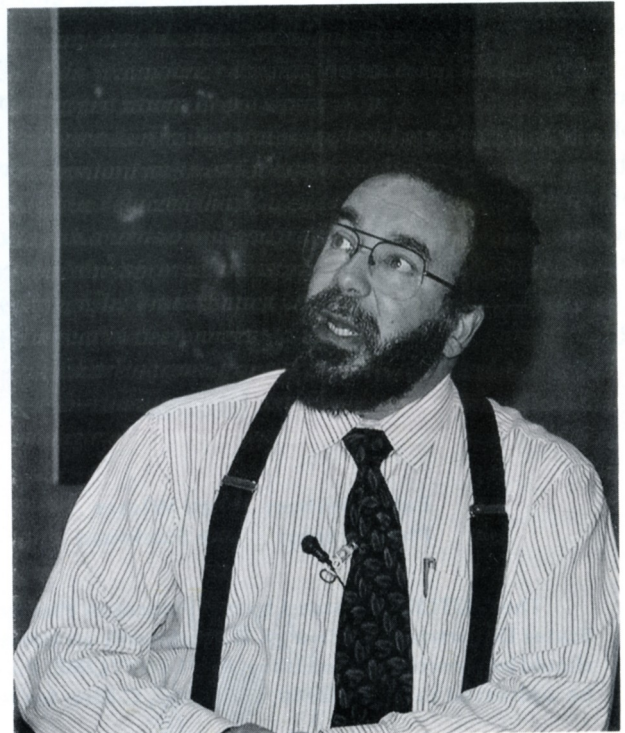
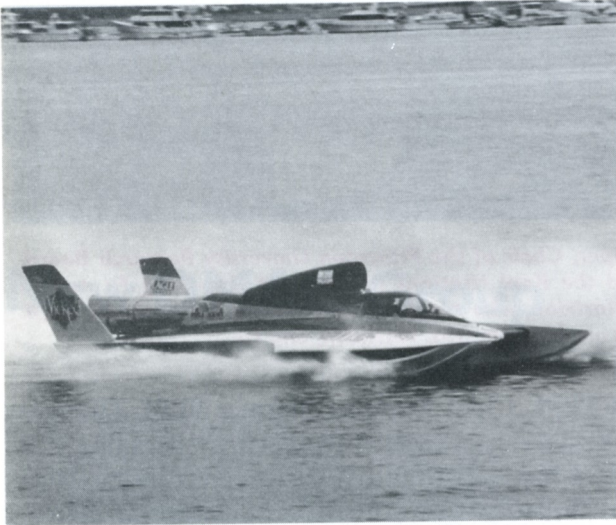


# HOTLINE

The Princeton Plasma Physics Laboratory is a United States Department of Energy Facility

## The Laboratory is on a "Good Course"



Describing the "State of the Laboratory" on October 14 in the MBG Auditorium, PPPL Director Rob Goldston told staff, "We are on a good course." Goldston drew an analogy between a speedboat and the Lab and discussed PPPL's external affairs, scientific program, and internal operations, as well as how "we're going to keep this boat going." The talk was followed by the presentation of the Kaul Award and the PPPL Distinguished Research and Engineering Fellowships. Anyone who would like to view the address may borrow a videotape of it by contacting Sonja Patterson at ext. 2220. At right is Goldston. At top left is the speedboat the Director showed during the address. Above are employees enjoying cake and conversation at the reception in the Lobby following the address. At top right are staff at the talk.



# PPPL Names Scientists Fu and Nazikian as the 1998 Kaul Foundation Prize Recipients

**P** PPL physicists Guo-Yong Fu and Raffi Nazikian are the 1998 recipients of the Kaul Foundation Prize for Excellence in Plasma Physics and Technology Development. Fu, along with Nazikian's wife, Fumiko, accepted the awards during a ceremony and reception at PPPL on October 14. Nazikian was in Japan working on experiments at the Japan Atomic Energy Research Institute at the time of the ceremony.

Fu and Nazikian were cited "for their work leading to the discovery and understanding of alpha-particle-driven Toroidal Alfvén Eigenmodes (TAEs) in the Tokamak Fusion Test Reactor (TFTR)." This discovery is helping scientists gain an understanding of the magnetic confinement of hot, ionized gases known as plasmas at the temperature, density, and duration required for the controlled production of significant amounts of fusion energy. TFTR was PPPL's flagship experimental fusion machine for 14 years, concluding experiments in 1997.

"Raffi and Guo-Yong are being honored for an exceptional accomplishment, which is a fine example of close collaboration between theoretical and experimental physicists, leading to new insight into the physics of high-temperature plasmas," noted PPPL Director Rob Goldston.

Will Happer, Chair of the Princeton University Research Board, presented the citations to Fu and Mrs. Nazikian during the awards ceremony.

The Prize is awarded by Princeton University to recognize a recent outstanding technical achievement in plasma physics or technology development by a full-time, regular employee of PPPL. It includes a cash award of \$2,000, which is divided equally between the two honorees. Nominations for the award are submitted to the Prize Selection Committee, which includes the Princeton University Provost, the Chair of the Princeton University Research Board, the PPPL Director, PPPL Deputy Direc-



*Will Happer, Chair of the Princeton University Research Board, presented the Kaul citations to recipient Guo-Yong Fu and to Fumiko Nazikian, who accepted on behalf of her husband, Raffi. From left are Happer, Mrs. Nazikian, and Fu.*

tor, and PPPL Chief Scientist. Former PPPL Director Ronald C. Davidson created the prize by directing that \$40,000 of the \$100,000 gift he received as the 1993 recipient of the Award for Excellence in science, education, and physics from the Kaul Foundation be given to Princeton University to endow the Kaul Foundation Prize for Excellence. This is the second time the prize has been given. The first was in 1996 to Richard Hawryluk, who is now the Deputy Director at PPPL.

## Fu

Fu came to PPPL in 1992 following a research fellowship at the Centre de Recherches en Physique des Plasmas in Lausanne, Switzerland. Fu received a bachelor's degree in physics from the University of Science and Tech-

Continued on page 3

## HOTLINE

Editor/Writer: Patti Wieser  
Photography: Elle Starkman

Graphic Artist: Greg Czechowicz  
Layout: Patti Wieser

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## Kaul

Continued from page 2

nology of China in 1983 and a Ph.D. in physics from the University of Texas at Austin (UTA) in 1988. He was a postdoctoral fellow at the Institute for Fusion Studies and Center for Fusion Engineering at UTA from 1988 to 1989.

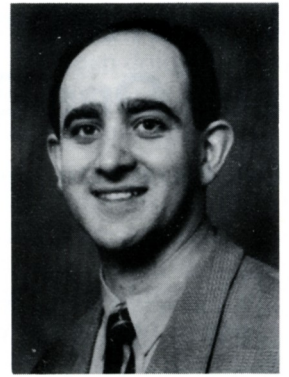
Upon receiving the prize, Fu said, "It is a great honor for me to be chosen for this prize among this group of outstanding researchers at PPPL. Many people worked very hard in making this experiment a great success. This award is really for each of them."

## Nazikian

Nazikian joined PPPL's research staff in 1989 and became the Laboratory's Energetic Particle Science Focus Group Leader in 1997. He received a bachelor's

degree in Science from Melbourne University in Australia in 1984 and a Ph.D. from Australian National University in 1989, where he was a Commonwealth Scholar.

Nazikian said, "The discovery of alpha-particle-driven TAE modes would not have been possible without the dedication and total commitment of the TFTR team. It was a privilege to work on the TFTR project alongside so many talented theorists, experimentalists, engineers, and technicians. I am particularly indebted to Stewart Zweben, who got me interested in alpha-particle instabilities, and to Guo-Yong Fu, who never gave up on his theories." ●



**Raffi Nazikian**

## Magnetic and Inertial Fusion Meeting

PPPL Hosts First MFE/IFE Gathering



**Above left, Ilan Hutchinson of MIT discusses "Burning Plasma Experiments." Above right, participants listen to a presentation in the MBG Auditorium.**

**M**ore than 125 people attended the first Magnetic Fusion Energy-Inertial Fusion Energy (MFE-IFE) Technical Workshop held at PPPL in September. Attendees from more than twenty-five U.S. institutions participated in the three-day workshop, which included twenty-two presentations on topics ranging from "Plasma Confinement and Exhaust" to "Direct-Drive Target Designs." PPPL Advanced Reactor Concepts Head Dale Meade, Keith Thomassen of the Lawrence Livermore National Laboratory, Steve Bodner of the Naval Research Laboratory, and Roger Bangerter of the Lawrence Berkeley National Laboratory organized the workshop.



# Laboratory Awards Two Physicists and One Engineer Distinguished Fellowships

Lee, Mazzucato, and Ku Receive Honors during Formal Ceremony at PPPL

In recognition of their excellence in research and in engineering, two physicists and one engineer at PPPL have been named PPPL Distinguished Fellows for 1998. The Distinguished Research Fellows are W. Wei-li Lee and Ernesto Mazzucato and the Distinguished Engineering Fellow is Long-Poe Ku. The recipients were honored during a formal ceremony on October 14 at the Laboratory.

The Distinguished Research Fellow Program, which is funded by the Department of Energy (DOE), was created in 1993 to recognize members of the Laboratory's Research Staff. Fellowships are awarded to those who have achieved extraordinary records of creativity and accomplishments in research over an extended period of time. The Distinguished Engineering Fellow Program was created in 1995 to honor members of the engineering and scientific staff who have achieved outstanding records of innovation and accomplishment in engineering over an extended period of time. Fellows receive one-time gifts of \$5,000 and qualify for priority in regard to their research and engineering programs.

The Distinguished Research Fellows, Lee and Mazzucato, were cited for their "excellence in theoretical and experimental plasma physics research at PPPL."



*From left are 1998 PPPL Distinguished Research Fellows W. Wei-li Lee and Ernesto Mazzucato with PPPL Director Rob Goldston and 1998 Distinguished Engineering Fellow Long-Poe Ku. The recipients were honored at a formal ceremony at the Laboratory in October.*

## Lee

Lee, a Principal Research Physicist, was honored "For pioneering research in the development of gyrokinetic particle simulation and delta-f technique for studying low-frequency phenomena in magnetically confined plasmas, and for contributions in relativistic particle simulation in intense ion beam research."

Lee received a bachelor's degree from the National Taiwan University in 1962, a master's from Duke University in North Carolina in 1965, and a Ph.D. from Northwestern University in Illinois in 1970.

After working as an accelerator physicist at Fermi Laboratory in Batavia, Illinois, for four years, he joined PPPL's Theory Division in 1974. He became a Fellow of the American Physical Society's Division of Plasma Physics (APS-DPP) in 1992 and is the author of more than 70 scientific papers in magnetic fusion and accelerator research.

## Mazzucato

Mazzucato, a Principal Research Physicist, was cited "For outstanding contributions in density fluctuation measurement in magnetically confined plasmas, innovative diagnostics in microwave scattering, reflectometer, and Thomson scattering, and formulation of transport models."

Mazzucato received a degree in physics from the University of Padua in Italy in 1960 and a Libera Docenza in plasma physics from the University of Rome in Italy in 1970. He came to PPPL in 1972 after working as a research physicist at the Laboratorio Gas Ionizzati in Frascati, Italy, from 1968 to 1972. He is an APS Fellow and the author of about 200 publications.

Said PPPL Director Rob Goldston, "Wei-li Lee and Ernesto Mazzucato make an excellent pair of Research Fellows to honor this year. Dr. Lee invented the 'gyrokinetic' technique of plasma simulation, which has given us tremendous new insight into plasma turbulence, when it is implemented on fast modern supercomputers. On the other other hand, Dr. Mazzucato pioneered the direct experimental measurement of plasma turbulence in our hot fusion plasmas, and it is the combination of the

Continued on page 5



## Fellows

Continued from page 4

fields of research they began which has given us new confidence in our understanding of fusion plasmas.”

### Ku

Ku, a Principal Engineer, was honored “For extraordinary creativity, capabilities, and accomplishments in developing and applying advanced analysis methods in a wide range of technical areas, which include experimental fusion devices, electron lithography, and the optimization of stellarator plasma configurations.”

Ku, who came to the Laboratory in 1977 as a post doctoral fellow, received a bachelor’s degree in nuclear engineering from the National Tsin-hua University in Taiwan in 1970 and a master’s and Ph.D. in nuclear engineering and applied physics from Columbia University in New York in 1976. He is the author and co-author of more than 60 publications.

“Dr. Ku is a tremendously versatile engineer. He has worked on a wide range of engineering problems — from studying how to provide radiation shielding of sensitive

equipment to predicting electron trajectories in lithography machines. Most recently he has been doing ‘plasma engineering’ — using the most sophisticated computer codes to optimize the design of a new fusion experiment,” said Goldston.

Approximately ten PPPL Distinguished Research Fellows and five Engineering Fellows are expected to be appointed by the end of the decade. Eight Research Fellows have been named at the Laboratory since the program was established. They are Chio-Zong Cheng, Russell Hulse, Masayuki Ono, James Strachan, Roscoe White, Masaaki Yamada, Michael Zarnstorff, and Stewart Zweben. Three Engineering Fellows have been appointed since 1996. They are Peter Bonanos, Philip Heitzenroeder, and Robert Woolley.

Fellows are expected to devote most of their time to active research and engineering activities. They will describe their work during regularly scheduled colloquia. The Research and Engineering Fellows form the Distinguished Research Fellow Council and the Distinguished Engineering Fellow Council, respectively, which advise the Director on the scientific and engineering direction of the Laboratory. ●

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# Powerful Computers Advance Fusion Research at the Laboratory

By Anthony De Meo

**S**cientists at PPPL report a major advance in the computer modeling of fusion plasmas in the September 18 edition of *Science*. The new results were obtained utilizing the Massively Parallel Processing (MPP) capabilities of the DOE’s National Energy Research Scientific Computing Center (NERSC) at the Lawrence Berkeley National Laboratory (LBNL) in Berkeley, California.

In general, the formation of stars results from the dynamic behavior of hot ionized gases known as plasmas. Fusion researchers use magnetic fields to confine such hot gaseous fuel at the temperature, density, and duration required for the controlled production of significant amounts of fusion energy. However, turbulence can spoil the efficiency of this approach by causing accelerated loss of particles and energy from the plasma. As pointed out in a Perspectives article in the same issue of *Science*, good news from toroidal confinement experiments indicates that the suppression of turbulence can enable transitions

to newly discovered enhanced confinement regimes.

In the work reported in *Science* this week, PPPL scientists have used the full power of the SGI/Cray T3E supercomputer at NERSC to create three-dimensional nonlinear particle simulations of microturbulence in the plasma. The use of NERSC’s massively parallel processor capabilities enabled scientists to perform calculations involving 400 million plasma particles (i.e., 100 million guiding centers) in 5,000 time-steps — an achievement impossible without the use of powerful MPP computers.

“The information obtained from these advanced computer simulations is providing valuable new physics insights and correlates well with trends observed in experiments. This work builds on the excellent knowledge base developed internationally and complements related research efforts at other national laboratories, such as

Continued on page 6



## Computers

Continued from page 5

Lawrence Livermore National Laboratory and General Atomics [both in California], as well as at universities such as UCLA and the University of Colorado,” noted PPPL’s Chief Scientist, William M. Tang. “The results in our *Science* article help support the increasingly accepted position that high-performance scientific computing has matured to a level where it can be considered a new tool for discovery, complementing traditional theory and experiment. It is evident that plasma science, along with many other fields, will benefit greatly from the development of the advanced computational capabilities envisaged and strongly encouraged at the DOE/National Science Foundation Workshop on Advanced Scientific Computing held this July at the National Academy of Sciences.”

### Powerful Unclassified Supercomputing Center

NERSC was originally established in 1974 to support fusion energy research programs sponsored by the DOE. The center, one of the nation’s most powerful unclassified supercomputing centers, provides both computational resources and technical support to researchers at PPPL, as well as a wide range of research efforts in various scientific disciplines at other DOE sites.

**“These results are exciting in that they again demonstrate the value of computational science as a complement to experimental science. It’s particularly exciting that this significant fusion result was achieved using a highly parallel computing system.”**

**—William Kramer  
NERSC Deputy Director**

“These results are exciting in that they again demonstrate the value of computational science as a complement to experimental science. It’s particularly exciting that this significant fusion result was achieved using a highly parallel computing system,” said William Kramer, Deputy Director of NERSC. “We’re also pleased to see that NERSC continues to play a critical role in helping plasma physics scientists make new advances in the field. Col-



**PPPL scientists involved in using the full power of the SGI/Cray T3E supercomputer at NERSC to create three-dimensional nonlinear particle simulations of microturbulence in the plasma are, from left, (standing) PPPL Chief Scientist William Tang and Roscoe White; and (seated) W. Wei-li Lee, Zhihong Lin, and Taik Soo Hahm.**

laborations such as this really are the future of large-scale scientific research.”

NERSC ([www.nersc.gov](http://www.nersc.gov)) provides high-performance computing services to DOE’s Energy Research programs at national laboratories, universities, and industry. The DOE’s LBNL ([www.lbl.gov](http://www.lbl.gov)) conducts unclassified research and is managed by the University of California.

**Editor’s Note:** The citation for the PPPL *Science* article is: “Turbulent Transport Reduction by Zonal Flows: Massively Parallel Simulations,” Z. Lin, T.S. Hahm, W.W. Lee, W.M. Tang, and R.B. White, *Science* **281**, (1998) 1835. There is also a Perspective article by Keith Burrell of General Atomics Corporation and a highlight of the article in the same issue of *Science*. Copies of the article are available from Information Services and can be obtained by calling ext. 2750. ●

**Rush Holt, former Assistant Director of the Laboratory, was elected to the 106th U.S. Congress. He will represent the 12th district in New Jersey. Congratulations, Rush!**



# PPPL Operates Exhibit at World Energy Congress



PPPL coordinated a community fusion display (at far left) for the 17th World Energy Congress in Houston in September. PPPL External Affairs Head John DeLooper, along with PPPL's James Morgan and William Hogan of the National Ignition Facility, participated in the event. The display included the topics: why fusion, what is fusion, research facilities, spin offs, and science education. At left, DeLooper (right) discusses fusion with a visitor at the display. Representatives from 90 countries participated in the Congress, which drew about 8,000 people.

## New DMAC Group



The Director's Minority Advisory Committee (DMAC) for this year includes, from left, Susan Murphy-LaMarche, Linda Harmon, Joe Winston, Chairperson Arlene White, John Clark, Virginia Finley, Pamela Lucas, and Bob Kaita. Not pictured is Council Advisor John Schmidt. Please contact any of the members if you have issues you would like to bring to the attention of the Committee.

## Employees Dress up for Halloween



On the Friday before Halloween, many PPPL staff members came to work in costume at the urging of Lab Director Rob Goldston. Above left is Goldston and above right are John Bennevich (left) and Bobbie Forcier.

### Thank You

*My family and I would like to thank everyone for the sympathy and kindness extended to us following the death of my mother. Your many notes, kind words, mass cards, and donations given in her memory are deeply appreciated.*

— Patti Wieser





# Let's Get Physical



**The new Fitness Center at PPPL opened in October in Room A-105. It is in the former Training Room and includes two treadmills, a step machine, two rowing machines, a Universal machine, a cardio-glide, two exercise bicycles, and weight areas. Members of the Maintenance and Operations Division completed the center, which is open around-the-clock. PPPL Director Rob Goldston (center) tries out the treadmill while Human Resources Deputy Director Susan Murphy-LaMarche (left) and ES&H and Infrastructure Support Head J.W. Anderson cut the ribbon marking the opening of the center.**

## **Dateline New York City: November 1, 1998**

by Steve Jardin

**I** ran in the New York City Marathon on November 1, along with about 30,000 others from around the world. It was quite an experience, certainly one that I will remember for a long time. I finished the 26.2-mile course in 3 hours and 51 minutes, which was a bit slower than the 3 hours and 30 minutes I was shooting for (to qualify for the Boston Marathon), but was still in the top one-fourth of the finishers.

It was a beautiful day, and the entire route was lined by thousands of cheering crowds, including dozens of bands, and many, many volunteers handing out water, oranges, and other treats. The race went through all five Boroughs, across five bridges, and through many ethnic neighborhoods. I personally enjoyed the first 13 miles immensely, but started getting tired during the second half, and almost had to drop out when my muscles suddenly began to cramp at about mile 17 or 18. I somehow found some way to run through this period, although quite slowly for a while, but I felt really horrible the last six or so miles. I was never so happy as when I crossed the finish line and

the other runners in the shoot started congratulating each other and they gave the finishers medals and blankets to stay warm. I lost more than five pounds during the race, even though I got water at just about every water stop.

I started moderately serious running training about a year ago. My original motivation was just for health and to control my weight, but I soon realized that I needed a goal to keep it up. I had always wanted to run a marathon, and so I applied to the NYC Marathon in the spring. I was accepted during the summer, by lottery, after I had almost given up hope and had actually been accepted to another marathon, which I then withdrew from. For the past three to four months I have been running 40-45 miles a week, including a Sunday morning run which I have built up to 20 miles.

I still want to run in the Boston Marathon, which means that I have to qualify by running 3:30 in another marathon. I'm starting to train again, but this time will add some additional high-speed "interval" workouts to help me get into the lower time bracket. I now have new respect for marathon runners, especially the fast ones. They're also really a great bunch of people, and always have the desire to do better. ●



# HOTLINE

The Princeton Plasma Physics Laboratory is a United States Department of Energy Facility

## The United Way... Helps People Smile

**O**n Tuesday, December 1, you can have a little fun *and* help put a smile on the faces of those in need. All you have to do is attend the PPPL United Way meeting for employees at 10:30 A.M. in the MBG Auditorium.

"The Laboratory has always been a strong supporter of the United Way. I hope this year we can continue our excellent standard of giving and I would like to see an increase in employee participation," said Mary Ann Brown, PPPL's 1998 United Way Campaign Chairperson.

This meeting will provide information about United Way programs, and will feature a speaker, a special entertainer, refreshments, and door prizes [see list of prizes on page 2.] The prizes have been donated by employees and local merchants.

Everyone who attends the meeting is eligible for the door prizes drawn. In addition, those who contribute to this year's campaign will be entered in the Grand Prize Drawing for a \$300 gift certificate for travel arrangements, compliments of PPPL. The Grand Prize will be drawn on Tuesday, December 8, at noon in the LSB Lobby.

Staff will receive pledge cards in the interoffice mail before the United Way meeting on December 1. These forms can be dropped off at the close of the meeting or mailed to 1998 United Way Chairperson Mary Ann Brown at MS-38. Donations may be given as a one-time

**United Way  
Can Save the Day!  
So Pledge Some Pay  
Right Away!**

**Created by Slogan Contest Winner Mary Ann Brown**

contribution or through payroll deductions. If you donate through payroll deduction, Princeton University will give an additional 15 percent of your contribution. Contributors may also earmark which charities they would like their donations to fund.

Through your United Way, volunteers distribute resources to high-quality, effective human care programs for those most in need in greater Mercer County. The agency focuses resources on five critical areas: building self-sufficiency, strengthening families, promoting health and well-being, responding to crises, and building community. Programs range from substance abuse prevention, to infant, child, and adult day care, to hospice and home health care, to disaster and emergency assistance.

