

FERMILAB FRIENDS FOR
SCIENCE EDUCATION



ANNUAL REPORT
2005

2005 HONORARY BOARD OF DIRECTORS

Edwin L. Goldwasser
Professor of Physics, retired
University of Illinois
Vice Chancellor for Academic Affairs
retired, University of Illinois

Pier Oddone
Director
Fermilab

Judith J. Schramm
Director's Assistant, retired
Fermilab

Stanka Jovanovic
Manager, retired
Fermilab Education Office
President, retired
Friends of Fermilab

John Peoples, Jr.
Director Emeritus
Fermilab

H. Guyford Stever
Foreign Secretary, retired
National Academy of
Engineering

Leon M. Lederman
Nobel Laureate
1991 President of AAAS
Director Emeritus, Fermilab
Professor of Physics
Illinois Institute of Technology

Norman F. Ramsey
Nobel Laureate
Higgins Professor of Physics
Harvard University

Michael Witherell
Director
Fermilab

2005 BOARD OF DIRECTORS

Michael Albrow
Physicist
Fermilab

Patricia Franzen
Vice President, Membership
Consultant
Wild Enterprises

Eileen Pasero
Treasurer

Jeffrey Appel
Physicist
Fermilab

William Grosser
Teacher
Glenbard South High School

Elizabeth K. Quigg
Computer Specialist
Fermilab

Marjorie G. Bardeen
President
Manager, Education Office
Fermilab

Gary V. Johnson
Secretary
Attorney-at-Law
Camic, Johnson, Wilson &
McCulloch

Kenneth J. Spengler
Teacher
retired

Susan M. Dahl
Vice President, Programs
Education Specialist
Fermilab

Michael Knapp
Teacher
Marquardt Middle School

Sherry Yarema
Teacher
retired

Jean B. Fisk
Founder and Director, retired
Batavia Nursery School

Lee R. Marek
Vice President,
Nominating Committee
University of Illinois, Chicago
Chemistry Lecturer and
Demonstrator

Bruce L. Chrisman
Ex-Officio
Associate Director for
Administration
Fermilab

MEMBERSHIP

Director's Club

William and Marjorie Bardeen
Roger and Marilyn Dixon
Edwin and Liza Goldwasser
John and Nancy Peoples
Alvin and Janine Tollestrup
Michael and Elizabeth Witherell

Patron

Pat and Dick Franzen
Leon and Ellen Lederman
Ernest Malamud and Olivia Diaz
Chris and Liz Quigg

Sponsor

Karen Bardeen
Steven Dixon
Gene and Jean Fisk
Edward and Adrienne Kolb
Gary and Roberta Kupkowski
Katherine Ladd
Lee and Marge Marek
Marquardt School District 15
Thomas and Patricia Matzka
Harry and Ellen Przekop
Michael Smith
Guyford and Bunny Stever
Bruce and Joan Winstein

Benefactor

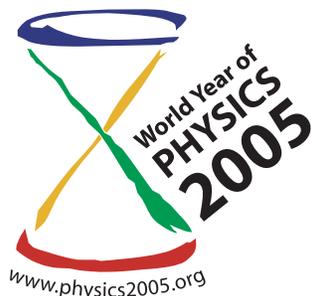
Anonymous donor
Carl and Cynthia Albright
Jeffrey and Marjorie Appel

Charles Bardeen
Gerald and Jean Brown
Cynthia Crego
William Flaherty
William and Elizabeth Fowler
Thomas and Edna Groves
Margery Hanson
Ezra Heitowit
Drasko and Stanka Jovanovic
Peter Koehler
Joseph Lach
Kenneth Lane
James and Nancy Lanning
Charles Marofske
Robert and Stephanie Marshall
Leonard and Sally Michaels
Tom and Karen Prosapio
Judy Schramm
John and Marcia Seiler
Michael and Claudia Sloan
Marion and Mollie Stoerker
Dennis and Lee Theriot
Kay Van Vreede
Joyce Wallenborg
Donald and Billie Young
George and Adrienne Zahrobsky

