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Photo by Fred Ullrich

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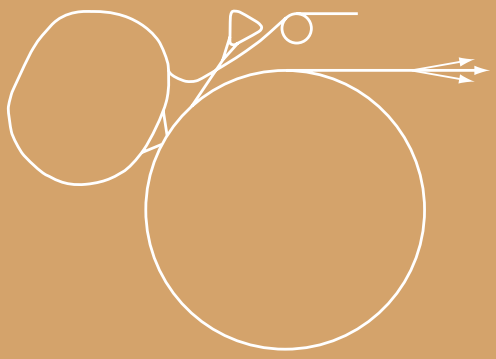
# Happy Holidays!

## *Inside: A Special Round-Up of 2002 at Fermilab*



# Physics Driver

by Kurt Riesselmann

When you drive your car along a highway, you probably don't think too much about all the things that need to function properly: the pistons moving up and down, the gasoline flowing into the fuel chamber, the spark plugs firing at the right time. Likely, you just get into your car, start the engine, put it in gear —and go.

The driving done by Fermilab's accelerator operators is far from being that simple. It requires five years of training. Instead of gears, operators engage a chain of increasingly more powerful accelerators. Instead of combustion engines, they monitor the energy provided by powerful "microwave ovens." And instead of 65 miles per hour, they accelerate particles close to the speed of light.

"There are 66,000 parameters that we can control," said Bob Mau, head of Fermilab's Accelerator Operations department. "If not set properly, every single one can effect beam operation, perhaps terminating a store."

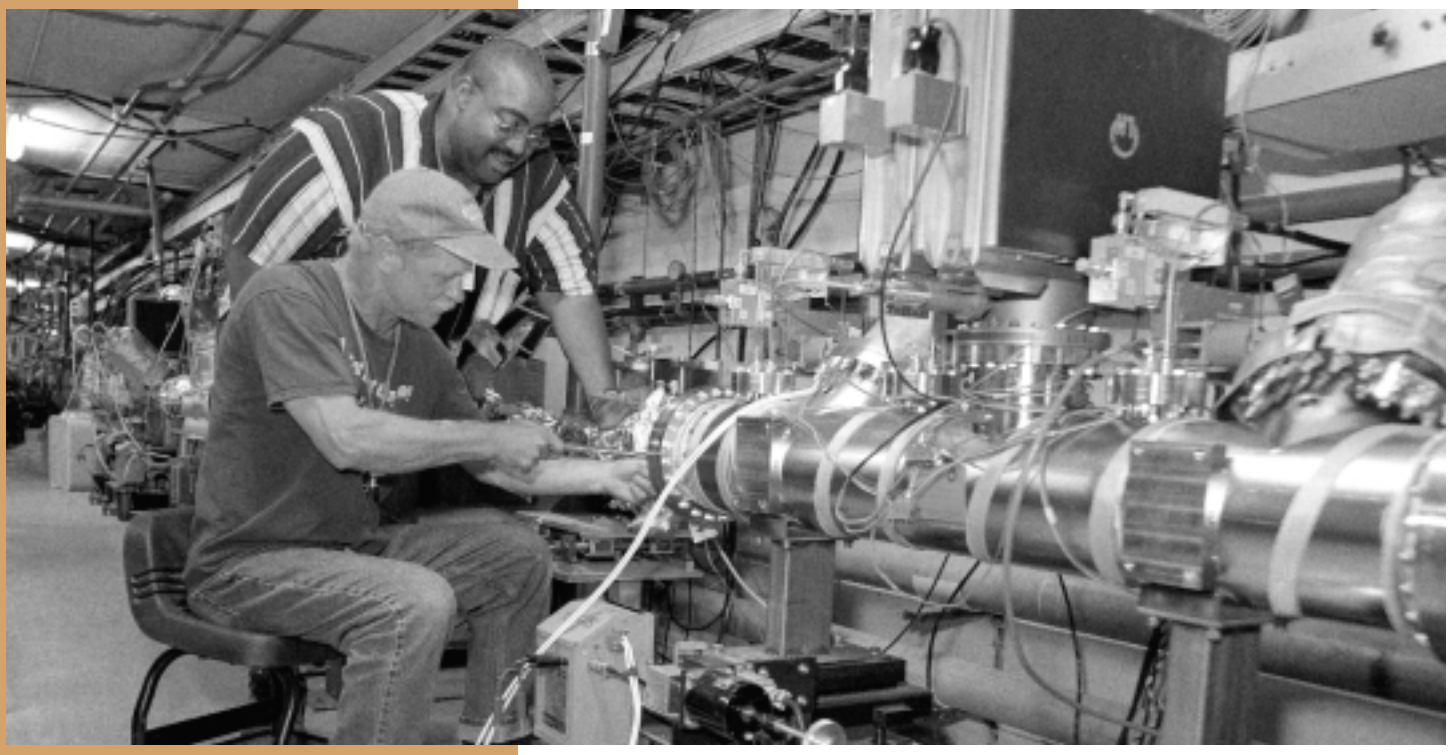


Photo by Reidar Hahn

The installation of core cooling tanks in the Antiproton Source improved the antiproton beam properties, leading to better transfer efficiencies. Phil Crabtree (front) and Halbert Landers are two of the experts who worked on the project in June 2002.

# 2002 sees TEVATRON SPEEDING UP

| FERMILAB ACCELERATOR RECORDS | Run I | Run II | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1992-1996 | 2001 | 2002 | | | | | | | | | | |
| | | | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
| Tevatron peak luminosity records ($10^{31}cm^{-2}sec^{-1}$) | 2.5 | 1.1 | | 1.2 | | 1.6 | | | ***2.6*** | | ***3.0*** | ***3.6*** | ***3.7*** | |
| Tevatron weekly integrated luminosity records (inverse picobarns ($pb^{-1}$)) | 4.9 | 1.7 | 1.9 | | | 3.0 | 3.7 | | | | 4.8 | ***6.7*** | | |
| Antiproton Source stacking rate records ($10^{10}$ antiprotons per hour) | 7.2 | ***10.2*** | ***11.0*** | | | | | | ***11.5*** | | ***12.4*** | | ***13.0*** | |

**First exceeded Run I record.**

In 2002, the upgraded Fermilab accelerator complex broke the last remaining records of the Run I era.

Store is Fermilab's technical jargon for a large number of particles doing laps inside the Tevatron ring, the world's highest-energy accelerator. During a store, protons and antiprotons race through the Tevatron tunnel in opposite directions, with the speedometer showing an impressive 670 million miles per hour. Physicists use the two particle beams to initiate powerful head-on collisions to learn more about the building blocks of matter and their role in the evolution of the universe.

To get the best performance, accelerator experts constantly tune their particle machines. In the past six months Fermilab accelerators have broken several performance records. But you won't hear the physicists talk about "horsepower" or "revolutions per minute." Instead, they get excited about "inverse picobarns," a measure for integrated luminosity, the number of collisions recorded during a store.

During the second week of October, beam experts achieved an all-time Tevatron record of 6.7 inverse picobarns in a single week, more than a factor four larger than the weekly integrated luminosity twelve months ago. They also set several all-time records for the highest peak luminosity, with a current top value of $3.7 \times 10^{-5}$ inverse picobarns per second.

