Fermilab Research Program 1997

Workbook

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Roy Rubinstein

Fermi National Accelerator Laboratory
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INTRODUCTION

The 1997 Fermilab Research Program Workbook carries on a tradition which started in 1975 in the early days of the Laboratory's experimental research program. Whilst its original purpose of providing information for the Physics Advisory Committee's annual meeting is now less important, it has become of value as a yearly picture of the status of Fermilab's experimental program; this includes not only the running experiments, but also those in the data analysis stage.

This year, we have broadened the definition of experiments to be included in the approved experiment summaries (Section VIII) and listing (Section IX). For some time now, Fermilab physicists have been involved in significant experimental physics research activities which are not particle physics experiments using the Fermilab accelerators; these include such activities as collaboration on astrophysics experiments, and on the CMS experiment at the CERN LHC. These are now included for the first time in the sections noted above.

As always, many people have contributed to the Workbook; special thanks go to Jud Parker (database upkeep), Angela Gonzales (artwork) and Taiji Yamanouchi (advice). As in past years, Jackie Coleman put it all together.

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	Withdrawn/Inactive	Proposals that were not considered at the request of the spokesperson or that are no longer being considered for other reasons.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, 894 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	July 1971	July 1972	July 1973	July 1974	July 1975	July 1976	July 1977	July 1978	July 1979	July 1980	July 1981	July 1982	July 1983	July 1984	July 1985	July 1986	July 1987	July 1988	July 1989	July 1990	July 1991	July 1992	July 1993	Jul 1994	Jul 1995	Jul 1996	Feb 1997
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
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
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
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
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
"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
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
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
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
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
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

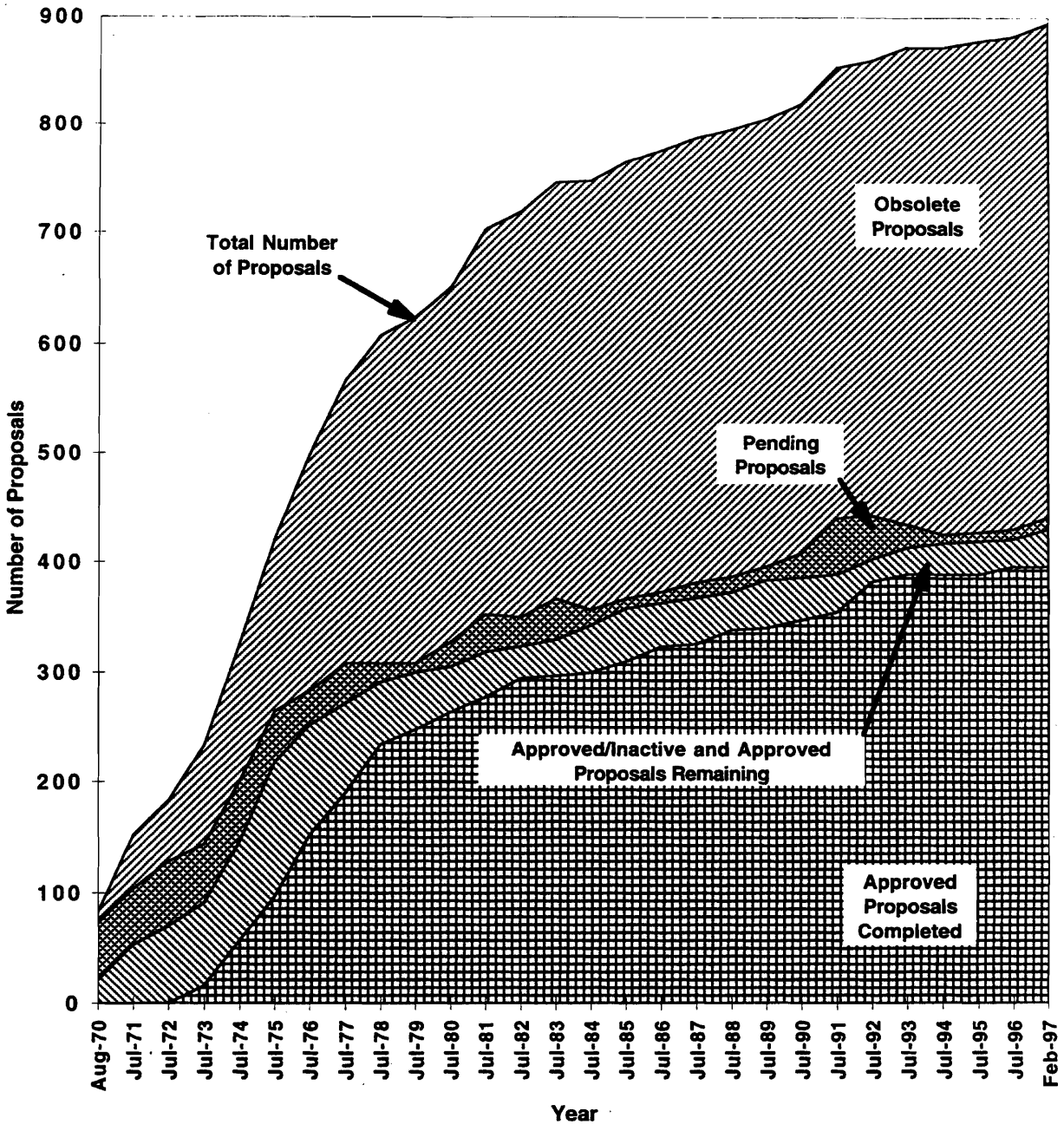


Figure 1. Growth of the Fermilab research program. The total number of approved experiments is obtained by adding the numbers shown as completed and those remaining and approved/inactive. Pending proposals are those which are unconsidered, deferred or "not approved;" obsolete proposals are rejected or 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 Collider runs of 1992-93 and 1994-96, and also the Fixed Target runs of 1990, 1991, and 1996-97. In the currently underway 1996-97 run, Tevatron peak intensities of 2.7×10^{13} protons per pulse have so far been achieved.

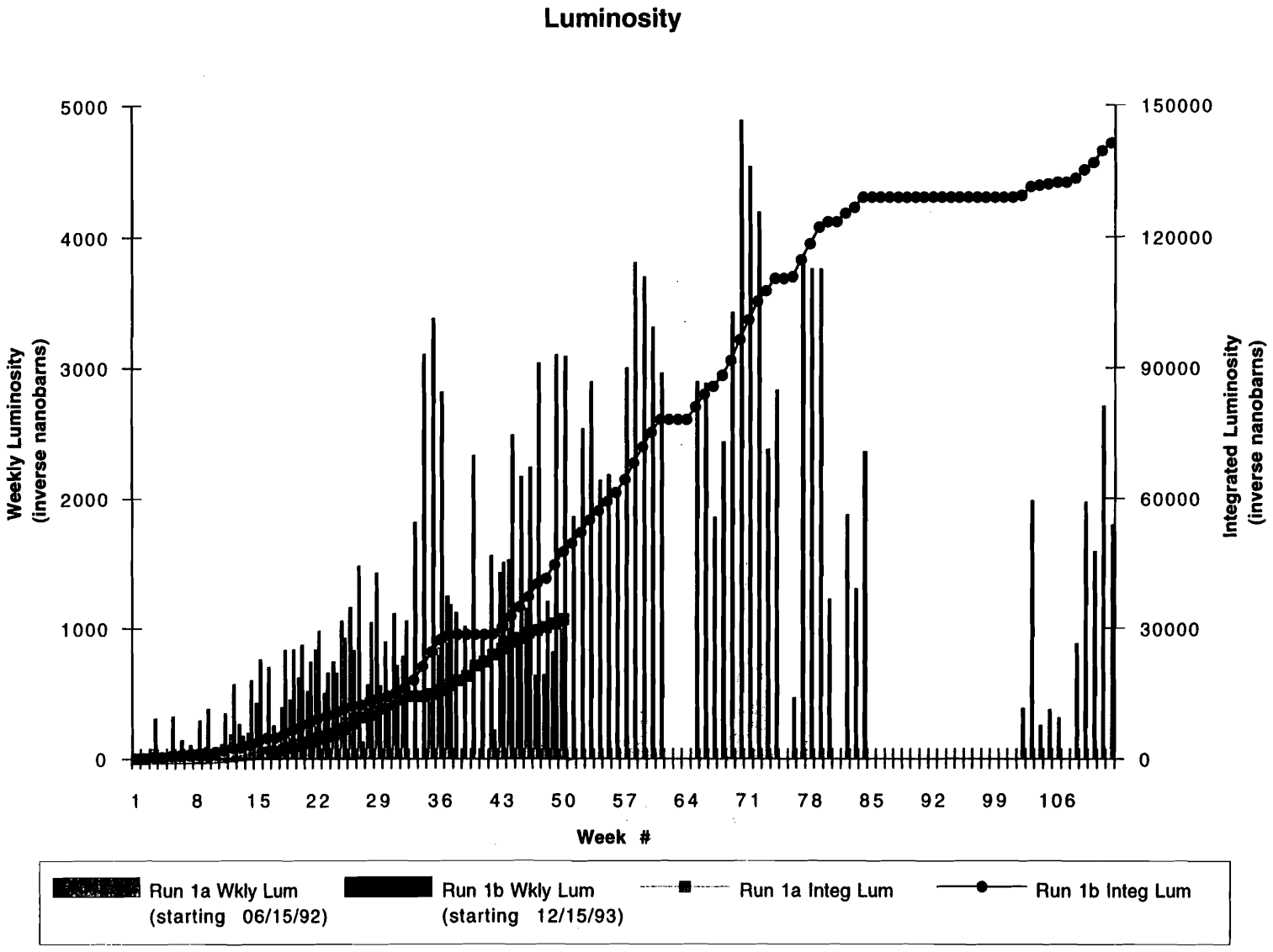


Figure 2. Tevatron Collider operation during the 1992-1993 and 1994-96 running periods - luminosity per week and integrated luminosity.

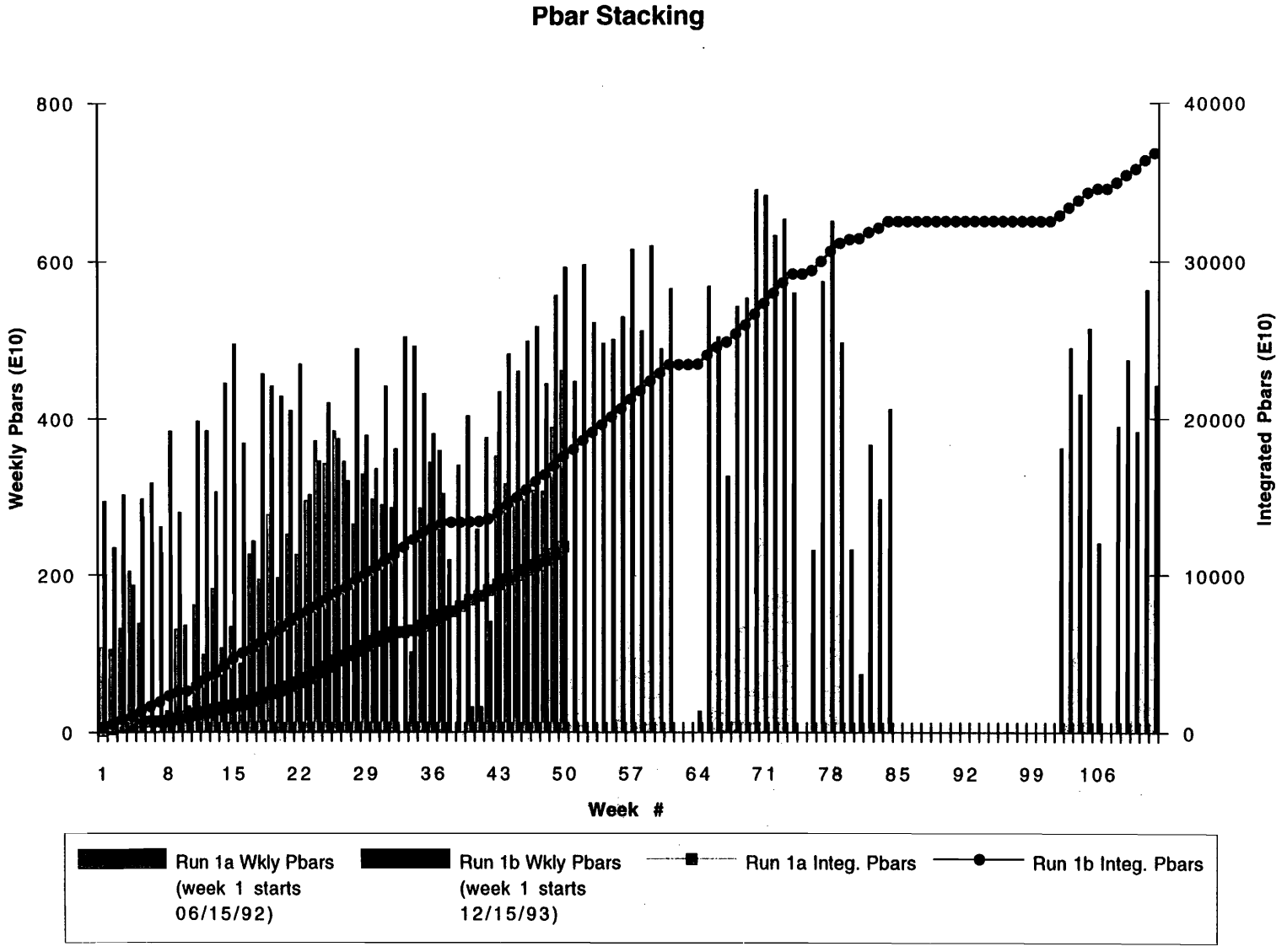


Figure 3. Tevatron Collider operation during the 1992-1993 and 1994-96 running periods - antiproton stacking per week and integrated stacking.

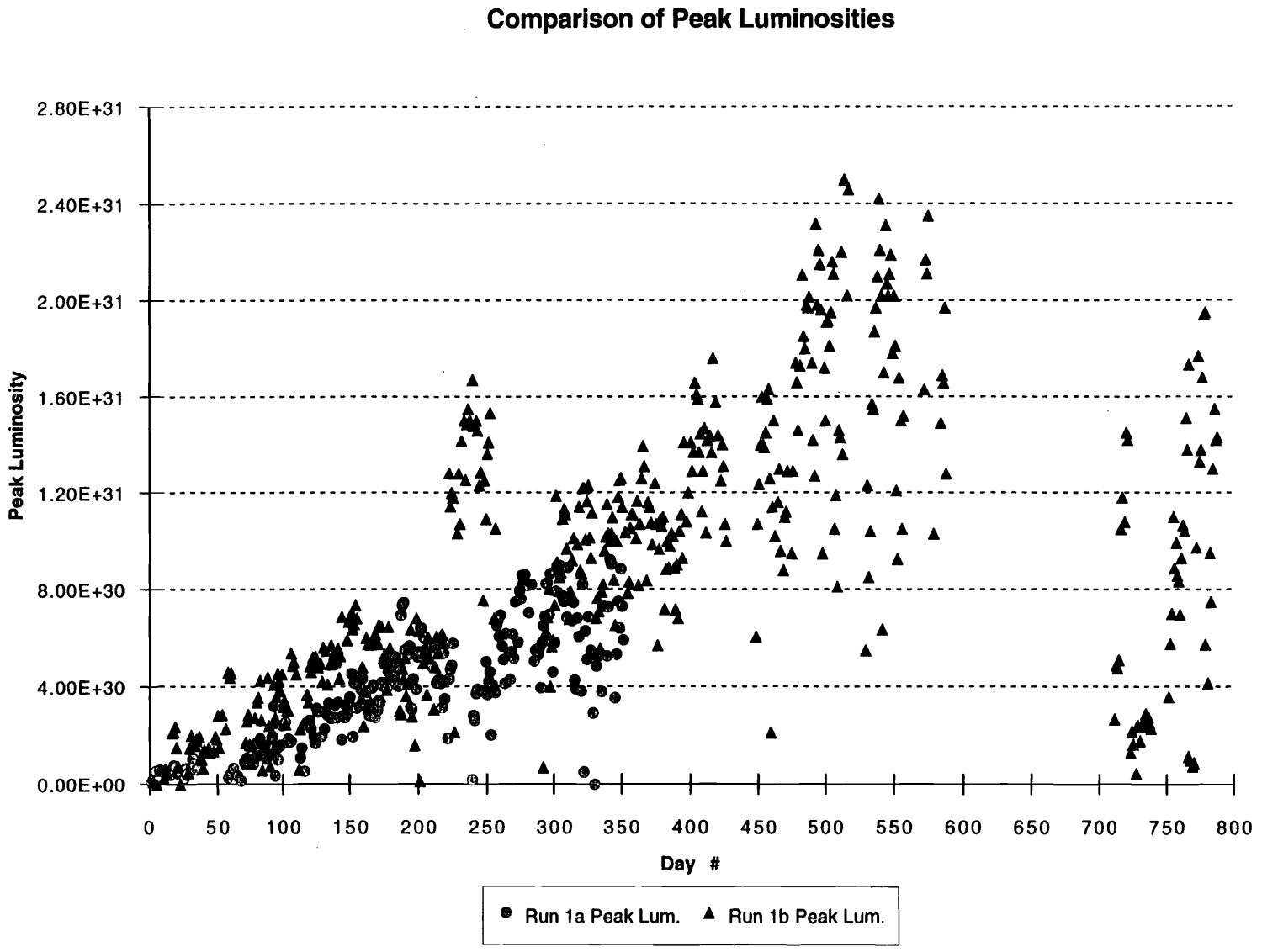


Figure 4. Tevatron Collider operation during the 1992-1993 and 1994-96 running periods - daily peak luminosity.

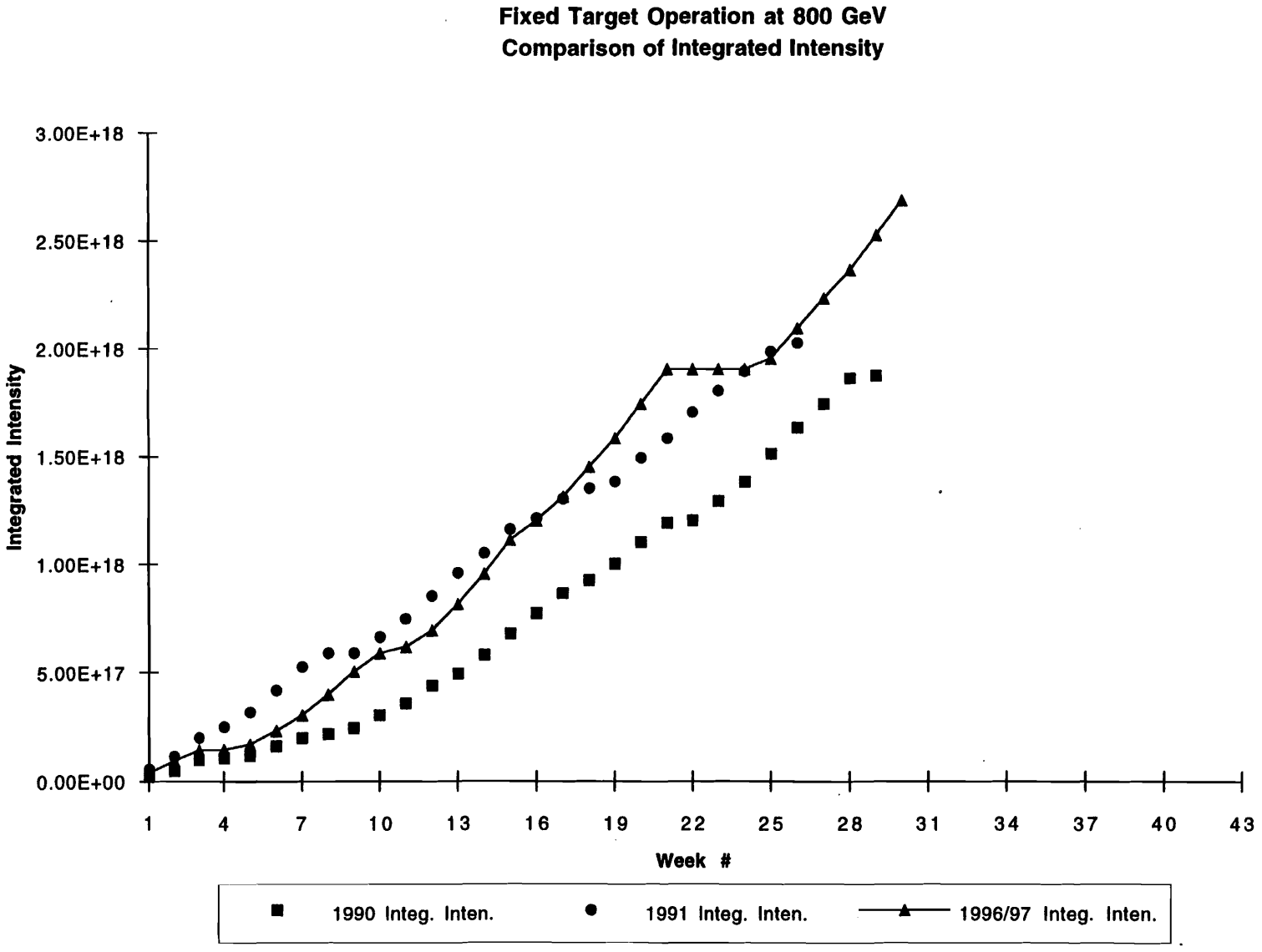


Figure 5. Integrated intensity for the 1990, 1991 and 1996/97 Fixed Target running periods.

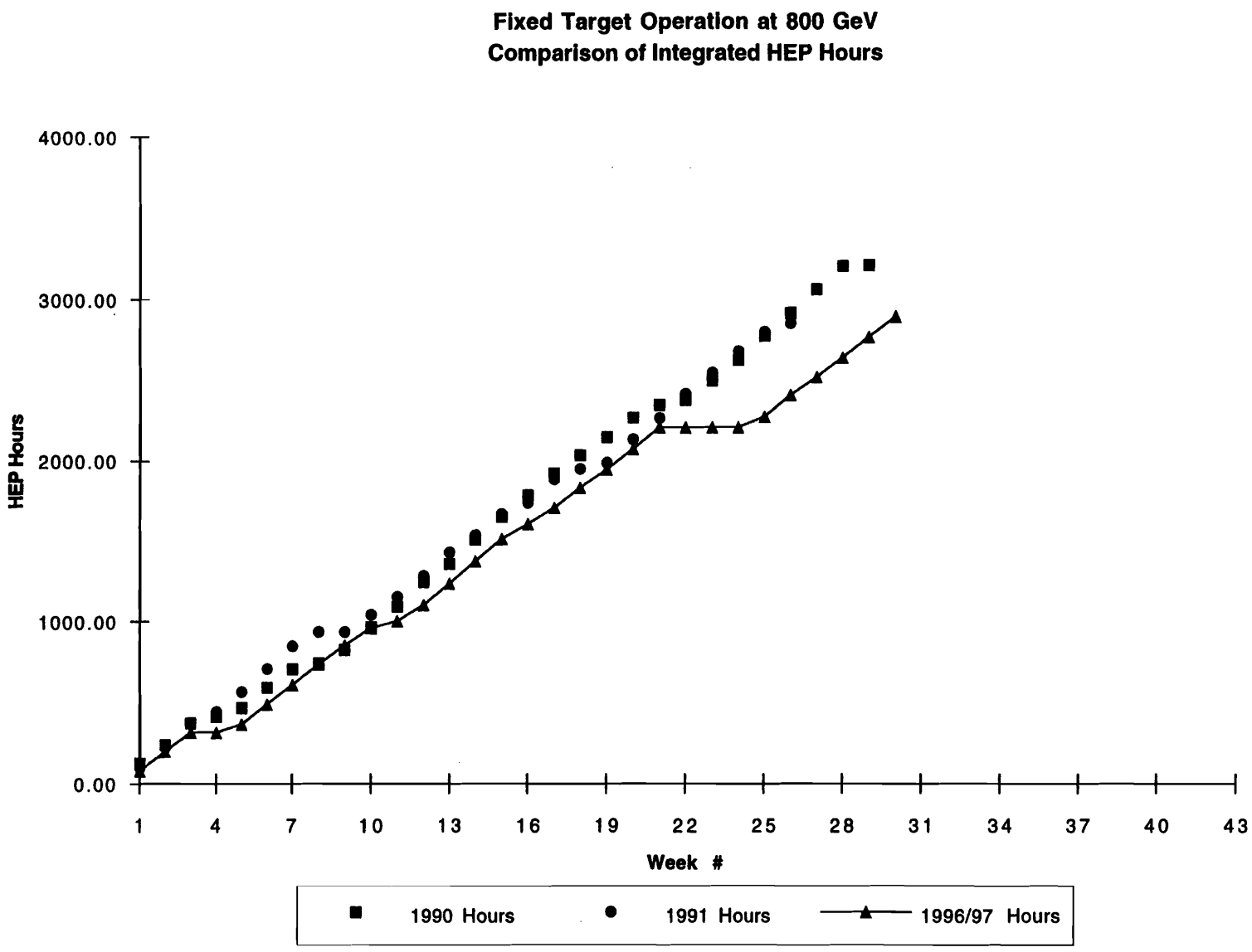


Figure 6. Integrated high energy physics hours for the 1990, 1991 and 1996/97 Fixed Target running periods.

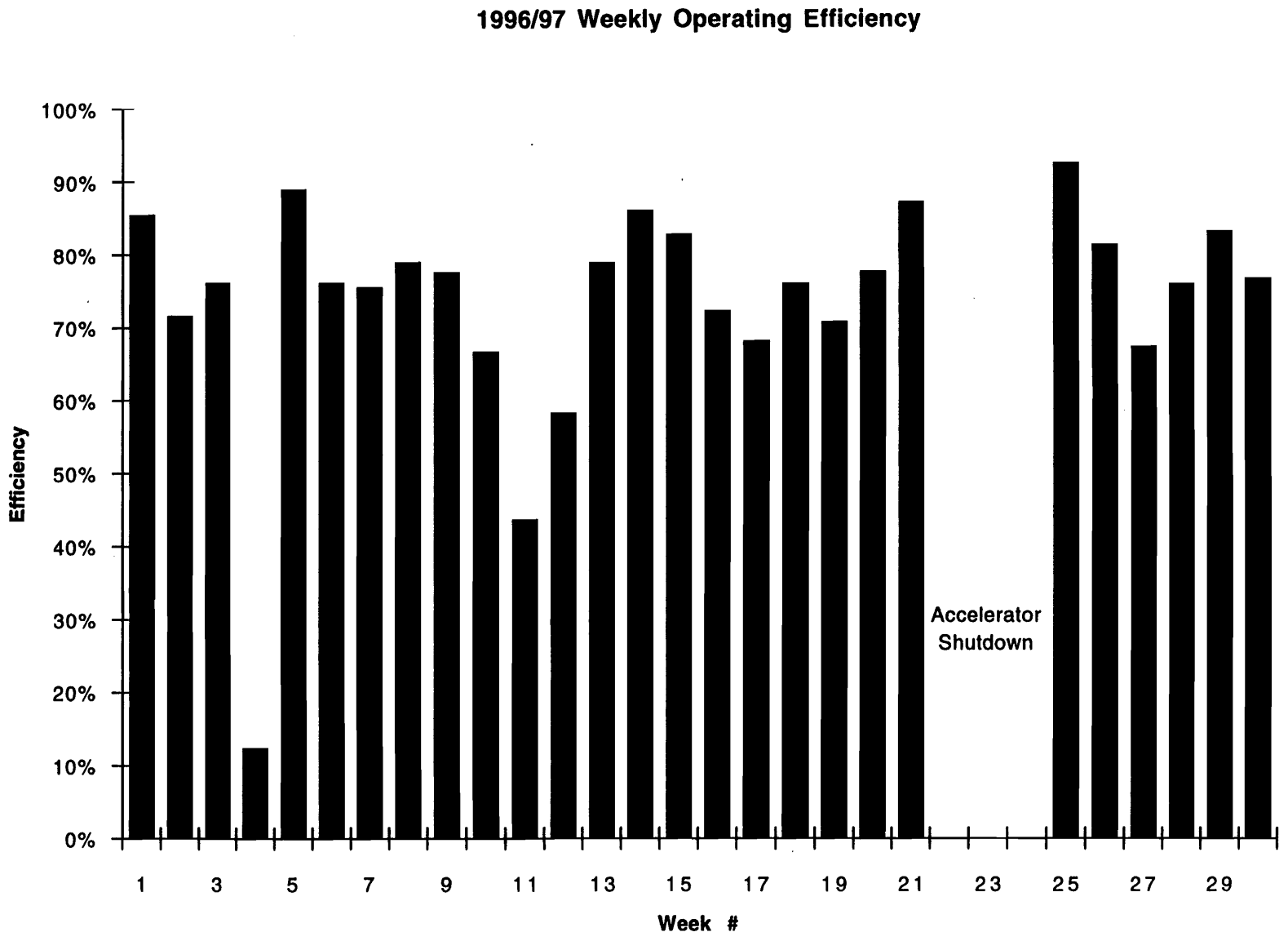


Figure 7. Weekly operating efficiency for the 1996/97 Fixed Target run.

SECTION III. FERMILAB BEAM PROPERTIES AND EXPERIMENT LOCATION

Table 2 gives properties of Fermilab beams; their location is shown in Figure 8. The locations of major experiments which have not yet completed data-taking are shown in Figure 9 (Fixed Target) and Figure 10 (Collider and Accumulator). Figures 11-15 give some additional information on beam line particle fluxes (all for 800 GeV incident protons except where indicated).

TABLE 2. FERMILAB BEAM LINE PROPERTIES

Beam	Momentum Range (GeV/c)	$\pm\Delta p/p$ (%)	Production Angle (mr)	Solid Angle (μsr)	Particles	Flux per 10^{12} protons on target	at (GeV/c)	Comments
PW	800				p		800	Up to 1 x 10^{13} primary protons
						3×10^9 ν_e, ν_μ		Neutrino Beam
						1.5×10^8 ν_τ		
PB	500 (peak)	12		4	$e^- + e^+$	$\approx 3 \times 10^8$	250	Wide band charged and neutral beam also capable of K_L^0, p, and π.
PE	500 (peak)	2.1	0		π^+, K^+, p	$\approx 1.5 \times 10^9$	250	Maximum momentum for positives
			0	0.5	$\pi^-, K^-, \bar{p}$	$\approx 4 \times 10^7$	500	
PC	1000	16	0-3.5		π^-, K^-, Σ^- Ξ^-, Ω^-	3×10^7	600	Primary protons, neutral and charged hyperons
ME	1000 (peak)	0.1			p		1000	$\approx 4 \times 10^{12}$ primary protons
MP	200	9.0	0 ± 1.0		p	$\approx 10^7$	200	Polarized protons from 800 GeV primary.
					$\bar{p}$	$\approx 5 \times 10^5$		Polarized antiprotons from 800 GeV primary.
					π^-	1×10^5		(Average polarization expected $\approx$ 30%).
MC	150 (mean)	75-200 GeV	0 to $\pm$ 3.0	4.88	$\pi^-, \Sigma^-, \Xi^-, \Omega^-$, $\pi^+, p, \Sigma^+, \bar{\Xi}^+$, $\bar{\Omega}^+$	4.3×10^9	150	Positive and negative secondary beams will use different targets.
MB	20-200	5.0	2.5		π, K	3×10^6	75-100	Requires MC beam dump.
					$e^\pm$	2×10^2	100	

Beam	Momentum Range (GeV/c)	$\pm\Delta p/p$ (%)	Production Angle (mr)	Solid Angle (μsr)	Particles	Flux per 10^{12} protons on target	at (GeV/c)	Comments
MT	80-245	5.0	0		Hadrons	1×10^6	75-245	Test beam
						500	25	
					$e^{\pm}$	500-2500	10-150	
MW	1000 (peak)	10	0-4		Primary p's	2×10^8		Beam transport to new multiparticle spectrometer; assumes 800 GeV on target
					p	1.3×10^8	500	
					π^+	2×10^7	500	
					K^+	4×10^6	500	
					π^-	2.7×10^7	500	
					K^-	8×10^5	500	
					$\bar{p}$	8×10^4	500	
NW	2-150	1.6	0	5	μ^-			Currently a test beam, intensity limited.
					π^-	$\approx 10^8$	≈ 150	
					e^-	$\approx 10^5$	≈ 100	
NC	250	10	0	5	$\nu/\bar{\nu}$	10^8	250	Sign-Selected Neutrino Beam.
						$0.5 \times 10^8\ \bar{\nu}/m^2$		
NE	1000				p	1×10^9	800	To Lab G.
NT	10-200	1.5	0-6	0.7	negative hadrons	$\approx 0.5 \times 10^6$	140	Test and calibration beam to Lab E, neutrino detector and Lab F.
	10-120	1.5			e^-	$\approx 10^3$	100	
NM (KTeV)	85 (mean)		4.0 - 5.8	0.25	K_L^0	$\approx 2 \times 10^7$		Neutral beam with 800 GeV primary protons.
					n	$\approx 4 \times 10^7$		

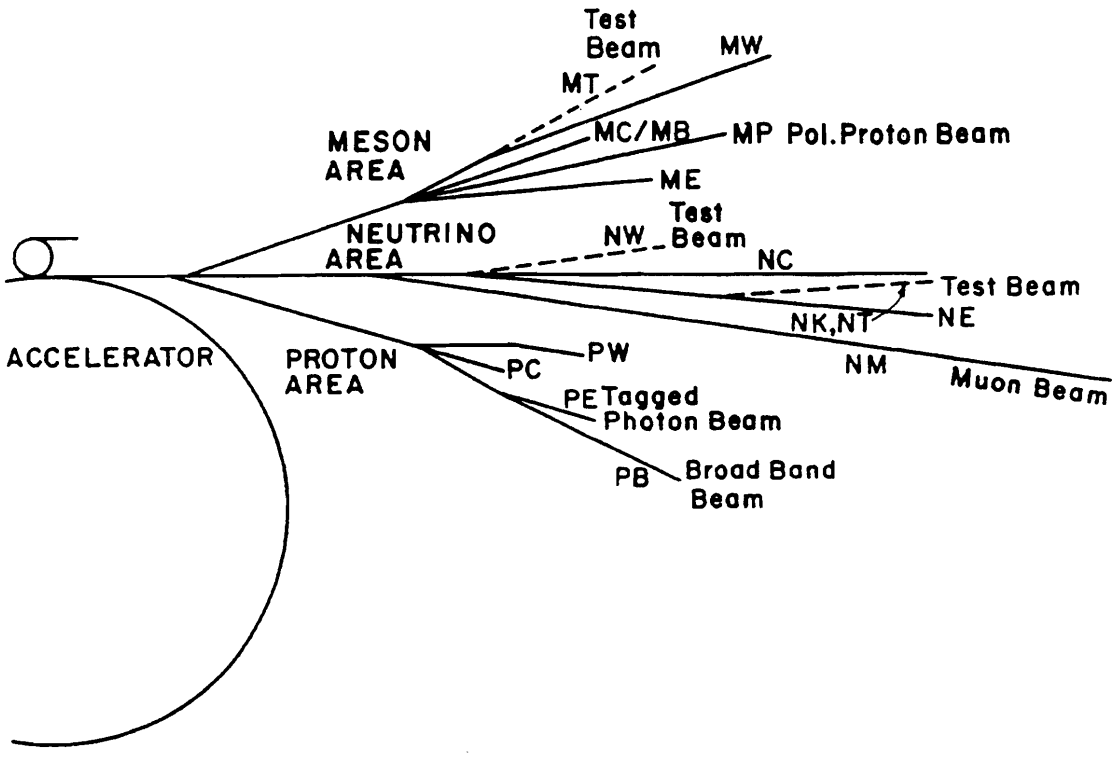


Figure 8. Layout of Fermilab Fixed Target beams. Properties of individual beams are given in Table 2.

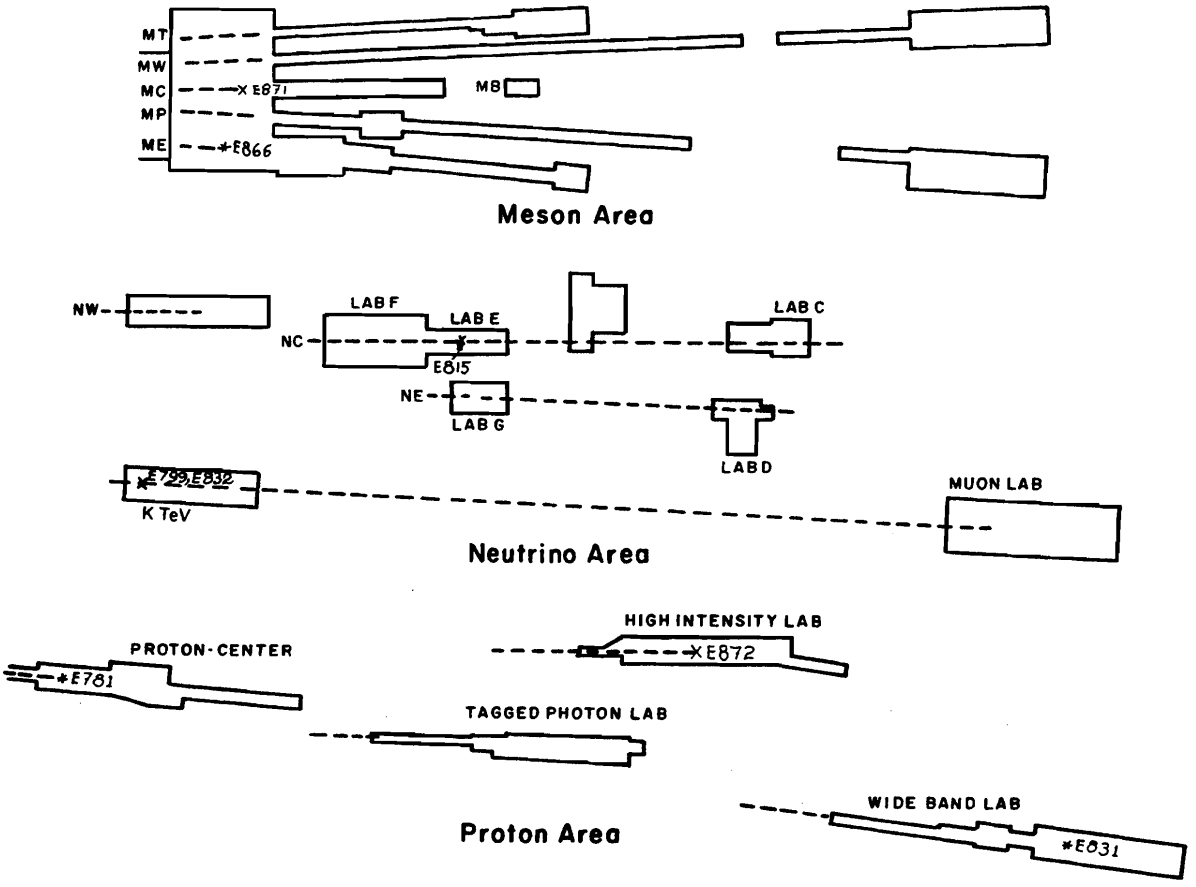


Figure 9. Schematic of the Fixed Target experimental areas with locations of major experiments running in the current Fixed Target run. Not shown are future experiments E-803 and E-875, which will use a neutrino beam from the Main Injector. The drawings are not to scale.

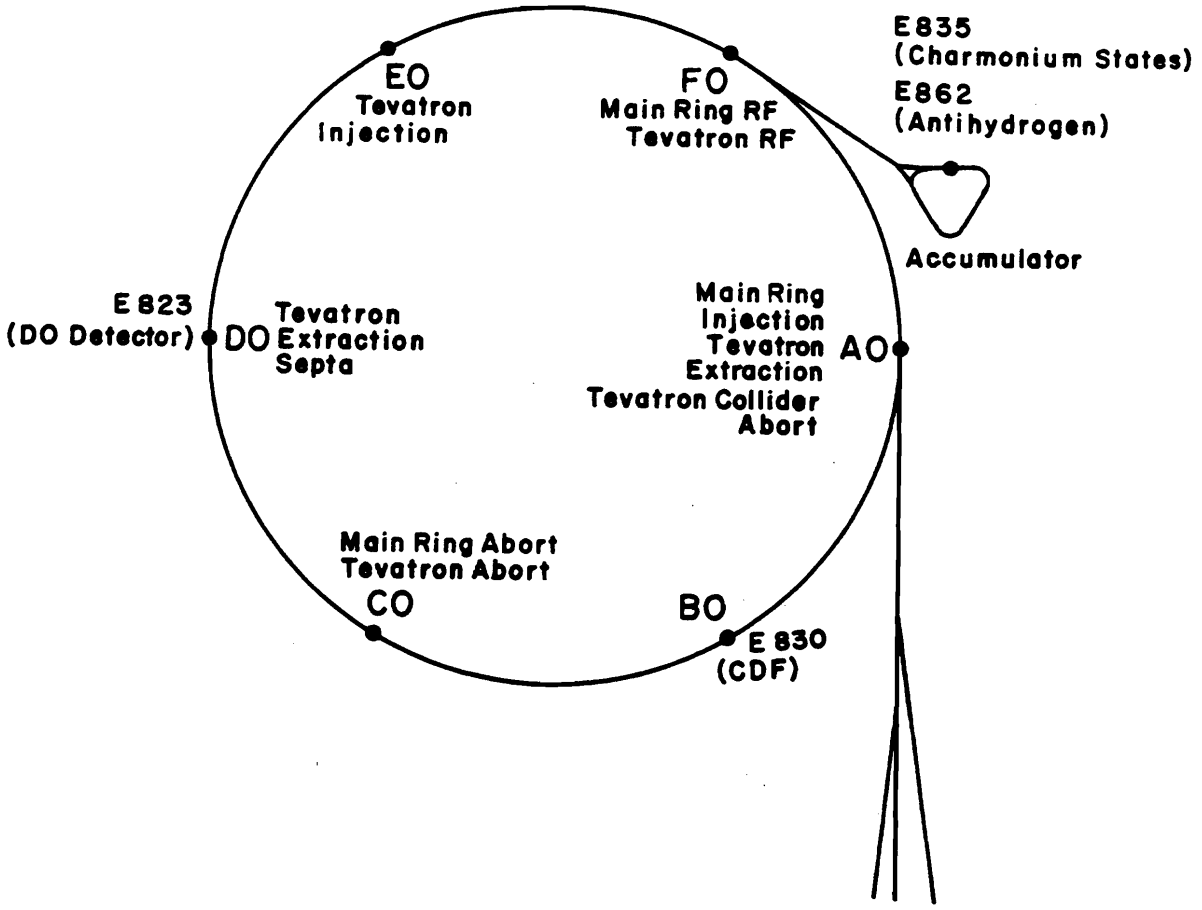


Figure 10. Locations in the Tevatron of the approved $p\bar{p}$ Collider experiments and the two experiments using the Antiproton Accumulator.

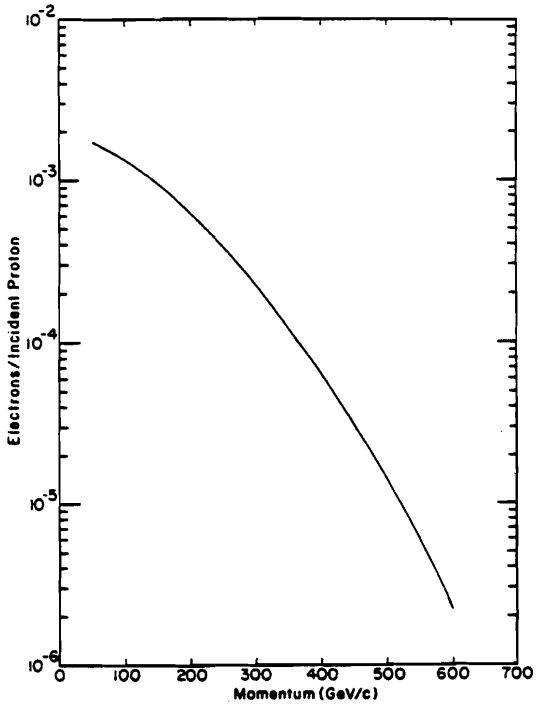


Figure 11.

Proton Area: Electron flux in the Proton Area Wide Band Beam; double band using a deuterium production target.

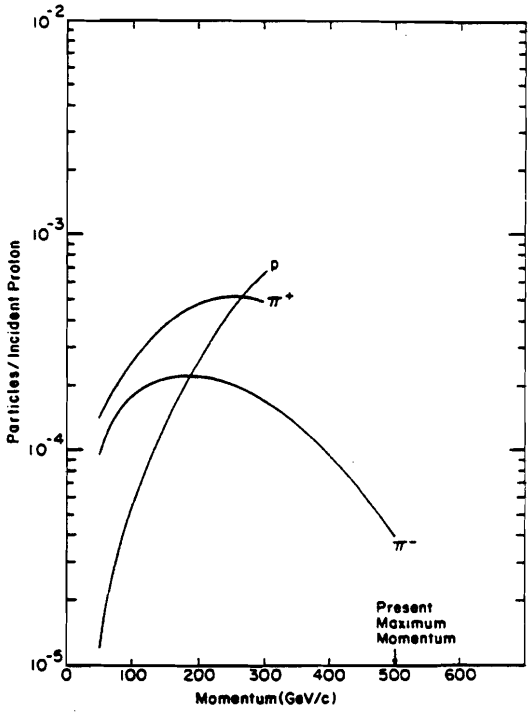


Figure 12.

Proton Area: Hadron flux in the Tagged Photon Laboratory.

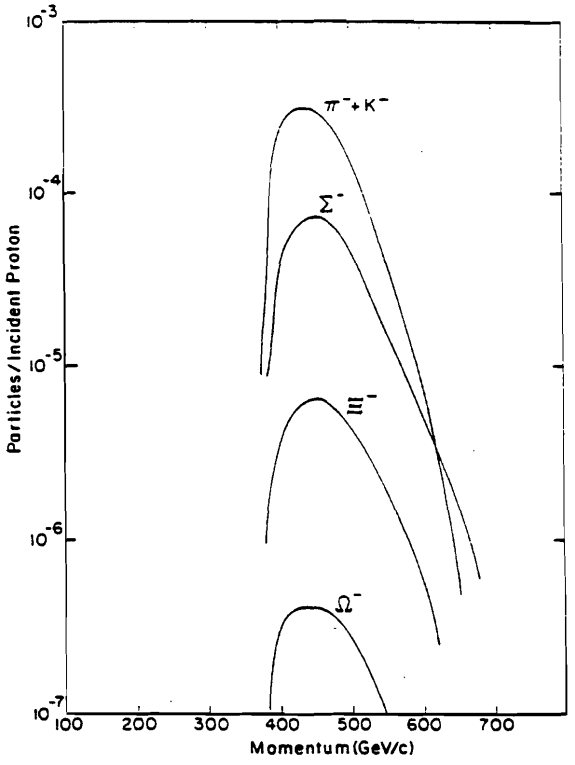


Figure 13.

Proton Area: Fluxes in the Proton Center Hyperon Facility.

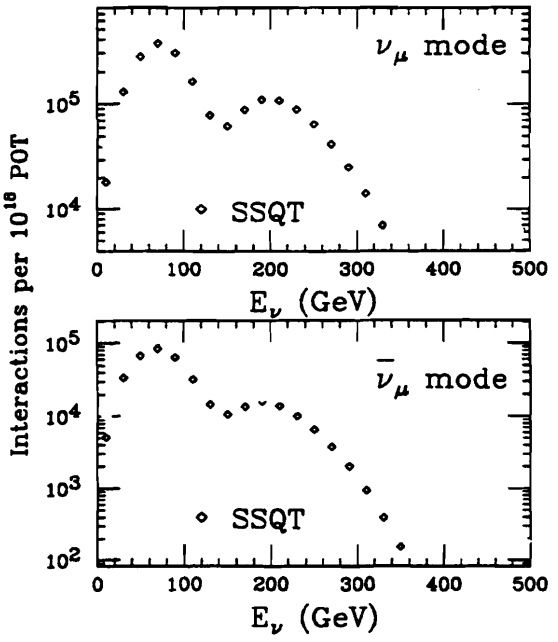


Figure 14.

Neutrino Area: Interaction rates inside a 50" radius at the Lab E detector from the E-815 sign-selected quadrupole triplet beam.

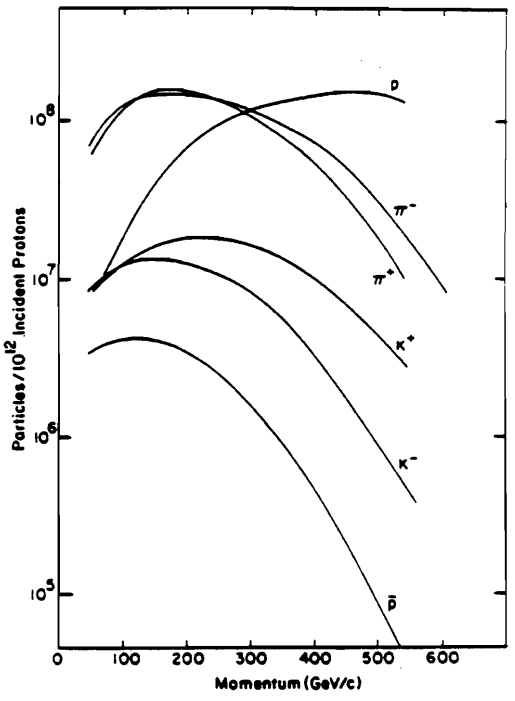


Figure 15.

Meson Area: Fluxes in the MW beam line. Production angle for negatives is zero degrees; for positives it is 1.4 mr.

SECTION IV. MAIN INJECTOR ERA

The Main Injector is now well under construction. Already two experiments using this 120/150 GeV high-intensity proton accelerator (E-803 and E-875, both on neutrino oscillations - see Section VIII) have been approved.

In this Section, we give some information on the expected Main Injector performance, and also preliminary estimates of some beam properties for experiments. Table 3 shows the number of 120 GeV protons/hour that can be expected from the Main Injector under various operating scenarios; the fast spill can be up to ~1 msec long, and slow spill will be one second. Figures 16, 17, 18 show expected fluxes of some neutrino and secondary hadron beams using the Main Injector. Future editions of this Workbook will provide more information as it becomes available.

It should be noted that there are some other future new experimental area possibilities under consideration. An example is the use of the 8 GeV Booster to produce a neutrino beam. Figure 19 gives a schematic illustration of some of these ideas.

Of course, not to be overlooked is the major impetus for the Main Injector. It will increase the performance of the Tevatron to luminosities of $\sim 1\times10^{32}cm^{-2}sec^{-1}$ in the Collider mode, and to over 5×10^{13} protons per ~20 sec spill every ~60 sec for fixed-target.

TABLE 3. PROTONS PER HOUR UNDER VARIOUS MODES OF OPERATION

Mode	Cycle Time	Protons/Hour		
		AP Target	Fast Spill	Slow Spill
Antiproton Production	1.466 sec	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.]

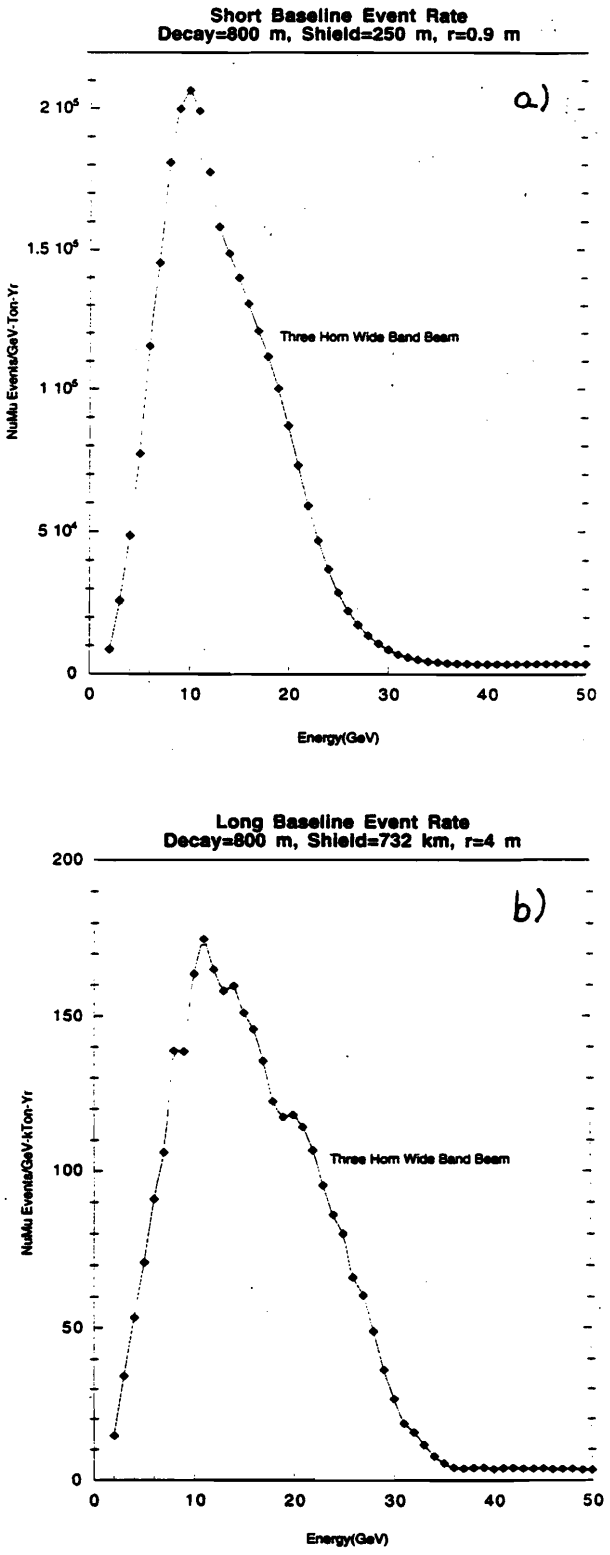


Figure 16. Main Injector, 120 GeV protons: Neutrino event rates for a) short-baseline (per ton), and b) long-baseline (per kton). One year is taken as 3.7×10^{20} incident protons.

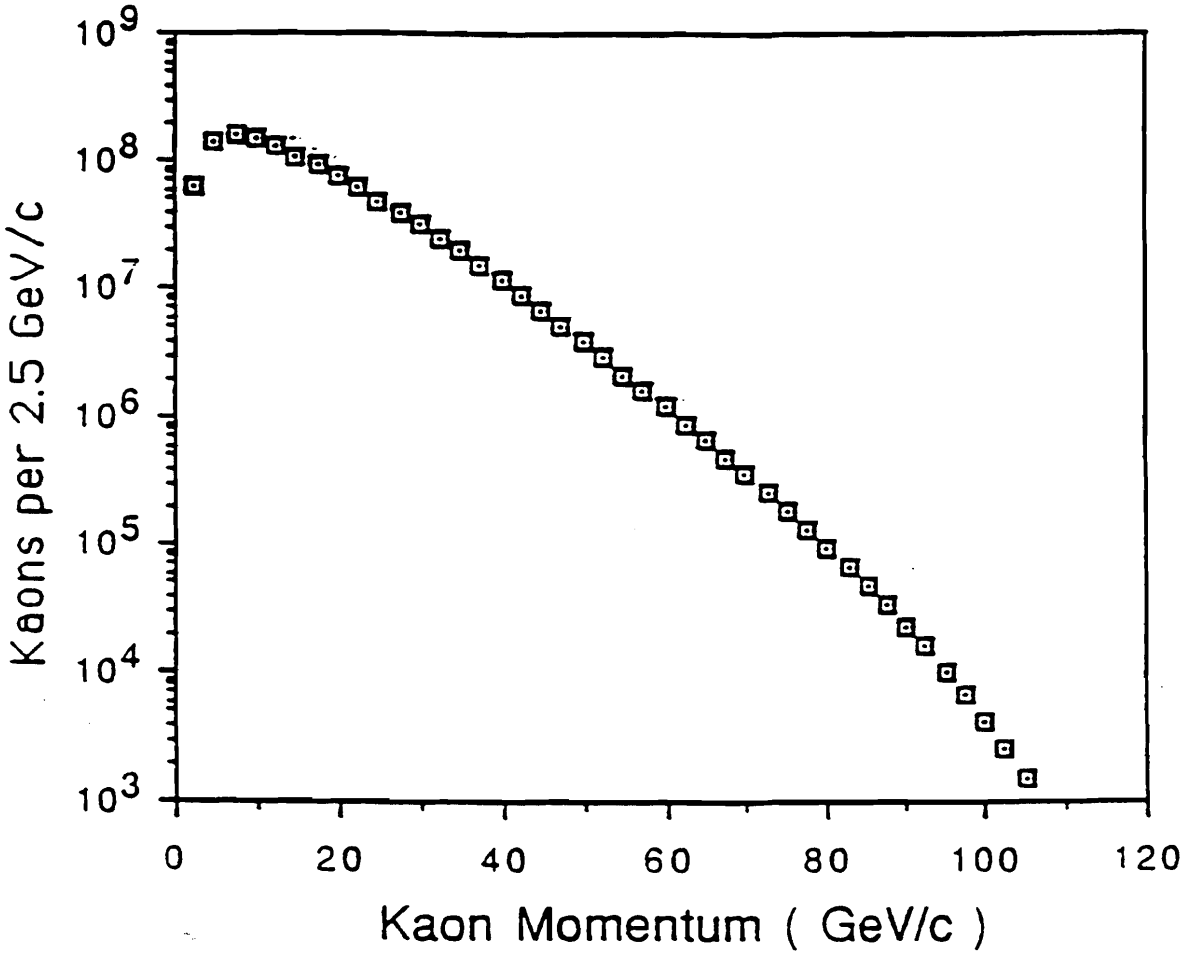


Figure 17. Main Injector: K^0 flux per 2.5 GeV assuming 3×10^{13} protons on a 50 cm target, 12 μstr beam, at 24 mrad targeting angle, including absorbers and filters.

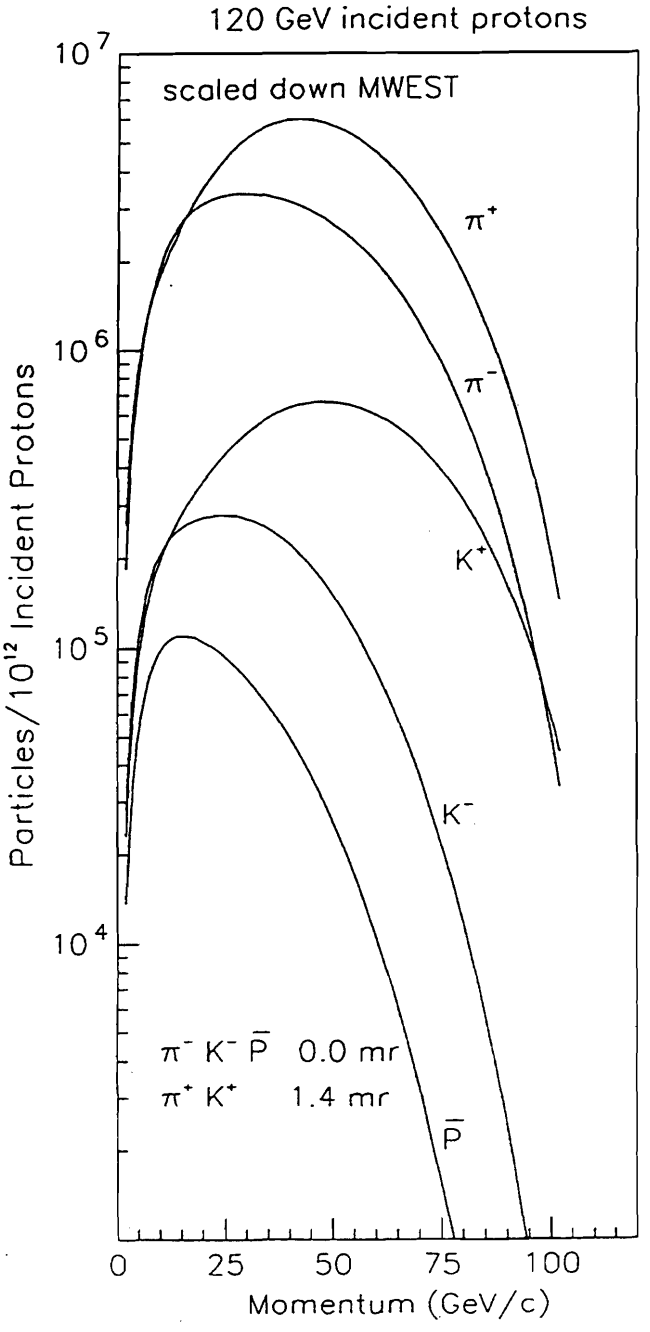


Figure 18. Main Injector: Fluxes in the MW beamline.

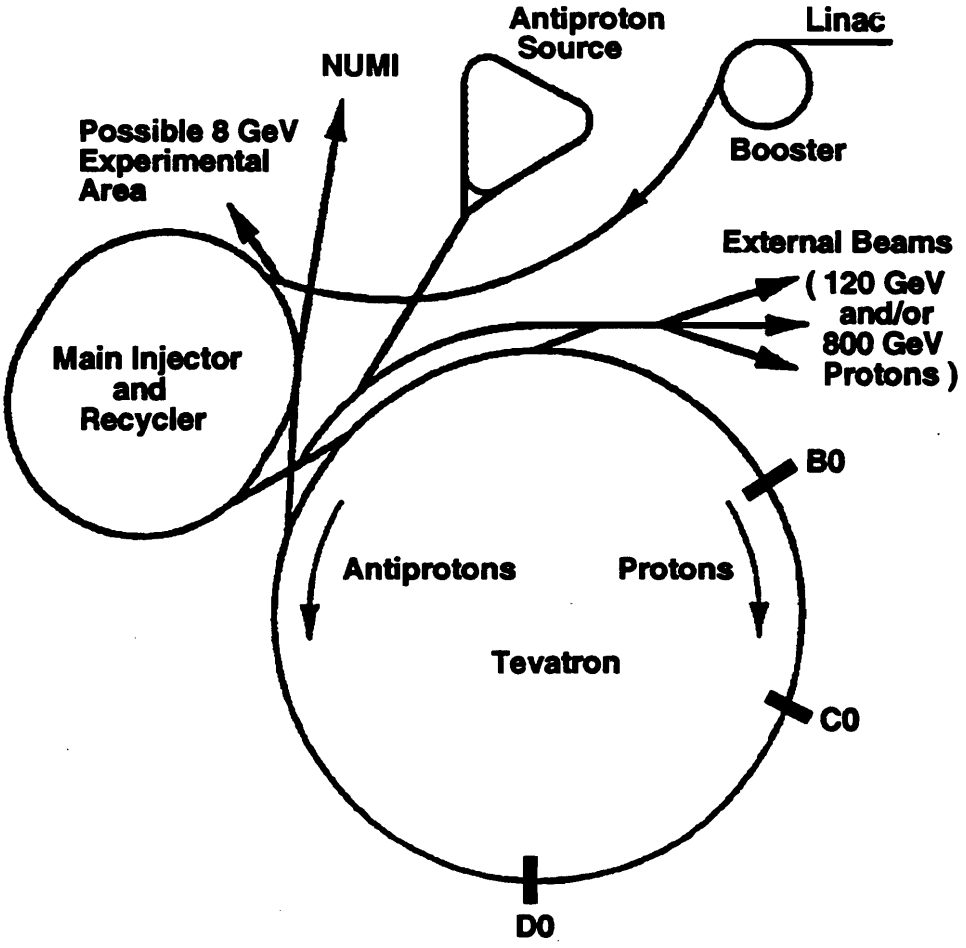


Figure 19. Schematic layout of possible future experimental areas.

SECTION V. FERMILAB COMPUTING FACILITIES

The computing services provided for high energy physics by the Computing Division focus on solving large physics problems (such as event reconstruction and Monte Carlo) and providing support for experimental activities.

The systems currently supported centrally by the Computing Division include the Unix farms and the FNALU and CLUBS Unix systems (see Figures 20 and 21). The multiprocessor farm systems composed of commercial workstations dominate the installed computing capacity at the lab and allow fast cost-effective event reconstruction. The computing power delivered by the central farm systems reached almost 6000 MIPS per month in late 1995. In 1996 and continuing into 1997, the farms are being expanded in order to provide computing capacity for the current fixed-target run, the current capacity being approximately 16000 MIPS (see Figure 22). Many thousands of additional MIPs are delivered by other systems for physics analysis and simulation. Many of these systems are housed in the Feynman Computing Center, along with tape libraries providing approximately 35 terabytes of robotically-accessible tape storage. The configuration of the shared mass storage system is shown in Figure 23. Several hundreds of terabytes of additional data reside in the tape vault. Hundreds of tape drives and more than three terabyates of spinning disk are also online at present. The Computing Division also supports VMS and Unix systems for D0 and CDF (see Figure 24 - a VUP is equivalent to one VAX 11/780, or approximately a MIP), as well as other distributed systems on site.

State of the art high-speed networks glue the systems together and connect to the outside world. The LANs (local-area networks) facilitate access to the data by people on site, and the WANs (wide-area networks) enable world-wide collaborations to function efficiently. The Computing Division also supports a central mail server.

The fixed-target experiments successfully started data-taking in summer 1996. The DART project provided the data acquisition system used by all experiments except one. The project - a collaboration between the Computing Division, the experiments and other divisions within the Laboratory - provided hardware and software that was tailored to each experiment's needs - with data rates at the KTeV facility (E-799/832) of 100 Mbytes/sec being fed to 3,000 MIPS of Silicon Graphics computers providing the Level 3 software event filter processing. Ongoing maintenance and support throughout the run is being provided by the Computing Division.

The data acquisition system for the Sloan Digital Sky Survey (E-885) was deployed at Apache Point in New Mexico, and is being cycled nightly using simulated data while the camera and telescope are being completed.

