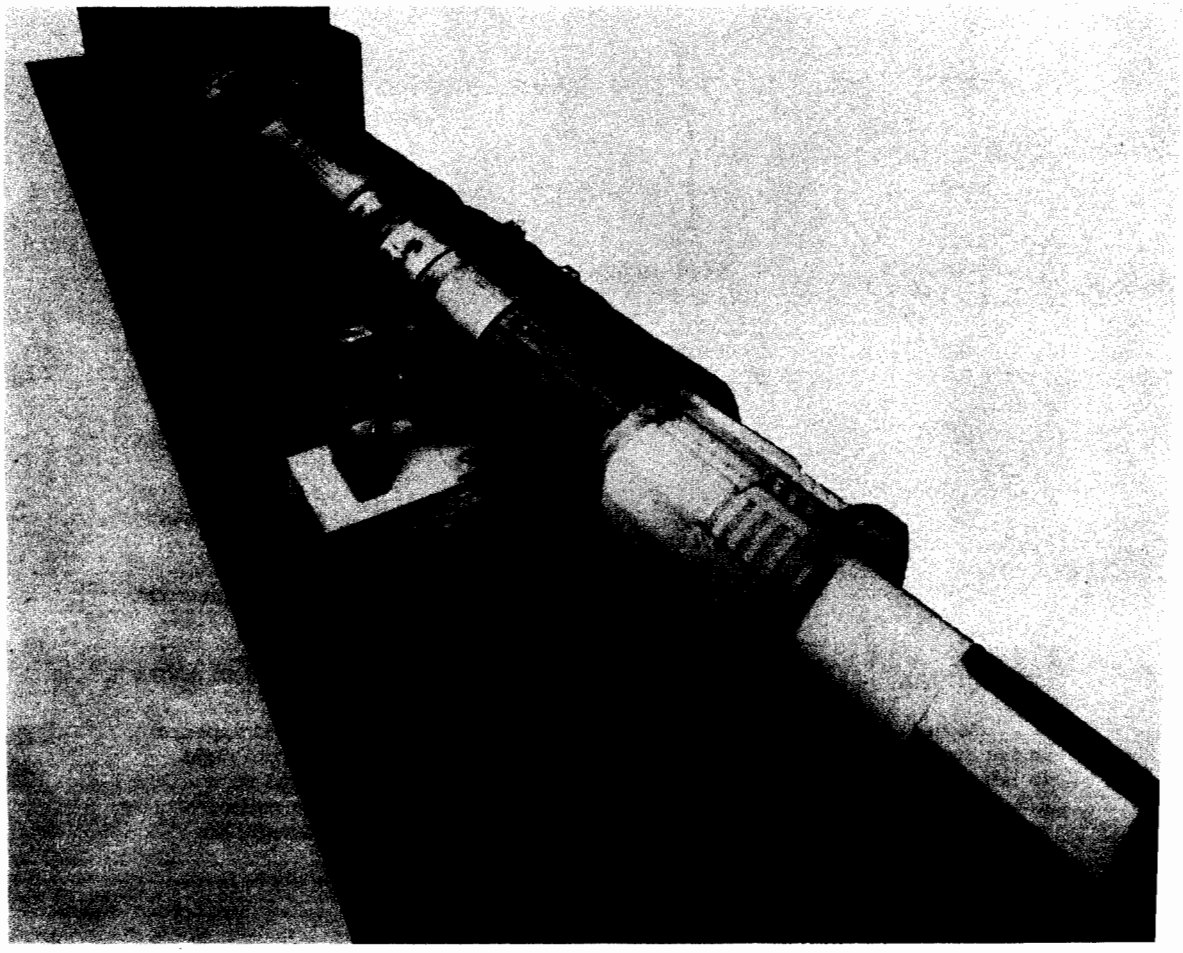
fermilab report

Fermi National Accelerator Laboratory Monthly Report

January 1978



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THE COVER:

Model of an Energy Doubler/Saver superconducting magnet as it appears in the Smithsonian Institution exhibit "Atom Smashers." Reading from right to left, one sees the vacuum chamber, the insulation wrapped around it, a plastic ring that is part of the model, but not of a real magnet, the coils, including the intermediate banding, outer wrapping, coil collar, insulation and mounting, and, finally, the magnetic core.

(Photo by Fermilab Photo Unit)

[illegible] under contract with the United States Department of Energy

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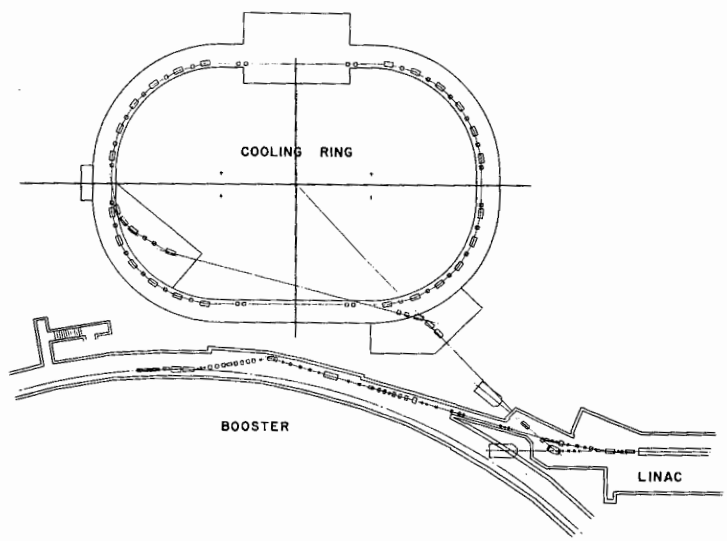
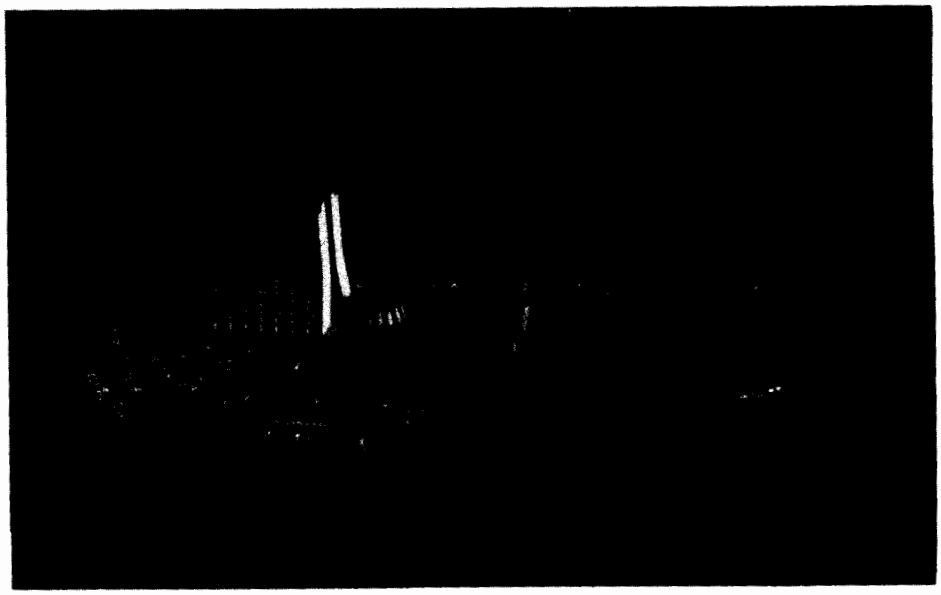
STATUS OF THE ELECTRON COOLING EXPERIMENT

