

THIS WEEK

MONDAY, NOV. 6

Travel Office Lunch and Learn
12 p.m. ♦ MBG Auditorium
[See page 6 for details.](#)

TUESDAY, NOV. 7

State of the Laboratory
1:30 p.m. ♦ MBG Auditorium
[See page 2 for details.](#)

WEDNESDAY, NOV. 8

Council Café Lunch
12 p.m. ♦ Cafeteria
Marc Cohen
Interim Head of Information Technology

PPPL Colloquium
4:15 p.m. ♦ MBG Auditorium
Ras Labs-CASIS-ISS NL Synthetic Muscle™ Experiment Returned to Earth: Resistance to Radiation
Lenore Rasmussen, Ras Labs, Inc.

UPCOMING

WEDNESDAY, NOV. 15

America Recycles Day
[See page 9 for details.](#)

MONDAY, NOV. 20

**Celebrate PPPL's
Inventor Hall of Fame**
12:30 p.m. ♦ LSB Lobby
[See page 7 for details.](#)

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The blob that ate the tokamak

Physicists gain understanding of how bubbles at the edge of plasmas can drain heat and reduce fusion reaction efficiency

By Raphael Rosen

To fuse hydrogen atoms into helium, doughnut-shaped devices called tokamaks must maintain the heat of the ultrahot plasma they control. But like boiling water, plasma has blobs, or bubbles, that percolate within the plasma edge, reducing the performance of the plasma by taking away heat that sustains the fusion reactions.

Now, PPPL scientists have completed new simulations that could provide insight into how blobs at the plasma edge behave. The simulations, produced by a code called XGC1 developed by a national team based at PPPL, performed kinetic simulations of two different regions of the plasma edge simultaneously. This ability produces a more fundamental and fuller picture of how heat moves from plasma to the walls, potentially causing damage.

[continued on page 2](#)

Construction on LSB Annex mostly complete

By Jeanne Jackson DeVoe



The back wall of the LSB Annex third floor. (Photo by Elle Starkman)

The reconstruction of offices in the Lyman Spitzer Building Annex is nearly complete and staff will move in by early next year, said Les Hill, head of the Infrastructure Operational Improvements (IOI) project.

"We're starting to wind down in the Annex," Hill said. "We're entering the transition of the Annex from construction to operation."

Business Operations staff now located in a modular building in front of the Theory Wing and staff located in Mod 6 will have their belongings moved to new locations between late December and mid-January, said David Carle, head of Facilities and Site Services, who is in charge of the move. Mod 6 will be demolished soon after the staff moves, Carle said.

The LSB Annex offices were completely gutted and refitted with a new electrical system; heating, ventilation, and air conditioning (HVAC) systems; and lighting. The layout will take advantage of the windows that surround the building with offices and cubicles that are fitted with glass windows for maximum natural light. The first floor includes a conference room. The second and third floors will have smaller meeting rooms called "huddle rooms."

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State of the Laboratory

Richard Hawryluk, PPPL's interim director, will give the State of the Laboratory address on Tuesday, Nov. 7, at 1:30 p.m. in the MBG Auditorium.

Refreshments will be served in the LSB lobby after the talk.

Plasma blobs

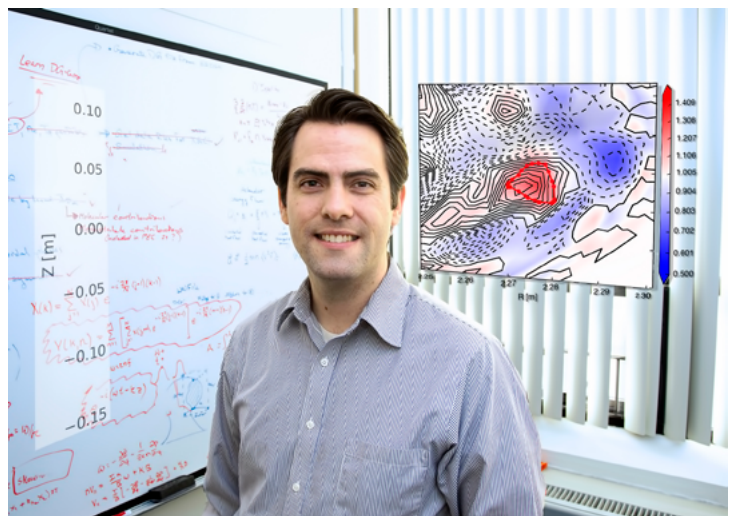
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"In simulations, we often separate two areas at the plasma edge known as the pedestal and the scrape-off layer and focus on one or the other," said PPPL physicist Michael Churchill, lead author of a paper describing the results in the journal *Plasma Physics and Controlled Fusion*. "XGC1 is unique because it is able to simulate both regions simultaneously, using kinetic ion and electron equations. In fact, it is important to include both regions in simulations because they affect each other."

