

Calendar of Events

TUESDAY, APRIL 26

Lunchtime walk on the D&R Canal
11:45 a.m. ♦ Meet in Lower Parking Lot
([See page 5 for Earth Week events](#))

PPPL Celebrates National Pretzel Day
1-2:30 p.m. ♦ LSB Lobby

WEDNESDAY, APRIL 27

Green Machine Awards and short video, "The Story of Stuff"
1 p.m. ♦ MBG Auditorium
Plants and snacks for audience members.

PPPL Colloquium
4:15 p.m. ♦ MBG Auditorium
[Probing the Accelerating Universe with the Dark Energy Survey](#)
Dr. Joshua Frieman, Fermilab and the University of Chicago

UPCOMING

TUESDAY, MAY 3

Bike Month Challenge breakfast meeting
Stay tuned for details.

MAY 11-12

PPPL Advisory Committee

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PPPL inventors awarded patent for method to produce vital medical isotope

By John Greenwald

The U.S. Patent and Trademark Office has awarded a patent for a novel method that PPPL has developed for producing a radioactive element vital to medical exams. The element, Molybdenum 99 (Mo-99), decays to Technetium-99m (Tc-99m), the world's most widely used isotope for diagnosing conditions ranging from brain tumors to heart disease. The tracer is used in more than two-thirds of diagnostic procedures and is currently in short supply.

The patent goes to Charles Gentile and George Ascione, PPPL engineers, and to Adam Cohen, former deputy director for operations at PPPL and now Deputy Under Secretary for Science and Energy in the U.S. Department of Energy. The three inventors will share in any revenue that comes from licensing the invention; licensing rights are held by Princeton University.

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Obscura Day visitors peek behind the scenes through tours and videos

By Jeanne Jackson DeVoe



Visitors learn about plasma in the Science Education Laboratory during the Obscura Day tour.

PPPL opened its doors on Saturday, April 16, to offer a behind-the-scenes tour of the Laboratory to adventure-seekers and science lovers as one of dozens of activities at interesting and often undiscovered sites all over the country and overseas for Obscura Day.

Obscura Day was organized by Atlas Obscura, the travel and adventure website and offered 160 events in 31 states and 44 countries. These ranged from science activities such as a tour of the TRIUMF Accelerator Laboratory in Canada to quirkier events like a secret garden party at Marble Cemetery in New York, or a simulated amputation of a leg using Civil War surgical tools in Washington, D.C.

"Obscura Day was particularly interesting because it brought an eclectic crowd of visitors to the Lab," said Arturo Dominguez, a physicist and senior program leader in PPPL's Science Education program, who organized the tours along with Jeanne Jackson DeVoe, of the Communications Office. "While we generally reach an overwhelmingly local crowd, the Obscura Day event also included guests from New York, North Jersey, and Pennsylvania, who heard about us through the event."

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PPPL's Communiversality booth provides fun for all

By Jeanne Jackson DeVoe

PPPPL's booth was once again a crowd pleaser at this year's Communiversality, Princeton's annual arts festival, which reportedly drew 40,000 people this year.

With the help of more than a dozen volunteers, the booth offered something for everyone, with science demonstrations, giveaways, a model of ITER, the international fusion experiment, and a chance to chat with some of PPPL's top physicists and engineers.


"It's really cool," said Tyler Olmstead, 10, of Princeton.

Children and adults had fun with the hair-raising Van de Graaff generator. They enjoyed watching marshmallows expand and shrivel up in the vacuum. They looked at different chemicals through spectroscopic glasses and played with a plasma ball. They also appreciated the sports bags, orange balls, pens and tiny notebooks PPPL distributed for free.

For children like Sara Zins, 13, of North Brunswick, PPPL's booth was a perfect fit. "She loves science, 100 percent," said her mother.

Lydia Biggers, 10, of Roosevelt, said the demonstrations were "awesome." She demonstrated that she might have a future as a plasma physicist. "Everyone thinks the sun is a gas but it's a plasma," she said.

Even adult visitors like Misha Gerschel, who grew up in Princeton but now lives in upstate New York, were captivated. "It's very interesting," she said. "We need a new technology for energy."

