FERMINEWS

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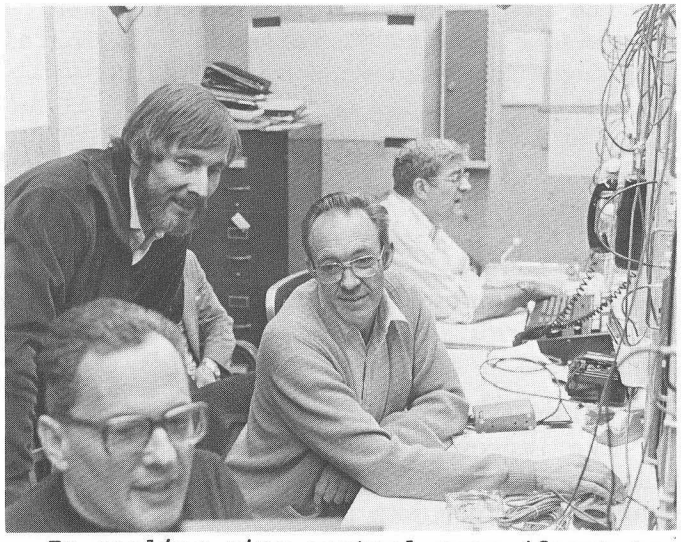
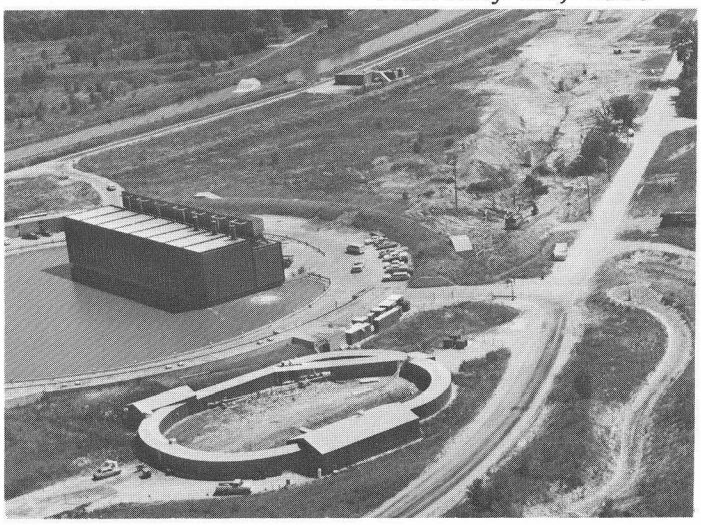


...In cooling ring control room (front to rear) Branko Leskovar, Chris Leemann (standing), Glen Lambertson, all of LBL, and Fred Mills follow progress of an experiment...



...Cooling ring is circular building in foreground. Behind it are Central Utility Building and cooling pond for Booster. Construction site shows location of antiproton target station (near top of photograph) and line that connects it to Booster...

COLLIDING BEAMS COLLABORATION ACHIEVES STOCHASTIC COOLING

The Colliding Beams Group achieved stochastic cooling for the first time Feb. 9.

It was about 4:30 a.m. that Saturday and "our measurements were good enough to really convince us we had a cooling system," said Fred Mills, associate head of the Colliding Beams Group. "We reduced the momentum spread of the beam with this device."

"It's been three years of hard work, research and development," said Mills, "but it's beginning to pay off in terms of our learning how to cool beams. That Saturday morning, Fermilab got its first glimpse of this kind of thing."

Cooling is an important part of the Tevatron Phase I Project that has the goal of providing the capability of sustained operation of the superconducting magnet ring at 1 TeV (1,000 GeV) and proton-antiproton colliding beams at up to 2 TeV center of mass. These enormously high energy levels will provide physicists with a whole range of new information.

Part of this overall project is an antiproton source that includes both stochastic and electron cooling. Plans call for the use of a precooler ring, about Booster length, to collect and stochastically momentum cool antiprotons produced by 80 GeV protons extracted from the Main Ring and striking a target. When the circulating beam has been sufficiently cooled, it will be transferred to another ring for accumulation and further cooling by electron cooling.

Stochastic momentum cooling is effective for high energy, large momentum spread beams, and electron cooling is most effective for relatively cool beams at low energy. Furthermore, electron cooling works equally well for transverse and longitudinal beam dimensions. The plan, therefore, uses the advantages of both stochastic and electron cooling.

