FERMI NEWS

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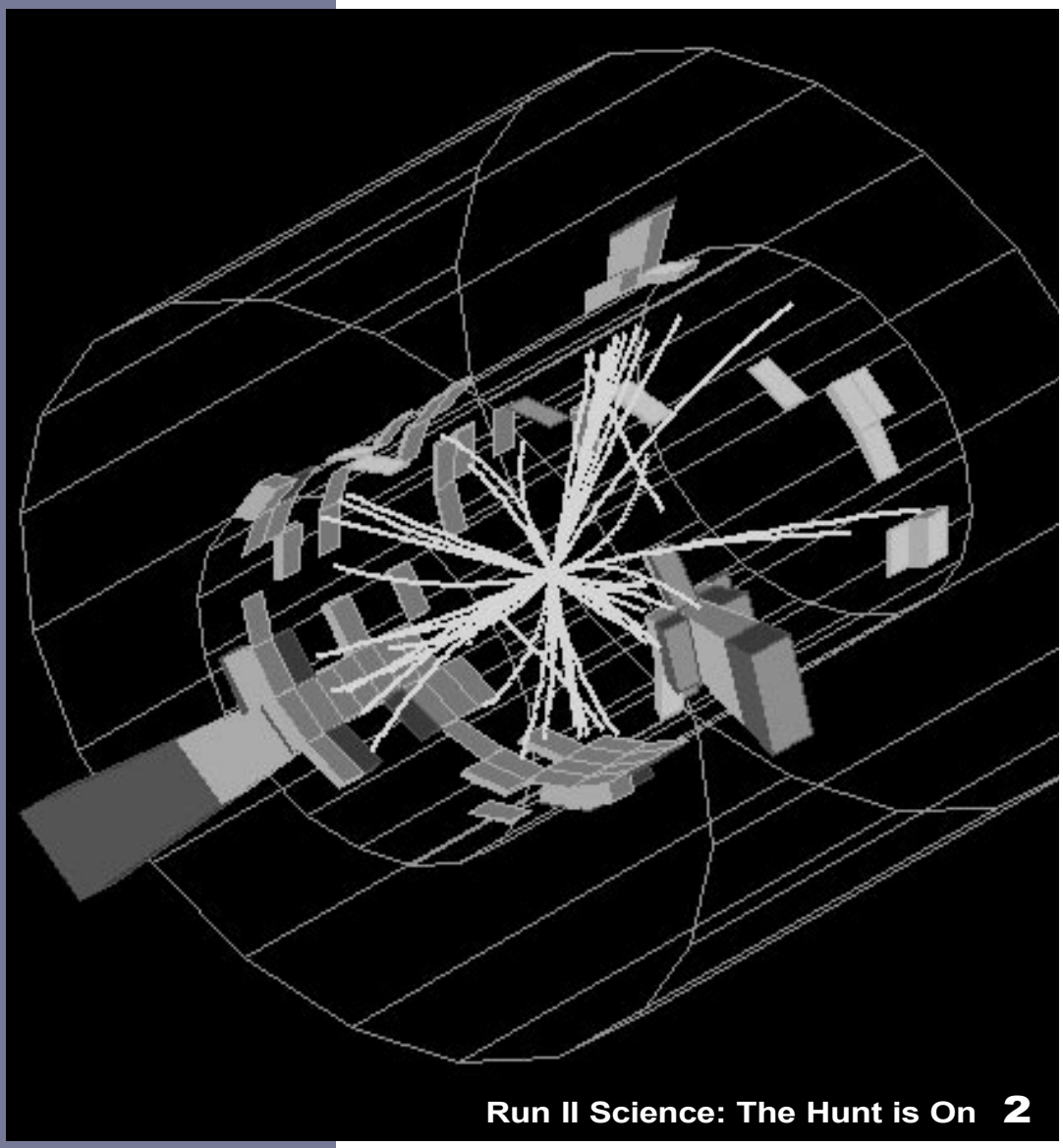

Fermilab Illustration

Run II Science: The Hunt is On 2

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INSIDE:

Run II Science

THE HUNT IS ON

by Mike Perricone

Chris Tully made his first visit to Fermilab in 1988 as a high school student, representing the state of Virginia in the U.S. Department of Energy's national high school honors program. He learned to string wires for the muon chambers at the DZero detector.

He made his second visit on December 13, 2000 as a Fermilab Colloquium presenter, Princeton University physicist and CERN experimenter. This time, he was reporting on the "tantalizing hints" for the Higgs mechanism that had shown up at CERN's Large Electron Positron Collider, before the November 8 shutdown. This time, he was representing the worldwide state of anticipation over the beginning of Collider Run II of the Tevatron—and the search for the origin of mass.

"For eager Higgs hunters," Tully said, "the immediate focus will be on the Run II results from Fermilab as the next possible source for direct evidence for the Higgs mechanism. Now that evidence suggests a low mass Higgs, it might mean that Fermilab is in exactly the right place to observe a wealth of new physics."

The whole world is watching, and the Higgs is far from the only attraction as Fermilab opens Collider Run II of the Tevatron. In fact, Higgs candidates might not make an appearance for quite some time. CDF co-spokesperson Franco Bedeschi estimates that five years of Run II would produce about 3,000 Higgs candidates (out of 5×10^{14} proton-antiproton collisions) in the mass range of 115 GeV/c^2 predicted by LEP results and other data.

So what else is new? Almost everything: new particles, new dimensions, new top quark measurements and production channels, new CP violation results in B physics. New physics. New excitement. News.

"There is the possibility of something definitive early on," said theorist Chris Hill. "For example, it's possible we will uncover a new layer of physics with new strong dynamics. That could show up in the first inverse femtobarn." (See box: *The broad side of a femtobarn.*)

Right near the top of the Run II wish list is the top quark. Discovered at the Tevatron in 1995, the top is due for a step up in precision and a new production mode. Called single top production, the process starts with an up quark annihilating against a down quark (within the Tevatron's proton-antiproton collisions). Out pops a "virtual" W boson, which quickly decays into a top and an antibottom.

