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A U.S. DEPARTMENT OF ENERGY LABORATORY



It's Beginning to Look a Lot Like Run II **2**

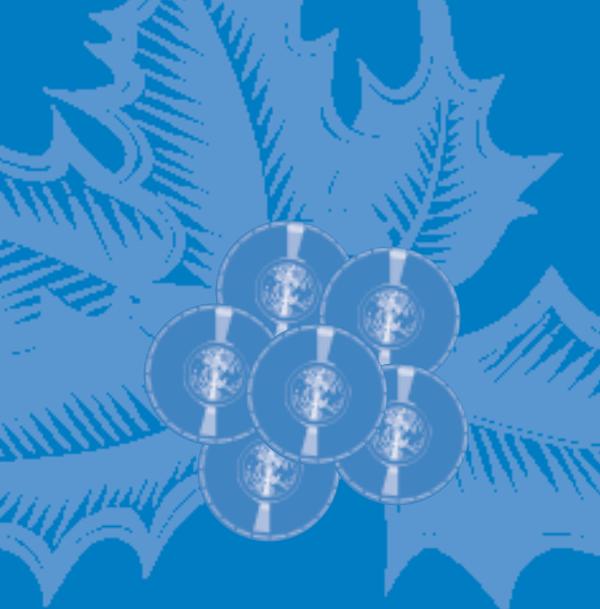
Photo by Reidar Hahn

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It's
BEGINNING
to Look
a Lot
Like
RUN II

By Judy Jackson

Like Christmas, Collider Run II sometimes seemed that it would never come. Now, suddenly, it's almost here, with a million things left to do and a dwindling number of shopping days to pull everything together. The elves at those giant toylands, CDF and DZero, have never been busier, as they prepare for the magical day when Santa Tevatron begins sending sackfuls of high-energy particle collisions to all the good boys and girls at Fermilab's collider detector experiments. Visions of fermions dance in their heads.

True, Christmas at the Tevatron will come in March 2001, and not in December; but the good news is it looks as if everyone will be home for the holidays. Both the CDF and DZero collaborations reported last week that they'll be rolling into the beamline on time. After five years and \$200 million dollars devoted to complete makeovers for both detectors, that was news worth celebrating.

In fact, CDF has already had a sneak peak at the presents. A "commissioning run" last month left collaborators beaming, verging on euphoric at the early indications of their detector's performance. Only slightly less elated were the accelerator teams who delivered billions of high-energy proton-antiproton collisions from the Tevatron accelerator they had re-awakened to duty after a long hibernation. In fact, CDF rolled out of the beamline and back into the assembly hall on November 7 with 12 million "good" events, or particle interactions, including one "poster child" event, under its belt.

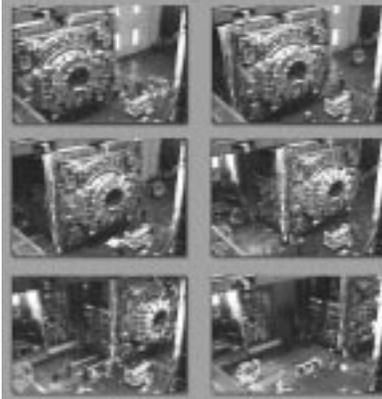
"It worked," said CDF spokesperson Franco Bedeschi. "The commissioning run was very successful. It set us up for taking data. We are on schedule for the full detector to roll in on March 1. There are a few concerns. There are still a few problems. But all the detector components are ready. The detector will operate fine. The silicon will all be ready. Some electronics may still need a little work, but they will all be minor components, not critical. They will be little things that won't slow us down in any way."

Both Bedeschi and fellow CDF spokesperson Al Goshaw credit the commissioning run with focusing their collaboration's efforts.

"The intensity of activity in the commissioning run was amazing," Goshaw said. "We had to make the detector work in record time. We had a deadline. Franco and I were worried that it wouldn't happen. We wrote to the director, asking for consideration of an extension. Then, in the last ten days, the accelerator came through marvelously. We were right on the edge of our seats."

Indeed, for the first few weeks, it looked as if the run might end with a whimper. Problems with Tevatron magnets and other components kept the accelerator from delivering the collisions that CDF was breathlessly awaiting.

CDF Roll-In 2000



Deck the halls!

CDF and DZero are coming to town.

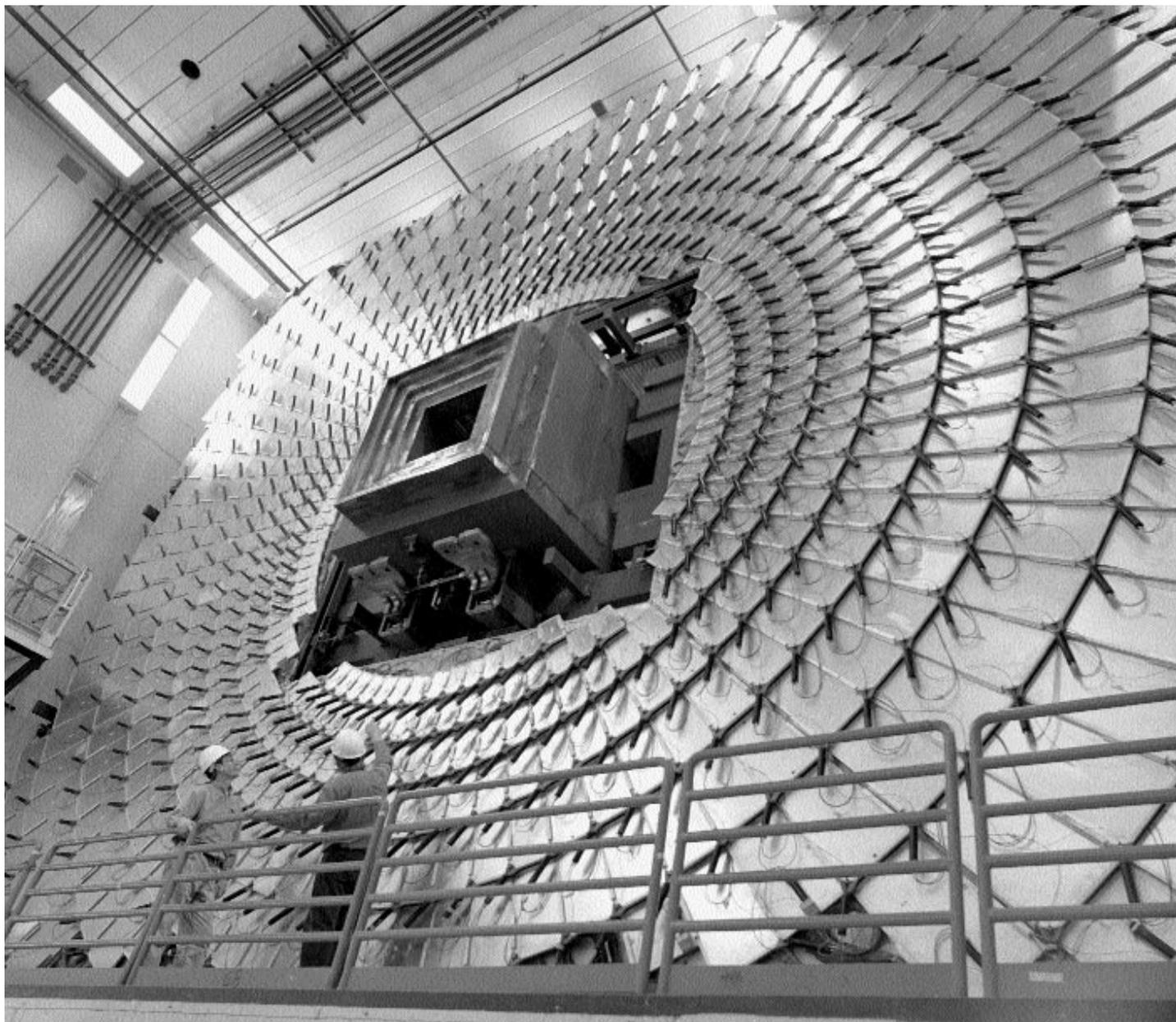
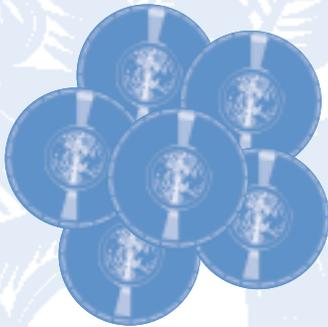


