FERMI NEWS

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Rare and Well Done 12

Photo by Reidar Hahn

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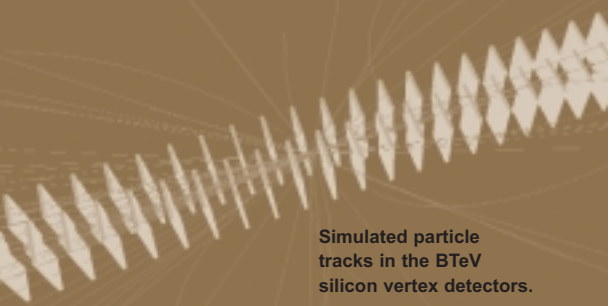
INSIDE:

Critical Decision:

BTeV gets DOE approval



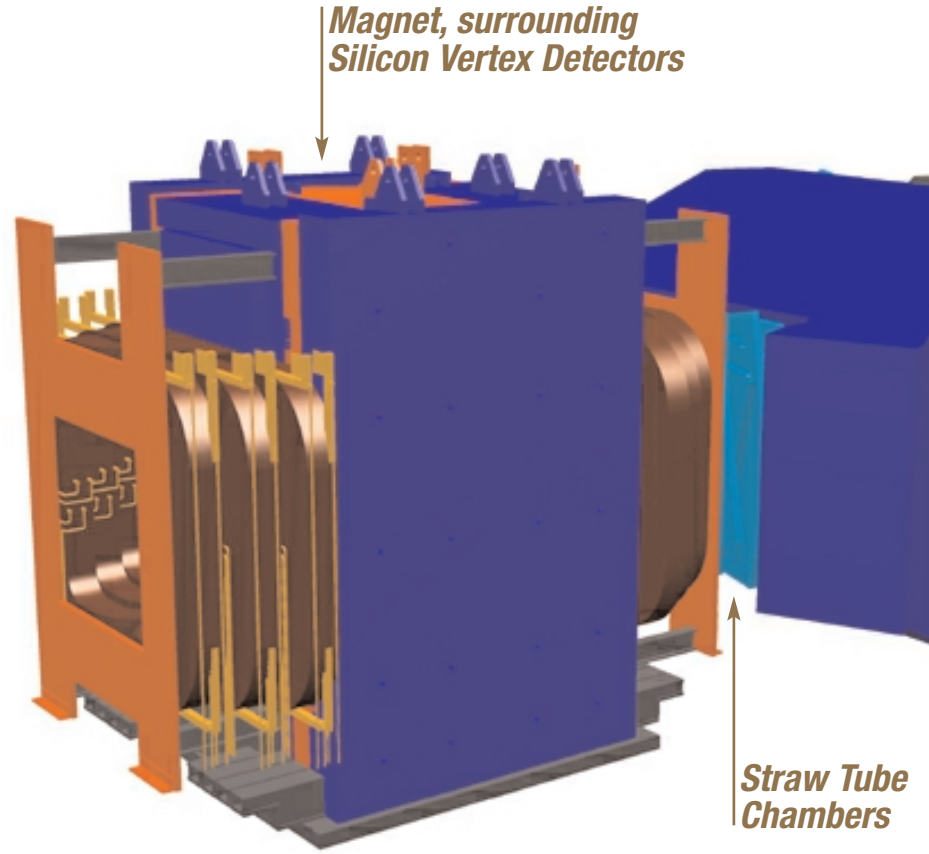
Simulated particle tracks in the BTeV silicon vertex detectors.

ON THE WEB:

BTeV Experiment:
http://www-btev.fnal.gov/

LHCb Experiment:
http://lhcb-public.web.cern.ch/

DOE's Facilities for the Future of Science: A 20-year Outlook:
http://www.science.doe.gov/Sub/Facilities_for_future/facilities_future.htm



Schematic view of the BTeV detector. With the detector, physicists hope to shed light on why there is so little antimatter in the universe. The detector will use the Tevatron collider at Fermilab to make precision measurements of particle processes involving bottom quarks. For an interactive view of the detector go to http://www-btev.fnal.gov/public/gen/detector/index.shtml.

by Kurt Riesselmann

Scientists of the BTeV experiment at Fermilab will be busy for years to come. At the end of February the Director of the Department of Energy's Office of Science, Ray Orbach, gave Fermilab's B Physics at the Tevatron experiment the first DOE stamp of approval. The decision, referred to as Critical Decision Zero (CD-0), designates the project as necessary to accomplish DOE's mission. It allows Fermilab and the BTeV collaboration to develop a conceptual design report and to submit a budget request. Three additional approvals (CD-1, 2, and 3) with regard to technology, cost and schedule are required before construction can begin.

"We've had a really powerful and effective R&D program, supported by the Department of Energy, the National Science Foundation and Fermilab," said Sheldon Stone, professor at Syracuse University and cospokesperson of the BTeV collaboration of 170 scientists from six countries. "The big step was getting the DOE behind the project."

Prior to the CD-0 approval, the BTeV experiment had received positive evaluations from several review committees, including Fermilab's Physics Advisory Committee and the U.S. Particle Physics Project Prioritization Panel. At the end of 2003, DOE's Office of Science listed the BTeV experiment in its

Graphics by
Michael Wang, Fermilab

> ***"B physics** is one of the **few areas** in particle physics where **matter** and **antimatter** **DO NOT BEHAVE IDENTICALLY."***
>
> *—BTeV cospokesperson Sheldon Stone*

20-year strategic plan for future scientific facilities, ranking the experiment in the top one third and giving it near-term priority.

The BTeV experiment will use Fermilab's Tevatron collider to make precision observations of particle processes that will provide hints at the evolution of the early universe. Scientists will use a system of high-tech detectors to analyze the decay of composite particles containing bottom quarks, which were first discovered at Fermilab in 1977. Scientists believe that the composites, known as B mesons, hold the key to understanding CP violation, a phenomenon that may explain why the universe contains more matter than antimatter and how the universe evolved from its simple initial state to the complex patterns we see today.

"If the universe started out symmetrically, then why is all the antimatter gone? B physics is one of the few areas in particle physics where matter and antimatter do not behave identically," explained Stone. "The bottom quark and the bottom antiquark do not decay in identical manners. Yet our present particle theory is flawed as it doesn't explain the abundance of matter in our universe."

BTeV will also look for rare B decays, subatomic processes that may contradict theoretical predictions. Such processes could indicate new subatomic particle behavior, perhaps caused by yet-undiscovered particles or a new type of subatomic force.

The first-step approval of the BTeV experiment was welcome news for physicists working on the LHCb experiment, under construction at the European particle physics laboratory CERN since 2002.

"We congratulate our colleagues at BTeV," said LHCb spokesperson Tatsuya Nakada, of the Swiss Federal Institute of Technology, Lausanne, and CERN. "It is encouraging to see the confirmation of the importance of B physics."

