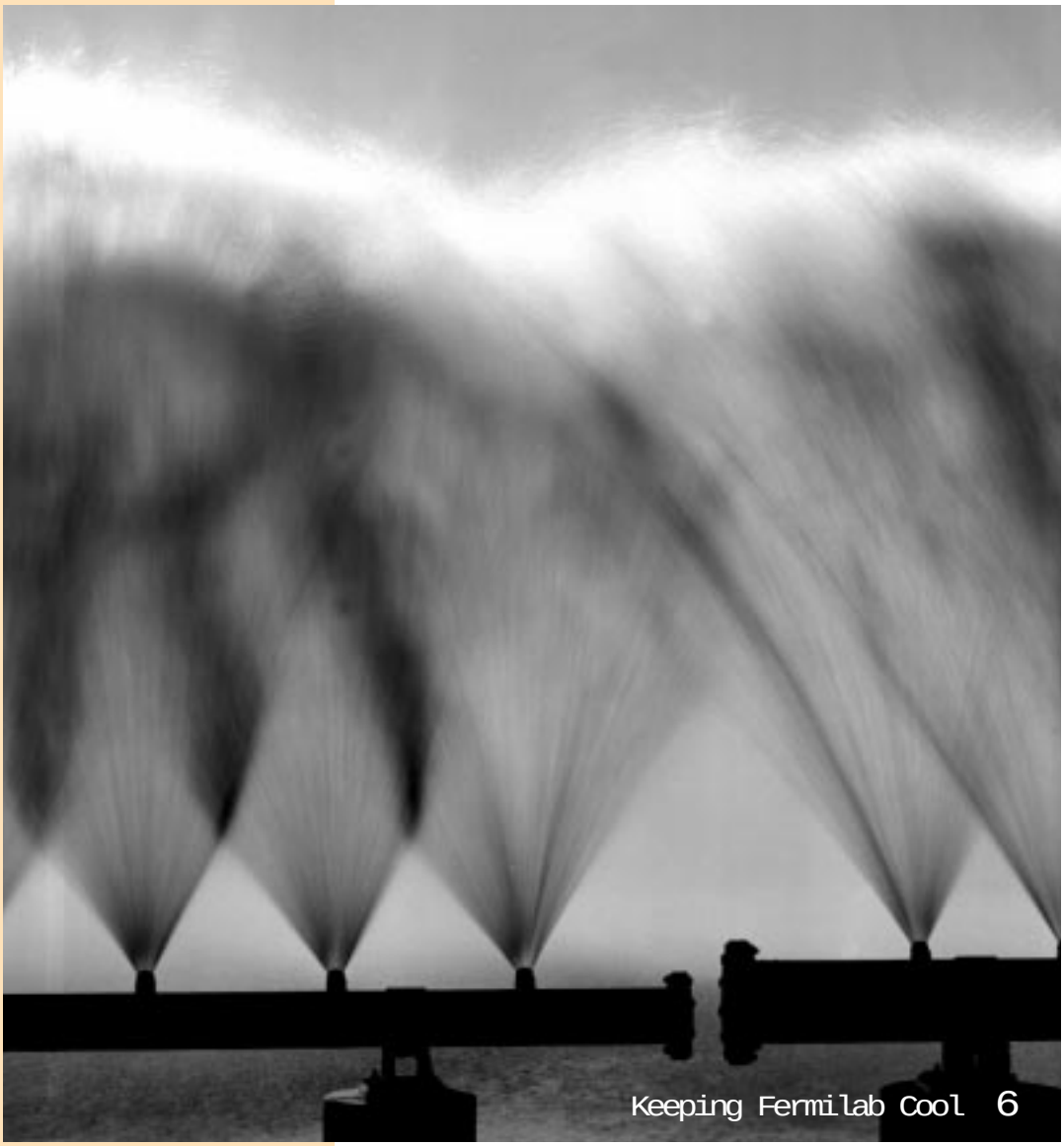
FERMI NEWS

FERMILAB A U.S. DEPARTMENT OF ENERGY LABORATORY



Keeping Fermilab Cool 6

Photo by Reidar Hahn

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FERMILAB

Serving Researchers, Serving Science

Photo by Reidar Hahn

The DZero collaboration

Photo by Fred Ullrich

The CDF collaboration

Photo by Fred Ullrich

The NUMI collaboration

by Sharon Butler

"A high-energy accelerator is like the 'Field of Dreams,'" said a Fermilab physicist. "If you build it, they will come."

And, indeed, they have. According to the latest statistics, more than 2,000 physicists and graduate students from nearly 200 research institutions in the U.S. and around the world come here to advance the understanding of the building blocks of matter. They are called "users" in the Fermilab vernacular.

From its inception, Fermilab was intended to be a "truly national" laboratory where particle physicists would feel "at home and loved." And so it remains. Today, of the 2,000-plus scientists who do their research here, some 1,407 are from nearly 100 universities and national laboratories in 34 states in the U.S.

But over the years, Fermilab has become a "truly international" laboratory as well. The latest statistics show that 753 scientists come here from 24 countries to probe the secrets of matter and antimatter.

THE EXPERIMENTS

With the highest-energy accelerator in the world today, Fermilab is the center of the universe for particle physicists. It is not only a place where they conduct the latest experiments, but a place where scientists gather to collaborate on building new electronics, discuss the latest experimental results, or pore over a late night's calculations.

Experiments here are in various stages. Some are still on paper: Bids are just going out for the MiniBooNE experiment to build a four-story-high detector that will track neutrinos. Bids are also out for excavation of a tunnel for the MINOS experiment, another scientific collaboration looking for neutrino oscillations. Further along are the upgrades for the CDF and DZero detectors, the colossal assemblies of intricate electronic devices that will home in on the Higgs boson once Run II begins.

Other experiments have just started up. When protons began circulating again in the Tevatron earlier this summer, HyperCP started collecting data to look for CP violation in hyperons, particles that have at least one strange quark and are heavier than protons. KTeV resumed looking for CP violation as well, but in particles called kaons. Both experiments ran during Run I, but have upgraded their detectors to collect more data.

Fermilab's Bob Bernstein, right, and Sergey Avvakumov, from the University of Rochester, work on the NuTeV experiment.

Craig Dukes, from the University of Virginia, is cospokesperson for the HyperCP experiment. Here he installs new scintillation counters for the experiment's trigger.

Photos by Reidar Hahn

Still other experiments are completed, but scientists are busy analyzing the data they amassed earlier. In the DONUT experiment, for example, experimenters hope the signal they caught on magnetic tape was evidence for the tau neutrino, the only known particle in the Standard Model not yet observed.

