FERMI NEWS

FERMILAB A U.S. DEPARTMENT OF ENERGY LABORATORY

Photo by Reidar Hahn

Millie Comes to Fermilab 2

Volume 23
Friday, October 20, 2000
Number 18

INSIDE:

Millie Comes to Fermilab

by Judy Jackson

It was a special pleasure, Millie Dresselhaus said, to visit the physics laboratory named in honor of her former teacher at the University of Chicago, Enrico Fermi.

During her September 27-28 visit to Fermilab for an onsite DOE review of the laboratory, Dresselhaus, director of the Department of Energy's Office of Science, spoke with respect and affection of the professor she knew during her years as a University of Chicago graduate student, She referred often to Fermi's legendary concern for graduate students and young physicists. It's a concern she clearly shares.

"Young people are excited about high-energy physics," Dresselhaus said, "but there are serious career problems for youth. This is not just a Fermilab problem, but a problem for high-energy physics generally. It can be hard to envision a career when there is such a long lead time for experiments. The community will have to address this."

As a step in that direction, she began her laboratory visit with a "focus group" of Fermilab graduate students and young physicists, to hear what was on their minds and to assure them of her support.

The students responded enthusiastically.

"The meeting with Dr. Dresselhaus was like doing group therapy," said DZero graduate student Florencia Canelli next day. "I feel really happy to come in to work today."

Columbia University's Bonnie Fleming, a grad student at the MiniBooNE experiment, said she found Dresselhaus's experiences as a female physicist coming of age in the 1950's "inspiring."

Dresselhaus, a solid-state physicist known for her research on carbon-based systems, is on leave of absence from her day job as a physics professor at the Massachusetts Institute of Technology. She was sworn in as director of the Office of Science on August 7, 2000.

With an annual budget of $2.8 billion, Dresselhaus's new domain is among the largest funding agencies for basic research in the federal government—with by far the largest budget for research in the physical sciences, including high-energy physics.

And budgets were on everyone's mind during Dresselhaus's Fermilab tour, which coincided with enactment of key Congressional legislation that, among other things, will fund Fermilab's operations during FY2001. As news of the

Cover Photo: Fermilab physicist Jim Strait, project leader for the U.S. LHC accelerator effort, gave DOE's Millie Dresselhaus a look at a cross section of a quadrupole magnet like the ones Fermilab is building for the LHC.

Fermilab Director Mike Witherell gave Dresselhaus some pointers on preparations for Collider Run II.

spending bill's provisions filtered in from Washington during the course of her visit, Dresselhaus voiced her thoughts on the outlook for battered high-energy physics funding.

"We all share concerns about the budget for high-energy physics in the United States," she said. "I believe that a budget of $800 million for high-energy physics is achievable [in FY2002]. The community has to have an open mind about how to get there. From what I see, if we work together it could be a very rosy picture. There should be no whining and moaning. We need to present the compelling nature of the science."

The Onsite Review gave Dresselhaus and Office of Science colleagues an opportunity to hear first-hand about the compelling science now getting underway at Fermilab. With CDF, one of Fermilab's two collider detectors, now comfortably ensconced in the Tevatron beamline and witnessing the first collisions of its engineering run, CDF spokesman Franco Bedeschi took a few hours off to talk about the exciting potential for discovery in Collider Run II at the Tevatron. Neutrino maven Janet Conrad, of Columbia University, gave Dresselhaus the "U.S. *Nu's* & World Report" on Fermilab's frontier neutrino experiments.

Dresselhaus, just back from a trip to CERN, the European Particle Physics Laboratory, said she is pleased by the March 1 start date for Run II at the Tevatron.

"It is clear that Fermilab understands that the laboratory must take advantage of the window of opportunity to make a contribution," she said. "Before the Large Hadron Collider at CERN begins operating, there is a critical gap, a critical chance to do physics. It is obvious that Fermilab sees that window clearly. We at DOE will do all that we can

Photos by Reidar Hahn

The latest budget news from Washington, hot off the fax machine, held everyone's attention during Dresselhaus's tour of Fermilab. Judy Jackson, of the Office of Public Affairs, held the pages far enough away to read without her glasses, as Dresselhaus, DOE's Peter Rosen, Fermilab Director Mike Witherell and DOE's Jane Monhart looked on.

from our end to help Fermilab take advantage of it." Fermilab Director Michael Witherell described the challenges of operating a laboratory at the discovery frontier while at the same time developing its future in the context of international high-energy physics research, in an era when funding for the field has been shrinking. Dresselhaus pledged to do her best to help. She told the Fermilab audience that she believes a realistic goal is to increase funding for the U.S. high-energy physics program by 15 percent next year.

"If we can do that for a few years, we'll have a good program," she said. "In fact, we have a good program in high-energy physics research. Now we have to sell it. That's my job." □

$aving the Day

by Mike Perricone

Back on March 15, Rep. James Sensenbrenner Jr., (R-Wis.), chairman of the House Science Committee, toured Fermilab and described it as "the jewel in the crown of scientific institutions in the United States."

Considering the budget numbers for FY2001 being considered back then, the lab's unofficial general sentiment might have been: "That's good news—what do crown jewels bring on the open market?"

Rep. James Sensenbrenner Jr.

Now the jewels are safe, thanks to Congressional budget talks that produced a House-Senate conference agreement with more than $3.18 billion for the Department of Energy's Office of Science, including more than $726 million for High-Energy Physics.

"We were originally very disappointed at the level of funding for high-energy physics and for Fermilab," said Fermilab Director Michael Witherell, who has been among the many prominent scientific voices asking for reconsideration of the numbers. "We've come a long way since then. Both the Department of Energy and the Congressional committees recognized the need of doing more for Fermilab and high-energy physics. This budget is significantly better than the original budget request."

Fermilab had faced a shortfall of some $30 million in the original Congressional numbers, but the conference committee pushed the lab's budget up to $277 million. That new level remains short of the lab's estimate ($286 million) for the amount needed to run experimental programs and keep projects on schedule, but Witherell said it was enough to allow Fermilab "to get by this year."

"This puts us back in the position of having a normally tight year, as opposed to the very damaging effect the original budget would have had," Witherell said. "There are some things we won't be able to do as quickly as we would like. But we will not have to make drastic cuts in areas that could not be recovered later, as we would have under the original budget proposal."

