

NALREP



Monthly Report of the Fermi National Accelerator Laboratory

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N. Stiening, Assistant Editor

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Contributions and comments should be addressed to the Program Planning Office. Requests for copies should be addressed to the Publications Office.

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THE COVER: View of the Fermilab Library, located on the third floor in the Central Laboratory. The staff, (l-r) J. Kelley, M. West, and Librarian R. Thompson, work at the desks in the south crossover. Behind them, in the west wing, are the reference and the book collections. Reading tables are placed throughout the area.



The Bubble Chamber Hadron Physics Program	4
The Fermilab Library	7
Notes and Announcements	
A Review of Forthcoming PAC-Related Meetings . . .	13
Preliminary Plans for an Aspen Summer Study . . .	15
Facility Utilization Summary -- November 1975	17
Proposals Received During October and November 1975	23
Index to the 1975 Issues of NALREP	25
Dates to Remember	

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

THE BUBBLE CHAMBER HADRON PHYSICS PROGRAM

At a symposium at Fermilab on September 18 and 19, 1975, members of the bubble chamber physics community presented results and future plans for the study of hadron interactions in the 30-inch and 45-foot bubble chambers. A panel of high energy physicists was in attendance throughout the symposium with the responsibility of preparing a report for the Director and for the Program Advisory Committee. That report summarized the discussions at the symposium and contained recommendations on future priorities for bubble chamber hadron physics research at Fermilab. The panel members included:

| | |
|----------------------|---|
| M. L. Good, Chairman | State University of New York at Stony Brook |
| D. Cline | University of Wisconsin |
| R. Lander | University of California at Davis |
| D. Miller | Northwestern University |
| T. O'Halloran | University of Illinois |
| J. Rosner | University of Minnesota |
| J. Sandweiss | Yale University |
| G. Trilling | Lawrence Berkeley Laboratory. |

A discussion of the report of the symposium panel was a principal agenda item at the meeting of the Program Advisory Committee at Fermilab on November 20 and 21, 1975. At the conclusion of the discussion the Committee went on record as endorsing the analysis and recommendations contained in the symposium panel report. A brief review of some of the features of the symposium discussion follows, as well as an outline of future priorities for the bubble chamber hadron physics program.

Considerable progress has been made in the past few years both at Fermilab and elsewhere in the study of multi-particle production at high

energies. To a large extent these contributions, particularly for high multiplicity reactions, have owed a great deal to the 4π geometry and low systematic errors of bubble chambers. Data from early runs of the bare 30-inch bubble chamber at Fermilab have contributed much to this progress.

A number of new physics results from later runs of the 30-inch chamber using a hybrid system to improve downstream particle detection were noted.

These included:

- A. Strong "leading cluster" effects in which the charge transferred across the largest rapidity gap tends strongly to be zero and the charge multiplicity on either side of this gap tends to be odd.
- B. Like-particle correlations which are particularly strong at $\Delta y = \Delta\phi = 0$, possibly indicating the importance of Bose statistics.
- C. Charge and transverse momentum correlations as a function of rapidity.
- D. Inclusive ρ production studies with improved resolution and statistics.
- E. Improved studies of double Pomeron exchange made possible by increased statistics on the reaction $pp \rightarrow pp\pi^+\pi^-$.
- F. Consistency of double diffraction in the reaction $pp \rightarrow pp\pi^+\pi^-\pi^+\pi^-$ with Pomeron factorizability.
- G. Initial studies of the peak near $x_{\pi} = 1$ in the inclusive reaction $\pi^- + p \rightarrow \pi^- + X$ at current energies. (This peak corresponds to excitation of relatively low-mass N^* 's; this excitation proceeds in a manner roughly similar to that induced by protons.)

These results have contributed to an emerging picture of cluster emission with short range correlations. A truly quantitative theory corresponding to this picture is still lacking, however.

Looking to the future, the bubble chamber technique is unlikely to be able to be useful for resolving questions involving submicrobarn cross sections. At the level $\sigma \gtrsim 10 \mu\text{b}$ there are several topics for which the bubble chamber still is an ideal tool, especially if considerable attention is paid to particle identification. Examples include:

- A. How do baryon number-, strangeness-, and charge-transfer processes behave at high energies? Specifically, how mobile in rapidity are these quantum numbers?
- B. How do correlations behave between pairs of particles other than $\pi\pi$?
- C. What is the behavior of neutral particles?

