Fermilab Research Program 2004

Workbook

March 2004

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 30th edition of the Fermilab Research Program Workbook, originally used as an aid to the Physics Advisory Committee's annual review of the experimental program at Fermilab, but which long ago became a more general purpose annual update of the Laboratory's research activities. As for the past many years, it is a pleasure to thank Jud Parker for keeping up the databases used in compiling the information given in the Workbook, and Jackie Coleman who skillfully combines the many inputs and makes a Workbook out of them. The advice and encouragement of Jeff Appel is much appreciated.

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	Withdrawn/Inactive	Proposals that were not considered at the request of the spokesperson or that are no longer being considered for other reasons.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, 938 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	Mar 2004
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
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
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
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
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
"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
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
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
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
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
TOTAL NUMBER OF PROPOSALS	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

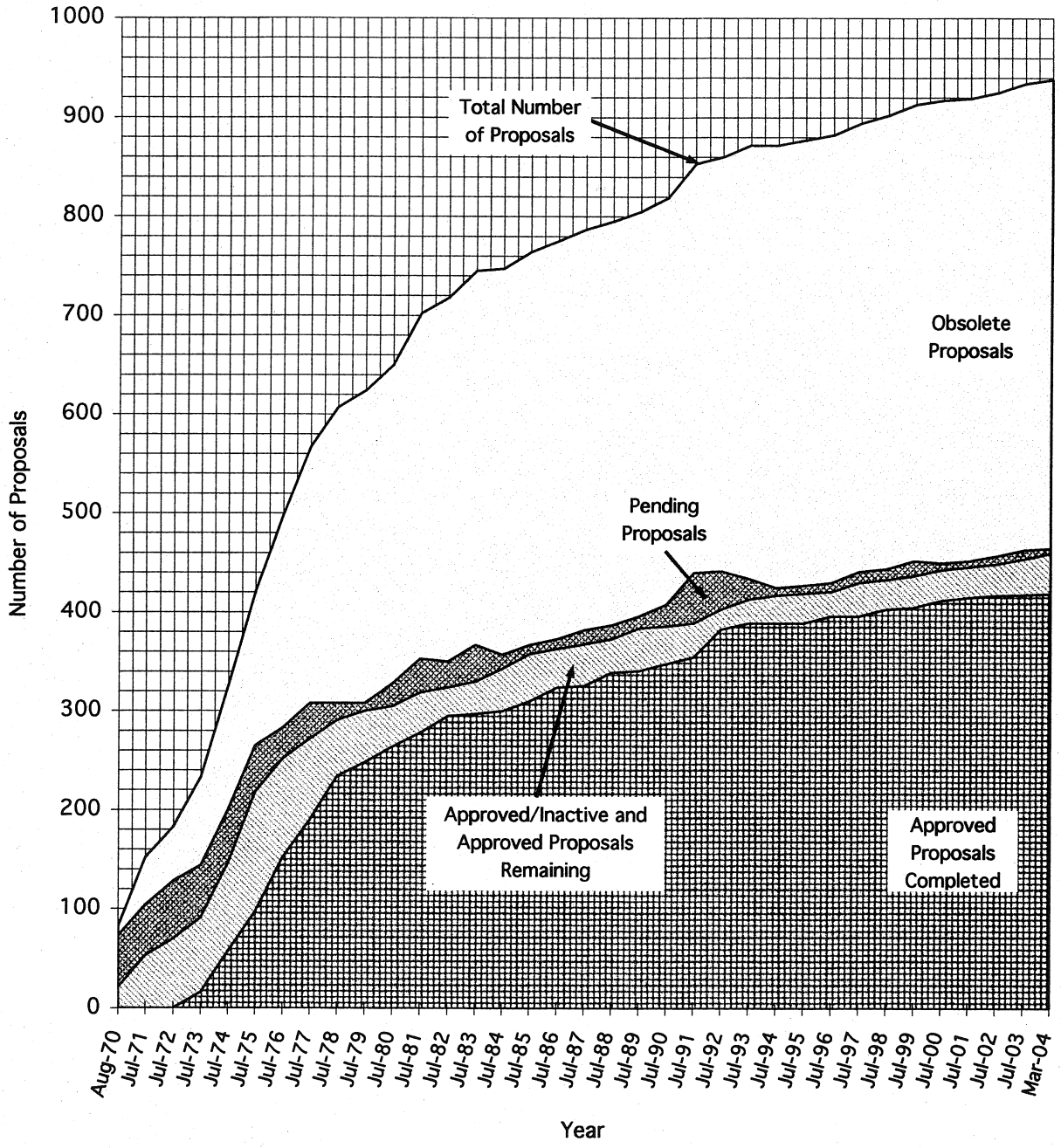


Figure 1. Growth of the Fermilab research program. The total number of approved experiments is obtained by adding the numbers shown as completed and those remaining and approved/inactive. Pending proposals are those which are unconsidered, deferred or "not approved;" obsolete proposals are rejected or 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 $\bar{p}p$ Collider runs (Run I, 900 GeV $\times$ 900 GeV) of 1992-1993 and 1994-1996, and for the current Collider run (Run II) which started in 2001. The current run is at 980 $\times$ 980 GeV.

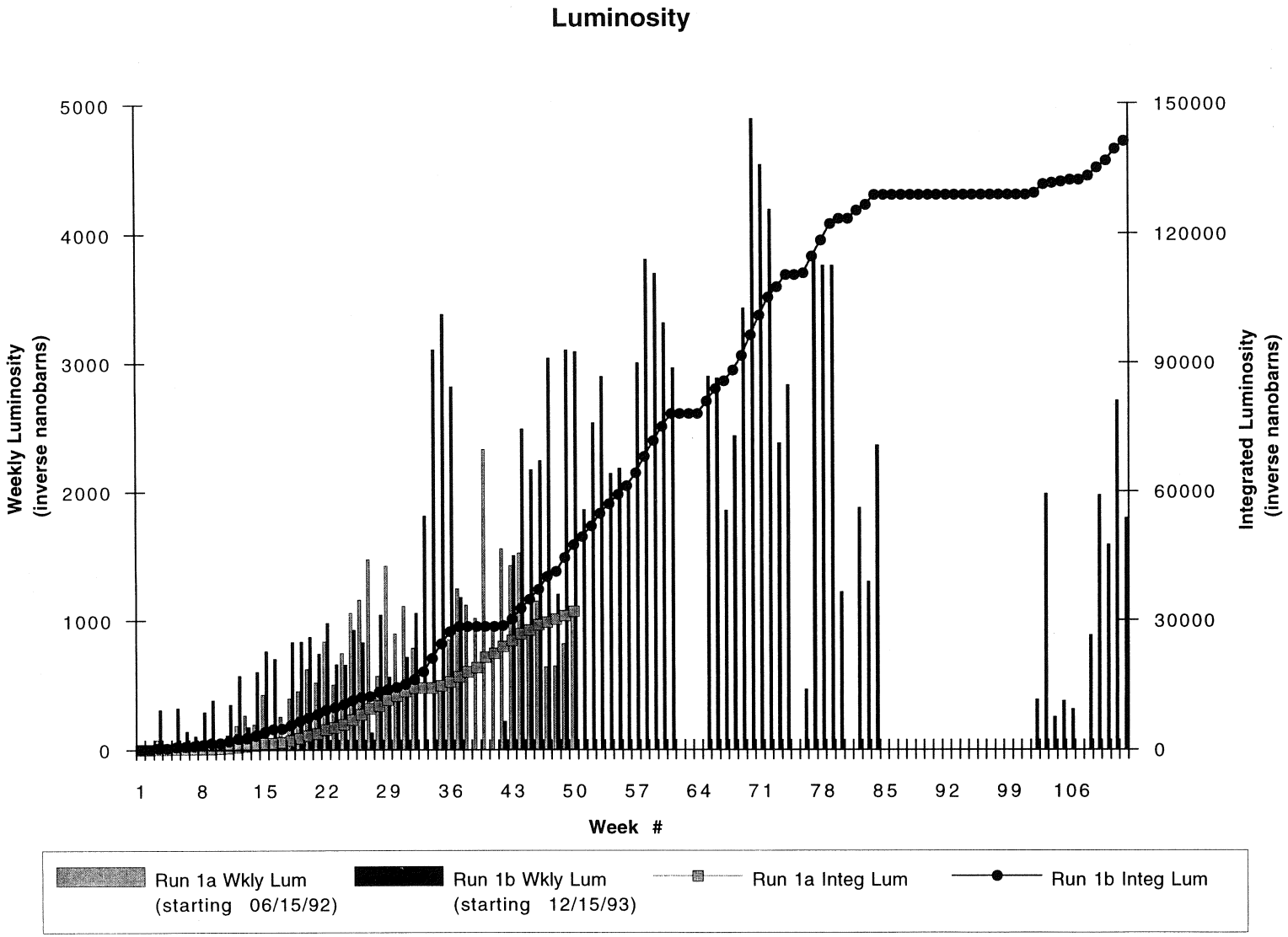


Figure 2. Tevatron Collider operation during the 1992-1993 and 1994-96 running periods - luminosity per week and integrated luminosity.

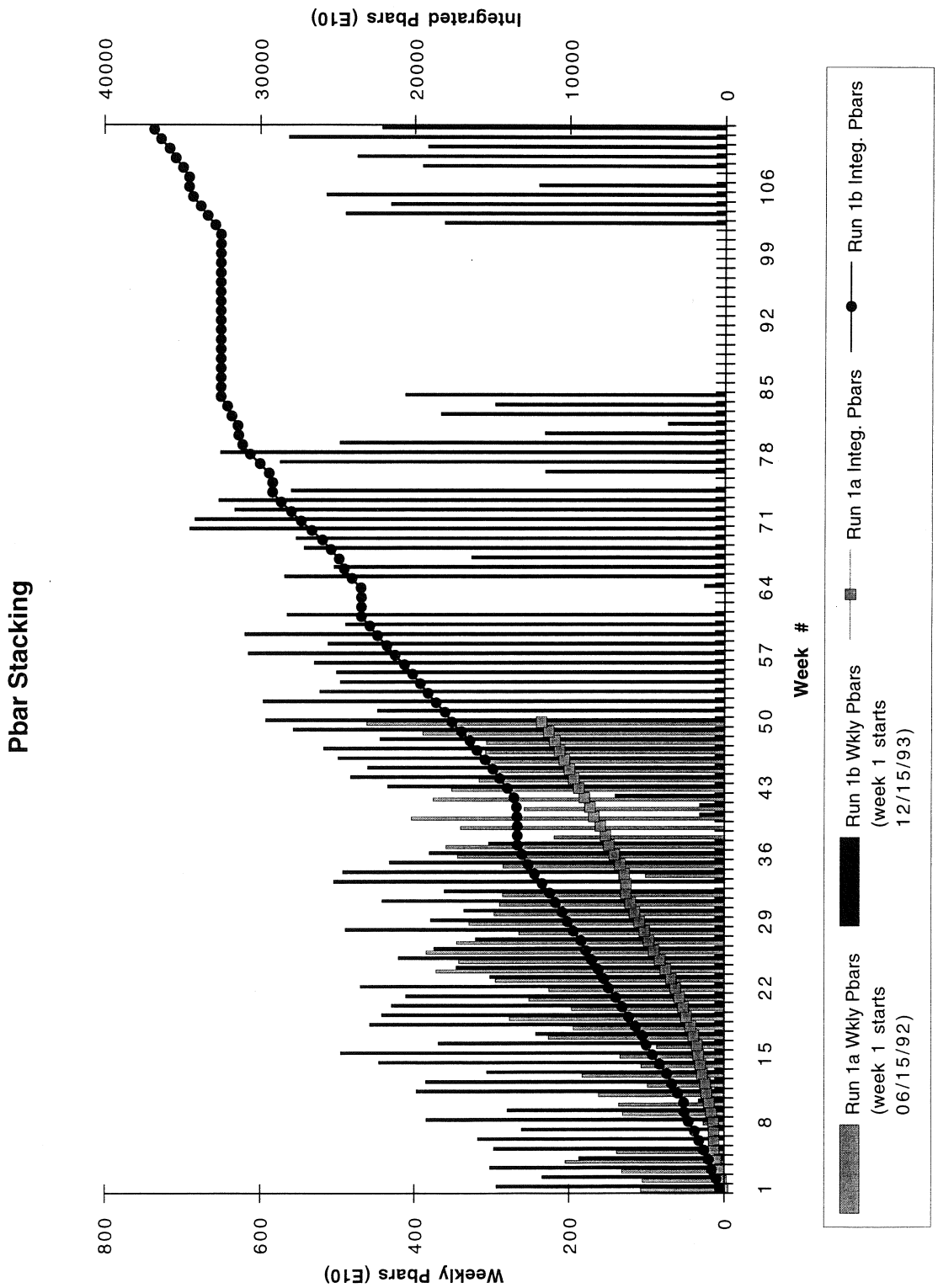


Figure 3. Tevatron Collider operation during the 1992-1993 and 1994-96 running periods - antiproton stacking per week and integrated stacking.

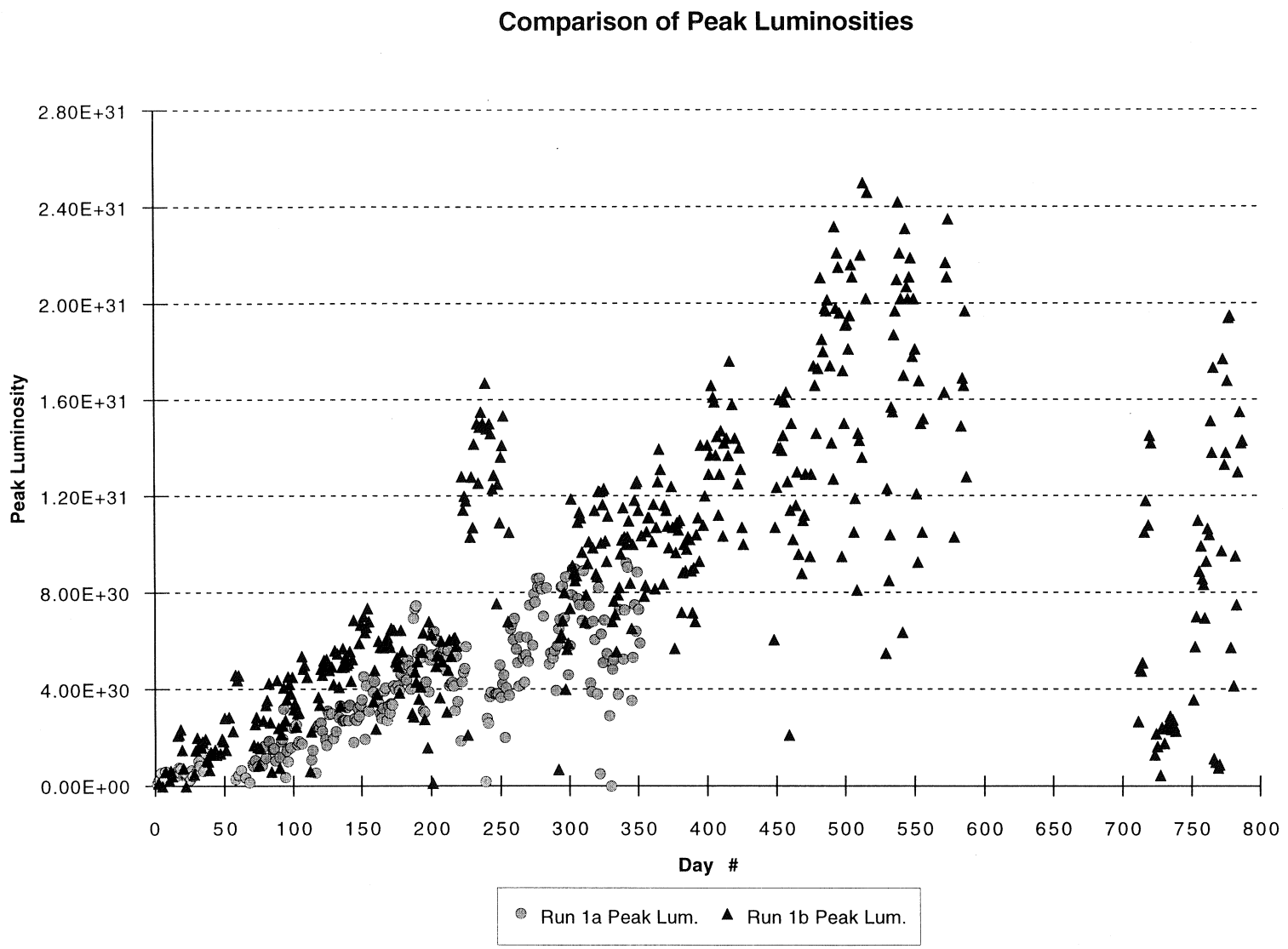


Figure 4. Tevatron Collider operation during the 1992-1993 and 1994-96 running periods - daily peak luminosity.

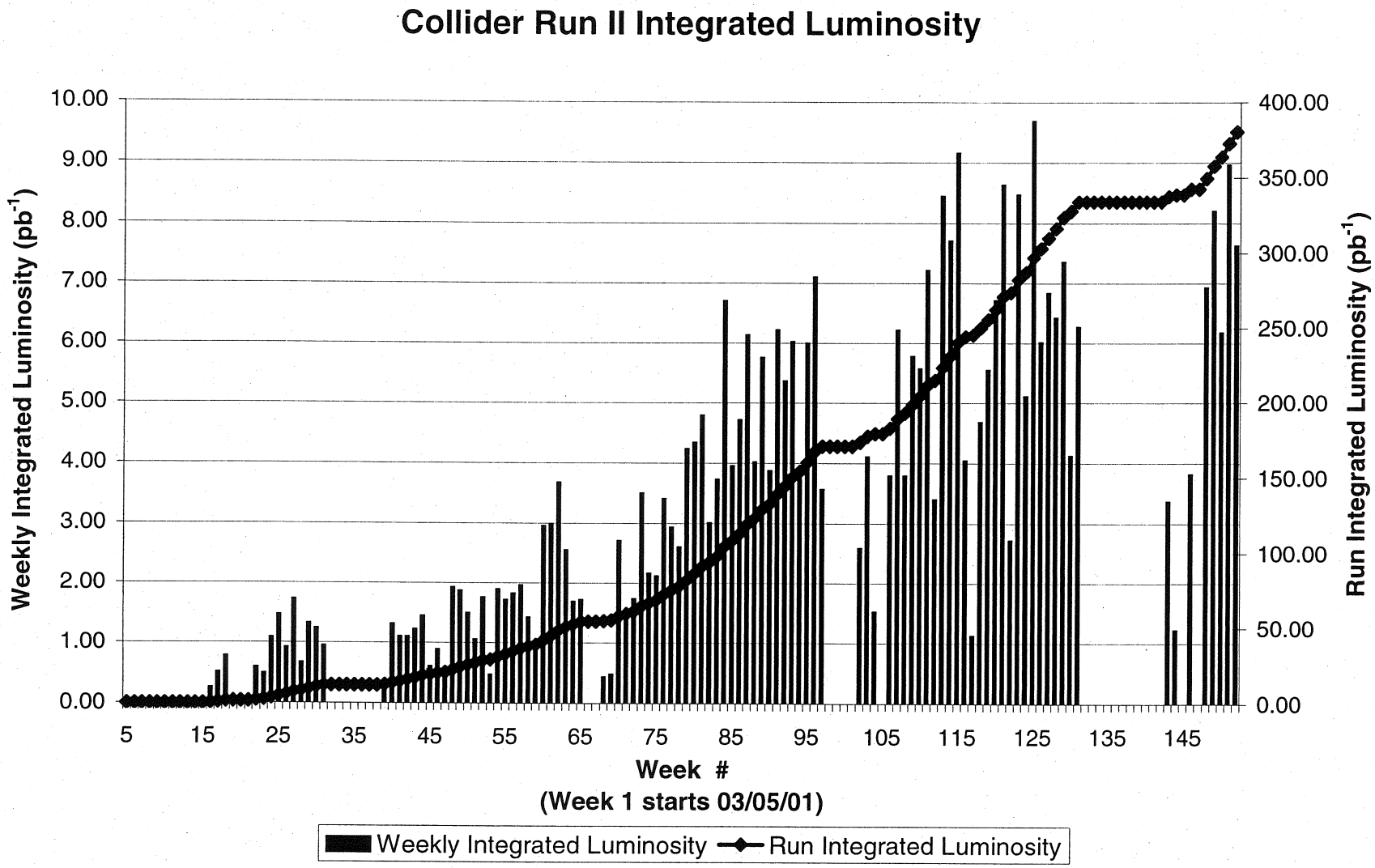


Figure 5. Tevatron Collider operation during the current running period, which started in 2001 - luminosity per week and integrated luminosity.

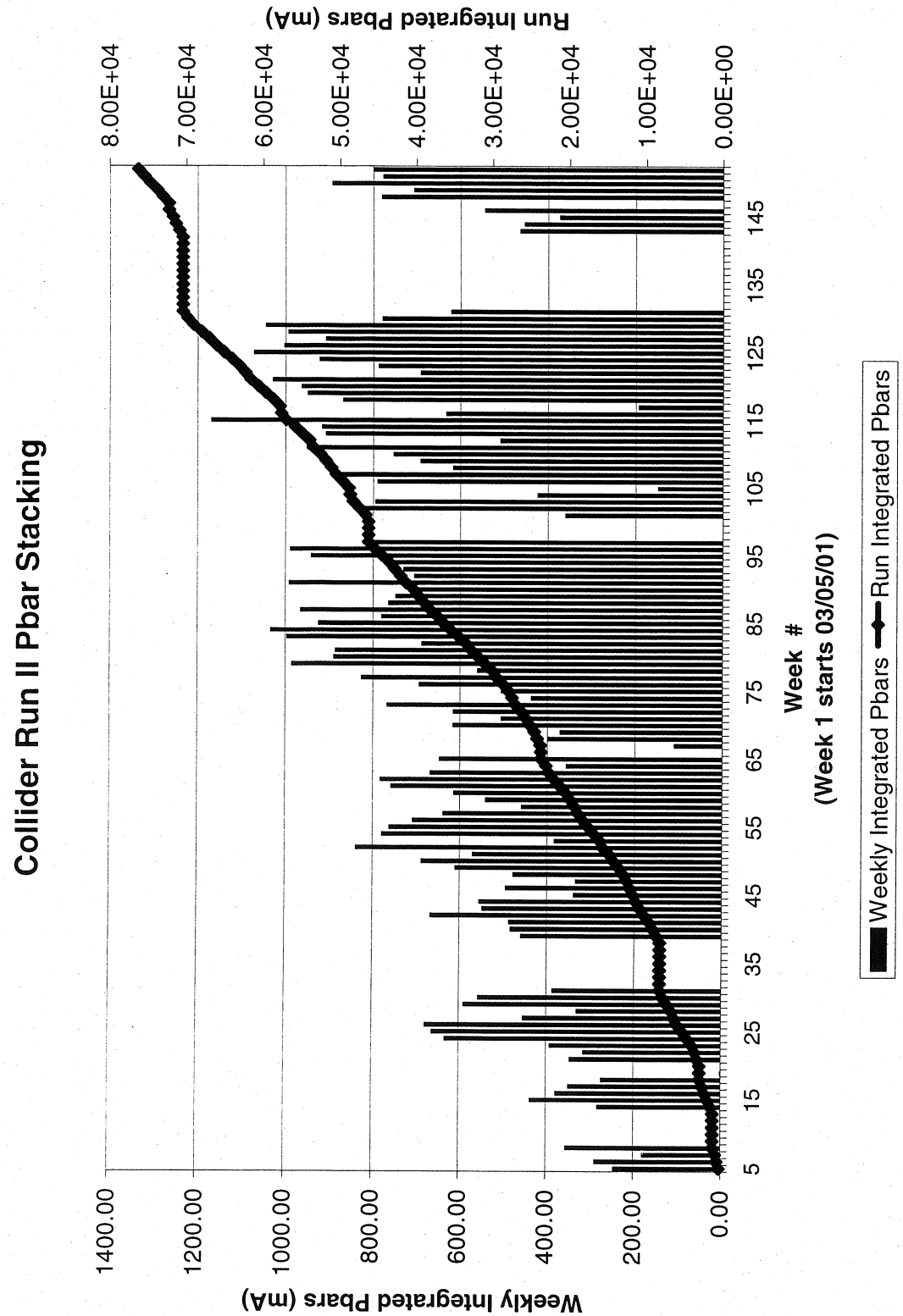


Figure 6. Tevatron Collider operation during the current running period, which started in 2001 - antiproton stacking per week and integrated stacking.

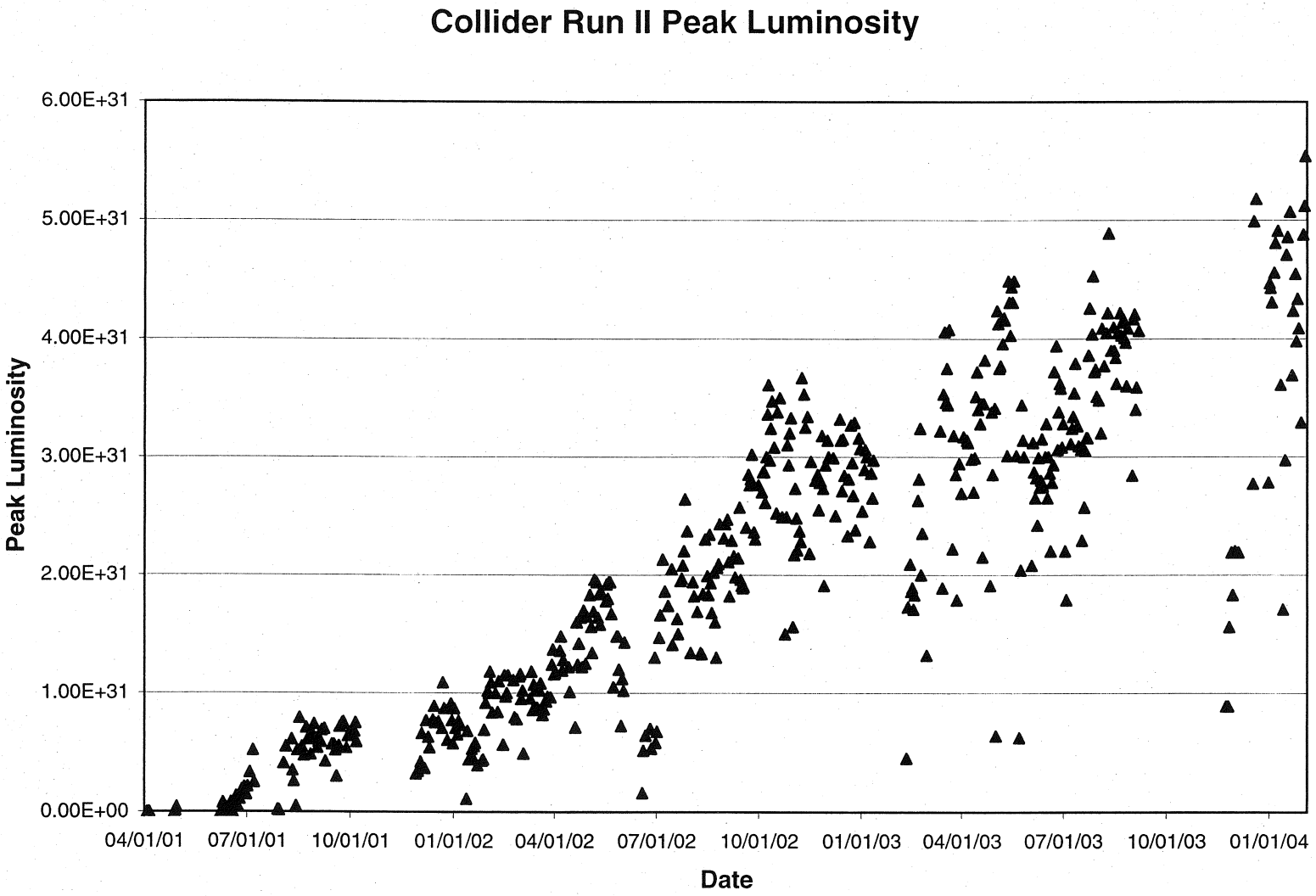


Figure 7. Tevatron Collider operation during the current running period, which started in 2001 - daily peak luminosity.

SECTION III. FERMILAB BEAM PROPERTIES AND EXPERIMENT LOCATION

The locations of all Fermilab fixed-target area beamlines are shown in Figure 8; Figure 9 gives the locations of Collider experiments.

The currently approved neutrino experiments use beams from the Booster (for experiment E-898, MiniBooNE) and the Main Injector (for the future experiment E-875, MINOS). The locations of these experiments are shown on the overall Fermilab accelerator layout in Figure 10, and their expected beam fluxes are shown in Figures 11 and 12. The fixed-target program scheduled to start in early 2004 will be located in the Meson Area: E-907 (MIPP) in MC, and test beam users in MT. Other approved future fixed-target experiments (E-906 and E-921) will also be 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 13 shows some expected secondary beam fluxes using the Main Injector.

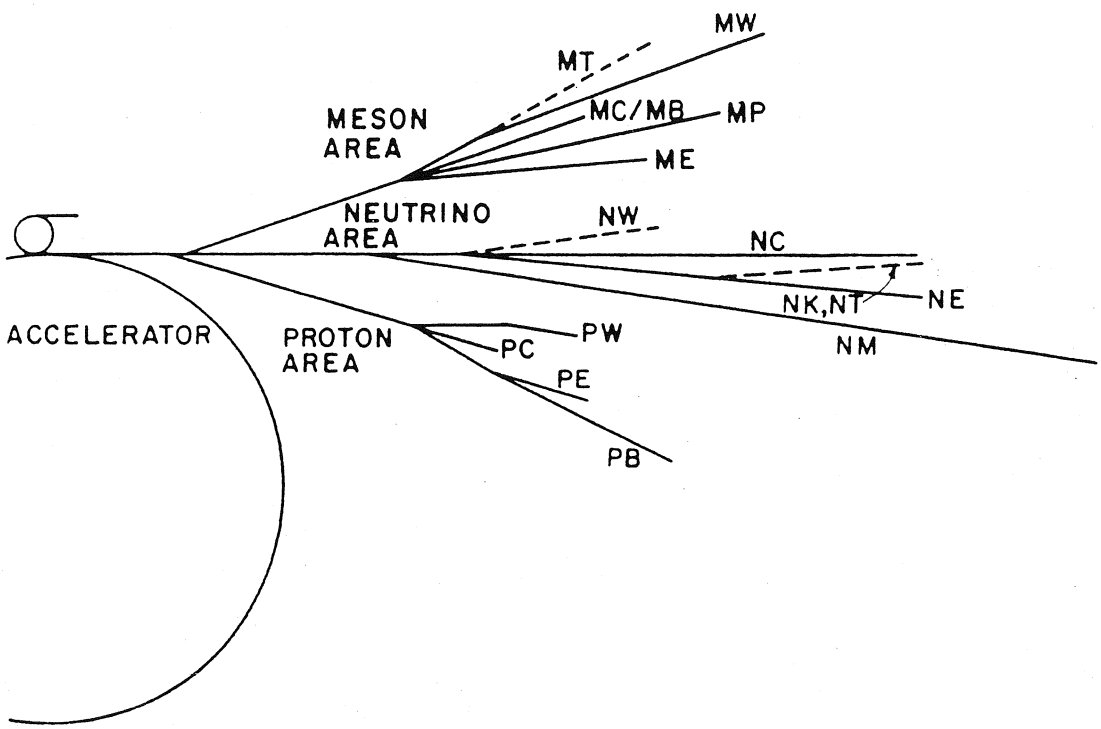


Figure 8. Layout of Fermilab Fixed Target area beams.

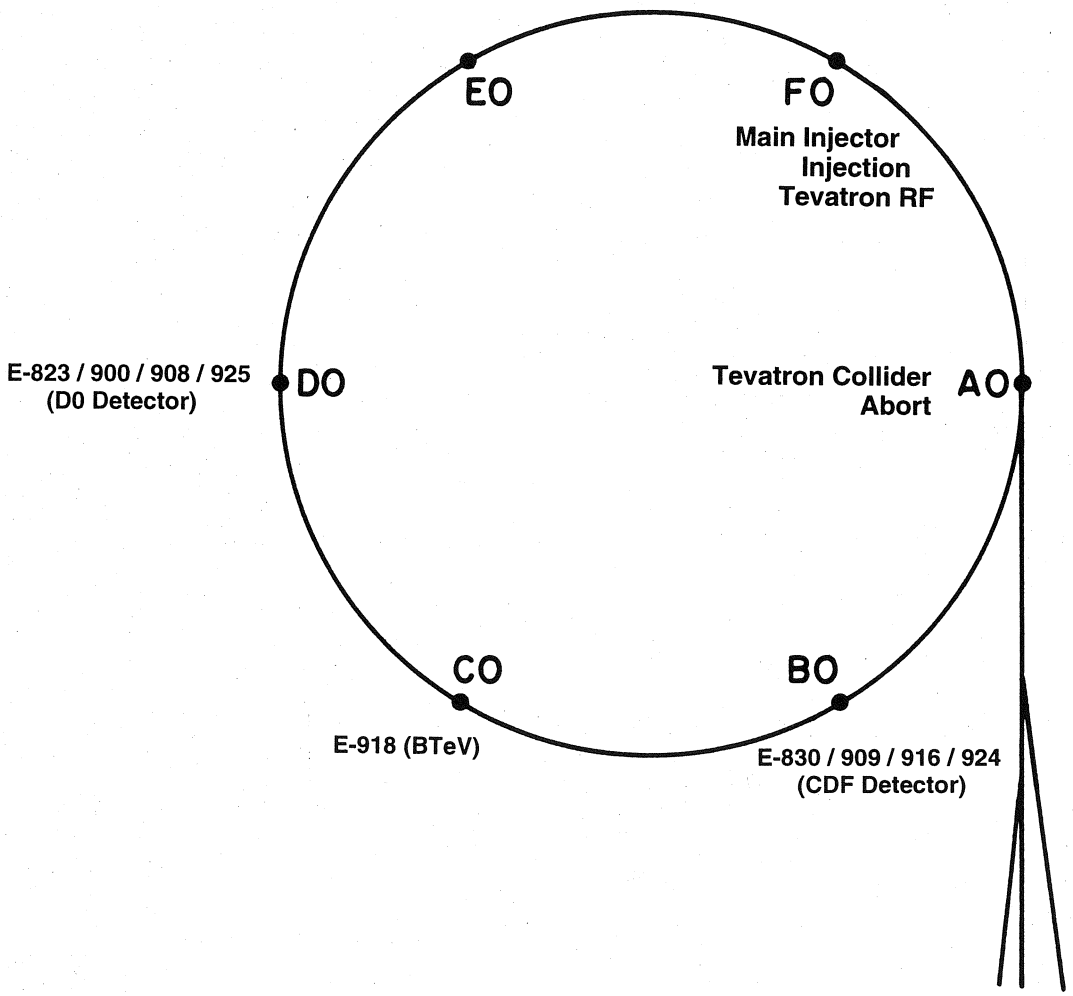


Figure 9. Locations in the Tevatron of the approved $\bar{p}p$ Collider experiments.

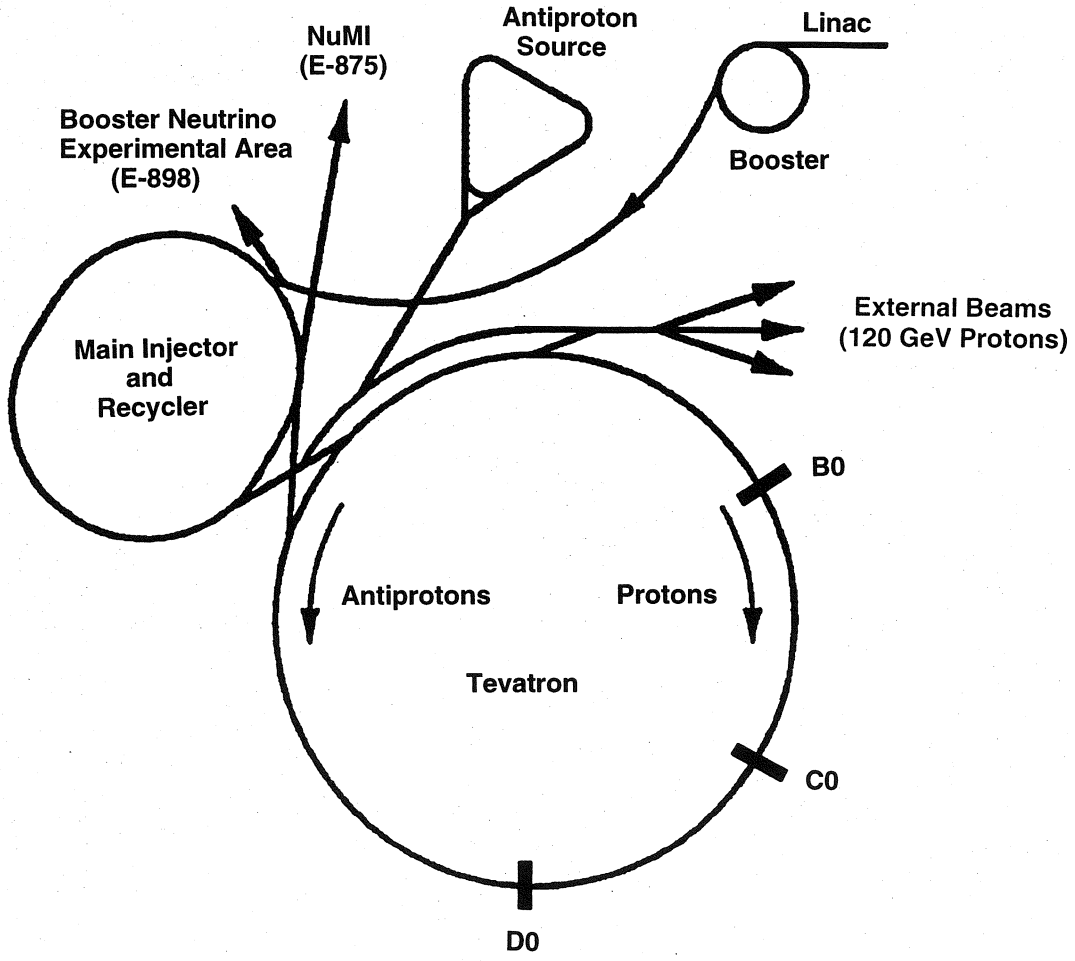


Figure 10. Schematic layout of Fermilab accelerators with present and future experimental areas.

