

American Physical Society Honors PPPL Scientists

Belova, Fisch, and Phillips Receive Awards

In October, the American Physical Society's Division of Plasma Physics (APS-DPP) honored three PPPL scientists: Elena Belova, Nathaniel Fisch (see Fisch article in the September, 2005, *Hotline*), and Cynthia Phillips. Belova received the Katherine E. Weimer Award for Women in Plasma Physics, Fisch received the James Clerk Maxwell Prize for Plasma Physics, and Phillips was named an APS Fellow.

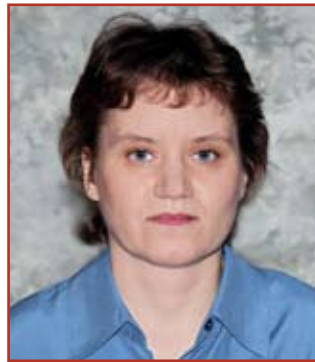
Belova

The Weimer Award recognizes Belova for her outstanding achievement in plasma science research, citing her for pioneering analytical and numerical contributions to the fundamental physics of magnetically confined plasmas [hot, ionized gases used as the fuel for the production of fusion energy]. The award is given to recognize and encourage outstanding achievement in plasma science research by a woman physicist in the early years of her career. Weimer (1919-2000) was a pioneering woman physicist at PPPL.

Ronald C. Davidson, Princeton University Professor of Astrophysical Sciences and PPPL researcher, said, "I have followed closely Dr. Belova's fundamental research contributions to the theory and simulation of magnetically confined plasmas since 1997 when she joined the research staff at the Princeton Plasma Physics Laboratory. I have only the highest opinion of her research accomplishments, her intellectual ability, and the prospects for her continued growth as a world-class plasma theorist."

Davidson described Belova as "an extraordinarily talented plasma physicist, with exceptional analytical and numerical capabilities, and outstanding physical insight." He added, "Her scientific accomplishments in a short period of time are truly remarkable."

Belova received an M.S. degree in space plasma physics from the Moscow Institute of Physics and Technology in 1987, having majored as an undergraduate in numerical methods and applied mathematics. She worked for several years as a staff member in the Russian Academy of Science's Space Research Institute in Moscow. She moved to the U.S. in 1992 and received a Ph.D. from Dartmouth



Elena Belova



Cynthia Phillips

College in 1997. Her thesis research was related to the development and application of new physical models and computational techniques that make it practical to carry out simulations of physical problems with highly disparate temporal and spatial scales.

Since joining PPPL's Theory Department as a researcher eight years ago, Belova has achieved a worldwide reputation for her theoretical studies of field-reversed configurations. A Field-Reversed Configuration (FRC) is a device developed for magnetic fusion energy research that confines a plasma on closed magnetic field lines. Belova is regarded as one of the leading computational theorists in the world in the research area of FRC stability studies.

"Dr. Belova's research has revolutionized the understanding of a new class of fusion systems that could allow smaller, simpler fusion power plants in the future," said PPPL Director Rob Goldston.

Belova has made many pioneering contributions to both analytical and computational plasma physics. She is the first author of 21 scholarly publications in refereed journals and conference proceedings. Martha Redi, who recently retired as a Principal Research Physicist at PPPL, said, "Dr. Belova is a highly creative and industrious young woman with considerable potential to enrich our understanding of the complex phenomena in plasma physics."

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APS

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Samuel Cohen, Director of the Program in Plasma Science and Technology at PPPL, noted the similarities between the prize recipient and the woman for whom the prize was named. "I knew Dr. Weimer for over a dozen years. Her analytical and numerical studies of plasma equilibrium and stability were held in high regard by other pioneering researchers during the 1960s and 1970s, the first Golden Age of plasma physics," said Cohen.

