

# Education Programs At Fermilab

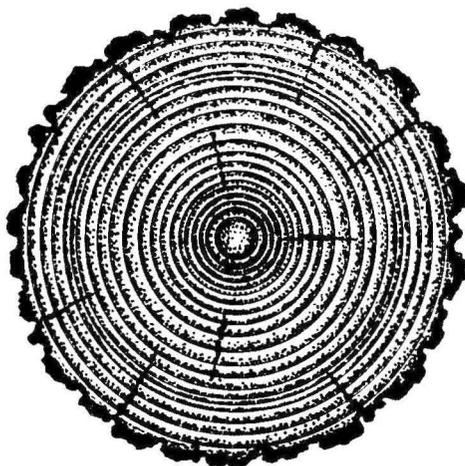




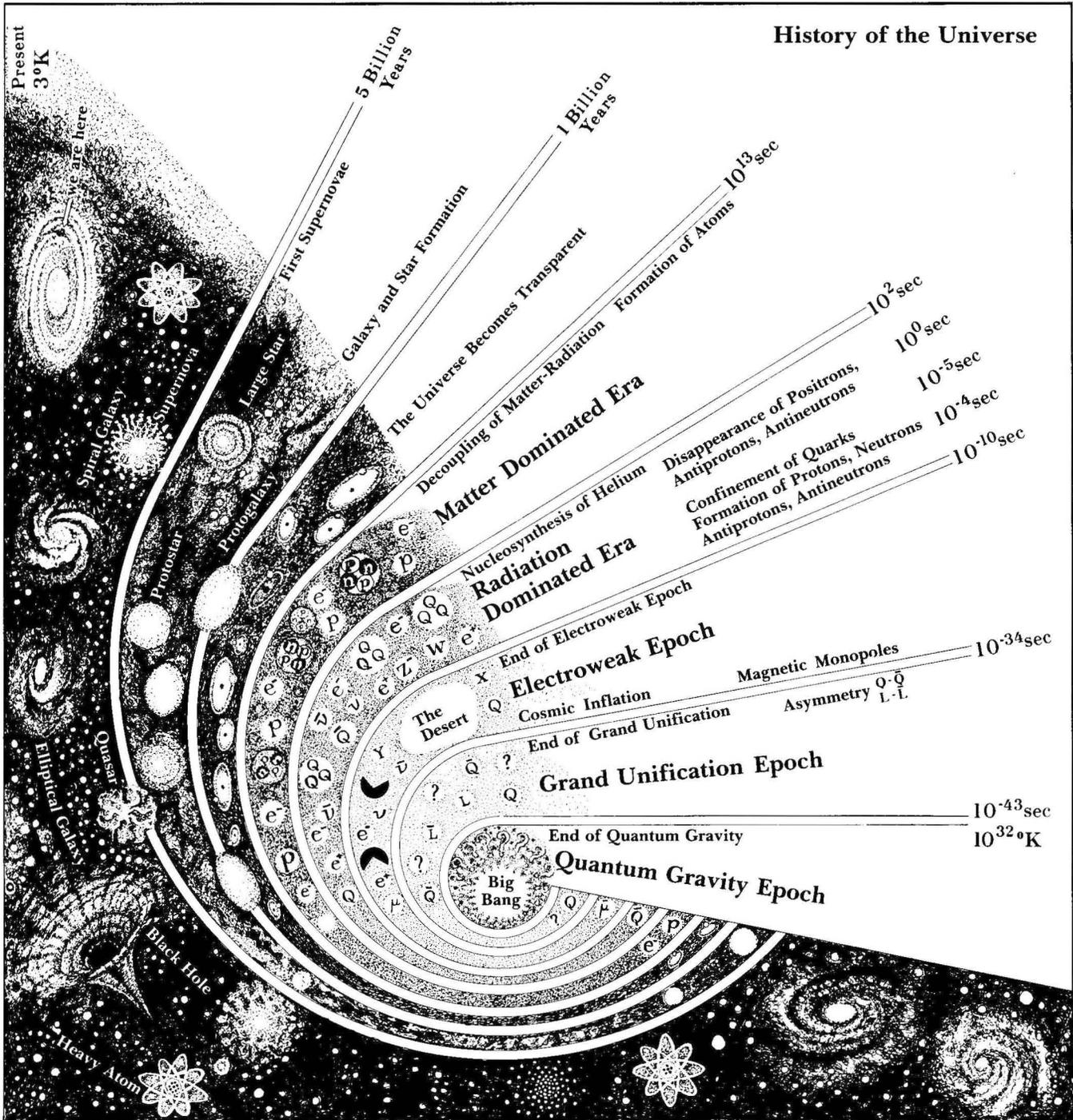


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# History of the Universe



## Introduction

The creation of knowledge, research; its application, technology; and its dissemination, education are inextricably bound together. At Fermilab these connections are visible in many ways. They appear in the work of Ph.D. students and their professors as they jointly seek to understand the fundamental properties of matter. It is also manifest in the work of the engineers and physicists who develop the technology necessary to make the Tevatron the highest energy collider in the world. The connections appear again when a Fermilab scientist describes the beauty of quarks and leptons and the ways that particle accelerators reveal that beauty to high school students on a Saturday morning. Education is present in every step in the process of scientific research.

This booklet describes all of the education programs at Fermilab and a perusal of its pages will illustrate for the reader the value of formal training programs that range from providing teachers of science and mathematics in elementary and secondary schools a glimpse of modern physics to university professors sabbaticals. The former keeps teachers refreshed and up-to-date and they in turn will lead young people to choose careers in science. The latter provides a unique opportunity for the few who specialize in particle physics to extend the world's knowledge of the subject. Education of future generations of scientists and engineers is a responsibility that Fermilab shares with the nation.

A handwritten signature in black ink that reads "John Peoples Jr." The signature is fluid and cursive, with the first name "John" being larger and more prominent than the last name "Peoples Jr.".

John Peoples Jr.  
Director  
Fermi National Accelerator Laboratory





## Postdoctoral Programs

### Postdoctoral Appointments

**Contact:** Accelerator Physics  
Gerald F. Dugan, Head, Accelerator Division  
Fermilab MS 306  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-4468  
Decnet: FNAL: :DUGAN

Experimental Particle Physics  
Jeffrey A. Appel, Head, Physics Department  
Fermilab MS 122  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3201  
Bitnet: Appel@FNAL

Theoretical Astrophysics  
Edward W. Kolb, Head, Astrophysics Group  
Fermilab MS 209  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-4695  
Bitnet: Rocky@FNAL

Theoretical Particle Physics  
William A. Bardeen, Head, Theoretical Physics Department  
Fermilab MS 106  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3070  
Bitnet: Bardeen@FNAL

**Objective:** To broaden or intensify the research experience of recent Ph.D.'s through involvement in experimental or theoretical research.

**Description:** Recent Ph.D.'s receive Research Associate appointments generally for two or more years.

**Application Deadline:** None for Accelerator or Experimental Particle Physics.  
January 15 for Theoretical Astrophysics and Particle Physics.



## Lederman Fellowships

**Contact:** Jeffrey A. Appel, Head, Physics Department  
Fermilab MS 122  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3201  
Bitnet: APPEL@FNAL

**Objective:** To support talented young researchers in high energy and accelerator physics.

**Description:** Appointments are awarded on a competitive basis from among the applicants for first postdoctoral appointments in experimental physics at Fermilab. The term is for three years, and is not extendable. In recognition of Leon M. Lederman's commitment to the teaching of physics at all levels, fellows will participate in Saturday Morning Physics or an equivalent educational program.

**Application Deadline:** None

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## Wilson Fellowships

**Contact:** Rolland P. Johnson, Chairman, Robert R. Wilson Fellows Committee  
Fermilab MS 345  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-4823  
Bitnet: ROL@FNAL

**Objective:** To support talented young researchers in high energy and accelerator physics.

**Description:** Appointments as Robert R. Wilson Fellows are awarded on a competitive basis to promising young Ph.D. physicists for a term of three years. Fellows will work at Fermilab in an area of experimental high energy or accelerator physics of their own choice. No service work will be required. Research support will be provided by the appropriate Fermilab department. Fellows in experimental high energy physics will normally be required to have had several years of post-doctoral experience. Previous experience is not required of fellows in accelerator science in order to encourage talented young researchers to enter that field.

**Application Deadline:** None



## Graduate Student Programs

### CINVESTAV Fellowships

**Contact:** Roy Rubinstein, Assistant Director, Fermilab  
Fermilab MS 105  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-4108  
Decnet: FNAL: :ROYR

**Objective:** To aid physics graduate students of CINVESTAV in obtaining a Ph.D. in experimental particle physics.

**Description:** CINVESTAV is a Ph.D. granting institution in Mexico which does not have the facilities or faculty for a graduate program in experimental particle physics. A student who is selected by CINVESTAV and Fermilab staff can carry out a Ph.D. thesis research project on a Fermilab experiment under the supervision of a Fermilab staff member. After the research is completed, the thesis is submitted for a CINVESTAV Ph.D.

**Application Deadline:** None

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### Doctoral Fellowships

**Contact:** Dianne M. Engram, Manager, Equal Opportunity Office  
Fermilab MS 117  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-4633

**Objective:** To increase the number of underrepresented minorities in graduate physics programs.

**Description:** Students considered for the graduate program must be accepted at a Universities Research Association, Inc. (URA) university and be pursuing their Ph.D. degree. Under the terms of the fellowship, Fermilab and the URA institution collaborate to provide tuition and a stipend similar to that of other first year students. Candidates are reviewed by the Summer Intern Committee. The Committee recommends support to the Laboratory Director. The Laboratory Director assigns a senior scientific staff member as a mentor for sponsored students.