Fred Mills and Don Young

Electron cooling, the damping of the oscillations of a proton beam by the interaction with an electron beam, was described in the December 1976 issue of NALREP. An experiment is being constructed at Fermilab to verify the data obtained on electron cooling at the Institute of Nuclear Physics, Novosibirsk, USSR, and to demonstrate the accumulation of cooled protons. It will consist of a storage ring located at ground level just west of the Booster (see diagram below), which will be equipped with a high-current electron gun in the cooling straight section to cool a beam of 200-MeV protons



Cooling-ring experiment located above ground near the Booster at the 200-MeV end of the Linac (see aerial view on next page).



Aerial view of the Injector Area with the cooling ring in the foreground to the right. (Photo by Fermilab Photo Unit)

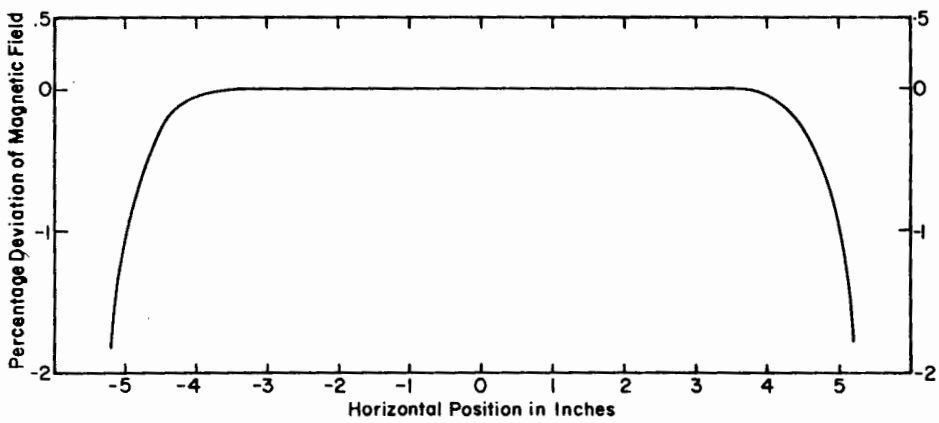
extracted from the Linac. The purpose of this report is to summarize the progress being made toward construction of this experiment.

The temporary building that will house the ring has been completed and occupied. Power and water are installed. Power supplies for the dipole magnets are installed along with the dc distribution system and cable trays. Preliminary survey monuments have been installed. A control room is being installed in the adjacent Booster West Gallery fan room.

The high-intensity electron beam and the magnets to contain and transport it have a powerful influence on the orbits of protons in the storage ring. We now have a lattice (with sextupoles) that corrects all electron-beam effects

and will contain a total momentum spread of 2%. This large momentum aperture is necessary both to cool and accumulate protons.

The magnets for this lattice are also progressing. All 68 half-cores of the ring and beam-transport dipoles have been fabricated and all coils have been wound and insulated. Field measurements on a dipole were made to determine the necessary modifications in the magnet-core end-pack to correct the field. The graph below shows the measured field after these corrections were made. The dipole field is flat to within 0.02% over the full 7-in. width.



Integrated field profile in cooling-ring dipole magnet.

All quadrupole coils have been completed. A complete quadrupole has been assembled for measurements, with two different end-packs for interpolation to reach the final design. All quadrupole iron half-cores should be completed this month.

Vacuum tests on prototype chambers have been completed. These tests were essential in order to achieve the desired pressure of 10^{-10} Torr.

Vacuum parts (chambers, bellows, pump elements) are beginning to arrive. We are planning to install pickup-electrode beam-position detectors at every quadrupole location. We are also planning to use the Schottky-scan technique that was used in the Booster to measure beam-momentum spread. With these techniques we should be able to measure beam positions with only 10^7 protons circulating. A magnesium-jet beam-profile monitor is also being built.

The electron-beam equipment is progressing on schedule. The electron gun, which was built for us by SLAC, is on hand. The electron collector is also being fabricated at SLAC and will be finished by February. This collector should allow recovery of 95% of the 2 MW electron beam power. The solenoidal and toroidal coils are being wound here. The precise high-voltage supply has been delivered and is under test. Several diagnostic devices for the electron beam have been designed, and are being built--microwave cyclotron radiation, light scattering, and beam-profile detectors.

An injection line to the ring has been designed and is under construction. Unused protons in the Linac momentum analysis line will be used as a source of protons for the cooling ring. These protons (or H^- ions) would normally end up in the beam dump. A vertical switching magnet and horizontal bending magnet direct the beam through a collimator system which attenuates the beam to the desired intensity and determines the beam momentum spread and emittance. The switching magnet has been fabricated and was scheduled for installation during January; the horizontal bending magnet was installed last September. The above-ground section of the beam line to the South

straight section of the cooling ring utilizes dipole and quadrupole magnets which are the same as those used in the cooling ring. The injection beam line from the Linac and cutting across the inside of the cooling ring is shown in the diagram on page 1.

