fermilab report

Fermi National Accelerator Laboratory Monthly Report

March 1982

fermilab report is published monthly by the Fermi National Accelerator Laboratory, P. O. Box 500, Batavia, Illinois 60510

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FERMILAB-82/2 **Fermi National Accelerator Laboratory** 0090.01

THE COVER: TREAD vessel being moved to the Tagged Photon Laboratory.

(Photograph by Jerry Silverman)

CONTENTS MARCH 1982

Energy Saver Sector Test 1

New Electron-Cooling Tests 3

Toward the Future of High-Energy Physics 4

Diffraction Dissociation of Photons at High Energies Measured with a Hydrogen TPC - Preliminary Results From Experiment 612
H. Sticker 7

Physics Advisory Committee Membership 13

Summary of Operations - January 1982
H. Fenker 14

Monthly Operations History - January 1982 15

Beam Utilization by Experimental Activity - January 1982 16

Facility Utilization Summary - January 1982 18

Situation Report - January 1982 20

Manuscripts, Notes, Lectures, and Colloquia Prepared or Presented from January 17, 1982 to March 5, 1982 23

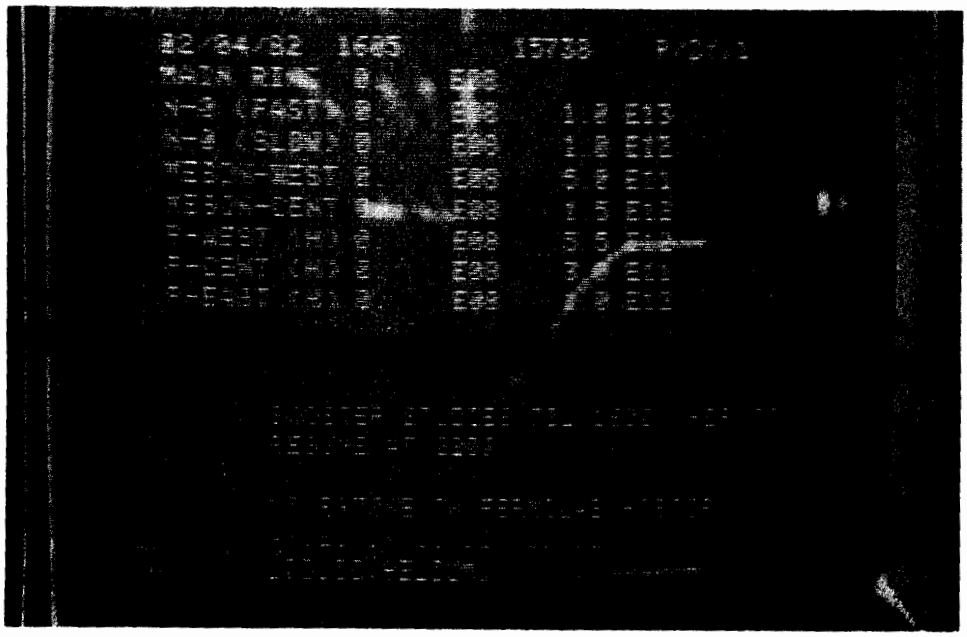
Dates to Remember 27

ENERGY SAVER SECTOR TEST

A major milestone has been achieved in the construction of the Energy Saver, the Fermilab superconducting magnet ring that will be the foundation of the Tevatron. The first sector (one-eighth of the entire ring) has been cooled to operating temperature and has been energized to a current level of 2200 amperes, corresponding to more than 500 GeV.

Cooling tests were begun in mid-January, utilizing the three satellite refrigerators at A1, A2, and A3. When the heavy muscle of the Central Helium Liquefier was added, the sector (118 magnets, 25 spool pieces, 3 refrigerators, 4 compressors, and several thousand feet of helium-transfer line) was cooled down rapidly. On February 19, a ramp at 100 amperes per second to 2200 amperes was tried and sustained for 1-1/2 hours. At the end, all the magnet heaters were fired simultaneously in a spectacular, successful, "worst-case" test of the quench-protection system. The magnet has been ramped to 2600 amperes since then.

The above-ground test system at B12 has previously been the largest superconducting system ever operated. These sector tests surpass that size by far and give confidence that the entire ring now being built will operate as designed.



Control-room display of one of the first Energy-Saver ramps.
(Photograph by Fermilab Photo Unit)

The first 200-GeV beam was March 1, 1972. Some of the participants gathered in the Control Room to mark the tenth anniversary. Seated, left to right, Bob Mau, Frank Cole, Quentin Kerns. Standing, left to right, Jim Griffin, Curt Owen, Helen Edwards, Don Edwards. Oh, where have the years gone?

(Photograph by Fermilab Photo Unit)

NEW ELECTRON-COOLING TESTS

The electron-cooling system is now back in operation after some modifications. On March 1, the system achieved cooling at its design energy of 200-MeV protons. Electron cooling has been performed previously at proton energies from 10 MeV to 110 MeV at Novosibirsk, at 50 MeV at CERN, and at 114 MeV at Fermilab.

TOWARD THE FUTURE OF HIGH-ENERGY PHYSICS

The Trilling Committee (the HEPAP Subpanel on Long Range Planning for the United States High Energy Physics Program) has made its final report. Its recommendations are given for various program levels. For a level of $345 million (in FY 82 dollars) for the Department of Energy and $34 million for the National Science Foundation (as in the President's budget), it recommends:

- Adequate utilization and maintenance of existing accelerator and storage ring facilities, and support of important non-accelerator particle physics projects.

- Expeditious completion of the Energy Saver at Fermilab.

- Implementation of the Tevatron II (TeV II) fixed-target program at Fermilab in all three experimental areas.

- Completion of the Tevatron I (TeV I) proton-antiproton collider at Fermilab, including the provision of a major detector facility.

- Continuation of the major R&D effort at SLAC on the Stanford Linear Collider (SLC), with construction of associated conventional facilities to begin in FY 1984 such that the R&D phase can be completed in FY 1986. Funding of major new detectors and provision of a second beam-beam intersection region could occur once the R&D program has demonstrated adequacy for expanded physics research.

- Pursuit of other advanced accelerator R&D activities on items such as high field superconducting magnets, high gradient accelerating rf structures, superconducting rf cavities, and novel means of acceleration.

