PRINCETON PLASMA PHYSICS LABORATORY
A Collaborative National Center for Fusion & Plasma Research
U.S. DEPARTMENT OF ENERGY
WEEKLY
JUNE 10, 2013

At PPPL THIS WEEK

MON. - FRI, JUNE 10 - 14

SOFE Symposium on Fusion Engineering

San Francisco

TUESDAY, JUNE 11

Start of the Research Experience for Undergraduates

10-week program in which 40 college students work with PPPL scientists on research projects

WEDNESDAY, JUNE 13

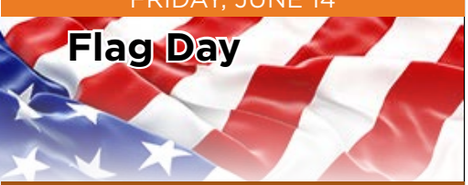
PPPL Colloquium
4:15 p.m. ◆ MBG Auditorium

The European Roadmap for MFE

Francesco Romanelli, JET and EFDA

Refreshments at 4 p.m. in the LSB Lobby

FRIDAY, JUNE 14



UPCOMING EVENTS...

June 18
Service Awards
9:30 a.m. ◆ MBG Auditorium

June 24
Patent Awareness Program
6 p.m. ◆ Prospect House, Princeton University

Inside...

Cool Science on a Hot Day as 3,000 Flock to PPPL's June 1 Open House

Prasad Chalasani, of Princeton Junction, and his son, Avinash, 8, examine a plasma ball in the Science Education Laboratory during the PPPL Open House on June 1.

By Jeanne Jackson DeVoe

More than 3,000 people flocked to PPPL's Open House on June 1 where they were treated to rare glimpses of every corner of the Laboratory – from the machine shop water jets to tours of the National Spherical Torus Experiment Upgrade (NSTX-U).

About 175 PPPL staff members, including some family members, volunteered their time on a hot, sunny Saturday for the event, whether it was handing out snacks and water bottles, giving passersby directions or staffing the "Ask the Physicist," and "Ask the Engineer" booth in the D Site parking lot.

"The Laboratory staff did an absolutely amazing job preparing and showing off the Laboratory to the public," said John DeLooper, head of best practices and outreach, who organized the event. "I think the people who were here were extremely appreciative and amazed at what we do at the Laboratory."

Visitors leave rave reviews on whiteboard

In fact, the Open House and PPPL both got rave reviews on a whiteboard at the back of the Science Education Laboratory where visitors were invited to write. One note in the shaky print of a small child read, "I love this place!" Another young visitor got the Ls backward when he or she wrote, "I love, love this place!"

One appreciative adult writer was more specific. "Thanks for all the time, energy and thought that went into making this experience great for us," she wrote. Another visitor thanked the scientists and engineers for making the Laboratory's fusion research understandable. "Keep up the good work and always be able to tell the non-scientists why the research is necessary," the visitor wrote.

There were 1,000 more people at this year's Open House than there were at the 2010 event and there was standing-room-only at many of the exhibits. "The people I talked to seem to be enjoying this," said PPPL's Andrea Moten, who coordinated volunteers for the event. "They're very curious and inquisitive about the science."

Among the new exhibits this year was the Hall of Machines at D site, where a drawing of ITER took up an entire wall and showed the scale of the machine compared to the NSTX, TFTR and other fusion machines. The NASA moon rocks exhibit was also popular. Children enjoyed the kid's station in the courtyard where

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A creative approach to visualizing fusion in winning PU student video

By Jeanne Jackson DeVoe

A video on fusion by Princeton University students that won second place at Princeton's first Science Action Video Contest has been posted to the Web and can be seen at the Princeton Science Action YouTube site, http://www.youtube.com/user/princetonSA/videos.

The video, much of which was filmed at PPPL and guided by PPPL's Arturo Dominguez, won the second place "Mechanic Prize" at a May 8 screening and awards ceremony at Princeton University.

A creative way to explain fusion

Dominguez, a postdoctoral fellow in Science Education, along with Sajan Saini, of the Princeton Writing Program, coached "Team Plasma," which put together the short video titled, "How does a plasma contribute to a fusion reaction?" in which students use their bodies to demonstrate a fusion reaction.

"They put their bodies into motion when explaining science and I thought that was such a dramatically effective way to explain their topic," said Saini. That dramatic mode of communicating information made it sticky and stayed with the audience."

Andrew Zwicker, head of Science Education, was one of the co-organizers of the program along with Saini and Judy Swan, of the University's Writing Program. He also coached a second team that did a fusion video entitled, "How is a fusion reactor different from a fusion bomb?" In that video a young couple discover romance and get an explanation of the difference between a fusion reaction and a nuclear bomb by Robert Goldston, a physicist, PPPL's former director and a professor of astrophysical sciences at Princeton. The video also features an interview with Zwicker.

