

## Calendar of Events

### THIS WEEK

WEDNESDAY, OCT. 26

**Shredding Event**

Warehouse Receiving Area #3  
[See page 9 for details.](#)

THURSDAY, OCT. 27

**Open Enrollment 2017  
Benefits Fair**

10 a.m.-2 p.m.  
[See page 8.](#)

**Princeton University  
Duo Security rollover**

[See page 6.](#)

### UPCOMING

WEDNESDAY, NOV. 2

**Shredding Event**

Warehouse Receiving Area #3  
[See page 9 for details.](#)

NOV. 3-4

**Plasma Hutch 50% Off  
Liquidation Sale**

10:30 a.m.-1 p.m.  
[See page 7.](#)

WEDNESDAY, NOV. 9

**PPPL Colloquium**

4:15 p.m. ♦ MBG Auditorium  
[History and Derivation of the  
Schrödinger Equation](#)  
Wolfgang P. Schleich, University of Ulm/  
Texas A&M University

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## PPPL physicists win funding to lead a DOE exascale computing project

By Raphael Rosen

A proposal from PPPL scientists has been chosen as part of a national initiative to develop the next generation of supercomputers. Known as the Exascale Computing Project (ECP), the initiative will include a focus on exascale-related software, applications, and workforce training.

Once developed, exascale computers will perform a billion billion operations per second, a rate 50 to 100 times faster than the most powerful U.S. computers now in use. The fastest computers today operate at the petascale and can perform a million billion operations per second. Exascale machines in the United States are expected to be ready in 2023.

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## PPPL staff in LSB Annex to move in November after DOE approves CD3-A

By Jeanne Jackson DeVoe



Module 1, C33, will primarily house procurement and accounting staff.  
(Photo by Elle Starkman)

PPPL employees in the LSB Annex will begin moving to temporary offices early next month after U.S. Department of Energy (DOE) officials gave PPPL the green light to move forward with plans to renovate office space in the Lyman Spitzer Building (LSB) Annex and create new machine shops in the C-Site Motor Generator (MG) building.

The DOE approved Critical Decision (CD) 3-A on Wednesday, Oct. 19. This allows PPPL to proceed with construction on two major components of the Laboratory's \$25 million facility renovation project, the Infrastructure and Operational Improvements (IOI) Project.

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# IOI approved

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“It’s a major milestone for the project that basically signifies that we are ready to proceed with construction,” said Les Hill, IOI project manager. “It means we have our plans in place and our contract is ready to be awarded to our contractor. It means that preliminary work is now complete and we’re ready to build.”

Some 70 employees will move to two temporary office complexes during the first two weeks of November. Procurement and accounting staff will move to Module 1, which will be called, “C33” and has 40 office spaces. Engineers, along with some research staff and visitors, will move to Module 2 (C34), the building closer to the upper parking lot, which has 38 office spaces. The research staff from the second floor Annex will also move into offices in the LSB that weekend. (See moving day box).

The contract will be awarded to a highly qualified construction firm, Hill said. The company has extensive experience with large projects, including the renovation of government buildings, he said. The contractor is expected to begin construction on the two projects in December.



Module 2, C34, which is closer to the upper parking lot, will mostly house engineering staff. (Photo by Elle Starkman)

Before work begins, the contractor will have to submit detailed plans, Hill said. The contractor will set up several temporary office trailers, which will likely be located at the far end of the upper parking lot. Hill has been working with staff members who will be involved with training and badging for the 45 to 55 people working with the construction contractor. A total of about 200 workers will cycle through the site over the 14-month project. Hill said he is working closely with PPPL organizations and staff affected by the project to ensure it is completed with minimum disruptions to the Laboratory.

The IOI is the second phase of PPPL’s campus plan aimed at modernizing PPPL’s offices, meeting spaces, technical shops and laboratories, many of which were built in the 1960s and ‘70s. Completing the project successfully is crucial, Hill said. “The IOI is the first major step in the campus plan,” he said. “There’s a great deal riding on successful completion of the project. Our ability to obtain funding for future projects will be based on a proven track record and a compelling story.”

The IOI project is divided into two phases. The first phase is the Annex and the MG Building renovations. The second is the Research Storage and Assembly (RESA) Building renovation and the demolition of Mod 6.

