

F E R M I N E W S

F E R M I L A B A U.S. DEPARTMENT OF ENERGY LABORATORY



Photo by Reidar Hahn

Professor Prairie 12

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Checking in: A CERN technician inspects the superconducting magnet after arrival in a container from Brookhaven. The container is trucked to CERN, then lifted off the truckbed by crane and prepared for receiving.

CERN Receives First U.S.- Built

GENEVA, Switzerland—In a milestone for global science collaboration, the European Organization for Nuclear Research (CERN) took delivery on Tuesday, January 21, of the first U.S.-built contribution to what will be the world's highest-energy particle accelerator.

The superconducting magnet, built at the U.S. Brookhaven National Laboratory, will become a key component of the Large Hadron Collider (LHC). It is the first of several advanced accelerator elements the U.S. will provide for the LHC under the terms of a 1998 agreement between CERN and the U.S. Department of Energy (DOE) and National Science Foundation (NSF).

"The arrival of this magnet from Brookhaven marks a new era in international collaboration in particle physics," said CERN Director General Luciano Maiani. "The LHC is the first truly global collaboration in particle physics, and this magnet joins a steadily growing stream of LHC components arriving from around the world—a substantial demonstration of people of all kinds working together towards a common goal."

Scheduled to start in April 2007, the LHC will probe deeper into matter than ever before to explore a new energy region and search for new phenomena. The 27-kilometer rings of the LHC will circulate two counter-rotating beams of protons at nearly the speed of light (300,000 kilometers or 186,000 miles per second) while maintaining the protons precisely at the center of the beam pipe containing them.

To reach the highest energy ever produced by an accelerator, the LHC will use more than 6,000 superconducting magnets, most of which are being built by CERN's industrial partners in Europe. As part of the total \$531-million U.S. contribution to the LHC, Brookhaven agreed to develop and manufacture the LHC's interaction-region dipole magnets, which will guide the LHC's two counter-rotating beams of protons into collision.

"I congratulate the Brookhaven team on this milestone for international collaboration in scientific research," said Dr. Raymond L. Orbach, Director

ON THE WEB:

LHC
http://lhc.web.cern.ch/lhc/general/gen_info.htm

CERN
<http://public.web.cern.ch/public/>

BNL
www.bnl.gov

Fermilab
www.fnal.gov



Photos courtesy CERN

Component for Large Hadron Collider

of the Department of Energy's Office of Science, which funds the US LHC magnet contributions. "It is tangible evidence of the successful fulfillment of the commitment we have made to provide advanced U.S. magnet technology and accelerator expertise for the next step in worldwide particle physics research at the energy frontier. And it is exciting to be a party to the future accomplishments of the LHC."

The 25-ton Brookhaven magnet, the first of 20 that the laboratory will ultimately provide, took nine months to construct, with more than 100 scientists, engineers and technicians contributing to its successful completion. Brookhaven's Superconducting Magnet Division is now building the remaining 19 magnets, which will be shipped to CERN later this year.

In addition to Brookhaven, other U.S. partners on the project include Fermi National Accelerator Laboratory (Fermilab), which is constructing 18 quadrupole magnets, and Lawrence Berkeley National Laboratory, which is working on superconducting cable and utility boxes for the magnet assemblies.

"Our colleagues at Brookhaven have done a splendid job, producing the first U.S.-built superconducting magnet for the LHC project in time and according to specification," said LHC project leader Lyn Evans. "This will soon be

followed by further deliveries from Brookhaven as well as from Fermilab and Lawrence Berkeley National Laboratory, all actively participating in the LHC design and construction. This constitutes a major step forward in international collaboration in the construction and exploitation of large facilities for particle physics research."

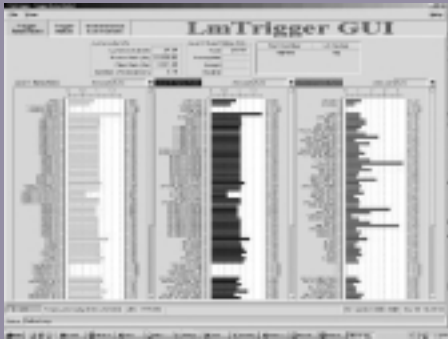
Fermilab physicist Jim Strait, Project Manager for the US LHC accelerator effort, said the collaborative nature of the project is integral to its success.

"The delivery of the first U.S. superconducting magnet to CERN for the LHC is a significant accomplishment by Brookhaven, and a major milestone in international collaboration on high-energy accelerators," said Strait. "The U.S. collaboration with CERN is proving very productive for both sides, and I hope it will continue in the future for the benefit of world-wide particle physics."

—This story was prepared jointly by James Gillies of the Press Office at CERN, the European Organization for Nuclear Research in Geneva, Switzerland; Peter A. Genzer, Principal Media & Communications Specialist at Brookhaven National Laboratory in Upton, New York, and Judith Jackson, Director of the Office of Public Affairs at Fermilab in Batavia, Illinois. 🌐

DZero Goes Global

**New
monitoring system
allows serving
control room shifts
as far away as India**



ON THE WEB:

DZero collaboration
www-d0.fnal.gov

by Mike Perricone

On Friday, January 3 at about 5 a.m. Central Standard Time, Onne Peters was on a control room shift for Fermilab's DZero detector when he saw something that wasn't right: hot cells, or excess jets, appearing in the detector's calorimeter. He immediately notified the shift captain, who alerted the calorimeter expert on shift, and the problem was solved.

It might sound like particle physics business as usual in the predawn of a winter morning, but there was a big difference: Peters was serving his DZero control room shift from a computer at NIKHEF, the National Institute for Nuclear Physics and High Energy Physics in Amsterdam, Holland. Some 4,000 miles and an ocean away from the chilly predawn in Batavia, Illinois, Peters was hooked into DZero's new Global Monitoring System.

DZero has seen the future, and it works.

It works as far away as NIKHEF in Holland; the Saclay laboratory of CEA, the French Atomic Energy Commission; and the Tata Institute of Fundamental Research in Mumbai, India, where experimenters have taken "virtual" shifts in the DZero control room through the Global Monitoring System.