The PPPL volunteers who made the booth a success were: John DeLooper, Deedee Ortiz, Atiba Brereton, Stuart Hudson, Yuhu Zhai and his son Andrew, Russell Feder and his son, Brandon, David Gates, Charles Swanson, Jacob Schwartz, Dave Johnson, John Greenwald, and Shannon Greco. 



Atiba Brereton talks to youngsters about the vacuum experiment in which a marshmallow expands in a vacuum and then shrivels when air is let back in. (Photo by Elle Starkman)



Sophia Budny, 6, Bob Budny's daughter, tries out the Van de Graaff generator. (Photo by Elle Starkman)



A little girl has fun with a plasma ball. (Photo by Elle Starkman)



Deedee Ortiz shows the Van de Graaff generator to visitors. (Photo by Jeanne Jackson DeVoe)



Stuart Hudson discusses the ITER model. (Photo by Jeanne Jackson DeVoe)



Among the volunteers were left to right: John Greenwald, Yuhu Zhai, and Zhai's son Andrew, 15. (Photo by Elle Starkman)

Eduroam provides easy web access for collaborators

By Jeanne Jackson DeVoe

Good news for staff members traveling to other institutions or laboratories who have been frustrated with getting good access to the web: Now you can connect to a secure wireless service called eduroam at many institutions to quickly access the Internet.

Eduroam (short for “education roaming”) will allow PPPL students, researchers and staff to connect to Wi-Fi through PPPL at any participating institution simply by opening their laptops. It will also allow collaborators from participating institutions who are visiting PPPL to connect to the Internet via Wi-Fi by authenticating through their home institutions. Once they have done that, they too can instantly connect through their laptops.

“It’s to enable collaboration,” said Mike Zarnstorff, PPPL’s deputy director for research, who first suggested PPPL sign up to use the service. “It’s all a matter of convenience. The whole idea is to increase productivity.”

PPPL-based users can set up eduroam by signing into it from PPPL before using it remotely. Simply select eduroam from the list of available wireless networks and enter your PPPL email address and password. Then, when you’re visiting an institution that has eduroam, the network should pop up automatically. [Instructions are available here](#) and additional instructions will be available on [PPPL’s ServiceNow page](#) soon.

Eduroam is available at about 4,000 institutions in 76 countries. ([A list of all the institutions is available here](#)). Princeton University has belonged to the service for a few years and the Massachusetts Institute of Technology, Harvard and Yale are members, as well as national laboratories such as Fermi Lab, Argonne and Lawrence Berkeley, said Stacia Zelick, PPPL’s chief information officer and head of information technology.

The idea for PPPL joining eduroam came about several months ago when Zarnstorff was visiting the University of Greifswald in Germany. The university only provided guest web access through eduroam. “All my friends were using it but I was out of luck,” Zarnstorff said.

When he came back to PPPL, Zarnstorff was able to sign on to eduroam through Princeton University. He used it during trips to MIT, the University of Maryland, the University of Wisconsin



PPPL’ers can access eduroam on their laptops.

and Argonne National Lab. “It is completely easy, because you just open your laptop and it authenticates automatically,” Zarnstorff said. “You don’t have to get special instructions or a specific password in order to get network access.”

When Zarnstorff brought up the idea of getting eduroam at PPPL with the Laboratory Council, Zelick was already familiar with the service through previous positions at several universities. “A light bulb came on,” Zelick said. “I told my staff, ‘Let’s do it.’”

The Laboratory began piloting eduroam in January and officially began offering the service on April 11, the day before Zelick discussed the service at a Laboratory Management Review meeting. Only a handful of people have begun using it so far.

Eduroam is more secure for travelers than a traditional guest network because all the traffic is encrypted and there is less chance for anyone to eavesdrop, said Kevin Czarnecki, an IT security analyst who helped establish the service along with Ashwini Borkar, a network engineer. By connecting with eduroam, PPPL scientists and visiting scientists at PPPL can use their mobile devices to check their email and therefore avoid using their data, Borkar said.

Borkar said she was able to field test eduroam when visiting her daughter recently. “I was able to test it when I was at my daughter’s college at the University of Pittsburgh,” she said. “It comes in handy!”

