

Calendar of Events

THIS WEEK

AUGUST 9-12

IBEX Mission meeting
Aug. 9: Director's Conference Room
Aug. 10-12: Room B318

WEDNESDAY, AUGUST 10

Summer intern poster session
10 a.m. to 1 p.m. ♦ LSB Lobby

UPCOMING

THURSDAY, AUGUST 18

Liberty Science Center Camp
10:30 a.m.-1 p.m. ♦ Science Education Laboratory

FRIDAY, AUGUST 19

Open Public Tour
10 a.m. ♦ LSB Lobby
Information & Registration at
<http://www.pppl.gov/about/tours>

AUGUST 22-25

Technology of Fusion Energy (TOFE) Conference
Philadelphia

SUMMER SCHEDULE FOR PPPL WEEKLY

The PPPL Weekly will be published every other week during the summer. The next issue will be on August 22.

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“Stellar engineer and project manager” is first Princeton assistant vice president for engineering for PPPL

By Jeanne Jackson DeVoe

Scott Weidner’s passion for engineering has taken him more than 1,700 miles from his long-time home in San Antonio, Texas, to Princeton, New Jersey, to become Princeton University’s first assistant vice president for engineering for PPPL.

Weidner, a project manager for 25 years on multiple NASA projects at the Southwest Research Institute (SwRI), will bring his skills to a new position in a new field. “This is definitely going to be a new chapter in my career and it’s very exciting to me because I’ll be doing things that I have not done before,” Weidner said.

David McComas, the Princeton University vice president for PPPL, worked closely with Weidner at the Institute. “He is a stellar engineer and project manager whom I have entrusted with a number of my spacecraft instruments,” McComas said. Working on NASA instruments means meeting very high standards aimed at ensuring that the instruments work perfectly in space, he said. “It’s a very careful and formal process and to bring some of that rigor to PPPL could be very helpful,” McComas said.



Scott Weidner

Half of Weidner’s time will be devoted to the assistant VP for PPPL position, which directly supports McComas’ oversight of the Lab. His primary job will be to assist McComas with understanding large PPPL projects from an engineering and project management perspective and to work with PPPL, the U.S. Department of Energy (DOE), and Princeton University leadership on PPPL’s major projects. Weidner noted that DOE Secretary Ernest Moniz has made improving project management a top priority. “I would love to help support that and help plan how we can grow that capability,” Weidner said. “He’s advising me but he’s also there to bring his different experience to the table and try to help,” McComas said. “I think he’s going to be a really great and valuable asset to the Lab.”

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Fusion-powered engine based on PPPL technology wins NASA grant

By John Greenwald

Princeton Satellite Systems (PSS), which has licensed technology under development at PPPL for a fusion-powered engine system that could revolutionize space travel, has won a highly competitive grant from NASA. The \$100,000 award, from the NASA Innovative Advanced Concepts (NIAC) program that supports visionary ideas from non-traditional sources, will fund Phase I of a project to develop a rocket engine for a mission to Pluto.

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Princeton Energy Scholars report focuses on fusion energy

By Jeanne Jackson DeVoe

Magnetic fusion has “enormous promise as a global energy source” if researchers are able to make “significant progress in several areas of science and technology” in the coming decades, according to a recent report published by Princeton University’s Andlinger Center for Energy and the Environment.

The report was researched and written by 10 Ph.D. students who are part of the Princeton Energy Scholars graduate school honor society at the Princeton Environmental Institute. The students, supervised by Princeton University faculty mentor Robert Socolow, are from a variety of fields that include electrical engineering, psychology and public policy. The students visited PPPL in June 2014 and spoke with PPPL researchers, including former Deputy Director for Operations Adam Cohen, now with the U.S. Department of Energy, as part of their research. Other PPPL staff whom the students consulted for technical information were: Nat Fisch, Rob Goldston, Greg Hammett, Dale Meade, Stewart Prager and Andrew Zwicker.

