

## Calendar of Events

**NOV. 3-6**

**18th International Spherical  
Torus Workshop**  
Princeton University

**FRIDAY, NOV. 6**

**Public Tour**

10 a.m.

[tours@pppl.gov](mailto:tours@pppl.gov)

**PPPL Colloquium**

1 p.m. ♦ MBG Auditorium

[Technical Aspects of the Iran  
Nuclear Agreement](#)

Professor Robert Goldston,  
Princeton University

**UPCOMING**

**NOV. 16-20**

**American Physical Society Division  
of Plasma Physics conference**  
Savannah, Georgia

**FRIDAY, NOV. 20**

**Public Tour**

10 a.m.

[tours@pppl.gov](mailto:tours@pppl.gov)

**TUESDAY, NOV. 24**

**PPPL Colloquium**

4:00 p.m. ♦ MBG Auditorium

[Sustainability Economics](#)

James Morris, Rutgers University

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## Adam Cohen becomes Deputy Under Secretary for Science and Energy in Washington

By John Greenwald

After nearly seven years as deputy director for operations at the U.S. Department of Energy's (DOE) Princeton Plasma Physics Laboratory (PPPL), Adam Cohen has been named Deputy Under Secretary for Science and Energy in Washington D.C. He succeeds Michael Knotek, who retired September 30.

"I am very excited and humbled by the opportunity to take on this role," Cohen said. "I look forward to working with Secretary [Ernest] Moniz, Under Secretary [Lynn] Orr and all within the department, as well as across the complex, in supporting the research mission of the department and helping to ensure the vitality of the national laboratories."

Cohen's contributions to the Laboratory have been invaluable, said A.J. Stewart Smith, Princeton University vice-president for PPPL. "He evolved the management structure that we all enjoy today," Smith said. "He has been a superb colleague and will be sorely missed."



Adam Cohen

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## Scientists propose an explanation for puzzling electron heat loss in fusion plasmas

By Raphael Rosen

Creating controlled fusion energy entails many challenges, but one of the most basic is heating plasma – hot gas composed of electrons and charged atoms – to extremely high temperatures and then maintaining those temperatures. Now scientist Elena Belova of the U.S. Department of Energy's (DOE) Princeton Plasma Physics Laboratory (PPPL) and a team of collaborators have proposed an explanation for why the hot plasma within fusion facilities called tokamaks sometimes fails to reach the required temperature, even as researchers pump beams of fast-moving neutral atoms into the plasma in an effort to make it hotter.

The results, published in June in *Physical Review Letters*, could lead to improved control of temperature in future fusion devices, including ITER, the international fusion facility under construction in France to demonstrate the feasibility of fusion power. This work was supported by the DOE Office of Science (Office of Fusion Energy Sciences).

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## Adam Cohen

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In Washington, Cohen's wide-ranging position will help Orr, a chemical engineer from Stanford University who was sworn in last December, oversee the seven Energy and Science organizations within DOE. These organizations, which include the Offices of Science, Nuclear Energy and Energy Efficiency and Renewable Energy, oversee 13 of the 17 national laboratories, including PPPL.

Cohen will not be directly involved with operations at PPPL, or with any activities with a direct impact on PPPL, since he is on assignment from Princeton, which manages the Laboratory. He assumes the post under the Intergovernmental Personnel Act, which provides renewable government positions for personnel at universities and national laboratories. Princeton and PPPL have launched a national search for his replacement.

Cohen will make use of his fusion experience by heading the U.S. delegation to ITER, the international fusion experiment that is under construction in France. His contact with ITER will be at the international level; he will not be directly involved in the US ITER Project Office at Oak Ridge National Laboratory.