"This is absolutely the wave of the future," said Peters. "With increasingly international collaborations, it is just not feasible to expect people to be available on-site for a large amount of time. This is a trend we see with remote computing, the remote analysis stations, as well, and I certainly foresee that these projects will benefit high-energy physics greatly."

DZero cospokesperson John Womersley also sees future applications when the Large Hadron Collider begins operations at CERN, the European Particle Physics Laboratory.

"Five to ten years from now, many U.S. institutions, Fermilab among them, will themselves become remote collaborators working on LHC experiments," Womersley said. "We need to learn how to contribute effectively to all aspects of LHC physics, and remote participation in data taking operations will be an important piece of the puzzle."

The global monitoring hookup was "godmothered" from concept to operation by DZero physicist Pushpalatha Bhat, with yeoman work on the user interface and the communication system—a global message board—by her undergraduate student, Jason Webb, who works part-time at DZero while studying electronic engineering at DeVry University in Addison, Illinois.

"It's a joy to work with bright and motivated students," Bhat said. "I love to encourage them to pursue studies in physics and perhaps a career in physics."



Photo by Reidar Hahn

"We initiated the remote international monitoring as an opportunity to take part in activities in the Control Room for collaborators who can't travel frequently to the lab. It's a good way for them to participate and to know what's going on here," said Pushpa Bhat, viewing the DZero Global Monitoring System with Michiel Sanders (center) and Jason Webb (right). Webb, an undergraduate student at DeVry University, developed the messenger system for communication with remote shifters. Sanders, of the University of Manchester in England, helped develop on-line monitoring tools.

The project has had exactly that effect on Webb.

"After working here at Fermilab," he said, "I have been seriously considering going for a Master's degree in Physics."

Bhat explained that the message board is used for chatting between people in the control room at the detector and remote shifters. Anyone else who wants to join and share information online can also communicate through the messenger system. A problem can be sent to this chat box, and it also appears on a web search board, where messages can be seen between the control room and the remote shifters. The messenger system also provides for archiving.

"Sometimes, if I'm up late at night, I can go to the message board," Bhat said. "Even if I do not log on to the detector's online system, I can see what is being said back and forth, if there are any problems, or if there is anything that needs attention."

To be sure, as with any newly-developed (and developing) system, not everything goes smoothly. Sudeshna Banerjee of Tata Institute recalls a few

weeks of "owl shifts" in Mumbai that pointed up some glitches.

"Some days we had problems with communication because the message board got stuck frequently," Banerjee said. "Therefore we did not do much 'research.' But maybe in the future things will get better."

Webb agreed that there is more work to be done on the messenger system. "I am working on making the messenger system more like 'AOL Instant Messenger,'" he said. "I would like the communication to be more person-to-person apart from posting to a message board."

Despite the problems, Banerjee remains enthusiastic.

"These shifts did give us a feel that we were taking part in the experiment and monitoring the detector performance," she said. "And these huge experiments need many people and much space. So, it is helpful if some people work remotely and contribute both manpower, space and resources not necessarily located at Fermilab."

Driving the global monitoring system is the detector's on-line monitoring system, which samples physics data in real time to determine whether the detector is performing properly, and whether the data will produce good physics results. Elliott Cheu (Arizona), Han Do (Vietnam), Harrison Prosper (Florida State), Michiel Sanders (Manchester) and Joe Steele (Virginia) have developed tools used in on-line monitoring.

"It's our first line of defense," Bhat explained. "If you are writing bad data, and don't know about it, weeks later when you start to reconstruct your results off-line, that's when you'll see the problems. We sample data in real time, as it is being written to file, then we run a full reconstruction program. We're looking at where the hits are in the detector, or what we call how the occupancy looks. Then we make more sophisticated reconstructions of the data. Our on-line monitoring only looks at a small fraction of the data. We can't process all the data that comes through. But this is the information we need to see if any part of the detector or trigger is not working as it should be. On-line monitoring enables us to diagnose problems quickly, and make sure they are solved quickly."

On-line monitoring is also used at the CDF detector (see accompanying story), but Bhat regards the global monitoring system as an important step forward in enabling true international collaboration on day-to-day detector activities and physics analysis. She also sees an extra level of support for the detector itself.

"We have hundreds of collaborators," she said. "The remote monitoring allows collaborators everywhere in the world to participate in activities, when they would otherwise have no clue as to what's going on in the control room. We only have four or five people on shift in the control room at any one time, and we rely on these very few people to make sure the data we're taking is good. By adding the remote shifters, we now have groups of experts outside the control room, who don't have to be there physically. These remote shifters may be the ones who have done the most work in building specific parts of our detector, or who know most about the triggers, for example. To have an expert group that can make sure part of the detector is working properly is very important because we cannot expect all our experts to be on the site all the time."

And in human terms, the feeling of active participation is invaluable, especially for scientists constrained by limited travel budgets. Scientists are expected to serve shifts to earn the right to analyze data, and that includes overnight shifts. But an

Global



At left, Onne Peters checks in for a DZero control room shift via computer from NIKHEF in Amsterdam, Holland. Above, Pushpa Bhat shows the range of data available to remote shifters on the Global Monitoring System.

Photo by Reidar Hahn

overnight shift on the site translates into a shift starting at 7 a.m. in Europe, meaning a remote shifter like Peters can work a day shift and relieve someone else from working all night.

“It is a great opportunity to fulfill one’s shift requirements, without having to physically be present,” Peters said. “On the one hand, it tightens the connection one feels with the running of the experiment. If I am just doing my analysis here, 4,000 miles away, that connection ‘fades’. Also, traveling to the U.S. is expensive. When I am able to be at Fermilab, I would rather talk with people and work with them instead of doing shifts, even though that is very useful work as well. And last, I can save somebody else from staying up all night.”

In addition, Womersley is aware that the tools of particle physics research often have unforeseen benefits in other fields.

