

At PPPL THIS WEEK

MON., MAY 5 - SAT., MAY 10

Arson Awareness Week

[Click here](#) for more info

MONDAY, MAY 5

CINCO DE MAYO!



WEDNESDAY, MAY 7

Blood Pressure Screening

11:15 a.m. - 1 p.m. ♦ LSB Lobby

PPPL Colloquium

4:15 p.m. ♦ MBG Auditorium

Exploring the Physical Properties of Matter in Extreme Conditions

Siegfried Glenzer, SLAC

UPCOMING EVENTS

May 14

PPPL Colloquium

4:15 p.m. ♦ MBG Auditorium

Mikhail Lomonosov - Father of Russian Science

Robert Crease, Stony Brook University
Vladimir Shiltsev, Fermi Nat'l Lab

May 17

Girl Scout STEM Fair

8 a.m. - 4 p.m. ♦ Labwide

May 21

PPPL Colloquium

4:15 p.m. ♦ MBG Auditorium

N.J. as U.S. Electronics Center

Benjamin Gross, The Sarnoff Collection

May 26

Lab closed

Memorial Day Holiday

Inside...



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versity

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State of the Lab

“Stellar” progress on NSTX-U highlights strong year for PPPL, Prager says

by Jeanne Jackson Devoe

PPPL is looking forward to reopening the National Spherical Torus Experiment (NSTX-U) after “stellar” progress in the \$94 million upgrade of the facility that should allow it to be completed by December of this year, Lab Director Stewart Prager told PPPL staff during his annual State of the Laboratory speech on April 29.

NSTX-U is the experiment at the heart of PPPL’s research activities and will make the facility the most powerful tokamak of its type in the world. The two main components of the upgrade, Prager said, are the center magnet or center stack, and a second neutral beam that injects neutral atoms into the ionized gas, or plasma, to heat the plasma to temperatures of about 100 million degrees Centigrade. Those components will double the current, double the heat and quintuple the duration of the plasma.

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Lab Director Stewart Prager gave a “tour” of PPPL’s accomplishments during his annual State of the Laboratory address on April 29.

(Photo by Russ DeSantis)

Physicist Allen Boozer and engineer Charles Gentile receive PPPL honors

By John Greenwald

PPPL presented its 2014 outstanding research awards to physicist Allen Boozer and engineer Charles Gentile following Director Stewart Prager’s April 29 annual State of the Laboratory address. Boozer received the Kaul Foundation Prize for Excellence in Plasma Physics Research and Technology Development for his theoretical work in advancing the understanding of plasma confinement in twisting — or 3D — magnetic fields. Gentile was named recipient of the Distinguished Engineering Fellow award for his wide-ranging contributions to the Laboratory.

Boozer, a professor of applied physics at Columbia University who first worked at PPPL from 1974 to 1986 and moved his research from Columbia to the Lab in 2005, receives a \$6,000 cash award that comes with the Kaul honor. Former PPPL Director Ronald Davidson endowed the prize by giving Princeton University a portion of the gift he received as the 1993 recipient of the Award for Excellence in Science, Education and Physics from the Kaul Foundation in Tampa, Fla.

The honor for Gentile, who heads the Tritium Systems Group at PPPL, includes a \$5,000 cash award supported by the U.S. Department of Energy. The recognition is part of the Laboratory’s Distinguished Research and Engineering Fellow Program, which honors members of the scientific and engineering staffs for outstanding achievements.

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Allen Boozer



Charles Gentile

State of the Lab

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Great progress over the last year

“We’re building a scientific tool for the country and the Laboratory and there’s been great progress over the last year,” Prager said. “To date, every technical challenge has been met and there have been many of them.”

The second neutral beam is already in place in the NSTX and the center stack magnet is being constructed, Prager said. The center stack magnet is really two magnets in one: copper bars that go straight up and down create one magnetic field and a coil around the center stack is a second magnet that drives a current through the plasma. It was constructed in four quadrants, which were then assembled and insulated.

“This requires incredible engineering and craftsmanship and it’s gone extremely successfully,” Prager said. “We’re 85 percent in completion of the upgrade.”