“I am impressed with how well the students have captured essential elements of fusion from essentially a cold start,” said PPPL Director Stewart Prager. “The report is interesting reading and will be very useful to those wishing a lucid summary of fusion.”

The report notes that the students recognized “a special challenge” to their objectivity arising from the fact that PPPL is a national Department of Energy (DOE) laboratory that is operated by Princeton University. “Although we consulted with several fusion experts at PPPL, this report was written independently of PPPL and does not represent its views,” the students wrote. “We have sought to write an impartial and rigorous assessment, the kind that we would most want to read ourselves.”

Fusion energy offers unique advantages over current methods of generating electricity because its fuel is nearly inexhaustible, the report said. It could provide enough energy to meet global demand without producing carbon emissions that are linked to global warming. Fusion also avoids some of the issues of nuclear waste and potential danger to the environment associated with nuclear fission plants, according to the report.

Another advantage: fusion energy power plants could be located in areas where renewable energy such as wind or solar would not work, the report said. Fusion plants also would not affect the health or environment of local communities.

The nation’s newest magnetic fusion experiment is the NSTX-U (National Spherical Torus Experiment – Upgrade)

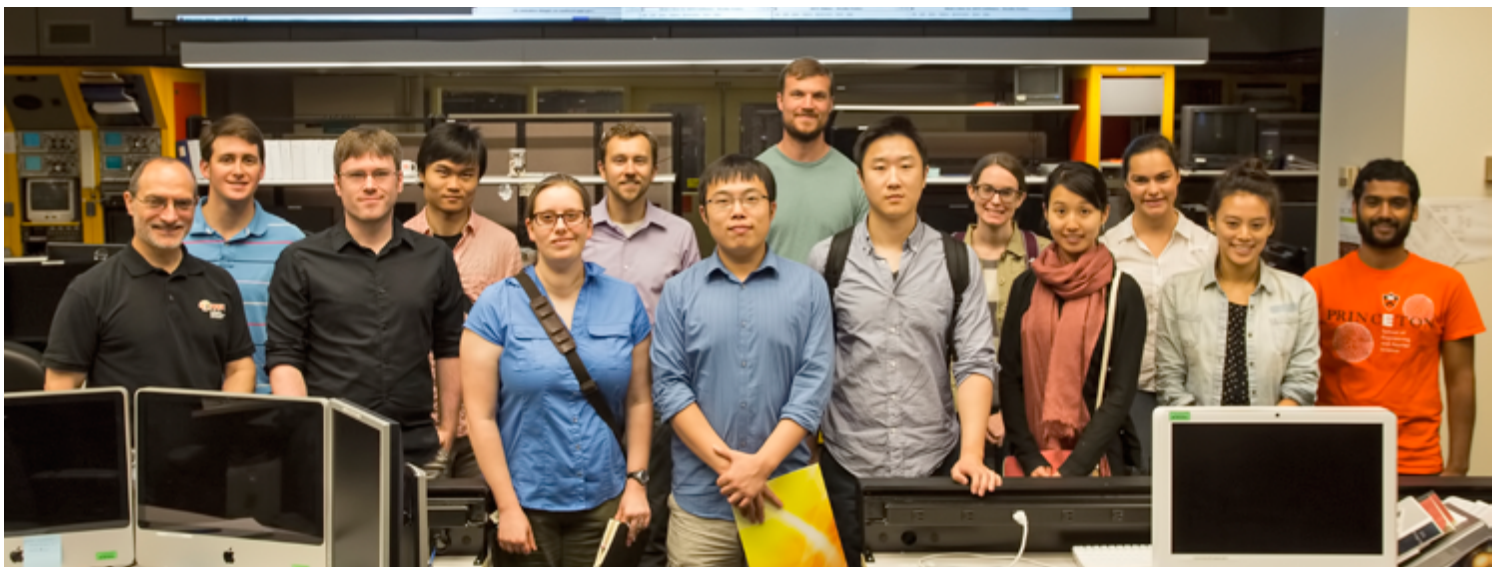
here at PPPL. This spherical tokamak is designed to produce data over the next decade relevant to ITER and the next generation of fusion devices, and perhaps lead to a Fusion National Science Facility or a pilot plant.

