

SUMMARY OF OPERATIONS - MARCH 1978

Program Planning Office

The most important feature of research operations at Fermilab during the month of March was that activities were allowed to begin again following a two-week shutdown. The Department of Energy had directed the research program to be interrupted on February 22 due to concern over the availability of energy during the coal strike. The directive was withdrawn on March 8 and after about a day to complete a few development projects which had been underway, and another day for tuneup of the accelerator, the research program again was in full swing. Most remarkable was the fact that within a couple of hours after stable beam was available several experiments were again taking data. Running for the first weekend was accomplished using the new  $H^-$  injection system. However, it was necessary to return again to  $H^+$  injection after complications due to contamination in the new source briefly interrupted operations.

As a result of study of operating the accelerator and experiments with day/night pricing it was decided during March to make changes which will hopefully improve the overall operating efficiency. The daytime power demand level was raised slightly to enable shorter times between accelerator cycles; normal daytime cycles are now 16-17 sec. Also, the time scheduled for accelerator studies and maintenance and development was rearranged to reduce the number of startups.

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FERMI NATIONAL ACCELERATOR LABORATORY  
MONTHLY OPERATIONS HISTORY  
MARCH 1978

| Date      | Accelerator   | Int. Target Area       | Proton Area            | Neutrino Area                     | Meson Area                                      |
|-----------|---|------------------------|------------------------|-----------------------------------|---|
| Wed. 3/1  | Shutdown Imposed by the Department of Energy                |                        |                        |                                   |   |
| Thu. 3/2  | Due to the Coal Strike                                      |                        |                        |                                   |   |
| Fri. 3/3  | (since Wed., Feb. 22)                                       |                        |                        |                                   |   |
| Sat. 3/4  |   |                        |                        |                                   |   |
| Sun. 3/5  |   |                        |                        |                                   |   |
| Mon. 3/6  |   |                        |                        |                                   |   |
| Tue. 3/7  |   |                        |                        |                                   |   |
| Wed. 3/8  |   |                        |                        |                                   |   |
| Thu. 3/9  |   |                        |                        |                                   |   |
| Fri. 3/10 | Accelerator Startup   |                        |                        |                                   |   |
| Sat. 3/11 | ~1.4x10 <sup>13</sup> ppp<br>@400 GeV<br>(1.25 sec flattop) | Proton Polariz.<br>522 | Photoprod. 87A<br>(PE) | Muon 203A/391<br>&                | Multi- $\mu$ 439 (M2)<br>Incl. $K_S^0$ 383 (M4) |
| Sun. 3/12 | Reprs; Ref. to<br>H <sup>+</sup> injection                  |                        | Di-Lepton 288<br>(PC)  | Muon 448 (N1)<br>Yield Meas. (N3) | Multipart. 110A<br>(M6W)                        |
| Mon. 3/13 |   |                        | P 519 Tests<br>(PW)    | V253 (NO)<br>Yield Meas. (N3)     | Part. Search 490<br>(M1W)                       |
| Tue. 3/14 |   |                        |                        | Muon 203A/391<br>&                |   |
| Wed. 3/15 | Reprs: MR Magnet  |                        |                        | Muon 448<br>(N1)                  |   |
| Thu. 3/16 |   |                        |                        | Yield Meas.<br>(N3)               |   |
| Fri. 3/17 | Reprs: MR Feeder  |                        |                        |                                   |   |
| Sat. 3/18 | ~1.4x10 <sup>13</sup> ppp<br>@400 GeV<br>(1.25 sec flattop) |                        |                        |                                   |   |
| Sun. 3/19 |   |                        |                        |                                   |   |
| Mon. 3/20 |   |                        |                        |                                   |   |
| Tue. 3/21 | Accelerator Studies   |                        |                        |                                   |   |
| Wed. 3/22 | ~1.8x10 <sup>13</sup> ppp<br>@400 GeV                       | P-N Scattering<br>552  |                        | Muon 203A/391<br>&                |   |
| Thu. 3/23 |   |                        |                        | Muon 448<br>(N1)                  |   |
| Fri. 3/24 |   |                        |                        | Neutrino 310<br>Calib. (N5)       |   |
| Sat. 3/25 |   |                        |                        |                                   |   |
| Sun. 3/26 |   |                        |                        |                                   |   |
| Mon. 3/27 |   |                        |                        |                                   |   |
| Tue. 3/28 |   |                        |                        |                                   |   |
| Wed. 3/29 | Accelerator Studies and Maintenance & Development           |                        |                        |                                   |   |
| Thu. 3/30 | Repairs: Booster and Linac                                  |                        |                        |                                   |   |
| Fri. 3/31 |   |                        |                        |                                   |   |