Proposals were presented at the symposium for the upgrading of the spectrometer system associated with the 30-inch bubble chamber. Improvements proposed included the addition of detectors to do secondary charged particle identification, apparatus to measure the directions and energies of π^0 's near the forward direction, and the addition of a downstream magnet to improve momentum resolution.

On the basis of the symposium presentations and our subsequent discussions with the Program Advisory Committee, we believe that a capability for external particle identification coupled with the 30-inch bubble chamber would provide an impressive facility for the exploration of interesting but not necessarily rare classes of hadronic reactions well suited for the bubble chamber technique. Studies of $\bar{p}p$ annihilation would be greatly aided in this manner. In addition, we believe that external photon and π^0 measurements are important.

We now intend to implement the above by exploring various possibilities for developing a detector, capable of particle identification, behind the 30-inch chamber. However, in the foreseeable future we will not plan to install a downstream magnet behind the chamber as we do not feel that a pressing need exists for the further resolution which would thereby be provided. We intend to consider carefully possible efficiencies which could be gained by having exposures with incident particles other than protons and pions carried out in enriched beams, i. e. , positive beams enriched with K^+ 's and negative beams enriched with \bar{p} 's. We shall also consider the possibility of maximizing physics output by supporting high statistics runs at particular energies in contrast with small survey runs over many energies.

We are currently attempting simultaneous picture taking for the neutrino program and the hadron physics program with the 15-foot bubble chamber, exploiting the multi-pulsing capability of that chamber. It is very likely that the 15-foot chamber will provide an almost parasitic, long term capability for utilizing the bubble chamber technique to study hadron physics, and we intend to pursue aggressively the multi-pulsing mode of operation of the 15-foot chamber to make it possible to perform hadron and neutrino experiments at the same time.

For the near future, we do not foresee making significant changes in the overall fraction of time accorded to the 30-inch bubble chamber program. We shall strive to increase our rate of taking pictures by improving the operating efficiency of the 30-inch bubble chamber within the present budgetary limits. Our present annual commitment to the 30-inch bubble chamber

is considerable, and we plan to keep an eye on this program and to review it again in about two years to be sure that it remains competitive with other research techniques.

Some preliminary conversations have been carried out with CERN to explore the desirability of a future collaborative arrangement for the operation of a rapid-cycling bubble chamber spectrometer facility at Fermilab which would provide film for both American and European groups interested in this type of physics. The discussions to date have been quite preliminary, and it is still premature to foresee what their outcome will be. However, in carrying forward these discussions we shall insist that any future collaboration should have within it the capability for achieving a substantial increase in the physics productivity per unit time. We expect to maintain the support of the United States program at least its present level. We furthermore are setting a guideline that the implementation of the 30-inch bubble chamber program should not involve an investment larger than 10% of the total number of protons available for general use.

As announced in the November issue of NALREP, a meeting of the Bubble Chamber Subcommittee of the Program Advisory Committee will be held at Fermilab on January 15 and 16, 1976. The Subcommittee will consider the deferred and unconsidered proposals for bubble chamber hadron physics and will formulate recommendations which will be discussed at the next meeting of the Program Advisory Committee, March 4 and 5, 1976.

Reported by T. Groves



1
2
3
4

5
6
7
8

THE FERMILAB LIBRARY

Located at the south end of the Central Laboratory on the third floor, the Fermilab Library is arranged in three general areas. Preprints, proposals, and journals are grouped on the east side, with a copier and the Publications Department close by. In the center of the Library, the journal index and reference sections occupy convenient low stacks surrounding the reference and charge desks. Book stacks occupy the west side along with the slide and photo index.

The heart of the preprint system is a card catalogue based on the Preprints in Particles and Fields listings. Filed by first author, each card indicates shelf location and publication information. Fermilab proposals, with related information such as one-page summaries and proposal status listings, are available for copying. Internal reports, as well as SLAC and CERN proposals are also available.

The 150 journals in the collection are those considered most pertinent to Laboratory work. Besides the standard physics publications, they include Journal of Physics E: Scientific Instruments, Nuclear Instruments and Methods, and Review of Scientific Instruments, all of which are related to instrumentation; several titles on cryogenics; IEEE Proceedings, Spectrum, and Transactions of selected groups; Astrophysical Journal; Medical Physics and Physics in Medicine and Biology, for use by the Cancer Therapy Facility; and Solar Energy. Back volumes of selected journals are being acquired on microfilm cassettes, as well.