**Application Deadline:** August 1



## Graduate Engineering for Minorities (GEM)

**Contact:** James L. Thompson, Personnel Manager  
Fermilab MS 116  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3324

**Objective:** To increase the number of minority students (American Indians, Black Americans, Mexican Americans and Puerto Rican Citizens) with graduate degrees in engineering.

**Description:** Fermilab participates in the Graduate Education for Minorities (GEM) program open to minority students enrolled in their junior or senior year in an engineering discipline. The ability and commitment to pursue graduate studies are required. The GEM Consortium, through participating employers' fees, provides financial support to the student while he or she is in graduate school. Typically, a student is employed at Fermilab for two to three summers.

**Application Deadline:** December 1

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## Joint University-Fermilab Doctoral Program in Accelerator Physics

**Contact:** Roy Rubinstein, Assistant Director, Fermilab  
Fermilab MS 105  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-4108  
Decnet: FNAL: :ROYR

**Objective:** To increase the number of accelerator physicists.

**Description:** University students who have passed all their graduate physics qualifying exams and are ready to choose a thesis topic are eligible to join this program. They arrange for a sponsor in their Physics Department (often a member of the high energy physics group) who is Fermilab's contact with the University while the student is carrying out thesis research at Fermilab. A Fermilab committee interviews candidates, approves thesis topics, and assures the University of the student's progress. A Fermilab staff member (approved by both the committee and the University) is the student's supervisor during the thesis work here. Thesis problems can be in either theoretical or experimental accelerator work.

**Application Deadline:** None



## Undergraduate Programs

### CO-OP/Internships

**Contact:** James C. Lasenby  
Fermilab MS 116  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3324

**Objective:** To provide a practical approach to education, especially in the technical disciplines, through a combination of theory and practice, and to produce graduates who are prepared to make immediate contributions when permanently employed.

**Description:** Usually, students join the program during their sophomore year and begin a cycle of alternating study sessions and work sessions lasting from 10 to 18 weeks. The CO-OP students work in an alternating school/work schedule. Interns work 20 hours per week during the academic year and full time during the summer. Fermilab is currently working with seven universities/colleges. There are approximately 50 students in the program throughout the year.

**Application Deadline:** None

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### Guided Tours

**Contact:** Public Information Office  
Fermilab MS 206  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3351

**Objective:** To provide an opportunity for science students to visit the site of a high energy physics laboratory.

**Description:** Guided tours are available year-round Monday through Friday at 9:30 a.m. or 1:30 p.m. We advise booking tours as far ahead as possible especially in the spring months. The size of the group should range from 10 to 40. We ask that one instructor or responsible adult accompany every 20 students. The tour lasts approximately two hours. With prior arrangement, students may purchase lunch in the cafeteria or use Fermilab facilities for sack lunches. There is no charge for tours. A guided tour begins in Wilson Hall and consists of an orientation talk and slide presentation followed by an opportunity to see the preaccelerator, components in the linear accelerator gallery and the Main Control Room. The tour then moves to the 15th floor where visitors have a panoramic view of the Laboratory site and the surrounding area. Because the Fermilab accelerator typically operates around the clock, students may not see the tunnels of the accelerator system or the interior of experimental areas. For physics classes, a Fermilab physicist may be involved in the tour.



## Summer Interns for Physics Majors

**Contact:** Drasko D. Jovanovic  
Fermilab MS 200  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3077  
Bitnet: SIMPHY@FNAL

**Objective:** To introduce students majoring in physics, computer science and engineering to the current methods and problems of high energy physics research.

**Description:** Approximately 20 students of high academic achievement whose career interests coincide with Laboratory activity are selected to work at Fermilab. These students are given a research assignment and, in addition to the technical work, participate in a lecture series on accelerators and particle physics. Housing, transportation and other services are provided. A senior scientific staff person serves as a mentor during the summer session. Appointments generally are for ten weeks.

**Application Deadline:** March 15

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## Summer Interns in Science and Technology

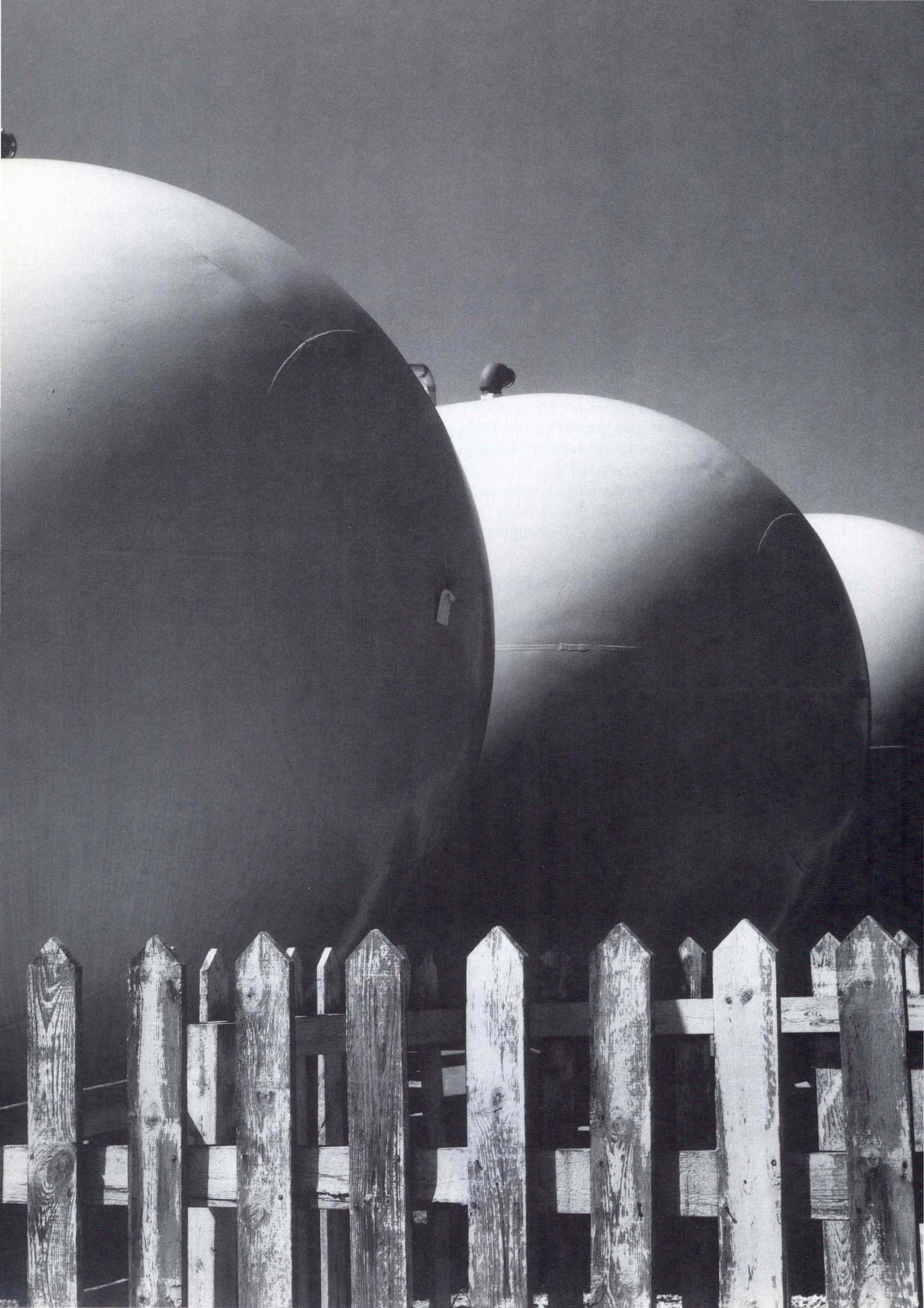
**Contact:** Dianne M. Engram, Manager, Equal Opportunity Office  
Fermilab MS 117  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-4633

**Objective:** To provide challenging summer experiences for minority students who have selected careers in engineering, physics and computer science.

**Description:** A Summer Internship Committee recruits and selects students nationwide. Interns are assigned to scientists or engineers for specific projects. Approximately 20 candidates are selected each summer to work for a period of 11 weeks. A lecture series by staff members is included as a part of the program, and a full-time coordinator is in residence during the summer to assist students.

**Application Deadline:** February 1





## Vocational Programs

### DeVry Work Study

**Contact:** James L. Thompson, Personnel Manager  
Fermilab MS 116  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3324

**Objective:** To provide students part-time employment with a not-for-profit organization.

**Description:** Fermilab determines the number of students to be employed, positions, and descriptions of the duties to be performed. Students are recruited through the DeVry Work Study Coordinator's Office. These students are available 20 to 25 hours per week.

**Application Deadline:** None

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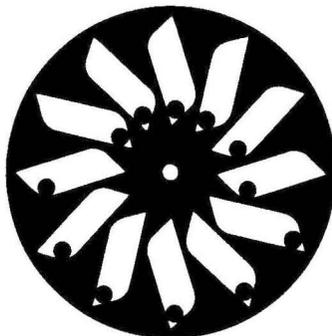
### Machinist Apprenticeship

**Contact:** Ruth E. Christ, Assistant Personnel Manager  
Fermilab MS 113  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3793

**Objective:** To support Laboratory needs for instrument machinists through an on-site formal apprenticeship program.

**Description:** A five-year program of on-the-job training and related course work leads to qualification as an instrument machinist.