Regular

James Anderson
Robert and Barbara Baken
Alice Bean
Andrew Beretvas
John and Roberta Birmingham

David and Kathleen Carlig
Thomas and Carrie Carter
Harry Cheung
Robert and Susan Dahl
Conger and Jane Jahimiale
Krzysztof and Dorota Genser
LaMargo Gill
Henry and Sharlene Glass
Robert and Tracey Grimm
Hans and Angela Jostlein
Alan and Linda Kersey
Mike and Linda Knapp
Stephen and Joanne Krstulovich
Paula Lambertz
Donald and Judith Larson
Gary and Grace Leonard
Gordon and Cynthia Marler
John and Ann Marriner
Gerald and Mary Jo Murphy
Spencer and Eileen Pasero
Rajendran and Selitha Raja
Kurt and Lisa Riesselmann
James and Melanie Ruebush
James and Linda Smedinghoff
Ken and Paula Spengler
Michael Turner and
Barbara Ahlberg
Fred and Judy Ullrich
Louis Vasquez
William and Barbara Wester
Brian Yanny
John Yoh



A very important report of the National Academy of Sciences produced last year by a distinguished committee of educators, scientists, industrialists and public policy experts under the leadership of Norman Augustine, CEO emeritus of Lockheed Martin Corporation, highlights the importance of science education for the future well-being of the nation. The report, entitled "Rising Above the Gathering Storm," makes recommendations on the actions that we need to take as a nation to maintain our economic competitiveness and well-being in the 21st century.

The three top actions recommended by this committee address the urgent need to improve science and mathematics education. Action A-1, titled "Recruit ten thousand teachers, educate ten million minds," describes a program to attract thousands of new teachers educated in the basic sciences, engineering and mathematics. Action A-2, "Strengthen two hundred and fifty thousand teachers' skills, inspire students everyday," makes specific recommendations on summer institutes, advanced science and mathematics training for teachers, and the development of world class K-12 curriculum materials. Action A-3, "Enlarge the pipeline," recommends creating incentives and opportunities for middle-school and high-school students to pursue science and mathematics.

I am very proud of the role that the Fermilab education program plays in providing students and teachers of the surrounding community access to the resources of our great scientific laboratory. With the help of our Fermilab Friends for Science Education (FFSE), we have created a program that is very much in the spirit of the recommendations above and that is inspirational to both teachers and students. I am very grateful for the support that FFSE provides to our education program.



A handwritten signature in black ink that reads "Piermaria Oddone". The signature is stylized and written in cursive.

*Piermaria Oddone, Director
Fermi National Accelerator Laboratory*

Fermilab Friends for Science Education helps provide the extra support that makes Fermilab's science education programs thrive. With FFSE support, the Education Office is able to have a lasting impact on science education by providing indepth staff development.

When we show students the world of science, we can inspire a new generation of scientists and science-savvy citizens. When we enhance the teaching strategies our participants use, we can impact a generation of students in their classrooms.

2005 was the World Year of Physics and with your help we had quite a celebration at Fermilab. In these pages you will get an idea of the programs we were able to offer for families, students and teachers.

We look forward to making every year the world year of physics, the world year of science.

The following anecdote speaks volumes about the impact our support has. Pat Franzen, board member and a teacher-instructor with our prairie workshops for the past 15 years, reported the following conversation at a beauty parlor. She told the hairwash girl that she came in periodically when she came to Fermilab. "Ah, Fermilab!" exclaimed the girl with delight. "I remember that place. I went to Wheaton-Warrenville Middle School, and we took trips to the Fermilab prairie." (The prairie programs were developed by grants for FFSE.) She went on to describe in minute detail a trip she took as middle school student some 10 years prior. She talked about the different kinds of plants, the insects, an encounter with a wolf spider in a plastic observation box and the pond study. She said she came back to collect seeds and marveled at the wonder of the prairie. She ended with, "I'm 24 now. Someday I'll bring my own kids out there." She indicated, without reservation, that it was her best science experience in middle school. "Now, how COOL is that," says Pat!



