the Village Crier

fermi national accelerator laboratory

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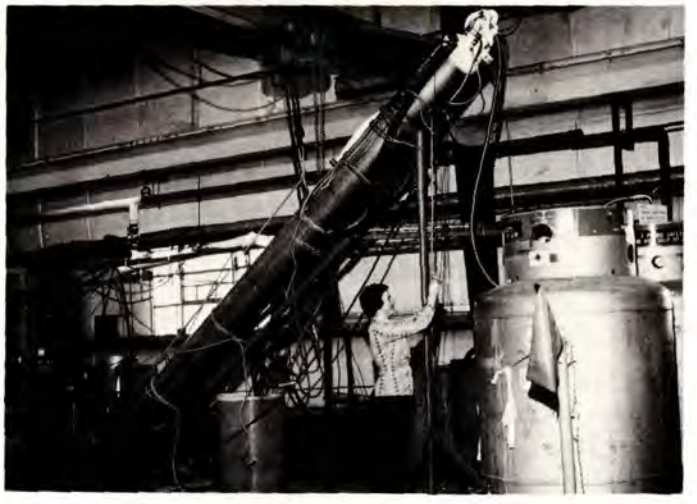
C2-10 MAGNET TEST SUCCESS

A successful test run of a 10-foot superconducting magnet designed by the Fermilab Superconducting group, took place between February 24 and 28. The magnet test showed that if this and similar magnets were to be used in a ring of superconducting magnets installed above the present main accelerator magnets, the result could be as much as a 2/3 reduction in power cost at 400 BeV energy--the so-called Energy Saver mode of operation. In addition, the capability of raising the energy of the accelerator to as much as 1,000 BeV--the Energy Doubler mode--is an important feature which is being developed with these same magnets.

...L-R (front) E. Dreier, E. Ioriatti, D. Sutter, L. Latreille, (back) P. Sanger, W. Habrylewicz pose beside C2-10 magnet before it was tested...

The recent test on the so-called three inch reference design dipole produced a magnetic field equivalent to running at 400 BeV, with additional ramping to 500 BeV. The magnet -- known as the C2-10 -- was the second phase of a design program initiated by the late Dr. Darrell Drickey. Prototype magnet tests previously conducted by the Superconductor group resulted in important knowledge about different types of superconducting wire, different fabrication techniques, and different cooling schemes necessary to go forward successfully in this pioneering work. After a 40 kilogauss field (896 BeV) was reached in the test of a 2½ foot prototype designated C1-2.5, the Superconductor group decided that it could be conservatively expected that a 10-foot model would operate successfully at the lower field required for 500 BeV. Tests were then designed and completed to check out the 10-foot magnet at magnetic fields and repetition rates required for the Energy Saver mode of operation. The magnets were built in Fermilab's Magnet Facility.



...Louise Latreille adjusts cable for C2-10 test. Cryostat containing magnet is in diagonal position...

The historic test during the last week in February began for the Superconducting group on Saturday, February 22, with cooldown of the magnet. On Monday, February 24, the first powered test began late in the afternoon. Many operating modes were tested -- a 30-second cycle at 100 BeV to 470 BeV. Then a 25-second cycle, the results of which closely matched the program used in present main accelerator magnets. (The present main accelerator repeats its cycle every six seconds, ramping from 8 BeV to 300 BeV.) Then, a 12-second cycle, continued for 12 hours. Using a triangular ramp (no injection allowance, no flat top), the supercon-

(Continued on Page 2)

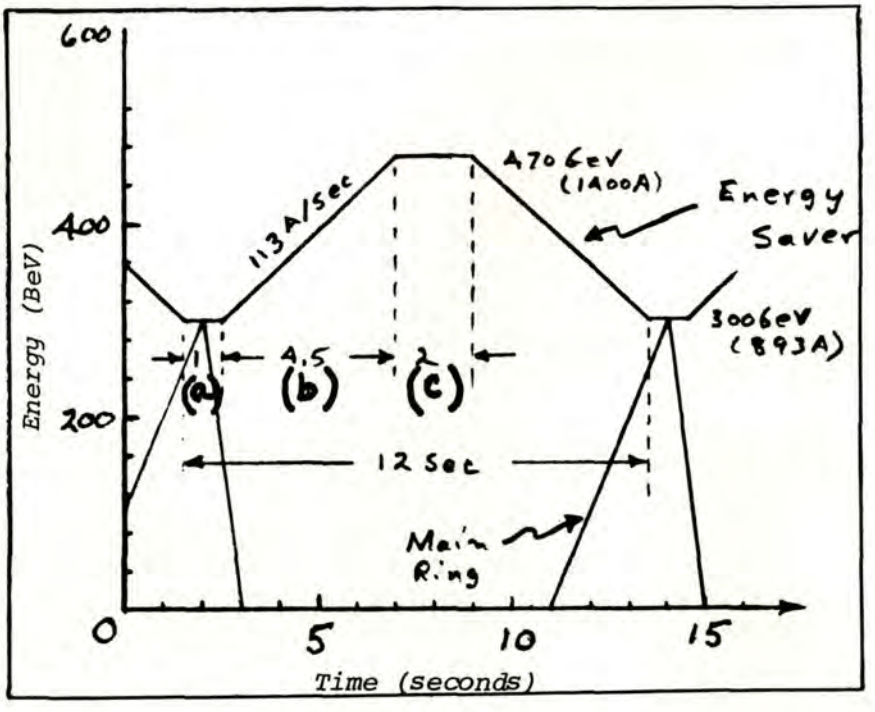
ducting magnet also ran 6- and 5-second cycles successfully. More than 12,000 cycles were run in the entire test.