Remember on December 1 to attend the United Way meeting at 10:30 A.M. in the MBG Auditorium and the celebration party at 3:30 P.M. in the LSB Lobby. Please, help those in need by supporting the United Way! ●

*[A special thanks goes to the 1998 United Way Committee, which includes John Bennevich, Joanne Bianco, Chairperson Mary Ann Brown, Sara Flohr, Steve Iverson, Tom McGeachen, Sonja Patterson, Rod Templon, and Patti Wieser. Thanks also go to the many others who helped with this year's campaign.]*



**United Way  
Special Edition**



# PPPL 1998 United Way Campaign

## Tuesday, December 1

*The One-Day United Way Campaign at PPPL is Tuesday, December 1. Please come to the meeting in the morning and join in the Celebration Party in the afternoon. Thank you!*

**10:30 A.M. — MBG Auditorium  
United Way Meeting**

**3:30 P.M. — LSB Lobby  
United Way Party**

## Door Prizes for the United Way Meeting

### Gift Certificate

ANNEX RESTAURANT

### Haircut, Style, and Manicure

ARTISTIC HAIR DESIGN

### Lancome Bag

JOHN BENNEVICH

### Green Bag

JOHN BENNEVICH

### \$35 Gift Certificate

GOOD TIME CHARLEY'S

### Dinner for Two

HOLIDAY INN of PRINCETON

### \$25 Gift Certificate to Hyatt Regency Princeton

PPPL

### Whale and Sunset Cruise for Two

EXPRESS NAVIGATION

### Dinner for Two

NASSAU INN

### Brunch for Two

PROSPECT HOUSE

### Dinner for Two

RUSTY SCUPPER

### \$20 Gift Certificate

MARRAZZO'S THRIFTWAY

### \$25 Gift Certificate

SUNNY GARDEN RESTAURANT

### Two Passes

LIBERTY SCIENCE CENTER

### \$10 Gift Certificates (3)

RED LOBSTER RESTAURANT

### Certificate for Two

OCEAN COUNTY PLANETARIUM

### \$25 Gift Certificate

MCCAFFREY'S MARKET

### \$20 Gift Certificate

WESTERN WEAR

### \$10 Gift Certificate

JUST YOUR STYLE

### Three Tickets

RIPLEY'S BELIEVE IT OR NOT

### Avon Product

LENA SCIMECA

### Man's Tie

ERMENEGILDO ZEGNA CORP.

### Man's Shirt

ERMENEGILDO ZEGNA CORP.

### \$10 Gift Certificate to the Olive Garden

PPPL

### \$50 Gift Certificate

PENNINGTON MARKET

### Special Parking Spaces (4)

PPPL

### Gift Certificate

JAZZERCISE

### Holiday Wreath

MRS. CARL POTENSKY

### Tennis Rackets (2)

PRINCE MANUFACTURING, INC.

### Entertainment Book

PPPL

## Grand Prize Drawing

**Tuesday, December 8**

**Noon, LSB Lobby**

### Grand Prize:

**\$300 Gift Certificate for Travel Arrangements**

**Compliments of PPPL**

### Runner-up Prizes will also be drawn

*Anyone who contributes to this year's PPPL United Way Campaign  
will automatically be entered in the Grand Prize Drawing.*



# HOTLINE

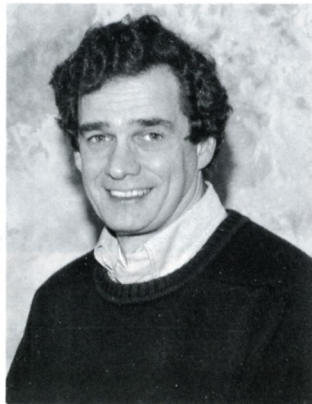
The Princeton Plasma Physics Laboratory is a United States Department of Energy Facility

## Neilson Named 1998 APS Fellow

In honor of his contributions to the field of plasma physics, PPPL scientist George "Hutch" Neilson was recently named a Fellow by the American Physical Society (APS).

Neilson, a Principal Research Physicist, received the lifetime appointment from the APS's Division of Plasma Physics during the November APS meeting held this year in New Orleans. The APS rules limit the maximum number of Fellows selected each year to be no more than half of one percent of the Division membership.

Neilson, Project Manager for the National Compact Stellarator Experiment, was cited "For his pioneering



Hutch Neilson

work in the exploitation of magnetic equilibrium diagnostics and for his leadership in the physics design of fusion experiments."

Neilson received bachelor's and master's degrees in electrical engineering from the Massachusetts Institute of Technology in 1973 and a Ph.D. in physics from the University of Tennessee at Knoxville in 1979. He joined PPPL's staff in 1996, but from 1989 until 1996, as an Oak Ridge National Laboratory employee, he was a visiting fulltime participant in PPPL's programs.

PPPL Advanced Projects Head John Schmidt said of Neilson, "Hutch has many attributes that make him a leader in the U.S. fusion program. One that is particularly important at this stage in fusion research is his experience and expertise in working with U.S. and international fusion scientists on collaborative projects. He has been very successful at organizing and managing collaborative projects and is held in high regard by the fusion community for both his technical and managerial capability."●

## PPPL Offers Intriguing Proposals to DOE Team

By Patti Wieser

PPPL may play a role in dismantling a defunct tritium production facility six times the size of a football field.

During the past year, the Department of Energy (DOE) designated the Mound Laboratory, a mostly underground facility in Miamisburg, Ohio, as a large-scale demonstration project and began looking for new dismantling technologies to test for effectiveness. Since then, a team of tritium experts, including PPPL's Keith Rule, was formed to develop and evaluate proposals for the technologies. This integrated contractor team is comprised of experts in various fields from other national laboratories. The DOE quit operating the Mound five

years ago. Rule became part of the team after he and Steve Raftopoulos attended the Mound Tritium Decontamination and Decommissioning Forum in Ohio in 1997. Since that time, the two PPPL'ers have developed five proposals for demonstration at the Mound plant.

According to Rule, the team found PPPL's proposals "intriguing."

"These new technologies, along with the original proposals, all became of great interest to the team. Now we are continuing with proposal development and any preliminary evaluation at PPPL," he said.

Continued on page 3



# PPPL Awarded for Small Business Participation



*In recognition of its outstanding efforts to provide subcontracting opportunities to small businesses, PPPL recently garnered an "Award of Distinction" from the U.S. Small Business Administration (SBA). Small businesses include small disadvantaged businesses and women-owned businesses. PPPL is one of 26 recipients out of 2,500 large businesses in the SBA's portfolio nationwide to have been honored with the citation. Representatives of the SBA presented the award to PPPL Director Rob Goldston on Monday, November 23, at the Laboratory. From left are PPPL Business Operations Head Ed Winkler, SBA Area Director for Government Contracting Jannette Fasano, SBA Commercial Market Representative Andrew Zuber, PPPL Procurement Head Rod Templon, PPPL Director Rob Goldston, SBA Regional Administrator for Region II Thomas Bettridge, U.S. Department of Energy Contracting Officer Raymond Kimble, and Deputy District Director of the SBA's New Jersey District Office James Kocsi.*

## HOTLINE

Editor/Writer: Patti Wieser  
Photography: Elle Starkman  
Graphic Artist: Greg Czechowicz  
Layout: Patti Wieser

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## Women in Science



*During a recent roundtable discussion at the Lab, four PPPL women in science and technology encouraged young women from Foxcroft School in Virginia to consider a range of career options now open to females. PPPL's Andrew Post Zwicker organized activities for the students. Lab participants in the talk included Virginia Finley, Martha Redi, and Phyllis Roney, visitor Boel Denne Hinnov, and moderator Pamela Lucas. From left are Roney, a student, Redi (holding newspaper), and another student. Discussing the progress of women in science, Redi showed a New York Times article, "Women in Antarctica," and noted that until recently women were not allowed to do research at the Antarctica research station.*





## Proposals

Continued from page 1

Of the five proposals, two were discarded because they already existed in a form of technology, but three are under evaluation, including a surface tritium monitor, a 55-gallon drum that removes tritium through bubbling, and a polymer-based absorbance that solidifies — and thus stabilizes — radioactive water for transportation and burial. Also under consideration is a pipe crimper to crimp capillary tubing. Such tubing was used to deliver tritium to the Lab's Tokamak Fusion Test Reactor (TFTR).

"Through environmental management funding, PPPL is managing some of the hazardous removal on TFTR, including capillary tubing. The crimper allowed us to safely remove the tubing," said Rule.

Rule noted that the Mound Laboratory has miles of capillary tubing, while PPPL had just a couple of hundred feet of it. The tubing at the Lab has since been successfully removed. PPPL's Charles Gentile and his group developed the pipe crimper.

The integrated contractor team meets quarterly and participates in monthly conference calls. Members have

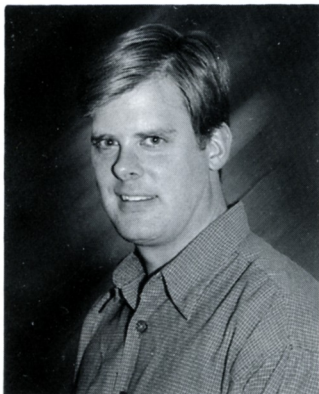


From left are Steve Raftopoulos and Keith Rule with the pipe crimper.

already selected some technologies that are not PPPL's and scheduled test planning for demonstrations.

Rule lauded the tritium community for working together. "This is a great group. We share information on tritium processing, clean up, and waste management, and are selecting technologies and incorporating them into test plans for the Mound." ●

## Ernst Honored by APS for Doctoral Thesis



Darin Ernst

**P** PPL Associate Research Physicist Darin Ernst received the 1998 American Physical Society (APS) Award for "Outstanding Doctoral Thesis in Plasma Physics" during the APS Division of Plasma Physics Annual Meeting in New Orleans last month.

The APS citation honored Ernst "For elucidating the role of radial electric field shear in reducing local heat transport in supershot tokamak plasmas." The award was established in 1985 (originally as the Simon Ramo Award) to provide recognition to exceptional young scientists who have performed original thesis work of outstanding scientific quality and achievement in the area of plasma physics. It consists of a certificate and \$2,000.

Ernst came to PPPL in 1992 and played an active role in the Tokamak Fusion Test Reactor (TFTR) Deuterium-Tritium (D-T) experiments through 1995 as part of his graduate work at the Massachusetts Institute of Technol-

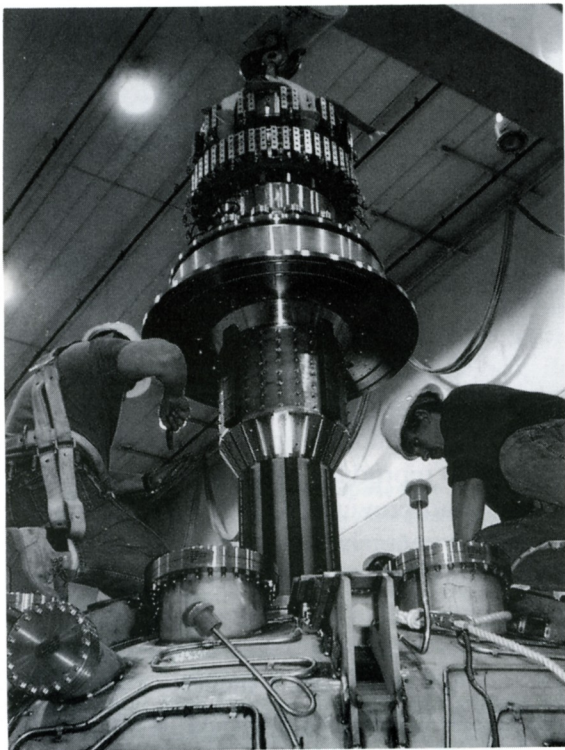
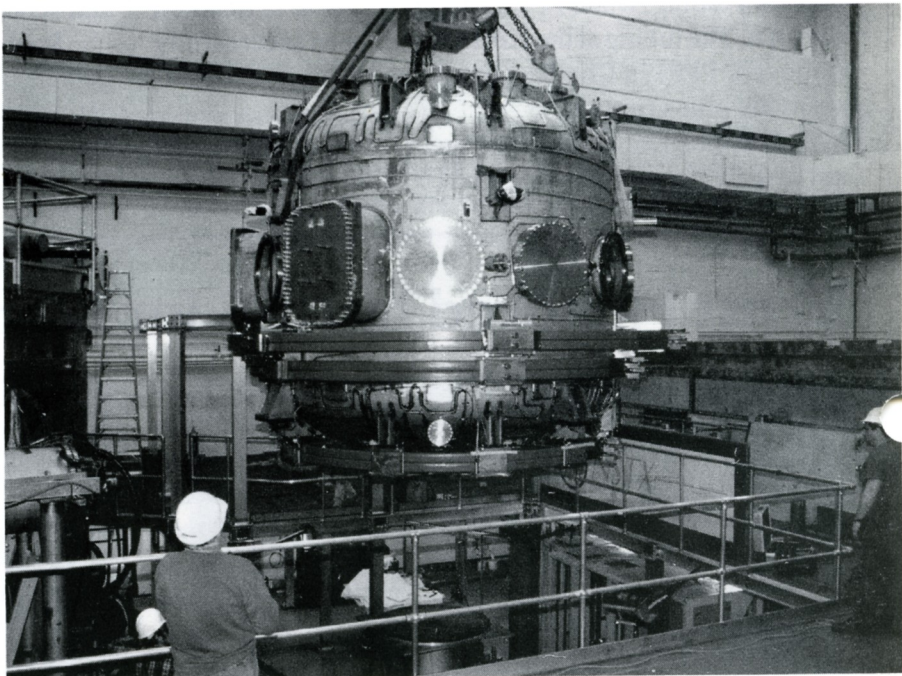
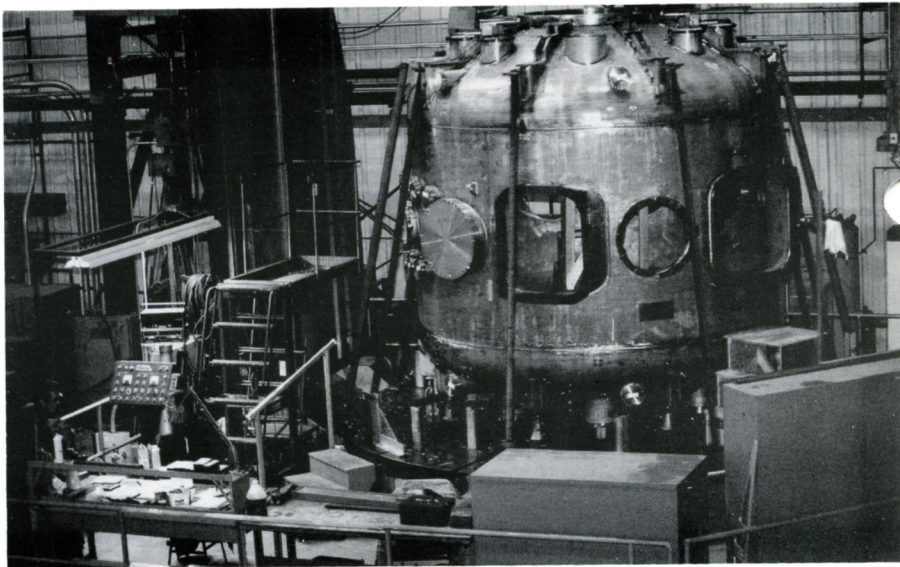
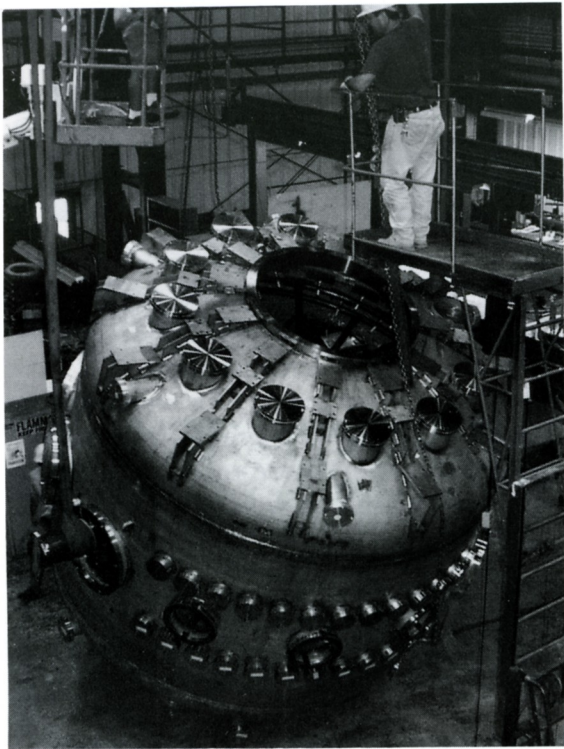
ogy (MIT). For his undergraduate work at the University of Wisconsin, he completed majors in physics, mathematics, and electrical engineering. After receiving a Ph.D. in physics from MIT in 1997, he joined PPPL's staff. He is now a member of the National Spherical Torus Experiment team and continues to collaborate on the Doublet III-D tokamak at General Atomics.

### Phenomenon of Supershots

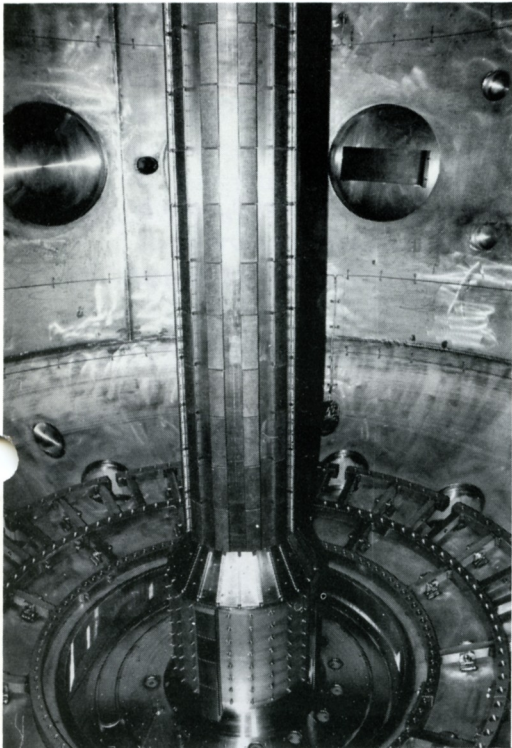
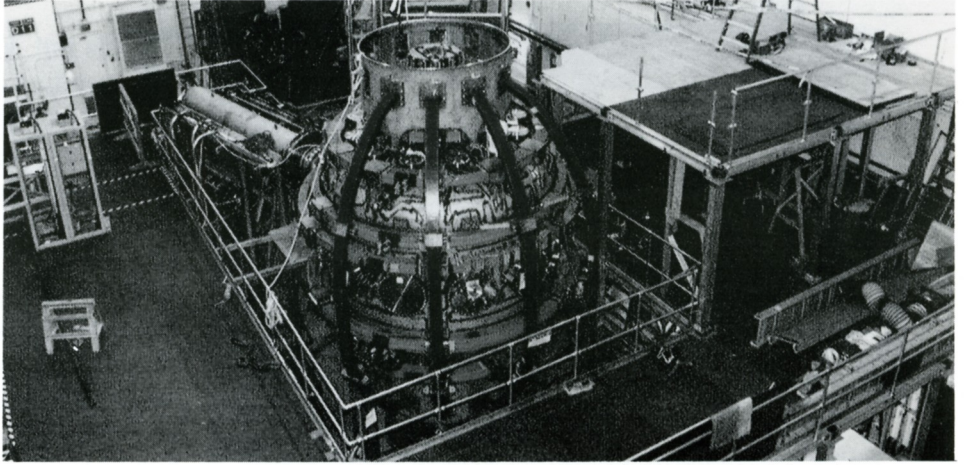
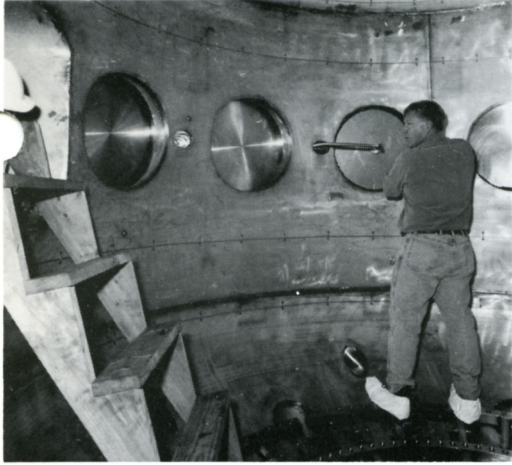
PPPL's Michael Bell said of Ernst, "Darin came to PPPL in 1992 to work with Steve Scott, who acted as his co-adviser, along with Professor Bruno Coppi of MIT. In addition, Professor Miklos Porkolab of MIT was Reader and also contributed. In his thesis, Darin developed a theory to describe the phenomenon of "supershots" in TFTR that was able to reproduce many features of their confinement which had previously eluded explanation. Darin's theory brings supershots into the fold of other enhanced confinement modes in tokamaks, such as the H-mode, where the suppression of turbulent transport by sheared flow improves the confinement. Along the way, Darin also contributed directly to the success of the D-T experiments in TFTR, developing many tools for rapid analysis of the data." ●



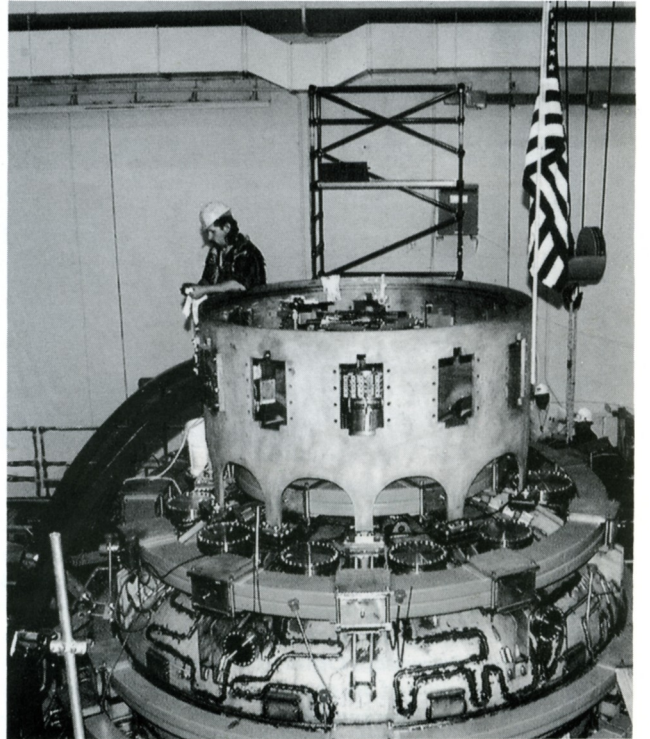
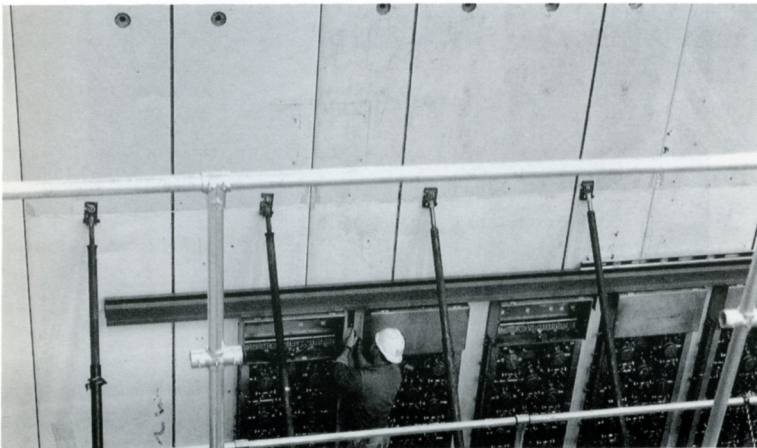
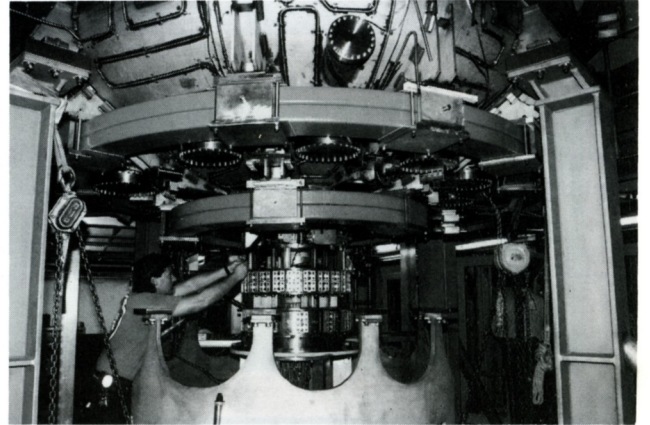
# NSTX Update







Progress continues on the construction of the National Spherical Torus Experiment (NSTX). Clockwise from top left (page 4), turning over the vacuum vessel; machining the vessel; lifting it into place; inspecting the vessel's legs; and installing the center stack; (page 5) leak testing the vessel; a view of the NSTX Test Cell; installing connections to the center stack; installing the outer toroidal-field coils; installing water racks; and an interior view of the vacuum vessel.





