

At PPPL  
**THIS WEEK**

**TUESDAY OCTOBER 23**

**9 a.m. to 11 a.m.**  
Safety All-Hands Meeting  
MBG Auditorium

**WEDNESDAY OCTOBER 24**

**10 a.m. to 2 p.m.**  
PPPL Health Fair ♦ LSB Lobby  
**Informational Meetings**  
11:30 a.m. & 1:30 p.m. ♦ MBG Auditorium

**4:15 p.m.**  
Colloquium  
*Nanoengineered Surfaces for Efficiency  
Enhancements in Energy and Water*  
Professor Kripa Varansi, Massachusetts  
Institute of Technology  
Refreshments at 4 p.m. in the LSB Lobby

**UPCOMING EVENTS**

**Oct. 29 – Nov. 2**  
54th Annual American Physical Society  
Division of Plasma Physics Conference  
Providence, Rhode Island

**Nov. 7 – 8**  
PPPL Advisory Committee Meeting

**Nov. 12 - 13**  
Synergize 2012  
Princeton Energy & Environment  
Corporate Affiliates Program  
Princeton University

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Sustainability Award** *page 2*

○ **Mentors needed for  
robotics team** *page 3*

**THIS TUESDAY:  
MANDATORY ALL-HANDS SAFETY MEETING**



By Stewart Prager, Director, Princeton Plasma Physics Laboratory

Dear PPPL'ers:

I would like to invite you to an all-hands safety meeting on Tuesday, Oct. 23, from 9 a.m. to 11 a.m., in the MBG Auditorium. At this mandatory meeting, we will update you on actions taken since the May 2012 Safety Forum. Thanks very much and see you there.

*Stewart C. Prager*

**Stewart**

**The man who loves science**  
Zarnstorff ponders how Lab can do more

By John Greenwald

Michael Zarnstorff couldn't decide whether to major in physics, math or computer science. So he majored in all three at the University of Wisconsin-Madison, and co-owned a computer company on the side. "My normal rule of thumb is that I'm interested in almost everything," said Zarnstorff, an award-winning physicist who joined PPPL in 1984, and has been deputy director for research since 2009.

Zarnstorff's broad curiosity dovetails with the task of supervising research that ranges from testing ideas for harnessing fusion to developing rockets for space flight. His job encompasses keeping projects aligned with DOE goals and envisioning new research opportunities for PPPL. "I always try to look at how we can do more," he said.

**An early interest in science**

Zarnstorff first showed an interest in science as a youngster in Madison. He recalled childhood kits called "Things of Science" that came in little blue boxes in the mail each month. His father was a University of Wisconsin professor who taught medical physics, a discipline that develops medical imaging devices, and ran a company that built insect traps that showed farmers how much spraying they needed to do. "I learned at a relatively early age how to use a lathe and other machine tools," recalled Zarnstorff, who made parts for the traps with his younger brother, Dan, in the basement of their home, which their father and grandfather had built.



Mike Zarnstorff

## The man who loves science

Continued from page 1

High school found Zarnstorff taking college courses as a senior and working in a University of Wisconsin physics laboratory. High school was where he met his future wife, Sally, who went on to become a computer scientist. The couple's son, Jonathan, attends middle school.

Zarnstorff and five classmates launched a hardware and software company while in college. They did consulting work for clients located as far away as the Netherlands and came close to landing a contract with Disney World in Florida. The partners named their company Shinar Digital after the plain where the Tower of Babel was located, as described in the Bible's book of Genesis. "Computers are to some extent a jumble of different languages," said Zarnstorff. "We were willing to speak many of those languages, and we wanted to be a little bit funny too." The company disbanded after Zarnstorff earned his doctorate and moved from Madison to PPPL.

Zarnstorff became a vegetarian during his undergraduate years. "It was a health choice as much as anything," he said, "and there's also a little bit of choosing not to be cruel." His brother is a vegetarian too. "Our parents are coping but they still find it mystifying," said Zarnstorff. He has since gone his own way in footwear as well, wearing sandals for comfort year-round in New Jersey, where the winters are milder than in the Midwest.

### Focusing on plasma physics

Zarnstorff focused on plasma physics as a graduate student at Wisconsin, though it took him a while to make up his mind. High-energy physics, which uses accelerators to study subatomic particles, also intrigued him. But the promise of plasma as a fuel for clean-energy fusion carried the day. "It's easy to find challenging problems in science," Zarnstorff said. "But the challenges of plasma physics have an impact on society because of their connection to the energy supply."

While working on those challenges, Zarnstorff co-discovered a key phenomenon called the "bootstrap current" that helps to control the plasma in experimental fusion devices called tokamaks. His co-discoverer was PPPL director Stewart Prager, who was Zarnstorff's thesis adviser at Wisconsin at the time. The two physicists received the American Physical Society's 2008 Dawson Award for Excellence in Plasma Physics Research for their finding, which has helped to shape the design of a generation of tokamaks.

