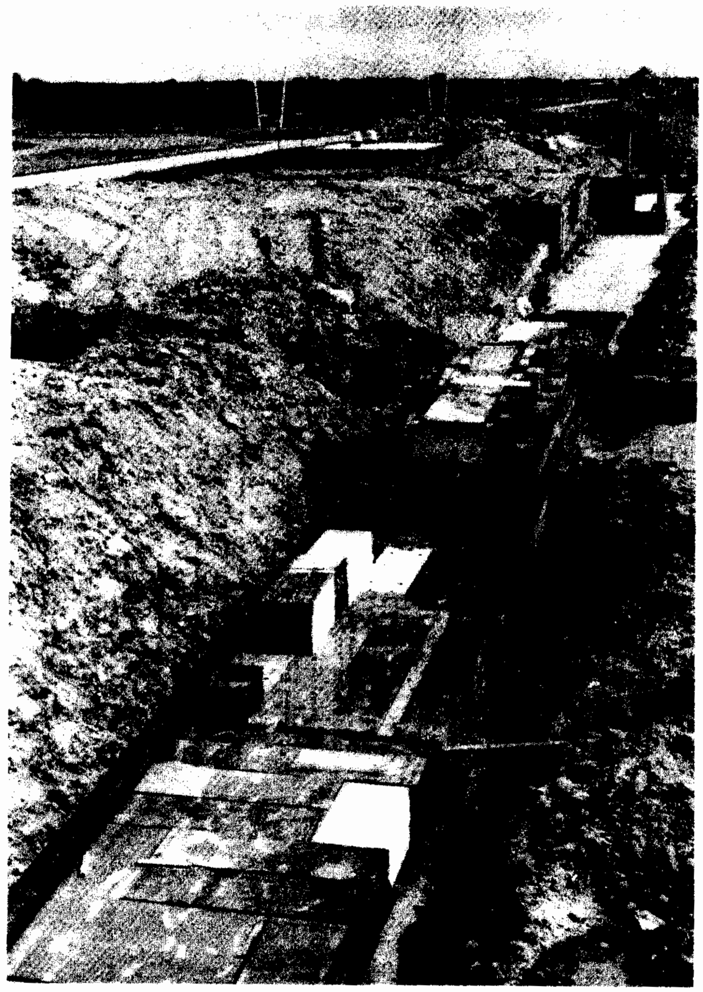
fermilab report

Fermi National Accelerator Laboratory Monthly Report

September 1980



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THE COVER: Steel shielding being installed to replace earth shielding in the 1000-GeV Neutrino Area.

(Photograph by Fermilab Photo Unit)

DIRECTOR'S REPORT

Leon Lederman

(The following is a Director's Report to the Fermilab staff)

I would like to provide all Laboratory personnel with a status report on Fermilab projects, prospects, and problems over the next few years. We have the following major tasks:

(1) Construction of the Energy Saver
(2) Operation of the 400-GeV Program
(3) Preparation for Fixed Target, 1000-GeV Physics (Tevatron II)
(4) Preparation for Colliding Beams of protons and anti-protons (Tevatron I).

Energy Saver

The Saver is paced by the Magnet Assembly Facility. After a number of technical problems involving cryostat weakness and correction coil quenching, ten models have passed an exhaustive set of tests, and we are now in production on a final accelerator package. Dipole magnet assembly has been proceeding at a rate of one a day and almost one-third of the required coil assemblies have been completed. Progress has been made in most of the many other systems associated with the Saver.

400 GeV

This program ran for only 28 weeks in FY 80 and there is no question that this hurt the research effort. We must keep this program going, limited as it is, since the physics potential now in our experimental areas is very strong and many of these experiments will evolve into Tevatron research. In the sense of a department store, these are our customers and, even though we are renovating (in order to provide better service), we must remain open or we'll find them all at Macy's!

Tevatron II

The planning for 1000-GeV beams has culminated in a book which has been submitted to the DOE. A set of priorities has been endorsed by our PAC and we continue to generate new ideas and new scientific prospects by workshops and summer studies. Some head start on all of this has been going on as we upgrade the 400-GeV program in small construction packages (as everyone can see in front of the high rise).

Tevatron I

This is limping along, being held back by a shortage of research and development funds--generated principally by more urgent Saver problems. Nevertheless, significant progress has been made partially due to the collaborative efforts of our colleagues at LBL, Wisconsin, Argonne, and Novosibirsk for which we are thankful. We have achieved stochastic cooling in the cooling ring. Work is proceeding on a demonstration of electron cooling, and on an extracted beam for $\bar{p}$ production. The associated colliding detector group is firming up a good design. In addition an overall design for a colliding beam proton-antiproton facility exists and is being sharpened.