Isotope patent

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“This patent is potentially very valuable to PPPL and to Princeton and the general public,” said Laurie Bagley, head of the PPPL Office of Technology Transfer. “It will allow the delivery of cancer diagnostic testing to parts of the world that currently don’t have access.”

Concurred Gentile: “We’re looking for people to invest in some prototype systems. This took six years of our lives to develop,” he noted, “and now here we are.”

The method works by firing high-energy neutrons at a metal target. The contact produces high-energy gamma rays that strike a naturally occurring isotope called Molybdenum 100 (Mo-100), knocking a neutron from the isotope’s nucleus to produce Mo-99, which then turns into Tc-99m.

The method differs radically from today’s centralized systems for producing Mo-99. They employ uranium, a substance that

raises proliferation concerns and that the federal government is looking for ways to replace. The PPPL method uses no uranium and can be installed in hospitals and doctors’ offices, eliminating lengthy supply chains and making the isotope far more accessible to individuals around the world.

Among those working on the project were summer interns, Gentile said. They included Kelsey Pagdon, lead author of a 2011 paper on the method, who earned a bachelor’s degree in biomedical engineering from Drexel University and now is a project manager and research engineer at the Children’s Hospital of Philadelphia.



Charles Gentile

The patent marks the second recognition for the method in 2016. In February, the PPPL process won third prize in the 11th Annual Innovation Forum sponsored by the Keller Center for Entrepreneurship at Princeton University. The highly selective forum draws entrants from throughout the University.

Obscura Day

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PPPL's tours attracted more than 60 visitors who came indoors on a beautiful spring day to see the Laboratory. Many of them came from New York via train and taxi.

One of them was Richard Hirsch, who came with his son Graham, 15. "I had no idea about any of this," Hirsch said. "That you could come here and learn about this is amazing! It's kind of tucked away for some unknown reason."

Dominguez learned about the Atlas Obscura tours through a podcast, "Slate's Political Gabfest," which features David Plotz, the CEO of Atlas Obscura. He emailed Plotz about hosting an Obscura Day tour and Plotz was enthusiastic. Plotz later gave the PPPL tour a shout-out when he promoted Obscura Day on the program.

The morning tour visited PPPL's \$94 million National Spherical Torus Experiment-Upgrade (NSTX-U). Atlas Obscura's Lex Berko live-streamed videos of Dominguez discussing fusion energy in the NSTX-U Control Room, and Al von Halle giving a tour of the NSTX-U. "People seemed really into it," Berko said. "This tour is the one we all had the most excitement about."

The live streams were viewed by 3,000 people on Atlas Obscura's Facebook page. As of April 20, that number had grown to almost 12,000 people. "This really increased the reach of our message," Dominguez said. The videos can be viewed on [Atlas Obscura's Facebook page](#).



Arturo Dominguez shows visitors the model stellarator.

In one video, von Halle recalls how impressed he was as an engineer working on the Tokamak Fusion Test Reactor (TFTR) in the late 1980s and early 1990s to see that the device had plasmas that were up to 500 million degrees C, while a couple of meters away it had cryogenic tubes that were at almost absolute zero. "It's possible because a vacuum is such a good insulator," he explained. "As long as we can keep that vacuum around the plasma we have something equivalent to a star on earth."

The video drew several positive comments. "Love this!" said one viewer. "Perfect Saturday! Sitting in my jammies and still learning something," said another.

Another video was of Dominguez and physicist Clayton Myers giving an overview of the NSTX-U Control Room. Myers explained that the upgrade has made the NSTX-U more powerful. It has already doubled the time of experiments or shots to two seconds, and will eventually have up to five-second shots, he said. At five seconds, the plasma is nearly stationary and unchanging, Myers said. This will allow physicists to investigate conditions almost like a



Atlas Obscura's Lex Berko tries out an experiment in the Science Education laboratory with Arturo Dominguez, right.

steady state machine with superconducting coils, like those that would be used in ITER, the international fusion experiment being built in Cadarache, France, he said.

