PPPL PRINCETON PLASMA PHYSICS LABORATORY
A Collaborative National Center for Fusion & Plasma Research
U.S. DEPARTMENT OF ENERGY
WEEKLY
September 25, 2017

THIS WEEK

WEDNESDAY, SEPT. 27

Weekly Lunchtime Leadership Chat
12 p.m. ◆ Cafeteria
Dave McComas, Princeton University Vice President for PPPL
See page 9 for details.

UPCOMING

WEDNESDAY, OCT. 4

PPPL Colloquium
4:15 p.m. ◆ MBG Auditorium
High-Yield Neutron Generators for Industrial Applications
Ross Radel, Phoenix Nuclear

FRIDAY, OCT. 6

American Red Cross Fall Blood Drive
8 a.m.–1 p.m. ◆ Blood mobile by the Warehouse near Mod VI
See page 8 for details.

WEDNESDAY, OCT. 11

PPPL Colloquium
4:15 p.m. ◆ MBG Auditorium
Overview of the Basic Plasma Science Facility
Troy Carter, University of California - Los Angeles

WEDNESDAY, OCT. 18

PPPL Colloquium
4:15 p.m. ◆ MBG Auditorium
Properties and Degradation of Polyimide in Extreme Hygrothermal Environments
Professor Alan Zehnder, Cornell University

INSIDE

PPPL'ers have a blast at Big Bang Bash

By Jeanne Jackson DeVoe

PPPL'ers got to take a break, relax, enjoy good food and have some fun Sept. 15 at the Big Bang Bash. Staff tried on costumes at the cultural fair, checked out antique and specialty vehicles at the car show, played numerous games and just relaxed and talked with one another.

The picnic extended from the lawn in front of the Lyman Spitzer Building near the upper parking lot to the D Site parking lot, where the vehicle show was located. People got to vote for their favorite chili in the chili cook-off, match faces to names at the "Name the Face" game, play volleyball, or sit and listen to music and sample food from the buffet line and cultural fair. There was also a popular ice cream truck.

Angela Powell, right, and Margaret Kevin-King show off a display on Liberia and Nigeria dressed in native costumes as Hutch Neilson looks on at the Big Bang Bash cultural fair. *(Photo by Russ DeSantis*

continued on page 4

Discovered: A quick and easy way to shut down instabilities in fusion devices

By John Greenwald

Scientists have discovered a remarkably simple way to suppress a common instability that can halt fusion reactions and damage the walls of reactors built to create a "star in a jar." The findings, published in June in the journal *Physical Review Letters*, stem from experiments performed on the National Spherical Torus Experiment-Upgrade (NSTX-U), at PPPL.

The suppressed instability is called a global Alfvén eigenmode (GAE) — a common wave-like disturbance that can cause fusion reactions to fizzle out. Suppression was achieved with a second neutral beam injector recently installed as part of the NSTX-U upgrade. Just a small amount of highly energetic particles from this second injector was able to shut down the GAEs.

continued on page 7

Invention Recognition Reception marks a banner year for PPPL inventors

By Jeanne Jackson DeVoe

There was a lot to celebrate at PPPL's Inventor Recognition Reception on Sept. 13 – with three inventions receiving patents last year, the most in the Lab's history. Several inventors also received awards and 40 inventors filed 20 invention disclosures.

The reception, held this year at Acacia Restaurant in Lawrenceville, New Jersey, is an annual event sponsored by the Technology Transfer Office that recognizes inventors from the previous year. It was organized by Laurie Bagley, head of Technology Transfer, and administrator Aileen Pritch.

Rich Hawryluk, PPPL's interim director, served as master of ceremonies.

Terry Brog, PPPL's deputy director for operations, with administrator Aileen Pritch, who helped organize the event.

Enjoying the reception are from left: Barbara Kolemen, Mary Dolan, Richard Majeski and Egemen Kolemen.

Ken Silber, Adam Cohen, and Debra Cohen.

Bagley noted that inventions last year ranged from a method of preventing contamination on optical surfaces during the production of nanomaterials to a concept for a device to detect distracted or aggressive drivers in real-time. "Thank you for all your hard work and creative ideas," Bagley told the inventors.

