FERMI NEWS

FERMILAB A U.S. DEPARTMENT OF ENERGY LABORATORY

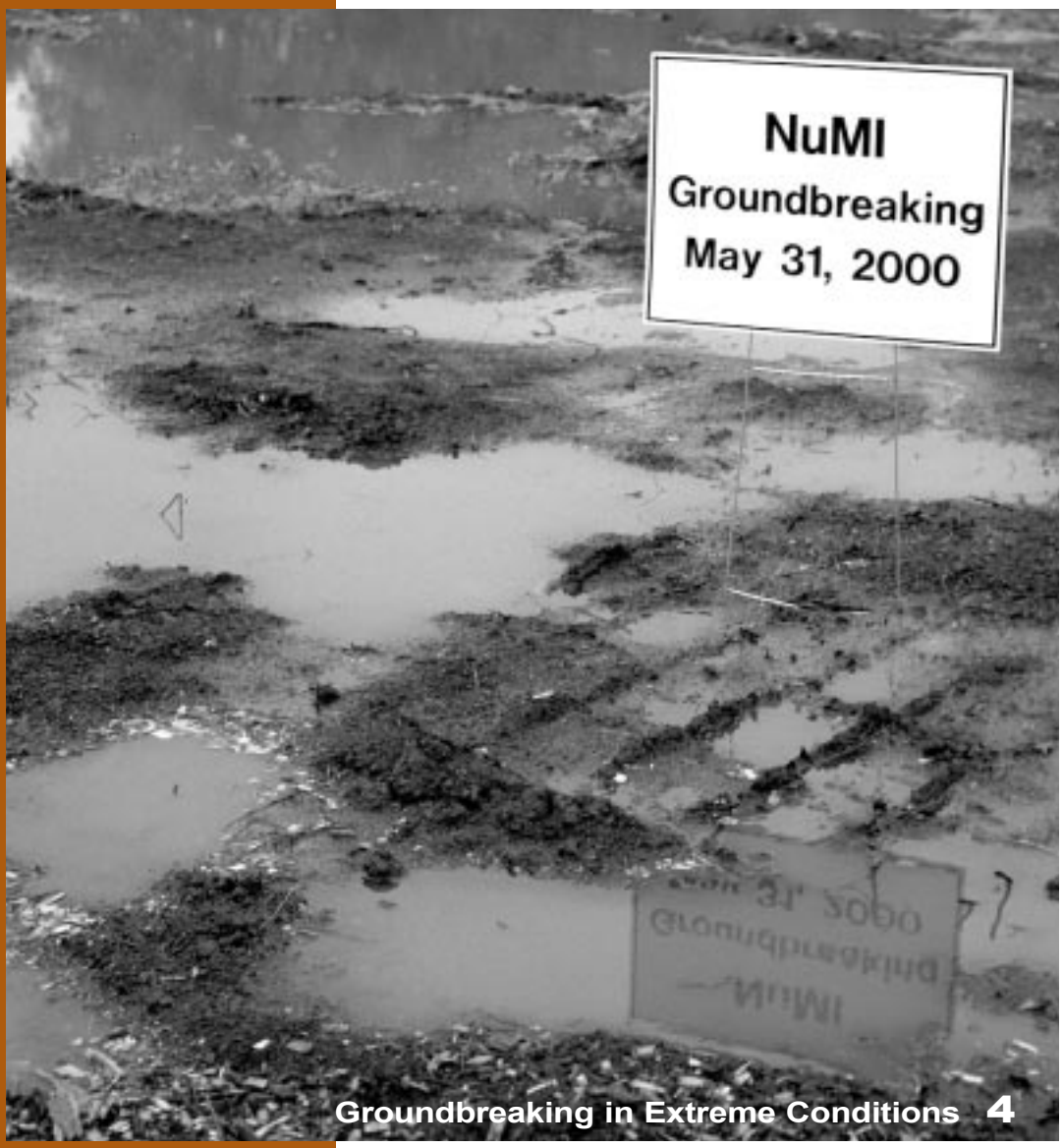

Photo by Reidar Hahn

Groundbreaking in Extreme Conditions 4

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INSIDE:

PHYSICS AND INDUSTRY

by Judy Jackson

Physics and industry.

They both rely on revolutionary new ideas. They both thrive on advances in the highest of high technology. And they both love a challenge. Physics and industry have so much in common they ought to be the best of friends. And yet, their relationship sometimes makes oil and water look like soul mates.

At a conference last month at Sicily's Centro Scientifico Ettore Majorana, physicists and industrialists from Europe and the U.S. met to try to analyze this complicated relationship and to consider ways to strengthen the connection between basic physics research and economic benefit to industry and society.

Physicist Enzo Iarocci, president of INFN, the Istituto Nazionale di Fisica Nucleare, Italy, who hosted the symposium, pointed to four main links between physics and industry: the physics education of young people; collaboration in the development and construction of accelerators and detectors; cooperative agreements; and interdisciplinary applications.

Iarocci also sounded a worrisome theme, one that resonated throughout the meeting, of declining national spending, both public and private, for research and development in Europe and the U.S.

Physicist Deiter Trines of Germany's Deutsches Elektronen-Synchrotron observed that one motivation of government in supporting basic science is to stimulate technology transfer to industry. He said that DESY had turned successfully to industry for help when the laboratory lacked the manpower to develop the laboratory's linear accelerator and its associated facilities, an experience that proved profitable for both partners. But, Trines said,

Can they CONNECT?

the time lag between basic physics discoveries and their industrial applications is long—at least 30 years, and perhaps closer to 50 in the case of high-energy physics.

"So far," he said, "there has been no industrial product based on our research at DESY. Perhaps there never will be. But there are spin-offs, including medical applications and synchrotron radiation that can move to other fields and to industry, with much shorter time lags."

In the short term, spin-offs from the advancing technology of accelerators and detectors are often more likely to yield grist for industry's mill than are the discoveries themselves, the conferees agreed.

Sometimes, in fact, the stars are aligned so that tools developed for high-energy physics quickly find applications in the industrial world. Two textbook cases concern superconducting magnets and the World Wide Web.