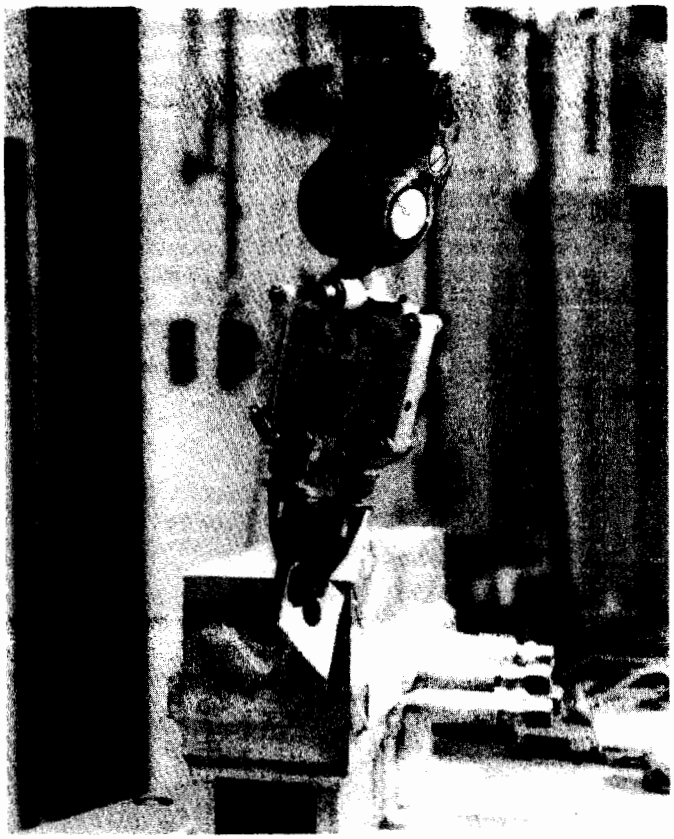
For a funding level of $440 million (in FY 82 dollars), the Trilling Committee recommends in addition construction of ISABELLE at Brookhaven with completion by the end of this decade.

There are other initiatives for the future of the field. The Division of Particles and Fields of the American Physical Society is convening a workshop at Aspen in July under the present chairman, Charles Baltay of Columbia University, to consider, independently of funding constraints and shorter-range problems, steps toward long-range experimental facilities.

Second, the International Committee for Future Accelerators, (ICFA), has proposed to set up study teams to work on design of two "typical" accelerators, one for e^+e^- and one for pp or $\bar{p}p$, with each major laboratory contributing the effort of a few people to this work. ICFA hopes to stimulate detailed consideration of accelerator designs for the long range and to move toward a future World Laboratory containing accelerators in

the multi-TeV range. Here, a candidate technology is the Fermilab approach with superconducting magnets, perhaps going to 10 Tesla. But other approaches will be considered, for example, exotic acceleration devices such as the laser accelerator or other forms of coherent or collective acceleration.

Fermilab, up to its eyebrows in the Tevatron program, has a very real problem: on the one hand, we cannot afford to be diverted from completing the Saver and building TeV I and TeV II, but neither can we ignore completely the plans and programs which may very well involve our future in the 1990's. At least these are not dull issues!



A new remote target manipulator built for use in the Neutrino Area.

(Photograph by Fermilab Photo Unit)

DIFFRACTION DISSOCIATION OF PHOTONS AT HIGH ENERGIES MEASURED WITH A HYDROGEN TPC PRELIMINARY RESULTS FROM EXPERIMENT 612

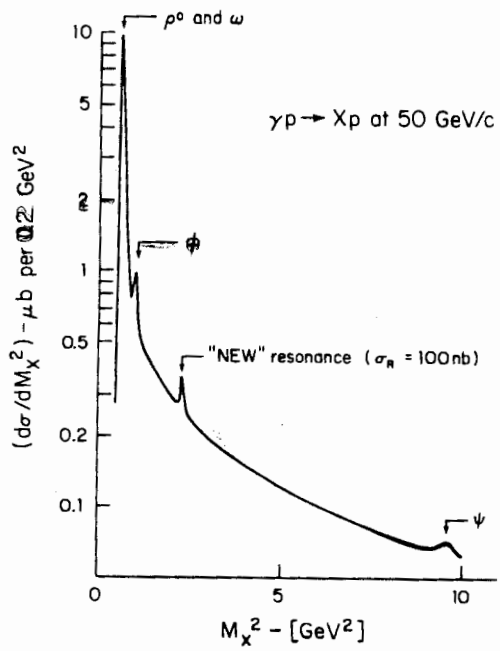
Harry Sticker, Rockefeller University

The experimenters on E-612 are Thomas Chapin, Rodney Cool, Konstantin Goulianos, Keith Jenkins, Jerry Silverman, Gregory Snow, Harry Sticker, and Sebastian White, Rockefeller University, and Yue-Hua Chou, Institute of High Energy Physics, Beijing, China.

The diffraction dissociation of photons on protons

$$\gamma + p \rightarrow X + p$$

at high energies and low momentum transfer provides a unique window through which we can view the strong interaction properties of the photon. In this process the photon transforms coherently, with no exchange of quantum numbers, into high mass hadronic states while the recoil proton remains intact. These hadronic states can be rich in structure surprises. The figure below from our proposal shows the distribution in missing mass that might arise in such interactions. In addition to the



Expected mass distribution for diffractively excited photons.

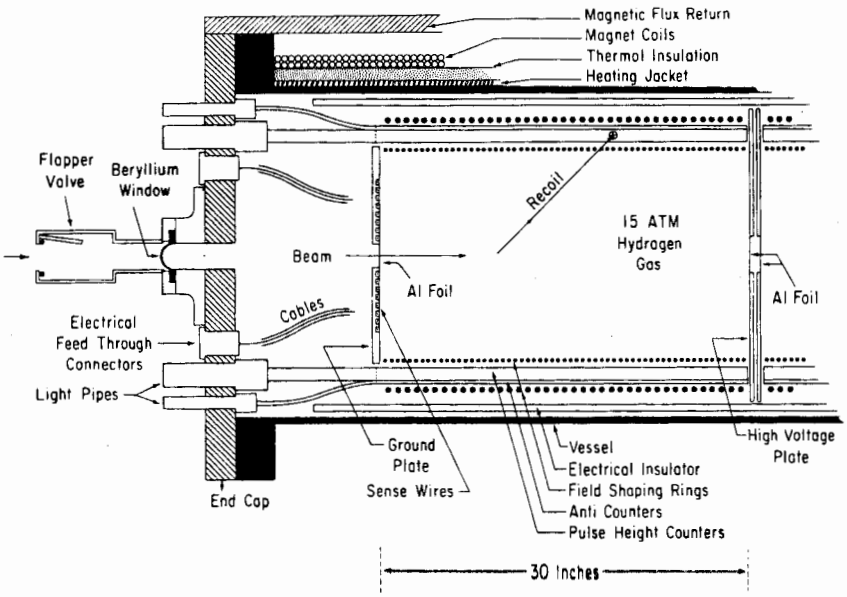
known and familiar resonances such as the ρ and the ψ, new resonances might be produced, along with a continuum of masses like that found in the diffraction of pions, kaons, and protons.

