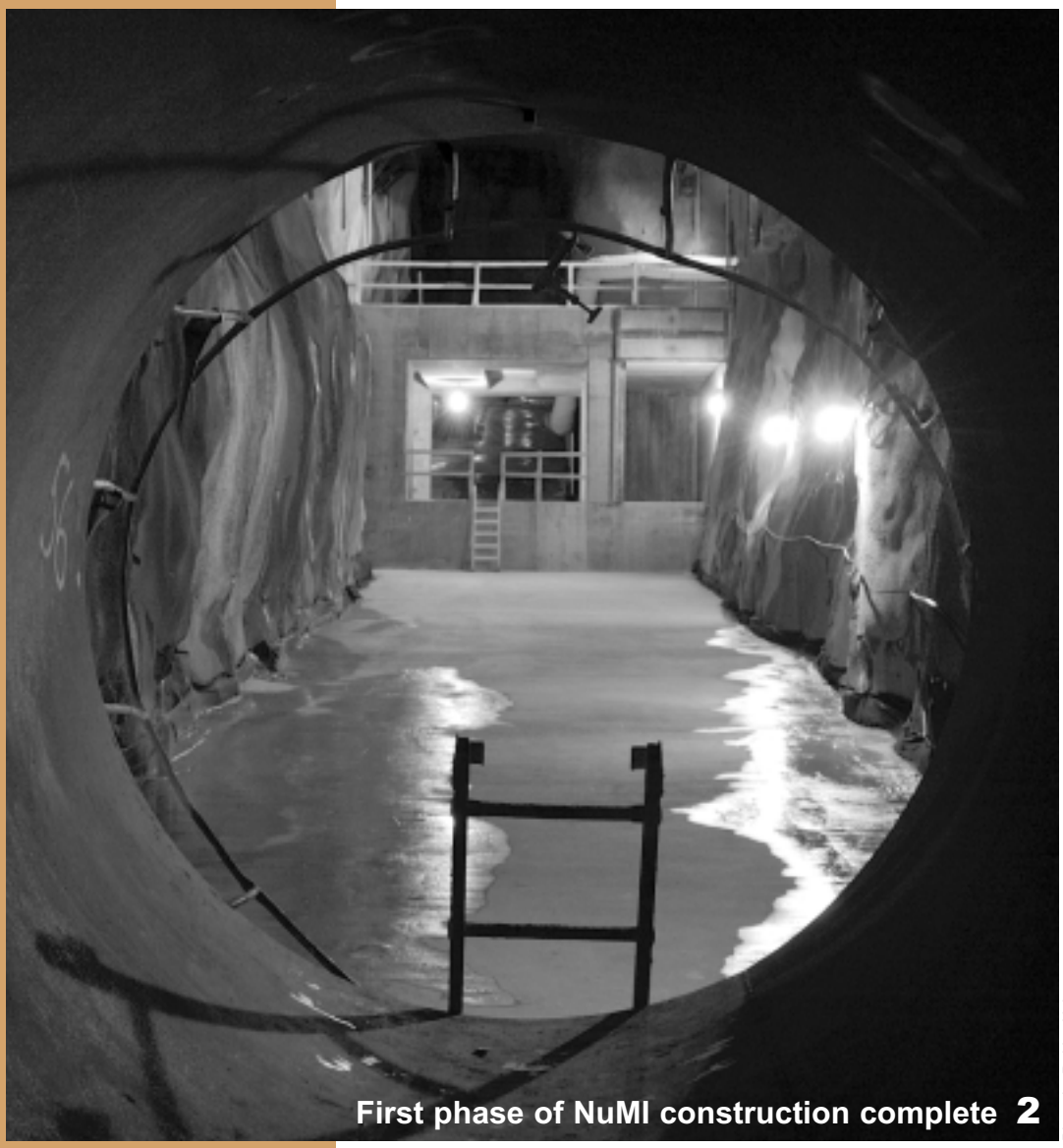
FERMI NEWS

FERMILAB A U.S. DEPARTMENT OF ENERGY LABORATORY



First phase of NuMI construction complete **2**

Photo by Reidar Hahn

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Number 20

INSIDE:

First phase of NuMI construction COMPLETE

by Kurt Riesselmann

At 219 feet, Wilson Hall is Fermilab's tallest building. It offers one of the longest elevator rides in the Fox Valley area: sixteen stories.

Since November, Fermilab employees can take an even longer elevator ride. Construction workers have completed the installation of a new 30-story elevator. At the final stop, however, passengers won't get a view of Chicago's skyscrapers. Instead, passengers exit into a vast, windowless hall that could easily serve as a small cathedral.

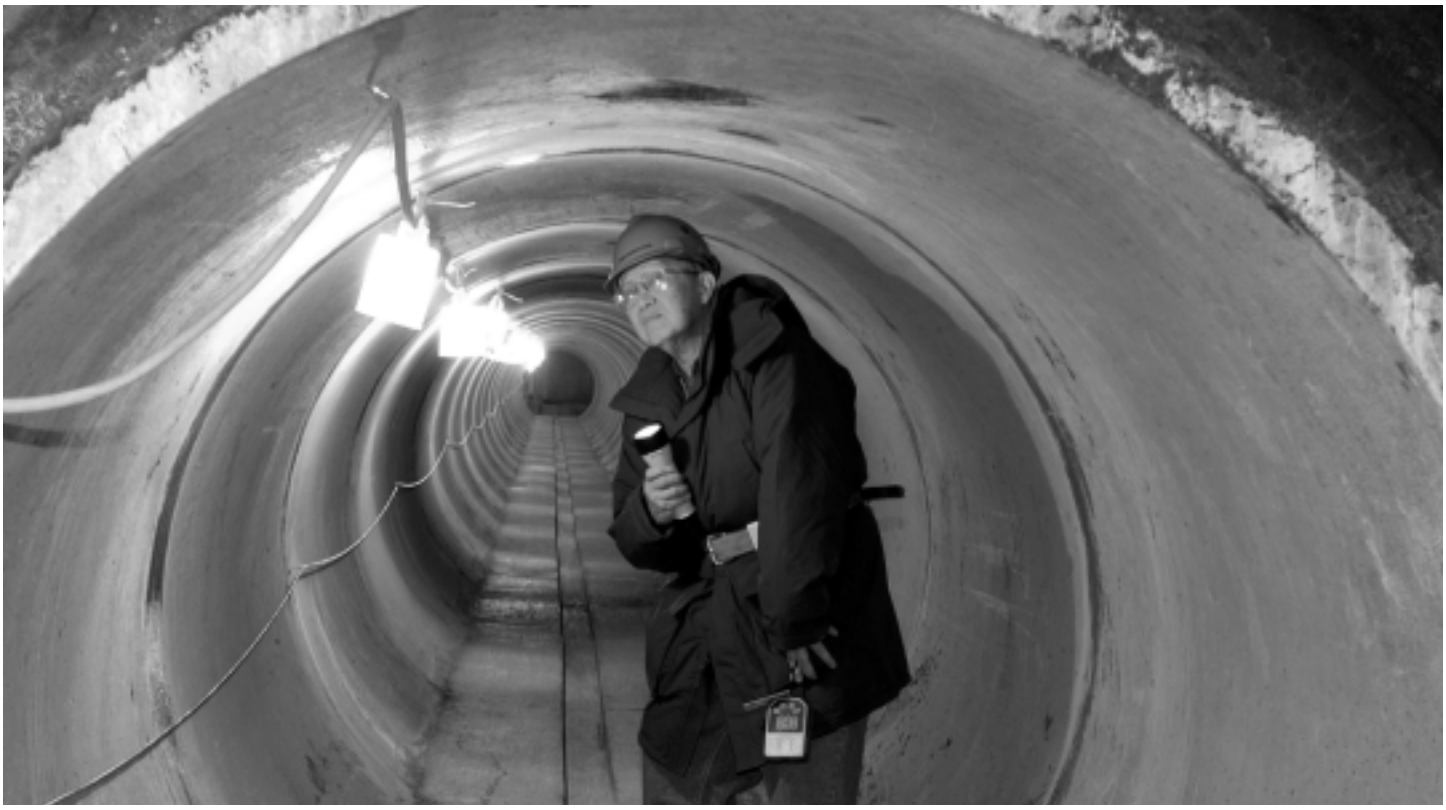
The 120-foot-long cavern, called the MINOS hall, is located 350 feet underground. In two years, it will host the Main Injector Neutrino Oscillation Search experiment, a research project carried out by two hundred physicists from five countries. The experimenters will study the properties of neutrinos, one of the least understood types of particles in the universe.