Marjorie G. Bardeen

*Marjorie G. Bardeen, President
Fermilab Friends for Science Education*

CELEBRATING THE WORLD YEAR OF PHYSICS 2005

During 2005, the Fermilab Education Office joined with other physics organizations in celebrating the World Year of Physics, a commemoration of Einstein's "miraculous year" and a campaign to raise public awareness of the excitement of physics.

Fermilab's contribution to the yearlong event was multifaceted: it included three special events and a yearlong program of classroom visits.

The first special event was the Family Open House on February 3. For three hours, visitors of all ages enjoyed a variety of activities, including hands-on physics demonstrations, accelerator tours, Mr. Freeze's cryogenics show, and conversational opportunities with physicists. As a special treat, guests could meet Enrico Fermi, Wolfgang Pauli, Richard Feynman and Einstein himself—or at least physicists impersonating their famous predecessors and speaking about their accomplishments.

The nearly 2,000 people who attended the open house left with WYOP puzzles, scintillating rulers, physics publications and a new appreciation of the amazing world of particle physics.

The second special event, held on October 8, was a day-long symposium for high school students and teachers on the topic of Einstein's Legacy.

Approximately 300 guests attended the symposium. They were treated to talks by eminent physicists and authors, including John Rigden, author of *Einstein 1905: The Standard of Greatness*, Alex Fillipenko, a co-discoverer of the accelerating expansion of the universe, Niki Saoulidou, a neutrino physicist from the MINOS project, Sean Carroll, author of *Spacetime and Geometry: An Introduction to General Relativity*, Randy Hulet, a physicist from Rice University and Fermilab's own Chris Quigg, Leon Lederman and Pier Oddone.

Attendees came from as far away as Florida and New York, and QuarkNet teachers came from twelve states, including Hawaii and Puerto Rico. The symposium was so well received that the Education Office decided to sponsor another one in 2006, rather than waiting until 2007.

The third special event was a Web broadcast, "Late Show with Leon Lederman," a one-hour segment of a larger worldwide broadcast originating from CERN. Fermilab's contribution, a take-off on "Late Show with David Letterman," featured Leon as host to three special guests: theoretical physicist Peter Skands, Anna Goussiou of DZero, and Jason Nielsen of CDF. In lively exchanges with Leon, these physicists described their work and lives to the audience of high school science students, opening a window onto the personal side of particle physics.

Others from around the Lab contributed to the broadcast in a variety of supporting roles. Chris White of the MINOS experiment donned an unruly wig to impersonate Einstein and field questions contributed via e-mail by observers from around

the world. The CDF band, made up of physicists from the CDF experiment, provided musical interludes throughout the program. Fred Ullrich and Visual Media Services produced the entire broadcast, as well as several video clips, including "Science Bytes," featuring Lee Marek performing brief but memorable physics experiments. (The production is available for viewing as a streaming video at http://www-visualmedia.fnal.gov/VMS_Site_2/index.shtml.)

The broadcast was a great success, and special touches, such as the colorful t-shirts worn by the audience and the band—provided through FFSE funds—did much to enliven the show.

In addition to the three special events, the Education Office embarked on an ambitious yearlong project: to



Albert Einstein, a.k.a. physicist Chris White, and the CDF band at the Late Show With Leon Lederman webcast.

present hands-on classroom science demonstrations, led by Fermilab volunteers, to at least 10,000 students during the WYOP.

Education Office staff member Susan Dahl worked extensively with physicists to update old presentations and to develop ideas and equipment for new ones. Over 60 volunteers contributed their services throughout the year, participating in training sessions and practice “open houses,” then taking their shows on the road to classrooms throughout the greater Chicago area.

Teachers selected from a list of topics, including Charge! Electricity and Magnetism; Light and Color; Physics of Sports; Force and Motion; Zap! Light and Color; Stories of Science; Physics in the Real World; Cosmic Rays; Space, Time and Einstein; and the ever-popular cryogenics show.

