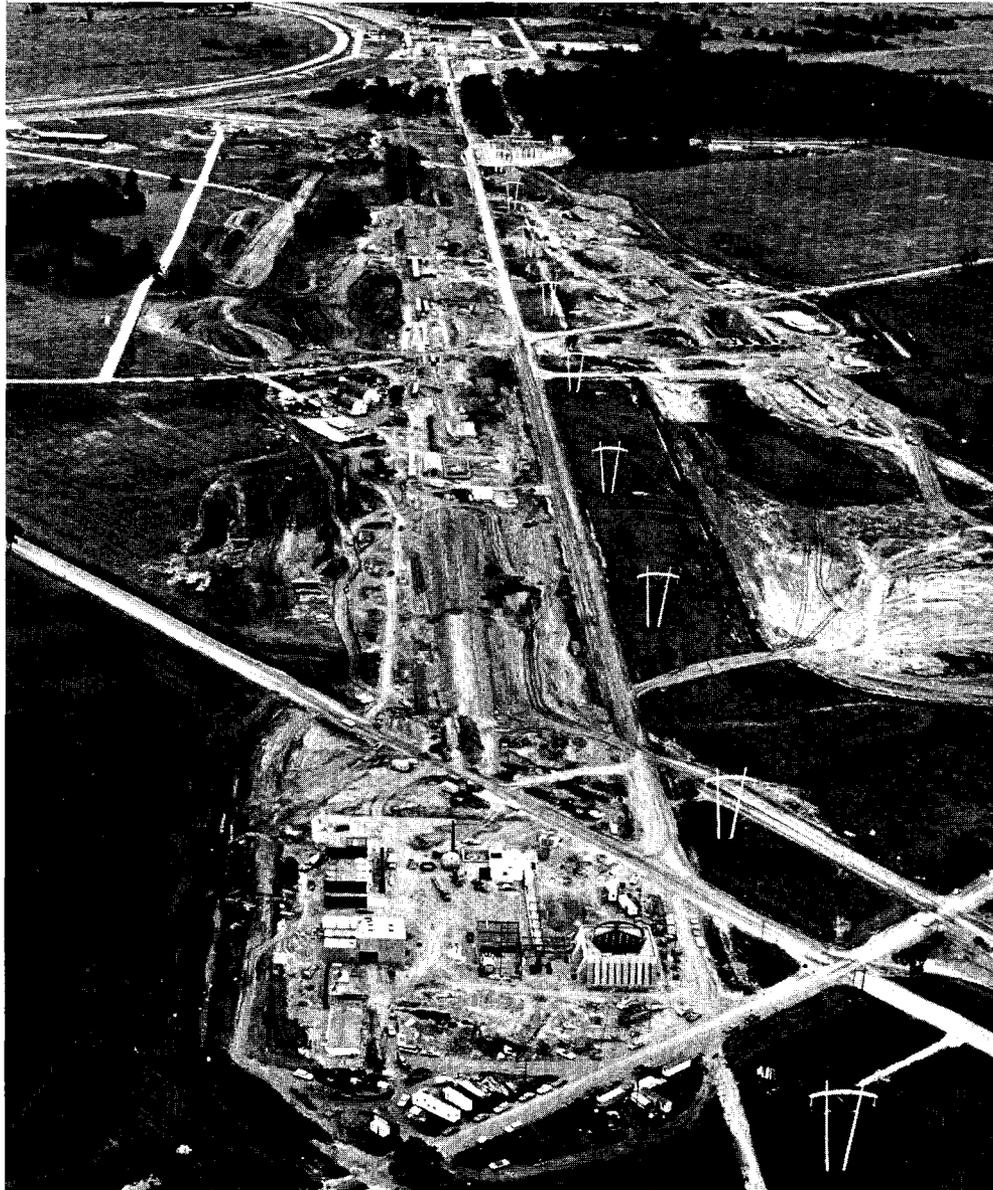




MONTHLY REPORT OF ACTIVITIES

August 31, 1971



LOOKING SOUTHWEST ALONG THE BEAM LINE



FORTHCOMING MEETING AT THE LABORATORY

NAL Users Executive Committee September 17

THE COVER: This aerial photo was taken looking back toward the accelerator. The bubble-chamber area is in the foreground, with the Neutrino Laboratory being constructed beyond. The Meson Laboratory is to the right of the power poles. Work on the Proton Laboratory is beginning to the left of the Neutrino Laboratory. The Main Ring is at the upper left.