BEAM UTILIZATION BY

|                                     | <u>Beam</u> | <u>Hours</u> |
|-------------------------------------|-------------|--------------|
| MESON AREA                          | M6W         | 220.4        |
| Multiparticle #110A                 | M4          | 245.1        |
| Inclusive $K_S^0$ #383              | M2          | 250.3        |
| Multi-Muon #439                     | M1W         | 210.5        |
| Particle Search #490                | M0          | -            |
| Nuclear Chemistry #81A              |             |              |
| NEUTRINO AREA                       | N1          | 223.4        |
| Muon #203A/391                      | N0          | 25.7         |
| Neutrino #253                       | N5          | 122.6        |
| Neutrino #310 Calibration           | N1          | 222.9        |
| Muon #448                           | N0          | -            |
| Nuclear Fragments #466              |             |              |
| PROTON AREA                         | P1          | 284.2        |
| Photoproduction #87A                | PC          | 269.2        |
| Di-Lepton #288                      | PW          | 196.7        |
| P #519 Tests                        |             |              |
| INTERNAL TARGET AREA                | C0          | 156.6        |
| Proton Polarization #522            | C0          | <u>115.9</u> |
| p-N Scattering #552                 |             | 2543.5       |
| Total Hours for Experiments         |             | <u>147.1</u> |
| Engineering tests (N3 meas.)        |             | 2690.6       |
| TOTAL HOURS FOR HIGH ENERGY PHYSICS |             |              |

EXPERIMENT -- MARCH 1978

Activities

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data: primarily for study of the reaction  $\pi^- p \rightarrow \pi^+ \pi^- n$  at 20, 50, and 175 GeV

data: for study of the reaction  $K^- p \rightarrow K_S^0 X$  at 200 GeV

data: for study of the high mass dimuon & multimMuon spectra produced by 400-GeV proton interactions

tuneup: including tests of a new high pressure streamer chamber

data: 3 targets exposed

data: including a search for heavy neutral leptons produced in muon interactions at 225 GeV

tests: of ability to collect data using a 1.25-sec slow spill

calibration: of liquid and iron calorimeters using a hadron beam

data: study of muon interactions with nuclear targets at 225 GeV

data: 2 targets exposed

data: search for charmed states produced in photon interactions

data: for study of the high mass dimuon spectrum produced by 400-GeV proton interactions

tests: of ability to collect data using a high-intensity proton beam

data: complete; study of recoil proton polarization from inclusive pp scattering

data: pp and pd scattering studies using an internal proton beam

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FACILITY UTILIZATION SUMMARY--MARCH 1978

I. Summary of Accelerator Operations

|  | <u>Hours</u> |
|--|--------------|
| A. Accelerator use for physics research            |              |
| Accelerator physics research                       | 51.1         |
| High energy physics research                       | 300.6        |
| Research during other use                          | -            |
| Subtotal   | 351.7        |
| B. Other activities                                |              |
| Accelerator setup and tuning to experimental areas |              |
| Program interruption                               | 225.8        |
| Unscheduled interruption                           | 166.5        |
| Subtotal   | 392.3        |
| C. Unmanned time                                   | -            |
| Total  | 744.0        |

II. Summaries of High Energy Physics Research Use

|                                  | <u># of Expts.</u> | <u>Hours</u> | <u>Results</u>        |
|----------------------------------|--------------------|--------------|-----------------------|
| A. Counter experiments           | 12                 | 2346.8       | 1 exp. complete       |
| B. Bubble chamber experiments    | -                  | -            | -                     |
| C. Emulsion experiments          | -                  | -            | -                     |
| D. Special target experiments    | 2                  | -            | 5 targets exposed     |
| E. Test experiments              | 1                  | 196.7        | P 519 tests           |
| F. Engineering studies and tests | (1)                | 147.1        | N3 yield measurements |
| G. Other beam use                | -                  | -            |                       |
|                                  | 15                 | 2690.6       |                       |

III. Number of Protons Accelerated and Delivered @ 400 GeV ( $\times 10^{18}$ )

|   |             |
|---|-------------|
| A. Beam accelerated in Main Ring        | 1.61        |
| B. Beam delivered to experimental areas | <u>1.52</u> |
| Meson Area                              | 0.32        |
| Neutrino Area                           |             |
| Slow Spill                              | 1.07        |
| Fast Spill                              | 0.00        |
| Proton Area                             | 0.13        |



Prof. M. Stanley Livingston during a recent visit to Fermilab, which he helped to found.

