

Fermilab report



Fermi National Accelerator Laboratory Monthly Report

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Fermi National Accelerator Laboratory

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THE COVER: Construction work in progress on the Industrial Center Building. Industrial Building 1 is in the background.
(Photograph by Fermilab Photo Unit)

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SPECIAL ANNOUNCEMENT

The Annual Fermilab Users Meeting will take place on April 22-23. This has developed into an historic occasion. Last year, we had lucid and entertaining presentations from Congressman Don Fuqua, House S & T staffer Martha Krebs, and OMB official Hugh Loweth. The year before featured a "Town Hall meeting" relevant to the Trilling Subpanel issues. This year the Users have amassed the following speakers:

- L. Lederman
- G. Stever, President, URA
- A. Trivelpiece, Director, Energy Research, DOE
- S. Wojcicki, Chairman, 1983 Woods Hole Panel
- J. D. Bjorken on the "Dedicated Collider"
- M. Tigner on the "Desertron"
- K. Wilson on Theory
- J. Peoples on Tevatron Status
- D. Johnson on DO Experimental Area
- M. Perl on Heavy Lepton Searches
- M. Abolins, Chairman, Users Executive Committee

PROGRESS ON THE ENERGY SAVER

Tim Toohig

Sectors E and F have been powered to a peak current of 2004 amps, corresponding to an energy of 451 GeV. It is regarded as particularly important that this involves four power supplies, and building and installation of the control system has advanced to the point that it can be used to coordinate their simultaneous operation. A 66-magnet string of spool-piece correction magnets has also been powered to its full current of 50 amps.

D Sector is now completed and cooled down to less than 5 Kelvin. The dipoles and quadrupoles have been completely installed in C, in all of B and in all of A except for A4. Spool pieces for some parts of A, B, and C are not yet installed. Replacement of A-sector quadrupoles is still going on.

Elsewhere in the tunnel, the CO abort system is almost completely installed. There is beneficial occupancy of the B0 straight section, reconstructed as part of the Detector Building construction, and vacuum-pipe installation across the straight section has begun. Main-Ring magnets are also being reinstalled in the area of B0. Only two Main-Ring magnets may need to be changed as a result of recent resistance checks. The Main Ring will start up soon.

The B0 service building is also available again and compressors are reinstalled in it. The CO compressors are in the process of commissioning. The operation of the refrigeration system has been encouraging. The cleanup systems are working well, and operation is pleasingly reliable.

The Magnet Test Facility has completed work on the initial complement of dipoles and is concentrating on quadrupoles. Installation of the nitrogen reliquefier in the Central Helium Liquefier is beginning.

NEUTRINO BEAMS WORKSHOP

Stephen Pordes, Linda Stutte, and Frank Taylor*

A workshop on neutrino beams at the Tevatron was held at Fermilab on November 23, 1982, and was attended by a representative group of users of these beams. The purpose of the workshop was to discuss the various neutrino beam options which will be available at the Tevatron, with some emphasis on the technical aspects of monitoring the flux of these beams.