MONTHLY REPORT OF ACTIVITIES

F. T. Cole

August 31, 1971

Abstract: This report summarizes the activities of the National Accelerator Laboratory in August, 1971.

Main Accelerator

Circulating-beam tests were continued through almost all of the month of August. The beam has been observed to coast for about one second, although there is typically a rapid decrease during the first one-tenth millisecond. Its stability from pulse to pulse was greatly improved by using the beam-position electrodes to center the beam at approximately 100 points around the circumference. Experiments showed that the initial decay is not caused by gas scattering. The loss does not change with betatron-oscillation frequencies, so does not seem to be a resonance phenomenon. The decay times also do not appear to be consistent with debunching, using the measured momentum spread of the 7-GeV beam. The 50-MHz beam structure of the Booster is observed to disappear in a few milliseconds, implying that the 2 μ sec-long injected pulse, which occupies about 1/10 of the main ring circumference, should spread out and fill the main ring uniformly after about 2 seconds. Thus, with a beam life of the order of one second, the response of the detectors will be decreased by debunching.

The radiofrequency cavities have been turned on, four of them out of the sixteen for full operation, so that there is about 400 kilovolts available per turn. Then the 50-MHz structure does not disappear and, of course, the

beam does not spread out around the ring. Beam bunching has been observed to persist for as long as 0.25 seconds. The loss at this time was caused by loss of phase-feedback control because of low beam intensity. Beam losses and residual radioactivity were particularly high in Sector C. On August 31, a small scrap piece of stainless-steel wire was found in the vacuum chamber at position C19. This section had never been opened since initial installation, and apparently the wire had been there for some time. It was found to be radioactive and may well have contributed to beam loss. Beam tests are continuing at the time of writing.

Injector

Almost all the time of the injector was utilized in providing beam for the main accelerator. Some hardware improvements were made during August and the operation of the injector has become much more stable.

Meson Laboratory

All magnets for the beam switchyard have been completed. A number of magnets and collimators for the Meson Laboratory secondary-beam lines have been completed and installed and are undergoing tests.

Neutrino Laboratory

Cable-tray and piping installation are almost complete. Magnets are being installed, as shown in Fig. 1.

Bubble Chamber

Work on the chamber vessel and coils is progressing. Figure 2 shows the first completed pancake of the coil.

