

FermiNews

Fermi National Accelerator Laboratory

Volume 18

FRIDAY, NOVEMBER 17, 1995

Number 20

CDF AND DZERO: WORKING TOGETHER TO ADVANCE DETECTOR PHYSICS

by Donald Sena, Office of Public Affairs

As Fermilab prepares for the future in high-energy physics, the Laboratory must maintain a certain synergy. If technology and engineering advance in one field, other areas must progress in parallel, as with the DZero and CDF experiments and their future benefactor—the Main Injector.

The Main Injector, which will begin operating by 1999, will greatly increase the luminosity of the Tevatron, resulting in many more collisions per second at DZero and CDF. Without upgrades, the detectors at the two experiments would not be able to keep up with the higher luminosity, and all those extra collisions would be for naught.

“Detectors have to keep up with the accelerator to achieve more precision in the physics measurements that we are making,” said Ron Lipton, a DZero experimenter and head of his experiment’s silicon detector project.

These studies include “better measurements of the mass of the top quark, [and] more accurate measurements of the intermediate bosons, which are carriers of the electroweak force. All of those things benefit from having higher luminosity...”

Because upgrading the detectors is a laborious and expensive task, requiring great expertise in multiple fields, CDF and DZero are cooperating on the project. When scientists complete the upgrades, components



Photo by REIDAR HAHN

Mike Roman, of the silicon detector development staff, with Ron Lipton (right), at the silicon detector facility at Lab D.

in the two detectors will be different in detail but similar in concept and development. Both experiments are using a common facility for silicon detector construction, a common engineering staff to design them, and a common electronics development effort as well, according to Lipton.

“It is really important...to understand that the two experiments have worked together to build the infrastructure of the detectors,” said Lipton.

“The Laboratory just can’t afford to build many independent, similar devices. It is just too expensive in terms of dollars, but mostly in terms of manpower, expertise and technical abilities. And so I think the coopera-

tion has worked out [fairly] well.”

Jim Hysten, a CDF physicist and head of his experiment’s scintillating fiber project, agreed and said the sharing of knowledge has greatly benefited CDF.

Of the many facets to the
continued on page 2

Inside

URA EXPECTED TO GROW	4
FERMILAB EDUCATORS AND LIBRARIANS ADD VALUE TO THE WORLD WIDE WEB.	5
ICALEPCS	6

CDF and DZero: Working Together to Advance Detector Physics

continued from page 1

upgrades of the two experiments, some of the most ambitious involve the two inner layers of detectors—the silicon vertex tracker and scintillating fiber technology, according to Lipton.

CDF developed much of the technology for the silicon vertex tracking, and DZero pioneered the development of the scintillating fiber tracking system.

SILICON VERTEX TRACKER

A silicon vertex tracker, made possible by technology that grew out of the microelectronics industry, consists of a piece of silicon with microscopic detector strips imprinted directly on it. The strips are sensitive to particles passing through them. Technicians connect sets of 128 strips to a SVX chip with a wire thinner than a human hair. Scientists and engineers from both Fermilab and the Lawrence Berkeley Laboratory in California developed the SVX chip.

As a particle passes through the detector, it knocks out electrons that the microstrips collect; this is the “signal” of the particle. The signal then goes through the wire to the chip. The chip amplifies the signal, then delays the charge. A “delay” stores the event information for 32 collisions; this infinitesimal amount of time gives the trigger hardware a chance to analyze the event and decide if it should be kept. The trigger will generally keep one interesting event out of approximately 1,000 total events.

If the event is worth keeping, the SVX chip turns that charge into a digital number, and a computer converts the digitized information to a readout that physicists can study.

When silicon vertex trackers were first used for experiments at the Large Electron Positron collider at CERN, each separate silicon detector had 40,000–50,000 “channels” for detection.



Photo by REIDAR HAHN

Ron Lipton, DZero scientist, holds a test fixture containing a microstrip detector and test board.

The detectors now being developed for CDF will have about 400,000 channels per detector, and the DZero version will have about 800,000 channels, allowing much more precise measurements than any seen in the past.

“In the end, when you display a track coordinate, a single piece of information about that track coordinate is contained in that one channel of electronics. So, the more channels you have, the more detail [you] can measure about the tracks,” said Lipton.

SCINTILLATING FIBER TECHNOLOGY

The next layer of detectors after the silicon vertex trackers is the scintillating fiber. Technicians weave fibers together in a very precise array of ribbons and then place the ribbons and their mountings onto cylinders. When a particle passes through, a brief flash of light occurs. That light travels down an optical fiber, similar to the kind used in telecommunications. The light then hits a Visible Light Photon Counter. The VLPC changes the flash of light into an electrical signal for a better reading and then converts the signal to digitized information. A computer trans-

lates that data into information physicists can study. Scientists keep the VLPC very cold because it is sensitive to thermal “noise” generated by heat.

The scintillating fiber is not as fine grained as the silicon, but more fine grained than the next layer of detectors in CDF, the wire drift chambers, said Hysten.