"Single top production has never been observed before," Hill said. He called it a "new window into the top," allowing views of how it couples to the W boson. It also provides tests of the Standard Model and background for Higgs production."

Cover image: Three-dimensional computer simulation of a Higgs event from CDF Monte Carlo data.

Precision measurements of the top mass (down to around ± 0.6 GeV) and the W (± 20 MeV) also serve as constraints on the Higgs mass, Hill said.

Chris Hill

"These precision electroweak tests use the top mass and the W mass in combination with other measurements to predict the Higgs mass," he continued. "You then have the potential to define precisely where the Higgs ought to be, and check it with a discovery."

In Run I, Fermilab produced the grand total of 150 top quarks. Run II, however, will yield thousands.The top is also a route into super-symmetry, the theory that all Standard Model particles have "superpartners." But it's a route with a twist.

"It seems to work in reverse," Hill explained. "Because the top is heavy, many people expect its superpartner [the 'stop'] to be light. The production of 'stop' and 'antistop' are possibilities, although the decay modes are very model-dependent: you have to determine what they're decaying into. There are many possible channels, but 'stop' production is something people might expect in Run II."

It won't stop there. New physics goes from top to bottom.

Fermilab discovered the bottom quark in 1977. The accelerating field of B physics measures the behavior of particles containing bottom quarks, known as B mesons. The decays of B mesons and their antimatter counterparts (anti-B mesons) produce subtle differences that could go a long way toward explaining the universe's preferential treatment of matter of antimatter, leading to Life As We Know It.

Here, the key quantity differentiating the decays is sin2β, and the goal is measuring that quantity as accurately as possible. Fermilab's CDF collaboration set a new standard in sin2β measurement with data from Collider Run I, establishing a value of 0.79 ± 0.4 which is consistent with Standard Model predictions of a large positive CP-violating asymmetry in this decay mode. In other words, a big gap between the behavior of matter and antimatter.

Franco Bedeschi

Then along came BABAR, the electron-positron collider at Stanford Linear Accelerator Center. BABAR raised the bar with its recently-announced sin2β measurement of 0.34 ± 0.20, "which is about twice as accurate as previously published values," as stated in the paper submitted to Physical Review Letters.

"We measured the sin2β CP violation parameter with an error of about 0.40, compared with the BABAR error of 0.21," said CDF's Bedeschi. "We are aiming for the Summer of 2002 to match the

The broad side of a femtobarn

Physicists developing the U.S. atomic bomb in World War II were bouncing neutrons off uranium nuclei, which they described as being "as big as a barn."

A barn is a unit of area equal to 10^{-24} square centimeters, about the size of a uranium nucleus. "Femto" is the prefix meaning 10^{-15}, or a thousandth of a millionth of a millionth (0.000 000 000 000 001). A femtobarn is an area much smaller than the shadow of a proton.

"Inverse femtobarns" are a measure of integrated luminosity, that is, of total events over a period of time. The goal of Collider Run II is achieving very high integrated luminosity, measured in inverse femtobarns. One inverse femtobarn will allow physicists to see one event with a cross-section, or probability, of one femtobarn. One femtobarn is one hundred thousand billion times smaller than the cross-section for a proton-antiproton collision.

The higher the integrated luminosity—the greater the number of inverse barns—the greater the number of events that will occur. It's like throwing more baseballs, closer together, through the barn window. Or, throwing more protons, closer together, at more antiprotons.

Run II Science

BABAR resolution, but it's an aggressive goal. In the meantime BABAR will be taking even more data, so they will still be ahead. With a good luminosity profile over the next few years, however, we should in principle surpass them."

"CDF will be very competitive with BABAR," Hill added. "That's borne out by recent BABAR and BELLE measurements with errors on them comparable to what CDF had a couple of years ago. So when CDF is back up to speed, they'll be well able to address CP Violation in the B system."

Fermilab has a long history of offering up something extra, and extra dimensions may be a bonus for Run II.

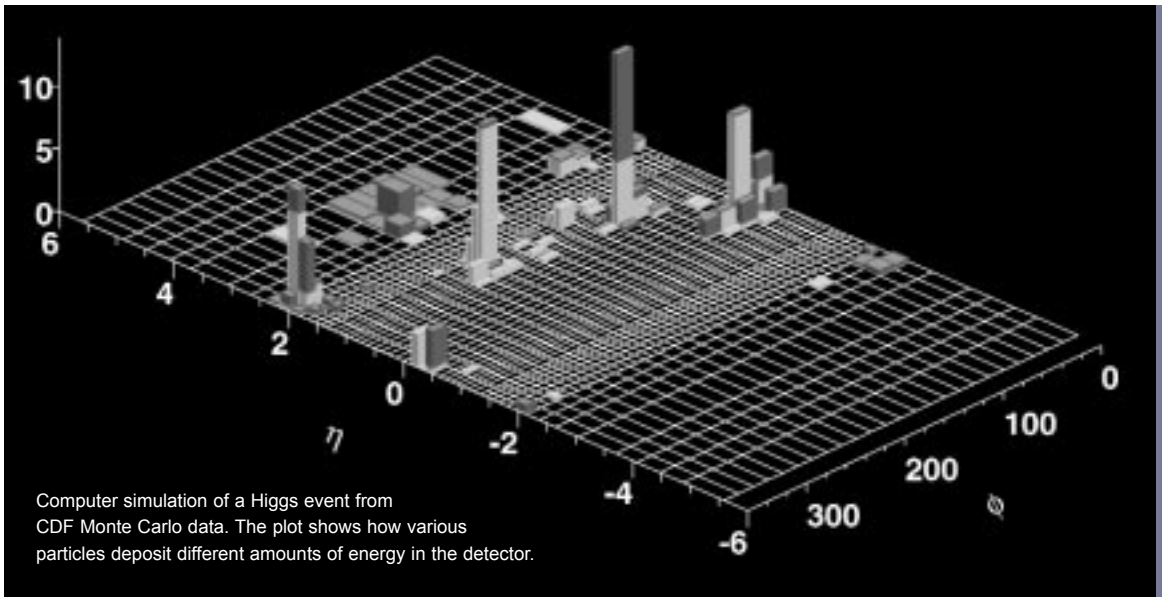
"These are the 'K-K' or Kalusza-Klein modes," Hill explained. "These are carbon copies of Standard Model particles but at much higher masses. For example, a KK mode of the gluon would be a heavy gluon, and the mass of the heavy gluon would measure the size of the extra dimension. Personally, I think extra dimensions are beyond the reach of the Tevatron, but hope springs eternal."

