June 27, 1985
FERMI NATIONAL ACCELERATOR LABORATORY

FermiNews

Science Teachers Gather at Fermilab for Institute

The Summer Institute for Science Teachers (SIST), under the auspices of the Friends of Fermilab Association (FFLA), began its third year of intensive science education for 45 high school biology, chemistry, and physics teachers on June 17.

Drawn from the nine-county northeastern Illinois area, the teachers will divide their time between Fermilab and Naperville Central High School during the four week Institute.

Marge Bardeen (l), director of SIST, and Jenny Nichol, SIST secretary, at SIST's "office" on the 2nd floor crossover. SIST T-shirts are available, for a small fee, to anyone who stops by.

Marge Bardeen, director of the SIST, emphasized the special nature of the Institute's program. "This is a cooperative effort between Fermilab and both university and high school educators. FFLA basically said to these teachers, 'How can we help you?' As a result, our program design and curriculum development was based on the recommendations of peers of the participating teachers. The teachers who go through our Summer Institute are professionals, and their learning sessions are conducted in an atmosphere of sharing."

Each of the four weeks is divided into intradisciplinary lectures and plenary lectures at Fermilab, and computer and science labs held at Naperville High School. The specialized lectures afford teachers an opportunity to update their understanding of basic science within their particular discipline (biology, chemistry, and physics). The plenary lectures delivered by, among others, Dr. Marie T. Banich of the University of Chicago, Dr. Leon Lederman of Fermilab, Dr. Micheal Lipschultz of Purdue University, and Dr. Earl Zwicker of IIT, bring all 45 teachers together for a look at the latest advances in scientific research. The labs involve demonstrations and experiments presented by outstanding high school teachers, and afford SIST participants the opportunity to develop their own lab programs. At the end of the four weeks, the participants within each discipline share their newly-developed lab programs with their colleagues. As a result, each teacher returns to his or her classroom with 15 new labs ready for students in the next school year.

Computer labs have proven especially useful to teachers who may find themselves rushing to keep up with their students' computer adeptness. SIST provides teachers a chance to interface with word-processing, data storage and retrieval, and software evaluation.

The SIST was inspired by the Saturday Morning Physics Program for high school students. While the Saturday morning sessions continue to be a resounding success, the SIST serves as a way to reach even more students by raising the level of science knowledge carried back into the high school by teachers involved in the SIST program.

The SIST recently received a $225,000 grant from the National Science Foundation, enabling SIST to continue its program over the next three years (see FermiNews, May 2, 1985). As stated at that time, the Institute's goal is "to enhance teachers' professional competence, resulting in more students in science classrooms, better informed citizens, and more people entering scientific careers."

TeV I Target Station is Ready for Antiproton Production

The Target Station is the part of the Antiproton Source in which the antiprotons will be produced. It is located in building AP0, which is a few hundred meters south of the Debuncher and Accumulator Rings. Once every two seconds during the antiproton production cycle, a 1.6 microsecond-long batch containing 2×10^{12} 120-GeV protons is transported along beamline AP1 from the Main Ring to the Target Station. There, the protons strike a production target from which antiprotons of 8 GeV are selected and transported along beamline AP2 to the Debuncher. When enough antiprotons have been accumulated and cooled (about four hours), they are transported through beamline AP3, which bypasses the Target Station, and through AP1 to the Main Ring.

Front row, from left: John Krider, Jeff Hangst, George Biallas, Hiep Le, Gerry Gould, Tony McKee, Rob Reilly, and Dave Augustine. Back row, from left: Jay James, Mike Roman, Don Szarzynski, Ron Kellet, Mitch Tarkowski, Kerry Mellott, Gerry Dugan, Simmie Meredith, Ken Bourkland, Carlos Hojvat, Doug Booth, Steve Hays, Bill Karl, Sr., and Jim Holub. (Not pictured is Frank Krzich)

The Target Station consists of the following components: 1) entrance collimators, 2) instrumentation for measuring the position and size of the incident proton beam, 3) a production target, 4) a lens to collect antiprotons, 5) a dipole magnet to select antiprotons of about 8 GeV, 6) a beam dump, 7) a beam stop in AP2, and 8) a beam stop in AP3. All components are five meters below floor level in a steel and concrete vault which contains the high level of background radiation associated with antiproton production. Except for the beam stops, each individual component is attached to the bottom of a block of steel six feet tall to form an independent "module." A module may be remotely withdrawn from, or inserted into, the vault. Also, a defective radioactive component may be remotely replaced with a working component. Carlos Hojvat is the Group Leader for the entire Target Station. George Biallas is the lead mechanical engineer on the project. Joe Heim worked on the project during the conceptual phase. Ron Hansen worked on the module design.