The experiments are not just related to particle accelerators, and not even to high-energy physics per se, although at some level, the research all connects. There's the Cold Dark Matter Search, and the Sloan Digital Sky Survey, which saw "first light" in June 1998 and has already photographed the farthest quasar yet discovered. The Pierre Auger Project, which will study cosmic rays, just broke ground to install detectors in a 3,000-square-kilometer expanse of desert in Argentina. Scientists here at Fermilab have been heavily involved in their design.

THE PEOPLE

Not surprisingly, the majority of scientists here—nearly 1,500—come from U.S. institutions, including universities whose high-energy physics programs rank among the nation's best. The University of Rochester is one, with a group of 48 physicists and graduate students. Others include the University of Chicago, with 34 physicists and graduate students, and the University of Michigan (Ann Arbor), with 45.

Greg Snow, a physicist from the University of Nebraska and chair of the Users Executive Committee, said that, like other academic professors, he comes to Fermilab to do research but also to have access to conferences and seminars that would never take place back in Nebraska. "At Fermilab I stay plugged into the latest developments in the field of high-energy physics—and to the gossip," he said.

FERMILAB Serving Researchers, Serving Science

Scientists flock here from foreign institutions, too, mindful that there is no comparable facility elsewhere in the world. Many of the research facilities that send physicists to Fermilab are from Russia, including IHEP, in Protvino, JINR, in Dubna, ITEP, in Moscow, and Moscow State University.

Of the total number of scientists at Fermilab, almost 500 are graduate students who are here to do research for their doctoral degrees. In cramped cubicles in trailers mounted on cinder blocks, they sit in front of their PCs, sorting background from meaningful signals, hoping their analyses will merit publication and recognition in the world of high-energy physics.

Angela Bellavance, a graduate student at Rice University, inspects the preamplifier electronics for the KTeV experiment.

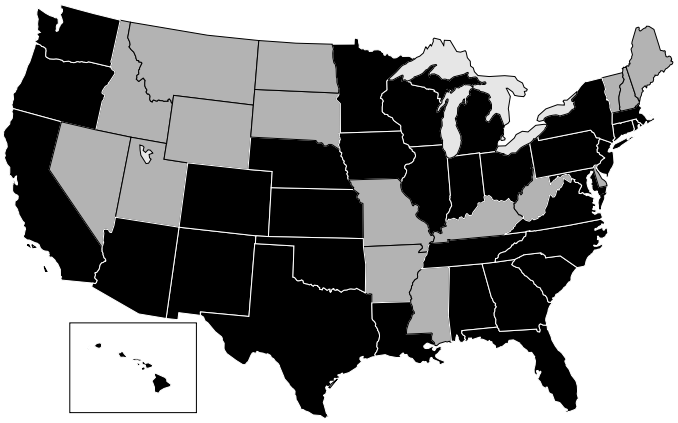
"Fermilab is a really cool place to work," said Andrew Green, a leader of the Graduate Student Association. "It's a real ego boost. Not everyone is selected."

This year, there are newcomers to Fermilab's scientific ranks from abroad: The Netherlands has joined, with six physicists now participating in experiments here. But from overseas, there are many more old hands as well.

Indeed, some scientists just can't stay away, like Bruce Hoenesien, the only physicist from Ecuador—and probably the only physicist who also farms avocado trees. On the DZero experiment, he says, perhaps more so than on his avocado farm, he "feels the excitement of discovering nature's secrets."

The scientists who use Fermilab's facilities come here to use its high-energy beam; all they want is "beam, beam, and more beam," as a former chair of the Users Executive Committee once put it. That makes the Fermilab staff here invaluable. They are the technicians who solder copper wire to superconducting magnets that steer the beam; the truckers who cart equipment from one building to another, careful not disrupt the delicate electronics; the round-the-clock operators who monitor the beam's performance from the Main Control Room; the crewmen who answer a page in the middle of the night when a magnet fails, and rush in to rescue; the staff physicists who know how to master the beam.

Janet Conrad, a professor at Columbia University who is cospokesperson for the MiniBooNE experiment, paid tribute to them all. "We succeed" she said, "because the technical and support staff at Fermilab really come through for us."



U.S. Users, by state

Alabama, 2; Arizona, 18; California, 138; Colorado, 9; Connecticut, 13; Florida, 34; Georgia, 3; Hawaii, 7; Illinois, 431; Indiana, 54; Iowa, 17; Kansas, 15; Louisiana, 12; Maryland, 25; Massachusetts, 83; Michigan, 74; Minnesota, 16; Nebraska, 4; New Jersey, 26; New Mexico, 40; New York, 150; North Carolina, 22; Ohio, 11; Oklahoma, 10; Oregon, 4; Pennsylvania, 53; Puerto Rico, 6; Rhode Island, 14; South Carolina, 6; Tennessee, 13; Texas, 50; Virginia, 19; Washington, 11; Wisconsin, 17.

Top Ten U.S. Institutions (other than Fermilab, 286)

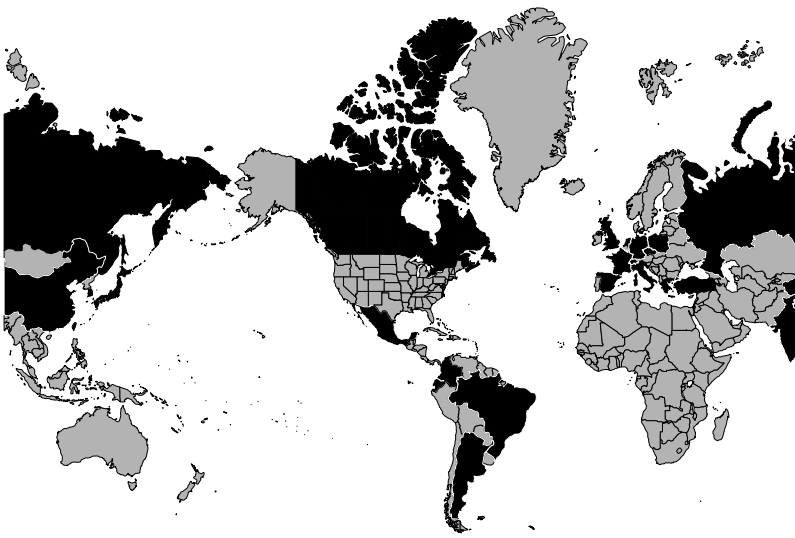
University of Rochester	48
University of Michigan (Ann Arbor)	45
Lawrence Berkeley National Laboratory	43
SUNY, Stony Brook	36
University of Chicago	34
Argonne National Laboratory	29
University of Illinois (Champaign)	28
UCLA	28
Michigan State University	28
University of Pennsylvania	27

International Users, by country

Argentina, 5; Brazil, 38; Canada, 21; Colombia, 8; Czech Republic, 6; Ecuador, 1; France, 37; Germany, 17; Greece, 3; India, 23; Israel, 3; Italy, 175; Japan, 90; Mexico, 18; Peoples Republic of China, 20; Poland, 3; Russia, 180; South Korea, 24; Spain, 5; Switzerland, 11; Taiwan, 17; The Netherlands, 6; Turkey, 1; United Kingdom, 41.

