PPPL PRINCETON PLASMA PHYSICS LABORATORY
A Collaborative National Center for Fusion & Plasma Research
U.S. DEPARTMENT OF ENERGY
WEEKLY
APRIL 29, 2013

At PPPL THIS WEEK

MONDAY, APRIL 29

GFDL Seminar
Smagorinsky Seminar Room
What did we achieve from global cloud satellite observations?

Claudia Stubenrauch, CNRS/IPS Laboratoire de Meteorologie Dynamique

WEDNESDAY, MAY 1

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

In Search of the First Americans

Michael Waters, Texas A & M University

THURSDAY, MAY 2

Princeton University Hamilton Colloquium Series
4:30 p.m. ◆ Jadwin A10

The Physics of Galaxy Cluster Plasmas

Eliot Quataert, University of California – Berkeley

SUNDAY, MAY 5

34th Annual Founders Day Celebration for Plainsboro Township
Parade at 12:30 p.m. from Edgemere Avenue to Municipal Grounds

Festival at Municipal Grounds, 641 Plainsboro Road, at **1:15 p.m.**

UPCOMING EVENTS...

June 1
PPPL Open House
9 a.m. - 4 p.m.

Inside...

Phil Heitzenroeder named winner of the 2013 Fusion Technology Award

By John Greenwald

Phil Heitzenroeder, who leads the Mechanical Engineering Division at PPPL and whose advice is sought by engineers around the world, has won the 2013 Fusion Technology Award. The high honor from the Nuclear and Plasma Sciences Society of the Institute of Electrical and Electronics Engineers (IEEE) recognizes outstanding contributions to research and development in the field of fusion technology.

Heitzenroeder has contributed to the design and construction of many of the world's major magnetic fusion facilities during a storied 40-year career at PPPL that includes more than 20 years as head of the Mechanical Engineering Division. That career has been marked by "increasing responsibilities, particularly in the magnet design and manufacturing area, for every experimental fusion device that PPPL has been associated with," said Mike Williams, associate PPPL director for engineering and infrastructure and a winner of the Fusion Technology Award in 1993.

Heitzenroeder is famed for developing imaginative solutions to engineering challenges. "He's probably the most creative person I've ever worked with," said Wayne Reierson, a PPPL engineer currently on long-term assignment to Oak Ridge National Laboratory, where he serves as team leader for U.S. magnet systems contributions to ITER. "If there was a problem Phil could come


Phil Heitzenroeder

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Farewell to Ed Winkler

By Jeanne Jackson DeVoe


Ed Winkler is retiring as CFO after 23 years at PPPL.

When Ed Winkler first started at PPPL as the chief financial officer in 1989, George H.W. Bush was president and the Berlin Wall had just come down. PPPL researchers had witnessed first plasma on TFTR only seven years before.

In the 23 years since, the Laboratory has been through many transformations, including moving from TFTR to NSTX-U. Now PPPL is facing another major change as Winkler retires from PPPL to pursue new adventures in Swansboro, North Carolina.

Winkler will join his wife of nearly

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PPPL & Princeton scientists develop novel system for verifying nuclear warheads

By John Greenwald

Scientists at Princeton University and PPPL are developing a unique process to verify that nuclear weapons to be dismantled or removed from deployment contain true warheads. The system would do so without measuring classified information that could lead to nuclear proliferation if the data were to be leaked.

The novel verification process draws upon principles used in cryptography, the science of disguising information. Researchers said the project could help support nuclear arms talks and ensure that weapons of mass destruction are truly removed from circulation. The study is funded by grants of $100,000 from the U.S. State Department and $162,500 from Global Zero, a nonprofit organization dedicated to eliminating all nuclear weapons.

"The goal is to prove with as high confidence as required that an object is a true nuclear warhead while learning nothing about the materials and design of the warhead itself," said physicist Robert Goldston, a co-principal investigator for the project and professor of astrophysical sciences at Princeton. He is a fusion researcher and former director of PPPL.