At PPPL, which recently completed construction of the \$94 million National Spherical Torus Experiment-Upgrade, the Laboratory's major fusion experiment, Cohen has played many critical roles. As deputy director for operations, he was in charge of the upgrade and ran the indirect — or non-research — side of the Laboratory, whose departments range from engineering and infrastructure to information technology. He recently headed preparation of the Campus Plan, a 10-year program for modernizing the Laboratory whose first steps are under way, and set the Lab on its current path to a business system upgrade that will replace all financial software by 2018.


In other initiatives, Cohen has strongly advocated expanding PPPL research beyond its core fusion activities. He was a moving force in setting up a low-temperature plasma lab to study nanotechnology and in creating PTOLEMY, an experiment to detect Big Bang neutrinos that could offer clues to

the origin of the universe. Other non-fusion projects that he has supported include an advanced centrifuge and a plasma mass filter, both of which are designed for nuclear cleanup.

Cohen holds a bachelor's degree in engineering from Columbia University, a doctorate in materials science from Northwestern University and an M.B.A. from the University of Chicago. After graduating from Columbia he spent four years as a junior U.S. Navy officer aboard nuclear submarines, followed by two years assembling fuel rods for nuclear power plants for Babcock and Wilcox in Virginia. He went on to spend 20 years at Argonne National Laboratory, during which time he earned his doctorate and M.B.A. degrees and rose to the position of chief operating officer.

Cohen's new post marks his second Washington position. From 2006 to 2008 he served on assignment from Argonne as senior adviser for nuclear energy for Raymond Orbach, who was both Undersecretary for Science and Director of the Office of Science, which funds basic research for energy and the physical sciences. While in Washington Cohen helped to organize the National Laboratory Directors' Council, which facilitates communications among the laboratories and between the DOE and Congress and other federal agencies, and which has given rise to other national laboratory groups.

Cohen brought his interest in networking to PPPL, which he joined in 2009. "Adam has helped to integrate us with the rest of the labs," said Mike Zarnstorff, deputy director for research at PPPL. "We participate in a variety of ways because of his efforts. We call upon other laboratories, and they call to consult with us."

Reflecting on his years at PPPL, Cohen says, "I have been very proud of the people who work at the Laboratory and the achievements we have seen. The team of people we have at the Lab are best in class, and I believe the Lab is in a great position to lead in the next phases of both fusion and plasma physics research. While I came with deep experience in energy research, management and operations, I have learned a great deal about the fusion and plasma physics fields, about the academic environment, and many aspects of management." That knowledge, combined with Cohen's already wide and deep experience, will help to guide him in the important new position that he has assumed. 

# COLLOQUIUM

## Technical Aspects of the Iran Nuclear Agreement

**Professor Robert Goldston**  
Princeton University



**Friday, Nov. 6**

1:00 p.m., M.B.G Auditorium, Lyman Spitzer Building

# Plasma heat loss

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The researchers focused on the puzzling tendency of electron heat to leak from the core of the plasma to the plasma's edge. "One of the largest remaining mysteries in plasma physics is how electron heat is transported out of plasma," said Jon Menard, program director for PPPL's major fusion experiment, the National Spherical Tokamak Experiment-Upgrade (NSTX-U), which has completed a \$94 million upgrade.

Belova hit upon a possible answer while performing 3D simulations of past NSTX plasmas on computers at the National Energy Research Scientific Computing Center (NERSC), in Oakland, California. She saw that two kinds of waves found in fusion plasmas appear to form a chain that transfers the neutral-beam energy from the core of the plasma to the edge, where the heat dissipates. While physicists have long known that the coupling between the two kinds of waves – known as compressional Alfvén waves and kinetic Alfvén waves (KAWs) – can lead to energy dissipation in plasmas, Belova's results were the first to demonstrate the process for beam-excited compressional Alfvén eigenmodes (CAEs) in tokamaks.

Her simulations showed that when researchers try to heat the plasma by injecting beams of energetic deuterium, a form of hydrogen, the beams excite CAE waves in the plasma's core. Those waves then resonate with KAW waves, which occur primarily at the plasma's edge. As a result, the energy is transported from the injection site deep within the plasma to the plasma's edge.

