FERMI NEWS

FERMILAB A U.S. DEPARTMENT OF ENERGY LABORATORY

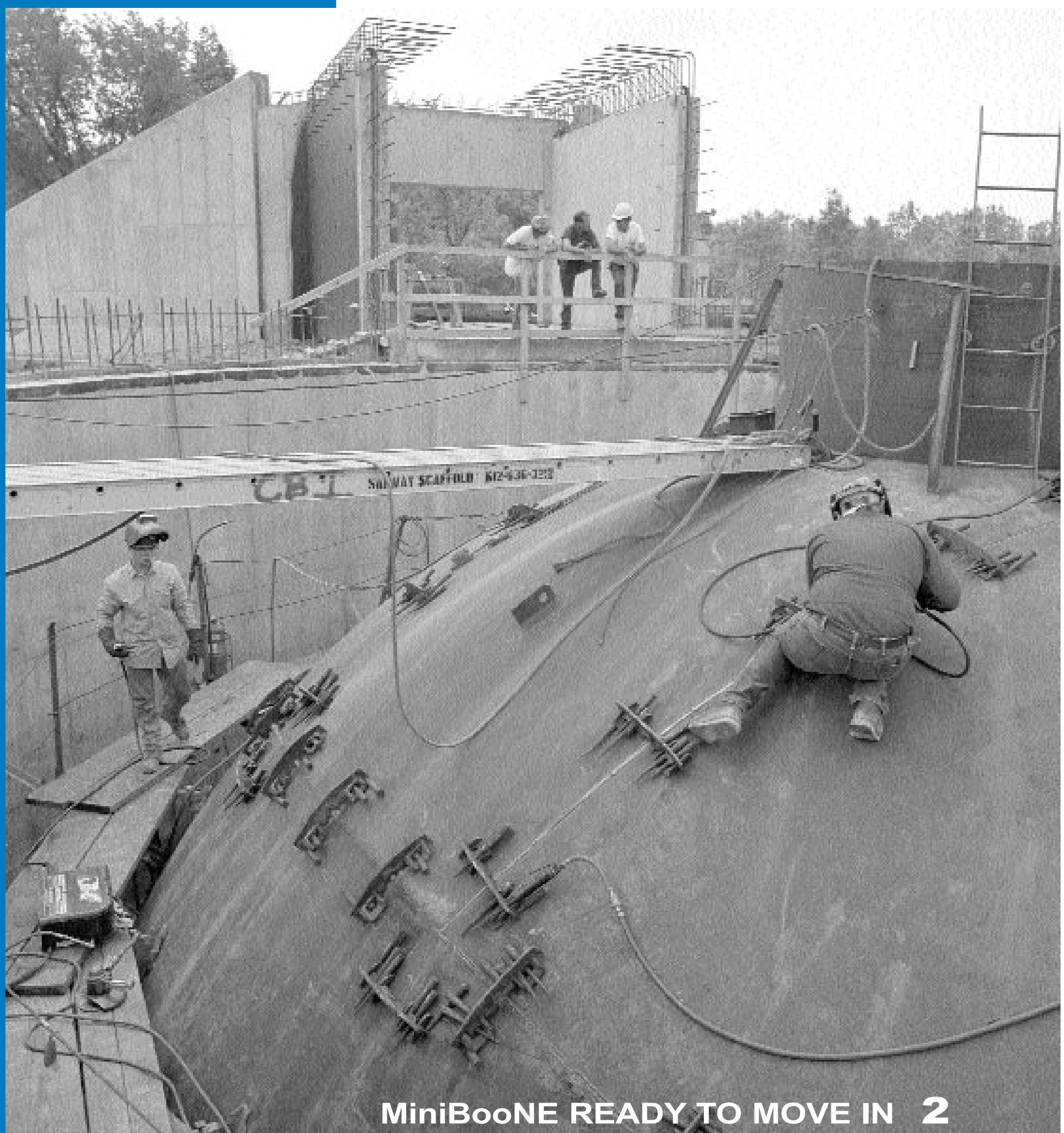

Photo by Reidar Hahn

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INSIDE:

MiniBooNE READY TO MOVE IN

Cover: Construction workers put the finishing touches on the tank that will be used for the MiniBooNE neutrino experiment.

by Kurt Riesselmann

After investing $1.5 million and 12 months of construction work, the MiniBooNE collaboration is getting ready to take over the building that will host its neutrino experiment. The Whittaker Excavating company, which started work on this project in October 1999, is about to put the finishing touches on the building and a 40-foot-diameter tank located inside.

"We are on schedule, right at the point that we expected when we first started," said Fermilab physicist Peter Kasper, project manager for the MiniBooNE civil construction. "Whittaker will soon be done with its part of the project and we will have beneficial occupancy."

At that point, the MiniBooNE collaboration can start with the installation of various equipment needed to carry out their experiment.

The MiniBooNE civil construction, begun in October 1999, will end this month. The earth berm covers a 45-foot-deep underground vault that contains the MiniBooNE tank.

The MiniBooNE collaboration, a group of 50 scientists from 12 institutions, will use the building and its tank to study the properties of neutrinos, ghost-like particles that account for perhaps as much as five percent of the total mass in our universe. As you read this sentence, billions of neutrinos traverse your body, completely undetected, rarely leaving a trace behind. Whether these particles have any mass at all will soon be clarified by the MiniBooNE experiment.

But before physicists are ready to detect any neutrino signals, another 12 months of work are needed to install mechanical and electrical systems, prepare the neutrino detector, set up the electronics and test all equipment. The civil construction is the foundation of the $16 million MiniBooNE experiment, but it ran into a problem with a coat of paint.

The 250,000-gallon tank inside the MiniBooNE building requires a special coat of reflective white paint that doesn't contain organic molecules, ring-shaped carbon compounds that emit light as they oscillate. The present paint contains a thin layer of organic non-white color on its surface.

"If it weren't for the paint problem we could have obtained beneficial occupancy at the beginning of November," said Kasper. "Now it looks as if it will be in the middle of November."

The design of the MiniBooNE experiment features 1,520 lightsensors, mounted on the inside of the tank. They are able to detect tiny amounts of light. The tank will be filled with mineral oil, a fluid with little intrinsic luminescence.

Starting in fall of 2001, an intense neutrino beam, created by Fermilab's accelerators, will cross the tank, causing approximately one neutrino-oil interaction every 20 seconds. The interactions create secondary particles that produce tiny flashes of light, bright enough to be registered by the lightsensors.

Additional light caused by ring-shaped carbon compounds would interfere with the dim neutrino-induced light flashes. Using a high-quality paint and keeping light-producing impurities out of the tank is a major requirement to conduct the MiniBooNE experiment.

But physicist Rex Tayloe and technician Andy Lathrop may have found a remedy that makes repainting the tank unnecessary. They learned that a powerwash with baking soda, usually used for cleaning graffiti from buildings, could remove the unwanted surface layer without damaging the perfectly white coat underneath. At present, physicists are working with Whittaker to find the best solution to the problem.

