national accelerator laboratory FERMILAB-NAL-043

AERIAL VIEW OF THE INJECTION AREA

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The cover is a recent aerial photograph of the injection area. The Booster Galleries circle the Central Utility Plant in the foreground. Above are the Linac, Cross Gallery, and Transfer Galleries. The Main Ring is just to the right of the Cross Gallery.

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MONTHLY REPORT OF ACTIVITIES

F. T. Cole

June 30, 1970

Abstract: This report summarizes the activities of the National Accelerator Laboratory in June, 1970.

General

1. Proposals. We have received a total of 76 proposals for the first round of experiments at the Laboratory. A list of titles and authors is appended to this report. The full proposals are available in the NAL Library.

We are analyzing these proposals in preparation for the meeting of the Program Advisory Committee in August. Two new members have been added to that committee, Prof. D. D. Reeder of the University of Wisconsin and Prof. T. B. W. Kirk of Harvard University.

2. Laboratory Staff. The Laboratory now has 690 employees, including 152 engineers and scientists. These numbers reflect the steps that have been taken to slow the rate of growth of the staff.

3. Construction

(i) Booster. The Booster building was completed and occupied by the Laboratory on June 17. It is shown on the cover and from a different angle in Fig. 1.

(ii) Cross Gallery. The Cross Gallery was completed and occupied on June 20. It can also be seen on the cover and in Fig. 1. Work is going on to complete the interior of the Control Room under a supplemental agreement. This work can be seen in Fig. 2.

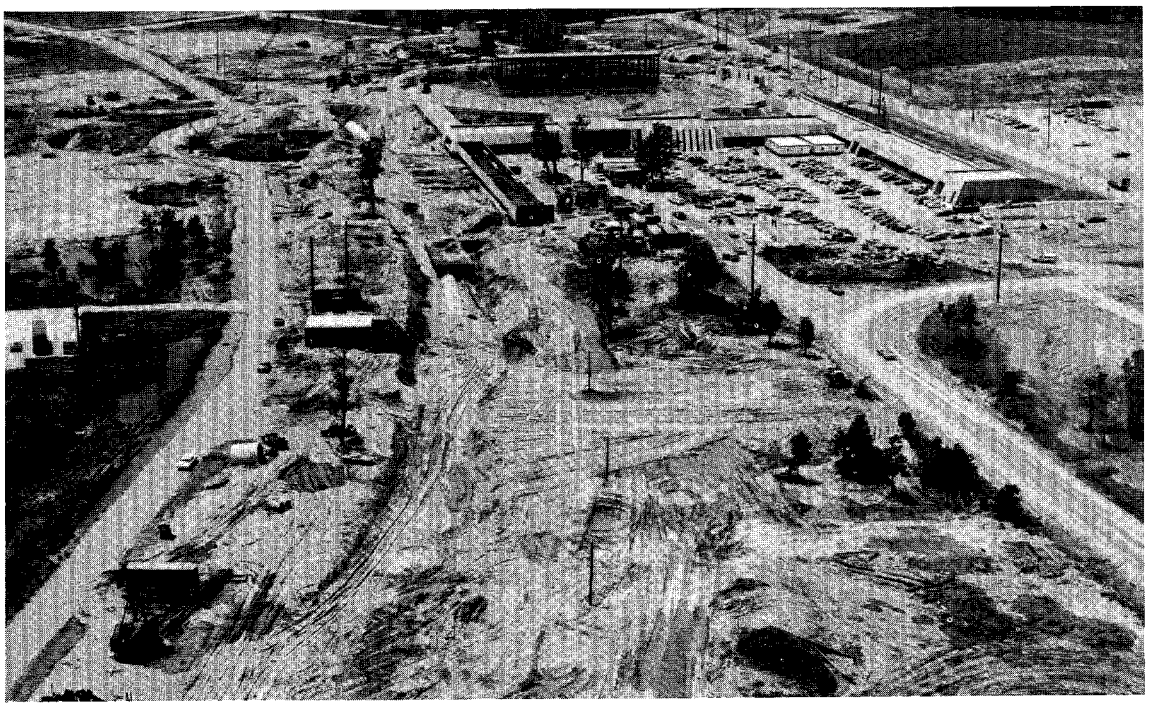

Fig. 1. A low-altitude view of the injection area. The Proton Beam Enclosure will emerge from the Transfer Hall just to the right of the tunnel. The first Service Building can be seen between the tunnel and the Ring Road.