Our experiment was designed to measure the missing-mass distribution in photon dissociation with a resolution of $\Delta M_y/M_y \approx 1.5\%$ in order to search for these new resonances and to extract the shape and level of the continuum. Among other results, we wanted to compare whether the photon continuum has the same shape and scales to the total cross section in the same way as othr hadrons, a behavior dictated by what is known as the factorization of the diffractive vertex. In a previous experiment performed at Fermilab, E-396, we showed that factorization works well for many different hadrons.[1]

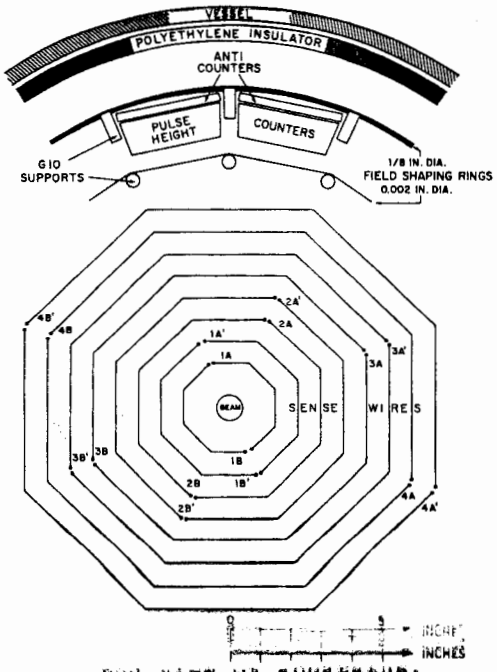
The experiment is located in the Tagged Photon Laboratory, which provides a flux of $1\text{-}2\times10^6$ photons with an energy resolution of $\pm2\%$. The photons interact in a high-pressure gas hydrogen target, transferring a small fraction of their momentum to the target protons, which recoil at large angles. By measuring the kinetic energy T and polar angle θ of the recoil we obtain the missing mass

$$M_x^2 = 2p_\gamma \sqrt{2M_pT}\ \cos(\sigma) - \sqrt{\frac{T}{2M_p}}\ .$$

The apparatus, pictured on the next page, is of novel design. It is described in Ref. 2. High-pressure hydrogen gas is used both as a target for the photons and as a track detector for the recoil protons. The hydrogen is contained in a vessel that may be pressurized up to 20 atmospheres. The photon beam enters through a 2-in. diam. × 0.03-in. thick window, made of beryllium in order to minimize photon-window interactions. The recoiling protons are stopped in scintillation counters whose light output determines the kinetic energy. These counters are placed inside the pressure vessel 9 in. from the axis. The ionization electrons generated by the recoil proton drift along axial electric field lines toward a ground plate where they are detected by a set of concentric octagonal sense wires. The electric field is established by an aluminum high-voltage plate in the center of the vessel and two ground plates near the ends and is shaped to the required uniformity by two concentric wire cages that carry a graded potential from the high voltage to the ground. The central plate divides the vessel into two equivalent detectors, each 75 cm long. The sense wires and associated electronics record the arrival time and the amount of ionization, from which we calculate the polar angle θ and the energy loss dE/dX. From dE/dX and T we can verify that the mass of the recoil particle is that of the proton. Typically, as seen in the graph on page 10, the drift velocity is 0.5 cm/μsec at our normal running conditions of 15 atmospheres and 130 kV. Our detector, known as TREAD, The Recoil Energy and Angle Detector, is similar in concept to the Time Projection Chamber (TPC) now operating at Stanford.

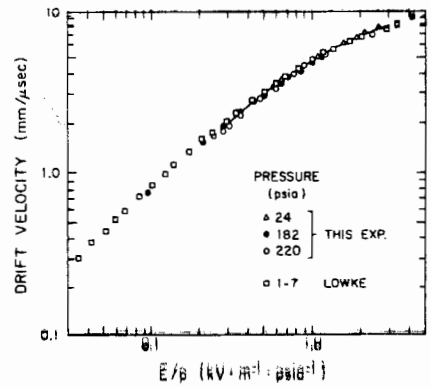


Side view of apparatus.



[redacted]

Many technical problems had to be overcome to realize this apparatus. As one can imagine, a high-pressure hydrogen vessel with thin windows presents formidable safety problems. With the help of a special Fermilab safety committee, chaired by George Biallas, and the Proton Department engineering staff, headed by Ron Currier, these were overcome largely by sealing the endcaps in a nitrogen atmosphere that would vent out safely any small amounts of leaking hydrogen, and by mounting on the beryllium window a special valve, the "flapper valve," designed to shut quickly if the window burst. Impurities in the hydrogen gas can seriously degrade the ionization drifting toward the sense wires. Materials placed inside the vessel were selected for low outgassing rates and the chamber gas is continuously circulated through a purifier that removes oxygen, the worst contaminant, to a level of 10 ppb. Another concern was that hydrogen is a poor proportional gas. It does not reach very high gain. Tests we performed proved that it would work adequately provided the appropriate sense-wire material, such as stainless steel, is used. Finally, in order to obtain the required angular resolution, we had to maintain the drift velocity constant to 0.1%, requiring careful monitoring and good control of the pressure, temperature, and electric field. Sensitive transducers placed inside and outside TREAD measure these parameters and radioactive α-particle sources positioned over the sense wires are used to keep track of the drift time, the wire gain, and the impurity level.



Drift velocity of electrons in H_2 gas.

