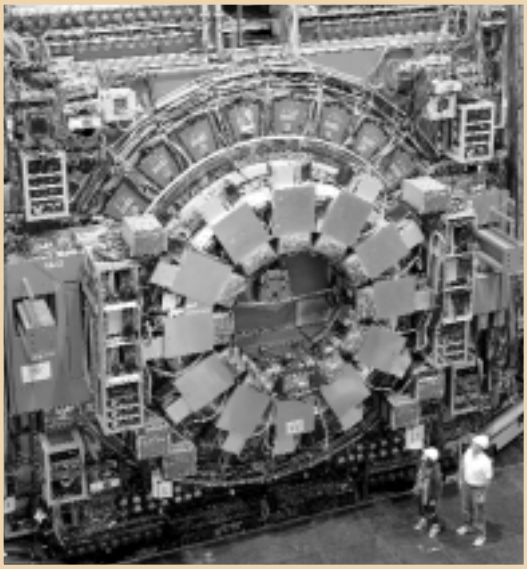
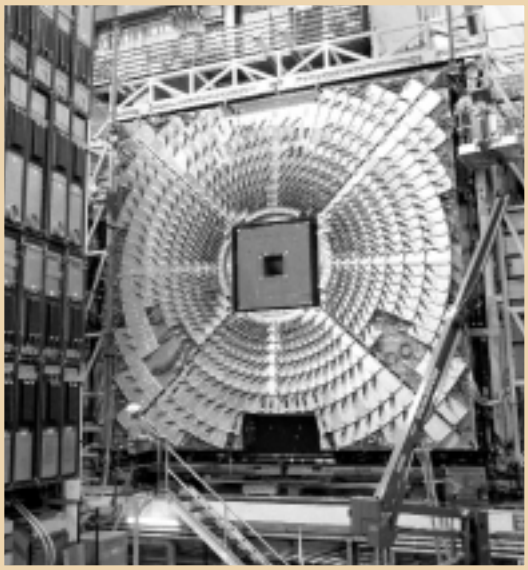
FERMI NEWS

FERMILAB A U.S. DEPARTMENT OF ENERGY LABORATORY





Photos by Reidar Hahn

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PARTICLE DETECTIVES

ANNOUNCE FIRST RESULTS

A top dielectron candidate

- e+e-,two jets with a large missing Et -

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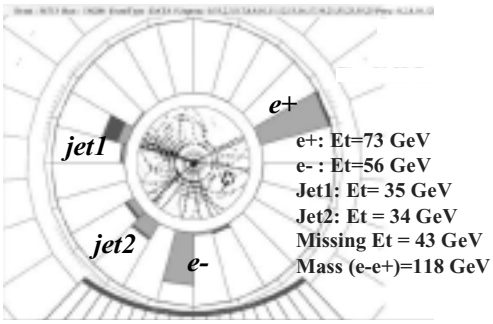


Analyzing Run II data, CDF scientists identified this event that matches the criteria for the production of a pair of top quarks that subsequently decayed into two electrons, two neutrinos (no visible tracks, but identified by "missing energy") and two quark jets.

ON THE WEB:

CDF Homepage:
www-cdf.fnal.gov

DZero Homepage:
www-d0.fnal.gov

Live collisions and more:
www.fnal.gov/pub/now/

by Kurt Riesselmann

Finding a particular person in a sold-out stadium can be a daunting task. You scan thousands and thousands of faces, many looking similar from far away.

You might be looking for someone with dark hair – but are you sure your friend isn't wearing a hat today? If you remember the color of your friend's favorite jacket, your task may be easier. But what if he wears a different coat for a change? Or even worse, have you considered the possibility that he hasn't yet arrived at the stadium?

Particle physicists face pretty much the same dilemma as they look for their favorite particle friends, such as the top quark and the Higgs boson. They've studied their characteristic appearances and know what these friends "look" like, but don't know when a particular particle will appear and which jacket—decay mode, in expert's terminology—it will favor at that moment.

The only chance to spot a rare particle friend is to frequently create large crowds of particles and take pictures of them. Scientists can analyze such pictures and identify unique signatures—the particle faces, in the crowd.

That's exactly what scientists at Fermilab have been doing since the beginning of Collider Run II in March 2001. Having tuned up their two "cameras," CDF and DZero, systems of particle-detecting devices that are as big as three-story houses, they have begun to take more than one million pictures of particle crowds *per second*. Although scientists have stored only the most promising pictures, about 100 per second, they are filling up their electronic storage space at a rate of one CD-Rom every few minutes.

"To me, it's like the work of a detective," said Italian INFN physicist Patrizia Azzi, who leads the top quark physics group of the CDF collaboration at Fermilab, together with Pierre Savard from University of Toronto. "It's never the same."

TOP IN AMSTERDAM

In the last six months, CDF and DZero scientists have achieved the first findings of their detective work. At the end of July, they announced the results of their analyses of the first Run II data. And the results are promising.

Photo by Fred Ullrich

Patrizia Azzi, scientist of the INFN – Padova section, co-chairs the group of CDF scientists studying the top quark.

"At the ICHEP physics conference in Amsterdam, our collaboration showed the first top quark candidates of Run II," said Azzi, who worked as a graduate student on Run I. "Run I saw the discovery of the top quark in 1995. For Run II, we are now in the position of doing precision top quark physics. Our goal is to measure the top quark mass with a precision of about two percent."

More than 800 particle physicists from across the world attended the International Conference on High Energy Physics. About 20 CDF and DZero scientists had the opportunity to give talks on a variety of physics topics, highlighting the progress that Run II presents compared to Run I.

"About eight years ago, we embarked upon a very aggressive program for the detector upgrades," said Kevin Pitts, assistant professor at the University of Illinois at Urbana-Champaign. "It seems it will pay off in a big way. We will measure physics processes that we didn't have access to before."

In Run I, which took place from 1992 to 1996, the CDF and DZero collaborations each sifted through more than 100 inverse picobarns (pb^{-1}) of data, a measure for the total number of collisions. Since the beginning of Run II, each collaboration has analyzed 20 pb^{-1} of data. Scientists expect to exceed the Run I mark in spring of next year, with much more data to come over the next five years.

To create top quarks and other particles, Fermilab scientists create powerful collisions of protons and antiprotons at the center of the CDF and DZero detectors. Each collision produces hundreds of particles in new combinations and geometries, which the detectors record.

COVER PHOTOS:
Control rooms at the CDF (top) and DZero (bottom) detectors have been bustling with activity in producing the first physics results from Run II.