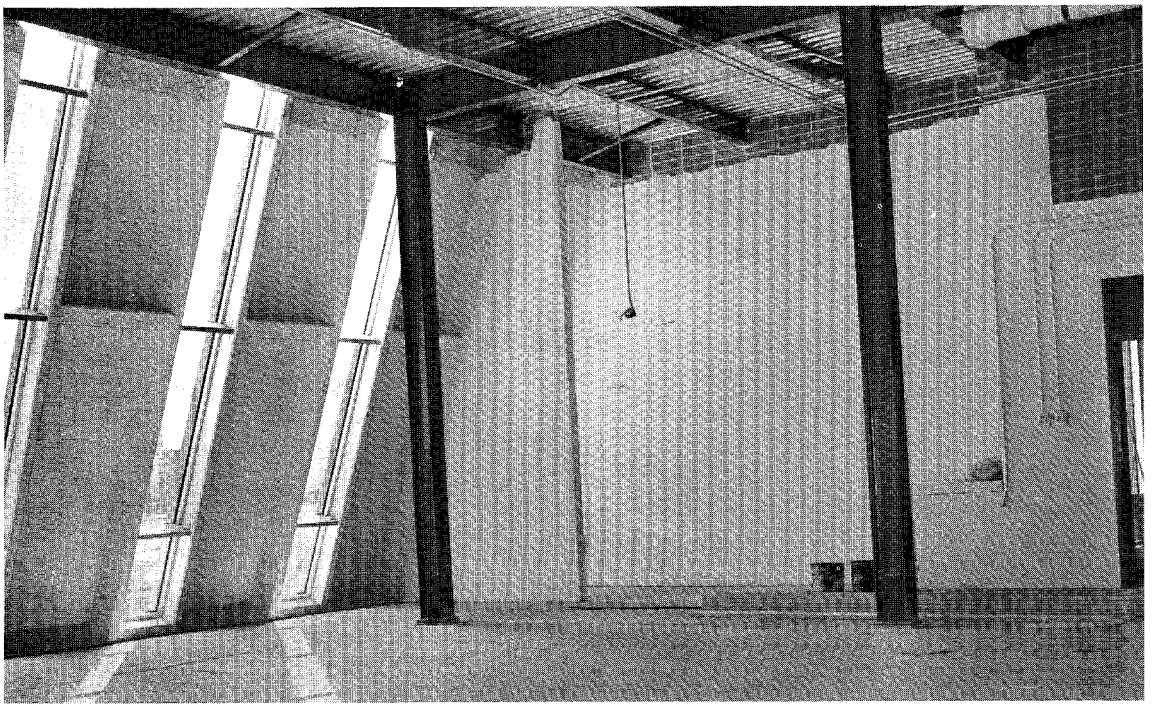

Fig. 2. The Control Room under construction.

(iii) Industrial Buildings. The second Industrial Building was completed and occupied on June 23. Some area paving is still in progress and the contract is 99% complete.

(iv) Main Accelerator

(a) Phase I. This contract is 80% complete. All tunnel sections have been placed and backfilling is almost completed, as can be seen on the cover and in Fig. 1. More than half of the tunnel is now being occupied by the Laboratory. The first service building, shown in Fig. 3, is well along. The Transfer Hall will be occupied in the near future.

Fig. 3. The first Service Building, seen from the fill on top of the tunnel.

(b) Phase II. Excavation and floor slab have been finished well into Superperiod D, more than halfway around the ring from the injection point. Tunnel sections have been placed through Superperiod B. Work is also proceeding on the RF Building in Straight Section F. This contract is 28% complete. An over-all view of the work is given in Fig. 4.

Fig. 4. An aerial view of the Laboratory, looking northeast. The injection area is at the left. The Laboratory Village is at top right. The diagonal line intersecting the highway toward the bottom is an abandoned railroad, now preserved as part of the "Prairie Path."

(v) Central Utility Plant. Roof decking has been completed. Work is in progress on installation of equipment and on treatment of the bed of the cooling pond, filling of which will begin in July. Figure 5 shows this work. The contract is 36% complete.

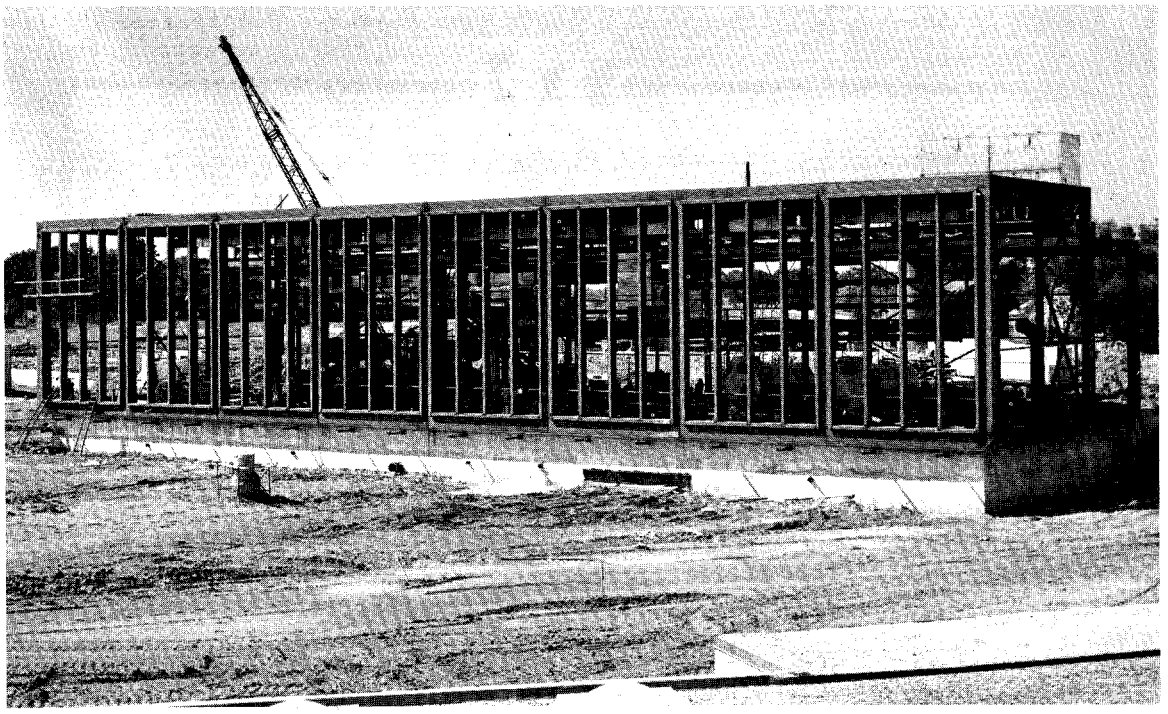

Fig. 5. The Central Utility Plant and Booster cooling pond.