Prager noted that the U.S. Department of Energy has strongly supported the NSTX-U project despite the ups and downs of federal funding. “This is a fantastic result for this year and I hope next year we’ll be talking about the initial experiments on the NSTX-U,” Prager said.

The NSTX-U will allow researchers to produce “a sustained high pressure plasma” over the next decade, Prager said. Researchers also hope to discover “novel solutions” for the plasma material interface, the contact between the plasma and the plasma-facing components. That will be an essential task not only for PPPL but also for developing magnetic fusion in general, Prager said.

A smaller device, PPPL’s Lithium Tokamak Experiment, has been operating with a liquid lithium surface and has had “very favorable results,” Prager said. One long-term goal is “to have LTX become more integrated into the NSTX-U program,” he said.

Role in ITER

The next step in developing magnetic fusion as a clean, abundant and safe energy source is the international fusion experiment ITER in Cadarache, France. PPPL is strongly contributing to ITER, Prager said. For example, PPPL is designing and engineering diagnostic port plugs and is responsible for delivering the facility’s steady-state electric power network, Prager said.

Prager noted that Richard Hawryluk returned to PPPL after working on ITER for two years as Deputy Director General for the Administration Department. Hawryluk received a certificate of appreciation from U.S. Secretary of Energy Ernest Moniz.

Despite some press reports of management challenges at the international facility, Prager said, “ITER is actually being constructed. And when ITER is constructed, it will be a landmark scientific experiment for the 21st century, so we shouldn’t lose sight of that.”

But ITER won’t solve all the problems of nuclear fusion, Prager said, and researchers are looking ahead to a fusion nuclear science facility (FNSF) that could eventually lead to a demonstration plant. PPPLers are involved in preliminary research for an FNSF, Prager said.

PPPL’s theory and computation research is also essential to the Laboratory, Prager said. PPPL researchers last year were awarded more than 275 million core hours on supercomputers to study the plasma edge and plasma confinement, the equivalent of some 20,000 years of computer time, Prager said.

Budget ups and downs

The national budget for fusion energy research has been a “roller coaster ride for the research program,” Prager said. After dipping from 2012 to 2013 it was back up to \$306 million for research and \$200 million for ITER in fiscal year 2014. The 2015 budget is not known but the Obama Administration has proposed a \$266 million budget for research with \$150 million for ITER.

PPPL’s funding from Fusion Energy Science also dipped from 2012 to 2013. The FY 2014 estimated budget for PPPL totals \$96 million, including \$80 million from FES. However, the Administration’s request for PPPL in 2015 is \$75.5 million, for a total PPPL budget of \$92 million.

The good news is that the 2015 budget could include an additional \$25 million for infrastructure improvements, as part of an overall campus plan. “This is fantastic,” Prager said. The plan would look at updating PPPL’s laboratories, particularly for smaller experiments; modernizing office

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PPPLers listen to Prager give the State of the Lab address. (Photo by Russ DeSantis)

State of the Lab

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spaces, particularly in the Theory Department and the Environment, Safety, Health & Security Department; and upgrading electrical and mechanical infrastructure.

Other new experiments & collaborations

In addition to PPPL's main experiment, the Laboratory has also moved ahead with several new experiments and collaborations, Prager said. One such facility is a new version of the Magnetic Reconnection Experiment called FLARE to study magnetic disturbances that cause northern lights solar flares, geomagnetic disturbances, and numerous astronomical phenomena. FLARE will be three times bigger and much more powerful than the current device. It will be constructed over three years and will be funded through \$3 million from the National Science Foundation and \$1.2 million from Princeton University, Prager said.

PPPL also began the Center for Heliospheric Physics, a joint project with the University's Department of Astrophysical Sciences, that will study the space surrounding the sun where violent space weather can interrupt cell phone service, damage satellites and knock out power grids.

Researchers at the Laboratory have also pursued numerous collaborations nationally and internationally, including the Max-Planck/Princeton Center for Plasma Physics, a collaboration between Princeton University and the Max Planck Society of Germany.

