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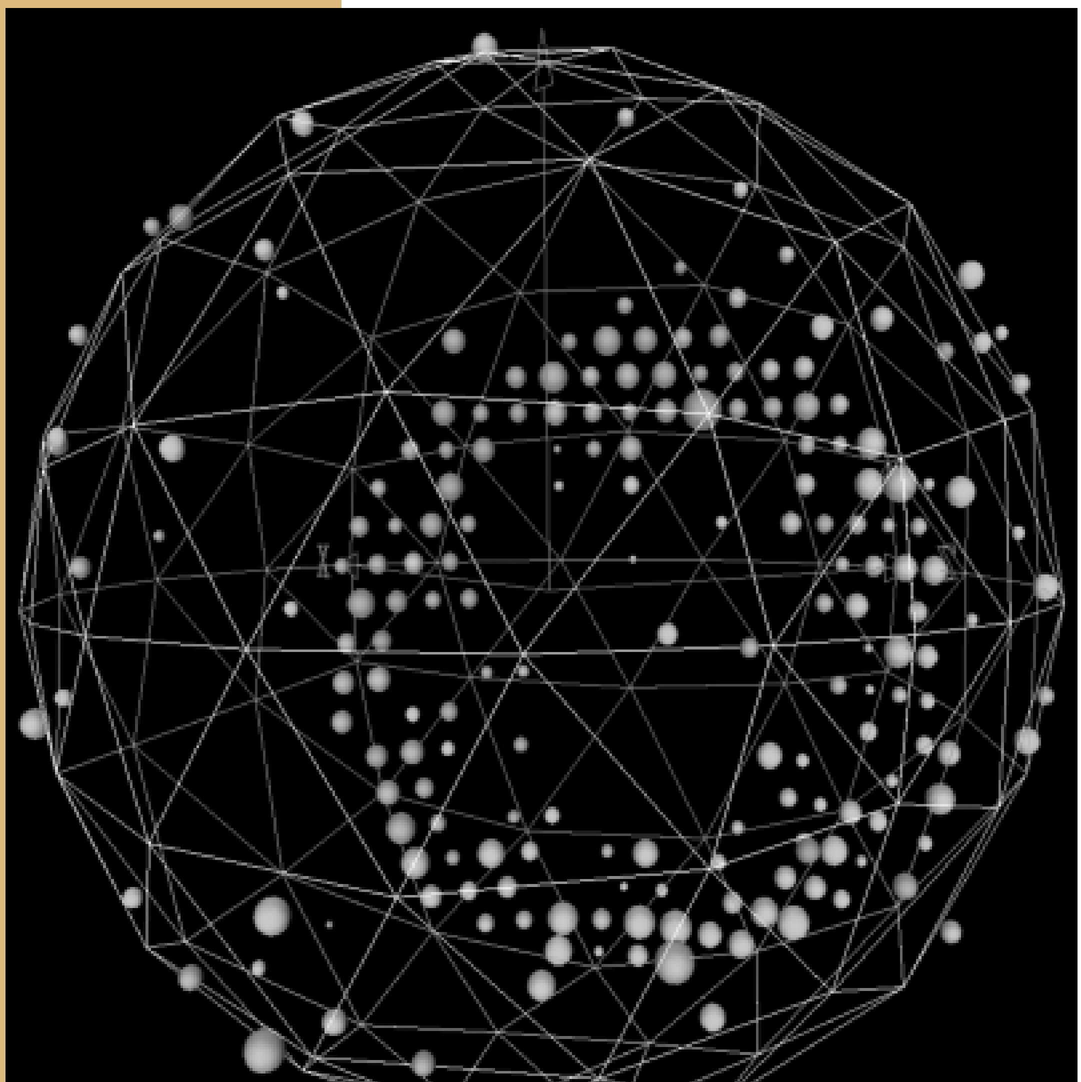

New Neutrino Experiment at Fermilab Goes Live 2

Jeff Kallenbach, Fermilab and Jon Link, BooNE collaboration

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INSIDE:

# New neutrino experiment at Fermilab goes LIVE

by Kurt Riesselmann

Scientists of the Booster Neutrino Experiment collaboration announced on September 9 that a new detector at the U.S. Department of Energy's Fermi National Accelerator Laboratory has observed its first neutrino events. The BooNE scientists identified neutrinos that created ring-shaped flashes of light inside a 250,000-gallon detector filled with mineral oil.

The major goal of the MiniBooNE experiment, the first phase of the BooNE project, is either to confirm or refute startling experimental results reported by a group of scientists at the Los Alamos National Laboratory. In 1995, the Liquid Scintillator Neutrino Detector collaboration at Los Alamos stunned the particle physics community when it reported a few instances in which the antiparticle of a neutrino had presumably transformed into a different type of antineutrino, a process called neutrino oscillation.

"Today, there exist three very different independent experimental results that indicate neutrino oscillations," said Janet Conrad, a physics professor at Columbia University and cospokesperson of the BooNE collaboration. "Confirming the LSND result would suggest the existence of an additional kind of neutrino beyond the three known types. It would require physicists to rewrite a large part of the theoretical framework called the Standard Model."

Over the next two years, the BooNE collaboration will collect and analyze approximately one million particle events to study the quantum behavior of neutrinos. Neutrinos play an integral role in decay and fusion processes. The sun, for example, sends out an incredible amount of neutrinos, invisible to the naked eye. Although neutrinos are among the most abundant particles in the entire universe, little is known about the role of these ghost-like particles in nature.

"It is an exciting time for neutrino physics," said Department of Energy Office of Science Director Raymond Orbach. "In the past few years experiments around the world have made extraordinary neutrino observations, shattering the long-standing view that neutrinos have no mass. The MiniBooNE experiment has the potential for advancing the revolution of our understanding of the building blocks of matter."

**ON THE COVER**

**Scientists of the Booster Neutrino Experiment collaboration announced on September 9 that a new detector at Fermilab has observed its first neutrino events. The BooNE scientists identified neutrinos that created ring-shaped flashes of light, here read out by a computer display, inside a 250,000-gallon detector filled with mineral oil.**

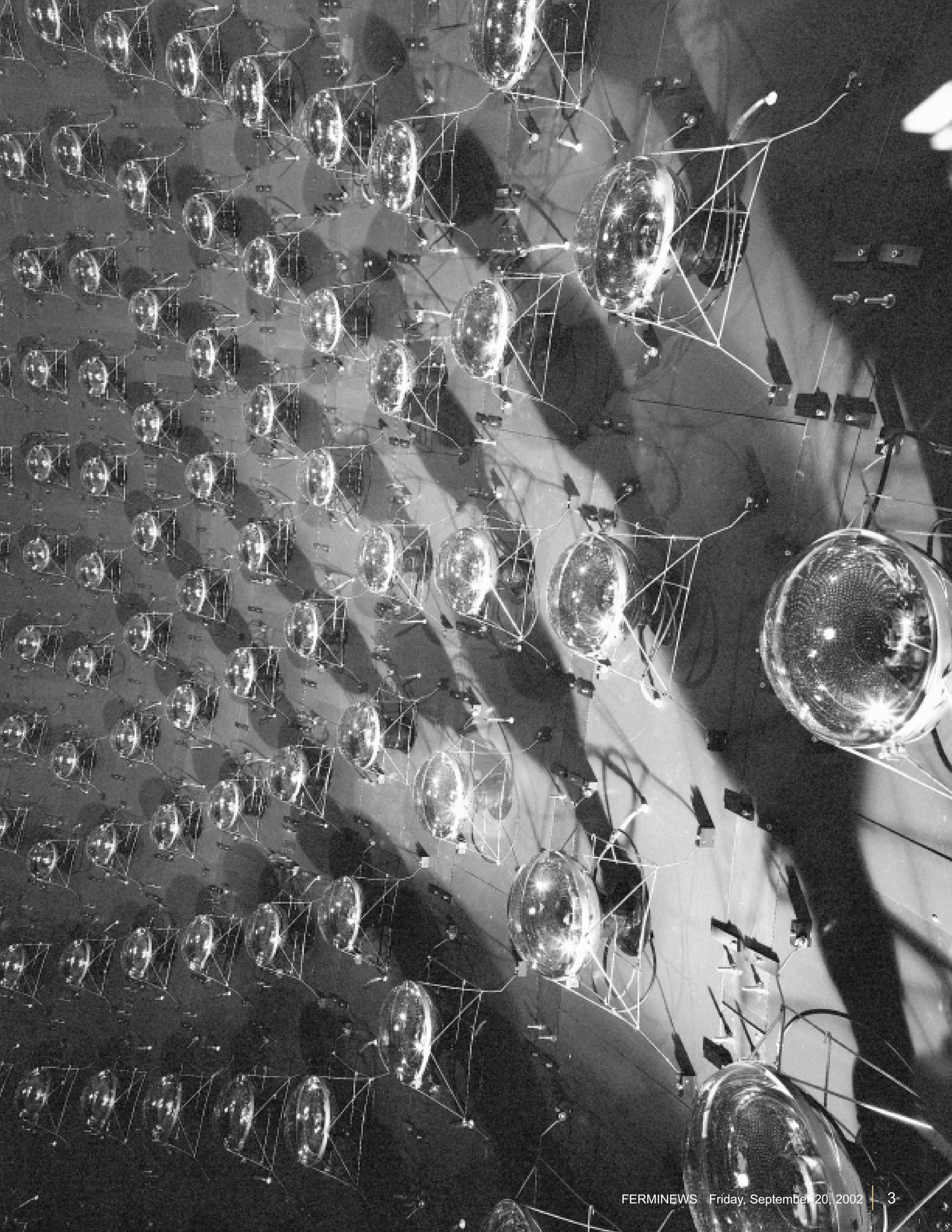
**Opposite page: The spherical MiniBooNE detector contains an inner layer of 1,280 photomultiplier tubes that will detect neutrinos produced by Fermilab's Booster accelerator.**

