

# F E R M I N E W S

F E R M I L A B A U. S. D E P A R T M E N T O F E N E R G Y L A B O R A T O R Y



OSTP's Marburger Visits Fermilab **12**

Photo by Reidar Hahn

Volume 25  
Friday, August 30, 2002  
Number 14



## **INSIDE:**

- 2 Physics in Crisis
- 6 Hello, I Must Be Going
- 8 Flying Without a Net

# PHYSICS IN CRISIS

## A condensed-matter physicist sees the need to unify all the fields

by Sidney Nagel

This article is also being  
published in the September  
issue of PHYSICS TODAY.

Respond online at  
[www.fnal.gov/pub/ferminews/  
interactions/index.html](http://www.fnal.gov/pub/ferminews/interactions/index.html)  
or send email to  
[ferminews@fnal.gov](mailto:ferminews@fnal.gov)

**P**hysics is in crisis. We have lost our ideals and focus as a unified field.

The reasons for this loss can be traced to recent history as well as to pressures currently felt within the physics community. Particle physics used to be the dominant area and had pride-of-place in our discipline. It was “basic” and “fundamental.” It was exciting, with many great discoveries taking place and with a unified picture of the interactions emerging.

Physicists were convinced that the best science was reductionist and that all other sciences, at least in principle, could eventually be predicated on, if not reduced to, physical laws. Even though in practice it would be impossible to accomplish such a vast reduction, there was comfort and pride in believing that our science was fundamental. Particle physics served as a culmination of that viewpoint: Other subdisciplines of physics were often seen as studying phenomena that merely originated from the relentless working-out of the laws to be discovered in the realm of high energy. As such, those other areas were relegated to a lower, secondary status. The goal of physics was to find the basic underlying laws of nature, and the most basic ones were those governing the elementary particles.

These attitudes have slowly been eroded. This is in part due to the fact that high-energy particle physics is no longer so healthy—particularly within the U.S. since the demise of the Superconducting Super Collider. Great discoveries and advances are less frequent. Without the preeminent role of particle physics, it has become less accepted what the ultimate goal of physics should be. Although there is great excitement in many different areas, no other group has risen up and taken the lead in defining our mission.

What is our overall objective as physicists? Do we know anymore? Whereas previously, understanding between fields was less important because of the dominance of a single viewpoint, now with the decline of that position’s most visible exemplar the splits between disciplines inside physics have taken on greater consequence, making better communication essential for restoring our sense of community.



Photo by Fred Ullrich

Sidney Nagel is the Stein-Freiler Distinguished Service Professor in the Department of Physics and at the James Franck and Enrico Fermi Institutes at the University of Chicago.

Why are there splits within our field? First, there is a noted lack of sympathy between subdisciplines. There is a long history, which is better forgotten, that documents the uneasy relationship between particle physics and other areas such as condensed matter. This establishment of a pecking order is not unique to physics and is perhaps a common trait in many, if not all, academic disciplines. More discouraging is that despite our best intentions and frequent objections to the contrary, we do not really appreciate what is done in other areas. I would

venture that a colloquium talk with the words “Standard Model” in its title would not be immediately engaging to a condensed-matter physicist, nor would one with the words “High-Temperature Superconductivity” be attractive to a community of particle physicists (nor for that matter to a group of soft-condensed-matter physicists). I could give many other examples from all different areas in physics. Such division is clearly not good but I think it is a shocking and unfortunate fact. We are, it seems, very parochial.

# INTERACTIONS

Communicating particle physics  
in the 21<sup>st</sup> century

## In order to study GEOLOGY, CONDENSED

A second split is the inevitable conflict between big and small science. Big physics has gotten much bigger, with collaborations ballooning in size, whereas small physics, if possible, has gotten even smaller. Not only are some experiments done with a minimum of personnel, but they also use a minimum of sophisticated equipment. This leads to the troubling question: Why should a condensed-matter physicist pronounce on the hiring of a high-energy particle physicist and vice versa? We can, of course, listen to our colleagues and either choose to believe their opinions or not, but we could do the same for our colleagues in, say, the English department. What do we share as physicists that makes our opinions important to our departmental colleagues?

A third split that emerges is that between basic and applied. We are often caught arguing which is “better,” as if that had a meaningful answer; we then straddle the fence and proclaim that our research has aspects of both.

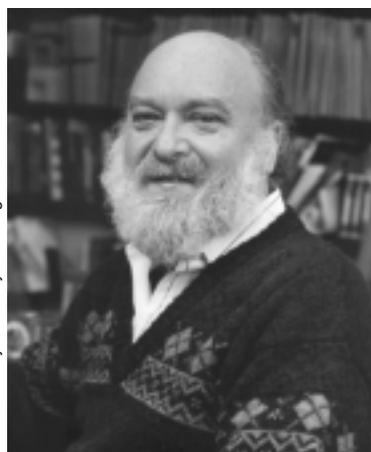


Photo courtesy University of Chicago

Leo Kadanoff: Is nature an apple or an onion?

Finally, I come to the split between the study of emergent phenomena and reductive science and to the ongoing debate about which of the two is more useful or interesting. Many of us no longer blindly buy into the idea that reductionism is superior to other science. Using a metaphor that I learned from Leo Kadanoff, we can ask whether nature is an apple or an onion. That is, does nature have a core that is fundamentally different from the outer region and that contains the seeds of truth (i.e., the reductionist

viewpoint); or is it an onion in which each layer is only loosely attached to the one beneath it? So in order to study geology, condensed matter physics, or biology, does one really need to know the Standard Model? Does it even help? Of course not. Likewise, we can ask whether the Standard Model is so fundamental that we need it before we can build a strong scientific structure. I would suggest that we can even turn that question (and with it the reductionist agenda) around and argue that one cannot study particle physics without knowing about more macroscopic physics. In that point

of view, we would say that our knowledge about the more microscopic world is based on our understanding of the macroscopic one. Science, as a whole, provides one interrelated, mutually consistent description.

There are other trends aggravating these tensions in the community. In recent years, at least in condensed matter science, there has been an emphasis on interdisciplinary research. This diminishes our sense of a common physics mission. However, it is difficult to engage in interdisciplinary research without the solid foundation of a discipline from which to start. Because we have only finite time, energy, and attention to lavish on neighboring fields, interdisciplinary research can lead to an even further decrease in the communal activity within physics itself.