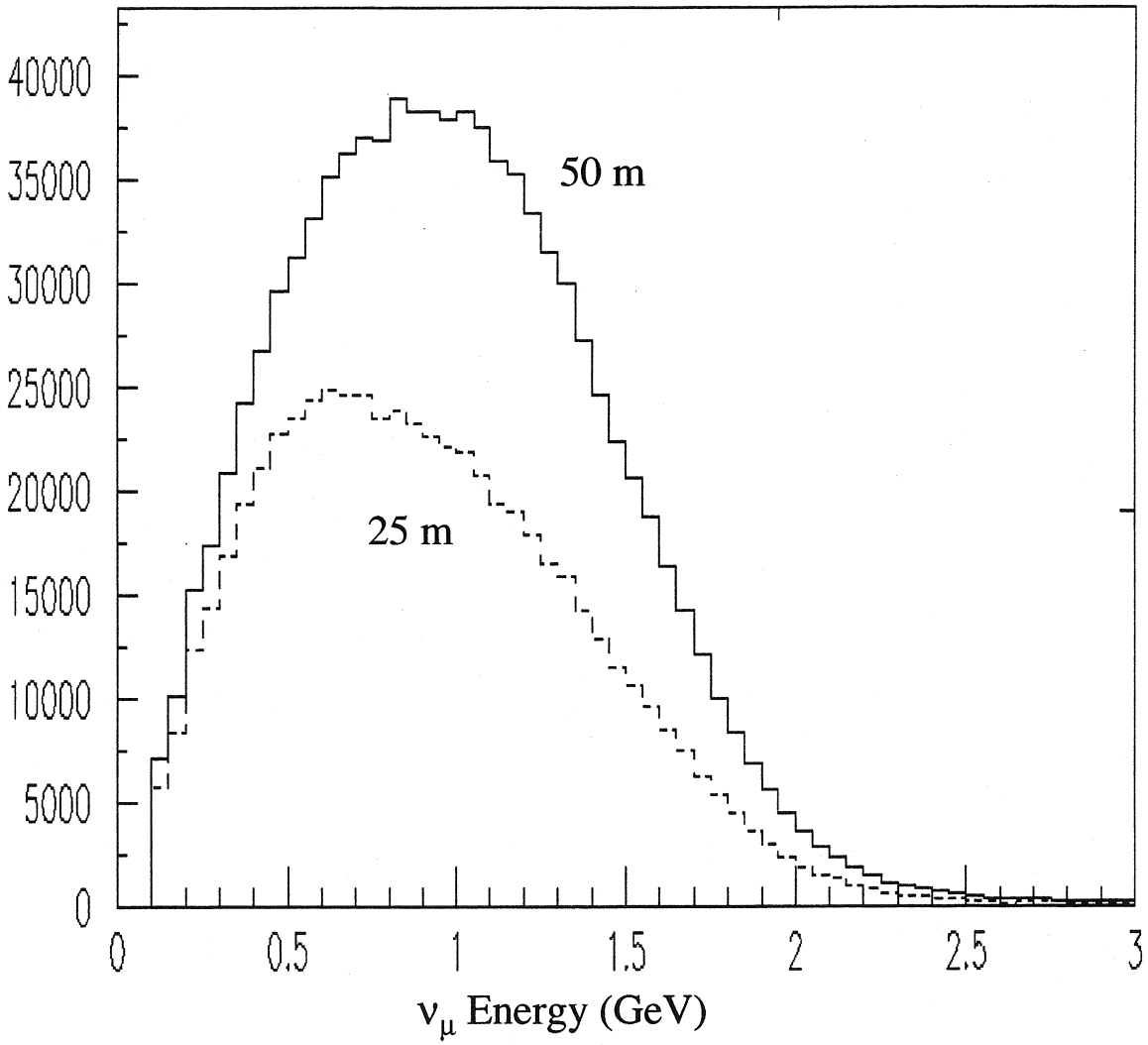


Figure 11. Predicted neutrino flux at the MiniBooNE detector, for 4.7×10^9 protons on a beryllium target, through a 2.5 m-radius circle at 541 m from the target. The data are for a single magnetic-focusing horn. MiniBooNE expects to run with both a 25 m and a 50 m decay pipe.

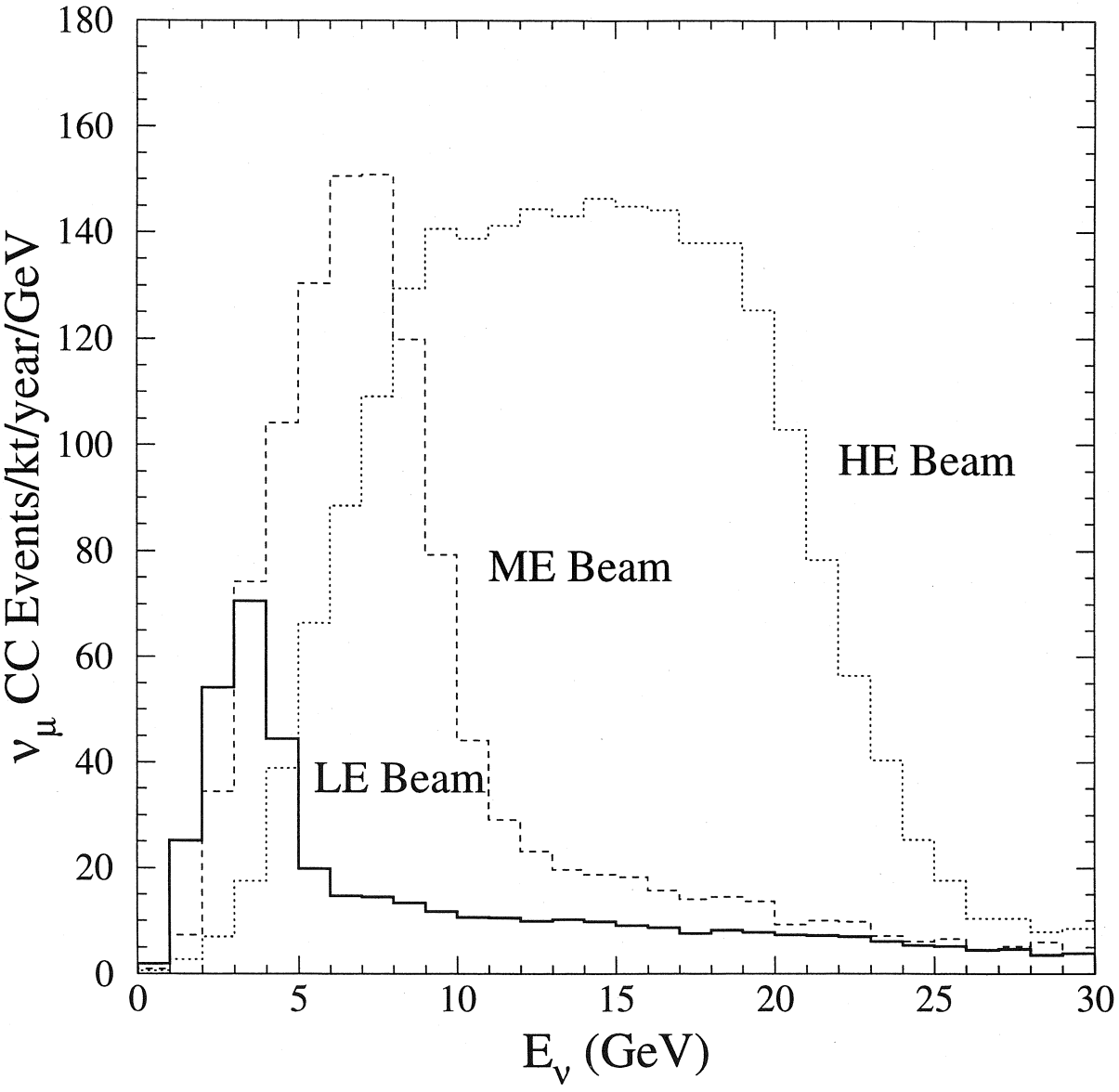


Figure 12. Neutrino event rate at Soudan, Minnesota, for the MINOS experiment. Three beam tunes are shown; the most desirable tune depends on what the neutrino masses actually turn out to be. NuMI plans to begin operations with the LE tune. Rates are based on 3.7×10^{20} protons per year from the Main 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)

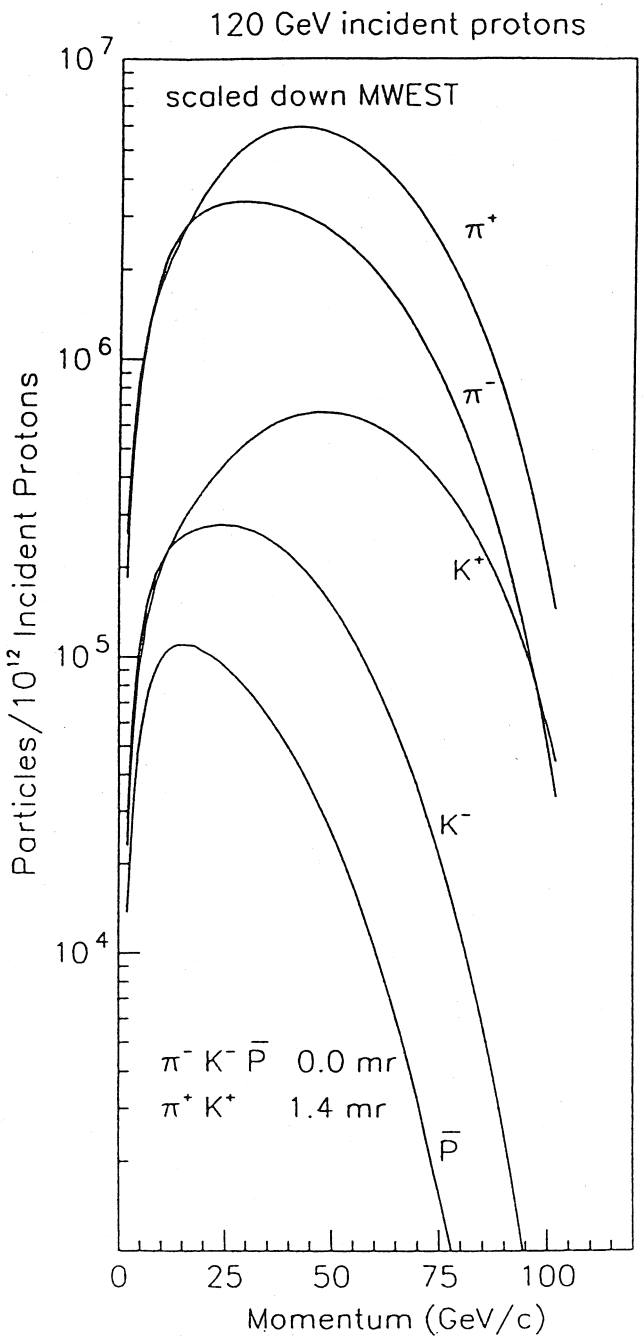


Figure 13. Main Injector: Fluxes scaled from the 800 GeV MW beamline.

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 focussed 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 accelerator, linear collider and other beam studies, as well as BTeV simulation and engineering and computing research. Support for SDSS, CDMS and Auger continues, as well as analysis computing for completed experiments including KTeV and E-871. The Computing Division is providing initial support for the Laboratory's collaboration on SNAP and other new astrophysics initiatives.

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. U.S. CMS is making significant progress in development of a completely distributed computing model using Grid technologies, incorporating the CERN Tier 0, the Fermilab and other regional center Tier 1s and many university Tier 2 centers in the US and elsewhere. This requires significant research, development and ongoing prototyping of the use of Grid technologies and in the past year U.S. CMS has helped lead a successful nation Grid demonstrator in the U.S., Grid2003, for distributed data processing and access. Collaboration with computer science groups and universities in the US continues to grow as well as with the new 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. Dedicated special-purpose systems are developed and supported, such as the high-performance integrated Linux cluster for lattice QCD calculations housed in the New Muon Lab. The multiprocessor farm systems composed of PCs running Linux dominate the production computing capacity at the Laboratory and allow fast cost-effective event reconstruction and Monte Carlo calculations. The current capacity of the farms is over 350,000 SpecInt2000. 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. Over 1.5 petabytes of data (1 petabyte = 1 million gigabytes) are now stored in the central STK. The distributed disk cache system, Dcache, a collaborative development between Fermilab and DESY, moves 10s of 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 all four experiments.

The D0 and Fermilab-developed Sequential Access using Meta-Data (SAM) distributed processing and meta-data system is in production use at over 20 sites in the U.S., Europe and beyond. It has been adopted by CDF 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 ESNET OC-12 connection is in production. The Fermilab dark fiber WAN connection to Starlight is being installed and will be in use by mid-2004. Several development initiatives to utilize this network in collaboration with computer and network research scientists at Northwestern University, the University of Illinois at Chicago and experiment colleagues at Caltech and UCSD are being proposed. The Fermilab campus network continues to be upgraded in response to experiment data distribution and access needs. A conceptual diagram of the Laboratory's network infrastructure is shown in Figure 14.

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 BTeV data acquisition and

trigger systems, as well as for SNAP and CKM 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. 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 being regarded as a strategy 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 (iVDGL) and Trigger Farm R&D (BTeV RTES).

The Division also engages in advanced research and development of technologies needed by its experiment 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.

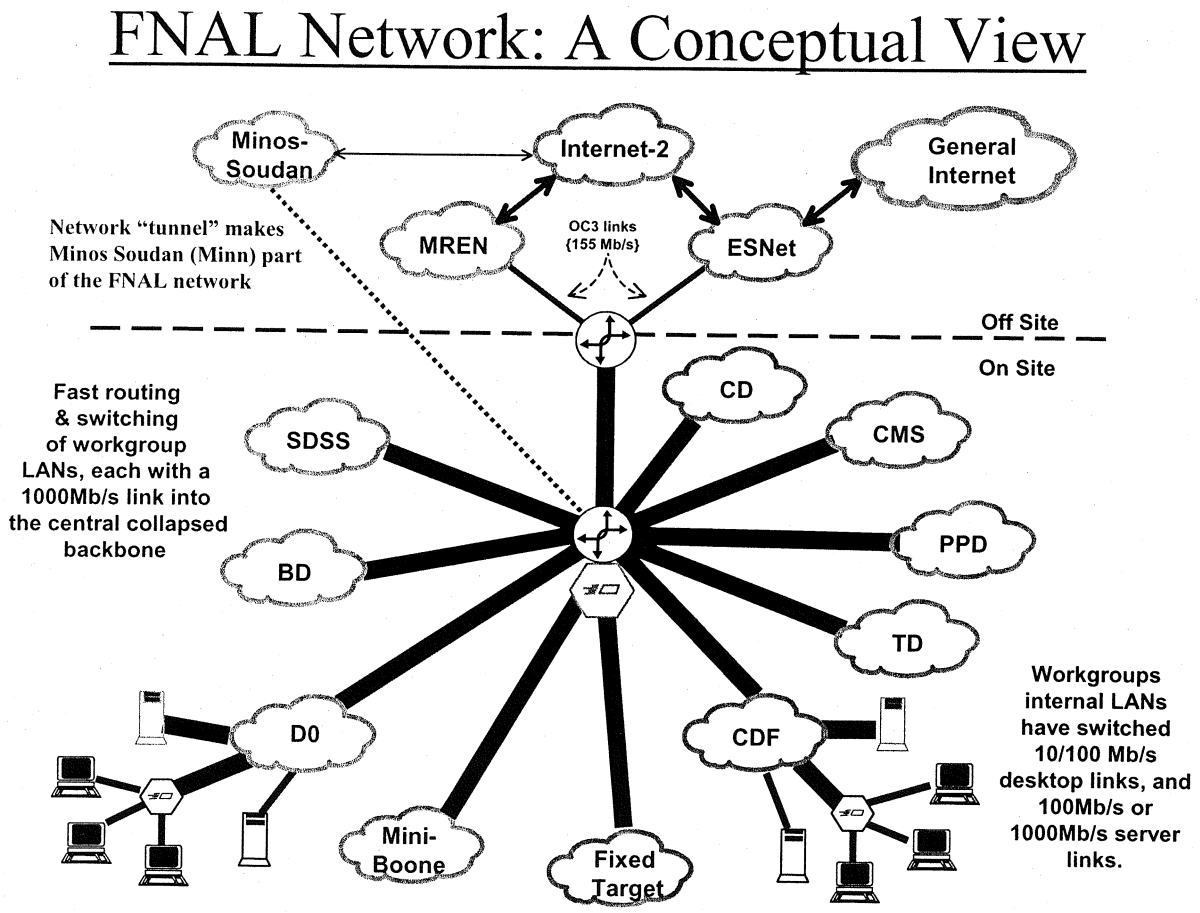


Figure 14. Conceptual diagram of Fermilab's networking infrastructure.

SECTION V. MAJOR RESEARCH ACTIVITIES DURING 2003 AND 2004

Information on the Fermilab research program during 2003 and early 2004 is given in the following pages. Figure 15 shows when beam was delivered to the experiments; Table 3 describes the major research activities in a little more detail.

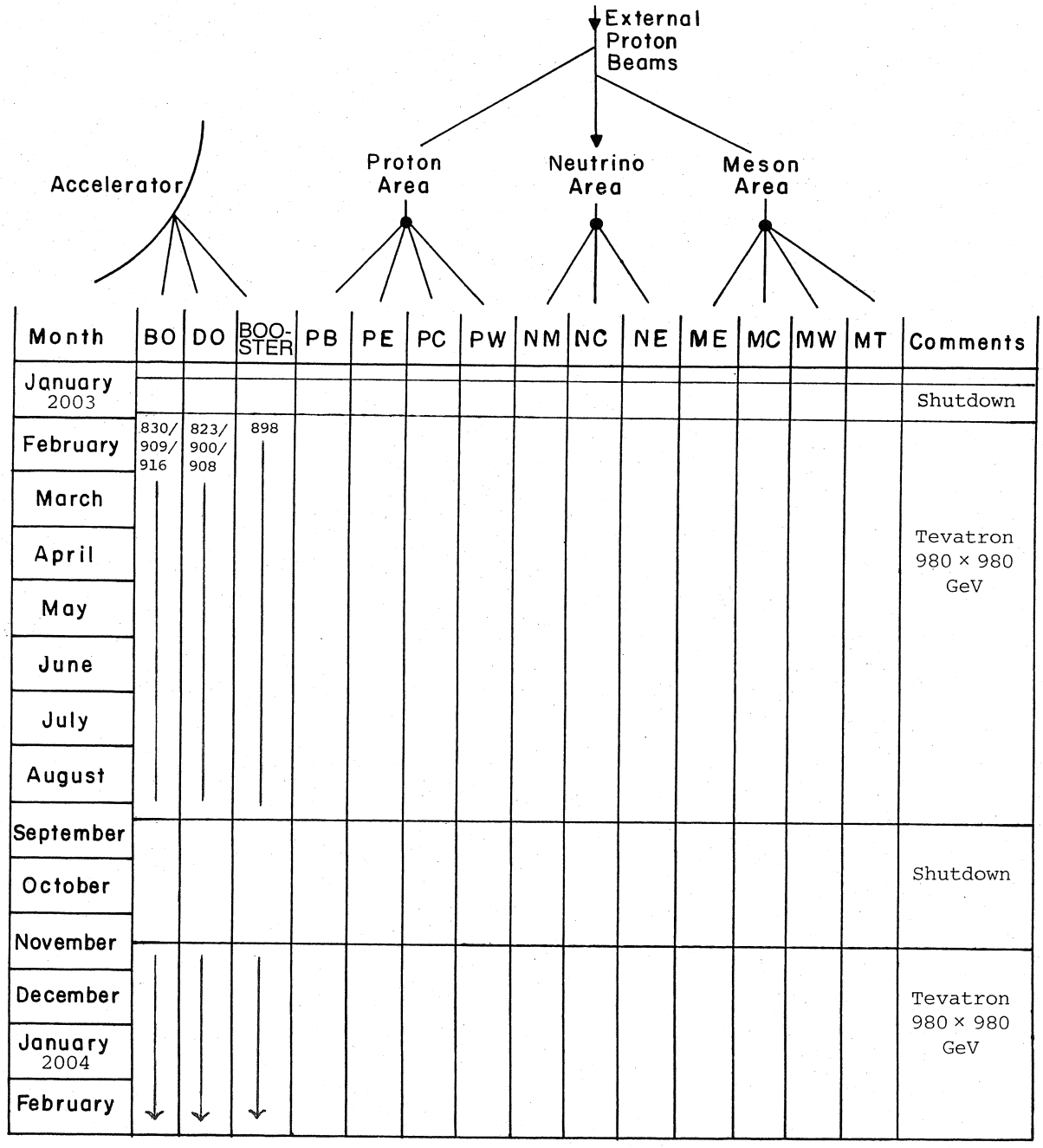


Figure 15. Major experiments running at Fermilab in 2003 and 2004 (through February).

TABLE 3. DESCRIPTION OF MAJOR RESEARCH ACTIVITIES DURING 2003 AND 2004 (through February)

EXP. #	AREA
	BOOSTER
898	MiniBooNE – data-taking
	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 16, based on the Situation Report, illustrates by beam line the major approved experiments that have not yet completed data-taking.

Fermi National Accelerator Laboratory
Experiment Program Situation Report as of February 1, 2004

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 January 31, 2003. 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**); Beam from the Main Injector (**MAIN INJECTOR**) and A0 Facility (**A0 Facility**).

Total number of approved experiments - 460

Beam Area & Line		Experiment	Spokesperson(s)	Completion Date
EXPERIMENTS THAT ARE COMPLETED (409)				
(Note: Only experiments which were completed since January 1, 2000 are listed.)				
MA	ME	ANTI(U-QUARK)/ANTI(D-QUARK) DIST#866	(LEITCH)	DEC 06, 2001
	MC	HYPERCP PARTICLE MEASUREMENT #917	(GUSTAFSON)	MAR 01, 2001
	MT	B PHYSICS TEST BEAM PROGRAM #T880	(BUTLER, STONE)	MAR 01, 2001
		DIAMOND DETECTOR TEST #911	(STONE)	JAN 21, 2000
		TRD TEST #913	(SWORDY)	JAN 21, 2000
	MW	COSMIC RAY CALORIMETER CALIBRATION #T883	(ADAMS)	MAR 01, 2001
COL	B-0	CDF HARD DIFFRACTION STUDIES #876	(ALBROW)	FEB 01, 2004
COL	C-0	TEVATRON CRYSTAL EXTRACTION #853	(MURPHY)	MAR 01, 2001
		BTEV R&D #897	(BUTLER, STONE)	JAN 01, 2002
	E-0	PBAR P ELASTIC SCATTERING #811	(OREAR)	MAR 01, 2001
ACCUM RING		ANTIPROTON DECAY #868	(GEER)	MAR 01, 2001
MAIN INJECTOR		KAMI R&D #804	(RAY, WAH)	JUN 28, 2001
		CKM R&D #905	(COOPER)	JUN 28, 2001
		MINOS VETO SHIELD PROTOTYPE #T928	(MICHAEL, WOJCICKI)	JUL 22, 2003
OTHER		SEARCH FOR LOW MASS MONOPOLES #882	(KALBFLEISCH)	FEB 01, 2004
A0 FACILITY		PLASMA WAKE-FIELD ACCELERATOR TEST #890	(ROSENZWEIG)	FEB 01, 2004
EXPERIMENTS THAT ARE ANALYZING DATA (10)				**Last Run**
MA	MC	CP VIOLATION #871	(DUKES, LUK)	JAN 21, 2000
NA	NC	NEUTRINO #815	(BERNSTEIN, SHAEVITZ)	SEP 05, 1997
	NM	CP VIOLATION #799	(BARKER)	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	(LUNDBERG, PAOLONE)	SEP 03, 1997
COL	B-0	CDF UPGRADE #775	(BELLETTINI, CARITHERS)	FEB 20, 1996
	D-0	D-0 DETECTOR #740	(GRANNIS, MONTGOMERY)	FEB 20, 1996
ACCUM RING		CHARMONIUM STATES #835	(CESTER, PORDES)	NOV 08, 2000
EXPERIMENTS THAT ARE IN PROGRESS (14)				
COL	B-0	CDF UPGRADE #830	(LOCKYER, RISTORI)	
		CDF INNER SILICON AND TOF #909	(LOCKYER, RISTORI)	
		CDF MINIPLUGS #916	(LOCKYER, RISTORI)	
	D-0	D-0 DETECTOR UPGRADE #823	(BLAZEY, WOMERSLEY)	
		D-0 FORWARD PROTON DETECTOR #900	(BLAZEY, WOMERSLEY)	
		D-0 SILICON TRACK TRIGGER #908	(BLAZEY, WOMERSLEY)	
MAIN INJECTOR		PARTICLE PRODUCTION #907	(RAJA)	
		MINOS VETO SHIELD #934	(MICHAEL, WOJCICKI)	
BOOSTR		MINIBOONE #898	(CONRAD, LOUIS)	
OTHER		AUGER PROJECT R&D #881	(MANTSCH)	
		SLOAN DIGITAL SKY SURVEY #885	(KENT)	
		DARK MATTER SEARCH #891	(BAUER)	
		RECYCLER ELECTRON COOLING #901	(NAGAITSEV)	
A0 FACILITY		EXPERIMENTS AT THE A0 PHOTOINJECTOR #886	(PIOT)	
EXPERIMENTS THAT ARE BEING INSTALLED (3)				
MA	MT	RICE TEST #T926	(BEAN)	
		BTEV PIXEL DETECTOR TEST #T927	(BUTLER, STONE)	
MAIN INJECTOR		NEUTRINO OSCILLATIONS #875	(MICHAEL, WOJCICKI)	

Fermi National Accelerator Laboratory
Experiment Program Situation Report as of February 1, 2004

(Continued)

OTHER APPROVED EXPERIMENTS (13)

MA	MT	BTEV STRAW TESTS #T930	(BUTLER, STONE)
		BTEV MUON DETECTOR TEST #T931	(JOHNS)
		DIAMOND DETECTOR TEST #T932	(WORM)
		BTEV RICH TEST #T935	(ARTUSO)
		US-CMS PIXEL DETECTOR TEST #T936	(WORM)
COL	B-0	CDF RUN IIB UPGRADE #924	(LOCKYER, RISTORI)
	C-0	B PHYSICS AT THE TEVATRON #918	(BUTLER, STONE)
	D-0	D0 RUN IIB UPGRADE #925	(BLAZEY, WOMERSLEY)
MAIN INJECTOR		ANTI(D-QUARK)/ANTI(U-QUARK) DIST #906	(GEESAMAN, REIMER)
		CKM #921	(COOPER)
OTHER		CMS AT FERMILAB #892	(GREEN)
		LHC ACCELERATOR #893	(STRAIT)
		US CMS SILICON TRACKER #919	(GREEN)

PENDING PROPOSALS (5)

MA	MT	BTEV EM CALORIMETER TEST #T933	(SEMENOV)
COL	B-0	CDF FORWARD DETECTORS #920	(ALBROW)
UNSPEC BEAM		MUON COOLING R&D #904	(GEER)
MAIN INJECTOR		NUMI OFF-AXIS DETECTOR #929	(FELDMAN)
		HIGH-STATISTICS NEUTRINO SCATTERING #938	(MCFARLAND, MORFIN)

Collider

B0 —	830/909/916/924 Lockyer / Ristori	ANL, Barcelona, Bologna, Brandeis, UC/Davis, UCLA, UCSB, UCSD, Cantabria, Carnegie Mellon, Chicago, Duke, Fermilab, Florida, Frascati, Geneva, Glasgow, Harvard, Helsinki, Hiroshima, Illiinois, 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, Pennsylvania, Pisa, Pittsburgh, Purdue, Rochester, Rockefeller, Rome, Rutgers, Taiwan, Texas A&M, Texas Tech, Trieste/Udine, Tsukuba, Tufts, Univ. Coll. London, Waseda, Wayne State, Wisconsin, Yale	CDF Detector
C0 —	918 Butler / Stone	Belarussian, UC/Davis, Colorado, Fermilab, Florida, Frascati, Houston, IHEP/Protvino, IIT, Illinois, Insubria, Iowa, Milano, Minnesota, Nanjing, New Mexico State, Northwestern, Ohio State, Pavia, Pennsylvania, Puerto Rico/Mayaguez, Shandong, Southern Methodist, Syracuse, Tennessee, UST/China, Vanderbilt, Virginia, Wayne State, Wisconsin, York	BTeV Detector
D0 —	823/900/908/925 Blazey / Womersley	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, Michigan, Michigan State, Moscow State, Nebraska, Nijmegen/NIKHEF, NIKHEF/Amsterdam, Northeastern, Northern Illinois, Northwestern, Notre Dame, Oklahoma, Orsay, Panjab, Paris VI & VII, PNPI, Princeton, Quito, Rice, Rio de Janeiro, Rochester, Saclay, Simon Fraser, Strasbourg, SUNY/Stony Brook, Swedish Consortium, Tata, Texas/Arlington, Univ. Coll. Dublin, Virginia, Washington, Wuppertal	D0 Detector

Booster

—	898 Conrad / Louis	Alabama, Bucknell, Cincinnati, Colorado, Columbia, Embry Riddle, Fermilab, Indiana, LANL, Louisiana State, Michigan, Princeton	MiniBooNE

Main Injector

—	875 Michael / Wojcicki	ANL, Athens, BNL, Caltech, Cambridge, Campinas, Fermilab, College de France, Harvard, IHEP/Protvino, IIT, Indiana, ITEP, Lebedev, LLNL, Macalester, Minnesota, Minnesota/Duluth, Oxford, Pittsburgh, Rutherford, São Paulo, South Carolina, Stanford, Sussex, Texas A&M, Texas/Austin, Tufts, Univ. Coll. London, Western Washington, Wisconsin	MINOS
—	906 Geesaman / Reimer	Abilene Christian, ANL, Colorado, Fermilab, Illinois, LANL, Rutgers, Texas A&M, Valparaiso	$\bar{d}(x) / \bar{u}(x)$ Distribution
—	907 Raja	BNL, Chicago, Colorado, Elmhurst, Fermilab, Harvard, IIT, Indiana, LLNL, Michigan, Purdue, South Carolina, Virginia	MIPP
—	921 Cooper	BNL, Colorado, Fermilab, IHEP/Protvino, INR/Troitsk, Michigan, San Louis Potosi, South Alabama, Texas/Austin, Virginia	CKM

Figure 16. Fermilab experimental program, showing all major approved experiments that have not yet completed data-taking.

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 4, together with information on how they are derived.

TABLE 4. DATA ON FERMILAB USERS

The data given below are based on the following:

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

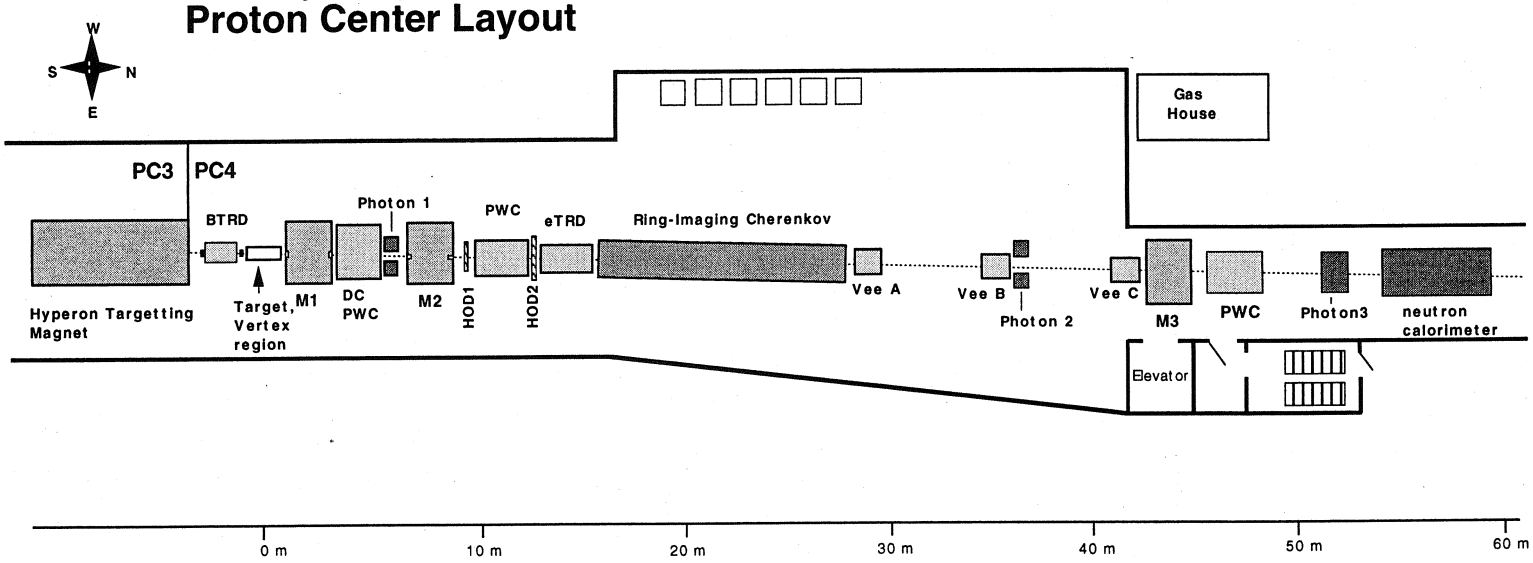
2. Fermilab experiments included in the list are those approved by the Laboratory, and in any of the stages from approval to data analysis, as given in the Experimental Program Situation Report on pages 30-31. The experiment personnel is supplied by the experiment spokespersons, and is divided into physicists 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.

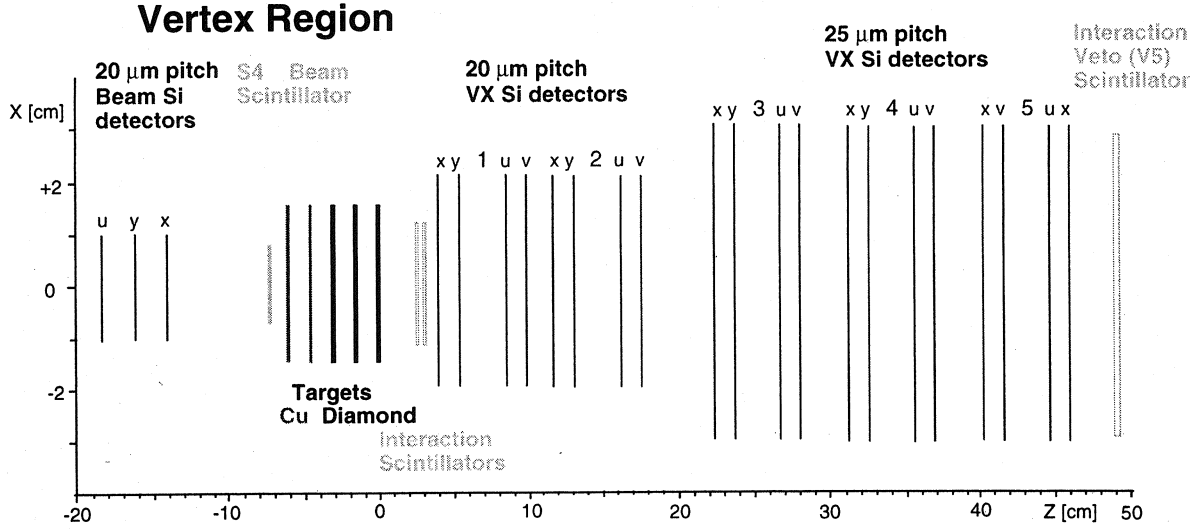
4. When experiments pass into the data analysis stage, students may graduate and move to other experiments and/or institutions, as also may more senior researchers. For experiments in the data analysis stage, we list users and institutions as at the end of the data-taking phase.

	Physicists	Students	Subtotal	Institutions
US				
University	852	511	1363	94
Industry	0	0	0	0
National Lab.	446	13	459	6
Subtotal	1298	524	1822	100
Non-US				
University	534	264	798	97
Industry	0	0	0	0
National Lab.	293	45	338	22
Subtotal	827	309	1136	119
Total	2125	833	2958	219

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 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.

SELEX 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 SELEX analysis tools that were developed for single-charm studies. Subsequently two independent SELEX 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, to be submitted in early 2004. In addition, we have reported the observation of an intriguing new spectroscopy in the double-charm system at last summer's conferences. That will be brought to publication in 2004. 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. Exciting new physics continues to emerge from SELEX.

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).

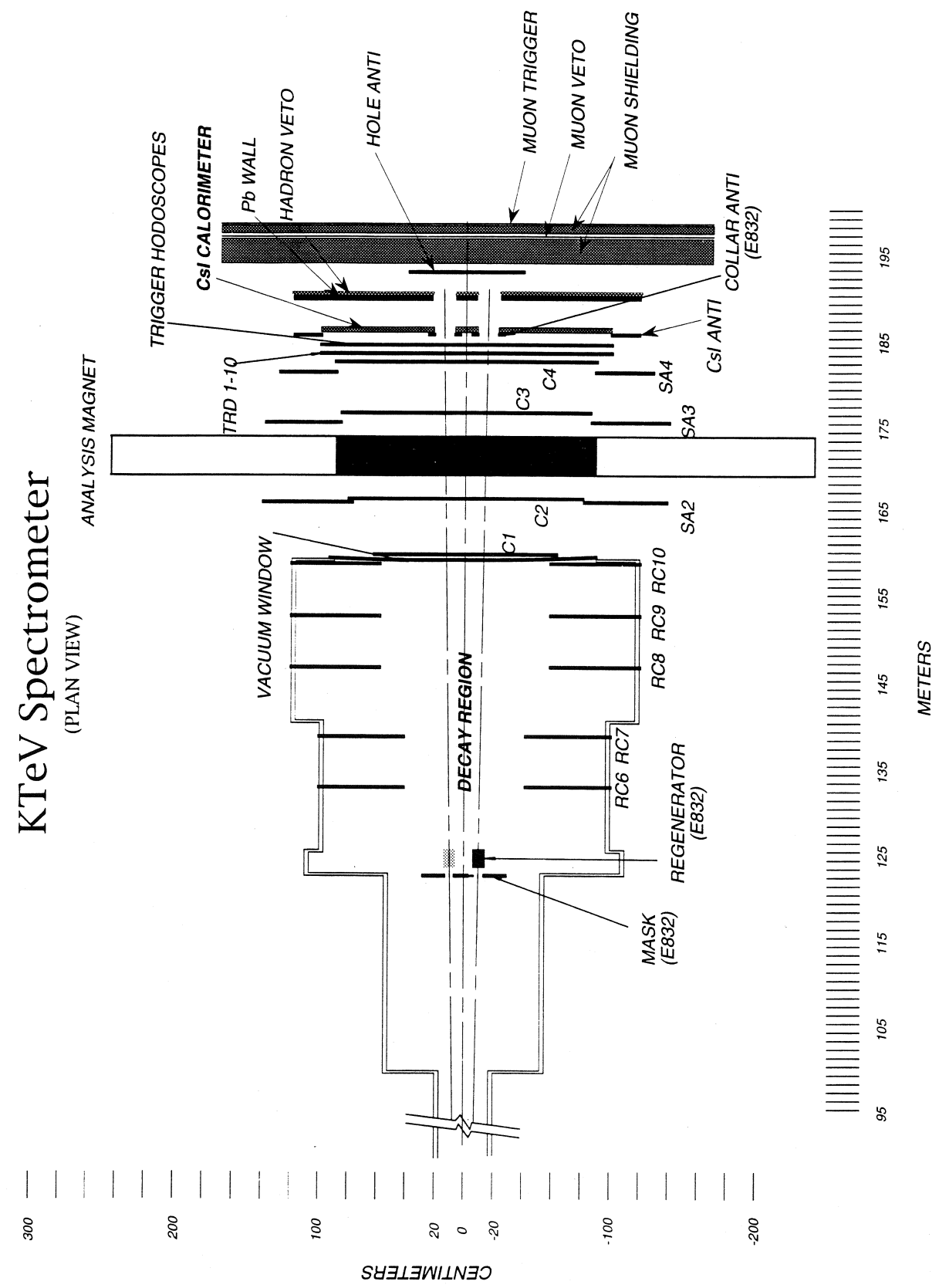
Hadronic Production of Λ_c from 600 GeV/c π^-, Σ^- and p Beams, F. G. Garcia et al., Phys. Lett. B528, 49 (2002).

