

FERMINES

 Fermi National Accelerator Laboratory

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ACCELERATOR DIVISION COMMISSIONS MAJOR NEW FACILITY



...Fermilab aerial view shows newly commissioned cooling ring in lower right foreground...

On Friday, September 1, a major milestone occurred at Fermilab. Donald E. Young, who led the successful event, has written the following report for FERMINEWS.

A new storage ring-accelerator was born at Fermilab at 1:40 a.m., Friday, September 1. A beam of protons was injected and allowed to coast in the magnet ring of the new machine for many seconds.

This is the first new accelerator, or storage ring, which has been added to the Fermilab accelerator complex since the original commissioning of the Main Ring in 1971. The storage ring is a part of the antiproton cooling ring project, the goal of which is providing a beam of antiprotons so that protons and antiprotons can be collided in the Main Ring or Energy Doubler/Saver at a later date.

The new ring is located west of the Booster Accelerator and at the 200 MeV end of the linear accelerator. (See photo above.) A beam transport system has been constructed to carry 200 MeV protons from the linac to the cooling ring. These protons will be used as test particles so that the design parameters of the storage ring can be achieved and verified.



...Helping commission the cooling ring were: Kneeling (L-R) B. Florian, M. Shea, L. Bartelson; Standing (L-R) S. Agrawal, D. Young, F. Mills, J. Otavka, L. Benson, E. Gray, J. Gannon, N. Sands...

The purpose of the cooling ring is to demonstrate that protons, and later antiprotons, can be "cooled" by an intense,

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MAJOR NEW FACILITY (Continued)

monoenergetic electron beam. The "cooling" process by the electron beam will be tested later this fall.

The "cooling" of protons by electrons is a process which was first demonstrated by Fermilab's Soviet colleagues in 1976, at the Institute of Nuclear Physics in Novosibirsk, under somewhat different conditions.

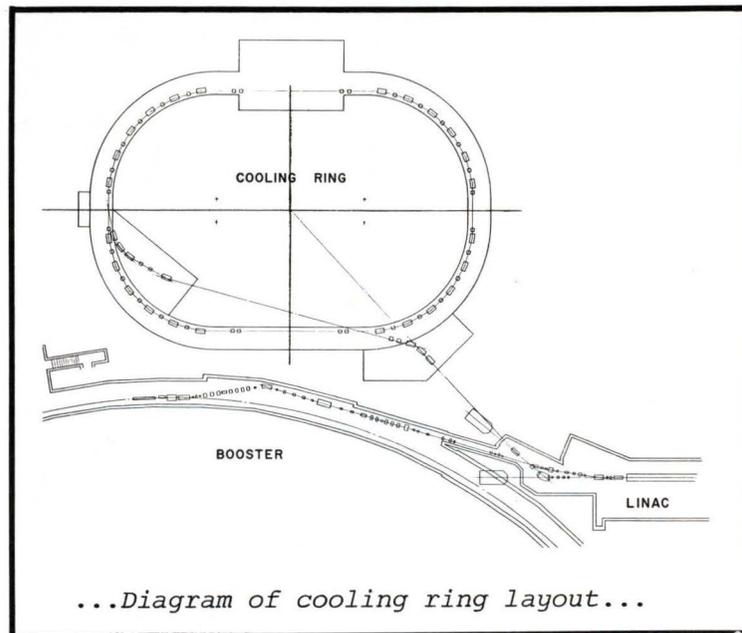
In this cooling process, excess transverse and longitudinal momentum of the protons is transferred to the electrons, until the two beams reach equilibrium; the proton beam is "cooled" by heating the cooler electron beam.

This allows the proton beam to be reduced in size. Successive pulses of the proton beam can then be accumulated in the storage ring for long periods of time.

This process, if successful, is likely to have far-reaching implications in designing future accelerators all over the world. At Fermilab the process is crucial in the plan to provide a beam of antiprotons in the accelerators which will have sufficient intensity, and luminosity, to allow good physics experiments to be carried out. This is because antiprotons can only be made at higher energies and are difficult to collect in a small-sized beam which can be accommodated in the small accelerator aperture. Hence the ability to cool them into a more dense beam and accumulate them, is essential.