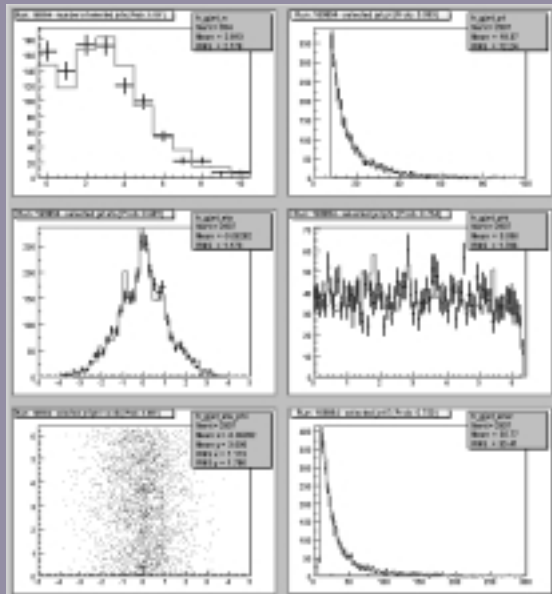
“Making worldwide collaboration effective and seamless is a challenge in many activities, not just science,” he said. “Tools that have been developed to improve collaborative work in high-energy physics have turned out to be more broadly useful. Medicine and global business are obvious examples. Our community is international, highly networked, and closely collaborating; it can serve as an effective ‘technology incubator’ for ideas like this.”

Always global in outlook, the world of particle physics gets smaller every day. ☼

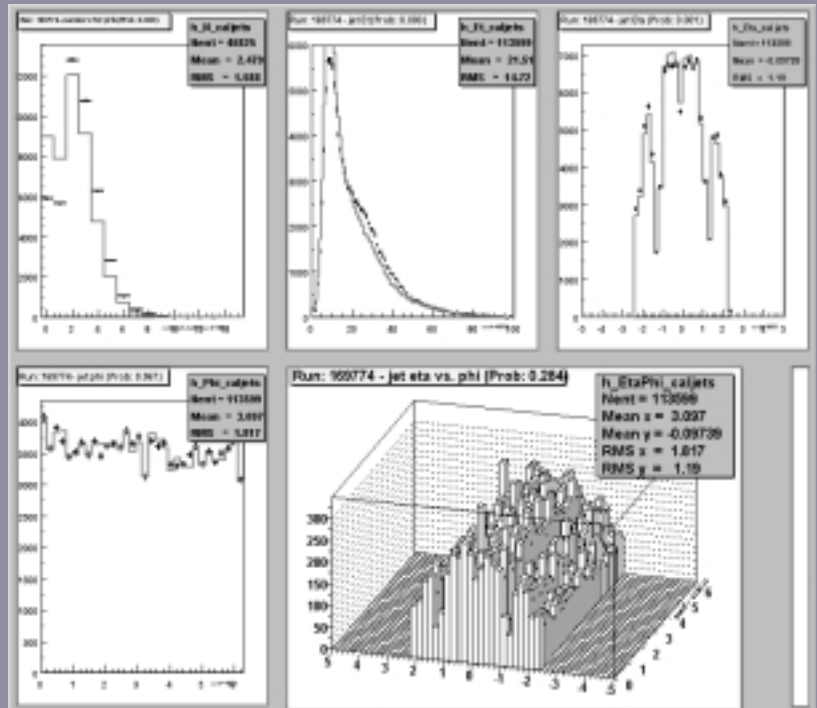
Meanwhile, over at CDF...

The CDF detector has a sophisticated on-line monitoring system, and physicist Kaori Maeshima, who coordinates the data taking operation, says that the results from the on-line monitoring are available remotely for more detailed diagnostic purposes.

“CDF has only four people on shift and this is the minimum (or very close to the minimum) number of people we need to have in the control room,” Maeshima said. “They are there to take high quality data efficiently. The CDF monitoring system enables the shift crew to monitor the entire detector and accelerator status. Sub-detector, trigger, DAQ, and other experts are not ‘on shift,’ but they are ‘on call.’ Some of the experts are quite far away—in Italy for the plug detector and at Brandeis University [in Boston] for temperature monitoring, for example. If the shift crew finds a problem with a specific part of the experiment, they can get help from an ‘expert on call’ by calling the expert, and in many cases, the expert can investigate and fix the problem remotely.”



Here’s a sample of what Bhat and remote shifters like Onne Peters are viewing simultaneously: Plots of some basic characteristics such as number per event, transverse and total energies, pseudo-rapidity and azimuthal angle for hadronic jets satisfying set selection criteria after reconstruction on-line. The crosses are the data being recorded at the time; the histograms are the reference distributions used as standards for comparisons.



Left: Plots from Physics Examined Data.
Above: Plots from Trigger Examined Data.

NEW HEAD OF *Program Planning*

by Kurt Riesselmann

Jeff Appel:
"I'm the
EXPEDITER
for information."

For experimenters, accelerator experts or technicians, in fact almost everyone, life at Fermilab revolves around the operations of its accelerator complex.

"When will we get particle collisions at our experiments? When can we have more time for beam studies to improve the performance of our accelerators? When will the beams be shut down so that we can install new equipment?"

Those are typical inquiries, and everyone tries to get the best and biggest slice of the pie. But what is good for one group often presents a handicap for a different team. Finding a plan that works for everyone is a daunting task.

"The pressures on the experiments are different from the pressures on the laboratory," said Jeff Appel, newly appointed Assistant Director and Head of Fermilab's Program Planning Office. "Fortunately, there is a very common set of goals: It's all physics driven. If we don't lose sight of those goals, then it will be easy to communicate with the various parties involved."

Appel has been at the center of this pressure system since December 1, when he assumed his new PPO duties.

"There are two cultures at the laboratory: aggressive planning versus no-risk scheduling," Appel outlined his view. "If you are aggressive in your goals, you reach for more than you are assured of attaining. If you focus on reliable schedules, it gets harder to reach for more: nothing ventured, nothing gained. I see my job as working at the interface of these two cultures."

To help the lab directors navigate the best course, Appel pulls together information on operations and future plans for both accelerators and experiments, taking note of the various requests for beam time and shutdowns. He also provides the support documents when the lab directors negotiate a memorandum of understanding with a university or an experimental collaboration, clarifying the responsibilities of all parties.

