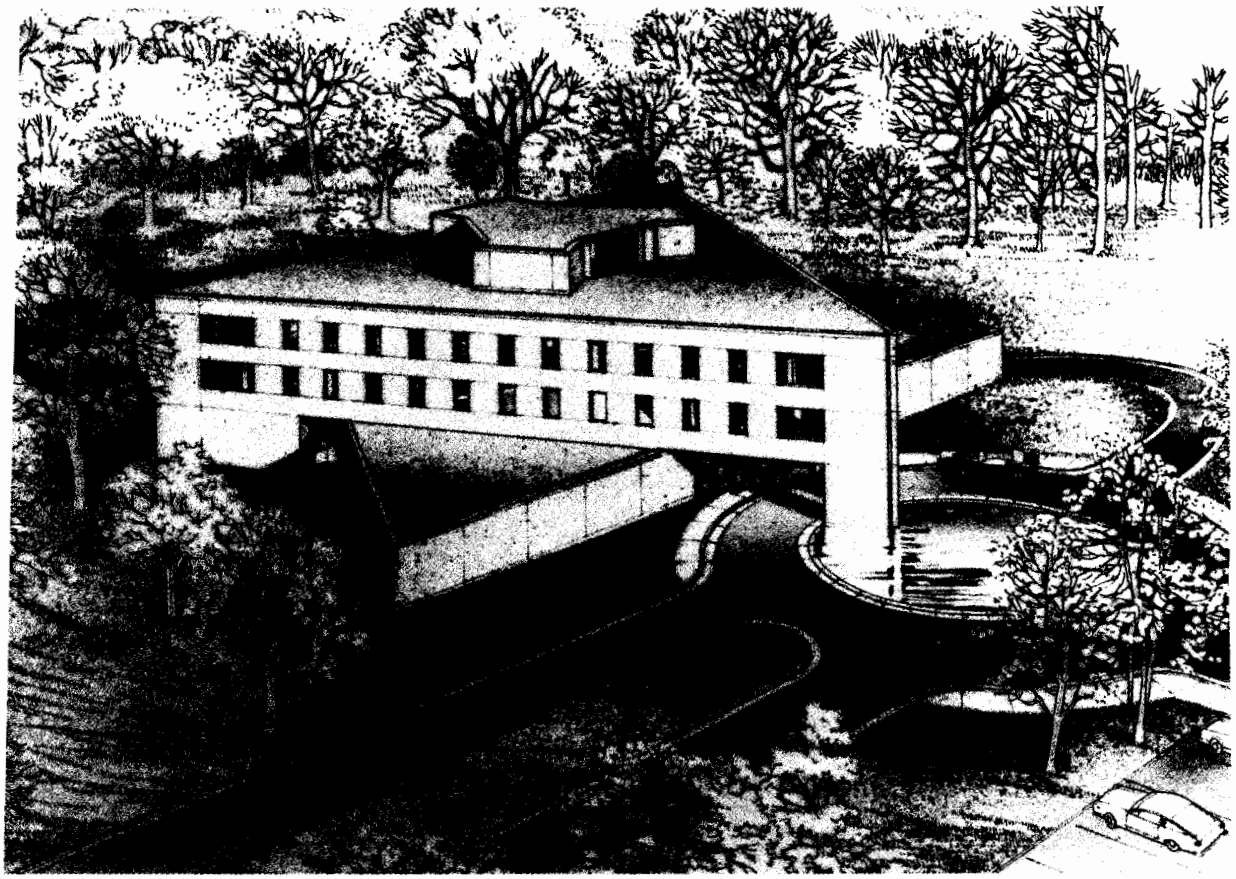
fermilab report

Fermi National Accelerator Laboratory Monthly Report

May 1980



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F. T. Cole, Editor R. Donaldson, Asssistant Editor

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THE COVER: Universities Research Association has proposed to NASA that the Space Telescope Science Institute be located nearby. The cover is an artist's concept of the space laboratory.
(Photograph by Fermilab Photo Unit)