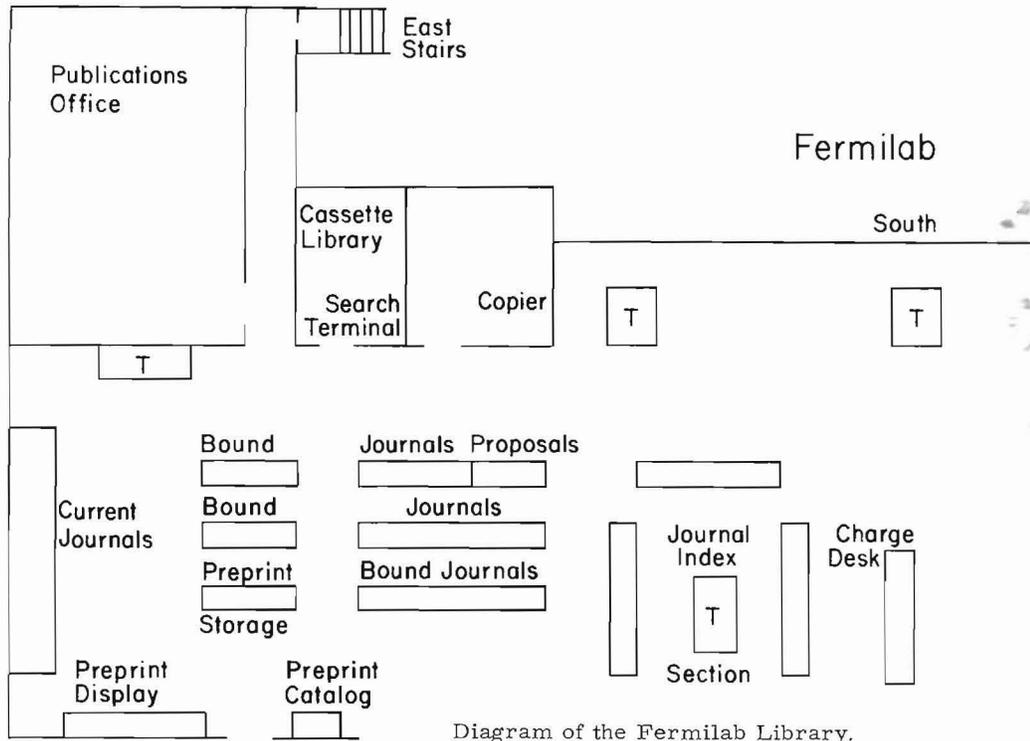
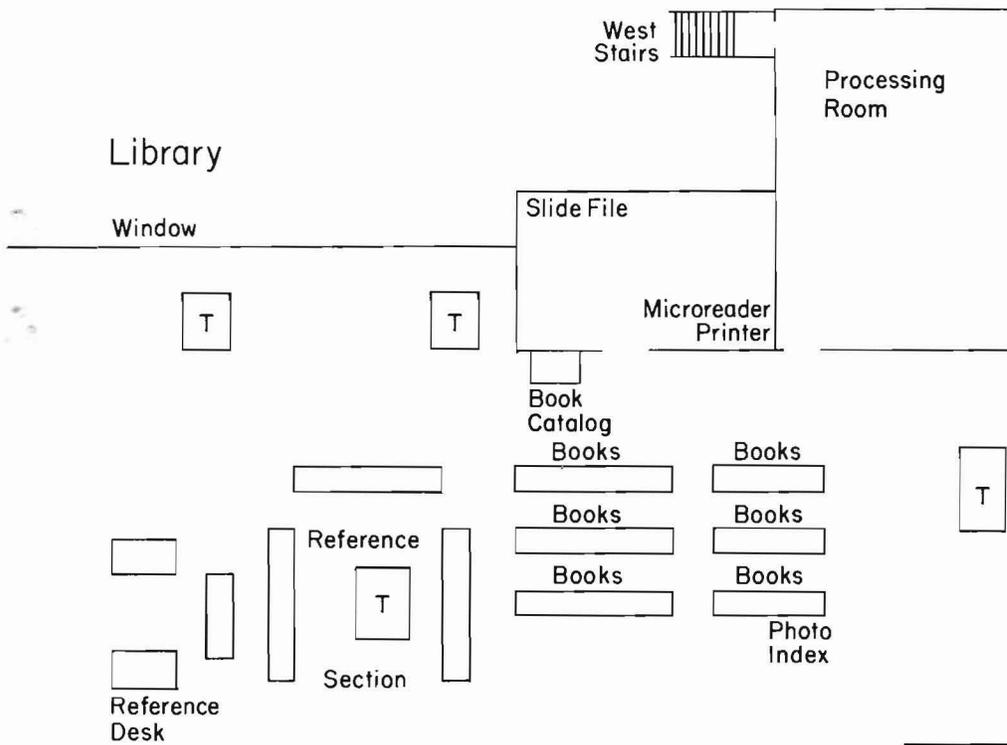


Diagram of the Fermilab Library.

