

# FermineWS

FERMI NATIONAL ACCELERATOR LABORATORY

## The Fermilab experimental program: vital and changing

The research program at Fermilab has come a long way since the first experiment began in 1970. Once confined to a number of small experiments, the research program has grown considerably and now includes several large experiments, some with collaborations of over a hundred researchers. Some of the experiments are so large now that many of those involved do not know all of the workings of the experiment as researchers on past projects once did.

"When I was working on my thesis experiment," Director **John Peoples** said, "three or four people worked on it, including my professor. Everybody knew everything in it. I certainly knew everything. I could fix things; there wasn't a thing I didn't know. Take a detector like CDF - no single person knows more than a few percent. It's just too vast."

Today, the experimental program has evolved into experiments that are much bigger and have longer runs, said Research Division Acting Head **Roger Dixon**. "The present collider run, for example, is much longer than I would have imagined five or seven years ago. These experiments are large and complicated and they are not like some of the experiments that I did even in the last 10 years."

Since August of 1970, 861 experiments have been proposed at Fermilab, and nearly 400 of these have been completed thus far. Experiments at Fermilab can take anywhere from a few months to 10 years to complete, said Assistant Director **Roy Rubinstein**. The time it takes to complete the experiment depends on its complexity and other factors, such as the amount of testing needed prior to the actual startup of the experiment.

The number of people on an experiment can vary as much as the amount of time it takes to run. According to Roy, the number of people involved can range from 2 to over 300, and can include people from many different countries and universities. "Typically, at any one time, there are 17 or so countries on our active program," Roy said. "There are about 80 U.S. institutions and 60 foreign. Roughly one quarter of our users are from foreign countries."

The staff structure of an experiment is another variable. "People come and go," Roy said. "Gener-

ally, the senior people stay with an experiment, but a graduate student may get his or her Ph.D. on an early part of the experiment and then may take a job somewhere else. And meanwhile, new research associates and graduates students come in. There is always change."

The amount of proposals Fermilab receives each year can also vary. For example, the Laboratory received 19 proposals in 1990 and 34 in 1991.

Usually, an experiment begins simply with an idea by a physicist or group of physicists. After careful research, the proponents of the experiment submit a proposal to the director, who passes it to the Physics Advisory Committee, or PAC, for consideration. PAC is a committee established by the director to advise him on all aspects of the physics program at the Laboratory. The committee meets three to four times a year to consider proposals for experiments.

The first step in the approval process involves an initial presentation by the experimenters to PAC. After careful examination of the proposal, PAC compiles a list of questions that the proponents answer prior to the next PAC meeting. These questions often center on things which the committee feels the proposal did not go into enough detail on, or questions about calculations or issues in the proposal that need justification.

Once the initial review process is over, PAC makes its recommendation to the director, who either approves, defers decision or rejects the experiment.

When an experiment is approved by the director, called Stage I approval, the proponents must write a Memorandum of Understanding with the Lab. This document is signed by both the Laboratory and the experimenters and details what each Laboratory section and division will provide and what the proponents will provide on that experiment. The projected costs of the experiment are also outlined in this document. Funding for an experiment can come from a number of sources, including the National Science Foundation, the Department

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## On the job: experimenters



*Nancy Grossman: "I always liked math and science. It was the hardest...so it was the most interesting and challenging."*



*John Jiang: "I feel like I am a part of the collaboration and I think the Lab offers a lot of support and services for experimenters."*

For an experimenter, life at Fermilab can be a mix of fun, hard work, quiet triumphs and long hours. And, as four experimenters will attest, working on an experiment can be very rewarding and a key to their future.

**Eddie Kuns**, a 27-year-old graduate student from Rutgers University, came to Fermilab and the CDF Experiment 775 in 1989.