Photo by Fred Ullrich

The 150-ton C-layer muon truss, part of the DZero detector, installed in the assembly hall. Above, time-lapse shots of CDF rolling into the beamline for a commissioning run.



It's BEGINNING *to Look a Lot Like...*

Then, days before the run was due to end, it all came together. Suddenly, CDF had all the collisions they had dreamed of.

"Everything jelled," said Mike Church, of the Beams Division. "To get the collider going for a new run, there are just a lot of things to do. There was no single show stopper, just a lot of things that had to work."

Operations Chief Bob Mau cited an additional critical factor in attaining the requisite level of Tevatron performance.

"We had a hell of a lot of luck," Mau said.

Across the ring at the DZero collaboration, excitement mounted as the myriad components of their phenomenally complex and massive detector at last came together.

"All the pieces of the detector are now here," said DZero spokesperson Harry Weerts. "Only the

second half of the silicon detector has yet to come in. We are hooking up the first half of the silicon. The other half will arrive in mid-December."

Indeed, Weerts said, on a single memorable day in late November, DZero put in place both the heaviest piece of the detector, the 150-ton muon truss, and the most expensive piece, the SVX silicon detector, which cost \$7.9 million and weighs a mere 22.4 pounds.

"That works out to about three hundred and fifty thousand dollars a pound for the silicon detector," Weerts said. "We were trying not to drop it."

Indeed, both the huge scale of a modern particle detector and its intricate complexity, down to the last detail, are strikingly apparent as DZero puts the millions of components, large and small, together.

"There is an enormous amount of engineering in every piece of the detector," said Jon Kotcher, associate project manager. "It is a huge machine. The astonishing thing is the contrast between the detector's massiveness and its precision. And it is a complete revamp of concept and execution from the detector we used in Run I. It's all new. It's tight, much tighter than before. Everything has to nest very, very precisely together."



Photo by Fred Ullrich

At this critical point, only an elite team of specialists is allowed into the inner recess at the center of the DZero detector.

STOP!

THIS AREA IS RESTRICTED TO THE FOLLOWING PERSONNEL:

- AVTO KHARCHILAVA
- MIKE McKENNA
- NICK SPARTANA
- CHRIS TOLIAN
- ROLANDO FLORES
- RYAN HOOPER
- DAVE BUTLER
- DENNY GRAHAM
- BOB KUBINSKI

ALL OTHERS **MUST** HAVE PERMISSION OR ESCORT FROM MIKE McKENNA

**** VIOLATORS WILL BE SHOT ****

135.50 GeV

As the nesting proceeds, the alignment of every piece and every step must be checked and re-checked.

"Surveying is a constant job while the detector is being fitted together," Kotcher said. "Not only the pieces are a tight fit, but scheduling is a tight fit. You can't proceed with the next job until the last job is finished and surveyed, adjusted and re-surveyed."

No detail is too small to overlook. For example, in Run II, DZero will operate for the first time with a central solenoid magnet. The magnet's presence means that any tiny ferrous metal scrap or minuscule screw accidentally overlooked and left lying inside the detector would be sucked right through that expensive new silicon when the magnet turns on. Needless to say, housekeeping standards are strict at DZero these days. Martha Stewart would be proud.

In December, DZero will begin a commissioning stint of its own. However, the collisions for this round will be furnished by Mother Nature, and not by the Fermilab Beams Division. DZero will use the high-energy particle collisions created by cosmic rays streaming to earth from space to put their detector through its paces as they bring it from a dazzling collection of parts to a functioning experiment.

"There will be a mechanically complete DZero detector by March 1," Weerts said. "It will probably not have all the channels instrumented, but all the parts will be there. Some of the electronics will be late, but it will be a functioning detector. DZero will go in about the same stage where CDF went into its commissioning run."

With the end of their endless makeovers now in sight, both collaborations can now begin to focus on the point of all their efforts, the physics of Run II. Both teams have begun the transition from construction project to operating experiment.

"We are thinking about how to jump on the data when Run II starts," CDF's Goshaw said. "We have a new group of physics convenors to set targets and goals. We've set summer 2002 as our target for reporting first results. The physics will be unique."

For either detector, Weerts pointed out, it will take a few months of operating before the real results begin to emerge. Nevertheless, said Weerts, he and his DZero collaborators are already excited about the physics just ahead.

"It's the only reason I am putting myself through this," Weerts said of his role as project manager of DZero's upgrade. "I clearly see the physics in the machine. There are easier ways to make a living than being a detector project manager. But I'm curious. I'd like to see some answers."