Journal articles and reports are located by consulting the Index section.

High Energy Physics Index, Nuclear Science Abstracts, and Physics Abstracts are available for the physicist. For the engineer, titles include: Electrical and Electronic Abstracts, Engineering Index, and ERDA Reports Abstracts. The computer specialist can search Computer and Control Abstracts and Computing Reviews.

A terminal has just been acquired which will make possible the rapid, high-power searching of these indexes. In addition, using programs such as SLAC's, SPIRES, ERDA's RECON, Lockheed's DIALOG, and SDC's ORBIT, searches can be expanded to include Chemical Abstracts, Biological Abstracts, government reports provided by the National Technical Information Service, and the burgeoning energy literature.



Many of the recent improvements have been made possible with the support of an active Library Committee. Headed by S. Ecklund, its membership includes D. Carey, F. Cole, S. Jackson, and J. O'Meara. In consultation with the Committee, an acquisition policy has recently been defined. All publications on high energy and accelerator physics are to be acquired, supported by selected materials on theoretical, low-temperature, plasma physics, electronics, classical mechanics, mathematics, astronomy, computation, energy, and radiation cancer therapy.

Turning to the book collection, about half of it is related directly to physics, one-fifth to other sciences, and one-fifth to engineering. The proportions of books already in the Library roughly follow the subject areas outlined in the new acquisition policy.

In the reference section are to be found the usual dictionaries, encyclopedias, and directories such as American Men and Women of Science. In addition, handbooks of physics and science are to be found. There are also a substantial number of standard physics texts, such as the Feynman Lectures, Bjorken and Drell, Landau and Lifshitz, Rossi, as well as the proceedings of important conferences. As an aid in locating conference proceedings, the Library maintains a catalogue file according to the place at which each was held. For example, all conferences held in London and acquired by the Library are listed under London, by date.

For the person interested in browsing in the book section, subjects are indicated by signs on end panels and individual shelves. The Library of Congress classification system is employed. Accordingly, basic computer publications appear together in the mathematics section under QA 76. The astronomy collection, found under QB, is growing rapidly. The largest groups classed as physics include Collected Works (QC3), Physics of Particles (QC721), Accelerator Conferences (QC770), "Rochester" Conferences (QC786), Apparatus and Instruments such as bubble and spark chambers and storage rings (QC787), and Particle Interactions (QC793-4). Under technology, the large collections include Mechanical Engineering (TJ), Electrical Engineering (TK1-), and Electronics Engineering (TK7800). Of course, if a specific reference is sought, the quickest approach is to examine the catalogue file under subject, author, or title.

Since it is accessible at all hours, the Fermilab Library is designed for self service. However, the staff members, M. West, J. Kelley, and the

librarian, welcome requests for assistance during regular working hours. They are aware that in spite of their efforts to simplify the system, there still remain dark and mysterious pathways to some important tidbits of information. Please don't hesitate to ask for assistance.

Reported by R. Thompson

6

11

12

13

NOTES AND ANNOUNCEMENTS

A REVIEW OF FORTHCOMING PAC-RELATED MEETINGS. . .

The current schedule for PAC-related meetings for the period January to June, 1976, is in this issue of NALREP under "Dates to Remember." As noted before, the Bubble Chamber Subcommittee will meet on January 15 and 16 to formulate recommendations on the bubble chamber hadron physics proposals that are on hand. These recommendations will be given final consideration at the March PAC meeting.

The deadline for the receipt of material to be considered at the March PAC meeting is Friday, January 23. It is our present intention to schedule as many of the oral presentations of new proposals as possible for the Proposal Presentation Meeting on February 5 and 6. Opportunities for oral presentations at the March meeting will be very limited.

The workshop on Elastic Scattering Experiments at Large p_t , presently scheduled for April 15 and 16, is contingent upon a reasonable degree of progress with Proton-Proton Elastic #177 between now and then. Much the same comment applies to the workshop on Multiparticle Final State Experiments, tentatively scheduled for May 6 and 7. Whether or not we proceed with plans for this workshop will depend on sufficient progress being recorded for Multiparticle #110 and Hadron Jets #260.

The deadline for the receipt of material to be considered at the Extended Summer Meeting is now tentatively May 7. Opportunities for oral presentations of this material will be afforded at the two-day Proposal Presentation

Meeting on May 20 and 21. Consistent with the practice we have been following, we will not plan on having any oral presentations at the PAC meeting held June 19 through 25.