Simulations allow scientists to explore plasma, the fourth and hottest state of matter in which electrons are separated from atomic nuclei, without running physical experiments that could be costly. They also sometimes provide insights that physical experiments do not. Simulations of turbulence at the edge of the plasma, near where the plasma approaches a tokamak's interior wall, are particularly important. The more that scientists understand such turbulence, the better able they will be to prevent moving blobs of plasma from forming in the plasma edge. If not controlled, these blobs could drain large amounts of heat from the confined plasma, and possibly either damage plasma-facing components or hinder the fusion reactions.


The XGC1 code simulated plasma in high-confinement mode, or H-mode, a set of conditions that helps plasma retain its heat. In H-mode, the results showed, a large number of blobs form between the pedestal and the scrape-off layer, two conditions near the edge, and move towards the outer edge, crossing the magnetic field lines as they go.

Blobs play an important role in the outward movement of particles in plasma. Blobs cause approximately 50 percent of the particle loss at the plasma edge, and researchers have observed blobs in a wide range of plasma devices, including tokamaks, figure-eight-shaped fusion devices known as stellarators, and linear machines. "The big picture is that blobs can pull energy and particles out of the plasma, and you don't want that," Churchill said. "You want to keep things confined."



Michael Churchill

Scientists ran the simulation on America's fastest supercomputer, called Titan, at the Oak Ridge Leadership Computing Facility, a DOE Office of Science User Facility in Oak Ridge, Tennessee. Much of the post-simulation analysis was performed at the National Energy Research Scientific Computing Center (NERSC), a DOE Office of Science User Facility at Lawrence Berkeley National Laboratory in Berkeley, California. Coauthors of the *Plasma Physics and Controlled Fusion* paper included PPPL physicists C.S. Chang, Seung-Hoe Ku, and Julien Dominski.

Future research will focus on how the blobs form and how their behavior is affected by the shape of the tokamak. Scientists must also fully determine how density, temperature, and electromagnetic force affect the behavior of the blobs. 

IOI update

continued from page 1

Workers have begun installing glass partitions in offices around the perimeter of the Annex that is being frosted for privacy. The walls are painted, and carpeting installed. Furniture should arrive toward the end of this month, Hill said.

Meanwhile, there has also been considerable progress on the C Site-Motor Generator Building where work will be complete by early next year, Hill said. New LED lighting has been installed and most of the walls in the 32,000-square-foot building have been sheet-rocked. The roof and the walls have been insulated and ductwork for a new HVAC system is being installed.



Glass partitioned offices on the first floor of the LSB Annex. (Photo by Elle Starkman)



The conference room on the first floor of the LSB Annex (Photo by Elle Starkman)

Hill said fabrication and machine tools in the Research, Storage, and Assembly (RESA) Building may be moved to the site as early as December. Once this equipment is removed, the RESA Building will be remodeled and repurposed as a storage facility.

With both projects winding down, Hill has begun plans to use contingency funds, an option identified in the DOE-approved Project Execution Plan. One of the possible projects is the renovation of the Lyman Spitzer Building Annex basement. The renovation would allow for more flexible and efficient use of the existing conference space in the basement. Hill said he hopes to have a conceptual design for the space ready for review in late December.

Work on the entire IOI project is slated to be finished by early next summer, well before the scheduled completion of December 2019, if all goes well, Hill said. 📍



Insulation ducts line the floor of the C Site-MG Building. (Photo by Elle Starkman)

PPPL'ers don frightful attire for Halloween

Some PPPL'ers haunted the hallways on Halloween with their scary and imaginative costumes. 🎃



Little Red Riding Hood (aka Gretchen Zimmer) doesn't seem concerned about wolves outside the LSB. (Photo by Jane Feng)



Kevin Lamb, left, and Al von Halle show off their devilishly good costumes. (Photo by Elle Starkman)



Daenerys Targaryen, the mother of dragons from "Game of Thrones," (aka Drina Duryea), brought her progeny to work with her. (Photo by Elle Starkman)



A scary treat in Human Resources, courtesy of Michael Gonzalez and his family. (Photo by Elle Starkman)



Marianne Tyrrell shows off her dark side. (Photo by Elle Starkman)



Michael Gonzalez is ready for some trick-or-treating. (Photo by Elle Starkman)



Angela Roberson, the PPPL Café cashier, shows off her Halloween duds. (Photo by Elle Starkman)



Jose Rodriguez patrolled the hallways in his policeman's outfit. (Photo by Chris Cane)