**Application Deadline:** Openings are posted on the Fermilab Job Postings when available.





## Secondary Teacher Programs

### Beauty and Charm at Fermilab Workshops

**Contact:** Robin M. Dombeck  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3092

**Objective:** To prepare teachers to introduce sixth through ninth grade students to particle physics.

**Description:** A workshop is held for teachers to become familiar with a particle physics curriculum for the sixth through ninth grade, which includes simple hands-on experiments which portray concepts such as how small is small; and how to measure what we cannot see. The teachers can purchase a "kit unit" including all materials for the classroom experiments, a manual outlining the day-by-day conduct of the curriculum and audio-visual materials to supplement the curriculum. A workshop, lasting Friday evening and all day Saturday, is offered in the fall and in the winter. Teachers may receive credit for the program.

**Application Deadline:** September 14 for fall workshop; January 1 for winter workshop.

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### Chemistry West

**Contact:** Lee R. Marek  
Naperville North High School  
Ogden and Mill Streets  
Naperville, IL 60540  
(708) 420-6513

**Objective:** To provide opportunities for Summer Institute graduates and other science teachers to continue sharing successful teaching materials and strategies.

**Description:** Fermilab sponsors Chemistry West, a network organization for area teachers. The group meets monthly in a local school or college in order to share skills, teaching strategies and materials for the high school science classroom.

**Application Deadline:** NA



## DOE Teacher Research Associates Program (TRAC)

**Contact:** Kristin F. Ciesemier  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3007

**Objective:** To recognize superior science teaching and expose teachers to state-of-the-art scientific research equipment and procedures.

**Description:** Fermilab and other Department of Energy national laboratories host a summer research program for high school teachers. Candidates for the national program are nominated by their state education departments. Candidates for the regional program are nominated by their school districts. Teachers are assigned to a scientist or engineer involved in a research project at one of the participating institutions and make contact with many professional researchers. Teachers learn to acquire data and report results in a scientifically acceptable manner, skills directly transferable to the classroom. Teachers earn a salary, and national participants receive travel and housing allowances.

**Application Deadline:** Varies by state. Illinois deadline is October 15.

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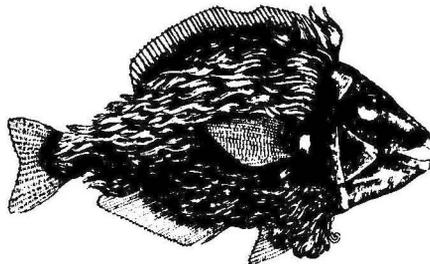
## TRAC Graduates

**Contact:** Kristin F. Ciesemier  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3007

**Objective:** To recognize superior science teaching and expose teachers to state-of-the-art scientific research equipment and procedures.

**Description:** Some teachers who have been involved in the TRAC program return to research assignments in succeeding summers. Employment selection is made by laboratory supervisors. Teachers are assigned to a scientist or engineer involved in a research project at one of the participating institutions, and make contact with many professional researchers. Teachers learn to acquire data and report results in a scientifically acceptable manner, skills directly transferable to the classroom. Teachers earn a salary.

**Application Deadline:** NA



## Down to Earth at Fermilab Workshop

**Contact:** Education Office  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3092

**Objective:** To prepare teachers to give students in sixth through ninth grades a field experience in geology on the Fermilab site.

**Description:** A workshop is held for teachers to become familiar with instructional materials. Teachers will receive instruction, work through student activities and view a videotape that will enable them to bring students to Fermilab. Techniques include identifying rocks and telling time using the sun. A morning workshop is held in the fall, and an evening workshop is held in the winter.

**Application Deadline:** September 15 for fall workshop; January 1 for winter workshop.

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## Midlevel Science Network

**Contact:** James D. Cox  
Hinsdale Junior High School  
100 S. Garfield  
Hinsdale, IL 60521  
(708) 887-1370

Susan B. Jones  
Hadley Junior High School  
240 Hawthorne  
Glen Ellyn, IL 60137  
(708) 790-6450

**Objective:** To provide an opportunity for teachers to share materials and teaching strategies with their colleagues.

**Description:** In cooperation with Argonne National Laboratory and the DuPage-Kane Educational Service Center #4, Fermilab sponsors this network organization for area teachers. The group meets monthly in a local school in order to share skills, teaching strategies and materials for the junior high/middle school science classroom.

**Application Deadline:** NA



## Physics Mini-courses

**Contact:** Kristin F. Ciesemier  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3007

**Objective:** To share materials and strategies for teaching particle physics and cosmology at the high school and college introductory level.

**Description:** Mini-courses consist of lectures by Fermilab physicists or physicists affiliated with Fermilab and demonstrations by physics teacher based on the format developed in the Summer Institute for Science and Mathematics Teachers and Topics in Modern Physics programs. Teams are available upon request to make presentations across the country.

**Application Deadline:** NA

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## Physics West

**Contact:** James Ruebush  
St. Charles High School  
1020 Dunham Road  
St. Charles, IL 60174  
(708) 584-1100

**Objective:** To provide opportunities for Summer Institute graduates and other science teachers to continue sharing successful teaching materials and strategies.

**Description:** Fermilab sponsors Physics West, a network organization for area teachers. The group meets monthly in a local school or college in order to share skills, teaching strategies and materials for the high school science classroom.

**Application Deadline:** NA



## Summer Institute for Chicago Science and Mathematics Teachers

**Contact:** Marjorie G. Bardeen  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-2031  
Bitnet: FFLA @ FNAL

**Objective:** To enhance science and mathematics teaching in the Chicago public high school classroom.

**Description:** Forty-five selected high school science teachers in biology, chemistry and physics and 15 high school mathematics teachers attend an intensive three-week institute at Chicago State University. Lecture sessions in the four disciplines are conducted on Monday, Wednesday and Friday mornings by Fermilab physicists and college faculty. On Tuesday and Thursday mornings, plenary sessions are held with nationally-known experts lecturing on interdisciplinary science topics. In the afternoon, computer instruction, lab sessions and mathematics sessions with master teachers are held at a local high school. Four follow-up sessions are held in each discipline during the academic year following the Institute. Teachers receive a stipend for their participation and earn graduate credit from Chicago State University.

**Application Deadline:** March 1

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## Summer Institute for Science and Mathematics Teachers

**Contact:** Kristin F. Ciesemier  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3007

**Objective:** To enhance science and mathematics teaching in the high school classroom.

**Description:** Forty-five selected high school science teachers in biology, chemistry and physics and 15 high school mathematics teachers attend an intensive four-week institute at Fermilab. Lecture sessions in the four disciplines are conducted on Monday, Wednesday and Friday mornings by Fermilab physicists and college faculty. On Tuesday and Thursday mornings, plenary sessions are held with nationally-known experts lecturing on interdisciplinary science topics. In the afternoon, computer instruction, lab sessions and mathematics sessions with master teachers are held at a local high school. A follow-up session is held in each discipline during the academic year following the Institute. Teachers receive a stipend for their participation and earn graduate credit from an area university.

**Application Deadline:** March 1



## Summer Science Project

**Contact:** Robin M. Dombeck  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3092

**Objective:** To augment middle/junior high school science programs through activities that incorporate hands-on investigation and small group interaction.

**Description:** The program brings 45 teachers to Fermilab for an intensive three-week institute. The institute curriculum includes seminars on basic science, training sessions on sound science instruction and inservice techniques, laboratory sessions where participants try out hands-on classroom activities and tours. During the workshop participants develop an inservice plan that will be implemented during the following school year. Presentations may be given in individual schools, in local school districts and at state and national meetings. Follow-up activities include quarterly meetings and participation in a network with teachers trained at other DOE laboratories. Teachers receive a stipend and graduate credit for their participation.