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).

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


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

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

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 $K_L \rightarrow \pi^0 l^+ l^-$ (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 $K \rightarrow \pi\pi$ 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 already published more than 25 papers based on the 50-terabyte data sample collected during the 1996-97 run, and has published two papers using data from the 1999 run. 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 recently 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 $K_L \to \pi e \upsilon$ events. Analysis of the full E-832 data sample (1996+1997+1999) is progressing well. 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, 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 have now been published for these modes based

on the first 40% of the E-799II data, from the 1997 run, and analyses are in progress to include the data collected in 1999-2000. 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.

The table below summarizes results published from the first 40% of the E-799II data, which was collected during the 1997 KTeV run. Analysis of the remaining 60% of the data is underway, with one paper (on $K_L \to ee\mu\mu$) already accepted for publication, and a number of preliminary results having been shown at conferences.

Decay Mode	E-799II BR results	Paper
$\pi^0 \to ee$	$(6.09 \pm 0.40 \pm 0.24) \times 10^{-8}$	PRL 83, 922 (1999)
$K_L \to \pi^0 ee$	$< 5.1) \times 10^{-10}$	PRL 86, 397 (2001)
$K_L \to \pi^0 \mu\mu$	$< 3.8) \times 10^{-10}$	PRL 84, 5279 (2000)
$K_L \to \pi^0 ee$	$< 5.1) \times 10^{-10}$	PRL 86, 397 (2001)
$K_L \to \pi\nu\bar{\nu}$	$< 5.9) \times 10^{-7}$	PR D61, 072006 (2000)
$K_L \to \pi^+\pi^- ee$	$(3.2 \pm 0.6 \pm 0.4) \times 10^{-7}$	PRL 80, 4123 (1998)
$K_L \to \pi^+\pi^- ee$ Asymm	$(13.6 \pm 2.5 \pm 1.2)\%$	PRL 84, 408 (2000)
$K_L \to \pi^0\pi^0 ee$	$< 6.6) \times 10^{-9}$	PRL 89, 211801 (2002)
$K_L \to \pi^0 ee\gamma$	$(2.34 \pm 0.35 \pm 0.13) \times 10^{-8}$	PRL 87, 021801 (2001)
$K_L \to ee\gamma\gamma$	$(5.84 \pm 0.15 \pm 0.32) \times 10^{-7}$	PR D64, 012003 (2001)
$K_L \to \mu\mu\gamma\gamma$	$(1.4+1.0-0.8) \times 10^{-9}$	PR D62, 112001 (2000)
$K_L \to \mu\mu\gamma$	$(3.62 \pm 0.04 \pm 0.08) \times 10^{-7}$	PRL 87, 071801 (2001)
$K_L \to ee\mu\mu$	$(2.9^{+6.7}_{-2.4}) \times 10^{-9}$	PRL 87, 111802 (2001)
Ξ^0 polarization		PRL 87, 132001 (2001)
$\Xi^0 \to \Sigma^+ e^- \bar{\nu}$	$(2.71 \pm 0.22 \pm 0.31) \times 10^{-4}$	PRL 82, 3751 (1999)
$\Xi^0 \to \Sigma^0\gamma$	$(3.34 \pm 0.05 \pm 0.09) \times 10^{-3}$	PRL 86, 3239 (2001)
H dibaryon search		PRL 84, 2593 (2000)

As the Table shows, E-799II has published results on hyperon and π^0 decays, as well as kaon decays. Analysis of data from the second KTeV run is expected to continue until approximately 2005. By that time, many of the above results will

have improved still further, and we expect to have results on a number of additional decays, including $\pi^0 \rightarrow$ eeee and $K_L \rightarrow ee\gamma$.

Publications

Design and Test Results of a Transition Radiation Detector for a Fermilab Fixed Target Rare Kaon Decay Experiment, G. E. Graham et al., Nucl. Instr. and Meth. A367, 224 (1995).

Development of a Parallel Plate Proportional Counter TRD with Suppressed Sensitivity to Ionization, N. Solomey et al., Nucl. Instr. and Meth. A367, 252 (1995).

Beam Test of Prototype CsI Calorimeter, R. S. Kessler et al., Nucl. Instr. and Meth. A368, 653 (1996).

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 $K_L \rightarrow \pi^+\pi^-e^+e^-$, J. Adams et al., Phys. Rev. Lett. 80, 4123 (1998)

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

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

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

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

Measurement of the Branching Ratio of $\pi^0 \rightarrow e^+e^-$ Using $K_L \rightarrow 3\pi^0$ 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 $K_L \rightarrow \pi^+\pi^-e^+e^-$ Decays, A. Alavi-Harati et al., Phys. Rev. Lett. 84, 408 (2000).

Search for the Decay $K_L \rightarrow \pi^0\nu\bar{\nu}$ Using $\pi^0 \rightarrow e^+e^-\gamma$, 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 $K_L \rightarrow \mu^+\mu^-\gamma\gamma$, A. Alavi-Harati et al., Phys. Rev. D62, 112001 (2000).

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

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

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

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

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

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

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

First Measurement of Form-Factors of the Decay $\Xi^0 \rightarrow \Sigma^+e^-\bar{\nu}_e$, 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 $K_L \rightarrow e^+e^-\mu^+\mu^-$, A. Alavi-Harati et al., Phys. Rev. Lett. 87, 111802 (2001).

Measurement of the Branching Ratio and Form Factor of $K_L \rightarrow \mu^+\mu^-\gamma$, 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).

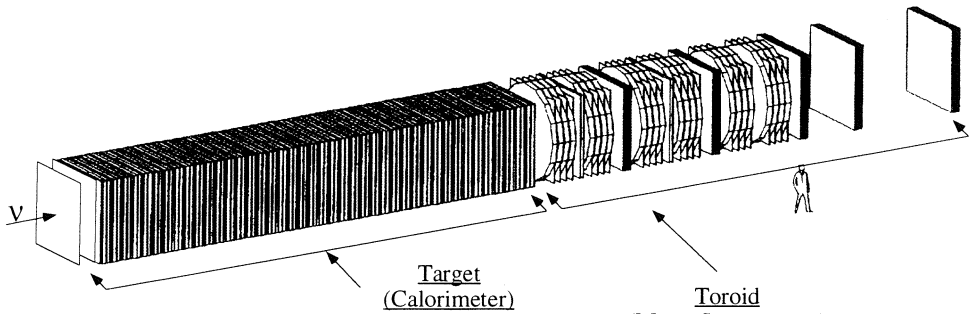
Search for the $K_L \rightarrow \pi^0\pi^0e^+e^-$ Decay in the KTeV Experiment, A. Alavi-Harati et al., Phys. Rev. Lett. 89, 211801 (2002).

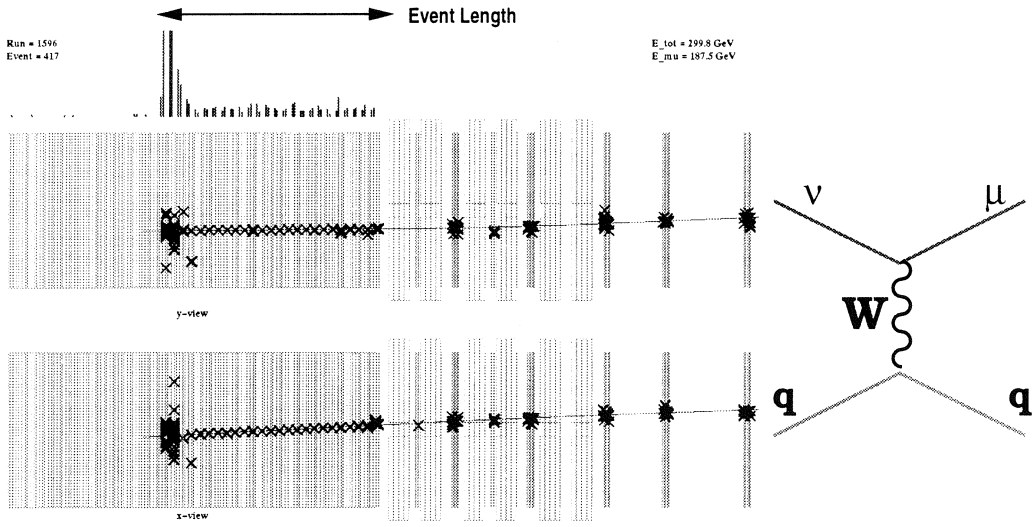
Measurements of Direct CP Violation, CPT Symmetry, and Other Parameters in the Neutral Kaon System, A. Alavi-Harati et al., Phys. Rev. D67, 012005, (2003).

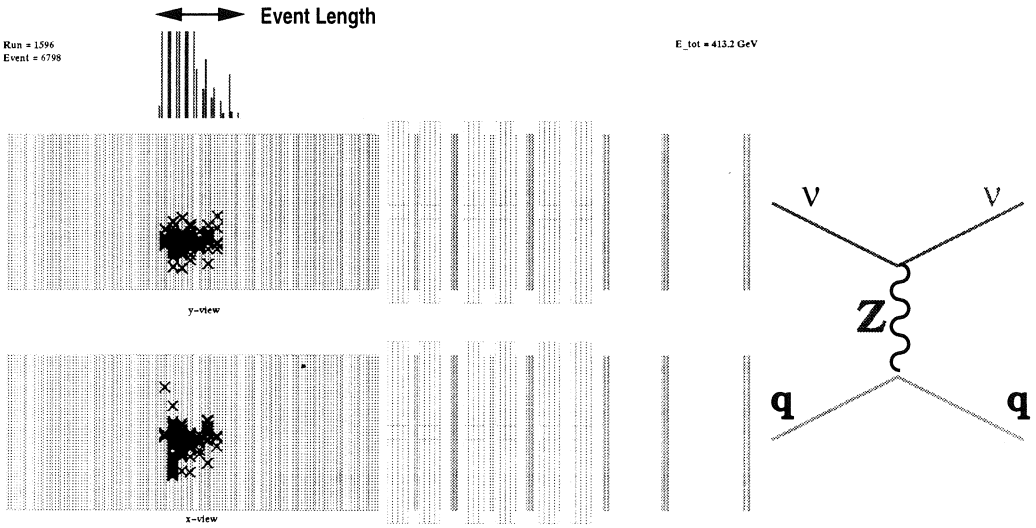
Measurements of the Decay $K_L \rightarrow e^+e^-\mu^+\mu^-$, A. Alavi-Harati et al., Phys. Rev. Lett. 90, 141801 (2003).

Search for the Rare Decay $K_L \rightarrow \pi^0e^+e^-$, A. Alavi-Harati et al., submitted to Phys. Rev. Lett.

E-815


ν
Target
(Calorimeter)
690 tons: Fe-Scintillator-
Drift Chambers
Fiducial Volume: 350 tons
Toroid
(Muon Spectometer)
420 tons


Event Length
Run = 1596
Event = 417
E_tot = 299.8 GeV
E_mu = 187.5 GeV
y-view
x-view
ν
μ
W
q
q


Event Length
Run = 1596
Event = 6798
E_tot = 413.2 GeV
y-view
x-view
ν
ν
Z
q
q

E-815 (Bernstein / Shaevitz) Precision Neutrino / Antineutrino Deep Inelastic Scattering Experiment

Cincinnati, Columbia, Fermilab, Kansas State, Northwestern, Oregon, Rochester, Xavier

Status: *Data Analysis*

The NuTeV experiment is in the exciting position of being the only high-statistics neutrino experiment with separate extremely pure neutrino and antineutrino beams. During the 1996-97 fixed-target run we accumulated samples of 5×10^6 ν_μN and 1×10^6 $\bar{\nu}_\mu$N.

Electroweak measurements/$\sin^2\theta_w$

Neutrino experiments have played a pivotal role in our improved understanding of the electroweak interaction. Early measurements of the neutral-to-charged current neutrino cross section ratio provided key input on the W and Z boson masses before their direct observation. Soon afterwards, the increasing precision of electroweak measurements allowed constraints on the mass of the top quark to be set before its direct measurement. Likewise today, precision measurements of electroweak parameters strictly limit the mass of the yet unobserved Higgs boson.

In particular, precision electroweak measurements from neutrino-quark scattering (e.g. the weak mixing angle) provide an indispensable complement to high-energy collider experiments because of their sensitivity to light quark couplings as well as physics beyond the standard model (including extra Z' bosons, neutrino oscillations, and quark compositeness).

Prior to NuTeV, the uncertainty on the world average of the weak mixing angle, $\sin^2\theta_W$, as measured from neutrino scattering data was dominated by a large correlated systematic uncertainty in charm production (namely, the charm quark mass). However, given the innovation of separate neutrino and antineutrino beams, NuTeV can separately measure the ratios of neutral- to charged-current neutrino and antineutrino cross sections. This allows optimization of the $\sin^2\theta_W$ measurement with respect to the dominating charm production uncertainty. As a result, NuTeV has reduced the uncertainty from charm production by almost a factor of six, while accumulating enough statistics to surpass its predecessor, CCFR. After extensive systematic studies, the analysis has been finalized in 2001. The result, $\sin^2\theta_W^{(\text{on-shell})} = 0.2277 \pm 0.0013$ (stat.) $\pm$ 0.0009 (syst.), deviates by approximately 3σ from the Standard Model expectation. Performing an additional two-parameter fit to $\sin^2\theta_W$ and ρ_0 (the ratio of neutral- to charged-current weak couplings which is naturally one in the Standard Model), indicates that the NuTeV measurement is compatible with the Standard Model expectation values for either $\sin^2\theta_W$ or ρ_0, but both agreeing is

unlikely. Given the significant inconsistency, a model-independent analysis was also performed. The result suggests a smaller left-handed neutral-current light quark coupling than expected. The NuTeV results have been published in Phys. Rev. Lett. 88, 091802 (2002). Including the NuTeV result in the global electroweak fit increases the χ^2 to 28.2/15 d.o.f. (without NuTeV 19.6/14 d.o.f.). NuTeV's suprising result has generated much interest with possible interpretations including new tree level physics in the neutrino couplings and isospin symmetry violation in nucleon light quark parton distribution functions.

Having pure neutrino and antineutrino beams has enabled NuTeV to measure effectively the difference between neutrino and antineutrino neutral-current cross sections; we also can take advantage of these beams to study interactions in which there are two muons of opposite charge in the final state. One muon comes from the lepton vertex, where the charged-current interaction changes a neutrino into a muon; the other, from the decay of a charm particle, produced when the neutrino (antineutrino) interacts with a strange (antistrange) quark in the nucleon. This means that these events can be used to study both charm production and the strange content of the nucleon. To give phenomenologists the most model-independent access to these data, the results of the analysis have been published as dimuon production cross sections (Phys. Rev. D64, 112006, 2001.) A next-to-leading-order (NLO) analysis of the charm production process is currently underway and will soon be completed. The method uses an improved model which takes into account NLO QCD diagrams which contribute to the process as well as the angular dependence in production of the final state charm quark. The results will be used to extract NLO strange and anti-strange sea distributions and a re-extraction of the differential cross section, which is expected to be model-independent, will be performed as a cross check.

In addition to producing charm through the charged-current interaction, it should be possible to produce charm via the neutral-current interaction. Exploiting the purity of the SSQT, one can select single muon events where the muon is of the opposite lepton number expected from the neutrino beam. This sample has been used to set limits on Flavor-Changing Neutral-Current (FCNC) production of charm and bottom, and to measure the cross section for $\nu N \rightarrow c\bar{c}+X$. No one has ever used neutrino scattering to limit FCNC and the use of neutrinos may be uniquely sensitive to certain types of Z's. This is the first measurement of the cross section for gluon-Z boson fusion production of a c-pair. The results on the FCNC limits and the pair production cross sections have been published in Phys. Rev. D63, 012001 (2001) and Phys. Rev. D64, 012002 (2001).

Structure functions and α_s

Deep inelastic charged-current neutrino scattering offers unique opportunities to reveal the structure of the nucleon. In particular, it is the only channel capable of unraveling the valence and sea parton distribution functions. This is not only interesting by itself, but extremely important for the interpretation of present and future hadron collider results.

NuTeV has completed a precision calibration of the muon energy scale using data from the continuous calibration beam. Precise knowledge of the muon energy is especially important in the extraction of the neutrino flux and for the differential cross section determination. Careful studies of experimental and model systematics in flux and cross section extraction are presently underway.

The other main focus of the analysis is the extension of the kinematic coverage. The sign-selected beam assigns a sign to the muon in charged-current events allowing the inclusion of events with a low energy muon in the sample. These high-inelasticity (y) events were previously inaccessible because a sign-determination in the spectrometer was required to separate events originating from neutrinos from those originating from anti-neutrinos. The expanded range in y will reduce the correlations in the structure function determinations, and is especially useful in constraining the longitudinal structure function $F_L(x, Q^2)$. Preliminary results on NuTeV structure function measurements have been presented at Moriond 2001 and EPS-HEP 2001. The final result will include a full co-variance matrix of uncertainties to be used in QCD fits of the data. This analysis should be finalized in 2003.

Another promising field closely related to the structure function measurements is the determination of the strong coupling constant α_s via the Gross-Llewellyn-Smith sum rule. Also here NuTeV expects an improvement on the precision of the results compared to former analyses due to the extremely thorough test beam calibration program.

Search for exotic physics

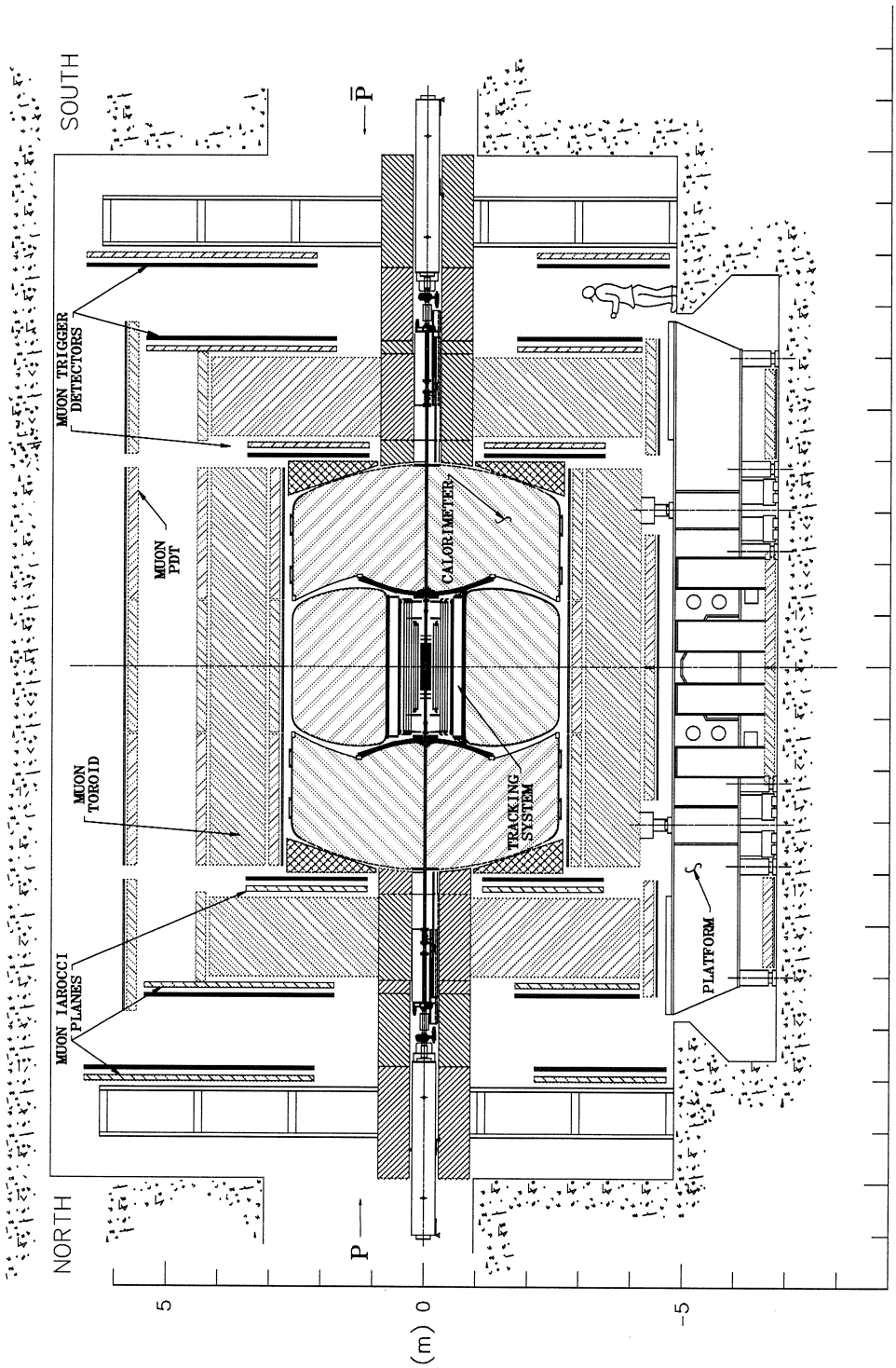
The instrumentation of the upstream region of the experimental hall has allowed NuTeV to search competitively for weakly-interacting neutral particles produced in either pion or kaon decays. Interactions (i.e. decays) occurring in the 34 m upstream of the neutrino target can now be identified in a series of drift chambers, and the background was kept to a minimum by filling the remainder of the decay region with helium bags. Because the neutrino target itself provides particle identification, searches can be made for a variety of exotic particles which may be expected to decay into very different final states.

For example, we have completed a search for neutral heavy leptons which decay to at least one muon in the final state, published in PRL in 1999. We have also published a search for a 33.9 MeV particle which decays into an e^+e^- final state. This particle has been proposed to account for the timing anomaly found in the KARMEN data. NuTeV ruled out a large region of phase space that is implied by the KARMEN data. A very interesting result arose from the search for high-mass, rarely-interacting neutral particles decaying into a final state with one muon and one other charged particle. Three muon + muon events were found, which is far above the expectation from background Standard Model processes. The result was published in Phys. Rev. Lett. 87, 071803, 2001 and a more detailed PRD article is in preparation.

Another exotic process searched for was the lepton number-violating reaction $\bar{\nu}_\mu + e \rightarrow \mu + \bar{\nu}_e$. The resulting restrictive limits on V-A and scalar couplings for this process have been published in Phys. Rev. Lett. 87, 071803 (2001).

Neutrino oscillations are currently at the forefront of neutrino physics. While NuTeV cannot access the region of phase space that is expected to produce oscillations, our high precision results with a statistical identification technique are a proof of principle for future efforts involving similar steel-scintillator detectors (e.g. MINOS). A sample of charged-current electron neutrino events can be isolated from neutral-current interactions (mostly from muon neutrinos) using the pattern of longitudinal energy deposition in the steel-scintillator-calorimeter. The NuTeV result using this method has obtained the most stringent limits to date for large mass difference $\nu_\mu \rightarrow \nu_e$ (and $\bar{\nu}_\mu \rightarrow \bar{\nu}_e$) oscillations. The results are published in Phys. Rev. Lett. 89, 011804 (2002).

The rich physics potential of NuTeV's unique high-purity high-statistics samples of muon neutrinos and antineutrinos is apparent from this summary of results and current analyses. The success of our data-taking run is evident in both the depth and breadth of physics issues that are being addressed.



Side view of the DØ detector for Run II

E-823 / 900 / 908 / 925 / 740 (Blazey / Womersley) 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, Michigan, Michigan State, Moscow State (Russia), Nebraska, Nijmegen/NIKHEF (Netherlands), NIKHEF/Amsterdam (Netherlands), Northeastern, Northern Illinois, Northwestern, Notre Dame, Oklahoma, 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), Strasbourg (France), SUNY/Stony Brook, Swedish Consortium (Sweden), Tata (India), Texas/Arlington, Virginia, Washington, Wuppertal (Germany)

Status:	*E-740 - Data Analysis*
	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 for the study of proton-antiproton collisions with a center-of-mass energy of 2.0 TeV at the Fermilab Tevatron Collider. 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 650 physicists and Ph.D. students from 76 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, amassing ~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) has recorded about 75 pb^{-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 must 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 provide 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 and are in operation.

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 compensating ($e/\pi \sim 1.05$) 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 (≥ 1.5 GeV/c) muons. The muon tracker and trigger are now in operation and 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. The 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 and approximately 50% instrumented. Elastic scattering of protons and antiprotons has been observed. Integration of the system into the data acquisition and trigger system will be complete in 2003.

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 5-10 kHz depending on the 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 is performed by a massively parallel application of field programmable gate arrays; electron candidates can be selected using azimuthal matching between the CFT and CPS. Quadrant level matching between the preshowers and calorimeter is also performed at Level 1.

The Level 2 trigger with 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 will be supplemented by a Silicon Track Trigger (E-908). This device will discriminate 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 will greatly enhance 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 is complete and installation and integration of the trigger underway.

The Level 3 trigger uses a commodity-based PC farm running under Linux. The availability of fully digitized information permits sophisticated

software reconstruction algorithms to be applied. The Level 3 accept rate is 5-10 Hz depending on dead time.

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 4 fb^{-1}. It will therefore need to be replaced during Run II. The Run IIb Upgrade Project (E-925) will construct a new, more radiation-hard silicon tracker, which makes use of standardized components and will contain six layers in a barrel geometry. The upgrade will also substantially improve the calorimeter and track triggers 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, the Z and the top quark. The experiment already has first results in all of these areas.

As the world's highest energy collider, the Tevatron is the most likely place to directly discover a new particle or force. We know the standard model is incomplete; theoretically the most popular extension is to make it a part of a larger picture called supersymmetry (which is a basic prediction of superstring models). Here each known particle has a so-far unobserved and more-massive partner, to which it is related through a change of spin. If it exists, the lightest supersymmetric particle would be stable, and vast numbers of them would pervade the universe, perhaps explaining the astronomers' observations of dark matter. The Tevatron is the only place to directly search for supersymmetry. In Run II, the opportunities for discovery include squarks and gluinos, in final states with missing energy (E_T^{miss}) and jets (and lepton(s)); charginos and neutralinos through multilepton final states; gauge mediated SUSY in E_T^{miss} + photon(s) channels; stop and sbottom; and R-parity violating models. Searches for other new phenomena include leptoquarks, dijet resonances, new heavy W′ and Z′ bosons, massive stable particles, and monopoles.

The Tevatron allows us to experimentally test the new and exciting idea that gravity may propagate in more than four dimensions of spacetime. If there are extra dimensions that are open to gravity, but not to the other particles and forces of the standard model, then we could not perceive them in our everyday lives. But particle physics experiments at the TeV scale could see signatures such as a quark or gluon jet recoiling against a graviton, or indirect indications like an increase in high energy electron-pair production. These studies use the Tevatron to literally measure the shape and structure of space-time. D0 has developed a quasi-model-independent (signature-based) new phenomena search, which looks for significant deviations from the Standard Model. In the Run I dataset, no significant evidence for new physics was found, but this technique will prove very powerful in Run II.

The experiment has already embarked on a number of searches using Run II data. Work has started on understanding the E_T^{miss} distribution in multijet events as a prelude to squark and gluino searches; trilepton candidates are also being accumulated. A gauge-mediated SUSY search has set a limit on the cross section for $\bar{p}p \rightarrow E_T^{miss} + \gamma\gamma$. Virtual effects of extra dimensions are being sought in e^+e^-, $\mu^+\mu^-$ and $\gamma\gamma$ final states, and limits on the scale of new dimensions at the 0.9 TeV level can already be set. A search for leptoquarks decaying to electron+jet has been carried out. None of the cross sections or mass limits is better, yet, than published Run I results, but serves as a demonstration that the pieces are all in place.

In the standard model, the weak force is weak because the W and Z bosons interact with a field (called the Higgs field) that permeates the universe. This same field gives masses to all the fundamental fermions. It should be possible to excite this field and observe its quanta — the long sought Higgs boson. It is the last piece of the standard model, and also the key to understanding any beyond-the-standard-model physics like supersymmetry. Finding it is a very high priority. Right now, we are developing the foundations needed for Higgs physics in Run II: good jet resolution, high b-tagging and trigger efficiencies, and a good understanding of all the backgrounds. One area that can be attacked with relatively modest luminosities is to search for one or more of the extended suite of Higgs bosons that are predicted in supersymmetric models. Associated production of a SUSY Higgs together with a $b\bar{b}$ pair is enhanced at high $\tan\beta$, and tighter limits than those from LEP can already be set with a few hundred inverse picobarns.

In Run II, we will complement our direct searches for new phenomena with indirect probes. New particles and forces can be seen indirectly through their effects on electroweak observables. The tightest constraints will come from improved determination of the masses of the W and the top quark. We now have preliminary results from Run II samples of W and Z candidates. We have measured the cross sections at the Tevatron's new center-of-mass energy of 1.96 TeV and used the ratio of the W to the Z to indirectly extract the W width. It will take a Run II dataset of order 1 fb^{-1} before we can significantly improve the world knowledge of m_W given the precision achieved at LEP. With 2 fb^{-1} we will be able to drive the uncertainty down to the 25 MeV level per experiment, with an ultimate capability of 15 MeV per experiment.

The Tevatron Collider is the world's only source of top quarks. The top quark was discovered by CDF and D0 in 1995 on the basis of a few tens of events — we are now gearing up to study top quarks in the thousands. The top is the heaviest known quark and alone among them, couples strongly to the Higgs. We need to test its properties and decays with sufficient precision that the standard model can be confirmed or not — is the top really top? Here we can look forward to significant improvements in the short term because the Run I dataset was statistically limited. D0 is on the road to "rediscovering" top for the spring 2003 conferences, and has candidate events. Per inverse femtobarn, we will collect roughly 500 b-tagged top-pair events in the lepton + jets final state. As well as improving the cross section and mass measurements, we will look for top-antitop spin correlations which can tell us if the top is really the spin-½ object it should

be, and observe single top production (which allows a model-independent measurement of the CKM matrix element $|V_{tb}|$). New techniques are also being developed: D0 has reported a new, preliminary determination of the top mass from Run I data that uses more information per event, obtains a better discrimination between signal and background than the published 1998 analysis, and improves the statistical error equivalently to a factor 2.4 increase in the number of events. Run II will also test beyond-the-standard-model theories that predict unusual top properties, states decaying into top, and anomalously enhanced single top production.

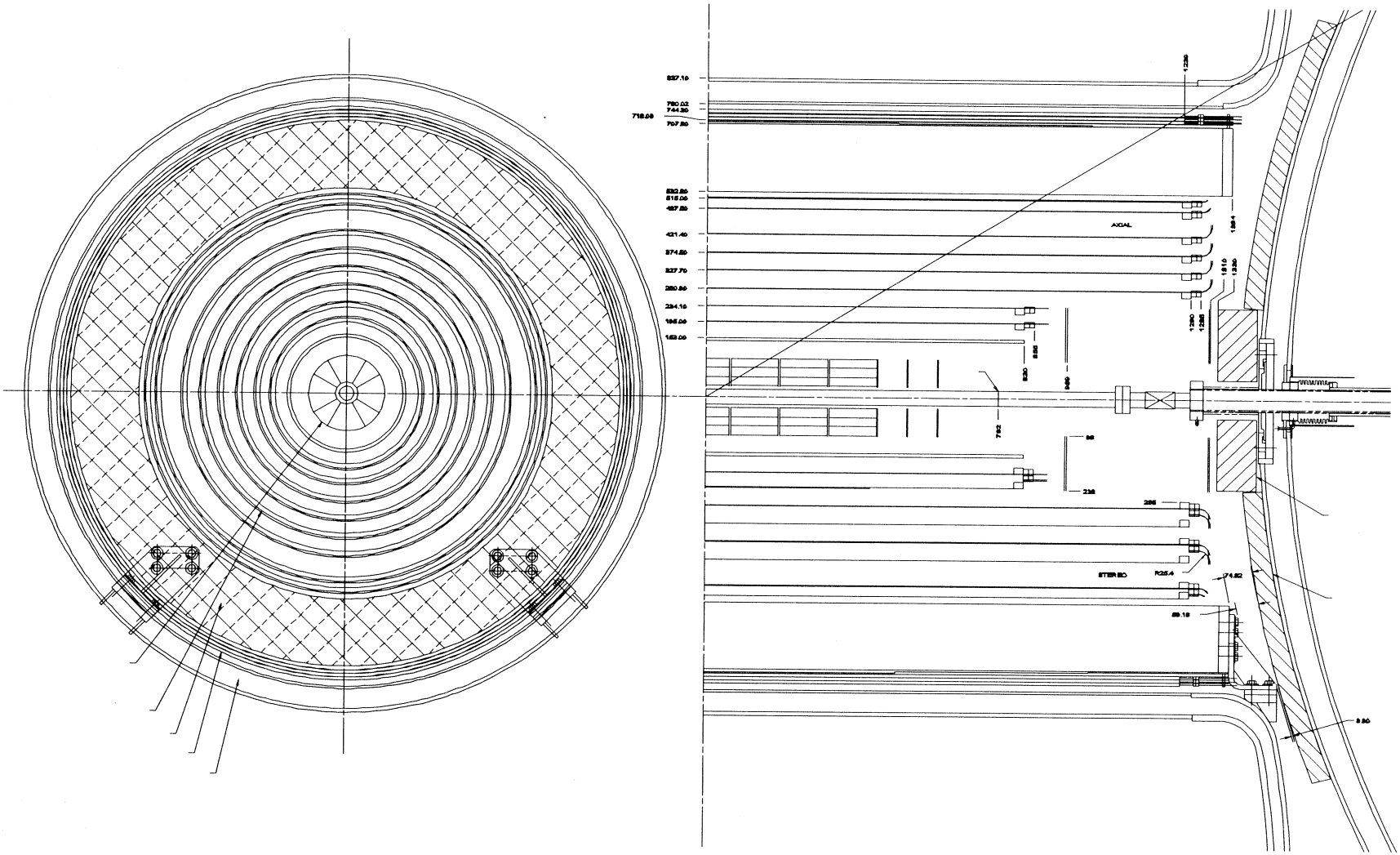
The mixing between the three generations of quarks results in subtle violations of the so-called CP symmetry relating particles and antiparticles. Understanding this symmetry will help explain why the universe is filled with matter, not antimatter. In the decays of B-mesons, these symmetry violations can be large, and so B-hadrons have become an important laboratory to explore the "unitarity triangle," which relates the elements of the Cabibbo-Kobayashi-Maskawa (CKM) quark mixing matrix. In Run II we want to confront the CKM matrix in ways that are complementary to the electron-positron B-factories. CP violation is now established in the B system through the decay $B_d \rightarrow J/\psi\ K_S$. The measured mixing angle is consistent with the standard model but, by itself, cannot exclude new physics. The BaBar and BELLE experiments can and will do much more with their data, but the Tevatron can uniquely access the B_s meson, which is not produced at the B-factories. By measuring the mixing rate between B_s and $\overline{B}_s$, we can determine the length of one of the sides of the unitarity-triangle and complement the B-factories' measurements of its angles. It will also be interesting to see if there is sizeable CP violation in $B_s \rightarrow J/\psi\ \phi$ (it is expected to be small); while the decay $B_s \rightarrow KK$ at the Tevatron complements $B_d \rightarrow \pi\pi$ that is measured at the B-factories. Together they can pin down the triangle angle γ. There are many other opportunities, such as Λ_b properties and searches for rare decays. In D0 the tools are being put in place for a B-physics program. The inclusive B lifetime has been measured and B mesons are being reconstructed. D0 does not exploit purely hadronic triggers but benefits from its large muon acceptance, forward tracking coverage, and ability to exploit $J/\psi \rightarrow e^+e^-$.

D0 has now measured jet energy distributions from Run II. Jet calibrations are not yet final, but already we see events with transverse energies beyond 300 GeV. With the full Run II dataset this will reach as far as 600 GeV, allowing us to pin down the high-energy behavior of the cross section and thus the gluon content of the proton (which remains poorly determined at high momentum and a source of uncertainty). Another issue provoking much discussion is the choice of the algorithm used to define jets. D0's Run I data have shown that the two most popular jet definitions (the geometrically-based "cone" and the momentum-based recombination "$k_\perp$" algorithms) yield different cross sections for collider data; while qualitatively as expected, quantitatively it is not yet clear whether the differences are understood. We will try to address this question with early Run II data.