Although the goal was ambitious, by the end of the year the team had exceeded it, visiting 10,930 students in 84 schools. But the success was not just in the numbers. The response from teachers was very enthusiastic, with high praise for the style and energy of the presenters, as well as for the content of the programs. Students’ lively participation spoke for itself, but many followed up with thank you notes to the presenters, attesting to the lasting impression the visits had made.

All of these events in celebration of the World Year of Physics were made possible by the support of FFSE members and a grant from an anonymous donor.

Fermilab Family Open House
February 3, 2005



WORKSHOP NEWS FOR 2005

MUSEUM PARTNERS

In 2005, Fermilab continued its membership in the Chicago Public Schools Museum Partners program. As a member of this program, the Education Office annually hosts workshops for Chicago Public School teachers. FFSE is the recipient of the grant from the Chicago Public Schools.

The Education Office offered two workshops in 2005. In January, docents Gail Haynes and Anne Mary Teichert led a session for grades K-4 physical science teachers. Braving snowy conditions, fourteen teachers made their way from Chicago to the Lederman Science Center to learn about electricity and magnetism and to perform simple experiments appropriate for use with their students.

Each teacher left the workshop with a bag of enough materials to allow small groups of students to conduct

the experiments learned at the workshop in their classrooms.

In February, docents Gail Haynes and David Hoppert led a session for physical science teachers at the 5-8 level. As in years past, the topic was Indirect Observation: Exploring the Unseen. These teachers, too, left equipped with new ideas for classroom experiments and with sufficient supplies to allow students to replicate the experiments in small groups.

Teachers who attended the Museum Partners workshops were enthusiastic in their praise of the Fermilab sessions. They appreciated the ideas, the clarity of the presentations and the bags of supplies. Teachers received college credit for their work, and this has helped many of them complete the requirements for their middle grades science endorsement.

ENTICE

The Illinois Department of Natural Resources once again invited Fermilab to offer workshops as part of the ENTICE (Environment and Nature Institute for Conservation Education) program. These environmental education workshops are held throughout the state at various times of the year to allow educators to learn more about the environment and to learn classroom activities appropriate for passing on this knowledge.

Money from the IDNR pays for instructor fees and free materials for the participants, and is channeled through FFSE.

As part of this program, docents Mary Jo Murphy and Sue Sheehan taught a one-day session entitled "Illinois

Insects" on October 1 at the Lederman Science Center. It included background information for teachers, as well as hands-on training and insect-related activities to be done outdoors or in the classroom. Topics covered included identifying insects, set-up and use of Berlese equipment for studying soil insects, insect games, and collecting, preserving and displaying insects.

In June, the IDNR asked Fermilab to send instructors to substitute for a teacher who was unable to fulfill his commitment to teach a workshop. Docents Sue Sheehan and Dee Huie went to Altamont, Illinois and presented a session on the topic of insects at the Ballard Nature Center.

SUMMER SECONDARY SCIENCE INSTITUTES

The Summer Secondary Science Institutes continued in 2005. For the first time, a two-week Biology Institute joined the lineup. Five teachers attended, and feedback from the participants and instructors was very positive.

The Physics Institutes returned, with sessions offered on the topics of Mechanics; Electricity and Magnetism; and Waves, Sound and Optics. Eleven teachers attended one session, two attended two sessions, and one teacher attended all three sessions.

LInC ACT

In June, the Education Office offered two two-credit LInC ACT (Analyze, Create and Transform) courses. Participants, teachers at the K-12 level, created or customized an inquiry-based learning unit, integrating technology in order to enable students to reach beyond classroom walls.

The original plan was to offer only one course. However, it was necessary to open a second section due to the quantity of qualified applicants. In the end, 24 participants completed the course under the guidance of four teacher-facilitators. Participants drove from as far as two hours away for the course, and one participant flew in from Virginia.

Twenty-one more participants completed a LInC ACT I course in December. Participants field-tested units along with students on topics such as pollution, cloning, water shortage, neurological development, and assisting hurricane Katrina victims.

Participants responded enthusiastically:

“I learned that my students will soar when I learn to step to the side and let them take more responsibility for their learning. I learned the true meaning of engaged learning . . .”