Rich Hawryluk, PPPL's interim director, also thanked the inventors for their innovative ideas to support fusion energy research and to solve problems outside the Laboratory. "If we can help society and help individuals with the work we do, then we have an added benefit to society," he said.

Hawryluk said he was saddened by the absence of physicist and inventor Robert Woolley, who passed away in August 2016. Woolley filed an invention disclosure last year for his concept of a dual tokamak. "Bob was an old friend who's no longer with us," Hawryluk said. "He was a very creative person whom I worked with for many years."

Among the many people recognized at the event, engineer Charles Gentile was named the most frequently. Gentile and his collaborators Adam Cohen, the former deputy director for operations of PPPL, and engineer George Ascione, received a patent last year for an on-demand method to produce the badly-needed isotope technetium 99-m. The substance is used in more than 40 million diagnostic tests each year, according to the World Nuclear Association website. The three inventors received a 2016 Thomas Alva Edison Patent Award for the invention. They also were awarded third place and received $5,000 as part of Princeton University's Innovation Forum Award. Gentile received the 2016 New Jersey Inventors Hall of Fame Innovators Award for the research.

continued on page 3

Laurie Bagley with Charles Gentile.

Dave McComas describes the design, mission and accomplishments of IBEX to a PPPL colloquium

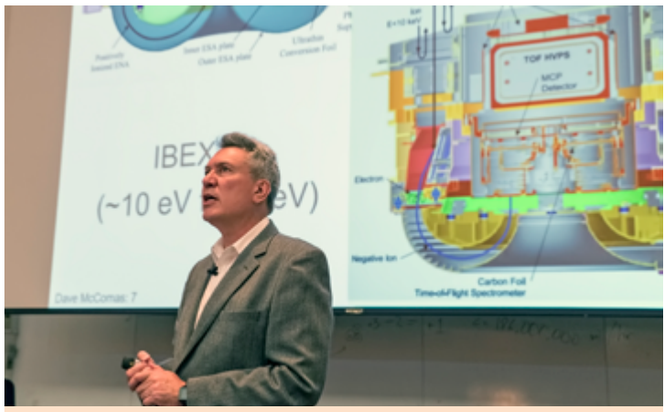
By Larry Bernard

Much of the knowledge about how the solar wind interacts with the interstellar medium at the edge of the solar system, and with the heliosphere, the bubble the million-mile-per-hour solar wind creates around the solar system, can be attributed to a relatively small but mighty mission that has been in orbit since October 2008.

The Interstellar Boundary Explorer, or IBEX, is about the size of a card table and has been remotely imaging and collecting data about the solar wind's interaction at the boundaries of the sun's influence. Dave McComas, Princeton University vice president for the Princeton Plasma Physics Laboratory (PPPL) who leads the IBEX mission, explained the scientific and engineering challenges and findings to about 100 PPPL staff members at a colloquium on Wednesday, Sept. 20.

"We had to figure out how to make these measurements. There was no prior way to do it," McComas said. It was a great example of how "experimental physicists and engineers working together to invent new ways to observe things that had never been possible before." McComas described the design for the two instruments: "A Bundt pan shape," he said, that has a very large aperture around the perimeter and focuses the particles into the much smaller central regions, and it was a critical design innovation to make the two large single-pixel cameras – one for high-energy neutral atoms, one for low-energy. "We then pointed them perpendicular to the spacecraft's spin axis and regularly repoint that axis toward the sun as the Earth's motion caused it to drift off."

That way, "every six months we can see all directions in space and view the whole sky," he said. As a result, the IBEX team was able to make roughly 50 discoveries and "firsts" in space physics, publishing several hundred papers over a decade. In addition to the instrumentation and construction, the team had to invent its own orbit-raising system and provide an extra stage rocket to carry IBEX from low Earth orbit where



Dave McComas at the Sept. 20 colloquium.
(Photo by Elle Starkman)

NASA's launch delivered it to about 50 Earth radii away from Earth – nearly out to the orbit of the moon.