At the same time there has been tremendous excitement in other fields such as biology and computer science. Those fields have now outstripped physics in terms of excitement in the public eye, and we have lost students to those disciplines. This loss makes us uneasy and less confident of the value of our own research areas. While competition for funding has always been stressful, we feel overlooked as more funds are delivered elsewhere (such as to the health disciplines). In response, we often make exaggerated claims for our field that only infuriate our physics colleagues. In particular, credit is sometimes taken by one field of physics for the accomplishments of another. In our self-evaluation, we don't know whether to be practically useful to society or to answer the “big,” intellectually satisfying questions that may have no obvious applications. Finally, I believe that none of this is helped by the growing split between theory and experiment in all areas of physics.

If there are splits within our discipline, we must then rediscover what different areas have in common. Is there a common approach to problems or a common type of question that we, as physicists, tend to ask? I can think of some possible, but not wholly satisfactory, answers to this query: For example, we might say that we study universal features of how matter and energy can be organized. Although vague, this description nevertheless captures at least some of the strands interweaving our subject.

# MATTER PHYSICS, or BIOLOGY,

## does one REALLY NEED TO KNOW the STANDARD MODEL?

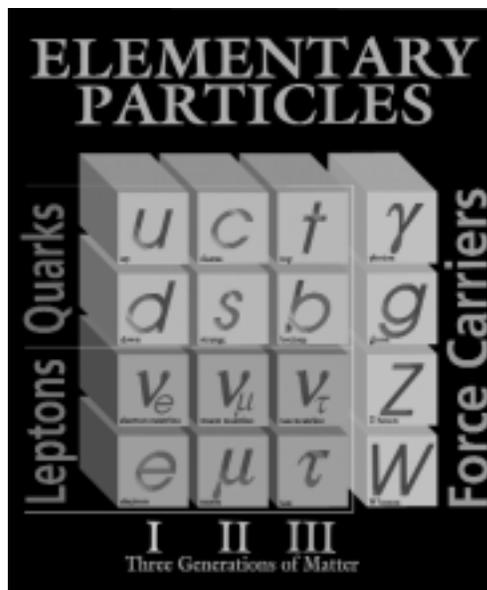
Likewise, we must articulate more clearly, so that we can all understand, what are the big questions we still need to answer that will launch new fields of research rather than close off old ones. I can only give an illustration from my own area but I hope that we can get examples from all our work. Starting the exercise, I ask, "How do we begin to think about systems far from equilibrium?" From one point of view, all of life can be considered as simply an organized struggle to delay our descent into bland equilibrium. If we were in equilibrium, we would not only be dead—we would be homogeneous!

A question such as this is clearly central, open-ended and will not be answered in a few years. I urge us all to contribute to this dialogue and suggest our own set of grand questions. In doing so we can provide a basis for the argument that physics is as exciting and relevant today as at any point in the past.

Clearly, we have not been very good at communicating about (or perhaps even at considering the broader implications of) our work. We are thus urged—indeed required—by many of our funding agencies to engage in public outreach. Yet it is disheartening that we have not, as a group, rewarded and embraced our colleagues who are particularly good at conveying our messages to the broader society. At best, we give them a grudging acknowledgement.

But outreach to the public is not enough. I think we have done precious little to communicate to other members of our own community. An often-heard complaint is that our colloquia, supposedly meant for the non-expert, are notoriously difficult even for specialists to understand. More important, they rarely address the fundamental question: Why should one even care about the research or topic being discussed? We assume everyone should be interested—but we are wrong.

To end on a positive note, I think some things can be done to improve the situation. I would, after all,



like us all to be able to go to our deans or provosts and insist that we have a dire need for new physics faculty, and to argue the case as forcefully as can our colleagues in biology and computer science.

It can seem daunting to contemplate a thorough reevaluation of our educational system with an eye toward instilling in our students some sense of the breadth and interrelatedness as well as the depth of physics. Such a task will require a broad collaborative effort.

To get things started, I suggest we begin at a more modest level. My suggestion consists of a two-part homework assignment. The first part will be due every September, to be presented the following March:

1) Create two symposia for the next March meeting (primarily devoted to condensed matter and materials physics) of the American Physical Society that bring together condensed matter and particle physicists to discuss science of common interest. One of these should be on an experimental topic and one should be on a theoretical topic. Make sure you have speakers from both disciplines.

*(Extra credit: do this same assignment linking other pairs of disciplines.)*

The second assignment is ongoing and is perhaps even harder:

2) Answer honestly why someone from outside your subfield should be interested in what you are doing. Then, **GIVE THOSE REASONS CLEARLY IN ALL YOUR TALKS.** 📌

*This opinion piece would not have been written without the suggestion and encouragement of Judith Jackson. I am grateful to Steven Girvin, Young-Kee Kim, Andrea Liu, and Piermaria Oddone for their thoughtful comments on earlier drafts of the manuscript.*

ON THE WEB:

Fermilab Arts Series  
www.fnal.gov/culture/

# Hello, I Must Be

# Going

## 'EVENING WITH GROUCHO' OPENS ARTS SERIES, MARKS RE-OPENING OF FERMILAB

by Mike Perricone

If it's OK to laugh again, there's nothing better than laughing with the best. "An Evening with Groucho" opens the 2002-03 Fermilab Arts Series at 8 p.m. on Saturday night, Sept. 21 in Ramsey Auditorium. Actor-director-playwright Frank Ferrante portrays Groucho Marx in 90 minutes of wit, wisdom, one-liners and ad-libs that have been seen and acclaimed on PBS, and onstage in London and New York.