The paint problem has caused the only construction delay. The project has swiftly moved along since breaking ground 12 months ago. Construction consisted of creating a cylindrical underground vault 50 feet in diameter and 45 feet deep, assembling a spherical tank inside the vault and building an electronics room above it. After completion, the whole construction was covered with an earth berm to reduce the number of cosmic particles entering the tank. A 24-foot-long entrance corridor provides access to the electronics room, the main tank and a smaller overflow tank located under the entrance tunnel.

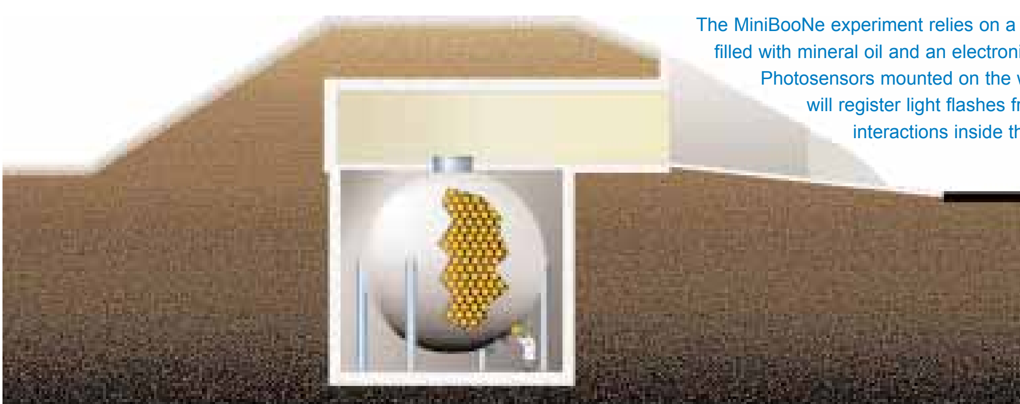
Photos by Reidar Hahn

The construction of the 40-foot-diameter steel tank, from April to August, presented a major milestone. It will hold 250,000 gallons of mineral oil.

"Right now people are working on the electrical system," explained Tayloe, who just started an Assistant Professorship at Indiana University. "The MiniBooNE experiment uses two independent power systems: one for the utilities, such as air conditioning, and one for the sensitive electronics."

With two systems, the electronics will be shielded from power surges and voltage variations as air conditioners and other equipment are switched on and off. Without these irregularities, the electronics will be more reliable in recording the faint electrical signals produced by the photosensors as light strikes their surfaces.

Tayloe is in charge of managing the installations inside the building. In Phase I, he and his colleagues need to prepare the interior so



The MiniBooNe experiment relies on a spherical tank filled with mineral oil and an electronics room above it. Photosensors mounted on the walls of the tank will register light flashes from neutrino interactions inside the oil.

"The more DETAILS you can VISUALIZE, THE BETTER." – Rex Tayloe

that scientists, led by a group from Princeton University, can start to mount the photosensors in January.

"Once beneficial occupancy is established, my job is to coordinate all the tasks involved with the installation of the detector components," explained Tayloe. "I have to determine and delegate who is doing what, when and where."

Talking to senior collaboration members, who have managed other physics projects, he thinks he drafted a realistic plan.

"Being conservative is always a good thing [when creating a schedule]," Tayloe pointed out. "The more details you can visualize, the better."

In May the installation of the photosensors, each eight inches in diameter, should be complete. Physicists will then connect them to the data acquisition system and test the electronics. To check the functionality of their experiment, the MiniBooNE collaboration will operate their experiment with an empty tank for about one month, studying background signals created by cosmic rays.

Photo by Jenny Mullins

Rex Tayloe, Assistant Professor at Indiana University, inspects the MiniBooNE oil tank. He will spend the next couple of months at Fermilab to organize the installation of equipment in the recently finished building.

Photo by Reidar Hahn

The room on top of the oil tank will host MiniBooNE's electronics and data acquisition system. Physicists will monitor the experiment from a control room in Wilson Hall.

"For every signal caused by the Fermilab neutrino beam, there will be about 100,000 events from cosmic rays," said Bill Louis, physicist at Los Alamos National Laboratory and cospokesperson of the MiniBooNE collaboration. Fortunately, the neutrino beam is pulsed, and the majority of background events can be easily discarded as they occur when the beam is off.

To find out whether neutrinos have mass, the MiniBooNE experiment is looking for neutrino oscillations: Physicists will use Fermilab's Main Injector accelerator to create muon neutrinos and send them to the MiniBooNE building. The MiniBooNE detector will check whether some of the muon neutrinos, traveling a distance of 500 meters, have transformed into electron neutrinos, creating electrons as some of them interact with the mineral oil. If the results of an earlier experiment carried out at Los Alamos are confirmed, the MiniBooNE experiment should observe about 1000 transformations a year, clearly establishing neutrino oscillations.

MiniBooNE will test one scenario, either establishing or ruling out muon-neutrino to electron-neutrino oscillations beyond any doubt. Other experiments will test oscillation scenarios such as muon neutrinos to tau neutrinos.

"Presently, there exist three very different experimental results that hint at neutrino oscillations," said Louis. "MiniBooNE will be the first accelerator neutrino experiment to provide a definitive answer." □

LHC MAGNETS: From MODEL to PROTOTYPE

by Kurt Riesselmann

Magnets are crucial components of every particle accelerator around the world. Like tracks guiding trains, they force charged particles to follow a path prescribed by magnetic forces. The higher the energy of the particles, the stronger the magnetic forces needed to steer them around a ring.

The Large Hadron Collider, which will be the world's most powerful particle accelerator when finished in 2005, will feature the world's largest assembly of powerful magnets. Thousands of magnets will assure that protons, traveling at almost the speed of light, will stay on track as they zip around a 17-mile-long circular track at CERN, the European particle physics laboratory near Geneva, Switzerland.

Operating a particle accelerator requires two main types of magnets: dipole and quadrupole magnets. Dipole magnets are able to bend a particle beam. Quadrupole magnets work like lenses, focusing particle beams. Locating them next to the collision detectors, physicists use quadrupole magnets to direct as many particles as possible to a tiny area at the center of their detectors, called the interaction point. The number of beam particles and the quality of the quadrupole magnets determine the number of collisions an accelerator can produce.

Fermilab is one of the world's top laboratories in magnet research and development. Three years ago, as part of a $531 million U.S. commitment to the LHC, it joined a collaboration with CERN; Japan's prime research laboratory, KEK; and Lawrence Berkeley National Laboratory, to develop and build the eight final focusing sections for the LHC. Each section is almost 100 feet long and has a peak magnetic field of more than eight Tesla, twice the strength of the Tevatron magnets and a 100,000 times stronger than the earth's magnetic field.

"Each section consists of four main quadrupoles," said Jim Kerby, project manager for Fermilab's magnet construction. "KEK and Fermilab will each be responsible for two quadrupoles in each section."

CERN will build magnetic correctors, which will serve as magnetic fine-tuning lenses between the main magnets. Fermilab will receive the KEK and CERN magnets and assemble the final configuration, which it will ship to CERN for installation in the LHC tunnel.

