News Notes

Fermilab Friends *for* Science Education

Winter, 2009

2009 Family Open House

FFSE's annual Fermilab Family Open House drew big crowds again this year. More than 2,000 people turned out on a cold day in January to enjoy hands-on activities, tours and presentations guaranteed to increase anyone's interest in science. The pictures below capture some of the fun.

Mr. Freeze's cryogenics show drew giggles and cheers.

Exploring optics with a handmade kaleidoscope.

Magnetism—always a source of wonder.

2009 Director's Volunteer Award

At an awards ceremony on November 25, 2008, Jean Slaughter received the 2008 Director's Volunteer Award for her extensive volunteer work for Fermilab's Education Office over the years. Suzanne Weber and Peter Garbincius, finalists for the award, were honored with certificates of appreciation.

Jean's volunteer contributions to education began as soon as she arrived at Fermilab as a post-doc in 1973. Since then she has offered her time as a mentor to students and interns as a classroom presenter, as a participant in the Ask-a-Scientist program, and as a volunteer in the QuarkNet program. Now retired, she continues to volunteer and also to work on the Dark Energy Survey.

Each year a Fermilab employee, user, guest scientist or retiree receives the Director's Volunteer Award, which includes a plaque and a $1,000 prize, funded through Friends by an anonymous donor. In 2008, 205 Education Office volunteers interacted with nearly 30,000 students and 2,000 teachers. All of them received recognition and thanks from Fermilab Director Pier Oddone and Education Office Manager Marge Bardeen at the ceremony.

Fermilab Friends for Science Education exists to support innovative science education programs.

This is the second article in a series about the past, present and future of Fermilab Friends for Science Education.

The establishment of Friends of Fermilab as a not-for-profit organization in 1983 gave Fermilab access to private funds to support K-12 programs. Friends' first offering, the Summer Institute for Science Teachers, was tremendously successful, and summer institutes ran every summer from 1983 until 1990. As Marge Bardeen had foreseen, a program designed with teacher input would meet the needs of teachers.

The first institute became the model for other multi-week programs: *Topics in Modern Physics* (1987-1995), the *Summer Institute for Chicago Science and Math Teachers* (1990-1993), the *Illinois Leadership Institute* (1993-1996), and a series of *Summer Secondary Science Institutes* in physics, chemistry and biology.

Clearly, the institute model met teachers' needs; but could Fermilab offer something directly to students as well? Middle school teachers seemed especially intrigued with that idea: Fermilab was a place where children might experience a scientific environment, see scientists at work, even talk with scientists. But the lab asked Friends to first provide a program for teachers so that students who came to Fermilab would be prepared for the encounter.

And thus began "Beauty and Charm." A five-day program for middle-school teachers, it centers on a professional development workshop with themes such as seeing the unseen, methods of science, and the human element in science. Teachers learn science content and teaching strategies by doing activities from the B&C instructional unit, and they are mentored by master teachers who use the materials themselves.

After teaching the unit, teachers may bring students to Fermilab to explore the Lederman Science Center, Wilson Hall, the Linear Accelerator building and the Main Control Room. The highlight of students' visit is a question-and-answer session with a Fermilab scientist.

Once again, Friends had a winner. The B&C program proved tremendously popular with teachers and students, and it became a model for the prairie field trip programs: *From Beneath the Ashes, Particles and Prairies,* and *The Prairie, Our Heartland*—all developed by educators and taught by master teachers. Now more than 15,000 students a year visit Fermilab to engage with real science and scientists.

Wonders of Science was another early success. Created for Fermilab's celebration of the 1985 National Science and Technology Week—a program of the National Science Foundation—Wonders took on a life of its own. This show featured award-winning chemistry teachers presenting fast-paced demonstrations of chemical and physical phenomena and proved so popular that it has continued every year since its inception.

In 1986, a fortuitous encounter led Marge in a new direction. She happened to meet a woman involved with launching a science center in Michigan. "We need one of those," she told Stanka. Leon Lederman, director of Fermilab, gave permission to explore the concept, and so Marge met with teachers, scientists and community members for a needs assessment, to see what ideas would emerge. The group envisioned a building with hands-on exhibits related to Fermilab science, a small laboratory for children's classes, and a computer room.

Local teachers expanded the vision when they learned that Friends had a growing collection of reference materials for the staff and wondered if those could be made available to them. In response, Susan Dahl organized a needs assessment and gathered teachers to help develop a vision for the collection and how it could serve them.

The result was the Teacher Resource Center, now an invaluable clearinghouse of science, math and technology resources. It supports educators in the Chicagoland area and well beyond with materials, programs and services.

To brainstorm museum exhibits, a group of ten physicists and ten teachers met and pondered the questions, "What are ten things you'd like kids to know about science and technology at Fermilab?" and, "How would you make exhibits to demonstrate those ideas?"