With the Annex renovation, “I think we’re creating a much-improved work environment for a significant number of people,” Hill said. All three floors of the building will be gutted and replaced with modern office spaces and new conference

rooms as well as a new heating and air conditioning system. The renovation will likely be completed next summer. This will allow business operations staff to move back to the Annex along with staff currently located at Mod 6 sometime next fall.

The new tech shops at the MG Building will be in a centrally-located modern space that makes use of a huge building that had been virtually unused for many years, Hill said. “We’re going to transform that into a marquee fabrication and machine hall and create space for future facilities,” he said. Renovations on the building are slated to be completed next fall.

Meanwhile, the RESA Building will be renovated to create a modern warehouse, with work expected to begin next fall and to finish by the end of the year. Machine tools will be moved from RESA to the MG Building in phases starting next summer. Moving the machine tools is challenging because some of them are “the size of a locomotive,” Hill said. Some of the equipment will be disposed of as excess property through the DOE, he added.

The project will spruce up the PPPL campus and meet a contract requirement to reduce clutter and improve workspace utilization by ridding the site of 75 trailers starting as early as next spring. Equipment that is still needed will be moved to the warehouse at RESA. “We’ll come up with a rational approach to storing those materials and eliminate the clutter,” Hill said. The Mod 6 building, a temporary modular facility that dates back to 1993, will also be demolished next fall.

Hill emphasized that safety, security and quality will not be compromised. He said he is determined to keep to the schedule and come in below budget. At the same time, “you can’t cut any corners,” Hill said. “This starts with running a tight ship, making sure we have a plan and we execute from the plan.”

## Moving day schedule for LSB Annex staff

Staff members in the LSB Annex should be preparing to move to office modules in November, said John DeLooper, head of Best Practices. They should take the opportunity to reduce clutter and downsize items that need to be moved, he said. He noted that this is a 2017 contract notable item.

### Important upcoming dates:

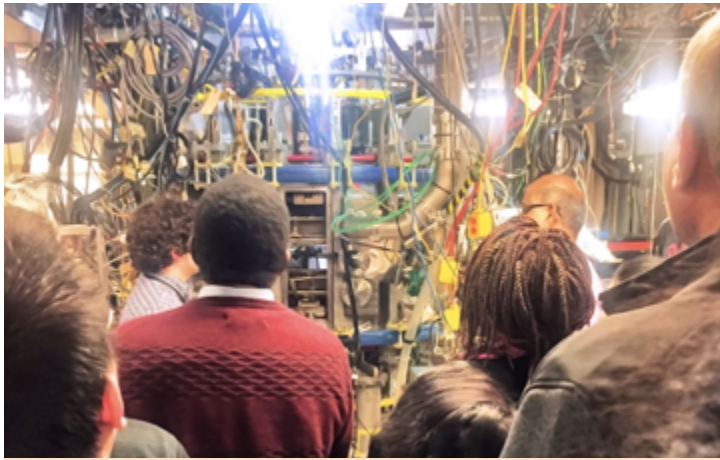
- Nov. 5 weekend: Procurement and accounting staff move to Module 1.
- Nov. 12 weekend: Engineering staff moves to Module 2, the module closest to the upper parking lot. The research staff from the second floor Annex will also move into offices within the LSB that weekend.
- Nov. 24: Deadline for all staff and their belongings to be moved out of the LSB Annex.
- Starting in early November: Contractors set up office and construction trailers in back of upper parking lot.
- December: Contractors begin work on LSB Annex and C-Site MG Building.

## More than 140 tour PPPL for Princeton University Freshman Family Weekend

PPPL hosted 60 Princeton University freshmen and their families on Friday, Oct. 14, and 80 on Saturday, Oct. 15, for Princeton University's Freshman Family Weekend. On Oct. 14, Jeanne Jackson DeVoe and Raphael Rosen hosted and tour guide Atiba Brereton showed the group plasma demos in the MBG Auditorium and Brereton, Stuart Hudson, Carmela Ciummo, and Stephen DePasquale gave the group a tour of the Laboratory that included the NSTX-U Control Room and the NSTX-U test cell, with Brereton's group visiting the Science Education Laboratory. On Saturday, Raphael Rosen hosted and the tour guides were Brereton, Brian Kraus and Jacob Schwartz, assisted by Sangeeta Punjabi-Vinoth and Cindy Lasky. The tour guides showed the group plasma demos in the MBG Auditorium. The groups then visited the NSTX-U Control Room, The Hall Thruster Experiment, and the Lithium Tokamak Experiments (LTX), where they were hosted by Dennis Boyle.