In the early 1980s, Fermilab's Tevatron required miles of superconducting wire and cable to build the electromagnets that guide its proton beams in circles of ever-increasing energy. Fermilab's demand for large quantities of superconducting wire, a previously nonexistent product, created a new industrial capability. Then, at just the right moment, as Tevatron construction wound down, a new market for superconducting magnets emerged in the form of the developing medical diagnostic tool known as magnetic resonance imaging. Today, hospitals and clinics all over the world use MRI, with superconducting wire developed for a particle accelerator at its heart. From physics to industry to market: it should always be so easy!

And it *WAS* that easy, in the exhaustively retailed story of the World Wide Web, developed by Tim Berners-Lee at CERN, the European Particle Physics Laboratory. Berners-Lee invented the Web to allow far-flung physics collaborators at the world's handful of high-energy physics laboratories to share their data across the globe. Then destiny intervened, with spectacular results. The trajectory of the Web from physicists' lonely terminals to the dot.com economy was even shorter and more spectacular than the case of MRI. From physics, to industry, to market: whoosh!

Synchrotron radiation from electron accelerators brings growing numbers of industrial users to light sources around the world. Superconducting technology at both high and low temperatures is slowly but surely seeing increased application. Protons and neutrons find uses in cancer therapy. But such cases are relatively rare, rather the exception than the rule.

Moreover, said Fermilab's Peter Limon, who represented the U.S. at the symposium, the sporadic and unpredictable nature of large world physics projects such as accelerators makes many firms reluctant to invest substantially in the infrastructure and R&D required to supply technologically advanced components. The late lamented Superconducting Super Collider stands as a stark object lesson to firms contemplating entry into the accelerator supply business.

Ultimately, conferees agreed, the fundamental connection between physics and industry is through people, and principally through the training of new generations of physicists.

"Physics supports industry principally by educating and training young people," said DESY's Trines, echoing Iarocci's opening comments. "Besides their physics training, young high-energy physicists learn to work in international teams, on challenging projects in which science and engineering are inextricably linked, and in a world in which projects change every few years. Such an education is very valuable to industry, making young physicists in great demand in the industrial job market."

As Fermilab's Bruce Chrisman once observed, the most reliable vehicle for technology transfer from high-energy physics is still the moving van.

Groundbreaking in Extreme Conditions

Cover Photo: Severe thunderstorms inundated the NuMI site, but the show still went on.

by Kurt Riesselmann

The title of the Wednesday afternoon colloquium on May 31 should have been a warning. Theorist Frank Wilczek from Princeton's Institute for Advanced Study came to Fermilab to talk about Quantum Chromodynamics in Extreme Conditions.

Indeed, it turned out to be an afternoon of extreme conditions.

About 70 guests and Fermilab employees had gathered to break ground for the Neutrinos at the Main Injector (NuMI) construction project when meteorological hell broke loose in the form of a howling Midwest thunderstorm.

"It was a classical case of horizontal rain," remembers Fred Ullrich of Fermilab's Visual Media Services.

The ceremony was supposed to be held in a tent set up at the site of the future access shaft to the detector hall. But the tent was no match for lightning, heavy rain and winds of more than 40 miles an hour. Organizers quickly moved the event to the more welcoming – and much drier – environment at Ramsey Auditorium.

Despite the last-minute changes, Fermilab's director Michael Witherell took the stage to make his opening remarks only a few minutes late.

"This is where civil construction meets the nature of the universe," Witherell said, referring to the physics goals of the neutrino experiments related to NuMI. The thunderclaps in the background gave his words a whole new meaning.

The rock at the end of the tunnel

The symbolic groundbreaking marked the start of construction for tunnels and access shafts that will house a new beamline for the NuMI project. To produce a beam of neutrinos, physicists will send a beam of 120 GeV protons from Fermilab's Main Injector through the new tunnel, smashing them into a graphite target and creating a secondary beam containing pions and kaons, which quickly decay into muons and muon neutrinos.

The muons are stopped using a 750-foot-thick absorber made of rock and steel. The muon neutrinos easily pass this barrier, continuing their flight to the two detectors of the Main Injector Neutrino Oscillation Search (MINOS) experiment. The near MINOS detector, located just beyond the absorber, will verify that the beam only consists of muon neutrinos. The far MINOS detector, located about 450 miles away in a former iron mine at Soudan, Minnesota, will again monitor the neutrino beam. Physicists expect to find that the muon neutrino beam has transformed ("oscillated") into a mixture of muon and tau neutrinos, possibly also containing some electron neutrinos, by the time it gets to the far detector.

Mayor Jeff Schielke, Batavia (right) joins Michael Witherell and Robert San Martin for a conversation.

Fortunately, no tunnel has to be constructed between Fermilab and Soudan, since neutrinos can easily traverse the earth. As a matter of fact, most of the neutrino beam will also traverse the two MINOS detectors without leaving a trace. Only one of a million million neutrinos will leave a signal in either one of the detectors.

Studying the exact content of the NuMI neutrino beam one millionth of a second (near detector) and 2.5 milliseconds (far detector) after its creation is essential to determining the difference in mass of the three kinds of neutrinos known to particle physicists. Since physicists think that the entire universe contains an enormous amount of – mostly undetectable – cosmic neutrinos, the knowledge of the combined amount of these particles' mass should have profound consequences for explaining how the universe evolved.

"In the case of telescopes, people are anxiously waiting to see the first light. Today we start waiting to see the first neutrino," Witherell told his audience at the groundbreaking ceremony. The MINOS collaboration will begin taking data in fall of 2003.

A SPECIAL CHALLENGE

Robert San Martin, head of the Chicago office of the Department of Energy, pointed out the significance of the NuMI project beyond the physics point of view.

Photos by Reidar Hahn

The official start of the NuMI construction: Robert San Martin, DOE (left), Dixon Bogert and Michael Witherell, Fermilab, David Ferguson, S.A. Healy Company, and Stanley Wojcicki, Stanford University, break ground in the planters of Wilson Hall.

Groundbreaking in Extreme Conditions

MINOS spokesman Stanley Wojcicki.

NuMI project manager Dixon Bogert.

Photos by Reidar Hahn

"This project again represents an opportunity to demonstrate that DOE, Fermilab, and all of our partners can do a good job at managing large complex projects, reminding everyone that we can jointly effectively manage and deliver top quality science facilities," he said.