Building powerful magnets is not a straightforward task. Precision machines

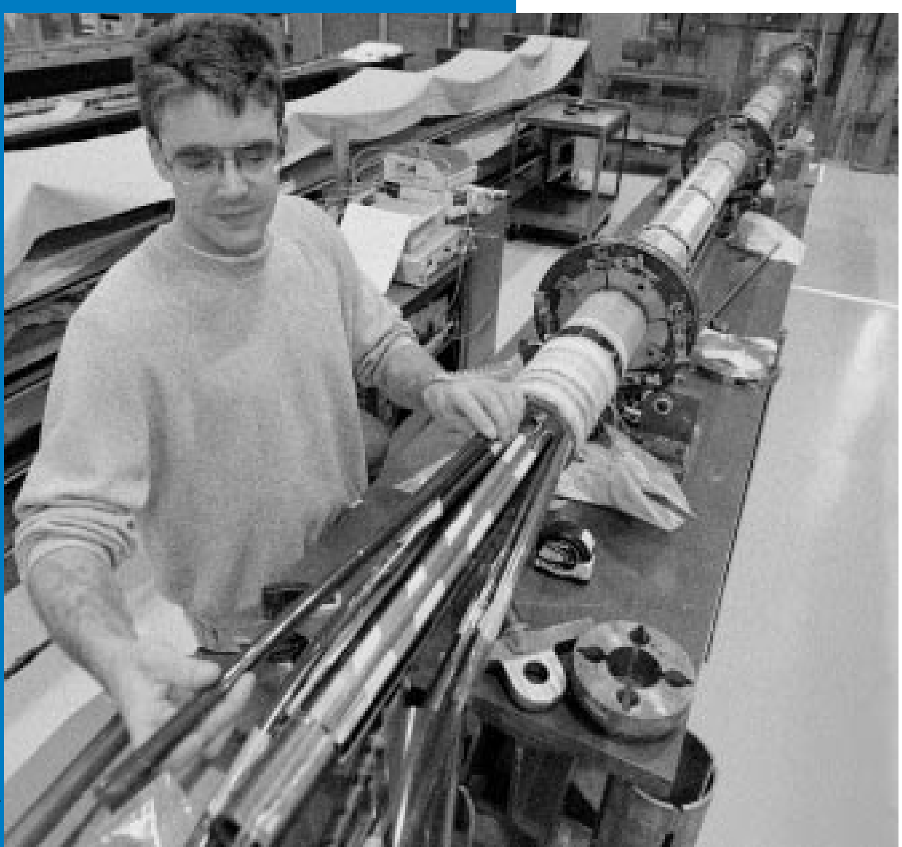
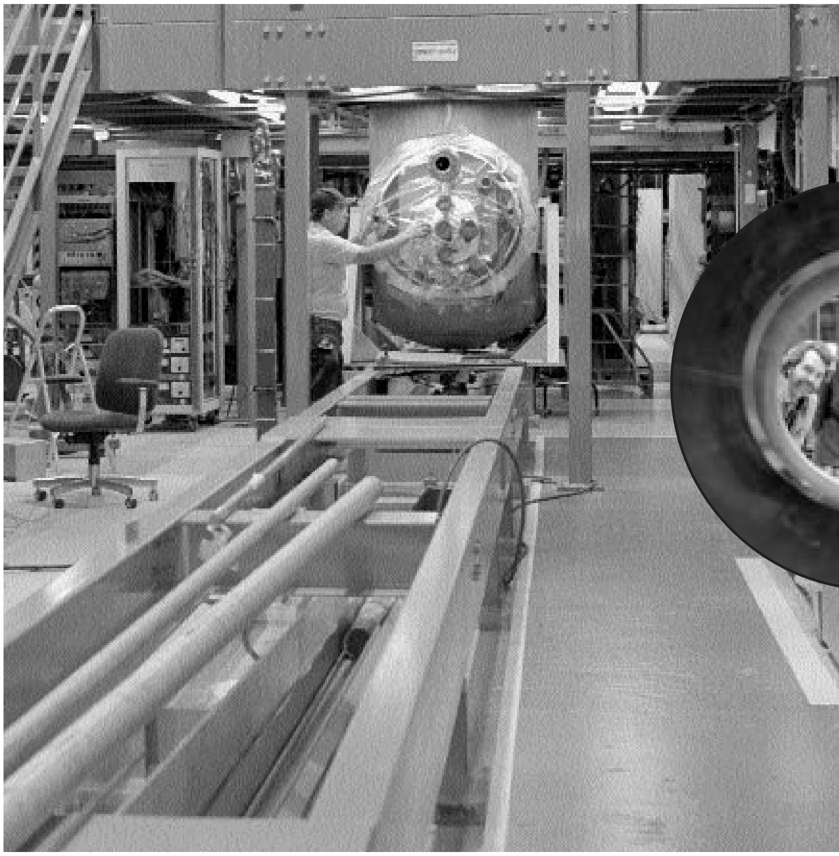


Photo by Reidar Hahn

Magnets for powerful particle beams are an intricate construction of wound coils, pressed together by precision collars. Paul Mayer checks one of the leads to a coil prior to final assembly.



Photos by Reidar Hahn

The Magnet Test Facility prepares for cooling and testing LHC superconducting magnets. Charlie Hess covers the liquid-helium pipes and other connectors with plastic to protect them from dust. When finished, the vessel containing the first prototype will be placed on top of the rails in the front of the picture.

"These MAGNETS are touchy **WIDGETS**."

– Jim Kerby

Arnold Knauf (front), Tom Nicol, Christine Darve, Tom Page and Marsha Schmidt (from left) will see that this empty vacuum vessel houses the first superconducting LHC magnet and its cooling system.

carefully wind and cure superconducting cables into elongated coils, placing the cables accurately to within thousandths of an inch. Technicians take the coils and pack them tightly together. Specially designed collars keep the coils in place, protecting them from the strong magnetic forces that try to drive the coils apart as electrical currents flow through the cables. A massive iron yoke, which wraps around the collars, stabilizes the magnetic field. When completed, a steel skin covers the final assembly. In the case of the LHC quadrupole magnets, the assembly is about 16 inches in diameter and 20 feet long.

"These magnets are touchy widgets," Kerby said. "We spent about two years to build and test 6-foot-long models."

The coil and magnet ends are the most difficult parts to design. Studying short models saves time and money, and produces reliable test results. In March of this year, the ninth model produced by the Fermilab team provided confirmation that it had met all technical requirements. The project leaders decided to move on and build a full-length prototype, which is currently under construction.

The strength of the magnetic field is determined by the amount of electrical current flowing through the coils. The 8-Tesla magnetic fields of the LHC quadrupole magnets require currents of 12,000 amperes, about 50 times more than the engine-cranking current delivered by a car battery. Finding materials that can conduct and withstand such extreme currents in a limited volume is an important field of research. The LHC magnets rely on a niobium-titanium compound, which is an excellent conductor at ultra-low temperatures. At about 10 kelvins, a temperature only slightly above the lowest temperature possible in nature, the niobium-titanium compound becomes superconducting and carries electrical currents without resistance.

