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Making an Art of Science

Art and science blend elegantly in the work of Fermilab artist Angela Gonzales, leaving a lasting impact on the Laboratory and all who pass through it.

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Artwork by Angela Gonzales

INSIDE

Photos by Reidar Hahn

Artist Angela Gonzales retired on July 31 after 31 years at Fermilab.

High-Energy Artist Says Good-Bye

Angela Gonzales retires after 31 years of creating distinctive designs for Fermilab

by Mike Perricone, Office of Public Affairs

From the day she arrived in 1967, Angela Gonzales added to Fermilab's unique character by taking an abstract view of the concrete.

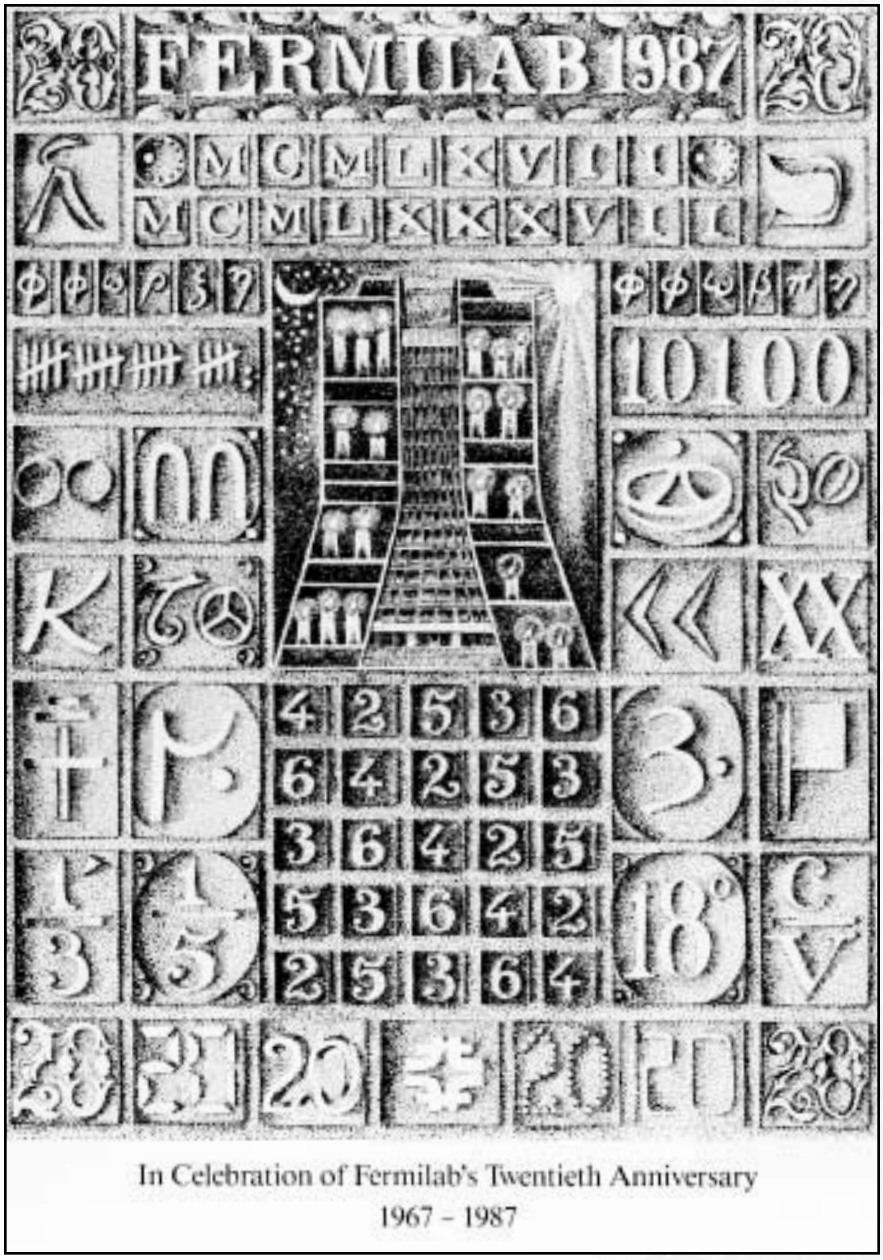
She asked, "Do industrial-style buildings have to be industrial gray in color?" She answered with a palette of blue, orange and yellow (even apple-green, in the early days) that was sure to arouse strong reactions but would never go unnoticed. Included was a row of propane tanks whose colors graduated from orange to yellow.

"They didn't have to be just obvious old gray things," said Nancy Peoples, wife of Fermilab Director John Peoples, who worked closely with Gonzales on art committees at the Lab from 1980 until Gonzales's retirement on July 31.

"Her choice of colors gave the Lab a really unique touch," Peoples continued. "It's such an individual style, and it removes the Lab from having just the usual conglomerate look of mundane plastic or concrete. It gives the Lab a feeling of being in touch with the arts as well as with the sciences."

Both parents were artists, meaning Gonzales was in touch with the arts beginning with her childhood in 1930s Germany. Her father's involvement in modern art, not favored by Hitler, forced the family to move around Europe. Gonzales has remained a committed traveler, visiting her elderly mother annually in Germany, and journeying to wide-flung destinations from Costa Rica to Egypt.

"She once brought me back a bottle of sand from the Sahara Desert," said Hazel Cramer, Gonzales's friend and fellow committee-member though her own 26-year career at the Lab.



Gonzales's cover art for the 1987 Annual Report, celebrating Fermilab's 20th anniversary.

Cramer recalled that Gonzales had worked at Cornell with Robert Wilson, the Lab's first director, and rejoined Wilson at Fermilab to work on the design for the site. She noted that in addition to being an accomplished abstract artist, working in a range of media from paint to ink to pencil, Gonzales was skilled at technical illustration and produced distinctive work for both experimenters and theorists. Her designs include the covers for many of the Lab's annual reports, including the commemoration of the Lab's 20th anniversary in 1987.

"She's also a very clever writer, although English is not her native language," Cramer added. "She's very widely-read, and she has a great deal of knowledge in many fields."

Peoples described Gonzales as having a keen eye for art and design, and holding high standards.

"She does not accept anything that she thinks is substandard," Peoples said.

Gonzales offered a blunt statement of those standards as recently as the holiday season of 1997, when the Wilson Hall atrium was decorated with a series of banners adapted from graphic representations of particle collisions.

Not amused, Gonzales wrote to *FermiNews* and quoted Goethe in giving her judgment: *"Den Geschmack kann man nicht am Mittelgut bilden, sondern nur am Allervozueglichsten,"* which she translated as: "(Good) taste cannot be achieved by learning from the mediocre (I add trash; there is not even much 'mediocre' left to go by) but only from the most excellent."

Cramer, who continues to serve on the Lab's Auditorium Committee after retirement, has known Gonzales since 1968, and remembers Gonzales's daughter as "a four-year-old crawling around on the floor and drawing pictures." But she wryly describes Gonzales as "not a people person."