Problems

Last June a DOE advisory panel met at Woods Hole and issued a report which had the effect of strongly supporting the entire Fermilab program outlined above. Nevertheless, budgets in FY 81 and FY 82 are generally expected to be tight.

The resources which the DOE will be able to make available to the Laboratory are not enough to pursue all of these projects with the efficiency and vigor which they require. Therefore we must set priorities and adjust the pace of our projects to bring us to our goals in the best possible way.

In general the Saver must take first priority. This establishes the superconducting ring of magnets and this is the key to the future of the Laboratory. The Saver is the basis of Tevatron I and II, and in fact of any future, more ambitious project beyond these. It is a key to giving our users a unique resource for exploring new physics.

In FY 81 we will call on all divisions and sections of the Laboratory to assist in Saver-related problems. This will conflict with their normal tasks and will clearly impact on our capability relative to the 400-GeV program. Nevertheless, the capability of carrying on a reduced 400-GeV program is extremely important. People with skills and expertise in such diverse groups as, for example, the Booster group, the Neutrino Laboratory, the 15-ft bubble chamber or Research Services may be asked to take on Saver-related projects and to carry these out with the same love and dedication as they put on their own specialties. This is because the future of Fermilab hinges on this plan. We must also be able to demonstrate the technical adaptability to return to the 400-GeV activities when these are called for and make them work. **This will be the most difficult challenge for many of us at Fermilab in the next two years!** If we survive the dangers of schizophrenia and carry it off we will be **the** pre-eminent laboratory in the world. This is the only way we can overcome the funding handicaps generated by having our peak activity coincide with a national fiscal crisis. I hope we are good enough to meet this challenge.

STATUS OF THE SUPERCONDUCTING ACCELERATOR PROJECT

K. Koepke and T. E. Toohig

Since the last status report on the superconducting accelerator project in the January issue of **fermilab report**, considerable progress has been made on many fronts.

The vertical-plane motion problem of the dipoles has been cured and full-scale magnet production has resumed; production of quadrupoles and trim magnets is also starting. The refrigeration system has made considerable progress and has been used for system tests.

These system tests, both in the tunnel in the A2 cryoloop and above ground in the B12 systems, have settled many questions about installation, leak checking, cooldown, system operation, and heat losses. This report will discuss these and other items making progress on the superconducting accelerator.

1. Magnets

Dipoles

The problem of the instability of the vertical plane of the magnetic field under cooldown proved to be rather intractable. A solution was finally arrived at using four opposed anchors at the center of the cryostat and a series of "smart" bolts to maintain the preload on the cryostat at a constant pressure. A "smart" bolt, a bolt containing a spring-loaded piston, is shown disassembled in the photograph below. The photograph at the top of

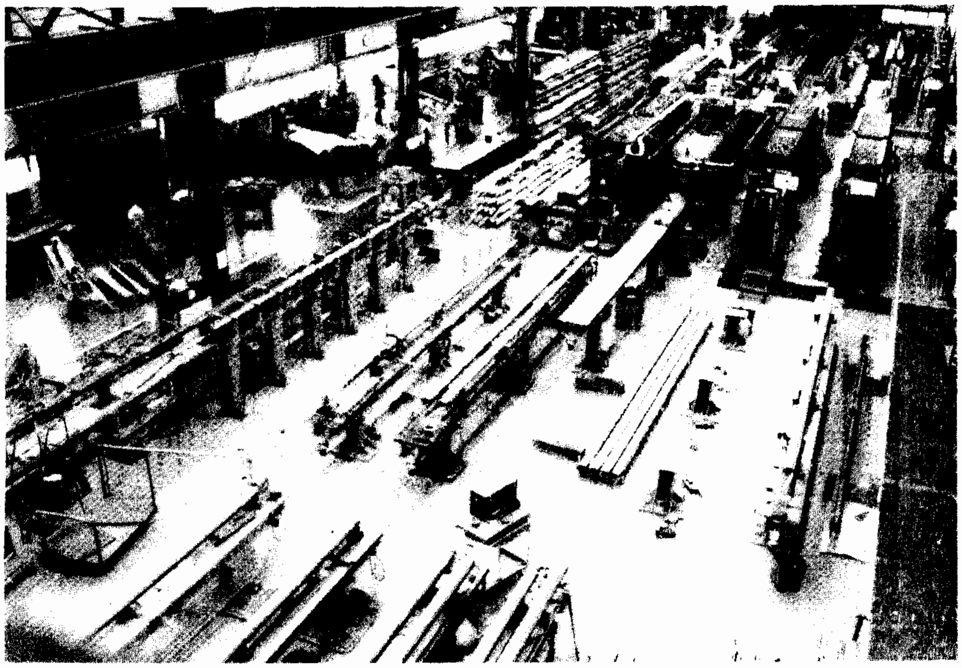
"Smart" bolt components.
(Photograph by Fermilab Photo Unit)