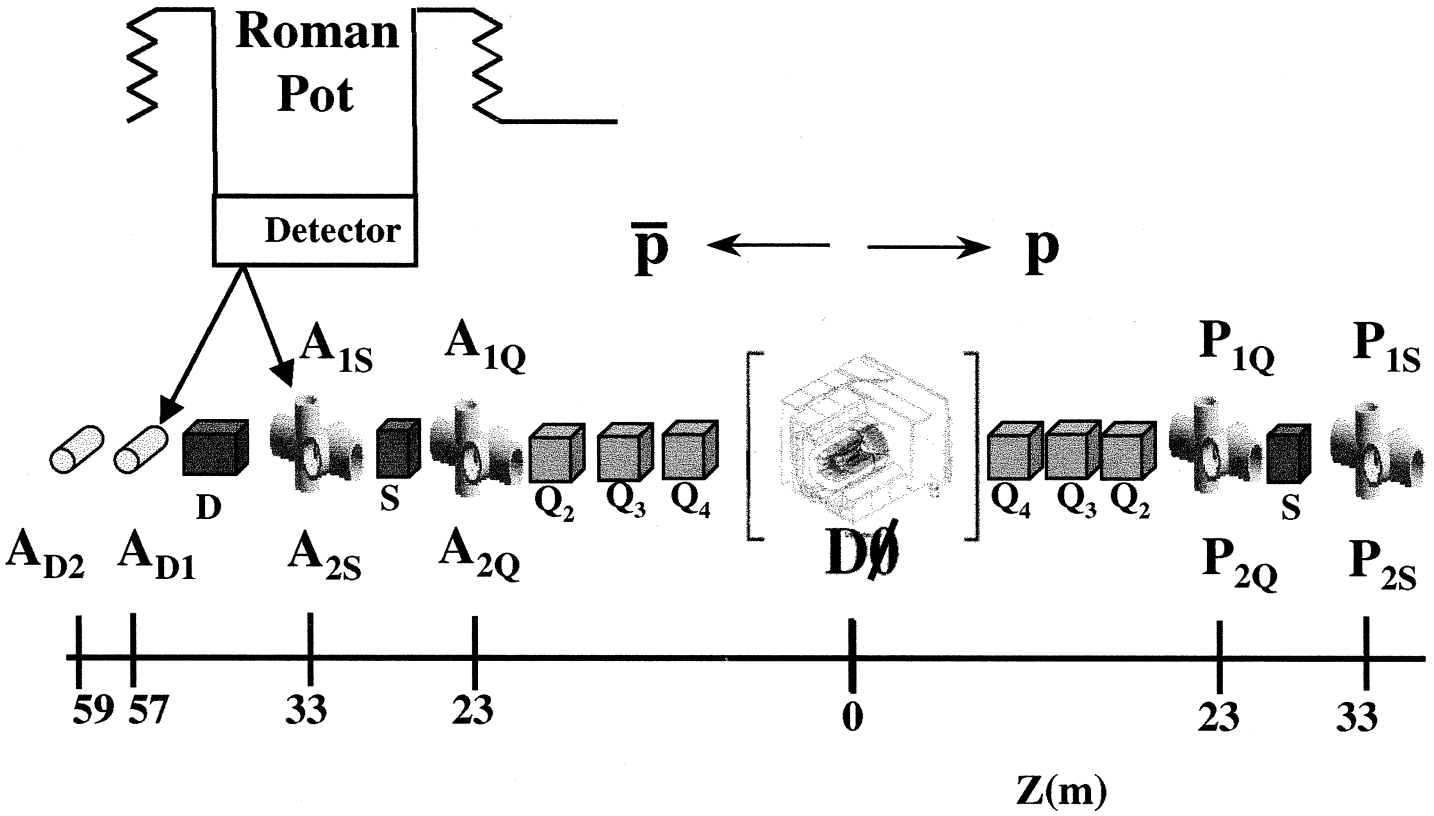
Run I left many unanswered questions about heavy flavor (charm and bottom) production. Resolving these is important because many new particles

result in heavy flavor signatures. The inclusive B-meson production cross section lies significantly above the QCD prediction, though it can be made to fit better using resummation and retuned fragmentation functions (from LEP data). For charmonium, the measured cross section requires a large color-octet component but that is not consistent with the observed J/ψ polarization. D0 now has preliminary Run II J/ψ and muon+jet cross sections which are the first steps in measuring the charmonium polarization (and thus production process) and the b-jet cross section.

Another QCD-related puzzle is hard diffraction. In these events, a high-momentum-transfer collision occurs but one of the incoming beam particles appears to leave the collision intact, instead of being destroyed in the process. In fact, events with a leading proton comprise about 40% of the total cross section and are typically described by the exchange of a color-singlet or pomeron, about which little is known. This observation is rather surprising and needs to be pinned down better, and related quantitatively with similar phenomena observed at HERA. The addition of the FPD to the detector facilitates studies of the pomeron structure and its dependence on diffractive mass and momentum transfer, searches for diffractive production of heavy objects such as W bosons, and studies of hard double pomeron exchange. The FPD will also allow us to explore ideas of Higgs production through similar mechanisms at the LHC.



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 $Z(\rightarrow \nu\nu)\gamma$ 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 $\mu\nu$ + 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 WWγ and WWZ Couplings from WW/WZ $\rightarrow$ eνjj 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 $W \rightarrow e\nu$ 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).

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
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

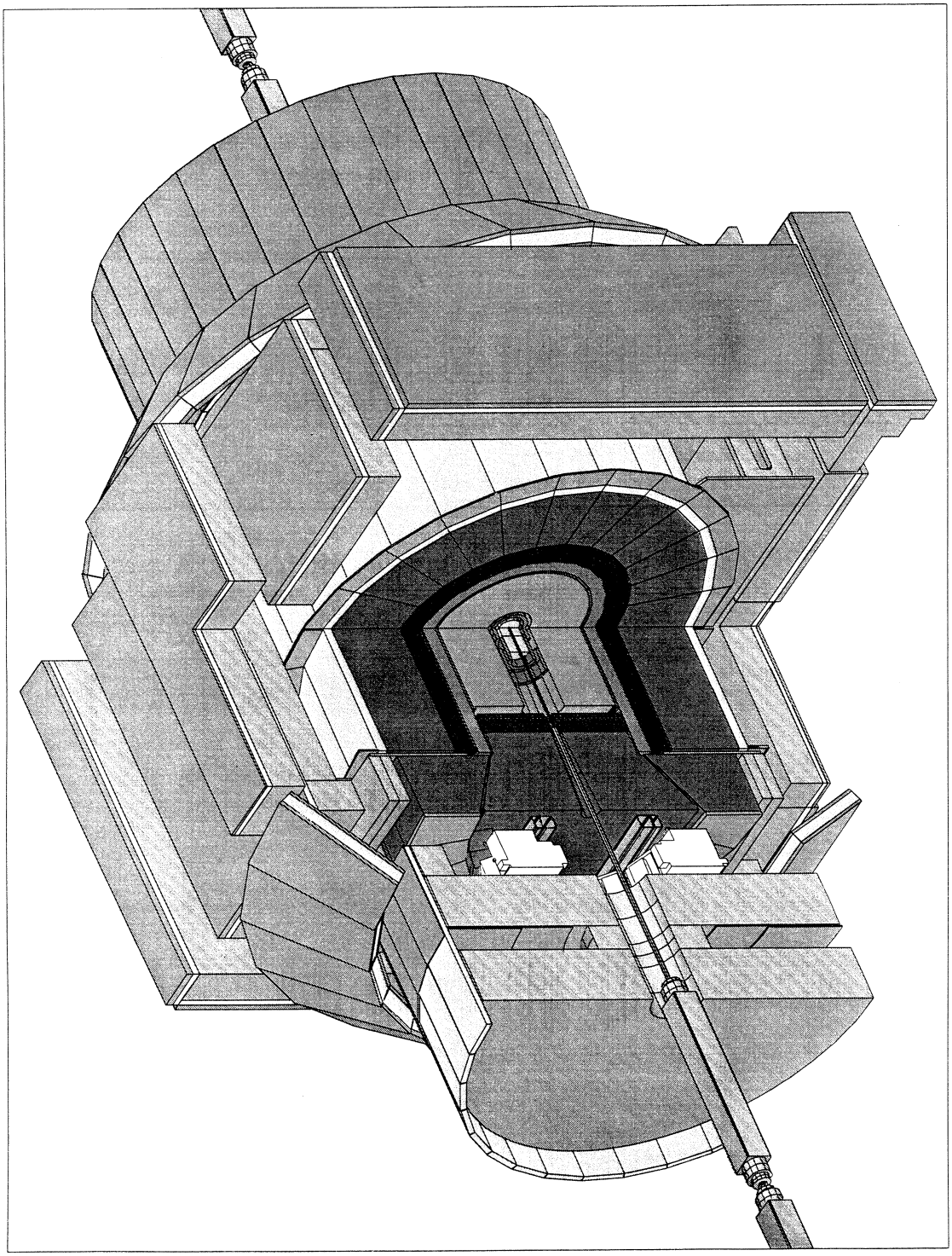
M. Kelly	University of Notre Dame	April 1996
F. Nang	Brown University	April 1996
J.-F. Lebrat	University of Paris XI	May 1996
H. Li	SUNY/Stony Brook	May 1996
G. Alvarez	University of Indiana	June 1996
S. Chang	Northeastern University	August 1996
T. Hu	SUNY/Stony Brook	August 1996
E. Flattum	Michigan 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
T. McKibben	University of Illinois/Chicago	November 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
M. Mason	University of California/Riverside	June 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 Mediterranee	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
A. Patwa	SUNY/Stony Brook	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	Orsay	April 2003
C. Hebert	University of Kansas	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. 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

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 / 775 (Lockyer / Ristori) Collider Detector at Fermilab (CDF)

Academia Sinica (Taiwan), ANL, Barcelona (Spain), Bologna (Italy), Brandeis, UC / Davis, UCLA, UC / San Diego, UC / Santa Barbara, Cantabria (Spain), Carnegie Mellon, Chicago, Duke, Fermilab, Florida, Frascati (Italy), Geneva (Switzerland), Glasgow (United Kingdom), Harvard, Helsinki (Finland), Hiroshima (Japan), 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), Pennsylvania, Pisa (Italy), Pittsburgh, Purdue, Rochester, Rockefeller, Rome (Italy), Rutgers, Texas A&M, Texas Tech, Trieste / Udine (Italy), Tsukuba (Japan), Tufts, Univ. Coll. London (United Kingdom), Waseda (Japan), Wayne State, Wisconsin, Yale

Status: *E-775 - Data Analysis*
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 is 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 has continued to function well, taking data at luminosities up to ~$20\times10^{30}cm^{-2}sec^{-1}$ 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 269 papers on CDF results have been published or submitted, and 273 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. The CDFII Detector and Tevatron Run II (E-830)

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 $2\times10^{32}cm^{-2}sec^{-1}$. 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.

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.

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 200 pb^{-1} of recorded data, roughly twice 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.

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 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 $p\bar{p} \rightarrow Z^0 X \rightarrow e^+ e^- X$ 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 $p\bar{p}$ 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 $B^0 \rightarrow J/\psi K_S^0$ 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_s^0 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_b^0 Lifetime Using $\Lambda_b^0 \rightarrow \Lambda_c^+ l^- \bar{\nu}$, 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_s^0 Meson Using the Exclusive Decay Mode $B_s^0 \rightarrow J/\psi\phi$, 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 γ + $D^{*\pm}$ 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 $\Lambda_b^0 \rightarrow J/\psi\Lambda$ 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 $\sigma(W + \bullet\ 1\ Jet)/\sigma(W)$ 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 $\sin 2\beta$ from $B \rightarrow J/\psi K^0_S$ 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 $e\tau$ and $\mu\tau$ 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 $d\sigma/dy$ 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 $e\nu$ 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 $B^0 \to J/\psi K^{(*)0}\pi^+\pi^-$ 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 $B_s \to \mu^+\mu^-\phi$ 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, submitted to Phys. Rev. Lett., Fermilab-Pub-03/070-E (2003).

Measurement of the Average Time-Integrated Mixing Probability of b-Flavored Hadrons Produced at the Tevatron, submitted to Phys. Rev. D, Fermilab-Pub-03/327-E (2003).

Search for Kaluza-Klein Gravitron Emission in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV Using the Missing Energy Signature, submitted to Phys. Rev. Lett., Fermilab-Pub-03/285-E (2003).

Inclusive Double Pomeron Exchange at the Fermilab Tevatron $\bar{p}p$ Collider, submitted to Phys. Rev. Lett., Fermilab-Pub-03/043-E (2003).

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, submitted to Phys. Rev. D, Fermilab-Pub-03/381-E (2003).

Combination of CDF and D0 Results on W Boson Mass and Width, submitted to Phys. Rev. D, Fermilab-Pub-03/398-E (2003).

Optimized Search for Single-Top-Quark Production at the Tevatron, submitted to Phys. Rev. D, Fermilab-Pub-03/388-E (2003).

Heavy Flavor Properties of Jets Produced in $p\bar{p}$ Interactions at $\sqrt{s}$ = 1.8 TeV, submitted to Phys. Rev. D, Fermilab-Pub-03/382-E (2003).

Observation of the Narrow State $X(3872) \rightarrow J/\psi\pi^+\pi^-$ in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.96 TeV, submitted to Phys. Rev. Lett., Fermilab-Pub-03/393-E (2003).

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

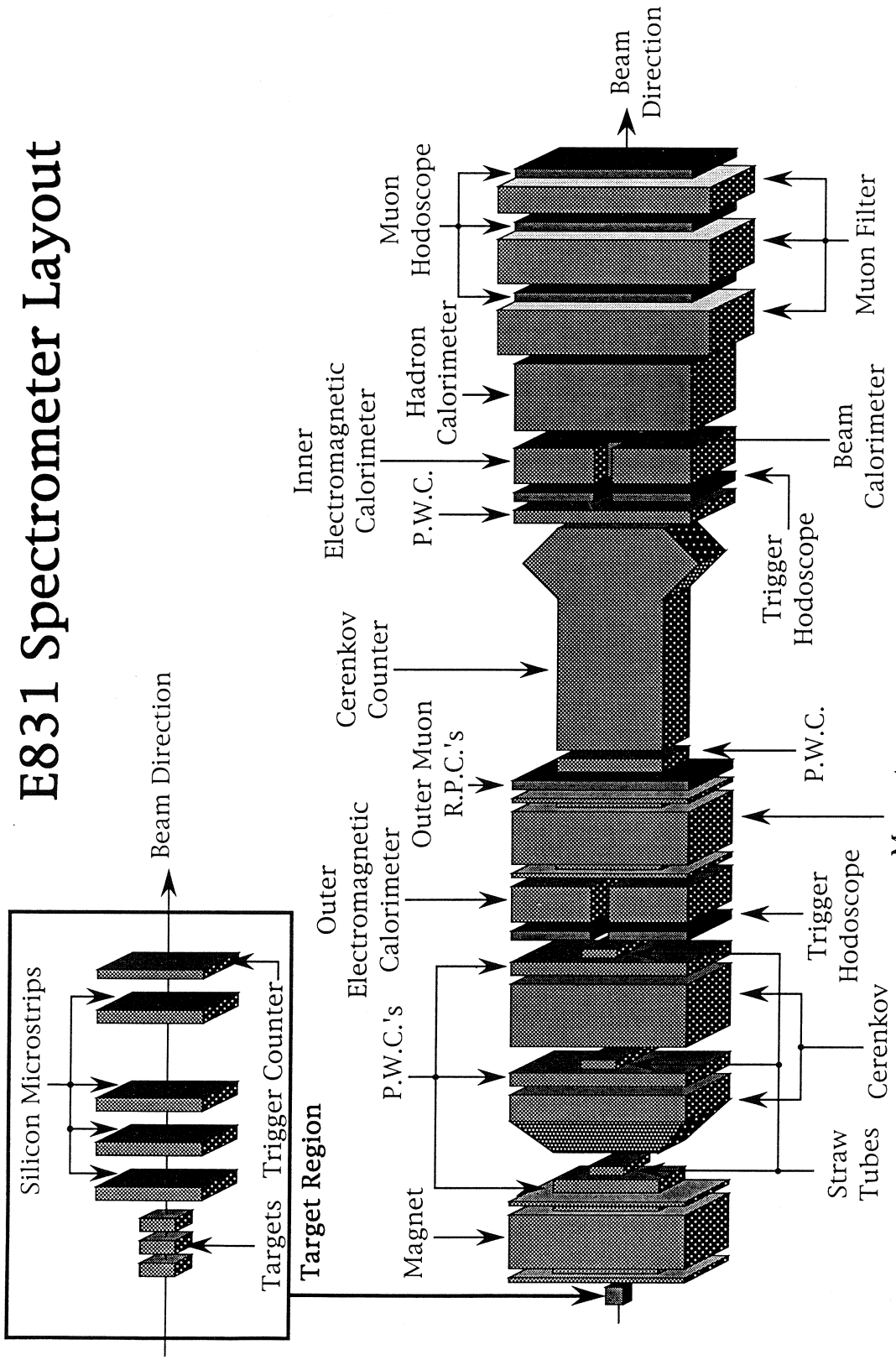
R. Markeloff	University of Wisconsin	August 1992
D. Gerdes	University of Chicago	September 1992
L. Keeble	Texas A&M University	September 1992
B. T. Huffman	Purdue University	December 1992
S. Vejcik	Johns Hopkins University	August 1992
S. M. Moulding	Brandeis University	February 1993
P. A. Maas	University 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


E831 Spectrometer Layout
Beam Direction
Silicon Microstrips
Targets
Trigger Counter
Target Region
Magnet
P.W.C.'s
Outer Electromagnetic Calorimeter
Outer Muon R.P.C.'s
Cerenkov Counter
Inner Electromagnetic Calorimeter
P.W.C.
Hadron Calorimeter
Muon Hodoscope
Beam Direction
Straw Tubes
Cerenkov Counters
Trigger Hodoscope
P.W.C.
Trigger Hodoscope
Beam Calorimeter
Magnet
Muon Filter

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 2003 we published nine papers. They include the first tests of CPT and Lorentz invariance in the charm sector, a study of five-body decays of charm mesons which points to a significant $a_1(1260)$ component, a study of the Cabibbo-suppressed decays $D^0 \to \pi^+\pi^-$ and $D^0 \to K^+K^-$, the best determination of the Ω_c^0 lifetime, studies of correlations between D and $\overline{D}$ mesons in photoproduction, and measurements of the Ξ_c^+ branching ratios. We significantly reduced the limits on several rare and forbidden three-body decays of the D^+ and D_s^+. In addition, we performed a coherent amplitude analysis of the decay $D^0 \to K^-K^-K^+\pi^+$ which shows a dominant contribution from ϕ and $\overline{K}^{*0}$ states. We also have four additional papers submitted for publication which include an extension of our five-body decay studies using K_s^0's, a study of charm and anti-charm baryon production asymmetries, a study of the excited charm meson states with the first observation of broad S-wave states, and the first Dalitz plot analysis of D^+ and D_s^+ to $\pi^+\pi^+\pi^-$ using the K-matrix formalism.

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^0 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 Photoproduction, 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, hep-ex/-0310051 (2003).

Charm-AntiCharm Baryon Production Asymmetries in Photon Nucleon Interactions, hep-ex/0311022 (2003).

Dalitz Plot Analysis of D_s^+ and D^+ Decay to $\pi^+\pi^+\pi^-$ Using the K-Matrix Formalism, hep-ex/0312040 (2003).

Measurement of Masses and Widths of Excited Charm Mesons D_2^* and Evidence for Broad States, hep-ex/0312060 (2003).

New Measurements of the $D_s^+ \to \phi\mu^+\nu$ Form Factor Ratios, hep-ex/0401001 (2004).

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.

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.

Table 1. Comparison of relative branching fractions with previous experiments. The FOCUS measurements are about a factor of two better than previous measurements in both the statistical and the systematic uncertainties.

Experiment	$\frac{\Gamma(D^0\to K^-K^+)}{\Gamma(D^0\to K^-\pi^+)}$	$\frac{\Gamma(D^0\to \pi^-\pi^+)}{\Gamma(D^0\to K^-\pi^+)}$	$\frac{\Gamma(D^0\to K^-K^+)}{\Gamma(D^0\to \pi^-\pi^+)}$
E687[10]	$0.109 \pm 0.007 \pm 0.009$	$0.043 \pm 0.007 \pm 0.003$	$2.53 \pm 0.46 \pm 0.19$
E791[11]	$0.109 \pm 0.003 \pm 0.003$	$0.040 \pm 0.002 \pm 0.003$	$2.75 \pm 0.15 \pm 0.16$
CLEO[12]	$0.1040 \pm 0.0033 \pm 0.0027$	$0.0351 \pm 0.0016 \pm 0.0017$	$2.96 \pm 0.16 \pm 0.15$
E831(this result)	$0.0993 \pm 0.0014 \pm 0.0014$	$0.0353 \pm 0.0012 \pm 0.0006$	$2.81 \pm 0.10 \pm 0.06$

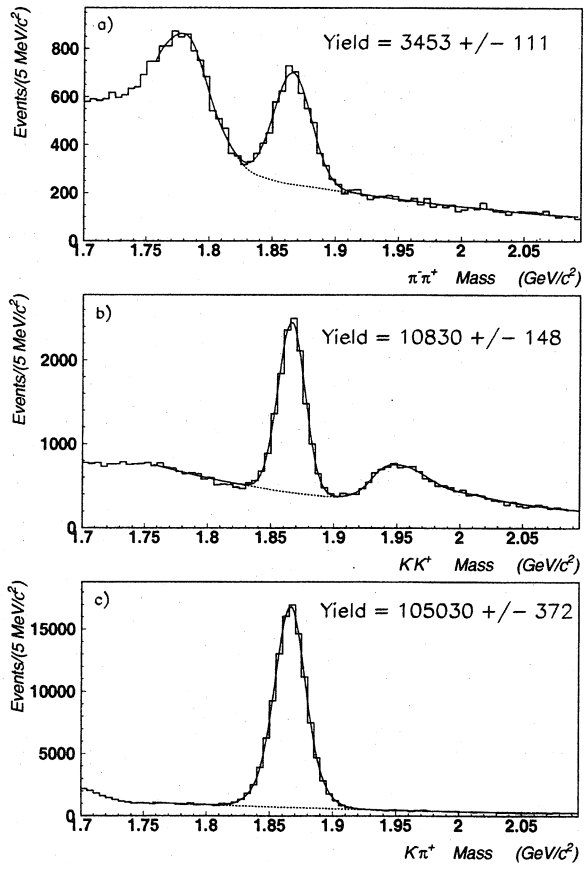


Figure 1. Invariant mass distribution for (a) $\pi^+\pi^-$, (b) K^+K^-, (c) $K^-\pi^+$. The fit (solid curve) for the Cabibbo-suppressed decay modes of D^0 is to a Gaussian over a polynomial (for combinatorial background) and a function obtained with Monte Carlo simulations for the reflection peak.

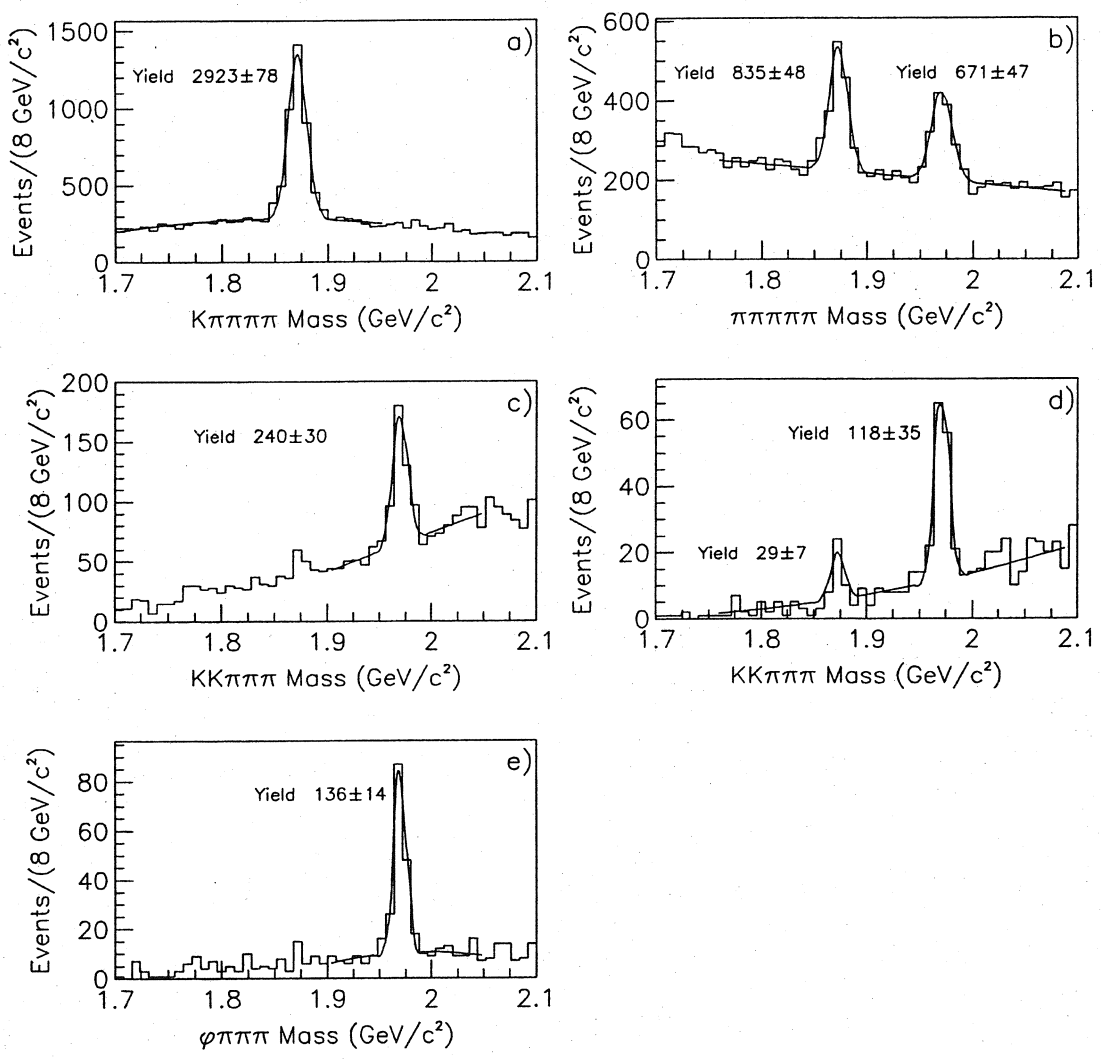


Figure 2. Invariant mass distribution for (a) $K^-\pi^+\pi^+\pi^+\pi^-$, (b) $\pi^-\pi^+\pi^+\pi^+\pi^-$, (c) $K^-K^+\pi^+\pi^-\pi^+$, (d) $K^-K^+\pi^+\pi^-\pi^+$ with tighter cuts to bring out the D^+ signal, (e) $\phi\pi^+\pi^-\pi^+$. The numbers quoted are the yields from the fits.

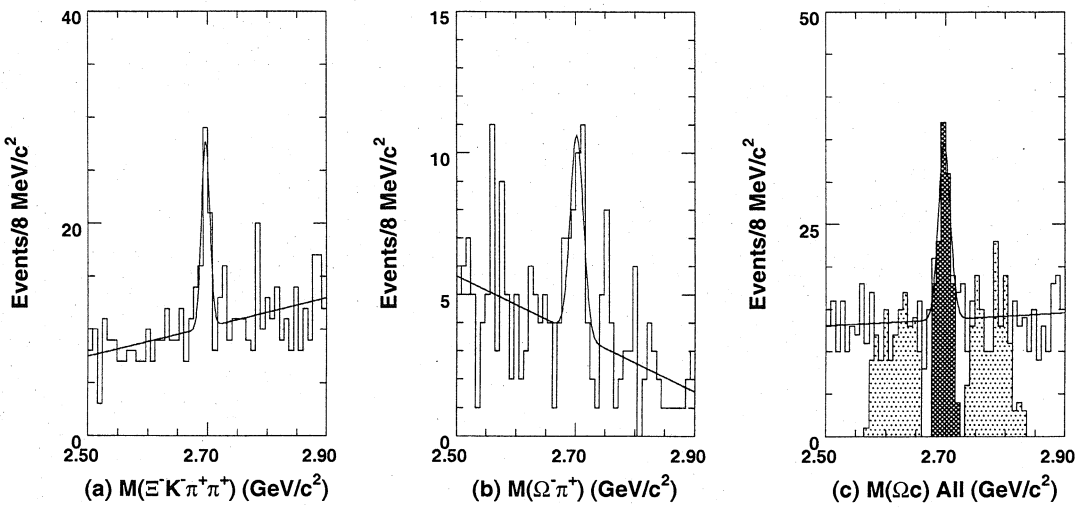


Figure 3. Invariant mass distribution for two different final states of the Ω_c^0 : (a) Reconstructed mass of $\Xi^-K^-\pi^+\pi^+$. There are 38 ± 9 events at a mass of 2696.5 ± 1.9 MeV/c^2 and a width of 7 MeV/c^2. (b) Reconstructed mass of $\Omega^-\pi^+$. There are 25 ± 7 events at a mass of 2701.6 ± 4.2 MeV/c^2 and a width of 10 MeV/c^2. (c) Combined mass of both modes. There are 65 ± 14 events at a mass of 2697.5 ± 2.3 MeV/c^2. The signal region (hatched area) is defined to be within 2σ of the fitted mass value and the two sideband regions (the dotted area) are selected to be 4-12σ from the center-of-signal.

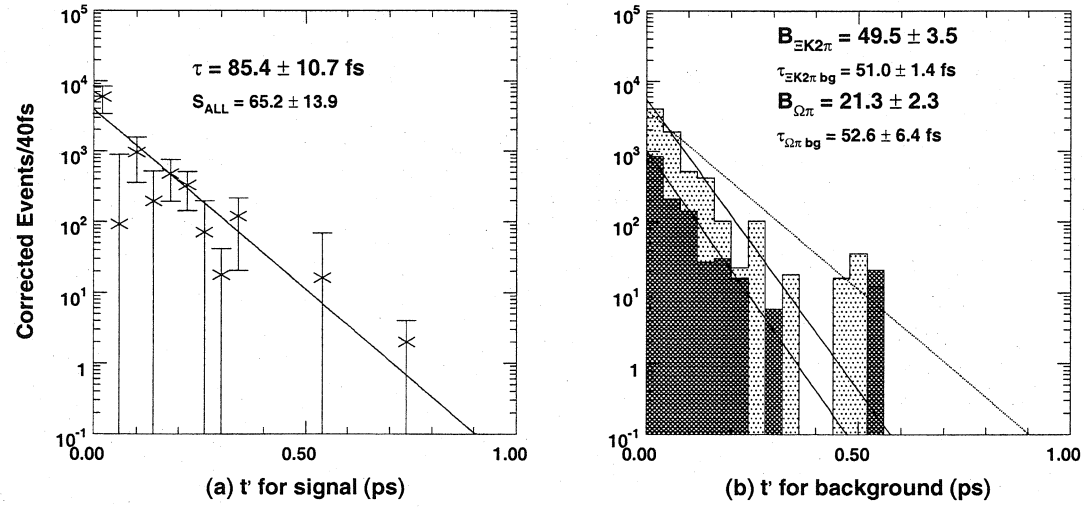


Figure 4. (a) The corrected t' distribution with the lifetime fit function for the combined signal, (b) the t' distributions of expected backgrounds in the signal band for each mode; the light region is for $\Xi^-K^-\pi^+\pi^+$ and the dark one is for $\Omega^-\pi^+$. Lines show the lifetime fitting functions for signal and two background distributions.

Table 2. Measured masses and widths for narrow and broad structures in $D^+\pi^-$ and $D^0\pi^+$ invariant mass spectra. The first error listed is statistical and the second is systematic. Units for the masses and widths are MeV/c^2.

	D_2^{*0}	D_2^{*+}	D_2^{*+} - D_2^{*0}	$D^0_{\frac{1}{2}}$	$D^+_{\frac{1}{2}}$
Yield	5776±869±696	3474±670±656		9810±2657	18754±2189
Mass	2464.5±1.1±1.9	2467.6±1.5±0.8	3.1±1.9±0.9	2407±21±35	2403±14±35
PDG03	2458.9±2.0	2459±4	0±3.3		
Width	38.7±5.3±2.9	34.1±6.5±4.2		240±55±59	283±24±34
PDG03	23±5	25^{+8}_{-7}			

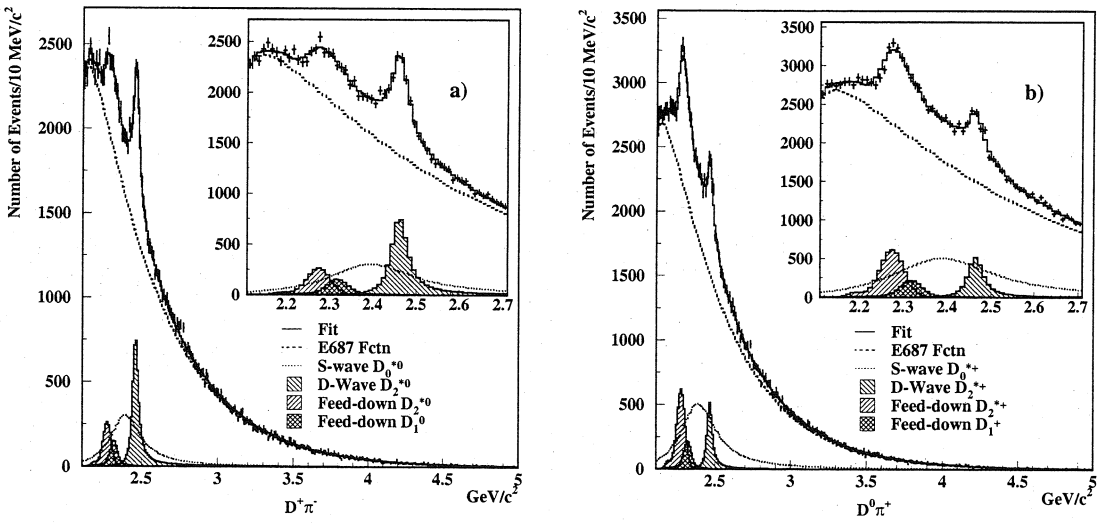
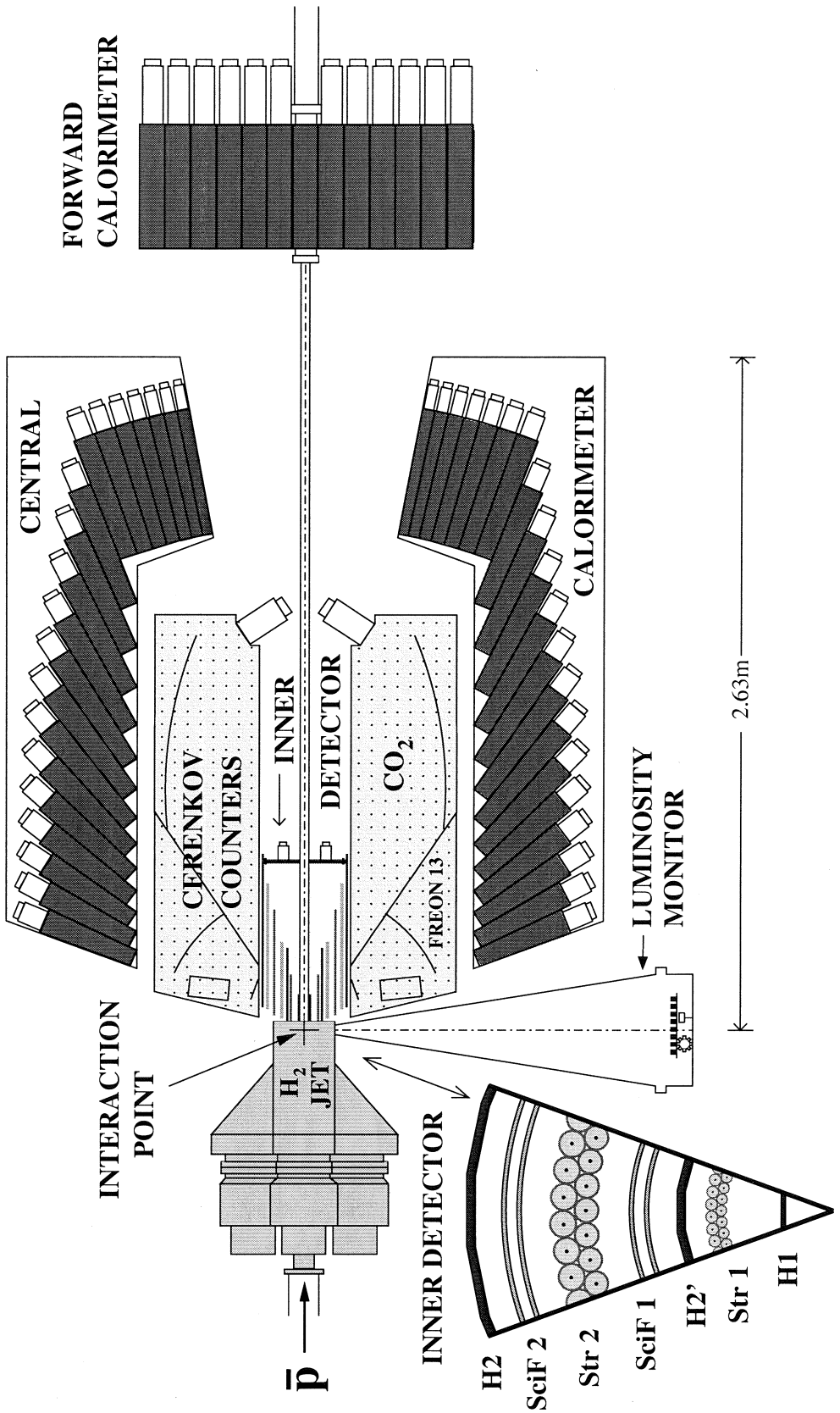


Figure 5. Fits to the (a) $D^+\pi^-$ mass spectra and to the (b) $D^0\pi^+$ mass spectra, including a term for an S-wave resonance. The mass and width for the $D_1(3/2)$ feed-down is fixed to the PDG values. The fit values are reported in Table 2 above. The inset histograms provide a magnified view of the mass region from 2100 MeV/c^2 to 2700 MeV/c^2. A broad resonance centered at around 2400 MeV/c^2 is required to obtain a good fit to the data.

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.

Topics of continuing analysis include:

the χ_0 branching ratio to $\gamma\gamma$;

a study of $\phi\phi$ production and a search for $\phi\phi\gamma$ production in $\bar{p}p$ annihilations;

a search for the $^1P_1$ in several decay modes;

a study of ψ' decay modes;

a measurement of χ_1 and χ_2 total widths;

a study of exclusive two-body reactions.

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 $\psi' \rightarrow e^+e^-$; $\psi' \rightarrow J/\psi\pi^0\pi^0$, and $\psi' \rightarrow J/\psi\eta$, 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 $\bar{p}p \rightarrow \chi_{c1}, \chi_{c2} \rightarrow J/\psi\gamma \rightarrow e^+e^-\gamma$, 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).