Top Nine International Institutions

IHEP, Protvino, Russia	54
INFN, Pisa, Italy,	53
JINR, Dubna, Russia	44
University of Tsukuba, Japan	35
ITEP, Moscow, Russia	35
CBPF, Rio de Janeiro, Brazil	27
Moscow State University, Moscow, Russia	21
University of Padova, Italy	20
University of Pavia, Italy	18



NO SMOKING!

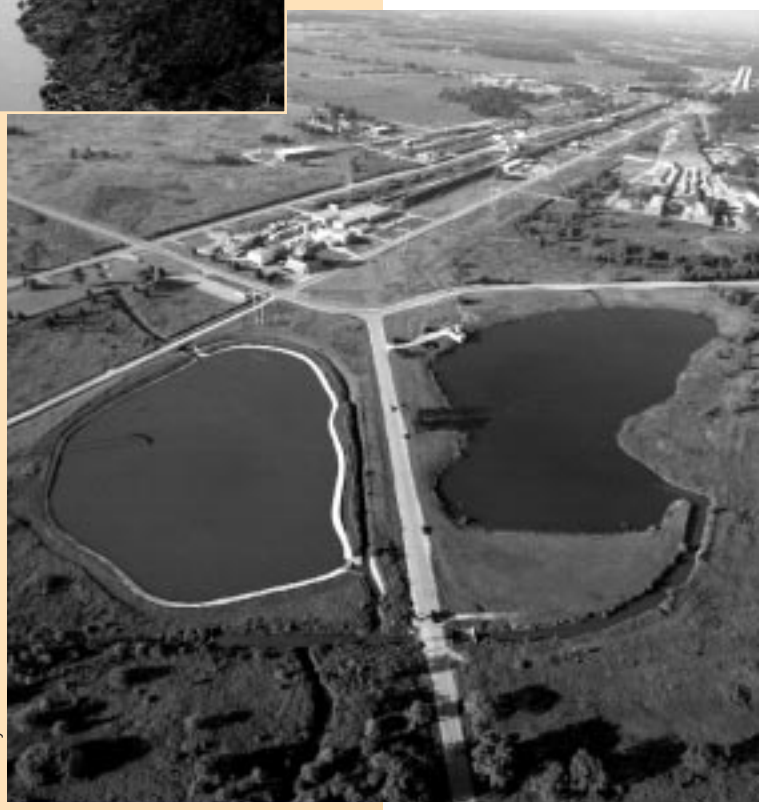
by Mike Perricone

When founding Director Bob Wilson put his stamp on the original design and development of Fermilab, he wanted the site to be open to the sky, with only clouds altering the vista.

He ruled out the big, industrial-strength, plume-producing cooling towers that remain the norm for most industrial facilities, and he was aided by the scope of the 6,800-acre site. The natural open terrain made it possible to install the series of artificial ponds that contribute to the character and attractiveness of the Lab as a welcoming area for recreation.

After all, how many scientific or industrial facilities have a working cooling system that can also provide visitors with a day fishing?

"We have by far one of the most complex industrial pond systems anywhere. People who look at our set-up say they've never seen anything so integrated on this scale," said Steve Krstulovich, whose engineering duties in the Lab's Facilities Engineering Services Section involve overall responsibility for the system–and whose history includes the development in 1990 of the computerized water management program to keep that system working smoothly.



Photos by Reidar Hahn

With supplementary cooling towers located only atop the Central Utility Building (and those essentially used only in summertime), the Lab's complex system of interconnected ponds supplies the cooling water for the Wilson Hall high-rise, for the accelerators, for the detectors, for the outlying industrial buildings, and for the fire protection system.

"Cooling towers take a lot of maintenance," Krstulovich said. "They create solid waste and disposal problems. Cooling towers would create huge plumes of vapor, and that's all you would see around Fermilab. Instead, the ponds create a friendly environment that also serves the community with recreation, fishing, and an overall pleasant atmosphere."

Top: Digging the new Six-Acre Pond, in 1995.

Bottom: The view from Casey's Pond along the fixed target beam path, with Wilson Hall in the distance.

Cover: Sprayers in the accelerator cooling ponds provide additional evaporation to reject heat absorbed from the equipment. Tevatron cooling ponds reject about 16 megawatts of heat each year.

FERMILAB'S POND SYSTEM USES EVAPORATION FOR EFFICIENT COOLING, AND FOR A FRIENDLY SITE.

With their large surface areas, water volumes and flow rates, the ponds use the natural (and invisible) process of evaporation to shed the heat picked up from equipment throughout the site. Annual rainfall is insufficient to replace all the water lost through evaporation, and the deficit is made up by pumping in water from the nearby Fox River—about 250 million gallons of it each year, along with an incidental supply of fish eggs that helps keep the Fermilab ponds well stocked.

The catch is that the Lab can't tap the Fox River in times of drought, when pumping would be most desirable. Under Illinois conservation standards, the Lab can only bring in water when the river's natural flow exceeds 275 cubic feet per second.

The ponds act as reservoirs to keep a sufficient supply of water on the site. The system is designed to provide enough water to keep the site running for 83 days, based on a survey of weather conditions over the last 25 years.

Casey's Pond, in the northeast corner of the site, is the oldest and one of the largest ponds, holding 36 million gallons of water. The adjacent Six-Acre Pond was recently dug to add another 12 million gallons to the site supply, and to pre-cool water recirculating back to Casey's Pond.

Casey's Pond is the heart of the Lab's water supply, feeding the fire protection system and the three main cooling pond systems: the accelerator cooling system, the Central Utility Building system, and the Industrial Cooling Water system. In the earliest days of the Lab's construction, Casey's Pond originated as a "borrow pit" for earth needed around the site. The resulting hole was filled with water for a fire protection system, then was tapped for the ICW system and some additional cooling uses. When the Lab is operating full tilt, Casey's Pond can pump out as much as 12,000 gallons per minute.