Photo by Reidar Hahn

**ON THE WEB:**

**MiniBooNE goes live**
**www.fnal.gov/pub/miniboone/**

**The BooNE homepage**
**www-boone.fnal.gov**



# “MiniBooNE is an EXAMPLE of a SUCCESSFUL PARTNERSHIP

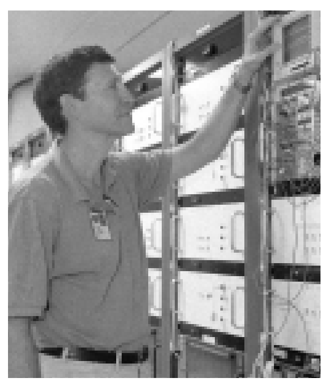
Photo by Jenny Mullins

**LEFT:** Fernanda Garcia of Fermilab announced the collaboration’s debut on September 9. **RIGHT:** BooNE collaborators pose in front of the entrance to their experiment. The $19 million MiniBooNE experiment is funded by the Department of Energy and the National Science Foundation. The 66 members of the BooNE collaboration come from 13 institutions: University of Alabama, Bucknell University, University of California at Riverside, University of Cincinnati, University of Colorado, Columbia University, Embry Riddle Aeronautical University, Fermi National Accelerator Laboratory, Indiana University, Los Alamos National Laboratory, Louisiana State University, University of Michigan, Princeton University

Only in the last several years have scientists begun to shed light on the mysterious behavior of the three types of neutrinos – electron, muon and tau neutrino. Originally thought to be massless, experiments at the Superkamiokande neutrino detector in Japan have shown that neutrinos indeed have mass, allowing the particles to morph into each other. In 2001, experiments at the Sudbury Neutrino Observatory in Canada substantiated the Superkamiokande findings.

To simultaneously explain all experimental results, including LSND, introducing neutrino masses is not enough. Hence physicists have hypothesized the existence of a fourth type of neutrino, with properties rather different from the three types known so far. It could explain a range of neutrino-oscillation phenomena. Since the additional particle would interact with its surroundings even less than the three conventional neutrinos, scientists have named it the sterile neutrino.

The MiniBooNE experiment will now put the sterile-neutrino theory to the test. The experiment examines the behavior of an intense beam of muon neutrinos, created by the Booster accelerator at Fermilab. After traveling about 1,500 feet, the neutrino beam traverses the MiniBooNE detector. According to the LSND results, the distance is just right to allow a fraction of the muon neutrinos to transform into electron neutrinos.



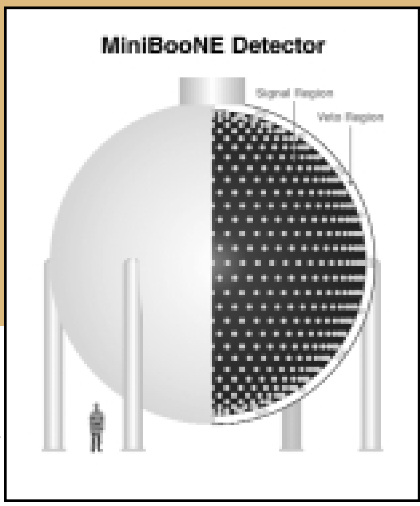
BooNE cospokesperson Bill Louis checks the MiniBooNE data acquisition system. Louis is a scientist at Los Alamos National Laboratory. In the 1990s, he worked on the LSND experiment, which triggered the idea for the MiniBooNE experiment.

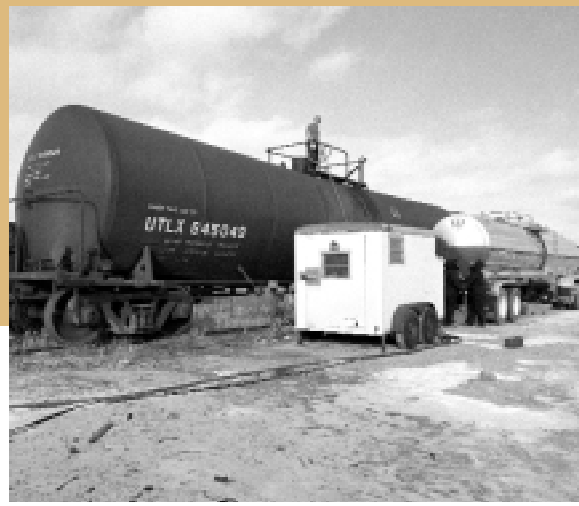
The detector consists of a tank filled with ultraclean mineral oil, which is clearer than water from a faucet. The tank’s interior is lined with 1,520 light-sensitive devices, called photomultiplier tubes, which record tiny flashes of light produced by neutrinos colliding with carbon nuclei inside the oil. Based on the pattern and the timing of the light flashes, scientists can identify the type of neutrino that created a collision.

“We will operate the experiment 24 hours a day, seven days a week,” said Bill Louis, a Los Alamos scientist and cospokesperson of the BooNE collaboration. “We will be looking for oscillations of muon neutrinos into electron neutrinos. If nature behaves as LSND suggests, our detector will collect about one thousand electron neutrino

**among federal agencies, universities and national laboratories."**

*— Marvin Goldberg, NSF program director*




Photos by Reidar Hahn

**LEFT:** The MiniBooNE experiment relies on a 250,000-gallon tank filled with mineral oil that is clearer than water from a faucet. Light-sensitive devices (PMTs) mounted inside the tank are capable of detecting collisions between neutrinos and carbon nuclei of oil molecules. **CENTER :** Twelve railcars delivered the oil for the MiniBooNE detector to Fermilab. Technicians used food-grade-clean pipes and trucks to get the oil into the detector. **RIGHT:** Fermilab deputy director Ken Stanfield (right) had the honor of pouring the final cup of oil into the MiniBooNE detector, assisted by physicists Eric Hawker and Jennifer Raaf (both University of Cincinnati). Looking on are BooNE cospokespersons Bill Louis and Janet Conrad.

events over the next two years. If not, we won't see any excess of electron neutrinos. Either way, we'll get a definite answer."

The MiniBooNE experiment began taking data on August 24. Since then, the data acquisition system has been on-line 99.8 percent of the time. Two of the 66 BooNE scientists, who come from 13 institutions from across the United States, are monitoring the equipment around the clock.

"It's not an issue to find people for the midnight shift," said Bonnie Fleming, a Fermilab scientist working on MiniBooNE. "Now that we have beam, everybody is eager to do shifts, even at night."

Construction of the MiniBooNE experiment lasted from October 1999 to May 2002. It required the construction of a 40-foot-diameter tank of steel surrounded by a concrete building. In addition, scientists had to build a beam line to transport protons from the Booster accelerator to a target building, in which the protons hit a metal block to produce muon neutrinos. The funding for the $19 million MiniBooNE experiment has come from the DOE's Office of Science and the National Science Foundation.

"In addition to the importance of the science, MiniBooNE is an example of a successful partnership among federal agencies, universities and national laboratories," said Marvin Goldberg, program director at NSF. "The project has also set new standards for education and public outreach in the field of high-energy physics. The small scale of the project allows undergraduate and graduate students to participate fully in all of the experimental components."

On September 9, Fernanda G. Garcia, one of the young scientists of the collaboration, gave the MiniBooNE report at the weekly meeting of Fermilab experimenters. The highlight of her talk was the presentation of the first neutrino event observed by the detector, featuring a ring of light caused by a muon neutrino collision.

"We now have a small sample of neutrino events that we can study," she said. "All forthcoming neutrino events we will collect in a 'black box,' making sure that we develop our analysis tools without knowing the exact content of the box. When we have collected enough events—in about two years—we will open the box and get our ultimate count of electron-neutrino events."