Further information about these meetings will appear in forthcoming issues of NALREP. Questions should be addressed to T. Groves in the Directors Office.

PRELIMINARY PLANS FOR AN ASPEN SUMMER STUDY . . .

The Energy Doubler/Saver project continues to progress, as more magnets are built and tested. In parallel with these developments cryogenic systems are being designed. It now seems to be an opportune time to look in detail at the expected performance of the new accelerator and to see how it will be used for particle physics research.

Early studies have highlighted the enormous value of 1000-GeV protons for extending particle physics research into higher energy regimes. Now one must make a thorough examination of possible experiments in order to determine how the Doubler/Saver might be used to best advantage. The study of real experiments in the context of the existing experimental areas will uncover many of the problems in the use of these high energy protons. From such studies will come fresh insight into the equipment and construction requirements for the existing research areas and, possibly, ideas for new areas.

This study of the utilization of the Doubler/Saver will take place at a Summer Study to be held in Aspen, Colorado, following the week-long meeting of the Program Advisory Committee. Tentative dates for the study are June 28 through July 9. More information will be available in a later issue of NALREP.

This Summer Study will be preceded by extensive preparatory work at Fermilab by personnel in the Accelerator and Research Divisions. It is hoped that interested users will help with this work so that many concepts can be explored and made available to the Summer Study participants.

FACILITY UTILIZATION SUMMARY -- NOVEMBER 1975

A major interruption in the 400-GeV high energy physics research program run which began in the latter part of July occurred on November 3, when the accelerator was shut down for five days of maintenance and development work. This marked the end of the first sustained operating period at 400 GeV. The improvement in performance during the period has demonstrated that the accelerator is capable of stable and reliable operation at that energy. During the short off-period, the major effort was to carry out a backlog of corrective and preventive maintenance, including extensive work on the electrical power distribution systems. No major improvement projects were undertaken, but many minor ones were completed. In the latter part of the month, however, the Accelerator Division was hard at work on projects to improve beam brightness and proton beam intensity in both the booster and the main ring. In addition, work was undertaken on the low-level rf system for the main ring.

Following the shut-down, the high energy physics research program was resumed immediately in the Internal Target, Meson, and Proton Areas. The Neutrino Area startup was delayed ten days to install the horn target train and to bring the 15-foot bubble chamber into operation for neutrino running. The accelerator provided slow-spilled 400-GeV beam to all experimental areas; in addition, a high intensity, fast-extracted pulse and low intensity "ping" were delivered to the Neutrino Area during the latter third of the month when the 15-foot chamber became operational. The Cancer Therapy Facility conducted test irradiations at the linac parasitically to

routine machine operation. Overall reliability of accelerator operation during the 317 hours scheduled for high energy physics research was 67%. This includes the normal start-up difficulties which follow a shut-down.

The Meson Area, which was shut down in late October for extensive maintenance and development work particularly in the M2 and M5 beam lines, was ready to receive beam when the accelerator started up on November 8. After several days of beamline shakedown, Polarized Scattering #61 and Inclusive Scattering #118A began initial setting up and testing for their experiments, while the Particle Search #397 group worked on beam tests and start-up of their apparatus. Both groups had reached the stage of preliminary data taking by the end of the month. Particle Search #357 began a smooth data-taking run after a series of incidents which delayed by over a week the start-up of the revised M2 beamline. Neutral Hyperon #8 began a parasitic data run in a position behind #357 in the M2 beam. Hadron Jets #395 tuned up the newly installed M5 beamline and then began a series of tests on a calorimeter module. K^0 Regeneration #425 installed a large liquid hydrogen target in the M4 beam and tested their apparatus first without, and later with beam. Nuclear Chemistry #81A exposed two targets in Meshall during November.

On the weekend prior to the accelerator shut down, two branches of the Proton Area were running, with Photoproduction #87A taking data in Proton East and Photon Search #95A doing some final tuning and preliminary data-taking in Proton West. When operation resumed a week later, the activity in Proton East was the same, Proton West was off to install equipment for

Particle Production #284, and Muon Search #48 was starting up, testing apparatus, and shortly thereafter, collecting data in Proton Central. This program continued through the end of the month.