"Like many artists, she's very involved with what she is doing at the moment," Cramer said. "I met her in 1968. I remember being introduced to her, and I said 'Hello,' and she said 'Hello,' but then she went right on talking (with someone else) as she often does.

"The next day I happened to see her at the Oak Brook shopping center. I said 'Hello' but she didn't say anything. Then she came back five minutes later, tapped me on the shoulder and said, 'I know who you are now. I can say hello.'"

Socializing and friendship were separate categories.

"If she's your friend, she is truly your friend," Cramer said. "She will not tolerate any criticism of a friend, even in a joking way."

After 31 years, Gonzales's work speaks forcefully of her contributions.

"A lot of her work will be around us, but her day-to-day input will be missing," said Peoples. "With her retirement, I think the Lab loses a lot. It's almost like losing some of its original soul." ■

Judging the merits of an art display in Wilson Hall in 1993 are Hanging Committee members (left to right) Mizuho Mishima, Nancy Peoples, Saundra Poces and Angela Gonzales.

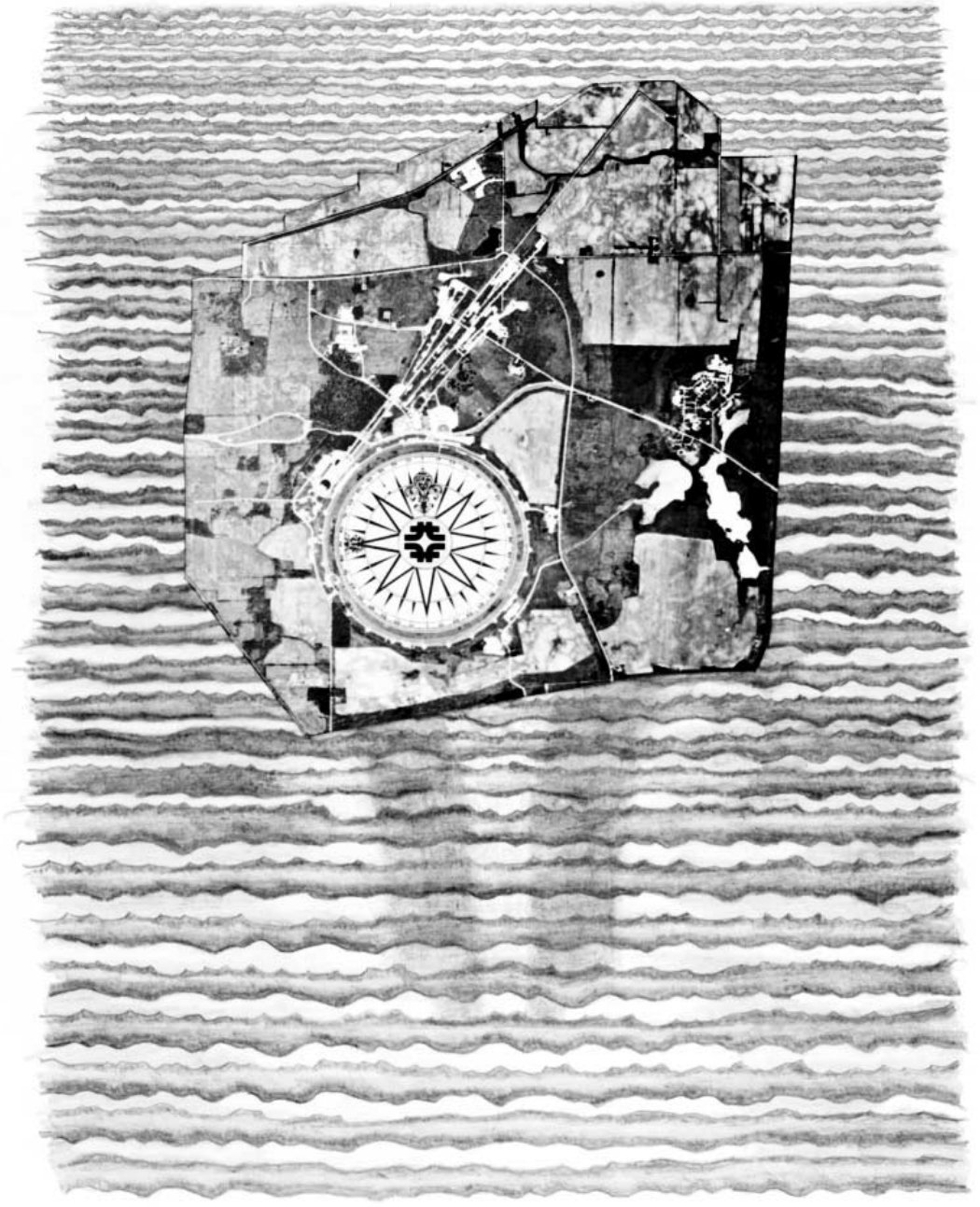


Photo courtesy of University of Rochester

"Fred Lobkowicz took me under his wing in 1965, when I was a fledgling graduate student working with my mentor John Tinlot on a muon storage ring (*plus ça change*...). In the ensuing 30-plus years from then to U.S. CMS today, Fred was a good colleague and a good friend who is most sorely missed."
~ Dan Green,
U.S. CMS Technical Director

Made in the USA

In the City of Big Shoulders, one of the first American-built parts for the CMS experiment is ready for shipment, thanks to Polish laborers and a Czech prince.

by Sharon Butler, Office of Public Affairs

Fred Lobkowicz wasn't doing well last fall. Just walking from his desk to the fax machine was a strain. He had had a massive heart attack in the summer of 1997 and had lost a great deal of weight. His familiar booming voice had thinned.

But Lobkowicz hadn't lost his devotion to physics, nor his intellectual vigor and sardonic sense of humor. Of Czech nobility, Lobkowicz was fluent in English, French, German and Czech; steeped in history, physics, math and philosophy; skilled in mechanical design, cryogenic engineering and electronics. With a Ph.D. from the Eidgenossische Technische Hochschule in Zurich, where Einstein once taught, Lobkowicz had earned international repute for his design and construction of liquid argon electromagnetic calorimeters: complex devices consisting of multiple layers of lead or uranium and copper-clad circuit boards, immersed in hundreds of gallons of liquid argon maintained at very cold temperatures. Such devices have been key components of detectors used at Fermilab—in the discovery of the top quark and in the study of gluons.

When Lobkowicz fell ill, he was working on a project important to the next generation of particle physics: the design of a large device, a motion table, that would help in testing the Compact Muon Solenoid detector for the Large Hadron Collider in CERN, the European Laboratory for Particle Physics. The motion table needed to arrive in CERN by the summer of 1998 to be in time for the next test beam run.

And so, despite deteriorating health, Lobkowicz postponed a medical evaluation for a heart transplant so that he could review detailed drawings for a bid package requesting quotations for the fabrication of the motion table. He signed off on the drawings on January 8, 1998, and a day later, entered the hospital.

