technique
	28 Jun, 76	700 Hours	with 600 hours additional for data
	19 Nov, 76	1,500 Hours	with additional 800 hours to collect data at 200 GeV and 400 GeV to t-values of 18 GeV squared; completion of run expected by 15 Feb 1977
	7 Mar, 77	2,200 Hours	with additional 700 hours to collect data in high t region with completion of experiment expected at end of April 1977
Completed	19 Apr, 77	2,400 Hours	

178 **MULTIPLICITIES #178** — Wit Busza — CARELTON UNIVERSITY (CANADA); FERMILAB; MASSACHUSETTS INST. OF TECHNOLOGY

BEAM: Meson Area - M6 Beam
A STUDY OF THE AVERAGE MULTIPLICITY AND MULTICIPLICITY DISTRIBUTIONS IN HADRON-NUCLEUS COLLISIONS AT HIGH ENERGIES.
(Using Cerenkov counter pulse height analysis.)

Request	16 Jun, 72	60 Hours	including 20 hours for tests
Approval	6 Aug, 73	100 Hours	with understanding that running will be on a parasitic basis during tuning of M6 beam line by exp# 96
	25 Oct, 74	200 Hours	with an additional 100 hours of running in the M6 beam line
Completed	14 Aug, 75	800 Hours	

180 **15-FOOT ANTI-NEUTRINO/H2&NE#180** — Pavel F. Ermolov — FERMILAB; UNIVERSITY OF MICHIGAN - ANN ARBOR; ITEP, MOSCOW (RUSSIA); IHEP, PROTVINO (SERPUKHOV)(RUSSIA)

BEAM: Neutrino Area - Wide Band Horn
A STUDY OF ANTINEUTRINO INTERACTIONS IN THE NAL 15-FOOT BUBBLE CHAMBER, FILLED WITH HYDROGEN AND NEON.

Request	23 Jun, 72	200 K Pix	
Approval	11 Jul, 72	50 K Pix	of antineutrinos to run before exp# 172 and to have first choice of the two H2/neon mixtures
	29 Jun, 76	200 K Pix	including an additional 150K pix; with the expectation that the experiment will involve a total of 500K pix
Approved/Inactive	1 Jun, 77	273 K Pix	as of 01 Jun 1977

181 **EMULSION/PROTONS @ 300 #181** — Arthur S. Cary — HARVEY MUDD COLLEGE

BEAM: Neutrino Area - Miscellaneous
THE DIRECT PRODUCTION OF ELECTRON PAIRS IN NUCLEAR EMULSION BY 100 AND 200 GEV PROTONS.

Request	27 Jul, 72	Emulsion Exposure
Approval	15 Nov, 72	Emulsion Exposure
Completed	20 Oct, 73	3 Stack(s)

---

183 **EMULSION/PROTONS @ 200 #183** — M. I. Tretjakova — LEBEDEV PHYSICAL INST. (RUSSIA)

BEAM: Meson Area - Miscellaneous
A PROPOSAL OF THE PHOTOEMULSION EXPERIMENT AT THE NATIONAL ACCELERATOR LABORATORY (BATAVIA).

Request	7 Jul, 72	Emulsion Exposure
Approval	1 Aug, 72	Emulsion Exposure
Completed	20 Sep, 72	3 Stack(s)

---

184 **PARTICLE SEARCH #184** — Peter J. Wanderer — UNIVERSITY OF CHICAGO, HARVARD UNIVERSITY, UNIVERSITY OF PENNSYLVANIA, UNIVERSITY OF WISCONSIN - MADISON

BEAM: Internal Target Area (C-0)
SEARCH FOR A NEW CLASS OF PENETRATING MASSIVE PARTICLES AT C-0.

Request	14 Sep, 72	Unspecified
Approval	5 Oct, 72	400 Hours with installation to begin at time of removal of exp# 120 and extending for a period of one month
	6 Aug, 73	600 Hours with approval for occupancy at C-0 for 6 weeks
	22 Feb, 74	760 Hours with an authorized extension of 160 hours
Completed	29 May, 74	800 Hours

---

186 **PROTON-DEUTERON SCATTERING #186** — Adrian Melissinos — FERMILAB, JINR, DUBNA (RUSSIA), UNIVERSITY OF ROCHESTER, ROCKEFELLER UNIVERSITY

BEAM: Internal Target Area (C-0)
A PROPOSAL TO STUDY SMALL ANGLE PROTON-DEUTERON SCATTERING.
(Using a gas jet target with deuterium and the internal proton beam; t from 0.001 - 0.020.)

Request	19 Oct, 72	400 Hours
Approval	1 Nov, 72	400 Hours
Completed	19 Aug, 74	450 Hours

---

187 **PARTICLE SEARCH #187** — Leon M. Lederman — COLUMBIA UNIVERSITY, FERMILAB

BEAM: Proton Area - Center
PHASE 0.8 - SEARCH FOR LONG-LIVED MASSIVE OBJECTS (HIGH ENERGY CALIBRATION RUN).
(Relying on r.f. bunching and time of flight measurement.)

Request	5 Sep, 72	Unspecified
Approval	30 Oct, 72	100 Hours
Completed	6 Nov, 73	200 Hours

---

188 **PROTON-NUCLEON INCLUSIVE #188** — Felix Sannes — UNIV. OF ILLINOIS, CHICAGO CIRCLE, IMPERIAL COLLEGE (ENGLAND), RUTGERS UNIVERSITY, UPSALA COLLEGE

BEAM: Internal Target Area (C-0)
A PROPOSAL TO MEASURE CROSS SECTIONS FOR P-P TO P-X, N-X AS A FUNCTION OF S AND MX SQUARED USING THE INTERNAL TARGET FACILITY AT NAL.

Request	25 Oct, 72	200 Hours
Approval	1 Nov, 72	200 Hours
Completed	9 May, 73	1,050 Hours

---

189 **EMULSION/PROTONS @ 200 #189** — David Ritson — STANFORD UNIVERSITY

BEAM: Meson Area - Miscellaneous
NUCLEAR EMULSION EXPOSURES TO 400 GEV.
(For student laboratory use.)

Request	16 Oct, 72	Emulsion Exposure
Approval	2 Nov, 72	Emulsion Exposure
Completed	20 Sep, 72	2 Plate(s)

---

194 **30-INCH P - D @ 100 #194** — C. Thornton Murphy — CARNEGIE-MELLON UNIVERSITY, FERMILAB, UNIVERSITY OF MICHIGAN - ANN ARBOR, SUNY AT STONY BROOK

BEAM: Neutrino Area - 30 in. Hadron Beam
PROPOSAL TO STUDY PROTON-DEUTERON INTERACTIONS IN THE 30-INCH BUBBLE CHAMBER.

Request	13 Nov, 72	200 K Pix
Approval	1 Mar, 74	100 K Pix in bare chamber with downstream chamber data if it can be arranged
Completed	20 Aug, 76	92 K Pix

---

195 **EMULSION/PROTONS @ 300 #195** — Yu K. Lim — CRFC, CAMBRIDGE, EMMANUEL COLLEGE, MISSISSIPPI STATE UNIVERSITY, UNIVERSITY OF SINGAPORE(SINGAPORE)

BEAM: Neutrino Area - Miscellaneous
PROPOSAL TO MEASURE THE LIFETIME OF THE NEUTRAL PION.

Request	13 Nov, 72	Emulsion Exposure
Approval	15 Nov, 72	Emulsion Exposure
Completed	10 Jun, 75	3 Stack(s)

---

196 **30-INCH P - D @ 400 #196** — Roderich J. Engelmann — CARNEGIE-MELLON UNIVERSITY, FERMILAB, UNIVERSITY OF MICHIGAN - ANN ARBOR, SUNY AT STONY BROOK

BEAM: Neutrino Area - 30 in. Hadron Beam
PROTON-DEUTERON INTERACTIONS IN THE BARE 30-INCH BUBBLE CHAMBER.

Request	13 Nov, 72	100 K Pix
Approval	21 Mar, 74	100 K Pix in bare chamber with downstream chamber data if it can be arranged
Completed	20 Oct, 75	109 K Pix

198A **PROTON-NUCLEON SCATTERING #198A** — Stephen L. Olsen — IMPERIAL COLLEGE (ENGLAND), UNIVERSITY OF ROCHESTER, RUTGERS UNIVERSITY

BEAM: Internal Target Area (C-0)
A PROPOSAL FOR A MAGNETIC RECOIL SPECTROMETER FOR THE GAS JET TARGET.
(Use of the gas jet target with H2 and D2 to study p - p and p - d scattering with the internal proton beam; t from 0.15 - 3.0.)

Request	22 Dec, 72	800 Hours
Approval	22 Mar, 74	800 Hours contingent on construction of C-0 extension
	26 Jun, 74	800 Hours with the understanding that concurrent running with exp# 313 be arranged whenever possible
Completed	19 Apr, 77	900 Hours

199 **MASSIVE PARTICLE SEARCH #199** — Sherman Frankel — FERMILAB, UNIVERSITY OF PENNSYLVANIA

BEAM: Neutrino Area - Miscellaneous
SEARCH FOR WEAKLY PRODUCED MASSIVE LONG LIVED PARTICLES AT NAL.
(Using a threshold Cerenkov counter.)

Request	21 Dec, 72	Target Exposure(s)
Approval	15 Jan, 73	Target Exposure(s)
Completed	22 Aug, 73	2 Targets Exposed

202 **TACHYON MONOPOLE #202** — David F. Bartlett — UNIVERSITY OF COLORADO AT BOULDER, PRINCETON UNIVERSITY

BEAM: Neutrino Area - Miscellaneous
SEARCH FOR TACHYON MONOPOLES IN COSMIC RAYS ABOVE 15-FOOT BUBBLE CHAMBER.
(Using magnet fringe field.)

Request	1 Feb, 73	800 Hours of which half would be at zero field
Approval	22 Aug, 73	Parasitic Running
Completed	19 May, 76	Cosmic Ray Running

203A **MUON #203A** — Leroy T. Kerth — UNIV. OF CALIFORNIA, BERKELEY, FERMILAB, LAWRENCE BERKELEY LABORATORY, PRINCETON UNIVERSITY

BEAM: Neutrino Area - Muon/Hadron Beam
FEASIBLE SEARCH FOR HEAVY NEUTRAL MUONS PREDICTED BY GAUGE THEORIES AND CONCURRENT MEASUREMENT OF DEEP-INELASTIC VIRTUAL COMPTON SCATTERING.

Request	9 Mar, 73	600 Hours with muon beam intensity of 5 x 10 to the 6th per pulse
Approval	26 Mar, 75	500 Hours with formal approval of 1 x 10 to the 18th protons
	23 Mar, 78	1,200 Hours with the expectation to run the experiment until about April 27, 1978
Completed	18 May, 78	1,200 Hours

205A **EMULSION/MUONS @ 150 #205A** — Osamu Kusumoto — KINKI UNIVERSITY (JAPAN), KOBE UNIVERSITY (JAPAN), OKAYAMA UNIVERSITY (JAPAN), OSAKA CITY UNIVERSITY (JAPAN), OSAKA SCIENCE EDUC. INST. (JAPAN), UNIVERSITY OF TOKYO (JAPAN)

BEAM: Neutrino Area - Miscellaneous
PHENOMENOLOGICAL STUDY OF MUON-NUCLEON COLLISION AT ENERGY MORE THAN 100 GEV IN EMULSION.

Request	4 Apr, 73	Emulsion Exposure
Approval	15 Jun, 73	Emulsion Exposure
Completed	16 Oct, 73	2 Stack(s)

209 **30-INCH P - D @ 300 #209** — Fu Tak Dao — CALIFORNIA INSTITUTE OF TECHNOLOGY, IOWA STATE UNIVERSITY, TUFTS UNIVERSITY, VANDERBILT UNIVERSITY

BEAM: Neutrino Area - 30 in. Hadron Beam
A STUDY OF 300 GEV/C P D INTERACTIONS IN THE THIRTY-INCH BUBBLE CHAMBER.

Request	1 May, 73	50 K Pix
Approval	21 Mar, 74	100 K Pix in bare chamber with downstream chamber data if it can be arranged
Completed	7 Oct, 76	106 K Pix

211 **BEAM DUMP #211** — Klaus Goebel — CERN (SWITZERLAND), FERMILAB

BEAM: Neutrino Area - Miscellaneous
PROPOSAL FOR RADIATION MEASUREMENTS AROUND A PROTON BEAM DUMP AT 300 GEV.
(Early measurements to confirm calculations for CERN; very reduced version of exp #108.)

Request	18 Apr, 73	10 Hours with a total of 10 to the 15th protons
Approval	20 Apr, 73	10 Hours
Completed	14 Nov, 73	2 Hours

216 **FORM FACTOR #216** — Donald H. Stork — UNIV. OF CALIFORNIA, LOS ANGELES, FERMILAB, JINR, DUBNA (RUSSIA), NOTRE DAME UNIVERSITY, UNIVERSITY OF PITTSBURGH

BEAM: Meson Area - M1 Beam
A MEASUREMENT OF THE PION FORM FACTOR BY DIRECT PION-ELECTRON SCATTERING.

Request	25 May, 73	630 Hours
Approval	6 Aug, 73	100 Hours for testing and running at 100 GeV to assess background effects
	7 Jul, 75	600 Hours with additional 500 hours of running in M-1 beam line and encouragement to select a single high energy for measurement
Completed	1 Oct, 75	900 Hours

217 **30-INCH PI+ & P - P @ 200 #217** — Richard L. Lander — UNIV. OF CALIFORNIA, DAVIS, LAWRENCE BERKELEY LABORATORY, SLAC

BEAM: Neutrino Area - 30 in. Hadron Beam
A COMPARISON OF 100 GEV AND 200 GEV PI+ - P INTERACTIONS.

Request	29 May, 73	50 K Pix
Approval	6 Aug, 73	50 K Pix
Completed	15 May, 74	85 K Pix

218 **30-INCH PI- - D @ 200 #218** — Philip Marvin Yager — UNIV. OF CALIFORNIA, DAVIS, INP, KRAKOW (POLAND), WARSAW UNIVERSITY, INP, (POLAND), UNIVERSITY OF WASHINGTON

BEAM: Neutrino Area - 30 in. Hadron Beam
PION-DEUTERON INTERACTIONS AT 200 GEV/C.

Request	29 May, 73	50 K Pix
Approval	21 Mar, 74	50 K Pix in bare chamber with downstream chamber data if it can be arranged
Completed	18 Sep, 74	72 K Pix

221 **PROTON-PROTON INELASTIC #221** — Paolo Franzini — COLUMBIA UNIVERSITY, SUNY AT STONY BROOK

BEAM: Internal Target Area (C-0)
P - P INELASTIC SCATTERING IN THE DIFFRACTIVE REGION.
(Continuation of experiment #14A.)

Request	8 Jun, 73	400 Hours including 200 hours of setup and tuning
Approval	6 Aug, 73	400 Hours
Completed	5 Sep, 74	950 Hours

226 **K ZERO CHARGE RADIUS #226** — Valentine L. Telegdi — UNIVERSITY OF CHICAGO
BEAM: Meson Area - M4 Beam — LHE, ETH HONGGERBERG (SWITZERLAND)
COHERENT K-SHORT REGENERATION BY ELECTRONS. — UNIVERSITY OF WISCONSIN - MADISON

Request	12 Jun, 73	720 Hours
	15 Nov, 74	2,100 Hours total for Phase 1, 500 hours in M4 line; and Phase 2, 1600 hours in M3 line
Approval	22 Nov, 74	500 Hours
	30 Jun, 76	600 Hours with a total of 800 hours approved for the combination of E-486 and E-226
Completed	17 Mar, 77	1,200 Hours

228 **30-INCH PI+ & P - P @ 60 #228** — Thomas Ferbel — UNIVERSITY OF MICHIGAN - ANN ARBOR
BEAM: Neutrino Area - 30 in. Hadron Beam — UNIVERSITY OF ROCHESTER
PROPOSAL TO EXTEND THE ENERGY RANGE OF A STUDY OF MULTIPARTICLE PRODUCTION IN P - P COLLISIONS.
(Request for the remaining pictures for exp #252 to be with a momentum of 60 GeV/c.)

Request	16 Jun, 73	25 K Pix
	20 Feb, 74	35 K Pix total with a pi/p ratio of 5/3
Approval	6 Aug, 73	25 K Pix in bare chamber with tagged beam
	14 Mar, 74	35 K Pix including additional 10K pix and a pi/p ratio of about 5/3
Completed	15 Apr, 74	37 K Pix

229 **DETECTOR DEVELOPMENT #229** — Luke C. L. Yuan — BROOKHAVEN NATIONAL LABORATORY
BEAM: Meson Area - M1 Beam
A PROPOSAL FOR TESTING A TRANSITION RADIATION DETECTOR AT NAL.

Request	19 Jun, 73	100 Hours
Approval	23 Aug, 73	Parasitic Running for about 200 hours
Completed	16 Nov, 74	300 Hours

230 **MULTIGAMMA #230** — Michael J. Longo — UNIVERSITY OF MICHIGAN - ANN ARBOR
BEAM: Meson Area - M3 Beam
A SEARCH FOR "SCHEIN EVENTS" AND EVENTS WITH A HIGH MULTIPLICITY OF GAMMAS.

Request	25 Jun, 73	40 Hours
Approval	6 Aug, 73	40 Hours with restriction that wide gap chambers will not cause any interference with other experiments in the area
Completed	24 Apr, 74	50 Hours

232 **EMULSION/PROTONS @ 300 #232** — David T. King — UNIVERSITY OF TENNESSEE, KNOXVILLE
BEAM: Neutrino Area - Miscellaneous
400-GEV PROTONS ON COMPLEX NUCLEI.

Request	6 Jul, 73	Emulsion Exposure
Approval	16 Aug, 73	Emulsion Exposure
Completed	20 Oct, 73	2 Stack(s)

233 **EMULSION/PROTONS @ 300 #233** — Jacques D. Hebert — UNIVERSITY OF BARCELONA (SPAIN)
BEAM: Neutrino Area - Miscellaneous — UNIVERSITY OF BELGRADE(YUGOSLAVIA)
300 GEV (AND 400 GEV) PROTON INTERACTIONS IN NUCLEAR EMULSION. — IAP, BUCHAREST (ROMANIA)
CRN, STRASBOURG (FRANCE)

Request	16 Jul, 73	Emulsion Exposure
Approval	16 Aug, 73	Emulsion Exposure
Completed	20 Oct, 73	8 Stack(s)

FERMILAB
UNIVERSITY OF LUND (SWEDEN)
MCGILL UNIVERSITY (CANADA)
UNIVERSITY OF NANCY (FRANCE)
UNIVERSITY OF OTTAWA (CANADA)
UNIV. OF PARIS VI, LPG (FRANCE)
UNIVERSITY OF QUEBEC (CANADA)
LRC, LYON (FRANCE)
INFN, ROME (ITALY)
IFC, VALENCIA (SPAIN)

234 **15-FOOT ENGINEERING RUN #234** — Fred Russell Huson — FERMILAB
BEAM: Neutrino Area - 15 ft. Hadron Beam — FLORIDA STATE UNIVERSITY
AN ENGINEERING RUN FOR THE NAL 15-FOOT CRYOGENIC BUBBLE CHAMBER.

Request	1 Aug, 73	50 K Pix
Approval	6 Aug, 73	50 K Pix
Completed	5 Nov, 74	57 K Pix of pi- - p interactions at 250 GeV/c

236A **HADRON JETS #236A** — Paul M. Mockett — FERMILAB
BEAM: Meson Area - M1 Beam — TUFTS UNIVERSITY
A PROPOSAL TO EXPLORE THE LARGE-PT DOMAIN: INCLUSIVE CROSS SECTIONS AND POSSIBLE JET STRUCTURE. — UNIVERSITY OF WASHINGTON

Request	13 Aug, 73	550 Hours for tests and data
	16 Dec, 76	1,150 Hours including an additional 400 hours for data and 200 hours for tests
Approval	22 Jan, 74	550 Hours
	1 Apr, 77	1,150 Hours including additional 600 hours to complete experiment during a six week running period
Completed	20 Jul, 77	1,700 Hours

237 **EMULSION/PROTONS @ 300 #237** — Jere J. Lord — UNIVERSITY OF WASHINGTON
BEAM: Neutrino Area - Miscellaneous
EMULSION EXPOSURE TO 300 GEV PROTONS.

Request	14 Aug, 73	Emulsion Exposure
Approval	11 Sep, 73	Emulsion Exposure
Completed	10 Jun, 75	5 Stack(s)

238 **EMULSION/PROTONS @ 400 #238** — Jere J. Lord — UNIVERSITY OF WASHINGTON
BEAM: Neutrino Area - Miscellaneous
EMULSION EXPOSURE TO 400 GEV PROTONS.

Request	14 Aug, 73	Emulsion Exposure
Approval	12 Mar, 74	Emulsion Exposure
Completed	9 Dec, 75	9 Stack(s)

239 **LONG-LIVED PARTICLES #239** — William Frati — FERMILAB, UNIVERSITY OF PENNSYLVANIA

BEAM: Neutrino Area - Miscellaneous
PROPOSAL FOR A FURTHER SEARCH FOR LONG LIVED PARTICLES AT NAL.
(With a Cerenkov counter looking at the neutrino target from the 90 degree monitor pipe.)

Request	15 Jul, 73	Parasitic Running
Approval	6 Dec, 73	Parasitic Running
Completed	3 Feb, 74	350 Hours

242 **EMULSION/PROTONS @ 300 #242** — Kiyoshi Niu — AICHI UNIV. OF EDUCATION (JAPAN), NAGOYA UNIVERSITY (JAPAN), YOKOHAMA NATIONAL UNIV. (JAPAN)

BEAM: Neutrino Area - Miscellaneous
STUDY OF SECONDARY PARTICLES PRODUCED BY 300 GEV PROTONS IN EMULSION CHAMBERS.

Request	28 Sep, 73	Emulsion Exposure
Approval	22 Nov, 73	Emulsion Exposure
Completed	20 Oct, 73	2 Stack(s)

243 **EMULSION/PROTONS @ 400 #243** — Kiyoshi Niu — AICHI UNIV. OF EDUCATION (JAPAN), KONAN UNIVERSITY (JAPAN), NAGOYA UNIVERSITY (JAPAN), YOKOHAMA NATIONAL UNIV. (JAPAN)

BEAM: Neutrino Area - Miscellaneous
STUDY OF SECONDARY PARTICLES PRODUCED BY 400 GEV PROTONS IN EMULSION CHAMBERS.

Request	28 Sep, 73	Emulsion Exposure
Approval	12 Mar, 74	Emulsion Exposure
Completed	9 Dec, 75	7 Stack(s)

244 **EMULSION/PROTONS @ 300 #244** — Piyare L. Jain — SUNY AT BUFFALO

BEAM: Neutrino Area - Miscellaneous
INTERACTION OF 300 GEV PROTONS IN NUCLEAR EMULSION.

Request	1 Oct, 73	Emulsion Exposure
Approval	22 Nov, 73	Emulsion Exposure
Completed	20 Oct, 73	1 Stack(s)

245 **EMULSION/PROTONS @ 400 #245** — Piyare L. Jain — SUNY AT BUFFALO

BEAM: Neutrino Area - Miscellaneous
INTERACTION OF 400 GEV PROTONS IN NUCLEAR EMULSION.

Request	1 Oct, 73	Emulsion Exposure
Approval	3 Mar, 74	Emulsion Exposure
Completed	9 Dec, 75	1 Stack(s)

247 **PARTICLE SEARCH #247** — Eric H. S. Burhop — UNIV. COLLEGE DUBLIN (IRELAND), FERMILAB, UNIVERSITY OF LIBRE (BELGIUM), LONDON UNIVERSITY COLLEGE(ENGLAND), INFN, ROME (ITALY), UNIVERSITY OF STRASBOURG (FRANCE)

BEAM: Neutrino Area - Wide Band Horn
A PROPOSED EXPERIMENT TO SEARCH FOR HEAVY LEPTONS.
(Using a hybrid emulsion-spark chamber arrangement.)

Request	21 Sep, 73	1,000 Hours with request for a bombardment of 2 x 10 to the 18th protons
Approval	2 Oct, 73	Unspecified but with expectation of test running for feasibility studies
	26 Mar, 75	1,000 Hours with formal approval for 2 x 10 to the 18th protons subject to the condition that running is compatible with exp# 310 and the 15-ft bubble chamber program
	11 Mar, 76	1,000 Hours with formal approval for 2 x 10 to the 18th protons and high priority
Completed	18 May, 76	350 Hours

248 **NEUTRON ELASTIC SCATTERING #248** — Michael J. Longo — UNIVERSITY OF MICHIGAN - ANN ARBOR

BEAM: Meson Area - M3 Beam
NEUTRON-PROTON DIFFRACTION SCATTERING UP TO 300 GEV.
(Differential cross sections with t from 0.1 to 3.5; formerly referred to as exp #4II.)

Request	15 May, 70	700 Hours as an estimate
Approval	1 Aug, 70	400 Hours
Completed	10 Dec, 76	2,400 Hours

249 **EMULSION/PROTONS @ 400 #249** — Wladyslaw Wolter — INP, KRAKOW (POLAND)

BEAM: Neutrino Area - Miscellaneous
CRACOW EMULSION EXPOSURE TO 400 GEV PROTONS.

Request	8 Oct, 73	Emulsion Exposure
Approval	12 Mar, 74	Emulsion Exposure
Completed	9 Dec, 75	3 Stack(s)

250 **EMULSION/PROTONS @ 300 #250** — Osamu Kusumoto — KINKI UNIVERSITY (JAPAN), KOBE UNIVERSITY (JAPAN), OSAKA CITY UNIVERSITY (JAPAN), OSAKA SCIENCE EDUC. INST. (JAPAN), WAKAYAMA MEDICAL COLLEGE (JAPAN)

BEAM: Neutrino Area - Miscellaneous
PHENOMENOLOGICAL STUDY OF PROTON-NUCLEUS COLLISION AT NAL ENERGIES IN EMULSION (300 GEV).

Request	10 Oct, 73	Emulsion Exposure
Approval	22 Nov, 73	Emulsion Exposure
Completed	20 Oct, 73	1 Stack(s)

251 **EMULSION/PROTONS @ 400 #251** — Osamu Kusumoto — KINKI UNIVERSITY (JAPAN), KOBE UNIVERSITY (JAPAN), OSAKA CITY UNIVERSITY (JAPAN), OSAKA SCIENCE EDUC. INST. (JAPAN), WAKAYAMA MEDICAL COLLEGE (JAPAN)

BEAM: Neutrino Area - Miscellaneous
PHENOMENOLOGICAL STUDY OF PROTON-NUCLEUS COLLISION AT NAL ENERGIES IN EMULSION (400 GEV).

Request	10 Oct, 73	Emulsion Exposure
Approval	22 Oct, 73	Emulsion Exposure
Completed	9 Dec, 75	3 Stack(s)

252 **30-INCH P-P @ 100 #252** — Thomas Ferbel — UNIVERSITY OF MICHIGAN - ANN ARBOR, UNIVERSITY OF ROCHESTER

BEAM: Neutrino Area - 30 in. Hadron Beam
STUDY OF MULTIPARTICLE PRODUCTION IN A 30-INCH BUBBLE CHAMBER.
(Formerly known as experiment #138I.)

Request	10 May, 71	240 K Pix
Approval	26 Aug, 71	50 K Pix in bare chamber with events where there is downstream spark chamber data to be shared with exp #2B
Completed	6 Dec, 72	33 K Pix

253 **NEUTRINO #253** — Luke W. Mo — IHEP, BEIJING (PRC); UNIVERSITY OF MARYLAND; NATIONAL SCIENCE FOUNDATION; UNIVERSITY OF OXFORD (ENGLAND); VIRGINIA TECH

BEAM: Neutrino Area - Wide Band Horn
NEUTRINO-ELECTRON SCATTERING AT NAL.

Request	15 Oct, 73	Parasitic Running expected to total 1,000 hours
Approval	7 Jul, 75	Parasitic Running
Completed	7 Mar, 79	2,050 Hours

254 **NEUTRINO #254** — George R. Kalbfleisch — BROOKHAVEN NATIONAL LABORATORY; CALIFORNIA INSTITUTE OF TECHNOLOGY; FERMILAB; PURDUE UNIVERSITY

BEAM: Neutrino Area - Dichromatic
PROPOSAL TO SEARCH FOR A SECOND MUON NEUTRINO.
(Dichromatic beam incident on target calorimeter with muon spectrometer of exp #21A; muon monitoring instrumentation will be added.)

Request	17 Oct, 73	300 Hours with total flux of 3 x 10 to the 17th protons
Approval	22 Nov, 74	300 Hours with a formal approval for 3 x 10 to the 17th protons and the hope that running can be coordinated with exp# 21
Completed	15 Oct, 75	550 Hours

255 **EMULSION/MUONS @ 150 #255** — Piyare L. Jain — SUNY AT BUFFALO

BEAM: Neutrino Area - Miscellaneous
EXPOSURE OF NUCLEAR EMULSIONS TO A BEAM OF 150 GEV MUONS AT THE NATIONAL ACCELERATOR LABORATORY.

Request	15 Oct, 73	Emulsion Exposure
Approval	22 Oct, 73	Emulsion Exposure
Completed	16 Oct, 73	1 Stack(s)

258 **PION INCLUSIVE #258** — Melvyn Jay Shochet — UNIVERSITY OF CHICAGO; PRINCETON UNIVERSITY

BEAM: Proton Area - West
A PROPOSAL TO MEASURE PARTICLES PRODUCED AT HIGH TRANSVERSE MOMENTUM BY PIONS.

Request	22 Oct, 73	Unspecified
Approval	26 Jun, 74	800 Hours contingent upon development of a suitable beam
Completed	9 Jul, 79	1,500 Hours

260 **HADRON JETS #260** — Donald W. McLeod — CALIFORNIA INSTITUTE OF TECHNOLOGY; UNIV. OF CALIFORNIA, LOS ANGELES; FERMILAB; UNIV. OF ILLINOIS, CHICAGO CIRCLE; INDIANA UNIVERSITY; MAX-PLANCK INSTITUTE (GERMANY)

BEAM: Meson Area - M6 Beam
A PROPOSAL TO STUDY HIGH PT PHYSICS WITH A MULTIPARTICLE SPECTROMETER.

Request	26 Oct, 73	650 Hours
	9 Aug, 76	1,150 Hours including an extension of 500 hours to complete the experiment
Approval	16 Nov, 73	200 Hours to come out of the 800 hours previously approved for exp# 110A
	13 Aug, 76	950 Hours for data including an additional 750 hours with the understanding that the commitment to the experiment is to be complete before a shutdown in September 1976
Completed	20 Sep, 76	2,300 Hours

261 **DETECTOR DEVELOPMENT #261** — Ching Lin Wang — BROOKHAVEN NATIONAL LABORATORY; FERMILAB

BEAM: Meson Area - M1 Beam
PROPOSAL TO TEST TRANSITION COUNTERS AT NAL.

Request	26 Oct, 73	Parasitic Running expected to total 200 hours
Approval	17 Jan, 74	Parasitic Running for about 200 hours
Completed	20 Nov, 74	600 Hours

262 **NEUTRINO #262** — Barry C. Barish — CALIFORNIA INSTITUTE OF TECHNOLOGY; FERMILAB

BEAM: Neutrino Area - Dichromatic
NEUTRAL CURRENT INVESTIGATION AT NAL.
(Using the Dichromatic beam, target calorimeter, and spectrometer of exp. #21A.)

Request	28 Oct, 73	300 Hours to include 3 x 10 to the 17th protons
Approval	16 Nov, 73	300 Hours with understanding that this will include 3 x 10 to the 17th protons
Completed	20 Mar, 74	400 Hours

264 **EMULSION/PI- @ 200 #264** — Poh Shien Young — MISSISSIPPI STATE UNIVERSITY; UNIVERSITY OF TENNESSEE, KNOXVILLE

BEAM: Neutrino Area - Miscellaneous
EXPOSURE OF EMULSIONS TO 200-300 GEV PI- FOR NEW DETERMINATION OF MEAN LIFE OF PI ZERO.

Request	31 Oct, 73	Emulsion Exposure
Approval	12 Mar, 74	Emulsion Exposure
Completed	7 Oct, 74	2 Stack(s)

265 **EMULSION/PROTONS @ 400 #265** — Poh Shien Young — CRFC, CAMBRIDGE; MISSISSIPPI STATE UNIVERSITY

BEAM: Neutrino Area - Miscellaneous
EXPOSURE OF EMULSIONS TO 400 GEV PROTONS FOR NEW DETERMINATION OF MEAN LIFE OF PI ZERO.

Request	31 Oct, 73	Emulsion Exposure
Approval	12 Mar, 74	Emulsion Exposure
Completed	9 Dec, 75	3 Stack(s)

268 **INCLUSIVE PHOTON #268** — Joel Mellema — BROOKHAVEN NATIONAL LABORATORY; CALIFORNIA INSTITUTE OF TECHNOLOGY; LAWRENCE BERKELEY LABORATORY

BEAM: Meson Area - M2 Beam
A PROPOSAL TO STUDY MESON PRODUCTION AT LARGE P- TRANSVERSE WITH A GAMMA RAY DETECTOR.
(Induced by protons @ 300 GeV and by pi+- @ 100 and 200 GeV; using photon detector of exp #111.)

Request	5 Nov, 73	900 Hours	total with an initial run of 500 hours
	3 Nov, 75	1,200 Hours	including a three-week extension
Approval	21 Mar, 74	100 Hours	of running in diffracted proton beam to demonstrate feasibility
	26 Jun, 74	100 Hours	with formal approval for parasitic running using a pion beam in front of exp# 51
	22 Nov, 74	600 Hours	including an additional 500 hours of running in a pion beam
	10 Nov, 75	900 Hours	including an additional three week run to obtain data at a forward angle with a 200 GeV beam
Completed	11 Feb, 76	1,850 Hours	

271 **EMULSION/PROTONS @ 200 #271** — Kurt Gottfried — IAP, BUCHAREST (ROMANIA); CERN (SWITZERLAND); CORNELL UNIVERSITY; UNIVERSITY OF LUND (SWEDEN)

BEAM: Neutrino Area - Miscellaneous
MULTIPARTICLE PRODUCTION IN NUCLEI BY PROTONS OF SEVERAL HUNDRED GEV.
(Using target materials consisting of fine wires imbedded in emulsion or foils covering the emulsion; 200 GeV exposure.)

Request	30 Nov, 73	Emulsion Exposure
Approval	16 Jan, 74	Emulsion Exposure
Completed	10 Jun, 75	10 Stack(s)

272 **HADRON DISSOCIATION #272** — Thomas Ferbel — BROOKHAVEN NATIONAL LABORATORY; FERMILAB; UNIVERSITY OF MINNESOTA; UNIVERSITY OF ROCHESTER

BEAM: Meson Area - M1 Beam
PROPOSAL TO MEASURE COHERENT DISSOCIATION OF PI-, K-, AND PBAR INTO TWO-BODY SYSTEMS AT FERMILAB ENERGIES.

Request	3 Dec, 73	600 Hours	
	9 Jun, 75	900 Hours	total with the additional 300 hours of data taking at 150 and 300 GeV/c incident momentum
Approval	7 Jul, 75	600 Hours	
Completed	3 Dec, 79	1,950 Hours	

275 **PLASTIC DETECTORS #275** — Wolfgang Enge — CHRISTIAN-ALBRECHTS UNIV.(GERMANY)

BEAM: Neutrino Area - Miscellaneous
EXPOSURE OF PLASTIC-DETECTOR STACKS TO A 300 GEV PROTON BEAM AT NAL.

Request	17 Dec, 73	Detector Exposure
Approval	20 Oct, 73	Detector Exposure
Completed	20 Oct, 73	4 Stack(s)

276 **QUARK #276** — Andreas Van Ginneken — ARGONNE NATIONAL LABORATORY; UNIVERSITY OF CHICAGO; FERMILAB

BEAM: Neutrino Area - Miscellaneous
A SEARCH FOR STABLE INTEGRALLY CHARGED MASSIVE PARTICLES (HAN-NAMBU QUARKS).
(Mass spectroscopic analysis of irradiated target.)

Request	25 Jan, 74	Target Exposure(s)
Approval	8 Jul, 74	Target Exposure(s)
	30 Aug, 76	Target Exposure(s) with different chemicals and re-exposure of two previous samples
Completed	2 Nov, 75	3 Targets Exposed

279 **EMULSION/PROTONS @ 400 #279** — David T. King — UNIVERSITY OF TENNESSEE, KNOXVILLE

BEAM: Neutrino Area - Miscellaneous
THE INTERACTION OF PA=PAE+E- AT 400 GEV.

Request	28 Jan, 74	Emulsion Exposure
Approval	12 Mar, 74	Emulsion Exposure
Completed	9 Dec, 75	3 Stack(s)

280 **30-INCH P - D @ 200 #280** — Thomas H. Fields — ARGONNE NATIONAL LABORATORY; CIPP (CANADA); JINR, DUBNA (RUSSIA); MOSCOW STATE UNIVERSITY (RUSSIA)

BEAM: Neutrino Area - 30 in. Hadron Beam
PROPOSAL TO STUDY P - D INTERACTIONS AT 205 GEV/C IN THE 30-INCH BUBBLE CHAMBER.

Request	1 Feb, 74	100 K Pix	
Approval	21 Mar, 74	100 K Pix	in bare chamber with downstream chamber data if it can be arranged
Completed	11 Oct, 75	103 K Pix	

281 **30-INCH HYBRID #281** — Gerald A. Smith — IOWA STATE UNIVERSITY; UNIVERSITY OF MARYLAND; MICHIGAN STATE UNIVERSITY; NOTRE DAME UNIVERSITY

BEAM: Neutrino Area - 30 in. Hadron Beam
PROPOSAL TO STUDY HIGH ENERGY PROTON-PROTON AND PI-MINUS PROTON INTERACTIONS WITH THE NAL 30-INCH BUBBLE CHAMBER-WIDE GAP SPARK CHAMBER HYBRID SYSTEM.

Request	1 Feb, 74	400 K Pix	including 200K pix of p - p 300 GeV and 200K pix of pi- - p at highest momentum
	25 Sep, 74	700 K Pix	total including 300K pix of p - p @ 300 GeV, 100K pix of pi- - p @ 100 GeV, and 300K pix of pi- - p @ 375 GeV
Approval	22 Nov, 74	300 K Pix	in a combination of pi- and p bombardments at an energy greater than or equal to 300 GeV and with the understanding that following this run work with the wide gap chamber system will be terminated
Completed	28 Sep, 75	301 K Pix	of pi- - p interactions at 360 GeV/c

284 **PARTICLE PRODUCTION #284** — James K. Walker — FERMILAB; NORTHEASTERN UNIVERSITY; NORTHERN ILLINOIS UNIVERSITY

BEAM: Proton Area - West
SURVEY OF PARTICLE PRODUCTION IN PROTON COLLISIONS AT NAL.
(Continuation of work begun in exp #63A.)

Request	19 Feb, 74	Unspecified	
Approval	26 Jun, 74	750 Hours	divided roughly as 150 hours for setup and testing and 150 hours each at the four energies of 100, 200, 300, and 400 GeV
Completed	3 Oct, 76	1,150 Hours	

285 **SUPER-HEAVY ELEMENTS #285** — Leon M. Lederman — COLUMBIA UNIVERSITY
FERMILAB

BEAM: Neutrino Area - Miscellaneous
A SEARCH FOR A NEW STATE OF MATTER IN THE ANALYSIS OF AN NAL BEAM DUMP.

Request	21 Feb, 74	Target Exposure(s)
Approval	27 Feb, 74	Target Exposure(s)
Completed	2 Aug, 76	3 Targets Exposed

288 **DI-LEPTON #288** — Leon M. Lederman — COLUMBIA UNIVERSITY
FERMILAB
SUNY AT STONY BROOK

BEAM: Proton Area - Center
A STUDY OF DI-LEPTON PRODUCTION IN PROTON COLLISIONS AT NAL.
(Formerly known as exp #70 III.)

Request	21 Feb, 74	Unspecified
	10 May, 76	1,500 Hours additional for mu-mu II
	10 Nov, 77	4,500 Hours with a request for an additional 3,000 hours for high intensity and high resolution studies
Approval	18 Jan, 74	1,000 Hours
	17 Nov, 76	2,500 Hours with additional 1,500 hours not to extend beyond 1 Sep 1977
	16 Nov, 77	5,500 Hours with an extension of about 3,000 hours until August 1978, and with a request for a progress report in May 1978
Completed	23 Jul, 78	6,850 Hours

289 **PROTON-HELIUM SCATTERING #289** — Ernest I. Malamud — UNIVERSITY OF ARIZONA
FERMILAB
JINR, DUBNA (RUSSIA)

BEAM: Internal Target Area (C-0)
SMALL ANGLE PROTON-HELIUM ELASTIC AND INELASTIC SCATTERING FROM 8 TO 500 GEV.
(Using an internal proton beam with a gas jet target.)

Request	1 Mar, 74	700 Hours
Approval	22 Mar, 74	700 Hours conditional upon successful development of the helium jet technique
Completed	8 Nov, 77	1,050 Hours

290 **BACKWARD SCATTERING #290** — Winslow F. Baker — UNIVERSITY OF ARIZONA
FERMILAB

BEAM: Meson Area - M6 Beam
BACKWARD PION-PROTON ELASTIC SCATTERING.
(For u from 0 - 0.8.)

Request	6 Mar, 74	1,100 Hours including 200 hours for testing
Approval	22 Nov, 74	900 Hours
Completed	31 Jul, 78	1,500 Hours

292 **EMULSION/PROTONS @ 400 #292** — Kurt Gottfried — IAP, BUCHAREST (ROMANIA)
CERN (SWITZERLAND)
CORNELL UNIVERSITY
UNIVERSITY OF LUND (SWEDEN)

BEAM: Neutrino Area - Miscellaneous
MULTIPARTICLE PRODUCTION IN NUCLEI BY PROTONS OF SEVERAL HUNDRED GEV.
(Using target materials consisting of fine wires imbedded in emulsion or foils covering the emulsion; 400 GeV exposure.)

Request	30 Nov, 73	Emulsion Exposure
Approval	16 Jan, 74	Emulsion Exposure
Completed	9 Dec, 75	12 Stack(s)

295 **30-INCH PI+ & P - D @ 200 #295** — Gideon Yekutieli — CRN, STRASBOURG (FRANCE)
FERMILAB
WEIZMANN INSTITUTE (ISRAEL)

BEAM: Neutrino Area - 30 in. Hadron Beam
A STUDY OF PI+ - D INTERACTIONS AT 200 GEV/C IN THE 30-INCH BUBBLE CHAMBER AT NAL.

Request	15 Mar, 74	50 K Pix of p - d @ 205 GeV
	14 Aug, 74	150 K Pix total including an additional 50K pix due to decreased yield of pi+ - d events
Approval	21 Mar, 74	100 K Pix in bare chamber with downstream chamber data if it can be arranged; and with request that interest be switched from p - d to pi+ - d bombardment
	27 Aug, 74	150 K Pix with additional 50K pix to yield the requested number of pi+ - d
Completed	2 Nov, 75	156 K Pix

297 **QUARK #297** — Lawrence B. Leipuner — BROOKHAVEN NATIONAL LABORATORY

BEAM: Neutrino Area - 30 in. Hadron Beam
QUARK SEARCH USING 400-500 GEV PROTONS.
(By measuring ionization energy loss.)

Request	15 Apr, 74	24 Hours with beam of 5 x 10 to the 4th particles/pulse and a 200 msec spill
Approval	15 May, 74	24 Hours
Completed	10 Jul, 74	50 Hours

299 **30-INCH HYBRID #299** — Irwin A. Pless — BROWN UNIVERSITY
UNIVERSITY OF CAMBRIDGE (ENGLAND)
FERMILAB
ILLINOIS INSTITUTE OF TECHNOLOGY
UNIVERSITY OF ILLINOIS, CHAMPAIGN
INDIANA UNIVERSITY
JOHNS HOPKINS UNIVERSITY
UNIVERSITY OF L'ETAT (BELGIUM)
MASSACHUSETTS INST. OF TECHNOLOGY
SUNY AT ALBANY
NIJMEGEN UNIVERSITY (NETHERLANDS)
OAK RIDGE NATIONAL LABORATORY
RUTGERS UNIVERSITY
STEVENS INSTITUTE OF TECHNOLOGY
UNIVERSITY OF TENNESSEE, KNOXVILLE
YALE UNIVERSITY

BEAM: Neutrino Area - 30 in. Hadron Beam
PRECISION STUDY OF HIGH ENERGY COLLISIONS INDUCED BY INCIDENT 150 GEV/C PIONS AND PROTONS.
(Using the downstream PWC hybrid system.)

Request	16 May, 74	1,200 K Pix at 150 GeV equally split between study of p - p, pi- - p, and pi+ - p interactions
Approval	22 Nov, 74	600 K Pix of pi- - p, p - p, and pi+ - p interactions at 150 GeV/c
	6 Aug, 76	500 K Pix to be pi+ - p @ 150 GeV/c in 30-inch bubble chamber with PWC hybrid system and with 100K pix of pi- - p now included in approval for exp# 393
	28 Oct, 76	660 K Pix with additional 160K pix from a collaboration with proposal #375 to provide an overall package of 500K pix to be taken in an enriched K+ mode; 160K pix already taken at this time
Completed	22 Nov, 76	431 K Pix with 229K pix remaining to be taken under earlier approval when declared complete on 29 Jun 1977

300 PARTICLE SEARCH #300 — Pierre A. Piroue — UNIVERSITY OF CHICAGO; PRINCETON UNIVERSITY

BEAM: Proton Area - East

STUDY OF PARTICLE PRODUCTION AT HIGH TRANSVERSE MOMENTA USING HYDROGEN AND DEUTERIUM TARGETS.

Request	16 May, 74	1,200 Hours	with a liquid hydrogen/deuterium target and at beam energies of 200, 300, 400, and 500 GeV
Approval	26 Jun, 74	600 Hours	with hydrogen target
Completed	24 Apr, 76	750 Hours	

305 NEUTRON DISSOCIATION #305 — Bruno Gobbi — FERMILAB; NORTHWESTERN UNIVERSITY; UNIVERSITY OF ROCHESTER; SLAC

BEAM: Meson Area - M3 Beam

PROPOSAL TO STUDY THE COHERENT DISSOCIATION OF NEUTRONS.

(A continuation of work begun in exp #27A.)

Request	22 May, 74	1,200 Hours	total to include one month of running every four months through calendar 1975
Approval	26 Jun, 74	900 Hours	without approval for the installation of the transmission target for H2 and D2 cross section measurements
	16 Dec, 74	1,200 Hours	with additional 300 hours for particle search
Completed	14 Apr, 75	1,400 Hours	

310 NEUTRINO #310 — David B. Cline — FERMILAB; HARVARD UNIVERSITY; UNIVERSITY OF PENNSYLVANIA; RUTGERS UNIVERSITY; UNIVERSITY OF WISCONSIN - MADISON

BEAM: Neutrino Area - Wide Band Horn

FURTHER STUDY OF HIGH ENERGY NEUTRINO INTERACTIONS AT FERMILAB.

Request	4 Jun, 74	Unspecified	
	1 Feb, 78	1,200 Hours	to include 2 x 10 to the 18th protons on target with the Wide Band Horn system focused for negatives without a plug and 2 x 10 to the 18th for positives
Approval	22 Nov, 74	1,000 Hours	with a formal approval for 2 x 10 to the 18th protons and the understanding that use will be made of a horn focusing system
	17 Nov, 76	1,000 Hours	to also include running with the Quadrupole Triplet train for an exposure of 1 x 10 to the 18th protons during December 1976
	15 Mar, 77	2,500 Hours	with formal additional approval as follows--1 - 2 x 10 to the 18th protons using the sign-selected-bare-target train understood to focus antineutrinos, and 2 x 10 to the 18th protons using the Quadrupole Triplet train load
	21 Mar, 78	3,500 Hours	with additional approval for a final run to complete the experiment during wide-band horn running for the 15-ft bubble chamber
Completed	31 Aug, 78	3,800 Hours	at the request of the experimenters, because it was felt that the conditions required to properly continue the experiment could not be met.