(vi) Master Substation. Equipment installation is proceeding, as seen in Fig. 6. The contract is 54% complete.

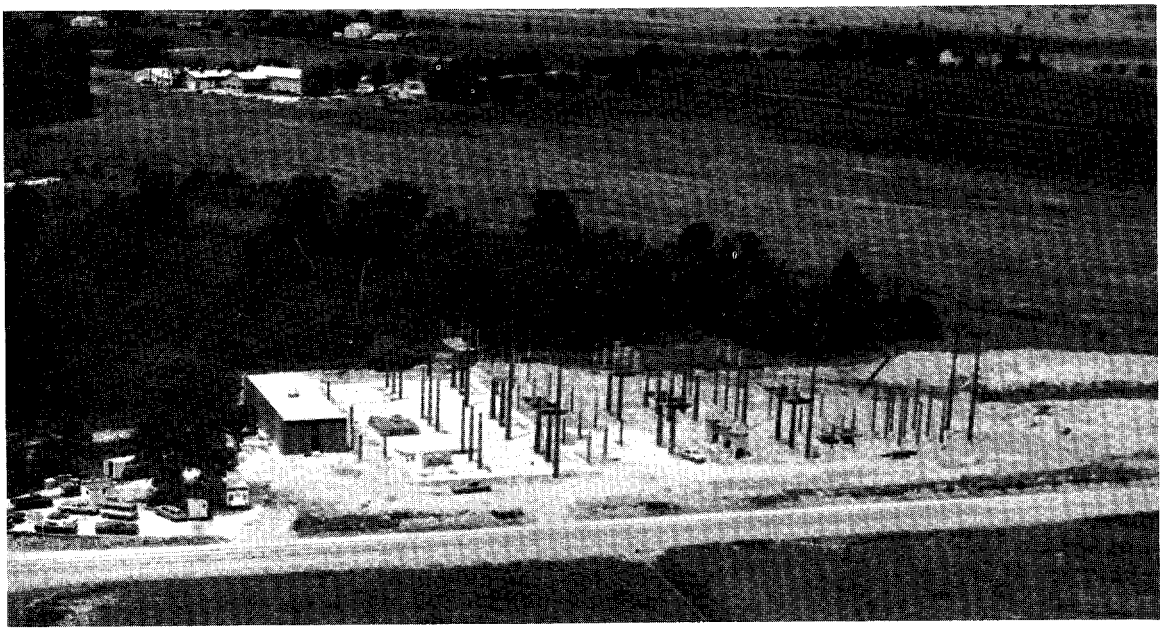

Fig. 6. The Master Substation from the air. The main power line will come from the right. In the background is the farm used as working space by DUSAF.

Work has also begun on the 345-kV power line from the Commonwealth Edison line at the northeast corner of the site to the Master Substation.

Bids were received in June on the Proton Beam Enclosure. The low bidder is the R. Rudnick Co. of Chicago. A contract for $329,000 will be let to this company in the next few days. The contract will contain a number of options for further work to extend the proton beam enclosure toward target-area 2.

Linac

1. Tanks. Some drift tubes in Tank 2 became misaligned as it was moved into its permanent position. These misalignments have been corrected and final adjustments of the rf fields are in progress. All drift tubes have been installed and fields adjusted in Tank 3, which will be moved to its permanent position July 6. Tanks 4 and 5 have been assembled and will be taken to the permanent building early in July. The three sections of Tank 6 are on hand. All sections of the final three tanks (7, 8, and 9) will be delivered to the Laboratory in July.

2. RF Systems. System 2 has been operated at over 6 megawatts into a dummy load. System 3 is now being tested, and system 4 is ready for tests. The remaining systems are in various stages of installation. The problem of late delivery of filament power supplies has been overcome; three units have now been received. All rf equipment is schedules for delivery by the end of July.

Booster

1. Magnet System. Power tests have been started on the first ring magnet power supply, which is installed and connected to two girder assemblies in

the tunnel. Girders are now being partially assembled in the West Chicago facility. Magnets are added at the Laboratory.

A total of 16 magnets has been built at the Laboratory or received from vendors. Equipment installation in the galleries is proceeding, as can be seen in Fig. 7.