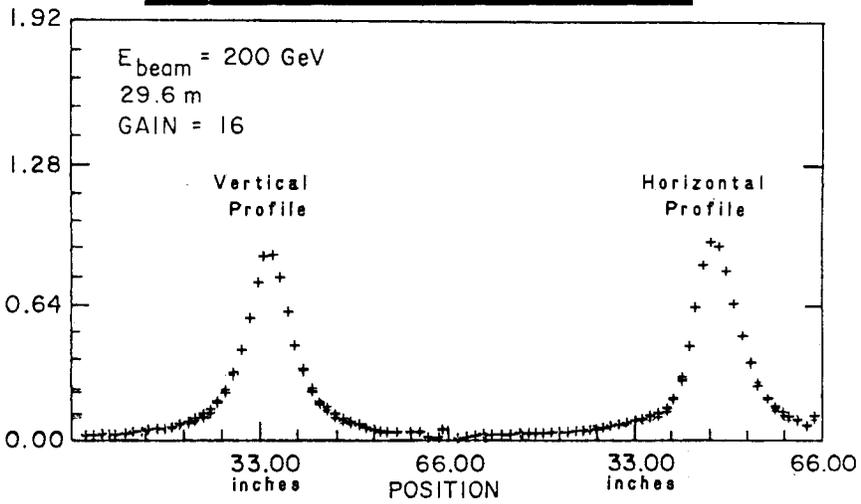
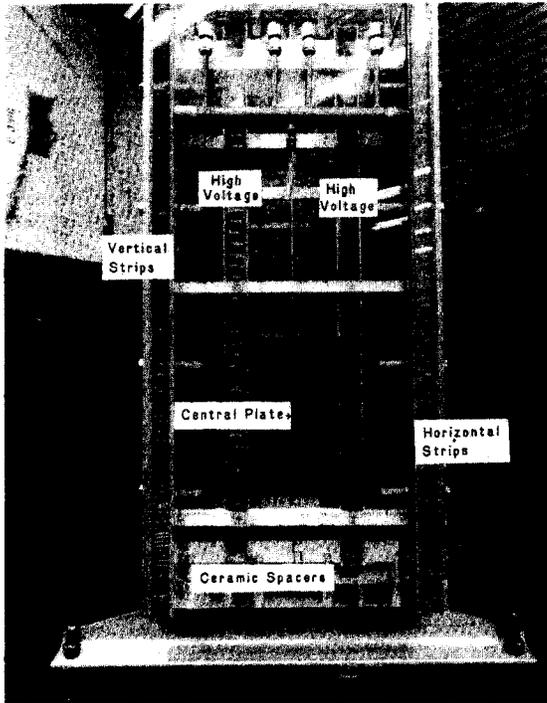
After the workshop was opened by Ken Stanfield, head of the Experimental Areas Department, there was a presentation of the predicted operating characteristics of the conventional ν_μ , $\bar{\nu}_\mu$ neutrino beams presently under construction. These beams are the quad-triplet wide-band beam and the narrow-dichromatic beam and were discussed by Linda Stutte. James K. Walker showed the current plans for the dedicated 'prompt neutrino' beam, which should provide a useful flux of other neutrino flavors, such as $\nu(\bar{\nu})_e$, $\nu(\bar{\nu})_\tau$ as well as the conventional $\nu(\bar{\nu})_\mu$ flavors.

A discussion of the flux monitoring techniques in the narrow-band beam was introduced by Stephen Pordes. Various technical aspects of this problem involving the operation of the Cherenkov counter, ion chambers, rf cavity, and the large ion chambers for the muon-flux measurements were presented by Dan Owen (E-594), Petros Rapidis (E-616, 701), Randall Pitt (E-594), and Carl Haber (E-701), respectively. The CERN experience in monitoring the wide-band neutrino flux was summarized by Vince Peterson, and Herman White discussed a scheme based on the large ion chambers which might be used to monitor the wide-band beam for Fermilab. The plans for hadron/muon calibration beams to the Neutrino Area were described by Ray Stefanski, and Taiji Yamanouchi outlined the latest schedule of the neutrino program at Fermilab.

The last portion of the workshop was devoted to a possible high flux broad-band neutrino beam which could be made by extracting protons from the old Main Ring at 150 GeV, while the Tevatron is either in collider mode, or between Tevatron spills for the fixed-target program. Some of the physics options and technical aspects of building and operating such a beam were discussed by Ray Brock and Roger Dixon.

There was much stimulating discussion of the technical problems of monitoring the flux of the narrow-band beam at the Tevatron and of the experience of monitoring the flux at 400 GeV. The workshop brought together several interested parties and gave everyone a sense of the problems and technical challenges of the beam-line part of doing neutrino physics at the Tevatron. Sets of transparencies from the talks are available from Stephen Pordes.