He noted how in 1969, Weimer, with John Greene and John Johnson, co-authored one of the first papers on FRC stability, Dr. Belova's field of research. Weimer applied her research talents in the then-new field of nonlinear plasma effects including ideal and resistive magnetohydrodynamics. "It is easy to see many similarities between the research of Dr. Belova and of Dr. Weimer. Two scientists, masters of similar theoretical and computational techniques, with strikingly similar scientific interests and dedication to fusion," Cohen said.

Added Davidson, "Elena's thorough attention to detail and her exceptional intellectual ability to tackle and solve complex physics problems are qualities she shares with Katherine Weimer."

Redi also noted the likenesses between the two female scientists. "Like Dr. Katherine Weimer, she [Belova] is truly a pioneer in a field with few women faculty, few women with doctorates in plasma physics-fusion science and a community, historically, without many research discoveries by women. The struggle for recognition and acceptance, for professional and personal satisfaction under these conditions is especially difficult and Elena has persevered successfully, with a love of plasma physics and excellence in research. She is an exceptional, outstanding physicist and well deserving of the Weimer Award," Redi said.

The Weimer Award, established in 2001, is presented every three years. It consists of \$2,000 and funds for travel to the meeting where the award is to be made, as well as a certificate citing the contributions made by the recipient.

Phillips

PPPL physicist Cynthia Phillips received the lifetime appointment as an APS Fellow in recognition of "her theoretical and experimental contributions to the understanding

of radio frequency wave-particle interactions in fusion plasmas." In fusion experiments, radio waves are used to heat and drive current in the plasma. Researchers choose waves with characteristics for interacting with the ions or electrons in the plasma that cause the ions or electrons to move faster and thereby raise the temperature.

"Dr. Phillips is leading in the application of advanced computation to understanding the interaction of radio waves with plasmas, a critical part of the research needed to make fusion practical," said PPPL Director Goldston.

Phillips is the Head of the Wave-Plasma Interactions Science Focus Group at PPPL and is a lecturer with the rank of professor at Princeton University's Department of Astrophysical Sciences, Program in Plasma Physics. She joined PPPL's research staff in 1983 after receiving a B.S. in physics from the Massachusetts Institute of Technology (MIT) in 1976 and an M.A. in 1977 and a Ph.D. in 1982 in physics, both from the University of Wisconsin-Madison.

For more than two decades her research has focused on radio-wave propagation in plasmas, and Phillips has participated in experiments on the National Spherical Torus Experiment at PPPL, a collaboration at MIT, and the Department of Energy's multi-disciplinary program in advanced scientific computing applications, Scientific Discovery through Advanced Computing (SciDAC).

Nobel Laureate and PPPL physicist Russell Hulse has known Phillips for more than 20 years, first meeting her as a result of their mutual involvement in computer modeling at PPPL. Hulse said, "It is a great pleasure to hear that Cynthia has been named an APS Fellow. She is a leading researcher in wave-plasma interactions, and has provided important leadership to the entire plasma community, particularly through her service on FESAC [Fusion Energy Science Advisory Committee]. It is a well-deserved honor."

Added PPPL Off-Site Research Department Head Randy Wilson, "Cynthia is the glue that holds the radio frequency group together with a unique ability to bridge the worlds of theory and experiment." Wilson has worked with Phillips for more than two decades on radio frequency experiments on several devices at the Laboratory, including the Princeton Large Torus, the Tokamak Fusion Test Reactor, and NSTX.

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.