But fusion energy faces several scientific and technological challenges to create, maintain, and manipulate a plasma at temperatures of up to 200 million degrees Celsius -- far hotter than the sun, the report said.

Those challenges go hand-in-hand with policy challenges regarding funding, the report said. Fusion scientists have formed international collaborations to overcome this challenge, most notably ITER, the massive international fusion experiment under construction in Cadarache, France.

The report, or “distillate,” is divided into five sections that include an introduction and a discussion of four major issues. [The full report can be downloaded here.](#)

- An [executive summary, overview, and key concepts](#)
- [Technology](#): The report states that some of the major challenges in fusion energy include how to maintain a “burning plasma,” a plasma that sustains itself, which is the goal of ITER. Other key technological challenges include how to produce enough of the radioactive material tritium for fusion plants to operate.
- [Economics](#): Fusion will be competitive if it can find a way to control instabilities that could damage components and thus avoid shutting down future power plants, the report said. Another challenge is finding materials that are strong enough to last without having to be frequently replaced. The report said a strong climate policy would help make fusion more competitive.
- [Fusion and Fission](#): The report compares fusion and fission power. Fusion power plants do not use plutonium and highly enriched uranium, the materials used in nuclear fission plants. Thus they would not cause a nuclear meltdown in the event of an accident. Fusion power plants would not have the same issues of nuclear waste disposal as nuclear fission power plants and materials could not be used to create nuclear weapons.
- [Politics and Progress](#): Countries that fund the ITER fusion experiment, which could begin operating in 2026 at a cost of more than \$20 billion, find it challenging to also fund a strong domestic fusion research program, the report said. The next step would be to build a DEMO, a demonstration experiment that would be “a bridge between ITER and an eventual commercial reactor.” 📄



Adam Cohen, left, former deputy director for operations at PPPL, with Princeton Energy Scholars in the National Spherical Torus Experiment-Upgrade Control Room during a tour of PPPL in June 2014.

Scott Weidner

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The other half of his job will be to continue to manage a number of NASA projects for McComas.

Weidner, who began work on July 11, is equally enthusiastic about taking on the new position. "I love everything about engineering," he said. "I'm happy to serve in any way possible to make the Lab the best in the world."

Inspiration from great-grandfather

Weidner's third-floor office is fairly bare except for a large wooden gear that has a place of honor on a cabinet. Weidner draws inspiration from the story of how his great-grandfather, Fred Wikowski, an Illinois farmer, did his own makeshift engineering in the 1890s. When a metal gear on a water drill broke, his great-grandfather hand-carved that wooden gear to fit the drill. He then used the wooden gear to make a mold in the sand and poured iron into the mold to cast a new gear.

The engineering gene apparently runs in the family. Weidner's father, Edward Jennings Weidner, was an engineer on instruments on NASA missions to the moon. He inspired a love of engineering in his son by working on ham radios with him when Weidner was growing up in Ann Arbor, Michigan.

Weidner was the kind of kid who reads the encyclopedia and dictionary. He learned about fusion energy early on because a laboratory run by KMS Fusion in his hometown worked on inertial confinement fusion. "It's always been fascinating to me," he said.

Weidner graduated from the University of Michigan in 1982 with a bachelor's degree in computer engineering. His first job out of college was working for McDonnell Douglas Corp. in Saint Louis. He went on to earn a master's degree in electrical engineering from Purdue University in 1991 and a second master's degree in technology management from the University of Texas at San Antonio in 2012.