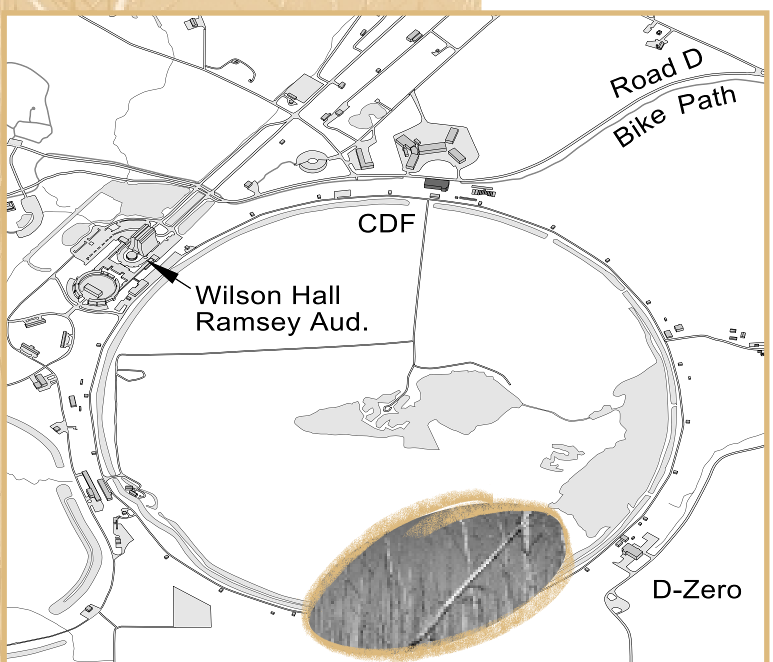
Then, the BooNE collaboration will reveal the ending of an important chapter on the mysterious neutrinos. The whole story, however, will captivate scientists for decades to come.

# Last Rites

## Site managers leave dying trees to natural cycle

by Pamela Zerbinos

A grove of invasive cottonwood trees has disturbed the prairie restoration in the circled area of Fermilab's main accelerator ring.




Where do trees go when they die?

In most cases, it depends on where they lived. If they lived here at Fermilab, chances are they don't go anywhere at all.

In the southern end of the Tevatron ring, near DZero, there is a veritable forest of dead trees. Their number is uncertain, but they definitely outnumber live ones.

"Not only is it unsightly," said Dmitri Denisov, who works at DZero and gives about one tour of the facility each month, "but it also raises some uncomfortable questions."

Those questions, Denisov said, come from visitors who seem to be concerned that the trees—which are mostly inside the accelerator ring—are being killed off by radiation.

Of course, this is not the case. The trees, mainly cottonwoods, are being killed off by the Ecological Land Management Committee. Some of the trees have been killed by the annual prairie burn, and some have been girdled, which involves making a cut around the circumference of the tree to prevent nutrients from circulating. A girdled tree usually dies within a year or two.

Those trees were never supposed to be there in the first place. The land inside the ring is prairie land, or at least it's supposed to be, and prairies don't have trees. But cottonwoods are a weedy, aggressive species, and they've invaded the southern end of the ring.

"There are good places for trees and bad places for trees," said Peter Kasper, a Fermilab physicist and ELM bird monitor. Grasslands and prairies are bad places for trees.

Birds such as the Grasshopper Sparrow or the Meadowlark, Kasper said, won't nest anywhere near a tree for fear of predators. If a tree ends up in the middle of prime grassland, that grassland will be ruined for many animals that otherwise would like to live there.

ON THE WEB:

**Ecology at Fermilab:**
www.fnal.gov/pub/about/campus/ecology/

**Ecological Land Management Committee:**
www.fnal.gov/pub/about/campus/ecology/elm/

**2002 Land Management Plan:**
www-esh.fnal.gov/ELM/ELM_Plan_2002.htm

## “There are GOOD PLACES FOR TREES and BAD PLACES FOR TREES”

Beginning in the mid-80s, ELM started paying careful attention to where trees were planted in the lab, and now there is a detailed plan—online at www-esh.fnal.gov/ELM/ELM_Plan_2002.htm —for each of Fermilab’s 6,800 acres. The northwest corner of the lab is being converted to woods—trees are regularly planted in those areas, and valuable trees like oaks are relocated there (rather than killed) whenever possible. The plan for the ring calls for getting rid of the cottonwood grove and converting the land there to restored prairie.

If that grove of trees—or any grove of trees—is instead left to its own devices, it will eventually kill the prairie, as the trees grow and choke out the shorter grasses. Fires traditionally kept the woody areas at bay (if you look at pre-settlement habitat distributions, you’ll notice forested areas generally developed around rivers and other natural fire breaks). But natural prairie fire is a rarity these days, and land managers interested in prairie restoration have had to find other means of controlling the spread of trees.

The most familiar method is probably the controlled prairie burn, but others include mowing and tree removal. These are part of an overall strategy known as “ecosystem management,” or EM, adopted by ELM in the last five to 10 years. It was a broad strategy until recently, but now a four-person subcommittee makes decisions on a tree-by-tree basis to help the overall plans along.

The goal of this strategy, said committee member Rod Walton, “is a full-scale reconstruction of a functional ecosystem that is as close to pre-settlement conditions as possible.”

And that means that prairie needs to be prairie, and woods need to be woods.

Which brings us back to that forest of dead trees, and why it’s not going anywhere.

“Tree removal is always dangerous,” said Mike Becker of Fermilab’s Roads and Grounds department, which does the actual work of cutting them down. “You’re using chainsaws and heavy equipment.”

Despite the risk, the trees would be removed if they were near roads or buildings, or someplace where people go regularly—”basically anywhere they’d threaten infrastructure,” Becker said. This approach isn’t unique to Fermilab. Spokespersons for both the Morton Arboretum and the DuPage County Forest Preserve said they have similar policies. But since the trees in question are in a natural area, there’s no real reason to cut them down.

Photo by Jenny Mullins

This Cottonwood grove at the southern end of the Tevatron ring would choke out the prairie if ELM hadn’t intervened.

“The only drawback to leaving them there is looks,” Walton said. “They provide food and shelter for insects and birds, and when they decay they provide humus for the soil.” Humus is dark, rich, fertile soil produced by the decay of organic material. Many people buy it to use as fertilizer for their gardens. In the meantime, Kasper said, the dead trees keep woodpeckers out of the power poles and provide convenient perches for hawks.

“It’s not so much a matter of educating the public,” Kasper said, “but of educating ourselves. A lot of people interact with the public...They should know we’re actually managing the land intelligently and with a purpose and—importantly for this place—in a way that has some science behind it.”

# FYI

## An abbreviated look at the alphabet soup of HEP-speak

by Pamela Zerbinos

If you've ever tried to speak with a member of the military, you know that comprehension is nearly impossible unless you're familiar with its language. You probably also know that its language of acronyms sometimes seems...well, pointless. They don't have cars, they have POVs—Privately Owned Vehicles.

While it's true that acronyms in the HEP—er, High Energy Physics—community have a different purpose, it's also true that the simple statement, "STAR is a QGP experiment at BNL'S RHIC," will not draw even a flicker of understanding from the uninitiated. As the list of labs, agencies, accelerators, detectors and experiments grows ever longer, *FERMINEWS* decided it was time for an AHEP update.

***Please note that although space in FERMINEWS is limited, an expanded acronym directory is available online at:***
**www.fnal.gov/pub/inquiring/more/acronyms.html**
***If we missed anything (and we did), please be sure to let us know.***

### LABS, FACILITIES & RESEARCH INSTITUTIONS

**ANL:** *The Department of Energy's Argonne National Laboratory in Argonne, Ill.* www.anl.gov/

**Bates:** *Not an acronym. The Massachusetts Institute of Technology Bates Linear Accelerator Center.* mitbates.mit.edu/

**BNL:** *The Department of Energy's Brookhaven National Laboratory in Upton, Long Island, New York.* www.bnl.gov/

**CERN:** *Originally "Conseil Européenne pour Recherches Nucléaires," now the European Laboratory for Particle Physics, in Geneva, Switzerland.* www.cern.ch/

**CNRS:** *Centre National de la Recherche Scientifique, France's equivalent to the NSF.* www.cnrs.fr/

**DESY:** *Deutsches Elektronen-SYnchrotron laboratory in Hamburg, Germany.* www.desy.de/

**ESRF:** *The European Synchrotron Radiation Facility in Grenoble, France.* www.esrf.fr/

**FNAL:** *The Department of Energy's Fermi National Accelerator Laboratory in Batavia, Ill.* www.fnal.gov/

**FZK:** *Forschungszentrum Karlsruhe, a nonprofit basic science research center in Karlsruhe, Germany.* www.fzk.de/

**GSI:** *Gesellschaft für Schwerionen-forschung, a heavy-ion research center in Darmstadt, Germany.* www.gsi.de/

**HASYLAB:** *HAmburger SYnchrotronstrahlungsLABor, part of DESY.* www-hasylab.desy.de/

**IN2P3:** *Institut National de Physique Nucleaire et de Physique des Particules, the division of CNRS that oversees nuclear and particle physics.* www.in2p3.fr/

**JINR:** *The Joint Institute for Nuclear Research in Dubna, Russia.* www.jinr.ru/

**JLAB:** *The Department of Energy's Thomas Jefferson Newport National Accelerator Facility, or Jefferson Lab, in Newport News, Va. Formerly CEBAF (Continuous Electron Beam Accelerator Facility).* www.jlab.org/