"It was just really inspiring to see students being so creative," Zwicker said. "They came up on their own with the narrative, the storyboarding, filming and editing."

The first place winner of the Science Mechanic prize was "Team Microfluidic," for a short video entitled, "How is bacterial quorum sensing influenced by microfluidics?" In addition to the physics of fusion, student teams produced vidoes on climate change and engineering.

A fusion dream sequence

Team Plasma (aka students Hee Jae Jang, Elizabeth Paul, Dayton Martindale and Maxson Jarecki) interviewed other students about what they knew about plasma (One response: "It's a kind of blood.") and about nuclear fusion (they mostly got blank stares). Then they hit the books before falling asleep and entering a dream state.

In their dreams, the students find themselves inside a nuclear reaction with two students in yellow shirts playing electrons and one student each in pink and blue playing hydrogen nuclei. Ultimately, when they find themselves in a smaller circle and the temperature is turned up, the two nuclei come together in a big hug. When the three students wake up, they find themselves in PPPL's Science Education laboratory where they meet Dominguez and they see how plasma can be manipulated by magnets using the Laboratory's plasma demonstration machine.

In the video's dream sequence, the students become hydrogen nuclei and electrons. Here, Paul and Martindale, the two students portraying hydrogen nuclei share a hug as they fuse, while the two students in yellow portraying electrons continue moving around. *(Screenshot from "How does a plasma contribute to a fusion reaction?" at the Science Action YouTube site).*

Team Plasma won the Science Action Video contest for their video on fusion. From left to right: Elizabeth Paul, Dayton Martindale and Maxson Jarecki. (Hee Jae Jang is not shown). *(Screenshot from "How does a plasma contribute to a fusion reaction?" at the Science Action YouTube site).*

Dominguez has the final words of the video. "It's very fulfilling to be in a job where our ultimate purpose is to try to save the world," he says. "We know that the rate we're going at right now is completely unsustainable and we need to be able to find ways to get to the next level and we feel that with fusion we can do this, so it's really great to be working toward this goal."

Overcoming a major bump on the road

It wasn't easy creating the video. The students hit a major bump on the road when they showed their video to Zwicker and Dominguez and they told them that while they had come up with a creative way to depict fusion, they did not have the correct number of ions and electrons or the correct motion to be scientifically accurate. They would have to go back to the drawing board. "They reshot that entire sequence and it looked like a lot of effort but it paid off," Saini said.

Team member Dayton Martindale, a sophomore who plans to major in astrophysical sciences, said he learned a lot working on the video. "What I really loved about this project is I'm working towards something important," he said. "One, it's cool. Two, it can actually change the world and three, it's academic but it doesn't have to be locked in its ivory tower – you can show it to people and it's something other people can get excited about."

Siyu Yang, a freshman, was on the other team that produced a fusion video. Yang, who agreed that it was a learning experience, said: "I come from China and China is now investing a lot in nuclear energy."

"Science is interesting and awesome"

The video took many hours to produce and Jarecki said he was up until the wee hours of the morning editing it but it was worth it. "I was excited to learn about it," he said.

He said he was inspired by the project to change his major to environmental and evolutionary biology. "Science is interesting and awesome," he said, "and if I'm trying to change the world, it will be easier to do that with hard science than with art and this project helped me get to that realization."

PPPL was one of the sponsors of Science Action, along with the Princeton Writing Program, Writing in Science and Engineering, the Princeton Environmental Institute, Atmospheric and Oceanic Sciences and the Cooperative Institute for Climate Science, the School of Engineering and Applied Sciences, the Andlinger Center for Energy and the Environment, and the Keller Center. The program is expected to continue next fall with different topics. For more information visit the Science Action website.

Open House

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they could color and walk in sticky orange oobleck, a gooey substance named for a Dr. Seuss invention that's made of cornstarch and water. (Science Education staff used 100 pounds of cornstarch, 16 gallons of water and three tubes of concentrated orange coloring to create the oobleck at the Open House). Kids tried out computer games to manipulate plasma and a Lego Mindstorms robot in the Commons. There was also an art show by Princeton University students and their professor, well-known artist Josephine Halvorson, and an Art of Science exhibit by PPPL staff members.

Kids got stamps at many of the stops for a scavenger hunt to earn an orange "Energy Ranger" badge, which was created by water jets at PPPL.

The Science Education Laboratory was a popular stop, with dozens of people lining up to touch a plasma ball, try out the Van De Graaff generator or see a 3-D printer in action. Many enjoyed finding out about the plasma machine that demonstrates how fusion works.

Einstein mingles with the crowds

Albert Einstein, aka Arturo Dominguez, made an appearance dressed in a sweater and lab coat and answered questions and directed people throughout the day. One of the comments on the whiteboard was from someone who wrote. "Albert Einstein is so cute!" Another visitor told him, "I'm a fan of your work."