The Neutrino Area was also in operation the first two days in November. Neutrino #21A ended a long data-taking run which completed the experiment; at the same time, the target exposures for Quark #276 were completed. Meanwhile, a 155,000-picture run for $\pi^+ - d @ 200 \text{ GeV}$ #295 was also completed, with the 30-inch chamber running in the quadrupole-pulsed mode. Shortly after mid-month, when the train change had been completed and the area was again prepared to receive beam, the first effort was to test beam plugs on the target train with fast spill and to bring the 15-foot chamber into operation. Initial chamber tests checked backgrounds with 400-GeV primary beam and also tested the new triad of cameras installed to take neutrino pictures. After several days of debugging, picture taking for ν/H_2 #45A was begun, while tests of double-pulsing the chamber were performed in preparation for combined neutrino-hadron operation. A "pinged beam" pulse was used to send 400-GeV diffracted protons to the chamber at the beginning of each slow spill, and the high intensity fast-extracted beam spike was directed onto the horn target at the end to provide beam for the neutrino exposure. Subsequent difficulties with the chamber expansion systems and the hadron beam power supplies limited hadron picture taking in November to a few test strips. In the meantime, Di-Muon #331 used slow-spilled beam from the horn target to produce hadrons in the N1 beamline for a study of di-muon production in their experiment, located in the Muon Laboratory. In spite of unexpected trouble with the beam, they managed to get their apparatus set

up to perform tests and take some preliminary data. Tachyon Monopole #202 turned on their apparatus after the 15-foot chamber magnetic field was available to continue their data run using cosmic rays.

At the Internal Target Area, Proton-Proton Inelastic # 321 tested the 1-mil and 3-mil warm gas jets, but were not able to take data because of high backgrounds. While awaiting additional necessary equipment to improve the vacuum, they took preliminary scattering data for reference. During the shutdown the spectrometer arm, magnets, and other major components for Proton-Nucleon Scattering # 198A/# 313 were installed and surveyed into place in the new recoil room. Since then these groups have simultaneously used the upstream rotating target to produce secondaries for testing the proportional wire chambers and other apparatus installed on their spectrometer.

The facility utilization summary for the month of November is as follows:

I. Summary of Accelerator Operations

| | <u>Hours</u> |
|--|---------------|
| A. Accelerator use for physics research | |
| Accelerator physics research | 68.5 |
| High energy physics research | 316.9 |
| Research during other use | <u>(17.7)</u> |
| Subtotal | 385.4 |
| B. Other activities | |
| Accelerator setup and tuning to experimental areas | 13.7 |
| Programmed interruption | 143.0 |
| Unscheduled interruption | 177.9 |
| Subtotal | 334.6 |
| C. Unmanned time | |
| Total | <u>720.0</u> |

II. Summaries of High Energy Physics Research Use

| | <u># of Expts.</u> | <u>Hours</u> | <u>Results</u> |
|----------------------------------|--------------------|--------------|-----------------|
| A. Counter experiments | 14 | 1929.9 | |
| B. Bubble chamber experiments | 3 | 121.4 | 55,388 pictures |
| C. Emulsion experiments | - | - | |
| D. Special target experiments | 2 | 39.7 | 5 targets |
| E. Test experiments | 1 | 41.0 | |
| F. Engineering studies and tests | 2 | 78.6 | |
| G. Other beam use | <u>3</u> | <u>129.3</u> | |
| | 25 | 2339.9 | |

III. Number of Protons Accelerated and Delivered ($\times 10^{18}$)

| | | <u>Protons</u> |
|---|-------|----------------|
| A. Beam accelerated in main ring | Total | 1.160 |
| B. Beam delivered to experimental areas | | |
| Meson Area | | 0.234 |
| Neutrino Area | | |
| Main beam (N-0) | | 0.509 |
| Bypass beam (N-7) | | 0.005 |
| Proton Area | | <u>0.313</u> |
| | Total | 1.061 |

IV. Beam Utilization by Experiment

| | <u>Hours</u> | |
|-----------------------------------|--------------|----------------------------|
| A. Meson Area | | |
| Neutral Hyperon # 8 | 37.7 | Data |
| Polarized Scattering # 61 | 233.0 | Setup |
| Nuclear Chemistry # 81A | | 2 targets |
| Inclusive Scattering # 118A | 224.3 | Setup and preliminary data |
| Particle Search # 357 | 191.8 | Data |
| Hadron Jets # 395 tests | 41.0 | |
| Particle Search # 397 | 179.6 | Setup and preliminary data |
| K ⁰ Regeneration # 425 | 99.7 | Tests |