"I'm the expeditor for information," said Appel, who has been at the lab for 27 years. "The focus of my new job is that communication happens even when everybody has lots to do. There are lots of venues for communication. There are meetings, there is the cafeteria and there are office doors that are open. Above all, I will have my ear to the ground."

Appel, one of the physicists who discovered the bottom quark at Fermilab in 1977, has experienced both the need for, and the power of, program planning from many points of view. In the 1970s, working in the switchyard group, he was at the interface between lab management and several collaborations of physicists conducting fixed-target experiments. During his administrative positions as head of Computing (1986-1990) and head of the Physics Department (1990-1998), he closely worked with the Fermilab directorate

ON THE WEB:

Fermilab Program Planning Office
www.fnal.gov/directorate/profiles/PPO.html

Fermilab Directorate
www.fnal.gov/directorate/directorate.html



Photo by Reidar Hahn

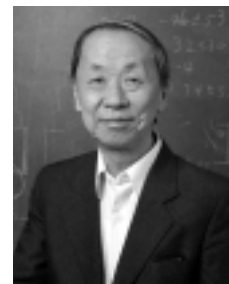
Jeff Appel in his office. "Jeff is very familiar with the laboratory and fully aware of the diversity of its program," said Hugh Montgomery, Associate Director for Research.

while staying actively involved in physics experiments. As a spokesperson of two collaborations, Appel directly dealt with the PPO and advocated the needs of his physics experiments (E769, E791). In the last five years, Appel has led a group of scientists developing high-precision particle-detection components (pixel detectors) for the BTeV experiment.

"Jeff is very familiar with the laboratory and fully aware of the diversity of its program," said Hugh Montgomery, Associate Director for Research. "He has the respect of both the experimental community and the directorate. In his new position, he sits at the interface of these two groups, advocate and defender for each to each."

Appel has replaced Taiji Yamanouchi, who retired after serving as head of the PPO from 1980 to 2002, interrupted by a yearlong stint at the CDF experiment in 1986. Yamanouchi's tenure at PPO included the early fixed-target days, when he had to coordinate the simultaneous activities of as many as two dozen experimental collaborations at the lab. In the last ten years, he balanced the experiments' needs of data taking with the shutdowns required by the upgrade of the Linear Accelerator and the construction of the Main Injector.

"In the '90s, we were down almost half the time," said former Fermilab Director John Peoples. "There was an awful lot of construction going on. Trying to schedule all the big interruptions was Taiji's job. I would always come up with crazy schedules, and Taiji would make them work. Every week there were changes as we tried to balance operations with construction that required the accelerators to be shut down."



Taiji Yamanouchi

With less construction and fewer experiments, it seems as if Appel's job might be somewhat easier. But the experimenters' cry for more powerful beams and steady delivery is getting louder. Both CDF and DZero have a growing appetite for colliding beams, and the new neutrino experiments MiniBooNE (started in 2002) and MINOS (beginning in 2005) are asking for delivery of as many protons as possible. Appel, who is currently working on a draft schedule for 2003, is aware of the task ahead.

"I think the challenges are at least as great as ever," he said. "Certainly the importance and visibility of the task is no less so." ☒

REACHING OUT

**Lederman fellows
bring science to
the public, and
have fun doing it**

ON THE WEB:

Fermilab Education Office
www-ed.fnal.gov

by Mike Perricone

Jay Dittmann has spent most of his life in school. He has earned a bachelor's degree, a master's degree and a doctorate, and even now, he is serving the equivalent of an apprenticeship as a postdoctoral researcher at Fermilab.

But when he gets the call, he loves going back to school and mixing with kids in classrooms.

"Bright-eyed, curious, uninhibited—young children are eager sponges," Dittmann said. "I love to talk with them about what I do. Showing them what I do is even better. I remember mesmerizing a third grader with an oscilloscope. I showed him how I could make the traces appear with different shapes and colors. And then I let him push the buttons and turn the knobs himself. He was absolutely delighted. It's hard to believe that this kind of interaction with a young person doesn't make a lasting impression."

