PPPL PRINCETON PLASMA PHYSICS LABORATORY
A Collaborative National Center for Fusion & Plasma Research
U.S. DEPARTMENT OF ENERGY
WEEKLY
April 4, 2016

Calendar of Events

APRIL 1–15

Green stockroom contest
(See page 8)

WEDNESDAY, APRIL 6

Voluntary Group Long-Term Care Insurance Program talks
1:30–2:30 p.m. and 2:30–3:30 p.m. ◆ MBG Auditorium

PPPL Colloquium
4:15 p.m. ◆ MBG Auditorium
The Evolving Terrorist Threat
Mitchell Silber, FTI Consulting

UPCOMING

FRIDAY, APRIL 15

Lab-wide Cleanup

SATURDAY, APRIL 16

Obscura Day Tour
1–3:30 p.m.

SUNDAY, APRIL 17

Communiversity ArtsFest
1–6 p.m. ◆ Princeton University/ Princeton
Volunteers needed! (See page 8)

TUESDAY, APRIL 19

Earth Day Cleanup
10:30 a.m.
Pizza lunch for volunteers!

WEDNESDAY, APRIL 20

Unicor Electronics Recycling
7:30–10 a.m. ◆ Upper parking lot

Earth Week colloquium on climate change
4:15 p.m. ◆ MBG Auditorium
Dell Anderson, NYU

INSIDE

Cherry Murray, director of DOE's Office of Science, visits PPPL

By Jeanne Jackson DeVoe

When Cherry Murray, the director of the Department of Energy's Office of Science, visited PPPL on Friday, March 25, it was a homecoming of sorts. Murray worked at PPPL during a summer internship in 1976 when she was an undergraduate student at MIT.

Cherry Murray learns about the LTX from physicist Richard Majeski, right. With Murray are David McComas, center, incoming Princeton University vice president for PPPL, and James Cronin, winner of the 1980 Nobel Prize in physics.

Her latest visit gave her a behind-the-scenes look during a whirlwind tour of the Laboratory. Murray said she was impressed by the National Spherical Torus Experiment-Upgrade (NSTX-U), which recently completed $94 million in improvements. "I liked seeing the machine," she said. "It's great to see that it's on and doing extremely well."

The Senate confirmed Murray as the director of the Office of Science last December. The office oversees and supports research at 10 of the DOE's 17 national laboratories. She is on leave from Harvard University, where she is dean of the School of Engineering and Applied Science and is the Elizabeth S. Armstrong Professor of Engineering and Applied Science, and a physics professor. She was previously principal associate director for science and technology at the DOE's Lawrence Livermore National Laboratory from 2004 to 2009 and was president of the American Physical Society in 2009. Before joining Lawrence Livermore, she was senior vice president of Physical Sciences and Wireless Research at Bell Laboratories Research, where she had a 27-year career. She received both a bachelor's degree and a doctorate in physics from MIT.

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World-class scientists gather to discuss plasma physics and honor Nat Fisch

By John Greenwald

Physics, education and warm-hearted humor were all on display last week during a three-day symposium in honor of the 65th birthday of physicist Nat Fisch. Attended by some 200 leading scientists from around the world, the event focused on "Solved and Unsolved Problems in Plasma Physics" and celebrated the myriad achievements of Fisch, who is associate director for Academic Affairs at the U.S. Department of Energy's (DOE) Princeton Plasma Physics Laboratory (PPPL), director of the graduate Program in Plasma Physics and professor and associate chair of the Department of Astrophysical Sciences at Princeton University.

Nat Fisch enjoys the banquet.

More than 35 invited speakers, plus some dozen recent alumni, discussed key developments in plasma physics and looked ahead to issues to be worked on over the next decade. Subjects ranged from magnetic and inertial confinement fusion to solar coronal heating, next generation laser and accelerator technology, philanthropic giving and the future of U.S. science. Highlights included a banquet at which speakers praised and poked fun at Fisch and recalled incidents and stories about him.

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Cherry Murray tour

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Nobel Laureate James Cronin, professor emeritus at the University of Chicago, joined Murray on the tour. Cronin won the 1980 Nobel Prize with physicist Val Fitch, for showing that the laws of nature operate differently on matter and antimatter. Cronin, who was a Princeton University physics professor from 1958 to 1971, happened to be visiting the University the day of Murray's tour and was the guest of A.J. Stewart Smith, the Princeton University vice president for PPPL.