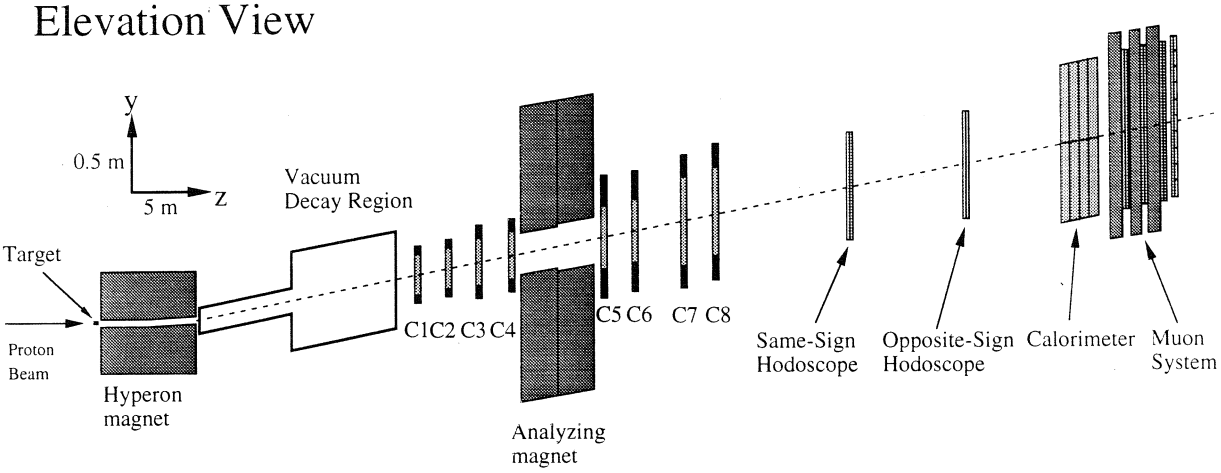
Interference Study of the χ_{c0} (1^3P_0) in the Reaction $\bar{p}p \rightarrow \pi^0\pi^0$, M. Andreotti et al., Phys. Rev. Lett. 91, 091801 (2003).

Ph.D. Theses

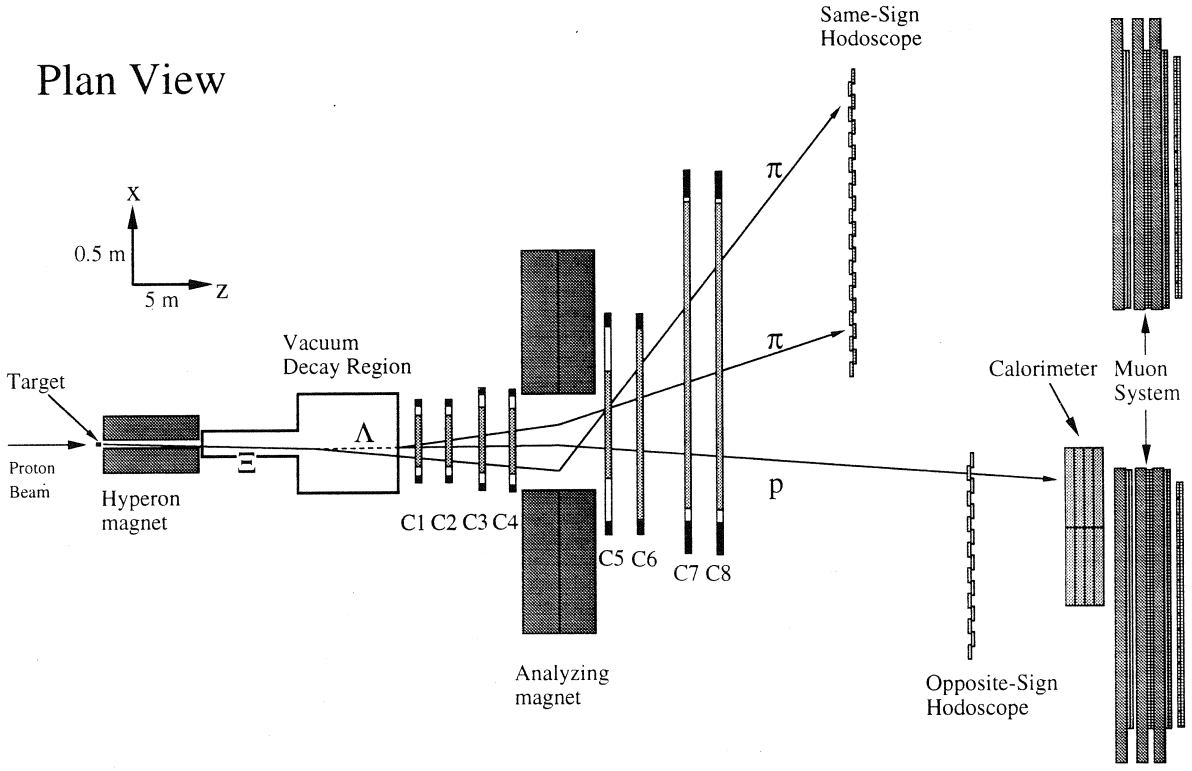
G. Stancari, University of Ferrara, Italy
W. Baldini, University of Ferrara, Italy
M. Ambrogiani, University of Ferrara, Italy
R. McTaggart, Pennsylvania State University
T. Pedlar, Northwestern University
M. Stancari, University of California/Irvine
M. Obertino, University of Torino, Italy
M. Graham, University of Minnesota
T. Vidnovic, University of Minnesota
M. Negrini, University of Ferrara
P. Rumerio, Northwestern University
S-H. Seo, University of Minnesota

E-871

Elevation View



Plan View



E-871 (Dukes / Luk) HyperCP: Search for CP Violation in the Decays of $\Xi^- / \bar{\Xi}^+$ and $\Lambda / \bar{\Lambda}$ Hyperons

Academia Sinica (Taiwan), UC / Berkeley, Fermilab, Guanajuato (Mexico), IIT, Lausanne (Switzerland), LBNL, Michigan, South Alabama, Virginia

Status: *Data Analysis*

Discovered over 35 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 two particles, the K_L and B_d) 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 particular in the decays of Ξ and Λ hyperons, which are sensitive to 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 – α parameters – where the Λ and $\bar{\Lambda}$ have been produced from Ξ^- and $\bar{\Xi}^+$ decays. The expected sensitivity in the difference in the α parameters is about 2×10^{-4}, two orders of magnitude better than the present experimental limit. Theoretical predictions range from several times 10^{-2} to 10^{-5}.

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 data set ever taken – 231 *billion* events – in two runs: 1997 and 1999. After careful work in precisely calibrating the spectrometer and tuning up the code, 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 data set 25 times larger than the total amount of data on all of the Web sites in the entire world at the time.

The scope of the physics topics that HyperCP addresses goes beyond CP violation in hyperon decays, the complete physics menu including: 1) the search for CP violation in Ω, Ξ and Λ decays; 2) the search for the lepton-number-violating decay $\Xi^- \to p\mu^-\mu^-$; 3) the search for the $|\Delta S| > 1$ decays: $\Omega^- \to p\pi^-\pi^-$, $\Omega^- \to pK^-\pi^-$, $\Omega^- \to \Lambda\pi^-$, and $\Xi^- \to p\pi^-\pi^-$; 4) the search for the flavor-changing neutral-current (FCNC) decays: $\Omega^- \to \Xi^-\mu^+\mu^-$, $\Sigma^+ \to \pi^+\mu^+\mu^-$ and $K_S \to \mu^+\mu^-$; 5) the

measurement of the branching ratios: $\Omega^- \to \Xi^-\pi^+\pi^-$ and $\Omega^- \to \Xi^-\mu^+\mu^-$; 6) the measurement of the branching ratios and form factors in the flavor-changing neutral-current decays: $K^+ \to \pi^+\mu^+\mu^-$ and $K^- \to \pi^-\mu^+\mu^-$; 7) the measurement of the Ω^-, $\bar{\Omega}^+$, Ξ^-, and $\bar{\Xi}^+$ α-parameters; 8) the measurement of the Ξ^- β-parameter; 9) the measurement of the Λ-π^- strong phase shift; 10) the measurement of Ξ^- ($\bar{\Xi}^+$) and Ω^- ($\bar{\Omega}^+$) polarizations in inclusive production; and 11) the measurement of the Ξ^- ($\bar{\Xi}^+$) and Ω^- ($\bar{\Omega}^+$) production cross sections.

Many of the analyses have reached a mature stage. We have published a new measurement of the branching ratio of the FCNC decay $K^+ \to \pi^+\mu^+\mu^-$ which resolves an outstanding disagreement between two BNL experiments for this important test of chiral perturbation theory. In addition, we have observed the conjugate decay, $K^- \to \pi^-\mu^+\mu^-$, for the first time. The search for CP violation in hyperon decays has produced a null result from a complete analysis of ~15% of the data. This result and five other papers are being prepared for publication.

We expect to publish at least ten papers in 2004 as we wrap up the analysis of the HyperCP data set.

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).

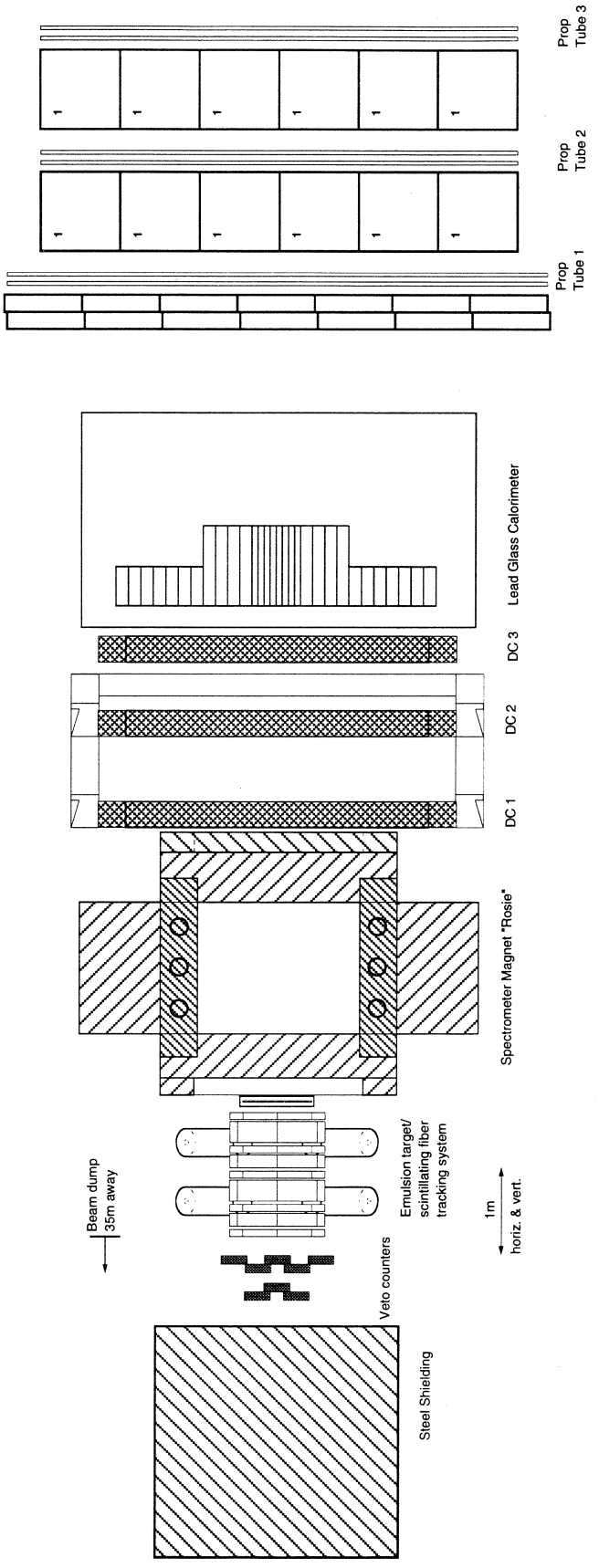
Tripling the Data Set for the HyperCP Experiment, C. White et al., IEEE Trans. Nucl. Sci. 49, 568 (2002).

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).

Theses

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 (Lundberg / Paolone) Direct Observation of the Tau-Neutrino

Aichi (Japan), Athens (Greece), UC/Davis, Changwon Nat'l (Korea), Coll. 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*

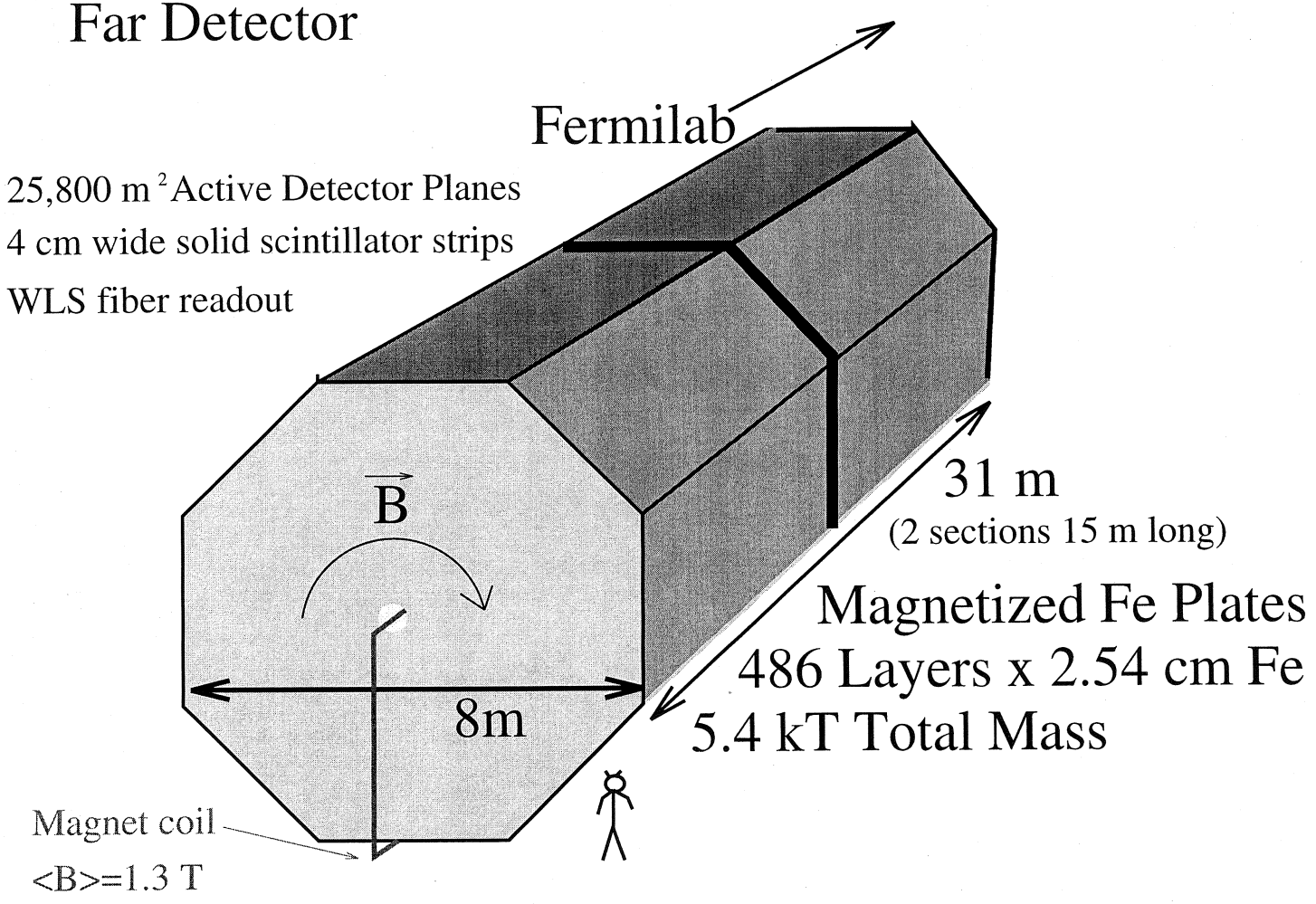
Since the discovery of the tau lepton in 1975, the desire to detect the ν_τ was strong, but the experiments that were proposed were technically very challenging and expensive. The use of emulsion, as active targets, in conjunction with its specially designed beam, has enabled DONUT to overcome most of 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 additional events to provide an independent confirmation of the signal. Results from an additional ~230 interactions have been completed. The remaining events were scanned using ultra-high speed scanning stations developed over the last few years for future experiments. Additional ν_τ interactions have been found and will be presented in 2004.

MINOS (Main Injector Neutrino Oscillation Search)
Far Detector



E-875 (Wojcicki / Michael) Main Injector Neutrino Oscillation Search

ANL, Athens (Greece), BNL, Caltech, Cambridge (United Kingdom), Campinas (Brazil), Fermilab, College de France (France), Harvard, IHEP/Protvino (Russia), IIT, Indiana, ITEP (Russia), Lebedev (Russia), LLNL, Macalester, 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, Wisconsin

Status: *No Data Yet*

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. The approach of our experimental program is to perform a variety of different measurements, all of which would be sensitive to neutrino oscillations. A self-consistent analysis will provide measurements of oscillation modes, oscillation parameters (Δm^2 and $\sin^2 2\theta$) and the energy dependence of the oscillation probability.

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. First indications from the accelerator K2K experiment in Japan appear to confirm that conclusion. Recently, the SNO experiment in Canada looking at solar neutrino interactions in heavy water and the KamLAND experiment in Japan looking at reactor neutrinos 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 rate 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 and is now 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 will be finished in early 2004. The installation of beamline components began in September 2003. Data-taking is scheduled to begin, with both the near detector and the far detector, when the neutrino beam commissioning starts in early 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. The new lower value of Δm^2 requires 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.
March 1999:	MINOS steel purchase subcontract awarded.
May 1999:	DOE CD-3b (continue construction at Fermilab) approved.
May 1999:	Excavation of far detector lab started at Soudan.
June 1999:	Top of Soudan mineshaft located with GPS survey.
October 1999:	Near detector electronics design upgraded for fast extraction.
November 1999:	Detector 4-plane prototype erected at Fermilab.
November 1999:	Site preparation completed for Fermilab civil construction.
March 2000:	Excavation of NuMI beamline tunnels and halls started at Fermilab.
November 2000:	Excavation of far detector cavern completed at Soudan.
December 2000:	Far detector cavern outfitting started 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 far detector magnet coil operated at Fermilab.
October 2001:	First run of MINOS calibration detector completed in CERN test beam.
November 2001:	Prototype near detector magnet coil operated at Fermilab.
December 2001:	Revised NuMI Project baseline approved by the Department of Energy.
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.
July 2002:	Construction of prototype veto shield over far detector started.
August 2002:	Near detector hall excavation completed.
September 2002:	Surface Building and Outfitting (SB&O) contract awarded.
September 2002:	Second calibration detector run completed in CERN test beam.
October 2002:	NuMI target hall excavation completed.
October 2002:	Near detector coil delivered to Fermilab.
November 2002:	Underground excavation completed at Fermilab.
November 2002:	SB&O contractor takes beneficial occupancy of NuMI tunnels.
December 2002:	Preassembly of near detector planes completed.
January 2003:	MINOS Collaboration forms neutrino beam physics analysis groups.
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.

E-881

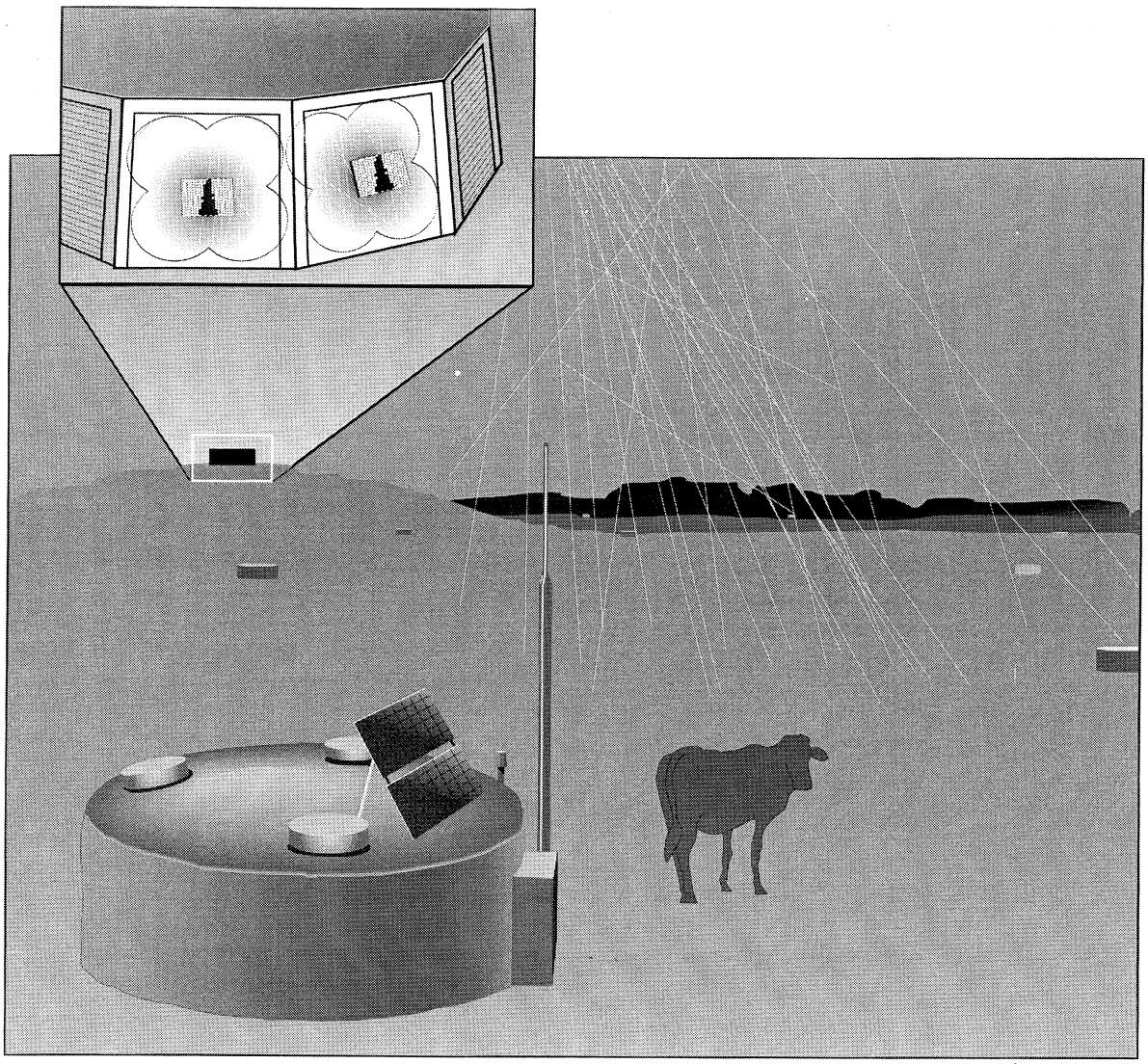


Illustration of the detector systems used in the Pierre Auger Project. Self-contained particle detectors are spaced on a 1.5 km grid over the surface. The air showers are also observed on dark nights using air fluorescence telescopes (inset).

E-881 (Mantsch) The Pierre Auger Project - A Study of the Highest-Energy Cosmic Rays

Fermilab
(and institutions in 15 countries)

Status: *Data-Taking*

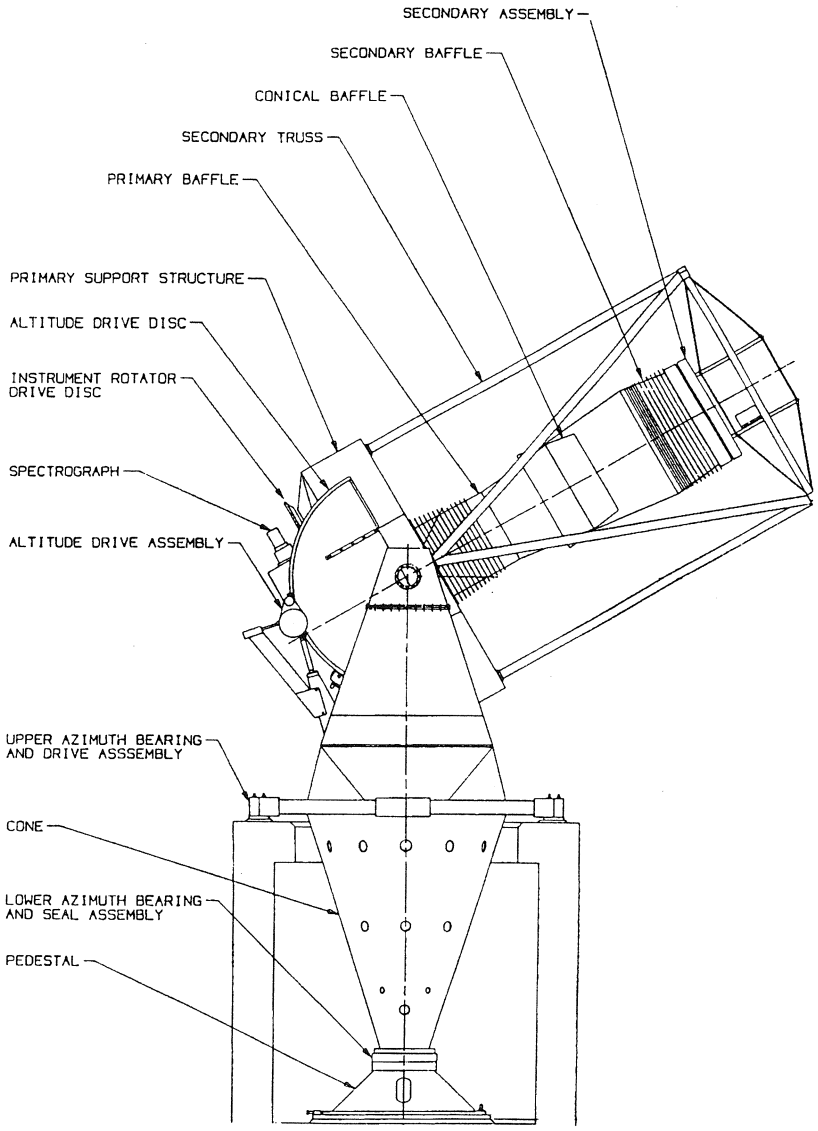
Over the past thirty years cosmic ray air shower detectors have recorded a number of events with energies greater that 10^{20} eV. These super-high-energy events are extraordinary for two reasons. First, there are no known acceleration mechanisms that can produce particles of these energies. Second, 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.

Construction of the southern site of the Auger Observatory was started in Mendoza, Argentina with an engineering array at the beginning of 2000. The Engineering Array, consisting of 30 surface detectors and two prototype fluorescence telescopes, demonstrated that the detectors perform very well, indeed better than expected. Observatory components are now in full production and are being deployed as they reach the site. The Auger surface array is now the largest in the world. Completion is expected by the end of 2005.

Fermilab is playing an important role in the Auger Project. In addition to scientific participation, Fermilab brings to bear its substantial experience with projects of this scope. Fermilab participated in the design of the surface detector station and the central data acquisition system. The overall project management for the Auger Project is based at Fermilab.

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 (Kent) Sloan Digital Sky Survey

Fermilab
(and Chicago, Inst. for Adv. Study, Japan Promotion Group [Japan], Johns Hopkins, LANL, Max Planck / Garching [Germany], Max Planck / Heidelberg [Germany], New Mexico State, Pittsburgh, Princeton, US Naval Observatory, Washington)

Status: *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.

To achieve these goals, one million galaxy redshifts are to be measured to a uniform flux limit within a solid angle of pi steradians, away from the obscuring disk of the Milky Way. The need for a uniform and well-calibrated flux limit requires a new imaging survey to be conducted, from which the spectroscopic (redshift) target list will be derived. This imaging survey yields a two-dimensional map of the same region, which itself will provide new cosmological information since the detection threshold of the imaging survey is much fainter than that of the spectroscopic survey. 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.

The survey entered its third year of formal operations in April 2003. Based upon our experiences in the first year, the survey goals for total sky coverage in imaging and spectroscopy were re-baselined for a five-year survey. The current goals are 8452 square degrees of imaging and 1688 plates (or 1 million total objects) for spectroscopy. In addition, the survey expects to reimage a small portion of the southern equator 18 times total, and obtain 388 spectroscopic plates for other purposes.

Observing was conducted every month in 2003 except for a six-week shutdown during the summer months. Through the end of 2003, the survey has collected 80% of its baseline imaging data and 52% 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 1641 plates have been designed and drilled from the processed imaging data. Including reprocessing, about 46 terabytes of data have been processed.

The first official release of data to the public (although the second release in all, since a prior release of commissioning data was done 2 years ago) happened in April 2003. This release, DR1, includes essentially all imaging and spectroscopic data obtained up to June 2002. The distribution is done via file servers that are hosted and accessed through Fermilab (the Data Archive Server) and a database that is hosted at Johns Hopkins University (the Catalog Archive Server). The next release is scheduled for early 2004.

The SDSS collaboration has published over 50 papers in refereed journals over the past year. Additionally, over 40 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 include the discovery of the widest separation gravitationally lensed quasar known, an improved measurement of the galaxy density fluctuation spectrum that matches and corroborates the spectrum obtain by the WMAP satellite, the discovery of a correlation between galaxy clustering observed by SDSS and fluctuations in the microwave background that provides strong evidence for a dark energy component in the universe, the discovery of an apparent ring of stars around the Milky Way galaxy, and the discovery of yet another record-setting quasar with the highest known redshift. Figure 3 shows the latest version of the density fluctuation power spectrum combining the results of SDSS and several other experiments.

Fermilab continues to be responsible for the maintenance of the data acquisition systems and certain hardware systems at APO. 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.

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).

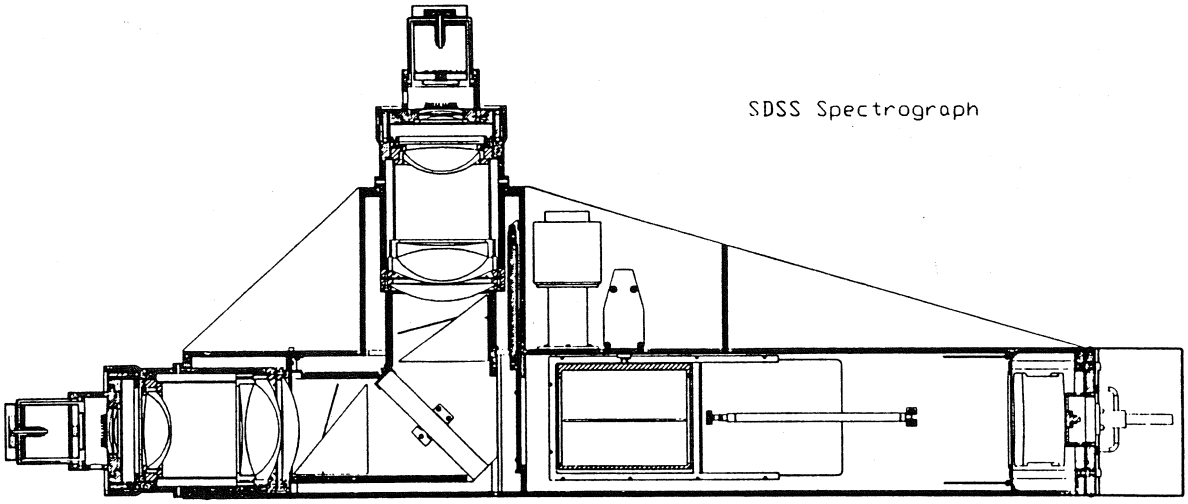


Figure 1

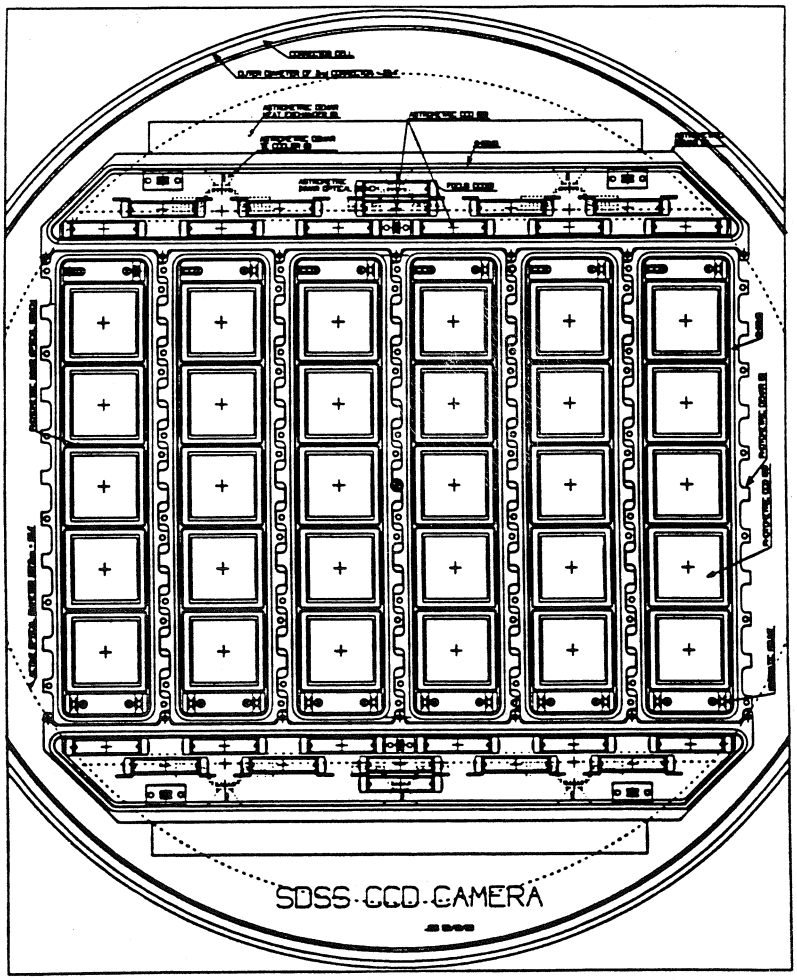


Figure 2

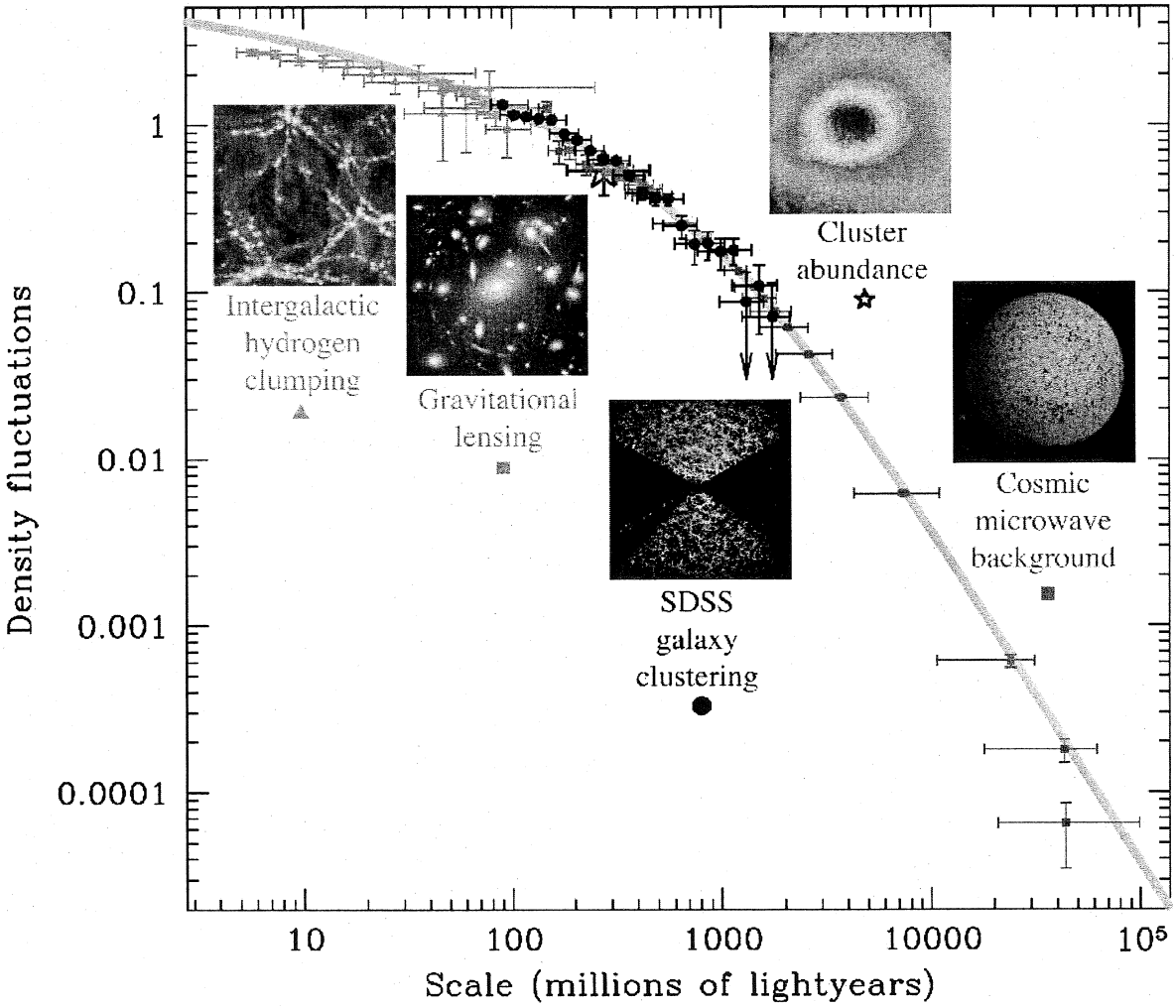
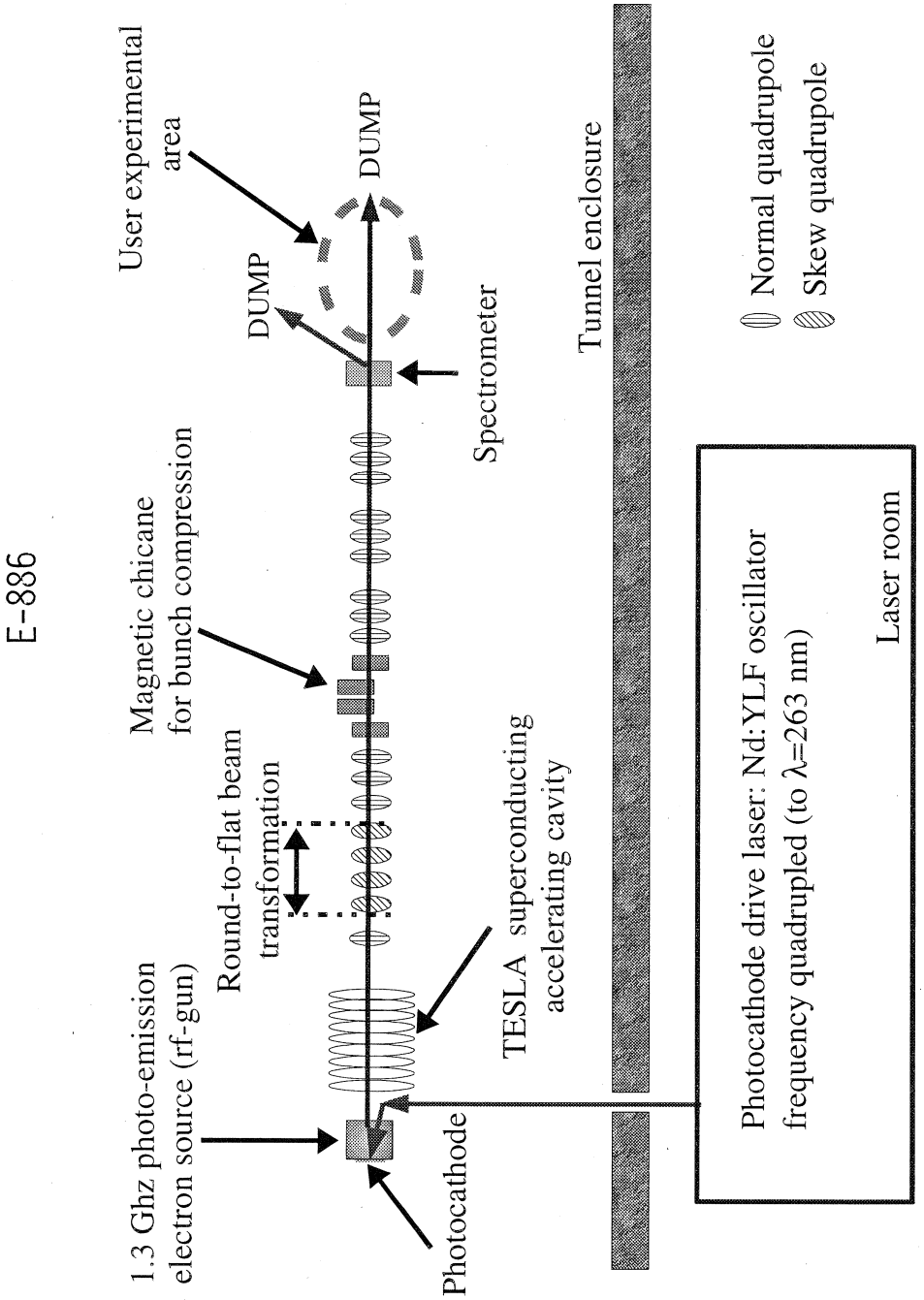


Figure 3. The new SDSS results (black dots) are the most accurate measurements to date of how the density of the Universe fluctuates from place to place on scales of millions of lightyears. These and other cosmological measurements agree with the theoretical prediction (heavy shaded curve) for a Universe composed of 5% atoms, 25% dark matter and 70% dark energy. The larger the scales we average over, the more uniform the Universe appears. [Figure courtesy of Max Tegmark.]