For accelerator magnets, this still isn't good enough. Further decreasing the temperature, the current-carrying capability of the compound improves. Fermilab operates its 4-Tesla Tevatron magnets at 4.8 kelvins. Because the LHC pushes niobium-titanium technology to its limits, engineers had to take another step down on the temperature scale, lowering its operating temperature to 1.9 kelvins to achieve higher fields in the magnet design.

Creating and maintaining these temperatures is a major challenge. Scientists use helium as coolant since all other materials are solid at temperatures close to absolute zero.

"Testing the full-length magnets will be more difficult than testing the model magnets was," said Tom Peterson, who is responsible for cryogenics at the Magnet Test Facility. “The model magnets were tested in a 12-foot-deep dewar filled with liquid helium at 1.9 kelvins. The prototype is too long to fit in our vertical dewar, so it has to be tested in its own liquid-helium container.”

Peterson is now involved in setting up the test facility for the full-length prototype. Like the magnets destined for the LHC, the prototype magnet will be mounted inside a cryostat, a vacuum vessel three feet in diameter that contains liquid-helium pipes and special heat shields.

The magnet is mounted at the center of the cryostat. Minimizing the number of contact points between the magnet and the surrounding vessel reduces the amount of heat flowing toward the magnet. In addition, cryogenic experts need to remove heat generated by the particle beam from the vacuum vessel.

“Because they are so close to the interaction points, these quadrupole magnets are exposed to much more heat than any other LHC magnet,” said Christine Darve, a thermomechanical engineer working on the cooling system. “In each final-focusing section, we constantly need to get rid off about 200 watts of power.”

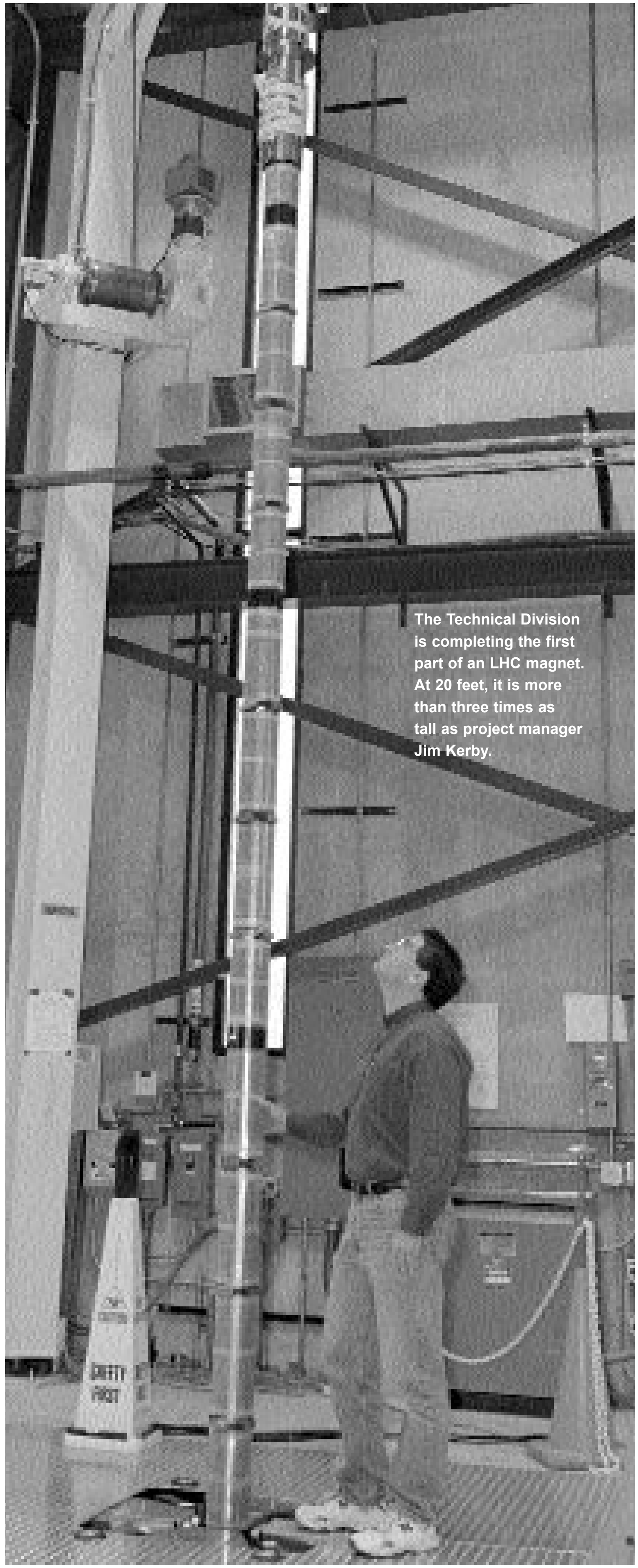
This corresponds to the heat generated by a couple of strong light bulbs, assuming they burn inside the beam pipe. At ultra-low temperatures and in the middle of a superconducting magnet, this is a major engineering challenge. Fermilab designed a full-scale model of the cooling system for the final-focusing sections and successfully tested it at CERN.

To keep the magnets at their ultra-low temperature, they are bathed in 1.9-kelvin superfluid helium. The helium absorbs the excess heat generated by the beam, transports it to a heat exchanger inside the vacuum vessel, and a separate stream of liquid helium carries the heat outside the vessel, where refrigerating units re-cool the helium.

Fermilab’s first LHC prototype magnet will be ready around the end of the year. Technicians currently install the superconducting coils. Soon the steel yoke will be in place. Next, they will outfit the prototype with supports and pipes of the cooling system.

“We build the cooling system around the magnet core,” explains Darve. “Once all equipment is installed, we carefully slide the whole construction into the vacuum vessel.”

Next summer, after completing the prototype tests, production and final assembly of the magnets will start. Fermilab will ship the last quadrupole magnet to CERN in 2004, allowing physicists there to continue exploring the secrets of matter at the smallest scales. □



The Technical Division is completing the first part of an LHC magnet. At 20 feet, it is more than three times as tall as project manager Jim Kerby.

Photo by Reidar Hahn

Brazil/500

Its modern-day borders encompass nearly half the continent of South America. It is home to the world's second-longest river, the 3,900-mile Amazon. No one's day would be quite the same without one of its major exports: it is the world's leading producer of coffee.

Brazil celebrates its 500th anniversary this year, commemorating the claim of the explorer Pedro Alvares Cabral for Portugal in 1500. The festivities extend to Fermilab with a Nov. 11 performance in Ramsey Auditorium by Anima, six musicians who demonstrate the merging of medieval European music with that of Africa and of the land's indigenous peoples, resulting in the rich musical heritage of modern-day Brazil. Fermilab also will be graced by the presence of Ambassador Alexandre Addor, Consul General of Brazil.

Particle physics has played a critical role in the development of Brazilian science for nearly 70 years, and the connection with Fermilab has helped encourage the growth of Brazilian particle physics for nearly 20 years.

