

## THIS WEEK

WEDNESDAY, DEC. 21

**PPPL Colloquium**  
4:15 p.m. ♦ MBG Auditorium  
[Solving magnetic reconnection,  
one plasmoid at a time](#)  
Nuno Laureiro, MIT

THURSDAY, DEC. 22

**PPPL's Annual Holiday Luncheon**  
12 p.m. ♦ LSB Lobby  
[See page 9.](#)

DEC. 23-26

**Laboratory closed**  
Happy holidays!

## UPCOMING

DEC. 27-29

**Laboratory open**

DEC. 30-JAN. 2

**Laboratory closed**

FRIDAY, JAN. 6

**Public Tour**  
10 a.m.

JAN. 13-15

**Conference for Undergraduate  
Women in Physics (CUWiP)**  
Princeton University

FRIDAY, JAN. 13

**CUWiP tour of PPPL**

SATURDAY, JAN. 14

**Science on Saturday**  
9:30 a.m. ♦ MBG Auditorium  
**Plasma Control for Energy**  
Egemen Kolemen, PPPL & Princeton  
University

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# DOE “report card” points to several areas requiring improvement at PPPL

By Jeanne Jackson DeVoe

The U.S. Department of Energy (DOE) gave PPPL lower grades in FY 16 than in FY 15 in six of eight areas in its year-end evaluation of the Laboratory due to the failure of a coil and other problems with the National Spherical Torus Experiment-Upgrade (NSTX-U). The agency said the issues with the device “revealed serious flaws and deficiencies in the laboratory’s design and construction practices.”

PPPL received an overall score of 2.6, down from 3.1 last year — the lowest grade of the Office of Science’s 10 national laboratories for the second consecutive year in the Performance Evaluation and Measurement Plan (PEMP) scores.

“I’m getting tired of talking about past performance,” Brog told about 30 staff members at a Dec. 15 brown bag session to discuss the scores. “Be prepared: these are not very good grades. But I want you to keep in mind that, yes, there were some positives and there are some positives going forward.”

### Some successes

The DOE report acknowledges that PPPL had some successes, including overseeing the early delivery of key components to ITER, the international fusion experiment in France. But those accomplishments were overshadowed by the shut down of the NSTX-U in July, following the failure of a magnetic coil called a “poloidal field coil,” and other problems.

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# Magnetic reconnection sheds lights on explosive phenomena

Understanding challenging process that occurs throughout universe

By John Greenwald

Scientists are closer than ever to unraveling a process called magnetic reconnection that triggers explosive phenomena throughout the universe. Solar flares, northern lights and geomagnetic storms that can disrupt cell phone service and black out power grids are all set off by magnetic field lines that converge, break apart and violently reconnect in ways that are not fully understood.

Now physicists Masaaki Yamada, of PPPL and Ellen Zweibel of the University of Wisconsin-Madison have provided a major perspective on four key problems in magnetic reconnection in a paper published Dec. 7 in the [British journal Proceedings of the Royal Society A](#). Their research focuses on how the field lines embedded in plasma, the hot, charged gas composed of electrons and atomic nuclei — or ions — that makes up 99 percent of the visible universe, behave as they do. The findings are relevant to both astrophysics and magnetically controlled fusion experiments, which reconnection can shut down.



Masaaki Yamada

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# PEMP overview

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Brog, along with Stacia Zelick, PPPL's interim deputy director for operations, and Michael Zarnstorff, PPPL's deputy director for research, also met with managers on Dec. 15 to discuss the PEMP scores. Managers will hold individual meetings with their departments this week to go over details of the DOE report and to come up with improvement plans and goals.

Brog said Laboratory staff must work hard to improve the Lab's performance, and to attempt to avoid the DOE re-competing the contract to manage PPPL, which is currently managed by Princeton University. "We have a very short period of time to improve performance in very specific areas," Brog said.

## Project management issues

The report points to project management problems in several areas, Brog said. The coil failure pointed out "failures of process and procedure" in the design and fabrication of components of the device, he said. A new NSTX-U Recovery Project team has been appointed to identify any weaknesses in NSTX-U systems. It has begun a design verification and validation review (DVVR) of all the NSTX-U components. The DVVR will help them prepare for an "extent of condition" review and corrective action plan that will be externally reviewed.