On February 3, 1998, Lobkowicz died. He was 65.

Almost two centuries earlier, in 1804, Ludwig van Beethoven had dedicated his third symphony, "Eroica," to one of Lobkowicz's ancestors (presumably after the temperamental, and disappointed, composer tore up his homage to Napoleon).

This year, Lobkowicz's colleagues dedicated the motion table to him.

Testing the detector

The motion table is a crucial piece of heavy equipment for the CMS experiment. It will allow the collaboration to calibrate and test the performance of their detector.

The size of a five-story building, the CMS detector includes numerous specialized components. Nearest the beam are tracking devices so sensitive that they can measure the trajectory of a single particle to better than a thousandth of an inch. In layers surrounding these devices are, in order, the electromagnetic calorimeter, the hadronic calorimeter, a superconducting solenoid, steel, and muon chambers—components designed to measure the energies and identities of the particles emerging from the collision of protons inside.

But will all these components perform the way they are supposed to? To ensure that they will, a section of the detector will be tested with a beam extracted from CERN's SPS accelerator. The problem is: the beam follows a strait and narrow path; in collisions, particles fly off in every direction.

George Ginther has been finetuning the controls for the motion table, currently residing on the factory floor of Industrial Maintenance in South Chicago.

Photo by Reidar Hahn

That's where the motion table comes in, a 40-ton platform capable of holding a 40-degree wedge of the detector, from the tracking devices out to the first of the muon chambers. The motion table allows the detector to be moved around the beam, as if particles from collisions were hitting the detector from multiple angles. With an entire wedge of the detector, not just individual components, "transition regions" in between can be tested. That's where the performance of the detector inevitably changes; knowing just how it changes is important, because experimenters need to develop statistical methods to compensate.

Set on Hilman rollers and riding on curved tracks, the motion table can move horizontally, sweeping a 90-degree arc around the beam.

The table platform can also move vertically, with the help of spherical bearings on one side of the table and two jackscrews on the other. As the table lifts, it exposes different levels of the detector to the stream of particles.

A point of honor

It was a "point of honor" with the University of Rochester group, says Paul Slattery, who, with Arie Bodek, heads the Rochester CMS group: "We could have shipped the motion table in time for the test beam this year; we were ready." He adds, "The fact that we can make that statement is primarily a tribute to George Ginther," the University of Rochester senior research associate who stepped in to finish the motion table after Lobkowicz's health failed.

But the detector components for testing were held up. The Spanish company manufacturing them was buying raw materials from Bulgaria, and no one could figure out on time how to overcome arcane international banking rules. With no urgent reason to ship the motion table to CERN, Ginther decided to take advantage of the delay to test the device and finetune its controls more thoroughly.

For now, the dull-red (soon to be yellow) motion table occupies a grimy factory floor on the premises of Industrial Maintenance, the company that manufactured the device. The factory is located in a nondescript brick building in South Chicago, boxed between scrap-metal dealers and junkyards where Chicago's infamous packinghouses once stood. For the Polish nationals who work there, the device may look like another piece of the heavy industrial machinery they typically work on—the submarine-size blast furnaces and the hot-metal transfer cars. But this one has a little plaque affixed to its control box. The fine lettering reads simply, "Test beam motion table, designed for the CMS experiment by Frederick Lobkowicz (1932-1998)…."

The control panel for the motion table, with a plaque honoring the device's designer, Fred Lobkowicz .

Across an ocean

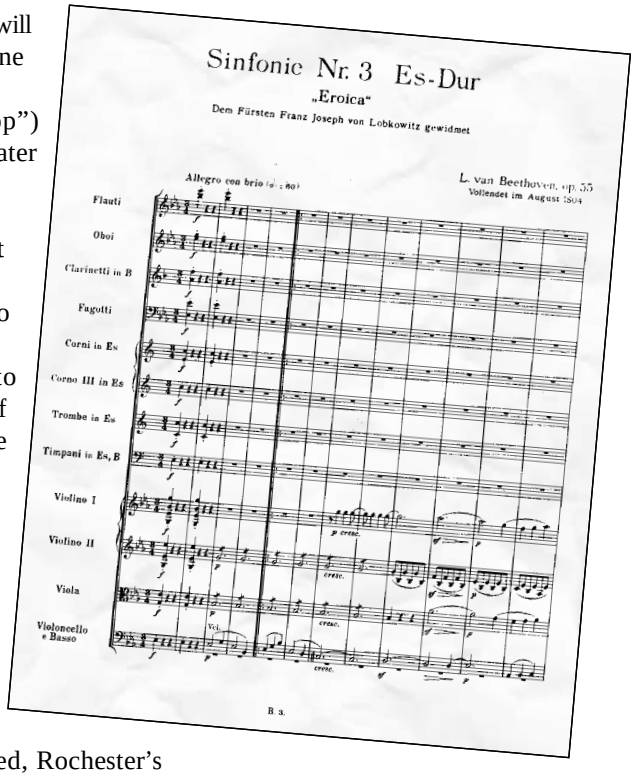
Within the next few weeks, the motion table will be broken down, its mostly-steel parts unbolted, packed into overseas shipping containers, and blocked and braced with two-by-fours. The holes where the bolts screw in will be lathered with Cosmoline (a kind of oil or paste Ginther describes as "goop") to prevent the salty sea water from rusting the threads. The control box will be vacuum packed to protect its electronic relays.

Ginther anticipates no mishaps on the voyage to Europe. Robust enough to support up to 150 tons of detector, the motion table can presumably weather the Atlantic Ocean.

Its arrival at CERN a month later, well in advance of the next test beam run, will be a tribute to Ginther, and to Lobkowicz.

"Beyond a doubt," says Slattery, "without Fred, Rochester's involvement in liquid argon calorimetry, or even such projects as the motion table, would never have occurred." The Rochester group relied on his conceptual designs—"he was an exceptionally imaginative man."