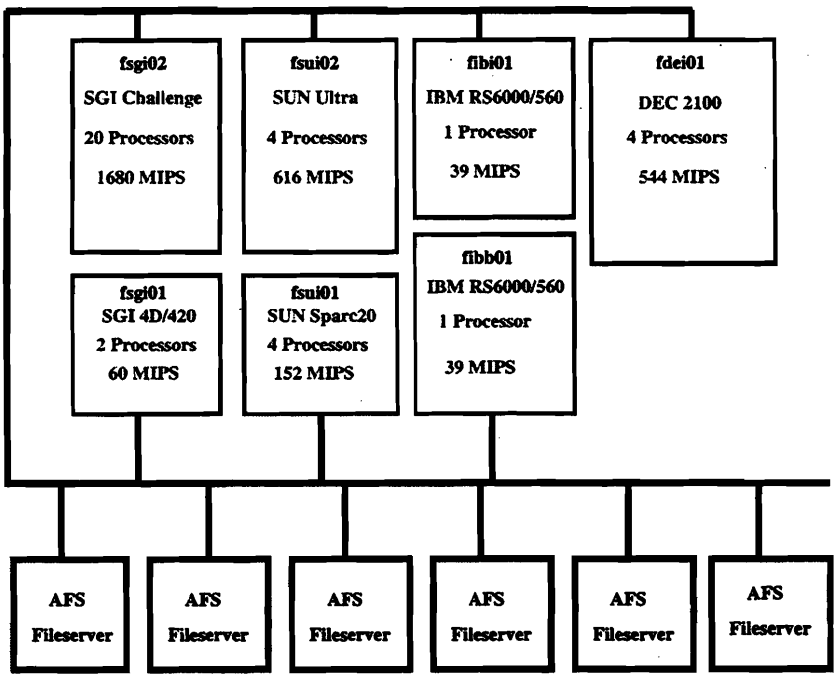


Figure 20. Current FNALU configuration.

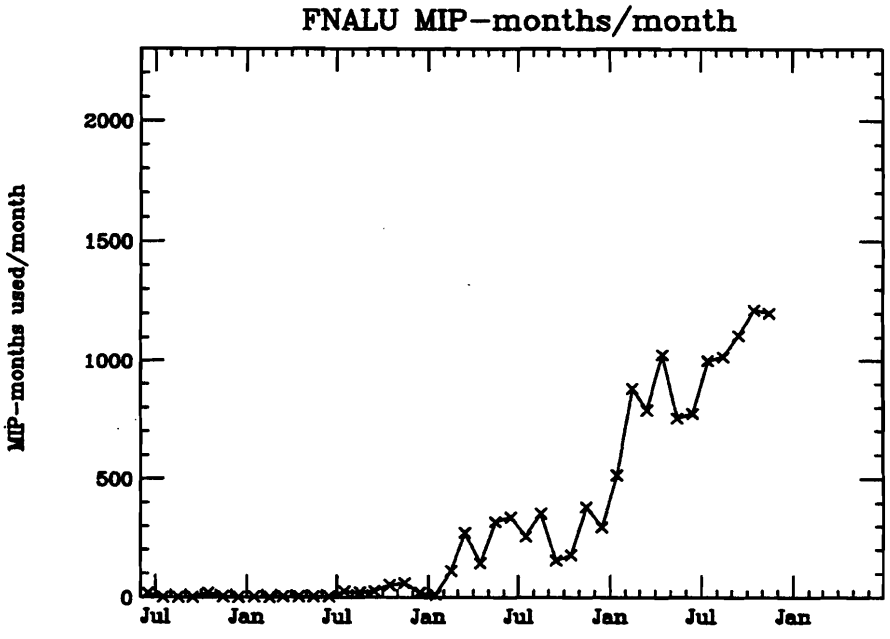


Figure 21. Computing delivered by FNALU in MIP-months/month July 1993 through December 1996.

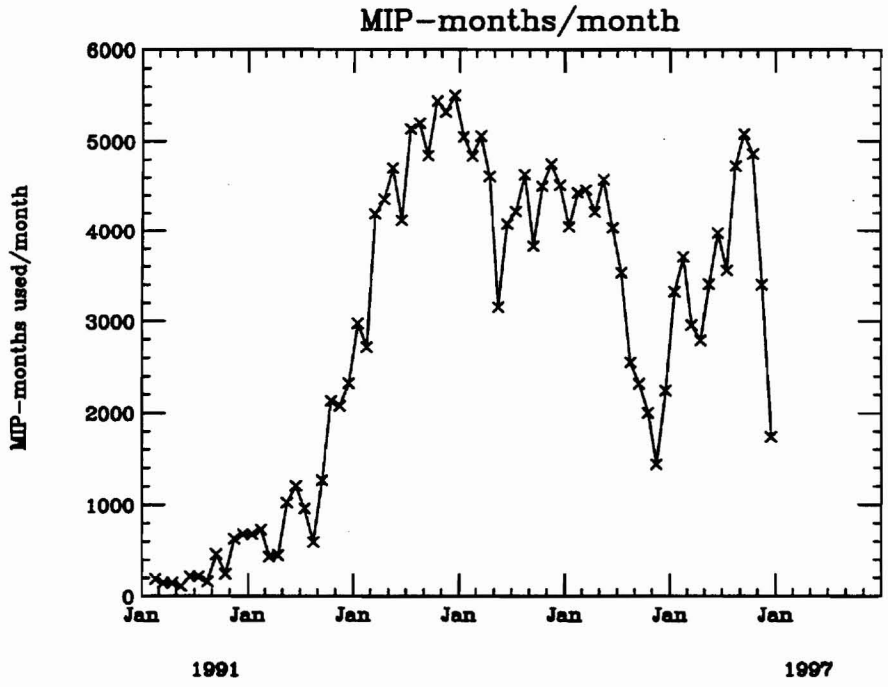


Figure 22. Computing delivered by the farms in MIP-months/month.

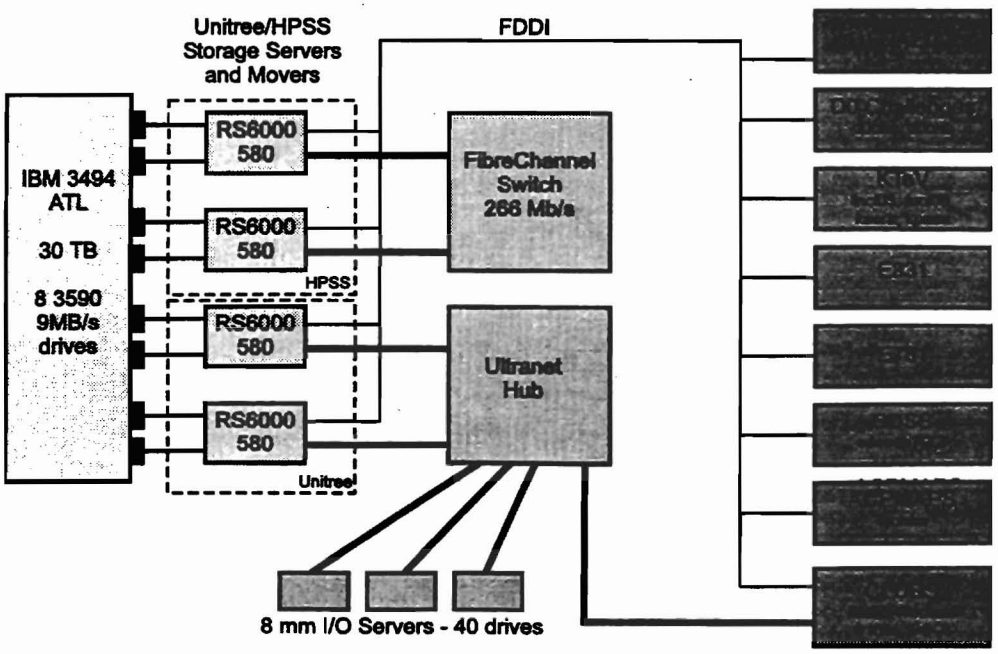


Figure 23. Mass storage configuration - clients and interconnects (not including CDF's robot).

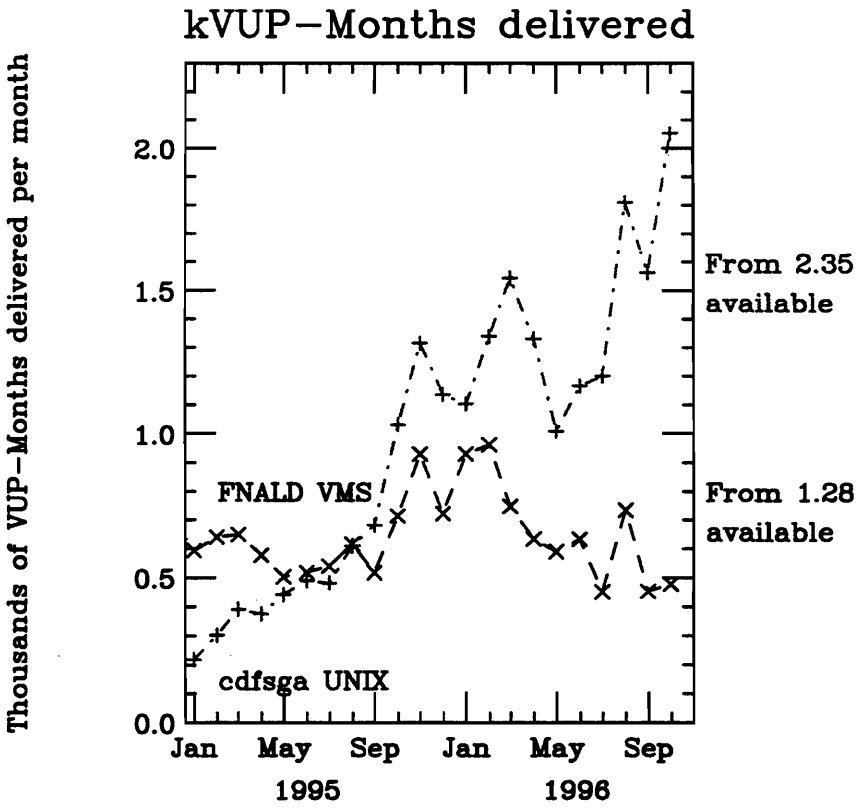
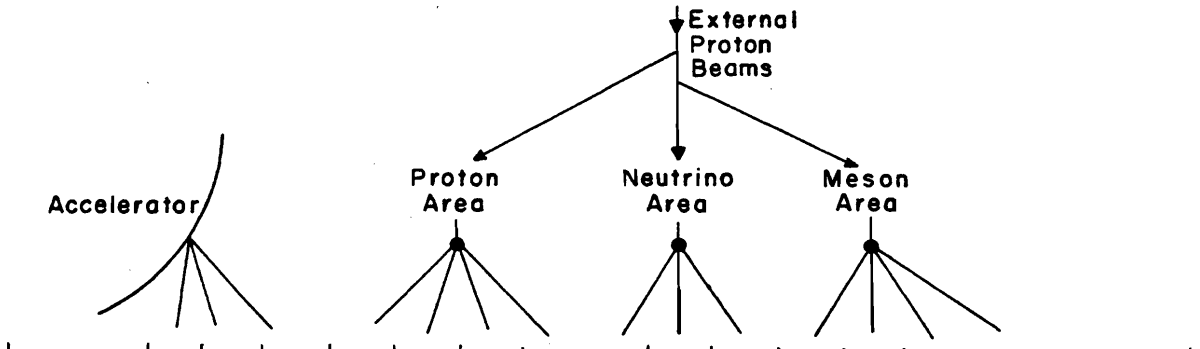


Figure 24. CDF non-farm computing usage in thousands of VUP months/month.

SECTION VI. MAJOR RESEARCH ACTIVITIES DURING 1996 AND 1997

Information on the Fermilab Research Program during 1996 and early 1997 is given in the following pages. Figure 25 shows when the experiments ran; Table 4 describes the major research activities in a little more detail.



Month	BO	DO	ACC	PB	PE	PC	PW	NM	NC	NE	ME	MC	MW	MT	Comments
January 1996	775 ↓ End	740 ↓ End													900x900 GeV Collider Run
February															
March															Shutdown
April															
May															
June									815						800 GeV Fixed Target Run
July															
August															
September				831							866				
October			835 862					832 799							
November															
December															
January 1997															Shutdown and Studies
February			↓	↓		781	872	↓	↓		↓	871			800GeV Fixed Target Run

Figure 25. Major experiments running at Fermilab in 1996 and 1997 (through February).

TABLE 4. DESCRIPTION OF MAJOR RESEARCH ACTIVITIES DURING 1996 AND EARLY 1997

EXP. #

COLLIDER

740 Studies of 900×900 GeV $\bar{p}p$ collisions using the D0 detector - data-taking; completed

775 Studies of 900×900 GeV $\bar{p}p$ collisions using the CDF detector - data-taking; completed

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ACCUMULATOR

835 Charmonium states - setup and data-taking

862 Search for antihydrogen - setup and data-taking

PROTON AREA

781 Charm baryon studies - setup and data-taking

831 Photoproduction of heavy quark states - setup and data-taking

872 ν_τ charged-current interactions - setup and data-taking

NEUTRINO AREA

799 Rare K_L^0 decays - setup and data-taking

815 Neutrino neutral- and charged-current interactions - setup and data-taking

832 Search for direct CP violation in $K_L^0 \rightarrow 2\pi$ - setup and data-taking

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MESON AREA

866 Measurement of $\bar{d}(x)/\bar{u}(x)$ in the proton - setup and data-taking

871 Search for CP violation in Ξ and Λ decays - setup and data-taking

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SECTION VII. FERMILAB RESEARCH PROGRAM

This Section contains information on the Fermilab research program for the next few years. The Situation Report, given on pages 38-39, is a summary of the current status of the experimental program. Figure 26, based on the Situation Report, illustrates by beam line the major approved experiments.

Fermi National Accelerator Laboratory
Experimental Program Situation Report as of February 28, 1997

The Experimental Program situation at Fermilab is summarized below. The experiments are listed by experimental area and beamline under categories which best describe their status as of February 28, 1997. 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**); and Beam from the Main Injector (**MAIN INJECTOR**).

Total number of approved experiments - 430

Beam Area & Line		Experiment	Spokesperson(s)	
A. EXPERIMENTS THAT ARE COMPLETED (378)				
(Note: Only experiments which were completed since January 1, 1996 are listed.)				
MA	MC	ETA00 & ETA+- PHASE DIFFERENCE #773	Gollin	
COL	B-0	COLLIDER DETECTOR #741	Shochet, Tollestrup	
B. EXPERIMENTS THAT ARE ANALYZING DATA (18)				**LAST RUN**
MA	ME	B-QUARK MESONS & BARYONS #789	Kaplan, Peng	JAN 8, 1992
	MP	POLARIZED BEAM #704	Yokosawa	AUG 13, 1990
	MW	HADRON JETS #672A	Zieminski	JAN 8, 1992
		DIRECT PHOTON PRODUCTION #706	Slattery	JAN 8, 1992
NA	NM	TEVATRON MUON #665	Schellman	JAN 8, 1992
	NE	PARTICLE SEARCH #690	Knapp	JAN 8, 1992
PA	PE	PION & KAON CHARM PROD. #769	Appel	FEB 15, 1988
		HADROPRODUCTION HEAVY FLAVORS #791	Appel, Purohit	JAN 8, 1992
	PB	PHOTOPRODUCTION OF JETS #683	Corcoran	JAN 8, 1992
		PHOTOPRODUCTION OF CHARM AND B #687	Butler, Cumalat	JAN 8, 1992
	PW	BEAUTY PRODUCTION BY PROTONS #771	Cox	JAN 8, 1992
COL	B-0	CDF UPGRADE #775	Carithers, Jr., Bellettini	FEB 20, 1996
		CDF HARD DIFFRACTION STUDIES #876	Albrow	FEB 20, 1996
	C-0	TEVATRON CRYSTAL EXTRACTION #853	Murphy	FEB 20, 1996
	D-0	D-0 DETECTOR #740	Grannis, Montgomery	FEB 20, 1996
	E-0	PBAR P ELASTIC SCATTERING #811	Orear	FEB 20, 1996
ACCUM RING		CHARMONIUM STATES #760	Cester	JAN 10, 1992
		ANTIPROTON DECAY #868	Geer	JUL 24, 1995
C. EXPERIMENTS THAT ARE IN PROGRESS (10)				
MA	ME	ANTI(U-QUARK)/ANTI(D-QUARK) DIST#866	McGaughey	
	MC	CP VIOLATION #871	Luk, Dukes	
NA	NC	NEUTRINO #815	Shaevitz, Bernstein	
	NM	CP VIOLATION #799	Wah, Yamanaka	
		CP VIOLATION #832	Hsiung, Winstein	
PA	PB	HEAVY QUARK PHOTOPRODUCTION #831	Cumalat, Moroni	
	PC	LARGE-X BARYON SPECTROMETER#781	Russ	
	PW	TAU NEUTRINO #872	Lundberg, Paolone	
ACCUM RING		CHARMONIUM STATES #835	Cester	
		ANTI-HYDROGEN DETECTION #862	Christian	
G. OTHER APPROVED EXPERIMENTS (13)				
COL	B-0	CDF UPGRADE #830	Carithers, Jr., Bellettini	
	D-0	D-0 DETECTOR UPGRADE #823	Montgomery, Weerts	
MAIN INJECTOR		NEUTRINO OSCILLATIONS #803	Reay	
		NEUTRINO OSCILLATIONS #875	Wojcicki	
OTHER		AUGER PROJECT R&D #881	Mantsch	
		SEARCH FOR LOW MASS MONOPOLES #882	Kalbfleisch	
		SLOAN DIGITAL SKY SURVEY #885	Kron	
		PET ACCELERATOR #887	Pasquinelli	
		DARK MATTER SEARCH #891	Dixon	
		CMS AT FERMILAB #892	Green	
		LHC ACCELERATOR #893	Strait	
A0 FACILITY		PICOSECOND X-RAY SOURCE #886	Melissinos	
		PLASMA WAKE-FIELD ACCELERATOR #890	Rosenzweig	

Fermi National Accelerator Laboratory

Experimental Program Situation Report as of February 28, 1997

(Continued)

PENDING PROPOSALS (11)

MA	MT	B PHYSICS TEST BEAM PROGRAM #879	Butler, Selove
		B PHYSICS TEST BEAM PROGRAM #880	Stone
	MW	COSMIC RAY CALORIMETER CALIB. #883	Adams
		COSMIC RAY DETECTOR TEST #884	Kim
MAIN INJECTOR		KAON PHYSICS AT MAIN INJECTOR #804	Winstein
		SPIN STRUCTURE FUNCTION PHYSICS #878	Moss
		P-BAR+NUCLEI STUDIES #888	Viola
		CPT TEST #894	Thomson
BOOSTR		BOOSTER NEUTRINOS #873	Federspiel, White
		NEUTRINOS AT THE BOOSTER #889	Abashian
OTHER		AXION SEARCH #877	Lee

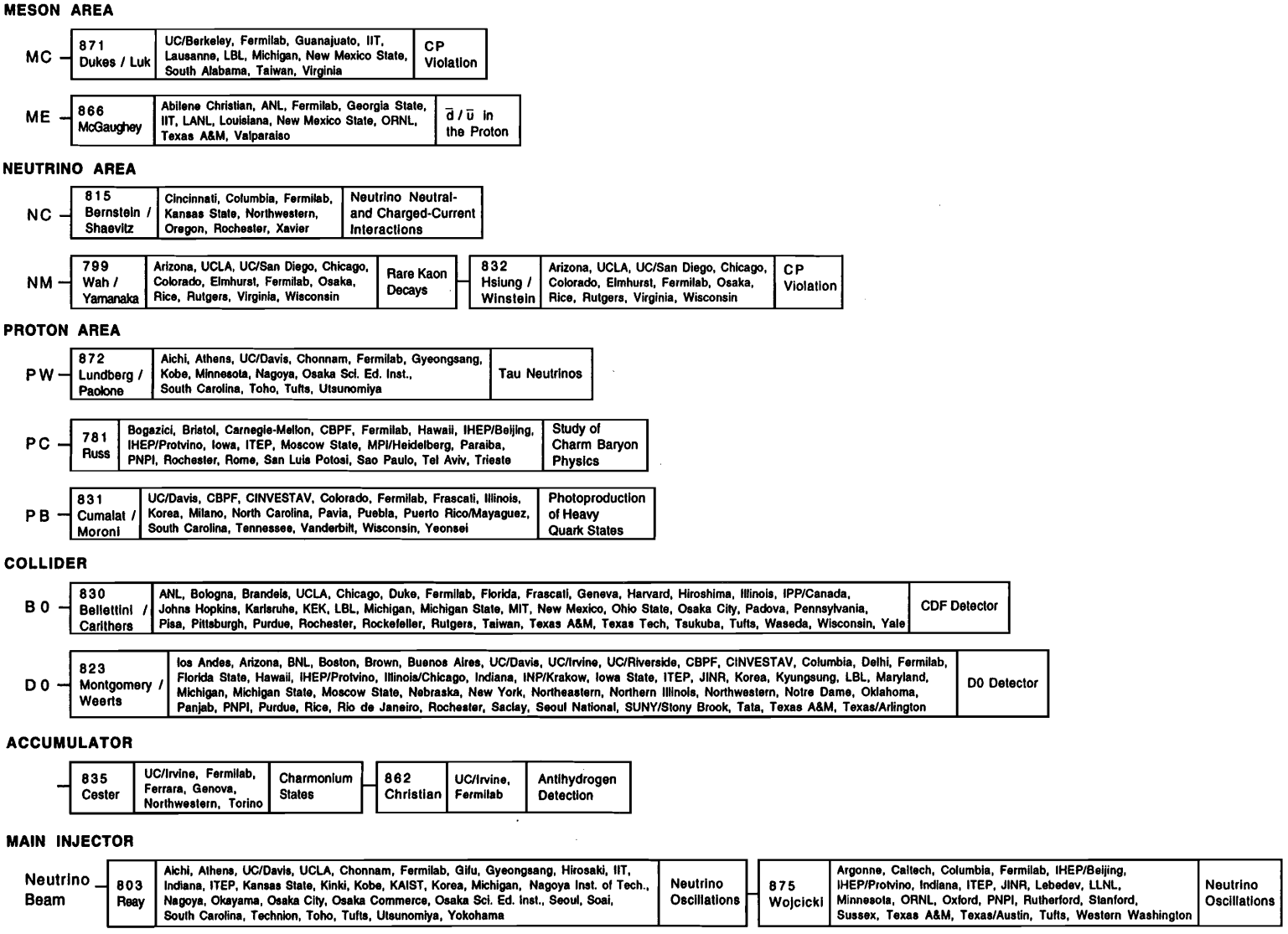


Figure 26. Fermilab experimental program. All major approved experiments that have not yet completed data-taking by the beginning of 1997 are shown here.

SECTION VIII. SUMMARIES OF APPROVED EXPERIMENTS

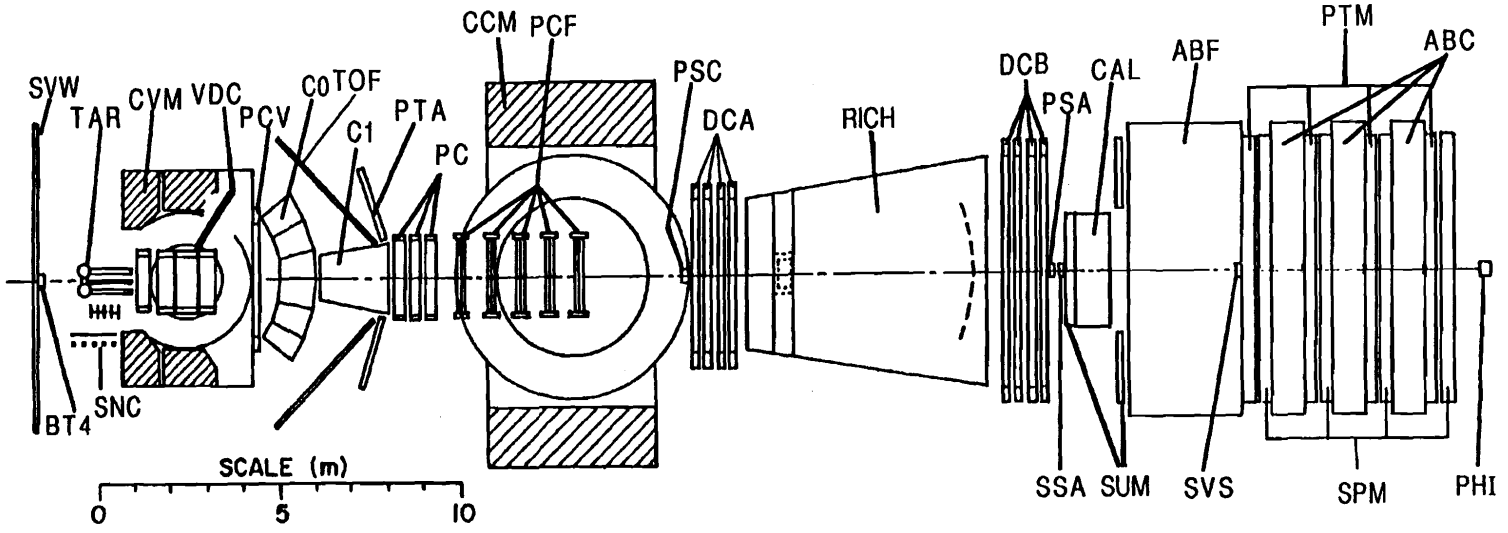
Summaries are given in this Section of major approved experiments which have not yet completed data-taking, and also those major experiments still carrying out a significant analysis effort. Most were prepared recently by the experiment spokesperson(s).

As discussed in the Introduction on page iii, now included in this Section are 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 given below, only the Fermilab physicists on these activities are included.

The number of users (physicists and graduate students) and institutions on the listed experiments are as follows; each user and institution is counted only once even if on more than one experiment.

	Number of Users	Number of Institutions
US institutions	1496	98
Non-US institutions	813	90

FERMILAB E665
MUON SPECTROMETER



SVW	7m x 3m Veto Counter Wall
BT4	Beam Tagging, Station 4
PBT	0.13m x 0.13m MWPC 6 Planes
SBT	0.13m x 0.18m Scintillation Counter Array
TAR	1m LH_2 + LD_2 + Solid Targets
SNC	Neutron Scintillators
CVM	CERN Vertex Magnet
VDC	Vertex Drift Chambers, 16 Planes
PCV	2.8m x 1m MWPC, 6 Planes
C0	144 Cell Threshold Cerenkov Counter
C1	58 Cell Threshold Cerenkov Counter
TOF	4.2m x 1.6m Scintillation TOF Arrays
PTA	2m x 2m Prop. Tube Arrays, 4 Planes
PC	2m x 2m MWPC, 12 Planes
CCM	Chicago Cyclotron Magnet
PCF	2m x 1m MWPC, 15 Planes
PSC	0.13m x 0.13m Small Angle MWPCs, 8 Planes
DCA	4m x 2m Drift Chambers, 8 Planes
RICH	Ring Imaging Cerenkov Counter
DCB	6m x 2m Drift Chambers, 8 Planes
PSA	0.13m x 0.13m Small Angle MWPCs, 8 Planes
SSA	0.13m x 0.13m Scintillation Counter Array
SUM	7m x 3m Scintillation Counter Array
CAL	3m x 3m EM Shower Calorimeter
ABF	7m x 3m x 3m Iron Absorber
SVS	0.23m x 0.3m Scintillation Counter Array
PTM	7m x 3m Prop. Tube Arrays, 8 Planes
SPM	7m x 3m Scintillation Counter Arrays
PHI	0.025m x 0.025m rf Phase Lock Scintillation Counters
ABC	0.9m Concrete Absorbers

E-665 (Schellman) Muon Scattering with Hadron Detection

ANL, UC/San Diego, Fermilab, Freiburg (Germany), Harvard, Illinois/Chicago, INP/Krakow (Poland), LLNL, Maryland, MIT, Max-Planck (Germany), Northwestern, Ohio, Pennsylvania, Washington, Wuppertal (Germany), Yale

Status: *Data Analysis*

The experiment studies the interactions of muons with average beam energies up to 500 GeV in various targets and with the capability of making detailed measurements of the hadrons that emerge from the collision vertex. To this end, the collaboration has combined two large magnets, the CERN Vertex Magnet (CVM) and the Chicago Cyclotron Magnet in a spectrometer that is as powerful as any known. We use this spectrometer in two basic, and for the most part complementary, ways to explore:

1) The properties of hadrons emerging from deep inelastic muon collisions in hydrogen and heavy nuclei. It is possible to study single quark fragmentation and jet physics in the same CM energy range as e^+e^- annihilation experiments which directly observe gluon radiation. In deep inelastic muon scattering, the fragmentation of the current and diquark jets (not seen in e^+e^-) can be measured relative to the precise knowledge of the exchanged virtual photon direction. By studying the A-dependence of these phenomena, we expect to learn new things about the propagation of quarks in nuclear matter and to use the nucleus as a length scale to study non-perturbative quantum chromodynamics.

2) Complementing the fragmentation studies are studies of the deep inelastic structure functions on the same nucleon and nuclear targets. Although the targets are relatively thin, the high incident muon energy makes this experiment particularly suited to the study of structure functions at small x_{Bj} (<0.02). This region is of great interest in the study of nucleon structure. Here, all experiments are limited by kinematics rather than rates, and the increased muon energy available at Fermilab automatically increases the available kinematic range.

The experiment took data for the first time during 1987-88 using deuterium, hydrogen and xenon targets. In 1990 the apparatus was supplemented with a tracking system of drift chambers inside the CVM to improve the pattern recognition capabilities and resolution of the spectrometer. With a new target system, allowing targets to be changed every 60 seconds, muon interactions in hydrogen, deuterium, carbon, calcium and lead were studied. During the 1991 fixed-target run, higher-luminosity studies of hydrogen and deuterium focussed on the difference between the quark content of neutrons and protons and on the structure of events at the highest center of mass energies yet available in muon-nucleon scattering experiments.

Efforts in 1996 concentrated on final publication of the 1990 and 1991 data samples. Other results include measurements of nuclear transparency in vector meson production, Bose-Einstein correlations and the A-dependence of jet production and fragmentation.

Publications

A Spectrometer for Muon Scattering at the Tevatron, M. R. Adams et al., Nucl. Instr. and Meth. A291, 533 (1990).

Distribution of Charged Hadrons Observed in Deep-Inelastic Muon-Deuterium Scattering at 400 GeV, M. R. Adams et al., Phys. Lett. B272, 163 (1991).

Saturation of Shadowing at Very Low x_{Bj}, M. R. Adams et al., Phys. Rev. Lett. 68, 3266 (1992).

Shadowing in the Muon-Xenon Inelastic Scattering Cross Section at 490 GeV, M. R. Adams et al., Phys. Lett. B287, 375 (1992).

First Measurement of Jet Production Rates in Deep-Inelastic Lepton-Proton Scattering, M. R. Adams et al., Phys. Rev. Lett. 69, 1026 (1992).

An Investigation of Bose-Einstein Correlations in Muon-Nucleon Interactions at 490 GeV, M. R. Adams et al., Phys. Lett. B308, 418 (1993).

Measurement of the Ratio σ_n/σ_p in Inelastic Muon-Nucleon Scattering at Very Low x and Q^2, M. R. Adams et al., Phys. Lett. B309, 477 (1993).

Perturbative QCD Effects Observed in 490 GeV Deep-Inelastic Muon Scattering, M. R. Adams et al., Phys. Rev. D48, 5057 (1993).

Q^2 Dependence of the Average Squared Transverse Energy of Jets in Deep-Inelastic Muon-Nucleon Scattering with Comparison to QCD Predictions, M. R. Adams et al., Phys. Rev. Lett. 72, 466 (1994).

Production of Charged Hadrons by Positive Muons on Deuterium and Xenon at 490 GeV, M. R. Adams et al., Z. Phys. C61, 179 (1994).

Scaled Energy (z) Distributions of Charged Hadrons Observed in Deep-Inelastic Muon Scattering at 490 GeV from Xenon and Deuterium Targets, M. R. Adams et al., Phys. Rev. D50, 1836 (1994).

Production of Neutral Strange Particles in Muon-Nucleon Scattering at 490 GeV, M. R. Adams et al., Z. Phys. C61, 539 (1994).

Large Density and Correlation Integrals in Deep-Inelastic Muon-Nucleon Scattering at 490 GeV, M. R. Adams et al., Phys. Lett. B335, 535 (1994).

Nuclear Shadowing, Diffractive Scattering and Low Momentum Protons in μXe Interactions at 490 GeV, M. R. Adams et al., Z. Phys. C65, 225 (1995).

Measurement of Nuclear Transparencies from Exclusive ρ^0 Meson Production in Muon-Nucleus Scattering at 470 GeV, M. R. Adams et al., Phys. Rev. Lett. 74, 1525 (1995).

Nuclear Decay Following Deep Inelastic Scattering of 470 GeV Muons, M. R. Adams et al., Phys. Rev. Lett. 74, 5198 (1995).

Measurement of the Ratio F_2^n/F_2^p in Muon-Nucleon Scattering at Small x and Q^2, M. R. Adams et al., Phys. Rev. Lett. 75, 1466 (1995).

Shadowing in Inelastic Muon Scattering Off Carbon, Calcium and Lead at Low x_{Bj}, M. R. Adams et al., Z. Physics C67, 403 (1995).

Measurement of the Gluon Distribution Function of the Nucleon Using Energy-Energy Angular Pattern in Deep-Inelastic Lepton Scattering, M. R. Adams et al., Z. Phys. C71, 391 (1996).

Proton and Deuteron Structure Functions in Muon Scattering at 470 GeV, M. R. Adams et al., Phys. Rev. D54, 3006 (1996).

Diffractive Production of ρ^0 (770) Mesons in Muon-Proton Interactions at 470 GeV, submitted to Z. Phys. C, 1997.

Theses

E. Ramberg, University of Maryland, 1989.
P. Anthony, Massachusetts Institute of Technology, 1990.
M. Erdmann, University of Freiburg i.Br., 1990.
S. Magill, University of Illinois/Chicago, 1990.
D. Michael, Harvard University, 1990.
S. O'Day, University of Maryland, 1990.
J. Ryan, Massachusetts Institute of Technology, 1991.
A. Salvarani, University of California/San Diego, 1991.
S. Aid, University of Maryland, 1991.
A. Bhatti, University of Washington, 1991.
U. Ecker, Wuppertal, 1991.
D. Jansen, University of Washington, 1991.
A. Roser, Wuppertal, 1992.
M. Schmitt, Harvard University, 1991.
S. Söldner-Rembold, Technischen Universitaät München, 1992.
R. Kennedy, University of California at San Diego, 1992.
M. Baker, Massachusetts Institute of Technology, 1993.
J. Conrad, Harvard University, 1993.
D. Hantke, Technischen Universitaät Munchen, 1993.
H. Clark, Ohio State University, 1993.
M. Wilhelm, University of Freiburg, 1993.
R. Guo, University of Illinois/Chicago, 1994.
T. Carroll, University of Illinois/Chicago, 1994.
P. Spentzouris, Northwestern University, 1994.
W. Dougherty, University of Washington, 1994.
A. Kotwal, Harvard University, 1995.
P. Madden, University of California/San Diego, 1995.
A. Banerjee, University of Pennsylvania, 1995.

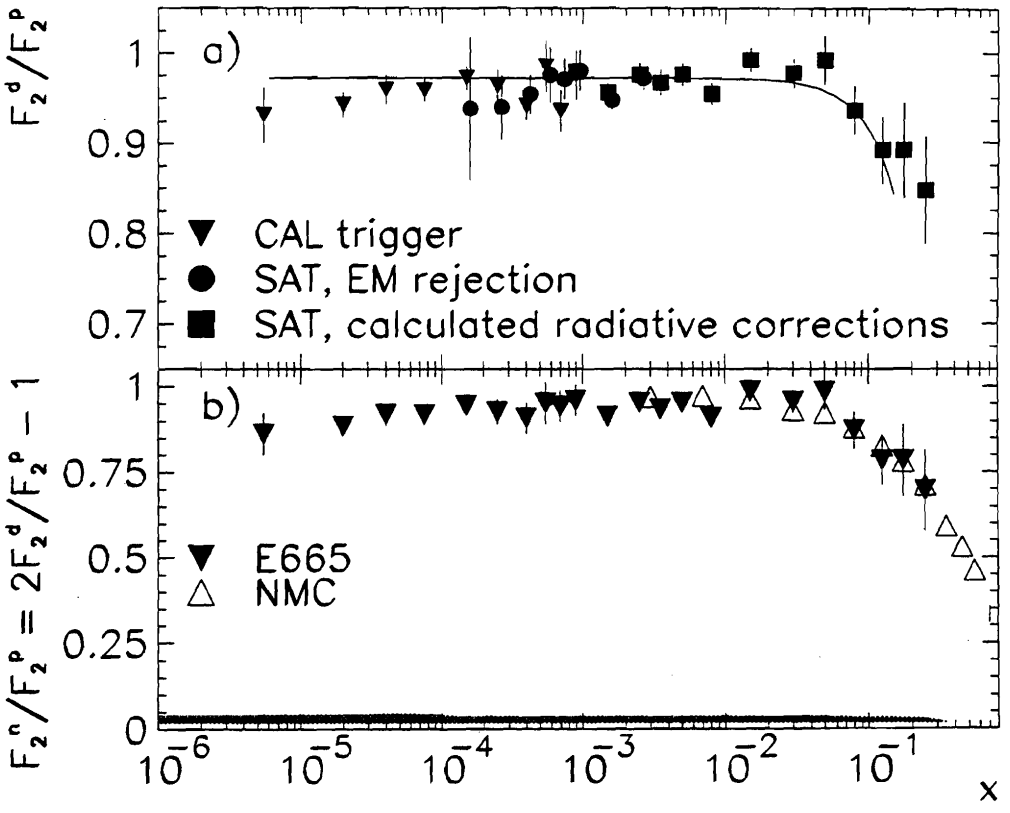


Figure 1. Final neutron-to-proton structure function ratio from the full 1991 data sample. The x region below 2×10^{-3} is unique to E-665.

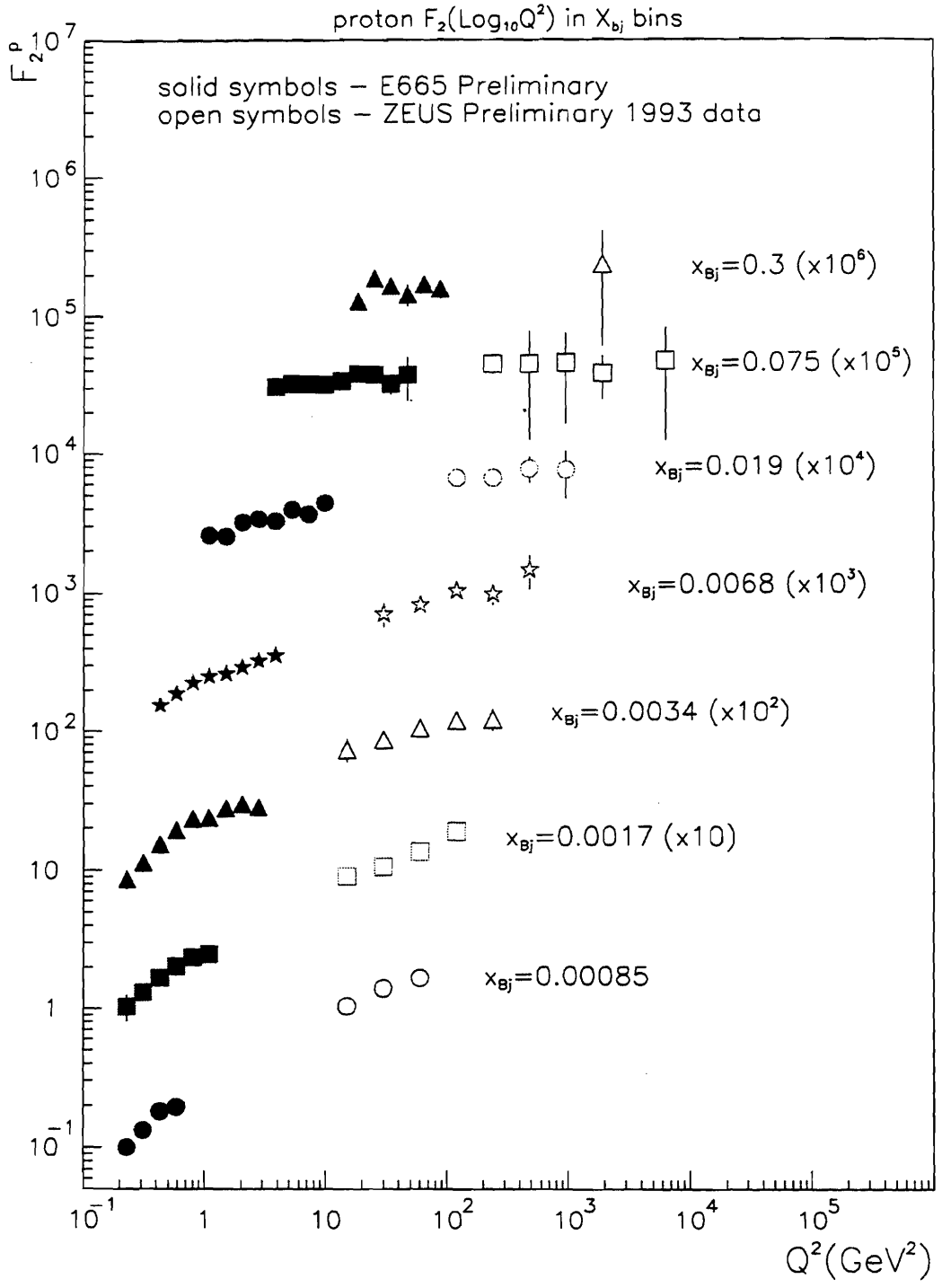
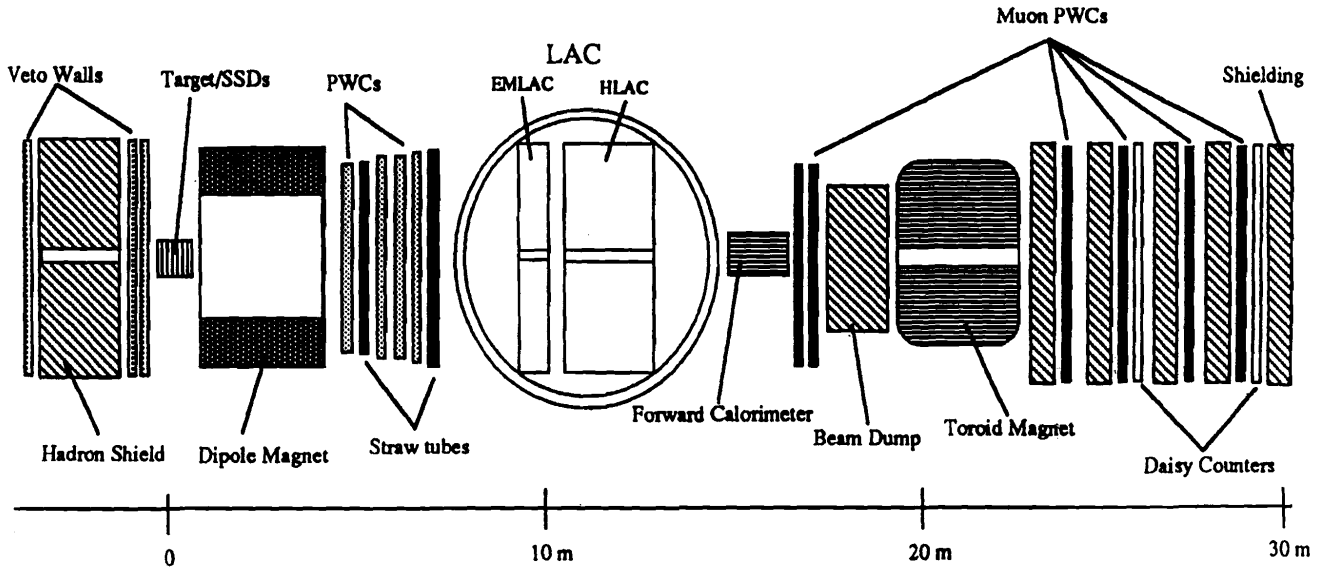


Figure 2. The structure function F_2 (x, Q^2) measured at low x and compared to HERA results.



The Meson-West apparatus.

E-672 (Zieminski) Study of Hadronic Final States in Association with High Mass Dimuons

Fermilab, IHEP/Protvino (Russia), Illinois/Chicago, Indiana, Louisville, Michigan/Flint

Status: *Data Analysis*

The aim of the E-672 experiment is to study hadronic processes yielding vector mesons (ρ/ω, ϕ, J/ψ, ψ')and high mass dimuon pairs (the trigger) and associated particles. The experiment shares the MW beam line, magnetic spectrometer and calorimetry with the E-706 experiment. The dimuon detector is located downstream of the forward hadronic calorimeter and consists of a toroid magnet, six PWC's with three or four planes each, two scintillator hodoscopes used in the dimuon pretrigger and pretrigger and trigger processors.

E-672 is an open geometry dimuon experiment. The geometrical acceptance for dimuon pairs produced in hA collisions at 530 GeV/c is approximately 20% and has a maximum for Feynman x = 0.25. The physics goals, which all are related to experimental tests of Quantum Chromodynamics, include:

(a) Production of χ states by observing their radiative decays into $J/\psi\gamma$ with gammas either converting into e^+e^- pairs inside the target or observed in the LAC;

(b) Production of b-quarks observed via their decays to J/ψ (inclusive and exclusive modes: $J/\psi K$, $J/\psi K^*$ and $J/\psi K^0$);

(c) General properties of the production of vector mesons (ρ/ω, ϕ, J/ψ, and ψ') and Drell-Yan pairs

- total and differential cross sections
- gluon structure function of the incident hadron
- production of associated charged and neutral particles
- dependence on the inelasticity of the collision
- the A-dependence of total and differential cross sections

(d) $J/\psi + n\pi$ spectroscopy (same for ϕ).

The first test/physics run of the experiment took place in 1987/88. Approximately 2000 J/ψ's were recorded and successfully reconstructed under various running conditions. Two papers were published: one on the A-dependence and another on properties of J/ψ production in π^- Be and pBe collisions at 530 GeV/c.

During the 1990 run we collected 5 million triggers with the 530 GeV/c π^- beam incident on Be and Cu targets. All triggers were processed through the off-line reconstruction. This gave us over 350,000 events with both muons originating from the target. The sample includes 13,000 reconstructed J/ψ events with J/ψ mass resolution better than 60 MeV/c^2 and over 500 ψ' events in the $\mu^+\mu^-$ and J/$\psi\pi^+\pi^-$ decay modes. It also contains approximately 15,000 ϕ events and 50,000 ρ/ω events. The quality of the data is far superior compared to the 1987/88 run due to extra tracking chambers, new SSD planes and reading out the LAC data without zero suppression.

We reconstructed over 100 $\chi \rightarrow$ J/ψ + e^+e^- decays and several hundred $\chi \rightarrow$ J/$\psi\gamma$ decays. A 10 MeV mass resolution enabled a clear separation of the χ (3510) and χ (3555) signals in the $\chi \rightarrow$ J/ψe^+e^- mode.

Several multivertex finding algorithms were developed. There are 73 events with J/ψ originating from well-separated vertices (3 sigma in transverse and longitudinal directions). Ten of the secondary vertices are outside the target region. We estimate that 26 $\pm$ 10 events are due to B $\rightarrow$ J/ψ X decay. We also observe five exclusive B $\rightarrow$ J/ψ K and B $\rightarrow$ J/ψ K* decays.

During the 1991 run we collected 10 million triggers with 515 GeV/c and 800 GeV/c protons incident on H, Be and Cu targets.

Publications

A-Dependence of J/ψ Production in π^--Nucleus Collisions at 530 GeV/c, S. Kartik et al., Phys. Rev. D41, 1 (1990).

Properties of J/ψ Production in π^-Be and pBe Collisions at 530 GeV/c, V. Abramov et al., FERMILAB-Pub-91/62-E (1991).

Bottom Production in pi-Be Collisions at 515 GeV/c, R. Jesik et al., Phys. Rev. Lett. 74, 495 (1995).

Production of J/ψ and ψ(2s) Mesons in π^-Be Collisions at 515 GeV/c, A. Gribushin et al., Phys. Rev. D53, 4723 (1996).

Production of Charmonium States in π^-Be Collisions at 515 GeV/c, V. Koreshev et al., Phys. Rev. Lett. 77, 4294 (1996).

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S. Kartik, Indiana University, 1991.
R. Li, Indiana University, 1993.
R. Jesik, University of Illinois at Chicago, 1994.
F. Vaca, University of Illinois at Chicago, 1995.

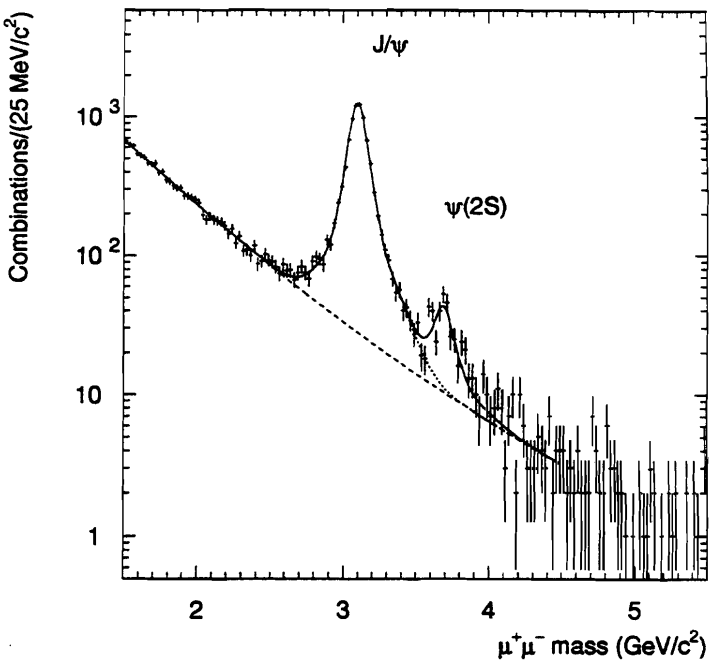


Figure 1. Invariant mass distribution for $\mu^+\mu^-$ pairs in the J/ψ mass region. The solid curve is a fit to the data; the dotted curve shows the J/ψ contribution, and the dashed curve shows the background contribution.

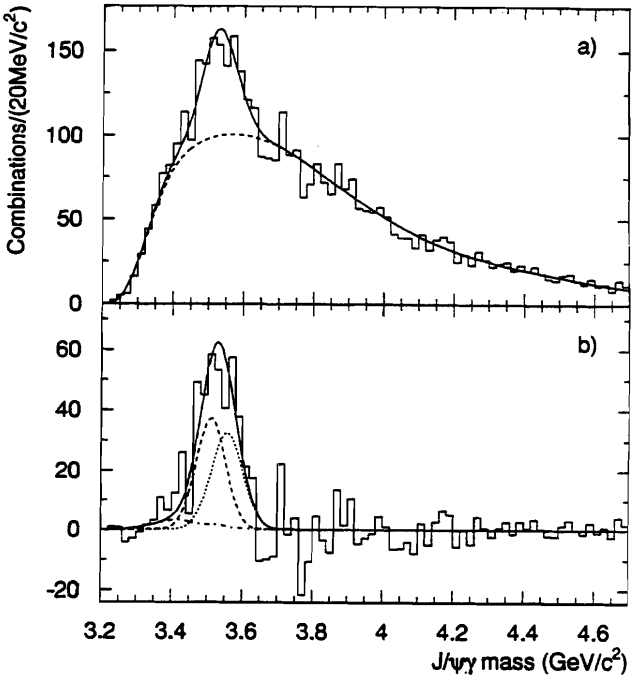


Figure 2. J/ψγ invariant mass for γ's detected in the EMLAC: (a) the solid curve shows the fit to the signals and background, the dashed curve illustrates the background contribution; (b) the background subtracted data and signals (solid curve), and the estimated contributions from χ_{c0} and ψ(2S) (dot-dash), χ_{c1}(dash), and χ_{c2}(dot).

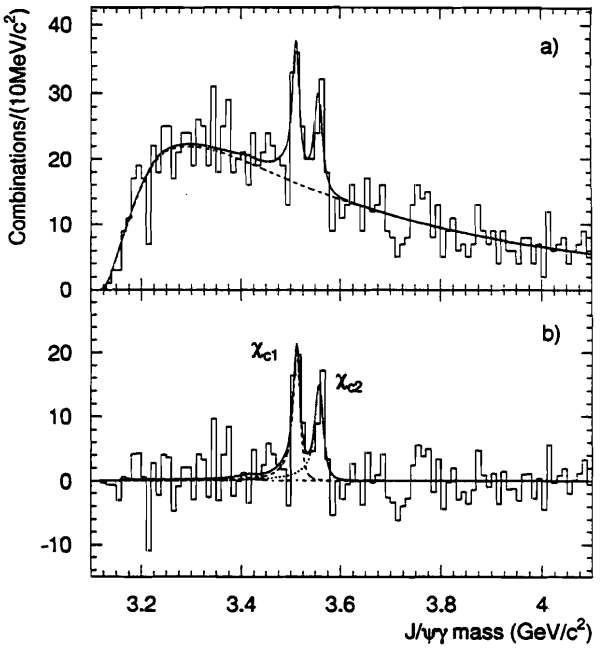


Figure 3. J/ψ invariant mass for γ's detected through conversions into e^+e^- pairs: (a) the solid curve shows the fit to the signals and background, the dashed curve shows the background contribution; (b) the background subtracted data and estimated contributions from χ_{c0} and ψ(2S) (dot-dash), χ_{c1}(dash), and χ_{c2}(dot).

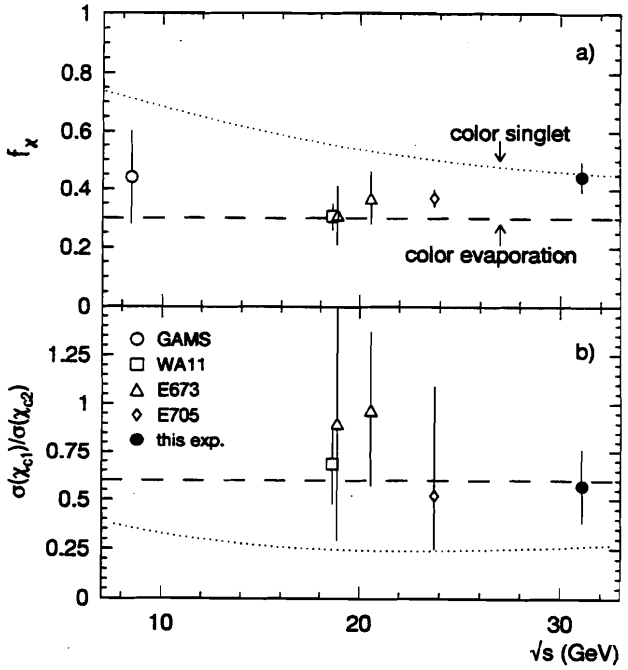
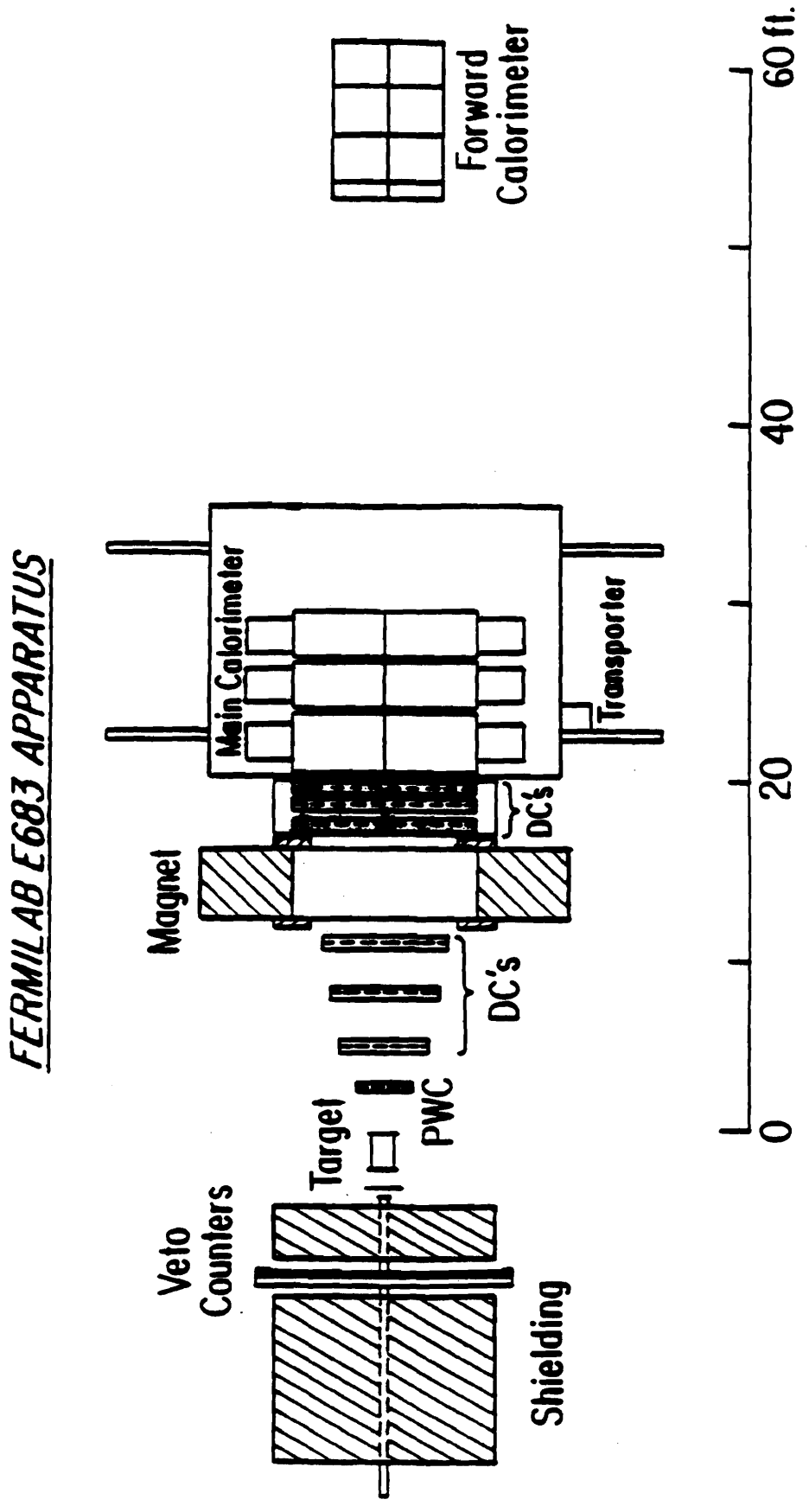


Figure 4. Dependence of (a) the fraction of J/ψ's coming from χ_c decays, and (b) the ratio of χ_{c1} to χ_{c2} cross sections, on the π^--nucleon center-of-mass energy. The error bars represent statistical and systematic uncertainties added in quadrature. Dashed lines show predictions of a color-evaporation model, dotted curves show predictions of a color-singlet model by Schuler (without K factors).


FERMILAB E683 APPARATUS
Veto Counters
Target
PWC
DC's
Magnet
Main Calorimeter
DC's
Transporter
Shielding
Forward Calorimeter
0
20
40
60 ft.

E-683 (Corcoran) Photoproduction of High P_t Jets

Ball State, Fermilab, Iowa, Maryland,
Michigan, Rice, Vanderbilt

Status: *Data Analysis*

This experiment is studying the photoproduction of high p_t jets in the Wide Band Photon Beam of the Tevatron. At first order, the QCD processes of interest are QCD Compton scattering ($\gamma q \rightarrow gq$) and photon-gluon fusion ($\gamma g \rightarrow q\bar{q}$). These processes are distinctive in that the photon couples directly to the hard scattering, giving all of its energy to the two high p_t jets, and leaving no beam jet. In addition to the direct processes, the resolved photon processes are expected to be important. In these processes, the photon is resolved into a virtual quark-antiquark pair, one of which then interacts with a parton in the target. For the resolved process, the photon behaves somewhat like a meson, but with a much harder structure function. In both the direct and resolved processes, the energy in the parton-parton frame is a large fraction of the total CM energy, and the beam jet is either missing entirely or small. Both of these features lead to an especially clean jet signal. Comparison of pion and photon data confirms that this is the case.

To higher orders in QCD, the distinction between direct and resolved processes becomes blurred. At our energies and Q^2, higher-order processes are expected to be important. Our data are consistent with this expectation in that the jet cross sections fall faster in p_t than leading-order QCD would predict, and our observed photon structure function is softer than leading-order QCD would suggest.

The A-dependence of jet production from heavy nuclei has been studied in E-683. The photon can produce partons deep inside a nucleus, allowing one to study the propagation of partons through nuclear matter. A photon beam is a clean probe of such processes. Significant A-dependent effects have been observed in our data.

Photons in the momentum range of 100 to 400 GeV/c were tagged with a momentum uncertainty of about 2%. A plan view of the apparatus is shown in the accompanying figure. It consists of a wide-angle magnetic spectrometer, the main calorimeter array, and a forward calorimeter. The spectrometer is composed of an SCM-105 magnet with 20 planes of drift chambers and PWC's. Vertexing and tracking efficiencies are about 80% for all targets. The main calorimeter is segmented in area and depth and consists of 528 modules forming 132 towers. The forward calorimeter measures the energy flow in the region from $\theta_{cm} = 0^o$ to about 20^o. The main calorimeter has a measured energy resolution of $35\%/\sqrt{E}$ for electromagnetic particles and $75\%/\sqrt{E}$ plus a 5% constant term for hadronic particles.

E-683 began taking data in June of 1991, when the fixed-target program resumed. Data-taking was complete in January of 1992. A total of about 10 million triggers were recorded, fairly equally divided between hydrogen, deuterium, and six different nuclear targets. Analysis is proceeding, both at Fermilab and at the various institutions.

To date five students have received M.S. degrees from work related to E-683, and three students have completed Ph.D. theses. Results have been presented at several conferences and workshops. To date two Physical Review Letters and two NIM articles have been published, and one Physical Review Letter is pending.

Publications

Detecting Beam Pileup for High-Rate Particle Beams, D. Lincoln and D. Naples, Nucl. Instr. and Meth. A332, 23 (1993).

Observation of Jet Production by Real Photons, D. Adams et al., Phys. Rev. Lett. 72, 2337 (1994).

A-Dependence of Photoproduced Dijets, D. Naples et al., Phys. Rev. Lett. 72, 2341 (1994).

A Hidden Bias in a Common Calorimeter Calibration Scheme, D. Lincoln, G. Morrow, and P. Kasper, Nucl. Instr. and Meth. A345, 449 (1994).

Pending Publication

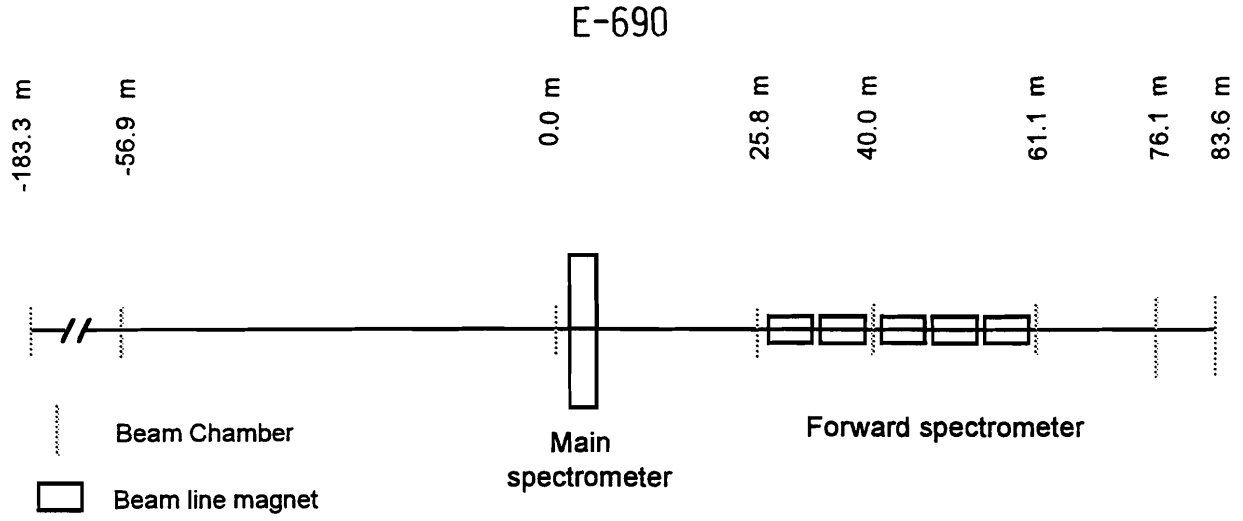
The Emergence of Jet Dominance in Gamma - P Interactions at Fixed-Target Energies, D. Alton et al., submitted to Phys. Rev. Lett.