"Originally, when scientists found that the electron temperature wouldn't go up with increased beam power, everybody assumed that the electrons were getting heated at the plasma's center and then were somehow losing that heat," Belova said. "Our explanation is different. We propose that




Elena Belova

part of the beam energy goes into CAEs and then to KAWs. The energy then dissipates at the plasma's edge."


The simulations provided a broad perspective. "In simulations you can look everywhere in a plasma," Belova said. "In the experiments, on the other hand, you are very limited in what and where you can measure inside the hot plasma."

Belova's findings reflect the growing collaboration between theoretical and experimental research at the Laboratory. "Her results uncover a novel loss mechanism for electron energy that could be important for NSTX-U plasmas," said Amitava Bhattacharjee, head of the Theory Department at PPPL.

Belova plans to run more simulations to determine whether the mechanism she identified is the primary process that modifies the electron heating profile. She will also look for ways in which physicists can avoid this wave-induced change in the profile. In the meantime, she is driven by her desire to learn more physics. "We want to understand how these waves are excited by the beam ions," she said, "and how to avoid them in the experiments." 

## "What is the Princeton Plasma Physics Laboratory?"

That would have been the answer when the Laboratory popped up as a \$200 question on "Jeopardy!" on Monday, Oct. 26 under "A Nation of National Labs." The question was, "Fusion Energy is under study at PPPL, this New Jersey Plasma Physics Lab." There were also questions about Sandia, Fermilab, Pacific Northwest, and Brookhaven national

laboratories. The quiz show pitted Sean Anderson, a law professor from Champaign, Illinois against Beth Horn, a new contestant from Dallas, and Tom Flynn, a bartender from Goshen, New York. Anderson won the contest and advanced to the next day with winnings of \$48,300. 

LOONEY TUNE CHARACTERS	NONFICTION	A NATION OF NATIONAL LABS	PEOPLE WITH BIBLE BOOK NAMES
\$200 2	\$200 6	\$200 26	\$200 12
I say, I say, he's a big blowhard who thinks he runs the barnyard	Falconry hobbyist Helen MacDonal called her memoir of bereavement "H is for this bird"	Fusion energy is under study at PPPL, this New Jersey Plasma Physics Lab	Justice Ginsburg; late screenwriter Praver Jhabvala

Screenshot from j-archive.com showing the text of the question.

## Engineering Tour

About 40 engineers and students from the Mercer County and Raritan Valley chapters of the New Jersey Society of Professional Engineers toured the Laboratory during their October meeting. The group visited the NSTX-U Control Room, the NSTX-U test cell, the Field Coil Power Conversion Building, the motor generators and NCSX/QUASAR, led by guides Al von Halle and Tim Stevenson, along with Charlie Gentile, Clayton Myers and Michael Mardenfeld. 📷



Tim Stevenson talks to visitors in the NSTX-U Control Room.



Al von Halle shows the second neutral beam injector in the NSTX-U test cell.



Von Halle with visitors in the Field Coil Power Conversion Building on D-Site.



Stevenson and tour goes in the LSB Lobby.



PPPLers celebrate Halloween. From left: Marianne Tyrrell, Maria Castillo, Nakia Townsend, Kate Harkness, Jennifer Leggett, Alba Castano, Mark Gazo, Andrea Moten, Dana Eckstein, Suzzan Kirkley, Nevell Greenough, Michael Gonzalez.

## Young Women's Conference

**PPPL's 15th annual Young Women's Conference will be March 18, 2016.**

Registration opens October 16, 2015, and will remain open until the registration deadline of March 1, 2016.

**Hurry, space is limited!**

Visit our website at [pppl.gov/YWC](http://pppl.gov/YWC) or contact Deedee Ortiz at [dortiz@pppl.gov](mailto:dortiz@pppl.gov) for more information.