Zarnstorff confirmed the existence of the crucial current after joining PPPL. He and physicist James Strachan created high-pressure plasmas that revealed the current in the Laboratory's Tokamak Fusion Test Reactor (TFTR), the world's most powerful fusion facility in the 1980s

and 1990s. The experiments found a sharp drop in the externally applied current inside the plasma as the pressure rose, a sure sign that the bootstrap current had emerged.

The process is like the production of current in barbecue-grill lighters, Zarnstorff said. Just as the crystal inside the lighters creates a current when squeezed, so the plasma gas inside a tokamak produces the bootstrap current when the pressure is raised.


Zarnstorff went on to head several divisions of the TFTR project, which set records for producing heat and fusion power before the device was decommissioned at the end of the 1990s. He then led the physics group for the National Compact Stellarator Experiment, an innovative facility whose construction was halted in 2008 when costs exceeded estimates.

### A promotion to deputy director for research

Zarnstorff became deputy director for research the following year. The promotion reunited him with Prager, who arrived from Wisconsin to head the Laboratory in 2009. The new leadership included Adam Cohen, who came from the Argonne National Laboratory outside Chicago to serve as deputy director for operations at PPPL.

Together with Prager and Cohen, Zarnstorff aims to broaden the scope of Laboratory research over the next five years while keeping it strongly engaged in efforts to harness fusion. Such efforts range from the current \$94 million upgrade of the National Spherical Torus Experiment, the Laboratory's largest project, to key design and technical support for ITER, a \$20-billion tokamak that is being built by the European Union, the United States and five other countries in the south of France. At the same time, "we are broadly engaged in applying research to developing new uses for plasma and understanding its role in the universe," Zarnstorff said.

Recent initiatives that Zarnstorff has worked on include the rejuvenation of PPPL's post-doctoral fellowship program, and the strengthening of the Laboratory's collaborations with fusion experiments in Asia and Germany. Also under way is an increased focus on the development of liquid lithium to absorb the heat flux that strikes tokamaks' inner, or plasma-facing, walls. "That's clearly an area of potential strength for the Laboratory," Zarnstorff said of the lithium work.

His own role is many-sided. "In essence, it's to manage and help all the research activities within the Laboratory succeed," he said. This calls not only for setting priorities, but for remaining open to new possibilities. "Planning and forethought are crucial," said Zarnstorff, "but plans are made to be changed." 



### PPPL wins DOE Sustainability Award

Robert Sheneman, the deputy head of PPPL's Environment, Safety, Health and Security (ESH&S) Department, and Mark Hughes, an environmental engineering assistant, accepted the 2012 Sustainability Award from the U.S. Department of Energy on behalf of PPPL in a ceremony in Washington DC on Sept. 27. PPPL received the award for cutting greenhouse emissions by 28 percent in the last three years, far exceeding the DOE's goals of a 28 percent reduction.

From left to right: Associate Deputy Secretary of Energy Melvin G. Williams Jr., Hughes, Sheneman and Jennifer McDonald, director of the DOE's Sustainability Performance Office.

## Mentors needed for high school robotics team



John Lacenere with the robot built by students last year. (Photo provided by John Lacenere.)

Each year, PPPL staff help high school students hone their technical and engineering skills on the MidKnight Inventors robotics team, which creates a robot from scratch for the FIRST Robotics Competition, an international competition.

Now, organizers are looking for a few more technically talented PPPL'ers to help them with the effort to train tomorrow's engineers and computer scientists.

"It's really fun and it's rewarding to see them build a project," said Michael Mardenfeld, a mechanical engineer who volunteers with the program. "You know some of the kids are going to go off and they're going to be engineers and you can tell they're going to be good at it but there's also people who might get interested in a technical career who weren't before."

The robotics team from West Windsor-Plainsboro South and North high schools designs and builds the robot to complete tasks set out by the FIRST Robotics Competition, an international competition for grades 9 to 12.

Last year, the team built a 120-pound remote-controlled robot that could pick up foam basketballs and shoot them into four basketball hoops. The team made it to the regional competition for the Northeast in Philadelphia. PPPL volunteers, including Mardenfeld, John Lacenere and Cassandra Pugh, helped about 60 students design the robot and fabricate aluminum parts. They also helped them to troubleshoot problems that came up when they had to hook up motors and wiring with the software.

The robotics team has just six weeks to build the robot, starting in January. Then the robot must be sealed away in a plastic bag and only taken out for competitions.

The robotics team is aimed at teaching kids skills in leadership, communications, teamwork and project management in addition to technical skills, Mardenfeld said. It takes a combination of all those things for the team to figure out how to build the robot in just six weeks, as well as raise money for the team and do community outreach like talking to local middle school and elementary school students.

Other laboratories and companies that volunteer in the program include SRI International, Bristol-Myers Squibb and Lockheed-Martin.

For more information about the program or to volunteer, call or email Mardenfeld, ext. 2082, [mmarden@pppl.gov](mailto:mmarden@pppl.gov).