this page shows its mounting in a cryostat. Individual magnets have been thermally cycled more than 60 times with a total measured vertical plane excursion less than 0.5 mrad. We are confident that a full solution of the problem has been achieved and full production of the new design has been initiated.

Cutaway view of the cryostat showing revised anchor. (Photo by Fermilab Photo Unit)

Production of collared coil assemblies has continued during the period of development of the improved cryostat so that over 200 (out of a total of 774) had been produced by the end of August. A recent view of Industrial Building 3 shows many finished stacked coil assemblies.

On the basis of extended systems tests, an alternating bus scheme has been incorporated in the magnets to improve quench-protection characteristics.

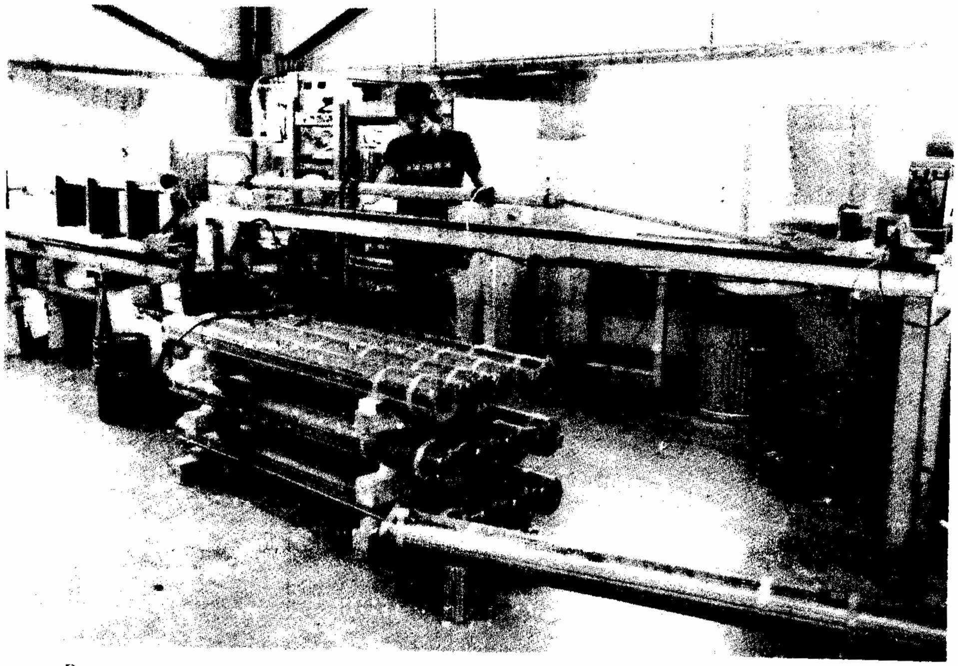


The magnet factory. Many coil assemblies are stacked, awaiting cryostats.

(Photograph by Fermilab Photo Unit)

Quadrupoles

Production has moved along smoothly so that more than a dozen collared coils had been produced by the end of August. The cryostat assembly has now started again, based on the success of the dipole cryostat design change. Some of these can be seen in the photograph below.



Room temperature quadrupole magnetic measurement apparatus. Completed collared coils in foreground; Ned Cummins in background is part of the quadrupole fabrications staff.
(Photograph by Fermilab Photo Unit)

Correction Coils

The correction coil package has been successfully tested to more than 50 A and production of coil assemblies is proceeding on schedule. The photograph at the top of the next page shows the production process. The present package contains dipole, quadrupole, and sextupole elements in coil bundle #1 and skew quadrupole, skew sextupole, and octupole in bundle #2.

2. Refrigerators

Central Helium Liquefier

The Central Helium Liquefier has successfully operated to produce more than 3,000 ℓ/h of liquid in two closed-loop tests.

Walter Wojak winds correction coils.
(Photograph by Fermilab Photo Unit)

In early September, Road D was cut to install a culvert to carry the transfer lines connecting the CHL with the accelerator preparatory to exercising the combined system.