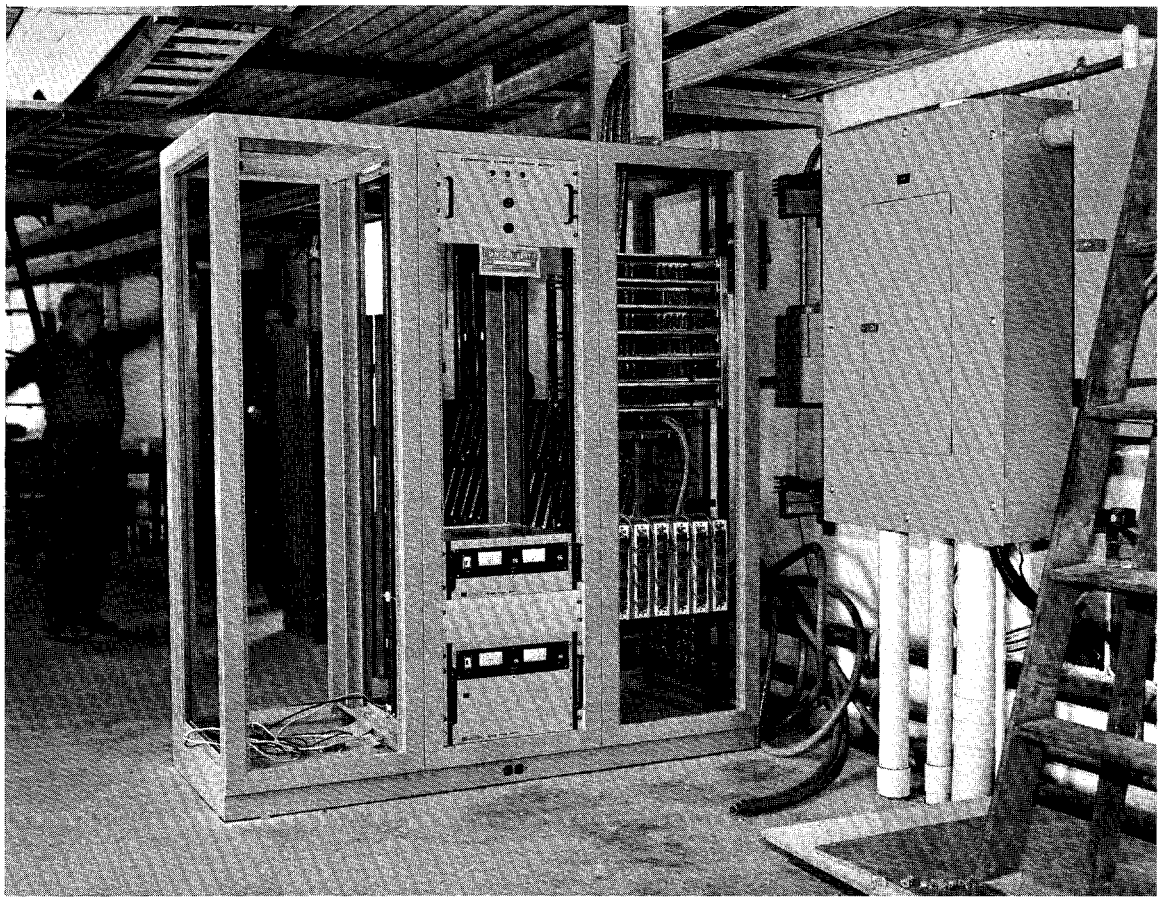

Fig. 7. Equipment being installed in the West Booster Gallery.

2. 200-MeV Transport and Analysis. Approximately three-fourths of the magnets in the Analysis Area are in place and installation of vacuum pipes, wiring, and plumbing is progressing rapidly. Power tests on the injection septum have been successfully completed and stray-field measurements are beginning. Computer-assisted operation of the 200-MeV transfer system is expected by August 1.

Main Accelerator

1. Production. More than 100 inner coils have been produced at the West Chicago facility. The production rate is now 22 per week, 2 more than the goal. In total, 70 magnets have been assembled. Assembly and testing is now taking place in the first Industrial Building. Magnetic characteristics of individual magnets are now being used to sort the magnets for installation.

2. Installation. Surveying for magnet bases and installation of magnet is moving along. Twelve magnet bases have been placed. There are 19 magnets in the tunnel, 8 of which are installed on bases. In addition, water-piping and power-bus installation is in progress and is completed and being tested from the Transfer Hall to beyond the first service building.

Radio Frequency

1. Booster RF System. The first production booster cavity was delivered on June 24. The second is expected in one week. The first power amplifier has also been delivered and the second is in route. There have been delays in completion of the first bias supply, but these appear to have been overcome. Delivery of the first anode power supply is expected in July.

2. Main-Accelerator RF System. A prototype main-accelerator cavity was delivered with the first booster cavity. Tests are in progress to verify the design. Negotiations are in progress with this vendor to supply main-accelerator tuners. A second prototype is being built by another manufacturer and is expected to be delivered early in July.

Radiation Physics

The Radiation-Physics Section is now carrying out courses of instruction to teach operating personnel of the accelerator sections about radiation

hazards and monitoring. In addition, the section is building prototypes of simple radiation instruments for use by other section personnel. The first neutron survey meter and dose integrator is now in operation.

A review of the Laboratory work on radiation was held on June 10 and 11 for the AEC Advisory Panel on Accelerator Radiation Safety.

Experimental Facilities

The 1970 Summer Study began June 22. The participants have been treated to a series of talks describing the work at the Laboratory. They are now dividing into working groups to consider the experimental arrangements at the ends of the beam lines. Part of the input for this work is the proposals received by the Laboratory.

A concentrated design effort is being made to study the problem of muon "groundshine," in Experimental-Area 1, that is, muons that reach the detector by scattering around the dense iron shield. It is expected that Title I design on target-area 2 will be completed by July 22.