**Application Deadline:** March 1

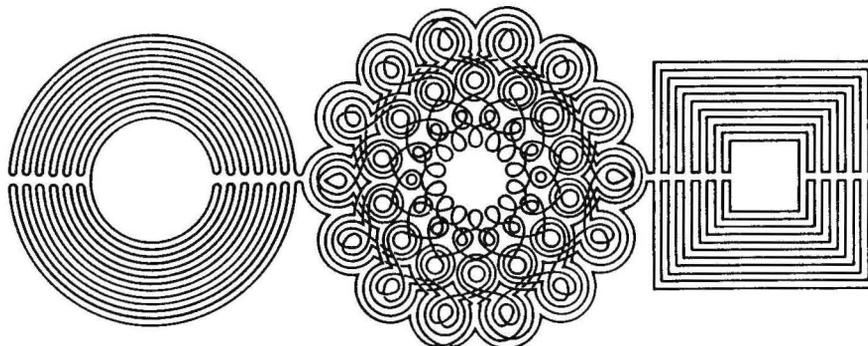
## Weird Science

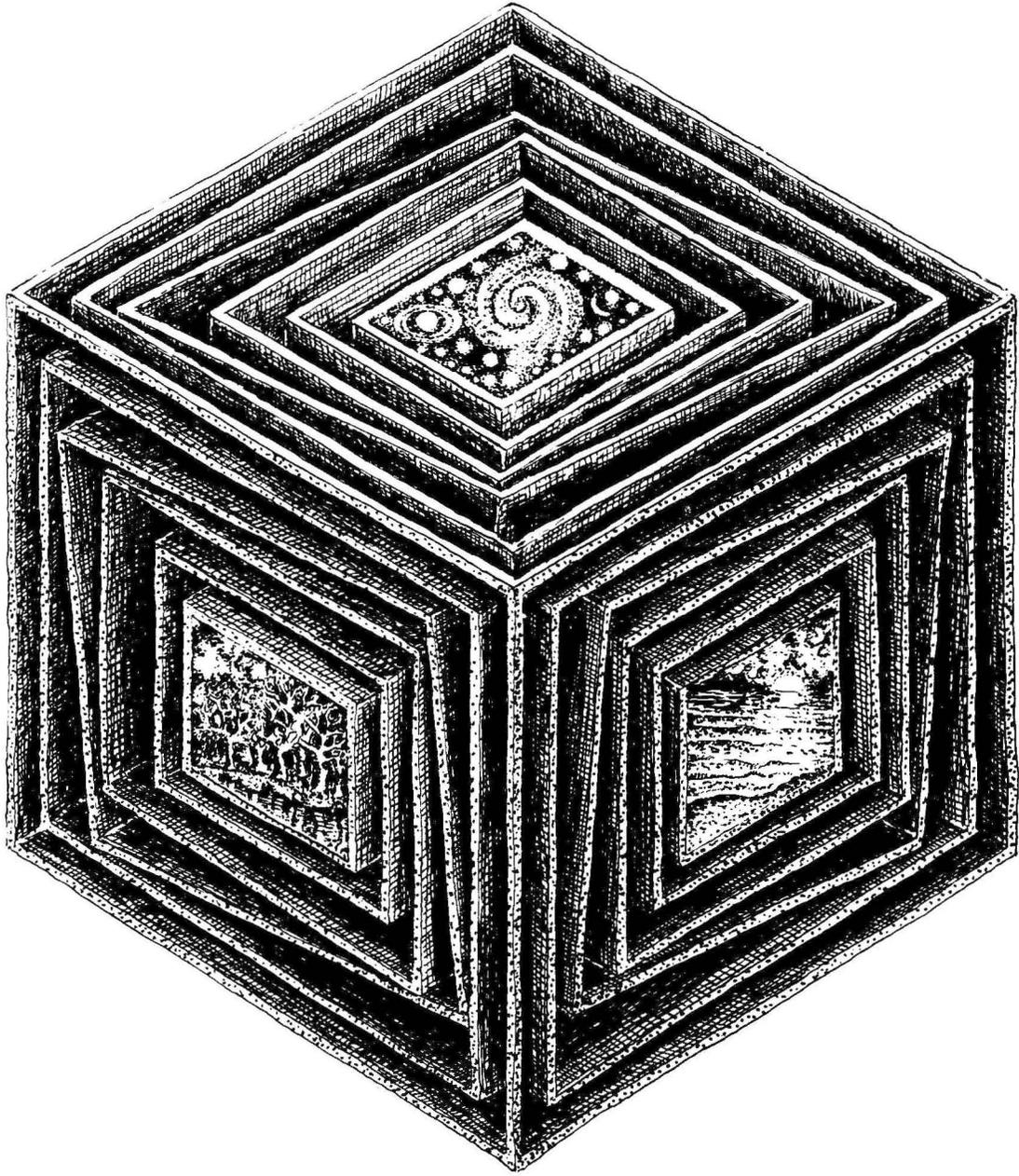
**Contact:** Lee R. Marek  
Naperville North High School  
Ogden and Mill Streets  
Naperville, IL 60540  
(708) 420-6513

**Objective:** To promote the use of demonstrations in chemistry classrooms as an effective teaching method and motivational tool for students.

**Description:** "Weird Science" is a program to turn on teachers and students to science. Four Summer Institute chemistry instructors have developed a repertoire of science demonstrations. Presentations are given for teachers at various local, state, regional and national conferences. These presentations model effective teaching methods and provide teachers with successful classroom demonstrations.

**Application Deadline:** NA







## Secondary Student Programs

### Beauty and Charm Tours

**Contact:** Priscilla Meldrin  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-4723

**Objective:** To familiarize sixth through ninth grade students with the environment in which cutting edge particle physics research is conducted.

**Description:** Students receive classroom instruction prior to the tour. Specially trained guides lead groups of students to see the preaccelerator, components in the linear accelerator gallery and the Main Control Room. The tour includes a visit to the 15th floor of Wilson Hall where students have a panoramic view of the Laboratory site and the surrounding area. Activity sheets are completed by students during the tour. After the tour, students discuss particle physics, Fermilab and career opportunities with a physicist. Also, a cryogenic presentation is given for the students.

**Application Deadline:** NA

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### DOE High School Honors Research Program in Particle Physics

**Contact:** Kristin F. Ciesemier  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3007

**Objective:** To expose gifted high school students to the research done at a world class particle physics laboratory.

**Description:** Fermilab and six other Department of Energy laboratories host a research program for gifted high school students. Participants in this program join groups of physicists and graduate students doing frontier research in the properties of elementary particles. The program includes lectures by Fermilab staff physicists, lab tours, and tutorial sessions, as well as on-the-job experiences. Students spend two weeks working and studying at Fermilab. They are supervised by high school physics teachers. Students in this program come from the fifty states, the District of Columbia, Puerto Rico and six foreign countries.

**Application Deadline:** U.S. Students are selected through the Governors' Offices.  
A typical deadline is in January or February.



## Down to Earth at Fermilab Field Experience

**Contact:** Education Office  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-4723

**Objective:** To give students some field experience in geology on the Fermilab site.

**Description:** Students visit three designated earth science study sites. At two sites, students learn about the geology of the area and conduct simple rock identification. At the third site, students determine local time and trace the path of the sun for the first days of each season.

**Application Deadline:** NA

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## Explorer Scouts

**Contact:** Dianne M. Engram, Manager, Equal Opportunity Office  
Fermilab MS 117  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-4633

**Objective:** To provide out-of-class experiences for young people interested in scientific careers.

**Description:** This program provides a planned program of career interest exposure that brings eleventh and twelfth graders into association with professional adults. The program assists young people define future career goals. Explorers usually meet twice a month on Tuesday for an hour and a half after school at Fermilab. These young adults are invited to join through a yearly survey that is provided by the Exploring Division of the Boy Scouts.

**Application Deadline:** Scouting Survey specifies the deadline.



## Fermilab-EAL Summer Science Experience

**Contact:** Kristin F. Ciesemier  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3007

**Objective:** To encourage economically disadvantaged students to continue their study of mathematics and science and to enroll in college.

**Description:** Fermilab collaborates with Educational Assistance Ltd. (EAL) to provide a science program for selected students involved in the EAL College Opportunity Program. The students spend one week at the Laboratory attending classes, visiting laboratory facilities and meeting with personnel to discuss career opportunities.

**Application Deadline:** NA

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## Guided Tours

**Contact:** Public Information Office  
Fermilab MS 206  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3351

**Objective:** To introduce high school science classes - primarily physics and chemistry - to high energy physics research and to give them an opportunity to see the extent of the facilities involved.

**Description:** Guided tours are available year-round Monday through Friday at 9:30 a.m. or 1:30 p.m. We advise booking tours as far ahead as possible especially in the spring months. The size of the group should range from 10 to 40. We ask that one instructor or responsible adult accompany every 20 students. The tour lasts approximately two hours. With prior arrangement, students may purchase lunch in the cafeteria or use Fermilab facilities for sack lunches. There is no charge for tours.

A guided tour begins in Wilson Hall and consists of an orientation talk and slide presentation followed by an opportunity to see the preaccelerator, components in the linear accelerator gallery and the Main Control Room. The tour then moves to the 15th floor where visitors have a panoramic view of the Laboratory site and the surrounding area. Because the Fermilab accelerator typically operates around the clock, students may not see the tunnels of the accelerator system or the interior of experimental areas. Teachers are provided an informational packet to use for follow-up work with their students.



## Illinois Minority Precollege Internships (IMPRINT)

**Contact:** Dianne M. Engram, Manager, Equal Opportunity Office  
Fermilab MS 117  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-4633

**Objective:** To provide a challenging opportunity for students accepted to the College of Engineering at the University of Illinois at Urbana-Champaign.

**Description:** Each student spends the summers with a participating corporation. A student must apply for admission to the College of Engineering and be admitted in order to qualify for IMPRINT. Admission is based on high school profile and standardized test scores from ACT or SAT.

**Application Deadline:** Deadline established by the University of Illinois.

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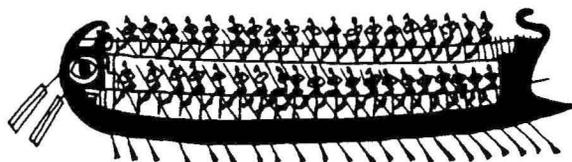
## Saturday Morning Physics at Fermilab

**Contact:** Drasko D. Jovanovic  
Fermilab MS 200  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3077  
Bitnet: SIMPHY@FNAL

**Objective:** To introduce selected high school students to topics in modern physics.

**Description:** Three times each year, a series of ten lectures is conducted at Fermilab. One hundred students from area high schools are selected by their schools to participate in each series. Lectures on topics such as "Accelerators and Detectors," "Special Theory of Relativity", "Leptons and Hadrons" and "Cosmology" are delivered by Fermilab staff experimental and theoretical physicists. The program also includes lab tours, demonstrations of equipment and instruments, and tutorial sessions led by physicists to discuss in depth the material presented in the lectures.

**Application Deadline:** September 15



## Summer Youth Employment and Training Program

**Contact:** Elvira Rodriguez  
Fermilab MS 117  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-4632

**Objective:** To provide youths ages 14 to 21 who meet eligibility requirements of the Kane, DeKalb, and Kendall Counties Job Training Departments with an opportunity to acquire work skills in order to clarify their career goals and prepare them for future employment.

**Description:** The Summer Youth Employment Training Program is basically a nine week program. Interns are allowed to work a maximum of 35 hours per week. Candidates are identified by the county agency and referred to the Fermilab Laboratory Services Section. The Equal Opportunity Office coordinates interviews, placement, and support effort with the agency.