Students flock to plasma demos at PPPL's booth at APS-DPP Plasma Science Expo

PPPL and other national laboratories and institutions hosted around 1,000 Milwaukee students attending the APS Division of Plasma Physics Education and Outreach Plasma Science Expo Oct. 26 and 27. Science Education senior program leader Arturo Dominguez and program manager Deedee Ortiz organized the event. Volunteers were: Ahmed Diallo, Andrew Alt, Oak Nelson, Matt Parsons, Luxherta Buzi, Laura Zhang, Seth Davidovitz, Evan Yerger, Charles Swanson, Jessica Guttenfelder, Brian Kraus, Jack Matteucci, Devon Battaglia, Jacob Schwartz, Erik Gilson, Hanna Schamis, Jeff Lestz, Charles Skinner, Dick Majeski, Denis St-Onge, Valentin Skoutnev, and Paul Hughes. 📷

Photos by Arturo Dominguez.



Valentin Skoutnev shows students an electromagnet demo.



Oak Nelson lights up a fluorescent bulb with a Tesla coil.



PPPL volunteers, left to right, Andy Alt, Seth Davidovitz, Laura Zhang, and Evan Yerger.



Arturo Dominguez, far right, poses with students from Bay View High School in Milwaukee in an Oct. 23 news report on WTMJ-TV in Milwaukee. The segment described an outreach program by PPPL and MIT scientists attending the APS Division of Plasma Physics meeting. (Screenshot courtesy of WTMJ-TV)



PPPL's booth with volunteers, left to right, Denis St-Onge, Brian Kraus, Paul Hughes, Erik Gilson, and Jacob Schwartz.



Graduate student Brian Kraus greets students in the news report. (Screenshot courtesy of WTMJ-TV)



A group of students tries out the Van de Graaff generator.

Scientists from China and Japan meet at PPPL to discuss plan for stellarator



Scientists from Japan and from Southwest Jiaotong University in Chengdu, China, met with Hutch Neilson, head of advanced projects, and other PPPL scientists at PPPL on Oct. 30 and 31, to discuss a project to build a quasi-axisymmetric stellarator at the university. From left to right: Tom Brown, PPPL; Yi Wan, Hefei Keye Electrical Physical Equipment Manufacturing Co., China; Dapeng Yin, Hefei Keye Electrical Physical Equipment Manufacturing Co., China; David Gates, PPPL; Yuhong Xu, Southwest Jiaotong University; Shoichi Okamura, National Institute for Fusion Science, Japan; Hutch Neilson and Pamela Serai, PPPL. *(Photo by Elle Starkman)*

Whiting Turner Safety Event

Timothy Regan, the CEO of Whiting Turner, the contractor for the IOI Project, left, speaks to Terry Brog, PPPL's deputy director for operations, middle, and Les Hill, head of the IOI Project, right. Regan came to PPPL for an organization-wide Whiting Turner safety event. *(Photo by Jeanne Jackson DeVoe)*



Travel Office Lunch and Learn on new Travel Manual

Kristen Fischer, PPPL's chief financial officer, and PPPL's Travel Office will hold a Lunch and Learn about PPPL's newly-revised Travel Manual on Monday, Nov. 6, at noon in the MBG Auditorium.

Council Café Lunch

This Week:

Marc Cohen, Interim Head
of Information Technology



Wednesday, Nov. 8
12 p.m., PPPL Café

Next Week: Andrew Zwicker

Celebrate PPPL's Inventor Hall of Fame

Come celebrate PPPL's Inventor Hall of Fame, Monday, Nov. 20, at 12:30 p.m. in the LSB Lobby.

Cake and coffee will be served.

Register your future scientist for the Young Women's Conference

Registration is now open for you to register your seventh to tenth-grade future scientist for the 2018 Young Women's Conference in Science, Technology, Engineering, and Mathematics, March 22, 2018, at Princeton University.

The all-day conference for seventh through tenth graders will include lectures, hands-on activities and science demonstrations. Registration is open to the daughters and relatives of PPPL staff and to school groups on a first-come-first-served basis. While registration is closed to the public, it is open for up to 50 PPPL employee relatives.

[More information is available here.](#)

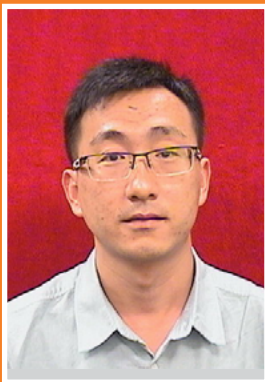
[Click here for a registration form.](#)

Farewell to retiree Richard Yager after 55 years

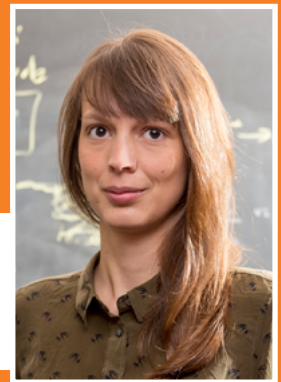
PPPL bids a fond farewell to Richard Yager, an experimental technician in Engineering who was at PPPL for 55 years.