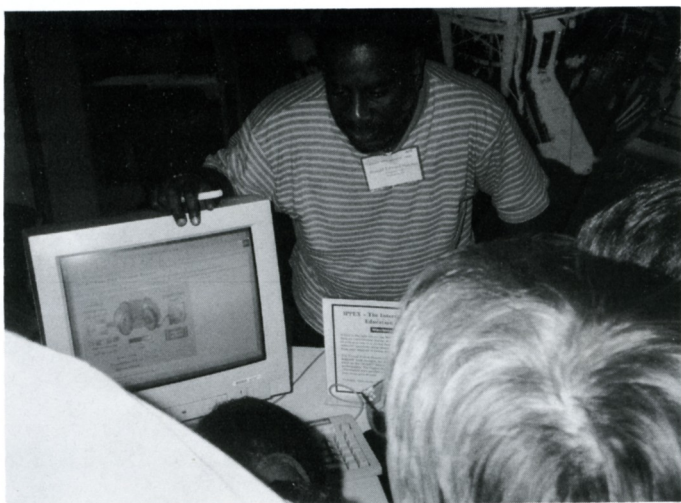
# Lab Wins Award for Outreach Program in Recycling



**T**his fall, PPPL received the 1998 Award for “Outstanding Achievement in Recycling” from the New Jersey Department of Environmental Protection. The Laboratory was cited for its outreach efforts in recycling, and was noted, in particular, for its pollution prevention activities during Earth Week in April. The Lab sponsored a Pollution Prevention Poster Contest for students, as well as hosted 125 youngsters from area schools for “Pollution Prevention Awareness Day.” PPPL’s Thomas J. McGeachen and Margaret King, who organized the poster contest and events, accepted the award during a luncheon in September at the Princeton Marriott. From left are Scott Larson, PPPL Director Rob Goldston, McGeachen (holding the award), King, Rich Gallagher, and J.W. Anderson. ●

## Science Bowl Volunteers Needed

**Volunteers for the New Jersey Regional Competition of the National Science Bowl®, which will be held at PPPL on Saturday, February 27, are needed. If you are interested in serving as a judge, timekeeper, moderator, or scorekeeper, or could assist with logistics, please call James Morgan at ext. 2116.**



**In November, PPPL participated in the 1998 Plasma Expo and Science Teachers Day at the American Physical Society-Division of Plasma Physics (APS-DPP) annual conference held in New Orleans. PPPL’s Henry Carnevale, John DeLooper, Ron Hatcher, Bob Heeter, Bob Kaita, James Morgan, Andrew Post Zwicker, Martha Redi, Barbara Sarfaty, and Ron Strykowski, along with Rick Kessler of Princeton University’s Office of Government Affairs in Washington, D.C., participated in the Expo, which drew more than 4,000 students. Post Zwicker, Morgan, and Peddie School teacher Nick Guilbert hosted 138 teachers during Teacher’s Day. Above, PPPL’s Ron Hatcher discusses IPPEX with a group.**



**PPPL’s Ron Strykowski demonstrates turbulence with a flowing bubble apparatus to young visitors at the Expo.**

Photos by James Morgan



## Materiel Control Celebrates Five Years Without Time-Lost Accident



In October, the Materiel Control Division celebrated a milestone — five years without a “lost-time” accident. The following month the group celebrated with a juice and cookie reception in the Warehouse, where PPPL Director Rob Goldston presented the staff with an “Outstanding Safety Performance” Award. A lost-time accident occurs when an employee is injured at work or becomes ill due to a work-related exposure and, as a result, cannot perform work activities. From left are J.W. Anderson, Jerry Levine, Chris Gillars, Rob Goldston, Matt Lawson, Jim Conover, Joyce Bitzer, Trevor Bayes, Fran Cargill, Spence Holcombe, Nelson Neal, and John Luckie. Not pictured is Jerry Siminoff. Congratulations to Materiel Control! ●



## Dual-Fuel Vehicles Arrive at PPPL

PPPL recently replaced two GSA gasoline vehicles with dual-fuel vehicles. These Chevy 2500 pickups use natural gas and gasoline for power. A natural gas tank is fitted in the bed of the pickup, which holds about 1100 cubic feet of natural gas equivalent to about 8.5 gallons of gasoline. When using natural gas, they run 50 percent cleaner, significantly reducing the problem of emissions. Since these vehicles are dual-fuel and are not dedicated to natural gas, they can be taken on long trips. ●

Above is one of PPPL's dual-fuel vehicles. During the next two or three years, PPPL expects to operate five to seven compressed natural gas vehicles.



# United Way Makes Giving Fun

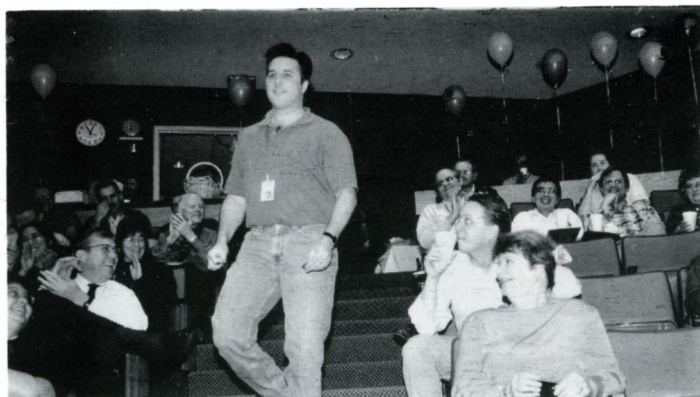
**H**ow can giving to the community be so much fun? Through PPPL's United Way Campaign. As of December 9, employees contributed \$17,939 to this year's drive at the Lab. About 36 percent of the staff participated in the annual fundraising effort.

Throughout the month, staff enjoyed United Way activities, which included a slogan contest and culminated with the Campaign Meeting on December 1 at the MBG Auditorium. The gathering featured information about United Way programs presented by guest speakers, a short video titled "Circle of Hope," door prizes, and entertainment by Father Guido Sarducci.

As guest speaker Mark Lamar, of Family Guidance, noted, "Philanthropy can be fun." ●



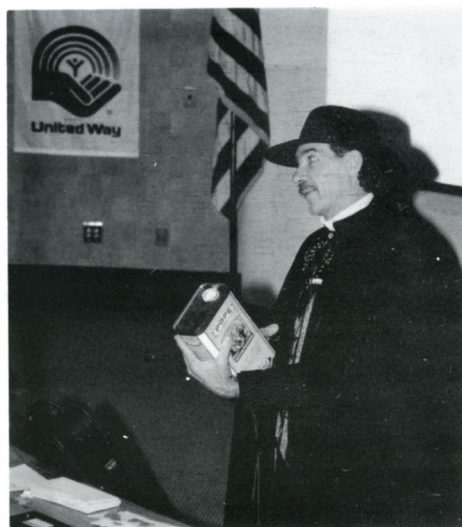
*United Way representative Bobbie Kulp told staff, "I want to thank you — the donor — for investing in your community."*



*Rich Iavarone wins a door prize.*



*The winning slogans were posted along the entryway to the Laboratory. Campaign Chairperson Mary Ann Brown received first place in the contest. The second-place winner was donated by an anonymous sloganer.*



*Father Guido Sarducci entertains the group.*



*John Luckie (at right) wins the holiday wreath donated by Mrs. Carl Potensky. PPPL United Way Campaign Chairperson Mary Ann Brown presents the prize to Luckie.*



# HOTLINE

The Princeton Plasma Physics Laboratory is a United States Department of Energy Facility

## PPPL Prepares for the Year 2000

**T**he problem started in the sixties. Memory for computers was expensive and people saved every bit of it. So when entering a year, folks used the last two digits rather than all four numbers. The year 1968 became simply "68."

Nobody thought about the consequences.

Fast forward to the approaching year 2000. The last two digits could be read as 1900, not 2000. Imagine the problems.

Computer functions that depend on dates may produce unpredictable results ranging from equipment failures to ambiguous or incorrect data. Internal clocks on hardware may not roll over to the year 2000 and data may not be stored correctly. The use of two digits to represent the year may affect calculations, comparison, and data sorting.

Not to worry.

When 2000 arrives, PPPL will ready. Upon the return of staff after next year's holiday break, employee access cards will continue to lift the entrance gate for admittance, paychecks will be distributed — as usual — at the end of the month, and vendors will receive payment for their bills. Operations are anticipated to continue normally because the Laboratory has been tackling the "Year 2000" problem, commonly referred to as Y2K, for the last few years.

### Those Affected

PPPL computers affected by Y2K are IBM large mainframe computers, as well as IBM and IBM-clone personal computers built before 1994, said PPPL Computer Head Dori Barnes. Systems and applications most affected at the Laboratory include the financial systems, which include those for accounting, procurement, and budgets, and the programs developed by scientists for specific research.

MAC users will **not** be affected by the Y2K problem. "With the exception of the financial systems, we do not have any systems that would cause us to halt operations and productivity. We would just have some annoyances," said Barnes, who is the Lab's Point of Contact for the Department of Energy (DOE) on Y2K.

Preparing the Lab's financial systems computers for the Year 2000 is the largest task. In Fiscal Year 1996, PPPL Information Resource Management (IRM) Head Bob Wilson, along with IRM employees Jim MacTaggart, Rich Iavarone, and Joan Orlopp, began upgrading the financial systems. Once completed, they will have upgraded the IBM mainframe computer hardware, two operating systems on the mainframe, all the system applications, the servers, and department personal computers.

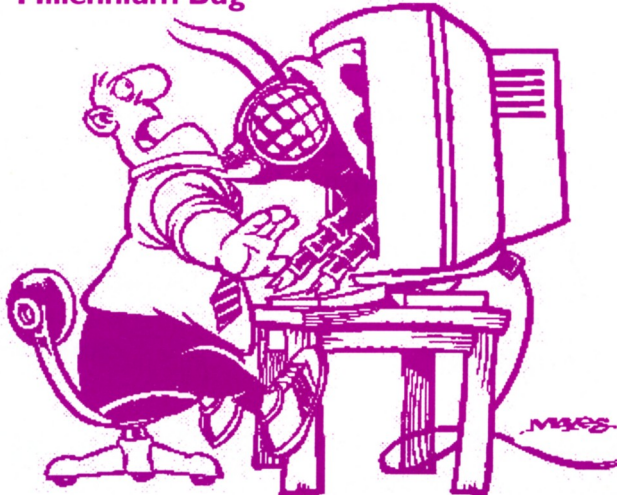
So far, everything has been upgraded except one of the mainframe operating systems and about half of the applications on the mainframe.

So how do they test systems?

"First we upgrade the operating system. Next we survey the applications, identifying which will have problems. After fixing these problems, we essentially tell the machine the date is 2000 and see what happens when we run programs," said Wilson.

There are three critical dates to test — January 1, 2000; February 28, 2000 (a leap year); and September 9, 1999. Some companies used the numerals nine, nine, ninety-nine as digits to flag records as invalid. "We have to prove that we don't have any of those in our system," said MacTaggart.

Millennium Bug



Continued on page 2



## Y2K

Continued from page 1

The system also must be tested to see if February 29 follows February 28 or if it tells the computer to skip to March 1 as it would for an ordinary year.

"The DOE is essentially requiring us to prove that we can survive those three dates," said Wilson.

The Y2K project for the financial systems is taking several person-years to complete. "The work is time consuming because we have approximately 1 million lines of code in our system and virtually all of it has to be looked at manually. There are utilities that look for systems level problems, but at the applications level most problems need to be found by either surveying the code or testing with a 2000 date," said Wilson. A line of code is a single command within a computer program.

Wilson said a big portion of the accounting, procurement, and budgeting work is now computerized. If the computers did not operate, PPPL would have to employ many more employees to accomplish these tasks, as it did in the past. "We've built systems that reduce manual effort. It is critical that we keep the systems running or we'd have to go back to large staffs," he said.

Another group that must attend to Y2K includes the scientific staff. PPPL scientists are encouraged to look at the codes in their individual applications to see if they will have a problem when the new year begins. "The physicists need to look at the code for their physics applications ahead of time. They are not going to be doing physics calculations

that are wrong because of the Y2K problem, but they may have problems. For instance, they could be using wrong calibrations," noted Barnes.

Various other areas at the Laboratory are affected by Y2K, including building systems that have a date function, such as the fire protection and energy management systems. The security and communications systems, as well as programs used by the Health Physics group, are similarly affected by Y2K.

According to Site Protection Head John Bavlish, PPPL's fire protection reporting, security, and communications systems were either installed or have been upgraded to be Y2K compliant. So, too, is the energy management system.

In the Health Physics area, Y2K could have an impact on tritium sample analysis, said Environment, Safety, and Health Head Jerry Levine. When testing liquid or smears that may be contaminated by tritium, Health Physics staff use counters that are dependent on computers to function. These computers are not Y2K compliant. "Most likely, the solution will be to install new equipment," Levine said.

Still others must address database problems brought on by the approaching year. For instance, the toolcrib uses a database to track items and it must be fixed for compliance.

### DOE Deadline

March of 1999 is the deadline set by the DOE for the Laboratory to be Y2K compliant. With much effort and over many hours, PPPL is progressing toward that goal. "The DOE wants us to be completely remediated by March of 1999," said Barnes. ●

## What Are You Doing About Y2K?

### Who Should Worry?

- Scientists who have developed their own programs for specific research tasks.  
*You are encouraged to test your applications for Y2K and fix, if necessary.*
- Database users who have IBM and IBM-compatible computers.  
*Please check databases for compliance. If you need help, please send an e-mail to [helpdesk@pppl.gov](mailto:helpdesk@pppl.gov).*
- Anyone who suspects he or she may have programs that are not compliant.  
*If you are uncertain, send an e-mail to [dbarnes@pppl.gov](mailto:dbarnes@pppl.gov).*

### Who Does NOT Need to Worry?

- MAC users.

## HOTLINE

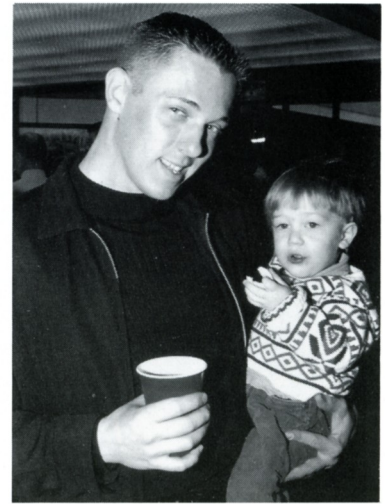
Editor/Writer: Patti Wieser  
Photography: Elle Starkman

Graphic Artist: Greg Czechowicz  
Layout: Patti Wieser

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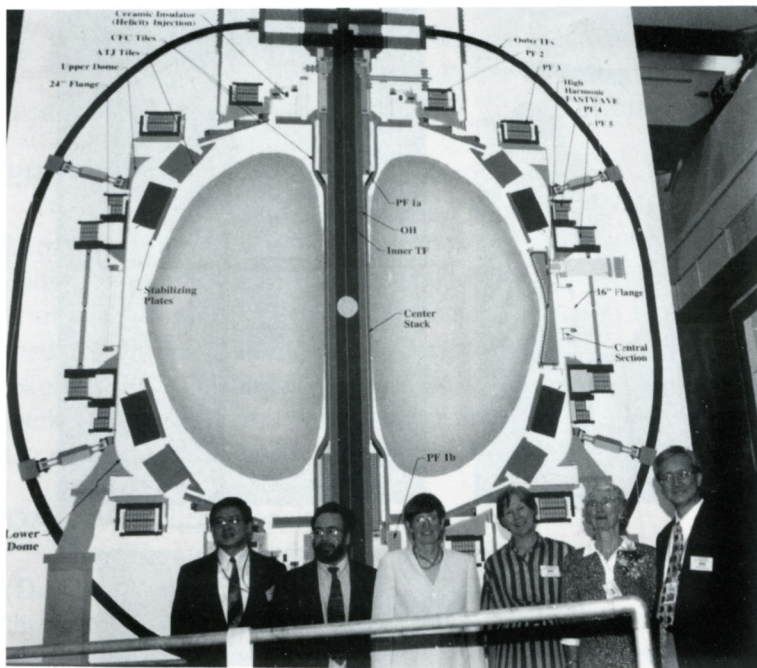
# Glad Tidings Abound at PPPL's Holiday Festivities



*On December 23, the Laboratory hosted an employee holiday party featuring food, music, and good times. At right, The Rhythm Kings, who include PPPL physicist Ed Synakowski, provides musical entertainment during the bash. At middle right, PPPL Director Rob Goldston addresses staff. Top right, PPPL'er James Morgan and Max Post Zwicker, son of PPPL'er Andrew Post Zwicker, participate in the festivities. Above and at top left, employees enjoy the food and conversation.*



# The Year in Review



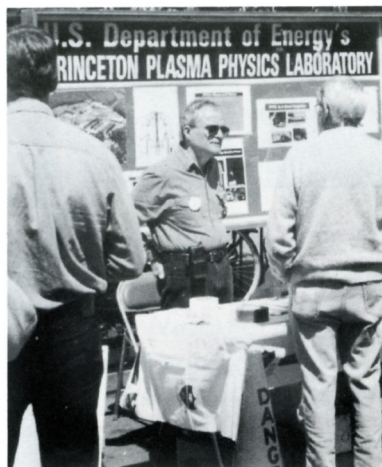
Standing in front of a full-scale drawing of NSTX at the groundbreaking ceremony are (from left) Masa Ono, NSTX Project Director; Rob Goldston, Director of PPPL; Martha Krebs, Director of the U.S. Department of Energy's Office of Science; Anne Davies, Associate Director, U.S. Department of Energy Office of Fusion Energy Sciences; Doreen Spitzer, widow of Lyman Spitzer, Jr.; and Martin Peng, NSTX Program Director.



PPPL celebrated the dedication of the Lyman Spitzer Building and the groundbreaking of the National Spherical Torus Experiment (NSTX) on May 18, 1998. PPPL's Laboratory Office building was renamed in honor of Laboratory founder Lyman Spitzer, Jr., who died in 1997. Mrs. Spitzer (right) and Martha Krebs, Director of the U.S. Department of Energy's Office of Science, view the building plaque after the unveiling.

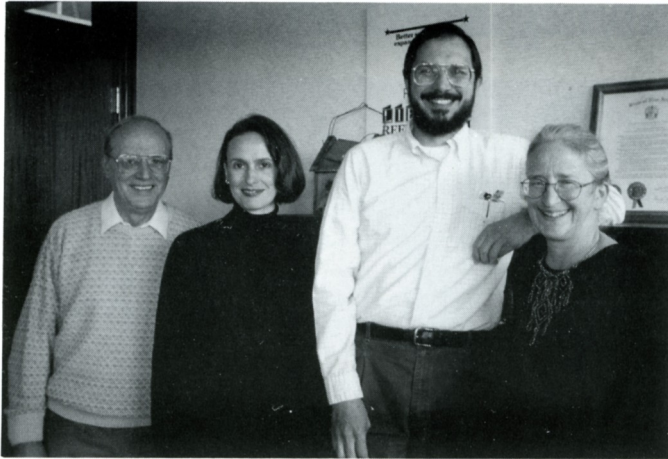


More than 125 students from area schools participated in hands-on science demonstrations, watched some of their classmates receive awards for pollution prevention posters, and toured the Tokamak Fusion Test Reactor during Pollution Prevention Awareness Day at PPPL in April. The Laboratory hosted the youngsters, as well as about a dozen children of staff who came to PPPL for Take Our Daughters to Work Day. Diane Carroll, Head of PPPL's Science Education Program, demonstrates to students the effects of magnetic fields on plasma in an uncoated fluorescent light bulb.

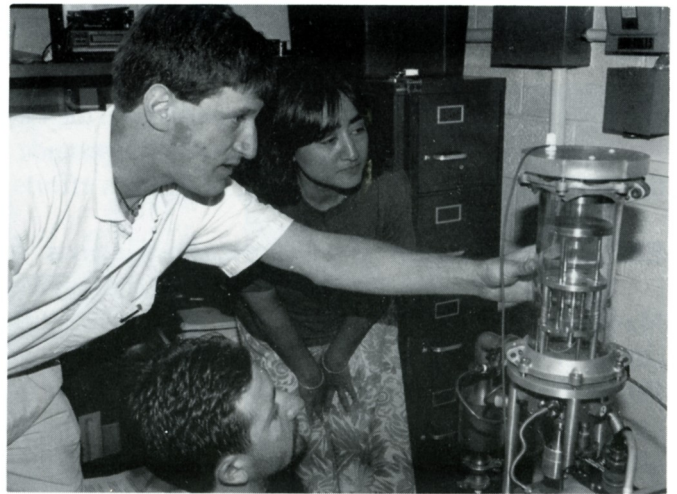


In April, the Laboratory participated in Communiiversity, an annual springtime celebration that joins Princeton University with the community of Princeton. At top, PPPL Associate Director for External Affairs John DeLooper (left) demonstrates turbulence with a flowing bubble apparatus to the sons of Laboratory Deputy Director Richard Hawryluk as Hawryluk (in sunglasses) watches. At left, Information Services Head Anthony DeMeo fields questions about the Lab.