The controls for the cooling ring will be integrated with the existing control system for the accelerator and will incorporate the same control and diagnostic techniques.

With construction activities moving at this pace, we expect to inject protons into the ring in the spring and to begin cooling experiments in the summer.

Clarence Black of Aurora (left) and Merrit Nicholls of Wheaton (right) clean seeds of big bluestem grass (Andropogon gerardi) for the Fermilab Prairie Project. The event was held in the Village Barn.

(Photo by Anthony R. Donaldson)

TRIMUON EVENTS AND THEIR INTERPRETATION

David Cline
University of Wisconsin

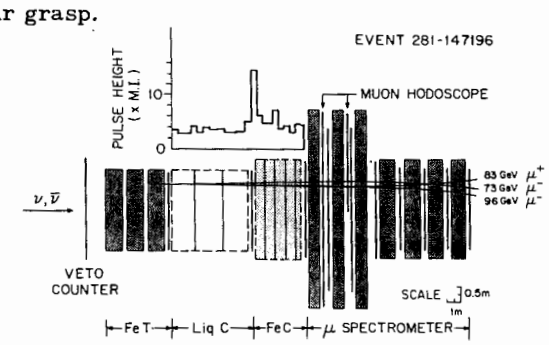
Neutrino experiments have always been an important part of the Fermilab program. One of the earliest results of Fermilab research was the observation of neutral currents independently of and almost simultaneously with CERN. In 1974, the first dimuons were observed. This was the first indication of charm and was reported at the London conference that summer. By now, approximately 5000 dimuon events have been observed. They occur in approximately 1% of all neutrino interactions.

Trimuon events have been produced in both Fermilab counter neutrino experiments (see Fermilab Report, April, 1977), the Caltech-Fermilab-Rockefeller collaboration (E21), and the Fermilab-Harvard-Pennsylvania-Rutgers-Wisconsin collaboration (E310). The rate of trimuon events is small, approximately 10^{-4} of the total neutrino interaction rate, and approximately 50 trimuon events have now been observed in the counter experiments. It is to be expected that they will be observed soon in bubble-chamber experiments. Two four-muon event candidates have also been recorded in the E310 experiment.

A number of mechanisms of trimuon production are possible. One likely and attractive possibility is the "flavor cascade," where new kinds of quarks decay in series. The discovery of the upsilon particle at Fermilab has made it likely that another quark, the b, exists. It is possible to envisage a t quark, paired with the b, decaying into the b, which in turn

decays into a charmed quark, which in turn decays into an s quark, with muons produced in each of these decays (dimuons, trimuons, and four-muon events). The flavor cascade is in accord with the bulk of the data, but has not been uniquely established. It is also possible to interpret some of the data in terms of parton-muon radiation or other, apparently less likely, possibilities, such as heavy lepton cascades. Several of the observed trimuons do not fit easily into any existing model and are perhaps a hint of something new, perhaps due to new leptons.

Neutrinos are a powerful tool for producing new phenomena, but the event rates become lower as the phenomena become more exotic. Neutrino experiments at Fermilab have been aided in exploring these new phenomena by significant increases in machine intensity. The number of protons on target for neutrino experiments has increased steadily, reaching more than 7×10^{18} in 1977. Higher beam energy is another direction in which accelerator improvements can be expected to make a substantial contribution to these studies. With the completion of the Energy Doubler an understanding of some of the phenomena which now appears to be tantalizingly close should come within our grasp.

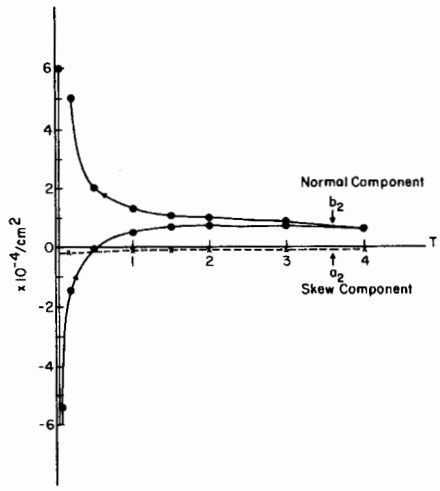


An unusual trimuon event superimposed on the Neuland detector in Lab C.

PROGRESS ON THE ENERGY DOUBLER/SAVER

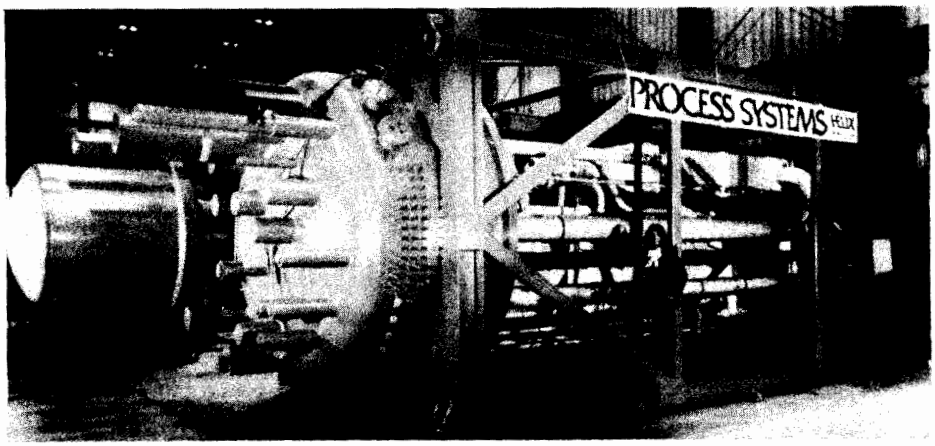
A significant advance has been made in fabrication techniques of Energy Doubler/Saver magnets. Motion of the coils during excitation had been somewhat of a problem, giving unacceptable field distortions. A new clamping-system design has been developed using more precise tooling and careful measurements to give a uniform preloading of the coil at cryogenic temperature. Several prototypes have been built and tested by measuring the change in arc length along the coil shell during excitation. This change has been reduced from approximately 20 mil in older designs to 4 mils, a result close to the "ideal" to be expected from motion of the collar itself. The new clamping system and a small, but important change in the width of the coils have combined to reduce the measured sextupole field in a dipole to within acceptably small limits, as is shown in the graph below.