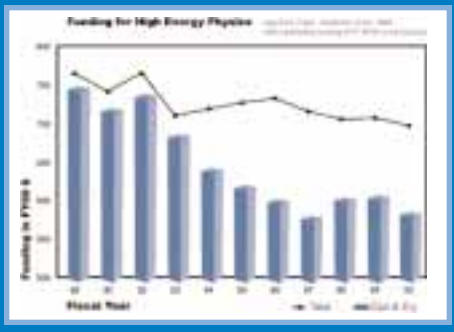
Early in the budget revision process, Speaker of the House Dennis Hastert, whose Illinois Congressional District includes Fermilab, expressed his own concerns over the lab's level of funding.

"The Speaker's support for the work at Fermilab is very important to us," Witherell said.

In two important areas—$4 million for the Wilson Hall Safety Improvements Project, and $23 million for NuMI/MINOS construction—the funding was set by line items, which are usually safe from variation.

Still there are adjustments coming into play. Witherell said NuMI/MINOS would face some reduction in the category of "Other Project Costs." These costs are included in the lab's overall operations budget.

There is also an adjustment in next year's funding on the U.S. effort for the Large Hadron Collider at CERN, an adjustment that improved the lab's overall funding picture. Witherell explained that the LHC spending profile (in other words, which expenses are paid for at which times) was restructured



Charts like this one—Fermilab Director Michael Witherell's analysis of the growing shortfall in real dollars for high-energy physics funding—were part of the information effort by laboratories, universities and user communities, which helped the turnaround in funding for the Department of Energy's Office of Science.

NEW BUDGET NUMBERS *BRING FERMILAB AND DOE'S OFFICE OF SCIENCE* **BACK** FROM THE BRINK.

Photos by Reidar Hahn

Concerns for funding were front and center during meetings of the DOE's High Energy Physics Advisory Panel, held at Fermilab last March 9-10. HEPAP Chairman Fred Gilman (left) confers with DOE's Associate Director for High-Energy and Nuclear Physics, Peter Rosen.

in a way that will not affect the project's progress, an effect verified by the LHC managers.

If the budget cloud carried a silver lining, it might have been the mobilization of the science community in communicating the needs and value of research. Witherell cited a letter to Congress from university presidents, a strong message signed by several members of the U.S. House of Representatives, and efforts by user communities in high-energy physics and in all the science disciplines represented at DOE laboratories. He also stressed the long-term importance of a guest column in *The Washington Post* ("Squeeze on Science," Oct. 4, 2000) by Harold Varmus, president of Memorial Sloan-Kettering Cancer Center and a former director of the National Institutes of Health. Varmus won the Nobel Prize in medicine in 1989.

"It was very helpful for a leader in biomedical research to state that when we talk about the possible doubling of research spending, we should include research in the physical sciences, particularly that supported by the Office of Science," Witherell said.

Witherell added that the Op-Ed piece by Varmus contributed to a growing awareness of the needs and importance of the Office of Science. The $3.18 billion for the Office of Science in the conference committee report was a large boost from the levels originally proposed in both houses of Congress ($2.80 billion in the House, and $2.87 billion in the Senate), and even exceeded the level in the original President's Budget Request ($3.151 billion).

"The Office of Science as a whole gained a lot of attention to the problem of funding," Witherell said. "I think it was very important that people heard that message, that support for the Office of Science has been falling in real terms as opposed to other areas such as biomedical research."

The budget cycle is never ending, and Witherell was clear that FY2002 represented an immediate challenge with crowning achievements such as discovering the Higgs boson seemingly in reach.

"We need to maintain our voice. We need to do better in '02," the director concluded. "We need to get an increase that allows us to carry out both our experimental program, and our accelerator research and development. The scientific opportunities make a very compelling case. We're working very hard on explaining that to people, so we'll be able to start out with a better budget next year." □

Keep it COOL

The CHL facility features a complex system of pipes and valves. Mike Geynisman knows their functions inside out.

by Kurt Riesselmann

Visitors rarely come to the place where Fermilab produces its coolest and arguably most important stuff. Located just opposite the fancy-looking Feynman Computing Center, a plain industrial building labeled CHL hosts a complex arrangement of large and extremely loud machines.

CHL stands for Central Helium Liquefier.

Without the CHL, the Tevatron, the world's most powerful particle accelerator, would have no beams, no collisions and no experiments. Without the people working at the CHL, physicists could forget about finding the Higgs boson at Fermilab.

To keep the Tevatron running, Fermilab operates one of the largest helium plants in the world. It produces liquid helium at 4.5 kelvins (-450 Fahrenheit). Ultracold helium is the perfect coolant to keep the Tevatron magnets at superconducting temperatures, eliminating electrical resistance inside the magnet coils.

Starting from gaseous helium at room temperature, the CHL facility can produce up to 6,300 liters of liquid helium per hour. Using pumps and dewars, special containers to store cold fluids, the CHL can deliver a peak rate of 9,000 liters per hour. More than 25 km (15 miles) of pipes transport helium from the CHL to the Tevatron magnets and back. Four crews totaling 14 people take turns operating the facility 24 hours a day, seven days a week.

Jay Theilacker, head of the Cryogenic Department, inspects equipment of the cooling system. Fermilab relies on liquid helium and nitrogen as coolants.

"They work 12-hour shifts to maintain the equipment, supervise the controls and carry out emergency repairs," said Mike Geynisman, a mechanical engineer in the Cryogenic Operations group. Aided by a computerized system, the crews tune the CHL performance to produce the right amount of helium, replacing the helium that evaporates while cooling the magnets. Depending on the status of the Tevatron magnets and the status of the particle beams inside, the demand for liquid helium can fluctuate by 30 percent within a short time.

Operations change dramatically when a magnet quenches as it returns to normal-conducting temperatures. Within seconds, the energy of the magnet's strong magnetic field is converted into heat as the magnet regains electrical resistance. The surrounding helium quickly boils off and the magnet warms up even further. An automated system immediately shuts valves and redirects the helium flow. The CHL operators then must carefully monitor the recovery and respond to changing helium demands.

Ideally, Fermilab's helium cooling network is a closed system. In reality, helium is lost due to magnet quenches and tiny leaks. Helium is one of the hardest substances to capture, as proven by billions of birthday balloons that fizzle out or float away before the party ends.