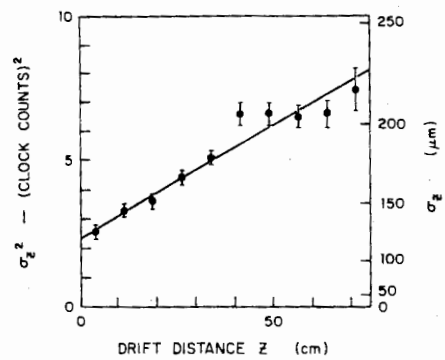
Before being placed in the beam, TREAD was tested with cosmic rays. The figure at the top of page 11 shows the rms deviation of one wire from a fit to cosmic-ray tracks. Also shown is a straight line fit to the form

$$\sigma_z^2 = \sigma_1^2 + \sigma_0^2 z$$

with z in cm. This functional form is expected from electron diffusion, where σ_0 depends on the electronic thresholds and σ_1 on known transport coefficients. The fit gives σ_0 = 123±5 μm and σ_1 + 22±1 μm, whereas the calculated value for σ_1 is 21 μm. With an average resolution over the length of the chamber better than 200 μm, TREAD worked as designed.

With the help of Peter Garbincius and the Proton Department staff, TREAD was installed in the photon beam in early 1981. Most of the running in the spring was devoted to shaking down the

hardware and software and to understanding the beam, but we did collect some data. Fortunately, since the photon beam can be converted to a pion beam, we could also compare the high mass continuum of photons and pions directly in our experiment, thus minimizing systematic uncertainties and obtaining reliable results even with limited statistics.

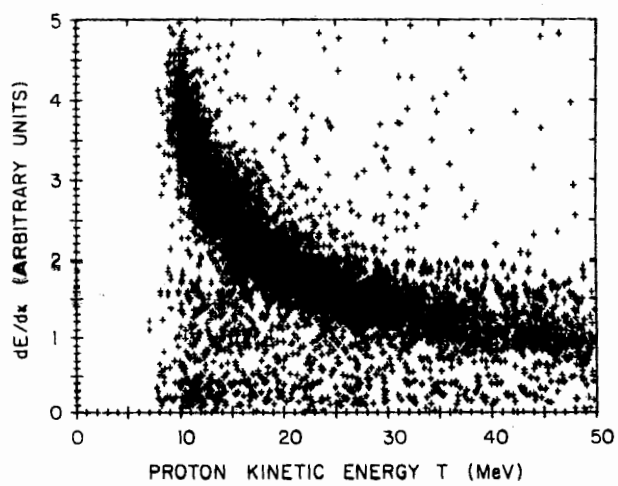


Spatial resolution of TREAD.

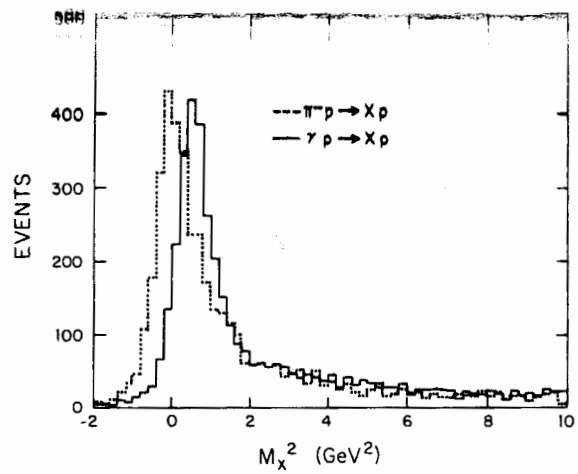
To extract the missing-mass distribution, recoil protons must be identified. The graph below, a scatter plot of dE/dX against T, shows how this is done. The dark band consists of protons. Keeping only events within this band, and making timing and fiducial cuts, leaves us with the missing mass distribution shown in the figure at the top of the next page. The prominent peak, the ρ, is followed by a continuum of events at higher masses. The photon and pion data look similar. We fit the high mass data to the form

$$\frac{d^2\sigma}{dxdt} = \left[\frac{A}{1-x} + B(1 - x)\right] e^{b(t+0.05)}$$

which describes well the pion, kaon, and proton data.[1] The



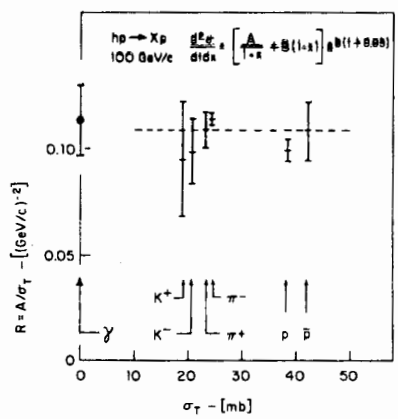
Energy loss of recoil particles in the H_2 gas vs. kinetic energy.



Missing mass distribution of pion and photon diffraction dissociation. The peak in the pion data is due to elastic scattering; the peak in the photon data is the p.

parameter A represents the true **diffractive component. The figure at the right shows that although** the total cross section, σ_T, for photons differs from hadrons by a factor of almost 100, the fraction A/σ_T remains about the same.

We must still collect more data before definitive comparisons between the photon and hadrons can be made, but we can already see in these results that the photon diffractive vertex indeed appears to factorize as it does for strongly interacting particles. We also look forward to a sensitive search for new resonances in our forthcoming run.



Test of factorization in hadron dissociation from E-396 and photon dissociation from E-612.

References

[1]R. L. Cool et al., Phys. Rev. Lett. **47**, 701 (1981).
[2]R. L. Cool et al., Phys. Rev. **D24**, 2821 (1981).
[3]T. J. Chapin et al., to be published in Nucl. Instrum. Methods.

PHYSICS ADVISORY COMMITTEE MEMBERSHIP

Name	Institution	Term Expires
Lee Pondrom	University of Wisconsin	Oct. '82
Edmond Berger	Argonne National Laboratory	Apr. '83
Wit Busza	MIT	Apr. '83
Edward Witten	Princeton University	Apr. '83
Stanley Brodsky	SLAC	Apr. '84
Vera Luth	SLAC	Apr. '84
John Peoples	Fermilab	Apr. '84
Frank Sciulli	Columbia University	Apr. '84
Bruce Winstein	Enrico Fermi Institute	Apr. '84
John Cumalat	University of Colorado	Apr. '85
Thomas Devlin	Rutgers University	Apr. '85
Gary Feldman	SLAC	Apr. '85
Hugh Williams	University of Pennsylvania	Apr. '85

SUMMARY OF OPERATIONS - JANUARY 1982

Howard Fenker, Program Planning Office

January was the first month of accelerator operations for high-energy physics research since the end of May last year. During the seven-month shutdown almost every area that produces, accelerates, or transports beam was a scene of activity. The presence of new targets in experimental areas, relocated septa and Lambertson magnets in Switchyard, and a Main Ring that had to be pieced back together after Doubler/Saver construction could have made the startup in December more difficult than it turned out to be. As it happened, beam was available for research in the experimental areas on January 1, as scheduled.