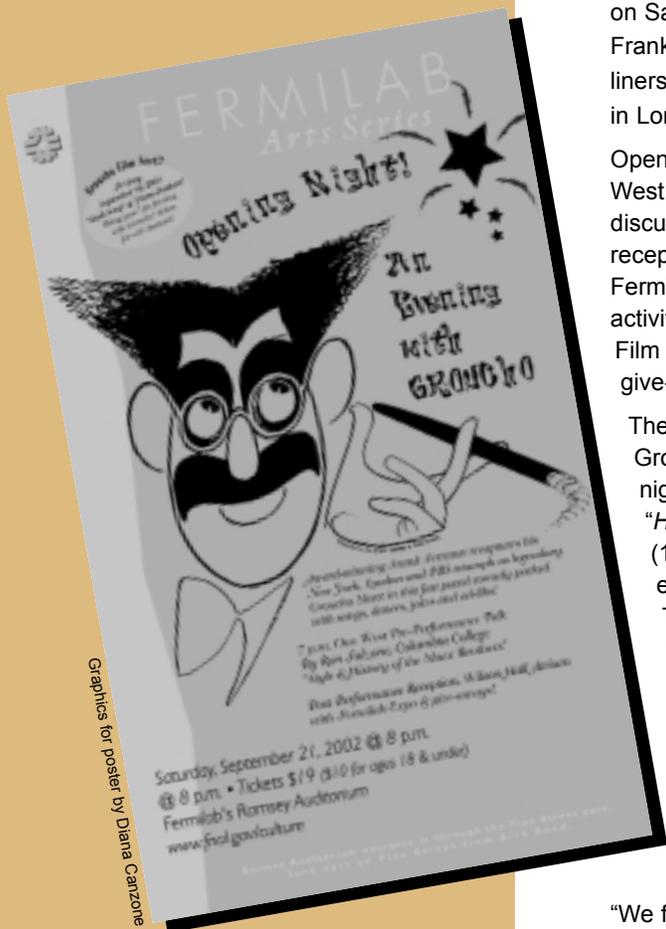
Opening-night special events include a 7 p.m. lecture in Wilson Hall's One West conference room by Ron Falzone of Columbia College in Chicago, discussing Groucho's influence on modern comedy. There will also be a reception following the performance with special refreshments, and several Fermilab organizations will have display tables highlighting such public activities as bird-watching, the Lederman Science Education Center, the Film Series and the prairie restoration effort. There will be prizes and give-aways.

The Film Series is offering a bonus: those purchasing "An Evening with Groucho" tickets in advance can get half-price admission for Friday night's double-feature of Marx Brothers classics, "Duck Soup" and "Horse Feathers," at 8 p.m. in Ramsey Auditorium. In "Horse Feathers (1932)," Groucho is Prof. Wagstaff of Huxley College, skewering higher education and college football; in "Duck Soup (1933)," he's Rufus T. Firefly of Freedomia, skewering world politics and anything else that comes along.

*"I've had a perfectly wonderful evening. But this wasn't it."*

The back-to-back festivities represent the first opening-night celebration since the 2000-2001 season. Last season's opening night performance and activities were canceled following the terrorist attacks of September 11. The performance was rescheduled, but opening-night activities were not.

"We felt that since the site was not generally open to visitors, we wanted to wait," said Ray Yarema, chair of the Fermilab Arts Committee. "This opening night is also a nice celebration of the lab being open again."



Graphics for poster by Diana Carzone



Photo by Fred Ullrich

The Ramsey Auditorium lobby will again be buzzing for the 2002-2003 Fermilab Arts Series. See the schedule on page 15 or go to [www.fnal.gov/culture/](http://www.fnal.gov/culture/) for more information.

Yarema also promised you can bet your life on a few more surprises for the opening-night audience.

Fermilab announced that the laboratory had re-opened to visitors on Thursday, August 8. The U.S. Department of Energy had ordered the closing of the laboratory to most visitors as a security measure following the terrorist attacks.

“Security remains a priority at Fermilab,” said laboratory director Michael S. Witherell. “But we are delighted to welcome visitors to our site once again.”

Visitors may now enter the site daily between the hours of 6 a.m. and 8 p.m. from both east and west entrances without obtaining visitors’ passes. Both the west side Pine Street entrance and the east side Batavia Road entrance are again open to motorists as well as to pedestrians and bicyclists from 6 a.m. to 8 p.m. Motorists must use the indicated visitors’ lane upon entry, and they must leave the site from the same gate they enter. Parking restrictions for visitors remain in effect, and drive-through traffic remains prohibited.

Patrons of the Fermilab Arts, Lecture and Film Series now may also enter the site from either the Pine Street or Batavia Road gates. The gates will be lowered at 8 p.m., with guards posted; however, the guards will be instructed to allow latecomers

to attend the presentations. Parking for the performances will be available in the lot on the west side of Wilson Hall, except for restricted areas where signs or cones are in place.

***“A child of five would understand this. Someone fetch me a child of five.”***

The Ask-A-Scientist program has returned to Wilson Hall on Sunday afternoons, from 1:30 p.m. to 3:30 p.m. Visitors can meet Fermilab scientists and ask them questions in the 15th floor display space, reached by taking the elevator from the east or west side of the Wilson Hall Atrium. As with the Arts Series, parking is available in the lot on the west side of Wilson Hall, except for restricted areas. The Ask-A-Scientist program had been temporarily relocated to the Lederman Science Education Center while enhanced security measures were in effect.

And once again, visitors may also look in on the public areas of Wilson Hall—the first-floor Atrium and exhibit space, second-floor Art Gallery and 15th-floor exhibit areas. However, all other buildings remain closed to the public, and are accessible only with a Fermilab identification card.

***“Those are my principles, and if you don’t like them... well, I have others.”*** 🌱

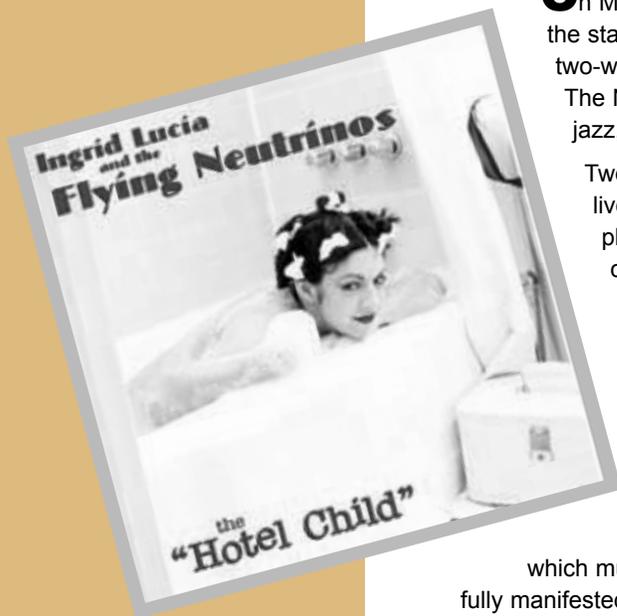
IN WHICH A  
PUBLIC AFFAIRS  
INTERN EMBARKS UPON  
A PERSONAL  
NEUTRINO ADVENTURE,  
CONFRONTING SOME OF  
HEP'S WEIGHTIEST  
QUESTIONS

# *flying*

without a

# NET

by Pamela Zerbinos



**O**n May 3 of this year, Ingrid Lucia and the Flying Neutrinos took the stage at the New Orleans Jazz & Heritage Festival, an annual two-week long party that draws more than half a million people. The Neutrinos, a quirky six-person band out of New York that mixes jazz, swing, blues and soul, were making their second appearance.

