

THIS WEEK

MONDAY, MARCH 13

Feedback sessions on organizational diagnosis survey
 MBG Auditorium
9:30-11 a.m. — *Administrative, technical and engineer staff*
12:30-2:30 p.m. — *Research staff*
3-5 p.m. — *All supervisory staff*

WEDNESDAY, MARCH 15

American Red Cross Blood Drive
 8 a.m.-1 p.m.
[See page 6 for more details.](#)

PPPL Colloquium
 4:15 p.m. ♦ MBG Auditorium
[The New Wave of Pilot-Wave Theory](#)
 John W. M. Bush, MIT

FRIDAY, MARCH 17

Public Tour
 10 a.m.

SATURDAY, MARCH 18

Science on Saturday
 9:30 a.m. ♦ MBG Auditorium
[Mechanics, organ development, and disease](#)
 Celeste Nelson, Princeton University

UPCOMING

THURSDAY, MARCH 23

Young Women's Conference in STEM
 9 a.m.-2 p.m.
[See page 7 for information on how to volunteer.](#)

WEDNESDAY, MARCH 30

PPPL Colloquium
 4:15 p.m. ♦ MBG Auditorium
[The U.S. D.O.E. Exascale Computing Project - Goals and Challenges](#)
 Paul Messina, Argonne National Laboratory

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Experts outline recommendations for NSTX-U recovery

By Jeanne Jackson DeVoe

An external team of national and international experts reviewing PPPL's plans to address issues with PPPL's National Spherical Torus Experiment-Upgrade (NSTX-U) found that major issues on the machine are fixable and endorsed many of the remedies laid out by PPPL's NSTX-U Recovery Team.

Tom Todd, the head of the Extent of Condition (EOC) Committee and former chief of technology at the Culham Centre for Fusion in England, said that the numerous issues related to NSTX-U on a spreadsheet compiled by PPPL's Recovery Team include many long-standing issues that do not need to be immediately addressed. "The sheer size of that spreadsheet gives the impression that NSTX-U is burdened down with insurmountable problems, which is not what we think is the case, and not what your management thinks is the case," Todd said.



Marc Sibilia, a member of the Recovery Team, points out features on the NSTX-U to members of the EOC Committee. (Photo by Jeanne Jackson DeVoe)

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Perry Sworn in as 14th Secretary of U.S. Department of Energy

Former Texas Governor Rick Perry was sworn in on March 2, 2017, as the 14th Secretary of the United States Department of Energy.

"It is an honor and privilege to serve as the Secretary of the Department of Energy. As Secretary, I will advocate and promote American energy in all forms. America has been blessed with vast natural resources and the technology to utilize them. I am committed to helping provide stable, reliable, affordable, and secure sources of American energy. An American first energy strategy is important to create jobs and grow the economy.

"I am also committed to maintaining a safe, secure and effective nuclear deterrent while reducing the threat of nuclear proliferation. We will also continue the important mission of carrying out the environmental clean-up from the Cold War nuclear mission," said Secretary Perry.



Secretary Rick Perry

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C Site MG gets new concrete floor as work continues on IOI project

The C-Site Motor Generator Building has a new concrete floor in the basement and steel columns are being installed to support the concrete floor slab on the first floor as work continues on PPPL's Infrastructure Operational Improvements (IOI) project.

"We're transforming what was an unoccupied and unused building into what will become a valuable asset to the Laboratory," said Les Hill, head of the IOI project. "And, we're tracking well to our schedule."

Workers fed 240 tons of concrete from a truck in the parking lot through a long boom connected to rollers and a belt into the MG Site basement on March 2 and 3.

The floor extends through three-quarters of the building, excluding the southeast corner, which is still being excavated. A jackhammer and backhoe were still at work last week removing the concrete floor in that corner. That area of the building will also have a concrete floor but will have numerous steel-reinforced concrete pillars to bear the weight of the heavy equipment from machine shops above it, Hill said. The machine shops will be relocated from the RESA building, which will be transformed into a large material and equipment storage facility badly needed by the Laboratory, he said.