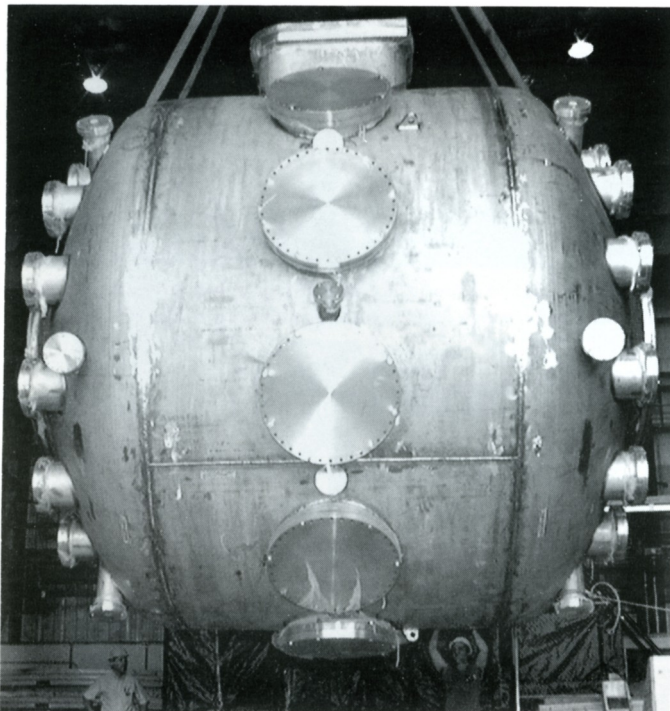




PPPL Nobel Laureate Russell Hulse and Plainsboro Public Library Director Jinny Baeckler spearheaded a project called "Contact Science," which will create, disseminate, and support small-scale traveling science exhibits in public libraries. The prototype exhibit would be located at the Plainsboro, New Jersey library and travel to other libraries from there. Procter & Gamble, Inc. is funding the Phase I scoping and program development studies. The Contact Science team includes, from left, former PPPL'er Dick Rossi, consultant Barbara Graham, Hulse, and Baeckler.



Ten teachers from across the country participated in "Plasma Camp," an intensive two-week summer program of lectures, lab work, and curriculum design for high school physics teachers. During the camp, officially called the Plasma Science and Fusion Energy Institute, PPPL physicist Andrew Post Zwicker (left) discusses an experiment with high school physics teachers Brian Wargo (middle) and Uma Jayaraman (right). They are using an apparatus at PPPL for studying the conditions under which air can become a plasma.



Construction of the National Spherical Torus Experiment (NSTX) progressed rapidly. The 23,000-pound vacuum vessel for NSTX arrived at the Laboratory on August 5, marking a major step in the construction of the new device. Earlier in the summer, the world's tallest ohmic-heating solenoid was delivered to PPPL and lowered over the inner toroidal-field coils of NSTX, which were also major milestones in the assembly of the project.



The Laboratory honored twenty-two inventors for Fiscal Year 1997 during the sixteenth annual Patent Recognition Dinner on June 16 at Princeton University's Prospect House. Those attending the dinner and receiving awards were (from left) Don Weissenburger, Joseph Cecchi, Charles Skinner, Nathaniel Fisch, Robert Woolley, Samuel Cohen, Gennady Shvets, Tobin Munsat, Jan Wioncek, Enoch Durbin, Szymon Suckewer, and Hironori Takahashi.

# Happy New Year!



# December ...A Month for Giving at PPPL

**D**ecember marked a month of generosity at the Laboratory. Several drives were underway to provide for those in need. Below is a sampling of PPPL's efforts.

## ER/WM Relief Effort for Hurricane Victims

The Laboratory's Environmental Restoration/Waste Management (ER/WM) group headed a drive at PPPL to collect items for Guatemalan and Honduran victims of Hurricane Mitch this fall. Employees contributed food, medical supplies, equipment, and clothing for the relief effort. PPPL's Keith Rule headed the effort to collect and package the items and arranged for their distribution to the nearest relief organization before the holiday break.

## DACW Holiday Baskets

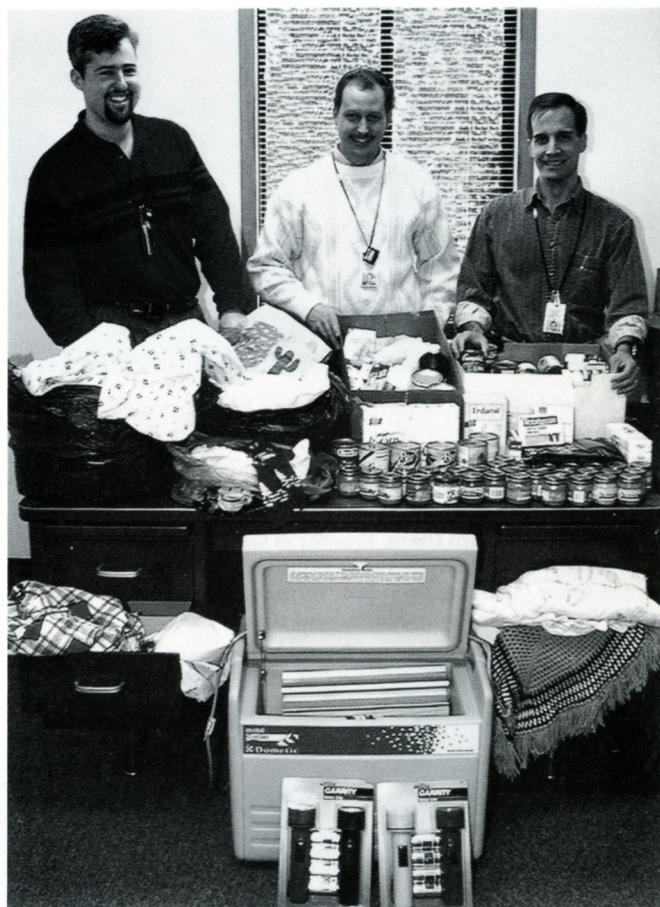
The Director's Advisory Committee on Women (DACW) "adopted" two needy families in December through Princeton University's Holiday Basket program. Working with HomeFront, a local agency that provides for the homeless, the DACW provided all the items on wish lists submitted by the families and donated additional items for stocking stuffers. HomeFront staff gave the baskets to the recipient families during a holiday party in their honor.

## United Way Drive

PPPL's 1998 United Way Campaign netted \$21,221!

## Maintenance and Operations Collection

The Maintenance and Operations Division sponsored a Holiday Basket for the Mercer County Head Start Program. At the request of Head Start, 19 hat-and-mitten sets in toddler size were donated by the division to one entire class in the program. The sets were purchased at many different retailers in the vicinity, with a certain number for boys and another quantity for girls. Each set



*From left are Steve Elwood, Keith Rule, and Rob Sheneman with the donations for the Honduras and Guatemala relief efforts.*

was unique. PPPL's Sara Flohr and Linda Harmon organized the effort.

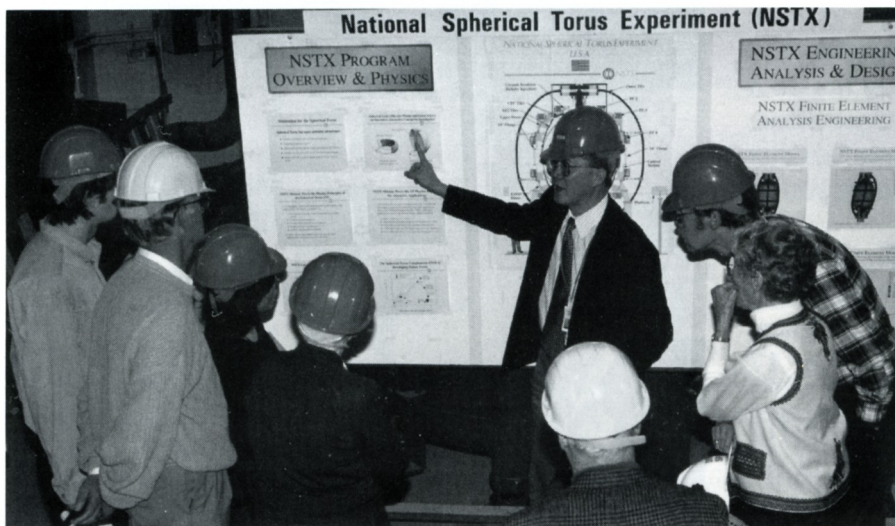
A special thanks goes to all staff who so generously donated to these and other worthy causes. ●

## Science Bowl Volunteers Needed

*Volunteers for the New Jersey Regional Competition of the National Science Bowl®, which will be held at PPPL on Saturday, February 27, are needed. If you are interested in serving as a judge, timekeeper, moderator, or scorekeeper, or could assist with logistics, please call James Morgan at ext. 2116.*



# Doreen Spitzer Group Tours NSTX



*In December, Doreen Spitzer, widow of Laboratory founder Lyman Spitzer, Jr., brought a group of friends to PPPL to tour the National Spherical Torus Experiment (NSTX). It was Mrs. Spitzer's first visit to the NSTX Test Cell since the groundbreaking ceremony for the project in May. By December, much of the machine had been constructed. At left, NSTX Program Director Martin Peng (pointing) gives an overview of the project, which is scheduled to produce first plasma in February, 1999. At right is Mrs. Spitzer on the tour.*

---

## Keeping Fit ... PPPL'ers Hit the Pavement

Four Participate in Area Marathons



*During 1998, several runners from the Lab participated in marathons along the East Coast. Steve Jardin ran in the New York*

*Marathon, J.W. Anderson in the Marine Core Marathon in Washington, D.C., and Tony Bleach and Charles Skinner in the Philadelphia Marathon. Tony and J.W. also ran in the Jersey Shore Marathon earlier in the year. Above, the group practice their sport on the grounds at PPPL. From left are Skinner, Bleach, Jardin, and Anderson. At left, from left in running gear are Skinner, Anderson, Bleach, and Jardin.*



# America Recycles Day at PPPL is a Success

**S**o why recycle and buy products which contain recycled material?

During PPPL's celebration of America Recycles Day this past fall, the Laboratory hosted a morning devoted to answering just those questions. The theme of the day, which included speakers and displays, was, "If you're not buying recycled, you're not really recycling."

"Recycling and buying recycled creates jobs and economic opportunities, creates new markets ... and conserves resources and energy," said guest speaker Aletha Spang during the November 17 event.

Spang, of Recycling Unlimited, recited a list of recycling benefits and displayed examples of recycled materials and products manufactured with recycled materials during her talk, "The Importance of Recycling and Buying Recycling Content Products." Such products include "plastic lumber," which is used for picnic tables and boardwalk, and pencils made from recycled blue jeans, as well as carpet made from recycled material. The picnic tables in PPPL's courtyard are an example of plastic lumber. They are manufactured with 100 percent recycled plastic.

## Recycling Performance and Goals

In addition to Spang, PPPL's Thomas J. McGeachen and Margaret King discussed the Lab's recycling performance and goals, and J.W. Anderson recognized members of the Laboratory staff for their support of PPPL's recycling effort. During Fiscal Year 1997, PPPL recycled 145,505 pounds of paper and 23,752 pounds of aluminum, plastic, and glass bottles and cans. During Fiscal Year 1998, PPPL's purchases of federally designated products manufactured with recycled materials was 54 percent, up significantly from the previous year's 6 percent. The process of buying products manufactured with recycled materials content is called "Affirmative Procurement" or "Buying Recycled" and includes the pur-



*Lab employees stop by the U.S. Postal Service recycling display in the Lobby on America Recycles Day. From left are U.S. Postal worker Carol Willis and PPPL staff members John Bennevich, Keith Rule, and Steve Elwood.*

chase of items such as copier paper, printer paper, and remanufactured toner cartridges.

During America Recycles Day, local exhibitors provided displays of their recycled-content products in the Lyman Spitzer Building Lobby and fielded questions from staff. Exhibitors were from the U.S. Postal Service, Staples, PPPL, the Environmental Protection Agency, the Steel Recycling Institute, and Home Depot.

The events were open to all PPPL employees and the public. The Lab's Environmental Restoration/Waste Management and Maintenance and Operations groups organized the day.

"A strong recycling effort and procurement of recycled-content products at the Laboratory is important. Not only is the recycling and the use of recycled-content products consistent with the goals of fusion, but it is a requirement of our client," said PPPL Director Rob Goldston. ●

As part of America Recycles Day, a national contest to win "The American Green Dream House," a three-bedroom home built primarily with recycled-content materials, was held. One of the entry boxes was in the Lyman Spitzer Building Lobby. The winner was chosen on December 15 from a random drawing of entries submitted by 2.1 million individuals who voluntarily pledged to recycle and buy recycled products. Rhode Island resident Lori McKee won the contest. For more information about the contest and the winner, check out the website at <http://www.americarecyclesday.org>.



# HOTLINE

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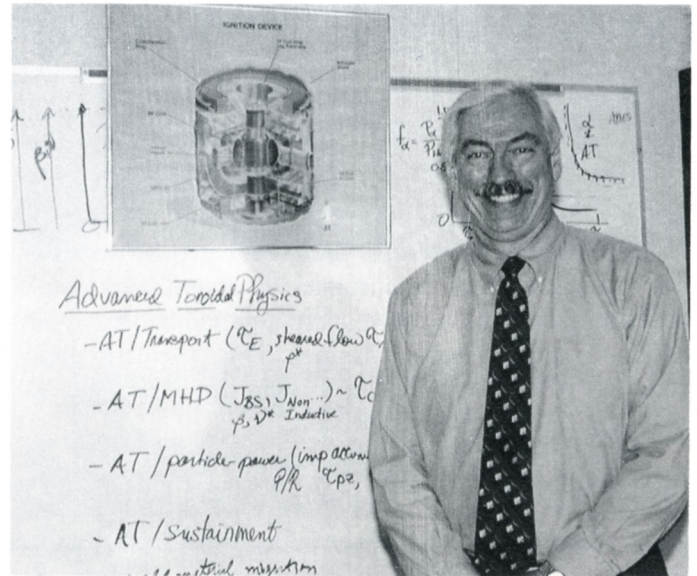
## Fusion Power Associates Honors Meade

In recognition of his "outstanding leadership qualities in accelerating the development of fusion," the Fusion Power Associates (FPA) Board of Directors is honoring Dale Meade, Head of Advanced Reactor Concepts at PPPL.

Meade, former Deputy Director at the Laboratory, is the recipient of the group's 1999 Leadership Award. Meade's citation states, "Your early leadership of the TFTR [Tokamak Fusion Test Reactor] program and continuing contributions to the field of energy-producing plasmas and fusion applications have challenged the community to move forward expeditiously toward practical fusion power."

TFTR, which operated at PPPL from 1982 to 1997, made many contributions to fusion science and set world records in plasma temperature and fusion power production.

PPPL Director Rob Goldston said of Meade, "Dale has shown outstanding persistence, energy, and inventiveness throughout his scientific career, all key qualities for the success of fusion. We are very pleased that his



**Dale Meade**

contributions have been recognized by Fusion Power Associates."

**Continued on page 2**

## Taylor Receives Presidential Achievement Award

By Patti Wieser

When the phone rings in the L-wing for PPPL technician James Taylor, it usually signals the start of a new task. "You never know what's next," said Taylor, a 32-year veteran of the Laboratory.

It could be a problem with the experimental area water system for the entire L-wing. Or it might require special knowledge about



**James Taylor works on the Current Drive Experiment-Up-grade project.**

machining or electrical installation or vacuum technology.

According to his supervisors, it is Taylor's unique blend of expertise and dedication, as well as his breadth of abilities in tackling such problems, that led to him being chosen as one of four Princeton University 1998 Presidential Achievement Award recipients. The honorees were cited during a ceremony at Princeton's Rockefeller College on January 27.

The award, part of Princeton's Staff Recognition Program, was established in 1997 and is designed to recognize members of the support and administrative staff with ten or more years of service who, through their

**Continued on page 3**



## Meade

Continued from page 1

FPA President Stephen O. Dean presented the award to Meade on January 25 during the FPA's annual meeting in Marina del Rey, California. Meade and B. Grant Logan of the Lawrence Livermore National Laboratory in Livermore, California, are the two recipients this year.

During the awards presentation, Dean told the honorees, "In selecting you, the FPA Board of Directors recognizes your many past contributions and continued dedication to finding viable pathways to practical applications of fusion. Congratulations both!"

Meade said, "I am honored to receive the FPA Leadership Award. Progress in fusion is always the result of the efforts and dedication of many — a team effort. I would like to thank my colleagues for their support and encouragement."

Meade noted the "amazing things" that have been accomplished in magnetic fusion research. "Controlled fusion plasmas have been produced in the laboratory, which together with comprehensive diagnostics and detailed modeling, have led to a fundamental understanding of the science of fusion plasmas. This scientific understanding will be essential in solving the challenges of a practical fusion system," he said.

Meade, who came to the Laboratory in 1973 after serving as a professor of physics at the University of

Wisconsin, was Deputy Director of PPPL from 1991 to 1997 and Head of the TFTR Project from 1986 until 1991. He presently heads the Laboratory's program in Advanced Reactor Concepts.

**"Dale has shown outstanding persistence, energy, and inventiveness throughout his scientific career, all key qualities for the success of fusion."**

**—Rob Goldston**

He is the second person from PPPL to receive the FPA's Leadership Award since it was created in 1980. Former Director Harold Furth received the award in 1982. The same award also went to former PPPL Director Ronald C. Davidson in 1986, while he was at the Massachusetts Institute of Technology.

Meade received a bachelor's degree in electrical engineering in 1961, a master's in physics in 1962, and a Ph.D. in physics in 1965, all from the University of Wisconsin. He is a Fellow of the American Physical Society. Other awards he has received are the Department of Energy Distinguished Associate Award in 1994 and the University of Wisconsin-Madison College of Engineering Distinguished Service Citation in 1990. ●

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## PPPL Boasts Outstanding Safety Record

**S**afety first! That's a favorite motto at the Lab and — according to last year's statistics — one heeded by staff.

Environment, Safety, and Health Head Jerry Levine called the Lab's safety record for 1998 "outstanding."

### Only One Case

Last year, there was only one case of an employee who was out of work for one or more days after being injured on the job.

"This outstanding safety performance is the result of everyone's efforts and care on the job. I want to thank the whole staff," said Levine.

The Lab's one lost work day case in 1998 occurred when an employee injured his right knee and hip after missing the last step of a ladder on his way down from modifying the electrical systems on the National Spherical Torus Experiment (NSTX). As a result of the accident, the staff member was out for three days.

"It's incredible that there was only one lost work day case last year, especially when you consider the work being done here," said Levine, noting the building of NSTX.

The Lab also had just seven recordable injuries in 1998. Recordable injuries are those in which an employee would have lost work time, restricted work time, or medical treatment. An injury could be as minor as a cut finger requiring stitches.

Levine keeps a log of the recordable injuries and illnesses that occur at the Lab. Each incident is investigated.

He credited the Lab's staff for the successful safety record. "I think the biggest factor is that all of our workers are experienced people. They care about safety and they work safely," Levine said. In addition, the good morale brought on by constructing a new machine contributes to the success rate. "Everyone works together and watches out for each other," he said. ●



## Taylor

Continued from page 1

dedication and excellent work, have made a significant contribution to the success of their department and to the university. Four awards are made annually to staff. Nominations are made by managers and their vice presidents or deans. Recipients receive a certificate, a cash award of \$2,000, and have their names inscribed on a plaque displayed in the Office of Human Resources on main campus. Three other nominees were from PPPL this year, including Les Gereg, Larry Sutton, and Joe Winston.

### Invaluable Contributor

Said PPPL Engineering and Technical Infrastructure Head Michael Williams, "Jim's broad knowledge of Laboratory technologies and wide-ranging technical expertise have made him an invaluable contributor to all of the Laboratory's experimental programs."

Added Experimental Systems Branch Head Bill Blanchard, "Jim has been frequently sought out to assist in both the troubleshooting and resolution of various problems that might arise such as vacuum or grounding problems ...As impressive as Jim's technical achievements have been, his professional outlook and complete willingness to help wherever and whenever he is needed are equally as impressive, if not more so."

Others described Taylor as "upbeat and pleasant to work with," "a natural leader of the technical staff," and one who possesses the ability to "boost morale."

Hired by the Laboratory in 1967 as an electronics technician, Taylor was asked if he would temporarily work as a technician on experiments since there were no openings in the electronics shop. Thirty-two years later — interrupted only by a military stint three decades ago — he remains working on experimental projects. "Any day now I should get this call that there's an opening in the electronics shops," mused Taylor.

Whatever the task, it's what makes each workday unique for Taylor. "There isn't a typical day," he said.

Presently, Taylor is involved in the Current Drive Experiment-Upgrade (CDX-U) project. After a long hiatus, CDX-U began operating again in January using the power supplies that were originally purchased for the Princeton Beta Experiment-Modification. "It's been a long process getting the cables pulled from where the power supplies are at the ESAT Building and working out the logic for the supplies," said Taylor, who built the machine and is familiar with every piece on it. CDX-U is the latest in a series of devices Taylor has worked on since he came to the Lab in 1967. His first was the Etude stellarator at B-site. Following military service, he came to the L-wing — where he has been ever since — to serve



**Princeton University Vice President for Public Affairs Bob Durkee (right) presents the Presidential Award to James Taylor.**

as the technician on the Large Ion Larmor Orbit (LILO), the L-3 and L-4 linear devices, the Advanced Concepts Torus I (ACT-I), and finally CDX, which is now CDX-U.

Taylor said he enjoys working on the small experiments, as well as with graduate students. "The smaller devices in the L-wing offer hands-on learning for graduate students. This is not just a place for experimentation, but also where the students can get their hands dirty," he said.

He added, "The students are fun to work with because each one is different. They are from all walks of life and areas of the world. Each of them has a unique way of going about getting their results."

One former graduate student, Masayuki Ono, who is now the Project Director for the National Spherical Torus Experiment (NSTX), recalled the help he received from Taylor 25 years ago. "What makes Jim very special, aside from his outstanding technical skill, is his caring and understanding attitude toward everyone, including the students. I, for one, was helped by Jim in many ways during my thesis years ...Jim has performed a great service in training the scientific leaders of tomorrow in both technical and human aspects," said Ono.

Likening PPPL to a family, Taylor insisted the Presidential Achievement Award honors the Laboratory more than the individual. "If you need help, you can always go to the person across the hall. It's always been a family atmosphere here and I really feel that PPPL received the award," he said. ●



# How to Encourage Action on Diversity

**P**eople often ask for concrete suggestions for managing diversity. At PPPL, each individual is encouraged to be a "Change Agent" for diversity. This concept has been reinforced during seminars about diversity and in the recent Diversity Awareness Training given by Enrico Carreira. However, there are things that can be done organizationally to strategically have an impact on our diversity efforts. PPPL has been recognized as an organization that has demonstrated our commitment to developing sound and notable programs. Together we can continue to improve and build on this foundation.