Lake Logo, in the middle of the Main Ring where the Tevatron is located, was another original pond, and the source of a stream that led off the eastern end of the site. Damming that stream produced the eastern ponds, Lake Law, AE Sea, named for the Atomic Energy Commission (AEC), and Dusaf Pond, named for the architectural and engineering firm that built Fermilab.

Water circulating through the CUB system undergoes the most thorough treatment with bromine solution to kill algae and bacteria. Since 1992, the site-wide system has been treated with annual flushes to clear out debris from the water lines to prevent blockages and to keep runoff water to offsite creeks within Illinois environmental standards. The Lab acts as a watershed for three offsite systems: Indian Creek to the west, Ferry Creek to the east, and Kress Creek to the north.

What appears to be a moat around the Main Ring is actually an interconnected series of 26 cascading ponds, containing a total of 39 million gallons of water. Each pond is about four feet deep, and keeps water flowing around the ring at about 1,000 gallons per minute during the hot weather. Water leaving the accelerator equipment generally enters a cooling pond with a temperature of around 94 degrees Fahrenheit, and leaves with a temperature around 87 degrees.

As part of the Lab's management plan, measurements of a column of air in the sump at the Casey's Pond pumping station link the pond level to possible emergency action at the Lab. The column is normally about 126 inches. If it drops to 90 inches, the Lab plans shutdowns to reduce the cooling load. At 75 inches, the plans begin to take effect. If the level reaches 12 inches, the Lab stops using the ponds for cooling, to conserve water for fire protection.

"That's only happened once," Krstulovich said, adding that the recent wave of 100-degree temperatures had no serious effect on the Lab's water supply. "That would happen only with a prolonged drought over several months. We noticed pond temperatures going up somewhat, but all in all, the system was working very well."

This magnet bends the electron beam 90° for injecting and extracting with almost no distrubance to the antiproton beam.

FUTURE Cool

Electron cooling project hopes to boost effectiveness of Recycler and Tevatron.

by Mike Perricone

Research and development can be defined as dreaming up ways to improve something that doesn't yet exist.

Consider the case of electron cooling.

In 1995, when the Main Injector was a construction project and the Antiproton Recycler was an idea, Fermilab had already begun to investigate electron cooling as a means of extending the Recycler's ability to hoard antiprotons—even further enhancing the Tevatron's luminosity, the production of proton-antiproton collisions, in Run II and beyond.

"The thinking at the Lab seems to be that we'll go beyond Run II, not by declaring an end point and the beginning of a new run, but by continually progressing and improving the capability of the machines," said Jim MacLachlan, a full-time member of the electron cooling group.

Led by Sergei Nagaitsev, the group has placed an order for a $2.5 million device called the Pelletron, which will provide the source of electrons for cooling the antiproton beam in the Recycler—with the hope of eventually escalating the Tevatron luminosity by another factor of four beyond the anticipations from the Main Injector and Recycler.

The Pelletron is old-fashioned accelerator technology: an electrostatic generator of the Van de Graaff type, using a conveyor to carry charge and create voltage. The Pelletron is manufactured in Middleton, Wisconsin by National Electrostatics Corporation. Its name derives from the charging chain of metal pellets that replaces the conventional conveyor belts.

The unit for Fermilab will generate five million electron volts (5 MeV), in a tower assembly 7.3 meters high and 3.7 meters in diameter (about 24 feet by 12 feet). It will be delivered in stages beginning next March, and Nagaitsev hopes to begin commissioning in July 2000.

Nagaitsev and other group full-timers, including Alexander Shemyakin, Alexei Burov and Arden Warner, have also spent much time at NEC, using the company's testing facilities to push the Pelletron's beam current beyond its intrinsic capabilities. They've developed a high efficiency of returning the charge to the high voltage terminal, so that current only needs to be added to make up for beam loss.

"We're using old technology and doing new things with it, things that no one has done before," Nagaitsev said.

Electrons are used for cooling the antiproton beam because they're easier to produce than any other charged particles. The concept was developed in 1964 in Novosibirsk, Russia (where Shemyakin, Burov and Nagaitsev have studied), and was tested at Fermilab and at CERN in the 1970s. But the alternative stochastic cooling method came to prominence after it was developed at CERN.

Much of Fermilab's original electron cooling test apparatus was sent to Indiana University—where Nagaitsev later earned his PhD. Electron cooling was also proposed for the medium energy booster of the Superconducting

Super Collider. Congress pulled the plug on the SSC in 1993, but the electron cooling idea created a spark when MacLachlan met Nagaitsev at a conference at Indiana in 1994. A possible match between electron cooling and the Antiproton Recycler was too good to pass up.

Electron cooling is envisioned as a further cooling step for the Recycler after stochastic cooling reaches its peak. Stochastic cooling is a sort of remote control process, signaling individual particles in the beam to fall into line. Electron cooling works by a series of collisions, transferring heat or energy from one particle to another.

Think of a cue ball scattering a series of billiard balls. In each collision, the cue ball transfers some of its energy to another ball. The antiproton is the cue ball, losing its energy; the electrons are the other billiard balls, absorbing bits of energy with each collision. Eventually, the balls (particles) will reach an energy equilibrium.

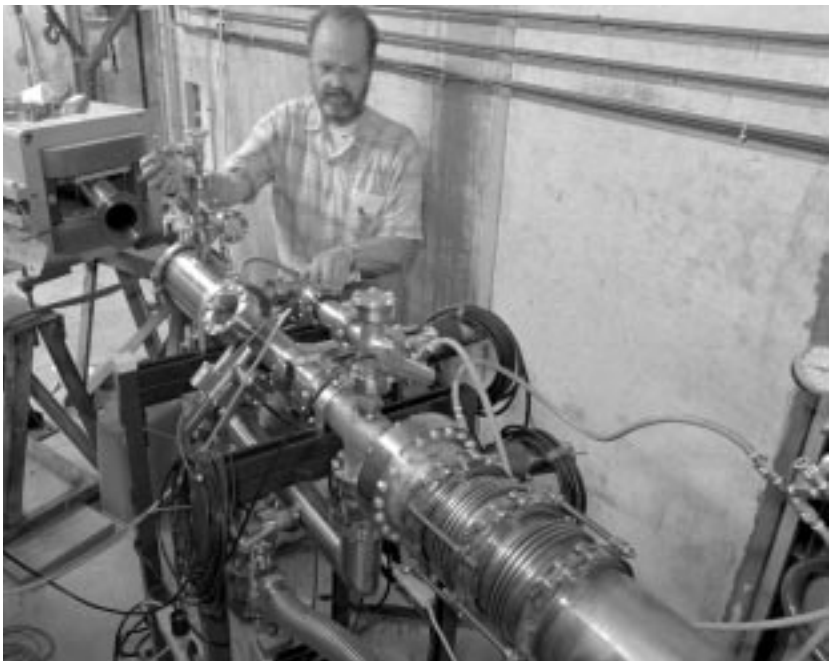
The cooling will take place in a 20-meter-long stretch of the Recycler beam pipe, with both the antiproton and electron beam flowing at identical velocities. The electron beam will surround the antiproton beam as completely as possible. The antiproton beam is densest in the center, but has thin tails extending from it. The art in setting the size of the roughly concentric outer electron beam is in deciding how much of the antiproton beam is expendable, since enlarging the electron beam decreases its density and its cooling effectiveness. Nagitsev's group hopes to cool 95 percent of the antiproton beam.