311 30-INCH PBAR - P @ 100 #311 — William W. Neale — UNIVERSITY OF CAMBRIDGE (ENGLAND); FERMILAB; MICHIGAN STATE UNIVERSITY

BEAM: Neutrino Area - 30 in. Hadron Beam

PROPOSAL TO STUDY MULTIPARTICLE PRODUCTION IN HIGH ENERGY ANTIPROTON-PROTON INTERACTIONS WITH THE FERMILAB 30-INCH BUBBLE CHAMBER.

Request	6 Jun, 74	100 K Pix	with equal numbers of pbar and pi-
Approval	26 Jun, 74	100 K Pix	to be obtained with not more than 200K pulses of the chamber
Completed	27 Jan, 75	98 K Pix	

313 PROTON-PROTON POLARIZATION #313 — Homer A. Neal — INDIANA UNIVERSITY

BEAM: Internal Target Area (C-0)

POLARIZATION IN P - P ELASTIC, INELASTIC AND INCLUSIVE REACTIONS AT FERMILAB ENERGIES.

(Using a gas jet target with hydrogen, the internal proton beam, the spectrometer of exp #198A, and a new carbon polarimeter.)

Request	5 Jun, 74	1,500 Hours	total with two jet pulses per cycle
Approval	26 Jun, 74	1,000 Hours	with about 800 hours of running on polarization in elastic scattering and about 200 hours of running to observe polarization in inelastic channels
	15 Mar, 77	1,000 Hours	with encouragement to use some of the remaining running to accumulate further data on polarization in inelastic processes; see proposal #522
Completed	30 Mar, 77	850 Hours	with some approved running remaining; see exp #522

317 PROTON-NUCLEON INELASTIC #317 — Rodney L. Cool — UNIVERSITY OF ARIZONA; FERMILAB; JINR, DUBNA (RUSSIA); UNIVERSITY OF ROCHESTER; ROCKEFELLER UNIVERSITY

BEAM: Internal Target Area (C-0)

PROTON DIFFRACTION DISSOCIATION ON HYDROGEN AND DEUTERIUM.

(Using the gas jet target and internal proton beam.)

Request	7 Jun, 74	800 Hours	for tests and data taking
Approval	3 Jul, 74	800 Hours	using gas jet with running to be interleaved with exp# 321
Completed	1 Nov, 75	1,400 Hours	

319 MUON #319 — K. Wendell Chen — FERMILAB; MICHIGAN STATE UNIVERSITY

BEAM: Neutrino Area - Muon/Hadron Beam

FURTHER TEST OF SCALING AT HIGH MOMENTUM TRANSFERS IN DEEP INELASTIC MUON SCATTERING.

(A continued exploration of the studies begun in exp #26.)

Request	10 Jun, 74	1,100 Hours	
Approval	26 Mar, 75	500 Hours	for a scaling test at high energies
Completed	20 Sep, 76	900 Hours	

320 NEUTRINO #320 — Frank J. Sciulli — CALIFORNIA INSTITUTE OF TECHNOLOGY; FERMILAB

BEAM: Neutrino Area - Dichromatic

PROPOSAL TO MEASURE NEUTRAL CURRENT CROSS-SECTIONS AND ASSOCIATED INELASTIC DISTRIBUTIONS IN THE NARROW-BAND BEAM.

Request	10 Jun, 74	1,200 Hours	with request of 3 x 10 to the 18th protons total and initial run of 1 x 10 to the 18th protons for investigation
Approval	26 Jun, 74	500 Hours	with a formal approval for 1 x 10 to the 18th protons pending a positive finding of neutral currents and with the inclination to assign higher priority for running to exp# 320 than to completion of exp# 21
Completed	1 Oct, 74	500 Hours	

321 **PROTON-PROTON INELASTIC #321** — Juliet Lee-Franzini — COLUMBIA UNIVERSITY, SUNY AT STONY BROOK

BEAM: Internal Target Area (C-0)
A HIGH PRECISION EXPERIMENT TO MEASURE THE INELASTIC P - P CROSS SECTION AND ITS ASSOCIATED FORWARD MULTIPLICITIES AT SMALL MOMENTUM TRANSFER.
(Using a new hydrogen gas jet target and the internal proton beam.)

Request	11 Jun, 74	2,000 Hours	total including 800 hours for testing
Approval	3 Jul, 74	800 Hours	with running to be interleaved with exp# 317 and using the existing cryogenic hydrogen jet
	26 Mar, 75	800 Hours	with approval to use a room temperature gas jet of their own design
Completed	20 Sep, 76	1,900 Hours	

324 **INCLUSIVE SCATTERING #324** — Howard L. Weisberg — UNIVERSITY OF PENNSYLVANIA

BEAM: Meson Area - M1 Beam
A PROPOSAL TO STUDY SINGLE PARTICLE INCLUSIVE SPECTRA IN HIGH ENERGY HADRON-HADRON COLLISIONS

Request	11 Apr, 74	1,000 Hours	
Approval	24 Jun, 74	500 Hours	
Completed	13 Aug, 77	1,200 Hours	

325 **PARTICLE SEARCH #325** — Pierre A. Piroue — UNIVERSITY OF CHICAGO, PRINCETON UNIVERSITY

BEAM: Proton Area - East
STUDY OF DI-MUON PRODUCTION AT HIGH TRANSVERSE MOMENTA.

Request	12 Jun, 74	Parasitic Running	
Approval	25 Nov, 74	Parasitic Running	with the stipulation that this running time will be concurrent with the previously approved 600 hours for exp# 300
	6 May, 76	600 Hours	for a portion of the program estimated to require 13 weeks and with the expectation to continue the experiment during another running period
	26 Oct, 76	1,200 Hours	during a six-week running period to begin in January 1977
Completed	28 Feb, 77	1,500 Hours	

326 **DI-MUON #326** — Melvyn Jay Shochet — UNIVERSITY OF CHICAGO, PRINCETON UNIVERSITY

BEAM: Proton Area - West
PROPOSAL TO MEASURE MUON PAIRS PRODUCED AT HIGH TRANSVERSE MOMENTUM BY PIONS.

Request	29 May, 74	Unspecified	
	7 Jul, 75	400 Hours	
	2 Feb, 77	800 Hours	to be run in conjunction with exp #258 in the P-West pion beam by adding a second arm to the exp #258 spectrometer
Approval	15 Mar, 77	800 Hours	
Completed	26 Apr, 82	2,000 Hours	

327 **DETECTOR DEVELOPMENT #327** — Wade W. M. Allison — MASSACHUSETTS INST. OF TECHNOLOGY, UNIVERSITY OF OXFORD (ENGLAND)

BEAM: Neutrino Area - Miscellaneous
PROPOSAL TO TEST PARTICLE IDENTIFICATION BY IONIZATION LOSS (ISIS).

Request	15 Jul, 74	400 Hours	
Approval	31 Jul, 74	50 Hours	
Completed	7 Feb, 75	50 Hours	

328 **EMULSION/PI- @ 200 #328** — M. I. Tretjakova — LEBEDEV PHYSICAL INST. (RUSSIA)

BEAM: Neutrino Area - Miscellaneous
PROPOSAL TO STUDY THE INTERACTIONS OF PI- MESONS IN NUCLEAR EMULSION AT THE FERMILAB ACCELERATOR.

Request	5 Aug, 74	Emulsion Exposure	
Approval	5 Aug, 74	Emulsion Exposure	
Completed	7 Oct, 74	5 Stack(s)	

329 **EMULSION/PROTONS @ 300 #329** — M. I. Tretjakova — LEBEDEV PHYSICAL INST. (RUSSIA)

BEAM: Neutrino Area - Miscellaneous
PROPOSAL TO STUDY THE INTERACTIONS OF PROTONS IN NUCLEAR EMULSION AT THE FERMILAB ACCELERATOR.

Request	5 Aug, 74	Emulsion Exposure	
Approval	3 Jun, 75	Emulsion Exposure	
Completed	10 Jun, 75	2 Stack(s)	

330 **PARTICLE SEARCH #330** — H. Richard Gustafson — UNIVERSITY OF MICHIGAN - ANN ARBOR

BEAM: Meson Area - M4 Beam
SEARCH FOR MASSIVE NEUTRAL PARTICLES.
(Using time-of-flight and a total absorption calorimeter.)

Request	6 Aug, 74	1,300 Hours	to include 800 hours for tuneup parasitic to exp #305 and 500 hours for data
Approval	22 Jan, 75	100 Hours	
Completed	7 Jul, 75	150 Hours	

331 **DI-MUON #331** — James E. Pilcher — UNIVERSITY OF CHICAGO, PRINCETON UNIVERSITY

BEAM: Neutrino Area - Muon/Hadron Beam
PROPOSAL FOR A DETAILED STUDY OF DI-MUON PRODUCTION.
(Alternative version of exps #308 & #323 designed for muon laboratory cyclotron spectrometer.)

Request	10 Aug, 74	Unspecified	
Approval	25 Nov, 74	400 Hours	for an initial run at an incident beam intensity of about 10 to the 6th particles/pulse
Completed	22 Mar, 76	1,400 Hours	

335 **MUON SEARCH #335** — Orrin D. Fackler — CALIFORNIA INSTITUTE OF TECHNOLOGY, UNIVERSITY OF CHICAGO, FERMILAB, PRINCETON UNIVERSITY, ROCKEFELLER UNIVERSITY

BEAM: Meson Area - M1 Beam
A SEARCH FOR DIRECT MUON PRODUCTION IN THE FORWARD DIRECTION.

Request	18 Aug, 74	200 Hours	total including time for tests and data
Approval	22 Nov, 74	200 Hours	provided that this running time can be arranged in such a way as not to interfere substantially with the ongoing physics program in the M1 beam line
Completed	6 Jun, 75	300 Hours	

336 **EMULSION/PROTONS @ 400 #336** — Takeshi Ogata — KWANSEI GAKUIN UNIVERSITY (JAPAN)

BEAM: Neutrino Area - Miscellaneous
MULTIPARTICLE PRODUCTION IN NUCLEON-NUCLEUS COLLISIONS AT 400 GEV.

Request	9 Sep, 74	Emulsion Exposure
Approval	19 Oct, 74	Emulsion Exposure
Completed	9 Dec, 75	2 Stack(s)

337 **DI-MUON #337** — David P. Eartly — FERMILAB; MAX-PLANCK INSTITUTE (GERMANY)

BEAM: Meson Area - Miscellaneous
MEASUREMENT OF DI-MUON EVENTS IN THE MESON AREA.

Request	20 Sep, 74	3 Hours
Approval	27 Sep, 74	3 Hours
Completed	7 Feb, 75	5 Hours

338 **30-INCH PI- - D @ 360 #338** — Keihachiro Moriyasu — UNIV. OF CALIFORNIA, DAVIS; INP, KRAKOW (POLAND); WARSAW UNIVERSITY, INP, (POLAND); UNIVERSITY OF WASHINGTON

BEAM: Neutrino Area - 30 in. Hadron Beam
PION-DEUTERON INTERACTIONS AT 400 GEV/C.

Request	21 Sep, 74	100 K Pix
Approval	24 Sep, 74	50 K Pix in bare chamber with downstream chamber data if it can be arranged
Completed	28 Aug, 76	53 K Pix

339 **EMULSION/PI- @ 200 #339** — Wladyslaw Wolter — INP, KRAKOW (POLAND)

BEAM: Neutrino Area - Miscellaneous
CRACOW EMULSION EXPOSURE TO 200 GEV PIONS.

Request	12 Sep, 74	Emulsion Exposure
Approval	1 Oct, 74	Emulsion Exposure
Completed	9 Jun, 75	4 Stack(s)

340 **EMULSION/ELECTRONS @ HI E #340** — Shoji Dake — KOBE UNIVERSITY (JAPAN); KONAN UNIVERSITY (JAPAN); SAITAMA UNIVERSITY (JAPAN); UNIVERSITY OF TOKYO (JAPAN); UTSUNOMIYA UNIVERSITY (JAPAN); WASEDA UNIVERSITY (JAPAN)

BEAM: Proton Area - Miscellaneous
STUDY OF THE ELECTRON-PHOTON CASCADE SHOWER IN LEAD ABSORBER.

Request	25 Sep, 74	Emulsion Exposure
Approval	10 Oct, 74	Emulsion Exposure
Completed	5 Oct, 76	10 Stack(s)

341 **15-FOOT P - P @ 400 #341** — Winston Ko — UNIV. OF CALIFORNIA, DAVIS; LAWRENCE BERKELEY LABORATORY

BEAM: Neutrino Area - 15 ft. Hadron Beam
INTERACTIONS OF PI+ MESONS AND PROTONS IN A HYDROGEN-NEON MIXTURE.

Request	1 Oct, 74	100 K Pix
Approval	4 Dec, 74	25 K Pix of tagged pi+ and p at 150 GeV in H2 to develop analysis techniques for 15-foot bubble chamber film
	8 Dec, 75	25 K Pix of p - p interactions at 400 GeV
Completed	21 Dec, 75	34 K Pix

343 **15-FOOT P - P @ 300 #343** — Roderich J. Engelmann — ARGONNE NATIONAL LABORATORY; UNIVERSITY OF KANSAS; SUNY AT STONY BROOK; TUFTS UNIVERSITY

BEAM: Neutrino Area - 15 ft. Hadron Beam
PROPOSAL TO STUDY NEUTRAL PARTICLE PRODUCTION IN 250 GEV P - P INTERACTIONS IN THE FERMILAB 15-FOOT BUBBLE CHAMBER.

Request	3 Oct, 74	25 K Pix
Approval	4 Dec, 74	25 K Pix
Completed	13 Jan, 76	27 K Pix

344 **30-INCH PBAR - P @ 50 #344** — Laszlo J. Gutay — CNTRL RES INST, BUDAPEST (HUNGARY); FERMILAB; PURDUE UNIVERSITY

BEAM: Neutrino Area - 30 in. Hadron Beam
PROPOSAL TO SURVEY CENTRAL COLLISIONS IN PBAR - P TO MESONS BETWEEN 30 AND 60 GEV/C IN THE 30-INCH BUBBLE CHAMBER AT FERMILAB.

Request	4 Oct, 74	100 K Pix to be taken in < 200K chamber expansions
Approval	27 Nov, 74	100 K Pix with the qualification that it must be possible to obtain these pictures in no more than one calender month of running time
Completed	1 Nov, 76	145 K Pix

345 **30-INCH PBAR - D @ 100 #345** — Gosta Ekspong — UNIVERSITY OF LIVERPOOL (ENGLAND); UNIVERSITY OF STOCKHOLM (SWEDEN); VANDERBILT UNIVERSITY

BEAM: Neutrino Area - 30 in. Hadron Beam
PROPOSAL TO STUDY MULTIPARTICLE PRODUCTION IN 100 GEV/C ANTI-PROTON-DEUTERIUM INTERACTIONS WITH THE FERMILAB 30-INCH BUBBLE CHAMBER.

Request	5 Oct, 74	100 K Pix with a Cerenkov tagged incoming beam
Approval	4 Dec, 74	100 K Pix with the qualification that serious consideration be given to the use* of the PWC downstream system
Completed	7 Sep, 76	61 K Pix with 39K pix remaing to be taken under earlier approval when declared complete on 29 Jun 1977

346 **EMULSION/PROTONS @ 400 #346** — Gosta Ekspong — UNIVERSITY OF STOCKHOLM (SWEDEN)

BEAM: Neutrino Area - Miscellaneous
SEARCH FOR HEAVY, SHORTLIVED PARTICLES.

Request	6 Oct, 74	Emulsion Exposure
Approval	21 Oct, 74	Emulsion Exposure
Completed	9 Dec, 75	1 Stack(s)

350 **INCLUSIVE NEUTRAL MESON #350** — Robert W. Kenney — BROOKHAVEN NATIONAL LABORATORY; CALIFORNIA INSTITUTE OF TECHNOLOGY; LAWRENCE BERKELEY LABORATORY

BEAM: Meson Area - M2 Beam
A PROPOSAL TO STUDY NEUTRAL PIONS AND MESON INCLUSIVE PRODUCTION WITH INCIDENT NEGATIVE PIONS IN THE TRIPLE REGGE REGION.
(Using the photon detector of exp #111.)

Request	11 Oct, 74	500 Hours
Approval	21 Nov, 74	400 Hours
	16 Dec, 74	400 Hours with up to 150 hours approved for a particle search with the condition that this time be included within the 900 hours already approved for for exps# 268 and 350
Completed	24 Feb, 77	900 Hours

356 **NEUTRINO #356** — Frank J. Sciulli — CALIFORNIA INSTITUTE OF TECHNOLOGY, FERMILAB, UNIVERSITY OF ROCHESTER, ROCKEFELLER UNIVERSITY

BEAM: Neutrino Area - Dichromatic
STUDIES OF DEEP INELASTIC DIFFERENTIAL DISTRIBUTIONS AT HIGH ENERGIES FOR NEUTRINO AND ANTI-NEUTRINO BEAMS.
(A continuation of the work begun in exp #21A with a new narrow band beam and changed apparatus.)

Request	18 Oct, 74	1,000 Hours	
Approval	22 Nov, 74	1,000 Hours	with a formal commitment of 2 x 10 to the 18th protons contingent on the feasibility of developing the improved Dichromatic beam
Completed	17 Jan, 79	1,350 Hours	

357 **PARTICLE SEARCH #357** — Donald I. Meyer — FERMILAB, UNIVERSITY OF MICHIGAN - ANN ARBOR, PURDUE UNIVERSITY

BEAM: Meson Area - M2 Beam
A PROPOSAL TO SEARCH FOR CHARMED PARTICLES AND MEASUREMENTS OF TWO-PARTICLE INCLUSIVE CROSS SECTIONS AT LARGE P-TRANSVERSE.
(Employing a two-arm magnetic spectrometer.)

Request	19 Oct, 74	2,400 Hours	
Approval	16 Dec, 74	600 Hours	
Completed	7 Jun, 76	1,700 Hours	

358 **DI-MUON #358** — Wonyong Lee — COLUMBIA UNIVERSITY, CORNELL UNIVERSITY, FERMILAB, UNIVERSITY OF HAWAII AT MANOA, UNIVERSITY OF ILLINOIS, CHAMPAIGN

BEAM: Proton Area - East
DI-MUON PRODUCTION BY NEUTRONS.

Request	20 Oct, 74	Unspecified	
Approval	27 Nov, 74	300 Hours	of neutron running to be interleaved within the 600 hours already approved for exp# 87A
Completed	1 Oct, 75	400 Hours	

361 **LAMBDA BETA-DECAY #361** — Lee G. Pondrom — UNIVERSITY OF MICHIGAN - ANN ARBOR, UNIVERSITY OF MINNESOTA, RUTGERS UNIVERSITY, UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M2 Beam
PRECISION MEASUREMENT OF LAMBDA BETA DECAY PARAMETERS.
(Will run with experimental set-up for neutral hyperon #8.)

Request	14 Nov, 74	300 Hours	
	23 Jan, 76	350 Hours	total including 150 hours in unpolarized lambda-zero beam and 200 hours in polarized lambda-zero beam
Approval	15 Nov, 77	300 Hours	
Completed	29 Oct, 79	1,250 Hours	

362 **EMULSION/PI- @ 200 #362** — Piyare L. Jain — SUNY AT BUFFALO

BEAM: Neutrino Area - Miscellaneous
INTERACTION OF 200 - 400 GEV PIONS WITH EMULSION NUCLEI.

Request	15 Nov, 74	Emulsion Exposure	
Approval	25 Nov, 74	Emulsion Exposure	
Completed	9 Jun, 75	1 Stack(s)	

363 **PARTICLE SEARCH #363** — Stephen L. Olsen — FLORIDA STATE UNIVERSITY, IMPERIAL COLLEGE (ENGLAND), UNIVERSITY OF ROCHESTER, RUTGERS UNIVERSITY

BEAM: Internal Target Area (C-0)
A PROPOSAL TO SEARCH FOR CHARMED PARTICLE PRODUCTION NEAR THRESHOLD.

Request	24 Nov, 74	Unspecified	
Approval	16 Dec, 74	500 Hours	of running with the rotating carbon filament target
Completed	9 Apr, 75	650 Hours	

365 **PARTICLE SEARCH #365** — David A. Garelick — NORTHEASTERN UNIVERSITY

BEAM: Meson Area - M2 Beam
A PROPOSAL TO SEARCH FOR THE PRODUCTION OF CHARMED MESONS IN PI - P INTERACTIONS.

Request	27 Nov, 74	200 Hours	including 40 hours for testing
Approval	31 Dec, 74	200 Hours	during a two week run with a passive, nonmagnetized steel absorber to be used in conjunction with a muon trigger
Completed	5 Feb, 75	200 Hours	

366 **PARTICLE SEARCH #366** — Maris A. Abolins — CARELTON UNIVERSITY (CANADA), FERMILAB, MICHIGAN STATE UNIVERSITY, OHIO STATE UNIVERSITY

BEAM: Meson Area - M3 Beam
STUDY OF HEAVY, NARROW MESONS USING A MASS-FOCUSING SPECTROMETER.
(Experiment consists mainly of rearranged components from exp #12.)

Request	27 Nov, 74	Unspecified	
Approval	16 Dec, 74	600 Hours	for a particle search to be slanted particularly toward an identification of charmed mesons
	24 Nov, 75	1,200 Hours	with an additional 600 hours to explore the possibility of a mass peak in the K- pi+ mass spectrum
Completed	2 Jul, 76	2,500 Hours	

369 **PARTICLE SEARCH #369** — Thomas B. W. Kirk — FERMILAB, HARVARD UNIVERSITY, UNIVERSITY OF ILLINOIS, CHAMPAIGN, MAX-PLANCK INSTITUTE (GERMANY), TUFTS UNIVERSITY

BEAM: Neutrino Area - Muon/Hadron Beam
A SEARCH FOR CHARMED PARTICLES.
(Using the spectrometer originally developed for exp #98.)

Request	9 Dec, 74	700 Hours	for data with 300 pulses/hour and 1 x 10 to the 6th pi-/pulse
Approval	17 Mar, 76	600 Hours	
Completed	13 Aug, 77	1,000 Hours	

370 **NEUTRINO #370** — David B. Cline — FERMILAB, HARVARD UNIVERSITY, UNIVERSITY OF PENNSYLVANIA, UNIVERSITY OF WISCONSIN - MADISON

BEAM: Neutrino Area - Quadrupole Triplet
CONTINUED SEARCH FOR NEW PARTICLE PRODUCTION USING THE EXP #1A DETECTOR.

Request	9 Dec, 74	500 Hours	with a total of 1 x 10 to the 18th protons and a 1 msec spill
Approval	7 Jul, 75	500 Hours	with the hope of providing 1 x 10 to the 18th protons
Completed	19 Mar, 75	400 Hours	

371 **SUPER-HEAVY ELEMENTS #371** — Mira Juric — UNIVERSITY OF BELGRADE(YUGOSLAVIA)

BEAM: Meson Area - Miscellaneous
INVESTIGATION OF THE PRODUCTION OF HEAVY FRAGMENTS INDUCED BY PARTICLES OF HIGH ENERGIES.

Request	2 Dec, 74	Target Exposure(s)
Approval	12 Mar, 75	Target Exposure(s)
Completed	20 Dec, 75	2 Stack(s)

373 **EMULSION/MUONS @ 200 #373** — Piyare L. Jain — SUNY AT BUFFALO

BEAM: Neutrino Area - Miscellaneous
INTERACTION OF 50 - 100 GEV MUONS WITH EMULSION NUCLEI.

Request	8 Jul, 75	Emulsion Exposure
Approval	24 Sep, 76	Emulsion Exposure to muons @ 225 GeV/c and with an intensity not to exceed 50K particles/sq cm
Completed	22 Nov, 76	2 Stack(s)

374 **EMULSION/PROTONS @ 300 #374** — D. H. Davis — UNIVERSITY OF BELGRADE(YUGOSLAVIA); UNIV. COLLEGE DUBLIN (IRELAND); INP, KRAKOW (POLAND); UNIVERSITY OF LIBRE (BELGIUM); LONDON UNIVERSITY COLLEGE(ENGLAND); THE OPEN UNIVERSITY (ENGLAND); INFN, ROME (ITALY); UNIVERSITY OF STRASBOURG (FRANCE); WARSAW UNIVERSITY, INP, (POLAND)

BEAM: Neutrino Area - Miscellaneous
A PROPOSAL TO SEARCH FOR CHARMED PARTICLES ORIGINATING FROM INTERACTIONS OF 300 GEV/C PROTONS IN EMULSION NUCLEI.

Request	25 Jan, 74	Emulsion Exposure
Approval	12 Mar, 75	Emulsion Exposure with the understanding that exp# 374 will replace exp# 364
Completed	10 Jun, 75	1 Stack(s)

379 **PARTICLE SEARCH #379** — Stanley G. Wojcicki — CALIFORNIA INSTITUTE OF TECHNOLOGY; UNIVERSITY OF ROCHESTER; STANFORD UNIVERSITY

BEAM: Neutrino Area - 15 ft. Hadron Beam
SEARCH FOR SHORT LIVED STATES DECAYING WEAKLY VIA LEPTONIC MODES.

Request	5 Feb, 75	1,000 Hours
Approval	26 Mar, 75	200 Hours for testing and initial data taking
	17 Nov, 76	600 Hours with 400 hours for high priority running and with the expectation that a second 400 hour run will be approved if preliminary analysis of initial results are satisfactory
	15 Mar, 77	600 Hours with a hope of combining the two requested running periods into a single block of running but with the understanding that the total number of hours would be somewhat less than requested
Completed	8 Jun, 77	1,250 Hours

380 **15-FOOT NEUTRINO/H2&NE #380** — Charles Baltay — BROOKHAVEN NATIONAL LABORATORY; COLUMBIA UNIVERSITY

BEAM: Neutrino Area - Dichromatic
STUDY OF THE PROPERTIES OF WEAK NEUTRAL CURRENTS IN THE INTERACTIONS OF A NARROW BAND NEUTRINO BEAM IN LIQUID NEON.

Request	6 Feb, 75	200 K Pix
Approval	7 Jul, 75	200 K Pix in a heavy neon-hydrogen mixture contingent upon the construction and adequate performance of an improved narrow-band beam
	24 Jun, 77	200 K Pix at higher energies using the D C Dichromatic train; new requests for use of the Dichromatic horn to be considered later
Completed	31 Oct, 79	196 K Pix

381 **PROTON-NUCLEON SCATTERING #381** — Ernest I. Malamud — UNIVERSITY OF ARIZONA; FERMILAB; JINR, DUBNA (RUSSIA); UNIVERSITY OF ROCHESTER

BEAM: Internal Target Area (C-0)
MEASUREMENT OF THE REAL PART OF THE P - N AND P - P FORWARD SCATTERING AMPLITUDES; PRODUCTION OF LOW MASS ISOBARS IN THE VERY SMALL MOMENTUM TRANSFER REGION.
(Uses gas jet target.)

Request	20 Feb, 75	300 Hours
Approval	26 Mar, 75	300 Hours
Completed	30 Mar, 77	600 Hours

382 **PARTICLE SEARCH #382** — Louis N. Hand — CORNELL UNIVERSITY; FERMILAB; INP, KRAKOW (POLAND); MICHIGAN STATE UNIVERSITY; UNIVERSITY OF WASHINGTON

BEAM: Neutrino Area - Muon/Hadron Beam
A SEARCH FOR CHARMED HADRONS PRODUCED BY MUON DEEP INELASTIC SCATTERING IN TAGGED NUCLEAR EMULSIONS.
(Using drift chambers to locate events and reduce scanning time.)

Request	21 Feb, 75	Emulsion Exposure
Approval	26 Mar, 75	Emulsion Exposure with a provision that it does not seriously interfere with the rest of the muon and neutrino program
	24 Nov, 75	Emulsion Exposure with a bombardment of five days duration during December 1975
Completed	19 Dec, 75	200 Hours

383 **INCLUSIVE K-SHORT #383** — Hans G. E. Kobrak — UNIV. OF CALIFORNIA, DAVIS; UNIV. OF CALIFORNIA, SAN DIEGO; CARELTON UNIVERSITY (CANADA); MICHIGAN STATE UNIVERSITY

BEAM: Meson Area - M4 Beam
A PROPOSAL TO STUDY THE INCLUSIVE PRODUCTION OF K ZERO SHORT BY K MINUS ON HYDROGEN.
(To use the M4 line as a charged beam at momenta of 20 - 150 GeV/c.)

Request	24 Feb, 75	500 Hours
Approval	29 Jun, 76	500 Hours with 200 hours for setup and original run and 300 hours for final run
Completed	7 May, 78	2,200 Hours

385 **EMULSION/PROTONS @ 400 #385** — Yog Prakash — DELHI UNIVERSITY (INDIA); JAMMU UNIVERSITY (INDIA); PANJAB UNIVERSITY (INDIA); RAJASTHAN UNIVERSITY (INDIA)

BEAM: Neutrino Area - Miscellaneous
PROPOSAL FOR EXPOSURE OF A STACK OF NUCLEAR EMULSIONS TO PROTONS OF 400 GEV/C.

Request	5 Mar, 75	Emulsion Exposure
Approval	11 Mar, 75	Emulsion Exposure
Completed	9 Dec, 75	1 Stack(s)

386 **EMULSION/NEW PARTICLES #386** — Jere J. Lord — UNIVERSITY OF WASHINGTON

BEAM: Neutrino Area - Miscellaneous
A SEARCH FOR LOW ENERGY NEUTRAL PARTICLES AND PARTICLE INTERACTIONS INVOLVING SMALL ENERGY EXCHANGES IN THE NEUTRINO BEAM.

Request	7 Mar, 75	Emulsion Exposure
Approval	27 Mar, 75	Emulsion Exposure
Completed	29 Dec, 76	1 Stack(s)

387 **EMULSION/PI- @ 200 #387** — Richard J. Wilkes — UNIVERSITY OF WASHINGTON

BEAM: Neutrino Area - Miscellaneous
100 TO 300 GEV PION INTERACTIONS IN EMULSION AND HEAVY ELEMENT TARGETS.

Request	7 Mar, 75	Emulsion Exposure
Approval	13 May, 75	Emulsion Exposure
Completed	9 Jun, 75	4 Stack(s)

388 **15-FOOT ANTI-NEUTRINO/H2&NE#388** — Vincent Z. Peterson — FERMILAB, UNIVERSITY OF HAWAII AT MANOA, LAWRENCE BERKELEY LABORATORY

BEAM: Neutrino Area - Dichromatic
PROPOSAL TO STUDY NEUTRAL CURRENT NEUTRINO AND ANTI-NEUTRINO INTERACTIONS IN THE 15-FOOT BUBBLE CHAMBER USING THE EXTERNAL MUON IDENTIFIER AND A DICHROMATIC BEAM.

Request	24 Apr, 75	200 K Pix	
	7 Jun, 78	500 K Pix	or 5 x 10 to the 18th protons
Approval	7 Jul, 75	200 K Pix	of antineutrino bombardment with a heavy neon-hydrogen mixture contingent upon the construction and adequate performance of an improved narrow-band beam; see proposal #455
	24 Jun, 77	200 K Pix	at higher energies using the D C Dichromatic train; new requests for use of the Dichromatic horn to be considered later
	28 Jun, 78	200 K Pix	with a decision to maintain the approval as it stands
Completed	12 Sep, 79	181 K Pix	

390 **15-FOOT ANTI-NEUTRINO/D2 #390** — Arthur F. Garfinkel — ARGONNE NATIONAL LABORATORY, CARNEGIE-MELLON UNIVERSITY, PURDUE UNIVERSITY

BEAM: Neutrino Area - Wide Band Horn
ANTI-NEUTRINO INTERACTIONS IN THE DEUTERIUM-FILLED 15-FOOT BUBBLE CHAMBER.

Request	29 Apr, 75	300 K Pix	
Approval	7 Jul, 75	300 K Pix	
	28 Jun, 78	300 K Pix	with a total of 150K pix presently scheduled for the experiment during the fall 1978 run
	19 Mar, 79	250 K Pix	
Approved/Inactive	1 Apr, 79	10 K Pix	as of 1 Apr 1979

391 **MUON #391** — Leroy T. Kerth — UNIV. OF CALIFORNIA, BERKELEY, FERMILAB, LAWRENCE BERKELEY LABORATORY, PRINCETON UNIVERSITY

BEAM: Neutrino Area - Muon/Hadron Beam
EXPLORATION OF RARE MUON-INDUCED PROCESSES.

Request	15 Feb, 75	Unspecified
Approval	7 Jul, 75	Parasitic Running concurrent with exp# 203
Completed	18 May, 78	Unspecified but for information on the total extent of run, see exp #203A

395 **HADRON JETS #395** — Walter Selove — LEHIGH UNIVERSITY, UNIVERSITY OF PENNSYLVANIA, UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M2 Beam
CALORIMETER-ARRAY STUDY OF HIGH P-TRANSVERSE EVENTS.

Request	21 May, 75	450 Hours	total including 150 hours of tests
Approval	7 Jul, 75	450 Hours	contingent upon the successful completion of the calorimeter tests planned for the M5 beam line
Completed	16 Nov, 77	1,150 Hours	

396 **HADRON DISSOCIATION #396** — Konstantin Goulianos — ROCKEFELLER UNIVERSITY

BEAM: Meson Area - M6 Beam
ELASTIC SCATTERING AND DIFFRACTION DISSOCIATION AT SMALL MOMENTUM TRANSFER FOR PI+-, K+-, P, PBAR AND N.

Request	21 May, 75	1,000 Hours
Approval	7 Jul, 75	600 Hours for Phase I
Completed	23 Nov, 77	1,200 Hours

397 **PARTICLE SEARCH #397** — Jerome L. Rosen — FERMILAB, NORTHWESTERN UNIVERSITY, UNIVERSITY OF ROCHESTER, SLAC

BEAM: Meson Area - M3 Beam
PROPOSAL TO SEARCH FOR HIGH MASS PARTICLES PRODUCED IN ASSOCIATION WITH PROMPT MUONS. (Using the spectrometer from exps #27A and #305 with additions.)

Request	21 May, 75	1,000 Hours	
Approval	9 Jul, 75	500 Hours	
	18 May, 76	1,000 Hours	including an additional running period of approximately 5 weeks duration during the summer of 1976
Completed	18 Aug, 76	1,150 Hours	

398 **MUON #398** — Richard Wilson — UNIVERSITY OF CHICAGO, HARVARD UNIVERSITY, UNIVERSITY OF ILLINOIS, CHAMPAIGN, UNIVERSITY OF OXFORD (ENGLAND), VIRGINIA TECH

BEAM: Neutrino Area - Muon/Hadron Beam
A PROPOSAL FOR A FURTHER STUDY OF MUON NUCLEON INELASTIC SCATTERING AT FERMILAB. (Using the spectrometer of exp #98.)

Request	21 May, 75	800 Hours	
Approval	7 Jul, 75	800 Hours	of H2 and D2 running with the expectation that some of this running can occur concurrently with exp #319, at which time priority will be given to exp# 319
Completed	1 Dec, 76	1,100 Hours	

399 **EMULSION/ELECTRONS @ >100 #399** — Robert L. Golden — JOHNSON SPACE CENTER (NASA), KANAGAWA UNIVERSITY (JAPAN), ISAS, TOKYO UNIVERSITY (JAPAN), UNIVERSITY OF WASHINGTON

BEAM: Proton Area - Miscellaneous
PRODUCTION OF ELECTROMAGNETIC CASCADE SHOWERS BY SEVERAL HUNDRED GEV ELECTRONS IN EMULSION CHAMBERS.

Request	5 May, 75	1,000 Emulsion Exposure
Approval	19 Jun, 75	Emulsion Exposure to electrons with fluxes of 10, 1,000, and 200K/sq cm
Completed	5 Oct, 76	6 Stack(s)

400 **PARTICLE SEARCH #400** — James E. Wiss — UNIVERSITY OF BOLOGNA (ITALY); UNIVERSITY OF COLORADO AT BOULDER; FERMILAB; UNIVERSITY OF ILLINOIS, CHAMPAIGN; INFN, MILANO (ITALY); UNIVERSITY OF MILANO (ITALY); UNIVERSITY OF PAVIA (ITALY); YALE UNIVERSITY

BEAM: Proton Area - East
A SEARCH FOR NEW PARTICLES PRODUCED IN ASSOCIATION WITH THE HADRONIC PRODUCTION OF PSI (3.1) MESONS.
(Using a proton beam of about 10 to the 7th into the zero degree neutral beam line and the spectrometer of exp #401/458 with additions.)

Request	22 May, 75	870 Hours	
Approval	7 Jul, 75	400 Hours	
	2 Jul, 76	400 Hours	with a total of 1,000 hours approved for the combination of exps #400, #401, and #458
	14 Mar, 77	400 Hours	with a total of 2,000 hours for the combination of exps #400,401 & 458
	1 Apr, 78	Unspecified	since approved running time has been used by exp #87A
	7 Jul, 80	500 Hours	
Completed	14 Jul, 84	2,210 Hours	

401 **PHOTOPRODUCTION #401** — Michael F. Gormley — FERMILAB; UNIVERSITY OF ILLINOIS, CHAMPAIGN

BEAM: Proton Area - East
PHOTOPRODUCTION OF HIGH MASS TWO-BODY FINAL STATES.
(Using an improved exp #87A apparatus and an additional sweeping magnet in the photon beam.)

Request	22 May, 75	300 Hours	
	1 Jun, 78	1,100 Hours	
Approval	7 Jul, 75	300 Hours	
	2 Jul, 76	300 Hours	with a total of 1,000 hours approved for the combination of exps #400, #401, and #458
	14 Mar, 77	600 Hours	with a total of 2,000 hours for the combination exps #400,401,&458
	1 Apr, 78	Unspecified	since approved running time has been used by exp #87A
	29 Jun, 78	600 Hours	
Completed	26 Nov, 79	2,100 Hours	

404 **INCLUSIVE NEUTRON #404** — H. Richard Gustafson — UNIVERSITY OF MICHIGAN - ANN ARBOR; RUTGERS UNIVERSITY; UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M2 Beam
INCLUSIVE NEUTRON PRODUCTION BY PROTONS ON PROTONS AND NUCLEI.

Request	22 May, 75	500 Hours	
Approval	11 Mar, 76	Parasitic	Running with the condition that there will be no significant interference with other work in the Meson Laboratory
Completed	5 Jul, 77	350 Hours	

415 **PARTICLE PRODUCTION #415** — Lee G. Pondrom — BROOKHAVEN NATIONAL LABORATORY; UNIVERSITY OF MICHIGAN - ANN ARBOR; RUTGERS UNIVERSITY; UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M2 Beam
MEASUREMENTS OF PI- CU TO K-SHORT, LAMBDA AND NEUTRON INCLUSIVE CROSS SECTIONS.
(For proposal #360 with the apparatus of exp #8 in the M2 beam line.)

Request	24 May, 75	100 Hours	
Approval	28 Jun, 75	100 Hours	
Completed	18 Oct, 76	100 Hours	

416 **PARTICLE SEARCH #416** — Henry J. Lubatti — UNIV. OF CALIFORNIA, DAVIS; LAL, ORSAY (FRANCE); UNIVERSITY OF WASHINGTON

BEAM: Meson Area - M1 Beam
STREAMER CHAMBER SEARCH FOR NEW STATES WHICH DECAY SEMI-LEPTONICALLY.
(Using the streamer chamber originally proposed for exp #86A with additional muon counters.)

Request	27 May, 75	300 Hours	
Approval	29 May, 75	300 Hours	with the understanding that the total running time for exp# 416 and exp# 86A is to remain within 800 hours
Completed	1 Jul, 75	400 Hours	

418 **PARTICLE PRODUCTION #418** — Felix Sannes — IMPERIAL COLLEGE (ENGLAND); UNIVERSITY OF ROCHESTER; RUTGERS UNIVERSITY

BEAM: Internal Target Area (C-0)
NUCLEAR SIZE DEPENDENCE FOR PARTICLE PRODUCTION AT INTERMEDIATE TRANSVERSE MOMENTUM.
(With the spectrometer used for exp #363.)

Request	2 Jun, 75	Unspecified	
Approval	7 Jul, 75	500 Hours	contingent upon the fact that such running does not constitute an interference with the requirements of other experiments to be run in that area
Completed	22 Oct, 75	900 Hours	

419 **EMULSION/PROTONS @ 300 #419** — Giorgio Giacomelli — UNIVERSITY OF BOLOGNA (ITALY)

BEAM: Neutrino Area - Miscellaneous
SEARCH FOR SHORT LIVED PARTICLES PRODUCED BY 300 GEV PROTONS IN EMULSIONS.

Request	2 Jun, 75	Emulsion Exposure
Approval	10 Jun, 75	Emulsion Exposure
Completed	10 Jun, 75	1 Stack(s)

421 **EMULSION/PROTONS @ 300 #421** — Venedict P. Dzhelepov — JINR, DUBNA (RUSSIA)

BEAM: Neutrino Area - Miscellaneous
EXPOSURE OF AN EMULSION CHAMBER TO A 300 GEV/C PROTON BEAM.

Request	18 Jun, 75	Emulsion Exposure
Approval	18 Jun, 75	Emulsion Exposure
Completed	24 Jun, 75	1 Stack(s)

423 **EMULSION/PROTONS @ 400 #423** — Hisahiko Sugimoto — HIROSAKI UNIVERSITY (JAPAN); ICRR, UNIVERSITY OF TOKYO (JAPAN); UNIVERSITY OF TOKYO (JAPAN); WASEDA UNIVERSITY (JAPAN)

BEAM: Neutrino Area - Miscellaneous
SEARCH FOR NEW PARTICLES IN EMULSION CHAMBERS.

Request	7 Jul, 75	Emulsion Exposure
Approval	21 Jul, 75	Emulsion Exposure
Completed	9 Dec, 75	4 Stack(s)

424 **EMULSION/MUONS @ 200 #424** — Tomonori Wada
ASHIKAGA INST. OF TECH. (JAPAN)
ICRR, UNIVERSITY OF TOKYO (JAPAN)
OKAYAMA UNIVERSITY (JAPAN)
SAITAMA UNIVERSITY (JAPAN)

BEAM: Neutrino Area - Miscellaneous
MULTIPLE PION PRODUCTION BY 200 GEV/C MUONS.

Request	23 Jun, 75	Emulsion Exposure
Approval	9 Feb, 76	Emulsion Exposure in the muon beam while it is operating for exp# 319 at a momentum in the vicinity of 300 GeV/c
Completed	8 Oct, 76	1 Stack(s)

425 **K ZERO REGENERATION #425** — Valentine L. Telegdi
UNIV. OF CALIFORNIA, SAN DIEGO
UNIVERSITY OF CHICAGO
LHE, ETH HONGGERBERG (SWITZERLAND)
SLAC
UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M4 Beam
PROPOSAL TO INVESTIGATE REGENERATION OF NEUTRAL K-MESONS AT VERY HIGH ENERGIES.
(Using a liquid hydrogen target; see exp #82.)

Request	24 Jun, 75	600 Hours
Approval	18 Mar, 75	600 Hours contingent upon exp# 425 providing a hydrogen target (see exp# 82)
Completed	17 May, 76	1,400 Hours

426 **FRAGMENTATION PARTICLES #426** — Katsura Fukui
HANSCOM A.F.B. GEOPHYSICS LAB.
UNIVERSITY OF KIEL (GERMANY)

BEAM: Meson Area - Miscellaneous
PROPOSAL ON THE STUDY OF FRAGMENTATION PARTICLES CREATED IN A PLASTIC DETECTOR BY 300 GEV PROTONS.

Request	27 May, 75	Detector Exposure
Approval	28 Jul, 75	Detector Exposure
Completed	20 Mar, 76	16 Stack(s)

427 **DETECTOR DEVELOPMENT #427** — Luke C. L. Yuan
BROOKHAVEN NATIONAL LABORATORY

BEAM: Meson Area - M1 Beam
A PROPOSAL FOR TESTING A TRANSITION RADIATION DETECTOR AND A HIGH ENERGY SHOWER DETECTOR FOR COSMIC RAY EXPERIMENTS.

Request	27 Jun, 75	50 Hours
Approval	4 Jan, 78	100 Hours during an opportunity for running in the M1-beam in January 1978
Completed	10 Jan, 78	40 Hours with only a portion of the objectives of the experiment finished due to problems with the M1-beam and the accelerator

428 **EMULSION/PROTONS @ 400 #428** — Jacques D. Hebert
UNIVERSITY OF BELGRADE(YUGOSLAVIA)
CRN, STRASBOURG (FRANCE)
FERMILAB
UNIVERSITY OF LUND (SWEDEN)
UNIVERSITY OF LYON (FRANCE)
UNIVERSITY OF NANCY (FRANCE)
UNIVERSITY OF OTTAWA (CANADA)
UNIV. OF PARIS VI, LPG (FRANCE)
UNIVERSITY OF QUEBEC (CANADA)
UNIVERSITY OF SANTANDER (SPAIN)
UNIVERSITY OF VALENCIA (SPAIN)
UNIV. OF WESTERN ONTARIO (CANADA)

BEAM: Neutrino Area - Miscellaneous
400 GEV PROTON INTERACTIONS IN NUCLEAR EMULSION.

Request	4 Aug, 75	Emulsion Exposure
Approval	25 Aug, 75	Emulsion Exposure
Completed	9 Dec, 75	14 Stack(s)

434 **EMULSION/PROTONS @ 400 #434** — Shoji Dake
KOBE UNIVERSITY (JAPAN)
KONAN UNIVERSITY (JAPAN)
SAITAMA UNIVERSITY (JAPAN)
UNIVERSITY OF TOKYO (JAPAN)
UTSUNOMIYA UNIVERSITY (JAPAN)

BEAM: Neutrino Area - Miscellaneous
CASCADE SHOWERS ORIGINATED IN JET SHOWERS.

Request	16 Sep, 75	Emulsion Exposure
Approval	20 Sep, 75	Emulsion Exposure
Completed	9 Dec, 75	3 Stack(s)

435 **MUON SEARCH #435** — Robert K. Adair
BROOKHAVEN NATIONAL LABORATORY
FERMILAB
YALE UNIVERSITY

BEAM: Proton Area - Center
MEASUREMENT OF THE POLARIZATION OF PROMPT MUONS AT X = 0.14 AT P-TRANSVERSE = 0 AND P-TRANSVERSE = 1.5 GEV/C.
(Extension of measurements begun in experiment #48.)

Request	18 Sep, 75	250 Hours total including 50 hours of tests
Approval	25 Nov, 75	250 Hours of setup and running time
Completed	2 Jul, 76	250 Hours

436 **DI-MUON #436** — Robert K. Adair
BROOKHAVEN NATIONAL LABORATORY
FERMILAB
YALE UNIVERSITY

BEAM: Proton Area - Center
DETERMINATION OF THE POSSIBLE DI-MUON CHARACTER OF THE PROMPT MUON FLUX.

Request	18 Sep, 75	75 Hours including 40 hours of tests
Approval	7 Oct, 75	100 Hours to be completed during the operating period due to end in Nov. 1975
Completed	29 Oct, 75	200 Hours

438 **NEUTRON-NUCLEUS INELASTIC #438** — Lawrence W. Jones
UNIVERSITY OF MICHIGAN - ANN ARBOR

BEAM: Meson Area - M3 Beam
INELASTIC CROSS SECTIONS OF NEUTRONS ON NUCLEI.