Dr. Robert Wilson, Fermilab Director, heads the Superconductor group. W. B. Fowler, D. Getz, D. Sutter, B. Strauss, E. Dreier, R. Flora, W. Habrylewicz, J. Houkal, E. Ioriatti, M. Kuchnir, L. Latreille are other members of the Doubler group participating in the test. During the past three years of Doubler activity Paul Reardon and Don Edwards played a major part in the program. Mechanical design was by Technical Services, with G. Biallias, H. Hinterberger contributing. The magnets were built at the magnet facility, under supervision of R. Brocker and W. Hanson, by B. Assel, C. Bowling, D. Fischer, E. Gonzy, P. Hamilton, G. Jugenitz, C. Kirksey, D. Leifheit, G. Mikota, D. Smith and H. Warren.

Two other essential ingredients of the superconducting accelerator system -- the development of superconducting wire and the building of the complex refrigeration system -- have gone forward at the same time. Because they involve new technology, the necessary ingredients are not always available commercially. Fermilab has experimented with several superconducting wire geometries available on the commercial market but none of the products has been completely satisfactory. Recently, an improved wire was produced, but it was not in the form of the multistrand cable needed for winding a magnet. Availability of cabled wire in time for completing the C2-10 magnet was due to a special machine for twisting the wire into cable built at the University of Wisconsin by Robert Remsbottom of University of Wisconsin and Bruce Strauss of Fermilab. Remsbottom, Ernie Ioriatti and Phil Sanger of Fermilab were able to turn out the additional cable needed to complete magnet C2-10 in time for the test. The strands which make up the wire cable are each composed of thousands of filaments of niobium titanium superconducting alloy imbedded in a copper matrix. Each of the superconducting filaments is less than two thousandths of an inch in diameter.

Also important for construction of a superconducting accelerator has been the refrigeration system developed by W. Fowler and D. Richied, of Fermilab, and Peter Van der Arend and Stan Stoy of Cryogenic Consultants, Inc. This complex system requires a sophisticated piping array to maintain a liquid helium bath of small cross section and very long length at constant temperature. The superconducting magnets must be surrounded by liquid helium, which maintains the temperature of 4.2 K (-452° F) required for the magnet wire to operate in the superconducting state.

One of the more significant tests which has been conducted as part of the development of superconducting accelerator technology at Fermilab was the operation of a 20-foot prototype dipole magnet in the pump loop of the system. This was the world's first marrying of a large superconducting accelerator magnet to a liquid helium refrigerator system with such spread-out dimensions, an operating prototype of a section of an accelerator. A large amount of the liquid helium required for the magnet test was produced by the Fermilab helium refrigeration system under Richied's supervision.



...This trace is typical of some of the various possible operating modes tested with the 10-foot prototype superconducting magnet. If this cycle were actually used in a ring of superconducting magnets, injection of particles from the existing Main Ring could take place during the indicated one second constant magnetic field at 300 BeV (a), acceleration would occur during the next 4.5 seconds (b), and beam would be extracted for experiments over the 2 second flat-top period (c)...

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PAUL REARDON ACCEPTS NEW POSITION

...Paul J. Reardon...

Paul J. Reardon, Associate Laboratory Director and Head of the Fermilab Accelerator Division, will leave Fermilab in the next few months to become Project Manager for the construction of a new facility at Princeton University that will study the fusion process as an energy source for the U.S. The project's formal title is the TCT/TFTR (Two Component Torus/Tokamak Fusion Test Reactor).

Reardon reports that the design for the project has been underway for some time at Princeton and at other laboratories funded by the Energy Research and Development Administration (ERDA). In the fall of 1975, $7.5 million of the expected construction cost of $215 million will be allocated by ERDA to begin the final design at Princeton.

"The Tokamak design appears to be one of the most promising approaches to the ultimate goal of building a demonstration production fusion reactor in twenty years," Reardon notes. "It is hoped that the project at Princeton will be the first fusion device where the fusion energy in the plasma is equivalent to the energy used to heat the plasma, exclusive of the power required to develop the magnetic field." The Tokamak was first proposed by scientists in the Soviet Union.

It will be a return to Princeton for Reardon, who headed the operating division of the Princeton-Penn Accelerator from 1961 to 1964. He came to Fermilab in October, 1968 from a position as Project Manager of MIT's electron linear accelerator, to head the Fermilab Booster Accelerator. He moved from there to head the Business Office in 1970, then became head of the Energy Doubler group and later was in charge of the Accelerator Physics group. He became Associate Laboratory Director and head of the Accelerator Division in 1973.