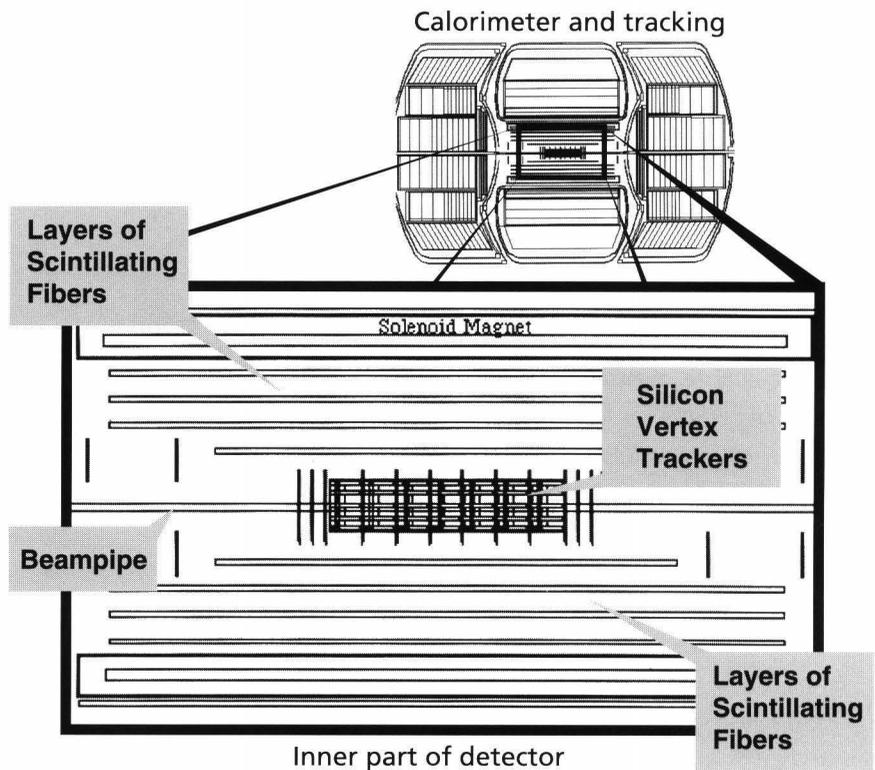
A goal of the new detector technology will be to pinpoint the “displaced vertex” of a particle. This technique enables scientists to track a particle back to where it first decayed.

Rockwell International Corp. developed VLPC technology for the military, and Fermilab staff helped adapt it for the Laboratory.

DISPLACED VERTEX

A goal of the new detector technology will be to pinpoint the “displaced vertex” of a particle. This technique enables scientists to track a particle back to where it first decayed. A particle often decays before it gets out of the vacuum pipe and hits the first detectors. Physicists use the displaced vertex to find out where the particle first decayed by

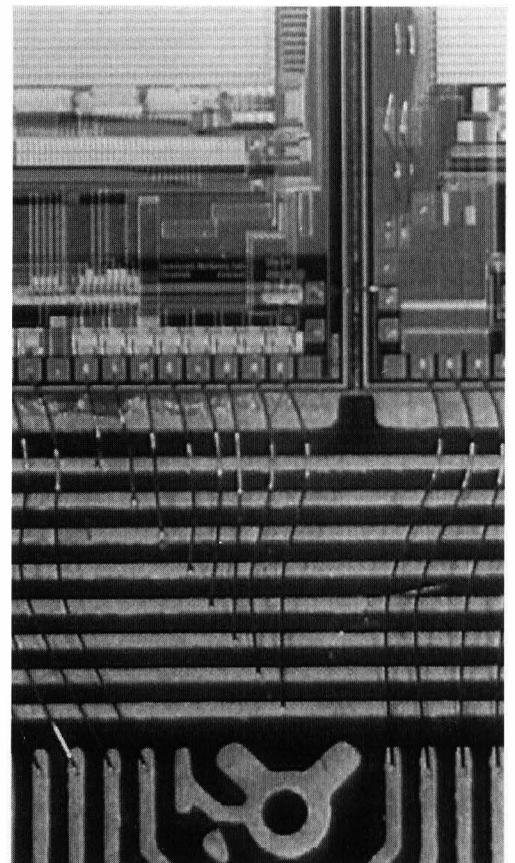
DZero's future upgraded detector



“retracing” its steps. CDF has used this technique in the past, but DZero did not previously have the technology to exploit it. With the upgrades, both experiments will be able to use the displaced vertex technique. =

OTHER UPGRADES

Along with the inner layers of the detectors, other components of CDF and DZero will be getting upgrades. For example, scientists in DZero are developing a new muon system to measure muons that don't pass through the entire steel system. DZero and CDF are also revamping the calorimeter electronics system and other electronics components to keep up with the higher luminosity generated by the Main Injector. □



A close-up of an SVX chip microbonded to a readout board.

URA EXPECTED TO GROW

by Donald Sena, Office of Public Affairs

The letter of application to Universities Research Association, Inc. listed fairly impressive credentials: "The University of Pisa, which was established in 1343, is one of the oldest..., as well as one of the most active, universities in Italy today, both in human and in natural sciences. Galileo Galilei was born and lectured at Pisa, and Enrico Fermi and Carlo Rubbia were our students."