Request	26 Sep, 75	500 Hours
Approval	25 Nov, 75	200 Hours
Completed	18 Apr, 77	350 Hours

439 **MULTI-MUON #439** — David A. Garelick
UNIVERSITY OF MICHIGAN - ANN ARBOR
NORTHEASTERN UNIVERSITY
TUFTS UNIVERSITY
UNIVERSITY OF WASHINGTON

BEAM: Meson Area - M2 Beam
HIGH SENSITIVITY SEARCH FOR NEW STATES WHICH DECAY INTO MUONS.

Request	26 Sep, 75	500 Hours with 200 hours for tests and 300 hours for data
	31 May, 77	1,600 Hours to include 3 additional one-month periods of running
Approval	25 Nov, 75	400 Hours
	24 Jun, 77	800 Hours with the understanding that the 400-hour extension and time remaining under previous approval be used for investigation of multi-muon events
	27 Jul, 77	800 Hours with the previous constraints on the further running removed
	24 Mar, 78	1,600 Hours with an extension until the spring 1978 shutdown, but without overriding priority
Completed	19 May, 78	1,700 Hours

440 **LAMBDA MAGNETIC MOMENT #440** — Gerry M. Bunce — UNIVERSITY OF MICHIGAN - ANN ARBOR; RUTGERS UNIVERSITY; UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M2 Beam
PROPOSAL FOR A NEW MEASUREMENT OF THE MAGNETIC MOMENT OF THE LAMBDA HYPERON.

Request	26 Sep, 75	160 Hours	
Approval	25 Nov, 75	160 Hours	
Completed	22 Mar, 77	250 Hours	

441 **LAMBDA POLARIZATION #441** — Lee G. Pondrom — UNIVERSITY OF MICHIGAN - ANN ARBOR; RUTGERS UNIVERSITY; UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M2 Beam
A PROPOSAL TO STUDY LAMBDA POLARIZATION IN THE INCLUSIVE REACTION PROTON - PROTON TO LAMBDA PLUS ANYTHING WITH LIQUID HYDROGEN TARGET.
(Extension of previous measurements of 300 GeV protons on beryllium to 400 GeV protons on hydrogen.)

Request	29 Sep, 75	150 Hours	
Approval	25 Nov, 75	150 Hours	
Completed	2 Jul, 77	400 Hours	

442 **NUCLEAR FRAGMENTS #442** — Frank Turkot — FERMILAB; PURDUE UNIVERSITY

BEAM: Internal Target Area (C-0)
STUDY OF NUCLEAR FRAGMENT EMISSION IN PROTON HEAVY NUCLEUS COLLISIONS FROM 10 TO 500 GEV.
(Will use room temperature gas jet target with heavy gases.)

Request	26 Sep, 75	400 Hours	for data taking
	11 May, 77	800 Hours	to include additional time to search for quarks bound in nuclear fragments
Approval	25 Nov, 75	400 Hours	
	25 Jun, 77	400 Hours	without time for the quark search
Completed	13 Aug, 77	1,200 Hours	

444 **DI-MUON #444** — A. J. Stewart Smith — UNIVERSITY OF CHICAGO; PRINCETON UNIVERSITY

BEAM: Neutrino Area - Muon/Hadron Beam
A SPECIAL REQUEST FOR HIGH-PRIORITY RUNNING TO MEASURE HIGH-MASS MUON PAIRS.
(Using the Quadrupole Triplet focusing system for producing a high intensity hadron beam.)

Request	25 Sep, 75	400 Hours	
	31 May, 77	800 Hours	with a request for a 400 hour extension for a scaling test and to increase the sensitivity at high masses
Approval	24 Nov, 75	400 Hours	
	24 Jun, 77	400 Hours	with a decision not to grant an extension
Completed	3 Jan, 78	1,100 Hours	

448 **MUON #448** — William A. Loomis — UNIVERSITY OF CHICAGO; FERMILAB; HARVARD UNIVERSITY; MASSACHUSETTS INST. OF TECHNOLOGY; MICHIGAN STATE UNIVERSITY; TUFTS UNIVERSITY

BEAM: Neutrino Area - Muon/Hadron Beam
PROPOSAL FOR THE INVESTIGATION OF VIRTUAL PHOTOABSORPTION BY NUCLEAR MATTER.
(Using the cyclotron spectrometer and heavy targets; see proposal #257.)

Request	17 Oct, 75	300 Hours	
	9 Jun, 77	300 Hours	to study both photoabsorption by nuclear matter and production of charmed particles (the latter to employ a Cerenkov counter)
Approval	15 Mar, 77	Parasitic Running	for about 300 hours concurrent with exp #203
	29 Jun, 77	Parasitic Running	for about 300 hours for study of photoabsorption of nuclear matter; without the disruption required to install the Cerenkov counter
Completed	7 May, 78	900 Hours	

451 **INCLUSIVE SCATTERING #451** — Donald S. Barton — UNIVERSITY OF BARI (ITALY); BROWN UNIVERSITY; FERMILAB; MASSACHUSETTS INST. OF TECHNOLOGY; WARSAW HEP LABORATORY (POLAND)

BEAM: Meson Area - M6 Beam
STUDY OF THE A-DEPENDENCE OF INCLUSIVE PROCESSES AND ASSOCIATED MULTIPLICITY.
(Using the single arm spectrometer facility.)

Request	17 Oct, 75	600 Hours	including 100 hours of tests
Approval	30 Jun, 76	400 Hours	
Completed	6 Sep, 78	500 Hours	

456 **FORM FACTOR #456** — Donald H. Stork — UNIV. OF CALIFORNIA, LOS ANGELES; FERMILAB; JINR, DUBNA (RUSSIA); NOTRE DAME UNIVERSITY; UNIVERSITY OF PITTSBURGH

BEAM: Meson Area - M1 Beam
MEASUREMENT OF THE KAON FORM FACTOR.
(Continuation of work begun in exp #216.)

Request	17 Oct, 75	800 Hours	including 200 hours of tests
Approval	25 Nov, 75	500 Hours	
	7 Dec, 76	950 Hours	including an additional 450 hours for data taking with a request for a report on preliminary results from existing data before the start of the next running period
Completed	13 Apr, 77	1,450 Hours	

458 **PHOTOPRODUCTION #458** — Wonyong Lee — COLUMBIA UNIVERSITY; FERMILAB; UNIVERSITY OF ILLINOIS, CHAMPAIGN

BEAM: Proton Area - East
PHOTOPRODUCTION EXPERIMENT AT FERMILAB.
(Using the broad band photon beam; a continuation of work begun in exp #87A and #401.)

Request	17 Oct, 75	700 Hours	
	7 May, 76	900 Hours	with 300 hours for testing, 600 hours for data
Approval	2 Jul, 76	300 Hours	with a total of 1,000 hours approved for the comination of exps #400, #401, and #458
	14 Mar, 77	1,000 Hours	with a total of 2,000 hours for the combination of expts #400,401,&458
	1 Apr, 78	Unspecified	since approved running time has been used by exp #87a
Approved/Inactive	27 Oct, 81	Unspecified	

461 **EMULSION/PROTONS @ 400 #461** — Jere J. Lord — UNIV. OF AUCKLAND (NEW ZEALAND); AUSTRALIAN NAT'L. UNIV.(AUSTRALIA); UNIVERSITY OF MELBOURNE(AUSTRALIA); UNIVERSITY OF SYDNEY (AUSTRALIA); UNIVERSITY OF TASMANIA (AUSTRALIA); UNIVERSITY OF WASHINGTON

BEAM: Neutrino Area - Miscellaneous
SEARCH FOR NEW PARTICLES FROM 400 GEV PROTON COLLISIONS IN EMULSIONS.

Request	10 Nov, 75	Emulsion Exposure	
Approval	26 Nov, 75	6 Stack(s)	
Completed	9 Dec, 75	6 Stack(s)	

462 **EMULSION/PROTONS @ 400 #462** — Giorgio Giacomelli — UNIVERSITY OF BOLOGNA (ITALY); UNIVERSITY OF FIRENZE (ITALY)

BEAM: Neutrino Area - Miscellaneous
SEARCH FOR SHORT LIVED PARTICLES PRODUCED BY 400 GEV PROTONS IN EMULSIONS.

Request	18 Nov, 75	Emulsion Exposure
Approval	26 Nov, 75	Emulsion Exposure
Completed	9 Dec, 75	1 Stack(s)

---

463 **EMULSION/PROTONS @ 400 #463** — M. I. Tretjakova — KAZAKH STATE UNIV., (KAZAKHSTAN); LEBEDEV PHYSICAL INST. (RUSSIA); ITEP, MOSCOW (RUSSIA); PNPI, ST. PETERSBURG (RUSSIA); TASHKENT, PHY.TEC.INS (UZBEKISTAN)

BEAM: Neutrino Area - Miscellaneous
THE INTERACTIONS OF PROTONS IN NUCLEAR EMULSION AT 400 GEV/C (OR 500 GEV/C).

Request	17 Nov, 75	Emulsion Exposure
Approval	26 Nov, 75	Emulsion Exposure
Completed	9 Dec, 75	2 Stack(s)

---

466 **NUCLEAR FRAGMENTS #466** — Norbert T. Porile — ARGONNE NATIONAL LABORATORY; UNIVERSITY OF CHICAGO; UNIV. OF ILLINOIS, CHICAGO CIRCLE; PURDUE UNIVERSITY

BEAM: Proton Area - Miscellaneous
A PROPOSAL FOR THE STUDY OF HIGH-ENERGY REACTION MECHANISMS BY THE MEASUREMENT OF THE ANGULAR AND ENERGY DISTRIBUTIONS OF NUCLEAR FRAGMENTS RECOILING FROM TARGETS BOMBARDED WITH 200-300 GEV PROTONS.

Request	9 Jan, 76	500 Hours
Approval	30 Mar, 76	500 Hours to be met on an essentially parasitic basis with the understanding that this work will not constitute an interference with the rest of the proton area program
Completed	15 Feb, 88	102 Targets Exposed

---

467 **TEST MUON IRRADIATION #467** — Melvin Freedman — ARGONNE NATIONAL LABORATORY

BEAM: Neutrino Area - Miscellaneous
PROPOSAL FOR PARASITIC DUAL TARGET IRRADIATION WITH MUON SPILL BEAM BEHIND EXP #319.

Request	13 Jan, 76	Target Exposure(s)
Approval	28 Apr, 76	Parasitic Running for a bombardment of chlorine and thallium targets downstream of exp #319 or exp #398
Completed	1 Dec, 76	4 Targets Exposed

---

468 **PARTICLE SEARCH #468** — Phillip H. Steinberg — UNIVERSITY OF MARYLAND

BEAM: Meson Area - M2 Beam
SEARCH FOR PENETRATING MASSIVE NEUTRAL PARTICLES PRODUCED IN HIGH ENERGY PROTON COLLISIONS.

Request	21 Jan, 76	1,200 Hours
	4 Oct, 76	300 Hours in a 400 GeV proton beam at an intensity of 10 to the 9th protons/pulse
	4 Nov, 77	450 Hours including an additional 150 hours to improve the sensitivity during another run of the experiment
Approval	18 Nov, 76	300 Hours
Completed	14 Aug, 77	300 Hours

---

469 **PARTICLE SEARCH #469** — David Cutts — UNIVERSITY OF BARI (ITALY); BROWN UNIVERSITY; CERN (SWITZERLAND); FERMILAB; MASSACHUSETTS INST. OF TECHNOLOGY

BEAM: Meson Area - M6 Beam
SEARCH FOR HEAVY LONG-LIVED PARTICLES.
(Using the single arm spectrometer facility.)

Request	23 Jan, 76	150 Hours
Approval	3 Feb, 78	150 Hours with the understanding that the schedule for this run may place the desired running for exp #451 in some jeopardy
Completed	15 May, 78	400 Hours

---

472 **PARTICLE SEARCH #472** — Kenneth C. Stanfield — FERMILAB; UNIVERSITY OF MICHIGAN - ANN ARBOR; PURDUE UNIVERSITY

BEAM: Meson Area - M2 Beam
SEARCH FOR HEAVY PARTICLES PRODUCED IN ASSOCIATION WITH PROMPT MUONS.
(Experiment would use modified exp #357 spectrometer.)

Request	23 Jan, 76	600 Hours including 100 hours of tests
Approval	10 Mar, 76	600 Hours
Completed	29 Nov, 76	1,100 Hours

---

481 **EMULSION/PI- @ 300 #481** — Yoshiyuki Takahashi — OSAKA CITY UNIVERSITY (JAPAN); SHINSHU UNIVERSITY (JAPAN)

BEAM: Neutrino Area - Miscellaneous
INVESTIGATION OF MULTIPLE PRODUCTION BY PI - MESONS WITH EMULSION CHAMBER.

Request	28 Apr, 76	Emulsion Exposure 10K particles per cm. sq. over a square of 10 cm x 10 cm
Approval	12 May, 76	Emulsion Exposure
Completed	18 Jan, 78	7 Stack(s)

---

482 **NEUTRINO #482** — Barry C. Barish — CALIFORNIA INSTITUTE OF TECHNOLOGY; FERMILAB; NORTHWESTERN UNIVERSITY; UNIVERSITY OF ROCHESTER; ROCKEFELLER UNIVERSITY

BEAM: Neutrino Area - Quadrupole Triplet
STUDY OF DI-MUON EVENTS PRODUCED IN NEUTRINO INTERACTIONS.

Request	11 May, 76	500 Hours to be run with the Quadrupole Triplet train load with focus set at 200 GeV at 10 to the 13th protons per pulse
Approval	30 Jun, 76	Parasitic Running with other experiments using the neutrino beam
Completed	3 Jan, 78	1,600 Hours

---

486 **K ZERO CROSS SECTION #486** — Bruce D. Winstein — UNIVERSITY OF CHICAGO; LHE, ETH HONGGERBERG (SWITZERLAND); UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M4 Beam
PROPOSAL TO STUDY THE ATOMIC NUMBER DEPENDENCE OF THE DIFFERENCE BETWEEN PARTICLE AND ANTI-PARTICLE TOTAL CROSS SECTIONS.
(Using the apparatus of exps #82 and #425 with modifications.)

Request	7 May, 76	200 Hours to be run in a modified version of the M-4 neutral beam; data taking to require 1.4 x 10 to the 17th protons into the meson production target
Approval	30 Jun, 76	200 Hours with a total of 800 hours approved for the combination of E-486 and E-226
Completed	17 Mar, 77	950 Hours

490 **PARTICLE SEARCH #490** — Jack Sandweiss — FERMILAB, LAWRENCE BERKELEY LABORATORY, YALE UNIVERSITY

BEAM: Meson Area - M1 Beam
SEARCH FOR SHORT LIVED PARTICLES USING A HIGH RESOLUTION STREAMER CHAMBER.

Request	7 May, 76	800 Hours to be run in a 200 GeV pi- beam of intensity 8 x 10 to the 5th particles per pulse focused to a 1 mm x 5 mm spot
Approval	30 Jun, 76	Test Running to study the performance of the high resolution streamer chamber
Completed	9 Jun, 80	850 Hours

494 **DI-HADRON #494** — Myron L. Good — COLUMBIA UNIVERSITY, FERMILAB, SUNY AT STONY BROOK

BEAM: Proton Area - Center
A STUDY OF DI-HADRON PRODUCTION IN PROTON COLLISIONS AT FERMILAB.
(This experiment is an off-shoot of di-lepton #288.)

Request	10 May, 76	800 Hours
Approval	17 May, 76	800 Hours
	17 Nov, 76	1,400 Hours including an additional six weeks of running with the experiment expected to terminate in February 1977
Completed	21 Feb, 77	1,950 Hours

495 **XI-ZERO PRODUCTION #495** — Kenneth J. Heller — BROOKHAVEN NATIONAL LABORATORY, UNIVERSITY OF MICHIGAN - ANN ARBOR, RUTGERS UNIVERSITY, UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M2 Beam
PROPOSAL TO STUDY CASCADE ZERO AND ANTILAMBDA PRODUCTION AND POLARIZATION.
(Experiment would use the spectrometer of E-8.)

Request	17 May, 76	400 Hours
Approval	17 Nov, 76	400 Hours
Completed	28 Aug, 78	700 Hours

497 **CHARGED HYPERON #497** — Joseph Lach — FERMILAB, IOWA STATE UNIVERSITY, YALE UNIVERSITY

BEAM: Proton Area - Center
ELASTIC SCATTERING OF THE HYPERONS.
(Measurements of charged hyperon fluxes and differential elastic cross sections, and a particle search.)

Request	13 May, 76	1,200 Hours with 600 hours for flux measurements and new particle search and 600 hours to measure differential cross sections
	26 Jan, 79	800 Hours including an additional 400 hours to search for the b-particle after the beam is commissioned
Approval	29 Jun, 76	400 Hours initial approval
Completed	16 Mar, 81	2,500 Hours see proposal #697

498 **DETECTOR DEVELOPMENT #498** — Charles R. Gruhn — LOS ALAMOS NATIONAL LABORATORY

BEAM: Proton Area - East
A MEASUREMENT OF THE RELATIVISTIC RISE IN THE MOST PROBABLE ENERGY LOSS IN THIN SOLID FILMS.

Request	26 May, 76	50 Hours in an electron beam at the highest energies available
Approval	14 Jun, 76	Parasitic Running that will not disturb the normal proton area program
Completed	18 Aug, 76	50 Hours

499 **EMULSION/PROTONS @ 400 #499** — Junsuke Iwai — WASEDA UNIVERSITY (JAPAN)

BEAM: Neutrino Area - Miscellaneous
A STUDY OF ANGULAR DISTRIBUTIONS IN PROTON-NUCLEUS COLLISIONS USING NUCLEAR EMULSIONS.

Request	1 Jun, 76	2 Exposure(s)
Approval	16 Aug, 76	Emulsion Exposure with one stack exposed to an intensity of 600K protons/sq cm and a second to an intensity of 10K protons/sq cm
Completed	15 Jan, 78	5 Stack(s)

501 **TEST MUON IRRADIATION #501** — Kenneth Lande — BROOKHAVEN NATIONAL LABORATORY, UNIVERSITY OF PENNSYLVANIA

BEAM: Neutrino Area - Muon/Hadron Beam
PROPOSAL FOR A MEASUREMENT OF THE TRANSITION RATE FOR CL(37) AND AR(37) INDUCED BY MUONS AT FERMILAB ENERGIES.

Request	11 Aug, 76	25 Hours an integrated flux of - about 5 x 10 to the 9th times (e/300) to the 0.7th - muons @ 75, 150, and 250 GeV
Approval	28 Oct, 76	Target Exposure(s) parasitic to running of upstream muon experiments
Completed	1 Dec, 76	2 Targets Exposed

502 **MONOPOLE #502** — David F. Bartlett — UNIVERSITY OF COLORADO AT BOULDER, GENERAL ELECTRIC R&D CENTER

BEAM: Neutrino Area - Miscellaneous
SEARCH FOR MONOPOLES ABOVE THE 15-FOOT BUBBLE CHAMBER.
(Would require a scuttle in the roof of the 15-foot bubble chamber building.)

Request	30 Jul, 76	Cosmic Ray Running to include use of the fringe field of the 15-foot bubble chamber magnet during two long runs; approximately 7 months of data-taking requested with lexan and later with emulsion detectors
Approval	2 Sep, 76	Cosmic Ray Running during parasitic operation in the fringe field of the 15-foot bubble chamber magnet
Completed	23 Jun, 80	Cosmic Ray Running

503 **EMULSION/PI- @ 300 #503** — Takeshi Ogata — HIROSAKI UNIVERSITY (JAPAN), ICRR, UNIVERSITY OF TOKYO (JAPAN), KONAN UNIVERSITY (JAPAN), KWANSEI GAKUIN UNIVERSITY (JAPAN)

BEAM: Neutrino Area - Miscellaneous
MULTIPARTICLE PRODUCTION IN HIGH ENERGY PION-NUCLEUS INTERACTIONS.

Request	12 Aug, 76	Emulsion Exposure consisting of eight blocks of mulsion exposed to 50K particles/sq cm in a pi- beam of 200 GeV/c or greater
Approval	19 Aug, 76	Emulsion Exposure
Completed	18 Jan, 78	4 Stack(s)

505 **PROTON POLARIZATION #505** — Samuel Peter Yamin — BROOKHAVEN NATIONAL LABORATORY; UNIVERSITY OF MICHIGAN - ANN ARBOR; RUTGERS UNIVERSITY; UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M2 Beam
A SEARCH FOR PROTON POLARIZATION IN INCLUSIVE PRODUCTION AT 300 GEV/C.

Request	16 Aug, 76	100 Hours with a change in the targetting angle of the primary proton beam for the meson area
Approval	29 Jun, 78	100 Hours with low priority during the time available for exp #495
Completed	27 Aug, 78	50 Hours

506 **EMULSION/PI- @ 300 #506** — Shoji Dake — KOBE UNIVERSITY (JAPAN); KONAN UNIVERSITY (JAPAN); SAITAMA UNIVERSITY (JAPAN); UNIVERSITY OF TOKYO (JAPAN)

BEAM: Neutrino Area - Miscellaneous
CASCADE SHOWERS ORIGINATED IN JET SHOWERS DUE TO NEGATIVE PIONS.

Request	17 Aug, 76	Emulsion Exposure using two - three emulsion chambers 10 cm x 10 cm x 8 xm exposed to 10-100 particles/sq cm in a pi- beam of 200 GeV/c or greater
Approval	23 Aug, 76	Emulsion Exposure
Completed	15 Jan, 78	2 Stack(s)

507 **HIGH ENERGY CHANNELING #507** — Edward N. Tsyganov — UNIV. OF CALIFORNIA, LOS ANGELES; FERMILAB; JINR, DUBNA (RUSSIA); KHARKOV PHYS-TECH INST (UKRAINE); LEHIGH UNIVERSITY; ITEP, MOSCOW (RUSSIA); SUNY AT ALBANY; TOMSK POLYTECH. INST. (USSR); INR, WARSAW (POLAND)

BEAM: Meson Area - M1 Beam
PROPOSAL TO STUDY CHANNELING AT FERMILAB.
(Using the spectrometer of exp #456.)

Request	8 Sep, 76	250 Hours use of the M-1 beam is requested in conjunction with operation of form factor #456
Approval	1 Jun, 77	250 Hours with the understanding that this activity will not delay significantly the program in the M1 beam
Completed	30 May, 77	350 Hours

508 **EMULSION/PROTONS @ 500 #508** — Wladyslaw Wolter — INP, KRAKOW (POLAND)

BEAM: Meson Area - Test Beam
STUDY OF THE MECHANISM FOR MULTIPLE PRODUCTION OF PARTICLES AT HIGH ENERGIES.

Request	15 Sep, 76	Emulsion Exposure consisting of 3 emulsion stacks
Approval	24 Sep, 76	Emulsion Exposure
Completed	26 Apr, 85	7 Emulsion Stack(s)

509 **EMULSION/MUONS @ 200 #509** — T. Shirai — KANAGAWA UNIVERSITY (JAPAN); KOBE UNIVERSITY (JAPAN); UNIVERSITY OF TOKYO (JAPAN)

BEAM: Neutrino Area - Miscellaneous
SEARCH FOR THE LARGE ANGLE SCATTERING OF MUONS.

Request	13 Sep, 76	Emulsion Exposure of 10 to the 6th particles/sq cm
Approval	24 Sep, 76	Emulsion Exposure
Completed	8 Oct, 76	1 Stack(s)

510 **EMULSION/ELECTRONS @ HI E #510** — Kiyoshi Niu — AICHI UNIV. OF EDUCATION (JAPAN); NAGOYA UNIVERSITY (JAPAN); YOKOHAMA NATIONAL UNIV. (JAPAN)

BEAM: Proton Area - Miscellaneous
STUDY OF CASCADE SHOWERS INITIATED BY ELECTRONS.

Request	9 Sep, 76	Emulsion Exposure
Approval	24 Sep, 76	Emulsion Exposure
Completed	5 Oct, 76	6 Stack(s)

515 **PARTICLE SEARCH #515** — Jerome L. Rosen — CARNEGIE-MELLON UNIVERSITY; FERMILAB; NORTHWESTERN UNIVERSITY; NOTRE DAME UNIVERSITY

BEAM: Meson Area - M1 Beam
PROPOSAL TO STUDY CHARGED PARTICLES PRODUCED IN HADRONIC INTERACTIONS.

Request	5 Oct, 76	1,000 Hours in a high intensity pi- beam @ 200 GeV/c
Approval	14 Mar, 77	800 Hours
Completed	10 Mar, 82	2,650 Hours

516 **PHOTOPRODUCTION #516** — E. Thomas Nash — UNIV. OF CALIFORNIA, SANTA BARBARA; CARELTON UNIVERSITY (CANADA); UNIVERSITY OF COLORADO AT BOULDER; FERMILAB; NATIONAL RESEARCH COUNCIL (CANADA); UNIVERSITY OF OKLAHOMA; UNIVERSITY OF TORONTO (CANADA)

BEAM: Proton Area - East
A STUDY OF PHOTOPRODUCTION USING A MAGNETIC SPECTROMETER AT THE TAGGED PHOTON LAB.

Request	5 Oct, 76	1,000 Hours in the tagged photon beam assuming a primary beam of 450 GeV protons with 2.9 x 10 to the 15th protons/hour
	3 Oct, 77	1,000 Hours with 6 x 10 to the 12th protons per pulse, a 1 sec. flattop and a 10 sec. cycle
Approval	15 Nov, 77	1,000 Hours to include 400 hours for testing and 600 hours for data
Completed	1 Jun, 81	4,500 Hours

522 **PROTON POLARIZATION #522** — Harold O. Ogren — INDIANA UNIVERSITY

BEAM: Internal Target Area (C-0)
A STUDY OF INCLUSIVE PROTON POLARIZATION.

Request	28 Oct, 76	840 Hours the experiment would run with the existing exp #313 set-up in the internal target area
Approval	25 Jun, 77	800 Hours conditional on cryogenic operation of the internal target area
Completed	21 Mar, 78	700 Hours

524 **EMULSION/PROTONS > 500 GEV #524** — Richard J. Wilkes — UNIVERSITY OF WASHINGTON

BEAM: Meson Area - Test Beam
PROPOSAL TO STUDY INTERACTIONS OF PROTONS OF ENERGY GREATER THAN 500 GEV IN EMULSION AND HEAVY NUCLEI.

Request	18 Jan, 77	Emulsion Exposure of 10 plates would be exposed to fluxes ranging from 75,000 to 200,000 particles/sq.cm.
Approval	3 Mar, 77	Emulsion Exposure with a momentum of approximately 500 GeV/c
Completed	26 Apr, 85	6 Emulsion Stack(s)

525 **EMULSION/PI- @ 300 #525** — Richard J. Wilkes — UNIVERSITY OF WASHINGTON

BEAM: Neutrino Area - Miscellaneous
PROPOSAL TO STUDY PROTON-NUCLEUS INTERACTIONS IN EMULSION PLATES WITH EMBEDDED METAL POWDER GRANULES AT 300 GEV.

Request	18 Jan, 77	Emulsion Exposure of 10 plates would be exposed in a negative beam to fluxes ranging from 75,000 - 200,000 particles/sq.cm.
	13 Dec, 77	Emulsion Exposure with a request for the beam energy to be changed to 300 GeV
Approval	3 Mar, 77	Emulsion Exposure
Completed	15 Jan, 78	2 Stack(s)

531 **NEUTRINO #531** — Neville W. Reay — AICHI UNIV. OF EDUCATION (JAPAN), FERMILAB, ICRR, UNIVERSITY OF TOKYO (JAPAN), KOBE UNIVERSITY (JAPAN), KOREA UNIVERSITY, SEOUL (KOREA), MCGILL UNIVERSITY (CANADA), NAGOYA UNIVERSITY (JAPAN), OHIO STATE UNIVERSITY, OKAYAMA UNIVERSITY (JAPAN), OSAKA CITY UNIVERSITY (JAPAN), OSAKA SCIENCE EDUC. INST. (JAPAN), UNIVERSITY OF OTTAWA (CANADA), UNIVERSITY OF TORONTO (CANADA), VIRGINIA TECH, YOKOHAMA NATIONAL UNIV. (JAPAN)

BEAM: Neutrino Area - Wide Band Horn
A PROPOSAL TO STUDY WEAK DECAY LIFETIMES OF NEUTRINO PRODUCED PARTICLES IN A TAGGED EMULSION SPECTROMETER.

Request	31 Jan, 77	1,500 Hours	or a total proton flux of 3 x 10 to the 18th
	19 May, 78	3,000 Hours	including a second parasitic run
	8 May, 79	2,250 Hours	total with an additional 1,100 hours requested for two runs of 6 x 10 to the 18th protons each, the first to be neutrinos (350 GeV pi+), the second to be antineutrinos (350 GeV pi- with the plug out)
Approval	15 Mar, 77		Parasitic Running concurrent with other neutrino experiments
	1 Jul, 79		Parasitic Running concurrent with the next 15-foot bubble chamber neutrino run with the Wide Band Horn
Completed	1 Jun, 81	3,800 Hours	

533 **PI-MU ATOMS #533** — Gordon B. Thomson — UNIVERSITY OF CHICAGO, STANFORD UNIVERSITY, UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M3 Beam
PROPOSAL TO MEASURE THE RATE OF FORMATION OF PI-MU ATOMS IN K-LONG M 3 DECAY.

Request	1 Feb, 77	500 Hours	based on 3 x 10 to the 6th K-longs/pulse in the M3 beam
Approval	18 Mar, 77	500 Hours	with the requirement that preliminary studies and tests show that costs for the experiment are reasonable
	19 Mar, 79	2,100 Hours	for the additional 1,500 hours requested for tuneup and data to complete the experiment
Completed	28 Nov, 79	2,050 Hours	

536 **EMULSION/NEUTRINO #536** — Kiyoshi Niu — AICHI UNIV. OF EDUCATION (JAPAN), NAGOYA UNIVERSITY (JAPAN), YOKOHAMA NATIONAL UNIV. (JAPAN)

BEAM: Neutrino Area - Wide Band Horn
STUDY OF NEUTRINO INTERACTIONS IN NUCLEAR EMULSIONS.

Request	2 Feb, 77	500 Hours	or 1 x 10 to the 18th protons to be run in the broad band neutrino beam on a parasitic basis with the regular neutrino program
Approval	10 Feb, 77		Parasitic Running
Completed	13 Aug, 77	2 Stack(s)	

537 **DI-MUON #537** — Bradley B. Cox — UNIVERSITY OF ATHENS (GREECE), FERMILAB, MCGILL UNIVERSITY (CANADA), UNIVERSITY OF MICHIGAN - ANN ARBOR, SHANDONG UNIVERSITY (PRC)

BEAM: Proton Area - West
PROPOSAL TO STUDY PBAR-N INTERACTIONS IN THE P-WEST HIGH INTENSITY LABORATORY

Request	14 Feb, 77	1,700 Hours	with 300 hours of tuning and 600 hours initial data run to be followed by 800 hours for final data run, all in high intensity secondary beam
	31 Oct, 77	1,400 Hours	to include 100 hours of tuneup, 300 hours of pi- @ 200 or 300 GeV, 700 hours of pi+ @ 200 or 300 GeV and 300 hours of pbar @ 100 GeV
	31 Jan, 78	2,000 Hours	in high intensity secondary beam. Phase 1 would consist of 250 hours for tune up and 750 hours for data taking on di-muon production by p bars. Phase 2 would consist of 250 hours for tune up and 750 hours for data taking on di-electron production by p bars
Approval	16 Mar, 78	1,000 Hours	for study of di-muon production by pbars
Completed	28 Feb, 82	2,700 Hours	

540 **PARTICLE SEARCH #540** — Michael J. Longo — UNIVERSITY OF MICHIGAN - ANN ARBOR

BEAM: Meson Area - M3 Beam
A SEARCH FOR NEW METASTABLE PARTICLES TRAPPED IN MATTER.

Request	22 Mar, 77	1,900 Hours	with a running period of six months in the M3 beam. The beam would be used 50 - 75% of the time available.
Approval	23 May, 77		Parasitic Running conditional on negotiation of an agreement and that the experiment will be mounted and run under low priority conditions
Completed	21 Feb, 78	600 Hours	

545 **15-FOOT NEUTRINO/D2&HIZ #545** — George A. Snow — ILLINOIS INSTITUTE OF TECHNOLOGY, UNIVERSITY OF MARYLAND, SUNY AT STONY BROOK, TOHOKU UNIVERSITY (JAPAN), TUFTS UNIVERSITY

BEAM: Neutrino Area - Wide Band Horn
PROPOSAL FOR AN EXTENSION OF E-151/E-227 TO STUDY NEUTRINO INTERACTIONS IN DEUTERIUM IN THE 15-FOOT BUBBLE CHAMBER WITH PLATES.
(An initial run will be without plates.)

Request	18 Apr, 77	300 K Pix	
	21 Dec, 77	500 K Pix	to be run in the wide band beam with 1.3 x 10 to the 13th protons per pulse incident on the target at 400 GeV
Approval	16 Mar, 78	350 K Pix	or equivalently 3.5 x 10 to the 18th protons; with the assumption that the test of the plate system will be successful
	28 Jun, 78	350 K Pix	to be run in the 15-ft chamber without plates
Completed	17 Jan, 79	317 K Pix	

546 **15-FOOT NEUTRINO/H2&NE #546** — Fred Russell Huson — UNIV. OF CALIFORNIA, BERKELEY; FERMILAB; UNIVERSITY OF HAWAII AT MANOA; LAWRENCE BERKELEY LABORATORY; UNIVERSITY OF WASHINGTON; UNIVERSITY OF WISCONSIN - MADISON

BEAM: Neutrino Area - Quadrupole Triplet
HIGH ENERGY NEUTRINO AND ANTINEUTRINO INTERACTIONS IN THE 15-FOOT BUBBLE CHAMBER USING THE QUADRUPOLE TRIPLET TRAIN LOAD AND THE TWO-PLANE EMI.

Request	27 Apr, 77	250 K Pix with specific interest in an exposure of 5 x 10 to the 18th protons
Approval	29 Jun, 77	Parasitic Running concurrent with other neutrino running with the Quad Triplet train
Completed	26 Jan, 78	375 K Pix

547 **EMULSION/PROTONS @ 400 #547** — C. J. Jacquot — CRN, STRASBOURG (FRANCE); UNIVERSITY OF LYON (FRANCE); UNIVERSITY OF SANTANDER (SPAIN)

BEAM: Neutrino Area - Miscellaneous
ANGULAR CORRELATIONS STUDY IN PROTON-NUCLEI JETS AT 400-500 GEV USING EMULSION TELESCOPE TECHNIQUES.

Request	27 Apr, 77	Emulsion Exposure in a 400-500 GeV proton beam with incoming flux of 5 x 10 to the 4th particles over a surface 5 x 5 cm sq.
Approval	14 Jun, 77	Emulsion Exposure
Completed	15 Jan, 78	24 Stack(s)

549 **QUARK #549** — Michael J. Longo — UNIVERSITY OF MICHIGAN - ANN ARBOR; STANFORD UNIVERSITY

BEAM: Neutrino Area - Miscellaneous
A SEARCH FOR FRACTIONAL CHARGES USING ACCELERATOR AND LOW TEMPERATURE TECHNIQUES.

Request	2 May, 77	Parasitic Running to expose at least 12 niobium spheres in the vicinity of a proton beam with intensities of > 1 x 10 to the 13th per pulse
Approval	16 May, 77	Parasitic Running contingent on the target being prepared and provided by the experimenters
Approved/Inactive	1 Oct, 78	1 Target Exposure(s) as of 1 Oct 1978

552 **P-N SCATTERING #552** — Felix Sannes — IMPERIAL COLLEGE (ENGLAND); UNIVERSITY OF ROCHESTER; RUTGERS UNIVERSITY

BEAM: Internal Target Area (C-0)
A PROPOSAL TO STUDY P - P ELASTIC AND P - D COHERENT SCATTERING.

Request	6 May, 77	900 Hours
Approval	25 Jun, 77	800 Hours conditional on cryogenic operation of the Internal Target Area
Completed	9 Apr, 78	950 Hours

553 **NEUTRINO #553** — Paul F. Shepard — CORNELL UNIVERSITY; UNIVERSITY OF LIBRE (BELGIUM); UNIVERSITY OF LUND (SWEDEN); UNIVERSITY OF OKLAHOMA; UNIVERSITY OF PADOVA (ITALY); UNIVERSITY OF PITTSBURGH; INFN, ROME (ITALY); UNIVERSITY OF SYDNEY (AUSTRALIA); UNIVERSITY OF TORINO (ITALY); YORK UNIVERSITY (CANADA)

BEAM: Neutrino Area - Wide Band Horn
A PROPOSAL TO SEARCH FOR SHORT-LIVED PARTICLES PRODUCED BY ANTINEUTRINOS AND NEUTRINOS
(Using a hybrid emulsion-visual detecter.)

Request	6 May, 77	2,000 Hours with a specific request for 4 x 10 to the 18th protons
	5 Mar, 79	2,500 Hours total with an additional 1,000 hours for a run of at least 7 x 10 to the 18th protons with the broad band beam tuned for neutrinos
Approval	24 Jun, 77	Parasitic Running conditional on review of detector tests
	16 Nov, 77	Parasitic Running conditional on review of detector tests in January 1978
	1 Jul, 79	Parasitic Running concurrent with the next 15-foot bubble chamber neutrino run with the Wide Band Horn
Completed	1 Apr, 80	1,500 Hours

555 **NEUTRAL HYPERON #555** — Thomas J. Devlin — UNIVERSITY OF MICHIGAN - ANN ARBOR; UNIVERSITY OF MINNESOTA; RUTGERS UNIVERSITY; UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M2 Beam
A PROPOSAL TO STUDY CROSS SECTIONS AND POLARIZATION IN NEUTRAL STRANGE PARTICLE PRODUCTION AT HIGH TRANSVERSE MOMENTUM.
(Using the neutral hyperon beam and associated experimental apparatus.)

Request	6 May, 77	250 Hours for tuneup and data
	19 May, 78	530 Hours for tuning and data at intensities of 1 x 10 to the 11th per pulse
Approval	15 Nov, 78	450 Hours
Completed	17 Feb, 82	650 Hours

557 **HADRON JETS #557** — Ernest I. Malamud — UNIVERSITY OF ARIZONA; CALIFORNIA INSTITUTE OF TECHNOLOGY; FERMILAB; FLORIDA STATE UNIVERSITY; GEORGE MASON UNIVERSITY; UNIV. OF ILLINOIS, CHICAGO CIRCLE; INDIANA UNIVERSITY; UNIVERSITY OF MARYLAND; IHEP, PROTVINO (SERPUKHOV)(RUSSIA); RUTGERS UNIVERSITY

BEAM: Meson Area - Test Beam
PROPOSAL TO STUDY HADRON JETS WITH THE CALORIMETER TRIGGERED MULTIPARTICLE SPECTROMETER.
(Continuation of work begun in exp #260.)

Request	9 May, 77	1,600 Hours for data with a suggested run plan as follows - 400 hours at 200 GeV, 800 hours with upgraded M6-beam at 300 GeV, and 400 hours at 400 GeV
Approval	24 Jun, 77	1,600 Hours conditional on a better understanding of beam requirements for the experiment after an upgrading of the M6 beam
Completed	14 Jul, 84	1,470 Hours

564 **15-FOOT & EMULSION/NEUTRINO#564** Louis Voyvodic

FERMILAB
ILLINOIS INSTITUTE OF TECHNOLOGY
JINR, DUBNA (RUSSIA)
UNIVERSITY OF KANSAS
INP, KRAKOW (POLAND)
ITEP, MOSCOW (RUSSIA)
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
INST.FOR NUCL. RESEARCH (BULGARIA)
UNIVERSITY OF SYDNEY (AUSTRALIA)
UNIVERSITY OF WASHINGTON

BEAM: Neutrino Area - Wide Band Horn
DIRECT DETECTION OF SHORT-LIVED PARTICLES FROM NEUTRINO INTERACTIONS IN NUCLEAR EMULSIONS INSIDE THE 15-FOOT BUBBLE CHAMBER.

Request	11 May, 77	1,500 Hours with a specific request for neutrinos from a total proton flux of 3 x 10 to the 18th; running is proposed during the 15-foot running period with a deuterium fill planned for the spring of 1978
	8 May, 79	1,100 Hours additional to be run parasitically in the 15-ft chamber. film from two auxiliary cameras is requested for the neutrino portion of the running
Approval	24 Jun, 77	Parasitic Running with the understanding that the experiment impose only a small impact on the 15-ft chamber operations
	1 Jul, 79	Parasitic Running with the understanding that the experiment impose only a small impact on the 15-ft chamber operations
Completed	9 Mar, 81	277 K Pix

565 **30-INCH HYBRID #565** Irwin A. Pless

BROWN UNIVERSITY
FERMILAB
COLLEGE DE FRANCE (FRANCE)
INDIANA UNIVERSITY
MASSACHUSETTS INST. OF TECHNOLOGY
NIJMEGEN UNIVERSITY (NETHERLANDS)
OAK RIDGE NATIONAL LABORATORY
RUTGERS UNIVERSITY
STEVENS INSTITUTE OF TECHNOLOGY
UNIVERSITY OF TEL-AVIV (ISRAEL)
UNIVERSITY OF TENNESSEE, KNOXVILLE
TOHOKU GAKUIN UNIVERSITY (JAPAN)
TOHOKU UNIVERSITY (JAPAN)
YALE UNIVERSITY

BEAM: Neutrino Area - 30 in. Hadron Beam
A STUDY OF THE DETAILED CHARACTERISTICS OF HADRON-NUCLEUS COLLISIONS USING THE FERMILAB HYBRID SPECTROMETER.
(The experiment would be run with aluminum, silver, and gold foil targets mounted inside the 30-inch hydrogen-filled bubble chamber.)

Request	2 Jun, 77	3,000 K Pix in a 400 GeV proton beam (400 hours, 1,000K pix) and a 200 GeV proton plus pion beam (800 hours, 2,000K pix)
	7 Feb, 78	2,000 K Pix to be taken as follows- 500K pix with 200 GeV incident protons 500K pix with 200 GeV incident pi+ 800K pix with 200 GeV incident pi- 200K pix with 400 GeV incident protons
Approval	16 Mar, 78	Parasitic Running with exp #570
Completed	1 Jun, 82	1,068 K Pix total for E-565 and E-570

567 **PARTICLE SEARCH #567** Michael S. Witherell

BROOKHAVEN NATIONAL LABORATORY
CEN-SACLAY (FRANCE)
FERMILAB
PRINCETON UNIVERSITY
UNIVERSITY OF TORINO (ITALY)

BEAM: Proton Area - West
SEARCH FOR CHARM PRODUCTION IN 200 GEV/C HADRON INTERACTIONS.
(Using the spectrometer for exp #302 with additions.)

Request	13 Jun, 77	500 Hours
Approval	24 Jun, 77	500 Hours with 100 hours for checkout and 400 hours for data-taking
Completed	7 Nov, 79	1,650 Hours see exp #650

568 **EMULSION/PI- @ 300 #568** Jacques D. Hebert

UNIVERSITY OF BELGRADE(YUGOSLAVIA)
CRN, STRASBOURG (FRANCE)
FERMILAB
UNIVERSITY OF LUND (SWEDEN)
UNIVERSITY OF NANCY (FRANCE)
UNIVERSITY OF OTTAWA (CANADA)
UNIV. OF PARIS VI, LPG (FRANCE)
LRC, LYON (FRANCE)
UNIVERSITY OF SANTANDER (SPAIN)
UNIVERSITY OF VALENCIA (SPAIN)

BEAM: Neutrino Area - Miscellaneous
300 GEV PION INTERACTIONS IN NUCLEAR EMULSION.

Request	8 Aug, 77	Emulsion Exposure of 3 stacks in a negative beam of about 30K particles per cm sq.
Approval	16 Sep, 77	Emulsion Exposure of 3 stacks in a 300 GeV negative beam with a flux of 30K particles per cm sq over an area of 3 x 3 cm sq
Completed	15 Jan, 78	3 Stack(s)

570 **30-INCH HYBRID #570** Irwin A. Pless

BROWN UNIVERSITY
FERMILAB
COLLEGE DE FRANCE (FRANCE)
INDIANA UNIVERSITY
MASSACHUSETTS INST. OF TECHNOLOGY
NIJMEGEN UNIVERSITY (NETHERLANDS)
OAK RIDGE NATIONAL LABORATORY
RUTGERS UNIVERSITY
STEVENS INSTITUTE OF TECHNOLOGY
UNIVERSITY OF TEL-AVIV (ISRAEL)
UNIVERSITY OF TENNESSEE, KNOXVILLE
TOHOKU GAKUIN UNIVERSITY (JAPAN)
TOHOKU UNIVERSITY (JAPAN)
YALE UNIVERSITY

BEAM: Neutrino Area - 30 in. Hadron Beam
PROPOSAL FOR A STUDY OF PARTICLE PRODUCTION AND DYNAMICS FROM X = 0 TO X = 1 AND THE DEPENDENCE ON INCIDENT QUANTUM NUMBERS.
(Supercedes proposal #488. Will use the forward gamma detector and the downstream ISIS system with the 30-inch hybrid spectrometer.)

Request	16 Sep, 77	2,000 K Pix to be taken with the 30-inch hybrid spectrometer exposed to two beams, 1,000K pix in a positive beam with 10% K+ and equal fractions of protons and pi+, and 1,000K pix in a negative beam with 20% pbars
Approval	16 Mar, 78	1,500 Hours for a run of 15 weeks duration; combined with exp #565
Completed	1 Jun, 82	1,068 K Pix total for E-565 and E-570

573 **EMULSION/PI- @ 300 #573** Noriyuki Ushida

AICHI UNIV. OF EDUCATION (JAPAN)
NAGOYA UNIVERSITY (JAPAN)
YOKOHAMA NATIONAL UNIV. (JAPAN)

BEAM: Neutrino Area - Miscellaneous
A SEARCH FOR CHARMED PARTICLES PRODUCED BY 300 GEV/C NEGATIVE PIONS IN NUCLEAR EMULSION.

Request	29 Nov, 77	3 Stack(s) exposed in a negative pion beam to an integrated flux of 7.5 x 10 to the 3rd particles per cm sq
Approval	29 Nov, 77	3 Stack(s)
Completed	15 Jan, 78	3 Stack(s)

574 **EMULSION/PI- @ 300 #574** — Wladyslaw Wolter — INP, KRAKOW (POLAND)

BEAM: Neutrino Area - Miscellaneous
A STUDY OF THE MECHANISM FOR MULTIPLE PRODUCTION OF PARTICLES AT OR ABOVE 300 GEV PION INTERACTIONS IN NUCLEAR EMULSION.

Request	1 Dec, 77	3 Stack(s)	exposed in a 300 GeV negative pion beam to an integrated intensity of 5 x 10 to the 4th particles per cm sq
Approval	1 Dec, 77	3 Stack(s)	
Completed	18 Jan, 78	4 Stack(s)	

575 **EMULSION/PROTONS @ 400 #575** — Jere J. Lord — UNIVERSITY OF WASHINGTON

BEAM: Neutrino Area - Miscellaneous
PROPOSAL TO STUDY 400 GEV PROTON INTERACTIONS IN NUCLEAR EMULSION.

