

DOE Princeton Plasma Physics Laboratory

# PPPL NEWS

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

## PPPL Garner Technology Transfer Award



PPPL Director Rob Goldston (left) and PPPL Technology Transfer Head Lewis Meixler hold the Regional Laboratory Award that PPPL received from the Federal Laboratory Consortium for Technology Transfer.

The U.S. Department of Energy's Princeton Plasma Physics Laboratory (PPPL) recently received a Regional Laboratory Award from the Federal Laboratory Consortium for Technology Transfer (FLC). The award from the FLC Northeast Region recognizes PPPL's "extraordinary efforts" to further national and regional technology transfer activities during 1999.

PPPL Technology Transfer Head Lewis Meixler accepted a plaque on behalf of the Laboratory during an FLC Northeast Regional meeting at the consortium's national gathering in Charleston, South Carolina, in May. The award honors PPPL for promoting technology transfer through collaborations with small businesses on the development of scientific instrumentation, work with other agencies to support the development and transfer of technology, and Science-on-Saturday lecture series.

PPPL Director Rob Goldston said, "We are very pleased to be recognized for our efforts in technology transfer. It is an important part of our program as a Department of Energy Laboratory to assure that the technologies we develop have a positive impact on the nation."

The FLC, organized in 1974 to promote and facilitate the rapid movement of federal laboratory research results and technologies into the mainstream U.S. economy, includes more than 700 major federal labs and centers and their parent departments and agencies as members. ●

## Lucas Named Head of Science Education Program

Pamela Lucas is the newly named Head of PPPL's Science Education Program. Lucas, who joined the Laboratory's Science Education staff six years ago, has been Acting Head for the past eight months. She replaces Diane Carroll, who is Executive Director of the Invention Factory Science Center in Trenton.

As Head, Lucas is responsible for overseeing educational programs for students and teachers from all levels, as well as for implementing new educational and outreach



initiatives at the Laboratory. Present programs range from the National Undergraduate Fellowship Research Program and the Energy Research Undergraduate Laboratory Fellowships, to the New Jersey regional competition

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# PPPL Inventors Honored at Patent Dinner



To honor inventors who received patents, applied for patents, and disclosed inventions during Fiscal Year 1999, the Laboratory held the eighteenth annual Patent Recognition Dinner at Princeton University's Prospect House in June. The thirty-five inventors recognized are from the Research, Engineering, and Technical staffs of the Laboratory, as well as from other institutions that work in collaboration with PPPL. The inventors who attended the Patent Dinner are, from left, Martin Peng, Nathaniel Fisch, Joel Hosea, John Schmidt, Allen Boozer, Hyeon Park, Elizabeth Foley, Nevell Greenough, Yevgeny Raitses, Leonid Zakharov, Keith Rule, Gennady Shvets, Robert Woolley, and Geoff Gettelfinger. Not pictured are Samuel Cohen, Douglass Darrow, Philip Efthimion, Nikolai Gorelenkov, Paul Kivler, R. Majeski, V.M. Malkin, Dennis Mansfield, Evgeni Muraviev, Stephen Paul, Wayne Reiersen, Gary Taylor, and Roscoe White. ●

## PPPL NEWS

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# Post-Zwicker Named Lead Scientist, Sci Ed Programs

**A**ndrew Post-Zwicker has been appointed Lead Scientist, Science Education Programs, at PPPL.

Post-Zwicker will be responsible for creating and implementing the initiatives that result in the Science Education Program becoming a local and national leader in science education reform. Since joining PPPL's Science Education Program staff as a Senior Program Leader in 1997, he has expanded the Internet Plasma Physics Educational eXperience (IPPEX) and created the Plasma Camp program. IPPEX is an interactive educational experience that teaches users about plasma physics and fusion energy at a precollege level; Plasma Camp is an intensive two-week summer program of lectures, lab work, and curriculum design for high school physics teachers who are selected nationwide. In his new role, Post-Zwicker plans to create new programs for local high school students and community college professors nationwide, design and teach an undergraduate-level plasma sciences course, and create new internet education sites. He said his first goal is to establish a Plasma Science Education Center at PPPL. "I hope to use this center as a focal point for introducing a new generation of students and teachers to the beauty, complexity, and utility of plasmas — from computer chip manufacturing and lighting today to fusion energy tomorrow," Post-Zwicker said.