Supervising the installation of the elevator was one of the last tasks carried out by the S.A. Healy company, which has been responsible for Phase I of the Neutrinos at the Main Injector construction. The NuMI project included the excavation of two access shafts, four thousand feet of tunnels, two large underground halls and several alcoves. On November 22, Healy finished its 30.5-million-dollar contract, which it was awarded in spring of 2000.

"There has been significant progress in the NuMI underground area since my last tour in September 2001," said NuMI program manager Phil Debenham, who monitors the NuMI project on behalf of the Department of Energy. "My strongest impressions on this visit [at the end of October] were the length of the excavation and the interesting texture of the surfaces created by blasting. The overall progress on the project since [our last] Lehman review in May appears good."

ON THE COVER:
Looking from the decay pipe into the target hall. The pipe, six feet in diameter, will receive a beam with an array of short-lived particles produced in the NuMI target hall. These particles will decay as they travel through the beam pipe, and produce neutrinos.

BELOW: Since the beginning of November, project manager Greg Bock has been taking an elevator to visit the NuMI tunnels and halls. Installation of this elevator was one of the last tasks carried out as part of the S.A. Healy contract.



Photos by Reidar Hahn

The NuMI carrier tunnel, here inspected by Tony Ramos, will host the beam line that transports protons from Fermilab's Main Injector accelerator to the NuMI target hall.

Ragnar Benson Inc., of Park Ridge, Illinois will carry out the next phase of the NuMI/MINOS construction, an 18-million-dollar contract. Its employees are already using the new elevator to access the underground area.

"It is certainly a better environment than I thought it would ever be," said Fermilab engineer Tom Lackowski. "You almost have the feeling you are inside a building. The physicists—the end users—are very happy."

John Sollo, engineer at MWH Global Inc. and NuMI construction coordinator, agreed.

"The most satisfying thing is to see and hear how pleased the scientists are with how the site looks," he said. "[Fermilab physicist and NuMI project manager] Greg Bock said it looked `beautiful.' I've never thought that way about any underground work myself."

In May 2002, Healy miners removed the last pieces of rock from underground. Over the summer, workers installed a 2,000-foot long steel pipe, six feet in diameter. They surrounded it with one thousand truckloads of concrete—25,000 cubic yards. When in operation, short-lived particles such as pions will decay inside the pipe and produce the treasured neutrinos, ghost-like particles that MINOS scientists want to study in great detail.

"When you are pouring 8-foot-thick concrete around a pipe, all kinds of things can go wrong," said Lackowski. "Getting the decay pipe in better than the specified tolerances is a great success."

Aiming the neutrinos in the right direction is the most critical aspect of the MINOS experiment. Scientists will examine the beam of neutrinos at two locations. First, the neutrinos will traverse a detector inside the MINOS hall, about 1,000 feet away from the end of the decay pipe. The neutrinos will continue their journey past the detector and travel straight through 450 miles of rock—no tunnel needed—before entering a second detector located inside an old iron mine in Soudan, Minn. Scientists will then compare the results obtained from both near and far detectors to check for neutrino oscillations, the transformation of neutrinos while traveling a long distance.

To ensure that the neutrinos leave the Fermilab site in precisely the right direction, a crew of Fermilab surveyors has worked in the NuMI tunnels almost every day.

"We set up a control network in the tunnel," explained Gary Crutcher, who heads a crew of four. "We are continually tightening up all control points down there. [The S.A. Healy subcontractor]

John Sollo supervised the first phase of the NuMI construction, carried out by the S.A. Healy company.

In 2005, a beam line will bring high-energy protons into the 60 foot-high NuMI target hall, where they will collide with a graphite target and create neutrinos.

Precision Survey has done a very good job. We found little discrepancy between the work they did and we did. ”

The NuMI tunnels have up to a six percent slope, pointing directly at the Soudan mine. The actual location of the decay pipe within the tunnel is well within the three quarters of an inch tolerance specified by NuMI scientists, a great accomplishment by everybody involved.

Planning the NuMI/MINOS project has taken many years.

“I’ve been working on this project since ’94,” said Lackowski, who belongs to the Facilities Engineering Services Section at Fermilab. “The gestation period for these experiments is quite long. If you look at the early designs, they were quite different. We began with tunnels that were only half as long. Eventually, we got to a baseline, a technical design report.”