With a list of suggestions in hand, Marge Bardeen attended a meeting at the Lawrence Berkeley National Laboratory and spoke with Elsa Thayer from the Reubin H. Fleet Science Center in San Diego. She looked over the information and commented, "This is great! You can organize it by Methods, Tools and Ideas." After breaking the "Tools" category down into Accelerators and Detectors, Marge had the themes for the Fermilab science center.

Before the Lab began construction of the building, work began on developing exhibits. Marge, a careful observer of science museums, didn't want exhibits that allowed a student to push a button or turn a crank, then walk away. She wanted exhibits that would make students stick around and collect data, exhibits that required some time and thought.

By 1989, "Hands-on Science," a collection of interactive

exhibits and accompanying teaching materials, was ready for its debut in area elementary schools. Teachers, PTA members, and local library staff became HoS facilitators by attending a workshop, which made them eligible to borrow the equipment for up to a week. The exhibits were a hit, and since that time, the Hands-on Science program has remained a valuable resource for area schools.

In 1989, Congress passed a law authorizing the Department of Energy to allow national laboratories to establish education programs for K-12 students. Fermilab could now provide funds for an Education Office, and so Friends' staff became Fermilab employees. But Friends of Fermilab continued in its role as an avenue for private sector funding of programs that utilize Fermilab science resources.

The early 90's brought two significant developments: one was the long-awaited opening of the Leon M. Lederman Science Education Center in 1992; the other was the invention of the World Wide Web.

Laura Mengel of the Computing Division introduced the Education Office staff to the Web. The staff quickly sensed the wealth of possibilities it created and responded with a needs assessment in which they asked teachers to consider how Fermilab data could be accessed and used in schools.

Guided by that discussion, the staff put a wealth of existing resources onto an Education Office web server, and also took time to develop materials especially for the Web. For example, Liz Quigg designed a variety of student-friendly web pages with data on the flora and fauna of Fermilab, and also "Fermilabyrinth," a simulation of Lederman Science Center physics exhibits presented in a gaming format.

Laura Mengel led the team that developed Fermilab LInC Online, a program to assist educators in creating engaged learning projects about real-world issues using online technology. The projects, technology-dependent, student-driven and collaborative, encourage learners to reach beyond classroom walls to work with experts and students in distant locations and to publish original work to a worldwide audience.

The words of a local school administrator led Friends in another direction: "We just wish our elementary teachers knew more physical science!" she said. Could Friends help?

Phriendly Physics was the answer. Led by a master elementary school teacher and a Fermilab scientist, Phriendly Physics offers support to K-5 science teachers. It includes five days of inquiry exploration of physical science concepts through experimentation, discussion and reflection. Participants receive equipment and supplies for the classroom, and are invited to bring students to Fermilab for a field trip to explore electricity and magnetism, light, heat, or mechanics. The program caught on, and Phriendly Physics continues to inspire elementary teachers and students.

The new millennium brought more new programs—and also a new name for the organization: in 2003, Friends of Fermilab became Fermilab Friends for Science Education (FFSE).

New programs included Symposia on the Nature of Science, the Fermilab Family Open House, and Classroom Presentations for Schools.

For the first symposium, held in March of 2000, Friends used grant money from the Illinois State Board of Education, enabling more than 425 educators from the Chicagoland area, Illinois, and surrounding states to attend a daylong program of presentations by prominent scientists in a wide range of fields. Participants were thrilled, and six more symposia followed in ensuing years.

The Fermilab Family Open House debuted in 2005 to celebrate the World Year of Physics, and brought more than 2,000 guests to the lab for an afternoon of science activities and tours. It was so successful that it has become an annual event, and draws more visitors every year.

Another World Year of Physics innovation, Classroom Presentations for Schools, grew out of an idea from FFSE board member Michael Albrow. The program sends Fermilab scientists into area schools to demonstrate Force and Motion, Electricity and Magnetism, Light and Color, the Science of Sports, and other topics chosen to pique students' interest. In 2008, more than 10,000 students in 60 schools enjoyed these demonstrations.

Over the years, Friends has sometimes stepped in to provide assistance for special projects. In 2000, FFSE applied to the Illinois Board of Education for a Science Literacy Grant to jumpstart high school cosmic ray projects in the state. The grant money bought 36 detectors for 12 teachers, enabling them to motivate students by allowing them to do real research in the classroom.

These are just some of the successful programs that Friends has supported during its first 25 years. Members and donors have made an enormous contribution toward educating a new generation of citizens and scientists, providing them with access to the unique resources of Fermilab. The next 25 years will hold many more opportunities.

See the annual report for the third and last article in this series, in which Marge Bardeen reflects on the past and future of Fermilab Friends for Science Education.

Membership Form

Annual Dues:

Director's Club	$1,000
Patron	$500
Sponsor	$250
Benefactor	$100
Regular	$50
Joint FFSE/ISTA membership	$39
Teacher	$10

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.*

Name_____

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Address_____

City_____State_____Zip_____

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Visit the FFSE page on the Fermilab Education Office website at:
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