

Calendar of Events

THIS WEEK

TUESDAY, OCT. 11

Tour Guide Meeting and Training
9:30-11:30 a.m. ♦ MBG Auditorium
[See page 4 for details.](#)

WEDNESDAY, OCT. 12

PPPL Colloquium
4:15 p.m. ♦ MBG Auditorium
[Estimating the Age of Life
Using Moore's Law](#)
Alexei Sharov, National Institutes
of Health

THURSDAY, OCT. 13

**Laboratory Management Review
meeting (LMR)**
8:30 a.m.-12 p.m.

FRIDAY, OCT. 14

**Princeton University Freshman
Families Tour of PPPL**
2 p.m.

SATURDAY, OCT. 15

**Princeton University Freshman
Families Tour of PPPL**
2 p.m.

UPCOMING

WEDNESDAY, OCT. 19

PPPL Colloquium
4:15 p.m. ♦ MBG Auditorium
[Flight of the Fruit Fly](#)
Itai Cohen, Cornell University

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FTC: Highlighting the key role of engineering in fusion energy

By John Greenwald

Few groups are more central to fusion engineering than a committee within the Institute of Electrical and Electronics Engineers (IEEE). Known as the [Fusion Technology Standing Committee \(FTC\)](#), it is part of the IEEE's Nuclear & Plasma Sciences Society (NPSS) and represents nearly all major fusion laboratories around the world. Roles of the committee and the NPSS range from networking with colleagues to drafting white papers on energy to organizing the biennial Symposium on Fusion Engineering (SOFE), a worldwide gathering that provides key opportunities for exchanging information on the latest developments in fusion engineering.



Charles Neumeyer

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PPPL on lockdown for emergency drill

By Jeanne Jackson DeVoe

Some 400 PPPL employees took cover inside darkened offices or other locations on the morning of Sept. 30 during an emergency lockdown drill simulating an active shooter in the Lyman Spitzer Building (LSB).

The drill revolved around a scenario of an unidentified gunman entering the cafeteria of the LSB and opening fire, then making his way to the third floor, killing eight people and injuring five, and then killing himself on the third floor.



Plainsboro police entering the second floor of the LSB to "sweep" the building.
(Photo by Lt. Fred Tavener, Plainsboro Police)

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PPPL intern helped build components for a “zero knowledge” system

By Jeanne Jackson DeVoe

Joseph Labrum spent his summer internship building components to upgrade an experiment that successfully compared physical objects without learning anything about the objects themselves. Such a “zero-knowledge protocol” system is a promising first step toward a technique that could possibly be used in future disarmament agreements, pending the results of further development, testing, and evaluation. While important questions remain, the system might have potential application to verify that nuclear warheads are in fact true warheads without revealing classified information. (See article, [“PPPL and Princeton demonstrate novel technique that may have applicability to future nuclear disarmament talks.”](#))

Labrum is a senior at the University of California-Berkeley studying nuclear engineering. He helped create a precise device for counting the bubbles in detectors used in the experiment by working with Sébastien Philippe, a graduate student in the Princeton University Department of Mechanical and Aerospace Engineering, and Robert Goldston, a fusion scientist, professor of astrophysical sciences at Princeton and former director of PPPL.

“The idea is to have better statistics, better accuracy, for the next phase of our zero-knowledge experiments” said Philippe, lead author of a paper published in *Nature Communications* in September that described the system. “This is very important work to be able to detect smaller and smaller changes in objects that are not that different from each other,” he said of the improved method for counting bubbles. Coauthors of the paper together with Goldston were Alex Glaser, associate professor in Princeton’s Woodrow Wilson School of Public and International Affairs and the Department of Mechanical and Aerospace Engineering, and Francesco d’Errico, senior research scientist at the Yale University School of Medicine and professor at the University of Pisa, Italy.

The device Labrum assembled can be remotely operated, allowing two different parties to view the number of bubbles in the detectors, Goldston said. And using a series of photos or “movies” for tracking the bubbles could produce a more accurate count. “The problem is bubbles tend to hide behind each other,” Goldston said. “We need to develop a better method to measure how many bubbles are in this bubble counter.”