Goldston and Princeton physicist Alexander Glaser, working with PPPL engineer Charles Gentile, have begun building an experimental system at PPPL to probe a DOE-approved, unclassified, and steel-encased test object containing non-nuclear materials. The project would mimic the procedure for inspecting warheads. They hope to complete the first full phase of experiments by the end of the year.

Glaser and Goldston both are associated with Princeton's Program in Science and Global Security.

The idea behind the warhead verification system is surprisingly simple. It calls for comparing a nuclear warhead that is presented for inspection with a presumed identical one — sometimes called a "golden warhead" — that is known to be real and armed with fissile, or explosive, nuclear material.

"You just need to know that one warhead is good, and if you can verify that one you can verify others," said Glaser, an assistant professor of mechanical and aerospace engineering and international affairs in Princeton's Woodrow Wilson School of Public and International Affairs.

Such a "zero-knowledge protocol" for verifying warheads could create a new tool for global arms control efforts. While the total number of nuclear weapons in the United States and Russian arsenals has shrunk from more than 60,000 reported deployed and nondeployed warheads during the Cold War to some 16,000 reported today, this has been achieved without verification of the actual contents of the warheads. Arms inspectors have instead counted the reduction of nuclear weapon delivery systems, such as submarines and missile silos, without requiring or verifying the dismantlement of the warheads themselves.

"It is certainly true that if a workable zero-knowledge approach proves feasible, it would greatly facilitate nuclear warhead reduction regime verifications," said James Fuller, an independent consultant and former director of Defense Nuclear Nonproliferation Programs at the Pacific Northwest National Laboratory.

From left, lead engineer Charles Gentile and physicists Alexander Glaser and Robert Goldston examine neutron detectors that have collected preliminary data.

The PPPL project aims to show that the zero-knowledge verification process can work.

"We know it is doable in theory, but will a hardware implementation used under real-world conditions be sensitive enough to detect meaningful differences and violations?" said Glaser, who thought up the system with Goldston and computer scientist Boaz Barak, a former Princeton associate professor of mathematics and now a senior researcher at Microsoft Research New England. Similar verification processes are regularly used online to authenticate passwords and other encrypted data, Glaser noted.

The warhead verification system would work like this:

- Arms inspectors beam high-energy neutrons at the presumed nuclear warhead and record how many pass through the warhead to an array of radiation detectors on the other side. Neutrons that fail to reach the detector have been absorbed or scattered by the material inside the warhead.
- The neutrons that do reach the detectors are counted and added to the number that the host nation whose warheads are being inspected had "preloaded" into the detectors. Inspectors would measure the total number of counts in the detectors without knowing how many had been preloaded. This total count could be straightforwardly tallied with non-electronic neutron counters such as the personal dosimeters used to measure exposure to radiation in nuclear power plants.

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Heitzenroeder wins Fusion Award

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up with half-a-dozen ways to solve it. New ideas just seem to come from him without any effort all."

A graduate of the New Jersey Institute of Technology with a bachelor's degree in mechanical engineering, Heitzenroeder first honed his skills in the PPPL magnetic coil shop during the 1970s. The copper, electricity-conducting coils are crucial to fusion research. They wind around fusion devices to create the magnetic fields that control the hot, charged plasma gas during experiments. Heitzenroeder helped design coils for the Princeton Large Torus and Tokamak Fusion Test Reactor facilities, both of which set world records for plasma temperature at the time.

Current projects from the Mechanical Engineering Division range from the design and analysis of coils for the $94 million upgrade of the National Spherical Torus Experiment (NSTX-U), the Laboratory's major fusion facility, to the development of in-vessel coils for ITER, the huge international fusion experiment under construction in Cadarache, France. Another recent project has been a set of five coils that the Laboratory completed delivering this year to the Wendelstein 7-X stellarator fusion project in Greifswald, Germany.