The leadership team plans to hire two senior project managers who will be part of the project management office, Zelick said. Valeria Riccardo, the new head of Engineering, is due to start work at PPPL soon. A new facilities manager is also being hired.

## Communications improvements and transparency

The PEMP evaluation also found PPPL needs to make major improvements in its communications with the DOE. Although communications and transparency have improved recently, the evaluation found that laboratory managers were not always completely forthcoming with the DOE when there was a problem. Brog said he is determined to forge a better relationship with the DOE through regular meetings with top leaders at the Office of Science in Washington D.C.



Terry Brog, PPPL's interim director, speaks to staff about the PEMP scores during a Dec. 15 presentation in the MBG Auditorium. (Photo by Elle Starkman)

Zelick said PPPL staff members also need to work on improving communications and transparency between individuals, departments, and with PPPL leadership. "If you have a deadline you're not meeting, you have to talk to one another and go back and say you're not meeting the deadline, and ask for their help," she said. "If you say you're going to do something, you have to do it or you have to let us know. If you have ideas or concerns, please bring those to us too." 

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## The PPPL report card summary

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### 1. Mission Accomplishment: B

The science mission grade went from a B+ in FY 2015 to a B. The drop in grade reflects the premature shut down of the NSTX-U, said Michael Zarnstorff, deputy director for research. "It's not all of our research, but it's the largest piece and it has a central place," he said. "This ends up having a dominating role in our evaluation."

The DOE found PPPL's research program has many strengths. PPPL scientists "played a critical leadership role in research efforts" in the U.S. and internationally, the DOE said. The DOE also noted that the Lab received funding for a new fusion-plasma simulation project as part of the development of the next generation 'exascale' super computers, and for new research on the EAST tokamak in China.

### 2. Scientific Facilities: C

The Scientific Facilities grade was reduced from a C+ in FY 15 to a C in 2016. The lab is expected to conduct "efficient and effective operation of all research facilities." "The failure of several NSTX-U critical components revealed serious flaws and deficiencies in the Laboratory's design and construction practices," the DOE said.

### 3. Program Management: C+

PPPL's program management grade was reduced from a B+ in FY 15 to a C+. The evaluation found the Laboratory was "slow

to address engineering challenges revealed in FY 15." While the DOE found that overall communications with the Office of Science were very good, they identified specific areas that need improvement, Zarnstorff said. Individual departments will address those areas, he said.

### 4. Contractor Leadership & Stewardship: C-

PPPL's contractor leadership and stewardship grade was reduced from a B+ in FY 15 to a C-, the lowest grade of all the categories. Terry Brog, PPPL's interim director, noted that two sub-categories, leadership and stewardship, and management and operation, both received a D. The agency rarely gives such a low grade, he said. "It reflects their opinion of how well we've led the Laboratory and how we've managed the Laboratory over the past year," Brog said.

On the bright side, Brog said the DOE is very supportive of PPPL's leadership reorganization announced early in December. It also said PPPL is heading in the right direction in developing a stronger relationship with Princeton University.

### 5. Environment, Safety & Health (ES&H): B+

The ES&H grade went up from a B since FY 15. The DOE generally praised PPPL's ES&H program stating that, "The Laboratory provides an effective level of attention to safety,

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## PEMP breakdown

continued from page 2

health and environmental protection,” and “staff are well trained, engaged and generally care about their mission.” The report stated that there is room for improvement, however, including the need for better fire protection engineering.

### 6. Business Systems: B

The business systems grade was reduced from a B+ in FY 2015. The DOE said it was “very disappointed in the Laboratory’s contractor assurance processes.” The report stated that, “Critical issues with lack of engineering configuration control and field modifications that make up the Contractor Assurance System manifested themselves this year with the NSTX-U coil failure.” The DOE said the processes “must be overhauled and focused on ensuring engineering rigor moving forward.”

The DOE noted that PPPL met the goal to start submitting pre-publication copies of papers to the Office of Science and Technical Information (OSTI) E-Link system, even though the Lab got off to a slow start.