The vault is shielded by 1100 pieces of steel weighing 1500 tons. Rob Reilly was the engineer in charge of assembling the vault. The module alignment system within the steel stack was designed by Fritz Lange.

The instrumentation module consists of a horizontal-vertical pair of high resolution, multiwire, secondary emission chambers, which measure the proton beam profile and position, and a horizontal-vertical pair of Beam Position Monitors, which provide a second measurement of the beam position. In order to maximize antiproton yield, the proton beam size at the target must be small, approximately 1 millimeter in diameter, and the position must be well controlled. Each wire chamber consists of 24, 100-micron diameter titanium wires. The central 12 wires are spaced 250 microns apart, and the remaining six wires on each side are spaced 500 microns apart.

The chambers measure the beam position and width with an accuracy of 100 microns. The Beam Position Monitors have an accuracy of 250 microns in beam position. The secondary emission chambers were designed by John Krider.

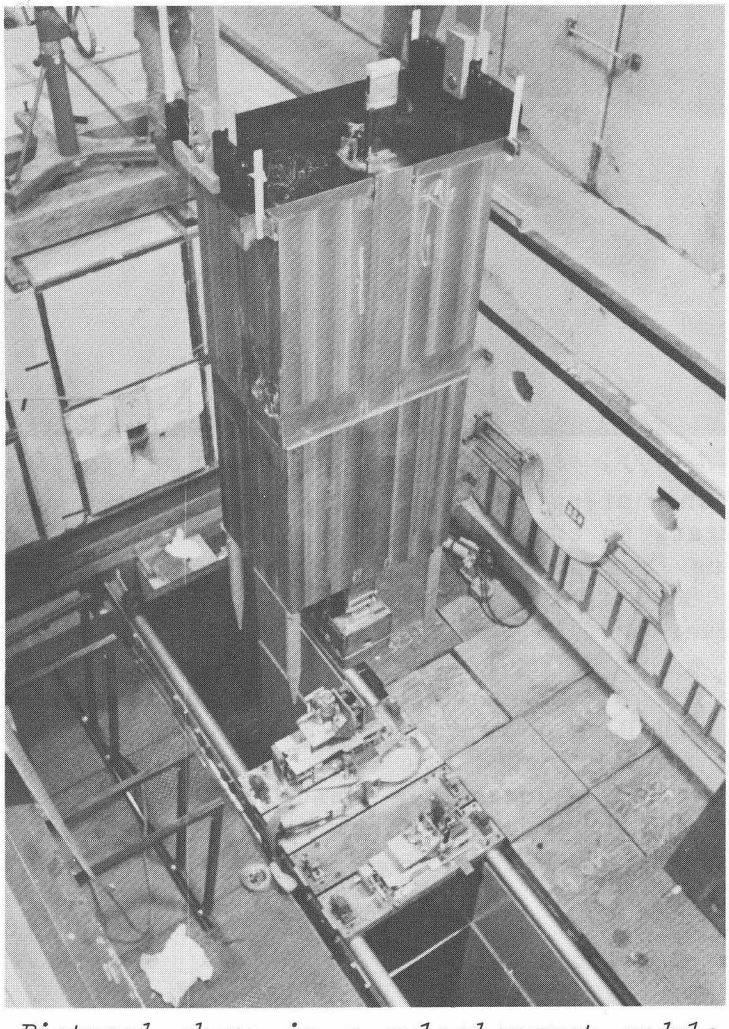
The target is composed of a vertical stack of 4-in. diameter by 3/8-in. thick tungsten-rhenium discs interleaved with air-cooling channels. The target material is very dense, so the target length can be kept short compared to the focal length of the antiproton collection lens. Approximately 50% of the protons interact in a 6

continued on page 3...