This project was proposed by David Cline (University of Wisconsin), Peter McIntyre (Harvard/Fermilab), Fred Mills (Fermilab), and Carlo Rubbia (Harvard) in the fall of 1976. Following a year of intensive design effort, construction of the major components started in late summer, 1977, with a small group of physicists and technicians under the direction of Russ Huson.

The Internal Target Group in the Accelerator Division, led by McIntyre, has taken the responsibility of constructing and developing the electron beam cooling system. The Antiproton Cooling Group, under the direction of Don Young, group leader, and Fred Mills, associate group leader, has been primarily involved with the construction and development of the storage ring-accelerator.



...At cooling ring control console are (L-R): E. Gray, F. Mills, J. Gannon...

Other assistance has come from the support groups in the Accelerator Division. The University of Wisconsin has provided valuable support by contributing the help of four students this summer and post-doctoral fellows last year.

Achieving circulating beam in any new accelerator is always cause for great jubilation. There is always a question whether the design performance can be achieved in an accelerator which extends the state-of-the-art in accelerator design. The cooling ring, with 32 quadrupole magnets, 24 four-foot bending magnets, and of about 1/3 the circumference of the Booster Accelerator, is complicated by the two long, 45-foot straight sections to accommodate the electron beam cooling system. The magnet lattice, worked out by Dave Johnson, requires nine quadrupole magnet busses in which the currents must be separately adjusted and closely controlled.

Jeff Gannon has been responsible for the magnet power supply system. The mag-

FOR SALE: Wooden extension ladder to 25 ft., \$85; swivel fishing seat with back, \$5; Coleman 2 burner camp stove, \$15; Coleman 2 mantle lantern, \$10; new Evinrude/Johnson propeller 13½"x17", \$30; Shakespeare trolling motor with foot control - bow mount, \$85. Call H. Barber at Ext. 3445.

FOR SALE: New (boxed) 21" electric lawnmower, rear bagger with catcher, \$90. Call Bill at Ext. 3392.

LOST: HP21 calculator; brown sweater. M. Goodman, CL11W, x3918.

FOR SALE: Camping package - 1975 26' travel trailer and 1975 Buick station wagon, \$8000 complete or will sell separately. Call Sharon Henderson at x3585 or 312-896-0128.

LESSONS: Square dance lessons starting September 27, 1978, Smith School, 1332 Robinwood, Aurora. For more information call x3585 or 312-896-0128, Sharon Henderson.

FOR SALE: 1974 Dodge Dart, 4 dr/air, power steering/power brakes, AM/FM, 66,000 miles, \$1700 or offer; 6-cyl. radial tires, Consumer's Report recommended. Call Ext. 3916.

FOR SALE: 1974 Pinto station wagon, auto/AM radio, 59000 miles, good condition. Asking \$1200. Call 840-3080.

FOR SALE: 1971 Oldsmobile Cutlass, 61000 miles, new trans./power steering/power brakes. Very good body and running condition. \$1000 or best offer. Call 665-0439 after 7 P.M.

FOR SALE: 1967 Ford Galaxy, 92000 miles, 289VS, standard. \$150 or best offer. Call Louise at Ext. 3420.

FOR SALE: Tires: 2 snow tires, Douglas tubeless G-70-14; 1 G-78-14; 1 tractor tire used for sandbox for children. All excellent condition. Call Lucy at Ext. 3276.

FOR SALE: Window air conditioner, 8000 BTU; used two seasons, \$90. Call Art at x3696.

FOR SALE: Sears 23 channel, SSB CB radio w/ringo ranger antenna mastng, coaxial and matcher. All in excellent condition. \$200. Call Kevin at Ext. 4028.

FOR SALE: 1975 Yamaha YZ 250 dirt bike, excellent condition, used one season and stored for two seasons. Asking \$550. Call Jay 897-5195 evenings.