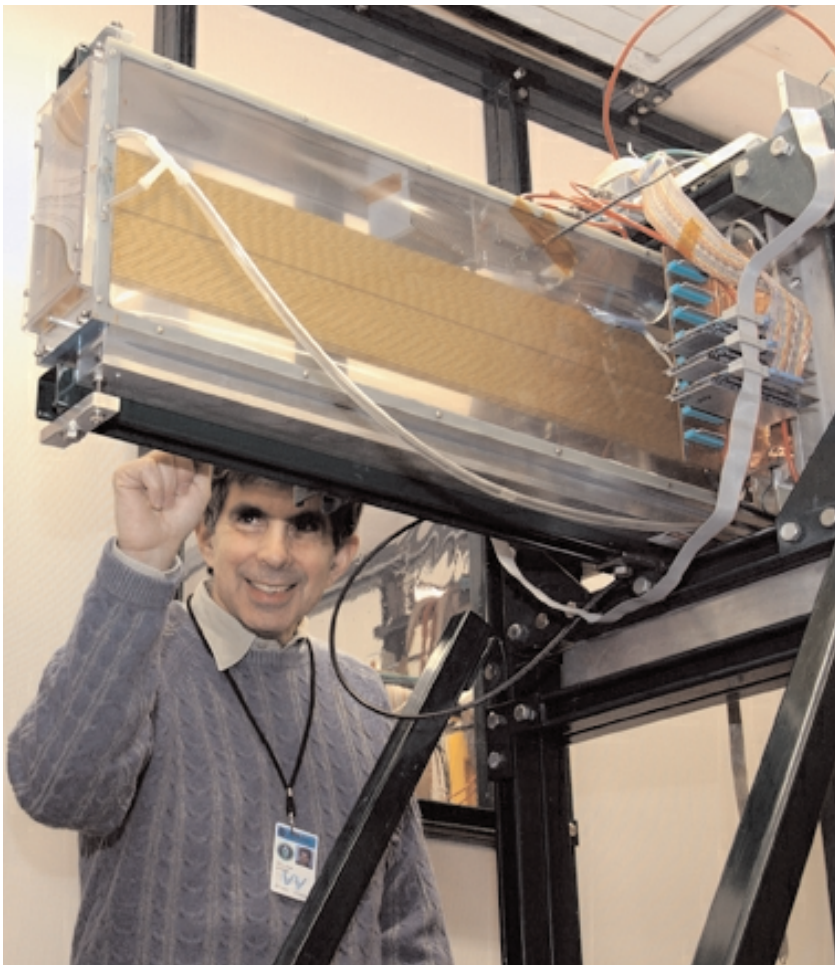


Photo by Reidar Hahn

BTeV cospokesperson Sheldon Stone with a protype tracking detector.

BTeV approval

*"We **CONGRATULATE** our **COLLEAGUES** at BTeV. It is encouraging to see the **confirmation** of the **importance** of **B physics**."*