Making these light-speed beams coexist requires extreme precision. Warner is working on the diagnostics, the instruments for measuring the beams' positions and characteristics. The alignment tolerance is an angle of about 50 microradians; to produce the same angle, a triangle would need an apex six feet away from a base as wide as the diameter of a human hair.

Another challenge lies in continually introducing the electron beam into the beam pipe, wrapping it around the antiproton beam, and then extracting it to be collected, cooled and replenished–with minimum, if any, disturbance to the antiproton beam. Here, Nagaitsev explained, the mass difference between the particles offers a critical advantage. At 1/2,000 of the mass of the antiprotons, the electron beam can be bent 90 degrees with 1/2,000 of the magnetic field it would take to produce a 90-degree bend in the antiproton beam. The antiproton beam also passes through only a small segment of the bending magnet and barely feels the effects of the weak magnetic field used to inject and extract the electron beam. Any residual disturbances can be easily corrected in the antiproton beam.

Nagaitsev cautions that no research and development project is sure of success, but MacLachlan likes what he's seen.

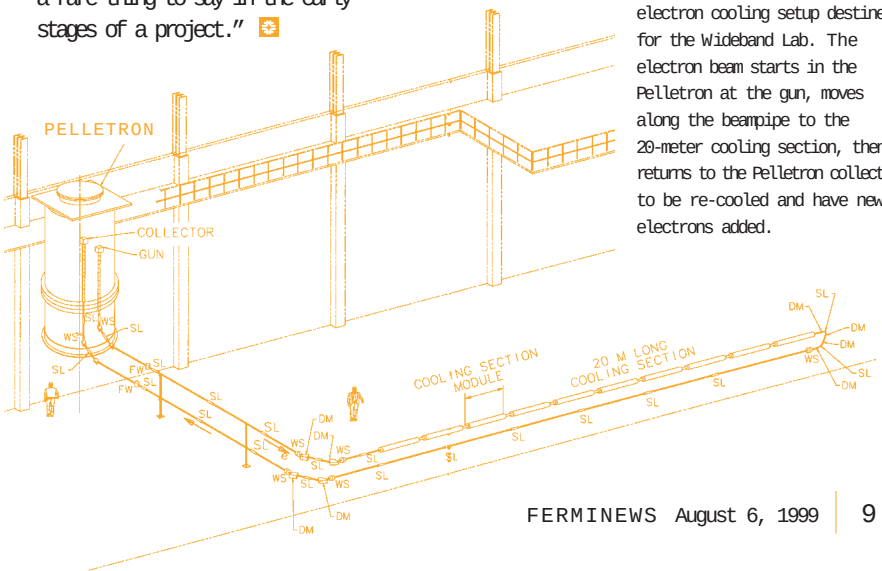
"Our experience has been that more we understand it, the better it looks," he said. "That's a very qualitative statement. But it's a rare thing to say in the early stages of a project."



Basement science experiment? No, it's an early step in testing equipment and concepts, as Jim MacLachlan works on electron beam approximations using a low-energy proton beam in 1996.

Photos by Reidar Hahn

Brainstorming plays a key role in research and development, as in this electron cooling workshop at Fermilab in 1996. Sergei Nagaitsev is third from the left in jacket and tie.



A diagram of the Pelletron and electron cooling setup destined for the Wideband Lab. The electron beam starts in the Pelletron at the gun, moves along the beampipe to the 20-meter cooling section, then returns to the Pelletron collector to be re-cooled and have new electrons added.

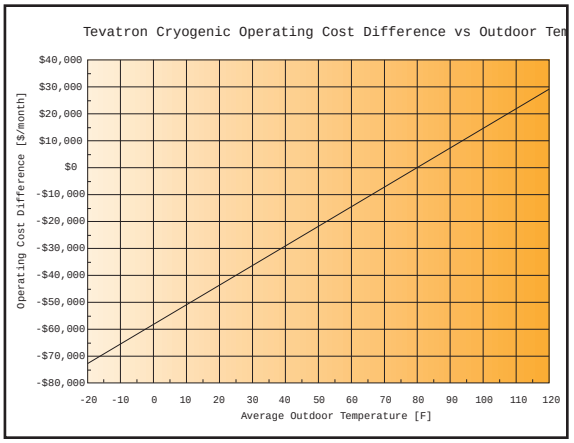
HOW HOT WAS IT ?

By Judy Jackson

In Chicagoland, the last week in July was a scorcher. The heat boiled up to a peak of 102° on Friday, July 30, and the dew point stuck for five hours at 82 degrees, giving the air the approximate consistency of simmering cottage cheese. Out on the prairie at Fermilab, it was really, really hot.

How hot was it?

It was so hot we shut the Tevatron off to save power to help keep Chicago from an electrical blackout.



When the thermometer goes way up, so do the cryogenic operating costs for the Tevatron.

It was so hot that Wilson Hall began rocking and rolling. The High Rise's two independent but connected towers move slightly, in response to temperature extremes, causing cracking and spalling (or chipping) concrete. (Fermilab, the joke goes, operates DOE's "Concrete Spallation Source.") An extensive renovation beginning this fall will address this problem, but in the meantime, the cracks opened up.

Photos by Reidar Hahn

Hot weather opened this crack in Wilson Hall, in the Library ceiling, to five millimeters, a historic high for the building, whose twin towers move in response to temperature extremes.