After her visit, Murray met with Princeton University President Christopher Eisgruber and with Emily Carter, founding director of Princeton's Andlinger Center for Energy and the Environment.

Cherry Murray, center, speaks to Mike Zarnstorff, left, and Richard Majeski, right, at the LTX. Behind them from left are Stewart Prager, PPPL site office manager Pete Johnson, A.J. Stewart Smith, David McComas, and James Cronin.

Cherry Murray, center, visits the NSTX-U Control Room. From left, Stewart Prager, A.J. Stewart Smith, David McComas, James Cronin, Murray, Masa Ono, John DeLooper, and Jon Menard.

Meeting with early career scientists

Murray managed to fit a packed itinerary into her PPPL visit. It included meeting with PPPL directors, an extensive tour, and a meeting with Smith and PPPL Director Stewart Prager. Murray also made it a priority, as she does during visits to other national laboratories, to fit in a lunch with early career scientists at PPPL. "I like to see how they're doing and how excited they are about plasma physics," she said. Among the scientists she met were physicists Ahmed Diallo and Luis Delgado-Aparicio, who won highly competitive Early Career awards from the DOE in 2013 and 2015 respectively. Delgado-Aparicio said Murray discussed opportunities for the scientists such as that award, LDRD funds, and working with students from the SULI summer internship program. "It was a very useful meeting," he said.

The first stop on Murray's tour was the NSTX-U Control Room where Stefan Gerhardt, head of Experimental Research Operations for the NSTX-U, gave Murray an overview of the upgrade. He showed her a diagram of the second huge neutral beam added to the device, which doubles the tokamak's heating power. He also pointed out the new wider center stack, which doubles the magnetic field strength and plasma current and quintuples the length of fusion experiments. "Most of what you paid for in the last five years is the neutral beam and the center stack," Gerhardt told Murray.

Smith said he was happy to see the control room once again full of physicists, engineers, and technicians working on NSTX-U operations. "To see this room full of people after all these years is very exciting," he told Murray.

NSTX-U "working better than planned"

"Is it working as planned?" Murray asked the physicists regarding the NSTX-U. "I'd say better than planned," said Jonathan Menard, the NSTX-U program director. As leader of the NSTX-U tour, Menard pointed out that the NSTX-U has already doubled the length of the pulse or shots in the machine from one to two seconds and would eventually get to five seconds. "It's never really been done before in a high-current spherical torus," he said.

The next stop on Murray's tour was the nanotechnology laboratory, which began two years ago with $4.3 million in Office of Science funding. Physicist Yevgeny Raitses explained PPPL's research on the role of high-pressure plasmas in synthesizing nanoparticles—a field that has not been extensively studied. "When we started research we found it wasn't studied by plasma researchers," he said. "We found many open questions, which could only be answered by the combined efforts of plasma physicists and material scientists."

Discussing QUASAR and stellarators

Murray next visited QUASAR, formerly the National Compact Stellarator Experiment or NCSX, the complex stellarator that was discontinued in 2008. Hutch Neilson, head of Advanced Projects, said the stellarator is still an important avenue for the development of fusion energy in the U.S. Unlike tokamaks, which require that a current be injected into the plasma, stellarators have 3-D coils that produce their own poloidal field and can therefore sustain a steady-state fusion reaction, Neilson said. "As a technological

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Fisch Fest

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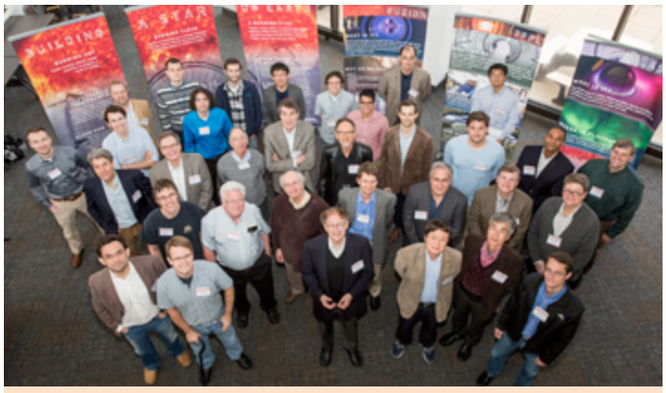
Also featured in the program was a session of 34 posters, including several from Fisch's current graduate students and postdocs. Among them was a poster by graduate student Seth Davidovits, whose work was recently featured in Physical Review Letters.