Michael Zarnstorff, PPPL's deputy director for research, was one of the morning tour guides. He explained that the high temperatures of the plasma causes it to become turbulent. "The turbulence is very complicated," he said. "It's only in the last 10 years that we've had computers strong enough to actually understand that."

The morning tour groups visited NSTX-U, the NSTX-U Control Room, QUASAR, and the Science Education Laboratory. In the afternoon, the tour groups could not tour NSTX-U because of previously scheduled tests, so they instead visited the L Wing or the Hall thruster. The tour guides for the morning tour also included Walter Guttenfelder. The afternoon tour guides were Dominguez, graduate student Brian Kraus and physicist Erik Gilson.

Mark Gebel of Brooklyn had high praise for Gilson. "He answered questions and made it as accessible as possible," he said. Said Tara Quinn Lindsey on Facebook: "So inspiring to be @PPPLab for Obscura Day. Gratitude to Walter & Arturo for making it fun!"

And Edith Kealy of New York said she was impressed by the effort that went into the NSTX-Upgrade. "You don't think of something like this as beautiful but when you get up close, there's something really artistic about this," she said. "There's something that speaks to the core. It speaks to the artist. It speaks to the poet even – the idea of people working together to create something like this. That to me is very poetic. I think everyone should come see it." 📷



Al von Halle gives visitors a tour of NSTX-U.

PPPL goes green for Earth Week

The celebration continues with vendors, Green Machine awards & a movie

P PPL went green last week as it kicked off Earth Week activities with a grounds cleanup, electronics recycling, and Earth Week colloquium.

PPPL started going green with the Lab-wide clean-up day on April 15. The cleanup generated 3,100 pounds, or 1.55 tons, of recycling, which was mostly paper from offices, according to Margaret Kevin-King, PPPL's building and grounds supervisor.

More than 20 volunteers spent a warm spring morning on Tuesday, April 19, cleaning up the PPPL grounds. In the process, they picked up 210 pounds of trash, recyclables, and compost. They were rewarded with a pizza lunch after the cleanup.

On April 20, PPPL'ers brought in home electronics to be recycled by Unicor. The collection brought in 675 pounds of electronics.

Also on April 20, Dale Jamieson of New York University presented a talk on "Living with Climate Change: The Road from Paris," in a special Earth Week colloquium. [G](#)

The festivities continue this week with the following events. More information is available on the Environmental Service Division's [Earth Week website](#).

- **Tuesday, April 26, at 11:45 a.m.—**
A lunchtime walk along the D&R Canal. Meet in the Lower Parking Lot. [Sign up here](#).
- **Wednesday, April 27, noon to 2 p.m.—**
Vendor displays in the LSB Lobby. (Please note the new time).
- **Wednesday, April 27, 1 p.m.—**
Green Machine Awards and viewing of "The Story of Stuff" mini movie. Audience members receive cupcakes, dirt cups (chocolate pudding and gummy worms), and succulent office plants.



Dorothy Strauss picks up trash outside the LSB building. (Photo by Elle Starkman)



Kyron Jones poses with some of the electronics collected on April 20 to be recycled by Unicor. (Photo by Elle Starkman)



Volunteers pause for a photo before starting the cleanup. (Photo by Elle Starkman)



Volunteers attended a pizza lunch in Mod 6. (Photo by Keith Rule)

PPPL Celebrates National Pretzel Day

Tuesday, April 26
1-2:30 p.m. in the Lobby



Join your Lab Council and celebrate National Pretzel Day!

Enjoy a twisted treat or—for those not eating leaven—a macaroon as you network with your colleagues at an informal afternoon get-together.

Join a PPPL bike team to compete in the Federal Bike Challenge next month

PPPL'ers can bike to work, to the grocery store, or anywhere else they can think of as PPPL once again joins the Federal Bike Challenge in honor of National Bike Month in May.

[You can register for a PPPL team here.](#) One of four team captains will contact you with registration information. Then all you have to do is log your cycling miles during May for all your bike rides at home and to work.



There will be a breakfast meeting on May 3 at 8 a.m. for anyone who has registered or who wants more information. Stay tuned for more details.



Some members of last year's PPPL Bike Challenge team take a lunchtime ride last year.