"We have been monitoring the building motion in Wilson Hall since 1997, watching the cracks over the course of the year," said Fermilab engineer Elaine McCluskey. "In the recent heat wave, the cracks opened more than ever before. In summer, we generally see the cracks open up to a width of three to four millimeters. This time they reached a width of five millimeters, 20 to 25 percent more than we have seen. In the winter the cracks will close up again."

It was so hot that keeping the Tevatron cold (when it was operating) was a challenge. The accelerator's superconducting magnets operate at close to absolute zero.

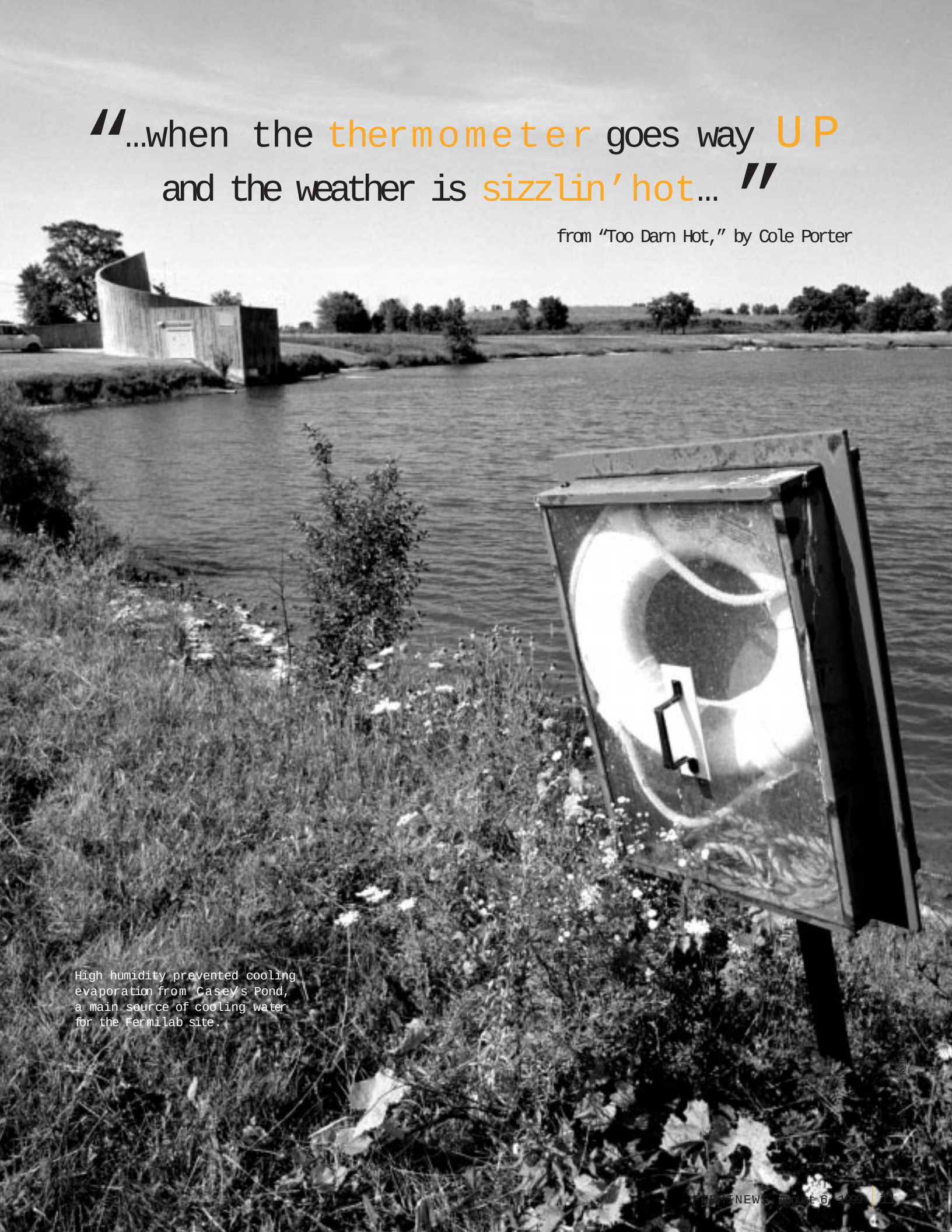
"The bigger the difference between the outside temperature and the temperature required for operating the Tevatron," said Fermilab cryogenics expert Jay Theilacker, "the more refrigeration we need, the harder the cryogenic systems have to work, and the more it costs in cryogens, like liquid nitrogen and liquid helium. It takes more compressor power to reach our fixed cold-capacity requirement."

It was so hot, we ate lunch with the lights off in the Wilson Hall cafeteria, which was actually rather pleasant.

It was so hot, the cooling water lost its cool. Much of the cooling on the Fermilab site starts with Casey's Pond, a pastoral pool from which huge

"...when the thermometer goes way UP and the weather is sizzlin'hot..."

from "Too Darn Hot," by Cole Porter



High humidity prevented cooling evaporation from Casey's Pond, a main source of cooling water for the Fermilab site.

HOT

400-horsepower pumps circulate water throughout the laboratory to cool accelerators, machinery, buildings and people. On Fry Day, the 30th, hot machinery and hot weather brought the temperature in Casey's Pond to 84 degrees. The pumping process added still more energy, and the pond could not shed its heat.

"When the humidity is very high, as it was in the recent heat wave, evaporation does not take place, so the pond cannot cool off," said Pump House building manager Cliff Worby. "It's the sweating effect."

It was so hot, the fish in Casey's Pond began to die. A species called the quill back (Carpiodes cyprinus) is especially sensitive to the lower oxygen levels in hotter water, and many died. This was bad news for the quill backs but good news for the herons, egrets and raccoons who flocked to the ponds for a hot fish dinner,