The Chicago weather was the cause of several problems this month. High winds and four weekends with temperatures well below zero (Farenheit) is unusually severe for this part of the world. The Meson Detector Building suffered when wind blew out a section of the north wall and allowed -26° F air to enter. This, in turn, froze the industrial cooling water system which responded with a demonstration in freshman physics. The Proton Department, with most of their facilities underground, thought they were safe until they discovered a sump pump with a frozen discharge line.

Although weather-related incidents caused some disruptions, considerable progress was made in accommodating the needs of experimenters. The Neutrino narrow-band train achieved the "best alignment ever" by using 200-GeV protons extracted from the Main Ring half way up the 400-GeV ramp. Two experiments quickly achieved data-taking status to make use of the resulting increased neutrino flux. The Switchyard crew managed to set up the N7 beam line to deliver pings to the 30 in. bubble chamber.

The Meson experiments, blessed with a now stable superconducting left-bend string, saw beam from the Center target after only a few problems associated with the redesigned beam lines. In particular, commissioning of a tagged electron beam in M4 went smoothly. This will be used to test Colliding Detector Facility prototype devices. Turning on the superconducting bend string in M6 was delayed until it could be determined that the installation was safe. By the end of the month it appeared that this equipment was close to operation.

Experiments in both M1 and P-East have seen most of their beam during nights and weekends so that construction crews could work during the day shifts installing new experiments. Researchers in all areas of the Laboratory have, of course, eagerly accepted beam whenever they could get it.

FERMI NATIONAL ACCELERATOR LABORATORY
MONTHLY OPERATIONS HISTORY
JANUARY 1982

Date		Accelerator	Internal Target Area	Proton Area	Neutrino Area	Meson Area
Fri.	1/1	~$1x10^{13}$ppp @400 GeV 1.0 sec flattop w/200 GeV Front MR Power Supply	OFF Porch	537 (PW) 612 (PE) 630 (PC)	594/701 (N0) DPI Test (N7)	555 (M2) 617 Test (M3) Beam Test (M4) OFF (M1) OFF (M6)
Sat.	1/2					
Sun.	1/3					
Mon.	1/4	Replace & Align Septum at D0				
Tue.	1/5					
Wed.	1/6	~$1.0x10^{13}$ppp				
			Accelerator M&D			
Thu.	1/7	~$1.5x10^{13}$ppp @400 GeV/c 1.0 sec flattop	OFF	537 (PW) 612 (PE) 630 (PC)	594/701 (N0) DPI Test (N7) 673 (N1)	555 (M2) 617 Test (M3) 660 (M4) OFF (M1) OFF (M6)
Fri.	1/8					
Sat.	1/9					
Sun.	1/10					
			Necessary Repairs			
Mon.	1/11	MRPS & Controls ~$1.5x10^{13}$ppp @400 GeV/c	OFF	537 (PW) 612 (PE) 630 (PC)	594/701 (N0) DPI Test (N7) 673 (N1)	555(M2,617 Test(M3) 660(M4),OFF(M1 & (M6)
Tue.	1/12					
Wed.	1/13					
			Accelerator Maintenance & Development			
Thu.	1/14	Controls	OFF	537 (PW) 612 (PE) 630 (PC)	594/701 (N0) DPI Test (N7) 673 (N1)	555 (M2) 617 Test (M3) 660 (M4) 515 (M1) OFF (M6)
Fri.	1/15	200 MeV Power Cap. Tyco Pump				
Sat.	1/16					
Sun.	1/17	Switchyard Controls				
Mon.	1/18	Replace M.R.Dipole ~$1.7x10^{13}$ppp @400 GeV/c				
Tue.	1/19					
Wed.	1/20					CDF (M4)
			Accelerator Maintenance & Development			
Thu.	1/21	Replace MR Dipole	OFF	537 (PW) 612 (PE) 630 (PC)	594/701 (N0) DPI Test (N7) 673 (N1)	555 (M2) OFF (M6) 617 Test (M3) 515 (M1) CDF (M4)
Fri.	1/22					
Sat.	1/23	Replace MR Dipole ES 3R Cable Shorted				
Sun.	1/24					
Mon.	1/25	Switchyard Studies ~$1.6x10^{13}$ppp				
Tue.	1/26					
			Accelerator Studies			
Wed.	1/27		Continue HEP			
			Accelerator Maintenance & Development			
Thu.	1/28		OFF	537 (PW) 612 (PE) 630 (PC)	594/701 (N0) DPI Test (N7) 673 (N1)	555 (M2) OFF (M6) 617 Test (M3) 515 (M1) CDF (M4)
Fri.	1/29	Linac Power Amp ~$2.2x10^{13}$ppp @400 GeV/c 1.0 sec flattop				
Sat.	1/30					
Sun.	1/31					

BEAM UTILIZATION

	Beam	Hours
PROTON AREA		
Dimuon #537	PW	360
Photodissociation #612	PE	310
Charm Search #630	PC	280
NEUTRINO AREA		
Neutrino #594	N0	330
Chi Meson #673	N1	300
Neutrino #701	N0	350
MESON AREA		
Particle Search #515	M1	160
Neutral Hyperon #555	M2	410
CP Violation #617	M3	410
Channeling #660	M4	150
CDF Development	M4	160
TOTAL HOURS FOR HIGH ENERGY PHYSICS		3220

BY EXPERIMENTAL ACTIVITY - JANUARY 1982

Activities
rate and trigger studies; data collection
background studies and data collection
streamer chamber and beam alignment; background studies, data collection
startup tests and data with narrow-band beam; neutrinos and antineutrinos
setup and beam tuning; detector calibration; data collection
tests and data collection
setup, beam tuning, trigger studies
beam tuning and data at various production angles
beam line setup and tests; detector tests
beam setup and tuning; crystal channeling data.
electron beam established; detector tests