“Special teams repeatedly check the Tevatron cooling system for leaks,” said Jay Theilacker, head of Fermilab’s Cryogenic Department. Using special sprays and portable detectors, the teams have located hundreds of leaks. By fixing the leaks, Fermilab hopes to save some of the one million dollars it spends annually on purchasing liquid helium, one truck-load of 30,000 liters each month.

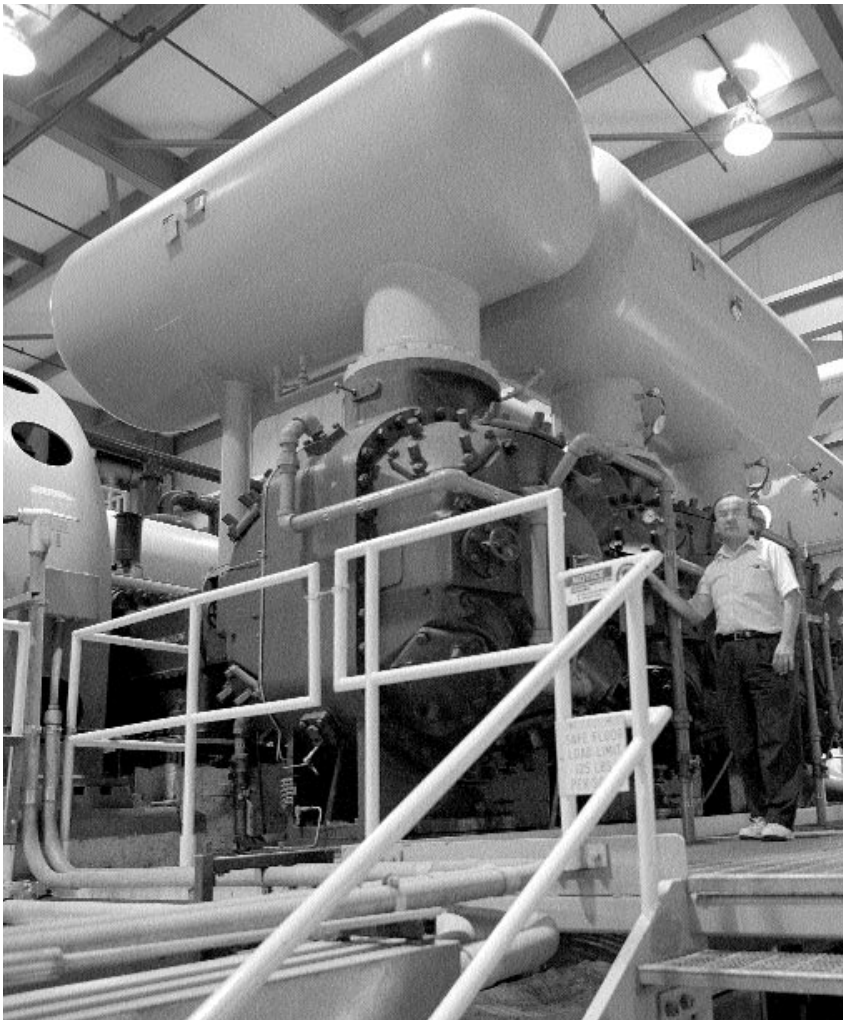
“Some leaks are extremely difficult to stop,” said Theilacker. “Many pieces of cryogenic equipment have hundreds of connections.” They are all candidates for possible leaks, hard to check and even harder to fix. Even worse, new leaks can develop every time a piece of equipment undergoes a major change in temperature: A 20-foot-long magnet, warming up from 4.5 kelvins to room temperature, expands by almost an inch.

“Even when the Tevatron is not in operation, we usually maintain its magnets at liquid-nitrogen temperature,” said Jerry Makara, head of Cryogenic Operations. “It minimizes the stress on the magnets [from heat expansion]. And it is optimal from a cost-benefit point of view.”

In addition to the helium system, Fermilab operates a nitrogen cooling system that shields magnets and the liquid-helium transfer line from direct heat exposure. The system, fueled by a nitrogen reliquefier located at the CHL facility, guarantees that the magnets stay below 77 kelvins, the boiling temperature of nitrogen.

The Cryogenic Department has worked continuously to make the cooling system more reliable. One of the present projects includes the upgrade of one of two coldboxes for liquid helium production. It is designed to match the increased helium demand by the Tevatron, which is now operating at an energy about 10 percent higher than four years ago. The new beam energy of 980 GeV requires stronger magnetic fields, resulting in higher cooling demand by the magnets.

“We’ve been doing upgrades for the last 20 years,” said Makara. “As soon as we are done with one project, the next one is in line.” With past visionary guidance of physicists Ron Walker and Bill Fowler,



The CHL helium compressors consume a total of 5 megawatts of power, ten thousand times more than a standard refrigerator. Jerry Makara, head of Cryogenic Operations, and his team keep them humming.