Fa la la la, la la la ! □

The signature of a high-energy two-jet (one emerging at just past 12 o'clock, one at just past six, above) event, or collision. The event shows clearly defined particle tracks leading from the collision point to the energy deposited in the calorimeter. The collisions in the commissioning run were the highest-energy collisions ever created in a particle accelerator.



Y2K

by Mike Perricone

Whatever millennial forebodings preceded it, the year 2000 at Fermilab turned out to be much like other years for people anywhere. It was a year when we said good-bye to a cherished friend, a year when we worried about money, and wondered what lay ahead of us.

The year began with a small but valiant group of selected staff members standing watch at the lab by night for the dreaded Y2K bug. But midnight brought just another tick of the clock, and there was no computer infestation marking the transition from December 31, 1999 to January 1, 2000.

THAT WAS THE YEAR THAT WAS

Time had more important lessons to impart.

Robert Rathbun Wilson, Fermilab's founding director, died on January 16 in Ithaca, New York, following a long illness. He was 85. Wilson was the Wyoming cowboy who built the world's highest-energy particle physics laboratory with the eye of an artist, the shrewdness of a banker, and the conscience of a human rights activist.

"His spirit invades every corner of this great laboratory," said Nobel Laureate Leon Lederman, who succeeded Wilson as director. "He speaks to us through the surfaces of precast, through the prairie restoration, through the style of openness, through the flags that grace the entry."

An eloquent spokesman for science, Wilson had a memorable exchange with Senator John Pastore in hearings of the Joint Congressional Committee on Atomic Energy in 1969. Sen. Pastore asked the value of a national accelerator laboratory to the country's defense.

"It has nothing to do directly with defending our country, except to make it worth defending," Wilson replied.

Wilson was interred in the Pioneer Cemetery on the lab site in private memorial ceremonies on April 28.

Just a few weeks earlier, work had begun on the largest civil construction project in the laboratory's history, the \$30.5 million excavation of the target tunnel for the Main Injector Neutrino Oscillation Search. MINOS will send a neutrino beam through the earth, destined for a detector in a mineshaft a



Photo by Reidar Hahn

The budget crunch had everyone's attention when HEPAP meet at Fermilab, March 9-10, 2000.

half-mile underground in Soudan, Minnesota, some 450 miles away. The goal: precision measurements of neutrino mass.

The official groundbreaking for the project served up its own anticlimax on May 31. Roiling thunderstorms sent dignitaries fleeing for cover and moved the ceremonies indoors, nearly blowing away the pavilion tent intended as the setting. The symbolic shovels of earth were turned at a planter in the Wilson Hall atrium.

But concerning money, the gathering storm was more representative of the year than was the rich earthmoving contract. The lab faced a shortfall of some \$30 million in the budget for FY2001, relative to what was needed for continuing the research program without interruption; in fact, the entire high-energy physics community felt the pain of shortfalls.

Fermilab Director Michael Witherell was among the strong voices urging reconsideration in Washington, especially during a March 9-10 meeting of the High Energy Physics Advisory Panel at Fermilab. Witherell stressed the impact of the FY'01 budget for years to come. Stanford Linear Accelerator Center Director Jonathan Dorfan warned of wasting the achievements of previous years; HEPAP chairman Fred Gilman noted the extraordinary circumstances of the budget crisis, and DOE's Peter Rosen urged formulating a national plan for the high-energy physics community.

The lab's Physics Advisory Committee convened in Aspen, Colorado on June 17 without knowing the budget outcome. But the PAC endorsed the proposal for the \$150 million BTeV project. This experiment in the physics of the bottom quark at the Tevatron was described as an "ambitious" experiment with "an elegant and challenging detector," which "could be the definitive experiment that ultimately clarifies the picture of CP violation." If not the budget picture.



Robert Rathbun Wilson, 1914-2000.

Fermilab Photo



The NuMI groundbreaking moved indoors with (from left) DOE's Robert San Martin, Fermilab's Dixon Bogert and Director Michael Witherell, S.A. Healy's David Ferguson, and MINOS spokesman Stanley Wojcicki wielding the shovels.



Y2K

But another picture was clarified with the July 21 announcement of the first direct observation of the tau neutrino, the third type or flavor of neutrino, and the most elusive of the three, in the Standard Model. The DONUT experiment (Direct Observation of *Nu* Tau) had evidence for four signature events for the tau neutrino among six million interactions over two years.

And while budget talks continued in Washington, the lab continued with upgrades for Collider Run II of the Tevatron and the new configuration including the Main Injector. The 800-GeV fixed target program reached the end of the line, closing out a major era in Fermilab's history that had produced the bottom quark discovery and many other significant contributions to the field. But milestone after milestone pointed to an auspicious start for Run II:

- The Main Injector circulated antiprotons for the first time on August 1.
- The DZero detector completed assembly of its forward muon system on time, on August 24.
- The CDF detector rolled into the collision hall on September 9 to begin its engineering run, consummating a five-year, \$110-million upgrade, and soon saw its first collisions from cosmic rays.
- CDF recorded the first proton-antiproton collisions in the Tevatron's preparations for Run II, just before midnight on October 2.

The best news for the year ahead came during a Sept. 27-28 visit to the lab by Millie Dresselhaus, the new Director of the Office of Science at DOE. The lab began receiving news that the House-Senate conference had produced a budget agreement in Washington, yielding more than \$726 million for High-Energy Physics in FY'01.

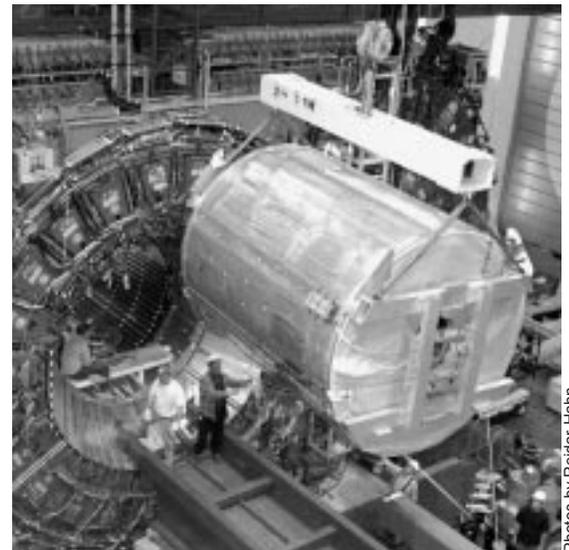
The \$277 million for Fermilab was still below the lab's estimate to run all experimental programs and keep projects on schedule, but most of the \$30 million shortfall had been recovered.