FACILITY UTILIZATION SUMMARY - JANUARY 1982

I. Summary of Accelerator Operations

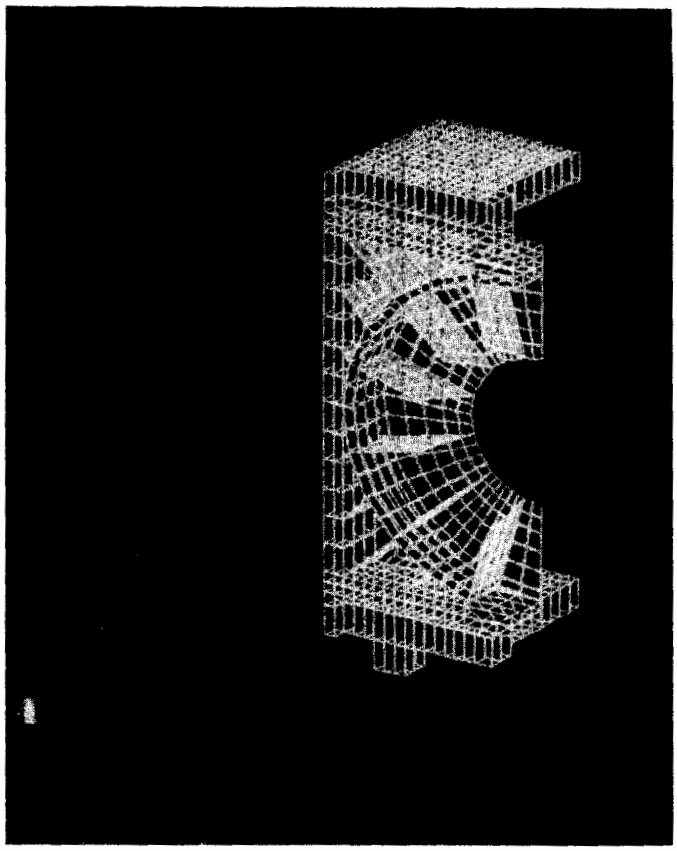
		Hours	
A. Accelerator use for physics research			
High energy physics research		468.7	
Accelerator physics research		12.0	
	Subtotal		480.7
B. Other Activities			
Program interruption		66.3	
Accelerator setup and tuning to experimental areas		-	
	Subtotal		66.3
C. Unscheduled interruption		197.0	
D. Unmanned time		-	
Total			744.0

II. Summaries of High Energy Physics Research Use

	# of Expts.	Hours	Results
A. Counter experiments	9	2650	
B. Bubble chamber experiments			
C. Emulsion experiments			
D. Special target experiments	1	-	4 foils exposed
E. Test experiments	1	410	
F. Engineering studies and tests	1	160	
G. Other Beam Use	-	-	
Totals	12	3220	

III. Number of Protons Accelerated and Delivered ($\times 10^{17}$)

A. Beam accelerated in Main Ring		18.8
B. Beam delivered to experimental areas		16.3
Proton Area		5.8
Neutrino Area		
	Slow Spill	0.4
	Fast Spill	8.1
Meson Area		2.0



Stress analysis of an End Wall of the Collider Detector Facility.
(Photograph by Fermilab Photo Unit)

SITUATION REPORT -- JANUARY 1982

FERMI NATIONAL ACCELERATOR LABORATORY

PROGRAM PLANNING OFFICE
1 FEB 1982

EXPERIMENTAL PROGRAM SITUATION REPORT

THE EXPERIMENTAL PROGRAM SITUATION AT FERMILAB IS SUMMARIZED BELOW. THE EXPERIMENTS ARE LISTED BY EXPERIMENTAL AREA AND REGROUPED UNDER CATEGORIES THAT BEST DESCRIBE THEIR STATUS ON FEBRUARY 1, 1982. FOR EXPERIMENTS WHICH HAVE BEEN COMPLETED OR HAVE RECEIVED BEAM, THE AMOUNT OF BURNERS TIME OR SHOWDOWN TO DATE IS LISTED. THE EXPERIMENTAL AREA NAMES ARE ABBREVIATED AS FOLLOWS: MESON AREA (MA), NEUTRINO AREA (NA), PHOTON AREA (PA), INTERNAL TARGET AREA (ITA). PROPOSALS OR EXPERIMENTS THAT ARE REQUESTING TEVATRON ENERGY ARE PRECEDED BY TEV.