"I got involved in the experiment by luck," Eddie said. "I was a summer student working on code for CDF in 1988. At the time, I understood the bit of code I was working on, but I didn't have the 'big picture' of where the bit of code fit in with the rest of the experiment and the data acquisition system. The big picture is only gained after a year or two of experience working full-time on the experiment. When I went back to Rutgers, I decided I was interested in staying on CDF. The professor I was working with, Terry Watts, was happy with the way I worked. Later he became my thesis advisor and I joined the experiment in May of 1989."

Eddie said he has always been interested in science and somehow gravitated to physics without even thinking about it. "I'm actually interested in all of the sciences but physics is most interesting because it is somehow the most fundamental. I have always wanted to know why and how."

Finding out why and how is a big part of Eddie's role in the CDF experiment. His main responsibility is to maintain a specific part of the Level 3 data acquisition control software. This software involves several distinct programs which communicate with one another. According to Eddie, most of his time is spent split between working on physics and carefully watching the Level 3 trigger log files to make sure everything is functioning normally. "I've been spending less and less time on Level 3 except for maintenance duties as we find and eliminate the bugs—but I still have a lot of documentation to write!"

"The one thing I like about working here is I get to do many things. If I get tired with one of them, I can always work on the other. And if I am trying to hunt down some bug and I just can't find it, or if I am trying to think what is the best way to do this, I can put it away for a week and think about it in the back of my head. I would not like a job where I had to do the same thing every day."

Eddie said he also enjoys the respect that comes from working in this position. "When I first came here, I didn't necessarily get a whole lot of respect. I had opinions, but I didn't really know all that much. Now, I have had to speak up for Level 3 enough so

that I am recognized within the collaboration. Some people have asked me if I am a post-doc or a grad student. I take that as a compliment."

While here, Eddie said he wants to accomplish a few simple things. Most importantly, graduate. "I want to graduate, and that's what I think about first, probably because I have already finished five years of graduate school."

Eddie hopes to be finished with his thesis on tau physics and lepton universality in one and a half to two years. "The two-year date is called the mythical two years, though, because it is two years from now, every year," Eddie said. "My advisor says I'll be finished in a year and a half. I think he is optimistic, but I like his estimate better than mine."

So far, Eddie has not decided what he will do after he graduates. He said will stay in physics, but is not sure if he will continue in academia or go into research.

In the meantime, Eddie keeps enjoying his work and tries to stay as young as possible. "I try to remain child-like. I got a lot of attention last summer when I would skateboard to lunch and back. Oh, and I still slide down banisters."

For 28-year-old **Simone Dell'Agnello**, being a student experimenter at CDF is a bit different.

Simone first came to Fermilab from his home town of Sanvincenzo, Italy in 1985 on a 20-day tour organized by the University of Pisa. Enjoying what he saw, Simone returned to Fermilab in 1987 for three months as a summer student, and then again in 1988 as a graduate student working on his thesis on QCD. While working on his thesis, which is the equivalent of a U.S. masters degree, Simone also was employed by Fermilab as a guest scientist. In July 1989, he finished his graduate thesis and is now working on his Ph.D. at CDF, using data from the silicon vertex detector, or SVX.

Simone's interest in physics started from a love of astronomy. "I had a real passion for astronomy," Simone said. "But the place where I could do it was too far from home, so I decided to start in physics and then eventually change. But what happened is that when I started to do physics, I really started to like high-energy physics and nuclear physics, things which bring you to work with accelerators and colliders."

Fermilab also had a hand in developing Simone's interest in physics. "It was part of the experience which I had in 1985. At that time, I was not convinced I would enter physics, but I started to develop an interest. When I was a summer student in 1987,

I had almost finished my classes and I was more able to decide on a topic. At the end of that period, I decided I would continue my studies in high-energy physics here at Fermilab.”