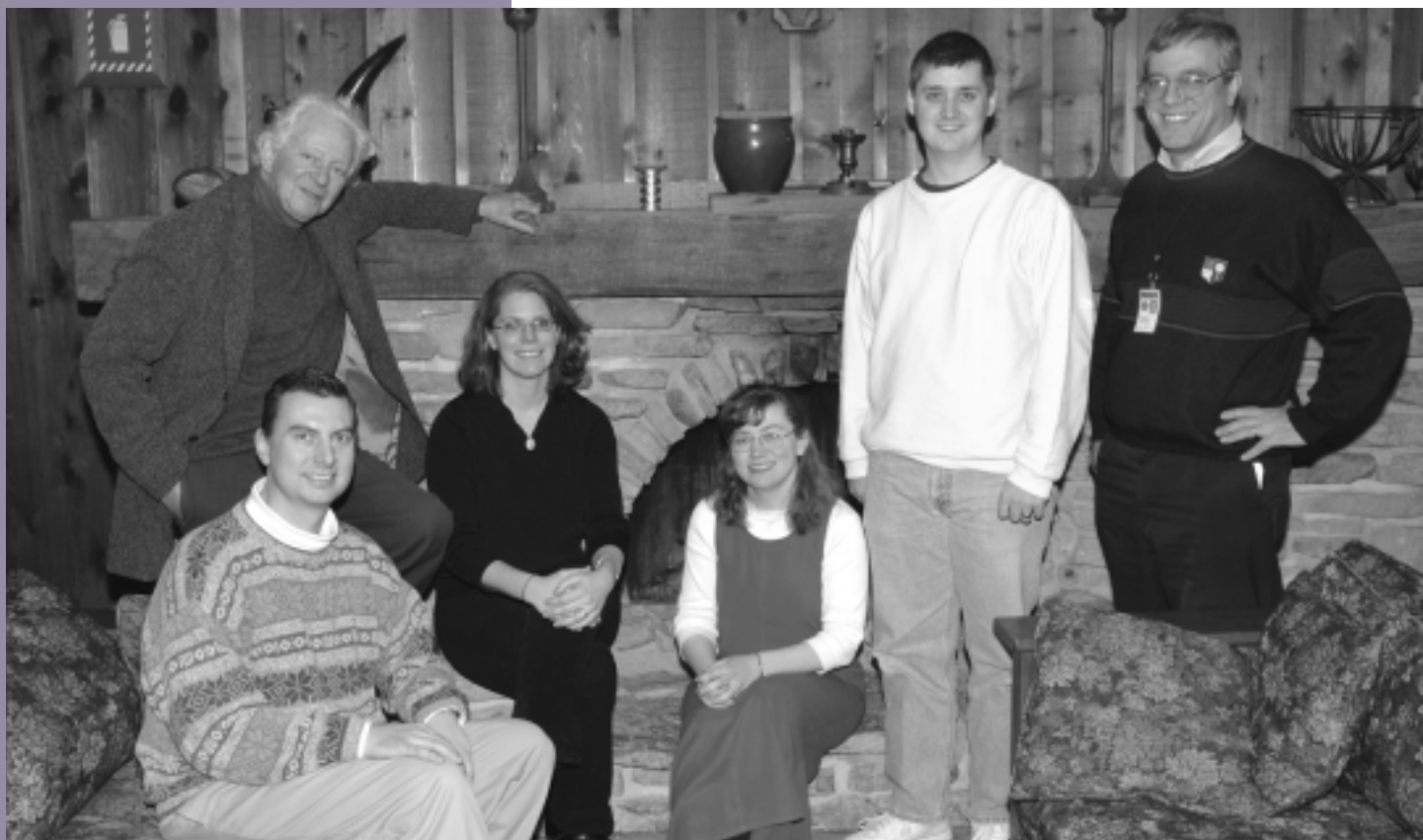


Photo by Jenny Mullins

Gathering before the fireplace, and before lunch, at Chez Leon are (from left) Leon Lederman, Lederman Fellows Jay Dittmann, Bonnie Fleming, Natalia Kuznetsova and Breese Quinn, and Lederman Fellows Committee chair Michael Albrow.

A lasting impression is the greatest hope of all who do science outreach—and encouraging young scientists to take part in science outreach is the distinguishing characteristic of the Lederman Fellowships. The awards were established in 1990 by Leon Lederman, Fermilab’s director emeritus and 1988 Nobel Prize winner, and by then-director John Peoples. The three-year fellowships carry the specific requirement of participating in educational activities, including and well beyond Fermilab’s Saturday Morning Physics program for high school students.

To Lederman, a strong proponent of science education, making an impression on the public is critical for the well-being of science. And he wants scientists to be involved from the start of their careers, to get lots of practice.

“Outreach is essential for all publicly supported science research

activities,” Lederman said. “Research is fundamentally inefficient and has only long-term payoff. This is not understood by most of the public that pays for it. Thus, it is our obligation to explain, to clarify, but to do it honestly. And there is a big influence if the explaining is carried out by the young scientists who carry the enthusiasm and the knowledge. Also, it takes time and experience to do it well, so start early!”

Lederman fellows—currently, four of them—do just that. Dittmann, Breese Quinn, Natalia Kuznetsova and Bonnie Fleming are definitely on the run. Just a list of all their activities would fill an entire story by itself.

They give tours for school groups, senior citizens and VIP’s. They appear regularly in Saturday Morning Physics. They work closely with Fermilab’s Education Office. They go to schools and community organizations to give science presentations and participate in career day activities. They judge science fairs.

Quinn is a dean at the lab’s Tevatron University instructional program, helping coordinate evening talks at the advanced graduate level and post-doc level. He is helping develop a visitors’ display center at DZero. Dittmann serves on committees for the Summer Internships in Science and Technology program, and for the Fermilab Colloquium program.

Kuznetsova and Fleming have each written an article for *FERMINEWS*. Last April, with Susan Dahl of the Lederman Science Education Center, and Gail Green, a science teacher at Keller Junior High School in Schaumburg, they organized a Girls’ Scientific Salon—a science adventure for girls in grades 6-8. The girls spent a Saturday at the Lederman center, doing various fun science-oriented things such as exploring the chemistry of cooking, and understanding the physics of dance.



Bonnie Fleming (stirring) and Natalia Kuznetsova (pouring) demonstrate making ice cream with liquid nitrogen at the Girls’ Scientific Salon last spring at the Lederman Science Education Center.

“It is very important for me to relate to young students, especially girls, and present being a scientist as an attractive career option,” said Kuznetsova, who is originally from Belarus. “Our field will have no future without a very significant outreach effort, and I wish there was a better appreciation of that fact in the high-energy physics community.”

That motion is strongly seconded by veteran physicist Michael Albrow, chairman of the Lederman Fellows Committee for the past five years.

“It’s extremely important that particle physicists, and all physicists, should take very seriously the duty, in fact the obligation, to make the general public as informed as possible about what we’re doing,” Albrow said. “For example, in doing astronomy, people ask, ‘What’s the use of astronomy? Are there any applications?’”

“Well, most of astronomy doesn’t have any application at all, but it’s understood by the general public as being important to do. They can appreciate the value of the knowledge, something that’s harder to get across in particle physics. People can look up and feel a connection with the stars, but it’s harder to see a connection with protons. The public pays for the research we do, and it’s entitled to get something back from it.”

Albrow experienced no comparable window on the world years ago as a young postdoc at another lab.

“There was no outreach component at all, none expected and none encouraged,” he said. “We just put our heads down and worked.”

Compared to the Lederman Fellows, it sounds like he missed out on a lot of fun. ☹️

*"I have spread my dreams under your feet;
tread softly because you tread on my dreams."*

—W.B. Yeats

Professor **Prairie**

DOUBLE CELEBRATION:

BETZ IS 80,
FERMILAB PRAIRIE IS 30,
*AND BOTH ARE
GOING STRONG*

ON THE WEB:

ELM Committee
[www.fnal.gov/pub/
about/campus/ecology/elm](http://www.fnal.gov/pub/about/campus/ecology/elm)

Fermilab Prairie
[www.fnal.gov/pub/
about/campus/ecology/prairie](http://www.fnal.gov/pub/about/campus/ecology/prairie)

COVER PHOTO:
Bob Betz and his wife, Eleanor, enjoyed the dual celebration of Betz's 80th birthday and the prairie restoration project's 30th anniversary.

by Elizabeth Clements

Freedom, serenity, history, endurance – these are just a few of the words that come to mind when describing the feeling of a prairie. It is a feeling that Dr. Robert Betz, the inspiration behind the Prairie Restoration Project at Fermilab, knows well.