DETECTIVES

Looking for a specific particle created in these collisions is challenging. Scientists expect to spot a particle like the top quark, which is 175 times heavier than a proton, only in a small number of "pictures." During Run I, scientists observed a few hundred collisions that produced top quarks. For Run II, however, they expect to find thousands.

Zooming in on the Higgs

At the Amsterdam conference, both CDF and DZero collaborations also announced their first Run II results on processes involving W and Z particles, the carriers of the weak force.

"We presented our first measurements of the W and Z cross sections at the new collision energy of 2 TeV," said Fermilab physicist John Womersley, cospokesperson of the DZero collaboration. "Run II produces collisions with ten percent more energy than Run I, the highest collision energy in the world. The W and Z results are important as they are the first step in understanding Higgs and top quark events."

Although the current number of Run II "pictures" is still smaller than the sample accumulated during Run I, the quality of the data is much better.

Photo by Jenny Mullins

Marco Verzocchi (pictured here), University of Maryland, and Georg Steinbrück, Columbia University, are the W and Z working group conveners at DZero. Verzocchi is one of many physicists who joined the Fermilab collider experiments last year after the conclusion of experiments at the European accelerator LEP. According to DZero cospokesperson John Womersley, "there are great research opportunities. We welcome new collaborators from all over the world."

"Because of the higher energy, we have a thirty-five percent higher production rate for the top," said physicist Boaz Klima, who coordinates the physics analyses of the DZero collaboration. "In addition, our upgraded detectors are better than during Run I. Hence every recorded picobarn of Run II data is much more valuable than the same amount of Run I data. By spring 2003, we expect to have the first results for top cross section and top mass measurement of Run II."

Improving the experimental knowledge of the masses of the W particle and the top quark will help scientists zoom in on a particle that nobody has ever seen: the Higgs boson. Named after a theoretical model proposed by Scottish professor Peter Higgs and others, the Higgs particle is the missing ingredient in an otherwise successful model of particles and their interactions. Over several years, the Fermilab mass measurements will slowly narrow the window on the Higgs. If the particle is not too heavy, the Fermilab accelerators will be able to produce it.

"To directly see the Higgs, it will take time and data," said Klima. "You are not going to jump from nothing directly to discovery. There is still a lot of work ahead of us."

Looking for rare B's

Another hot research topic is the physics of the bottom quark, a particle that weighs much less than the top quark. Scientists have built B factories in California and Japan, but the heavier types of B mesons, such as those consisting of a bottom quark and a strange quark, will only be produced in large numbers at Fermilab.

"The world expects us to measure B_s oscillations," said Pitts, who worked on a new detection subsystem for bottom quarks. "Our findings will be complementary to results from the B factories."

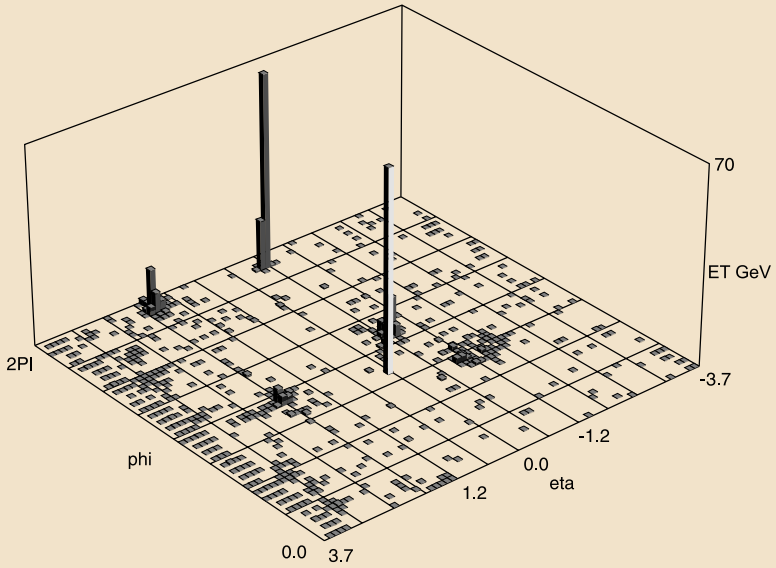
During Run II, the Fermilab accelerators will routinely produce tens of millions of B mesons per day. In addition to identifying B_s particles in this large crowd, scientists expect to catch an occasional glimpse of bottom quarks wearing "jackets" never seen before.

"We know that rare decay modes of the B mesons should exist," said Pitts. "The question is: how do you isolate them?"

Pitts and Marjorie Shapiro, professor at UC Berkeley, head the B physics group of the CDF collaboration. They coordinate the work of about one hundred scientists that scrutinize the CDF data for information on bottom quarks.

Photo by Fred Ullrich

Kevin Pitts and collaborators at the University of Illinois constructed an electronic "extrapolation system" for the trigger system of the CDF detector.



This top quark candidate, identified by the DZero collaboration, indicates a process in which one of the intermediate W bosons has decayed into two jets, while the other produced an electron and a neutrino.

"Our upgraded detector is a brand-new tool," Pitts said about the CDF experiment. "We now have new ways of finding things. In addition to finding B mesons, we get a lot of charm quark states. In a few weeks of running we've got 50,000 decays of a D_0 meson into a kaon and a pion. We've also reconstructed D^+ and D_s^+ charm states in quantities that have already far surpassed the Run I samples."

Godparents make the call

Measuring the mass difference between the two D states, particles that contain a charm quark and a lighter partner, might be the subject of the first CDF publication from Run II. Even with a relatively small data sample, the quality of the mass measurement is already comparable to the best results obtained at other labs in the past. The B physics group has written a draft of an article, which is currently being reviewed by an internal board of CDF experts called the godparents. If the godparents approve, the paper will go for review by all collaboration members. The submission of the article to a scientific journal may happen even before the end of the year.

But the new Run II data may hold more treasures. Scientists are searching for phenomena in particle signatures and interactions that cannot be explained by the standard particle theory. From extra dimensions to leptoquarks to super-symmetric partners, physicists are prepared for the unexpected. At Amsterdam, scientists reported on their search strategies.

"Traditionally, scientists begin to look for new particles by identifying collisions that have produced a particle with large momentum perpendicular to the direction of the incoming proton beam," explained Fermilab physicist Gustaaf Brooijmans, who heads the new phenomena group at DZero together with Greg Landsberg of Brown University. "It's a rather clean signal.

"To look for leptoquarks, for example, the rule of thumb is: Every time you double the number of collisions in your analysis, you gain 20 GeV in your exclusion limits. Improving our analysis, this winter we could get a limit of 200 GeV—very close to the Run I results."