And hope springs from luminosity, the number of collisions the Tevatron can produce over the course of its run to light up the field with new discoveries—Higgs and otherwise.

"The big question is can we get the integrated luminosity," said veteran CDF experimenter Henry Frisch of the University of Chicago. "If we make enough Higgs candidates, the newly-upgraded detectors will definitely be capable of seeing them."

Henry Frisch

Making enough candidates applies to the entire range of Run II science. That puts the focus on Fermilab's Beams Division, performing the intricate tasks of creating antiprotons, "cooling" them into intense beams, and colliding them with proton beams. As Frisch pointed out, the Beams Division has a long and distinguished history of exceeding its goals.



Computer simulation of a Higgs event from CDF Monte Carlo data. The plot shows how various particles deposit different amounts of energy in the detector.

For example, the original design goal for the Tevatron collider luminosity was 10^{30} cm^{-2}/sec, which corresponds to about 50,000 collisions per second witnessed at each detector. The collisions are inelastic collisions, violent collisions that break up both the proton and the antiproton, sending lots of stuff flying all over the place.

The Beams Division took that goal and exceeded it by a factor of about 16. They got to $1.6x10^{31}$, which corresponds to inelastic collisions occurring at a rate of about 800,000 per second.

"Now we're talking on the order of 10 to 20 times that number—as many as 10 to 15 million collisions per second," Frisch said.

Luminosity holds the key to discoveries—specifically, integrated luminosity, or the number of total collisions over the course of the run. Frisch explained that the Higgs has an extremely small cross-section—physics-speak for the probability that a proton would actually make a Higgs particle, or any specific particle under investigation. The equation in question is simple:

(luminosity) x (cross section) = collision rate, or number of events per second

As Frisch pointed out, a small cross section requires lots of luminosity to produce a significant number of observable events.

"The people in the Beams Division have always had wonderful ideas to get the luminosity up," Frisch said. "We're not yet running up against a 'brick-wall' limit set by physical law. Clever ideas, new techniques and a lot of hard work may well get us what we need."

All this against the background of pushing forward with the neutrino experiments, MINOS and MiniBooNE; and of the lab's continuing support effort for the LHC and the Compact Muon Solenoid at CERN.

Chris Tully

"Looking from the outside," Chris Tully said, perhaps wistfully, "the prospects for Run II at Fermilab are very promising if new physics is sitting just beyond what LEP was able to explore."

Just beyond LEP, and just within reach of the Tevatron? The whole world is watching.

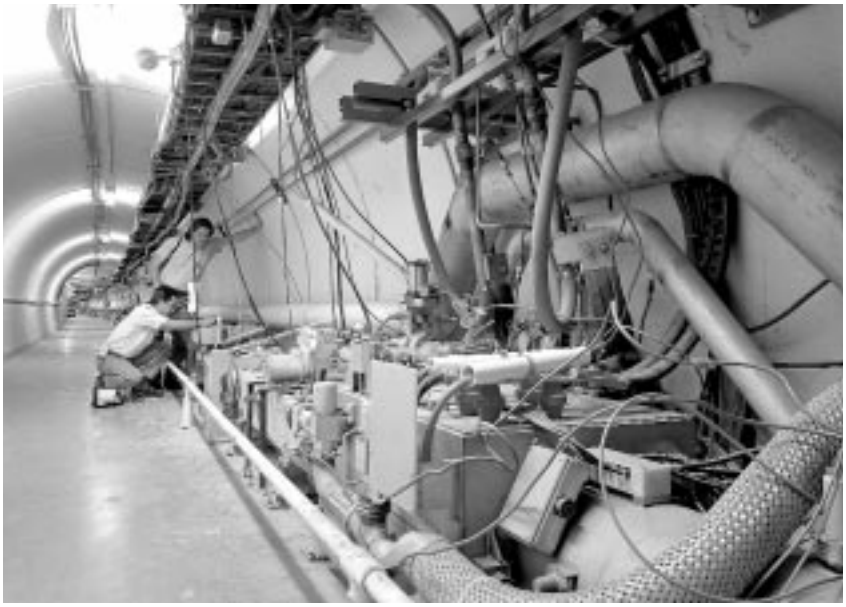


Photo by Reidar Hahn

The upgraded Tevatron will be the source of Fermilab's discoveries in Collider Run II.

Targeting the Higgs

The probability of producing a Higgs in a specific mode typically decreases as the mass of the Higgs increases. However, above a certain Higgs mass other production channels open up, increasing this probability. For example, if the Higgs mass is less than the order of twice the W mass (light Higgs), this process will create the Higgs:

p—pbar –>W* (or Z*) –> W (or Z) + Higgs,

where W* and Z* indicate metastable states of the W and Z bosons.

If the Higgs mass is about twice the W mass or larger (160 GeV/c^2 or above), this process will dominate:

p—pbar –> Higgs –> W + W (or Z + Z).