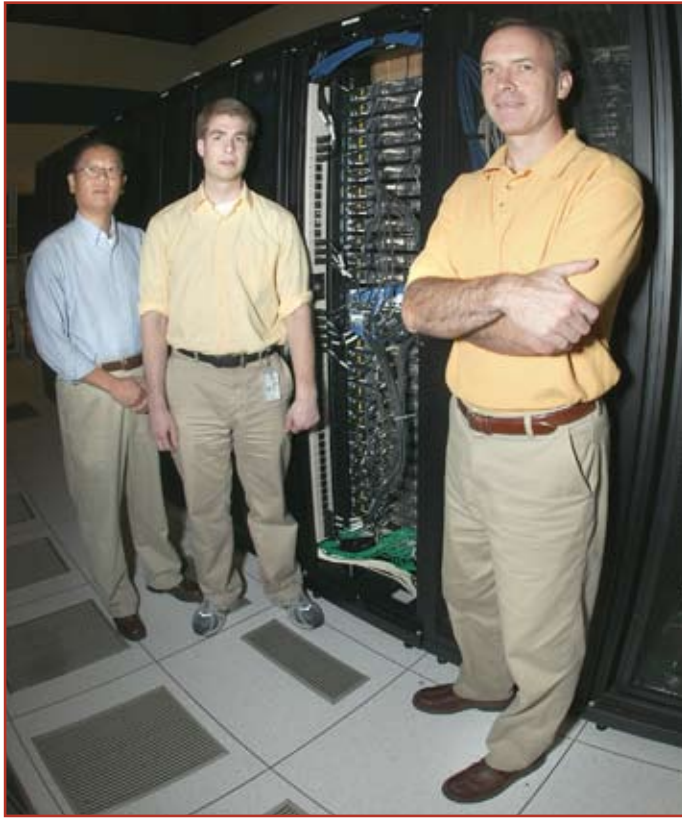
Congratulations, Elena, Nat, and Cynthia! ●

Hotline

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High-speed Computer Cluster Installed at PPPL



From left are Kevin Ying, Dan Perry, and Paul Henderson next to the newly installed high-speed computer cluster in the FCC Computer Room (next to the NSTX Control Room). Ying, Perry, and Henderson made up the team that set up the system, installation, and administration.

A new high-speed computer cluster was installed this fall at the Laboratory's Fusion Computational Center (adjacent to the NSTX Control Room). Called "Kite," the system is used primarily to test computational codes by staff from the Lab's Theory Department and the National Spherical Torus Experiment (NSTX), as well as by collaborators. An example of its use is modeling plasma using data from NSTX.

Valuable Resource

"This is a very valuable resource to us," said PPPL Systems and Network Engineering Branch Head Paul Henderson. Henderson was on the team, along with Kevin Ying and Dan Perry, responsible for system set up, installation, and administration.

The system is comprised of SUN servers with Dual Opteron processors, and a total of 144 gigabytes of RAM (memory). For comparison, the average home computer may have one-quarter gigabyte of memory.

Fastest System

Henderson noted that Kite is a miniature version of a very large computer cluster at the National Energy Research Scientific Computing Center at Lawrence Berkeley National Laboratory. "It's probably the fastest system we have at PPPL," he said.

For more information about the Kite cluster and its use, see beowulf.pppl.gov or contact unixadmin@pppl.gov. ●

You Have the Power: Save Energy at Home and PPPL

On November 3, PPPL Pollution Prevention-Energy Coordinator Tom McGeachen led a brown-bag discussion for staff, "You Have the Power to be an Energy Saver at Home and at PPPL," in the Training Room.

McGeachen shared examples of steps he has taken at home to reduce energy consumption. "Heating and cooling your home uses more energy than any other system," he said. McGeachen's presentation can be downloaded at <http://www-local.pppl.gov/HomeEnergy2005.pdf>.

At home and at the laboratory, McGeachen stresses the Department of Energy mantra: You Have the Power. ●



Tom McGeachen gives an energy saver presentation.

2005 State of the Lab Slated for Tuesday

PPPL Director Rob Goldston's

2005 State-of-the-Lab Talk

Tuesday, November 22

10 a.m.

MBG Auditorium

Prior to the talk, a light breakfast (fresh fruit and fruit juice, muffins, danish, donuts, coffee, and tea) will be served in the LSB Lobby beginning at 9:30 a.m.

PPPL 2005 United Way Meeting

Thursday, December 1

9:30 a.m.

MBG Auditorium

Presentations — Refreshments (Light Breakfast) — Door Prizes

Please join us to find out more about the United Way and how your contributions can help those in need. Everyone is welcome!