Fermilab's Main Injector, dedicated just one year ago, is only the latest in the laboratory's tradition of building large projects on time and on budget.

State Representative Tim Schmitz (right) and his father Tom Schmitz (left), a Batavia Alderman and former Fermilab employee, chat with Witherell.

The NuMI project, however, presents a special challenge because the 30.5 million-dollar price tag for its tunnels and halls has all but eaten up the project's margin of "contingency" funding.

"At the present time all construction, including underground construction, is heavily committed," explained Dixon Bogert, NuMI project manager. "The labor market is tight. All bidders submitted offers that significantly exceeded the original estimate made during the development of the project engineering. Financial experts did not accurately predict the effect of a full-employment economy."

The MINOS collaborators, of course, hope that the NuMI project will deliver its neutrino beam on time.

"You may be able to start taking data if the detector is not quite complete, but you cannot do anything if you don't have a beam," said MINOS spokesperson Stan Wojcicki. "The NuMI construction clearly defines the critical path to finish the project on time."

Value engineering changes, which were made to reduce construction costs, delayed the award of the contract to excavate the NuMI tunnels and access shafts at Fermilab by six months. Bogert acknowledged that "DOE officials have been very helpful in finding a solution to the tight financial situation. They also helped us to draw up a project schedule which still should allow us to finish on time." Project time, though, has been reduced to a minimum.

Knowing that any underground construction is subject to surprises regarding the geological conditions found when excavation actually takes place, Bogert is aware that he and his co-workers still have a challenging time ahead.

First blasting at depth of 66 feet

So far the excavation for the NuMI project is on schedule. In March, DOE gave notice to proceed. Employees of the S.A. Healy Company, the subcontractor chosen to carry out the underground work, started working. The first step is to construct the access shaft of the NuMI target hall. Digging through the soil has been completed, and Healy has maintained their schedule to date.

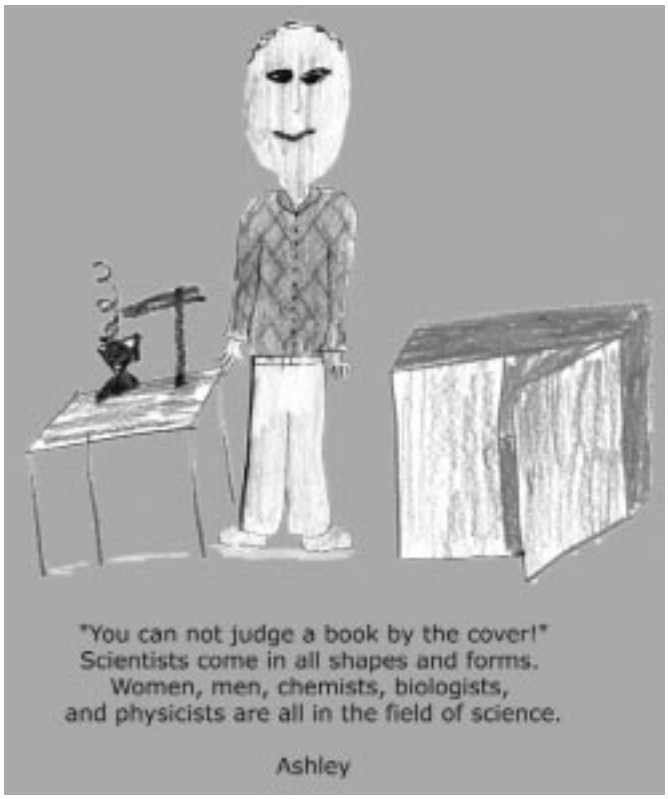
The first blasting of rock at the target shaft at a depth of 66 feet was scheduled to take place at the same time as the groundbreaking ceremony at the detector shaft, with the two events a safe distance of about 3000 feet apart. The extreme weather forced a delay in blasting, and sent the groundbreakers to Wilson Hall where they used gold-toned shovels to turn over soil in a planter.

"Doing the NuMI groundbreaking in a flower box isn't so unusual," said Dave Ferguson, representing the S.A. Healy Company at the groundbreaking. "I have been at many groundbreaking ceremonies where they just put a sandbox someplace."

If this is the most extreme situation encountered during the NuMI construction, finishing on schedule should not be a problem.

before...