Mike Mardenfeld works with students on the MidKnight Inventors robotics team. (Photo provided by Mike Mardenfeld)



## Princeton University Freshman Parents Weekend tour

PPPL played host to more than 200 Princeton University freshman parents and students as part of the University's Freshman Parents Weekend on Oct. 12 and 13 and tour guides took time out from busy schedules and gave up their Saturday afternoon to show them around the Laboratory during three tours. John DeLooper, head of best practices and outreach, volunteered for all three tours and served as master of ceremonies and Adam Cohen, deputy director of operations, volunteered as a tour guide on Friday. Other volunteer tour guides were: Charlie Gentile, Bob Kaita, Bill Blanchard, Stewart Zweben and Henry Carnevale.

Photo: Adam Cohen, 3rd from left at back, shows freshman parents and students the work on the NSTX upgrade.

# BENEFITS FAIR

## ANNUAL BENEFITS OPEN ENROLLMENT

# 2013

Talk with healthcare vendors and representatives from HR and register to win door prizes.

**PPPL Fair**  
Wednesday, October 24  
10 a.m. to 2 p.m.  
LSB Lobby

Attend a presentation to learn more about benefits changes for this year.

**Information Sessions**  
11:30 a.m. and 1:30 p.m.  
MBG Auditorium

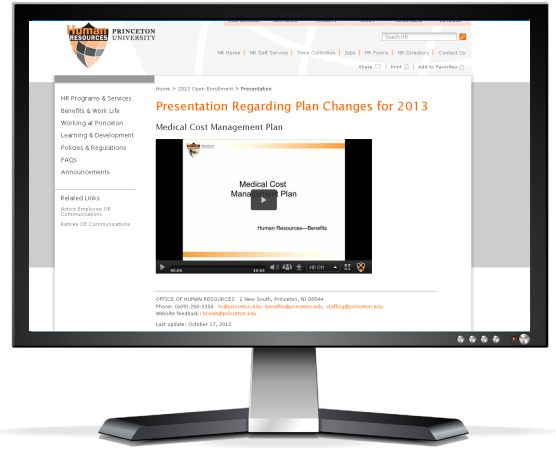
Annual Benefits Open Enrollment begins **Monday, October 15**, and ends **Friday, November 16, 2012**

*November 16 is the last day for making any benefits changes.*



### PARTICIPATING VENDORS

- Aetna**
- Bank of America**  
(Mortgage Programs)
- Bright Horizons**  
(Backup Care Advantage Program)
- Carebridge**
- Express Scripts**  
(Prescription Drug)
- MetLife**
- NJ Manufacturers Insurance**
- PayFlex**  
(Expense Accounts)
- Princeton Federal Credit Union**
- Prudential**  
(Life Insurance)
- TIAA-CREF**
- Transportation and Parking Services**
- UnitedHealthcare**
- Vanguard**
- VSP—Vision Services Plan**



Click [here](#) to view a 10-minute video explaining changes in health benefits on the Princeton University Human Resources website.



# PPPL Café Menu

**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 - OCT. 22**

**TUESDAY - OCT. 23**

**WEDNESDAY - OCT. 24**

**THURSDAY - OCT. 25**

**FRIDAY - OCT. 26**

**COMMAND PERFORMANCE CHEF'S FEATURE**



Baked Ziti w/ a Vegetable & Garlic Knot



Create Your Own Chicken Nachos



Halushki



Turkey Meatloaf w/ Mashed Potatoes & Vegetable



Cold Crab, Tilapia & Shrimp Ceviche served over Rice

<b>Early Riser</b>	Walnut Raisin Pancakes w/Bacon	The XL Western Omelet w/ Home Fries	Corned Beef Hash over 2 Eggs any Style	Homemade Banana Bread	Breakfast Lasagna
<b>Country Kettle</b>	Chicken Rice 🍎	Split Pea w/ Ham 🍎	Cream of Broccoli	Navy Bean 🍎	Crab Bisque
<b>Grille Special</b>	Santa Fe Chicken Wrap w/ Fries	Mediterranean Chicken Cheese Steak w/ Onion Rings	Hawaiian Burger w/ Ham & Pineapple w/ Fries	Two Chili Cheese Dogs w/ Fries	Grilled Chicken & Red Wine Vinaigrette Wrap w/ Onion Rings
<b>Deli Special</b>	Open-Faced Tuna & Cheddar Hoagie	Waldorf Chicken Salad on a Multigrain Roll	Open-Faced Ham & Swiss Toasted Hoagie	Caribbean Shrimp Salad Wrap w/ Lettuce & Tomato	Ham Salad w/ Lettuce & Tomato on a Wrap
<b>Panini</b>	Salami & Three Cheeses w/ Tomato, Onion & Spicy Mustard	Turkey, Pepper Jack, Banana Peppers, Tomato & Spicy Mayo	Roast Beef, Cheddar, Onion, Tomato & Horseradish Cream	Chorizo, Provolone, Pepper & Onion	Roasted Vegetable w/ Provolone & Balsamic Vinaigrette

MENU SUBJECT TO CHANGE WITHOUT NOTICE

# WEEKLY

Editor: **Jeanne Jackson DeVoe** ♦ Copy Editor /Graphic Design: **Francine Henry**  
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Comments: [commteam@pppl.gov](mailto:commteam@pppl.gov) ♦ PPPL WEEKLY is archived on the web at: <http://www.pppl.gov/ppplweekly.cfm>