TOTAL NUMBER OF APPROVED EXPERIMENTS - 320

AREA-BEAM		SPOKESPERSON	TOTAL RUN	DATE COMPLETED
A. EXPERIMENTS THAT HAVE COMPLETED DATA TAKING (278):				
(ONLY EXPERIMENTS COMPLETED SINCE 1 JAN 1981 ARE LISTED BELOW)				
MA-M1	DIRECT PHOTON PRODUCTION #629	NELSON	600 HOURS	9 MAR 1981
-M4	KAON CHARGE EXCHANGE #585	FRANCIS	3,150 HOURS	16 MAR 1981
	LAMBDA POLARIZATION #663	KOBRAK	320 HOURS	1 JUN 1981
-M6	ELASTIC SCATTERING #577	HUBINSTEIN	1,550 HOURS	16 MAR 1981
MA-NO-HORN	15-FOOT NEUTRINO/N2GNE #53A	BALTAY	440K PIX	9 MAR 1981
	NEUTRINO #531	BEAT	3,800 HOURS	1 JUN 1981
	15-FOOT & EMULSION/NEUTRINO#564	VOYVODIC	277K PIX	9 MAR 1981
-OTHER	MUC CALIBRATION CROSS SECT #631	BAKER	41 EXPOSURES	1 JUN 1981
PA-PE	PHOTOPRODUCTION #516	WASH	4,500 HOURS	1 JUN 1981
-PC	CHARGED HYPERON #497	LACH	2,500 HOURS	16 MAR 1981
	EMULSION EXPOSURE #666	WILKES	6 STACKS	9 MAR 1981
ITA-C 0	PARTICLE SEARCH #591	GUTAY	1,950 HOURS	8 FEB 1981
B. EXPERIMENTS THAT ARE IN PROGRESS (18):			TOTAL RUN TO DATE	DATE OF RECENT RUN
MA-M1	PARTICLE SEARCH #515	ROSEN	2,200 HOURS	1 FEB 1982
-M2	NEUTRAL HYPERON #555	DEVLIN	400 HOURS	1 FEB 1982
	BEAM DUMP #613	ROE	1,150 HOURS	1 JUN 1981
-M4	CHANNELING #660	GIBSON	150 HOURS	1 FEB 1982
-M6	HADRON JETS #557	ZIEMINSKI	600 HOURS	1 JUN 1981
	PARTICLE SEARCH #580	GREEN	800 HOURS	1 JUN 1981
MA-NO-ZICHBOM	NEUTRINO #594	WALKER	2,600 HOURS	1 FEB 1982
	NEUTRINO OSCILLATION #701	SHAEVITZ	350 HOURS	1 FEB 1982
-NO-WB HORN	15-FOOT ANTI-NEUTRINO/N2GNE#180	ERMOLOV	273K PIX	1 JUN 1977
-MUON/HADRON	CHI MESON #673	COOPER	300 HOURS	1 FEB 1982
-30 INCH	30-INCH HYBRID #565	PLESS	46K PIX	1 JUN 1981
	30-INCH HYBRID #570	PLESS	46K PIX	1 JUN 1981
	30-INCH HYBRID #597	WHITMORE	76K PIX	1 JUN 1981
-OTHER	NUCLEAR FRAGMENTS #466	SUGARMAN	58 TARGETS EXPOSED	1 FEB 1982
PA-PE	PHOTON DISSOCIATION #612	GOULIANOS	1,200 HOURS	1 FEB 1982
-PC	CHARM PARTICLE #630	SANDWEISS	700 HOURS	1 FEB 1982
-PN	DI-MUON #326	SHOCHET	1,500 HOURS	16 MAR 1981
	DI-MUON #537	COX	2,300 HOURS	1 FEB 1982
C. EXPERIMENTS THAT ARE IN TEST STAGE (3):			TOTAL RUN TO DATE	DATE OF RECENT RUN
MA-M3	CP VIOLATION #617	WINSTEIN	450 HOURS	1 FEB 1982
-M4	COLLIDING DETECTOR FACILITY	TOLLESTRUP	150 HOURS	1 FEB 1982
-M6	PARTICLE SEARCH #623	GREEN	60 HOURS	1 JUN 1981
D. EXPERIMENTS BEING INSTALLED (4):			APPROVAL	
MA-M1	HIGH MASS PAIRS #605	BROWN	1,000 HOURS	
-M6	HADRON JETS #609	SZLOVE	1,500 HOURS	
PA-PE	PARTICLE SEARCH #800	BUTLER	500 HOURS	
-PN	FORWARD SEARCH #615	ANDERSON	1,000 HOURS	
E. EXPERIMENTS TO BE SET UP IN A YEAR (1):			APPROVAL	NOTE: THE ABILITY TO SET UP THIS EXPERIMENT DURING THE NEXT YEAR IS CONTINGENT ON THE AVAILABILITY OF FUNDS.
PA-PC	TRANSITION MAGNETIC MOMENT #619	DEVLIN	250 HOURS	
F. OTHER APPROVED EXPERIMENTS (16):			APPROVAL	
MA-OTHER	EMULSION/PROTONS @ 500 #508	WOLTER	EMULSION EXPOSURE	
	EMULSION/PROTONS @ 500 #524	WILKES	EMULSION EXPOSURE	
	EMULSION/PROTONS @ 500 #576	HEBERT	3 STACKS	
TEV- NA-PCL BEAM	POLARIZED BEAM #704	YOKOSAWA	UNSPECIFIED	
- NA-M6	HADRON JET #672	DZIERBA	UNSPECIFIED	
	PARTICLE SEARCH #690	KNAPP		
TEV- NA-NEUTRINO	NEUTRINO #652	SCIULLI	UNSPECIFIED	
- NA-BB DUMP	BEAM DUMP #636	PLESS	UNSPECIFIED	
	15-FT BEAM DUMP #646	BALTAY	UNSPECIFIED	
- NA-MUON	MUON #640	LOKEN	1,000 HOURS	
	TEVATRON MUON #665	KIRK	UNSPECIFIED	
TEV- PA-PE	PHOTOPRODUCTION #687	BUTLER	UNSPECIFIED	
- PA-PC	CP VIOLATION #621	THOMSON	UNSPECIFIED	
	PARTICLE SEARCH #653	BEAT	UNSPECIFIED	
- PA-PN	CHI MESON #705	COX	UNSPECIFIED	
TEV-UNSPEC BEAM	DIRECT PHOTON #706	SLATTERY	UNSPECIFIED	
PENDING PROPOSALS (28):			REQUEST	
MA-M2	BEAM DUMP #644	LONGO	2,000 HOURS	
ITA-C 0	PARTICLE SEARCH #702	GLASS	400 HOURS	
TEV- NA-PCL BEAM	POLARIZED BEAM #682	UNDERWOOD	1,700 HOURS	
	POLARIZED BEAM #688	DITZLER	400 HOURS	
	POLARIZED BEAM #699	STANEK	1,000 HOURS	
- NA-M6	PARTICLE SEARCH #684	LAI	1,000 HOURS	
	PARTICLE SEARCH #696	TROWER	UNSPECIFIED	
TEV- NA-NEUTRINO	15-FT NEUTRINO/N2 & NE #632	MORRISON	250K PIX	
	NEUTRINO #635	NG		
	15-FT NEUTRINO/D2 #637	ANMOSOV		
	15-FT NEUTRINO #641	KITAGAKI	200K PIX	
	HYBRID NEUTRINO #647	PETERSON	UNSPECIFIED	
	NEUTRINO #649	TAYLOR		
	15-FT NEUTRINO/D2 #651	MILLER	100K PIX	
- NA-BM DUMP	BEAM DUMP #656	WHITAKER		
	NEUTRINO OSCILLATION #700	MILLER		
TEV- PA-PE	PHOTON DISSOCIATION #670	GOULIANOS	UNSPECIFIED	

PAGE 2 EXPERIMENTAL PROGRAM SITUATION REPORT (CONT'D) 1 FEB 1982

AREA-BEAM

PENDING PROPOSALS (CONT'D)

		SPOKESPERSON	REQUEST
	PHOTOPRODUCTION OF JETS #683	CORNELL	1,500 HOURS
	TAGGED PHOTON #691	WASH	1,000 HOURS
- PA-PW	DI-MUON #671	POPE	UNSPECIFIED
	LEPTON PAIR #693	MCDONALD	1,000 HOURS
TEV-ITA-C 0	PROTON-PROTON SCATTERING #500D	FRANZINI	1,000 HOURS
	P-P AND P-D SCATTERING #681	GOTAY	950 HOURS
-ITA-D 0	ELECTRON TARGET FACILITY #703	FRISKEN	1,000 HOURS
	ELECTRON TARGET FACILITY #706	LEE	
TEV-UNSPEC BEAM	EMULSION/PI- @ 500 #667	WOLTER	EMULSION EXPOSURE
	EMULSION/PI- @ 800 #668	WOLTER	EMULSION EXPOSURE
	PARTICLE SEARCH #692	BUCHTI	1,000 HOURS