**Application Deadline:** May of each year through KDK office

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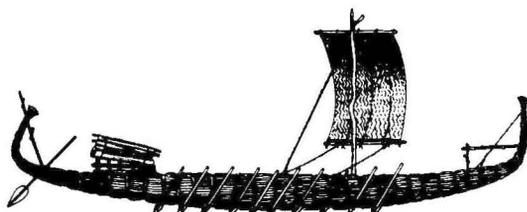
## Target: Science and Engineering

**Contact:** Dianne M. Engram, Manager, Equal Opportunity Office  
Fermilab MS 117  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-4633

**Objective:** To conduct an apprentice research program for talented minority high school students.

**Description:** Students are nominated by their schools and selected by the Fermilab Equal Opportunity Office personnel. The 25 participants, the majority from Chicago schools, spend six weeks in the program. In the mornings, they work side-by-side with a scientific, engineering or technical mentor at Fermilab. In the afternoons the students attend classes and receive assistance in the preparation of an individual or group research project. The students receive a combination of a salary and a stipend for their participation in the program.

**Application Deadline:** March 15





## Elementary Teacher Programs

### Chicago Science Explorers Workshop

**Contact:** Marjorie G. Bardeen  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-2031  
Bitnet: FFLA @ FNAL

**Objective:** To develop instructional materials that introduce students, particularly minorities, to science as a career possibility.

**Description:** Fermilab is working with a group of teachers to develop instructional materials to extend the educational impact of *Yellowstone*, a videotape in "The New Explorers" series. Students will be able to participate in interesting science activities, talk with scientists, go on a field trip to Fermilab and learn about science careers.

**Application Deadline:** NA

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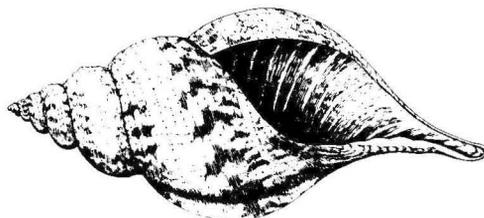
### Hands-on-Science Workshop

**Contact:** Education Office  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3092

**Objective:** To give students direct experience with the phenomena and principles of science and technology.

**Description:** A travelling collection of interactive science activities with accompanying teaching materials is available on loan to area schools. Teachers are able to provide for their students a depth of insight and involvement with science that cannot be matched in most regular classroom programs. At least one teacher from each school must attend a training workshop to become familiar with the activities and the accompanying instructional materials.

**Application Deadline:** September 14 for fall workshop; January 1 for winter workshop.



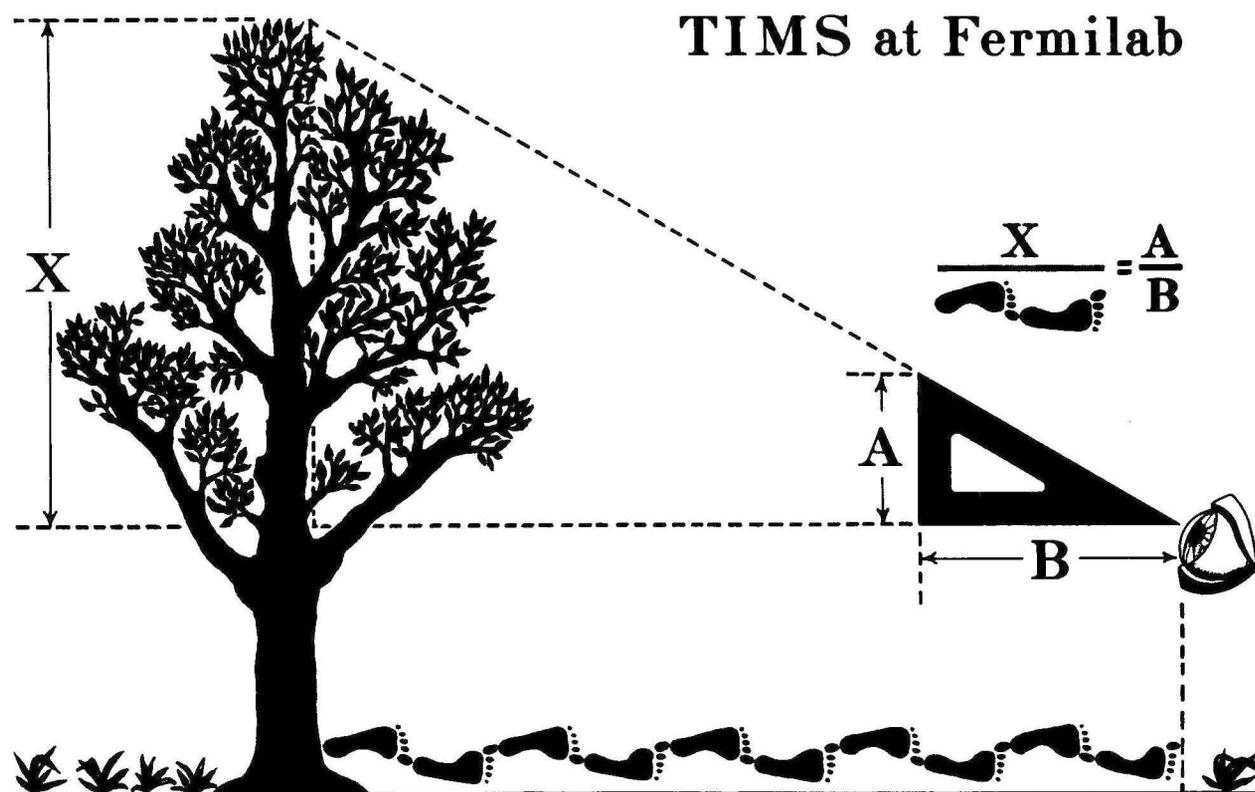
## Teaching Integrated Mathematics and Science (TIMS)

**Contact:** Robin M. Dombeck  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3092

**Objective:** To introduce Teaching Integrated Mathematics and Science (TIMS), an NSF funded curriculum project at the University of Illinois, Chicago, into schools in participating districts.

**Description:** This is a three year program for 39 elementary and junior high school teachers from ten school districts and/or private schools. The workshop curriculum includes seminars to update participants' knowledge of basic science and laboratory sessions to try out the TIMS classroom activities. Following the institute, teachers will implement the program in their own classrooms. Teachers will receive further training during the second summer to prepare them to be lead teachers. Teachers and administrators will develop a plan to integrate TIMS into the regular school curriculum. The plan will be implemented during the second and third years. Follow-up meetings are held during the school year. The Fermilab Outreach Coordinator visits teachers in their classrooms to assess and assist with implementation. Teachers receive a stipend and graduate credit for their participation.

**Application Deadline:** NA



## Elementary Student Programs

### Cryogenic Magic Show

**Contact:** Education Office  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-4723

**Objective:** To demonstrate the change in properties of materials when they are exposed to very cold temperature.

**Description:** The cryogenic show is designed to turn on teachers and students to science. Fermilab engineers have developed liquid nitrogen demonstrations that can be presented to teachers and students of all ages. Presentations are given to schools, for youth groups and in conjunction with other science activities upon request. Reservations are required.

**Application Deadline:** NA

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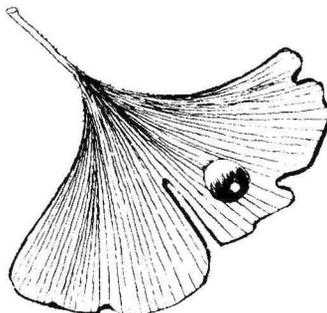
### Hands-on-Science

**Contact:** Education Office  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3092

**Objective:** To give students direct experience with the phenomena and principles of science and technology.

**Description:** A travelling collection of interactive science activities with accompanying teaching materials is available on loan to area schools. Teachers are able to provide for their students a depth of insight and involvement with science that cannot be matched in most regular classroom programs.

**Application Deadline:** Reservations can be made at the beginning of the school year.



## Weird Science

**Contact:** Lee R. Marek  
Naperville North High School  
Ogden and Mill Streets  
Naperville, IL 60540  
(708) 420-6513

**Objective:** To motivate young students to study science.

**Description:** "Weird Science" is a program to turn on students to science. Four Summer Institute chemistry instructors have developed a repertoire of science demonstrations. A limited number of presentations can be scheduled for student groups.

**Application Deadline:** NA

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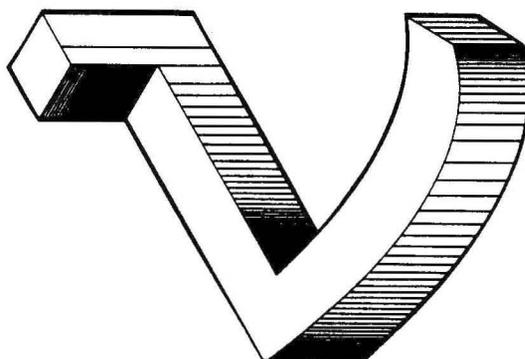
## Wonders and Magic of Science

**Contact:** Education Office  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3092

**Objective:** To reward outstanding elementary school science students and encourage them to continue their interest in science.

**Description:** Fermilab sponsors a science show for area elementary schools during National Science and Technology Week. Schools participate by extending an invitation to two outstanding science students in grades three through six. The students and their parents come to a Saturday program where high school science teachers entertain the guests with the wonder and magic of science. Students receive a demonstration kit based on one of the show's activities which they can share with their classmates. The program ends with refreshments.

**Application Deadline:** March 1



## Classes for Kids

**Contact:** Education Office  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3092

**Objective:** To offer intermediate school students hands-on science activities.

**Description:** In conjunction with the Wonders and Magic of Science program, Fermilab offers classes for students in grades three through six. Classes of eleven students are taught a curriculum developed by Hands-On Science Outreach, Inc. under an NSF grant. Teachers are trained through the HOSO DuPage/Kane County Outreach Office. Eight hours of instruction are provided.