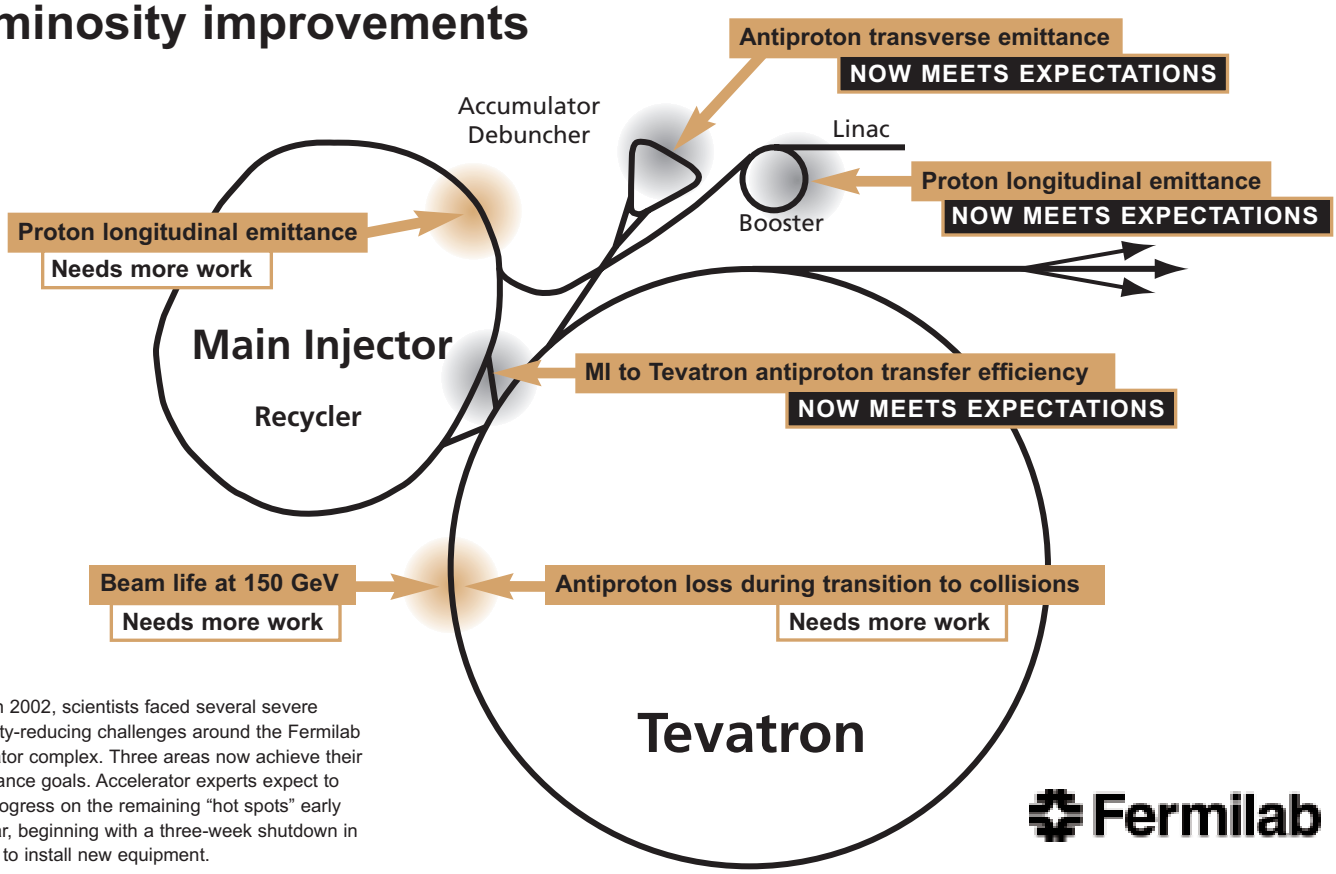
"Over the past year, we've investigated over fifty ideas to improve the Tevatron performance," said Vladimir Shiltsev, the head of the Tevatron Department. "Five attempts were really successful, resulting in major improvements. Ten attempts were so-so, and the others didn't fly. It is a continuous search."

During 2002, scientists and engineers have carefully studied and adjusted subsets of the 66,000 accelerator parameters to increase beam luminosity, improving the rate of collisions. In March, a graphic published in *FERMINEWS* explained the troubles beam experts had identified at that time (*FERMINEWS*, March 1, 2002, Vol. 25, No. 4). The updated version (see graphic on page 4) shows that scientists have corrected many of them.

"At the beginning of the year, we still had large problems with transfer efficiencies, getting particles from their point of production through several stages of acceleration into the Tevatron," Shiltsev said. "These problems have largely been resolved."

Fermilab's antiprotons, for example, travel through three different accelerators before arriving at the Tevatron. Each transfer from one accelerator to another is comparable to transferring water from a container into an empty bottle using a garden hose. If the diameter of the hose is larger than the opening of the bottle, a lot of water will be spilled, resulting in low transfer efficiency. Repeating the inefficient transfer process several times, pouring the water from one bottle into the next, the losses quickly add up. If the bottles have leaks, the total efficiency drops even more.

## Luminosity improvements




In March 2002, scientists faced several severe luminosity-reducing challenges around the Fermilab accelerator complex. Three areas now achieve their performance goals. Accelerator experts expect to make progress on the remaining "hot spots" early next year, beginning with a three-week shutdown in January to install new equipment.

Handling antiprotons, arguably the most precious particles on earth, scientists try to minimize losses as much as possible.

"In March, we saw a total efficiency of 30 percent in getting particles to the collision point," said the deputy head of the Beams Division, Mike Church, recalling the problematic performance of the accelerator complex at the beginning of the year. "Now we are at 70 percent, which is better than during Run I. Our goal is 80 percent."

Collider Run I ended in 1996. During the next five years, scientists and technicians upgraded Fermilab's accelerator complex. The construction of a new "switchyard accelerator," called the Main Injector, was equivalent to installing a new transmission in a car.

On March 1, 2001, Run II began. It took more than a year to work out the kinks of the upgraded accelerator complex. In the summer of 2002, for example, technicians installed additional equipment in the Accumulator, an accelerator ring that stores antiprotons.

"It was like doing open-heart surgery on the Accumulator," said Dave McGinnis, head of the Antiproton Source group. "We carried out two extremely ambitious projects. They allowed us to reduce the antiproton beam size by about a factor two and a half, leading to an increased transfer efficiency."

Because of better beam cooling equipment and reprogrammed particle trajectories, scientists now manage to transfer more antiprotons from the Accumulator to the Main Injector, from which the particles are sent to the Tevatron. Also, the rate of antiproton production is now 30 percent higher than at the beginning of the year, almost twice the rate of Run I.

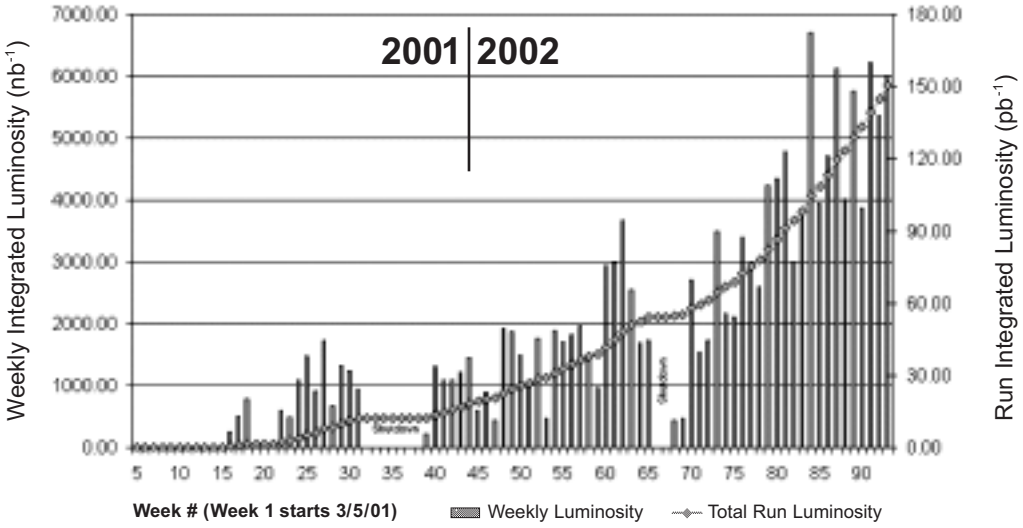
"In a typical store we now have a factor four more antiprotons in the Tevatron than in December 2001," said Tevatron department head Shiltsev.

Delivering more particles to the Tevatron is only the first—although most important—step in improving the luminosity. At present, too many particles—both protons and antiprotons—are lost while circling the four-mile Tevatron ring.