**KEK:** *Koo Energy Ken. The High Energy Research Accelerator Organization in Tsukuba, Japan.* www.kek.jp/

**LAL:** *The Laboratoire de L'Accelerateur Lineaire at the University of Paris-Sud in Orsay, France.* www.lal.in2p3.fr/

**LANL:** *The Department of Energy's Los Alamos National Laboratory in Los Alamos, N.M.* www.lanl.gov/

**LBL:** *The Department of Energy's Lawrence Berkeley Laboratory in Berkeley, Calif.* www.lbl.gov/

**LEPP:** *Laboratory for Elementary-Particle Physics at Cornell University in Ithaca, New York. Formerly the Laboratory for Nuclear Studies (LNS).* w4.lns.cornell.edu/

**LLNL:** *The Department of Energy's Lawrence Livermore National Laboratory in Livermore, Calif.* www.llnl.gov/

**LNF:** *Laboratori Nazionali di Frascati, near Rome, Italy.* www.lnf.infn.it/

**LNGS:** *Laboratori Nazionali del Gran Sasso, in L'Aquila, Italy. Usually referred to as "Gran Sasso."* www.lngs.infn.it/

**NUSL:** *The National Underground Science Laboratory in the Homestake Mine, S.D.* int.phys.washington.edu/NUSL/

**ORNL:** *The Department of Energy's Oak Ridge National Laboratory in Oak Ridge, Tenn.* www.ornl.gov/

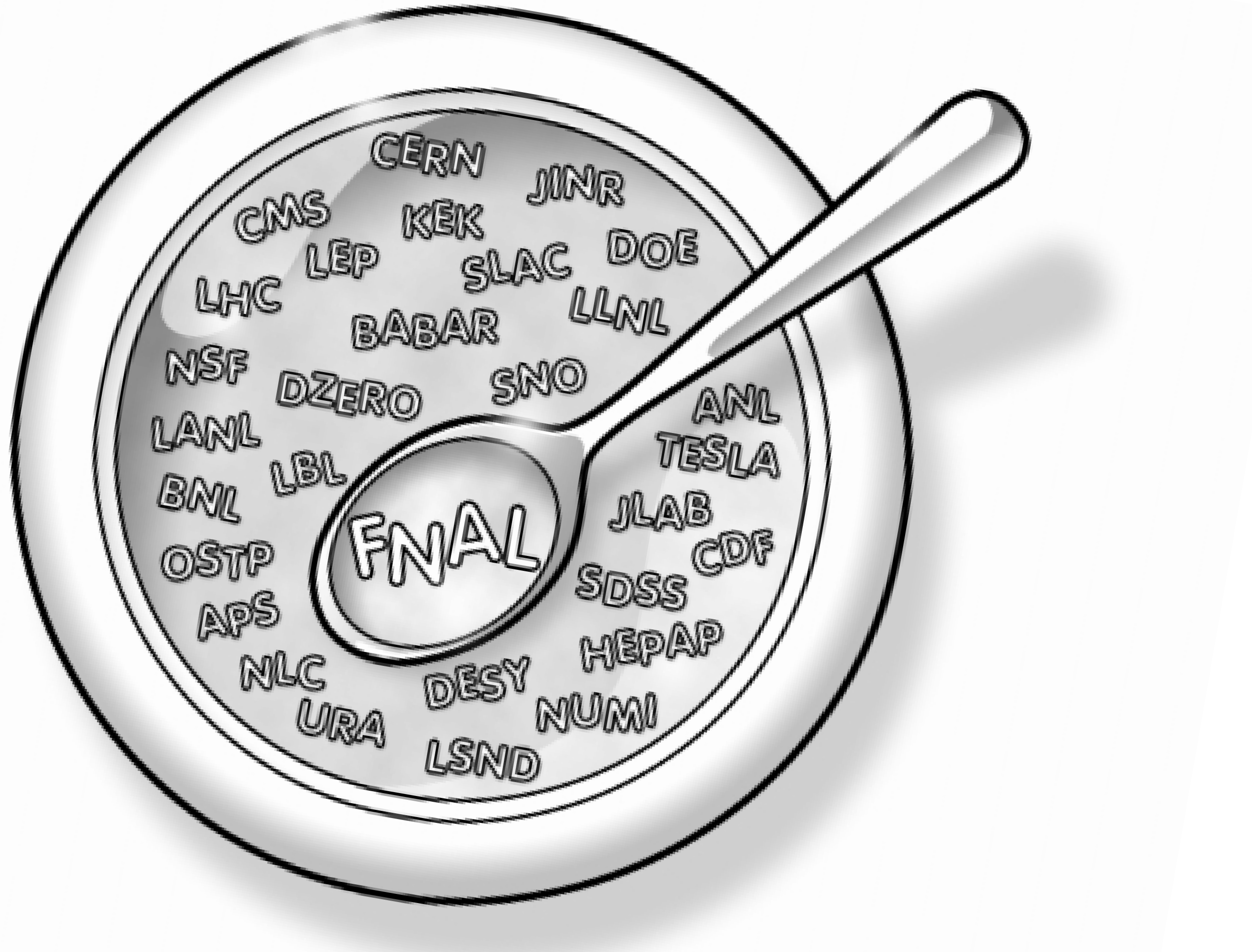
**PSI:** *Paul Scherrer Institut, a research facility in northern Switzerland.* www.psi.ch/

**SLAC:** *The Department of Energy's Stanford Linear Accelerator Center in Menlo Park, Calif.* www.slac.stanford.edu/

**SSRL:** *SLAC Synchrotron Radiation Laboratory.* ssrl.slac.stanford.edu/

**TRIUMF:** *TRI-University Meson Facility. (Although now there are eight universities involved, TRIUMF started with three.) Located at the University of British Columbia in Vancouver, Canada.* www.triumf.ca/

**WIPP:** *The Department of Energy's Waste Isolation Pilot Plant, a nuclear waste center in New Mexico also being used as an underground laboratory.* www.wipp.carlsbad.nm.us/science/




## ACCELERATORS

**AD:** *Antimatter Decelerator. New facility at CERN to study antimatter.* psdoc.web.cern.ch/PSdoc/acc/ad/

**AGS:** *The Alternating Gradient Synchrotron at Brookhaven.* www.bnl.gov/bnlweb/facilities/AGS.html

**ATLAS:** *The Argonne Tandem Linear Accelerator, a heavy-ion accelerator at Argonne.* www.phy.anl.gov/atlas/

**AWA:** *The Argonne Wakefield Accelerator, working on accelerator R&D.* gate.hep.anl.gov/awa/

**B Factory:** *SLAC's new electron-positron collider, built to produce B mesons, beginning in 1999.* www.slac.stanford.edu/accel/pepii/ home.html

**CLIC:** *CERN's proposed Compact LInear Collider.* ps-div.web.cern.ch/ps-div/CLIC/Welcome.html

**CESR:** *The Cornell Electron Storage Ring. A high-luminosity electron-positron collider at the Wilson Synchrotron Laboratory, Cornell University.* w4.lns.cornell.edu/public/CESR/

**DAFNE:** *(Sometimes DAPHNE) Double Annular Factory for Nice Experiments. 1.0 GeV high luminosity phi factory at LNF in Italy.* www.lnf.infn.it/accelerator/dafne/ dafne.html

**EPA:** *CERN's Electron Positron Accumulator.* psdoc.web.cern.ch/ PSdoc/acc/lpi/lpidoc .html

**FMI:** *The Fermilab Main Injector, which began operating in 1999 as an injector to the Tevatron.* www-fmi.fnal.gov/

**HERA:** *Hadron-Electron Ring Accelerator at DESY.* www.desy.de/f/hera/engl/

**ISAC:** *TRIUMF's Isotope Separator and ACcelerator for astrophysics study.* www.triumf.ca/isac/isac_home.html

**KEKB:** *An electron-positron collider to study CP violation in the B meson, at KEK.* www-acc.kek.jp/www-ACC-exp/KEKB/KEKB-home.html

**LANSCE:** *Los Alamos Neutron Science CEnter (formerly LAMPF, the Los Alamos Meson Physics Facility).* lansce.lanl.gov/index_ext.html

**LEIR:** *Low Energy Ion Ring. Used to be LEAR, an antiproton ring. LEAR is being converted into LEIR, a machine to store ions for the LHC at CERN.* www.cern.ch/PSdoc/acc/lear/ leardoc.html

**LEP:** *The Large Electron Positron Collider at CERN.* www.cern.ch/PSdoc/ acc/lear/ leardoc.html

**LHC:** *The Large Hadron Collider, a new international 14 TeV proton-proton accelerator now being built at CERN, to begin operating sometime after 2005.* lhc-new-homepage.web.cern.ch/lhc-new-homepage/

**LIL:** *The Linear Injector for LEP at CERN.* psdoc.web.cern.ch/PSdoc/ acc/lpi/lpidoc. html

**NLC:** *Next Linear Collider, now under study. A possible future electron-positron accelerator, proposed by SLAC to be built with international participation.* www-project.slac.stanford.edu/ nlc/home.html

**NLCTA:** *The Next Linear Collider Test Accelerator at SLAC.* www-project.slac.stanford.edu/lc/local/ Projects/NLCTA/nlcta.htm