# Flu Vaccines Are Here!

Influenza is a contagious disease caused by a virus. It can be spread by coughing, sneezing or nasal secretions.

By getting the flu vaccine, you can protect yourself from influenza and may also avoid spreading this illness to others.

Please call the OMO at extension 3200 to make an appointment.

Thank you.

—The OMO Staff

**BROCK**

**MARK GAZO**  
Chef Manager



BREAKFAST ..... 7 a.m. • 10 a.m.

CONTINENTAL BREAKFAST ..... 10 a.m. • 11:30 a.m.

LUNCH ..... 11:30 a.m. • 1:30 p.m.

SNACK SERVICE ..... until 2:30 p.m.

	Monday November 2	Tuesday November 3	Wednesday November 4	Thursday November 5	Friday November 6
<b>COMMAND PERFORMANCE Chef's Feature</b>	<b>Fried Chicken</b> served with Cheesy Mashed Potatoes	<b>Veggie Ravioli</b> in a Pink Primavera Sauce	<b>Chicken Marsala</b> with Mushrooms served with Stuffing and Vegetable	<b>Carved Roast Beef</b> with Mashed Potatoes, Gravy & Vegetable	<b>Salmon Piccata</b> with Vegetable & Rice Pilaf
Early Riser	<b>Huevos Rancheros Burrito</b>	<b>French Toast</b> with Glazed Apples	<b>Grilled Vegetable Quesadilla</b> with Spinach, Peppers, Onions, Tomatoes & Cheddar Cheese	<b>Chocolate Banana Pancakes</b>	<b>Steak, Egg &amp; Cheese Burrito</b>
Country Kettle	<b>Chicken Noodle</b>	<b>Tomato Spinach Lentil</b>	<b>Stuffed Cabbage Soup</b>	<b>Cheddar Cheese &amp; Broccoli</b>	<b>Beef Mushroom Barley</b>
Grille Special	<b>Grilled California BLT Burger</b> with Caramelized Chipotle Onions	<b>Turkey Reuben</b> with Swiss Cheese, Sauerkraut & Russian Dressing On Rye	<b>Salmon Burger</b> with Lettuce & Tomato on a Whole Wheat Roll	<b>Italian Sausage &amp; Peppers</b>	<b>Broccoli Cheddar Stromboli</b>
Deli Special	<b>Fresh Mozzarella, Tomato &amp; Basil</b> on Ciabatta with Orange Honey Balsamic Drizzle	<b>Baked Glazed Ham &amp; Cheddar</b> on Ciabatta with Dijon Mustard	<b>Chicken Caesar Salad</b> Wrapped in a Tomato Tortilla	<b>Seafood Salad Croissant</b>	<b>Pork Carnita Soft Taco</b> with Red Cabbage Slaw, Avocado & Lime Sour Cream
Panini	<b>Buffalo Chicken &amp; Mushroom Quesadilla</b> with Bleu Cheese	<b>Parisian Tuna Salad</b> with Tomato, Onion, Artichoke, Olives, Arugula & Olive oil Dressing on Ciabatta Bread	<b>BBQ Chicken, Bacon &amp; Balsamic Onions</b> with Provolone on Ciabatta Bread	<b>Roasted Pesto Vegetables</b> with Fresh Mozzarella on Ciabatta Bread	<b>Italian Meatball Parmesan Torpedo</b>

MENU SUBJECT TO CHANGE WITHOUT NOTICE

VEGETARIAN OPTION

**WEEKLY**

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The PPPL WEEKLY is published by the [PPPL Office of Communications](#) on Mondays throughout the year except for holidays.

**DEADLINE for calendar item submissions is noon on WEDNESDAY. Other stories should be submitted no later than noon on TUESDAY.**

Comments: [commteam@pppl.gov](mailto:commteam@pppl.gov) ♦ PPPL WEEKLY is archived on the web at: <http://w3.pppl.gov/communications/weekly/>.