In 1973—almost thirty years ago—Betz, along with Raymond Schulenberg, of Morton Arboretum, and some dedicated Fermilab employees, drew up the first plans for the nine acres of land that would become the Prairie Restoration Project. Thirty years later the Fermilab prairie is flourishing with over 1,100 acres of restored prairie and no sign of anything slowing down yet, including Betz. In addition to celebrating three decades of a successful prairie restoration, Betz, also known as Professor Prairie, has another occasion to celebrate this month, his 80th birthday.

THE CELEBRATION

In honor of these milestones, on January 16, 2003, the Ecological Land Management (ELM) Committee surprised Dr. Betz with a birthday party that included a slide show of the early days of the Prairie Restoration Project and, of course, a cake.

Fermilab Director Michael Witherell presented Betz with a Certificate of Appreciation in recognition of the Prairie Restoration Project and a poster-sized image of a prairie burn.

"Hardly anybody, other than [founding director] Bob Wilson, has ever left as big an imprint on Fermilab as Bob Betz," said Witherell.

Expressing appreciation and gratitude for all of those who had helped the prairie become what it is today, Betz said, "I'm so happy. I would do it for nothing."

Betz remembered passing by Fermilab in its early days—1971—and hearing a rumor that Robert Wilson, the founding Director of Fermilab, had contacted the Morton Arboretum about landscaping plans for the lab's 6,800 acres of land. Betz, who had been searching for a place to build a big pre-settlement prairie, knew that Fermilab would be the perfect place. He contacted Wilson, who had only one question: how long would it take to reconstruct this prairie? Betz admitted that this had never been done before, so he really didn't know. It might take 10, 20, 30, 40—he stopped at 100 years. Wilson replied, "We should start this afternoon."

And they did.



Fermilab Director Michael Witherell presented a certificate of appreciation and a commemorative photo to prairie project founder Bob Betz. And then, it was time to cut the cake.



Photo by Reidar Hahn

BEHIND THE SCENES

At first glance, a prairie may appear to be just a random palette of colors that blossom as a result of Johnny Appleseed sprinkling the land with seeds. And although it is true that a flower—perhaps a marigold—can grow from a random tossing of seed, a garden takes time and effort and planning and care. A prairie takes even more. In fact, even before a seed can be planted in the prairie, it needs to go through a meticulous cleaning and sorting process.

Martin Valenzuela and Joe Trevino, of Fermilab's Roads & Grounds department, understand first hand the amount of work that a prairie requires. Inside a greenhouse in the Fermilab village, the sweet aroma of herbs and wildflowers welcomes visitors in from the winter chill. Barrels and barrels of plants, collected by volunteers at the prairie harvests in the fall, occupy every inch of space.

Betz makes regular visits to the greenhouse. "I enjoy it when he is around," said Trevino. "Dr. Betz takes his time to explain the types of plants and where they come from. I always learn from him."

Valenzuela and Trevino have the harvesting of seed down to a science. Sifting mills and air pressure mills extract the seeds, which can be minuscule, from the dust and other entities that make up a plant. Sanding blocks and ordinary kitchen strainers are also used to sort out the pure seeds. Once the seeds are considered to be at least 90% pure—100% for rare plants—batches are stored in a walk-in freezer adjacent to the greenhouse. Valenzuela explains that the freezer reenacts winter for the seeds, keeping them cool and dry. In the spring, the seeds are planted in the tracks of prairie burns.

"One of the key things that Dr. Betz taught us about the prairie is that you can't just throw seed in one place and have it grow," said Valenzuela. "It depends on so many things. It is really an experiment."



Prairie seeds shown actual size, with a penny for scale. From top: Foxglove Beard Tongue (*penstemon digitalis*); False Sunflower (*heliopsis helianthoides*); Mountain Mint (*pycnanthemum virginianum*); Heart-Leaved Golden Alexanders (*zizia aptera*); Prairie Goldenrod (*solidago rigida*); a grouping of Golden Seal (*hydrastis canadensis*), Blue Flag (*iris virginica shrevei*) and Early Meadow Rue (*thalictrum dioicum*); and Culver's Root (*veronicastrum virginicum*).



The Fermilab greenhouse is filled with containers of prairie plants that volunteers picked during the harvests in the fall. Joe Trevino, of Roads & Grounds, sifts the dried plants by hand, which is one of several steps of cleaning seeds.



Photos by Elizabeth Clements

Fermilab's Road & Grounds Department uses sifting mills and air pressure mills to extract the pure prairie seeds from the rest of the plant. Martin Valenzuela, who has seed harvesting down to a science, said, "Once the flowers are in bloom and you see the beauty of the prairie, that is your reward."

THE BIRDS AND THE BEES (BISON AND BUTTERFLIES TOO!)

When Betz first started the Prairie Restoration Project at Fermilab, he knew that harvesting the original plants was only the first step. He envisioned a prairie community made up of birds and butterflies and other critters. Betz's plan was not only to restore a forgotten heritage in Illinois; it was also to create a haven for many rare animal species. Today, in addition to its famous herd of bison, Fermilab is home to over 273 species of birds and more than 53 species of butterflies.

"One has to start with the plants," said Tom Peterson, a Fermilab engineer and ELM Committee member. "Prairie animals, such as insects, can only be introduced after the plants are established because the animals depend on them. Several prairie butterfly species, like the large and beautiful Regal Fritillary, which were once common and widespread in Illinois, are now extremely rare due to the destruction of the prairies. We hope that, eventually, prairie restorations like Fermilab's will be able to support some of these long-absent prairie animal species."