Coming to the United States from Italy is not a easy thing for many people to do, Simone said. “Many experimenters have a fellowship with an institution in Italy. They have to try to build a career there while at the same time they are spending most of their time here trying to be effective and make a contribution to the experiment.” Another problem that exists is that in recent years it has become impossible to get a position in an Italian institution without a Ph.D. “If a student works for years at CDF, but does not get a Ph.D. from an Italian institution, when he goes back to Italy his work is not fully recognized by the sponsoring institution.” In order to get a Ph.D in Italy, first a student must pass an entrance exam which takes at least three months of preparation. “This is a problem for a student already working on an experiment in the U.S. The student must withstand the pressure of trying to fulfill work obligations on the experiment while at the same time studying for the exams.

Like many other student experimenters, Simone is most interested in graduating. “The main thing I want to accomplish is to get a Ph.D.,” Simone said. “My goal now is to be able to write my thesis using the data of the SVX.”

In his role as a CDF experimenter, Simone spends most of his time analyzing data and producing analysis programs. Most of the time Simone can be found in front of a computer. “I take data as soon as it comes out of the detector and analyze it for problems and then if the data does not look bad, I try to analyze it and get some physics results out of it.” During next winter, however, Simone—like other graduate students— will take shifts for three months to contribute to the data taking.

The fun part, Simone said, is when “you work hard and then at last, you are able to find some results. There is always the excitement of being able to find some nice events.”

Simone said he has enjoyed being in the U.S. and feels he has had the opportunity to enjoy the “good things” in both countries. Although the U.S. is different from Italy, Simone said this has not been a problem for him and he has easily adapted to this new kind of life. He added that Fermilab has also been kind to him and said he is thankful for the support Fermilab gives to its foreign experimenters.

Simone plans to stay at Fermilab once he is finished with his Ph.D. and anticipates continuing his work on SVXs well into the 90s. “If they build the Main Injector, there will be better things to do, new

other detectors to build. There is a lot of work to do. Besides, there is no other place in the world where we can do the physics we do at Fermilab right now. So I think there is no reason to leave.”

**Nancy Grossman**, 32, knows what it is like to be both a physics graduate student and a post-doc researcher, having worked on Experiment 621 and DØ.

As a graduate student at the University of Minnesota, Nancy worked here on E621, and then joined DØ in May of 1991 as a postdoctoral researcher from Michigan State University. Like many other experimenters, Nancy’s dream of being a physicist started in high school.

“I always liked math and science,” Nancy said. “It was the hardest thing, so it was the most interesting and most challenging. I sort of went the physics route because I really liked mathematics, and there is so much of it in physics.”

Nancy said her parents had wanted her to become an engineer rather than a physicist. “They used to send me articles on women engineers - you know, all the money women engineers make.... So I actually got a degree in electrical engineering and physics from Clarkson University to make mom and dad happy.”

Nancy said her first exposure to Fermilab came on an “all inclusive weekend trip” to the Laboratory as a student at Minnesota. She said she was “wowed” and impressed by the site, and decided to come here to study. After completion of her graduate studies, Nancy said she wanted to join a large experiment, such as DØ, since that seems to be the way experiments are evolving.

As a post-doc, Nancy is part of the Muon Group and is involved in a hardware project working on scintillation counters. Nancy said she would like to devote more time to doing strictly physics work, though. “I have spent a lot of time doing hardware last year and now I am trying to get into doing W and Z physics and hope to be able to do some more towards the measure of the W mass.”

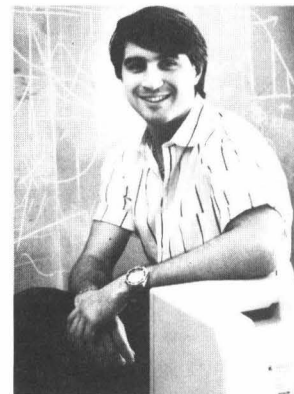
Working on DØ involves basically working in two modes, Nancy said. “You have one mode where you are working shifts, and the other mode when you are not.” The shifts run for three or four days in a row, three or four weeks of the month, and the schedule alternates. Nancy said that one week she might work days, the next week, evenings, and the following week, she might work the owl shift, which is midnight to 8:00 a.m.