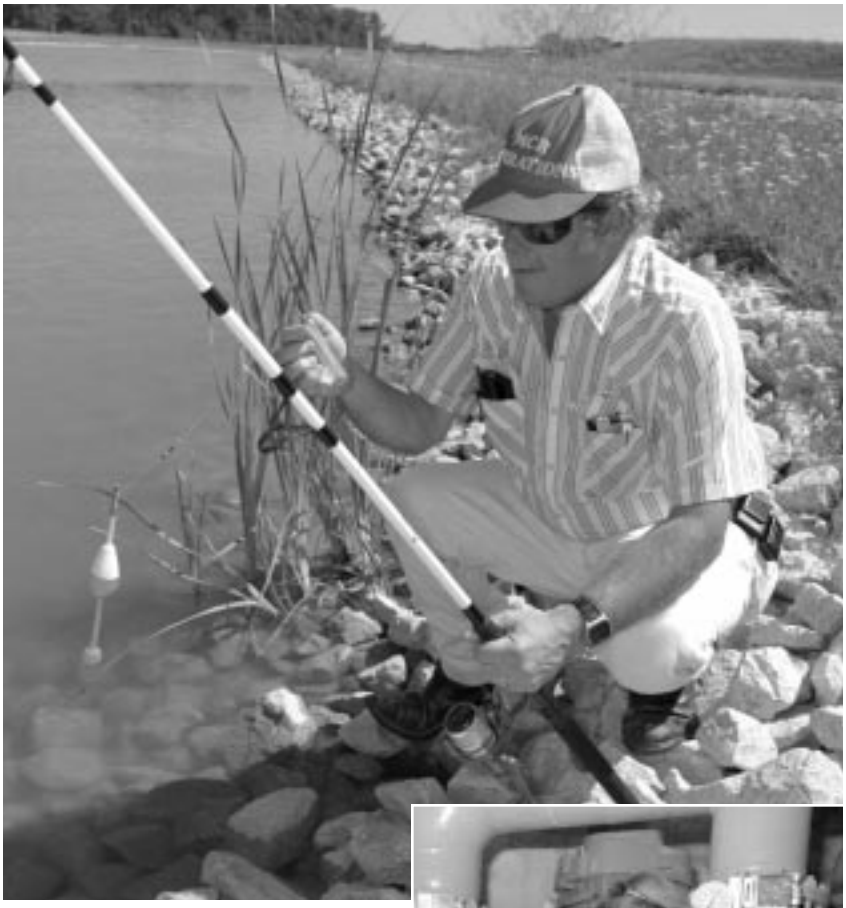
It was so hot, the Computing Division made a plan to start shutting down if it got any hotter.

"The Casey's Pond cooling water input to Feynman Computing Center reached 87 degrees," said Matthias Kasemann, head of the Computing Division. "If it reaches about 90 degrees, then it does not cool anymore. If computing equipment gets too hot, things begin to fail, power supplies burn up, and systems trip off. As the temperature of the cooling water began to rise, we devised a plan to begin shutting off equipment, starting with systems that aren't being used for current operations."

In the end, the heat wave broke and the computers kept running, but "we came close," Kasemann said.

How hot was it?

It was so hot the Fermilab buffalo stood in the shade and didn't move— a strategy with much to recommend it if and when the weather once again becomes too darn hot.



Duane Plant of the Beams Division uses fishing gear to check the temperature of the Main Injector cooling ponds.

Steve Krstulovich, of FESS, said "Every cooling system at Fermilab was operating at or beyond its design capacity."

Fermilab maintenance planner Susan Sprosty checks the temperature in Casey's Pond, aiming an electronic thermometer at the water lapping a few inches below a grate in the pump house floor. Water temperature reached 84 degrees, close to the point where it ceases to cool.

Photos by Reidar Hahn

the talk of the lab

To Boldly Go W here No Accelerator Beam Has Gone Before

Last June, Secretary of Energy Bill Richardson and Speaker of the House Dennis Hastert stood on the stage in Ramsey Auditorium, and by the miracle of modern electronics, activated the beam in the Main Injector, before a live audience. A few seconds after they pushed the buttons on a couple of laptop computers on stage, beam traces on huge TV screens mounted high above the capacity audience showed the result: the two rookie accelerator operators had brought the new accelerator beam to life. The crowd burst into applause, and the Main Injector was declared dedicated.

At that moment, Steve Holmes, the Main Injector project manager, also on stage, heaved a sigh of relief. He and a few others in the audience knew that the staged event was real, that the Main Injector was operating unpredictably that morning, and that there was no guarantee that this bit of complicated stagecraft would work. There were no plans to "fake" a beam if one didn't actually materialize. What if the two honored guests had pushed the buttons and the beam plot, instead of rising obediently, had flatlined?

Plan B can now be told. Here is the scenario:

The Secretary and the Speaker push the buttons. Nothing happens. The beam trace doesn't move. Suddenly on all four big screens in the auditorium appears the control room of the Starship Enterprise, with Captain Kirk in the foreground, furrowing his brow. He looks worried.

Cut to Scotty, seated at the starship controls. Scotty shouts.

"Captain! They've completely shut down the machines! They're completely cold! It'll take thirrrty minutes to regenerate them!"

Back to Kirk, who appears to be on the verge of tears.

"Thirty minutes! We don't have thirty minutes."

Scotty again.

"Captain, I can't change the laws of physics!"

Cut.

It was a scream. Some people wanted to use Plan B even if the Main Injector worked.

Then there was "the other back-up," a second clip culled from the same Star Trek series. In this thigh-slapper, Scotty and crew are at work, frantically trying to fix something near an elevator door of the Enterprise. Mr. Spock walks in and takes a look at their efforts.

"You'd better hurry," Spock says helpfully "By my calculations, we have eight minutes until impact."

"Sorry," Scotty tells him "we can't fix it in under fourteen minutes. Not and maintain a safety factor".

"You don't have time for a safety factor," says Spock, who turns on his heel and stalks out.

The dedication committee reluctantly voted that one down. Somehow, it just didn't seem right for a Department of Energy national lab.

–Judy Jackson

A Little Help from a Prairie

You may think that Fermilab is preoccupied with the abstruse—those evanescent particles that disappear faster than you can blink.

And indeed Fermilab is. But out on the flat stretches of Midwest prairie that dot this 10-square-mile campus, other research is preoccupied with more immediate problems threatening us from just across the millennial hump: problems like global warming.

Researchers from several national laboratories have launched a study of "carbon sequestration"—how carbon gets imprisoned in vegetation, and in this case, in the grassland vegetation of a reconstructed prairie like Fermilab's.

Rainforests tend to hog all the environmental respect, but grasslands have enormous ecological value because they are so highly productive, according to Rod Walton, Fermilab's resident ecologist. Across the seasons, the grasses repeatedly grow and decompose, again and again. "Every carbon atom in a carbohydrate molecule in one of these plants is not a carbon atom in the carbon dioxide in our atmosphere," Walton said.

The researchers are tackling several questions: Exactly how does carbon enter into the vegetation of a reconstructed prairie? How much of it is sequestered, and where (at the surface or farther down in the soil)? If a reconstructed prairie can shackle carbon, might it help rid the atmosphere of harmful levels of carbon dioxide? Should we start to think about new land management practices, like encouraging the growth of prairies on farmland that remains fallow?