Designed numerous space instruments

At the SwRI, Weidner designed, built, tested and delivered scientific instruments for numerous spaceflight missions. He was the lead electrical engineer for the Medium Energy Neutral Atom imager on NASA's IMAGE (Imager from Magnetopause to Aurora for Global Exploration) mission, a satellite launched in 2000 that studies how the magnetosphere responds to changes in the solar wind. "That was my first taste of space flight hardware and I was hooked," Weidner said. "It was stressful, you work a lot of long hours, but it was really rewarding."

He designed the front-end electronics for the Ion Electron Spectrometer instrument on the European Space Agency's Rosetta Mission, launched in 2004, which is orbiting the comet 67P/Churyumov-Gerasimenko. Among numerous other projects, Weidner worked on the Solar Wind Around Pluto (SWAP) Instrument on the New Horizons mission to Pluto, which flew by Pluto last July. He was also instrument manager for JADE (Jovian Auroral Distributions Experiment) on the Juno mission to Jupiter, leading a team of 35 scientists, engineers, and technicians to design and build the instruments to study Jupiter's magnetosphere.

Continuing to work on NASA projects

Weidner's main task in his other half-time position will be to serve as project manager on the Integrated Science Investigation of the Sun (ISOIS) instrument suite on the Solar Probe Plus mission. McComas is the principal investigator on the project. The device will explore the Sun's outer atmosphere or corona in space and it is expected to launch on board the Solar Probe in 2018. Multiple institutions around the country are building hardware for the device, Weidner said.

Weidner will continue to work with McComas on two extended NASA Heliophysics Observatory missions: the Interstellar Boundary Explorer (IBEX) and two spacecraft called the Two Wide-Angle Imaging Spectrometers (TWINS) Explorer Mission-of-Opportunity. IBEX studies the heliospheric boundary or edge of the solar system, while TWINS studies the magnetosphere, the area surrounding Earth dominated by Earth's magnetic field. He is also working on the Solar Wind Electrons Alphas and Protons solar probe, and the Advanced Composition Explorer spacecraft, which studies the solar wind.

Weidner has settled into an apartment in Princeton. He said he loves the area and enjoys being close to New York City. A dedicated father, Weidner once drove 1,000 miles through the night as a surprise, just to volunteer at a triathlon where his son was competing. He has two grown children in Texas: Tyler, 26, and Sarah, 23, a recent graduate of the University of Texas at Austin. Another son, Travis, 21, is a junior at Arizona State University.

An avid singer, Weidner once sang with the Saint Louis Symphony Chorus. He also plays guitar and piano.

Weidner said he is looking forward to learning more about PPPL's research into developing magnetic fusion as a clean, abundant and safe source of energy. He has been arriving at the office early and leaving late to learn all he can about the subject. "It's amazing," he said. "It really is the energy we need for the future." 📧

PPPL Welcomes New Employees!



ARASH ASHOURVAN
Associate research physicist
ITER and Tokamaks



SCOTT DOSKOCZYNSKI
Junior computer technician
Information Technology



FANGHAO YANG
Software engineer
Information Technology

First trailer arrives for temporary office space

By Jeanne Jackson DeVoe

The first of 16 trailer sections was installed outside the Theory Wing next to the lower parking lot on Aug. 4 with the remaining trailers expected over the next week. They will create two large temporary office complexes that will house staff from the LSB Annex during building renovations.

Employees will likely move into the first of the temporary office facilities in October, said John Lacenere, interim head of facilities. Before anyone can move into the temporary offices, they will have to be fitted with sufficient electric power, data/telecommunications systems, a fire detection system and the EVES evacuation system, he said. "There's quite a bit of work to be done first," he said.

The first move will affect approximately 40 employees, including business operations employees and engineers.



Overall, the trailer complexes will provide temporary offices for up to 85 people during construction work that is expected to last approximately 18 months. These trailers are part of the Laboratory's \$26 million facility renovation project, the Infrastructure and Operational Improvements (IOI) project, which is funded by the Office of Safety, Security and Infrastructure in the Department of Energy's Office of Science. Plans call for all three floors of the annex to be gutted and replaced with modern office spaces that can accommodate more people as well as new conference rooms. The current heating and air conditioning system will be replaced with a new energy-efficient system.