—Tatsuya Nakada, LHCb spokesperson

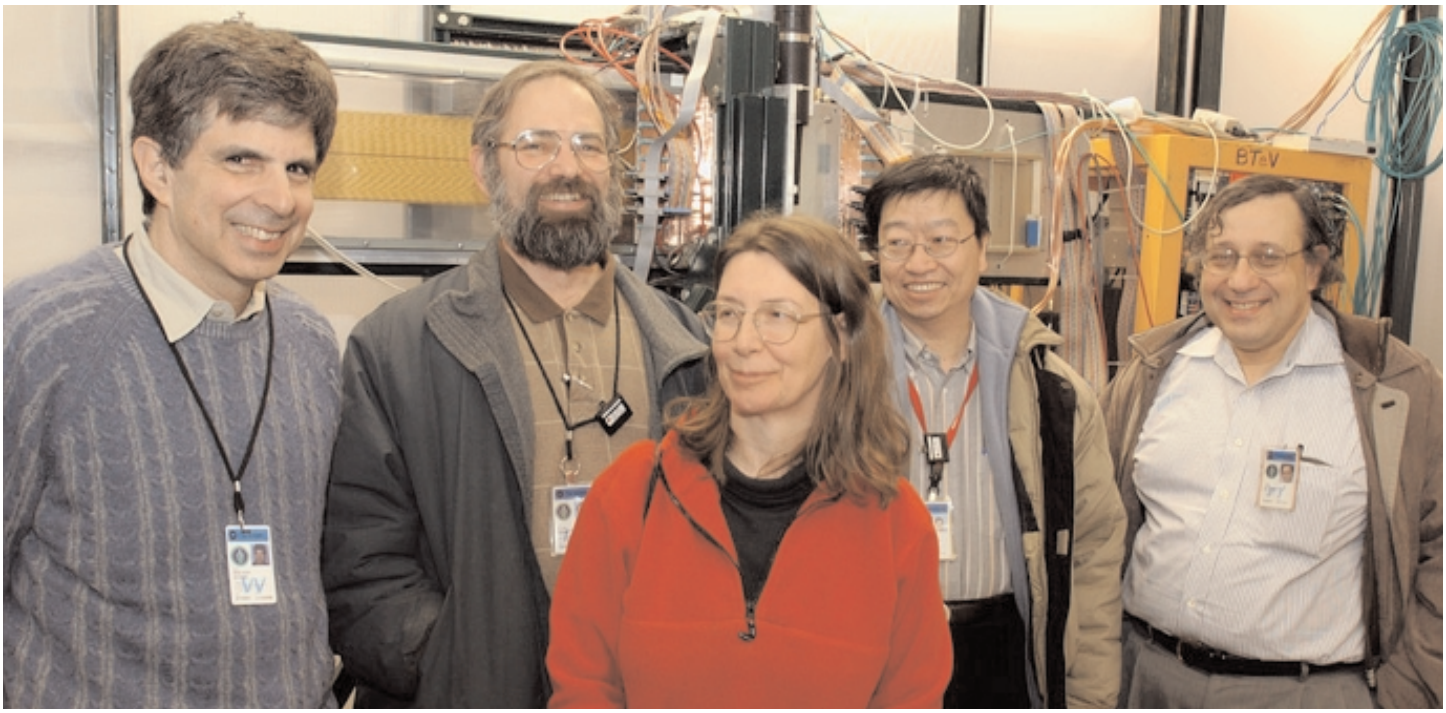


Photo by Reidar Hahn

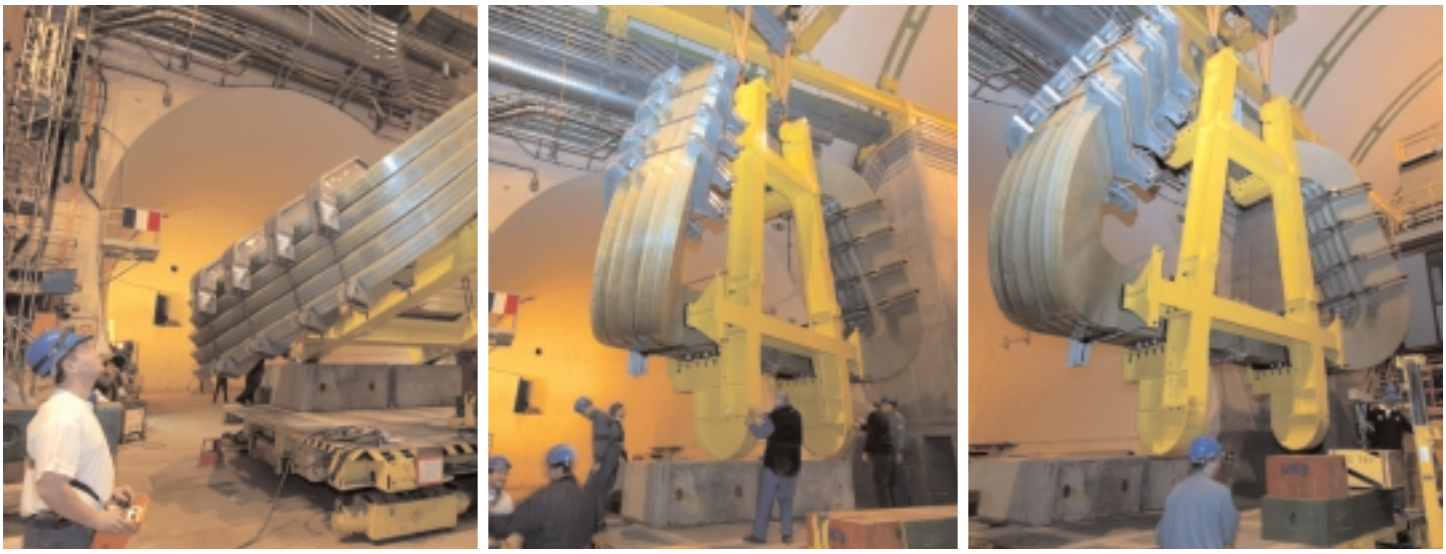
BTeV physicists Sheldon Stone (left, Syracuse University), Alan Hahn, Penny Kasper, Simon Kwan and Joel Butler (all Fermilab). Stone and Butler are the spokespersons of the collaboration, which includes 170 scientists from six countries.

LHCb and BTeV are the future generation of B physics experiments, designed to study the elusive mechanism behind the matter-antimatter asymmetry and to look for new physics phenomena. In the last ten years physics laboratories around the world have embarked on an ambitious experimental B physics program. In the late 1990s the accelerator laboratories SLAC in California and KEK in Japan built B factories: electron-positron colliders dedicated to the production of B mesons. The machines have produced collisions since 2000, and currently they are operating at their best performance ever. The colliders, which are limited in the types of B mesons that can be produced, have enabled the corresponding experiments, BaBaR and Belle, to collect a wealth of information.

LHCb and BTeV will rely on colliders that produce proton-proton and proton-antiproton collisions, respectively. Such collisions produce more types of B mesons, allowing scientists to study CP violation in many different processes. In addition, both experiments will record even more B decays per year than current experiments, improving the chances of observing very rare decays.

"We will extend the results of the B factories," said Roger Forty, LHCb collaborator, CERN. "We will have higher statistics, and we will study B decays at higher energies allowing different types of B particles to be investigated. The B factories have yielded signatures that are not in full agreement with the Standard Model of particle interactions. At the same time, the results of BaBar and Belle are not in full agreement with each other either. Together with BTeV we will clarify the situation."

Both the BTeV and LHCb detectors are highly specialized tools designed with one goal in mind: to capture B mesons that leave the collision point in the forward direction. Unlike the BaBar and Belle detectors, which completely surround the collision point, the next-generation B detectors are designed only to record particles leaving the collision in the forward direction, close to the beam pipe.



Photos by Maximilien Brice, CERN

In December 2003, the magnetic coil of the LHCb experiment arrived in the experimental hall at CERN, about 300 feet underground.

"You couldn't do B physics in the forward direction in the 80s. The technology just wasn't up to it," said Fermilab's Joel Butler, cospokesperson for the BTeV experiment. "The CDF and DZero experiments (at Fermilab) focus on measuring transverse B particles. But technology has made a lot of progress. We are doing B physics in the forward direction because the Bs are faster. They travel a lot farther before they decay. That makes it easier to separate them from other particle events."

To record the forward Bs, BTeV scientists have designed radiation-tolerant decay vertex detectors that can be positioned only six millimeters from the collision point. Parts of the vertex detector are located inside the beam pipe, closer to the collider beams than in any other collider experiment.

To the outsider, the BTeV and LHCb detectors are rather similar. Both experiments follow the same good strategy, and their scientists regularly share their expertise with each other at workshops and conferences. In the details, however, the technologies are different. The BTeV experiment will feature some alternative technology choices compared to the LHCb experiment, which already was approved in 1998.

"Our whole trigger and data acquisition system is a very big advance over what LHCb can do," said BTeV's Stone. "In addition, we use silicon pixel detectors. They provide better precision tracking than strip detectors."

For the LHCb collaboration it is too late to make major design changes. Construction of the large dipole magnet, a core component of the detector, is close to completion. Other components, such as calorimeter modules produced in Moscow, already have arrived at CERN as well. Yet there is room for final tuning.

"We've been inspired by the BTeV strategy for the trigger system," Nakada mentioned as an example. "This led to a modification of the LHCb trigger to improve its efficiency. Also, we've just finished the re-optimization of our systems for material budget reduction."

In the meantime the BTeV collaboration has been preparing for the next couple of DOE reviews. The CD-1 review of technology, cost and schedule will be in April. If approved, scientists expect the CD-2 and CD-3 reviews to happen soon thereafter.

"We're confident that we will surpass all of these hurdles," said Butler. "We'll convince people that we have a great experiment and are ready to move ahead. If everything goes well the experiment will be taking data in 2009."

Photo by Maximilien Brice, CERN

LHCb physicists Roger Forty (left) and Tatsuya Nakada, LHCb spokesperson, in front of the LHCb detector construction site. Scaffolding surrounds the recently installed magnetic coil, a core component of the LHCb detector to identify different types of particles.

What's a Nice Field

HEPAP committee will explain

by Judy Jackson

The quarks. The leptons. The bosons, the mesons, the hadrons, the so-forth-and-so-ons. Not to mention the antiquarks, the antileptons and all their cousins and anticousins by the dozens....

The science of particle physics spent the 20th century discovering, in incredible depth and with amazing precision, the particles that make up the world and the forces that determine how it works. The result was the Standard Model, the theory that answered the question "What is the universe made of?"

Then they went and changed the universe.

Astrophysical and cosmological discoveries of the past few years have revealed the astonishing fact that the universe we thought we knew is only about five percent of what's out there. The rest, the other 95 percent, is....well, we don't know what it is. We call it dark matter and dark energy, for lack of any better terminology. Dark matter, we now know, is what's holding the universe together. Dark energy, we now know, is some unknown force that is driving it farther and farther apart.

In a revolution that some have compared to Copernicus's 16th century recognition that we aren't at the center of the solar system, we in our time have realized that we do not really know what our universe is made of. Science Magazine called the confirmation of a dark universe, the "Breakthrough of the Year" for 2003.

"Nothing's bigger than the universe," wrote *Science* Editor-in-Chief Donald Kennedy. "The question is what it's made of."

That's where particle physics comes in. Not that it ever really left.

What is the universe made of? Same question, new universe. What does this revolutionary new view of the cosmos mean for 21st-century particle physics?

A committee of the High Energy Physics Advisory Panel, appointed by HEPAP Chair Fred Gilman and led by Stanford Linear Collider Center physicist and Research Director Persis Drell, has spent the past five months working on a report that will explain what the field that brought you the Standard Model is doing in a universe of matter and energy unlike any we have ever seen before.