And almost immediately after Witherell said "the scientific opportunities make a very compelling case" to justify significant increases in FY2002, the Higgs raised the stakes.

In Geneva, Switzerland, scientists at CERN were announcing "tantalizing hints" of seeing the Higgs particle, postulated by Peter Higgs and others as the source of mass for all fundamental particles. But the European Particle Physics laboratory was about to shut down the 11-year run of the Large Electron-Positron Collider to make way for the Large Hadron Collider. A one-month extension yielded no further evidence, and on Nov. 8, CERN Director-General Luciano Maiani announced that LEP had been turned off "for the last time."

Chris Tully, a CERN experimenter from Princeton University, was widely quoted when he termed Fermilab "the next up to bat," and a suspected mass range around 115 GeV/C² put the Higgs squarely in Fermilab's sights for Run II beginning in March, 2001. Fermilab became the center of a flurry of media attention in Europe and across the U.S.

The Higgs was news. Science was news. Fermilab was news. The new year would bring yet another challenge. We were sure that somehow, Robert Rathbun Wilson knew and approved. □



Photos by Reidar Hahn

The CDF Central Outer Tracker was lowered into position May 11.

Antiprotons Officially Join the RECYCLING Effort

In April 1999 John Barilla and fellow technicians installed the last connection for the vacuum system of the Recycler. The first antiprotons traveled through the ring on November 6, 2000.

by Kurt Riesselmann

To the ubiquitous arrays of recycling bins labeled *Cans Only*, *Bottles Only* and *Paper Only*, Fermilab now adds its own unique category: *Antiprotons Only*.

Traveling near light speed, antiprotons dashed for the first time through the two-mile circular pipe of Fermilab's newest storage ring, the Antiproton Recycler, on Monday, November 6, 2000.

Designed to reclaim "used" antiprotons and store them for more than ten hours to be used again, the Antiproton Recycler is an integral part of Fermilab's plan to produce 20 times more proton-antiproton collisions in the Tevatron than were created in Run I. The Recycler will save time and money and expand the lab's Run II experimental reach by taking antiprotons previously discarded after being run through the Tevatron, and using them again. The Recycler is expected to contribute a factor 2.5 in the number of particle collisions, a significant step in increasing the chance that the Tevatron will produce the Higgs particle, the key to understanding the origin of mass.

The eighth-largest particle machine ever built, the Recycler is the only one of its kind. While its cousins accelerate particles to higher and higher energies, the Recycler will store and condense antiproton beams, keeping the beam energy at a steady 8 GeV. This fundamental difference allowed physicists Gerry Jackson and Bill Foster to propose the use of permanent magnets, and the Recycler ranks as the world's largest assembly of permanent magnets.

"Previously, at least 75 percent of the antiprotons were still circulating when the beam density became insufficient and the beam had to be discarded from the Tevatron," explained Cons Gattuso, one of about 15 scientists presently working on the Recycler. "In the future, the Tevatron will send the antiproton beam back to the Main Injector, and from there into the Recycler."

The beam then will be reshaped and replenished with additional antiprotons. Shape and density are important properties of particle beams. They are critical to the number of collisions produced when two beams collide. Once injected into the Tevatron, the quality of a beam deteriorates over time, making it less likely that interactions will take place. After circulating for many hours, the proton and antiproton beams become too diffuse and are discarded.

Not any longer. With the Recycler, Fermilab will be able to save the hard-to-make antiproton beams and use them again.

The commissioning of the Recycler, the art of tuning it to achieve the design performance, is still in progress. If Gattuso and his colleagues achieve their goal, Fermilab's beam operators will be able to inject a new high-density antiproton beam into the Tevatron