Besides Pisa, three other universities recently submitted applications for membership, and URA officers expect two more to formally apply. The prospective members would raise URA's total to 86 institutions and add the first European university to the prestigious group.

This year's applicants include the University of California-Davis, Kansas State University and New Mexico State University, along with Pisa. At this writing, applications from the University of Florida and the University of New Mexico are clearing administrative hurdles, and URA expects them soon. The association last added a new member in 1993 with the addition of Waseda University in Japan.

Ezra Heitowit, vice-president of URA, said all six new institutions have strong physics programs and all have faculty members involved in research at Fermilab. He said he believes the universities will easily make it through the election process.

"I see no problems; they are all well qualified," said Heitowit.

Membership in URA gives the institutions a chance to voice their views and ideas about Fermilab's direction.

"URA provides a forum for member universities to participate in the

governance and oversight of Fermilab," said Heitowit.

URA'S HISTORY AND STRUCTURE

In 1965, Frederick Seitz, the president of the National Academy of Sciences, met with presidents of various American universities that had particle physics programs in their curricula. The group discussed the possibility of creating a particle accelerator on a scale too large for any single university to build and operate. Twenty-five of the university presidents agreed to form a consortium for that purpose, which eventu-

They, in turn, appoint a Board of Trustees that can have up to 15 participants, seven of whom must be URA-member presidents from seven different geographic regions in the U.S. The other eight appointees can come from industry, non-member universities or other areas.

The Trustees, who make general policy decisions and engage in long-term planning, appoint a Fermilab Board of Overseers comprising up to 18 people. The Board is "responsible for oversight of the general management and operation of assigned programs," according to URA's annual report.

THE URA ELECTION PROCESS

To become a URA member, a university must agree to pay a \$10,000 assessment fee and meet the established criteria.

The following information, excerpted from a letter to one of the applicants, describes the criteria. Each institution must have "(a) reasonable output of Ph.D.'s in relevant disciplines; (b) commitment to support at least two experimental high-energy physics [faculty] positions; (c) at least fifteen physics faculty; (d) at least fifteen physics graduate students who have reached thesis research; (e) adequate strength in related areas (e.g., mathematics, library resources, etc.)."

These criteria are currently being reviewed by the Physics Committee of the Fermilab Board of Overseers for possible changes to reflect a broader scientific orientation.

Institutions apply for membership by submitting letters describing how they meet the above criteria and providing additional background information, such as their graduate catalogues. The letters can also include other relevant information to bolster their cases.

The initial letters, along with any supporting information, serve as a

*The prospective
members would
raise URA's total
to 86 institutions
and add the
first European
university to the
prestigious group.*

ally led to the incorporation of URA. Two years later, URA became a contractor to the Atomic Energy Commission (now the Department of Energy) to build and operate the National Accelerator Laboratory, later renamed for Enrico Fermi. Since then, URA has grown to include 80 universities in the United States, Canada and Japan.

The URA Council of Presidents comprises the 80 university heads.

continued on page 8

FERMILAB EDUCATORS AND LIBRARIANS ADD VALUE TO THE WORLD WIDE WEB

by Leila Belkora, Office of Public Affairs

Two groups in the Fermilab community have found new ways to put the World Wide Web to work for Fermilab physicists and for the benefit of students in 12 local districts. In one instance, members of the Library and Publications Office staff greatly expanded the scope of the Information Resources home page. Beginning in August of this year, the changes enabled users to view the full text and figures of recent documents from their own terminals and linked the Fermilab library to others around the world.

In the other case, education specialists from the Lederman Science Center and members of the Computing Division designed a course to help teachers make good use of the Internet and WWW in their classrooms, and won a \$150,000 grant from the Illinois State Board of Education (administered through a not-for-profit organization, Friends of Fermilab) to train teachers during a two-year program.

LIBRARY ON THE WEB

Library patrons will often find that the new home page has obviated the need for a trip to the third floor to read a recent reprint. "The number of people checking our home page has really been growing since the summer," says Beth Anderson, systems librarian. Technical editor Jean Slisz from the Publications Office adds preprints from Fermilab and some of those received from other institutions to the Information Resources Web server (<http://www-pubs.fnal.gov/>). Once a week, new arrivals make their way onto the Web page and find their niche in the on-line catalog, thanks to a collaboration between Anderson, Catalog Librarian Robert Atkinson, and Library Administrator Sara Tompson.