Working on the owl shift is not as bad as it seems, Nancy said. “It’s fun working with other people at 3:00 a.m. It’s neat in a sick sort of way.”

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**Eddie Kuns:**  
*“I’m actually interested in all of the sciences but physics is most interesting because it is somehow the most fundamental.”*



**Simone Dell’Agnello:**  
*The fun part is when “you work hard and then at last, you are able to find some results. There is always the excitement of being able to find some nice events.”*



## An opportunity to make a difference

### EEO seeks volunteers

The Fermilab Equal Opportunity Office in partnership with the Chicagoland Chamber of Commerce is once again seeking volunteer speakers from the Fermilab community to help inspire young people through the Youth Motivation Program.



With just a few hours of your time, you can make a difference in the life of a young person who needs a strong role model for success. As a volunteer, YMP will send you into the classrooms of Chicago public high schools where you will speak

with students about their futures and the importance of education.

This program is one way the Fermilab and surrounding business communities have responded to the growing gap between the needs of the workplace and the skills of the workforce. As a volunteer, your encouragement can inspire students to work hard, stay in school and strive for the best. And in the process, you will be rewarded with the satisfaction of knowing that you have contributed to the future of your community.

This year the Chicagoland Chamber of Commerce has set as its goal to recruit 1000 business professionals who can serve as role models for success.

If you are interested in being a YMP volunteer, please contact Ruby Coiley, EEO, x8362, MS 117.

### Book share project thrives

Ever wonder what to do with all those old technical magazines and books cluttering the selves in your office? Well, there is a program at the Laboratory that just might help you.

The program, called Books for Latin America Project, is run by **Roy Rubinstein**, assistant director, with the help of **Joy Miletic** and **Mercedes Nylund** of the Users Office. The Users Office collects physics-related magazines, journals and textbooks from Fermilab employees and sends the publications to higher education institutions in Latin America.

The Users Office requests that donors box their materials and contact the Users Office when boxes are filled. The boxes are then cataloged and stored on the 16th floor of Wilson Hall. When enough accumulates for distribution, roughly once a year, a catalog list is sent to institutions in Latin America. These institutions can then request which boxes they wish to receive.

This program was started in the early 1980s as an effort by then Director Leon Lederman to help physics programs in Latin America, Roy said. "It is just one of the many things we are doing to help physics there," he added.

This is also a useful service to Fermilab staff, Roy said. It is a socially acceptable way to "recycle" unneeded materials.

This mutually beneficial program helps Latin American institutions build their libraries.

Those who wish to donate used publications in good condition may do so by contacting the Users Office. They will accept any type of physics-related journals or books.



*Joy Miletic and Mercedes Nylund index books for the Books to Latin America Project*

### Benefit notes

#### Opportunity to transfer your health insurance

During the open enrollment period, September 14 through September 25, active employees can elect to transfer their medical and dental coverages from one plan to another. This year the HMO representatives are scheduled to be at the Laboratory for only one day—September 15.

Open enrollment information will be mailed to your mail station in the near future. When the information arrives, please review it carefully. For further information, contact the Benefits Office at x3395 or x4361.—*Paula Cashin*



# FERMILAB ART SERIES PRESENTS: *Gross National Product*

"Always funny...this morning's headlines into this evening's bellylaughs ... a brisk merger between Firesign Theatre and the cast of the original Saturday Night Live."—*Washington Post*

Gross National Product, known internationally for its Scandal Tours of Washington, D.C. hits the road and heads to Ramsey Auditorium with its scathing, topical brand of political humor just in time for the election, on Saturday, September 19 at 8:00 p.m.

Since 1980 this satirical comedy group has been one of Washington's comic monuments which led the *Washington Post* to dub them "the capital's resident satirical gang...keeping you grinning from year to year...Washington's answer to Chicago's Second City."

