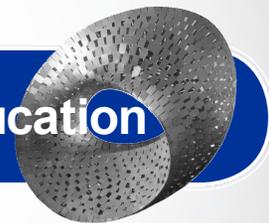




 **Fermilab Friends for Science Education**



annual report 2011



**FERMILAB FRIENDS FOR
SCIENCE EDUCATION**

ANNUAL REPORT

2011



P.O. Box 500, MS 226
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<http://fermilabfriends.org>

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Fermilab Friends' graphics incorporate an image of one of Robert Wilson's best known sculptures, Möbius Strip. Slicing a Möbius strip lengthwise results in two interlinked loops, an appropriate metaphor for the relationship between FFSE and the Fermilab Education Office: separate, yet tightly linked.

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FROM THE FERMILAB DIRECTOR

April 11, 2012

Dear Fermilab Friends for Science Education:



*Piermaria Oddone, Director
Fermi National Accelerator Laboratory*

I am always inspired by the creative and high-quality K-12 science education programs that you have continued to help us create. They have a lasting and positive impact in our neighboring communities and beyond. Without your support we could never have achieved the breadth and excellence that are the hallmarks of our program. It has been a model for other institutions and for our sponsoring agency, the U.S. Department of Energy. Over the last decade we have reached hundreds of thousands of students and tens of thousands of teachers—a fantastic record that benefits the nation.

During economically difficult times, science and the education of our future scientists become all the more important. Unfortunately, it can be a challenge to fund them. We are in such times now, but with your help we are rising to the challenge.

As Fermilab looks to an exciting post-Tevatron future, we know you will remain a friend to Fermilab and our education programs. Just as Fermilab plays an essential role in the Intensity, Cosmic and Energy frontiers, Fermilab Friends for Science Education will play a role in the future of education programs at Fermilab. We have a vital program in the next ten years with a set of world-class experiments at the Intensity Frontier that use the existing accelerators right here at Fermilab, and we look to a continuation of vital education programs as well.

The constancy of the support of Fermilab Friends for Science Education has anchored our science education program and has permitted us to design new, creative ways to engage our youth in scientific inquiry. The support of Fermilab Friends for Science Education is now more important than ever in seeding these initiatives so that the next generation of young scientists may flourish.

Sincerely,

A handwritten signature in black ink that reads "Piermaria Oddone". The signature is written in a cursive style and is positioned above a thin horizontal line.



FROM THE FFSE PRESIDENT

May 1, 2012

Dear Friends,

I wish to share a few things Fermilab Friends for Science Education has achieved during 2011 and what lies ahead in 2012. This report features information about our 2011 programs.

Along with the development of our website, we continue to improve our visibility to the community with the hope of reaching more friends. We would appreciate your help in this ongoing effort. Bring your friends to FFSE-sponsored events, such as the Family Open House and the Fermilab Family Outdoor Fair, or bring them as guests to a members-only tour.

In September 2011 we held our second members-only tour. Program leaders Pat Franzen and Amy Fehrman shared their experiences conducting research in the prairie and leading prairie teacher workshops. Pat, along with docent Vida Goldstein, led a tour through the Margaret Pearson Interpretive Trail and the Robert F. Betz (research) Prairie inside the Tevatron ring. It was a beautiful day with a wonderful turnout of members.

Join us on June 9th for our next members-only tour, featuring the history, art and architecture of Fermilab. Bring a friend and let us know what you would like to see on future tours.

What challenges will there be in 2012? Our 2011 newsletters shared snapshots of the Education Office needs assessments in response to Fermilab's shift in science focus. The Next Generation Science Standards, (NGSS) expected out soon, may require further adjustments in some programs. A recently released *Issue Brief*, "The Role of Informal Science in the State Education Agenda," from the National Governors Association, stresses the need for districts and schools to better utilize the rich resources of informal science efforts from organizations including research centers, universities, and science museums.

Changes in Fermilab science, new science standards and an increased emphasis on informal science each provide new viewpoints to consider. Education Office program leaders, docents and scientists are working together to rethink field trips and teacher workshops. Staff, program leaders and educators need to understand the NGSS and what they mean to Fermilab education programs.