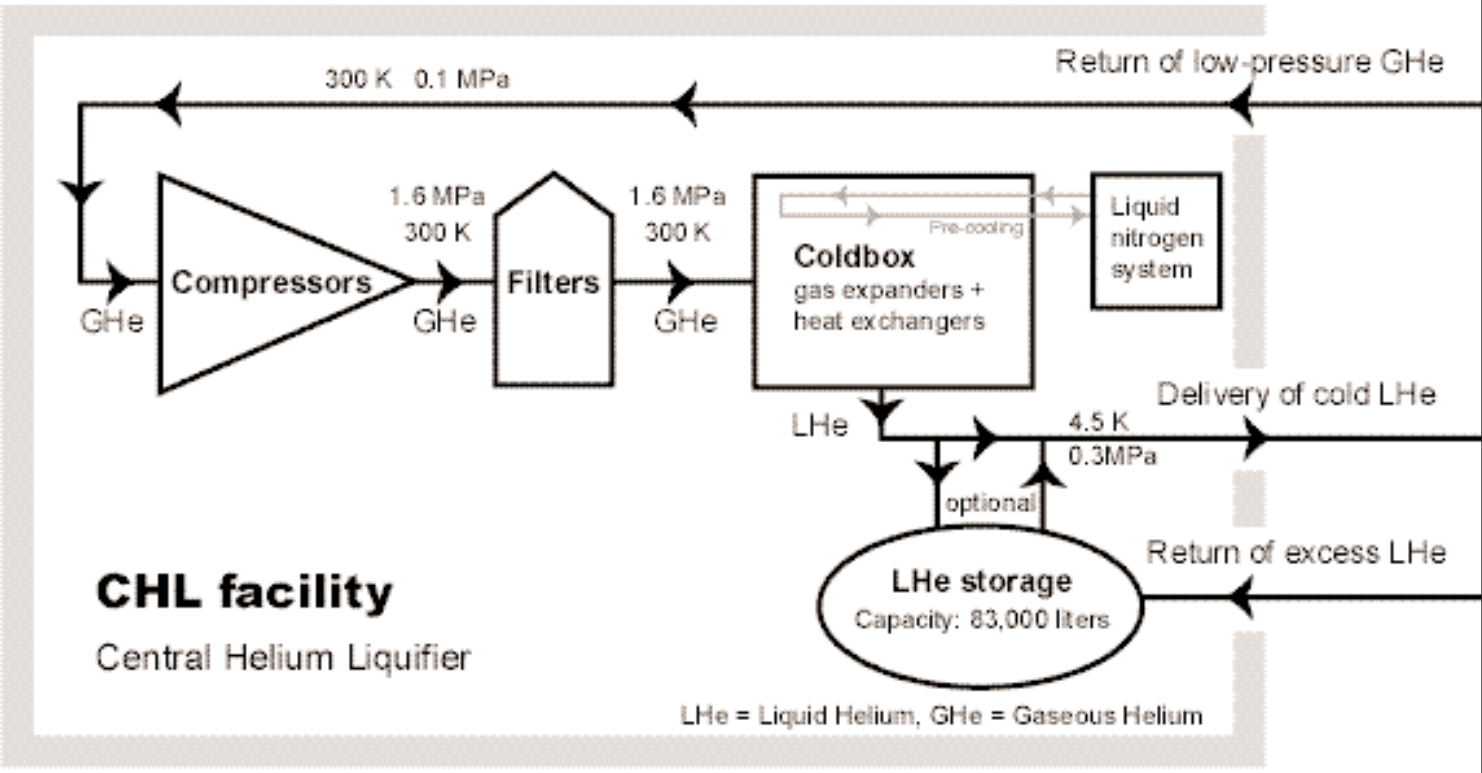
the upgrades have greatly improved the availability of liquid helium for the Tevatron. CHL engineers designed and implemented redundancy in the cooling system to make it less prone to equipment failures. At the same time, production capacities were increased to permit faster cool-downs after a magnet heated up.

“Recently, the reliability of our equipment has been 95 percent,” Geynisman said. “Due to our storage capacities and backup equipment, liquid helium was available to the Tevatron 99.9 percent of the time.”

With its combined knowledge and dedication, the CHL group should be able to keep it cool.

Photos by Jenny Mullins

Jerilyn McDowell and Paul Kurylo are two of the people who work 12-hour shifts to operate the Tevatron cooling system. Four crews with a total of 14 people are responsible for maintenance, emergency repairs and operational controls seven days a week.



