

The Village Crier



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ENERGY DOUBLER EMERGES FROM DRAWING BOARDS (PART TWO OF TWO PARTS)

(Development of the Energy Doubler/Saver is a major new project at Fermilab. The last issue of the Village Crier discussed development of some of the refrigeration and cryogenic equipment.)

A prototype 10-foot magnet of the "E" series will be tested before the end of this month, then released for production as the final version of the dipole magnets to be used in the Fermilab Energy Doubler, according to Dr. William Fowler, assistant to Dr. Robert Wilson, leader of the Doubler/Saver project.

The "E" series represents the evolution of magnet research carried on in the past two years by the groups associated with the Fermilab Energy Doubler. The research has proceeded from the first model through the B-C-D series, each series improving on the last. Much of the effort in the improvement of the magnets has been associated with improving the insulation and with the clamping of the conductor in such a way to prevent motion during excitation. Alvin Tollestrup from the California Institute of Technology joined the group in July as part of his sabbatical leave. With other members of the group he has perfected and tested the new schemes that have been incorporated in the magnets which along with a successful magnet protection system, designed by Tollestrup, allows a high level of confidence in the 20-foot "E" series with 3-inch bore achieving their design field of a maximum possible 45 kilogauss. As recently as last week the group carried out the most successful 10-foot magnet test to date.

Fowler says that one "string" of such magnets -- 20 magnets, a length of about 400 feet -- will be built and installed in the Main Ring tunnel before June 30, 1976, another string by September 30. In the following fiscal year, plans call for the production of magnets to escalate sharply to the rate of 180 per quarter, continuing to June 30, 1978. It is planned for the Doubler ring to contain about 800 dipole magnets and 200 quadrupoles, the total of 1,000 being the same number as are in the present Main Ring.

Doubler research has advanced sharply the "state of the art" of superconductor wire for the Doubler magnets. The success of the magnets has to



...Designs for Doubler are the work of Andy Oleck (top) and Howard Fulton...



...Bob Pighetti (L), Peggy Price on a short sample test of Doubler conductor...



...Tony Rader (L), Ron Norton, Jerry Czop move Doubler prototype into place in Main Ring tunnel...

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ENERGY DOUBLER (Continued)

a large degree depended on the knowledge gained about the wire. A new industry has been spawned by the need for millions of feet of superconducting multifilament wire. To reduce cryogenic losses in the Doubler system, the 4,000 ampere conductor is made of 23 strands of special alloy material cabled into a conductor .050" x .300" which is insulated and then wound into approximately 100 turn coils of the magnets. Each magnet requires about 5,000 feet of cable.

The Laboratory has spent much time working with suppliers as well as tightening the specifications for all of the components of the superconducting wire. To be sure that all materials are equal in quality and satisfactory for the wire, the Laboratory provides "kits" to vendors. The materials are assembled into a 450 pound billet, ten inches in diameter, which returns six weeks later as 9,000 feet of 23-strand cable.

Bruce Strauss has been responsible for the development of superconducting wire and Bob Remsbottom of the University of Wisconsin has been coordinating quality control and delivery from vendors. According to Strauss, "The program has yielded an additional benefit of seeing the price of this wire come down 33% in the past two years. We've been the largest single purchaser of superconducting materials in the United States in the past two years."

The power supplies, instrumentation and controls, and radio frequency for the Energy Doubler will reflect many major innovations developed during the construction of the present accelerator.

Some of the important milestones planned for the Doubler project are the powering and testing of the first string of magnets; circulating a "coasting beam" in a completed ring of Doubler magnets; accelerating a beam to 1,000 BeV, and, extracting that beam to the experimental areas for use by experimenters.

What is the promise held out by a 1,000 BeV accelerator? Why is it necessary to make this advance in accelerator energy even as unexplained phenomena spew out of the existing accelerators?

It is that very cascade of experimental results that has confirmed the 1963 recommendation by the "Ramsey Panel," in a report submitted to the United States Congress in 1965. That recommendation was for a two-step approach toward higher energy physics in the United States; namely, that a 200-BeV accelerator be authorized in 1965 and a 600-1,000 BeV accelerator be started by 1975.

With the \$250 million of the first appropriation (actually authorized in 1969 and reduced to \$243.5 million in fiscal year 1975) the United States has gained not only a 200 but a 500 BeV-capability accelerator, now being used by scientists from all over the world at Fermilab.

John Peoples, head of Fermilab's Research Division, writing in the October, 1975 issue of NALREP, cites five recent experimental discoveries in elementary particle physics. "Although each of these discoveries came as a surprise," he points out, "there were theoretical ideas that predicted the gross features of the phenomena; however, the results of the experiments...have not always been in harmony with the theoretical ideas...the physical laws which describe these new phenomena could well be even more complex than the theoretical framework which now exists.