Two of the band's members have been Neutrinos most of their lives. The lead vocalist and her brother, a tap-dancing trombone player, are the oldest children of a musical pair of socially conscious adventurers whose family band was called the Flying Neutrinos. When the oldest children split in the mid-90s, they took the name with them, and the remaining family members became the Floating Neutrinos.

"Neutrinos," say the Neutrinos, "are subatomic particles that exist throughout the universe, invisible but ever-present, and act as a sort of balancing factor to all visible matter.

The neutrino is a symbol of all the unseen but nevertheless real parts of ourselves and the universe,

which must be taken into account if we are to become whole and fully manifested."

And that's what I knew about neutrinos the day I reported for work at Fermilab. Clearly, there was work to be done.

My background doesn't offer much of a starting point. I arrived at Northwestern University with thoughts of double-majoring in journalism and mathematics. I thought science coverage—especially "hard" science coverage—was abysmal, I was madly in love with calculus, and combining the two sounded like a great idea.

#### ON THE WEB:

#### Neutrinos at Fermilab

[www.numi.fnal.gov](http://www.numi.fnal.gov)

[www-boone.fnal.gov](http://www-boone.fnal.gov)

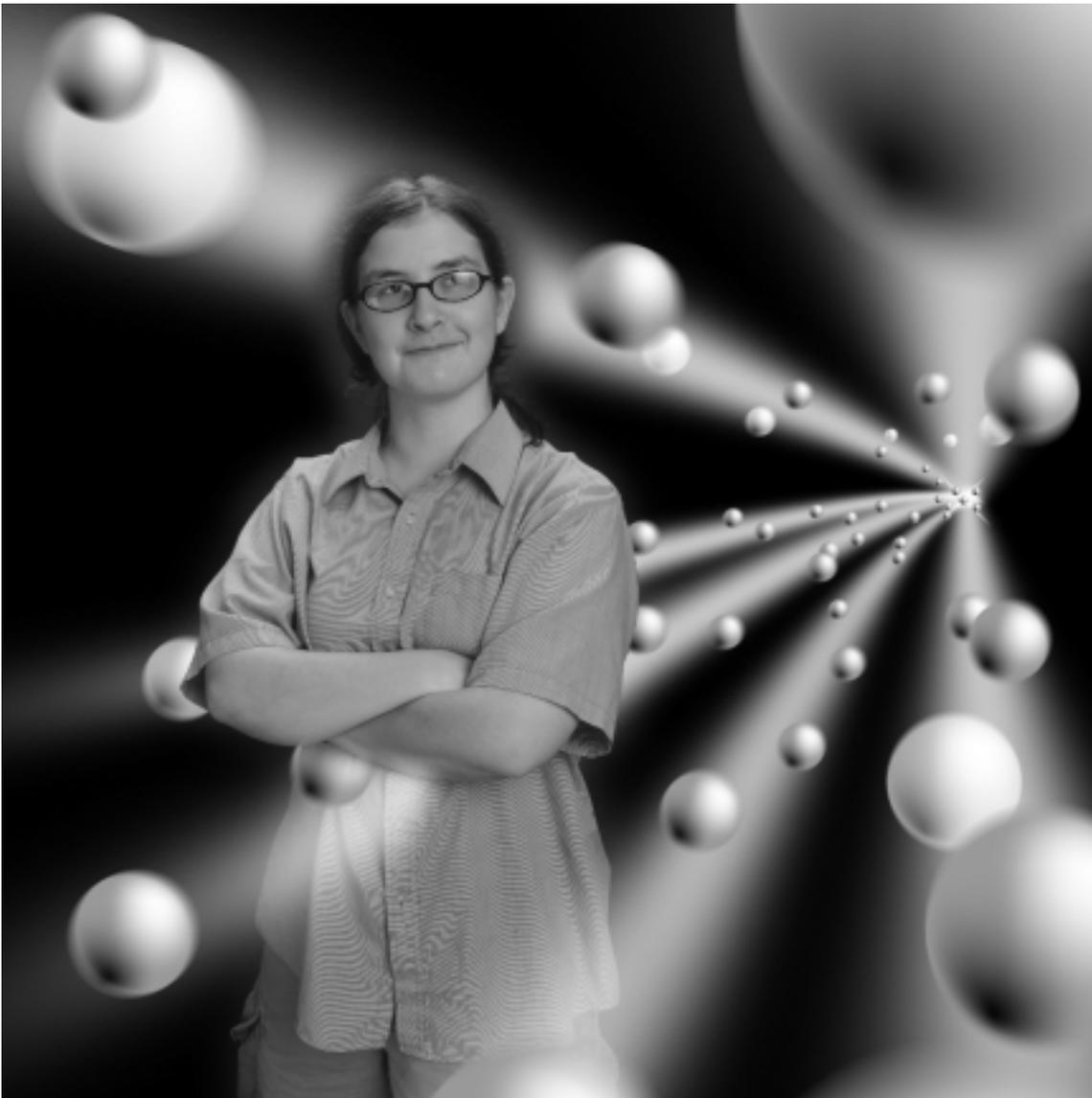


Photo and illustration by Reidar Hahn

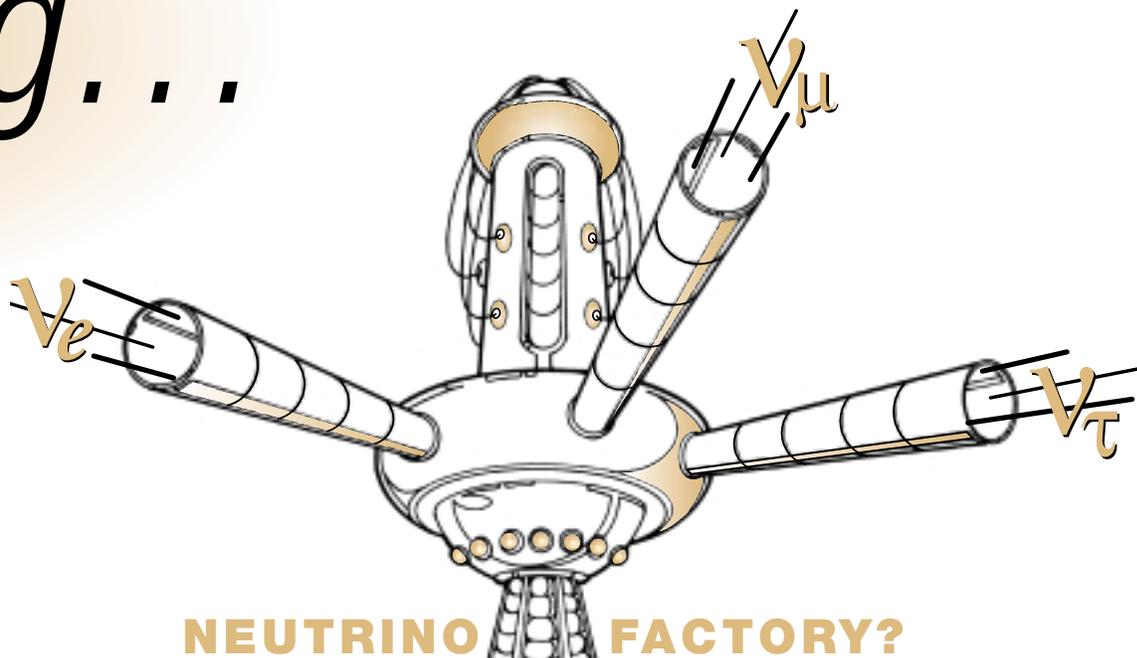
Pamela Zerbinos finds that neutrinos are everywhere, but they're very tricky to grasp.

Predictably, I veered off-course. Although I stuck to journalism, my second major switched four times before settling on European history. My specialty, if you can call it that, was the papacy. I know a lot about popes and politics (and even papal politics), but not very much about particles or physics or particle physics.

I went on to get my Master's degree in journalism from Northwestern, where I took a science writing class, which came on a field trip to Fermilab, which was arranged by the Public Affairs Office, which was looking for a summer intern. So, after a winding but eventually circular path, I find myself back to writing about science. My first task: figure out this neutrino thing.

The first stop on My Personal Neutrino Adventure, as I begin to think of it, is Fermilab's website. From this, I learn that neutrinos are incredibly elusive, "ghostly particles" that travel throughout the universe "without leaving a trace." Throughout the 70-year history of the neutrino, it has been at the center of a host of mysteries, some of which remain unsolved. Most neutrino literature has names like, "*The Case of the Missing Neutrinos*" and "*A Subatomic Detective Story*." I start having black-and-white visions of Humphrey Bogart, chomping a cigar, interrogating physicists about the missing particles, the keys to larger mysteries and higher understanding.

# flying...



## NEUTRINO FACTORY?

I need to know more. I don't understand how to count particles that leave no trace. I don't understand where you get them or how you make them.

