

THIS WEEK

MARCH 6-9

Extent of Review Committee meeting

WEDNESDAY, MARCH 8

PPPL Colloquium

4:15 p.m. ♦ MBG Auditorium

[The Breakthrough Starshot Initiative: A Funded Interstellar Flight Project](#)

Edward Turner, Princeton University

THURSDAY, MARCH 9

N.J. Society of Women Engineers Tour

SATURDAY, MARCH 11

Science on Saturday

9:30 a.m. ♦ MBG Auditorium

[Science Invigorating Architecture](#)

Forrest Meggers, Princeton University

MARCH 12-15

Mercer Science and Engineering Fair

[See page 6 for information on how to volunteer.](#)

UPCOMING

WEDNESDAY, MARCH 15

American Red Cross Blood Drive
8 a.m.-1 p.m.

[See page 5 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

THURSDAY, MARCH 23

Young Women's Conference in STEM

9 a.m.-2 p.m.

[See page 2 for information on how to volunteer.](#)

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Princeton-area schools bowl over competition to win Science Bowl

W. Windsor-Plainsboro S., JW Middle School win berth at Nationals

By Jeanne Jackson DeVoe

Two local teams will travel to Washington, D.C., for the National Science Bowl® finals after winning the regional middle school and high school competitions at the U.S. Department of Energy's (DOE) New Jersey Science Bowl® at PPPL Feb. 24 to 25.

The West Windsor-Plainsboro South Science Bowl team won its third victory in a row at the high school contest on Saturday, Feb. 25. The team was undefeated in 12 rounds of competition at this year's competition. Thirty-two teams from New Jersey, Pennsylvania and Delaware competed by answering challenging questions in timed rounds in science, technology and mathematics in a quiz-show type double elimination format.

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Seventh DVVR focuses on power systems

Extent of Review Committee meets this week

By Jeanne Jackson DeVoe

The seventh of 12 design verification and validation reviews (DVVRs) on the power systems of the National Spherical Torus System-Upgrade found a major issue: the likely need to repair welding cracks in one of two motor generators that power the NSTX-U.

Engineers told the DVVR committee that there are cracks in the spider arms of the 700-ton generator rotor of motor generator #2 (MG #2).

Having the two motor generators operational provides a back-up that ensures continual operation without interruption, engineers say. The MG sets could also be a power source for future experiments.



Members of the review team look into the pit where Motor Generator #1 is located. (Photo by Elle Starkman)

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DVVR

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The two motor generators powered the Tokamak Fusion Test Reactor (TFTR) from the early 1980s through 1997, with MG #1 starting in 1983 and MG #2 the following year. MG #1 supported NSTX until 2004 when cracks were discovered in the welding and it was shut down. MG #2 was repaired in three locations during that time. After MG #1 was shut down, MG #2 supported NSTX from 2004 to 2010 when NSTX was shut down for the upgrade. MG #1 was repaired in 2014 as part of the upgrade and supported the NSTX-U during operations in 2016. The MG #2 has a similar problem with cracks in the welding and cannot be used as a backup unless it is repaired. An analysis found the cracks were related to improper welding when the MGs were constructed. Engineers already have a plan to repair MG #2.



The review team tours the field coil power conversion (FCPC) area. (Photo by Elle Starkman)

Another issue is that the system's transformers, which are 37 years old and need to be tested to ensure they are functioning well. Two of the critical transformers date back to the late 1970s.

Aside from those issues, engineers said the power systems are generally in good shape for equipment that dates to the 1970s and 1980s. The fact that the power systems were built for the much larger TFTR is potentially good news for the NSTX-U because it doesn't use the system to full capacity, said Charles Neumeyer, head of engineering for the NSTX-U Recovery project. "The system is a very complex and awesome design," Neumeyer said. "But it's pretty well-designed and NSTX-U doesn't use it to full capacity so that makes it a little easier."

John Dellas, the responsible engineer for the power systems, was the primary presenter at the DVVR. External reviewers attending the meeting at PPPL included Heinrich Boenig, a retired engineer from the Los Alamos National Laboratory, and Dave Terry, of MIT's Plasma Science and Fusion Center, as well as Jim Irby, of MIT's Plasma Science and Fusion Center, and Tom Todd, the chair of the external review committee, who participated by video conference.



Engineer Mounir Awad shows a wooden model of a motor generator to, from left: Scott Weidner, vice president for engineering at PPPL, and engineers Manish Kumar and Pete Titus. (Photo by Elle Starkman)

This week, an Extent of Condition (EOC) committee made up of national and international experts will meet March 6 to 9 to discuss possible solutions to some of the major issues that must be resolved to get the NSTX-U up and running. The committee will be chaired by Todd, the retired chief of technology at the Culham Center for Fusion Energy in England.

The committee will review issues raised in the DVVRs for the magnets, the vacuum vessel and internal hardware, the heating systems, integrated project design, and the central instrumentation and controls. Those systems involve some of the major issues facing the NSTX-U Recovery Team.