E-886
User experimental area
DUMP
DUMP
Magnetic chicane for bunch compression
Round-to-flat beam transformation
Spectrometer
Tunnel enclosure
1.3 Ghz photo-emission electron source (rf-gun)
TESLA superconducting accelerating cavity
Photocathode
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)

Chicago, DESY, Fermilab, Georgia, INFN/Milan,
LBNL, Northern Illinois, Rochester, UCLA

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.

Research activities for FY2003:

Over the last year, our activities have mainly focused on the demonstration of photoinjector production of flat beam with high transverse

---

1 NICADD is an acronym for Northern Illinois Center for Accelerator and Detector Development

emittance ratio, our present goal being to reach an emittance ratio of about 100 with charge per bunch of 0.5 nC. The road map to such a goal involves a better theoretical and numerical understanding of the beam dynamics evolution throughout the beamline. We have worked towards improving our numerical modeling by including a 3D space charge algorithm in the ASTRA code from DESY, and a series of data were taken to study the conservation of canonical angular momentum along the beamline, and its conversion into kinetic angular momentum.

The beamline was modified to relocate the magnetic bunch compressor downstream of the round-to-flat beam transformer. New diagnostics were added in the round-to-flat beam transformer so as to be able to study the evolution and removal process of the angular momentum. New electromagnetic beam position monitors provided by DESY were also installed. A new bunch length diagnostic based on the detection of coherent transition radiation was installed and commissioned in collaboration with the University of Georgia: it is presently used to investigate the longitudinal beam dynamics for various operating points of the accelerator. Additional sensitive, high-resolution, screens made of laminated YaG were installed at key locations to improve the signal-over-noise ratio in our transverse emittance measurement stations. Finally, in collaboration with LBNL we have upgraded our control system, and most of the machine subsystems can now be operated from single LINUX-based workstations; this will render more efficient the data collection/analysis.

On the user experiments side, the plasma wake-field acceleration experiment (NIU/UCLA) has observed acceleration of electrons with an estimated average accelerating electric field larger than 100 MV/m. These measurements were generated from a single electron bunch used both to drive and probe the plasma wake-field. In an upgrade of the experiment based on two electron bunches, a (high charge) drive bunch followed by a (low charge) probe bunch has been commissioned and preliminary data were taken. This latter improvement will allow more detailed studies of the plasma wake-field acceleration scheme.

At the end of 2003, a new plasma wake-field experiment was installed by UCLA. The aim of this new experiment is to generate a ~1 MeV electron bunch based on self-trapping of plasma electrons using a steep plasma density transition. This proof-of-principle experiment should demonstrate the feasibility of plasma-based electron sources.

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.

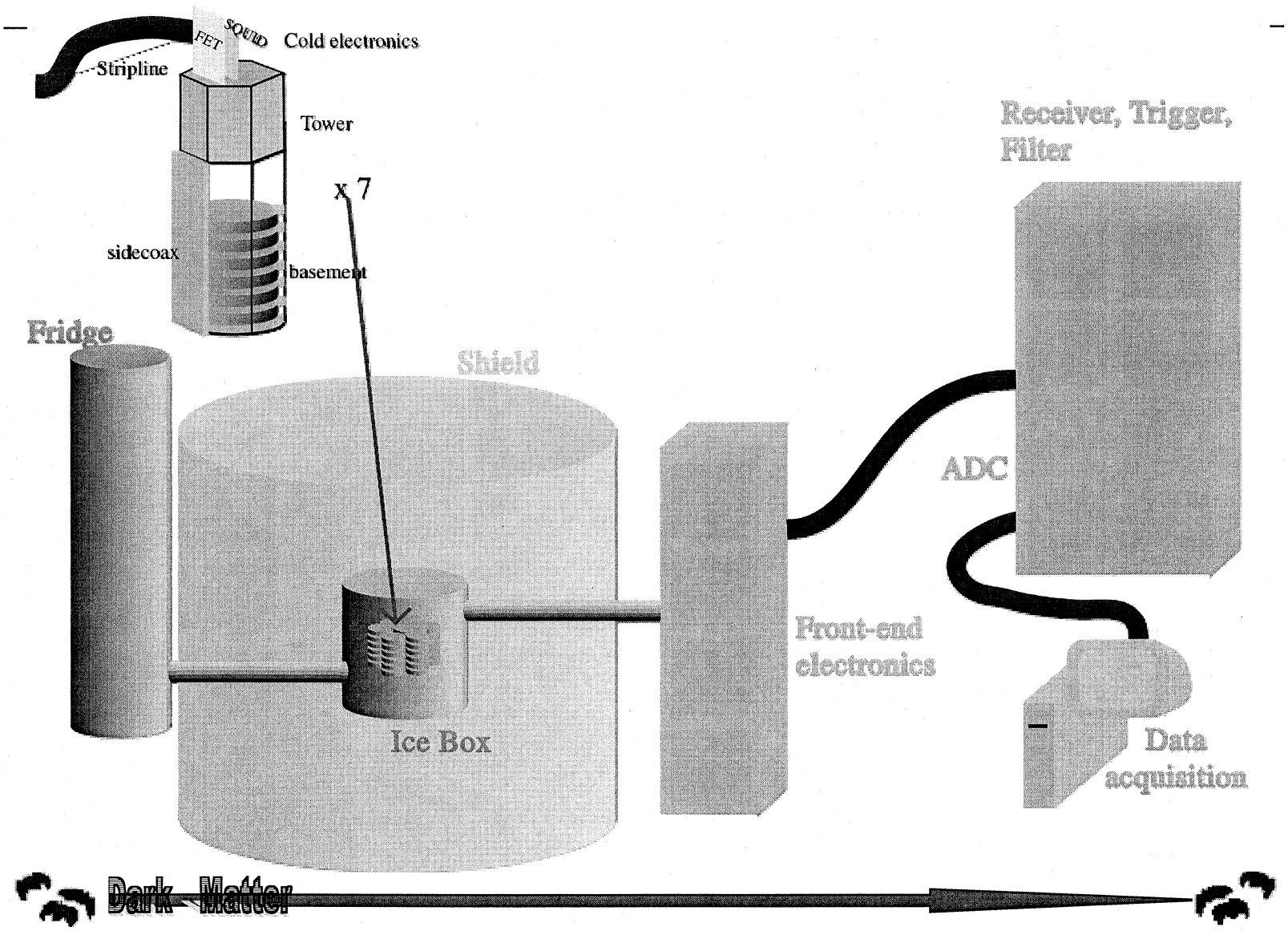
Notes on Sub-Picosecond Bunch Length Measurement at Fermilab A0/NICADD Photoinjector, D Mihalcea, preprint NICADD-0010 (2003).

Observation of Plasma-Wakefield Acceleration at FNPL, N. Barov, et al., to be submitted to Phys. Rev. Lett. (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.

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, LBNL, Minnesota, NIST/Boulder, Princeton, 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

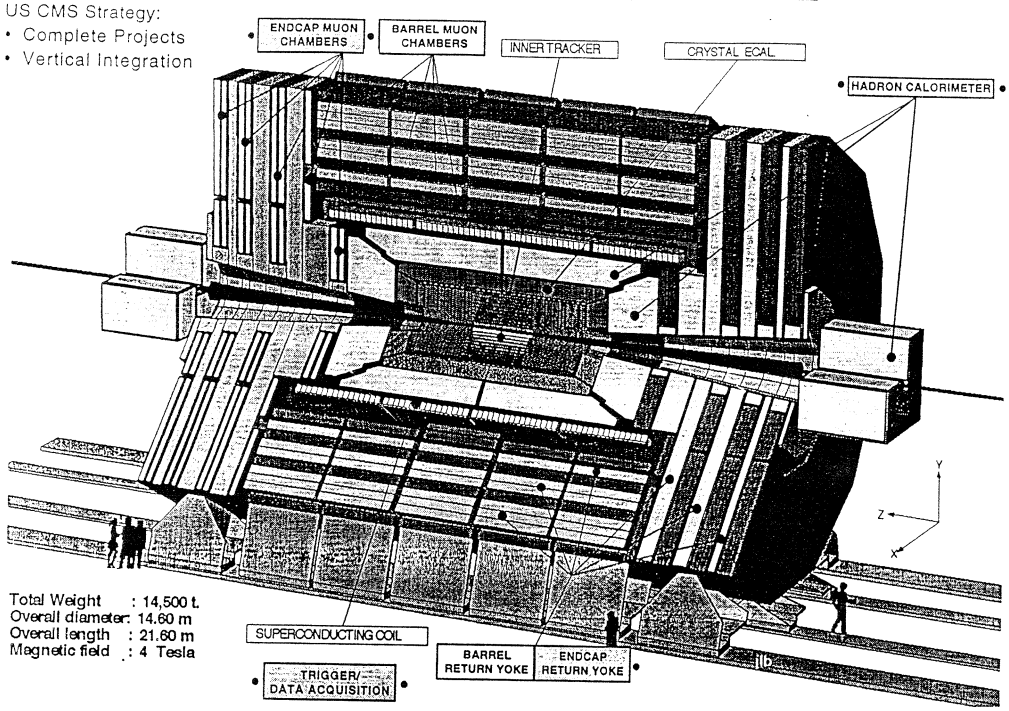
During 2003, we completed the installation and commissioning of CDMS II at the the Soudan Underground Laboratory in northern Minnesota. Prior to arrival of the Ge and Si detectors, the other systems (cryogenics, electronics, data acquisition, shielding, muon veto and analysis) were all installed and debugged. The first 12 detectors (two towers) were then installed and cooled to 50 mK. After a commissioning period, data-taking with the first tower of six detectors began in October. By the end of the year, we had accumulated approximately 50 live-days of data. Given that the data is taken at a much deeper site than CDMS I, we expect our sensitivity to WIMPS to be improved by a factor of 10 compared with our last run at Stanford. Physics results from this first Soudan data run should be available by summer 2004.

In early 2004, we expect to turn on the second tower and take data for about four months. Later in the year, we will install three additional detector towers, completing the full detector payload for CDMS II.

E-892

US CMS Management Responsibilities

US CMS Strategy:
- Complete Projects
- Vertical Integration

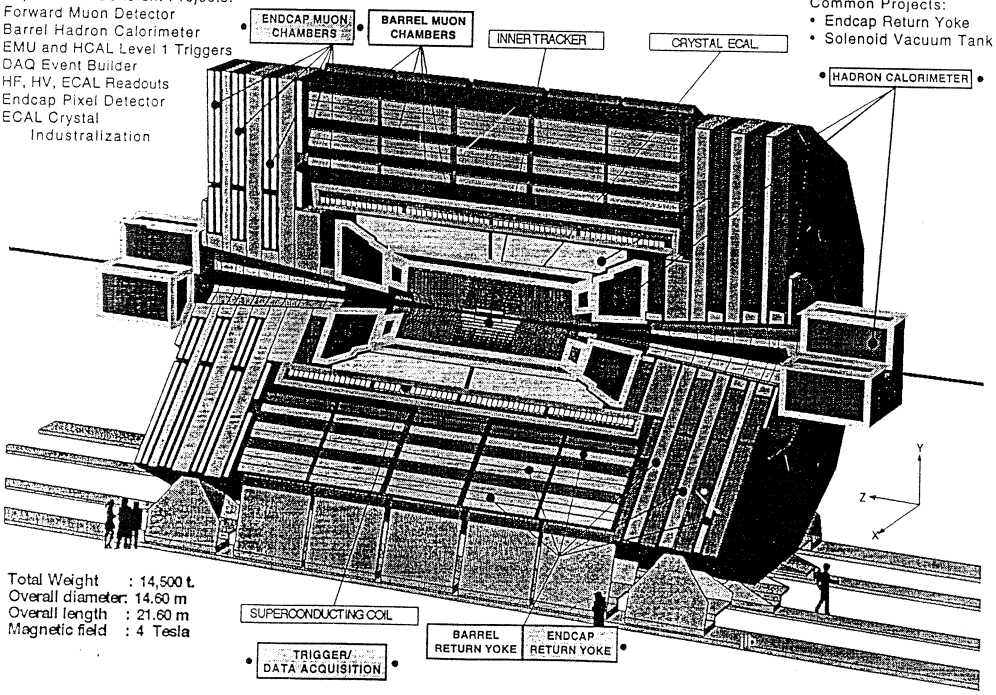


Total Weight : 14,500 t.
Overall diameter: 14.60 m
Overall length : 21.60 m
Magnetic field : 4 Tesla

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 Industralization

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 37 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 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 475 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, 30% from Russia and other non-member states, and 20% US groups. The US CMS Collaboration consists of about 400 physicists and engineers from 38 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 most subsystems have fabricated preproduction prototypes. The CMS Fermilab group is heavily involved in test beam R&D, in engineering design, and in detector construction.

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.

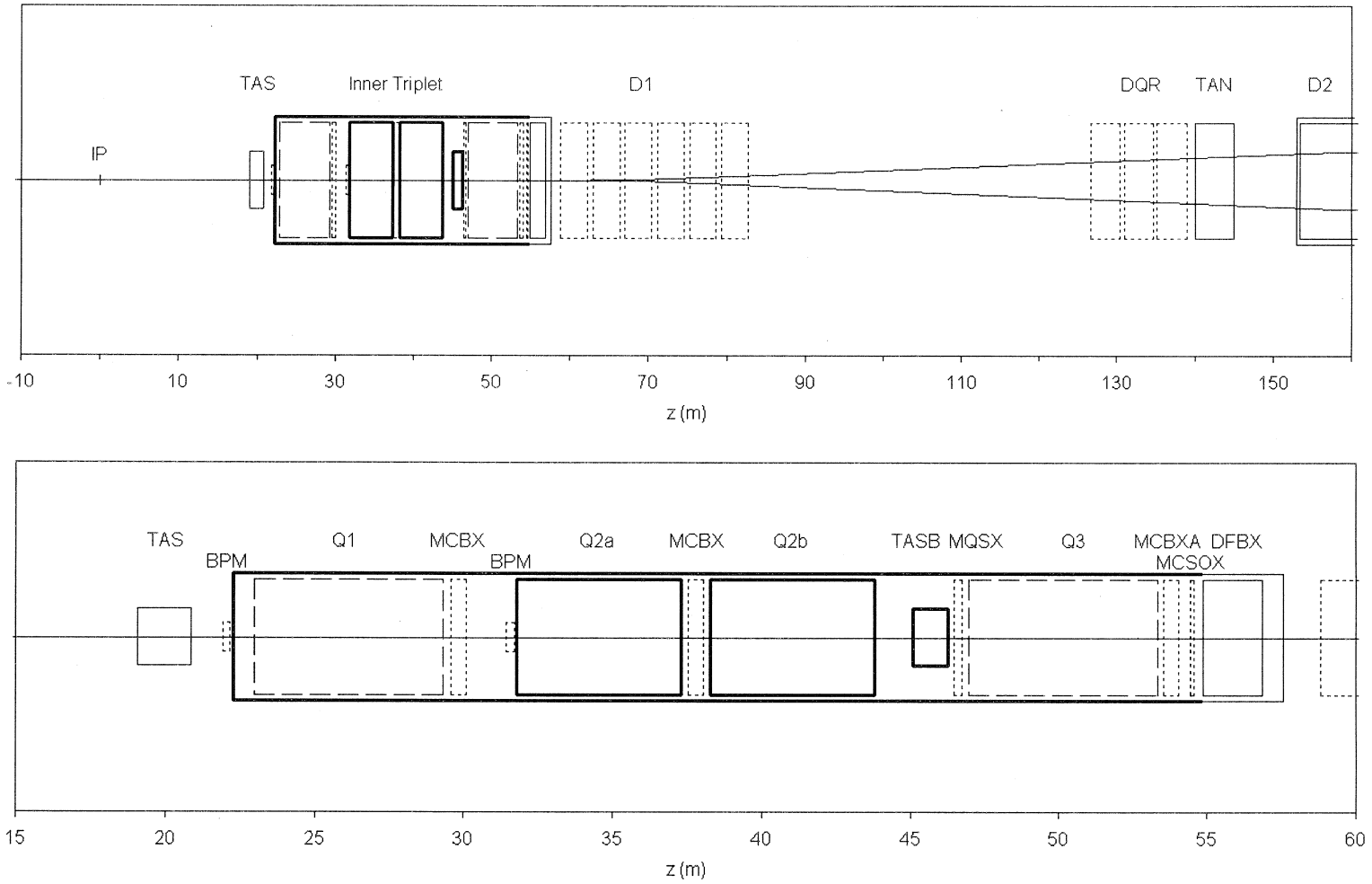
In turn, working on CMS will enhance the art of detector building in the US, especially in the demanding environment found in high-luminosity hadron colliders. The operational experience obtained at CDF and D0 is crucial in ensuring a realistic detector design for CMS. In addition, the use of Fermilab 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 HCAL, EMU, the trigger, and the software/computing subsystems.

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.



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 (Strait) 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. In addition, these quadrupoles, or ones very much like them, can be used to upgrade the Tevatron Collider.

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 under way. The first Q2 assembly[5], made of two quadrupoles and a correction magnet in a common cryostat, is complete, the second is nearing completion, and quadrupoles for two of the remaining seven Q2 assemblies are in production. The quench performance of the first production Q2's are shown in Fig. 2. (Q2B in LQXB02 appears to have damaged superconductor, which is under investigation.) The first CERN-provided correction coils and KEK-provided quadrupoles are at Fermilab. Delivery of the first inner triplet to CERN is expected to take place by the end of 2004, and the final delivery is scheduled for early 2005, comfortably ahead of the LHC installation plan.

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. R. Bossert et al., Test Results from the LQXB Quadrupole Production Program at Fermilab for the LHC Interaction Regions, presented at MT-18, October 2003, Morioka, Japan.

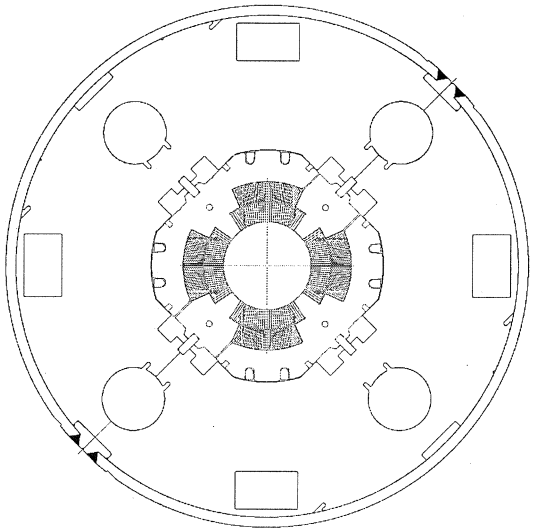


Figure 1. Cross-section of the LHC interaction region quadrupole under development at Fermilab.

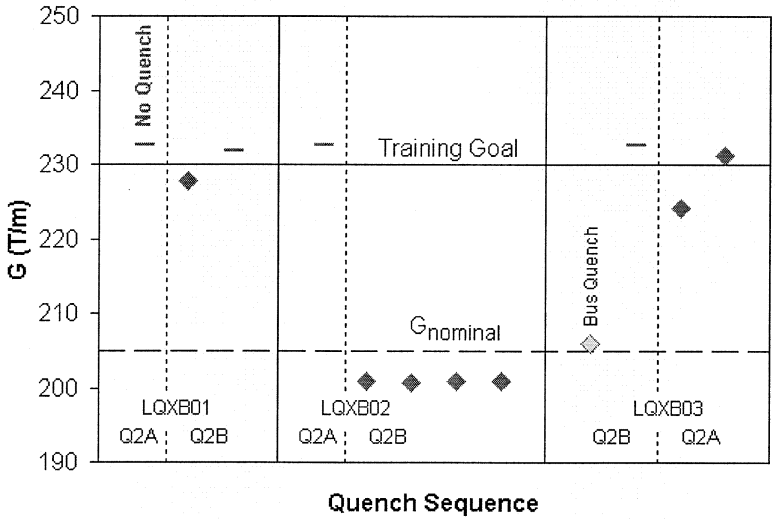
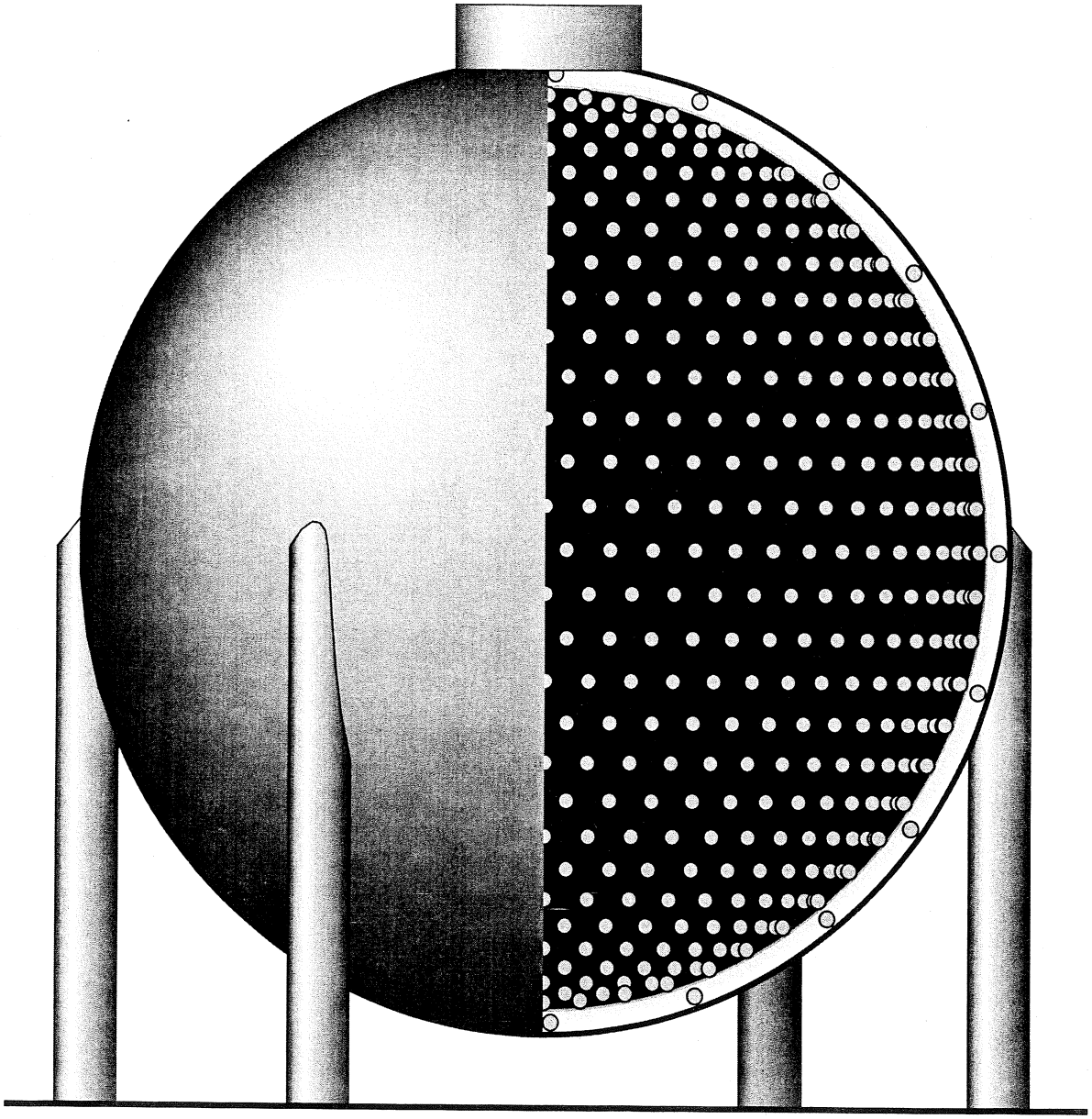


Figure 2. Quench performance of production quadrupoles.

E-898



Schematic drawing of the BooNE spherical tank

E-898 (Conrad / Louis) Booster Neutrino Experiment

Alabama, Bucknell, Cincinnati, Colorado, Columbia, Embry Riddle, Fermilab, Indiana, LANL, Louisiana State, Michigan, Princeton

Status: *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.

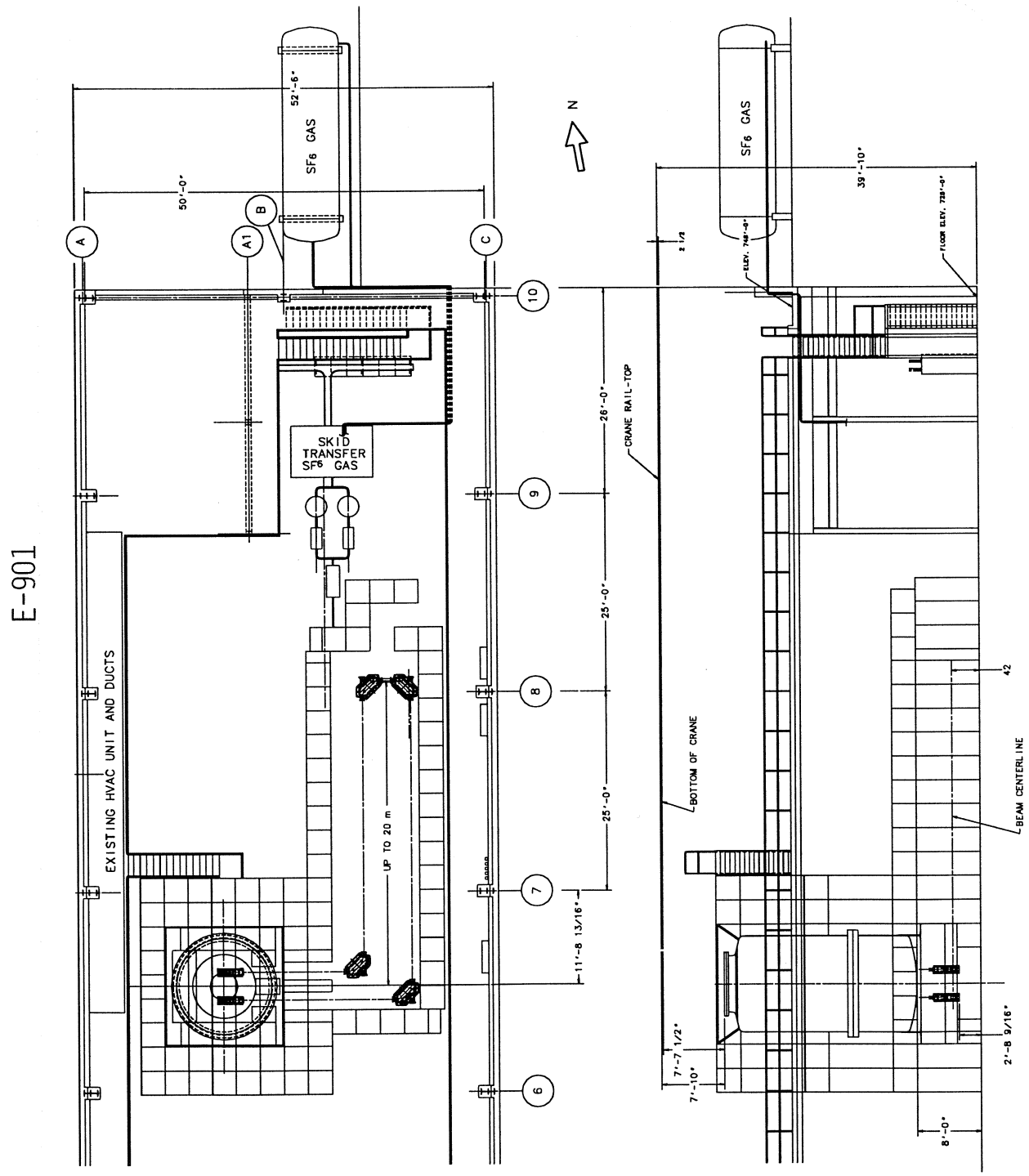
The detector consists of a spherical tank 20 feet in radius, as shown in the accompanying figure. An inner structure at 5.7 m radius supports 1280 8-inch phototubes (10% coverage) pointed inward and optically isolated from the outer region of the tank. The vessel is filled with 800 t of mineral oil, 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 December 2003, over 160,000 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 3 pulses per second, which is within a factor of about two of our

goal. During the summer 2003 shutdown, improvements were made to the Booster, including the installation of three Booster collimators, which should allow us to reach our Booster intensity goal.

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 are expected in 2004, while the first oscillation results should be ready in 2005.


E-901
SF6 GAS
52'-6"
50'-0"
A
A1
B
C
10
9
8
7
6
N
SKID TRANSFER SF6 GAS
EXISTING HVAC UNIT AND DUCTS
UP TO 20 m
26'-0"
25'-0"
25'-0"
11'-8 13/16"
CRANE RAIL-TOP
BOTTOM OF CRANE
BEAM CENTERLINE
42
2'-8 9/16"
7'-7 1/2"
7'-10"
8'-0"
39'-10"
FLOOR ELEV. 738'-0"
ELEV. 748'-8"
2 1/2

E-901 (Nagaitsev) Recycler Medium Energy Electron Cooling Experiment

Fermilab, Indiana, JINR (Russia), Rochester

Status: *Data-Taking*

The purpose of this experiment is to study the technical issues surrounding the implementation of electron cooling in the Recycler. A 5-MeV kinetic energy Pelletron accelerator will be constructed and operated to perform this research.

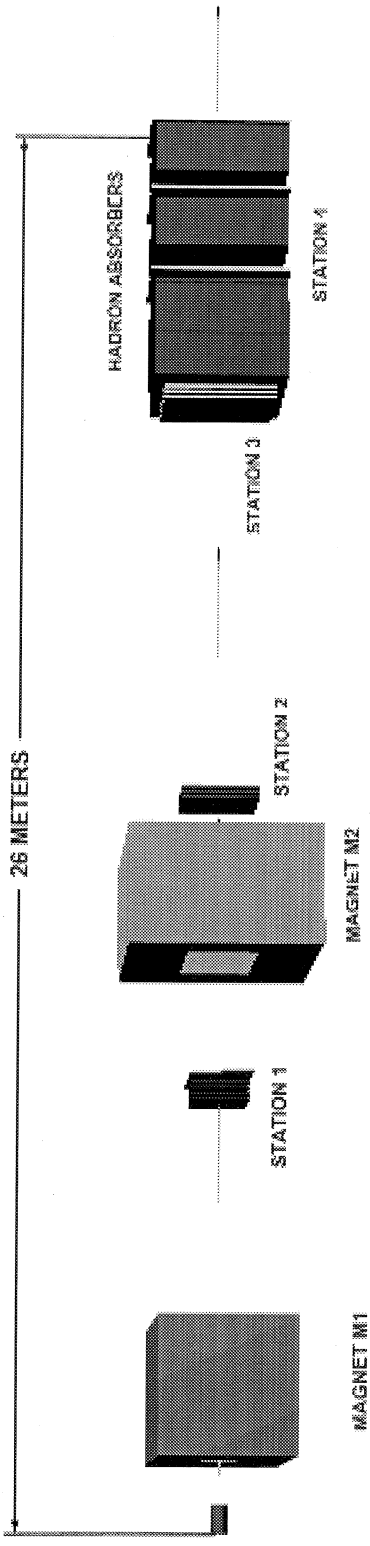
The research will be concentrated on the effects of solenoidal magnetic field and high beam currents on beam recirculation stability. A layout of the Pelletron installation is shown in the accompanying figure. It is approximately 24 ft long and 12 ft in diameter. Associated with the Pelletron is an SF_6 gas handling system composed of vacuum pumps, dryers, compressors, and heat exchangers. The high-voltage terminal is charged to 5 MV using a charging chain system.

The plan is to have an accelerator installed and operated in a radiation enclosure. At the Wideband Photon Laboratory (WPL), the floor of the experimental pit is sufficiently shielded and interlocked. An additional safety concern is the oxygen deficiency hazard posed by the heavy and inert SF_6 gas used as a dielectric in the Pelletron. If a leak occurred, approximately 8,300 cu ft of air would be displaced at the floor of the enclosure housing the Pelletron.

The experiment received its final safety approval ("beam permit") in April 2001 and began operations in May 2001. It is currently taking data.

It is expected that this experiment will run until electron cooling has been installed in the Recycler itself. At present, April 2004 is the anticipated date for this transition.

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, 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.

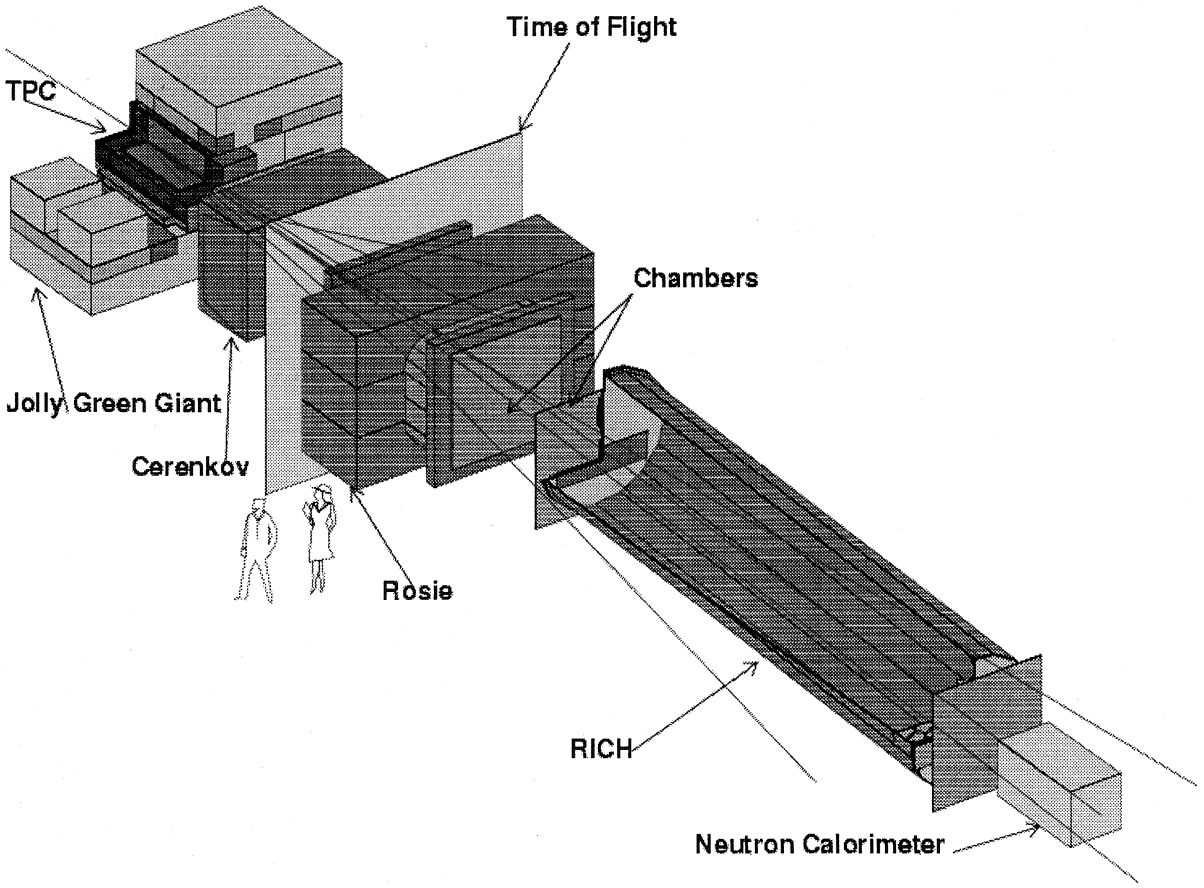
The apparatus is a two-magnet spectrometer. The upstream magnet focuses the muon pair into the detector and sweeps other particles produced in the collision out of the way. Inside this magnet will be a large wall of material, through which the muons are able to pass, and in which other particles will

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, LLNL, Michigan, Purdue, South Carolina, Virginia

Status: *No Data Yet*

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.