The 8-magnet string just as assembled at the time of our last report in these pages (Oct. 1977) has been successfully operated. We are now modifying the energy-dumping scheme and connecting the system to a Main-Ring power supply for ramping tests.



Normal and skew sextupole components vs. magnetic field for magnet E22-52D.

Four Energy Doubler/Saver dipoles have been installed in A sector of Main Ring as part of the



The Central Helium Liquefier as it underwent final tests at the manufacturer.

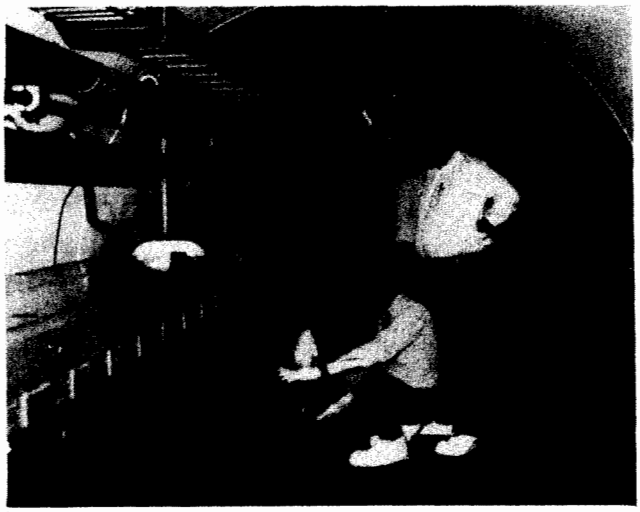
(Photo courtesy of Helix Technology Corporation)

Sector Test to be carried out over the next months. Several of the accompanying photographs show this work in progress in the tunnel. As part of the the Sector Test, a prototype satellite refrigerator has been installed in the new mini-Service Building at A1, shown on the cover of last month's Fermilab Report. Compressors have also been installed in the A1 Service Building itself.

The large Central Helium Liquefier cold box has been completed and tested at the manufacturer's plant and is being delivered this month. The compressors and fin coolers for this plant, which were recovered as surplus equipment from an Air Force installation, have been refurbished and installed and the interconnecting piping is now being connected. Tests are scheduled to start in early spring.

The special C stand rotates to remove interference.

(Photo by Fermilab Photo Unit)



Rich Orr, Peter Limon (standing), and Gene Fisk inspect the installation of the Energy Doubler/Saver magnet.

(Photo by Fermilab Photo Unit)

Jack Smith connects two Energy Doubler/Saver magnets.

(Photo by Fermilab Photo Unit)

POSITION AVAILABLE AT FERMILAB

A new position is available in the Electronic Support Group of Research Services. This person will be responsible, under Bob Shafer, for the design, and fabrication, of specialized electronic circuits and electronic systems for the PREP electronics pool, and will also assist in the development and bringing into operation of improved computer-controlled testing and fault diagnosis systems for electronic circuit modules; a vigorous liaison role with the users of the PREP pool is another important facet of this job opening. A master's degree in physics or electronic engineering is required. A strong interest in electronic circuit design is essential. Candidates with a Ph. D. or with extensive experience in experimental high-energy physics will be preferred. Interested persons should contact R. Shafer.

RESEARCH ACTIVITIES DURING DECEMBER 1977

James MacLachlan

The accelerator ran in December at 400 GeV with a 1.25-sec flattop and provided 2.44×10^{18} protons and 401 hours of beam time of the 553 hours scheduled for high-energy physics. The 72% ratio of available to scheduled beam is somewhat below average, but after time had been taken out for a couple of sessions of extraction-system repair, leak hunting near C0, and finding a shorted Main-Ring transformer, the remaining operation was generally quite satisfactory. The accelerator was put into a Christmas standby for the 79-hour period from Friday, December 23, through Monday, December 26. The resumption of running for high-energy physics was reasonably smooth with good beam arriving about 2 shifts after startup. At the end of the month, both the Booster and the Main Ring were running at around their highest recorded intensities.

Considerable progress was made during the month in smoothing the transition between high repetition-rate running during the night hours and slower running on weekdays. Initially, there were severe problems with extraction a few minutes after a major change in cycle time. The Main Ring could be made to run well either at slow repetition rate or at fast repetition rate, but seemingly not both. But, by adjusting the magnet cooling-water temperature to keep the magnets at constant temperature rather than by keeping the water at constant temperature, a 6° change in magnet temperature was eliminated. The extraction difficulties appear to have been related in some poorly understood way to this temperature difference. The day/night

variation in cycle will apparently be a long-term feature of accelerator operation, because negotiations for a new power contract have reached an advanced stage with provisions that encourage reduced consumption of power during the day. From the standpoint of protons accelerated and available spill seconds, it would already appear that a daytime limit of 55 MW will be workable. More difficult to assess are the effects on experiments, particularly the efficiency of short periods of running for high-energy physics sandwiched between successive daytime study periods. The relative value of continuity of running and the close matching of high-energy physics running to the power schedule is being carefully evaluated; the information from experimenters' hours reporting will be an important indication of the subtler effects of the new power limits.