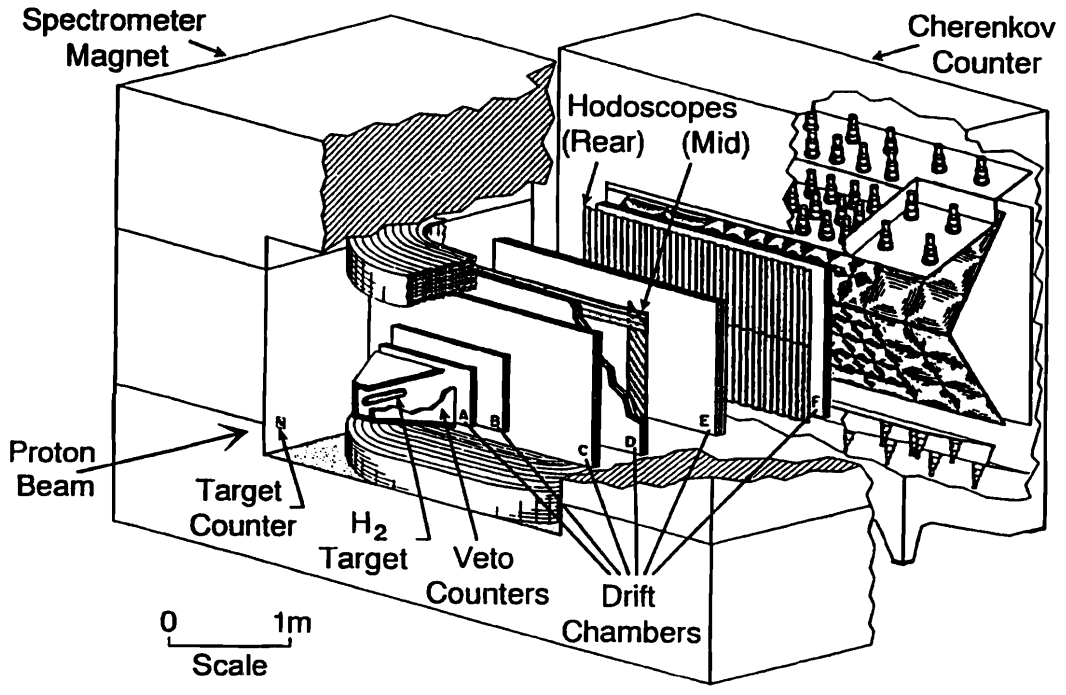
Ph.D. Theses

D. Naples, University of Maryland
D. Lincoln, Rice University
M. Traynor, Rice University

M. S. Theses

D. Lincoln, Rice University
M. Traynor, Rice University
G. Morrow, Rice University
W. Davis, Ball State University
D. Alton, Ball State University





Main Spectrometer

E-690 (Knapp) Study of Charm and Bottom Production

Columbia, Fermilab, Guanajuato (Mexico), Massachusetts, Texas A&M

Status: *Data Analysis*

This experiment studies proton diffraction, pp→pX, with 800 GeV protons scattering from liquid hydrogen, measuring a diffracted forward proton in a forward beam spectrometer, and looking at the recoil system X in a magnetic spectrometer. The detector and its data acquisition system were designed to tolerate interaction rates on the order of 1 MHz, reading 100K events per second into a pipelined hardware processor, ultimately recording on tape more than 10K events per second of beam. In three months of running, we recorded more than 5 billion events, with periods of sustained running with 200K events per spill recorded, with a trigger requiring an incoming beam particle and an outgoing beam particle within the acceptance of the forward spectrometer but scattered out of the small beam envelope, in coincidence with at least one particle in the magnetic spectrometer.

The tracks were reconstructed with the hardware processor after the run, writing all raw data and track information out for every event, and selecting candidates for momentum balance for a secondary output. All events are now running through a vertex reconstruction program that reconstructs every event in as much detail as possible, writing out everything along with a secondary output containing candidates for complete event reconstruction and events with identified strange particles. We estimate a final yield of a few hundred million reconstructed V^0's and more than ten million fully reconstructed events, recorded with good resolution and a geometric acceptance that favors diffractive production of heavy particles.

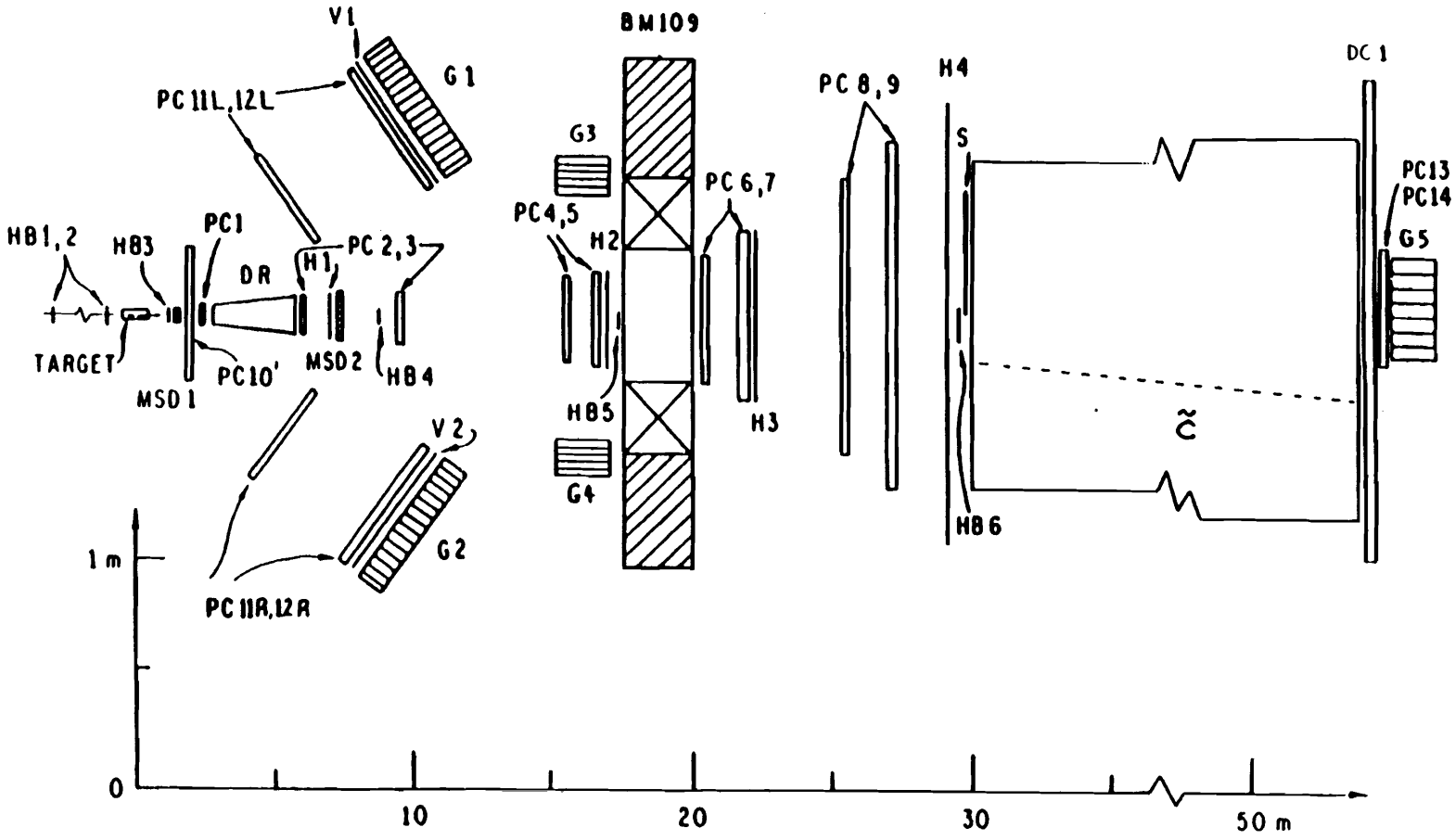
Our analysis efforts are focusing on diffraction of heavy particles: antibaryons, strange particles, charm particles, ... and on particle spectroscopy. With high statistics for a large number of exclusive reactions, we can determine production cross-sections and parameters of many resonances. For example, in double Pomeron production, pp→ppM, we have large clean signals in meson resonances that have been considered candidates for non-q-$\bar{q}$ mesons. For the general study of heavy particle production in diffraction, we have the opportunity to perform doubly inclusive measurements for a variety of heavy particles: measuring the momentum of the scattered forward proton and the momentum of a particular heavy particle type. Along with the measurements of exclusive reaction cross sections and distributions, this will allow detailed modeling of diffractive production in pp interactions, which could, for example, be compared with diffraction in deep inelastic ep scattering.

Publication

Light-Meson Spectroscopy in Fermilab Experiment E690, A. Gara et al., Il Nuovo Cimento 107A, 1847 (1994).

Theses

S. Lee, University of Massachusetts/Amherst, 1994.
M. Sosa, Universidad de Guanajuato, 1996.
M. Reyes, CINVESTAV, 1996.


V1
G1
PC 11L, 12L
BM109
G3
PC 8, 9
H4
DC 1
S
PC13
PC14
G5
PC 6, 7
PC4,5
H2
HB1, 2
HB3
PC1
PC 2, 3
DR
H1
TARGET
PC10'
MSD2
HB4
MSD 1
HB5
H3
G4
HB6
V2
G2
PC 11R, 12R
1 m
0
10
20
30
50 m

E-704 (Yokosawa) Experiments with the Polarized Beam Facility

ANL, Fermilab, Hiroshima (Japan), IHEP/Protvino (Russia), Iowa, Kyoto (Japan), Kyoto Education (Japan), Kyoto Sangyo (Japan), LANL, LAPP/Annecy (France), Northwestern, Univ. of Occup. & Env. Health (Japan), Rice, Saclay (France), Trieste (Italy), Udine (Italy)

Status: *Data Analysis*

Experiment 581, Construction of a Polarized Beam Facility and Measurement of the Beam Polarization by Polarimeters, has obtained initial data on the properties of the new polarized beam.

Completion of a 200-GeV/c conventional-magnet beam line allowed observation of polarized protons and polarized antiprotons from decaying lambdas and antilambdas, respectively. A beam tagging system and two polarimeters, using the Primakoff effect and Coulomb-nuclear interference, measured the beam polarization during the 1987-1988 TeV-II period. Measured beam polarization was consistent with the designed value.

Experiment 704, the Integrated Proposal on First Round Experiments with the Polarized Beam Facility, constitutes a proposal to simultaneously perform substantial parts of previously proposed Experiments 674, 676, 677 and 678. The first 1200 hours of beam time for E-704 were allocated as follows:

1) First 300 hours for $\Delta\sigma_L^{Tot}(pp)$ including tuning.

2) 300 hours for $\Delta\sigma_L^{Tot}(\bar{p}p)$

The experimenters intend to explore the spin dependence of the interactions in a global way using a straightforward experiment which measures the difference in pp and $\bar{p}p$ total cross sections between the states with helicities of target and beam parallel and antiparallel. Experience shows that an accuracy of ± 100 microbarns can easily be achieved. A longitudinally-polarized proton target in a superconducting solenoid was used with the polarized beam during the 1990 fixed-target period. The data are being analyzed.

3) 600 hours for simultaneous measurements using a hydrogen target for A_N in large-$p_\perp$ π^0, large-x π's, lambda and sigma-zero production.

Studies of the inclusive production of neutral pions around $x_F \approx 0$ and large $p_\perp$ of neutral and charged pions at large x, and of $\Lambda^0(K^0)$ and Σ^0 at large x_F were carried out simultaneously. These measurements investigate the spin effects as a function of x_F and $p_\perp$. Interpretation of the polarization of Λ^0 and Σ^0 produced inclusively from an unpolarized initial state has given rise to extensive discussion about the origin of this polarization. It is expected that

information on spin transfer from initial to final states in these reactions will enlighten the debate.

Elements of the existing polarization monitor were used in conjunction with new detectors in E-704. Two large calorimeters, each consisting of 500 lead-glass cells, detected photons from the π^0-decay. The magnetic spectrometer with proportional and drift chamber systems observed the $\pi^{\pm}$ and Λ^0 and Σ^0 decay products.

The technique for measuring single spin asymmetries in hadron production was considerably improved over the previous experiments since the polarized beam allowed the use of a liquid hydrogen target.

The following data are being analyzed:

$\Delta\sigma_L^{Tot}(pp)$ and $\Delta\sigma_L^{Tot}(\bar{p}p)$, $\bar{p}^{\uparrow}p \rightarrow \pi^{\pm}x$,

$p^{\uparrow}p \rightarrow (\Lambda,\Sigma^0)\ X$, $p^{\uparrow}p \rightarrow (\text{direct } \gamma)\ X$, and

detailed analyses of $p^{\uparrow}p \rightarrow \pi^0 X$ at $x_F = 0$.

The following data are published in Physics Letters:

$p^{\uparrow}p \rightarrow \pi^0 X$, $\bar{p}^{\uparrow}p \rightarrow \pi^0 X$ at large x_F,

$p^{\uparrow}p \rightarrow (\pi^0, \eta)X$ at $x_F = 0$,

A_{LL} measurement in $p^{\uparrow}p^{\uparrow} \rightarrow \pi^0 X$ at $x_F = 0$, and

$p^{\uparrow}p \rightarrow \pi^{\pm} X$ at $x_F = 0$ to 1.0.

Comments on data analysis and future plans:

1. We have finished the data analysis of a single-spin asymmetry A_N in the η·(550)-meson production at large x_F in pp interactions. A_N is positive and about 20% for $0.3 < x_F < 0.8$ and $0.7 < p_T < 2.0$ Gev/c. Earlier we saw a significant asymmetry in π^+, π^-, and π^0 production in the same kinematic region. We will study A_N in the η-meson production at large x_F in $\bar{p}p$ interactions and prepare a paper on both pp and $\bar{p}p$ interactions.

2. We plan to finish a complete analysis of spin effects in π^+, π^-, π^0, and Λ^0 production at large x_F and prepare a paper on it.

Publications

Analyzing Power-Measurement in Inclusive π^0 Production at High x_F, B. E. Bonner et al., Phys. Rev. Lett. 61, 1918 (1988).

Polarized-Proton and -Antiproton Beams at Fermilab and Associated Experiments, A. Yokosawa, Int. Journal of Modern Physics A, Vol. 3, No. 12, 2753 (1988).

Analyzing Power-Measurements of Coulomb-Nuclear Interference with the Polarized-Proton and -Antiproton Beams at 185 GeV/c, N. Akchurin et al., Phys. Lett. B229, 299 (1989).

Measurement of the Analyzing Power in the Primakoff Process with a High-Energy Polarized Proton Beam, D. C. Carey et al., Phys. Rev. Lett. 64, 357 (1990).

The Design and Performance of the FNAL High-Energy Polarized-Beam Facility, D. P. Grosnick et al., Nucl. Instr. Meth. in Phys. Research, A290, 269 (1990).

First Results for the Two-Spin Parameter A_{LL} in π^0 Production by 200-GeV Polarized Protons and Antiprotons, D. L. Adams et al., Phys. Lett. B261, 197 (1991).

Comparison of Spin Asymmetries and Cross Sections in π^0 Production by 200-GeV Polarized Antiprotons and Protons, D. L. Adams et al., Phys. Lett. B261, 201 (1991).

Analyzing Power in Inclusive π^+ and π^- Production at High x_F with a 200 GeV Polarized Proton Beam, D. L. Adams et al., Phys. Lett. B264, 462 (1991).

High-x_t Single-Spin Asymmetry in π^0 and η Production at $x_F = 0$ by 200 GeV Polarized Antiprotons and Protons, D. L. Adams et al., Phys. Lett. B276, 531 (1992).

Large-x_F Spin Asymmetry in π^0 Production by 200-GeV Polarized Protons, D. L. Adams et al., Zeit Physik C 56, 181 (1992).

Analyzing-Power Measurement of pp Elastic Scattering in the Coulomb-Nuclear Interference Region with the 200-GeV/c Polarized-Proton Beam at Fermilab, N. Akchurin et al., Phys. Rev. D48, 3026 (1993).

Measurement of the Double-Spin Asymmetry A_{LL} for Inclusive Multi-Gamma Pair Production with 200 GeV/c Polarized Proton Beam and Polarized Proton Target, D. L. Adams et al., Phys. Lett. B336, 269 (1994).

Measurement of Single-Spin Asymmetry for Direct Photon Production in pp Collisions at 200 GeV/c, D. L. Adams et al., Phys. Lett. B345, 569 (1995).

Measurement of Lambda Production with 200 GeV/c Polarized Proton Beam, D. L. Adams et al., Phys. Rev. Lett. 75, 3073 (1995).

Single Spin Asymmetries and Invariant Cross Sections of the High-Transverse Momentum Inclusive π^0 Production in 200 GeV/c pp and $\bar{p}p$ Interactions, D. L. Adams et al., Phys. Rev. D53, 4747 (1996).

Single Spin Asymmetries in Inclusive Charged Pion Production by Transversely Polarized Antiprotons, A. Bravar et al., Phys. Rev. Lett. 77, 2626 (1996).

Measurement of the Difference in the Total Cross Section for Antiparallel and Parallel Longitudinal Spins and a Measurement of Parity Nonconservation with Incident Protons and Antiprotons at 200 GeV/c, D. P. Grosnick et al., submitted to Phys. Rev., 1996.

Papers Being Prepared

High-x_F Single- and Double-Spin Asymmetry in Λ Production

Papers on K^0, π^+, π^-, Λ production are in preparation.

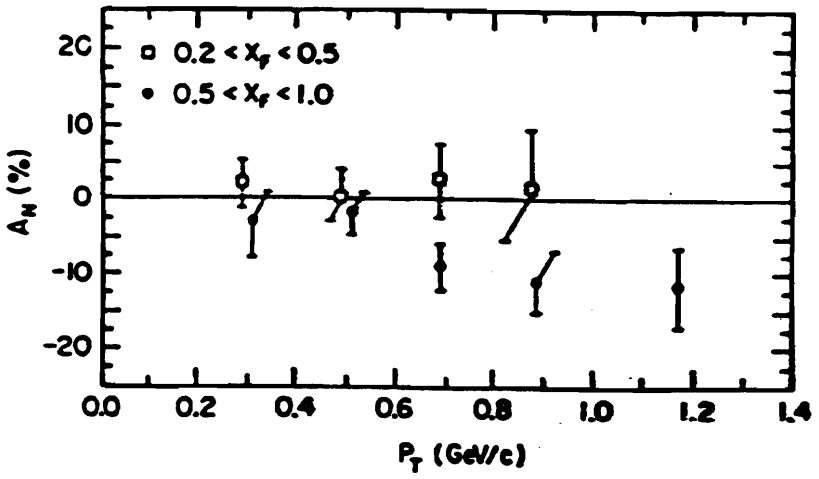


Figure 1. A_N data for $p^{\uparrow} + p \rightarrow \Lambda^0 + X$ as a function of p_T.

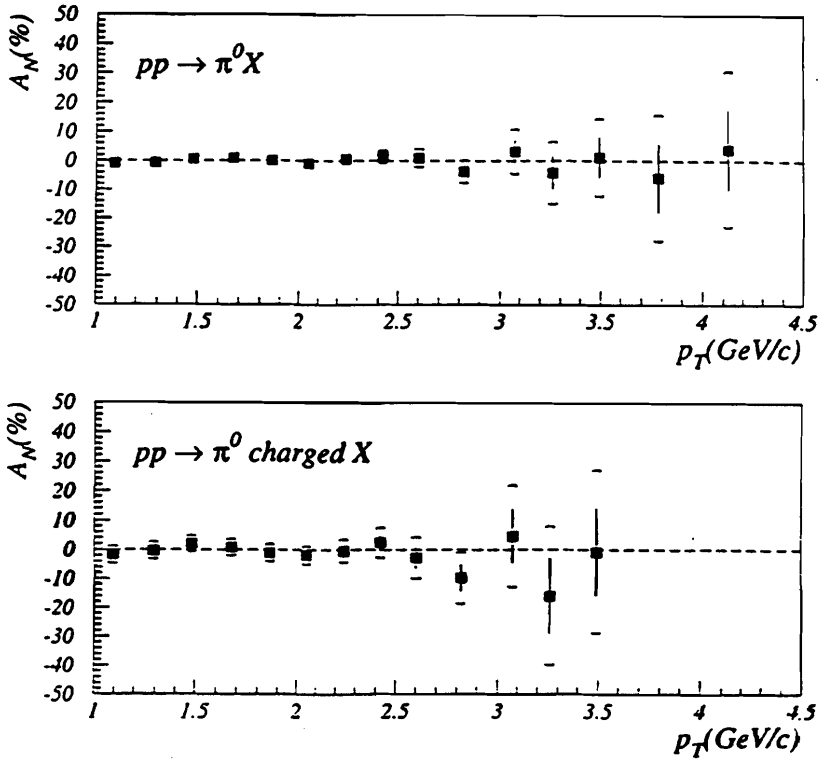


Figure 2. Asymmetries of the high p_T inclusive π^0 production in 200 GeV/c pp interactions.

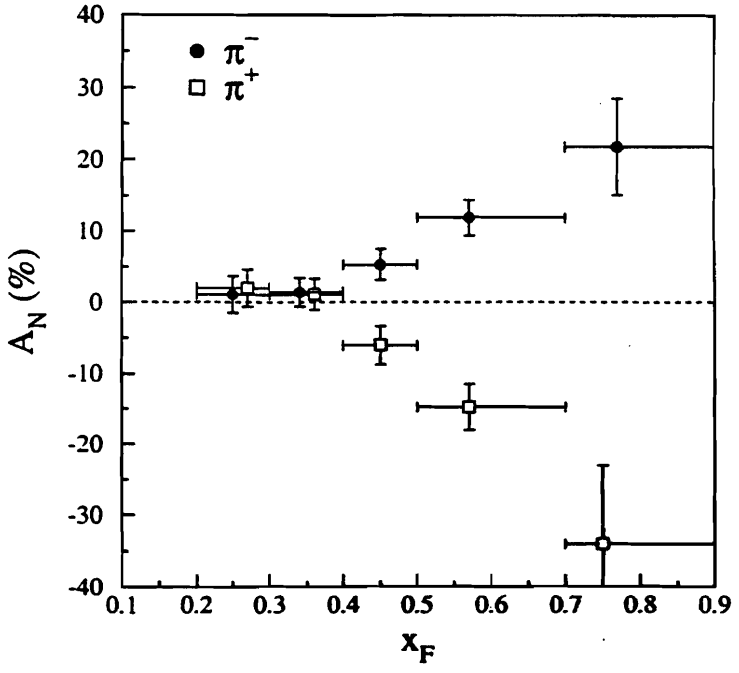
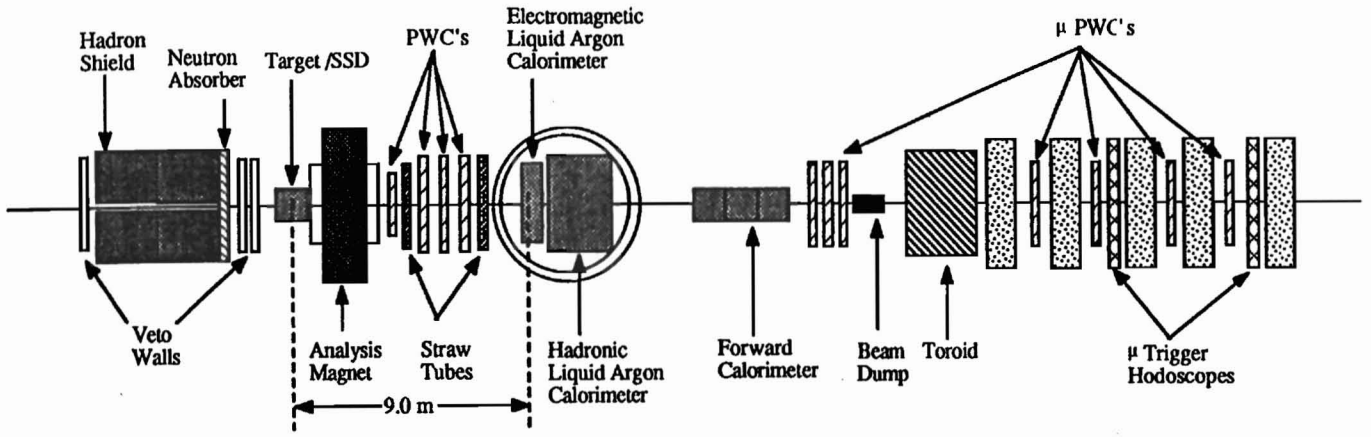
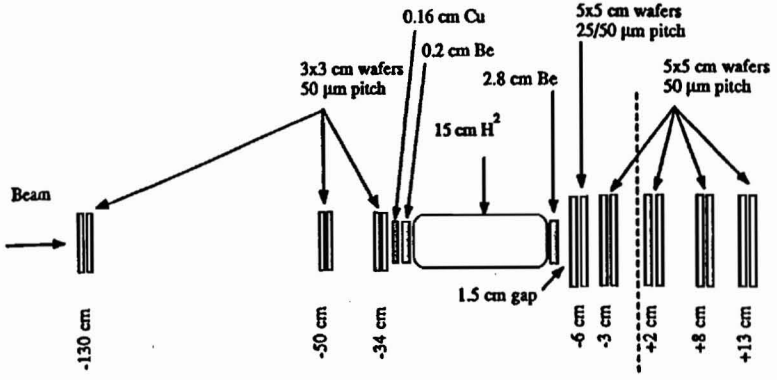


Figure 3. A_N (analyzing power) data as a function of x_F for π^- (full circles) and π^+ (open squares) integrated over p_T in 200 GeV $\bar{p}p$ interactions.

E-706



M WEST SPECTROMETER



Target Region

E-706 (Slattery) A Comprehensive Study of Direct Photon Production in Hadron Induced Collisions

UC/Davis, Delhi (India), Fermilab, Michigan State, Northeastern, Oklahoma, Pennsylvania State, Pittsburgh, Rochester

Status: *Data Analysis*

E-706 is a second generation fixed-target experiment to study events containing high transverse momentum direct photons produced in hadronic interactions. Only two leading order diagrams contribute to direct photon production: the QCD Compton diagram ($q + g \rightarrow q + \gamma$) and the quark-antiquark annihilation process ($\bar{q} + q \rightarrow g + \gamma$). Next-to-leading order QCD calculations are available for both inclusive direct photon cross sections and for direct photon plus jet production.

The physics goals of E-706 include measuring the gluon distribution function of the nucleon and the charged pions. The E-706 data for incident mesons is at a significantly higher CM energy (31 GeV) than previous experiments, which are clustered at CM energies between 19 and 24 GeV. The study of direct photon plus jet events (including $\gamma\gamma$ production) provides sensitive tests of next-to-leading order QCD calculations. Direct photon data also provide input to quark and gluon fragmentation studies.

Since electromagnetic decays of neutral pions are the primary source of background to direct photon data, precision measurements of neutral pion cross sections are an essential part of this experimental program. These measurements are of interest in their own right since they provide insight into hard scattering processes. Next-to-leading order calculations of large transverse momentum neutral pion (and eta) production are also available.

The MWest spectrometer, which was simultaneously employed to acquire data for E-706 and E-672, is a large acceptance multiparticle spectrometer. The MWest beamline included spoilers to reduce the muon flux incident upon the spectrometer, and a differential Cerenkov counter to identify incident particle types. Veto walls and hadron shielding upstream of the target minimized the impact of incident beam halo on the experiment. Six planes of 50 μm pitch silicon strip detectors were positioned upstream of the target. Different targets allow for investigation of the nuclear dependence of the various processes. A pair of silicon strip detectors, with 25 μm pitch in the central region and 50 μm pitch on their outer edges, was located immediately downstream of the target, and was followed by eight additional silicon strip planes of 50 μm pitch. The large aperture (122×91 cm^2) conventional analysis magnet provided a transverse momentum impulse of 450 MeV to charged particles. Four proportional wire chamber modules were located downstream of the magnet, each containing four planes with 2.54 mm pitch. Two straw tube drift chambers, each with four planes in each of two views, were also positioned downstream of the magnet. The drift chamber resolutions were

300 μm and 250 μm per plane, respectively. The finely segmented, focused electromagnetic lead and liquid argon calorimeter has a radius of 1.6 m and was located 9 m downstream of the target. The standard deviation of the reconstructed π^0 mass peak is ~6 MeV, while that of the η is ~20 MeV. A steel hadronic calorimeter was located behind the electromagnetic calorimetry within the liquid argon cryostat. An iron and scintillator calorimeter intercepted the particles passing through a central hole in the liquid argon calorimeters. A muon identification system provided by E-672 was located downstream of the forward calorimeter. For the purposes of E-706, the spectrometer triggered upon large transverse momentum electromagnetic showers detected in the liquid argon calorimeter.

The MWest spectrometer was commissioned during the 1987-1988 fixed-target run. Approximately 5 million physics-quality triggers were recorded during that run using positive and negative 0.5 TeV beam on copper and beryllium targets. This data sample corresponds to a sensitivity of about 0.5 events per picobarn for the negative beam and about 0.8 events per picobarn for the positive beam. Seventeen students completed their Ph.D. research using this data sample. These students investigated a wide variety of topics including neutral pion production at low transverse momentum, neutral pion and eta production at high transverse momentum, direct photon production at high transverse momentum, recoiling jet structure in high transverse momentum events, fragmentation properties of strange particles produced in high transverse momentum hadronic interactions, neutral pion pair production, characteristics of forward energy production, and leading particle production at 0.8 TeV.

Inclusive high transverse momentum neutral meson and direct photon cross section measurements for incident negative pions and protons at 500 GeV have been published. The results of studies of the hadronic jets produced in association with neutral pions and direct photons, including fragmentation and angular distributions, have been reported.

During the 1990 fixed-target run, about 30 million triggers induced by a negative 0.5 TeV beam incident on beryllium and copper targets were recorded. These data provide more than a factor of fifteen increase in sensitivity relative to that acquired during our initial run. Prior to the 1991 fixed-target run, a 0.02 interaction length liquid hydrogen target was installed. During 1991, we accumulated 23 million triggers using an 0.8 TeV primary proton beam incident on hydrogen, beryllium, and copper targets. This data sample corresponds to a sensitivity of about ten events per picobarn. An additional 14 million triggers induced by a 0.5 TeV positive beam incident upon the same targets were also accumulated during this run. These data represent a sensitivity of about ten events per picobarn. A smaller sample (4 million triggers) of negative 0.5 TeV beam induced data was also recorded during the 1991 running, and provides the opportunity to investigate nuclear dependence effects in the negative data, and also verify the relative normalization of the 1990 and 1991 data samples.

Twelve students have completed their Ph.D. research using the data accumulated during the 1990-91 fixed-target runs. Four additional students

should complete their research within the coming year. We have measured the cross sections for neutral pion, eta, omega and direct photon production at high transverse momentum. Typical mass plots of the neutral pion, eta, and omega signals are shown in Figure 1. Examples of the resulting inclusive neutral pion and direct photon cross sections as a function of transverse momentum are shown in Figure 2. The nuclear dependence of these measurements has been investigated. High statistics studies of photon-plus-jet and neutral-pion-plus-jet events have been carried out. Strange particle production in these high transverse momentum interactions has been investigated. The production of charm mesons at high transverse momentum has been investigated. A study of the inclusive production of low transverse momentum neutral pions has also been performed. Papers summarizing this research are currently in preparation.

The large-acceptance MWest multiparticle spectrometer has demonstrated its power and versatility. The large-statistics, high-quality direct photon data samples acquired by E-706 are providing unique insights into hadronic structure and QCD dynamics.

Publications

Production of π^0 Mesons at High p_T in π^-Be and pBe Collisions at 500 GeV/c, G. Alverson et al., Phys. Rev. D45, R3899 (1992).

Direct Photon Production at High p_T in π^-Be and pBe Collisions at 500 GeV/c, G. Alverson et al., Phys. Rev. Lett. 68, 2584 (1992).

Production of Direct Photons and Neutral Mesons at Large Transverse Momenta by π^- and p Beams at 500 GeV/c, G. Alverson et al., Phys. Rev. D48, 5 (1993).

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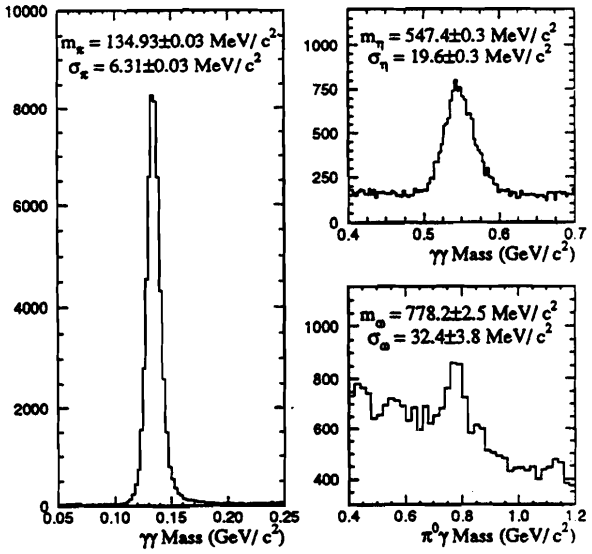


Figure 1. P_T > 5 Gev/c meson signals from the 1991 data sample.

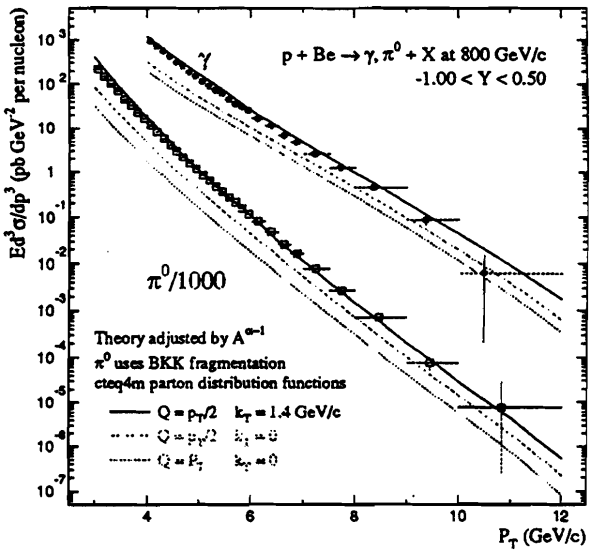
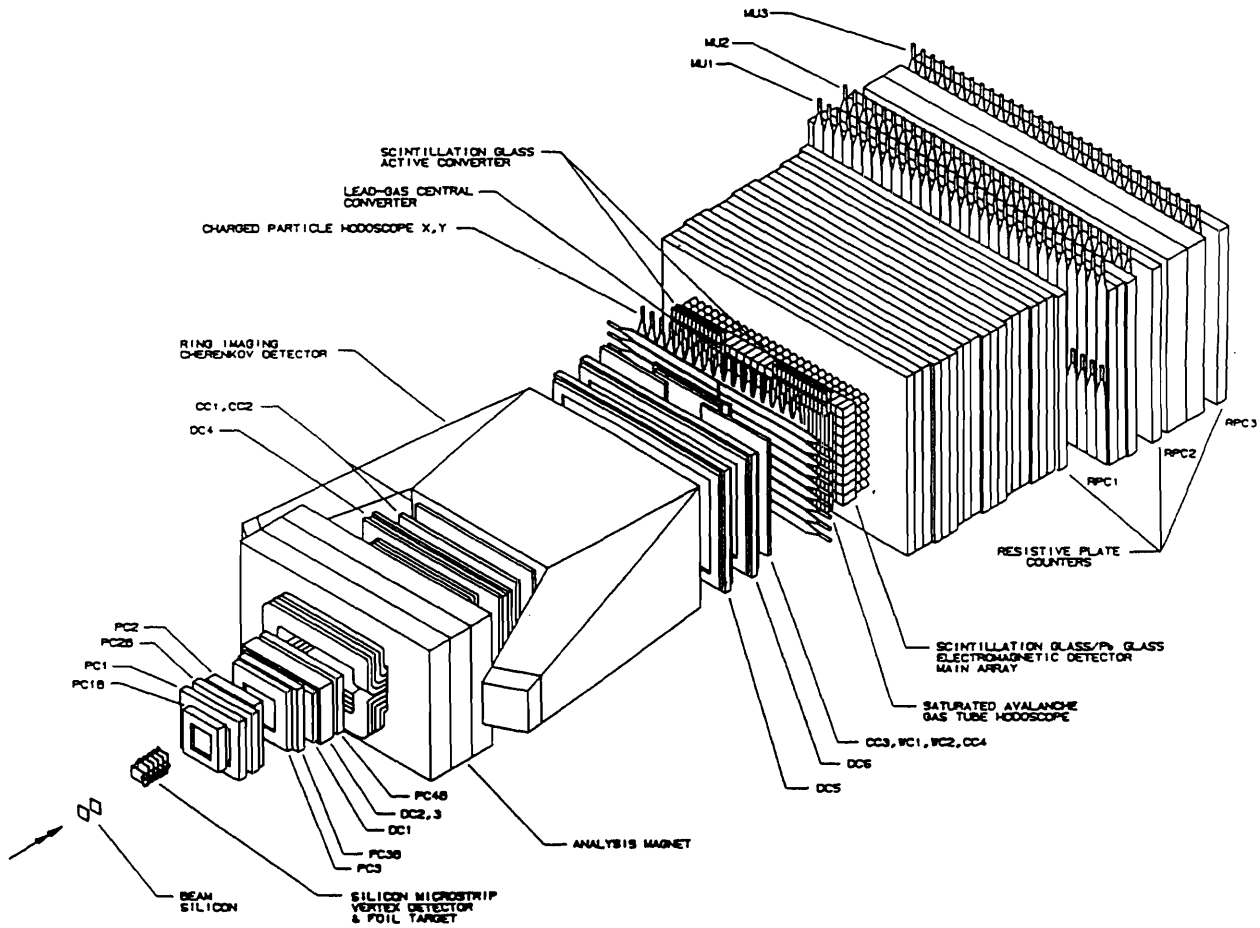


Figure 2. π^0 and direct-photon cross sections from 800 GeV/c proton Be interactions.

High Intensity Lab Spectrometer
E771



E-771 (Cox) Beauty Production by Protons

Athens (Greece), Brown, UC/Berkeley, UCLA, Duke, Fermilab, Houston, JINR (Russia), Lecce (Italy), MIT, McGill (Canada), Nanjing (PRC), Northwestern, Pavia (Italy), Pennsylvania, Prairie View A&M, Shandong (PRC), South Alabama, SSCL, Vanier (Canada), Virginia, Wisconsin

Status: *Data Analysis*

In a brief data-taking period at the end of the 1991 run, 128 million dimuon triggers were acquired in 800 Gev/c p-Si interactions. This data has been analyzed to extract beauty and hidden charm physics via the signatures

$$pN \rightarrow B\bar{B} + x$$
$$B \text{ or } \bar{B} \rightarrow J/\psi + \text{anything}$$

$$pN \rightarrow B\bar{B} + x$$
$$B \rightarrow \mu^+ + \text{anything}$$
$$\bar{B} \rightarrow \mu^- + \text{anything}$$

$$pN \rightarrow \text{charmonium states} + \text{anything}$$
$$\rightarrow J/\psi + \text{anything}$$

All of the dimuon data has been processed and some 12K to 15K $J/\psi \rightarrow \mu\mu$ events have been reconstructed (the number depending on cuts necessary for the physics under study). Differential and total cross sections for inclusive J/ψ and ψ' states have been published, along with a measurement of the Υ total cross section at 800 GeV/c p-Si interactions.

E-771 has also published the most stringent limit to date on the flavor-changing neutral current decay, $D^0 \rightarrow \mu^+\mu^-$. Efforts are currently underway to achieve comparably significant limits for $D^{\pm} \rightarrow \mu^+\mu^-\pi^{\pm}$. Also, E-771 has presented preliminary results on the ratio of χ_1 to χ_2 production in proton collisions.

At present, the experiment is evaluating preliminary measurements of the total beauty production cross section based on two different analysis procedures as applied to the double semimuonic signature data. Beauty events are identified statistically based on the presence of high transverse momentum muons and muons with finite impact parameters as seen by the silicon tracker system. Final results are expected early in 1997, and all physics analysis should be complete by the end of the year.

Publications

Search for the Flavor Changing Neutral Current Decay $D^0 \rightarrow \mu^+\mu^-$ in 800 GeV/c Proton-Silicon Interactions, T. Alexopoulos et al., Phys. Rev. Lett. 77, 2380 (1996).

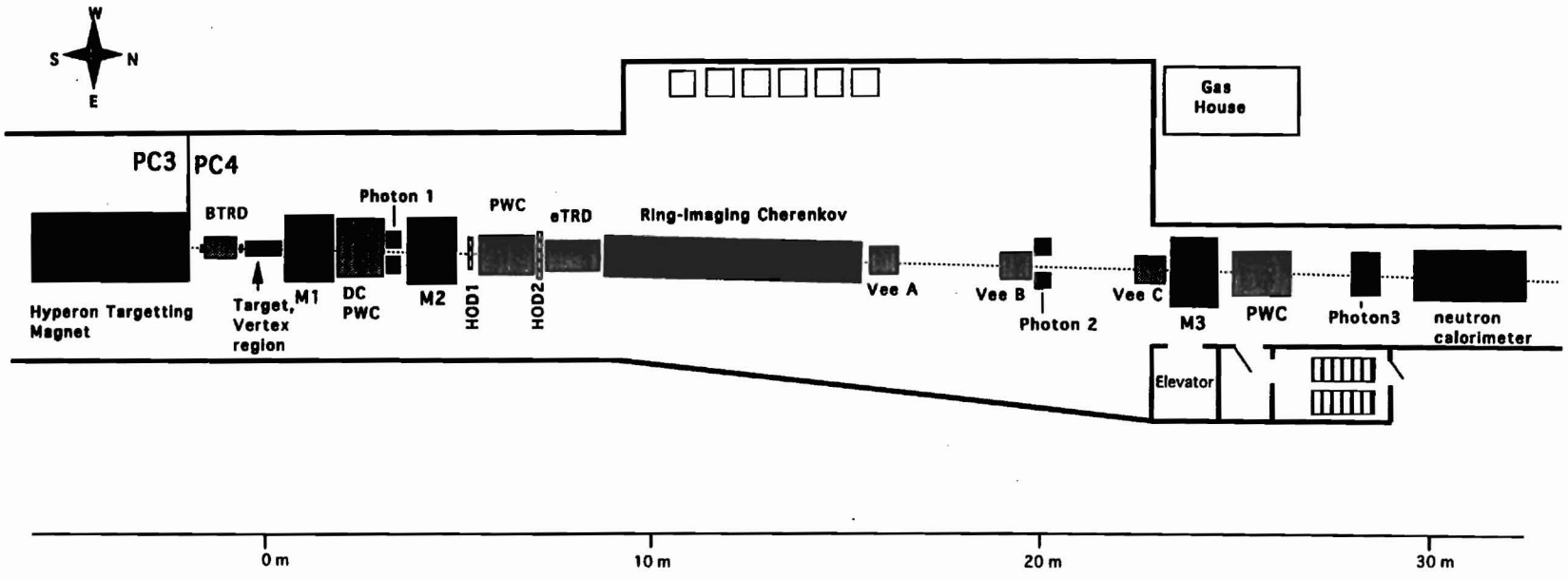
Production of J/ψ, ψ', and Υ in 800 GeV/c Proton-Silicon Interactions, T. Alexopoulos et al., Phys. Lett. B374, 271 (1996).

The Fermilab E-771 Spectrometer. A Large Aperture Spectrometer to Study Charm and Beauty States as Detected by Decays into Muons, T. Alexopoulos et al., Nucl. Instr. and Meth. A376, 375 (1996).

Measurement of J/ψ, ψ', and Υ Total Cross Sections in 800 GeV/c p-Si Interactions, T. Alexopoulos et al., FERMILAB-Pub-95/297-E (1995), to be published in Phys. Rev. D.

Differential Cross Sections of J/ψ and ψ' in 800 GeV p-Si Interactions, T. Alexopoulos et al., submitted to Phys. Rev. D (1996).

SELEX (E781)
Proton Center Layout



E-781 (Russ) Study of Charm Baryon Physics

Bogazici (Turkey), Bristol (Great Britain), Carnegie-Mellon, CBPF (Brazil), Fermilab, Hawaii, IHEP/Beijing (PRC), 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), Sao Paulo (Brazil), Tel Aviv (Israel), INFN/Trieste (Italy), Trieste (Italy)

Status: *Data-Taking*

The study of charm baryons has lagged behind the recent progress in charm meson physics. The production of baryons by electron colliders or photon beams is small compared to meson production. Sample sizes of charm baryons comprise a few thousand events, compared to the hundred thousand event samples for charm mesons. In photoproduction Λ_c^+ decays comprise most of the data. Present hadron data indicate larger production of c-s baryons in hadronic interaction, especially with hyperons. E-781 runs in a mixed hyperon/pion beam. Because hadronic production of charm remains a difficult experimental challenge, current generation experiments have tended to run "open" triggers. The charm states produced are preponderantly charm mesons near x = 0, the dominant cross section in all hadronic processes. The design philosophy for E-781 is to use the fact that for all known baryons, the baryon/meson ratio increases dramatically at large x. The overall charm production cross section decreases, of course, but a good charm trigger can produce an enriched sample of charm baryons.

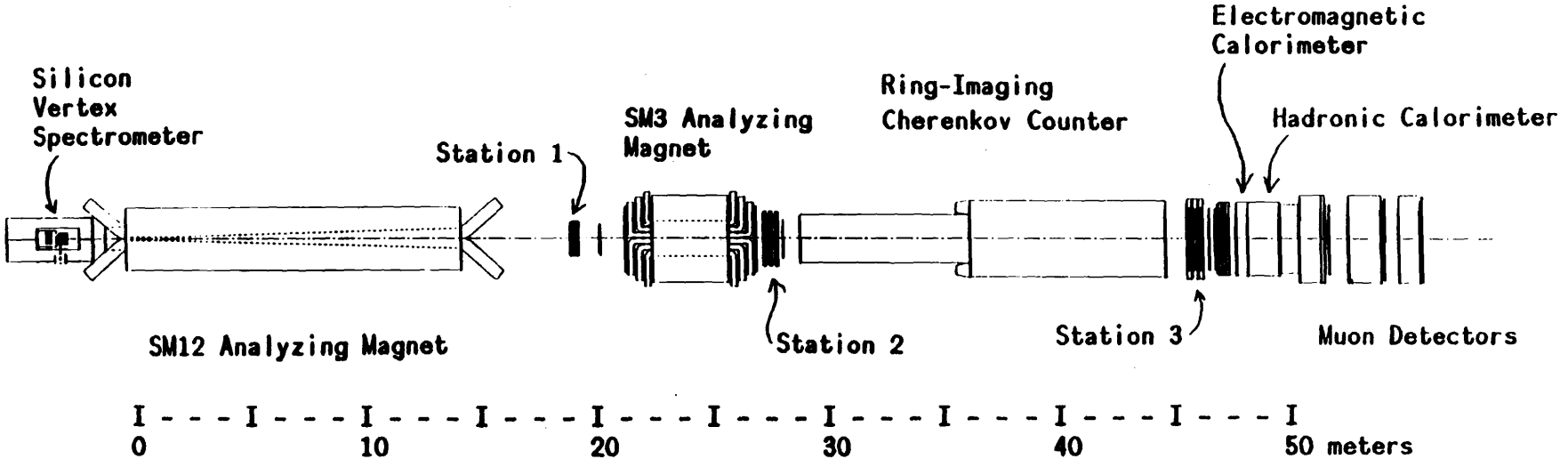
The charm trigger for E-781 is based on impact parameter, to provide a topology-independent trigger. All charm particles have a finite decay length, albeit short. A high resolution tracking device close to the target can select charm candidates on the basis of one or more tracks with a sufficiently large miss distance from the primary interaction point. Such a trigger is now conceivable because of recent advances in VLSI readout of silicon strip detectors and tremendous improvement in the online computer power available to an experiment. The spectrometer, shown in the accompanying figure, deploys a number of existing chambers and neutral particle detectors as well as the new silicon strip and pixel devices and the Ring-Imaging Cerenkov counter. By using VLSI amplifiers, E-781 can afford to make a vertex detector with 20 micron strips, totalling 50,000 channels of readout. This allows one to achieve 8-10 micron track spatial precision, and the large-x condition boosts all interesting tracks to high momentum (> 15 GeV) to minimize multiple Coulomb scattering errors. The computational trigger for E-781 is expected to give a charm enrichment factor at large x of at least 100. It was tested and verified in the 1991 fixed-target run.

The physics questions for a charm baryon study have to do with both production and decay mechanisms. In charm baryon decays, the charm quark may decay or interact through exchange mechanisms with the light

quarks. The exchange mechanisms are not suppressed by helicity considerations as they are in meson decays. A rich spectrum of two-body resonances may dominate the final states. Do they? The discovery of resonance-dominance of charm meson final states was a surprise, and the study of decay modes in baryons is an important goal of E-781. Such a study requires good particle identification and also good photon detection. We have both. Comparison of non-leptonic and semi-leptonic modes is also important. The transition radiation detector in front of the Ring-Imaging Cerenkov is a clean tag on electrons. From a theoretical point of view, understanding the ordering of the decay rates of the four different stable charm baryons will give useful insight into which of the several competing decay mechanisms dominates these states. All these data will provide useful tests of the first-order corrections to Heavy Quark Effective Theory. For $c \rightarrow s$ transitions, details of the model can be probed.

Strong interaction physics can be studied in the production of charm baryons. The observation of a p_t-dependent polarization in the production of strange baryons has led to a resurgence of interest in spin-effects at high energies. What happens with charm baryons? E-781 will measure polarizations. There is evidence for leading production of charm baryons from some experiments, but this is not universally observed. E-781 will do a detailed x-dependence measurement of charm baryon production from several different incident beams.

The physics potential of the experiment touches many little-known areas of heavy quark physics. The focus on baryons is especially appropriate for a hadron machine. The experiment is now being installed and anticipates an extremely productive run in the 1996-97 fixed-target period.



E789 SCHEMATIC (PLAN VIEW)

E-789 (Kaplan / Peng) b-Quark Mesons and Baryons

Abilene Christian, Academia Sinica (Taiwan), Chicago, Fermilab, LANL, LBL, Northern Illinois, South Carolina

Status: *Data Analysis*

E-789 was designed to study charmless two-body two-prong decays of neutral b-quark hadrons. Sensitivity to inclusive beauty decays to J/ψ and to two-prong decays of charm was also achieved.

E-789 was an exploratory effort to address this physics using the existing MEast beamline and upgraded E-605/772 spectrometer. This spectrometer, shown in the accompanying figure, uses two large analysis magnets and twenty-three planes of scintillation-counter hodoscopes and wire chambers to measure charged-particle tracks passing above and below a central beam dump. Particles are identified by electromagnetic and hadronic calorimeters, muon detectors, and a ring-imaging Cherenkov counter. An array of silicon microstrip detectors pinpoints the vertices of two-prong beauty decays to < 1mm in z. Since the average decay distance for the decays accepted by the downstream spectrometer is 1.4 cm (for a 1.5×10^{-12} sec B lifetime), a vertex cut 0.7 cm downstream of the 3-mm-long target retains more than half of these decays while greatly suppressing the copious background of dihadrons produced in the target.

The E-605/772 spectrometer has demonstrated its suitability over several years for high-precision measurements at high luminosity and high counting rates. Such measurements require not only high-rate particle detectors but also high-rate data acquisition and sophisticated triggering capability. These are furnished by the Nevis Laboratories Data Transport and hardware trigger processor systems, which were suitably upgraded for the charm and beauty running. The upgraded data acquisition system is capable of recording ≈ 50 megabytes per beam spill on 8-mm tape cassettes. The upgraded trigger processor reconstructs the decay vertex using information from the silicon microstrip detectors, providing on-line suppression of non-heavy-quark triggers by up to an order of magnitude.[13]

The physics run for E-789 took place in July 1991 - January 1992. The beam time was divided roughly equally between charm and beauty running (two months each). A total of $\approx1.5\times10^{9}$ events, collected over a total of $\approx8.0\times10^{4}$ beam spills, were recorded on ≈1300 8-mm tapes. Table I lists the various data sets from this run.

Table I. Summary of E-789 Data Sets

Data set	Quark studied	Spectrometer setting	Target material	Target dimensions $x \times y \times z$ (mm^3)	Total live interactions
1	charm	1000A	Au	$50 \times 0.1 \times 0.8$	4×10^{11}
2	charm	1000A	Be	$50 \times 0.1 \times 0.8$	1×10^{11}
3	beauty	1500A	Au	$50 \times 0.2 \times 3$	3×10^{13}
4	charm	900A	Au	$50 \times 0.15 \times 1.5$	7×10^{10}
5	charm	900A	Be	$50 \times 0.15 \times 1.5$	1×10^{11}
6	charm→ dileptons	900A	Au	$50 \times 0.15 \times 1.5$	4×10^{11}
7	charmonium	2400A	Cu	Beam dump	2×10^{13}
8	charmonium	2400A	Be	$50 \times 100 \times 915$	5×10^{12}

The charm running was crucial for tuning our newly installed silicon-strip detectors. It also provided new information on the cross sections and nuclear effects of D^0 production. The observed D^0 cross section is $d\sigma/dx_F = 58 \pm 3 \pm 7$ pb/nucleon, which extrapolated over all x_F implies a total D^0 cross section $\sigma = 17.7 \pm 0.9 \pm 3.4$ μb/nucleon.[1] Averaging with previous measurements using 800-GeV proton beams gives $\sigma(pN \rightarrow D^0\ X) + \sigma(pN \rightarrow \bar{D}^0\ X) = (20.9 \pm 3.5)$ μb/nucleon, consistent with next-to-leading-order (NLO) QCD predictions within the broad range of theoretical uncertainty. The nuclear dependence of D^0 production was measured with gold and beryllium targets. Parametrizing the nuclear dependence as A^α, we find $\alpha = 1.02 \pm 0.03 \pm 0.02$ at $x_F = 0.03$.[1]

We have measured differential cross sections for charmonium production. We find $\sigma(pN \rightarrow J/\psi + X) = 442 \pm 2 \pm 88$ nb/nucleon and $\sigma(pN \rightarrow \psi' + X) = 75 \pm 5 \pm 22$ nb/nucleon, factors of 7 and 25 above QCD predictions.[2] Charmonium production is thus substantially underestimated in models which include only contributions from color-singlet charmonium states below DD threshold.

Our beauty data were collected at a spectrometer setting which simultaneously optimized sensitivity for $B \rightarrow J/\psi$ and for $B^0 \rightarrow$ dihadrons. We ran at a 50-MHz interaction rate, constrained by radiation limits at our trailer. The beauty data correspond to a total of 3.0×10^{13} interactions. Production of beauty hadrons is studied by searching for evidence of $J/\psi \rightarrow \mu^+\mu^-$ decay occurring in vacuum downstream of the 3-mm-long gold target. A significant excess is observed of events with vertex downstream of the target compared to those with vertex upstream, leading to the measured cross section for J/ψ from b decay $d^2\sigma/dx_F dp_T^2 = 107 \pm 28 \pm 19$ pb/(GeV/c)^2/nucleon at $x_F = 0.05$ and $p_T = 1$ GeV/c.[3] This can be corrected for the $b \rightarrow J/\psi + X$ branching ratio and extrapolated over all of phase space to yield $\sigma(pN \rightarrow bb + X) = 5.7 \pm 1.5 \pm 1.3$ nb/nucleon.[3] This value is consistent with NLO QCD predictions but a factor ≈2 below their central value.

In addition to the measurements discussed above, we have also measured the A-dependence of J/ψ production at very large x_F ($0.3 < x_F <$

0.95).[4] This was accomplished by detecting dimuons produced in the copper beam dump, as well as dimuons produced in a thick block of beryllium placed upstream of the beam dump. During the 1990 test run we also took data with three different targets to measure the A dependence of J/ψ production at x_F near 0.[5] These data supplement the results previously published by our collaboration in E-772.

Analyses of the $B^0 \rightarrow h^+h^-$ and $D^0 \rightarrow l^+l^-$ decays are in progress. From the 1990 test run, a new upper limit for the $D^0 \rightarrow \mu^+\mu^-$ branching ratio was determined.[6]

E-789 has been the subject of several papers.[1-13] Four M.S. theses[14-17] and two Ph.D. dissertations[18,19] on E-789 have been completed.

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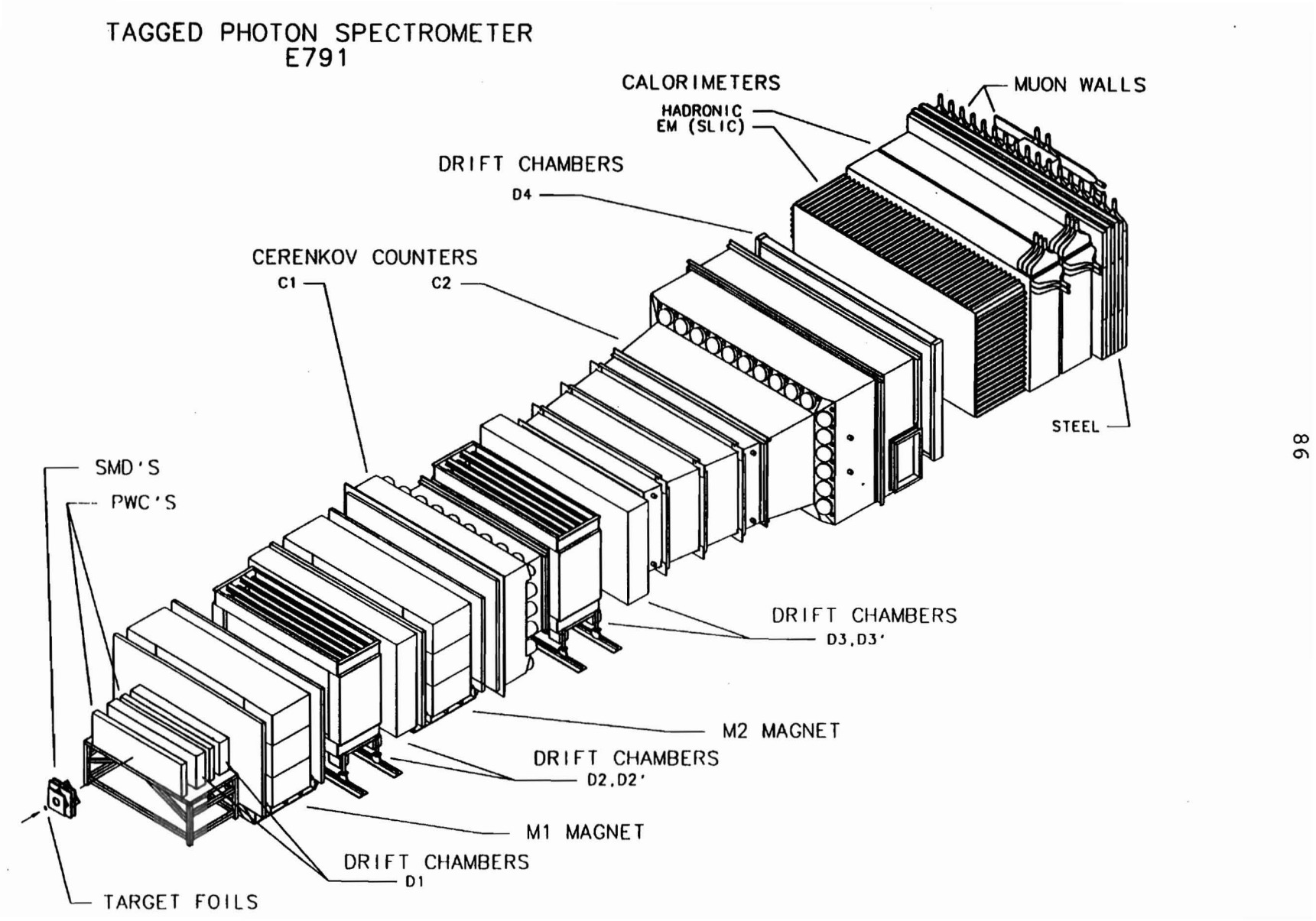
TAGGED PHOTON SPECTROMETER
E791
CALORIMETERS
HADRONIC
EM (SLIC)
MUON WALLS
DRIFT CHAMBERS
D4
CERENKOV COUNTERS
C1
C2
STEEL
SMD'S
PWC'S
DRIFT CHAMBERS
D3,D3'
M2 MAGNET
DRIFT CHAMBERS
D2,D2'
M1 MAGNET
DRIFT CHAMBERS
D1
TARGET FOILS

E-791 (Appel / Purohit) / E-769 (Appel) Hadroproduction of Charm

E-791: UC/Santa Cruz, CBPF (Brazil), Cincinnati, CINVESTAV (Mexico), Fermilab, IIT, Kansas State, Mississippi, Ohio State, Princeton, Puebla (Mexico), Rio de Janeiro (Brazil), Stanford, South Carolina, Tel Aviv (Israel), Tufts, Wisconsin, Yale

Status: *E-769, E-791 - Data Analysis*

E-769 is an experiment to measure the properties of hadronic charm production using the Tagged Photon Spectrometer facility. It measures the flavor, x, p_t and A dependences of this process at the same time and in a single apparatus.

The experiment collected its data during the 1987-88 fixed-target running period, recording interactions of 250 GeV beams of identified pions, kaons and protons. The beam was incident on a foil target assembly with four materials: beryllium, aluminum, copper and tungsten, segmented in the beam direction. The total data set consists of about 400 million triggers with about 200 million each of negative beam events (85% pi, 15% kaon) and positive beam events (40% pi, 30% kaon and 30% proton). This data set, unprecedented in high energy physics at the time, required a highly parallel, multi-microprocessor system for data acquisition, designed and implemented specially for E-769. The off-line analysis also extended the use of microprocessor farms, being the first at Fermilab to use commercial processors with elements of the Computing Division CPS software for large-scale reconstruction of experiment data.

E-791 has broken new ground in charm physics. Located in the Tagged Photon Laboratory it has a 500 GeV/c π^- beam incident on a multi-foil target. As with E-769, charm events are selected by a high-E_T trigger made possible by the segmented nature of the electromagnetic and hadronic calorimeters. The detector has 23 planes of high-resolution silicon strip devices (six in the beam, 17 downstream of the target, giving a total of ten more than in E-769) followed by 37 planes of drift-chambers and PWC's. Two Cerenkov detectors and a muon wall are used with the calorimeters to identify particle types. The experiment took data in the 1991 fixed-target run and wrote to tape over 20 billion events. About 200,000 charm decays have been fully reconstructed (20 $\times$ E-691's sample of 10,000 fully reconstructed charm decays).

While several features of charm decays are now understood (the pattern of lifetimes, the small contributions from exchange, annihilation and color-suppressed diagrams) there remain several open questions. These include the degree to which two-body decays dominate, the role of final state interactions and, of course, the pattern of lifetimes of the charm-strange baryons. E-791, being a very high-statistics as well as open-geometry experiment, is ideal for

observing rare branching ratios into fully charged modes and has good background rejection for γ and π^0 modes.

Semileptonic and leptonic modes of charm particle decay are of particular interest because they probe the weak charm decay vertex without the complications of final-state interactions. E-691 had marginal sensitivity to $\pi e\nu$ and $\phi e\nu$ decays and E-791 will have important results there. Branching ratio measurements for even the copious modes are currently at the 10% level and will be improved. E-791 has good sensitivity to D_s^+ and Λ_c^+ semileptonic decays, and is measuring form-factors and polarization effects in these decays. Polarization and production dynamics of the large hyperon sample are also being measured.

D^0-$\bar{D}^0$ mixing is predicted to be unobservably small in the Standard Model. E-791's factor-of-twenty increase in statistics explores an interesting new region where physics beyond the Standard Model could be observed. The higher statistics will also allow precision studies of charm hadroproduction. The data sample is being searched for evidence of pentaquarks, doubly charmed mesons and other new physics. Limits on flavor changing neutral currents (FCNC) have been extracted.

E-791 is simultaneously exploring challenging new technologies. The vast number of reconstructed events was made possible by fast front-end electronics (<40 μs readout times), fast data acquisition and high-speed writing to 8 mm tape (10 Mbyte/sec).

Nine Ph.D. students gained hardware and running experience on E-791, but have completed physics analyses based on E-691 or E-769 data. A total of 15 Ph.D. theses based on E-769 have been accepted, with an additional two expected. All more recent Ph.D. students, 25 as of this writing, have both their hardware and analysis experience with E-791. The first nine Ph.D. theses based on E-791 data have been accepted.

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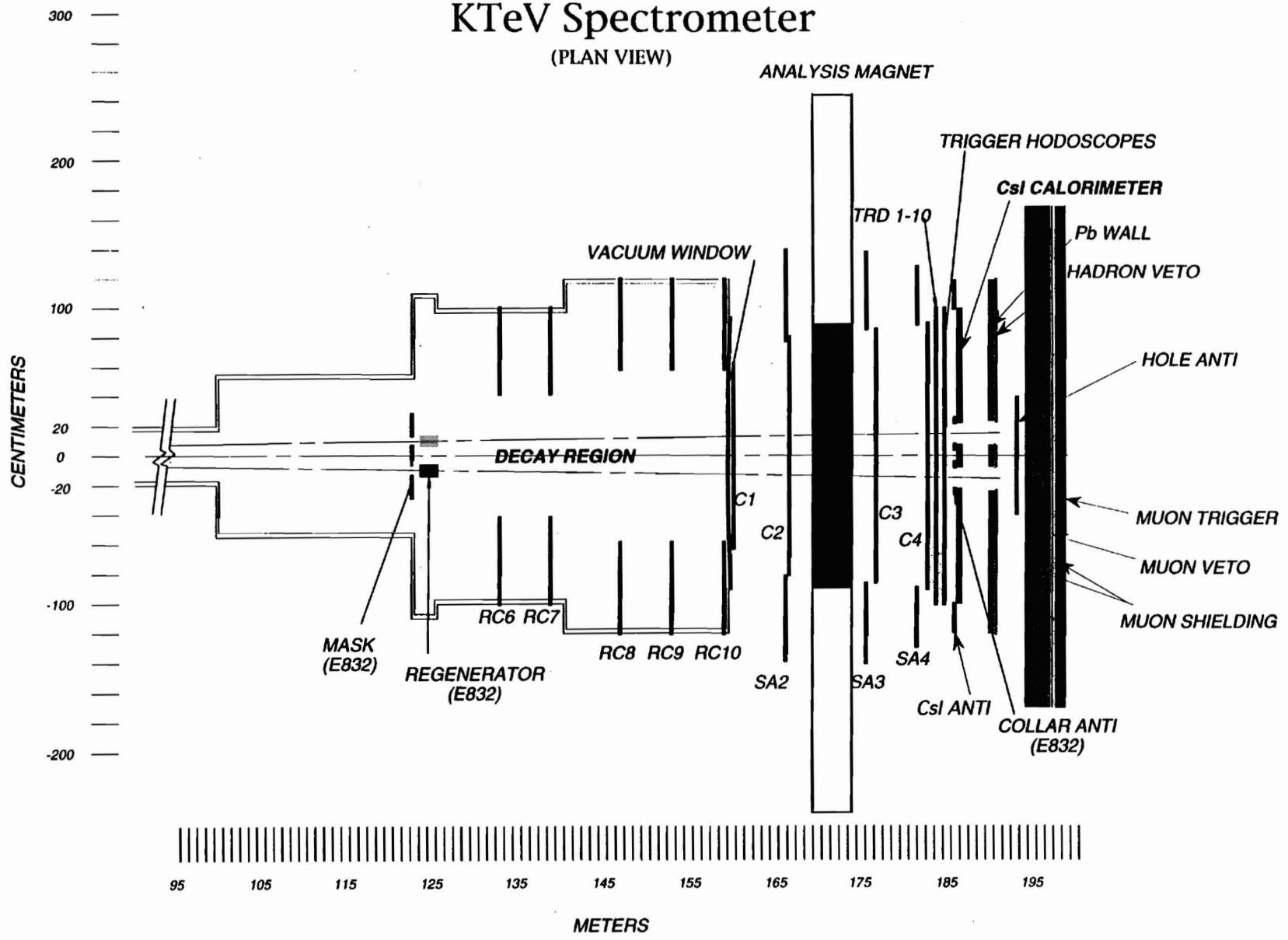
Search for CP Violation in Charged D Meson Decays, E. M. Aitala et al., submitted to Phys. Rev. Lett., November 1996.