Physicist Stuart Hudson speaks to Princeton University Freshman Family Weekend visitors in the MBG Auditorium. (Photo by Elle Starkman)



Visitors at the Lithium Tokamak Experiment. (Photo by Raphael Rosen)



Visitors learn about the NSTX-U Control Room with tour guide Atiba Brereton. (Photo by Elle Starkman)



Atiba Brereton lights up a bulb with a Tesla coil during plasma demonstrations in the MBG Auditorium. (Photo by Elle Starkman)



Dennis Boyle in the LTX Control Room. (Photo by Raphael Rosen)



Brian Kraus shows visitors the Hall Thruster Experiment. (Photo by Raphael Rosen)



Atiba Brereton shows visitors the NSTX-U test cell. (Photo by Elle Starkman)

# Exascale computing

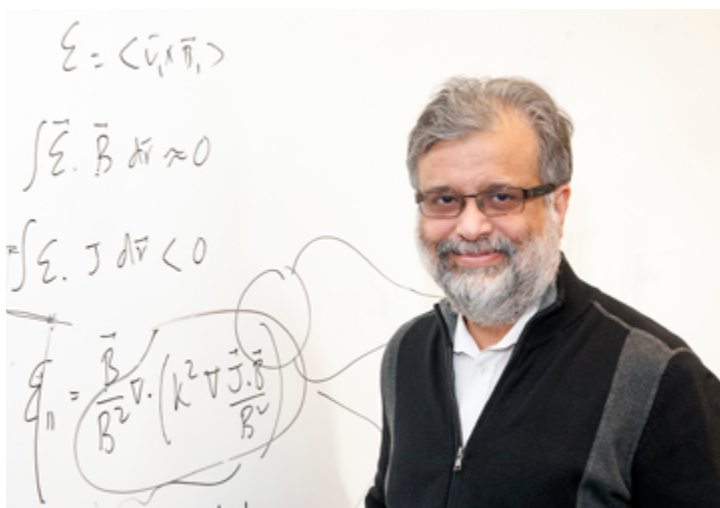
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The PPPL-led multi-institutional project, titled “High-Fidelity Whole Device Modeling of Magnetically Confined Fusion Plasma,” was selected during the ECP’s first round of application development funding, which distributed \$39.8 million. The overall project will receive \$2.5 million a year for four years to be distributed among all the partner institutions, including Argonne, Lawrence Livermore, and Oak Ridge national laboratories, together with Rutgers University, the University of California, Los Angeles, and the University of Colorado, Boulder. PPPL itself will receive \$800,000 per year; the project it leads was one of 15 selected for full funding, and the only one dedicated to fusion energy. Seven additional projects received seed funding.

The application efforts will help guide DOE’s development of a U.S. exascale ecosystem as part of President Obama’s National Strategic Computing Initiative (NSCI). DOE, the Department of Defense and the National Science Foundation have been designated as NSCI lead agencies, and ECP is the primary DOE contribution to the initiative.

The ECP’s multi-year mission is to maximize the benefits of high performance computing (HPC) for U.S. economic competitiveness, national security and scientific discovery. In addition to applications, the DOE project addresses hardware, software, platforms and workforce development needs critical to the effective development and deployment of future exascale systems. The ECP is supported jointly by DOE’s Office of Science and the National Nuclear Security Administration within DOE.

PPPL has been involved with high-performance computing for years. PPPL scientists created the XGC simulation code, which models the behavior of the plasma in the boundary region where the ions and electrons have much lower density than they have in the core plasma, are far from thermal equilibrium, and neutral particles can play an important role. The high-performance code is maintained and updated by PPPL scientist C.S. Chang and his team.



Amitava Bhattacharjee

XGC runs on Titan, the fastest computer in the United States, at the Oak Ridge Leadership Computing Facility, a DOE Office of Science User Facility at Oak Ridge National Laboratory. The calculations needed to model the behavior of the plasma edge are so complex that the code uses 90 percent of the computer’s processing capabilities. Titan performs at the petascale, completing a million billion calculations each second, and the DOE was primarily interested in proposals by institutions that possess petascale-ready codes that can be upgraded for exascale computers.

The PPPL proposal lays out a four-year plan to combine XGC with GENE, a computer code that simulates the behavior of the plasma core. GENE is maintained by Frank Jenko, a professor at the University of California, Los Angeles. Combining the codes would give physicists a far better sense of how the core plasma interacts with the edge plasma at a fundamental kinetic level, giving a comprehensive view of the entire plasma volume.