After receiving a bachelor's degree in physics from Bard College in Annandale-on-Hudson, New York, in 1986, Post-Zwicker went on to receive a master's and a Ph.D. in physics from Johns Hopkins University in 1988 and 1992, respectively. He conducted post-doctoral research for Oak Ridge National Laboratory at PPPL and at a fusion science laboratory in Jülich, Germany. Post-Zwicker always thought he would have the "standard research career," but during his first year as a post-doc researcher, he began working with an urban high school student and found the experience enriching. "Helping a student learn is one of the most rewarding

things you could ever do with your scientific training," said Post-Zwicker, who hails from a family of teachers. That first student he mentored, by the way, is now in medical school.

He is a member of the American Physical Society's Executive Committee for the Forum on Education and the Committee on Science Education for the Division of Plasma Physics, and is an author on more than 30 articles in a variety of journals. ●



*Andrew Post-Zwicker*

## Lucas

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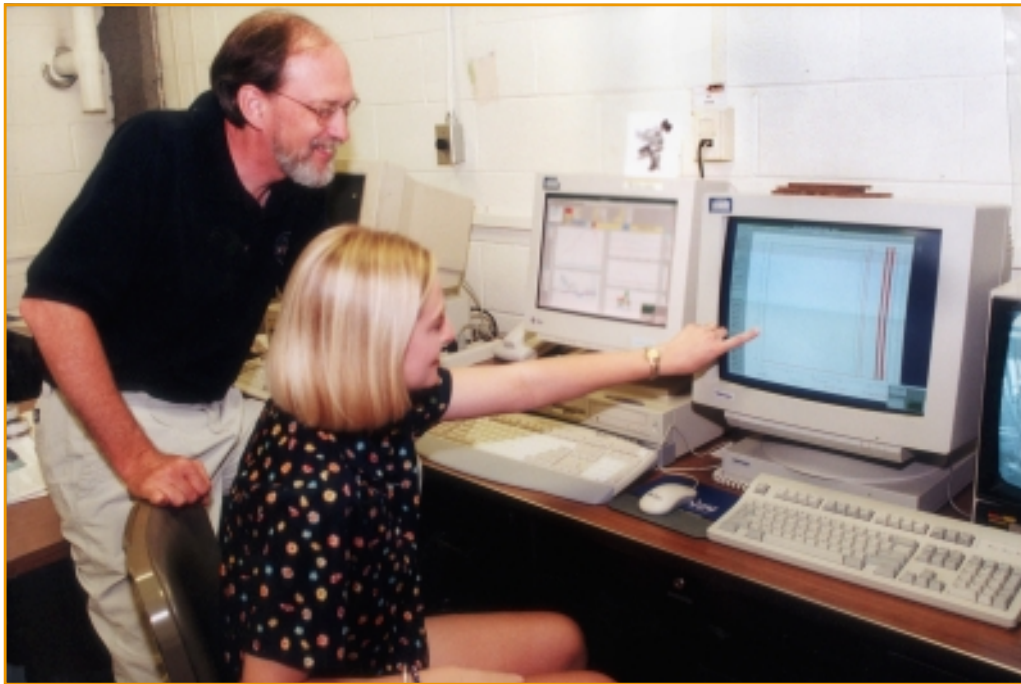
of the National Science Bowl® and the Science-on-Saturday lecture series. They also include several educational partnerships with local communities, such as the Trenton Partnership, which focuses on family outreach, teacher professional development, school support, and increased opportunities for students from the Trenton School District.

"My goal is to maintain and build on our existing programs, as well as to develop new programs for reaching out to students, educators, and the community. I also want to make sure the systems and structures are in place to support

positive experiences for students and teachers," said Lucas, who looks forward to her continuing work with students. "What I find exciting about the field of science education is having a role in inspiring and training the next generation of scientists — from children in elementary schools to graduate students."

Lucas has bachelor's degrees in biology and in natural science and mathematics from Rutgers University and from Thomas Edison State College, respectively. She worked in private industry before coming to PPPL. At the Lab, she has been a Science Education administrator and program leader, and has been Diversity Officer since 1994, a post she will continue to hold. ●

# Summer Sizzles with Teacher Workshops and Plasma Camp



At left, teachers Steve Brehmer and Stephanie Connors, Plasma Camp participants back for a second time, prepare the Current Drive Experiment-Upgrade for a plasma experiment. Below, Trenton and Burlington teachers make parachutes during a physical science workshop at PPPL. First they constructed the parachutes from instructions and then designed their own and developed experiments. These exercises were to show the differences between "cookbook" science and inquiry-based science. From left around the table are Trenton teacher Denise Mylowe, Burlington teacher Ed Alfaro, and Trenton teacher Brenda Koonce. On page 5 are teachers collecting aquatic insects during a life sciences exercise at the Stony Brook-Millstone Watershed.