(Is there some kind of neutrino factory? When I find out exactly such a thing may be in the works, I am giddy. I have visions of Willie Wonka's Chocolate Factory, with Oompa-Loompas carrying around baskets of brightly colored neutrinos, all carefully labeled "electron," "muon" and "tau.") In the case of a long-baseline neutrino experiment like MINOS, how do you know the neutrinos arriving in Minnesota are the same ones that left Fermilab? I am particularly baffled by this phrase, which pops up again and again: "new physics beyond the Standard Model." What is "new physics"? Is it like "new math"? I always thought that was a joke my parents used to get out of helping me with my algebra homework.

I set off on My Neutrino Adventure, intent on finding some answers. Help arrives quickly, although from an unexpected quarter: my mother. During our weekly phone call, I happen to mention something about neutrinos. Excitedly, she says, "I know what neutrinos are!" I can practically see her bouncing up and down. I swallow my surprise, and wait for her to continue.

"They're energy sources from the sun," my mother explains.

"By measuring the different kinds of neutrinos and how many there are, they can tell how hot the sun is."

She pauses. "Or...something like that."

Illustration by Pamela Zerbinos

She points me in the direction of a poorly executed story by her local NPR affiliate about the Sudbury Neutrino Observatory and its latest results. I head to SNO's site, and then make a quick list of the neutrino facts I have gathered on my adventure: Neutrinos are elementary particles with no charge. There are three types of neutrinos—electron, muon and tau. Most were produced in the Big Bang, but some show up in cosmic-ray showers, some are produced in the sun's core during fusion reactions and still others are given off during radioactive beta decay. For a long time, they were thought to be without mass, and the Standard Model does not account for a massive neutrino. Nor does the Big-Bang theory, or the theory about universal expansion. But recent experiments have found hints that neutrinos can oscillate—change from one type to another—and SNO seems sure that it's got definitive proof. And if neutrinos oscillate, they have mass.

I panic, and here's why. I'm one of those people who suffers from an overactive imagination, and in my head, it works like this: Someone discovers that a fundamental idea of physics—say, gravity—doesn't work the way we thought it did. Furthermore, we have no idea how it works, and this changes everything. None of our math works now. Suddenly, by merely uttering that statement, reality reflects the new uncertainty. Not only does none of our math work, but gravity itself no longer works. Books fly off the shelves. People float around, bumping their heads on ceilings, which are themselves coming apart. There is a run on jet packs.

True, a massive, oscillating neutrino will solve a lot of mysteries. Neutrino mass may account for some of the mysterious dark matter in the universe. Neutrino oscillations explain “the missing solar neutrinos”—the mystery of why, when counting neutrinos from the sun, only about one-third as many show up as the theories predict.

But the cosmologists' equations for the first few minutes of the universe use a massless neutrino. As do the astrophysicists' equations showing the universe will expand indefinitely. And so, if neutrinos have mass (which they do), and that mass is found to be sufficient for the universe to eventually collapse back in on itself (which it probably is), then clearly that collapse is going to happen soon. Like next Tuesday. Hence my panic.