C.S. Chang

Leading the overall PPPL proposal is Amitava Bhattacharjee, head of the Theory Department at PPPL. Co-principal investigators are PPPL’s Chang and Andrew Siegel, a computational scientist at the University of Chicago.

The multi-institutional effort will develop a full-scale computer simulation of fusion plasma. Unlike current simulations, which model only part of the hot, charged gas, the proposed simulations will display the physics of an entire plasma all at once. The completed model will integrate the XGC and GENE codes and will be designed to run on exascale computers.

The modeling will enable physicists to understand plasmas more fully, allowing them to predict its behavior within doughnut-shaped fusion facilities known as tokamaks. The exascale computing fusion proposal focuses primarily on ITER, the international tokamak being built in France to demonstrate the feasibility of fusion power. But the proposal will be developed with other applications in mind, including stellarators, another variety of fusion facility. Better predictions can lead to better engineered facilities and more efficient fusion reactors. Currently, support for this work comes from the DOE’s Advanced Science Computing Research program.

“This will be a team effort involving multiple institutions,” said Bhattacharjee. He noted that PPPL will be involved in every aspect of the project, including working with applied mathematicians and computer scientists on the team to develop the simulation framework that will couple GENE with XGC on exascale computers.

“You need a very-large-scale computer to calculate the multiscale interactions in fusion plasmas,” said Chang. “Whole-device modeling is about simulating the whole thing: all the systems together.”

Because plasma behavior is immensely complicated, developing an exascale computer is crucial for future research. “Taking into account all the physics in a fusion plasma requires enormous computational resources,” said Bhattacharjee. “With the computer codes we have now, we are already pushing on the edge of the petascale. The exascale is very much needed in order for us to have greater realism and truly predictive capability.”

## Fire safety demonstrations for Fire Prevention Week

The Site Protection Division marked Fire Prevention Week with fire safety demonstrations outside the Lyman Spitzer

Building on Friday, Oct. 14. The theme was, “Don’t wait CHECK the date! Replace smoke alarms every 10 years.”



Ambica Nandanavanam extinguishes a fire under the guidance of Capt. Kevin Rhoades. Looking on from left are: ESU Officer Sean Galie, Han Zhang, Neelima Yeragudipati, Ewa Kontor and Jane Feng. (Photo by Elle Starkman)



Mary Payne puts out a fire with the help of Capt. Kevin Rhoades. (Photo by Elle Starkman)

# Princeton University websites switch to Duo Security

Many Princeton University websites will switch to Duo Security starting Oct. 27. Duo Security is a new layer of security that requires users to enter two pieces of information: a password and a code. This new requirement will affect everyone who has a princeton.edu account.

Among those affected are:

- Employees who directly log on to Princeton.edu email
- Biweekly employees filling out timesheets
- Employees filling out work request forms

For more information and a complete list of sites that will require Duo Security go to [https://ppplprod.servicenow.com/kb\\_view.do?sysparm\\_article=KB0010455](https://ppplprod.servicenow.com/kb_view.do?sysparm_article=KB0010455).

## Greater Trenton ASME tours Laboratory



Ray Camp gives a dozen members of the Greater Trenton American Society of Mechanical Engineers (ASME) a tour of the NSTX-U test cell the evening of Oct. 19. They were greeted by Terry Brog, PPPL's interim director, and after viewing videos in the MBG Auditorium, visited the NSTX-U Control Room and test cell with Camp, Robert Ellis and Neway Atnafu as tour guides. (Photo by Robert Ellis).

## Dominguez gives TEDx talk on fusion in Colombia



Arturo Dominguez gave a TEDx talk on fusion energy on Oct. 6 for a TEDx conference on, "Exponential Change," held at the Colegio de Estudios de Administración (CESA) Business Administration School in Bogotá, Colombia. During the trip, Dominguez also gave talks to physics students at the National University of Colombia and the University of los Andes, both in Bogotá. (Photos courtesy of CESA Business Administration School and Arturo Dominguez)

## PPPL America Recycles Day Clothing Drive Challenge for The Trenton Rescue Mission

Please deposit clothing that is clean, gently used, and in usable condition the in collection box Nov. 2-20.

### Drop off locations:

1. LSB Lobby
2. Lab Building (by lower lot entrance)

## 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.

## Plasma Hutch Liquidation Sale

### ALL ITEMS 50% OFF!

Start your holiday shopping early at the hutch!