The lure of aquatic insects, fusion reactions, electric circuits, and parachutes drew both local and distant teachers to summer science workshops organized, in part, by PPPL's Science Education Program staff. From July 24 through August 4, forty-five elementary and middle school teachers from Trenton, Burlington City, and Florence, New Jersey, participated in one-week "Sizzling Summer Science" sessions either at PPPL or at the Samuel Smith Elementary School in Burlington. In addition, a two-week "plasma camp" for high school science teachers was held at the Lab in July.

During the Sizzling Summer Science workshops led by experts from the Liberty Science Center, Compaq Computers, PPPL, and Georgian Court College, teachers conducted experiments and developed inquiry-based teaching skills. Burlington and Florence teachers were at the Smith Elementary School and Trenton teachers were at PPPL. On two days, each respective group took a field trip to the Stony Brook-Millstone Watershed in Pennington to study aquatic insects.

Plasma Camp, officially called the Plasma Science and Fusion Energy Institute, was an intensive two-week summer program of lectures, lab work, and curriculum design for high school physics teachers who were selected nationwide. Thirteen teachers participated in this year's institute, which was hosted by PPPL for the third summer. The goal was to help teachers develop curricular materials for physics classes, making the subject of plasma and fusion accessible to high school pupils. As part of the workshop, teachers actually conducted experiments in the Current Drive Experiment-

Upgrade to study plasma behavior. Three of the thirteen teachers had been involved in last year's plasma camp and returned this year to assist with the program.

## Unique Opportunity

Andrew Post-Zwicker, Lead Scientist for PPPL's Science Education Program, who designed and led the institute, said, "Plasma Camp is a unique opportunity for teachers from all over the country to engage in cutting-edge research and bring the excitement and beauty of plasmas to their

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students.” Nick Guilbert, Head of the Science Department at the Peddie School in Hightstown, co-led the institute.

Plasma Camp was funded by the Department of Energy’s Office of Fusion Energy Sciences. Sizzling Summer Science was a program of Teaching Science Matters, funded by an Eisenhower Professional Development grant from the New Jersey Department of Education. The workshops were provided through a collaboration involving Princeton University, PPPL, and the Invention Factory Science Center in Trenton. ●

The following people were involved in leading the Sizzling Summer Science workshops:

**Erin Peacock, Chris Manno, and Russ Walsh**  
— Montgomery Township Schools

**Betty Faber** — Liberty Science Center

**Dave Cochran** — Georgian Court College

**Richard Catena** — Compaq Computer Corp.

**Andrew Post-Zwicker** — PPPL

**Jeff Hoagland** — Stony Brook-Millstone Watershed

**Anthony Fredericks**, consultant

## PPPL, Berkeley, and Livermore Form Virtual Lab

**P**PPPL has joined forces with Lawrence Berkeley National Laboratory and Lawrence Livermore National Laboratory in a memorandum of agreement to create a “virtual lab” that will conduct research on heavy ion inertial fusion energy.

### Three Labs Collaborate

Under the agreement, funded through the Department of Energy’s Office of Fusion Energy Sciences, the three laboratories will collaborate on the new Heavy Ion Fusion Virtual National Laboratory (HIF-VNL). The labs will work together on “conducting heavy ion driver development and related topics in the common pursuit of Inertial Fusion Energy, and promoting more rapid progress in the development of heavy ion drivers through technical management integration of the laboratories’ scientific staff, equipment, and experimental facilities.”

In heavy ion fusion, high-powered beams of heavy ions ignite pea-sized capsules of deuterium and tritium fuel. The fuel burns so quickly it is confined by its own inertia long

enough for the reaction to produce energy. Roger Bangerter, of Berkeley Lab’s Accelerator and Fusion Research Division, a long-time leader in heavy ion fusion research, will be the Director of the HIF-VNL. The Deputy Directors will be Grant Logan of the Livermore Lab and Ronald Davidson of PPPL.