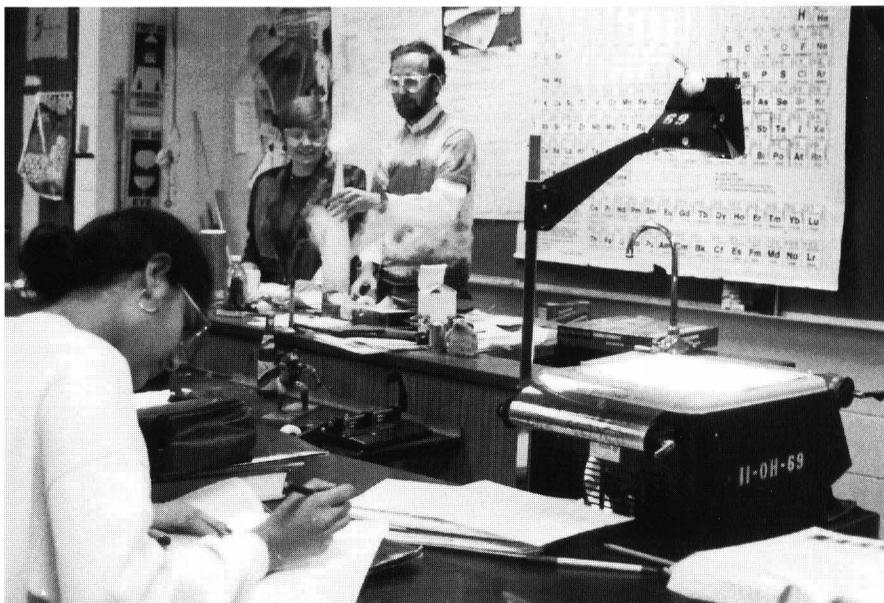


Photo by Leila Belkora

Cheryl LaMaster, director of Naperville North High School's Instructional Materials Center, and Lee Marek, Chemistry teacher, take a break between class periods to demonstrate properties of dry ice. Both educators are participating in the on-line leadership program at the Lederman Science Education Center.

Anderson and her colleagues have made links between the Fermilab library page and other reference resources available on the Web, relying on experience with Fermilab users to select the most valuable remote sites, and have registered the Information Resources page with Internet directories, so that researchers at other institutions will know of information available here.

ON-LINE LEARNING

With so much information available via computer, and in the face of great popular awareness of the Web, it is not surprising that school principals and other educators are keen to make the new technology a part of the school day. But how does a teacher turn the fun of connecting to sites on the Web into a learning experience? Marge Bardeen, Kris Ciesemier, Laura Mengel, and Liz Quigg studied the needs of teachers in local school districts and came up with a proposal to the Illinois State Board of Education.

Theirs was one of 17 applications to be funded, in a field of 180. "Our goal is to train a lead team [of teachers] from each of 12 school districts," says Marge Bardeen. "We assume they already have computer skills and know how to get on to the Internet." With support from the director, the Distributed Computing Department of the Computing Division provides expertise for this Lederman Science Center program (http://www-ed.fnal.gov/linc/linc_home.html).

At Fermilab the teachers learn where to find information, how to integrate the resources available over the Web into a class project, and how to write the language to create a home page for their project. A class of elementary school students may study pollution in a stream, perhaps using techniques they learn about on the Web. They may publish their data on their Web page, and communicate with students doing similar projects in distant areas. This year's classes of teachers at Fermilab will

continued on page 10

ICALEPCS IN CHICAGO

by Leila Belkora, Office of Public Affairs

“E kaleps.” That’s how to pronounce the acronym for the International Conference on Accelerator and Large Experimental Physics Control Systems, held October 29-November 3 at the Swissotel in downtown Chicago. At least, that is how Fermilab physicist Peter Lucas, conference chairman, says it. The biennial conference was co-hosted this year by Fermilab and the Advanced Photon Source of Argonne National Laboratory, and drew 320 participants. The largest non-local contingent came from CERN, the European Laboratory for Particle Physics; in total, 19 nations were represented. “ICALEPCS” may not roll off the tongue in quite the same way for all the conference participants.

The conference is devoted to problems of running complex computer control networks, particularly for detectors, accelerators and arrays of astronomical telescopes. “I came here to get the lowdown on the philosophy of control systems,” says Greg Sherwin, member of the computing staff at the Stanford Linear Accelerator Center. Control systems are typically responsible for such tasks as broadcasting data to a number of operators, synchronizing clocks, and transferring data at a high rate. ICALEPCS allows computing and engineering specialists to share information on control systems they

have developed, and perhaps to agree to standardize their approaches.

Participants at this year’s gathering presented papers on solutions to common problems. For example, experimentalists at Fermilab, CERN, and Italy’s Frascati laboratory have integrated an industrial software package, LabView, into their control systems, saving time and money. Several groups reported on feedback systems, which can dramatically reduce the time required to start an accelerator. Frederic Momal of CERN and Martin Knott of ANL praised the use of the World Wide Web and Internet: as a manager of a collaborative software development effort, Knott found that the use of the Internet as a forum for troubleshooting “gives reassuring evidence that the collaboration is alive, responsive to calls for aid, and helpful even to those not actively participating in the question-and-answer activity.”

This reassurance is particularly valuable when collaborators are spread across three continents, as they are in the case of the Gemini 8-meter telescope control team. Indeed, many participants attended ICALEPCS for the first time this year, recognizing that communication among control system developers is an increasingly important problem. Says Sherwin, “Everybody will have to be more integrated in the future.” □

MILESTONES

BORN: A son, Dustin Michael, to Troy Hamlin, CDF technician, and Loretta Hamlin, on Oct. 28 in Joliet.