A recent grant from the Kane County Riverboat Fund Program will get us started on a new physics playground in 2012! We expect to utilize the playground in both formal programs and informal opportunities.

The Fermilab community is a unique treasure. Through the resources of Fermilab, the people and facility, we have the opportunity to excite teachers, students and the public about science in a very special way. Stay tuned in 2012 for what promises to be an exciting year.

Your help and interest is essential. As a not-for-profit organization, Fermilab Friends for Science Education will continue to play an important role. Thank you for your continuing support.



*Susan M. Dahl, President
Fermilab Friends for Science Education*

A handwritten signature in blue ink that reads "Susan Marie Dahl".



PROGRAMS IN 2011

SCHOLARSHIP RECIPIENTS

Every year FFSE provides scholarships to teachers who wish to attend workshops at Fermilab.

Two teachers who attended Education Office programs in 2011 expressed their appreciation for the opportunity this way:

"This program was a great way to learn how to make your classroom a more diverse learning environment," wrote Michael Palazzolo, a participant in the Chemistry Institute: Introductory Topics workshop. "We were taught how to use multiple intelligences to benefit our students. There are things that I wish I had learned earlier in my teacher education!"

Sharon Koenig, a participant in the Beauty and Charm

teacher workshop, called the scholarship a "godsend" and wanted FFSE members to understand the value of their assistance.

Wrote Sharon, "The FFSE scholarship that I received was an invaluable gift. As districts are financially strapped, science tends to lose out on any available funds and I would have lost out on this great opportunity. The scholarship provided me with the chance to learn about the available resources and support Fermilab has to offer. By the end of the workshop, I acquired a wealth of practical strategies and lessons to use in the classroom."

FERMILAB FAMILY OPEN HOUSE

On February 27, the 2011 Fermilab Family Open House, sponsored by FFSE and billed as "a party for children who bring an adult with them to learn about the world of physics," drew 2,000 attendees to Fermilab for an afternoon of exploration and discovery, talks and tours.

In addition to the usual demonstrations by Fermilab staff, there was a new feature: a "physics carnival," featuring eleven demos created by science students from twelve Illinois high schools.

Six students from Hamilton High School in rural Hamilton, Illinois drove four hours to bring their activities about Newton's Second Law, light refraction, and magnetic fields to the event. Sixteen students from Cristo Rey Jesuit High School in Chicago prepared three different demonstrations: one on static electricity, another on conservation of angular momentum, and a third using a bicycle generator to make electricity.

Two students from Carl Sandburg High School in Orland

Park demonstrated centripetal force, while six students from Glenbrook South in Glenview used eggs to demonstrate momentum and inertia. A collaboration of six Chicago schools—St. Patrick's, St. Mary of the Woods, St. Robert Bellarmine, St. Stanislaus Kostka and Thorp—built a "Gaussian gun" to demonstrate the conversion of magnetic potential energy into kinetic energy.

Seven students from Naperville Central's GEMS (Girl Engineers, Mathematicians and Scientists) club banded together to build an exhibit demonstrating lasers. And Naperville North students built a working hovercraft from plywood, propelled by a leaf blower.

Pint-sized attendees seemed especially impressed by the demonstrations, created and explained by students not much older than themselves. The demonstrators, too, said they enjoyed the experience of researching, learning, creating and exhibiting to a very enthusiastic audience.



Clockwise from right:

- Using eggs to demonstrate momentum and inertia
- Taking a ride on the hovercraft
- Experiencing angular momentum with a bicycle wheel
- Hamilton High School students demonstrate refraction.
- GEMS club girls let visitors experiment with lasers.



PROGRAMS IN 2011

STEM CAREER EXPO

Fermilab's STEM Career Expo on April 13 was a success for a fourth year, drawing about 550 students and parents from the west suburban area.

Scientists, engineers, technicians and mathematicians volunteered their time to speak individually with students, and also to participate in panel discussions about their own career and educational backgrounds.