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

E-799 (Wah / Yamanaka) / E-832 (Hsiung / Winstein) 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, Chicago, Colorado, Elmhurst, Fermilab, Osaka (Japan), Rice, Rutgers, Virginia, Wisconsin

Status: *E-799 Phase I - Data Analysis*
E-799 Phase II - Data-Taking
E-832 - Data-Taking

KTeV (Kaons at the Tevatron) consists of two experiments: E-799 II (a rare K_L decay experiment) and E-832 (search for direct CP violation in $K_L \rightarrow 2\pi$).

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^{-11}.

E-799 Phase I ran from October 1991 until January 1992, with a lead-glass calorimeter and spectrometer in the Meson Center beamline. The table below summarizes the published results from E-799 Phase I.

Decay Mode	E-799I BR results	Paper
$\pi^0 \rightarrow ee$	$(7.6\ ^{+3.9}_{-2.8} \pm 0.5) \times 10^{-8}$	PRL 71, 34 (1993)
$K_L \rightarrow \pi^0 ee$	$< 4.3 \times 10^{-9}$	PRL 71, 3918 (1993)
$K_L \rightarrow \pi^0 \mu\mu$	$< 5.1 \times 10^{-9}$	PRL 71, 3914 (1993)
$\pi^0 \rightarrow \mu e$	$< 8.6 \times 10^{-9}$	PL B320, 407 (1994)
$K_L \rightarrow eeee$	$(3.96 \pm 0.78 \pm 0.32) \times 10^{-8}$	PRL 72, 3000 (1994)
$K_L \rightarrow \pi^0 \nu\bar{\nu}$	$< 5.8 \times 10^{-5}$	PRL 72, 3758 (1994)
$K_L \rightarrow \pi^0 \pi^0 \gamma$	$< 2.3 \times 10^{-4}$	PR D50, 1874 (1994)
$K_L \rightarrow ee\gamma\gamma$	$(6.5 \pm 1.2 \pm 0.6) \times 10^{-7}$	PRL 73, 2169 (1994)
Λ, $\bar{\Lambda}$ polarization		PL B338, 403 (1994)
$K_L \rightarrow \mu\mu\gamma$	$(3.23 \pm 0.23 \pm 0.19) \times 10^{-7}$	PRL 74, 3323 (1995)
$K_L \rightarrow ee\mu\mu$	$(2.9\ ^{+6.7}_{-2.4}) \times 10^{-9}$	PRL 76, 4312 (1996)

The goal of E-832 is a measurement of the ratio of the CP violation parameters, ε'/ε, in the $K^0\bar{K}^0$ system to a precision of 1.0×10^{-4}, to search for direct CP violation phenomenon in the neutral kaon system at the Fermilab Tevatron. This is a factor of seven improvement in precision over the previous Fermilab experiment E-731 and the CERN experiment NA31.

So far the only manifestations of CP violation are a result of a lack of symmetry in the rate of particle-antiparticle transitions in the $\Delta S = \pm 2$ processes $K^0 \leftrightarrow \bar{K}^0$. This experiment addresses the issue as to whether the CP violation is confined to a $\Delta S = 2$ interaction (the superweak model) or has a $\Delta S = 1$ component, as naturally arises in the standard six-quark model (Cabbibo-Kobayashi-Maskawa). Although there is considerable uncertainty in the predictions for the size of ε'/ε in the standard model, this measurement would severely constrain the models and, if non-zero but small ($<10^{-3}$), would give an important new "handle" on the phenomenon of CP violation, even with the discovery of "top" in the Tevatron Collider.

The E-832 experiment makes use of a double-beam technique, essentially the same as E-731, whereby both K_L and K_S decays are studied simultaneously: a totally active regenerator is placed in one of the beams to provide a K_S component with very small background and the regenerator is alternated from beam to beam to reduce the effects of any beam and detector asymmetries. The goal of the experiment is to collect 6×10^6 $K_L \rightarrow 2\pi^0$ events along with 1.2×10^7 $K_S \rightarrow 2\pi^0$ "normalizing" events, and at the same time to collect 3×10^7 $K_L \rightarrow \pi^+\pi^-$ events and 6×10^7 $K_S \rightarrow \pi^+\pi^-$ "normalizing" events for the double ratio measurement.

For the effort of E-832 and Phase II of E-799 (rare K decay experiment), a new KTeV facility was constructed which takes full advantage of the Tevatron primary protons up to 5×10^{12} per spill and its superior duty cycle to provide a factor of three increase in usable K_L flux in the 100 GeV/c region over E-731. Special attention has been paid to significantly improving the neutral beam stability, reducing the neutral beam halo, and reducing the background muon rate. The spectrometer consists of a 60 meter vacuum decay space, electromagnetic calorimetry, tracking and magnetic spectrometer, nearly hermetic photon vetoes, transition radiation detectors, and hadron and muon detectors.

The neutral final state ($2\pi^0$) is detected with a new 1.9m $\times$ 1.9m high resolution (better than 1%) electromagnetic calorimeter made of an array of 3100 blocks of pure CsI crystals. A newly developed "digital" PMT base (digitizing the PMT signal with a current switcher and a flash ADC right on the base and running at 53 MHz) is used to read out the CsI array for a better understanding of the calorimeter in the higher rate environment. Triggering in the neutral mode is effected by counting clusters in the CsI array by a hardware cluster finder. The $\pi^+\pi^-$ are detected with a 2000 sense-wire high-rate drift chamber spectrometer. A new, large-aperture KTeV magnet, providing a p_T kick up to 450 MeV/c, will be used for momentum measurement of charged particles. Scintillation hodoscope counters and an improved in-time track processor are used for the charged trigger. The most serious background, $K_L \rightarrow 3\pi^0$, is significantly reduced by means of a nearly hermetic system of 12 new photon-veto anti-counters, designed to detect extra gammas outside the solid angle of the CsI calorimeter including the beam holes. Inelastic regeneration is greatly reduced by the detection of the production of secondaries in the totally active scintillation regenerator. The

$K_{\mu 3}$ background is rejected by the muon shielding and anti-counters behind the CsI calorimeter, and by crude hadron vetoes. A new buffer matrix data acquisition system with a level-3 parallel processing filter is used for the high data rate environment.

With the long decay space, the experiment can also measure the K_L-K_S interference in both the $2\pi^0$ and $\pi^+\pi^-$ data sample to obtain $\Delta\phi$, the phase difference between ϕ_{00} and ϕ_{+-}, to a precision of 0.2^o, a very stringent test of CPT invariance.

A KTeV Design Report (FN-580) was prepared for the project. A new KTeV experimental hall has been completed at the NM4 enclosure in the NM beamline and was operational in 1996. The experiment is now taking data in the current fixed-target run.

E-799 Phase II started taking data in 1997 with the KTeV spectrometer and pure CsI calorimeter. The clean beam and a new data acquisition system allow us to run at higher proton beam intensity and trigger acceptance. The pure CsI calorimeter offers a far better energy resolution to reduce major backgrounds in rare decays. New TRD modules give signficant e/π separation for background rejection. New photon veto counters have better coverage to reduce backgrounds caused by escaping photons. With all these combined, E-799 Phase II is planning to improve the sensitivity for many rare decays by two orders of magnitude compared to Phase I.

Publications

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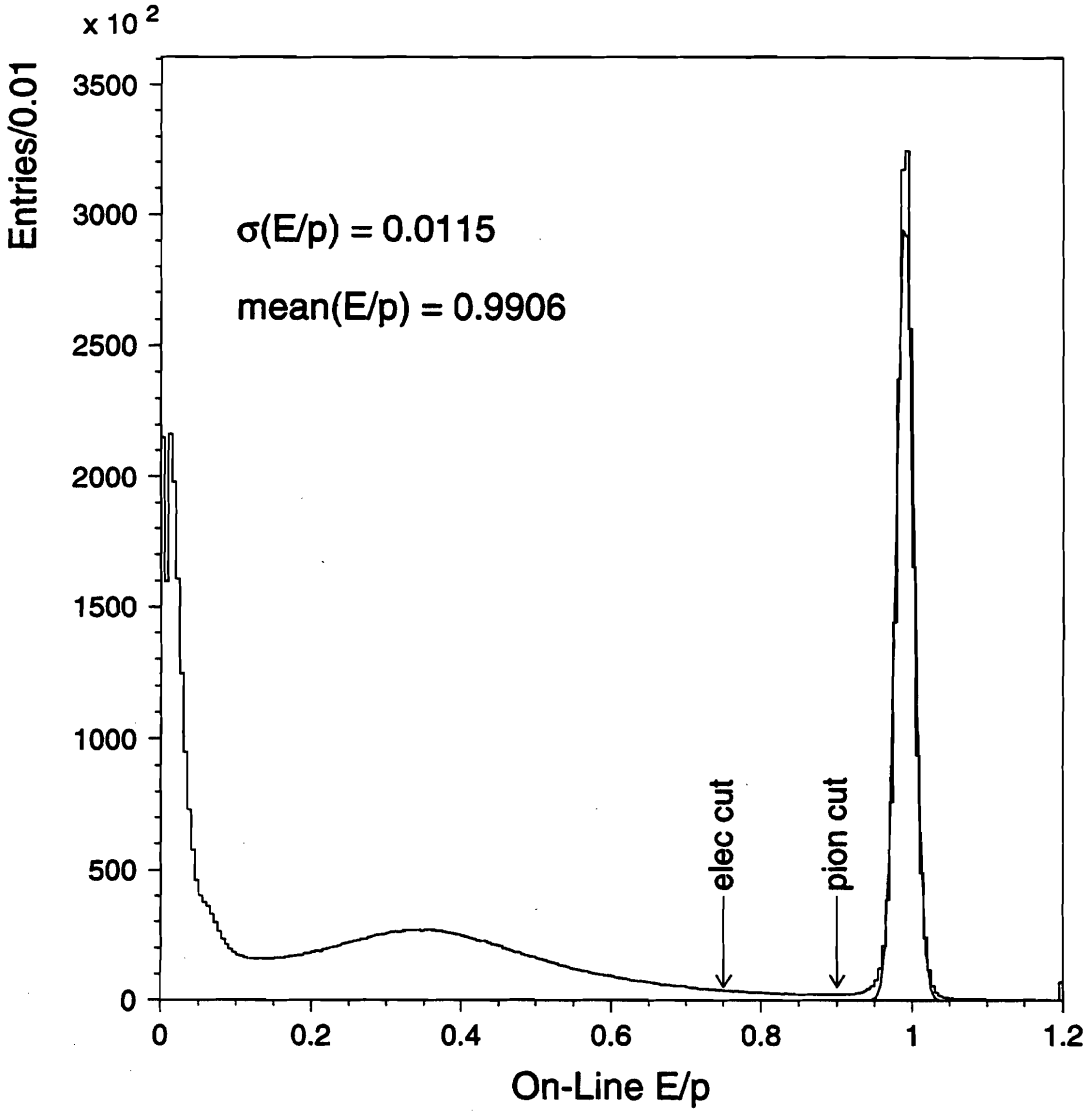


Figure 1. On-line E/p distribution for events with two charged tracks in the $\pi^+\pi^-$ trigger.

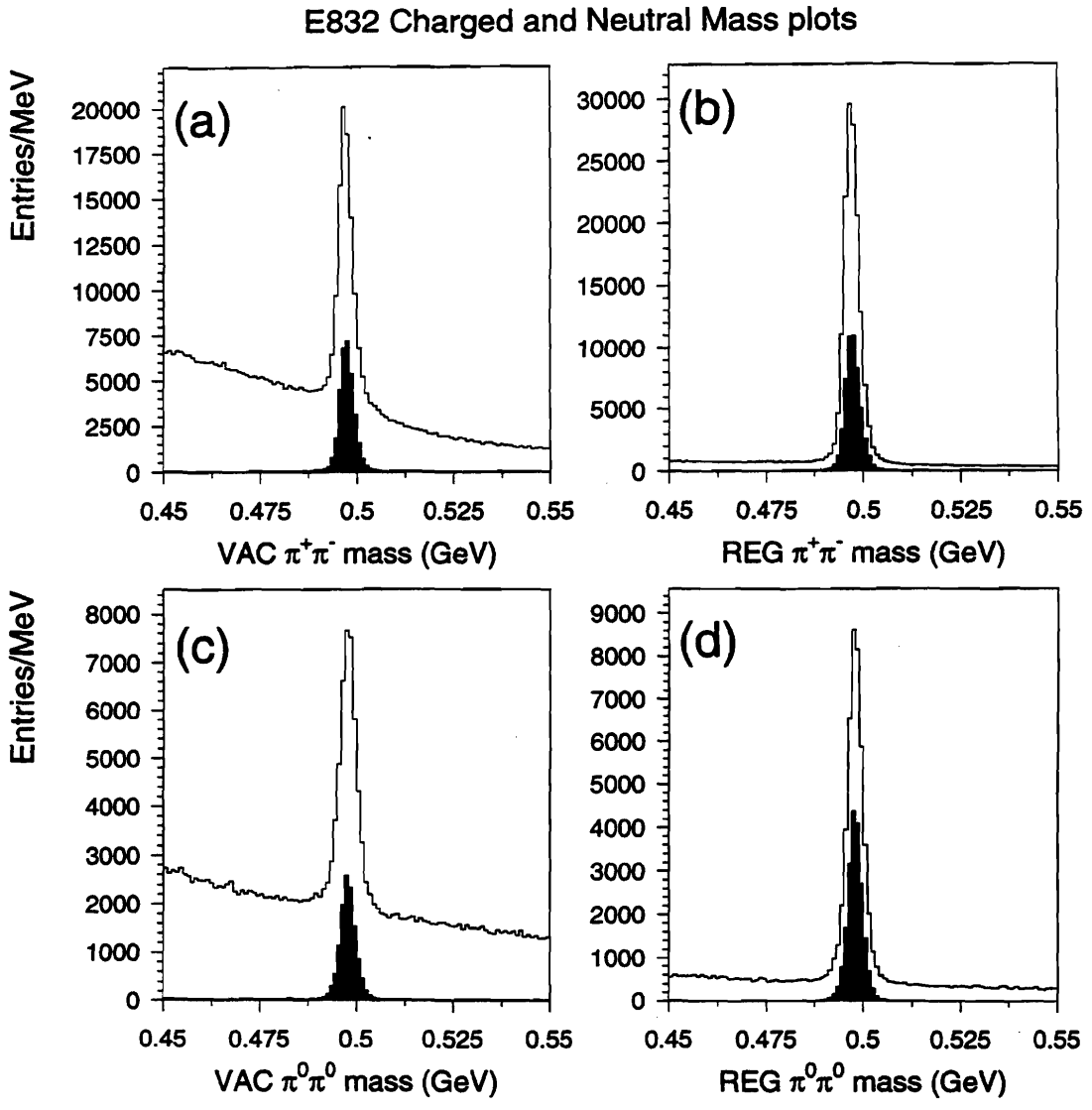
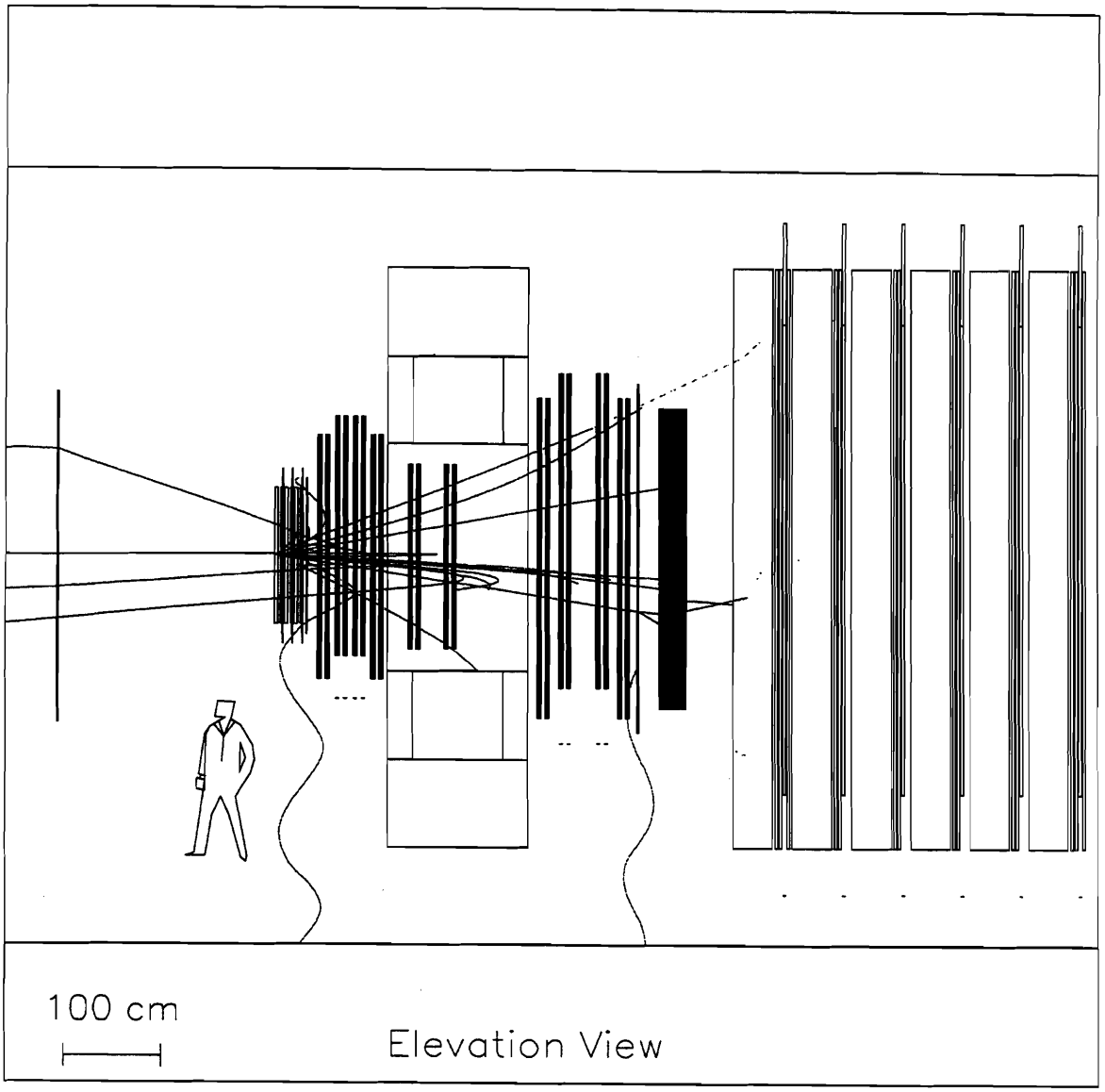


Figure 2. Signal mass plots for (a) vacuum beam $\pi^+\pi^-$ decays, (b) regenerator beam $\pi^+\pi^-$ decays, (c) vacuum beam $\pi^0\pi^0$ decays, (d) regenerator beam $\pi^0\pi^0$ decays. The solid plots show the mass peaks after some off-line cuts.

E-803



E-803 (Reay) Muon Neutrino to Tau Neutrino Oscillations

Aichi (Japan), Athens (Greece), UC/Davis, UCLA, Chonnam (Korea), Fermilab, Gifu (Japan), Gyeongsang (Korea), Hirosaki (Japan), IIT, Indiana, ITEP (Russia), Kansas State, Kinki (Japan), Kobe (Japan), KAIST (Korea), Korea (Korea), Michigan, Nagoya Institute of Tech. (Japan), Nagoya (Japan), Okayama (Japan), Osaka City (Japan), Osaka Commerce (Japan), Osaka Sci. Ed. Inst. (Japan), Seoul (Korea), Soai (Japan), South Carolina, Technion (Israel), Toho (Japan), Tufts, Utsunomiya (Japan), Yokohama (Japan)

Status: *No Data Yet*

Fermilab E-803 (COSMOS) is a short-baseline neutrino oscillation $\nu_\mu, \nu_e \rightarrow \nu_\tau$ appearance experiment sensitive to ultra-small mixing angles, for neutrino mass differences in the cosmologically interesting range. Interest in oscillations has been stimulated by the apparent deficit of ν_e coming from the sun, and of ν_μ coming from atmospheric cosmic-ray interactions. Recent COBE measurements suggest that a third of the dark matter needed to close the universe could be hot. According to the see-saw mechanism, ν_τ potentially is the most massive neutrino, hence a leading candidate for the missing hot component.

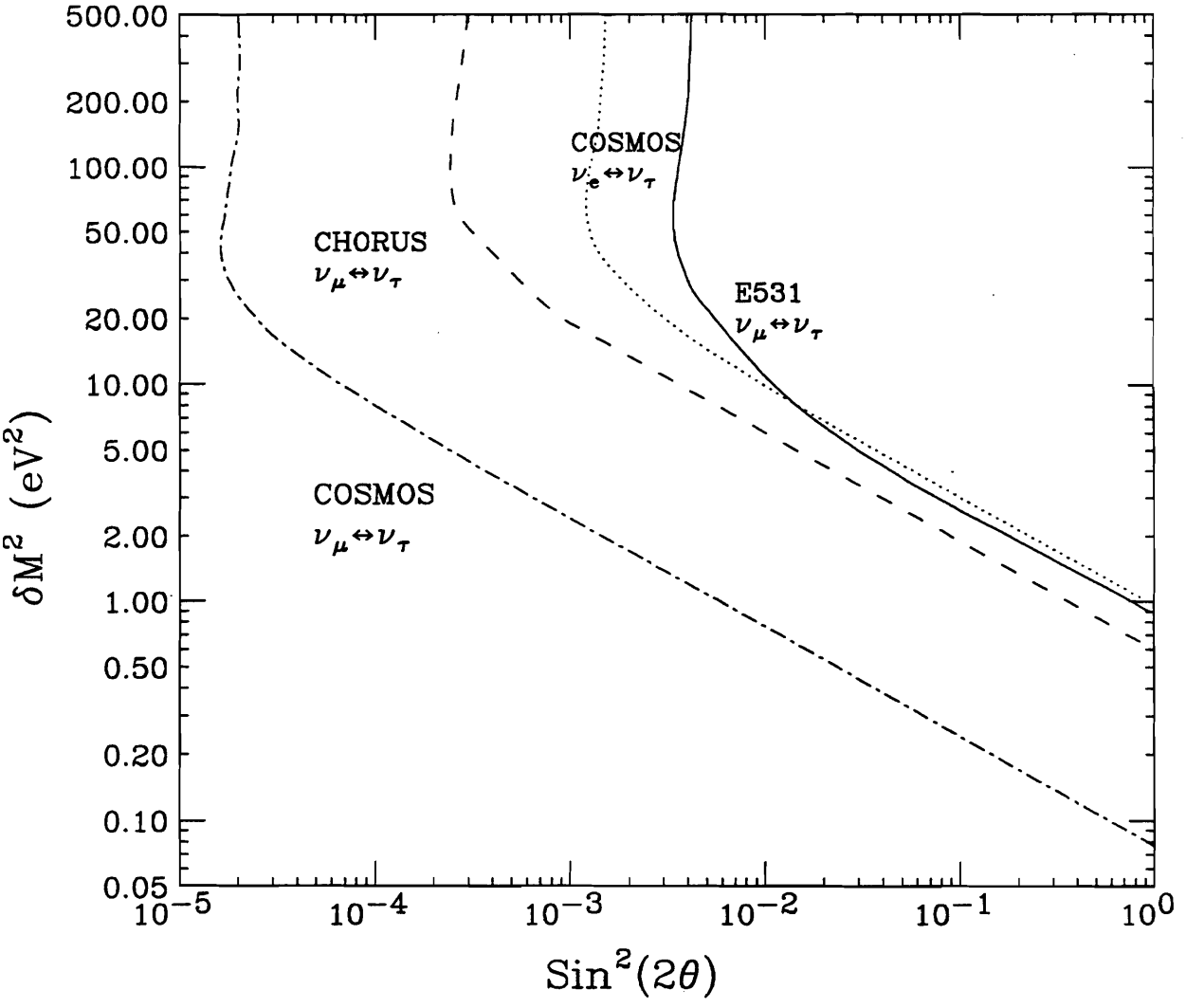
E-803 will achieve a sensitivity 200 times better than the seminal E-531 Fermilab experiment by using a wide-band Main Injector beam of unprecedented intensity. In the mass-squared range of cosmological interest, E-803's sensitivity is 60 times better than that of present CERN experiments. The E-803 apparatus is a third-generation hybrid emulsion-electronic spectrometer based on experience gained in previous Fermilab experiments E-531 and E-653. Muon or electron neutrinos oscillating to ν_τ will produce τ^- from charged-current interactions. The subsequent τ decays will leave a permanent record in an emulsion target with 1-micron spatial resolution. Information from the electronic spectrometer will be used both to locate events and together with emulsion measurements to provide p_T and other kinematic constraints on the short-lived τ decay. Proposed 90% confidence-level (CL) oscillation limits are given in the accompanying figure.

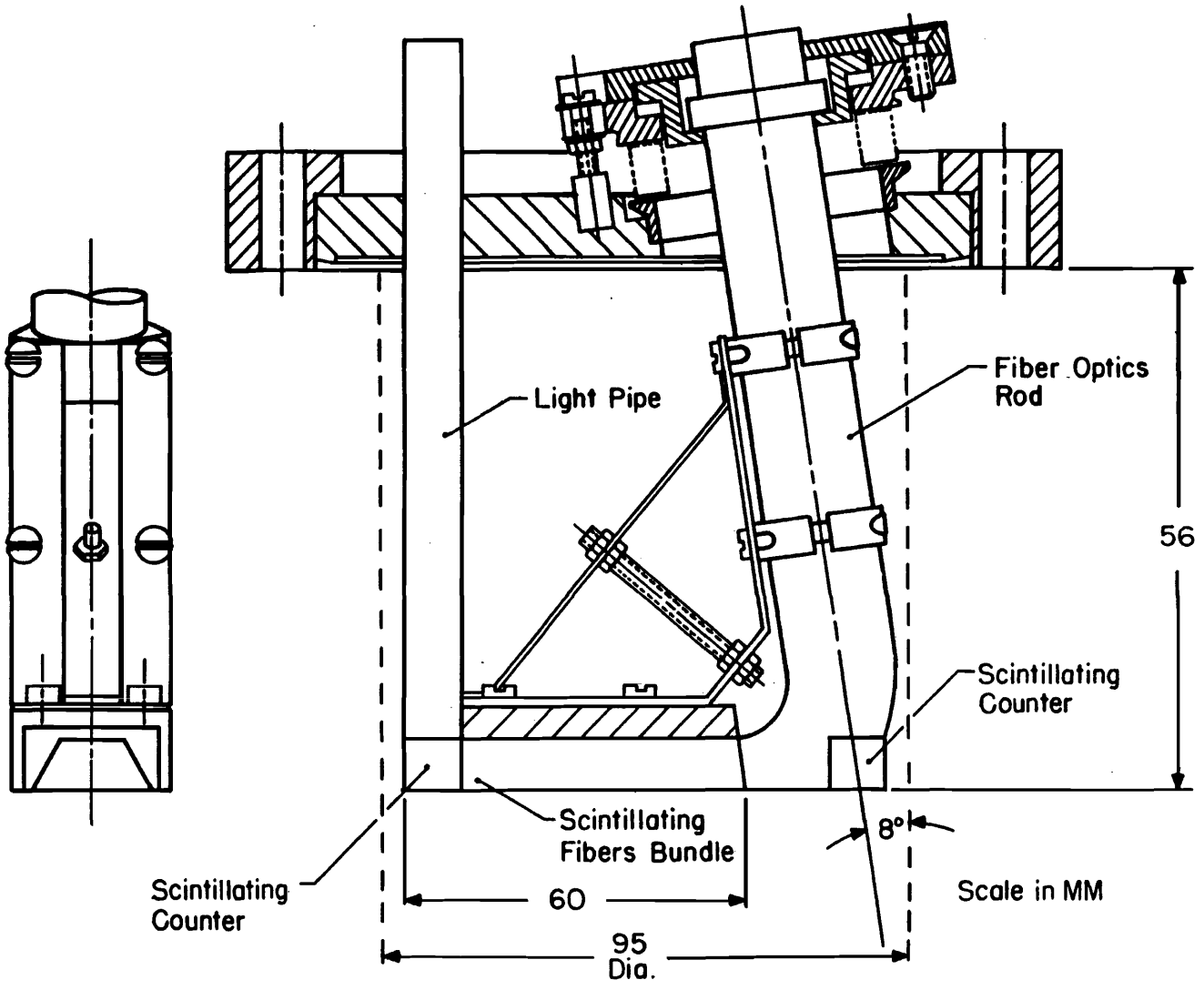
If τ candidates are observed, E-803 will be able to use its precise determination of p_T to fit τ mass and proper decay times for individual candidates in a variety of decay channels. The resulting discovery potential for observing oscillations is approximately five times the 90% CL limits shown in the figure.

The 10^7 neutrino interactions from COSMOS will be recorded in a detector which allows complete reconstruction of final states with high precision, and with micron vertex resolution in its emulsion target. These unique capabilities give COSMOS access to other high-quality physics such as QCD studies of F_2 (x, Q^2) and xF_3 (x, Q^2) (complementing studies with NuTeV),

determination of CKM matrix element V_{cd} to ±3%, a ±2% determination of the charm quark mass m_c, a detailed exploration of charm production dynamics in neutrino scattering, and clean measurements of inverse muon decay and quasi-elastic scattering. Much of this Standard Model physics depends on COSMOS' ability to measure high-statistics charm production by neutrinos and antineutrinos from threshold up to medium energies, and to scan large numbers of events automatically.

During the past year, E-803/COSMOS chose the ITEP lead-glass option for its electromagnetic calorimeter, which must be able to see shower energies as low as 100 MeV. Existing lead glass and Russian photomultipliers will allow a superb calorimeter to be built for less than $1 million. The performance of a portion of this calorimeter will be studied in the NuMI test beam during summer, 1997. Prototypes of COSMOS jet drift chambers are now under construction, and will be installed in ongoing experiments E-815 and E-872; they will contribute to the physics of these experiments as well as undergo extensive testing under real running conditions.


500.00
200.00
100.00
50.00
20.00
10.00
5.00
2.00
1.00
0.50
0.20
0.10
0.05
δM^2 (eV^2)
10^{-5}
10^{-4}
10^{-3}
10^{-2}
10^{-1}
10^{0}
$\mathrm{Sin}^2(2\theta)$
CHORUS
$\nu_\mu \leftrightarrow \nu_\tau$
COSMOS
$\nu_e \leftrightarrow \nu_\tau$
E531
$\nu_\mu \leftrightarrow \nu_\tau$
COSMOS
$\nu_\mu \leftrightarrow \nu_\tau$


Light Pipe
Fiber Optics Rod
56
Scintillating Counter
Scintillating Fibers Bundle
8°
Scintillating Counter
60
95 Dia.
Scale in MM

E-811 (Orear) Physics at E0 for Collider Run Ib

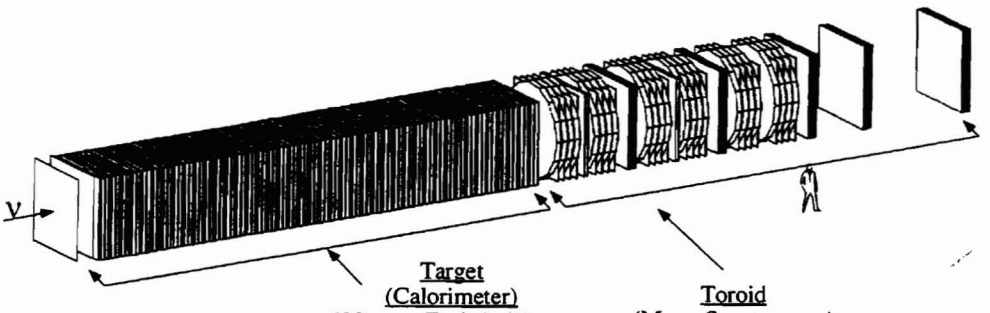
CERN, Cornell, Fermilab

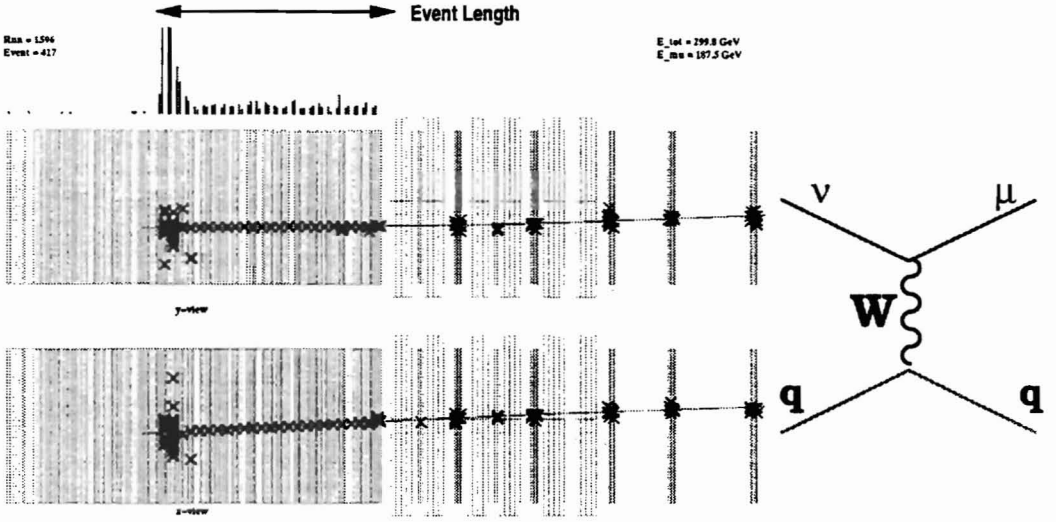
Status: *Data Analysis*

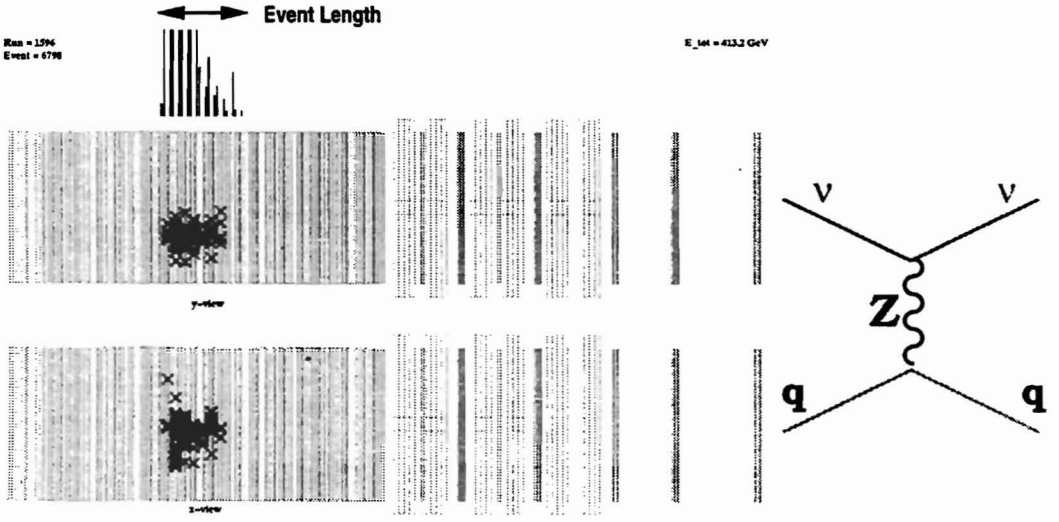
The goals are two-fold: (1) to get new, accurate values of the rho value (ratio of real to imaginary part of the forward scattering amplitude) and total cross section at the full collider energy, and (2) to test out a new detector scheme designed to do the same thing at a higher energy collider. These new detectors are designed to measure very small angle elastic scatterings within a millimeter or two of the beam. They consist of bundles of 100 micron scintillating fibers lined up parallel to the beam and remotely adjustable in position. Light generated in a scintillating fiber is led outside the vacuum tank by glass fiber optics undergoing a 90 degree bend to a series of two image intensifiers. The image on the final phosphor is registered on a CCD, digitized, and dumped onto data tape after an appropriate trigger. The voltage signal on the final phosphor allows it to behave as the anode of a photomultiplier tube and can be used as part of the trigger. This new detector has been tested in a 10 GeV pion beam at CERN and found to be 100% efficient with zero background, both for the CCD image and the fast pulse obtained from the anode. Such a detector is equivalent to a bundle of 15,000 independently readable scintillation counters, each with 100% efficiency, with zero noise, no cracks, and position resolution in both dimensions of about 30 microns. In the actual data-taking run of January 1996, close to 100% efficiency was obtained for each detector, and position resolution of ~30 microns was also obtained.

Four such detectors were installed at the same far positions used by E-710. During the shutdown between Runs Ia and Ib one such detector had been installed and shown to work in the beam pipe vacuum. In E-710 the detectors were able to get within 2.2 mm of the beam without running into too much background. Analysis of simulated data has shown that if these new detectors can take data down to 2.9 mm of the beam then the rho value can be obtained to an accuracy of 0.03 and the total cross section to 2.0 mb. This is based on a sample of 80,000 elastics in the low-t geometry which is what was obtained in the January 1996 run. Data-taking was with separators off and highly scraped beam. Data analysis is now in progress.

E-815


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


Event Length
ν
μ
W
q
q


Event Length
ν
ν
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E-815 (Bernstein / Shaevitz) Precision Measurements of Neutrino Neutral- and Charged-Current Interactions Using a Sign-Selected Beam

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

Status: *Data-Taking*

Before the top quark discovery, precision measurements of the weak mixing angle, θ_W, at lepton and hadron colliders and in neutrino-nucleon collisions, provided a prediction of its mass when interpreted in light of the top mass-dependent radiative corrections. With the discovery of the top quark, precision tests of Standard Model predictions have assumed an even greater role as sensitive probes for physics beyond it. The incomplete nature of the Standard Model inspires further theoretical and experimental effort to resolve the many unanswered questions, and the departure of a precisely measured Standard Model parameter from its predicted value would provide a clear indication of new physics.

E-815 (NuTeV) will exploit the full power of the high-energy, high-intensity Tevatron neutrino beam to significantly improve upon the current precision of the electroweak parameters. The new Sign-Selected Quadrupole Train (SSQT) will enable us to unambiguously distinguish neutrino and anti-neutrino interactions with at least two significant results:

(1) Previously limiting systematic errors on the determination of $\sin^2\theta_W$ can be eliminated or dramatically reduced.

(2) The ability to distinguish between neutrino and anti-neutrino interactions will enable the first precision measurement of ρ, the ratio of neutral- to charged-current coupling strengths.

Historically, the comparison of different measurements of the weak mixing angle in collider and fixed-target experiments has proven fruitful since each type of experiment has different sensitivity to the Standard Model radiative corrections which depend on the top quark and Higgs boson masses. Precision electroweak measurements had already predicted the top mass before its recent discovery, and further increases in precision may uncover mass effects due to the existence of yet undiscovered particles such as the Higgs boson or supersymmetric particles. The value of ρ reflects the structure of the Higgs sector so a precise determination is a powerful probe of the nature of electroweak unification.

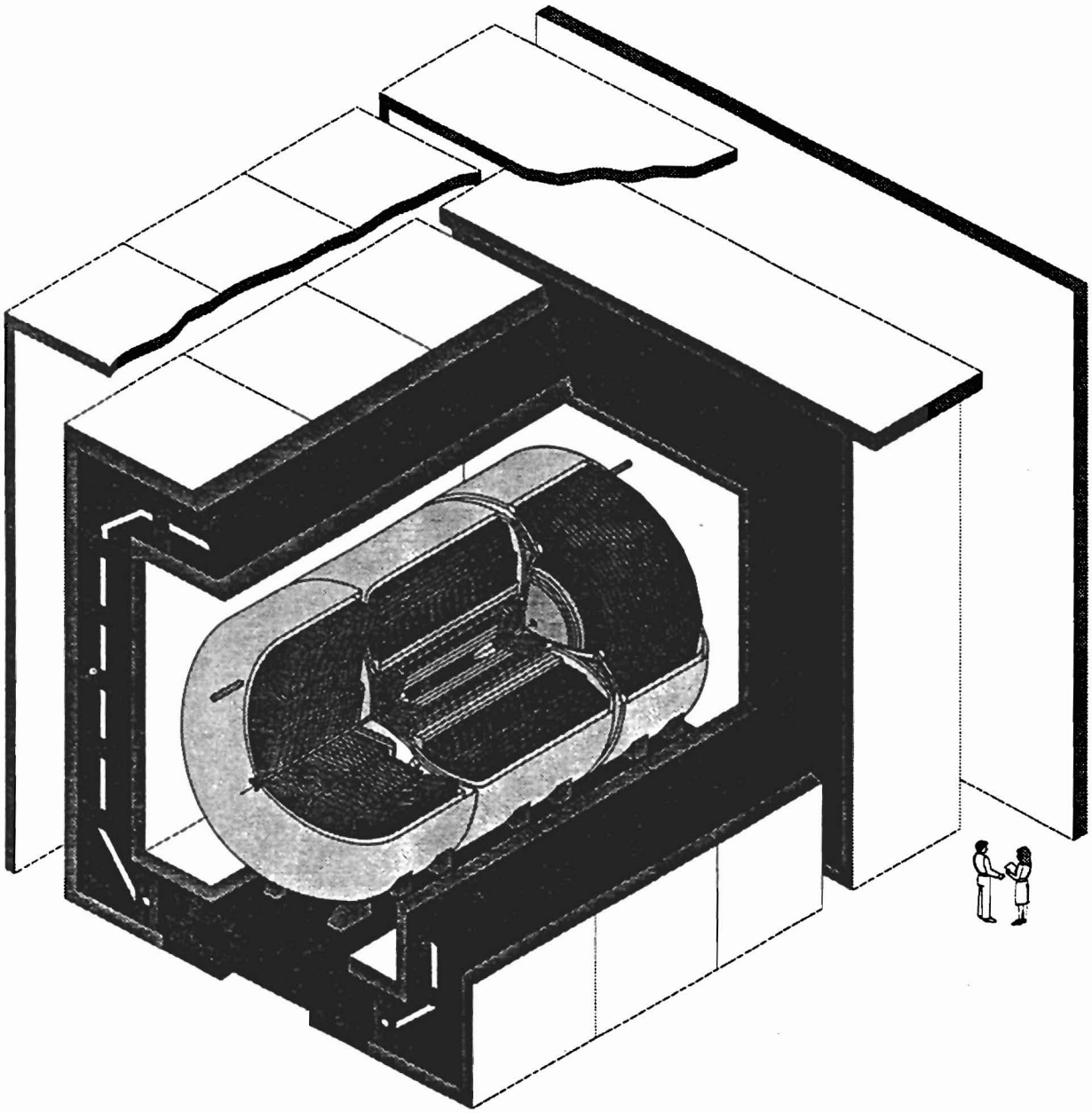
NuTeV will measure $\sin^2\theta_W$ with an expected total error of ± 0.0025, and ρ with an error of ± 0.010. Within the electroweak theory, these measurements can be expressed in terms of equivalent measurements on the top quark and W boson masses; the corresponding error on M_{top} is ± 20 GeV/c^2 ± 17 GeV/c^2

(M_{higgs}) and only ±120 MeV/c^2 on M_W, competitive with collider measurements. Neutrino-nucleon scattering measurements have a unique dependence on the radiative corrections and are the only measurements which directly determine both $\sin^2\theta_W$ and ρ.

Neutrino-nucleon scattering has always been a rich source of information on the structure of nucleons and tests of QCD, and NuTeV will build on that tradition. Experience gained in E-744/E-770 will be used to reduce the systematic errors on α_s and Λ_{QCD} through the use of an extensive calibration program with a new test-beam spectrometer. E-744/E-770 has already provided the best measurement $\alpha_s(M_z)$; NuTeV can reduce that error by nearly a factor of two. In addition, the SSQT will allow increased precision of measurements of the anti-quark distributions, charm and strange sea, and $R_l=\sigma_L/\sigma_T$.

E-815 is currently taking data and anticipates a rapid analysis. The beam and detector are performing well and the test beam program is already providing information three times more precise than previous efforts. The run so far is an unqualified success.

E-823



DØ Detector

The Run I configuration of the D0 detector. The central tracking detectors are surrounded by the liquid argon calorimeter and the muon tracking system.

E-823 / 740 (Montgomery / Weerts) Study of Events in $\bar{p}p$ Collisions at 2 TeV in the D0 Detector

los Andes (Colombia), Arizona, BNL, Boston, Brown, Buenos Aires (Argentina), UC/Davis, UC/Irvine, UC/Riverside, CBPF (Brazil), CINVESTAV (Mexico), Columbia, Delhi (India), Fermilab, Florida State, Hawaii, IHEP/Protvino (Russia), Illinois/Chicago, Indiana, INP/Krakow (Poland), Iowa State, ITEP (Russia), JINR (Russia), Korea (Korea), Kyungsung (Korea), LBL, Maryland, Michigan, Michigan State, Moscow State (Russia), Nebraska, New York, Northeastern, Northern Illinois, Northwestern, Notre Dame, Oklahoma, Panjab (India), PNPI (Russia), Purdue, Rice, Rio de Janeiro (Brazil), Rochester, Saclay (France), Seoul National (Korea), SUNY/Stony Brook, Tata (India), Texas/Arlington, Texas A&M

Status: *E-740 - Data Analysis*
E-823 - 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 1.8 TeV at the Fermilab Tevatron Collider. The detector stresses identification of leptons, photons, jets and missing transverse energy for high-p_T physics with high acceptance up to pseudorapidity of $|\eta| < 3$ for electrons and muons. After five years in the construction phase, the detector has been operated since 1992 by a collaboration now totaling 49 institutions within the U.S. and overseas, with over 450 Ph.D. physicists and graduate students, to study a variety of particle physics topics with the top search as perhaps the most visible example.

The detector consists of three major subsystems. Innermost is a central tracking system containing vertex, forward and central drift chambers. There is no central magnetic field. The drift chamber resolution is ~60 μm (vertex) and 180 μm (forward and central). The tracking system also includes a transition radiation detector to aid in electron identification; it provides a rejection of about 50 against single pions. The tracking chambers are surrounded by a hermetic liquid argon sampling calorimeter with uranium and copper/steel absorber. The calorimeter is contained in three cryostat vessels (a central barrel and two end caps). The calorimeter is compensating (e/π ~1.05) and finely segmented to identify electrons, photons, muons and jets. The electromagnetic (EM) calorimeter covers $|\eta| < 3$ and hadronic calorimetry extends to $|\eta| < 4.4$; this large acceptance provides excellent measurement of missing transverse energy. The segmentation is $\Delta\eta \times \Delta\phi = 0.1 \times 0.1$ (0.05×0.05 at EM shower maximum); the energy resolution is $\sim 15\%/\sqrt{E}$ for electrons and photons (with a small constant term), $\sim 50\%/\sqrt{E} \oplus 5\%$ for single hadrons, and about $85\%/\sqrt{E}$ for jets. Outside the calorimeter cryostats is a muon system comprising three layers of proportional drift tubes (0.3 mm resolution) with magnetized iron toroids to provide muon momentum measurement. In the forward regions a small angle muon spectrometer (200 μm resolution) extends coverage up to $|\eta| < 3.3$.

The detector as a whole contains 116,000 channels. Data recording is initiated by a three-level trigger system: the first (Level 0) is a scintillator interaction trigger, the second (Level 1) a hardware analog trigger capable of making calorimeter energy sums, missing E_T, and coarse muon tracks, and the third (Level 2) is a software filter implemented on a farm of 48 VAX Station 4000 computers with full event information available. A supplementary Level 1.5 trigger refines the Level 1 muon trigger.

Initial running concentrated on commissioning the apparatus and understanding the effects of the Main Ring beam which passes through the calorimeter 2m above the Tevatron beam. First collisions were observed on May 12, 1992 and the data run started after a brief shutdown in August. Over the whole of Run Ia, D0 accumulated $15pb^{-1}$ of collider data including special and calibration data runs. The overall ratio of beam data recorded to beam available was about 70%, with the main loss coming from the veto imposed to stop triggering during Main Ring injection and transition and while Main Ring protons pass through the detector. Data were taken at a rate of about 2 Hz and reconstructed at the same rate on a multi-processor UNIX farm.

D0 is now finished taking data in Run I. The detector was improved for the higher luminosities compared with Run Ia by the addition of a cosmic ray shield for the muon system and hardware Level 1.5 trigger for electrons capable of performing both threshold and simple isolation cuts. The total data to tape for Run I corresponded to ~120 pb^{-1}.

Current Ia and Ib physics analyses at D0 are organized into five groups. The Top Quark Group was able to set a mass limit of $m_t > 131$ GeV using Run Ia data. With the larger statistics available from Run Ib, we reported observation of the top quark in February 1995. This was a major accomplishment in understanding the Standard Model. During 1996, we presented preliminary measurements of the top mass of 169 ± 11 GeV.

The QCD Group has presented cross sections for inclusive jets in the central and forward regions and differential cross sections for dijet production. The dijet angular distributions have been measured, and photon cross sections and angular distributions presented. Many new analyses have extended the study of QCD at the Tevatron Collider into new regimes: the reported observation of rapidity gaps between forward and backward jets is a signal for colorless exchange, e.g. pomerons; the decorrelation in azimuthal angle between forward and backward jets allows tests of resummation in mixed-scale problems; measurement of energy flow around jets allows the color coherence of gluon emission to be probed.

The Electroweak Group focuses on the production and decay of W and Z bosons. The mass of the W-boson has been measured and published from Run Ia data: $m_W = 80.35 \pm .27$ GeV/c^2. Results published from Run Ia data include the W and Z production cross sections, and p_T distributions. The production of dibosons ($W\gamma$, $Z\gamma$, WW, WZ) through trilinear couplings, a test of the Standard Model, has been studied with Run I data. D0 is also using vector-

boson-plus-jet events as a QCD laboratory: the strong coupling constant α_s has been measured from W+jet events and color coherence effects can be studied here too.

The B-Physics Group has obtained cross sections for low-p_T muons, inclusive b production and J/ψ's. The cross-sections for b and J/ψ production have been measured in previously unexplored large rapidity regions. Measurements of the inclusive b cross-section may also provide a new determination of the strong coupling constant. The b quark fragmentation function has been measured using muons within jets.

The New Phenomena Group is conducting searches for physics beyond the Standard Model. Limits on the production cross-sections for leptoquarks, W', Z' and right-handed W's have been presented. In addition, mass limits and cross-sections have been set for squarks, gluinos and gauginos as predicted by supersymmetric models.

The approved D0 upgrade for Run II, E-823, must operate at luminosities near $2\times10^{32}cm^{-2}s^{-1}$ with bunch spacings as short as 132 nanoseconds. To meet the challenges of such a high-rate environment the entire central tracking system will be replaced with a silicon microstrip detector, a scintillating-fiber tracker, a solenoid magnet, and central and forward preshower detectors. The new trackers will provide enhanced pattern recognition and triggering opportunities for both lepton and photon final states. Studies of top quark, electroweak, and b physics will be significantly enhanced by the new detectors.

The scintillating-fiber tracker, an innovative design based upon visible light photon counters, has passed a major developmental milestone with successful operation of a 3000-channel test stand at Fermilab. The single-channel noise rate, quantum efficiency, and photo-electron production all meet or exceed design specifications. The construction of the solenoid magnet is scheduled to be complete in 1997. Improvements in the calorimeter electronics required to meet the high-rate environment have been prototyped in a 3000-channel test. The design of similar improvements for the muon electronics is at an advanced stage. A preliminary design of the upgraded DAQ and triggering system specifies a Level 1 accept rate of 10 kHz, a Level 2 accept rate of 1 kHz and a Level 3 output of 5-10 Hz. The new triggering elements will include the fiber tracking and preshower detectors.

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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
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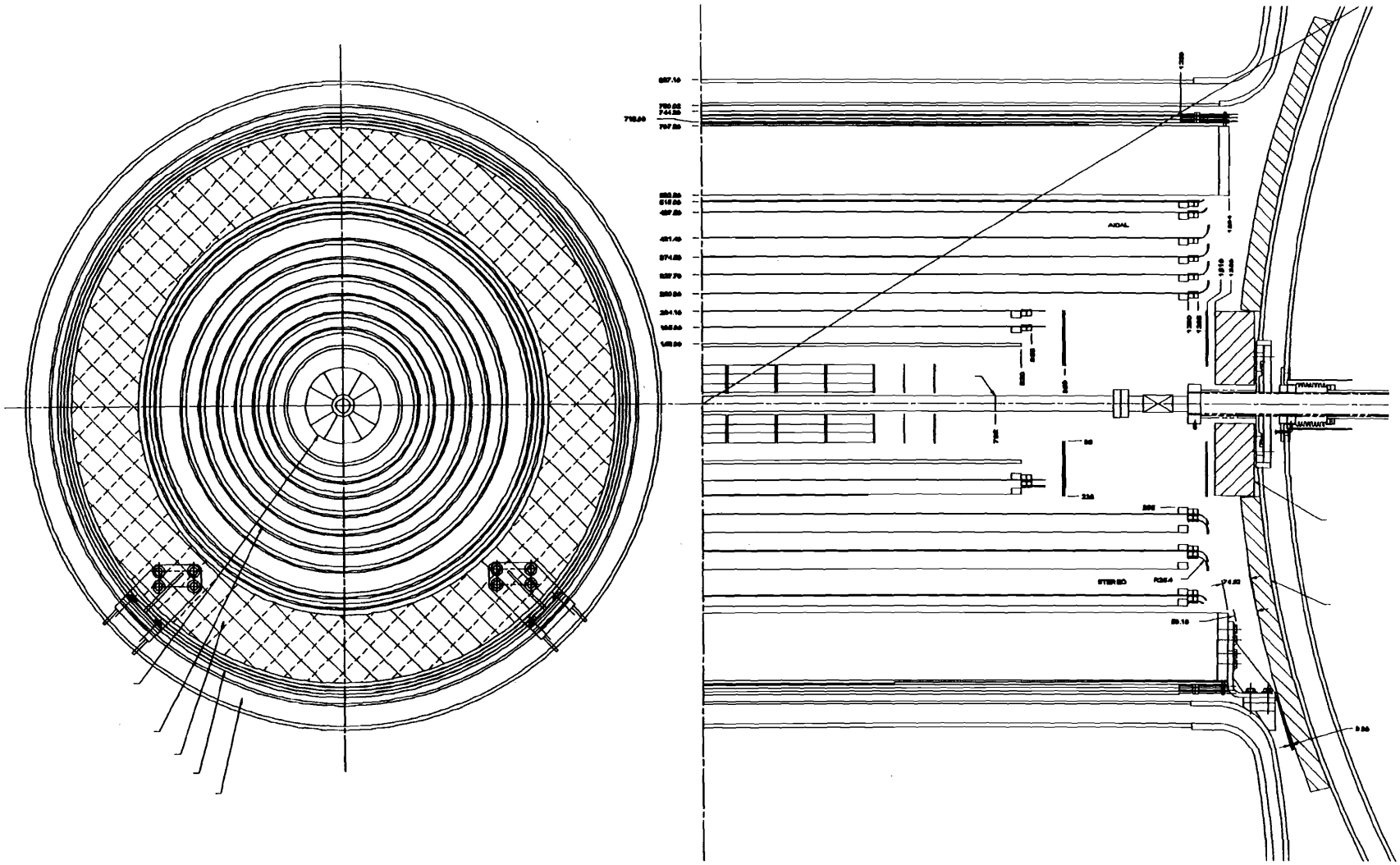
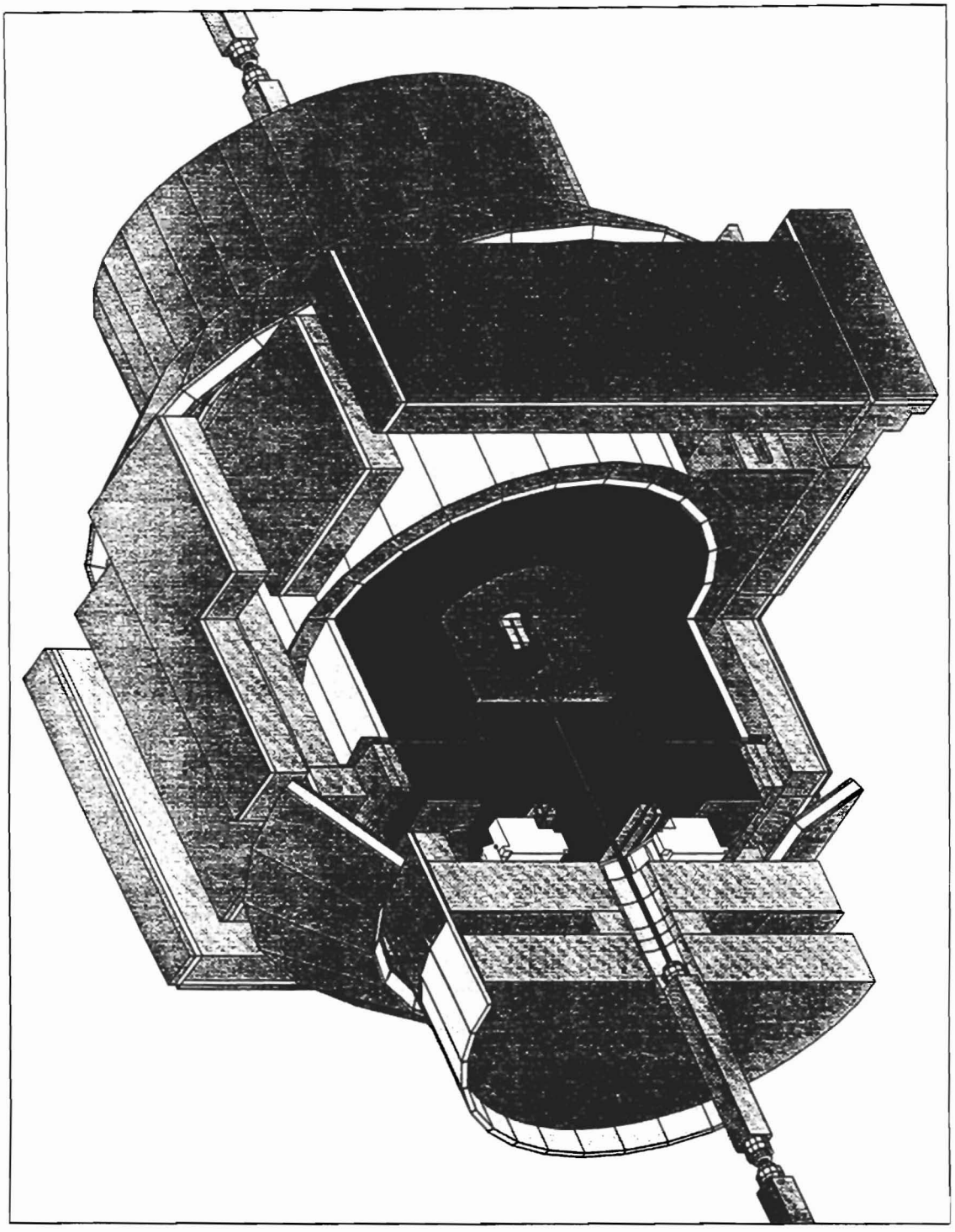
D. Vititoe	University of Arizona	October 1996
J. Jaques	University of Notre Dame	October 1996
M. Martin	University of Barcelona	October 1996



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.



E-830

E-830 / 775 (Bellettini / Carithers) Collider Detector at Fermilab

Academia Sinica (Taiwan), ANL, Bologna (Italy), Brandeis, UCLA, Chicago, Duke, Fermilab, Florida, Frascati (Italy), Geneva (Switzerland), Harvard, Hiroshima (Japan), Illinois, Inst. of Particle Phys. (Canada), Johns Hopkins, Karlsruhe (Germany), KEK (Japan), LBL, MIT, Michigan, Michigan State, New Mexico, Ohio State, Osaka City (Japan), Padova (Italy), Pennsylvania, Pisa (Italy), Pittsburgh, Purdue, Rochester, Rockefeller, Rutgers, Texas A&M, Texas Tech, Tsukuba (Japan), Tufts, Waseda (Japan), Wisconsin, Yale

Status: *E-775 - Data Analysis*
E-830 - 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 with the Fermilab Tevatron Collider.

The heart of the CDF central detector is a 3.0-meter-long, 1.5-meter-radius, 1.4 Tesla superconducting solenoid with tracking chambers in the magnetic field for momentum analysis of charged particles. In the original detector, which operated until the spring of 1996, 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, and two "plug" gas calorimeters in the ends of the solenoid completing 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. In the forward directions for angles below 10^o and down to 2^o are additional electromagnetic and hadronic gas calorimeters. The muon detector system in the forward direction includes magnetized iron toroids for momentum measurement. The original detector has approximately 100,000 channels of electronics read out via a FASTBUS data acqusition system. A three-level trigger system selects events to be recorded on magnetic tape.

CDF as E-775

E-775 is the upgraded version of CDF for Collider Runs Ia and Ib. The new upgrades to CDF for E-775 for Collider Run Ia were extensive:

1. A new 1.5 inch diameter beryllium beam pipe with a 0.020 inch wall thickness was installed to replace the 2.0 inch diameter pipe used in 1989;
2. A new 4-layer, 46,000 channel Silicon microstrip Vertex Detector was installed around the beampipe to detect secondary vertices;
3. A new set of Vertex Time Projection Chambers with 4 cm drift spaces and 8,600 wires replaced the old 15 cm drift space devices;

4. New low noise preamplifiers were added to these Vertex TPCs;
5. New higher gain preamplifiers were installed on the inner layers of the Central Drift Chamber and the chamber gain was reduced to increase the lifetime of the device;
6. New amplifiers were installed on the outer layers of the Central Drift Chamber to give dE/dx information from 54 layers;
7. A vacuum leak in the solenoid cryostat was repaired;
8. 50 square meters of new wire chambers were added just behind the 1.1 radiation length thick solenoid as preradiator detectors;
9. 630 tons of steel was added to beef up the central muon detection;
10. 856 new chambers were added behind the steel walls and above/below the return yoke steel of the magnet to detect muons with rapidity less than 0.5;
11. An additional 1632 muon chambers and scintillators were added to extend the central muon coverage from rapidity of 0.5 to 1.0;
12. The forward (rapidity greater than 2.0) muon chambers and scintillators interspersed in the forward magnetic toroids were removed, refurbished with finer phi segmentation and reinstalled;
13. The gas calorimeter chamber gains were lowered to ease operation at ten times the original design luminosity;
14. 24,000 channels of new front-end electronics were installed on the gas calorimeters to compensate the gain change mentioned above, to shorten the integration times, and to reduce noise to the trigger system;
15. High voltage feedback was installed on the gas calorimeters to keep the gain stable with changing temperature and atmospheric pressure;
16. The existing multiplexed Analog to Digital Converter (ADC) cards were replaced with faster versions to reduce the front-end readout time from 18 to 3 milliseconds;
17. New luminosity monitors were installed;
18. Dual Fastbus Event Builders were installed to increase the data acquisition system rate capability by a factor of four to about 25 Hz;
19. The data acquisition system rate capability to 8 mm magnetic tape was increased from 1.2 to 8 Hertz;
20. The Level Two trigger processors were speeded up from 40 μsec to 20 μsec processing time per event;
21. A new Neural Net Level Two trigger was installed to make possible an isolation requirement on photon and electron triggers;
22. The computing power in the Level Three trigger farm was increased by a factor of 25 using UNIX based processors;
23. The offline code (and identical Level Three trigger code) was ported to UNIX;

24. 1000 Mips of offline computing was installed in offline farms; and
25. A robotic tape silo with 1.2 Terabytes of storage was installed for fast access to the data.

For Collider Run Ib, several upgrades were installed:

26. The SVX was replaced with a radiation-hard version, the SVX'. This device has similar acceptance but much improved signal-to-noise performance;
27. The DAQ system bandwidth has increased considerably with the addition of Fastbus Readout Controllers (FRC), VME-based scanner processors, and a very fast Ultranet hub connection to connect the scanners with the Level 3 trigger processors;
28. The Level 2 trigger processors have been replaced by a faster, more flexible system based on the DEC Alpha processor; and
29. New front-end electronics for the central electromagnetic strip chambers were added to allow a track match with strip clusters at Level 2 of the trigger.

In Collider Run Ia, CDF rolled into the B0 Collision Hall at the end of March, 1992, and first collisions were seen in May, 1992. During Run Ia, the E-775 detector functioned well, taking data at luminosities up to 9×10^{30} $cm^{-2}sec^{-1}$ with 90% livetime and an overall data-taking efficiency of 71%. A total data sample of 21.4 pb^{-1} was collected by the end of the run in June, 1993. The first-pass event reconstruction for all Run Ia data was completed by the end of 1993, and data analysis is continuing.

During Collider Run Ib, the detector has continued to function well, taking data at luminosities up to 18×10^{30} $cm^{-2}sec^{-1}$ with 90% livetime and an overall data-taking efficiency of about 80%. Data-taking began on January 19, 1994, and by February 20, 1996, a total integrated luminosity of $\approx$90 pb^{-1} had been recorded. Data analysis for this Run Ib data is continuing.

A total of 123 papers on CDF results have been published or submitted for publication. The main highlight to date is a paper on the observation of the top quark submitted for publication on February 24, 1995, using 48 pb^{-1} of Run Ib data and all of the Run Ia data. One hundred and twenty-four graduate students have submitted theses for their degrees based on CDF data.