HONORED: Hans Jostlein, Fermilab physicist, for receiving U.S. Patent No. 5,315,259 for a “Capacitive Probe;” and David Anderson, Fermilab physicist, and Brian Kross, an engineer from the Department of Energy’s CEBAF Laboratory in Virginia, for receiving Patent No. 5,319,203 for “Cerium Fluoride Scintillating Material,” with certificates and cash awards at a ceremony at Fermilab on November 8 (see right).

HONORED: Venkat Kumar, Fermilab engineer, by the Association of Energy Engineers, Iliana Chapter, as the Association’s Energy Manager of the Year, on October 11.

HONORED: Fermilab, also by the Association of Energy Engineers, Chicago Charter Chapter, for “Environmental Projects” including lighting and heating retrofits, on October 26.

HONORED: John Peoples Jr., Fermilab director, awarded the Distinguished Alumni Award by Staten Island Academy, on November 11. “The joy of learning and the pursuit of knowledge are core to an Academy education, and your career in scientific research embodies the noblest of endeavors. The accomplishments of Fermilab under your leadership are admirable and inspiring,” wrote the Academy in advising Peoples of the award.

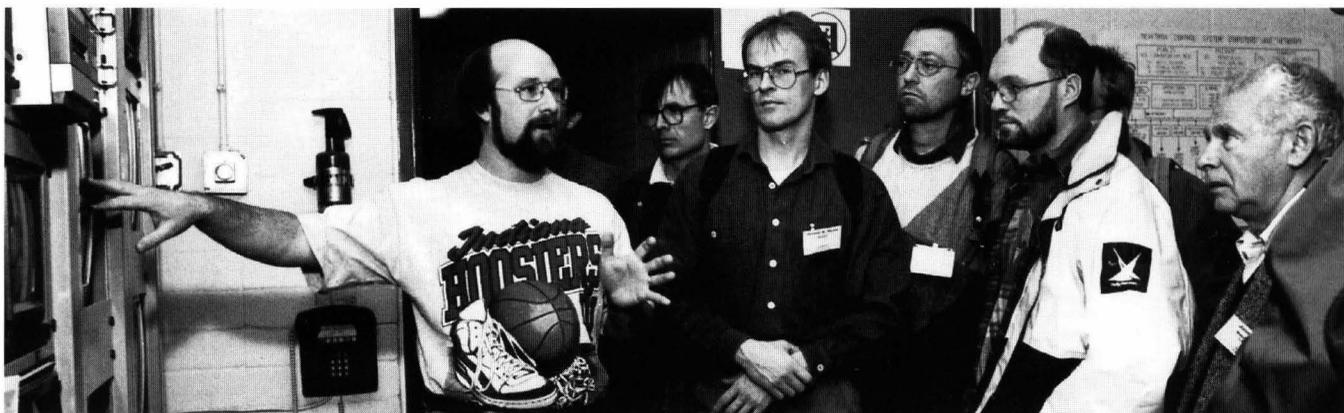
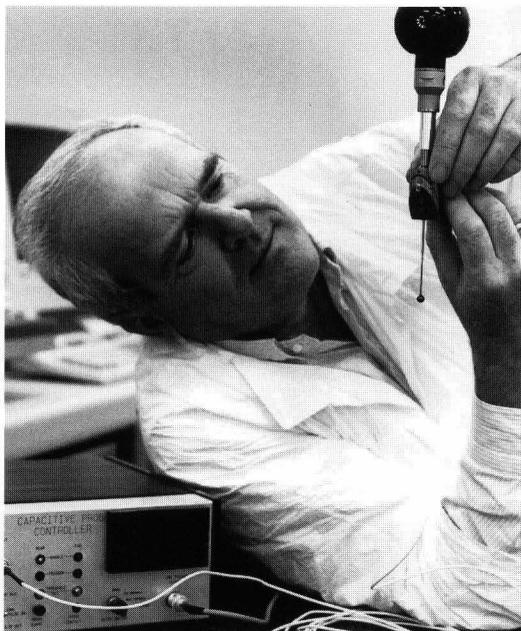
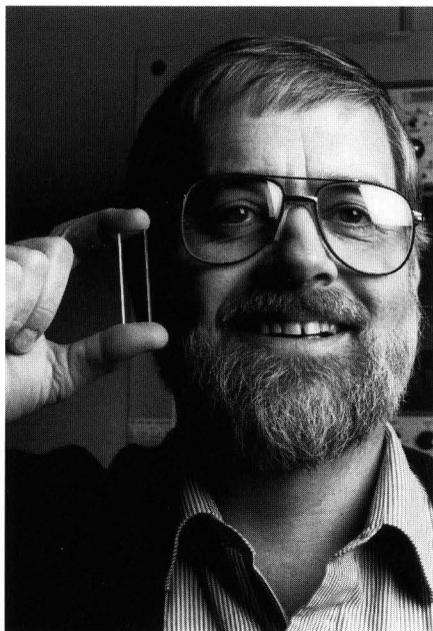


PHOTO BY REIDAR HAHN

Brian Hendricks of Fermilab's Controls Department explains the accelerator control system during a Laboratory tour by ICALEPCS participants on October 31.