—Franco Bedeschi

For more information: **Beams Division—http://www-bd.fnal.gov/**
Computing Division—http://www.fnal.gov/cd/
Particle Physics Division—http://ppd.fnal.gov/

ESO Photo Fermilab Photo

This cyclotron (above), built in 1930, accelerated protons in a spiral motion to 80,000 electron volts. Fermilab's Tevatron (top), 4 miles in circumference, accelerates protons to more than 12 million times that energy.

Tevatron to reach

by Kurt Riesselmann

Fermilab scientists are taking yet another step up the energy ladder. After five years of upgrades and tests, scientists are ready to squeeze an extra 10 percent of energy out of the Tevatron accelerator when Run II starts this month.

Technicians have carried out a lot of work to give every proton circulating in the Tevatron an extra 80 GeV (billion electron volts). In everyday life, this extra energy just wouldn't matter. It is orders of magnitude less than the calories contained in a single cornflake. It is negligible compared to the energy a mosquito needs to fly. And it is even less than the energy stored in a single gold atom according to Einstein's famous equation $E=mc^2$.

As a matter of fact, a cosmic particle traveling with 80 GeV energy may well have hit you as you read this story. Cosmic particles constantly arrive here on earth, many traveling at even higher energies. The most powerful particles ever observed had energy of more than 10^{20} eV, or 100,000,000,000 GeV. That is the energy a high-speed tennis ball transfers when hitting the ground. Confined to a tiny particle, this energy doesn't even cause a dent: Like an x-ray, such a particle traverses thick layers of material, losing its energy along the way.

Compared to the power of the highest-energy cosmic accelerators, which are associated with black holes and violent, star-producing areas in the universe, the new Tevatron beam energy of 980 GeV is about a billion times smaller.

A rising scale of accelerator energies

SLC at SLAC: **45 GeV** electrons and positrons for collisions (until 1998)

RHIC at BNL: **100 GeV** per nucleon gold ions for gold-gold collisions (summer 2001)

LEP at CERN: **105 GeV** electrons and positrons for collisions (until 2000)

SPS at CERN: **315 GeV** protons and antiprotons for collisions (until 1990)

HERA at DESY: **920 GeV** protons and 27.5 GeV electrons for collisions

Tevatron at FNAL: **980 GeV** protons and antiprotons for collisions

LHC at CERN: **7,000 GeV** protons for proton-proton collisions (starts in 2005)

Cosmic accelerators: 100,000,000,000 GeV particles

Many accelerators around the world operate at beam energies below 10 GeV (billion electron volts). The most common accelerators are television tubes, which produce electrons of about 10,000 electron volts.

Star-forming regions contain the most powerful particle accelerators of the universe. High-energy flashes, called gamma-ray bursts, frequently hit earth.

highest energy ever

Adding the extra 10 percent should have been an easy task. But not so.

"We pushed the Tevatron to the limit," said Mike Church, the head of the Tevatron Department. He and his group have spent the last three years on maximizing the strength of the Tevatron magnets, which confine protons and antiprotons to the beam pipe while their energy is increased. Eventually, the magnets reached their limit, defining the maximum energy at which protons and antiprotons can circulate in the Tevatron without veering out of the beam pipe.

"You are limited by the weakest link in the chain," Church said. "We weeded out the 20 weakest magnets and swapped other magnets to put the remaining weak ones in cold spots."

Cold spots, according to Church, are areas inside the Tevatron tunnel in which the temperature of the liquid-helium cooling system is less than the usual minus 450 degrees Fahrenheit, or 4.5 kelvins. The more cooling they receive, the more electric current the magnets can conduct and still remain superconducting. Every tenth of a degree is important, but it costs dearly. Fermilab's Cryogenic Department has made significant upgrades to match the increased helium demand by the Tevatron during Run II (*FERMINEWS*, Vol. 23, No. 19, Oct. 20, 2000).

This ultimate increase in the Tevatron beam energy could be the critical boost necessary to discover the Higgs boson, the missing keystone in the intricate theoretical construction called the Standard Model of particles and their interactions.

"In a single proton-antiproton collision it is possible to produce the Higgs together with a top and anti-top quark," said Fermilab theorist David Rainwater. "Such an event would leave a distinctive signature in a detector. The increase in Tevatron energy leads to a 65-percent higher chance of producing it." A recent report shows that the Tevatron could produce more than a hundred events with this particular signature in the next years if the Higgs mass is about 115 GeV/c^2, a value favored by experimenters at the European research laboratory CERN.

The Tevatron completed its engineering run at the new record beam energy in September of last year and produced the first proton-antiproton collisions. Since then physicists moved two large detectors, CDF and DZero, into the beamline. The Tevatron will resume operation at the beginning of March, and collisions are scheduled to begin at the end of the month.

"It's been a long project," said Church, recalling years of magnet testing and reshuffling. "I'm glad it's over."

For more than 1,000 physicists who will be using the improved Tevatron to conduct their experiments, the fun has just begun.

The start of a new accelerator run often prompts misguided fears of cosmic mayhem as a result of high-energy particle collisions. In fact, we know such fears have no foundation because Mother Nature creates millions of collisions every day at much higher energies, with no ill effects.

observed in cosmic rays hitting the earth

The line representing the highest cosmic energies extends 300 miles.

Accelerators on the Web:

cbp-1.lbl.gov
www-bd.fnal.gov/public/
www-elsa.physik.uni-bonn.de/accelerator_list.html

On the Eve of *Collider Run II*

As the days dwindled down to a precious few, people from the Fermilab community and beyond shared their thoughts about the imminent start of Collider Run II at the Tevatron.

Andre Turcot, DZero collaborator:
I hope it works.

Robin Erbacher, CDF collaborator:

I'm ready to **get my hands on some data** and analyze it.

Michael Witherell, director:
Thank God we are starting on time. Now we can look forward to the excitement of seeing new physics results. We can't predict what Nature has in store for us. All we can guarantee is the opportunity for discovery.