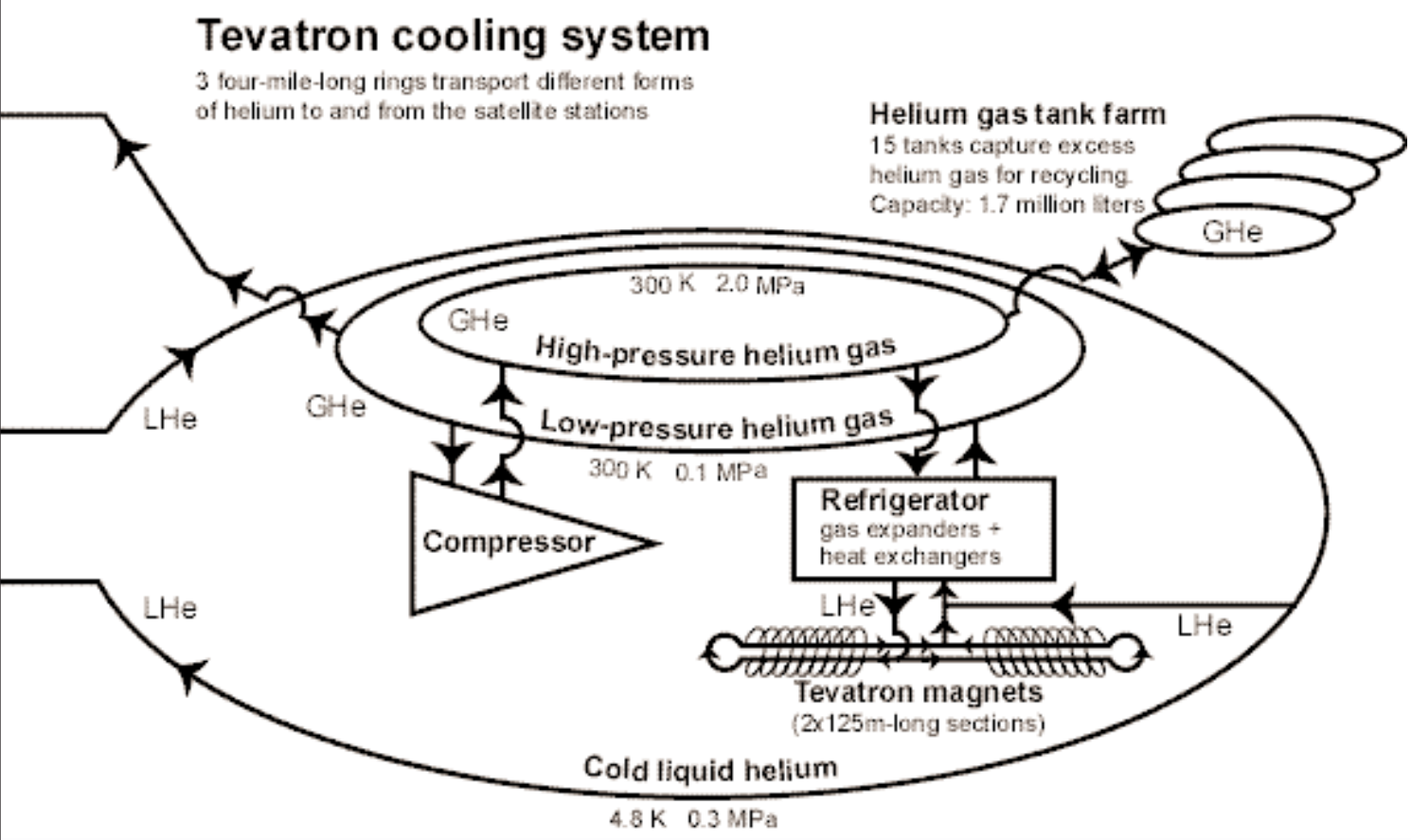
Central Helium Liquefier

At very low temperatures, when other matter is frozen, helium gas becomes liquid. Liquefaction can be achieved through a four-step process of compression, heat exchange, expansion, and subcooling. At Fermilab, helium refrigeration and liquefaction takes place in the CHL facility and in 24 refrigerators round the Tevatron ring.

At the CHL, four independent compressors pressurize helium gas from 0.1 to 1.6 megapascal (1 MPa equals 145 psi). The gas, still at ambient temperature, is filtered to remove impurities that would freeze and clog heat exchangers as the helium is cooled. The CHL filters reduce impurities to less than one part per million.

The pure high-pressure helium gas then enters one of the CHL coldboxes, where it is pre-cooled to 77 kelvins (-320° Fahrenheit) using liquid nitrogen. To lower the temperature further, the coldbox extracts additional energy by guiding the gas through a series of cryogenic turboexpanders and elaborate heat exchangers. In the expanders, the pressurized helium gas spins turbines at 55,000 revolutions per minute. By performing this work, the helium lowers its temperature (conservation of energy). Sending the expanded helium through heat exchangers reduces the temperature of warmer, high-pressure helium. Successive steps repeat the expansion and heat-exchange processes, eventually leading to liquefaction. The final expansion cools the helium to below 6 kelvins at 0.33 MPa.

The liquid helium is either stored in vacuum-insulated dewars, which can hold up to 83,000 liters of liquid helium, or routed to the Tevatron transfer line where, flowing through a subcooler, its temperature drops to 4.8 kelvins.



Six buildings with 24 compressors and 24 refrigerators are located along the Tevatron. With help from the CHL, the refrigerators produce the liquid helium to cool the superconducting magnets inside the Tevatron tunnel. Carefully aligned, the magnets are needed to guide proton and antiproton beams around the four-mile-long ring.

The Tevatron magnets are made of niobium-titanium, a material that becomes superconducting at 10 kelvins (-440º). Below this temperature, the coils of the magnets carry electrical currents without resistance.

The Tevatron magnets are operated at about 4.5 kelvins, making liquid helium the only available coolant. It absorbs heat as it evaporates, keeping the magnets cold and superconducting. The helium gas produced in this process carries away the heat. Warm helium gas is returned to the compressors along the Tevatron ring and further to the CHL to be reprocessed.

Fermilab's cooling system is designed to supply each magnet with enough liquid helium to compensate for losses due to the heat created by electrical currents. Otherwise, the temperature of a magnet will begin to rise. More liquid helium is needed or the magnet will return to its normal-conducting mode. If electrical resistance occurs, more heat will be produced, reinforcing the warm-up process. Eventually the magnet quenches: Within seconds, the energy of the magnetic field completely transforms into heat, evaporating the magnet's entire liquid helium supply. The excess helium gas created in this process can be captured and temporarily stored in tanks until the magnet can be cooled down again.

Tevatron cooling system

PROFILE IN PHYSICS

Continuing Education in the Main Control Room

by Mike Perricone

Step inside the Main Control Room and look at the monitors, more than a hundred of them.

When you know the right keys to punch, you can call up readouts on those monitors from well over 100,000 channels of information, and you can make sensitive adjustments to some 44,000 different components spread throughout the Fermilab accelerator complex. The key, of course, is knowing the right keys to punch.

"You just have to sit down and start learning, and it takes time," said Stan Johnson, a Main Control Room veteran of nearly 13 years, the last seven as a crew chief. "The most important readbacks and settings get absorbed into your memory because you see them constantly every day. That involves somewhere from just a few hundred to maybe a couple thousand devices. The machines are always changing and growing, and that represents one of the major challenges."

Photo by Jim Shultz

Main Control Room crew chief Stan Johnson

Photo by Reidar Hahn

Even with degrees in physics or engineering (in one case it was a history degree; in another, a background in computer training for air traffic controllers), you enter the MCR as a trainee. The designation is Operator 1, but expect at least two intense years of onsite, hands-on course work. You'll study from a series of "rookie books" (Concepts, LINAC, Booster, Antiprotons, Tevatron, Switchyard, External Beamlines and Controls) in preparation for the oral and written exams required for promotion to Operator 2.

"It's very much a troubleshooting job," said operations chief Bob Mau. "It takes two to three years to be ready for the formal test for Operator 2. But to get really good in the Main Control Room—that will take four or five years."

And by then, the machines are likely to change, as they have during the upgrades in preparation for Collider Run II of the Tevatron. All the existing machines in the accelerator complex—the preaccelerator, Linac, Booster, Main Injector, and Tevatron—and their new components were put on line with the new Main Injector to produce proton-antiproton collisions for the first time on Monday, Oct. 2, at 11:21 PM Central Time. The collisions occurred at CDF, the extensively upgraded 5,000-ton detector that was rolled in for its commissioning run last month (see *FERMINEWS*, Vol. 23, No. 17, "All-CDF Issue," October 6, 2000).

"That was a long day, starting at about 9:30 in the morning," Johnson said. "When we're doing [collisions] for physics, we hope the shot set-ups will take much less time. But all along the way, people were trying to figure out how to do things in the new Main Injector era."

Even the basic beam path has changed since Collider Run I. The old Main Ring has been removed from the Tevatron tunnel, and the particle beam path now runs through the new Main Injector.

"We don't have an existing pattern. We're building that pattern now," Johnson explained. "We're working with a lot of people now—machine physicists, engineers, technicians—and we're using a lot of systems that didn't exist during the last collider run. We're trying to bring all these people and systems together."