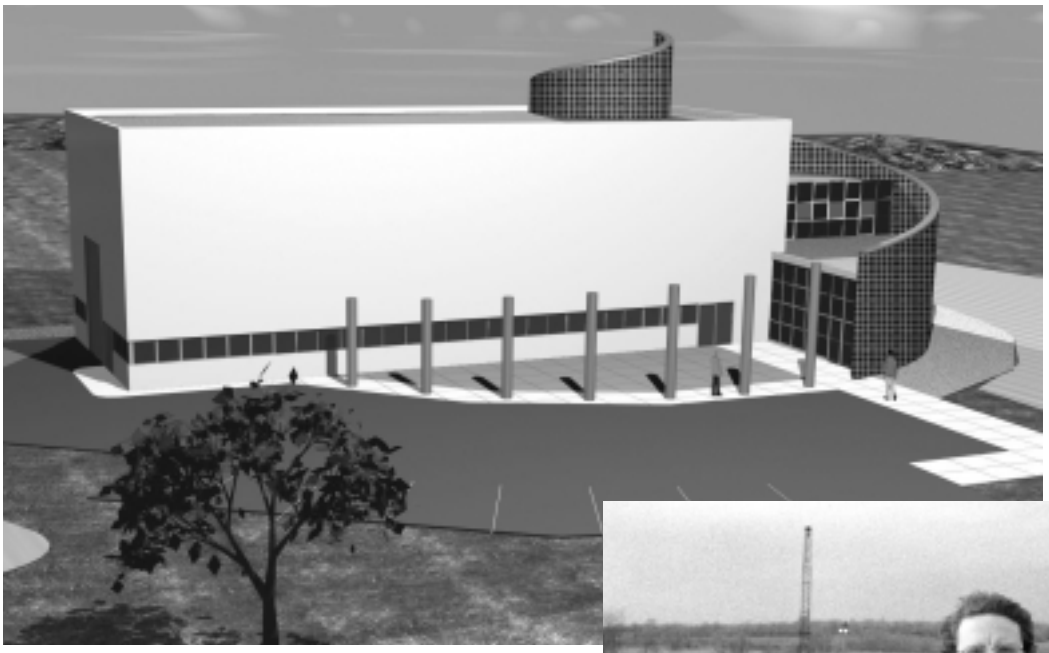
Since FESS engineers had limited experience with deep underground construction, Fermilab hired Chris Laughton, an engineer who had worked on the Large Electron-Positron collider construction in Switzerland. In addition, the construction companies Fluor Daniel and Harza (now part of MWH Global) helped with the site selection for the NuMI tunnels.

Sollo, who has worked for Harza and other companies on underground construction projects around the world, appreciated the cooperation between Fermilab’s engineering group and the various contractors.

“Tom Lackowski was one of the key players in getting this project done,” said Sollo. “He knew the design in great detail, and he knew what would or would not work when changes had to be made.”

With the end of Phase I, Sollo is done with his work at Fermilab. In November, he and his colleague Mike Bruen turned over 190 ring binders with field data—drawings, correspondence, reports, submittals, survey data—to Fermilab.

“Now it’s back to what the FESS engineers are familiar with,” Sollo said. “The underground work was a little different.”



Graphic: Fermilab FESS

The MINOS service building, to be built near the Lederman Science Education Center on Pine Street, will continue the Robert Wilson legacy of unique and aesthetic architecture on the Fermilab site. A spiral, reminiscent of a particle track, relates the building's appearance to the lab's mission.

Photos by Reidar Hahn

Physicist Rob Plunkett, NuMI deputy project manager, stands near the site where the building will rise. Construction is expected to be completed by the end of 2003.

Fermilab engineer Elaine McCluskey will lead the next construction phase. She will coordinate the work by Ragnar Benson Inc. The company will work on outfitting the underground areas as well as the construction of two service buildings right on top of the access shafts.

"The next phase of the NuMI construction is a fairly complicated project from the logistics point of view," explained McCluskey. "We have an aggressive schedule. We have to really pay attention to how the project is managed. That also means that the contractor has to pay close attention to the subcontractors' work."

Ragnar Benson Inc. has been in business for about 80 years, and its local credentials include the construction of two large glass buildings for Lucent Technologies, just five miles east of Fermilab.

"Healy is leaving us with finished floor and shotcrete-lined walls and ceiling," McCluskey said. "Ragnar Benson still needs to pour two thousand cubic yards of concrete, which is nothing compared to the amount of concrete poured by Healy. We are also going to install large cranes. To satisfy regulations by the National Fire Protection Association, we also need to build life-safety passage ways inside the tunnels."

Above ground, Ragnar Benson will start from scratch. The company will construct two buildings right above the access shafts to the tunnels.

"The purpose of these two buildings is to bring material underground and supply utilities to the experiment," said McCluskey. "We are building what the experiment needs. To provide cooling, there will be heat exchangers and chillers. We also need to install plumbing and ventilation. Ventilation is no small matter. You can imagine what it takes to ventilate such a large tunnel."

According to the contract, Phase II will be completed in fall of 2003. Fermilab scientists will then begin to install the beam line and near detector. In early 2005, the first neutrinos will take their trip to Minnesota. It will take them about one thousandth of a second, even without a tunnel.

ON THE WEB:

NuMI/MINOS homepage:
http://www-numi.fnal.gov/

NuMI excavation on VideoNews (5 min):
http://www-visualmedia.fnal.gov/VMS_Site/s_videonews.html

MINOS video about detecting neutrino oscillations (12 min):
http://vmsstreamer1.fnal.gov/VMS_Site_02/VMS/MINOS/MINOS.ram

LHC magnet test

Super*Results* FOR Super*conducting* LHC Magnets

by Mike Perricone

Fermilab's Technical Division has completed highly successful tests of the first superconducting quadrupole assemblies for the US LHC Accelerator Project. The 19-foot, 12,000-pound magnets, part of an overall $531 million effort in the U.S., are bound for the Large Hadron Collider under construction at CERN, the European Particle Physics Laboratory in Geneva, Switzerland.

"The first results have been very good," said Fermilab LHC project manager Jim Kerby, of the lab's Technical Division. "They've performed well above where they need to be for the [LHC operation]. In fact, they've performed better than any magnets we've ever made here."

The LHC superconducting magnets are designed to reach a peak magnetic field of 9 Tesla; superconducting magnets at Fermilab's Tevatron reach 4.4 Tesla.

"In terms of production accelerator magnets," said Fermilab's Jim Strait, the US LHC project manager, "this is about as high a field as anyone has ever achieved. These are some of the best production accelerator magnets ever made."

The system is working.

With outstanding performances by these first two assemblies at superconducting temperatures, Kerby added, "we know that we do not have a systematic problem with our production process. That doesn't rule out random problems, but it lets us know that our overall process is working. It's a testimony to good quality assurance practices and the dedication of everyone who has worked on the project."

The tests have been performed at Fermilab's Industrial Center, on quadrupole assemblies destined for the beam interaction points at LHC. The assemblies incorporate two Fermilab-produced quadrupoles (focusing magnets) joined with a CERN-designed correction dipole (steering magnet), with the components stretching about 40 feet.