"Phil has demonstrated his acumen by the range of technologies that he mastered, the enormous number of projects that have benefited from his influence, and the consistency with which he has brought them to successful conclusions," said Timothy Stevenson, who heads engineering project management at the Laboratory.

Heitzenroeder's 40-member team works on all aspects of mechanical engineering for fusion facilities. Such tasks include analysis of support structures for the NSTX-U, whose electric current and magnetic fields will be doubled when the work is completed in 2014. "This really pushes the envelope," said Ron Strykowsky, who oversees the upgrade. "Every nut, bolt and weld has to be analyzed, and that's all part of what Phil's team does, and does well."

Heitzenroeder's influence is felt throughout the world fusion community. "It is no surprise that Phil has been asked to participate in virtually all of the design studies for the next generation of fusion devices," said Al von Halle, the head of electrical engineering at PPPL.

Heitzenroeder approaches the toughest tasks with unflagging optimism. "His upbeat personality and pleasant demeanor are often key to bringing conflicting opinions in the room to final agreement," said Larry Dudek, the head of engineering fabrications and operations. "It is difficult to imagine the fusion community without Phil leading it."

Heitzenroeder's positive-minded approach to problems stems from a lifelong interest in the way that mechanisms work. "I always liked mechanical things," he said. "I liked to go into plants and see how things were made. So when you think of a solution you try to think of what you've seen."

He increases his store of knowledge through voracious reading. "Since I was a kid I've loved magazines like Popular Science, Popular Mechanics and auto magazines," he said. "And these are marvelous times. You can go on the Web and find out about everything and pick up incredible ideas that way.

As a manager of engineers at PPPL, Heitzenroeder sees himself as "sort of like a conductor of the incredibly capable band we have. My job is to do what I can to make it all work." Heitzenroeder has done that well enough to win the Fusion Technology Award that he is to receive, together with a plaque and a check for $3,000, at the IEEE's biennial Symposium on Fusion Engineering conference to be held the week of June 10 in San Francisco. The IEEE is the world's largest professional association for the advancement of technology.

Novel system verifies nuclear warheads

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- If the total number of counts matched the number that the parties had stipulated in advance, the warhead would be found to be a true one. But if the total differed from the stipulated number, the warhead would stand exposed as a spoof. To prevent cheating by preloading detectors in such a way that a spoof would pass the test, the inspector decides on the spot which preloaded detectors will be used on the "golden warhead" and which on the item offered for inspection.
- An alternative approach would be to make measurements on a large set of putative warheads, including some selected by the inspector from among deployed missiles. Since at least some of the deployed warheads would be real, if all of the warheads are measured to be identical, all are real.

Glaser views this zero-knowledge protocol as an incentive to support and facilitate future nuclear arms talks. "I think it will be important to have this on the table when people think about an inspection system," he said. "Many will say that it's impossible to verify nuclear warheads without running the risk of leaking classified information and so contributing to nuclear proliferation. It would be a powerful argument to show that in principle, and even in real experiments, you can build a system that never measures any properties of objects but still verifies that they are identical to one another, and can achieve this to whatever level of accuracy is required."

Farewell to Ed Winkler

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40 years, Denise, a retired speech therapist, in a home in North Carolina's Outer Banks. The house, which overlooks Foster's Bay and the Atlantic Ocean, will offer them plenty of opportunities to enjoy boating and walks on the beach.

"Although I'm very excited about transitioning to my new life, there's some degree of sadness," Winkler said. "I really enjoyed myself at the Laboratory for these 20-something years. I have great associations. It's just been a very great, very enjoyable, satisfying happy time of my life."

Winkler will be leaving the Laboratory on May 1 and a new chief financial officer, Kristen Fischer, who is currently the director of budget and grant operations for the New Jersey Office of the Attorney General, will begin work on May 24. Deputy Director for Operations Adam Cohen will serve as interim CFO in the meanwhile.

"I'm very excited about the opportunity," Fischer said. "Although I've had a wonderful career working for the Attorney General, I feel privileged that I will have this opportunity to work for PPPL. I am honored."