Labrum was one of 23 Science Undergraduate Laboratory Internship (SULI) students at PPPL this summer in a program sponsored and managed by the DOE Office of Science’s Office of Workforce Development for Teachers and Scientists. He plans to present a poster on his project at the American Nuclear Society Winter Meeting and Nuclear Technology Expo to be held in Las Vegas in November.

Building a bubble-counting device

Working from Philippe’s designs, Labrum fitted a small optical table inside a breadbox-sized container. He then installed a turntable that rotated a collection of tubes filled with Yale-created bubble detectors. The bubbles form when high-energy neutrons interact with a specially designed mixture of fluids filling the detectors.

Labrum next connected a light, along with a mirror and a diffuser, to shine light evenly onto the bubble detector. He positioned a camera to take high-quality images of the bubbles as the turntable rotated. Connected to the camera is a small credit-card size computer that collects and analyzes data recorded by the detectors that results from the neutron interaction with a variety of objects.

Labrum also worked on a computer program that would count the number of bubbles by pinpointing the center of



Joseph Labrum, a Science Undergraduate Laboratory Internship student at PPPL this past summer, holds a bubble detector. (Photo by Elle Starkman/PPPL Office of Communications)

each one. When the program is completed, the goal is to accurately count 1,000 bubbles per vial, about 10 times more than the current capability, according to Philippe.

The coding was challenging. “I am not a coder,” Labrum said. “That kind of coding was not in my skill set prior to the internship.” He got up to speed by reading articles provided by Philippe and Goldston.

Philippe said researchers chose Labrum to work on the project because he was a nuclear engineering major who had already garnered a lot of experience at laboratories. “Joe was a very good fit,” Philippe said. “He had a natural sense of how to build practical, useful systems, while understanding the theory behind it.” “He did a beautiful job putting together this instrument,” Goldston said.

Returning to N.J. for internship

A native of North Hanover, a small town in Burlington County, New Jersey, Labrum said he enjoyed being back home with his family for the summer during his internship. “Being home and being at one of the best labs in the world was pretty nice,” he said.