The free event serves younger students, who must make choices about high school classes, as well as older students who are considering college options. The expo is sponsored

by FFSE, Batavia High School, Geneva Community High School, Northern Kane EFE 110 Region, and Valley Education for Employment System (VALEES).

As in past years, the response from attendees was enthusiastic: "Excellent! Exceeded expectations!" "Great opportunity—completely opened up many new job opportunities and ideas for my future." (Somonauk HS sophomore)

And the presenters concurred: "The level of interest and questions were outstanding. The committee does a good job and this event is our yearly delight."



FAMILY OUTDOOR FAIR



The Family Outdoor Fair on June 12 drew 900 visitors on a bright and beautiful day. Families explored the Fermilab prairie and woods, learned about raptors and bison, collected insects and pond critters, and studied soil and rocks.

Clockwise from above:

- Young attendees look for signs of life in a rotten log.
- Searching for prairie insects to study
- Taking a sample to learn about prairie soil
- Brother and sister learn to tell time with a sundial.



CONGRATULATIONS TO HONOREES!

DIRECTOR'S AWARD

FFSE's Director's Award annually honors the more than 200 members of the Fermilab community who contribute their time and talents to Fermilab's education programs.

The Director's Award of \$1,000 is made possible by an anonymous donor and recognizes one volunteer whose contributions are exceptional, even among the many outstanding volunteer supporters of Fermilab's K-12 education programs.

This year's nominees were **Maurice Ball, Curtis Danner, David Harding, Todd Johnson, Don Lincoln, Dennis Nicklaus, Linda Purcell-Taylor, Jamie Santucci** and **David Schmitz**. Each received a certificate of appreciation at the Volunteer Reception on December 7.

David Schmitz, a neutrino physicist, received the 2011 Director's Award. His certificate noted Dave's "exceptional and varied



Dave Schmitz receives the Director's Award at the Volunteer Reception.

contributions . . . to our K-12 education programs. Outstanding among his contributions is his work to engage students on field trips, in their classrooms, and in the public arena.

"As one-half of the FUNDamentals of Physics team, he shares his excitement and joy for physics with hundreds of students each year at events including the Fermilab Family Open House and DASTOW.

"His dedication to these and other programs and his generosity with his time enhance the Laboratory's reputation in both education and science research."

The committee that reviews candidates for the Director's award is composed of lab personnel who are themselves often active volunteers for the Education Office. Thus it is an award from peers to peers, and another good example of the generous volunteer spirit at Fermilab.

FERMILAB SCIENCE AWARD FOR HIGH SCHOOL STUDENTS

Every year FFSE underwrites an award program for outstanding science students attending high schools in DuPage and Kane Counties. Nominated by school faculty, each winner receives a certificate and a book at their school's award ceremony. This year's winners were:

Joanna Bober, Chelsea Lindelof, Glenbard North High School; **Erik Roisland, Palak Patel**, Glenbard South High School; **Daniel Motel**, Glenbard West High School; **Gouri Dharmavaram, Ani Nallakrishnan**, Hinsdale Central High School; **Dhruv Joshi, Julia Weigel**, Hinsdale South High School; **Natasha Arvanitis, Irina Pushel**, Illinois Mathematics and Science Academy; **Kyleen Lee, Natalie D'Agostino**, Immaculate Conception High School; **Thomas DeLeon, Babara Blachut**, Lake Park High School; **Najid Ali, Reggie Jansen**, Lisle High School; **Chirag Sachar, Rishi Sriram**, Metea Valley High School; **Joseph Versaci, Patrick**

Barrett, Montini Catholic High School; **Charles Tschirhart, Sabina Maddila**, Naperville Central High School; **Conner Jager, Mit Shah**, Neuqua Valley High School; **Kendall Ford, Morgan Hunt**, Rosary High School; **Janaki Panchel, Scott Walters**, St. Charles East High School; **Steven Boi, Jessica Lewandowski**, St. Charles North High School; **Ryan Shulski, Kyle Bhatia**, St. Francis High School; **Emily Peterson, Rhobinson Nato**, Streamwood High School; **Shawn Oleszczuk**, The Einstein Academy; **Scott Kottkamp**, Waubonsie Valley High School; **Robert Louzen, Shannon Waisath**, West Aurora High School; **Caleb Gannon, David Lindberg**, Westminster Christian High School; **Matthew Wen, Aaron Pell**, Wheaton Academy; **Melanie Golden, Theodore Bronson**, Wheaton North High School; **George T. Doran, Teresa Martz**, Wheaton Warrenville South High School; **Katherine Kirby, Paul Mondl**, York Community High School

COLLEGE SCHOLARSHIPS

The FFSE scholarship committee awarded two \$1,000 scholarships to one college-bound student in each of Kane and DuPage Counties.