"We see a stability problem in the Tevatron," said Church. "The beam oscillates in an uncontrolled fashion and as a result the beam size increases. In addition, the proton beam has a lifetime problem. We lose protons while the antiprotons get loaded. The long-range beam-beam effect is still an issue."

To minimize the influence of the positively-charged protons on the negatively-charged antiprotons, and

# Collider Run II Integrated Luminosity




The weekly number of particle collisions produced by the Tevatron has greatly increased in the past year. On average, accelerator operators now achieve a weekly integrated luminosity of 5,000 inverse nanobarns ($nb^{-1}$), a factor 2.5 larger than at the beginning of the year. The last three months have resulted in more than 60 inverse picobarns, three times more than the last three months of Run I. For the latest luminosity update, see www-bdnew.fnal.gov/operations/lum/lum.html

Photo by Reidar Hahn

On a couple of occasions, setting new records brought out the champagne. Beam experts John Crawford, Bob Mau and Dan Johnson (from left) helped with the celebrations.

vice versa, scientists try to separate the two beams from each other as much as possible. The limited size of the Tevatron beam pipe, in places less than two inches in diameter, severely restricts how far the two beams, which twist around each other by following the lines of a double helix, can be separated. Reducing the thickness of each beam —its emittance—is a key factor in reducing beam-beam effects.

"Now it's more about beam quality, not quantity," Shiltsev said. "We have about seventy people working on the Tevatron issues, equivalent to thirty-six fulltime employees. This is two times more than a year ago."

To improve the accelerators, beam experts and operators work hand in hand.

"Because of the amount of changes in the operations of the Tevatron, we frequently have the beam experts in the Main Control Room," said Mau, who supervises the operators in the MCR. "When they make a change they want to observe what is happening. When they deem the change operational, they give the operators the control."

Duane Newhart, who's worked for six years as an accelerator operator and who is now a crew chief, agreed.

"It meshes pretty nicely when the experts are in the control room," he said. "It's a team effort. They tell us what they want changed and why, and we make the changes they ask for. Typically, we will still do the driving."

Although the Fermilab accelerators aren't yet the nicely tuned racecar that everyone is hoping for, beam experts have produced a reliable sedan. If things continue to improve, Fermilab could enter the Formula One circuit in 2003.

## Physics Driver

**ON THE WEB:**
**Live Tevatron status and latest luminosity charts:**
www.fnal.gov/pub/now/

**Accelerators at Fermilab:**
www.fnal.gov/pub/inquiring/physics/accelerators/

**Animation of Fermilab accelerators:**
www-bd.fnal.gov/public/

# Prairie Home Companions

Abundance of species celebrates the lab's commitment to prairie restoration

by Elizabeth Clements

In 1974, a biologist, Robert Betz, initiated the Fermilab prairie reconstruction project with a vision to reconstruct a large-scale prairie on portions of Fermilab's land. Fermilab's Founding Director, Robert R. Wilson, supported the idea, and the project was born.

This year, with 6,800 acres of land, 273 species of birds, 53 species of butterflies, 32 bison (and a partridge in a pear tree?), the Fermilab prairie reconstruction project celebrates its twenty-eighth birthday. And from Henslow's Sparrows to Silver-bordered Fritillaries, the Fermilab prairie certainly has some achievements to raise a glass to this year.

Photo by Merilee Janusz

The Henslow's Sparrow, a state endangered bird, is secretive and difficult to find. According to Peter Kasper, a Fermilab physicist and bird expert, the best way to identify a Henslow's Sparrow is to listen for its characteristic call.

Fermilab's Roads and Grounds Department hosted two successful prairie harvests this fall, with approximately 240 people attending the events. Roads and Grounds also conducted controlled prairie burns in the spring and fall, burning approximately 700 acres of prairie land, to eradicate weedy, non-native plants and to help native seeds grow.

Dave Shemanske of Roads and Grounds explained that before conducting a prairie burn, many precautions must be taken to make sure that the wind is blowing at the right speed and in the right direction.

"Prairie burns require extensive planning and good communication. The whole crew works as a team," Shemanske said. "We burn only when the weather and wind offer us a window of opportunity."

One of the best measures of the quality of Fermilab's prairie land is how many rare animal species call it home. This year's large increase in Henslow's Sparrows, a state-designated endangered bird that is extremely fussy about its habitat, indicates that the grasslands at Fermilab are of the highest quality.

Photo by Reidar Hahn

Photo by Reidar Hahn

Photo by Tom Peterson

From the baby bison that were born in the spring (left) to the Silver-bordered Fritillaries (right) that were introduced to Fermilab in the fall as caterpillars, every new addition brings the Prairie Reconstruction Project one step closer to being complete.

According to Peter Kasper, a Fermilab physicist and local bird expert, 2002 was the best year for Henslow's Sparrows at Fermilab. This past summer, large numbers of the bird were found inside the main ring for the first time and in the grasslands along Eola Road, which have been specifically managed to attract Henslow's Sparrows. Kasper explained that a prairie is considered to have excellent grasslands if Henslow's Sparrows decide to inhabit them.

"If you have Henslow's, you must be doing something right." Kasper said. For birders, "Henslow's sparrows are the most interesting thing of the year."

For butterfly experts, the Silver-bordered Fritillary, a very rare butterfly in the Illinois region, is the story of the year.

On October 2, Doug Taron, the Curator of Biology at Chicago's Peggy Notebaert Nature Museum, released 40 Silver-bordered Fritillary caterpillars into the fields to the east of the Fermilab Village, with the help of Tom Peterson, a Fermilab engineer and butterfly expert, and Bob Lootens of Fermilab's Roads & Grounds Department [*FERMINEWS*—November 1, 2002]. They hope that by next spring, these 40 caterpillars will grow into adult butterflies and spawn a new colony of Silver-bordered Fritillaries in the Fermilab prairie.

Although many new plants have been introduced to the prairie, Lootens believes that the Silver-bordered Fritillary may be the first new animal introduced to Fermilab. This groundbreaking introduction of a species brings the Prairie Reconstruction Project one step closer to being complete.

Peterson reports that the Fermilab butterfly list also may be close to being complete. No new butterfly populations were found this year, but the ones that were previously seen, such as the Clouded Sulphur and Dion Skipper, are still "thriving and active".

"Not seeing a new species indicates that we have a fairly mature list that is close to being complete," Peterson said. "I am interested in long term monitoring of butterflies. Hopefully twenty years from now, people can use our list as a baseline to see how things have changed."

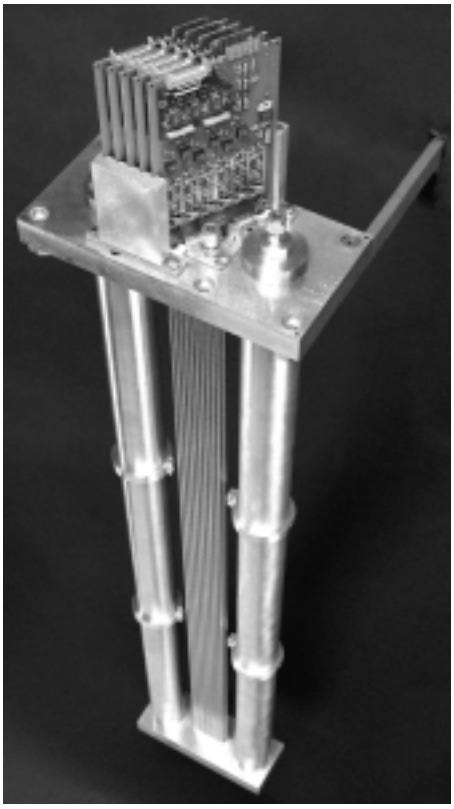
A prairie cannot be considered complete without a few bison roaming around.