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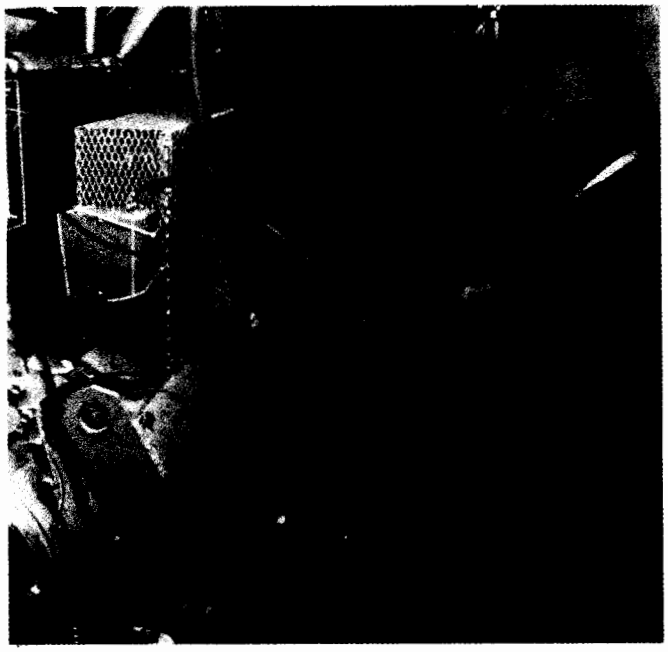
CONTENTS MAY 1980

SUPERCONDUCTING DIPOLE OPERATES IN PROTON WEST

A superconducting dipole built for use in external beam lines was first put into operation on March 28. It is installed to bend a pion beam in the high-intensity line in Proton West.

The magnet is 4 ft long, has a 6-in. diameter bore and achieves 4.2 Tesla at a current of 210 A. It was developed separately from the Tevatron dipoles to meet the special needs of long beam lines with widely separated magnets. The low current gives small refrigeration losses in the power leads from room temperature to the helium environment. A low-current superconducting quadrupole has been designed by the Proton Department in collaboration with Research Services and built by Research Services. The prototype coil has been successfully tested.

Another feature of the installation is a very long (900 ft) helium-transfer line, the longest ever built. It has 46 spigots ready for new magnets to be installed. All in all, it takes fourteen 90° bends as it winds its way down the tunnel. Like the magnet, it has been successful in operation.



Rich Stanek, Peter Garbincius, and Peter Mazer (left to right) admire the Proton West superconducting dipole.
(Photograph by Fermilab Photo Unit)

CENTRAL HELIUM LIQUEFIER OPERATES

The Central Helium Liquefier achieved success on April 18, operating on its first full-scale test. It produced more than 2000 liters per hour of liquid helium, about half its full capacity. The liquid-helium storage system was not complete, so the liquid was reheated and returned to gas storage. On April 24, the system produced 2700 liters per hour. The cold box is performing up to specification.

The CHL is designed to produce 4500 liters per hour of liquid helium at 4.6K, the largest such facility in the world. The plant was built with three large used compressors moved here from a facility in California. The cryogenic-fluid output is to be used in conjunction with 24 satellite refrigerators to provide liquid helium at 4.55K to cool the superconducting magnets of the Tevatron.

ANNUAL MEETING OF THE USERS ORGANIZATION

Charles Ankenbrandt

The Annual Meeting of the Fermilab Users Organization took place May 2 in the Fermilab auditorium. John Rutherfoord, chairman of the Users Executive Committee, opened the meeting by welcoming the users and reporting recent activities of the Executive Committee. He then introduced Norman Ramsey, President of Universities Research Association, who commented on the organization of URA and its relationship to Fermilab. He encouraged users to communicate with the Trustees and the Area Secretaries of URA.

J. D. Bjorken of Fermilab then spoke on the provocative topic, "A Review of the Physics of the 80's from the Perspective of the 90's." He began by reviewing the 70's, examining in particular how well a theorist could have foreseen the developments of that decade. He then reviewed the accelerators expected to start up in the 80's and how they might contribute to the "standard physics scenario," speculating that the nature of W, Z, ν_τ, bottom and top quarks, and Higgs particles will have been elucidated and issues such as jets, the Q^2 dependence of α_s, the elementarity of quarks and leptons, the gauge structure of the electroweak interactions, and quantum chromodynamics will have been clarified by 1990. He then speculated on discoveries that might alter the standard scenario. He described many ways that Fermilab can contribute to the development of our understanding of particle physics in the next decade, concluding that the Tevatron will be the foundation of dynamic and vigorous colliding-beam and fixed-target programs in 1990.

The Woods Hole Committee, charged by the Department of Energy with recommending the course of United States high-energy physics efforts for the next several years, was meeting simultaneously at Fermilab. To provide input for their deliberations, a panel of users discussed the relationship of Fermilab's present program and future prospects to the national program. Panelists were Dino Goulianos, Bob Diebold, Wit Busza, Al Erwin, Stan Wojcicki, Frank Sciulli, John Rutherfoord, Henry Frisch, Bob McCarthy, Carl Akerlof, Jerry Rosen, Larry Jones, and George Brandenburg. Users in the audience also joined the discussion. Dominant themes of the discussion were as follows:

> Fermilab's present fixed-target program needs additional support. Because of leverage, increasing the funding by 10-15% would greatly improve the program.
>
> The present 400-GeV and future 1000-GeV fixed-target programs support the research efforts of a very large number of experimenters. The smaller size and quicker time scale of fixed-target experiments

vis-a-vis colliding-beam experiments are well matched to the requirements and resources of university high-energy physics groups.