The mission, which came in under budget, was meant to last two years, but IBEX is still operating after nine. Among its discoveries was a giant ribbon of enhanced energetic neutral particles that come from the solar wind and interact at the edge of the heliosphere before they return back toward the sun. This ribbon of energetic neutral atoms had not been anticipated by any model or theory before IBEX observed it.

What's next? McComas said an Interstellar Mapping and Acceleration Probe (IMAP) mission that NASA is currently soliciting proposals for what would be the big next step. "This has been a remarkable mission of discovery and exploration," he said of IBEX as he closed his talk by thanking "all of the outstanding team members that made the mission such a great success."

The address was the first PPPL colloquium of the new academic year, kicking off the series of weekly science-related talks by experts from the Lab and elsewhere.

Inventor Recognition Reception

continued from page 2

Manfred Bitter and his collaborators Kenneth Hill and Philip Efthimion received a patent for a 2D x-ray imaging system for hot plasmas that could be used in an x-ray Bragg crystal spectrometer and could also be used in EUV lithography to manufacture the next generation of computer chips. Bitter also received a 2016 New Jersey Inventors Hall of Fame Innovators Award for the invention.

Inventors Yevgeny Raitses, Alexandros Gerakis, Yao-Wen Yeh, and Alex Merzhevskiy.

The third patented invention last year was the concept of a fusion-powered rocket that can produce enough thrust and power to be used in deep space exploration. It was invented by PPPL physicist Samuel Cohen and his collaborators at Princeton Satellite Systems: Gary Pajer, Michael Paluszek, and Yosef Razin.

PPPL'ers also applied for patents on three technologies last year. They were: Michael Jaworski and Jacob Schwartz for an electrical detector for detecting liquid metal leaks based on a metal's electrical conductivity; Sam Cohen and Matthew Chu-Cheon, for a system and method for small, clean, steady-state fusion reactors; and Michael Gomez, Cara Bagley, Benjamin Tobias, Ali Zolfaghari, Alexandros Gerakis, and Mary Angelique Demetillo for a self-aligning mirror device for transmission offset correction.

The inventors each received a certificate and $100 for each patent, patent application, or invention disclosure.

"There was a lot of recognition for PPPL technologies last year," Bagley said after the event. "Taking technology outside the Laboratory to make the world a better place is the mission of technology transfer. I hope more people at PPPL will be inspired to become inventors."

Big Bang Bash

continued from page 1

"Our goal quite simply was for everyone to have a break from their regular workday and to have fun," said Tori Sikkema, the procurement specialist who was the project manager for the event. "Everyone is working so hard, and it was a good time for all of us to come together in a relaxing environment. I think the food, games, exhibits, and cultural fair provided something for everyone. It was gratifying to see so many people engaging and interacting with others from across the Lab. That's what the Big Bang Bash was all about."

People seemed to enjoy spending time with one another outside the office. "It's a terrific event. It's going beautifully," said Rich Hawryluk, PPPL's interim director. "The food was great but it was really great just for everyone to be here with their friends in an atmosphere where we are enjoying each other's companionship and not just talking shop."

Added Kristen Fischer, PPPL's chief financial officer and one of the sponsors of the event. "I love to see so many smiling faces – people laughing and talking to each other. The Big Bang Bash reminded all of us that we can have fun together."

China, India, Vietnam, and several other countries and cultures were represented in interactive displays at the cultural fair. PPPL'ers lined up to sample roast pork and other dishes from Puerto Rico prepared by Deedee Ortiz, of Communications and Public Outreach. Many people also tried on native costumes from Nigeria and Liberia courtesy of Margaret Kevin-King, head of Facilities, and Angela Powell, of Plasma Science & Technology.

Rich Hawryluk perches on the dunk tank. To his left is volunteer Kevin Lamb.

Volleyball players reach for the ball.

Russell Feder loses a friendly game of giant Jenga to Kathleen Lukazik.