**Application Deadline:** March 15





## Materials

### Classroom Materials

**Contact:** Education Office  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3092

**Objective:** To provide classroom materials that enhance science instruction.

**Description:** A variety of classroom materials has been developed in conjunction with FFLA education programs. These are made available free of charge or at cost to teachers. Included are: Beauty and Charm curriculum materials, Topics in Modern Physics videotapes which contain some of the Saturday Morning Physics lectures; Topics in Modern Physics Resource Book and posters.

**Application Deadline:** NA

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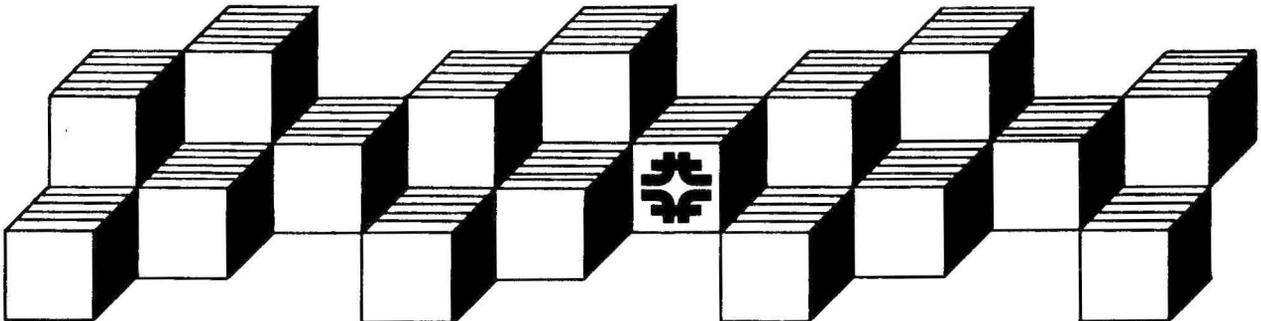
### Resources for the Science Classroom

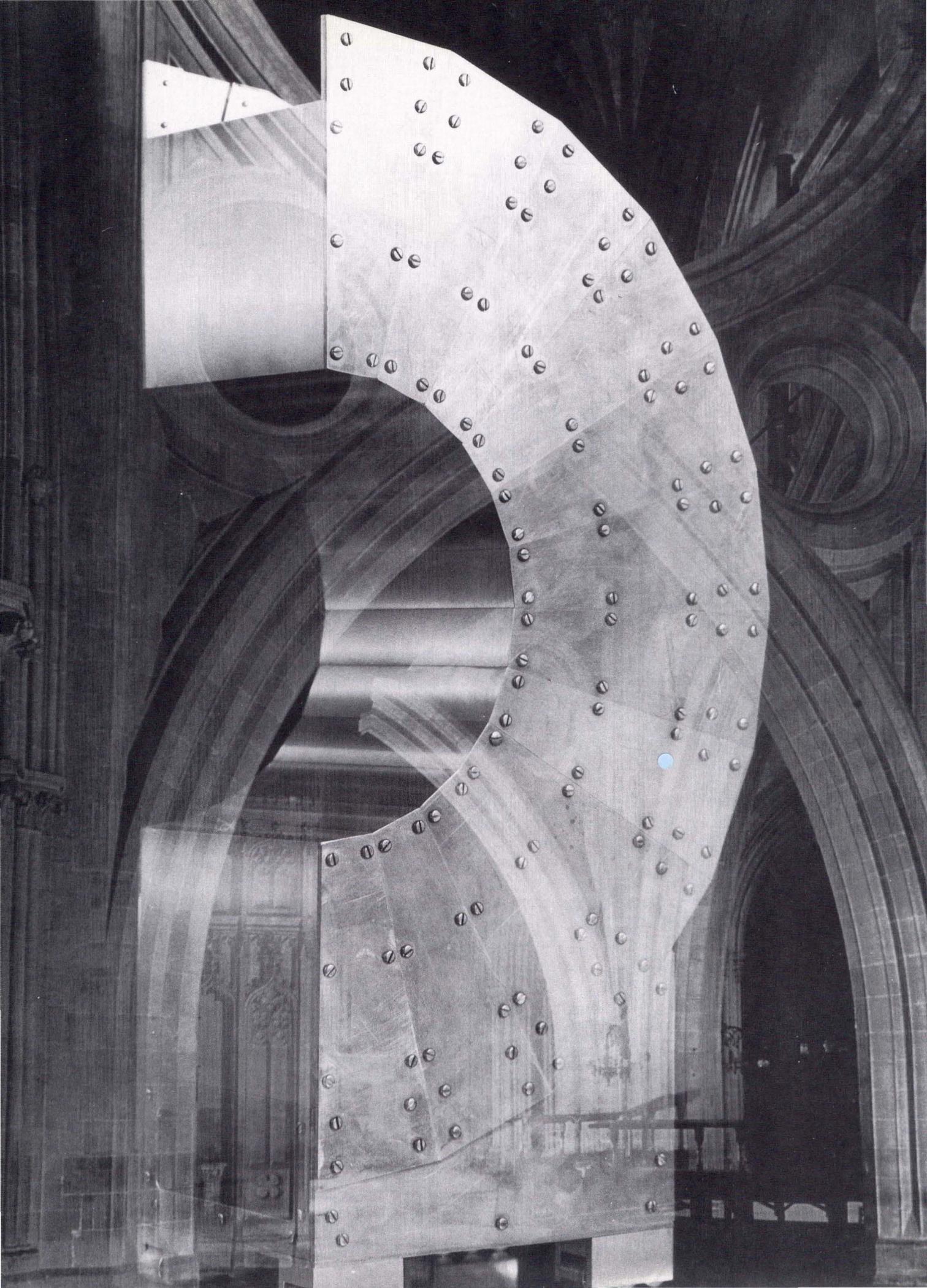
**Contact:** Education Office  
Fermilab MS 777  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3092

**Objective:** To familiarize K-12 teachers with the resources available to them in Northern Illinois.

**Description:** Fermilab has produced Resources for the Science Classroom, a manual listing over 150 opportunities for teachers to enhance the teaching of science. A data base which includes federal, state, local, not-for-profit and corporate programs, tours, materials and give-aways has been created. The listings are printed into a bound manual for easy copying and are available to schools at no charge. A second edition was published in 1987, and the resources were entered into a new data base to permit selective listings to be prepared upon request.

**Application Deadline:** NA





## Public Understanding of Science and Technology Programs

**Contact:** Public Information Office  
Fermilab MS 206  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3351

**Objective:** To provide an opportunity for the general public to visit the laboratory and to understand the mission of Fermilab.

### Guided Tours

**Description:** Guided tours are available year-round Monday through Friday at 9:30 a.m. or 1:30 p.m. We advise booking tours as far ahead as possible. We reserve the spring months (March, April and May) exclusively for school groups. The size of the group should range from 10 to 40. Tour participants must be at least 14 years old. The tour lasts approximately two hours. With prior arrangement, students may purchase lunch in the cafeteria or use Fermilab facilities for sack lunches. There is no charge for tours. A guided tour begins in Wilson Hall and consists of an orientation talk and slide presentation followed by an opportunity to see the preaccelerator, components in the linear accelerator gallery and the Main Control Room. The tour then moves to the 15th floor where visitors have a panoramic view of the Laboratory site and the surrounding area.

**Special Groups:** Groups with an educational or scientific focus may arrange for an evening dinner tour or a Saturday luncheon tour. Groups of various sizes will be accommodated.

**Summer Sunday Tours:** Sunday tours are offered at least four times a year during the summer months. The overall format varies from year to year, but a regular feature of the tours is an opportunity for visitors to talk with a physicist about his/her work at Fermilab.

### Self-guided Tours

**Description:** Self-guided tours are available seven days a week between 8:30 a.m. and 5:00 p.m. for groups of ten or less. There is no age restriction. However, children under 16 must be accompanied by a responsible adult. Self-guided tour booklets are available at the reception desk inside the front doors of Wilson Hall. (Wilson Hall is accessible to the handicapped.) This tour consists of a walk through exhibit areas on the 15th floor and includes a video presentation, slides, display models and equipment, and three observation areas which overlook the entire Laboratory site. A walk through the Atrium on the first floor of Wilson Hall and a site drive-around tour are also described.

The Margaret Pearson Interpretive Trail is a quarter mile self-guiding nature trail through a portion of Fermilab's restored prairie. Located on the north side of the Pine street exit of the site, the trail is open to the public during daylight hours.



## Off-site Speakers

**Description:** Representatives of the Public Information Office are available for presentations to groups within a twenty-mile radius of Fermilab.

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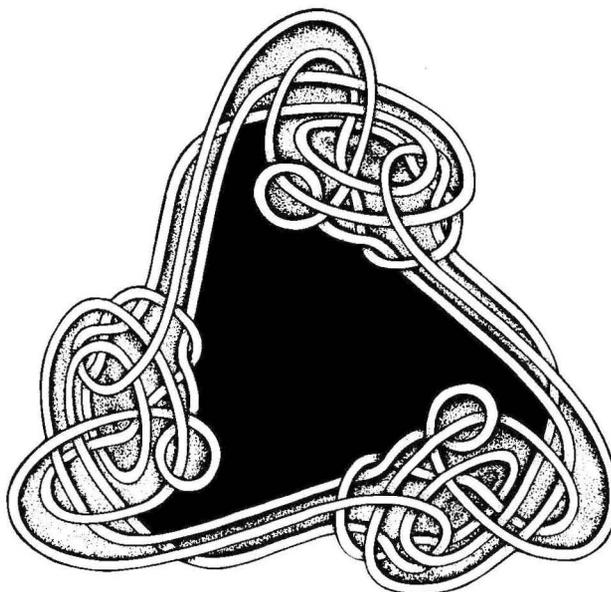
## The Science and Human Values Lecture Series

**Contact:** Janet Conrad  
Fermilab MS 356  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3706  
Bitnet: CONRAD@FNAL

**Objective:** To enhance public interest in and understanding of science.

**Description:** The Science and Human Values Lecture Series brings together science and humanities in a way which shows their interrelationships and which makes both more understandable. Information about the lectures may be obtained in person at the information desk in the Wilson Hall atrium or by calling 840-ARTS. Tickets may be picked up in person or by sending a check and stamped self-addressed envelope to Fermilab MS 111, P.O. Box 500, Bataiva, IL 60510.