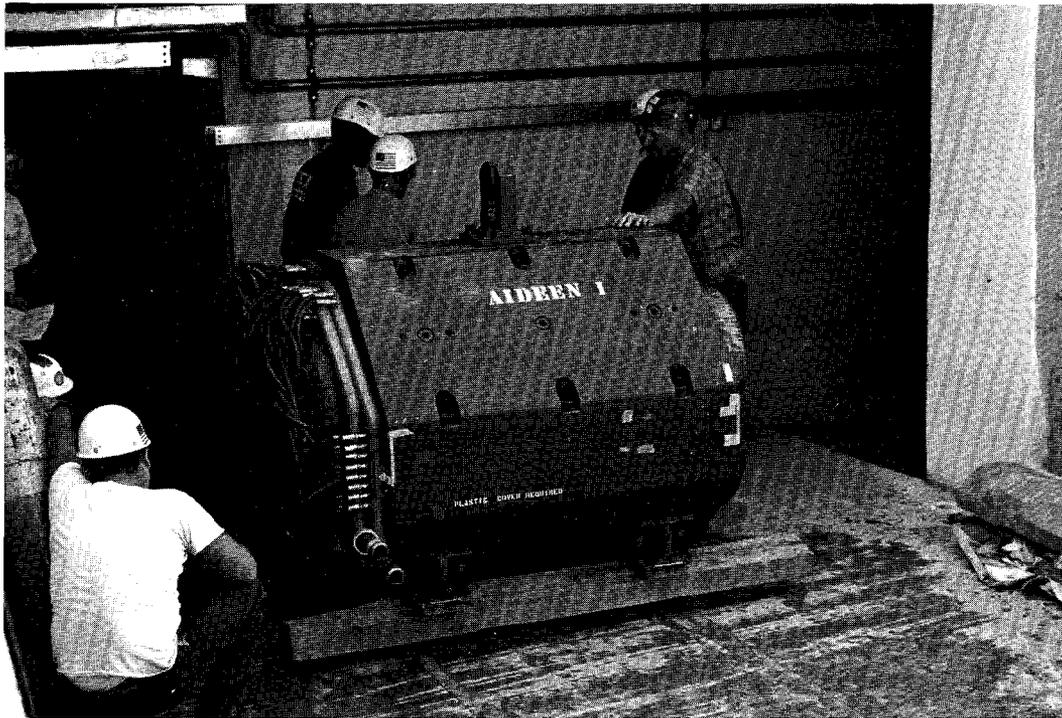


Fig. 1. A large quadrupole from the Cambridge Electron Accelerator being installed in the Neutrino Laboratory.

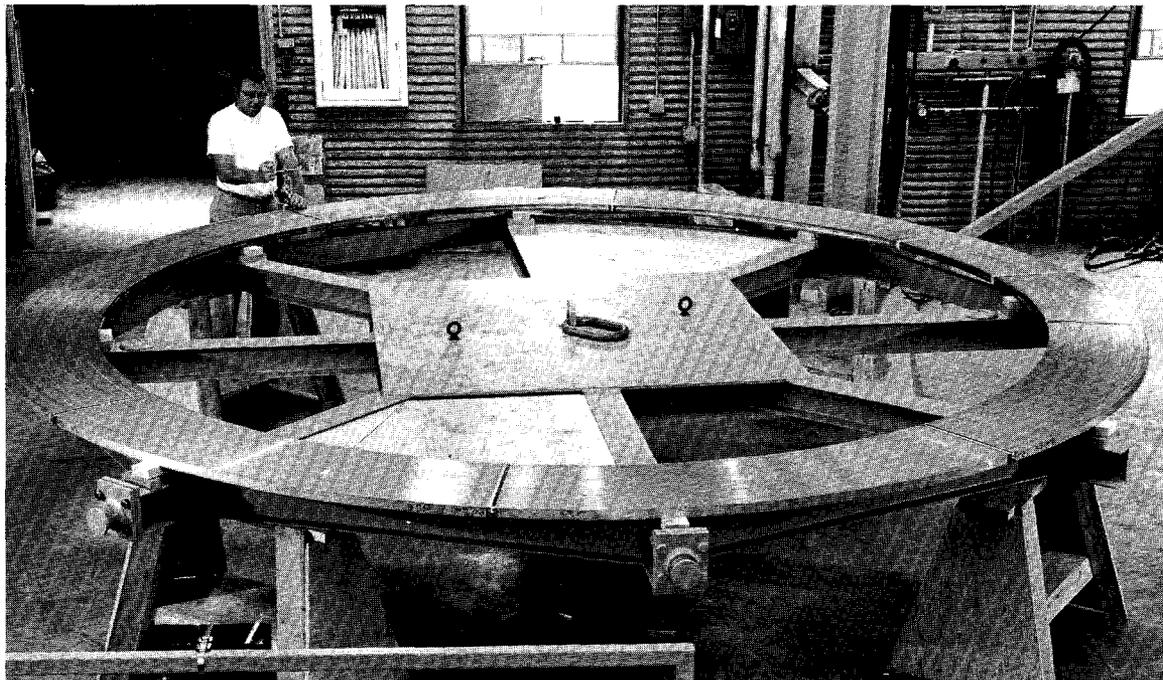


Fig. 2. The first completed pancake of the bubble-chamber coil. The coil is being fabricated at Argonne National Laboratory.

Program Advisory Committee

The Committee met during August in Aspen, Colorado. As a result of this meeting, a number of proposals have been accepted. A letter reporting the developments has been sent to all members of the Users Organization and a list of the proposals accepted is attached to this report.

Construction

Meson Laboratory. The target-area contract, which is 90% complete, has mainly piping and mechanical work and finishing of backfill to complete. The secondary-beam lines up to the Detector Building are 93% complete, with only earthwork to go. The mezzanine of the Detector Building is approximately 70% complete. It is shown in Fig. 3.