FOR SALE: Woodhaven Lakes camping site. Size 55 x 110, stone patio, fire pit, water and electricity. Three lakes, swimming pool, year-round planned activities. \$4,500. Call Chuck 879-1925 or 879-2440.

FOR SALE: Cottage, 11 miles east of Wisconsin Dells, 1 acre land, 100 ft. lake frontage (Lake Mason), 3 bedrooms, wooded lot. Call Chuck at 879-2440 or 879-1925. Asking \$41,200 or make offer.

CLASSIFIED ADS CONTINUED

FOR SALE: Epiphone solid body electric guitar; excellent condition. \$130.
Call Ed at Ext. 3795 or 629-7643.

FOR SALE: Kodak XL-55 Super 8 movie camera and case, 4 years old, top condition.
\$90 or best offer. Call Art Streccius at Ext. 4438 or 879-5215.

FOR SALE: Dehumidifier, \$35; antenna rotor, \$20, tetherball pole, free; 4'x6'
utility trailer, good condition, \$75. Call Jess at Ext. 3886 or
466-4129.

FOR SALE: 1 "Rochester" Quadrajets Carburetor, 500 miles, perfect condition, \$40.
1 AM/FM quad radio, fits 73-78 Camaro, never used, \$35. 1 AC electric
fuel pump, never used, \$5. Call Vance at Ext. 4191.

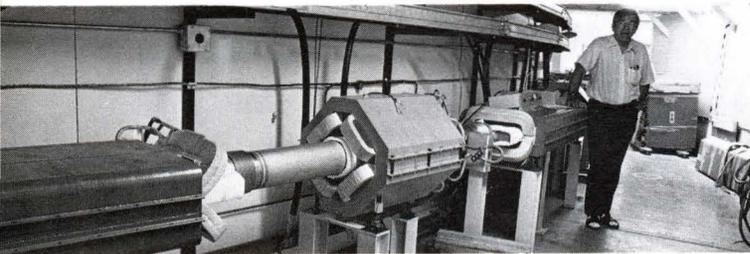
FOR SALE: 16 Cu. Ft. Hot Point refrigerator, 220 lb. freezer, like new, \$150.
Call Ed Kuhulchi, 629-7643.

FOR SALE: 1973 Pontiac Firebird, silver w/white interior; fully equipped;
excellent condition, interior and exterior; 4 new radial tires; new carb.,
recent tune up; 39,000 miles. Price \$2850. Call x3452, home 825-6582
(evenings) ask for Tom.

FREE: Puppies, part sheppard-part collie. Call Dennis Gaw at Ext. 3555.



...With first magnet are (L-R):
J. Otavka, N. Sands, T. Larson...



...F. Mills with magnet string in tunnel...

nets were specially designed for this unique application and have a relatively large aperture to accommodate several parallel beams. Stan Snowdon designed the magnets; the coils were fabricated in the magnet factory under the direction of Jack Jagger. The cores were fabricated and the magnets assembled by Tom Larson, Bryan Winfield, Nate Sands, and Dan Villarreal. The field in each magnet was measured by Terry Rhodes and Shree Agrawal. Installation of the magnets was done by Joe Otavka and Lee Benson.

A unique vacuum system has been designed and constructed by Ed Gray and Jim Klen. It will be capable of achieving a vacuum of 10^{-10} torr which is necessary to obtain the long lifetime required for the accumulation of antiprotons. For this extremely-good vacuum, the chamber is all welded, stainless steel in which all components have been degassed by baking in a vacuum oven to 900° Centigrade before assembly. A further bake of the chamber in place at a lower temperature, i.e. 400°

C., will be possible by heaters attached or wrapped on the chamber. With only about 5% of the ultimate pumping speed which will be available, and before the chamber has been baked, a pressure of about 10^{-8} torr has been achieved which bodes well for the attainment of the future goal.

The transport of the 200 MeV proton beam from the linear accelerator to the new ring presented several difficult problems. The main problem involved the attenuation of the intense linac beam to a low enough intensity so that the ground level ring would require only a small amount of local shielding. This was accomplished by chopping a short pulse out of the long linac pulse and reducing its intensity by using a series of small collimators. The injection transport lines from the linac with controls was designed and developed by Craig Moore, Mike Shea, Bob Goodwin, and Bob Florian. The safety system and radiation monitoring has been the responsibility of Howard Casebolt and Rich Parry. The abort system, and injection kicker, have been built by Leon Bartelson.