PPPL researchers are also working on "fledgling" studies of plasma-based nanotechnology and are resubmitting a proposal to the DOE for research into this field, Prager said.

Other technologies being investigated at PPPL include a plasma mass filter that could potentially be used to clean up large amounts of radioactive waste. Researchers are also working on X-ray imaging techniques that could have "enormous impact in a huge array of applications," Prager said.

PPPL and U.S. Department of Agriculture researchers are developing a technique that uses radio frequency waves to pasteurize eggs. Princeton University and PPPL researchers are also working on a method to verify whether presumed nuclear warheads being decommissioned actually are nuclear warheads.

"All of this diversity of activities do not add up to a huge pile of money," Prager said. "However, they lead to huge scientific creative activity at the Laboratory, so in that way they're incredible."

Collaborations around the world

Prager noted that while NSTX-U has been under construction for the past three years, PPPL researchers have been busy analyzing previous data from the experiment and col-

laborating with laboratories around the world. Researchers at PPPL published 60 articles in journals over the past year, including four in the prestigious Physical Review letters.

He noted that three Office of Communications staff members: Science Writer John Greenwald, Photographer Elle Starkman, and Webmaster Chris Cane, received awards from the Council for the Advancement and Support of Education District II last year.

Prager recognized physicists David Gates and Charles Skinner, who received the prestigious honor of being named APS fellows last year. He also cited Robert Cutler, a technician at PPPL for the past 34 years, who recently received Princeton University's Presidential Achievement Award for his work at the Laboratory.

RGDX and outreach

Some of PPPL's research is geared toward educating and informing students and the general public, Prager said. One example is the Remote Glow Discharge Experiment (RGDX) devised by Science Education Postdoctoral Fellow Arturo Dominguez. The RGDX allows users from anywhere in the world to log on to a program where they can create and manipulate a glowing plasma in a device in a PPPL laboratory, and watch their results in a video stream.

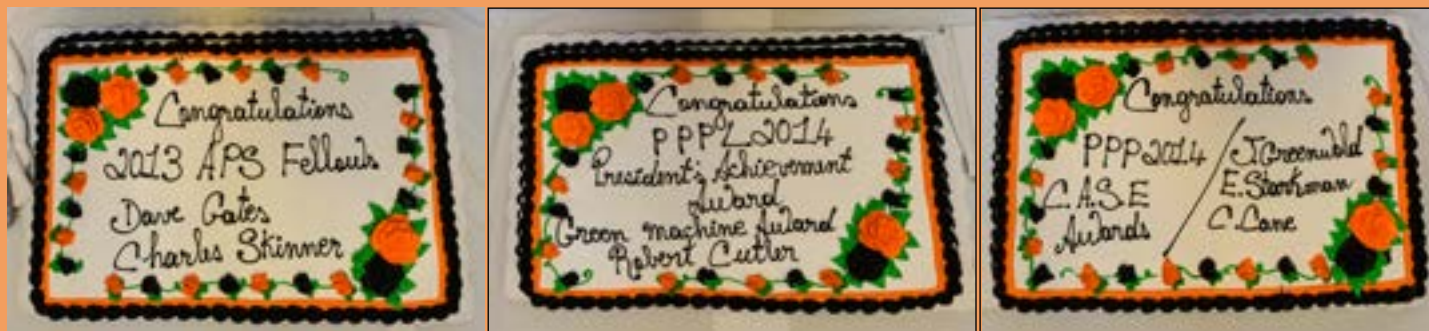
PPPL had a hugely successful outreach event in June of 2013 when the Laboratory opened its doors to the public and some 3,000 people visited the Laboratory, Prager said.

Safety continues to be a big priority for the Laboratory, Prager said. He urged staff to continue taking part in a quarterly survey so that PPPL can continue to improve. The Safety Champions Committee is also coming up with a list of recommendations to address some of the concerns raised in the survey.