CDF as E-830

E-830 is the upgraded version of CDF for Collider Run II, where the spacing between Tevatron bunches will decrease from 3500 nsec to 396 sec, and possibly to 132 ns later on, and luminosities as large as $2\times10^{32}cm^{-2}sec^{-1}$ are expected. The goal of this upgrade project is to improve the detector to enable it to operate at a luminosity of $2\times10^{32}cm^{-2}sec^{-1}$ with a Tevatron bunch spacing as small as 132 nsec. The major components of the E-830 CDF upgrade are:

a) Replace the plug and forward gas calorimeters with a new scintillator-based calorimeter enabling the forward muon toroids to be moved closer to the interaction region;

b) Upgrade the front-end electronics and trigger systems to accommodate data-taking at higher rates with shorter Tevatron bunch spacings;

c) Upgrade the data acquisition system to increase throughput and reliability;

d) Replace the silicon vertex detector (SVX II) with a device capable of withstanding higher radiation and with a readout system matched to 132 nsec spacing;

e) Add an intermediate silicon layer detector (ISL) between SVX II and the outer main chamber to insure continued quality of tracking pattern recognition and accuracy for pseudorapidity $|\eta| \leq 2$;

f) Replace the main CTC tracking chamber with a smaller-cell chamber (COT); and

g) Enhance the off-line computing capability to provide for efficient production of physics results as the quantity of data increases.

The CDF Collaboration has increased dramatically in size since 1989. Twenty-three new universities and national laboratories have joined to double the number of collaborating institutions to 40. A total of 482 physicists are now members, up from 187 in 1989.

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Search for Third Generation Leptoquarks in $\bar{p}p$ Collisions at $\sqrt{s}$ = 1.8 TeV, submitted to Phys. Rev. Lett., December, 1996. FERMILAB-PUB-96/450-E.

Theses

G. Chiarelli	University of Pisa	March 1985
M. Sekiguchi	University of Tsukuba	
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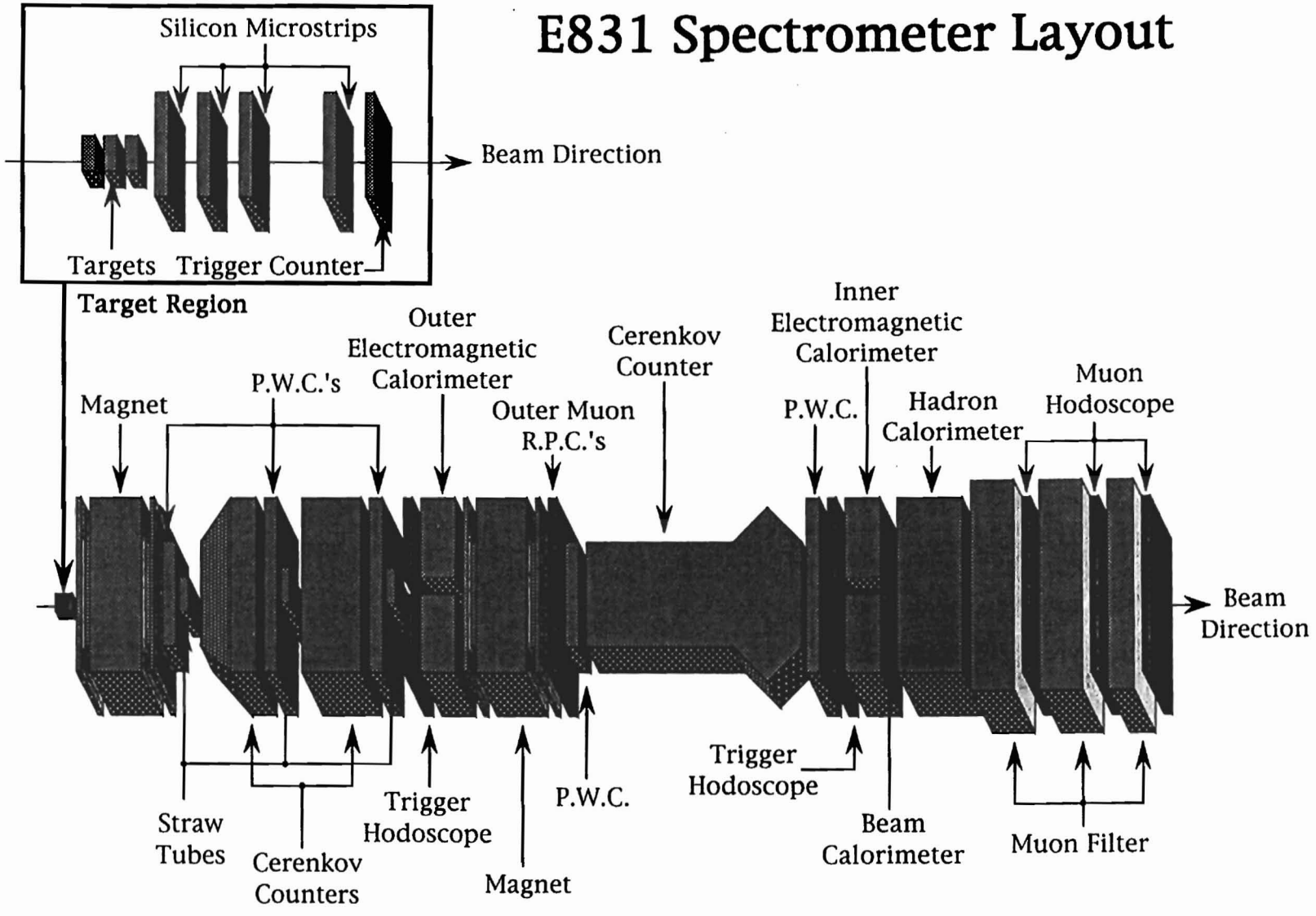
L. Zhang	University of Wisconsin	August 1996
E. Hayashi	University of Tsukuba	September 1996
M. Pillai	University of Rochester	September 1996
F. Keyvan	Univ. of California/Los Angeles	September 1996
S. Metzler	University of Pennsylvania	December 1996
P. Koehn	University of Rochester	December 1996

E831 Spectrometer Layout



E-831 (Cumalat / Moroni) / E-687 (Butler) 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: *E-687 - Data Analysis*
E-831 - Data-Taking

The spectrometer used in Fermilab Experiment 687 (FOCUS) to study the photoproduction and decay of charmed particles has been upgraded to run at higher intensity with increased efficiency in order to achieve the goal of 10^6 fully reconstructed charm particles.

The physics involves high precision studies of D semileptonic decays, QCD studies of Double D events, a measurement of the absolute branching fraction for the D^0 meson, searches for D^0 mixing, CP violation, rare and forbidden decays, fully leptonic decays of the D^+, and a systematic investigation of charm baryons and their lifetimes.

The increased yield of charm in E-831 is obtained by (1) running at five times the average luminosity of E-687 and (2) increasing the efficiency of the detector by a factor of two. The increased luminosity is achieved by lowering the beam energy to 250 GeV, using the positron arm of the beam, and running at higher average proton intensity.

The detector upgrades to handle the increased luminosity are:

1. Speeding up the hadron calorimeter and using it in the First Level Trigger to reduce deadtime;
2. Adding straw tube planes to cover the high-rate pair region;
3. Speeding up the front-end electronics;
4. Speeding up the data acquisition system by a factor of 20; and
5. Improving the Second Level Trigger.

Other changes that have been made to improve efficiency include extending the coverage of the muon system, the addition of six finely-segmented scintillator planes, and the implementation of a lead-glass array for electrons. In addition, the target has been segmented with microstrip planes inserted between target elements.

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Description and Performance of the Fermilab E-687 Spectrometer, P. L. Frabetti et al., Nucl. Instr. and Meth. A320, 519 (1992).

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Measurement of the Mass and Lifetime of the Ξ_c^+, P. L. Frabetti et al., Phys. Rev. Lett. 70, 1381 (1993).

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Study of $D^0 \to K^-\mu^+\nu$ in High Energy Photoproduction, P. L. Frabetti et al., Phys. Lett. B315, 203 (1993).

A Measurement of Elastic J/ψ Photoproduction Cross Section at Fermilab E-687, P. L. Frabetti et al., Phys. Lett. B316, 197 (1993).

A Measurement of the Cabibbo-Suppressed Decays $D^0 \to \pi^-\pi^+$ and $D^0 \to K^-K^+$, P. L. Frabetti et al., Phys. Lett. B321, 295 (1994).

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Branching Ratios of the Decays $D^0 \to \bar{K}^0K^0$ and $D^0 \to K_S^0K_S^0K_S^0$, E-687 Collaboration, Phys. Lett. B340, 254 (1994).

Measurement of the Masses and Widths of L = 1 Charmed Mesons, P. L. Frabetti et al., Phys. Rev. Lett. 72, 324 (1994).

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First Measurement of the Lifetime of the Ω_c^0, P. L. Frabetti et al., Phys. Lett. B357, 678 (1995).

Doubly and Singly Cabibbo-Suppressed Charm Decays into the $K^+\pi^-\pi^+$ Final State, P. L. Frabetti et al., Phys. Lett. B359, 403 (1995).

Search for the Decay of D^+ and D_s^+ Mesons to Three Charged Kaons, P. L. Frabetti et al., Phys. Lett. B363, 259 (1995).

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Study of Higher Mass Charm Baryons Decaying into Λ_c^+, E-687 Collaboration, P. L. Frabetti et al., Phys. Lett. B365, 461 (1996).

Charm-Anticharm Asymmetries in High Energy Photoproduction, E-687 Collaboration, P. L. Frabetti et al., Phys. Lett. B370, 222 (1996).

Analysis of the Caibbo-Suppressed Decay $D^0 \to \pi^- l^+ \nu$, E-687 Collaboration, P. L. Frabetti et al., Phys. Lett. B382, 312 (1996).

Observation of the Vector Meson Cabibbo-Suppressed Decay $D^+ \to \rho^0 \mu^+ \nu_\mu$, E-687 Collaboration, P. L. Frabetti et al., Phys. Lett. B391, 235 (1997).

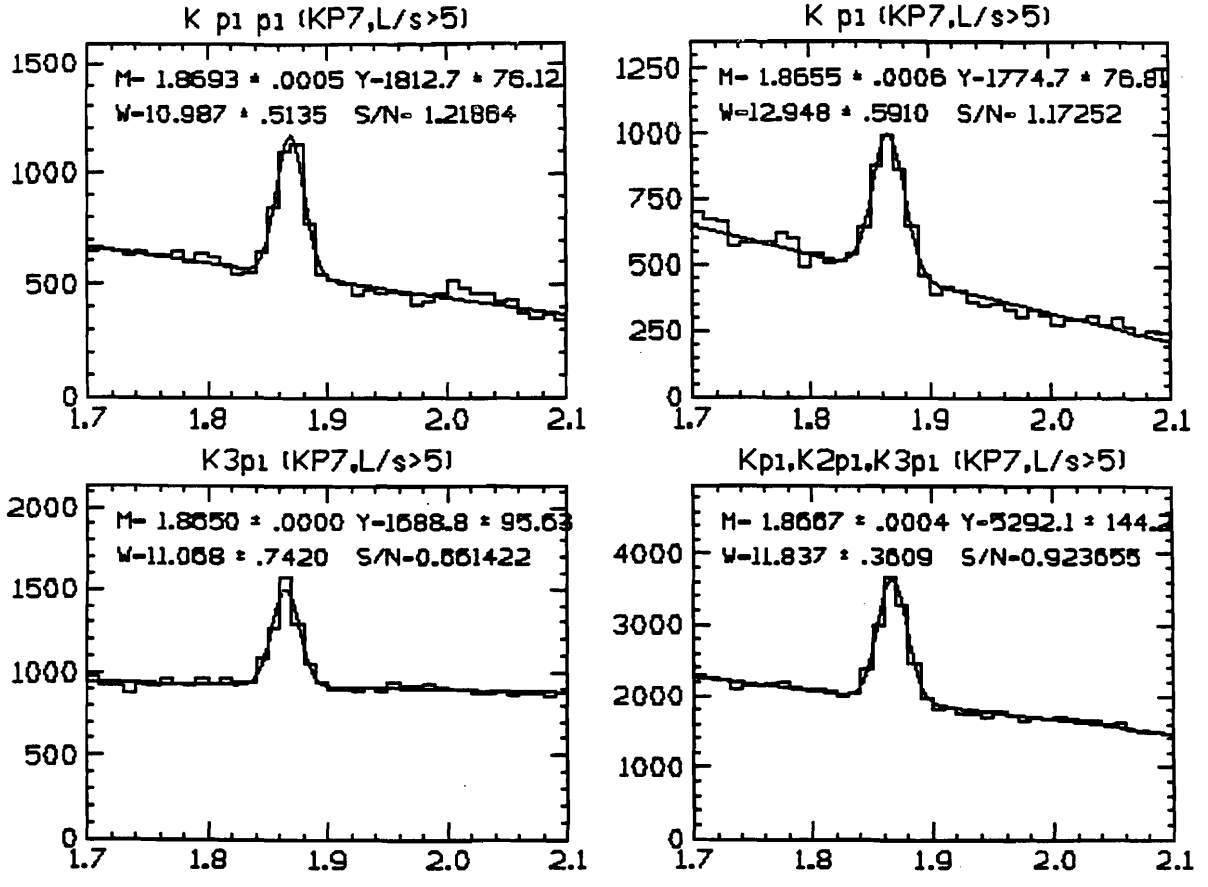
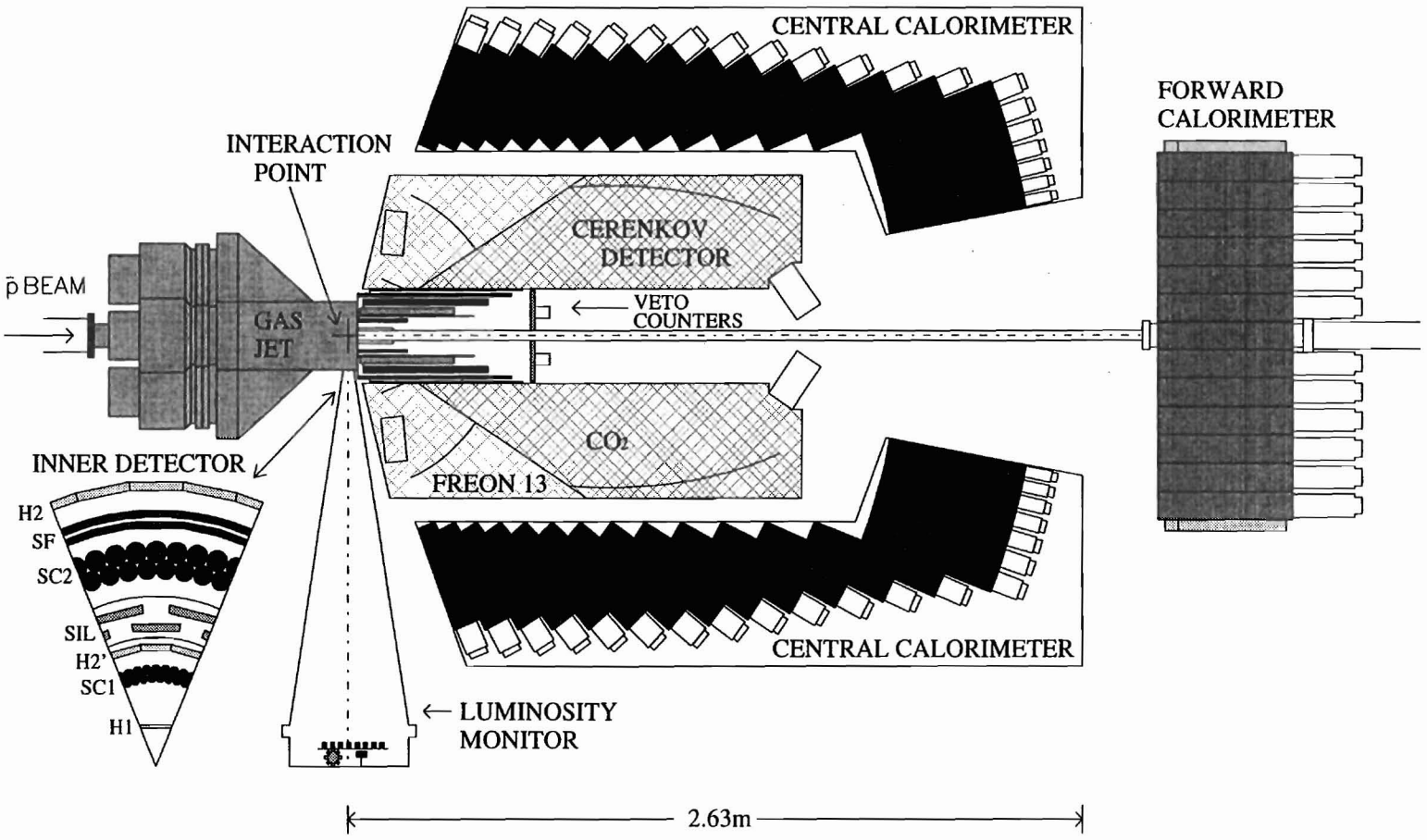


Figure 1. The mass plots indicate that FOCUS is reconstructing charm signals. Each of the samples of $K^-\pi^+\pi^+$, $K^-\pi^+$, and $K^-\pi^+\pi^-\pi^+$, have the same significance of separation cut of $l/\sigma \geq 5$.

E835 EQUIPMENT LAYOUT



E-835 / E-760 (Cester) Investigation of the Formation of Charmonium States Using the Antiproton Accumulator Ring

UC/Irvine, Fermilab, INFN/Ferrara (Italy), Ferrara (Italy), INFN/Genova (Italy), Genova (Italy), Northwestern, INFN/Torino (Italy), Torino (Italy)

Status: *E-760 - Data Analysis*
E-835 - Data-Taking

Experiment E-835 is a continuation of the studies of charmonium states formed in $\bar{p}p$ collisions performed in E-760. The experiment will take data during the 1996/97 fixed-target run. The aims of this run include

a) a precision determination of the mass and total width of the η_c and of the product of the branching fractions $B(\eta_c \rightarrow \bar{p}p) \times B(\eta_c \rightarrow \gamma\gamma)$;

b) the confirmation of the $^1P_1$ signal and a more precise determination of the $^1P_1$ parameters;

c) a search for the η_c' and determination of its mass and width;

d) the determination of the mass and total width of the χ_0 and of the products of the branching fractions $B(\chi_0 \rightarrow \bar{p}p) \times B(\chi_0 \rightarrow \gamma\gamma)$ and of $B(\chi_0 \rightarrow \bar{p}p) \times B(\chi_0 \rightarrow J/\psi + \gamma)$; and

e) the search for the $^3D_2$ and $^1D_2$ charmonium states.

The experiment will also measure the angular distributions in radiative decays of the χ_1 and χ_2. The studies on the spectroscopy of light-quark states which decay to all photons will continue concurrently with the main charmonium topics.

Based on our experience in E-760, an integrated luminosity of about 200 pb^{-1} is required and several improvements to achieve this have been implemented. To produce the required instantaneous luminosity, the density of the gas-jet target has been increased by lowering its operating temperature to ~23° Kelvin. Improvements in the antiproton accumulation rate and in the Antiproton Source itself will allow us to use antiproton beams up to 100 mA. A new set of inner tracking devices has been built. It includes new straw-chambers, a new hodoscope, a silicon system and two planes of scintillating fibers read out with VLPC's. The electromagnetic calorimeters remain and shaping circuits have been implemented to avoid problems from pile-up. A new data acquisition and online filtering system capable of handling the increased data rate has been implemented under the DART umbrella.

E-760 Publications

Precision Measurements of Charmonium States Formed in $\bar{p}p$ Annihilation, T. A. Armstrong et al., Phys. Rev. Lett. 68, 1468 (1992).

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Observation of the $^1P_1$ State of Charmonium, T. A. Armstrong et al., Phys. Rev. Lett. 69, 2337 (1992).

Measurement of the J/ψ and ψ' Resonance Parameters in $\bar{p}p$ Annihilation, T. A. Armstrong et al., Phys. Rev. D47, 772 (1993).

The Proton Electromagnetic Form Factors in the Time-Like Region from 8.9 to 13.0 GeV^2, T. A. Armstrong et al., Phys. Rev. Lett. 70, 1212 (1993).

Measurement of the $\gamma\gamma$ Partial Width of the χ_2 Charmonium Resonance, T. A. Armstrong et al., Phys. Rev. Lett. 70, 2988 (1993).

Study of the Angular Distribution of the Reaction $\bar{p}p \rightarrow \chi_2 \rightarrow J/\psi\gamma \rightarrow e^+e^-\gamma$, T. A. Armstrong et al., Phys. Rev. D48, 3037 (1993).

Evidence for η-η Resonances in Antiproton-Proton Annihilations at $2950 < \sqrt{s} < 3620$ MeV, T. A. Armstrong et al., Phys. Lett. B307, 394 (1993).

Production of the f2 (1520) Resonance in Antiproton-Proton Annihilations at $\sqrt{s}$=2980 and 3526 MeV, T. A. Armstrong et al., Phys. Lett. B307, 399 (1993).

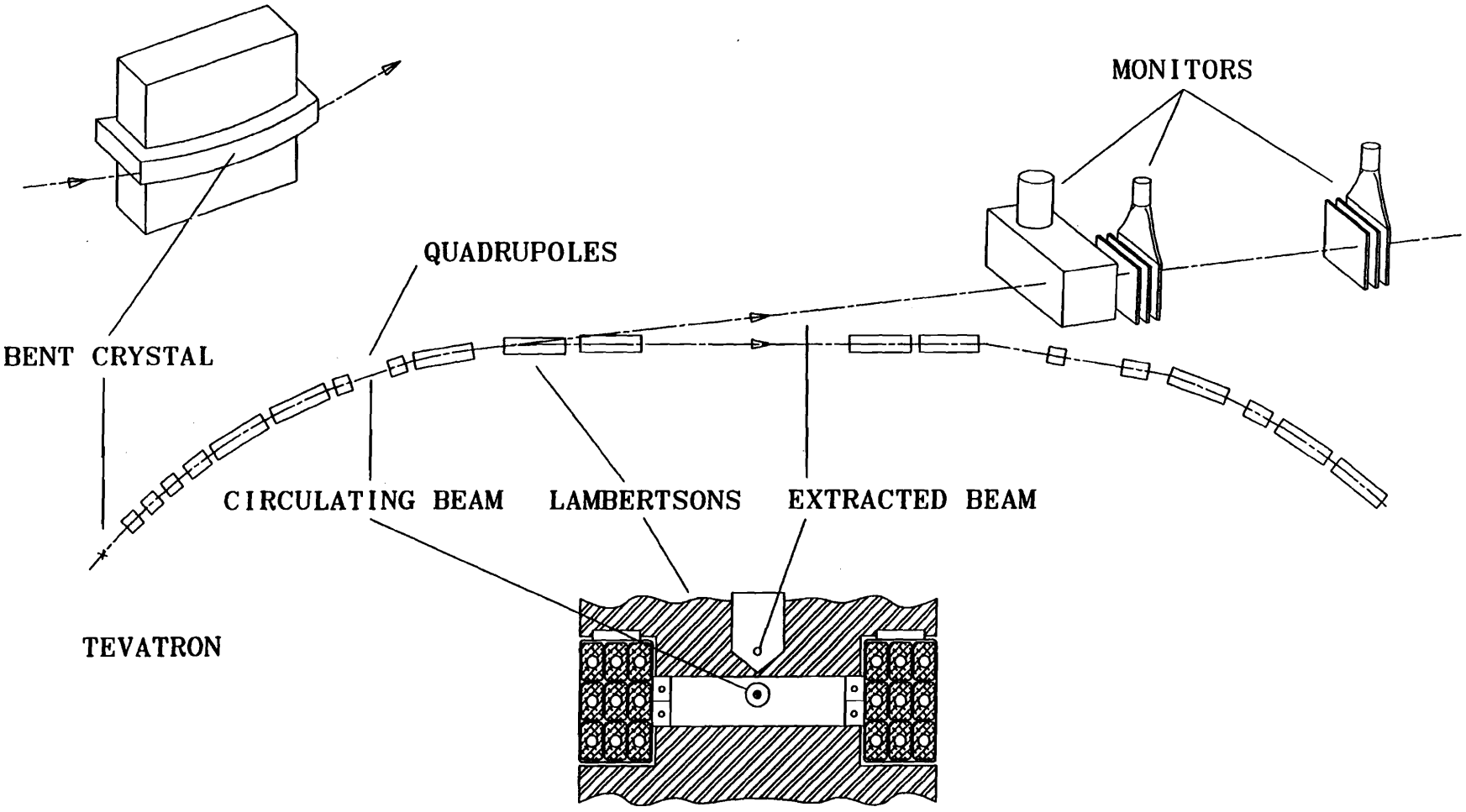
Study of the η_c (1^1S_0) State of Charmonium Formed in $\bar{p}p$ Annihilations and a Search for the η_c' (2^1S_0), T. A. Armstrong et al., Phys. Rev. D52, 4839 (1995).

Precision Measurements of Antiproton-Proton Forward Elastic Scattering Parameters in the 3.7 to 6.2 GeV/c Region, T. A. Armstrong et el., Phys. Lett. B385, 479 (1996).

Observation of the Radiative Decay J/$\psi \rightarrow e^+e^-\gamma$, T. A. Armstrong et al., Phys. Rev. D54, 7067 (1996).

Measurement of Branching Ratios $\psi' \rightarrow e^+e^-$, $\psi' \rightarrow J/\psi\pi\pi$, and $\psi' \rightarrow J/\psi\eta$, T. A. Armstrong et al., Phys. Rev. D55, 1153 (1997).

FERMILAB E853
CRYSTAL EXTRACTION
C0 LONG STRAIGHT SECTION



E-853 (Murphy) Test of Low Intensity Extraction from the Tevatron Using Channeling in a Bent Crystal

ANL, UCLA, Fairfield, Fermilab, IHEP/Protvino (Russia), JINR (Russia), New Mexico, PNPI (Russia), Southwestern Med. Center, SUNY/Albany, Texas/Austin, Vanderbilt, Virginia

Status: *Data Analysis*

E-853 is a study of the feasibility and efficiency of extracting a beam from the halo of the Tevatron using channeling in a bent silicon crystal. It has also tested the effectiveness of bent crystals as halo scrapers for collider experiments. The motivation of the experiment was to apply crystal extraction to TeV-range accelerators. The data-taking phase of the experiment has been completed. The experiment was a distinct success, demonstrating that a robust beam could be extracted parasitically with no consequential impact on the collider experiments.

Characteristically, E-853 removed 10^{-7} of the circulating protons in the accelerator each second (about 10^5 protons/sec). The luminosity lifetime was approximately 18 hours during the run. The above extraction rate corresponds to a much longer proton beam intensity lifetime so that the luminosity lifetime during these extraction experiments was almost unchanged.

The Tevatron was a good test bed for studies of crystal extraction since it is superconducting, a collider, operates at high energy, and had collider experiments in operation. These features offered a distinct advantage over a related crystal extraction experiment at CERN (RD22).

E-853 was carried out in the 1995-96 time period in the C0 straight section, the normal location of the proton abort line. During collider runs, the abort line is not used at 900 GeV, so one kicker magnet was replaced by a bent crystal (see the figure). The crystal was positioned to the outside of the beam with an upward curvature of 640 μrad to deflect beam halo into the field-free region of the Lambertson magnets. The crystal was mounted in the B48 straight section at the upstream end of a 1-m beam pipe with articulating bellows which served as a precision goniometer. Scintillators in the extraction line monitored the extracted beam. A CCD camera imaging a fluorescent flag was also mounted in the line. Since the C0 abort line was used for disposing of 150 GeV protons during Tevatron injection, the detectors in the line retracted when the Tevatron was not in a 900 GeV store. There were also monitors at the crystal location to measure the interaction rate of the circulating protons with the crystal.

During this run we demonstrated extraction of 900 GeV protons (obviously the highest energy at which channeling has been observed). The channeling extraction efficiency was studied in different situations with

several techniques. Beam was extracted in a few turns (kick mode) and with natural, noise-driven, and luminosity-driven diffusion (diffusion mode). Multiple crystal pass effects were observed and found to be significant. The technique has proved to be robust and crystal alignment was reproducible. It should be emphasized that significant beam intensities were extracted. On the order of 0.1 MHz can be extracted without violating CDF or D0 loss limits. Several interesting accelerator phenomena have been illuminated in the course of these studies. Two simulation models are in use to model channeling and accelerator effects.

We are now in the process of analyzing these studies to refine the efficiency measurements, investigate luminosity-driven diffusion, and follow some of the interesting accelerator phenomena. We believe the current system could be used as an active scraper in the Tevatron to diminish distributed radioactivity, and as a bunch eliminator when coupled with the E17 kicker. The technique could also be used to extract a parasitic 0.1 MHz beam to the 900 GeV areas during Collider operation.

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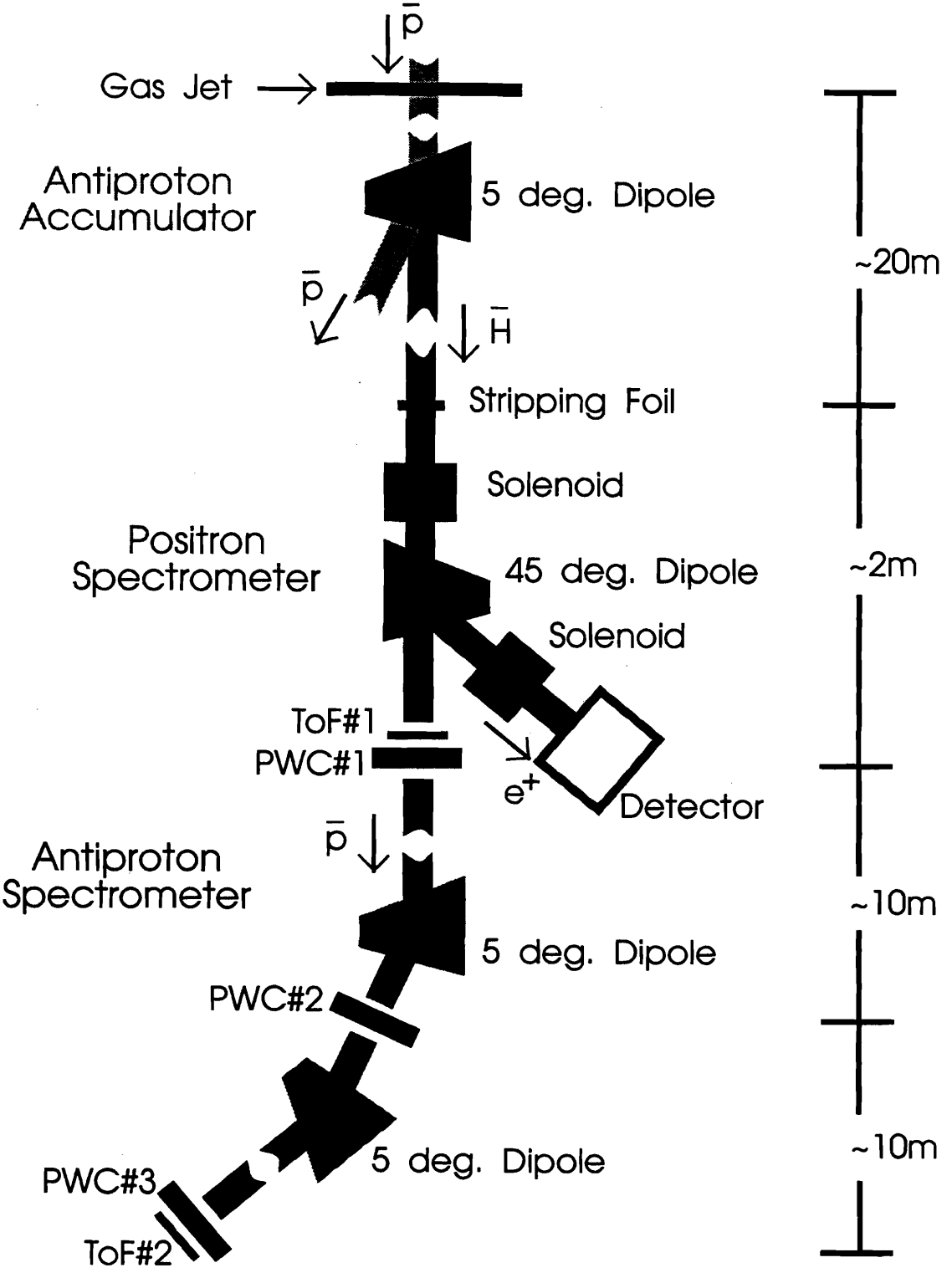
E-862


$\bar{p}$
Gas Jet
Antiproton
Accumulator
5 deg. Dipole
$\bar{p}$
$\bar{H}$
Stripping Foil
Solenoid
Positron
Spectrometer
45 deg. Dipole
Solenoid
ToF#1
PWC#1
e^+
Detector
$\bar{p}$
Antiproton
Spectrometer
5 deg. Dipole
PWC#2
5 deg. Dipole
PWC#3
ToF#2
~20m
~2m
~10m
~10m

E-862 (Christian) Search for Antihydrogen in the Reaction $\bar{p}p \rightarrow \bar{H}pe^-$

UC/Irvine, Fermilab

Status: *Data-Taking*

The goal of this experiment is the detection of a sample of antihydrogen atoms – the bound state ($\bar{p}e^+$). This will be the first element ever constructed entirely out of antimatter. A source of antihydrogen atoms is needed to compare antihydrogen with hydrogen spectroscopy, to search for interactions that violate CPT.

A fast antiproton passing by a stationary proton will generate electron-positron pairs; occasionally a positron will be created in a bound instead of a continuum state about the antiproton and form antihydrogen. The cross section for this process is 3.8 pb for an antiproton momentum of 6 GeV/c. Experiment E-682 runs parasitically on experiment E-835, which will integrate a sample of 200 pb^{-1} in a study of $\bar{p}p$ annihilation in a hydrogen gas jet; the integrated luminosity will produce a sample of 700 antihydrogen atoms.

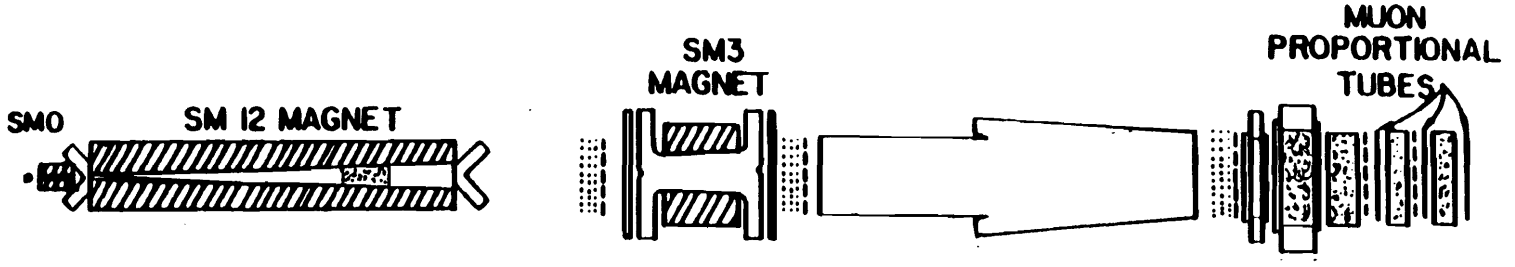
Antihydrogen atoms emerge from the gas jet with the same tiny momentum distribution as the cooled antiproton beam has in the Fermilab Accumulator, $\Delta p/p = 2\times10^{-4}$. Being neutral, the atoms exit the Accumulator at the first dipole magnet, A5B3, 15 m from the gas jet, and enter the E-862 beamline laid between the Accumulator and Debuncher rings in the Accumulator tunnel. At the entrance to the line the atoms strike a known 3 cm^2 spot on a 400 $\mu g/cm^2$ carbon foil, and disassociate into an antiproton and a positron of equal velocities. The momentum vector of the antiproton is known from the tune of the Accumulator ring to 2×10^{-4}, and that of the positron, which is smeared by the momentum distribution of the atomic 1s state, to 10^{-2}. The coincidence between an antiproton and a positron, appearing in such a thin ($10^{-5}\chi_0$) foil, and each with a preset and narrowly defined momentum, defines an antihydrogen event.

A spectrometer, consisting of a pair of weak solenoid lenses and a dipole magnet, separates the positron from the antiproton, filters the positron momentum to 1%, and focuses the positron onto a scintillator 2.5 cm in diameter and 1 cm thick. There the positron stops; the light output of the scintillator gives the positron's time of arrival and a measure of its kinetic energy. The scintillator is surrounded by a 4π NaI detector which detects the photons from the positron's 2γ annihilation. The whole positron spectrometer is just over 2 m long. The antiproton is undeflected by the weak fields of the positron spectrometer. Its momentum and velocity are measured in a separate spectrometer instrumented with proportional wire chambers and time-of-flight counters. The antiproton spectrometer is approximately 25 meters long, and uses two Antiproton Source magnets to provide a 10 degree bend.

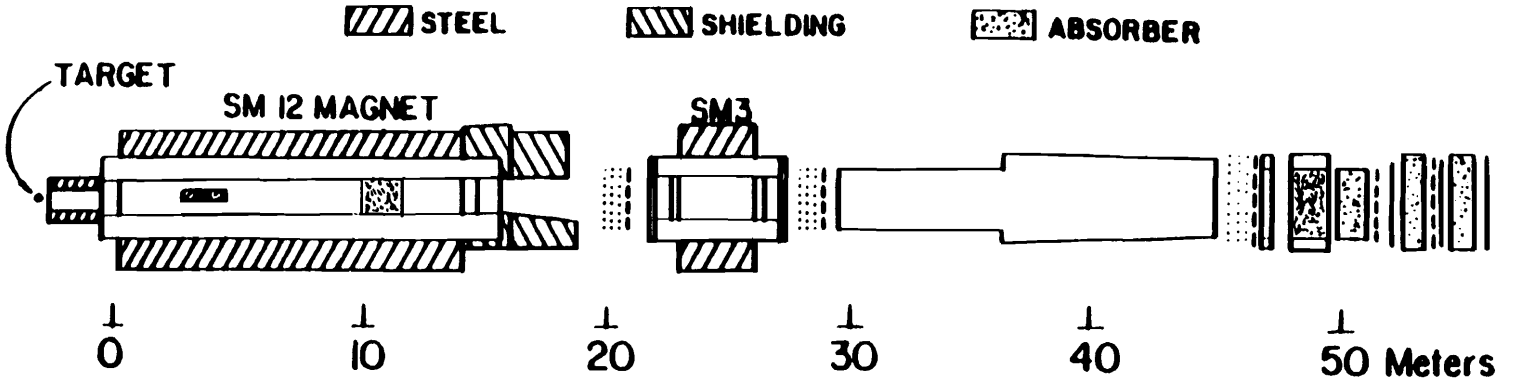
During 1996, the E-862 apparatus was installed and the experiment started data-taking. The first antihydrogen event was recorded on November 10, and by the end of the year E-862 had collected more than a dozen clean antihydrogen events with no background. The immediate goals of the collaboration are:

1. To demonstrate that the observed signal is antihydrogen by showing that the presence of the signal depends on the 10^{-5}-radiation-length foil that ionizes the anti-atoms; and

2. To determine the geometrical acceptance of the e^+ and antiproton spectrometers so that the antihydrogen production cross section can be determined.



PLAN VIEW



ELEVATION SECTION

····· DRIFT CHAMBER

----- COUNTER BANK

E-866 (McGaughey) Measurement of $\bar{d}(x) / \bar{u}(x)$ in the Proton

Abilene Christian, ANL, Fermilab, Georgia State, IIT, LANL, Louisiana, New Mexico State, ORNL, Texas A&M, Valparaiso

Status: *Data-Taking*

E-866 proposes to greatly improve the experimental knowledge of $\bar{d}_p(x)/\bar{u}_p(x)$ via precision measurement of the ratio of Drell-Yan yields from protons on protons to protons on deuterium.

$$\left.\frac{Y_{DY}^{p+p}}{Y_{DY/2}^{p+D}}\right|_{x_f>0.2} \cong 1-\left[\frac{\bar{d}_p(x)-\bar{u}_p(x)}{\bar{d}_p(x)+\bar{u}_p(x)}\right] \qquad (1)$$

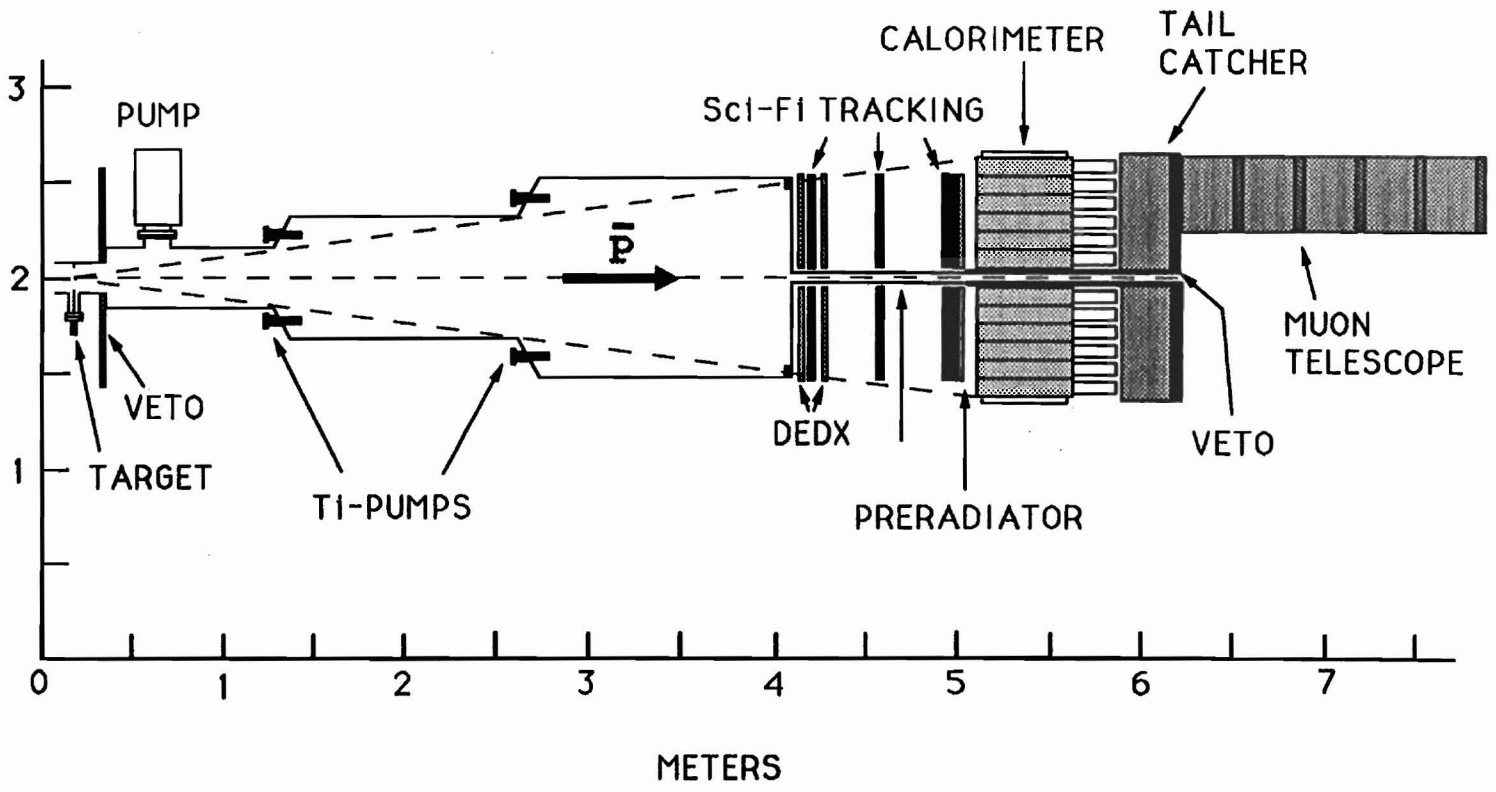
In addition to being five times more sensitive than our earlier E-772 measurement on W, it uses the lightest possible nuclei, thereby minimizing any nuclear effects that could obscure extraction of the structure function ratios. The left-hand side of Eq. (1) can be measured as a function of x with experimental systematic errors that will be, at most, ±1.5%. The range in x to be investigated is $0.04 \le x \le 0.3$. The upper limit arises because the sea distribution is a rapidly falling function of x [~ $(1 - x)^8$]. The lower limit arises from the fact that we require the Drell-Yan dilepton pair ($\mu^+\mu^-$) to have a mass appreciably greater (4 GeV) than the mass of the ψ' (3.69 GeV).

The experiment will be carried out using essentially the same equipment as E-772. This setup allowed a high statistics measurement of the ratio of Drell-Yan yields from a variety of nuclear targets. The experimental layout used in E-772 is shown in the figure. The RICH counter will not be used as muons are sufficiently well selected via their range. The three dipoles, SM0, SM12, and SM3, serve as a dimuon spectrometer. The first magnet, SM0, serves to open up the small opening angle of low-mass dimuon pairs, SM12 focuses high p_T muons into the downstream detectors, and both SM12 and SM3 are used to measure the muon momenta. A hadron absorber (e^{-13}) of Cu, C, and CH_2 blocks is placed in the gap of SM12. In this configuration, the apparatus has an energy resolution of 150 MeV at the J/ψ and 200 MeV at the Υ, and z vertex resolution is more than sufficient to reject dimuon pairs created in the beam dump.

In addition to the Drell-Yan data, high-statistics data on J/ψ and ψ' production, as well as a few thousand Υ(1S), Υ(2S) and Υ(3S) events, from H and D targets will also be obtained. The proposed experiment makes use of existing equipment and requires only three months of beam time (one month of setup and checkout, and two months of data-taking).

The installation and checkout of the E-866 spectrometer was completed during the summer of 1996. The experiment received its first 800 GeV proton beam in July. Studies and calibrations were performed until September. Production data-taking began at that time and continued through December.

By the end of 1996, E-866 achieved its proposed goals. In addition to providing a precise study of the nucleon sea asymmetry, absolute cross sections for the production of Drell-Yan, J/ψ and upsilon events will be obtained from the hydrogen and deuterium targets. Preliminary results indicate that the antiquark sea is asymmetric.


CALORIMETER
TAIL CATCHER
PUMP
Sci-Fi TRACKING
$\bar{p}$
MUON TELESCOPE
VETO
DEDX
VETO
TARGET
TI-PUMPS
PRERADIATOR
3
2
1
0
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4
5
6
7
METERS

E-868 (Geer) Search for Antiproton Decay at the Fermilab Antiproton Accumulator

UCLA, Fermilab, Michigan, Nebraska, Penn State

Status: *Data Analysis*

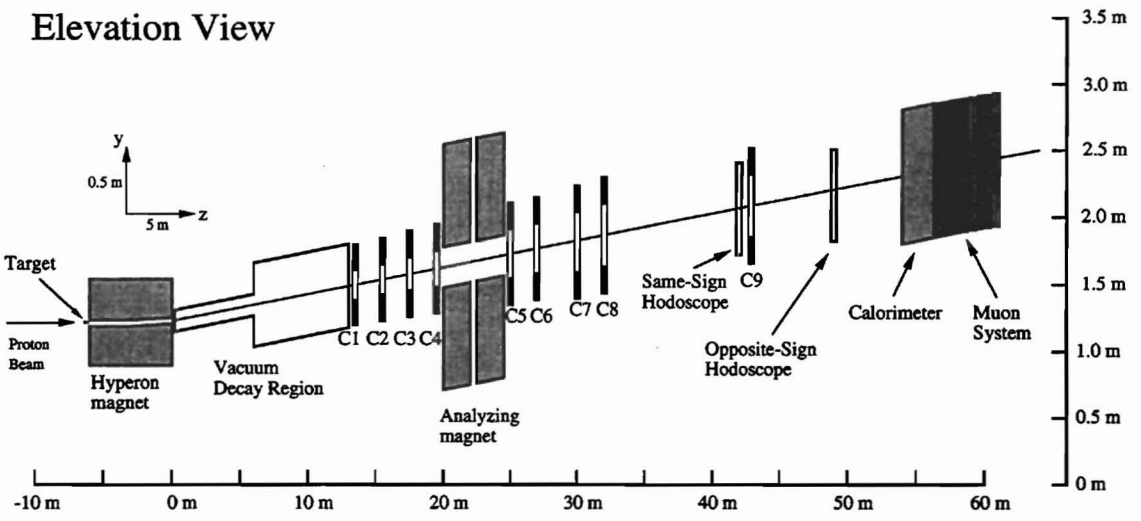
E-868 (APEX) is an experiment designed to search for antiproton decay at the Fermilab Antiproton Accumulator operating at 8.9 GeV. The CPT theorem requires that the antiproton lifetime $\tau_{\bar{p}}$ equals the proton lifetime which we know exceeds 10^{32} years. In practice we can only hope to observe antiproton decay if $\tau_{\bar{p}} << 10^{32}$ years. APEX is therefore a test of the CPT theorem and of the intrinsic stability of antimatter.

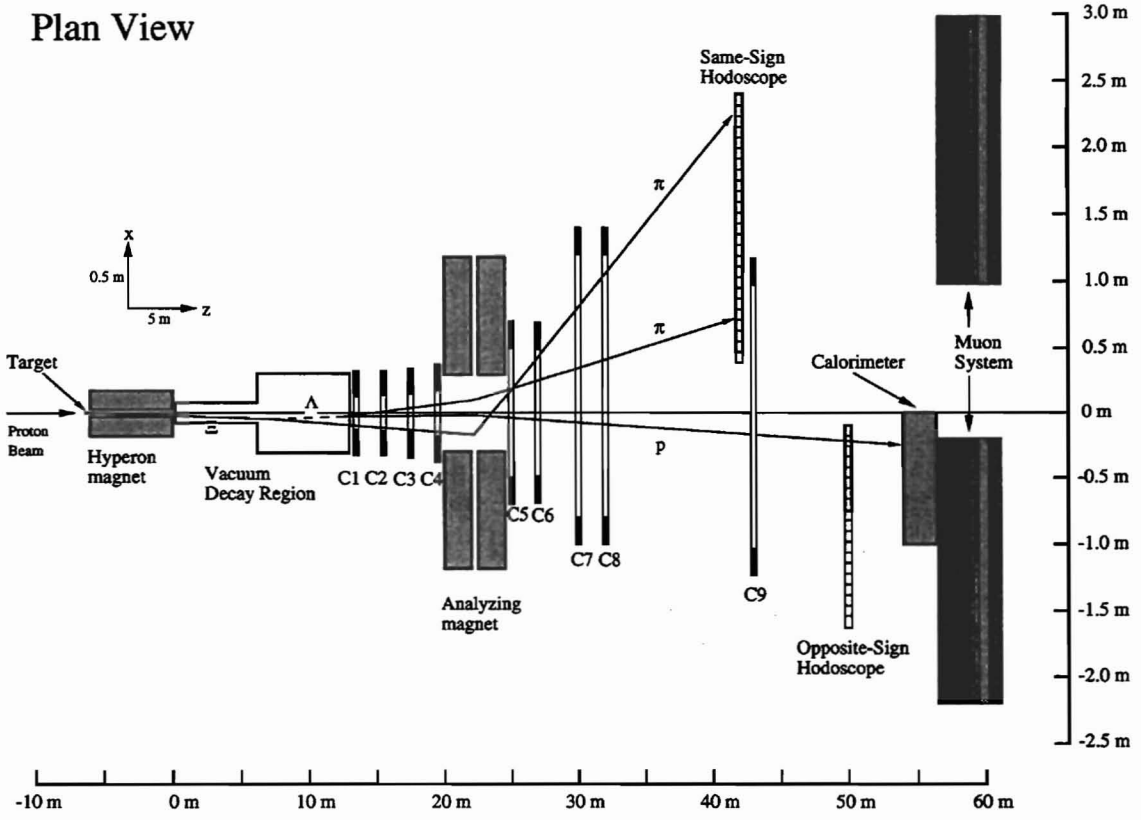
Our present experimental knowledge of the stability of the antiproton is modest. Prior to the recent T-861 test experiment, which was designed to prepare the way for APEX, the best limit on $\tau_{\bar{p}}$ came from observing ~1000 antiprotons in an ion trap for two months, which yielded $\tau_{\bar{p}} > 3$ months. The T-861 experiment at the Fermilab Antiproton Accumulator searched for explicit two-body decay modes of the antiproton containing an electron in the final state (angular momentum conservation requires that there is a final state fermion; electron, muon, or neutrino). T-861 obtained limits on several antiproton decay modes, the most stringent being $\tau_{\bar{p}}$/ BR($\bar{p} \rightarrow e^{-}\gamma$) > 1848 years at the 95% confidence level. [S. Geer et al., PRL 72, 1596 (1994)].

The APEX experiment was designed to achieve a sensitivity $\tau_{\bar{p}}$ / BR = O(10^5-10^6) years for several decay modes. The experiment was installed in the AP50 region of the Antiproton Accumulator, and took data in the period April-July 1995, during times when there were O(10^{12}) antiprotons stored and stacking was not taking place. The experiment consisted of a 3.5-meter-long decay tank, downstream of which were (i) three horizontal and three vertical scintillating-fiber tracking planes to allow reconstruction of charged tracks; (ii) dE/dx counters to distinguish between single electrons and conversion pairs, and to provide a trigger; (iii) a lead-scintillator preradiator to assist electron identification; (iv) a lead-scintillator electromagnetic calorimeter to locate electrons and photons and measure their energies; (v) a lead-scintillator tail catcher behind the calorimeter to aid electron and photon identification; and (vi) a limited-acceptance muon telescope to explore the possibility of searching for decay modes with a muon in the final state.

The experiment recorded a data sample which corresponds to a single-event sensitivity of $3 \times 10^9 \times \varepsilon$ years, where ε is the fraction of antiprotons decaying uniformly around the ring that would trigger the experiment. We expect ε to be O(10^{-3}-10^{-4}). Preliminary results from searches for $\bar{p} \rightarrow e^{-}\gamma$, $\bar{p} \rightarrow e^{-}\pi^0$, and $\bar{p} \rightarrow \mu^{-}\gamma$ have yielded lower limits for τ/B in the range 10^5-10^6 years. Further analysis is in progress.

E-871
The HYPERCP Spectrometer





E-871 (Dukes / Luk) 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), LBL, Michigan, New Mexico State, South Alabama, Virginia

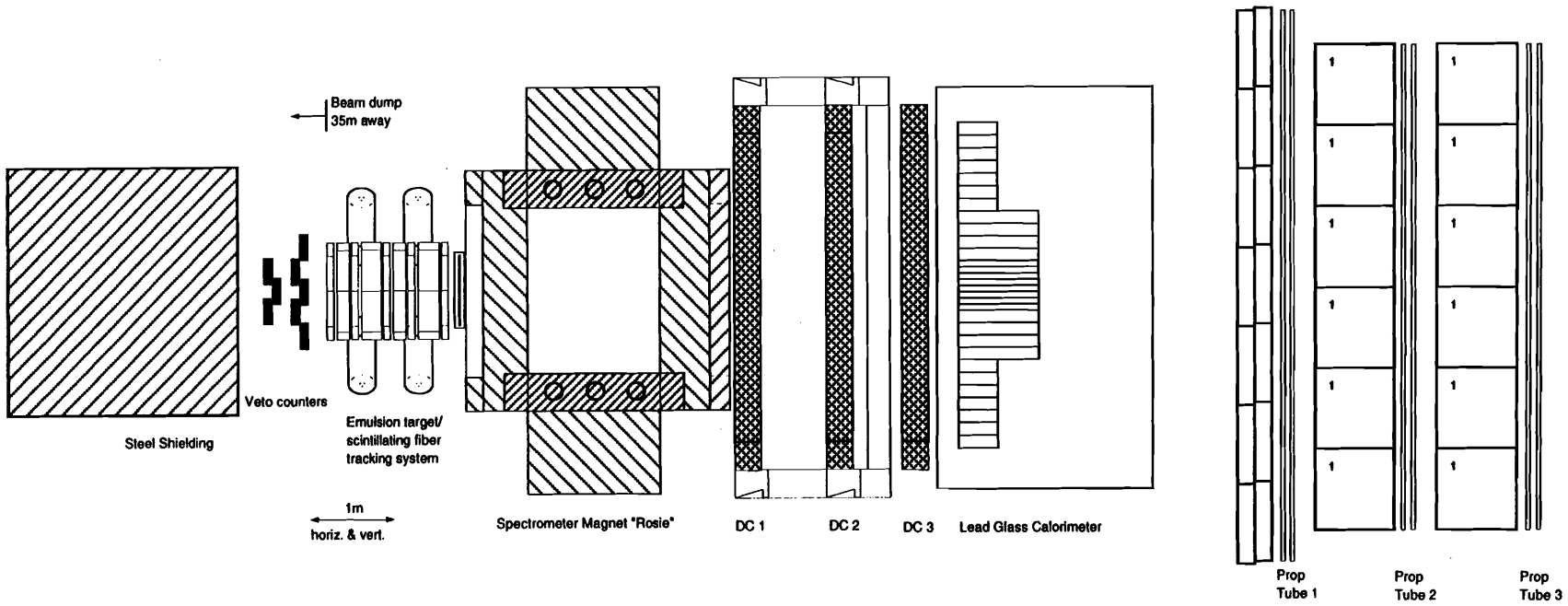
Status: *Data-Taking*

In the thirty years since the discovery of CP violation our understanding of the phenomenon has improved little despite a long series of beautiful experiments. It still remains a small peculiarity found only in the decays of the K_L. Whether CP violation is a property unique to the kaon system and whether direct CP violation exists — as predicted by the Standard Model — remain outstanding experimental questions.

Both of these important issues are addressed by E-871 which seeks to perform a high-sensitivity search for CP violation in the decay of Ξ and Λ hyperons. The signature for a CP asymmetry is a difference between the angular distributions (α parameter) of the Ξ^- and $\bar{\Xi}^+$ decay daughters or in the decay daughters of the Λ and $\bar{\Lambda}$. The two measurements are done simultaneously through the decay sequence: $\Xi^- \rightarrow \Lambda\pi^-$, $\Lambda \rightarrow p\pi^-$ and its CP conjugate. The goal of the experiment is a sensitivity in the difference of the α parameters of less than 10^{-4}, three orders of magnitude better than the current experimental limit. Standard Model predictions range from about 5×10^{-4} to about an order of magnitude lower. The CP violation is manifestly direct, or $|\Delta S| = 1$.

The design of the E-871 spectrometer is based on twenty years of experience in doing hyperon physics at Fermilab. The apparatus is simple and has a much higher rate capability than previous hyperon experiments. A target followed by a curved collimator embedded in a dipole (hyperon) magnet produces a momentum and charge-selected secondary beam. Following an evacuated decay region is a wire chamber spectrometer composed of nine high-rate narrow pitch (1.0 mm – 2.0 mm) wire chambers separated by a dipole spectrometer magnet. There is a total of 20,000 wires. The magnetic fields of the hyperon and spectrometer magnets are periodically reversed to switch between Ξ and $\bar{\Xi}^+$ data-taking modes. A simple first-level trigger requiring a left-right charged particle coincidence at the rear of the spectrometer selects events with an anticipated 10% Ξ yield. A hadronic calorimeter on the proton side makes that part of the trigger muon-blind. Fast front-end latches and a small event size allow an event rate of up to 100,000 per spill second with minimal dead time. A parallel data acquisition system based on the successful E-791 model builds the events and writes them to tape. We expect to log approximately 100 billion events. A muon detector at the rear of the spectrometer allows the search for rare and forbidden decays of charged hyperons and kaons.

E-872 Spectrometer Plan View



E-872 (Lundberg / Paolone) Measurement of τ Production from the Process $\nu_\tau + N \rightarrow \tau$

Aichi (Japan), Athens (Greece), UC/Davis, Chonnam Nat'l. (Korea), Fermilab, Gyeongsang (Korea), Kobe (Japan), Minnesota, Nagoya (Japan), Osaka Sci. Ed. Inst. (Japan), South Carolina, Toho (Japan), Tufts, Utsunomiya (Japan)

Status: *Data-Taking*

The direct observation of the tau neutrino through its charged-current interaction, in the manner of the ν_e and ν_μ discoveries, waits to be made. Since 1975 the desire to detect the ν_τ has been strong, but the proposed experiments were technically challenging, required large resources and relied on poorly known charm production cross-sections. In retrospect, using what we know now, it is clear that these efforts were not optimized to see ν_τ interactions. Today, the ν_τ production uncertainties are small, and using ultra-high resolution emulsions coupled with the technology of 1994 we can be confident in E-872 of measuring such an experimentally demanding process. There is compelling experimental evidence that a third neutrino exists, but since the ν_τ is the focus of many theoretical and experimental studies its direct confirmation is due.

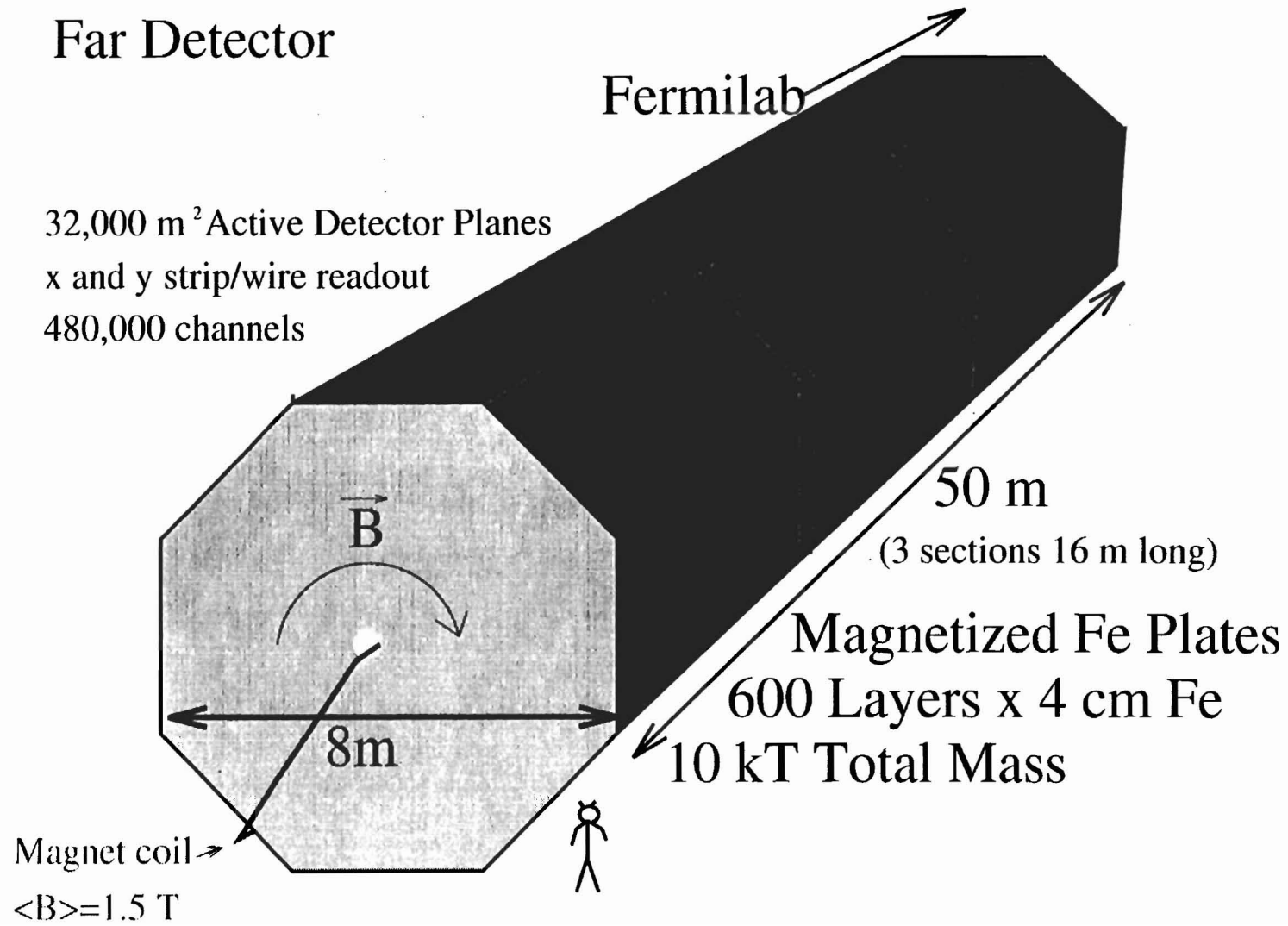
Experimental observation of ν_τ charged-current interactions requires high proton intensities at high energy and extremely good detector resolution. An 800 GeV primary proton beam from the Fermilab Tevatron in conjunction with a high-resolution active target meets these requirements. In E-872 we will produce tau neutrinos in a beam dump and directly measure ν_τ charged-current interactions by observing τ production and subsequent decay in an emulsion target. This is the same technique currently being used to search for the $\nu_\mu \rightarrow \nu_\tau$ oscillations in the CERN CHORUS experiment and is also proposed for the Fermilab Main Injector experiment, E-803. Since E-872 will see the signal the oscillation experiments *hope* to observe, we view E-872 as an important step in addressing the exciting question of neutrino mass and mixing.

Tau neutrinos are produced predominantly from the leptonic decay of the D_s meson in the decay sequence $D_s \rightarrow \tau + \nu_\tau$, $\tau \rightarrow \nu_\tau$. In this experiment D_s mesons will be produced by 800 GeV protons interacting in a tungsten beam dump. Both the D_s and the daughter τ will decay in the dump, each decay producing one ν_τ. The number of ν_τ per incident proton which will be produced in the beam dump through this process is 1.5×10^{-4}. The number of ν_τ charged-current interactions that will occur per centimeter of target material is determined by the ν_τ energy and interaction cross section. Because of the energy dependence of the ν_τ cross section, the neutrinos from each of the decays ($D_s \rightarrow \tau + \nu_\tau$, and $\tau \rightarrow \nu_\tau$) have very different interaction probabilities. Their energy spectra are determined by the x_f dependence of the D_s production cross section. An effective interaction cross section of 0.42×10^{-37} cm^2 can be

used to estimate the interaction yield. Within a solid angle acceptance of ±9 mr this gives 6.5×10^{-18} ν_τ charged-current interactions per centimeter of emulsion (ρ = 3.72 g/cm^3) per proton. Taking into account all other sources of ν_τ, such as secondary production from charm, $D^\pm$ decays, B-meson decays increases this number by 14% to 7.4×10^{-18} ν_τ charged-current interactions per centimeter of emulsion per proton. Given this interaction rate, we plan to use 24 cm of emulsion and have set as a goal to accumulate 2×10^{18} integrated protons. The latter can be achieved in a 30-week running period, assuming that an intensity of 10^{13} protons per minute can be delivered at a 75% efficiency. Before fiducial volume cuts and efficiency cuts this will yield approximately 310 interactions. We estimate that cuts will reduce the sample by about 15%. Details of these yield calculations are given in the proposal.