The DOE acknowledged that the Lab’s Procurement group met its goal to improve operations. However, it said that Procurement’s performance for much of the year was “less than optimal.”

The evaluation noted that the upgrade to the business computing software system was put on hold until the DOE decides whether to rebid the PPPL contract. The DOE pointed out, however, that PPPL has been working on the project since 2009.

### 7. Facilities and Infrastructure: B-

The facilities and infrastructure grade was reduced from a B in FY 2015. The DOE said there were “significant program management issues and shortcomings” in facilities projects. More specifically, it found that there were problems with the cost estimates and management of the GPP capital project that were not recognized by PPPL until the DOE pointed them out. However, the DOE has been positive about progress of the Infrastructure and Operational Improvements (IOI) project, which began this fall.

### 8. Security and emergency management: A-

The security and emergency management grade was raised from a B+ in FY 2015. The DOE stated that the Laboratory “notably exceeds expectations” in emergency management. It cited the active shooter exercise on Sept. 30 as evidence of the Laboratory’s “strong commitment” to emergency management. It also noted that the Laboratory has a strong cyber security program. PPPL was one of the first to implement a new DOE cyber security program on multi-factor authentication for privileged users, and helped other national laboratories to implement the program. [D](#)

## Environment, Safety & Health heads from Princeton University and other institutions tour PPPL

A group of heads of university environment, safety and health (ES&H) departments toured PPPL on Dec. 9 with guides Robert Sheneman, deputy director of PPPL’s ES&H Department and physicist Walter Guttenfelder. The group included representatives from Clemson University in South

Carolina, Carnegie Mellon University in Pittsburgh, Stanford University and the University of California in California, Washington University in Saint Louis, Saint Louis University, and Princeton University. [D](#)



Physicist Walter Guttenfelder shows ES&H heads from Princeton University and other institutions the National Spherical Torus Experiment-Upgrade test cell. (Photo by Rob Sheneman)

# Magnetic reconnection

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The extensive 30-page paper, which Proceedings of the Royal Society invited, advances understanding of four deep and long-standing puzzles:

- The rate problem. Why does reconnection take place much faster than theory indicates?
- The trigger problem. What determines the amount of energy that can be stored in a magnetic field and triggers its release?
- The energetics problem. How does reconnection convert magnetic energy into explosive kinetic energy?
- The interplay of scales problem. How does reconnection that occurs on a microscale trigger blasts that occur on a global scale?

Yamada and Zweibel, winners of the James Clerk Maxwell Prize in Plasma Physics in 2015 and 2016, respectively, take a comprehensive approach to these issues. The prize, awarded by the American Physical Society Division of Plasma Physics, honors their contributions to the dynamics of reconnection and to plasma astrophysics. Their paper combines data gleaned from satellite sightings and the Magnetic Reconnection Experiment (MRX) at PPPL, together with theory and computer simulation, to provide a detailed view of these puzzling processes.


On the rate problem, the authors note that two paths to fast reconnection have been identified. In the first, fast reconnection takes place when magnetized electrons and demagnetized ions behave differently, causing a phenomenon called a Hall effect in the reconnection layer. In the second, a process called plasmoid instability breaks up thin current layers into magnetic islands that produce rapid reconnection ([see related article here](#)) "Characterizing the plasmoid instability in a large laboratory plasma is a goal for future research," the authors write.

There is also much work to do on the trigger problem, Zweibel and Yamada noted. Formation of a thin current sheet has long been held to be a prerequisite for fast reconnection, they write. However, distribution of the energy that erupts in solar flares "is a key observation which trigger theories must explain," they state, and identifying the power law behind the distribution "remains a distant but important goal." In power laws, one form of energy varies as a power of another.

With regard to the energetics problem, important progress has been made recently, the authors say. Experiments conducted on the MRX at PPPL show that reconnection converts about 50 percent of the magnetic energy, with one-third of the conversion accelerating the electrons and two-thirds accelerating the ions in the plasma. "These results raise the question of whether there is a universal principle for partitioning of converted energy, an important problem for future research," they write.