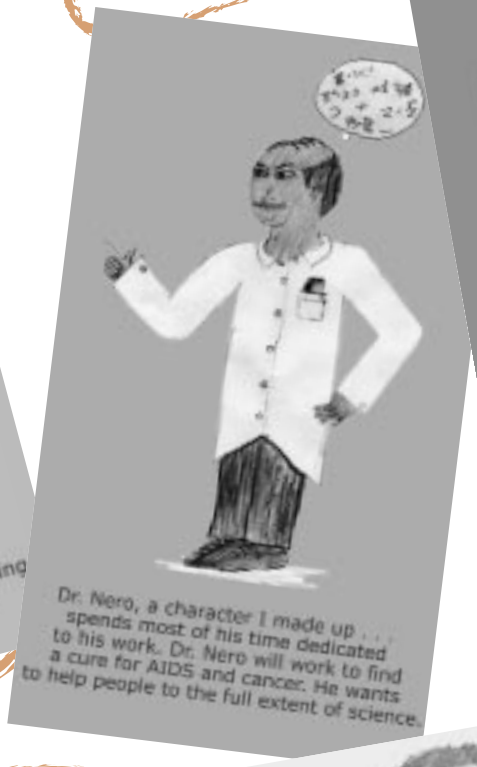
...after

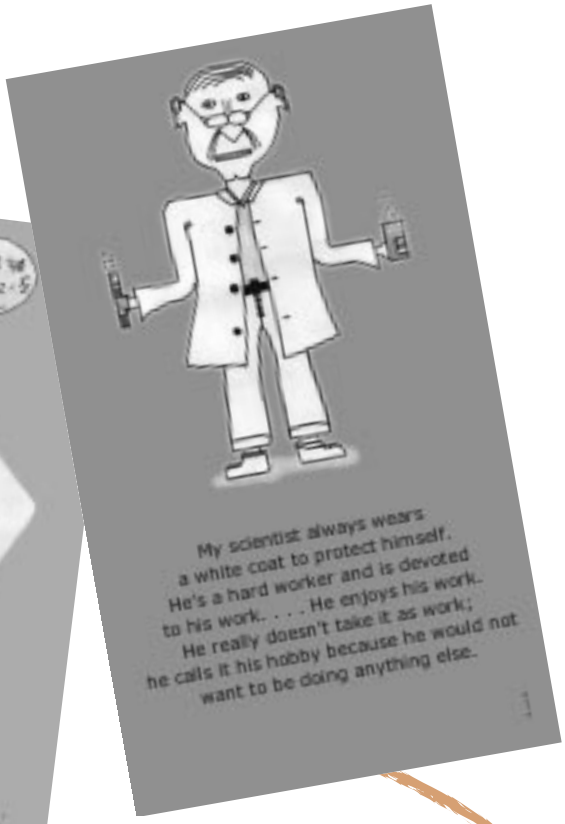


Seventh-graders describe **scientists** **before** & **after** their visit to **Fermilab**

before...


A scientist is in the Guinness Book of World Records. I see a scientist winning on "Who Wants to Be a Millionaire?"


Dr. Nero, a character I made up . . . spends most of his time dedicated to his work. Dr. Nero will work to find a cure for AIDS and cancer. He wants to help people to the full extent of science.


My scientist always wears a white coat to protect himself. He's a hard worker and is devoted to his work. . . . He enjoys his work. He really doesn't take it as work; he calls it his hobby because he would not want to be doing anything else.


I think of a scientist as very dedicated to his work. He is kind of crazy, talking always quickly. He constantly is getting new ideas. He is always asking questions and can be annoying. He listens to others' ideas and questions them.


The scientist has big square-shaped glasses and a big geeky nose with brown hair and blue eyes. I see a scientist working in a lab with a white lab coat . . . holding a beaker filled with solutions only he knows. Scientists are very interesting people who can figure out things we don't even know exist.


3.14

$E=MC^2$

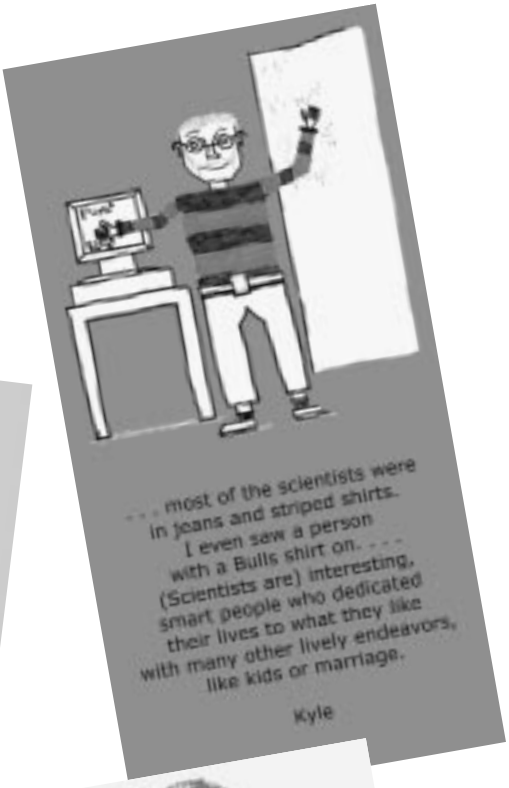
...after

. . . anyone can be a scientist. I saw people walking around in sweatshirts and jeans. Who knows? Maybe I can be a scientist.

Amanda

The stereotype gives the impression of a geek with glasses or someone who is bald. Actually, they are just people who ask and answer questions.

Eric



. . . most of the scientists were in jeans and striped shirts. I even saw a person with a Bulls shirt on. . . . (Scientists are) interesting, smart people who dedicated their lives to what they like with many other lively endeavors, like kids or marriage.

Kyle

My picture of a scientist is completely different than what it used to be! The scientist I saw doesn't wear a lab coat. . . . The scientists used good vocabulary and spoke like they know what they were talking about.

Beth

I know scientists are just normal people with a not so normal job. . . . Scientists lead a normal life outside of being a scientist. They are interested in dancing, pottery, jogging and even racquetball. Being a scientist is just another job which can be much more exciting.

Amy

Scientists love their jobs. They wake up in the morning and are excited to come to work. . . . When you are a scientist, you come to work ready to explore and learn new things. Things that may change the world someday. Maybe not today, maybe not tomorrow.

Andrea

Antiproton Upgrades Fill a TALL ORDER in a Small Space

by Mike Perricone

Antiprotons hold the key to the Fermilab's hoped-for ovations from an eager worldwide high-energy physics audience, in greeting the experimental results of Collider Run II at the Tevatron beginning March 1, 2001.

Without antiprotons, the collider run would produce the sound of one hand clapping.

Antiprotons are pivotal in achieving what Fermilab Director Michael Witherell anticipates will be 100 times the integrated luminosity of Run I, the experimental run that yielded the discovery of the top quark in 1995. Complicating the process is a limit imposed by the Tevatron. The four-mile accelerator is near the capacity of protons it can hold without defocusing the counter-circulating antiproton beam and limiting its brightness—a phenomenon called beam-beam tune spread.

The most fundamental answer will come from the source—the Antiproton Source, gearing up to triple its antiproton production for Run II. The two machines sharing this triangular-shaped ring, the Debuncher and the Accumulator, are undergoing major upgrades as part of the labwide preparations to push back the frontiers of high-energy physics once again in the 21st century.

Steve Werkema (left), Dave Vander Meulen and Dave McGinnis in the Antiproton Source control room at AP10.

Another New Beginning

The particles are dubbed "Pbars" from their symbol, $\bar{P}$ (P is the symbol for proton; adding a bar atop a particle's symbol signifies its antimatter counterpart). This will be the second "new era" for the antimatter producer. Former lab director John Peoples was the project manager for the construction of the Antiproton Source, with groundbreaking on August 16, 1983.

The Tevatron was in the midst of its transition from 400 GeV to 800 GeV, accomplished in 1984. And in October, 1985, the first proton-antiproton collisions were observed by the CDF detector (DZero had yet to be built) at 1.6 TeV center-of-mass energy; that is, 800-GeV protons circulating the Tevatron clockwise colliding with 800-GeV antiprotons circulating the Tevatron counter-clockwise. Within a decade, the lab announced first the evidence, and then the discovery, of the top quark.