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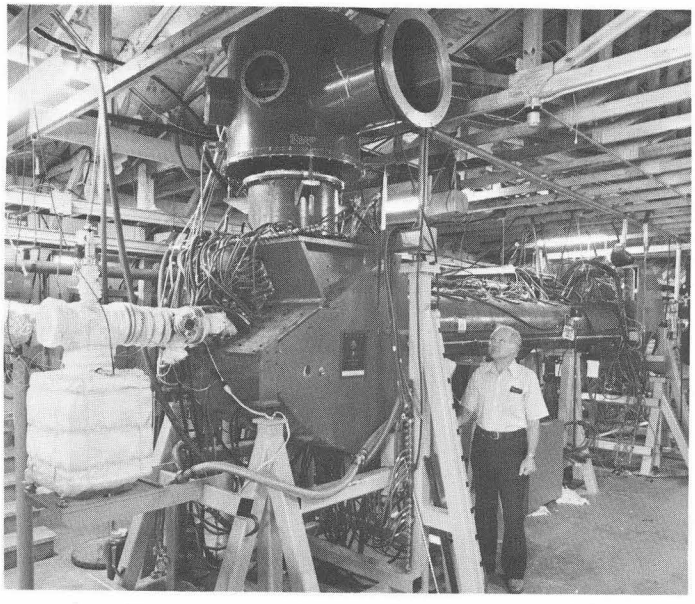

...Don Young examines electron cooling device. Electrons are made by a cathode mechanism (far right of photograph). They travel through a solenoid magnet (behind Young's head) and are bent upward through toroid magnets into the collector (at the very top) for the electron cooling system...

The Fermilab Colliding Beam Group, headed by Don Young, had been working with scientists from the Lawrence Berkely Laboratory at the time of the first stochastic momentum cooling.

"In this collaboration with LBL, we are studying two systems of stochastic cooling," said Mills. "These systems are very advanced and different from the stochastic cooling systems at CERN. We are pushing the art in beam detectors and low noise amplifiers."

Mills emphasized that "this is an experimental program." It is not the final system. We have to learn how to do many things yet, but Saturday's (Feb. 9) cooling was a step forward toward that knowledge."

The scenario for the Feb. 9 accomplishment began last fall when LBL scientists began installing their equipment in the Fermilab cooling ring. This ring is located in the blue "race track" building west of the Booster Ring. Both Fermilab and LBL believed that such a collaboration would be beneficial to both institutions.

In addition to studying the two systems of stochastic cooling, Fermilab also is working with electron cooling as a means of reducing the momentum spread of antiprotons.

THE PEOPLE WHO MADE IT WORK

Fred Mills, Terry Rhoades and Yoshi Miyahara operated the accelerator for the LBL group and provided the beams they wanted. They have also conducted accelerator physics on the ring together with Don Young. (Miyahara is from KEK, on leave at Fermilab).

Ed Gray, Jim Klen, Dick Downs, Ken Shores and Richard M. Reimers (LBL) installed equipment into the vacuum system.

Jim Bridges, Gil Nicholls, Loretta McMath;Bill South and Casey Cahill (both Accelerator Division) were responsible for the electrical installation and cabling.

Bill Miller and Stan Tawzer, both with the Accelerator Division, loaned test equipment and provided assistance when it was needed.

Frank Cilyo was primarily responsible for the improved magnet current regulation, which allows a longer beam lifetime. The experimentation was possible because of this key factor.

All are with the Colliding Beams Group except where noted.

The LBL group was led by Glen Lambertson, who invented the magnet that eventually was to be named after him -- the Lambertson magnet. Chris Leemann and John Staples, both LBL physicists, took measurements, and Bill Flood, an engineer, was primarily responsible for installing much of the equipment the LBL group brought last fall. Assisting them was C.C. Lo, an LBL electrical engineer.

Peter McIntyre of Fermilab and Harvard University is heading this effort.

"Since December of last year, we have been conducting tests of these two systems (stochastic cooling)," explained Mills.

Early Friday morning, the cooling ring was temporarily shut down to allow the Cancer Therapy Facility to treat patients. Then on Friday night, "we got back into business," continued Mills. And on Saturday morning came the successful cooling.

In addition to LBL, other institutions collaborating on the broad program of colliding beams include the Argonne National Laboratory, the Institute of Nuclear Physics at Novosibirsk, USSR, and the University of Wisconsin.

WHY COOLING IS NECESSARY

Cooling is a sophisticated technology that allows scientists to calm down antiprotons so that more of them can be packed together. They do this by reducing the momentum and angular spreads of the antiprotons. There are two types of cooling, stochastic and electron, each with their advantages.

Fred Mills, associate head of the Colliding Beams Group, explained why cooling is necessary. "It allows us to accumulate lots of particles in a cooling ring." With one Main Ring pulse, about 50 million antiprotons can be collected. However, in order to conduct collisions at 1 TeV, physicists need about 2,000 times that many. To accomplish this, they take antiprotons created by 2,000 Main Ring pulses. But in order to collect and store them, they have to cool the antiprotons.

The antiprotons will be stochastically cooled in the precooler ring and electron-cooled in the electron cooling ring. When enough antiprotons have been accumulated, they will be injected into the Main Ring, accelerated to appropriate energies and then injected into the Superconducting Ring. Whirling around now in a direction opposite to the protons, the antiprotons will be accelerated to 1 TeV. They will then collide with 1 TeV protons hurtling at them thus giving 2 TeV center-of-mass collisions.