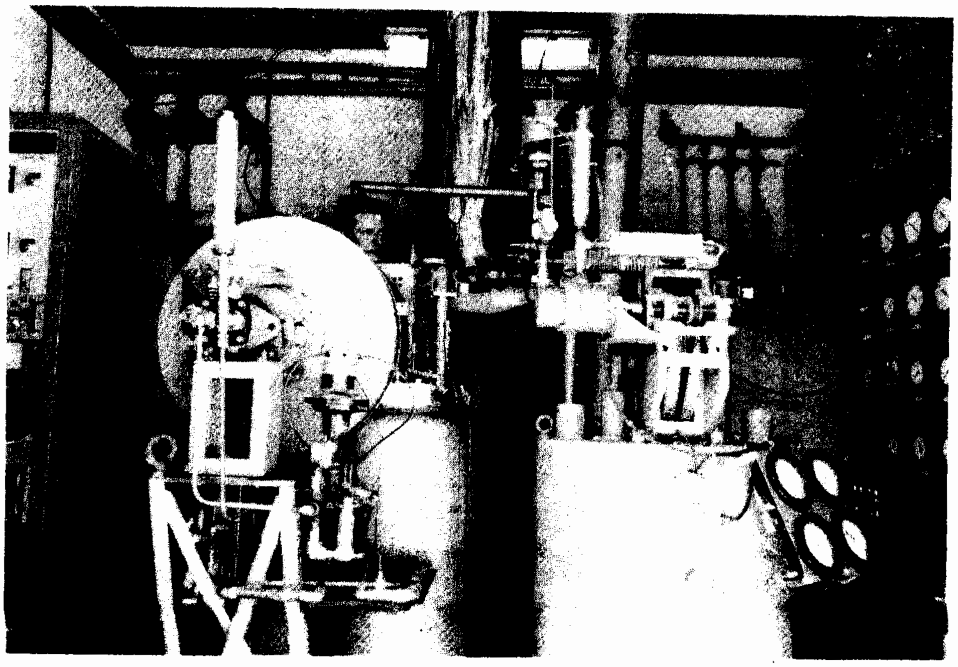
Satellites

The first of the production-model horizontal heat exchangers have been installed at A3 and A4, together with production-model valve boxes and tunnel connections. The rural scene on the next page shows the A4 heat exchanger. A final choice of engines has been made. Installation of the expansion engines and controls is proceeding towards a system shakedown in the late fall.

Meanwhile, the A0 and B0 compressor installations have been commissioned. The high-pressure helium line delivering gas from the compressors to the satellite refrigerators is completed from A0 to B1, one-sixth of the ring. The liquid-helium transfer line is completed from A1 to A2. The A2 refrigerator has operated successfully for over three weeks in satellite mode being fed liquid from the A1 refrigerator. It is shown in the bottom photograph on the next page.

First production model of the heat exchanger installed at the A4 refrigerator building.

(Photograph by Fermilab Photo Unit)



Satellite refrigerator installation at A2. Paul Furio can be seen in the background.

(Photograph by Fermilab Photo Unit)

3. Tests

A2

The A2 cryoloop involving 40 magnets in the tunnel, referred to above, has been successfully completed and operated. Based on the experience of this installation, a crew of technicians can install a half-cell in less than six shifts, including alignment, connection, pumpdown, hipot, and leak check. Leak checking must be done to a level of 10^{-9} atm-mm/s. The techniques for doing this have now been developed.

Further tests are being done in the A2 string before warming it up to measure the heat leak at various cryostat pressures. The measured heat leak for the cryoloop at the canonical 4.6 K is 232 watts, to be compared with the design value of 300 watts.

B12

B12 is an ongoing test of a string of 20 magnets located above ground between the B0 and B1 service buildings. The magnets presently being used are old 22-ft dipoles with old quads and spool pieces. The tests, for the most part, concern power-supply and quench protection and satellite-refrigerator controls. We intend in the near future to convert B12 to the new 21-ft dipoles, with new quads and spool pieces, especially for the purpose of testing the alternating coil-bus configuration mentioned below.

It is an understatement to say that we have learned a considerable amount from the B12 program. Often we have learned by making rather disastrous mistakes. After analysis, of course, all of the mistakes are "obvious," even to the casual observer. The major advantage of B12 is that it is the only large-scale system to which we have continuous and easy access. If there are any disadvantages, it is that it is not big enough, both in concept and operation, and that turn-around time is too long. In other words, we could perhaps invest more money and manpower into this sort of research.

As an example of the tests done at B12, we have paraphrased an internal memo of April 24, 1980, along with comments as to the progress made in each experiment. The purpose of the memo was to outline our research program at B12 for the summer.