...continued from page 2

centimeter long target. The target alloy must be resistant to thermal shock damage, because the peak temperature rise will be about 1500° centigrade in 1.5 microseconds. The target rotates in order to distribute radiation damage throughout the discs. It can also be moved vertically to select different discs, and it can be moved horizontally into the beam to change the chord length through which beam passes. Ron Hansen and George Biallas worked on the design.

The antiproton collection lens consists of a 2-centimeter diameter by 15-centimeter long cylinder of lithium. The axis of the lens coincides with the centerline of the proton beam. A 620,000-ampere peak axial current pulse generates a radial magnetic field gradient of 1000 tesla per meter at beam time, giving a 20-centimeter focal length for 8-GeV antiprotons. Lithium is used for the conductor because of its low density; the current is pulsed to reduce joule heating. The lens is water cooled. The lens module is equipped with motor drives, which allow the lens to be displaced with respect to the other components of the target station in order to maximize antiproton yield. The lens has been an extensive development project directed by Carlos Hojvat, with Gerry Dugan as the lead physicist. George Biallas, Jeff Hangst, and Werner Sax provided much engineering assistance. Hiep Le has done most of the mechanical assembly of lenses and transformers. Ken Bourkland and Steve Hays designed and built the pulsed power supply. Bill Marsh wrote the application program which positions the lens. Numerous other physicists, engineers, technicians, and machinists have contributed to the project. There is an ongoing collaboration with scientists from CERN. Fermilab provided a lithium lens which has been used successfully during the last year in the CERN antiproton source. Development work is continuing on improved, radiation-hard lenses and transformers.



Pictured above is a pulsed-magnet module being inserted into the target vault.

The 30 centimeter long, pulsed dipole magnet has a 5.17-tesla field, which bends 8-GeV antiprotons 3 degrees to the left of the proton beam. It has a six-turn winding which requires a 50,000 ampere current pulse. Jeff Hangst designed the magnet. Lamination stacking was done by Leo Ray's group, and insulation was done by Rich Isiminger and Mary Brooks. The power supply was provided by Ken Bourkland and Steve Hays. New radiation-hard magnets are being developed.

The beam dump was designed by Max Palmer and installed by Rob Reilly. It absorbs protons which do not interact in the target, as well as many of the interaction products from the target. It consists of a six-foot long, water-cooled carbon core surrounded by an aluminum jacket. Radiation-hard thermocouples monitor the temperature at six points inside the dump.

Rob Reilly designed the beam stops. They consist of motor driven steel jaws which can be opened and closed from the accelerator control system, and which are also interlocked to the Accelerator safety system.

continued on page 5...

McInturff Records 1000th Assisted Descent. 4000 to Go

Al McInturff, somewhere over the earth and falling fast.

To those of us for whom stepping on an airplane is an act contrary to the natural order of things, stepping from an airplane while said airplane is 8000 feet off the ground is positively perverse.

Not so, however, for Al McInturff, head of Magnet Research and Development at Lab 2. A few weekends ago Al logged his 1000th jump, freefall, and successful landing, placing him in the upper echelon of airborne daredevils and people without a proper respect for gravity.

Al began voluntarily leaving airplanes almost 20 years ago as a Marine in Tennessee. He was lured into skydiving by a fellow Marine who promoted the activity as "a great way to relax." Making his first unrequired midair exit from a farmer's 4-place, 172 Cessna, Al decided he "liked it, once I was clear of the 'plane. I only jumped from 3,000 feet, but I remember that my first thought was how small things looked from that high up."

In those days, not many people jumped out of airplanes unless something essential was on fire. Twenty or thirty jumps, and you qualified as an expert. Nowadays, upwards of 2300 people have earned their gold wings and an "Expert" rating for having made over 200 jumps. While Al is uncertain of the number of people who have jumped 1000 times, he knows of only one person who has intentionally bailed out 5000 times.

After leaving the service, and while working at Brookhaven, Al joined the Long Island Skydivers, an association which led him into skydiving as a professional sideline during the years 1970-1979. The group performed at air shows, festivals, carnivals, and rodeos. One of Al's rodeo jumps, at the Suffolk County Fairgrounds near Brookhaven, brought him closer to a pen full of bulls than comfort would dictate.