The group's conclusions will become part of an interim corrective action report to be submitted to the U.S. Department of Energy at the end of this month. 📄



Jim Corl, FCPC operations supervisor, shows field coil power conversion (FCPC) equipment to Heinrich Boenig, left, a retired engineer from the Los Alamos National Laboratory, and engineer John Dellas, the main presenter at the power systems DVVR. Behind Dellas is Stefan Gerhardt, deputy head of engineering for the NSTX-U Recovery Project. (Photo by Elle Starkman)

Volunteer for PPPL's Young Women's Conference March 23

Please volunteer for PPPL's Young Women's Conference STEM on March 23 from 9 a.m. to 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. Please contact organizer Deedee Ortiz, dortiz@pppl.gov, ext. 2785 with any questions. Thank you!

Science Bowl

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The second place Bridgewater-Raritan High School team competing. (Photo by Elle Starkman)

“I’ve got to tell you what a thrill it is to see so many people here with the same enthusiasm and effort we see for our sports teams,” said Andrew Zwicker, head of PPPL’s Communications and Public Outreach Department.

The winning team, along with the John Witherspoon Middle School team, of Princeton, which won the Middle School tournament on Friday, Feb. 24, will have all expenses paid for the National Science Bowl® April 27 to May 1 in Washington, DC. They will compete with 69 other high school and 49 other middle school regional teams. The DOE’s Office of Science manages the National Science Bowl®, and sponsors the finals competition. More information is available on the NSB website: <http://www.science.energy.gov/wdts/nsb/>.

Approximately 9,000 high schoolers and middle schoolers compete in 70 high school and 50 middle school regional Science Bowl tournaments across the country.



Andrew Zwicker, head of PPPL’s Office of Communications and Public Outreach, left, with the third-place Ridge team, a new team in the competition.



PPPL volunteers in the MBG Auditorium. From left, Olivia Merrill, who was a timekeeper, Soha Aslam, who was a science judge, and Arturo Dominguez, who was a moderator. (Photo by Elle Starkman)



The West Windsor-Plainsboro South team, left, in the final competition against the Bridgewater-Raritan team. (Photo by Elle Starkman)



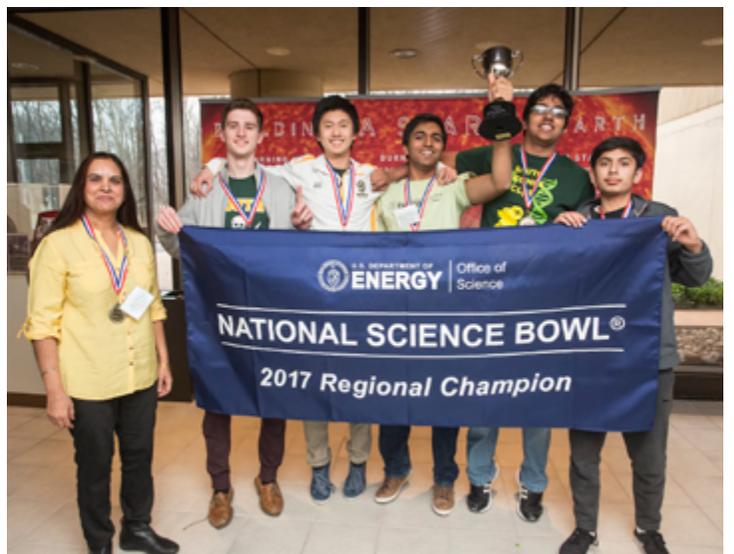
Angela Powell, who volunteered as a timekeeper, with two of the Princeton Charter School team members. (Photo by Elle Starkman)

West Windsor-Plainsboro South won the final round of the competition 104 to 76 against the Bridgewater-Raritan High School team, which came in second. The Ridge team from Basking Ridge, New Jersey, came in third place.

The West-Windsor team tied with Ridge in the first half of the 10th round but pulled ahead in the second half. “We’re excited,” said Eric Liu, one of the winning team members. “We were down but we were confident we were going to come back.”

The team captain, Tanishq Aggarwal, is an intern in PPPL’s Science Education Department. “I learned a lot more about fusion energy, so that helped me in previous rounds,” Aggarwal said.

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The West-Windsor Plainsboro South with their banner and trophy. (Photo by Elle Starkman)

Science Bowl

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JW vs. Princeton Charter in final match

In the middle school contest, two Princeton teams competed in the final rounds to win the tournament. The John Witherspoon (JW) Middle School team won the competition on Friday, Feb. 24, in the 11th round. It beat the Princeton Charter School team, which placed second.

The team won after going into the 10th round undefeated, and being beaten by the Princeton Charter School in a close contest 114 to 90. In the final round, the JW team won 188 to 72.

The team will join West Windsor-Plainsboro South High School at the National Science Bowl® in Washington, D.C., April 27 to May 1.

“It was really exciting,” said JW team captain Brian Zhang. “I was hoping we might be able to win.”