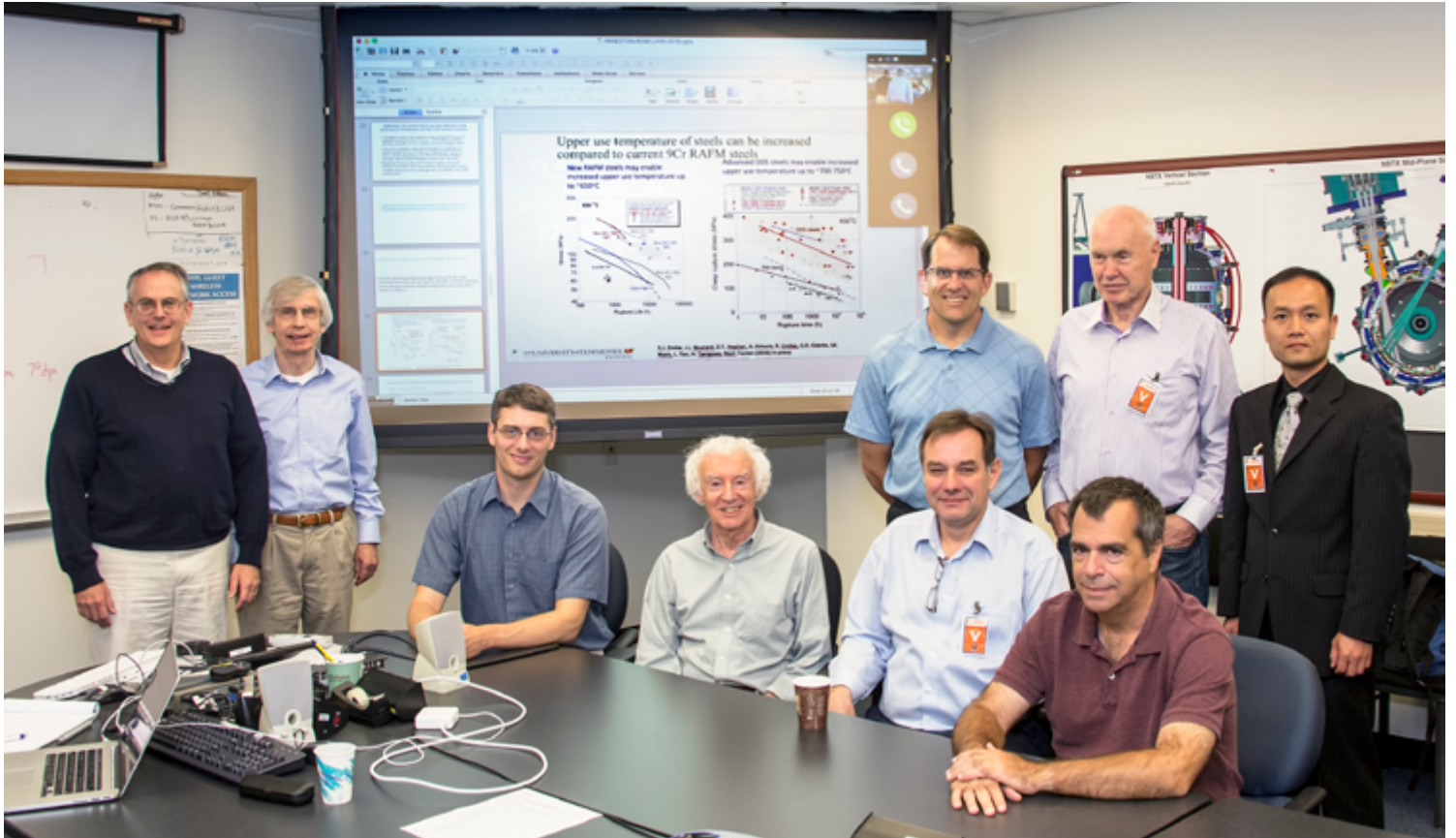
Labrum first learned about nuclear engineering in a middle school class on careers. He became interested in nuclear non-proliferation in a college class on “analytical methods to non-proliferation.” As a sophomore, he worked at Lawrence Berkeley National Laboratory on a computer code that modeled radiation from a decommissioned reactor in Baghdad, Iraq. Last year, he worked with researchers at the National Ignition Facility at Lawrence Livermore National Laboratory on the redesign of a soft X-ray imaging camera that was used as a diagnostic tool.

Labrum said he would encourage other students to apply for the SULI internship and to take full advantage of the experience when they’re here. “It’s definitely very rewarding,” he said. “You should meet as many people as you can when you’re at PPPL because you’re surrounded by some of the most talented people in the field.”

The next step for Labrum will be applying to graduate school to get his Ph.D. in nuclear engineering. He hopes he might return to Princeton as a graduate student. Meanwhile, he and Goldston have discussed a new mathematical approach to counting the bubbles in detectors that might someday play a role in verifying future arms control agreements.

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Chuck Kessel leads semi-annual FNSF planning session



Scientists gathered at PPPL last week to discuss possible designs for a Fusion Nuclear Science Facility, a proposed tokamak that could develop materials and components for a fusion reactor and serve as a link between ITER and a demonstration power plant. The group, led by PPPL Engineer Chuck Kessel, has met twice a year for the past three years and will summarize their observations and recommendations in a series of papers in *Fusion Engineering and Design*. The group will begin another set of sessions to discuss liquid metal plasma-facing components for an FNSF in 2017. Front row from left: Chuck Kessel; Tom Rognlien, Lawrence Livermore National Laboratory; Greg Wallace, MIT; Arthur Rowcliffe, consultant; Juergen Rapp, Oak Ridge National Laboratory; Mark Tillack, consultant. Rear row: Jake Blanchard, University of Wisconsin; Siegfried Malang, Karlsruhe, Germany, consultant; Wu Wen, General Atomics. Not shown: Andy Davis, University of Wisconsin; Sergey Smolentsev, UCLA.

FTC

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The FTC seeks to call attention to the important role of engineering in fusion energy development. It recognizes outstanding fusion engineers with the annual Fusion Technology Award, awarded to PPPL's Chuck Kessel in 2015, and the outstanding Student Paper Award at each SOFE conference.