Global warming has become a critical issue because, as Walton put it while inventing a new word, we've long been "de-sequestering" carbon by unearthing coal, peat, and other fuels. The carbon was safely stored away for years until human ingenuity released it into the atmosphere. Now our task is not so much to sequester, but to "re-sequester."

On hearing news of the research project, Bob Betz, who has nursed Fermilab's reconstructed prairie since its inception, grew anxious, as he does whenever someone mentions cutting down anything in his carefully tended grassland garden—even if it is for research. Just how much biomass would the researchers need?

No more than a few test tubes full, they assured him. At least for now.

But in these few test tubes, the U.S. Department of Energy, which is funding the research, has vested much hope. Said DOE official Martha Krebs, "Breakthroughs … could lead to new, environmentally acceptable ways to help address global warming."

–Sharon Butler

CALENDAR

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

ONGOING

English Classes, Thursday at the Users' Center, 10-11:30, free classes. NALWO coffee for newcomers & visitors every Thursday at the Users' Center, 10:30-12, children welcome. In the auditorium, International folk dancing, Thursday, 7:30-10 p.m., call Mady, (630)584-0825; Scottish country dancing Tuesdays, 7:30-9:30 p.m., call Doug, x8194 or e-mail folkdance@fnal.gov.

FERMILAB ARTS SERIES

Fermilab's 1999/2000 Series offers an outstanding array of performances with this year's schedule featuring some of the most innovative artists performing today. Save 10% from single ticket purchase by purchasing tickets for three events. All performances take place at 8 p.m. in Fermilab's Ramsey Auditorium. For more info call 630/840-ARTS (2787) or check out our Web Page at www.fnal.gov/culture.

Ahmad Jamal
Saturday, October 2, 1999 - $22

Clarita & The Arte Flamenco Dance Theatre
Saturday, October 23, 1999 - $18

Natalie MacMaster
Saturday, November 20, 1999 - $18

Windham Hill's Winter Solstice Concert
Featuring Liz Story, Angels of Venice and David Arkenstone
Saturday, December 4, 1999 - $25

St. Louis Brass Quintet
Saturday, January 29, 2000 - $16

Leo Kottke
February 19, 2000 - $17

Solas
Saturday, March 11, 2000 - $18

Musicians from Ravinia's Steans Institute
Saturday, March 25, 2000 - $15

Jellyeye Drum Theatre
Saturday, April 29, 2000 - $16

For further information or telephone reservations, call 630/840-ARTS(2787) weekdays from 9 a.m. to 4 p.m. At other times an answering machine will give you information and a means of placing ticket orders. Ramsey Auditorium is located in Wilson Hall, the central building of the Fermi National Accelerator Laboratory. Wilson Hall, a hi-rise, is visible from the two lab entrances, from the west on Kirk Road at Pine Street and from the east on Batavia Road at Route 59.

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

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

Chez Léon MENU

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

LUNCH
WEDNESDAY, AUGUST 25

Seafood Cannelloni

Caesar Salad

Fruit Tarts

DINNER
THURSDAY, AUGUST 26

Fresh Mozzarella, Tomato and Basil Salad

Scampi

FERMI NEWS

FERMILAB
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The deadline for the Friday, September 3, 1999, issue is Tuesday, August 24, 1999. Please send classified advertisements and story ideas by mail to the Public Affairs Office MS 206, Fermilab, P.O. Box 500, Batavia, IL 60510, or by e-mail to ferminews@fnal.gov. Letters from readers are welcome. Please include your name and daytime phone number.

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CLASSIFIEDS

FOR SALE

- 1968 Yamaha Grd Prix yr-2, 350 cc,10,256 orig.mi great shape,$400. Garbage compactor almond $20 (630)557-2523 or x3011.
- 1988 Honda Civic, needs muffler, some body damage/rust,$400(630)466-7025.
- 4 rsvd.Tix:Kane County Cougars, Aug. 25, 7pm, $7.00 ea. Jim x4293, (630)585-0907.
- 1990 Ford Escort, 2 door, 94K dependable, good gas mi, $1800 OBO. Pat (630)556-3556.
- AC motor, Dayton model 6K246B, 1HP, Capacitor start, 1725RPM,115/230v, hardly used. $75markl@fnal.gov Mark, x4776
- Longhorn Western Saddle 14" seat, short round skirt, tooled w/silver trim, VG condt. $400 xlarge doghouse, $75 Diana x3704 ladydi@fnal.gov or (630)761-8164
- Homes for Endangered and Lost Pets is holding its annual Household Dog and Cat Show on Oct. 30, 31 at the Kane Cty Fairgrds, St. Charles, bring your pets. For more info/pet adoption http://members.xoom.com/help_pets. Call Teri Grandt (630)897-7427 or Marcia Teckenbrock x5417 or http://www.hep.net
- Honda Civic LX 1998, 4dr., White, automatic, ac, am fm, elec.locks/windows. 14.5K mi, warranty. $12,800 Claudio x8035 or (630)393-6526.

HELP WANTED

Mother's helper for 5-month-old, in Naperville home, three hours, twice a week, so Mom can study for exams. Call (x3351), email (topquark@fnal.gov) or stop by (Wilson Hall 1East) the Office of Public Affairs.

MILESTONES

BORN

[redacted] Cele Bruce (CD) and Dave Bruce, a contractor employed by Johnson Controls

HONORED

Bill Griffing, head, ES&H Section, on August 6, with an Employee Recognition Award for his leadership in improving safety at Fermilab.

Cindy Crego, Beth Anderson and Jean Slisz, on August 6, with an Employee Recognition Award for development and implementation of the Fermilab Technical Report Legacy Conversion Project to convert preprints, technical notes, papers, conference reports and memos to electronic form.

By "Leading Us in Commerce and Industry," an honor roll recognizing the contributions of women in business sponsored by The Business Journal, Arlene Lennox, of Fermilab's Neutron Therapy Department, for her "contributions to the economic vitality of Kane County" through her efforts on behalf of neutron therapy.

ACCELERATED

At CERN, on August 2 at 11:15 a.m., beams of electrons and positrons to 100 GeV in the Large Electron-Positron collider, setting a world record for an electron-positron collider. "The collision energy of 200 GeV opens up exciting new discovery potential for the LEP experiments," said CERN's press release.

ACED

On August 4, 1999, Alan Jonckheere from Fermi Golf League Wednesday Night Fox Valley used a 6 iron to ace the 168 yard No. 9 hole, with Darrell Sigmon, Ron Haynes, Claude King, and Byron Wagner as witnesses. Alan works at DZero.

LAB NOTE

See your Recreation Department for big discounts on our collection of Christmas cards.

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

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