Welcoming the gathering was PPPL Director Stewart Prager, who discussed how Fisch has revolutionized the field of plasma physics during nearly 40 years of contributions. These began with the development of Fisch's idea for lower hybrid current drive — a method of producing plasma current that now is used throughout the world — and extended to projects as diverse as the science behind space thrusters to a method for separating high-level radiation sources from low-level ones to clean up nuclear waste. "Nat works on big unsolved problems and turns them into solved ones," Prager said.



Nat Fisch, center, with alumni of the Princeton Program in Plasma Physics.

Some of the wide-ranging talks that followed:

Mark Herrmann, Fisch's first graduate student, now directs the National Ignition Facility (NIF) at the DOE's Lawrence Livermore National Laboratory (LLNL). He discussed challenges and opportunities in high-energy density physics, which studies matter at pressures more than a million times greater than the atmosphere of the Earth. Such intense pressure lies at the core of the Earth and plays a key role in enabling life to exist, since it produces the magnetic field that surrounds the planet and protects it from dangerous solar radiation. At NIF, experiments in inertial confinement fusion can have pressure 200 billion times greater than the atmosphere of Earth. Achieving ignition — a state in which the energy released by striking a pellet of plasma fuel with lasers is equal to or greater than the energy that creates the reaction — is the grand scientific challenge for NIF, Herrmann said.

Jean Marcel Rax, Fisch's first postdoctoral associate and now professor at the University of Paris, discussed solved and unsolved problems in rotating plasma, with particular application to mass separation. Building upon Fisch's recent work in rotating plasma, Rax, a former Directeur du Laboratoire de Physique et Technologie des Plasmas at École Polytechnique, laid out the principal ways to harness plasma to address unsolved problems in separating nuclear waste.

Rush Holt, the former U.S. Congressman and former assistant director of PPPL, praised Fisch's role in education. Holt, now CEO of the American Association for the Advancement of Science, said a large segment of the public is unwilling to accept pronouncements on subjects like climate change and evolution that scientists who are mostly male and white declare to be "cut and dried and right." But he praised Fisch for his role in creating a special summer internship program in plasma physics that has helped to increase ethnic and gender diversity.

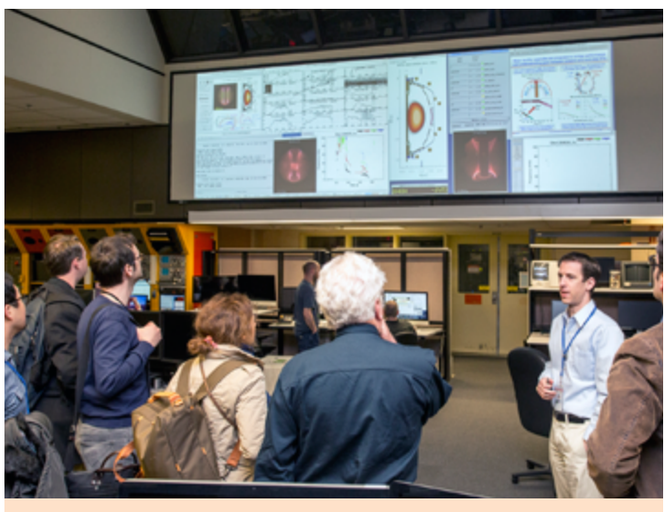
Former Congressman Rush Holt praised Fisch's summer internship program for producing diversity.

Steve Cowley, a former student in the Program in Plasma Physics at Princeton and now CEO of the United Kingdom Atomic Energy Authority and member of the PPPL Advisory Committee, discussed the Joint Economic Torus (JET), the largest magnetic fusion experiment in Europe. In 2018, Cowley said, JET hopes to produce 1.25 times more energy than it takes to create the reaction, which would be "a tremendous shot in the arm for fusion." But for that to happen, he said, researchers must find ways to keep highly confined plasmas from strongly disrupting and halting experiments, which is something that happens now.