Next year, the particle detectives at CDF and DZero will be staking out new territory. Whether they will find any exotic signals remains to be seen.

If they do, they will have pictures to prove it.

Star Light Star Bright

Fermilab Public Affairs intern Pamela Zerbinos attends Cosmo-02, and discovers a field of dreams.

by Pamela Zerbinos

Wednesday, Sept. 18, 2002: Picture This

0730

I have always hoped that if the universe is to one day cease its outward expansion and collapse back in on itself, that this will happen sooner rather than later. It will put me out of the misery of wondering about its expansion—where is it going? This question makes my head hurt, and I have always avoided cosmology because of it.

So the last place I ever expected to find myself is crammed onto a Chicago Transit Authority "L" car, headed to Cosmo-02, the annual International Workshop on Particle Physics and the Early Universe, at the Adler Planetarium. The conference is being sponsored in part by Fermilab's Theoretical Astrophysics Group, along with Adler and the University of Chicago's Center for Cosmological Physics. I am expecting a four-day cosmological extravaganza. I am nervous, but mostly excited.

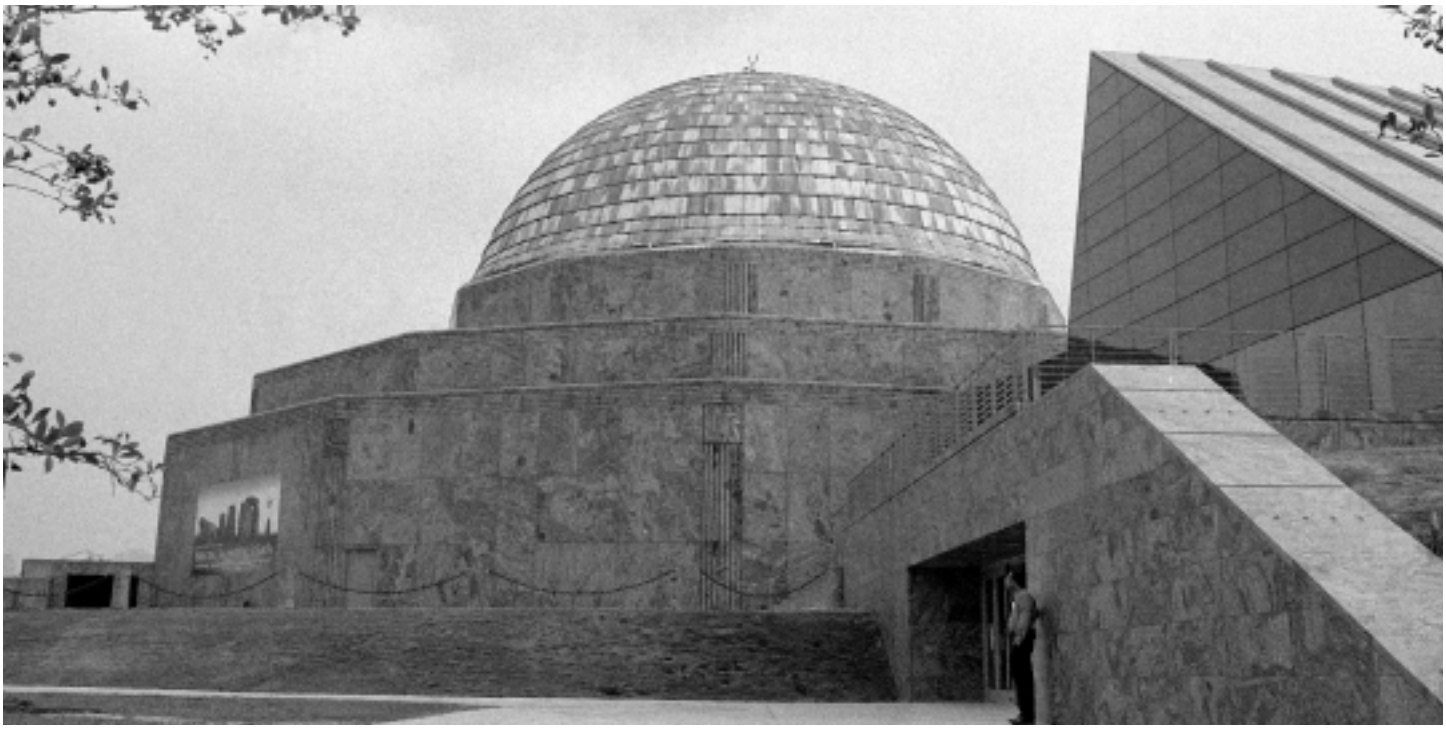
I have been cramming for this conference for a week—definitely not enough time. But despite my meager preparation, I feel I'm on pretty decent footing. I think I have the core concepts down: The universe is expanding, and the rate of expansion is increasing. A mere 5 percent of the universe is made of normal matter—the same kind of quarks and leptons that make up the world around us. The other 95 percent is dark matter and dark energy, and what it's made of is one of the great cosmological mysteries. The Big Bang was not actually a "bang," not something that happened at a particular point in space and time, but rather was the sudden and simultaneous appearance of matter in all of space. (I can't quite wrap my mind around this concept, but I like the way it sounds—the Big Ta-da!) The Ta-da! was most likely followed by a period of exponential expansion, which has been dubbed "inflation." The universe is homogeneous (the same in all places) and isotropic (the same in all directions). It's flat.

Illustration by Mike Turner

My goal for the conference, other than finding someone who can tell me where the universe is going, is to find out what other cosmological mysteries are out there, how the cosmologists are faring with their attempts to figure it all out, and what the particle physicists are doing to help.

0850

I am waiting for the conference to start, admiring the very nice black leather portfolio that all the participants have been given. The 264-seat auditorium is crowded; there are 265 participants. As I look through the list of registrants, I have two realizations. First, I am approaching physics geekdom—I recognize some names. Second, this is a very diverse crowd. There are cosmologists, astrophysicists, particle physicists, nuclear physicists, astronomers, string theorists and journalists. I know it's too much to ask that the talks be pitched to the lowest common denominator, but a girl can dream.



Photos by Jim Shultz

Cosmo-02 was held at the Adler Planetarium on Chicago's lakefront.

0915

Fermilab director Mike Witherell announces in his opening remarks that he was one of the first people not to detect cold dark matter. The Theoretical Astrophysics Group at Fermilab was founded by Leon Lederman in 1983, and although it was an unorthodox move at the time, there are no longer any doubts that particle physics and cosmology share a deep connection.