Photo by Reidar Hahn

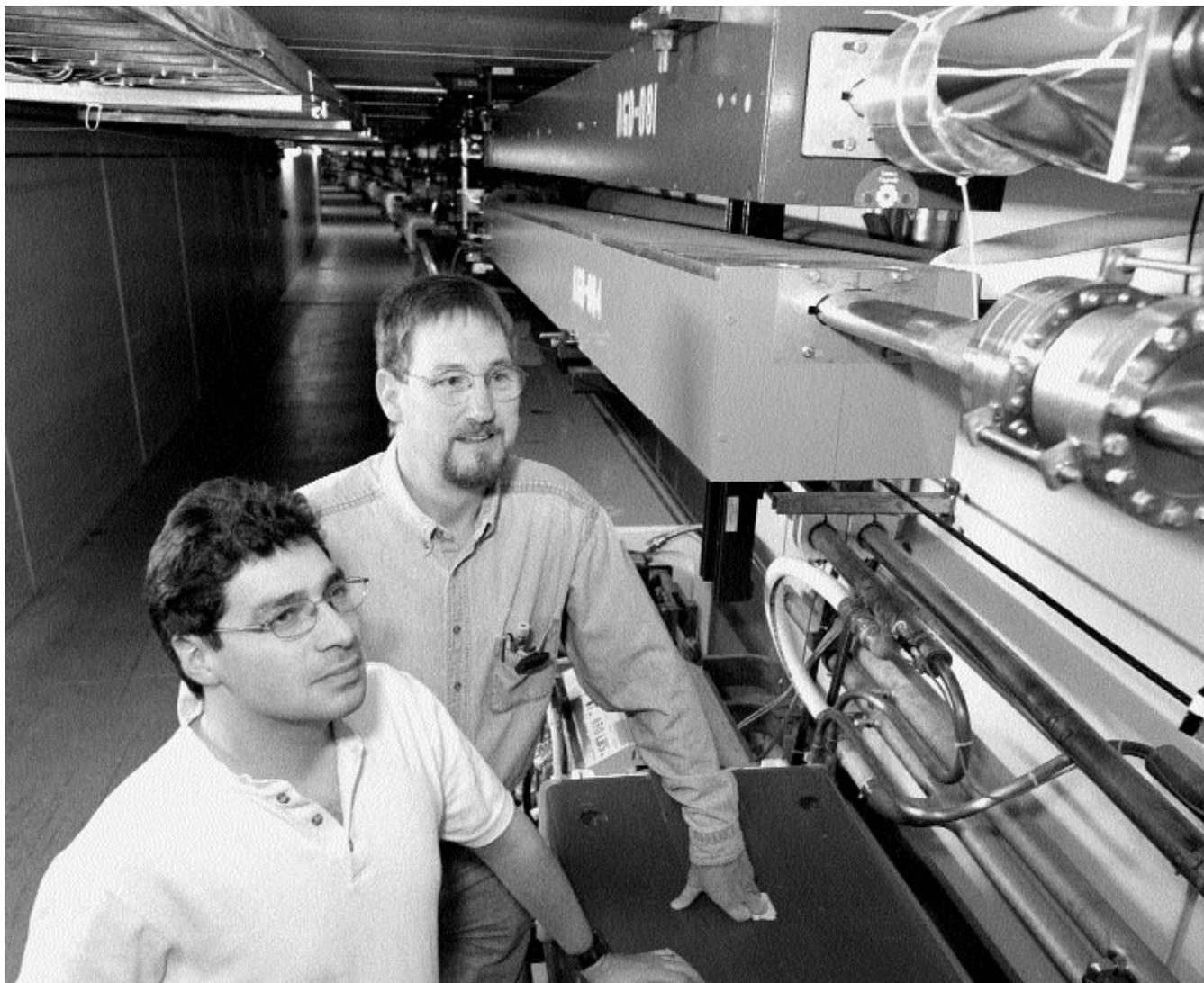


Photo by Reidar Hahn

Cons Gattuso (left) and Dave Johnson are two of about 15 people who work on commissioning the Recycler ring (top right). A transfer line (below the Recycler) allows for sending antiprotons from the Main Injector ring (bottom) to the Recycler.

approximately every eight hours. In the past, stores were kept for nearly 24 hours.

The Recycler ring is located underground in a tunnel also housing the Main Injector, the new accelerator that transfers particles to the Tevatron. (see “The Main Injector Issue,” *FERMINEWS*, Vol. 22, No. 11, June 1, 1999). During the construction of the Main Injector, project manager Steve Holmes realized that the contingency funding for the project was great enough to invite an expanded vision.

Physicists suggested using the extra money to enhance the Tevatron’s future. With space to spare in the Main Injector tunnel, Foster and Jackson proposed adding the Antiproton Recycler. DOE approved the plan in February 1997, before the completion of Main Injector construction.

The work on the Recycler was carried out in the spirit of Robert Wilson, Fermilab’s founding director. Cutting back on desirable but expensive equipment, scientists designed a storage ring at a minimal cost. At the end, the construction of the Recycler under project manager Gerry Jackson’s leadership cost less than \$15 million, far less than any comparable machine, and using only about three-fourths of the contingency funding available.

“There were many adventurous things about the design of the Recycler, besides the use of the permanent magnets,” said Foster. “Most of them worked well—for example Gerry’s design of the vacuum system, which is half the price of the Main Injector vacuum system and produces 100 times better vacuum. There were also other places where we did things on the cheap – and got nailed to the wall.”



Antiproton

RECYCLING

For example, to save cost, the Recycler has only about one-tenth the number of orbit corrector magnets of typical machines. However, when combined with a lack of adequate beam monitoring equipment, the low number of correctors left physicists feeling as if they were blindly shooting particles down the beam pipe. Improvements to the beam monitors and correctors have remedied the situation.

The first particles circulated in the Recycler in the fall of 1999, when physicists tested the new machine with protons. With the same mass and opposite electric charge, protons can travel through the Recycler in the opposite direction of antiprotons.

“We have lots of protons to use for commissioning,” said Shekhar Mishra, head of the Main Injector department, who leads the commissioning of both Main Injector and Recycler. “We can put in a beam of protons every three seconds. But antiprotons take much longer to produce, cool and transfer.”

Even using the improved antiproton source, Fermilab would need more than two billion years to produce just one gram of antiprotons. So, to save time and money, most of the commissioning work of the past year has relied on protons. Only after good results with proton beams did physicists decide to introduce antiprotons.

“We have come a long way in the last six months,” said Mishra. “It has been an enormous effort by lots of Beams Division staff in software, instrumentation and alignment. Besides Dave and Cons, several Main Injector physicists, including Ming-Jen Yang, Krish Gounder, Stan Pruss and Martin Hu to name a few, are working hard to understand the new machine. Many other departments, including RF&I, Controls, Mechanical, EE, Operations and Alignment Group of PPD have been working very hard on the Recycler. It is rather remarkable the way everyone has come together to make the Recycler work.”

Dave Johnson, who has worked with Jackson and Mishra on the design of the magnet configuration, admires the interplay of the different groups.

“It has to work like gears cogged together,” he said. “The different accelerators and the people behind them are all so dependent on each other.”

At present, moving particles around and transferring them from one accelerator to another requires a lot of manual coordination. To improve operations, Mishra’s team has to upgrade the magnet configuration and alignment and install more correcting magnets and new shielding. Working on a tight budget and with few people, Mishra expects to have the Recycler ready in Summer 2001. To complete the work as early as possible, commissioning will continue through the Christmas holidays.

“When all accelerators are commissioned, we can flip a switch and the beam should just go around,” said Gattuso, who formerly worked in the Main Control Room as an operator, flipping the very switches whose functions he now helps design.

“There are a lot of major hurdles that still need to be crossed,” Gattuso said. “But things are starting to come together.” □



Photo by Reidar Hahn

The Recycler contains two miles of beam pipes. Welding the vacuum tubes created airtight connections.

Silence is Golden

ELECTRIC TRUCKS

by Mike Perricone

Quietly (very quietly), Fermilab's Facilities Engineering Services Section has taken three significant steps toward complying with a major Federally-mandated reduction in fuel consumption.

Under a 1999 executive order by President Clinton, federal agencies face a deadline of 2005 when they must cut their fleets' use of petroleum-based fuels by 20 percent from 1999 levels; specific saving strategies are left up to the agencies. At Fermilab, the strategy includes the recent delivery of three electrically-powered Ford Ranger pickup trucks. Ironically, the Ranger fails one critical visual test: from the outside, even from the inside, it's difficult to identify this truck as a four-wheeled paradigm-shifter.

"I thought it might look a little hokey, but it really doesn't," said Bill Shull, FESS Operations Group Manager. "It looks, feels and drives just like a conventional vehicle. It's a more mature design than I anticipated. Unless you look under the hood, you think you're driving an internal combustion engine."

Even the dashboard can fool you at first glance. It includes a "fuel gauge" with an apparently standard gas pump icon, and it takes some close peering-in to see that the pump's filler hose ends, not with a nozzle, but with an electric plug.

The first overt sign that this isn't your Uncle Buck's pickup truck comes with turning the "ignition key:" Nothing happens—nothing you can hear. It's as if the key goes only as far as the "Accessory" click. No coughing starter, no auditory cues that combustion is taking place. And, of course, there is no combustion taking place.