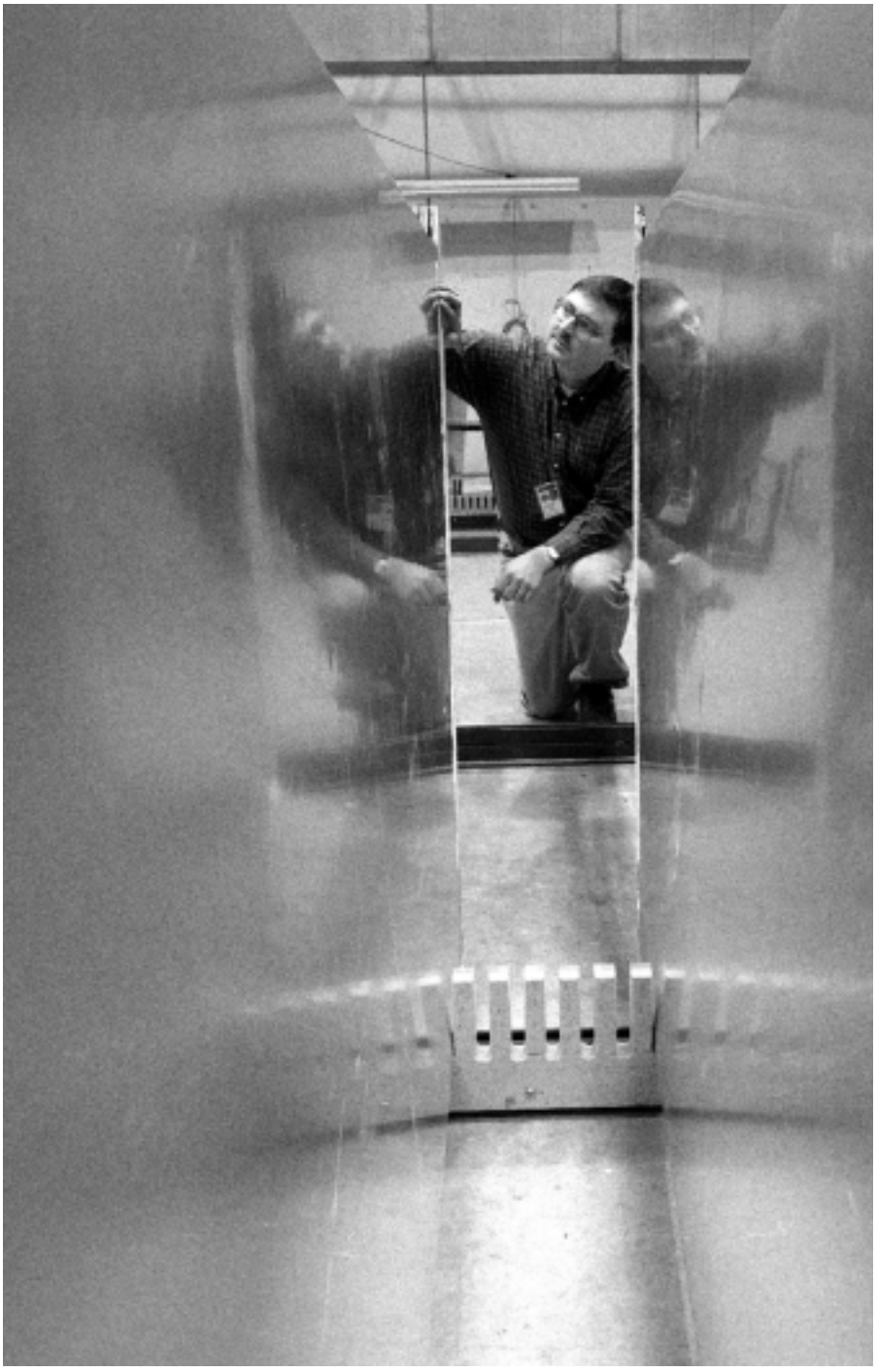
Fermilab's legendary herd of bison currently has twenty-nine cows and three bulls. The herd reached its peak number this past spring, when over two-dozen calves were born. In October, twenty-five calves and three cows were sold to private bidders. John Plese of Roads and Grounds expects the herd to return to its normal size of about sixty bison after babies are born in the spring of 2003.

"The buffalo are doing very well. Everyone here takes very good care of them," Plese said. "People drive here all the way from other states just to see the buffalo at Fermilab."

They are witnesses to the prairie legacy founded by Wilson and Betz.

