

## At PPPL THIS WEEK

### WEDNESDAY, FEBRUARY 22

#### PPPL Colloquium

4:15 p.m. ♦ M.B. Gottlieb Auditorium

Web 3.0 Emerging

James Hendler  
(Rensselaer Polytechnic Institute)

[CLICK HERE FOR ABSTRACT](#)

### THURSDAY, FEBRUARY 23

#### PPPL Colloquium

4:15 p.m. ♦ M.B. Gottlieb Auditorium

Stephen Hawking: An Unfettered Mind

Kitty Ferguson

[CLICK HERE FOR ABSTRACT](#)

#### Physics Colloquium

4:30 p.m. ♦ Main Campus Jadwin A10

Self-Assembly and Evolution of Color  
Producing Nanostructures of Birds and  
Insects

Richard Prum (Yale University)

<http://www.princeton.edu/physics/events/>

### FRIDAY, FEBRUARY 24

#### Middle School Science Bowl®

All Day ♦ Lab Wide

#### DIII-D Science Meeting

1 p.m. ♦ B-233

#### High Energy Theory Seminar

1:30 p.m. ♦ Institute for Advanced  
Study, Bloomberg Lecture Hall

TBA

Tristan Dennen (UCLA)

### SATURDAY, FEBRUARY 25

#### High School Science Bowl®

All Day ♦ Lab Wide



**ENGINEERS  
WEEK®  
2012**  
FEBRUARY 19-25

## N.J. Lt. Gov. Guadagno Visits PPPL



From right are: Jeff Makiel, chief of staff at the DOE Princeton Site Office; A.J. Stewart Smith, dean for research at Princeton University (tan jacket); Robert Durkee, university vice president and secretary; Lt. Gov. Kim Guadagno; Stewart Prager, PPPL director; John DeLooper, outreach and best practices head at PPPL; Andrew Zwicker, science education head at PPPL; and Tracye McDaniel, CEO of Choose New Jersey.

By Patti Wieser

New Jersey Lt. Gov. Kim Guadagno visited PPPL on Monday, Feb. 13, learning about the facility's economic impact on the state and gleaning new facts about fusion science. After concluding a tour of the Laboratory, Guadagno characterized it as being one of the state's "crown jewels."

"The visit of Lieutenant Governor Guadagno and her colleagues to PPPL was extremely productive, highlighting the strong synergies between PPPL and the State," said PPPL Director Stewart Prager. "Our discussions brought out the potential for greater PPPL interaction with New Jersey high-tech industry, as well as for partnering with the State to develop new research opportunities."

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## From Desktop Designs to 3-D Reality: Stereolithography Produces "A Great Time For Engineering"

By John Greenwald



PPPL Engineer Mark Smith displays a 3-D model.

When Laboratory engineers needed to check the fit of a part for the NSTX upgrade, they turned to a novel technique that makes 3-D scale models out of computer-aided design (CAD) drawings. Called stereolithography, the process produces detailed plastic prototypes in a matter of days with a high degree of accuracy. "Twenty years ago skilled model makers were needed to create models out of blocks of Styrofoam or wood," says Phil

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## Lt. Gov. Visits

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Guadagno was wowed during a tour of the Plainsboro facility when she heard a song by the rock group Pearl Jam boom through plasma speakers. "Imagine a high school student looking at this and becoming inspired to study plasma," Guadagno said. Plasma, she learned during her 90-minute visit, is a superhot gas of charged particles and the fuel for fusion energy production. The Laboratory's mission is to develop fusion as a safe, clean and abundant energy source for the future.

The lieutenant governor came to PPPL to discuss the potential for synergy between the Laboratory and the state. Her visit included a brief overview of the fusion energy research being conducted at PPPL, a tour of research areas and demonstrations at the Science Education Laboratory — one featuring a plasma speaker, an experimental device that transmits sound by turning on and off a one-inch, artificial lightning bolt in sync with an iPod.

Guadagno was joined by state economic development experts, including: Caren Franzini, the CEO of the state Economic Development Authority (EDA); Tracye McDaniel, CEO of Choose New Jersey, a nonprofit focused on encouraging statewide economic growth; Kathleen Coviello, director of technology and life sciences for the EDA; and Cathy Scangarella, director of state marketing for the Business Action Center, which is part of the New Jersey Department of State.

Guadagno and other members of the group said they viewed PPPL as a "crown jewel" in terms of innovation and cutting-edge research in fusion and plasma physics, and its potential for collaborative growth and economic development. The visitors and Laboratory officials discussed their shared interest in exploring ways to increase research collaborations and attract startups in the state. They vowed to continue talking about ways to generate ideas and discover how they could support one another.

"We were delighted to come to PPPL today to learn more about fusion energy research and to see how you inspire and educate the next generation of scientists," Guadagno said. "By gaining insight about your research and a better understanding of what you do, we can promote your work, garner support and help identify potential collaborators."