Praise for hard work of Facilities crews

Prager showed photos of the Lab during one of the numerous winter snowstorms this year and joked that "it was a beautiful winter for cross-country skiing and enjoying the cold." The audience applauded when Prager remarked that everyone should appreciate the hard work of the Facilities group. They "worked through the night to ensure that the Lab could open safely and people could come to work in the morning," he said.

Prager told PPPLers that the past year "was a good year for the fusion program and a great year for us." He added that PPPL has "planted the seeds for an even greater harvest next year." 🍷



Three of the five cakes dedicated to PPPLers achievements served following the State of the Lab. At left, a cake congratulating APS fellows Dave Gates and Charles Skinner; center, congratulating technician Bob Cutler for the University's Presidential Achievement Award; at right, congratulating John Greenwald, Elle Starkman and Chris Cane, for winning CASE awards. (Photos by Russ DeSantis)

PPPL's booth is a crowd pleaser at Communiversity

By Jeanne Jackson DeVoe

Some 35,000 people attended Communiversity on Sunday, April 27, and many of them stopped by PPPL's booth. There, they could take part in hands-on plasma demonstrations, view an ITER model and chat with scientists, engineers and staff members about the great work taking place at PPPL.

More than 20 PPPL'ers volunteered to staff PPPL's booth, located next to Princeton University front gates on Nassau Street, where the music was loud but there was a steady crowd. The annual event, sponsored by Princeton University and the Arts Council of Princeton, features music, art, and performances and more than 200 booths staffed by both food and merchandise vendors and civic and University groups.

Michael Zarnstorff, PPPL's deputy director for research, was one of several physicists who volunteered. "It's always a thrill to be at Communiversity and have talks with everyone about the Lab and about progress in fusion," Zarnstorff said. "It was essentially non-stop discussions and interactions."

Many people came by to try out the science activities. One of the most popular was a large vacuum jar with a marshmallow inside attached to a vacuum. Wenping Wang, who stayed most of the day, along with engineers John Lacenere, Bill Davis, and Mike Mardenfeld, and technician John Adams, spent hours showing off the device. People in the crowd watched in fascination as the marshmallow puffed up when the vacuum was turned on and then shriveled into a small pebble when it was turned off.

Deedee Ortiz of PPPL's Science Education department spent hours showing children the Van De Graaff generator. "I thought that it was a great event," Ortiz said. "It brought so many people together from the community and the interest in our booth was very high. People were very interested in what we do. And the kids loved the demos!"

The plasma speaker, which uses plasma to power an iPod, was also a popular item. Another crowd pleaser was an electromagnet that pushes metal circles up a circular pole. People also admired the ITER model and asked about its history and future. Volunteers handed out PPPL-logoed string bags, balls, as well as hundreds of brochures about the research taking place at PPPL.

Several other physicists, including George "Hutch" Neilson, head of advanced projects, and staff physicists Igor Kaganovich, Greg Hammett, Sam Lazerson, David Mikkelsen and Stuart Hudson were on hand to talk to the crowd about PPPL's research. Other volunteers included Dana Eckstein, an administrative assistant in the Facilities Department, engineers Henry Carnevale and Russell Feder and PPPL Webmaster Chris Cane. 📷



Alexander Sotorando, 7, and his father William, of Lawrenceville, keep a close eye on a plasma ball at PPPL's display.



Lauren Evans, 10, of Trenton, smiles as she tries out the Van de Graaff generator at PPPL's Communiversity booth.



Daniel Etra, 7, left, and brother David, 5, of Princeton, watch engineer Wenping Wang make a marshmallow puff up in a vacuum.



Physicist Igor Kaganovich has a lively discussion with Tom Salomone, of North Brunswick.



Michael Zarnstorff, PPPL's Deputy Director for Research, shows off a model of ITER to Mitch Marx and Neha Bhatia.



James Kisian, 11, of Hopewell, has fun trying out the Van de Graaff generator as PPPL's Deedee Ortiz looks on.

Photos by Jeanne Jackson DeVoe

PPPL Honors

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Allen Boozer

The Kaul Prize cited Boozer for his “seminal contributions to the understanding of three-dimensional magnetic fields in plasma confinement, and their use for improved approaches to fusion energy.”