**Application Deadline:** NA



## Education Programs for Laboratory Employees

### English as a Second Language

**Contact:** Ruth E. Christ  
Fermilab MS 113  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3793

**Objective:** To provide visiting scientists and spouses with English instruction enabling them to attain a proficiency in English appropriate to their needs at Fermilab.

**Description:** Classroom instruction in conversational English is offered at three levels - for those who speak no English, for those who understand and speak some English and for those who also need some instruction in written English.

**Application Deadline:** Classes are on-going.

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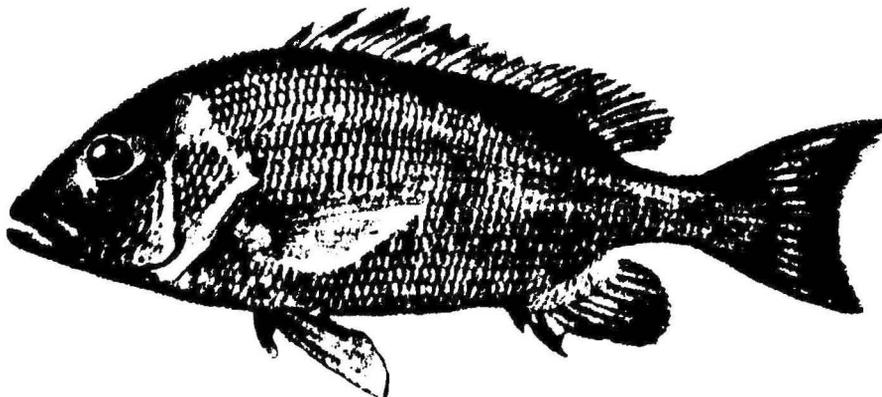
### Fermilab Scholarships

**Contact:** Ruth E. Christ  
Fermilab MS 113  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3793

**Objective:** To encourage the children of employees to attain college degrees.

**Description:** Universities Research Association, Inc. awards a number of scholarships to full-time employees' children who are currently high school seniors and who will begin a four-year college degree program. The maximum amount of the scholarship is \$3000 for tuition and fees and is renewable for four years if the student maintains good academic standing. Scholarships are awarded on the basis of SAT scores.

**Application Deadline:** March 1



## Machinist Apprenticeship

**Contact:** Ruth E. Christ  
Fermilab MS 113  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3793

**Objective:** To supplement Laboratory needs for instrument machinists through an on-site formal apprenticeship program.

**Description:** A five-year program of on-the-job training and related course work which leads to qualification as an instrument machinist.

**Application Deadline:** Openings are posted on the Fermilab Job Postings when available.

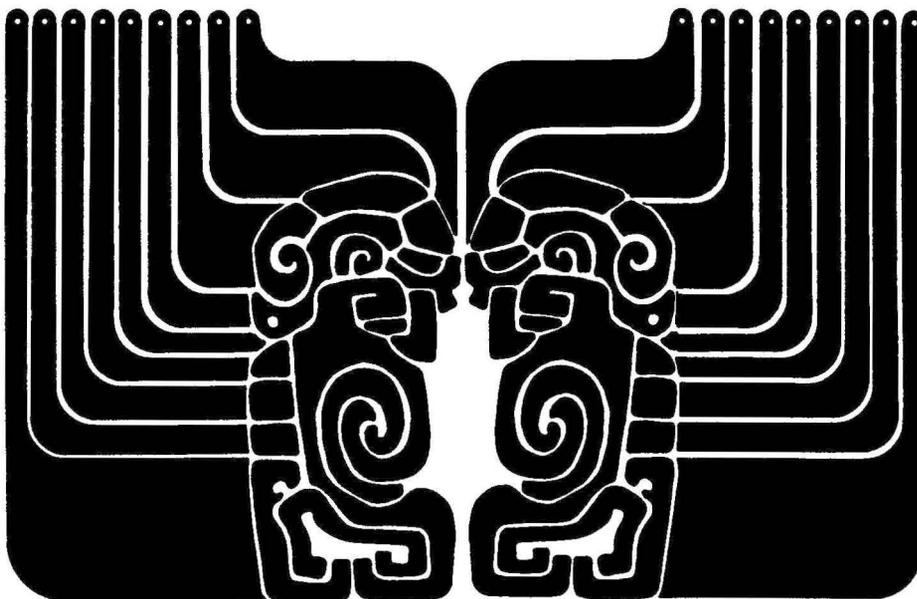
## On-site Training

**Contact:** Ruth E. Christ  
Fermilab MS 113  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3793

**Objective:** To orient employees to Fermilab policy/procedures and to facilitate the development of skills specific to Lab operations.

**Description:** The Laboratory offers a variety of technical and non-technical classes/courses. Topics include: supervisory development, equal opportunity concerns, pre-retirement planning, safety, data processing, operator training, etc.

**Application Deadline:** Training is scheduled as needed.



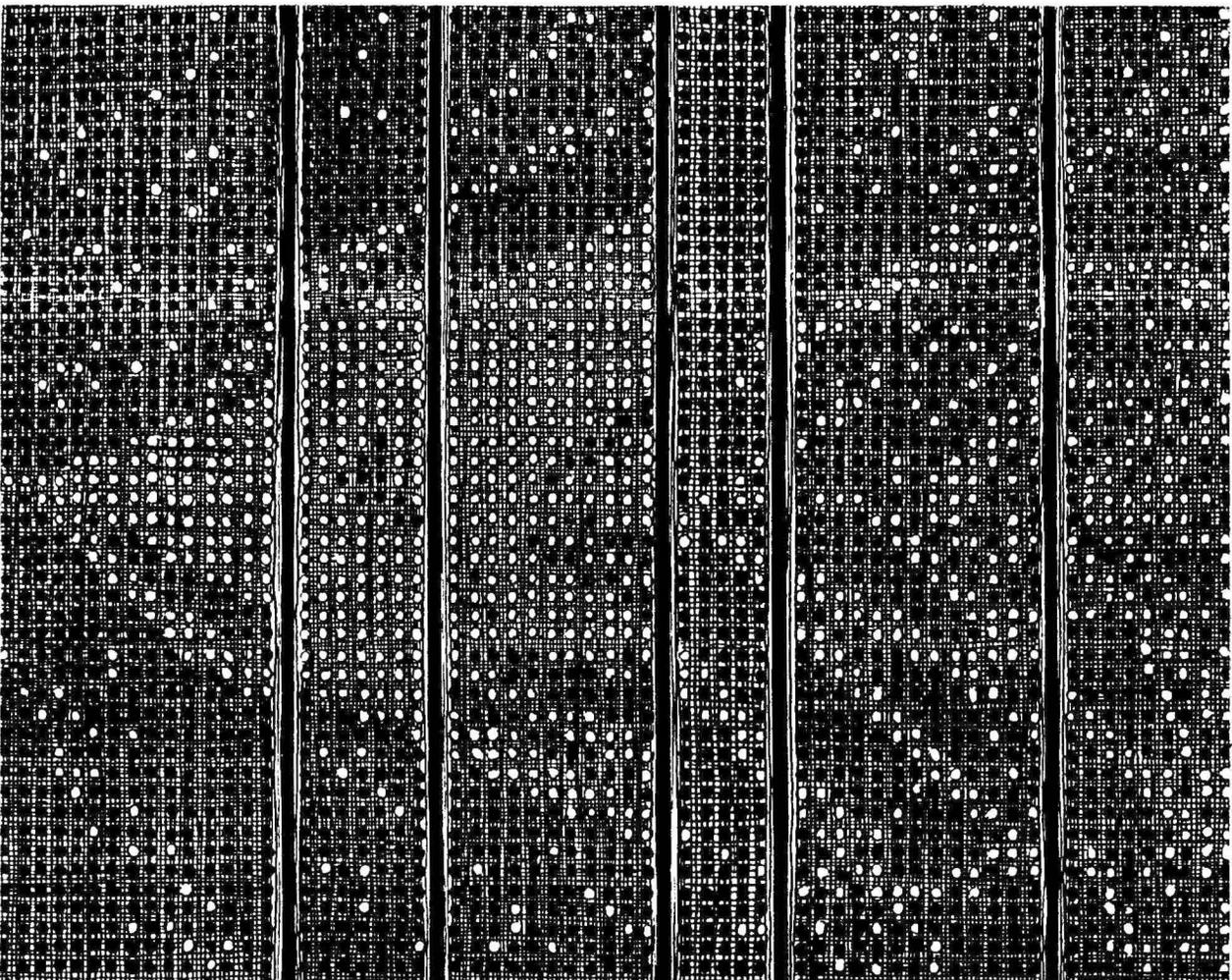
## Tuition Refund

**Contact:** Ruth E. Christ  
Fermilab MS 113  
P.O. Box 500  
Batavia, IL 60510  
(708) 840-3793

**Objective:** To encourage employee development by financially supporting formal education.

**Description:** Course work and degree majors which are related to an employee's current job or a possible future job are reimbursed for regular, full-time employees. One hundred percent of the tuition, required fees and required books for up to ten hours per term are reimbursible for satisfactorily completed work.