Said Davidson, “The HIF-VNL provides an excellent opportunity for PPPL researchers to have a major technical impact on the development of heavy ion fusion, particularly in critical physics and engineering areas related to intense nonneutral beam propagation, final focus optimization studies, and beam-plasma interactions in the target chamber.”

The HIF-VNL agreement has been publicly hailed by Stephen Dean, president of the Fusion Power Associates, an independent fusion advocacy group, as proof that DOE’s non-weapons labs can still collaborate on research projects with the weapons labs even though the latter are now a part of National Nuclear Security Administration. ●

— *Provided by Lawrence Berkeley National Laboratory*

# President and Energy Secretary Honor PPPL's Shvets

Earlier this year, PPPL physicist Gennady Shvets received awards from President Clinton and from Energy Secretary Bill Richardson. Shvets was among 60 young researchers President Clinton named as recipients of the fourth annual Presidential Early Career Awards for Scientists and Engineers and among five recipients of the U.S. Department of Energy's (DOE) Office of Science Early Career Awards in Science and Engineering.



*Gennady Shvets*

The Presidential citation, which this year's honorees received during a springtime White House ceremony, is the highest honor bestowed by the United States government on young professionals at the outset of their independent research careers. Established by President Clinton in February of 1996, the award embodies the high priority the Adminis-

tration places on producing outstanding scientists and engineers ready to contribute to all sectors of the economy. Eight Federal departments and agencies join together annually to nominate the most meritorious young scientists and engineers who will broadly advance the science and technology that will be of the greatest benefit to fulfilling the agencies' missions. The young scientists and engineers receive up to a five-year research grant to further their study in support of critical government missions. The Federal agencies involved are: the Departments of Agriculture, Commerce, Defense, Energy, Health and Human Services, Veterans Affairs; the National Aeronautics and Space Administration; and the National Science Foundation.

Prior to the White House ceremony, Shvets received a DOE Office of Science Early Career Award in Science and Engineering from Secretary of Energy Bill Richardson.

Shvets was cited "for theoretical and computational investigations of the interaction of ultra-strong laser pulses with plasmas (hot, ionized gases), with applications to inertial confinement fusion, to plasma-based particle accelerators, to new radiation sources based on beams and plasmas." ●

## Carroll Receives Education and Outreach Award

In July, former PPPL Science Education Program Head Diane Carroll received a Special Award for Education and Outreach for the year 2000. The award from Fusion Power Associates (FPA) honors Carroll for spreading the fusion message to students, teachers, and the general public through PPPL's outreach and education programs. Carroll is one of three recipients of the newly created award. The others are Don Correll of the Lawrence Livermore National Laboratory and Carol Danielson of General Atomics.

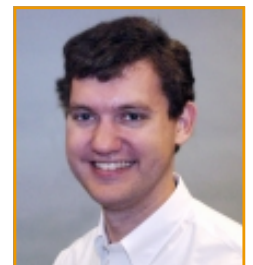
The awards were part of the FPA's annual meeting and symposium at the University of California at San Diego. Carroll is presently the Executive Director of the Invention Factory Science Center in Trenton. ●



*Diane Carroll*

## Herrmann Awarded for Doctoral Dissertation

Former PPPL graduate student Mark Herrmann is the winner of the 2000 Award for Outstanding Doctoral Dissertation in Plasma Physics. The award, sponsored by General Atomics, was established to recognize exceptional young scientists who have performed original doctoral thesis work of outstanding scientific quality and achievement in the area of plasma physics. Herrmann's citation states, "With elegant use of analytical theory and computation, and insightful comparisons to experiment, this thesis lays the foundation for how radio frequency waves might cool fusion byproducts in a tokamak." The award will be presented at the October American Physical Society's Division of Plasma Physics meeting in Quebec. Herrmann, who is now at the Lawrence Livermore National Laboratory, received a Ph.D. from Princeton University in Astrophysical Sciences, Program of Plasma Physics, in 1998. ●



*Mark Herrmann*

## Physicist Gates Visits Lab



Earlier this year, Professor Sylvester J. Gates, of the University of Maryland, presented a colloquium at PPPL entitled, “Einstein’s Dream at the End of the Millennium,” as well as led a small group discussion, “Diversity in the Scientific Workforce.” Professor Gates’ visit, hosted by the Director’s Minority Advisory Committee (DMAC), was in support of Black History Month. A leader in the African-American scientific community, Gates’ field of study is theoretical elementary particle physics and quantum field theory, with particular interest in the topic known as “supersymmetry.” From left are PPPL Science Education Program Head Pamela Lucas, Gates, and DMAC Chairperson Andrea Moten. ●