Leading the group, Stewart Prager, director of PPPL, summarized the Laboratory's research and vision — enabling a world powered by fusion energy and leading discoveries in plasma science and technology. He noted the Laboratory's associated mission to advance basic plasma research and develop plasma applications and general spinoffs. He cited the Miniature Integrated Nuclear Detection System (MINDS) as a successful spinoff that grew out of fusion research. MINDS, which identifies specific sources of radiation that may be associated with the threat of nuclear terrorism, is a homeland security technology that has been transferred to the marketplace.




**New Jersey Lt. Gov. Kim Guadagno and PPPL Director Stewart Prager discuss opportunities for synergy between the Lab and the State.**

Prager also discussed how PPPL and fusion serve New Jersey. The Laboratory employs staff spread over 10 legislative districts, procured \$6.7 million in 277 purchase orders from New Jersey industry in 2011, and operates an extensive educational outreach program for the public and students from middle school through college, he said. Also, ITER, an international fusion experiment being built in France, made more than \$80 million in purchases from state industry in 2011. The United States is an ITER partner; PPPL is one of the U.S. ITER partners.

Princeton University officials present, including A.J. Stewart Smith, dean for research, and Robert Durkee, vice president and secretary, praised Guadagno's economic development activities. "The lieutenant governor has been a very forceful advocate for economic development in New Jersey, and it was terrific that she was able to come and see for herself everything that is going on and potentially could go on at PPPL," Durkee said.

During a stop at the National Compact Stellarator Experiment (NCSX) components, Arlene White, a principal buyer and small business liaison, heralded the Laboratory's small business program and its successes, and introduced one of PPPL's area subcontractors, Zenex Precision Products of Paterson, N.J. Zenex Vice President Robert Wronski showed the lieutenant governor NCSX parts fabricated by his company and lauded the benefits of Zenex's partnership with the Laboratory.

The tour also included the National Spherical Torus Experiment (NSTX), the Laboratory's flagship fusion experiment, which is being upgraded. The work will enhance the position of the NSTX as the world's most powerful spherical torus — or tokamak — a device that controls plasmas in an effort to create fusion power.

The last time the Laboratory hosted such a high-level state government executive was a February 1995 visit by then-Gov. Christine Todd Whitman. 



New Jersey Lt. Gov. Kim Guadagno participated in discussions with PPPL officials, learned about fusion research, and toured research areas and the Science Education Laboratory during a Feb. 13 visit to PPPL. Clockwise from top left: NSTX Program Head Jon Menard explains the NSTX-Upgrade to the lieutenant governor during a stop at the NSTX test cell; (from left) PPPL Director Stewart Prager, Lt. Gov. Guadagno, and Princeton University Vice President and Secretary Robert Durkee at the Science Education Lab; Arlene White (right), PPPL principal buyer and small business liaison, shakes hands with Lt. Gov. Guadagno at the NCSX components area; PPPL Science Education Program Head Andrew Zwicker (right) shows the lieutenant governor experiments at the Science Ed Lab; and Lt. Gov. Guadagno, along with state economic development experts and PPPL and Princeton University leaders, next to the NSTX machine.



## 3D Reality

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Heitzenroeder, head of the mechanical engineering division. "It took a lot of time and cost, and getting the precise scale correct was not always possible, especially for complex curved surfaces."

Engineers are using stereolithography — also known as "3-D printing"— to create support rings for the outer legs of the magnetic coils that span the length of the upgrade. Technicians armed with the model can test how well the CAD design matches the actual size and shape required to fit the machine. "We try the 3-D model out in the test cell to see about interference issues, clearance and things of that nature," said Mark Smith, design engineer for structural support for the upgrade. "We find everywhere that it fits or doesn't fit and then I can adjust my CAD model that way."

PPPL assigned the stereolithography job to Laser Reproductions in Gahanna, Ohio. Its computerized system slices a CAD file into thousands of digital layers and uses a laser to build a 3-D model that hardens layer by layer.

Stereolithography is now used in a growing range of applications. "Dentists use this to make ceramic crowns in their offices," said the Heitzenroeder. Consumers can even buy small desktop printers to produce toys and other items at home. "3-D printing has moved from something exotic to a process that many can now afford to use," he adds. In fact, "technology is moving so rapidly that it's a great time for engineering." 📄



Phil Heitzenroeder



Mark Smith shows where the part will fit on the NSTX upgrade.

## Director Addresses Staff at All-Hands Meeting



PPPL Director Stewart Prager discussed the proposed fiscal year 2013 budget for fusion research during a Feb. 15 "all-hands" meeting in the Gottlieb Auditorium. Staff filled the auditorium and the cafeteria to hear the director's presentation. President Obama presented his budget request for fiscal year 2013 on Feb. 13.

## PPPL Annual "Green Machine" Awards


PPPL will celebrate Earth Day on Tuesday, April 24, with guest speakers, displays and activities for employees, and a presentation of the annual PPPL Green Machine Awards.