"Recent scientific discoveries at the energy frontier and in the far reaches of the universe have redefined the scientific landscape for cosmology, astrophysics and high energy physics, and revealed new and compelling mysteries," wrote the Department of Energy and National Science Foundation officials responsible for U.S. particle physics research. "We are writing to ask the High Energy Physics Advisory Panel to take the lead in producing a report which will illuminate the issues, and provide the funding and science policy agencies with a clear picture of the connected, complementary experimental approaches to the truly exciting scientific questions of this century."

Committee Members

Persis Drell (Chair)
SLAC

Samuel Aronson
Brookhaven National Laboratory

Jonathan Bagger
John Hopkins University
Department of Physics & Astronomy

O. Keith Baker
Hampton University
Department of Physics

Neil Calder
SLAC

Fred Gilman
Carnegie Mellon University
Department of Physics

Judith G. Jackson
Fermilab

Edward W. Kolb
Fermilab

Joseph Lykken
Fermilab

Hitoshi Murayama
University of California at Berkeley
Physics Department

R. G. Hamish Robertson
University of Washington
Physics and Astronomy Department

James L. Siegrist
University of California at Berkeley
Physics Department

Simon P. Swordy
University of Chicago
Department of Physics

W. John Womersley
Fermilab

Like Particle Physics Doing in a Universe Like This?

Photo courtesy SLAC

Persis Drell, committee chair

Drell said the report will articulate a set of questions that define the science of 21st-century particle physics and discuss how both current and future particle physics experiments can address those questions.

"This has been a great committee. The opportunity to collaborate with people from many different branches of physics has been a privilege. We have worked hard but also had a lot of fun. It is an exciting time in particle physics, and we hope that our report will help serve as a guide to where the search for understanding has taken us so far, and to where it is going."

Committee member and Fermilab theorist Joe Lykken described the group's work.

"It's been an interesting process," said Lykken, one of four Fermilab members of the committee. "We wanted to make clear that the questions particle physics has always asked have not changed, but that they have a revolutionary new meaning in the context of these recent discoveries about the nature of the universe."

The committee's report will be made public at a meeting of HEPAP in Washington, DC on April 18 and 19.

Professor Frederick Gilman
Chair, HEPAP
Carnegie-Mellon University
5000 Forbes Avenue
Pittsburgh, PA 15213

Dear Professor Gilman:

Recent scientific discoveries at the energy frontier and in the far reaches of the universe have redefined the scientific landscape for cosmology, astrophysics and high energy physics, and revealed new and compelling mysteries. We are writing to ask the High Energy Physics Advisory Panel (HEPAP) to take the lead in producing a report which will illuminate the issues, and provide the funding and science policy agencies with a clear picture of the connected, complementary experimental approaches to the truly exciting scientific questions of this century. The report should elucidate how the questions being asked in particle physics overlap with those being asked by other communities. Further, we are particularly interested in the role that accelerators will play in addressing the important questions and the complementary roles played by other experimental techniques.

We request that HEPAP form a committee that will write a report identifying and addressing the key questions now faced by high energy physics, particle astrophysics and cosmology:

- What are the general methods and technologies that can answer these questions, and what is the particular contribution made by particle accelerators?
- What is the current status of scientific efforts in these areas and what are the near-term prospects for advances?
- Explain the connections between various approaches to this research. How can the results from one type of investigation impact the science of another experiment ? For example, discuss the interrelation of searches for dark matter .

The membership of the committee should be drawn broadly from the communities in particle physics, nuclear physics, cosmology, astrophysics and related fields that are actively involved in this science and can give independent advice on the relative strengths of the various approaches considered. We would like a brief report which encompasses the most important scientific questions and addresses the issues outlined above in a summary fashion. We recognize that, given the complexity of interconnections between fields, further studies may be needed to give a more complete picture of these evolving areas. We appreciate your advice on the appropriate next steps to follow-up on your report.

We look forward to the creation of this committee in the near future. We would like to have a status report on the work of the committee by the end of 2003, with a final report to HEPAP early in 2004.

We wish you success in this challenging and important endeavor.

Sincerely,

Raymond L. Orbach
Director

John Hunt
Assistant Director

Movin' On Up

Campaign '03-'04 has Tevatron soaring to new heights, and still climbing

by Matthew Hutson

"Run II is not a construction project," Dan Lehman of the Department of Energy said in July of 2003. Lehman directs the DOE's Construction Management Support Division and regularly conducts reviews of large DOE projects. After reviewing Fermilab's Run II Luminosity Upgrade plan last July, he said, "Run II is a complex campaign of operations, maintenance, upgrades, R&D, and studies."

A campaign. "He got it just right," Jeff Spalding said. "We've kind of taken that as our theme." Spalding is Project Manager for the Upgrade, which began last summer and will continue until the end of the run in 2009. "The Upgrade plan is a living plan," Spalding continued, "with adjustments and improvements as we continue to learn from operations and from the R&D."

Experts from this and other labs around the world define each element of the plan through a series of technical reviews. These reviews, organized by Pushpa Bhat of the Computing Division, are essential to make sure that the plan is technically sound.

The singular term Upgrade belies the plural nature of the project, which includes upgrades to seven of the eight linked accelerators. The Accelerator, Technical, Particle Physics, and Computing Divisions will perform upgrades continually during scheduled annual shutdowns and in the hours between data-collecting sessions.

STACK 'EM UP

The campaign to increase "integrated luminosity," or the number of proton-antiproton collisions in the Tevatron over time, is broken down into six major phases. The major Phase 1 project nearing completion is "slip stacking." In the Tevatron, protons outnumber antiprotons—also called pbars—by 10 to one, so the number of antiprotons produced forms the bottleneck for luminosity. Slip stacking will break the bottleneck.

To create pbars, the Main Injector sends a batch of protons towards the Antiproton Source, where they hit a stainless steel target. Slip stacking doubles the number of protons hitting the target. When in operation, two Booster batches of protons will travel around in MI at different speeds. When one slides up next to the other, they are combined together in one batch.

ON THE WEB:

Accelerator Division:
http://www-bd.fnal.gov/

Technical Division:
http://www-td.fnal.gov/

Particle Physics Division:
http://ppd.fnal.gov/

Computing Division:
http://computing.fnal.gov/cd/

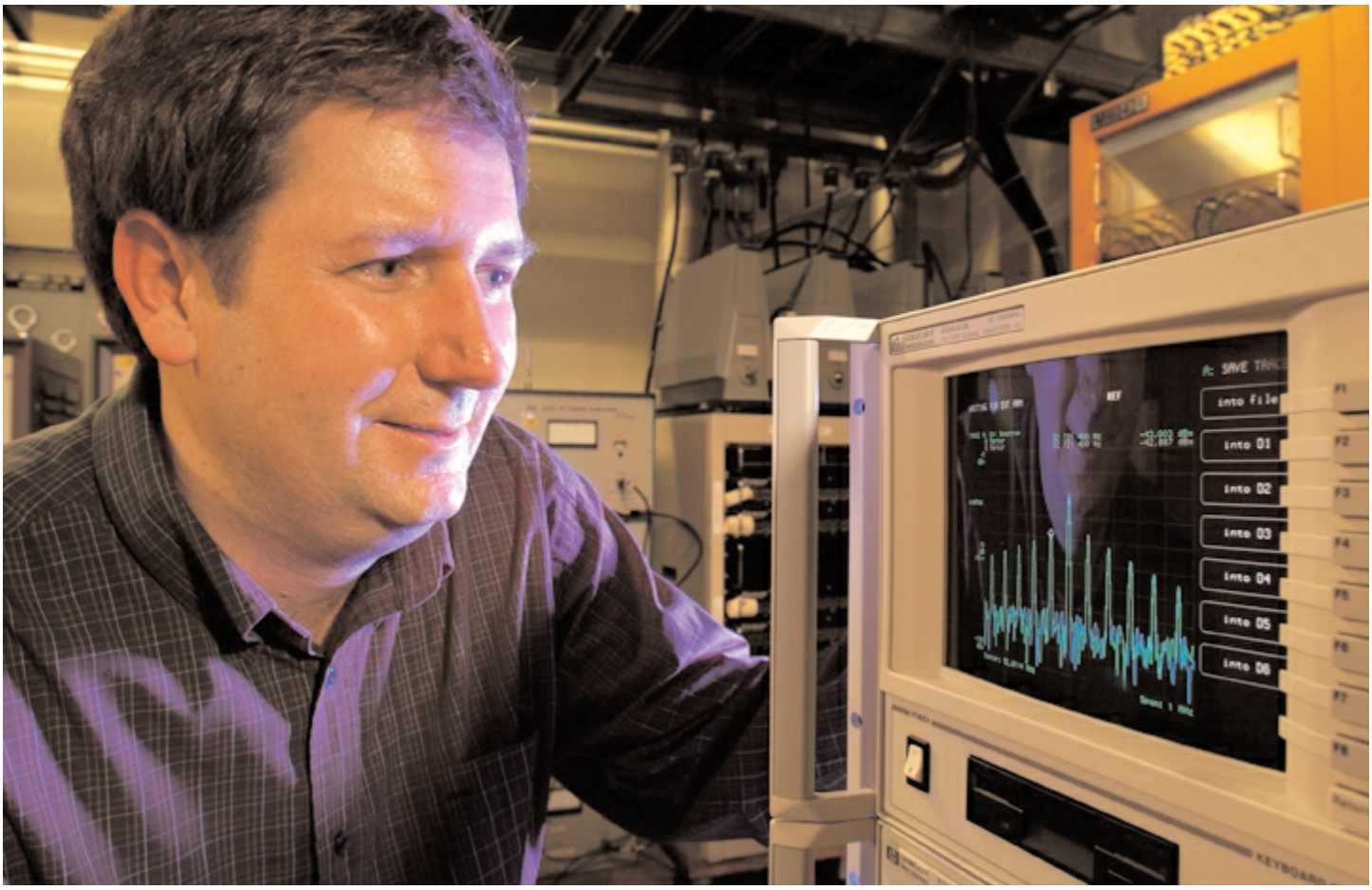


Photo by Reidar Hahn

Engineer Joe Dey working on the RF system for slip stacking. Dey is viewing the transient beam loading on the Main Injector cavities in the frequency domain using a vector signal analyzer.

But first the MI needs more radio frequency power to drive the protons around the ring. So Ioanis Kourbanis and MI technicians are doubling the number of RF amplifiers.

"We're pretty optimistic that we're going to finish on time and we're going to get our goal," Kourbanis said.

COOL IT

During Phase 2, the Recycler will near completion. In January the AD achieved its first data taking session, or store, in the Tevatron using pbars transferred from the Recycler after more than a year of setbacks.

"Sergei Nagaitsev put together a very aggressive plan for [last year's] shutdown and got a lot of support," Spalding said. "He added new capability, he added new diagnostics, and he did a thorough bake-out of the vacuum system, and basically solved the problem."

The biggest project for Phase 2, and perhaps the riskiest element of the entire Upgrade, is electron cooling. When protons hit the target, the pbars emerge as a poof of hot gas. By the time the pbars make it all the way to the Tevatron, they travel in orderly bunches. This transformation from random to ordered is called cooling.

An electron accelerator will create a cold electron beam and inject it into the Recycler. The electrons will mix with the pbars, and the more erratic pbars will share their thermal energy with the electrons. After 20 meters, a magnet will redirect the electrons away from the pbars.

Alexander (Sasha) Shemyakin manages the electron cooling research at the Wide Band lab in the fixed target area. Electron cooling has been used before, but "nobody has done it with a beam this powerful," he said. In June, the team will move their equipment to MI31 next to the Recycler, and in August during the shutdown they'll install the final elements into the Recycler. They hope to have the process working by late 2005.

With the Recycler and electron cooling fully operational, the transfer of pbar stacks from the Accumulator to the Recycler will be automated. Transfers will require only a minute and happen every half hour.

Photo by Reidar Hahn

Project manager Ioanis Kourbanis and postdoc Kiyomi Seiya in the Main Injector control room.

Movin' On Up

GETTING COLDER

With electron cooling in place, the AD can focus on another type of cooling during Phase 3: stochastic cooling. Stochastic cooling has been compared to separating green paint into blue and yellow one molecule at a time. A sensor detects which particles in a hot beam are misbehaving and applies microwaves to set them in order.

Stochastic cooling is used in the Debuncher, the Accumulator, and the Recycler. Elvin Harms, in charge of stochastic cooling in the Antiproton Source, calls this technique a bit of "radiofrequency gymnastics."

Another group will upgrade "stacktail cooling" in the Accumulator, which further refines the pbar stacks.

BEAM VS. BEAM

Phases 4, 5, and 6 will focus mostly on helping the Tevatron more efficiently use pbars. The beams of protons and pbars, each about half a millimeter thick, travel around the Tevatron in opposite directions while twisting around each other like cords in a rope. Separated by only five millimeters, their mutual electrical attraction "shaves" some of the particles off each beam.

The Tevatron uses 22 separators, pairs of metal plates generating electrical fields, to keep the two beams apart. One option is to add more separators, but this is expensive. The other option is to increase the voltage of the separators. Vladimir Shiltsev, Head of the Tevatron Department, and a team led by Ron Moore and Peter Limon, are researching new materials for the plates and doing beam studies. They should know by the end of 2004 whether they will install new separators or upgrade the existing ones.

A beam in the Tevatron contains 36 separate bunches. After crossing paths inside CDF and DZero, the bunches get wider, some more than others. One solution is to install a magnet called an electron lens that can turn on and off rapidly enough to narrow individual bunches. Currently one lens is in testing at the Tevatron, with another on the way. "These are top-notch experiments," Shiltsev said. "It's the first electron lens ever." Scientists at the LHC are watching closely to see if it works.

Fermilab also collaborates with SLAC, LBL, and Budker Institute of Nuclear Physics in Russia to study these "beam-beam" effects.

STEADY CLIMB

Several improvements have already increased luminosity. During the last shutdown an alignment task force installed TevNet, a GPS-based system for measuring magnet movement and correcting misplacement. These changes allow the corrector magnets to run at lower currents. The stores have increased from 15 hours to 30 hours.