Any similar discoveries at the Tevatron's detectors in the 21st century—and hopefully in the first five years of the 21st century, before the Large Hadron Collider turns on at CERN in Switzerland—will hinge on the planned threefold increase of antiproton flux produced by a 19-member department (13 of them on control room shifts) working closely for some three years.

Simply defined, flux is the number of antiprotons coming off the target per unit time.

"If we cut a cross-section of the beam pipe coming out of the Pbar Source," says Dave McGinnis, head of the Antiproton Source department, "and we count the number of pbars passing in a unit of time, we want to triple that number."

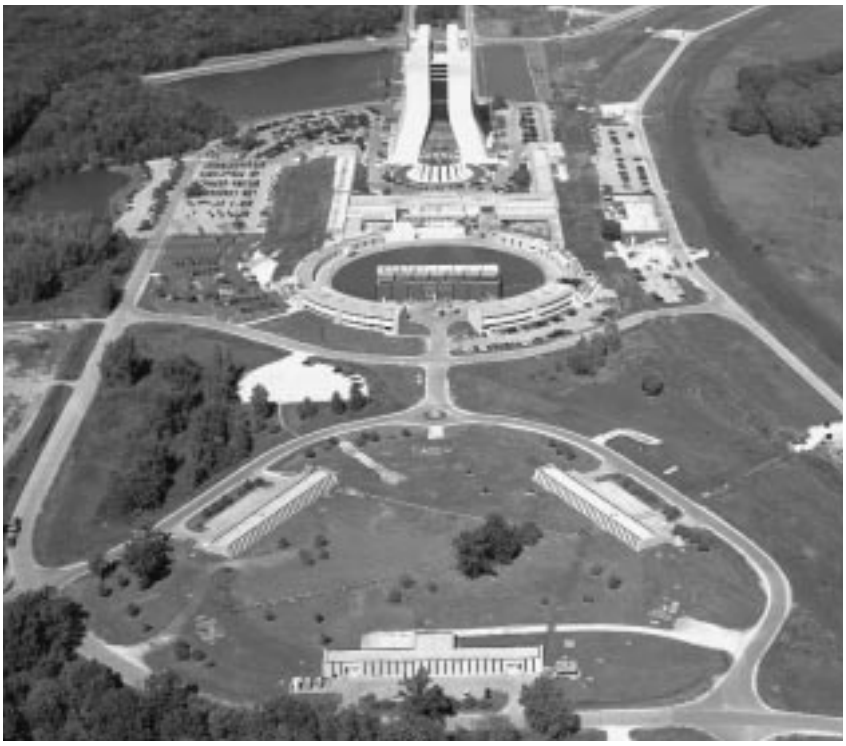
The Antiproton Source has three segments: the target station and lens, where the pbars are produced from proton-target collisions and transported to the next step; the Debuncher, and the Accumulator. The Debuncher takes the highly diffuse beam coming off the target, and turns it into a continuous ribbon of beam to provide a better fit for the next accelerator, the Accumulator. The Debuncher also pre-cools the beam, reducing the phase space by a factor of five. The Accumulator takes in multiple pulses from the Debuncher and stacks them, squeezing them together to produce a core beam with a density more than 10,000 times greater than a single beam pulse from the Debuncher.

Taking a snapshot

The Debuncher does its job in a relatively small amount of time—37 turns around the 500-meter ring. The beam is essentially being stored the rest of its stay in the Debuncher. Compressing the beam to make it fit the smaller aperture of the Accumulator is the job of the stochastic cooling system, which takes a snapshot of the beam at one point on the ring, and relays information to the other side, aligning the beam particle by particle.

The new Debuncher stochastic cooling system, is the biggest technological gamble of the upgrade. It has doubled the bandwidth of the old stochastic cooling system, going from a range of 2-4 gigahertz to a range of 4-8 gigahertz. Cooling, McGinnis explains, is directly proportional to bandwidth.

"We want a very narrow resolution in time, so we can look at particle and see if it's in the right spot and in the correct phase space," he says. "Looking at something very quickly means looking over a very broad bandwidth in frequencies. A flashbulb, for example, is a pulse of white light, which contains all frequencies. One way to look at stochastic cooling is that a wider bandwidth produces finer resolution. So by doubling the bandwidth, you double the resolution."



Its distinctive rounded triangle shape marks the Antiproton Source, with the Booster and Wilson Hall in the background.

Photos by Reidar Hahn

The Debuncher stochastic cooling upgrade will play a key role in Run II.

Upgrades Fill a TALL ORDER

Stochastic cooling incorporates a pickup antenna, sensing a particle's position; electronics to process and transmit the data; and a kicker antenna to reposition the traveling particle. The 80 million pbars entering the Debuncher per pulse might sound like a lot, but actually there are so few of them (the Tevatron, for example, will hold a trillion) that they are hard for the pickups antennae to hear: they can be drowned out by the noise, called thermal noise, of the atoms moving within the structure of the Debuncher itself.

The unique design of the new pickups will have them operating at higher frequencies and lower temperatures, and handling more power, than the pickups used in any other stochastic cooling system anywhere.

A REAL COOL CELL PHONE

For increased sensitivity, the upgraded system will cool the antennas by tapping into the cryogenic system and lowering them to liquid helium temperatures: from the previous 77 Kelvin down to four Kelvin (four degrees above absolute zero).

"We showed the system to some people from the Very Large Array of radioastronomy telescopes in New Mexico, the ones that were featured in the movie 'Contact,'" McGinnis says. "They're also looking for very weak signals from the stars. Every one of their antennas has an amplifier cooled with gaseous helium, at 10-15 Kelvin. But they can't cool their entire antenna, which is huge. Not only do we cool our amplifier, we cool the entire antenna."

The new stochastic cooling system uses an array of eight narrowband microwave antennas instead of a single, wideband antenna. The principle is similar to that of cellular telephones: each unit has its own frequency to rule out cross talk. High sensitivity can be built more easily into a narrow band antenna, and the large number of narrow-band channels is equivalent to one wide-band channel.