The loudest noise comes during braking, with a little bass-toned "thrum" added to the faint whine of the 90-hp motor and single-speed, rear-mounted transaxle (acceleration is 0-50 in 12.5 seconds, though the lab speed limit is 40 mph). The Ranger uses regenerative braking to partially replenish the charge in the 39 eight-volt, sealed lead-acid batteries mounted under the frame.

"It's pretty responsive, and it drives almost like a normal car," said Transportation Supervisor George Davidson. "I like the quiet. It seems kind of nice, but it is hard to get used to."

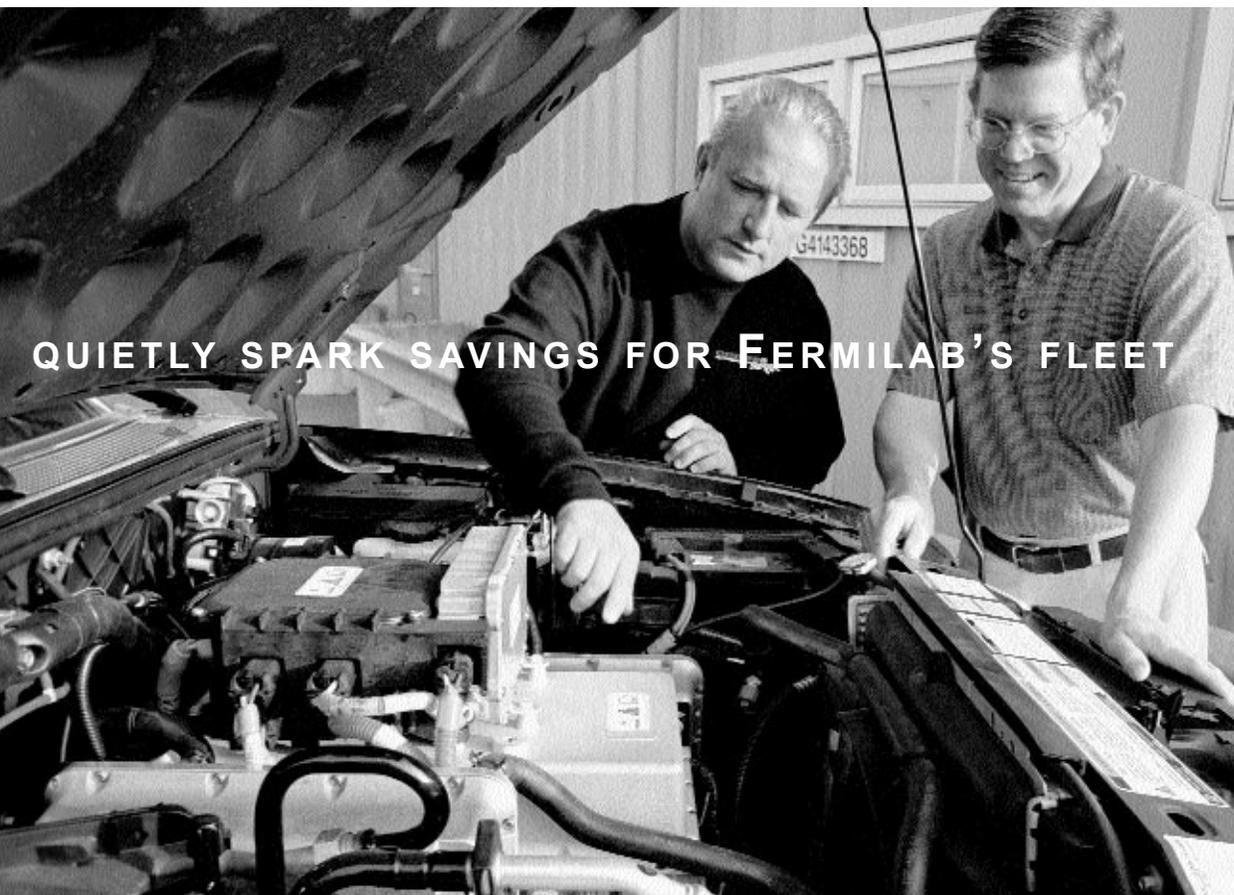
The electric Ranger "Zero Emission Vehicles," leased from a local Ford dealer for three years through the Government Services Administration, will require a few other accommodations.



Photos by Raïdar Hahn

FESS Operations Group Manager Bill Shull demonstrates "plug-in refueling" on one of the lab's new electric Ford Ranger pickup trucks.





QUIETLY SPARK SAVINGS FOR FERMILAB'S FLEET

Shull and George Davidson (left) check under the hood and point out the differences in the electric Ranger's running gear.

Their range is optimistically estimated at 74 miles, but Davidson explained that estimate is based on a 72-degree day, with no heating or air conditioning, and no stop-and-go driving. He thought 40 to 50 miles was more realistic, though sufficient for on-site use by FESS engineers and technicians. The lab had to purchase three battery chargers (at \$2,200 each) in order to use the electric Rangers; two have been installed at Site 39, and the third at Site 38, in the vehicle maintenance area. The trucks can be charged at any time; the batteries don't need to be completely run down, as with many cellular telephones. Davidson said drivers will be asked not to leave the truck idling, a major power drain. But as compensation in severe Batavia winters, the electrical system delivers heat instantly.

Fermilab's transportation fleet of 264 vehicles uses about 95,000 gallons of fuel annually, including about 25,000 gallons of diesel fuel. In addition to the electric Rangers, FESS currently has alternative fuel vehicles in two other categories, but not yet the facilities to take full advantage of them:

- Compressed Natural Gas—these nine vehicles can run on either gasoline or CNG, but the lab doesn't currently have a CNG refueling facility.

In its energy partnership program with NICOR, which played a critical role in recent upgrades to the Central Utility Building (see "All Pumped Up," *FERMINEWS*, Vol. 22, No. 4, Feb. 19, 1999), the lab is working on a proposal to add a CNG tank to its fueling station, possibly in 2001.

- E-85 Flex Fuel—these 10 vehicles (five are Fermilab's, five are GSA's) can run on gasoline or on mixtures of up to 85 percent alcohol (ethanol). FESS is seeking funding for 2002 to install the tanks and pumps capable of handling the ethanol mixture.

FESS can also use "biodiesel" in its diesel-fueled vehicles, a mixture of 20 percent soy-based diesel added to conventional diesel fuel. Biodiesel is costly, but it requires no additional infrastructure and could become a more economical choice if diesel prices remain high.