Work has also started on the roof of the MG building. A major component will be insulating and heating the building, which once housed huge motor generators for PPPL experiments and has never been used regularly as a workspace.



Les Hill, head of the IOI project, stands next to piles of sheetrock on the third floor of the LSB Annex. (Photo by Elle Starkman)



Steel pillars will be installed in the concrete floor of the C Site-Motor Generator Building. (Photo by Elle Starkman)



The southeast corner of the building is still being excavated. (Photo by Elle Starkman)

Meanwhile, workers are busy placing studs, the steel frames for office walls, in the LSB Annex. Sheetrock to be used for office walls is piled on the third floor. The building was designed to let in as much light as possible, Hill said. The front of the offices along the perimeter of the building will have enough glass to let the light in to cubicles in the center, which will also have glass doors.

Contractors are completing work on custom-made duct work for the building, Hill said. He added that once that work is complete, the remaining construction work will proceed fairly quickly. 📍

Rick Perry

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"I have a long record of aggressively courting leading scientific minds to set forth innovation, solutions, and job creation strategies. Our scientists and labs are the envy of the world, and I am a major proponent of maintaining American leadership in the area of scientific inquiry."

During Perry's 14 years as Governor, he proved economic growth and increased energy production can be accomplished alongside caring for the environment. During his tenure, Texas created 2.2 million jobs. Texas led the nation in energy production -- not just in oil and gas, but also in wind energy. Texas now produces more wind energy than all but six countries in the world.

Under his leadership, Texas reduced its carbon footprint by 17%, reduced sulfur dioxide by 56%, and nitrogen oxide by

66%. Despite having a rapidly growing population and one of the largest petrochemical refining industries in the world, Texas saw its air quality improve.

Perry brings the executive experience and management skills honed during his time as governor to the leadership of the Department of Energy.

Perry is a veteran of the United States Air Force. He married his childhood sweetheart, Anita, in 1982. They have two children and two granddaughters.

Reprinted from the DOE website at <https://energy.gov/>. Go to <https://energy.gov/articles/perry-sworn-14th-secretary-united-states-department-energy> to see video of Perry addressing DOE employees for the first time on March 3. 📍

Extent of Condition Committee

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Terry Brog, PPPL's interim director, said that the committee's review is a crucial step forward. "It's critical that this extent of condition review ensure that we've looked at everything that needs to be addressed to get NSTX-U up and running," Brog said. "Just as important, we need the committee to validate the DVVR (design, verification and validation review) process that has been going on since January."

A three-part process

Brog said the extent of condition review is part of a three-part process. This includes an extent of cause review, which likely will begin this month, to examine the processes and conduct of operations underlying the NSTX-U coil failure that shut the experiment down last summer. PPPL will also commission a full analysis of the coil failure by an outside consultant with extensive experience in such investigations at other national laboratories, he said.

The EOC committee gave "homework" to the PPPL Recovery Team on various issues and met in closed session to discuss their findings. They focused on major issues identified in the first five of 12 DVVRs in which engineers analyzed each system of the machine and identified any gaps in the design or construction.

The EOC committee's recommendations will be part of an interim report to the U.S. Department of Energy (DOE) due this month that will outline PPPL's preliminary corrective action plan for some of these issues. The EOC will meet again in May prior to the deadline to deliver a final corrective action report to the DOE.

The committee's feedback was very useful, Hawryluk said. "It was an extremely good committee made up of highly knowledgeable and experienced engineers and scientists," he said. "They provided technical input and dug into things and thought about things deeply. That was extremely productive and helpful."

Jonathan Menard, head of NSTX-U research, told the committee their work was "excellent." "Thank you for all your efforts in this. It's going to make NSTX-U a much better facility and program," he said.

"Having these recommendations is really helpful," said Stefan Gerhardt, the deputy engineering director for the recovery program. "This will really help us make the choices we have to make."