| | <u>Hours</u> | |
|-----------------------------------|--------------|-------------------------------------|
| B. Neutrino Area | | |
| Neutrino # 21A | 39.7 | Complete |
| 15' Neutrino/H ₂ # 45A | 58.3 | 23,910 pictures |
| Tachyon Monopole # 202 | | Cosmic ray data |
| Quark # 276 | 39.7 | Complete 3 targets (partial) |
| 30'' π^+ -d @200 GeV # 295 | 37.7 | 31,478 pictures |
| Di-Muon # 331 | 74.3 | Preliminary data |
| 15' p-p @400 GeV # 341 | 25.4 | Test strips |
| C. Proton Area | | |
| Muon Search # 48 | 252.6 | Data |
| Photoproduction # 87A | 219.1 | Data |
| Photon Search # 95A | 48.7 | Preliminary data |
| D. Internal Target Area | | |
| p-N Scattering # 198A | 125.4 | Setup and tests |
| Polarized Scattering # 313 | 125.4 | Setup and tests |
| p-N Inelastic # 317 | 16.1 | Complete |
| p-p Inelastic # 321 | 62.5 | Preliminary data,
warm jet tests |
| | <hr/> | |
| Total | 2132.0 | |

Reported by H. Allen

PROPOSALS RECEIVED DURING OCTOBER AND NOVEMBER 1975

| <u>No.</u> | <u>Title</u> | <u>Submitted By</u> |
|------------|--|---------------------|
| 446 | The Direct Determination of Kaon and Pion Form Factors | C. Ankenbrandt |
| 447 | A Proposal to Study \bar{p} - p Interactions at 150 GeV/c | R. Hulsizer |
| 448 | Proposal for the Investigation of Virtual Photoabsorption by Nuclear Matter | R. Wilson |
| 449 | A Proposal to Measure Coulomb and Diffractive Production of K^* and \bar{K}^* | M. Abolins |
| 450 | New Particle Physics at the Tagged Photon Laboratory | D. Caldwell |
| 451 | Study of the A-Dependence of Inclusive Processes and Associated Multiplicity | D. Barton |
| 452 | Proposal for a Streamer Chamber Facility to Study Psi Production | H. Lubatti |
| 453 | A Proposal to Continue Measurements of Direct Muon Production in the Forward Direction | H. Frisch |
| 454 | Fermilab Proposal for an Experiment to Measure Deep Inelastic Scattering on Hydrogen and Deuterium with Separation of νW_2 and W_1 Nucleon Structure Functions at the Highest Fermilab Energies and Q^2 Regions | Z. Guiragossian |
| 455 | Bubble Chamber Study of Dimuon Production by Neutrinos Using the Phase 2 EMI and a Dichromatic Beam | V. Peterson |
| 456 | Measurement of the Kaon Form Factor | D. Stork |
| 457 | Search for Muons, K-Zeros, or Characteristic Hadron Signatures and Masses in Coincidence with Single, Directly Produced Electrons | G. Brandenburg |
| 458 | Photoproduction Experiment at Fermilab | W. Lee |
| 459 | Search for New Phenomena Associated with High Energy Neutrinos Using the Quadrupole Triplet Beam | W. Fry |

| <u>No.</u> | <u>Title</u> | <u>Submitted By</u> |
|------------|--|---------------------|
| 460 | Proposal to Study Dilepton Neutrino Interactions with the Triplet Quadrupole Beam, the Phase 1 EMI, and the 15-Foot Bubble Chamber filled with a Hydrogen-Neon Mixture | F. Huson |
| 461 | Search for New Particles from 400-GeV Proton Collisions in Emulsions | J. Lord |
| 462 | Search for Short-Lived Particles Produced by 400-GeV Protons in Emulsions | G. Giacomelli |
| 463 | The Interactions of Protons in Nuclear Emulsion at 400 GeV/c | M. Tretjakova |
| 464 | A Proposal to Study Diffractive Processes in K ⁺ -P Interactions at 150 GeV/c | F. Grard |