Request	13 Dec, 77	2 Stack(s)	to be exposed in a 400 GeV proton beam focused to a diameter of less than 5-10 mm. One stacK to receive a total dose of 100K p/cm sq and the other 200K p/cm sq.
Approval	13 Dec, 77	2 Stack(s)	
Completed	15 Jan, 78	2 Stack(s)	

576 **EMULSION/PROTONS @ 500 #576** — Jacques D. Hebert

UNIVERSITY OF BELGRADE(YUGOSLAVIA)
CRN, STRASBOURG (FRANCE)
FERMILAB
UNIVERSITY OF LUND (SWEDEN)
UNIVERSITY OF LYON (FRANCE)
UNIVERSITY OF NANCY (FRANCE)
UNIVERSITY OF OTTAWA (CANADA)
UNIV. OF PARIS VI, LPG (FRANCE)
UNIVERSITY OF SANTANDER (SPAIN)
UNIVERSITY OF VALENCIA (SPAIN)

BEAM: Neutrino Area - Miscellaneous
500 GEV PROTON INTERACTIONS IN NUCLEAR EMULSION

Request	21 Dec, 77	Emulsion Exposure	exposed in a 500 GeV proton beam to a total integrated flux of 3 x 10 to the 4th particles per cm sq
Approval	20 Feb, 78	Emulsion Exposure	
Completed	11 Jul, 85	1 Emulsion Stack(s)	

577 **ELASTIC SCATTERING #577** — Roy Rubinstein

UNIVERSITY OF ARIZONA
UNIV. OF CALIFORNIA, SAN DIEGO
CORNELL UNIVERSITY
FERMILAB

BEAM: Meson Area - M6 Beam
PROPOSAL TO MEASURE PI P ELASTIC SCATTERING AT LARGE ANGLES.

Request	30 Jan, 78	1,000 Hours	to be run in a 200 GeV incident beam with a beam flux between 5 x 10 to the 7th and 5 x 10 to the 8th pions per pulse
Approval	29 Jun, 78	1,000 Hours	
Completed	16 Mar, 81	1,550 Hours	

580 **PARTICLE SEARCH #580** — Daniel R. Green

UNIVERSITY OF ARIZONA
FERMILAB
FLORIDA STATE UNIVERSITY
NOTRE DAME UNIVERSITY
TUFTS UNIVERSITY
VANDERBILT UNIVERSITY
VIRGINIA TECH

BEAM: Meson Area - M6 Beam
A SEARCH FOR NARROW AND BROAD RESONANCES DECAYING INTO LAMBDA-LAMBDA BAR, LAMBDA-LAMBDA BAR-PI, K SHORT AND K SHORT-K SHORT-PI FROM PI- P INTERACTIONS AT 300 GEV USING THE FERMILAB MPS.

Request	31 Jan, 78	800 Hours	to be run in a pion beam with an incident flux of 1.5 x 10 to the 6th pions per pulse at 300 GeV
Approval	29 Jun, 78	800 Hours	
Completed	1 Jun, 81	800 Hours	

581 **POLARIZED SCATTERING #581** — Akihiko Yokosawa

ARGONNE NATIONAL LABORATORY
CEN-SACLAY (FRANCE)
FERMILAB
HIROSHIMA UNIVERSITY (JAPAN)
UNIVERSITY OF IOWA
KYOTO SANGYO UNIVERSITY (JAPAN)
KYOTO UNIVERSITY (JAPAN)
KYOTO UNIV. OF EDUCATION (JAPAN)
LAPP, D'ANNECY-LE-VIEUX (FRANCE)
LOS ALAMOS NATIONAL LABORATORY
NORTHWESTERN UNIVERSITY
UN. OF OCCUP. & ENV. HEALTH(JAPAN)
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
RICE UNIVERSITY
UNIVERSITY DI TRIESTE (ITALY)
UNIVERSITY OF UDINE (ITALY)

BEAM: Meson Area - Polarized Proton Beam
CONSTRUCTION OF A POLARIZED BEAM FACILITY IN THE MESON LABORATORY AND EXPERIMENTS USING SUCH A FACILITY.
(Using the M2-beam converted to a polarized proton/antiproton beam.)

Request	31 Jan, 78	1,200 Hours	to include- 600 hours for total cross section difference measurements 600 hours for asymmetry measurements in inclusive pion production
	30 Jan, 79	1,670 Hours	to include- 200 hours for beam measurements 1,000 hours for high p-transverse physics 220 hours for cross section measurements 250 hours for hadron production at large-x
Approval	27 Nov, 79	Unspecified	approval for the construction of a polarized beam only There is no approval yet for any experiment to use the beam.
Approved/Inactive	10 Feb, 84	Unspecified	

584 **PARTICLE SEARCH #584** — Bruce D. Winstein

UNIVERSITY OF CHICAGO
STANFORD UNIVERSITY
UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M3 Beam
PROPOSAL TO SEARCH FOR THE DECAY OF NEW LONG-LIVED NEUTRAL PARTICLES WITH A MASS AND LIFETIME EXCEEDING THAT OF THE K LONG.

Request	31 Jan, 78	300 Hours	to be run in the M3 beam as modified for experiment #533
Approval	29 Jun, 78	300 Hours	with low priority
Completed	22 Jan, 80	400 Hours	

585 **KAON CHARGE EXCHANGE #585** — William R. Francis — UNIV. OF CALIFORNIA, DAVIS; UNIV. OF CALIFORNIA, SAN DIEGO; CARELTON UNIVERSITY (CANADA); MICHIGAN STATE UNIVERSITY

BEAM: Meson Area - M4 Beam
A PROPOSAL TO STUDY EXCLUSIVE KN CHARGE EXCHANGE AT FERMILAB.
(The spectrometer from experiment #383 would be used.)

Request	31 Jan, 78	600 Hours	to be run immediately following the conclusion of exp #383
	13 Nov, 78	2,700 Hours	for 7 weeks of data to finish K- running and 9 weeks to repeat the experiment with a K+ beam and a deuterium target
Approval	16 Mar, 78	600 Hours	with conditions before the Meson Laboratory pause
	21 Dec, 78	1,800 Hours	with the approval of an additional 7 weeks of running to finish K- data; no commitment is made to K+ running
Completed	16 Mar, 81	3,150 Hours	

591 **PARTICLE SEARCH #591** — Laszlo J. Gutay — FERMILAB; PURDUE UNIVERSITY

BEAM: Internal Target Area (C-0)
BROAD SEARCH FOR NEW HADRONIC STATES VIA HIGH RESOLUTION CHARGE AND MASS DETERMINATION OF NUCLEAR FRAGMENTS.

Request	31 Jan, 78	800 Hours	to include 200 hours for setup and 600 hours for data
Approval	21 Apr, 78	800 Hours	
Completed	8 Feb, 81	1,950 Hours	

592 **NUCLEAR SCALING #592** — Sherman Frankel — ITEP, MOSCOW (RUSSIA); UNIVERSITY OF PENNSYLVANIA; COLLEGE OF WILLIAM AND MARY

BEAM: Proton Area - West
PROPOSAL FOR EXPERIMENTAL STUDY OF THE RELATIONSHIP BETWEEN HADRONIC AND NUCLEAR SCALING AT VERY HIGH ENERGIES.

Request	31 Jan, 78	300 Hours	to be run in a 400 GeV proton beam at an upstream location in P-West
Approval	17 Mar, 78	300 Hours	to be run in such a manner as not to interfere with the installation of the P-West pion beam
Completed	17 Jul, 78	500 Hours	

594 **NEUTRINO #594** — James K. Walker — FERMILAB; ILLINOIS INSTITUTE OF TECHNOLOGY; MASSACHUSETTS INST. OF TECHNOLOGY; MICHIGAN STATE UNIVERSITY; NORTHERN ILLINOIS UNIVERSITY

BEAM: Neutrino Area - Dichromatic
PROPOSAL FOR A NEW NEUTRINO DETECTOR AT FERMILAB.

Request	1 Feb, 78	2,500 Hours	for data to include: Experiment A (a study of semi-leptonic neutral current reactions) to require 6 x 10 to the 18th protons utilizing the narrow band beam at 250 GeV; Experiment B (neutrino electron elastic scattering) to require 6 x 10 to the 18th protons utilizing the two-horn beam
Approval	16 Mar, 78	Unspecified	
Completed	14 Jun, 82	4,400 Hours	

595 **PARTICLE SEARCH #595** — Arie Bodek — CALIFORNIA INSTITUTE OF TECHNOLOGY; UNIVERSITY OF CHICAGO; FERMILAB; UNIVERSITY OF ROCHESTER; STANFORD UNIVERSITY

BEAM: Neutrino Area - 15 ft. Hadron Beam
A STUDY OF CHARM AND OTHER NEW FLAVORS PRODUCED IN PION-NUCLEON COLLISIONS.
(Continuation of work begun in exp #379.)

Request	1 Feb, 78	1,000 Hours	to include 400 hours at 300 GeV with an incident intensity of 10 to the 5th pi- per pulse and 400 hours at 250-300 GeV with incident intensity of 10 to the 6th pi- per pulse
Approval	29 Jun, 78	600 Hours	for the low-pt part of the experiment
Completed	16 Jun, 80	1,450 Hours	

596 **PARTICLE SEARCH #596** — Leon M. Lederman — COLUMBIA UNIVERSITY; FERMILAB; SUNY AT STONY BROOK

BEAM: Neutrino Area - Muon/Hadron Beam
ON SEARCHING FOR HEAVY STABLE PARTICLES
(A continuation of work begun with exp #187.)

Request	3 Feb, 78	150 Hours	to be run with the beam tuned to 75 GeV and assuming 10 to the 13th primary protons incident per pulse
Approval	1 May, 78	150 Hours	
Completed	21 May, 78	200 Hours	

597 **30-INCH HYBRID #597** — James J. Whitmore — UNIVERSITY OF CAMBRIDGE (ENGLAND); DUKE UNIVERSITY; FERMILAB; UNIVERSITY OF KANSAS; MICHIGAN STATE UNIVERSITY; NOTRE DAME UNIVERSITY

BEAM: Neutrino Area - 30 in. Hadron Beam
PROPOSAL FOR A HIGH STATISTICS STUDY OF PBAR-P ANNIHILATIONS AND A COMPARISON OF PBAR, P, PI+-, AND K+ INTERACTIONS ON HYDROGEN, MAGNESIUM, AND GOLD AT 100 GEV/C UTILIZING THE FERMILAB 30-INCH HYDROGEN BUBBLE CHAMBER.
(The use of thin metallic foil targets in the hydrogen is requested.)

Request	3 Feb, 78	1,450 K Pix	to be taken as follows- 1,000K pix in negative beam @ 100 GeV; 400K pix in positive beam @ 100 GeV; 50K pix in negative beam @ 360 GeV
Approval	16 Mar, 78	1,000 Hours	for a run of 10 weeks duration
Completed	3 May, 82	658 K Pix	

605 **HIGH MASS PAIRS #605** — John P. Rutherfoord — CEN-SACLAY (FRANCE); CERN (SWITZERLAND); COLUMBIA UNIVERSITY; FERMILAB; KEK (JAPAN); KYOTO UNIVERSITY (JAPAN); SUNY AT STONY BROOK; UNIVERSITY OF WASHINGTON

BEAM: Meson Area - East
A STUDY OF LEPTONS AND HADRONS NEAR THE KINEMATIC LIMITS.
(Using an apparatus with higher luminosity and acceptance than experiment #288.)

Request	9 May, 78	4,000 Hours	to be run with an incident intensity greater than 10 to the 13th protons/pulse at an energy of at least 400 GeV
	28 Nov, 78	4,000 Hours	in the Phase I configuration. an incident beam of 400 GeV protons would be needed with an intensity of 3 x 10 to the 12th per pulse
Approval	19 Mar, 79	1,000 Hours	with the Phase I detector
Completed	29 Aug, 85	3,970 Hours	

608 **PARTICLE SEARCH #608** — Charles N. Brown — COLUMBIA UNIVERSITY, FERMILAB, SUNY AT STONY BROOK

BEAM: Proton Area - Center
A SEARCH FOR THE ETA SUB C IN HADRONIC INTERACTIONS.
(Using the spectrometer from exp #288/494.)

Request	28 Sep, 78	100 Hours in the P-center proton beam at an incident intensity of 3 x 10 to the 9th protons per pulse
Approval	25 Jan, 79	Parasitic Running
Completed	7 Mar, 79	600 Hours

609 **HADRON JETS #609** — Walter Selove — ARGONNE NATIONAL LABORATORY, FERMILAB, LEHIGH UNIVERSITY, UNIVERSITY OF PENNSYLVANIA, RICE UNIVERSITY, UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M6 Beam
A STUDY OF THE STRUCTURE OF HIGH P TRANSVERSE HADRONIC INTERACTIONS.
(This proposal supersedes P-246.)

Request	2 Oct, 78	1,500 Hours for Phase 1 to be run in a beam with 400 GeV capability with at least 10 to the 8th protons per sec incident Phase 2 would include addition of a large aperture magnet, Cerenkov imaging device and PWC's; Phase 3 would include a request for a higher energy beam
Approval	16 Nov, 78	Unspecified with conditions
	30 Jan, 80	1,500 Hours
Completed	14 Feb, 84	620 Hours

610 **PARTICLE SEARCH #610** — Thomas B. W. Kirk — FERMILAB, HOWARD UNIVERSITY, UNIVERSITY OF ILLINOIS, CHAMPAIGN, UNIVERSITY OF PENNSYLVANIA, PURDUE UNIVERSITY, TUFTS UNIVERSITY

BEAM: Neutrino Area - Muon/Hadron Beam
PION PRODUCTION OF HEAVY QUARK MESON STATES DECAYING INTO THE PSI/J (3097).
(Continuation of work begun in exp #369 but with upgraded cyclotron spectrometer.)

Request	2 Oct, 78	1,000 Hours to be run with an incident intensity of 10 to the 13th protons per pulse on the production target
Approval	21 Dec, 78	1,000 Hours with a schedule yet to be formally determined
Completed	23 Jun, 80	1,250 Hours see proposal #673

612 **PHOTON DISSOCIATION #612** — Konstantin Goulianos — ROCKEFELLER UNIVERSITY

BEAM: Proton Area - East
A PROPOSAL TO MEASURE THE DIFFRACTIVE PHOTON DISSOCIATION ON HYDROGEN.

Request	2 Oct, 78	1,150 Hours to be run in the tagged photon beam with 10 to the 6th incident photons per pulse
Approval	15 Nov, 78	1,150 Hours
Completed	12 Apr, 82	1,850 Hours

613 **BEAM DUMP #613** — Byron P. Roe — UNIVERSITY OF FIRENZE (ITALY), UNIVERSITY OF MICHIGAN - ANN ARBOR, OHIO STATE UNIVERSITY, UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M2 Beam
PROPOSAL FOR A PROMPT NEUTRINO EXPERIMENT AT FERMILAB.

Request	2 Oct, 78	1,000 Hours to obtain an exposure of 1 - 2 x 10 to the 17th protons with an incident intensity of 1 x 10 to the 12th protons/pulse
Approval	15 Nov, 78	1,000 Hours with an expected reassessment of physics priorities and possible implications for this experiment in the fall of 1979
Completed	13 May, 82	1,800 Hours

615 **FORWARD SEARCH #615** — Kirk T. McDonald — UNIVERSITY OF CHICAGO, FERMILAB, IOWA STATE UNIVERSITY, PRINCETON UNIVERSITY

BEAM: Proton Area - West
A STUDY OF THE FORWARD PRODUCTION OF MASSIVE PARTICLES. IN PHASE ONE THE FORWARD PRODUCTION OF MUON PAIRS WOULD BE STUDIED.
(Using a forward spectrometer with mass selection.)

Request	28 Nov, 78	1,000 Hours to be run in a 50-GeV pion beam at an incident intensity of 10 to the 10th pions per pulse
	7 May, 79	1,000 Hours to include 600 hours of running with 250 GeV pions and 200 hours with 75 GeV pions. A primary proton intensity of 10 to the 13th per pulse on the P-West production target and 300 pulses per hour are assumed.
Approval	1 Jul, 79	1,000 Hours
Completed	14 Jul, 84	2,260 Hours

616 **NEUTRINO #616** — Frank J. Sciulli — CALIFORNIA INSTITUTE OF TECHNOLOGY, COLUMBIA UNIVERSITY, FERMILAB, UNIVERSITY OF ROCHESTER, ROCKEFELLER UNIVERSITY

BEAM: Neutrino Area - Dichromatic
PROPOSAL TO MEASURE NEUTRINO STRUCTURE FUNCTIONS.
(Use of the Lab E neutrino detector to continue work begun in exp #356.)

Request	29 Jan, 79	3,200 Hours to include specifically 600 hours for checkout, calibration and background studies, and 2 x 10 to the 19th protons at 400 GeV for data
Approval	19 Mar, 79	4,000 Hours approximately or 2 x 10 to the 19th protons to be combined with running for exp #356
Completed	22 Jan, 80	2,900 Hours

617 **CP VIOLATION #617** — Bruce D. Winstein — CEN-SACLAY (FRANCE), UNIVERSITY OF CHICAGO

BEAM: Meson Area - M3 Beam
A STUDY OF DIRECT CP VIOLATION IN THE DECAY OF THE NEUTRAL KAON VIA A PRECISION MEASUREMENT OF THE RATIO OF ETA 00 TO ETA +-.

Request	30 Jan, 79	1,000 Hours for data
Approval	19 Mar, 79	1,000 Hours
Completed	14 Jun, 82	2,300 Hours

619 **TRANSITION MAGNETIC MOMENT #619** — Thomas J. Devlin — UNIVERSITY OF MICHIGAN - ANN ARBOR; UNIVERSITY OF MINNESOTA; RUTGERS UNIVERSITY; UNIVERSITY OF WISCONSIN - MADISON

BEAM: Proton Area - Center
A MEASUREMENT OF THE SIGMA-ZERO TO LAMBDA TRANSITION MAGNETIC MOMENT.

Request	7 May, 79	250 Hours	to be run in the diffracted proton beam (normally 400 GeV) at an intensity between 10 to the 8th and 10 to the 9th protons per pulse with a 1-sec spill
Approval	1 Jul, 79	250 Hours	
Completed	14 Jun, 82	675 Hours	

620 **CHARGED HYPERON MAG MOMENT #620** — Lee G. Pondrom — UNIVERSITY OF MICHIGAN - ANN ARBOR; UNIVERSITY OF MINNESOTA; RUTGERS UNIVERSITY; UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M2 Beam
PROPOSAL TO MEASURE THE MAGNETIC MOMENTS OF THE SIGMA +, SIGMA -, XI -, AND OMEGA - HYPERONS USING THE FERMILAB NEUTRAL HYPERON BEAM.

Request	7 May, 79	300 Hours	to be run in the diffracted proton beam (350 to 400 GeV) at an intensity of 10 to the 9th protons per pulse and a 1-sec spill
Approval	1 Jul, 79	300 Hours	
Completed	22 Jan, 80	900 Hours	

621 **CP VIOLATION #621** — Gordon B. Thomson — UNIVERSITY OF MICHIGAN - ANN ARBOR; UNIVERSITY OF MINNESOTA; RUTGERS UNIVERSITY

BEAM: Proton Area - Center
A MEASUREMENT OF THE CP VIOLATION PARAMETER ETA +-0.
(Use of the neutral hyperon spectrometer is assumed.)

Request	7 May, 79	1,200 Hours	to be run in 2 phases consisting of 200 hours for Phase 1 with some modifications to the present apparatus 1000 hours for Phase 2 at a later date after results from Phase 1 have been analyzed
Approval	1 Jul, 81	Unspecified	
Completed	29 Aug, 85	2,470 Hours	

622 **QUARK #622** — H. Richard Gustafson — UNIVERSITY OF MICHIGAN - ANN ARBOR

BEAM: Meson Area - M2 Beam
PROPOSAL TO SEARCH FOR FRACTIONAL CHARGE PARTICLES FROM A MAGNETIZED BEAM DUMP.

Request	7 May, 79	100 Hours	to be run partially in conjunction with exp #361 using the beam dump from that experiment
Approval	1 Jul, 79	Parasitic	Running in a mode that is not to interfere with the operation of exp #361
Completed	23 Jun, 80	Unspecified	

623 **PARTICLE SEARCH #623** — Daniel R. Green — UNIVERSITY OF ARIZONA; FERMILAB; FLORIDA STATE UNIVERSITY; NOTRE DAME UNIVERSITY; TUFTS UNIVERSITY; VANDERBILT UNIVERSITY; VIRGINIA TECH

BEAM: Meson Area - M6 Beam
PROPOSAL TO STUDY HIGH MASS STATES DECAYING INTO PHI-PI AND PHI-PHI PAIRS PRODUCED CENTRALLY IN 300 GEV/C PI MINUS PROTON INTERACTIONS.
(Use of the Fermilab multiparticle spectrometer facility is assumed.)

Request	7 May, 79	1,000 Hours	to be run in a 300 GeV/c beam of negative pions at an intensity of a few times 10 to the 6th pions per pulse
Approval	14 Nov, 80	500 Hours	to be run before 1983
Completed	14 Jun, 82	425 Hours	

629 **DIRECT PHOTON PRODUCTION #629** — Charles A. Nelson, Jr. — FERMILAB; MICHIGAN STATE UNIVERSITY; UNIVERSITY OF MINNESOTA; NORTHEASTERN UNIVERSITY; UNIVERSITY OF ROCHESTER; TEXAS A&M UNIVERSITY

BEAM: Meson Area - M1 Beam
DIRECT PHOTON PRODUCTION IN HADRON NUCLEUS COLLISIONS.

Request	25 Feb, 80	600 Hours	to include 200 hrs for set up, 400 hrs for data
Approval	7 Jul, 80	Unspecified	approved as a test in the M-1 beam line in the fall of 1980
Completed	9 Mar, 81	600 Hours	

630 **CHARM PARTICLE #630** — Jack Sandweiss — FERMILAB; LAWRENCE BERKELEY LABORATORY; YALE UNIVERSITY

BEAM: Proton Area - Center
STUDY OF B PARTICLE AND CHARMED PARTICLE PRODUCTION AND DECAY USING A HIGH RESOLUTION STREAMER CHAMBER.

Request	26 Feb, 80	600 Hours	
Approval	15 Mar, 80	600 Hours	
Completed	15 Mar, 82	1,150 Hours	

631 **NUC CALIBRATION CROSS SECT #631** — Samuel I. Baker — BROOKHAVEN NATIONAL LABORATORY; CERN (SWITZERLAND); FERMILAB

BEAM: Neutrino Area - Miscellaneous
A MEASUREMENT OF NUCLEAR CALIBRATION CROSS SECTIONS FOR PROTONS BETWEEN 100 AND 1000 GEV.

Request	26 Feb, 80	25 Exposure(s)	
Approval	15 Dec, 80	Unspecified	in neutrino area
Completed	1 Jun, 81	41 Exposure(s)	

632 **15-FT NEUTRINO/H2 & NE #632** — Douglas R. O. Morrison and Michael W. Peters

UNIVERSITY OF BIRMINGHAM (ENGLAND)
UNIV. OF CALIFORNIA, BERKELEY
CEN-SACLAY (FRANCE)
CERN (SWITZERLAND)
FERMILAB
UNIVERSITY OF HAWAII AT MANOA
ILLINOIS INSTITUTE OF TECHNOLOGY
IMPERIAL COLLEGE (ENGLAND)
JAMMU UNIVERSITY (INDIA)
UNIVERSITY OF LIBRE (BELGIUM)
MAX-PLANCK INSTITUTE (GERMANY)
MOSCOW STATE UNIVERSITY (RUSSIA)
ITEP, MOSCOW (RUSSIA)
UNIVERSITY OF OXFORD (ENGLAND)
PANJAB UNIVERSITY (INDIA)
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
RUTGERS UNIVERSITY
TUFTS UNIVERSITY

BEAM: Neutrino Area - Center
AN EXPOSURE OF THE 15-FOOT BUBBLE CHAMBER WITH A NEON-HYDROGEN MIXTURE TO A WIDEBAND NEUTRINO BEAM FROM THE TEVATRON.

Request	25 Apr, 80	250 K Pix
Approval	18 Jun, 82	1 E18th Protons Stage I approval
	15 Dec, 83	1 E18th Protons Stage II approval
Completed	1 Feb, 88	446 K Pix

635 **NEUTRINO #635** — Luke W. Mo

FERMILAB
VIRGINIA TECH

BEAM: Neutrino Area - Prompt Beam
PROPOSAL TO MEASURE MUON NEUTRINO ELECTRON AND MUON ANTI-NEUTRINO ELECTRON ELASTIC SCATTERING, NEUTRINO OSCILLATIONS, AND DECAYS OF LONG-LIVED NEUTRAL PARTICLES AT THE TEVATRON OF FERMILAB.

Request	25 Apr, 80	... 3 x 10 to the 18th protons
	16 Mar, 83	Unspecified
Approval	12 Nov, 83	Unspecified Stage I approval.
Approved/Inactive	1 Feb, 88	Unspecified

636 **BEAM DUMP #636** — Toshio Kitagaki and Irwin A. Pless

IHEP, BEIJING (PRC)
BROWN UNIVERSITY
FERMILAB
INDIANA UNIVERSITY
MASSACHUSETTS INST. OF TECHNOLOGY
OAK RIDGE NATIONAL LABORATORY
TECHNION-ISRAEL INST (ISRAEL)
UNIVERSITY OF TEL-AVIV (ISRAEL)
UNIVERSITY OF TENNESSEE, KNOXVILLE
TOHOKU GAKUIN UNIVERSITY (JAPAN)
TOHOKU UNIVERSITY (JAPAN)

BEAM: Neutrino Area - Prompt Beam
NEUTRINO INTERACTION STUDIES WITH A HEAVY LIQUID BUBBLE CHAMBER AT TEVATRON ENERGIES USING A BEAM DUMP TECHNIQUE TO PRODUCE THE NEUTRINO BEAM.

Request	25 Apr, 80	2.5 E18th Protons
Approval	14 Nov, 80	Unspecified
Approved/Inactive	1 Feb, 88	Unspecified

646 **15-FT BEAM DUMP #646** — Michael W. Peters

UNIV. OF CALIFORNIA, BERKELEY
FERMILAB
UNIVERSITY OF HAWAII AT MANOA
ILLINOIS INSTITUTE OF TECHNOLOGY
RUTGERS UNIVERSITY
STEVENS INSTITUTE OF TECHNOLOGY
TUFTS UNIVERSITY

BEAM: Neutrino Area - Prompt Beam
SEARCH FOR THE TAU NEUTRINO AND STUDY OF ELECTRON NEUTRINO AND ELECTRON ANTI-NEUTRINO INTERACTIONS.

Request	25 Apr, 80	2 E18th Protons
Approval	1 Jul, 81	Unspecified
Approved/Inactive	1 Feb, 88	Unspecified

650 **PARTICLE SEARCH #650** — Robert C. Webb

BROOKHAVEN NATIONAL LABORATORY
CEN-SACLAY (FRANCE)
PRINCETON UNIVERSITY
TEXAS A&M UNIVERSITY
UNIVERSITY OF TORINO (ITALY)

BEAM: Proton Area - West
REQUEST FOR A CONTINUATION OF E-567.

Request	29 Apr, 80	500 Hours
Approval	7 Jul, 80	500 Hours expected to run in the spring 1981 running period.
Completed	29 Dec, 80	550 Hours

653 **PARTICLE SEARCH #653** — Neville W. Reay

AICHI UNIV. OF EDUCATION (JAPAN)
UNIV. OF CALIFORNIA, DAVIS
CARNEGIE-MELLON UNIVERSITY
CHONNAM NATIONAL UNIVERSITY(KOREA)
FERMILAB
GIFU UNIVERSITY (JAPAN)
GYEONGSANG NATIONAL UNIV. (KOREA)
KINKI UNIVERSITY (JAPAN)
KOBE UNIVERSITY (JAPAN)
KOREA UNIVERSITY, SEOUL (KOREA)
NAGOYA INST. OF TECHNOLOGY (JAPAN)
NAGOYA UNIVERSITY (JAPAN)
OHIO STATE UNIVERSITY
OKAYAMA UNIVERSITY (JAPAN)
UNIVERSITY OF OKLAHOMA
OSAKA CITY UNIVERSITY (JAPAN)
OSAKA SCIENCE EDUC. INST. (JAPAN)
TOHO UNIVERSITY (JAPAN)
UTSUNOMIYA UNIVERSITY (JAPAN)
WON KWANG UNIVERSITY, IRI (KOREA)

BEAM: Neutrino Area - East
A PROPOSAL TO MEASURE CHARM AND B DECAYS VIA HADRONIC PRODUCTION IN A HYBRID EMULSION SPECTROMETER.

Request	1 May, 80	1,500 Hours
Approval	1 Jul, 81	Unspecified
Completed	15 Feb, 88	1,800 Hours

660 **CHANNELING #660** — Walter M. Gibson

CERN (SWITZERLAND)
CHALK RIVER NUCLEAR LAB. (CANADA)
FERMILAB
JINR, DUBNA (RUSSIA)
UNIVERSITY OF NEW MEXICO
SUNY AT ALBANY
UNIVERSITY OF STRASBOURG (FRANCE)

BEAM: Meson Area - M4 Beam
PROPOSAL TO STUDY THE EFFECT OF BENT CRYSTALS ON CHANNELING NEAR THE CRITICAL RADIUS OF BENDING.

Request	10 Jun, 80	300 Hours
Approval	14 Nov, 80	400 Hours
Completed	13 Jun, 82	425 Hours

663 **LAMBDA POLARIZATION #663** — Hans G. E. Kobrak

UNIV. OF CALIFORNIA, DAVIS
UNIV. OF CALIFORNIA, SAN DIEGO
CARELTON UNIVERSITY (CANADA)
FERMILAB
MICHIGAN STATE UNIVERSITY

BEAM: Meson Area - M4 Beam
COMPARISON OF POLARIZATION OF INCLUSIVELY PRODUCED LAMBDAS AND ANTILAMBDAS BY PROTONS, ANTIPROTONS, KAONS AND PIONS ON HYDROGEN.

Request	29 Sep, 80	1,000 Hours
Approval	14 Nov, 80	800 Hours must be completed by July 1, 1981
Completed	1 Jun, 81	500 Hours

665 **TEVATRON MUON #665** — Heidi M. Schellman

ARGONNE NATIONAL LABORATORY
UNIV. OF CALIFORNIA, SAN DIEGO
FERMILAB
FREIBURG UNIVERSITY (GERMANY)
HARVARD UNIVERSITY
UNIV. OF ILLINOIS, CHICAGO CIRCLE
INP, KRAKOW (POLAND)
LAWRENCE LIVERMORE LABORATORY
UNIVERSITY OF MARYLAND
MASSACHUSETTS INST. OF TECHNOLOGY
MAX-PLANCK INSTITUTE (GERMANY)
NORTHWESTERN UNIVERSITY
OHIO UNIVERSITY
UNIVERSITY OF PENNSYLVANIA
UNIVERSITY OF WASHINGTON
UNIVERSITY OF WUPPERTAL (GERMANY)
YALE UNIVERSITY

BEAM: Neutrino Area - Muon Beam
MUON SCATTERING WITH HADRON DETECTION AT THE TEVATRON.

Request	3 Oct, 80	3,000 Hours
Approval	1 Jul, 81	1,000 Hours
	30 Jan, 89	... Tracking system upgrade
Data Analysis	8 Jan, 92	Unspecified
Completed	1 Mar, 99	Unspecified

666 **EMULSION EXPOSURE #666** — Richard J. Wilkes

INP, KRAKOW (POLAND)
UNIVERSITY OF WASHINGTON

BEAM: Proton Area - Center
EMULSION EXPOSURE TO SIGMA MINUS BEAM AT FERMILAB.

Request	2 Dec, 80	1 K Pix
Approval	2 Dec, 80	Unspecified
Completed	9 Mar, 81	6 Stack(s)

667 **EMULSION/PI- @ 500 #667** — Wladyslaw Wolter

INP, KRAKOW (POLAND)
LEBEDEV PHYSICAL INST. (RUSSIA)
LOUISIANA STATE UNIVERSITY
TASHKENT, PHY.TEC.INS (UZBEKISTAN)

BEAM: Proton Area - East
STUDY OF PION-NUCLEUS INTERACTIONS IN PURE EMULSION STACKS AND EMULSION CHAMBERS AT ENERGY ABOVE 500 GEV.

Request	2 Dec, 80	Emulsion Exposure
Approval	28 Mar, 90	Unspecified
Completed	27 Aug, 90	Unspecified

668 **EMULSION/PI- @ 800 #668** — Wladyslaw Wolter

INP, KRAKOW (POLAND)

BEAM: Unspecified Beam
STUDY OF PION NUCLEUS INTERACTIONS IN PURE EMULSION STACKS AND EMULSION CHAMBERS AT ENERGY ABOVE 800 GEV.

Request	2 Dec, 80	Emulsion Exposure
Completed	26 Apr, 85	Emulsion Exposure

672A **HADRON JETS #672A** — Andrzej Zieminski

FERMILAB
UNIV. OF ILLINOIS, CHICAGO CIRCLE
INDIANA UNIVERSITY
UNIVERSITY OF LOUISVILLE
UNIVERSITY OF MICHIGAN - FLINT
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)

BEAM: Meson Area - West
A STUDY OF HADRONIC FINAL STATES PRODUCED IN ASSOCIATION WITH HIGH-PT JETS AND HIGH-MASS DIMUONS.

Request	1 Feb, 81	2,000 Hours for data taking plus 500 hours for setup and testing
Approval	1 Jul, 81	Unspecified
Data Analysis	8 Jan, 92	Unspecified
Completed	1 Mar, 99	Unspecified

673 **CHI MESON #673** — John W. Cooper

FERMILAB
UNIVERSITY OF ILLINOIS, CHAMPAIGN
UNIVERSITY OF PENNSYLVANIA
PURDUE UNIVERSITY
TUFTS UNIVERSITY

BEAM: Neutrino Area - Muon/Hadron Beam
CHI MESON PRODUCTION BY HADRONS.
(E-610 extension.)

Request	1 Feb, 81	1,500 Hours to be run with Dichromatic train during the fall 1981 period
Approval	1 Jul, 81	Unspecified
Completed	14 Apr, 82	1,100 Hours

683 **PHOTOPRODUCTION OF JETS #683** — Marjorie D. Corcoran

BALL STATE UNIVERSITY
FERMILAB
UNIVERSITY OF IOWA
UNIVERSITY OF MARYLAND
UNIVERSITY OF MICHIGAN - ANN ARBOR
RICE UNIVERSITY
VANDERBILT UNIVERSITY

BEAM: Proton Area - Broad Band
PHOTOPRODUCTION OF HIGH PT JETS.

Request	1 Feb, 81	1,200 Hours including 500 hours for tune-up, calibration and some hadron beam running
Approval	15 Dec, 83	Unspecified Stage I approval.
	4 Apr, 87	Unspecified Stage II approval.
Data Analysis	8 Jan, 92	Unspecified
Completed	1 Mar, 99	Unspecified

687 **PHOTOPRODUCTION OF CHARM AND B #687** — Joel N. Butler and John P. Cumalat

UNIV. OF CALIFORNIA, DAVIS
UNIVERSITY OF COLORADO AT BOULDER
FERMILAB
INFN, FRASCATI (ITALY)
UNIVERSITY OF ILLINOIS, CHAMPAIGN
INFN, MILANO (ITALY)
UNIVERSITY OF MILANO (ITALY)
UNIVERSITY OF NORTH CAROLINA
NORTHWESTERN UNIVERSITY
NOTRE DAME UNIVERSITY
UNIVERSITY OF PAVIA (ITALY)
UNIV. OF PUERTO RICO - RIO PIEDRAS

BEAM: Proton Area - Broad Band
HIGH ENERGY PHOTOPRODUCTION OF STATES CONTAINING HEAVY QUARKS AND OTHER RARE PHENOMENA.

Request	1 Feb, 81	2,000 Hours including a 500 hour run with a thick target and a beam dump and another 1500 hour run with an open geometry
Approval	1 Jul, 81	Unspecified Stage I approval.
	15 Dec, 83	Unspecified Stage II approval.
Data Analysis	8 Jan, 92	Unspecified
Completed	1 Mar, 99	Unspecified

690 **PARTICLE SEARCH #690** — Bruce C. Knapp

COLUMBIA UNIVERSITY
FERMILAB
UNIVERSITY OF GUANAJUATO (MEXICO)
UNIVERSITY OF MASSACHUSETTS
TEXAS A&M UNIVERSITY

BEAM: Neutrino Area - East
STUDY OF HADRONIC PRODUCTION AND SPECTROSCOPY OF STRANGE, CHARM AND BOTTOM PARTICLES AT THE TEVATRON.

Request	1 Feb, 81	1,400 Hours	including 400 hours of target fragmentation measurements during installation and 1000 hours with full detector
Approval	1 Jul, 81	Unspecified	
	12 Nov, 83	Unspecified	Stage I approval.
	4 Apr, 87	Unspecified	Stage II approval.
	8 Jan, 92	Unspecified	
Data Analysis	8 Jan, 92	Unspecified	
Completed	1 Mar, 99	Unspecified	

691 **TAGGED PHOTON #691** — Michael S. Witherell

UNIV. OF CALIFORNIA, SANTA BARBARA
CARELTON UNIVERSITY (CANADA)
CBPF (BRAZIL)
UNIVERSITY OF COLORADO AT BOULDER
FERMILAB
NATIONAL RESEARCH COUNCIL (CANADA)
UNIVERSITY OF OKLAHOMA
UNIVERSITE OF SAO PAULO (BRAZIL)
UNIVERSITY OF TORONTO (CANADA)

BEAM: Proton Area - East
PROPOSAL TO DO PHOTON PHYSICS WITH THE TEVATRON AT THE TAGGED PHOTON SPECTROMETER.

Request	1 Feb, 81	1,000 Hours	
Approval	12 Nov, 83	Unspecified	Stage I approval
Completed	29 Aug, 85	1,400 Hours	

700 **NEUTRINO OSCILLATION #700** — David J. Miller

UNIVERSITY OF BARI (ITALY)
ECOLE POLYTECH, PALAISEAU (FRANCE)
ILLINOIS INSTITUTE OF TECHNOLOGY
LONDON UNIVERSITY COLLEGE(ENGLAND)
TUFTS UNIVERSITY

BEAM: Neutrino Area - Prompt Beam
STUDY OF NEUTRINO OSCILLATIONS AND SEARCH FOR THE TAU NEUTRINO.

Request	10 Feb, 81	2.5 E18th Protons	
Inactive	1 Apr, 84		

701 **NEUTRINO OSCILLATION #701** — Michael H. Shaevitz

UNIVERSITY OF CHICAGO
COLUMBIA UNIVERSITY
FERMILAB
UNIVERSITY OF ROCHESTER

BEAM: Neutrino Area - Dichromatic
A SEARCH FOR NEUTRINO OSCILLATIONS WITH DELTA-M-SQUARE GREATER THAN 10 EV-SQUARE.

Request	12 Feb, 81	5.2 E18th Protons	
Approval	1 Jul, 81	Unspecified	
Completed	14 Jun, 82	2,250 Hours	

702 **PARTICLE SEARCH #702** — George Glass

IHEP, BEIJING (PRC)
FERMILAB
NORTHEASTERN UNIVERSITY
TEXAS A&M UNIVERSITY

BEAM: Internal Target Area (C-0)
SEARCH FOR PARTICLES WITH ANOMALOUS VALUES OF M/Q AND EXTREMELY SHORT INTERACTION LENGTHS (A REVISION OF P-607).
(To use recoil spectrometer with rotating be wire filament target.)

Request	12 Jun, 81	400 Hours	for data and approximately 3 months to build and debug the apparatus
Inactive	1 Apr, 84		

703 **ELECTRON TARGET FACILITY #703** — William R. Frisken

CIPP (CANADA)
CARELTON UNIVERSITY (CANADA)
CEN-SACLAY (FRANCE)
CHALK RIVER NUCLEAR LAB. (CANADA)
UNIVERSITY OF CHICAGO
CORNELL UNIVERSITY
FERMILAB
UNIVERSITY OF MARYLAND
MCGILL UNIVERSITY (CANADA)
NATIONAL RESEARCH COUNCIL (CANADA)
UNIVERSITY OF SASKATCHEWAN(CANADA)
UNIVERSITY OF TORONTO (CANADA)
TRIUMF (CANADA)
YORK UNIVERSITY (CANADA)

BEAM: Collision Area (D-0)
ELECTRON-PROTON COLLISIONS AT FERMILAB
(Electron-proton collisions using the canadian high energy electron ring cheer.)

Request	6 Jul, 81	1,000 Hours	initial run to obtain 1 x 10 to the 4th inverse nanobarns. plus several later runs totalling 10 to the 6th inverse nanobarns
Inactive	23 Jun, 82		

704 **POLARIZED BEAM #704** — Akihiko Yokosawa

ARGONNE NATIONAL LABORATORY
CEN-SACLAY (FRANCE)
FERMILAB
HIROSHIMA UNIVERSITY (JAPAN)
UNIVERSITY OF IOWA
KYOTO SANGYO UNIVERSITY (JAPAN)
KYOTO UNIVERSITY (JAPAN)
KYOTO UNIV. OF EDUCATION (JAPAN)
LAPP, D'ANNECY-LE-VIEUX (FRANCE)
LOS ALAMOS NATIONAL LABORATORY
NORTHWESTERN UNIVERSITY
UN. OF OCCUP. & ENV. HEALTH(JAPAN)
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
RICE UNIVERSITY
UNIVERSITY DI TRIESTE (ITALY)
UNIVERSITY OF UDINE (ITALY)

BEAM: Meson Area - Polarized Proton Beam
INTEGRATED PROPOSAL ON FIRST ROUND EXPERIMENTS WITH THE POLARIZED BEAM FACILITY.

Request	8 Sep, 81	1,200 Hours	proposal to perform simultaneously substantial parts of experiments described in P676, P678, P674 and P677.
Approval	14 Dec, 81	Unspecified	Stage I approval.
	15 Dec, 83	1,200 Hours	Stage II approval.
Data Analysis	13 Aug, 90	Unspecified	
Completed	1 Mar, 99	Unspecified	

705 **CHI MESON #705** — Bradley B. Cox

BEAM: Proton Area - West
A STUDY OF CHARMONIUM AND DIRECT PHOTON PRODUCTION BY 300 GEV/C ANTIPROTON,PROTON,PI+ AND PI- BEAMS.

Request	1 Oct, 81	1,500 Hours
Approval	14 Dec, 81	1,500 Hours
Completed	15 Feb, 88	3,600 Hours

UNIVERSITY OF SOUTH ALABAMA
UNIVERSITY OF ARIZONA
UNIVERSITY OF ATHENS (GREECE)
DUKE UNIVERSITY
FERMILAB
UNIVERSITY OF FIRENZE (ITALY)
MCGILL UNIVERSITY (CANADA)
NANJING UNIVERSITY (PRC)
NORTHWESTERN UNIVERSITY
PRAIRIE VIEW A&M UNIVERSITY
SHANDONG UNIVERSITY (PRC)
SSC LABORATORY
UNIVERSITY OF VIRGINIA

---

706 **DIRECT PHOTON PRODUCTION #706** — Paul F. Slattery

BEAM: Meson Area - West
A Comprehensive Study of Direct Photon Production in Hadron Induced Collisions

Request	26 Oct, 81	2,400 Hours
Approval	14 Dec, 81	1,000 Hours
Data Analysis	8 Jan, 92	Unspecified
Completed	1 Mar, 99	Unspecified

UNIV. OF CALIFORNIA, DAVIS
DELHI UNIVERSITY (INDIA)
FERMILAB
MICHIGAN STATE UNIVERSITY
NORTHEASTERN UNIVERSITY
UNIVERSITY OF OKLAHOMA
PENNSYLVANIA STATE UNIVERSITY
UNIVERSITY OF PITTSBURGH
UNIVERSITY OF ROCHESTER

---

707 **SIGMA MINUS BETA DECAY #707** — Peter S. Cooper

BEAM: Proton Area - Center
MEASUREMENT OF THE ELECTRON ASYMMETRY PARAMETER IN SIGMA MINUS BETA DECAY.

Request	24 Nov, 81	300 Hours
Rejected	15 Dec, 81	

UNIVERSITY OF CHICAGO
FERMILAB
IOWA STATE UNIVERSITY
UNIVERSITY OF IOWA
PNPI, ST. PETERSBURG (RUSSIA)
YALE UNIVERSITY

---

708 **ELECTRON TARGET FACILITY #708** — Wonyong Lee

BEAM: Collision Area (D-0)
ELECTRON-PROTON INTERACTION EXPERIMENT
(Supercedes proposal #659.)

Request	25 Nov, 81	Unspecified
Inactive	23 Jun, 82	

ARGONNE NATIONAL LABORATORY
BROOKHAVEN NATIONAL LABORATORY
UNIVERSITY OF CHICAGO
UNIVERSITY OF COLORADO AT BOULDER
COLUMBIA UNIVERSITY
FERMILAB
HARVARD UNIVERSITY
UNIVERSITY OF ILLINOIS, CHAMPAIGN
UNIVERSITY OF MICHIGAN - ANN ARBOR
NIKHEF-H (NETHERLANDS)
UNIVERSITY OF PENNSYLVANIA
PRINCETON UNIVERSITY
ROCKEFELLER UNIVERSITY

---

709 **FORWARD DETECTOR #709** — Michael J. Longo

BEAM: Collision Area (D-0)
PROPOSAL FOR A FORWARD DETECTOR FOR THE D0 AREA

Request	11 Jan, 82	Unspecified
Rejected	23 Jun, 82	

UNIV. OF ILLINOIS, CHICAGO CIRCLE
UNIVERSITY OF MICHIGAN - ANN ARBOR

---

710 **TOTAL CROSS-SECTION #710** — Jay Orear and Roy Rubinstein

BEAM: Collision Area (E-0)
MEASUREMENTS OF ELASTIC SCATTERING AND TOTAL CROSS SECTIONS AT THE FERMILAB PBAR-P COLLIDER.

Request	1 Feb, 82	Unspecified
Approval	23 Jun, 82	Unspecified
Completed	31 May, 89	Unspecified

UNIVERSITY OF BOLOGNA (ITALY)
CORNELL UNIVERSITY
FERMILAB
GEORGE MASON UNIVERSITY
UNIVERSITY OF MARYLAND
NORTHWESTERN UNIVERSITY

---

711 **CONSTITUENT SCATTERING #711** — David A. Levinthal

BEAM: Neutrino Area - East
A PROPOSAL TO MEASURE THE ENERGY, ANGULAR, AND CHARGE DEPENDENCE OF MASSIVE DI-HADRON PRODUCTION OVER A LARGE SOLID ANGLE IN INTENSE PROTON AND PION BEAMS.

Request	28 Aug, 82	Unspecified
Approval	1 Jul, 83	Unspecified
Completed	15 Feb, 88	1,400 Hours

ARGONNE NATIONAL LABORATORY
FERMILAB
FLORIDA STATE UNIVERSITY
UNIVERSITY OF MICHIGAN - ANN ARBOR

---

712 **MUON PRODUCTON #712** — Patrick D. Rapp

BEAM: Collision Area (D-0)
STUDY OF MUONS FROM PBAR-P COLLISIONS UP TO SQUARE ROOT OF S EQUAL TO 2 TEV.

Request	1 Feb, 82	Unspecified
Rejected	23 Jun, 82	

FERMILAB
GEORGE MASON UNIVERSITY

---

713 **HIGHLY IONIZING PARTICLES #713** — P. Buford Price

BEAM: Collision Area (D-0)
PROPOSAL FOR A SEARCH FOR HIGHLY IONIZING PARTICLES FOR THE D0 AREA AT FERMILAB.

Request	29 Jan, 82	Unspecified
Approval	23 Jun, 82	Unspecified
Completed	31 May, 89	Unspecified

UNIV. OF CALIFORNIA, BERKELEY
HARVARD UNIVERSITY

---

714 **LARGE ANGLE PARTICLE #714** — Paul D. Grannis

BEAM: Collision Area (D-0)
LARGE ANGLE PARTICLE D0 GROUP

Request	5 Feb, 82	Unspecified
Rejected	1 Jul, 83	

BROOKHAVEN NATIONAL LABORATORY
BROWN UNIVERSITY
COLUMBIA UNIVERSITY
FERMILAB
MICHIGAN STATE UNIVERSITY
SUNY AT STONY BROOK

---

715 **SIGMA BETA DECAY #715** — Peter S. Cooper

BEAM: Proton Area - Center
PRECISION MEASUREMENT OF THE DECAY SIGMA MINUS TO NEUTRON AND ELECTRON AND NEUTRINO.