An explanation of the scale problem, in which tiny microprocesses produce large global effects, "remains extremely challenging," the authors state. Nonetheless, much "important progress" has been made. While the triggers for reconnection are mostly global, the sources of energy conversion can be either global or small in scale. Therefore, "the presence of a continuum of scales coupled from microscopic to macroscopic may be the most likely path to fast reconnection."

Going forward, the authors write that, "prospects for future progress depend on continued successful innovations in methodology. The combination of laboratory experiments, space plasma measurements and numerical simulations is proving to be especially successful." Such developments will lead future research to focus "on the specialized features of natural plasmas throughout the universe."

The research was supported by the Vilas Trust and the University of Wisconsin-Madison for Zweibel's work and the DOE Office of Science for Yamada's. 

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## Princeton University Office of Information Technology staff tours Laboratory

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Tour guide Brian Kraus shows several staff members of the Princeton University Office of Information Technology database team the plasma demonstration in the LSB lobby during a Dec. 15 tour. (Photo by Raphael Rosen).

# Resolution at Princeton faculty meeting honors Ron Davidson, former PPPL director, physicist, author and professor

Princeton University faculty unanimously approved a memorial resolution honoring former PPPL director and Princeton University professor Ronald Davidson at their Dec. 5 meeting. Nat Fisch, the director of the Program in Plasma Physics at PPPL and a Princeton University professor, read the resolution into the record. It touches on Davidson's many contributions as a pioneering physicist, author and professor. Davidson died on May 19 at age 74.

The resolution was prepared by a special committee consisting of Fisch; Robert Goldston, a Princeton University professor and a former director of the Laboratory who was recently named special advisor to the PPPL director; and Stewart Prager, a Princeton University professor and former director of PPPL. It will be sent to Davidson's family and the Princeton University archivist.



**Ronald Crosby Davidson**  
1941–2016

This Memorial Resolution prepared by a special committee was approved by unanimous rising vote at the meeting of the Princeton University Faculty on 05 December 2016 and ordered spread upon the records of the Faculty.

**RONALD CROSBY DAVIDSON**, professor of astrophysical sciences, died on May 19, 2016 in Cranbury, NJ, at the age of 74 years, due to complications from pneumonia. In his illustrious career in the field of plasma physics, Ron was known as a superb researcher, as a prolific author of fundamental textbooks that anchored the field, and as an extraordinary scientific administrator. Ron was further known for somehow pursuing all these capacities simultaneously, rather than sequentially, with inconceivable ease.

Ron was born July 3, 1941 in Norwich, Ontario. He grew up on a family dairy farm, driving a tractor by age 11, clearing tree stumps with dynamite, and pitching in wherever needed. Had he not been the younger brother, Ron would have inherited and would have been expected to run the family farm. Instead, after his schooling in a 1-room elementary school, Ron developed a passion for physics and mathematics.

But Ron learned at an early age how the annual cycle of farm activities was comprised of seasonal tasks none of which could tolerate postponement. Many years later, as Director of the Princeton Plasma Physics Laboratory (PPPL), Ron would be struck by similarities in meeting the seasonal responsibilities for the annual budget cycle of a large national laboratory. And his colleagues would be struck by Ron's early-riser habits, incredible energy, and his penchant for getting things done as early as weather would permit.

After meeting his future wife-to-be, Jean, in high school, and after earning a B.Sc. degree in physics from McMaster University in 1963, Ron received his Ph.D. degree in astrophysical sciences from Princeton University, in just three years, in 1966. After a postdoctoral fellowship at the University of California, Berkeley, he became a professor at the University of Maryland. In 1978 Ron was recruited to MIT, where he was the founding director of the MIT Plasma Fusion Center. Ron returned to Princeton in 1991 as Professor of Astrophysical Sciences and as Director of PPPL.

As Director of PPPL, Ron oversaw the spectacular achievements of the Tokamak Fusion Test Reactor (TFTR) during its D-T (deuterium-tritium) campaign. In December 1993, for the first time in the history of magnetically confined, fusion energy research devices, a reactor fuel mix of 50% deuterium and 50% tritium was used. Introducing this fuel mix into TFTR released about 6 million watts of fusion power. In November 1994, capturing the further attention of the

lay press, TFTR achieved 10.7 million watts of fusion power for one second, which, if converted to electricity, would be enough to power momentarily 2,000 to 3,000 homes.