The IOI is the second phase of an ambitious 10- to 15-year campus plan to modernize PPPL's facilities by updating offices, meeting spaces, technical shops and laboratories on PPPL's 90-acre campus; many of these facilities were built in the 1960s and 1970s.

Once the renovation of the LSB annex is completed, the business operations employees would move back to the annex. The 37 employees now located in the Mod 6 trailer in the lower parking lot would also move to the annex and Mod 6 would be demolished. The engineers from the annex would remain in the temporary offices until the renovation of the engineering wing is completed in 2018, which will be accomplished via a separate project.

While work begins on the annex in October, work will also begin to renovate the C-Site MG Building to house machine shops now located in the Research Storage and Assembly (RESA) Building. The RESA building will be renovated to create storage space. 📍

IBEX science working team meeting here this week

By John Greenwald

More than 35 leading experts in the physics of space plasmas will gather at PPPL this week to discuss the latest findings of NASA's Interstellar Boundary Explorer (IBEX). The mission explores the interaction between the heliosphere, the region of space carved out by the solar wind plasma that streams from the sun, and the interstellar medium that fills the space between stars.

"This is one of the last places in our solar system that is just now being explored," said David McComas, Princeton University vice president for PPPL and principal investigator of the IBEX mission, who will host the event. "It's the most exciting area of space plasma physics today."

This week's gathering, the twentieth in a series that has been held at team member locations across the country and in Europe, will consist of two separate meetings. First will be a session on Tuesday to discuss the instruments on board the card table-sized satellite, their data quality, and possible changes to their settings.

This will be followed by a science working team meeting from Wednesday through Friday at noon. Subjects at the meeting will range from topics such as the shape of the heliosphere and properties of the "ribbon" of energetic neutral atoms that IBEX has discovered, to ideas for new studies. Also discussed will be possible indications from IBEX that NASA's interstellar mission Voyager I has not yet left the heliosphere.

For McComas, the meeting will provide an opportunity to introduce space plasmas to physicists at PPPL and Princeton University. "Part of our ultimate goal is to grow a world-class space plasma physics program here at Princeton and PPPL to

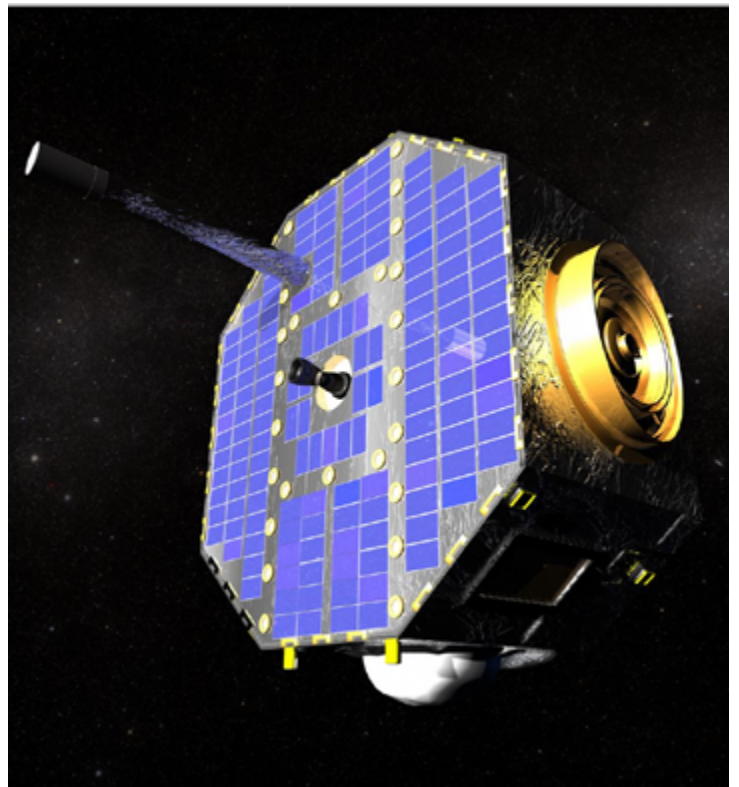


Image of the IBEX in orbit (courtesy of NASA)

