

## At PPPL THIS WEEK

WEDNESDAY, APRIL 9

### PPPL Colloquium

4:15 p.m. ♦ MBG Auditorium

How Trenton Iron and Steel innovations reshaped America

Clifford Zink, Independent Historian

### UPCOMING EVENTS

April 14

### PPPL Colloquium

4:15 p.m. ♦ MBG Auditorium

Fusion through the eyes of a science journalist

Dan Clery, Science Magazine

April 16

### PPPL Colloquium

4:15 p.m. ♦ MBG Auditorium

Extreme Global Warming: Examples from the past

Mark Pagani, Yale University

April 17

### PPPL Colloquium

4:15 p.m. ♦ MBG Auditorium

Toward Diversity in Flatland: Controlled Synthesis of 2D Alloys and Heterostructures

Peter Sutter, Brookhaven Nat'l Lab

April 22

### Earth Day Grounds Clean-up at PPPL

Volunteers needed!

Lunch will be provided.

Sign up [here](#)

Apr. 27

### Communiversy Festival

1 p.m. ♦ Nassau St., Princeton

## No cookies but lots of science at Girl Scout STEM Fair on May 17

By Jeanne Jackson DeVoe

The Girl Scouts may be famous for selling cookies but today's Scout leaders are focusing more on encouraging girls to learn about science and technology than on making cookie sales. Some 250 Girl Scouts will get plenty of hands-on activities and encouragement through a Girl Scout STEM Fair at PPPL on Saturday, May 17, and they'll need the help of PPPL volunteers.



"We are trying to encourage girls to go into STEM fields because they have been male-dominated fields," said Theresa Gillars, a senior staff accountant at PPPL and a long-time Girl Scout leader who is one of the main organizers of the event. "We're trying to introduce the girls to STEM at an early age."

The event, sponsored by the Girl Scouts of Central and Southern New Jersey, will include a day of activities for younger Scouts from third to fifth grade and workshops for older Scouts from sixth to twelfth grade. Everything from chemistry to robotics and nuclear science will be on display. There will be tours, hands-on demonstrations and a panel discussion on women in STEM. College counselors will also have tables set up in the lobby to meet with the Scouts. More information is available [here](#).

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## Bob Cutler: PPPL's virtuoso technician wins prestigious award from Princeton

By Jeanne Jackson DeVoe

Robert Cutler came to PPPL in 1980 thinking that he would work at the Laboratory over the winter when carpenter work was slow. That was 34 years ago and he never left. Princeton University last month recognized Cutler's decades of virtuoso work spent building, designing and maintaining devices on PPPL experiments, and mentoring graduate students, by honoring him with a 2014 President's Achievement Award at Princeton University.

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Bob Cutler, left, a technician at PPPL for 34 years, shakes Princeton University President Christopher L. Eisgruber's hand at the March 27 ceremony at the University where he received the Presidential Achievement award for his contributions to PPPL and the University.

# Robert Cutler

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Phil Efthimion, who heads PPPL's Plasma Science and Technology Department, hired Cutler after hearing about his carpentry skills and learning Cutler had built his own house. "I said, 'This is a fellow I want to hire,' and it made me look like a really smart guy," Efthimion said. "He's a very hard worker and he's conscientious and he takes responsibility. But the thing that is most unique about Bob is that he is gifted mechanically to the extent that he can basically design things without any formal mechanical engineering training and make them work. That is the thing that all of us have been astounded by."

Cutler played a key role in building, installing and maintaining diagnostics for the Tokamak Fusion Test Reactor (TFTR) and more recently has been a key part of the Magnetic Reconnection Experiment (MRX) where he devised and installed new toroidal coils and has worked with graduate students on many other modifications to the experiment.

## Characteristically modest

Cutler himself is characteristically modest about the award. The honor recognizes staff members with five or more years of service "whose dedication, excellent work and special efforts have contributed significantly to the success of their departments and the University." His colleagues, knowing that he shuns parties and detests the spotlight, joked that this was one party he couldn't avoid.

Sure enough, Cutler said he was pleased at getting the award but didn't like all the attention. "I haven't felt calm since the whole thing started," Cutler said. "Deep down I'm happy but it's unnerving."

Cutler was one of five University employees to win the prestigious award, which includes a \$2,500 prize. Lynn, Cutler's wife of 45 years, and their two daughters Virginia and Penny, attended the March 27 Service Awards luncheon, along with Director Stewart Prager and Efthimion. Cutler also has a son, Richard, who is an engineer at an energy company in Ohio, and two grandchildren, Robert Michael Cutler, and Kaylin.