Shannon Greco lights up a fluorescent tube with a Tesla coil during demonstrations at Material Science & Nano Day at Princeton Public Library on April 16. Greco highlighted contributions of famous female astronauts such as Annie Jump Cannon, who manually classified a record 350,000 stars. Volunteer Atiba Brereton also brought in a plasma-facing tile from the NSTX-U to demonstrate the importance of material science in plasma physics and fusion science. The event was sponsored by the Princeton Center for Complex Materials, an NSF-funded center at Princeton University. Other volunteers were Charles Swanson and Jacob Schwartz. (Photo by Atiba Brereton)

Robotics coaches needed for all-girls robotics teams

PPPL's Science Education team is looking for volunteer coaches for a new all-girls FIRST Lego League Robotics team (ages 9 to 13) and the new FIRST Tech Challenge Team (ages 13 to 18) being organized in collaboration with the YWCA-Princeton.

The teams will meet throughout the fall semester and there are lots of events throughout the spring and summer to engage everyone. The program welcomes volunteers with all kinds of skills. This includes not only those with engineering, robotics, and building skills, but also volunteers with the ability to mentor students and help build leadership, teamwork, research, and social engagement skills. Coaching the teams is a rewarding experience that is, as one of the teams' founders put it, "the hardest fun you'll ever have!"

**Please call Shannon Greco ASAP to volunteer:
sgreco@pppl.gov, 609-243-2208.**

COLLOQUIUM

Probing the Accelerating Universe with the Dark Energy Survey

Dr. Joshua Frieman
Fermilab and the University of Chicago



Wednesday, April 27
4:15 p.m., M.B.G Auditorium, Lyman Spitzer Building

BROCK

MARK GAZO
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 April 25	Tuesday April 26	Wednesday April 27	Thursday April 28	Friday April 29
COMMAND PERFORMANCE Chef's Feature	Crunchy Potato Chip Chicken served with Macaroni & Cheese	Baked Stuffed Shells served with Tomato Cucumber Salad & Garlic Bread	COMMAND PERFORMANCE Create your own Burrito Bar	Beef Brisket with Roasted Potatoes & Carrots	Eggplant Parmesan served with Pasta
Early Riser	Vegetable Breakfast Burrito	Scrapple with 2 Eggs any style & Potatoes	Strawberry French Toast	Ham, Egg & Cheddar Croissant	Spaghetti with Bacon & Eggs
Country Kettle	Chicken Noodle	Tomato Tortellini Bisque	Corn Chowder with Bacon, Cheddar & Potato	Black Bean Cilantro	Chicken Vegetable Soup
Grille Special	BURGERLICIOUS As Gouda As It Gets Burger Grilled Beef Burger smothered with smoked gouda, caramelized onions, and garlic-roasted wild mushrooms topped with Applewood bacon jam on a grilled brioche roll (Available All Week)	Potato Skins stuffed with Bacon, Broccoli, Cheddar Cheese & Sour Cream	Homemade Tuna Burger served on a Wheat Roll	Sausage Peppers & Onion Torpedo	Turkey Burger with Cheddar Cheese, Avocado & Guacamole on a Kaiser Roll
Deli Special	Egg Salad Wrap with Avocado	Veggie Burger on a Wheat Roll with Hummus, Lettuce & Tomato	Salami & Fontina Panini with Tomato & Banana Peppers	Corned Beef , Swiss Cheese, Coleslaw & Russian Dressing on Rumpelstiltskin	Italian Hoagie Cut from a 6-Footer!!
Panini	The Cubano- Roast Pork, Ham, Swiss, Pickles & Dijonnaise on a Ciabatta	Chicken Breast with Artichoke & Mushrooms on French Bread with Parmesan Cream Sauce	Breaded Chicken Cutlet on Ciabatta Bread with Ham, Salami, Provolone & Marinated Roasted Peppers	Chicken Salad with Bacon & Swiss Melt on Ciabatta	Flank Steak Quesadilla

MENU SUBJECT TO CHANGE WITHOUT NOTICE

VEGETARIAN OPTION

WEEKLY

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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/>.