Davidson is keeping an e-mail log of comments from drivers of the electric Rangers, which are on a non-renewable lease and will be returned to Ford when the contract expires.

"Maybe they'll even have a new and improved version by then," Shull said. "I think we've found a really good match." □

the

Moxie, calculus and 'The Wall'

He made a shining debut with *Marjorie Morningstar*, etched the indelible image of Captain Queeg and the ball bearings in *The Caine Mutiny*, and brought a historian's rigorous standards to *The Winds of War* and *War and Remembrance*. Yet Herman Wouk wondered aloud if he still had the "moxie" to take on a new novel.

"After all, it's been a few years since I've really told a story," said Wouk, 85, on a November 15 visit to Fermilab. His exploratory mission enhanced the possibility that he would write a story centered on a scientist, a project on his mind since the days of his friendship with the late Glenn T. Seaborg, original director of the U.S. Atomic Energy Commission.



"Glenn would write books about science, and he always wanted my advice about selling them," Wouk recalled.

"I would have him explain science to me, and he'd ask me when I was going to write a book about a scientist."

During a visit shortly before Seaborg's death in February 1999, Seaborg said: "Herman, you still haven't written that book about a scientist."

"I thought I'd better do it," Wouk said.

Through mutual acquaintances at Columbia University, Wouk contacted former Fermilab Director John Peoples to view high-energy physics research first-hand, and to delve into the life and loss of the Superconducting Super Collider. Peoples, now head of the Sloan Digital Sky Survey, had been assigned to dismantle the SSC after Congress pulled the plug on funding in 1993. Peoples toured Fermilab with Wouk, and hosted a luncheon with some old SSC hands to turn back the pages.

Wouk offered a candid insight into the central problem of writing about science.

"I've always felt that the wall separating science from most people is mathematics," he said. "It's so difficult to explain much of science without using mathematics."

Wouk recalled a visit to physicist Richard Feynman at Cal Tech, while researching the work on the atomic bomb for *The Winds of War*.

"Feynman said to me, 'Do you know any calculus? You should learn it. It's the language that God speaks.' So I did some studying. I found so much beauty in the equations. I knew that if I had another lifetime, this is what I would do."

Physics of The West Wing

Speakerphone voice: "It's called the 'Theory of Everything.'"

Wry response: "Is that comprehensive?"

Speakerphone: "Let me hear you say it: '*Physicists* at Cal Tech and the Fermi National Accelerator Lab have announced...'"

The speakerphone voice belongs to Josh Lyman, deputy chief of staff to President Josiah Bartlett, pleading with presidential press secretary C.J. Cregg to remember to say "physicists" and not "psychics" in her daily press briefing. But comes the big moment, and yes, C.J. does indeed refer to "*psychics* at Cal Tech and the Fermi National Accelerator Lab...."

(Prompting this quip from one member of Fermilab's hierarchy: "Maybe we *should* hire some psychics. They might help us around budget time.")

The setting is the fictional White House of NBC-TV's *The West Wing*, at the opening of the October 18 episode. Any announcement of the Theory of Everything remains fictional (or at least, conjectural), notwithstanding the next morning's calls to Fermilab and queries from unofficial websites dedicated to tracking events on the show and their relation to reality.

Later in the October 18th episode, Lyman discourses on superstring theory. Maria Stasi, publicist for *The West Wing* at Warner Bros. Productions in Burbank, California confirms that researchers for the multiple Emmy Award-winner keep up with "Science Times" in *The New York Times*, and at least one researcher has read Brian Greene's *The Elegant Universe*,

reflecting series creator Aaron Sorkin's own interest in science. The Nov. 29 episode's subplot involved a failed NASA mission to Mars (art imitating life), giving Pres. Bartlett (Martin Sheen) a chance to show off his command of Martian esoterica, including

the red planet's daily highs and lows in degrees Celsius. His adviser cautions him about appearing to be a know-it-all.



"God forbid we should have a President who appears to be smart," Bartlett says.

—Mike Perricone

of

the

CALENDAR

ONGOING NALWO

■ Free English classes in the Users' Center for FNAL guests, visitors and their spouses. The schedule is: Monday and Friday, 9:30 a.m. - 11:00 a.m. Separate classes for both beginners and advanced students.

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

DANCING

■ International folk dancing, Thursdays, 7:30-10 p.m., Village Barn, newcomers always welcome. Scottish country dancing, Tuesdays, 7:30 - 10 p.m., Village Barn, newcomers always welcome. For information on either dancing group, call Mady, 630-584-0825 or Doug, x8194, or e-mail folkdance@fnal.gov.

■ The Fermilab Barn Dance series, featuring traditional square and contra dances, takes place every second Sunday evening at 6:30 p.m., Village Barn. Come with or without partner and family. Admission: \$5 for adults, \$2 age 12-18, free for under 12. For information contact Dave Harding, x2971 or Lynn Garren, x2061, or check the webpage at www.fnal.gov/orgs/folkclub/.

MILESTONES

BORN

■ Sophie Z. Beacom, on Nov. 22, to John (Theoretical Astrophysics) and Jenna Beacom.
■ Sophia Ayelen Mostafa, on Dec. 11, to Miguel (PPD-DZero) and Clarissa Mostafa.

RETIRING

■ William Beckley, ID 1398, ES&H Fire Group effective December 20, his last day of work was December 8.
■ Clifford Worby, ID 3433, FES-OP-Electrical, his last day of work was December 8.

■ Nathaniel Barnes, ID 1925, FES Services, December 29, 2000.

LABNOTES

■ The Lederman Science Education Center is closed from Friday, December 22, 2000 thru Monday, January 1, 2001.

PUBLISHED

■ By David F. Anderson (ID 06301, PPD-MINOS), co-author with Scott Eberhardt:

Understanding Flight (McGraw-Hill, \$34.95, ISBN 0-07-136377-7). Provides clear grasp of physical flight; explains wing design, propulsion, and high-speed flight; covers airplane construction and performance. Available at Fermilab's Office of Public Affairs.

VISITED

■ By Elvin Harms (ID 03996N, BD-BS-Antiproton Source Dept.): Hall School's Cub Scout Pack #358 in Aurora, on November 21. Harms' presentation brought written thanks for providing "a positive role model as a scientist, a professional and a person."