In 1983, Brazilian physicists organized a conference to consider the possibility of joining international research collaborations at the high-energy frontiers of particle physics. Among those attending was Leon Lederman, then Director of Fermilab. Lederman offered his support and helped to establish a Brazilian presence at Fermilab. Soon the first Brazilian contingent—five physicists and an engineer—made the transcontinental journey to Batavia, Illinois.

Since then, Brazilian scientists have participated in both fixed-target and colliding-beam experiments, and today Brazil's Fermilab collaboration

Celebrating Brazil's 500th anniversary with a North American tour, Anima uses traditional instruments coupled with extensive research to demonstrate the merging of medieval European music with African music and the music of indigenous Brazilian peoples, producing the rich music of modern-day Brazil.

The President of Brazil, José Sarney (left), toured the Main Control Room with Fermilab Director John Peoples during his visit to the lab on Sept. 27, 1989.

numbers 43 physicists and students. They are involved in data analysis, software and hardware development, detector design and the production of detector components. Graduate students receive training both at their home universities and Fermilab, capitalizing on the opportunity to work at the high-energy frontier and continuing a legacy of discovery extending to the earliest history of the field.

In the 1930s, physicists Gleb Wathagin, Paulus A. Pompeia and Marcelo Damy de Souza Santos did pioneering work at the University of Sao Paulo. They identified characteristic features of cosmic rays created by particles entering the earth's atmosphere.

In 1947, Cesar Lattes and G.P.S. Occhialini participated in C.F. Powell's Nobel Prize-winning experiments in the Bolivian Andes, using photographic plates to study the processes leading to the production of secondary particles in cosmic rays. They discovered the pion, an unstable particle seven times lighter than a proton. Today, we know the pion as the lightest meson, or quark-antiquark combination.

In 1949, Lattes founded the *Centro Brazileiro de Pesquisas Fisicas* (CBPF), a research center devoted to both experimental and theoretical physics. He continued his own research in particle physics at Chacaltaya peak in Bolivia, using nuclear emulsions to record and analyze the tracks of cosmic particles. Today, CBPF has 28 collaborators on Fermilab experiments.

As Fermilab embarks upon Collider Run II of the Tevatron in 2001, Brazilian scientists will continue their contributions to the new physics of the 21st Century. And Brazilian coffee will help jump-start the day for scientists and non-scientists the world over. ☐

Photos by Fred Ullrich

Helio da Motta Filho of CBPF checks on the DZero forward proton detector, which will play a major role in Run II of the Tevatron. Developed in collaboration with European and U.S. institutions, these instruments dubbed "Roman pots" can be placed close to the oncoming beam, inside the high-vacuum beam pipe. They measure the direction and energy of particles escaping from what are called diffractive collisions, where surviving particles leave the collision area with a very small angle of deflection, very close to the beam of oncoming particles.

Part of a lengthy Fermilab connection, Brazilian experimenters work on Experiment E769 (Hadroproduction of charm at Tagged Photon Spectrometer) in 1989.

It Can't Hurt To Try

by Mike Perricone

With 21 years of experience as a user at CDF, new Users Executive Committee chairman Larry Nodulman has a keen understanding of how volunteerism translates into action.

"There's never a lack of enthusiasm to grab onto an issue," says Nodulman, also a senior physicist at nearby Argonne National Laboratory. "Then you look around the table, and those are the people you have to work with. When somebody says, 'WE must do something,' that's the 'WE,' the people around the table. So you have to set realistic goals."

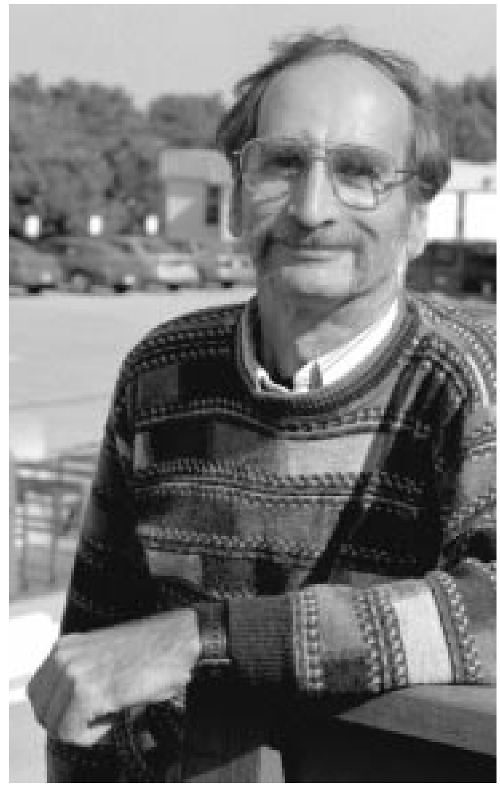


Photo by Reidar Hahn

UEC chairman Larry Nodulman will work with committee members Robin Erbacher (Fermilab), Peter Garbincius (Fermilab), Sally Koutsoliotas (Bucknell), Jim Musser (Indiana), Vaia Papadimitriou (Texas Tech), Roger Rusack (Minnesota), Rick St. Denis (Glasgow U., Scotland), Herman White (Fermilab), Ben Tannenbaum (UCLA), Philip Yager (UC-Davis), and Gordon Watts (Washington).

But realistic doesn't equal pessimistic. Nodulman may greet diverse challenges with identically bemused shrugs, but it's soon evident that his outlook comes from being a process guy. With two decades of experience working on a detector, he appreciates the way you can't take a long walk without making a lot of small steps.

"We regard ourselves as an ombudsman for the Fermilab users," he says of the UEC. "If any users have any issues they'd like us to think about or investigate, at any level, we want them to feel free to contact us. We're not the PAC [Physics Advisory Committee], we can't say yes or no on something.

"But you can actually do things. I was impressed when [outgoing chairman] Dan Amidei went to the Board of Overseers to talk about the lack of office space for users. The Board got interested, URA put up some money, and there will be some new office space. So there really are possibilities. Maybe we can do something or maybe not, but it certainly can't hurt to try."

One issue Nodulman knows the UEC will work on is that of health insurance for graduate students, following up on a survey taken during the last year by the Graduate Students Association at Fermilab. Graduate students are required to have health insurance before being issued a Fermilab identification card, but the GSA survey found that many students have inadequate coverage if they're away from their home universities. Nodulman says the UEC is making inquiries and eliciting feedback, and hopes to make a recommendation in the course of the next few monthly meetings.

Vaia Papadmitriou of Texas Tech and Peter Garbincius of Fermilab. DZero and NuMI/MINOS have also held tours for the general public, and Garbincius spurred the inception of Fermilab's new weekend "Meet a Scientist" program.

"I think our outreach efforts have been very well received," Nodulman says. "Herman, Vaia and Peter have especially contributed to an atmosphere of getting people to do things, and encouraging spinoffs, which has really helped."

{Larry Nodulman sees 'ombudsman' role as chairman of Users Executive Committee.