FACILITY UTILIZATION SUMMARY -- DECEMBER 1977

I. Summary of Accelerator Operations

		Hours	
A. Accelerator use for physics research			
Accelerator physics research		52.6	
High energy physics research		400.7	
Research during other use		(16.3)	
	Subtotal		453.3
B. Other activities			
Accelerator setup and tuning to experimental areas		14.0	
Program interruption		27.1	
Unscheduled interruption		170.6	
	Subtotal		211.7
C. Unmanned time			79.0*
	Total		744.0

II. Summaries of High Energy Physics Research Use

	# of Expts.	Hours	Results
A. Counter experiments	13	3167.8	1 exp. completed
B. Bubble chamber experiments	1	337.3	103 K 15' pictures
C. Emulsion experiments	-	-	-
D. Special target experiments	-	-	-
E. Test experiments	1	261.1	Tests complete
F. Engineering studies and tests	-	-	-
G. Other beam use	(2)	5.4	N1 and PW beam tuning
	15	3771.6	

III. Number of Protons Accelerated and Delivered @ 400 GeV ($\times 10^{18}$)

A. Beam accelerated in Main Ring			2.44
B. Beam delivered to experimental areas			
Meson Area		0.36	
Neutrino Area			
Slow Spill	0.67		
Fast Spill	1.19	1.86	
Proton Area		0.08	
Total			2.30

*Christmas standby

BEAM UTILIZATION BY

	Beam	Hours
MESON AREA		
Associated Production #99	M6E	267.0
Total Cross Section #104	M1W	265.8
Inclusive K_s^o #383	M4	267.4
Multi-Muon #439	M2	263.7
Particle Search #540	M3	194.6
NEUTRINO AREA		
Muon #203A	N1	9.6
Neutrino #310	N0	343.2
Di-Muon #444	N1	328.7
Neutrino #482	N0	351.2
15' ν/H_2 & Ne #546	N0	337.3
DPI Tests	N3	261.1
PROTON AREA		
Photoproduction #87A	P1	259.7
Di-Lepton #288	PC	304.2
INTERNAL TARGET AREA		
Proton Polarization #522	C0	211.1
p-N Scattering #552	C0	128.6
Hours for experiments		3766.2
Hours for beam tuning		5.4
TOTAL HOURS FOR HIGH-ENERGY PHYSICS		3771.6

EXPERIMENT -- DECEMBER 1977

Activities

data: Σ and Y^* production with 70 GeV π^+ and 70 GeV K^- using the Single Arm Spectrometer

data: complete; H_2, D_2 and nuclear total cross sections for $\pi^\pm$, $K^\pm$, p, and $\bar{p}$ at momenta up to 370 GeV/c

tuneup: beam tuning and trigger studies for inclusive K_s^o production by K^-

tuneup & data: beam tuning, counter timing, and rate studies followed by high mass dimuon production by protons in magnetized Fe beam dump

tests: looking for delayed energy release from a target bombarded by neutrons

tests: rate studies of chambers and computer interface

data: prescaled single-μ and multi-μ data with an iron-scintillator calorimeter and toroidal muon spectrometer

data: mass spectrum of dimuons produced by ±225 GeV/c π measured with the cyclotron spectrometer

data: single-μ and multi-μ data using the Lab E calorimeter and muon spectrometer

data: 103K pictures in the 15' chamber with 47% neon hydrogen mixture using the double plane EMI

tests: complete; tests of the γ detector and ISIS

tests: trigger studies and equipment checkout for the production of high mass hadron states with the broad-band photon beam

data: high mass dimuon data in a high rate configuration

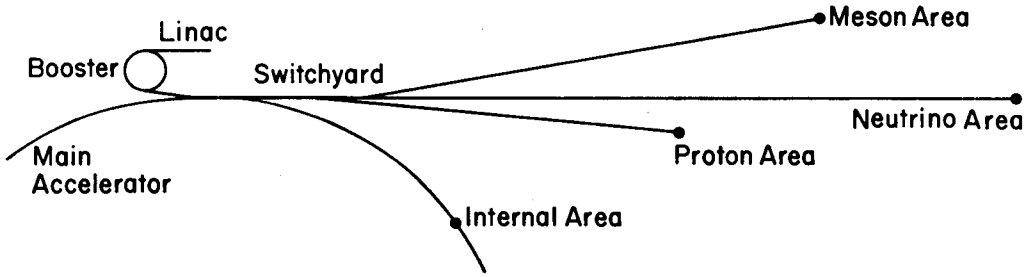
data: recoil proton polarization in pp inclusive scattering at 100-400 GeV

data: p-p and p-D scattering using the superconducting recoil spectrometer

FERMI NATIONAL ACCELERATOR LABORATORY
MONTHLY OPERATIONS HISTORY
DECEMBER 1977

Date	Accelerator	Int. Target Area	Proton Area	Neutrino Area	Meson Area
Thurs. 12/1	Accelerator Maintenance & Development				
Fri. 12/2	Repairs: Main Ring vacuum, Extraction, Linac gas barrier				
Sat. 12/3		p-N Scattering 552	Di-Lepton 288 (PC) Photoprod. 87A (PE) OFF (PW)	Di-Muon 444(N1) Neutrino 310 (N0) Neutrino 482 (N0) 15'ν/H_2&Ne#546 (N0) DPI Tests (N3)	Assoc. Prod. 99 (M6E) σ_T 104 (M1W) Multi-μ 439 (M2) Incl. K^o_s 383 (M4) Part. Sch. 540 (M3)
Sun. 12/4	Repairs:Extraction				
Mon. 12/5					
Tues. 12/6					
Wed. 12/7	Accel. Studies; Repairs:MR Vacuum				
Thurs. 12/8	Accel. Studies	Proton Polariz. 522			
Fri. 12/9	~1.8×10^{13}ppp @400 GeV (1.25 sec flattop)				
Sat. 12/10					
Sun. 12/11					
Mon. 12/12					
Tues. 12/13					
Wed. 12/14	Accel. Studies				
Thurs. 12/15	Accel. Studies; ~1.7×10^{13}ppp				
Fri. 12/16	@400 GeV				
Sat. 12/17					
Sun. 12/18					
Mon. 12/19	~1.9×10^{13}ppp @400 GeV				
Tues. 12/20					
Wed. 12/21				Tests for μ203A(N1) DPI Tests (N3)	
Thurs. 12/22	Interlock Tests and Accelerator Studies				
Fri.(H) 12/23					
Sat. 12/24	CHRISTMAS STANDBY PERIOD				
Sun. 12/25					
Mon.(H) 12/26					
Tues. 12/27	Accelerator Startup				
Wed. 12/28		p-N Scattering 552	OFF	Di-Muon 444(N1) Neutrino 310 (N0)	Water System Repairs
Thurs. 12/29			Di-Lepton 288 (PC) Photoprod. 87A (PE) OFF (PW)	Neutrino 482(N0) 15'ν/H_2&Ne #546 (N0)	
Fri. 12/30	Reprs:MR Xformer				
Sat. 12/31	~2.2×10^{13}ppp @400 GeV (1.25 sec flattop)				