**PEP:** *SLAC's Positron Electron Project, now the site of the B Factory.* www.slac.stanford.edu/accel/pepii/ home.html

**PEP-II:** *The official name for the SLAC B Factory.* www.slac.stanford.edu/ accel/pepii/ home.html

**PS:** *CERN's Proton Synchrotron.* psdoc.web.cern.ch/PSdoc/acc/ps/psdoc. html

**RHIC:** *Brookhaven's Relativistic Heavy Ion Collider began operation in 2000. RHIC collides beams of gold ions to study what the universe looked like in the first few moments after its creation.* www.bnl.gov/RHIC/

**SLC:** *SLAC Linear electron-positron Collider.* www.slac.stanford.edu/welcome/slc.html

**SPEAR3:** *Proposed upgrade for the Stanford Positron Electron Accelerating Ring, completed in 1965. Now being used as a synchrotron light source for SSRL.* www-ssrl.slac.stanford.edu/spear3/ SPEAR3_main_page.html

**SPS:** *CERN's Super Proton Synchrotron.* sl-div.web.cern.ch/sl-div/

**TESLA:** *TeV-Energy Superconducting Linear Accelerator, a possible future linear collider, proposed by DESY to be built with international participation.* tesla.desy.de/

**Tevatron:** *Fermilab's 2-TeV proton-antiproton accelerator, the world's highest-energy accelerator.* adcon.fnal.gov/userb/www/tevatron/

**TTF:** *TESLA Test Facility at DESY.* tesla.desy.de/

**VLHC:** *Very Large Hadron Collider, possible new accelerator now under study as an international follow-on to the LHC.* www.vlhc.org/

## DETECTORS AND EXPERIMENTS

**ALEPH:** *Apparatus for LEP PHysics, a detector at CERN.* alephwww.cern.ch/

**ALICE:** *A Large Ion Collider Experiment, destined for the LHC at CERN.* www.cern.ch/ALICE/

**AMS:** *Alpha Magnetic Spectrometer. A detector on the international space station to search for dark matter and antimatter. Scheduled to launch in 2003.* ams.cern.ch/

**ANTARES:** *Astronomy with a Neutrino Telescope and Abyss environmental RESearch.* antares.in2p3.fr/

**APEX:** *AntiProton Experiment. Fermilab experiment to search for antiproton decay.* www-apex.fnal.gov/

**ATLAS:** *A Toroidal LHC ApparatuS. Detector for the LHC under construction at CERN. U.S. HEP community plays a major role.* atlasinfo.cern.ch/Atlas/Welcome.html

**BaBar:** *B-Bbar (anti-B) detector at SLAC's B Factory. Named for the elephant in Laurent DeBrunhoff's children's books.* www.slac.stanford.edu/welcome/babar.html

**BELLE:** *B detector at KEK in Japan.* belle.kek.jp/

**BOREXINO:** *(sometimes Borex): An underground solar neutrino experiment at Gran Sasso in Italy.* almime.mi.infn.it/

**BTeV:** *Proposed dedicated B physics experiment at Fermilab's Tevatron.* www-btev.fnal.gov/btev.html

**CAT:** *Cherenkov Array at Themis, an imaging telescope in France to detect very high-energy gamma rays.* lpnp90.in2p3.fr/~cat/index.html

**CDF:** *Collider Detector at Fermilab, studies proton-antiproton collisions at the Tevatron.* www-cdf.fnal.gov/

**CDMS:** *Cryogenic Dark Matter Search. A Fermilab/university experiment to search for the interaction of dark matter particles with the nuclei of silicon and germanium detectors, now at Stanford. Will place a detector in Soudan Mine, Minnesota.* ppd.fnal.gov/experiments/cdms/

**CHAOS:** *Canadian High Acceptance Orbit Spectrometer.* chaos.triumf.ca/

**CHOOZ:** *An international long-baseline reactor neutrino experiment located at the CHOOZ A nuclear power station, les Ardennes, France.* duphy4.physics.drexel.edu/chooz _pub/

**CHORUS:** *CERN Hybrid Oscillation Research apparatUS.* choruswww.cern.ch/welcome.html

**CKM:** *Charged Kaons at the Main Injector, a proposed Fermilab experiment to measure charged kaon decay.* www.fnal.gov/projects/ckm/Welcome.html

**CLEO:** *Not an acronym. Goes with CESR. Get it? Upgrade of detector at Cornell's CESR accelerator.* w4.lns.cornell.edu/public/CLEO/

**CMS:** *Compact Muon Solenoid. Detector now being built for CERN's LHC by international collaboration including many U.S. physicists.* cmsdoc.cern.ch/ cms/outreach/ html/index.shtml

**CNGS:** *CERN Neutrinos to Gran Sasso, a long-baseline neutrino oscillation experiment.* proj-cngs.web.cern.ch/proj-cngs/

**COBE:** *COsmic Background Explorer, a satellite launched by NASA in 1989 to search for evidence of the Big Bang. Currently in data analysis.* aether.lbl.gov/www/projects/cobe/

**COSMOS:** *Cosmologically Significant Mass Oscillation Search at Fermilab to detect muon neutrino to tau neutrino oscillations.* pooh.physics.lsa.umich.edu/e803/ e803.html

**CRESST:** *Cryogenic Rare Event Search with Superconducting Thermometers. An experiment in the Gran Sasso Underground Laboratory to search for Weakly Interacting Massive Particle (yes, WIMP) dark matter using cryogenic detectors.* avmp01.mppmu.mpg.de/cresst/

**DAMA:** *Particle DArk MAtter search with highly radiopure scintillators at Gran Sasso, searching for WIMPs.* www.lngs.infin.it/lngs/ htexts/dama/ welcome.html

**DELPHI:** *Detector with Lepton Photon and Hadron Identification at CERN's LEP accelerator.* www.cern.ch/Delphi/Welcome .html

**DONUT:** *Direct Observation of the Nu Tau. A Fermilab fixed-target experiment to detect direct interactions of the tau neutrino.* www-donut.fnal.gov/

**DZero:** *(named for location on the Tevatron Ring) Collider detector studies proton-antiproton collisions at Fermilab's Tevatron.* www-d0.fnal.gov/

**EXO:** *Enriched Xenon Observatory, searching for neutrinoless double beta-decay at WIPP.* www.wipp.carlsbad.nm.us/science/ DBDecay/DBDecay.htm

**FOCUS:** *FOtoproduction of Charm: Upgraded Spectrometer. A Fermilab fixed target experiment to study charm physics.* www-focus.fnal.gov/

**GALLEX:** *The Gallium EXperiment at Gran Sasso, which has now been replaced by GNO.*

**GNO:** *Gallium Neutrino Observatory, the successor to GALLEX.* www.lngs.infn .it/site/exppro/gno/ Gno_home.htm

**H1:** *Collider experiment at DESY.* www-h1.desy.de/

**HDMS:** *Heidelberg Dark Matter Search. Double beta decay and dark matter searches taking place at the University of Heidelberg in Germany.* www.mpi-hd.mpg.de/non_acc/dm .html

**HERA-B:** *Fixed-target experiment at DESY, to investigate CP violation in the B meson.* www-hera-b.desy.de/

**HERMES:** *DESY fixed-target experiment to explore spin.* hermes.desy.de/

**Hi Res Fly's Eye:** *High-energy cosmic ray experiment in Dugway, Utah.* nevis1.nevis.columbia.edu/~hires/hires .html

**HOMESTAKE:** *A solar neutrino experiment in the Homestake Gold Mine in South Dakota.* durpdg.dur.ac.uk/scripts/ explist2.csh/1289/

**HYPER-CP (e871):** *A search for direct CP Violation in Hyperon decays. Fermilab fixed-target experiment.* ppd.fnal.gov/experiments/ e871/welcome.html

**ICARUS:** *Imaging Cosmic and Rare Underground Signal. Neutrino experiment proposed at CERN/Gran Sasso.* www.lngs .infn.it/site/exppro/icarus/icarus.html

**ISOLDE:** *Isotype On-Line separator at CERN.* www.cern.ch/ISOLDE/

**K2K:** *KEK to Kamioka. Long-baseline neutrino experiment using a beam from KEK accelerator to Super-Kamiokande detector in Japan.* neutrino.kek.jp/

**KAMIOKANDE:** *A solar neutrino experiment at the Kamioka Observatory in Japan.* www-sk.icrr.u-tokyo.ac.jp/doc/kam/ index.html

**KAMLAND:** *KAmioka Liquid Scintillator Anti-Neutrino Detector, under construction in Japan.* www.awa.tohoku.ac.jp/html/ KamLAND/

**KARMEN:** *Karlsruhe-Rutherford Medium-Energy Neutrino Experiment. A neutrino interaction experiment using a detector at the ISIS spallation neutron source at Rutherford-Appleton Laboratory in England.* www-ik1.fzk.de/www/karmen/karmen_e.html