The afternoon program was devoted to reviews of the present status and future plans of the Tevatron. Rich Orr led off the program by describing the status of the Energy Saver. They are making five magnets a week, having fixed the so-called vertical-plane problem wherein the dipoles were rotating in the cryostats on successive warm-ups and cool-downs. A 90-GeV beam of 1.7×10^{13} protons per pulse has been transported through a string of superconducting magnets in A sector without inducing a quench. The central helium liquefier has made liquid during a successful test run.

Donald Young described the status of antiproton source development. Argonne National Laboratory, Lawrence Berkeley Laboratory, the Institute for Nuclear Physics at Novosibirsk, and the University of Wisconsin are collaborating with Fermilab on this project. The scenario for producing antiproton-proton collisions at 1000 GeV includes the following steps:

1) Accelerate protons to 80 GeV in the Main Ring,
2) Coalesce this beam longitudinally to approximately one Booster circumference by rf gymnastics,
3) Target the protons on a liquid-metal target,
4) Transport a 4.5-GeV antiproton beam having relatively small transverse emittance but large momentum spread to a new precooler ring,
5) Stochastically cool, bunch, decelerate, and debunch the beam several times in the Precooler,
6) Transfer at 200 MeV to a ring where electron cooling and accumulation of 10^{11} antiprotons takes place,
7) Reaccelerate the antiprotons via the Precooler and the Main Ring to the Tevatron. Young reported successful initial tests of stochastic cooling in the cooling ring.

Alvin Tollestrup discussed the Colliding Beam Detector plans. His talk touched on schedules, on a new scheme for producing low β (small beam size) at the interaction region, on the design of the experimental hall, on the configuration of the detector, and on the accuracy of reconstructing events. Physicists from Argonne, Caltech, Chicago, Illinois, Purdue, Wisconsin, Pisa/Frascati, and Tsukuba/KEK are collaborating with Fermilab on this project.

John Peoples reported recent and forthcoming improvements to experimental areas. He described several improvements in each of the three areas to be completed by the end of 1981. Other developments include improvements to the control systems in the areas, enhancements to the CYBER system, and the merging of PREP and Data Acquisition Systems under Jeff Appel as Associate Head of the Computer Department. Providing in-house maintenance of PDP-11's is under serious consideration. Finally, Peoples described

the evolution of plans for experimental-area improvements for Tevatron II, the 1000-GeV fixed-target program.

Next on the agenda, Charles Brown talked about the early Tevatron program. A Tevatron II Design Report was completed just before the Users Meeting; users' input is solicited at a summer study to be held at Fermilab July 25-August 8. Brown reviewed plans for extraction from the accelerator and for the three experimental areas. Readers are encouraged to consult the Design Report for details.

As in the biblical story of the marriage feast at Cana, the planners of the meeting saved the best for last. Leon Lederman talked about Tevatron Physics and the Future. He stated the near-term priorities of the Laboratory as:

1) The Energy Saver,
2) The transition fixed-target program based on the Main Ring,
3) Tevatron II, i.e., the fixed-target program based on the 1-TeV Ring, and
4) Tevatron I, i.e., antiproton-proton colliding beams at 2 TeV.

The present goal of the Laboratory is to preserve a vigorous fixed-target program while continuing to build for the future. Through 1983 the Laboratory will rely on fixed-target physics, because the collider facility will not be ready until then. Further in the future, prospects for electron-proton collisions (with an electron ring provided by the Canadians) and for a site-filler ring of about 5 TeV were discussed.

The thrust of the entire Users meeting was that Fermilab is pressing toward the future, improving its facilities to continue serving as a premier center for national and international high-energy physics research.

SUMMARY OF OPERATIONS - APRIL 1980

Program Planning Office

The experimental activities underway in April were primarily a continuation of those begun in March. The accelerator was operated at 350 GeV with a 1.0-second flattop for most of the month while the majority of scheduled experiments were engaged in start-up or tuning activities. During the last week of running the flattop length was changed to 1.5 seconds, reflecting the fact that over half of the scheduled experiments were in a data-taking mode and benefited from a longer spill. The overall efficiency of the accelerator in delivering beam for high-energy physics was relatively poor for the month of April due to numerous and varied failures. These included problems with the Booster injection orbit bump power supply, two separate failures of extraction septum ES-38, and two Main-Ring feeder faults.

Particle Search #580 (M6) and Particle Search #595 (N5) took data steadily during the available running time in April and by the end of the month Dimuon #326 (PW), Particle Search #515 (M1), and Particle Search #591 (ITA) were also in a data-taking mode.