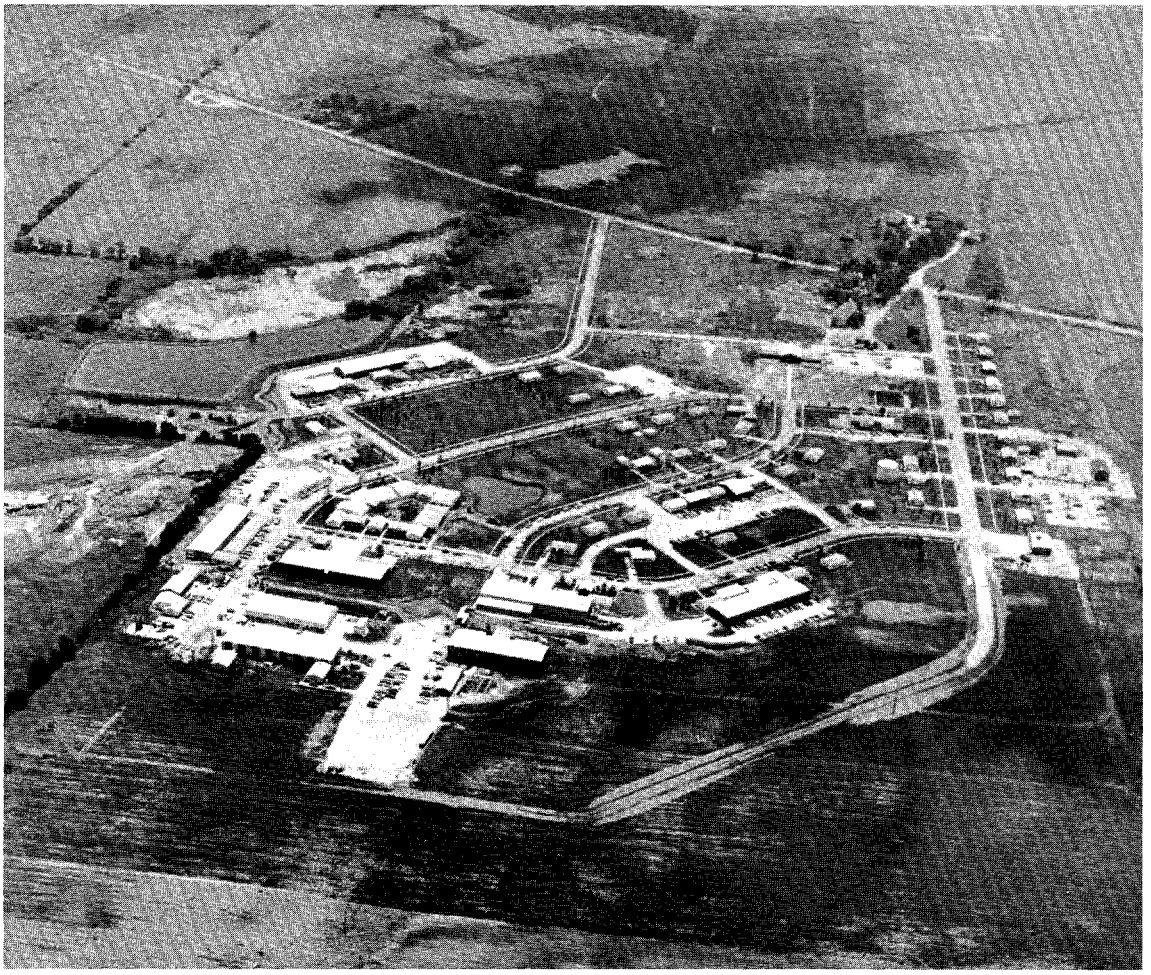

Fig. 8. An aerial view of the Laboratory Village, looking south, showing its development.

APPENDIX. LIST OF PROPOSALS RECEIVED

1. Preliminary Version of a Proposal for Neutrino Scattering

   D. Cline, A. K. Mann, and C. Rubbia

2. Preliminary Proposal to Study Multiparticle p-p and π^--p Interactions from 75 to 200 GeV/c (and higher momenta as soon as they have become available)

   University of Maryland High-Energy Physics Group and G. A. Snow

3. Proposal for a Search for Magnetic Monopoles at NAL

   L. W. Alvarez, R. R. Ross, R. D. Watt, and P. H. Eberhard

4. Neutron-Proton Diffraction Scattering and Neutron Total Cross Sections Up to 200 GeV

   M. J. Longo, L. W. Jones, O. E. Overseth, and B. Cork

5. Muon-Proton Inelastic Scattering

   B. Dieterle, W. Lakin, F. Martin, M. Perl, E. Petraske, J. Tenenbaum, W. Toner, and T. Zipf

6. 200-GeV Proton-Proton Elastic Scattering at High Transverse Momentum

   L. G. Ratner, A. K. Krisch, J. B. Roberts, and K. M. Terwilliger

7. A Proposal to Measure $\pi^{\pm}$p and p-p Differential Elastic Scattering Cross Sections From 50 to 170 GeV/c

   C. Akerlof, P. Caldwell, D. Meyer, K. Stanfield, R. Lundy, D. Rust, C. Ward, D. Yovanovitch, W. Baker, D. Eartly, K. Pretzl, S. Pruss, and A. Wehmann

8. Experiments in a Neutral Hyperon Beam

   R. H. March, L. G. Pondrom, and O. E. Overseth

9. Proposal for a High-Energy Neutrino Experiment in the NAL 30 m^3 H_2, D_2 Bubble Chamber

   R. Cence, F. Harris, M. Peters, V. Peterson, D. Yount, S. Meyer, M. Alston-Garnjost, R. Birge, G. Goldhaber, J. Kadyk, S. Parker, M. L. Stevenson, and G. Trilling