Jim Glanz, who earned a Ph.D. in plasma physics from Princeton and now reports for the New York Times, said physics has been surprisingly useful in his work. For example, he was able to report that the collapse of the World Trade Center towers on 9/11 was caused not by the jetliners that crashed into them but by heat from the fires that weakened their lateral supports. When Glanz later served as bureau chief in Iraq, the country's oil minister, a nuclear physicist, never turned down his interview requests. Another good source was an official in the Iraq foreign ministry who holds a Ph.D. in plasma physics from MIT.

Bill Brinkman, former director of the DOE's Office of Science, said the "golden era" for physics that the United States enjoyed in 1970s and 1980s ended after the Cold War, when funding for plasma physics and high-energy physics was reduced. Now, he said, the country needs to stand behind ITER, which "gets a bummer rap than it deserves" and is still "the best bet for fusion in the next 20 years."

Robert Conn, president and CEO of the Kavli Foundation, and former Professor of Engineering and Applied Science at UCLA, began by mentioning how he once tried to recruit Fisch to UCLA. Conn agreed that government support for basic science has leveled off and said that philanthropy has picked up some of the slack. Philanthropic contributions totaled $360 billion in 2014, he said, with funds



Physicist Devon Battaglia fields questions in the NSTX-U Control Room from symposium-goers who toured the Laboratory.

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Fisch Fest

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coming from individuals, foundations and nonprofit groups. Kavli and five other foundations recently formed a "Science Philanthropy Alliance," whose goals include increasing recognition of the importance of scientific research to society and increasing funding for basic research by at least $1 billion a year within five years.

Ron Parker, professor emeritus of electrical engineering at MIT and former chair of the PPPL Advisory Committee, who once taught Fisch in undergraduate courses at MIT, discussed the unsolved problems in lower hybrid current drive now being addressed in advanced numerical simulations and experimentally on tokamaks worldwide.

Former DOE Office of Science Director Bill Brinkman said physics funding has been reduced since the Cold War ended.

Also included in the symposium were talks by key figures in the field of laser science. **Paul Corkum** from Canada discussed his recent contributions to attosecond science, which deals with events that unfold in a few attoseconds; an attosecond is a billionth of a billionth of a second. Corkum initiated the field with his groundbreaking identification of the recollision effect, which serves as the basis for generating attosecond pulses from lasers. **Margaret Murnane** of the University of Colorado at Boulder then spoke of how these attosecond pulses could be harnessed to explore new frontiers on the timescale of an electron circulating an atom. Professor **Gerard Mourou** of École Polytechnique in France discussed the next generation of laser intensities, a field that he helped to dramatically further through his influential technique of chirped pulse amplification, which nowadays allows ultrashort laser pulses to reach beyond a thousand billion billion watts per square centimeter.

Nat Fisch with Michael Campbell, deputy director of the Laboratory for Laser Energetics at the University of Rochester, who drew a cartoon for Fisch's 65th birthday.

Greg Hammett, a PPPL physicist and Ph.D. alumnus of Princeton, moderated the banquet held between the second and third day of the symposium. The dinner featured a wide variety of speakers that included the following:

Jon Menard, program director of the National Spherical Torus Experiment-Upgrade and a Princeton alumnus, discussed what he called "a few fond memories." These included photos of his classmates, including Hilary Oliver, who served as best man at his wedding and is with the National Institute of Water and Research in New Zealand, and Barbara Sarfaty, the now-retired administrator of the graduate program who was affectionately known as "den mother." Menard gave thanks to Fisch as "a brilliant and creative plasma theorist" and for helping to keep Princeton No. 1 in the U.S. News & World Report ranking of plasma physics graduate schools.

Dan Clark, Fisch's fifth doctoral student and now a physicist at LLNL, recalled storing his belongings in Fisch's basement before spending a summer at the California laboratory. When Clark returned for his possessions at the end of the summer, Fisch pointed to a bike in a corner of the basement and said, "What about your bicycle?" But the bike was not Clark's, who suggested that its ownership might still be one of the unsolved problems in plasma physics.