Request	19 Feb, 82	Unspecified
Approval	23 Jun, 82	Unspecified for 3 months
Completed	14 Feb, 84	820 Hours

UNIVERSITY OF CHICAGO
ELMHURST COLLEGE
FERMILAB
IOWA STATE UNIVERSITY
UNIVERSITY OF IOWA
PNPI, ST. PETERSBURG (RUSSIA)
YALE UNIVERSITY

716	**BEAM DUMP #716** BEAM: Meson Area - M2 Beam PROPOSAL FOR FURTHER BEAM DUMP NEUTRINO RUNNING Request 9 Feb, 82 Unspecified Rejected 23 Jun, 82	Byron P. Roe	FERMILAB UNIVERSITY OF FIRENZE (ITALY) UNIVERSITY OF MICHIGAN - ANN ARBOR UNIVERSITY OF WISCONSIN - MADISON
717	**FORWARD DETECTOR #717** BEAM: Collision Area (D-0) A FORWARD LOOKING DETECTOR FOR THE D0 AREA. Request 19 Mar, 82 Unspecified Rejected 23 Jun, 82	Joseph Lach	FERMILAB
718	**CALORIMETERS AT D-0 #718** BEAM: Collision Area (D-0) STUDY OF PBAR-P INTERACTIONS USING CALORIMETERS AT D-0. Request 1 Apr, 82 Unspecified Rejected 23 Jun, 82	Albert R. Erwin	ARGONNE NATIONAL LABORATORY UNIVERSITY OF ARIZONA FERMILAB UNIVERSITY OF PENNSYLVANIA UNIVERSITY OF WISCONSIN - MADISON
719	**ELECTRON TARGET FACILITY #719** BEAM: Collision Area (D-0) ELECTRON-PROTON INTERACTION EXPERIMENT. (This proposal supercedes proposals #703 and #708.) Request 14 May, 82 Unspecified Not Approved 23 Jun, 82	Wonyong Lee	ARGONNE NATIONAL LABORATORY CARELTON UNIVERSITY (CANADA) CEN-SACLAY (FRANCE) CHALK RIVER NUCLEAR LAB. (CANADA) UNIVERSITY OF COLORADO AT BOULDER COLUMBIA UNIVERSITY FERMILAB HARVARD UNIVERSITY UNIVERSITY OF ILLINOIS, CHAMPAIGN JOHNS HOPKINS UNIVERSITY UNIVERSITY OF MARYLAND MCGILL UNIVERSITY (CANADA) UNIVERSITY OF MICHIGAN - ANN ARBOR MICHIGAN STATE UNIVERSITY NIKHEF-H (NETHERLANDS) UNIVERSITY OF PENNSYLVANIA PRINCETON UNIVERSITY RICE UNIVERSITY ROCKEFELLER UNIVERSITY UNIVERSITY OF SASKATCHEWAN(CANADA) UNIVERSITY OF TORONTO (CANADA)
720	**FREE QUARK SEARCH #720** BEAM: Miscellaneous Area PROPOSAL TO SEARCH FOR +1/3E STABLE PARTICLES USING CRYOGENIC SOURCES. Request 29 Jan, 82 Unspecified Approval 15 Mar, 82 Unspecified for 3 months 2 Jun, 82 Unspecified Completed 8 Oct, 82 Unspecified	John P. Schiffer	ARGONNE NATIONAL LABORATORY FERMILAB
721	**CP VIOLATION #721** BEAM: Proton Area - West AN EXPERIMENT TO STUDY CP VIOLATION IN THE DECAY OF K-LONG PRODUCED BY ANTI-PROTONS. Request 11 Jun, 82 Unspecified Approval 12 Mar, 84 Test Running Approved/Inactive 30 Jun, 87 Unspecified	Jerome L. Rosen	UNIVERSITY OF ARIZONA UNIVERSITY OF ATHENS (GREECE) DUKE UNIVERSITY FERMILAB FLORIDA A&M UNIVERSITY MCGILL UNIVERSITY (CANADA) NORTHWESTERN UNIVERSITY SHANDONG UNIVERSITY (PRC)
722	**D-0 STREAMER CHAMBER #722** BEAM: Collision Area (D-0) STREAMER CHAMBER EXPERIMENT AT THE TEVATRON COLLIDER. Request 11 Oct, 82 Unspecified Inactive 18 Feb, 83	V. Paul Kenney	UNIVERSITY OF CAMBRIDGE (ENGLAND) NOTRE DAME UNIVERSITY
723	**GRAVITATIONAL DETECTOR #723** BEAM: Collision Area (C-0) TEST OF A GRAVITATIONAL DETECTOR AT THE TEVATRON COLLIDER. Request 21 Oct, 82 Unspecified Approval 12 Mar, 84 Test Running Completed 29 Aug, 85 Test Running	Adrian Melissinos	FERMILAB UNIVERSITY OF ROCHESTER
724	**CALORIMETRIC DETECTOR #724** BEAM: Collision Area (D-0) COMPLETE CALORIMETRIC DETECTOR FOR THE D-0 AREA. Request 26 Oct, 82 Unspecified Rejected 1 Jul, 83	Michael J. Longo	CALIFORNIA INSTITUTE OF TECHNOLOGY UNIV. OF ILLINOIS, CHICAGO CIRCLE MCGILL UNIVERSITY (CANADA) UNIVERSITY OF MICHIGAN - ANN ARBOR NOTRE DAME UNIVERSITY
725	**DIFFRACTION DISSOCIATION #725** BEAM: Collision Area (D-0) A PROPOSAL TO MEASURE SINGLE AND DOUBLE DIFFRACTION DISSOCIATION AT THE FERMILAB PBAR-P COLLIDER. Request 1 Nov, 82 Unspecified Rejected 1 Jul, 83	Konstantin Goulianos	ROCKEFELLER UNIVERSITY
726	**CALORIMETRIC DETECTOR #726** BEAM: Collision Area (D-0) PROPOSED CALORIMETRIC DETECTOR FOR THE D-0 AREA. Request 1 Nov, 82 Unspecified Rejected 1 Jul, 83	Maris A. Abolins	UNIVERSITY OF ARIZONA FERMILAB MICHIGAN STATE UNIVERSITY UNIVERSITY OF PENNSYLVANIA

727 **FORWARD CALORIMETER #727** — Jerome L. Rosen — NORTHWESTERN UNIVERSITY
BEAM: Collision Area (D-0)
SPLIT-FIELD MAGNET SPECTROMETER AND ELECTROMAGNETIC SHOWER DETECTOR FOR D-0.

Request	2 Nov, 82	Unspecified
Withdrawn	16 May, 83	

728 **MUON PRODUCTION #728** — Daniel R. Green — UNIVERSITY OF ARIZONA, FERMILAB, FLORIDA STATE UNIVERSITY, UNIVERSITY OF MARYLAND, VIRGINIA TECH
BEAM: Collision Area (D-0)
STUDY OF MUONS FROM PBAR-P COLLISIONS UP TO SQUARE ROOT OF S EQUAL TO 2 TEV.
(This proposal supercedes proposal #712.)

Request	1 Nov, 82	Unspecified
Rejected	1 Jul, 83	

729 **EMULSION/PROTONS @ 1 TEV #729** — Atul Gurtu — TATA INSTITUTE (INDIA)
BEAM: Meson Area - Test Beam
PROPOSAL TO STUDY CHARM AND MULTIPARTICLE PRODUCTION IN 1 TEV PROTON-EMULSION COLLISIONS

Request	24 Nov, 82	Unspecified
Approval	5 Dec, 83	Emulsion Exposure
Completed	26 Apr, 85	2 Emulsion Stack(s)

730 **EMULSION/SIGMA-MINUS @ 250 #730** — Richard J. Wilkes — INP, KRAKOW (POLAND), INST.FOR NUCL. RESEARCH (BULGARIA), UNIVERSITY OF WASHINGTON
BEAM: Proton Area - Center
EMULSION EXPOSURE TO 250 GEV SIGMA-MINUS.

Request	5 Jan, 83	Unspecified
Approval	10 Feb, 84	Unspecified
Completed	10 Feb, 84	4 Hours

731 **CP VIOLATION #731** — Bruce D. Winstein — CEN-SACLAY (FRANCE), UNIVERSITY OF CHICAGO, ELMHURST COLLEGE, FERMILAB, PRINCETON UNIVERSITY
BEAM: Meson Area - Center
A MEASUREMENT OF THE MAGNITUDE OF (E'/E) IN THE NEUTRAL KAON SYSTEM TO A PRECISION OF .001.

Request	1 Feb, 83	Unspecified
Approval	1 Jul, 83	Unspecified
Completed	15 Feb, 88	3,100 Hours

732 **XI-ZERO DECAY #732** — Marleigh C. Sheaff — UNIVERSITY OF MICHIGAN - ANN ARBOR, UNIVERSITY OF MINNESOTA, RUTGERS UNIVERSITY, UNIVERSITY OF WISCONSIN - MADISON
BEAM: Proton Area - Center
A SEARCH FOR THE DECAY NEUTRAL CASCADE TO PROTON AND NEGATIVE PION.

Request	1 Feb, 83	Unspecified
Rejected	25 Jun, 85	

733 **NEUTRINO INTERACTIONS #733** — Raymond L. (Chip) Brock — FERMILAB, UNIVERSITY OF FLORIDA, MASSACHUSETTS INST. OF TECHNOLOGY, MICHIGAN STATE UNIVERSITY
BEAM: Neutrino Area - Center
PROPOSAL TO STUDY HIGH ENERGY NEUTRINO INTERACTIONS WITH THE TEVATRON QUADRUPOLE TRIPLET BEAM.

Request	1 Feb, 83	Unspecified
	16 Sep, 83	Unspecified
Approval	12 Nov, 83	Unspecified Stage I approval.
Completed	1 Feb, 88	4,100 Hours

734 **HYPERON PRODUCTION #734** — Michael V. Hynes — UNIV. OF CALIFORNIA, LOS ANGELES, LOS ALAMOS NATIONAL LABORATORY
BEAM: Proton Area - Center
PRIMAKOFF PRODUCTION OF HYPERON EXCITED STATES.

Request	1 Apr, 83	Unspecified
Inactive	21 May, 86	

735 **PARTICLE SEARCH #735** — Laszlo J. Gutay — DUKE UNIVERSITY, FERMILAB, IOWA STATE UNIVERSITY, NOTRE DAME UNIVERSITY, PURDUE UNIVERSITY, UNIVERSITY OF WISCONSIN - MADISON
BEAM: Collision Area (C-0)
SEARCH FOR A DECONFINED QUARK GLUON PHASE OF STRONGLY INTERACTING MATTER IN PBAR-P INTERACTIONS AT SQUARE ROOT OF S EQUAL TO 2 TEV.

Request	11 Apr, 83	Unspecified
	16 Sep, 83	Unspecified
Approval	15 Dec, 83	Unspecified Stage I approval.
Completed	31 May, 89	Unspecified

736 **D-0 QUARK SEARCH #736** — Robert K. Adair — BROOKHAVEN NATIONAL LABORATORY, YALE UNIVERSITY
BEAM: Collision Area (D-0)
A PROPOSAL TO CONDUCT A QUARK SEARCH AT THE FERMILAB COLLIDER.

Request	11 Apr, 83	Unspecified
Rejected	1 Jul, 83	

737 **BATISS EXPERIMENT #737** — Peter Kotzer — KAZAKH STATE UNIV., (KAZAKHSTAN), MOSCOW STATE UNIVERSITY (RUSSIA), UNIVERSITY OF WASHINGTON, WESTERN WASHINGTON UNIVERSITY
BEAM: Unspecified Beam
STUDY OF HIGH ENERGY NEUTRINOS WITH A DEEP UNDERWATER DETECTOR OF A MASS GREATER THAN 10 TO THE 6TH TONS.

Request	25 Apr, 83	Unspecified
Rejected	12 Nov, 83	

738 **NARROW BAND #738** — Charles Baltay — COLUMBIA UNIVERSITY
BEAM: Neutrino Area - Center
LETTER OF INTENT TO RUN IN THE NARROW BAND AND BEAM AT TEVATRON II.

Request	3 Jun, 83	Unspecified
Withdrawn	26 Apr, 84	

739 **ELECTRON-POSITRON #739** — Nelson Cue and Chih-Ree Sun

BEAM: Proton Area - East
MEASUREMENTS OF CRYSTAL-ASSISTED ELECTRON-POSITRON PAIR CREATION.

Request	9 Sep, 83	Unspecified
Rejected	19 Apr, 85	

UNIV. OF CLAUDE BERNARD (FRANCE)
FERMILAB
LAPP, D'ANNECY-LE-VIEUX (FRANCE)
SUNY AT ALBANY

---

740 **D-0 DETECTOR #740** — Paul D. Grannis and Hugh Elliott Montgomery

BEAM: Collision Area (D-0)
STUDY OF PROTON ANTI-PROTON COLLISIONS USING A LARGE DETECTOR AT D-0.

Request	9 Sep, 83	Unspecified
Approval	10 Feb, 84	Unspecified
Data Analysis	20 Feb, 96	
Completed	1 Mar, 05	

UNIVERSIDAD DE LOS ANDES(COLOMBIA)
UNIVERSITY OF ARIZONA
BOSTON UNIVERSITY
BROOKHAVEN NATIONAL LABORATORY
BROWN UNIVERSITY
UNIVERSIDAD DE BUENOS AIRES
UNIV. OF CALIFORNIA, DAVIS
UNIV. OF CALIFORNIA, IRVINE
UNIV. OF CALIFORNIA, RIVERSIDE
CBPF (BRAZIL)
CEN-SACLAY (FRANCE)
CINVESTAV-IPN (MEXICO)
COLUMBIA UNIVERSITY
DELHI UNIVERSITY (INDIA)
FERMILAB
FLORIDA STATE UNIVERSITY
UNIVERSITY OF HAWAII AT MANOA
UNIV. OF ILLINOIS, CHICAGO CIRCLE
INDIANA UNIVERSITY
IOWA STATE UNIVERSITY
JINR, DUBNA (RUSSIA)
KOREA UNIVERSITY, SEOUL (KOREA)
INP, KRAKOW (POLAND)
KYUNGSUNG UNIVERSITY, PUSAN(KOREA)
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF MARYLAND
UNIVERSITY OF MICHIGAN - ANN ARBOR
MICHIGAN STATE UNIVERSITY
MOSCOW STATE UNIVERSITY (RUSSIA)
UNIVERSITY OF NEBRASKA
SUNY AT STONY BROOK
NEW YORK UNIVERSITY
NORTHEASTERN UNIVERSITY
NORTHERN ILLINOIS UNIVERSITY
NORTHWESTERN UNIVERSITY
NOTRE DAME UNIVERSITY
UNIVERSITY OF OKLAHOMA
PANJAB UNIVERSITY (INDIA)
PNPI, ST. PETERSBURG (RUSSIA)
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
PURDUE UNIVERSITY
RICE UNIVERSITY
UNIV. FEDERAL DO RIO DE JANEIRO
UNIVERSITY OF ROCHESTER
SEOUL NATIONAL UNIVERSITY (KOREA)
SSC LABORATORY
TATA INSTITUTE (INDIA)
TEXAS A&M UNIVERSITY
UNIVERSITY OF TEXAS AT ARLINGTON

---

741 **COLLIDER DETECTOR #741** — Melvyn Jay Shochet and Alvin V. Tollestrup

BEAM: Collision Area (B-0)
STUDY OF PROTON ANTI-PROTON COLLISIONS USING A LARGE DETECTOR AT B-0.

Request	1 Apr, 82	Unspecified
Approval	1 Apr, 82	Unspecified
Completed	31 May, 89	Unspecified

ARGONNE NATIONAL LABORATORY
BRANDEIS UNIVERSITY
UNIVERSITY OF CHICAGO
FERMILAB
INFN, FRASCATI (ITALY)
HARVARD UNIVERSITY
UNIVERSITY OF ILLINOIS, CHAMPAIGN
KEK (JAPAN)
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF PENNSYLVANIA
INFN, PISA (ITALY)
PURDUE UNIVERSITY
ROCKEFELLER UNIVERSITY
RUTGERS UNIVERSITY
TEXAS A&M UNIVERSITY
UNIVERSITY OF TSUKUBA (JAPAN)
UNIVERSITY OF WISCONSIN - MADISON

---

742 **STRANGE QUARK #742** — Joseph Lach

BEAM: Proton Area - Center
LETTER OF INTENT TO MEASURE OMEGA MINUS POLARIZATION AND MAGNETIC MOMENT.

Request	13 Jun, 83	Unspecified
Inactive	15 Jun, 85	

UNIVERSITY OF CHICAGO
ELMHURST COLLEGE
FERMILAB
IOWA STATE UNIVERSITY
UNIVERSITY OF IOWA
PNPI, ST. PETERSBURG (RUSSIA)
YALE UNIVERSITY

---

743 **CHARM PRODUCTION #743** — Stephen Reucroft

BEAM: Meson Area - Test Beam
PROPOSAL TO MEASURE OPEN CHARM PRODUCTION IN PROTON-PROTON COLLISIONS AT 1 TEV WITH LEBC-FMPS.

Request	16 Sep, 83	Unspecified
Approval	16 Dec, 83	Unspecified Stage I approval
Completed	29 Aug, 85	1,256 K Pix

ITP, AACHEN (GERMANY)
CERN (SWITZERLAND)
CRN, STRASBOURG (FRANCE)
DUKE UNIVERSITY
FERMILAB
FLORIDA STATE UNIVERSITY
IHEP, BERLIN-ZEUTHEN (GERMANY)
UNIVERSITY OF KANSAS
UNIVERSITY OF L'ETAT (BELGIUM)
UNIVERSITY OF LIBRE (BELGIUM)
LPNHE, UN. OF P & M CURIE (FRANCE)
UNIVERSITY OF MICHIGAN - ANN ARBOR
MICHIGAN STATE UNIVERSITY
NORTHEASTERN UNIVERSITY
NOTRE DAME UNIVERSITY
TATA INSTITUTE (INDIA)
VANDERBILT UNIVERSITY
VIENNA INSTITUTE FUR HEP (AUSTRIA)

744 **CHARGED INTERACTIONS #744** — Frank S. Merritt

UNIVERSITY OF CHICAGO
COLUMBIA UNIVERSITY
FERMILAB
UNIVERSITY OF ROCHESTER

BEAM: Neutrino Area - Center
HIGH STATISTICS STUDIES OF CHARGED CURRENT INTERACTIONS USING THE TEVATRON QUAD TRIPLET BEAM.

Request	16 Sep, 83	Unspecified
Approval	17 Nov, 83	Unspecified Stage I approval.
Completed	29 Aug, 85	1,900 Hours

745 **MUON NEUTRINO #745** — Toshio Kitagaki

IHEP, BEIJING (PRC)
BROWN UNIVERSITY
FERMILAB
INDIANA UNIVERSITY
MASSACHUSETTS INST. OF TECHNOLOGY
NAGOYA UNIVERSITY (JAPAN)
OAK RIDGE NATIONAL LABORATORY
UNIVERSITY OF TENNESSEE, KNOXVILLE
TOHOKU GAKUIN UNIVERSITY (JAPAN)
TOHOKU UNIVERSITY (JAPAN)

BEAM: Neutrino Area - Center
MUON NEUTRINO EXPERIMENT USING THE TOHOKU HIGH RESOLUTION ONE METER BUBBLE CHAMBER.

Request	10 Sep, 83	Unspecified
Approval	16 Dec, 83	Parasitic Running
Completed	1 Feb, 88	553 K Pix

746 **PROMPT BEAM FACILITY #746** — James K. Walker

FERMILAB
MASSACHUSETTS INST. OF TECHNOLOGY
MICHIGAN STATE UNIVERSITY

BEAM: Neutrino Area - Prompt Beam
LETTER OF INTENT TO SEARCH FOR NEW PARTICLES FROM THE PROMPT BEAM FACILITY.

Request	1 Sep, 83	Unspecified
Withdrawn	2 Jun, 86	

747 **CHARGED PARTICLES #747** — Alan A. Hahn

CALIFORNIA INSTITUTE OF TECHNOLOGY
UNIV. OF CALIFORNIA, IRVINE
FERMILAB
LAWRENCE BERKELEY LABORATORY
LAWRENCE LIVERMORE LABORATORY
LOS ALAMOS NATIONAL LABORATORY
UNIVERSITY OF ROCHESTER
SAN FRANCISCO STATE UNIVERSITY
UNIVERSITY OF TORONTO (CANADA)

BEAM: Proton Area - Broad Band
A SEARCH FOR FRACTIONALLY CHARGED PARTICLES AT THE TEVATRON.

Request	27 Feb, 84	Unspecified
Approval	1 Apr, 85	Unspecified
Completed	2 Aug, 85	Unspecified

748 **BEAUTY & CHARM PRODUCTION #748** — Jack Sandweiss

FERMILAB
NEW YORK UNIVERSITY
UNIVERSITY OF VRIJE (BELGIUM)
YALE UNIVERSITY

BEAM: Unspecified Beam
LETTER OF INTENT TO STUDY BEAUTY AND CHARM AT THE TEVATRON USING HIGH RESOLUTION STEAMER CHAMBER AND A DOWNSTREAM SPECTROMETER.

Request	7 May, 84	Unspecified
Withdrawn	2 Oct, 84	

749 **CHANNELING #749** — James S. Forster

CHALK RIVER NUCLEAR LAB. (CANADA)
FERMILAB
UNIVERSITY OF NEW MEXICO
SUNY AT ALBANY

BEAM: Meson Area - Bottom
LETTER OF INTENT TO STUDY MATERIAL AND FABRICATION ASPECTS OF CRYSTALS USED FOR CHANNELING.

Request	19 Jul, 84	400 Hours
Withdrawn	1 Oct, 84	

750 **MULTIPARTICLE PRODUCTION #750** — Ram K. Shivpuri

DELHI UNIVERSITY (INDIA)

BEAM: Neutrino Area - Miscellaneous
A PROPOSAL TO STUDY MULTIPARTICLE PRODUCTION IN INTERACTIONS OF 1 TEV PROTONS WITH EMULSION NUCLEI.

Request	27 Jun, 84	Emulsion Exposure beam at or near 1 TeV protons of flux approximately 5 x 10 to the 4th protons/sq cm over an area of (8 x 3)sq cm
Approval	23 Jul, 84	Emulsion Exposure
Completed	11 Jul, 85	1 Emulsion Stack(s)

751 **EMULSION EXPOSURE @ 1 TEV #751** — Piyare L. Jain

SUNY AT BUFFALO

BEAM: Meson Area - Test Beam
PROPOSAL TO STUDY 1 TEV PROTON INTERACTIONS IN EMULSION.

Request	27 Jun, 84	Emulsion Exposure
Approval	2 Jul, 84	Emulsion Exposure
Completed	26 Apr, 85	1 Emulsion Stack(s)

752 **PARTICLE COLLISIONS #752** — James W. Cronin

UNIVERSITY OF CHICAGO
TECHNION-ISRAEL INST (ISRAEL)

BEAM: Unspecified Beam
PROPOSAL TO SEARCH FOR ANOMALOUSLY LARGE HADRON CROSS SECTIONS AT SHORT DISTANCES.

Request	23 Oct, 84	200 Hours
Withdrawn	8 Dec, 86	

753 **CHANNELING STUDIES #753** — James S. Forster

BELL NORTHERN RESEARCH LAB(CANADA)
CHALK RIVER NUCLEAR LAB. (CANADA)
FERMILAB
UNIVERSITY OF NEW MEXICO
SUNY AT ALBANY

BEAM: Meson Area - Bottom
PROPOSAL TO IMPROVE THE DEFLECTION OF HIGH ENERGY PARTICLE BEAMS BY CHANNELING IN BENT CRYSTALS OF SI AND GE.

Request	28 Sep, 84	400 Hours
Approval	20 Nov, 84	Unspecified
Completed	5 Jul, 85	150 Hours

754 **CHANNELING TESTS #754** — Chih-Ree Sun

FERMILAB
GENERAL ELECTRIC R&D CENTER
SUNY AT ALBANY
SANDIA LABORATORIES
SSC LABORATORY

BEAM: Meson Area - Bottom
CRYSTAL CHANNELING TESTS IN M-BOTTOM INCLUDING FOCUSING WITH DEFORMED CRYSTALS AND STUDIES OF HIGH Z CRYSTALS.

Request	1 Oct, 84	300 Hours
Approval	20 Nov, 84	Unspecified
Approved/Inactive	24 Dec, 91	

755	**BEAUTY & CHARM STUDY #T755**	Richard D. Majka and Anna Jean Slaughter	FERMILAB YALE UNIVERSITY

BEAM: Meson Area - Test Beam
A HIGH SENSITIVITY STUDY OF BEAUTY AND CHARM IN HADROPRODUCTION AT THE TEVATRON.

Request	2 Oct, 84	Unspecified
Approval	25 Nov, 86	Unspecified
Completed	15 Feb, 88	Unspecified

756	**MAGNETIC MOMENT #756**	Kam-Biu Luk	UNIVERSITY OF ARIZONA UNIV. OF CALIFORNIA, BERKELEY FERMILAB INDIANA UNIVERSITY LAWRENCE BERKELEY LABORATORY UNIVERSITY OF MICHIGAN - ANN ARBOR UNIVERSITY OF MINNESOTA RUTGERS UNIVERSITY

BEAM: Proton Area - Center
MEASUREMENT OF THE MAGNETIC MOMENT OF THE OMEGA MINUS HYPERON.

Request	8 Oct, 84	1,000 Hours
Approval	25 Jun, 85	1,000 Hours Stage I approval
Completed	15 Feb, 88	1,700 Hours

757	**MUON DEFLECTION #757**	Jorge G. Morfin	FERMILAB UNIVERSITY OF ILLINOIS, CHAMPAIGN UNIVERSITY OF WASHINGTON UNIVERSITY OF WISCONSIN - MADISON

BEAM: Neutrino Area - Muon Beam
LETTER OF INTENT FOR A PROPOSAL TO STUDY MOMENTUM RESOLUTION FOR MUONS ABOVE 300 GEV IN MAGNETIZED IRON.

Request	12 Dec, 84	Test Running
Rejected	14 Dec, 85	

758	**EMULSION EXPOSURE #758**	Mitsuko Kazuno and Hiroshi Shibuya	NAGOYA UNIVERSITY (JAPAN) TOHO UNIVERSITY (JAPAN)

BEAM: Meson Area - Test Beam
STUDY OF THE MECHANISM OF MULTIPARTICLE PRODUCTION IN EMULSION NUCLEI @ 800 GEV PROTONS.

Request	11 Mar, 85	Unspecified
Approval	11 Mar, 85	Unspecified
Completed	26 Apr, 85	2 Emulsion Stack(s)

759	**EMULSION EXPOSURE #759**	Yoshihiro Tsuzuki	KOBE UNIVERSITY (JAPAN) OSAKA CITY UNIVERSITY (JAPAN) OSAKA SCIENCE EDUC. INST. (JAPAN)

BEAM: Meson Area - Test Beam
A STUDY OF NUCLEAR INTERACTIONS OF 800 GEV PROTONS IN EMULSION.

Request	11 Mar, 85	Unspecified
Approval	11 Mar, 85	Unspecified
Completed	26 Apr, 85	2 Emulsion Stack(s)

760	**CHARMONIUM STATES #760**	Rosanna Cester	UNIV. OF CALIFORNIA, IRVINE FERMILAB UNIVERSITY OF FERRARA (ITALY) INFN, GENOVA (ITALY) NORTHWESTERN UNIVERSITY PENNSYLVANIA STATE UNIVERSITY UNIVERSITY OF TORINO (ITALY)

BEAM: Accumulator Ring
A PROPOSAL TO INVESTIGATE THE FORMATION OF CHARMONIUM STATES USING THE PBAR ACCUMULATOR RING.

Request	29 Mar, 85	Unspecified
Approval	25 Jun, 85	Unspecified
Data Analysis	10 Jan, 92	Unspecified
Completed	1 Mar, 99	Unspecified

761	**HYPERON RADIATIVE DECAY #761**	Alexei A. Vorobiev	IHEP, BEIJING (PRC) UNIVERSITY OF BRISTOL (ENGLAND) CBPF (BRAZIL) FERMILAB UNIVERSITY OF IOWA ITEP, MOSCOW (RUSSIA) PNPI, ST. PETERSBURG (RUSSIA) UNIV. FEDERAL DO RIO DE JANEIRO UNIVERSITE OF SAO PAULO (BRAZIL) YALE UNIVERSITY

BEAM: Proton Area - Center
PROPOSAL TO STUDY HYPERON RADIATIVE DECAY.

Request	3 Apr, 85	Unspecified
Approval	25 Jun, 85	Unspecified Stage I approval
Completed	27 Aug, 90	Unspecified

762	**EMULSION/PROTONS @ 800 GEV #762**	Shoji Dake	AOYAMA GAKUIN UNIVERSITY (JAPAN) ICRR, UNIVERSITY OF TOKYO (JAPAN) KOBE UNIVERSITY (JAPAN) OKAYAMA UNIVERSITY (JAPAN) OSAKA SCIENCE EDUC. INST. (JAPAN)

BEAM: Meson Area - Test Beam
CASCADE SHOWERS ORIGINATING IN PROTON-NUCLEUS COLLISIONS.

Request	11 Jun, 85	Unspecified
Approval	21 Jun, 85	Unspecified
Completed	11 Jul, 85	18 Emulsion Stack(s)

763	**EMULSION/PROTONS @ 800 GEV #763**	Takeshi Ogata	ICRR, UNIVERSITY OF TOKYO (JAPAN) KOBE UNIVERSITY (JAPAN) OKAYAMA UNIVERSITY (JAPAN) OSAKA SCIENCE EDUC. INST. (JAPAN)

BEAM: Meson Area - Test Beam
PROTON-NUCLEUS INTERACTIONS AT TEVATRON ENERGY.

Request	11 Jun, 85	Unspecified
Approval	21 Jun, 85	Unspecified
Completed	11 Jul, 85	2 Emulsion Stack(s)

764	**EMULSION EXPOSURE #764**	Hirotada Nanjo	HIROSAKI UNIVERSITY (JAPAN)

BEAM: Meson Area - Test Beam
EXCLUSIVE INVESTIGATION OF MULTIPLE PRODUCTION IN RAPIDITY SPACE.

Request	11 Jun, 85	Unspecified
Approval	21 Jun, 85	Unspecified
Completed	11 Jul, 85	1 Emulsion Stack(s)

765	**EMULSION/PROTONS @ 800 GEV #765**	K. Imaeda	OKAYAMA UNIVERSITY (JAPAN)

BEAM: Meson Area - Test Beam
TRANSVERSE MOMENTUM MEASUREMENT OF SECONDARY PARTICLES IN PROTON-EMULSION COLLISIONS AT 800 GEV.

Request	20 Jun, 85	Unspecified
Approval	21 Jun, 85	Unspecified
Completed	11 Jul, 85	7 Emulsion Stack(s)

766 **MR TUNNEL NEUTRONS #T766** — Joseph B. McCaslin

FERMILAB
LAWRENCE BERKELEY LABORATORY

BEAM: Collision Area (Miscellaneous)
MEASUREMENTS OF THE NEUTRON SPECTRUM IN THE TEVATRON TUNNEL WITH APPLICATION TO THE SSC.

Request	11 Jul, 85	Unspecified
Approval	17 Jul, 85	Unspecified
Completed	13 Oct, 85	Unspecified

767 **MUON CALORIMETRY #767** — Yasushi Muraki

CHUO UNIVERSITY (JAPAN)
ICRR, UNIVERSITY OF TOKYO (JAPAN)
KEK (JAPAN)
NAGOYA UNIVERSITY (JAPAN)

BEAM: Neutrino Area - Muon Beam
MEASUREMENT OF DIRECT ELECTRON PAIR PRODUCTION CROSS-SECTION IN THE TEVATRON MUON BEAM.

Request	29 Aug, 85	Unspecified
Rejected	1 Jul, 86	

768 **POLARIZED SCATTERING #768** — Alan D. Krisch

BROOKHAVEN NATIONAL LABORATORY
CERN (SWITZERLAND)
FERMILAB
LHE, ETH HONGGERBERG (SWITZERLAND)
UNIVERSITY OF MARYLAND
MASSACHUSETTS INST. OF TECHNOLOGY
UNIVERSITY OF MICHIGAN - ANN ARBOR
NOTRE DAME UNIVERSITY
TEXAS A&M UNIVERSITY

BEAM: Proton Area - West
PROTON - PROTON ELASTIC SCATTERING WITH A POLARIZED TARGET.

Request	12 Nov, 85	Unspecified
Rejected	30 Jun, 87	

769 **PION & KAON CHARM PROD. #769** — Jeffrey A. Appel

CBPF (BRAZIL)
FERMILAB
UNIVERSITY OF MISSISSIPPI
NORTHEASTERN UNIVERSITY
UNIVERSITY OF TORONTO (CANADA)
TUFTS UNIVERSITY
UNIVERSITY OF WISCONSIN - MADISON
YALE UNIVERSITY

BEAM: Proton Area - East
PION AND KAON PRODUCTION OF CHARM AND CHARM-STRANGE STATE.

Request	14 Dec, 85	Unspecified
Approval	14 Dec, 85	Unspecified
Data Analysis	15 Feb, 88	1,900 Hours
Completed	1 Mar, 99	Unspecified

770 **QUAD TRIPLET NEUTRINO #770** — Wesley H. Smith

UNIVERSITY OF CHICAGO
COLUMBIA UNIVERSITY
FERMILAB
UNIVERSITY OF ROCHESTER
UNIVERSITY OF WISCONSIN - MADISON

BEAM: Neutrino Area - Center
HIGH STATISTICS STUDIES OF CHARGED CURRENT INTERACTIONS USING THE TEVATRON QUAD TRIPLET BEAM.

Request	27 Dec, 85	Unspecified
Approval	27 Dec, 85	Unspecified Stage I approval.
Completed	1 Feb, 88	1,600 Hours

771 **BEAUTY PRODUCTION BY PROTONS #771** — Bradley B. Cox

UNIVERSITY OF SOUTH ALABAMA
UNIVERSITY OF ATHENS (GREECE)
BROWN UNIVERSITY
UNIV. OF CALIFORNIA, BERKELEY
UNIV. OF CALIFORNIA, LOS ANGELES
DUKE UNIVERSITY
FERMILAB
UNIVERSITY OF HOUSTON
JINR, DUBNA (RUSSIA)
UNIVERSITY OF LECCE (ITALY)
MASSACHUSETTS INST. OF TECHNOLOGY
MCGILL UNIVERSITY (CANADA)
NANJING UNIVERSITY (PRC)
NORTHWESTERN UNIVERSITY
UNIVERSITY OF PAVIA (ITALY)
UNIVERSITY OF PENNSYLVANIA
PRAIRIE VIEW A&M UNIVERSITY
SHANDONG UNIVERSITY (PRC)
VANIER COLLEGE (CANADA)
UNIVERSITY OF VIRGINIA
UNIVERSITY OF WISCONSIN - MADISON

BEAM: Proton Area - West
PROPOSAL TO STUDY BEAUTY PRODUCTION AND OTHER HEAVY QUARK PHYSICS ASSOCIATED WITH DIMUON PRODUCTION IN 800 (925) GEV/C PP INTERACTIONS.

Request	10 Dec, 86	Unspecified
Approval	4 Apr, 87	Unspecified
Data Analysis	8 Jan, 92	Unspecified
Completed	1 Mar, 99	Unspecified

772 **DIMUONS #772** — Joel M. Moss

CASE WESTERN RESERVE UNIVERSITY
FERMILAB
UNIV. OF ILLINOIS, CHICAGO CIRCLE
LOS ALAMOS NATIONAL LABORATORY
SUNY AT STONY BROOK
NORTHERN ILLINOIS UNIVERSITY
RUTGERS UNIVERSITY
UNIVERSITY OF SOUTH CAROLINA
UNIVERSITY OF TEXAS AT AUSTIN
UNIVERSITY OF WASHINGTON

BEAM: Meson Area - East
STUDY OF THE NUCLEAR ANTIQUARK SEA VIA P+N -> DIMUONS.

Request	11 Mar, 86	Unspecified
Approval	1 Jul, 86	Unspecified
Completed	15 Feb, 88	1,700 Hours

773 **ETA00 & ETA+- PHASE DIFFERENCE #773** — George D. Gollin

UNIVERSITY OF CHICAGO
ELMHURST COLLEGE
FERMILAB
UNIVERSITY OF ILLINOIS, CHAMPAIGN
RUTGERS UNIVERSITY

BEAM: Meson Area - Center
MEASUREMENT OF PHASE DIFFERENCE BETWEEN ETA 00 AND ETA +- TO A PRECISION OF 1/2 DEGREE.

Request	11 Mar, 86	Unspecified
Approval	1 Jul, 86	Unspecified
	29 Jun, 89	Unspecified Stage II approval.
Completed	30 Sep, 91	Unspecified

774 **ELECTRON BEAM DUMP #774** — Michael B. Crisler

FERMILAB
UNIVERSITY OF ILLINOIS, CHAMPAIGN
INP, KRAKOW (POLAND)
NORTHEASTERN UNIVERSITY

BEAM: Proton Area - Broad Band
ELECTRON BEAM DUMP PARTICLE SEARCH IN THE WIDE BAND HALL.

Request	4 Apr, 86	Unspecified
Approval	10 Dec, 86	Unspecified
Completed	27 Aug, 90	Unspecified

775 **CDF UPGRADE #775** William C. Carithers, Jr. and Giorgio Bellettini

BEAM: Collision Area (B-0)
CDF UPGRADE (Level-3 Trigger; Silicon Vertex (#775A); and Muon System (#775B))

Request	28 May, 86	Unspecified
Approval	1 Jul, 86	Unspecified Phase I approval
Data Analysis	20 Feb, 96	
Completed	1 Mar, 05	

IHEP, ACADEMIA SINICA (TAIWAN)
ARGONNE NATIONAL LABORATORY
UNIVERSITY OF BOLOGNA (ITALY)
BRANDEIS UNIVERSITY
UNIV. OF CALIFORNIA, LOS ANGELES
CIPP (CANADA)
UNIVERSITY OF CHICAGO
DUKE UNIVERSITY
FERMILAB
INFN, FRASCATI (ITALY)
HARVARD UNIVERSITY
HIROSHIMA UNIVERSITY (JAPAN)
UNIVERSITY OF ILLINOIS, CHAMPAIGN
JOHNS HOPKINS UNIVERSITY
KEK (JAPAN)
LAWRENCE BERKELEY LABORATORY
MASSACHUSETTS INST. OF TECHNOLOGY
UNIVERSITY OF MICHIGAN - ANN ARBOR
MICHIGAN STATE UNIVERSITY
UNIVERSITY OF NEW MEXICO
OSAKA CITY UNIVERSITY (JAPAN)
UNIVERSITY OF PADOVA (ITALY)
UNIVERSITY OF PENNSYLVANIA
INFN, PISA (ITALY)
UNIVERSITY OF PITTSBURGH
PURDUE UNIVERSITY
UNIVERSITY OF ROCHESTER
ROCKEFELLER UNIVERSITY
RUTGERS UNIVERSITY
TEXAS A&M UNIVERSITY
TEXAS TECH UNIVERSITY
UNIVERSITY OF TSUKUBA (JAPAN)
TUFTS UNIVERSITY
WASEDA UNIVERSITY (JAPAN)
UNIVERSITY OF WISCONSIN - MADISON
YALE UNIVERSITY

---

776 **NUCLEAR CAL. CROSS SECTIONS#776** Samuel I. Baker

BEAM: Miscellaneous Area
MEASUREMENT OF NUCLEAR CALIBRATION CROSS SECTIONS FOR PROTONS GREATER THAN 400 GEV.

Request	6 Aug, 86	Unspecified
Approval	7 Jan, 87	Unspecified
Completed	15 Feb, 88	Unspecified

BROOKHAVEN NATIONAL LABORATORY
CERN (SWITZERLAND)
FERMILAB

---

777 **MR TUNNEL NEUTRONS #777** Joseph B. McCaslin

BEAM: Collision Area (Miscellaneous)
NEUTRON FLUX MEASUREMENTS IN THE TEVATRON TUNNEL.

Request	29 Oct, 86	Unspecified
Approval	7 Jan, 87	Unspecified
Completed	11 May, 87	Unspecified

FERMILAB
LAWRENCE BERKELEY LABORATORY
SSC CENTRAL DESIGN GROUP

---

778 **MAGNET APERTURE STUDIES #778** Rodney E. Gerig and Richard Talman

BEAM: Collision Area (Miscellaneous)
STUDY OF THE SSC MAGNET APERTURE CRITERION.

Request	18 Oct, 86	Unspecified
Approval	10 Dec, 86	Unspecified
Completed	21 Jan, 91	Unspecified

CERN (SWITZERLAND)
CORNELL UNIVERSITY
FERMILAB
UNIVERSITY OF HOUSTON
SSC CENTRAL DESIGN GROUP
SLAC

---

779 **HIGH RATE CALORIMETER STUDY#779** David F. Anderson

BEAM: Meson Area - West
PROPOSAL TO BUILD A VERY HIGH RATE CALORIMETER.

Request	29 Oct, 86	Unspecified
Rejected	10 Dec, 86	

FERMILAB

---

780 **CHARM PRODUCTION BY PROTONS#780** Ronald J. Lipton and Douglas M. Potter

BEAM: Neutrino Area - East
STUDY OF CHARM PRODUCED BY 850 GEV PROTONS.

Request	1 Mar, 87	Unspecified
Rejected	14 Dec, 87	

UNIV. OF CALIFORNIA, DAVIS
CARNEGIE-MELLON UNIVERSITY
UNIVERSITY OF OKLAHOMA

---

781 **LARGE-X BARYON SPECTROMETER#781** James S. Russ

BEAM: Proton Area - Center
SEGMENTED LARGE-X BARYON SPECTROMETER (SELEX).

Request	4 Mar, 87	Unspecified
Approval	24 Oct, 88	Unspecified
In Progress	20 Feb, 97	
Data Analysis	3 Sep, 97	

IHEP, BEIJING (PRC)
BOGAZICI UNIVERSITY (TURKEY)
UNIVERSITY OF BRISTOL (ENGLAND)
CARNEGIE-MELLON UNIVERSITY
CBPF (BRAZIL)
FERMILAB
UNIVERSITY OF HAWAII AT MANOA
UNIVERSITY OF IOWA
MAX-PLANCK INSTITUTE (GERMANY)
MOSCOW STATE UNIVERSITY (RUSSIA)
ITEP, MOSCOW (RUSSIA)
UNIV. FEDERAL DO PARAIBA (BRAZIL)
PNPI, ST. PETERSBURG (RUSSIA)
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
UNIVERSITY OF ROCHESTER
INFN, ROME (ITALY)
UN.AUTO.DE SAN LUIS POTOSI(MEXICO)
UNIVERSITE OF SAO PAULO (BRAZIL)
UNIVERSITY OF TEL-AVIV (ISRAEL)
INFN, TRIESTE (ITALY)

782 **MUONS IN 1M BUBBLE CHAMBER #782** — Toshio Kitagaki

BEAM: Neutrino Area - NK Beam
A MUON EXPOSURE IN THE TOHOKU HIGH RESOLUTION BUBBLE CHAMBER.

Request	4 Feb, 87	Unspecified
Approval	16 Jul, 87	Unspecified
Completed	21 Jul, 90	330 K Pix

IHEP, BEIJING (PRC)
BROWN UNIVERSITY
FERMILAB
MASSACHUSETTS INST. OF TECHNOLOGY
OAK RIDGE NATIONAL LABORATORY
SENSYU UNIVERSITY (JAPAN)
SUGIYAMA JOGAKUEN UNIV. (JAPAN)
UNIVERSITY OF TENNESSEE, KNOXVILLE
TOHOKU GAKUIN UNIVERSITY (JAPAN)
TOHOKU UNIVERSITY (JAPAN)

---

783 **TEVATRON BEAUTY FACTORY #783** — Neville W. Reay

BEAM: Collision Area (C-0)
LETTER OF INTENT FOR A TEVATRON COLLIDER BEAUTY FACTORY.

Request	4 Mar, 87	Unspecified
Inactive	23 Dec, 92	

UNIV. OF CALIFORNIA, DAVIS
CARNEGIE-MELLON UNIVERSITY
FERMILAB
OHIO STATE UNIVERSITY
UNIVERSITY OF OKLAHOMA

---

784 **BOTTOM AT THE COLLIDER #784** — Nigel S. Lockyer

BEAM: Unspecified Beam
PROPOSAL FOR RESEARCH & DEVELOPMENT: VERTEXING, TRACKING AND DATA ACQUISITION FOR THE BOTTOM COLLIDER DETECTOR.

UNIVERSIDAD DE LOS ANDES(COLOMBIA)
UNIV. OF CALIFORNIA, DAVIS
FERMILAB
UNIVERSITY OF FLORIDA
UNIVERSITY OF HOUSTON
ILLINOIS INSTITUTE OF TECHNOLOGY
UNIVERSITY OF IOWA
NORTHEASTERN UNIVERSITY
NORTHERN ILLINOIS UNIVERSITY
OHIO STATE UNIVERSITY
UNIVERSITY OF OKLAHOMA
UNIVERSITY OF PENNSYLVANIA
PRAIRIE VIEW A&M UNIVERSITY
PRINCETON UNIVERSITY
UNIV. OF PUERTO RICO - RIO PIEDRAS
UN.SAN FRANCISCO DE QUITO(ECUADOR)
YALE UNIVERSITY

Request	2 Jan, 89	Unspecified
Approval	30 Jan, 89	Unspecified Approval of Phase I (bench tests) and Phase II (beam tests). Phase III (C0 run at the Tevatron Collider) deferred pending results of simulation studies.
Completed	8 Jan, 92	Unspecified

---

785 **LOW ENERGY ANTIMATTER #785** — Billy Bonner and Lawrence Pinsky

BEAM: Miscellaneous Area
ANTIMATTER PHYSICS AT LOW ENERGY (AMPLE)

Request	12 Mar, 87	Unspecified
Withdrawn	24 Oct, 88	

UNIVERSITY OF HOUSTON
RICE UNIVERSITY

---

786 **TEVATRON MUON #786** — Richard Wilson

BEAM: Neutrino Area - Muon Beam
WEAK INTERACTIONS AND HEAVY QUARK PHYSICS WITH THE TEVATRON MUON BEAM.

Request	10 May, 87	Unspecified
Rejected	29 Jun, 88	

ARGONNE NATIONAL LABORATORY
UNIV. OF CALIFORNIA, SAN DIEGO
FERMILAB
FREIBURG UNIVERSITY (GERMANY)
HARVARD UNIVERSITY
UNIV. OF ILLINOIS, CHICAGO CIRCLE
INP, KRAKOW (POLAND)
UNIVERSITY OF MARYLAND
MASSACHUSETTS INST. OF TECHNOLOGY
MAX-PLANCK INSTITUTE (GERMANY)
UNIVERSITY OF WASHINGTON
UNIVERSITY OF WUPPERTAL (GERMANY)
YALE UNIVERSITY

---

787 **PARTICLE SEARCH #787** — Alfred T. Goshaw

BEAM: Collision Area (C-0)
PARTICLE SEARCH (PHASE II OF E-735).

Request	30 Jun, 87	Unspecified
Rejected	1 May, 89	

DEPAUW UNIVERSITY
DUKE UNIVERSITY
FERMILAB
IOWA STATE UNIVERSITY
NOTRE DAME UNIVERSITY
PURDUE UNIVERSITY
UNIVERSITY OF WISCONSIN - MADISON

---

788 **NEUTRINO OSCILLATIONS #788** — Robert H. Bernstein

BEAM: Neutrino Area - Center
NEUTRINO OSCILLLATIONS AND CROSS-SECTIONS IN A TAGGED NEUTRINO LINE.