The high point for many people was watching the Laboratory's leaders gamely get dunked at a dunk tank, to the applause and cheers of the crowd. Terry Brog, deputy director for operations, and David Carle, head of Facilities, both wore a suit and tie for the occasion. Rich Hawryluk was first up in the tank. Mike Zarnstorff, deputy director for research; Valeria Riccardo, head of Engineering; Chelle Reno, Princeton University assistant vice president for operations; Marc Cohen, interim head of Information Technology; Hutch Neilson, head of Advanced Projects; and Andrew Zwicker, head of Communications and Public Outreach, all got dunked by eager staff members throwing a ball at a target that dropped the victims into the water. The dunk tank was Keith Erickson's favorite activity. "The party team did a great job," he said. "It's pretty neat seeing everyone line up for the dunk tank!"

Soha Aslam tries out an Indian outfit.

Packing snack bags prepared in the community service project are, from left: Andrea Moten, interim head of Human Resources; Tori Sikkema, the project manager for the Big Bang Bash; Kristen Fischer, PPPL's chief financial officer, and John Santana, of United Way of Mercer County.

continued on page 5

Big Bang Bash

continued from page 4

Many people also took part in a community service activity in which volunteers packed snacks and drinks donated by PPPL'ers into bags. The activity yielded 1,000 snack bags that will be distributed to underprivileged school children for after-school snacks, said John Santana, director of financial empowerment and community engagement at United Way of Mercer County.

The picnic was emceed by Arturo Dominguez, of Science Education, with John Wertenbaker, of Engineering, serving as deejay. Engineer Marc Sibilia brought along a huge speaker, which he built at home, so that the music could be heard all over the campus. "It was awesome," Dominguez said. "It was really fun and of course the emcee did a great job!"

Another highlight was a friendly game of "PPPL Family Feud," in which two teams competed to answer questions about PPPL's history, like "What was the name of PPPL's first tokamak?" (Answer: the Symmetric Tokamak or ST) and "What is the unofficial name of the tiger mascot that is sold in the Plasma Hutch?" (Answer: Turbulent Eddie).

There was also a "Torus on a String" game in which participants competed to eat a donut (torus) hung from a string. There was a booth where people could take selfies, a "guess the number of marbles" activity, a water balloon toss, a corn hole game, a football toss and "Name the Face, " where staffers had to match faces on a board with the correct names.

The car show featured several classic and unusual cars and other vehicles, including a 2008 Honda VTX 1300 tryke that was driven by Hans Schneider's late grandfather, Leo Chlebnikow, who died at age 103 last month. He had driven the tryke until age 96. The car show also included a silver 1971 Corvette owned by Kristen Fischer that she inherited from her father.

Robert Sheneman and Laurie Bagley compete to finish their donuts in a friendly "Torus on a String" game.

Two teams, the ELMs (Edge-localized Modes) and the GAMs (Geodesic Acoustic Modes) compete in Family Feud. From left to right: Andrea Moten, Mike Churchill, Nicole Allen, Mike Gonzalez; Mike Mardenfeld, Chris Giles, Jose Rodriguez and Kyron Jones.

Dressed in colorful Indian and African costumes are from left: Soha Aslam, Ambica Nandanavanam, Alana Coleman, Angela Powell, Margaret Kevin-King, Mary Payne, Andrea Moten, Neelima Yeragudipati, and Richard Owusu.

A team of more than a dozen people led by Sikkema came together to plan each detail of the event, which was sponsored by David McComas, Princeton University vice president for PPPL, along with Andrea Moten, Kristen Fischer and the Director's office. Some staff volunteers arrived at 7 a.m. to set up for the event and stayed afterward to help clean up.

Ortiz, one of the Big Bang Bash team members, said the event has gotten rave reviews. "The event went off without a hitch," she said. "The overall consensus that I've been hearing is that it was wonderful."

Marisol Ovalles is all smiles after dunking Andrew Zwicker.

Michael Zarnstorff, deputy director for research, emerges from the dunk tank.

continued on page 6

Big Bang Bash

continued from page 5

The Big Bang Bash team included: Tori Sikkema, Olivia Merrill, Kevin Lamb, Marc Sibilia, Laurie Bagley, Erik Gilson, Kathleen Lukazik, Elle Starkman, Andrea Moten, Arturo Dominguez, John Wertenbaker, Deedee Ortiz, Alana Coleman, Jeanne Jackson DeVoe, Larry Bernard, Ana Marie Datuin, Kristen Fischer, Margaret Kevin-King, Kevin Lamb, Robert Lunsford, Oak Nelson, Igor Kaganovich, and William Chyzik.