The assemblies are slid into a vacuum vessel and chilled with superfluid helium to around 2 kelvins (2 degrees celsius above absolute zero). Each half of the assembly is tested individually. The magnets are "trained" with electric current flowing through them until they quench, or rise above superconducting temperatures. When the magnets quench, they "remember" the levels of current flow they've experienced, and the intensity of the

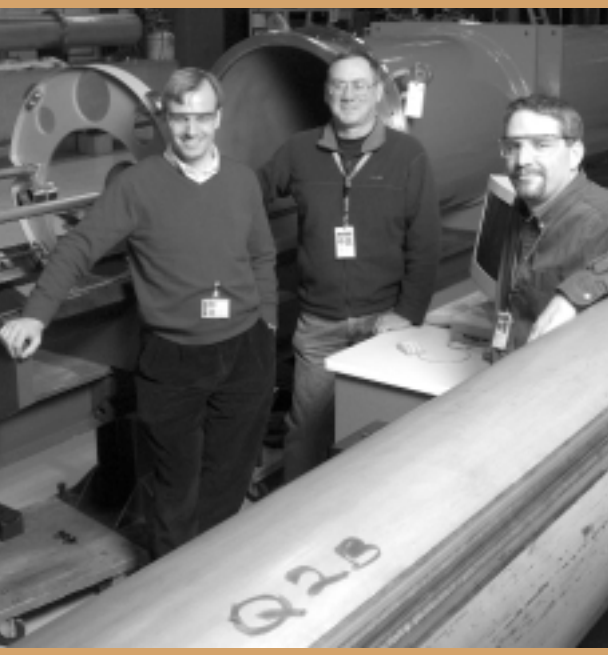


Photo by Jenny Mullins

US LHC project manager Jim Strait (left) and Fermilab LHC project manager Jim Kerby (right) flank Fermilab Technical Division head Bob Kephart.

ON THE WEB:

US LHC Accelerator Project:
www-td.fnal.gov/LHC/USLHC.html

Fermilab Technical Division:
www-td.fnal.gov

Photo by Reidar Hahn

The LHC magnet project at Fermilab has involved as many as 40 full-time crew members at any given time.

magnetic field they have generated. If all goes well, they will equal or surpass those standards in succeeding thermal cycles, until they have reached their performance goals.

For their role in the LHC, the magnets are expected to generate a magnetic field gradient of 205 Tesla per meter, with some portions requiring 214 T/m. Fermilab is expected to train the magnets up to 230 T/m, providing a high level of confidence for their performance under the most stringent experimental conditions in the collider.

When tested in 2001, the Fermilab prototype quenched at an electrical current just under 12,000 amperes. The first half of the first production assembly went all the way to 13,000 amperes without quenching, reaching a field gradient of 233 T/m in the first thermal cycle. The second magnet reached 12,710 amperes, producing a gradient of 229 T/m on its first quench, then hit 12,955 amperes and 232 T/m on the second quench—again, above the target of 230 T/m.

“If I could bottle this kind of result, I would,” Kerby said.

While production and testing continue on the remainder of the 18 Fermilab magnets, another production process is beginning. The Fermilab team will receive 18 LHC magnets produced at KEK in Japan. At Fermilab, they will be assembled into their cryostat structures before being shipped to CERN.

Brookhaven and Lawrence Berkeley National Laboratories round out the U.S. collaboration on LHC accelerator components. Brookhaven has built and tested beam separator dipole magnets to be used in specialty regions around the 27-kilometer (17-mile) LHC ring. Of an allotment of 20 magnets of four different types, Brookhaven has completed 13, tested eight, and shipped one to CERN. Brookhaven is also testing superconducting cable produced in Europe. Berkeley is working with Fermilab on superconducting cable; producing absorbers to protect magnet components from low-angle debris in the collision region, and building feed boxes to provide utilities for the magnets—power, cryogens, vacuum and instrumentation.

Fermilab was a pioneer in superconducting accelerator magnets, with more than 1,000 incorporated into the Tevatron, which was completed in 1983. The US LHC effort means superconducting magnet production has returned to Fermilab in a big way.

“We have developed the engineering, scientific and technical staff to produce the highest-performing magnets in the world,” Strait said. “With this project, we have maintained and extended our leadership in superconducting magnet technology.”

'Serious' refrigeration the key to Cryogenic Dark Matter Search

How to Catch a COLD WIMP

by Pamela Zerbinos

It is relatively well-established, as far as these things go, that the vast majority of the universe is unaccounted for. It's not "missing," per se—we know *where* it is. We just don't know *what* it is. We can't see it, except by the effects it has on matter, such as galaxies, that we can see (much as we can "see" wind by watching the trees sway).

But help is on the way. After almost a year of difficulties, scientists working on the Cryogenic Dark Matter Search say they're nearly ready to begin the second stage of their search for the dark matter candidate known as the "WIMP," or Weakly Interacting Massive Particle.

"There's a lot of crazy stuff going on out in the universe if you try to understand it," said Fermilab's Michael Crisler, who handles the electronics for CDMS. "But [WIMPs] are a compelling model. They provide a nice, tight, uniform explanation for a lot of things, and tie together all the gravitational anomalies."

"WIMP" is actually a generic name for a group of as-yet-undiscovered heavy particles that interact only through the weak force. One group of WIMPs known as supersymmetric particles looks particularly promising, and the lightest SUSY particle, the neutralino, is currently the leading dark matter candidate. Another SUSY particle, the axion, also has its proponents, and there are additional theories espousing extremely heavy particles called WIMPzillas, others proposing sterile neutrinos, and some who say that maybe we don't know as much about gravity as we think we do.