*Northern Illinois University

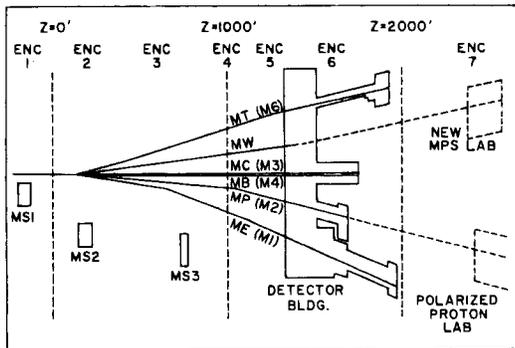
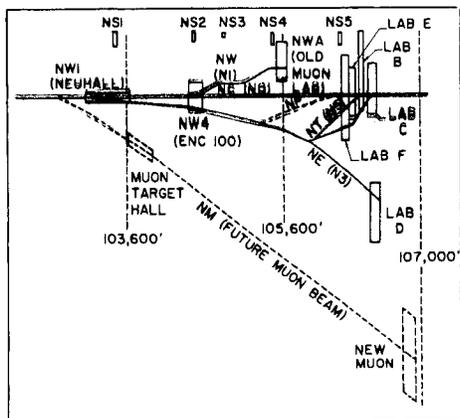


One of the ion chambers used to measure the muon-flux in the neutrino beam, and a typical muon-flux profile.
(Photograph by Fermilab Photo Unit)

NEW BEAMS, NEW NAMES, CONVENTIONS

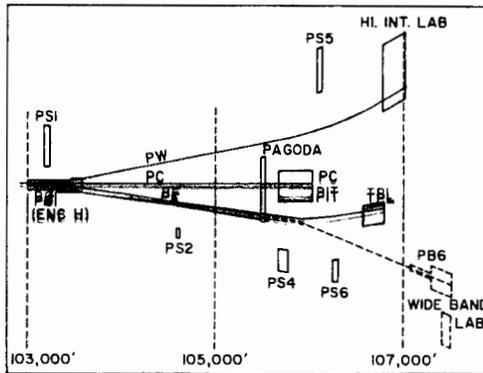
Marshall Mugas

The Tevatron era has brought a great many changes to the experimental areas at Fermilab. A three-way split to Meson, a two-way split to Neutrino, and an effective four-way split to Proton plus major new construction of a prompt neutrino beam, a muon beam, a polarized proton beam, and a broad-band photon beam are highlights of the upgrades now in progress. With so much change, the Experimental Areas Department (EAD) took the opportunity to rename beam lines and enclosures in a way that most people will quickly relate to a location in the experimental areas. In addition, beam-line devices were named with a set of descriptive qualifiers. The resulting naming convention is a composite of many people's efforts and reflects some past practices from the Meson, Neutrino, and Proton Areas.



The associated figures show the beam lines in each of the three areas. The following list correlates old and new names.

| <u>Old</u> | <u>New</u> | <u>Mnemonic</u> |
|------------|------------|---|
| M1 | ME | Meson East |
| M2 | MP | Meson Polarized Proton |
| M3 | MC | Meson Center |
| M4 | MB | Meson Bottom |
| M5 (M6/M8) | MW | Meson West |
| M6 | MT | Meson Test (for the next run a misnomer) |
| Muon | NM | Neutrino Muon |
| N3 | NE | Neutrino East |
| N5 | NT | Neutrino Test |
| Beam Dump | NP | Neutrino Prompt Beam |
| N0 | NC | Neutrino Center |
| N1 | NW | Neutrino West |
| PE/WB | PB | Proton Broad Band Beam |
| PE/TP | PE | Proton East |
| PC | PC | Proton Center |
| PW | PW | Proton West |