Gross National Product presents its brand of humor on stage combining sketches, impersonations and improv. They take their material from the latest headlines, leading to a new show every week (or perhaps every hour during these exciting days). This show will likely feature mock debates and a town meeting involving the audience in the election excitement!

The comedy troupe's popularity has grown rapidly as their D.C. stage show expanded to a regular

feature with a 300-seat house. Repeat customers looking for the latest headline humor are not uncommon. GNP has chalked up stage revues and club appearances in New York and Hollywood, has been seen and heard on radio and television, and in private performances throughout the country.

Gross National Product is a company of professional comic actors whom the *London Observer* noted as being "first rate." GNP is well known for their political impersonators. GNP's "George Bush" has been featured in *People* magazine as the winner of the national look-alike contest.

Admission to GNP is \$12. For further information or telephone reservations, call 708-840-ARTS weekday from 9 a.m. to 4 p.m. At other times an answering machine will give you information and a means of placing ticket orders.



*Gross National Product*

## Movie schedule announced

The Fermilab International Film Society presents movies from all over the world. Movies are shown at 8 p.m. Fridays in Ramsey Auditorium.

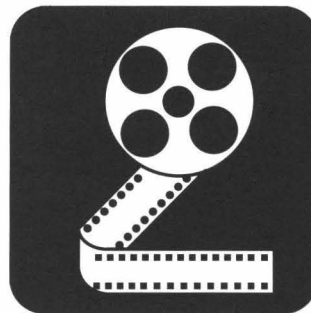
The September movie schedule is as follows:

September 11: *Slacker*

Set in the college town of Austin, Texas, this is a deadpan, funny, disquieting look at slackers: students, ex-students, nonstudents, drop-outs, discards. . . Richard Linklater, dir. U.S., 1991. (97 minutes)

September 25: *It*

Sex symbol Clara Bow plays a gold-digger to the tunes of live piano accompaniment! With Gary Cooper. Clarence Badger, dir. U.S., 1927. (72 minutes)



## 1993 gym memberships now on sale

Recreation Facility 1993 Gym Memberships are now on sale in the Activities Office, WH15W. Regular membership is \$40. Student membership is \$20. For more information contact Jean Guyer, Activities Office, x4544. Remember: 1992 memberships expire October 1.

## Harper's index

Average percentage of each candidate's supporters who say their commitment to him or her is "strong": 29.

Percentage of soft-drink consumers who say their commitment to their brand is "strong": 60.

## Quality corner

If you have a suggestion on how to improve the quality, efficiency, reliability or effectiveness of a Laboratory service or operation, please send it to Mark Bodnarczuk, MS 200 or Bitnet Bodnarczuk @FNAL.

## GIVE IT YOUR ENERGY *Don't can your aluminum*

When you toss out one aluminum can you waste as much energy as if you'd filled the same can half full of gasoline and poured it onto the ground.

Aluminum is the most abundant metal on earth, but it was only discovered in the 1820s. At that time it was worth \$1,200 a kilogram, more than gold. According to Worldwatch Institute: "Since its first use as a toy rattle for Napoleon's son, aluminum's use has escalated. The first all-aluminum beverage can appeared in 1963, and today accounts for the largest single use of aluminum. In 1985 more than 70 billion beverage cans were used, of which almost 66 billion—or 94%—were aluminum."

### Facts . . .

- If you throw an aluminum can out of your car window, it will still litter the Earth up to 500 years later.
- If you throw away 2 aluminum cans, you waste more energy than is used daily by each of a billion human beings in poorer lands.
- According to the Aluminum Association, Americans recycled 42.5 billion aluminum cans in 1988.
- In 1988 alone, aluminum can recycling saved more than 11 billion kilowatt hours of electricity, enough to supply the residential electric needs of New York City for six months.
- The energy saved from one recycled aluminum can will operate a television set for three hours.
- Recycling aluminum cuts related air pollution by 95%.
- Making aluminum from recycled aluminum uses 90% less energy than making aluminum from scratch.