MIPP data using nitrogen as a target will help us understand the behavior of atmospheric cosmic ray showers better and control the systematics involved in atmospheric neutrino measurements at detectors such as Super-K. Particle production from the full MINOS target can be 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. MIPP production measurements will also benefit the neutrino factory by enabling the calculation of the flux of muons collected to higher accuracy. 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.

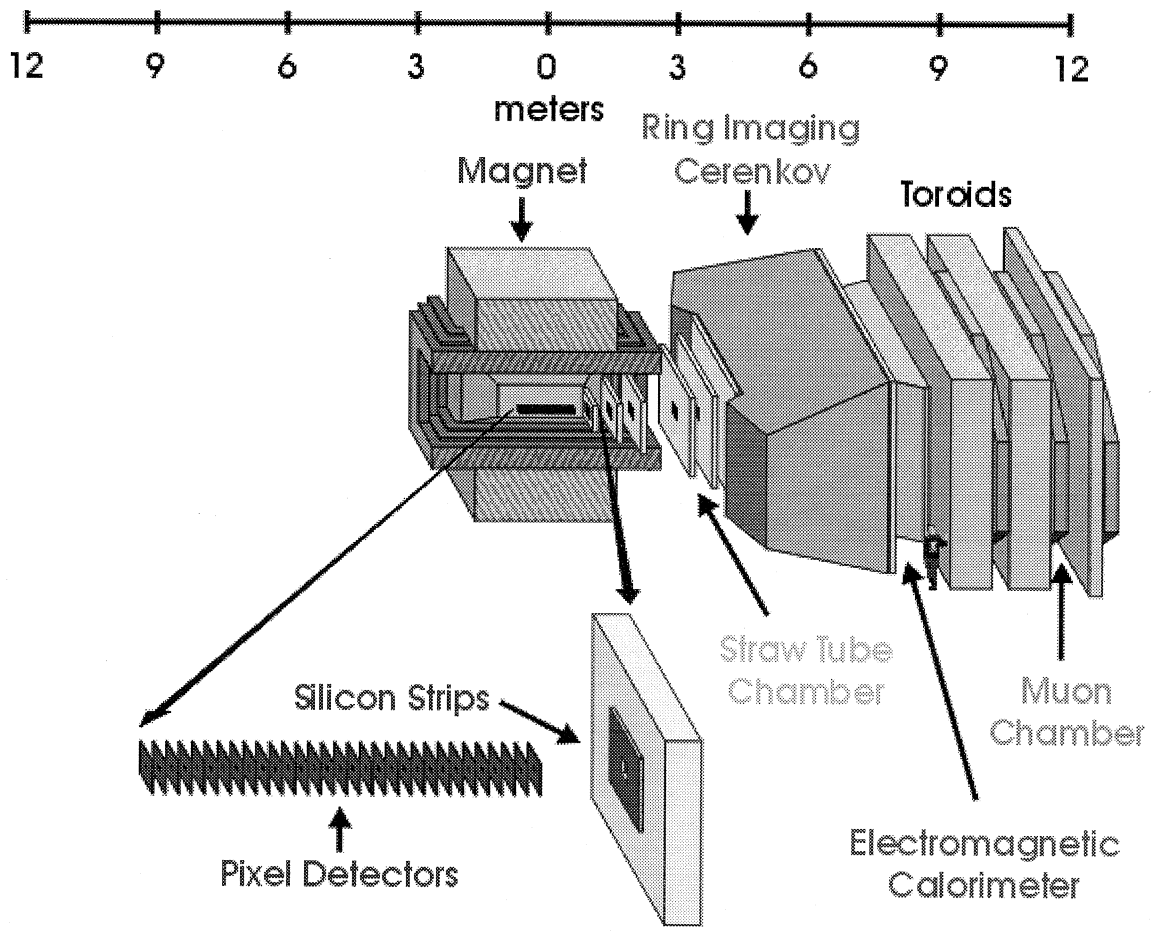
Finally, proton-nucleus cross sections from MIPP can be used to pin down the scattering models used in proton radiography. Proton radiography can be briefly described as being similar to a CAT scan using protons as a probe and is of relevance to the nuclear stockpile stewardship program of the nation.

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 the experiment to be ≈$1.5 million. The data acquisition system for the experiment is being rewritten with the help of expertise provided by the Computing Division. Fermilab has agreed to build the beamline for the experiment and make the requisite amount of running time available. Funding for putting the experiment together comes from other sources, primarily from Lawrence Livermore National Laboratory.

Current Status

Installation of the MIPP experiment should be completed in December 2003. We expect secondary beams in the Meson Area in December 2003 and to run in 2004.

E-918


12
9
6
3
0
3
6
9
12
meters
Magnet
Ring Imaging
Cerenkov
Toroids
Straw Tube
Chamber
Muon
Chamber
Silicon Strips
Pixel Detectors
Electromagnetic
Calorimeter

E-918 (Butler / Stone) A Measurement of Mixing, CP Violation and Rare Decays in Charm and Beauty Particle Decays at the Fermilab Collider - BTeV

Belarussian State (Belarus), UC/Davis, Colorado, Fermilab, Florida, INFN/Frascati (Italy), Houston, IHEP/Protvino (Russia), IIT, Illinois, Insubria (Italy), Iowa, INFN/Milano (Italy), Minnesota, Nanjing (China), New Mexico State, Northwestern, Ohio State, INFN/Pavia (Italy), Pennsylvania, Puerto Rico/Mayaguez, Shandong (China), Southern Methodist, Syracuse, Tennessee, UST (China), Vanderbilt, Virginia, Wayne State, Wisconsin, York (Canada)

Status: *No Data Yet*

BTeV, originally approved in June 2000, was re-approved in April 2002 with a one-arm rather than two-arm detector. The experiment will study CP violation, mixing and rare decays in the b and c quark systems using 2 TeV proton-antiproton collisions with a forward spectrometer located in the C0 interaction region.

We live in a world composed almost completely of matter. Current theories that address the origin of the Universe, "big bang" theories, all start with vacuum fluctuations that produce equal amounts of matter and antimatter. Violation of CP symmetry is a necessary element of any explanation of how the antimatter disappeared.

CP violation in weak decays was first demonstrated in 1964 in the decays of the neutral K_L meson. While the "Standard Model" of elementary particle physics has within it a mechanism for generating CP violation, it is by no means clear that the Standard Model mechanism accounts for all of the observed effect. Furthermore, the Standard Model has many fundamental parameters with no explanation of the relationships between them, which strongly suggests that it is incomplete and that there is new physics waiting to be discovered. Making a broad range of very precise measurements of CP violation in b decays is a wonderful way of both finding "new physics" and also identifying the kind of "new physics" by its subtle effects not only on CP violation but also on rare interactions. CP violation is expected to be very small in charm decays. Finding CP violation or mixing at larger than expected levels would almost certainly be driven by new physics. If the Standard Model does prove to explain this and other phenomena in weak decays, precise measurements of the parameters could point us to understanding the relations among the fundamental parameters and may still point us to an understanding beyond the model.

The total b cross section at the Tevatron is ~100 μb. With a machine luminosity of $2\times10^{32}cm^{-2}s^{-1}$, we expect ~$4\times10^{11}$ b's in a "Snowmass" year of running (10^7s). This is a large sample of b's that allows precision measurements of B_s mixing, the CP violating angles α, β and γ, rare decay branching ratios, and CP

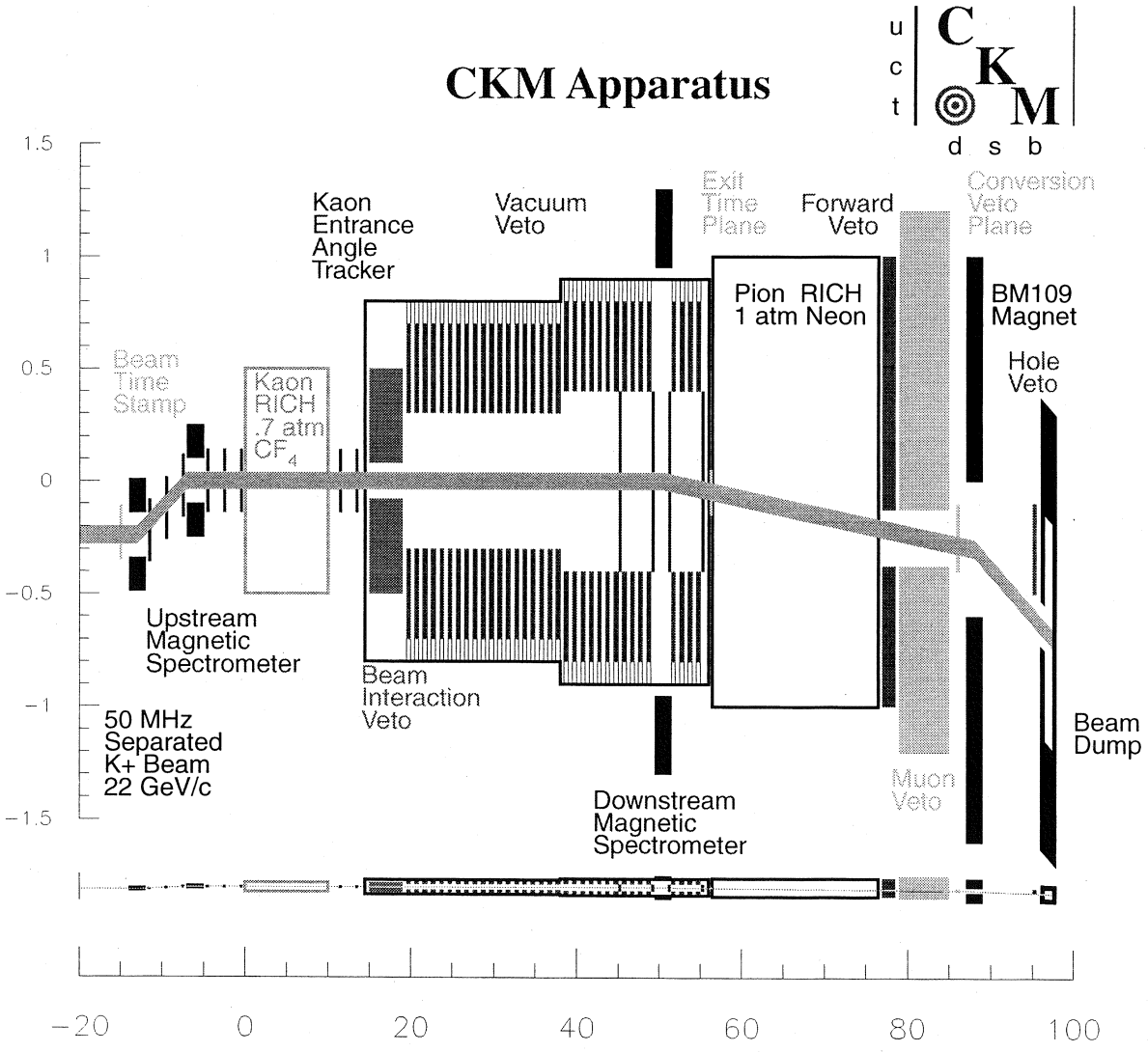
violation in rare decays. Charm production is ~10 times higher than b production and we can search for CP violation and mixing in this sector as well.

BTeV has chosen the "forward" detector geometry shown in the accompanying figure. There are several important advantages in this scheme that must be exploited to overcome the 500 times larger background rate for ordinary collisions than b collisions. In order to extract the b signal we need an efficient trigger that rejects most of the background. To help triggering it is important to get the b's to move at large momentum to defeat multiple scattering. The forward direction naturally selects fast b's.

For the first-level trigger, we use the presence of evidence for secondary vertices, which provides high efficiency for a broad range of b-decays while achieving excellent rejection of light quark events. To provide the best possible input to triggering and to achieve excellent proper time resolution required to follow the very rapid oscillations of the B_s meson, we use a vertex detector based on silicon pixels. Another crucially important advantage of the forward direction is that it allows space for charged hadron identification using a Ring Imaging Cherenkov detector (RICH). The RICH allows us to virtually eliminate the background in many important decay modes. For example, we reject the ~15 times larger $B_s \rightarrow D_s \pi^-$ background from $B_s \rightarrow D_s K^-$. Finally, instrumenting the forward region inherently costs less than a cylindrical detector for the central region, thus allowing us to be able to afford a state-of-the-art electromagnetic calorimeter based on lead-tungstate crystals which will permit reconstruction of η's, π^0's and single photons even in the difficult environment of the Tevatron.

Current activities include completion of detector R&D and final baseline design, continuation of our detailed program of detector and physics simulations. We expect to be taking data in 2007-2008. More information can be found at http://www-btev.fnal.gov.

E-921


CKM Apparatus
u
c
t
C K M
d s b
Kaon Entrance Angle Tracker
Vacuum Veto
Exit Time Plane
Forward Veto
Conversion Veto Plane
Pion RICH 1 atm Neon
BM109 Magnet
Hole Veto
Beam Time Stamp
Kaon RICH .7 atm CF_4
Upstream Magnetic Spectrometer
Beam Interaction Veto
50 MHz Separated K+ Beam 22 GeV/c
Downstream Magnetic Spectrometer
Muon Veto
Beam Dump
1.5
1
0.5
0
−0.5
−1
−1.5
−20
0
20
40
60
80
100

E-921 (Cooper) Charged Kaons at the Main Injector – CKM

BNL, Colorado, Fermilab, IHEP/Protvino (Russia), INR/Troitsk (Russia), Michigan, San Luis Potosi (Mexico), South Alabama, Texas/Austin, Virginia

Status: *No Data Yet*

CKM (Charged Kaons at the Main Injector) is an experiment to measure the branching ratio of the ultra-rare charged-kaon decay $K^+ \rightarrow \pi^+ \nu\bar{\nu}$ by observing a large sample of these decays (~100) with small background (< 10). The physics goal we obtain from this is a measurement of the magnitude of the Cabibbo, Kobayashi, Maskawa matrix element $|V_{td}|$ with a statistical precision of about 5%.

This measurement will play a critical role in testing the Standard Model hypothesis that the sole source of CP violation in nature resides in the imaginary parts of the V_{td} and V_{ub} Cabibbo, Kobayashi, Maskawa matrix elements. Attacking this question in the kaon sector is both experimentally and theoretically independent of the ongoing programs to measure these same parameters in the B meson sector. Each sector provides an independent test of the Standard Model description of CP violation. Both must measure the same parameters for that description to be correct. Such a parallel approach is critical to confirm, with confidence, both the Standard Model description of CP violation and the veracity of the individual measurements. The $K^+ \rightarrow \pi^+ \nu\bar{\nu}$ decay mode is regarded as the theoretically cleanest system in which to measure the magnitude of V_{td}. The only important uncertainty in the relationship between the branching ratio and $|V_{td}|$ is a small contribution from the charmed quark which depends upon the poorly known charmed quark mass.

Evidence for this decay mode has recently been published by the stopped-kaon decay experiment E787 at Brookhaven National Laboratory (BNL). They reported the observation of two events with an expected background of 0.15 ± 0.05 events based upon the complete data set taken in 1995-98. They quote a branching ratio of $[1.57^{+1.75}_{-0.82}] \times 10^{-10}$ which is consistent with the current Standard Model prediction of $[0.75 \pm 0.29] \times 10^{-10}$.

The challenge of this measurement is clearly experimental. We require the apparatus to control all backgrounds to less than the 10^{-11} level in branching ratio in order to reliably measure this kinematically unconstrained decay. To achieve a two order-of-magnitude increase in sensitivity per year of data-taking while maintaining excellent control of all backgrounds requires an apparatus with much higher rate capabilities than has been achieved in the BNL experiment. This led us to a decay-in-flight experiment, in contrast to the stopped-kaon technique used at BNL.

In addition to the paramount goal of measuring the $K^+ \rightarrow \pi^+ \nu\bar{\nu}$ branching ratio, we also plan a series of other measurements of rare charged-kaon decay

properties using the CKM apparatus. The high rate capabilities and redundant measurement capabilities of the CKM spectrometer will make it well suited to such a program of measurements.

A critical new feature of this experiment is a separated K^+ beamline based on superconducting RF cavities operating in a transverse deflecting mode at 3.9 GHz. This SCRF system is a major new development based upon the 1.3 GHz accelerating mode SCRF cavities developed at DESY for the TESLA project. A major effort is underway in the Fermilab Beams Division, in collaboration with the CKM experiment, to develop the cavities and associated beamline. The goal is a 70% pure debunched K^+ beam at 22 GeV/c with a flux of 50 MHz over the 1-second Main Injector slow spill.

The experimental apparatus is shown in the figure. We will use detectors that are well established in performance and reliability, very high performance veto systems and with redundant measurements made for charged particles. There are high-rate multi-wire proportional chambers to measure the incident kaon trajectory and vector momentum and low-mass straw tube chambers operating in the decay volume vacuum to measure the downstream charged-pion trajectory and vector momentum. Redundantly, we will measure the vector velocity of the charged kaon and pion using very high-rate velocity spectrometers based on phototube ring-imaging Cerenkov detectors. The remainder of the detectors is a set of veto systems for photons, muons and electrons. All of these vetos will be scintillator sandwiched with lead or steel and read out with phototubes. Timing measurements with 1 nsec precision will be made for all detector signals coming from the experiment.

CKM received first stage approval in June 2001. We have moved into a detector prototyping phase which will lead to a full technical design report. The first SCRF cavities have been fabricated and tested, achieving nearly twice the required field strength in the first 1-cell prototype. A muon veto prototype has been completed and tested at IHEP in Protvino. Prototypes of the upstream proportional chambers are under design and construction at Virginia. A series of small prototypes for the straw tubes have been built at Fermilab leading to a prototype which will operate in a test beam while under vacuum. San Luis Potosi has identified potential vendors for phototubes and accepted the first prototype mirrors for the RICH detectors. There is active work at Fermilab, BNL, and IHEP on aspects and components of a prototype photon veto module. We have successfully tested this prototype in an electron test beam with very high electron tagging efficiency in the summer of 2002 to demonstrate the single photon inefficiency requirement.

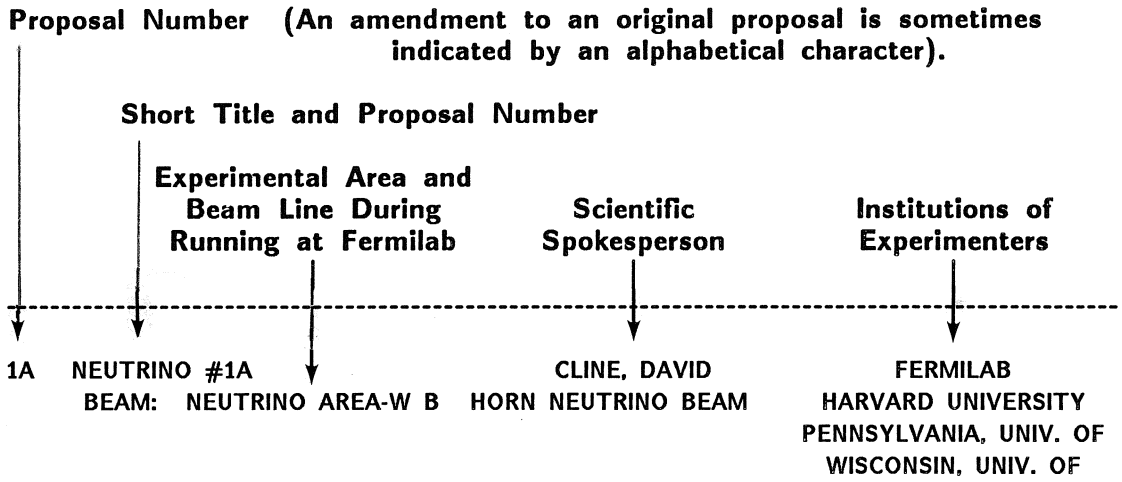
SECTION VIII. MASTER LIST OF PROPOSALS

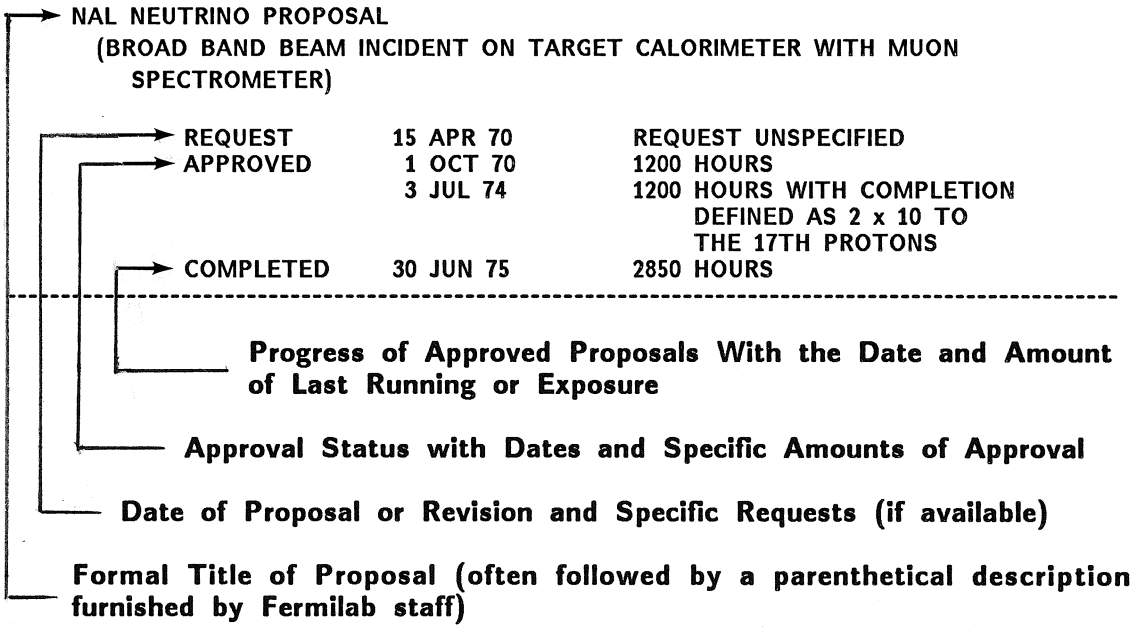
The Master List of proposals contains an entry for each proposal submitted to Fermilab; a typical entry is explained on the next page. In addition to the formal title of the proposal and a brief parenthetical explanation, the name of the spokesperson and a list of participating institutions are included. 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 - 934 ... Total number of approved & pending proposals - 462

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; FERMILAB; LAWRENCE BERKELEY LABORATORY

BEAM: Neutrino Area - 30 in. Hadron Beam
STUDY OF PI- + P INTERACTIONS AT HIGH ENERGY..

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; UNIVERSITY OF ROCHESTER

BEAM: Neutrino Area - 30 in. Hadron Beam
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; FERMILAB; IOWA STATE UNIVERSITY; UNIVERSITY OF MARYLAND; MICHIGAN STATE UNIVERSITY

BEAM: Neutrino Area - 30 in. Hadron Beam
STUDY OF PP INTERACTIONS IN THE ANL 30-INCH HYDROGEN BUBBLE CHAMBER AT NAL.

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; OAK RIDGE NATIONAL LABORATORY

BEAM: Neutrino Area - Miscellaneous
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; CASE WESTERN RESERVE UNIVERSITY
BEAM: Neutrino Area - 30 in. Hadron Beam
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); UNIVERSITY OF OTTAWA (CANADA)
BEAM: Meson Area - Miscellaneous
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; FERMILAB; 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
BEAM: Neutrino Area - 30 in. Hadron Beam
TEST OF PROPORTIONAL WIRE CHAMBERS IN HYBRID SYSTEMS.

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; LHE, ETH HONGGERBERG (SWITZERLAND); UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M4 Beam
COHERENT K-SHORT REGENERATION BY ELECTRONS.

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; UNIVERSITY OF ROCHESTER

BEAM: Neutrino Area - 30 in. Hadron Beam
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); UNIVERSITY OF BELGRADE(YUGOSLAVIA); IAP, BUCHAREST (ROMANIA); CRN, STRASBOURG (FRANCE); 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)

BEAM: Neutrino Area - Miscellaneous
300 GEV (AND 400 GEV) PROTON INTERACTIONS IN NUCLEAR EMULSION.

Request	16 Jul, 73	Emulsion Exposure	
Approval	16 Aug, 73	Emulsion Exposure	
Completed	20 Oct, 73	8 Stack(s)	

234 **15-FOOT ENGINEERING RUN #234** — Fred Russell Huson — FERMILAB; FLORIDA STATE UNIVERSITY

BEAM: Neutrino Area - 15 ft. Hadron Beam
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; TUFTS UNIVERSITY; UNIVERSITY OF WASHINGTON

BEAM: Meson Area - M1 Beam
A PROPOSAL TO EXPLORE THE LARGE-PT DOMAIN: INCLUSIVE CROSS SECTIONS AND POSSIBLE JET STRUCTURE.

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
BEAM: Neutrino Area - Dichromatic — FERMILAB
STUDIES OF DEEP INELASTIC DIFFERENTIAL DISTRIBUTIONS AT HIGH ENERGIES FOR NEUTRINO AND ANTI-NEUTRINO BEAMS. — UNIVERSITY OF ROCHESTER, ROCKEFELLER UNIVERSITY
(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
BEAM: Meson Area - M2 Beam — UNIVERSITY OF MICHIGAN - ANN ARBOR
A PROPOSAL TO SEARCH FOR CHARMED PARTICLES AND MEASUREMENTS OF TWO-PARTICLE INCLUSIVE CROSS SECTIONS AT LARGE P-TRANSVERSE. — PURDUE UNIVERSITY
(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
BEAM: Proton Area - East — CORNELL UNIVERSITY
DI-MUON PRODUCTION BY NEUTRONS. — FERMILAB, UNIVERSITY OF HAWAII AT MANOA, UNIVERSITY OF ILLINOIS, CHAMPAIGN

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
BEAM: Meson Area - M2 Beam — UNIVERSITY OF MINNESOTA
PRECISION MEASUREMENT OF LAMBDA BETA DECAY PARAMETERS. — RUTGERS UNIVERSITY
(Will run with experimental set-up for neutral hyperon #8.) — UNIVERSITY OF WISCONSIN - MADISON

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
BEAM: Internal Target Area (C-0) — IMPERIAL COLLEGE (ENGLAND)
A PROPOSAL TO SEARCH FOR CHARMED PARTICLE PRODUCTION NEAR THRESHOLD. — UNIVERSITY OF ROCHESTER, RUTGERS UNIVERSITY

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)
BEAM: Meson Area - M3 Beam — FERMILAB
STUDY OF HEAVY, NARROW MESONS USING A MASS-FOCUSING SPECTROMETER. — MICHIGAN STATE UNIVERSITY, OHIO STATE UNIVERSITY
(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
BEAM: Neutrino Area - Muon/Hadron Beam — HARVARD UNIVERSITY
A SEARCH FOR CHARMED PARTICLES. — UNIVERSITY OF ILLINOIS, CHAMPAIGN
(Using the spectrometer originally developed for exp #98.) — MAX-PLANCK INSTITUTE (GERMANY), TUFTS UNIVERSITY

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
BEAM: Neutrino Area - Quadrupole Triplet — HARVARD UNIVERSITY
CONTINUED SEARCH FOR NEW PARTICLE PRODUCTION USING THE EXP #1A DETECTOR. — UNIVERSITY OF PENNSYLVANIA, UNIVERSITY OF WISCONSIN - MADISON

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 — 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

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	

706 **DIRECT PHOTON PRODUCTION #706** — Paul F. Slattery

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

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

707 **SIGMA MINUS BETA DECAY #707** — Peter S. Cooper

UNIVERSITY OF CHICAGO
FERMILAB
IOWA STATE UNIVERSITY
UNIVERSITY OF IOWA
PNPI, ST. PETERSBURG (RUSSIA)
YALE UNIVERSITY

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	

708 **ELECTRON TARGET FACILITY #708** — Wonyong Lee

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

BEAM: Collision Area (D-0)
ELECTRON-PROTON INTERACTION EXPERIMENT
(Supercedes proposal #659.)

Request	25 Nov, 81	Unspecified
Inactive	23 Jun, 82	

709 **FORWARD DETECTOR #709** — Michael J. Longo

UNIV. OF ILLINOIS, CHICAGO CIRCLE
UNIVERSITY OF MICHIGAN - ANN ARBOR

BEAM: Collision Area (D-0)
PROPOSAL FOR A FORWARD DETECTOR FOR THE D0 AREA

Request	11 Jan, 82	Unspecified
Rejected	23 Jun, 82	

710 **TOTAL CROSS-SECTION #710** — Jay Orear and Roy Rubinstein

UNIVERSITY OF BOLOGNA (ITALY)
CORNELL UNIVERSITY
FERMILAB
GEORGE MASON UNIVERSITY
UNIVERSITY OF MARYLAND
NORTHWESTERN UNIVERSITY

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

711 **CONSTITUENT SCATTERING #711** — David A. Levinthal

ARGONNE NATIONAL LABORATORY
FERMILAB
FLORIDA STATE UNIVERSITY
UNIVERSITY OF MICHIGAN - ANN ARBOR

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

712 **MUON PRODUCTON #712** — Patrick D. Rapp

FERMILAB
GEORGE MASON UNIVERSITY

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	

713 **HIGHLY IONIZING PARTICLES #713** — P. Buford Price

UNIV. OF CALIFORNIA, BERKELEY
HARVARD UNIVERSITY

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

714 **LARGE ANGLE PARTICLE #714** — Paul D. Grannis

BROOKHAVEN NATIONAL LABORATORY
BROWN UNIVERSITY
COLUMBIA UNIVERSITY
FERMILAB
MICHIGAN STATE UNIVERSITY
SUNY AT STONY BROOK

BEAM: Collision Area (D-0)
LARGE ANGLE PARTICLE D0 GROUP

Request	5 Feb, 82	Unspecified
Rejected	1 Jul, 83	

715 **SIGMA BETA DECAY #715** — Peter S. Cooper

UNIVERSITY OF CHICAGO
ELMHURST COLLEGE
FERMILAB
IOWA STATE UNIVERSITY
UNIVERSITY OF IOWA
PNPI, ST. PETERSBURG (RUSSIA)
YALE UNIVERSITY

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

716 **BEAM DUMP #716** — Byron P. Roe

FERMILAB
UNIVERSITY OF FIRENZE (ITALY)
UNIVERSITY OF MICHIGAN - ANN ARBOR
UNIVERSITY OF WISCONSIN - MADISON

BEAM: Meson Area - M2 Beam
PROPOSAL FOR FURTHER BEAM DUMP NEUTRINO RUNNING

Request	9 Feb, 82	Unspecified
Rejected	23 Jun, 82	

717 **FORWARD DETECTOR #717** — Joseph Lach

FERMILAB

BEAM: Collision Area (D-0)
A FORWARD LOOKING DETECTOR FOR THE D0 AREA.

Request	19 Mar, 82	Unspecified
Rejected	23 Jun, 82	

718 **CALORIMETERS AT D-0 #718** — Albert R. Erwin

ARGONNE NATIONAL LABORATORY
UNIVERSITY OF ARIZONA
FERMILAB
UNIVERSITY OF PENNSYLVANIA
UNIVERSITY OF WISCONSIN - MADISON

BEAM: Collision Area (D-0)
STUDY OF PBAR-P INTERACTIONS USING CALORIMETERS AT D-0.

Request	1 Apr, 82	Unspecified
Rejected	23 Jun, 82	

719 **ELECTRON TARGET FACILITY #719** — Wonyong Lee

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	

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** — John P. Schiffer

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

ARGONNE NATIONAL LABORATORY
FERMILAB

---

721 **CP VIOLATION #721** — Jerome L. Rosen

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

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** — V. Paul Kenney

BEAM: Collision Area (D-0)
STREAMER CHAMBER EXPERIMENT AT THE TEVATRON COLLIDER.

Request	11 Oct, 82	Unspecified
Inactive	18 Feb, 83	

UNIVERSITY OF CAMBRIDGE (ENGLAND)
NOTRE DAME UNIVERSITY

---

723 **GRAVITATIONAL DETECTOR #723** — Adrian Melissinos

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

FERMILAB
UNIVERSITY OF ROCHESTER

---

724 **CALORIMETRIC DETECTOR #724** — Michael J. Longo

BEAM: Collision Area (D-0)
COMPLETE CALORIMETRIC DETECTOR FOR THE D-0 AREA.

Request	26 Oct, 82	Unspecified
Rejected	1 Jul, 83	

CALIFORNIA INSTITUTE OF TECHNOLOGY
UNIV. OF ILLINOIS, CHICAGO CIRCLE
MCGILL UNIVERSITY (CANADA)
UNIVERSITY OF MICHIGAN - ANN ARBOR
NOTRE DAME UNIVERSITY

---

725 **DIFFRACTION DISSOCIATION #725** — Konstantin Goulianos

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	

ROCKEFELLER UNIVERSITY

---

726 **CALORIMETRIC DETECTOR #726** — Maris A. Abolins

BEAM: Collision Area (D-0)
PROPOSED CALORIMETRIC DETECTOR FOR THE D-0 AREA.

Request	1 Nov, 82	Unspecified
Rejected	1 Jul, 83	

UNIVERSITY OF ARIZONA
FERMILAB
MICHIGAN STATE UNIVERSITY
UNIVERSITY OF PENNSYLVANIA

---

727 **FORWARD CALORIMETER #727** — Jerome L. Rosen

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	

NORTHWESTERN UNIVERSITY

---

728 **MUON PRODUCTION #728** — Daniel R. Green

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	

UNIVERSITY OF ARIZONA
FERMILAB
FLORIDA STATE UNIVERSITY
UNIVERSITY OF MARYLAND
VIRGINIA TECH

---

729 **EMULSION/PROTONS @ 1 TEV #729** — Atul Gurtu

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)

TATA INSTITUTE (INDIA)

---

730 **EMULSION/SIGMA-MINUS @ 250 #730** — Richard J. Wilkes

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

INP, KRAKOW (POLAND)
INST.FOR NUCL. RESEARCH (BULGARIA)
UNIVERSITY OF WASHINGTON

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 — UNIV. OF CLAUDE BERNARD (FRANCE); FERMILAB; LAPP, D'ANNECY-LE-VIEUX (FRANCE); SUNY AT ALBANY

BEAM: Proton Area - East
MEASUREMENTS OF CRYSTAL-ASSISTED ELECTRON-POSITRON PAIR CREATION.

Request	9 Sep, 83	Unspecified
Rejected	19 Apr, 85	

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	

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

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

UNIVERSITY OF CHICAGO
COLUMBIA UNIVERSITY
FERMILAB
UNIVERSITY OF ROCHESTER

745 **MUON NEUTRINO #745** — Toshio Kitagaki

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

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)

---

746 **PROMPT BEAM FACILITY #746** — James K. Walker

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	

FERMILAB
MASSACHUSETTS INST. OF TECHNOLOGY
MICHIGAN STATE UNIVERSITY

---

747 **CHARGED PARTICLES #747** — Alan A. Hahn

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

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)

---

748 **BEAUTY & CHARM PRODUCTION #748** — Jack Sandweiss

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	

FERMILAB
NEW YORK UNIVERSITY
UNIVERSITY OF VRIJE (BELGIUM)
YALE UNIVERSITY

---

749 **CHANNELING #749** — James S. Forster

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	

CHALK RIVER NUCLEAR LAB. (CANADA)
FERMILAB
UNIVERSITY OF NEW MEXICO
SUNY AT ALBANY

---

750 **MULTIPARTICLE PRODUCTION #750** — Ram K. Shivpuri

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)

DELHI UNIVERSITY (INDIA)

---

751 **EMULSION EXPOSURE @ 1 TEV #751** — Piyare L. Jain

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)

SUNY AT BUFFALO

---

752 **PARTICLE COLLISIONS #752** — James W. Cronin

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	

UNIVERSITY OF CHICAGO
TECHNION-ISRAEL INST (ISRAEL)

---

753 **CHANNELING STUDIES #753** — James S. Forster

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

BELL NORTHERN RESEARCH LAB(CANADA)
CHALK RIVER NUCLEAR LAB. (CANADA)
FERMILAB
UNIVERSITY OF NEW MEXICO
SUNY AT ALBANY

---

754 **CHANNELING TESTS #754** — Chih-Ree Sun

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	

FERMILAB
GENERAL ELECTRIC R&D CENTER
SUNY AT ALBANY
SANDIA LABORATORIES
SSC LABORATORY

---

755 **BEAUTY & CHARM STUDY #T755** — Richard D. Majka and Anna Jean Slaughter

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

FERMILAB
YALE UNIVERSITY

---

756 **MAGNETIC MOMENT #756** — Kam-Biu Luk

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

UNIVERSITY OF ARIZONA
UNIV. OF CALIFORNIA, BERKELEY
FERMILAB
INDIANA UNIVERSITY
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF MICHIGAN - ANN ARBOR
UNIVERSITY OF MINNESOTA
RUTGERS UNIVERSITY

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

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

CBPF (BRAZIL)
FERMILAB
UNIVERSITY OF MISSISSIPPI
NORTHEASTERN UNIVERSITY
UNIVERSITY OF TORONTO (CANADA)
TUFTS UNIVERSITY
UNIVERSITY OF WISCONSIN - MADISON
YALE UNIVERSITY

---

770 **QUAD TRIPLET NEUTRINO #770** — Wesley H. Smith

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

UNIVERSITY OF CHICAGO
COLUMBIA UNIVERSITY
FERMILAB
UNIVERSITY OF ROCHESTER
UNIVERSITY OF WISCONSIN - MADISON

---

771 **BEAUTY PRODUCTION BY PROTONS #771** — Bradley B. Cox

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

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

---

772 **DIMUONS #772** — Joel M. Moss

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

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

---

773 **ETA00 & ETA+- PHASE DIFFERENCE #773** — George D. Gollin

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

UNIVERSITY OF CHICAGO
ELMHURST COLLEGE
FERMILAB
UNIVERSITY OF ILLINOIS, CHAMPAIGN
RUTGERS UNIVERSITY

---

774 **ELECTRON BEAM DUMP #774** — Michael B. Crisler

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

FERMILAB
UNIVERSITY OF ILLINOIS, CHAMPAIGN
INP, KRAKOW (POLAND)
NORTHEASTERN UNIVERSITY

---

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	

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 — BROOKHAVEN NATIONAL LABORATORY
BEAM: Miscellaneous Area — CERN (SWITZERLAND)
MEASUREMENT OF NUCLEAR CALIBRATION CROSS SECTIONS FOR PROTONS GREATER THAN 400 GEV. — FERMILAB

Request	6 Aug, 86	Unspecified
Approval	7 Jan, 87	Unspecified
Completed	15 Feb, 88	Unspecified

777 **MR TUNNEL NEUTRONS #777** Joseph B. McCaslin — FERMILAB
BEAM: Collision Area (Miscellaneous) — LAWRENCE BERKELEY LABORATORY
NEUTRON FLUX MEASUREMENTS IN THE TEVATRON TUNNEL. — SSC CENTRAL DESIGN GROUP

Request	29 Oct, 86	Unspecified
Approval	7 Jan, 87	Unspecified
Completed	11 May, 87	Unspecified

778 **MAGNET APERTURE STUDIES #778** Rodney E. Gerig and Richard Talman — CERN (SWITZERLAND)
BEAM: Collision Area (Miscellaneous) — CORNELL UNIVERSITY
STUDY OF THE SSC MAGNET APERTURE CRITERION. — FERMILAB
UNIVERSITY OF HOUSTON
SSC CENTRAL DESIGN GROUP
SLAC

Request	18 Oct, 86	Unspecified
Approval	10 Dec, 86	Unspecified
Completed	21 Jan, 91	Unspecified

779 **HIGH RATE CALORIMETER STUDY#779** David F. Anderson — FERMILAB
BEAM: Meson Area - West
PROPOSAL TO BUILD A VERY HIGH RATE CALORIMETER.