The scholarship is an effort to encourage and support student interest in science and to recognize outstanding achievement. Any senior in Kane or DuPage County who has been honored with the Fermilab Science Award is eligible.

Selection criteria included grades; participation in activities

such as science clubs, academic competitions or talent searches; original work; and internships.

This year there were six finalists from Kane County high schools. **Jordan Otto** (Geneva High School, Geneva) was the recipient.

Seven students from DuPage County high schools applied for the award. **Joanna Bober** (Glenbard North High School, Carol Stream) was the recipient.

PROGRAM SCHOLARSHIPS

Seven teachers were awarded FFSE-funded scholarships allowing them to attend workshops at Fermilab or to hire buses to bring students to Fermilab on field trips.

Recipients were: **Jo Ann Fritz**: award toward bus fee for *The Prairie—Our Heartland* field trip; **Sharon Koenig**: award toward Beauty & Charm teacher workshop; **Michael Palazzolo**: award toward Chemistry Institute: Introductory Topics; **Michelle Sigler**: award toward Beauty & Charm teacher workshop; **Adriane**

Slaton: award toward Chemistry Institute: Introductory Topics; **Gregory Weipert**: award toward Physics Institute: Waves, Sound and Optics; **Sarah Wisek**: award toward bus fee for Particles and Prairies field trip.

Eight families received scholarships that allowed their children to attend Science Adventures at Fermilab. Recipients were: the **Berlin, Chin, Flanders, Killough, Montes, Stotler, Shinofield** and **Szuberla** families.

PROGRAM HIGHLIGHTS

January

Education Office staff presented three sessions to teachers at the 21st Century Learning Institute Day in LaGrange Park, engaging them in activities from the *Beauty and Charm* and *Phriendly Physics* programs.

February

The seventh annual Fermilab Family Open House on February 27 drew nearly 2,000 people. Visitors enjoyed hands-on exhibits, presentations, tours, “make and takes,” Ask-a-Scientist, and multiple shows by Fermilab’s cryogenic showman, Mr. Freeze. As in previous years, the event was funded by an anonymous donor through FFSE.

The newly revised version of the FFSE website made its debut this month.

March

On March 27, Weird Science presented the 24th annual “Wonders of Science” show in Ramsey Auditorium to an enthusiastic audience of about 600 children and adults.

April

The STEM Career Expo on April 13 drew 500-600 students and parents for presentations by more than 50 science, technology, engineering and mathematics professionals from 30 area organizations. This is the fourth year that Fermilab has helped organize and host this event, along with educators from Kane and DuPage Counties.

May

In 2011 the Lederman Science Center offered 39 Science Adventures to 521 students of all ages. Adventures included: *Lego Engineering*; *Family Math Time*; *The Bugs are Back*; *Wild and Wonderful Weather*; *Nanotech Investigation*; *Fireflies*, *Sea Monsters and Glow Sticks*; *Earth Engineers*; *Primary Physical Science*; and several more.

June

The Outdoor Family Fair on June 12 drew about 900 people for a day of activities at the LSC and the Fermilab prairie.

Students who presented activities at last February’s Open House came to Fermilab with their teachers for a tour of the lab and lunch with Leon Lederman.

Nearly 2,500 visitors from all over the globe visited the Lederman Science Center during 2011.

July

The Summer Secondary Biology, Chemistry and Physics Institutes drew 47 educators.

Twelve teachers participated in the *Beauty and Charm* workshop, and eight teachers participated in the Phriendly Physics workshop.