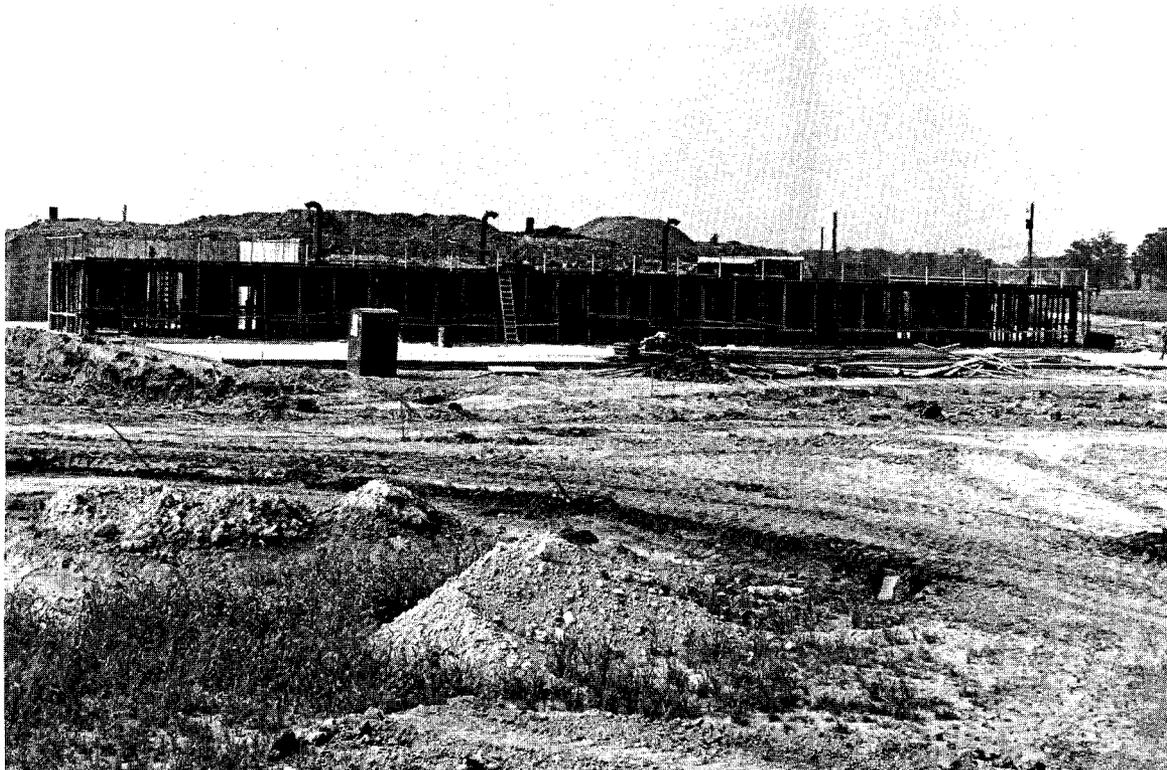


Fig. 3. Mezzanine construction in the Meson Laboratory. The shielding over the upstream secondary-beam lines can be seen beyond.

A contract has been placed with the Schless Construction Company of Batavia for the remainder of the Detector Building. The value of this contract is \$2.247.

Neutrino Laboratory. The target area is complete except for cleanup of minor defects. All structural concrete has been placed on the beam line and the beam pipe is now being encased. This contract is 53% complete. Figure 4 shows the bubble-chamber area.