"The SOFE conferences are invaluable community gatherings that stimulate cross-fertilization of ideas, establish professional relationships, and promote cohesion among engineers working within a field that tends to be dominated by physicists," said engineer Charles Neumeyer, who heads engineering for PPPL's National Spherical Torus Experiment Upgrade (NSTX-U) and in January became chair of the Standing Committee, a four-year position. The next conference, expected to attract more than 400 engineers, physicists and other science professionals, will be in June 2017 in Shanghai, China, and will be the first to be held outside the United States since the event began in 1965.

Leading the planning for this event is Hutch Neilson, head of the Advanced Projects Department at PPPL and a member of the Standing Committee. "We chose China because it has a dynamic fusion program that is rapidly growing and can provide local support through the Institute of Plasma Physics Chinese Academy of Science (ASIPP), with which we collaborate," said Neilson.

PPPL has played a crucial role in planning these conferences. It led the organization of SOFE in Princeton in 1973; Philadelphia in 1983; Atlantic City in 2002; and Chicago in 2011. An added feature next year will be emphasis on education, with five short courses available for students and experienced researchers alike. The conference planners have established a fund to support student participation in the conference.

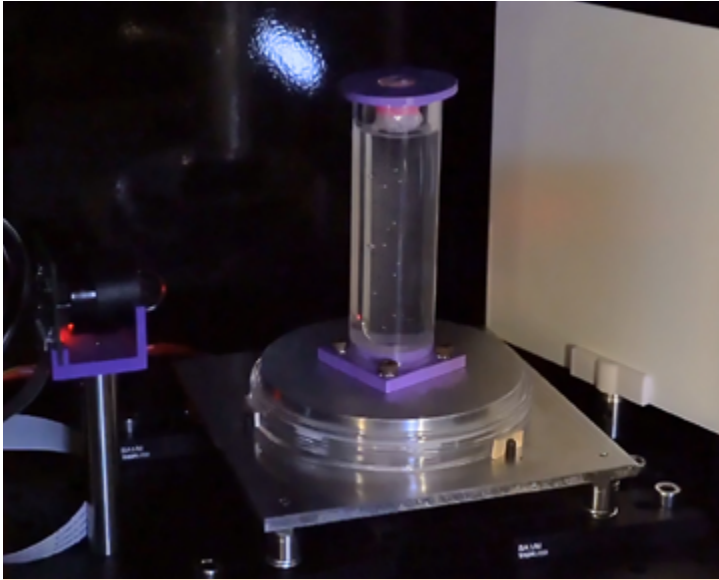
PPPL staffers active in planning SOFE 2017 include Neumeyer, finance chair; Charles Gentile, fundraising chair; Kathleen Lukazik, registration chair; Chris Cane, webmaster; Pamela Serai, administrative assistant; Kyle Palmer, graphic designer; and Doug Loesser, who is arranging a reception for a Women in Engineering program.

All PPPL engineers and science professionals are welcome to join the NPSS, Neumeyer said. "Membership provides many opportunities to engage the fusion community and beyond through the avenues provided by IEEE," he said. "[Special programs](#) exist for women in engineering, young professionals and more."

Moreover, "Networking with engineers, scientists, and managers from academia, companies, and laboratories is a great way to build enduring personal and professional friendships, and to advance in your career and professional accomplishment," he said. To open an IEEE account, explore the benefits of membership and to join, [click here](#). 

Intern


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The bubble detector, at right, inside the device Labrum constructed. (Photo by Elle Starkman/PPPL Office of Communications)

“Nuclear disarmament is a big thing,” Labrum said. “The world should strive to control the amount of nuclear weapons and know how many each country has and limit each country.”

Seed money for the original research came to Princeton from The Simons Foundation of Vancouver, Canada, through a nonprofit called Global Zero. Current research is funded by the DOE’s National Nuclear Security Administration (NNSA) through the Consortium for Verification Technology.