The bandwidth was also doubled in the Accumulator's stochastic cooling system (from 1-2 gigahertz up to 2-4 gigahertz), to handle the three-fold increase in flux handed to it from the target and the Debuncher, though the temperature remained at 77 Kelvin. But it squealed: the change produced positive feedback, like a microphone held too close to speaker.

That meant changing the lattice of the Accumulator —the way the beam is focused around the accelerator, as determined by the strength and position of the quadrupole magnets. The lattice change represented a major challenge, because the Accumulator is a storage machine: the beam remains there for hundreds of hours at a time. Commissioning the lattice changes lasted until July of 1999; work then proceeded in reverse direction of the beam's path, first the Accumulator cooling, and then the Debuncher.

Promising no "showstoppers" for the Antiproton Source Upgrade are (back row, left to right) Al Sondgeroth, Mark Dilday, Tony Leveling, Craig Deibele, Chuck Bair, Tom Budlong (that's his photo inside the "0" of AP10), Elvin Harms, Steve Werkema, and Bernie Wisner; (front row), Dave Peterson, Don Poll, Bob "Obie" Oberholtzer, Dave McGinnis, Giulio Stancari, Dave Vander Meulen, Keith Gollwitzer.

Charmonium and Transition

The Accumulator uses 84 quadrupole magnets to focus the Pbar beam, and six special focusing magnets had to be replaced. These special focusing magnets are about five wide but just a foot long. They must produce a very strong magnetic field in a small linear space in the Antiproton Source tunnel, and with a wide cross-section because of the wide beam aperture.

The Accumulator also runs the E385 (Charmonium) fixed-target experiment, which produces a particle consisting of a charm quark and anticharm quark from collisions between a Pbar beam and a jet of hydrogen gas in the accumulator. That experiment also required decelerating the Pbar beam, and holding the lower-energy beam for an adequate lifetime.

The Accumulator was not originally designed for this kind of ramping, which also means crossing transition energy.

"You don't want to cross transition energy," McGinnis warns. "It's very unpleasant for the beam."

Transition energy is a sort of relativistic border that occurs in every accelerator. Below the transition energy, high-energy particles take less time to navigate the accelerator than low-energy particles, which is what our intuition would lead us to expect. But above the transition energy, high-energy particles take longer to move around the accelerator than do low-energy particles, because they acquire mass and move toward the outside of the beam path. They can't travel any faster than light-speed, so covering a longer distance takes more time.

"When decelerating the beam for E835, or reducing its energy, we avoided crossing the transition energy by moving that energy a step ahead of the beam energy all the way down the pipe," McGinnis explains. "We were able to use the modifications for our lattice upgrades to continuously adjust the lattice down the ramp, and we changed our transition energy by a large amount down the ramp. Steve Werkema proposed the idea, and Giulio Stancari designed the ramps. We learned a lot about the machine, and a lot about the beam. This was a really neat piece of accelerator physics."

The Right Direction

Commissioning on the upgrades began in January, 1999. The first stacking of antiprotons took place on Dec. 22, 1999, and McGinnis remembers that on Christmas Day, the group was stacking at a rate equivalent to just 1/1,000 of the commissioning goal, which could have been discouraging.

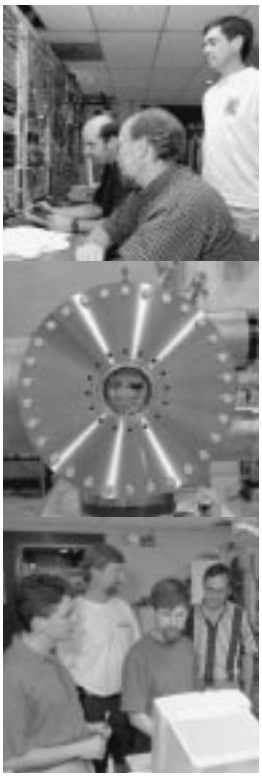
"But we got beam going around the machine, and now we're at one-fourth of our goal," McGinnis says. "We can actually support a collider run now. This is a wonderful group of people, a small group where everybody wanted to go in the right direction, and that's what you have to have with commissioning. Everybody worked lots of hours and lots of shifts."

The group worked with so much mutual regard that one member, Jim Budlong, was included when the group photograph was taken for this article, even though he was on vacation at the time. His coworkers came up with a headshot of Budlong and stuck it into the "0" of the AP10 sign on the building when they posed for the shot.

Their work isn't finished. They face some puzzles in increasing the stacking rate, cutting the cycling time in half, and doubling the yield into the Debuncher.

"We know what we have to do on each of the problems, and there are no show-stoppers," McGinnis says.

Unlike the theater, a high-energy physics show-stopper halts the production for a big problem, not for a big ovation. No showstoppers will mean a big round of applause for the cast of the Antiproton Source upgrade.



Top: Al Sondgeroth, Tony Leveling and Jim Morgan in the control room.

Middle: End flange for the Debuncher pickup pictured on Page 11.

Bottom: Giulio Stancari, Elvin Harms, Dave Peterson, Keith Gollwitzer.

Photos by Reidar Hahn

Dan Poll, Jim Budlong and Paul Derwent with the Accumulator stacktail upgrade stochastic cooling pickup tank.

Fermilab Director Michael Witherell guides Illinois Lt. Governor Corinne Wood on a tour of the 15th floor of Wilson Hall.

Wood Visits NTF

Photos by Reidar Hahn

Lt. Governor Wood visits the treatment room with Dr. Jeffrey Smoron, medical director of Provena St. Joseph Hospital.

Illinois Lieutenant Governor Corinne Wood, herself a cancer survivor, toured the Midwest Institute for Neutron Therapy at Fermilab on May 25, after receiving an award from the Elgin (Ill.) Chapter of Hadassah and Provena St. Joseph Hospital recognizing her efforts on behalf of cancer awareness, prevention and treatment. Provena St. Joseph Hospital of Elgin operates the Neutron Therapy Facility at Fermilab.

"We are fortunate to have Fermilab, one of the world's premier centers for research, right here in Illinois," Lt. Gov. Wood said. "We can be proud of the positive working relationship that Fermilab and Provena St. Joseph have developed, with many people treated successfully through this partnership."

The Neutron Therapy Facility, which has treated patients from around the world, is one of only three U.S. facilities using neutrons to treat cancer.