Request	11 Aug, 87	Unspecified
Inactive	23 Dec, 92	

FERMILAB
UNIV. OF PARIS VI, LPG (FRANCE)

---

789 **B-QUARK MESONS & BARYONS #789** — Daniel M. Kaplan and Jen-Chieh Peng

BEAM: Meson Area - East
MEASUREMENT OF THE PRODUCTION AND DECAY INTO TWO-BODY MODES OF B-QUARK MESONS AND BARYONS.

Request	9 Nov, 87	Unspecified
Approval	24 Oct, 88	Unspecified
Data Analysis	8 Jan, 92	Unspecified
Completed	1 Mar, 99	Unspecified

ABILENE CHRISTIAN UNIVERSITY
IHEP, ACADEMIA SINICA (TAIWAN)
UNIVERSITY OF CHICAGO
FERMILAB
LAWRENCE BERKELEY LABORATORY
LOS ALAMOS NATIONAL LABORATORY
NORTHERN ILLINOIS UNIVERSITY
UNIVERSITY OF SOUTH CAROLINA

---

790 **CALORIMETER FOR ZEUS #790** — Frank J. Sciulli

BEAM: Neutrino Area - Test Beam
CALORIMETER MODULE CALIBRATION FOR ZEUS DETECTOR.

Request	5 Jun, 87	Unspecified
Approval	17 Dec, 87	Unspecified
Completed	27 Aug, 90	Unspecified

ARGONNE NATIONAL LABORATORY
COLUMBIA UNIVERSITY
UNIVERSITY OF IOWA
LOUISIANA STATE UNIVERSITY
OHIO STATE UNIVERSITY
PENNSYLVANIA STATE UNIVERSITY
VIRGINIA TECH
UNIVERSITY OF WISCONSIN - MADISON

791 **HADROPRODUCTION HEAVY FLAVORS #791** — Jeffrey A. Appel and Milind Vasant Purohit

UNIV. OF CALIFORNIA, SANTA CRUZ
CBPF (BRAZIL)
UNIVERSITY OF CINCINNATI
CINVESTAV-IPN (MEXICO)
FERMILAB
ILLINOIS INSTITUTE OF TECHNOLOGY
KANSAS STATE UNIVERSITY
UNIVERSITY OF MISSISSIPPI
OHIO STATE UNIVERSITY
PRINCETON UNIVERSITY
UN.AUTONOMA DE PUEBLA (MEXICO)
UNIV. FEDERAL DO RIO DE JANEIRO
UNIVERSITY OF SOUTH CAROLINA
STANFORD UNIVERSITY
UNIVERSITY OF TEL-AVIV (ISRAEL)
TUFTS UNIVERSITY
UNIVERSITY OF WISCONSIN - MADISON
YALE UNIVERSITY

BEAM: Proton Area - East
Search for the Flavor-Changing Neutral-Current Decays

Request	10 Nov, 87	Unspecified
Approval	29 Jun, 88	Unspecified
Data Analysis	8 Jan, 92	Unspecified
Completed	1 Mar, 99	Unspecified

792 **NUCLEAR FRAGMENTS #792** — Kjell Aleklett and Lembit Sihver

LAL, ORSAY (FRANCE)
UPPSALA UNIVERSITY (SWEDEN)

BEAM: Meson Area - East
STUDY OF FRAGMENTATION PRODUCTS FROM THE REACTION 800 GEV P + 197 AU.

Request	15 Jan, 88	Unspecified
Approval	15 Jan, 88	Unspecified
Completed	15 Feb, 88	Unspecified

793 **EMULSION EXPOSURE 1000 GeV #793** — Jere J. Lord

KAZAKH STATE UNIV., (KAZAKHSTAN)
WASHINGTON NATURAL PHILOSOPHY INS.
UNIVERSITY OF WASHINGTON

BEAM: Proton Area - Miscellaneous
Emulsion Exposure to 1000 GeV, or highest energy protons.

Request	19 Feb, 88	Unspecified
Approval	21 Sep, 88	Unspecified
Approved/Inactive	13 Jan, 94	

794 **AXION HELIOSCOPE #794** — Karl Van Bibber

UNIV. OF CALIFORNIA, BERKELEY
CERN (SWITZERLAND)
LAWRENCE BERKELEY LABORATORY
LAWRENCE LIVERMORE LABORATORY
OHIO STATE UNIVERSITY
TEXAS A&M UNIVERSITY
TEXAS ACCELERATOR CENTER

BEAM: Unspecified Beam
CONSTRUCTION AND OPERATION OF AN AXION HELIOSCOPE.

Request	5 Mar, 88	Unspecified
Inactive	23 Dec, 92	

795 **WARM LIQUID CALORIMETRY TEST #795** — Morris Pripstein

UNIVERSITY OF ALABAMA
UNIV. OF CALIFORNIA, BERKELEY
CEN-SACLAY (FRANCE)
CERN (SWITZERLAND)
FERMILAB
COLLEGE DE FRANCE (FRANCE)
HARVARD UNIVERSITY
KYOTO UNIVERSITY (JAPAN)
LAPP, D'ANNECY-LE-VIEUX (FRANCE)
LAWRENCE BERKELEY LABORATORY

BEAM: Meson Area - Test Beam
TEST OF ELECTRON/HADRON COMPENSATION FOR WARM LIQUID CALORIMETRY.

Request	1 Mar, 88	Unspecified
Approval	24 Oct, 88	Unspecified
Completed	23 Dec, 91	Unspecified

796 **CP VIOLATION #796** — Gordon B. Thomson

UNIVERSITY OF MINNESOTA
RUTGERS UNIVERSITY

BEAM: Proton Area - Center
A MEASUREMENT OF THE CP VIOLATION PARAMETER N+-0 THE SON OF E621.

Request	1 Jun, 88	Unspecified
Withdrawn	4 Jan, 94	

797 **FINE-GRAINED ELECTROMAG. CAL. #T797** — H. Richard Gustafson and Rudolf P. Thun

UNIVERSITY OF MICHIGAN - ANN ARBOR

BEAM: Proton Area - East
FINE-GRAINED ELECTROMAGNETIC CALORIMETRY.

Request	31 Aug, 88	Unspecified
Approval	1 Apr, 90	Unspecified
Completed	20 May, 90	Unspecified

798 **SSC DETECTOR TEST #T798** — Priscilla Cushman and Roger W. Rusack

ROCKEFELLER UNIVERSITY
YALE UNIVERSITY

BEAM: Proton Area - East
PROPOSAL TO BUILD A SYNCHROTRON-RADIATION DETECTOR FOR TAGGING ELECTRONS AT THE SSC.

Request	20 Jul, 88	Unspecified
Approval	30 Jan, 89	Unspecified Stage I approval.
Completed	2 May, 90	Unspecified

799 **CP VIOLATION #799** — Robert S. Tschirhart

UNIVERSITY OF ARIZONA
UNIV. OF CALIFORNIA, LOS ANGELES
UNIV. OF CALIFORNIA, SAN DIEGO
UNIV. ESTADUAL DE CAMPINAS(BRAZIL)
UNIVERSITY OF CHICAGO
UNIVERSITY OF COLORADO AT BOULDER
ELMHURST COLLEGE
FERMILAB
OSAKA UNIVERSITY (JAPAN)
RICE UNIVERSITY
RUTGERS UNIVERSITY
UNIVERSITE DE SAO PAULO (BRAZIL)
UNIVERSITY OF VIRGINIA
UNIVERSITY OF WISCONSIN - MADISON

BEAM: Neutrino Area - Muon Beam
PROPOSAL TO SEARCH FOR RARE KAON DECAY.

Request	2 Jan, 89	Unspecified
Approval	29 Jun, 89	Unspecified Stage I approval for phases 1 and 2
	Jul, 91	Unspecified Stage II approval deferred
In Progress	1 Oct, 91	
Data Analysis	17 Jan, 00	

800 **MAGNETIC MOMENT #800** — Kenneth A. Johns and Regina A. Rameika

UNIVERSITY OF ARIZONA
DEPAUW UNIVERSITY
FERMILAB
UNIVERSITY OF MICHIGAN - ANN ARBOR
UNIVERSITY OF MINNESOTA

BEAM: Proton Area - Center
MEASUREMENT OF THE MAGNETIC MOMENT OF THE OMEGA MINUS HYPERON.

Request	1 Mar, 88	Unspecified
Approval	5 Oct, 88	Unspecified
Completed	8 Jan, 92	Unspecified

801 **PHOTON TOTAL XSECTION-URANIUM #801** G. L. Bayatian — YEREVAN PHYSICS INST. (ARMENIA)

BEAM: Proton Area - Broad Band
MEASUREMENT OF THE TOTAL CROSS SECTION OF REAL AND VIRTUAL PHOTON ABSORBTION ON URANIUM NUCLEI AT ENERGIES OF HUNDREDS OF GEV.

Request	10 Oct, 88	Unspecified
Rejected	26 Dec, 89	

802 **MUONS IN EMULSION #802** Lali Chatterjee and Dipak Ghosh — FERMILAB, JADAVPUR UNIVERSITY (INDIA)

BEAM: Neutrino Area - Muon Beam
DEEP INELASTIC MUON INTERACTION WITH NUCLEAR TARGETS USING EMULSION TELESCOPE TECHNIQUE.

Request	12 Dec, 88	Emulsion Stack(s)
Approval	8 Feb, 89	Emulsion Stack(s) 1st stage approval - exposure of stacks of G5 nuclear emulsion plates to the main muon beam.
Completed	30 Dec, 91	Unspecified

803 **NEUTRINO OSCILLATIONS #803** Neville W. Reay — AICHI UNIV. OF EDUCATION (JAPAN), UNIVERSITY OF ATHENS (GREECE), UNIV. OF CALIFORNIA, DAVIS, UNIV. OF CALIFORNIA, LOS ANGELES, CHONNAM NATIONAL UNIVERSITY(KOREA), FERMILAB, GIFU UNIVERSITY (JAPAN), GYEONGSANG NATIONAL UNIV. (KOREA), HIROSAKI UNIVERSITY (JAPAN), ILLINOIS INSTITUTE OF TECHNOLOGY, INDIANA UNIVERSITY, KANSAS STATE UNIVERSITY, KINKI UNIVERSITY (JAPAN), KOBE UNIVERSITY (JAPAN), KOREA ADV. INST OF SCIENCE (KOREA), KOREA UNIVERSITY, SEOUL (KOREA), UNIVERSITY OF MICHIGAN - ANN ARBOR, ITEP, MOSCOW (RUSSIA), NAGOYA INST. OF TECHNOLOGY (JAPAN), OKAYAMA UNIVERSITY (JAPAN), OSAKA CITY UNIVERSITY (JAPAN), OSAKA SCIENCE EDUC. INST. (JAPAN), OSAKA UNIV. OF COMMERCE (JAPAN), SEOUL NATIONAL UNIVERSITY (KOREA), SOAI UNIVERSITY (JAPAN), UNIVERSITY OF SOUTH CAROLINA, TECHNION-ISRAEL INST (ISRAEL), TOHO UNIVERSITY (JAPAN), TUFTS UNIVERSITY, UTSUNOMIYA UNIVERSITY (JAPAN), YOKOHAMA NATIONAL UNIV. (JAPAN)

BEAM: Main Injector Area
Muon Neutrino to Tau Neutrino Oscillations

Request	6 Apr, 89	Unspecified
Unscheduled	24 Nov, 93	
Withdrawn	9 Mar, 98	

804 **KAMI R&D #804** Ronald Ray — UNIVERSITY OF ARIZONA, UNIV. OF CALIFORNIA, LOS ANGELES, UNIV. ESTADUAL DE CAMPINAS(BRAZIL), UNIVERSITY OF CHICAGO, UNIVERSITY OF COLORADO AT BOULDER, FERMILAB, OSAKA UNIVERSITY, IHEP, PROTVINO (SERPUKHOV)(RUSSIA), RICE UNIVERSITY, UNIVERSITE DE SAO PAULO (BRAZIL), UNIVERSITY OF VIRGINIA

BEAM: Main Injector Area
HIGH PRECISION, HIGH SENSITIVITY KAON PHYSICS AT THE MAIN INJECTOR

Request	14 Jun, 88	Unspecified
Unconsidered	14 Jun, 88	
Approval	7 Jul, 99	
In Progress	17 Jan, 00	
Completed	28 Jun, 01	

805 **IMB NEUTRINO OSCILLATIONS #805** Wojciech Gajewski — BOSTON UNIVERSITY, BROOKHAVEN NATIONAL LABORATORY, UNIV. OF CALIFORNIA, IRVINE, CLEVELAND STATE UNIVERSITY, UNIVERSITY OF HAWAII AT MANOA, LONDON UNIVERSITY COLLEGE(ENGLAND), LOUISIANA STATE UNIVERSITY, UNIVERSITY OF MARYLAND, NOTRE DAME UNIVERSITY, WARSAW UNIVERSITY, INP, (POLAND)

BEAM: Main Injector Area
Long Baseline Oscillation Experiment using a High Intensity Neutrino Beam from the Fermilab Main Injector to the IMB Water Cerenkov Detector

Request	24 Aug, 89	Unspecified
Inactive	23 Dec, 92	

806 **MP BEAMLINE UPGRADE #806** Akihiko Yokosawa — ARGONNE NATIONAL LABORATORY, CEN-SACLAY (FRANCE), FERMILAB, HIROSHIMA UNIVERSITY (JAPAN), UNIVERSITY OF IOWA, KEK (JAPAN), KYOTO SANGYO UNIVERSITY (JAPAN), KYOTO UNIVERSITY (JAPAN), KYOTO UNIV. OF EDUCATION (JAPAN), LAPP, D'ANNECY-LE-VIEUX (FRANCE), LOS ALAMOS NATIONAL LABORATORY, NORTHEASTERN UNIVERSITY, NORTHWESTERN UNIVERSITY, UN. OF OCCUP. & ENV. HEALTH(JAPAN), IHEP, PROTVINO (SERPUKHOV)(RUSSIA), RICE UNIVERSITY, UNIVERSITY DI TRIESTE (ITALY), UNIVERSITY OF UDINE (ITALY)

BEAM: Meson Area - Polarized Proton Beam
ENERGY UPGRADE OF THE MP BEAMLINE AND PROPOSED EXPERIMENTS

Request	28 Sep, 89	Unspecified
Withdrawn	7 Mar, 90	

807 **WARM HEAVY LIQUID CALORIMETRY #T807** Scott Teige — RUTGERS UNIVERSITY

BEAM: Proton Area - East
WARM HEAVY LIQUID CALORIMETRY: A PROPOSAL TO MEASURE PERFORMANCE OF CANDIDATE MATERIALS

Request	26 Dec, 89	Unspecified
Approval	9 Feb, 90	Unspecified
Completed	1 May, 90	Unspecified

808 **B-PHYSICS #T808** — Howard S. Goldberg

BEAM: Meson Area - West
B-MESON HADROPRODUCTION, INCLUDING MEASUREMENTS OF CROSS-SECTIONS, LIFETIMES, AND MIXING.

Request	1 Mar, 90	Unspecified
Inactive	23 Dec, 92	

UNIV. OF ILLINOIS, CHICAGO CIRCLE
UNIVERSITY OF LOUISVILLE
UNIVERSITY OF MICHIGAN - ANN ARBOR
UNIVERSITY OF PITTSBURGH
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)

---

809 **DIRECT PHOTON SPIN DEPENDENCE #809** — Akira Masaike and Sandibek B. (Sergei) Nurushev

BEAM: Meson Area - Polarized Proton Beam
STUDY OF THE SPIN DEPENDENCE OF DIRECT-GAMMA PRODUCTION AT HIGH P

Request	7 Mar, 90	Unspecified
Inactive	23 Dec, 92	

ARGONNE NATIONAL LABORATORY
CEN-SACLAY (FRANCE)
FERMILAB
UNIVERSITY OF IOWA
KEK (JAPAN)
KYOTO SANGYO UNIVERSITY (JAPAN)
KYOTO UNIVERSITY (JAPAN)
KYOTO UNIV. OF EDUCATION (JAPAN)
LAPP, D'ANNECY-LE-VIEUX (FRANCE)
LOS ALAMOS NATIONAL LABORATORY
INFN, MESSINA (ITALY)
NEW MEXICO STATE UNIVERSITY
NORTHWESTERN UNIVERSITY
OKAYAMA UNIVERSITY (JAPAN)
OSAKA CITY UNIVERSITY (JAPAN)
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
RICE UNIVERSITY
UNIVERSITY DI TRIESTE (ITALY)
UNIVERSITY OF UDINE (ITALY)

---

810 **STRUCTURE FUNCTIONS #810** — Richard Wilson

BEAM: Neutrino Area - Muon Beam
MEASUREMENT OF NUCLEON STRUCTURE FUNCTIONS WITH HIGH STATISTICAL ACCURACY AND LOW SYSTEMATIC ERRORS, USING MUON BEAMS FROM THE TEVATRON.

Request	5 Mar, 90	Unspecified
Inactive	23 Dec, 92	

UNIV. OF CALIFORNIA, SAN DIEGO
FERMILAB
HARVARD UNIVERSITY
UNIV. OF ILLINOIS, CHICAGO CIRCLE
UNIVERSITY OF WUPPERTAL (GERMANY)

---

811 **PBAR P ELASTIC SCATTERING #811** — Jay Orear

BEAM: Collision Area (E-0)
PBAR P ELASTIC SCATTERING.

Request	14 Mar, 90	Unspecified
Approval	9 Jul, 92	Unspecified
Data Analysis	20 Feb, 96	
Completed	1 Mar, 01	

CERN (SWITZERLAND)
CORNELL UNIVERSITY
FERMILAB

---

812 **CPT AND GRAVITY TESTS #812** — Gerald A. Smith

BEAM: Accumulator Ring
PRECISION TESTS OF CPT AND GRAVITY USING LOW ENERGY ANTIMATTER AT FERMILAB.

Request	19 Feb, 90	Unspecified
Inactive	30 Jun, 94	

UNIV. OF CALIFORNIA, IRVINE
GSI, DARMSTADT (GERMANY)
FERMILAB
INTEGRATED ACCELERATOR TECHNOLOGY
UNIVERSITY OF IOWA
LOS ALAMOS NATIONAL LABORATORY
MANNE SIEGBAHN INSTITUTE (SWEDEN)
MAX-PLANCK INSTITUTE (GERMANY)
UNIVERSITY OF MICHIGAN - ANN ARBOR
UNIVERSITY OF NEW MEXICO
PENNSYLVANIA STATE UNIVERSITY
RUTGERS UNIVERSITY
UNIVERSITY DI TRIESTE (ITALY)

---

813 **SMALL PHYSICS #813** — Lawrence W. Jones

BEAM: Unspecified Beam
I. A QUANTITATIVE TEST OF THE LANDAU-MIGDAL-POMMERANCHUK EFFECT; II. HADRON INCLUSIVE DISTRIBUTIONS AT HIGH X; III. NEUTRON POLARIZATION

Request	2 Mar, 90	Unspecified
Rejected	5 May, 93	

UNIVERSITY OF HAWAII AT MANOA
LODZ UNIVERSITY
UNIVERSITY OF MICHIGAN - ANN ARBOR
UNIVERSITY OF WASHINGTON

---

814 **PRIMAKOFF PRODUCTION #814** — Vladimir Chaloupka

BEAM: Proton Area - Center
SEARCH FOR PRIMAKOFF PRODUCTION OF HYBRID MESONS.

Request	28 Feb, 90	Unspecified
Inactive	23 Dec, 92	

UNIVERSITY OF ROCHESTER
UNIVERSITY OF WASHINGTON

---

815 **NEUTRINO #815** — Michael H. Shaevitz and Robert H. Bernstein

BEAM: Neutrino Area - Center
Precision Measurements of Neutrino Neutral Current Interactions Using a Sign-Selected Beam

Request	7 Mar, 90	Unspecified
	9 Oct, 90	Unspecified
Approval	10 Jul, 91	Unspecified Stage I approval for Phase I granted.
	9 Jul, 92	Unspecified Stage I approval for 10 E18th Protons on target
	24 Jun, 94	Unspecified 1E18 protons on target at an intensity between 1 and 3 E13 protons / pulse
In Progress	15 Jun, 96	
Data Analysis	5 Sep, 97	
Completed	5 Mar, 05	

UNIVERSITY OF CINCINNATI
COLUMBIA UNIVERSITY
FERMILAB
KANSAS STATE UNIVERSITY
NORTHWESTERN UNIVERSITY
UNIVERSITY OF OREGON
UNIVERSITY OF ROCHESTER
XAVIER UNIVERSITY

---

816 **SDC DETECTOR MUON BEAM TESTS #T816** — Henry J. Lubatti

BEAM: Neutrino Area - Muon Beam
SSC Detector Muon Sub-System Beam Tests

Request	1 May, 90	Unspecified
Approval	30 Oct, 90	Unspecified
Completed	8 Jan, 92	Unspecified

UNIVERSITY OF COLORADO AT BOULDER
FERMILAB
UNIVERSITY OF ILLINOIS, CHAMPAIGN
UNIVERSITY OF MARYLAND
OSAKA CITY UNIVERSITY (JAPAN)
UNIVERSITY OF ROCHESTER
TEMPLE UNIVERSITY
TUFTS UNIVERSITY
UNIVERSITY OF WASHINGTON
UNIVERSITY OF WISCONSIN - MADISON

817	**SILICON STRIP DETECTOR TEST #817** BEAM: Neutrino Area - Muon Beam Double-sided silicon strip detector prototype evaluation. Request 1 May, 90 Unspecified Approval 9 Jul, 90 Unspecified Completed 15 Aug, 90 Unspecified	James P. Alexander	UNIV. OF CALIFORNIA, SANTA BARBARA CORNELL UNIVERSITY
818	**LEAD GLASS DETECTOR TEST #818** BEAM: Unspecified Beam Proposal to use the NWA Electron Test Beam at Fermilab for Tests of a Lead Glass Calorimeter Prototype Request 26 Jun, 90 Unspecified Withdrawn 30 Apr, 91	Scott Teige	INDIANA UNIVERSITY UNIVERSITY OF LOUISVILLE MOSCOW STATE UNIVERSITY (RUSSIA) IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
819	**EMPACT DETECTOR TEST FOR SSC #819** BEAM: Neutrino Area - Muon Beam EMPACT Muon Telescope Evaluation at Fermilab Request 28 Jun, 90 Unspecified Approval 15 Aug, 91 Unspecified Completed 15 Oct, 91 Unspecified	Louis S. Osborne	UNIVERSITY OF HOUSTON INDIANA UNIVERSITY JINR, DUBNA (RUSSIA) MASSACHUSETTS INST. OF TECHNOLOGY
820	**MUON NEUTRINO MAGNETIC MOMENT #820** BEAM: Miscellaneous Area Search for the muon neutrino magnetic moment at the 10 to the -10 Bohr magneton level using the Booster at Fermilab Request 13 Jul, 90 Unspecified Inactive 30 Jun, 94	Nikos D. Giokaris	FERMILAB UNIVERSITY OF MARYLAND NORTHEASTERN UNIVERSITY NORTHERN ILLINOIS UNIVERSITY UNIVERSITY OF ROCHESTER ROCKEFELLER UNIVERSITY
821	**NEUTRON MEASUREMENTS AT NWA #T821** BEAM: Neutrino Area - West Neutron Measurements at NWA Request 14 Aug, 90 Unspecified Approval 14 Aug, 90 Unspecified Completed 8 Jan, 92 Unspecified	Kenneth A. Johns	UNIVERSITY OF ARIZONA BALL STATE UNIVERSITY FERMILAB UNIVERSITY OF MICHIGAN - ANN ARBOR UNIVERSITY OF MINNESOTA NORTHERN ILLINOIS UNIVERSITY RICE UNIVERSITY
822	**NEUTRINO OSCILLATIONS #822** BEAM: Main Injector Area A Long-Baseline Neutrino Oscillation Experiment from Fermilab to Soudan Request 24 Aug, 90 Unspecified Withdrawn 24 Oct, 95	Maury C. Goodman	ARGONNE NATIONAL LABORATORY FERMILAB LEBEDEV PHYSICAL INST. (RUSSIA) UNIVERSITY OF MINNESOTA ITEP, MOSCOW (RUSSIA) UNIVERSITY OF OXFORD (ENGLAND) RUTHERFORD-APPLETON LABS.(ENGLAND) SSC LABORATORY TEXAS A&M UNIVERSITY TUFTS UNIVERSITY WESTERN WASHINGTON UNIVERSITY

823 **D-0 DETECTOR UPGRADE #823** — Gerald Blazey and Terry Wyatt

BEAM: Collision Area (D-0)
D0 Detector Upgrade

Request	4 Oct, 90	Unspecified	
Approval	11 Jul, 91	Unspecified	Stage I / Step 1 approval granted
			Stage I / Step 2 and 3 approval deferred
Unscheduled	11 Jul, 91		
Setup in a Year	1 Mar, 99		
In Progress	1 Mar, 01		

INST.OF PHYS.ACADEMY OF SCI(CZECH)
UNIVERSITY OF ALBERTA (CANADA)
UNIVERSIDAD DE LOS ANDES(COLOMBIA)
UNIVERSITY OF ARIZONA
IHEP, BEIJING (PRC)
UNIVERSITY OF BONN (GERMANY)
BOSTON UNIVERSITY
BROOKHAVEN NATIONAL LABORATORY
BROWN UNIVERSITY
UNIV. DE BUENOS AIRES (ARGENTINA)
CALIFORNIA STATE UNIVERSITY
UNIV. OF CALIFORNIA, RIVERSIDE
CBPF (BRAZIL)
CEA-SACLAY (FRANCE)
CPPM, MARSEILLE (FRANCE)
CHARLES UNIVERSITY (CZECH)
CINVESTAV-IPN (MEXICO)
LPN, UNIV. DE CLERMONT (FRANCE)
COLUMBIA UNIVERSITY
CZECH TECHNICAL UNIVERSITY(CZECH)
DELHI UNIVERSITY (INDIA)
UNIVERSITY COLLEGE DUBLIN(IRELAND)
FERMILAB
FLORIDA STATE UNIVERSITY
FREIBURG UNIVERSITY (GERMANY)
HO CHI MINH CITY INS PHY(VIET NAM)
UNIV. OF ILLINOIS, CHICAGO CIRCLE
IMPERIAL COLLEGE (ENGLAND)
INDIANA UNIVERSITY
INS RECHERCHES SUBATOMIQUE(FRANCE)
ISN (GRENOBLE, FRANCE)
IPNL (FRANCE)
IOWA STATE UNIVERSITY
JINR, DUBNA (RUSSIA)
KANSAS STATE UNIVERSITY
UNIVERSITY OF KANSAS
KOREA UNIVERSITY, SEOUL (KOREA)
LAL, ORSAY (FRANCE)
LANCASTER UNIVERSITY (ENGLAND)
LANGSTON UNIVERSITY
LAWRENCE BERKELEY NATIONAL LAB.
LOUISIANA TECH UNIVERSITY
LPNHE, UN. OF P & M CURIE (FRANCE)
LUDWIG MAXIMILIANS UNIV. (GERMANY)
LUND,RIT,STOCKHOLM,UPPSALA(SWEDEN)
MAINZ UNIVERSITY (GERMANY)
UNIVERSITY OF MANCHESTER (ENGLAND)
UNIVERSITY OF MARYLAND
UNIVERSITY OF MICHIGAN - ANN ARBOR
MICHIGAN STATE UNIVERSITY
UNIVERSITY OF MISSISSIPPI
MOSCOW STATE UNIVERSITY (RUSSIA)
ITEP, MOSCOW (RUSSIA)
UNIVERSITY OF NEBRASKA - LINCOLN
SUNY AT BUFFALO
SUNY AT STONY BROOK
UN OF NIJMEGEN/NIKHEF(NETHERLANDS)
NIKHEF&U OF AMSTERDAM(NETHERLANDS)
NORTHEASTERN UNIVERSITY
NORTHERN ILLINOIS UNIVERSITY
NORTHWESTERN UNIVERSITY
UNIVERSITY OF NOTRE DAME
OKLAHOMA STATE UNIVERSITY
UNIVERSITY OF OKLAHOMA
PANJAB UNIVERSITY (INDIA)
UNESP (BRAZIL)
PNPI, ST. PETERSBURG (RUSSIA)
PRINCETON UNIVERSITY
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
RICE UNIVERSITY
UN. ESTADO RIO DE JANEIRO (BRAZIL)
UNIVERSITY OF ROCHESTER
RWTH, AACHEN (GERMANY)
UN.SAN FRANCISCO DE QUITO(ECUADOR)
UNIV. OF SCI. & TECH., HEFEI (PRC)
SIMON FRASER UNIVERSITY (CANADA)
SOUTHERN METHODIST UNIVERSITY
SUNG KYUN KWAN UNIVERSITY (KOREA)
TATA INSTITUTE (INDIA)
UNIVERSITY OF TEXAS AT ARLINGTON
UNIVERSITY OF ZURICH (SWITZERLAND)
UNIVERSITY OF VIRGINIA
UNIVERSITY OF WASHINGTON
UNIVERSITY OF WUPPERTAL (GERMANY)

824 **DUMAND NEUTRINO OSCILLATIONS #824** — Medford S. Webster

BEAM: Main Injector Area
Neutrino Beam from the Proposed Main Injector to the DUMAND Detector

Request	4 Oct, 90	Unspecified
Inactive	23 Dec, 92	

RWTH, AACHEN (GERMANY)
UNIVERSITY OF BERNE (SWITZERLAND)
BOSTON UNIVERSITY
UNIVERSITY OF HAWAII AT MANOA
ICRR, UNIVERSITY OF TOKYO (JAPAN)
UNIVERSITY OF KIEL (GERMANY)
KINKI UNIVERSITY (JAPAN)
KOBE UNIVERSITY (JAPAN)
SCRIPPS INST. OF OCEANOGRAPHY/UCSD
TOHOKU UNIVERSITY (JAPAN)
VANDERBILT UNIVERSITY
UNIVERSITY OF WASHINGTON
UNIVERSITY OF WISCONSIN - MADISON

825 **SDC PROTOTYPE DETECTORS #825** James R. Bensinger

BEAM: Unspecified Beam

Testing of Prototype Detectors for the Solenoidal Detector Collaboration

Request	1 Oct, 90	Unspecified
Inactive	23 Dec, 92	

ARGONNE NATIONAL LABORATORY
UNIVERSITY OF ARIZONA
BRANDEIS UNIVERSITY
BRATSLAVA STATE UNIVERSITY (CZECH)
UNIVERSITY OF BRISTOL (ENGLAND)
BROWN UNIVERSITY
UNIV. OF CALIFORNIA, DAVIS
UNIV. OF CALIFORNIA, LOS ANGELES
UNIV. OF CALIFORNIA, RIVERSIDE
UNIV. OF CALIFORNIA, SAN DIEGO
UNIV. OF CALIFORNIA, SANTA CRUZ
CHIBA UNIVERSITY (JAPAN)
UNIVERSITY OF CHICAGO
UNIVERSITY OF COLORADO AT BOULDER
DUKE UNIVERSITY
FERMILAB
FLORIDA STATE UNIVERSITY
UNIVERSITY OF FLORIDA
FUKUI UNIVERSITY (JAPAN)
GOMEL STATE UNIVERSITY (BYELARUS)
HARVARD UNIVERSITY
UNIVERSITY OF HAWAII AT MANOA
HIROSHIMA INST. OF TECH. (JAPAN)
HIROSHIMA UNIVERSITY (JAPAN)
IBARAKI COLLEGE OF TECH. (JAPAN)
UNIV. OF ILLINOIS, CHICAGO CIRCLE
UNIVERSITY OF ILLINOIS, CHAMPAIGN
INDIANA UNIVERSITY
IOWA STATE UNIVERSITY
JINR, DUBNA (RUSSIA)
JOHNS HOPKINS UNIVERSITY
KEK (JAPAN)
KYOTO UNIVERSITY (JAPAN)
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF LIVERPOOL (ENGLAND)
UNIVERSITY OF MARYLAND
UNIVERSITY OF MICHIGAN - ANN ARBOR
UNIVERSITY OF MINNESOTA
ACADEMY OF SCI. OF BSSR (BYELARUS)
UNIVERSITY OF MISSISSIPPI
MIYAZAKI UNIVERSITY (JAPAN)
NAGOYA UNIVERSITY (JAPAN)
NIIGATA UNIVERSITY (JAPAN)
NOTRE DAME UNIVERSITY
OAK RIDGE NATIONAL LABORATORY
OHIO STATE UNIVERSITY
OKAYAMA UNIVERSITY (JAPAN)
OSAKA CITY UNIVERSITY (JAPAN)
OSAKA UNIVERSITY (JAPAN)
UNIVERSITY OF OXFORD (ENGLAND)
PENNSYLVANIA STATE UNIVERSITY
UNIVERSITY OF PENNSYLVANIA
UNIVERSITY OF PISA (ITALY)
UNIVERSITY OF PITTSBURGH
PURDUE UNIVERSITY
RICE UNIVERSITY
UNIVERSITY OF ROCHESTER
ROCKEFELLER UNIVERSITY
RUTGERS UNIVERSITY
RUTHERFORD-APPLETON LABS.(ENGLAND)
SAGA UNIVERSITY (JAPAN)
SAITAMA COLLEGE OF HEALTH (JAPAN)
SLOVAK ACADEMY OF SCIENCE (CZECH)
SOFIA STATE UNIVERSITY (BULGARIA)
SSC LABORATORY
SLAC
TASHKENT, PHY.TEC.INS (UZBEKISTAN)
IHEP, TBILISI STATE UNIV (GEORGIA)
TEXAS A&M UNIVERSITY
UNIVERSITY OF TEXAS AT DALLAS
TOHOKU GAKUIN UNIVERSITY (JAPAN)
TOHOKU UNIVERSITY (JAPAN)
TOKYO INST. OF TECHNOLOGY (JAPAN)
TOKYO METROPOLITAN UNIV. (JAPAN)
TOKYO UNIV. OF AGR. & TECH.(JAPAN)
UNIVERSITY OF TOKYO (JAPAN)
UNIVERSITY OF TSUKUBA (JAPAN)
TUFTS UNIVERSITY
VIRGINIA TECH
WAKAYAMA MEDICAL COLLEGE (JAPAN)
UNIVERSITY OF WASHINGTON
UNIVERSITY OF WISCONSIN - MADISON
YEREVAN PHYSICS INST. (ARMENIA)

826 **HYPERON MEASUREMENTS #826** Kenneth A. Johns and Regina A. Rameika

BEAM: Proton Area - Center

An Expression of Interest to Continue Hyperon Measurements at Fermilab

Request	8 Oct, 90	Unspecified
Inactive	23 Dec, 92	

UNIVERSITY OF ARIZONA
FERMILAB
UNIVERSITY OF MICHIGAN - ANN ARBOR
UNIVERSITY OF MINNESOTA

827	**MICRO-BCD #827**	Nigel S. Lockyer	UNIVERSIDAD DE LOS ANDES(COLOMBIA) UNIV. OF CALIFORNIA, DAVIS FERMILAB UNIVERSITY OF FLORIDA UNIV. OF ILLINOIS, CHICAGO CIRCLE ILLINOIS INSTITUTE OF TECHNOLOGY UNIVERSITY OF IOWA UNIVERSITY OF MONTREAL (CANADA) SUNY AT ALBANY OAK RIDGE NATIONAL LABORATORY UNIVERSITY OF OKLAHOMA UNIVERSITY OF PENNSYLVANIA PRAIRIE VIEW A&M UNIVERSITY PRINCETON UNIVERSITY UNIV. OF PUERTO RICO - RIO PIEDRAS UN.SAN FRANCISCO DE QUITO(ECUADOR) SPACE SCIENCE LAB., U.C., BERKELEY UNIVERSITY OF WISCONSIN - MADISON YALE UNIVERSITY
	BEAM: Collision Area (C-0) B Physics at the TEV I; Micro-BCD +----------+ Request 8 Oct, 90 Unspecified Rejected 10 Jul, 91		
828	**B-MESON CP VIOLATION #828**	Sheldon L. Stone	FERMILAB UNIVERSITY OF FLORIDA UNIVERSITY OF MICHIGAN - ANN ARBOR SYRACUSE UNIVERSITY
	BEAM: Collision Area (Miscellaneous) Letter of Intent to Measure CP Violation in B Meson Decay at the Fermilab Collider +----------+ Request 26 Sep, 90 Unspecified Withdrawn 22 Jun, 91		
829	**HEAVY FLAVORS AT TPL #829**	David C. Christian and Michael D. Sokoloff	UNIVERSITY OF CINCINNATI CINVESTAV-IPN (MEXICO) FERMILAB ILLINOIS INSTITUTE OF TECHNOLOGY UNIVERSITY OF MASSACHUSETTS PRINCETON UNIVERSITY UN.AUTONOMA DE PUEBLA (MEXICO) UNIVERSITY OF TEL-AVIV (ISRAEL) TUFTS UNIVERSITY UNIVERSITY OF WISCONSIN - MADISON YALE UNIVERSITY
	BEAM: Proton Area - East Study of Heavy Flavors at TPL, Continuation of E-791 +----------+ Request 8 Oct, 90 Unspecified Rejected 28 Feb, 94		
830	**CDF UPGRADE #830**	Young-Kee Kim and Robert Roser	IHEP, ACADEMIA SINICA (TAIWAN) ARGONNE NATIONAL LABORATORY UNIVERSITY OF BARCELONA (SPAIN) BAYLOR UNIVERSITY UNIVERSITY OF BOLOGNA (ITALY) BRANDEIS UNIVERSITY UNIV. OF CALIFORNIA, DAVIS UNIV. OF CALIFORNIA, LOS ANGELES UNIV. OF CALIFORNIA, SAN DIEGO UNIV. OF CALIFORNIA, SANTA BARBARA UNIVERSITY OF CANTABRIA (SPAIN) CARNEGIE-MELLON UNIVERSITY UNIVERSITY OF CHICAGO CIEMAT, MADRID, SPAIN (SPAIN) DUKE UNIVERSITY FERMILAB UNIVERSITY OF FLORIDA INFN, FRASCATI (ITALY) UNIVERSITY OF GENEVA (SWITZERLAND) GLASGOW UNIVERSITY (SCOTLAND) HARVARD UNIVERSITY UNIVERSITY OF HELSINKI (FINLAND) UNIVERSITY OF ILLINOIS, CHAMPAIGN INFN, TRIESTE/UNIV DI UDINE(ITALY) IPP/MCGILL U/UN OF TORONTO(CANADA) JINR, DUBNA (RUSSIA) JOHNS HOPKINS UNIVERSITY UNIVERSITY OF KARLSRUHNE (GERMANY) KEK (JAPAN) KOREA CENTER FOR HEP (KOREA) LAWRENCE BERKELEY NATIONAL LAB. UNIVERSITY OF LIVERPOOL (ENGLAND) UNIVERSITY COLLEGE LONDON(ENGLAND) LPNHE, UN. OF P & M CURIE (FRANCE) MASSACHUSETTS INST. OF TECHNOLOGY UNIVERSITY OF MICHIGAN - ANN ARBOR MICHIGAN STATE UNIVERSITY ITEP, MOSCOW (RUSSIA) UNIVERSITY OF NEW MEXICO NORTHWESTERN UNIVERSITY OHIO STATE UNIVERSITY OKAYAMA UNIVERSITY (JAPAN) OSAKA CITY UNIVERSITY (JAPAN) UNIVERSITY OF OXFORD (ENGLAND) UNIVERSITY OF PADOVA (ITALY) UNIVERSITY OF PENNSYLVANIA INFN, PISA (ITALY) UNIVERSITY OF PITTSBURGH PURDUE UNIVERSITY UNIVERSITY OF ROCHESTER ROCKEFELLER UNIVERSITY UNIVERSITY OF ROME (ITALY) RUTGERS UNIVERSITY TEXAS A&M UNIVERSITY UNIVERSITY OF TSUKUBA (JAPAN) TUFTS UNIVERSITY WASEDA UNIVERSITY (JAPAN) WAYNE STATE UNIVERSITY UNIVERSITY OF WISCONSIN - MADISON YALE UNIVERSITY
	BEAM: Collision Area (B-0) Proposal for an Upgraded CDF Detector +----------+ Request 9 Oct, 90 Unspecified Unscheduled 11 Jul, 91 Setup in a Year 1 Mar, 99 In Progress 1 Mar, 01		

831 **HEAVY QUARK PHOTOPRODUCTION #831** John P. Cumalat and Luigi Moroni

BEAM: Proton Area - Broad Band
A High Statistics Study of States Containing Heavy Quarks Using the Wideband Photon Beam and the E687 Multiparticle Spectrometer

Request	17 Oct, 90	Unspecified
	1 Sep, 92	5,000 Hours 1000 hours for setup and 4000 hours for data taking
Approval	7 Dec, 92	Unspecified
In Progress	15 Sep, 96	
Data Analysis	25 Aug, 97	

UNIV. OF CALIFORNIA, DAVIS
CBPF (BRAZIL)
CINVESTAV-IPN (MEXICO)
UNIVERSITY OF COLORADO AT BOULDER
FERMILAB
INFN, FRASCATI (ITALY)
UNIVERSITY OF ILLINOIS, CHAMPAIGN
KOREA UNIVERSITY, SEOUL (KOREA)
INFN, MILANO (ITALY)
UNIVERSITY OF MILANO (ITALY)
UNIVERSITY OF NORTH CAROLINA
UNIVERSITY OF PAVIA (ITALY)
UN.AUTONOMA DE PUEBLA (MEXICO)
UNIV. OF PUERTO RICO - MAYAGUEZ
UNIVERSITY OF SOUTH CAROLINA
UNIVERSITY OF TENNESSEE, KNOXVILLE
VANDERBILT UNIVERSITY
UNIVERSITY OF WISCONSIN - MADISON
YEONSEI UNIVERSITY (KOREA)

---

832 **CP VIOLATION #832** Edward C. Blucher

BEAM: Neutrino Area - Muon Beam
Proposal for a New Tevatron Search for Direct CP Violation in the 2pi decays of the Neutral Kaon

Request	18 Oct, 90	Unspecified
Approval	1 Jun, 92	
In Progress	26 Oct, 96	
Data Analysis	17 Jan, 00	

UNIVERSITY OF ARIZONA
UNIV. OF CALIFORNIA, LOS ANGELES
UNIV. OF CALIFORNIA, SAN DIEGO
UNIV. ESTADUAL DE CAMPINAS(BRAZIL)
UNIVERSITY OF CHICAGO
UNIVERSITY OF COLORADO AT BOULDER
ELMHURST COLLEGE
FERMILAB
OSAKA UNIVERSITY (JAPAN)
RICE UNIVERSITY
RUTGERS UNIVERSITY
UNIVERSITE DE SAO PAULO (BRAZIL)
UNIVERSITY OF VIRGINIA
UNIVERSITY OF WISCONSIN - MADISON

---

833 **K-SHORT DECAYS #833** Gordon B. Thomson

BEAM: Meson Area - Center
Letter of Intent to Measure the Branching Ratio for the K-short Decay

Request	19 Oct, 90	Unspecified
Inactive	30 Aug, 95	

UNIV. OF CALIFORNIA, LOS ANGELES
UNIVERSITY OF CHICAGO
ELMHURST COLLEGE
FERMILAB
UNIVERSITY OF ILLINOIS, CHAMPAIGN
RUTGERS UNIVERSITY

---

834 **DIRECT PHOTON #834** Paul F. Slattery

BEAM: Meson Area - West
Direct Photon Production #834

Request	19 Oct, 90	Unspecified
Inactive	23 Dec, 92	

DELHI UNIVERSITY (INDIA)
FERMILAB
MICHIGAN STATE UNIVERSITY
UNIVERSITY OF MINNESOTA
NORTHEASTERN UNIVERSITY
PENNSYLVANIA STATE UNIVERSITY
UNIVERSITY OF PITTSBURGH
RAJASTHAN UNIVERSITY (INDIA)
UNIVERSITY OF ROCHESTER

---

835 **CHARMONIUM STATES #835** Rosanna Cester and Stephen H. Pordes

BEAM: Accumulator Ring
Study of Charmonium States formed in Antiproton-proton Annihilations
MOU Executed.