(Photograph by Fermilab Photo Unit)

SITUATION REPORT - APRIL 1978

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FERMI NATIONAL ACCELERATOR LABORATORY  
EXPERIMENTAL PROGRAM SITUATION REPORT

PROGRAM PLANNING OFFICE  
12 APR 1978

THE EXPERIMENTAL PROGRAM SITUATION AT FERMILAB IS SUMMARIZED BELOW. THE EXPERIMENTS ARE LISTED SEPARATED BY EXPERIMENTAL AREA UNDER CATEGORIES THAT BEST DESCRIBE THEIR CIRCUMSTANCES AS OF APRIL 1, 1978. FOR EXPERIMENTS WHICH HAVE BEEN COMPLETED OR HAVE RECEIVED BEAM THERE IS INDICATION OF THE AMOUNT OF RUNNING TIME OR EXPOSURE. THE EXPERIMENTAL AREA NAMES ARE ABBREVIATED AS FOLLOWS: RESON AREA (RA), NEUTRINO AREA (NA), PROTON AREA (PA), INTERNAL TARGET AREA (ITA).

TOTAL NUMBER OF APPROVED EXPERIMENTS - 284

AREA-BEAM  
A. EXPERIMENTS THAT HAVE COMPLETED DATA TAKING (223): SPOKESPERSON EXTENT OF RUN TO DATE DATE COMPLETED

(ONLY EXPERIMENTS COMPLETED SINCE 1 JAN 1978 ARE LISTED BELOW)

| AREA-BEAM     | EXPERIMENT                  | SPOKESPERSON | EXTENT OF RUN TO DATE | DATE COMPLETED |
|---------------|-----------------------------|--------------|-----------------------|----------------|
| NA-R1         | DETECTOR DEVELOPMENT #427   | YUAN         | 40 HOURS              | 10 JAN 1978    |
| -R3           | PARTICLE SEARCH #540        | LONGO        | 600 HOURS             | 21 FEB 1978    |
| -R6           | ASSOCIATED PRODUCTION #99   | DIBOLD       | 750 HOURS             | 24 JAN 1978    |
| NA-WO-TRIPLET | NEUTRINO #482               | BARISH       | 1,600 HOURS           | 3 JAN 1978     |
| -NUON/HADRON  | 15-FOOT NEUTRINO/H26WE #546 | HUSON        | 375K PIX              | 26 JAN 1978    |
| -OTHER        | DI-NUON #444                | SMITH        | 1,100 HOURS           | 3 JAN 1978     |
|               | EMULSION/PI- # 300 #487     | TARANASHI    | 7 STACKS              | 18 JAN 1978    |
|               | EMULSION/PI- # 300 #503     | OGATA        | 4 STACKS              | 18 JAN 1978    |
|               | EMULSION/PI- # 300 #506     | DAKE         | 2 STACKS              | 15 JAN 1978    |
|               | EMULSION/PI- # 300 #525     | WILKES       | 2 STACKS              | 15 JAN 1978    |
|               | EMULSION/PI- # 300 #568     | HEBERT       | 3 STACKS              | 15 JAN 1978    |
|               | EMULSION/PI- # 300 #573     | USHIDA       | 3 STACKS              | 15 JAN 1978    |
|               | EMULSION/PI- # 300 #574     | WOLTER       | 4 STACKS              | 18 JAN 1978    |
|               | EMULSION/PROTONS # 400 #499 | IWAI         | 5 STACKS              | 15 JAN 1978    |
|               | EMULSION/PROTONS # 400 #547 | JACQUOT      | 24 STACKS             | 15 JAN 1978    |
|               | EMULSION/PROTONS # 400 #575 | LORD         | 2 STACKS              | 15 JAN 1978    |
| ITA-C-0       | PHOTON POLARIZATION #522    | DOERN        | 700 HOURS             | 21 JAN 1978    |