Dan Johnson, deputy chief, Accelerator Operations: When a shutdown starts, we have lots of time. Now, however, it's the hectic moment where we have to get everything together and come up, so it's exciting.

Boaz Klima, DZero collaborator: Three years to the next discovery. Either the Higgs or something even more exciting. I have a mass prediction for the Higgs: 123 GeV.

Jonathan Dorfan, director, SLAC: The discovery reach of Run II is breathtaking. Your friends at SLAC look forward to celebrating with you some early successes.

Gene Fisk, DZero collaborator: This moment in the history of particle physics represents the culmination of preparations by Fermilab, experiment collaborators and the worldwide scientific and engineering communities in the search for new physics. We look forward to the physics revelations that will follow.

Joe Lykken, Theory Group:

Two recent results from other experiments add to the excitement of Run II. The **g minus two results from Brookhaven** have a straightforward interpretation as signs of supersymmetry with light particles. The **increasingly interesting sine two beta results from BABAR** add to the importance of B physics in Run II, and also suggest new physics. I will be shocked and disappointed if we don't have at least one **major discovery**.

Bob Mau, chief, Accelerator Operations: The next couple of weeks should be quite exciting. This start-up is no different from any other. I always go into these things feeling like we're doomed, but we never are. We have a lot of good people here.

Steve Holmes, associate director: I hope it works. I'll feel satisfied if we achieve five times ten to the thirty-one by December 31— I won't say what year.

Wyatt Merritt, DZero collaborator:

I remember the **excitement** of being able to look at real data from the Run I detector after the many years of waiting, and Run II should be **even more exciting**. For DZero, the upgrade has so much new capability that it is like a completely different detector, and there is so much physics that can be done with it that we will feel like **kids in a candy store**.

Collider Run II

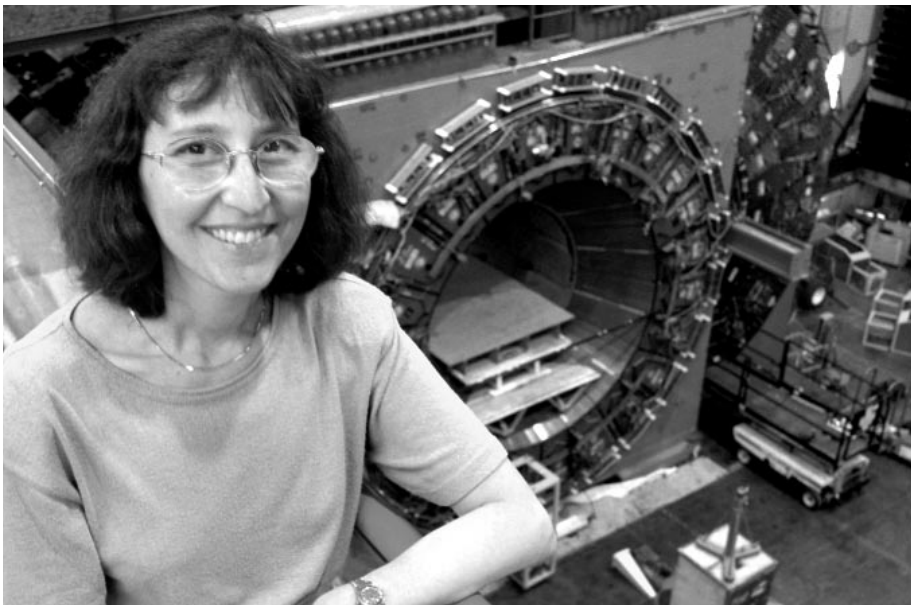
Harry Weerts, DZero cospokesman: I am surprised at the perception that Run IIa is just an appetizer for Run IIb, the main course. If we don't see new physics in Run IIa, then it's unlikely that we will see it in Run IIb. But Run IIb is important, to run up the Higgs curve. In Run IIa, we will increase our data over Run I by a factor of 20. Then in Run IIb, it will only be a factor of seven. The first step is the largest one; that's why it's important to do a good job on IIa. Run IIa is the main course. Run IIb is the dessert.

Young-Kee Kim, CDF collaborator It's exciting. I've been completely absorbed by the detector, but now commissioning is continuing beyond just the detector to the experiment and offline analysis. CDF has a lot of potential. We don't know what Run II will bring.

Avi Yagil, CDF collaborator: I'm jubilant. Our detector is in great shape, and it is a beautiful thing. Now we have to make it happen. But we should not predict what discoveries we will make. We are like space explorers; we don't know what we are looking for. God put it there—we're just searching. We have models and predictions, but we do not know what's out there.

Cathy Newman-Homes, co-project manager, CDF upgrade:

Like everyone else, I am looking forward to the start of **Run II**. I started working on the CDF upgrade in February, 1992, so **it's like giving birth after being pregnant for nine years**.



Matthias Kasemann, Computing Division head:

One of the biggest challenges of modern HEP experiments is the **huge data volume**. HEP is a very data-intensive science. Fast and efficient access to several hundred terabytes of data determines the time it takes to produce the scientific answer, who finds the Higgs first. Both CDF and DZero have developed **elaborate data-handling systems** to manage their data and to reduce it to the final set of plots for publication. I hope the investment pays off and we will learn something substantial from Run II data. The experiments are **well prepared to discover** what is out there to discover.

Bob Kephart, co-project manager, CDF upgrade: It has been a long haul, five years since the last time CDF took physics data. The new CDF II detector is now complete and installed. I think CDF is right where we wanted to be with more than five years before the LHC competition arrives. Just a few more things to work out before Run II Physics. (like...commissioning a whole new detector and new offline software: details, details) It should be fun!