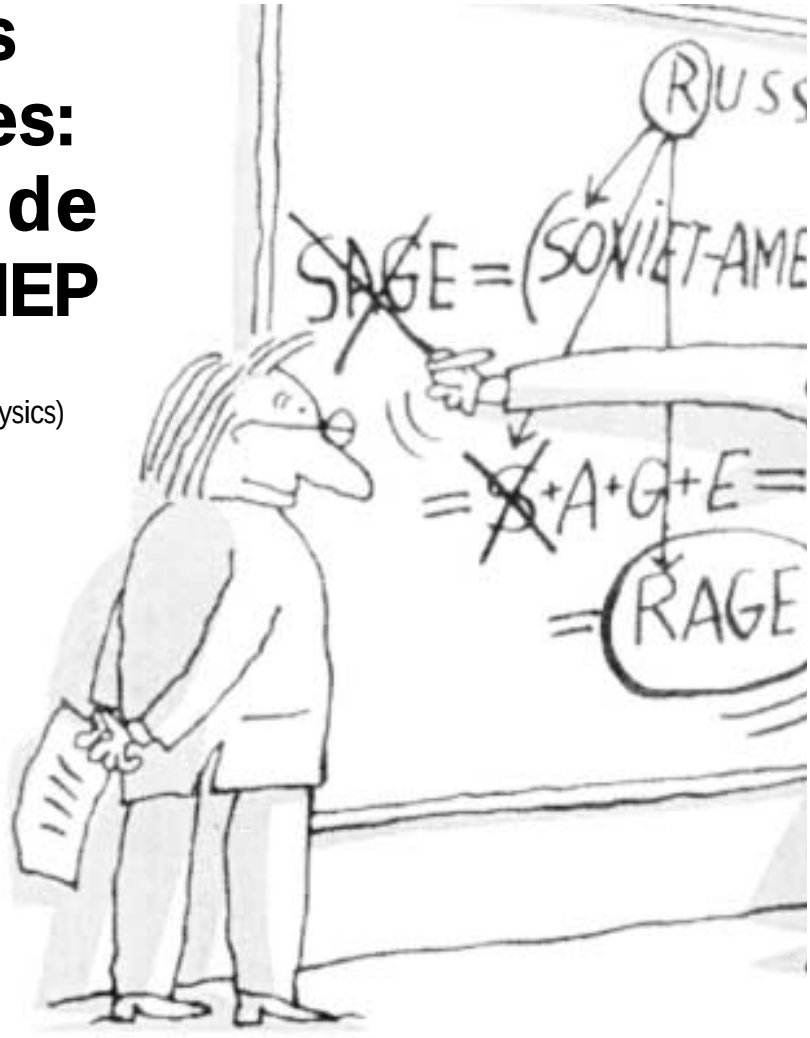
"Without Fred," Slattery believes, "it will have to be a very different kind of future at Rochester." ■


Sinfonie Nr. 3 Es-Dur
„Eroica"
Dem Fürsten Franz Joseph von Lobkowitz gewidmet
L. van Beethoven, op. 55
Vollendet im August 1804
Flauti
Oboi
Clarinetti in B
Fagotti
Corni in Es
Corno III in Es
Trombe in Es
Timpani in Es, B
Violino I
Violino II
Viola
Violoncello e Basso

In 1804, Ludwig van Beethoven dedicated his Eroica Symphony to Prince Franz Joseph von Lobkovitz, an ancestor of Fred Lobkowicz .

Belles Lettres: A Guide to AHEP

(Acronyms of High-Energy Physics)



by Judy Jackson, Office of Public Affairs

The language of physics—with the likes o
off physicists' tongues—is bad enough, lamen
writer Malcolm Browne. But throw in the acr
and accelerators and the jargon becomes hope
other physicists.

True, HEP (that would be "high-energy
particles fly off from a CDF ("Collider Detect
to laboratories, accelerators, experiments and
Note: Although we strove for completeness, w
experiment, write to *FermiNews*; we'll publish

Laboratories

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

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

DESY: Deutches Elektronen SYnchrotron laboratory in Hamburg, Germany. http://www.desy.de/

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

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

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

SLAC: The Department of Energy's Stanford Linear Accelerator Center in Palo Alto, California. http://heplibw3.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 Canada. http://www.triumf.ca/welcome/

Accelerators:

AD: Antimatter Decelerator. New facility at CERN to study antimatter. http://www.cern.ch/PSdoc/acc/ad/index.html

AGS: The Alternating Gradient Synchrotron at Brookhaven. http://www.rhichome.bnl.gov/AGS/

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

CLIC: CERN's proposed Compact LInear Collider. http://www.cern.ch/CERN/Divisions/PS/CLIC/Welcome.html

CESR: The Cornell Electron Storage Ring. A high-luminosity electron-positron collider at the Wilson Synchrotron Laboratory, Cornell University. http://www.lns.cornell.edu/public/lab-info/cesr.html

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

EPA: CERN's Electron Positron Accumulator. http://www.cern.ch/PSdoc/acc/lpi/lpidoc.html

FMI: The Fermilab Main Injector, due to begin operating in 1999 as an injector to the Tevatron. http://www-fermi3.fnal.gov/injector.html

HERA: Hadron-Electron Ring Accelerator at DESY. http://www.desy.de/pr-info/desy-fokus_e.html#Beschleuniger

ILC: International Linear Collider, now under study. A possible future electron-positron accelerator, proposed to be built with international participation. (If the Japanese should build it by themselves, it would be the JLC, or Japanese Linear Collider. If the Americans go it alone — the NLC, or Next Linear Collider.) http://www-project.slac.stanford.edu/lc/nlc.html

KEK B-Factory: An electron-positron collider to study CP violation in the B meson, at KEK. http://ccwww.kek.jp/kek/shomu/kekb-e.html

LEAR: Low Energy Antiproton Ring at CERN (closed for physics in 1996). http://www.cern.ch/PSdoc/acc/lear/leardoc.html

LEIR: Low Energy Ion Ring. (LEAR is now being converted into LEIR, a machine to store ions for the LHC at CERN.) http://www.cern.ch/PSdoc/acc/lear/leardoc.html

LEP: The Large Electron Positron Collider at CERN. http://www.cern.ch/CERN/Divisions/SL/lep2page.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. http://wwwlhc01.cern.ch/

LIL: The Linear Injector for LEP at CERN. http://www.cern.ch/PSdoc/acc/lpi/lpidoc.html

Muon Collider: No acronym. Possible future accelerator, now under study in the US. http://www.fnal.gov/projects/muon_collider/

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

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

PS: CERN's Proton Synchrotron. http://www.cern.ch/PSdoc/acc/pscomplex.html

SBLC: S-Band Linear Collider. Possible future linear collider, under study at DESY. http://www.desy.de/~mpywar/beamdyn.html

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

SPEAR: The Stanford Positron Electron Accelerating Ring, completed in 1965. Now being used as a synchrotron light source for SSRL. http://www.slac.stanford.edu/welcome/spear.html

SPS: CERN's Super Proton Synchrotron. http://www.cern.ch/CERN/Divisions/SL/spspage.html

TESLA: TeV-Energy Superconducting Linear Accelerator, a possible future linear collider, now under study at DESY. http://www.desy.de/~mpywar/beamdyn.html

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

VLHC: Very Large Hadron Collider, possible new accelerator now under study as an international follow-on to the LHC. http://www-ap.fnal.gov/VLHC/

Detectors and Experiments

ALEPH: Apparatus for LEP PHysics, at CERN. http://alephwww.cern.ch/WWW/

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

AMANDA: Antarctic Muon and Neutrino Detector Array. International collaboration proposing to detect high-energy cosmic neutrinos at the South Pole. http://amanda.berkeley.edu/

AMS: Alpha Magnetic Spectrometer. A detector in space to search for antimatter. http://mitlns.mit.edu/~elsye/pressrelease-ams.html

APEX: AntiProton Experiment. Fermilab experiment to search for antiproton decay. http://fnapx1.fnal.gov/