I head to the cafeteria, intent on grabbing a physicist—any physicist—and accosting him with questions like, “What are we going to do about this?!” Suddenly, I am stopped in my tracks by a comforting thought: the Plum-Pudding Model.

To my knowledge, the world did not spin out of control, or explode, or cease to exist, when J.J. Thomson's old model about atom composition was disproved. Granted, that's comparing apples and oranges, but I try not to think about that. I go back to my desk, deciding, for the sake of my mental health, to finish my neutrino reading.

The Public Affairs library, conveniently located about four feet from my desk, is home to several helpful volumes. I grab “*The Elusive Neutrino*” by Nickolas Solomey, “*Spaceship Neutrino*” by Christine Sutton and “*The Case of the Missing Neutrinos*” by John Gribbin. I talk to neutrino physicists. I go to a lecture called “Neutrino Physics at Fermilab,” for which I am overdressed, and after which I call the lecturer (a very helpful Peter Shanahan) for more details. I ask him intelligent questions like, “What's with that?” He indulges me for quite some time, and then says, “Maybe you should talk to a theorist.”

I do, and eventually, a picture starts to emerge. But just as I start to wrap my mind around it, it shatters into a million different pieces, a million new questions, each more complicated, perplexing—and philosophical—than the last.

The latest batch: Can neutrinos spin in either direction? (The short answer—yes—confuses me even more than parity violation, because, despite the valiant efforts of the theorist Boris Kayser, I don't see why the angle from which you're viewing the neutrino should change the direction in which it's spinning. I just don't.) How can a particle be its own antiparticle? Are there really just three types of neutrinos? In what ways do they mix? Why are they so light? How long do they live? What's a spinor? (I picture a spiky armadillo, but apparently it's some kind of mathematical construct.)

My confusion and I are in good company.

“It's like wallowing in an intellectual mud bath,” says Boris, after very generously attempting to explain to me for nearly two hours just how a particle can be an antiparticle of itself. After our talk, I spend 45 minutes staring at a wall, trying to decide if I understand or need to go back.

That answer is one that comes quickly. Of course I'll need to go back. I will always need to go back. Even the physicists need to go back, which is precisely what makes neutrinos so fascinating. Neutrinos are both telescope and microscope, able to take us out to the farthest reaches of the universe and into the very heart of matter. They can shed light on how particles acquire mass, what the universe is made of, and why there is more matter than antimatter (which is too bad—I must admit to liking the idea of an anti-Pam, except for the annihilation part). Neutrinos can be a wonderful probe into the weak force, into flavor, into the structure of the nucleon. There are countless neutrino adventures to be had, countless physics adventures to be had, and I hope to leave Fermilab better able to communicate the excitement of those adventures to the outside world. I'll just need a few more weeks to work on this neutrino thing. 🌟

—Pamela Zerbinos is an intern in Fermilab's Office of Public Affairs.



Photo by Reidar Hahn

At New Muon Lab, Pam gets a sense of scale from a component of the near detector for the MINOS neutrino experiment.

# OSTP's Marburger



## Visits Fermilab



**COVER PHOTO:**  
CDF Co-spokesperson Al Goshaw  
guides OSTP Director John Marburger  
at the CDF Main Control Room.

**ON THE WEB:**

**Office of Science and Technology Policy**  
[www.ostp.gov](http://www.ostp.gov)

by Judy Jackson

**"I** am personally excited about particle physics," John Marburger, the Bush Administration's director of the Office of Science and Technology Policy, told a Fermilab audience earlier this month. Furthermore, he said, now is a great time to be a particle physicist.

"Experiment is driving theory at this moment," Marburger said. "We need data. The Standard Model is great, but it is exciting to move into areas that are not predicted. All eyes are on this lab, watching for data. I wish I could stay here and work with you. The excitement of your discoveries will propagate through society."

Marburger made his remarks during a day-long visit to Fermilab on August 1, in which he met with lab managers, addressed the Fermilab community and kicked the tires on a tour of CDF and the Technical Division's LHC magnet center.

Discussions during the visit frequently centered on how to convey Marburger's excitement about particle physics to others in government. He acknowledged the challenges currently confronting the field of particle physics, in particular the re-evaluation of the rationale for physics funding at national laboratories following the end of the Cold War and the long-term nature of the payoffs from basic science.

"The old Cold War rationale for science was replaced by an economic rationale," he said. "This was scary to basic science, because investment criteria often require short-term payoffs. Basic science rarely creates new technology for immediate goals."

Nevertheless, Marburger urged listeners not to bemoan the shrinking funding levels for the physical sciences, in particular particle physics, but to concentrate instead on the scientific opportunities that will come from increased investment in the field. He stressed the link between particle physics and cosmology and urged particle physicists to make the case more clearly for the connection between research at the largest and smallest scales of nature, pointing to potential benefits from increased coordination of high energy physics and the space program. He said he believes the case for science has been made well in Congress and the administration, and that it has met with a positive response.



Photo by Reidar Hahn

Muge Karagoz Unel, Northwestern University, gives OSTP Director John Marburger a personal poster session on Beam Halo Monitoring at CDF. Unel and colleague Rich Tesarek of Fermilab captured first place in the 2002 poster session of the Graduate Students Association.

## “I am personally excited about PARTICLE PHYSICS.”



Photos by Reidar Hahn

Above: Marburger and Marge Bardeen (standing, left), head of Fermilab’s Education Office, confer with local teachers undergoing training at the Leon Lederman Science Education Center. Below: Marburger and Patrick Looney, OSTP Assistant Director for Physical Sciences, watch Bardeen demonstrate the billiard ball model of particle interactions.

“Congress is ready to support basic science,” Marburger said, “but the economy must be strong enough. And there are so many opportunities in basic science that you may have to stand in line, and you must prioritize. High energy physics has done a good job of identifying priorities, and it should get funded. It does get more expensive, so we must look for new ways to fund it by collaborating to spread the costs among many nations.”

In response to a question from Fermilab physicist Robert Bernstein, Marburger said he thought particle physicists had done a good job of educating others about the science that they do, but had not yet succeeded in conveying “how the science gets done” within government agencies. Until he began serving as OSTP director in mid-September 2001, Marburger, a physicist, was director of the Department of Energy’s Brookhaven National Laboratory. His comments reflected a keen grasp of the funding challenges for physics research at national laboratories.