Please submit Green Machine award nominations for PPPL employees or employee teams that have contributed to PPPL's environmental performance by:

- Reducing greenhouse gas emissions
- Saving energy or water
- Reusing equipment or material
- Recycling materials or equipment
- Reducing the use of toxic or hazardous materials
- Sustainable acquisition (purchasing recycled content, bio-based, and other "green" products)
- Reducing or eliminating pollution
- Actions that help protect public health or the environment

Nominations should include: nominee name(s), PPPL work group, description of the actions taken, estimated cost savings or environmental benefit.

Nominations are due by Friday, March 9, and should be emailed to Virginia Finley at [vfinley@pppl.gov](mailto:vfinley@pppl.gov).



# ENGINEERS WEEK<sup>®</sup> 2012

**FEBRUARY 19-25**

# COLLOQUIUM

**WEB 3.0 EMERGING**

**JAMES HENDLER**  
Rensselaer Polytechnic Institute

**Wednesday, February 22**

**4:15 p.m. (Coffee/Tea at 4 p.m.)**  
**M.B. Gottlieb Auditorium, Lyman Spitzer Building**  
PLEASE NOTE: COFFEE/TEA IS FOR COLLOQUIUM ATTENDEES ONLY.

***Latest Employment Opportunities at PPPL***



- Electrical Engineer — Power Systems
- Property Administration Coordinator

*For more information as well as the complete job listings please go to: [jobs.princeton.edu](http://jobs.princeton.edu)*

# COLLOQUIUM

**STEPHEN HAWKING:  
AN UNFETTERED MIND**

**KITTY FERGUSON**

**Thursday, February 23\***

**4:15 p.m. (Coffee/Tea at 4 p.m.)**  
**M.B. Gottlieb Auditorium, Lyman Spitzer Building**  
PLEASE NOTE: COFFEE/TEA IS FOR COLLOQUIUM ATTENDEES ONLY.  
**\* NOTE SPECIAL DATE**



## CAFÉ MENU






**MONDAY, FEB. 20**

**TUESDAY, FEB. 21**

**WEDNESDAY, FEB. 22**

**THURSDAY, FEB. 23**

**FRIDAY, FEB. 24**

	MONDAY, FEB. 20	TUESDAY, FEB. 21	WEDNESDAY, FEB. 22	THURSDAY, FEB. 23	FRIDAY, FEB. 24
<b>COMMAND PERFORMANCE CHEF'S FEATURE</b>	 <b>Lasagna with Meat Sauce</b>	 <b>Roast Pork Lo Mein</b>	 <b>Chicken Marco Polo</b>	 <b>Tilapia Francaise over Rice</b>	 <b>Chicken Parmesan over Pasta</b>
<b>EARLY RISER</b>	Turkey, Onion and Cheddar Omelet	Steak, Egg and Cheese Burrito	Hawaiian Breakfast Pizza	Sausage, Egg, Pepper and Onion Quesadilla	Blueberry Pancakes with Sausage
<b>COUNTRY KETTLE</b>	Beef Noodle	Vegetarian Black Bean	Beef Chili	Split Pea w/ Ham	Broccoli and Cheddar
<b>GRILLE SPECIAL</b>	Crispy Chicken Ranch Hoagie w/ Fries	Spinach and Blue Cheese Burger w/ Onion Rings	Chicken Quesadilla w/ Salsa and Sour Cream	Chicken, Onions, Peppers, Mushrooms, Provolone Wrap	Turkey Patty Melt on Grilled Rye with Sweet Potato Fries
<b>DELI SPECIAL</b>	Classic Turkey and Cheese Hoagie	Honey Mustard Chicken Salad on a Multi Grain Roll	Louisiana Seafood Salad on a Multi Grain Roll	Prosciutto, Provolone and Roasted Red Peppers	Grilled Vegetable Stacker w/ Provolone
<b>PANINI</b>	Grilled Chicken, Bacon and Cheese, w/BBQ Sauce	Sicilian Eggplant Parmesan	Grilled Turkey Rueben	3 Cheese and Bacon	Ham, Turkey, Provolone and Chipotle Mayo

MENU SUBJECT TO CHANGE WITHOUT NOTICE

[CLICK HERE FOR A PRINTABLE WEEKLY MENU](#)

# WEEKLY

Editor: **Patti Wieser** ♦ Copy Editor /Graphic Design: **Gregory Czechowicz**  
Photography: **Elle Starkman** ♦ Web: **Chris Cane**

PPPL WEEKLY is published by the PPPL Office of Communications on Mondays throughout the year except for holidays.

Deadline for calendar item submissions is noon on Thursday. Other stories should be submitted no later than noon on Wednesday.

Send to: [pwieser@pppl.gov](mailto:pwieser@pppl.gov) ♦ Comments: [commteam@pppl.gov](mailto:commteam@pppl.gov) ♦ PPPL WEEKLY is archived on the web at: <http://www.pppl.gov/ppplweekly.cfm>