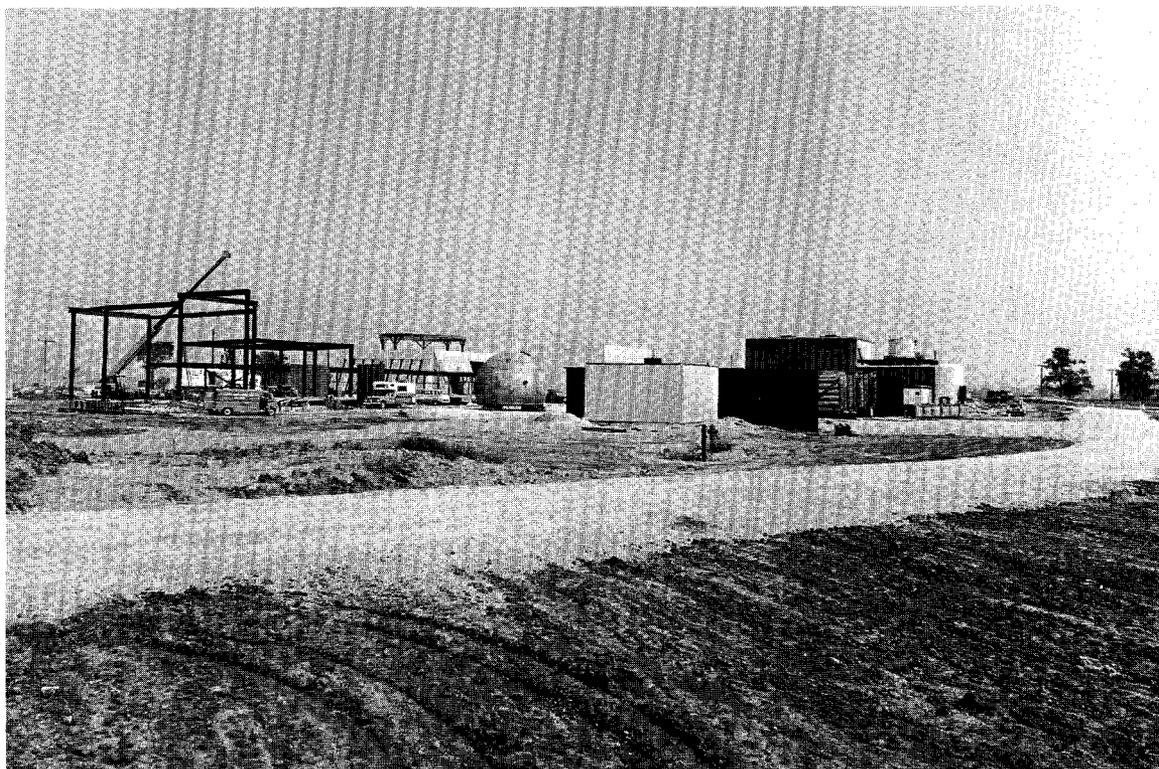


Fig. 4. Bubble-chamber area. The vacuum tank of the 15-ft chamber is to the left of Building B and in front of Buildings A and C. The Compressor Building is at the right, in front of the 30-in. chamber building (D).

Central Laboratory. The ground floor, the first phase, is 83% complete and there will be partial occupancy early in September. The second-phase contractor is mobilizing and beginning to take delivery of structural steel. Figure 5 is a recent photo of the exterior and Fig. 6 shows the state of the interior.



Fig. 5. The Central Laboratory exterior. The Cross Gallery is at the far left.

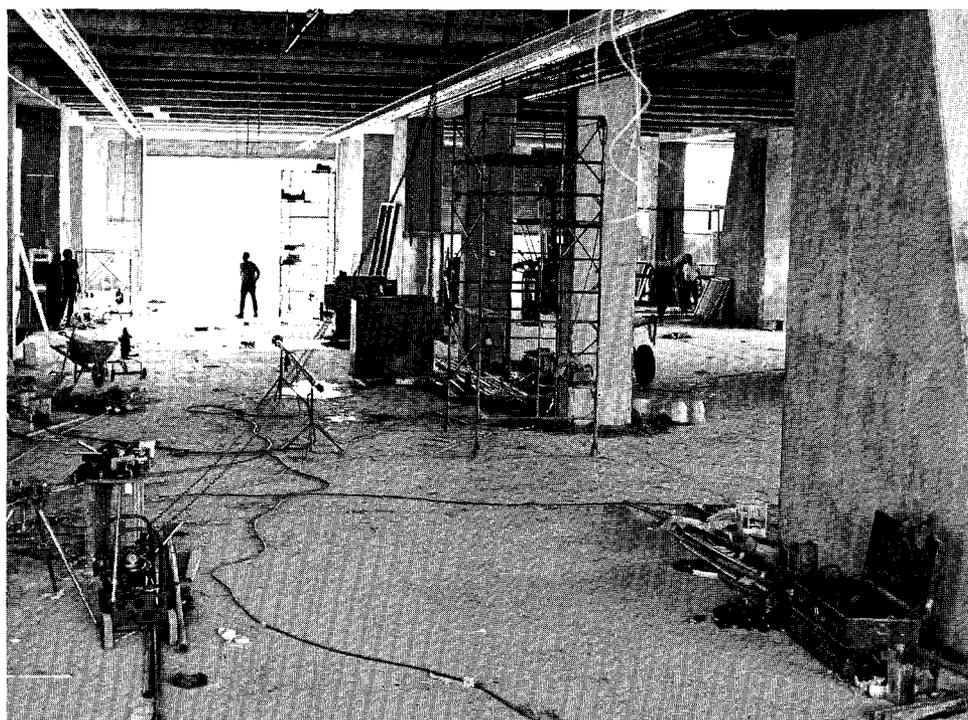


Fig. 6. Interior of the Central Laboratory under construction.