10. Backward Pion-Proton Elastic Scattering

    W. F. Baker, D. P. Eartly, K. P. Pretzl, S. M. Pruss, and A. A. Wehmann

11. Search for Fast Particles Produced at Large Lab Angles at NAL

    T. K. E. Alvager, J. B. Westgard, W. J. Beam, W. T. Chu, Y. S. Kim, and N. W. Kwak

12. A Study of Neutron-Proton Charge-Exchange Scattering in the Momentum Range 50-200 GeV/c

    N. W. Reay, K. Reibel, T. A. Romanowski, N. R. Stanton, M. A. Abolins, M. T. Lin, G. A. Smith, K. W. Edwards, J. S. Fitch, and C. J. Rush

13. Ionization Spectrometer Development and Calibration

    V. K. Balasubrahmanyan, J. F. Ormes, T. Bowen, R. W. Huggett, T. A. Parnell, and K. Pinkau

14. Proposal to Study Inelastic High-Energy Proton-Proton Collissions in the Diffractive Region

    P. Franzini, S. Zubarik, Juliet Lee-Franzini, J. Cole, and P. Cowell

15. Proposal for a Measurement of the Momentum Dependence of the Difference in Forward Scattering Amplitudes of K and $\overline{K}$

    W. Carithers, D. Nygren, J. Steinberger, N. Gelfand, K. Kleinknecht, and H. Wahl

16. P-P Elastic and Inelastic Scattering at Small Momentum Transfer

    A. R. Clark, T. Elioff, A. C. Entis, R. C. Field, D. Keefe, L. T. Kerth, R. C. P. Sah, W. A. Wenzel, and graduate students

17. $\overline{p}$d Interactions from 20 to 60 GeV/c

    J. M. Bishop, D. O. Huwe, B. G. Reynolds, and H. L. Yarger

18. Proposal to Study the Reactions $p + p \rightarrow p + (p + \pi^+ + \pi^-)$ $p + (n + \pi^+)$ at 200 and 500 GeV

    W. W. Ash, D. C. Cheng, D. Coyne, G. K. O'Neill, G. Goggi, and D. Scannicchio

19. A Cerenkov Counter Search for Monopole Production by 200-BeV Protons
    A Cerenkov Counter Search for Monopole Production by 100-BeV Muons

    D. R. Tompkins and R. E. Williams

20. A Study of Elastic Neutrino Scattering Using a Deuterium Bubble Chamber

    M. M. Block

21. Neutrino Physics at Very High Energies

    F. Sciulli, B. Barish, W. Ford, P. Oddone, C. Peck, and A. Maschke

22. Experimental Proposal to the NAL for a Search for Multigamma Events From Magnetic Monopole Pairs

    G. B. Collins, J. R. Ficenec, W. P. Trower, J. Fischer, and S. Shibata

23. Inclusive Pion-Proton Scattering

    R. W. Williams, J. E. Rothberg, V. Cook, D. M. Wolfe, K. K. Young, A. Schenck, L. Sompayrac, and H. Romer

24. Measurement of Inelastic Compton Scattering

    D. O. Caldwell, V. B. Elings, A. J. Greenberg, B. N. Kendall, R. J. Morrison, and F. V. Murphy

25. Measurement of the Total Photoabsorption Cross Section on H, D, C, Cu, and Pb for Photon Energies from 26 to 125 GeV

    D. Caldwell, V. Elings, A. Greenberg, B. Kendall, R. Morrison, and F. Murphy

26. High Momentum Transfer Inelastic Muon Scattering and Test of Scale Invariance at NAL

    K. W. Chen and L. N. Hand

27. Proposal to Study the Small Angle Neutral Beam Using a V Spectrometer

    J. Rosen, T. Ferbel, B. Gobbi, S. Shapiro, P. Slattery, and B. Werner

28. Search for Heavy Leptons; Study of Coulomb-Diffraction Dissociation of Neutrinos; Measurement of the Charge Radius of the ν_μ and the Study of Deep Inelastic ν_μ Scattering in a Ne Bubble Chamber at NAL

    A. Benvenuti, U. Camerini, W. Fry, R. March, and H. W. Wachsmuth

29. Proposal for μP Scattering Experiment at NAL

    T. Kirk, F. M. Pipkin, J. Russell, M. Tannenbaum, R. Wilson, and J. Sanderson

30. Neutral Kaon Regeneration in Liquid Hydrogen From 40 GeV to 200 GeV

    T. B. W. Kirk, J. E. Pilcher, L. Verhey, R. Wilson, and T. L. Collins

31. Proposal to Investigate $\bar{\nu}_\mu$ Interactions in Hydrogen at NAL

    Bubble Chamber Groups from Argonne National Laboratory and Carnegie-Mellon University and M. Derrick

32. Test and Calibrate a Large NaI(Tl) Tanc Detector and to Measure Neutral Hadron Total Cross Sections

    R. Hofstadter, J. F. Crawford, E. B. Hughes, and R. F. Schilling

33. Preliminary Proposal to Measure the Hadrons in Muon-Proton Inelastic Scattering at the National Accelerator Laboratory