## Neumeyer Named Engineer of the Year

Charles Neumeyer, lead project engineer for the National Spherical Torus Experiment (NSTX) at PPPL, was recently named “Engineer of the Year” by the Professional Engineering Society of Mercer County (PESMC). Neumeyer (at right) received the citation during a PESMC awards banquet earlier this year. According to the PESMC, the group chose Neumeyer based on his “achievements with the National Spherical Torus Experiment and on having a distinguished career in fundamental research dealing with multiple technologies that hold great promise for the future.”



As NSTX project engineer, Neumeyer was responsible for integrating the many physics and engineering requirements and developing the overall engineering design of the NSTX. He was also responsible for leading the integrated testing phases which led to the first plasma (hot, ionized gas) operation ten weeks ahead of schedule and the demonstration of full plasma operation at one million amperes of plasma current more than nine months ahead of schedule. The success of this program is due, in large part, to Neumeyer’s breadth of knowledge and dedication to the tasks at hand. ●



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# Bretz Honored for Science-on-Saturday Work



Organizing talks for the Lab's Science-on-Saturday lecture series could be a worrisome task.

Just ask PPPL physicist Norton Bretz (pictured above), who recently stepped down as Chairperson of the series. A persistent thought nagged him prior to every talk: What if the speaker doesn't show up?

During his eight years as Chairperson or Co-chairperson, his concern was for naught. All the speakers arrived without fail. The only scare occurred when one of the presenters came to the Lab and sat down in the Auditorium, waiting to be introduced. Bretz, thinking she hadn't arrived yet, kept talking to the audience and stalling. Finally, he said, "The speaker should be here any minute." She popped up in the front row and said, "I'm here."

Earlier this year, Lab staff honored Bretz for his Science-on-Saturday efforts by presenting him with a plaque bearing the citation, "In appreciation of your commitment and dedication to PPPL's Science-on-Saturday Program from 1992-2000." Bretz, who is retiring from PPPL in

January, stepped down as Chairperson at the conclusion of the series this spring. Bretz said his goal was to offer a varied group of speakers and topics. "There are a lot of possibilities for keeping this series diverse. Science enters into many aspects of our lives, and there are many different personal styles with which people practice science. Jhane Barnes, one of the speakers this past season, is an entrepreneur fashion designer who uses computers and mathematical models to generate fabric patterns. Professor Paul Lansky, the Chairman of the Princeton University Music Department, spoke last year about composing and creating music with computers. Some scientists look like car mechanics, others like students, and still others like classical professors, and they present science in many different ways," he said.

By offering talks in astrophysics, math, biology, earth science, computer technology, ecology, chemistry, and physics, the audience, composed mostly of students, is exposed to a variety of scientific topics and sees a wide range of opportunities in the sciences.

The Chairperson said the series has been popular since its inception a decade and a half ago. It is a free, wintertime series geared toward high school students, but open to everyone. The age of attendees ranges from 8 to 80, and often parents, siblings, and teachers accompany students to the talks. Presently, Bretz is assisting PPPL's Ron Hatcher, Janardhan Manickam, and the Lab's Science Ed staff in organizing the line-up for the 2001 series.

When choosing a speaker, one plus is if the presenter is a parent. "People with kids are good candidates because they know the audience and have a natural connection to the age group," he explained. Bretz said when he was chairperson, throughout the year he would collect suggestions for speakers from friends and colleagues, and consider scientists he heard about through newspaper articles and periodicals. In the fall, he would create a list of potential speakers, careful not to cover one discipline or topic twice. Bretz said his duties as Chairperson were as varied as the talks. He has served as chauffeur — one of the speakers did not drive — found replacements for cancellations, arranged for special props such as a floor for the "Physics and the Dancer" talk, juggled the schedule, and kept a "back up" speaker on-call.

Bretz's involvement with the series has been personally rewarding. "I've liked doing this because it is an opportunity for me to talk to people I wouldn't normally get to talk to and to see first-hand their research," he said, adding that the series is also beneficial to the community. "Saturday mornings are an important time for people with families and during each of the talks, the Auditorium is filled with students and their families." ●