In fact, there was an unscheduled dress rehearsal on opening night. Just before collisions could be created Monday evening, a problem arose in the Tevatron. The beam was lost. Fortunately, the Antiproton Source retained enough antiprotons for a second set of shots. With the process repeated, CDF saw collisions. Johnson emphasized that the success stemmed from yet another example of the operators' interdependence with support and systems groups. A prime example is handling the crisis of every operator's and crew chief's nightmares: a power outage through the accelerator complex, shutting down all the machines. In the middle of the night.

"What you do in the first 15 to 20 minutes can determine whether the machines come back on or whether they're down for a week," Johnson said.

The critical step is getting the cryogenic systems running again before they warm up. It can take a week to cool them back to superconducting temperatures—a week lost from schedules, commissioning or experiments. The Cryogenics and Controls groups are called in, and there may be 25 people working to solve the crisis.

"They'll get here as quickly as they can, but it's 2 a.m., and you're waking people up," Johnson said. "In that case, the first line of defense will be the operators. It can get to a real crunch time, and it helps to have a good crew."

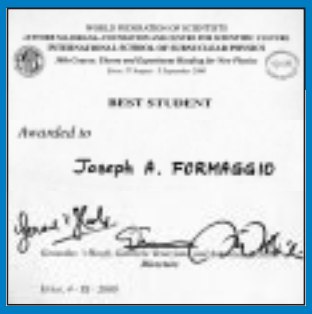
A crew chief will usually work with four or five operators, on rotating shifts, which Mau conceded "plays havoc with marriages, families and your bodies." Running the accelerators is a 24/7/365 job, and one that is seldom scripted.

The Main Control Room contains readouts on more than 100,000 channels of information, with controls for 44,000 devices in the Fermilab accelerator complex.

"You always have a plan for the shift," Johnson said, "but five minutes after you get in, something might break. At that point, all bets are off."

Johnson is moving from crew chief to Operations Specialist, focusing on the Antiproton Source. He'll be a chief troubleshooter and trainer, acting as liaison among Operations, experimenters and the Antiproton Source Department. And of course, he'll keep learning.

"We're trying to assist the people commissioning the machines, and learn from them at the same time," Johnson said. "We'll have to take over from them at some point. We're in a big learning curve right now."



FAMOUS in

by Kurt Riesselmann

When Joe Formaggio, a physics graduate student at Columbia University, visited his Italian grandparents after attending a physics summer school in Sicily, he found he had become a legend in his own homeland.

"Who is the guy standing next to Joe?" If Formaggio (right) continues to have more TV and radio appearances, he may soon be more famous than Antonino Zichichi, director of the *Ettore Majorana Centre* in Erice, Italy.

"Joe, we heard your name on TV," his grandparents told him. "They said that you won the Best Student award!"

A group of physicists, including several Nobel Prize winners, voted Joe the best student of the 38th International School of Subnuclear Physics in Erice, Sicily. The school featured ten days of morning lectures by scientists from around the world. In the afternoon, students discussed the morning topics with the lecturers, and gave presentations of their own research results.

"The Best Student nomination is based on your participation in the discussion groups," said Joe. Though he was one of the more active participants in the Q & A sessions, he didn't expect to receive the prize, which is honored with one million lira, about 500 dollars.

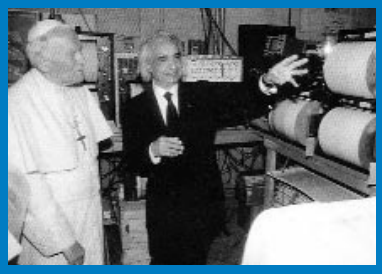
Winning a physics award is usually not enough to make the evening news. In Sicily, physicist Antonino Zichichi added the extra magic. He is the director of the *Ettore Majorana Centre* in Erice and frequently appears on TV. Physicists joke that, in Sicily, he is more famous than the Pope. So, when Zichichi informed the media that a young American physicist from an Italian family had won the Best Student award, it instantly became a hot item.

"Watching TV that night, my grandparents heard about a meeting hosted by Zichichi," Joe said. "Then they learned that I won an award."

Joe's minute of fame didn't stop there.

"A couple of days later, a reporter from a local radio station interviewed me for about 20 minutes," Joe added. "Fortunately, my Italian is still good enough." Joe lived in Italy from ages 5 to 11, when his parents returned for an extended stay.

Winning the Best Student award is the highlight of Joe's blossoming physics career, which began five years ago when he entered graduate school.



Pictures of Antonino Zichichi (right) standing next to Pope John Paul II are legendary. And so is the question highlighting Zichichi's popularity: "Who is the guy standing next to Zichichi?"

Sicily

Erice is located in the Sicilian mountains. During coffee break, people attending meetings at the *Ettore Majorana Centre* can enjoy a breathtaking view.

"Joe is an amazing student," said Mike Shaevitz, Fermilab's Associate Director of Research, who is on a leave of absence from a physics professorship at Columbia University. "I am Joe's adviser for his work on the NuTeV experiment here at Fermilab. Joe has done some great work on NuTeV's decay channel detector and the analysis of the resulting data."

The NuTeV collaboration, which carried out its final measurements in January 2000, has investigated high-energy neutrino-nucleon scattering processes. Joe joined the NuTeV experiment in 1996 when it had just begin recording data. He worked on several data analysis projects. Today, he is considered one of NuTeV's experts in this area. His excellent work ensured him the trip to Erice.

One of Joe's projects focused on the detection of new particles, such as heavy neutrinos. At Erice, he gave a presentation of his latest results.

"Joe has worked on many different things," said Janet Conrad, physics professor at Columbia University. "Joe even has a short publication in the area of theoretical physics."

At Erice, students have plenty of opportunities to explore Sicilian restaurants. Here Joe Formaggio (right) poses with fellow students, including Volker Büscher (front left).

Conrad works with Joe on both the NuTeV and the new MiniBooNe experiment, a neutrino detector that is currently under construction.

Two other young scientists working on experiments at Fermilab also earned trips to Erice: Jim Graham and Volker Büscher. Graham is a graduate student at the University of Chicago. At Erice, he gave an award-winning presentation on his analysis of matter-antimatter asymmetries, observed by the KTeV experiment.