PPPL Welcomes New Employees!



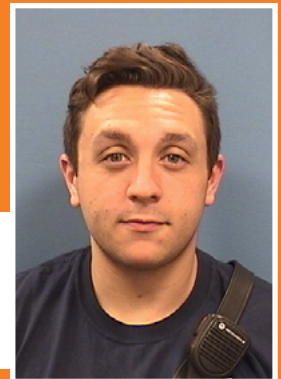
QIMING HU
Associate research physicist
ITER and Tokamaks



ISABEL KREBS
Associate research physicist
Theory



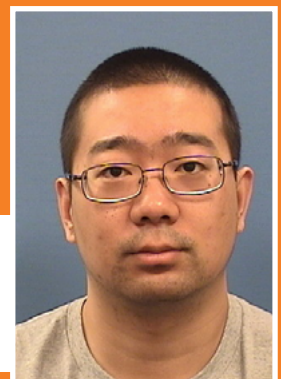
ROBERT MELISH
CAD Group Leader
Engineering



SCOTT RITTER
Emergency services officer
Office of the Director



BENJAMIN STURDEVANT
Associate research physicist
Theory



YAO ZHOU
Associate research physicist
Office of the Director

PPPL celebrates America Recycles Day

Mark your calendar for America Recycles Day events the week of Nov. 13 and on America Recycles Day Nov. 15.

Events include:

- A recycling art contest
- Unicorn electronics collection
- Clothing drive
- Get caught green-handed

Recycling Art contest

Enter the 2017 Recycling Art contest! Winners will receive a prize and entries will be on display in the LSB lobby Nov. 13-15. Contact Margaret Kevin-King, ext. 3652, or Leanna Sullivan, ext. 2599, for more information.

Clothing Drive

Please donate your gently used clothing to the Trenton Rescue Mission through Nov. 21. Bins are located in the LSB lobby and lower parking lot entrance.

Unicorn electronics recycling collection

On Nov. 15, please bring your home electronics for recycling to the Warehouse by the roll-up door across from the firehouse 7:30-10 a.m.

COLLOQUIUM

Ras Labs-CASIS-ISS NL Synthetic Muscle™ Experiment Returned to Earth: Resistance to Radiation

Lenore Rasmussen
Ras Labs, Inc.

Wednesday, Nov. 8
4:15 p.m., M.B.G. Auditorium, Lyman Spitzer Building

BROCK

NICK PETTI
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 Nov. 6	Tuesday Nov. 7	Wednesday Nov. 8	Thursday Nov. 9	Friday Nov. 10
COMMAND PERFORMANCE Chef's Feature	Beef Stew over Egg Noodles	Baked Potato Bar	Fried Chicken and a Biscuit	"Super Salad"	Tortellini Primavera with Garlic Bread
Early Riser	Bacon, Egg & Cheese Croissant	Sausage, Egg and Cheese Biscuit	Chocolate Chip Pancakes served with Choice of Breakfast Meat	Ham, Egg and Cheese Sandwich	2 Eggs, 1 Pancake, Choice of Breakfast Meat & Potatoes
Country Kettle	Vegetable Noodle	Beef Barley	Cream of Mushroom	Tuscan Chicken and Pasta	Seafood Chowder
Deli Special	California Wrap	Hummus Turkey Wrap	Buffalo Chicken Salad Wrap	Grilled Ham and Cheese on Texas Toast	Chicken, Mozzarella, Red Onion, Basil, Arugula and Balsamic Tomatoes on French Bread
Grill Special	Patty Melt	Shrimp Tacos	Pork Torta on Ciabatta	Portobello Mushroom Cheese "Steak"	Monte Cristo
Panini	Tomato, Fresh Mozzarella, Spinach and Pesto Hoagie	Grilled Eggplant, Spinach and Tomato Parmesan with Caesar Salad	Clam Strip Po' Boy	Sausage and Peppers	Cuban Sandwich

MENU SUBJECT TO CHANGE WITHOUT NOTICE

HEART HEALTHY

VEGETARIAN OPTION

WEEKLY

Editor: **Jeanne Jackson DeVoe** ♦ Layout and graphic design: **Kyle Palmer** ♦ Photography: **Elle Starkman** ♦ Science Editor: **John Greenwald** ♦ Science Writer: **Raphael Rosen** ♦ Webmaster: **Chris Cane** ♦ Communications Director: **Larry Bernard**

The PPPL WEEKLY is published by the [PPPL Office of Communications](#) on Mondays throughout most of the year and biweekly during the summer, 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 ♦ PPPL WEEKLY is archived on the web at: <http://w3.pppl.gov/communications/weekly/>.