The following is from "101 Actions You Can Take to Value and Manage Diversity," a booklet by Julie O'Mara and the One America in the 21st Century, the Advisory Board's Report to President Clinton.

## For All Employees:

Identify and be aware of your biases, assumptions, and prejudices. Consider how they may affect your attitude at work. Recognize that prejudice is often subtle and it is natural to make assumptions or to have biases toward others. [Remember Rico's "Personal Values Exercise."] When you know you'll be in a challenging situation, plan to question your biases and perhaps react differently than your feelings might dictate. Make a point to raise your concerns about comments or actions that appear prejudicial, even if you are not the targets of these actions. Learn

more about heterosexism, homophobia, and issues related to gays, lesbians, and bisexuals in the workplace. [Locally, contact the ALLY Project sponsored by the P-QUE (Princeton Queer University Employees). The purpose of the project is to foster a supportive and affirming atmosphere for lesbian, gay, and bisexual people by establishing a network of faculty and staff members who are visible allies of the community. The Ally Project sponsors a training session. Please contact Adam Rockman at [rock@princeton.edu](mailto:rock@princeton.edu).]

## For Managers and Supervisors:

Model the diversity behaviors advocated by your organization. Don't say one thing publicly and another informally. [For example, do not publicly support PPPL's policy against sexual harassment and then tell sexist jokes — even if only to a select few personal friends at work.]

Set objectives and performance standards, but don't dictate ways to achieve them. People with various problem-solving styles will enrich the results. According to diversity specialist Karen Bearden, Ph.D., it is important for leadership to set a vision for the organization and how diversity fits in, and articulate it to the rest of the organization. Education of senior management and training the entire workforce also figure highly in making diversity work, according to Dr. Bearden. ●

— *Provided by PPPL Diversity Officer Pamela Lucas*

## HOTLINE

Editor/Writer: Patti Wieser  
Photography: Elle Starkman  
Graphic Artist: Greg Czechowicz  
Layout: Patti Wieser

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## BBC Notes Lab Website

**T**he Internet Plasma Physics Educational eXperience (IPPEX) website has been chosen for inclusion in the BBC Education Web Guide. IPPEX is PPPL's interactive, educational website that allows users to operate their own fusion experiments and analyze data from real experiments conducted by physicists. The internet address for IPPEX is: <http://ippex.pppl.gov/ippex/>.

The Education Web Guide team noted the quality and educational content of the IPPEX site and have placed a short review of it in the guide's searchable database, which can be accessed by Internet users everywhere at <http://www.bbc.co.uk/education/webguide>. The guide offers the newest and best websites for learning at home, at school, and at college. The sites included have been hand-picked by a team of subject specialists, and scrutinised for educational rigor by experts at BBC Education. The guide provides a one-stop shop for the best educational resources on the internet and is the focal point for all of the BBC's educational resources. ●



# HOTLINE

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## NSTX Achieves First Plasma



Photo by Patti Wieser

*PPPL staff see the first plasma on a monitor in the Control Room. From left are Tom Egebo, Raffi Nazikian, Ken Young, Ron Strykowski, Steve Sabbagh (seated), Charles Gentile, Eric Fredrickson, PPPL Director Rob Goldston (seated at front wearing suspenders), Martha Redi, Hutch Neilson, and NSTX Program Director Martin Peng (far right at front).*

**A**mid the cheers and jubilation of PPPL staff, the National Spherical Torus Experiment (NSTX) achieved first plasma on Friday, February 12, at 6:06 p.m. Its flash across the monitors in the Control Room signaled the successful construction of the Laboratory's new experimental fusion device, heralding the start of an exciting research adventure at PPPL.

"We've created a star again in the Laboratory," noted PPPL scientist Henry Kugel.

Throughout the afternoon, technicians, physicists, engineers, and interested staffers began filling up the NSTX Control Room to wait for first plasma. The researchers conducted a series of tests on the magnetic coils and diagnostics for the machine before attempting to produce a plasma. At 3:20 p.m., some members of the NSTX Program Advisory Council (PAC) filed in to catch

**Continued on page 2**



## Plasma

Continued from page 1

a glimpse of the first NSTX plasma. The group had been at the Laboratory for a two-day meeting that concluded the afternoon of February 12.

As the clock ticked down, people gathered around the monitors to wait for the bright appearance of a plasma. Shortly after 6 p.m., the wait paid off. Following the count down, a flash beamed across the screens.

## New Adventure

"This is a tremendous accomplishment by the whole NSTX Team. The combination of energetic enthusiasm and care for all of the critical details is wonderful to see. It makes me very proud of all of us. This first result from NSTX reflects well not only on PPPL, but on the whole U.S. and world fusion program. We are started off on a new adventure. I believe that it will be an exciting one!" said PPPL Director Rob Goldston.

Added NSTX Project Director Masa Ono, "I'm very excited about actually getting first plasma. This is due to the great teamwork we have and to the dedication, capabilities, and experience of everyone involved. Everything came together in the critical moment."

"First plasma" marks the beginning of NSTX experimental operations, following a national design and construction effort completed 10 weeks ahead of schedule and right on budget. On Monday, testing continued until the machine produced a plasma current of 50 kiloamps.

Said NSTX Program Director Martin Peng, "The NSTX Team achieved its milestone of 50 kiloamps in induced plasma current during the second run day of the first plasma test, ten weeks ahead of the schedule. This accomplishment attests to the super dedication and expertise of the entire NSTX Team, and the great support of the host and participating institutions. We look forward to working with the national research team and beginning the scientific investigations of the exciting spherical torus fusion plasmas enabled by the upcoming NSTX facility." ●



Above, gathered around the monitor displaying the first NSTX plasma, are (from left) Henry Kugel, Masa Ono, Rob Goldston, John DeLooper, and Rich Hawryluk. At right are (from left) Tim Stevenson, Masa Ono, Rob Goldston, Mike Williams, Jon Menard, Rich Hawryluk, Dennis Mueller, and Bill Tang.



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# HOTLINE

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## Irrepressible Secretary Lauds Lab



Cutting the ribbon to mark the beginning of experimental operations on the National Spherical Torus Experiment at PPPL are, from left, Laboratory Director Rob Goldston, N. Anne Davies, Associate Director for Fusion Energy Sciences at the DOE Office of Science, Representative Rush Holt (NJ-12th), U.S. Secretary of Energy Bill Richardson, Representative Rodney Frelinghuysen (NJ-11th), Princeton University President Harold Shapiro, and Princeton Township Mayor Phyllis Marchand.



Physicist Janardhan Manickham asks the Secretary a question during the all hands meeting in the MBG Auditorium.



Secretary Richardson (holding fluorescent tube) demonstrates how a plasma globe lights a fluorescent bulb to a group of Trenton students. At far left is PPPL Science Education Program Head Diane Carroll and at far right is PPPL Director Rob Goldston.



NSTX Program Director Martin Peng (left) discusses the project with Secretary Richardson (middle) and NSTX Project Director Masayuki Ono (right).



# An Irrepressible Day...

**O**n February 26, the mood at the Laboratory was, simply, “irrepressible.”

The staff could not contain its excitement about the visit by U.S. Secretary of Energy Bill Richardson, who was described by one elected official as “irrepressible.” The Secretary came for a ceremony marking the beginning of experimental operations on the National Spherical Torus Experiment (NSTX).

“I want to applaud everyone at this Laboratory for the path-breaking success of the National Spherical Torus Experiment, which through hard work has been brought in ahead of schedule and on budget,” said Secretary Richardson during the NSTX ribbon cutting ceremony in the Test Cell. “It is outstanding research such as this that leads to important breakthroughs.”

Secretary Richardson was assisted in the ribbon cutting by Congressmen Rodney Frelinghuysen (NJ-11) and Rush Holt (NJ-12), Associate Director for Fusion Energy Sciences Anne Davies, Princeton University President Harold Shapiro, Princeton Township Mayor Phyllis Marchand, PPPL Director Rob Goldston, NSTX Program Director Martin Peng, and NSTX Project Director Masa Ono.

## Music to the Ears

“This new machine is like music to the ears of the appropriations committee — on time and on budget,” said Congressman Frelinghuysen. The Congressman, a strong supporter of PPPL and of fusion research, is on the Appropriations Energy and Water Subcommittee.

Added Congressman Holt, “NSTX is an example of what the Princeton Plasma Physics Laboratory has to offer...I am proud of the research and teaching taking place at the Lab.” Holt is a former assistant director of PPPL.

Thanking the Congressmen, Secretary Richardson emphasized the importance of bi-partisan support. He also lauded the Laboratory for its accomplishments and stressed the significance of the Department of Energy’s collaboration with Princeton. “I’m committed to this Lab and to the relationship of DOE with Princeton University ...The research at PPPL has the potential to revolutionize the world.”

The visit included a senior staff meeting and overview with community leaders including Plainsboro Township Mayor Peter Cantu, a tour of the L-wing and of the Tokamak Fusion Test Reactor, the NSTX ribbon cutting ceremony, a science education demonstration with students from Trenton’s P.J. Hill Elementary School, and an “all hands” staff meeting in the MBG Auditorium.

Secretary Richardson told the visiting youngsters, “Fusion is the power source of the stars and some day it will be a power source on the earth because of this research, PPPL, and children like you.”

The Secretary drew a packed auditorium during the all hands meeting, in which he addressed staff and responded to questions.

“You’ve had some tough times here. That’s another reason why I’m here — to say ‘thank you,’” he said.

Secretary Richardson also presented a DOE Service Award to Dottie Kerr for 40 years of service at the DOE Princeton Group Office.

Recapping the day, Director Goldston said, “The spirit of the day with Secretary Richardson, Congressman Holt and Congressman Frelinghuysen was ‘irrepressible.’ It certainly made me smile from ear to ear to hear the enthusiasm expressed for fusion and for PPPL by these three key leaders.”

In a note to staff, Goldston added, “I want to thank everyone who helped put together this event for a tremendous effort — both your commitment to the job and your attention to all of the details made this possible. I especially want to thank the NSTX Team who got us to first plasma 10 weeks ahead of schedule, and right on budget. This was a tremendous accomplishment, and one which most certainly impressed the Secretary. This will be the most important point he will remember from his visit here.” ●



Secretary Richardson

Photo by Diemar Krause

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# HOTLINE

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## They Had a Dream ...

### NSTX Team Leaders Ono and Peng See the Culmination of Aspiration

*Some science projects require the direction of a superhuman. In the case of the National Spherical Torus Experiment (NSTX), the project needs — simply — “two enthusiastic scientists who have complementary backgrounds and are willing to work together,” according to its co-heads. Project Director Masayuki Ono and Program Director Martin Peng presently co-head the national collaborative project, which began operating at PPPL in February. Below are their stories.*

By Patti Wieser

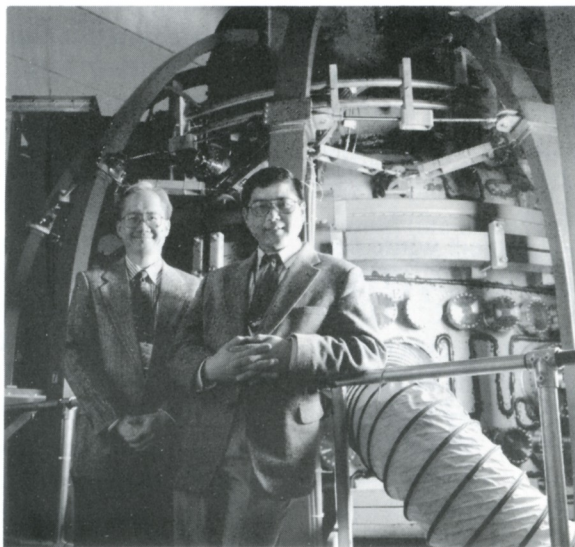
**W**hen Masa Ono was growing up in Japan, he dreamed of becoming a medical research doctor so that he could help people.

“I wanted to become a scientist to cure diseases,” said Ono, recalling his childhood idol, Hideo Noguchi, a Japanese medical pioneer.

Later, as a physics student at the California Institute of Technology, Ono discovered another avenue for helping others. It was plasma physics, which held the promise of benefiting humankind through the development of an alternative power source.

“I was studying physics when I found out about fusion and it sounded very exciting,” said Ono. “It has great potential for humankind and Princeton was the place to be.”

After receiving a bachelor’s degree in physics from CalTech in 1973 he came to PPPL as a graduate student and received a Ph.D. in plasma physics from Princeton University. He joined the research staff at PPPL in 1978. Today he is the Project Director for the National Spherical Torus Experiment (NSTX), a new, innovative fusion energy research device at PPPL.



*From left are Program Director Martin Peng and Project Director Masayuki Ono in front of the NSTX device.*

**F**or Martin Peng, this year’s start of the National Spherical Torus Experiment (NSTX) marks the culmination of a 15-year quest.

A decade and a half ago, Peng, now NSTX Program Director, developed the low aspect ratio “spherical” torus concept that is the basis for NSTX. This concept could ultimately simplify engineering and make fusion energy affordable and practical.

Peng came up with the idea when he began looking at how to increase plasma beta in tokamak plasmas. “I always had a bend

for applications and knew that plasma beta was very important, and I began wondering about the best way to improve it in tokamaks. It became obvious at that time that beta would increase if the aspect ratio was reduced,” said Peng, an Oak Ridge National Laboratory (ORNL) employee on a long-term assignment at PPPL.

Aspect ratio is the ratio of the plasma’s major radius to its minor radius. The name spherical torus comes from the shape of the plasma. As the plasma’s aspect ratio becomes smaller, the plasma elongates naturally and takes on a spherical shape instead of the donut-shape of

Continued on page 2

Continued on page 3



## Ono

Continued from page 1

"I hope NSTX will be a successful physics machine and it will help the Lab and the fusion program to prosper — that this will ignite broad enthusiasm for fusion," said Ono. Scientists believe NSTX could lead to a less expensive path to fusion energy.

Ono, who moved to the U.S. as a young teenager, began his career at the Laboratory working on the Linear-4 machine, which was modified to become the Advanced Torus Concepts-I (ACT-I), a toroidal device that marked the start of Ono's design work.

By 1986, the seed for a spherical torus was planted. Ono met Martin Peng, now the Program Director for NSTX, when the latter was reviewing the Current Drive Experiment-Upgrade (CDX-U) design, which Ono had developed with PPPL graduate students.

Six years later, at an international meeting, Rob Goldston, now the Director of PPPL and then the head of the Research Council, suggested to Ono a larger spherical torus. Around the same time, the director of the Oak Ridge National Laboratory suggested to Peng, who was at Oak Ridge, a joint spherical torus project with PPPL.

"I started working with Martin in 1992 and Stan Kaye soon joined forces with us. Peng named it the Princeton Spherical Torus Experiment, but it became a larger project — a national effort — so the name became the National Spherical Torus Experiment," said Ono.

He continued to head the CDX-U project while collaborating on the design of NSTX and in 1996, CDX-U was transformed into a prototype of NSTX. CDX-U became a high harmonic fast wave heating experiment because fast wave heating appeared to be one of the few viable ways to heat NSTX plasmas to a very high temperature.

### First Plasma

In February of this year, the construction of NSTX was completed and the machine produced its first plasma. Ono and Peng presently co-head NSTX. "Martin provides the vision and I help make it real," remarked Ono about his and Peng's roles. In other words, Peng works with many researchers in the fusion community to formulate the research plan and with experimental task leaders to cover the scientific elements of the research, while Ono manages the NSTX operations, working with a national team of physicists, engineers, and technicians to make the project and its experiments possible. PPPL Director Rob Goldston played a crucial role in the formulation of this arrangement.

For Peng and Ono, it has been a long road to fulfill their joint aspiration. "Since 1986, we have been working

toward this kind of facility for PPPL and for the fusion community," said Ono.

### Typical Day

A typical day for Ono begins with an 8:30 a.m. staff meeting, a check of his myriad e-mails to see what is planned, and then meeting after meeting, where potential problems are discussed and solved. "My job is making sure everyone communicates and that they all understand the scope of the work," said Ono, who also reports on the project's progress to the Department of Energy and upper management at PPPL.

It is a different hat than the one he donned as an experimentalist designing toroidal and spherical torus machines, running experiments, and analyzing data. Now he heads a team and "helps create an environment for researchers to be productive," he said.

Ono, an American Physical Society Fellow and PPPL Distinguished Research Fellow, lauded the NSTX team and described his job as "a lot of fun."

"I get to work with many people who have different skills, backgrounds, and knowledge. It is a busy but rewarding job," he said.

To unwind, Ono, the father of three sons and one daughter, often works out at the local gym with one of his sons, and is the self-described "handyman" at home, where he enjoys projects such as building a deck and installing new windows. Working with his hands gives him a break from his desk and meeting-bound job.

In addition, he is the president of the Princeton Community Japanese Language School, a non-profit entity created in 1980 to teach area children the Japanese language and culture. Ono's wife, Sakiko, is an administrator for the school.

"I'm interested in education. I like students and working with them because they are our future. They bring fresh perspectives and keep you young," said Ono, who also has worked with many graduate students at PPPL and is a Lecturer with the rank of Professor for the Program in Plasma Physics in Princeton University's Astrophysical Sciences Department.

Being fond of fresh perspectives is one of the things that drew Ono to the spherical torus. "I myself like new things so it is logical for me to go in the spherical torus direction. Fusion is complex and coming up with a good fusion reactor is a challenge. We should look at all the possibilities," he said.

He said seeing NSTX produce first plasma and participating in a ribbon cutting ceremony with Secretary of Energy Bill Richardson was "a great honor and great fun."

"I'm very happy and excited and privileged to be where I am," he said. ●





## Peng

Continued from page 1

standard tokamak plasmas. A higher beta means that greater plasma pressure, thus more fusion output, is achieved in a given magnetic field; or conversely, that the same output can be achieved in a weaker field. "High plasma pressure well confined in a low magnetic field has always been our great dream," Peng said.

### Natural Inclination to Tinker

Peng, whose engineering background prods him to approach physics puzzles with a practical bend, has always had a natural inclination to tinker with things. As a young boy growing up in Taiwan, he built small rockets from scratch and made airplane gliders using pieces of plastic for wings. During his teen years, he enjoyed repairing his car and went on to study engineering at the National Taiwan University, receiving a bachelor's degree in electrical engineering. In 1974, he received a Ph.D. in applied physics from Stanford University and joined the research staff at ORNL.

By the early 1980s, Peng became involved in studying fusion power plant designs and future devices at ORNL, as well as the International Tokamak Reactor (INTOR), the predecessor to the International Thermonuclear Experimental Reactor (ITER). The assessments drew him to investigate how to qualitatively improve beta. "I believe engineering serves the goal of research and if this goal is to increase beta, then we had to look at the engineering approach that would allow us to go to a very low-aspect ratio," he said.

Peng worked out the theoretical calculations for low-aspect ratio by the mid-eighties. Toward the end of the decade, he worked with colleagues to propose a spherical torus experiment.

"What pushed me to continue over the years was the prospect of an order of magnitude increase in beta and an order of magnitude reduction in the magnetic field strengths in a spherical torus," he said. While serving on a review panel in the late 1980s, Peng encouraged researchers to upgrade PPPL's Current Drive Experiment (CDX) to a low-aspect ratio configuration. During this time, he met Masayuki Ono, then Head of CDX and presently Project Director of NSTX.

Peng went on to work with the Russian researchers at the Ioffe Institute and with British researchers at Culham Laboratory, where the Small Tight Aspect Ratio Tokamak (START), a spherical torus, was eventually constructed.

By the mid-nineties, the restructured U.S. fusion program emphasized concept innovation, as well as national collaboration. Peng began regularly coming to

PPPL to work with Rob Goldston, Ono, and Stan Kaye on the Princeton Spherical Torus Experiment, which evolved into the National Spherical Torus Experiment.

NSTX is truly a national collaborative effort that brings Peng and Ono together as co-directors of the project. Said Peng of his work with Ono, "We are very fortunate to have hit on an arrangement in which we have a complementary dual role. We constantly talk about what we are doing and know what we have to do separately, in concert, to make this research program successful."

As Program Director, Peng works with many researchers in the fusion community to formulate the research plan for NSTX and with experimental task leaders to cover the scientific elements of the research.

The project leaves little time for outside activities. "Right now my life evolves around work and family," said Peng, the father of three.

When not traveling, he typically arrives at the Lab around 8 a.m. and works until 7 p.m. His days at PPPL and on the road are filled with meetings, e-mails, and interaction with researchers from 13 other institutions across the U.S. who are collaborating on the project. In addition, Peng is in frequent contact with DOE officials and leaders in fusion research.

His schedules poses one particular difficulty — finding time to work on outside scientific endeavors. "One of the problems we all face is that there are so many ideas we would like to test out. You must be diligent about getting things accomplished to be successful at work and then, once in a while, squeeze in something extra," said Peng.

### Fusion Power Source for NASA

One of these "extras" is developing a spherical torus power source for NASA's Deep Space Manned Mission. Fusion energy is the only power source capable of sending a manned mission to Jupiter, noted Peng. A chemical source of fuel for rockets is sufficient for closer missions, but would be so large for a vehicle to Jupiter that it would become impractical. Fusion power is 450 times more powerful than a chemical source. Presently, Peng is involved in a small study funded by NASA to investigate a process for extracting fusion energy from an advanced fuel power source directly into thrust.

Mostly, though, Peng spends his time on the new fusion project at PPPL.

"The goal of NSTX is to find a way to do fusion much better. Magnetic fusion is complex. I hope the spherical torus will give us a scientific basis to do fusion less expensively and more compactly," said Peng. "We are very fortunate to have NSTX, and are just beginning our work." ●

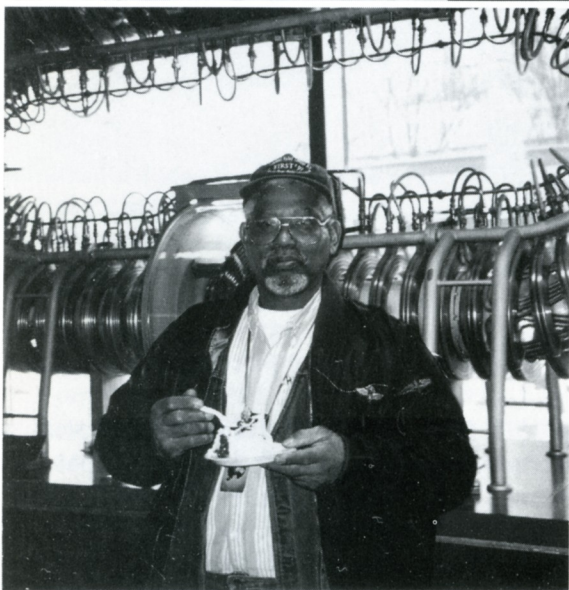


# NSTX Makes a Splash

Ribbon Cutting Ceremony and Staff Bash Celebrate Machine's First Plasma









# PPPL Hosts Regional Science Bowl®; Montgomery Wins Final Round Moderated by Congressman Holt

Competing against twenty other high school teams from New Jersey and Pennsylvania, Montgomery High School, Team A, won first place at the New Jersey Regional Competition of the National Science Bowl® on Saturday, February 27. The double-elimination tournament took place at PPPL.