Michael Campbell, deputy director of the Laboratory for Laser Energetics at the University of Rochester, presented Fisch with a cartoon wishing him a happy 65th birthday. The cartoon showed Fisch clad in a bathing suit and holding a surfboard that Campbell said represented a problem that Fisch had worked on. "Your greatest accomplishment," Campbell said, "has been inspiring plasma physicists."

Nat Fisch, lower right, at the reception before the banquet that was held in his honor.

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Cherry Murray tour

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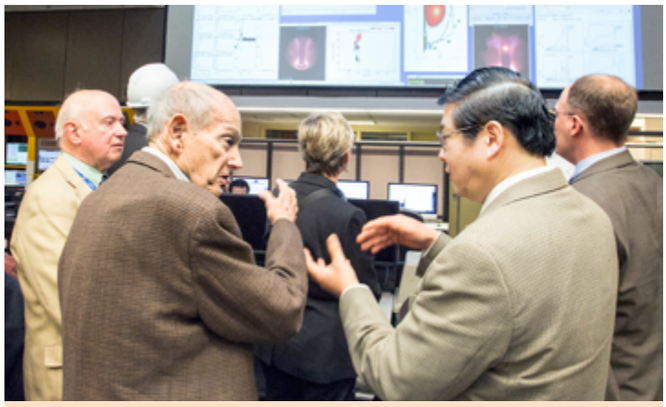
achievement we have nothing to apologize for," Neilson said. "We're very proud of the technology."

The Wendelstein 7-X (W7-X) stellarator in Greifswald, Germany, has sparked new interest in stellarators worldwide, Neilson said. PPPL has led the U.S. collaboration on that device and "that collaboration stands on its own as a great collaboration no matter what," Neilson said. "But we need stellarators in the U.S. It's a solution to a lot of problems."

Smith noted that Neilson is heading an optimization study on stellarators that will investigate the best configuration for a possible stellarator project in the U.S. "Now we're doing a scoping project to say if the stellarator makes sense, let's do it, especially with the W7-X, which is getting fantastic interest in stellarators," Smith said.

The final stop of Murray's tour was the Lithium Tokamak Experiment (LTX) where physicist Richard Majeski, the project's principal investigator, gave Murray an overview of the experiment. Majeski said the LTX features an advanced liquid lithium wall that provides an absorbent boundary that protects the plasma-facing tokamak wall and makes the device unique in the world fusion program. LTX has produced the first experimental evidence that high-performance



Cherry Murray, center, views the screen in the NSTX-U Control Room. From left, A.J. Stewart Smith, James Cronin, Masa Ono, and Jon Menard.

tokamak discharges are compatible with large-area liquid lithium walls, thereby dramatically improving the plasma energy confinement, he told Murray. The device is currently being upgraded and PPPL plans to add a neutral beam to expand its capabilities, Majeski said.

Smith noted that early in their careers at PPPL, Masa Ono, the project director of the NSTX-U, worked on the Current Drive Experiment-Upgrade (CDX-U), an earlier version of LTX, and Menard got his Ph.D. working on CDX-U. "This little machine has produced the two leaders of NSTX-U," he said.

Fisch Fest

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Physicist Ilya Dodin chaired the committee that organized the symposium.

Adam Fisch, the youngest of Nat's three sons, spoke of growing up in the Fisch household. He said that when cake was served at birthday parties, his father asked him and his brothers to cut the cake so that everyone got a fair share. He first showed an algorithm for cutting the cake for "N hungry people," which addressed fairness but had the drawback that the number of slices grows factorially with "N." He then suggested an "improved solution," devised recently with his brothers for the occasion, that limited the number of slices while preserving fairness. Adam humorously concluded by pointing out how certain generalizations of the cake-cutting problem remained unsolved.

Jonathan Wurtele, a professor of physics at the University of California-Berkeley, called Fisch, "not a one-act wonder," but someone who takes a simple idea that hasn't been looked at before and comes up with fresh concepts. He thanked Fisch "for making plasma physics fun, which is a lot of the reason why we do it."