Request	29 Oct, 86	Unspecified
Rejected	10 Dec, 86	

780 **CHARM PRODUCTION BY PROTONS#780** Ronald J. Lipton and Douglas M. Potter — UNIV. OF CALIFORNIA, DAVIS
BEAM: Neutrino Area - East — CARNEGIE-MELLON UNIVERSITY
STUDY OF CHARM PRODUCED BY 850 GEV PROTONS. — UNIVERSITY OF OKLAHOMA

Request	1 Mar, 87	Unspecified
Rejected	14 Dec, 87	

781 **LARGE-X BARYON SPECTROMETER#781** James S. Russ — IHEP, BEIJING (PRC)
BEAM: Proton Area - Center — BOGAZICI UNIVERSITY (TURKEY)
SEGMENTED LARGE-X BARYON SPECTROMETER (SELEX). — 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)

Request	4 Mar, 87	Unspecified
Approval	24 Oct, 88	Unspecified
In Progress	20 Feb, 97	
Data Analysis	3 Sep, 97	

782 **MUONS IN 1M BUBBLE CHAMBER #782** Toshio Kitagaki — IHEP, BEIJING (PRC)
BEAM: Neutrino Area - NK Beam — BROWN UNIVERSITY
A MUON EXPOSURE IN THE TOHOKU HIGH RESOLUTION BUBBLE CHAMBER. — 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)

Request	4 Feb, 87	Unspecified
Approval	16 Jul, 87	Unspecified
Completed	21 Jul, 90	330 K Pix

783 **TEVATRON BEAUTY FACTORY #783** Neville W. Reay — UNIV. OF CALIFORNIA, DAVIS
BEAM: Collision Area (C-0) — CARNEGIE-MELLON UNIVERSITY
LETTER OF INTENT FOR A TEVATRON COLLIDER BEAUTY FACTORY. — FERMILAB
OHIO STATE UNIVERSITY
UNIVERSITY OF OKLAHOMA

Request	4 Mar, 87	Unspecified
Inactive	23 Dec, 92	

784 **BOTTOM AT THE COLLIDER #784** Nigel S. Lockyer — UNIVERSIDAD DE LOS ANDES(COLOMBIA)
BEAM: Unspecified Beam — UNIV. OF CALIFORNIA, DAVIS
PROPOSAL FOR RESEARCH & DEVELOPMENT: VERTEXING, TRACKING AND DATA ACQUISITION FOR THE BOTTOM COLLIDER DETECTOR. — 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 — UNIVERSITY OF HOUSTON
BEAM: Miscellaneous Area — RICE UNIVERSITY
ANTIMATTER PHYSICS AT LOW ENERGY (AMPLE)

Request	12 Mar, 87	Unspecified
Withdrawn	24 Oct, 88	

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 OSCILLATIONS 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

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

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

792 **NUCLEAR FRAGMENTS #792** — Kjell Aleklett and Lembit Sihver

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

LAL, ORSAY (FRANCE)
UPPSALA UNIVERSITY (SWEDEN)

793 **EMULSION EXPOSURE 1000 GeV #793** — Jere J. Lord

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	

KAZAKH STATE UNIV., (KAZAKHSTAN)
WASHINGTON NATURAL PHILOSOPHY INS.
UNIVERSITY OF WASHINGTON

794 **AXION HELIOSCOPE #794** — Karl Van Bibber

BEAM: Unspecified Beam
CONSTRUCTION AND OPERATION OF AN AXION HELIOSCOPE.

Request	5 Mar, 88	Unspecified
Inactive	23 Dec, 92	

UNIV. OF CALIFORNIA, BERKELEY
CERN (SWITZERLAND)
LAWRENCE BERKELEY LABORATORY
LAWRENCE LIVERMORE LABORATORY
OHIO STATE UNIVERSITY
TEXAS A&M UNIVERSITY
TEXAS ACCELERATOR CENTER

795 **WARM LIQUID CALORIMETRY TEST #795** — Morris Pripstein

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

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

796 **CP VIOLATION #796** — Gordon B. Thomson

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	

UNIVERSITY OF MINNESOTA
RUTGERS UNIVERSITY

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** Anthony Barker

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

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	

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)

---

806 **MP BEAMLINE UPGRADE #806** Akihiko Yokosawa

BEAM: Meson Area - Polarized Proton Beam
ENERGY UPGRADE OF THE MP BEAMLINE AND PROPOSED EXPERIMENTS

Request	28 Sep, 89	Unspecified
Withdrawn	7 Mar, 90	

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)

---

807 **WARM HEAVY LIQUID CALORIMETRY #T807** Scott Teige

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

RUTGERS UNIVERSITY

---

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 — UNIVERSITY OF ROCHESTER; UNIVERSITY OF WASHINGTON

BEAM: Proton Area - Center

SEARCH FOR PRIMAKOFF PRODUCTION OF HYBRID MESONS.

Request	28 Feb, 90	Unspecified	
Inactive	23 Dec, 92		

815 **NEUTRINO #815** — Michael H. Shaevitz and Robert H. Bernstein — UNIVERSITY OF CINCINNATI; COLUMBIA UNIVERSITY; FERMILAB; KANSAS STATE UNIVERSITY; NORTHWESTERN UNIVERSITY; UNIVERSITY OF OREGON; UNIVERSITY OF ROCHESTER; XAVIER UNIVERSITY

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		

816 **SDC DETECTOR MUON BEAM TESTS #T816** — Henry J. Lubatti — 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

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	

817 **SILICON STRIP DETECTOR TEST #817** — James P. Alexander — UNIV. OF CALIFORNIA, SANTA BARBARA; CORNELL UNIVERSITY

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	

818 **LEAD GLASS DETECTOR TEST #818** — Scott Teige — INDIANA UNIVERSITY; UNIVERSITY OF LOUISVILLE; MOSCOW STATE UNIVERSITY (RUSSIA); IHEP, PROTVINO (SERPUKHOV)(RUSSIA)

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		

819 **EMPACT DETECTOR TEST FOR SSC #819** — Louis S. Osborne — UNIVERSITY OF HOUSTON; INDIANA UNIVERSITY; JINR, DUBNA (RUSSIA); MASSACHUSETTS INST. OF TECHNOLOGY

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	

820 **MUON NEUTRINO MAGNETIC MOMENT #820** — Nikos D. Giokaris — FERMILAB; UNIVERSITY OF MARYLAND; NORTHEASTERN UNIVERSITY; NORTHERN ILLINOIS UNIVERSITY; UNIVERSITY OF ROCHESTER; ROCKEFELLER UNIVERSITY

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		

821 **NEUTRON MEASUREMENTS AT NWA #T821** — Kenneth A. Johns — UNIVERSITY OF ARIZONA; BALL STATE UNIVERSITY; FERMILAB; UNIVERSITY OF MICHIGAN - ANN ARBOR; UNIVERSITY OF MINNESOTA; NORTHERN ILLINOIS UNIVERSITY; RICE UNIVERSITY

BEAM: Neutrino Area - West

Neutron Measurements at NWA

Request	14 Aug, 90	Unspecified	
Approval	14 Aug, 90	Unspecified	
Completed	8 Jan, 92	Unspecified	

822 **NEUTRINO OSCILLATIONS #822** — 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

BEAM: Main Injector Area

A Long-Baseline Neutrino Oscillation Experiment from Fermilab to Soudan

Request	24 Aug, 90	Unspecified	
Withdrawn	24 Oct, 95		

823 **D-0 DETECTOR UPGRADE #823** Gerald Blazey and William J. Womersley

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 INST OF PHYS (VIET NAM)
UNIV. OF ILLINOIS, CHICAGO CIRCLE
IMPERIAL COLLEGE (ENGLAND)
INDIANA UNIVERSITY
INST DE RECHERCHES SUBATOMIQUES (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 LABORATORY
LOUISIANA TECH UNIVERSITY
LPNHE, UN. OF P & M CURIE (FRANCE)
LUDWIG MAXIMILIANS UNIVERSITY (GERMANY)
LUND, RIT, STOCKHOLM, UPPSALA UN(SWEDEN)
MAINZ UNIVERSITY (GERMANY)
UNIVERSITY OF MANCHESTER (ENGLAND)
UNIVERSITY OF MARYLAND
UNIVERSITY OF MICHIGAN - ANN ARBOR
MICHIGAN STATE UNIVERSITY
MOSCOW STATE UNIVERSITY (RUSSIA)
ITEP, MOSCOW (RUSSIA)
UNIVERSITY OF NEBRASKA
SUNY AT STONY BROOK
UNIV. OF NIJMEGEN/NIKHEF (NETHERLANDS)
NIKHEF & UNIV. OF AMSTERDAM(NETHERLANDS)
NORTHEASTERN UNIVERSITY
NORTHERN ILLINOIS UNIVERSITY
NORTHWESTERN UNIVERSITY
UNIVERSITY OF NOTRE DAME
UNIVERSITY OF OKLAHOMA
PANJAB UNIVERSITY (INDIA)
UNESP (BRAZIL)
PNPI, ST. PETERSBURG (RUSSIA)
PRINCETON UNIVERSITY
IHEP, PROTVINO (SERPUKHOV) (RUSSIA)
RICE UNIVERSITY
UNIV.DO ESTADO DO RIO DE JANEIRO(BRAZIL)
UNIVERSITY OF ROCHESTER
RWTH, AACHEN (GERMANY)
UN.SAN FRANCISCO DE QUITO(ECUADOR)
SIMON FRASER UNIVERSITY (CANADA)
TATA INSTITUTE (INDIA)
UNIVERSITY OF TEXAS AT ARLINGTON
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

BEAM: Collision Area (C-0)
B Physics at the TEV I; Micro-BCD

Request	8 Oct, 90	Unspecified
Rejected	10 Jul, 91	

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

828 **B-MESON CP VIOLATION #828** Sheldon L. Stone

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	

FERMILAB
UNIVERSITY OF FLORIDA
UNIVERSITY OF MICHIGAN - ANN ARBOR
SYRACUSE UNIVERSITY

829 **HEAVY FLAVORS AT TPL #829** David.C. Christian and Michael D. Sokoloff

BEAM: Proton Area - East
Study of Heavy Flavors at TPL, Continuation of E-791

Request	8 Oct, 90	Unspecified
Rejected	28 Feb, 94	

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

830 **CDF UPGRADE #830** Nigel Lockyer and Luciano Ristori

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	

IHEP, ACADEMIA SINICA (TAIWAN)
ARGONNE NATIONAL LABORATORY
UNIVERSITY OF BARCELONA (SPAIN)
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
DUKE UNIVERSITY
FERMILAB
UNIVERSITY OF FLORIDA
INFN, FRASCATI (ITALY)
UNIVERSITY OF GENEVA (SWITZERLAND)
GLASGOW UNIVERSITY (SCOTLAND)
HARVARD UNIVERSITY
UNIVERSITY OF HELSINKI (FINLAND)
HIROSHIMA UNIVERSITY (JAPAN)
UNIVERSITY OF ILLINOIS, CHAMPAIGN
INFN, TRIESTE/UNIV. DI UDINE (ITALY)
IPP / MCGILL UNIV. / UNIV. OF TORONTO
JINR, DUBNA (RUSSIA)
JOHNS HOPKINS UNIVERSITY
UNIVERSITY OF KARLSRUHNE (GERMANY)
KEK (JAPAN)
KOREA CENTER FOR HEP (KOREA)
LAWRENCE BERKELEY NATIONAL LABORATORY
UNIVERSITY OF LIVERPOOL (ENGLAND)
UNIVERSITY COLLEGE LONDON (ENGLAND)
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
TEXAS TECH UNIVERSITY
UNIVERSITY OF TSUKUBA (JAPAN)
TUFTS UNIVERSITY
WASEDA UNIVERSITY (JAPAN)
WAYNE STATE UNIVERSITY
UNIVERSITY OF WISCONSIN - MADISON
YALE UNIVERSITY

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

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

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)

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 — 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

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

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
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	

UNIV. OF CALIFORNIA, LOS ANGELES
FERMILAB
PENNSYLVANIA STATE UNIVERSITY

862 **ANTI-HYDROGEN DETECTION #862** David C. Christian
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	

UNIV. OF CALIFORNIA, IRVINE
FERMILAB

863 **NUCLEON SPIN #863** Aldo Penzo

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	

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)

864 **MAXIMUM ACCEPTANCE DETECTOR #T864** James D. Bjorken and Cyrus C. Taylor

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	

CASE WESTERN RESERVE UNIVERSITY
DUKE UNIVERSITY
FERMILAB
LOS ALAMOS NATIONAL LABORATORY
UNIVERSITY OF MICHIGAN - ANN ARBOR
SLAC
VIRGINIA TECH

865 **CHARM AND BEAUTY DECAYS #865** Daniel M. Kaplan

BEAM: Meson Area - East
High-Sensitivity Study of Charm and Beauty Decays.

Request	1 Sep, 92	Unspecified
Withdrawn	4 Feb, 94	

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

866 **ANTI(U-QUARK)/ANTI(D-QUARK) DIST#866** Michael J. Leitch

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	

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

867 **HIDDEN CHARM AND BEAUTY #867** Bradley B. Cox

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	

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)

868 **ANTIPROTON DECAY #868** Steve Geer

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	

UNIV. OF CALIFORNIA, LOS ANGELES
FERMILAB
UNIVERSITY OF MICHIGAN - ANN ARBOR
UNIVERSITY OF NEBRASKA
PENNSYLVANIA STATE UNIVERSITY

869 **GEM DETECTOR AT THE SSC #869** Barry C. Barish and William J. Willis

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	

FERMILAB
SSC LABORATORY

870 **PROTOTYPE DETECTORS FOR THE SDC #870** George H. Trilling

BEAM: Meson Area - Polarized Proton Beam
PROTOTYPE DETECTORS FOR THE SDC #870

Request	1 Jan, 93	Unspecified
Withdrawn	4 Jan, 94	

FERMILAB
LAWRENCE BERKELEY LABORATORY
SSC LABORATORY

871 **CP VIOLATION #871** Kam-Biu Luk and Edmond Craig Dukes

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	

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

872 **TAU NEUTRINO #872** — Vittorio Paolone and Byron G. Lundberg

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** — 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 NATIONAL LABORATORY
LEBEDEV PHYSICAL INST. (RUSSIA)
UNIVERSITY COLLEGE LONDON (ENGLAND)
MACALESTER COLLEGE
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
UNIVERSITY OF WISCONSIN - MADISON

BEAM: Main Injector Area
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	

876 **CDF HARD DIFFRACTION STUDIES #876** — Mike G. Albrow

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

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	

877 **AXION SEARCH #877** Siu Au Lee — COLORADO STATE UNIVERSITY, FERMILAB, JOINT INST. FOR LAB. ASTROPHYSICS, SSC LABORATORY
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	

878 **SPIN STRUCTURE FUNCTION PHYSICS #878** Joel M. Moss — LOS ALAMOS NATIONAL LABORATORY
BEAM: Main Injector Area
Spin Structure Function Physics at Fermilab.

Request	7 Nov, 95	Unspecified
Unconsidered	7 Nov, 95	
Inactive	3 Feb, 98	

879 **B PHYSICS TEST BEAM PROGRAM #879** Joel N. Butler and Walter Selove — CARNEGIE-MELLON UNIVERSITY, FERMILAB, UNIVERSITY OF PENNSYLVANIA, SYRACUSE UNIVERSITY
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	

880 **B PHYSICS TEST BEAM PROGRAM #T880** Sheldon L. Stone — CARNEGIE-MELLON UNIVERSITY, FERMILAB, UNIVERSITY OF MINNESOTA, SYRACUSE UNIVERSITY, WAYNE STATE UNIVERSITY
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	

881 **AUGER PROJECT R&D #881** Paul M. Mantsch — FERMILAB
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	

882 **SEARCH FOR LOW MASS MONOPOLES #882** George R. Kalbfleisch — UNIVERSITY OF OKLAHOMA
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	

883 **COSMIC RAY CALORIMETER CALIB. #T883** James H. Adams — LEBEDEV PHYSICAL INST. (RUSSIA), MOSCOW STATE UNIVERSITY (RUSSIA), NAVAL RESEARCH LABORATORY
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	

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	

886 **EXPERIMENTS AT THE A0 PHOTOINJECTOR #886** Philippe Piot — UNIV. OF CALIFORNIA, LOS ANGELES, UNIVERSITY OF CHICAGO, DESY (GERMANY), FERMILAB, UNIVERSITY OF GEORGIA, 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
	BEAM: A0 Facility		FERMILAB
	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 B. Strait	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
	BEAM: Main Injector Area		TRIUMF (CANADA)
	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**	Simon Kwan	FERMILAB
	BEAM: Meson Area - Test		
	Pixel Detector Test		
	Request 17 Mar, 97		
	Withdrawn 28 Jan, 98		
896	**RADIO COHERENCE TEST #896**	David Besson	UNIVERSITY OF KANSAS
	BEAM: Main Injector Area		
	Test of the Principle of Radio Coherence		
	Request 4 Nov, 96		
	Unconsidered 4 Nov, 96		
897	**BTeV R&D #897**	Joel N. Butler and Sheldon Stone	CARNEGIE-MELLON UNIVERSITY
	BEAM: Collision Area (C-0)		UNIVERSITY OF COLORADO AT BOULDER
	BTeV: A Heavy Quark Program at C0		FERMILAB
	Request 18 May, 97		UNIVERSITY OF FLORIDA
	Unconsidered 18 May, 97		ILLINOIS INSTITUTE OF TECHNOLOGY
	Approval 13 Jan, 98		UNIVERSITY OF ILLINOIS, CHAMPAIGN
	Unscheduled 13 Jan, 98		INDIANA UNIVERSITY
	In Progress 15 Jun, 99		UNIVERSITY OF IOWA
	Data Analysis 21 Jul, 00		INFN, MILANO (ITALY)
	Completed 1 Jan, 02		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**	Janet M. Conrad and William Charles Louis	UNIVERSITY OF ALABAMA
	BEAM: Booster Accelerator		BUCKNELL UNIVERSITY
	An Experiment to Measure nu-mu->nu-e Oscillations and nu-mu Disappearance at the Fermilab Booster		UNIVERSITY OF CINCINNATI
	Request 16 May, 97		UNIVERSITY OF COLORADO AT BOULDER
	Unconsidered 16 May, 97		COLUMBIA UNIVERSITY
	Approval 4 Jun, 98		EMBRY RIDDLE AERONAUTICAL UNIVERSITY
	Unscheduled 4 Jun, 98		FERMILAB
	Setup in a Year 1 Mar, 01		INDIANA UNIVERSITY
	Being Installed 1 Jan, 02		LOS ALAMOS NATIONAL LABORATORY
	In Progress 1 Sep, 02		LOUISIANA STATE UNIVERSITY
			UNIVERSITY OF MICHIGAN - ANN ARBOR
			PRINCETON UNIVERSITY

899 **PARTICLE PRODUCTION #899** — Michael Longo

CASE WESTERN RESERVE UNIVERSITY
LOUISIANA STATE UNIVERSITY
UNIVERSITY OF MICHIGAN
FERMILAB
UNIVERSITY OF TENNESSEE

BEAM: Collision Area (C-0)
Particle Production at Zero Degrees from the

Request	31 May, 97
Rejected	23 Oct, 97

900 **D-0 FORWARD PROTON DETECTOR #900** — Gerald Blazey and William J. Womersley

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 INST OF PHYS (VIET NAM)
UNIV. OF ILLINOIS, CHICAGO CIRCLE
IMPERIAL COLLEGE (ENGLAND)
INDIANA UNIVERSITY
INST DE RECHERCHES SUBATOMIQUES (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 LABORATORY
LOUISIANA TECH UNIVERSITY
LPNHE, UN. OF P & M CURIE (FRANCE)
LUDWIG MAXIMILIANS UNIVERSITY (GERMANY)
LUND, RIT, STOCKHOLM, UPPSALA UN(SWEDEN)
MAINZ UNIVERSITY (GERMANY)
UNIVERSITY OF MANCHESTER (ENGLAND)
UNIVERSITY OF MARYLAND
UNIVERSITY OF MICHIGAN - ANN ARBOR
MICHIGAN STATE UNIVERSITY
MOSCOW STATE UNIVERSITY (RUSSIA)
ITEP, MOSCOW (RUSSIA)
UNIVERSITY OF NEBRASKA
SUNY AT STONY BROOK
UNIV. OF NIJMEGEN/NIKHEF (NETHERLANDS)
NIKHEF & UNIV. OF AMSTERDAM(NETHERLANDS)
NORTHEASTERN UNIVERSITY
NORTHERN ILLINOIS UNIVERSITY
NORTHWESTERN UNIVERSITY
UNIVERSITY OF NOTRE DAME
UNIVERSITY OF OKLAHOMA
PANJAB UNIVERSITY (INDIA)
UNESP (BRAZIL)
PNPI, ST. PETERSBURG (RUSSIA)
PRINCETON UNIVERSITY
IHEP, PROTVINO (SERPUKHOV) (RUSSIA)
RICE UNIVERSITY
UNIV.DO ESTADO DO RIO DE JANEIRO(BRAZIL)
UNIVERSITY OF ROCHESTER
RWTH, AACHEN (GERMANY)
UN.SAN FRANCISCO DE QUITO(ECUADOR)
SIMON FRASER UNIVERSITY (CANADA)
TATA INSTITUTE (INDIA)
UNIVERSITY OF TEXAS AT ARLINGTON
UNIVERSITY OF VIRGINIA
UNIVERSITY OF WASHINGTON
UNIVERSITY OF WUPPERTAL (GERMANY)

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

901 **RECYCLER ELECTRON COOLING #901** — Sergei Nagaitsev

FERMILAB
INDIANA UNIVERSITY
JINR, DUBNA (RUSSIA)
UNIVERSITY OF ROCHESTER

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

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

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

UNIV. OF CALIFORNIA, IRVINE
FERMILAB
UNIVERSITY OF ROCHESTER

---

904 **MUON COLLIDING R&D #904** Steve Geer

BEAM: Unspecified Beam

Ionization Cooling Research and Development Program for a High Luminosity Muon Collider

Request	15 Apr, 98
Unconsidered	15 Apr, 98

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

---

905 **CKM R&D #905** Peter S. Cooper

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

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

---

906 **ANTI(D-QUARK)/ANTI(U-QUARK) DIST #906** Donald Geesaman and Paul E. Reimer

BEAM: Main Injector Area

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

ABILENE CHRISTIAN UNIVERSITY
ARGONNE NATIONAL LABORATORY
UNIVERSITY OF COLORADO AT BOULDER
FERMILAB
UNIVERSITY OF ILLINOIS, CHAMPAIGN
LOS ALAMOS NATIONAL LABORATORY
RUTGERS UNIVERSITY
TEXAS A&M UNIVERSITY
VALPARAISO UNIVERSITY

---

907 **PARTICLE PRODUCTION #907** Rajendran Raja

BEAM: Main Injector Area

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

BROOKHAVEN NATIONAL LABORATORY
UNIVERSITY OF COLORADO AT BOULDER
ELMHURST COLLEGE
ENRICO FERMI INSTITUTE
FERMILAB
HARVARD UNIVERSITY
ILLINOIS INSTITUTE OF TECHNOLOGY
INDIANA UNIVERSITY
LAWRENCE LIVERMORE NTL. LABORATORY
UNIVERSITY OF MICHIGAN - ANN ARBOR
PURDUE UNIVERSITY
UNIVERSITY OF SOUTH CAROLINA
UNIVERSITY OF VIRGINIA

908 **D-0 SILICON TRACK TRIGGER #908** Gerald Blazey and William J. Womersley

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 INST OF PHYS (VIET NAM)
UNIV. OF ILLINOIS, CHICAGO CIRCLE
IMPERIAL COLLEGE (ENGLAND)
INDIANA UNIVERSITY
INST DE RECHERCHES SUBATOMIQUES (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 LABORATORY
LOUISIANA TECH UNIVERSITY
LPNHE, UN. OF P & M CURIE (FRANCE)
LUDWIG MAXIMILIANS UNIVERSITY (GERMANY)
LUND, RIT, STOCKHOLM, UPPSALA UN(SWEDEN)
MAINZ UNIVERSITY (GERMANY)
UNIVERSITY OF MANCHESTER (ENGLAND)
UNIVERSITY OF MARYLAND
UNIVERSITY OF MICHIGAN - ANN ARBOR
MICHIGAN STATE UNIVERSITY
MOSCOW STATE UNIVERSITY (RUSSIA)
ITEP, MOSCOW (RUSSIA)
UNIVERSITY OF NEBRASKA
SUNY AT STONY BROOK
UNIV. OF NIJMEGEN/NIKHEF (NETHERLANDS)
NIKHEF & UNIV. OF AMSTERDAM(NETHERLANDS)
NORTHEASTERN UNIVERSITY
NORTHERN ILLINOIS UNIVERSITY
NORTHWESTERN UNIVERSITY
UNIVERSITY OF NOTRE DAME
UNIVERSITY OF OKLAHOMA
PANJAB UNIVERSITY (INDIA)
UNESP (BRAZIL)
PNPI, ST. PETERSBURG (RUSSIA)
PRINCETON UNIVERSITY
IHEP, PROTVINO (SERPUKHOV) (RUSSIA)
RICE UNIVERSITY
UNIV.DO ESTADO DO RIO DE JANEIRO(BRAZIL)
UNIVERSITY OF ROCHESTER
RWTH, AACHEN (GERMANY)
UN.SAN FRANCISCO DE QUITO(ECUADOR)
SIMON FRASER UNIVERSITY (CANADA)
TATA INSTITUTE (INDIA)
UNIVERSITY OF TEXAS AT ARLINGTON
UNIVERSITY OF VIRGINIA
UNIVERSITY OF WASHINGTON
UNIVERSITY OF WUPPERTAL (GERMANY)

909 **CDF INNER SILICON AND TOF #909** — Nigel Lockyer and Luciano Ristori

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)
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
DUKE UNIVERSITY
FERMILAB
UNIVERSITY OF FLORIDA
INFN, FRASCATI (ITALY)
UNIVERSITY OF GENEVA (SWITZERLAND)
GLASGOW UNIVERSITY (SCOTLAND)
HARVARD UNIVERSITY
UNIVERSITY OF HELSINKI (FINLAND)
HIROSHIMA UNIVERSITY (JAPAN)
UNIVERSITY OF ILLINOIS, CHAMPAIGN
INFN, TRIESTE/UNIV. DI UDINE (ITALY)
IPP / MCGILL UNIV. / UNIV. OF TORONTO
JINR, DUBNA (RUSSIA)
JOHNS HOPKINS UNIVERSITY
UNIVERSITY OF KARLSRUHNE (GERMANY)
KEK (JAPAN)
KOREA CENTER FOR HEP (KOREA)
LAWRENCE BERKELEY NATIONAL LABORATORY
UNIVERSITY OF LIVERPOOL (ENGLAND)
UNIVERSITY COLLEGE LONDON (ENGLAND)
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
TEXAS TECH 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
Rejedted	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** — Gerald A. Smith

BEAM: Beam Not Applicable
A Magnetic Degrading Spectrometer for Trapping of Low-Energy Antiprotons at Fermilab

Request	28 Oct, 98
Rejected	6 Jul, 99

PENNSYLVANIA STATE UNIVERSITY
SYNERGISTIC TECHNOLOGIES, INC.

915 **MINOS EMULSION DETECTOR #915** Stanley G. Wojcicki

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

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** Nigel Lockyer and Luciano Ristori

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

IHEP, ACADEMIA SINICA (TAIWAN)
ARGONNE NATIONAL LABORATORY
UNIVERSITY OF BARCELONA (SPAIN)
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
DUKE UNIVERSITY
FERMILAB
UNIVERSITY OF FLORIDA
INFN, FRASCATI (ITALY)
UNIVERSITY OF GENEVA (SWITZERLAND)
GLASGOW UNIVERSITY (SCOTLAND)
HARVARD UNIVERSITY
UNIVERSITY OF HELSINKI (FINLAND)
HIROSHIMA UNIVERSITY (JAPAN)
UNIVERSITY OF ILLINOIS, CHAMPAIGN
INFN, TRIESTE/UNIV. DI UDINE (ITALY)
IPP / MCGILL UNIV. / UNIV. OF TORONTO
JINR, DUBNA (RUSSIA)
JOHNS HOPKINS UNIVERSITY
UNIVERSITY OF KARLSRUHNE (GERMANY)
KEK (JAPAN)
KOREA CENTER FOR HEP (KOREA)
LAWRENCE BERKELEY NATIONAL LABORATORY
UNIVERSITY OF LIVERPOOL (ENGLAND)
UNIVERSITY COLLEGE LONDON (ENGLAND)
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
TEXAS TECH UNIVERSITY
UNIVERSITY OF TSUKUBA (JAPAN)
TUFTS UNIVERSITY
WASEDA UNIVERSITY (JAPAN)
WAYNE STATE UNIVERSITY
UNIVERSITY OF WISCONSIN - MADISON
YALE UNIVERSITY

917 **HYPERCP PARTICLE MEASUREMENT #917** Richard H. Gustafson

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

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	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 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	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**	Nigel Lockyer and Luciano Ristori	IHEP, ACADEMIA SINICA (TAIWAN)
	BEAM: Collision Area (B-0)		ARGONNE NATIONAL LABORATORY
	The CDF IIb Detector Technical Design Report		UNIVERSITY OF BARCELONA (SPAIN)
	+-------------------------+		UNIVERSITY OF BOLOGNA (ITALY)
	Request 9 Oct, 01		BRANDEIS UNIVERSITY
	Unconsidered 9 Oct, 01		UNIV. OF CALIFORNIA, DAVIS
	Approved 11 Jul, 02 Stage I		UNIV. OF CALIFORNIA, LOS ANGELES
	Unscheduled 11 Jul, 02		UNIV. OF CALIFORNIA, SAN DIEGO)
			UNIV. OF CALIFORNIA, SANTA BARBARA
			UNIVERSITY OF CANTABRIA (SPAIN)
			CARNEGIE-MELLON UNIVERSITY
			UNIVERSITY OF CHICAGO
			DUKE UNIVERSITY
			FERMILAB
			UNIVERSITY OF FLORIDA
			INFN, FRASCATI (ITALY)
			UNIVERSITY OF GENEVA (SWITZERLAND)
			GLASGOW UNIVERSITY (SCOTLAND)
			HARVARD UNIVERSITY
			UNIVERSITY OF HELSINKI (FINLAND)
			HIROSHIMA UNIVERSITY (JAPAN)
			UNIVERSITY OF ILLINOIS, CHAMPAIGN
			INFN, TRIESTE/UNIV. DI UDINE (ITALY)
			IPP / MCGILL UNIV. / UNIV. OF TORONTO
			JINR, DUBNA (RUSSIA)
			JOHNS HOPKINS UNIVERSITY
			UNIVERSITY OF KARLSRUHNE (GERMANY)
			KEK (JAPAN)
			KOREA CENTER FOR HEP (KOREA)
			LAWRENCE BERKELEY NATIONAL LABORATORY
			UNIVERSITY OF LIVERPOOL (ENGLAND)
			UNIVERSITY COLLEGE LONDON (ENGLAND)
			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
			TEXAS TECH 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** 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	Gerald Blazey and William J. Womersley	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 INST OF PHYS (VIET NAM) UNIV. OF ILLINOIS, CHICAGO CIRCLE IMPERIAL COLLEGE (ENGLAND) INDIANA UNIVERSITY INST DE RECHERCHES SUBATOMIQUES (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 LABORATORY LOUISIANA TECH UNIVERSITY LPNHE, UN. OF P & M CURIE (FRANCE) LUDWIG MAXIMILIANS UNIVERSITY (GERMANY) LUND, RIT, STOCKHOLM, UPPSALA UN(SWEDEN) MAINZ UNIVERSITY (GERMANY) UNIVERSITY OF MANCHESTER (ENGLAND) UNIVERSITY OF MARYLAND UNIVERSITY OF MICHIGAN - ANN ARBOR MICHIGAN STATE UNIVERSITY MOSCOW STATE UNIVERSITY (RUSSIA) ITEP, MOSCOW (RUSSIA) UNIVERSITY OF NEBRASKA SUNY AT STONY BROOK UNIV. OF NIJMEGEN/NIKHEF (NETHERLANDS) NIKHEF & UNIV. OF AMSTERDAM(NETHERLANDS) NORTHEASTERN UNIVERSITY NORTHERN ILLINOIS UNIVERSITY NORTHWESTERN UNIVERSITY UNIVERSITY OF NOTRE DAME UNIVERSITY OF OKLAHOMA PANJAB UNIVERSITY (INDIA) UNESP (BRAZIL) PNPI, ST. PETERSBURG (RUSSIA) PRINCETON UNIVERSITY IHEP, PROTVINO (SERPUKHOV) (RUSSIA) RICE UNIVERSITY UNIV.DO ESTADO DO RIO DE JANEIRO(BRAZIL) UNIVERSITY OF ROCHESTER RWTH, AACHEN (GERMANY) UN.SAN FRANCISCO DE QUITO(ECUADOR) SIMON FRASER UNIVERSITY (CANADA) TATA INSTITUTE (INDIA) UNIVERSITY OF TEXAS AT ARLINGTON UNIVERSITY OF VIRGINIA UNIVERSITY OF WASHINGTON UNIVERSITY OF WUPPERTAL (GERMANY)
926	**RICE TEST #T926** BEAM: Meson Area - 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	Alice Bean	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: Meson Area - 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	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	**NUMI OFF-AXIS DETECTOR #929** BEAM: Main Injector Area 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	Gary J. Feldman	ARGONNE NATIONAL LABORATORY UNIVERSITY OF ATHENS (GREECE) BOSTON UNIVERSITY CALIFORNIA INSTITUTE OF TECHNOLOGY UNIVERSITY OF CHICAGO FERMILAB HARVARD UNIVERSITY UNIVERSITY COLLEGE LONDON (ENGLAND) LOUISIANA STATE UNIVERSITY MASSACHUSETTS INST. OF TECHNOLOGY MICHIGAN STATE UNIVERSITY UNIVERSITY OF MINNESOTA - DULUTH UNIVERSITY OF MINNESOTA NORTHERN ILLINOIS UNIVERSITY OHIO UNIVERSITY UNIVERSITY OF OXFORD (ENGLAND) UNESP (BRAZIL) UNIVERSITY OF PITTSBURGH PRINCETON UNIVERSITY UNIVERSITY OF ROCHESTER RUTHERFORD-APPLETON LABS.(ENGLAND) STANFORD UNIVERSITY SUSSEX UNIVERSITY (ENGLAND) TECHNISCHE UNIVERSITAT MUNCHEN (GERMANY) UNIVERSITY OF TEXAS AT AUSTIN TOKYO METROPOLITAN UNIV. (JAPAN) TUFTS UNIVERSITY
930	**BTEV STRAW TESTS #T930** BEAM: Meson Area - Test Beam BTeV Straw Prototype Detector Test Request 13 Jun, 01 Unconsidered 13 Jun, 01 Approved 14 Aug, 03 Unscheduled 14 Aug, 03	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: Meson Area - Test Beam BTeV Muon Detector Test Request 14 Nov, 02 Unconsidered 14 Nov, 02 Approved 14 Aug, 03 Unscheduled 14 Aug, 03	Will E. Johns	UNIVERSITY OF ILLINOIS, CHAMPAIGN UNIV. OF PUERTO RICO - MAYAGUEZ VANDERBILT UNIVERSITY
932	**DIAMOND DETECTOR TEST #T932** BEAM: Meson Area - Test Beam Diamond Detector Test Request 14 Nov, 02 Unconsidered 14 Nov, 02 Approved 3 Sep, 03 Unscheduled 3 Sep, 03	Steven Worm	PURDUE UNIVERSITY RUTGERS UNIVERSITY
933	**BTEV EM CALORIMETER TEST #T933** BEAM: Meson Area - Test Beam BTeV Electromagnetic Calorimeter Test Request 14 Nov, 02 Unconsidered 14 Nov, 02	Pavel A. Semenov	FERMILAB UNIVERSITY OF MINNESOTA IHEP, PROTVINO (SERPUKHOV)(RUSSIA) SYRACUSE UNIVERSITY

934	**MINOS VETO SHIELD #934** BEAM: Main Injector Area Proposal for Cosmic Ray Veto Shield for the MINOS Far Detector Request 1 Jun, 02 Unconsidered 1 Jun, 02 Approved 22 Jul, 03 In Progress 22 Jul, 03	Douglas 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
935	**BTEV RICH TEST #935** BEAM: Meson Area - Test Beam BTeV RICH Detector Test Request 26 May, 03 Approved 14 Oct, 03 Unscheduled 14 Oct, 03	Marina Artuso	FERMILAB SYRACUSE UNIVERSITY
936	**US-CMS PIXEL DETECTOR TEST #936** BEAM: Meson Area - Test Beam US-CMS Forward Pixel Detector Test Request 19 Jun, 03 Approved 20 Nov, 03 Unscheduled 20 Nov, 03	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 Area 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	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 JAMES MADISON UNIVERSITY NORTHERN ILLINOIS UNIVERSITY UNIVERSITY OF PITTSBURGH UNIVERSITY OF ROCHESTER RUTGERS UNIVERSITY TUFTS UNIVERSITY

*** End of Report ***