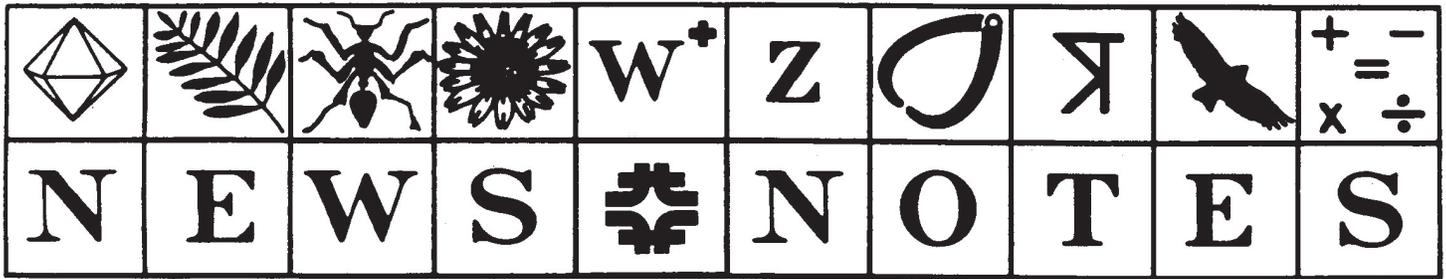


## Fermilab Friends for Science Education



P.O. Box 500, MS 226 Batavia, IL 60510-0500

Winter, 2006

### *President's Message*

*This issue highlights the programs we supported during the World Year of Physics. It was an opportunity to bring the excitement of physics to our neighbors and inspire a new generation of scientists. With support from Fermilab Friends for Science Education, we were able to reinvigorate programs such as our classroom presentations and open house, and to hold special programs such as the symposium for high school students and The Late Show with Leon Webcast. I could not begin to list all the people who worked to make these programs a success. I'd be sure to forget some important folks. From FFSE board members to physicist to VMS, from techs to docents to teachers, it was a team effort.*

*The good news is that 2005 is history, but our WYP programs will continue in 2006 thanks to help from you.*

*Marjorie G. Bardeen*  
Marjorie G. Bardeen

### **Bringing the WYP to Classrooms**

As part of the WYP, the Education Office embarked on a program to bring science presentations to schools in the area. A leadership team, led by Mike Albrow, Marge Bardeen and Susan Dahl discussed and established the ambitious goal of reaching 10,000 students by the end of 2005.

The Education Office developed a brochure describing presentations, from which teachers could select one suitable for their curriculum and grade level. An online version of this brochure can be viewed at <http://www-ed.fnal.gov/trc/demos>.

The scientists who made the presentations enjoyed themselves. Scientist Don Lincoln, who offers "Forces and Motion," noted the students' active participation. "The kids had fun and they all were volunteering to be assistants," Lincoln said. "They all were offering suggestions when we asked them what they thought would happen. The teachers were grateful to have scientists in the classrooms. With travel budgets so curtailed, this was an inexpensive alternative to a field trip. I was really impressed with just how engaged the students and teachers were."

The presentations received a very enthusiastic response from teachers. For fifth-grade teacher Sarah Garcia of Stevenson Elementary School in Melrose Park, Illinois, the classroom presentations even surpassed the experience of a field trip.

"I have never seen any of my students so attentive and interested in any educational presentation before," Garcia said. "They were eager to participate, and eager to show everyone else what they had learned. Our presenter was wonderful and tried to give every student a chance to participate. He even allowed the students to come up after the presentation and work with the demonstrations that they didn't get to participate in. In my opinion, this was the best 'field trip' we had all year. I would highly recommend this to any teacher, and plan to ask Fermilab to come out again this year."

The Education Office surpassed their goal by reaching 10,930 students in 84 schools. Many scientists received a stack of thank-you letters after visiting classrooms. Kristin Haynes from Stratford Middle School commented, "I liked having scientists from Fermilab come to the classroom and teach us about force and motion. It was different, and that made it interesting and entertaining."

"We thank a crew of 20-30 loyal volunteer presenters representing physicists, engineers, and technicians. These men and women served as unique, exciting role models for students," said Susan Dahl, Fermilab Education Specialist.