be synergistic with our fabulous fusion and lab plasma programs," he said. The sessions will show space physicists the Laboratory and encourage collaboration on the subject between these outside researchers, the Lab and the main campus. 📍

A cool ice cream party

PPPLers beat the heat with an ice cream party on Friday, July 22. 🍦



Stewart Prager, PPPL's director, serves ice cream, as PPPLers create their own sundaes.



Serving ice cream are from left: Mary Payne, Carol Ann Austin, and Rich Hawryluk.



Scott Kampel, left, and Chris Minervini, enjoy some ice cream.

NASA grant

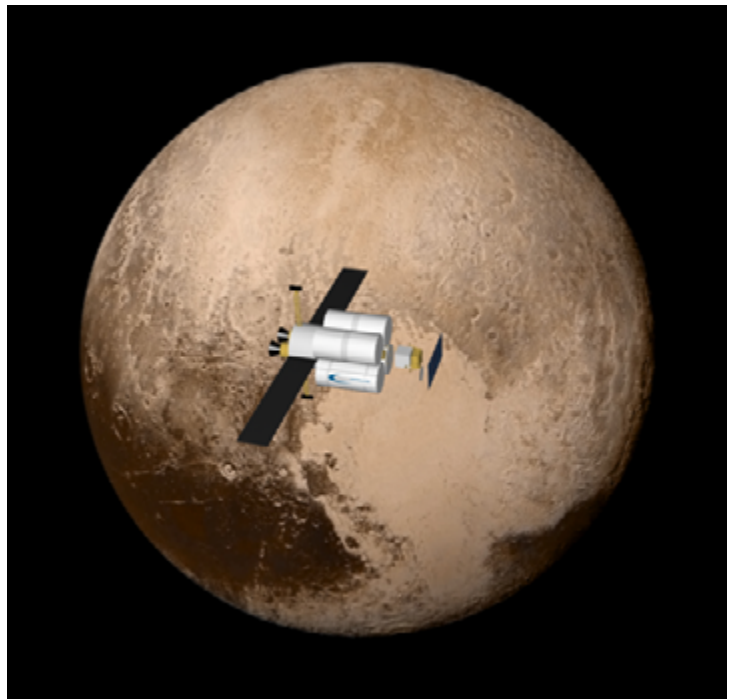
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“This is quite significant,” said Michael Paluszek, PSS president. “It’s the first time we’ve gotten positive feedback from NASA with money attached to it, and gives us the opportunity to further explore the technology.”

PSS is working on a concept called “direct fusion drive” that is based on the Princeton Field-Reversed Configuration (PFRC), a reactor that physicist Sam Cohen is developing. This system would heat the hydrogen isotope deuterium and helium-3, a scarce helium isotope, to produce fusion in a cigar-shaped plasma that would create relatively few neutrons and require relatively little radiation shielding — a critical consideration for spacecraft with limited mass. Propulsion would come from high-speed fusion exhaust mixed with hydrogen atoms to bulk up the mass of the exhaust and augment the thrust.

The PSS proposal, spearheaded by company vice president Stephanie Thomas, would put a spacecraft in orbit around Pluto after a travel time of about four years, compared with the nine years that NASA’s New Horizons flyby mission took in the earlier part of the century. Once in orbit, the system would generate electricity to power a lander to explore the surface of the planet.

Plans for Phase I include designing refined theoretical models of the engine and using them to study optimal trajectories for the mission. Cohen will work on analyzing the system for augmenting the thrust from the fusion exhaust and setting limits for reactor size. “The New Horizons Pluto mission has been so immensely popular,” Thomas said.