1200

I have heard four talks. I have copious notes on the Cosmic Microwave Background, cosmological parameters and large-scale structure. I am not confused, but this is only because being in a state of confusion first requires a modicum of understanding, which I don't have. The effort of trying to figure out what's going on has exhausted me. I feel like a zombie. I stick my arms out in front me of me and follow the crowd to lunch.

1430

I have now heard two talks on inflation, one by David Wands and the other by Alan Guth. There's one more coming up. I am feeling slightly more human, but now I'm having a visualization problem. Can these speakers actually picture the things they're talking about? Does Guth, father of the inflationary universe theory, have a picture in his head of an infinite number of universes? According to him, each second sees the birth of 10^{37} more universes than the last.

Mathematically, this is fine, but I can't see it. I can't touch it. Can anyone?

2130

I am at the Education Forum, where about 45 people have gathered to discuss ways to educate the public about cosmology—what the public needs to know and how to help them know it. There are many hurdles, the biggest of which seems to be a lack of qualified teachers. Your average junior high or high school science teacher simply doesn't have the background to teach cosmology, and fixing that requires an overhaul in our educational system. This isn't a great prognosis.

After the forum, I bring up my visualization problem to Evalyn Gates, one of the conference organizers. Eureka! Yes, she tells me, cosmologists have problems picturing universal expansion and extra dimensions. But cosmologists can do the math, which provides understanding on a different level.

This I can accept, but I wasn't having any fun thinking that there are people out there who can really wrap their head around this stuff, and I'm not one of them. I feel that one function of being an expert in a highly technical or esoteric field is—or should be—granting access to that field to the rest of us, and I find it frustrating when the people who say they understand can't help me do the same. It's comforting to know that we're all more or less on the same level, and cosmologists just happen to have this extra tool—mathematics—that grants them understanding.

Fermilab Director Michael Witherell claimed to have been among the first not to detect cold dark matter.

Photo by Fred Ullrich

The Chicago skyline as seen from the Adler Planetarium.

Thursday, Sept. 19, 2002: Particle Accelerators to Cosmology

0830

I am optimistic about today's program. There are some neutrino talks that I think I might understand, and Fermilab's Joe Lykken is giving a talk about accelerators and cosmology that I'm looking forward to. I also know there's going to be some big news today—there were hints of it yesterday—but I have no idea what it will be about.

1200

Lykken described some of the activities and goals of Run II and the LHC, and related it all very nicely to cosmology. Some cosmological questions—dark matter, baryogenesis, extra dimensions—can be studied directly in the laboratories, and many particle physics issues—supersymmetry, string theory—can provide cosmologists with new ways to think about and study the universe. After all, particle physicists and cosmologists are ultimately after the same thing: cosmic understanding.

Lykken is not the only one who has tied the fields together; I've noticed most speakers have been careful to point out why their talk should matter to those on the other side.

1230

John Carlstrom, of the University of Chicago, has just announced the results of DASI, the Degree Angular Scale Interferometer. DASI is a telescope near the south pole that's been measuring the polarization of the Cosmic Microwave Background. The CMB is radiation left over from the big bang, discovered by Arno Penzias and Robert W. Wilson in 1964. The theories predicted that this radiation would be uniformly polarized, and the results conform exactly to that theory. Light polarizes when it hits something, and the last time any of these photons hit anything was when the universe was about 400,000 years old (its current age is estimated at roughly 14 billion years), when they were bouncing off the cosmic gases that were cooling down to form atoms. If the CMB hadn't been polarized, cosmologists would have had to rewrite their entire universal framework.

2130

I have a feeling that the lecture I just heard is going to be the most useful one I hear during this extravaganza. It was, again, Alan Guth on inflation, but this time it was open to the public and therefore pitched to the non-expert. It's helped me draw a lot of connections to talks I heard earlier and has clarified many things. He went over a few theories (inflation, cosmic acceleration), the supporting evidence and some of the kinks in the system, and he did it in a humorous and understandable way.

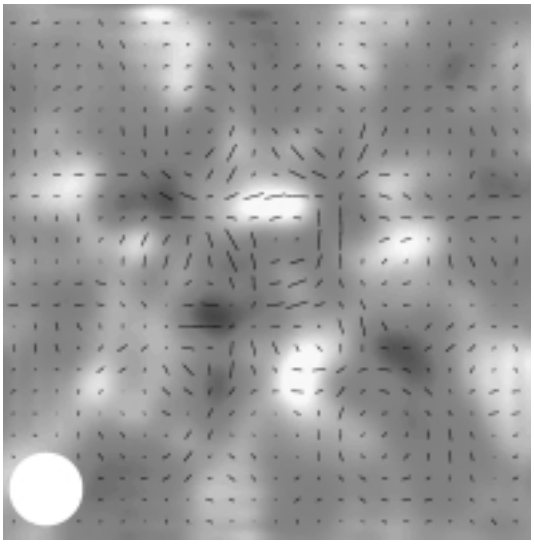
Friday, Sept. 20, 2002: The Universe Is Weird

0417

I have just woken up from a fitful sleep. I have been dreaming about neutrino eigenstates. I don't even know what an eigenstate is (other than a type of Rottweiler). In my dream I was hacking up neutrinos with a machete, and putting the different pieces together. The pieces were the eigenstates. I go back to sleep.

0830

Today's menu consists of weird topics: branes, extra dimensions, strings and dark matter. I can't decide if I'm excited or worried. These are all things I'm interested in, but I'm not sure I've absorbed enough to be able to understand any of it. If I haven't, it's going to be a very long day.



An image of the intensity and polarization of the cosmic microwave background radiation made with the Degree Angular Scale Interferometer (DASI) telescope. The small temperature variations of the cosmic microwave background are shown by shading, with darker indicating colder. The polarization at each spot in the image is shown by a black line. The length of the line shows the strength of the polarization and the orientation of the line indicates the direction in which the radiation is polarized. The size of the white dot in the lower left corner approximates the Angular Resolution of the DASI polarization observations. DASI Collaboration, 2002

1200

It's been a long day. I've understood a fair bit—definitely more than I did yesterday—but now my head is swimming in extra dimensions, trying to figure it all out. I met a soon-to-be physics graduate student at the University of Chicago who has been just as confused as I've been. I feel a small twinge of guilt for taking comfort in other people's confusion, but just a small one.

I decide that my cosmological education would be best enhanced by finding a quiet corner of the planetarium and finishing some books (I've been reading Guth's book on—surprise—the inflationary theory, and Brian Greene's book on string theory).