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

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



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CONTACT TITA, X3524
[HTTP://WWW.FNAL.GOV/FAW/EVENTS/MENUS.HTML](http://www.fnal.gov/faw/events/menus.html)

LUNCH WEDNESDAY, DECEMBER 20

Sauteed Shrimp and Red Peppers
Spinach with Lemon Zest
Saffron Rice
Eggnog Cheesecake
with Cinnamon Crust

DINNER THURSDAY, DECEMBER 21

Red Pepper Soup
with Julienne of Zucchini
Stuffed Rolled Flank Steak
Lemon Risotto
Xmas Salad
Raspberry Parfait
Assortment of Cookies

LUNCH WEDNESDAY, DECEMBER 27

Closed

DINNER THURSDAY, DECEMBER 28

Closed

LUNCH WEDNESDAY, JANUARY 3

Cheese Fondue
Salad of Field Greens
with Raspberry Vinaigrette
Sliced Marinated Oranges
with Candied Rind

DINNER THURSDAY, JANUARY 4

Winter Squash Soup
Spiced Monkfish
Saffron Rice
Vegetable of the Season
Rum Raisin Souffle

LUNCH WEDNESDAY, JANUARY 10

Chicken Enchiladas
Rice and Beans
Pico de Gallo
Pineapple Flan

LUNCH WEDNESDAY, JANUARY 17

Pork Loin
with Braised Red Cabbage
Roasted Dill Potatoes
Apple Pie

DINNER THURSDAY, JANUARY 18

Sopade Ajo
Paella
Garbanzo and Red Pepper Salad
Almond Cake

DINNER THURSDAY, JANUARY 11

Booked

F E R M I
N E W S

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CLASSIFIEDS

FOR SALE

■ '97 Jeep Wrangler SE - 42K miles, 5-speed, soft top, great fun! \$11,500. michthom@fnal.gov or call x4855

■ '96 Ford Taurus GL 4 door sedan. Silver gray, new tires and only 45,000 miles. \$7,500. Phone 630-355-9282.

■ '94 Honda Civic EX 4dr., dark green, 5 spd, 85k, A/C, antilock brake, cruise control, dual air bags, power brake/lock/mirrors/moonroof /windows, AM/FM, Cassette, in excellent condition, \$6,800 o.b.o. Contact John at x6088.

■ '90 Ford Probe, 6 cylinder, 3.0 L black with red interior, no rust 5 speed, good starter, 115k miles \$2,000 or best offer Greg or Chris Lawrence 630-557-2523

■ '86 VW Golf seeks good home. Needs some attention but runs. Has normal maintenance & old age ailments. 225k miles with original: owner, clutch, engine, & 5 spd trans. Newer: radio, tires, rust. Ave. 32 mpg commuting, started OK on cold days in Nov. For details, contact x4505, or lambertz@fnal.gov

■ Swedish snows for a venerable Volvo: set of four (4) Gislaved 195/65-R15 used winter tires mounted on black steel rims, \$75. E-mail mikep@fnal.gov

GREAT STOCKING STUFFERS: Fermilab Arts Series tickets. Great seats still available for Trio Settecento (\$18; Sat., Jan. 27) and Maynard Ferguson (\$25; Sat., Feb. 17). Check the web at www.fnal.gov/culture.

■ RC airplanes, radio, and accessories. Planes need some work. Call Fred x4271 or nobrega@fnal.gov. Moving sale. Refrigerator, couch, end tables, chairs, la-z-boys, cabinet, bookshelves, Q bed with dresser and night stand, charcoal BBQ grill, edger, K2 snowskis with boots, wall hangings, kitchen accessories and more - call Lucy x2241 or brega@fnal.gov.

■ Palm VIIx. Brand new - still in box. Asking \$440. Call Mark 979-2724

■ Gray/green dresser in good condition. Approximately 46"H x 36"W x 18"D with 5 Drawers: \$50. Late 1960's-style office chair with wheels: free with the dresser! Contact Burt Holzman, bholzm1@uic.edu / (312) 243-2614

■ Classical guitar, Suzuki G-15, very good condition, \$290 with hard-shell case; guitar amp combo, Marshall VS65R, 65W, valve preamp, reverb, like new, \$320. Call Giulio at 630-840-4855. stancari@fnal.gov

■ Electric dryer Whirlpool 5-cycle 3-temp dryer. \$50 or best offer. Note since this is an electric dryer you need a 220V outlet. Call 836-9151 ask for Drew or Julie.

■ 10' (maybe 12'?) artificial Christmas tree. Call Margaret x2625, or votava@fnal.gov.

■ TV stand new unassembled, still sealed in box. Black laminate with glass doors and shelf for VCR and tape storage. Approximately 36" wide by 18" high. \$25. Mark x2253.

■ Kids winter gear: girls white figure skates (worn twice), size 1, \$6.00. Boys or girls all black fur-lined Sorel snow boots, size 1, \$10; black overall-style ski/snow pants, size 5/6. All in excellent condition. Contact crogers@fnal.gov/x3824.

■ Moving sale: mountain bike with shocks, \$100; mountain bike, \$50; twin air mattress, \$10, rollerblades (size 10 women's, size 8 mens) with bag, wrist guards and knee pads, \$50; ice chest, \$5; halogen lamp, \$5. E-mail michthom@fnal.gov or call x4855.

WANTED

■ Old chalk statuettes, prizes from amusement park and carnivals, and any old carnival memorabilia. Bill x32541. .

FOUND

Expensive flashlight, E4 service building, 11/21/00. Terry x8181.

FURNITURE REFINISHING

Repairs and restorations, pick-up and delivery available. 815-695-5460.

FOR RENT

■ Warrenville: 3-room apartment in private home. Kitchen, living room, bath/bedroom, private entrance. Monthly, \$700. Call Cara 630-393-9161.

FOLK DANCERS PERFORM AT MUSEUM OF SCIENCE AND INDUSTRY

Fermilab's International Folk Dancers will present a costumed performance at 2:45 p.m. Saturday, Dec. 16, at the Museum of Science and Industry in Chicago, as part of the museum's Christmas Round the World/Holidays of Light Festival. The program will feature dances and costumes from Israel, Mexico, Austria, Hungary, Bulgaria and other countries. Several members of Fermilab's Silk and Thistle Scottish country dance group will also be performing at the Museum, just before the folk dancers in the 1:30 p.m. performance of the Royal Scottish

Country Dance Society. The festival is free with museum admission, with more information available by calling the museum at 773-684-9844. The following Tuesday and Thursday, the Scottish and international folk dance groups will hold holiday parties during their usual Tuesday and Thursday dance times at Fermilab's rustic Village Barn, and all are invited to join in and try the dancing. For more information, call Mady Newfeld at 630-584-0825.

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



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