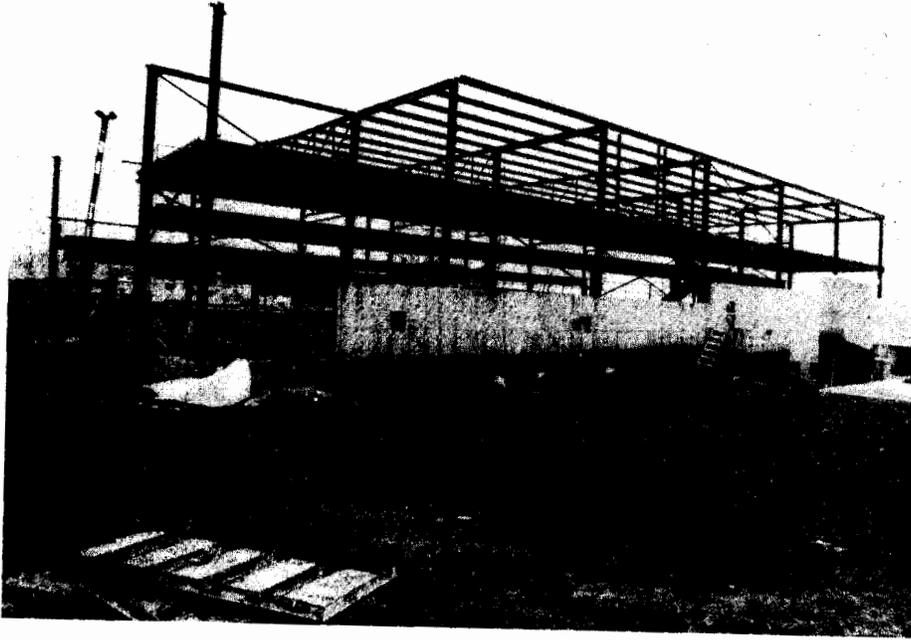


Enclosures along beam lines are numbered sequentially from 1 to 9. When needed, enclosures continue with letters. The criss-crossing of beams along some lines requires the sequence to skip forward in order to keep a unique number/letter for each enclosure. The Meson Area is divided somewhat arbitrarily into "enclosures."

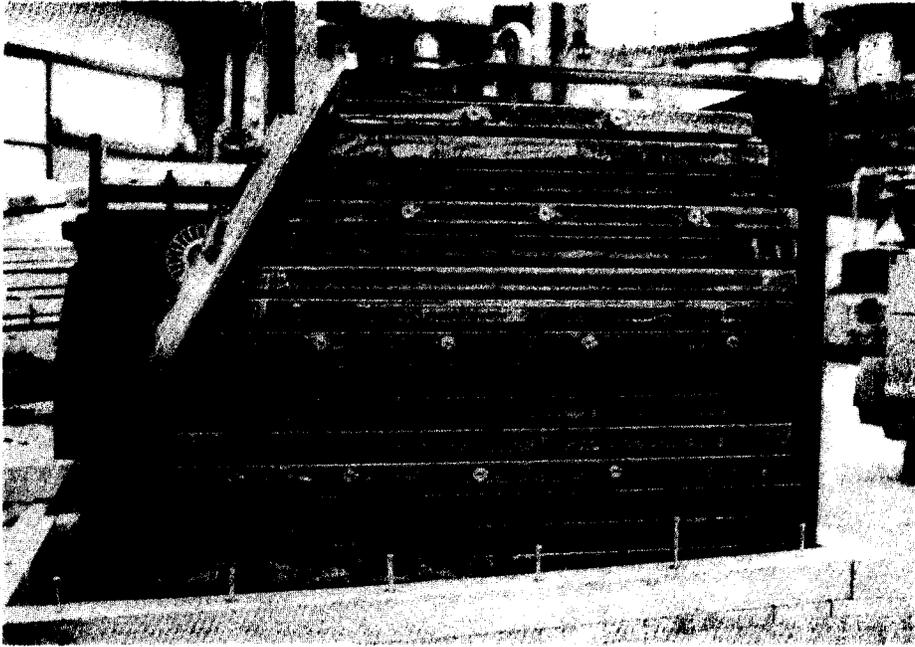
Devices in the beam line assume the Area/Beam Line/Enclosure plus device code. For example, a west bending

magnet string in the Neutrino West Enclosure 4 becomes NW4W. Quadrupoles in NW Enclosure 8 become NW8Q. There are currently over 30 "devices" which are creeping out of various corners as we ready the beam lines for the upcoming run.