Saturday, Sept. 21, 2002: Catalog of Universes

1300

For the most part, today's talks have been about dark matter and dark energy. I'm understanding more and more, and the dark matter frontier actually looks very promising. Most people are predicting they'll have it figured out in the next 10 years or so. Dark energy they're less sure about, although they have been optimistic.

1530

The conference is wrapping up. I've been impressed with the organization (especially the food—good cookies), and although it felt like it was about 50 degrees in the auditorium, I think Gates, Chicago's Sean Carroll and Fermilab's John Beacom, the organizers, did a great job.

Photo by Jim Shultz

The 264-seat auditorium was crowded. There were 265 participants.

The closing remarks were by the string theorist David Gross, and I think it speaks well for the conference that an "outsider" was chosen and was so well received. He, like most of the speakers, did a good job of tying various fields together.

He also brought up something I've been suspecting for the last day or so: Cosmology is currently in a state very similar to the one particle physics was in 30 years ago when the Standard Model was emerging. Cosmology's own standard model is starting to settle out, built on the big bang theory and the inflationary universe. Experiments are lining up beautifully with predictions, and there's excitement in the air.

"In the Sears & Roebuck catalog of universes," Beacom tells me later, "we now know which one is ours."

It's a comforting thought. I think.

ON THE WEB:

Cosmo-02:
http://pancake.uchicago.edu/~cosmo02/

Fermilab Theoretical Astrophysics Group:
www-astro-theory.fnal.gov/

Adler Planetarium & Astronomy Museum:
www.adlerplaneterium.org/

University of Chicago Center for Cosmological Physics:
http://cfcp.uchicago.edu/

DASI results:
http://astro.uchicago.edu/dasi/

(image at wwwnews.uchicago.edu/releases/photos/polarization/polmap_press.jpg)

Starry Messages:
www.fnal.gov/pub/events/starrymessages.html

PROFILE IN
PHYSICS

Making an IMPACT

by Pamela Zerbinos

In the late 1980s, Luciano Ristori had an idea.

Researchers had just gotten their hands on a new technology that allowed them to design and build their own silicon microchips. The technology, called VLSI for Very Large Scale Integration, had previously been available only to large companies like Intel and Motorola, but gradually it leaked into the research sector and allowed scientists and engineers to design and build integrated circuits for very specific purposes.

Ristori, a CDF collaborator from the Italian Institute of Nuclear Physics (INFN) laboratory at Pisa, convinced himself that chips could be built for the specific purpose of matching up patterns created by particles flying through the layers of a silicon detector—which did not yet exist. The silicon detector is now the innermost layer in a series that makes up a large detector like CDF or DZero, and is therefore the first to "see" the products of a particle collision.

The particles in question are the protons and antiprotons that Fermilab's Tevatron smashes together at very high energies to watch what comes out. One kind of particle that sometimes comes out is the B meson, made of a bottom quark and a lighter anti-quark. The B meson travels about one millimeter (that's a long way in particle physics) and then decays into other particles called pions and kaons. As these particles pass through the detector, they leave tracks that scientists can use to figure out exactly what kind of particle it was.

Decays, collisions and other events happen at the Tevatron at a rate of millions per second, and even Fermilab doesn't have enough disk space to save them all. So they have to filter out the important events and throw everything else away. This is accomplished by a set of electronic devices collectively known as "the trigger" that measure all kinds of factors—speed, energy, charge, etc. The trigger has to make extremely fast decisions about which events to keep and which ones to throw away.

"This is important," Ristori said, "because there is no going back. Once you reject an event, it is lost forever." CDF is currently keeping an average of 50 events per second, "so we'd better make sure they're the right 50."

And that's where his idea came in. He thought it would be possible to use VLSI to design circuits that would match new particle tracks with previously identified geometric patterns to find out how long the particle had traveled before decaying—all in about 20 microseconds. This information could then be used in the trigger to keep valuable B meson events from being thrown out.

CDF researcher Luciano Ristori of INFN-Pisa set the fast track for saving the right data

Photos by Reidar Hahn

"In the early days," said CDF cospokesman Nigel Lockyer, "nobody believed it would work. It was too ambitious, and we didn't understand whether the beam was stable. We didn't know whether you could find these tracks fast enough. We hadn't even put silicon detectors in the experiment at that point. None of the technology was available to do this."

But Ristori went ahead with it anyway, and the project, called the Silicon Vertex Tracker (SVT), was proposed to CDF in 1991.

"I was convinced that it was a good thing to do, that it would be important, and I was convinced that we could do it," he said. "There was no reason why we couldn't do it. I did the first step, which was to convince people that it was not totally crazy." Once he had convinced the first two or three people at the University of Pisa, others quickly followed and now the collaboration includes the University of Chicago, the University of Geneva and the INFN labs at Rome and Trieste.

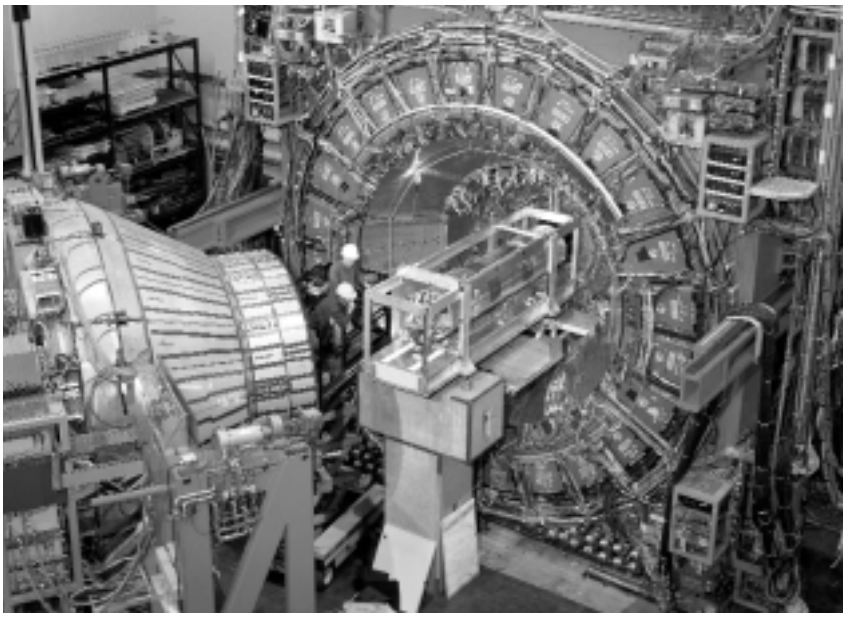
"I think the real virtue of the people who started working on this was to believe it could be done," said Ristori. "It took some courage—it was a new technology and it was very easy to make mistakes. There were many, many ways we could have failed."