“Very rewarding; I saw my students blossom before my eyes; they took ownership of their learning and were actively engaged throughout the entire unit I put together based on the instructional strategies I learned in this course.”

“The most important things I learned by participating in this course were that I don’t always have to be in control of students’ learning and often, students will take things farther than I would expect them to . . .”

“. . . I learned . . . all the various ways to use computer technology. This was a struggle for me but it was exactly what I needed practice with.”

Funds from FFSE underwrote the LInC courses.

QUARKNET

In 2005, high school physics students all over the country benefited from FFSE support which enabled the placement of Cosmic Ray Detectors (CRDs) into secondary school classrooms. Distributed to schools participating in the QuarkNet program, 170 CRDs provide hands-on experience with the problem-solving nature of science. Many more schools are clamoring for hardware, so another 75 detectors are under construction. QuarkNet staff members have designed a new generation of CRDs (called Mark II CRD). Funds from FFSE are being used to provide the photomultiplier tube (PMT) component of these new detectors.

CRDs respond to cosmic ray particles, but the “eyes” of the detector are the PMTs which sense the signal. The hardware design is based on hardware found in detectors at Fermilab and CERN.

QuarkNet staff member Bob Peterson, formerly a

QuarkNet teacher himself, noted that students’ understanding of science is greatly enriched when they have the opportunity to use the same equipment as scientists, ask the same types of questions, confront the same problems, and undertake the same challenge of presenting and defending results to their peers. Measuring and recording data invests students in the learning process, and teachers change their teaching methods when they conduct research alongside students.

The new Mark II CRDs will be distributed in 2006. Already nearly one thousand students have gathered more than five thousand days of data to share with each other. Many posters exist within the cosmic e-Lab portal where students upload their data. The data set will grow rapidly when the new FFSE-supported CRDs come on line over the next year. For more details, see: [/quarknet.fnal.gov/e-labs](http://quarknet.fnal.gov/e-labs)



A QuarkNet student adjusts his cosmic ray detector.

CONGRATULATIONS TO HONOREES!

SCHOLARSHIP WINNERS

This year ten teachers received scholarships funded by FFSE that allowed them to attend workshops or field trips. The recipients were:

Mark Bonem (Science and Arts Academy) and **Dani Brandt** (Antioch Community H.S.): \$100 toward Summer Secondary Science Institute; **Justine Schwarz** (Prairie Hill School): \$200 toward LInC; **Joan Lantner** (Indian Knoll Elementary School): \$200 toward Phriendly Physics; **Mary Beth Hagberg** (Prairie View School): \$175 toward From Beneath the Ashes; **Martha Jane Hooper** (Sycamore Middle School): \$200 toward Particles and Prairies.

Margaret Fabrizius (St. Mary Catholic School): \$200 toward Beauty and Charm; **Michelle Kovac** (Sycamore Middle School): \$100 toward From Beneath the Ashes and \$100 toward Particles and Prairies; **Manju Rupani**: \$100 toward a Science Adventure; **Kathy Hamilton** (Seventh Avenue School): \$100 toward bus rental.

DIRECTOR'S AWARD

For the second year in a row, FFSE supported an award for a Fermilab staff member who made an outstanding contribution to the Lab's K-12 education program.

This year's winner, CDF's **Mike Albrow**, received the \$1,000 Director's Award for his contributions to the WYOP classroom visit program.

Fermilab Director Pier Oddone presented Albrow with a plaque and check at a ceremony on November 20 honoring hundreds of employees, users and contractors for their support of Fermilab educational programs.

Other nominees for the award included **Muzaffer Atac**, **Geoff Eargle**, **Terry Kiper**, **John Korienek** and **Paul Nienaber**. Finalists were **Curt Danner**, **Don Lincoln**, **Arnold Pompos**, **Ron Ray** and **Jerry Zimmerman**.

A contribution from an anonymous donor to FFSE underwrites the Director's Award.

HIGH SCHOOL STUDENT AWARDS

Each year FFSE supports an awards program for outstanding science students attending high schools in DuPage and Kane counties. School faculty submits the names of up to two students, who each receive a certificate and two books at their school's award ceremony.