Request	16 Oct, 90	Unspecified
Approval	7 Dec, 92	Unspecified
In Progress	1 Oct, 96	
Data Analysis	8 Nov, 00	

UNIV. OF CALIFORNIA, IRVINE
FERMILAB
UNIVERSITY OF FERRARA (ITALY)
INFN, GENOVA (ITALY)
UNIVERSITY OF MINNESOTA
NORTHWESTERN UNIVERSITY
UNIVERSITY OF TORINO (ITALY)

---

836 **SUPERCONDUCTING DETECTOR TEST #836** Robert G. Wagner

BEAM: Unspecified Beam
Proposal for a Beam Test of a Superconducting Thin Film Strip Particle Detector

Request	3 Oct, 90	24 Hours in three 8 hour shifts
Withdrawn	8 Jan, 92	

ARGONNE NATIONAL LABORATORY

---

837 **EMPACT/TEXAS TEST #837** Michael D. Marx

BEAM: Unspecified Beam
EMPACT/TEXAS Beam Test(s)

Request	12 Oct, 90	Unspecified
Inactive	23 Dec, 92	

SUNY AT STONY BROOK

---

838 **POLARIZED BEAM #838** Akihiko Yokosawa

BEAM: Meson Area - Polarized Proton Beam
Continuation of E-704 and Simultaneous Measurement of Chi-2 Production

Request	1 Oct, 90	Unspecified
Rejected	19 Feb, 91	

ARGONNE NATIONAL LABORATORY
CEN-SACLAY (FRANCE)
FERMILAB
UNIVERSITY OF IOWA
KYOTO SANGYO UNIVERSITY (JAPAN)
KYOTO UNIVERSITY (JAPAN)
KYOTO UNIV. OF EDUCATION (JAPAN)
LAPP, D'ANNECY-LE-VIEUX (FRANCE)
LOS ALAMOS NATIONAL LABORATORY
INFN, MESSINA (ITALY)
NEW MEXICO STATE UNIVERSITY
NORTHWESTERN UNIVERSITY
UN. OF OCCUP. & ENV. HEALTH(JAPAN)
OKAYAMA UNIVERSITY (JAPAN)
OLD DOMINION UNIVERSITY
OSAKA CITY UNIVERSITY (JAPAN)
OSAKA UNIV. OF COMMERCE (JAPAN)
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
RICE UNIVERSITY
UNIVERSITY DI TRIESTE (ITALY)
UNIVERSITY OF UDINE (ITALY)

839 **FIBER TRACKING TEST #839** — Seymour Margulies — UNIV. OF CALIFORNIA, LOS ANGELES; FERMILAB; UNIV. OF ILLINOIS, CHICAGO CIRCLE; NOTRE DAME UNIVERSITY; OSAKA CITY UNIVERSITY (JAPAN); PENNSYLVANIA STATE UNIVERSITY; PURDUE UNIVERSITY; RICE UNIVERSITY; UNIVERSITY OF TEXAS AT DALLAS; UNIVERSITY OF TSUKUBA (JAPAN)

BEAM: Neutrino Area - Muon Beam
Scintillating Fiber Tracker - Beam Test

Request	25 Sep, 90	Unspecified	
Approval	15 Apr, 91	Unspecified	
Completed	8 Jan, 92	Unspecified	

840 **SPAGHETTI CALORIMETRY TEST #840** — Adam Para — FERMILAB

BEAM: Meson Area - Polarized Proton Beam
Spaghetti calorimetry in '91 test beam cycle

Request	11 Oct, 90	592 Hours	1. Systematic studies of the laminated prototype (160 hrs.) 2. Studies of the RGB prototype (56 hrs.) 3. Dichromatic calorimeter (80 hrs.) 4. Liquid scintillator prototype (56 hrs.) 5. Two-segment fiber prototype (240 hrs.)
Approval	8 Aug, 91	Unspecified	
Completed	8 Jan, 92	Unspecified	

841 **CALORIMETER BEAM TEST #T841** — Lawrence E. Price — ARGONNE NATIONAL LABORATORY; CEN-SACLAY (FRANCE); FERMILAB; IOWA STATE UNIVERSITY; LAWRENCE BERKELEY LABORATORY; NORTHEASTERN UNIVERSITY; PURDUE UNIVERSITY; UNIVERSITY OF ROCHESTER; ROCKEFELLER UNIVERSITY; UNIVERSITY OF SOUTH CAROLINA; VIRGINIA TECH; WESTINGHOUSE ELECTRIC CORPORATION; UNIVERSITY OF WISCONSIN - MADISON; YALE UNIVERSITY

BEAM: Meson Area - Test Beam
Proposal for Beam Test of Scintillator Calorimeter Prototypes at Fermilab during FY 1991

Request	8 Oct, 90	Unspecified
Approval	28 Mar, 91	Unspecified
Completed	8 Jan, 92	Unspecified

842 **RADIATION EXPOSURE #842** — David G. Underwood — ARGONNE NATIONAL LABORATORY

BEAM: Proton Area - Broad Band
Proposed Radiation Measurement in the Wideband Neutral Dump Area

Request	6 Nov, 90	Unspecified
Approval	15 Aug, 91	Unspecified
Completed	8 Jan, 92	Unspecified

843 **EMULSION EXPOSURE 600 GeV #843** — C. O. Kim — CHONNAM NATIONAL UNIVERSITY(KOREA); KOREA UNIVERSITY, SEOUL (KOREA)

BEAM: Neutrino Area - Muon Beam
Interactions of 600 Gev Muons with Emulsion Nuclei

Request	24 Oct, 90	Unspecified
Approval	1 Jul, 91	Unspecified
Completed	13 Jul, 91	Unspecified

844 **TRD/SHOWER COUNTER TEST #844** — Simon P. Swordy — UNIVERSITY OF CHICAGO

BEAM: Meson Area - Polarized Proton Beam
Transition Radiation Detector/EM Shower Counter Calibration

Request	28 Nov, 90	40 Hours	
Approval	11 Oct, 91	Unspecified	
Completed	26 Dec, 91	Unspecified	

845 **TEVATRON BEAUTY #845** — Peter E. Schlein — UNIV. OF CALIFORNIA, LOS ANGELES; CERN (SWITZERLAND); COLLEGE DE FRANCE (FRANCE); INP, KRAKOW (POLAND); MAX-PLANCK INSTITUTE (GERMANY); NANJING UNIVERSITY (PRC); IHEP, PROTVINO (SERPUKHOV)(RUSSIA); YALE UNIVERSITY

BEAM: Unspecified Beam
A Dedicated Beauty Experiment for the Tevatron Collider

Request	7 Jan, 91	Unspecified
Rejected	10 Jul, 91	

846 **FRACTIONAL CHARGE IMPURITIES #846** — Unil Perera — UNIVERSITY OF PITTSBURGH

BEAM: Meson Area - West
Search for Fractional Charge Impurities

Request	1 Feb, 91	Unspecified
Inactive	23 Dec, 92	

847 **CALORIMETER TEST #847** — Lawrence R. Sulak — BOSTON UNIVERSITY

BEAM: Unspecified Beam
Beam Test for scintillating fiber / lead alloy calorimeter prototype

Request	13 Feb, 91	Unspecified
Completed	8 Jan, 92	

848 **GAS CALORIMETRY FOR SDC #848** — Nikos D. Giokaris — ABILITY ENGINEERING TECHNOLOGY; FERMILAB; JINR, DUBNA (RUSSIA); UNIVERSITY OF ROCHESTER; ROCKEFELLER UNIVERSITY; UNIVERSITY OF WISCONSIN - MADISON; YEREVAN PHYSICS INST. (ARMENIA)

BEAM: Neutrino Area - Test Beam
High Pressure Sampling Gas Calorimetry for the SDC Calorimeter

Request	29 Mar, 91	Unspecified
Approval	29 Oct, 91	Unspecified
Completed	23 Dec, 91	Unspecified

849 **BARIUM FLUORIDE CALORIMETER #849** — Hans G. E. Kobrak — BROOKHAVEN NATIONAL LABORATORY; CALIFORNIA INSTITUTE OF TECHNOLOGY; UNIV. OF CALIFORNIA, SAN DIEGO; CARNEGIE-MELLON UNIVERSITY; OAK RIDGE NATIONAL LABORATORY; PRINCETON UNIVERSITY; TATA INSTITUTE (INDIA)

BEAM: Neutrino Area - Test Beam
Request for Test Beam Time for Barium Fluoride Calorimeter Development

Request	11 Apr, 91	Unspecified	Two (2) "beam on" periods of about 1 month each, separated by a data analysis period of about 1 month
Approval	18 Sep, 91	Unspecified	
Completed	8 Jan, 92	Unspecified	

850 **DIAMOND RADIATION DETECTOR TEST #850** Melissa Franklin

BEAM: Meson Area - Test Beam
Fermilab Test Beam Time of Diamond Radiation Detectors

Request	1 May, 91	Unspecified
Approval	8 Jan, 92	Unspecified
Withdrawn	8 Jan, 92	Unspecified

UNIV. OF CALIFORNIA, SANTA BARBARA
HARVARD UNIVERSITY
KEK (JAPAN)
LAWRENCE LIVERMORE LABORATORY
OHIO STATE UNIVERSITY
PRINCETON UNIVERSITY
UNIVERSITY OF ROCHESTER
RUTGERS UNIVERSITY
SSC LABORATORY
STANFORD UNIVERSITY

---

851 **FIBER IRRADIATION STUDIES #851** Seymour Margulies and Jadwiga Warchol

BEAM: Collision Area (C-0)
Fiber Irradiation Studies in the C0 Region

Request	1 May, 91	Unspecified
Approval	14 Aug, 91	Unspecified
Completed	8 Jan, 92	Unspecified

UNIV. OF CALIFORNIA, LOS ANGELES
FERMILAB
UNIV. OF ILLINOIS, CHICAGO CIRCLE
NOTRE DAME UNIVERSITY
OAK RIDGE NATIONAL LABORATORY
OSAKA CITY UNIVERSITY (JAPAN)
PENNSYLVANIA STATE UNIVERSITY
PURDUE UNIVERSITY
RICE UNIVERSITY
UNIVERSITY OF TEXAS AT DALLAS
UNIVERSITY OF TSUKUBA (JAPAN)

---

852 **PIXEL DETECTOR TEST #T852** Eric Arens

BEAM: Neutrino Area - Muon Beam
Pixel Detector Test at NM

Request	8 May, 91	Unspecified
Approval	9 Sep, 91	Unspecified
Completed	23 Dec, 91	Unspecified

FERMILAB
LAWRENCE BERKELEY LABORATORY

---

853 **TEVATRON CRYSTAL EXTRACTION #853** C. Thornton Murphy

BEAM: Collision Area (C-0)
A Test of Low Intensity Extraction from the Tevatron Using Channeling in a Bent Crystal

Request	22 May, 91	100 Hours of dedicated Tevatron time, during which only protons need to be circulating
	10 May, 93	72 Hours
Approval	10 May, 93	72 Hours
Data Analysis	20 Feb, 96	
Completed	1 Mar, 01	

ARGONNE NATIONAL LABORATORY
UNIV. OF CALIFORNIA, LOS ANGELES
FAIRFIELD UNIVERSITY
FERMILAB
JINR, DUBNA (RUSSIA)
UNIVERSITY OF NEW MEXICO
SUNY AT ALBANY
PNPI, ST. PETERSBURG (RUSSIA)
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
SOUTWESTERN MEDICAL CENTER
UNIVERSITY OF TEXAS AT AUSTIN
VANDERBILT UNIVERSITY
UNIVERSITY OF VIRGINIA

---

854 **MUON FLUXES IN THE DEBUNCHER #854** Alan D. Bross

BEAM: Debuncher Ring
Proposal to Measure the Flux of Ciculating Muons in the Debuncher.

Request	11 Jul, 91	Unspecified
Approval	8 Jan, 92	Unspecified
Completed	8 Jan, 92	Unspecified

COLUMBIA UNIVERSITY
FERMILAB

---

855 **dE/dx MUONS #855** George R. Kalbfleisch

BEAM: Neutrino Area - Muon Beam
Test Beam Request to Directly Measure dE/dx of High Energy Muons from 150 to 650 GeV/c in Muon Laboratory

Request	3 Aug, 91	Unspecified
Approval	18 Nov, 91	Unspecified
Completed	8 Jan, 92	Unspecified

UNIVERSITY OF OKLAHOMA
SSC LABORATORY

---

856 **INTEGRATED PIXEL DETECTOR TEST#856** Sherwood I. Parker

BEAM: Neutrino Area - Muon Beam
An Integrated Pixel Detector - Test Beam Request

Request	4 Oct, 91	Unspecified
Approval	11 Oct, 91	Unspecified
Completed	8 Jan, 92	Unspecified

UNIVERSITY OF HAWAII AT MANOA
LAWRENCE BERKELEY LABORATORY
STANFORD UNIVERSITY

---

857 **SPIN-TENSOR #857** L. I. Sarycheva

BEAM: Unspecified Beam
Proposal to measure all components of the depolarization tensor.

Request	10 Dec, 91	Unspecified
Inactive	23 Dec, 92	

MOSCOW STATE UNIVERSITY (RUSSIA)

---

858 **ELASTIC SCATTERING SPIN EFFECTS #858** Alan D. Krisch

BEAM: Unspecified Beam
Spin Effects in High Proton-Proton Elastic Scattering

Request	6 Jan, 92	Unspecified
Rejected	30 Jul, 92	

FERMILAB
INDIANA UNIVERSITY
JINR, DUBNA (RUSSIA)
KEK (JAPAN)
UNIVERSITY OF MICHIGAN - ANN ARBOR
MOSCOW STATE UNIVERSITY (RUSSIA)
UNIVERSITY OF NORTH CAROLINA
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)

---

859 **CP VIOLATION IN HYPERON DECAY #859** Shao Yuan Hsueh

BEAM: Unspecified Beam
CP Violations in Hyperon Decay

Request	2 Jan, 92	Unspecified
Withdrawn	13 Jan, 94	

FERMILAB

---

860 **SEARCH FOR NEUTRINO OSCILLATIONS#860** Wonyong Lee

BEAM: Debuncher Ring
A Search for Neutrino Oscillations using the Fermilab Debuncher.

Request	14 Jan, 92	Unspecified
Withdrawn	17 Jan, 96	

BROOKHAVEN NATIONAL LABORATORY
COLUMBIA UNIVERSITY
FERMILAB
KANGNUNG NATIONAL UNIV. (KOREA)
KOREA UNIVERSITY, SEOUL (KOREA)
SEOUL NATIONAL UNIVERSITY (KOREA)

861 **ANTIPROTON DECAY #T861** — Steve Geer

UNIV. OF CALIFORNIA, LOS ANGELES
FERMILAB
PENNSYLVANIA STATE UNIVERSITY

BEAM: Accumulator Ring
Test of Backgrounds for an Antiproton Decay Search Experiment at the Antiproton Accumulator

Request	10 Feb, 92	24 Hours
Approval	16 Apr, 92	
Completed	29 Oct, 92	

862 **ANTI-HYDROGEN DETECTION #862** — David C. Christian

UNIV. OF CALIFORNIA, IRVINE
FERMILAB

BEAM: Accumulator Ring
Detection of Relativistic Anti-Hydrogen Atoms produced by Pair Production with Positron Capture

Request	27 Aug, 92	Unspecified
Approval	4 Mar, 93	
In Progress	10 Nov, 96	
Data Analysis	18 Sep, 97	
Completed	1 Mar, 99	

863 **NUCLEON SPIN #863** — Aldo Penzo

ARGONNE NATIONAL LABORATORY
CEN-SACLAY (FRANCE)
CNRS, MARSEILLE (FRANCE)
UNIVERSITY OF IOWA
KYOTO SANGYO UNIVERSITY (JAPAN)
KYOTO UNIVERSITY (JAPAN)
KYOTO UNIV. OF EDUCATION (JAPAN)
LAPP, D'ANNECY-LE-VIEUX (FRANCE)
INFN, MESSINA (ITALY)
NEW MEXICO STATE UNIVERSITY
UN. OF OCCUP. & ENV. HEALTH(JAPAN)
OKAYAMA UNIVERSITY (JAPAN)
OSAKA CITY UNIVERSITY (JAPAN)
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
RICE UNIVERSITY
UNIVERSITY DI TRIESTE (ITALY)

BEAM: Meson Area - Polarized Proton Beam
Nucleon Spin Structure Studies with Polarized Proton and Antiproton Beams

Request	31 Aug, 92	7 Months
Rejected	7 Dec, 92	

864 **MAXIMUM ACCEPTANCE DETECTOR #T864** — James D. Bjorken and Cyrus C. Taylor

CASE WESTERN RESERVE UNIVERSITY
DUKE UNIVERSITY
FERMILAB
LOS ALAMOS NATIONAL LABORATORY
UNIVERSITY OF MICHIGAN - ANN ARBOR
SLAC
VIRGINIA TECH

BEAM: Collision Area (C-0)
Maximum Acceptance Detector for the Fermilab Collider (MAX)

Request	1 Sep, 92	Unspecified
Approval	24 May, 93	Unspecified
Completed	20 Dec, 95	

865 **CHARM AND BEAUTY DECAYS #865** — Daniel M. Kaplan

ABILENE CHRISTIAN UNIVERSITY
UNIV. OF CALIFORNIA, LOS ANGELES
CEN-SACLAY (FRANCE)
CERN (SWITZERLAND)
CINVESTAV-IPN (MEXICO)
FERMILAB
ILLINOIS INSTITUTE OF TECHNOLOGY
IOWA STATE UNIVERSITY
UNIVERSITE DE LAUSANNE
NORTHERN ILLINOIS UNIVERSITY
UNIVERSITY OF SOUTH CAROLINA
UNIVERSITY OF TEXAS AT DALLAS

BEAM: Meson Area - East
High-Sensitivity Study of Charm and Beauty Decays.

Request	1 Sep, 92	Unspecified
Withdrawn	4 Feb, 94	

866 **ANTI(U-QUARK)/ANTI(D-QUARK) DIST#866** — Michael J. Leitch

ABILENE CHRISTIAN UNIVERSITY
ARGONNE NATIONAL LABORATORY
FERMILAB
GEORGIA STATE UNIVERSITY
ILLINOIS INSTITUTE OF TECHNOLOGY
LOS ALAMOS NATIONAL LABORATORY
LOUISIANA STATE UNIVERSITY
NEW MEXICO STATE UNIVERSITY
OAK RIDGE NATIONAL LABORATORY
TEXAS A&M UNIVERSITY
VALPARAISO UNIVERSITY

BEAM: Meson Area - East
Measurement of x distribution of the ratio of anti(u-quark) to anti(d-quark) in the proton

Request	2 Sep, 92	Unspecified
Approval	7 Dec, 92	Unspecified
In Progress	14 Sep, 96	
Data Analysis	6 Aug, 97	
Completed	6 Dec, 01	

867 **HIDDEN CHARM AND BEAUTY #867** — Bradley B. Cox

UNIVERSITY OF SOUTH ALABAMA
UNIV. OF CALIFORNIA, BERKELEY
UNIV. OF CALIFORNIA, LOS ANGELES
FERMILAB
UNIVERSITY OF HOUSTON
JINR, DUBNA (RUSSIA)
UNIVERSITY OF LECCE (ITALY)
MCGILL UNIVERSITY (CANADA)
ACADEMY OF SCI. OF BSSR (BYELARUS)
NANJING UNIVERSITY (PRC)
NORTHWESTERN UNIVERSITY
UNIVERSITY OF PAVIA (ITALY)
UNIVERSITY OF PENNSYLVANIA
PRAIRIE VIEW A&M UNIVERSITY
SHANDONG UNIVERSITY (PRC)
IHEP, TBILISI STATE UNIV (GEORGIA)
VANIER COLLEGE (CANADA)
UNIVERSITY OF VIRGINIA
UNIVERSITY OF WISCONSIN - MADISON
YEREVAN PHYSICS INST. (ARMENIA)

BEAM: Proton Area - West
A Proposal to Continue the Study of Hidden Charm and Beauty States by Triggering on High Transverse Momentum Single Muons and High Mass Dimuons in 800 GeV/c pN Interactions

Request	3 Sep, 92	Unspecified
Rejected	28 Feb, 94	

868 **ANTIPROTON DECAY #868** — Steve Geer

UNIV. OF CALIFORNIA, LOS ANGELES
FERMILAB
UNIVERSITY OF MICHIGAN - ANN ARBOR
UNIVERSITY OF NEBRASKA
PENNSYLVANIA STATE UNIVERSITY

BEAM: Accumulator Ring
Proposal to Search for Antiproton Decay at the Fermilab Antiproton Accumulator

Request	24 Sep, 92	Unspecified
Approval	4 Mar, 93	
Data Analysis	24 Jul, 95	
Completed	1 Mar, 01	

869 **GEM DETECTOR AT THE SSC #869** Barry C. Barish and William J. Willis — FERMILAB, SSC LABORATORY

BEAM: Meson Area - West
Testing of Components for the GEM Detector at the Superconducting Super Collider Laboratory: A Proposal to the Fermi National Accelerator Laboratory

Request	11 Nov, 92	Unspecified
Withdrawn	4 Jan, 94	

870 **PROTOTYPE DETECTORS FOR THE SDC #870** George H. Trilling — FERMILAB, LAWRENCE BERKELEY LABORATORY, SSC LABORATORY

BEAM: Meson Area - Polarized Proton Beam
PROTOTYPE DETECTORS FOR THE SDC #870

Request	1 Jan, 93	Unspecified
Withdrawn	4 Jan, 94	

871 **CP VIOLATION #871** Kam-Biu Luk and Edmond Craig Dukes — IHEP, ACADEMIA SINICA (TAIWAN), UNIVERSITY OF SOUTH ALABAMA, UNIV. OF CALIFORNIA, BERKELEY, FERMILAB, UNIVERSITY OF GUANAJUATO (MEXICO), ILLINOIS INSTITUTE OF TECHNOLOGY, UNIVERSITE DE LAUSANNE, LAWRENCE BERKELEY LABORATORY, UNIVERSITY OF MICHIGAN - ANN ARBOR, UNIVERSITY OF VIRGINIA

BEAM: Meson Area - Center
A Search for CP Violation in the Decays of Cascade minus / Anti-Cascade plus and Neutral Lambda / Neutral Anti-Lambda Hyperons

Request	21 Mar, 93	Unspecified
Approval	29 Jun, 94	Unspecified Stage I approval
In Progress	20 Feb, 97	
Data Analysis	21 Jan, 00	

872 **TAU NEUTRINO #872** Vittorio Paolone and George S. Tzanakos — AICHI UNIV. OF EDUCATION (JAPAN), UNIVERSITY OF ATHENS (GREECE), UNIV. OF CALIFORNIA, DAVIS, CHANGWON NATIONAL UNIV. (KOREA), CHONNAM NATIONAL UNIVERSITY(KOREA), FERMILAB, COLLEGE DE FRANCE (FRANCE), GYEONGSANG NATIONAL UNIV. (KOREA), KANSAS STATE UNIVERSITY, KOBE UNIVERSITY (JAPAN), KON-KUK UNIVERSITY (KOREA), KOREAN NTNL.UN.OF EDUCATION(KOREA), UNIVERSITY OF MINNESOTA, NAGOYA UNIVERSITY (JAPAN), OSAKA SCIENCE EDUC. INST. (JAPAN), UNIVERSITY OF SOUTH CAROLINA, TOHO UNIVERSITY (JAPAN), TUFTS UNIVERSITY, UTSUNOMIYA UNIVERSITY (JAPAN)

BEAM: Proton Area - West
BEAM DUMP #872

Request	26 Mar, 93	Unspecified
Approval	29 Jun, 94	Unspecified Stage I approval granted. 10 to the 18th protons-on-target minimum.
In Progress	20 Feb, 97	
Data Analysis	3 Sep, 97	

873 **BOOSTER NEUTRINOS #873** Fred J. Federspiel and H. White — LOS ALAMOS NATIONAL LABORATORY

BEAM: Booster Accelerator
Letter of Intent to Perform a Neutrino Experiment using the Fermilab 8 GEV Booster

Request	21 Oct, 94	Unspecified
Unconsidered	21 Oct, 94	
Inactive	3 Feb, 98	

874 **CHARGED PION LIFETIME #874** Steve Geer — DUKE UNIVERSITY, FERMILAB, UNIVERSITY OF NEBRASKA, ROCKEFELLER UNIVERSITY

BEAM: Meson Area - West
Precision Measurement of the Lifetime of Charged Pions

Request	9 Nov, 94	Unspecified
Withdrawn	16 Dec, 96	

875 **NEUTRINO OSCILLATIONS #875** Stanley G. Wojcicki — ARGONNE NATIONAL LABORATORY, UNIVERSITY OF ATHENS (GREECE), BENEDICTINE UNIVERSITY, BROOKHAVEN NATIONAL LABORATORY, CALIFORNIA INSTITUTE OF TECHNOLOGY, UNIVERSITY OF CAMBRIDGE (ENGLAND), UNIV. ESTADUAL DE CAMPINAS(BRAZIL), FERMILAB, COLLEGE DE FRANCE (FRANCE), HARVARD UNIVERSITY, ILLINOIS INSTITUTE OF TECHNOLOGY, INDIANA UNIVERSITY, LAWRENCE LIVERMORE NATIONAL LAB., LEBEDEV PHYSICAL INST. (RUSSIA), UNIVERSITY COLLEGE LONDON(ENGLAND), UNIVERSITY OF MINNESOTA - DULUTH, UNIVERSITY OF MINNESOTA, ITEP, MOSCOW (RUSSIA), UNIVERSITY OF OXFORD (ENGLAND), UNIVERSITY OF PITTSBURGH, IHEP, PROTVINO (SERPUKHOV)(RUSSIA), RUTHERFORD-APPLETON LABS.(ENGLAND), UNIVERSITE DE SAO PAULO (BRAZIL), UNIVERSITY OF SOUTH CAROLINA, STANFORD UNIVERSITY, SUSSEX UNIVERSITY (ENGLAND), TEXAS A&M UNIVERSITY, UNIVERSITY OF TEXAS AT AUSTIN, TUFTS UNIVERSITY, WESTERN WASHINGTON UNIVERSITY, COLLEGE OF WILLIAM AND MARY, UNIVERSITY OF WISCONSIN - MADISON

BEAM: Main Injector - NuMI
A Long-baseline Neutrino Oscillation Experiment at Fermilab

Request	9 Feb, 95	Unspecified
Approval	2 May, 95	
Unscheduled	2 May, 95	
Being Installed	1 Aug, 01	
In Progress	28 Feb, 05	

876 **CDF HARD DIFFRACTION STUDIES #876** Mike G. Albrow

BEAM: Collision Area (B-0)
Proposal for Hard Diffraction Studies in CDF

Request	17 Jan, 95	Unspecified
Approval	3 Aug, 95	
Data Analysis	20 Feb, 96	
Completed	1 Feb, 04	

IHEP, ACADEMIA SINICA (TAIWAN)
ARGONNE NATIONAL LABORATORY
UNIVERSITY OF BOLOGNA (ITALY)
BRANDEIS UNIVERSITY
UNIV. OF CALIFORNIA, LOS ANGELES
CIPP (CANADA)
UNIVERSITY OF CHICAGO
DUKE UNIVERSITY
FERMILAB
INFN, FRASCATI (ITALY)
HARVARD UNIVERSITY
HIROSHIMA UNIVERSITY (JAPAN)
UNIVERSITY OF ILLINOIS, CHAMPAIGN
JOHNS HOPKINS UNIVERSITY
KEK (JAPAN)
LAWRENCE BERKELEY LABORATORY
MASSACHUSETTS INST. OF TECHNOLOGY
UNIVERSITY OF MICHIGAN - ANN ARBOR
MICHIGAN STATE UNIVERSITY
UNIVERSITY OF NEW MEXICO
OSAKA CITY UNIVERSITY (JAPAN)
UNIVERSITY OF PADOVA (ITALY)
UNIVERSITY OF PENNSYLVANIA
INFN, PISA (ITALY)
UNIVERSITY OF PITTSBURGH
PURDUE UNIVERSITY
UNIVERSITY OF ROCHESTER
ROCKEFELLER UNIVERSITY
RUTGERS UNIVERSITY
TEXAS A&M UNIVERSITY
TEXAS TECH UNIVERSITY
UNIVERSITY OF TSUKUBA (JAPAN)
TUFTS UNIVERSITY
WASEDA UNIVERSITY (JAPAN)
UNIVERSITY OF WISCONSIN - MADISON
YALE UNIVERSITY

---

877 **AXION SEARCH #877** Siu Au Lee

BEAM: Beam Not Applicable
Measurement of the Magnetically-Induced QED Birefringence of the Vacuum and an Improved Laboratory Search for Axions

Request	28 Mar, 95	Unspecified
Unconsidered	28 Mar, 95	
Rejected	14 Mar, 00	

COLORADO STATE UNIVERSITY
FERMILAB
JOINT INST. FOR LAB. ASTROPHYSICS
SSC LABORATORY

---

878 **SPIN STRUCTURE FUNCTION PHYSICS #878** Joel M. Moss

BEAM: Main Injector Area
Spin Structure Function Physics at Fermilab.

Request	7 Nov, 95	Unspecified
Unconsidered	7 Nov, 95	
Inactive	3 Feb, 98	

LOS ALAMOS NATIONAL LABORATORY

---

879 **B PHYSICS TEST BEAM PROGRAM #879** Joel N. Butler and Walter Selove

BEAM: Meson Area - Test Beam
A Test Beam Program for Future B Physics Experiments at Fermilab

Request	16 Mar, 95	Unspecified
Unconsidered	16 Mar, 95	
Inactive	3 Feb, 98	

CARNEGIE-MELLON UNIVERSITY
FERMILAB
UNIVERSITY OF PENNSYLVANIA
SYRACUSE UNIVERSITY

---

880 **B PHYSICS TEST BEAM PROGRAM #T880** Sheldon L. Stone

BEAM: Meson Area - Test Beam
Proposal for Test Beam Running of the CLEO III RICH Detector

Request	16 Mar, 95	Unspecified
Unconsidered	16 Mar, 95	
Approval	28 Feb, 96	
Data Analysis	19 May, 97	
Completed	1 Mar, 01	

CARNEGIE-MELLON UNIVERSITY
FERMILAB
UNIVERSITY OF MINNESOTA
SYRACUSE UNIVERSITY
WAYNE STATE UNIVERSITY

---

881 **AUGER PROJECT R&D #881** Paul M. Mantsch

BEAM: Beam Not Applicable
A Request for Fermilab R&D Support for the Pierre Auger Project.

Request	6 Nov, 95	Unspecified
Approval	8 Oct, 96	
Unscheduled	8 Oct, 96	
In Progress	1 Jan, 02	

FERMILAB

---

882 **SEARCH FOR LOW MASS MONOPOLES #882** George R. Kalbfleisch

BEAM: Beam Not Applicable
A Search for Low Mass Monopoles

Request	15 Aug, 95	Unspecified
Approval	23 Jul, 96	
Unscheduled	23 Jul, 96	
In Progress	23 Sep, 96	
Data Analysis	1 Mar, 01	
Completed	1 Feb, 04	

UNIVERSITY OF OKLAHOMA

---

883 **COSMIC RAY CALORIMETER CALIB. #T883** James H. Adams

BEAM: Meson Area - West
Calibration of Cosmic Ray "Thin Ionization Calorimeter"

Request	26 Oct, 95	
Unconsidered	26 Oct, 95	
Approval	16 Jul, 97	
Data Analysis	6 Aug, 97	
Completed	1 Mar, 01	

LEBEDEV PHYSICAL INST. (RUSSIA)
MOSCOW STATE UNIVERSITY (RUSSIA)
NAVAL RESEARCH LABORATORY

884 **COSMIC RAY DETECTOR TEST #884** — Sun Kee Kim — LOUISIANA STATE UNIVERSITY; UNIVERSITY OF MARYLAND; MAX-PLANCK INSTITUTE (GERMANY); MOSCOW STATE UNIVERSITY (RUSSIA); NAVAL RESEARCH LABORATORY; SEOUL NATIONAL UNIVERSITY (KOREA); SOUTHERN UNIVERSITY, BATON ROUGE

BEAM: Meson Area - West
A proposal for a Beam Test of the Advanced Thin Ionization Calorimeter Detector

Request	1 Feb, 96
Unconsidered	1 Feb, 96
Inactive	15 Mar, 99

885 **SLOAN DIGITAL SKY SURVEY #885** — Stephen M. Kent — FERMILAB

BEAM: Beam Not Applicable
SLOAN DIGITAL SKY SURVEY

Approval	9 Feb, 96
Unscheduled	9 Feb, 96
In Progress	1 Jun, 98
Data Analysis	30 Jun, 05

886 **EXPERIMENTS AT THE A0 PHOTOINJECTOR #886** — Philippe Piot — UNIV. OF CALIFORNIA, LOS ANGELES; UNIVERSITY OF CHICAGO; DESY (GERMANY); FERMILAB; UNIVERSITY OF GEORGIA; UNIVERSITY OF ILLINOIS, CHAMPAIGN; MICHIGAN STATE UNIVERSITY; INFN, MILANO (ITALY); NORTHERN ILLINOIS UNIVERSITY; UNIVERSITY OF ROCHESTER

BEAM: A0 Facility
Compton Scattering X-Ray Experiments at the Fermilab Electron Source Facility

Request	14 May, 96
Approval	8 Oct, 96
Unscheduled	8 Oct, 96
In Progress	1 Mar, 99

887 **PET ACCELERATOR #887** — Ralph Pasquinelli — FERMILAB

BEAM: Beam Not Applicable
A RFQ Linear Accelerator for PET Isotope Production

Request	21 Jun, 95
Approval	21 Jun, 95
Unscheduled	21 Jun, 95
Completed	31 Aug, 98

888 **P-BAR+NUCLEI STUDIES #888** — Vic. E. Viola — INDIANA UNIVERSITY

BEAM: Main Injector Area
P-Bar + A Studies of the Nuclear Equation-of-State

Request	15 Jul, 96
Unconsidered	15 Jul, 96
Withdrawn	12 Dec, 02

889 **NEUTRINOS AT THE BOOSTER #889** — Alexander Abashian — VIRGINIA TECH

BEAM: Booster Accelerator
Letter of Intent to Study Neutrino Oscillations Using the Fermilab Booster Beam

Request	6 Aug, 96
Unconsidered	6 Aug, 96
Inactive	15 Mar, 99

890 **PLASMA WAKE-FIELD ACCELERATOR #890** — James R. Rosenzweig — UNIV. OF CALIFORNIA, LOS ANGELES; FERMILAB

BEAM: A0 Facility
Advanced Accelerator Test at the Fermilab Electron Source Facility

Request	25 Sep, 96
Approval	8 Oct, 96
Unscheduled	8 Oct, 96
Setup in a Year	1 Mar, 99
In Progress	1 Jan, 00
Data Analysis	7 Jul, 02
Completed	1 Feb, 04

891 **DARK MATTER SEARCH #891** — Dan Bauer — FERMILAB

BEAM: Beam Not Applicable
The Cryogenic Dark Matter Search (CDMS)

Request	4 Mar, 96
Approval	4 Mar, 96
Unscheduled	4 Mar, 96
In Progress	1 Jan, 98

892 **CMS AT FERMILAB #892** — Daniel R. Green — FERMILAB

BEAM: Beam Not Applicable
The U.S. Compact Muon Solenoid (CMS) Collaboration at Fermilab

Request	8 Oct, 96
Approval	8 Oct, 96
Unscheduled	8 Oct, 96

893 **LHC ACCELERATOR #893** — James S. Kerby — FERMILAB

BEAM: Beam Not Applicable
Design and Construction of Interaction Regions at the CERN Large Hadron Collider (LHC)

Request	8 Oct, 96
Approval	8 Oct, 96
Unscheduled	8 Oct, 96

894 **CPT TEST #894** — Gordon B. Thomson — RUTGERS UNIVERSITY; TRIUMF (CANADA)

BEAM: Main Injector Area
An Experiment Studying Kl - Ks Interference to Test CPT Conservation at the Planck Scale

Request	7 Oct, 96
Unconsidered	7 Oct, 96
Rejected	6 Jul, 99

895	**PIXEL DETECTOR TEST #895** BEAM: Meson Area - Test Pixel Detector Test Request 17 Mar, 97 Withdrawn 28 Jan, 98	Simon Kwan	FERMILAB
896	**RADIO COHERENCE TEST #896** BEAM: Main Injector Area Test of the Principle of Radio Coherence Request 4 Nov, 96 Unconsidered 4 Nov, 96	David Besson	UNIVERSITY OF KANSAS
897	**BTeV R&D #897** BEAM: Collision Area (C-0) BTeV: A Heavy Quark Program at C0 Request 18 May, 97 Unconsidered 18 May, 97 Approval 13 Jan, 98 Unscheduled 13 Jan, 98 In Progress 15 Jun, 99 Data Analysis 21 Jul, 00 Completed 1 Jan, 02	Joel N. Butler and Sheldon Stone	CARNEGIE-MELLON UNIVERSITY UNIVERSITY OF COLORADO AT BOULDER FERMILAB UNIVERSITY OF FLORIDA ILLINOIS INSTITUTE OF TECHNOLOGY UNIVERSITY OF ILLINOIS, CHAMPAIGN INDIANA UNIVERSITY UNIVERSITY OF IOWA INFN, MILANO (ITALY) UNIVERSITY OF MINNESOTA NANJING UNIVERSITY (PRC) NEW MEXICO STATE UNIVERSITY OHIO STATE UNIVERSITY INFN, PAVIA (ITALY) UNIVERSITY OF PENNSYLVANIA IHEP, PROTVINO (SERPUKHOV)(RUSSIA) UNIV.OF PUERTO RICO - MAYAGUEZ UNIV.OF SCI & TECH., HEFEI (PRC) SHANDONG UNIVERSITY (PRC) SYRACUSE UNIVERSITY UNIVERSITY OF TENNESSEE, KNOXVILLE TUFTS UNIVERSITY VANDERBILT UNIVERSITY UNIVERSITY OF WISCONSIN - MADISON YALE UNIVERSITY YORK UNIVERSITY
898	**MINIBOONE #898** BEAM: Booster Accelerator An Experiment to Measure nu-mu->nu-e Oscillations and nu-mu Disappearance at the Fermilab Booster Request 16 May, 97 Unconsidered 16 May, 97 Approval 4 Jun, 98 Unscheduled 4 Jun, 98 Setup in a Year 1 Mar, 01 Being Installed 1 Jan, 02 In Progress 1 Sep, 02 Data Analysis 23 Jan, 06	Janet M. Conrad and William Charles Louis	UNIVERSITY OF ALABAMA BUCKNELL UNIVERSITY UNIVERSITY OF CINCINNATI UNIVERSITY OF COLORADO AT BOULDER COLUMBIA UNIVERSITY EMBRY RIDDLE AERONAUTICAL UNIV. FERMILAB INDIANA UNIVERSITY LOS ALAMOS NATIONAL LABORATORY LOUISIANA STATE UNIVERSITY UNIVERSITY OF MICHIGAN - ANN ARBOR PRINCETON UNIVERSITY ST. MARY'S UNIVERSITY OF MINNESOTA WESTERN ILLINOIS UNIVERSITY YALE UNIVERSITY
899	**PARTICLE PRODUCTION #899** BEAM: Collision Area (C-0) Particle Production at Zero Degrees from the Request 31 May, 97 Rejected 23 Oct, 97	Michael Longo	CASE WESTERN RESERVE UNIVERSITY LOUISIANA STATE UNIVERSITY UNIVERSITY OF MICHIGAN FERMILAB UNIVERSITY OF TENNESSEE

900	**D-0 FORWARD PROTON DETECTOR #900** BEAM: Collision Area (D-0) A Forward Proton Detector at D-0 Request 17 Sep, 97 Unconsidered 17 Sep, 97 Approval 29 May, 98 Unscheduled 29 May, 98 Setup in a Year 1 Mar, 99 In Progress 1 Mar, 01	Gerald Blazey and Terry Wyatt	INST.OF PHYS.ACADEMY OF SCI(CZECH) UNIVERSITY OF ALBERTA (CANADA) UNIVERSIDAD DE LOS ANDES(COLOMBIA) UNIVERSITY OF ARIZONA IHEP, BEIJING (PRC) UNIVERSITY OF BONN (GERMANY) BOSTON UNIVERSITY BROOKHAVEN NATIONAL LABORATORY BROWN UNIVERSITY UNIV. DE BUENOS AIRES (ARGENTINA) CALIFORNIA STATE UNIVERSITY UNIV. OF CALIFORNIA, RIVERSIDE CBPF (BRAZIL) CEA-SACLAY (FRANCE) CPPM, MARSEILLE (FRANCE) CHARLES UNIVERSITY (CZECH) CINVESTAV-IPN (MEXICO) LPN, UNIV. DE CLERMONT (FRANCE) COLUMBIA UNIVERSITY CZECH TECHNICAL UNIVERSITY(CZECH) DELHI UNIVERSITY (INDIA) UNIVERSITY COLLEGE DUBLIN(IRELAND) FERMILAB FLORIDA STATE UNIVERSITY FREIBURG UNIVERSITY (GERMANY) HO CHI MINH CITY INS PHY(VIET NAM) UNIV. OF ILLINOIS, CHICAGO CIRCLE IMPERIAL COLLEGE (ENGLAND) INDIANA UNIVERSITY INS RECHERCHES SUBATOMIQUE(FRANCE) ISN (GRENOBLE, FRANCE) IPNL (FRANCE) IOWA STATE UNIVERSITY JINR, DUBNA (RUSSIA) KANSAS STATE UNIVERSITY UNIVERSITY OF KANSAS KOREA UNIVERSITY, SEOUL (KOREA) LAL, ORSAY (FRANCE) LANCASTER UNIVERSITY (ENGLAND) LANGSTON UNIVERSITY LAWRENCE BERKELEY NATIONAL LAB. LOUISIANA TECH UNIVERSITY LPNHE, UN. OF P & M CURIE (FRANCE) LUDWIG MAXIMILIANS UNIV. (GERMANY) LUND,RIT,STOCKHOLM,UPPSALA(SWEDEN) MAINZ UNIVERSITY (GERMANY) UNIVERSITY OF MANCHESTER (ENGLAND) UNIVERSITY OF MARYLAND UNIVERSITY OF MICHIGAN - ANN ARBOR MICHIGAN STATE UNIVERSITY UNIVERSITY OF MISSISSIPPI MOSCOW STATE UNIVERSITY (RUSSIA) ITEP, MOSCOW (RUSSIA) UNIVERSITY OF NEBRASKA - LINCOLN SUNY AT BUFFALO SUNY AT STONY BROOK UN OF NIJMEGEN/NIKHEF(NETHERLANDS) NIKHEF&U OF AMSTERDAM(NETHERLANDS) NORTHEASTERN UNIVERSITY NORTHERN ILLINOIS UNIVERSITY NORTHWESTERN UNIVERSITY UNIVERSITY OF NOTRE DAME OKLAHOMA STATE UNIVERSITY UNIVERSITY OF OKLAHOMA PANJAB UNIVERSITY (INDIA) UNESP (BRAZIL) PNPI, ST. PETERSBURG (RUSSIA) PRINCETON UNIVERSITY IHEP, PROTVINO (SERPUKHOV)(RUSSIA) RICE UNIVERSITY UN. ESTADO RIO DE JANEIRO (BRAZIL) UNIVERSITY OF ROCHESTER RWTH, AACHEN (GERMANY) UN.SAN FRANCISCO DE QUITO(ECUADOR) UNIV. OF SCI. & TECH., HEFEI (PRC) SIMON FRASER UNIVERSITY (CANADA) SOUTHERN METHODIST UNIVERSITY SUNG KYUN KWAN UNIVERSITY (KOREA) TATA INSTITUTE (INDIA) UNIVERSITY OF TEXAS AT ARLINGTON UNIVERSITY OF ZURICH (SWITZERLAND) UNIVERSITY OF VIRGINIA UNIVERSITY OF WASHINGTON UNIVERSITY OF WUPPERTAL (GERMANY)
901	**RECYCLER ELECTRON COOLING #901** BEAM: Beam Not Applicable Recycler Medium Energy Electron Cooling Experiment Request 14 Nov, 97 Approval 14 Nov, 97 Unscheduled 14 Nov, 97 Setup in a Year 1 Jan, 00 In Progress 1 Mar, 01 Completed 31 May, 04	Sergei Nagaitsev	FERMILAB INDIANA UNIVERSITY JINR, DUBNA (RUSSIA) UNIVERSITY OF ROCHESTER

902 **EXOTIC ATOMS #902** Yuri M. Ivanov — PNPI, ST. PETERSBURG (RUSSIA)

BEAM: Main Injector Area
Particle Mass Measurement and Strong Interaction Studies with Exotic Atoms Using X-Ray Crystal Spectrometer

Request	24 Sep, 97
Unconsidered	24 Sep, 97
Deferred	29 Nov, 01

903 **TEST FOR ANTIHYDROGEN SPECTROSCOPY#903** Mark A. Mandelkern — UNIV. OF CALIFORNIA, IRVINE; FERMILAB; UNIVERSITY OF ROCHESTER

BEAM: Booster Accelerator
A Test Experiment at the Fermilab Booster to Study the Feasibility of Fast Antihydrogen Spectroscopy

Request	20 Mar, 98
Unconsidered	20 Mar, 98
Withdrawn	18 Dec, 02

904 **MUON COLLIDING R&D #904** Steve Geer — CEBAF - THOMAS JEFFERSON LAB.; ARGONNE NATIONAL LABORATORY; BROOKHAVEN NATIONAL LABORATORY; BUDKER INS.NUCLEAR PHYSICS(RUSSIA); UNIV. OF CALIFORNIA, BERKELEY; UNIV. OF CALIFORNIA, LOS ANGELES; FAIRFIELD UNIVERSITY; FERMILAB; INDIANA UNIVERSITY; UNIVERSITY OF IOWA; JOSEPH HENRY LABORATORIES; LAWRENCE BERKELEY NTL. LABORATORY; UNIVERSITY OF MISSISSIPPI; ROCKEFELLER UNIVERSITY

BEAM: Unspecified Beam
Ionization Cooling Research and Development Program for a High Luminosity Muon Collider

Request	15 Apr, 98
Unconsidered	15 Apr, 98

905 **CKM R&D #905** Peter S. Cooper — BROOKHAVEN NATIONAL LABORATORY; FERMILAB; UNIVERSITY OF MICHIGAN - ANN ARBOR; IHEP, PROTVINO (SERPUKHOV)(RUSSIA); UN.AUTO.DE SAN LUIS POTOSI(MEXICO); UNIVERSITY OF TEXAS AT AUSTIN; UNIVERSITY OF VIRGINIA

BEAM: Main Injector Area
A Proposal for a Precision Measurement of the Decay K+ to pi+-nu-nubar and Other Rare K+ Processes at Fermilab Using the Main Injector

Request	15 Apr, 98
Unconsidered	15 Apr, 98
Approval	6 Jul, 99
In Progress	6 Jul, 99
Completed	28 Jun, 01

906 **ANTI(D-QUARK)/ANTI(U-QUARK) DIST #906** Donald Geesaman and Paul E. Reimer — ABILENE CHRISTIAN UNIVERSITY; ARGONNE NATIONAL LABORATORY; CEBAF - THOMAS JEFFERSON LAB.; UNIVERSITY OF COLORADO AT BOULDER; FERMILAB; UNIVERSITY OF ILLINOIS, CHAMPAIGN; LOS ALAMOS NATIONAL LABORATORY; RUTGERS UNIVERSITY; TEXAS A&M UNIVERSITY; VALPARAISO UNIVERSITY

BEAM: Main Injector - Unspecified
Letter of Intent for Drell-Yan Measurements of Nucleon and Nuclear Structure with The FNAL Main Injector

Request	15 Apr, 98
Unconsidered	2 Apr, 01
Approval	26 Nov, 01
Unscheduled	26 Nov, 01

907 **PARTICLE PRODUCTION #907** Rajendran Raja — BROOKHAVEN NATIONAL LABORATORY; UNIVERSITY OF COLORADO AT BOULDER; ELMHURST COLLEGE; ENRICO FERMI INSTITUTE; FERMILAB; HARVARD UNIVERSITY; ILLINOIS INSTITUTE OF TECHNOLOGY; INDIANA UNIVERSITY; UNIVERSITY OF IOWA; LAWRENCE LIVERMORE NTL. LABORATORY; UNIVERSITY OF MICHIGAN - ANN ARBOR; PURDUE UNIVERSITY; UNIVERSITY OF SOUTH CAROLINA; UNIVERSITY OF VIRGINIA

BEAM: Main Injector - M Center
Proposal to Measure Particle Production in the Meson Area Using Main Injector Primary and Secondary Beams

Request	21 Jul, 97
Unconsidered	15 Apr, 98
Deferred	8 Nov, 00
Approval	8 Nov, 01
Unscheduled	8 Nov, 01
Being Installed	1 Dec, 02
In Progress	1 Feb, 04

908 **D-0 SILICON TRACK TRIGGER #908** Gerald Blazey and Terry Wyatt

BEAM: Collision Area (D-0)

A Silicon Track Trigger for the D0 Experiment in Run II

Request	21 Sep, 98	
Unconsidered	21 Sep, 98	
Approval	29 Jan, 99	Stage I
	15 Nov, 99	Stage II
Setup in a Year	1 Jan, 00	
In Progress	1 Mar, 01	