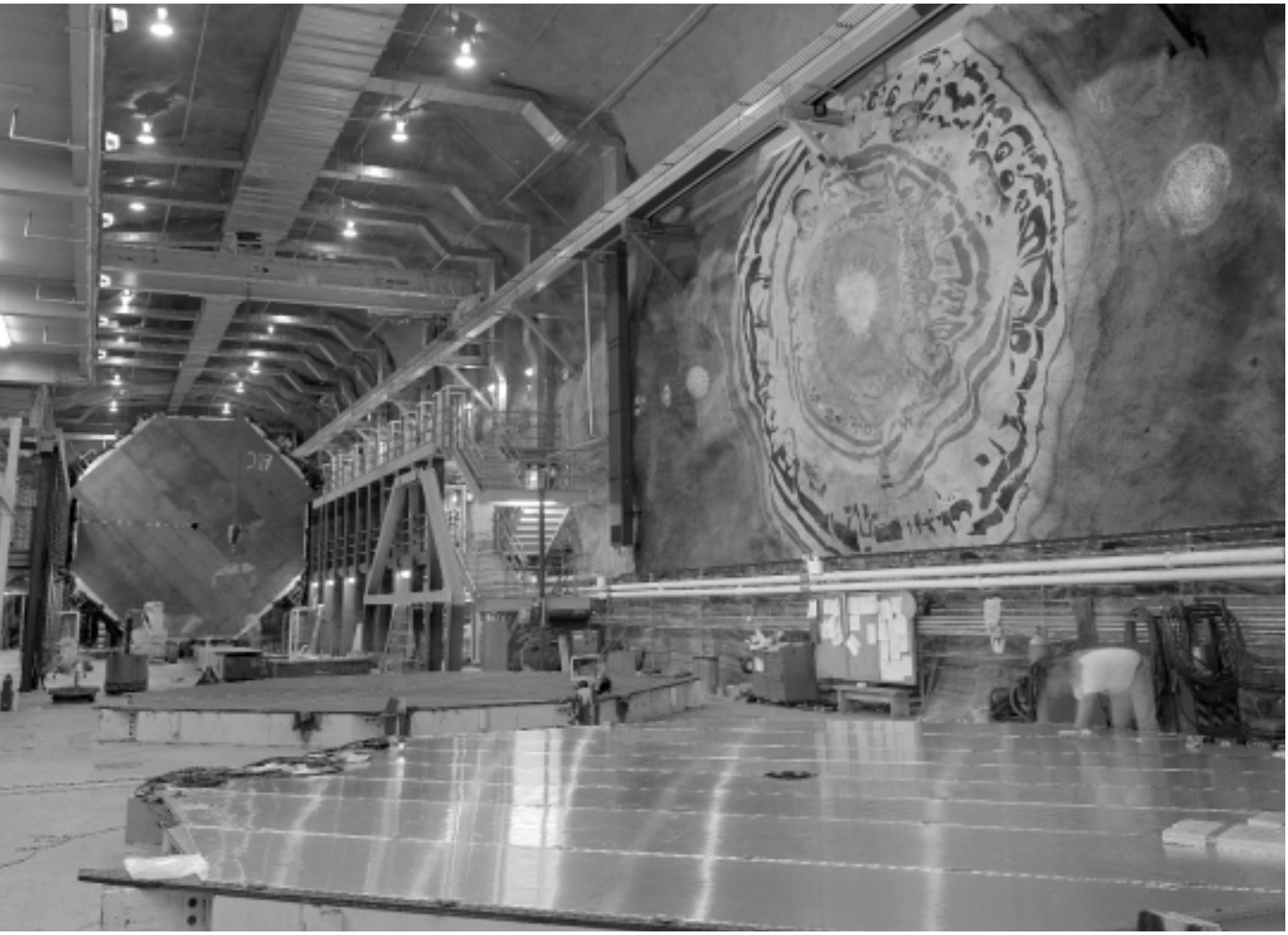
# Fermi LIFE

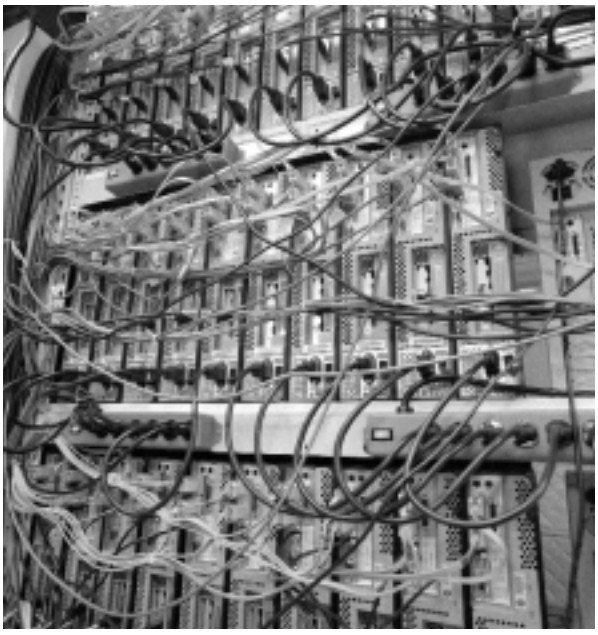




Fermi LIFE

# Portraits of 2002 by Fermilab's Visual Media Services





# Fermi LIFE

# 2002: The FNAL Finale

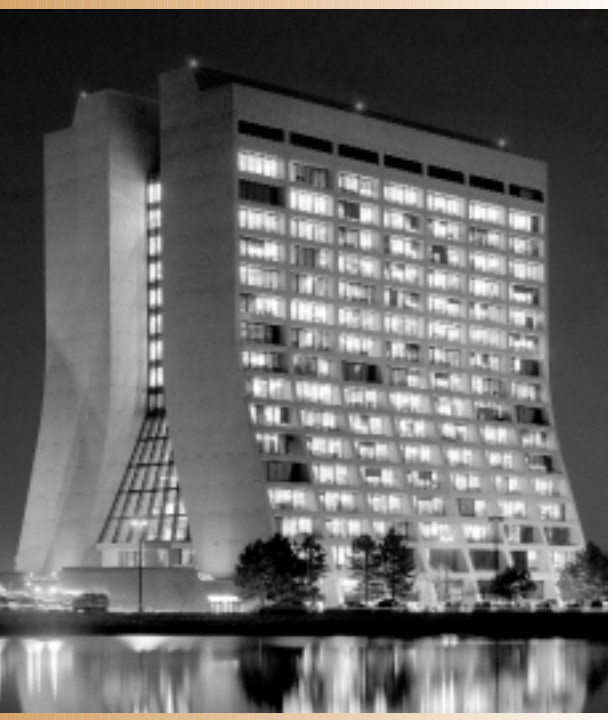


Photo by Fred Ullrich

'Midst green and red, this time of year we muse on old and new,
And toast to those, both far and near, who shaped Two Thousand Two.

The prairie winds sweep Fermilab, from gray skies snow is falling,
But finishing the High Rise fix means no more concrete spalling.
Securing floors, repairing joints, the scope of work was numbing,
But now at last the job is past—they even fixed the plumbing.
Through windows clear the light now bathes the Atrium's plants and vines,
And yet we look back fondly on Elaine McCluskey's signs.

The Tevatron began the year with prospects somewhat dimming,
But picobarns began to build and optimism's brimming.
The aid of friends, when sought, arrived with verve and generosity,
As other labs lent skills to help set record luminosity.
On Steve Holmes' door the message left priorities undoubted:
"If it's not about Run II, I will not talk about it."

Experimenters cried, "Results!" They hoped the time was nearing.
At ICHEP-Amsterdam came word: The data's now appearing!
At DZero and CDF, the top quarks started flowing,
The W and Z were there; B mesons, too, were showing.
Discoveries will spring from these and some could be quite newsy
Like new dimensions, strings, or just perhaps a hint of SUSY.

A half a mile below the ground in Soudan, Minnesota
The MINOS crew was out of view, but cared not one iota.
They worked away, both night and day to keep the job in line
To host a dedication in July down in the mine.
Neutrino hunters came and went by deafening elevator,
They'll look for oscillations first; the mass, they'll add up later.

MiniBooNE worked night and noon with unremitting toil
To fill their new detector with the purest mineral oil.
The tank topped off, the horn tuned up, they started taking data.
Two Thousand Two was great, they say, but next year will be greater.
And should events in coming months reveal a fourth neutrino,
To all of them at MiniBooNE we'll lift a glass of vino.

And by the way, we saw the wine return to wine and cheese.
Computing also made a splash: four hundred new PC's!
Their value goes unquestioned as a Run II data tool,
But CD's running question was, "How do we keep them cool?"
Some questions also rose on *FERMINEWS's* predilections
For getting NuTeV wrong until Bob Bernstein sends corrections.

# In which this event-filled year at Fermilab is reviewed from best to verse

TD's tests of quadrupoles in supercold revealed
These magnets bound for Switzerland are leaders in the field.
Both Fermilab and CERN took note of student Robert Lee:
From US CMS he earned the group's first Ph.D.
We raise a cheer to all our grads, to docs both pre- and post-,
They persevere to the nth degree and that's what means the most.

A special Yule acknowledgement that's both sincere and cheery
For insight on what lies ahead from Astro and from Theory.
Auger and Sloan, CDMS seek cosmic perturbations;
The third floor's constant ponderers are framing explanations
Of Space, and Time, and Nature's puzzling ways, both seen and un-;
That stillness means they're up there writing papers by the ton.

The year brought several changes in the lab's administration
Did anyone lose track of them? Well, here's the information:
Computing head is Vicky White, Kephart leads TD's teams,
And Roger Dixon gets the nod to take control of Beams,
Holmes regained the second floor, across from Hugh Montgomery,
At Ops. Support, Jed Brown assumed command—that's it in summary.

Some special names will come to mind as '02 fades from sight:
We twice misspelled Tom Nicol's name—this time, we've got it right!
To Helen Edwards came a most deserving new award
In the name of Robert Wilson, so it struck a poignant chord.
We lack the space to tell the tale of each retiree:
Can Halbert Landers stand for all (years service: 33)?

It takes a laboratory to pursue a physics mission,
Like everyone who staffs a desk, and every skilled technician;
Like shipping and receiving, and the staff in the library,
The always-ready firemen and folks who tend the prairie.
The ones who cook the lunches and the ones who swab the decks;
And let us now praise URA, the ones who sign the checks.

A treasured friend took leave of us, forever may our bond
With Andy Mravca's legacy reflect in Andy's Pond.
But somberness was not his way, so raise a glass with cheer
To toast success throughout the lab, for all the coming year.
With stockings hung by old and young we share our hopeful visions:
Dear Santa, all we want this year are particle collisions!

*—Mike Perricone*

Photo by Jenny Mullins

# A Year in the Life

**For a young researcher, the payoff is in data – and in the common cause**

by Robin D. Erbacher

I straightened up and leaned forward to listen while I struggled to contain a large grin. Oh, I wasn't the only one. When our co-spokesperson, Prof. Al Goshaw of Duke University, had finished the announcement at the CDF meeting on December 5, the room filled with spontaneous applause, and grins were everywhere. The first publication of results from CDF Run II was ready for review by the collaboration. We all realized at that moment that the investment in long hours, grueling work, diligent planning, modeling, testing, programming, debugging and repairing (not to mention the investment in funding) were all beginning to pay off with insights into the important questions that we've all set out to answer.