**KATRIN:** *KArlsruhe TRItium Neutrino experiment at FZK to measure neutrino mass.* ik1au1.fzk.de/~katrin/

**KLOE:** *A Klong experiment studying CP violation at LNF.* www.lnf.infn.it/kloe/

**KOPIO:** *A Klong decay experiment at Brookhaven.* www.bnl.gov/rsvp/KOPIO.htm

**KTeV:** *Kaons at the Tevatron, a Fermilab fixed-target experiment to study CP violation in kaon decay.* kpasa.fnal.gov:8080/public/ktev.html

**L3:** *Detector named for its location on CERN's LEP accelerator.* l3www.cern.ch/

**LHCb:** *Large Hadron Collider B Experiment, being built at the LHC at CERN.* lhcb-public.web.cern.ch/lhcb-public/

**LSND:** *Liquid Scintillator Neutrino Detector. Neutrino oscillation experiment at Los Alamos.* (no website)

**LVD:** *Gran Sasso's Large Volume Detector, looking for neutrino bursts from stellar collapses.* www.lngs.infn.it/site/exppro/lvd/lvd.html

**Majorana:** *Not an acronym. A double beta decay experiment taking place at the DOE's Pacific Northwest Laboratory.* majorana.pnl.gov/

**MECO:** *Muon to Electron COnversion, an RSVP experiment at Brookhaven's AGS.* www.bnl.gov/rsvp/MECO.htm

**MiniBooNE:** *Booster Neutrino Experiment, petite size. Planned experiment to study neutrino oscillations using Fermilab's Booster accelerator.* www-boone.fnal.gov/

**MINIMAX / T-864:** *A search for disoriented chiral condensates at Fermilab.* www-minimax.fnal.gov/

**MINOS:** *Main Injector Neutrino Oscillation Search. An experiment to study neutrino oscillations using the NuMI beam from Fermilab's Main Injector accelerator.* www-numi.fnal.gov/

**MIPP:** *Main Injector Particle Production, a proposed experiment at Fermilab.* ppd.fnal.gov/experiments/e907/e907.htm

**MONOLITH:** *Massive Observatory for Neutrino Oscillations or LImits on THeir existence. Atmospheric neutrino detector at Gran Sasso.* www.to.infn.it/monolith/

**MPS:** *The Microdrop Particle Search at SLAC, searching for extremely massive charged particles.* www.slac.stanford.edu/exp/mps/FCS/FCS.html

**MUCOOL:** *MUon COOLing experiment, which hopes to develop a muon ionization cooling channel for a high-luminosity muon chamber.*

**NOE:** *Neutrino Oscillation Experiment, at Gran Sasso.* www1.na.infn.it/wsubnucl/accel/noe/noe.html

**NOMAD:** *Neutrino Oscillation MAgnetic Detector, at CERN.* nomadinfo.cern.ch/

**NuMI:** *Neutrinos at the Main Injector, a project to send a beam of high-energy neutrinos from Fermilab to a detector in northern Minnesota, beginning in 2005.* www-numi-fnal.gov/

**NuSEA:** *Nucleonic Sea, Los Alamos-led collaboration at Fermilab to measure the proton's excess of anti-down quarks relative to anti-up quarks.* p25ext.lanl.gov/e866/e866.html

**NuTeV:** *Neutrinos at the Tevatron, a Fermilab fixed-target experiment using a neutrino beam for precision measurement of the mass of the W boson.* www-e815.fnal.gov/NuTeV.html

**OMNIS:** *Observatory for Multiflavor Neutrinos from Supernovae, an underground experiment at WIPP.* hwww.physics.ohio-state.edu/OMNIS/

**OPERA:** *Oscillation Project with Emulsion-tRacking Apparatus, the neutrino detector at Gran Sasso for the long-baseline experiment CNGS.* operaweb.web.cern.ch/operaweb/index.shtml

**ORLaND:** *Oak Ridge Large Neutrino Detector, searching for neutrino oscillations at Oak Ridge.* www.phys.subr.edu/orland/

**PHENIX:** *Pioneering High-Energy Nuclear Interaction eXperiment, at Brookhaven.* www.phenix.bnl.gov/

**PHOBOS:** *Not an acronym. Phobos is a moon of Mars, which was the name of the original proposed detector. Studies heavy-ion collisions at Brookhaven.* www.phobos.bnl.gov/

**Pierre Auger Project:** *(No acronym, sometimes just "Auger") International experiment to track down the origin of ultra-high-energy cosmic rays.* www-td-auger.fnal.gov/projects/auger.html

**pp2pp:** *proton-proton to proton-proton elastic scattering experiment at Brookhaven.* www.rhic.bnl.gov/pp2pp/

**SDSS:** *Sloan Digital Sky Survey. Astrophysics project to create largest-ever three-dimensional map of the sky.* www.sdss.org/

**SELEX:** *SEgmented Large X baryon spectrometer EXperiment. A fixed target experiment at Fermilab to study charm baryons.* fn781a.fnal.gov/

**SLD:** *SLAC Large Detector, optimized for physics at the SLC interaction point.* www-sld.slac.stanford.edu/sldwww/sld.html

**SNO:** *Sudbury Neutrino Observatory. A solar-neutrino detector near Sudbury, Ontario, Canada.* www.sno.phy.queensu.ca/

**SOUDAN II:** *Detector in an underground laboratory in the Tower-Soudan Iron Mine in Soudan, Minnesota, to search for nucleon decay and study atmospheric neutrino physics.* hepunx.rl.ac.uk/soundan2/

**STAR:** *Solenoidal Tracker At RHIC, looking for quark-gluon plasma at Brookhaven.* www.bnl.gov/RHIC/STAR.htm

**Super-K:** *Super-Kamiokande experiment to detect neutrino oscillations from atmospheric neutrino flux, in Japan.* www-sk.icrr.u-tokyo.ac.jp/doc/sk/

**TAPS:** *Two-Arm Photon Spectrometer, German experiment to measure hard photons and neutral mesons.* www.physik.uni-giessen.de/taps/index.htm

**UNO:** *Underground Nucleon decay and neutrino Observatory, located at WIPP.* superk.physics.sunysb.edu/nngroup/uno/main.html

**ZEUS:** *(Not an acronym, but goes with HERA) Collider experiment at DESY's HERA.* www-zeus.desy.de/

## ETC.

**AIP:** *American Institute of Physics. Publishes Physics Today.* www.aip.org/

**APS:** *American Physical Society. Publishes physics journals, organizes meetings and conferences, communicates to policymakers and the public.* www.aps.org/

**DOE:** *The U.S. Department of Energy. Funds the lion's share of U.S. HEP.* www.energy.gov/

**ER:** *DOE's Office of Energy Research. Funds basic science research, including HEP.* www.er.doe.gov/

**HENP:** *DOE's Office of High Energy and Nuclear Physics; part of ER.* www.er.doe.gov/production/ henp/henp.html

**HEPAP:** *High Energy Physics Advisory Panel. Advisory to DOE and NSF.* www.hep.net/doe-hep/hepap_general.html

**HEPIC:** *High Energy Physics Information Center, a clearinghouse of HEP info.* www.hep.net/

**NSF:** *National Science Foundation. Funds university physics research, physics experiments and projects, and the HEP lab at Cornell University.* www.nsf.gov/

**OSTP:** *Office of Science and Technology Policy. Advises the President.* www.ostp.gov/

**PRL:** *Physical Review Letters, the main journal of the APS.* prl.aps.org/

**SPIRES:** *Stanford Public Information REtreival System. Online gold mine of physics information.* www.slac.stanford.edu/find/spires.html

**URA:** *Universities Research Association. Contracts with DOE to run Fermilab.* www.ura-hq.org/

***An expanded version is available online:***
**www.fnal.gov/pub/inquiring/more/acronyms.html**

# Computing by the TRUCKLOAD

Lab's largest-ever single purchase of computers boosts physics analysis and challenges infrastructure

by Mike Perricone

Just for a moment, put aside the technical questions of how the recent $800,000 purchase of more than 400 PCs will be used to advance scientific research at Fermilab's DZero experiment during the quest for new physics at Collider Run II of the Tevatron.

Focus on the logistical issues involved in this largest single purchase of computers (by number of units) in lab history:

What do you do when 400 computers show up on a truck? How and where do you make room for them, even without monitors and keyboards? What do you do with more than 400 boxes, and with all the styrofoam and the little plastic bags inside? Where do you keep all these packing materials in case you have to send stuff back during the 30-day trial period?

And after you have them unpacked, where do you plug in all these computers? Do you even have 400 electrical outlets? Do you start them all up at once? Will that implode all your circuit breakers? And those 400 little fans blowing out heat from the backs of the CPU cases—will they turn your air-conditioned data center into a sauna?

When some of the 400 inevitably fuss, who fixes them? Who backs up the files?

"Building a data center today is a formidable challenge," said Gerry Bellendir of Fermilab's Computing Division, who has helped coordinate the process of

**ON THE WEB:**

**The Uptime Institute**
www.upsite.com/TUIpages/tuihome.html

**Fermilab Computing Division**
www.fnal.gov/cd/

getting the computers into the lab and getting them installed. The final count was 434 computers: 400 at the Feynman Computing Center and another 34 for the online system at DZero.