"Around 60 graduate students and young postdocs attended the meeting," said Büscher, a DZero postdoc at the University of Rochester. Both experimenters and theorists were among the participants.

The Erice school featured lectures on a variety of particle physics topics, including such hot research items as superstrings and the Higgs particles—all presented by some of the world's best high-energy physicists, including 1999 Nobel Laureate Gerardus 't Hooft of the Netherlands, whose signature graces the "Best Student" certificate. Presentation of the latest results from particle physics experiments around the world concluded the program.

"I don't know of any other particle physics school that has so many renowned lecturers," Büscher remarked. He appreciated that the school set the stage for many one-on-one discussions with the lecturers during lunch hours and coffee breaks.

Learning and discussing particle physics is the top priority of the Erice school. Meeting fellow students and future colleagues—and potential employers—is an extra benefit for the young physicists.

"It was great to hear from other participants what it's like to be a graduate student in France, Denmark, England—many places around the world," Joe said.

Now Joe is back in New York. He plans to graduate next summer, the next highlight of his career. He doesn't expect a reporter to call any time soon. Until then, his Best Student certificate reminds him of his first moment of fame. □

Fermilab Award Winners

Maria Goeppert-Mayer Award

Awarded to physicist **Janet M. Conrad**, of Fermilab and Columbia University: The American Physical Society's 2001 Maria Goeppert-Mayer Award, "for her leadership in experimental neutrino physics, particularly for initiating and leading the NuTeV decay channel experiment and the Mini-BooNE neutrino oscillations experiment, which are noted for their timeliness and significance in resolving frontier issues in neutrino physics." The award was established through sponsorship in 1985 by the General Electric Foundation (now the GE Fund), "to recognize and enhance outstanding achievement by a woman physicist in the early years of her career, and to provide opportunities for her to present these achievements to others through public lectures in the spirit of Maria Goeppert-Mayer." Previous recipients: 2000—Sharon C. Glotzer; 1999—Andrea M. Ghez; 1998—Elizabeth J. Beise; 1997—Margaret Mary Murnane; 1996—Marjorie Ann Olmstead; 1995—Jacqueline N. Hewitt; 1994—Laura H. Greene; 1993—Ewine van Dishoeck; 1992—Barbara H. Cooper; 1991—Alice E. White; 1990—Ellen Williams; 1989—Cherry A. Murray; 1988—Bonny L. Schumaker; 1987—Louise A. Dolan; 1986—Judith S. Young.

W. K. H. Panofsky Prize

Awarded to physicist **Paul J. Grannis**, of Fermilab and the State University of New York at Stony Brook: The 2001 W.K.H. Panofsky Prize, "for his distinguished leadership and vision in the conception, design, construction, and execution of the DZero experiment at the Fermilab Tevatron proton-antiproton collider. His many contributions have been decisive in all aspects of the experiment." The prize was awarded in 1990 to current Fermilab Director Michael Witherell; it went to Fermilab users Frank J. Sciulli in 1995, and Thomas J. Devlin and Lee G. Pondrom in 1994. The prize was established in 1985 by friends of W. K. H. Panofsky and the Division of Particles and Fields of the American Physical Society. Previous recipients: 2000— Martin Breidenbach; 1999—Edward H. Thorndike; 1998—David Robert Nygren; 1997—Henning Schröder and Yuri Zaitsev; 1996—Gail G. Hanson and Roy F. Schwitters; 1995—Frank J. Sciulli; 1994—Thomas J. Devlin and Lee G. Pondrom; 1993—Robert B. Palmer, Nicholas P. Samios, and Ralph P. Shutt; 1992—Raymond Davis, Jr. and Frederick Reines; 1991—Gerson Goldhaver and Francois Pierre; 1990—Michael S. Witherell; 1989—Henry W. Kendall, Richard E. Taylor, and Jerome I. Friedman; 1988—Charles Y. Prescott.

MILESTONES

Photo by Jim Shultz

Celebrating the first proton-antiproton collisions in the Beams Division.

COLLISIONS

Recorded at the CDF detector: the first proton-antiproton collisions in preparation for Collider Run II of the Tevatron, on 02 Oct 2000 at 23:21:42 (11:21:42 PM Central Time). The Early Bird Report summary of beam activity, filed by Main Control Room crew chief Darren J. Crawford, noted: "Pbar tune-up for shots began at 12:00 and lasted till 13:40. The first pbar shot was injected into the Tevatron at 14:47. Shots to the Tevatron continued into the evening shift. An 8 pbar-on -1 proton store was established. The store was aborted at 19:04 when the A1 line ion pumps tripped off and the bad vacuum propagated into the Tevatron FZero section. The remaining 9 mA of antiprotons in the Pbar Source were used in loading another 8 pbar X 1 proton store. The store was cogged for collisions and CDF reported detectable luminosity. The store was monitored through the owl shift."

RETIRING

- John Barry, ID 401, LS-AO-Accommodations Office, effective September 13.
- Gail Young, ID 10150, URA Headquarters, last day of work Sept. 8.
- Ernest Malamud, ID 70, BD-DH-Headquarters Staff, effective Dec. 29, last day of work Nov. 3.
- Carl Pallaver, ID 1047, BD-AS-Cryogenic Systems, October 31.

DESIGNER CERTIFICATION

Awarded to Richard Klecka (BD-Accelerator Controls) and to Angela Prosapio (PPD-Technical Centers): Certification in Printed Wiring Board Design Principles, by the Designers Council of IPC-Association Connecting Electronics Industries, conferring the designation CID (Certified Interconnect Designer).

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

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

Chez Léon MENU

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

LUNCH
WEDNESDAY, OCTOBER 25

Cheese Fondue
Salad of Field Greens
Buttered Rum Baked Apples

DINNER
THURSDAY, OCTOBER 26

Booked

LUNCH
WEDNESDAY, NOVEMBER 1

Belated Halloween Celebration
Black Cat's Delight
Dracula's Dream
Devil's Ecstasy

FERMINEWS

FERMILAB
A U.S. DEPARTMENT OF ENERGY LABORATORY

FERMINEWS is published by Fermilab's Office of Public Affairs. Phone: 630-840-3351

Design and Illustration:
Performance Graphics

Photography:
Fermilab's Visual Media Services

The deadline for the Friday, November 3, 2000, issue is Tuesday, October 24, 2000. Please send classified advertisements and story ideas by mail to the Public Affairs Office MS 206, Fermilab, P.O. Box 500, Batavia, IL 60510, or by e-mail to ferminews@fnal.gov. Letters from readers are welcome. Please include your name and daytime phone number.