INDEX TO THE 1975 ISSUES OF NALREP

| | | |
|--|------|----|
| Advisory committees, Laboratory | Jan | 13 |
| Assignments, Laboratory responsibilities | Jan | 17 |
| | May | 13 |
| | June | 16 |
| Bubble Chamber Subcommittee, results of meeting | Dec | 1 |
| Cancer Therapy Facility | Nov | 1 |
| Computers, description of BISON-NET | Sep | 1 |
| Development efforts, Laboratory | Sep | 1 |
| Cancer Therapy Facility | Nov | 1 |
| Physics of the Energy Doubler/Saver | Oct | 1 |
| Superconducting dipole magnet tests | Feb | 12 |
| Hadron physics program, Subcommittee report | Dec | 1 |
| Hydrogen targets | Jun | 9 |
| Internal Target Area Expanded | Jun | 1 |
| Library, Fermilab | Dec | 7 |
| Meson Area | | |
| The State of the Meson Area | Aug | 1 |
| 400-GeV Protons Now in Meson Area | Aug | 9 |
| The Single Arm Spectrometer | May | 1 |
| The Neutrino Area | Apr | 1 |
| Notes and announcements, general | | |
| Cafeteria hours | Mar | 10 |
| Housing, lights, Guest Office, Laboratory holidays | Jan | 18 |
| Housing rates, new | Apr | 12 |
| Identification cards, policy | Jun | 16 |
| Rental cars available | Apr | 13 |
| Stockroom hours, revisions | Mar | 11 |
| Telecopier service | Sep | 14 |
| Operations Center Relocation Now Complete | Feb | 14 |
| Program Advisory Committee | Jan | 15 |
| Meeting announcement | Sep | 13 |
| New Schedule of Meetings Relating to the
Spring PAC Meeting | Oct | 14 |
| Recent Program Advisory Committee Meetings | Jan | 1 |
| Some Comments on the Summer PAC Meeting | Jul | 1 |

| | | |
|---|-----|----|
| Physics of the Energy Doubler/Saver | Oct | 1 |
| Physics Research Equipment Pool (PREP) | Jul | 1 |
| Publications, Fermilab | | |
| Fermilab Research Program Workbook | Jun | 18 |
| Fermilab Safety Handbook | Mar | 11 |
| Procedures for Experimenters 1975 | Jan | 16 |
| Research program, scope | Feb | 1 |
| Research Notes | | |
| Elastic Scattering #96 | May | 1 |
| Scope of the Fermilab Research Program | Feb | 1 |
| Single Arm Spectrometer | May | 1 |
| Situation Report | | |
| January 9, 1975 | Jan | 21 |
| April 1, 1975 | Apr | 14 |
| July 16, 1975 | Jul | 23 |
| October 17, 1975 | Oct | 15 |
| Superconducting Magnet Reaches 40 Kilogauss | Feb | 12 |
| Theoretical Physics at Fermilab | Mar | 1 |
| Universities Research Association, Inc. ,
trustees and officers for 1975 | Jun | 17 |
| Users Center Advisory Committee Appointed | Jan | 13 |
| Users Center Completes First Year | Nov | 9 |
| Users Executive Committee | | |
| Current membership | Jun | 18 |
| Current officers | Aug | 11 |
| Report from the Users Executive Committee | Jan | 11 |
| | Jul | 19 |
| | Oct | 11 |
| The Users Office Activities and Staff | Jan | 9 |
| Workshops | | |
| Summary report on Muon Workshop | Feb | 20 |
| Ionization calorimeters, plans | Feb | 19 |
| Symposium on Bubble Chamber | | |
| Hadron Physics, plans | Jul | 21 |
| | Aug | 10 |
| Proposal Presentation Meeting scheduled | Jul | 22 |
| BISON-NET and related computing problems, plans | Sep | 13 |
| Short-Lived Particle Beam Facility, plans | Sep | 14 |
| | Oct | 13 |

10/10/10

10/10/10

DATES TO REMEMBER

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| January 15-16, 1976 | Bubble Chamber Subcommittee Meeting. |
| January 23, 1976 | Deadline for receipt of all new proposals and other written materials to be considered at the March meeting of the Program Advisory Committee. |
| January 31, 1976 | Fermilab Auditorium Arts Series: Choreographer's Showcase. Tickets available in Guest Office. |
| February 5-6, 1976 | Proposal Presentation Meeting. |
| March 4-5, 1976 | Spring meeting of the Fermilab Program Advisory Committee. |
| March 31, 1976 | Requests for summer accommodations should be received in the Housing Office. |
| April 15-16, 1976 | Workshop on Elastic Scattering at large P_t (tentative). |
| May 6-7, 1976 | Workshop on Multiparticle Final State Experiments (tentative). |
| May 7, 1976 | Deadline for receipt of new proposals and other written materials to be considered at the Extended Summer Meeting of the Program Advisory Committee. |
| May 20-21, 1976 | Proposal Presentation Meeting. |
| June 19-25, 1976 | Extended Summer Meeting of the Fermilab Program Advisory Committee (Aspen, Colorado). |
| June 28-July 9, 1976 | Aspen Summer Study on the Use of the Energy Doubler/Saver (tentative). |