PPPL Science Bowl Coordinator James Morgan said, "Science Bowl raises the visibility of academic achievement in the sciences. The program has been successful in placing these young people on a par with their peers who excel in athletics."

U.S. Representative Rush Holt, a Democrat representing New Jersey's 12th Congressional District, served as a guest moderator during the final round in which Montgomery defeated East Brunswick High School. Congressman Holt is



*Montgomery High School Team A won the New Jersey Regional Competition of the National Science Bowl®, which was held at PPPL on Saturday, February 27. From left are team members Brian Wong and Kathy Scott, PPPL Science Bowl Coordinator James Morgan, team members Chris Conlon and Bing Luke, U.S. Representative Rush Holt, team coach Ray Olschewski, and team member Brice Daniels.*

a physicist and former assistant director of the Laboratory.

As the 1999 top winner of the regional competition, the Montgomery team received an all-expense paid trip to Washington, D.C., to participate in the Ninth Annual National Science Bowl® this spring. East Brunswick garnered second place and West Windsor-Plainsboro South High School placed third. The top three winners at the regional competition received trophies.

## Competition Hosted by PPPL

Teams made up of four students, a student alternate, and a teacher who serves as an advisor and coach, participated in the competition hosted by PPPL. The students answered multiple choice or short answer questions in biology, chemistry, physics, astronomy, mathematics, and earth and computer sciences. Scientists from U.S. Department of Energy national laboratories made up the questions. The U.S. Department of Energy sponsors the regional competition. ●



*From left, PPPL's Pamela Lucas and Darin Stotler, Congressman Rush Holt, and PPPL Science Education Program Head Diane Carroll confer during the last rounds of the competition.*





PPPL's Al von Halle (left) and GFDL's Matthew Harrison serve as science judge and moderator, respectively, during Science Bowl.

### Thanks, Science Bowl Volunteers!

Dori Barnes, PPPL  
George Barnes, PPPL  
John Bennevich, PPPL  
Richard Bitzer  
Troy Carter, PPPL  
Bill Davis, PPPL  
Michael Del Corso  
Princeton University  
John DeLooper, PPPL  
Elizabeth Foley, PPPL  
Tom Gibney, PPPL  
Rob Goldston, PPPL  
Terry Greenburg, PPPL  
Matthew Harrison, GFDL  
Keith Harvest  
Richard Hawryluk, PPPL  
Margaret King, PPPL

Allen Lee  
Tom McGeachen, PPPL  
Tobin Munsat, PPPL  
Masayuki Ono, PPPL  
Franco Paoletti, PPPL  
Carol Phillips, PPPL  
Mike Pieja, PPPL  
Adam Rosenberg, PPPL  
Jeff Spaleta, PPPL  
Daren Stotler, PPPL  
Barbara Sarfaty, PPPL  
Al von Halle, PPPL  
Thomas von Halle  
Gregg Wielage  
Patti Wieser, PPPL  
Irving Zatz, PPPL

## Kaul Foundation Gives PPPL Additional \$60,000

The Kaul Foundation recently gave \$60,000 to PPPL to supplement the endowment for the Lab's "Prize for Excellence in Plasma Physics and Technology Development."

In a February 4 letter to PPPL Director Rob Goldston, James Kaul, Chairman of the Kaul Foundation's Board of Trustees, said, "It gives me great pleasure to advise you that the Board of Trustees of The Kaul Foundation has resolved to honor the Plasma Physics Laboratory of Princeton University with an enhancement grant... We are hopeful that this enhancement grant will support recognition of the scientists dedicated to fusion energy research at Princeton."

James Kaul is the son of Ralph Kaul, a Florida businessman who created the foundation in 1986 to encourage and reward excellence of national significance in scientific, public health and safety, literary, fine arts, and educational endeavors.

In 1993, the Kaul Foundation gave Ronald C. Davidson, then director of PPPL, its 1993 Award for Excellence in science, education and physics. The award was accompanied by a \$100,000 check, of which Davidson turned over \$40,000 to Princeton University to endow a "Prize for Excellence in Plasma Physics Research and Technology Development." This prize is awarded annually to a scientist or engineer at PPPL for outstanding technical achievement.

Goldston said of the recent supplement, "It is a great honor for us to be recognized by the Kaul Foundation. This year's prize was awarded to experimentalist Dr. Raffi Nazikian and theorist Dr. Guo-Yong Fu for their collaborative groundbreaking work in alpha-particle physics in the Tokamak Fusion Test Reactor. It is a real pleasure to be able to reward such excellent scientific work with special recognition, and we thank the Kaul Foundation for providing this opportunity to us." ●

## Larson Receives University Award

PPPL's Scott Larson was among 70 honorees awarded by the President's Standing Committee on the Status of Women at Princeton University for "making a difference in the lives of women at Princeton." Those awarded received certificates during a March reception in their honor at Prospect House. Larson was cited for "enriching the lives of those on campus, for encouraging the achievement of each person's full potential, and for making Princeton University a more welcoming environment for women to live, learn, and work." ●



Scott Larson



# Preston Talk Concludes Science on Saturday Series

Princeton author Richard Preston captivated a standing room only crowd at PPPL with his discussion about "The Shadow of Biological Weapons" on March 20 during the Lab's final talk for the 1999 Science on Saturday lecture series.

"Biological weapons are more powerful pound for pound than a hydrogen bomb," said Preston, citing anthrax, the Black Death, and smallpox as examples of such weapons.

Preston is a journalist and the author of the best selling nonfiction book, *The Hot Zone*, a true story about an outbreak of the Ebola virus near Washington, D.C. The author's newest release, *The Cobra Event* (RandomHouse—November 1997), a thriller about biological weapons and terrorism, is



Above, Preston signs books in PPPL's Lobby following his talk. At top right, the author discusses his work in the MBG Auditorium.

also on the bestseller lists. Preston spent three years researching *Cobra*, and his sources include top government officials and scientists who invented and tested strategic bioweapons.

The author, who brought a sterilized microscopic sample of the Ebola virus to show during the talk, discussed both books.

Science on Saturday is a series of eight free lectures geared toward high school students, but open to everyone. The lectures are given by scientists and other professionals who are leaders in their fields. This year's series was organized by PPPL's Norton Bretz, Janardhan Manickam, and Chris Ritter. ●

## HOTLINE

Editor/Writer: Patti Wieser  
Photography: Elle Starkman

Graphic Artist: Greg Czechowicz  
Layout: Patti Wieser

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# HOTLINE

The Princeton Plasma Physics Laboratory is a United States Department of Energy Facility

## Spreading the Word on Fusion



Photo by Elle Starkman

Community outreach takes many forms. At PPPL, staff connect with the public by, for example, guiding tours at the Laboratory; making presentations at professional, educational, and informal meetings; serving as judges at science fairs; giving science demonstra-

tions to school children, and participating in community exhibits and fairs. This issue highlights some of the ways PPPL'ers recently spread the message about fusion. Above, students try out the plasma ball during Pollution Prevention Awareness Day. ●



# Students Flock to PPPL's Pollution Prevention Day

Poster Awards, Science Demos, and Take Our Children to Work Day Activities Draw Crowd

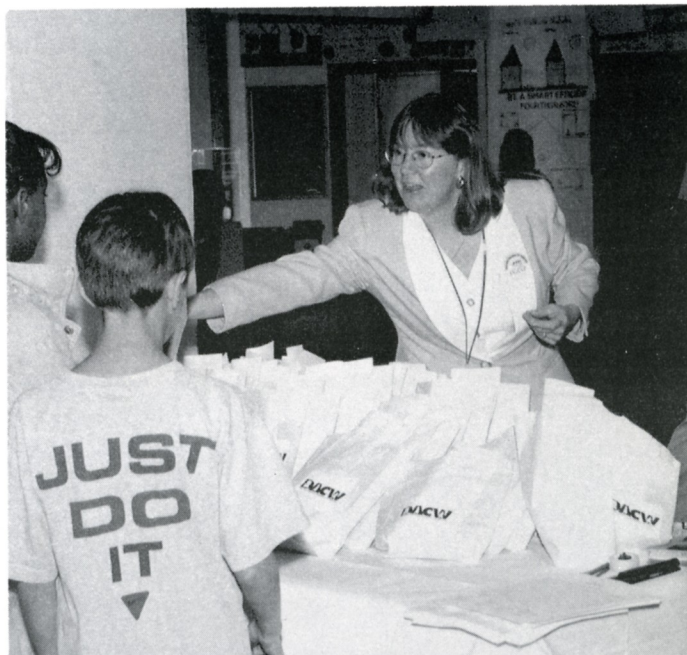
The day was a smash! On April 22, nearly 300 students, teachers, and children of PPPL staff came to the Lab for this year's Pollution Prevention Awareness activities and Take Our Children to Work Day.

The day featured poster contest displays and awards, science demonstrations, talks, and — for the offspring of staff here for Take Our Children to Work Day — hands-on experience in various areas of the Lab.

Said Pollution Prevention Awareness Day organizers Margaret King and Tom McGeachen, "The children's enthusiasm toward the scientific demonstrations and displays brightened up the Lab and made the event exciting and educational. The outreach endeavor on pollution prevention has become a tradition at PPPL that began three years ago and has grown every year. Our goal is to get our children interested in the future of the environment, clean energy sources, and reducing pollution."

The youngsters, many of whom had submitted entries to PPPL's Earth Day Poster Contest, were treated to a demonstration about electricity by Matt Kriebel of the Franklin Institute in Philadelphia and to a talk by PPPL's Erik Perry and Masayuki Ono about how the National Spherical Torus Experiment was constructed. In addition, winners of the poster contest received prizes donated by local merchants and institutions. Caitlin Movsch won first place in the poster contest, Todd Pagurek garnered second, and Bryan Cummings won third. Caitlin and Bryan are students at Orchard Hill Elementary School in Montgomery and Todd is a student at Corpus Christi School in Willingboro. The Lab's Environmental Restoration and Waste Management group sponsored the contest in which fourth, fifth, and sixth-graders from nine area schools submitted more than 700 entries.

The Director's Advisory Committee on Women (DACW) supported the day, offering goody bags to all of the youngsters and organizing afternoon sessions for about 30 children of staff who came for Take Our Children to Work Day. These sessions included water testing, photography and web design, computer aided design and



**DACW Chairperson Molly Tompkins hands out "goody" bags to the young visitors during Take Our Children to Work Day at the Lab.**

drafting, emergency services, and video conferencing. Staff children also participated in the Pollution Prevention activities in the morning. DACW Chairperson Molly Tompkins said, "It took a lot of planning and hard work on the part of the DACW, but we were rewarded many times over by the children's response to the programs and by the enthusiasm of the parents. The "career demonstrators" — Virginia Finley, Bob Lamb, Carol Phillips, Elle Starkman, Carl Scimeca, and Jerry Siegel — deserve credit for putting on such effective programs. They really made an impression on the children!" ●

Many thanks to the following supporters of Pollution Prevention Awareness Day: Barnes & Noble Booksellers, Borders Books and Music, Circle Line Cruise, COMP-USA, Dial Electronics, Express Navigation, FMC Corporation, the Liberty Science Center, Ripley's Believe It or Not Museum, Robert J. Novins Planetarium, Sam's Club, Wal-Mart, and PPPL's Director's Advisory Committee on Women, Director's Office, and Science Education Program.

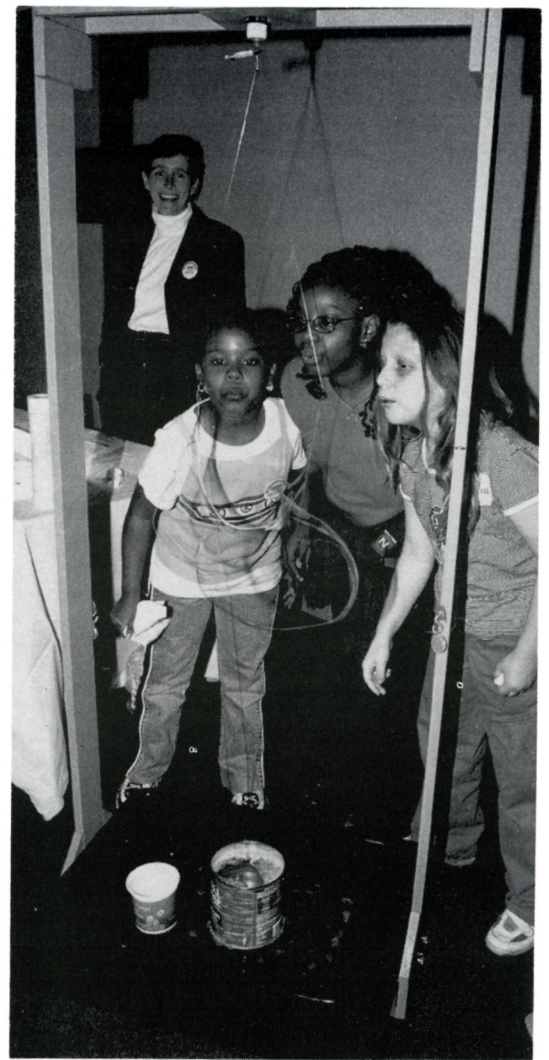
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***Clockwise from middle left, at Pollution Prevention Awareness Day, PPPL's Erik Perry discusses the construction of NSTX in the MBG Auditorium; first place poster contest winner Caitlin Movsch, a student at Orchard Hill Elementary School, poses with her winning entry; Matt Kriebel of the Franklin Institute demonstrates electricity to the youngsters; and students discover turbulence while blowing bubbles with the flowing bubble apparatus as PPPL's Diane Carroll (toward rear) watches. On April 17, PPPL participated in another Earth Day activity outside the Laboratory by operating a tabletop display at the Mercer County Improvement Authority Earth Day celebration at Quakerbridge Mall. Eric (left) and Ryan Starkman, the sons of PPPL photographer Elle Starkman, review material at the exhibit; and PPPL's Margaret King (left) discusses the Laboratory's pollution prevention activities with a visitor. Photos by Elle Starkman***





Photo by Carol Phillips

PPPL's booth at Communiunity in Princeton on April 24 drew hundreds of people of all ages. Above, from left (behind the table), are Hutch Neilson, Steve and Annette Iverson, and Tony DeMeo. During PPPL's annual Blood Drive, Joe Winston, at right, donates blood. At bottom left, John DeLooper (left) discusses fusion with a visitor at the Fourth Annual Renewable Energy Exhibition in Washington, D.C., on April 21, which drew an estimated 3,000 people. At bottom right, Ray Camp (right) and Victor Garzotto present a cryogenics demonstration to students at Bear Tavern School in Hopewell on March 19.



Photo by Ellie Starkman

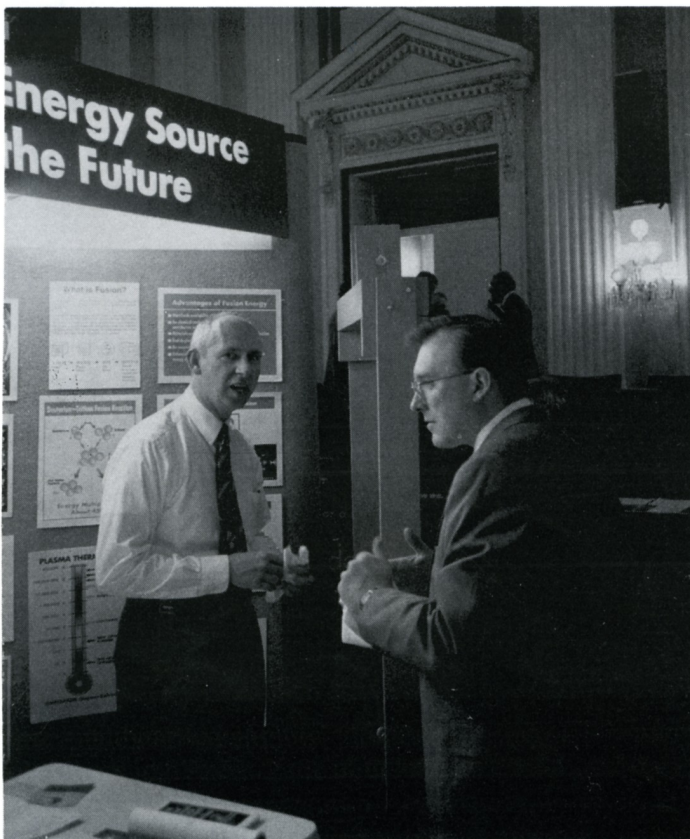


Photo by James Morgan



Photo by James Morgan



# HOTLINE

The Princeton Plasma Physics Laboratory is a United States Department of Energy Facility

## Safety Comes First at PPPL

*On June 21, a DOE team led by John Adachi of DOE-Chicago is scheduled to arrive at PPPL for a review of the Lab's Integrated Safety Management (ISM) system. Below, Environment, Safety & Health and Infrastructure Support Head J.W. Anderson discusses ISM and its importance at PPPL.*

### Question:

What is Integrated Safety Management (ISM)?

### J.W. Anderson:

ISM is a common sense approach to doing work safely. It reflects an effort by the Department of Energy (DOE) and its Laboratories to take the "next step" in the manner in which the Laboratories are operated. It identifies a set of *values* and *principles* that we should always expect of ourselves as we carry out our day-to-day activities in the safest way possible. It makes a lot of sense — it is as much about "culture" as it is about safety. In most cases, it reinforces the good work practices that we have developed over the years. The ultimate goal is that managing the safety aspects of our jobs will become so routine that it should almost become transparent. It's also important to emphasize that the term "safety" includes health, environmental compliance, and pollution prevention issues.

### Question:

Why is ISM important at PPPL?

### J.W. Anderson:

We have an obligation to our co-workers, our neighbors, and our families to operate PPPL in the safest manner possible. The ISM program offers guidance for workers, supervisors, and managers for doing this. It is also one of the criteria by which our client, the DOE, will be judging our ability to operate the Laboratory.

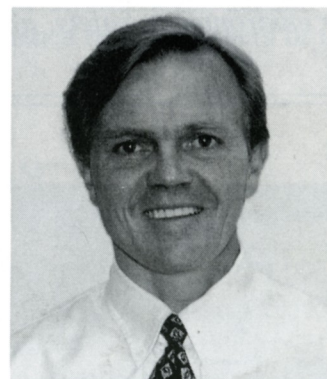
### Question:

Whose responsibility is ISM?

### J.W. Anderson:

Every one of us has responsibility for working safely and following the established policies and procedures. Line

management, from workers right to the Director, is directly responsible for the protection of the public, the workers, and the environment. To support line workers, the Environment, Safety & Health (ES&H) and Infrastructure Support Department provides safety policy, enforcement, and independent oversight functions.



J.W. Anderson

### Question:

I work at a desk job, why should I worry about ISM?

### J.W. Anderson:

There are some real benefits to be gained by applying ISM to **any** job. Most people already apply ISM principles and functions to their work here, at other Laboratories, and even at home. For example, when you ordered your desktop computer you also bought a wrist support pad, a UL approved surge protector, and an anti-glare screen. You might also have an ergonomic chair. Although the hazards you are protecting against are potentially less obvious than those for an electrician working on high-voltage equipment, the same ISM functions can be applied. When you considered how much time you spend working on the computer, you may have identified the potential hazards — eyestrain, back and neck strain, carpal tunnel syndrome, electrical surges, and tripping on cords. Then you ordered the wrist pad, surge protector,

Continued on page 3

**Special ISM Issue**





# Rob's Notes...

## Our Commitment to Integrated Safety Management

**O**ver the years we have achieved an excellent track record in environment, safety, and health performance. This is because it is an integral part of PPPL's culture — it is embodied in everything that we do. Integrated Safety Management provides a clear framework for incorporating safety into the management and performance of all Laboratory work activities. It strongly reinforces our policy that the responsibility for environment, safety, and health resides with line

management and each individual. We are committed to the principles, functions, and controls of ISM and we will continually apply the principles of integrated safety management as we fulfill our responsibilities and commitments to each other, the University, the Department of Energy, and the public.

— Robert J. Goldston  
PPPL Director



The DOE Integrated Safety Management Review Team came to the Laboratory for a pre-visit in May. At left, PPPL Director Rob Goldston (standing) gives an overview of the Laboratory and discusses the Lab's commitment to ISM with members of the team. At right, Lab and DOE officials talk with members of the review team during the pre-visit. The team of eight DOE reviewers are scheduled to arrive at PPPL for the actual review on Monday, June 21. The review will begin the following day and is expected to be completed by June 30. Most of the site observations and interviews will be conducted between June 22 and 25.

## HOTLINE

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## ISM

Continued from page 1

and other items to reduce or “control” the risk posed by those hazards.

In the jargon of ISM, you: (1) *defined your work*, (2) *analyzed the hazards*, and (3) *developed controls* for those hazards. Now you work on your computer using those “hazard controls.” If the equipment is working well, you might share that information with co-workers who have similar jobs. In ISM terms you would (4) *perform work within controls* and (5) *provide feedback*.

ISM is not something new, it just helps us to consistently apply some common-sense practices to our work. Those five steps you performed are called the ISM “Core Functions.”

### Question:

Shouldn't ISM be the concern and responsibility of managers?

### J.W. Anderson:

Integrating safe work practices into our everyday work is *everyone's* responsibility. We expect our managers and supervisors to lead by example and communicate expectations for safe work practices. This is consistent with the first “Principle” of ISM — Line Management Responsibility for Safety. Line managers play a key role in assuring that the ISM Principles are applied to work activities. These principles include making sure workers have the proper training, responsibilities for different tasks are clear, safety issues are appropriately addressed in schedules and budgets, safety standards are identified for their jobs, and everyone is prepared before authorizing work to begin.

### Question:

What is the Lab's approach to ISM?

### J.W. Anderson:

The main objective of ISM is to “do work safely.” We are finding that the ISM policy and guidance is helping us to improve this record even more while maintaining an appropriate balance of safety, cost, and schedule. Through the years, we have developed a solid foundation of safe work practices. The ISM effort helps us to reinforce these practices.

Our general approach has been to “tune-up” our ES&H Directives, procedures, and work planning, and to emphasize the principles and functions of ISM. We've had more than a dozen small-group meetings with more than

450 people attending to discuss PPPL's approach to the ISM Program.

### Question:

How has our safety track record been at PPPL?

### J.W. Anderson:

Our safety record has been improving through the years and consistently has been among the best within the DOE system of Laboratories. The number of injuries, lost workdays, and accidents is below the DOE average and our environmental and radiological records are also excellent. This performance track record means a lot to PPPL. In fact, during 1998, PPPL's performance was at such a level that we received *two* New Jersey Governor's Occupational Safety & Health Awards. The Laboratory, as a whole, received the State “Recognition” Award and the NSTX Project received the “Departmental Group” Award. These are significant accomplishments that we can attribute to the performance of all members of our staff.

### Question:

What are we doing about ISM?

### J.W. Anderson:

In addition to updating our procedures and ES&H Directives, and providing ISM training, we just completed ISM self-assessments for several projects, including NSTX, and work activities such as radiation protection. These self-assessments identified many strengths in our program, but also pointed out some areas where we can make further improvements. One thing we want to reinvigorate is our training program, so that staff members can maintain and increase their skills and qualifications. Investment in employees typically benefits management, workers, and the institution.

### Question:

How has ISM been applied at PPPL?