Sketch of a direct fusion drive-powered spacecraft in orbit around Pluto, with a true-color image of Pluto in the background. (Image courtesy of NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute.)

“We feel we could get there in less than one-half the time and orbit for years.”

PSS plans to attend a NASA symposium later this month to showcase its technology. Results of the Phase I grant are due in February, after which PSS plans to apply for a Phase II award to develop more detailed engine models. 🍦

A day of fishing fun



Some 35 PPPL'ers along with their friends and family members spent the day fishing on PPPL's annual bluefishing trip on board the Suzie Girl out of Belmar, New Jersey.

September 24th Bluefishing Trip Aboard the Suzie Girl

Date: Saturday September 24th 2016

Departure: 7:30 a.m. SHARP!!!

Location: Belmar Marina Hwy. 35, Belmar, NJ 07719

Cost: \$80 Per person ALL INCLUSIVE

Cost includes everything: rods, bait, fish cleaning, food, beverages. All you need to do is show up!

Money due by Friday, September 16th. NO REFUNDS

Contact Andy Carpe ext. 2118 acarpe@pppl.gov

Bob Tucker Jr. ext. 3190 rtucker@pppl.gov

Yoga Classes

PPPL offers lunchtime yoga classes each Monday and Wednesday from noon to 1 p.m. in the LSB Commons.

Lunch and learn session focuses on procurement guidelines



Arlene White, a supervising procurement specialist in PPPL's Procurement division, speaks during an Aug. 3 lunch and learn program on "Writing an Acceptable Sole Source Justification" in the MBG Auditorium.

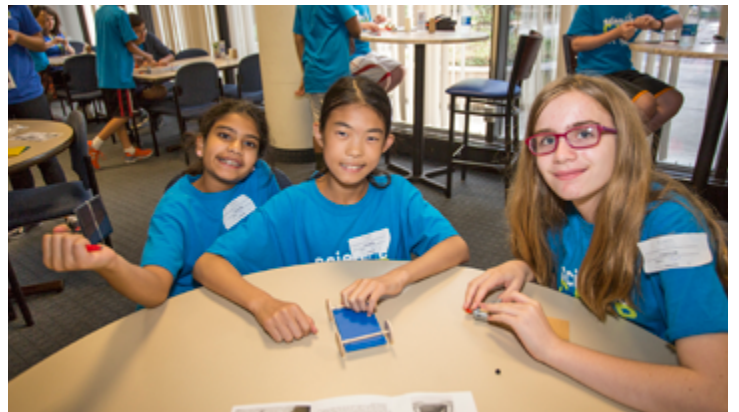
Youngsters learn about energy in visit to PPPL

Sixth and seventh graders attending a Liberty Science Center Camp in Jersey City, New Jersey, learned about various types of alternative energy during a visit to PPPL on July 28. The group did hands-on science demonstrations and

took a tour of PPPL, and then learned about various types of alternative energy. They wound up the visit by building their own solar-powered cars. 🚗



Shannon Greco, right, a Science Education program leader, talks to campers in PPPL's cafeteria.



A group of girls works on a solar-powered car.

Get involved! Tour Guides and Hosts Wanted!

We need engineers and physicists who are willing to donate a couple of hours of their time each week to show off the cool science at the Laboratory. We are also looking for hosts to greet visitors and make sure tours begin smoothly.

Please email Jeanne Jackson DeVoe, jjackson@pppl.gov, to volunteer.