Over the more than 10 years he's been working on the SVT, he's had help from more than 20 people, several of whom worked full-time on the device for several years. Ristori estimates the total amount of work put into the project to be around 50 man-years.

"There were a lot of good people who worked for many years," Ristori said. "It took a lot of ideas. We had to solve many problems. It was much harder than I anticipated, but we had enough people who were good enough to solve all these problems and go through to the end."

Their work was funded in large part by INFN, the U.S. National Science Foundation and the Department of Energy. Ristori thinks the project cost around $1 million, but the exchange rate has fluctuated so much in the past 12 years that it's hard to keep track. More importantly, "they always gave me the money I asked for."

All the hard work has paid off; the SVT has been up and running since Run II began in March 2001. It's the only device like it in the world, and it gives CDF important—and sometimes unexpected—capabilities.



Silicon Vertex Detector being installed at CDF in January 2001.

"It's given us the ability to do all kinds of things we never thought we could do," said Lockyer. "We now have the world's largest sample of charm [quarks]. We never planned on doing charm physics, but it turns out that the charm lifetime is very similar to the B lifetime, and all of a sudden we're inundated with all this charm. It's very exciting for us."

The 53-year-old Ristori was born in Prato, just outside Florence. He has always been interested in mathematics and physics, and attended the University of Pisa, where he "had to make this choice between physics and mathematics. I chose physics, and I do not regret it." He received his *Laurea in Fiscia* (Italy was not offering Ph.D.s at the time) from Pisa in 1971 and soon joined the NA1 experiment at CERN, the European Particle Physics Laboratory, as an INFN-Pisa collaborator. He stayed for several years, and then in 1980 he visited Fermilab and decided to join CDF.

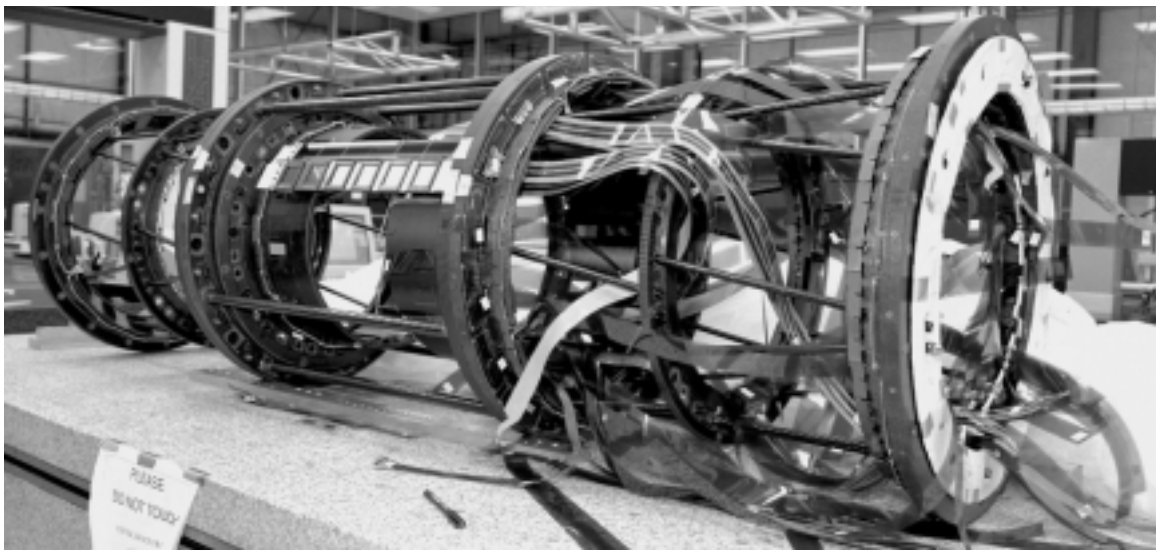
"I liked the place, I liked the physics, I liked what they were planning to do at CDF and at the Tevatron," he said. "CERN was a very nice place, but I like the style here, the way people are working and interacting. I also like the lifestyle here, this place, this part of the country."

When he first joined CDF, he lived mostly in Pisa and would commute back and forth several times a year, staying a few weeks or a few months. Now he and his wife live full-time in the Fermilab village, and he visits Pisa several times a year.

"It's important to keep the relationship with your home institution, even if most of the work is here at the moment," he said.

His work here still involves the SVT, "but there aren't any major problems to solve. It needs to be optimized, and there is fine tuning to do, but soon we should be able to just turn it on and have it work." Once that happens, Ristori hopes to turn his attention to some of the data produced by the device.

"I'd like to play a role at CDF in terms of looking at the important physics results we can get with SVT," he said. "I think it's the natural outcome of your work—you've been working so many years to build something, and then it works, and you want to see the results in terms of physics. I'd like to play a role in that, have more time to look at the outcome. That's the real motivation for going through all this trouble. It's fun, building something and using the detectors. But in the end all of this would not be worth it if it's not useful for physics."



Photos by Reidar Hahn

Silicon Vertex Detector on display at Fermilab's SiDet facility.

Remembering Those Who Served

Fermilab Fire Department honors firefighters who were lost on 9/11/01.

Photos by Reidar Hahn

On the anniversary of the September 11 attacks, members of the Fermilab community gathered at the Fermilab Fire House to commemorate the 343 firefighters who lost their lives when the two World Trade Center towers collapsed. Fire Chief Jack Steinhoff presided over the ceremony, which included remarks by Fermilab Director Mike Witherell and Associate Director Jed Brown, who read "The Firefighter's Prayer." The memorial service incorporated several traditional tributes to fallen firefighters, including the Tolling of the Bell; two piles of boots, coats and helmets; and a recording of bagpipers playing "Amazing Grace." The names of the 343 firefighters were read during the ceremony, which paused twice for a minute of silence to mark the times of the towers' collapse. About 150 people attended the ceremony.