Photos by Russ DeSantis. For more photos, go to: https://sites.google.com/s/0By6yWfB4xqwRZDJuTFp3V3R2dFU/p/0BxFVhtHjQi-pV1dGcHNleGZHZms/edit

Terry Brog, deputy director for operations, emerges from the dunk tank.

Deedee Ortiz serves some homemade Puerto Rican food.

PPPL'ers enjoy lunch under the tent.

Kate Morrison pitches a ball to the dunk tank.

John Lacenere and T.J. Levis examine a Corvette owned by Kristen Fischer as Frank Jones looks on. Talking to their left are Greg Tchilinguirian and Keith Erickson.

Big Bang Bash volunteers, front row, from left: Deedee Ortiz, Arturo Dominguez, and Laurie Bagley; back row, from left: John Wertenbaker, Erik Gilson, Jeanne Jackson DeVoe, Olivia Merrill, Tori Sikkema, Larry Bernard, Ana Marie Datuin, Kevin Lamb, Marc Sibilia, Robert Lunsford, and Alana Coleman.

Big Bang Bash contest winners on page 7

Big Bang Bash winners

Guess the marbles
Winner: Mary Payne (above) with a guess of 27,000

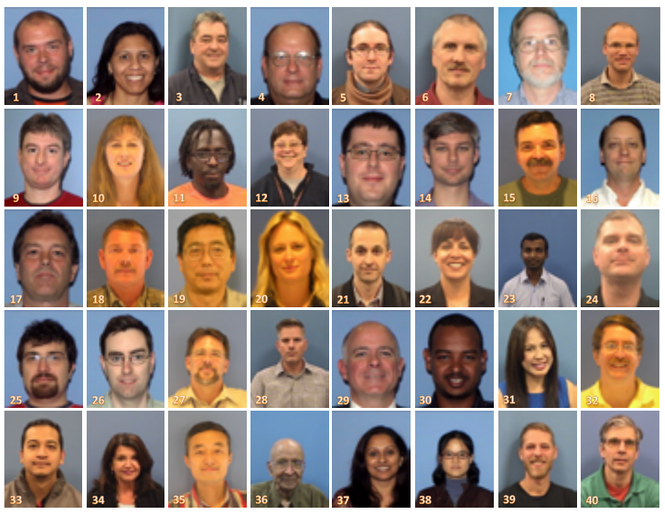
Actual number: 26,320

Chili Cook-Off
Winner: Andy Carpe
Chili name: *Chili Con Carpe*

Other participants:

Tim Conwell, Kristen Ferraro
Chili name: *Error 404: Chili Name Not Found*

Arturo Dominguez
Chili name: *Outreach Into Your Stomach — An Education In Pain*



Name the Face Match (Winners with 100 percent correct):
Drina Duryea, Mike Mardenfeld

Answers:

1. Novimir Pablant
2. Marisol Ovalles
3. Ed Bush
4. Richard Upcavage
5. Paul Hughes
6. John Mitchell
7. Ronald Bell
8. David Pfefferle
9. Erik Gilson
10. Marie Iseicz
11. Ahmed Diallo
12. Patricia Potts
13. Mike Mardenfeld
14. Sam Lazerson
15. Ted Franckowiak
16. David Gates
17. Kristopher Gilton
18. Stephan Jurczynski
19. Masaaki Yamada
20. Susan Thiel
21. Christopher Roames
22. Kristen Fischer
23. Manish Kumar
24. Scott Decker
25. Egemen Kolemen
26. Jack Berkery
27. Frank Malinowski
28. Jason Wohlberg
29. Chris Cane
30. Neway Atnafu
31. Marissa Zara
32. Michael Zarnstorff
33. Fredy Rabanales
34. Katina Garthe
35. Hantao Ji
36. Subrahmanya Ramakrishnan
37. Chitra Venkatraman
38. Eun-Hwa Kim
39. Elliott Baer
40. Marc Sibilia