Fermilab is operated by Universities Research Association, Inc., under contract with the U.S. Department of Energy.

CLASSIFIEDS

FOR SALE

- '97 Chevy custom high top conversion van by Sterling, black, V8/350, 32k, excellent condition, 4 way power captain driver/ passenger's seats, 2 removable captain's chairs and tri-fold power bench/bed, gray leather, real wood interior, clothes rack, bug shield, rain reflector, privacy curtain, window shades, mood/night lights, VCR/TV/2 radio systems, defrosting side mirrors, PS/B, A/C, new tires, hitch, security system. Asking $19,990. Diana x3704 or ladyki@fnal.gov.
- '96 Chevy Blazer LT 4-WD, excellent condition, white with black leather interior. AM/FM stereo; compact disc player; power windows; doors, seat, mirrors; cruise control; tilt wheel; air bag; anti-lock breaks; roof rack; privacy glass, new Michelin tires. $13,900. Call 630-717-5181 before 9pm
- '94 Honda Civic EX 4dr., dark green, 5 spd, 85k, A/C, ABS, cruise control, dual air bags, power lock/mirrors/moonroof/windows, AM/FM, cassette, in great condition. $7,500 o.b.o. Contact: Esther at 630-933-0934.
- '94 Honda Accord EX station wagon, 62k miles, stick, exc. cond. $10,500. Joe Lach, x4103.
- '95 Ford Econoline 150 conversion van, red,one owner, 64k miles, proof of all scheduled maintenance, 5.0 V8, quad captain's chairs, power rear bench seat, TV, VCR, passenger sound system,clean inside and out. Asking $16,000 o.b.o. A must-see. Ryan x8630 or e-mail to rhickey@fnal.gov
- Bose Acoustimass-7 home theater speakers, 3 cube speaker arrays, acoustimass bass module, was $650; now $450 and only two years old. Call Tim x4070
- Pro-form 525se Performance treadmill, power incline, was $600.00 now $350. Like new. Also: Pro-form 975s stationary bike, silent magnetic resistance, was $300 now $150. Like new. Call Tim x4070
- Sears 5 1/8″ jointer-planer was $250 now $125.00. Call Tim x4070
- Loveseat,1 year new, $175. Tire and wheel for Toyota corolla or tercel, P155 80R13, $28. Call 630 355-1253
- Unique 2-story house in Batavia built for "in-laws" or 2nd family. 1st and 2nd stories alike (kitchen, 3 bedrms, living & dining rms); 1st floor access to finished basement (laundry, rec.rm.,office); 2nd floor has laundry, fireplace, deck with stairs to yard. .8 acre lot with beautiful mature landscaping. Contact asfishman@aol.com or 630-262-6566
- Futon-mattress $200, bar stools $30, halogen lamp $30 (all 6-mo old). Schwinn bike $50, TV+VCR $70 630-968-6258. Shop Vac, 1 gallon, 1 horsepower. Think small, $15. Curtis x2394, crawford@fnal.gov.

FOR RENT

- Single family home, 1100 sq/ft, 2/3 bedroom, 1 bath, 2 car garage, fenced yard, 10 miles south of lab, Aurora area, Waubonsee High School District, $1200 /mo. Call Ed Dijak x6300 or dijak@fnal.gov.

CALENDAR

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

ARTS SERIES PRESENTS:

Shangri-La Chinese Acrobats

Sat., Oct. 28, 8 p.m., Ramsey Auditorium. The Shangri-La Chinese Acrobats from Taiwan offer a breathtaking glimpse of the Orient, in a multi-faceted production with formidable feats of daring and balance, explosive Kung-Fu, brilliantly-costumed traditional dancing and even a touch of Chinese humor. Tickets: $18/$9 (ages 18 and under).

Anima

Sat., Nov. 11, 8 p.m., Ramsey Auditorium. In its premier North American tour, celebrating Brazil's 500th anniversary, this group of six musicians demonstrates the merging of medieval European music with indigenous Indian music and with African music, resulting in the rich musical heritage of modern-day Brazil. Tickets: $18/$9 (ages 18 and under). Call 630-840-ARTS or visit www.fnal.gov/culture.

International Film Society Presents: HALLOWEEN SPECIAL!

Friday, Oct. 27, 8 p.m., Ramsey Auditorium Wilson Hall $4, $2 for Fermilab grad students. *The Rocky Horror Picture Show.* Dir: Jim Sharman,UK (1975) 100 min. This is THE cult classic of all time. Outrageously kinky horror movie spoof.

SMOKE DETECTORS

Fermilab's Fire Department reminds you that it's time again to change your clocks on Saturday, October 28. We ask that when you change your clocks, please change the batteries in your smoke detectors.

WELLNESS WORKS BROWN BAG SEMINAR

Tues., Nov. 7, 12 noon- 1 p.m., WH Curia II conference room: "Lasik Preview—Taking a careful look at the facts about Lasik eye surgery." Presented by Keila Castro, RN, coordinator of the Lasik Clinic of Wheaton Eye Clinic.

LABNOTES

The Recreation Office is now accepting Visa and Mastercard along with cash or check, for Recreation Facility and Pool memberships, Day Camp registrations, Exercise Class Registration, Fermilab Outings, and Movie, DisneyQuest and Entertainment book purchases. For more information: http://fnalpubs.fnal.gov/benedept/recreation/recreation.html

15TH FLOOR TOUR AREA CLOSED

Repair work in Wilson Hall requires closing its 15th floor viewing and exhibition area through early March. Starting October 20, visitors will be able to explore a smaller, temporary exhibit in Wilson Hall's Atrium. The "Ask a Scientist" program, Sundays from 1:30 to 3:30, will also be moved to the Atrium.

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

FERMILAB
A U.S. DEPARTMENT OF ENERGY LABORATORY

Office of Public Affairs
P.O. Box 500, Batavia, IL 60510

First-Class Mail
U.S. Postage
PAID
Bartlett, IL
Permit No. 125