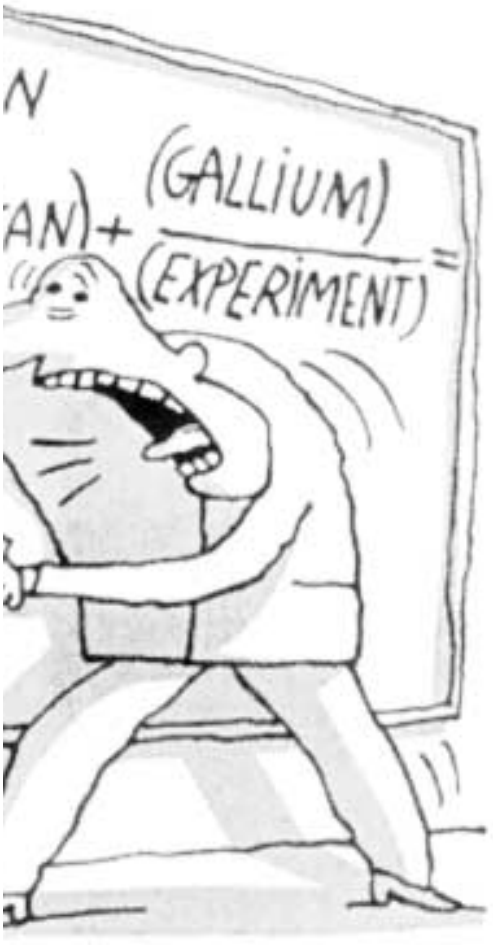
ATLAS: A Toroidal LHC ApparatuS. Detector now being built by an international collaboration for operation at the LHC at CERN. U.S. HEP community plays a major role. http://atlasinfo.cern.ch:80/Atlas/Welcome.html

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

BELLE: B detector at KEK in Japan. http://bsunsrv1.kek.jp/

BOREX: (or Borexino) An underground solar neutrino experiment at Gran Sasso in Italy. http://almime.mi.infn.it/

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



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:s") spawns acronyms faster than
Fermilab") collision. Herewith, a guide
exotica of international particle physics.
bably failed. If we forgot your
:P Part Deux.

CDF: Collider Detector at Fermilab, studies proton-antiproton collisions at the Tevatron. http://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.http://fnphyx-www.fnal.gov/experiments/cdms/homepage.html

CHAOS: Canadian High Acceptance Orbit Spectrometer. http://www.triumf.ca/chaos/chaos.html

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

CHORUS: CERN Hybrid Oscillation Research Apparatus. http://choruswww.cern.ch/welcome.html

CLEO: Not an acronym. Goes with CESR. Get it? Detector at Cornell's CESR accelerator. http://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. http://cmsinfo.cern.ch/Welcome.html

COMPASS: CERN's Common Muon and Proton Apparatus for Structure and Spectroscopy. http://wwwcompass.cern.ch/

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

DELPHI: Detector with Lepton Photon and Hadron Identification at CERN's LEP accelerator. http://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. http://fn872.fnal.gov/

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

E787: Brookhaven experiment at the AGS to study rare kaon decays. http://www.phy.bnl.gov/e787/e787.html

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

GALLEX: The Gallium EXperiment at Gran Sasso. An international collaboration uses a gallium detector at Gran Sasso, Italy to measure the solar neutrino flux produced inside the sun by proton-proton fusion. http://kosmopc.mpi-hd.mpg.de/gallex/gallex.htm

GLAST: Gamma-ray Large Area Space Telescope. A proposed orbiting telescope for high-energy gamma rays. http://www-glast.stanford.edu/

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

HEAT: High- Energy Antimatter Telescope. A NASA-supported program of high-altitude balloon-borne experiments to study antimatter in the primary cosmic radiation. http://pooh.physics.lsa.umich.edu /www/heat/heat_full.html

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

HERMES: DESY fixed-target experiment to explore spin. http://dxhra1.desy.de/

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

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

HYPER-CP: A Search for Direct CP Violation in Hyperon decays. Fermilab fixed-target experiment. http://beauty1.lbl.gov/~e871www/index.html]

ICARUS: Imaging Cosmic and Rare Underground Signal. Neutrino experiment proposed at CERN/Gran Sasso. http://www.aquila.infn.it/icarus/

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

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

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

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. http://www-ik1.fzk.de/www/karmen/karmen_e.html

KLOE: K LOng Experiment, to study CP violation at LNF's DAFNE. http://www.desy.de/

KTeV: Kaons at the Tevatron, a Fermilab fixed-target experiment to study CP violation in kaon decay. http://fnphyx-www.fnal.gov/experiments/ktev/ktev.html

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

LHC-B: Large Hadron Collider B Experiment, being built at the LHC at CERN. http://lhcb.cern.ch:8080/servlet/Nocchie

LSND: Liquid Scintillator Neutrino Detector. Neutrino oscillation experiment at Los Alamos. http://www.neutrino.lanl.gov/LSND/

MILAGRO: Detector to study cosmic ray air showers in the Jemez Mountains near Los Alamos, New Mexico. http://umauhe.umd.edu/milagro.html

MiniBooNE: Booster Neutrino Experiment, petite size. Planned experiment to study neutrino oscillations using Fermilab's Booster accelerator. http://www.neutrino.lanl.gov/BooNE

MINOS: Main Injector Neutrino Oscillation Search. An experiment to study neutrino oscillations using the NuMI beam from Fermilab's Main Injector accelerator. http://www.hep.anl.gov/NDK/Hypertext/numi.html

NOMAD: Neutrino Oscillation MAgnetic Detector, at CERN. http://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 2002. http://www-numi.fnal.gov:8875/

NuSEA: NUcleon SEA. Fermilab fixed target experiment to measure the asymmetry of down and up anti-quarks in the nucleon sea. http://p2hp2.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. http://www-e815.fnal.gov/NuTeV.html

OPAL: Omni Purpose Apparatus for LEP, at CERN. http://www.cern.ch/Opal/

Pierre Auger Project: (No acronym) International experiment to track down the origin of ultra-high-energy cosmic rays. http://www-td-auger.fnal.gov:82/

SAGE: Soviet-American Gallium Experiment. (Although "Soviet" changed to "Russian" a few years back, "RAGE" didn't have the right ring.) Recently, thieves stole the gallium from this solar neutrino detector in the Baksan Mountains of Russia. http://www.npl.washington.edu/npl/ar96/ch2_9.html

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

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

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

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

SOUDAN II: Soudan II underground detector, in an underground laboratory in the Tower-Soudan Iron Mine in Soudan, Minnesota, to search for nucleon decay and study atmospheric neutrino physics. http://hepwww.rl.ac.uk/soudan2/index.html

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

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

Etc.

DOE: U.S. Department of Energy. Funds the lion's share of U.S. HEP. http://www.doe.gov/

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

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

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

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

SAGENAP: Scientific Assessment Group for Experiments in Non-Accelerator Physics. Advisory to DOE. http://www.hep.net/doe-hep/reports.html

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

Senate Confirms Richardson as Secretary of Energy

" I look forward to taking on the significant responsibilities and challenges of leading the Department of Energy."