Other significant events during April included a resumption of experimental activity in Proton-Center by Charged Hyperon #497 and the beginning of a series of beam tests and radiation measurements in the M2 beam line to determine future operating conditions for Beam Dump #613.

FERMI NATIONAL ACCELERATOR LABORATORY
MONTHLY OPERATIONS HISTORY
APRIL 1980

Date		accelerator	Internal Target Area	Proton Area	Neutrino Area	Meson Area
Tue.	4/1	~~$7x10^{12}$~~		326 (PW)	595 (N5)	580 (M6)
		~~@350 GeV~~	591	516 (PE)	610 (N1)	585 (M4)
		~~0.5 sec flattop~~			594 Test (NO)	515 (M1)
Wed.	4/2	~~B3 3B shorted~~				OFF (M2,M3)
Thu.	4/3	Accelerator M & D		Accelerator Startup		
Fri.	4/4	ORBHM Tripped	591	326 (PW)	595 (N5)	580 (M6)
Sat.	4/5	$.6x10^{12}$ ppp		516 (PE)	610 (N1)	585 (M4)
		@350 GeV			594 Test (NO)	515 (M1)
Sun.	4/6	1.0 sec flattop				M2 Tests
		MAC-C disc;Linac	RF#9			OFF (M3)
Mon.	4/7	ORBHM				
Tue.	4/8					
Wed.	4/9	Accelerator M & D				
Thu.	4/10					
Fri.	4/11	$.1.4x10^{13}$ ppp	591	326 (PW)	595 (N5)	580 (M6)
Sat.	4/12	@350 GeV		516 (PE)	610 (N1)	585 (M4)
		1.0 sec flattop				515 (M1)
Sun.	4/13	~~200 MeV chopper~~				M2 Tests
						OFF (M3)
Mon.	4/14	Necessary Rep.&	Linac.			
Tue.	4/15	MR Conv. Feed.				
Wed.	4/16	Accelerator M & D				
Thu.	4/17					
Fri.	4/18	~~Water Leak & Feeder~~	591	326 (PW)	595 (N5)	580 (M6)
Sat.	4/19	Booster clock &		516 (PE)	610 (N1)	585 (M4)
		MR Quad		497 Tests (PC)		515 (M1)
Sun.	4/20					M2 Tests
Mon.	4/21	~~Necessary Rep.~~			Neut.Area Off;	OFF (M3)
		~~MR Safety~~			Controls problems	
Tue.	4/22					
Wed.	4/23	Accelerator M & D				
Thu.	4/24					
Fri.	4/25	Quad #5 Linac	591	326 (PW)	595 (N5)	580 (M6)
Sat.	4/26	~~Linac RF~~		516 (PE)	610 (N1)	515 (M1)
		$1.5x10^{13}$ ppp		497 Tests		585 (M4)
Sun.	4/27	@350 GeV				M2 Tests
		1.5 sec flattop				OFF (M3)
Mon.	4/28	ES38 short;Linac	#2			
Tue.	4/29					
Wed.	4/30	Accelerator Studies (Parasitic HEP)				

FACILITY UTILIZATION SUMMARY - APRIL 1980

I. Summary of Accelerator Operations

		Hours	
A. Accelerator use for physics research			
High energy physics research		387.4	
Accelerator physics research		49.0	
	Subtotal		436.4
B. Other Activities			
Program interruption		82.3	
Accelerator setup and tuning to experimental areas		29.0	
	Subtotal		111.3
C. Unscheduled interruption			171.3
D. Unmanned time			-
Total			719.0

II. Summaries of High Energy Physics Research Use

	# of Expts.	Hours	Results
A. Counter experiments	9	2560	
B. Bubble chamber experiments	-	-	
C. Emulsion experiments	-	-	
D. Special target experiments	-	-	
E. Test experiments	-	-	
F. Engineering studies and tests	1	30	M2 beam tests
G. Other Beam Use	-	-	
Totals	10	2590	

III. Number of Protons Accelerated and Delivered ($\times 10^{18}$) at 350 GeV

A. Beam accelerated in Main Ring	1.39
B. Beam delivered to experimental areas	*
Proton Area	0.28
Neutrino Area	
Slow Spill	0.29
Fast Spill	*
Meson Area	0.61

* Accurate delivered beam information was not available for the month of April.