### Things you can do . . .

Because recycling aluminum is so profitable for manufacturing companies (they make \$2 million every day from recycling), there probably are more different ways to recycle aluminum than any other material. Check to see which programs exist in your area:

- Multi-material drop-off centers with separate bins for aluminum.
- Buy-back operations with scales to weigh recycled aluminum and pay consumers accordingly.
- Large, igloo-like containers for aluminum only, often found in supermarket parking lots.
- Curbside pickup.
- Reverse vending machines. These machines accept aluminum cans, reject ferrous cans, glass or other unwanted objects. They weigh or count the aluminum deposited and dispense money or tokens in payment.

### Before you recycle your aluminum . . .

- Remove food, rinse, crush and bag or box cans.
- Remember: a lot more than cans can be recycled, including aluminum foil, pie plates, frozen food trays, window frames and siding.

### Results . . .

- According to Recycle America's statistics: If only 250 people (including you, of course) each recycled one can a day, we would save the energy equivalent of 1,750-3,500 gallons of gasoline every year. Now try that calculation with 250,000 people; just one can a day could save the energy equivalent of between 1.75 and 3.5 million gallons of gas. And that's only .1% of the U.S. population with a single can apiece.
- If we recycle, we mine less raw materials. To produce one ton of aluminum from raw materials, it takes a phenomenal 8,760 pounds of bauxite and 1,020 pounds of petroleum coke. But according to Aluminum Association estimates, this figure is cut down by 95% when recycled aluminum is used.

Sources: The Aluminum Association, 900 19th St. N.W., Washington, D.C. 20006. (They've got lots of information on how to recycle, how to set up fundraising events, stats, etc. Most of it is free.)

*50 Simple Things You Can Do To Save The Earth*, the Earth•Works Group.



## On the job continued

On a shift, Nancy will begin work by checking with the control room on what took place during the last shift. "I'll check if there are any problems and what things I should look into if there are problems, or I will just take collider data - that's great."

When not on a shift, toiling with the late hours and any problems she might face, Nancy tries to focus her work on software, examining such things as histograms, efficiencies or mass peaks.

Nancy said she hopes to stay on DØ for another three to five years as a post-doc. "I was in graduate school for eight and a half years, so it might be closer to three years, and depending upon how things have gone and what I have accomplished on DØ."

On a personal level, Nancy said she wants to find out what being on a large experiment is like. "That is sort of why I took a position on a colliding experiment, as opposed to a small fixed-target experiment. I want to get a feel for what it is like working on a large experiment and decide whether I want to try to get on smaller experiments or do some other type of research."

The most interesting part of Nancy's job is the freedom she has to decide what she wants to do with regards to hardware and software. "There are some limitations, but not that much," Nancy said. "If you really wanted to push it to do any given thing, you can. The hard part is deciding (which option to choose). You start doing one thing, then you talk to someone else and decide on something else. So, it's very hard. It's nice to have all the freedom, but then you have to really work on being focused and set your goals."

One other thing that Nancy enjoys about her work is finding someone who shares her same interests in physics. "It's wonderful if you can find someone who speaks the same language that you do with regards to physics, so you can work with them on a project. It doesn't happen all that frequently, but that's what I try to find."

A fascination with physics is what brought graduate student **John (Zhiyu) Jiang** to Fermilab in 1990.

"That is the major reason I came here,"

John said. "That, and because Fermilab is such a nice place."

John, a student from SUNY at Stonybrook, who was born in Zheng Zhou, China, is writing his thesis on electroweak physics at DØ, and could not be more honored to be part of the Fermilab community. "Fermilab is a very famous place, even in China. It's famous because it is the number one facility in the world."