*Thanks to Fermilab Today for some of the information in this article.*

## Late Show with Leon Lederman

In the spring of 2005, Fermilab agreed to participate in a live Webcast to be produced at CERN as the culminating event of the World Year of Physics. Scheduled for December 1, 2005, the 12-hour broadcast would include specially produced segments from various physics labs around the world.

Fermilab's theme, the hunt for the Higgs boson, with Nobel Laureate Leon Lederman as featured scientist, was announced in September. Marge Bardeen enlisted the help of Chris Quigg and Fred Ullrich of VMS to develop the plan for a program that could be camera-ready in just over two months.

An idea which arose early in the discussion, a take-off on "Late Show with David Letterman," emerged as the best way to showcase Leon's talents as a physics ambassador, while also including younger physicists, both experimenters and theorists, in the presentation.

Chris Quigg volunteered to find young physicists to participate. Marge Bardeen worked with Leon and the physicists on developing the content of their segments. Fred Ullrich took on the formidable task of developing a production script, producing video segments, and coordinating the logistics of the broadcast.

In keeping with the Letterman show format, Fred invited the CDF band to serve as the house band, performing one long number, and using short segments from their repertoire to segue between show sections. Physicist Chris White signed on to impersonate Albert Einstein and to field questions e-mailed by students from around the world.

The staff of VMS worked with Lee Marek, the "Science Guy" on the real Letterman Show, to develop several short "Science Bytes" for use in place of ads.

Filmed by VMS at the Adler Planetarium, one Science Byte demonstrated what results when a "cellulose encapsulated graphite trace device" (i.e., a pencil) is accelerated to 300 meters per second and collides with a block of wood. Another illustrated Newton's Third Law, utilizing a fire-extinguisher-powered cart. A third brought home the law of conservation of momentum with the help of a piñata, a bowling ball, and a very brave volunteer.

On the day of the broadcast, about 200 high school students from local schools, clad in bright yellow and orange t-shirts, filled the front rows of Ramsey Auditorium. Fred Ullrich conducted the audience warm-up, instructing the students to clap or laugh when the appropriate cue cards appeared.

The show began with music from the band, followed by Leon's opening monologue introducing Fermilab, Einstein, and the difference between "hardworking" experimentalists and theoretical physicists "who sleep late."

The first guest, theoretical physicist Peter Skands, brought along a VMS-produced video clip to help illustrate his job as a theorist and the interplay of physics and music in his life. Music is about taking simple little themes, he said, and then building up a complicated whole out of them. In physics it is the same: one takes the simple elementary particles and puts them together to make everything.

Leon's second guest, Anna Goussiou, also brought along a video. In hers, she described the Fermilab accelerator chain and brought the audience into the D-Zero control room, explaining how experimenters collect and analyze data. In her talk with Leon, she emphasized the international nature of physics and encouraged girls to consider physics as a career. The audience and the physicists enthusiastically applauded her observation that, "Being smart and doing something different is not nerdy, it's sexy!"

Jason Nielsen was next in the guest chair. However, only a few minutes into the interview, his pager went off, and despite Leon's surprised protests, he was obliged to rush to CDF to perform his job as an expert on the detector. "Luckily," VMS had foreseen this possibility and had a video clip ready, showing Jason rushing from the auditorium and racing to the CDF control room to consult with his colleagues. While there, he was able to show the audience the silicon device at the heart of the CDF detector and explain how it is used in the hunt for the Higgs boson.

A song from the band led to Leon's recitation of "13 Ways to Know You've Won the Nobel Prize," then to the final segment, questions from the audience. Queries like, "What do you think are the limits of physics?" and "Is there any aspect of physics that's hard for you to grasp?" met with thoughtful responses from the physicists.

Reaction to the broadcast was enthusiastic, with some calling the Fermi segment the best part of the day, due to the effective use of real people in bringing physics to life.

The participants were quick to credit their fellow collaborators for the success of the program. "Fred did a fabulous job," said Marge Bardeen of her colleague at VMS, "and the young scientists were terrific." Fred Ullrich called the production "a blast, one of the most satisfying things I've done," and cited Marge's work as a liaison among participants as critical to the success of the show.