### J.W. Anderson:

During the past twelve months, there have been many examples. The NSTX project team and support groups followed ISM principles during the construction and initial start-up of the experiment. The Current Drive Experiment-Upgrade and Hall Thruster experiments used the ISM program, from upgrades to construction to operation. In addition, the principles were applied to a construction job performed by a subcontractor installing several hundred feet of underground water lines. In all these cases, the ISM approach helped to complete these jobs safely and successfully. ●



# Integrated Safety Management



## Facility Managers Assigned to Assist with Safety Performance

Selected representatives from the Environment, Safety & Health (ES&H) and Infrastructure Support Department and from the Engineering and Technical Infrastructure Department have been designated as Facility Managers to facilitate ES&H performance. Every geographical area of the Laboratory has a Facility Manager, who is responsible for maintaining an awareness of ES&H issues within their assigned areas, but is not intended to replace line management's accountability for ES&H issues. The list of Facility Managers for each Lab area is available from the PPPL Employee Services Web page or at URL [http://www-local.pppl.gov/pppl/services/support\\_services/dept\\_office/FMs.html](http://www-local.pppl.gov/pppl/services/support_services/dept_office/FMs.html). ●



# HOTLINE

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## PPPL Receives Dwight D. Eisenhower Award

In recognition of its outstanding record in subcontracting to small businesses, PPPL recently garnered the Dwight D. Eisenhower Award from the U.S. Small Business Administration (SBA). SBA officials presented the award to PPPL Director Rob Goldston on Thursday, June 10, during a procurement conference in Washington, D.C. PPPL was one of three to receive the citation this year.

"We are very pleased to receive the Eisenhower Award this year from the Small Business Administration. Rod Templon and Arlene White have been outstanding in their ability to find win-win opportunities for our research and for small businesses," said Goldston. Templon is PPPL's Procurement Head and White is PPPL's Small Business Liaison. They joined Goldston in accepting the award on behalf of the Laboratory.

Continued on page 6



From left are Rod Templon, Rob Goldston (holding the Eisenhower Award), and Arlene White.



The inventors recognized at the Patent Dinner are, from left (front row), Charles Skinner, Henry Kugel, Manfred Bitter, and Kenneth Hill; (second row) Yevgeny Raitses, Wolfgang Stodieck, and A. Lane Roquemore; (third row) Amnon Fruchtman, Cynthia Phillips, Szymon Suckewer, and Robert Woolley; (fourth row) Schweickhard von Goeler, James Gorman, and David Mikkelsen.

## Inventors Honored

On June 29, the Laboratory celebrated the inventions of thirty-three individuals during the Fiscal Year 1998 Patent Recognition Dinner held at Princeton University's Prospect House.

"Inventors are an exiting bunch of people to work with. They are pushing the limits, and trying to create new

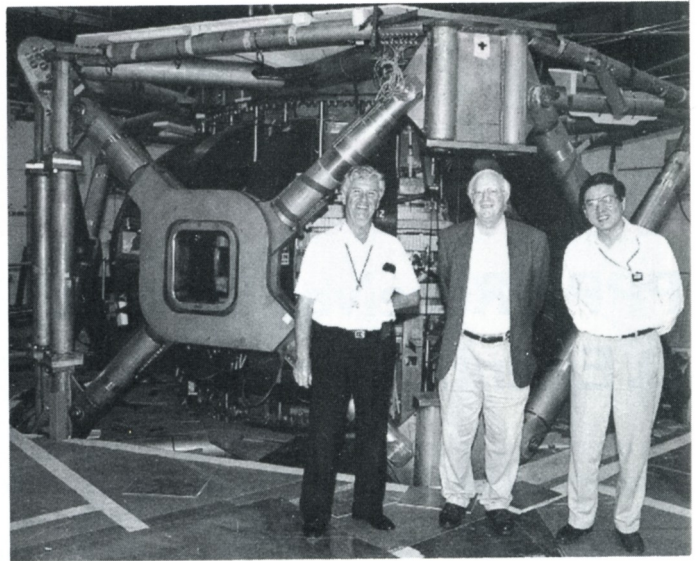
Continued on page 3



# Princeton Large Torus Removed and Scrap Sold



*PPPL'ers take one last look at PLT before it is taken apart and sold for scrap. From left are Will Derry, Jim Chrzanowski, Fred Dahlgren, Tom Meighan, and Phil Heitzenroeder.*



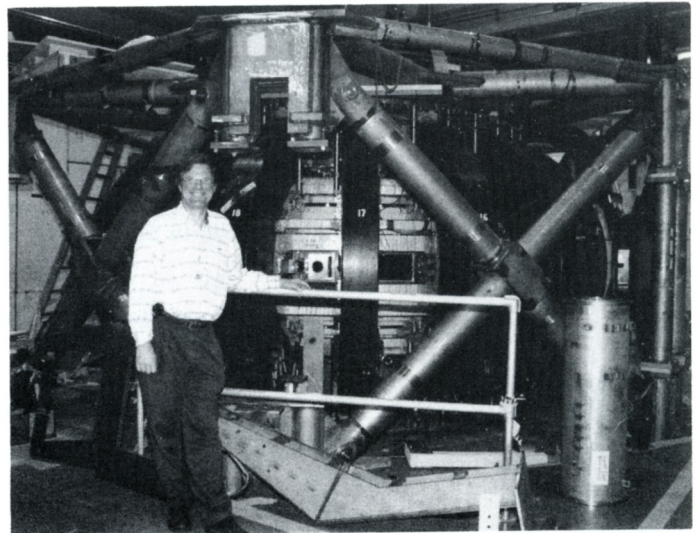
*From left are Alex Illic, Joel Hosea, and Masa Ono.*

**A**n independent wrecking crew is lugging away 212 tons of metal from the Princeton Large Torus (PLT) test cell — and paying for the privilege.

Mercer Wrecking and Recycling Corporation won the bid for the removal of PLT and last month began the 12-week project of breaking apart PLT and hauling it away for scrap metal. The PLT tokamak is made of copper poloidal field and toroidal field coils, insulating compound, and stainless steel. The project entails removing the device and its supporting platform down to the concrete floor.

Prior to the removal, PPPL staff disconnected all electrical and mechanical systems from the PLT tokamak, which is not contaminated. The PLT operated at PPPL from December of 1975 until December of 1986.

The removal of PLT clears the facility for future projects at the Laboratory. ●



*Ned Southoff poses next to PLT.*

## HOTLINE

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## Inventors

Continued from page 1

ways of doing things, and in the course of their work are always questioning things that we all tend to take for granted," said Lewis Meixler, Chairman of the Lab's Committee on Inventions.

Meixler, who is also Head of Technology Transfer at PPPL, said there have been 676 invention disclosures filed by the Lab since it was established in 1951. Of those, 70 U.S. Patents have been awarded. "This averages out to 14 disclosures a year and about 1.7 patents annually," said Meixler. In 1998, there were 15 disclosures and two U.S. Patents awarded. Meixler also discussed a recent Su-

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### Patents Issued in Fiscal Year 1998

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Traveling Spark Ignition (TSI) System

*Szymon Suckewer and Enoch Durbin*

Method and Apparatus for Steady-State Magnetic Measurement of Poloidal Magnetic Field Near a Tokamak Plasma using only Fixed Air-core Electrical Coils and a Mechanical Strain Gauge

*Robert Woolley*

---

### Patents Applied for in Fiscal Year 1998

---

Method and Apparatus for Measuring Micro Structures, Anisotropy and Birefringence in Polymers using Laser Scattered Light

*Boris Grek, Joseph Bartolick, and Alan Kennedy*

Method and Apparatus to Directly Produce Electrical Power Within the Lithium Blanket Region of a Magnetically Confined, Deuterium Tritium (D-T) Fueled Thermonuclear Fusion Reactor

*Robert Woolley*

---

### Inventions Disclosed in Fiscal Year 1998

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Hall Thruster with Segmented Cathode Electron Injection

*Nathaniel Fisch and Amnon Fruchtman*

A Hollow Cathode Magnetron

*Zhe Hui Wang and Samuel A. Cohen*

Hybrid Aircraft: Capable of Flying as a Helicopter, Autogyro, or Fixed Wing Plane

*David A. Cylinder*

New Type of X-ray Imaging Crystal Spectrometers for Extended X-ray Sources

*Manfred L. Bitter, Benjamin Fraenkel, James L. Gorman, Kenneth W. Hill, A. Lane Roquemore, Wolfgang Stodiek, and Schweickhard von Goeler*

preme Court decision that will affect patent protection and a potential future test of the patent laws in the field of biology and genetics.

PPPL Director Rob Goldston, who presented the inventors with certificates, noted, "Fusion energy is critical to humankind in the long-term, and the spin-off technologies being honored tonight also demonstrate the value of plasma science and technology in the near-term."

The Committee on Inventions includes C.Z. Cheng, Sam Cohen, Dave Cylinder, Phil Efthimion, Terry Greenberg, Rich Hawryluk, Steve Jardin, Henry Kugel, Carol Phillips, Mike Williams, Ken Young, and Chairman Lewis Meixler. ●

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Synthesis of Ozone at Atmospheric Pressure by a Quenched Induction-Coupled Plasma Torch

*Brentley C. Stratton, David R. Mikkelsen, Richard Knight, Elihu D. Grossman, Andreas Blutke, and John Vavruska*

Remote Erosion Measurement in a Fusion Reactor

*Charles H. Skinner*

Generation of Periodic Accelerating Structures in Plasmas

*Gennady Shvets, Alexander Pukhov, and Nathaniel J. Fisch*

Parametric Amplification of Ultra-short Laser Pulses in Plasma

*Gennady Shvets, Alexander Pukhov, and Nathaniel Fisch*

Nonneutral Plasma Fusion Trap Device

*Cynthia Kieris Phillips*

Passive Positioning of Hall Thruster Fields

*Amnon Fruchtman and Nathaniel Fisch*

In-vessel Dust Measurements by a Quartz Microbalance

*Charles Skinner and Henry Kugel*

High Energy for Sterilization

*John A. Schmidt*

Micro Hall Thruster

*Nathaniel Fisch and Yevgeny Raitses*

Ultra-high-density Feedthroughs and Signal Conduits using Thick-film Printed Circuit Technology

*Hironori Takahashi*

Edge Turbulence Measurement by Laser Induced Fluorescence

*Charles H. Skinner and Stewart J. Zweben*

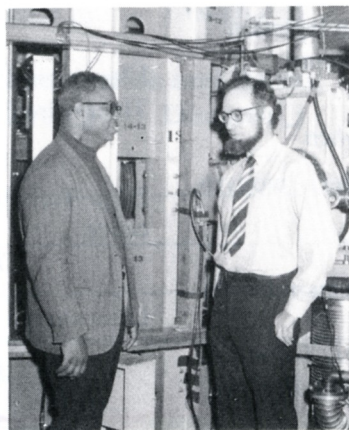
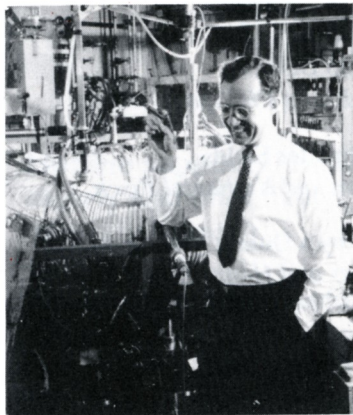
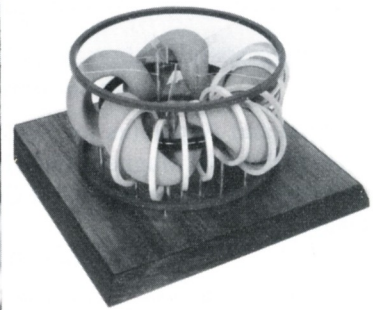
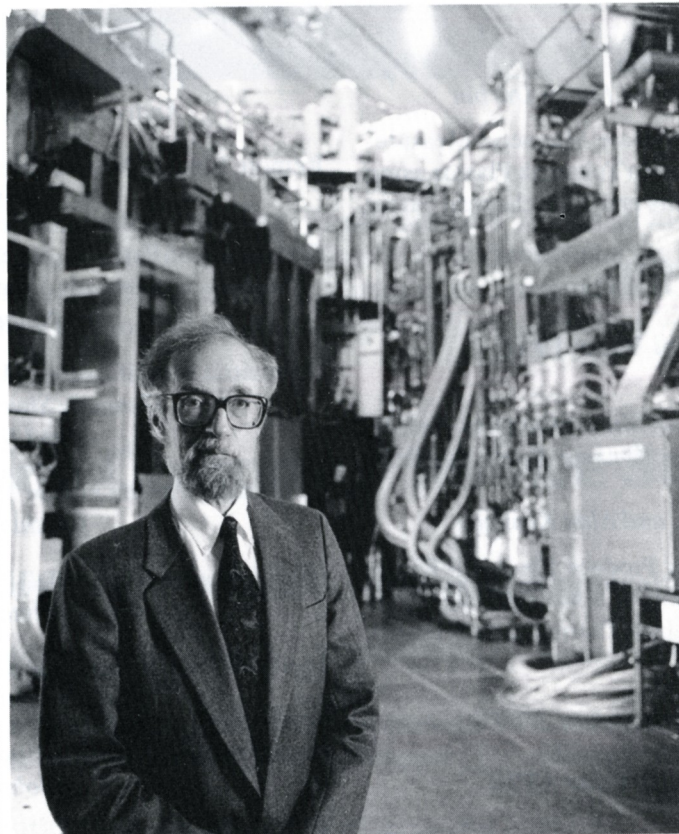
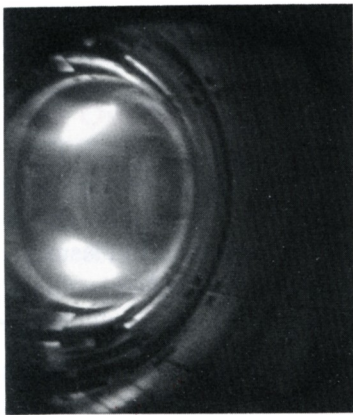
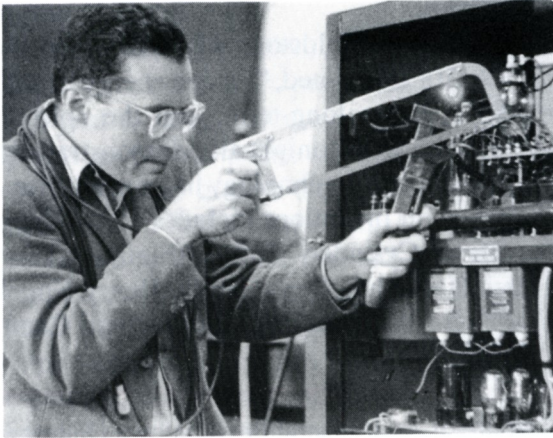
Laser-driven Source of Tunable Undulator Radiation

*Nathaniel L. Fisch, Jean-Marcel Rax, and Gennady Shvets*

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# Furth Honored with Scientific Symposium at PPPL







**H**arold P. Furth, former Director of PPPL and one of the “giants” of fusion, was honored during a day-long scientific symposium on June 7 at PPPL. More than 100 people, some from the national and international fusion community, as well as from the Department of Energy and Princeton University, came to the Laboratory to celebrate the life and scientific achievements of Furth. Furth retired on July 1 and became Professor Emeritus of Astrophysical Sciences at Princeton University.

Symposium speakers shared their remembrances of Furth and heralded his contributions to fusion research during the past five decades. Furth, who served as Director of PPPL from 1981 to 1990, launched the record-setting Tokamak Fusion Test Reactor (TFTR) project, which operated for 14 years before closing down in 1997.

A native of Vienna, Furth received a Ph.D. in physics from Harvard in 1960 and worked on controlled magnetic fusion research at the Lawrence Radiation Laboratory (now the Lawrence Livermore National Laboratory) in California prior to joining PPPL in 1967 and being appointed Professor of Astrophysical Sciences at Princeton University. He co-headed the Experimental Division at the Laboratory from 1967 to 1978, when he was appointed Associate Director and Head of the Research Department.

He became Program Director in 1980 and Director of the Lab the following year. Furth holds 20 patents, primarily in the areas of controlled magnetic fusion technology and metal forming with pulsed magnetic fields, and has published more than 200 technical papers. ●



## Eisenhower

Continued from page 1

Created in 1991, the Eisenhower Award is presented each year to large businesses that operate as federal prime contractors. The award honors those that have excelled in their use of small businesses as suppliers and subcontractors. Small businesses include small disadvantaged and women-owned firms. PPPL subcontracted nearly \$8.6 million in Fiscal Year 1998 and provided smaller firms with almost \$5.6 million of that total.



### Most Outstanding

PPPL was judged to be the most outstanding of all "research and development" companies nominated from the Small Business Administration's portfolio of 2,500 large contractors. SBA Commercial Market Representative Andrew Zuber nominated the Laboratory for the award. The Eisenhower Award for 1999 also was awarded in the manufacturing category to Bell Helicopter Textron, Inc., of Fort Worth, Texas, and in the services category to Computer Sciences Corp., of Falls Church, Virginia. ●

*From left are James Kocsi, Deputy District Director of the Small Business Administration's New Jersey District Office, PPPL Director Rob Goldston (holding the Dwight D. Eisenhower Award), and Andrew Zuber, Small Business Administration Commercial Market Representative.*

## Hotline Customer Service Survey

**Hotline supports the Laboratory's information needs by communicating Laboratory news clearly and effectively.**

Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree ☐ No Opinion ☐

**Hotline provides useful and accurate information about PPPL news and events.**

Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree ☐ No Opinion ☐

**Hotline presents information in a creative and interesting manner.**

Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree ☐ No Opinion ☐

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Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree ☐ No Opinion ☐

**Comments, suggestions** \_\_\_\_\_  
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Please return surveys to A. De Meo, MS-38.



# DACW Takes Up Collection for Womanspace

**T**his spring, the Lab's Director's Advisory Committee on Women (DACW) organized a collection for Womanspace, an area shelter for abused women. On June 7, Committee Chairperson Molly Tompkins and DACW member Mary Ann Brown presented the items to Womanspace Executive Director Pat Hart and Womanspace Residential Manager Peggy Weimer. DACW collected clothing, toys, and household items.



The collection filled a van brought by the Womanspace officials. Also given was a monetary donation. Brown organized the effort at the Lab. At far right, Tompkins hands a box of donations to DACW member Phyllis Roney (back to camera). At right, Mary Ann Brown (left), Hart (middle), and Weimer take a break from loading the van. A special thanks goes to everyone who contributed to this year's collection! ●



## Towner Receives Award



**P**PPL's Harry Towner recently received the Stark & Stark EMS Recognition Award. Towner is an emergency medical technician with the Plainsboro Rescue Squad. He was honored by Stark & Stark, a law firm, for 20 years of tireless work and service for the squad and the residents of Plainsboro. Congratulations, Harry! ●

## transitions

### Retirements

**Robert Brown**, Deputy Chief of the Site Protection Division, retired on July 1. Brown had been at the Lab for 17 years.

**Robert Longmuir**, a Construction Field Engineer, retired on July 1, after 37 years of service.

**Schweickhard von Goeler**, a Principal Research Physicist, retired on June 1, after 34 years of service.

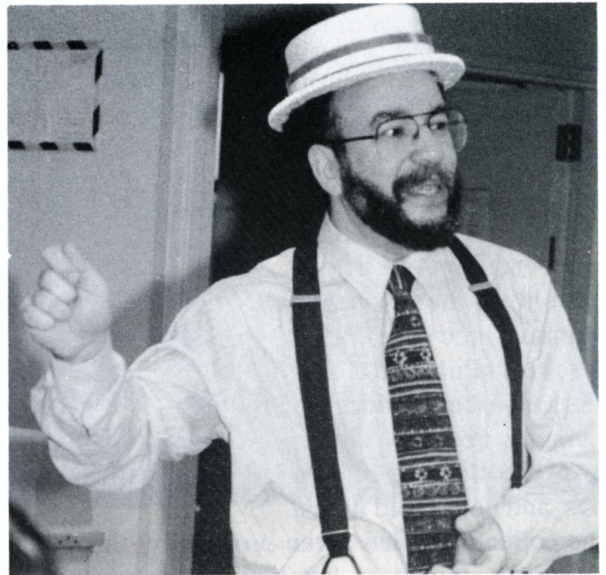
### In Memory

We are saddened by the loss of the following retired employees: Joseph Baker, who died on May 26; John R. Clarke, who died on March 22; J. Dale Herron, who died on May 25; and John Q. Lawson, who died on June 13.



# PPPL'ers Come Together for Employee Lunch

The Laboratory Sponsors BBQ for Staff on July 1 in the Courtyard

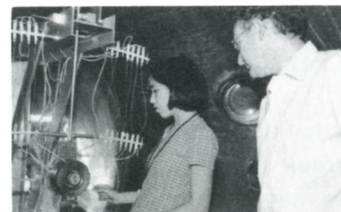




# HOTLINE

The Princeton Plasma Physics Laboratory is a United States Department of Energy Facility

## Hall Thruster Experiments Begin



*In large photo at left, standing next to the Hall Thruster, are, from left (back row), Kai-Mei Fu, PPPL technical associate Dick Yager, PPPL physicist Yevgeny Raitses, visitor Amnon Fruchtman, and Project Head Nathaniel Fisch; (front row) Adam Edwards, Eugenio Ortiz, and Princeton University graduate student Andrei Litvak. In small photo above are Fu (left) and Fisch inside the Hall Thruster. Fu, Edwards, and Ortiz are Energy Research Undergraduate Laboratory Fellowship students who were at the Lab for 10 weeks this summer. The Hall Thruster is in the space that formerly housed the S-1 Spheromak.*

**T**o establish the Hall Thruster experiment at PPPL, “all the planets had to be aligned.”

So noted Principal Investigator Nathaniel Fisch as he unfolded how each item — or “planet” — fell into place during the past year to make the project a reality. A Hall Thruster is a plasma-based propulsion system for space vehicles (**see sidebar on page 3**).

First, there were ideas generated in collaborative theoretical research with Professor Amnon Fruchtman of the Center for Technological Education in Holon, Israel, which indicated that certain improvements might be made in Hall thrusters. The theoretical effort was funded by the U.S. Air Force and the theoretical results suggested an interesting experimental campaign.

Second, with the Tokamak Fusion Test Reactor (TFTR) closed down, the time was ripe for PPPL to expand nonfusion experimental efforts.

Third, the TFTR remote manipulator tank was available and could serve as the vacuum chamber for the thruster.

Fourth, the area that had housed the S-1 Spheromak was available and it looked as if the tank would just fit.

Fifth — and probably most importantly — the perfect person to assume a key staff position for the project, Dr. Yevgeny Raitses, was looking for a post-doctoral position. “Yevgeny knew how to build a thruster. He had built one in Russia and then another one in Soreq, Israel for his thesis,” said Fisch, a Professor of Astrophysical Sciences at Princeton University. “Professor Fruchtman and I had been collaborating with the Soreq thruster project, when I noticed a truly exceptional graduate student. Quite frankly, I would not have embarked on the project if we could not have attracted Yevgeny. Fortunately, Yevgeny

**Continued on page 2**



## Thruster

Continued from page 1

was intrigued by the opportunity at PPPL. He has been absolutely key to the project — in designing the laboratory for the Hall Thruster experiment, in figuring out how to build the vacuum system, and in designing and building the prototype thruster and basic diagnostics.”