Three teachers attended the Particles and Prairies workshop this year.

August

On August 25, the Education Office hosted a meeting of the Fermilab Community Advisory Board at the LSC. After a short presentation about programs, board members toured the facility, tried out exhibits, conducted a lab activity and explored the Teacher Resource Center.

September

After a year of development, the new “Take a Cosmic Ray Shower” exhibit debuted in the Detector Room of the LSC on September 7.

FFSE members on a “Members Only” tour learned about environmental research activities at Fermilab and explored the prairie.

October

On October 22, 17 teachers and 4 docents participated in a needs assessment for the *Beauty and Charm* and *Particles and Prairies* programs. After a morning discussion of the current programs, they took a tour of CDF to stimulate a discussion about possible new tour opportunities.

On October 27 and 28, Education Office staff hosted a booth at the Illinois Science Education Conference in Tinley Park, offering handouts, leading short demonstrations and giving mini-talks on physics topics. In addition, they contributed two talks during breakout sessions.

Nearly 15,000 students in the greater Chicago area enjoyed 86 classroom presentations by scientists during 2011.

November

During fall, 4,383 students from 38 schools attended *Particles and Prairies* and *The Prairie—Our Heartland* field trips.

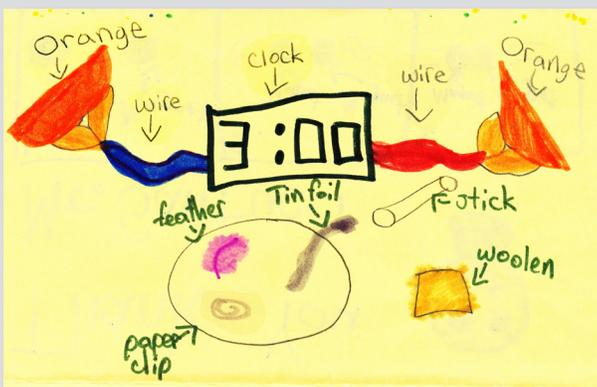
Beauty and Charm and *Phriendly Physics* field trips served 2,085 students from 24 schools in 2011.

The Ask-a-Scientist and Get to Know Fermilab tours introduced 1,900 visitors of all ages to the lab during 2011.

December

More than 300 volunteers were honored at the annual Volunteer Reception, held this year on December 7. Physicist David Schmitz’s many contributions to educational outreach were honored with the Director’s Award.

See last page for more about these drawings.



PERSONNEL

The success of the 2011 FFSE education programs rests with these outstanding program leaders.

Deanna Andriano, Batavia High School • **Michael Bachrodt**, Fremd High School, Palatine • **Sue Bober**, Schaumburg High School • **Maura Bridges**, West Chicago High School • **James Browne**, Amboy High School • **SueZ Bruno**, Gates Elementary School, Aurora • **Jill Burke**, Western Springs School District 101 • **Trudi Coutts**, Naperville Community Unit School District 203 • **James D. Cox**, Clarendon Hills Middle School • **Karl Craddock**, Fremd High School, Palatine • **Larry Cwik**, Seton Academy, South Holland • **Robin Dombeck**, Maple Middle School, Northbrook • **Jason English**, Fremd High School, Palatine • **Todd Ernst**, Valley View School District 365U • **Amy Fehrman**, Johnson Elementary School, Warrenville • **Patricia M. Franzen**, Wild Enterprises, Metamora • **Barbara Greenberg**, National Louis University • **Michael Heinz**, Niles West High School • **Maria Hull**, School District U-46 • **Mary Ann Janiak**, teacher, retired • **Randy Jones**, Glen Ellyn School District 41 • **Elizabeth Karnik**, Western Springs School District 101 • **Tanya Katovich**, Schaumburg High School • **Steve Keefe**, teacher, retired • **Nikki Kitzmiller**, Rotolo Middle School, Batavia • **Tom Knutson**, Glenbard North High School, Carol Stream, retired • **Robert Lewis**, Downers Grove North High School • **Paul Madsen**, Rosary High School, Aurora • **Lee R. Marek**, University of Illinois, Chicago • **Cynthia Marler**, teacher, retired • **Stefany Montgomery**, Geneva High School • **Jill Mueller**, West Chicago Middle School • **Radomir Niewrzol**, Glenbard North High School, Carol Stream • **Mary Sue Offut**, SciTech and Field Museum volunteer, Aurora • **Glenda Peck**, Alice Gustafson Elementary School, Batavia • **Pat Pentek**, West Chicago Middle School • **Tom Redig**, Downers Grove North High School • **Barbara A. Romack**, Kaneville North Elementary School, Elburn • **Susan Sanders**, Glenbard School District, Glen Ellyn • **Jill Serling**, Glenbrook North High School, Carol Stream • **Marsha Stierwalt**, Alice Gustafson Elementary School, Batavia • **Patrick Swanson**, Hoffman Estates High School • **Mary Van Slyck**, Bartlett High School • **Michael Wegrzyn**, Metea Valley High School, Aurora • **Karen Weigt**, Kaneland John Stewart Elementary School, Elburn • **Wayne R. Wittenberg**, Benjamin Franklin School, Glen Ellyn • **Anna Zuccarini**, Crone Middle School, Naperville