Quench Propagation. The purpose of the experiment was to see if quenches started in one half-cell would propagate to an adjacent half-cell, through the "quench stopper."

Up to this time (September 2, 1980), there has been no observation of quench propagation from a half-cell up to a current level of 3500 A.

Measurements of Integral I^2dT (Miits) During Quenches.

(i) For quenches started in a coil or bus inside the coil package, it apears that up to 2000 A, one heater out of the available four per half-cell is sufficient to protect the magnets. Up to 3500 A, two heaters are sufficient. Behavior at higher currents is yet to be investigated.

(ii) It is generally agreed that for currents less than 1000 A, heaters are not necessary for safe energy removal. If we dump 800 J into the heater circuit, all magnets will quench down to 500 A, so we are certainly safe. It remains to be established if all magnets will quench at 1000 A when 400 J are put into the heaters. This is one of the measurements which will be done at the Magnet Test Facility for each magnet. It is clear, nevertheless, from the results of (i) above that if there are a few magnets that do not readily quench with 400-J heaters at 1000 A addition of some heater circuits with 800 J will solve the problem.

(iii) Quenches That Start Outside the Coil Package. It is possible that beam loss can start a quench in the cable outside the coil package, for example, in the magnet interconnections, straight sections, or spool pieces, even though the magnetic field is low at those places. The quench propagation is much slower there, and the number of miits absorbed in the cable is, therefore, much higher before sufficient resistive voltage is present to allow quench detection. The solution to this problem is intimately connected with the level of noise present on the quench-protection monitor, and our ability to lower the detection threshold. With thresholds of a few V (resistive), we are probably not safe. The threshold can be run at approximately 1 V, but some work is still necessary on the quench problem of lowering that threshold. The research on the actual number of miits that a cable can take before damage and on the resistance growth rate will be moved from B12 to the short-sample test apparatus, where the experiments are much easier.

Transient Response on QPM. There is an ongoing problem of improving the transient response and smoothing of the QPM, both in hardware and software. At present, the induced voltages due to coupling in the detection network have been cancelled in software to the level of 1 V. This level cannot be improved until some hardware improvements are made in the uninterruptible power supply for the QPM.

Because B12 is not configured in the alternating coil-bus arrangement incorporated in the final magnet design, there are some special problems of transients. The final scheme using the alternating bus is much easier than that incorporated in B12 at present. Hence, we would like to change to the newer scheme as soon as possible.

Helium Lost During Quench. We have learned that the half loop not involved in the quench is not affected by the quench.

In addition, up to 3500 A, the half-cell adjacent to the quenching half-cell stays cold, and even retains much of its liquid. This is very good news and means fast recovery time after quenches. It also means that we will not suffer a great deal when we go to one-cell quench protection units instead of half-cell units.

Cryogenic Tests. For ramp parameters shown below, ΔT in the single phase was less than 0.1K in one half hour.

Ramp Parameters
0 to 4000 A, 20 s up, 2 s flattops, 20 s down, 18 s dwell

The results would probably have been better if the flattop were longer and the dwell shorter. More tests are planned.

Refrigeration Controls. A PDP-11 is being used to monitor the refrigerator and algorithms for the control microprocessor are being developed. At least one loop has been closed by software. This work is continuing at a satisfactory rate.

Warm-Up Time. We have succeeded in warming up the string in less than 24 hours by carefully spoiling the vacuum.

4. Conclusion

Production and installation of magnets and refrigeration systems is proceeding at a rate consistent with operation of the superconducting accelerator in late FY82. Development work on the control and peripheral systems that are not on the critical path for the accelerator is proceeding in a very satisfactory manner. Development work will continue in order to optimize each system before it is finally installed.

ORGANIZATION OF THE PROGRAM PLANNING OFFICE

Leon Lederman

At the suggestion of the Users Executive Committee, I will describe the functions of the Program Planning Office and its new responsibilities. Taiji Yamanouchi, Assistant Director of the Laboratory, is the head of this office.

One of the major responsibilities of the Program Planning Office is program acquisition. That is, this office is charged with the responsibility for receiving new proposals and following their progress all the way through to the completion of the proposed experiment.