Fischer will take over a many-faceted job. Winkler explained that the position is focused on "basically ensuring that the Laboratory accounts for the resources that are entrusted to it by the Department of Energy and the taxpayers." That involves having systems in place to ensure DOE funds are spent properly, preparing financial reports of the Laboratory's activities, allocating funds to staff for their work, trying to get the best value for the money that PPPL spends and making sure that everything PPPL does follows regulations, he explained.

"As the CFO, Ed has provided the critical leadership and technical guidance for the Lab to ensure we met our contractual requirements, objectives of the University, and the expectations of our personnel," said Cohen. "His reports are timely and accurate, his responsiveness is outstanding, and his integrity is among the highest I've seen. In short, since I've been here he has worked effectively to put us in as stable a financial position as possible, and it has been very comforting to know that Ed is leading the financial areas of this Lab. He will be missed."

Each day, Winkler gets up at 4:30 a.m. and commutes 40 minutes from his home in Medford, N.J., arriving at the Laboratory between 5:30 a.m. and 6:30 a.m. – often before the sun rises. "It's before the phones start ringing and you can prepare for the day," Winkler said. "There are no meetings at six o'clock in the morning. I can get some of the work done that I have to do."

But while retirement will bring many changes, sleeping in will not be one of them for the energetic Winkler. He relishes the thought of rising before the sun comes up when he can still see the stars. He envisions exercising on his porch while the sun comes up over the water. "It's fantastic, I wouldn't miss that for anything," he says, "and now I'll be able to get a couple of hours sleep on the beach."

Before coming to PPPL, Winkler worked for RCA and the General Electric Co. when it merged with RCA, in several different divisions. He traveled for his job to South America, Mexico and Europe. "It's been kind of lucky to have a career in the for-profit world, then a second career in a DOE Laboratory," he said.

Ed and Denise Winkler lived in the same home in Medford for 32 years. They raised a daughter, Sloan, who is an adult now and who will be relocating to North Carolina just a few miles from her parents.

An avid runner, Winkler and his wife both enjoy the outdoors. They spent some time looking for a house by the water in the Outer Banks before purchasing their home a few years ago. They are classic car buffs and plan to travel around the country visiting friends and going to car shows during the hot North Carolina summers.

Never one to stay still for long, Winkler will be managing some investment property in the area and may do some financial counseling. He also plans to volunteer at nearby Camp Lejeune to offer financial advice to the U.S. Marines stationed there.

Winkler said he will miss many of the people he has worked with at PPPL. "I've been blessed with a great staff, I've said that to each of them," he said. "The folks on my staff and in my department are just top notch. It's really been a pleasure to work with that group."

"It's not easy to leave, I've been very happy here," he said. "But I've always looked ahead and embraced the opportunities and the experiences in the present. You look back fondly and you have fond memories."

PPPL Advisory Committee Tours Laboratory

Jim Chrzanowski, far left, gives a tour of NSTX-U production facilities to the PPPL Advisory Committee on April 25. From left: Chrzanowski; Ray Fonck, University of Wisconsin; Steve Cowley, Culham Centre for Fusion Energy; Anatoly Spitkovsky, Princeton University; Mark Kushner, University of Michigan; Tim Meyer, TRIUMF Laboratory, Canada; Curtis Hillegas, Princeton University.

A Festive Earth Day Celebration at PPPL

Emelie Jeffries, a consultant at PPPL who is of the Occanechi-Saponi nation, and Patrick Littlewolf, of the Haudenosaunee (Iroquois) Confederacy from upstate New York, performed at PPPL's Earth Day celebration.

Joanne Bianco collects raffle tickets for seasonal gifts at the PPPL table, while John Horner, left, and Bob Hitchner observe. Winners of the raffle winners were: Mike Viola, who won the winter prize of a shovel; Chris Canal, who won the spring prize of an umbrella; Axel Molina, who won the summer prize of a bucket of sun products and Ani Malool, who won the fall prize of a rake.