The beamline between the target and the Debuncher ring has also been widened slightly to increase Debuncher acceptance of pbars. A team is currently studying the beamline using optical surveys, beam-based alignment techniques, and documentation to increase acceptance by rebuilding or relocating components or steering the beam differently. Ten quadrupole magnets in the Debuncher have been placed on motorized stands, and 20 more will receive the same treatment. Significant improvements in the Debuncher should continue to build up into 2007.

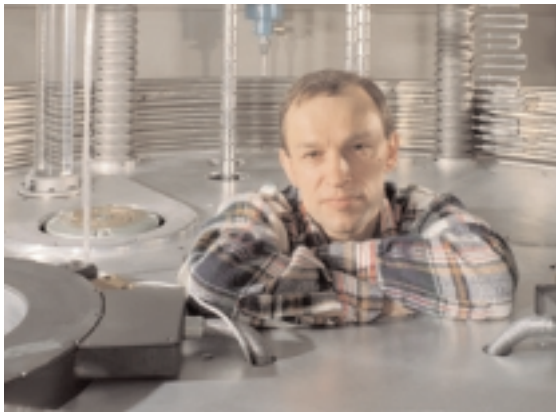


Photo by Reidar Hahn

Alexander Shemyakin of the Electron Cooling project.

LOCATION, LOCATION, LOCATION

The Computing Division's major contribution will be an upgrade to the Tevatron Beam Position Monitor, or BPM, system, in collaboration with the AD. At 240 points around the Tevatron, the particle beams pass through BPM's, which tell the operators how close the beams are to the center of the ring. The monitors send their data to 27 service buildings stationed above the ring, which process the data and send it to the main control room. The BPM group will replace all of the electronics in the service buildings. They will also rewrite much of the software for reading the data out, storing it, and analyzing it.

Steve Wolbers of the CD heads the project, and Bob Webber of AD is Deputy Head. Wolbers says that the upgrades will improve resolution by nearly a factor of 20, from 150 microns to eight microns.

A fast solution is better than a perfect solution. "The idea is to get this system in place quickly so that the Tevatron department and others can use this information," Wolbers said. The upgrade should be complete by the end of the year.

The CD will also work on hardware and software for the Tevatron Ionization Profile Monitors, or IPM's, which measure the size of the beam, and on several beam analysis projects around the lab.

ONE STEP AHEAD

Since December, the accelerators have been remarkably reliable, but according to Dave McGinnis, Technology Coordinator for the Upgrade, "the memory of December is fresh in our minds. We could at any time be down for 20 days."

Paul Czarapata, Associate Division Head of Engineering in the AD, says people have the wrong idea about maintenance; they think it's completely separate from upgrades. When something breaks you don't just fix it; you improve it. "Maintenance is a continual upgrade," he said. "You've gotta stay one step ahead." Czarapata's keeps an eye on the lifetimes of equipment, on how it's used, on the status of replacement parts, on run schedules, and a number of other factors. With so many variables, "people make careers out of just studying when to do maintenance."

Czarapata's biggest headache is securing spare parts for the Linac. The one vendor that makes the right power tubes is for sale, and its older engineers are retiring.

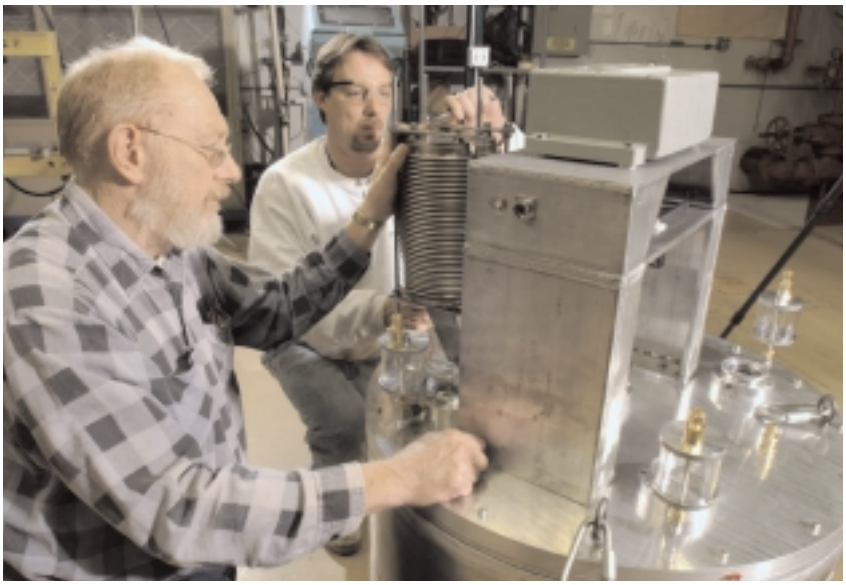


Photo by Reidar Hahn

Jim Walton (left) and Jeff Wittenkeller with one of twelve new separator polarity switches for the Tevatron.

MANAGE THIS

Accompanying the engineering changes have been some management changes. Roger Dixon took over as head of the AD last year, and he made several organizational changes. He also introduced the idea of an integration department to increase the efficiency and coherence operations. The next step was to charge Dave McGinnis with the responsibility for accelerator systems with all the systems departments reporting to him. Integration evolved naturally from that point.

"Integration is important, but more important is having the right people doing the right jobs," Dixon told me. "From the beginning I knew that the potential existed within the Division for extraordinary accomplishments. Most of these are yet to come."

Currently the integrated luminosity per week is around 11 inverse picobarnes (pb^{-1}). At the beginning of Run II in 2001 it was around one pb^{-1}, and by the end, it will probably reach between 28 and 47 pb^{-1}. Total Run II integrated luminosity will probably reach between 4.4 and 8.5 thousand pb^{-1}, or inverse femtobarnes.

"We're doing a lot better but we've got a long way to go," Spalding said. "8.5 fb^{-1} we think is a realistic goal if every element of the plan works the way it's designed to work. We think it's realistic to be achieved and in fact on paper you can certainly exceed it."

Even following the lower projection of 4.4, Run II would provide 30 times the integrated luminosity of Run I, and the subatomic realm holds no shortage of mysteries.

Rare and Well Done

Tita Jensen, *Chez Léon* celebrate 25 years of worldly dining

COVER PHOTO: Tita Jensen, gourmet chef of Chez Léon since its start in 1979.

Cooks in action: Konnie Barnes (left), Tita Jensen and Kathy Lootens.

by Elizabeth Clements

This year, on April 24, Chez Léon turns 25—a rare achievement for a restaurant.

For the past two and a half decades, Tita Jensen has delighted people's taste buds at Fermilab's onsite restaurant, and she doesn't have plans to stop anytime soon. "Every day that I open the dining room, it is wonderful," she said. "It is like when you open the curtains to a theater or an opera. It makes me very happy."

Named after Fermilab's second director, Nobel laureate Leon Lederman, Chez Léon started as a place of fine dining for employees and especially for the physicists who traveled to the lab from all around the world. "It was really isolated out there in those days. I used to have to drive to the farthest part of Aurora just to get a red pepper," Jensen said. "Leon always wanted to start a place for fine dining, and it was a big success."