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CHEZ LEON MENUS

Tuesday, Feb. 26 - 7 p.m. - $8.00
- Lentil soup
- Marinated lamb chops
- Stewed okra
- Fresh salad
- Walnut and honey custard

Wednesday, Feb. 27 - 12:30 - $4.50
- Caponata
- Scampi
- Fettuccine with red peppers
- Fresh salad
- Pecan torte

Thursday, Feb. 28 - 7 p.m. - $8.00
- Fresh leek soup
- Cornish hens with wild rice
- Tardiniere of vegetables
- Fresh salad
- Chocolate praline mousse

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...Richard A. Lundy, deputy head of the Energy Doubler Magnet Section, is interviewed in the Central Laboratory by film crew from television channel 5, Chicago. The interview about electric cars will be aired during "On Q" Feb. 23 at 6 p.m. and Feb. 24 at 10:30 a.m....

LEDERMAN TO APPEAR ON CALLAWAY SHOW

Dr. Leon Lederman, Fermilab director, will appear on "John Callaway Interviews" March 4.

The show will be aired at 9 p.m. on channel 11, WTTW, Chicago public television. The show's host, John D. Callaway, is director of news and current events for WTTW.

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NATIONAL GEOGRAPHIC TV SPECIAL TO AIR

"The Invisible World," a National Geographic special, will be shown here over local television stations March 3 at 7 p.m.

The hour-long documentary will take the viewer into the worlds that cannot be captured by the human eye alone. A portion of the show will be devoted to high energy physics as scientists search for answers ever deeper into the atom.

The segment featuring Fermilab will include the Main Ring tunnel, the 15 ft. Bubble Chamber, and the Scanning Facility.

The photographic team visited Fermilab twice to do the special photography. One of the scenes features a high-speed view of the Main Ring tunnel, simulating particles' trip through the Main Ring magnets.

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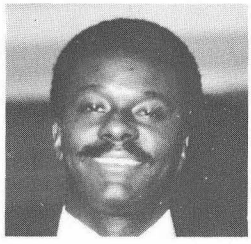

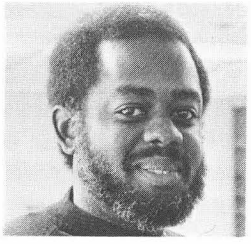

CARRYING ON THE BLACK AMERICAN TRADITION IN SCIENCE at Fermilab are a number of Ph.D. physicists:

Carl Johnson (top row, left), post-doc from the Lawrence Berkeley Laboratory, is a member of the E-203/391 collaboration in the Muon Lab. Dennis Judd, (right top) professor of physics at Howard University, is a member of the E-610 team, representing the first collaboration at Fermilab with a traditionally Black university.

Second row, (Left), Homer Neal, a professor of physics at Indiana University and dean of research and graduate development, is associated with E-313 in the Internal Target area. A. L. Sessoms (right, center) is assistant professor at Harvard University. His recent collaborations here include E-541 (Neutrino Area), E-398, (Muon Laboratory) and E-369 (Neutrino Area).

Bottom row, Elliot Treadwell is a research associate in the Fermilab Physics Department, a collaborator in E-546 in the 15 ft. bubble chamber.

BLACK HISTORY MONTH

February is Black History Month, a time to reflect upon and acknowledge the contributions of Black Americans to the achievements, progress, and spirit of the United States. American history and every facet of our society have been enriched by the efforts of Black Americans. The observance is the extension of National Negro History Week, which was begun by Carter G. Woodson, a reknowned Black historian, teacher, and author.

Of special interest to the Fermilab community are the innovations in science and technology that have been developed, researched and implemented by Black scientists today. The roll call is impressive---

James Harris - nuclear chemist at the Lawrence Berkeley Laboratory and co-discoverer of chemical elements 104 and 105.

Walter Massey - present director of Argonne National Laboratory with impressive credentials in high energy physics.

Isaac T. Gillam IV - director of NASA's Dryden Flight Research Center and an aeronautical engineer.

Ernest Coleman - teacher and physicist who has served as director of high energy physics research at three federal agencies.

Cordell Reed - engineer and assistant vice president of Commonwealth Edison of Chicago involved in safeguards of nuclear facilities.

Ernest Wilkins - physicist who developed devices to shield against gamma rays emitted from the sun and other nuclear sources.

A very significant date this month is February 14th, commemorating the birth of Frederick Douglass, a staunch abolitionist and champion of human liberty.

When National Negro History Week was launched in 1926, it was scheduled for the second week in February because the birthdays of Douglass and Abraham Lincoln occurred then. One historian has written, "If a man's capacity be measured by what he has achieved, Frederick Douglass must be ranked among the great men of a great day; if by the obstacles overcome, he must be accounted among the greatest of any time."

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