Betz's next goal for the Fermilab prairie is to reintroduce the original prairie pollinators—bees and wasps. A bee sting or two ("They only hurt for a minute," he said) is not enough to scare Betz from introducing a catalyst to help the flowers grow. Betz would also like to introduce the prairie earthworm to Fermilab. This whitish-pink earthworm is extremely fragile and can only survive in a specific type of prairie soil. The more often these critters are introduced to the prairie, the closer the project will be to completion.

BLUE (CHEESE) MOON

Toward the end of his birthday party, Betz recalled when he first began restoring prairies. He searched along railroad tracks and inside pioneer cemeteries, places that were rarely mowed, to find remnants of the original prairie. On his hands and knees, Betz would spot the small prairie plants that were trying to grow and noticed that their roots were still intact. He convinced cemetery caretakers to stop mowing certain areas and, as he suspected, the original prairie plants started to grow.

Two or three years later, on a morning in July, Betz watched the sun rise over the prairie plants that he had restored in a cemetery. One of the caretakers drove up the road and got out of his truck to admire the scene. The caretaker told Betz that when he had first heard all of these ideas about restoring a prairie with plants that he had never heard of, he never believed that it could be done.

"'Now,' he said, 'if you told me that the moon was made out of blue cheese, I would believe you,'" said Betz. "That was one of the nicest compliments I ever received."

Happy Birthday, Professor Prairie. 🌱

FERMILAB ARTS SERIES

Website for Fermilab events: <http://www.fnal.gov/faw/events.html>



Libana

Saturday, February 8, 2003

"There's something otherworldly about the beautiful, ethereal singing of Libana."

—The Minneapolis Star Tribune

Libana, New England's international touring world music ensemble, is now in its 23rd season of researching, performing, and celebrating songs, dances, and instrumental music from around the world, especially as handed down through women's traditions. The women of Libana present an exhilarating cross-cultural performance, and are experts in many vocal styles from exquisite a *cappella* Balkan harmonies to the traditional singing of Berber women in Algeria. Frenzied Egyptian drumming and ritual dancing, poignant and supple Hawaiian melodies, and the rhythms

of Africa and the Middle East are also among the cultural expressions offered by a Libana concert. Don't miss this beautiful and informative concert on Saturday, February 8 at Fermilab's Ramsey Auditorium.

Tickets for Libana are \$17 (\$9 for ages 18 and under). To purchase tickets, or for further information or telephone reservations, call 630-840-ARTS weekdays between 9 a.m. and 4 p.m. Phone reservations are held for five working days, but will be released for sale if not paid for within that time. Will-Call tickets may be picked up, or available tickets purchased, at the lobby box office on the night of the performance beginning at 7 p.m. When coming to this event, only the Pine Street entrance to Fermilab will be open.

Ramsey Auditorium is located in Wilson Hall, the hi-rise building on the Fermilab campus. Fermilab is accessible from the west by turning east on Pine Street from Kirk Road, just north of I88. Our address is Kirk Rd. & Pine Street, Batavia. For more information, check out our web page at www.fnal.gov/culture.

Dragon's Tale: Nai-Ni Chen Dance

March 8, 2003

Dragon's Tale is a feast for the eyes, mind, and heart. Bringing to life the culture and traditions of China, this full-length family show leaves children mesmerized at each enchanting, astounding dance, and adults equally caught up in the magic of it all.

Tickets - \$19 (\$10 ages 18 and under)

Quartetto Gelato

April 5, 2003

As the engaging innovators of a fresh approach to classical music, Quartetto Gelato has won the hearts of audiences worldwide since their remarkable 1994 debut season. The concert presentations combine supreme musicianship, irrepressible energy and charming wit, treating their listeners to an unforgettable musical event.

Tickets - \$21 (\$11 ages 18 and under)

MILESTONES

RETIRING

- Jerome Henry, ID 8246, TD-Machine Shop, December 27, 2002.
- Sharon Koteles, ID 2397, ES&H-Medical, January 6.
- Marc Haibeck, ID 5051, CD-Core Support Services, January 6.

- Pamela Ryback ID 8957, PPD-Technical Centers, January 6.
- Leland Benson, ED 2161, BS-AS-Mechanical Support Dept., January 7.
- Dennis Ostrowski, ID 4553, BD-AD-Cryogenic Systems, January 7.
- John Kowalski, ID 3067, PPD-Mechanical Support, January 7.

- Joseph Lach, ID 476, PPD-EPP Experimental Physics Projects, January 8.
- Jerry Domoleczny, ID 4901, PPD-Mechanical Dept., January 8.
- Edward Thomas Nash, ID 1692, DO-Directorate (G&A), January 22.

LUNCH SERVED FROM
11:30 A.M. TO 1 P.M.
\$10/PERSON

DINNER SERVED AT 7 P.M.
\$23/PERSON

Chef Léon M E N U

FOR RESERVATIONS, CALL X4512
CAKES FOR SPECIAL OCCASIONS
DIETARY RESTRICTIONS
CONTACT TITA, X3524
[HTTP://WWW.FNAL.GOV/FAW/EVENTS/MENUS.HTML](http://www.fnal.gov/faw/events/menus.html)

LUNCH WEDNESDAY, FEBRUARY 5

*Sherry-Glazed Salmon Fillet
Bow-Tie Pasta
with Greens
Orange Cake
with Crème Anglaise*

DINNER THURSDAY, FEBRUARY 6

*Beef Fondue
with Assortment of Sauces
Salad of Field Greens
Pear and Parmesan Shavings
Apple Strudel
with Calvados Cream*

LUNCH WEDNESDAY, FEBRUARY 12

*Cheese Fondue
Salad of Grape Tomatoes,
Cucumbers and Red Onion
on Field Greens
Poached Fruit
in Ginger Mint Syrup*

DINNER THURSDAY, FEBRUARY 13

*Borch
Medallions of Lobster
Spicy Noodles with Julienne
of Vegetables and Ginger
Lover's Salad
Chocolate Fondue with Fruit*

F E R M I N E R W M S I

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The deadline for the Friday, February 14, 2003 issue is Tuesday, February 4, 2003. 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

■ '01 Hyundai Accent GL, 25K miles, red, 4 doors, AM/FM/Cassette, dual front airbags, A/C, P/S, good condition, \$7,000. Contact Jorge at 630-840-2534 or barreto@fnal.gov.