MINOS (Main Injector Neutrino Oscillation Search)

Far Detector



E-875 (Wojcicki) Main Injector Neutrino Oscillation Search

ANL, Caltech, Columbia, Fermilab, IHEP/Beijing (PRC), IHEP/Protvino (Russia), Indiana, ITEP (Russia), JINR (Russia), Lebedev (Russia), LLNL, Minnesota, ORNL, Oxford (Great Britain), PNPI (Russia), Rutherford (Great Britain), Stanford, Sussex (Great Britain), Texas A&M, Texas/Austin, Tufts, Western Washington

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^{-2} or lower in both Δm^2 (eV^2) and $\sin^2(2\theta)$, using neutrinos produced by the Fermilab Main Injector beam and a large new detector located at the Soudan Mine in Minnesota, some 730 km away. The existing Soudan 2 detector at the same site will also contribute to these studies. 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 interpretation of all these measurements would be required for a claim of observation of neutrino oscillations.

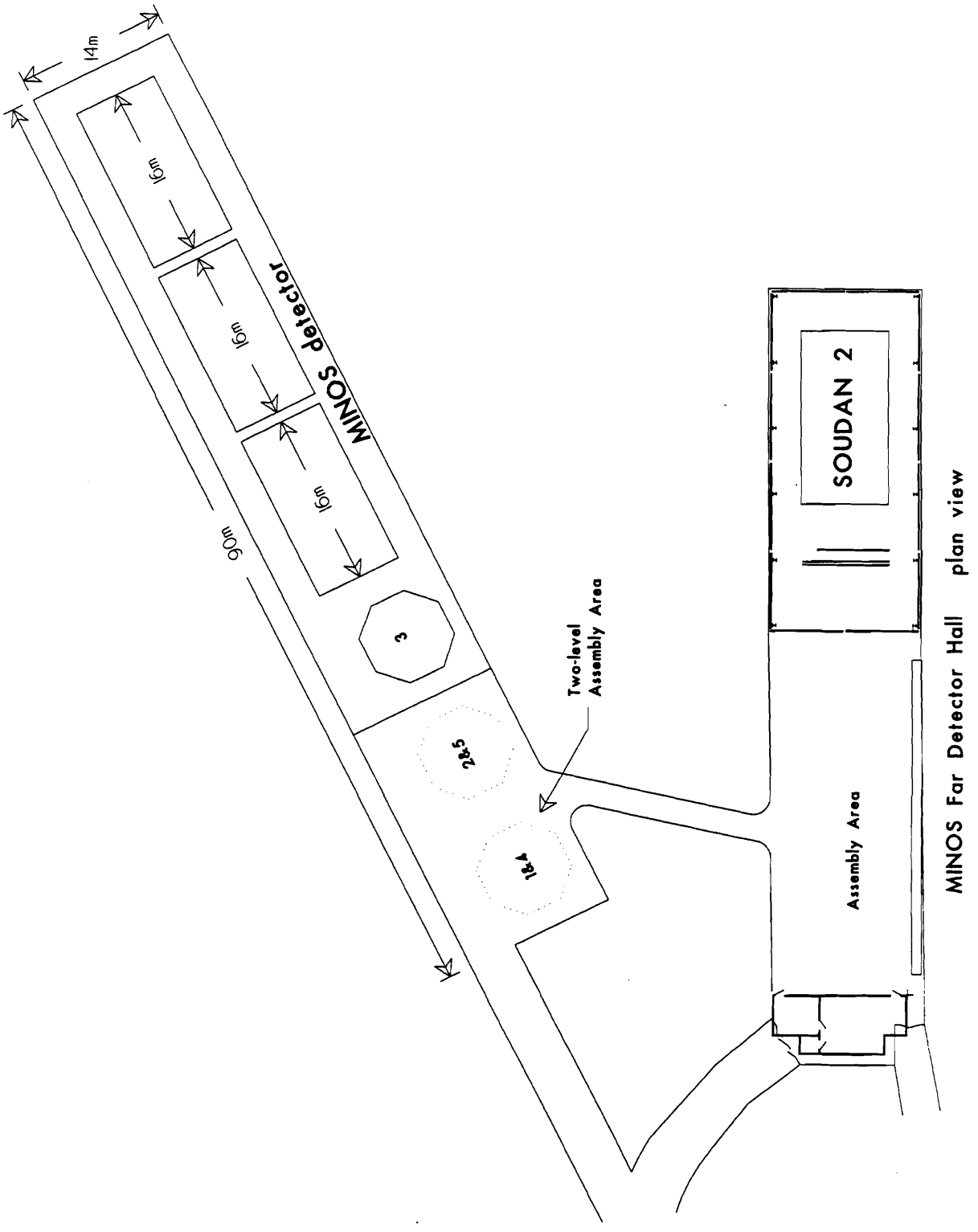
Neutrino physics presents today one of the most promising avenues to probe for extensions of the Standard Model. A priori, no fundamental reason exists why neutrinos should have zero mass or why there should be no mixing between different neutrino species. Thus, the existence of neutrino oscillations is quite plausible, maybe even likely, on theoretical grounds. The possible existence of this phenomenon has recently received some experimental support, both from the observations of a deficit of solar neutrinos and from the apparent ν_μ/ν_e anomaly in the interactions of atmospheric neutrinos observed by large underground experiments. Furthermore, many of the attractive theoretical models predict a mass hierarchy i.e., $m_{\nu e} << m_{\nu\mu} << m_{\nu\tau}$. Thus a search for oscillations into the tau mode, especially from an initial ν_μ beam, may be one of the most promising experimental approaches.

This experiment emphasizes the investigation of neutrino interactions with energies sufficiently above the tau production threshold so that the presence of $\nu_\mu \rightarrow \nu_\tau$ oscillations, if they occur, can be convincingly demonstrated. One of the signals for $\nu_\mu \rightarrow \nu_\tau$ oscillations in our experiment relies on a measurement of ν_τ charged-current events and the subsequent tau decay. In addition, we shall perform several independent measurements which will be sensitive to both $\nu_\mu \rightarrow \nu_\tau$ and $\nu_\mu \rightarrow \nu_e$ oscillations. Most of our tests will rely on near-detector/far-detector comparisons in order to minimize uncertainties due to imperfect knowledge of the neutrino beam energy spectrum and the detector responses.

One of the design goals of our experiment is to provide the maximum possible flexibility to respond to future improvements in our knowledge of neutrino oscillations. For example, in collaboration with Fermilab, we are designing a neutrino beamline that is capable of operating in several modes. The two extremes would be a wide-band beam which maximizes neutrino flux at the far detector and a narrow-band beam, which has lower flux, but is concentrated near one energy. Such flexibility would allow us to respond in an appropriate way to whatever may be the physics situation at the time of the startup of the experiment.

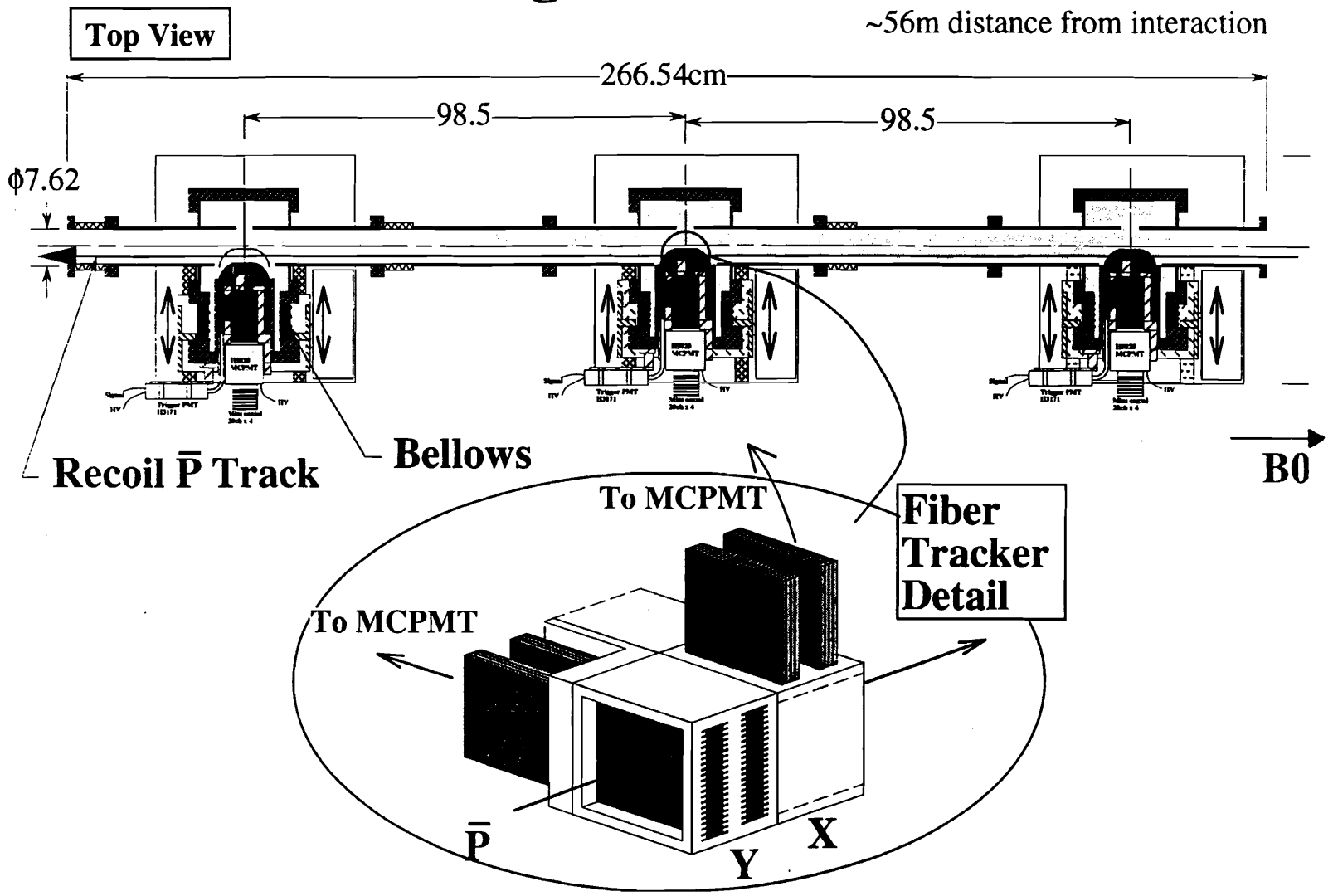
The actual features of the far detector are still under discussion. Our goal is to define an optimum detector in the fall of 1997, based on the results of an extensive R&D effort, encompassing both hardware and simulations. The general characteristics of the far detector will be: a total mass of about 10 kT, magnetized iron plates, 8 m in transverse dimensions and 2 to 4 cm thick, with active detector planes between the iron plates. Proportional tubes and scintillator are under consideration for the active detector technology. We estimate that about 30,000 charged current ν_μ interactions (in the absence of oscillations) would be detected in the far detector annually in a wide band beam. In addition, the existing Soudan 2 detector (about 1 kT in mass) will allow us to study neutrino interactions with lower statistics but with finer granularity.

The currently existing laboratory in the Soudan Mine will be expanded to house the new detector, as shown in the following figure. It is estimated that data-taking can commence in the year 2001.



MINOS Far Detector Hall plan view

Roman Pot Arrangement



E-876 (Albrow) Hard Diffraction Studies in CDF

Academia Sinica (Taiwan), ANL, Bologna (Italy), Brandeis, UCLA, Chicago, Duke, Fermilab, Frascati (Italy), Harvard, Hiroshima (Japan), Illinois, Inst. of Particle Phys. (Canada), Johns Hopkins, KEK (Japan), LBL, MIT, Michigan, Michigan State, New Mexico, Osaka City (Japan), Padova (Italy), Pennsylvania, Pisa (Italy), Pittsburgh, Purdue, Rochester, Rockefeller, Rutgers, Texas A&M, Texas Tech, Tsukuba (Japan), Tufts, Waseda (Japan), Wisconsin, Yale

Status: *Data Analysis*

The purpose of this experiment is to search for and study events in which an antiproton is diffractively scattered, i.e. by pomeron exchange, and a hard interaction takes place at the pomeron-proton vertex. Such interactions would be characterized by the production of high E_T jets, W or Z, or heavy flavors (b or c). Measurements of these jets or heavy particles in the CDF detector, together with existing knowledge of the structure of the proton, give information about the parton structure of the pomeron, if that concept is meaningful. From an extensive set of measurements one can derive separately the gluon and quark distribution functions for different values of t, the (negative) squared mass of the pomeron. This is complementary to studies with photon-pomeron collisions at HERA (ep); inconsistencies are expected by some theorists who point out that the pomeron is not like a normal (time-like) hadron. Whatever it is, it plays a major role in hadronic interactions and these experiments should shed some light on its nature.

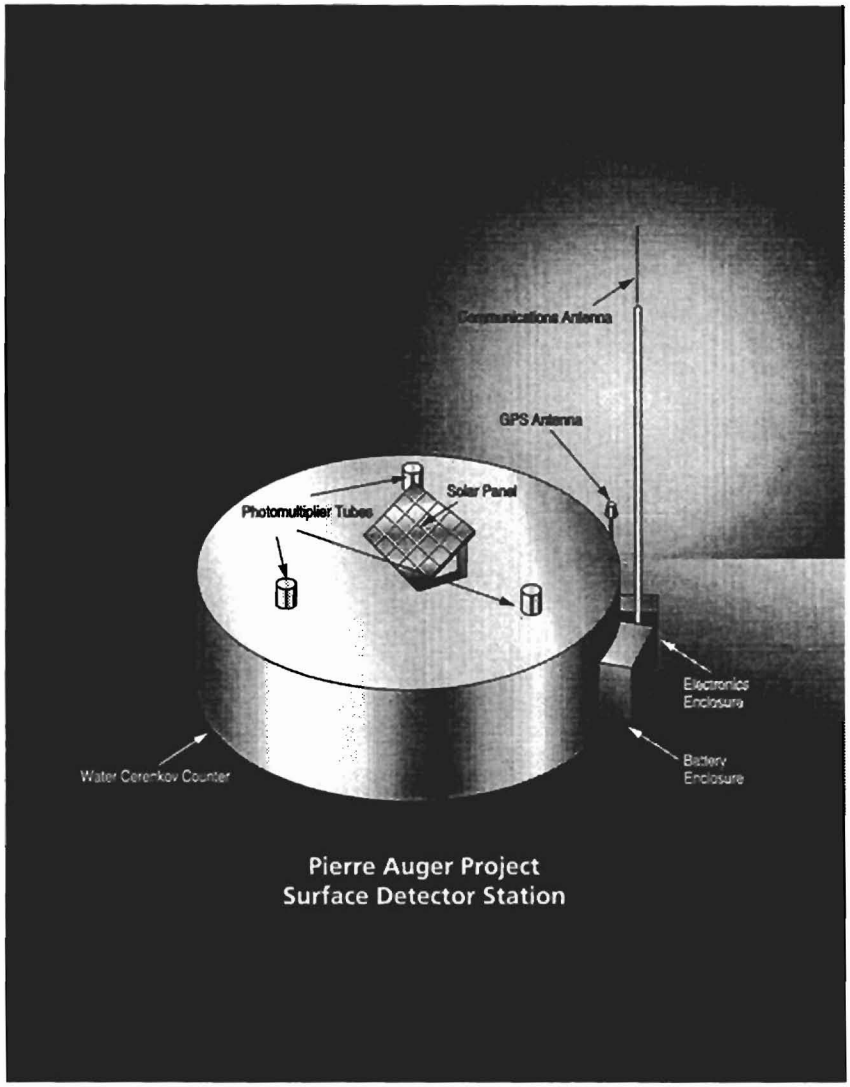
Diffractively scattered antiprotons have very small angles with respect to the outgoing beam and stay in the beam pipe. Those that have lost a small fraction (say 5%) of their energy in exciting the proton to a few hundred GeV (the pomeron-proton C.M. energy) are dispersed horizontally by the Tevatron dipoles. Small detectors are placed close to the beams, 57 m from the collision point, to measure these antiprotons. The detectors are hodoscopes of scintillating fibers, in x and y orientations, backed up by a square 2 cm x 2 cm trigger counter. There are three such detectors separated by 1m mounted in vacuum pots ("Roman Pots") which enable the detectors to move in to within about 7 mm of the circulating beam while they remain at atmospheric pressure and accessible. The scintillating fibers are read by multichannel (80 channels) PMTs, and the hodoscopes have a resolution of about 100 microns. Together with the interaction point (vertex) from the CDF detector this gives a momentum resolution of approximately 0.2%. The t-coverage depends on the diffractive mass; it extends from t = 0 to t = -2 GeV^2 at M = 360 GeV when $\sqrt{s}$ = 1800 GeV.

The diffractive events should also have a rapidity gap close to the antiproton, i.e. an angular region devoid of particles. Many diffractive studies use this gap alone as a signature for diffraction. We added two small calorimeters, called "microplugs," around the beam pipe in CDF to be able to

correlate the gap information with the scattered antiproton. The microplugs are octagonal cylinders, with 8 lead/scintillator cells. The full CDF detector is used to measure central jets, heavy flavors, Drell Yan and W/Z produced diffractively and also to search for new phenomena.

Data were taken in December 1995 - February 1996, and high E_T jets and some W events have been observed. These are now being analyzed in detail.

E-881



Conceptual design for the Water Cerenkov detector for use in the surface array.

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

Fermilab
(and institutions in 19 countries)

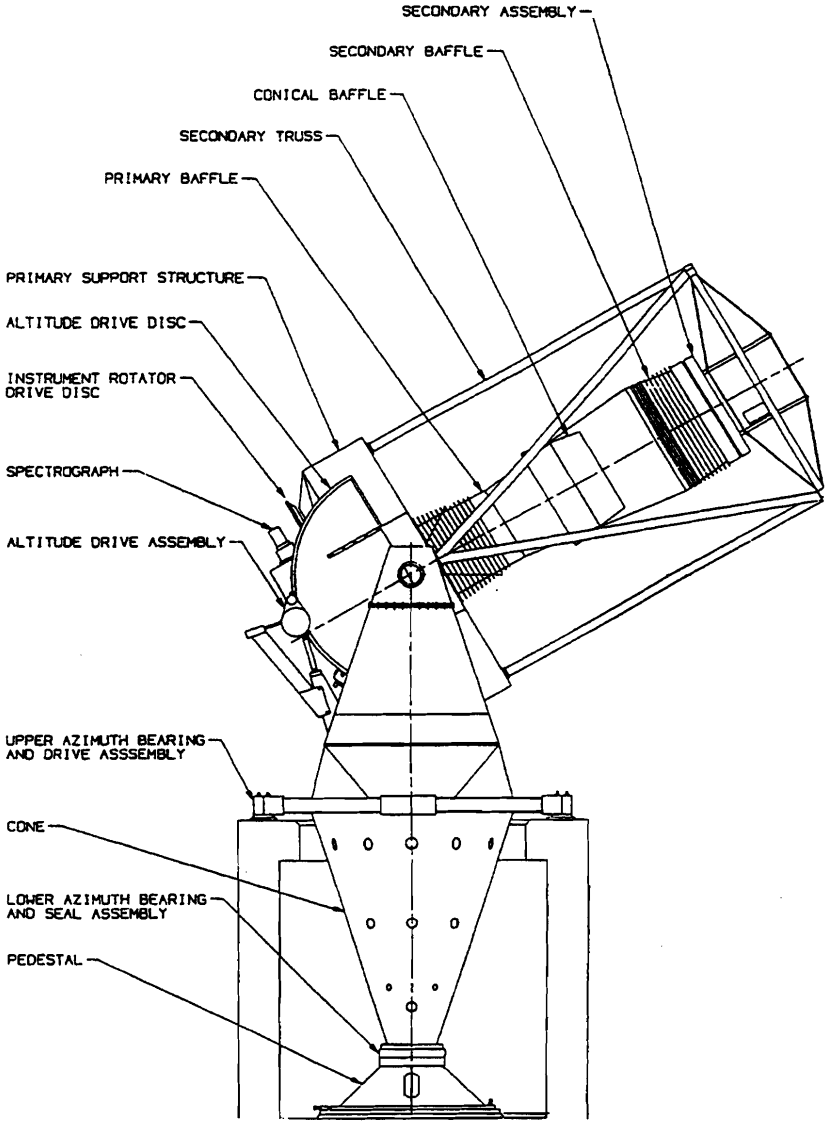
Status: *No Data Yet*

Over the past thirty years cosmic ray air shower detectors have recorded a number of events with energies greater than 10^{20} eV. In 1991, the collaboration operating the Fly's Eye atmospheric fluorescence detector in Utah recorded an event for which the primary energy was calculated to be $3.2\pm 0.9\times10^{20}$ eV (51 joules). Two years later, the AGASA air shower array at Akeno, Japan, observed an event with energy of $(1.7\text{-}2.6)\times10^{20}$ 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, attenuation lengths 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 can have these energies only 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 to make a detailed study of cosmic rays at the highest energies. Two air shower detectors are proposed, one to be placed in the Northern Hemisphere and one in the Southern Hemisphere. Each installation will consist of an array of about 1600 particle detectors spread over 3000 km^2. Each installation will also have three atmospheric fluorescence detectors viewing the volume above the surface array. These two air shower detector techniques working together form a powerful instrument for the proposed research. The objectives of the Pierre Auger Project are to measure the arrival direction, energy, and mass composition of 90 events per year above an energy of 10^{20} eV and 9000 events per year above 10^{19} eV. A collaboration has been formed and preferred sites chosen. The goal is to have the Pierre Auger Cosmic Ray Observatory in operation by 2002. At present, funds are being sought for the project.

Fermilab could play an important role in the Auger Project. In addition to scientific participation, Fermilab could bring to bear its substantial experience with projects of this scope. An R&D program is currently underway with other collaborators to develop the water Cerenkov surface detector station design including tank design, phototube specification and phototube base development. The project management for the Auger Project will be 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 (Kron) Sloan Digital Sky Survey

Fermilab
(and Chicago, Inst. for Adv. Study, Japan Promotion Group (Japan), Johns Hopkins, Princeton, US Naval Observatory, Washington)

Status: *No Data Yet*

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 redshifts are to be obtained to a uniform flux limit of galaxies 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 will soon be undergoing commissioning tests at Apache Point Observatory, 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 5 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.

Fermilab role:

The project will produce at least 10 Terabytes of data in five years of operation (each long, clear night will yield 200 GBy of raw data). It is Fermilab's primary responsibility on this project to handle this volume of data. The implementation of the end-to-end data system has been assigned to Fermilab. This includes design and construction of the data acquisition system (on the mountaintop at Apache Point), and the specification and responsibility for the production system (in the Feynman Computing Center at Fermilab). The scientific coding is being undertaken by scientists at the participating institutions (including Fermilab). The design and implementation of the code management system, the promulgation of standards, and the computing framework in which the scientific code runs, are also Fermilab's responsibility.

In addition to the computing infrastructure, Fermilab has also been an active contributor to a number of other aspects of the project, including development of the Monitor Telescope subsystem; development of a device that maps which optical fiber is plugged into which location on the focal-plane plate; implementation of the telescope control system; design and implementation of the interlocks system; and the specification of auxiliary mechanical handling fixtures.

Management:

The Apache Point Observatory is managed by the Astrophysical Research Consortium (ARC), a group of universities originally constituted to build and operate a 3.5-meter telescope. The SDSS represents the second major telescope and project at the same site. The ARC Board oversees ARC's activities and budget. Each of the two telescope projects has its own Director, who reports to the Board on the expenditures. The SDSS has an Advisory Council to the ARC Board that oversees SDSS project activities and budget. There are three non-ARC members of the SDSS project: Fermilab, the U.S. Naval Observatory, and the Japan Promotion Group (a collaboration of several Japanese academic institutions).

The SDSS Project Director is D. G. York of The University of Chicago. The Survey Director is R. G. Kron of the Experimental Astrophysics Group at Fermilab. The Computing Coordinator is S. Kent, also of the Fermilab Experimental Astrophysics Group.

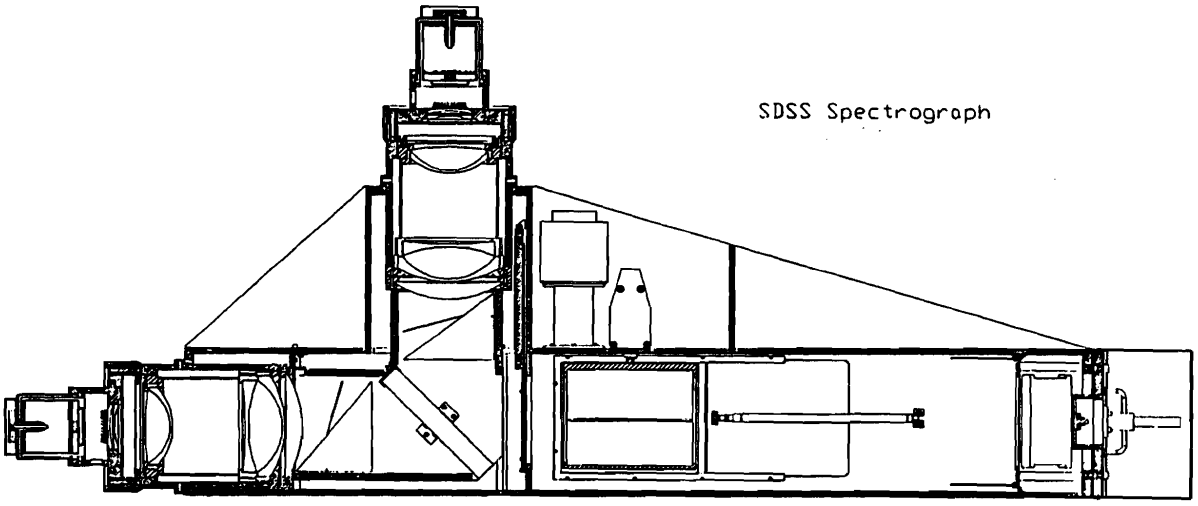


Figure 1

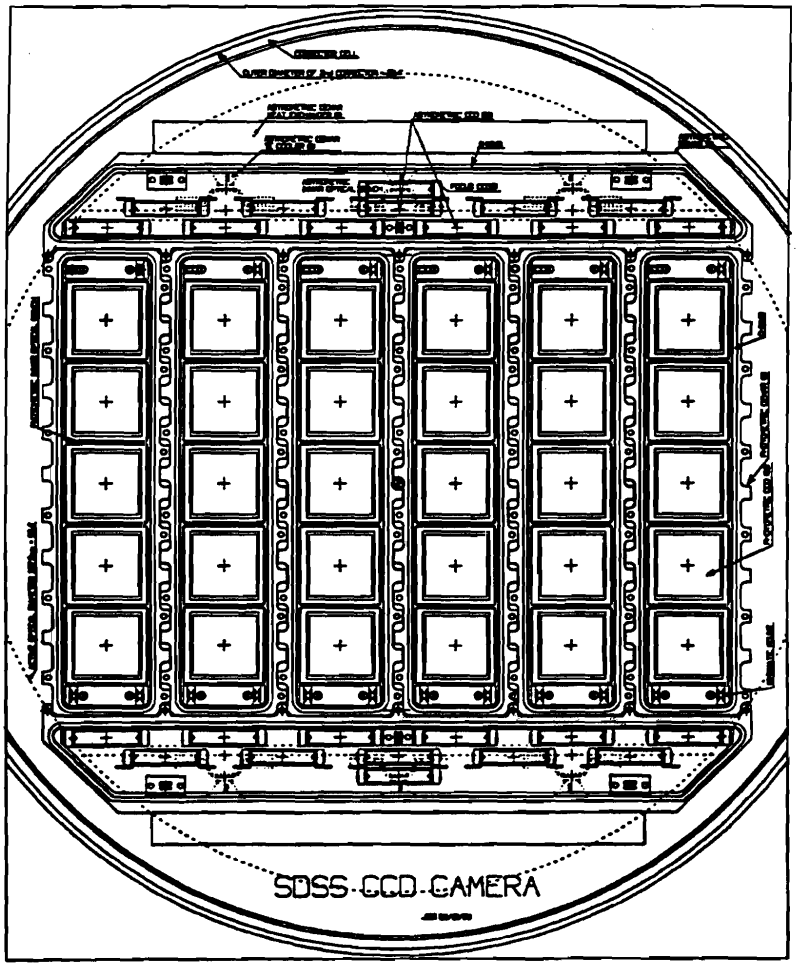
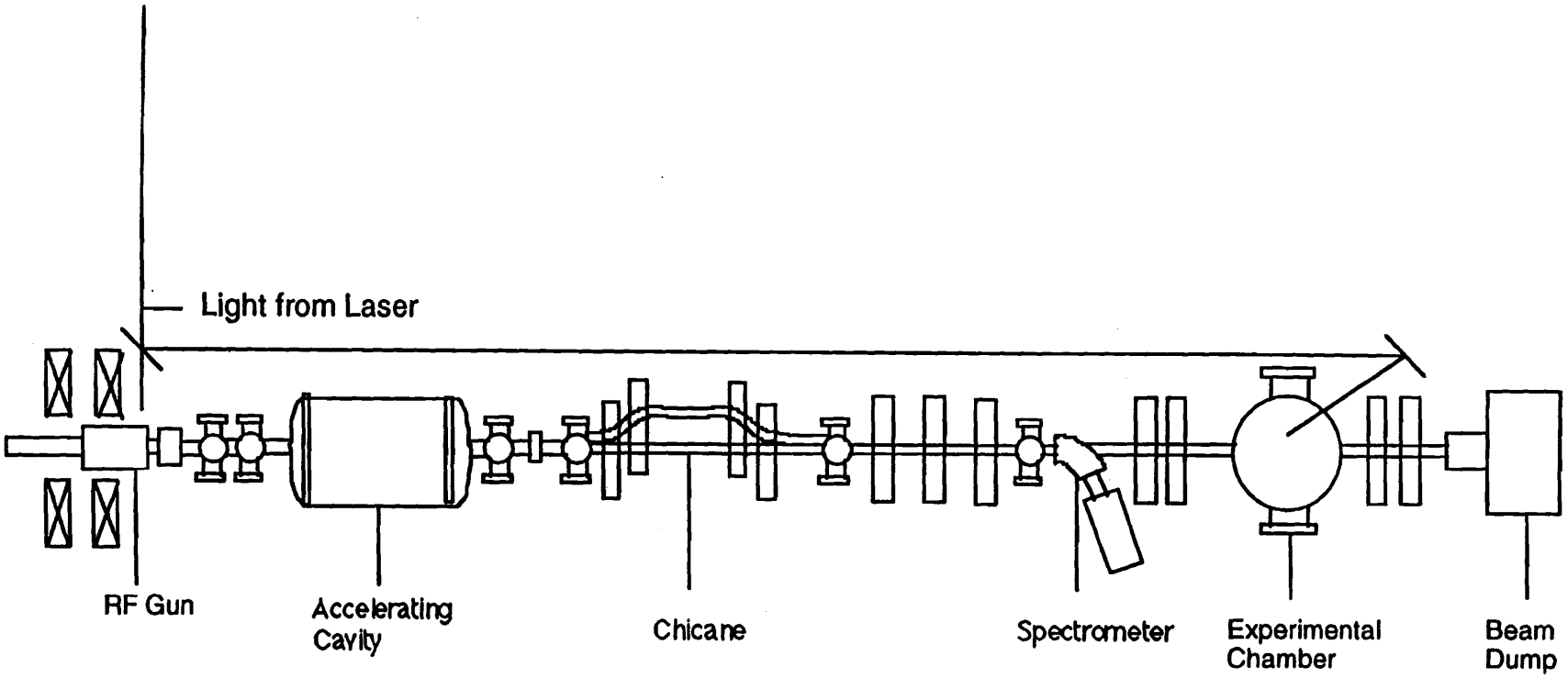


Figure 2



Schematic diagram of the electron source facility. A laser-driven photocathode produces short electron bunches which are accelerated by a superconducting cavity. A magnetic chicane is used to compress the bunches longitudinally, which are then focussed into the experimental chamber.

E-886 (Melissinos) Compton Scattering X-Ray Experiments at the Fermilab Electron Source Facility

Fermilab, Rochester

Status: *No Data Yet*

We propose to use the intense electron source that is being built at Fermilab to generate x-ray pulses with picosecond time resolution and with tunable wavelength in the range $2A < \lambda < 50A$. The x-rays are produced by backscattering an infrared (IR) laser pulse, $\lambda = 1054$ nm, from the pulsed electron beam. The same laser pulse, but after quadrupling to the UV ($\lambda =$ 263 nm), is used to excite the photocathode and thus generate the electron beam. Consequently the laser and the electron beam have the same time-structure and can be kept synchronized. Initially we plan to use pulses with 10 ps FWHM.

The x-ray energy in the forward direction is given by

$$E_X = 4\gamma^2 \hbar\, \omega_0$$

where $\gamma = E_0/mc^2$ is the γ-factor of the electron beam and ω_0 the laser frequency. The x-ray energy can be selected by adjusting the electron beam energy, or by moving to larger scattering angles. Using the parameters shown in Table I, the x-ray rate is found to be 5.4×10^{-5} x-rays/e^-; the x-ray spectrum is shown in Figure 1(a) whereas Figure 1(b) gives the dependence of the x-ray energy on the scattering angle. The electron beam will contain 5×10^{10} e^-/pulse (8nC) and there will be 1000 pulses in a 1 ms macropulse. Initially the macropulse repetition rate will be 1 Hz but could be increased later. For a 10% acceptance in x-ray energy ($\Delta E_X/E_X = 0.1$) the usable flux is 2.7×10^8 x-rays/s.

Table I. Parameters Used to Calculate the Backscattered X-Ray Flux

Electron Beam	
Energy	18 MeV
Bunch length (FWHM)	10 ps
Beam radius ($\sigma_x = \sigma_y$)	6.0 μm
Laser Beam	
Wavelength	1.054 μm
Energy	500 μJ
Pulse width (FWHM)	10 ps
f/D of lens	12.0
Total Rate	5.4×10^{-5} photons/e^-

A layout of the electron source, laser-electron interaction region and of the x-ray target chamber is presented in the schematic diagram of the electron source facility. A portion of the laser beam is transported to the target chamber so that pump-probe experiments can be carried out. The IR beam has a 1-micron diameter at the 1σ intensity point and collides with the electrons at an angle of 3^o. Finally we note that the x-ray energy spans the "water window" ($20 < \lambda < 50$A) and is therefore suitable for the study of biological samples.

One interesting application involves the investigation of the dynamics of heme proteins. Deterministic protein motion has been observed in the heme proteins hemoglobin and myoglobin[1]. In myoglobin, a polypeptide helix is folded around a heme group, (an iron atom in a porphyrin ring) and several ligands cross-link the helix. Hemoglobin is a tetramer composed of four units structurally similar to myoglobin. After ligand photodissociation (with a green laser pulse), deoxy-myoglobin undergoes a ball-and-socket motion in <10 ps with a displacement of about 6A, inferred from phase-grating studies. This vibrational energy is quickly dissipated to the surrounding aqueous environment. A pump-probe experiment using the unconverted green laser light and the picosecond x-ray source would contribute to the understanding of the dynamics of vibrational energy relaxation of macromoleculcules. A distinct advantage of the laser backscattered x-ray source is the easy availability of circular polarization; this can be used to explore condensed matter structures with specific helicity.

The backscattered x-rays are incoherent and are spread over a continuous spectrum. If, however, the electrons are scattered not from a single laser focus but from a longitudinal standing wave of sufficient field strength, they can radiate coherently at $E_X = 2\gamma^2\hbar\,\omega_0$. This is the same principle as for the free electron laser except that the undulator is now optical rather than a macroscopic magnetic field. One deals with a single pass FEL so that spontaneous start up from noise must be considered. It should be noted that the required emittance for this technique may be prohibitively small. However, improvements in beam transport and generation may make this an attractive approach.

The required field strength is of order B = 1 T or $E = 3\times10^6$ V/cm at λ = 1054 nm. For a 1 m long undulator of cross sectional area 5 mm^2 the energy stored in the cavity is 4 J. This can be supplied by the "slab" amplifier used in the laser drive system. To keep the fluence on the cavity mirrors below 10 J/cm^2 it is neceseary to enlarge the beam area by a factor of ten at the mirrors. The length of the two counter-propagating laser pulses will be 6 ns, that is, twice the cavity length.

Initially we will use a single laser pulse (at 1 Hz) in order to observe this coherent radiation process. Eventually the laser pulse rate, or the storage time in the cavity can be increased to accommodate the entire pulse train. If the optical undulator results in coherent radiation, it could be used in conjunction with much higher energy electrons to produce coherent high energy sources.

It is worthwhile to note that coherent x-ray sources can be used for future investigations of plasma beatwave or laser wakefield excitation of plasma waves in a solid-state accelerator, although high peak powers and sub-picosecond pulses would be then needed.

References

1. R. J. Dwayne Miller, Accounts of Chemical Research 27, 145 (1994); R. J. Dwayne Miller, Ann. Rev. Phys. Chemistry, 42, 581 (1991).

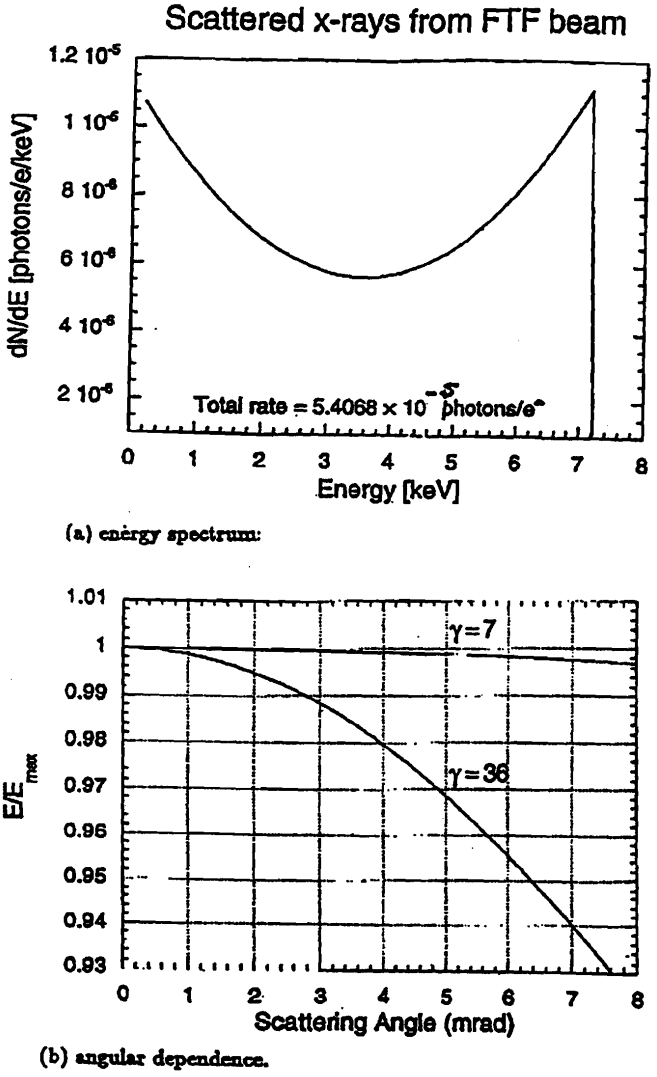
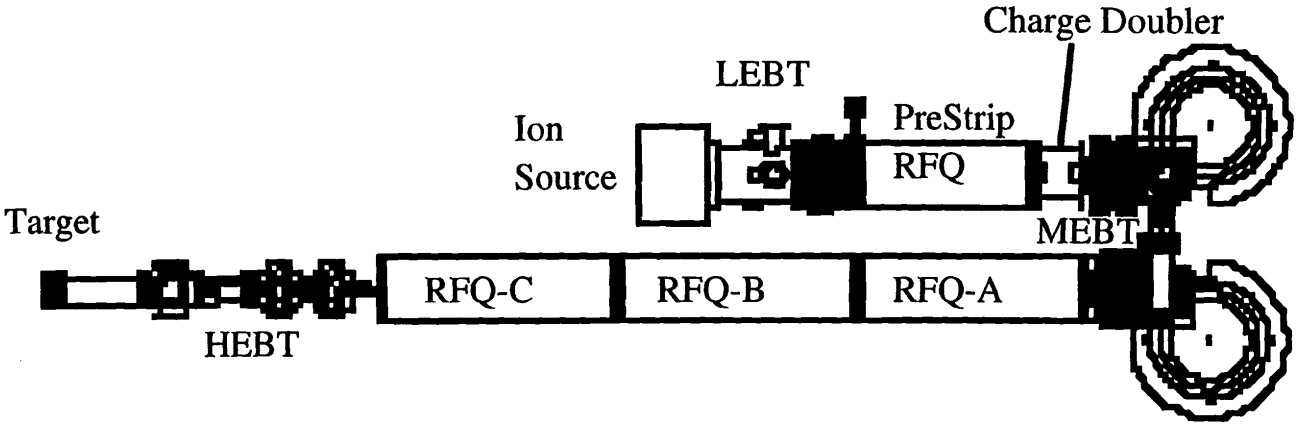


Figure 1. Yield of backscattered x-rays from the Fermilab Bright Electron Source (BES).



Layout of the BRF PET Accelerator

E-887 (Pasquinelli) A RFQ Linear Acclerator for PET Isotope Production

Fermilab
(and Biomedical Res. Found., Sci. Appl. Int'l. Corp., Washington)

Status: *No Data Yet*

1. Introduction

In 1995, Fermilab and Science Applications International (SAIC) formed a collaboration with partners from the University of Washington (UW) and the Biomedical Research Foundation of Northwest Louisiana (BRF) to explore an innovative approach to the production of radioisotopes. The accelerator system that is being developed accelerates ^{3}He to 10.5 MeV and then delivers it to the target to produce the short lived radioisotopes of interest to the PET community (^{18}F, ^{15}O, ^{13}N, ^{11}C).

The innovations in the accelerator system include multiple RFQ accelerators configured in series, a gas-jet stripper to doubly charge the low energy (1 MeV) ^{3}He beam, and an isochronous matching section to manipulate the transverse and maintain the longitudinal profile of the beam (without the use of an RF buncher) in the charge doubler transition section between RFQ's.

The idea of using ^{3}He for the production of radioisotopes for PET is not new. Development work on this concept was conducted by SAIC and UW in the early 1990's. However, the use of an RFQ with ^{3}He is a new approach and holds significant potential and research opportunities for advancing the state of the art in PET isotope generation.

2. System Description

Before the radiochemistry and targetry for ^{3}He could be investigated, an accelerator was needed that would supply a beam with the desired characteristics and parameters. A good starting point was the accelerator developed earlier by SAIC and UW, but upgrading was required. Analysis and a series of discussions resulted in the baseline operating parameters given in Table 1, based on the beam required as a function of energy for the target quantities of various PET isotopes (Table 2). The results of the redesign are shown in the layout; it makes the most efficient use of the existing equipment while solving some of the more challenging technical problems.

Ion Source and Charge Doubler

The approach taken is to use a singly-charged beam accelerated to an energy where it can be efficiently stripped (1 MeV). At this energy and a current of 400 μA_{avg} (20 mA_{peak}), carbon foil strippers could not survive the high power density, and a gas-jet stripper has been developed and tested with very promising results.

Medium Energy Beam Transport (MEBT)

The most difficult aspect of this accelerator system is the matching element between the prestripper and the poststripper RFQ's, which needs to accomplish several things: gas stripping, maintaining the longitudinal bunching of the beam, and transversely matching the beam into the second RFQ; tunable components are desired. It was decided to build an isochronous beam transport system that maintains the longitudinal and manipulates the transverse phase space of the beam. We will use use a 540-degree bending MEBT (Figure 1) which can be made isochronous; the beam optics are shown in Figure 2.

Radio Frequency Quadrupole

The accelerator that had been developed earlier had been designed for a final energy of 8 MeV. In order to achieve the higher energy requirements of the new system, it was decided that the most direct approach would be to add a third RFQ (manufactured by SAIC) to the high energy section to go from 8 MeV to the final energy of 10.5 MeV. The three RFQ cavities are not resonantly coupled. In order to have each cavity synchronized to, and resonant at, the same frequency, the resonant frequency of each cavity is controlled through adjustment of the temperature of the cavity cooling water. Tests on this tuning system at full (2.5%) duty factor have been successful.

3. Status

In tests so far, the low and medium energy beams have been characterized (important for the transport design) and the charge doubler has been prototyped, characterized, and tested with beam. Some of the information gained in the 1 MeV tests are summarized below.

Ion Source

He^+ ions are obtained from a fairly standard duoplasmatron ion source, operating at 360 Hz with a pulse length of 70 μs. Several weeks of reliable and stable source operation have been obtained. A 25 mA beam is extracted at 20 kV from a ~1 cm plasma cup through a 0.8 cm grounded extraction electrode with an electron suppression electrode. Slightly after extraction the ~90% normalized beam emittance was measured to be 0.5 - 0.7 π mm mrad. One magnetic solenoid is used to focus the 20 KeV beam into the RFQ. At the entrance of the RFQ, 0.7 m beyond the source, 75% of the beam is within ~0.5 π mm mrad emittance (normalized).

Measured Emittance of the 1 MeV Beam

After the prestripper RFQ, at 1 MeV, the rms emittance with 5.5 - 7 mA has been measured to be 0.2 mm mrad (or ~34 π mm mrad unnormalized for 90% of the beam). Better matching and understanding of the RFQ transmission is needed. A maximum beam of 11 - 13 mA has been observed from the RFQ and appears to have similar characteristics. This was achieved with a larger solenoid in the 20 KeV transport line.

Charge Doubler Tests

In a prototype stripper cell based on a pulsed gas jet, the flow rate of the gas jet was sufficient to prevent excessive heating of the gas by the beam, and the injected gas was pumped out between beam pulses. A magnetic spectrometer was used to test operation of the gas jet. Stripping efficiency for several gases is shown in Figure 3 as a function of back pressure on the injector. The best performance, with argon gas, reached 80% stripping efficiency at a pressure of 25 psia. Pressure measured at the RFQ was 2.8×10^{-6} Torr for this operating point, at a repetition rate of 60 Hz. We expect to be able to operate at no less than 70% stripping efficiency at the design rate of 360 Hz by increasing pumping capacity. An operational version of the stripper cell is now in fabrication.

4. Schedule

The major magnets for the MEBT system have been fabricated and are being tested, with installation and commissioning of the system scheduled to take place in late 1996. The modifications to the accelerator system are scheduled to be completed and tested in late 1996. Once completed, the accelerator will be run at Fermilab for six to eight weeks in order to test shielding and do some initial targetry development. Following this run, the accelerator system, built in a modular fashion in order to facilitate moving will be disassembled and shipped to BRF. The move and commissioning is anticipated to take about eight weeks, after which the in-depth targetry and radiochemistry research will begin.

Table 1. Accelerator Design Parameters

	Energy (MeV)	I_e (μA) average	Rep. Rate (Hz)	PW (μsec)
Existing System	8	300	360	55
New System	10.5	200	360	70

Table 2. ^{3}He Current Required for PET RFQ

Radionuclide	mCi EOB in target	μA_e 8 MeV*	μA_e 9.5 MeV**	μA_e 10 MeV**
^{18}F	600	627	389	332
^{11}C (low SA)	1000	202	140	125
^{11}C (high SA)	440	298	195	163
^{13}N	100	266	168	104
^{15}O (low SA)	800	517	360	318
^{15}O (high SA)	200	899	559	460

* 1 MeV energy loss in target window
** 1.5 MeV energy loss in target window

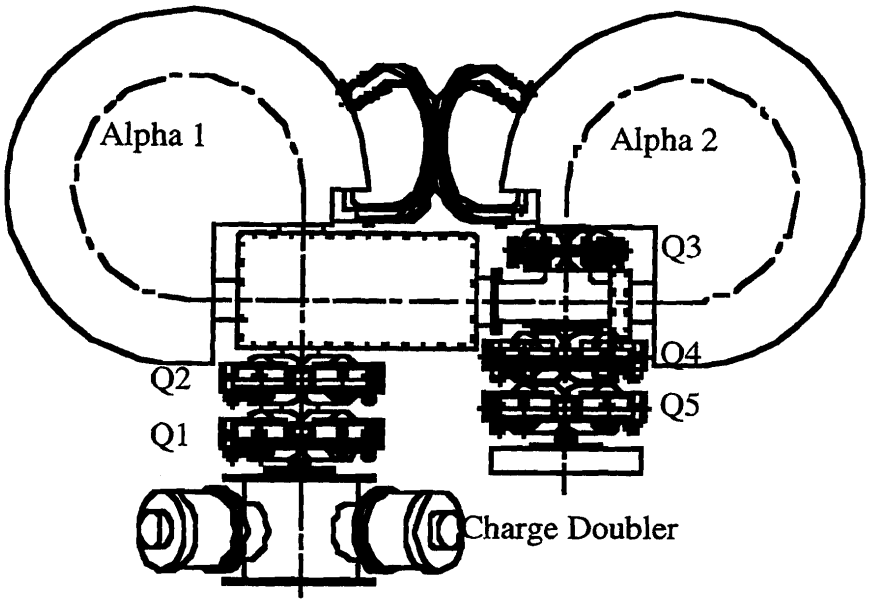


Figure 1. MEBT Mechanical Layout

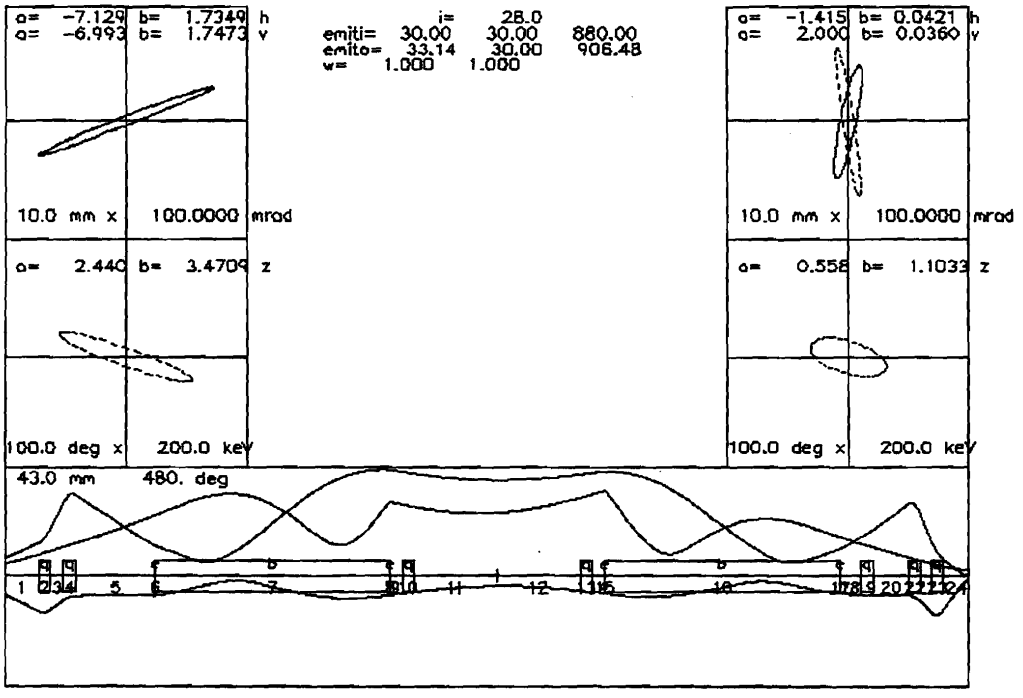


Figure 2. MEBT Optics

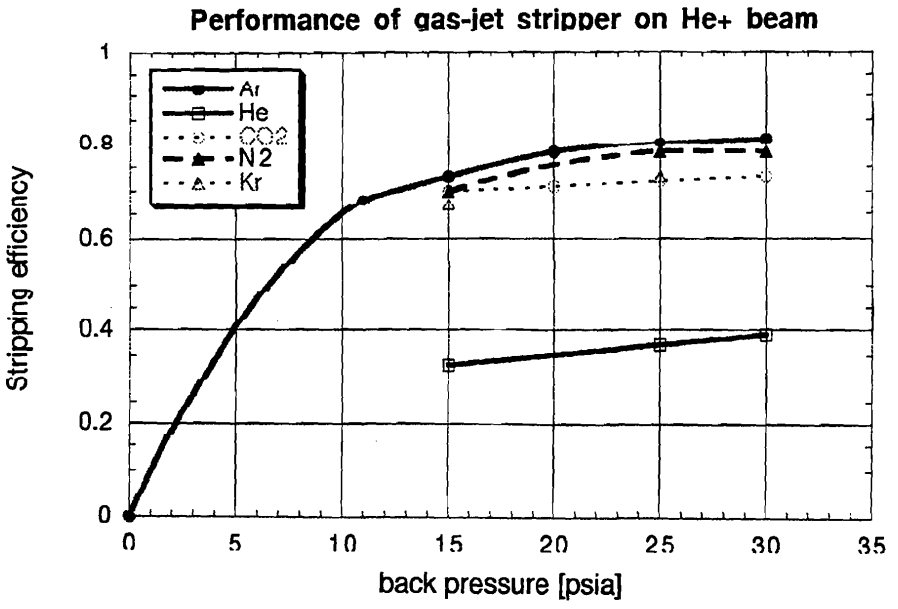
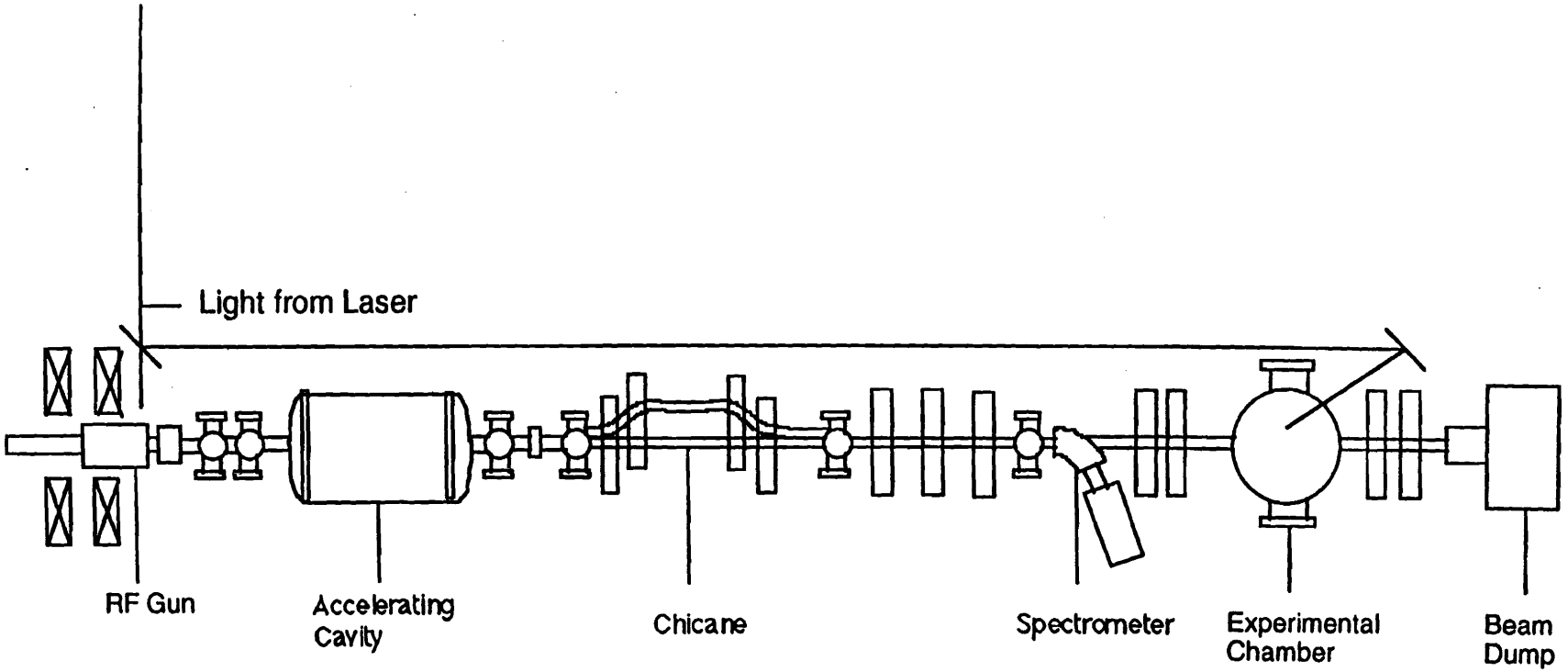


Figure 3. Performance of gas-jet stripper on He^+ beam



Schematic diagram of the electron source facility. A laser-driven photocathode produces short electron bunches which are accelerated by a superconducting cavity. A magnetic chicane is used to compress the bunches longitudinally, which are then focussed into the experimental chamber.

E-890 (Rosenzweig) Advanced Accelerator Test at the Fermilab Electron Source Facility

UCLA, Fermilab

Status: *No Data Yet*

A new set of experiments is proposed which uses accelerator facilities now under construction at Fermilab to accomplish several scientific objectives. The core of the facility is a short-bunch, long-pulse photoinjector, which can produce a train of intense electron bunches. Owing to the uniqueness and versatility of this facility, it can be used for multiple purposes in both accelerator and basic physics research.

There is widespread interest in developing high-gradient accelerating structures to pave the way toward more compact and affordable high energy accelerators. However, high-gradient acceleration is by nature faced with three problems to be solved: 1) to find a suitable structure or medium to support a high electric field for accelerating test particles using immediately available power sources; 2) to find methods to manipulate and synchronize intense beams for acceleration once the electric field is produced; and 3) to develop efficient compact power sources to couple energy from the external world to the accelerating structure, allowing staging of acceleration sections. In this proposal, we outline an experiment that can be performed at Fermilab, where staging of GeV/m accelerating sections can be demonstrated for the first time, using wakefields in plasmas driven by ultra-high brightness electron beams[1].

The plasma wakefield accelerator (PWFA) concept is based on the excitation of a steep field gradient in a plasma due to the injection of an intense drive electron beam, followed by a witness bunch which is to be accelerated. A promising regime which offers the most freedom from sources of instability and includes intrinsic linear focussing properties can be realized by the injection of an intense drive electron bunch into an underdense plasma, creating a symmetric focussing channel, the so-called electron blowout regime. Recent experimental work by the UCLA team at Argonne has shown effective generation of such channels, along with a significant acceleration gradient[2].

Perhaps the most important experiment to be undertaken in this area is that of synchronization of the witness bunch with the wakefields generated by the excitation bunch. Recently, it has been proposed that magnetic compression of an rf photoinjector beam can be applied to effectively reduce injection jitter from the witness beam that has plagued previous attempts at acceleration[3]. Such a scheme (shown schematically in the figure) would enable a first real attempt at synchronization and low-emittance, low-energy-

spread acceleration - with the possibility, currently unique to the Fermilab facility, of staging the accelerating sections.

The components of the experimental program envisioned are:

a) Demonstrate synchronization of a witness beam with the beam-generated wakefields in the blow-out regime of the PWFA, using an rf photoinjector with a bunch compression system;

b) Demonstration of GeV/m acceleration;

c) Understand the beam matching physics between successive modules of a multiple stage scheme. This includes the development of effective kickers or other schemes for merging drive and witness beams, and understanding of the beam dynamics; and

d) Demonstrate multiple stage acceleration using the PWFA; determine physics of intensity and gradient scaling, diagnose beam quality after each accelerating section.

The physical demands on the Fermilab facility for this project would be minimal. The basic experimental setup, as shown in the figure, consists of a plasma chamber at the end of the photoinjector/linac section. The primary diagnostics for the experiment are based on the Compton scattering apparatus described in E-886. It is envisioned that the work will proceed in two phases: the first phase will be the diagnosis of the accelerating channels produced by the drive beam, including demonstration of acceleration. A second phase would involve the demonstration of successful coupling of two stages.

References

1. J. B. Rosenzweig, Proc. Linear Accelerator Conference, Chalk River, AECL-10728, (1993).

2. N. Barov, et al., Proc. Particle Accelerator Conference, Dallas (1995).

3. J. B. Rosenzweig, N. Barov, and E. Colby, IEEE Trans. Plasma Science 24, 2, (1996).

E-891 (Dixon) Cryogenic Dark Matter Search (CDMS)

Fermilab
(and UC/Berkeley, UC/Santa Barbara, Case Western Reserve, San Francisco State, Santa Cruz, Stanford)

Status: *No Data Yet*

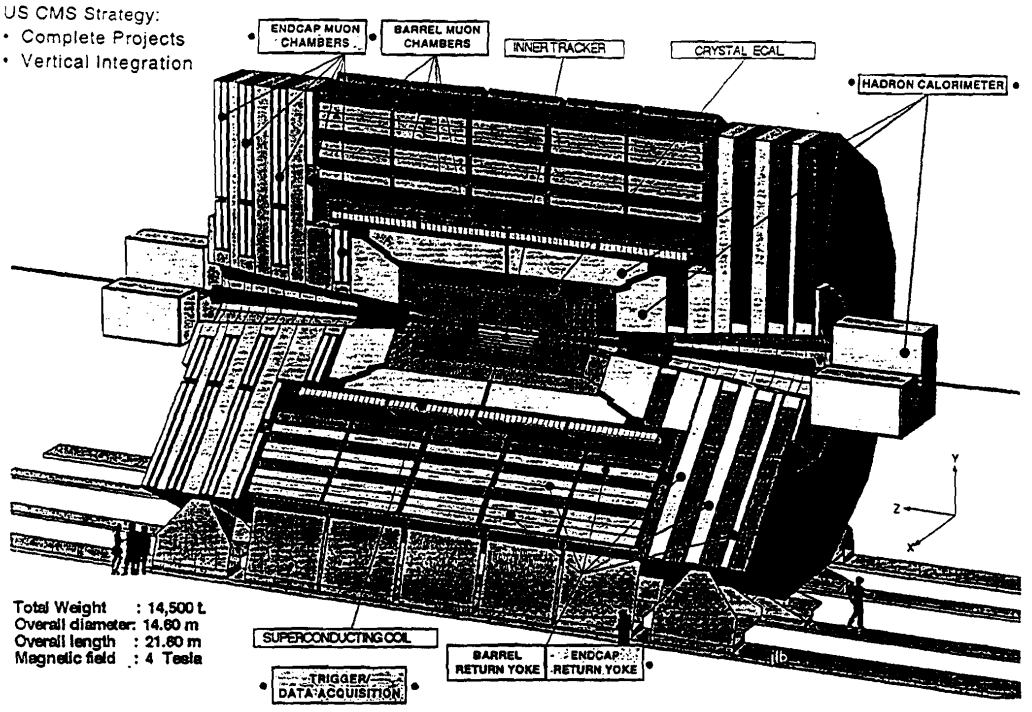
The CDMS collaboration is building a detector to search for cold dark matter. There are good reasons to believe that most of the matter in the universe is "seen" only gravitationally, and does not emit or absorb substantial amounts of electromagnetic radiation at any known wavelength. The nature of this "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 will be an upgraded version of the Cryogenic Dark Matter Search experiment (CDMS) currently running 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 0.1 K. 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. However, although the CDMS experiment is expected to be a factor of 30 more sensitive than previous searches, this first-generation experiment has only sufficient sensitivity to explore a small region of the interesting parameter space. The second-generation experiment (CDMS II) will be a larger version of CDMS, with a further factor of 30 improved sensitivity. This will enable us to explore for the first time a substantial region of the interesting parameter space. CDMS II will be installed in the low background environment of the Soudan mine in Minnesota. Currently, funding is being sought for CDMS II.

E-892

US CMS Management Responsibilities

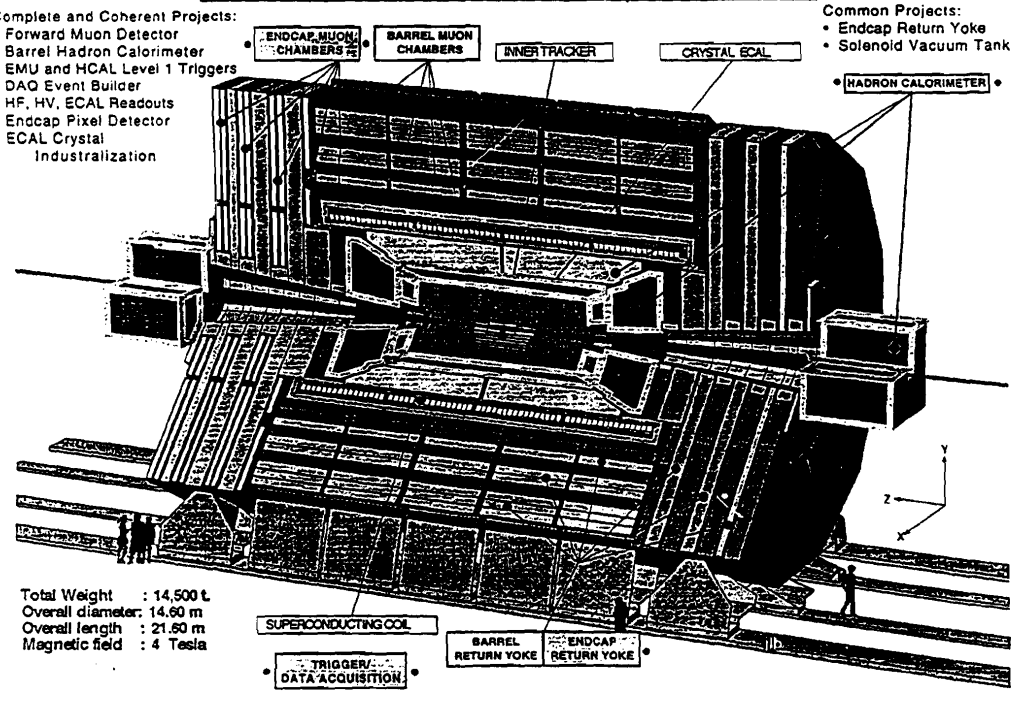
US CMS Strategy:
- Complete Projects
- Vertical Integration



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



E-892 (Green) The US CMS Collaboration at Fermilab

Fermilab
(and 39 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 1500 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 2005. 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 311 physicists and engineers from 40 institutions (4 national labs). 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 was taken in 1995/96 by subgroups of US CMS involved in Hadron Calorimetry (HCAL), Endcap Muon Chambers (EMU), Electromagnetic Calorimetry (ECAL) and Tracking. The Fermilab group is particularly active in HCAL and EMU. The CMS Project Managers for both HCAL and EMU are members of the Fermilab group. During 1995 engineering studies were carried out with the aim of beginning the conceptual designs which will culminate in a full Technical Design Report in 1997, followed by the fabrication of preproduction prototypes in 1997. The CMS Fermilab group is heavily involved both in test beam R&D and in engineering design.