Photos by REIDAR HAHN

PATENTS NO LONGER PENDING

Fermilab physicists David Anderson (left) and Hans Jostlein display inventions for which they recently received U.S. patents. A November 8 ceremony (see "Milestones") recognized their achievements.

BENEFITS NOTES

Cut medical and dependent care costs

■ November is Open Enrollment Month for Fermilab's Dependent Care Reimbursement Account and Health Care Reimbursement Account. These accounts allow employees to withdraw tax-free dollars that they set aside through salary reduction to pay for dependent care expenses and for eligible health care expenses that Laboratory health insurance does not cover. Using before-tax dollars to pay these expenses effectively lowers their actual cost.

All employees except day workers and summer employees may set aside up to \$2,000.00 in the Health Care Reimbursement Account and up to \$5,000.00 in the Dependent Care Reimbursement Account.

Those who want to sign up for calendar year 1996 must complete new forms. Employees currently enrolled were sent new forms; other employees should contact the Benefits Office, 15WHSW, M.S. 126, Extension 3395, for enrollment forms or information. Completed forms must be returned to the Benefits Office by the close of business on November 30, 1995 for coverage to be effective on January 1, 1996.

Invitation

Information Resources Department

Open House

The Information Resources Department (the Library and the Publications Office) invites you to attend an Open House on Thursday, November 30, 1995, in the Library, WH3X, from noon - 2:00 p.m. Please come and learn how the Information Resources Department can help you with your information needs.

The Open House will include demonstrations of new technology and resources available from the Library and the Publications Office:

- Library Web server access to the Library on-line catalog
- Access to monthly and weekly preprint lists and full-text publications
- Library homepage access to SPIRES
- Links between Library catalog and full-text publications
- Article citations on CD ROM

Staff will answer your questions: How do I submit a technical report for preprinting? How can I electronically submit my technical paper to the Publications Office? How can I retrieve full-text publications from the Publications Office fileservers? How do I print a preprint from SPIRES or the Los Alamos Web site? How do I get copyright forms properly executed to protect my rights and the Laboratory's?

Refreshments and door prizes.

THE LOST, THE FOUND, AND THE SUSPICIOUS

by Judy Jackson, Office of Public Affairs

"The sweaty gym clothes are the worst," says Bill Flaherty, supervisor of Fermilab's Communications Center. "We get a lot of athletic bags, and we usually have to look through the contents to identify the owners." Flaherty is describing the typical items that people bring to the Comm Center on Wilson Hall's first floor, home of Fermilab's Lost and Found.

Mostly it's a prosaic lot that turns up in Lost and Found—keys, hats, jackets, odd gloves, sack lunches... "Once a lady lost a purse with \$752 in it," Flaherty recalls. "She didn't even realize she'd lost it until we called her."

The Comm Center staff keeps found items for 30 days (except for the lunches!) and then disposes of them, donating unclaimed but

usable items to local charitable organizations. Flaherty urges those who have lost items to check with his staff more than once, since it sometimes takes a day or more for lost items to arrive in Lost and Found.

Similarly, the staff asks those who find stray items to turn them in to Lost and Found promptly—with one exception. "If you find a suspicious package that you can't identify, leave it where you find it and call 3131," says Romesh Sood, head of Fermilab's Emergency Management Department. "Use common sense and don't pick up or open something that could be dangerous."

Events such as last year's attack on the Federal Building in Oklahoma City and the mail bombings of the so-called "Unabomber" have drawn attention to such hazards. Sood adds that Fermilab's status as a prominent

government science laboratory and the Laboratory's openness to the public may increase its vulnerability, and he urges particular caution by employees and users.

What makes a box or a briefcase a "suspicious package"? Sood suggests calling Security at 3131 if you find:

- An unidentified box or wrapped package in a public area, especially if the package lacks identifying markings, such as an address or return address, or a description of its contents, or if the wrapping looks unusual.

- An unattended briefcase or duffle bag, left in a public place, that you don't recognize or that doesn't have markings to identify it.

Flaherty echoes this advice and adds one more guideline. "If it's ticking," he says, "don't bring it to Lost and Found." □

URA Expected to Grow

continued from page 4

formal application, which is first screened by the Board of Overseers, which eventually makes its recommendation to the Board of Trustees. The Trustees, in turn, review the recommendations and applications and nominate universities to the entire Council of Presidents.

The Council reviews the information and votes on each institution at its annual meeting; the entire URA membership must elect a nominee by a two-thirds majority.

On September 29, the Board of Overseers recommended that the Trustees nominate all six for membership, with the University of Florida and University of New Mexico receiving provisional recommendations pending the receipt of formal application letters.

The Trustees subsequently met on November 1 and formally nominated all six. The Council of Presidents meets on January 25 and will vote on the applicants, among other business.