~ Bill Richardson, U.N. Ambassador

by Judy Jackson, Office of Public Affairs

On July 31, the U.S. Senate unanimously confirmed U.N. Ambassador Bill Richardson to be the new Secretary of Energy.

President Bill Clinton welcomed Richardson's confirmation. In a statement issued from the Hamptons, on Long Island, the vacationing Clinton said Richardson brings extraordinary experience and expertise to his new job at DOE.

"As a member of the U.S. Congress representing New Mexico, an energy-rich state that is home to two Department of Energy national laboratories," Clinton said, "he has extensive firsthand experience on issues ranging from oil and gas deregulation, to alternative energy, to ensuring strong environmental standards in energy development. As U.S. Ambassador to the United Nations, he has been a vigorous and articulate proponent of U.S. engagement and has successfully tackled tough negotiating challenges around the world."

Richardson was elected eight times as U.S. representative of the 3rd District in New Mexico. He served as Chief Deputy Whip, among the highest-ranking posts in the house Democratic leadership, and also chaired the Congressional Hispanic Caucus.

As a special presidential envoy, Congressman Richardson traveled to trouble spots around the globe, gaining a growing reputation for his negotiating ability in areas of crisis. In Myanmar (formerly Burma) for example, he visited Aung San Suu Kyi, winner of the 1991 Nobel Peace Prize for her role in that country's pro-democracy movement, while she was under house arrest by Myanmar's military dictatorship. Richardson's efforts are credited with achieving greater freedom for the Burmese leader and her followers in the struggle for democracy. President Clinton named Richardson ambassador to the U.N in December, 1996.

In a July 31 statement, Richardson said he wants the American people to know that DOE is working for them.

"I look forward," Richardson said, "to taking on the significant responsibilities and challenges of leading the Department — protecting our national security, advancing the frontiers of science and technology, helping to solve the challenge of global climate change, cleaning up waste sites throughout the country, working to bring down the cost of electricity to the American people, and ensuring a balanced energy portfolio for our nation."

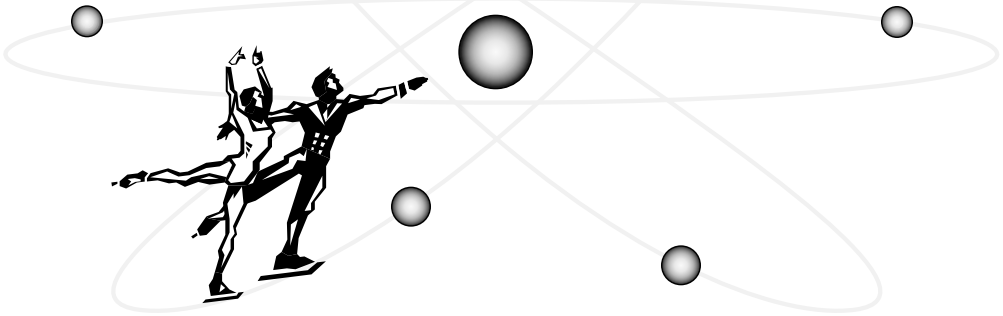
Officials at DOE's Office of Energy Research said they are pleased at Richardson's swift confirmation.

"I am delighted that Ambassador Richardson will be bringing his well-known energy and abilities to the Department of Energy," said ER director Martha Krebs. "We are looking forward to working with him as we continue to strengthen the Department's leadership in the support of U.S. science and technology."

Richardson said he will retain his position as U.N Ambassador until he takes up his post as DOE Secretary after a "long-delayed" family vacation. DOE officials said Acting Secretary Elizabeth Moler will continue to serve until Richardson's arrival at DOE. ■

DOE's Forrestal Headquarters Building in Washington, D.C., new home for U.N. Ambassador Bill Richardson, recently confirmed as Secretary of Energy

Spin



by Stephanie Butler,
Office of Public Affairs

Imagine an Olympic-size ice rink. Two skaters glide in graceful circles around the ring. Gasping, a crowd is hypnotized by the pair as they perform side-by-side triple jumps. After three perfect rotations, the skaters land and continue their revolutions around the center of their stage. Their motions are similar to the movement of electrons inside an atom. The atom's center is its nucleus, and revolving around the nucleus are the "skating" electrons. Not only do the electrons orbit about the nucleus, but they also rotate, or spin, around their own axes. Like the skaters, whose jumps add difficulty and points to their performance, electrons have a spin that gives them special characteristics in an atom.

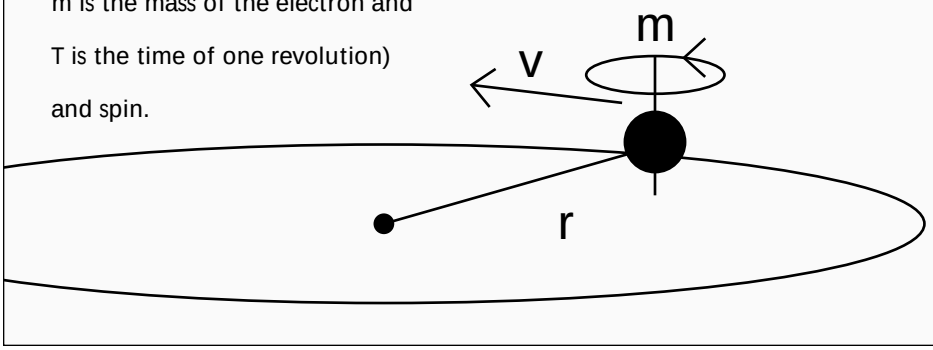
As parts of an atom both revolve and rotate, they create two types of angular momentum: orbital angular momentum and rotational angular momentum, or spin. Orbital angular momentum describes the revolution of an object around another stationary object or fixed point. In the case of the atom, this describes an electron's path around the nucleus. Electrons travel in individual circular orbits with different distances to the nucleus. Each electron creates its own circle (picture the grooves on a CD) that has its own orbital momentum.

The second type of momentum is the rotational angular momentum, or spin. It is a calculation of the rotating object's momentum around its own axis. Like the pole anchoring a merry-go-round, the axis of an electron is perpendicular to its center, with all points rotating around it. Because each point has a different distance from the center of the electron, each makes its contribution to the total.

It wouldn't be enough for our devious little electrons just to create more mathematical work for physicists. All this rotating and revolving actually *means* something! By piecing all of the small conclusions about spin together, scientists realize that without spin, the world as we know it would not exist. The rules of spin explain the configuration of atoms. Based on quantum mechanics, spin along any axis can be quantized in integer values (1, 2, 3, etc.) or halves (1/2, 3/2, 5/2). Particles with spin can "fit" other particles into their orbit based on their spin number. Taking a particle's spin number and multiplying it by two and adding one, scientists can calculate the number of particles that can exist in one orbital. For instance, electrons have a spin of one-half. When that is plugged into the equation, the answer two appears. That means that two and only two electrons—one with spin up and one with spin down—can travel in the same orbital. If this were not true, all of the electrons of every type of atom would crowd into the lowest orbital, and everything would look and act like hydrogen. Chemistry and physics as they are would not exist. Because only two electrons can occupy an orbital, when we add more electrons they must occupy other orbitals. Thus, we build up the shell structure of the atom, which is the microscopic explanation of the Periodic Table of Elements.