Youngsters wash their feet off after trying out some sticky oobleck in PPPL's courtyard where many kids' activities were set up.

PPPL's Andy Carpe talks to a Boy Scout troop about the plasma fusion demonstration machine at the Science Education Laboratory, a popular stop at the Open House.

Dominguez, who coordinated exhibits for the Open house, said the Open House was a hit. "We've gotten a lot of people stopping by and saying it's been great," he said. But by the end of the day, he was exhausted and ready to go home. "I am one tired Einstein," he said.

Miles Birnbaum, age 6, from West Windsor, who was taking a break at the snack tent, said he really liked the snacks and the long tunnel. His mother, Christine Ferrara, was more enthusiastic about seeing the NSTX-U and other science experiments. "I enjoyed everything," she said. "It was nice to be able to walk up so close to things and it was nice to be able to ask a lot of questions."

Tracy Rembecky, a teacher from Englewood, N.J., took her three nephews, who are also from North Jersey, to the Open House. She said she was encouraged to learn about new developments in fusion energy. "I love the idea of fusion, which is good for the environment," she said. "It's great to see it's finally coming of age."

A treat for budding scientists

Sam Robey, age 8, a budding scientist from Princeton Junction, took notes when he toured the Laboratory. "I learned how to make plasma and I wrote it down," he said, proudly displaying his notes and diagrams. "He liked that he could talk to all of the scientists and they're very good at explaining at a general level," said his father, Ethan. "It was all kind of cool."

Robert Storino, from Princeton Junction, came to the Open House with his wife and four children, one of whom, Emily, was celebrating her eighth birthday that day. They

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John Desandro, far right, in black, and Arturo Dominguez as Einstein, tell visitors about the National Spherical Torus Experiment Upgrade.

Open House

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came at 9 a.m. and were still there five hours later and each had a different favorite activity. Christopher, age 12, liked the 3-D printer and the hands-on plasma activities in the Science Education laboratory. Emmanuel, age 11, liked the firefighting demonstrations, while Emily said her favorite was the water jet cutter, and Gabriel, age 5, thought the best activities were the firefighting demonstrations.

"How can you keep four kids entertained? You keep it interesting," said their father, who said he enjoyed seeing the NSTX-U and other experiments. "I think it's a wonderful experience because you don't get to see things like this," he said. "I think all your presenters were excellent." His wife, Corinna, added, "You can tell everyone loves what they're doing."

PPPL Science Writer John Greenwald explains some of the basic principles of fusion to David and Sophia Lu, of West Windsor, and son Daniel, 6, at the plasma demonstration machine.

A father helps two girls get a stamp at the QUASAR/NCSX site as part of their scavenger hunt in which kids earned "energy ranger" badges for visiting nine stops on the self-guided tour.

DOE's OFES Program Manager Ann Satsangi, at far right, visited PPPL's Open House. Standing, left to right, in front of PPPL's firetruck are also: Ann's husband, Hem Satsangi, and the Satsangi children, Pavan, Yamuna, and Nandini.

Riley Mastromarino, 5, left, and his brother Elliott, 8 meet Albert Einstein (aka Arturo Dominguez).

Department of Energy Site Manager Maria Dikeakos, right, speaks to visitors at the DOE booth in the LSB lobby.

Emergency Services Officer Dan Goresh shows a youngster how to put out a fire during fire safety demonstrations in the D site parking lot.

MORE PHOTOS ON PAGE 5

Open House

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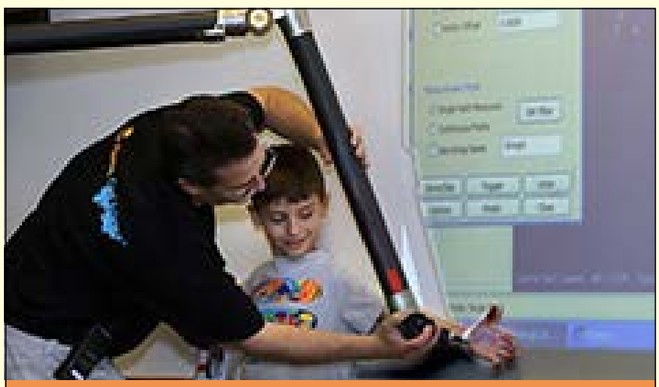
Nevell Greenough shows visitors the type of high power vacuum tubes used in the radio high-frequency heating system for NSTX.



Steve Raftopoulos shows a youngster a measuring arm during a show in the cafeteria.