Neutron Therapy Press Conference

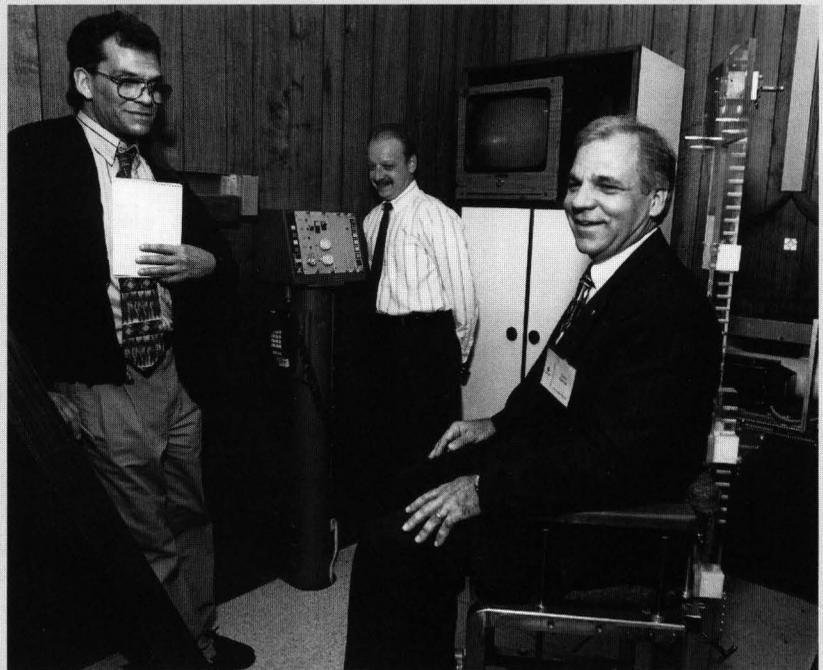


Photo by REIDAR HAHN

President Larry Narum of Saint Joseph Hospital, Elgin, tries a treatment chair at Fermilab's Neutron Therapy Facility. Narum joined Fermilab officials and Saint Joseph physicians for a joint press conference at the Laboratory November 2 to announce the signing of a contract under which Saint Joseph will operate NTF. Reporter Tom Schleuter of the Kane County Chronicle and NTF staff member Brian Pientak look on.

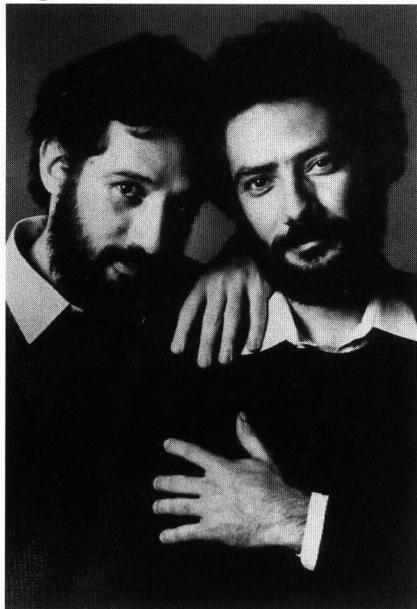
FERMILAB CALENDAR

NOV. 17

NALREC's Thanksgiving party at Kuhn Barn at 5:15 p.m. Turkey raffle, music by Heartbeats, pizza by the slice provided by Connie's.

NOV. 18

The Fermilab Arts Series presents Sergio & Odair Assad.



The Duo guitarists perform at Fermilab's Ramsey Auditorium at 8 p.m. For tickets (\$15) and more information, call the box office at (708) 840-ARTS.

NOV. 21

Blood pressure screening will take place in front of the Users Office at 11:30 a.m. to 1 p.m.

NOV. 22

Country line dancing classes start Wednesday, Nov. 22 and last through Jan. 17 from 5:30 -7 p.m. at the Kuhn Barn. Each class will offer two new dances and a review of the dances taught the previous week. Dance step sheets will be provided. No partner necessary, but feel free to bring one. Cost per class is \$5. For more information or to register, contact Jean Guyer at x2548.

NOV. 30

Brown Bag Seminar, "Fit for Life," presented by Greg Wojciechowski, noon-1 p.m. in 1 West Conference Room.

NOV. 30

DEADLINE TO ENROLL IN FERMILAB'S FLEXIBLE BENEFITS PLAN.

The deadline to sign up in Fermilab's Benefits Office for the Health Care Reimbursement and Dependent Care Reimbursement Accounts is Nov. 30. For forms or information, call Benefits Office at x3395, x4362, x4361, or stop by 15WHSW (see **BENEFITS NOTES** on page 7 for more information).

NOV. 30

Information Resources Department Open House. In the Library, WH3X, noon-2 p.m. Come and learn how the Information Resources Department can help you with your information needs (For more information, see page 7).

DEC. 2

The Fermilab art series presents **Voice of the Turtle.**

The Music of the Sephardic Jews performed at Fermilab's Ramsey Auditorium at 8 p.m. For tickets (\$15) and more information, call the box office at (708) 840-ARTS.

DEC. 5

Brown Bag Seminar on "Options for Eldercare."

What's available? How do you access services? What to do when "you're miles away and still caring." Presented by Carol McIntyre, 1 West Conference Room, noon to 1 p.m., for information, call EAP Office at x3591.