Tom Todd, the chair of the EOC committee, presents the group's findings on March 9, the final day of the meeting. (Photo by Elle Starkman)

The committee recognized that many of the issues to emerge in DVVRs are related to the age of various components, Hawryluk said. Many were repurposed from the Tokamak Fusion Test Reactor (TFTR) and date back to the 1980s and can be refurbished or modernized while the machine is operating. They recommended that parts of the central instrumentation and control (I&C) system, for example, gradually be replaced. They noted that the system is still functioning and a new system would be costly and time-consuming.

"They helped us prioritize things to develop a remediation strategy," said Charles Neumeyer, head of engineering for the recovery project.

Six new magnets

One major recommendation was that PPPL manufacture and install three paired sets of magnets that nestled in the center stack, the PF1A, PF1B, and PF1C upper and lower coils, which are used to shape the plasma. The PF1A upper coil is the magnet that failed last summer, causing the experiment to be shut down.

Physicists and engineers on the Recovery Team had debated whether to replace the PF1B coils, which were not used in the last operation of the NSTX-U. The PF1B coils presents a problem because they are located adjacent to divertor tiles that must be heated to 350 degrees Centigrade during bakeout to remove water. But heating the machine to that temperature would severely damage the PF1B magnet. As a result, the divertor tiles were never heated to more than 230 degrees Centigrade during bakeout in the last NSTX-U operations.

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Members of the Extent of Condition (EOC) committee. From left clockwise: Richard Callis, of General Atomics National Laboratory; Brian LaBombard, of MIT's Plasma Science and Fusion Center; Ronald Parker, emeritus professor at MIT's Plasma Science and Fusion Center; Dennis Youchison, of Oak Ridge National Laboratory, Tom Todd, the committee chair, retired chief technologist at the Culham Centre for Fusion Energy; Rem Haange, ITER technical director; Michel Huguet, former head of ITER Magnets; Martin Cox, of the Culham Centre for Fusion Energy; and John Smith, project manager at General Atomics. (Photo by Elle Starkman)

Extent of Condition Committee

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The committee agreed that getting to at least 300 degrees during a bakeout is important, but it urged the Recovery Team to find a solution that would retain the PF1B coils for future research. “If you really wanted to, you could leave out the Bs but we don’t favor that,” Todd said. “It would be a serious shame to leave those coils out of the machine and then find you need them in a few year’s time.”

Hawryluk said he and other members of the Recovery Team will have to review the cost and scheduling of all the recommendations, including building six coils. PPPL will have to review where and how the coils would be built as well as the cost and schedule, Hawryluk said.

Recommendations on CHI

The committee also recommended that PPPL take actions to make the vacuum vessel more reliable, which may entail doing away with design features supporting coaxial helicity injection (CHI) research. CHI is a non-inductive method of creating a plasma, meaning it doesn’t employ a central magnet or solenoid. It requires that the inner and outer vessel be electrically isolated from each other, and NSTX-U was built with a gap between the inboard and outboard divertors to do that. This design feature, however, can allow plasma to leak through the gap and damage the nearby PF1C coils.

The research into CHI is not completed. But Hawryluk said the Recovery Team will have to seriously consider the committee’s recommendation. “The changes they are proposing would have some positive impact on the reliability so we have to evaluate that,” he said.



Steve Raftopoulos, the responsible engineer in charge of magnets on the Recovery Team, discusses magnets on the NSTX-U with Tom Todd, as engineer Marc Sibilis looks on. (Photo by Jeanne Jackson DeVoe)



Charles Neumeyer, the head of engineering for the NSTX-U Recovery Project, examines the NSTX-U Center stack with Tom Todd, chairman of the EOC committee. At center is John Smith, project manager at General Atomics, and Dennis Youchison, of Oak Ridge National Laboratory. (Photo by Jeanne Jackson DeVoe)

Some other recommendations include:

- Develop a plan for testing new and existing coils
- Design PF coils so they can be easily tested
- Explore whether to replace graphite tiles with carbon fiber composite, which is a stronger material
- Ensure there are spares for aging components that are essential to NSTX-U operation

Members of the committee were: Richard Callis, of General Atomics National Laboratory; John Smith, project manager at General Atomics; Martin Cox, of the Culham Centre for Fusion Energy; Rem Haange, ITER technical director; Michel Huguette, former head of ITER magnets; Brian LaBombard, of MIT’s Plasma Science and Fusion Center; Ronald Parker, emeritus professor at MIT’s Plasma Science and Fusion Center; and Dennis Youchison, of Oak Ridge National Laboratory. In addition, some of the EOC members, Frank Cassella and Graeme Murdoch from the US ITER Project Office and Ursel Fantz from IPP, Garching, Germany, participated via video conference.