Controls were done by the Accelerator Division Controls Group with Bob Ducar, Lin Winterowd, and Mel Storm taking a major role.

The initial operation of the ring has been a great victory for the designers. The calculated currents in the magnets have resulted in a good circulating beam with a mean lifetime of 3 to 5 seconds. This lifetime is consistent with the present vacuum. No compensation or additional corrections have been required.

This important step will be followed by a test of the cooling system later this fall. If this succeeds and a cooled beam can be accumulated, then antiprotons will be brought to the ring and colliding beams at Fermilab can be anticipated for the future.

Philip V. Livdahl, Fermilab Acting Director, said, "This group has done a skillful job in completing the assembly and initial starting of this project. Although this step is only the first of many demanding steps, it is most encouraging to have come this far on schedule and with such good results. My congratulations and best wishes for the future to all of the persons involved!"

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Inter/National Film Society Presents

"BEDAZZLED"

Friday, September 8

8:30 p.m.

Fermilab Auditorium

Raquel Welch personifies lust in "Bedazzled" (1968). It is a devil-may-care update of the Faust legend that involves a short-order cook--short in stature and unsuccessful with women--who receives seven wishes from Satan. In short order, he becomes a fly, a rock star, an intellectual, and a nun. Still, the devil, who prefers to be called "George," remains his best (because his only) friend. (107 min.) Rated PG

Admission: \$1.50 for adults; 50¢ for children

FERMILAB GEARING UP FOR BIKE-A-THON

Time is running out to enter the first Fermilab Bike-A-Thon Sunday, September 17.

The event, from 1 to 6 p.m., will follow a course around the Main Ring. The Bike-A-Thon is sponsored by the Laboratory in cooperation with the South Kane-Kendall County unit of the American Cancer Society. All proceeds will be donated to combat cancer.

Gene Fisk, assistant head of Fermilab's physics department, is Bike-A-Thon chairman. He invites employees, visitors, subcontractor personnel and their families to enter the benefit bike ride with the public.

Top individual prize is a 10-speed bike. A "Fermilab Challenge Cup" will go to the top five-person team. Other prizes include trophies, T-shirts and Bike-A-Thon patches.

Bikers are asked to pedal 20 miles. Pledges are to be collected and turned in before a rider begins his turn. Sponsor sheets are available from the Fermilab Physics Department, Ext. 3203; Colonial Ice Cream shops in Batavia, Geneva and St. Charles; participating McDonald's restaurants; and the Cancer Society office in Geneva, 321 James St.

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QUARTET PERFORMS SATURDAY

The "Fine Arts Quartet", with pianist Menachim Pressler, will perform at Fermilab on Saturday, Sept. 9. Tickets--\$4 each--are on sale at the Guest Office.

A SPECIAL INVITATION has been issued to everyone at Fermilab to attend a dinner dance on September 23 in honor of Dr. and Mrs. Robert Wilson and Dr. and Mrs. E. L. Goldwasser. Tickets available in the Guest Office, CL-1 West.

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FERMI POOL ADOPTS FALL SCHEDULE

Fermilab swimming pool hours have been reduced with the arrival of another school year. Lifeguards will be on duty weekends only from 11 a.m. to 7 p.m. If weather conditions permit, the pool will remain open on a limited basis until Oct. 1.

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NEW STORES CATALOG AVAILABLE

An updated version of the Fermilab stores catalog has been published by the Material Supply group.

The 350-page volume replaces the first catalog issued in 1976. In addition to listing items available from site stockrooms, the catalog describes stores facilities, stockroom item classification codes, and explains catalog descriptions. Also, procedures for withdrawing stock, instructions for ordering compressed gases and procedures for requesting additions/deletions to stock are noted.

Copies of the new catalog are available from Material Supply, CL-6W/Ext. 3808-3809.

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