“In addition to his singular research contributions,” Prager noted, “he has contributed to the Lab in ways that range from stimulating new research activities to serving as interim head of the Theory Department and performing a valuable service in that way.”

After earning his doctorate from Cornell University, Boozer served in the U.S. Air Force from 1970 to 1974 before joining the Laboratory. He moved to the College of William and Mary as a full professor of physics from 1986 to 1994 before becoming a full professor in 1994 in the Department of Applied Physics and Applied Mathematics at Columbia University.

Boozer’s theoretical work on optimizing the magnetic field strength in 3D plasmas paved the way for development of the National Compact Stellarator Experiment — now known as QUASAR — as a hybrid of the stellarator and tokamak concepts. His contributions to the understanding of 3D plasma confinement won the 2010 Alfvén Prize, Europe’s most prominent plasma physics award, from the Plasma Physics Division of the European Physical Society. He has been a fellow of the American Physical Society since 1982.

Boozer called the Kaul Prize “certainly a great honor.” He noted that three principles have guided his research: “(1) Look for problems that are important, can be solved, but have not yet been solved — the easier the solution the better. (2) Seek the subtle constraints that fundamental physics, such as Maxwell’s equations, place on important problems. (3) Hunt for paradoxes in physics. Resolving paradoxes is frustrating, but physics is consistent, so the resolution implies a fundamental advance in understanding.”

Charles Gentile

Gentile plays a pivotal role in projects throughout the Laboratory. “He is a real go-to guy for lots of things,” said Michael Williams, head of the Engineering and Infrastructure Department and associate director of PPPL.

Gentile’s award reflects his richly diverse contributions. He was cited for “pioneering innovations and leadership in a diverse range of areas including tritium systems, pulsed laser techniques, nuclear detection, medical isotope production; for establishing many unique laboratories, from nanotechnology to liquid lithium; and for outstanding mentoring of numerous students.”

Gentile’s career spans 36 years in the fields of nuclear research, fission power production, magnetic fusion research and inertial fusion energy research. A graduate of the University at Buffalo, a branch of the State University of New York, he joined PPPL in 1984. Prior to joining PPPL he held supervisory positions at the Maine Yankee Nuclear Power Station, Salem Nuclear Power Station, Oyster Creek Nuclear Power Station, and the Shoreham Nuclear Plant on Long Island.

During his tenure at PPPL Gentile has served as Chief Operations Engineer on the Tokamak Fusion Test Reactor (TFTR), and managed the Tritium Operations Group, which was responsible for the safe introduction of tritium fuel to TFTR. He subsequently headed a team that developed the Miniature Integrated Nuclear Detection System (MINDS), a homeland security technology that grew from the decommissioning of TFTR.

Researchers across the Laboratory often turn to Gentile to help them realize their visions. “My job in part is to provide the engineering aspects associated with the many fusion-related technologies we have under way at the Laboratory,” Gentile said. “This award is a great honor. When I look at past recipients, I am thrilled to be included among them.”



The cakes commemorating the awards to Allen Boozer and Charles Gentile. (Photos by Russ DeSantis)



Prager with Allen Boozer, right, a professor of applied physics at Columbia University, who is displaying his Kaul Foundation Prize. (Photo by Russ DeSantis)



Prager with Charles Gentile, right, an engineer at PPPL since 1984, who received the Distinguished Engineering Fellow Award. (Photo by Russ DeSantis)

COLLOQUIUM



EXPLORING THE PHYSICAL PROPERTIES OF MATTER IN EXTREME CONDITIONS

SIEGFRIED GLENZER
SLAC NATIONAL ACCELERATOR LABORATORY

Wednesday, May 7

4:15 p.m. (Coffee/Tea at 4 p.m.) • MBG Auditorium

Girl Scout STEM Fair Volunteers Needed!

Many volunteers are still needed to help make the Girl Scout STEM Fair at PPPL on May 17 from 8 a.m. to 4 p.m. a success. Please volunteer an hour or two of your time. Contact Theresa Gillars, tgillars@pppl.gov, ext. 3512 if you can help out.