"We had a lot of high wind coming in from the ocean, but we decided to jump anyway. I turned into the wind, but the wind was winning; it was in excess of 30 knots, and it was pulling me toward the covered stadium. I pulled my front risers, which put me into a forward stall, which put me right over the stadium. I let up on my 'chute, and landed no more than 3 feet from a pen full of bulls. The crowd loved it, of course."

Hollywood, as they say, beckoned. Al and other members of the Long Island Skydivers provided parachute stunts for the

continued on page 6...

Nothing to Do? A Canoe's For You

How to have "fun" on a summer afternoon: mow the lawn (front and backyard); hang all of your laundry outside on the clothesline and forget to take it in before it starts to rain; clean out your sock drawer...or you could **rent a Fermilab canoe!**

Employees can take the canoes off-site or use Fermilab's Lake Law to practice for "big league" canoeing. The fee is $5 a day, which includes paddles and life preservers.

You must call Helen McCulloch, or the Recreation Office at ext. 3126, at least a week in advance to reserve a canoe.

Twain's Rule: Only kings, editors, and people with tapeworm have the right to use the editorial "we."

Guided Tours Offered This Summer

Fermilab will offer free guided tours on Sundays during June, July, and August. The one-hour tours will begin promptly at 3 p.m. and will include a short, general slide orientation as well as an escorted walk through the exhibit and observation area of Wilson Hall.

Reservations for the Sunday tours are not necessary. Interested persons should assemble in the Atrium of Wilson Hall. For more information, call ext. 3351.

"Hard Times" Party is NALREC's Next

NALREC presents their "Hard Times" Party at the Kuhn Barn on Friday, June 28, 1985, at 5:15 p.m. Menu includes New York Strip Steak, baked potato, cole slaw, and butter & rolls, all for only $3. For more information call Jim Fritz, ext. 4606 or Jim Fitzgerald, ext. 4978.

Copies of the 1984 Fermilab Annual Report are now available in the Publications Office, WH3E, or by sending a request, along with your name and mail station, to MS #107.

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Housing Deadline

July 19, 1985 is the deadline for receipt of reservations for fall on-site housing. Responses will be mailed out August 9, 1985. Starting dates for fall occupancy will begin during the first week of September, 1985. For information, please call the Housing Office, ext. 3777.

...continued from page 3

Surveyors led by Mike Roman carefully aligned all components on their respective modules. Frank Krzich led the assembly of water-cooling systems for the lens and dump. Robert "Obie" Oberholtzer coordinated electrical installation in the Target Hall.

By March 29 all components except the target, lens, and AP3 beam stop were installed and operating. By the end of April the remaining components were installed and operating. Spare components are now being assembled.

John Krider was responsible for the Target Station instrumentation. This involved two areas: 1) providing hardware alarm and interlock systems to protect all components in the Target Station, and 2) interfacing control and the readback of analog and digital status to the Accelerator control system. This included specifying, purchasing, and implementing commercial instrumentation, as well as designing custom circuitry. Jay James and Karen Watkins assembled and tested most of the instrumentation.

Much of the credit for the success of the Target Station must go to the following people who helped to put it together. Design and drafting suport was provided by Jim Edwards, Art Fischer, Dennis Johnston, Tony McKee, and Simmie Meredith. Mechanical support came from Phil Adderley, Dave Augustine, Lee Brown, Cliff Foster, Jim Holub, Ron Kellet, Hiep Le, Kerry Mellott, Dave Musser, Gene Opperman, and Mike Petkus. Machining and welding were provided by Doug Booth, Larry Chiplis, Don Szarzynski, and Mitch Tarkowski and all Fermilab Machine Shop personnel. Dixon Bogert, Bob Ducar, and Al Franck from the Controls Group, and Dennis McConnell, with his database mastery, connected us to the Accelerator control system.