B. EXPERIMENTS THAT ARE IN PROGRESS (23): SPOKESPERSON EXTENT OF RUN TO DATE DATE OF RECENT RUN

| AREA-BEAM    | EXPERIMENT                      | SPOKESPERSON | EXTENT OF RUN TO DATE | DATE OF RECENT RUN |
|--------------|---------------------------------|--------------|-----------------------|--------------------|
| NA-R2        | MULTI-NUON #439                 | GARLICK      | 1,300 HOURS           | 1 APR 1978         |
|              | PARTICLE SEARCH #468            | STEINBERG    | 300 HOURS             | 1 OCT 1977         |
| -R4          | INCLUSIVE X-SHOOT #383          | KOBRAK       | 1,400 HOURS           | 1 APR 1978         |
| -R6          | MULTIPARTICLE #110A             | DZIERBA      | 1,500 HOURS           | 1 APR 1978         |
| -OTHER       | BACKWARD SCATTERING #290        | BAKER        | 950 HOURS             | 1 APR 1978         |
|              | NUCLEAR CHEMISTRY #81A          | KAUFMAN      | 164 BOMBARDMENTS      | 7 APR 1978         |
| NA-WO-HORN   | 15-FOOT NEUTRINO/H2 #45A        | STEVENSON    | 162K PIX              | 1 APR 1976         |
|              | 15-FOOT ANTI-NEUTRINO/H26WE#180 | MAYLAWOY     | 273K PIX              | 18 JUL 1977        |
| -WO-TRIPLET  | NEUTRINO #310                   | CLINE        | 3,650 HOURS           | 1 APR 1978         |
|              | NEUTRINO #253                   | MO           | 450 HOURS             | 1 APR 1978         |
| -NUON/HADRON | TEST NUON IRRADIATION #501      | LANDE        | 2 TARGETS EXPOSED     | 1 APR 1977         |
|              | NUON #203                       | KEITH        | 650 HOURS             | 1 APR 1978         |
|              | NUON #391                       | UNSPECIFIED  |                       |                    |
|              | NUON #448                       | LOONIS       | 500 HOURS             | 1 APR 1978         |
| -15-PI       | 15-FOOT PI- - P # 100 #43A      | KITAGAKI     | 11K PIX               | 5 APR 1975         |
|              | 15-FOOT PI- - P#K # 200 #89     | FRETTER      | 4K PIX                | 1 JUL 1975         |
|              | 15-FOOT PI- - P # 360 #384      | LAMNUTTI     | 20K PIX               | 1 APR 1976         |
| -OTHER       | HOMOPOLE #502                   | GARLICK      | COSMIC RAY BURNING    | 1 JUL 1977         |
|              | NUCLEAR FRAGMENTS #466          | KAUFMAN      | 9 TARGETS EXPOSED     | 1 APR 1978         |
| PA-PE        | PHOTOPRODUCTION #87A            | LEE          | 4,400 HOURS           | 1 APR 1978         |
|              | PHOTOPRODUCTION #152B           | HEUSCH       | 900 HOURS             | 1 JAN 1978         |
| -PC          | DI-LEPTON #268                  | LEDERMAN     | 5,350 HOURS           | 1 APR 1978         |
| ITA-C-0      | P-W SCATTERING #552             | SANBORN      | 850 HOURS             | 1 APR 1978         |

C. EXPERIMENTS THAT ARE IN TEST STAGE (2): SPOKESPERSON EXTENT OF RUN TO DATE DATE OF RECENT RUN

| AREA-BEAM | EXPERIMENT               | SPOKESPERSON | EXTENT OF RUN TO DATE | DATE OF RECENT RUN |
|-----------|--------------------------|--------------|-----------------------|--------------------|
| NA-R1     | HADRON DISSOCIATION #272 | FENDEL       | 300 HOURS             | 1 APR 1978         |
|           | PARTICLE SEARCH #490     | SANDWEISS    | 200 HOURS             | 1 APR 1978         |