Concomitant with his careers in scientific administration, Ron pursued an illustrious academic career. He made numerous fundamental theoretical contributions to several areas of pure and applied plasma physics, including nonneutral plasmas, nonlinear effects and anomalous transport, kinetic equilibrium and stability properties, intense charged particle beam propagation in high-energy accelerators, and coherent radiation generation by relativistic electrons. Ron authored more than five hundred journal articles. He also wrote eight books. His 1972 book, "Methods in Nonlinear Plasma Theory" served as a key early textbook in this area of plasma physics. He is also credited with shaping the field of non-neutral plasma through his advanced research textbooks, including "Theory of Nonneutral Plasmas" (1974), "Physics of Nonneutral Plasmas" (1990), and, with Hong Qin, "Physics of Intense Charged Particle Beams in High-Energy Accelerators" (2001).

Ron was also known for his long-term editorship of "Physics of Plasmas," the preeminent journal for fundamental plasma research. Ron served (1976-1978) as the Assistant Director for Applied Plasma Physics, in the Office of Fusion Energy at DOE. Ron was the first Chairman of the DOE Magnetic Fusion Advisory Committee from 1982 to 1986. Embracing civic responsibility within the field, Ron chaired numerous committees for the national academies, and two divisions of the American Physical Society, the Division of Plasma Physics and the Division of Physics of Beams.

For his pioneering contributions to the physics of one-component non-neutral plasmas, intense charge particle beams, and collective nonlinear interaction processes in high-temperature plasmas, Ron was awarded the 2008 James Clerk Maxwell Prize, the American Physical Society's highest award in the field of plasma physics. Ron also received in 1986 the DOE Distinguished Associate Award and the Fusion Power Associates Leadership Award, in 1993 the Kaul Foundation Award for Excellence, in 2005 the IEEE Particle Accelerator Science and Technology Award, and in 2009 the DOE Office of Science Outstanding Mentor Award.

In 2007, a scientific symposium was held in honor of Ron's forty years of plasma research and graduate education. The "Davidson Fest" was a celebration of great warmth and immense appreciation for a wonderful mentor and colleague. The large attendance included numerous graduate students and postdocs trained by Ron, many of whom, now accomplished in their own right, traveled large distances to attend.

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## Ron Davidson Memorial Resolution

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It was also an occasion where colleagues learned about Ron's passion for life away from his professional life. We learned how devoted he was to his family and how devoted his family was to him. We learned of his accomplishments on the piano and guitar. His son spoke eloquently about growing up in the loving and organized Davidson household. But recognizable from his professional life was a quip by his son that captured Ron's singular ability to get everything done on time while retaining a sense of humor. In preparing his own remarks, his son had asked Ron what was the most spontaneous thing that Ron had ever done. Ron replied he would add it to his "to do" list and get back to him promptly.

For his colleagues, Ron was a true inspiration; he embodied leadership, purpose, personal integrity, encouragement to others, and monumental personal accomplishment.

*Nathaniel Fisch*

*Robert Goldston*

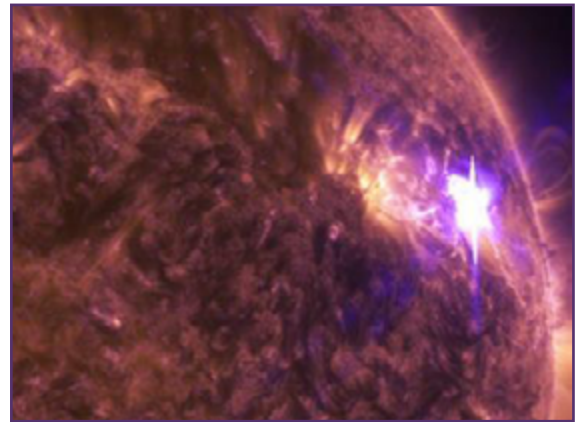
*Stewart Prager*

Mr. President, I move that a copy of this resolution be spread upon the records of the faculty; that a copy be sent to his widow, Mrs. Jean Davidson; to his daughter, Mrs. Cindy Premru; to his son, Mr. Ronald Davidson, Jr.; and to the Archivist of the University. 📄