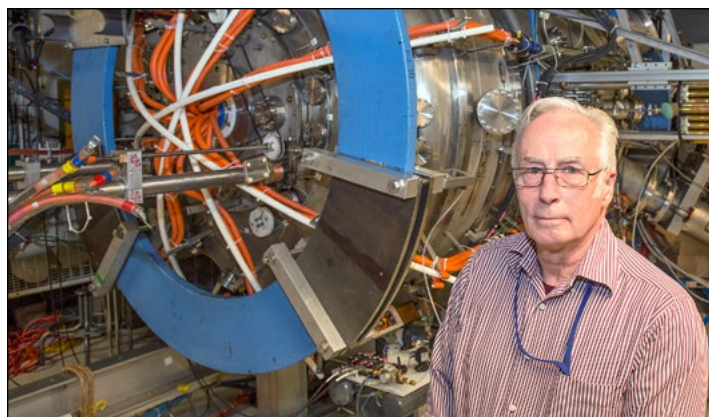
Cutler grew up in North Jersey, the son of a carpenter who was constantly renovating houses and then selling them, so the family moved seven times when he was growing up. He had some machine shop training in high school and learned about electronics in the Air Force, where he worked on B52 bombers and KC135 tankers during four years of service from 1963 to 1967 and on reserve duty for the following eight years.

## Constant challenges

Cutler said he likes the fact that his job at PPPL offers constant challenges. "It's been an interesting job," he said. "I haven't done the same thing twice since I got here." He said he enjoys working with various researchers at PPPL. "The people I work with – you wouldn't get any better." And he likes the fact that everyone is dedicated to the Lab's mission of developing magnetic fusion as a clean and abundant way to produce electric power. "Everyone's working toward the same goal rather than just being there for a paycheck," he said.

When he first came to PPPL, Cutler worked for several years on diagnostics for the TFTR. He was responsible for building, installing and maintaining seven large diagnostics based on microwave/millimeter wave technology that diagnoses microinstabilities that are responsible for heat loss in the plasma, Efthimion said.

In his letter nominating Cutler, Efthimion recalled Cutler's "finest achievement while he was working on TFTR," came when one of the diagnostics required four remote-controlled steerable optics (mirror antennas) that could be positioned close to the experiment. Engineers had estimated the cost to build such a device would be \$1.2 million – a price that would make the device impossible to build. Cutler found



Cutler stands next to the Magnetic Reconnection Experiment (MRX). He installed a new coil system on the device and has also worked closely with physicists and graduate students on reconfiguring the MRX for their research.

"a more elegant and cost-effective solution" that used the same kind of non-electric motors based on air compression that dentists use in their drills. He built a system that could be controlled remotely through a computer. After going through design reviews, Cutler worked with the machine shop to fabricate the parts, assembled the system and tested the device. The total cost was less than \$150,000.

## Moving to the MRX

A few years after TFTR shut down, Efthimion recommended Cutler move to the MRX, a device that creates magnetic reconnection, a process that takes place in the sun and is responsible for solar flares and geomagnetic storms.

When a new coil system had to be designed and built for the MRX, Cutler again designed and built the system. The cost of the coil upgrade was \$20,000. Efthimion says that amount is a fraction of what it would have cost if a team of engineers built it.

Masaaki Yamada, a physicist who is the principle investigator for the MRX along with physicist Hantao Ji, said he has been amazed at Cutler's mechanical abilities. "I joke that he has the brain of a 3-D printer," he said.

"As soon as he joined us, I realized this guy has real talent and he's the best fit for this type of machine," Yamada said. Researchers constantly change certain aspects of the machine for their research and Cutler is able to help them create the devices to do that, Yamada explained. "Usually I come up with certain physics ideas and then the rest is up to him."

## Working with graduate students

Cutler has worked closely with more than a dozen graduate students like Clayton Myers, who is wrapping up his research on the MRX this month. Cutler helped him with his thesis project, which uses the MRX to study solar eruptions, by helping Myers devise a complex apparatus inside the vacuum vessel of the MRX that has four independent magnetic field coils, two of which are movable, and two electrodes that are used to generate the plasma. Cutler worked with him to design and construct the apparatus in just two months and Myers said he would never have "dreamed of designing such an aggressive experiment," without Cutler's help. "It's a huge asset for MRX to have that expertise available," Myers said. "I've talked to him three times today about what we're doing!"

Even when he isn't at work, Cutler is putting his abilities to work. He spent more than two years converting a 1999 Toyota to a natural gas engine and designed and built a compressor for the car. He estimates the cost of filling a tank is about one-third the cost of regular gasoline.

Meanwhile, Cutler is involved in plans for the next generation of the MRX, the \$4.3 million Facility for Laboratory Reconnection Experiment (FLARE), which is scheduled for completion in 2016. He is sitting in on design meetings as a consultant. "We're going to need his talents to pull this thing together and build this thing and make it affordable," said Efthimion. "We're not going to let him get away!"