One of the first obstacles in building the project was moving the 15-ton, 28-foot by 8-foot manipulator tank. The scientists needed that size tank in order to have a state-of-the-art facility that would be competitive with other thruster facilities. “At first,” recalled Fisch, “people said it couldn’t be done because it was too heavy and would be too costly to move. Also, there was the matter of removing the remote manipulator arm. But Victor Garzotto said, ‘just slide it out.’ It was possible to move it if some flanges were removed. There was a clearance of what seemed like an inch on both sides; but there was a truck driver who really knew how to park. The crew managed to hoist the tank using a 15-ton crane at the former S-1 site.”

Fisch said there was dedicated support from all corners of the Lab to get the project underway — from checking out possible sites, to ensuring safety, to moving the tank, to getting the facility operational. “There was not a great deal of funding for the project, but everybody seemed to want this to succeed,” said Fisch. “J.W. Anderson and Steve Paul were helpful in figuring out the best site for the project; Ray Camp and Jerry Levine made sure the project was safety compliant; management, in particular Rich Hawryluk, supported the experiment; Dick Yager provided expert technical assistance; Assistant Professor Edgar Choueri of the University’s MAE Department provided helpful advice; and Victor Garzotto assisted in getting the tank moved into the former S-1 space. Larry Dudek was enormously helpful in orchestrating the whole move.” Fisch also credits his immediate management, Phil Efthimion and Plasma Science and Technology Department Head Stewart Zweben. “Phil and Stewart are a lot of fun to work with and have played key roles in making sure this project succeeded,” he said.

Fisch described the project as “a tremendous amount of fun” that has allowed him to get acquainted with so

many other PPPL’ers. “Before Yevgeny came, I’d been hiding in the Theory Division for 20 years. Since the project was initiated, I’ve met more people in the Lab than I did during my first two decades here,” he said.

The project is now host to several student projects. First-year graduate student Leonid Dorf built a movable probe diagnostic. Thesis student Andrei Litvak is doing theoretical work on crossed electric and magnetic fields that will be tested on the facility. Princeton University junior, Eugenio Ortiz, helped design the thruster magnetic field for his junior paper. With experiments now underway, the facility is host to several undergraduate summer projects. Also, the U.S. Air Force is now funding experiments in extrapolating the thruster ideas to the microthrust regime.

One goal of the research is to make improvements in plasma Hall thrusters, which can be used on satellites. For example, communications satellites are programmed to remain over one precise geographic location. However, such “geosynchronous” satellites drift out of place. Hall Thrusters could be employed to push a geosynchronous satellite back into its correct position. Other satellites in low-earth orbit are slowed by friction in the upper atmosphere. Hall Thrusters could generate the force to compensate for this drag. Presently there are approximately 600 operational satellites in low-earth orbit and over 300 in geosynchronous orbit that could, in principle, employ Hall thrusters. Gradually, these satellites will have to be replaced; consequently, a market may exist for the more efficient Hall Thrusters.

Less than \$200,000 was spent to assemble PPPL’s thruster facility and to build the first prototype thruster. Fisch takes great pride in this fact and is quick to note that another U.S. facility comparable to PPPL’s reportedly came with a pricetag of \$6 million. The assembly of PPPL’s device was funded as a Laboratory Program Development Activity. According to Fisch, “This was enough to hire Yevgeny, clear out the S-1 space, and move the TFTR manipulator tank. Somehow we also managed on this budget to build a state-of-the-art prototype thruster with basic diagnostics...All the planets were aligned to get this thing to work. We now have a fantastic state-of-the-art thruster facility,” said Fisch. ●

## HOTLINE

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Layout: Patti Wieser

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# Hall Thrusters: An Emerging Technology

by Anthony DeMeo

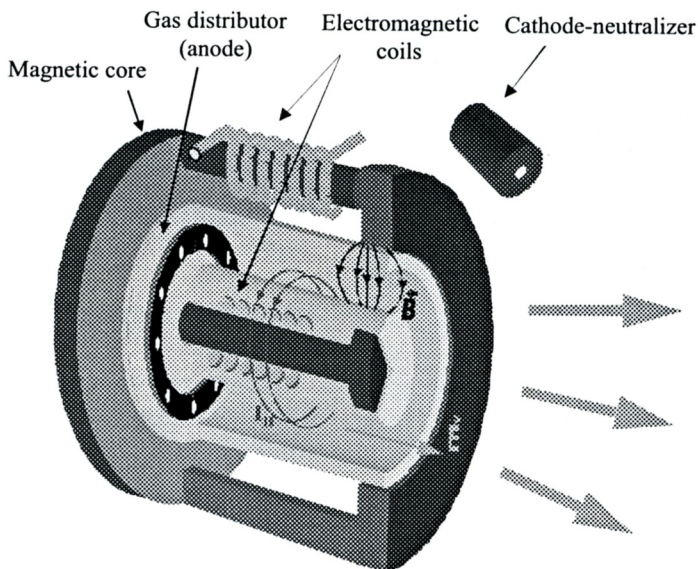
**T**he Hall Thruster is a plasma-based propulsion system for space vehicles that was invented in the late 1950s. It has been developed primarily by the Russians. During the past 20 years, the Russians placed in orbit about 100 Hall Thrusters. However, the vast majority of satellites worldwide have relied on chemical thrusters and, to a lesser extent, ion thrusters.

A conventional ion thruster consists of two grids, an anode and a cathode, between which a voltage drop occurs. Positively charged ions accelerate away from the anode toward the cathode grid and through it. After the ions get past the cathode, electrons are added to the flow, neutralizing the output to keep it moving. A thrust is exerted on the anode-cathode system, in a direction opposite to that of the flow. Unfortunately, a positive charge builds up in the space between the grids, limiting the ion flow and, therefore, the magnitude of the thrust that can be attained.

In a Hall Thruster, electrons injected into a radial magnetic field neutralize the space charge. The magnitude of the field is approximately 200 gauss, strong enough to trap the electrons by causing them to spiral around the field lines. Together, the magnetic field and a trapped electron cloud serve as a virtual cathode (see figure). The ions, too heavy to be affected by the field, continue their journey through the virtual cathode. The movement of the positive and negative electrical charges through the system results in a net force on the thruster in a direction opposite that of the ion flow.

Generally, thrusters are used to compensate for atmospheric drag on satellites in low-earth orbit, to reposition satellites in geosynchronous orbit, or to raise a satellite from a lower orbit to geosynchronous orbit. As a basic rule of thumb, for each kilogram of satellite mass one or two watts of on-board power are available. PPPL's Hall Thruster consumes several hundred watts of power, making it suitable for a satellite with a mass in the range of a few hundred kilograms. PPPL physicists believe there may be a market for Hall Thrusters operating at 1,000

watts or more, but say predictions are difficult to make. They also speculate about the development of Hall microthrusters with power outputs in the 100-watt range, useful for very small satellites with masses of 50 to 100 kilograms. One could envision a large satellite discharging hundreds of the smaller ones for the exploration of a planet or as a spaced-based radar array. The Hall Thruster may be too power hungry for this application, but answers to these and other questions may emerge from research now underway at PPPL.



Plasma thrusters for current space applications employ xenon propellant. Xenon is relatively easy to ionize and store onboard the spacecraft. It also has a high atomic number (54), which means a lot of mass per ionization energy expended. The ionization energy is an unavoidable inefficiency; in the range of exhaust velocities most useful for current space applications—about 15 km/sec—this energy loss for once-ionized xenon is less than 10 percent of the exhaust

energy. (If the weight per atom were half, this percentage would double.)

Initial results indicate that PPPL's Hall Thruster operating at 900 watts does so with an efficiency that is comparable to state-of-the-art thrusters. Planned upgrades include segmenting the thruster. Each segment would be held at a specific electric potential, enabling researchers to control exactly where the voltage drop occurs along the length of the thruster. PPPL's Hall Thruster was designed with a modular configuration so as to allow multiple thruster geometries that could be diagnosed in detail easily. This includes the ability to measure precisely in three dimensions how the thrust varies with position. This information could be used to arrive at techniques to narrow the plume and obtain more control over the outflow from the thruster, possibly improving its efficiency.

These capabilities may allow PPPL to advance the Hall Thrusters, making them more attractive for commercial and military applications. ●



# Keep on Learning!

## Staff Continue Self Development through Training, Books, and Conferences

**N**STX Administrator Joanne Savino recently completed a 10-week course on Office Management and Technology at Mercer County Community College (MCCC). She learned about business writing, picked up pointers on computer software she uses daily, and discovered more efficient ways of managing an office.

Site Protection Division Training Coordinator Kevin Rhoades finished an MCCC management course, which included 15 workshops that are part of the nationally recognized Zenger-Miller Leadership 2000 management series.

Some PPPL managers have taken on the task of reading the book, *A Force for Change: How Leadership Differs From Management*. In addition, employees have completed computer courses, participated in diversity training, and attended conferences about topics in their fields.

Through these activities, all are continuing their self development.

"Self development is a continuous process that helps to promote a creative environment and encourage innovation and enhancement of work performance of each individual at the Laboratory," said PPPL Director Rob Goldston in a recent memo to staff.

The Lab Director supports participation in professional development. "Everyone is encouraged to examine his or her performance and to take ownership of his or her personal development. Remember to meet with your supervisors to discuss the type of development activity that will boost your individual and your team accomplishments at PPPL," he said.

Self development activities include self education through studying textbooks and professional publications, as well as formal training through seminars, lectures, and courses. According to PPPL policy, exempt staff may dedicate up to 10 percent of their time in developmental and outreach activities and bi-weekly staff may dedicate up to 5 percent.

### Investing in Yourself

"Think about investing in yourself because you are also investing in PPPL," said Human Resources Deputy Head Susan Murphy-LaMarche.

She added that because of Savino's recent accomplishment, the latter is "better off and NSTX is better off." When Savino came to Human Resources to discuss her self development, she wanted to identify what was neces-



**Joanne Savino**

sary to do the best job possible for NSTX, said Murphy-LaMarche.

Savino attended the course at MCCC for one day a week for 10 weeks, and shared much of her newly gained knowledge, such as business writing techniques, with her work group at NSTX. While taking the course, she put in extra effort during her four days a week at work. "I had to work a little harder to catch up — but it was worth it," said Savino, adding that her group was supportive of her self development efforts.

NSTX Project Director Masa Ono said, "With everyday pressure at work and at home, it is not always easy for us to undertake new educational activities. This makes me particularly appreciative of the fact that Joanne has successfully completed the course on the Office Management and Technology at Mercer County Community College. What Joanne brings back in terms of new knowledge through her training will not only benefit her, but all of us working with her directly or indirectly. As I have come to appreciate through working on the NSTX Project, the people resource is what makes PPPL a special place, a premier fusion research institution highly respected worldwide. So Joanne's achievement is a very good reminder for all of us about the importance of professional development."

Rhoades, a captain for the Site Protection Division, continues to profit from the course that he completed in

**Continued on page 5**



## Self Development

Continued from page 4

two semesters. "I thought the course was very informative and has helped me immensely as a supervisor. We conducted practice sessions and role playing about the topic of the evening during each class," said Rhoades. "I often review my course notes in preparation for normal administrative and operational duties. I believe I have become a better supervisor since completing this course. I would recommend it to anyone interested in improving their professional development."

**"The important thing  
is that we keep learning."  
— Susan Murphy-LaMarche**

Murphy-LaMarche stressed that there are many ways for employees to develop themselves. Examples are single-session or multiple-session training courses, conferences, books, management training, and computer instruction. Since the activities are varied, some may take a longer period of time to complete.

"The important thing is that we keep learning," said Murphy-LaMarche. ●

*For information about self development, please contact Human Resources Deputy Head Susan Murphy-LaMarche at ext. 2224 or e-mail her at [smurphy@pppl.gov](mailto:smurphy@pppl.gov).*



**Kevin Rhoades**

## PPPL Garners DOE Small Business Award



**From left are PPPL Procurement Head Rodney Templon, PPPL Small Business Liaison Arlene White (holding the DOE Corporate Small Business Award), and PPPL Deputy Director Richard Hawryluk.**

**P** PPL recently received the U.S. Department of Energy's (DOE) Corporate Small Business Award. The award cites the Laboratory for its "outstanding achievement in providing substantial contracting opportunities to small business" during Fiscal Year 1998. DOE Deputy Secretary T.J. Glauthier presented the citation to PPPL Deputy Director Richard Hawryluk on June 9 during a ceremony in Washington, D.C. PPPL, the DOE Chicago Operations Office, and Brookhaven National Laboratory each received the award this year.

"We were honored to receive this award from our sponsor, the Department of Energy. It recognizes a great deal of hard work by the Procurement staff in the areas of small business outreach, supplier selection, and contract administration," said PPPL Procurement Head Rodney Templon. Templon, Hawryluk, and PPPL Small Business Liaison Arlene White represented the Laboratory during the awards presentation. ●



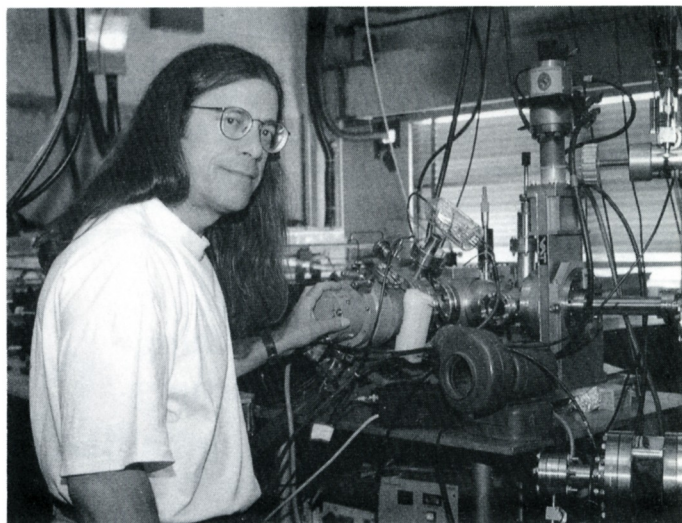
# Teachers Operate Fusion Machine at PPPL

**T**his summer, teachers participating in PPPL's "Plasma Camp" conducted experiments on a small fusion machine at the Laboratory. Three of the 14 teachers enrolled in this year's Plasma Camp, officially called the Plasma Science and Fusion Energy Institute, studied plasma behavior in the Current Drive Experiment-Upgrade (CDX-U).

Working with scientists at the Laboratory, one teacher operated the hydrogen-fueled machine, the second evaluated the temperature and density of the plasma, and the third analyzed impurities in the plasma recorded with a soft X-ray pinhole camera taking pictures inside the machine. The experiments involved changing the magnetic field level to gauge the effect on the plasma.

"This is the first time that I know of where teachers actually ran an experimental fusion device and conducted research the same way our scientists do," said PPPL's Andrew Post Zwicker, a Senior Program Leader in the Laboratory's Science Education Program. Post Zwicker designed and led the program.

The Institute is an intensive two-week summer program of lectures, lab work, and curriculum design for high

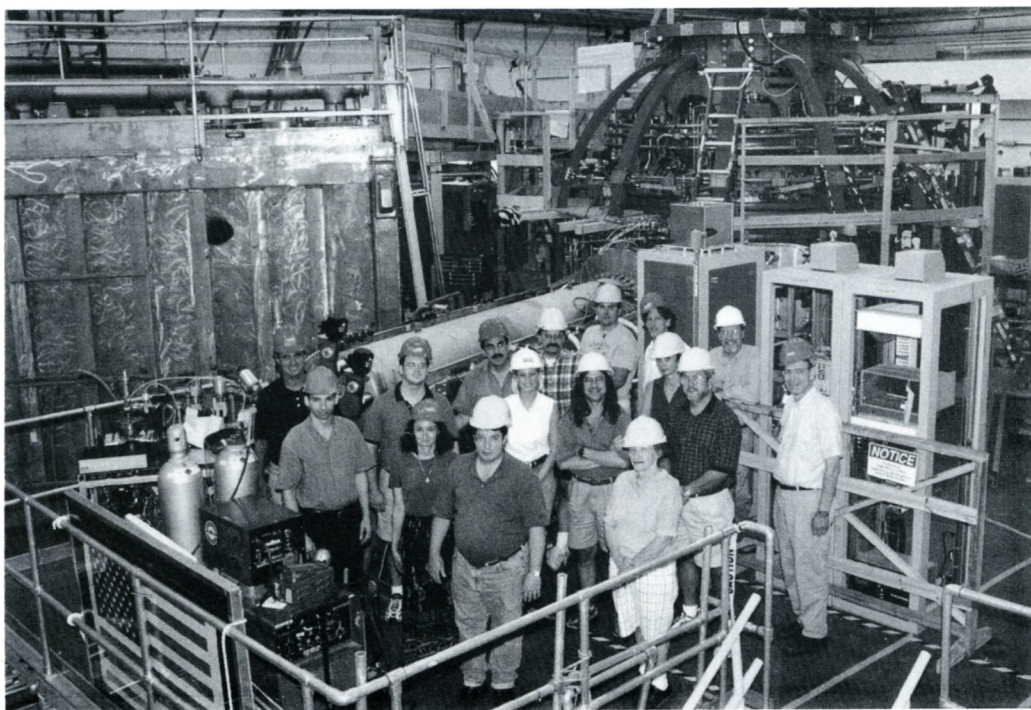


**Marc Sabb, a Plasma Camp participant who teaches at Canyon del Oro High School in Tucson, Arizona, stands next to an X-ray spectrometer, which takes a spectrum of multiple emission lines from the plasma.**

school physics teachers who were selected nationwide. This is the second summer the Laboratory hosted the

program. The three who did the CDX-U experiments participated in last year's program and returned this year to assist with the workshop. The returning teachers include Sophia Gershman of New Jersey, the Rev. Michael Liebl of Nebraska, and Marc Sabb of Arizona. The program concluded on July 30. The Institute's goal is to help teachers develop curricular materials for introductory physics teaching, making the subject of plasma and fusion accessible to high school pupils. Gershman noted that PPPL's program treats physics teachers as colleagues.

"At the Plasma Institute, they teach us on a graduate level and create a stimulating atmosphere where we can develop curriculum materials appropriate for our students," she said. ●



**The teachers who participated in this year's Plasma Camp and the leaders of the workshop are, from left, Michael Liebl, of Nebraska, Peter Gaudiano, of Louisiana, David Taylor, of Alabama, Sophia Gershman, of New Jersey, Tony Romanello, of Utah, Miguel Villanueva, of Massachusetts, Stephanie Connors, of Louisiana, Nick Guilbert (co-leader of the workshop), of New Jersey, Marc Sabb, of Arizona, Fran Leary, of New York, Randy Brown, of Vermont, Andrew Post Zwicker (co-leader and designer of the workshop), Violeta Grigorescu, of New Jersey, Dwight Johnston, of Pennsylvania, Steve Brehmer, of Minnesota, and Fred Oswald, of California.**



# Peng Honored by Oak Ridge for Work on NSTX

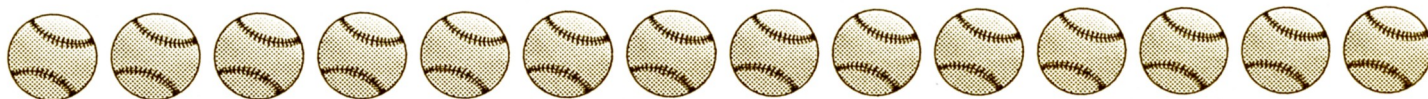
**N**STX Program Director Martin Peng has been selected to receive an Oak Ridge National Laboratory (ORNL) Significant Event Award (SEA). The award recognizes Peng's work on NSTX. His specific contributions were expressed in the nomination as follows:



"Dr. Martin Peng was appointed as the NSTX Program Manager and is on relocation to PPPL in fulfilling that role. As program manager he is responsible for developing the NSTX research program, which involves

collaborations with 14 installations. For over ten years he worked tirelessly on both the physics and engineering issues involved in the ST [spherical torus] concept. His personal development of the theories of low aspect ratio equilibrium, internal stability at high beta, and scrape-off layer stability caused interest to be cultivated in the low aspect ratio regime. Although he had very few supporters at first, it did not stop him from working patiently to convince the fusion community of the potential of ST as an attractive, cost-effective fusion reactor and development path for fusion." Peng is an ORNL employee on a long-term assignment at PPPL.

Congratulations, Martin! ●



## Batter Up! PPPL Softball Team Completes Season



Above, Tony Bleach takes a swing at the ball during one of the games. At right are 1999 PPPL Softball Team members (from left), standing, Tony Bleach, John Wheeler, Colin McFarlane, Sean Strasberg, Troy Carter, Kyle Morrison, Josh Carter, Phil Snyder, and Adam Rosenberg; kneeling, Jef Spaleta and Prentice Bisbal. Not pictured are Dave Cylinder, Jill Foley, Nick Guilbert, Dave Haas, Bob Heeter, Pat Hullfish, Steve Jardin, Jay Johnson, Russell Kulsrud, Cathy Manfredi, Jon Menard, Don Monticello, Hyeon Park, Steve Paul, Andrew Post Zwicker, Ed Synakowski, and Stewart Zweben. The team had four wins out of 13 games this summer before the August playoffs. Go team!





# The Troops Rally for Safety ...and Ice Cream



***Clockwise, from bottom left, students and staff mingle during the ice cream social; David Gates (left) orders the Rocky Road flavor from PPPL Director Rob Goldston (in hat) while Deputy Director Rich Hawryluk watches; Sabrina Turner (left), an Energy Research Undergraduate Laboratory Fellowship student, and Joe Franchino sample the toppings; Erik Perry (right) dishes up a bowlful of ice cream for Jon Menard. — Photo collage by Elle Starkman***

**O**n one of the hottest days of the summer, the Laboratory celebrated its safety success by breaking out tubs of ice cream in the Lobby.

“The ISM [Integrated Safety Management] review in June was very successful and we owe much of our success to J.W. Anderson and to his group. We passed the review with absolute flying colors,” said PPPL Director Rob Goldston, who had taken a break from scooping to address the troops during the July 28 party. The party was provided by the Laboratory to thank employees for their hard work and commitment to ISM.

During the employee bash, Goldston also acknowledged the following awards: the Small Business Administration Dwight D. Eisenhower Award for Excellence for

Exemplary Utilization of Small Business, presented to Rod Templon and Arlene White; the New Jersey Governor’s Occupational Safety and Health Department Recognition Award, presented to Martin Peng and Masa Ono on behalf of NSTX employees; and the New Jersey Governor’s Occupational Safety and Health Recognition Award presented to J.W. Anderson on behalf of all PPPL employees.

Goldston also noted that the 1999 Fusion Summer Study meeting in Snowmass, Colorado, was an “amazing accomplishment,” thanks to the efforts of Rich Hawryluk and John DeLooper. “It’s a good time to eat ice cream, beat the heat, and realize that fusion is important and people seem to be recognizing this fact,” said Goldston. ●