PPPL'ers brought in 2,480 pounds of personal electronics from home in the electronics collection by Unicor. From left to right, Margaret Kevin-King, Matt Lawson and Kyron Jones, display some of the donations. Also helping were James Conover and Spence Holcombe.

Tara Tietz, of the Mohawk Cherokee Nanticoke tribe, and her daughter Shea, age 7, perform a jingle dance, a traditional dance of healing, for the Earth Day celebration.

Sandy Shaw, Samantha Burrows, and Marisol Ovalles, look at Native American artifacts displayed in the lobby for Earth Day. About 125 staff members visited the displays in the lobby.

John Dunne, a research oceanographer with the National Oceanic and Atmospheric Administration's Geophysical Fluid Dynamics Laboratory, discusses "How Climate Change Affects Your Work," in a special Earth Day colloquium.

Green Machine Award Recipients Help Make PPPL More Sustainable

Efforts by the Green Machine recipients and employees throughout PPPL reduced the Laboratory's paper footprint from 11.6 reams per employee in Fiscal Year 2010 to 7.8 reams in Fiscal Year 2012, a 32 percent reduction.

PPPL also succeeded in reducing office trash by 40 percent from Fiscal Year 2011 to 2012 and increasing composting by 46 percent from Fiscal Year 2011 to 2012.

The 2012 Green Machine Award winners are:

Rose Fuchs, Engineering, and Sonya Patterson, HR: As Green Team members, Fuchs and Patterson are role models for composting and recycling in their work areas and are resources for their fellow employees.

Bill Gervasi, maintenance and operations, and Jules Nemeth, engineering:
Managed the boiler control and burner upgrade project . The high -efficiency burners and digital controls reduced the emission rates of nitrogen oxides (NOx) by 68 percent and sulfur dioxide (SO2) by 82 percent since 2009.

Kristen Ferraro, IT: Worked to develop IT's Thin-client program, which reduced the number of computers at PPPL while allowing employees access to PPPL documents and work-related files, saving money and energy. Several employees won awards for their efforts to reduce PPPL's paper footprint by eliminating hard copies and saving paper, toner, file space and time:

Patti Bruno, John Horner, Bob Hitchner, Pete Szaro, and Susan Thiel, the HP Division: Traded notebooks, clipboards, etc. for iPad tablets.

Nicolo Galioto, IT: Implemented and updated Print Server 2008 that allowed 60 percent of printers to default to double-sided printing.

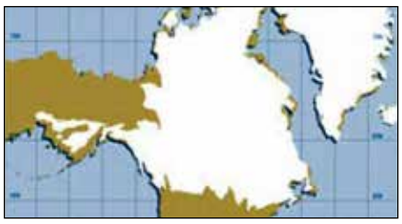
Kitta MacPherson, Office of Communications: Posts the PPPL Weekly via e-mail and promotes informational slideshows on TVs around the LSB.

Deedee Ortiz, Science Education: Replaced 3-ring binders with flash drives and PFD files of the lectures for an undergrad plasma physics course and replaced 3-ring binders with Kindles for Middle and High School Bowl questions.

Dorothy Strauss, ESH&S: Replaced hard copies of the "ES&H Newsletter" with an electronic version posted to PPPl's website and emailed to all employees.

Winners of the 2012 Green Machine Awards show off their tee-shirts. Front row: Sonja Patterson, Dorothy Strauss, Cathy Saville, Rose Fuchs, Chris Stires, Patti Bruno and John Horner ; Back row, left to right: Kristen Ferraro, Nicolo Galioto, Kitta MacPherson, Susan Thiel, George Ascione and Bob Hitchner. Missing are Pete Szaro, Deedee Ortiz, Jules Nemeth and Bill Gervasi.