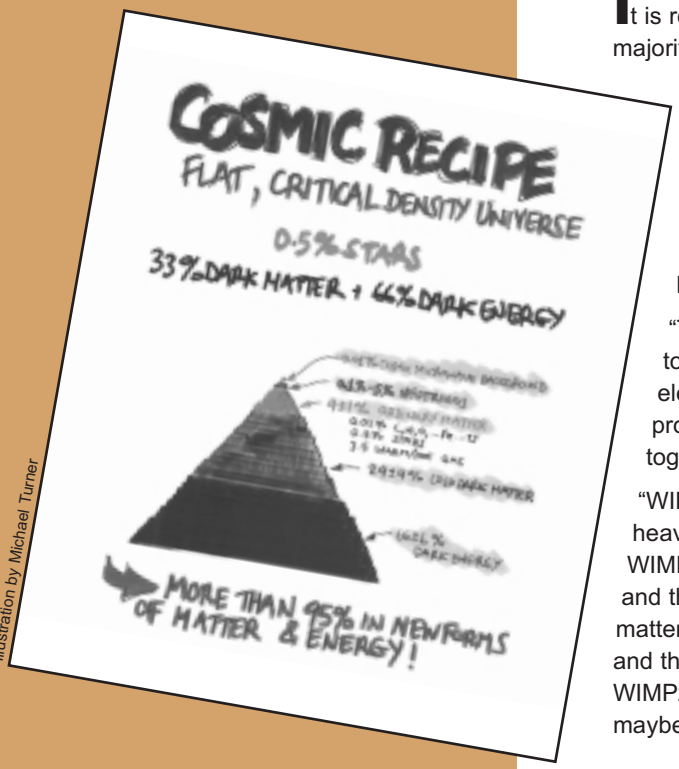


Illustration by Michael Turner

Photo by Reidar Hahn

New CDMS Project Manager Dan Bauer checks out the experiment's circuitry. Bauer, who has been working with CDMS since 1995, recently relocated from the University of California at Santa Barbara.

Sorting through all these theories and particles may seem daunting, but at a recent cosmology conference in Chicago, most scientists seemed confident they would be able to pin down dark matter within the decade. CDMS will play a major role in this undertaking; if WIMPs exist, they are firmly in the experiment's crosshairs.

The upcoming phase of the experiment will take place in Minnesota's Soudan Mine, half a mile underground to shield the detectors from interfering cosmic rays. The detector towers contain six individual detectors made of silicon or germanium, and are about the size of a beer can. The first tower destined for Soudan has been running for the past year at Stanford, and moving the tower to Soudan, a much deeper site, will significantly reduce the cosmic ray background and therefore enhance the physics results this tower produces.

When a WIMP hits a germanium nucleus in one of the detectors, the nucleus will recoil and cause the entire germanium crystal to vibrate. The vibrations will pass to the surface of the crystal, where they will heat up thin aluminum traps connected by tungsten. The tungsten is held at a critical temperature, and by monitoring changes in its temperature, CDMS scientists will be able to track the passage of WIMPs through their detectors.

"Everybody has a very high confidence level," Crisler said. "But I'm sure you wouldn't find anyone who, for fear of jinxing it, would say that it's working."

The "it" in question is a quantum-mechanical refrigerator, which keeps the tungsten at that critical temperature, around 70 millikelvins—"seriously cold," Crisler said, and the detectors themselves are even colder. It is a $200,000 machine made by Oxford Instruments that bubbles helium 3 through helium 4 and is more commonly known as a dilution refrigerator.

The refrigerator was purchased several years ago with money from Stanford, and then "it sat in a crate for a while," Crisler said. "Problems weren't anticipated. We started off assuming that we'd just buy this thing and it'd work."

Fermilab's Roger Dixon, who was the CDMS project manager at the time, recalled trying to cool the refrigerator down in the summer of 2001.

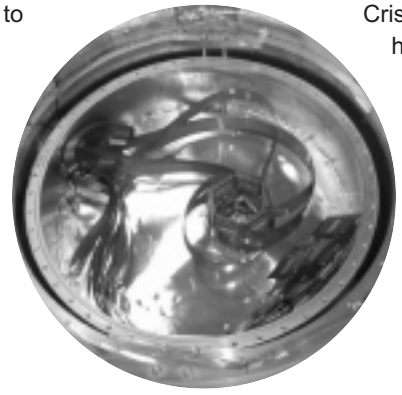
"There's a **LOT OF** *crazy stuff* GOING ON out

Photo courtesy CDMS collaboration.

A CDMS scientist working in the Soudan Mine finishes installing the lead shielding for the ice box in March, 2002. The ice box houses the detectors, and must be surrounded by lead to absorb the natural radiation produced by rock and soil. Inside the ice box, the detectors will be cooled to about 10 millikelvins by the dilution refrigerator, shown in the background. The tube to the right will carry signals from the detectors to the electronics.

"We ran into a lot of minor problems at first," Dixon said, "and then we got to the point where we were able to cool it down all the way, around the first of the year. That's when we discovered two potentially serious problems."

The first, and most serious, was a superfluid leak that only showed itself when the refrigerator was very cold—under a few degrees Kelvin. The second was a bit of weld bead that was preventing two flanges from mating properly, resulting in an intermittent leak from the helium bath into the outer insulating vacuum.



A closeup of the cryostat with a detector assembly installed. The six cables fanning out from the assembly are unique "striplines" that carry the detector signals out to room temperature.

"That's the unglamorous reality of it," said Crisler. "A dilution refrigerator doesn't have any moving parts. It's just a bunch of plumbing. So if you have a problem, it's either an obstruction or a leak.

"The plumbing is extremely delicate and small in places; it's a very subtle object. It goes through a fairly extensive set of tests, and was demonstrated to be working in the factory. It came here, and it can spring leaks during the shipping and handling process. And there's a certain amount of disassembly and reassembly that has to take

in the universe if you try to UNDERSTAND IT."

–Fermilab's Michael Crisler

Photo by Jim Beaty

Principle investigator and cospokesperson Blas Cabrera (center) from Stanford University and Fermilab technicians James Williams (left) and Bruce Lambin (right) prepare the dilution refrigerator for installation. The refrigerator was down for almost a year, but is now up and running.

WIMP

ON THE WEB:

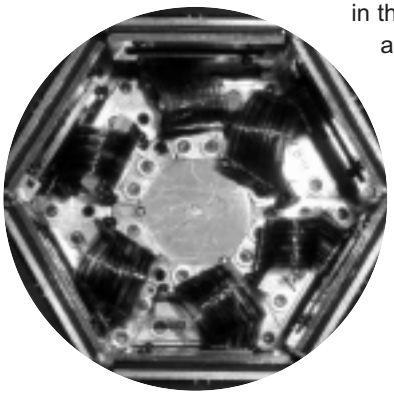
CDMS Homepage:
http://cdms.berkeley.edu/

CDMS at Fermilab:
http://ppd.fnal.gov/experiments/cdms/

place to hook up our stuff to it. At any step along the way, something could fail. And if one thing fails anywhere in the system, the dilution refrigerator experts can usually pin it down and fix it. Our problem was that we had two things fail that created a set of symptoms so complicated that the best of our experts were completely foiled until they took it apart so that they got one problem over here and one problem over there and they could pin it down."

It took a lot of hard work, but fortunately, both problems eventually were pinned down and fixed.

"They finally got very aggressive and took the thing completely apart," Crisler said.



A CDMS detector tower, as seen from above.