Alfvén eigenmode supression

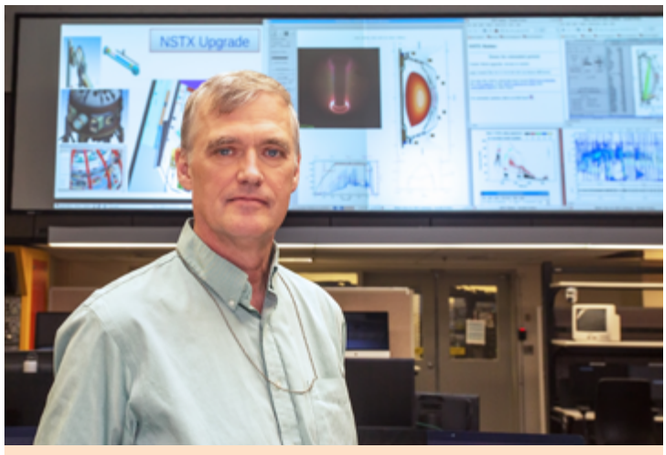
continued from page 1

Akin to a snake or dragon
Such instabilities are akin to a snake or dragon that swallows its own tail. Stirring up GAEs are the same neutral beam particles that heat the plasma, which are ionized into electrons and ions, or atomic nuclei, inside the gas. Once triggered by these fast ions, the GAEs can rise up and drive them out, cooling the plasma and halting fusion reactions.

Suppressing this arousal were beams from the second injector, which flow through the plasma at a higher pitch-angle, in a direction roughly parallel to the magnetic field that confines the hot gas. Physicists call such beams "outboard" to distinguish them from the "inboard" beams that the original NSTX-U injector produces, which flow through the plasma and the magnetic field in a more perpendicular fashion.

Injection of the outboard beam suppressed GAEs in milliseconds. Fast ions from the beam combined with those from the inboard beam to increase the density of the ions and alter their distribution in the plasma. The sudden alteration reduced the gradient, or slope, of the ion density, without which GAEs were unable to form and ripple through the plasma.

Good news for fusion development
These remarkable results were good news for fusion development. "Normally, when you inject energetic particles, you drive up instabilities," said Jonathan Menard, head of research on NSTX-U. "The fact that the second neutral beam was able to turn them off by varying the fast-ion distribution with a small amount of particles provides our research with flexibility and is a welcome discovery."



Eric Fredrickson *(Photo by Elle Starkman)*

The result validated predictions of a computer code called "HYM," developed by PPPL physicist Elena Belova, and could prove useful to ITER, the international fusion facility under construction in France to demonstrate the ability to confine a burning plasma and produce 10 times more energy than it consumes.

"This research demonstrates suppression of GAEs with just a small population of energetic particles," said physicist Eric Fredrickson, lead author of the journal article. "It gives confidence that by using this code, reasonable predictions of GAE stability can be made for ITER."

PPPL's booth is a star attraction at Princeton's Community & Staff Day

PPPL's booth was once again a bit hit at Princeton University's Community & Staff Day with fun, hands-on activities like the Van de Graaff generator, the vacuum demonstration that inflates and deflates marshmallows, a plasma ball, and other fun activities.

The booth was one of several family activities outside the Princeton University football stadium where Princeton began the season with a game against the San Diego Toreros. (Princeton won 27-17).

Volunteers of the booth, which was organized by Deedee Ortiz, were Ortiz, Arturo Dominguez, Kevin Lamb, Valentin Skoutnev, Brian Kraus, Erik Gilson, and Charles Swanson.

A youngster has fun on the Van de Graaff generator. *(Photo by Jeanne Jackson DeVoe)*

Arturo Dominguez chats with a girl holding the plasma ball. *(Photo by Jeanne Jackson DeVoe)*

Erik Gilson talks to a boy touching a plasma ball. *(Photo by Jeanne Jackson DeVoe)*

Aaron Schartman, age 4, son of physicist Ethan Schartman, tries out a plasma ball. *(Photo by Jeanne Jackson DeVoe)*

Youngsters try out an electromagnet demonstration with Valentin Skoutnev as Kevin Lamb looks on. *(Photo by Deedee Ortiz)*

The American Red Cross Fall Blood Drive

Friday, Oct. 6
8 a.m.–1 p.m.