Of course, some had waited longer than others. I joined CDF as a Fermilab postdoctoral Research Associate three years ago, but while I had more invested than some of the newer members of the collaboration, it is small in comparison to those who have been with CDF throughout the entire Tevatron and detector upgrades (which began in 1996). These veterans have been involved in carefully planning every stage to maximize our ability to gather interesting and varied physics data within the constraints of time, budget, and machine design. Still, these three years have been extremely demanding, and this past year in particular has been difficult at times for all of us, new members and senior members alike.

## Looking forward to data

At the end of 2001, I had felt a strong sense of optimism about the prospects for acquiring lots of data very quickly, and thus for our ability to immediately improve upon all aspects of the Run I physics measurements.

With the Tevatron upgrades, we had anticipated ten times more data than in Run I. Naturally our detector needed improvements to handle this increase. We had essentially built a new CDF, and re-instrumented what remained of the original. We used state-of-the art, custom-built electronics, more aggressive detector technology and new computing power, and we made many design changes. I had spent two years on our new Fermilab-designed calorimeter signal readout boards, along with all of the associated infrastructure—installing, burning-in, understanding, debugging, replacing, reading out, and calibrating. I had worked long hours with my colleague,

Photo by Jenny Mullins

CDF researcher Robin Erbacher: "The work is challenging, demanding, and stressful at times due to our push for deadlines, but we are problem-solvers by nature… that's what makes the job so interesting."

Rick Tesarek, to reduce noise, repair broken channels on the calorimeter, and generally make the detector readout as stable and reliable as possible for Run II. We (along with most of the detector operations experts) had handled hundreds of calls on the pager at all hours of day and night, during a very successful commissioning run the previous fall, and during the startup of Run II in the spring of 2001.

By the end of last year I was also finishing up important studies of calorimeter timing and performance and was preparing to decrease my detector duties. I wanted to begin to analyze the large amounts of data we expected to receive in 2002. In November 2001, I had the opportunity to give a CDF Run II Status and Prospects talk at a particle physics workshop in Zacatecas, Mexico. Although the collision data were coming in more slowly than expected, we had reason to believe that improvements were imminent. In my presentation, being able to describe how well things were working on CDF, how far we'd come, and what our physics goals were for Run II made me all the more excited for what lay ahead in 2002.

The mood changed perceptibly by late winter of this year. We were seeing only small improvements from the accelerator front. The reconfigured accelerator is a mixture of old and new, and maintaining it while trying to maximize the operation time has proven difficult. In addition, the complexity of running it in the new configuration and with the new Main Injector has provided a major challenge to the accelerator experts. After all, colliding small bunches of protons and antiprotons in two locations around a four-mile ring every 396 nanoseconds (a nanosecond is a thousand-millionth of a second) is, well, hard!

## A QUESTION OF TIME

But this adjustment had special repercussions for some of us younger experimenters. Graduate students trying to analyze Run II data were beginning to reduce their immediate expectations of what they could measure within their time scales. Postdocs who were at the end of their term positions had fewer data with which to do analyses before their job searches. Still, we were collecting data, and at a greater rate than ever before.

And I was happy to begin analyzing the data coming in, which will still be several times more than we obtained during the first run. Some Fermilab employees on CDF formed analysis groups in the spring to better coordinate our work, and we started on studies of the trigger and studies of jets (jets are a sort of spray or cluster of particle decays in our detector). Things were looking up for us.

Yet I had my own challenge. We could not find replacements for Rick and me to train, for supporting the calorimeter front-end electronics. While the time commitment had reduced substantially, there were still weekly tests, follow-up, monitoring, test-stand work, meetings, detector accesses for repairs, and pager calls.

I remember one morning being awakened at 1:10 am by the alarming beep of the pager. I had only been asleep for maybe an hour, but I threw on some clothes, shoes, and a jacket and drove on in to the CDF control room. A calorimeter power supply had tripped, and they needed an expert to reset it. Sometimes this goes smoothly and I'm done in an hour. This time, the supply didn't revive. I reset it again and it worked this time. The problem was that the power-cycling had inadvertently tripped a muon detector power supply. The muon electronics expert (Hyunsoo Kim, University of Illinois Urbana-Champaign) had to be called. He was actually still in his office. We cycled the power again, and this time neither of the supplies came back. And so on. I finally had to catch a few hours of sleep in the morning and get back for a meeting at 11 a.m.

I had expected to pass on my detector duties in October 2001, then December, and then this April. But April came and went, and I was still responsible for the calorimeter while trying to analyze data. Physicists cannot ignore problems under the guise of "not my job." We all need each portion of our project to work, and work well, so we take responsibility until someone else can take over. Relief came during the accelerator shutdown for repairs in June. I took Mark Mattson and Zhibin Huang (Wayne State University) and Vivek Tiwari (Carnegie Mellon University) down onto the detector and showed them how to replace electronics, check cables, work safely on a lift with a harness, and generally maintain the calorimeter electronics, performing checks on a weekly basis.

But in the middle of this busy spring, I had the chance to take a broader view of particle physics, working to increase communication within and beyond the field.

## Carrying the message

In April, I traveled with the Fermilab Users' Executive Committee to Washington D.C. to meet with members of Universities Research Association, Inc., the consortium of 91 universities operating Fermilab under contract with the U.S. Department of Energy. We also visited members of Congress. Our goal was to explain the importance of our work in particle physics, and to share our excitement about what lay ahead. I had made several contacts on the previous year's trip, yielding even more fruitful discussions this time around.

In May I helped the UEC organize a meeting of some 70 students and postdocs, in which senior people in the field shared their job experiences in academia and industry. In June, I chaired the Annual Fermilab Users' Meeting; we developed a full program on the research going on at Fermilab, following up on the previous year's meeting, which had focused mainly on future projects.

Everything changed in July. Rick and I handed over our pagers to our newly trained experts, and I was able to move to cell phone backup support only. At the end of the month I had the opportunity to travel, along with several of my colleagues, to the big international summer conference, ICHEP in Amsterdam, to give a talk on the integrated calorimetry system we had developed for CDF Run II. To me, it represented the culmination of the work I'd done on the detector. (Although now, in December, I am still documenting the detector work, and performing more studies of the calorimeter. Once you are deemed an expert, problems follow you, but these challenges are part of what makes this job so interesting.) During the conference in Amsterdam we received word that the Tevatron had delivered record luminosity,

Photo by Jenny Mullins

Trips to the library for studying and checking references are part of the routine for every researcher.

Photos courtesy CDF

"With the Tevatron upgrades, we had anticipated ten times more data than in Run I… We had essentially built a new CDF, and re-instrumented what remained of the original."

and was performing consistently better than it had previously. CDF co-spokesperson Franco Bedeschi of Pisa, Italy, was able to report this good news to the world during his summary talk in Amsterdam, and we were all optimistic once more.

Since July, the accelerator has performed increasingly well, thanks to heroic efforts in the Beams Division. In October, Fermilab did well in the Department of Energy's Lehman Review of Accelerator Run II. There are still problems to solve, but the machine operators and accelerator physicists are working tremendously hard. I imagine it's like an old house. You find you have a problem with a leaky faucet, but after a time you figure out how to turn the faucet slightly to the left and the leak is gone. In this case, the operators are finding all the right positions and parameters to allow our machine to perform at its peak.

Also since July, I have taken on new challenges. Our analysis group decided to work in conjunction with other members of the group studying the top quark, and to make a measurement of the top quark cross-section, a kind of measure of the production rate of the top quark, which was the major discovery in Run I, in 1995. We have the chance to make a much stronger measurement with the increasing data we are collecting, and now the entire top group is focused on getting results out for the important winter and summer conferences in 2003. The work is challenging, demanding, and stressful at times due to our push for deadlines, but we are problem-solvers by nature. Again, that's what makes the job so interesting.

## Succeeding Together

Sitting in that CDF meeting two weeks ago, we all felt the strong warmth of camaraderie when the announcement of the publication was made. I remember that the next topics at the meeting dealt with various problems we had encountered throughout the week. I also remember that I left the meeting, rushed to my office to prepare for a meeting the next day, and ended up having another late night, staying until 2 a.m. making histograms of the data with various constraints applied.