In the immediate time ahead he will share time half/half between Princeton and Fermilab. The two oldest Reardon daughters will be married in Wheaton during the coming summer, Chris in June and Barbara in August. The Reardons will then move to their new home in Lawrenceville, New Jersey.

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CROSS GALLERY LANDSCAPING BEGINS

The parking area in front of the Fermilab Cross Gallery will be closed Friday, March 7, and Saturday, March 8, to begin the first phase of a new landscape-parking plan for this area. In this new plan, the number of parking spaces in the Cross Gallery area will be reduced substantially to accommodate the greenery that will be added in the spring.

The parking bumpers will be relocated to new positions this weekend, with paving scheduled as soon as the weather permits. The planting will be done through the next growing season, a combination of grasses, shrubs, and other amenities to create a pleasant, relaxing atmosphere between the Cross Gallery and the Central Laboratory.

NALWO

WINE AND CHEESE TASTING PARTY

Users Center
8:30 p.m.

Saturday,
March 8

Dinner wines
Assorted Cheeses

Reservations:
Marianne Lee - 858-7177
Joan Harris - 851-5305
Guest Office - 840-3440

$2.25 with reservations in advance
$3.00 at door

Candlelight
Chamber Music

AUDITORIUM ARTS SERIES

CHOREOGRAPHERS' SHOWCASE

Fermilab's Auditorium Arts Series will present Choreographers' Showcase, an evening of dance, on Friday, March 21, at 8:30 p.m. in the Auditorium. Four excellent performers will present a variety of contemporary dances. The Chicago-based dancers include the Gus Giordano Company, Judy Joseph and Ken Brelsfoard, Nana Shineflug's Chicago Moving Company, and Spanish dancer Pascual Olivera.

Tickets may be purchased from the Guest Office, CL-1W, or from Marilyn Paul, CL-2E. They are $3.00 for adults, $1.50, children, with group rates available for students. For advance reservations call Ext. 3091 or Ext. 3440.

HUSTLERS' SEASON ENDED

The Hustlers basketball team has ended its first season with a 2-7 record, next to the bottom in their league. The coach attributes the loss to many things and looks forward to a better season next Fall.

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.....PROSPECTIVE POTTERY makers are invited to an informational meeting at the Fermilab Model Shop, 37 Shabbona in the Village, on Monday, March 10, at 5:15 p.m. For further information call Jerry or Nan Bruce, 682-9286, or Ext. 4144.

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CORRECTION: The correct number to call from O'Hare Airport to arrange pick-up in Batavia at the Continental Transport bus is 261-1910, *not 251-1910 as listed in last week's Crier.*

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THIS WEEK AT FERMILAB...International Folk Dancing, Village Barn, 8 p.m...Cocktail Hour - Users Center - 5-7 p.m. - reduced prices.

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CLASSIFIED ADS

APARTMENT SALE - Duncan Phyfe Dining Rm. table & chairs $75 - Twin Beds $60 - Studio cornered flrd blk. & white couches plus white table & dresser $100 - 2 black Naugatuck chairs $35. ea. - Liv. Rm. damask floral pale green on white 4 prs. (new $240), Used 6 mo. $100 - Olive on olive patterned drapes picture window size $50 - Small desk $15 - Misc Hhld items. June Olsen X3293.

FOR SALE - 14' fiberglass boat, 60 HP motor, EZ load trailer (new tires), boat cover, inc. battery & all access., exc/water skiing. Gd. cond. Consider trade for 12' fishing boat, less than 10 HP motor. J. Shaffer, Ext. 3883 or 466-4129.

FOR SALE - 1967 Dodge Van, gd. cond. w/cabinets & carpet. $800. M. Kastner after 5, 355-6174.

NOSTALGIA - Fly an Antique Piper Cub, $11. solo; $17. dual, hourly. Call Stan Tonkin, X4188.

FOR SALE - 1973 Honda 750, Many Extras, $1500. Tony Winchester, Ext. 3701.

FOR SALE - 3 bedroom Brick Ranch - bar & 2 fireplaces, in Hinckley. Low forties. Call Mrs. Cuomo, 815-286-7484.

FOR SALE - 2 H70x15 Jetson fiberglass snow tires, $15 ea. - 2 600 x 13 (Opel) Jetson studded snow tires $10 ea. - 2 used boat trailer tires & tubes 480x8, 6 Ply $10 ea. - 1 H78x15 Argyle bias belted $10. Bob Adams, Ext. 3580.

FOR SALE - 1969 Buick LeSabre, P/B/S, auto trans. w/new studded snow tires, new battery, $500 or best offer. Candy Jierree, 75-2165/964-2436.

HAVING A PARTY or Money-Making Project for your favorite organization? We supply pizza & oven at wholesale cost. B. Murphy TR9-7562 or 879-8534.

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