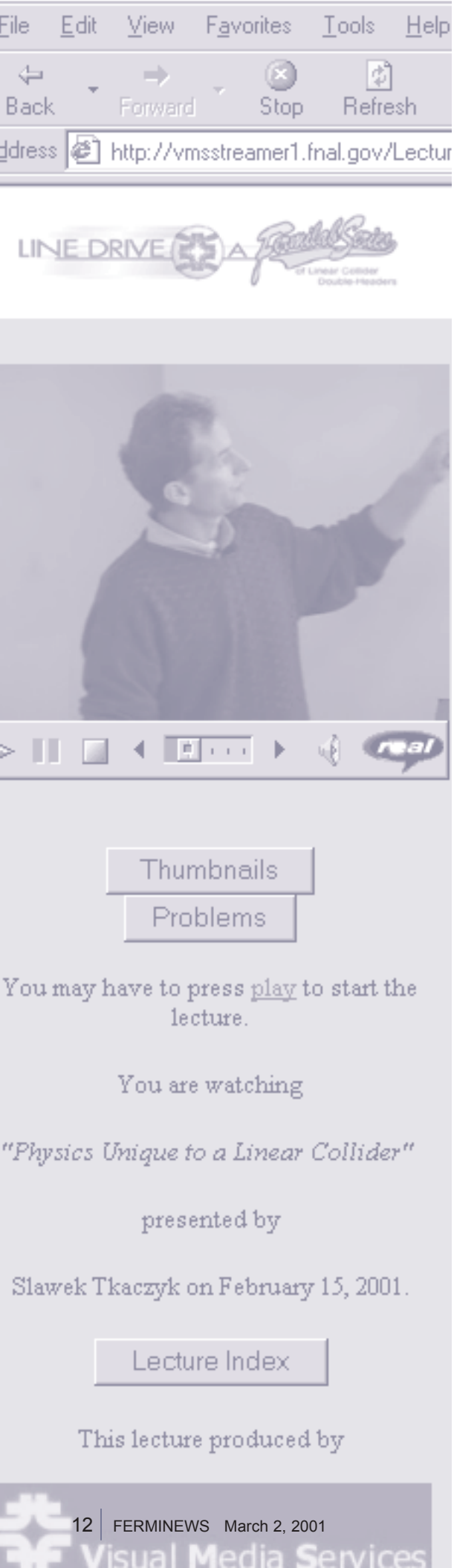
Rob Roser, CDF collaborator: Run II is very exciting. Our sensitivity to new physics is not just the factor of 20 increase in luminosity. We gain an additional factor due to increase in beam energy (40 percent in the case of the top quark) and an additional increase due to the improved acceptance and efficiency of our silicon detectors. For top physics, we are looking at about a 50-fold improvement! Lets get started!

Florencia Canelli, DZero grad student: I believe that graduate students deserve special gratitude for the upgrade effort. Many students worked (and are still working) full time and spent years on upgrade projects at the expense of graduating in a reasonable amount of time. Let the data come, and let the students go!!!

Collider Run II

Luciano Maiani, CERN director general:

After the very exciting final year of LEP, **the torch for exploring the high-energy frontier of physics has now passed to the Tevatron.** I would like to wish all at Fermilab the very best of luck on the start up of Run II. Enjoy the physics, and **listen hard for the LHC** coming up behind!



VideoSTREAM

by Chad Boutin

Want to find out what the universe is made of? Learn about the very first moments of its history? Or see how a particle detector works?

The answers are here, presented in laymen's terms by some of the most knowledgeable scientists in the business. Fermilab's Visual Media Services website has over 150 free video clips on particle physics, as well as other branches of science, available in streaming video format. And more are on the way all the time: Many Fermilab presentations are first broadcast live over the Internet, then archived for later download as well. In the game of physics research, this is like having a front-row seat.

And the seating isn't just for spectators. Although about half of the presentations are for nonscientists, the other half are technical lectures aimed at the specialist. Video streaming technology has made it possible for scientists around the world to listen to presentations by their Fermilab colleagues. One of the most popular series has been the Line Drive lectures, begun in mid-January.

"The feedback we have received from all over the world has been positive," said Fred Ullrich, manager of Visual Media Services and one of the principal developers of the web video collection. "They regularly set up viewing rooms at SLAC where they watch the meetings live, and people in Europe are saying they tune in on a regular basis."

Jim Shultz, another of the principal developers, hopes the public will respond with equal enthusiasm.

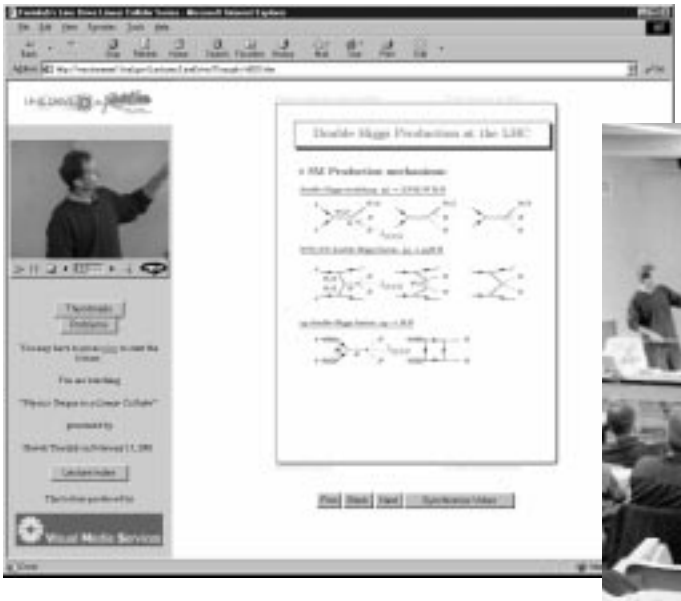
"The 'Physics for Everyone' series has the most to do with what goes on at the lab," Shultz said. "But the 'Nature of Science Symposium' would be of interest to any fan of science, not just of particle physics. There's one talk on cosmology, another on paleontology. We even have a Jesuit priest, a former Fermilab physicist, speaking on the relationship of science and religion."