    N. E. Booth, L. W. Mo, W. Selove, and L. C. Teng

34. Nuclear-Electromagnetic Cascade Development Study (Ionization Spectrometer Development)

    R. W. Huggett, W. V. Jones, K. Pinkau, and W. K. H. Schmidt

35. A Proposal to Study Resonance Production in $\pi^- p \rightarrow X^- p$ at 40 to 80 GeV/c

    R. Abrams, S. Bernstein, H. Goldberg, S. Margulies, D. McLeod, and J. Solomon

36. A Proposal to Study Small Angle p-p Scattering at Very High Energies

    D. Gross, H. Jostlein, A. Melissinos, L. Purser, R. A. Carrigan, J. Sculli, R. Yamada, T. Yamanouchi, and R. Cool

37. Multibody Final States in pp Collisions Up to 500 GeV

    E. Malamud, D. Gordon, J. Lach, P. Schlein, and W. Slater

38. Production of W's and Study of Deep Inelastic Reactions by Very High Energy Neutrinos

    Y. Cho, L. Hyman, T. Romanowski, O. Fackler, D. Frisch, M. Atac, D. Carey, T. Collins, Y. Kang, Q. Kerns, F. Nezrick, A. Roberts, J. Sauer, R. Shafer, R. Stefanski, D. Theriot, T. Toohig, J. Walker, J. Keren, S. Meyer, D. Miller, W. Cleland, and E. Engels

39. Proposal for the Use of a Rapid Cycling Bubble Chamber at NAL

    W. D. Walker, A. R. Erwin, M. A. Thompson, C. Mistretta, J. D. Prentice, T. S. Yoon, E. C. West, D. Carpenter, L. Fortney, C. Rose, and M. Binkley

40. Diffractive Process in $\pi^- p$ Interactions at 100 GeV/c

    V. E. Barnes, D. D. Charmony, R. S. Christian, J. A. Gaidos, A. F. Garfinkel, L. J. Gutay, S. Lichtman, F. J. Loeffler, R. L. McIlwain, D. H. Miller, T. R. Palfrey, R. B. Willmann, D. Cords, J. Lamsa, K. Paler, K. Rangan, and J. H. Scharenguivel

41. Very High Energy Proton Proton Interactions: Exploratory Survey in a Bubble Chamber

    F. J. Loeffler, V. E. Barnes, D. D. Carmony, R. S. Christian, J. A. Gaidos, A. F. Farfinkel, L. J. Gutay, S. Lichtman, R. L. McIlwain, D. H. Miller, T. R. Palfrey, R. B. Willmann, D. Cords, J. Lamsa, K. Paler, K. Rangan, and J. H. Scharenguivel

42. Neutrino Interactions in the Deuterium-Neon 14 Foot Double Bubble Chamber

    V. E. Barnes, D. D. Carmony, R. S. Christian, J. Gaidos, A. F. Garfinkel, L. J. Gutay, S. Lichtman, F. J. Loeffler, R. L. McIlwain, T. R. Palfrey, R. B. Willmann, D. Cords, J. Lamsa, K. Paler, L. Rangan, and J. H. Scharenguivel

43. Proposal to Study Single Meson Production in Meson Nucleon Interactions at 50 and 100 GeV/c

    Purdue High Energy Physics Group and D. H. Miller

44. Proposal to Study Neutrino Interactions with Protons and Neutrons Using the 14-Foot Bubble Chamber at NAL

    B. Roe, D. Sinclair, J. VanderVelde, W. Fowler, R. Hanft, R. Huson, Y. Kang, J. Lach, and F. A. Nezrick

45. Proposal to Study Neutrino Interactions with Protons Using the 14-Foot Bubble Chamber at NAL

    R. Roe, D. Sinclair, J. VanderVelde, W. Fowler, R. Hanft, R. Huson, Y. Kang, J. Lach, and F. A. Nezrick

46. A Study of High Energy π^- Proton Interactions with the NAL 14-Ft Bubble Chamber

    W. B. Fowler, R. Hanft, F. R. Huson, J. Lach, and F. Nezrick

47. Diffraction Dissociation and Elastic Scattering Processes with Incident Protons and Negative Pions in the 200 GeV/c Region

    B. T. Feld, R. I. Hulsizer, V. Kistiakowsky, I. A. Pless, F. Triantis, J. Wolfson, and R. K. Yamamoto

48. A Measurement of the Intensity and Polarization of Muons Produced Directly by the Interactions of Protons with Nuclei

    H. Kasha, R. K. Adair, L. W. Smith, L. B. Leipuner, R. C. Larsen, and K. W. Chen

49. The Electromagnetic Form Factor of the Charged Pion From $\pi^+ e^-$ Elastic Scattering

    N. N. Biswas, N. M. Cason, V. P. Kenney, J. A. Poirier, O. R. Sander, W. D. Shephard, and T. E. Toohig

50. Large Angle $\pi^{\pm}$-P, $K^{\pm}$-P, and $P^{\pm}$-P Elastic Scattering at High Energies

    P. Mazur, J. Orear, J. Peoples, and R. Rubinstein

51. Mass Spectrum and Decay Modes for Bosons in the 2.0 to 8.6 GeV/c^2 Mass Range

    D. Bowen, D. Earles, W. Faissler, D. Garelick, M. Gettner, B. Gottschalk, G. Lutz, E. Shibata, E. von Goeler, R. Weinstein, H. R. Bleiden

52. A Proposal to Study Particle Production Spectra and Multiplicities in High Energy Hadron-Hadron Collisions, and for a Beam Survey and Quark Search

    E. W. Beier, D. L. Kreinick, and H. Weisberg

53. Search for the Intermediate Boson, Lepton Pair Production, and a Study of Deeply Inelastic Reactions Utilizing High Energy Neutrino Interactions in Liquid Neon