In China, John graduated from the University of Science and Technology of China and attended the Institute of High Energy Physics for one year as a graduate student, before coming to the U.S. in 1986. John enrolled at SUNY when he came here and then began working at Brookhaven as a graduate student a few years later. John said when his advisor transferred from Brookhaven, John decided to join DØ.

The educational system in China had a hand in his decision to enter physics, John added. "We don't have as many liberal arts courses as in the United States. It's more technical and you learn a lot concentrated around physics."

John's primary goal has already been accomplished, he said. "DØ was my initial goal when I first came to graduate school. It was just the beginning of construction, but two years ago it looked right for me and things were getting exciting, so I joined."

Now, John, 29, is concentrating on a second goal: graduating. "I want to get my Ph.D., but I also think there are a lot of things to learn, a lot of high-tech information. My goal, though, is to get my Ph.D. first."

John started at DØ working on the test beam calibrating the liquid argon uranium calorimeter. He also helped assess the radiation evaluation for the MWA beam line in preparation for the Tiger Team. "That was nice," John said. "I felt I really could contribute something. It was also very important because without that, the experiment wouldn't have been able to run."

That assignment ended only a few months ago, so now John is concentrating more on his thesis. "I am shifting my efforts to one, taking shift and two, to doing things related to my thesis. I hope to be finished

next year. I am going to use data from this run which probably will end early next year." He said he plans to stay at Fermilab after he graduates if an offer is made to him.

John said the challenging part of working on DØ is "trying to put everything together." DØ is a big collaboration, John added, "you have to extend your antenna and be aware of what other people are doing and then try to collaborate in some way." Although it is big, DØ has a good communications setup, John added. "We have meetings, and if you want to get involved in something, you can volunteer or you can learn from other people."

Being in the U.S. and at Fermilab has been a pleasure for John. "I think the U.S. is great. I love the country. It has a lot of good things and I think the Laboratory has a very accommodating environment. You don't feel like an outsider here. I feel like I am part of the collaboration and I think the Lab offers a lot of support and services for experimenters." And also, John said, it is fun here. "With my fascination of physics and all the high-tech stuff here, you don't often find a place that combines the two things together."

### Experimental program continued

of Energy, foreign institutions and the universities taking part in the experiment.

Once the Memorandum of Understanding is signed, Stage II approval is given by the director and the experiment is put on the schedule for running time.

Prospects for the future of the experimental program look bright. "Although the number of fixed-target experiments running at one time will decrease from the typical numbers of the past, the size of those remaining will be larger and we will be able to give them better support," Roy said. "In addition, Collider physics at Fermilab will continue to be the world's leading program in high-energy physics."

## New from the stockroom

1110-1000 Strip, utility outlet, 3-wire fused, 6-outlet, rack mounting, 6 ft. cord, SGL Waber, Cat. No. 903CB-6

1268-5005 Padlock, keyed, hardened steel, chrome-plated shackle, alum. body with red finish, ID# stamp on keys and padlock body, 1.5 in. x 3 in. American P/N 1107R.

1315-0345 Toner Cartridge, FX1, for Cannon Laser Class L770 fax machine, Cannon P/N H11-6221.

1320-1330 Plotter pen, disposable, for paper or transparency, fiber-tip pens, for HP Plotters, HP #17745-T, multi-color, .3mm tip, 5 pens per pkg., black, green, blue, yellow and red.

1455-0110 Integrated circuit, dual optcoupler, high gain, LSTTL compat., low speed, 8-DIP, Hewlett-Packard P/N HCPL-2731.

1825-1340 Paint, enamel, fast drying, 12 oz., pressurized can, wood/metal, Seymour Hi-Tech P/N 16-134, flammable, flat white, indoor/outdoor.