MILESTONES

RECORDS SET

For luminosity: by the Fermilab Tevatron, Tuesday, Sept. 24, 2002, achieving a peak luminosity of 30.2 E30 inverse square centimeters per second (30.2×10^{30} cm^{-2} sec^{-1}), a measure of the collision rate of protons and antiprotons inside the accelerator tunnel. This all-time luminosity record followed a record-breaking weekend. On Saturday, Sept. 21, Fermilab accelerator experts had achieved a record luminosity of 28.5 E30. Two subsequent stores of protons and antiprotons, on Sunday and Monday, also approached that brand-new record, achieving luminosities of 27.6 E30 and 28.1 E30, respectively. Before the milestone weekend, the all-time Tevatron luminosity record was at 26.4 E30. The Run I record, achieved in 1995, was 25.0 E30. The Tevatron also set a new Run II record for the total number of collisions produced during a single week (Sept. 15-22), with an integrated luminosity of 4.8 inverse picobarns (pb^{-1}), close to the Run I record of 4.9 pb^{-1}. Fermilab's Antiproton Source also set records: on Sunday, Sept. 22, an antiproton production rate of 12.1 milliamps per hour, leading to the production of approximately 120 billion antiprotons in an hour. This record was immediately surpassed Sept. 23, with a stacking rate of 12.4 milliamps per hour. For more information on the Tevatron's performance, please check www.fnal.gov/pub/now.

LAUNCHED

Interactions.org, a new high-energy physics email news wire developed and maintained jointly by Fermilab and the Stanford Linear Accelerator Center in Menlo Park, Calif. The free service will function as a source of timely information on high-energy physics, including press releases and news items from the world's high-energy physics laboratories. A related web site will archive press releases and newsworthy stories. For more information, or to receive this new electronic subscriber news service, visit the Web site at:

http://www.interactions.org

APPOINTED

Vicky White

As head of Fermilab's Computing Division: Vicky White (ID 02263N, CD-Computing Division Office), effective Nov. 1, 2002. Said Fermilab Director Michael Witherell: "Vicky White has played prominent roles in all aspects of high-energy physics computing both in this country and at CERN and brings a wealth of management experience to the position." White succeeds Matthias Kasemann, who is joining CERN as head of LHC computing.

AWARDED

■ Fermilab Employee Performance Recognition Award: to **Steve Wolbers** (ID 06807N, CD-Computing Division Office). Fermilab Director Michael Witherell presented the award to Wolbers, the deputy head of CD, "for his continuous excellent performance and leadership of the Computing Division, especially during the time of transition in management."

■ 2002 URA Scholarships, to: **Eric Bowden** (Mark Bowden, CD/ESE), University of Kansas, Computer Science; **Hilary Christian** (David Christian, PPD/EPP), Johns Hopkins University, Political Science; **Paula Fischler** (Mark Fischler, CD/Comp. Physics), University of Illinois at Urbana-Champaign, Experimental Psychology; **Amanda Freeman** (Jim Freeman, PPD/CMS), Western Michigan University, Industrial Design – Engineering; **Elisabeth Harding** (David Harding, TD/Eng. & Fab.), Cornell University, Hotel Administration; **Lisa Kallenbach** (Jeff Kallenbach, CD/Comp. Physics), University of Illinois at Urbana-Champaign, Elementary Education; **Matthew Lackowski** (Tom Lackowski, FES/Eng.), Purdue University, Electrical Engineering; **Elizabeth Marriner** (John Marriner, Beams Division), University of Southern California, Film/Cinema; **Kiyoshi Martinez** (Victor Martinez, PPD/EE), University of Illinois at Urbana-Champaign, Materials Service Engineering; **Patrick McCluskey** (Elaine McCluskey, FESS/Engineering), Northeastern University, Civil Engineering; **Elisabeth Pordes** (Stephen & Ruth Pordes, BD/Headquarters & CD/Computing Div. Office), Georgetown University, Pre-Med.; **Katherine Schmidt** (Eugene Schmidt, CDF/PPD), Pepperdine University, Undecided; **Martha Skup** (Ewa Skup, PPD/TC), University of Michigan, Psychology; **Megan Smedinghoff** (James Smedinghoff, BD/Controls), Williams College, Undecided (considering Math); **Yun Wu** (Jinyuan Wu, PPD/EED), Massachusetts Institute Of Technology, Electrical Engineering & Computer Science

NAMED

■ National Merit Scholarship Semi-Finalist: **Alicia Seifrid** (Karen Seifrid, LS-VMS-Audio Visual, and Peter Seifrid, BD-BE-RF & Instrumentation). The 16,000 national semifinalists will compete for 8,000 Merit Scholarships next spring.

ELECTED

■ As co-spokesperson of DZero: **Gerry Blazey** (ID 03909V, Northern Illinois University); succeeding Harry Weerts (ID 03176V, Michigan State University).

RETIRING

■ **Arnold Knauf** (ID 8195 TD-Engineering & Fabrication), effective October 31.

URA SCHOLARSHIPS REQUIRE SAT TEST SCORES

Universities Research Association (URA) awards a number of scholarships to children of regular, full-time Fermilab employees, on the basis of SAT (Scholastic Aptitude Test) scores. High school seniors are reminded to sign up for a fall testing date if they have not already taken the test. Scholarship candidates must be high school seniors who will begin a four-year college degree program next fall. The maximum amount of the scholarship is $3,500 for tuition and fees, and is renewable for four years for students in good academic standing. Applications are available January 1 through March 1. Scholarships will be awarded in early April. Questions about the program may be directed to Jeannelle Smith, Human Resources, Mail Station 124, x4367.

CALENDAR

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

OCTOBER 9

VIRTUAL ASK-A-SCIENTIST

The next chat will take place Wednesday, October 9, 7-9 p.m. Central Time. Don Lincoln, an Associate Scientist for Fermilab's DZero experiment and Jocelyn Monroe, a researcher for Fermilab's MiniBooNE experiment, will respond to questions live on-line. Further information at http://www.fnal.gov/pub/inquiring/virtual/

OCTOBER 25

NALWO

NALWO cordially invites all Fermilab women to the Annual Autumn potluck luncheon, noon at Chez Leon.
http://www.fnal.gov/orgs/nalwo/lunchoct.html

FERMILAB ARTS SERIES 2002-2003 SEASON

Russian State Chorus
October 26, 2002
Tickets - $20 ($10 ages 18 and under)

Battlefield Band
November 23, 2002
Tickets - $19 ($10 ages 18 and under)

Windham Hill's Winter Solstice
Liz Story, Will Ackerman, and Samite of Uganda
December 7, 2002
Tickets - $25 ($13 ages 18 and under)

Libana
February 8, 2003
Tickets - $17 ($9 ages 18 and under)

Dragon's Tale: Nai-Ni Chen Dance
March 8, 2003
Tickets- $19 ($10 ages 18 and under)

Quartetto Gelato
April 5, 2003
Tickets - $21 ($11 ages 18 and under)

Orquesta Aragon
May 10, 2003
Tickets - $26 ($13 ages 18 and under)

Gallery Chamber Series
Sunday afternoons at 2:30 p.m.
Three Concert Series - $36

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.