Now that it's back together and seems to be working properly, scientists expect to begin testing the ice box by itself in early December (the ice box is the cryostat in which the detectors live while they're detecting). Meanwhile, CDMS has a new project manager, Dan Bauer, who is in charge of scheduling and budget issues, as well as of keeping track of the experiment's technical progress.

Bauer, who has been with CDMS since 1995, served as the operations coordinator for the first phase of the experiment, CDMS I, at Stanford, and has been the integration coordinator for CDMS II. He relocated to Fermilab from the University of California at Santa Barbara in early September of this year to take over the reins from Dixon.

Bauer was a graduate student at Fermilab in the '70s, which is why he was able to reclaim his original, low ID number (04383), something he says everyone keeps asking him about.

Dixon has been appointed head of Beams Division, but plans to keep working with CDMS. As for the experimenters, they hope to have at least one detector tower, possibly two, installed in the ice box in early 2003. After a few months of commissioning and calibration, the detectors should be up and running by summer. They'll collect data for about a year, and the final three towers (for a total of 30 individual detectors) should be installed by spring of 2004 to run through the end of 2005.

"Of course, all that could change depending on what we see in the first year," Bauer said. "We should be able to get a much better idea of where the experiment should go in that time—or, if we're lucky, we'll discover dark matter."

COOL IDEA

Test area for muon cooling recycles equipment for a new concept

by Kurt Riesselmann

It takes great ideas to make technological advances. And it takes experimental setups to test great ideas.

In the past one hundred years physicists have relied mostly on beams of electrons, protons and their corresponding antiparticles to advance our knowledge of the universe and its building blocks. Now physicists think that it's time to introduce a new type of charged particle to the bag of particle projectiles: the muon, a short-lived particle two hundred times heavier than its cousin, the electron.

The 130 members of the Neutrino Factory and Muon Collider collaboration have worked for about five years on the design of very intense sources for producing muons, suitable for subsequent acceleration to high energies.

If the design of such machines succeeds, scientists may some day turn to muons as a new surgical tool to probe deep into the structure of matter. In addition, experimenters can use muons to produce very intense beams of neutrinos, another particle that is causing much excitement amongst particle physicists.

At present, the Muon collaboration is getting ready to test its ideas and designs. Two small new buildings, located at the southeastern end of Fermilab's Linear Accelerator, will host the infrastructure for the new lab for accelerator R&D. The cost of the new construction, called the MuCool project, is about two million dollars. It is paid by DOE funds provided directly to the Muon collaboration, which primarily consists of particle- and

ON THE WEB:

The MuCool project:
www.fnal.gov/projects/muon_collider/cool/cool.html

The Muon Collaboration:
www.fnal.gov/projects/muon_collider/

The MuCool project requires the construction of a small building (center) to host cryogenic equipment that chills

Photo by Jenny Mullins

Steve Geer (left), cospokesperson of the Muon collaboration, and construction project manager Milorad Popovic lend a sense of scale to the first components for the new MuCool accelerator R&D lab at Fermilab. Northwestern University donated a transformer (center), and Fermilab built the first part of a beam enclosure in 2000 (left, in background).

accelerator physicists from U.S. laboratories and universities, but also has some participation from institutions in Japan and Europe.

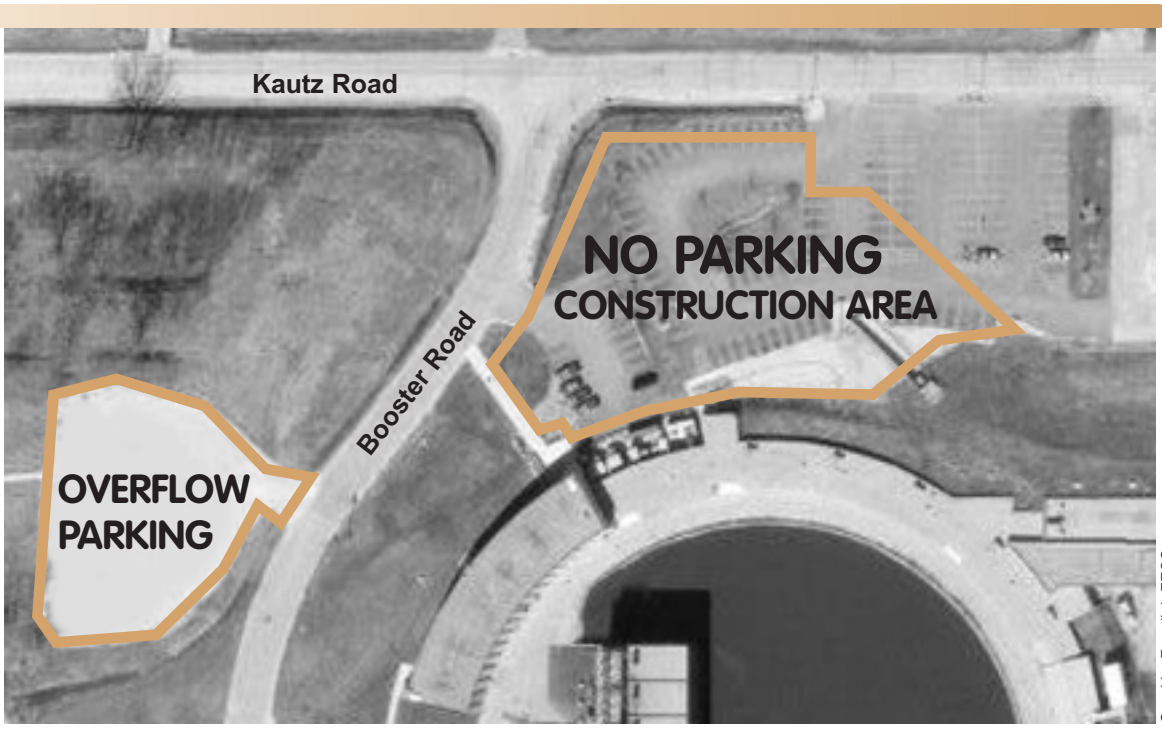
Much of the equipment that will go into the new buildings is either recycled (an old cryogenic plant at Fermilab will be moved to the new location), donated (a transformer from Northwestern University has already arrived), already exists in the adjacent Linac (radiofrequency tubes and klystrons) or will be built by collaborating institutions (an RF cavity, for example, will come from Lawrence Berkeley Laboratory).

"The power source for the RF cavity would have been the most expensive piece," said Fermilab physicist Steve Geer, cospokesperson of the Muon collaboration. "The Linac has two spare stations that we can use without affecting its operations and maintenance requirements."

Graphic: Fermilab FESS

and pumps coolant to the MuCool experiments. The vessels to the left of the new building will store liquid nitrogen.