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 will be centralized and located at Fermilab. The intent is to utilize existing infrastructure at Fermilab for muon chamber construction, the production of calorimeter optical readout, the mechanical layout of tracking detectors, and the pipelined electronic readout of all the HCAL devices. In addition, the fact that Fermilab is the location of the

US HEP hadronic collider program, means that the synergy between CDF and D0 upgrades and CMS design and construction is available. For example, high-rate triggering and data acquisition is an area where Fermilab will contribute expertise 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. Fermilab physicists are taking a leading role in the management of the hadronic calorimetry and the forward muon system. The collaboration plans to construct major elements of these two systems at existing facilities at Fermilab. In addition, the use of Fermilab facilities by university groups, such as the facilities for silicon detectors being developed for the Run II collider program, represents a low cost way for Fermilab to support university groups within the US CMS Collaboration.

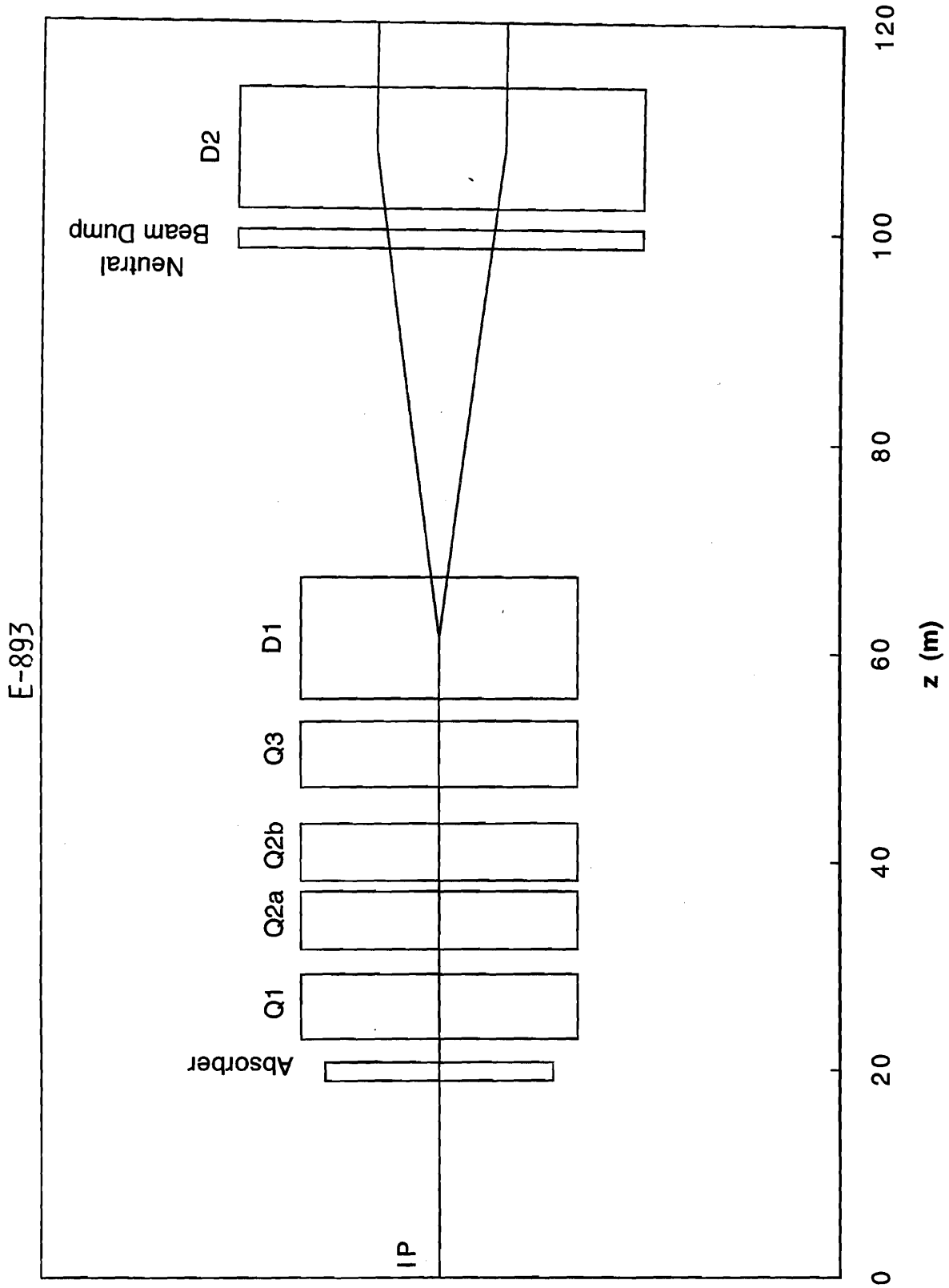
At present, KEK operates a remote control room to enable Japanese physicists to stand shift on CDF. Based on this positive experience, we imagine that a similiar remote control room could be set up at Fermilab in order to enable US physicists to stand shift on CMS. In general, the aim of Fermilab is to enable US CMS physicists to do physics at their home institution or within the U.S. if at all possible.

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. Fermilab plans to explore the operational meaning of "host laboratory to 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.

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, and the trigger system. We also have construction responsibilities in electron calorimetry (ECAL), tracking and data acquisition (DAQ). We are now fully integrated into the decision-making bodies of CMS and are represented in all the CMS governing bodies.

The US groups will also, as noted in the Letter of Intent (LoI) to DOE and NSF, 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. Fermilab is very involved in the engineering analysis of the vacuum vessel, as that device supports the HCAL for which we are responsible. The aim is ultimately to provide in-kind contributions to CMS bid and bought in the US.

The CMS experiment has been under intense review in 1995 by the program advisory committee of CERN, the LHCC. It has been scientifically approved early in 1996. The plan is to achieve financial approval sometime in 1997 and to then begin construction. The experiment is presently scheduled to commence in 2005. It will subsequently have at least a decade lifetime, LHC being at present the sole facility in the world capable of addressing the physics of the TeV mass scale. Currently an interim MOU for CMS has been signed by US and CERN representatives.


E-893
IP
Absorber
Q1
Q2a
Q2b
Q3
D1
Neutral
Beam Dump
D2
0
20
40
60
80
100
120
z (m)

E-893 (Strait) Design and Construction of Interaction Regions at the CERN Large Hadron Collider (LHC)

Fermilab
(BNL, LBL)

Status: *No Data Yet*

Fermilab, Brookhaven National Laboratory and Lawrence Berkeley Laboratory have formed a collaboration to contribute to the design and construction of the Large Hadron Collider (LHC) which will be built at CERN. The US efforts will focus primarily on the interaction regions (IRs), with the US taking significant responsibility for the design and construction of at least two, and possibly all four IRs. (Other contributions will include special twin-aperture dipoles for the RF straight section and superconducting cable R&D and testing.) Fermilab will work exclusively on the IRs and is leading this effort. The current status is that an Interim Implementing Arrangement for this collaboration is almost ready for signature by CERN and US laboratories.

The layout shows one half of an IR. It consists of four strong (>200 T/m), large aperture (70 mm) superconducting quadrupoles (Q1-Q3), which focus to beam at the interaction point (IP), and two dipole magnets, one single-aperture (D1) and one twin-aperture (D2) which bring the beams from their separated orbits into collisions at the IP. The dipoles are superconducting at two of the four IRs and are conventional magnets at the other two. The US Laboratory Collaboration will supply all of the superconducting magnets shown in the layout.

Fermilab will design and build the high-gradient quadrupoles which are the centerpiece of the IR project and are among the most challenging magnets required for the LHC. Figure 1 is a cross-section of the magnet currently under design. These magnets are required to operate at an unprecedentedly high gradient, at least 50% higher than the Low Beta Quadrupoles in the Tevatron Collider. Their field quality must be excellent over a large fraction of the aperture, since under collision conditions these quadrupoles are expected to be 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 will ensure that Fermilab and the US HEP program remain at the cutting edge of superconducting accelerator magnet technology. No matter what technology is used to build future higher energy colliders, it is certain that they will require quadrupoles of the highest possible gradient in their interaction regions. 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. New quadrupoles will be required for the mini-collider region being considered for

C0, and stronger quadrupoles at the CDF and D0 interaction regions will be able to free valuable space for improved shielding, beam instrumentation and forward detectors that may be required as the Collider luminosity grows.

The R&D program for the high gradient quadrupole is well underway. As we design the new quadrupole, we are also using several models of the existing Tevatron Low Beta Quadrupoles as a test bed for new design ideas, and we have entered into collaborations with industry and other Labs to develop improved superconducting wire that will ensure that the quadrupoles can reach the highest possible gradient. We will begin winding the first coils for the new high gradient quadrupole in the spring of 1997 and the first model magnet will be completed later in the year. The quadrupole development program is the base around which we will build a broader superconducting magnet R&D program looking at high-field or low-cost magnets for use in proposed future hadron or muon colliders.

In addition to building the quadrupoles themselves, Fermilab, together with the other labs in the collaboration, intends to take major responsibility for all aspects of the interaction region construction, from the interaction point out through the beam separation-recombination dipoles. This includes the construction of cryostats, cryogenic feed boxes, power lead boxes, and the integration of these and other components into the CERN accelerator system. This level of responsibility requires that we be involved in the accelerator physics as well as the technology of the IRs. Preliminary discussions have taken place among the accelerator physics groups at Fermilab, CERN and the other US Labs, and several areas of potential collaboration have been identified. Since the middle of 1995 we have had a physicist stationed at CERN working with the group responsible for all of the LHC insertions, and smooth working relations are being established. We have already made significant contributions to the design of absorber systems (shown in the layout) which are necessary to limit the beam heating of the magnets. By taking this global approach to the design and construction of the LHC IRs, we have an excellent opportunity to be deeply involved in a forefront hadron collider project and to begin to build the sort of global collaboration that will be necessary to build future colliders beyond the LHC. Our work on the advanced accelerator physics and technology of the LHC, together with our continuing efforts to improve the Tevatron Collider, will maintain and improve our position as accelerator builders at the energy frontier, a position essential if we aspire to lead the construction of future colliders.

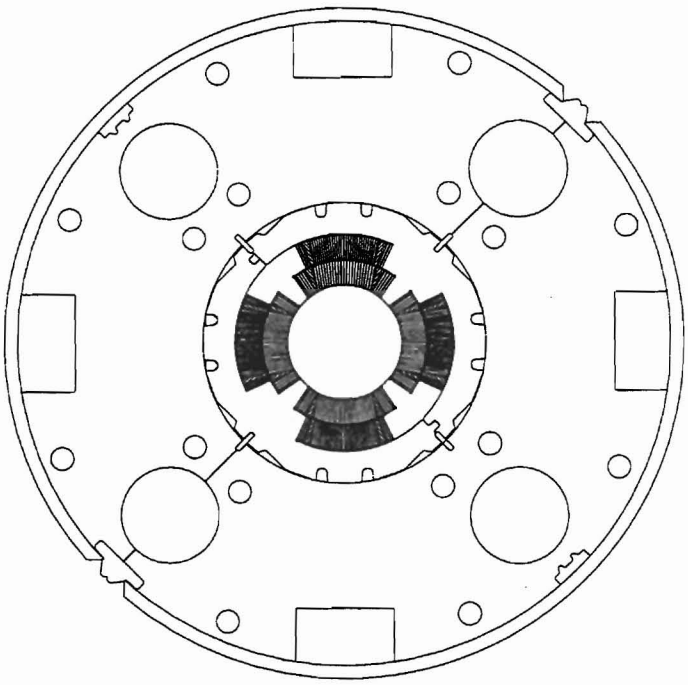


Figure 1. Cross-section of the LHC interaction region quadrupole currently under development at Fermilab.

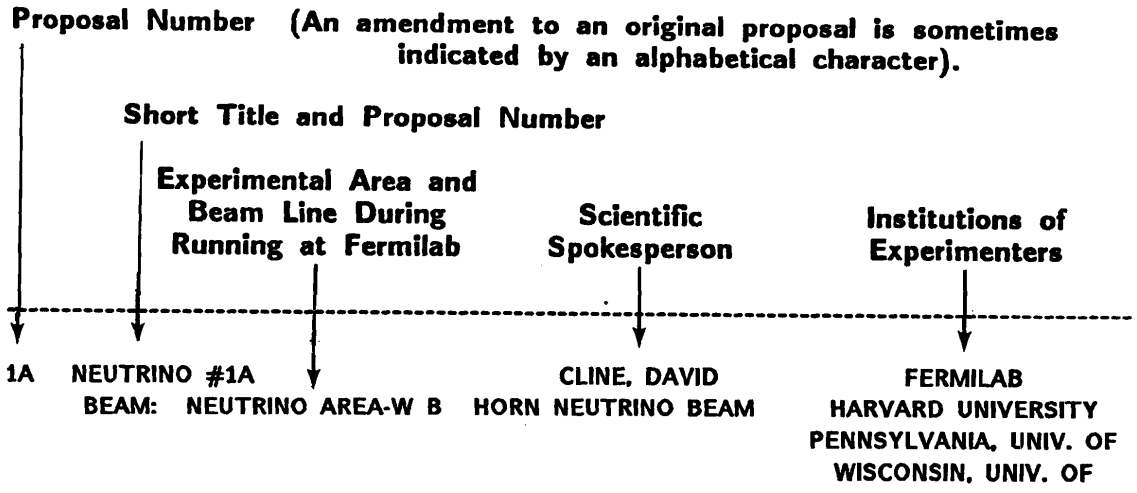
SECTION IX. MASTER LIST OF PROPOSALS

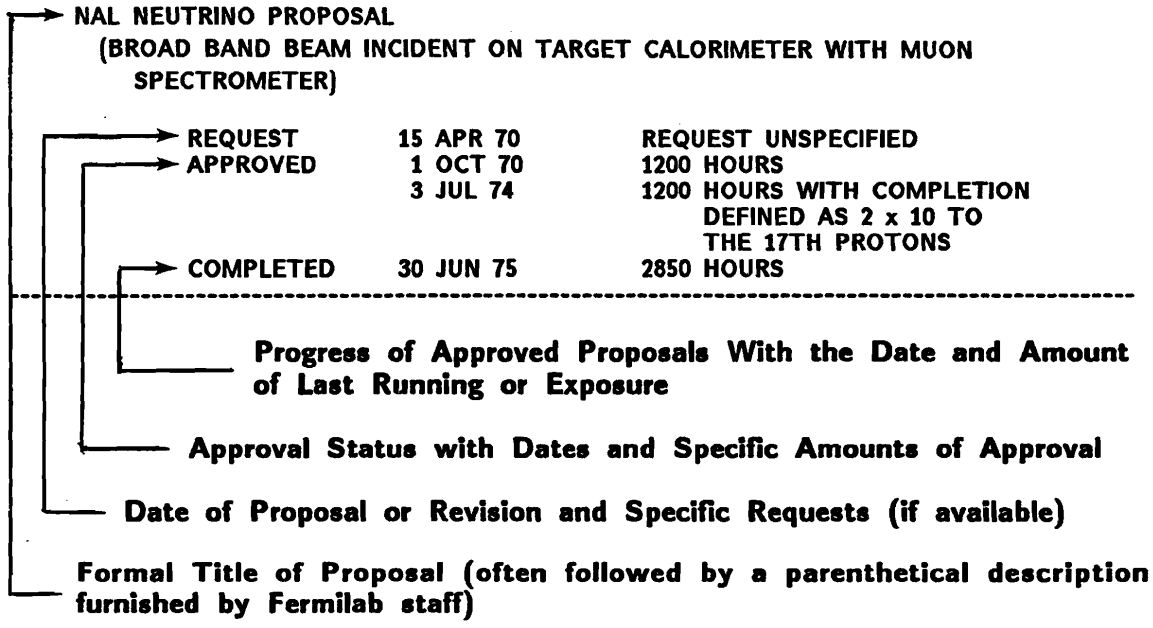
The Master List of proposals contains an entry for each proposal submitted to Fermilab; a typical entry is explained on the next page. In addition to the formal title of the proposal and a brief parenthetical explanation, the name of the spokesperson and a list of participating institutions are included. 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 and pending ones are listed.
Total number of proposals - 894 ... Total number of approved & pending proposals - 442

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	

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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

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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	

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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

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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

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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	

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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	

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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	

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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	

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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	

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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
FERMILAB
UNIVERSITY OF ROCHESTER
ROCKEFELLER UNIVERSITY
BEAM: Neutrino Area - Dichromatic
STUDIES OF DEEP INELASTIC DIFFERENTIAL DISTRIBUTIONS AT HIGH ENERGIES FOR NEUTRINO AND ANTI-NEUTRINO BEAMS.
(A continuation of the work begun in exp #21A with a new narrow band beam and changed apparatus.)

Request	18 Oct, 74	1,000 Hours	
Approval	22 Nov, 74	1,000 Hours	with a formal commitment of 2 x 10 to the 18th protons contingent on the feasibility of developing the improved Dichromatic beam
Completed	17 Jan, 79	1,350 Hours	

357 PARTICLE SEARCH #357 — Donald I. Meyer
FERMILAB
UNIVERSITY OF MICHIGAN - ANN ARBOR
PURDUE UNIVERSITY
BEAM: Meson Area - M2 Beam
A PROPOSAL TO SEARCH FOR CHARMED PARTICLES AND MEASUREMENTS OF TWO-PARTICLE INCLUSIVE CROSS SECTIONS AT LARGE P-TRANSVERSE.
(Employing a two-arm magnetic spectrometer.)

Request	19 Oct, 74	2,400 Hours	
Approval	16 Dec, 74	600 Hours	
Completed	7 Jun, 76	1,700 Hours	

358 DI-MUON #358 — Wonyong Lee
COLUMBIA UNIVERSITY
CORNELL UNIVERSITY
FERMILAB
UNIVERSITY OF HAWAII AT MANOA
UNIVERSITY OF ILLINOIS, CHAMPAIGN
BEAM: Proton Area - East
DI-MUON PRODUCTION BY NEUTRONS.

Request	20 Oct, 74	Unspecified	
Approval	27 Nov, 74	300 Hours	of neutron running to be interleaved within the 600 hours already approved for exp# 87A
Completed	1 Oct, 75	400 Hours	

361 LAMBDA BETA-DECAY #361 — Lee G. Pondrom
UNIVERSITY OF MICHIGAN - ANN ARBOR
UNIVERSITY OF MINNESOTA
RUTGERS UNIVERSITY
UNIVERSITY OF WISCONSIN - MADISON
BEAM: Meson Area - M2 Beam
PRECISION MEASUREMENT OF LAMBDA BETA DECAY PARAMETERS.
(Will run with experimental set-up for neutral hyperon #8.)

Request	14 Nov, 74	300 Hours	
	23 Jan, 76	350 Hours	total including 150 hours in unpolarized lambda-zero beam and 200 hours in polarized lambda-zero beam
Approval	15 Nov, 77	300 Hours	
Completed	29 Oct, 79	1,250 Hours	

362 EMULSION/PI- @ 200 #362 — Piyare L. Jain
SUNY AT BUFFALO
BEAM: Neutrino Area - Miscellaneous
INTERACTION OF 200 - 400 GEV PIONS WITH EMULSION NUCLEI.

Request	15 Nov, 74	Emulsion Exposure	
Approval	25 Nov, 74	Emulsion Exposure	
Completed	9 Jun, 75	1 Stack(s)	

363 PARTICLE SEARCH #363 — Stephen L. Olsen — FLORIDA STATE UNIVERSITY; IMPERIAL COLLEGE (ENGLAND); UNIVERSITY OF ROCHESTER; RUTGERS UNIVERSITY
BEAM: Internal Target Area (C-0)
A PROPOSAL TO SEARCH FOR CHARMED PARTICLE PRODUCTION NEAR THRESHOLD.

Request	24 Nov, 74	Unspecified
Approval	16 Dec, 74	500 Hours of running with the rotating carbon filament target
Completed	9 Apr, 75	650 Hours

365 PARTICLE SEARCH #365 — David A. Garelick — NORTHEASTERN UNIVERSITY
BEAM: Meson Area - M2 Beam
A PROPOSAL TO SEARCH FOR THE PRODUCTION OF CHARMED MESONS IN PI - P INTERACTIONS.

Request	27 Nov, 74	200 Hours including 40 hours for testing
Approval	31 Dec, 74	200 Hours during a two week run with a passive, nonmagnetized steel absorber to be used in conjunction with a muon trigger
Completed	5 Feb, 75	200 Hours

366 PARTICLE SEARCH #366 — Maris A. Abolins — CARELTON UNIVERSITY (CANADA); FERMILAB; MICHIGAN STATE UNIVERSITY; OHIO STATE UNIVERSITY
BEAM: Meson Area - M3 Beam
STUDY OF HEAVY, NARROW MESONS USING A MASS-FOCUSING SPECTROMETER.
(Experiment consists mainly of rearranged components from exp #12.)

Request	27 Nov, 74	Unspecified
Approval	16 Dec, 74	600 Hours for a particle search to be slanted particularly toward an identification of charmed mesons
	24 Nov, 75	1,200 Hours with an additional 600 hours to explore the possibility of a mass peak in the K- pi+ mass spectrum
Completed	2 Jul, 76	2,500 Hours

369 PARTICLE SEARCH #369 — Thomas B. W. Kirk — FERMILAB; HARVARD UNIVERSITY; UNIVERSITY OF ILLINOIS, CHAMPAIGN; MAX-PLANCK INSTITUTE (GERMANY); TUFTS UNIVERSITY
BEAM: Neutrino Area - Muon/Hadron Beam
A SEARCH FOR CHARMED PARTICLES.
(Using the spectrometer originally developed for exp #98.)

Request	9 Dec, 74	700 Hours for data with 300 pulses/hour and 1 x 10 to the 6th pi-/pulse
Approval	17 Mar, 76	600 Hours
Completed	13 Aug, 77	1,000 Hours

370 NEUTRINO #370 — David B. Cline — FERMILAB; HARVARD UNIVERSITY; UNIVERSITY OF PENNSYLVANIA; UNIVERSITY OF WISCONSIN - MADISON
BEAM: Neutrino Area - Quadrupole Triplet
CONTINUED SEARCH FOR NEW PARTICLE PRODUCTION USING THE EXP #1A DETECTOR.

Request	9 Dec, 74	500 Hours with a total of 1 x 10 to the 18th protons and a 1 msec spill
Approval	7 Jul, 75	500 Hours with the hope of providing 1 x 10 to the 18th protons
Completed	19 Mar, 75	400 Hours

371 SUPER-HEAVY ELEMENTS #371 — Mira Juric — UNIVERSITY OF BELGRADE(YUGOSLAVIA)
BEAM: Meson Area - Miscellaneous
INVESTIGATION OF THE PRODUCTION OF HEAVY FRAGMENTS INDUCED BY PARTICLES OF HIGH ENERGIES.

Request	2 Dec, 74	Target Exposure(s)
Approval	12 Mar, 75	Target Exposure(s)
Completed	20 Dec, 75	2 Stack(s)

373 EMULSION/MUONS @ 200 #373 — Piyare L. Jain — SUNY AT BUFFALO
BEAM: Neutrino Area - Miscellaneous
INTERACTION OF 50 - 100 GEV MUONS WITH EMULSION NUCLEI.

Request	8 Jul, 75	Emulsion Exposure
Approval	24 Sep, 76	Emulsion Exposure to muons @ 225 GeV/c and with an intensity not to exceed 50K particles/sq cm
Completed	22 Nov, 76	2 Stack(s)

374 EMULSION/PROTONS @ 300 #374 — D. H. Davis — UNIVERSITY OF BELGRADE(YUGOSLAVIA); UNIV. COLLEGE DUBLIN (IRELAND); INP, KRAKOW (POLAND); UNIVERSITY OF LIBRE (BELGIUM); LONDON UNIVERSITY COLLEGE(ENGLAND); THE OPEN UNIVERSITY (ENGLAND); INFN, ROME (ITALY); UNIVERSITY OF STRASBOURG (FRANCE); WARSAW UNIVERSITY, INP, (POLAND)
BEAM: Neutrino Area - Miscellaneous
A PROPOSAL TO SEARCH FOR CHARMED PARTICLES ORIGINATING FROM INTERACTIONS OF 300 GEV/C PROTONS IN EMULSION NUCLEI.

Request	25 Jan, 74	Emulsion Exposure
Approval	12 Mar, 75	Emulsion Exposure with the understanding that exp# 374 will replace exp# 364
Completed	10 Jun, 75	1 Stack(s)

379 PARTICLE SEARCH #379 — Stanley G. Wojcicki — CALIFORNIA INSTITUTE OF TECHNOLOGY; UNIVERSITY OF ROCHESTER; STANFORD UNIVERSITY
BEAM: Neutrino Area - 15 ft. Hadron Beam
SEARCH FOR SHORT LIVED STATES DECAYING WEAKLY VIA LEPTONIC MODES.

Request	5 Feb, 75	1,000 Hours
Approval	26 Mar, 75	200 Hours for testing and initial data taking
	17 Nov, 76	600 Hours with 400 hours for high priority running and with the expectation that a second 400 hour run will be approved if preliminary analysis of initial results are satisfactory
	15 Mar, 77	600 Hours with a hope of combining the two requested running periods into a single block of running but with the understanding that the total number of hours would be somewhat less than requested
Completed	8 Jun, 77	1,250 Hours

380 15-FOOT NEUTRINO/H2&NE #380 — Charles Baltay — BROOKHAVEN NATIONAL LABORATORY; COLUMBIA UNIVERSITY
BEAM: Neutrino Area - Dichromatic
STUDY OF THE PROPERTIES OF WEAK NEUTRAL CURRENTS IN THE INTERACTIONS OF A NARROW BAND NEUTRINO BEAM IN LIQUID NEON.

Request	6 Feb, 75	200 K Pix
Approval	7 Jul, 75	200 K Pix in a heavy neon-hydrogen mixture contingent upon the construction and adequate performance of an improved narrow-band beam
	24 Jun, 77	200 K Pix at higher energies using the D C Dichromatic train; new requests for use of the Dichromatic horn to be considered later
Completed	31 Oct, 79	196 K Pix

381 PROTON-NUCLEON SCATTERING #381 — Ernest I. Malamud
UNIVERSITY OF ARIZONA, FERMILAB, JINR, DUBNA (RUSSIA), UNIVERSITY OF ROCHESTER
BEAM: Internal Target Area (C-0)
MEASUREMENT OF THE REAL PART OF THE P - N AND P - P FORWARD SCATTERING AMPLITUDES; PRODUCTION OF LOW MASS ISOBARS IN THE VERY SMALL MOMENTUM TRANSFER REGION.
(Uses gas jet target.)

Request	20 Feb, 75	300 Hours
Approval	26 Mar, 75	300 Hours
Completed	30 Mar, 77	600 Hours

382 PARTICLE SEARCH #382 — Louis N. Hand
CORNELL UNIVERSITY, FERMILAB, INP, KRAKOW (POLAND), MICHIGAN STATE UNIVERSITY, UNIVERSITY OF WASHINGTON
BEAM: Neutrino Area - Muon/Hadron Beam
A SEARCH FOR CHARMED HADRONS PRODUCED BY MUON DEEP INELASTIC SCATTERING IN TAGGED NUCLEAR EMULSIONS.
(Using drift chambers to locate events and reduce scanning time.)

Request	21 Feb, 75	Emulsion Exposure
Approval	26 Mar, 75	Emulsion Exposure with a provision that it does not seriously interfere with the rest of the muon and neutrino program
	24 Nov, 75	Emulsion Exposure with a bombardment of five days duration during December 1975
Completed	19 Dec, 75	200 Hours

383 INCLUSIVE K-SHORT #383 — Hans G. E. Kobrak
UNIV. OF CALIFORNIA, DAVIS, UNIV. OF CALIFORNIA, SAN DIEGO, CARELTON UNIVERSITY (CANADA), MICHIGAN STATE UNIVERSITY
BEAM: Meson Area - M4 Beam
A PROPOSAL TO STUDY THE INCLUSIVE PRODUCTION OF K ZERO SHORT BY K MINUS ON HYDROGEN.
(To use the M4 line as a charged beam at momenta of 20 - 150 GeV/c.)

Request	24 Feb, 75	500 Hours
Approval	29 Jun, 76	500 Hours with 200 hours for setup and original run and 300 hours for final run
Completed	7 May, 78	2,200 Hours

385 EMULSION/PROTONS @ 400 #385 — Yog Prakash
DELHI UNIVERSITY (INDIA), JAMMU UNIVERSITY (INDIA), PANJAB UNIVERSITY (INDIA), RAJASTHAN UNIVERSITY (INDIA)
BEAM: Neutrino Area - Miscellaneous
PROPOSAL FOR EXPOSURE OF A STACK OF NUCLEAR EMULSIONS TO PROTONS OF 400 GEV/C.

Request	5 Mar, 75	Emulsion Exposure
Approval	11 Mar, 75	Emulsion Exposure
Completed	9 Dec, 75	1 Stack(s)

386 EMULSION/NEW PARTICLES #386 — Jere J. Lord
UNIVERSITY OF WASHINGTON
BEAM: Neutrino Area - Miscellaneous
A SEARCH FOR LOW ENERGY NEUTRAL PARTICLES AND PARTICLE INTERACTIONS INVOLVING SMALL ENERGY EXCHANGES IN THE NEUTRINO BEAM.

Request	7 Mar, 75	Emulsion Exposure
Approval	27 Mar, 75	Emulsion Exposure
Completed	29 Dec, 76	1 Stack(s)

387 EMULSION/PI- @ 200 #387 — Richard J. Wilkes
UNIVERSITY OF WASHINGTON
BEAM: Neutrino Area - Miscellaneous
100 TO 300 GEV PION INTERACTIONS IN EMULSION AND HEAVY ELEMENT TARGETS.

Request	7 Mar, 75	Emulsion Exposure
Approval	13 May, 75	Emulsion Exposure
Completed	9 Jun, 75	4 Stack(s)

388 15-FOOT ANTI-NEUTRINO/H2&NE#388 — Vincent Z. Peterson
FERMILAB, UNIVERSITY OF HAWAII AT MANOA, LAWRENCE BERKELEY LABORATORY
BEAM: Neutrino Area - Dichromatic
PROPOSAL TO STUDY NEUTRAL CURRENT NEUTRINO AND ANTI-NEUTRINO INTERACTIONS IN THE 15-FOOT BUBBLE CHAMBER USING THE EXTERNAL MUON IDENTIFIER AND A DICHROMATIC BEAM.

Request	24 Apr, 75	200 K Pix
	7 Jun, 78	500 K Pix or 5 x 10 to the 18th protons
Approval	7 Jul, 75	200 K Pix of antineutrino bombardment with a heavy neon-hydrogen mixture contingent upon the construction and adequate performance of an improved narrow-band beam; see proposal #455
	24 Jun, 77	200 K Pix at higher energies using the D C Dichromatic train; new requests for use of the Dichromatic horn to be considered later
	28 Jun, 78	200 K Pix with a decision to maintain the approval as it stands
Completed	12 Sep, 79	181 K Pix

390 15-FOOT ANTI-NEUTRINO/D2 #390 — Arthur F. Garfinkel
ARGONNE NATIONAL LABORATORY, CARNEGIE-MELLON UNIVERSITY, PURDUE UNIVERSITY
BEAM: Neutrino Area - Wide Band Horn
ANTI-NEUTRINO INTERACTIONS IN THE DEUTERIUM-FILLED 15-FOOT BUBBLE CHAMBER.

Request	29 Apr, 75	300 K Pix
Approval	7 Jul, 75	300 K Pix
	28 Jun, 78	300 K Pix with a total of 150K pix presently scheduled for the experiment during the fall 1978 run
	19 Mar, 79	250 K Pix
Approved/Inactive	1 Apr, 79	10 K Pix as of 1 Apr 1979

391 MUON #391 — Leroy T. Kerth
UNIV. OF CALIFORNIA, BERKELEY, FERMILAB, LAWRENCE BERKELEY LABORATORY, PRINCETON UNIVERSITY
BEAM: Neutrino Area - Muon/Hadron Beam
EXPLORATION OF RARE MUON-INDUCED PROCESSES.

Request	15 Feb, 75	Unspecified
Approval	7 Jul, 75	Parasitic Running concurrent with exp# 203
Completed	18 May, 78	Unspecified but for information on the total extent of run, see exp #203A

395 HADRON JETS #395 — Walter Selove
LEHIGH UNIVERSITY, UNIVERSITY OF PENNSYLVANIA, UNIVERSITY OF WISCONSIN - MADISON
BEAM: Meson Area - M2 Beam
CALORIMETER-ARRAY STUDY OF HIGH P-TRANSVERSE EVENTS.

Request	21 May, 75	450 Hours total including 150 hours of tests
Approval	7 Jul, 75	450 Hours contingent upon the successful completion of the calorimeter tests planned for the M5 beam line
Completed	16 Nov, 77	1,150 Hours

396 HADRON DISSOCIATION #396 — Konstantin Goulianos
ROCKEFELLER UNIVERSITY
BEAM: Meson Area - M6 Beam
ELASTIC SCATTERING AND DIFFRACTION DISSOCIATION AT SMALL MOMENTUM TRANSFER FOR PI+-, K+-, P, PBAR AND N.

Request	21 May, 75	1,000 Hours
Approval	7 Jul, 75	600 Hours for Phase I
Completed	23 Nov, 77	1,200 Hours

397 PARTICLE SEARCH #397 — Jerome L. Rosen — FERMILAB
BEAM: Meson Area - M3 Beam — NORTHWESTERN UNIVERSITY
PROPOSAL TO SEARCH FOR HIGH MASS PARTICLES PRODUCED IN ASSOCIATION WITH PROMPT MUONS. (Using the spectrometer from exps #27A and #305 with additions.) — UNIVERSITY OF ROCHESTER, SLAC

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
BEAM: Neutrino Area - Muon/Hadron Beam — HARVARD UNIVERSITY
A PROPOSAL FOR A FURTHER STUDY OF MUON NUCLEON INELASTIC SCATTERING AT FERMILAB. (Using the spectrometer of exp #98.) — UNIVERSITY OF ILLINOIS, CHAMPAIGN, UNIVERSITY OF OXFORD (ENGLAND), VIRGINIA TECH

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)
BEAM: Proton Area - Miscellaneous — KANAGAWA UNIVERSITY (JAPAN)
PRODUCTION OF ELECTROMAGNETIC CASCADE SHOWERS BY SEVERAL HUNDRED GEV ELECTRONS IN EMULSION CHAMBERS. — ISAS, TOKYO UNIVERSITY (JAPAN), UNIVERSITY OF WASHINGTON

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)
BEAM: Proton Area - East — UNIVERSITY OF COLORADO AT BOULDER
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.) — FERMILAB, UNIVERSITY OF ILLINOIS, CHAMPAIGN, INFN, MILANO (ITALY), UNIVERSITY OF MILANO (ITALY), UNIVERSITY OF PAVIA (ITALY), YALE UNIVERSITY

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
BEAM: Proton Area - East — UNIVERSITY OF ILLINOIS, CHAMPAIGN
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
BEAM: Meson Area - M2 Beam — RUTGERS UNIVERSITY
INCLUSIVE NEUTRON PRODUCTION BY PROTONS ON PROTONS AND NUCLEI. — UNIVERSITY OF WISCONSIN - MADISON

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
BEAM: Meson Area - M2 Beam — UNIVERSITY OF MICHIGAN - ANN ARBOR
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.) — RUTGERS UNIVERSITY, UNIVERSITY OF WISCONSIN - MADISON

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
BEAM: Meson Area - M1 Beam — LAL, ORSAY (FRANCE)
STREAMER CHAMBER SEARCH FOR NEW STATES WHICH DECAY SEMI-LEPTONICALLY. (Using the streamer chamber originally proposed for exp #86A with additional muon counters.) — UNIVERSITY OF WASHINGTON

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)
BEAM: Internal Target Area (C-0) — UNIVERSITY OF ROCHESTER
NUCLEAR SIZE DEPENDENCE FOR PARTICLE PRODUCTION AT INTERMEDIATE TRANSVERSE MOMENTUM. (With the spectrometer used for exp #363.) — RUTGERS UNIVERSITY

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
BEAM: Meson Area - M2 Beam — NORTHEASTERN UNIVERSITY
HIGH SENSITIVITY SEARCH FOR NEW STATES WHICH DECAY INTO MUONS. — TUFTS UNIVERSITY
UNIVERSITY OF WASHINGTON

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
BEAM: Meson Area - M2 Beam — RUTGERS UNIVERSITY
PROPOSAL FOR A NEW MEASUREMENT OF THE MAGNETIC MOMENT OF THE LAMBDA HYPERON. — UNIVERSITY OF WISCONSIN - MADISON

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
BEAM: Meson Area - M2 Beam — RUTGERS UNIVERSITY
A PROPOSAL TO STUDY LAMBDA POLARIZATION IN THE INCLUSIVE REACTION PROTON - PROTON TO LAMBDA PLUS ANYTHING WITH LIQUID HYDROGEN TARGET. — UNIVERSITY OF WISCONSIN - MADISON
(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
BEAM: Internal Target Area (C-0) — PURDUE UNIVERSITY
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
BEAM: Neutrino Area - Muon/Hadron Beam — PRINCETON UNIVERSITY
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
BEAM: Neutrino Area - Muon/Hadron Beam — FERMILAB
PROPOSAL FOR THE INVESTIGATION OF VIRTUAL PHOTOABSORPTION BY NUCLEAR MATTER. — HARVARD UNIVERSITY
(Using the cyclotron spectrometer and heavy targets; see proposal #257.) — MASSACHUSETTS INST. OF TECHNOLOGY
MICHIGAN STATE UNIVERSITY
TUFTS UNIVERSITY

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)
BEAM: Meson Area - M6 Beam — BROWN UNIVERSITY
STUDY OF THE A-DEPENDENCE OF INCLUSIVE PROCESSES AND ASSOCIATED MULTIPLICITY. — FERMILAB
(Using the single arm spectrometer facility.) — MASSACHUSETTS INST. OF TECHNOLOGY
WARSAW HEP LABORATORY (POLAND)

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
BEAM: Meson Area - M1 Beam — FERMILAB
MEASUREMENT OF THE KAON FORM FACTOR. — JINR, DUBNA (RUSSIA)
(Continuation of work begun in exp #216.) — NOTRE DAME UNIVERSITY
UNIVERSITY OF PITTSBURGH

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
BEAM: Proton Area - East — FERMILAB
PHOTOPRODUCTION EXPERIMENT AT FERMILAB. — UNIVERSITY OF ILLINOIS, CHAMPAIGN
(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
	BEAM: Meson Area - M4 Beam		LHE, ETH HONGGERBERG (SWITZERLAND)
	PROPOSAL TO STUDY THE ATOMIC NUMBER DEPENDENCE OF THE DIFFERENCE BETWEEN PARTICLE AND ANTI-PARTICLE TOTAL CROSS SECTIONS.		UNIVERSITY OF WISCONSIN - MADISON
	(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
	BEAM: Meson Area - M1 Beam		LAWRENCE BERKELEY LABORATORY
	SEARCH FOR SHORT LIVED PARTICLES USING A HIGH RESOLUTION STREAMER CHAMBER.		YALE UNIVERSITY
	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
	BEAM: Proton Area - Center		FERMILAB
	A STUDY OF DI-HADRON PRODUCTION IN PROTON COLLISIONS AT FERMILAB.		SUNY AT STONY BROOK
	(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
	BEAM: Meson Area - M2 Beam		UNIVERSITY OF MICHIGAN - ANN ARBOR
	PROPOSAL TO STUDY CASCADE ZERO AND ANTILAMBDA PRODUCTION AND POLARIZATION.		RUTGERS UNIVERSITY
	(Experiment would use the spectrometer of E-8.)		UNIVERSITY OF WISCONSIN - MADISON
	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
	BEAM: Proton Area - Center		IOWA STATE UNIVERSITY
	ELASTIC SCATTERING OF THE HYPERONS.		YALE UNIVERSITY
	(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
	BEAM: Neutrino Area - Muon/Hadron Beam		UNIVERSITY OF PENNSYLVANIA
	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
	BEAM: Neutrino Area - Miscellaneous		GENERAL ELECTRIC R&D CENTER
	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)
	BEAM: Neutrino Area - Miscellaneous		ICRR, UNIVERSITY OF TOKYO (JAPAN)
	MULTIPARTICLE PRODUCTION IN HIGH ENERGY PION-NUCLEUS INTERACTIONS.		KONAN UNIVERSITY (JAPAN)
			KWANSEI GAKUIN UNIVERSITY (JAPAN)
	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
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.

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

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
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.

FERMILAB
VIRGINIA TECH

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
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.

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)

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
BEAM: Neutrino Area - Prompt Beam
SEARCH FOR THE TAU NEUTRINO AND STUDY OF ELECTRON NEUTRINO AND ELECTRON ANTI-NEUTRINO INTERACTIONS.

UNIV. OF CALIFORNIA, BERKELEY
FERMILAB
UNIVERSITY OF HAWAII AT MANOA
ILLINOIS INSTITUTE OF TECHNOLOGY
RUTGERS UNIVERSITY
STEVENS INSTITUTE OF TECHNOLOGY
TUFTS UNIVERSITY

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
BEAM: Proton Area - West
REQUEST FOR A CONTINUATION OF E-567.

BROOKHAVEN NATIONAL LABORATORY
CEN-SACLAY (FRANCE)
PRINCETON UNIVERSITY
TEXAS A&M UNIVERSITY
UNIVERSITY OF TORINO (ITALY)

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
BEAM: Neutrino Area - East
A PROPOSAL TO MEASURE CHARM AND B DECAYS VIA HADRONIC PRODUCTION IN A HYBRID EMULSION SPECTROMETER.

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)

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
BEAM: Meson Area - M4 Beam
PROPOSAL TO STUDY THE EFFECT OF BENT CRYSTALS ON CHANNELING NEAR THE CRITICAL RADIUS OF BENDING.

CERN (SWITZERLAND)
CHALK RIVER NUCLEAR LAB. (CANADA)
FERMILAB
JINR, DUBNA (RUSSIA)
UNIVERSITY OF NEW MEXICO
SUNY AT ALBANY
UNIVERSITY OF STRASBOURG (FRANCE)

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
BEAM: Meson Area - M4 Beam
COMPARISON OF POLARIZATION OF INCLUSIVELY PRODUCED LAMBDAS AND ANTILAMBDAS BY PROTONS, ANTIPROTONS, KAONS AND PIONS ON HYDROGEN.
UNIV. OF CALIFORNIA, DAVIS
UNIV. OF CALIFORNIA, SAN DIEGO
CARELTON UNIVERSITY (CANADA)
FERMILAB
MICHIGAN STATE UNIVERSITY

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
BEAM: Neutrino Area - Muon Beam
MUON SCATTERING WITH HADRON DETECTION AT THE TEVATRON.
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

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

666 EMULSION EXPOSURE #666 — Richard J. Wilkes
BEAM: Proton Area - Center
EMULSION EXPOSURE TO SIGMA MINUS BEAM AT FERMILAB.
INP, KRAKOW (POLAND)
UNIVERSITY OF WASHINGTON

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
BEAM: Proton Area - East
STUDY OF PION-NUCLEUS INTERACTIONS IN PURE EMULSION STACKS AND EMULSION CHAMBERS AT ENERGY ABOVE 500 GEV.
INP, KRAKOW (POLAND)
LEBEDEV PHYSICAL INST. (RUSSIA)
LOUISIANA STATE UNIVERSITY
TASHKENT, PHY.TEC.INS (UZBEKISTAN)

Request	2 Dec, 80	Emulsion Exposure
Approval	28 Mar, 90	Unspecified
Completed	27 Aug, 90	Unspecified

668 EMULSION/PI- @ 800 #668 — Wladyslaw Wolter
BEAM: Unspecified Beam
STUDY OF PION NUCLEUS INTERACTIONS IN PURE EMULSION STACKS AND EMULSION CHAMBERS AT ENERGY ABOVE 800 GEV.
INP, KRAKOW (POLAND)

Request	2 Dec, 80	Emulsion Exposure
Completed	26 Apr, 85	Emulsion Exposure

672A HADRON JETS #672A — Andrzej Zieminski
BEAM: Meson Area - West
A STUDY OF HADRONIC FINAL STATES PRODUCED IN ASSOCIATION WITH HIGH-PT JETS AND HIGH-MASS DIMUONS.
FERMILAB
UNIV. OF ILLINOIS, CHICAGO CIRCLE
INDIANA UNIVERSITY
UNIVERSITY OF LOUISVILLE
UNIVERSITY OF MICHIGAN - FLINT
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)

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

673 CHI MESON #673 — John W. Cooper
BEAM: Neutrino Area - Muon/Hadron Beam
CHI MESON PRODUCTION BY HADRONS.
(E-610 extension.)
FERMILAB
UNIVERSITY OF ILLINOIS, CHAMPAIGN
UNIVERSITY OF PENNSYLVANIA
PURDUE UNIVERSITY
TUFTS UNIVERSITY

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
BEAM: Proton Area - Broad Band
PHOTOPRODUCTION OF HIGH PT JETS.
BALL STATE UNIVERSITY
FERMILAB
UNIVERSITY OF IOWA
UNIVERSITY OF MARYLAND
UNIVERSITY OF MICHIGAN - ANN ARBOR
RICE UNIVERSITY
VANDERBILT UNIVERSITY

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

687 PHOTOPRODUCTION OF CHARM AND B #687 — Joel N. Butler and John P. Cumalat
BEAM: Proton Area - Broad Band
HIGH ENERGY PHOTOPRODUCTION OF STATES CONTAINING HEAVY QUARKS AND OTHER RARE PHENOMENA.
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

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

690	PARTICLE SEARCH #690	Bruce C. Knapp		COLUMBIA UNIVERSITY
	BEAM: Neutrino Area - East			FERMILAB
	STUDY OF HADRONIC PRODUCTION AND SPECTROSCOPY OF STRANGE, CHARM AND BOTTOM PARTICLES AT THE TEVATRON.			UNIVERSITY OF GUANAJUATO (MEXICO) UNIVERSITY OF MASSACHUSETTS TEXAS A&M UNIVERSITY
	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	
691	TAGGED PHOTON #691	Michael S. Witherell		UNIV. OF CALIFORNIA, SANTA BARBARA
	BEAM: Proton Area - East			CARELTON UNIVERSITY (CANADA)
	PROPOSAL TO DO PHOTON PHYSICS WITH THE TEVATRON AT THE TAGGED PHOTON SPECTROMETER.			CBPF (BRAZIL) UNIVERSITY OF COLORADO AT BOULDER FERMILAB NATIONAL RESEARCH COUNCIL (CANADA) UNIVERSITY OF OKLAHOMA UNIVERSITE OF SAO PAULO (BRAZIL) UNIVERSITY OF TORONTO (CANADA)
	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)
	BEAM: Neutrino Area - Prompt Beam			ECOLE POLYTECH, PALAISEAU (FRANCE)
	STUDY OF NEUTRINO OSCILLATIONS AND SEARCH FOR THE TAU NEUTRINO.			ILLINOIS INSTITUTE OF TECHNOLOGY LONDON UNIVERSITY COLLEGE(ENGLAND) TUFTS UNIVERSITY
	Request	10 Feb, 81	2.5 E18th Protons	
	Inactive	1 Apr, 84		
701	NEUTRINO OSCILLATION #701	Michael H. Shaevitz		UNIVERSITY OF CHICAGO
	BEAM: Neutrino Area - Dichromatic			COLUMBIA UNIVERSITY
	A SEARCH FOR NEUTRINO OSCILLATIONS WITH DELTA-M-SQUARE GREATER THAN 10 EV-SQUARE.			FERMILAB UNIVERSITY OF ROCHESTER
	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)
	BEAM: Internal Target Area (C-0)			FERMILAB
	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.)			NORTHEASTERN UNIVERSITY TEXAS A&M UNIVERSITY
	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)
	BEAM: Collision Area (D-0)			CARELTON UNIVERSITY (CANADA)
	ELECTRON-PROTON COLLISIONS AT FERMILAB (Electron-proton collisions using the canadian high energy electron ring cheer.)			CEN-SACLAY (FRANCE) CHALK RIVER NUCLEAR LAB. (CANADA) CORNELL UNIVERSITY ENRICO FERMI INSTITUTE FERMILAB UNIVERSITY OF MARYLAND MCGILL UNIVERSITY (CANADA) NATIONAL RESEARCH COUNCIL (CANADA) UNIVERSITY OF SASKATCHEWAN(CANADA) UNIVERSITY OF TORONTO (CANADA) TRIUMF (CANADA) YORK UNIVERSITY (CANADA)
	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
	BEAM: Meson Area - Polarized Proton Beam			CEN-SACLAY (FRANCE)
	INTEGRATED PROPOSAL ON FIRST ROUND EXPERIMENTS WITH THE POLARIZED BEAM FACILITY.			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)
	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	

705	CHI MESON #705 BEAM: Proton Area - West A STUDY OF CHARMONIUM AND DIRECT PHOTON PRODUCTION BY 300 GEV/C ANTIPROTON,PROTON,PI+ AND PI- BEAMS.	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

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 BEAM: Meson Area - West A Comprehensive Study of Direct Photon Production in Hadron Induced Collisions	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

Request	26 Oct, 81	2,400 Hours
Approval	14 Dec, 81	1,000 Hours
Data Analysis	8 Jan, 92	Unspecified

707	SIGMA MINUS BETA DECAY #707 BEAM: Proton Area - Center MEASUREMENT OF THE ELECTRON ASYMMETRY PARAMETER IN SIGMA MINUS BETA DECAY.	Peter S. Cooper	UNIVERSITY OF CHICAGO FERMILAB IOWA STATE UNIVERSITY UNIVERSITY OF IOWA PNPI, ST. PETERSBURG (RUSSIA) YALE UNIVERSITY

Request	24 Nov, 81	300 Hours
Rejected	15 Dec, 81	

708	ELECTRON TARGET FACILITY #708 BEAM: Collision Area (D-0) ELECTRON-PROTON INTERACTION EXPERIMENT (Supercedes proposal #659.)	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

Request	25 Nov, 81	Unspecified
Inactive	23 Jun, 82	

709	FORWARD DETECTOR #709 BEAM: Collision Area (D-0) PROPOSAL FOR A FORWARD DETECTOR FOR THE D0 AREA	Michael J. Longo	UNIV. OF ILLINOIS, CHICAGO CIRCLE UNIVERSITY OF MICHIGAN - ANN ARBOR

Request	11 Jan, 82	Unspecified
Rejected	23 Jun, 82	

710	TOTAL CROSS-SECTION #710 BEAM: Collision Area (E-0) MEASUREMENTS OF ELASTIC SCATTERING AND TOTAL CROSS SECTIONS AT THE FERMILAB PBAR-P COLLIDER.	Jay Orear and Roy Rubinstein	UNIVERSITY OF BOLOGNA (ITALY) CORNELL UNIVERSITY FERMILAB GEORGE MASON UNIVERSITY UNIVERSITY OF MARYLAND NORTHWESTERN UNIVERSITY

Request	1 Feb, 82	Unspecified
Approval	23 Jun, 82	Unspecified
Completed	31 May, 89	Unspecified

711	CONSTITUENT SCATTERING #711 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.	David A. Levinthal	ARGONNE NATIONAL LABORATORY FERMILAB FLORIDA STATE UNIVERSITY UNIVERSITY OF MICHIGAN - ANN ARBOR

Request	28 Aug, 82	Unspecified
Approval	1 Jul, 83	Unspecified
Completed	15 Feb, 88	1,400 Hours

712	MUON PRODUCTON #712 BEAM: Collision Area (D-0) STUDY OF MUONS FROM PBAR-P COLLISIONS UP TO SQUARE ROOT OF S EQUAL TO 2 TEV.	Patrick D. Rapp	FERMILAB GEORGE MASON UNIVERSITY

Request	1 Feb, 82	Unspecified
Rejected	23 Jun, 82	

713	HIGHLY IONIZING PARTICLES #713 BEAM: Collision Area (D-0) PROPOSAL FOR A SEARCH FOR HIGHLY IONIZING PARTICLES FOR THE D0 AREA AT FERMILAB.	P. Buford Price	UNIV. OF CALIFORNIA, BERKELEY HARVARD UNIVERSITY

Request	29 Jan, 82	Unspecified
Approval	23 Jun, 82	Unspecified
Completed	31 May, 89	Unspecified

714	LARGE ANGLE PARTICLE #714 BEAM: Collision Area (D-0) LARGE ANGLE PARTICLE D0 GROUP	Paul D. Grannis	BROOKHAVEN NATIONAL LABORATORY BROWN UNIVERSITY COLUMBIA UNIVERSITY FERMILAB MICHIGAN STATE UNIVERSITY SUNY AT STONY BROOK

Request	5 Feb, 82	Unspecified
Rejected	1 Jul, 83	

715	SIGMA BETA DECAY #715 BEAM: Proton Area - Center PRECISION MEASUREMENT OF THE DECAY SIGMA MINUS TO NEUTRON AND ELECTRON AND NEUTRINO.	Peter S. Cooper	UNIVERSITY OF CHICAGO ELMHURST COLLEGE FERMILAB IOWA STATE UNIVERSITY UNIVERSITY OF IOWA PNPI, ST. PETERSBURG (RUSSIA) YALE UNIVERSITY

Request	19 Feb, 82	Unspecified
Approval	23 Jun, 82	Unspecified for 3 months
Completed	14 Feb, 84	820 Hours

716	BEAM DUMP #716 BEAM: Meson Area - M2 Beam PROPOSAL FOR FURTHER BEAM DUMP NEUTRINO RUNNING	Byron P. Roe	FERMILAB UNIVERSITY OF FIRENZE (ITALY) UNIVERSITY OF MICHIGAN - ANN ARBOR UNIVERSITY OF WISCONSIN - MADISON

Request	9 Feb, 82	Unspecified
Rejected	23 Jun, 82	

717	FORWARD DETECTOR #717 BEAM: Collision Area (D-0) A FORWARD LOOKING DETECTOR FOR THE D0 AREA.	Joseph Lach	FERMILAB

Request	19 Mar, 82	Unspecified
Rejected	23 Jun, 82	

718	CALORIMETERS AT D-0 #718 BEAM: Collision Area (D-0) STUDY OF PBAR-P INTERACTIONS USING CALORIMETERS AT D-0.	Albert R. Erwin	ARGONNE NATIONAL LABORATORY UNIVERSITY OF ARIZONA FERMILAB UNIVERSITY OF PENNSYLVANIA UNIVERSITY OF WISCONSIN - MADISON

Request	1 Apr, 82	Unspecified
Rejected	23 Jun, 82	

719	ELECTRON TARGET FACILITY #719 BEAM: Collision Area (D-0) ELECTRON-PROTON INTERACTION EXPERIMENT. (This proposal supercedes proposals #703 and #708.)	Wonyong Lee	ARGONNE NATIONAL LABORATORY CARELTON UNIVERSITY (CANADA) CEN-SACLAY (FRANCE) CHALK RIVER NUCLEAR LAB. (CANADA) UNIVERSITY OF COLORADO AT BOULDER COLUMBIA UNIVERSITY FERMILAB HARVARD UNIVERSITY UNIVERSITY OF ILLINOIS, CHAMPAIGN JOHNS HOPKINS UNIVERSITY UNIVERSITY OF MARYLAND MCGILL UNIVERSITY (CANADA) UNIVERSITY OF MICHIGAN - ANN ARBOR MICHIGAN STATE UNIVERSITY NIKHEF-H (NETHERLANDS) UNIVERSITY OF PENNSYLVANIA PRINCETON UNIVERSITY RICE UNIVERSITY ROCKEFELLER UNIVERSITY UNIVERSITY OF SASKATCHEWAN(CANADA) UNIVERSITY OF TORONTO (CANADA)

Request	14 May, 82	Unspecified
Not Approved	23 Jun, 82	

720	FREE QUARK SEARCH #720 BEAM: Miscellaneous Area PROPOSAL TO SEARCH FOR +1/3E STABLE PARTICLES USING CRYOGENIC SOURCES.	John P. Schiffer	ARGONNE NATIONAL LABORATORY FERMILAB

Request	29 Jan, 82	Unspecified
Approval	15 Mar, 82	Unspecified for 3 months
	2 Jun, 82	Unspecified
Completed	8 Oct, 82	Unspecified

721	CP VIOLATION #721 BEAM: Proton Area - West AN EXPERIMENT TO STUDY CP VIOLATION IN THE DECAY OF K-LONG PRODUCED BY ANTI-PROTONS.	Jerome L. Rosen	UNIVERSITY OF ARIZONA UNIVERSITY OF ATHENS (GREECE) DUKE UNIVERSITY FERMILAB FLORIDA A&M UNIVERSITY MCGILL UNIVERSITY (CANADA) NORTHWESTERN UNIVERSITY SHANDONG UNIVERSITY (PRC)

Request	11 Jun, 82	Unspecified
Approval	12 Mar, 84	Test Running
Approved/Inactive	30 Jun, 87	Unspecified

722	D-0 STREAMER CHAMBER #722 BEAM: Collision Area (D-0) STREAMER CHAMBER EXPERIMENT AT THE TEVATRON COLLIDER.	V. Paul Kenney	UNIVERSITY OF CAMBRIDGE (ENGLAND) NOTRE DAME UNIVERSITY

Request	11 Oct, 82	Unspecified
Inactive	18 Feb, 83	

723	GRAVITATIONAL DETECTOR #723 BEAM: Collision Area (C-0) TEST OF A GRAVITATIONAL DETECTOR AT THE TEVATRON COLLIDER.	Adrian Melissinos	FERMILAB UNIVERSITY OF ROCHESTER

Request	21 Oct, 82	Unspecified
Approval	12 Mar, 84	Test Running
Completed	29 Aug, 85	Test Running

724	CALORIMETRIC DETECTOR #724 BEAM: Collision Area (D-0) COMPLETE CALORIMETRIC DETECTOR FOR THE D-0 AREA.	Michael J. Longo	CALIFORNIA INSTITUTE OF TECHNOLOGY UNIV. OF ILLINOIS, CHICAGO CIRCLE MCGILL UNIVERSITY (CANADA) UNIVERSITY OF MICHIGAN - ANN ARBOR NOTRE DAME UNIVERSITY

Request	26 Oct, 82	Unspecified
Rejected	1 Jul, 83	

725 DIFFRACTION DISSOCIATION #725 — Konstantin Goulianos — ROCKEFELLER UNIVERSITY
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	

726 CALORIMETRIC DETECTOR #726 — Maris A. Abolins — UNIVERSITY OF ARIZONA, FERMILAB, MICHIGAN STATE UNIVERSITY, UNIVERSITY OF PENNSYLVANIA
BEAM: Collision Area (D-0)
PROPOSED CALORIMETRIC DETECTOR FOR THE D-0 AREA.

Request	1 Nov, 82	Unspecified
Rejected	1 Jul, 83	

727 FORWARD CALORIMETER #727 — Jerome L. Rosen — NORTHWESTERN UNIVERSITY
BEAM: Collision Area (D-0)
SPLIT-FIELD MAGNET SPECTROMETER AND ELECTROMAGNETIC SHOWER DETECTOR FOR D-0.

Request	2 Nov, 82	Unspecified
Withdrawn	16 May, 83	

728 MUON PRODUCTION #728 — Daniel R. Green — UNIVERSITY OF ARIZONA, FERMILAB, FLORIDA STATE UNIVERSITY, UNIVERSITY OF MARYLAND, VIRGINIA TECH
BEAM: Collision Area (D-0)
STUDY OF MUONS FROM PBAR-P COLLISIONS UP TO SQUARE ROOT OF S EQUAL TO 2 TEV.
(This proposal supercedes proposal #712.)

Request	1 Nov, 82	Unspecified
Rejected	1 Jul, 83	

729 EMULSION/PROTONS @ 1 TEV #729 — Atul Gurtu — TATA INSTITUTE (INDIA)
BEAM: Meson Area - Test Beam
PROPOSAL TO STUDY CHARM AND MULTIPARTICLE PRODUCTION IN 1 TEV PROTON-EMULSION COLLISIONS

Request	24 Nov, 82	Unspecified
Approval	5 Dec, 83	Emulsion Exposure
Completed	26 Apr, 85	2 Emulsion Stack(s)

730 EMULSION/SIGMA-MINUS @ 250 #730 — Richard J. Wilkes — INP, KRAKOW (POLAND), INST.FOR NUCL. RESEARCH (BULGARIA), UNIVERSITY OF WASHINGTON
BEAM: Proton Area - Center
EMULSION EXPOSURE TO 250 GEV SIGMA-MINUS.

Request	5 Jan, 83	Unspecified
Approval	10 Feb, 84	Unspecified
Completed	10 Feb, 84	4 Hours

731 CP VIOLATION #731 — Bruce D. Winstein — CEN-SACLAY (FRANCE), UNIVERSITY OF CHICAGO, ELMHURST COLLEGE, FERMILAB, PRINCETON UNIVERSITY
BEAM: Meson Area - Center
A MEASUREMENT OF THE MAGNITUDE OF (E'/E) IN THE NEUTRAL KAON SYSTEM TO A PRECISION OF .001.

Request	1 Feb, 83	Unspecified
Approval	1 Jul, 83	Unspecified
Completed	15 Feb, 88	3,100 Hours

732 XI-ZERO DECAY #732 — Marleigh C. Sheaff — UNIVERSITY OF MICHIGAN - ANN ARBOR, UNIVERSITY OF MINNESOTA, RUTGERS UNIVERSITY, UNIVERSITY OF WISCONSIN - MADISON
BEAM: Proton Area - Center
A SEARCH FOR THE DECAY NEUTRAL CASCADE TO PROTON AND NEGATIVE PION.

Request	1 Feb, 83	Unspecified
Rejected	25 Jun, 85	

733 NEUTRINO INTERACTIONS #733 — Raymond L. (Chip) Brock — FERMILAB, UNIVERSITY OF FLORIDA, MASSACHUSETTS INST. OF TECHNOLOGY, MICHIGAN STATE UNIVERSITY
BEAM: Neutrino Area - Center
PROPOSAL TO STUDY HIGH ENERGY NEUTRINO INTERACTIONS WITH THE TEVATRON QUADRUPOLE TRIPLET BEAM.

Request	1 Feb, 83	Unspecified
	16 Sep, 83	Unspecified
Approval	12 Nov, 83	Unspecified Stage I approval.
Completed	1 Feb, 88	4,100 Hours

734 HYPERON PRODUCTION #734 — Michael V. Hynes — UNIV. OF CALIFORNIA, LOS ANGELES, LOS ALAMOS NATIONAL LABORATORY
BEAM: Proton Area - Center
PRIMAKOFF PRODUCTION OF HYPERON EXCITED STATES.

Request	1 Apr, 83	Unspecified
Inactive	21 May, 86	

735 PARTICLE SEARCH #735 — Laszlo J. Gutay — DUKE UNIVERSITY, FERMILAB, IOWA STATE UNIVERSITY, NOTRE DAME UNIVERSITY, PURDUE UNIVERSITY, UNIVERSITY OF WISCONSIN - MADISON
BEAM: Collision Area (C-0)
SEARCH FOR A DECONFINED QUARK GLUON PHASE OF STRONGLY INTERACTING MATTER IN PBAR-P INTERACTIONS AT SQUARE ROOT OF S EQUAL TO 2 TEV.

Request	11 Apr, 83	Unspecified
	16 Sep, 83	Unspecified
Approval	15 Dec, 83	Unspecified Stage I approval.
Completed	31 May, 89	Unspecified

736 D-0 QUARK SEARCH #736 — Robert K. Adair — BROOKHAVEN NATIONAL LABORATORY, YALE UNIVERSITY
BEAM: Collision Area (D-0)
A PROPOSAL TO CONDUCT A QUARK SEARCH AT THE FERMILAB COLLIDER.

Request	11 Apr, 83	Unspecified
Rejected	1 Jul, 83	

737 BATISS EXPERIMENT #737 — Peter Kotzer — KAZAKH STATE UNIV., (KAZAKHSTAN), MOSCOW STATE UNIVERSITY (RUSSIA), UNIVERSITY OF WASHINGTON, WESTERN WASHINGTON UNIVERSITY
BEAM: Unspecified Beam
STUDY OF HIGH ENERGY NEUTRINOS WITH A DEEP UNDERWATER DETECTOR OF A MASS GREATER THAN 10 TO THE 6TH TONS.