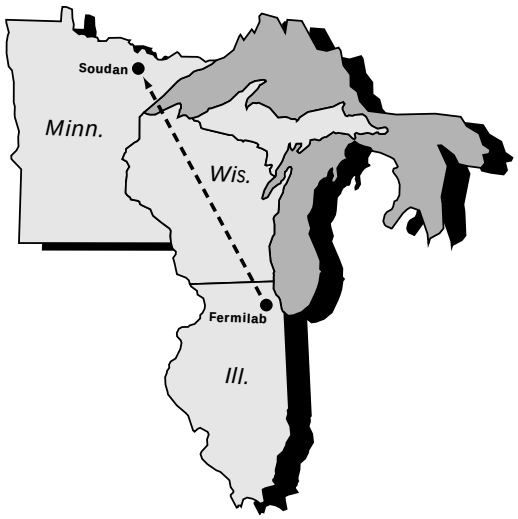
LETTER TO THE EDITOR

To *FERMINEWS*:

In the April 14 issue of *FERMINEWS* (Vol. 23, No. 7, "NuMI Construction Begins"), we read about "the neutrino's near-light-speed trip to Minnesota." Perhaps many of your readers might have missed the fact that you presume the existence of exciting new physics. The Standard Model describes neutrinos which travel at precisely the speed of light. Our speculation that neutrinos might oscillate would demand a mass for the neutrinos, and a velocity for this beam which would be just barely less than the velocity of light. Other speculations could lead to a different neutrino speed, and they would be even more exciting.

Bruce C. Brown

(a MiniBooNE Collaborator)



CALENDAR

Web site for Fermilab events: http://www.fnal.gov/faw/events.html

INTERNATIONAL FILM SOCIETY Presents

Grand Illusion (La Grande Illusion)
Dir: Jean Renoir, France (1937), 120 min.

July 14, 8 pm, Ramsey Auditorium, Wilson Hall. Erich von Stroheim as the commandant makes an indelible impression, as a man deluded by romantic notions of chivalry and friendship. Tickets, $4.

ARTS SERIES Presents:
Arlo Guthrie

July 29, tickets are $25, 8 pm, Ramsey Auditorium, Wilson Hall. Arlo gave his first performance at age 13 and quickly became involved in the music that was shaping the country during the 1960s. Arlo's career soared in 1967 with the release of Alice's Restaurant, a song that helped foster a new commitment among his generation to social activism and consciousness.

ONGOING

■ NALWO is pleased to announce the free morning English classes in the Users' Center for FNAL guests, visitors, and their spouses have been expanded; The new schedule is: Monday and Thursday, 9:30am - 11am beginners (Music Room) and intermediates (Library) Monday and Thursday, 11am - 12:30pm advanced, emphasizing pronunciation and American idioms (Music Room)

■ NALWO coffee for newcomers & visitors every Thursday at the Users' Center, 10:30-12, children welcome. In the auditorium, International folk dancing, Thursday, 7:30-10 p.m., call Mady, (630) 584-0825;

■ The Recreation Office will again be providing children's swim lessons for employees, users and on-site contractor children ages 5 - 12. For information pick up a brochure at the Recreation Office, Users Office, Housing Office, or Children's Center. You may also get info from our website: http://fnalpubs.fnal.gov/benedept/recreation/pool.html/. Jeanmarie Guyer Recreation Office M.S. 126, P.O. Box 500 Batavia, IL 60510 Phone (630)-840-2548 Fax (630)840-5207

■ NALWO is sponsoring a bus trip to Ravinia on Sat. July 1, 2000 to hear the Chicago Symphony Orchestra's "Russian Rhapsody" concert. Lawn seats at $10 to be purchased at Ravinia; bring or buy supper. Bus leaves the Users Center at 5:30pm; returns approximately 11pm. Contact Sue, x5059 or mendel@fnal.gov for information and reservations.

BARN DANCES

All dances are taught and people of all ages and experience levels are welcome. Admission is $5, children under 12 are free (12-18 $2). The barn dance is sponsored by the Fermilab Folk Club. For more info, contact Lynn Garren, x2061, garren@fnal.gov or Dave Harding, x2971, harding@fnal.gov.

MILESTONES

BORN

Tristan Andrew Cameron Walbridge, to Dana (TD/DTD) and PennyLou Walbridge on May 24. He weighed 7 lbs., 4 oz., and is 20" long. Dulcy Joy (age 3) is excited to be Tristan's big sister.

Evan Marie Anderson, to Beth (Information Resources Dept.) and Torrance Anderson on June 1. She weighed 7 lbs 10 oz., and is 19" long. Evan is welcomed by big brother Jack (age 2).

RETIRING

Michael McAshan, ID 11314 BD-AS-Cryo Systems, effective June 30, 2000

Edward Lober, ID 9948 FES-Engineering, June 29, 000, last day of work June 30.

DIED

Carolyn Gifford, ID127, formerly of the Purchasing Department, Tuesday, May 23, 2000.

CORRECTION

A photo in the previous issue of *FERMINEWS* (Vol. 23, No. 10, May 26, 2000), "Symposium on Fixed-Target Program with the Tevatron") was identified as: "Current Fermilab Director Michael Witherell with experiment E691 in 1979." The experiment pictured was actually E567. Experiment E691 was not approved until 1983. *FERMINEWS* regrets the error.

LUNCH SERVED FROM 11:30 A.M. TO 1 P.M.
$8/PERSON

DINNER SERVED AT 7 P.M.
$20/PERSON

Chez Léon MENU

FOR RESERVATIONS, CALL X4512
CAKES FOR SPECIAL OCCASIONS
DIETARY RESTRICTIONS
CONTACT TITA, X3524
HTTP://WWW.FNAL.GOV/FAW/EVENTS/MENUS.HTML

LUNCH
WEDNESDAY, JUNE 21

Thai Beef Salad
Chocolate Pecan Cake

DINNER
THURSDAY, JUNE 22

Eggplant Fans
Monkfish Tails en Piperade
Saffron Rice
Field Greens with Blue Cheese Dressing
Grand Marnier Soufflé

LUNCH
WEDNESDAY, JUNE 28

Salad Niçoise with Grilled Fresh Tuna
Brownie Espresso Sundae

DINNER
THURSDAY, JUNE 29

Seniche
Pork Tenderloin with Mexican Chipotle Marinade
Grilled Summer Vegetables
Ginger Banana Cream Tart Lined with Chocolate

FERMINEWS

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The deadline for the Friday, June 30, 2000, issue is Tuesday, June 20, 2000. Please send classified advertisements and story ideas by mail to the Public Affairs Office MS 206, Fermilab, P.O. Box 500, Batavia, IL 60510, or by e-mail to ferminews@fnal.gov. Letters from readers are welcome. Please include your name and daytime phone number.