"The notion that our family of three quarks might have a fourth relative, the charmed quark, was put forward many years ago. The discovery of the Ψ particle has enhanced that idea suggesting that something like charm exists. Already experiments have shown that our preconceived notion of charm does not fit all of the facts gleaned from the many hours of painstaking measurements. As before the gap between the theory and experiment is the place where the wedge is pushed to open up the secrets of nature. The doubler presents a magnificent wedge."

Peoples notes that the 400 BeV energy at Fermilab cannot produce, for example, the long-sought 37 BeV intermediate vector boson particle, but 1,000 BeV protons would produce conditions sensitive to an intermediate vector boson mass as high as 60 BeV.



DEVRY INSTITUTE COMMENCEMENT HERE DECEMBER 11

The December graduating class of the DeVry Institute of Technology, Chicago, held its commencement exercises at Fermilab Thursday evening, December 11. The 170 graduates and their families and friends also took advantage of the opportunity to tour part of the Fermilab facilities. Although graduation ceremonies do not normally occur at Fermilab, the DeVry ceremony was held here in recognition of the significant role tech school graduates, including more than 200 former DeVry students, have played in the construction and operation of the Laboratory. A close working relationship has existed between the two institutions since 1967. Many of these former students served as tour guides during the DeVry evening.

As part of his invocation for the ceremony, Father Tim Toohig said, "O Lord, in the book of Genesis, when your own work of creation was finished, you instructed man to carry on the work, to subdue the earth. When Jesus came, He came as a carpenter, the son of a carpenter, teaching us how that work of creation is carried on by the dedicated work of our hands and our minds." Dr. Edwin L. Goldwasser told the graduates, "We live in a complicated technological world in which each of us is very dependent on all the others. The solutions to all of our problems are in more and better technology. All kinds of people with all kinds of skills are necessary to provide that technology. None of them can do their jobs without the talent and skills of good technicians."



NEW MANAGER IN EEO OFFICE

Robert Sykes has joined the Fermilab staff recently as manager of the Equal Employment Opportunity Office. Mr. Sykes is a native of Gary, Indiana and a Phi Beta graduate of Fisk University where he majored in philosophy. Following his graduation he worked as an employment compliance administrator for Natural Gas Pipeline of America, Chicago, for five years.



...Robert Sykes...

Sykes brings to his new position a commitment to the programs of Fermilab that are dedicated to, as he puts it, "sensitizing people to the human aspects of a technical organization."

"This Laboratory is a young organization and it will certainly continue to evolve. As it does, personnel administration will take on a greater significance. No small part of this will be maintaining equitable working conditions for those we describe as 'minorities,' and the EEO office is concerned with all phases of these matters."

Women's concerns are often closely related minority concerns, Sykes feels. And, "I see us working closely with supervisors as we all try to understand each other. I hope our office will become something more than a service stop for a single group, and I hope women and other employees will see that our door is open for whatever help we can give."

Warren Cannon, Roel Rodriguez, and Joyce Curry are the other members of the Fermilab EEO group. Their office is at CL-6E, Ext. 3415.

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THE VILLAGE CRIER will not be issued during the weeks when holidays fall on Thursdays. The next issue therefore will be January 8.

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FOOD SERVICES HOURS during the holidays: Friday, December 19 - lunch will close at 1:30 p.m.; Thursday, December 25 (Christmas) - no food services available.

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VISITORS will be welcome in the Central Laboratory building from 8 a.m. to 8 p.m. on December 24 (Christmas Eve), December 25 (Christmas Day) and January 1 (New Year's Day). A guard will be on duty at the Receptionist Desk in the Atrium.

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PLEASE NOTE: In addition to December 24, December 25, and January 1 (Fermilab holidays), the Argonne Credit Union office at Fermilab will be closed December 31.

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HOLIDAY GREETINGS TO



ALL EMPLOYEES,
VISITORS, AND
ASSOCIATES OF FERMILAB.

CLASSIFIED ADS

FOR SALE - 70 Grand Prix, gold, vinyl top, P/S/B, AC, power windows, AM/FM radio, 8-track, mags & steel belted radials, 56,000 mi., \$1200. Dominick, Ext. 3555.

FOR SALE - Minolta SRI, 55mm, 1.8 lens, 1A & soft focus filters, adapter ring for series 7 filters, lens hood. Toshiba PE-1 hand held exp. meter. \$100. Steve, 851-4633, Ext. 4276.

FOR SALE - X-Country Ski boots, exc. cond., size 38cm (men's 5-5½ or ladies 6½-7). New \$44, will sell for \$28. Rene Donaldson, Ext. 3278 or 393-2163 evenings.

FOR SALE - Argus President Slide Projector - remote control, auto. timer - 16 magazines, \$35. Call Cheryl, Ext. 3351 or 896-9895.

FOR SALE - \$60 7½' Art. green Christ. tree, \$25. Movie Camera, screen and projector, \$50. Call Harry Carroll, Ext. 3174.