“Few in Congress understand that DOE owns about half of the physical sciences,” Marburger said. “Congress supports basic science, but they need to know what to fund in order to get the desired result. Who thinks about the Department of Energy in terms of cosmology and the Standard Model? We need to get across a better understanding of how this science works.”

**“We need to get across a better understanding  
of how this **SCIENCE WORKS.**”**



Above: Fermilab Director Michael Withereff (right) and physicist Victor Yarba (left) bring Marburger up to date on progress on LHC work at the Technical Division.

Below: Fermilab's Mike Lamm (right) shows Marburger a superconducting magnet headed for the LHC at CERN, the European Particle Physics Laboratory in Geneva, Switzerland.

In the area of potential roadblocks to international science collaboration as a result of visa restrictions in response to terrorist actions, Marburger said OSTP might be able to help.

“For big science projects, such as those in high-energy physics and astrophysics, international collaboration is regarded as essential,” Marburger said. “The Office of Science and Technology Policy tries to get involved when we hear of a proposal to hinder international collaboration. We try to forestall it, not just as a matter of sharing the cost, but because of the value of people from many countries collaborating on science. We are concerned about not over-reacting to the threat of terrorism and inadvertently shutting doors to contributions from foreign scientists. This is a delicate time. We try to help broker the needs of science and security.” ☎



Photos by Reidar Hahn

## CALENDAR

### SEPTEMBER 9, 11 & 13

#### WELLNESS WORKS PRESENTS THERAPEUTIC MASSAGE

Make an appointment for a FREE 15-minute introductory session during this opportunity to discover the benefits of therapeutic massage. Massage therapists will be available in the 1 North conference room between 11:30a.m. and 1:30p.m. Registration is necessary. Call Bernie Dugan x3591 or email bdugan@fnal.gov.

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/>

### SUNDAYS

#### MEET SCIENTISTS AT WILSON HALL

The popular Ask-a-Scientist program takes place every Sunday from 1:30 to 3:30 p.m. at Fermilab, on the 15th floor of Wilson Hall. Scientists will meet visitors to answer questions ranging from "What is dark matter?" to "How do you accelerate a particle close to the speed of light?"

## FERMILAB ARTS SERIES 2002-2003 SEASON

### OPENING NIGHT

#### An Evening With Groucho

Pre-Performance Talk at 7 p.m. in 1West  
Post-Performance Reception

September 21, 2002 at 8 p.m.

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

#### 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](http://www.fnal.gov/culture).

## MILESTONES

### FIRST VISITOR

■ The first visitor to enter Wilson Hall at Fermilab on August 8, when the lab was reopened to the public, was Jon Bauer, high school teacher of Physics, Astronomy and the Principles of Technology from Marshfield, WI. He was greeted by Alicia Seifrid, Public Affairs summer student.



### DEATHS

■ Retiree James P. Dowd (ID 4547) died on July 29, 2002. He worked in the TD/Conventional Magnet Production.  
■ Retiree Leon Francis Bonifas (ID 12191) died on August 2, 2002. He worked in the FESS/Operations/Fire Systems.

LUNCH SERVED FROM

11:30 A.M. TO 1 P.M.

\$10/PERSON

DINNER SERVED AT 7 P.M.

\$23/PERSON

## Cheez Léon MENU

FOR RESERVATIONS, CALL X4512

CAKES FOR SPECIAL OCCASIONS

DIETARY RESTRICTIONS

CONTACT TITA, X3524

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

### LUNCH

WEDNESDAY, SEPTEMBER 4

Fruits of the Sea Salad  
Black Forest Cake

### DINNER

THURSDAY, SEPTEMBER 5

Shrimp Tomato Timbale  
Steak Diane  
Potato Anna  
Zucchini Basilico  
Field Greens with Mustard Vinaigrette  
Grand Marnier Souffle

### LUNCH

WEDNESDAY, SEPTEMBER 11

Anchiate Chicken Skewers with  
Guava Sauce on Rice  
Bean, Corn and Pepper Salad  
Bread Pudding with Bourbon Sauce

### DINNER

THURSDAY, SEPTEMBER 12

Curried Beef Samosas with  
Mango Papaya Chutney  
Shrimp with Spiced Marsala  
and Coconut Milk  
Steamed Basmatic Rice  
Ginger Plum Turnovers

## F E R M I N E W S

F E R M I L A B  
A U S . D E P A R T M E N T O F E N E R G Y L A B O R A T O R Y

Ferminews is published by  
Fermilab's Office of Public Affairs.  
Phone: 630-840-3351

Design and Illustration:  
Performance Graphics

Photography:  
Fermilab's Visual Media Services

Ferminews Archive at:  
<http://www.fnal.gov/pub/ferminews/>

**The deadline for the Friday, September 20,  
issue is Tuesday, September 10, 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](mailto:ferminews@fnal.gov).

Letters from readers are welcome.  
Please include your name and daytime  
phone number.

Fermilab is operated by Universities  
Research Association, Inc., under  
contract with the U.S. Department  
of Energy.



## CLASSIFIEDS

### FOR SALE

■ '01 Jeep Grand Cherokee Laredo, 4wd, inferno red with all the standard equipment. 16K miles. Asking \$19,500. Call Merrill at x3011.

■ '97 Ford Taurus LX, A/C, PS, PW, PL, cruise, AM/FM stereo cassette, CD changer/stacker, premium sound, dual airbags, ABS (4-wheel), leather seats, moonroof, premium wheels, keyless entry, new tires, new brakes, new battery, 75K miles, excellent condition. Kelley Blue Book value \$9,115. Will sell for \$7,500. Call 840-3499, x3499.

■ '96 Model Chrysler Town and Country mini van, seats 7, 105K miles, \$5,500, very good condition, email ditmar@fnal.gov or x2115.

■ '96 Mazda Millenia, 105K miles, Gold with Gold package, V6/24V 180hp, moonroof, leather interior, Bose sound with 6 CD changer, automatic, Yokohama S60 tires (1yr. old) and alloy wheels. \$8,000 o.b.o. email:alexh@fnal.gov or call x5165

■ '94 Saturn SL1, gold, auto, 4-door, airbag, A/C, very clean, runs great, just passed emission test and is good for two years, 124K miles, \$2,500 o.b.o. x4740 or 630-897-7110.