Fermi National Accelerator Laboratory



Experiments in the Research Areas

JANUARY - MARCH 1978

Internal Area

PROTON POLARIZATION #522
p-N SCATTERING #552

Proton Area

PROTON EAST:
PHOTOPRODUCTION #87A
PHOTOPRODUCTION #152B

PROTON CENTER:
DI-LEPTON #288

Neutrino Area

MUON/HADRON BEAM:
MUON #203A/#391
MUON #448

NEUTRINO BEAM:
NEUTRINO #253
NEUTRINO #310
15-FT BUBBLE CHAMBER

Meson Area

M1 BEAM:
HADRON DISSOCIATION #272
PARTICLE SEARCH #490

M2 BEAM:
MULTI-MUON #439

M3 BEAM:
PARTICLE SEARCH #540

M4 BEAM:
INCLUSIVE K^0_S #383

M6 BEAM:
MULTIPARTICLE #110A
HADRON DISSOCIATION #396
INCLUSIVE SCATTERING #451

SITUATION REPORT--JANUARY 1978

PAGE 1 — FERMI NATIONAL ACCELERATOR LABORATORY — PROGRAM PLANNING OFFICE, 12 JAN 1978

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 JANUARY 1, 1978. 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 - 276

A. EXPERIMENTS THAT HAVE COMPLETED DATA TAKING (205):

(ONLY EXPERIMENTS COMPLETED SINCE 1 JAN 1977 ARE LISTED BELOW)

AREA-BEAM		SPOKESPERSON	EXTENT OF RUN TO DATE	DATE COMPLETED
MA-M1	POLARIZED SCATTERING #61	CHAMBERLAIN	1,900 HOURS	26 OCT 1977
	TOTAL CROSS SECTION #104	KYCIA	2,650 HOURS	22 DEC 1977
	HADRON JETS #236A	HOCKETT	1,700 HOURS	20 JUL 1977
	INCLUSIVE SCATTERING #324	WEISBERG	1,200 HOURS	13 AUG 1977
	FORM FACTOR #456	STORK	1,450 HOURS	13 APR 1977
	HIGH ENERGY CHANNELING #507	GIBSON	350 HOURS	30 MAY 1977
-M2	INCLUSIVE NEUTRAL MESON #350	KENNEY	900 HOURS	24 FEB 1977
	HADRON JETS #395	SELOVE	1,150 HOURS	16 NOV 1977
	INCLUSIVE NEUTRON #404	GUSTAFSON	350 HOURS	5 JUL 1977
	LAMBDA MAGNETIC MOMENT #440	BUNCE	250 HOURS	22 MAR 1977
	LAMBDA POLARIZATION #441	POMEROY	400 HOURS	2 JUL 1977
-M3	NEUTRON-NUCLEUS INELASTIC #438	JONES	350 HOURS	18 APR 1977
-M4	K ZERO CHARGE RADIUS #226	TELEGDI	1,200 HOURS	17 MAR 1977
	K ZERO CROSS SECTION #486	WINSTEIN	950 HOURS	17 MAR 1977
-M6	INCLUSIVE SCATTERING #118A	FRIEDMAN	2,550 HOURS	20 JUL 1977
NA-NO-HORN	15-FOOT ANTI-NEUTRINO/N2 #31A	DERRICK	211K PIX	13 AUG 1977
	15-FOOT NEUTRINO/H2EMU #53A	BALTAY	163K PIX	24 MAY 1977
	EMULSION/NEUTRINO #536	HIU	2 STACKS	13 AUG 1977
-MUON/HADRON	PARTICLE SEARCH #369	KIRK	1,000 HOURS	13 AUG 1977
-15-FT	PARTICLE SEARCH #379	WOJCICKI	1,250 HOURS	8 JUN 1977
PA-PE	PARTICLE SEARCH #325	CRONIN	1,500 HOURS	28 FEB 1977
-PC	DI-HADRON #494	GOOD	1,950 HOURS	21 FEB 1977
-PK	PROTON SEARCH #95A	COX	3,400 HOURS	17 OCT 1977
	PROTON-PROTON ELASTIC #177A	OREAR	2,400 HOURS	19 APR 1977
ITA-C-O	PROTON-NUCLEON SCATTERING #198A	OLSEN	900 HOURS	19 APR 1977
	PROTON-HELION SCATTERING #289	MALAMUD	1,050 HOURS	8 NOV 1977
	PROTON-PROTON POLARIZATION #313	MEAI	850 HOURS	30 MAR 1977
	PROTON-NUCLEON SCATTERING #381	MALAMUD	600 HOURS	30 MAR 1977
	NUCLEAR FRAGMENTS #442	TURKOT	1,200 HOURS	13 AUG 1977