Chez Léon MENU

Lunch served from 11:30 a.m. to 1 p.m.
$10/person

Dinner served at 7 p.m.
$23/person

For reservations, call x4512
Cakes for Special Occasions
Dietary Restrictions
Contact Tita, x3524
http://www.fnal.gov/faw/events/menus.html

Lunch
Wednesday, October 9

Tandoori Style Cornish Hens
Saffron Rice with Vegetables
Orange Cake with Strawberry Coulis

Dinner
Thursday, October 10

Curried Butternut Soup
Grilled Tuna with Rosemary Butter
Julienne of Autumn Vegetables
Spiced Honey Cake
with Orange Creme Anglais

Lunch
Wednesday, October 16

Northern Italian Meat Lasagna
Romaine and Red Onion Salad
with Blue Cheese Dressing
Peach Cake

Dinner
Thursday, October 17

Eggplant Rolls
Stuffed Flank Steak
Saffron Risotto
Radicchio and Endive Salad
Peach Melba

FERMI NEWS

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The deadline for the Friday, October 18, issue is Tuesday, October 8, 2002.
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 Dodge Ram 1500 conversion van, 20K miles, 4 captain chairs and a bench that folds into a bed. A/C, auto,cruise. $12,000. bianchiaj@fnal.gov or x4148, x3700.

■ '98 Honda CRV LX, red, 4-dr, air, dual airbags, auto., cruise, dual mirrors, PS, PW, PL, PM, tilt. 26K miles, driven mostly inside Fermilab. Looks and runs like new. $13,200. Contact Sandra Padula at padula@fnal.gov or x5527.

■ '97 Ford Aspire, automatic 69K miles, air conditioning, CD player, 30 MPG, well maintained, $3,250 o.b.o. Call Mark at x4836 or Obrycki@fnal.gov

■ '96 Chrysler Town and Country minivan. Fully loaded and clean, 100K miles, mostly highway, drives like new, $4,750. MUST SELL. Call 815-498-9072

■ '94 Mercury Villager LS, air conditioning (front and rear control), automatic, cruise, dual mirrors, PS, PW, PL, PB, ABS, rear wiper and defogger, intermittent wipers, privacy glass, two-tone metallic paint (red & silver), power mirrors, tilt, luggage/roof rack. $5,800 o.b.o. Contact: Sergio Novaes at novaes@fnal.gov or x2454.

■ '89 Dodge Grand Caravan LE, 3L V6, 160K miles runs well, rear heat, 7 passenger, $900 o.b.o. Dane at x4730 or dane@fnal.gov.

■ '89 Plymouth Acclaim 62K miles, good condition, well maintained. Blue book value $1,300 o.b.o. balm@fnal.gov.

■ Solid hard wood desk for sale in good condition. Has 4 drawers and a nice large surface area (44 x 32). Plenty of room for a computer and work area. Reasonably priced at $35. Call Karen at 208-1751.

■ Girl's bedroom set, head and foot board with frame, double dresser with matching mirror and 4 drawer chest, antique color with hand carving, excellent condition, $175. Boys Walnut double dresser and 5 drawer chest, good condition,$75. Call Ken x4225.

■ Well expansion tank. 80 gal, precharged bladder style. Like new, $75. Mark, x4776, markl@fnal.gov.

■ Die Walkure opera tickets. Two Lyric Opera, Dress Circle, tickets for Sunday, November 10th, 1:30 p.m. Subscription price. Call x3922 days, or 293-9349 evenings.

HOUSES FOR SALE

■ Townhouse in North Naperville. Great location, walk to downtown Naperville, District 203 schools, 15 minutes to Fermilab. Neutral décor and immaculate with many upgrades. 1,900 sq. ft., 2 bedroom, 3.0 baths, large covered deck, patio, fireplace, 2.5 car garage, built in 1996. $218,900. Call x8779 or 630-416-3721.

■ Brick ranch in West Aurora, 3 large bedroom home with 2.5 updated baths, 3 season room, new Pergo flooring in laundry room, country kitchen, see thru fireplace in formal living room and country kitchen, oversized 2 car garage, new roof, windows. Perennial gardens, mature trees. $224,900. treend@fnal.gov. or x6633.

FOR RENT

■ Back apartment in Batavia. 1 bedroom, office, living room, kitchen and porch. $675 per month plus utilities. Available Oct. 1, security deposit required. Call 630-879-7747 between 8:00 a.m and 5:00 p.m.

■ Duplex in Aurora, 2 bdrm, 2.5 bath, deep one car garage, private deck, fenced in back yard, 1,550 sq. ft, 2 miles from Fermilab, $1,050 a month, plus deposit, utilities. Marty 826-4377 or 907-1510.

WANTED TO RENT

■ Do you have an apartment or home in Italy that you would be willing to rent during February/March and April? If so please contact treend@fnal.gov, x6633.

GOLF LEAGUE

■ The Phillips Park Golf League just finished its 1st season back at the new Phillips Park Golf Course. The 1st place team consisted of Dave Bulmahn, John Najdzion, Bryan Falconer and Rose Callaghan. Darrel Sigmon had low average and Angela Prosapio had most points.

CHESS CLUB

■ Interested in chess? The Fermilab Chess Club meets for casual games and also participates in league matches in the Far West suburbs and Internet matches with our counterparts at CERN. For more information view our web page. http://www.fnal.gov/orgs/chess/ or contact Lenny Spiegel (lenny@fnal.gov, x2809).

BARN DANCING

■ The next Fermilab Folk Club Barn dance is Sunday, Oct. 13 at 6:30 p.m. with music by Bob, Lynn, & Howard and calling by Dan Saathoff. Barn dances are held in the Warrenville Community Building and feature traditional square and contra dances. Admission is $5 for adults, $2 for age 12-18, and free for under 12 years old. Come with a partner or without; bring the family or not. For more information contact Dave Harding (x2971, harding@fnal.gov) or Lynn Garren (x2061, garren@fnal.gov) or check the webpage at http://www.fnal.gov/orgs/folkclub/ .

WANTED: TREE SEEDS

■ Seeds from mature trees: Burr Oak, White Oak, Red Oak, Shagbark, Hickory, Bitternut Hickory, to be planted by Fermilab's Road and Grounds Department. Seeds should be separated by species, dried and kept cool. Drop off seeds at Roads and Grounds, or call Bob Lootens x3303 for pickup. The donated seeds from previous years are growing beautifully.

http://www.fnal.gov/pub/ferminews/

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