Winners in 2005 were:

Greg Formosa and **Tina Ho**, Addison Trail High School; **Alison McCarthy** and **William Strobel**, Aurora Central Catholic High School; **Kaitly Chapman** and **David Clapp**, Aurora Christian School; **Jacob Skrabacz** and **Mike Marzano**, Bartlett High School; **Matthew Lemay** and **Scott Williams**, Benet Academy; **Devin Kachan** and **Max Metz**, Burlington Central High School; **Emily Marie Timko** and **Alexander Carpenter**, Community High School District 94; **Dan Lithio** and **Adam Volrath**, Downers South High School; **Matthew Gerhard** and **Kimberly Harris**, East Aurora High School; **Bryan Pelka** and **Kimberley Farbota**, Elgin Academy; **Mike Kraft** and **Nicole**

Cieslak, Fenton High School; **Nick Plonczynski**, Geneva High School; **Alyssa Nikides**, Glenbard North High School; **Allison Baum** and **Randy Tang**, Hinsdale Central High School; **Michael Burke** and **Rachel Bryers**, Immaculate Conception High School; **James Pollack** and **Azeem Husain**, Larkin High School; **Kevin Hannan** and **Zachary Kunath**, Lisle High School; **Andrew Kerstein** and **Daniel Knapp**, Montini Catholic High School; **Pat Chesnut** and **Stephanie Nguyen**, Neuqua Valley High School; **Katherine Allen** and **Lauren Sands**, Rosary High School; **Hannah Newfield-Plunkett** and **Gregory Shoger**, St. Charles East High School; **Michael Deliberto** and **Branden Lynam**, St. Charles North High School; **Christopher Kassel** and **Abigail Ortlieb**, Streamwood High School; **Amanda Lawrie** and **Sam Krueger**, West Aurora High School; **Gregory Johnson**, Wheaton Academy; **Kristina Artner** and **Erik Lykken**, Wheaton North High School; **Kyle Hopkins** and **Jeremy Sugrue**, Wheaton Warrenville South High School; **Liz Bourgart** and **Ian Smith**, York Community High School.

PROGRAM HIGHLIGHTS

January

QuarkNet hosted 200 students and seven teachers from four schools for a day of cosmic ray studies. An array of detectors was set up in the Kuhn Barn, and participants gathered data for analysis using the QuarkNet/Grid portal. Students toured the Lab and met with Director Michael Witherell.

February

About 2,000 people attended the Fermilab Family Open House in honor of the World Year of Physics.

March

The Wonders of Science Show brought about 800 people to Ramsey Auditorium. This year's theme was Acceleration. After an hour-long show by Weird Science (science teachers Lee Marek, Tom Redig and Robert Lewis), each family went home with a packet of materials for follow-up activities.

April

The QuarkNet group reached a milestone when they successfully submitted a job for their Online Cosmic Ray Project to the Grid. Student data collected and stored in the Grid data portal can now be accessed by QuarkNet participants throughout the country.

May

Marge Bardeen, Eric Gilbert and Liz Quigg delivered a paper at the Second International Workshop on Collaborative and Learning Applications of Grid Technology and Grid Education, held in conjunction with the IEEE International Symposium on Cluster Computing and the Grid, in Cardiff, Wales. The paper described the QuarkNet Project, its use of Grid computing techniques and the outlook for use of the QuarkNet paradigm in the future.

June

During the summer, more than 100 teachers attended workshops at Fermilab. Offerings included workshops for secondary teachers in biology and physics, a "Reading Connections" workshop offered in conjunction with Chicago Wilderness, an ENTICE insect workshop, and the annual Beauty and Charm, Prairie, and Phriendly Physics workshops.

July

Thirty-five Summer Science Adventures, such as Survival Science and Lego Engineering, brought 343 students to the Lab.