New beams and new names have come together in a new convention. A compendium of these conventions is now 21 pages long and growing. This systematic approach was necessary in order for EAD personnel to quickly find and service the more than 4000 devices in the Experimental Areas. Our goal is a highly efficient operation in the coming run.



Construction work in progress on the Detector Building at B0.
(Photograph by Fermilab Photo Unit)

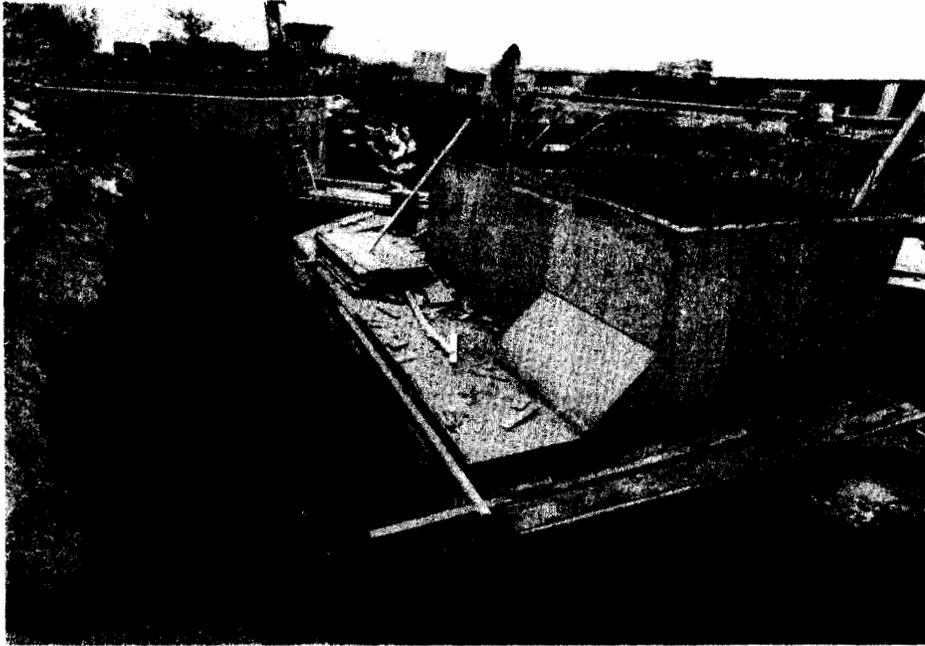


An end-wall hadron calorimeter module. The 2-inch thick steel plates of the calorimeter are assembled and cut at Purdue University. The scintillator sheets which will be mounted between the steel plates and their light guides are prepared in Pisa and Frascati, Italy.

(Photograph by Fermilab Photo Unit)

PROPOSALS RECEIVED FROM DECEMBER 1982 THROUGH FEBRUARY 1983

| <u>No.</u> | <u>Title</u> | <u>Spokesperson</u> |
|------------|--|---------------------|
| 729 | A Proposal to Study Charm and Multiparticle Production in 1 TeV Proton-Emulsion Collisions | A. Gurtu |
| 730 | Proposal: Emulsion Exposure to 250 GeV Sigma-Minus | R. Wilkes |
| 731 | Proposal: A Measurement of the Magnitude of ϵ'/ϵ in the Neutral Kaon System to a Precision of .001 | B. Winstein |
| 732 | Proposal: A Search for the $ \Delta S = 2$ Weak Non-Leptonic Decay $\Xi^0 \rightarrow p\pi^-$ | M. Sheaff |
| 733 | Proposal to Study High Energy Neutrino Interactions with the Tevatron Quadrupole Triplet Beam | R. Brock |



Construction work in progress for Tevatron II.
(Photograph by Fermilab Photo Unit)

MANUSCRIPTS, NOTES, LECTURES, AND COLLOQUIA PREPARED
OR PRESENTED FROM FEBRUARY 14, 1983 TO MARCH 13, 1983

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.