“People thought data centers would go away when desktops were introduced,” said Bellendir, whose lab service dates back to 1969. “But people want to use computers like a radio or telephone. They don’t want to install new systems, update software, back up files. And the enormous amounts of data from the experiments must be maintained in an air-conditioned environment, with fire protection systems.”

First comes the investment of effort involved in the ordering, receiving, checking, and moving the shipment to the Feynman Center.

Bellendir emphasized the pivotal contributions of Fermilab’s shipping, receiving, warehousing and property departments. All the receiving, unpacking, checking, tagging and repacking was done at Site 38, the lab’s shipping and receiving center. In addition, all the empty boxes (and styrofoam, and cardboard inserts and little plastic bags) were stored for the 30-day trial of “burn-in” period. Combustible materials are not permitted in the computing rooms at Feynman.

The computers—Atipa Technologies Athlon 1.67 GHz dual CPUs—will process the data and prepare experimental results for analysis by DZero collaborators. The collection of machines will be used to run many parallel jobs. The 400 dual CPUs at the Feynman Center produce close to the effect of 800 computers in 400 housings. At Feynman, they are being stacked in 25 racks, each holding 16 units in six square feet of floor space, with 240 on the second floor and 160 on the first floor. More comparatively large-scale purchases are coming: 240 for the CDF collaboration, and 72 for the Tier I computing center of U.S/CMS, located at Fermilab. The Compact Muon Solenoid detector (CMS) will operate with the Large Hadron Collider at CERN in Geneva, Switzerland.

Cables and cooling ducts were installed before the computers arrived. Bellendir said that while miniaturization puts more computing power into a smaller footprint, there is a cost. These installations, for example, will boost power and cooling requirements by 50 percent at the Computing Center.

“It’s one of the main problems facing data centers today,” Bellendir said.

The increased need for computing power reflects the geometric expansion of data in high-energy physics experiments, with DZero entering the physics analysis phase full force for Run II—the impetus for this purchase. Wyatt Merritt, head of DZero Computing and Analysis in the Computing Division, has seen computing become an increasing share of experiment hardware, with continual additions and upgrades beginning in the earliest stages of commissioning and testing the detector and its components.

“Then, when we reach the moment of truth where commissioning is complete and everything is running at or above design rates and sizes,” Merritt said, “we put in place the last bit of equipment needed—and then immediately start to replace the first bits we bought, because at least some parts of the computing plant have a useful lifetime of less than five years.”

Now, while at their peak potential, the majority of the computers the 260 computers on the second floor of Feynman) will be used largely to reconstruct the data from particle collisions at the same pace they are witnessed by experimenters. The raw data consists of independent events that are collected and written to large files, with each file then sent to a PC for reconstruction. These reconstructions are used to identify candidates for electrons, photos, jets and muons; to determine their location within the detector and measure their energy and/or momentum. They are also used to find “missing energy,” which indicates the presence of neutrinos in the detector. The 140 computers on the first floor are for user analysis: applying the

Photos by Reidar Hahn

Atipa representatives installed the units in the racks at Feynman Computing Center. Computing administrators booted up the systems, one unit at a time, and began the 30-day “burn-in” with a suite of software tools designed to stress the various hardware components (CPU, memory, disk, network).

# From buying to burn-in

The first step in obtaining 434 PCs is ordering them—after deciding what's needed, that is. Lisa Giacchetti of Computing Division's Operating System Support Department/Scientific Computing Support coordinated the process of compiling a Request for Bid document specifying requirements of the systems (type and speed, memory, quantity and capacity of disk, etc.), rack requirements, network and serial connection wiring requirements and more. The request went out to PC vendors who have passed Fermilab qualifications. Giacchetti also coordinated components needed for installing and running the machines: power, networking, floor space, receiving, tagging, safety. Atipa Technologies won the bid. Once the order was shipped, receiving the large number of PCs meant enlisting the help of receiving, warehouse and property staffers. The entire receiving operation was conducted not at Feynman Computing Center but at Site 38. Each PC was removed from its box, inspected for damage, tagged, loaded 16 to a skid, shrink-wrapped, and held at Site 38 until the Computing Center had room to bring them over. Computing's Equipment Logistics Services group also spent a great deal of time helping at Site 38. The PCs had an acceptance period of 30 days, and all the boxes and packing materials were held at Site 38. Not only was there no room at Feynman, but the computing center will no longer allow boxes or skids, or other combustibles, into the computer room. Once the PCs—not household types, but still valuable commodities—were moved to Feynman, they were secured overnight in locked cages. Atipa representatives installed the units in the racks. Computing administrators booted up the systems, one unit at a time, and began the 30-day "burn-in" with a suite of software tools designed to stress the various hardware components (CPU, memory, disk, network). The computers must meet specifications or units can be returned.

Lisa Giacchetti

Photos by Reidar Hahn

From left: Harold Scheppman of Support Services gets things moving at Site 38. Alex Hernandez of Computing Division's Equipment Support unpacks PCs and inspects them for damage. Dennis McAuliff of Support Services identifies and tags individual PCs. Keith Coiley of Computing Division lends a sense of scale to stacks of repacked and shrink-wrapped PCs.

output of the reconstruction for experimenters (users) to examine and select the data samples they need for their areas of physics analysis. The 34 units at DZero will provide additional computing power for online event selection as the Tevatron luminosity increases during the run.

"We delayed buying machines for as long as possible to get the maximum computing power within our budget," said Amber Boehnlein, co-leader of DZero Software and Computing. "Experimenters need to look at the data quickly, identify and fix any problems in the detectors or the software as quickly as possible, and make sure that our physics goals are met by finishing analyses in a timely manner. The amount of data we write to tape is increasing as the luminosity improves."

To keep the data flowing, the power must keep flowing. The Computing Center recently added a new array of Uninterruptible Power Supplies, and installed a generator capable of supplying the entire building and all its needs in the event of a power outage at the laboratory. The infrastructure improvements were made under the lab's Utilities Incentives Plan, a federal program that allows investments of funds and expertise by utility companies, with savings from the improvements used to pay back the utilities' initial investments.

How to keep the data flowing in the future, throughout Run II, is a question under study. The Computing Division believes it has the resources to ensure smooth running through FY'05, but has commissioned a study to examine alternatives. Beyond that time, Fermilab's Associate Director for Operations Support, Jed Brown, has commissioned a working group of computing and the lab's Facilities Engineering Services Section to formulate a 10-year plan for infrastructure supporting computers.

"We also participate in a consortium called the Uptime Institute, which is dealing with these types of issues," Bellendir said. "We're trying to stay in tune with the industry and where it's going. But we don't know what the technology will be two or three years from now. How do we estimate what's 10 years away? That's the question we're all facing."

## CALENDAR/LABNOTES

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

### NATIVE AMERICAN CULTURE AND HABITATION IN ILLINOIS

**Dr. Michael Wiant, Illinois State Museum**

**Sept. 23 – Sept. 27**

Week-long series of lectures at Waubonsee Community College, with an additional presentation at the Fermilab Colloquium on Wednesday, September 25, 4 p.m. at Wilson Hall.

For 30 years, Dr. Wiant has explored Native American culture and history in Illinois. He directed excavations at the Koster and Napoleon Hollow sites, and is knowledgeable about archaeological studies at Fermilab. His colloquium is titled "Ancient Fermilab: The Mier Collection of Native American Artifacts." For lecture schedule, please see http://chat.wcc.cc.il.us/~jbollie/lectures.html

### OCTOBER 9

### VIRTUAL ASK-A-SCIENTIST

The next chat will take place Wednesday, October 9, 7-9 p.m. Central Time. Don Lincoln, an Associate Scientist for Fermilab's DZero experiment and Jocelyn Monroe, a researcher for Fermilab's MiniBooNE experiment, will respond to questions live on-line. Further information at http://www.fnal.gov/pub/inquiring/virtual/

### This winter, take the TRAIN to work

PACE has introduced the Metra Feeder vanpool program, which provides vans to groups of four to get from a train station to their workplace and back. Taking into account all costs and tax benefits, the commute from Chicago Union Station to Fermilab, for example, would cost approximately $130 a month, including train ticket, van and parking. The cost is less for the driver or backup driver of the van, which remains at the train station overnight.

To voice your interest in this program or any other rideshare options, please post a message on the Car- and Vanpool WebBoard, accessible for Fermilab employees and users at www.fnal.gov/faw/vanpool/.

## FERMILAB ARTS SERIES 2002-2003 SEASON

**Russian State Chorus**
**October 26, 2002**
*Tickets - $20 ($10 ages 18 and under)*

**Battlefield Band**
**November 23, 2002**
*Tickets - $19 ($10 ages 18 and under)*

**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)*

**Gallery Chamber Series**
**Sunday afternoons at 2:30 p.m.**
*Three Concert Series - $36*

**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.**

## MILESTONES

### NUMI APPRECIATION DAY

On August 27, Fermilab held an S.A. Healy Workforce Appreciation Day. More than 200 construction workers attended the two sessions, with short talks by representatives from DOE, Healy and the NuMI project management. Dixon Bogert handed every worker a Fermilab travel mug in commemoration of the two-year construction of tunnels and underground halls for NuMI.