Established by Congress in 2000, NNSA is a semi-autonomous agency within the U.S. Department of Energy responsible for enhancing national security through the military application of nuclear science. NNSA maintains and enhances the safety, security, and effectiveness of the U.S. nuclear weapons stockpile without nuclear explosive testing; works to reduce global danger from weapons of mass destruction; provides the U.S. Navy with safe and effective nuclear propulsion; and responds to nuclear and radiological emergencies in the U.S. and abroad. Visit nnsa.energy.gov for more information. 

Tour Guide Meeting & Training Oct. 11 at 9:30 a.m.

New and experienced tour guides are invited to a tour guide meeting & training on Tuesday, Oct. 11 from 9:30 a.m. to 11:30 a.m. in the MBG Auditorium. Bring your friends! We’ll have refreshments, tee shirts for new tour guides, and we’ll go over what’s new in the tour program. Then we’ll have a tour training session on tour demos, highlights of our tours, and a tour for new tour guides.

To sign up to be a tour guide or for more information contact Jeanne Jackson DeVoe, jjackson@pppl.gov, ext. 2757.

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.

Emergency drill

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An announcement over the Emergency Evacuation Systems (EVES) at 9:35 a.m. told employees to immediately take shelter where they were, lock their doors, and turn off all phones and devices until further notice.

Following the 25-minute lockdown drill, members of PPPL's Emergency Response Organization (ERO), led by Erik Perry, emergency director, gathered in the alternate emergency operations center in the Emergency Services Building to respond to the incident.

The annual drill is necessary to teach emergency responders and staff how to respond to emergencies, said John DeLooper, head of best practices and the planning officer of the ERO. "It's like any skill: You have to practice it. And that's why we do these exercises. You have to do drills to hone your skills and be ready for any situation, regardless of the emergency."



Plainsboro police in the cafeteria. (Photo by Lt. Fred Tavener, Plainsboro Police)

Plainsboro police officers swept the LSB during the lockdown, while members of the Emergency Services Unit (ESU), directed by Acting Capt. Wes Foraker, closed off entrances to the campus and the building. Some 35 staff members served as building monitors by testing office doors to see if they were locked in all the buildings at PPPL, DeLooper said. Plainsboro Police Cpl. Russ Finkelstein served as the Plainsboro Police exercise supervisor and incident command officer.

Fran White, head of Site Protection, said the drill generally went well. "The vast majority of people responded quickly and resolutely," he said. "Exercise observers reported that his place largely became a ghost town, which was excellent."

Only a few stragglers who didn't hear the EVES announcement came into the hallways from restrooms or offices rather than sheltering in place. White noted that if people failed to follow instructions in a real-life situation, they would be "unnecessarily exposing themselves to a dangerous encounter."

Creating awareness

Teaching staff how to respond in dangerous situations is part of the reason for the drill, DeLooper said. "Unfortunately this type of event happens," he said. "Part of what we want to do is make people aware of what they should do if they're at the mall and there's a shooter. You should know what to do and take actions to protect your family."

If there were such an event in real life, the lockdown would have lasted far longer and employees would be released



Views of empty hallways on LSB East during the lockdown drill on Sept. 30. (Photo by Michael Gonzalez).

from the lockdown one at a time and escorted from the building once they were cleared by police, DeLooper said. Employees who witnessed the event would be retained for questioning. The parking lot would be part of the crime scene, so employees would be bused off the PPPL campus to B Site, DeLooper said.

A big priority in such an event is communicating what happened to the media, DeLooper said. Larry Bernard, director of communications, quickly wrote a press release about the scenario as it "developed" as part of the exercise.

The emergency team would also have to work quickly to identify the dead or injured and to notify their families and to put people in place to lead the emergency operations if senior managers were incapacitated.

About 14 PPPL and Princeton Site Office staff worked with Plainsboro Police for several months as a planning committee to prepare and administer the exercise. Three other staff members also helped out by making the "emergency" calls to ext. 3333 to "report" bangs, shots, and screams.