Of course, spin doesn't really follow all of the analogies we used to explain it. Whether particles are actually spinning or not, spin is a fundamental property of elementary particles. All the elementary particles that make up ordinary matter—from quarks, leptons and electrons to particles that carry forces, such as photons, W and Z bosons, and gluons—possess the property of spin. ■

In the classical model of the atom, the electron has both orbital angular momentum (given by the equation $L = \frac{2\pi r}{T}(m)(r)$, where L is the orbital angular momentum, r is the radius, m is the mass of the electron and T is the time of one revolution) and spin.



Park Place

What's behind the coming changes in parking regulations at the High Rise?

by Judy Jackson, Office of Public Affairs

Wilson Hall, rising 16 stories from the Illinois prairie, is a beacon, calling users, employees and visitors to Fermilab's central meeting place. Unfortunately, when they get there, they can't find a place to park. A lack of available close-in parking keeps the High Rise from functioning as it was designed to do, as the crossroads of Fermilab.

Laboratory officials hope that a new parking policy, beginning September 1, will ease the parking crunch at Wilson Hall. The new rules will add about 150 short-term parking spaces to accommodate those coming to the High Rise for lunch, meetings, classes, tours and laboratory business. That's the good part.

The bad part, of course, is that it will subtract an equal number of all-day parking spots from the pool available for those who work in Wilson Hall and the "footprint" area. High-Risers, unless they are also early risers and arrive in time to nab the few unrestricted east-side spots, will have to park in all-day spaces on the west side of Wilson Hall. For some, that will mean a longer walk from car to office.

"I know that asking people to change their driving and parking habits is hard," said Fermilab Director John Peoples. "But the one-hour spots in the horseshoe [in front of Wilson Hall] just aren't enough to accommodate people who need to come here every day. And I want all members of the Fermilab community, no matter where they work, to feel welcome at the High Rise. It's where we all meet."

The Laboratory will adopt a number of measures to help those who work in the "footprint" cope with the changes in parking rules. Among planned actions: cars in the rental fleet, formerly parked near the Cross Gallery, will be moved to the Lederman Science Center; the Linac-Kautz Road parking area will be paved; and access to Beams Division buildings from the AZero and the Linac parking lots will be improved. Laboratory officials are investigating the feasibility of a shuttle service between Fermilab and the West Chicago train station, possibly allowing some employees to leave their cars at home.

"We're open to suggestions from the Fermilab community about how to make the new parking policy work," said Associate Director George Robertson. "We are looking at any and all ideas to make the High Rise accessible, with the least inconvenience to all." ■

New parking regulations will go into effect on September 1, not August 17, as previously announced. They will be in effect between 8 a.m. and 4 p.m.

Photo by Reidar Hahn

Chez Léon

MENU

Lunch served from
11:30 a.m. to 1 p.m.
$8/person
Dinner served at 7 p.m.
$20/person

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

Lunch
Wednesday
August 19

Portabello Mushrooms
stuffed with
Sausage and Cheese
Spinach, Bacon and
Onion Salad
Chocolate Raspberry Bars

Dinner
Thursday
August 20

Seafood Vegetable Salad
Grilled Leg of Lamb
with Rosemary and
Garlic Couscous with
Grilled Vegetables
Peach Melba

Lunch
Wednesday
August 26

Crab and Tomato Quesadillas
Garbanzo Bean Salad
Orange Flan

Dinner
Thursday
August 27

Summer Corn Chowder
Grilled Pork Tenderloin
with Fresh Peach
and Ginger Sauce
Wild Rice with Mushrooms
Vegetable of the Season
Plum Turnovers
with Cardamon

CALENDAR

AUGUST 21

Fermilab International Film Society presents: *West Side Story* Dir: Jerome Robbins & Robert Wise, (USA, 1961). Film begins at 8 p.m., Ramsey Auditorium, Wilson Hall. Admission $4. (630) 840-8000.

AUGUST 29

Fermilab Art Series presents: *Jay Ungar & Molly Mason "Ashokan Farewell: The Civil War and Beyond"*, $16. Performance begins at 8 p.m., Ramsey Auditorium, Wilson Hall. For reservations or more information, call (630) 840-ARTS.

SEPTEMBER 10

There will be a Brown Bag Seminar, "Organizing for Success," presented by Cynthia Stringer of Success By Design in the 1 West Conference Room from noon to 1:00 PM. Gain the information and tools to be focused and productive. Learn simple and effective techniques to manage your desk and work area. Create your own action plan.

ONGOING

NALWO coffee mornings, Thursdays, 10 a.m. in the Users' Center, call Selitha Raja, (630) 305–7769. In the Auditorium (summertime only), international folk dancing, Thursdays, 7:30–10 p.m., call Mady, (630) 584–0825; Scottish country dancing Tuesdays, 7–9:30 p.m., call Doug, x8194.

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

LETTER TO THE EDITOR

I must say I found the article in July 3 issue of *FermiNews*, p. 9, very interesting. It discussed the cleanup of the fixed-target area and its change into a much-needed technical campus. There is, however, an issue that I find quite amusing. In the article, there is a photo that has the caption: "As the technical campus takes shape, integrated structures may replace the portakamps and 'debris' now in the area (see inset photo)."

At first glance at the inset photo, I was clearly able to make out the aforementioned portakamps but was unable to make out any 'debris.' Upon closer look at the photo, I then couldn't help but notice that basically the only other object that can be recognized in it is none other than MY TRUCK.

Come on now. You can knock me down, steal my wife, or shoot my dog.... But to refer to my truck as 'debris': that calls for a shootout at high noon in front of the reflecting pond.

Oh well, at least it's paid for. We all got a pretty good laugh out of the reference.

Jeff Johanning, Fermilab

HONORED

By the award of Universities Research Association scholarships:

■ Valerie E. Brown, daughter of Walter Brown of the Computing Division, has not yet decided where she will attend school.

■ Chad Jeremy Ellermeier, son of Jim Ellermeier of the Particle Physics Division, will attend Arizona State University.

■ Marlene Hahn, daughter of Alan Hahn of the Beams Division and Eileen Hahn of the Particle Physics Division, will attend the University of Illinois at Urbana-Champaign.

■ Adam Kissel, son of Walter Kissel of the Beams Division, will attend North Central College.

■ Shiri Klima, daughter of Boaz Klima of the Particle Physics Division, will attend the University of Michigan.

■ Jeffrey E. Kolb, son of Adrienne Kolb, of the Directorate and Rocky Kolb of the Particle Physics Division, will attend Bradley University.