## 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, September 25

*Bean, Cheese and Chorizo Quesadillas*
*Jicama, Pepper and Onion Salad*
*Pineapple Cake*

### Dinner
### Thursday, September 26

*Pasta Carbonara*
*Grilled Spiced Lamb Chops with Saffron Vegetable and Red Pepper Sauce*
*Caesar Salad*
*Pear Hazelnut Tart*

### Lunch
### Wednesday, October 2

*Booked*

### Dinner
### Thursday, October 3

*Lobster Bisque*
*Grilled Duck Breast with Zinfandel and Mushroom Sauce*
*Wild Rice and Barley*
*Crepes with Buttered Rum Apples*


F E R M I NEWS

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**The deadline for the Friday, October 4, issue is Tuesday, September 24, 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.

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SI NON VIS IMPRIMI NOLI PATI FIERI
FERMINEWS MCMLXXVIII


This fall at Fermilab, spend Thursday afternoons with the stars in a new lecture series about astrophysics and how it is revolutionizing our view of the universe. All lectures commence at 3:30 p.m. in the One West Conference Room. Upcoming lectures include:

**September 26: Inflation**

Rocky Kolb, Professor of Astronomy and Astrophysics at University of Chicago and scientist at Fermilab

**October 24: Neutrinos and Cosmology…**

Nicole Bell, Research Associate at University of Chicago and Theoretical Astrophysics Group at Fermilab

**…and Ultra High Energy Neutrinos**

John Learned, Professor of Physics and Astronomy at University of Hawaii-Manoa

For a complete schedule go to: http://www.fnal.gov/pub/events/starrymessages.html .

# CLASSIFIEDS

## FOR SALE

■ '02 Ford Focus, 16K miles, green 4 dr., A/C, AM/FM/CD, auto, cruise, excellent condition $12,500 o.b.o. dkeiner@fnal.gov or x6462.

■ '99 Ford Ranger 4x4, 5 speed manual, 3.0L V6, 75K ext. warranty, Rhino liner, 57K, must sell $8,200, Frank x4389, 630-553-0049, page 630-314-4029.

■ '95 Mazda Protégé DX 4-door, 88K auto., ABS. good condition, 2 new tires. Asking $3,500 o.b.o. manas@fnal.gov, x5224, x6391.

■ '94 Mazda 323, auto., power steering, AC, Pioneer CD/AM/FM stereo radio, new exhaust, brakes, and tires. It's a very reliable car, never had any problems, and it's in overall good condition. Asking $2,500 o.b.o. 630-840-3151 or cardoso@fnal.gov.

■ '93 Mazda Protege (DX 4-door), white, 5 speed manual, AC, AM/FM stereo radio, 104K miles in good condition. $2,900 o.b.o. email agallas@fnal.gov or x3054.

■ '92 Dodge Spirit, 4-dr sedan, auto, 4-cyl 2.3L, dark red, 75K miles, $1,950, Call Alex 630-637-0630.

■ '91 Pontiac 6000 LE 4Dr. Sedan, light blue, 85K miles, V6, auto., tilt PS, PB, AC, cruise, pwr. windows & locks. Must experience to appreciate $2,200. Page Arnold at 630-218-4375 or agermain@fnal.gov.

■ '91 Ford Escort LX 2dr hatchback, strawberry red, 130K miles, auto., tilt PS, PB, AC, sport pkg., driveline & suspension recently overhauled, new radiator, and lots more, complete maintenance history available, must drive to appreciate $1,200. Page Arnold at 630-218-4375 or email agermain@fnal.gov.

■ '90 Nissan Maxima, 4-door, 128K miles, 26 mpg on highway, slight damage near the trunk and the bumper, power everything, cruise, anti-theft, keyboard entry, drives great! Want $2,000. For test drive or more info, call x4051 or email qdu@fnal.gov.

■ '90 Dodge Caravan, one owner, 138K miles, cassette, new tires, burgundy, runs good. $600. Call x5249 or 815-899-7501. Please leave a message. jnelson@fnal.gov.

■ '89 Dodge Grand Caravan LE, 3L V6, 160K miles runs well, rear heat, 7 passenger, $900 o.b.o. Dane at x4730 or dane@fnal.gov.

■ Honda xr100 dirt bike, great shape, mechanically sound, $900. Email mccono@fnal.gov or call Frank at x6823.

■ '94 Fleetwood Prowler travel trailer in immaculate condition. 21′ long, sleeps 4 with fridge, micro, stove, oven, heat, a/c, stereo, shower, power vent, awning, huge clothes closet and storage areas. Only 3,800 lbs., $4,500. Days 630-840-4777, eves 630-552-1827 gardner@fnal.gov

■ Miyata 100 ten-speed man's bicycle; large frame; $100; if interested, contact Cynthia at x4102 or e-mail sazama@fnal.gov.

■ Hand lawn mower (the kind that doesn't have an engine). Craftsman, good condition, $20. Mark, x4776, markl@fnal.gov.

■ 1/2 HP 110v furnace motor. Used one season. $20 ark, x4776, markl@fnal.gov.

■ Need firewood? Yours for the asking - Oak cut to length but not split. Also an early Mac PowerPC 6100 with monitor, software and printer. Today, it makes a good Word Processor but not much else $100. Call Bruce at x6657.

■ Upholstered sofa, 2 upholstered chairs and 1 matching ottoman. Green coordinated color scheme. Good condition. 8 years old: never exposed to pets or smoking. Call Gary at x4754, or email gvanz@fnal.gov. I have photos and fabric samples for viewing. $475 o.b.o. for the group; will consider separating.

■ Capaccio Brothers, solid oak desk with computer return, $450 o.b.o. Features a 68" long desk with a 48″ L-shaped computer return. Has 2 large file drawers, one long shallow drawer and 4 standard drawers. Call to see it or for a picture: Julie 630-833-7208.

■ Lyric Opera tickets (2), Dress Circle, for Die Walkure on Sunday, November 10th, 1:30 pm. Subscription price. Call x3922 days, or 293-9349 evenings.

## HOUSING FOR RENT

■ Charming 3BR duplex located in the Naperville 204 school district. Freshly painted, new carpet, new ceiling fans, refrigerator, stove, dishwasher, washer/dryer. Fenced in backyard with large storage shed. Attached garage with EDO. Low utilities. One-month security deposit. Rent $1,275. Available immediately. Call 630-840-3499

■ 3 Bedroom, 1-1/2 bath, 1 car garage townhouse for rent in Warrenville. $1,100/mo. Available Oct. 1. Call Terry 630-665-3269.

■ For Rent: 1-bedroom apartment in secured building, just 3 miles from Fermilab, completely furnished. Close to 88 tollway and train station. Central air, cable TV, telephone, whirlpool, heat, and electricity included. Available October 10, 2002.Contact by e-mail: irina@fnal.gov, by phone x5074 or 630-466-8457 after 7pm.

■ Do you have an apartment or home in France or Italy that you would be willing to rent by the month in February/March and April? If so please contact treend@fnal.gov, x6633.

## HOUSES FOR SALE

■ Beautiful brick ranch in West Aurora, 3 large bedroom home with 2.5 updated baths, 3 season room, new Pergo flooring in laundry room, country kitchen, see thru fireplace in formal living room and country kitchen, oversized 2 car garage, new roof, windows. Perennial gardens, mature trees. $224,900. treend@fnal.gov. or x6633.

■ Historic home in West Chicago - sun-filled corner lot. 3 bedrooms, 2 baths, formal LR & DR w/FP. 2-car detached garage. Hardwood floors and beautiful wood trim throughout. Many updates: new copper & PVC plumbing, newer furnace, A/C, humidifier, air cleaner, 50 gal. water heater - to name a few. $192,900. If you have questions, or require additional information, please feel free to contact me at 630-876-9840.

■ Desirable Sugar Grove home on quiet cul-de-sac. Kaneland 302 Dist., 4 bdrm, 2.5 bath, formal LR & DR, FR, eat-in kitchen, full basement, 2-story, beautifully landscaped oversized lot (148x93x106x132) with newly installed 27′ pool in 2001. Huge deck and fully-fenced backyard. Many upgrades. For Appt. contact 630-247-7331. $295,000. NO REALTORS PLEASE!

■ 3BR, 1.5 bath Townhome in desirable Warrenville Summerlakes subdivision, a few minutes from Fermilab, a block from clubhouse w/tennis courts, pool, workout room, indoor whirlpool and sauna; beautiful cul-de-sac setting; walk to District 200 school $149,000. Call 630-393-2428 or cell 630-926-8821.

## WANTED: TREE SEEDS

Seeds from mature trees: Burr Oak, White Oak, Red Oak, Shagbark, Hickory, Bitternut Hickory, to be planted by Fermilab's Road and Grounds Department. Seeds should be separated by species, dried and kept cool. Drop off seeds at Roads and Grounds, or call Bob Lootens x3303 for pickup. The donated seeds from previous years are growing beautifully.

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