SITUATION REPORT -- APRIL 1980

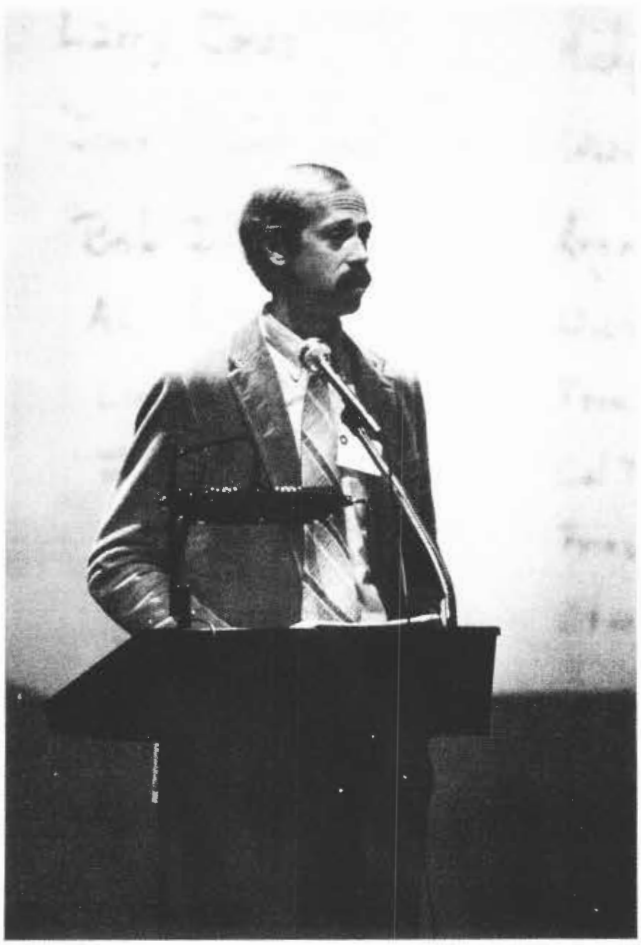
PAGE 1 FERMI NATIONAL ACCELERATOR LABORATORY PROGRAM PLANNING OFFICE
11 APR 1980

EXPERIMENTAL PROGRAM SITUATION REPORT

THE EXPERIMENTAL PROGRAM SITUATION AT FERMILAB IS SUMMARIZED BELOW. THE EXPERIMENTS ARE LISTED SEPARATED BY EXPERIMENTAL AREA UNDER CATEGORIES THAT BEST DESCRIBE THEIR CIRCUMSTANCE AS OF APRIL 1, 1980. FOR EXPERIMENTS WHICH HAVE BEEN COMPLETED OR HAVE RECEIVED BEAM THERE IS INDICATION OF THE AMOUNT OF RUNNING TIME OR EXPOSURE. THE EXPERIMENTAL AREA NAMES ARE ABBREVIATED AS FOLLOWS: MESON AREA (MA), NEUTRINO AREA (NA), PROTON AREA (PA), INTERNAL TARGET AREA (ITA).