■ Jonathan Richard Lahn, son of Paul Lahn of Facilities Engineering Services, will attend the University of Chicago.

■ Eve L. Lipton, daughter of Ron Lipton of the Particle Physics Division, will attend the University of Wisconsin.

■ Adeoti Efundademu Oshinowo, daughter of Babatunde O'Sheg Oshinowo of the Particle Physics Division, will attend the University of Illinois at Urbana-Champaign.

■ Bich-Van Chu Pham, daughter of Thinh Pham of the Computing Division, will attend Northwestern University.

■ Jennifer Volvovski, daughter of Tanya Levshina of the Computing Division, will attend the Rhode Island School of Design.

MILESTONES

DIED

Stephen Lusted, I.D. #4914, Fermilab firefighter, on August 3, 1998.

CLASSIFIEDS

FOR SALE

■ '84 Corvette, black, glass top, 60K miles, new paint & tires. Very good running order. Best offer, (630) 852-2475.

■ '85 Honda Civic, 4D, auto, a/c, am/fm, 87K miles; small cosmetic damage, fair condition. $1,200 obo. John x6088 or johnzhou@fnal.gov.

■ '86 Mercury Lynx station-wagon, blue, some rust, but all panels match, good interior and extremely reliable. 80K miles on rebuilt engine, all maintenance records, 2nd owner, 4-spd. Great work/school car at $850. Call John, x2237, (815)886-0036 or scifers@fnal.gov.

■ '86 Nissan 300zx, black, excellent condition. Florida car, 86K miles, auto, all power, c/c, alarm. Karen (630) 393-7058.

■ '87 Ford Mustang, white, 113K miles. Auto, a/c, AM/FM cass, ps, pb, very good condition. $1,400. Call John at x2237, (815)886-0036 or scifers@fnal.gov.

■ '91 Honda Civic CX, 4 speed, hatchback, base model, metallic blue, blue/gray interior, AM/FM cass, 1st owner, 77K miles, no rust, serviced by dealer, only premium gas, new exhaust and brakes, good tires, excellent condition. $4,800. Rafael, x8311, rafael@fnal.gov

■ '91 Subaru silver Justy, excellent cond., 28K miles, 5-speed, a/c, $3,600 obo. Erik, x6416, erik@fnal.gov.

■ '91 Toyota Camry LE 4dr sedan, a/c, auto trans., FWD, cruise, 81K miles, CD/cass/am/fm, power (seat, steering, windows, locks, mirrors), excellent cond., reliable, garage kept, $6,200. (630) 513-4742.

■ '93 Toyota Pickup, Standard Bed, black/gray, 65K miles, manual trans., a/c, sliding rear window, camper shell, carpeted bed liner, cloth seats, am/fm, cass, extended warranty 6 year/72K miles. Asking $6500. Patrick, X8596, (312) 421-3805, gartung@fnal.gov.

■ '95 Mitsubishi Mirage 4 dr, a/c, auto, am/fm, cassette, 40K miles, $6900, Dana (312) 467-9657.

■ '97 Blazer LT, 4x4, loaded, alarm, sunroof, 18K miles, white w/graphite interior, $21,500. Call Jim X3371, Jenny X3644 or (815) 729-9072.

■ Furniture! Rowe sleeper sofa w/ innerspring mattress, mixed burgundy/forest-green floral pattern. Very rarely used, less than 3 yrs old. Paid $800, will sell for $300. Also get matching green Action Lane recliners, $200 ea. Crème Schweiger sofa w/ oversized ottoman, less than 1 yr old, $350. Cherry-finished Polaski corner curio cabinet, mirrored back, glass shelves, lighted, less than 1 yr old, $350. Photos of the above available, if interested. Call John at x2237, (815)886-0036 or scifers@fnal.gov.

■ Moving sale. Sofa w/sleeper $200, compact stereo $100, women's mountain bike, Bianchi Lynx 15″ $350, microwave, cordless phone, desk, more. Call (630) 665-4168 or kazu@fnal.gov.

■ Apple PC Compatability card for Power Macs: Pentium 166 MHz processor, 16MB RAM built in, 256K L2 cache, 2MB graphics, Creative Labs Sound Blaster 16, MS-DOS 6.22 on floppies, Windows 95 (CD). Extras: Addt'l 32 MB RAM installed, Orange Micro 32-bit drivers & updated Apple/PC set-up software. Board sells for $995, asking $450 complete w/all manuals & original package. Call Jim, x3497 or jablon@fnal.gov or jablon@ix.netcom.com.

■ New Pioneer DVD player. Won as prize, never used, still in boxMSRP $700, typical retail over $500. Now $400. DTS compatible, plays DVDs & audio CDs. Has both 5.1-channel surround sound & digital PCM outputs. Full specs http://www.moviesoncd.com/pioneerdvd.html. John, x8885.

■ Professional digital photographs on CD by Corel, 100 photos on each CD (3 resolutions per photo). Hundreds of topics to choose from, royalty free, Mac or IBM $10 each. Graciela, x4645 or graciela@fnal.gov.

■ Ladies' 14k gold hexagon-shaped bracelet with inset diamonds, retail $1,000, asking $900. Call Sharon, x3598, or koteles@fnal.gov.

■ House: Warrenville, near Batavia Rd. gate, bike to work, 7 rm, 3 br, air, fr w/ frplc, patio, great yard, nice, privacy. $137,900. (630) 393-7770.

■ Full size futon with oak frame. Asking $175. Patrick, gartung@fnal.gov, X8596, (312) 421-3805.

■ Garage Sale: September 12 and 13, 9:00-4:00. Collector Series Plates, Ski's, Dive Equipment - Parkway BC Vest, US Divers Wet Suit, Artwork, Computer software and accessories, Microwave, Lamps, 4 Chair Dinette Set, Queen Size Waterbed Light Oak (1.5 yr. old) complete, King Size Waterbed Frame and Headboard needs mattress, Boating Items - 2 cushioned swivel seats, Wood Lathe w/ Chisels and cabinet w/ drawers, Ryobi Detail Carver w/ case & 5 Chisels, Clothes, Children's Items, much more. Terry x4572 skweres@fnal.gov 43W516 Plank Road, Hampshire. Located on the N.E. corner of Plank Road & Route 47.

■ Renaissance Faire tickets. Two adults ($10/ea) & one child ($4), will separate. Tickets good for one day on either: August 15, 16 or 22, 23 (last day of Faire). Call Rick x8225, colombo@fnal.gov.

■ Queen-sized bed with boxspring and frame, excellent condition, $150. Laminate (simulated oak) bookcase, 6 ft tall, $30. Andreas, x3753 or ask@fnal.gov.

WANTED

■ Female MBA attempting to build Hieronymous machine, which detects the 144 primary elements, seeks electronic engineer to help decipher instructions. For details call (630) 852-5411.

RENT

■ Large furn. room in private home, St. Charles (~10 mins from lab). Prefer nonsmoker. Available Sept 1. Contact Mary (630) 377–0862.

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