Yet even with the stress, and with the various problems that we encounter and solve on a daily basis, we feel a sense of optimism, excitement, and urgency for our research. In the meeting room that day, when we all realized that physics results were finally on the horizon, we genuinely felt our common success. It didn't matter what topic the first publication covered, or whose analysis result it was.

At that moment, we were a team: everyone in that room, along with all of the 700+ members of CDF from 59 institutions in 12 different countries. We were beginning to announce the discoveries we are making here at Fermilab, at the frontier of high-energy particle physics, and we had all struggled together to reach this moment.

# UNCERTAINTY Principle

## Policy changes produced swings in public access


by Pamela Zerbinos

Since its beginnings in 1967, Fermilab has been an open place—open to the sky, open to international collaborators whose home countries were sometimes political opponents, and open to visitors. This openness has always been an integral part of Fermilab's history, mission and identity.

Unfortunately, some of that openness was lost with the terrorist attacks of September 11, 2001, and although the lab is on the way to regaining it, there is still a long way to go. After the attacks, adhering to the Department of Energy's policy of heightened security, the Lab was closed to visitors. Employees were required to show identification badges to get on to the site, and to wear those badges visibly at all times.

As the months progressed, the Lab began, one step at a time, to welcome visitors to the site once again. This process was aided by the success of programs such as the Fermilab Arts and Lecture Series, which were able to show that public access does not necessarily present a security breach. Although the Arts Series' 2001 opening night festivities were cancelled on Sept. 15, the rest of the season went ahead as scheduled, and several of the events sold out.

In March, 2002 the Lab opened its doors a crack to allow limited recreational access to pedestrians and bicyclists. They were allowed to use either entrance during normal business hours and on weekends, but were not allowed into any building other than the Lederman Science Center.

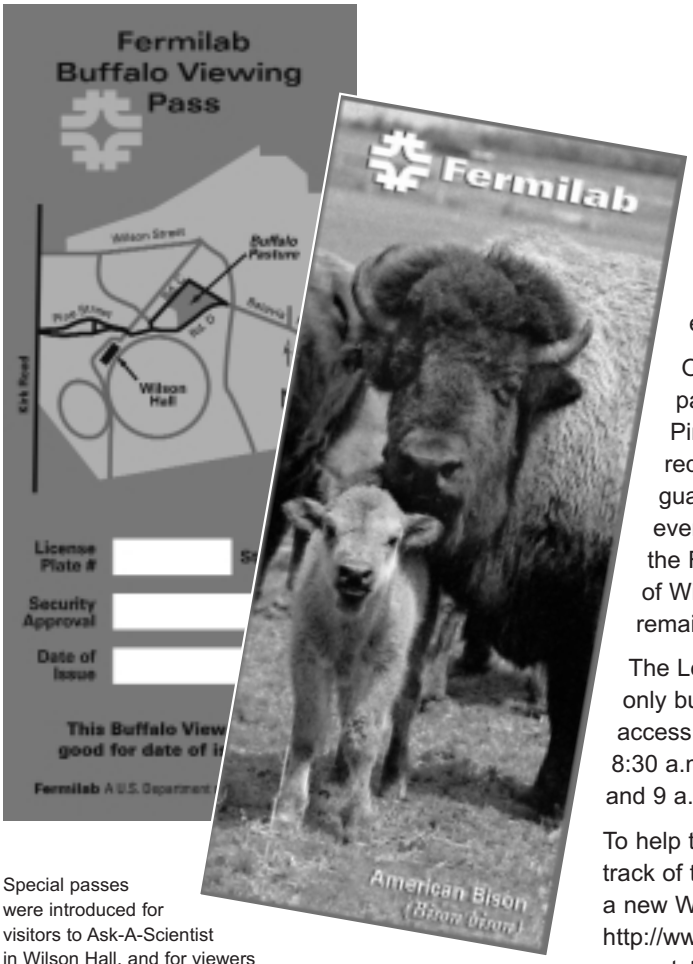
A few months later, on May 23, the Lab implemented the free Buffalo Pass, which motorists could obtain at the Pine Street entrance, and which would allow them to drive unescorted to look at the herd of about 60 buffalo that Fermilab keeps on site. The buffalo passes were a success; by mid-July more than 400 had been issued.

On Thursday, August 8, the Lab announced the site would return to its pre-9/11 level of access, with both pedestrians and motorists being allowed on site from either entrance between 6 a.m. and 8 p.m. every day. Although motorists were required to leave through the same gate they entered, no one was required to get a Visitor's Pass or a Buffalo Pass or any other kind of

**ON THE WEB:**

**Check the homepage for updates:**
www.fnal.gov

**Fermilab public access:**
www.fnal.gov/pub/about/public_affairs/currentstatus.html




Special passes were introduced for visitors to Ask-A-Scientist in Wilson Hall, and for viewers of the buffalo herd.

pass. The Ask-a-Scientist program, which had been moved to the Lederman Science Center while the security restrictions were in place, relocated back to the 15th floor of Wilson Hall.

But the access was not to last. On September 10, just one day before the one-year anniversary of last year's attacks, the Department of Energy ordered all national laboratories to go to a heightened state of security known as SECON 3. The guards were back at the gates, the employees were back to wearing ID badges at all times, and the visitors were back to severe limitations.

This time around, however, the Lab has been moving more quickly to step up recreational access. The Buffalo Passes are back, still free of charge, and there is a new Ask-A-Scientist Pass, also free, that visitors can obtain on Sundays at the Pine Street entrance. This allows visitors to drive to Wilson Hall and participate in the popular Ask-A-Scientist program from 1:30 – 3:30 p.m. However, driving is restricted to roads that lead directly to the buffalo herd or to Wilson Hall.

Pedestrians and bicyclists are allowed on to the site between 6 a.m. and 8 p.m. every day of the week; they don't have to get a pass, and can enter through either entrance.

On evenings of performances, Arts Series patrons are allowed on site through the Pine Street entrance. There is no pass required; they just have to inform the security guard they're there to attend an Arts Series event. Before, during and after these events, the Fermilab Art Gallery on the second floor of Wilson Hall is open to the public, but it remains off-limits at all other times.

The Lederman Science Center remains the only building open to the public, who can obtain access at the Pine Street entrance. Its hours are 8:30 a.m. to 4:30 p.m. Monday through Friday, and 9 a.m. to 3 p.m. on Saturday.

To help the public (and employees) keep track of the oft-changing status of Lab access, a new Web page has been set up at http://www.fnal.gov/pub/about/public_affairs/currentstatus.html, although it is certainly hoped that page will become unnecessary as the restrictions loosen and visitors are welcomed back with open arms.

Photo by Reidar Hahn

A Cub Scout Pack took to the Fermilab trails in August.

# Fermilab Colors Fly West

Photos courtesy SLAC

by Tom Mead, SLAC Public Affairs

In a graphic display of collaboration, one building at SLAC is "flying" the Fermilab colors. Emblazoned on the west-end double doors of Building 128 in the research yard next to End Station B gleams the recently painted orange-circle-on-a-blue-field Fermilab graphic. The paint pattern is from Fermilab and is seen on the majority of their research buildings.

The impetus for this graphic display here at SLAC is the fact that Fermilab is a strong partner in the NLC Collider program and is currently building accelerator structures that will be installed in the NLCTA. SLAC, in turn, is a strong partner to Fermilab, as are other HEP labs around the world, in that SLAC has sent a team—Marc Ross, Jim Sebek and Till Straumann—to lend a hand in the effort to get Fermalb's Tevatron accelerator operating closer to capacity.

NLC summer student Matthew Sorgenfrei did the actual painting in July. He is a recent graduate of Gunn High School and its Robotics Club, which is supported, in part, by SLAC.