TOTAL NUMBER OF APPROVED EXPERIMENTS - 301

AREA-BEAM		SPOKESPERSON	EXTENT OF RUN TO DATE	DATE COMPLETED
A. EXPERIMENTS THAT HAVE COMPLETED DATA TAKING (259):				
(ONLY EXPERIMENTS COMPLETED SINCE 1 JAN 1980 ARE LISTED BELOW)				
MA-M2	CHARGED HYPERON MAG MOMENT #620	PONDROM	900 HOURS	22 JAN 1980
-M3	PARTICLE SEARCH #584	WINSTEIN	400 HOURS	22 JAN 1980
NA-NO-DICHROM	NEUTRINO #616	SCIULLI	2,900 HOURS	22 JAN 1980
B. EXPERIMENTS THAT ARE IN PROGRESS (11):			EXTENT OF RUN TO DATE	DATE OF RECENT RUN
MA-M1	PARTICLE SEARCH #490	SANDWEISS	953 HOURS	1 OCT 1978
-M2	QUARK #622	GUSTAFSON	UNSPECIFIED	1 JUL 1979
-M4	FAOM CHARGE EXCHANGE #585	FRANCIS	1,250 HOURS	1 APR 1980
-M6	PARTICLE SEARCH #580	GREEN	400 HOURS	1 APR 1980
NA-NO-HORN	15-FOOT NEUTRINO/H2&NE #53A	BALTAY	163K PIX	1 JUL 1977
	NEUTRINO #531	REAY	1,150 HOURS	1 JUL 1979
	15-FOOT & EMULSION/NEUTRINO#564	VOYVODIC	EMULSION EXPOSURE	1 JUL 1979
	15-FOOT ANTI-NEUTRINO/D2 #390	GABRIMEL	10K PIX	1 APR 1979
	15-FOOT ANTI-NEUTRINO/H2&NE#180	ERWOLOV	273K PIX	1 JUL 1977
-OTHER	MONOPOLE #SC2	BARTLETT	COSMIC RAY RUNNING	1 APR 1979
	NUCLEAR FRAGMENTS #466	SUGARMAN	36 TARGETS EXPOSED	1 APR 1980
C. EXPERIMENTS THAT ARE IN TEST STAGE (10):			EXTENT OF RUN TO DATE	DATE OF RECENT RUN
MA-M1	PARTICLE SEARCH #515	ROSEN	700 HOURS	1 APR 1980
-M6	ELASTIC SCATTERING #577	RUBINSTEIN	300 HOURS	1 JAN 1980
	HADRON JETS #557	MALAMUD	250 HOURS	1 APR 1980
NA-MUON/HADRON	PARTICLE SEARCH #610	KIBK	150 HOURS	1 APR 1980
-15-FT	PARTICLE SEARCH #595	BODEK	600 HOURS	1 APR 1980
-OTHER	QUARK #549	LONGO	1 TARGETS EXPOSED	1 OCT 1978
PA-PE	PHOTOPRODUCTION #516	NASH	650 HOURS	1 JAN 1980
-PW	DI-MUON #326	SHOCHET	400 HOURS	1 APR 1980
	DI-MUON #537	COX	200 HOURS	1 APR 1980
ITA-C-0	PARTICLE SEARCH #591	GUTAY	150 HOURS	1 APR 1980
D. EXPERIMENTS BEING INSTALLED (4):			EXTENT OF APPROVAL	
MA-M2	BEAM DUMP #613	ROE	1,000 HOURS	
NA-NO-DICHROM	NEUTRINO #594	WALKER	PARASITIC RUNNING	
PA-PC	CHARGED HYPERON #497	LACH	400 HOURS	
-PW	C-TEST #302	WITHERELL	400 HOURS	
E. EXPERIMENTS TO BE SET UP WITHIN A YEAR (7):			EXTENT OF APPROVAL	NOTE: THE ABILITY TO SET UP THESE EXPERIMENTS DURING THE NEXT YEAR IS CONTINGENT ON THE AVAILABILITY OF FUNDS.
MA-M3	CP VIOLATION #617	WINSTEIN	1,000 HOURS	
-M6	HADRON JETS #609	SELOVE	UNSPECIFIED	
NA-30-IN	30-INCH HYBRID #570	PLESS	1,500 HOURS	
	30-INCH HYBRID #565	PLESS	PARASITIC RUNNING	
	30-INCH HYBRID #597	WHITMORE	1,000 HOURS	
PA-PE	PHOTON DISSOCIATION #612	GOULIANOS	1,150 HOURS	
-PC	B & CHARM PARTICLE PROD. #630	SANDWEISS	600 HOURS	
F. OTHER APPROVED EXPERIMENTS (10):			EXTENT OF APPROVAL	
MA-M1	HIGH MASS PAIRS #605	BROWN	1,000 HOURS	
-M2	TRANSITION MAGNETIC MOMENT #619	DEVLIN	250 HOURS	
	NEUTRAL HYPERON #555	DEVLIN	450 HOURS	
	POLARIZED SCATTERING #581	YOKOSAWA	UNSPECIFIED	
NA-OTHER	EMULSION/PROTONS @ 500 #508	WOLTER	EMULSION EXPOSURE	
	EMULSION/PROTONS @ 500 #524	WILKES	EMULSION EXPOSURE	
	EMULSION/PROTONS @ 500 #576	HERBERT	3 STACKS	
PA-PF	PARTICLE SEARCH #400	PEOPLES	UNSPECIFIED	
	PHOTOPRODUCTION #458	LEE	UNSPECIFIED	
-PW	FORWARD SEARCH #615	ANDERSON	1,000 HOURS	
PENDING PROPOSALS (10):			EXTENT OF REQUEST	
MA-M1	PHOTON SEARCH #614	ROSEN	300 HOURS	
-M2	DI-MUON #589	MOCKETT	750 HOURS	
	CP VIOLATION #621	THOMSON	1,200 HOURS	
-M6	MULTIPARTICLE #523	DZIERBA	800 HOURS	
	PARTICLE SEARCH #623	LAI	1,000 HOURS	
NA-15-FT	DETECTOR DEVELOPMENT #528	ROBERTS	100 HOURS	
-30-IN	DETECTOR DEVELOPMENT #550	ATAC	TEST RUNNING	
PA-PE	PHOTOPRODUCTION #627	KNAPP	1,000 HOURS	
ITA-C-0	PROTON-PROTON SCATTERING #500D	FRANZINI	1,000 HOURS	
MISC1	MUC CALIBRATION CROSS SECT #631	BAKER	25 EXPOSURES	



John Rutherfoord addressing the Annual Users Meeting (see story on page 3).