**Application Deadline:** NA

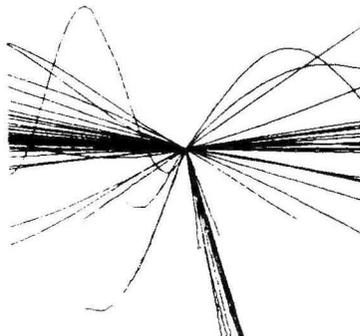


## Summary of Education Program Activity at Fermilab

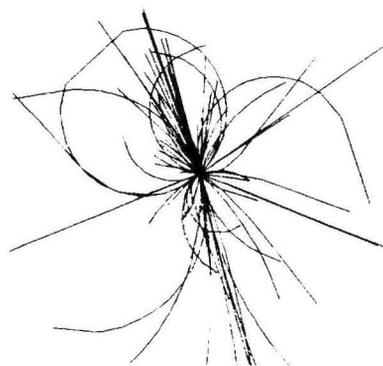
Program Name	Contact Person	Level
Beauty and Charm Tours	P. Meldrim	Junior High
Beauty and Charm Workshop	R. Dombeck	Junior High
Chemistry West	L. Marek	High School
Chicago Science Explorers Workshop	M. Bardeen	6 - 12
CINVESTAV Fellowships	R. Rubinstein	Graduate
Classes for Kids	Education Office	3 - 6
Classroom Materials	Education Office	K - 12
CO-OP/Internships	J. Lasenby	Undergraduate
Cryogenic Magic Show	Education Office	K - 12
DeVry Work Study	J. Thompson	Post High School
Doctoral Fellowships	D. Ingram	Graduate
DOE High School Honors Research Program	K. Ciesemier	High School
DOE Teacher Resource Associates	K. Ciesemier	High School
Down to Earth at Fermilab Workshop	Education Office	6 - 8
Down to Earth Field Experience	Education Office	6 - 8
English as a Second Language	R. Christ	Adult
Explorer Scouts	D. Ingram	High School
Fermilab Scholarships	R. Christ	College
Fermilab-EAL Science Experience	K. Ciesemier	High School
Graduate Engineering for Minorities	J. Thompson	Graduate
Guided Tours	Public Information Office	High School and Up
Hands-on Science	Education Office	K - 6
Hands-on Science Workshop	Education Office	K - 6
Illinois Mathematics & Science Academy	D. Jovanovic	High School
Illinois Minority Precollege Internships	D. Ingram	High School
Joint University-Fermilab Doctoral Program in Accelerator Physics	R. Rubinstein	Graduate
Lederman Fellowships	J. Appel	Postdoc
Machinist Apprenticeship	R. Christ	Post High School
Midlevel Science Network	J. Cox, S. Jones	Junior High
Off-site Speakers	Public Information Office	Adult
On-site Training	R. Christ	Adult
Physics Mini Courses	K. Ciesemier	High School - College
Physics West	J. Ruebush	High School
Postdoctoral Appointments	J. Appel, G. Dugan, E. Kolb, W. Bardeen	Post Graduate

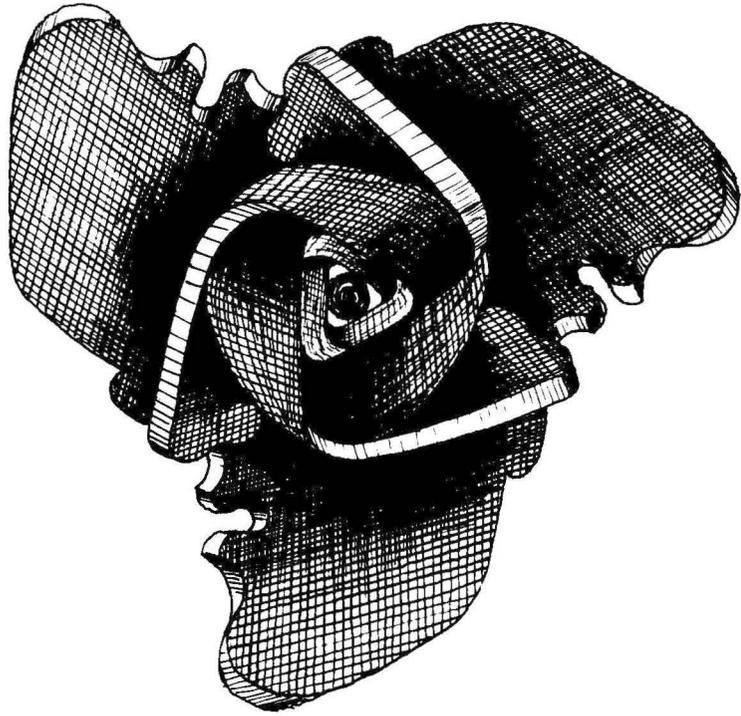
Length	Number of Participants	Number of Staff
Half day + up to two weeks classroom	1,900 Students; 40 teachers	5 Fermilab - 400 hours
Weekend - Three times a year	40 Teachers	2 Teachers
Once a month X 9 months	450 Teachers	1 Teacher
8 weeks	1 Teacher	1 Fermilab
2 - 3 years	2 CINVESTAV Students	2 Fermilab
8 hours: once a week X 4 weeks	21 Students	2 Teachers
NA	NA	1 Fermilab
16 weeks average	45 Students	22 Fermilab
1 hour	1,000 Students	3 Fermilab
25 hours per week X 52 weeks	14 Students	14 Fermilab
2 - 3 years	5 Students	5 Fermilab
2 weeks	58 Students	6 Teachers; 25 Fermilab
8 - 10 weeks	9 Teachers	9 Fermilab
Half day	-	1 Teacher
Half day - all day	-	1 Fermilab
3 hours per week	24 Students	1 Fermilab
2 hours per week X 36 weeks	32 Students	6 Fermilab
4 years	Varies	
1 week	14 Students	1 Teacher; 3 Fermilab
12 weeks	4 Students	4 Fermilab
Half day	2,709 Students; 254 Teachers	1.2 Fermilab
Two weeks per school X 15 schools	1,500 Students; 60 teachers	1 Teacher
Half day	60 Teachers	1 Teacher
NA	NA	NA
10 weeks	0 Students	0 Fermilab
2 - 3 years	9 Students	9 Fermilab
3 years	1 Postdoc	
All year	0 Students	0 Fermilab
Once a month X 9 months	75 Teachers	
	NA	
Variable	Varies	
Half day - 2 days	150 Students; 200 teachers	6 Teachers
Once a month X 9 months	150 Teachers	1 Teacher
2 years	52 Scientists	NA

<b>Program Name</b>	<b>Contact Person</b>	<b>Level</b>
Resources for the Science Classroom	Education Office	K - 12
Sabbatical Appointments	Fermilab Departments & Director's Office	Faculty
Saturday Morning Physics at Fermilab	D. Jovanovic	High School
Science and Human Values	J. Conrad	Adult & Older Students
Lecture Series		
Self-guided Tours	Public Information Office	Under 16 accompanied by adult
Summer Institute for Chicago Science and Mathematics Teachers	M. Bardeen	High School
Summer Institute for Science and Mathematics Teachers	K. Ciesemier	High School
Summer Interns in Science and Technology	D. Engram	Undergraduate
Summer Interns for Physics Majors	D. Jovanovic	Undergraduate
Summer Science Project	R. Dombeck	Junior High
Summer Youth Employment Training Program	E. Rodriguez	High School
Target: Science and Engineering Teaching Integrated	D. Engram	High School
Mathematics and Science	R. Dombeck	K- 8
Theory Visitors	W. Bardeen	Faculty
Topics in Modern Physics	K. Ciesemier	High School
TRAC Graduates	K. Ciesemier	High School
Tuition Refund	R. Christ	Adult
Weird Science	L. Marek	K - 12
Wilson Fellowships	R. Johnson	Postdoc
Wonders & Magic of Science	K. Ciesemier	3 - 6



<b>Length</b>	<b>Number of Participants</b>	<b>Number of Staff</b>
NA	NA	1 Fermilab
Varies	Varies	
10 Sat. mornings X 3 sessions 2 hours	300 Students NA	25 Fermilab
NA	NA	
4 weeks + 4 follow-up days	60 Teachers	35 Educators; 4 Fermilab
4 weeks + 1 follow-up day	60 Teachers	41 Educators; 10 Fermilab
11 weeks	20 Students	1 Faculty; 17 Fermilab
10 weeks	22 Students	22 Fermilab
3 weeks + 4 follow-up days	45 Teachers	9 Teachers; 3 Fermilab
8 weeks	3 Students	3 Fermilab
6 weeks	25 Students	3 Teachers; 17 Fermilab
2 weeks + 4 follow-up days	39 Teachers	4 Teachers; 10 Fermilab
1 week to 1 year	60 Faculty	NA
3 week workshop & materials development	25 Teachers	6 Teachers
8 - 14 weeks	17 Teachers	17 Fermilab
NA	Varies	
1 - 2 hours	1,000 Students; 400 Teachers	5 Teachers
3 years	8 Fellows	
Half day	470 Students	5 Teachers





## Credits

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Photographs

Cover: Reidar Hahn

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Reidar Hahn, Joe Kerke, Reidar Hahn, Reidar Hahn, Nadine Mungai, Reidar Hahn

p. i - Endpaper, clockwise, upper left first:

Nadine Mungai, Reidar Hahn, Reidar Hahn, Reidar Hahn, Reidar Hahn, Reidar Hahn

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Drawings and Vignettes

Angela Gonzales

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P.O. Box 500 • Batavia, Illinois 60510  
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