Many Fermilab scientists give their time generously to education programs throughout the year.

Mark Adams • Christine Ader • Michael Albrow • Maurice Ball • Leo Bellantoni • Halley Brown • Ryan Campbell • Tom Carter • Alex Chen • Dave Christian • Penelope Constanta • Michael Cooke • Fritz DeJongh • Brian Drendel • Luciano Elementi • Lynn Garren • Vanessa Gaultney • Camille Ginsburg • Doug Glenzinski • Sten Hansen • David Harding • Elvin Harms • Anne Heavey • Samantha Kaushalya Hewamanage • Amber Johnson • David Johnson • Young-Kee Kim • Terry Kiper • Sharon Lackey • Leon Lederman • Don Lincoln • Hugh Lippincott • Lucy Litvinenko • Michael McGee • Tom Meyer • Dennis Nicklaus • Paul Nienaber • Heath O'Connell • Michelle Prewitt • Piermaria Oddone • Jennifer Pursley • Chris Quigg • Erik Ramberg • Rob Roser • Tim Rupp • Brittany Rutherford • Jamie Santucci • Niki Saoulidou • Dave Schmitz • Valena Sibley • Al Sondgeroth • Chris Stoughton • Linda Valerio • Rod Walton • Jeremy Werner • Chris White • Herman White • Jim Zagel • Jerry K. Zimmerman

Education Office staff administers and supports Fermilab programs.

Marjorie G. Bardeen, Manager • **Ketevan Akhobadze**, Educational Facilities Coordinator • **Carol Angarola**, Program Administrator • **Susan M. Dahl**, Education Specialist • **LaMargo A. Gill**, Editor • **David Hoppert**, Laboratory Technician • **Nancy Lanning**, Public Information Specialist • **Gayle Millman**, Administrative Support Assistant • **Spencer L. Pasero**, Education Program Leader • **Robert Peterson**, Education Specialist • **Elizabeth K. Quigg**, Computer Specialist • **Sue Sheehan**, Education Program Leader • **Andrea Varry**, Administrative Support Assistant

Docents facilitate student field trips and other Education Office activities and supervise the Lederman Science Center.

Lynda A. Ballingall • Donna Blankenship • Maureen Boyer • Mary Campbell • Muriel Cease • Nanette Doubler • Susan Dumford • Jane Gravelle • Lori Haseltine • Maureen Hix • H. Ted Hoesel • Helen D. Huie • Jacqueline J. Krock • Dawn Miller • Wendy G. Mouche • Toni Mueller • Mary Jo Murphy • Gail Poisson • David R. Seymour • Bob Shaw • Mary Ann Stowell • Felicia Svoboda • Anne Mary Teichert • Yvonne Twomey • William Welch • Larry Welsh • Dorothy Yurs