Theoretical Physics

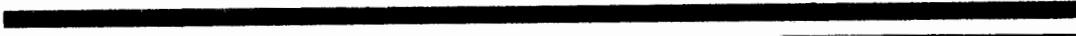
- E. J. Eichten et al. New Tests for Quark and Lepton Substructure (FERMILAB-Pub-83/15-THY; submitted to Phys. Rev. Lett.)
- C. H. Albright Composite Model with Confining $SU(N) \times SU(2)_L \times SU(2)_R$ Hypercolor (FERMILAB-Pub-83/16-THY; submitted to Phys. Lett. B)
- R. Huerta-Quintanilla and J. L. Lucio M. Constraint on Lorentz Non-Invariance from the Michel Parameter (FERMILAB-Pub-83/18-THY; submitted to Phys. Lett.)
- A. N. Schellekens and C. K. Zachos Classical Upper Bounds for Grand Unified Monopole Masses (FERMILAB-Pub-83/19-THY; submitted to Phys. Rev. Lett.)
- B. Durand and L. Durand Analytic Solution of the Relativistic Coulomb Problem for a Spinless Salpeter Equation (FERMILAB-Pub-83/21-THY; submitted to Phys. Rev. D)

General

- D. N. Schramm Underground Neutrino Astronomy (FERMILAB-Conf-83/22; submitted to the Workshop on Science Underground, Los Alamos National Laboratory, September 27-October 2, 1982)

Physics Notes

- J. A. Appel Summary Session of the Gas Sampling Calorimetry (FN-380)



Colloquia, Lectures, and Seminars

| | |
|---------------|---|
| R. Schwitters | "Plans for the Collider Detector" (Fermilab, February 15, 1983) |
| C. Rode | "Tevatron Satellite Refrigerator System: A Status Report" (Fermi- lab, February 22, 1983) |
| R. Orr | "Accelerator Division Informations Meeting" (Fermilab, March 1, 1983) |
| H. Weerts | "Limits on Neutrino Oscillations from E-594" (Fermilab, March 4, 1983) |
| M. Harrison | "Tevatron Injection, Extraction, and Abort Systems" (Fermilab, March 8, 1983) |



The Transfer Hall in the Main-Ring tunnel, looking downstream. All the Main-Ring beam-pipe and 400-GeV extraction equipment have been removed for work on the Energy Saver. The 8-GeV beam-line pipe from the Booster is at the right. See next month's issue for a dramatic difference.

(Photograph by Fermilab Photo Unit)



Secretary of Energy Hodel visiting Fermilab. From left to right, Richard Lundy, Andrew Mravca of DOE, Secretary Hodel, and Leon Lederman. They are looking at the Energy Saver magnet model on the 15th floor of Wilson Hall.

(Photograph by Fermilab Photo Unit)

DATES TO REMEMBER

| | |
|-------------------|--|
| April 7-8, 1983 | PAC Proposal Presentation Meeting |
| April 22-23, 1983 | Annual Users Organization Meeting |
| April 29-30, 1983 | Calorimeter Calibration Workshop |
| May 30, 1983 | As part of the AAAS Meeting (May 26-31), Detroit, Michigan, a symposium on High Energy Physics will be chaired by Robert G. Sachs, University of Chicago, and moderated by Leon Lederman. Other speakers include Professor Martinus J. Veltman, University of Michigan; Professor Lee G. Pondrom, University of Wisconsin, Madison; and Professor Robert R. Wilson, Columbia University. |
| June 18-24, 1983 | PAC Extended Summer Meeting |