    C. Baltay, R. B. Palmer, and N. P. Samios

54. Quasi-Two-Body Reactions at 50-200 GeV

    A. Dzierba, R. Gomez, J. Pine, Y. Nagashima, P. Schlein, W. Slater, and E. Malamud

55. Proposal to Study $\pi^- p \to \pi^0 n$ and $\pi^- p \to \eta n$ at High Energy

    A. V. Tollestrup and R. L. Walker

56. Measurement of Total Cross Sections on Hydrogen and Deuterium

    R. L. Cool, S. Segler, A. S. Carroll, T. F. Kycia, K. K. Li, D. N. Michael, P. M. Mockett, and R. Rubinstein

57. Behavior of High Energy Elastic Scattering and Total Cross Sections for $\pi^{\pm}$-p, $K^{\pm}$-p, p-p, and $\bar{p}$-p

    K. J. Foley, W. A. Love, S. J. Lindenbaum, S. Ozaki, E. D. Platner, A. C. Saulys, E. H. Willen, R. D. Ehrlich, V. Hughes, D. C. Lu, S. Mori, M. E. Zeller, and R. Yamada

58. Proposal to Study Multiparticle Production with NAL Bubble Chamber

    T. W. Morris, R. S. Panvini, A. M. Thorndike, E. O. Salant, M. S. Webster, J. W. Waters, A. Ervin, and M. A. Thompson

59. A Proposal to Study the Reaction $\pi^- p \rightarrow \pi^- \pi^+ n$ at the National Accelerator Laboratory

    L. Holloway, B. Huld, L. J. Koester, Jr., D. Mortara, and J. H. Smith

60. Very High Energy K_L^o Experiments at NAL

    R. Brown, M. Gormley, J. H. Smith, and A. Wattenberg

61. A Proposal to Measure Polarization in pp, $\pi^- p$, and $\pi^+ p$ Elastic Scattering at 50, 100, and 150 GeV/c at the National Accelerator Laboratory

    D. Hill, P. Koehler, T. B. Novey, A. Yokosawa, H. Spinka, C. Brown, M. E. Law, C. Lichtenstein, F. Pipkin, J. Sanderson, O. Chamberlain, G. Shapiro, H. Steiner, G. Burleson, G. A. Rebka, R. Ehrlich, V. W. Hughes, D. C. Lu, S. Mori, P. A. Thompson, M. E. Zeller, D. Eartly, and K. Pretzl

62. Study of Multiparticle Production in a Small Bubble Chamber

    J. Chapman, J. Lys, H. Ring, B. Roe, D. Sinclair, and J. VanderVelde

63. Survey of Particle Production in Proton Collisions at NAL

    M. Atac, D. Carey, T. Collins, Y. Kang, Q. Kerns, F. Nezrick, A. Roberts, J. Sauer, R. Shafer, R. Stefanski, D. Theriot, T. Toohig, and J. K. Walker

64. Hadron Spectra From High Energy Proton-Proton Interactions

    R. Diebold, L. Guerriero, R. Lanou, G. Cocconi, B. Gittelman, E. Loh, J. Friedman, H. Kendall, L. Rosenson, M. Awschalom, R. Billinge, A. E. Brenner, R. Juhala, R. Peters, A. L. Read, P. J. Reardon, J. F. Schivell, R. Shafer, and T. O. White

65. KP and $\bar{K}P$ Interactions From ~ 20-60 GeV/c in a Large Liquid Hydrogen Bubble Chamber

    D. J. Crennell, H. Gordon, K-W. Lai, P. V. C. Hough, J. M. Scarr, J. R. Albright, V. Hagopian, J. E. Lannutti, and M. S. Webster

66. Study of Low-Mass Peripheral States in a Small Triggered Bubble Chamber

    J. Chapman, J. Lys, H. Ring, B. Roe, D. Sinclair, and J. VanderVelde

67. Search for Baryon Resonances Up to 10 GeV Mass Produced in $p + p \rightarrow P + MM$ with a Resolution of ±25 MeV

    K. Cohen, W. E. Ellis, R. Esterling, B. Maglic, J. Norem, C. Rosenberg, F. Sannes, M. Silverman, K. Vosburgh, and G. Cvijanovich

68. Multiparticle Production in π-p Collisions at 100 GeV

    H. L. Anderson

69. Elastic Scattering of the Hadrons

    M. Atac, C. Dolnick, P. Gollon, J. Lach, J. MacLachlan, A. Roberts, R. Stefanski, D. Theriot, H. Kraybill, J. Marx, J. Sandweiss, and W. Willis

70. Study of Lepton Pairs From Proton-Nuclear Interactions; Search for Intermediate Bosons and Lee-Wick Structure

    W. Lee, L. M. Lederman, J. Appel, M. Tannenbaum, L. Read, J. Sculli, T. White, and T. Yamanouchi

71. A Measurement of the Pion Radius

    C. Buchanan, D. Drickey, D. Rudnick, P. Shepard, D. Stork, H. Ticho, and A. Wehmann

72. Experimental Proposal to NAL Quark Search

    R. K. Adair, H. Kasha, R. C. Larsen, L. B. Leipuner, and L. S. Smith

73. Proposal to Measure Two Body Elastic and Quasi-Elastic Scattering at High Energies

    R. L. Anderson, D. Gustavson, J. Johnson, I. Overman, D. Ritson, B. H. Wiik, and R. Weinstein

74. Proposal to National Accelerator Laboratory for a Search for Magnetic Monopoles

    R. L. Fleischer, H. R. Hart, Jr., G. M. Comstock, and E. L. Hubbard

75. A Proposal to Search for Fractionally Charged Quarks

    J. Sculli, T. White, and T. Yamanouchi

76. Search for Magnetic Monopoles Produced at NAL

    R. A. Carrigan, Jr. and F. A. Nezrick