Request	25 Apr, 83	Unspecified
Rejected	12 Nov, 83	

738	NARROW BAND #738	Charles Baltay	COLUMBIA UNIVERSITY
	BEAM: Neutrino Area - Center		
	LETTER OF INTENT TO RUN IN THE NARROW BAND AND BEAM AT TEVATRON II.		
	Request 3 Jun, 83 Unspecified		
	Withdrawn 26 Apr, 84		
739	ELECTRON-POSITRON #739	Nelson Cue and Chih-Ree Sun	UNIV. OF CLAUDE BERNARD (FRANCE)
	BEAM: Proton Area - East		FERMILAB
	MEASUREMENTS OF CRYSTAL-ASSISTED ELECTRON-POSITRON PAIR CREATION.		LAPP, D'ANNECY-LE-VIEUX (FRANCE)
			SUNY AT ALBANY
	Request 9 Sep, 83 Unspecified		
	Rejected 19 Apr, 85		
740	D-0 DETECTOR #740	Paul D. Grannis and Hugh Elliott Montgomery	UNIVERSIDAD DE LOS ANDES(COLOMBIA)
	BEAM: Collision Area (D-0)		UNIVERSITY OF ARIZONA
	STUDY OF PROTON ANTI-PROTON COLLISIONS USING A LARGE DETECTOR AT D-0.		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
	Request 9 Sep, 83 Unspecified		
	Approval 10 Feb, 84 Unspecified		
	Data Analysis 20 Feb, 96		
741	COLLIDER DETECTOR #741	Melvyn Jay Shochet and Alvin V. Tollestrup	ARGONNE NATIONAL LABORATORY
	BEAM: Collision Area (B-0)		BRANDEIS UNIVERSITY
	STUDY OF PROTON ANTI-PROTON COLLISIONS USING A LARGE DETECTOR AT B-0.		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
	Request 1 Apr, 82 Unspecified		
	Approval 1 Apr, 82 Unspecified		
	Completed 31 May, 89 Unspecified		
742	STRANGE QUARK #742	Joseph Lach	UNIVERSITY OF CHICAGO
	BEAM: Proton Area - Center		ELMHURST COLLEGE
	LETTER OF INTENT TO MEASURE OMEGA MINUS POLARIZATION AND MAGNETIC MOMENT.		FERMILAB
			IOWA STATE UNIVERSITY
			UNIVERSITY OF IOWA
			PNPI, ST. PETERSBURG (RUSSIA)
			YALE UNIVERSITY
	Request 13 Jun, 83 Unspecified		
	Inactive 15 Jun, 85		

743	CHARM PRODUCTION #743	Stephen Reucroft	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)
	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		
744	CHARGED INTERACTIONS #744	Frank S. Merritt	UNIVERSITY OF CHICAGO COLUMBIA UNIVERSITY FERMILAB UNIVERSITY OF ROCHESTER
	BEAM: Neutrino Area - Center		
	HIGH STATISTICS STUDIES OF CHARGED CURRENT INTERACTIONS USING THE TEVATRON QUAD TRIPLET BEAM.		
	Request 16 Sep, 83 Unspecified		
	Approval 17 Nov, 83 Unspecified Stage I approval.		
	Completed 29 Aug, 85 1,900 Hours		
745	MUON NEUTRINO #745	Toshio Kitagaki	IHEP, BEIJING (PRC) BROWN UNIVERSITY FERMILAB INDIANA UNIVERSITY MASSACHUSETTS INST. OF TECHNOLOGY NAGOYA UNIVERSITY (JAPAN) OAK RIDGE NATIONAL LABORATORY UNIVERSITY OF TENNESSEE, KNOXVILLE TOHOKU GAKUIN UNIVERSITY (JAPAN) TOHOKU UNIVERSITY (JAPAN)
	BEAM: Neutrino Area - Center		
	MUON NEUTRINO EXPERIMENT USING THE TOHOKU HIGH RESOLUTION ONE METER BUBBLE CHAMBER.		
	Request 10 Sep, 83 Unspecified		
	Approval 16 Dec, 83 Parasitic Running		
	Completed 1 Feb, 88 553 K Pix		
746	PROMPT BEAM FACILITY #746	James K. Walker	FERMILAB MASSACHUSETTS INST. OF TECHNOLOGY MICHIGAN STATE UNIVERSITY
	BEAM: Neutrino Area - Prompt Beam		
	LETTER OF INTENT TO SEARCH FOR NEW PARTICLES FROM THE PROMPT BEAM FACILITY.		
	Request 1 Sep, 83 Unspecified		
	Withdrawn 2 Jun, 86		
747	CHARGED PARTICLES #747	Alan A. Hahn	CALIFORNIA INSTITUTE OF TECHNOLOGY UNIV. OF CALIFORNIA, IRVINE FERMILAB LAWRENCE BERKELEY LABORATORY LAWRENCE LIVERMORE LABORATORY LOS ALAMOS NATIONAL LABORATORY UNIVERSITY OF ROCHESTER SAN FRANCISCO STATE UNIVERSITY UNIVERSITY OF TORONTO (CANADA)
	BEAM: Proton Area - Broad Band		
	A SEARCH FOR FRACTIONALLY CHARGED PARTICLES AT THE TEVATRON.		
	Request 27 Feb, 84 Unspecified		
	Approval 1 Apr, 85 Unspecified		
	Completed 2 Aug, 85 Unspecified		
748	BEAUTY & CHARM PRODUCTION #748	Jack Sandweiss	FERMILAB NEW YORK UNIVERSITY UNIVERSITY OF VRIJE (BELGIUM) YALE UNIVERSITY
	BEAM: Unspecified Beam		
	LETTER OF INTENT TO STUDY BEAUTY AND CHARM AT THE TEVATRON USING HIGH RESOLUTION STEAMER CHAMBER AND A DOWNSTREAM SPECTROMETER.		
	Request 7 May, 84 Unspecified		
	Withdrawn 2 Oct, 84		
749	CHANNELING #749	James S. Forster	CHALK RIVER NUCLEAR LAB. (CANADA) FERMILAB UNIVERSITY OF NEW MEXICO SUNY AT ALBANY
	BEAM: Meson Area - Bottom		
	LETTER OF INTENT TO STUDY MATERIAL AND FABRICATION ASPECTS OF CRYSTALS USED FOR CHANNELING.		
	Request 19 Jul, 84 400 Hours		
	Withdrawn 1 Oct, 84		
750	MULTIPARTICLE PRODUCTION #750	Ram K. Shivpuri	DELHI UNIVERSITY (INDIA)
	BEAM: Neutrino Area - Miscellaneous		
	A PROPOSAL TO STUDY MULTIPARTICLE PRODUCTION IN INTERACTIONS OF 1 TEV PROTONS WITH EMULSION NUCLEI.		
	Request 27 Jun, 84 Emulsion Exposure beam at or near 1 TeV protons of flux approximately 5 x 10 to the 4th protons/sq cm over an area of (8 x 3)sq cm		
	Approval 23 Jul, 84 Emulsion Exposure		
	Completed 11 Jul, 85 1 Emulsion Stack(s)		
751	EMULSION EXPOSURE @ 1 TEV #751	Piyare L. Jain	SUNY AT BUFFALO
	BEAM: Meson Area - Test Beam		
	PROPOSAL TO STUDY 1 TEV PROTON INTERACTIONS IN EMULSION.		
	Request 27 Jun, 84 Emulsion Exposure		
	Approval 2 Jul, 84 Emulsion Exposure		
	Completed 26 Apr, 85 1 Emulsion Stack(s)		
752	PARTICLE COLLISIONS #752	James W. Cronin	UNIVERSITY OF CHICAGO TECHNION-ISRAEL INST (ISRAEL)
	BEAM: Unspecified Beam		
	PROPOSAL TO SEARCH FOR ANOMALOUSLY LARGE HADRON CROSS SECTIONS AT SHORT DISTANCES.		
	Request 23 Oct, 84 200 Hours		
	Withdrawn 8 Dec, 86		

753 CHANNELING STUDIES #753 — James S. Forster
BELL NORTHERN RESEARCH LAB(CANADA)
CHALK RIVER NUCLEAR LAB. (CANADA)
FERMILAB
UNIVERSITY OF NEW MEXICO
SUNY AT ALBANY
BEAM: Meson Area - Bottom
PROPOSAL TO IMPROVE THE DEFLECTION OF HIGH ENERGY PARTICLE BEAMS BY CHANNELING IN BENT CRYSTALS OF SI AND GE.

Request	28 Sep, 84	400 Hours
Approval	20 Nov, 84	Unspecified
Completed	5 Jul, 85	150 Hours

754 CHANNELING TESTS #754 — Chih-Ree Sun
FERMILAB
GENERAL ELECTRIC R&D CENTER
SUNY AT ALBANY
SANDIA LABORATORIES
SSC LABORATORY
BEAM: Meson Area - Bottom
CRYSTAL CHANNELING TESTS IN M-BOTTOM INCLUDING FOCUSING WITH DEFORMED CRYSTALS AND STUDIES OF HIGH Z CRYSTALS.

Request	1 Oct, 84	300 Hours
Approval	20 Nov, 84	Unspecified
Approved/Inactive	24 Dec, 91	

755 BEAUTY & CHARM STUDY #T755 — Richard D. Majka and Anna Jean Slaughter
FERMILAB
YALE UNIVERSITY
BEAM: Meson Area - Test Beam
A HIGH SENSITIVITY STUDY OF BEAUTY AND CHARM IN HADROPRODUCTION AT THE TEVATRON.

Request	2 Oct, 84	Unspecified
Approval	25 Nov, 86	Unspecified
Completed	15 Feb, 88	Unspecified

756 MAGNETIC MOMENT #756 — Kam-Biu Luk
UNIVERSITY OF ARIZONA
UNIV. OF CALIFORNIA, BERKELEY
FERMILAB
INDIANA UNIVERSITY
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF MICHIGAN - ANN ARBOR
UNIVERSITY OF MINNESOTA
RUTGERS UNIVERSITY
BEAM: Proton Area - Center
MEASUREMENT OF THE MAGNETIC MOMENT OF THE OMEGA MINUS HYPERON.

Request	8 Oct, 84	1,000 Hours
Approval	25 Jun, 85	1,000 Hours Stage I approval.
Completed	15 Feb, 88	1,700 Hours

757 MUON DEFLECTION #757 — Jorge G. Morfin
FERMILAB
UNIVERSITY OF ILLINOIS, CHAMPAIGN
UNIVERSITY OF WASHINGTON
UNIVERSITY OF WISCONSIN - MADISON
BEAM: Neutrino Area - Muon Beam
LETTER OF INTENT FOR A PROPOSAL TO STUDY MOMENTUM RESOLUTION FOR MUONS ABOVE 300 GEV IN MAGNETIZED IRON.

Request	12 Dec, 84	Test Running
Rejected	14 Dec, 85	

758 EMULSION EXPOSURE #758 — Mitsuko Kazuno and Hiroshi Shibuya
NAGOYA UNIVERSITY (JAPAN)
TOHO UNIVERSITY (JAPAN)
BEAM: Meson Area - Test Beam
STUDY OF THE MECHANISM OF MULTIPARTICLE PRODUCTION IN EMULSION NUCLEI @ 800 GEV PROTONS.

Request	11 Mar, 85	Unspecified
Approval	11 Mar, 85	Unspecified
Completed	26 Apr, 85	2 Emulsion Stack(s)

759 EMULSION EXPOSURE #759 — Yoshihiro Tsuzuki
KOBE UNIVERSITY (JAPAN)
OSAKA CITY UNIVERSITY (JAPAN)
OSAKA SCIENCE EDUC. INST. (JAPAN)
BEAM: Meson Area - Test Beam
A STUDY OF NUCLEAR INTERACTIONS OF 800 GEV PROTONS IN EMULSION.

Request	11 Mar, 85	Unspecified
Approval	11 Mar, 85	Unspecified
Completed	26 Apr, 85	2 Emulsion Stack(s)

760 CHARMONIUM STATES #760 — Rosanna Cester
UNIV. OF CALIFORNIA, IRVINE
FERMILAB
UNIVERSITY OF FERRARA (ITALY)
INFN, GENOVA (ITALY)
NORTHWESTERN UNIVERSITY
PENNSYLVANIA STATE UNIVERSITY
UNIVERSITY OF TORINO (ITALY)
BEAM: Accumulator Ring
A PROPOSAL TO INVESTIGATE THE FORMATION OF CHARMONIUM STATES USING THE PBAR ACCUMULATOR RING.

Request	29 Mar, 85	Unspecified
Approval	25 Jun, 85	Unspecified
Data Analysis	10 Jan, 92	Unspecified

761 HYPERON RADIATIVE DECAY #761 — Alexei A. Vorobiev
IHEP, BEIJING (PRC)
UNIVERSITY OF BRISTOL (ENGLAND)
CBPF (BRAZIL)
FERMILAB
UNIVERSITY OF IOWA
ITEP, MOSCOW (RUSSIA)
PNPI, ST. PETERSBURG (RUSSIA)
UNIV. FEDERAL DO RIO DE JANEIRO
UNIVERSITE OF SAO PAULO (BRAZIL)
YALE UNIVERSITY
BEAM: Proton Area - Center
PROPOSAL TO STUDY HYPERON RADIATIVE DECAY.

Request	3 Apr, 85	Unspecified
Approval	25 Jun, 85	Unspecified Stage I approval.
Completed	27 Aug, 90	Unspecified

762 EMULSION/PROTONS @ 800 GEV #762 — Shoji Dake
AOYAMA GAKUIN UNIVERSITY (JAPAN)
ICRR, UNIVERSITY OF TOKYO (JAPAN)
KOBE UNIVERSITY (JAPAN)
OKAYAMA UNIVERSITY (JAPAN)
OSAKA SCIENCE EDUC. INST. (JAPAN)
BEAM: Meson Area - Test Beam
CASCADE SHOWERS ORIGINATING IN PROTON-NUCLEUS COLLISIONS.

Request	11 Jun, 85	Unspecified
Approval	21 Jun, 85	Unspecified
Completed	11 Jul, 85	18 Emulsion Stack(s)

763 EMULSION/PROTONS @ 800 GEV #763 — Takeshi Ogata
ICRR, UNIVERSITY OF TOKYO (JAPAN)
KOBE UNIVERSITY (JAPAN)
OKAYAMA UNIVERSITY (JAPAN)
OSAKA SCIENCE EDUC. INST. (JAPAN)
BEAM: Meson Area - Test Beam
PROTON-NUCLEUS INTERACTIONS AT TEVATRON ENERGY.

Request	11 Jun, 85	Unspecified
Approval	21 Jun, 85	Unspecified
Completed	11 Jul, 85	2 Emulsion Stack(s)

764 EMULSION EXPOSURE #764 — Hirotada Nanjo — HIROSAKI UNIVERSITY (JAPAN)
BEAM: Meson Area - Test Beam
EXCLUSIVE INVESTIGATION OF MULTIPLE PRODUCTION IN RAPIDITY SPACE.

Request	11 Jun, 85	Unspecified
Approval	21 Jun, 85	Unspecified
Completed	11 Jul, 85	1 Emulsion Stack(s)

765 EMULSION/PROTONS @ 800 GEV #765 — K. Imaeda — OKAYAMA UNIVERSITY (JAPAN)
BEAM: Meson Area - Test Beam
TRANSVERSE MOMENTUM MEASUREMENT OF SECONDARY PARTICLES IN PROTON-EMULSION COLLISIONS AT 800 GEV.

Request	20 Jun, 85	Unspecified
Approval	21 Jun, 85	Unspecified
Completed	11 Jul, 85	7 Emulsion Stack(s)

766 MR TUNNEL NEUTRONS #T766 — Joseph B. McCaslin — FERMILAB; LAWRENCE BERKELEY LABORATORY
BEAM: Collision Area (Miscellaneous)
MEASUREMENTS OF THE NEUTRON SPECTRUM IN THE TEVATRON TUNNEL WITH APPLICATION TO THE SSC.

Request	11 Jul, 85	Unspecified
Approval	17 Jul, 85	Unspecified
Completed	13 Oct, 85	Unspecified

767 MUON CALORIMETRY #767 — Yasushi Muraki — CHUO UNIVERSITY (JAPAN); ICRR, UNIVERSITY OF TOKYO (JAPAN); KEK (JAPAN); NAGOYA UNIVERSITY (JAPAN)
BEAM: Neutrino Area - Muon Beam
MEASUREMENT OF DIRECT ELECTRON PAIR PRODUCTION CROSS-SECTION IN THE TEVATRON MUON BEAM.

Request	29 Aug, 85	Unspecified
Rejected	1 Jul, 86	

768 POLARIZED SCATTERING #768 — Alan D. Krisch — BROOKHAVEN NATIONAL LABORATORY; CERN (SWITZERLAND); FERMILAB; LHE, ETH HONGGERBERG (SWITZERLAND); UNIVERSITY OF MARYLAND; MASSACHUSETTS INST. OF TECHNOLOGY; UNIVERSITY OF MICHIGAN - ANN ARBOR; NOTRE DAME UNIVERSITY; TEXAS A&M UNIVERSITY
BEAM: Proton Area - West
PROTON - PROTON ELASTIC SCATTERING WITH A POLARIZED TARGET.

Request	12 Nov, 85	Unspecified
Rejected	30 Jun, 87	

769 PION & KAON CHARM PROD. #769 — Jeffrey A. Appel — CBPF (BRAZIL); FERMILAB; UNIVERSITY OF MISSISSIPPI; NORTHEASTERN UNIVERSITY; UNIVERSITY OF TORONTO (CANADA); TUFTS UNIVERSITY; UNIVERSITY OF WISCONSIN - MADISON; YALE UNIVERSITY
BEAM: Proton Area - East
PION AND KAON PRODUCTION OF CHARM AND CHARM-STRANGE STATE.

Request	14 Dec, 85	Unspecified
Approval	14 Dec, 85	Unspecified
Data Analysis	15 Feb, 88	1,900 Hours

770 QUAD TRIPLET NEUTRINO #770 — Wesley H. Smith — UNIVERSITY OF CHICAGO; COLUMBIA UNIVERSITY; FERMILAB; UNIVERSITY OF ROCHESTER; UNIVERSITY OF WISCONSIN - MADISON
BEAM: Neutrino Area - Center
HIGH STATISTICS STUDIES OF CHARGED CURRENT INTERACTIONS USING THE TEVATRON QUAD TRIPLET BEAM.

Request	27 Dec, 85	Unspecified
Approval	27 Dec, 85	Unspecified Stage I approval.
Completed	1 Feb, 88	1,600 Hours

771 BEAUTY PRODUCTION BY PROTONS #771 — Bradley B. Cox — UNIVERSITY OF SOUTH ALABAMA; UNIVERSITY OF ATHENS (GREECE); BROWN UNIVERSITY; UNIV. OF CALIFORNIA, BERKELEY; UNIV. OF CALIFORNIA, LOS ANGELES; DUKE UNIVERSITY; FERMILAB; UNIVERSITY OF HOUSTON; JINR, DUBNA (RUSSIA); UNIVERSITY OF LECCE (ITALY); MASSACHUSETTS INST. OF TECHNOLOGY; MCGILL UNIVERSITY (CANADA); NANJING UNIVERSITY (PRC); NORTHWESTERN UNIVERSITY; UNIVERSITY OF PAVIA (ITALY); UNIVERSITY OF PENNSYLVANIA; PRAIRIE VIEW A&M UNIVERSITY; SHANDONG UNIVERSITY (PRC); VANIER COLLEGE (CANADA); UNIVERSITY OF VIRGINIA; UNIVERSITY OF WISCONSIN - MADISON
BEAM: Proton Area - West
PROPOSAL TO STUDY BEAUTY PRODUCTION AND OTHER HEAVY QUARK PHYSICS ASSOCIATED WITH DIMUON PRODUCTION IN 800 (925) GEV/C PP INTERACTIONS.

Request	10 Dec, 86	Unspecified
Approval	4 Apr, 87	Unspecified
Data Analysis	8 Jan, 92	Unspecified

772 DIMUONS #772 — Joel M. Moss — CASE WESTERN RESERVE UNIVERSITY; FERMILAB; UNIV. OF ILLINOIS, CHICAGO CIRCLE; LOS ALAMOS NATIONAL LABORATORY; SUNY AT STONY BROOK; NORTHERN ILLINOIS UNIVERSITY; RUTGERS UNIVERSITY; UNIVERSITY OF SOUTH CAROLINA; UNIVERSITY OF TEXAS AT AUSTIN; UNIVERSITY OF WASHINGTON
BEAM: Meson Area - East
STUDY OF THE NUCLEAR ANTIQUARK SEA VIA P+N -> DIMUONS.

Request	11 Mar, 86	Unspecified
Approval	1 Jul, 86	Unspecified
Completed	15 Feb, 88	1,700 Hours

773	ETA00 & ETA+- PHASE DIFFERENCE #773	George D. Gollin	UNIVERSITY OF CHICAGO ELMHURST COLLEGE FERMILAB UNIVERSITY OF ILLINOIS, CHAMPAIGN RUTGERS UNIVERSITY
	BEAM: Meson Area - Center MEASUREMENT OF PHASE DIFFERENCE BETWEEN ETA 00 AND ETA +- TO A PRECISION OF 1/2 DEGREE.		
	Request 11 Mar, 86 Unspecified Approval 1 Jul, 86 Unspecified 29 Jun, 89 Unspecified Stage II approval. Completed 30 Sep, 91 Unspecified		
774	ELECTRON BEAM DUMP #774	Michael B. Crisler	FERMILAB UNIVERSITY OF ILLINOIS, CHAMPAIGN INP, KRAKOW (POLAND) NORTHEASTERN UNIVERSITY
	BEAM: Proton Area - Broad Band ELECTRON BEAM DUMP PARTICLE SEARCH IN THE WIDE BAND HALL.		
	Request 4 Apr, 86 Unspecified Approval 10 Dec, 86 Unspecified Completed 27 Aug, 90 Unspecified		
775	CDF UPGRADE #775	William C. Carithers, Jr. and Giorgio Bellettini	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) 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		
776	NUCLEAR CAL. CROSS SECTIONS#776	Samuel I. Baker	BROOKHAVEN NATIONAL LABORATORY CERN (SWITZERLAND) FERMILAB
	BEAM: Miscellaneous Area MEASUREMENT OF NUCLEAR CALIBRATION CROSS SECTIONS FOR PROTONS GREATER THAN 400 GEV.		
	Request 6 Aug, 86 Unspecified Approval 7 Jan, 87 Unspecified Completed 15 Feb, 88 Unspecified		
777	MR TUNNEL NEUTRONS #777	Joseph B. McCaslin	FERMILAB LAWRENCE BERKELEY LABORATORY SSC CENTRAL DESIGN GROUP
	BEAM: Collision Area (Miscellaneous) NEUTRON FLUX MEASUREMENTS IN THE TEVATRON TUNNEL.		
	Request 29 Oct, 86 Unspecified Approval 7 Jan, 87 Unspecified Completed 11 May, 87 Unspecified		
778	MAGNET APERTURE STUDIES #778	Rodney E. Gerig and Richard Talman	CERN (SWITZERLAND) CORNELL UNIVERSITY FERMILAB UNIVERSITY OF HOUSTON SSC CENTRAL DESIGN GROUP SLAC
	BEAM: Collision Area (Miscellaneous) STUDY OF THE SSC MAGNET APERTURE CRITERION.		
	Request 18 Oct, 86 Unspecified Approval 10 Dec, 86 Unspecified Completed 21 Jan, 91 Unspecified		
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 CARNEGIE-MELLON UNIVERSITY UNIVERSITY OF OKLAHOMA
	BEAM: Neutrino Area - East STUDY OF CHARM PRODUCED BY 850 GEV PROTONS.		
	Request 1 Mar, 87 Unspecified Rejected 14 Dec, 87		

781 LARGE-X BARYON SPECTROMETER#781 James S. Russ
BEAM: Proton Area - Center
SEGMENTED LARGE-X BARYON SPECTROMETER (SELEX).

IHEP, BEIJING (PRC)
BOGAZICI UNIVERSITY (TURKEY)
UNIVERSITY OF BRISTOL (ENGLAND)
CARNEGIE-MELLON UNIVERSITY
CBPF (BRAZIL)
FERMILAB
UNIVERSITY OF HAWAII AT MANOA
UNIVERSITY OF IOWA
MAX-PLANCK INSTITUTE (GERMANY)
MOSCOW STATE UNIVERSITY (RUSSIA)
ITEP, MOSCOW (RUSSIA)
UNIV. FEDERAL DO PARAIBA (BRAZIL)
PNPI, ST. PETERSBURG (RUSSIA)
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
UNIVERSITY OF ROCHESTER
INFN, ROME (ITALY)
UN.AUTO.DE SAN LUIS POTOSI(MEXICO)
UNIVERSITE OF SAO PAULO (BRAZIL)
UNIVERSITY OF TEL-AVIV (ISRAEL)
INFN, TRIESTE (ITALY)

Request	4 Mar, 87	Unspecified
Approval	24 Oct, 88	Unspecified
In Progress	20 Feb, 97	

782 MUONS IN 1M BUBBLE CHAMBER #782 Toshio Kitagaki
BEAM: Neutrino Area - NK Beam
A MUON EXPOSURE IN THE TOHOKU HIGH RESOLUTION BUBBLE CHAMBER.

IHEP, BEIJING (PRC)
BROWN UNIVERSITY
FERMILAB
MASSACHUSETTS INST. OF TECHNOLOGY
OAK RIDGE NATIONAL LABORATORY
SENSYU UNIVERSITY (JAPAN)
SUGIYAMA JOGAKUEN UNIV. (JAPAN)
UNIVERSITY OF TENNESSEE, KNOXVILLE
TOHOKU GAKUIN UNIVERSITY (JAPAN)
TOHOKU UNIVERSITY (JAPAN)

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
BEAM: Collision Area (C-0)
LETTER OF INTENT FOR A TEVATRON COLLIDER BEAUTY FACTORY.

UNIV. OF CALIFORNIA, DAVIS
CARNEGIE-MELLON UNIVERSITY
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
BEAM: Unspecified Beam
PROPOSAL FOR RESEARCH & DEVELOPMENT: VERTEXING, TRACKING AND DATA ACQUISITION FOR THE BOTTOM COLLIDER DETECTOR.

UNIVERSIDAD DE LOS ANDES(COLOMBIA)
UNIV. OF CALIFORNIA, DAVIS
FERMILAB
UNIVERSITY OF FLORIDA
UNIVERSITY OF HOUSTON
ILLINOIS INSTITUTE OF TECHNOLOGY
UNIVERSITY OF IOWA
NORTHEASTERN UNIVERSITY
NORTHERN ILLINOIS UNIVERSITY
OHIO STATE UNIVERSITY
UNIVERSITY OF OKLAHOMA
UNIVERSITY OF PENNSYLVANIA
PRAIRIE VIEW A&M UNIVERSITY
PRINCETON UNIVERSITY
UNIV. OF PUERTO RICO - RIO PIEDRAS
UN.SAN FRANCISCO DE QUITO(ECUADOR)
YALE UNIVERSITY

Request	2 Jan, 89	Unspecified	
Approval	30 Jan, 89	Unspecified	Approval of Phase I (bench tests) and Phase II (beam tests). Phase III (C0 run at the Tevatron Collider) deferred pending results of simulation studies.
Completed	8 Jan, 92	Unspecified	

785 LOW ENERGY ANTIMATTER #785 Billy Bonner and Lawrence Pinsky
BEAM: Miscellaneous Area
ANTIMATTER PHYSICS AT LOW ENERGY (AMPLE)

UNIVERSITY OF HOUSTON
RICE UNIVERSITY

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.

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

Request	10 May, 87	Unspecified
Rejected	29 Jun, 88	

787 PARTICLE SEARCH #787 Alfred T. Goshaw
BEAM: Collision Area (C-0)
PARTICLE SEARCH (PHASE II OF E-735).

DEPAUW UNIVERSITY
DUKE UNIVERSITY
FERMILAB
IOWA STATE UNIVERSITY
NOTRE DAME UNIVERSITY
PURDUE UNIVERSITY
UNIVERSITY OF WISCONSIN - MADISON

Request	30 Jun, 87	Unspecified
Rejected	1 May, 89	

788 NEUTRINO OSCILLATIONS #788 — Robert H. Bernstein
FERMILAB
UNIV. OF PARIS VI, LPG (FRANCE)
BEAM: Neutrino Area - Center
NEUTRINO OSCILLATIONS AND CROSS-SECTIONS IN A TAGGED NEUTRINO LINE.

Request	11 Aug, 87	Unspecified
Inactive	23 Dec, 92	

789 B-QUARK MESONS & BARYONS #789 — Daniel M. Kaplan and Jen-Chieh Peng
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
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

790 CALORIMETER FOR ZEUS #790 — Frank J. Sciulli
ARGONNE NATIONAL LABORATORY
COLUMBIA UNIVERSITY
UNIVERSITY OF IOWA
LOUISIANA STATE UNIVERSITY
OHIO STATE UNIVERSITY
PENNSYLVANIA STATE UNIVERSITY
VIRGINIA TECH
UNIVERSITY OF WISCONSIN - MADISON
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

791 HADROPRODUCTION HEAVY FLAVORS #791 — Jeffrey A. Appel and Milind Vasant Purohit
UNIV. OF CALIFORNIA, SANTA CRUZ
CBPF (BRAZIL)
UNIVERSITY OF CINCINNATI
CINVESTAV-IPN (MEXICO)
FERMILAB
ILLINOIS INSTITUTE OF TECHNOLOGY
KANSAS STATE UNIVERSITY
UNIVERSITY OF MISSISSIPPI
OHIO STATE UNIVERSITY
PRINCETON UNIVERSITY
UN.AUTONOMA DE PUEBLA (MEXICO)
UNIV. FEDERAL DO RIO DE JANEIRO
UNIVERSITY OF SOUTH CAROLINA
STANFORD UNIVERSITY
UNIVERSITY OF TEL-AVIV (ISRAEL)
TUFTS UNIVERSITY
UNIVERSITY OF WISCONSIN - MADISON
YALE UNIVERSITY
BEAM: Proton Area - East
Search for the Flavor-Changing Neutral-Current Decays

Request	10 Nov, 87	Unspecified
Approval	29 Jun, 88	Unspecified
Data Analysis	8 Jan, 92	Unspecified

792 NUCLEAR FRAGMENTS #792 — Kjell Aleklett and Lembit Sihver
LAL, ORSAY (FRANCE)
UPPSALA UNIVERSITY (SWEDEN)
BEAM: Meson Area - East
STUDY OF FRAGMENTATION PRODUCTS FROM THE REACTION 800 GEV P + 197 AU.

Request	15 Jan, 88	Unspecified
Approval	15 Jan, 88	Unspecified
Completed	15 Feb, 88	Unspecified

793 EMULSION EXPOSURE 1000 GeV #793 — Jere J. Lord
KAZAKH STATE UNIV., (KAZAKHSTAN)
WASHINGTON NATURAL PHILOSOPHY INS.
UNIVERSITY OF WASHINGTON
BEAM: Proton Area - Miscellaneous
Emulsion Exposure to 1000 GeV, or highest energy protons.

Request	19 Feb, 88	Unspecified
Approval	21 Sep, 88	Unspecified
Approved/Inactive	13 Jan, 94	

794 AXION HELIOSCOPE #794 — Karl Van Bibber
UNIV. OF CALIFORNIA, BERKELEY
CERN (SWITZERLAND)
LAWRENCE BERKELEY LABORATORY
LAWRENCE LIVERMORE LABORATORY
OHIO STATE UNIVERSITY
TEXAS A&M UNIVERSITY
TEXAS ACCELERATOR CENTER
BEAM: Unspecified Beam
CONSTRUCTION AND OPERATION OF AN AXION HELIOSCOPE.

Request	5 Mar, 88	Unspecified
Inactive	23 Dec, 92	

795 WARM LIQUID CALORIMETRY TEST #795 — Morris Pripstein
UNIVERSITY OF ALABAMA
UNIV. OF CALIFORNIA, BERKELEY
CEN-SACLAY (FRANCE)
CERN (SWITZERLAND)
FERMILAB
COLLEGE DE FRANCE (FRANCE)
HARVARD UNIVERSITY
KYOTO UNIVERSITY (JAPAN)
LAPP, D'ANNECY-LE-VIEUX (FRANCE)
LAWRENCE BERKELEY LABORATORY
BEAM: Meson Area - Test Beam
TEST OF ELECTRON/HADRON COMPENSATION FOR WARM LIQUID CALORIMETRY.

Request	1 Mar, 88	Unspecified
Approval	24 Oct, 88	Unspecified
Completed	23 Dec, 91	Unspecified

796 CP VIOLATION #796 — Gordon B. Thomson
UNIVERSITY OF MINNESOTA
RUTGERS UNIVERSITY
BEAM: Proton Area - Center
A MEASUREMENT OF THE CP VIOLATION PARAMETER N+-0 THE SON OF E621.

Request	1 Jun, 88	Unspecified
Withdrawn	4 Jan, 94	

797 FINE-GRAINED ELECTROMAG. CAL. #T797 — H. Richard Gustafson and Rudolf P. Thun
UNIVERSITY OF MICHIGAN - ANN ARBOR
BEAM: Proton Area - East
FINE-GRAINED ELECTROMAGNETIC CALORIMETRY.

Request	31 Aug, 88	Unspecified
Approval	1 Apr, 90	Unspecified
Completed	20 May, 90	Unspecified

798 SSC DETECTOR TEST #T798 — Priscilla Cushman and Roger W. Rusack — ROCKEFELLER UNIVERSITY; YALE UNIVERSITY
BEAM: Proton Area - East
PROPOSAL TO BUILD A SYNCHROTRON-RADIATION DETECTOR FOR TAGGING ELECTRONS AT THE SSC.

Request	20 Jul, 88	Unspecified	
Approval	30 Jan, 89	Unspecified	Stage I approval.
Completed	2 May, 90	Unspecified	

799 CP VIOLATION #799 — Yau Wai Wah and Taku Yamanaka — UNIVERSITY OF ARIZONA; UNIV. OF CALIFORNIA, LOS ANGELES; UNIV. OF CALIFORNIA, SAN DIEGO; UNIVERSITY OF CHICAGO; UNIVERSITY OF COLORADO AT BOULDER; ELMHURST COLLEGE; FERMILAB; OSAKA UNIVERSITY (JAPAN); RICE UNIVERSITY; RUTGERS UNIVERSITY; 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.
	10 Jul, 91	Unspecified	Stage II approval deferred.
In Progress	1 Oct, 91		

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); NAGOYA UNIVERSITY (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		

804 KAON PHYSICS AT MAIN INJECTOR #804 — Bruce D. Winstein — UNIV. OF CALIFORNIA, IRVINE; CEN-SACLAY (FRANCE); UNIVERSITY OF CHICAGO; FERMILAB; UNIVERSITY OF ILLINOIS, CHAMPAIGN; RUTGERS UNIVERSITY; YALE UNIVERSITY
BEAM: Main Injector Area
HIGH PRECISION, HIGH SENSITIVITY KAON PHYSICS AT THE MAIN INJECTOR

Request	14 Jun, 88	Unspecified	
Unconsidered	14 Jun, 88		

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

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)

Request	24 Aug, 89	Unspecified
Inactive	23 Dec, 92	

806 MP BEAMLINE UPGRADE #806 — Akihiko Yokosawa
BEAM: Meson Area - Polarized Proton Beam
ENERGY UPGRADE OF THE MP BEAMLINE AND PROPOSED EXPERIMENTS

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)

Request	28 Sep, 89	Unspecified
Withdrawn	7 Mar, 90	

807 WARM HEAVY LIQUID CALORIMETRY #T807 — Scott Teige
BEAM: Proton Area - East
WARM HEAVY LIQUID CALORIMETRY: A PROPOSAL TO MEASURE PERFORMANCE OF CANDIDATE MATERIALS

RUTGERS UNIVERSITY

Request	26 Dec, 89	Unspecified
Approval	9 Feb, 90	Unspecified
Completed	1 May, 90	Unspecified

808 B-PHYSICS #T808 — Howard S. Goldberg
BEAM: Meson Area - West
B-MESON HADROPRODUCTION, INCLUDING MEASUREMENTS OF CROSS-SECTIONS, LIFETIMES, AND MIXING.

UNIV. OF ILLINOIS, CHICAGO CIRCLE
UNIVERSITY OF LOUISVILLE
UNIVERSITY OF MICHIGAN - ANN ARBOR
UNIVERSITY OF PITTSBURGH
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)

Request	1 Mar, 90	Unspecified
Inactive	23 Dec, 92	

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

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)

Request	7 Mar, 90	Unspecified
Inactive	23 Dec, 92	

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.

UNIV. OF CALIFORNIA, SAN DIEGO
FERMILAB
HARVARD UNIVERSITY
UNIV. OF ILLINOIS, CHICAGO CIRCLE
UNIVERSITY OF WUPPERTAL (GERMANY)

Request	5 Mar, 90	Unspecified
Inactive	23 Dec, 92	

811 PBAR P ELASTIC SCATTERING #811 — Jay Orear
BEAM: Collision Area (E-0)
PBAR P ELASTIC SCATTERING.

CERN (SWITZERLAND)
CORNELL UNIVERSITY
FERMILAB

Request	14 Mar, 90	Unspecified
Approval	9 Jul, 92	Unspecified
Data Analysis	20 Feb, 96	

812 CPT AND GRAVITY TESTS #812 — Gerald A. Smith
BEAM: Accumulator Ring
PRECISION TESTS OF CPT AND GRAVITY USING LOW ENERGY ANTIMATTER AT FERMILAB.

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)

Request	19 Feb, 90	Unspecified
Inactive	30 Jun, 94	

813	SMALL PHYSICS #813		Lawrence W. Jones	UNIVERSITY OF HAWAII AT MANOA
	BEAM: Unspecified Beam			LODZ UNIVERSITY
	I. A QUANTITATIVE TEST OF THE LANDAU-MIGDAL-POMMERANCHUK EFFECT; II. HADRON INCLUSIVE DISTRIBUTIONS AT HIGH X; III. NEUTRON POLARIZATION			UNIVERSITY OF MICHIGAN - ANN ARBOR UNIVERSITY OF WASHINGTON
	Request	2 Mar, 90	Unspecified	
	Rejected	5 May, 93		
814	PRIMAKOFF PRODUCTION #814		Vladimir Chaloupka	UNIVERSITY OF ROCHESTER
	BEAM: Proton Area - Center			UNIVERSITY OF WASHINGTON
	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
	BEAM: Neutrino Area - Center			COLUMBIA UNIVERSITY
	Precision Measurements of Neutrino Neutral Current Interactions Using a Sign-Selected Beam			FERMILAB KANSAS STATE UNIVERSITY NORTHWESTERN UNIVERSITY UNIVERSITY OF OREGON UNIVERSITY OF ROCHESTER XAVIER UNIVERSITY
	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		
816	SDC DETECTOR MUON BEAM TESTS #T816		Henry J. Lubatti	UNIVERSITY OF COLORADO AT BOULDER
	BEAM: Neutrino Area - Muon Beam			FERMILAB
	SSC Detector Muon Sub-System Beam Tests			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
	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
	BEAM: Neutrino Area - Muon Beam			CORNELL UNIVERSITY
	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
	BEAM: Unspecified Beam			UNIVERSITY OF LOUISVILLE
	Proposal to use the NWA Electron Test Beam at Fermilab for Tests of a Lead Glass Calorimeter Prototype			MOSCOW STATE UNIVERSITY (RUSSIA) IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
	Request	26 Jun, 90	Unspecified	
	Withdrawn	30 Apr, 91		
819	EMPACT DETECTOR TEST FOR SSC #819		Louis S. Osborne	UNIVERSITY OF HOUSTON
	BEAM: Neutrino Area - Muon Beam			INDIANA UNIVERSITY
	EMPACT Muon Telescope Evaluation at Fermilab			JINR, DUBNA (RUSSIA) MASSACHUSETTS INST. OF TECHNOLOGY
	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
	BEAM: Miscellaneous Area			UNIVERSITY OF MARYLAND
	Search for the muon neutrino magnetic moment at the 10 to the -10 Bohr magneton level using the Booster at Fermilab			NORTHEASTERN UNIVERSITY NORTHERN ILLINOIS UNIVERSITY UNIVERSITY OF ROCHESTER ROCKEFELLER UNIVERSITY
	Request	13 Jul, 90	Unspecified	
	Inactive	30 Jun, 94		
821	NEUTRON MEASUREMENTS AT NWA #T821		Kenneth A. Johns	UNIVERSITY OF ARIZONA
	BEAM: Neutrino Area - West			BALL STATE UNIVERSITY
	Neutron Measurements at NWA			FERMILAB UNIVERSITY OF MICHIGAN - ANN ARBOR UNIVERSITY OF MINNESOTA NORTHERN ILLINOIS UNIVERSITY RICE UNIVERSITY
	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
	BEAM: Main Injector Area			FERMILAB
	A Long-Baseline Neutrino Oscillation Experiment from Fermilab to Soudan			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
	Request	24 Aug, 90	Unspecified	
	Withdrawn	24 Oct, 95		

823	D-0 DETECTOR UPGRADE #823 BEAM: Collision Area (D-0) D0 Detector Upgrade	Hugh Elliott Montgomery and Hendrick J. Weerts	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) ITEP, MOSCOW (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) TATA INSTITUTE (INDIA) TEXAS A&M UNIVERSITY UNIVERSITY OF TEXAS AT ARLINGTON

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		

824	DUMAND NEUTRINO OSCILLATIONS #824 BEAM: Main Injector Area Neutrino Beam from the Proposed Main Injector to the DUMAND Detector	Medford S. Webster	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

Request	4 Oct, 90	Unspecified	
Inactive	23 Dec, 92		

825 SDC PROTOTYPE DETECTORS #825 James R. Bensinger
BEAM: Unspecified Beam
Testing of Prototype Detectors for the Solenoidal Detector Collaboration

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)

Request	1 Oct, 90	Unspecified
Inactive	23 Dec, 92	

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

UNIVERSITY OF ARIZONA
FERMILAB
UNIVERSITY OF MICHIGAN - ANN ARBOR
UNIVERSITY OF MINNESOTA

Request	8 Oct, 90	Unspecified
Inactive	23 Dec, 92	

827	MICRO-BCD #827 BEAM: Collision Area (C-0) B Physics at the TEV I; Micro-BCD	Nigel S. Lockyer	UNIVERSIDAD DE LOS ANDES(COLOMBIA) UNIV. OF CALIFORNIA, DAVIS FERMILAB UNIVERSITY OF FLORIDA UNIV. OF ILLINOIS, CHICAGO CIRCLE ILLINOIS INSTITUTE OF TECHNOLOGY UNIVERSITY OF IOWA UNIVERSITY OF MONTREAL (CANADA) SUNY AT ALBANY OAK RIDGE NATIONAL LABORATORY UNIVERSITY OF OKLAHOMA UNIVERSITY OF PENNSYLVANIA PRAIRIE VIEW A&M UNIVERSITY PRINCETON UNIVERSITY UNIV. OF PUERTO RICO - RIO PIEDRAS UN.SAN FRANCISCO DE QUITO(ECUADOR) SPACE SCIENCE LAB., U.C., BERKELEY UNIVERSITY OF WISCONSIN - MADISON YALE UNIVERSITY
	Request 8 Oct, 90 Unspecified Rejected 10 Jul, 91		
828	B-MESON CP VIOLATION #828 BEAM: Collision Area (Miscellaneous) Letter of Intent to Measure CP Violation in B Meson Decay at the Fermilab Collider	Sheldon L. Stone	FERMILAB UNIVERSITY OF FLORIDA UNIVERSITY OF MICHIGAN - ANN ARBOR SYRACUSE UNIVERSITY
	Request 26 Sep, 90 Unspecified Withdrawn 22 Jun, 91		
829	HEAVY FLAVORS AT TPL #829 BEAM: Proton Area - East Study of Heavy Flavors at TPL, Continuation of E-791	David C. Christian and Michael D. Sokoloff	UNIVERSITY OF CINCINNATI CINVESTAV-IPN (MEXICO) FERMILAB ILLINOIS INSTITUTE OF TECHNOLOGY UNIVERSITY OF MASSACHUSETTS PRINCETON UNIVERSITY UN.AUTONOMA DE PUEBLA (MEXICO) UNIVERSITY OF TEL-AVIV (ISRAEL) TUFTS UNIVERSITY UNIVERSITY OF WISCONSIN - MADISON YALE UNIVERSITY
	Request 8 Oct, 90 Unspecified Rejected 28 Feb, 94		
830	CDF UPGRADE #830 BEAM: Collision Area (B-0) Proposal for an Upgraded CDF Detector	William C. Carithers, Jr. and Giorgio Bellettini	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 UNIVERSITY OF FLORIDA INFN, FRASCATI (ITALY) UNIVERSITY OF GENEVA (SWITZERLAND) HARVARD UNIVERSITY HIROSHIMA UNIVERSITY (JAPAN) UNIVERSITY OF ILLINOIS, CHAMPAIGN JOHNS HOPKINS UNIVERSITY UNIVERSITY OF KARLSRUHNE (GERMANY) KEK (JAPAN) LAWRENCE BERKELEY LABORATORY MASSACHUSETTS INST. OF TECHNOLOGY UNIVERSITY OF MICHIGAN - ANN ARBOR MICHIGAN STATE UNIVERSITY UNIVERSITY OF NEW MEXICO OHIO STATE UNIVERSITY 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
	Request 9 Oct, 90 Unspecified Unscheduled 11 Jul, 91		

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
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)

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	

832 CP VIOLATION #832 — Yee Bob Hsiung and Bruce D. Winstein
BEAM: Neutrino Area - Muon Beam
Proposal for a New Tevatron Search for Direct CP Violation in the 2pi decays of the Neutral Kaon
UNIVERSITY OF ARIZONA
UNIV. OF CALIFORNIA, LOS ANGELES
UNIV. OF CALIFORNIA, SAN DIEGO
UNIVERSITY OF CHICAGO
UNIVERSITY OF COLORADO AT BOULDER
ELMHURST COLLEGE
FERMILAB
OSAKA UNIVERSITY (JAPAN)
RICE UNIVERSITY
RUTGERS UNIVERSITY
UNIVERSITY OF VIRGINIA
UNIVERSITY OF WISCONSIN - MADISON

Request	18 Oct, 90	Unspecified
In Progress	26 Oct, 96	

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
UNIV. OF CALIFORNIA, LOS ANGELES
UNIVERSITY OF CHICAGO
ELMHURST COLLEGE
FERMILAB
UNIVERSITY OF ILLINOIS, CHAMPAIGN
RUTGERS UNIVERSITY

Request	19 Oct, 90	Unspecified
Inactive	30 Aug, 95	

834 DIRECT PHOTON #834 — Paul F. Slattery
BEAM: Meson Area - West
Direct Photon Production #834
DELHI UNIVERSITY (INDIA)
FERMILAB
MICHIGAN STATE UNIVERSITY
UNIVERSITY OF MINNESOTA
NORTHEASTERN UNIVERSITY
PENNSYLVANIA STATE UNIVERSITY
UNIVERSITY OF PITTSBURGH
RAJASTHAN UNIVERSITY (INDIA)
UNIVERSITY OF ROCHESTER

Request	19 Oct, 90	Unspecified
Inactive	23 Dec, 92	

835 CHARMONIUM STATES #835 — Rosanna Cester
BEAM: Accumulator Ring
Study of Charmonium States formed in Antiproton-proton Annihilations
MOU Executed.
UNIV. OF CALIFORNIA, IRVINE
FERMILAB
UNIVERSITY OF FERRARA (ITALY)
INFN, GENOVA (ITALY)
NORTHWESTERN UNIVERSITY
UNIVERSITY OF TORINO (ITALY)

Request	16 Oct, 90	Unspecified
Approval	7 Dec, 92	Unspecified
In Progress	1 Oct, 96	

836 SUPERCONDUCTING DETECTOR TEST #836 — Robert G. Wagner
BEAM: Unspecified Beam
Proposal for a Beam Test of a Superconducting Thin Film Strip Particle Detector
ARGONNE NATIONAL LABORATORY

Request	3 Oct, 90	24 Hours in three 8 hour shifts
Withdrawn	8 Jan, 92	

837 EMPACT/TEXAS TEST #837 — Michael D. Marx
BEAM: Unspecified Beam
EMPACT/TEXAS Beam Test(s)
SUNY AT STONY BROOK

Request	12 Oct, 90	Unspecified
Inactive	23 Dec, 92	

838 POLARIZED BEAM #838 — Akihiko Yokosawa
BEAM: Meson Area - Polarized Proton Beam
Continuation of E-704 and Simultaneous Measurement of Chi-2 Production
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)

Request	1 Oct, 90	Unspecified
Rejected	19 Feb, 91	

839 FIBER TRACKING TEST #839 — Seymour Margulies
UNIV. OF CALIFORNIA, LOS ANGELES
FERMILAB
UNIV. OF ILLINOIS, CHICAGO CIRCLE
NOTRE DAME UNIVERSITY
OSAKA CITY UNIVERSITY (JAPAN)
PENNSYLVANIA STATE UNIVERSITY
PURDUE UNIVERSITY
RICE UNIVERSITY
UNIVERSITY OF TEXAS AT DALLAS
UNIVERSITY OF TSUKUBA (JAPAN)
BEAM: Neutrino Area - Muon Beam
Scintillating Fiber Tracker - Beam Test

Request	25 Sep, 90	Unspecified
Approval	15 Apr, 91	Unspecified
Completed	8 Jan, 92	Unspecified

840 SPAGHETTI CALORIMETRY TEST #840 — Adam Para
FERMILAB
BEAM: Meson Area - Polarized Proton Beam
Spaghetti calorimetry in '91 test beam cycle

Request	11 Oct, 90	592 Hours 1. Systematic studies of the laminated prototype (160 hrs.) 2. Studies of the RGB prototype (56 hrs.) 3. Dichromatic calorimeter (80 hrs.) 4. Liquid scintillator prototype (56 hrs.) 5. Two-segment fiber prototype (240 hrs.)
Approval	8 Aug, 91	Unspecified
Completed	8 Jan, 92	Unspecified

841 CALORIMETER BEAM TEST #T841 — Lawrence E. Price
ARGONNE NATIONAL LABORATORY
CEN-SACLAY (FRANCE)
FERMILAB
IOWA STATE UNIVERSITY
LAWRENCE BERKELEY LABORATORY
NORTHEASTERN UNIVERSITY
PURDUE UNIVERSITY
UNIVERSITY OF ROCHESTER
ROCKEFELLER UNIVERSITY
UNIVERSITY OF SOUTH CAROLINA
VIRGINIA TECH
WESTINGHOUSE ELECTRIC CORPORATION
UNIVERSITY OF WISCONSIN - MADISON
YALE UNIVERSITY
BEAM: Meson Area - Test Beam
Proposal for Beam Test of Scintillator Calorimeter Prototypes at Fermilab during FY 1991

Request	8 Oct, 90	Unspecified
Approval	28 Mar, 91	Unspecified
Completed	8 Jan, 92	Unspecified

842 RADIATION EXPOSURE #842 — David G. Underwood
ARGONNE NATIONAL LABORATORY
BEAM: Proton Area - Broad Band
Proposed Radiation Measurement in the Wideband Neutral Dump Area

Request	6 Nov, 90	Unspecified
Approval	15 Aug, 91	Unspecified
Completed	8 Jan, 92	Unspecified

843 EMULSION EXPOSURE 600 GeV #843 — C. O. Kim
CHONNAM NATIONAL UNIVERSITY(KOREA)
KOREA UNIVERSITY, SEOUL (KOREA)
BEAM: Neutrino Area - Muon Beam
Interactions of 600 Gev Muons with Emulsion Nuclei

Request	24 Oct, 90	Unspecified
Approval	1 Jul, 91	Unspecified
Completed	13 Jul, 91	Unspecified

844 TRD/SHOWER COUNTER TEST #844 — Simon P. Swordy
ENRICO FERMI INSTITUTE
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 BEAM: Neutrino Area - Test Beam Request for Test Beam Time for Barium Fluoride Calorimeter Development	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)
	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 BEAM: Meson Area - Test Beam Fermilab Test Beam Time of Diamond Radiation Detectors	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
	Request	1 May, 91	Unspecified	
	Approval	8 Jan, 92	Unspecified	
	Withdrawn	8 Jan, 92	Unspecified	
851	FIBER IRRADIATION STUDIES #851 BEAM: Collision Area (C-0) Fiber Irradiation Studies in the C0 Region	Seymour Margulies and Jadwiga Warchol		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)
	Request	1 May, 91	Unspecified	
	Approval	14 Aug, 91	Unspecified	
	Completed	8 Jan, 92	Unspecified	
852	PIXEL DETECTOR TEST #T852 BEAM: Neutrino Area - Muon Beam Pixel Detector Test at NM	Eric Arens		FERMILAB LAWRENCE BERKELEY LABORATORY
	Request	8 May, 91	Unspecified	
	Approval	9 Sep, 91	Unspecified	
	Completed	23 Dec, 91	Unspecified	
853	TEVATRON CRYSTAL EXTRACTION #853 BEAM: Collision Area (C-0) A Test of Low Intensity Extraction from the Tevatron Using Channeling in a Bent Crystal	C. Thornton Murphy		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
	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		
854	MUON FLUXES IN THE DEBUNCHER #854 BEAM: Debuncher Ring Proposal to Measure the Flux of Ciculating Muons in the Debuncher.	Alan D. Bross		COLUMBIA UNIVERSITY FERMILAB
	Request	11 Jul, 91	Unspecified	
	Approval	8 Jan, 92	Unspecified	
	Completed	8 Jan, 92	Unspecified	
855	dE/dx MUONS #855 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	George R. Kalbfleisch		UNIVERSITY OF OKLAHOMA SSC LABORATORY
	Request	3 Aug, 91	Unspecified	
	Approval	18 Nov, 91	Unspecified	
	Completed	8 Jan, 92	Unspecified	
856	INTEGRATED PIXEL DETECTOR TEST#856 BEAM: Neutrino Area - Muon Beam An Integrated Pixel Detector - Test Beam Request	Sherwood I. Parker		UNIVERSITY OF HAWAII AT MANOA LAWRENCE BERKELEY LABORATORY STANFORD UNIVERSITY
	Request	4 Oct, 91	Unspecified	
	Approval	11 Oct, 91	Unspecified	
	Completed	8 Jan, 92	Unspecified	
857	SPIN-TENSOR #857 BEAM: Unspecified Beam Proposal to measure all components of the depolarization tensor.	L. I. Sarycheva		MOSCOW STATE UNIVERSITY (RUSSIA)
	Request	10 Dec, 91	Unspecified	
	Inactive	23 Dec, 92		

858	ELASTIC SCATTERING SPIN EFFECTS #858 Alan D. Krisch BEAM: Unspecified Beam Spin Effects in High Proton-Proton Elastic Scattering		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)
	Request	6 Jan, 92 Unspecified	
	Rejected	30 Jul, 92	
859	CP VIOLATION IN HYPERON DECAY #859 Shao Yuan Hsueh BEAM: Unspecified Beam CP Violations in Hyperon Decay		FERMILAB
	Request	2 Jan, 92 Unspecified	
	Withdrawn	13 Jan, 94	
860	SEARCH FOR NEUTRINO OSCILLATIONS#860 Wonyong Lee BEAM: Debuncher Ring A Search for Neutrino Oscillations using the Fermilab Debuncher.		BROOKHAVEN NATIONAL LABORATORY COLUMBIA UNIVERSITY FERMILAB KANGNUNG NATIONAL UNIV. (KOREA) KOREA UNIVERSITY, SEOUL (KOREA) SEOUL NATIONAL UNIVERSITY (KOREA)
	Request	14 Jan, 92 Unspecified	
	Withdrawn	17 Jan, 96	
861	ANTIPROTON DECAY #T861 Steve Geer BEAM: Accumulator Ring Test of Backgrounds for an Antiproton Decay Search Experiment at the Antiproton Accumulator		UNIV. OF CALIFORNIA, LOS ANGELES FERMILAB PENNSYLVANIA STATE UNIVERSITY
	Request	10 Feb, 92 24 Hours	
	Completed	29 Oct, 92	
862	ANTI-HYDROGEN DETECTION #862 David C. Christian BEAM: Accumulator Ring Detection of Relativistic Anti-Hydrogen Atoms produced by Pair Production with Positron Capture		UNIV. OF CALIFORNIA, IRVINE FERMILAB
	Request	27 Aug, 92 Unspecified	
	In Progress	10 Nov, 96	
863	NUCLEON SPIN #863 Aldo Penzo BEAM: Meson Area - Polarized Proton Beam Nucleon Spin Structure Studies with Polarized Proton and Antiproton Beams		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)
	Request	31 Aug, 92 7 Months	
	Rejected	7 Dec, 92	
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)		CASE WESTERN RESERVE UNIVERSITY DUKE UNIVERSITY FERMILAB LOS ALAMOS NATIONAL LABORATORY UNIVERSITY OF MICHIGAN - ANN ARBOR SLAC VIRGINIA TECH
	Request	1 Sep, 92 Unspecified	
	Approval	24 May, 93 Unspecified	
	Completed	20 Dec, 95	
865	CHARM AND BEAUTY DECAYS #865 Daniel M. Kaplan BEAM: Meson Area - East High-Sensitivity Study of Charm and Beauty Decays.		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
	Request	1 Sep, 92 Unspecified	
	Withdrawn	4 Feb, 94	
866	ANTI(U-QUARK)/ANTI(D-QUARK) DIST#866 Patrick L. McGaughey BEAM: Meson Area - East Measurement of x distribution of the ratio of anti(u-quark) to anti(d-quark) in the proton		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
	Request	2 Sep, 92 Unspecified	
	Approval	7 Dec, 92 Unspecified	
	In Progress	14 Sep, 96	

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
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)

Request	3 Sep, 92	Unspecified
Rejected	28 Feb, 94	

868 ANTIPROTON DECAY #868 — Steve Geer
BEAM: Accumulator Ring
Proposal to Search for Antiproton Decay at the Fermilab Antiproton Accumulator
UNIV. OF CALIFORNIA, LOS ANGELES
FERMILAB
UNIVERSITY OF MICHIGAN - ANN ARBOR
UNIVERSITY OF NEBRASKA
PENNSYLVANIA STATE UNIVERSITY

Request	24 Sep, 92	Unspecified
Data Analysis	24 Jul, 95	

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
FERMILAB
SSC LABORATORY

Request	11 Nov, 92	Unspecified
Withdrawn	4 Jan, 94	

870 PROTOTYPE DETECTORS FOR THE SDC #870 — George H. Trilling
BEAM: Meson Area - Polarized Proton Beam
PROTOTYPE DETECTORS FOR THE SDC #870
FERMILAB
LAWRENCE BERKELEY LABORATORY
SSC LABORATORY

Request	1 Jan, 93	Unspecified
Withdrawn	4 Jan, 94	

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
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
NEW MEXICO STATE UNIVERSITY
UNIVERSITY OF VIRGINIA

Request	21 Mar, 93	Unspecified
Approval	29 Jun, 94	Unspecified Stage I approval.
In Progress	20 Feb, 97	

872 TAU NEUTRINO #872 — Byron G. Lundberg and Vittorio Paolone
BEAM: Proton Area - West
BEAM DUMP #872
AICHI UNIV. OF EDUCATION (JAPAN)
UNIVERSITY OF ATHENS (GREECE)
UNIV. OF CALIFORNIA, DAVIS
CHONNAM NATIONAL UNIVERSITY(KOREA)
FERMILAB
GYEONGSANG NATIONAL UNIV. (KOREA)
KOBE UNIVERSITY (JAPAN)
UNIVERSITY OF MINNESOTA
NAGOYA UNIVERSITY (JAPAN)
OSAKA SCIENCE EDUC. INST. (JAPAN)
UNIVERSITY OF SOUTH CAROLINA
TOHO UNIVERSITY (JAPAN)
TUFTS UNIVERSITY
UTSUNOMIYA UNIVERSITY (JAPAN)

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	

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	

874 CHARGED PION LIFETIME #874 — Steve Geer
BEAM: Meson Area - West
Precision Measurement of the Lifetime of Charged Pions
DUKE UNIVERSITY
FERMILAB
UNIVERSITY OF NEBRASKA
ROCKEFELLER UNIVERSITY

Request	9 Nov, 94	Unspecified
Withdrawn	16 Dec, 96	

875 NEUTRINO OSCILLATIONS #875 — Stanley G. Wojcicki
BEAM: Main Injector Area
A Long-baseline Neutrino Oscillation Experiment at Fermilab

ARGONNE NATIONAL LABORATORY
IHEP, BEIJING (PRC)
CALIFORNIA INSTITUTE OF TECHNOLOGY
COLUMBIA UNIVERSITY
FERMILAB
INDIANA UNIVERSITY
JINR, DUBNA (RUSSIA)
LAWRENCE LIVERMORE LABORATORY
LEBEDEV PHYSICAL INST. (RUSSIA)
UNIVERSITY OF MINNESOTA
ITEP, MOSCOW (RUSSIA)
OAK RIDGE NATIONAL LABORATORY
UNIVERSITY OF OXFORD (ENGLAND)
PNPI, ST. PETERSBURG (RUSSIA)
IHEP, PROTVINO (SERPUKHOV)(RUSSIA)
RUTHERFORD-APPLETON LABS.(ENGLAND)
STANFORD UNIVERSITY
SUSSEX UNIVERSITY (ENGLAND)
TEXAS A&M UNIVERSITY
UNIVERSITY OF TEXAS AT AUSTIN
TUFTS UNIVERSITY
WESTERN WASHINGTON UNIVERSITY

Request	9 Feb, 95	Unspecified
Unscheduled	2 May, 95	

876 CDF HARD DIFFRACTION STUDIES #876 — Mike G. Albrow
BEAM: Collision Area (B-0)
Proposal for Hard Diffraction Studies in CDF

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

Request	17 Jan, 95	Unspecified
Data Analysis	20 Feb, 96	

877 AXION SEARCH #877 — Siu Au Lee
BEAM: Beam Not Applicable
Measurement of the Magnetically-Induced QED Birefringence of the Vacuum and an Improved Laboratory Search for Axions

COLORADO STATE UNIVERSITY
FERMILAB
JOINT INST. FOR LAB. ASTROPHYSICS
SSC LABORATORY

Request	28 Mar, 95	Unspecified
Unconsidered	28 Mar, 95	

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

LOS ALAMOS NATIONAL LABORATORY

Request	7 Nov, 95	Unspecified
Unconsidered	7 Nov, 95	

879 B PHYSICS TEST BEAM PROGRAM #879 — Joel N. Butler and Walter Selove
BEAM: Meson Area - Test Beam
A Test Beam Program for Future B Physics Experiments at Fermilab

CARNEGIE-MELLON UNIVERSITY
FERMILAB
UNIVERSITY OF PENNSYLVANIA
SYRACUSE UNIVERSITY

Request	16 Mar, 95	Unspecified
Unconsidered	16 Mar, 95	

880 B PHYSICS TEST BEAM PROGRAM #880 — Sheldon L. Stone
BEAM: Meson Area - Test Beam
Proposal for Test Beam Running of the CLEO III RICH Detector

CARNEGIE-MELLON UNIVERSITY
FERMILAB
UNIVERSITY OF MINNESOTA
SYRACUSE UNIVERSITY
WAYNE STATE UNIVERSITY

Request	16 Mar, 95	Unspecified
Unconsidered	16 Mar, 95	

881 AUGER PROJECT R&D #881 — Paul M. Mantsch
BEAM: Beam Not Applicable
A Request for Fermilab R&D Support for the Pierre Auger Project.

FERMILAB

Request	6 Nov, 95	Unspecified
Unscheduled	8 Oct, 96	

882 SEARCH FOR LOW MASS MONOPOLES #882 — George R. Kalbfleisch
BEAM: Beam Not Applicable
A Search for Low Mass Monopoles

UNIVERSITY OF OKLAHOMA

Request	15 Aug, 95	Unspecified
Unscheduled	23 Jul, 96	

883	COSMIC RAY CALORIMETER CALIB. #883 BEAM: Meson Area - West Calibration of Cosmic Ray "Thin Ionization Calorimeter" +----------+ Unconsidered 26 Oct, 95	James H. Adams	LEBEDEV PHYSICAL INST. (RUSSIA) MOSCOW STATE UNIVERSITY (RUSSIA) NAVAL RESEARCH LABORATORY
884	COSMIC RAY DETECTOR TEST #884 BEAM: Meson Area - West A proposal for a Beam Test of the Advanced Thin Ionization Calorimeter Detector +----------+ Unconsidered 1 Feb, 96	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
885	SLOAN DIGITAL SKY SURVEY #885 BEAM: Beam Not Applicable SLOAN DIGITAL SKY SURVEY +----------+ Unscheduled 9 Feb, 96	Richard G. Kron	FERMILAB
886	PICOSECOND X-RAY SOURCE #886 BEAM: A0 Facility Compton Scattering X-Ray Experiments at the Fermilab Electron Source Facility +----------+ Unscheduled 8 Oct, 96	Adrian C. Melissinos	FERMILAB UNIVERSITY OF ROCHESTER
887	PET ACCELERATOR #887 BEAM: Beam Not Applicable A RFQ Linear Accelerator for PET Isotope Production +----------+ Unscheduled 21 Jun, 95	Ralph Pasquinelli	FERMILAB
888	P-BAR+NUCLEI STUDIES #888 BEAM: Main Injector Area P-Bar + A Studies of the Nuclear Equation-of-State +----------+ Unconsidered 15 Jul, 96	Vic. E. Viola	INDIANA UNIVERSITY
889	NEUTRINOS AT THE BOOSTER #889 BEAM: Booster Accelerator Letter of Intent to Study Neutrino Oscillations Using the Fermilab Booster Beam +----------+ Unconsidered 6 Aug, 96	Alexander Abashian	VIRGINIA TECH
890	PLASMA WAKE-FIELD ACCELERATOR #890 BEAM: A0 Facility Advanced Accelerator Test at the Fermilab Electron Source Facility +----------+ Unscheduled 8 Oct, 96	James R. Rosenzweig	UNIV. OF CALIFORNIA, LOS ANGELES FERMILAB
891	DARK MATTER SEARCH #891 BEAM: Beam Not Applicable The Cryogenic Dark Matter Search (CDMS) +----------+ Unscheduled 4 Mar, 96	Roger L. Dixon	FERMILAB
892	CMS AT FERMILAB #892 BEAM: Beam Not Applicable The U.S. Compact Muon Solenoid (CMS) Collaboration at Fermilab +----------+ Unscheduled 8 Oct, 96	Daniel R. Green	FERMILAB
893	LHC ACCELERATOR #893 BEAM: Beam Not Applicable Design and Construction of Interaction Regions at the CERN Large Hadron Collider (LHC) +----------+ Unscheduled 8 Oct, 96	James B. Strait	FERMILAB
894	CPT TEST #894 BEAM: Main Injector Area An Experiment Studying Kl - Ks Interference to Test CPT Conservation at the Planck Scale +----------+ Unconsidered 7 Oct, 96	Gordon B. Thomson	RUTGERS UNIVERSITY TRIUMF (CANADA)

*** End of Report ***