## Classified ads

### Miscellaneous

**Wood china cabinet** with lighted hutch, 52x17 base, height over 6 ft. \$200 obo. Call Brian at x3865.

**Solid oak pedestal table** with 2 leaves, 2 arm and 4 side chairs. \$525. Call Barbara at 708-833-6114 after 5 p.m.

**Household items:** 1-96" sofa, light tan with blue/brown pinstriping. Excellent condition, \$150. 2-48" vanity tops. Brand new, Cultured marble tops, white with blue marbling, \$50 each or both for \$90. New carpeting—several room-size pieces. Light gray, \$5 per sq. yd. Call Michael at 708-357-8150.

**Objectivist/Ayn Rand study group** now forming in West suburbs near the Lab. For info, contact Cathy at x8717 or 708-665-6073 or FNALDO::CRESTSINGER.

### Real estate

**Fox Valley luxurious end unit townhouse**, former model, 3 bedrooms, 1.5 baths, huge and loaded, finished basement, CAC, deck, top schools/location. Clean, bright and vacant. Motivated seller, \$83,900. Call Ellen at 708-820-3609.

**Large 1 bedroom condo in Naperville.** Minutes from Lab, security building, elevator, balcony, pool. Near Naperville North HS. Asking \$43,000. Call Jim at x3349 or 708-810-1014.

### Vehicles

**1978 Olds 98 Regency.** Only 70k miles, engine runs great and the body looks great. \$1000 obo. Call Michael at 708-357-8150.

## Nalrec news

The **Old Timers Steak Fry and Family Picnic** was a great success. All who attended had a most enjoyable evening. The food was plentiful and delicious—thanks to the cooks who gladly worked all night. A big thanks from Nalrec to all those who helped pull off this memorable event.

Don't miss the **September Social Hour** on Friday, September 18. It will start at 5:15 and rock until 9:15 with D.J. Michael "Angelo" Stinson.

**1983 Nissan Stanza**, red, auto., A/C, 77k miles, 5-door HB, cruise AM/FM cassette, rear window wiper and defrost. \$1650. Call x8599 or 708-406-1865 evenings.

**1984 Mitsubishi Cordia L hatchback**, 4-cyl, 5-speed, A/C, AM/FM cassette, 75k miles, 1 owner. Asking \$1200. Call Jim x3349 or 708-810-1014.

**1987 Honda CRX SI**, silver, 5-speed, AM/FM stereo deck, sunroof, A/C, excellent condition, \$5195. Call Rod at x2565 or 708-695-2037.

**1989 Pontiac Bonneville**, power steering, power brakes, A/C, front wheel drive, AM/FM stereo cassette, power door locks, power windows, cruise control, tilt steering wheel, aluminum wheels, approx. 30k miles. Gray, looks and runs like new. \$8999 or make an offer. Call Chuck at x2271, pager 536-8410 or 708-879-0394 evenings.

**1992 Dodge Caravan**, front wheel drive, auto 3.0-V6 engine with 6k miles. 7 passenger, 2 built-in child seats, AM/FM stereo w/cassette, A/C, tilt/cruise and luggage rack. \$15,000. Call Barb at x3492 or 708-859-8699.

**1990 Yamaha XT600 Enduro.** 27k miles, garage kept. \$3,200. Call Keith at x2727 or 815-756-6414.

**Fun boat!** 1987 Bayliner. 22' bowrider, 230 hp., tandem trailer and canvases included. Superb condition. \$12000. Call Elissa at x3304 or 708-851-8842.

**1983 Torpedo Super-Strada racing bicycle**, 12-speed, 53 cm frame, trip 6-t and campy gear, 15/23 free-wheel custom laced rear wheel, \$200 o.b.o. Call Rod at x2565 or 708-695-2037.

Stinson—from Dial a D.J.— will be spinning five decades of platters featuring your favorite songs from the 50s to the 90s. Sharpen up your "name that tune" skills because there will be contests and prizes. Pizza will be served—imported from West Chicago. Put it on your calendar and don't miss the fun.

This year's **Octoberfest** will be October 16. Read *Ferminews* for more details later. —Charlotte Smith