# COLLOQUIUM

## Solving magnetic reconnection, one plasmoid at a time

**Nuno Loureiro**  
MIT



**Wednesday, Dec. 21**

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

## It's time to get your flu vaccine!

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.**

# Deck the halls with doors so jolly

‘T is the season to be jolly at PPPL as staff members transform drab hallways into winter wonderlands. You can vote on your favorite door at ballot boxes in the LSB lobby, Mod 1 and other locations. Voting begins today and concludes on Wednesday, Dec. 21. 🗳️

(Photos by Elle Starkman)



Jane Feng's door in Accounting in Mod. 1 (C33).



Some New Year's sparkle by Irene Newman and Wendy Worringer, of Business Operations, in Room B104 of the Lyman Spitzer Building.



A Hanukkah celebration by Dana Eckstein in Facilities.



A festive Christmas tree created by Jennifer Leggett in "Whoville," aka Human Resources.



Santa's workshop by Maria Huber in Accounting in Mod 1 (C33).



A Christmas tree made of recycled materials by Margaret Kevin-King in Facilities.

## Avoid construction zones as demolition for IOI project begins

Demolition will begin this week for the Infrastructure and Operational Improvements (IOI) project in both the LSB Annex and the C-Site Motor Generator Building.



Red danger tape warns unauthorized staff not to enter the C-Site MG Building.

The areas are construction zones and will be closed off with red hazard tape. No one will be permitted to enter without prior authorization. Contractor Whiting-Turner will post information about ongoing work and hazards at the entrances to the construction zone along with a list of authorized personnel.

To be authorized to enter the areas, personnel should contact Les Hill, the IOI project manager, [lhill@pppl.gov](mailto:lhill@pppl.gov), ext. 2674 or Frank Karam, IOI field safety construction manager, [fkaram@pppl.gov](mailto:fkaram@pppl.gov), ext. 3604.

Anyone entering the construction areas during normal business hours must also contact Melanie Cryer, the Whiting-Turner safety manager, at 225-276-5075 to be briefed about current work and hazards.

Hill, Karam, and Sam Rozycki, the deputy IOI project manager, are authorized to take visitors into the areas following the protocols.

Workers from Whiting-Turner plan to begin demolition on the third floor of the LSB Annex before proceeding to the second and the first floors. They will use heavy equipment in the C-Site MG building to remove concrete floors in the basement.

The demolition will probably take four to six weeks and conclude in late January. 

## Princeton's Corporate Engagement and Foundation Relations staff tours PPPL

PPPL hosted a group of visitors from Princeton University's Office of Corporate Engagement and Foundation Relations on Dec. 14. Led by Tour Guide John DeLooper, the group visited the NSTX-U Control Room, the NSTX-U test cell, the Science Education Laboratory, and QUASAR in the C-Site high bay.



Visitors get an up-close view of the QUASAR stellarator coils.



Tour guide John DeLooper shows visitors the NSTX-U test cell.



DeLooper gives an overview of the QUASAR coils.



# Get merry at PPPL's Holiday Luncheon

**Thursday, December 22**

**Noon in the LSB Lobby**

Come have some holiday fun  
with your fellow PPPL'ers!

- A performance by Arsene Dupin,  
renowned comedian and magician!
- **GIFT RAFFLE** —  
You must be present to win!

Interested in contributing a dessert?  
Contact [eventscommittee@pppl.gov](mailto:eventscommittee@pppl.gov)



## Application opens for presenters at 2017 Princeton Research Day

Applications are being accepted for presenters at the 2017 Princeton Research Day, the second annual campus-wide celebration of research and creative endeavors by the University's undergraduates, graduate students, postdoctoral researchers and other non-faculty researchers. The May 11, 2017 event offers an opportunity for student and early career researchers and artists to share their work with the community through talks, posters, performances, art exhibitions, demonstrations and digital presentations. Topics will represent the range of research across the University, including the natural sciences, social sciences, engineering, the arts and humanities. More information about the event and the application for presenters is available on the Princeton Research Day website. The application deadline is Feb. 20.