D. EXPERIMENTS BEING INSTALLED (7): SPOKESPERSON EXTENT OF APPROVAL

| AREA-BEAM     | EXPERIMENT                | SPOKESPERSON | EXTENT OF APPROVAL |
|---------------|---------------------------|--------------|--------------------|
| NA-R2         | XI-ZERO PRODUCTION #495   | HELLER       | 400 HOURS          |
| -R3           | LAMBDA BETA DECAY #361    | PONDROP      | 300 HOURS          |
| -R4           | PI-NU ATOMS #533          | SCHWARTZ     | 500 HOURS          |
| -R6           | KAOV CHARGE EXCHANGE #585 | ABOLINS      | 600 HOURS          |
| -OTHER        | PARTICLE SEARCH #469      | CUTTS        | 150 HOURS          |
|               | INCLUSIVE SCATTERING #451 | HARTON       | 400 HOURS          |
| NA-WO-DICHSON | NEUTRINO #156             | BARISH       | 1,000 HOURS        |

E. EXPERIMENTS TO BE SET UP WITHIN A YEAR (16): SPOKESPERSON EXTENT OF APPROVAL

| AREA-BEAM   | EXPERIMENT                       | SPOKESPERSON | EXTENT OF APPROVAL | NOTES  |
|-------------|----------------------------------|--------------|--------------------|--|
| -WO-DICHSON | 15-FOOT NEUTRINO/H26WE #380      | BALYAI       | 200K PIX           |  |
|             | 15-FOOT ANTI-NEUTRINO/H26WE#388  | PETERSON     | 200K PIX           |  |
| -WO-WB HORN | NEUTRINO #594                    | WALKER       | PARASITIC BURNING  |  |
|             | 15-FOOT NEUTRINO/D26H12 #545     | SNOW         | 240K PIX           |  |
|             | 15-FOOT ANTI-NEUTRINO/D26H12#542 | CARONNY      | 150K PIX           | NOTE: THE ABILITY TO SET UP THESE EXPERIMENTS DURING THE NEXT YEAR IS CONTINGENT ON THE AVAILABILITY OF FUNDS. |
|             | NEUTRINO #531                    | REAY         | PARASITIC BURNING  |  |
|             | NEUTRINO #553                    | RAND         | PARASITIC BURNING  |  |
| PA-PE       | 15-FOOT E EMULSION/NEUTRINO#564  | VOTODIC      | PARASITIC BURNING  |  |
|             | PHOTOPRODUCTION #401             | GORNLEY      | 600 HOURS          |  |
|             | PHOTOPRODUCTION #516             | WASH         | 1,000 HOURS        |  |
| -PC         | CHARGED REFERENCE #497           | LACH         | 400 HOURS          |  |
| -PW         | NUCLEAR SCALING #592             | FRANKEL      | 300 HOURS          |  |
|             | PIOM INCLUSIVE #258              | SHOCHET      | 800 HOURS          |  |
|             | DI-NUON #326                     | SHOCHET      | 800 HOURS          |  |
|             | C-TEST #302                      | CESTER-BEGGE | 400 HOURS          |  |
|             | PARTICLE SEARCH #567             | CESTER-BEGGE | 500 HOURS          |  |

F. OTHER APPROVED EXPERIMENTS (13): SPOKESPERSON EXTENT OF APPROVAL

| AREA-BEAM | EXPERIMENT                     | SPOKESPERSON | EXTENT OF APPROVAL |
|-----------|--------------------------------|--------------|--------------------|
| NA-R1     | PARTICLE SEARCH #515           | ROSEN        | 800 HOURS          |
| -R6       | HADRON JETS #557               | HALARUD      | 1,600 HOURS        |
| NA-15-PI  | 15-FOOT P- - P # HZ # 400 #291 | HARR         | 25K PIX            |
| -30-IM    | 30-1MCH HYBRID #570            | PLESS        | 1,500 HOURS        |
|           | 30-1MCH HYBRID #565            | YANAGOTO     | PARASITIC BURNING  |
|           | 30-1MCH HYBRID #567            | WITTENBERG   | 1,000 HOURS        |
| -OTHER    | EMULSION/PROTONS # 500 #508    | WOLTER       | EMULSION EXPOSURE  |
|           | EMULSION/PROTONS # 500 #524    | WILKES       | EMULSION EXPOSURE  |
|           | EMULSION/PROTONS # 500 #576    | HEBERT       | 3 STACKS           |
|           | QUARK #549                     | LONGO        | PARASITIC BURNING  |

| AREA-BEAM |                      | SPOKESPERSON | EXTENT OF APPROVAL |
|-----------|----------------------|--------------|--------------------|
| PA-PE     | PARTICLE SEARCH #400 | PEOPLES      | 400 HOURS          |
|           | PHOTOPRODUCTION #458 | LEE          | 1,000 HOURS        |
| -PW       | DI-NUON #537         | CUX          | 1,000 HOURS        |