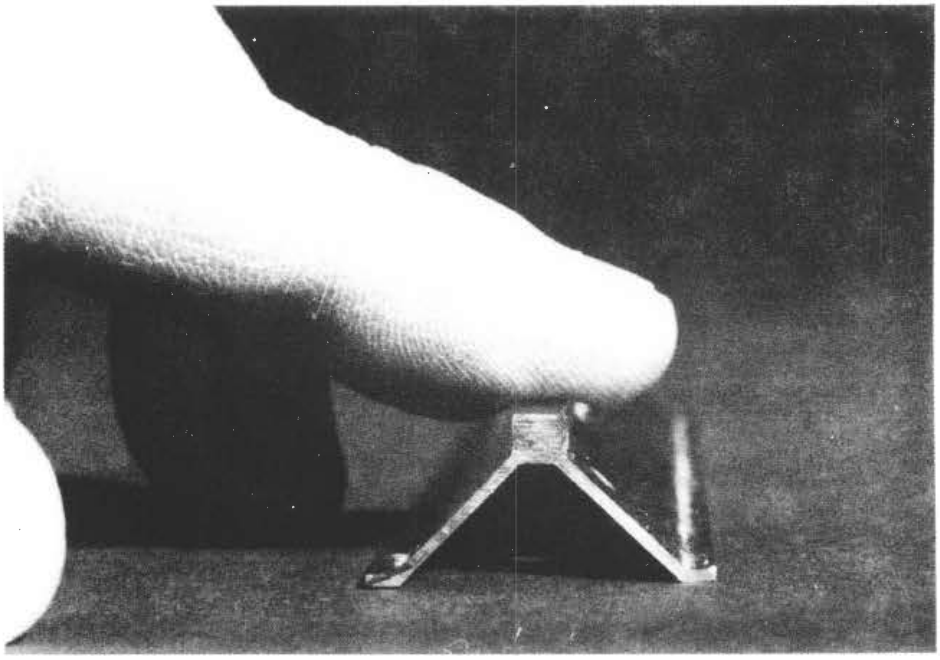
(Photograph by Fermilab Photo Unit)

PROPOSALS RECEIVED FROM OCTOBER 2, 1979
THROUGH MAY 16, 1980

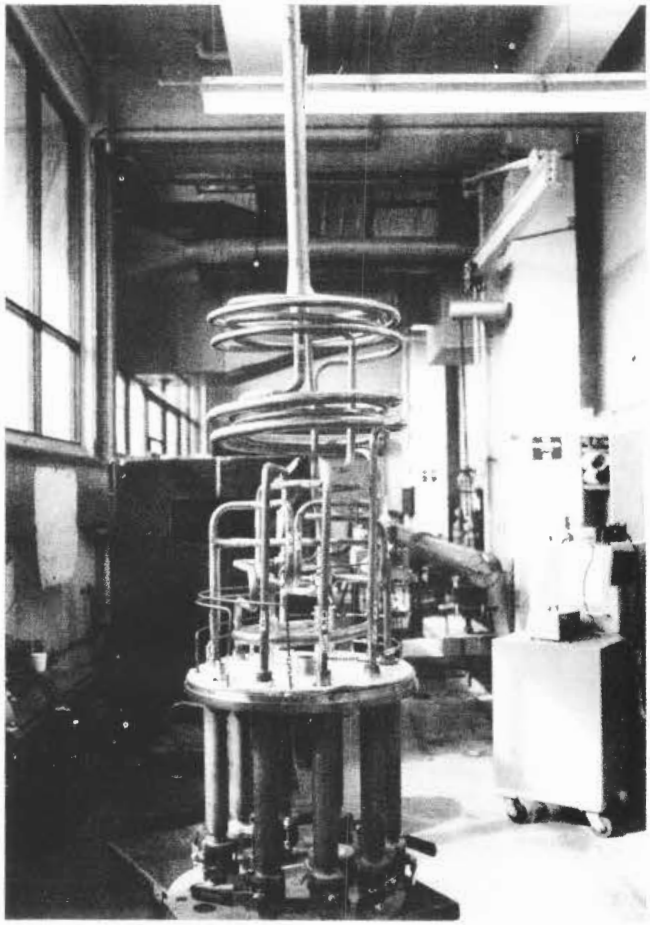
No.	Title	Spokesperson
629	Proposal to Fermilab to Measure Direct Photon Production in Hadron-Nucleus Collisions	T. Ferbel
630	Study of B Particle and Charmed Particle Production and Decay Using a High Resolution Streamer Chamber	J. Sandweiss
631	A Proposal to Measure Nuclear Calibration Cross Sections for Protons between 100 and 1000 GeV	S. I. Baker
632	An Exposure of the 15-Ft Bubble Chamber with a Neon-Hydrogen Mixture to a Wideband Neutrino Beam from the Tevatron	D. Morrison
633	Proposal to Study Neutrino Interactions in a Beam Dump Experiment with the 15-Ft Bubble Chamber at Tevatron Energies	V. Kaftanov
634	Proposal to Measure Neutrino and Anti-Neutrino Interactions in a Large Magnetized Iron Detector with Very Good Acceptance and Resolution at the Tevatron	No Spokesperson Given
635	Proposal to Measure $\bar{\nu}_\mu e^-$ and $\nu_\mu e^-$ Elastic Scattering, Neutrino Oscillations, and Decays of Long-Lived Neutral Particles at the Tevatron of Fermilab	L. Mo
636	Neutrino Interaction Studies at Tevatron Energies Using a Beam Dump Technique to Produce the Neutrino Beam	I. Pless
637	Proposal to Study Neutrino and Antineutrino Interactions in Deuterium with 15-Ft Bubble Chamber at Tevatron Energies	V. Ammosov V. Kaftanov
638	Antineutrino Interactions in Deuterium at Tevatron Energies	No Spokesperson Given
639	Tevatron Proposal for a Study of Deep Inelastic Muon Scattering and Electroweak Interference at 600 and 750 GeV	H. Anderson
640	The Multimuon Spectrometer at the Tevatron	S. Loken