Plainsboro Police Chief Guy Armour said the feedback he received about the drill "was entirely positive." "The drill encompassed key threat components that are essential for helping our department prepare and evaluate our emergency management drill and exercise planning," he wrote in an email to White. "Your staff was enthusiastic and professional throughout the drill." 📧



Fran White, center, the head of Site Protection, at the debriefing following the drill in the auditorium. (Photo by Lt. Fred Tavener, Plainsboro Police)

Director of Omega Facility tours Laboratory



Sam Morse, center, and his son Nathan, right, along with Morse's wife, Lauren, took a tour of PPPL with physicist Devon Battaglia, left, on Oct. 3. Morse is the Omega Facility Division director at the University of Rochester's Laboratory for Laser Energetics. Terry Brog, interim director for PPPL, and Michael Zarnstorff, deputy director for research, greeted Morse and his family before the visitors toured the Laboratory, stopping at the NSTX-U control room and the NSTX-U test cell. *(Photo by Lauren Morse)*

Korea Hydro & Nuclear Power Company delegation tours PPPL



Ray Camp, right, speaks to visitors from the Korea Hydro & Nuclear Power Company in the NSTX-U test cell. About 15 people from the company visited on Sept. 29. The group heard a lecture from physicist Joon-Wook Ahn, before visiting the NSTX-U control room and the NSTX-U, led by Ahn and Camp. *(Photo by Raphael Rosen)*

COLLOQUIUM

Estimating the Age of Life Using Moore's Law



Alexei Sharov
National Institutes of Health

Wednesday, Oct. 12

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

Wanted: Undergraduate women interested in physics for January conference

What: Apply now for the 2017 Conference for Undergraduate Women in Physics.

When: Oct. 14 deadline for the Jan. 13-15 conference.

Where: Princeton University

Cost: The conference, lodging and meals are covered. Students pay \$45 registration fee and transportation.

Applications and more information: cuwip.princeton.edu
or contact Shannon Swilley Greco, sgreco@pppl.gov, ext. 2208

Boy Scouts STEM Fair, October 22

Volunteers needed

Subject experts in physics and engineering are especially needed to plan workshops.



Please contact Rob Sheneman, rshenema@pppl.gov, ext. 3392, to volunteer.

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 10	Tuesday October 11	Wednesday October 12	Thursday October 13	Friday October 14
COMMAND PERFORMANCE Chef's Feature	Beef Chili Boule with Assorted Toppings	Baked Manicotti with Garlic Bread	Maple-Glazed Ham served with Au Gratin Potatoes & Roasted Squash & Zucchini	Traditional Sauerbraten	Teriyaki-Grilled Salmon with Roasted Edamame and Rice
Early Riser	Bacon, Egg and Cheese Croissant	Italian Meat & Cheese Omelet topped with Wilted Spinach with Home Fries	Potato, Roasted Pepper & Sundried Tomato Casserole with 2 Eggs any Style	Cinnamon-Raisin Pancakes with Homemade Apple Compote	Brunch Panini with Prosciutto, Provolone, & Strawberry Preserves
Country Kettle	Manhattan Clam Chowder	Potato Corn Chowder	Chicken Noodle	Tomato Soup	Turkey Chili
Grille Special	Grilled Ham and 3 Cheeses on Challah Bread	Fried Salami and Cheddar on a Kaiser	Cheese Calzone with Marinara Sauce	Knockwurst & Sauerkraut with Braised Cabbage & German Potato Salad	BBQ Tempeh Wrap with Cheddar Cheese, Peppers & Onions
Deli Special	Turkey Bruschetta on Ciabatta	Asiago Roast Beef Toasted Ciabatta with Grilled Onion, Tomato & Horseradish	BBQ Pulled Chicken on a Kaiser Roll	Turkey Pastrami Sloppy Joe	Autumn Chicken Salad on Multigrain Bread
Panini	Pastrami and Swiss Flatbread	Fried Fish with Cheddar, Tomato & Tartar Sauce Torpedo	Breaded Chicken Cutlet with Ham, Swiss Cheese, Lettuce & Honey Mustard Ciabatta	Curried Lentil & Brown Rice Wrap	Texas BBQ Beef topped with Southwest Slaw on a Kaiser Roll

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 ♦ PPPL WEEKLY is archived on the web at: <http://w3.pppl.gov/communications/weekly/>.