# Girl Scouts

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PPPL hosted a Boy Scouts STEM fair last October, which some 300 Scouts attended. Even before that event, engineer Ray Camp came looking for Gillars to enlist her help in organizing a similar event for Girl Scouts.

### Volunteers needed

Gillars has recruited numerous PPPL volunteers to help lead STEM sessions in chemistry, computers, engineering, fire safety, energy, and other fields. But she needs dozens more volunteers to help with the morning check-in, assist robotics teams, work as group assistants for younger girls and as classroom assistants for older girls. Volunteers are also needed to help supervise dozens of girls in the cafeteria, assist with panel discussions and lead tours of PPPL. Please contact Gillars, [tgillars@pppl.gov](mailto:tgillars@pppl.gov), ext. 3512 if you can help out.

Adam Cohen, PPPL's deputy director for operations, said the Girl Scout STEM Fair is exactly the kind of event PPPL should sponsor. "Here's an opportunity to open our doors and have people see science and see researchers and see their excitement, and I think that's a fabulous opportunity!" he said. "To me, it's all about 'Can we level the playing field?' Can we just say, 'Here are the opportunities, here are the skills you need to really go into these fields.'"

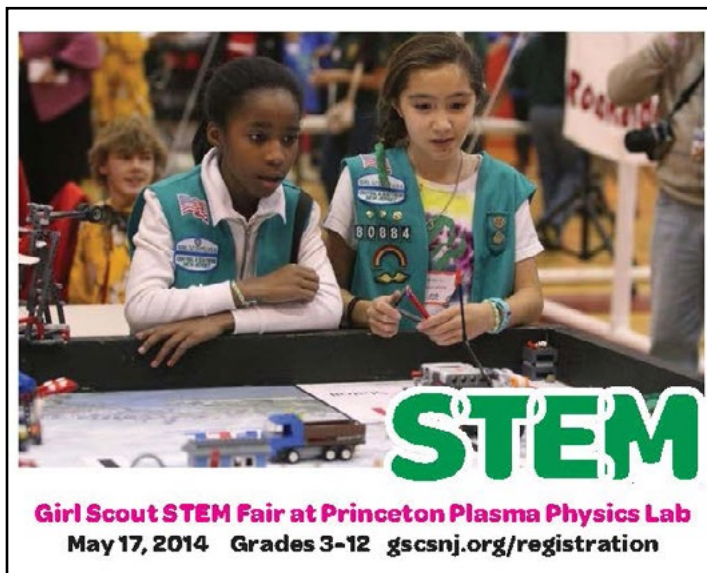
The STEM Fair will take place from about 8:15 a.m. when participants begin checking in to about 4 p.m. Some 240 Scouts are expected, including about 100 younger girls (Brownies and Juniors) and about 140 older Scouts (Cadets, Seniors and Ambassadors). Registration started with the Girl Scouts of Central and Southern New Jersey and opened last week to the rest of New Jersey and parts of Pennsylvania.

Cheryl L. Rowe-Rendleman, a Girl Scout leader and consultant for pharmaceutical companies on ophthalmic drug development who holds a Ph.D. in biochemical and biophysical sciences and is a Princeton University alumna, is helping to organize the fair at PPPL. It's important for the Girl Scouts to encourage girls in STEM fields, she said. "In addition to all the character building we do, there's also a need for things that will be useful for them as they move into their careers," she said.

Even those who don't enter a specific STEM field will need strong skills in computing and mathematics, Rowe-Rendleman said. "We're finding that quantitative skills are really employable," she said. "The whole idea is to develop skills for this century."

### Girls meet working scientists and engineers

The STEM fair will be the first time that many of the Girl Scouts are exposed to working scientists and en-



gineers, Rowe-Rendleman said. A 2012 report by the Girl Scouts entitled, "Generation STEM: What Girls Say About Science, Technology, Engineering and Math," found that girls who are interested in STEM fields have had greater exposure to such fields than girls not interested in STEM. "For some of these girls, this may be the first time they've ever done anything like this," Rowe-Rendleman said.

The 2012 report noted that girls tend to start losing interest in math and science in middle school. Only 20 percent of female college freshmen say they intend to major in a STEM field, and only 32 percent of girls ages 12 to 17 think computing would be a good college major, compared with 74 percent of boys the same age. And while there are stereotypes that girls are not as strong performers in math and science, high school girls actually perform equally well in those fields, according to the American Association of University Women. Girls generally take more STEM classes and have a higher grade-point average than boys do, but boys tend to perform better on standardized tests.