Marge points out that it was money from an anonymous donor to FFSE which underwrote the show. The donation provided not only enough to rent the extra lights and cameras needed, but enough for special touches, like t-shirts for the band.

Leon, his guests, and the CDF band will be back in Ramsey Auditorium on February 19 at the Fermilab Family Open House to reprise their humorous and informative take on particle physics and the hunt for the Higgs boson.

*View "Late Show with Leon" as a streaming video through the Education Office homepage:*  
**[http://www-ed.fnal.gov/ed\\_home.html](http://www-ed.fnal.gov/ed_home.html)**  
*Click on "What's New," then "Webcast."*

## World Year of Physics Symposium

On Saturday, October 8, Fermilab's Education Office presented a symposium for students and teachers. Geared toward students of high school age and up, and toward their teachers, the day-long event included an address by Leon Lederman, talks by eminent physicists, and a vision for Fermilab's future from lab Director Pier Oddone.

With Einstein's legacy as the theme for the day, prominent physicists outlined the profound impact of his work on modern physics.

John Rigden, author of the recent book *Einstein 1905: The Standard of Greatness*, began with a description of Einstein and his theories.

Alex Filipenko, member of a team that co-discovered the accelerating expansion of the universe, intrigued students with a talk on "Dark Energy and the Runaway Universe." Niki Saoulidou of Fermilab spoke on "Neutrinos: Past, Present and Future," describing her work on the MINOS project.

Sean Carroll, author of *Spacetime and Geometry: An Introduction to General Relativity*, expanded the cosmic picture with a talk on "The Warpings of Spacetime." Randy Hulet of Rice University moved from the highly energetic to the very slow with a description of "Bose-Einstein Condensation of Very Cold Atoms." Chris Quigg of Fermilab concluded the presentations with "The Coming Revolutions in Particle Physics."

Spencer Pasero, a symposium organizer, credits Chris Quigg with much of its success. "Chris did a fantastic job. He worked hard to get a great line-up of speakers. You couldn't have asked for a better person than John Rigden to talk about Einstein."

The symposium was so well-received that the Education Office has decided to sponsor another in 2006, rather than waiting until 2007, as originally planned. (See next column.)

## Open House at Fermilab

As the first big event of Fermilab's WYP celebration, the Education Office held an Open House on Sunday, February 13, inviting friends and neighbors to enjoy interactive exhibits, talks and tours. Nearly 2,000 people of all ages showed up to find out what goes on at Fermilab.

"We wanted to let parents and their kids see what goes on here, said Spencer Pasero of the Education Office. "We wanted to get across some of the understanding of how science works and how to investigate something you can't see."

"We had volunteers from Saturday Morning Physics, teachers, Friends of Fermilab board members and docents help out with the hands-on activities," said Marge Bardeen. "Sometimes Fermilab goes out to the neighbors in the community, but this time we invited them to our home, and everyone had a great time."

FFSE underwrote much of the cost of the open house through a grant from an anonymous donor.

The open house was such a success that another one will be held this year on February 19.

### ***Don't Forget!***

Fermilab Family Open House

Sunday, February 19

12 noon - 5

***Reserve a place at***

<http://www-ed.fnal.gov/ffse/openhouse.html>

## Fifth Symposium on the Nature of Science to Target AP Students

The Education Office's fifth Symposium on the Nature of Science will be held on Monday, May 22. As with previous symposia, this event will bring teachers and students together with scientists in various fields from around the country for a day of discussions about current topics in science. The format is short talks with plenty of opportunity after each talk and between sessions for informal conversation with the speakers.

The target audience for this symposium is Advanced Placement (AP) high school students who have completed their exams, however, the program is open to all high school and college students, as well as to the general public.

Talks from previous years can be viewed online at <http://www-ed.fnal.gov/symposium> and <http://www-ed.fnal.gov/wyop>.

## Membership Form

### Annual Dues:

Director.....\$1,000  
Patron.....\$500  
Sponsor..... \$250  
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Regular.....\$50

*Please check the appropriate membership category and enclose your check made out to **Fermilab Friends for Science Education**.  
Include matching funds from your company, if applicable.*

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