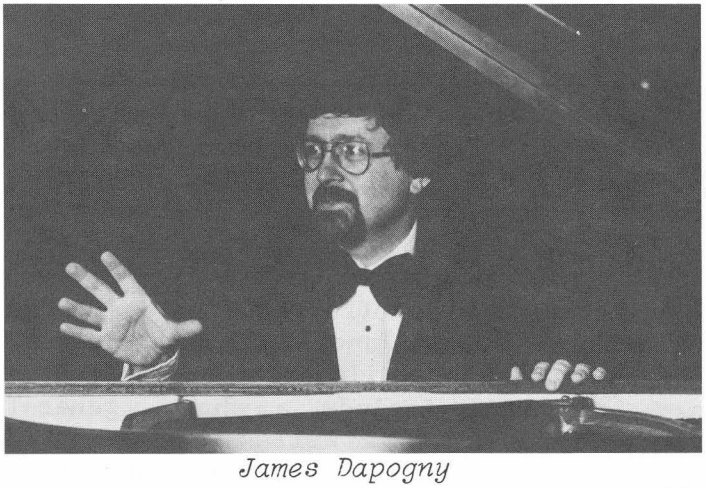
—John Krider

Let the Good Times "Roll" with Ragtime Piano Virtuoso

Jelly Roll Morton is revered as a pioneer of ragtime piano, and as a composer and brilliant innovator in the transition from early jazz to orchestral jazz. In celebration of the centennial of his birth, the Fermilab Arts Series will present "A Tribute to Jelly Roll Morton" for its annual Jazz Showcase on Saturday, July 13, 1985, at 8 p.m. in Ramsey Auditorium. Featuring traditionalist James Dapogny on piano, the program includes "Mr. Jelly Lord's" classic compositions for solo piano, the masterpieces of the Red Hot Peppers, and the music of the Morton Trio.

Jelly Roll Morton grew up in the culturally dazzling New Orleans of Buddy Bolden's era. As a teen he began to earn his living as a pianist in the Crescent City's red-light district. He then spent years criss-crossing America as a pianist, gambler, promoter, and vaudevillian before settling in Chicago in 1923. In the next five years he recorded most of the great piano compositions, such as **King Porter Stomp**, and such famed works as **Original Jelly Roll Blues** with the Red Hot Peppers. In 1928, Morton moved East and spent the rest of his life primarily in New York City and Washington, D.C. In the 30's, he fell on hard times; nonetheless, in 1938 the Library of Congress recorded Morton's oral history.

In concert, the immortal Morton's solo works will be performed by pianist James Dapogny who "has the composer's zest and flair." A performer and music historian whose works include the definitive biography of Jelly Roll Morton, Dapogny "plays Morton as Morton should be played." Joining Dapogny to perform the music of the Red Hot Peppers are six of Chicago's outstanding classical jazzmen: Steve Jensen, cornet; Kim Cusack, clarinet; Jim Beebe, trombone; Ikey Robinson--who was a member of Morton's Chicago-based bands and recorded with the master--on banjo; Truck Parham, bass; and Kansas Fields, drums.



James Dapogny

Admission to the Jazz Showcase is $6. Phone ext. 3353 for ticket information.

--Jane Green

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spy-spoof film, "Our Man Flint" which was doing location filming on Long Island. Al also jumped for Country Club Malt Liquor commercials and in Air Force training films.

Al's 1000th jump was uneventful, for the most part: the usual 35 seconds of freefall at up to 200 mph, followed by 2-1/2 minutes under the canopy, leading to a soft landing and a pie-in-the-face from his fellow jumpers. Al's highest jump to date has been from 18,000 ft, and his longest freefall clocked in at 1 minute, 45 seconds.

"Physiologists say that the adrenaline your body begins pumping just before a jump has a calming effect," Al noted. "And once you're in the air, all you hear is the wind. You have no sensation of falling; just a floating, free feeling. If I've got a lot of problems at work, I'll go out and freefall a few times, and when I'm through for the day I'm totally relaxed, my problems forgotten."

Anything you say, Al.

Film Society's Woody Allen Fest

On Friday, June 28, and Saturday, June 29, the Fermilab International Film Society will present a Woody Allen Film Festival in Ramsey Auditorium. **Bananas** will be shown at 8 p.m. on Friday, June 28, followed at 10 p.m. by **Sleeper.** On Saturday, June 29, Oscar-winning Best Picture of the Year **Annie Hall** will be shown at 8 p.m. Capping off the festival at 10 p.m. will be **Love and Death.** Tickets are $2 for adults, 50¢ for children, available at the door.

Torquemada's Law: When you are sure you're right, you have a moral duty to impose your will upon anyone who diagrees with you.