COOL IDEA



Graphic: Fermilab FESS

The construction of the MuCool buildings will take nine months. During that time more than one hundred parking spaces will be inaccessible. A new, temporary parking lot is located just 200 feet south of the construction site.

When complete in 2004 the MuCool laboratory will offer radiofrequency power of 200 and 800 megahertz, and cryogenic equipment to provide cooling with liquid helium.

“It will have all the things that you need for accelerator R&D,” said physicist Milorad Popovic, who is overseeing the MuCool construction at Fermilab. “The collaboration spends two million dollars and gets a ten-million-dollar test area.”

The Muon collaboration, which includes ten Fermilab physicists, will use the MuCool lab to test how to pack a large number of muons tightly together to create a narrow, high-density beam.

“A muon beam would initially be large, like the size of a basketball,” said Popovic. “But such a big, fat beam wouldn’t fit into an accelerator.”

To solve this problem, the Muon collaboration has developed a design that relies on two components: liquid hydrogen absorbers, which reduce the spread of the beam in transverse direction, and radiofrequency cavities, which reaccelerate the muons in longitudinal (forward) direction.

Theoretically, an alternating series of absorbers and cavities is the right idea to tame a large, diffuse group of muons, transforming it into a densely packed muon train moving at high speed.

Practically, the idea needs to be put to the test.

“Demonstrating the beam-cooling capabilities of the hydrogen absorbers and RF cavities is the critical item,” said Steve Geer. “Developing these components is the critical path before you can do more extensive tests. We need to start engineering tests without beam. If successful, we hope to use a muon beam line at the Rutherford laboratory [in the U.K.] to test this system. Rutherford has an eight hundred MeV proton accelerator that would create one hundred to two hundred MeV muons.”

To secure funding for its R&D program, the Muon collaboration is breaking new ground. Traditionally, R&D for accelerators has taken place at national laboratories, with little participation from university scientists. Tight budgets at accelerator laboratories, however, have led project leaders to look for more funding and manpower from universities.

Members of the Muon collaboration receive money from the Department of Energy, the National Science Foundation, and some modest funds from Japan. Individual institutions have obtained additional funding. The five member institutions of the Illinois Consortium for Accelerator Research, for example, have gotten money from the state of Illinois.

“We are doing this on a shoestring,” said Geer. “The biggest asset we have is the enthusiasm of the people.”

CALENDAR/LAB NOTES

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

TRAVEL OFFICE CLOSED

The Travel Office will be closed the entire day on: Dec. 24, 2002; Dec. 25, 2002; Dec. 31, 2002; Jan. 01, 2003

LEDERMAN CENTER CLOSED

The Lederman Science Education Center will be closed for the holidays from Dec. 24, 2002 through Jan. 01, 2003, and reopening on Jan. 2.

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.

VIRTUAL ASK-A-SCIENTIST, DEC. 12

Next chat session: December 12, 2002
7:00 p.m. - 9:00 p.m. Central Time

Featured Scientists: Brenna Flaugher, of Fermilab's CDF experiment, and Tom Diehl, of Fermilab's DZero experiment, will respond to questions live online. This upcoming chat session should be unique, because the featured scientists also happen to be husband and wife, which is a first for Virtual Ask-a-Scientist.

Virtual Ask-a-Scientist is an online chat session with Fermilab scientists that gives participants the opportunity to ask questions about high-energy physics. Fermilab invites people of all ages and all science backgrounds to participate.Some questions may not be answered during the on-line session. Full transcripts will be available on-line about a week after the chat session.

To join the chatroom on the day of the session by click a link on the Fermilab homepage and follow directions to log in and ask questions. Java enabled browsers are required. Internet Explorer version 4 or higher is recommended, but Netscape's browsers may also be used. (Netscape is not recommended for Macintosh users.)

Contact Elizabeth Clements at the Fermilab Office of Public Affairs for more information.
Email: lizzie@fnal.gov, 630-840-2326

BLOOD DRIVE, DEC. 12-13

Fermilab's Holiday blood drive will be held on December 12 and December 13, 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/pls/default/event_calendar.html or by calling Lori at x6615.

MILESTONES

NAMED

■ Michael Turner (ID 09970N, PPD-Theoretical Astrophysics), as a Phi Beta Kappa Visiting Scholar for 2002-2003. Turner, Rauner Distinguished Professor of Astronomy and Astrophysics at the University of Chicago, is one of 14 distinguished scholars selected by the Phi Beta Kappa Society for this program.

■ As head of Fermilab's Beams Division: Roger Dixon (ID 03277N), effective January 15, 2003. Among his posts, Dixon was head of the Research Division from 1992 to 1996, and most recently served as project manager for the Cryogenic Dark Matter Search. Steve Holmes, who has been acting as interim head of Beams, will resume his responsibilities as Associate Director for Accelerators.

RETIRING

■ Herman Haggerty (ID 1960, PPD-DZero), Dec. 3
■ Jerry Reeder (ID 9921, PPD-Mechanical Dept.), Dec. 3
■ Francis Pearsall (ID 2253 PPD-Technical Centers), Dec. 3
■ Pamela Fox (ID 3171 LS-AO-Housing Office), Dec.3
■ Terry Hendricks (ID 479, BD-Accelerator Controls), Dec. 4
■ Dean Krause (ID 740, TD-Development and Test), Dec. 6

FILM SERIES

All shows are on Friday nights at 8 p.m. (promptly) in Ramsey Auditorium, in Wilson Hall at Fermilab. Tickets are $4.00 for adults, $1.00 for children (under 12), and $2.00 for Fermilab students and are sold only at the door. Please join us for refreshments and discussion after the film.

DECEMBER 6

Spike and Mike's 2001 Animation Classic (USA,2001, 85 min.) For 23 years, Spike and Mike's Festivals of Animation have dazzled audiences with works by John Lasseter of Pixar, Tim Burton's first films, Nick Park of the Wallace and Gromit, the boys of South Park, Beavis and Butt-Head, The Powerpuff Girls, The Rugrats, Ren and Stimpy, and more. The 2001 Classic is a collection of 16 different cell, computer graphic, and clay animation shorts that range from the beautiful to the bizarre.

Chez Léon MENU

Lunch served from 11:30 a.m. to 1 p.m.
$10/person

Dinner served at 7 p.m.
$23/person

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

Lunch
Wednesday, December 11

Roast Pork Stuffed
with Apples and Prunes
with Lingonberry Sauce
Sweet and Sour Red Cabbage
Horseradish Potatoes
Fruit Cake
with Coconut Frosting

Dinner
Thursday, December 12

Lobster Bisque
Grilled Duck Breast
with Cranberry Salsa
Wild Rice
with Currants and Dried Figs
Vegetable Medley
Profiteroles

Lunch
Wednesday, December 18

Lunch at 12 noon

Christmas Pasta
with Shrimp,
Tomatoes and Arugula
Vanilla Bean Cake
with Raspberry Sauce

Dinner
Thursday, December 19

Chestnut Soup with Cognac Cream
Medallions of Lobster
with Champagne Butter Sauce
Sauteed Peapods with Grape Tomatoes
Saffron Rice
Spinach and Pomegranate Salad
Raspberry Parfait
with Christmas Cookies

FERMI NEWS

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The deadline for the Friday, December 20, issue is Tuesday, December 10, 2002.
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.