Give your loved ones the gift of PPPL or get yourself something nice!

When: 11/3 & 11/4 from 10:30 a.m.-1 p.m.

Where: LSB Lobby

# Open Enrollment 2017 Benefits Fair

PPPL will hold an Open Enrollment 2017 Benefits Fair on Oct. 27 from 10 a.m. to 2 p.m. with vendor displays in the LSB lobby and presentations in the MBG Auditorium.

## Scheduled presentations are:

- 10 a.m. to 11 a.m.: “Understanding your Social Security Benefits” by the Social Security Administration
- 11:30 a.m. to noon: “Introduction to the New Vision Care Plan” by MetLife
- 12:30 p.m. to 1:30 p.m.: “Introducing Health Advocate” by Health Advocate.

**Annual Benefits Open Enrollment begins Oct. 17 and ends Friday, Nov. 11. Nov. 11 is the last day to make any benefit changes.**

## Recycling Art Contest for America Recycles Day

Create your own art or fashion piece out of recycled products for PPPL’s Recycling Art Contest for PPPL’s America Recycles Day celebration! The deadline is Nov. 14. Entries will be placed on display from Nov. 14 to 18, with prizes awarded to submissions with the most votes on Nov. 18.



**Questions? Contact Margaret King, ext. 3652, Dana Eckstein, ext. 2588, or Leanna Meyer, ext. 2599.**



# Shred your old business documents!

PPPL will hold shredding events on Oct. 26, Nov. 2 & 9 at the warehouse receiving area in the lower parking lot for staff to shred old PPPL business-related records and documents.

Go to <https://goo.gl/Qm2O6o> to submit a work order for your shredding requirements. Record retention and destruction guidelines are available at <http://sportal.pppl.gov/bp/Lists/RecordsSchedule/Allitems.aspx>.

For more information, contact Dean Peterson, [dpeterso@pppl.gov](mailto:dpeterso@pppl.gov), ext. 3998.

**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 October 24	Tuesday October 25	Wednesday October 26	Thursday October 27	Friday October 28
<b>COMMAND PERFORMANCE Chef's Feature</b>	<b>Sushi Made to Order</b>	<b>Ravioli Puttanesca</b> with Olives, Capers, Red Onion, Garlic & Basil	<b>Vegetable Lo Mein</b> with Egg Roll	<b>Pork Chops</b> with Apple-Cranberry Sauce	<b>Pub-Style Fish &amp; Chips</b>
Early Riser	<b>Potato Skins</b> with Egg, Bacon & Swiss Cheese	<b>Steak, Egg &amp; Cheese Quesadilla</b>	<b>Ham &amp; Bacon Breakfast Strata</b>	<b>Ham Steak</b> with White Country Gravy, 2 Eggs & Biscuit	<b>2 Eggs</b> , Choice of Breakfast Meat & Tater Tots
Country Kettle	<b>Egg Drop</b>	<b>Spinach Tortellini Tomato</b>	<b>Italian Wedding Soup</b>	<b>Split Pea</b>	<b>Manhattan Clam Chowder</b>
Grille Special	<b>Corned Beef Reuben</b> on Rye	<b>Pork Roll, 2 Eggs &amp; Cheese</b> on a Kaiser with Tater Tots	<b>Chicken Cacciatore Sub</b>	<b>BBQ Chicken</b> , Cheddar Cheese, Onion Straws, Lettuce & Tomato on Kaiser Roll	<b>Crab, Asparagus &amp; Roasted Pepper Quesadilla</b>
Deli Special	<b>Buffalo Tofu Wrap</b>	<b>Italian Chopped Antipasto Wrap</b>	<b>Ham Salad</b> on Brioche Roll with Swiss Cheese	<b>Shrimp Salad</b> on Multigrain Bread	<b>Chicken Parmesan Sub</b>
Panini	<b>3-Cheese Panini</b> with Cheddar, Swiss & Blue Cheese with Bacon & Tomatoes on Sourdough	<b>Andouille Sausage Torpedo</b> with Peppers & Onion	<b>Teriyaki Chicken</b> with Grilled Pineapple, & Swiss Cheese on a Kaiser Roll	<b>Asparagus, Sundried Tomatoes, Roasted Peppers &amp; Mozzarella Cheese Wrap</b>	<b>Jerk Chicken, Peppers &amp; Onions Flatbread</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/>.