Volunteers are needed for the check-in/info desk, registration, snack/lunch helpers, younger Scout group leaders, older Scout workshop volunteers, group escorts, tour guides and the Plasma Hutch.

Thank you!



Site Protection Division • TIP • OF • THE • WEEK •

SUSPICIOUS MAIL

As a national laboratory, our laboratory address and staff directory are easily available on the web. With this in mind, all staff should take precautions in spotting and handling suspicious mail and should remain extra vigilant for unwanted or unsolicited letters, e-mails, notes, etc. Staff should continue to "think before you click" on links or attachments in any unusual, unsolicited, or suspicious e-mails, and report encounters to the PPPL cyber security team or Helpdesk. Report any unusual letters, notes, etc. to a supervisor who can work with Human Resources and Site Protection to resolve.

The staff in the PPPL Mail Room does an outstanding job inspecting mail and ensuring that unusual or suspicious items are flagged for further review. Here are some suggestions from the U.S. Postal Service and the PPPL Site Protection Division on how to recognize suspicious letters and parcels, and how to respond.

What makes a piece of mail or parcel "suspicious?"

- Unexpected or unfamiliar source
- Addressed to someone who is no longer at the Lab
- Outdated address information
- No return address
- Odd shape or unusual weight for its size
- Restrictive wording ("Personal" or "Confidential")
- Excessive writing on the outside, misspelled words, badly written
- Protruding wires, strange odors or stains
- Postmark doesn't match return address
- Excessive postage

What should I do?

- STOP — Don't handle it
- Do not try to open, smell or taste
- Isolate it immediately
- Evacuate the immediate area
- Call ESU at Ext. 3333
- Activate our Emergency Plan
- Notify a supervisor



BROCK 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.

— MARK GAZO, Chef Manager

COMMAND PERFORMANCE
CHEF'S FEATURE

	MON. 5 MAY	TUE. 6 MAY	WED. 7 MAY	THU. 8 MAY	FRI. 9 MAY
	CINCO DE MAYO				
	Arroz con Pollo	Cheese Tortellini with Sundried Tomatoes and Creamy Pesto Sauce	Jamaican-Style Beef Stew served over Mashed Potatoes	Breaded Pork Chops served with au Gratin Potatoes	Spanish Cod with Chickpea, Spinach & Potato Stew
EARLY RISER	Huevos Rancheros	Spaghetti & Egg Frittata	English Muffin Breakfast Pizza	Cowboy Breakfast Sandwich	Eggs Benedict-wich
COUNTRY KETTLE	Mexican Black Bean Soup	Chicken Noodle	Cream of Potato	Beef Mushroom Barley	Gazpacho
GRILLE SPECIAL	Flank Steak Soft Tacos	Pulled Pork Sandwich with Onions & Pepperjack Cheese	Seafood Quesadilla	Turkey Salisbury Steak with Baked Potato Wedge and Gravy	Provence Veggie Sandwich
DELI SPECIAL	Vegetarian Burritos with Salsa and Avocado Corn Relish	Roast Beef & Cheddar with Onions & Horseradish on an Onion Roll	Spinach Salad with Grilled Chicken, Sliced Apples, Candied Walnuts	Egg Salad BLT	Spring Chicken Salad with Grapes, Walnuts & Celery on a Croissant
PANINI	Chorizo Breakfast Burrito	Seafood Stuffed Potato	Chicken Patty with Peppers, Onions, Buffalo Sauce & Blue Cheese	BBQ Tofu Torpedo	Cowboy Stromboli with Mushrooms, Beef, Mozzarella & Chicken

MENU SUBJECT TO CHANGE WITHOUT NOTICE

VEGETARIAN OPTION

CLICK HERE FOR A PRINTABLE WEEKLY MENU

WEEKLY Editor: **Jeanne Jackson DeVoe** ♦ Layout and graphic design: **Gregory J. Czechowicz**
Photography: **Elle Starkman** ♦ Web: **Chris Cane** ♦ Admin. support: **Pamela Hampton**

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