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CLASSIFIEDS

FOR SALE

■ '99 Harley-Davidson Sportster Custom XL883C (Black) 3,000 miles, windshield, forward controls, saddle bag brackets and touring seat. Asking $7,500. Terry, X4572, skweres@fnal.gov, or Janine at none2compare@yahoo.com.

■ '99 Goldwing SE (Silver) with extras, price reduced to $14,500—lower than new and the extras still go with it. 11K miles, excellent condition, runs great. Markland receiver hitch and (5 pin) OEM trailer wiring kit, Markland floorboards, foam grips and extra Windshield. Also 2 headsets for the intercom. Still has 2 yrs on original (unlimited miles) warranty. Can get another 3 yrs extended (unlimited miles). Call Terry X4572 or e-mail skweres@fnal.gov.

■ '96 Ford Explorer, "Eddie Bauer", V-8 automatic, 35,000 miles all accessories, inc. JBL, CD changer stereo system, cassette, moon roof, lighted sun visor, leather power seats, Lady driver, one owner, very very nice SUV. $19,950 obo. Mike x3924, or 847-426-1596.

■ '90 Honda Civic Si Hatchback, 3 dr, very reliable, good condition inside & out, 2 yr new tires & breaks, new timing belt, 100k mi, A/C, 5 spd, moonroof, $3,150. x8295 x3604 428-0024 (evenings) gerber@fnal.gov

■ '88 Plymouth Sundance 4-door hatchback excellent condition, 105,000 miles, new brakes, battery and radiator $2,000 obo x8295 x3604 428-0024 (evenings) gerber@fnal.gov

■ '77 Honda Goldwing 1000, excellent condition with Vetter fairing and packs, 66K miles. Lots of extras. Asking $1,300 or best offer. Contact Gary at 896-6196 evenings.

■ Nordic Track machine $150; king size waterbed frame $40; toddler bed, new mattress $20; futon frame (wood) $50; snow skis, 3 sets, assorted sizes and bindings, and poles, all for $30. Call Terry X4572 or e-mail skweres@fnal.gov

■ 5 SAT & 1 ACT books ('98 editions) in fairly new condition, including "10 Real SAT's" by The College Board, and Princeton Review's SAT book, $50 for all. Jenny, quinofspaz@hotmail.com, or 630-355-1253

■ Guitar, Gibson 1956 ES-135 good condition $700, amplifiers Marshall AS80 like new $375, and Fender Reverb 30, good condition $125. Guitar Maker's cam clamps, Stewart-MacDonald part no. 3721, 6 for $35. Curtis x2394 or Crawford @fnal.gov.

■ Left-handed Tommy Armour 855 Hot Scott driver, 3 wood and 5 wood, graphite shaft, $150 for all three. Fred 4364 or FredU@fnal.gov

WANTED

■ BABY SITTING needed for my 6 year-old during summer. Ideal for high-schooler or college girl -time: M-F 9:30 am to 6 pm (afternoons at the Fermilab pool), $40/day, weeks from June 5 to July 21, 2000. Must have use of a car. 630-840-2574 or 983-3575 (eve)

FOR RENT

■ Newly redecorated 1 and 2 bedroom apartments, 10 minutes from Fermilab available. $550 - $750 / month. 630-892-5257

■ Spacious room for rent to female (physicist or student) 10 miles from Lab independent floor utilities and kitchen privileges, garage, living room to share, available July 31. $395/month call 840-2574 Silvia.

■ Three bedroom ranch single family home in Summer Lakes, Warrenville for $985/month. One car attached garage. Five minutes to Fermilab. Access to clubhouse with pool, work out equipment, hot tub and much more. Call Karen at X5427 or 836-9246.

FREE

To be given away: Free venetian mini-blinds and verticals, various sizes and colors. Inquire for details. x6342 or cader@fnal.gov

HELICOPTER FLY-IN

■ The Fermilab Barnstormers host the eleventh annual Anthony Frelo Memorial Helicopter Fly-In, Saturday 6/24 and Sunday 6/25, including an appearance by the Channel 2 helicopter. Everyone is invited and spectators are welcome. Pilots of all skill levels are encouraged to participate, with everything from trainers to scale models. Pilots must have AMA license to fly. Refreshments will be available. For more information, please call Jim Zagel at 4076 or Dave Pushka at 8767.

BIBLE STUDY

■ The 12 o'clock (noon) Bible Study continues its one-year survey of the Bible, Wednesdays in the Huddle located in the cross gallery. If interested contact Jeff Ruffin x4432, or ruffin@fnal.gov .

Help Batavia Celebrate the New Millennium!

The City of Batavia is celebrating the new millennium over the long Fourth of July weekend. There will be various programs devoted to Batavia's past, present, and future. Fermilab is, of course, part of all of these. Fermilab is planning two activities for this B2K celebration. The first is hosting a Film Festival (Saturday afternoon, July 1). We anticipate that this will be the first visit to Fermilab for many of the filmgoers, who will also be interested in investigating Wilson Hall and finding out what it is we do here. The second activity is a program on Fermilab and its plans for the future, at Batavia High School (Sunday afternoon, July 2). This will be highlighted by a presentation for the general public by Associate Director for Accelerators Steve Holmes. We plan to have videos and question and answer sessions with Fermilab employees both before and after Steve's presentation. We are asking for volunteers, especially Batavia residents, to help with the film festival, to be available to answer the public's questions both at Fermilab and BHS, and to help with the presentations. This is a chance to meet your neighbors from Batavia, and to represent the Laboratory, face to face, as a real-live person who happens to be a scientist, engineer, or other valued Fermilab employee or user. If interested, please respond to Peter H. Garbincius, x3693, garbincius@fnal.gov/.

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