B. EXPERIMENTS THAT ARE IN PROGRESS (27):

			EXTENT OF RUN TO DATE	DATE OF RECENT RUN
MA-M2	MULTI-MUON #439	GABELICK	700 HOURS	1 JAN 1978
	PARTICLE SEARCH #468	STEINBERG	300 HOURS	1 OCT 1977
-M3	PARTICLE SEARCH #540	LONGO	500 HOURS	1 JAN 1978
-M6	INCLUSIVE K-SHORT #383	KOBRAK	750 HOURS	1 JAN 1978
-M6	MULTIPARTICLE #110A	DZIERBA	1,000 HOURS	1 JUL 1977
	HADRON DISSOCIATION #396	GOULIANOS	1,200 HOURS	1 JAN 1978
	BACKWARD SCATTERING #290	BAKER	950 HOURS	1 JAN 1978
	ASSOCIATED PRODUCTION #99	DIEBOLD	400 HOURS	1 JAN 1978
-OTHER	NUCLEAR CHEMISTRY #81A	KAUFMAN	159 BOMBARDMENTS	1 JAN 1978
NA-NO-HORN	15-FOOT NEUTRINO/N2 #45A	STEVENSON	162K PIX	1 APR 1976
	15-FOOT ANTI-NEUTRINO/H2EMU#180	KAFTANOV	273K PIX	1 JUL 1977
-NO-TRIPLET	NEUTRINO #310	CLINE	3,350 HOURS	1 JAN 1978
	NEUTRINO #253	MO	300 HOURS	1 JAN 1978
	NEUTRINO #482	BARISH	1,550 HOURS	1 JAN 1978
	15-FOOT NEUTRINO/H2EMU #546	HOSON	274K PIX	1 JAN 1978
-MUON/HADRON	TEST MUON IRRADIATION #501	LANDE	2 TARGETS EXPOSED	1 JAN 1977
	DI-MUON #444	SMITH	1,050 HOURS	1 JAN 1978
-15-FT	15-FOOT PI- - P @ 100 #83A	KITAGAKI	11K PIX	1 APR 1975
	15-FOOT PI- - PEMU @ 200 #89	FRETTER	4K PIX	1 JUL 1975
	15-FOOT PI- - P @ 360 #384	LANEUTTI	20K PIX	1 APR 1976
-OTHER	MONOPOLE #502	BARTLETT	COSMIC RAY RUNNING	1 JUL 1977
	NUCLEAR FRAGMENTS #466	KAUFMAN	6 TARGETS EXPOSED	1 JAN 1978
PA-PE	PHOTOPRODUCTION #87A	LEE	3,650 HOURS	1 JAN 1978
	PHOTOPRODUCTION #152B	NEUSCH	900 HOURS	1 JAN 1978
-PC	DI-LEPTON #288	LEDERMAN	5,050 HOURS	1 JAN 1978
ITA-C-O	PROTON POLARIZATION #522	OGREN	400 HOURS	1 JAN 1978
	P-N SCATTERING #552	SAMMES	150 HOURS	1 JAN 1978

C. EXPERIMENTS THAT ARE IN TEST STAGE (2):

			EXTENT OF RUN TO DATE	DATE OF RECENT RUN
MA-MUON/HADRON	MUON #203A	KERTH	10 HOURS	1 JAN 1978
	MUON #391	KERTH		

D. EXPERIMENTS BEING INSTALLED (3):

			EXTENT OF APPROVAL
MA-M1	HADRON DISSOCIATION #272	FERBEL	600 HOURS
	PARTICLE SEARCH #490	SANDWEISS	TEST RUNNING
MA-MUON/HADRON	MUON #448	LOOMIS	PARASITIC RUNNING

E. EXPERIMENTS TO BE SET UP WITHIN A YEAR (29):

			EXTENT OF APPROVAL
MA-M2	XI-ZERO PRODUCTION #495	HELLER	400 HOURS
	LAMBDA BETA DECAY #[illegible]	POMEROY	300 HOURS
-M3	PI-MU ATOMS #533	SCHWARTZ	500 HOURS
-M6	INCLUSIVE SCATTERING #451	BARTON	400 HOURS
NA-NO-DICHROM	NEUTRINO #356	BARISH	1,000 HOURS
-NO-WB HORN	15-FOOT NEUTRINO/D2 #151A	SNOW	100K PIX
	15-FOOT NEUTRINO/D2 #227	ENGELMANN	100K PIX
	15-FOOT ANTI-NEUTRINO/D2 #390	CARMONY	300K PIX
	NEUTRINO #531	REAY	PARASITIC RUNNING
	NEUTRINO #553	HAND	PARASITIC RUNNING
	15-FOOT & EMULSION/NEUTRINO#564	VOYVODIC	PARASITIC RUNNING
-OTHER	QUARK #549	LONGO	PARASITIC RUNNING
	EMULSION/PI- @200 #481	TAKAHASHI	EMULSION EXPOSURE
	EMULSION/PI- @ > OR = 200 #503	OGATA	EMULSION EXPOSURE
	EMULSION/PI- @ > OR = 200 #506	DAKE	EMULSION EXPOSURE
	EMULSION/PI- @300 #525	WILKES	EMULSION EXPOSURE
	EMULSION/PI- @300 #568	HEBERT	EMULSION EXPOSURE
	EMULSION/PI- @300 #573	USHIDA	3 STACKS
	EMULSION/PI- @ 300 #574	WOLTER	3 STACKS

NOTE: THE ABILITY TO SET UP THESE EXPERIMENTS DURING THE NEXT YEAR IS CONTINGENT ON THE AVAILABILITY OF FUNDS.

PAGE 2 EXPERIMENTAL PROGRAM SITUATION REPORT (CONT'D) 12 JAN 1978

AREA-BEAM		SPOKESPERSON	EXTENT OF APPROVAL
	EMULSION/PROTONS @400 #459	IWAI	EMULSION EXPOSURE
	EMULSION/PROTONS @400 #547	JACQUOT	EMULSION EXPOSURE
	EMULSION/PROTONS @ 400 #575	LORD	2 STACKS
PA-PE	PHOTOPRODUCTION #401	GONALEZ	600 HOURS
	PHOTOPRODUCTION #516	NASH	1,000 HOURS
-PC	CHARGED HYPERON #497	LACH	400 HOURS
-PW	PION INCLUSIVE #258	SHOCHET	800 HOURS
	DI-MUON #326	SHOCHET	800 HOURS
	C-TEST #302	CESTER-REGGE	400 HOURS
	PARTICLE SEARCH #567	CESTER-REGGE	500 HOURS

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F. OTHER APPROVED EXPERIMENTS (10):