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 PENDING #RCPQSALS (36):

|              |                                 |            | EXTENT OF REQUEST |
|--------------|---------------------------------|------------|-------------------|
| NA-N1        | HADRON JETS #246                | SELOVF     | 1,500 HOURS       |
|              | ELASTIC SCATTERING #577         | RUBINSTEIN | 1,000 HOURS       |
|              | DI-HADRON #586                  | MCCARTHY   | 1,400 HOURS       |
|              | HADRON JETS #590                | TOUG       | 1,200 HOURS       |
| -N2          | PROTON POLARIZATION #595        | YAMIN      | 100 HOURS         |
|              | NUCLEAR CHEMISTRY #529          | TURNEVICH  | 100 HOURS         |
|              | NEUTRAL HYPERON #555            | DEVLIN     | 250 HOURS         |
|              | DI-NUON #583                    | WUTHEFOORD | 2,500 HOURS       |
|              | DI-NUON #589                    | MOCKETT    | 750 HOURS         |
| -N3          | INCLUSIVE NEUTRON #579          | JONES      | 800 HOURS         |
|              | POLARIZED SCATTERING #581       | YOKOSAWA   | 1,200 HOURS       |
|              | POLARIZED SCATTERING #592       | YOKOSAWA   | 750 HOURS         |
|              | PARTICLE SEARCH #584            | WIMSTEIN   | 300 HOURS         |
| -N6          | MULTIPARTICLE #523              | DEJERGA    | 800 HOURS         |
|              | PARTICLE SEARCH #580            | JENNINS    | 800 HOURS         |
|              | INCLUSIVE SCATTERING #589       | ELIAS      | 600 HOURS         |
| NA-W0-DICHRO | NEUTRINO #355                   | BARISH     | 1,400 HOURS       |
| -N0-NE HORN  | 15-FOOT MUON/PI/H2LH2 #489      | WESSICK    | 450K PIX          |
|              | 15-FOOT ANTIMUON/PI/H2LH2#544   | KAPTAPOV   | 500K PIX          |
| -WEUZEWO     | BEAM DUMP #599                  | MO         | 1,000 HOURS       |
| -NUON/HADRON | PI-OM DISSOCIATION #318         | ASCOLI     | 400 HOURS         |
|              | NUON #388                       | WILSON     | 800 HOURS         |
|              | PARTICLE SEARCH #596            | LEDERMAN   | 150 HOURS         |
| -15-FT       | 15-FOOT P - P # > OR = 100 #208 | TAKIDAEV   | 75K PIX           |
|              | 15-FOOT PBAR - P # 100 #526     | LANGER     | 150K PIX          |
|              | 15-FOOT PBAR - D # 100 #527     | LANGER     | 150K PIX          |
|              | DETECTOR DEVELOPMENT #528       | ROBERTS    | 100 HOURS         |
|              | 15-FOOT PI- - D # 1006360 #538  | FRETZER    | 150K PIX          |
|              | PARTICLE SEARCH #595            | BODEK      | 1,000 HOURS       |
| -30-IN       | 30-INCH PIP - PANE 3100 #504    | GULJAGOV   | 20K PIX           |
|              | DETECTOR DEVELOPMENT #550       | ATAK       | TEST RUNNING      |
| PA-PC        | CHARGED HYPERON #353            | ECKLUND    | 600 HOURS         |
|              | FORM FACTOR #446                | ECKLUND    | 800 HOURS         |
| -PW          | HADRON JETS #587                | SCHLEIN    | 1,000 HOURS       |
| ITA-C-0      | PROTON-PROTON SCATTERING #500D  | FRANZINI   | 1,000 HOURS       |
|              | PARTICLE SEARCH #591            | GUTAT      | 800 HOURS         |