REVENUES AND EXPENSES

	2011 (audited)	2010 (audited)
Revenue/Contributions (\$000)		
Contributions/Foundations	\$ 59.6	\$ 67.4
Membership	15.5	19.1
Other	9.8	21.3
Total Revenue/Contributions	\$ 84.9	\$ 107.8
Expenses		
Program Services	\$ 24.8	\$ 98.5
Administrative Overhead	19.5	38.9
Total Expenses	\$ 44.4	\$ 137.5
Change in Net Assets	\$ 40.5	\$ (29.6)
End of Year	\$ 136.8	\$ 96.2

ACKNOWLEDGEMENTS

Fermilab Friends for Science Education depends entirely on contributions and grants. We thank the Fermilab Friends for Science Education members, Tree of Knowledge contributors, and the following organizations for their generous support of Fermilab education programs:

United States Department of Energy
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Northern Kane County Region EF110
St. Charles East High School
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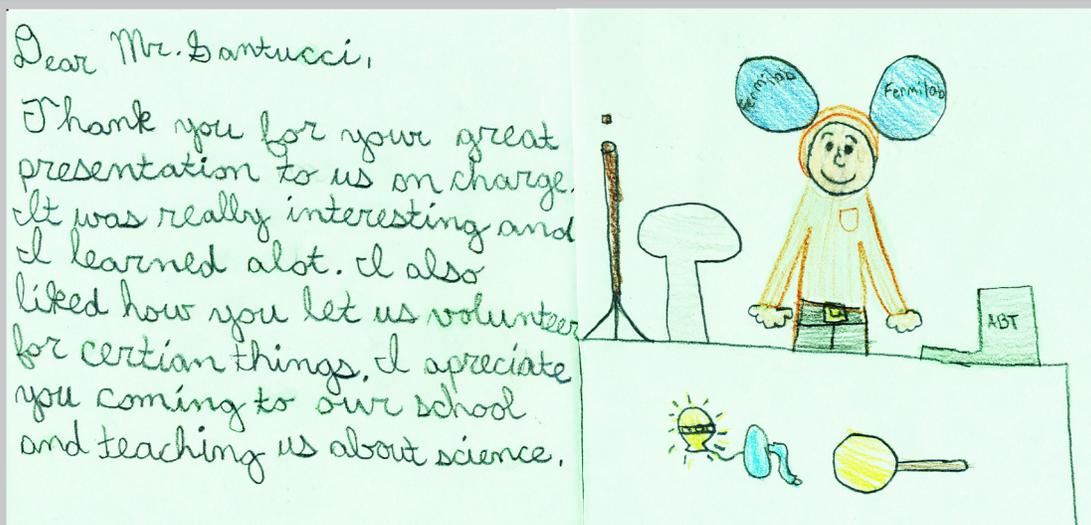
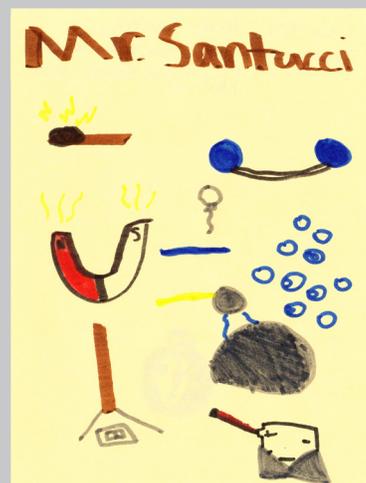


MAKING AN IMPRESSION

Each year, Fermilab scientists in the Classroom Physics Presentation program drive to schools in the Chicago area in a van purchased by FFSE members. They engage students in demonstrations of electricity and magnetism, force and motion, light and color, the physics of sports, physics in the real world, and "Space, Time and Einstein." During 2011, nearly 15,000 students enjoyed 86 classroom presentations.

These drawings show the excitement the sessions inspire. They are from a class that attended Charge! Electricity and Magnetism presented by physicist Jamie Santucci.

Look for some of the equipment used in the presentation: a Van de Graaff generator, a potato clock, a copper tube to demonstrate eddy currents, an orange battery and charged balloons.



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Reaching Out to Bring Science to Teachers, Students and Families

<http://ed.fnal.gov/ffse>