### Combatting a pervasive attitude

There is still a pervasive attitude that girls aren't good at STEM, Rowe-Rendleman said. She recalled that when her daughter, Hunter, a student at West Windsor-Plainsboro High School North, attended a special math camp for high school students, she found that she was one of two girls among numerous boys. The boys told the two girls, "You don't belong here." But the girls talked to the teacher and ended up getting additional encouragement. Now her daughter is taking advanced calculus, but without her parents' support the incident could have discouraged her for life. "When things like that happen, it throws girls off track," she said.

The younger Girl Scouts will learn about various topics as a group in the auditorium, where they will see plasma demonstrations by John DeLooper, learn about robotics and do other hands-on activities. Meanwhile, the older girls will take courses in a morning session. They'll visit with college counselors see robotics or fire-safety demonstrations, tour PPPL, and have lunch, and then attend an afternoon workshop. The day's events will conclude with a panel discussion called "Her Story in STEM" that will include college admissions counselors, undergraduate and graduate students, a faculty member and a professional in the STEM fields. 📺



## PPPL Welcomes New Employees!

**NABIDUR RAHMAN**  
Associate Engineer  
Engineering & Infrastructure

**JULIA L. TOTH**  
Safety Engineer  
ESH&S



# COLLOQUIUM



## HOW TRENTON IRON AND STEEL INNOVATIONS RESHAPED AMERICA

CLIFFORD ZINK, INDEPENDENT HISTORIAN

Wednesday, April 9

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

## Join in the fun and volunteer for Communiversality

The Communiversality Festival of the Arts is a great opportunity to have some fun and let the community know about PPPL. Please volunteer for one or two hours on Sunday, April 27 from 1 to 5 p.m. to talk to members of the public, help with demonstrations and hand out prizes at this annual event, which is sponsored by Princeton University and the Arts Council of Princeton and attracts more than 200 artists, crafters and merchants, and thousands of visitors. Please contact Jeanne Jackson DeVoe, [jjackson@pppl.gov](mailto:jjackson@pppl.gov), ext. 2757 to volunteer. More information about Communiversality is available at the Arts Council of Princeton [website](#).



# COLLOQUIUM



## EXTREME GLOBAL WARMING: EXAMPLES FROM THE PAST

MARK PAGANI, YALE UNIVERSITY

Wednesday, April 16

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

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

### PPPL TRAFFIC SAFETY

All vehicles on the PPPL site are to obey posted speed limits. Where the speed limit is not posted, the maximum speed is **15 MPH**. Be careful when approaching curves, as there are many pedestrian crossings and several curves with obstructed views.

Remember that there is no passing on the PPPL roadways unless a vehicle is stopped on the shoulder. Do not pass slow-moving vehicles or cranes that are traversing the site. Yield to walkers, cyclists and emergency vehicles.



# 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. 7  
APR.



**Fried Chicken with Mashed Potatoes, Country Gravy & Veggies**

Apple Pancakes with Sausage

Tomato Basil Bisque

Roast Beef Melt on French Bread with Baked Beans

Chopped Veggie Antipasto Wrap with Cheese, Tomatoes & Lettuce

Meatball & Mozzarella Stromboli

TUE. 8  
APR.



**Cheese Tortellini Pomodoro served with Tossed Caesar Salad**

Chicken, Spinach, Mushroom, Cheddar Omelet with Potatoes

Beef Noodle

Bratwurst & Kraut Torpedo Served with Fries

Chopped Chicken Caesar Sammie

Peppers & Eggs with Potatoes Torpedo in Melted Cheese

WED. 9  
APR.



**Taco Salad Bowl with All Your Favorite Taco Toppings**

Strawberry Shortcake English Muffin French Toast

French Onion

Popcorn Shrimp Po' Boy with Slaw, Remoulade Sauce & Hush Puppies

BLT with Avocado, Smoked Ham on Whole Grain Toast

Honey Dijon Grilled Chicken with Fresh Spinach on a Baguette

THU. 10  
APR.



**Carved Flank Steak with Roasted Potatoes and Vegetable**

Grilled Cheese with Bacon, Ham and Fried Egg

Cream Of Chicken

Chicken Cacciatore on a Torpedo Roll

Classic Tuna Club Sandwich with Hard-Cooked Egg

Eggplant Parmesan on Ciabatta Bread

FRI. 11  
APR.



**Shrimp Scampi with Broccoli over Fettuccine**

Banana Chocolate Chip Pancakes

Vegetarian Split Pea

Philly-Style Portobello Cheese Sandwich

Chicken Carbonara Torpedo with Bacon, Mushrooms, Mozzarella

Hot Open-Faced Roast Beef over Texas Toast with Mashed Potatoes

MENU SUBJECT TO CHANGE WITHOUT NOTICE

VEGETARIAN OPTION

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

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