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 August 8	Tuesday August 9	Wednesday August 10	Thursday August 11	Friday August 12
COMMAND PERFORMANCE Chef's Feature	Chicken Enchilada with Spanish Rice	Baked Eggplant Parmesan served with Pasta & Garlic Bread	Fried Chicken with Cornbread Stuffing & Collard Greens	Mac & Cheese Bar served with a Side Salad	Glazed Salmon with Broccoli Rice
Early Riser	Bacon, Egg & Cheese Croissant	Banana Walnut French Toast with Caramel Sauce	Mango & Blueberry Pancakes served with Choice of Breakfast Meat	Biscuits & Gravy with Choice of Breakfast Sausage	2 Eggs, 2 Pancakes, Choice of Breakfast Meat & Potatoes
Country Kettle	Creamy Chicken & Mushroom with Wild Rice	Tomato Bisque	Beef Barley	Vegetable Noodle	Matzoh Ball Soup
Grille Special	Chili Burger with Crisp Onions & Cheddar Cheese on an Onion Roll with Chipotle Mayo	Hot Pastrami & Cheddar Cheese on French Bread	Fish Taco with Cabbage, & Pico de Gallo served with Corn Relish & Chipotle Lime Sour Cream	Turkey, Bacon, Cheddar, Diced Tomato, Red Onion and BBQ Chipotle Mayo Flatbread	Roast Vegetable Stromboli
Deli Special	Middle Eastern Stacked Veggie Sandwich with Hummus, Eggplant, Red Onion, Red Pepper Tomato, Mozzarella & Balsamic on Wheat Roll	Chicken, Avocado, Pepperjack Cheese & Tomato on Ciabatta Bread	Turkey Pastrami on Rye with Coleslaw, Swiss Cheese and Russian Dressing	Open-Faced Cheesy Seafood Melt on French Bread	Chicken, Mozzarella, Red Onion, Basil, Arugula and Balsamic Tomatoes on French Bread
Panini	Breaded Pork Cutlet with Slaw on a Soft Roll	Fish Cake Sub with Pepperjack Cheese & Chipotle Cream	Turkey Meatball Parmesan Torpedo	Portobello Mushroom & Fontina Cheese with Roasted Peppers on Ciabatta	Foot-long Chili Dog

	Monday August 15	Tuesday August 16	Wednesday August 17	Thursday August 18	Friday August 19
COMMAND PERFORMANCE Chef's Feature	OTA-Ya Sushi	Ravioli Puttanesca with Olives, Capers, Red Onion, Garlic & Basil	Loaded Baked Potato Bar	Beef Stroganoff served over Egg Noodles	Pub-Style Fish & Chips
Early Riser	Potato Skins with Egg, Bacon & Swiss Cheese	Steak, Egg & Cheese Quesadilla	Ham & Bacon Breakfast Strata	Ham Steak with White Country Gravy, 2 Eggs & Biscuit	2 Eggs, Choice of Breakfast Meat & Tater Tots
Country Kettle	Chicken Gumbo	Spinach Tortellini Tomato	Italian Wedding Soup	Split Pea	Manhattan Clam Chowder
Grille Special	Corned Beef Reuben on Rye	Pork Roll, 2 Eggs & Cheese on a Kaiser Roll with Tater Tots	Chicken Cacciatore Sub	BBQ Chicken, Cheddar Cheese, Onion Straws, Lettuce & Tomato on Kaiser Roll	Crab, Asparagus & Roasted Pepper Quesadilla
Deli Special	Tofu Burger	Italian Chopped Antipasta Wrap	Italian Hot Dog with Peppers, Onions & Potatoes	Shrimp Salad on Multigrain Bread	Chicken Parmesan Sub
Panini	3-Cheese Panini with Cheddar, Swiss & Blue Cheese with Bacon & Tomatoes on Sourdough	Andouille Sausage Torpedo with Peppers & Onions	Teriyaki Chicken with Grilled Pineapple, & Swiss Cheese on a Kaiser Roll	Asparagus, Sundried Tomatoes, Roasted Peppers & Mozzarella Cheese Wrap	Teriyaki Chicken Quesadilla with Peppers & Onions

MENU SUBJECT TO CHANGE WITHOUT NOTICE

VEGETARIAN OPTION