DEC. 8

NALREC's Employee Christmas party at Kuhn Barn, 5:15 to 9:15 p.m. Band will be Chicago Express, featuring our very own Larry Bradley, food will be brats and rib tips. Gift raffles winners must be present; for more information call Ed Justice at x3632.

MENU

Chez Léon

Lunch served from 11:30 a.m. to 1 p.m. - \$8.00/person
Dinner served at 7 p.m. - \$20.00/person

For reservations call x4512

<p style="text-align: center;"><u>WEDNESDAY, NOVEMBER 22</u></p> <p style="text-align: center;">Cheese Fondue</p> <p>Mixed Marinated Vegetable Salad</p> <p>Pineapple Slices in Rum</p>	<p style="text-align: center;"><u>THURSDAY, NOVEMBER 23</u></p> <p style="text-align: center;">CLOSED</p>
<p style="text-align: center;"><u>WEDNESDAY, NOVEMBER 29</u></p> <p style="text-align: center;">Fiesta Fajitas with Flour Tortillas and Pico de Gallo</p> <p>Fresh Papaya with Lime</p>	<p style="text-align: center;"><u>THURSDAY, NOVEMBER 30</u></p> <p style="text-align: center;">Chestnut Soup with Cognac Cream</p> <p>Roast Saddle of Venison with Red Wine Sauce</p> <p>Autumn Squash</p> <p>Vegetable of the Season</p> <p>Black Forest Cake</p>

CLASSIFIEDS

FOR SALE

■ 1985 Toyota Celica GT Liftback, 5 speed, A/C, cruise, AM/FM radio, rear defroster/wiper, recent clutch, brakes, belts, hose, plugs, 113K miles, one owner, runs good, \$1,900/obo. call Bill, x3020 or 708-983-7047.

■ 100 H.P. Johnson Outboard motor, Model #100 ESL72R, \$1,000, Mike Van Densen, x4054.

■ Men's gray leather jacket, size 40L, with zip-out winter lining, excellent condition, \$40. Mink cape, excellent condition, dark brown, \$70, call Lois at x4372 or 708-393-2183.

■ G.E. electric stove/oven and microwave combo unit, self cleaning, \$275, almond, call Greg at x3011 or 708-557-2523.

■ Need a quick sale! 8-year-old house with nine large lovely rooms, a soaring two-story, 23x16 ft. sun

room, with a 2nd floor balcony/breakfast room, four bedrooms, 2 full baths, big utility room. Gorgeous new stainmaster carpet, new kitchen with custom crafted cherry cabinets including a pantry. Hardwood floors in entry and kitchen. Butterfield Estates across from Lab, near I-88. Naperville schools, only \$149,711. Call our agent, Angus Woodbury of Remax Affiliates at 708-420-2002 or 708-820-0024.

■ 1993 Mazda Protege DX, 4 door, white, air conditioning, 5 speed, power steering, power brakes, tilt steering wheel, AM/FM cassette, low mileage, excellent condition \$8,700 /obo. Call (708)515-8542.

■ Home, Schaumburg, immaculate condition, 4 BR, 2-1/2 BA, 2 car garage, minutes to expressways, new carpet, freshly painted, on 1/3 acre, quiet neighborhood, walk to all schools, \$235,900, call Bob for more information at x3528.

■ Baby cockatiels for sale, hand raised, very tame, ready before Christmas, \$40. Call x3230 or 708-896-6255.

■ 1989 Dodge Daytona, 5 speed, red AM/FM cassette, A/C, runs well, 160K miles, \$2,000/obo. Call x5223.

GIVEAWAY

■ Latest catalogs and literature on electronics and other Lab-related commodities, free. Available to all Fermilab employees and users at distribution center, WH13W, next to the elevators. Collection updated daily.

WANTED

■ 16 1/2 bias ply tire for light truck with or without rim, call Henry at x3377 or 708-665-2434.

■ Electric race car sets from the 1960s or 1970s. Call Mike at x4248.

Educators, Librarians, WWW

continued from page 5

develop the skills to manage a class project using the Internet, and will in turn instruct teachers in their home schools next year. An important feature of the Fermilab leadership course, says Kris Ciesemier, is that "The teachers can come back for help." Over ten years' experience running educational programs has taught the specialists at the Lederman Science Center that continuing support is the key to success in introducing a new program, along with hands-on experience, classroom trials, a team approach, and commitment and support from the school district, all of which seem to be in place for this project. "If this doesn't work," says Ciesemier, "nothing will." □

The deadline for the Friday, December 8 issue of FermiNews is Tuesday, November 28.

Please send your article submissions, classified advertisements and ideas to the Office of Public Affairs.

FermiNews welcomes letters from readers.

Please include your name and daytime phone number.

FermiNews

Fermi National Accelerator Laboratory

FermiNews is published by the Fermilab Office of Public Affairs

MS 206, P.O. Box 500 Batavia, IL 60510 • 708-840-3351 • TOPQUARK@fnal.gov

Fermilab is operated by Universities Research Association, Inc.

under contract with the U.S. Department of Energy.