[The link to the Research Day website is available here.](#)  
[The link to the application is available here.](#)



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 December 19	Tuesday December 20	Wednesday December 21	Thursday December 22	Friday December 23
<b>COMMAND PERFORMANCE Chef's Feature</b>	<b>Beef Chili</b> with Cornbread and Assorted Toppings	<b>Baked Manicotti</b> with Garlic Bread	<b>Maple-Glazed Ham</b> served with Potatoes & Creamed Spinach	<b>Holiday Luncheon</b> <i>See page 9</i>	<b>Happy Holidays!</b>
Early Riser	<b>Bacon, Egg and Cheese Croissant</b>	<b>Italian Meat &amp; Cheese Omelet</b> topped with Wilted Spinach with Home Fries	<b>Potato, Roasted Pepper &amp; Sundried Tomato Casserole</b> with 2 Eggs any Style		
Country Kettle	<b>Manhattan Clam Chowder</b>	<b>Potato Corn Chowder</b>	<b>Chicken Noodle</b>		
Deli Special	<b>Turkey Bruschetta</b> on Ciabatta	<b>Asiago Roast Beef</b> with Grilled Onion, Tomato & Horseradish on Pumpernickel	<b>BBQ Pulled Chicken</b> on a Kaiser Roll		
Grill Special	<b>Grilled Ham and 3 Cheeses</b> on Challah Bread	<b>Fried Salami and Cheddar</b> on a Kaiser	<b>Cheese Calzone</b> with Marinara Sauce		
Panini	<b>Pastrami and Swiss Flatbread</b>	<b>Fried Fish Torpedo</b> with Cheddar, Tomato & Tartar Sauce	<b>Breaded Chicken Cutlet</b> with Ham, Swiss Cheese, Lettuce & Honey Mustard on Ciabatta		

## Cafeteria Holiday Schedule

The cafeteria will be open Dec. 27 to 29 and will serve a limited menu.

	Monday January 2	Tuesday January 3	Wednesday January 4	Thursday January 5	Friday January 6
<b>COMMAND PERFORMANCE Chef's Feature</b>	<b>Happy New Year!</b>	<b>Bruschetta Chicken</b> with Orzo Pilaf	<b>Vegetarian Stuffed Pepper</b> with Elbow Pomodoro	<b>Baked Meatloaf</b> with Mashed Potatoes and Gravy	<b>Kielbasa</b> with Sauerkraut and Pierogies
Early Riser		<b>Banana-Walnut French Toast</b> with Caramel Sauce	<b>Mango &amp; Blueberry Pancakes</b> served with choice of Breakfast Meat	<b>Turkey Bacon, Egg and Cheese Sandwich</b>	<b>2 Eggs, 2 Pancakes,</b> Choice of Breakfast Meat & Potatoes
Country Kettle		<b>Cream of Mushroom</b>	<b>Beef Barley</b>	<b>Vegetable Noodle</b>	<b>Chicken Orzo</b>
Deli Special		<b>Caesar Turkey Focaccia</b>	<b>Ham and Smoked Gouda</b> with Pineapple Slaw	<b>Portobello Mushroom</b> & Fontina Cheese with Roasted Peppers on Ciabatta	<b>Chicken, Mozzarella,</b> Red Onion, Basil, Arugula and Balsamic Tomatoes on French Bread
Grill Special		<b>Teriyaki Chicken Cheese Steak</b> with Asian Slaw	<b>Fish Taco</b> with Cabbage, & Pico de Gallo served with Corn Relish & Chipotle Lime Sour Cream	<b>Turkey Flatbread</b> with Bacon, Cheddar, Diced Tomato, Red Onion and BBQ Chipotle Mayo	<b>Roast Vegetable Stromboli</b>
Panini		<b>Spicy Italian Grinder</b>	<b>Turkey Meatball Parmesan Torpedo</b>	<b>Grilled Ham and Cheese</b> on Texas Toast	<b>Foot-long Chili Dog</b>

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

This issue of the Weekly will be the last issue of the year.  
 The next issue will be on Jan. 9.