Arnold Kritz, former chair of the Physics Department at Lehigh University and former chair of the Physics Department at Hunter College in New York City, said he once suggested that Fisch apply for a position at Hunter. Since Fisch's wife had opportunities in New York, he seriously considered the move to balance work and home. Had that job materialized, Kritz said, Fisch's remarkable Princeton career would not have happened. Kritz congratulated Fisch and his wife, Tobe, a doctor of internal medicine, for their dedication and support for each other's careers.

Ilya Dodin, a former Fisch student and PPPL physicist who chaired the committee that organized the symposium, said Fisch had changed his life. Raised in a provincial city in Russia with little access to the internet, Dodin couldn't hope to come to Princeton. But that all changed when Fisch set up a program with the institute where Dodin was studying. Today Dodin works with Fisch and says he sometimes feels that he has "the best boss ever." But then he decides that "what I have is much better: a true friend."

When it came time for Fisch to speak at the banquet, he noted that he was "stunned by the sharp memory of people who recalled not only things that happened — but even things that didn't happen." He compared being a "designated listener" during the symposium to a designated driver at a drinking party. That worried him because "I generally don't go to conferences and listen to all the talks." But he did this time and found the sessions highly rewarding. He praised the speakers for fascinating and stimulating talks – and said how much he appreciated seeing his old friends and students. He said he felt honored by the symposium and by all that was said — and that it caused him to reflect on the non-intuitive economics of honor as a currency.

Fisch called honor "a currency that becomes more valuable when more of it is printed." He drew an analogy to the fact that people like to live in neighborhoods that rich people live in, thereby driving up house prices and making the people who live there even richer. Similarly, he observed, "when people honor one another it enriches the neighborhood and in the case of plasma physics it makes for a neighborhood that others want to join, thereby further enriching all who participate."

WHYY reporter at PPPL's Young Women's Conference

Jeanette Beebe, a reporter from Philadelphia Public Radio station WHYY, interviewed students from Patricia Hillyer's science class at the Matawan-Aberdeen Middle School at PPPL's Young Women's Conference. Her story on the conference appeared on the radio and on WHYY's Newsworks on March 25. Click here to read or listen to the story.

WHYY's Jeanette Beebe, center, interviews students from the Matawan-Aberdeen Middle School.

New tour registration system for PPPL visitors

PPPL has a new tour registration system that allows visitors to easily register for tours themselves through an automated calendar.

The new registration system by Fire Engine Red, based in Philadelphia, is used at several universities, including Boston College, Ohio University and Brown University. The calendar is customized to look like PPPL's site and links from PPPL's tour site: http://www.pppl.gov/about/tours.

Visitors can register for group tours, which are available most weekdays at 10 a.m. for groups of 10 to 40 people, or for open public tours, which are held the first and third Friday of most months at 10 a.m.

The tour registration page at https://pppl.edu.185r.net/Event/ allows visitors to choose which option they want and then click again on a calendar, which gives them the available dates.

Organizers whose groups need to come at a different time have the option of emailing tours@pppl.gov and requesting an available date at a different time. Tour director Jeanne Jackson DeVoe will then send out a link to the requested tour date if it is available.

The system will take visitors to a registration form and will automatically send them a message confirming that they have registered for a certain tour. The registration information is then sent out to tour organizers DeVoe and Raphael Rosen and the Site Protection Office on a daily basis, and to others in the Lab on a weekly or monthly basis.

The public tours are available for individuals or smaller groups who want to tour the Laboratory but are not part of a large, organized group.

There were 25 tours for 597 people from January through March of this year.

Robotics coaches needed for all-girls robotics teams

PPPL's Science Education team is looking for volunteer coaches for a new all-girls FIRST Lego League Robotics team (ages 9 to 13) and the new FIRST Tech Challenge Team (ages 13 to 18) being organized in collaboration with the YWCA-Princeton.

The teams will meet throughout the fall semester and there are lots of events throughout the spring and summer to engage everyone. The program welcomes volunteers with all kinds of skills. This includes not only those with engineering, robotics, and building skills, but also volunteers with the ability to mentor students and help build leadership, teamwork, research, and social engagement skills. Coaching the teams is a rewarding experience that is, as one of the teams' founders put it, "the hardest fun you'll ever have!"