COLLOQUIUM



In search of the First Americans

PROFESSOR MICHAEL WATERS
Texas A&M University

Wednesday, May 1, 2013

4:15 p.m. (Coffee/Tea at 4 p.m.)
M.B.G Auditorium, Lyman Spitzer Building

JUST BREATHE

Mindfulness Series

Mindfulness is the practice of purposely focusing your attention on the present without drifting into concerns about the past or future.

Fridays: 4/26, 5/10, 5/24, 6/7
12-12:30 p.m. Furth Plasma Physics Library

FOR PPPL STUDENTS, FACULTY, AND STAFF

Drop in as often as you can! No registration is required.

Learn to quiet the mind and ease physical distress. This mindfulness series will provide an opportunity to slow down in this fast-paced setting, and to experience balance and a sense of calm.

Facilitated by Shefalika Gandhi, LCSW, University Health Services. Sponsored by Princeton Plasma Physics Laboratory (PPPL). Email mgonzalez@pppl.gov for more information.

Save the Date and Spread the Word:

PPPL's Open House is on June 1!

PPPL's Open House is on June 1 from 9 a.m. to 4 p.m. and there will be fun for everyone with exhibits, moon rocks and science displays of all kinds. This is a rare chance to show your friends and family seldom-seen parts of the Laboratory. The Open House is a huge event and it won't work without your help! We will be asking for each person to donate two hours of their time so everyone can spend time with their guests! We will have more information on volunteering starting next week.

Plainsboro 34th Annual Founder's Day Celebration

Plainsboro Township will hold its annual Founder's Day celebration on Sunday May 5 with a parade and festival. The parade will start at 12:30 p.m. at Edgemere Avenue and end at the Municipal Grounds. The free festival, featuring jugglers, music, antique automobiles, super inflatables, children's arts and crafts and food for purchase will start at 1:15 p.m. All activities are free. The rain date is Saturday, May 11.

For more information call the Department of Recreation and Community Services at 609-799-0909, ext. 1719 or visit www.PlainsboroNJ.com.

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

COMMAND PERFORMANCE CHEF'S FEATURE	**MONDAY** APRIL 29	**TUESDAY** APRIL 30	**WEDNESDAY** MAY 1	**THURSDAY** MAY 2	**FRIDAY** MAY 3
					
	SPAGHETTI WITH MEATBALLS SERVED WITH GARLIC BREAD	CHICKEN ENCHILADAS SERVED WITH SPANISH RICE	BBQ CHICKEN WITH CORN ON THE COB & POTATO SALAD	MALAYSIAN COCONUT CHICKEN WITH JASMINE RICE	BEEF TACOS WITH REFRIED BEANS & SPANISH RICE
EARLY RISER	Southwest Breakfast Burrito	Cranberry Pancakes	Eggs Florentine over English Muffin	Corned Beef Hash & Eggs	Zucchini, Onion & Swiss Omelet
COUNTRY KETTLE	Pasta e Fagioli V	Cream of Potato V	Beef Stroganoff Soup	Stuffed Pepper Soup	Tomato Florentine V
GRILLE SPECIAL	Chicken Cheesesteak with Peppers & Onions served with Fries	Bacon Cheddar Burger with Onion Straws & BBQ Sauce	Chicken Wings served with Fries	Corned Beef Reuben	Chili Cheese Dog served with Fries
DELI SPECIAL	Chef Salad Wrap	Turkey & Avocado Wrap with Roasted Pepper Hummus	Spring Chicken Salad Wrap	Bologna & American Cheese On A Kaiser Roll	Three Cheese Hoagie V
PANINI	All-American BBQ Chicken Panini	Pork Roll & Swiss Cheese with Caramelized Onions & Dijon	Roast Beef & Swiss Melt with Coleslaw	Chicken, Mushrooms & Swiss On Garlic Texas Toast	Shredded Chicken Quesadilla

MENU SUBJECT TO CHANGE WITHOUT NOTICE

CLICK HERE FOR A PRINTABLE WEEKLY MENU

WEEKLY

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