Proton Laboratory. All phases of this work are roughly 25% complete and are on schedule, in spite of setbacks caused by a severe storm on August 24. Figure 7 shows the slab of the first phase, near the main-ring beam dump, and Fig. 8 shows concrete work further downstream.

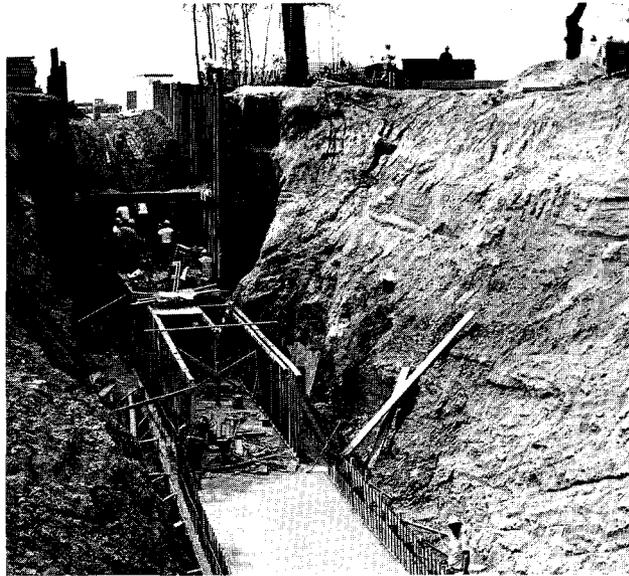


Fig. 7. Forming and concrete of the Proton Laboratory as the line emerges from the trees near Road B.



Fig. 8. Beam tunnel being formed for the Proton Laboratory north of Road B. The view looks upstream.

LIST OF APPROVED PROPOSALS*

<u>Experiment Number</u>	<u>Institutions</u>	<u>Scientific Spokesman</u>	<u>Subject</u>
1-A	Wisconsin Pennsylvania Harvard	Cline	NAL Neutrino Proposal
2-I	Michigan State Maryland Iowa State ANL	Smith	Multiparticle Interactions in 30-inch Bubble Chamber and Optical Spark Chamber Hybrid System
3	LRL, SLAC	Eberhard	Search for Magnetic Monopoles at NAL
4-A	Michigan, ANL	Longo	Neutron Total Cross Sections up to 200 GeV
4-B	Michigan, ANL	Longo	Neutron-Proton Diffraction Scattering
6	Michigan, ANL	Krisch	Proton-Proton Elastic Scattering at high Transverse Momentum
7	Michigan, ANL, NAL	Meyer	Measurement of $\pi^{\pm}p$ and p-p Differential Elastic Scattering Cross Sections from 50 to 170 GeV/c
8	Wisconsin Michigan	Pondrom	Experiments in a Neutral Hyperon Beam
12	Ohio State Michigan State Carleton	Reay	A Study of Neutron-Proton Charge-Exchange Scattering
14	Columbia SUNY Stony Brook	Franzini	Proposal to Study Inelastic Proton-Proton Collisions in the Diffractive Region
19-A	Wyoming	Tompkins	A Search for Monopole Production
21	Caltech NAL	Barish	Neutrino Physics at High Energies
22	VPI, BNL	Collins	Search for Multigamma Events from Magnetic Monopole Pairs
23-A	Washington	Rothberg	Inclusive πp and $K p$ Scattering

*Emulsion Experiments are not included in this list.