Whatever your background or interest level, the videos are easily accessible. "All you need is a computer with a 56k modem," Shultz said. "The streaming videos require RealPlayer 7.0, and you can download it free from the RealPlayer website—you can get there from a link on our own webpage."

Once you have RealPlayer, you can sample from any of these videos. All can be found under "Streaming Video" at the Visual Media Services website (see box next page). Most presentations have links at the bottom of the Streaming Video page, but look for the Video News series as well, found in the gold menu at the top.

"We have been doing Video News for a long time," said Ullrich. "We used to put four to six stories each on a video cassette and show them from a kiosk in the atrium. We needed a better way to distribute them. Now we have the most recent sixty-five stories available on streaming video."

LEARNING



http://www-visualmedia.fnal.gov

Photos by Reidar Hahn

Physicist Slawek Tkaczyk's recent Line Drive talk (top) was recorded to tape and sent out live on Fermilab's web stream (shown at left). The on-demand talk, which is now available on the VMS streamer server, contains the audio and a video thumbnail of the speaker during the presentation with a full screen view of each slide all synchronized to the timing of Tkaczyk's talk—as recorded on tape in Wilson Hall's One West conference room.

Ullrich would like to add the rest of the collection as time and money become available.

"There are over eighty editions in the Video News collection dating back to the early 1980s," he said. "We have the history of Fermilab all on tape, spoken by the people who made it. We want to make this history accessible."

Ullrich and Shultz realize that video streaming can provide even more services for the laboratory.

"Our department is the eyes and ears of the lab, and by continuing to improve the infrastructure we can stream more material," Shultz said. "We are configuring the One West conference room with lighting, microphones and a permanent camera to make it easier for us to stream lectures. We are upgrading our server as well—up to this point we have been using a borrowed desktop PC. We have had great support from several people in the Computing Division in putting all this together, John Urish in particular."

Ullrich also mentioned lab director Michael Witherell's support for the new technology.

"This is more than a trend," Shultz said. "The beauty of streaming is that you can view a video as it is sent to you, without having to wait for the whole file to download. This is the way information will be shared in the future."

How do I get streaming video?

Your computer needs at least a 56k modem. Go to the VMS website at **http://www-visualmedia.fnal.gov** and (if necessary) download RealPlayer 7.0 from the RealPlayer website (link provided). RealPlayer is free! It is unnecessary to purchase anything from the RealPlayer website.

Where should I start?

To find a list of ten short videos for the nonscientist, go to **http://www-visualmedia.fnal.gov/VMS_Site/gallery/v_selectProg.html** The list includes segments on particles, detectors, animation of particle collisions, and the life of Robert Wilson, Fermilab's first director.

Also recommended:

Physics for Everyone:
http://www-visualmedia.fnal.gov/VMS_Site/r_P4E.html

The Nature of Science Symposium:
http://www-visualmedia.fnal.gov/VMS_Site/r_NOS.html

DZero

Members of the DZero collaboration posed for their official portrait on February 9, 2001. Yes, we know the British flag is upside down. It should not be interpreted as a signal of distress.

CALENDAR

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

Fermilab Arts Series

Gaelic Storm

March 3, 2001, 8 p.m. SOLD OUT.

Choreographer's Showcase

Featuring Hubbard Street 2

April 21, 2001, 8 p.m. $17/$9 for ages 18 and under.

This traditional Fermilab Arts Series event features a variety of some of the brightest young dancers and dance companies in Chicago.

For more information call (630)-840-ARTS.

International Film Society Presents:

Eyes Wide Shut

March 9, 2001, 8 p.m. Ramsey Auditorium, Wilson Hall. USA/UK (1999), 159 min., Dir: Stanley Kubrick. Kubrick's last film. Released shortly after his death. Tickets are $4 for adults and $1.00 for children (under 12) and are sold only at the door.

Fermilab Lecture Series Presents

Living With A Star

George L. Withbroe, NASA Science Program
March 30, 2001, tickets: $5

Director for the Sun-Earth Connection program, George L. Withbroe has overall responsibility for developing policy and providing guidance for NASA's program to understand the physics of the Sun.

International Women's Day

March 10, 2001. Celebration sponsored by NALWO and organized by Fermilab's Russian women. Children wanted to perform! Please see www-fnal.gov/orgs/nalwo/irina.html for details.

ONGOING

NALWO

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

Coffee for newcomers and visitors. Thursday, March 29, 2001 at the Housing Office (Aspen East) 10:30 a.m. - 12:00 p.m.

WELLNESS WORKS

Covert Bailey Video Series
12:00-12:30 in One West

March 7 - The Target Diet: Blasting the New Food Pyramid

March 14 - Food and Fitness Foolishness

March 21 - Crash Diets and Other Weight Loss Tricks

DANCING

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

BARN DANCE

The Fermilab Barn Dance series, featuring traditional square and contra dances in the Fermilab Village barn, presents barn dances on Sundays. Check the webpages at http://www.fnal.gov/orgs/folkclub/ .

MILESTONES

PACKED AND JAMMED

■ The Lederman Science Center Open House on February 12, with more than 1,500 visitors.

AWARDED

■ The Philip Hauge Abelson Prize; by the American Association for the Advancement of Science; to former Fermilab director and Nobel Prize winner Leon Lederman.

■ The Luise Meyer-Schutzmeister Memorial Award for 2000; by the Association of Women in Science; to Bonnie Tamminga Fleming (ID 08607V). The Luise Meyer-Schutzmester Award is given annually to an outstanding woman graduate student in physics, for exceptional academic achievement, the importance of the research being addressed, the quality of the research, and the applicant's potential for future contributions to the field of physics.

CONTRADICTED

■ The theoretical prediction for the g-minus-2 value of the muon, a heavy relative of the electron; by the high-precision experimental result obtained by physicists at the Brookhaven National Laboratory. Though more data is needed to clarify the observations, the discrepancy suggests the existence of new particles and forces that influence the behavior of muons in a strong magnetic field.