And then there's the annual trek to Washington, D.C. Last year's visit was organized by Greg Snow of the University of Nebraska, who had been Amidei's immediate predecessor as UEC chairman. Graduate students have become an especially important part of the trip, emphasizing education and the long-term commitment of promising young scientists.

"People in Washington have so many visitors, with so many agendas," Nodulman says. "Do we have an impact? I don't know, but it can't hurt to try."

He adds: "Alan Greenspan, the chairman of the Federal Reserve Board, says this economic expansion is due to technology. When we're in Washington our goal is just talking to people, leaving them with something like a one-page summary of our message. And if nothing else, just being polite."

Reaching out to neighbors is equally imperative, and Nodulman hopes to continue and extend the highly successful "mini-open houses" which originated at CDF through the efforts of Outreach Committee members Herman White of Fermilab,

After working on the CDF upgrades, Nodulman is eager to dig in to the new physics possibilities when Collider Run II begins in March 2001. His own areas of focus are W mass measurements and electroweak physics, but he sees rich possibilities for B physics early in Run II, and

he's intrigued by the "indications" from CERN that the Higgs could well be within Fermilab's reach. But speaking of CERN, and the looming future presence of the Large Hadron Collider, raises his level of concern for the long run at Fermilab.

"In terms of the physics program, what happens when the energy frontier leaves town?" he wonders. "Some of the Fermilab user community is now working on CMS [the Compact Muon Solenoid detector for LHC]. Once that experiment running, those people will become more CERN users than Fermilab users. It's not an immediate crisis, but it is out there in the distance."

Can something be done? As Larry Nodulman likes to say, it can't hurt to try. □

Fermilab Users

Exploring Physics, And Building the Future

by Mike Perricone

They come from Abilene Christian University in Texas, and Yale University in Connecticut; from Academica Sinica in Taiwan, and York University in Canada.

Their group sizes range from a single Turkish physicist to 232 Italian scientists and students; from three collaborators working on the Picosecond X-Ray Source experiment, to 642 working on the DZero Silicon Tracker.

Fermilab users come from virtually everywhere, work in virtually every area of the lab, and meet any and every challenge presented to someone working away from home for a week or two—or a year or two.

“In the very crowded CDF/DZero trailers, I know some groups have scheduled rotations to determine who gets to sit at computers at a given time,” said Dan Amidei of the University of Michigan, outgoing chair of the Fermilab Users Executive Committee. “Maybe that’s just a measure of how dedicated the users are at Fermilab. We come here to do science, and we’ll do it—no matter what.”

Fermilab users are defined as “qualified researchers:” physicists and graduate students from universities and research institutions, participating in collaborations whose experiments are listed in the annual “Fermilab Research Program Workbook.” An experiment must qualify as “active” to be listed. It must be in a stage of detailed design, construction, data-taking or data analysis.

Users are explorers, drawn to the frontier—the lab is a frontier by mandate. Fermilab’s one-sentence mission charges the lab with the responsibility of “providing leadership and resources for qualified researchers to conduct basic research at the frontiers of high-energy physics and related disciplines.”

As the world’s highest-energy accelerator facility, Fermilab offers unmatched potential for discovery to 2,506 users from across the country and around the world. These explorers come from 116 institutions in 25 foreign countries; and from 101 institutions spread among 34 states in the U.S. They continue to mine data from Collider Run I of the Tevatron, and they work on preparations for Collider Run II for a new era of discovery beginning in March 2001.

“If your interests are in high-energy physics, this is where the biggest accelerator is and this is where you have to be,” said Tina Hebert, a doctoral student from the University of Kansas working at the DZero detector. She has worked on software for the central preshower detector at DZero, and is currently working on testing the new silicon detector.

She’s been working on a doctoral thesis based on data from Run I, though shifting from her original focus on the physics of the bottom quark. Users work on a sort of barter system: They exchange their contributions to

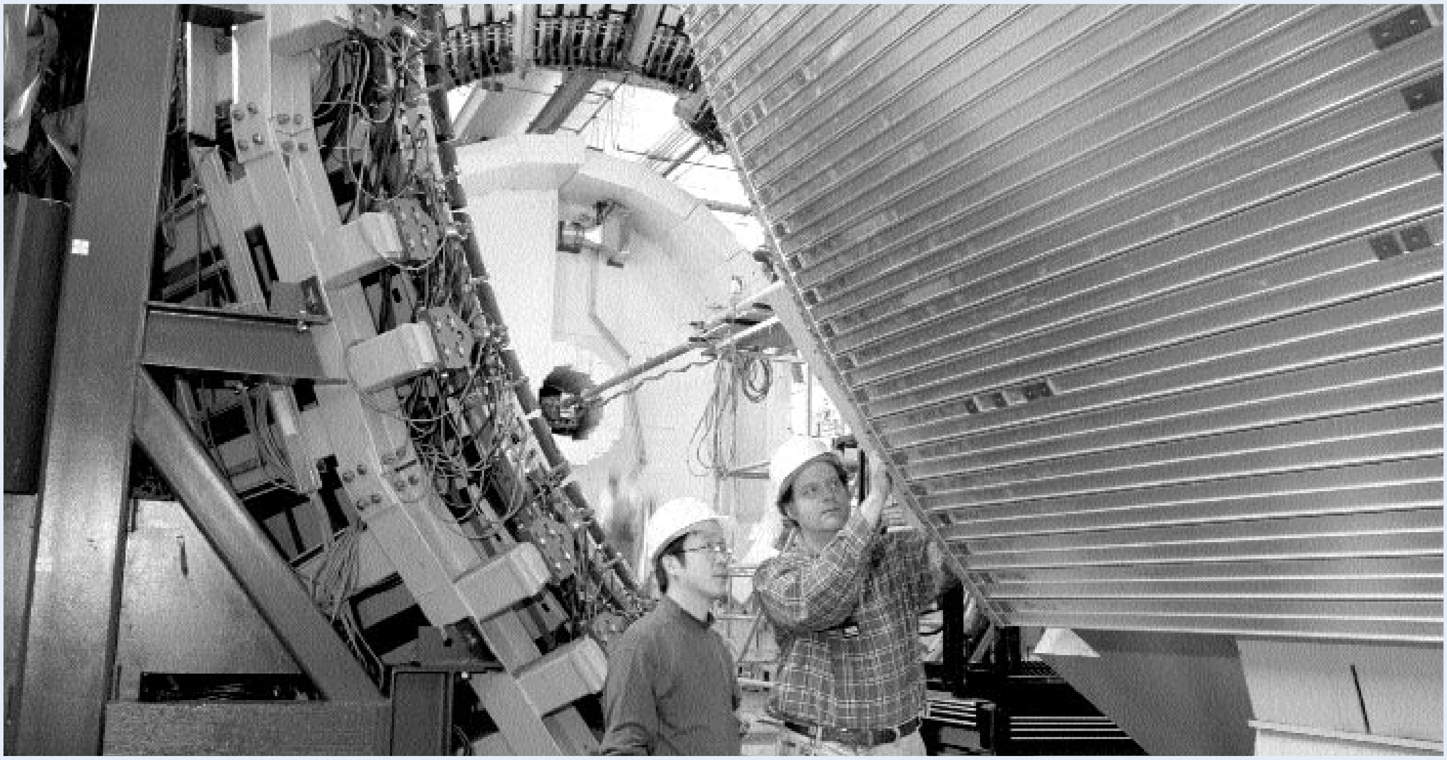


Photo by Reidar Hahn

Yeongdae Shon (left) and James Bellinger, inspecting the muon chamber on CDF's toroid, are among 17 collaborators from the University of Wisconsin at Madison. Fermilab users come from 101 U.S. institutions in 34 states.