August

Fermilab's new Director, Pier Oddone, was the guest speaker at Ask-a-Scientist. This monthly program gives visitors the chance to meet scientists and ask them questions. The program includes a talk by a guest scientist, a tour of some part of the Fermilab accelerator complex and a visit to the 15th-floor viewing area. More than 700 people of all ages attended Ask-a-Scientist in 2005.

September

More than 5,436 students from 64 schools attended prairie field trips in 2005. Physics field trips brought out 2,588 middle school students from 25 schools. An additional 3,581 students from 105 high schools and colleges visited the Lab on guided tours.

October

Roughly 300 people attended the WYOP Symposium on October 8. Fermilab Director Pier Oddone, Leon Lederman, and many other outstanding speakers from various universities and Fermilab addressed students and teachers from around the country on the theme of "Einstein's Legacy."

November

On November 28, the Education Office honored four teachers at a Prairie Celebration held at the Lederman Science Center. Collectively, the four have served for 60 years developing and conducting the two major prairie programs.

The annual Volunteers Reception recognized many of those who helped the Education Office throughout the year. Mike Albrow received the Director's Award for Exceptional Volunteer Service, and Curt Danner, Don Lincoln, Arnold Pompos, Ron Ray and Jerry Zimmerman were named as finalists.

December

As part of a world-wide Web broadcast in honor of the World Year of Physics, Fermilab presented "The Late Show with Leon Lederman."

Throughout the year, Education Office volunteers participated in a classroom visitation program in honor of the World Year of Physics. Funds from FFSE helped purchase supplies, underwrite brochures and support volunteer training, as nine programs were developed or upgraded. More than 10,000 students participated in the program, with such success that it will continue in 2006.

The success of the 2005 FFSE programs rests with these outstanding program leaders.

Michael Albrow, Fermilab • **Michael Bachrodt**, Fremd High School, Palatine • **Richard Billings**, Glenbard West High School, Glen Ellyn • **Sue-Z Bruno**, Gates Elementary School, Aurora • **Joseph Cave**, Naperville School District 203, Naperville • **John Chamberlain**, Glenbard North High School, Carol Stream • **Jennifer Ciaccio**, West Chicago High School, West Chicago • **Trudi Coutts**, Naperville School District 203, Naperville • **Laura Cox**, Glenbard South High School, Glen Ellyn • **James D. Cox**, Clarendon Hills Middle School, Clarendon Hills • **Karl Craddock**, Fremd High School, Palatine • **Robin Dombeck**, Brookfield Zoo, Brookfield • **Jason English**, Fremd High School, Palatine • **Amy Fehrman**, Community School District 200 • **William F. Fraccaro**, Johnson School, Warrenville • **Patricia M. Franzen**, Wild Enterprises, Metamora • **Sharon Gatz**, Beebe Elementary School, Naperville • **Jaci Gentile**, Naperville Central High School, Naperville • **Anna Goussiou**, Fermilab • **Lynn Hamper**, Naturalist, Aurora • **Bernard J. Jokiel**, Washington Middle School, Aurora • **Randy Jones**, Glen Ellyn School District 41, Glen Ellyn • **Marge Keefe**, St. Steve Keefe, Batavia School District 101, High School, retired • **Yvonne Krowka**, North High School, St. Charles • **Leon Lombard** School District 44, Lombard • **Mary Lou Lipscomb**, Illinois Math and Rosary High School, Aurora • **Lee R. Chris Marszalek**, Twin Groves Junior Guire, Hinsdale South High School, Hinsdale • **Stephen Meehan**, Naperville Community School District 203, Naperville • **Bill Mikuska**, State Microscopical Society of Illinois, Chicago • **Jill Mueller**, West Chicago Middle School, West Chicago • **Jason Nielsen**, Fermilab • **Paul Nienaber**, Fermilab • **Marcy Novak**, Lombard School District 44, Lombard • **Mary Sue Offut**, SciTech and Field Museum Volunteer, Aurora • **Pat Pentek**, West Chicago Middle School, West Chicago • **Chris Quigg**, Fermilab • **Tom Redig** • **Linda Richards**, Batavia School District 101, Batavia • **David Ritchie**, Fermilab • **Barbara A. Romack**, Kaneville North Elementary School, Elburn • **Niki Saoulidou**, Fermilab • **Jennifer Sheperd** • **Peter Skands**, Fermilab • **Robert Thompson**, Glen Ellyn School District 41, Glen Ellyn • **Linda Valerio**, Fermilab • **Chris White**, Fermilab • **Sharon White**, Grissom Junior High School, Tinley Park • **Patricia Witte**, Naperville • **Wayne R. Wittenberg**, Glen Ellyn School District 41, Glen Ellyn • **Barbara Youngren**, NCEMSC, Naperville • **Jerry K. Zimmerman**, Fermilab • **Anna Zuccarini**, Crone Middle School, Naperville