In the beginning, Chez Léon served two dinners and one lunch in the Music Room in the Users' Center. A year later, Chez Léon moved into its current location in the Users' Center. Since that time, Chez Léon has changed quite a bit.

"Miracles don't happen in a pot. You need to use good ingredients to get good results."

~ Madeline Kammen's philosophy on cooking according to Tita Jensen

Today, Jensen and her staff serve approximately 75 employees lunch every Wednesday and approximately 50 employees and their guests dinner every Thursday. In addition, Chez Léon also provides the food for most workshops, reviews, and parties on site. "We have turned into something of a private catering business, which has been very different," Jensen said.

As a professionally trained chef in classic French and Italian cuisine, Jensen learned her technique from Madeline Kammen at a restaurant school in Boston. Jensen has a degree in anthropology, and cooking was not her original plan. After graduating, she quickly realized that finding a job in anthropology was easier said than done and turned to cooking. Jensen said, "I was always interested in cooking, but I was very discouraged because it was not a woman's profession at the time."

Jensen will not argue that it could not have worked out better. "Chez Léon is the best thing that ever happened to me," she said. "I am able to create a friendly atmosphere. I get to create my own menus. I have a great staff. It is every chef's dream. The only thing left is to make my customers happy."

With at least 40 standing reservations every Wednesday for lunch, Jensen doesn't appear to have any problems pleasing her customers. "They don't even look at the menu for that day. They just make their reservations for lunch every Wednesday no matter what," she said. "I think that is very funny."

When it comes to choosing the menus, Jensen considers three main things: the season, the cost and the availability. "You don't want to serve asparagus in the middle of the winter," she said.

No matter the inspiration, menus at Chez Léon are without a doubt the product of Jensen's worldly travels. Originally from the Dominican Republic, Jensen met her Danish husband, Hans Jensen, who is a physicist on CDF, while traveling in Peru. They spent some time at CERN in Switzerland and moved to Illinois when CDF was getting started in the late seventies. Jensen explained that she really plans her menus simply around what looks good. "I was trained not to use recipes," she said. "I was told, 'You're an artist. You're trained to use food and techniques.'"

While the food is important, Jensen believes that the atmosphere plays just as big if not a bigger role. "Food is just a medium," she said. "You need a friendly place, where people feel welcome and special."

Looking back on the twenty-five years, Jensen is the first to admit that she is still learning. "When you work with food, you learn something every day," she said. "At every meal, I try to make something that I haven't done before. That is my challenge that I give myself. Sometimes it works out, and sometimes it doesn't."

From graduations to birthdays to even divorces, Chez Léon is the place to celebrate at Fermilab. It is indeed a rare day at Chez Léon when Jensen does not emerge from the kitchen with a lighted cake, singing Happy Birthday to a mildly blushing customer. "I was very against Chez Léon being an executive dining room when it first started. Everyone who walks in here is special," Jensen said. "The fact that they choose this as the place to come makes me very proud."

Jensen has mastered the art of celebrating other people's events, but how does she plan to celebrate her own? "I would like to do something where the staff doesn't have to work," she said. "I feel very fortunate because I have the most honest and loyal group of workers. I would like to take them out to a restaurant to celebrate Chez Léon's 25 years."

Ghost Leptons Beaming By

A POSTDOC LEGEND

(to the music of "Ghost Riders in the Sky — A cowboy legend")

A postdoc went to old Soudan
One dark and windy day.
Upon a wedge he rested
His detector to survey.
The particles he pondered
Were so puzzling in their dearth:
More downward through the atmosphere
Than upward through the earth.

Oscillations! Oscillations!
Ghost leptons beaming by!

The quantum law says if they change
You've got neutrino mass.
We'll send them out from Fermilab
And through the rock they'll pass!
In 2-plus milliseconds
They'll arrive there on the beam
A half-a-mile underground:
Will they still be what we've seen?

Oscillations! Oscillations!
Ghost leptons beaming by!

How much neutrino muon
And how much neutrino tau?
He'll scrabble at the data
'Till his hands are bleedin' raw!
For he's vowed to search forever
For just one defining change
Where MINOS miners seek new ore
In the lonely Iron Range.

Oscillations! Oscillations!
Ghost leptons beaming by!

As neutrinos zipped on through him
He heard one call his name:
"We're on our way to who-knows-where
Beyond this final plane
But your job is to think this through
And solve the mystery
To take precision measurements
And make some history!"

Oscillations! Oscillations!
Ghost leptons beaming by!

— *Mike Perricone, with apologies to author Stan Jones, and to artists Vaughn Monroe, Peggy Lee, Bing Crosby, Johnny Cash, Willie Nelson, Burl Ives, Marty Robbins, Frankie Laine, Eddy Arnold, Roy Clarke, The Ventures, Pioneer Pepper and the Sunset Pioneers, and many others.*

ON THE WEB:

Ghost Riders in the Sky:
www.sunsetpioneers.com/WagonWheel/GhostRidersInTheSky.html

An old cowboy went ridin' out
One dark and windy day
Upon a ridge he rested
As he went along his way
When all at once a mighty herd
Of red-eyed cows he saw
A-plowin' through the ragged sky
And up a cloudy draw.

Yippee—aye—oh! Yippee—aye—oh!
The ghost herd in the sky.

Their brands were still on fire
And their hooves were made of steel.
Their horns were black and shiny
And their hot breath he could feel.
A bolt of fear went through him
As the herd went thundering by
For he saw the riders coming hard
And he heard their mournful cry:

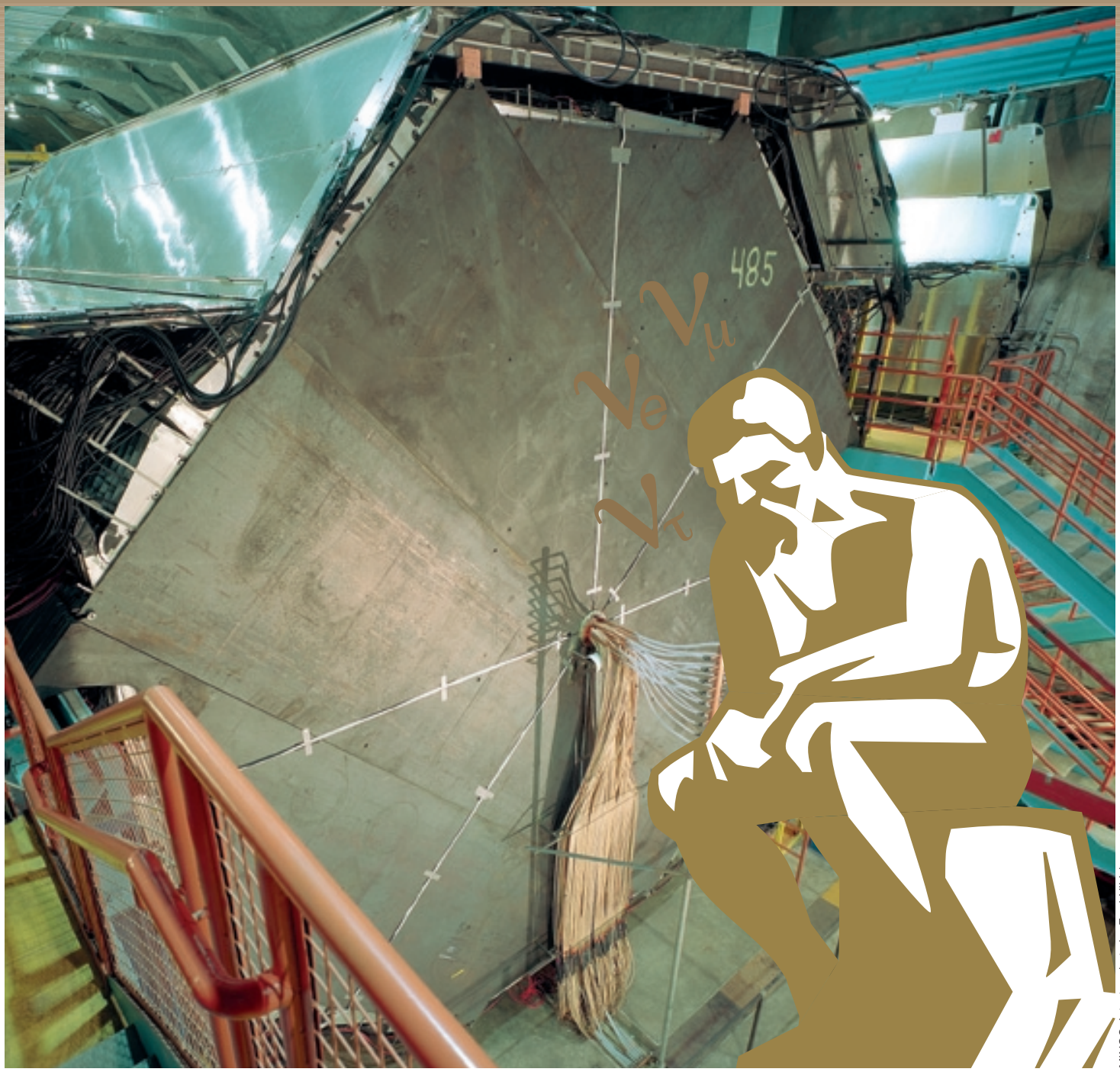
Yippee—aye—oh! Yippee—aye—oh!
Ghost riders in the sky.

Their faces gaunt, their eyes were blurred,
And shirts all soaked with sweat
They're ridin' hard to catch that herd
But they ain't caught 'em yet
For they've got to ride forever
On that range up in the sky
On horses snortin' fire
As they ride on hear their cry:

Yippee—aye—oh! Yippee—aye—oh!
Ghost riders in the sky.

As the riders loped on by him
He heard one call his name:
"If you want to save your soul from hell
A-ridin' on our range—
Then cowboy change your ways today
Or with us you will ride
Trying to catch the Devil's herd
Across these endless skies!"

Yippee—aye—oh! Yippee—aye—oh!
Ghost riders in the sky.



MINOS detector photo by Fred Ullrich

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To purchase tickets for Arts and Lecture Series events, or for further information or telephone reservations, **call 630-840-ARTS (1-800-840-2787)** weekdays between 9 a.m. and 4 p.m. Phone reservations are held for five working days, but will be released for sale if not paid for within that time. Will-Call tickets may be picked up, or available tickets purchased, at the lobby box office on the night of the performance beginning at 7 p.m. When coming to this event, only the Pine Street entrance to Fermilab will be open. *For more information, check out our web page at* **www.fnal.gov/culture.**

MANYA: A LIVING HISTORY OF MARIE CURIE

Written and performed by Susan Frontzcak

Saturday, April 17, 2004
Tickets- $15 ($8 for ages 18 and under)

Imagine: You are not allowed to speak your language. Your home country forbids you to attend university. You have no money to attend college elsewhere. What are your chances for success? In spite of these and other adversities, Marie Curie was the first woman to receive a doctorate in the sciences in Europe, the first woman to receive a Nobel Prize, the first person to receive a second Nobel Prize, and the first woman to teach at the Sorbonne in its 600-year history.

EINSTEIN'S UNFINISHED SYMPHONY: SOUNDS FROM THE DISTANT UNIVERSE

Dr. Barry C. Barish, Professor of Physics, Caltech, and Director, LIGO Laboratory

Friday, April 23, 2004
Tickets- $5

The Laser Interferometer Gravitational-Wave Observatory (LIGO) at Caltech is an ambitious attempt to detect gravitation waves from some of the most spectacular phenomena in the universe: colliding black holes, supernovae and even relic waves from the big bang. LIGO and the first sounds of the universe from these instruments will be described. Dr. Barry Barish, Director of LIGO will discuss these events.

SAM BUSH

Saturday, May 15, 2004
Tickets- $25 ($13 for ages 18 and under)

Sam Bush has become synonymous with the Telluride Bluegrass Festival. Founder and driving force behind the legendary New Grass Revival, Bush's ability to make music that exceeds all expectations is evident from two projects just in the past year. *Bluegrass Mandolin Extravaganza* and *Short Trip Home* were nominated for Grammy Awards as Best Bluegrass Album and Best Classical Crossover Album, respectively.

MILESTONES

RETIRING

- Edwin Arko, PPD-Electrical Engineering Dept., ID 360, on May 28.
- Richard Dice, PPD-Technical Centers, ID 1474, on April 1, 2004.

MEMORIAM

PASSED AWAY

- Carmenita Moore, CD-COMP, ID 05524N, on March 21.

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

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

Chez Léon MENU

FOR RESERVATIONS, CALL X4512
CAKES FOR SPECIAL OCCASIONS
DIETARY RESTRICTIONS
CONTACT TITA, X3524
HTTP://WWW.FNAL.GOV/FAW/EVENTS/MENUS.HTML

LUNCH
WEDNESDAY, APRIL 7

Pork Saltimbocca
Broccoli Risotto
Cassata

DINNER
THURSDAY, APRIL 8

Antipasto
Scampi
Lemon Scented Saffron Rice
Sauteed Spinach
Rhubarb Custard Tarts

LUNCH
WEDNESDAY, APRIL 14

New Potato Kielbasa
Gruyere Salad
Blueberry and Raspberry Cake

DINNER
THURSDAY, APRIL 15

Mussel Placki
Grilled Mongolian Lamb with Thai Curry Sauce and Tropical Mint Chutney
Mixed Grilled Vegetables
Kirsch and Tart Cherry Souffle

LUNCH
WEDNESDAY, APRIL 21

Grilled Beef
Vegetables and Rice Noodle Salad
Coconut Flan

DINNER
THURSDAY, APRIL 22

Salad of Field Greens with Pears & Shaved Parmesan
Monkfish with Cognac Sauce
Zucchini Spaghetti with Chive Sauce
Risotto
Mixed Berry and Ginger Shortcakes

LUNCH
WEDNESDAY, APRIL 28

Raspberry Chicken
Wild Rice
Sauteed Pea Pods
Cold Lemon Souffle with Apricot Sauce

DINNER
THURSDAY, APRIL 29

Cheese and Ham Souffle
Filet Mignon with Morel Sauce
Steamed Asparagus
Potato Dauphinos
Pistachio Napoleons with Chocolate Cream & Berries

Fermilab

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