No.	Title	Spokesperson
641	A Tevatron Proposal: Neutrino-Deuterium and Antineutrino-Deuterium Interactions in the 15-Ft Bubble Chamber Using an 800-1000 GeV/c Quadrupole Triplet Beam	T. Kitagaki
642	Proposal for an Extension of Experiment E-545 to Study Neutrino Interactions in Deuterium in the 15-Ft Chamber with Plates and High Resolution Optics Using the 400 GeV/c Wide Band Beam	G. Snow
643	An Open Geometry Magnetic Spectrometer for the Tevatron Muon Beam	G. Brandenburg
644	Further Studies of Prompt Neutrinos with the E-613 Detector	M. Longo
645	Muon Production in a Neutrino Beam Dump	M. Glaubman
646	Search for the ν_τ and Study of ν_e and $\bar{\nu}_e$ Interactions	C. Baltay
647	Development of a "Fermilab Neutrino Hybrid Spectrometer (FNHS)" for Neutrino Physics at the Tevatron	V. Peterson
648	Deep Inelastic Weak and Electromagnetic Interactions of Muons	No Spokesperson Given
649	Proposal to Study Nucleon Structure Functions at High Q^2	F. Taylor
650	Request for a Continuation of E-567	No Spokesperson Given
651	Letter of Intent for an Experiment at Tevatron with Wide Band Neutrino and Antineutrino Beams in the 15-Ft Chamber Filled with Deuterium (or Light Neon) and with an Internal Electromagnetic Calorimeter	No Spokesperson Given
652	Neutrino Physics at the Tevatron	F. Sciulli M. Shaevitz
653	A Proposal to Measure Charm and B Decays Via Hadronic Production in a Hybrid Emulsion Spectrometer	N. Reay
654	Fully Active Neutrino Target Assembly	W. Lee

No.	Title	Spokesperson
655	An Experiment to Search for $\nu_\mu \rightarrow \nu_\tau$ Neutrino Oscillations Using an Enriched $(\nu_e/\bar{\nu}_e)$ Beam	No Spokesperson Given
656	Proposal to Study Neutrino Interactions in a Beam Dump Experiment	S. Whitaker
657	Proposal for Studying Hadroproduction of Charmed Particles Using the 30-Inch Bubble Chamber	L. Voyvodic
658	A Letter of Intent to Study Hadronic Final States in Deep Inelastic Lepton Scattering by the Addition of a Vertex Detector to a Forward Spectrometer Proposed for the Tevatron Muon Beam at FNAL	V. Eckardt



A new beam target before installation.
(Photograph by Fermilab Photo Unit)



Energy Saver valve box.
(Photograph by Fermilab Photo Unit)

Tree planting at Fermilab's Arbor Day by Chinese visitors (left to right) Zhang Chuen-Ming, Xiao Yi-Xuang, Shi Yin-Sheng, and Ding Ji-Ping and Manuel Garcia, Fermilab employee.
(Photograph by Fermilab Photo Unit)

DATES TO REMEMBER

May 28-31, 1980	International Symposium on the History of Particle Physics (contact L. Hoddeson, Symposium Secretary, at Fermilab for further information).
June 16-17, 1980	Workshop on Helium Refrigeration for High Energy Accelerator Systems (contact W. B. Fowler, Fermilab, for further information).
June 21-27, 1980	Summer meeting of the Physics Advisory Committee (Aspen).
July 24-25, 1980 July 28-August 1, 1980	Fixed Target Workshop (contact Program Planning Office for details).