Education Office staff administers and supports the program leaders.

Marjorie G. Bardeen, Manager • Carol Angarola, Administrative Support Assistant • Carol S. Benson, Administrative Support Assistant • Susan M. Dahl, Education Specialist • LaMargo A. Gill, Editor • Thomas A. Jordan, Education Specialist • Nancy Lanning, Public Information Specialist • Waylon Meadors, Computer Specialist • Priscilla B. Meldrim, Public Information Specialist • Laura A. Mengel, Computer Specialist • Spencer L. Pasero, Education Specialist • Robert Peterson, Education Specialist • Elizabeth K. Quigg, Computer Specialist • Diana Smailus, Administrative Support Assistant • Gayle Stephens, Administrative Support Assistant

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

Lynda A. Ballingall • Karen Bass • Donna Blankenship • Lisanne Canal • Susan Dumford • Mary Hawthorne • Gail Haynes • Maureen Hix • H. Ted Hoesel • David Hoppert • Helen D. Huie • Jacqueline J. Krock • Wendy G. Mouche • Mary Jo Murphy • Gail Poisson • David R. Seymour • Sue Sheehan • Mary Ann Stowell • Felicia Svoboda • Anne Mary Teichert • Yvonne Twomey • William Welch • Larry Welsh • Dorothy Yurs

REVENUES AND EXPENSES

	2004 (audited)	2005 (audited)	23 Years (1982-2005)
Revenue/Contributions (\$000)			
Public Agencies	\$ 8.0	\$34.0	\$4,230.4
Private Foundations	75.6	23.9	660.4
Membership	20.6	17.0	297.4
Other	38.5	13.0	365.6
Total Revenue/Contributions	\$142.7	\$87.9	\$5,553.8
 Expenses			
Programs	\$ 88.1	\$119.9	\$4,048.8
Administrative Overhead	29.0	28.0	1,367.3
Total Expenses	\$117.1	\$147.9	\$5,416.1
 Excess (Deficit) of Revenue/Contributions over Expenses			
	\$ 25.6	\$ (60.0)	\$ 137.7

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
 Universities Research Association, Inc.
 North Central Regional Educational Laboratory
 Midwest Consortium for Mathematics and Science Education
 Chicago Public Schools
 National Science Foundation
 Illinois Department of Natural Resources
 Illinois Area I Regional Offices of Education
 Anonymous Donor



The pictures and quotes on this page are from 8th grade students at Sycamore Middle School who visited Fermilab on a field trip. Their teacher is Michelle Kovac.



"We had the opportunity to stand at the threshold of all new discoveries that deal with how everything on earth is built up." Mark



"I liked the fact that we got to see what scientists are actually doing with atoms and how they learn about them indirectly. Most students don't get a chance like we did" Maddie



"I liked how much creativity was used at Fermilab. There is a lot more to science than I thought." Brittany



"I really enjoyed seeing all the scientists and watching them look so excited when they talked. It was cool because they looked so interested in what they were doing" Elena



"The docents were nice, respectful people who taught us things that were actually worth knowing." Denaya



"They treat cancer with machines here." Jake



"I liked how we got to do the activities. They were fun." Emily



"I enjoyed going to the top of Wilson Hall and seeing all of Chicagoland. Fermilab is not just a science facility, it is a whole lot more" Aaron



"I liked the friendly environment at Fermilab" BJ