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

CLASSIFIEDS

FOR SALE

■ '94 Ford Probe, electric blue, new tires/alignment, $2,800 o.b.o. Please contact Chris at x2440 or stoughto@fnal.gov.

■ '85 Chevy Caprice wagon, 250K miles, runs well, $500 o.b.o. hmeyer@fnal.gov or x3774.

■ Weight lifting equipment: Over 1,000 lbs. of steel Olympic weights, Olympic style bar, curl bar, dumbbells, "IMAGE 4.0" free weight lift station with bench, $350. Contact Ed Dijak, x6300, home: 630-665-6674, dijak@fnal.gov.

■ Washer and dryer. Tappan brand. Very good condition. Located in Glendale Hts. $175 for both o.b.o. Contact x6342 or 708-645-1168.

■ Brand new Avia 5.1 channel DVD players compatible with VCD/MP3/CD-R disks and home theatre surround sound speakers with subwoofer, center and satellite (5 systems, never opened) plus Karaoke function for $300 each system, Macintosh LC II computer with external modem, CDROM, printer and monitor $100, Whistler 1670 Memo laser/radar detectors with 360 degree protection - 3 available (new, never opened in box) $115 each. Please call 630-781-8800 after 3pm.

■ Christmas Tree, 7-1/2 feet tall, pre-strung with 1,050 clear lights, $45. Contact Ed at x6300, home 630-665-6674, or dijak@fnal.gov.

■ Electric guitar, brand new Epiphone Gothic Explorer. Solid mahogany body, set mahogany neck with ebony fretboard. Satin black finish. Matching Case Included, $425 o.b.o. Jayson x2661 or jaysonh@fnal.gov.

■ One futon, black cover, very good condition, $40. 630-840-5151 or 630-482-3919 evenings.

FOR RENT

■ Spacious bedroom with private bath on independent floor, one car garage; spacious living area shareable on same floor; use of laundry and main kitchen; located in a family house in residential Naperville. 20 min from the lab. Available beginning of December. $495/mo. Call 840-2574, office hours.

■ Two bedroom villa for rent at the Orange Lake Country Club in Orlando, Florida, next to Disney World. Room enough for 8 people. Fully-equipped kitchen with full-sized appliances, plus cookware and dinnerware and more. Master suite with large whirlpool. Amenities on site include: 90 holes of golf, 80 acre lake and beach, 200,000 sq. ft. clubhouse and movie theater, 7 swimming pools and spa, tennis, racquetball & basketball courts, indoor/outdoor playgrounds, fitness center. Much more, too much to list. Available Feb. 8-15 2003, $1,000 or best offer. Call 630-840-3499.

■ Duplex in Batavia 3BR, 2.5 bath, attached garage w EDO, fenced yard, deck, available 1/1/03, $1,200 mo plus deposit, utilities, call 630-250-0991.

■ Duplex, near downtown Oswego, 3 bedroom, 1.5 bath, family room, $950 plus deposit 630-966-9768 or 630-750-2412.

■ Two bedroom apartment in downtown Batavia, five minutes from Fermilab, garage, washer/dryer, gas heat, $775 per mo. 630-840-5151 or 630-482-3919 evenings.

SUBLEASE

■ Naperville, 1 bdrm, access to indoor and outdoor swimming pools, exercise room, $677/mo plus utility. Available from December to May 2003. Contact Qiang at x4051(office), 630-5481236 (home) or qdu@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/month shared utilities. Elizabeth Melquist 630-428-9080 or Dave Carey x3639.

■ Roommate wanted Aurora (next to Fox Valley Mall) 2 bedroom, 2 bath, washer and dryer in unit. Rent $500 month plus 1/2 utilities. Available Dec.14th 2002 until May 31st 2003. Please call me at x5165 or email me alexh@fnal.gov

PIANO LESSONS

■ Private piano lessons, by a graduate of Indiana University School of Music with 5 years teaching experience, located on NW side of Naperville, $18/half hour. 630-428-9089.

CUT YOUR OWN CHRISTMAS TREE

■ Daily from 9:00 am to dusk, until December 23, Marmion's fields will be open for those tree hunters who enjoy the fun and challenge of cutting down their own Christmas trees. Marmion Abbey is located at 850 Butterfield Road, Aurora, IL 630-7215, extension 344 for Rev. Bede Stocker.

FERMILAB ARTS SERIES 2002-2003 SEASON

Windham Hill's Winter Solstice
Liz Story, Will Ackerman, and Samite of Uganda
December 7, 2002
Tickets - $25 ($13 ages 18 and under)

Libana
February 8, 2003
Tickets - $17 ($9 ages 18 and under)

Dragon's Tale: Nai-Ni Chen Dance
March 8, 2003
Tickets- $19 ($10 ages 18 and under)

Quartetto Gelato
April 5, 2003
Tickets - $21 ($11 ages 18 and under)

Orquesta Aragon
May 10, 2003
Tickets - $26 ($13 ages 18 and under)

Tickets for all Fermilab Events are available now. For further information or telephone reservations, call 630/840-ARTS weekdays from 9 a.m. to 4 p.m. Additional information is available at www.fnal.gov/culture.

GALLERY CHAMBER SERIES

Classical music at 2:30 p.m. on Sunday afternoons, in the second-floor gallery of Wilson Hall.

Chicago Chamber Musicians Brass, Jan. 26, 2003

Since its founding in 1994, the CCM Brass has established itself as a foremost interpreter of the brass repertoire. With some of North America's leading brass players, they present spectacular performances of cornerstones of the literature.

David Schrader, Feb. 16, 2003

David Schrader is equally at home in front of a harpsichord, organ, clavichord, piano or fortepiano. His performance in this seasons' Gallery Chamber Series will feature music of the 16th and 17th centuries performed on the Italian harpsichord and clavichord.

Scholars of Cambrai, Mar. 23, 2003

This quartet of two lutenists and two vocalists was founded for the purpose of performing music from the late medieval through early Baroque periods. The ensemble gives particular attention to little-known works and composers of the Renaissance era.

$36 for three concerts, $15 for single tickets if available (Series tickets for sale until January 1)

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