Fermilab Users by the Numbers

DOMESTIC

101 Institutions, 34 States

Top 10

(Other than Fermilab, 313)

Lawrence Berkeley Natl. Lab.	53
U of Mich-Ann Arbor	52
U of Rochester	50
Argonne Natl. Lab.	34
SUNY-Stony Brook	39
Harvard U	32
U of Chicago	31
U of Illinois (Champaign)	31
U of Pennsylvania	30
Michigan State	30

By state:

Alabama 2; Arizona 20; California 155; Colorado 10; Connecticut 16; Florida 36; Georgia 2; Hawaii 7; Illinois 476; Indiana 69; Iowa 20; Kansas 14; Louisiana 12; Maryland 28; Massachusetts 95; Michigan 84; Minnesota 27; Nebraska 3; New Jersey 25; New Mexico 43; New York 173; North Carolina 22; Ohio 12; Oklahoma 10; Oregon 4; Pennsylvania 62; Puerto Rico 8; Rhode Island 19; South Carolina 5; Tennessee 13; Texas 62; Virginia 19; Washington 12; Wisconsin 18.

INTERNATIONAL

116 Institutions, 25 Countries

Top 10

Italy	232
Russia	205
Japan	104
UK	65
France	53
Brazil	43
South Korea	26
India	25
Germany	23
Taiwan	20

By Country:

Argentina 6; Brazil 43; Canada 19; Peoples Republic of China 19; Colombia, 11; Czech Republic 6; Ecuador 1; France 53; Germany 23; Greece 4; India 25; Israel 4; Italy 232; Japan 104; South Korea 26; Mexico 20; Netherlands 10; Poland 4; Russia 205; Slovakia 1; Spain 8; Switzerland 13; Taiwan 20; Turkey 1; United Kingdom 65.

Total U.S.:	1,583
Total International:	923
Total Experimenters:	2,506

hardware and software for access to data. And while the first Run II data is not far away, there remain many fundamental stones unturned in Run I data.

"Students who come now or a year from now can contribute to Run II and use Run II data," said Arnold Pompos, a doctoral candidate at CDF from Purdue University, who has been working on the CDF endplug. Pompos is also investigating supersymmetry, specifically the search for "stop," the supersymmetric partner of the top quark.

"I've been working at CDF for a while now, and I'm looking at Run I data," he continued. "There's still lots of work to do—always. Students come here to look at the data collected in the world's premier lab. That data might hide something you're interested in—which is what everyone hopes to find. The finest instruments yield the best data. People have examined the data, true, but it's not obvious where the 'stop' might show up. Which decay channel? Maybe you'll find the right one."

While physicists and university professors often visit the lab on a schedule determined by the needs of the collaboration, students like Pompos and Hebert often live on the site in the area called "the village" while completing their work and their studies.

Photos by Reidar Hahn

Andrey Shchukin, of the Institute for High Energy Physics (IHEP) in Protvino, Russia examines muon chamber detectors for DZero. Fermilab is host to 205 users from Russia, including 70 from IHEP-Protvino and 47 from the Joint Institute for Nuclear Research (JINR) in Dubna.

"It's like living in a big park," said Hebert. "I can ride my bike to work. Or rollerblade. I can participate in all kinds of sports. I can always talk to my friends about physics. I have all the advantages of living where I work, and working where I live. And, of course, the disadvantages. It can be hard to separate the two environments."

The Fermilab Users' Organization helps address the issues that come up when life and work are so intertwined, both for users and the Fermilab community at large. The 12-member Users Executive Committee meets every month or so, handling "whatever comes up," as new UEC chairman Larry Nodulman described it. The UEC also has standing committees focusing on outreach and education; quality of life issues; younger physicist issues; and the annual Washington trip in the spring.

There isn't much time to check out the cherry blossoms during the visit to the capital, a hands-on lesson in the budget process and the importance of communicating the results and benefits of physics research. Last year's trip, coordinated by another former UEC chairman, Greg Snow, was a combined excursion by the users groups from Fermilab and Stanford Linear Accelerator Center, including visits to the the Department of Energy's Office of Science, the Office of Management and Budget and the Office of Science and Technology Policy.

"We made a particular effort to bring students and postdocs," said Amidei, "people whose futures are invested in the field, and who demonstrate a real commitment to the future."

"We're always willing to willing to get involved in activities that bring positive attention to our field," said Ben Kilminster of CDF and the University of Rochester, who was on the trip last March. "I believe we are obligated to share with the public exactly what we are doing and why it is the best research to fund: for the future of science, and for the future of technology."

Another Rochester student, Florencia Canelli of DZero, came away impressed with the necessity of being a good communicator as well as a good physicist.

"We can't take for granted that, just because we are doing science, someone will automatically provide us with money," Canelli said. "We have to try to explain what we do in a clear and compelling way. I learned that I can work in science because, long ago, someone did a good job of explaining what could be done at Fermilab. This is one way I can say, 'Thank you.'" ☐

CALENDAR

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

INTERNATIONAL FILM SOCIETY
Regret to Inform

Friday, Nov.10, 8 p.m., Ramsey Auditorium Wilson Hall $4, $2 for Fermilab grad students.

Dir: Barbara Sonneborn, USA (1998), 72 min. Made over the course of ten years by Sonneborn, whose husband died at Khe Sanh, the film brings the Vietnam War home from a new perspective—the war widow. Awarded Best Documentary and Best Cinematography at the 1999 Sundance Film Festival. Friday, Nov.10, 8 p.m., Ramsey Auditorium Wilson Hall $4, $2 for Fermilab grad students.

ARTS SERIES
Anima

Sat., Nov. 11, 8:00 p.m.
Tickets $18/$9 ages 18 and under

Don't miss this exciting Brazilian ensemble's premier North American Tour, celebrating Brazil's 500th anniversary. The mix of popular and "serious" music performed on traditional instrument recalls the most ancient roots of Brazilian traditional music.

A Celtic Christmas

Sat., Dec. 2, 8 p.m.
Tickets $20/$10 ages 18 and under

Storyteller Tomaseen Foley and an ensemble of musicians and dancers recreate a Christmas night in a remote Irish farmhouse in a time before cars, phones and TV, when the old traditions prevailed. Joining Foley are musicians William Coulter, Deby Benton Grosjean and Todd Deman, and dancers from the Murray School of Irish Dance.