			EXTENT OF APPROVAL
MA-M1	PARTICLE SEARCH #515	ROSEN	800 HOURS
-M6	HADRON JETS #557	MALAMUD	1,600 HOURS
MA-WO-DICHROM	15-FOOT NEUTRINO/H2GHE #380	BALTAY	200K PIX
	15-FOOT ANTI-NEUTRINO/H2GH#388	PETERSON	200K PIX
-15-FT	15-FOOT P - P 6 NE @ 400 #291	MANN	25K PIX
-30-IN	30-INCH PI- - HI Z @ 300 #304	WALKER	200K PIX
-OTHER	EMULSION/PROTONS @ 500 #508	WOLTER	EMULSION EXPOSURE
	EMULSION/PROTONS @ 500 #524	WILKES	EMULSION EXPOSURE
PA-PE	PARTICLE SEARCH #400	PEOPLES	400 HOURS
	PHOTOPRODUCTION #458	LEE	1,000 HOURS

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PENDING PROPOSALS (34):

			EXTENT OF REQUEST
MA-M1	HADRON JETS #246	SELOVE	1,500 HOURS
	DETECTOR DEVELOPMENT #527	YUAN	200 HOURS
-M2	PROTON POLARIZATION #505	YAMIN	100 HOURS
	NUCLEAR CHEMISTRY #529	TURKEVICH	100 HOURS
	NEUTRAL HYPERON #555	DEVLIN	250 HOURS
-M6	PARTICLE SEARCH #489	CUTTS	150 HOURS
	MULTIPARTICLE #523	DEIENBA	800 HOURS
MA-WO-DICHROM	NEUTRINO #355	BARISH	1,400 HOURS
-WO-WB HORN	15-FOOT NEUTRINO/H2GHIZ #489	MERRICK	450K PIX
	15-FOOT NEUTRINO/D2GHIZ #521	VANDER VELDE	200K PIX
	15-FOOT ANTINEUTRINO/D2GHIZ#539	FRETTER	400K PIX
	15-FOOT ANTINEUTRINO/D2GHIZ#542	CARRONY	500K PIX
	15-FOOT ANTINEUTRINO/H2GHIZ#544	KAPTANOV	500K PIX
	15-FOOT NEUTRINO/D2GHIZ #545	SHON	500K PIX
-NEUTRINO	NEUTRINO #572	BEEDER	6,500 HOURS
-MUON/HADRON	PION DISSOCIATION #318	ASCOLI	400 HOURS
	MUON #348	WILSON	800 HOURS
-15-FT	15-FOOT P - P @ > OR = 300 #208	TAKIBAEV	75K PIX
	15-FOOT PBAR - P @ 100 #526	LANDER	150K PIX
	15-FOOT PBAR - D @ 100 #527	LANDER	150K PIX
	DETECTOR DEVELOPMENT #528	ROBERTS	100 HOURS
	15-FOOT PI- - D @ 100&360 #538	FRETTER	150K PIX
-30-IN	30-INCH HYBRID #394	WHITMORE	2,250K PIX
	30-INCH PI6P - P6NE @100 #504	GULJAMOV	20K PIX
	30-INCH PBAR - D @ 200 #511	FRIDMAN	150K PIX
	DETECTOR DEVELOPMENT #550	ATAC	TEST RUNNING
	30-INCH PI6K - P @ 100 #558	SHEPHARD	2,250K PIX
	30-INCH HYBRID #565	YAMAMOTO	3,000K PIX
	30-INCH HYBRID #570	PLESS	2,000K PIX
PA-PC	CHARGED HYPERON #353	ECKLUND	600 HOURS
	FORM FACTOR #446	ECKLUND	800 HOURS
-PW	PARTICLE SEARCH #537	COX	1,400 HOURS
ITA-C-O	PROTON-PROTON SCATTERING #500D	FRANZINI	1,000 HOURS
	QUARK SEARCH #571	OLSEN	300 HOURS

MANUSCRIPTS AND NOTES PREPARED DURING JANUARY 1978

Copies of preprints with Fermilab publication numbers can be obtained from the Publications Office or Theoretical Physics Department, 3rd floor east, Central Laboratory. Copies of some articles listed are on the reference shelf in the Fermilab Library.

Experimental Physics

B. C. Barish et al. Experiment #21	Total Cross Sections and Mean Y from Charged Current ν_μ and $\bar{\nu}_\mu$ Collisions (Talk presented by F. Sciulli at the 1977 International Symposium on Lepton and Photon Interactions at High Energies, August 25-31, 1977, Hamburg, Germany)
H. L. Anderson et al. Experiment #98 and Experiment #398	A Determination of the Quark and Gluon Moments of the Nucleon
B. S. Yuldashev et al. Experiment #172	Multiplicity of Charged Particles in π^- Neon Interactions at 25 and 50 GeV/c
T. H. Burnett Experiment #172	Neutrino Results from the Fermilab 15-Foot Bubble Chamber Using Neon-Hydrogen Mixtures (Invited talk presented at the 1977 International Symposium on Lepton and Photon Interactions at High Energies, August 25-31, 1977, Hamburg, Germany)
F. A. Nezrick Experiment #180 (primarily)	Neutrino Physics at Fermilab (Invited talk at the Triangle Seminar on Recent Developments in High Energy Physics, Campione d'Italia, October 3-7, 1977; conference proceedings will be published in Nuovo Cimento Supplement - FERMILAB-Conf-77/112-EXP)
S. Mori et al. Experiment #310	Limits of the Probability that Trimuons are Produced by a New Short-Lived Source of Neutrinos (Submitted to Phys. Rev. Lett. - FERMILAB-Pub-77/113-EXP)
R. A. Carrigan, Jr. et al. (CERN experiment)	Search for Magnetic Monopoles at the CERN-ISR (Submitted to Phys. Rev. D - FERMILAB-Pub-77/111-EXP)

DATES TO REMEMBER

February 9-10, 1978	Proposal Presentation Meeting.
February 23-24, 1978	Meeting of the Hadron Physics Bubble Chamber Subcommittee of the Program Advisory Committee.
March 9-10, 1978	Spring meeting of the Fermilab Program Advisory Committee.
April 7-8, 1978	Workshop on Channeling at High Energies (for further details contact R. A. Carrigan)
May 5, 1978	Deadline for receipt of all new proposals and other written materials to be considered at the summer meeting of the Program Advisory Committee.
May 18-19, 1978	Proposal Presentation Meeting.
June 17-23, 1978	Summer meeting of the Fermilab Program Advisory Committee.