■ '97 Mitsubishi 300 GTSL, auto., fully loaded, 74K miles, excellent condition, \$16,000 o.b.o. Contact Chad 815-405-4668.

■ '96 Ford Taurus, 79K miles, fair condition, original owner, \$2,500. Contact David Butler 630-840-3370 or email, dbutler@fnal.gov

■ '95 GMC Sierra 2500 pickup, new brakes, P/S, P/B, P/L, cruise, heavy duty towing package, cloth seats, 6CD changer, electric trailer brakes. Contact Larry at 630-840-4386 or allen@fnal.gov.

■ '89 Acura Legend, 127K miles, leather seats with automatic adjustment in normal working condition. Asking \$2,250. Contact 630-840-3217 (after 8:00 p.m. or before 10:00 a.m.).

■ '86 Toyota Corolla, new tires, new brakes, 150K miles, some rust. 630-466-3743.

■ Treadmill, PRO-Form 730 CS, with full various function. Only used a few times, bought at \$799, asking \$400 o.b.o. Full size bed, frame with mattress, almost new, ask \$ 400. Student desk, asking \$20. Nightstands, two, asking \$20. Contact 630-840-2710 day or 630-305-8493 evening.

■ Couch and matching loveseat, \$375 for set. Pictures available. Contact 630-840-6633.

■ Craftsman tool box, lower 12 drawer section measures 27" wide and 18" deep. Upper 12 drawer section measures 27" wide and 16" deep. Both in very good condition, \$200. Contact Ed Dijak, work 630-840-6300, home 630-665-6674 or e.dijak@att.net

FREE FOR THE TAKING

■ Office desks and tables. Contact Nelson at 630-840-4622 or nchester@fnal.gov

ROOMMATE WANTED

■ Female graduate student or post-doc, or other female to share a house in nearby Naperville with female music teacher. The house has 3 bdrms, large living and dining rooms, garage, yard, kitchen, two baths, and finished basement. Asking \$600 per month shared utilities. Contact Elizabeth Melquist, 630-428-9080 or leave message at 630-840-3639.

HOUSES FOR SALE

■ Two-story home on far East side of Aurora. 15-20 minutes to Fermilab. 3 bedrooms, 1.5 bath, covered patio and 2 car attached garage in kid friendly new development. Neutral decor with light oak woodwork. Many upgrades. Built in 2001. \$153,500. Contact Patrick at 630-840-2977, donahoe@fnal.gov.

■ Vintage home 2 story, 3 bedrm, 1.5 baths, basement and 15 detached garage on West side of Batavia. Home is within walking distance of schools and downtown area. \$189,000. Contact 630-761-1799.

CALENDAR/LAB NOTES

FEBRUARY 13, 2003: NALWO

■ National Accelerator Laboratory Women's Organization cordially invites Fermilab women visitors and guests to a morning "coffee hour" at Aspen East from 10 a.m. to noon. Light refreshments; children welcome. Visit www.fnal.gov/orgs/nalwo/coffee.htm

BARN DANCING

■ The Fermilab Folk Club hosts two barn dances in February: Sunday, Feb. 9 at 6:30 p.m. with music by Good Gravity and calling by Tom Senior, and Sunday, Feb. 16 at 2 p.m. with music by the Long Valley Hillbillies and calling by Dan Saathoff. Barn dances are held in the Warrenville Community Building and feature traditional square and contra dances. 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) or check the webpage at <http://www.fnal.gov/orgs/folkclub/>

BLOOD DRIVE

■ Fermilab's annual blood drive will be held on February 17 and February 18, 2002 from 8 a.m. to 3 p.m. at Wilson Hall, Ground Floor NE Training Room. Appointments can be scheduled on the web at: <http://www-esh.fnal.gov> or by calling Lori at x6615. The blood shortage is at critical levels. Please help if you can.

Website for Fermilab events: <http://www.fnal.gov/faw/events.html>

HOUSING ASSIGNMENTS – SUMMER 2003

■ The Fermilab Housing Office is now taking requests for houses, apartments, and dormitory rooms for the Summer of 2003. Since there will be a large influx of experimenters, and requests are anticipated to be in excess of our available facilities, you are urged to submit your request for reservations to the Housing Office by **Monday, March 3, 2003**. Requests can be made for any period and need not commence on any particular date.

For further information, please contact the Housing Office at: Telephone: 630-840-3777, fax: 630-840-2823, email: housing@fnal.gov Individual housing requests can be made by using our Online Housing Request form at http://fnalpubs.fnal.gov/housing/housing_request.html (Requests for multiple housing units are best handled by direct email to housing@fnal.gov.)

CALL FOR ENTRIES

Fermilab Arts and Craft Show

May 1, 2003 to June 2, 2003.

■ Open to all Fermilab employees, visiting scientists or graduate students, retired employees, contractors and any member of his or her immediate family. Questions?? Contact 630-840-6825 or Georgia@fnal.gov.

ASK-A-SCIENTIST AT WILSON HALL

■ The popular Ask-A-Scientist program has returned to the 15th floor of Wilson Hall, every Sunday from 1:30 p.m. to 3:30 p.m. Scientists will meet visitors to answer questions ranging from "What is dark matter?" to "How do you accelerate a particle close to the speed of light?" Visitors must use the Pine Street entrance on the west side of the lab, and obtain the special "Ask-A-Scientist" pass to proceed to the viewing area of Wilson Hall.

URA SCHOLARSHIPS REQUIRE SAT TEST SCORES

■ Universities Research Association (URA) awards a number of scholarships to children of regular, full-time Fermilab employees. URA scholarships are awarded on the basis of SAT (Scholastic Aptitude Test) scores. Scholarship candidates must be high school seniors who will begin a four-year college degree program in the fall. The maximum amount of the scholarship is \$3,500 for tuition and fees, and is renewable for four years for students in good academic standing. Applications are available January 1 through March 1. Scholarships will be awarded in early April. Questions about the program may be directed to Jeannelle Smith of Human Resources, Mail Station 124, x4367.

<http://www.fnal.gov/pub/ferminews/>



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