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

DINNER SERVED AT 7 P.M.
$20/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	DINNER	LUNCH	DINNER
WEDNESDAY, MARCH 7	**THURSDAY, MARCH 8**	**WEDNESDAY, MARCH 14**	**THURSDAY, MARCH 15**
Reddened Catfish with Watercress Sauce	*Corn Chowder*	*Cheese Fondue*	*Grilled Portabello with Roasted Red Peppers and White Bean Puree*
Rice and Beans	*Chilean Sea Bass with Mango Salsa*	*Six Pepper Slaw*	*Grilled Duck Breasts with Bourbon Sauce*
Coconut Coupe with Chocolate Sauce	*Green Beans and Red Onions*	*Baked Spiced Pears*	*Nutted Wild Rice*
	Lemon Rice		*Vegetable of the Season*
	Coffee Flan		*Cherry Turnovers*

FERMINEWS

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The deadline for the Friday, March 16, 2001, issue is Tuesday, March 6, 2001. 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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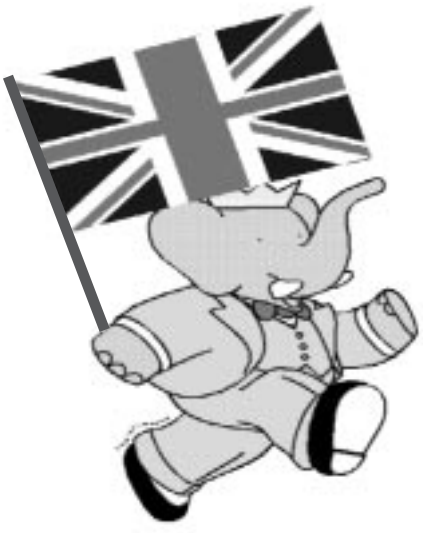
CLASSIFIEDS

FOR SALE

■ '00 Infiniti GS20T, 13,000 miles, garage kept, fully loaded—$22,500. Call 840-4361 or 879-5178.

■ '99 Ford Escort ZX2, 4 cyl., black w/tan int., auto, AM/FM/Cass, PW, PL, A/C, good gas mileage, 31k mi., $9,995 obo. Call 630-236-6070.



"Once more into the breach, dear friends, once more…"—Ed.

■ '97 Chevy Malibu LS, 3.1 Liter V6, 46,500 miles, dark green w/beige interior, fully loaded-power everything, AM/FM/CD, $12,500, Call ext. 3325 or 630-527-6218 after 6 p.m.

■ '96 Chevy Impala SS, dark cherry metallic, 57k mi., chrome factory wheels, gray leather, AM/FM/CD, viper alarm w/remote start, power everything, tinted windows, wood grain int., $20,500. Call 630-236-6070.

■ '91 Ford F-150 pickup, 6-cyl., auto, A/C, AM/FM, long bed with tonneau cover, $3,995. Phone x3697 or 630-668-8087.

■ '91 Chrysler New Yorker 102k, no rust, loaded, asking $3,500. Jim 630-896-4384 after 5:00 p.m.

■ '85 Honda Goldwing Anniversary Limited Edition. New tires, brakes, air shocks. 67k, fully equipped with trailer, too many "Markland" accessories to list. $4,850. Call Roger 630-859-3789 or email treend@fnal.gov.

■ 20″ Lexani Amethyst wheels w/tires—BFGoodrich 245-40ZR20, still new (front wheel or rear wheel drive), lugnuts, adapters and locks, $3,200 w/adapters obo, $3,000 w/o adapters obo. Call 630-236-6070.

■ Pacific Fitness Home Gym—2 years new! Exercises every inch of your body. Video and floor mat included. Excellent condition. $1,390 or best offer. Call 630-717-5181 before 9 p.m.

TUESDAY GOLF LEAGUE

■ Pebble Beach is too far away. Bliss Creek is just minutes from here. The Tuesday Bliss Creek golf league will be starting in April. We have openings for individuals or foursomes (but they're going fast). Golfers of all abilities are welcome. If interested, please contact Dean Sorensen (deans@fnal.gov, x-8230), Pat Sorensen (psorensen@fnal.gov, x-3811) or Don Arnold (arnold@fnal.gov, x-2871).

LETTER TO THE EDITOR

To *FERMINEWS*:

Thanks for an excellent "house journal" in *FERMINEWS*. But I cannot let you get away with letting BABAR carry our national flag upside down in your cartoon on the last page of your Feb. 16 issue!

You correctly drew the asymmetry in the placing of the diagonal red stripes on the diagonal white stripes. But every good UK Boy Scout knows that the broader white strip on the longer side of the rectangle which is closest to the flagpole should be uppermost! Check with your local Brits.

I believe flying the flag upside down is an international sign of distress.

Best wishes to all,
Graham R. Stevenson, CERN

CORRECTION

The Illinois Consortium for Accelerator Research (ICAR) is a group of five Illinois universities that are working together to create new particle accelerators and accelerator-based experiments for the future. ICAR encompasses the two Illinois-based national laboratories, Argonne and Fermilab, and five universities: Illinois Institute of Technology, Northern Illinois University, Northwestern University, the University of Chicago, and the University of Illinois, Urbana-Champaign. The last issue of *FERMINEWS* ("Tollestrup Looks Beyond the Next Step," Vol. 24, No. 3, Feb. 16, 2001) incorrectly omitted IIT and substituted the University of Illinois at Chicago. "IIT is the lead institution in ICAR, IIT's Tim Morrison is the Program Director, and it was IIT's lobbying and organizational efforts over two years that brought the consortium into existence and got it funded," said ICAR Principal Investigator and Fermilab experimenter Dan Kaplan. *FERMINEWS* regrets the error.

ILLINOIS INSTITUTE OF TECHNOLOGY

Dan Kaplan

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