Appointments are preferred and can be made either by calling the OMO at ext. 3200 or online: redcrossblood.org, enter sponsor code: PPPLPrinceton.

The blood mobile will be parked along side of the Warehouse near Mod VI. Please report to the Mod VI Conference room prior to going into the blood mobile.

Please consider donating. You can make a difference—your blood donation matters!

Staff chat with PPPL leaders at weekly lunch

Rich Hawryluk, PPPL's interim director, sat down for lunch with half a dozen people last week as part of a new "Council Café Lunch" initiative by the Organizational Diagnosis Group "Our People and Their Jobs (OD3)."

The meetings were designed to address a need expressed by staff in the Organizational Diagnosis survey for more communication from PPPL's leadership. "It was great; a very relaxed open discussion on a variety of important topics," said Mike Viola, who organized the meetings on behalf of the OD3 group. "The whole idea is for people to meet face-to-face with members of the Lab Leadership Council over lunch and I think that worked very well. All staff members are welcome to partake."

Hawryluk said he liked having the chance to talk informally with staff. "I always enjoy getting to know people and hearing what they have to say," he said. "This is another way of communicating with staff that complements the small group meetings we began last week, which will continue over the next few weeks."

The lunchtime meetings will be held weekly each Wednesday at noon. Dave McComas, the Princeton University vice president for PPPL, will be next up with a lunchtime meeting on Sept. 27.

The upcoming schedule for the remainder of this year is:
Sept. 27: Dave McComas
Oct. 4: Kristen Fischer
Oct. 11: Amitava Bhattacharjee
Oct. 18: Andrea Moten
Oct. 25: Valeria Riccardo
Nov. 1: David Carle
Nov. 8: Marc Cohen
Nov. 15: Andrew Zwicker
Nov. 22: Jerry Levine
Nov. 29: Jon Menard
Dec. 6: Charles Neumeyer
Dec. 13: Chelle Reno
Dec. 20: Scott Weidner

BROCK

NICK PETTI
Chef Manager

Café at PPPL

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 Sept. 25	Tuesday Sept. 26	Wednesday Sept. 27	Thursday Sept. 28	Friday Sept. 29
COMMAND PERFORMANCE Chef's Feature	**Roast Pork** with Barley wild Rice Pilaf and Vegetable.	**Pasta Bowl** with Garlic Breadstick	**Caprese Chicken** with Orzo Pilaf	**Buffalo Chicken Meatloaf** with Roasted Potatoes and Carrots	**Fish and Chips**
Early Riser	**Bacon, Egg and Cheese English Muffin**	**Mexican Breakfast Burrito**	**Scrapple and Eggs**	**Cinnamon-Raisin Pancakes** with Homemade Apple Compote	**French Toast Sticks**
Country Kettle	**Manhattan Clam Chowder**	**Vegetable**	**Chicken Noodle**	**Tomato Soup**	**Chili Bean**
Deli Special	**Autumn Chicken Salad Wrap**	**Caribbean Ham Hoagie**	**California BLT** with Avocado	**Turkey Sloppy Joe**	**Spicy Crab Sushi Wrap**
Grill Special	**Grilled Vegetable Quesadilla**	**Chipotle BBQ Pulled Pork Sandwich** with Fries and Slaw	**Burgerlicious Old Macdonald Burger**	**Ham and Cheese Calzone**	**Reuben Dog**
Panini	**Prosciutto and Spinach Melt**	**Baja Fried Flounder Hero** with Crunchy Slaw and Pico de Gallo	**Pastrami and Swiss** on Marble Rye	**Chipolte Roast Beef Melt**	**Breaded Chicken Cutlet** with Ham, Swiss Cheese, Lettuce & Honey Mustard Ciabatta

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/.