Completed E-605 magnet.
(Photograph by Fermilab Photo Unit)

MANUSCRIPTS, NOTES, LECTURES, AND COLLOQUIA PREPARED OR PRESENTED FROM JANUARY 17, 1982 TO MARCH 5, 1982

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

A. E. Brenner et al. Experiment #118	Experimental Study of Single Particle Inclusive Hadron Scattering and Associated Multiplicities (FERMILAB-Pub-81/82-EXP; submitted to Phys. Rev. D)
R. L. Cool et al. Experiment #396	Charged Multiplicities of High Mass Diffractive $\pi^{\pm}$, $K^{\pm}$, and $p^{\pm}$ States (Submitted to Phys. Rev. Lett.)
K. Goulianos et al. Experiment #396	Universality of Charged Multiplicity Distributions (Submitted to Phys. Rev. Lett.)
K. Goulianos Experiment #396	Universality of Charged Multiplicity Distributions (Presented at the 2nd Topical Conf. on Forward Collider Physics, Madison, Wisconsin, December 1981)
J. A. Appel Experiment #516	Triggering for Charm, Beauty and Truth (FERMILAB-Conf-82/20-EXP; invited contribution to the Trigger Discussion Europhysics Study Conference on Search for Charm, Beauty and Truth, Erice, Sicily, November 20, 1981)
R. C. Ball et al. Experiment #613	Prompt Production of Neutrinos by 400 GeV Protons on Tungsten: First Results from Fermilab E-613 (Submitted to the 1981 European Physical Society Study Conference on The Search of Charm, Beauty and Truth at High Energies, Erice, Sicily, 15-22 November, 1981)

D. R. Green et al. Experiment #623	Observation of $\phi^0\phi^0$ Production in 400 GeV/c Proton-Proton Interactions (FERMILAB-81/81-EXP, December 1981)

Theoretical Physics

T. Uematsu and T. F. Walsh	Virtual Photon Structure to Non-leading Order in QCD (FERMILAB-Pub-81/55-THY; submitted to Nucl. Phys.)
E. Eichten and F. Feinberg	Comment on Tumbling Gauge Theories (FERMILAB-Pub-81/62-THY; submitted to Phys. Lett.)
T. Uematsu and C. K. Zachos	Structure of Phenomenological Lagrangians for Broken Supersymmetry (FERMILAB-Pub-81/76-THY; submitted to Nucl. Phys.)
E. Eichten et al.	Anomaly Free Complex Representations in SU(N) (FERMILAB-Pub-81/83-THY; submitted to J. Math Phys.)
C. H. Albright et al.	Composite Quarks and Leptons from Restricted Anomaly Matching (FERMILAB-Pub-82/14-THY; submitted to Phys. Rev.)
A. R. White	Diffraction in Accelerators, Colliders and QCD (FERMILAB-Conf-82/16-THY; presented at the Topical Conference on Forward Collider Physics, Madison, Wisconsin, December 10-12, 1981)
R. W. Brown	$W^+W^-W^\pm\gamma$ Production in Proton Colliders (FERMILAB-Conf-82/17-THY; based in part on a talk presented at the Forward Collider Physics Topical Conference, Madison, Wisconsin, December 10-12, 1981)
K. Sasaki	Quantum-Chromodynamic Predictions for Direct Photons in e^+e^- Collisions II. Analysis of the Third and Fourth Structure Functions W_3^γ and W_4^γ (FERMILAB-Pub-82/18-THY; submitted to Phys. Rev. D)

General

I. Gaines	Trigger Processors for Hadron Colliders (Presented at the International Conference for Colliding Beam Physics, February 17-23, 1982, Stanford, California)

Physics Notes

F. T. Cole	Collective Accelerators (FN-355)
M. Atac et al.	Saturated Avalanche Calorimeter (FN-356)
D. Neuffer et al.	Diffusion Enhancement by the Beam-Beam Interaction in 1-D Simulations (FN-357)

Colloquia, Lectures, and Seminars

S. Dawson	"Phenomenology of 'Glow' Models" (Fermilab, January 19, 1982)
F. Turkot	"Magnet Test Facility" (Fermilab, January 19, 1982)
L. Michelotti	"Bdi-Shamania" (Fermilab, January 26, 1982)
H. Edwards	"The Energy Doubler" (Enrico Fermi Institute, University of Chicago, January 27, 1982)
L. Michelotti	"The Shoroku's Apprentice" (Fermilab, February 2, 1982)
P. Limon	"The e-p Proposal" (Fermilab, February 9, 1982)
R. Rubinstein	"Large Momentum Transfer Hadron-Proton Elastic Scattering at 100 and 200 GeV/c (Enrico Fermi Institute, University of Chicago, February 10, 1982)
E. Eichten	"Unbroken Chiral Symmetry" (Argonne National Laboratory, February 15, 1982)

E. Eichten	"Chiral Fermions on the Lattice?" (Fermilab, February 16, 1982)
S. Pruss et al.	"Starting the Accelerator After a 6-Month Shutdown; Status of the Accelerator After 6 Weeks of Operation" (Fermilab, February 16, 1982)
J. Peoples et al.	"The Antiproton Source" (Fermilab, February 23, 1982)
D. Wagoner	"SLAC Tests of New Ohara Scintillating Glass" (Fermilab, February 25, 1982)
R. Orava	"Jet Structure and the Magic of the Moments" (Fermilab, February 26, 1982)
R. Brown	"Gauge Zeros and Weak Bosons" (Argonne National Laboratory, March 1, 1982)
R. Orr	"Accelerator Division Information Meeting" (Fermilab, March 2, 1982)
L. Voyvodic	"Experimental Review" (Fermilab, March 4, 1982)
J. D. Bjorken	"A^{α} Physics" (Fermilab, March 4, 1982)

DATES TO REMEMBER

April 2-3, 1982	Physics Advisory Committee Meeting
April 30, May 1, 1982	Users Annual Meeting
June 13-19, 1982	Physics Advisory Committee Meeting
July 1-12, 1982	Advanced Study Institute on Techniques and Concepts of High Energy Physics, Lake George, New York (see November 1981 issue for details)