When a proposal is received, several physicists, usually from the Laboratory, are appointed by the office to act as the proposal's "Godfathers." They will study the proposal and try to anticipate the kind of questions that the Physics Advisory Committee (PAC) may raise about the proposal. These questions and other comments from the "Godfathers" will be transmitted to the proposers for their consideration. The proposers will, it is hoped, choose to consider these comments as a form of constructive advice and modify their proposal to increase its clarity and to anticipate the PAC's questions. In the case of similar proposals, the same physicists may be designated as the "Godfathers" for the group of proposals. In that case, they may provide the PAC with a tabular comparison of the proposals to aid them in their decisions. Laboratory physicists, in addition to providing a critical reading of a proposal for the proponents, will assist in preparing written impact statements for the PAC. These impact statements attempt to detail what would be the effect on the Laboratory of approving a proposal and what impact it may have on the running schedule.

The office is responsible for organizing the proposal presentations and the meetings of the PAC. After approval (Stage I), the experimenters and the Research Division of the Laboratory negotiate an agreement. The agreement is subject to final PAC approval (Stage II). The Program Planning Office is responsible for following the progress of the experiment as described in the agreement. One of its methods for doing so is to schedule a "Director's Review" somewhere in the middle of the preparation of the experiment. These reviews, which normally take place on Saturday mornings, cover the proposed physics and all aspects of the technical components necessary for a successful experiment. The Director asks several physicists to attend the review as "Judges" to assess the progress of both the experimenters and the Laboratory in the preparation of the experiment. They can suggest remedial action if they feel it is desirable. These reviews can take as much as 4 to 5 hours and for a large experiment, are typically scheduled about a year after approval.

The other major functions of the Program Planning Office involve experiment scheduling, carried out on several different time scales. Several times a year, following discussions with experimenters and the Accelerator and Research Divisions, a long-range schedule for the coming year is updated and issued. Every two weeks, on alternate Monday afternoons, an All-Experimenters Meeting is held where experimenters discuss the progress of their experiment and request any special running conditions needed in the near future. Every Tuesday morning a Scheduling Meeting is held, with the Director, Division Heads, heads of experimental areas and accelerator groups, and other directly involved Laboratory personnel, to arrange the operating schedule for the forthcoming week; this includes determination of which experiments are to run and with what relative priority, accelerator maintenance and development periods, accelerator operating conditions, and division of available beam to the various targets. Requests for changes in beam conditions on a time scale shorter than a week are handled by the Office through the Operations Coordinator on Ext. 3689. Advance notice of changes are posted on CCTV Channel 13. During running, the Program Planning Office follows the progress and problems of all experiments.

The Program Planning Office keeps a complete computer record of all experiments, their current status, hours accumulated, together with a list of the experimenters and institutions involved. Other tasks are to keep lists of special visitors for DOE, such as those currently from China; selection of international flags (representing nations with physicists on currently active experiments) for the display in front of the Central Laboratory Building; setting priorities for experimenters' on-site housing; keeping an up-to-date list of publications resulting from Fermilab experiments; and monitoring of the Laboratory power use. Recently, following the suggestion of the Users Executive Committee, the Users Office on the first floor of the Central Laboratory has become part of the Program Planning Office.

RUNNING SCHEDULE

Leon Lederman

FY 1981 is another very difficult year for high-energy physics at Fermilab. The Energy Saver project must take highest priority because it is the key to our future and any delay in this project has a very serious financial, as well as scientific penalty. We have recently experienced technical problems in the assembly of superconducting magnets. These problems are now solved, but the cost penalty has been substantial. This problem is related to A Sector and hence burdens the operating budget. Last July, we appealed to the DOE for a $7M supplement to the FY 81 financial plan as contained in the President's Budget. We were told that these funds are not available and this forced a review of the 400-GeV program. After detailed consideration we have decided to reduce the 400-GeV program in FY 1981 from 32 weeks to 22 weeks. The revised program will result in the cancellation of the FY 81 run for three approved experiments and will significantly shorten six additional experiments, although we believe the physics goals of three of these will be substantially met. Preparation for two other experiments will be slowed to a point where their 400-GeV expectations are in serious jeopardy. (These do have Tevatron capability.) In these decisions we did have guidance from the PAC.

It is not profitable to dwell on alternative courses of action. We have been in fairly vigorous confrontation with the DOE over the past year on funding problems. It is clearly our subjective opinion that the sums that would have made a reasonable running schedule possible should have been forthcoming. We cannot, however, jeopardize the long-range prospects for improvements by continuous confrontation, and we have designed the best compromise we know how with the budget given to us.

We expect to use large resources of manpower (as described on page 2) from the Research and Accelerator Divisions in the 9 to 10 month shutdown (April 1981 - January 1982) to advance the Saver project. The ability to take up these new assignments, carry them out with utmost care and efficiency, and then go back to restore the accelerator and beam lines for the final 400-GeV run starting February 1982, will place an enormous burden on Fermilab people in the Research and Accelerator Divisions.