On June 1, PPPL opened its doors to our families, friends and the public. From all accounts, it was a huge success. That success was directly due to the Laboratory staff and their family members that prepared, set up and served during the day. It is amazing to see how we were able to show off so much of the Laboratory. Our visitors were extremely impressed with our hardware and facilities, but even more so that they got to talk to folks doing and supporting the research. Only because of your hard work, dedication and service was this a great event.

In addition, I want to specifically thank the open house committee members who have been working for the past six months to organize this event.

Daniel Andruczyk
George Ascione
Jeanne Jackson DeVoe
Arturo Dominguez
Lawrence Dudek
Charles Gentile
Erik Gilson
Sue Hill
Kathleen Lukazik
Mike Mardenfeld
Kim Mastromarino
Eric Meier
Aliya Merali
Andrea Moten
Deedee Ortiz
Sonja Patterson
Barbara Sobel
Dolores Stevenson
Mike Viola
Alfred von Halle

As part of our continuous improvement process, please feel free to send me a note on any suggested improvements we could implement for the next open house. Your feedback is appreciated.

My thanks and deepest appreciation to each of you who helped make this open house a wonderful success. THANKS!

John DeLooper
Chair, Open House Committee

A whiteboard in the Science Education Laboratory where visitors left numerous compliments about the Open House and PPPL.

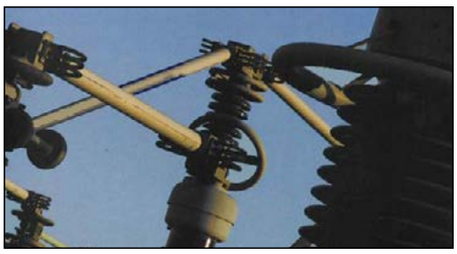
The Science Education Laboratory was very busy as people lined up to see and try out hands-on plasma activities. At right, Shuibing Ge, a visiting physicist, speaks to a visitor.

Mark Cropper gets a good reaction from his young audience during a cryogenics show in the cafeteria.

Princeton Reunion Tours at PPPL

About 40 Princeton University alumni toured PPPL on May 31 for the annual reunion tours as part of Princeton's Alumni Weekend. Stefan Gerhardt led a group on a morning tour, while Henry Carnevale led another group in the afternoon. John DeLooper and Al Von Halle also volunteered with the tour groups, which visited the QUASAR/NCSX site, the Science Education Laboratory and the NSTX Control Room. Carnevale, above at right, describes the QUASAR to the tour group. Andrew Zwicker, in photo at right, gives plasma demonstrations in the Science Education Laboratory.

COLLOQUIUM



The European Roadmap for MFE

FRANCESCO ROMANELLI
JET and EFDA

Wednesday, June 12

4:15 p.m. (Coffee/Tea at 3 p.m.)

MBG Auditorium, Lyman Spitzer Building

Did you know that there is a lab template for PowerPoint presentations that incorporates the logo?

Go here, for information on that or any other questions regarding use of the Lab's visual identity system:

http://w3.pppl.gov/communications/identity/identity.html

PPPL

Café at PPPL 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

	MONDAY JUNE 10	**TUESDAY** JUNE 11	**WEDNESDAY** JUNE 12	**THURSDAY** JUNE 13	**FRIDAY** JUNE 14
COMMAND PERFORMANCE CHEF'S FEATURE	 PORK MARSALA SERVED WITH RICE PILAF	 FRIED CHICKEN W/ MASHED POTATOES, COUNTRY GRAVY	 ADOBO MARINATED PORK w/GRILLED PINEAPPLE SALSA	 CHEESE MANICOTTI WITH MARINARA SAUCE	 BREAKFAST FOR LUNCH
EARLY RISER	Grits, Eggs & Bacon	Banana Walnut Pancakes	Cheese Steak Omelet	Veggie Pancakes	Western Omelet
COUNTRY KETTLE	Zesty Meatball Noodle Soup	Minestrone	Sausage Chicken Gumbo	French Onion	Seafood Bisque
GRILLE SPECIAL	Swedish Meatball Torpedo	Fish Fillet Sandwich	Pizza Burger	Cheesesteak Hoagie	Grilled Caponata Salad with Grilled Flatbreads
DELI SPECIAL	Grilled Vegetable & Feta Cheese Sandwich	Turkey Avocado Wrap	Tofu Taco	Classic Turkey Club	Turkey Pastrami, Swiss & Coleslaw on Rye
PANINI	Seafood Newburg over Puff Pastry	Corned Beef Reuben	BBQ Meatloaf & Cheddar on a Kaiser Roll	Pork Roll, Cheese, Peppers & Onions on Ciabatta Bread	Eggplant Parmesan Panini

MENU SUBJECT TO CHANGE WITHOUT NOTICE

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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Comments: commteam@pppl.gov ◆ **PPPL WEEKLY** is archived on the web at: http://www.pppl.gov/ppplweekly.cfm