B128 is now referred to as "Fermilab West" as a small nod to the paint job and to the fact that the continued support of the multilab collaboration is critical to the success of the project. While it is actually only paint on a door, it is, symbolically, a strong statement about the camaraderie of the collaborative effort.

# FERMILAB ARTS SERIES 2002-2003 SEASON

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

### Libana

**February 8, 2003**

Libana, New England's international touring world music ensemble, is now in its 23rd season of researching, performing, and celebrating songs, dances, and instrumental music from around the world, especially as handed down through women's traditions.

*Tickets - $17 ($9 ages 18 and under)*

### Dragon's Tale: Nai-Ni Chen Dance

**March 8, 2003**

Dragon's Tale is a feast for the eyes, mind, and heart. Bringing to life the culture and traditions of China, this full-length family show leaves children mesmerized at each enchanting, astounding dance, and adults equally caught up in the magic of it all.

*Tickets- $19 ($10 ages 18 and under)*

### Quartetto Gelato

**April 5, 2003**

As the engaging innovators of a fresh approach to classical music, Quartetto Gelato has won the hearts of audiences worldwide since their remarkable 1994 debut season. The concert presentations combine supreme musicianship, irrepressible energy and charming wit, treating their listeners to an unforgettable musical event.

*Tickets - $21 ($11 ages 18 and under)*

### Orquesta Aragon

**May 10, 2003**

Founded 60 years ago, Orquesta Aragon is recognized as the premiere charanga group in Cuban Music. In keeping with the charanga-style, Orquesta Aragon is a 13 piece band that does not feature a brass-section, but rather vocals, flute, and violins on top of a rhythm section of piano, bass, congas, timbales, bongo and clave.

*Tickets - $26 ($13 ages 18 and under)*

# GALLERY CHAMBER SERIES

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

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

### Chicago Chamber Musicians Brass, Jan. 26, 2003

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

### David Schrader, Feb. 16, 2003

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

### Scholars of Cambrai, Mar. 23, 2003

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


LUNCH SERVED FROM
11:30 A.M. TO 1 P.M.
$10/PERSON

DINNER SERVED AT 7 P.M.
$23/PERSON

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CHEZ LÉON WILL BE CLOSED THE WEEKS OF CHRISTMAS AND NEW YEAR.
SEE YOU IN JANUARY, 2003.
HAPPY HOLIDAYS!

FERMI NEWS

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**The deadline for the Friday, January 17, 2003 issue is Tuesday, January 7, 2003.**
Please send classified ads and story ideas by mail to the Public Affairs Office, MS 206, Fermilab, P.O. Box 500, Batavia, IL 60510, or by e-mail to ferminews@fnal.gov.
Letters from readers are welcome.
Please include your name and daytime phone number.

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# CLASSIFIEDS

### FOR SALE

■ '01 Pontiac Grand Prix GTP, 2-door, 25K miles, red, immaculate condition, $19,500 o.b.o., Contact Frank at 630-840-4188 or cesarano@fnal.gov.

■ '00 Subaru Forester L, 42K miles, white/black, AWD/ABS, 5 speed manual, excellent condition, all records, 6 years/100K miles extended warranty. Asking $14,500. Contact Andrei 630-840-8795 or nomerot@yahoo.com.

■ '95 Oldsmobile 88 Royale 93K miles, sky blue, excellent condition, $4,500. Contact Rose or Gene at 630-897-0263 or email oguyer@aol.com.

■ '92 Pontiac Bonneville, power windows, power seats, AM-FM cassette, new tires, new brakes, (front & rear), all new filters & fluids. Looks good, runs great! $1,800 o.b.o. Contact Cliff 630-840-3699 or email besch@fnal.gov .

■ '90 Mercury Sable, 125K miles. Runs well. Some cosmetic rust, nothing structural. Good, solid car. $1,600 o.b.o. Contact Don at 630-840-5218 or email lincoln@fnal.gov

■ '89 Chevy Caprice station wagon, blue, 133K miles, power steering, brakes, locks, windows, AM/FM cassette. Seats 9, rear seat faces back. $1,200 o.b.o. Contact Bill at 630-840-2689 or email barker@fnal.gov.

■ Christmas tree: artificial Hudson Valley Canadian Pine, 4 ft. stand included, $20. Bedroom furniture: queen bed frame, headboard and footboard, Cannonball style, dark pine, $25. Chest of drawers (6), dark pine, $50. Night stand (3 drawers), dark pine, $25. Dresser with mirror: medium stain, 4 drawers, 2 door/2 shelf storage area, $35. Matching chest of drawers (4 drawers), $20. Bernina serger: Model 1100DA, excellent condition, used only a couple of times, $800. Advanced guide workbook, $20. Contact 630-840-3880 or 630-690-1691 (located in Wheaton, Ill.).

■ Oberhamer figure skates. White, ladies size 7-AA, blades SLM 8-2/3, excellent quality and condition, $75. Contact Michelle at 630-840-8062.

■ Solid maple, butcher block table, 42-inch octagonal, with 4 maple chairs. $75. Contact 630-840-8062.

■ Ethan Allen love seat, excellent condition, 13 yrs. old, cream background with floral pattern, $300. Contact Liz at 630-840-8650 or buckley@fnal.gov.

■ Washer & gas dryer. Tappan brand. Very good condition; used less than 2 years. Located in Glendale Hts. $175 for both, o.b.o. Contact 630-840-6342 or 708-645-1168.

### CUT YOUR OWN CHRISTMAS TREE:

Still time until December 23. Daily from 9:00 a.m. to dusk, Marmion's fields will be open for those tree hunters who enjoy the fun and challenge of cutting down their own Christmas trees. Marmion Abbey is located at 850 Butterfield Road, Aurora. Call Rev. Bede Stocker at 630-7215, x344.

# CALENDAR/LAB NOTES

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

### SCIENCE CENTER OPEN DEC. 28

In response to the number of visitors on the Saturday of Thanksgiving weekend, the Lederman Science Education Center will be open on Dec. 28, the Saturday after Christmas, from 10 a.m. until 4 p.m. With the exception of that Saturday, the Science Education Center will be closed from Dec. 24 through Jan. 1, 2003.

### FOLK DANCING

The international folk dancers will continue to dance every Thursday throughout the holiday season, and will again celebrate with live music on Dec. 26. Joining them that evening beginning at 7:30 p.m. at the Barn will be Don Weeda, a renowned accordionist who hails from Austin, Texas, and who was last seen in this area at this past September's Fox Valley Folk Festival in Geneva. As always, the public is welcome.

### SILK AND THISTLE SCOTTISH COUNTRY DANCING

The group will not meet the following two Tuesdays, on Christmas Eve and New Year's Eve, and will resume on Tuesday, January 7, 2003. Contact: Mady Newfield, 630-584-0825. In accordance with Fermilab security, those who are do not have lab ID must call in advance to be put on the admission list and provide a picture ID when they enter at the west gate to the lab at Kirk Road and Pine Street. For more information and directions, please email folkdance@fnal.gov or call 630-584-0825 or 630-840-8194.

### TRAVEL OFFICE CLOSED

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

### ASK-A-SCIENTIST AT WILSON HALL

The popular Ask-A-Scientist program has returned to the 15th floor of Wilson Hall, every Sunday, including Sunday, December 22 and 29, from 1:30 p.m. to 3:30 p.m. Scientists will meet visitors to answer questions ranging from "What is dark matter?" to "How do you accelerate a particle close to the speed of light?" Visitors must use the Pine Street entrance on the west side of the lab, and obtain the special "Ask-A-Scientist" pass to proceed to the viewing area of Wilson Hall.

# MILESTONES

### COMPLETED

■ Pre-assembly of the MINOS Near Detector, at Fermilab's New Muon Lab. At the end of 2003, the detector planes will be brought underground.

### RETIRING

■ Kay Behr (ID 7716, ES&H Security Com/Center Team), Dec. 6.

■ Robert Marquardt (ID 864, BD-Accelerator Controls), Dec. 10.

■ Douglas Fisher (ID 11993, TD-Headquarters), Dec. 31.

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