We can, however, look forward to a successful completion of the Saver project. I am also optimistic that we will come out of this with a good operating budget and an upturn in the physics activity in 1983.

MANUSCRIPTS AND NOTES PREPARED FROM AUGUST 12 TO SEPTEMBER 14, 1980

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

J. J. Russell Experiment #87	Photoproduction of Charmed Baryons (Ph.D. Thesis, University of Illinois)
D. Brick et al. Experiment #154	Leading Particles and Diffraction Dissociation in 150-GeV/c π^-p Interactions [Phys. Rev. **D21**, 1726 (1980)]
D. Brick et al. Experiment #'s 154 and 299	Double Pomeron Exchange in the Reactions $pp \rightarrow pp\pi^+\pi^-$, $K^+p \rightarrow K^+p\pi^+\pi^-$, $\pi^+p \rightarrow \pi^+p\pi^+\pi^-$, and $\pi^-p \rightarrow \pi^-p\pi^+\pi^-$ at 147 GeV/c (Submitted to Phys. Rev. Lett.)
T. C. Jensen Experiment #272	Measurement of the Radiative Decay Width of the Rho Meson (Ph.D. Thesis, University of Rochester)
J. P. Dishaw Experiment #379	The Production of Neutrinos and Neutrino-Like Particles in Proton-Nucleus Interactions (Ph.D. Thesis, Stanford University)
K. W. Brown et al. Experiment #379	Observation of Prompt Single-Muon Production by 400 GeV Protons (Submitted to Phys. Rev. Lett.)
A. Diamant-Berger et al. Experiment #379	Observation of Missing Energy Associated with $\mu^+\mu^-$ Produced in p-Fe Interactions (Submitted to Phys. Rev. Lett.)
A. Diamont-Berger et al. Experiment #379	Search for Possible Signatures of Bottom-Meson Production in p-Fe Interactions at 400 GeV/c [Phys. Rev. Lett. **44**, 507 (1980)]
E. J. Siskind Experiment #379	Production of $\psi(3100)$ in 400-GeV/c Proton Interactions [Phys. Rev. **D21**, 628 (1980)]

J. P. Dishaw et al.
Experiment #379

Limits on the Production of Neutrino-Like Particles in Proton-Nucleus Interactions from Calorimetry Measurements [Phys. Lett. **85B**, 142 (1979)]

J. A. Gaidos et al.
Experiment #442

Evidence for Two Body Break Up at a Unique Temperature in High Energy P-Xe and P-Kr Collisions [From **Hadronic Matter at Extreme Energy Density**, Edited by N. Cabibbo and L. Sertorio (Plenum Publishing Corporation, 1980); presented by L. Gutay)

D. S. Barton
Experiment #451

Low p_T Inclusive Production in Hadron-Nucleus Collisions (Invited talk at the International Symposium on Multiparticle Dynamics, Bruges, Belgium, June 22-27, 1980)

V. L. Fitch et al.
Experiment #567

Measurement of D Production by Pions on Nucleons at $\sqrt{s}$ = 19 GeV (Submitted to the XX International Conf. on High Energy Physics, Madison, Wisconsin, July 17-23, 1980)

J. L. Ritchie et al.
Experiment #595

Prompt Muon Production at Small X_F and P_T in 350-GeV p-Fe Collisions [Phys. Rev. Lett. **44**, 230 (1980)]

R. E. Breedon
Experiment #595

Contribution of $\mu^+\mu^-$ Pairs to Prompt Muon Production from 350 GeV p-Fe Collisions (M.S. Thesis, University of Rochester)

A. Bodek
Experiment #595

Sources of Prompt Leptons in Hadronic Collisions (Invited talk at the Annual Meeting of the Division of Particles and Fields, American Physical Society, McGill University, Montreal, Canada, October 1979)

Theoretical Physics

C. T. Hill

Penguins and the ΔI = 1/2 Rule (FERMILAB-Conf-80/66-THY; invited talk at the XX International Conf. on High Energy Physics, Madison, July 17-23, 1980)