ONGOING
NALWO

■ Free English classes in the Users' Center for FNAL guests, visitors and their spouses. The schedule is: Monday and Friday, 9:30 a.m. - 11:00 a.m. Separate classes for both beginners and advanced students.

■ Coffee for newcomers & visitors, Thursday November 30 at Housing office (Aspen East) 10:30 a.m.-12 p.m.

DANCING
Fermilab barn dancing

■ Traditional square and contra dances, every second Sunday, in the Village Barn. Nov. 12, 6:30 p.m.: music by Still Working and calling by Paul Watkins; Nov. 19, 2:00 p.m. with music by Chirps & Stephanie and calling by Dot Kent. Admission is $5 for adults, $2 for age 12-18, and free for under 12 years old. Come with a partner or without; bring the family or not. For more information contact Dave Harding (x2971, harding@fnal.gov) or Lynn Garren (x2061, garren@fnal.gov). Check our Web page (http://www.fnal.gov/orgs/folkclub/) for schedule updates.

International folk dancing

■ Thursdays, 7:30-10 p.m., Village Barn, newcomers always welcome.

Scottish country dancing

■ Tuesdays, 7:30 - 10 p.m., Village Barn, newcomers always welcome.

For information on either dancing group, call Mady, (630) 584-0825 or Doug, x8194, or e-mail folkdance@fnal.gov.

LAB NOTES

News from Payroll

■ The 2001 Social Security Wage Base will be $80,400. This is a Base increase of $4,200 over calendar year 2000. The tax rate will remain at 6.2% producing a tax increase of $260.40 for employees exceeding the Base. Medicare does not have a base limit and the 1.45% rate is unchanged for 2001.

■ The Payroll Department will be closed from 12/22/2000 to 1/2/2001. Time and Leave Sheets will be requested early. Monthly paid employees will be paid on 12/21/2000 and Weekly employees who turn in Time Sheets for W/E 12/17 and 12/24 will also be paid on 12/21/2000. Questions? Call the Payroll Department at x3046, x2991 or x2992.

Chez Léon MENU

Lunch served from
11:30 a.m. to 1 p.m.
$8/person

Dinner served at 7 p.m.
$20/person

For reservations, call x4512
Cakes for Special Occasions
Dietary Restrictions
Contact Tita, x3524
http://www.fnal.gov/faw/events/menus.html

LUNCH
Wednesday, November 15

Cajun Catfish
Red Beans and Rice
Vegetable of the Season
Pecan Pie

DINNER
Thursday, November 16

Bean and Escarole Soup
Stuffed Flank Steak
Risotto
Caesar Salad
Amaretto Cheesecake

LUNCH
Wednesday, November 22

Cheese Fondue
Marinated Vegetable Salad
Poached Pears

DINNER
Thursday, November 23

Happy Thanksgiving

FERMINEWS

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The deadline for the Friday, December 1, 2000, issue is Wednesday, November 15, 2000. Please send classified ads 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

- ’98 Honda Civic LX, 4-door sedan, silver, 28,500 miles, from first owner. Auto, cruise, dual airbags, power locks, power windows. A/C, Auto Alarm, Radio/Tape, Floor Mats. Very clean, almost brand new. $13,500 (negotiable). Call Tug Arkan x3782, e-mail arkan@fnal.gov.
- ’93 Ford conversion van, excellent condition $6000. Call Rich, 630-505-3224.
- ’92 Nissan Sentra, needs muffler, $3,000. Call Rich, 630-505-3224.
- ’91 Ford F-150 pickup, long bed, 4.9 liter 6-cylinder engine, electronic fuel injection, automatic transmission, air conditioning, AM/FM stereo, 111k miles. $4,400. Call x3697 or 630-668-8087.
- ’88 Toyota Corolla, Automatic, 103k miles, 1yr battery, AM/FM radio, $1,500 obo. E-mail rhorowicz@yahoo.com.
- ‘87 Nissan Sentra 2 dr., 5-spd. manual, good condition, $1,000. Anatoly, 630-840-2878.
- Men’s 23″ 10-speed basic road bike, good condition $40. Joe 393-7722 or steel@fnal.gov.
- Bose Acoustimass-7 home theater speakers, 3 cube speaker arrays, Acoustimass bass module was $650 plus tax, now $450 and only two years old. Pro-form 525se performance treadmill power incline was $600, now $350. Like new. Pro-form 975s stationary bike silent magnetic resistance was $300, now $150 like new. Sears 5-1/8″ jointer-planer was $250, now $125. Call Tim x4070.
- Treadmill (10 MPH), $100. Helix climber, $50. Kingsize oak waterbed w/dbl drwrs and everything you need, $400. 4 new steel wheels with new winter tires (BFGoodrich P205/60R15 Touring TA) for a ’93 Audi Quattro, $175. Contact cdyrda@hotmail.com.
- DP Strider treadmill, model 21-1900, 13″ belt with incline, like new, excellent condition, $100, Call Bill x4597 or 630-983-0279 or ng@fnal.gov.
- Acer computer, Intel 486, Windows 3.1, includes: monitor, CPU, keyboard, mouse and HP 660 Deskjet printer. Best offer! Contact mclayton@fnal.gov.
- Gateway 2000 4SX-33 Computer with 15″ monitor, keyboard, mouse, 3-1/2″ drive, 5-1/4″ drive, CD-ROM drive, Windows 95, and Microsoft Office. $150 obo, Matt 208-1751.
- 2 SAT books, $14. Full size mattress and box spring, only $60. Call 630-355-1253.

WANTED

- Information on a car accident that took place in the parking lot west of Wilson Hall near Linac on Thursday, 10/19 between 1:30 and 8:30 p.m. The driver-side door of a red Honda Civic was severely damaged as another vehicle hit it. Please report information to Kurt at x5681 or contact Security.
- Folding/utility or craft table. Call x6633.
- Used camping equipment in good condition. Call 630-262-9380 or e-mail WriteETC@aol.com.

FOR RENT

1 bedroom with bath, kitchen and laundry facilities available. Non-smoking. Short term, no lease. In private home, 3 miles from Fermilab. Jan 630-892-9846.

MILESTONES

RETIRING

- Edward Barsotti, ID 890, CD-Electronic Systems Engineer, October 31.
- Norman Leja, ID 4200, BD-AS-Mechanical Support Dept., October 27.

Ph.D.

Robert Cropp, University of Toronto, completed his thesis working on the CDF experiment.

DIED

- Charles “Charlie” Paul, ID 6801 PPD TC Meson Assembly Building, October 1, 2000.
- Sam Segler, CDF/PPD, October 8, after retiring on October 3. Memorial donations may be made to Sunny Ridge Family Center, 2 S 426 Orchard Rd., Wheaton, IL, 60187.

TEST RUN COMPLETE

The Beams Division successfully completed a seven-week Tevatron test run. The partially installed CDF detector recorded millions of test collisions.

FIRST ANTIPROTONS

Circulated in the new Antiproton Recycler: the first antiprotons, at 2 p.m. on Monday, November 6, 2000.

http://www.fnal.gov/directorate/public_affairs/ferminews/

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