<u>Experiment Number</u>	<u>Institutions</u>	<u>Scientific Spokesman</u>	<u>Subject</u>
25-A	UCSB	Caldwell	Measurement of the Total Photo-Absorption Cross Sections
26	Michigan State Cornell, UCSD	Chen	High Momentum Transfer Inelastic Muon Scattering and Test of Scale Invariance
27	Rochester, NAL Northwestern	Rosen	Study of the Coherent Dissociation of Neutrons
32	Stanford	Hofstadter	Test and Calibrate a Large NaI (Tl) TANC Detector
34	Louisiana State Max-Planck	Huggett	Ionization Spectrometer Test and Development
36-A	Rockefeller Rochester, NAL USSR	Cool	Small Angle p-p Scattering
37-A	NAL, UCLA	Malamud	30" b.c. - pp
48	Yale BNL NAL	Adair	A Measurement of the Intensity and Polarization of Muons Produced Directly by the Interactions of Protons with Nuclei
61	LRL, Harvard ANL, North- western Wyoming, Yale, NAL	Chamberlain	Proposal to Measure Polarization in Elastic Scattering at 50, 100, and 150 GeV/c
63	NAL	Walker	Survey of Particle Production in Proton Collisions at NAL
67	Rutgers Upsala College	Maglic	Search for Baryon Resonances up to 10 GeV Mass Produced in p+p p+MM
69	NAL, Yale	Lach	Elastic Scattering of the Hadron
70	Columbia Rockefeller NAL	Lederman	Study of Lepton Pairs from Proton-Nuclear Interactions
72	BNL, Yale	Leipuner	Quark Search
74	General Elect. NAL	Fleischer	Search for Magnetic Monopoles

<u>Experiment Number</u>	<u>Institutions</u>	<u>Scientific Spokesman</u>	<u>Subject</u>
75	NAL	Yamanouchi	A Proposal to Search for Fractionally Charged Quarks
76	NAL	Carrigan	Search for Magnetic Monopoles
81	ANL, BNL Chicago Carnegie-Mellon Purdue SUNY (Buffalo)	Butler	Preliminary Survey of 200-GeV Proton Interactions with Complex Nuclei
82	Chicago, SLAC U of California- San Diego, NAL	Telegdi	Investigate Regeneration of Neutral K-Mesons at Very High Energies
86	U of Washington Orsay	Lubatti	Study Inelastic Diffractive Processes by Observing Coherent Production of Multi-Pion Final States from He Nuclei
87-A	Columbia Hawaii Illinois	Lee	Search for Heavy Leptons and Intermediate Bosons from Photon-Nuclei Collisions
95	Johns Hopkins U NAL	Cox	Proposal for Examination of Wide Angle Gamma Rays at NAL
96	Stanford U of Bari Brown, CERN ANL, Cornell MIT, NAL Northeastern	Ritson	Focusing Spectrometer Facility
97	NAL, Yale	Lach	Elastic Scattering of the Hyperons
98	Chicago Harvard Oxford	Mo	Muon-Proton Inelastic Scattering Experiment
100	Chicago Princeton	Cronin	Study Particle Production at High Transfer Momenta
104	NAL, BNL Rockefeller	Baker	Measurement of Total Cross Sections on Hydrogen and Deuterium
108	NAL	Awschalom	A Beam Dump Experiment
111	Caltech LRL, NAL	Tollestrup	Proposal to Study $\pi^- p \rightarrow \pi^0 n$ and $\pi^+ p \rightarrow \eta n$ at High Energy
115	LRL	Stevenson	Search for Long Lived Particles

<u>Experiment Number</u>	<u>Institutions</u>	<u>Scientific Spokesman</u>	<u>Subject</u>
121-A	UC, Davis	Lander	30" b.c. - π^+p
125	CERN	Morrison	30" b.c. - π^-p
137	NAL, LRL, U. of Calif.	Huson	30" b.c. - π^-p .
138-I	Rochester Mich.	Ferbel	30" b.c. - pp
138-II	Michigan Rochester	VanderVelde	30" b.c. - pp
141-A	ANL	Voyvodic	30" b.c. - pp
143	BNL	Kalbfleisch	30" b.c. - π^-p
154	MIT, Brown, Ill., IIT, Johns Hopkins, Notre Dame, Rutgers, Stevens, Yale, NAL, Indiana	Pless	Feasibility Study of Proportional Chamber Hybrid Systems with 30-inch b.c.
155	LRL, Hawaii	Stevenson	Development of a Phase I External Muon Identifier (EMI) for 15' b.c.