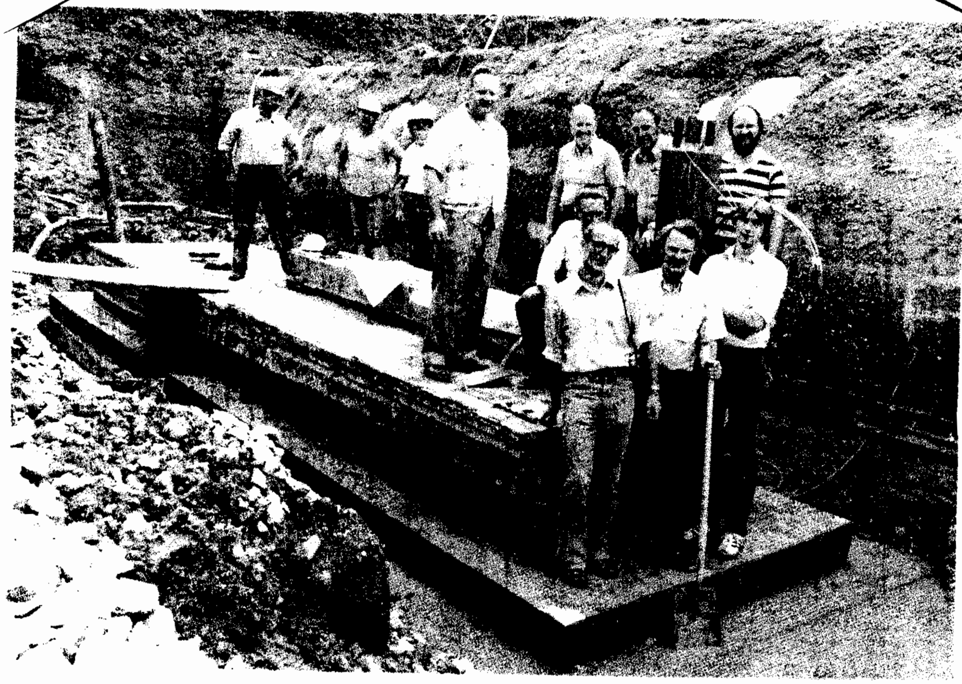
N. Sakai	Nonperturbative Vacuum and Hard Scattering Processes (FERMILAB-Conf-80/68-THY; submitted to the XX International Conf. on High Energy Physics, Madison, July 17-23, 1980)
Y. Kazama	Condensation of $(G^a_{\mu\nu})^2$ in Quantum Chromodynamics (FERMILAB-Conf-80/71-THY; talk presented at the XX International Conf. on High Energy Physics, Madison, July 17-23, 1980)
B. Zumino	Prospects for Supergravity (FERMILAB-Conf-80/74-THY; talk presented at the XX International Conf. on High Energy Physics, Madison, July 17-23, 1980)
C. Quigg and J. L. Rosner	Inverse Scattering and the Υ Family (FERMILAB-Conf-80/75-THY; invited talk at the XX International Conf. on High Energy Physics, Madison, July 17-23, 1980)

General

D. C. Carey	High Energy Charged Particle Optics Computer Program (FERMILAB-Conf-80/76; talk presented at the Conf. on Charged Particle Optics, Giessen, Germany, September 8-11, 1980)

Physics Notes

J. A. Appel et al.	Operating Characteristics of Lecroy 2280/2285 ADC System (FN-326)
N. V. Mokhov	Energy Deposition in Targets and Beam Dumps at 0.1-5 TeV Proton Energy (FN-328)
S. Ohnuma	Comments on Stable Motions in Non-linear Coupled Resonances (FN-329)



A new beam dump for the Main Ring and 1000-GeV Doubler abort being installed at CO. Supervising installation of the graphite-filled core box are (front row left to right) N. V. Mokhov (visitor from Serpukhov), Thornton Murphy, Elvin Harmes; (second row, left to right) Frank Turkot, John Kidd (seated), Max Palmer, Bob Vanecek, Brian Hendricks; Jim Moncrieff is standing in the background behind Frank Turkot.

(Photograph by Fermilab Photo Unit)

NOTES AND ANNOUNCEMENTS

WORKSHOP ON HOLOGRAPHIC TRACK CHAMBERS...

A two-day workshop will be held at Fermilab on November 11 and 12, 1980, on holographic techniques for particle detectors, with emphasis on high spatial resolution track chambers and vertex detectors for fixed-target physics in the Tevatron II program. The workshop is intended for experimenters interested in the possibility of holographic recording of "charm and beyond" particle tracks in mini, medium, and big bubble chambers, as well as in avalanche-triggered detectors. Those interested in participating are requested to contact Lou Voyvodic, Ext. 3170 or mail station #220, at Fermilab.

DATES TO REMEMBER

November 11-12, 1980	Workshop on Holographic Techniques for Particle Detectors (see above).
November 13-14, 1980	PAC Meeting.
February 1, 1981	Deadline for proposals for Tevatron experiments with hadron and photon beams in the Meson and Proton Areas to be considered at the June 1981 PAC meeting.