INST.OF PHYS.ACADEMY OF SCI(CZECH)
UNIVERSITY OF ALBERTA (CANADA)
UNIVERSIDAD DE LOS ANDES(COLOMBIA)
UNIVERSITY OF ARIZONA
IHEP, BEIJING (PRC)
UNIVERSITY OF BONN (GERMANY)
BOSTON UNIVERSITY
BROOKHAVEN NATIONAL LABORATORY
BROWN UNIVERSITY
UNIV. DE BUENOS AIRES (ARGENTINA)
CALIFORNIA STATE UNIVERSITY
UNIV. OF CALIFORNIA, RIVERSIDE
CBPF (BRAZIL)
CEA-SACLAY (FRANCE)
CPPM, MARSEILLE (FRANCE)
CHARLES UNIVERSITY (CZECH)
CINVESTAV-IPN (MEXICO)
LPN, UNIV. DE CLERMONT (FRANCE)
COLUMBIA UNIVERSITY
CZECH TECHNICAL UNIVERSITY(CZECH)
DELHI UNIVERSITY (INDIA)
UNIVERSITY COLLEGE DUBLIN(IRELAND)
FERMILAB
FLORIDA STATE UNIVERSITY
FREIBURG UNIVERSITY (GERMANY)
HO CHI MINH CITY INS PHY(VIET NAM)
UNIV. OF ILLINOIS, CHICAGO CIRCLE
IMPERIAL COLLEGE (ENGLAND)
INDIANA UNIVERSITY
INS RECHERCHES SUBATOMIQUE(FRANCE)
ISN (GRENOBLE, FRANCE)
IPNL (FRANCE)
IOWA STATE UNIVERSITY
JINR, DUBNA (RUSSIA)
KANSAS STATE UNIVERSITY
UNIVERSITY OF KANSAS
KOREA UNIVERSITY, SEOUL (KOREA)
LAL, ORSAY (FRANCE)
LANCASTER UNIVERSITY (ENGLAND)
LANGSTON UNIVERSITY
LAWRENCE BERKELEY NATIONAL LAB.
LOUISIANA TECH UNIVERSITY
LPNHE, UN. OF P & M CURIE (FRANCE)
LUDWIG MAXIMILIANS UNIV. (GERMANY)
LUND,RIT,STOCKHOLM,UPPSALA(SWEDEN)
MAINZ UNIVERSITY (GERMANY)
UNIVERSITY OF MANCHESTER (ENGLAND)
UNIVERSITY OF MARYLAND
UNIVERSITY OF MICHIGAN - ANN ARBOR
MICHIGAN STATE UNIVERSITY
UNIVERSITY OF MISSISSIPPI
MOSCOW STATE UNIVERSITY (RUSSIA)
ITEP, MOSCOW (RUSSIA)
UNIVERSITY OF NEBRASKA - LINCOLN
SUNY AT BUFFALO
SUNY AT STONY BROOK
UN OF NIJMEGEN/NIKHEF(NETHERLANDS)
NIKHEF&U OF AMSTERDAM(NETHERLANDS)
NORTHEASTERN UNIVERSITY
NORTHERN ILLINOIS UNIVERSITY
NORTHWESTERN UNIVERSITY
UNIVERSITY OF NOTRE DAME
OKLAHOMA STATE UNIVERSITY
UNIVERSITY OF OKLAHOMA
PANJAB UNIVERSITY (INDIA)
UNESP (BRAZIL)
PNPI, ST. PETERSBURG (RUSSIA)
PRINCETON UNIVERSITY
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
RICE UNIVERSITY
UN. ESTADO RIO DE JANEIRO (BRAZIL)
UNIVERSITY OF ROCHESTER
RWTH, AACHEN (GERMANY)
UN.SAN FRANCISCO DE QUITO(ECUADOR)
UNIV. OF SCI. & TECH., HEFEI (PRC)
SIMON FRASER UNIVERSITY (CANADA)
SOUTHERN METHODIST UNIVERSITY
SUNG KYUN KWAN UNIVERSITY (KOREA)
TATA INSTITUTE (INDIA)
UNIVERSITY OF TEXAS AT ARLINGTON
UNIVERSITY OF ZURICH (SWITZERLAND)
UNIVERSITY OF VIRGINIA
UNIVERSITY OF WASHINGTON
UNIVERSITY OF WUPPERTAL (GERMANY)

909 **CDF INNER SILICON AND TOF #909** — Young-Kee Kim and Robert Roser

BEAM: Collision Area (B-0)
Proposal for Enhancement of the CDF II Detector: An Inner Silicon Layer and a Time of Flight Detector

Request	22 Sep, 98		
Unconsidered	22 Sep, 98		
Approval	29 Jan, 99	Stage I	L00 & TOF
	6 Jul, 99	Stage II	L00
	15 Nov, 99	Stage II	TOF
Unscheduled	29 Jan, 99		
Setup in a Year	1 Jan, 00		
In Progress	1 Mar, 01		

IHEP, ACADEMIA SINICA (TAIWAN)
ARGONNE NATIONAL LABORATORY
UNIVERSITY OF BARCELONA (SPAIN)
BAYLOR UNIVERSITY
UNIVERSITY OF BOLOGNA (ITALY)
BRANDEIS UNIVERSITY
UNIV. OF CALIFORNIA, DAVIS
UNIV. OF CALIFORNIA, LOS ANGELES
UNIV. OF CALIFORNIA, SAN DIEGO
UNIV. OF CALIFORNIA, SANTA BARBARA
UNIVERSITY OF CANTABRIA (SPAIN)
CARNEGIE-MELLON UNIVERSITY
UNIVERSITY OF CHICAGO
CIEMAT, MADRID, SPAIN (SPAIN)
DUKE UNIVERSITY
FERMILAB
UNIVERSITY OF FLORIDA
INFN, FRASCATI (ITALY)
UNIVERSITY OF GENEVA (SWITZERLAND)
GLASGOW UNIVERSITY (SCOTLAND)
HARVARD UNIVERSITY
UNIVERSITY OF HELSINKI (FINLAND)
UNIVERSITY OF ILLINOIS, CHAMPAIGN
INFN, TRIESTE/UNIV DI UDINE(ITALY)
IPP/MCGILL U/UN OF TORONTO(CANADA)
JINR, DUBNA (RUSSIA)
JOHNS HOPKINS UNIVERSITY
UNIVERSITY OF KARLSRUHNE (GERMANY)
KEK (JAPAN)
KOREA CENTER FOR HEP (KOREA)
LAWRENCE BERKELEY NATIONAL LAB.
UNIVERSITY OF LIVERPOOL (ENGLAND)
UNIVERSITY COLLEGE LONDON(ENGLAND)
LPNHE, UN. OF P & M CURIE (FRANCE)
MASSACHUSETTS INST. OF TECHNOLOGY
UNIVERSITY OF MICHIGAN - ANN ARBOR
MICHIGAN STATE UNIVERSITY
ITEP, MOSCOW (RUSSIA)
UNIVERSITY OF NEW MEXICO
NORTHWESTERN UNIVERSITY
OHIO STATE UNIVERSITY
OKAYAMA UNIVERSITY (JAPAN)
OSAKA CITY UNIVERSITY (JAPAN)
UNIVERSITY OF OXFORD (ENGLAND)
UNIVERSITY OF PADOVA (ITALY)
UNIVERSITY OF PENNSYLVANIA
INFN, PISA (ITALY)
UNIVERSITY OF PITTSBURGH
PURDUE UNIVERSITY
UNIVERSITY OF ROCHESTER
ROCKEFELLER UNIVERSITY
UNIVERSITY OF ROME (ITALY)
RUTGERS UNIVERSITY
TEXAS A&M UNIVERSITY
UNIVERSITY OF TSUKUBA (JAPAN)
TUFTS UNIVERSITY
WASEDA UNIVERSITY (JAPAN)
WAYNE STATE UNIVERSITY
UNIVERSITY OF WISCONSIN - MADISON
YALE UNIVERSITY

---

910 **SPIN@FERMI #910** — Alan D. Krisch

BEAM: Main Injector Area
SPIN@FERMI Proposal - Analyzing Power A_nin High P-Transverse Squared Proton-Proton Elastic Scattering

Request	1 Aug, 98
Unconsidered	1 Aug, 98
Rejected	6 Jul, 99

INST.NUCL.RESEARCH,TROITSK(RUSSIA)
JINR, DUBNA (RUSSIA)
UNIVERSITY OF MICHIGAN - ANN ARBOR
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
TRIUMF (CANADA)
UNIVERSITY OF VIRGINIA

---

911 **DIAMOND DETECTOR TEST #911** — Robert L. Stone

BEAM: Meson Area - Test Beam
Fermilab Test Beam Proposal for Diamond Tracking Detectors

Request	23 Nov, 98
Unconsidered	23 Nov, 98
Approval	29 Jul, 99
Completed	21 Jan, 00

FERMILAB
OHIO STATE UNIVERSITY
RUTGERS UNIVERSITY
UNIVERSITY OF TORONTO (CANADA)

---

912 **HADRON CALORIMETER TEST #912** — Tohru Takeshita and Teruki Kamon

BEAM: Meson Area - Test Beam
Beam Test of High-Performance Hadron Calorimeter for Future Linear Colliders

Request	1 Feb, 99
Unconsidered	1 Feb, 99
Approval	3 Sep, 99
Completed	30 Sep, 99

UNIV. OF CALIFORNIA, LOS ANGELES
KEK (JAPAN)
KOBE UNIVERSITY (JAPAN)
KONAN UNIVERSITY (JAPAN)
SHINSHU UNIVERSITY (JAPAN)
TEXAS A&M UNIVERSITY
UNIVERSITY OF TSUKUBA (JAPAN)

---

913 **TRD TEST #913** — Simon P. Swordy

BEAM: Meson Area - Test Beam
Proposal for Calibration and Testing of a Transition Radiation Detector for Space Applications

Request	29 Dec, 98
Unconsidered	29 Dec, 98
Approval	19 Nov, 99
Completed	21 Jan, 00

UNIVERSITY OF CHICAGO

914	**ANTIPROTON TRAPPING #914** BEAM: Beam Not Applicable A Magnetic Degrading Spectrometer for Trapping of Low-Energy Antiprotons at Fermilab Request 28 Oct, 98 Rejected 6 Jul, 99	Gerald A. Smith	PENNSYLVANIA STATE UNIVERSITY SYNERGISTIC TECHNOLOGIES, INC.
915	**MINOS EMULSION DETECTOR #915** BEAM: Main Injector Area The Hybrid Emulsion Detector for MINOS - R&D Proposal Request 19 Apr, 99 Unconsidered 22 Jul, 99 Rejected 15 Nov, 99	Stanley G. Wojcicki	ARGONNE NATIONAL LABORATORY UNIVERSITY OF ATHENS (GREECE) IHEP, BEIJING (PRC) BROOKHAVEN NATIONAL LABORATORY CALIFORNIA INSTITUTE OF TECHNOLOGY UNIVERSITY OF CHICAGO ELMHURST COLLEGE FERMILAB HARVARD UNIVERSITY INDIANA UNIVERSITY JAMES MADISON UNIVERSITY JINR, DUBNA (RUSSIA) LAWRENCE LIVERMORE LABORATORY LEBEDEV PHYSICAL INST. (RUSSIA) UNIVERSITY COLLEGE LONDON (ENGLAND) UNIVERSITY OF MINNESOTA ITEP, MOSCOW (RUSSIA) NORTHWESTERN UNIVERSITY UNIVERSITY OF OXFORD (ENGLAND) UNIVERSITY OF PITTSBURGH IHEP, PROTVINO (SERPUKHOV)(RUSSIA) RUTHERFORD-APPLETON LABS.(ENGLAND) UNIVERSITY OF SOUTH CAROLINA STANFORD UNIVERSITY SUSSEX UNIVERSITY (ENGLAND) TEXAS A&M UNIVERSITY UNIVERSITY OF TEXAS AT AUSTIN TUFTS UNIVERSITY WESTERN WASHINGTON UNIVERSITY UNIVERSITY OF WISCONSIN - MADISON
916	**CDF MINIPLUGS #916** BEAM: Collision Area (B-0) Further Studies in Hard Diffraction and Very Forward Physics Request 4 Oct, 99 Deferred 15 Nov, 99 Being Installed 1 Mar, 01 In Progress 1 Mar, 01	Young-Kee Kim and Robert Roser	IHEP, ACADEMIA SINICA (TAIWAN) ARGONNE NATIONAL LABORATORY UNIVERSITY OF BARCELONA (SPAIN) BAYLOR UNIVERSITY UNIVERSITY OF BOLOGNA (ITALY) BRANDEIS UNIVERSITY UNIV. OF CALIFORNIA, DAVIS UNIV. OF CALIFORNIA, LOS ANGELES UNIV. OF CALIFORNIA, SAN DIEGO UNIV. OF CALIFORNIA, SANTA BARBARA UNIVERSITY OF CANTABRIA (SPAIN) CARNEGIE-MELLON UNIVERSITY UNIVERSITY OF CHICAGO CIEMAT, MADRID, SPAIN (SPAIN) DUKE UNIVERSITY FERMILAB UNIVERSITY OF FLORIDA INFN, FRASCATI (ITALY) UNIVERSITY OF GENEVA (SWITZERLAND) GLASGOW UNIVERSITY (SCOTLAND) HARVARD UNIVERSITY UNIVERSITY OF HELSINKI (FINLAND) UNIVERSITY OF ILLINOIS, CHAMPAIGN INFN, TRIESTE/UNIV DI UDINE(ITALY) IPP/MCGILL U/UN OF TORONTO(CANADA) JINR, DUBNA (RUSSIA) JOHNS HOPKINS UNIVERSITY UNIVERSITY OF KARLSRUHNE (GERMANY) KEK (JAPAN) KOREA CENTER FOR HEP (KOREA) LAWRENCE BERKELEY NATIONAL LAB. UNIVERSITY OF LIVERPOOL (ENGLAND) UNIVERSITY COLLEGE LONDON(ENGLAND) LPNHE, UN. OF P & M CURIE (FRANCE) MASSACHUSETTS INST. OF TECHNOLOGY UNIVERSITY OF MICHIGAN - ANN ARBOR MICHIGAN STATE UNIVERSITY ITEP, MOSCOW (RUSSIA) UNIVERSITY OF NEW MEXICO NORTHWESTERN UNIVERSITY OHIO STATE UNIVERSITY OKAYAMA UNIVERSITY (JAPAN) OSAKA CITY UNIVERSITY (JAPAN) UNIVERSITY OF OXFORD (ENGLAND) UNIVERSITY OF PADOVA (ITALY) UNIVERSITY OF PENNSYLVANIA INFN, PISA (ITALY) UNIVERSITY OF PITTSBURGH PURDUE UNIVERSITY UNIVERSITY OF ROCHESTER ROCKEFELLER UNIVERSITY UNIVERSITY OF ROME (ITALY) RUTGERS UNIVERSITY TEXAS A&M UNIVERSITY UNIVERSITY OF TSUKUBA (JAPAN) TUFTS UNIVERSITY WASEDA UNIVERSITY (JAPAN) WAYNE STATE UNIVERSITY UNIVERSITY OF WISCONSIN - MADISON YALE UNIVERSITY

917	**HYPERCP PARTICLE MEASUREMENT #917** BEAM: Meson Area - Center Test to Parasitically Measure the Charge of Muon-Like Particles Emerging from the HYPERCP Beam Dump Request 30 Nov, 99 Approval 20 Dec, 99 Data Analysis 17 Jan, 00 Completed 1 Mar, 01	Richard H. Gustafson	FERMILAB UNIVERSITY OF MICHIGAN - ANN ARBOR
918	**B PHYSICS AT THE TEVATRON #918** BEAM: Collision Area (C-0) Proposal for an Experiment to Measure Mixing, CP Violation and Rare Decays in Charm and Beauty Particle Decays at the Fermilab Collider - BTeV Request 15 May, 00 Approval 21 Jul, 00 Unscheduled 21 Jul, 00 Approved/Inactive 7 Feb, 05	Joel N. Butler and Sheldon Stone	BYELORUSSIAN ST UN-MINSK(BYELARUS) UNIV. OF CALIFORNIA, DAVIS UNIVERSITY OF COLORADO AT BOULDER FERMILAB UNIVERSITY OF FLORIDA INFN, FRASCATI (ITALY) UNIVERSITY OF HOUSTON ILLINOIS INSTITUTE OF TECHNOLOGY UNIVERSITY OF ILLINOIS, CHAMPAIGN UNIVERSITY OF INSUBRIA COMO(ITALY) UNIVERSITY OF IOWA INFN, MILANO (ITALY) UNIVERSITY OF MINNESOTA NANJING UNIVERSITY (PRC) NEW MEXICO STATE UNIVERSITY NORTHWESTERN UNIVERSITY OHIO STATE UNIVERSITY INFN, PAVIA (ITALY) UNIVERSITY OF PENNSYLVANIA IHEP, PROTVINO (SERPUKHOV)(RUSSIA) UNIV. OF PUERTO RICO - MAYAGUEZ UNIV. OF SCI. & TECH., HEFEI (PRC) SHANDONG UNIVERSITY (PRC) SOUTHERN METHODIST UNIVERSITY SYRACUSE UNIVERSITY UNIVERSITY OF TENNESSEE, KNOXVILLE VANDERBILT UNIVERSITY UNIVERSITY OF VIRGINIA WAYNE STATE UNIVERSITY UNIVERSITY OF WISCONSIN - MADISON YORK UNIVERSITY (CANADA)
919	**US CMS SILICON TRACKER #919** BEAM: Beam Not Applicable US CMS Silicon Tracker Request 7 Jun, 00 Approval 13 Nov, 00 Unscheduled 13 Nov, 00	Daniel R. Green	FERMILAB
920	**CDF FORWARD DETECTORS #920** BEAM: Collision Area (B-0) Letter of Intent - A Search for the Higgs Boson Using Very Forward Tracking Detectors with CDF Request 26 Mar, 01 Unconsidered 26 Mar, 01	Mike G. Albrow	FERMILAB ITEP, MOSCOW (RUSSIA) UNIVERSITY OF LIVERPOOL (ENGLAND) UNIVERSITY COLLEGE LONDON(ENGLAND) UNIVERSITY OF HELSINKI (FINLAND) HELSINKI INST. OF PHYSICS(FINLAND)
921	**CKM #921** BEAM: Main Injector - Unspecified A Proposal for a Precision Measurement of the Decay K+ to pi+-nu-nubar and Other Rare K+ Processes at Fermilab Using the Main Injector Request 2 Apr, 01 Approval 28 Jun, 01 Unscheduled 28 Jun, 01 Approved/Inactive 1 Mar, 05	Peter S. Cooper	UNIVERSITY OF SOUTH ALABAMA BROOKHAVEN NATIONAL LABORATORY UNIVERSITY OF COLORADO AT BOLDER FERMILAB INST NUCL RESEARCH TROITSK(RUSSIA) UNIVERSITY OF MICHIGAN - ANN ARBOR IHEP, PROTVINO (SERPUKHOV)(RUSSIA) UN.AUTO.DE SAN LUIS POTOSI(MEXICO) UNIVERSITY OF TEXAS AT AUSTIN UNIVERSITY OF VIRGINIA
922	**KAMI #922** BEAM: Main Injector A Proposal for a Precision Measurement of the Decay KL to pi0-nu-nubar and Other Rare Processes at Fermilab Using the Main Injector - KAMI Request 2 Apr, 01 Rejected 28 Jun, 01	Ronal Ray and Yau Wah	UNIV. OF CALIFORNIA, LOS ANGELES UNIVERSITY OF COLORADO AT BOULDER FERMILAB UNIVERSITY OF CHICAGO RICE UNIVERSITY UNIVERSITY OF VIRGINIA IHEP, PROTVINO (SERPUKHOV)(RUSSIA) UNIVERSITE OF SAO PAULO (BRAZIL) UNIV. ESTADUAL DE CAMPINAS(BRAZIL) OSAKA UNIVERSITY (JAPAN) NATIONAL TECH UN OF ATHENS(GREECE)
923	**PRIME #923** BEAM: Beam Not Applicable The PRIME Project: A Proposal for Fermilab to Join a NASA Small Explorer Program Request 8 Oct, 01 Unconsidered 8 Oct, 01 Withdrawn 13 Dec, 02	Stephen M. Kent	FERMILAB

924 **CDF RUN IIB UPGRADE #924** Young-Kee Kim and Robert Roser

BEAM: Collision Area (B-0)

The CDF IIb Detector Technical Design Report

Request	9 Oct, 01	
Unconsidered	9 Oct, 01	
Approved	11 Jul, 02	Stage I
Unscheduled	11 Jul, 02	
Setup in a Year	1 Mar, 05	

IHEP, ACADEMIA SINICA (TAIWAN)
ARGONNE NATIONAL LABORATORY
UNIVERSITY OF BARCELONA (SPAIN)
BAYLOR UNIVERSITY
UNIVERSITY OF BOLOGNA (ITALY)
BRANDEIS UNIVERSITY
UNIV. OF CALIFORNIA, DAVIS
UNIV. OF CALIFORNIA, LOS ANGELES
UNIV. OF CALIFORNIA, SAN DIEGO
UNIV. OF CALIFORNIA, SANTA BARBARA
UNIVERSITY OF CANTABRIA (SPAIN)
CARNEGIE-MELLON UNIVERSITY
UNIVERSITY OF CHICAGO
CIEMAT, MADRID, SPAIN (SPAIN)
DUKE UNIVERSITY
FERMILAB
UNIVERSITY OF FLORIDA
INFN, FRASCATI (ITALY)
UNIVERSITY OF GENEVA (SWITZERLAND)
GLASGOW UNIVERSITY (SCOTLAND)
HARVARD UNIVERSITY
UNIVERSITY OF HELSINKI (FINLAND)
UNIVERSITY OF ILLINOIS, CHAMPAIGN
INFN, TRIESTE/UNIV DI UDINE(ITALY)
IPP/MCGILL U/UN OF TORONTO(CANADA)
JINR, DUBNA (RUSSIA)
JOHNS HOPKINS UNIVERSITY
UNIVERSITY OF KARLSRUHNE (GERMANY)
KEK (JAPAN)
KOREA CENTER FOR HEP (KOREA)
LAWRENCE BERKELEY NATIONAL LAB.
UNIVERSITY OF LIVERPOOL (ENGLAND)
UNIVERSITY COLLEGE LONDON(ENGLAND)
LPNHE, UN. OF P & M CURIE (FRANCE)
MASSACHUSETTS INST. OF TECHNOLOGY
UNIVERSITY OF MICHIGAN - ANN ARBOR
MICHIGAN STATE UNIVERSITY
ITEP, MOSCOW (RUSSIA)
UNIVERSITY OF NEW MEXICO
NORTHWESTERN UNIVERSITY
OHIO STATE UNIVERSITY
OKAYAMA UNIVERSITY (JAPAN)
OSAKA CITY UNIVERSITY (JAPAN)
UNIVERSITY OF OXFORD (ENGLAND)
UNIVERSITY OF PADOVA (ITALY)
UNIVERSITY OF PENNSYLVANIA
INFN, PISA (ITALY)
UNIVERSITY OF PITTSBURGH
PURDUE UNIVERSITY
UNIVERSITY OF ROCHESTER
ROCKEFELLER UNIVERSITY
UNIVERSITY OF ROME (ITALY)
RUTGERS UNIVERSITY
TEXAS A&M UNIVERSITY
UNIVERSITY OF TSUKUBA (JAPAN)
TUFTS UNIVERSITY
WASEDA UNIVERSITY (JAPAN)
WAYNE STATE UNIVERSITY
UNIVERSITY OF WISCONSIN - MADISON
YALE UNIVERSITY

925 **D-0 RUN IIB UPGRADE #925** — Gerald Blazey and Terry Wyatt

BEAM: Collision Area (D-0)
D0 Run IIb Upgrade

Request	11 Oct, 01	
Unconsidered	11 Oct, 01	
Approved	11 Jul, 02	Stage I
Unscheduled	11 Jul, 02	
Setup in a Year	1 Mar, 05	

INST.OF PHYS.ACADEMY OF SCI(CZECH)
UNIVERSITY OF ALBERTA (CANADA)
UNIVERSIDAD DE LOS ANDES(COLOMBIA)
UNIVERSITY OF ARIZONA
IHEP, BEIJING (PRC)
UNIVERSITY OF BONN (GERMANY)
BOSTON UNIVERSITY
BROOKHAVEN NATIONAL LABORATORY
BROWN UNIVERSITY
UNIV. DE BUENOS AIRES (ARGENTINA)
CALIFORNIA STATE UNIVERSITY
UNIV. OF CALIFORNIA, RIVERSIDE
CBPF (BRAZIL)
CEA-SACLAY (FRANCE)
CPPM, MARSEILLE (FRANCE)
CHARLES UNIVERSITY (CZECH)
CINVESTAV-IPN (MEXICO)
LPN, UNIV. DE CLERMONT (FRANCE)
COLUMBIA UNIVERSITY
CZECH TECHNICAL UNIVERSITY(CZECH)
DELHI UNIVERSITY (INDIA)
UNIVERSITY COLLEGE DUBLIN(IRELAND)
FERMILAB
FLORIDA STATE UNIVERSITY
FREIBURG UNIVERSITY (GERMANY)
HO CHI MINH CITY INS PHY(VIET NAM)
UNIV. OF ILLINOIS, CHICAGO CIRCLE
IMPERIAL COLLEGE (ENGLAND)
INDIANA UNIVERSITY
INS RECHERCHES SUBATOMIQUE(FRANCE)
ISN (GRENOBLE, FRANCE)
IPNL (FRANCE)
IOWA STATE UNIVERSITY
JINR, DUBNA (RUSSIA)
KANSAS STATE UNIVERSITY
UNIVERSITY OF KANSAS
KOREA UNIVERSITY, SEOUL (KOREA)
LAL, ORSAY (FRANCE)
LANCASTER UNIVERSITY (ENGLAND)
LANGSTON UNIVERSITY
LAWRENCE BERKELEY NATIONAL LAB.
LOUISIANA TECH UNIVERSITY
LPNHE, UN. OF P & M CURIE (FRANCE)
LUDWIG MAXIMILIANS UNIV. (GERMANY)
LUND,RIT,STOCKHOLM,UPPSALA(SWEDEN)
MAINZ UNIVERSITY (GERMANY)
UNIVERSITY OF MANCHESTER (ENGLAND)
UNIVERSITY OF MARYLAND
UNIVERSITY OF MICHIGAN - ANN ARBOR
MICHIGAN STATE UNIVERSITY
UNIVERSITY OF MISSISSIPPI
MOSCOW STATE UNIVERSITY (RUSSIA)
ITEP, MOSCOW (RUSSIA)
UNIVERSITY OF NEBRASKA - LINCOLN
SUNY AT BUFFALO
SUNY AT STONY BROOK
UN OF NIJMEGEN/NIKHEF(NETHERLANDS)
NIKHEF&U OF AMSTERDAM(NETHERLANDS)
NORTHEASTERN UNIVERSITY
NORTHERN ILLINOIS UNIVERSITY
NORTHWESTERN UNIVERSITY
UNIVERSITY OF NOTRE DAME
OKLAHOMA STATE UNIVERSITY
UNIVERSITY OF OKLAHOMA
PANJAB UNIVERSITY (INDIA)
UNESP (BRAZIL)
PNPI, ST. PETERSBURG (RUSSIA)
PRINCETON UNIVERSITY
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
RICE UNIVERSITY
UN. ESTADO RIO DE JANEIRO (BRAZIL)
UNIVERSITY OF ROCHESTER
RWTH, AACHEN (GERMANY)
UN.SAN FRANCISCO DE QUITO(ECUADOR)
UNIV. OF SCI. & TECH., HEFEI (PRC)
SIMON FRASER UNIVERSITY (CANADA)
SOUTHERN METHODIST UNIVERSITY
SUNG KYUN KWAN UNIVERSITY (KOREA)
TATA INSTITUTE (INDIA)
UNIVERSITY OF TEXAS AT ARLINGTON
UNIVERSITY OF ZURICH (SWITZERLAND)
UNIVERSITY OF VIRGINIA
UNIVERSITY OF WASHINGTON
UNIVERSITY OF WUPPERTAL (GERMANY)

---

926 **RICE TEST #T926** — Alice Bean

BEAM: Main Injector - Test Beam
Radio Ice Cerenkov Experiment (RICE) Test

Request	26 Jun, 02
Approved	11 Jul, 02
Unscheduled	11 Jul, 02
Being Installed	1 Jun, 03
Completed	15 May, 04

BARTOL RESEARCH INSTITUTE
FLORIDA STATE UNIVERSITY
UNIVERSITY OF KANSAS
MASSACHUSETTS INST. OF TECHNOLOGY
NORTHERN ILLINOIS UNIVERSITY
UNIVERSITY OF CANTERBURY

927	**BTEV PIXEL DETECTOR TEST #T927** BEAM: Main Injector - Test Beam BteV Pixel Detector Test Beam Run Request 13 Jun, 01 Approved 6 Jun, 02 Unscheduled 6 Jun, 02 Being Installed 1 Jun, 03 In Progress 15 Dec, 03 Data Analysis 18 Jul, 05	Joel N. Butler and Sheldon Stone	FERMILAB UNIVERSITY OF IOWA INFN, MILANO (ITALY) SYRACUSE UNIVERSITY WAYNE STATE UNIVERSITY UNIVERSITY OF WISCONSIN - MADISON
928	**MINOS VETO SHIELD PROTOTYPE #T928** BEAM: Main Injector Area Proposal for Tests of a Prototype Veto Shield for MINOS Request 15 Apr, 02 Approved 29 May, 02 Being Installed 29 May, 02 Completed 22 Jul, 03	Doug Michael and Stanley G. Wojcicki	ARGONNE NATIONAL LABORATORY UNIVERSITY OF ATHENS (GREECE) BROOKHAVEN NATIONAL LABORATORY CALIFORNIA INSTITUTE OF TECHNOLOGY UNIVERSITY OF CAMBRIDGE (ENGLAND) UNIV. ESTADUAL DE CAMPINAS(BRAZIL) FERMILAB COLLEGE DE FRANCE (FRANCE) HARVARD UNIVERSITY ILLINOIS INSTITUTE OF TECHNOLOGY INDIANA UNIVERSITY LAWRENCE LIVERMORE NATL.LABORATORY LEBEDEV PHYSICAL INST. (RUSSIA) UNIVERSITY COLLEGE LONDON(ENGLAND) MACALESTER COLLEGE UNIVERSITY OF MINNESOTA - DULUTH UNIVERSITY OF MINNESOTA ITEP, MOSCOW (RUSSIA) NORTHWESTERN UNIVERSITY UNIVERSITY OF OXFORD (ENGLAND) UNIVERSITY OF PITTSBURGH IHEP, PROTVINO (SERPUKHOV)(RUSSIA) RUTHERFORD-APPLETON LABS.(ENGLAND) UNIVERSITE DE SAO PAULO (BRAZIL) UNIVERSITY OF SOUTH CAROLINA STANFORD UNIVERSITY SUSSEX UNIVERSITY (ENGLAND) TEXAS A&M UNIVERSITY UNIVERSITY OF TEXAS AT AUSTIN TUFTS UNIVERSITY WESTERN WASHINGTON UNIVERSITY UNIVERSITY OF WISCONSIN - MADISON
929	**NOVA #929** BEAM: Main Injector - Unspecified Letter of Intent to Build an Off-Axis Detector to Study nu_mu -> nu_e Oscillations with the NuMI Neutrino Beam Request 10 Jun, 02 Unconsidered 10 Jun, 02 Stage I Approval 20 Apr, 05	Gary J. Feldman and Mark D. Messier	ARGONNE NATIONAL LABORATORY UNIVERSITY OF ATHENS (GREECE) CALIFORNIA INSTITUTE OF TECHNOLOGY UNIV. OF CALIFORNIA, LOS ANGELES FERMILAB COLLEGE DE FRANCE (FRANCE) HARVARD UNIVERSITY INDIANA UNIVERSITY MICHIGAN STATE UNIVERSITY UNIVERSITY OF MINNESOTA - DULUTH UNIVERSITY OF MINNESOTA ITEP, MOSCOW (RUSSIA) SUNY AT STONY BROOK NORTHERN ILLINOIS UNIVERSITY OHIO STATE UNIVERSITY OHIO UNIVERSITY UNIVERSITY OF OXFORD (ENGLAND) UN. ESTADO RIO DE JANEIRO (BRAZIL) RUTHERFORD-APPLETON LABS.(ENGLAND) UNIVERSITY OF SOUTH CAROLINA SOUTHERN METHODIST UNIVERSITY STANFORD UNIVERSITY TECHNISCHE UNIV. MUNCHEN(GERMANY) TEXAS A&M UNIVERSITY UNIVERSITY OF TEXAS AT AUSTIN TUFTS UNIVERSITY UNIVERSITY OF VIRGINIA UNIVERSITY OF WASHINGTON COLLEGE OF WILLIAM AND MARY
930	**BTEV STRAW TESTS #T930** BEAM: Main Injector - Test Beam BTeV Straw Prototype Detector Test Request 13 Jun, 01 Unconsidered 13 Jun, 01 Unscheduled 14 Aug, 03 In Progress 15 May, 04 Data Analysis 15 May, 05	Joel N. Butler and Sheldon Stone	UNIV. OF CALIFORNIA, DAVIS FERMILAB INFN, FRASCATI (ITALY) UNIVERSITY OF HOUSTON SOUTHERN METHODIST UNIVERSITY SYRACUSE UNIVERSITY UNIVERSITY OF VIRGINIA
931	**BTEV MUON DETECTOR TEST #T931** BEAM: Main Injector - Test Beam BTeV Muon Detector Test Request 14 Nov, 02 Unconsidered 14 Nov, 02 Unscheduled 14 Aug, 03 Completed 15 Feb, 05	Will E. Johns	UNIVERSITY OF ILLINOIS, CHAMPAIGN UNIV. OF PUERTO RICO - MAYAGUEZ VANDERBILT UNIVERSITY
932	**DIAMOND DETECTOR TEST #T932** BEAM: Main Injector - Test Beam Diamond Detector Test Request 14 Nov, 02 Unconsidered 14 Nov, 02 Unscheduled 3 Sep, 03 Setup in a Year 6 Jan, 06	Steven Worm	PURDUE UNIVERSITY RUTGERS UNIVERSITY

933	**BTEV EM CALORIMETER TEST #T933** BEAM: BEAM: Main Injector - Test Beam BTeV Electromagnetic Calorimeter Test Request 14 Nov, 02 Unconsidered 14 Nov, 02 In Progress 15 Jan, 05 Data Analysis 4 Jul, 05	Pavel A. Semenov	FERMILAB UNIVERSITY OF MINNESOTA IHEP, PROTVINO (SERPUKHOV)(RUSSIA) SYRACUSE UNIVERSITY
934	**MINOS VETO SHIELD #934** BEAM: Main Injector - NuMI Proposal for Cosmic Ray Veto Shield for the MINOS Far Detector Request 1 Jun, 02 Unconsidered 1 Jun, 02 In Progress 22 Jul, 03	Stanley G. Wojcicki	ARGONNE NATIONAL LABORATORY UNIVERSITY OF ATHENS (GREECE) BROOKHAVEN NATIONAL LABORATORY CALIFORNIA INSTITUTE OF TECHNOLOGY UNIVERSITY OF CAMBRIDGE (ENGLAND) UNIV. ESTADUAL DE CAMPINAS(BRAZIL) FERMILAB COLLEGE DE FRANCE (FRANCE) HARVARD UNIVERSITY ILLINOIS INSTITUTE OF TECHNOLOGY INDIANA UNIVERSITY LAWRENCE LIVERMORE NATL.LABORATORY LEBEDEV PHYSICAL INST. (RUSSIA) UNIVERSITY COLLEGE LONDON(ENGLAND) MACALESTER COLLEGE UNIVERSITY OF MINNESOTA - DULUTH UNIVERSITY OF MINNESOTA ITEP, MOSCOW (RUSSIA) NORTHWESTERN UNIVERSITY UNIVERSITY OF OXFORD (ENGLAND) UNIVERSITY OF PITTSBURGH IHEP, PROTVINO (SERPUKHOV)(RUSSIA) RUTHERFORD-APPLETON LABS.(ENGLAND) UNIVERSITE DE SAO PAULO (BRAZIL) UNIVERSITY OF SOUTH CAROLINA STANFORD UNIVERSITY SUSSEX UNIVERSITY (ENGLAND) TEXAS A&M UNIVERSITY UNIVERSITY OF TEXAS AT AUSTIN TUFTS UNIVERSITY WESTERN WASHINGTON UNIVERSITY UNIVERSITY OF WISCONSIN - MADISON
935	**BTEV RICH TEST #935** BEAM: Main Injector - Test Beam Proposal for Cosmic Ray Veto Shield for the MINOS Far Detector Request 1 Jun, 02 Unconsidered 1 Jun, 02 Completed 15 Jan, 05	Marina Artuso	FERMILAB SYRACUSE UNIVERSITY
936	**US-CMS PIXEL DETECTOR TEST #936** BEAM: Main Injector - Test Beam Proposal for Cosmic Ray Veto Shield for the MINOS Far Detector Request 1 Jun, 02 Unconsidered 1 Jun, 02 In Progress 15 Apr, 04	Steven Worm	UNIV. OF CALIFORNIA, DAVIS FERMILAB JOHNS HOPKINS UNIVERSITY UNIVERSITY OF MISSISSIPPI NORTHWESTERN UNIVERSITY PURDUE UNIVERSITY RUTGERS UNIVERSITY
937	**FINESSE #937** BEAM: Booster Accelerator A Proposal for a Near Dectector Experiment on the Booster Neutrino Beamline: FINeSSE: Fermilab Intense Neutrino Scattering Scintillator Experiment Request 23 Nov, 03 Rejected 22 Dec, 03	Bonnie Fleming and Rex Tayloe	COLUMBIA UNIVERSITY FERMILAB UNIVERSITY OF ILLINOIS, CHAMPAIGN INDIANA UNIVERSITY LOS ALAMOS NATIONAL LABORATORY LOUISIANA STATE UNIVERSITY NEW MEXICO STATE UNIVERSITY UNIVERSITY OF VIRGINIA
938	**HIGH-STATISTICS NEUTRINO SCATTERING #938** BEAM: Main Injector - NuMI Proposal to Perform a High-Statistics Neutrino Scattering Experiment Using a Fine-Grained Detector in the NuMI Beam (MINERvA) Request 3 Dec, 03 Unconsidered 3 Dec, 03 Approved 15 Apr, 05	Kevin McFarland and Jorge Morfin	UNIVERSITY OF ATHENS (GREECE) UNIV. OF CALIFORNIA, IRVINE CEBAF - THOMAS JEFFERSON LAB. DORTMUND UNIVERSITY (GERMANY) FERMILAB HAMPTON UNIVERSITY ILLINOIS INSTITUTE OF TECHNOLOGY UNIV. NACIONAL DE INGENIERIA(PERU) INST.FOR NUCLEAR RESEARCH (RUSSIA) JAMES MADISON UNIVERSITY NORTHERN ILLINOIS UNIVERSITY UNIVERSITY OF PITTSBURGH PONTIFICA UN. CATOLICA PERU(PERU) UNIVERSITY OF ROCHESTER RUTGERS UNIVERSITY SAINT XAVIER UNIVERSITY TUFTS UNIVERSITY COLLEGE OF WILLIAM AND MARY
939	**DARK ENERGY SURVEY #939** BEAM: Other Proposal for Fermilab to Support the Dark Energy Survey Design and Development Request 11 Mar, 04 Approved 13 Jul, 04 Stage I	James Annis and Brenna Flaugher	FERMILAB
940	**CHARGED KAONS RARE DECAYS #940** BEAM: Main Injector - New Muon An Adaptation to an Existing Facility of the E-921 Precision Measurement of the Decay K+ -> pi+ nu nubar and Other Rare and Precision Measurements in K+ and pi+ Decays Request 2 Apr, 04 Unconsidered 15 Apr, 04 Not Approved 20 Apr, 05	Peter Cooper	UNIVERSITY OF SOUTH ALABAMA BROOKHAVEN NATIONAL LABORATORY UNIVERSITY OF COLORADO AT BOULDER FERMILAB INST NUCL RESEARCH TROITSK(RUSSIA) UNIVERSITY OF MICHIGAN - ANN ARBOR IHEP, PROTVINO (SERPUKHOV)(RUSSIA) UN.AUTO.DE SAN LUIS POTOSI(MEXICO) UNIVERSITY OF TEXAS AT AUSTIN UNIVERSITY OF VIRGINIA

941	**PPAC #T941** BEAM: Main Injector - Test Beam Parallel Plate Avalanche Counter Test Request 4 Jun, 04 Approved 19 Jul, 04 Completed 15 Jan, 05	Edwin Norbeck	UNIVERSITY OF IOWA
942	**FLARE # 942** BEAM: Unspecified Letter of Intent for FLARE: Fermilab Liquid Argon Experiments Request 8 Jun, 04 Not Approved 15 Jul, 04	Adam Para	BARTOSZEK ENGINEERING UNIV. OF CALIFORNIA, LOS ANGELES DUKE UNIVERSITY FERMILAB INDIANA UNIVERSITY LOUISIANA STATE UNIVERSITY MICHIGAN STATE UNIVERSITY OSAKA UNIVERSITY (JAPAN) INFN, PISA (ITALY) UNIVERSITY OF PITTSBURGH PRINCETON UNIVERSITY UNIVERSITY OF SILESIA (POLAND) UNIVERSITY OF SOUTH CAROLINA TEXAS A&M UNIVERSITY TUFTS UNIVERSITY WARSAW UNIVERSITY, INS (POLAND) WARSAW UNIVERSITY, INP, (POLAND) UNIVERSITY OF WASHINGTON YORK UNIVERSITY (CANADA)
943	**MONOLITHIC ACTIVE PIXEL DETECTOR #T943** BEAM: Main Injector - Test Beam Super B-factory Monolithic Active Pixel Detector Prototype Request 29 Aug, 04 Approved 24 Sep, 04 Completed 15 Jan, 05	Gary Varner	UNIVERSITY OF HAWAII AT MANOA KEK (JAPAN) INP, KRAKOW (POLAND) UNIVERSITY OF TSUKUBA (JAPAN)
944	**MINIBOONE EXTENSION #944** BEAM: Booster MiniBooNE Extension Request 28 Oct, 04 Approved 18 Nov, 04 Setup in a Year 18 Nov, 04 In Progress 23 Jan, 06	Stephen Brice and Richard Van de Water	UNIVERSITY OF ALABAMA BUCKNELL UNIVERSITY UNIVERSITY OF CINCINNATI UNIVERSITY OF COLORADO AT BOULDER COLUMBIA UNIVERSITY EMBRY RIDDLE AERONAUTICAL UNIV. FERMILAB INDIANA UNIVERSITY LOS ALAMOS NATIONAL LABORATORY LOUISIANA STATE UNIVERSITY UNIVERSITY OF MICHIGAN - ANN ARBOR PRINCETON UNIVERSITY ST. MARY'S UNIVERSITY OF MINNESOTA WESTERN ILLINOIS UNIVERSITY YALE UNIVERSITY
945	**COUPP #T945** BEAM: Other Chicagoland Observatory for Underground Particle Physics Request 29 Jul, 04 Approved 4 Feb, 05 Unscheduled 4 Feb, 05 In Progress 8 Feb, 05	Juan Collar	UNIVERSITY OF CHICAGO FERMILAB
946	**FINeSSE #946** BEAM: Booster A Letter of Intent for a Neutrino Scattering Experiment on the Booster Neutrino Beamline: FINeSSE Request 21 Mar, 05 Not Approved 20 Apr, 05	Bonnie Fleming and Rex Tayloe	COLUMBIA UNIVERSITY FERMILAB UNIVERSITY OF ILLINOIS, CHAMPAIGN INDIANA UNIVERSITY LOS ALAMOS NATIONAL LABORATORY LOUISIANA STATE UNIVERSITY NEW MEXICO STATE UNIVERSITY YALE UNIVERSITY
947	**SUPERCDMS #947** BEAM: Other SuperCDMS Development Project Request 1 Oct, 04 Unconsidered 20 Apr, 05	Dan Bauer	FERMILAB
948	**MIPP Upgrade #948** BEAM: Main Injector Proposal to Upgrade the DAQ for the Main Injector Particle Production Experiment (MIPP) at Fermilb Request 29 Mar, 05 Rejected 20 Apr, 05	Rajendran Raja	BROOKHAVEN NATIONAL LABORATORY UNIVERSITY OF COLORADO AT BOULDER ELMHURST COLLEGE ENRICO FERMI INSTITUTE FERMILAB HARVARD UNIVERSITY ILLINOIS INSTITUTE OF TECHNOLOGY INDIANA UNIVERSITY UNIVERSITY OF IOWA LAWRENCE LIVERMORE NATIONAL LAB. UNIVERSITY OF MICHIGAN - ANN ARBOR PURDUE UNIVERSITY UNIVERSITY OF SOUTH CAROLINA UNIVERSITY OF VIRGINIA
949	**SDSS-II #949** BEAM: Other An Extension of the Sloan Digital Sky Survey Request 15 Mar, 04 Stage I Approval 15 Apr, 04 Stage II Approval 20 Apr, 05 In Progress 1 Jul, 05	Steven Kent	FERMILAB

950	**VACUUM STRAW TRACKER #T950** BEAM: MTest Vacuum Straw Tracker Test Beam Run Request 4 Aug, 05 Approved 15 Sep, 05 In Progress 7 Nov, 05	Yau Wei Wah	UNIVERSITY OF CHICAGO FERMILAB OSAKA UNIVERSITY (JAPAN)
951	**ALICE EMCAL #T951** BEAM: Mtest ALICE Electromagnetic Calorimeter Prototype Test Request 20 Jul, 05 Approved 13 Oct, 05 In Progress 7 Nov, 05	Terry Awes	UNIV. OF CALIFORNIA, BERKELEY UNIV. OF CALIFORNIA, LOS ANGELES CREIGHTON UNIVERSITY UNIVERSITY OF HOUSTON LAWRENCE BERKELEY NATIONAL LAB. LAWRENCE LIVERMORE NATIONAL LAB. MICHIGAN STATE UNIVERSITY OAK RIDGE NATIONAL LABORATORY OHIO STATE UNIVERSITY PURDUE UNIVERSITY UNIVERSITY OF TENNESSEE, KNOXVILLE UNIVERSITY OF WASHINGTON WAYNE STATE UNIVERSITY
952	**PEANUT #T952** BEAM: NuMI Test of OPERA Targets in the NuMI Beam (Petit-Exposure At NeUTrino beamline - PEANUT) Request 3 Aug, 05 Approved 12 Aug, 05 In Progress 13 Oct, 05	Kimio Niwa	AICHI UNIV. OF EDUCATION (JAPAN) UNIVERSITY OF ATHENS (GREECE) UNIVERSITY OF BARI (ITALY) UNIVERSITY OF BOLOGNA (ITALY) UNIV. FEDERICO SANTA MARIA (CHILE) FERMILAB INFN, FRASCATI (ITALY) IPNL (FRANCE) KOBE UNIVERSITY (JAPAN) LA SAPIENZA UNIV. AND INFN (ITALY) NAGOYA UNIVERSITY (JAPAN) UNIVERSITY OF PADOVA (ITALY) UNIVERSITY OF PITTSBURGH SALERNO UNIVERSITY AND INFN(ITALY)
953	**CERENKOV TEST #T953** BEAM: MTest University of Iowa Cerenkov Light Test Request 7 Sep, 05 Approved 13 Oct, 05 Setup Witin Year 13 Oct, 05	Edwin Norbeck	UNIVERSITY OF IOWA UNIVERSITY OF WISCONSIN - MADISON
954	**SCIBOONE #954** BEAM: Booster Bringing the SciBar Detector to the Booster Neutrino Beam Request 10 Jun, 05 Stage I Approval 14 Dec, 05 Unscheduled 14 Dec, 05	Tsuyoshi Nakaya and Morgan Wascko	UNIVERSITY OF COLORADO AT BOULDER COLUMBIA UNIVERSITY FERMILAB ICRR, UNIVERSITY OF TOKYO (JAPAN) IFAE-BARCELONA (SPAIN) KEK (JAPAN) KYOTO UNIVERSITY (JAPAN) LA SAPIENZA UNIV. AND INFN (ITALY) LOS ALAMOS NATIONAL LABORATORY LOUISIANA STATE UNIVERSITY IFC, VALENCIA (SPAIN)
955	**RPC TEST #T955** BEAM: Mtest Resistive Plate Chamber Detector Test Request 7 Nov, 05 Approved 21 Dec, 05 Setup Witin Year 21 Dec, 05	David Underwood	ARGONNE NATIONAL LABORATORY UNIVERSITY OF IOWA
956	**ILC MUON DETECTOR #T956** BEAM: Mtest ILC Muon Detector Tests Request 20 Dec, 05 Approved 4 Feb, 06 Setup Witin Year 4 Feb, 06	Robert Abrams	UNIVERSITY OF CALIFORNIA, DAVIS FERMILAB INDIANA UNIVERSITY UNIVERSITY OF NOTRE DAME WAYNE STATE UNIVERSITY
957	**TAIL-CATCHER/MUON #T957** BEAM: Mtest Northern Illinois University Tail-catcher/Muon Tracker Test Request 30 Dec, 05 Approved 4 Feb, 06 Setup Witin Year 4 Feb, 06	Vishnu Zutshi	DESY (GERMANY) IMPERIAL COLLEGE (ENGLAND) NORTHERN ILLINOIS UNIVERSITY

*** End of Report ***