■ '94 Forest Green Chevy Blazer, 4 door, air conditioning, power windows, AM/FM radio, new brakes, new tires, recent tune-up, automatic transmission. Well-maintained! \$5,300. Email: slicemaste@aol.com or 630-527-2450.

■ '92 Ford Explorer, black, 2 doors, radio/CD player, recent paint job, automatic transmission, power windows, air conditioning, new brakes, \$4,000. Email: slicemaste@aol.com or 630-527-2450.

■ '91 Volvo 740 SW, manual, gold, airbag. In good condition with under 157K miles. Recently had 150K mile checkup. \$3,500 o.b.o. (\$600 less than KBB estimate). Contact edstrom@fnal.gov.

■ '89 Honda Accord LX 4-door, 5-speed, 106K miles, very good condition, asking \$2,750. Contact Jamie x2800 or blowers@fnal.gov.

■ '88 Buick Reatta, fullpower, blue leather, touch screen control, new front tires and rear brakes, excellent condition, \$4,200. Contact Don at 630-406-6941.

■ '88, Z-24 Cavalier convertible, white with black top. First year this model was made!!! Original owner, 102K miles. New top, tires and battery in '99. Always hand washed and waxed, garage stored. Call 393-6160 (Summertakes Subdivision). \$2,800 o.b.o.

■ '88 Mercedes-Benz, 560SL, white, convertible with white hard top, and blue soft top, air conditioning, AM/FM radio, power windows, new brakes, leather seats, recent tune-up, automatic transmission, in great shape! \$16,000. Contact slicemaste@aol.com or 630-527-2450

■ Craftsman rider mower, runs fine, needs belt for mower deck. \$100. 556-3077.

■ Oak entertainment center with storage space; 8 drawer white dresser; 1 drawer white nightstand; full size headboard; tall dress/hutch with 3 drawers on bottom, matching corner 1 drawer desk; hanging mirror with 1 shelf; large oval mirror; wicker baby basket; Macintosh Performa 6200 Series computer upgraded to OS 8.6 with many extras. Call Mary at 630-377-0862 evening about sizes prices and other details.

■ Full size violin made with spruce top, maple back, sides and ribs, comes with a genuine horse hair bow, form fitting case, four fine tuners, rosin. One year old and used only a couple of times, \$85. x4740

■ Couch, love seat, recliner,(2) brass tables with glass tops, lamp, \$500. 630-557-2523 x4606

### RIDE SHARE

■ Fermilab employee needs to share a ride to work. Algonquin Lake in the Hills area. Call Randy Ward at 847-658-1939.

### HOUSES FOR RENT

■ 3 bedroom duplex in the Naperville 204 school district. Freshly painted, new carpet, new ceiling fans, refrigerator, stove, dishwasher, washer/dryer. Fenced-in backyard with large storage shed. Attached garage with EDO. Low utilities. One-month security deposit. Rent \$1,275. Available 9/15. Call 630-840-3499.

■ 3 bedroom, 1-1/2 bath townhouse with 1 car garage in Warrenville. Rent: \$1,100 per month plus security deposit. Available mid September. Call 630-665-3269

■ 221 S. Forest Avenue, Batavia. House with 2 bedroom, 1 bath, close to Fermilab, available September 1. \$1,350 per month plus utilities. Call 317-581-9212, leave message.

■ House in Batavia to rent. 1 bedroom, living room, dining room, kitchen and porch. \$625 per month plus utilities. Available on Oct. 1, with or without furniture. Please contact Helen for more info or visit. 630-299-8085 or 630-554-9711 after 4 P.M.

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

### HOUSES FOR SALE

■ Desirable Sugar Grove home on quiet cul-de-sac. Kaneland 302 Dist., 4 bedroom, 2.5 bath, formal LR & DR, FR, eat-in Kitchen, full basement, 2-story, beautifully landscaped oversized lot (148x93x106x132) with newly installed 27' pool in 2001. Huge deck and fully-fenced backyard. Many upgrades. For appt. contact 630-247-7331. \$295,000. NO REALTORS PLEASE!

■ Beautiful 3 bedroom tri-level in Lake Holiday, 2 bath, professionally landscaped, Sandwich Schools, large lot, 3 beaches, boating, fishing, water-skiing, low taxes. Available immediately. \$139,900. Call x3499.

### ENTERTAINMENT BOOKS ON SALE BEGINNING SEPTEMBER 3

Entertainment Ultimate books are now bigger and better for an even lower price of \$20. Even more 50% off & 2-for-1 savings on local dining, movies, attractions, sports & more. Dining Advantage, CONDO DIRECT, travel, hotel discounts, discounts from top national retailers. Books are available for the West/Central area. Orders can be placed for North/Northwest and South/Southwest books, as well as other locations in the US. So pick up your book today in the Recreation Office, WH15W. (Sample books are available for preview.)

### WANTED: TREE SEEDS

■ Seeds from mature trees: Burr Oak, White Oak, Shagbark Hickory, Bitternut Hickory, to be planted by Fermilab's Roads 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.

### DANCING RETURNS TO KUHN BARN

■ Two of Fermilab's dance groups return to Kuhn Barn after Labor Day. Silk and Thistle Scottish Country Dancing meets Tuesdays, 7:30 to 10:00 p.m. beginning Sept. 3. International Folk Dancing returns Thursday, Sept. 5 at 7:30 p.m. Barn Dancing remains at Warrenville Community Center through December. All three groups will perform at the Fox Valley Folk Festival, Sept. 1-2 at Island Park in Geneva. For more information call Mady Newfield 630-584-0825 or email folkdance@fnal.gov

## SCHOOL'S OPEN—SLOW DOWN!

A reminder to all Fermilab employees, users and visitors: school has opened in Warrenville, and the hours this year are 9:30 a.m. to 3:30 p.m. Please be careful when driving on Batavia Road east of the lab entrance. The speed limit is 20 mph when the lights are flashing on School Zone signs, and penalties for speeding are steep: a mandatory court appearance, with the amount of the fine at the discretion of the judge (\$250 is not unheard-of), and driver's licenses may be suspended for a first infraction.

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



F E R M I L A B  
A U S . D E P A R T M E N T O F E N E R G Y L A B O R A T O R Y

Office of Public Affairs  
P.O. Box 500, Batavia, IL 60510

First-Class Mail  
U.S. Postage  
**PAID**  
Bartlett, IL  
Permit No. 125