Also attending was Josh King, program manager for Spherical Tokamak at the DOE’s Fusion Energy Sciences (FES) program, along with DOE program managers Mark Foster and Matthew Lanctot who participated remotely.

The DVVR on Thursday, March 16, will focus on the test cell and will be presented by Erik Perry, the responsible engineer for the test cell, and chaired by Valeria Riccardo, head of Engineering. 🗣️

Princeton University releases “Princeton Portraits” video on diverse administrators

Princeton University has unveiled the “Princeton Portraits” project in which 32 administrators tell stories of their identities — racial, ethnic, gender, class, faith and more — and their perspectives in working with and for members of the campus community. In this introductory video, several of the administrators describe Princeton’s commitment to diversity and inclusion, and how that inspires and fulfills them. Go to <http://www.princeton.edu/main/news/archive/S48/84/71M71/index.xml?section=featured> to view the video.

The physics of ice cream helps inspire students at PPPL's STEM Day

By Jeanne Jackson DeVoe

More than 35 students from Orange in the north and Moorestown in the south, came to PPPL on March 2 for a day of science activities that included ice cream made with cryogenics, cool plasma demos, and a hands-on workshop in which they made motors.

The activities were all part of STEM (Science, Technology, Engineering and Math) Day at the Lab and they had a serious aim: engaging students in science and technology and hopefully pointing the way to future careers.



Volunteer Atiba Brereton and two students watch as the electromagnet they built makes copper wire spin. (Photo by Elle Starkman)

"It's all about showing them a career path that is possible for them," said organizer Shannon Swilley Greco, a program leader in PPPL's Science Education department. "The communities that we're reaching typically do not have access to engaging STEM opportunities, let alone exposure to plasma science or fusion."

PPPL worked with Rowan College at Burlington County's Workforce Development Institute, the American Association of Black Engineers, and the Glover Group to put together the event. "It's just an extension of our mission to get the next generation excited about science and on board," said organizer Larry Glover.

The students rotated from a cryogenics demonstration in which they sampled ice cream made with liquid nitrogen to plasma demonstrations that included the hair-raising Van de Graaff generator and the always popular vacuum chamber that makes a marshmallow expand. They also spent time learning about electromagnets in the Science Education lab.



Volunteer Nicole Allen, center, and Arturo Dominguez, a senior program leader in Science Education make ice cream, as Andrew Zwicker, head of the Office of Communications and Outreach, looks on. (Photo by Elle Starkman)



Shannon Swilley Greco a program leader in Science Education and the event organizer, works with students in the Science Education laboratory. (Photo by Elle Starkman)



Students use prismatic glasses to view the signature color pattern of light from different elements with the help of Science Education's Arturo Dominguez. (Photo by Elle Starkman)

Michael Maitland, a 6th grader from Heywood Avenue Elementary School in Orange, said she liked making an electromagnet. "My favorite part was going into the Science Education Laboratory and attaching the wires to make the bulb light up. I like how we needed just a battery and copper wire."


Her friend and classmate, Sarlina Chery, was one of many who enjoyed the ice cream. "I think it was really fascinating, especially with the ice cream because they made it really fast, which was really cool!" she said. "At first I was scared to eat it but when I ate it, it was good!"

Teachers and administrators who came with the groups said they liked how engaged the students were. "I think it was fabulous exposure for our kids," said Faith Alcantara, the principal of the Heywood School. "They were able to make some connections from what they've been seeing in school to how it's actually applied."

Sparking an interest in science

"I think it was an incredible experience," agreed Samantha Fossella, assistant principal of the Orange Preparatory Academy. "Our students were really excited about it. This just sparks an interest even for those who aren't into science. It just brings it to a whole new level."