Sixteen teams from all over New Jersey competed in the middle school version of the game-show-style double-elimination format contest.

The three top teams were also the three top teams last year. JW came in third last year, while the Charter School team also came in second last year. Third-place winner William Annin Middle School from Basking Ridge, New Jersey, came in first last year.

“It was very close,” said JW Coach William Merritt. “I thought we had it and then we lost and then they came back and never let up.” Merritt said he is already looking ahead to the Nationals, which JW attended in 2015. “I’m thinking about DC already. I’m thinking about April. We have a lot of work to do before then.”



The John Witherspoon team, left, and the Princeton Charter School team, in the 10th round of the Science Bowl. (Photo by Elle Starkman)



The William Annin Middle School team competing. (Photo by Elle Starkman)

Some 50 PPPL scientists, engineers and staff members volunteer for the two-day event as science moderators, judges, timekeepers and helpers. Many of the volunteers have been coming to the Science Bowl for years. Engineer Irving Zatz has been volunteering for 20 years. “I’m always impressed by how well-prepared and how smart they are, how quick too,” he said. “That’s why I’ve been coming back for 20 years because it’s such a thrill.”

“It’s amazing to see how excited these kids are about science and if all we do is facilitate a fun competition to keep their momentum going, then we will keep making sure that happens,” said Deedee Ortiz, the program administrator of PPPL’s Science Education Department, who organized the event. “They are incredibly smart and if we can give them a chance to see a national laboratory then maybe someday some of those kids will be here working to make the world a better place.”



An exciting moment in the final rounds of competition between the John Witherspoon Middle School team, left, and the Princeton Charter School team. (Photo by Elle Starkman)



The John Witherspoon Middle School team confers during an earlier round in the competition. (Photo by Elle Starkman)

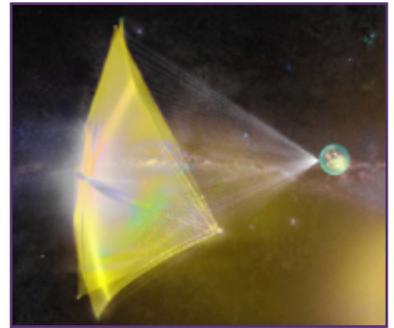


The John Witherspoon team members pose with their trophy and banner. (Photo by Elle Starkman)

COLLOQUIUM

The Breakthrough Starshot Initiative: A Funded Interstellar Flight Project

Edward Turner
Princeton University



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

Ronald E. Hatcher **Science on Saturday LECTURE SERIES**

March 11

Science Invigorating Architecture
Forrest Meggers, Princeton University

March 18

Mechanics, organ development, and disease
Celeste Nelson, Princeton University

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

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

Volunteers wanted for Mercer Science and Engineering Fair

Organizers of the Mercer Science and Engineering Fair are looking for scientists and engineers to volunteer as judges of fourth to twelfth-grade science projects during the fair in March at Rider University.

Students from Mercer County schools show off their original science projects at the fair from March 12 to March 15. Judging takes place March 12 to 13. Additional information about the fair is available at <https://mercersec.org/about/msef>.

To volunteer, go to <http://mercersec.org/help/BecomeAJudge> or contact volunteers Kevin Lamb, klamb@pppl.gov or Hans Schneider, hschneid@pppl.gov.

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 6	Tuesday March 7	Wednesday March 8	Thursday March 9	Friday March 10
COMMAND PERFORMANCE Chef's Feature	Baked Chicken Thighs with Roasted Potatoes and Carrots	Baked Manicotti with Garlic Bread	Buffalo Chicken Burrito with Cilantro Lime Rice and Oven-Roasted Corn	Pizza Day with Tossed Salad	Fish and Chips
Early Riser	Bacon, Egg and Cheese English Muffin	Mexican Breakfast Burrito	Potato, Roasted Pepper & Sundried Tomato Casserole with 2 Eggs any Style	Cinnamon-Raisin Pancakes with Homemade Apple Compote	French Toast Sticks
Country Kettle	Manhattan Clam Chowder	Sweet Potato Bisque	Chicken Noodle	Tomato Soup	Chili Bean
Deli Special	Turkey Bruschetta on Ciabatta	Asiago Roast Beef with Grilled Onion, Tomato & Horseradish on Pumpernickel	Southwest Ham Ciabatta	Turkey Sloppy Joe	Assorted Hoagies
Grill Special	Grilled Ham and 3 Cheeses on Challah Bread	Chipotle BBQ Pulled Pork Sandwich with Fries and Slaw	Cheese Calzone with Marinara Sauce	Kielbasa & Sauerkraut with German Potato Salad	Teriyaki Chicken Cheesesteak
Panini	Curried Lentil & Brown Rice Wrap	Fried Fish Torpedo with Cheddar, Tomato & Tartar Sauce	Pastrami and Swiss on Marble Rye	Breaded Chicken Cutlet with Ham, Swiss Cheese, Lettuce & Honey Mustard on Ciabatta	Chef's Choice

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/>.