Members of the Science Education Department and volunteers said they enjoyed the activities as much as the students. "It was very inspiring to see all these kids who were excited about doing science," Greco said.

"You asked amazing questions, you participated in everything, so today is just a wonderful day," Andrew Zwicker, head of Science Education, told the group at the end of the day. "You should know that for everything we gave to you, you gave us back just as much." 

American Red Cross Blood Drive

Wednesday, March 15

8 a.m.-1 p.m.

The blood mobile will be parked next to the warehouse near Mod VI in the Lower Parking Lot.

Appointments are still available! Please call the OMO at ext. 3200 or go to redcrossblood.org and enter sponsor code PPPLPrinceton. You can make a difference! Your blood donation matters!

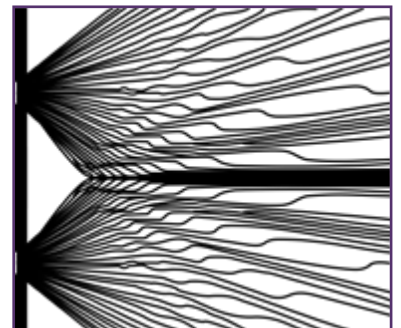
Thank you!

—American Red Cross, Occupational Medicine Office and Human Resources

COLLOQUIUM

The New Wave of Pilot-Wave Theory

John W. M. Bush
MIT



Wednesday, March 15

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

Ronald E. Hatcher

Science on Saturday LECTURE SERIES

March 18

Mechanics, organ development, and disease

Celeste Nelson, Princeton University

Saturdays at 9:30 a.m., MBG Auditorium

Volunteer for PPPL's Young Women's Conference

Thursday, March 23

9 a.m.-2 p.m.

at Princeton University's Frick Chemistry Laboratory

Go to <https://goo.gl/forms/uNn3TVQwstzk3Xa72> to fill out a registration form and pick your preferred job or jobs. Transportation and lunch will be provided. Thank you!

Please contact organizer Deedee Ortiz, dortiz@pppl.gov, ext. 2785 with any questions.

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 March 13	Tuesday March 14	Wednesday March 15	Thursday March 16	Friday March 17
COMMAND PERFORMANCE Chef's Feature	Chicken Parmesan served with Pasta	Bruschetta Chicken with Orzo Pilaf	Corned Beef with Cabbage and Boiled Potatoes	Kielbasa with Sauerkraut and Pierogies	Fried Fish with Cheesy Grits and Stewed Tomatoes
Early Riser	Bacon, Egg & Cheese Croissant	Biscuits with Sausage Gravy	Mango & Blueberry Pancakes served with Choice of Breakfast Meat	Turkey Bacon, Egg and Cheese Sandwich	2 Eggs, 2 Pancakes, Choice of Breakfast Meat & Potatoes
Country Kettle	Vegetable Noodle	Cream of Mushroom	Beef Barley	Tuscan Chicken and Pasta	Seafood Chowder
Deli Special	Curry Tuna Salad on Naan Bread	Caesar Turkey Wrap	Ham and Smoked Gouda with Pineapple Slaw	Portobello Mushroom & Fontina Cheese with Roasted Peppers on Ciabatta	Chicken, Mozzarella, Red Onion, Basil, Arugula and Balsamic Tomatoes on French Bread
Grill Special	Pico De Gallo Black Bean Burger with Avocado Sour Cream and Fries	Teriyaki Chicken Cheesesteak with Asian Slaw	Lamb Burger	Turkey, Bacon, Cheddar, Diced Tomato, Red Onion and BBQ Chipotle Mayo Flatbread	Roast Vegetable Stromboli
Panini	Tomato, Fresh Mozzarella, Spinach and Pesto Flatbread	Spicy Italian Grinder	Irish Stew over Noodles with Soda Bread	Grilled Ham and Cheese on Texas Toast	Foot-long Chili Dog

MENU SUBJECT TO CHANGE WITHOUT NOTICE

HEART HEALTHY

VEGETARIAN OPTION

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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/>.