Please call Shannon Greco ASAP to volunteer: sgreco@pppl.gov, 609-243-2208.

Learn more about the voluntary Group Long Term Care Insurance Program!

From March 21 through April 29, 2016, Princeton University benefit-eligible employees have a one-time opportunity to apply for long term care insurance coverage by completing an abbreviated medical questionnaire for underwriting through Genworth Life Insurance Company (Genworth Life).

Learn More:

To learn more about the program, get a rate quote and enroll online, go to: genworth.com/groupltc. Enter Group ID: Princeton and Code: groupltc

Or call (800) 416-3624, Monday through Friday, 8 a.m.–8 p.m.

Genworth Life will conduct on-site information meetings at PPPL on April 6 from 1:30 to 2:30 p.m. and 2:30 to 3:30 p.m. in the MBG Auditorium. The 60-minute meetings include a 30-minute presentation followed by a Q&A session.

Volunteer for PPPL's booth at Communiversity April 17

The Communiversity Festival of the Arts on Sunday, April 17 from 1 p.m. to 6 p.m. is a great opportunity to inform the public about the great research and public programs taking place at PPPL and have fun.

The event, which is produced by the Arts Council of Princeton with help from Princeton University students and support from the town of Princeton, attracts thousands of visitors and features more than 200 artists, crafters, merchants, organizations, and Princeton University-affiliated groups. We need volunteers to do plasma demos, answer questions about our research, and interact with the public. Please contact Jeanne Jackson DeVoe, jjackson@pppl.gov/ ext. 2757 to volunteer. More information about Communiversity is available at the Arts Council of Princeton website.

Earth Week celebration includes colloquium on climate change April 20

A colloquium on climate change highlights PPPL's Earth Week celebration the week of April 18. The celebration also includes a grounds cleanup, a special green buying contest, and PPPL's annual Green Machine awards the following week.

PPPL's Green Machine Awards will be held on Wednesday, April 27 at 11:30 a.m. in the MBG Auditorium. There will be displays and booths in the lobby from 10:30 a.m. to 1 p.m.

PPPL's Lab-wide cleanup will be held on Friday, April 15. The annual Earth Day grounds cleanup will be on Tuesday, April 19, with a rain date of April 20. Volunteers will be treated to a pizza lunch following the cleanup. Sign up here. Unicor will collect home electronics for recycling on Wednesday, April 20, from 7:30 a.m. to 10 a.m. in the lower parking lot in front of the warehouse, or at the warehouse rollup door next to the firehouse if it is raining. A list of items Unicor accepts is available here.

Plans are also under way for an informal Earth Week walk. Stay tuned for details.

Employees can take part in a green stockroom contest. Any employee who purchases one of the following items from the stockroom between April 1 and April 15 will be automatically entered into a raffle for a prize: motion sensor power strips, rechargeable batteries and battery charges, LED flashlights, and eco-friendly hand sanitizers.

Please help with the Earth Day celebration by nominating a PPPL employee or a team that has helped keep PPPL green. Self-nominations are accepted. You can submit nominations by filling out an online application form here by the April 11 deadline.

Categories include:

- Reducing greenhouse gas emissions
- Saving energy or water
- Reusing or recycling materials or equipment
- Reducing the use of toxic or hazardous materials
- Purchasing bio-based, recycled or other "green" products

Please include the following information in your nomination: the nominee's name or the names in the group, the nominee's work group, a description of the actions taken, and a summary of how those actions helped the environment. Please email Leanna Meyer (lmeyer@pppl.gov) for more information.

COLLOQUIUM

The Evolving Terrorist Threat

Mitchell Silber
FTI Consulting

Wednesday, April 6
4:15 p.m., M.B.G Auditorium, Lyman Spitzer Building

BROCK

MARK GAZO
Chef Manager

Café at PPPL

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.

	Monday April 4	Tuesday April 5	Wednesday April 6	Thursday April 7	Friday April 8
COMMAND PERFORMANCE **Chef's Feature**	**Inside-Out Chicken Cordon Bleu** served with Rice & Vegetable	**Assorted Quiche** served with Caesar Salad	**Carved Grilled Eye Round Steak** with Gravy, Mashed Potatoes & Vegetable	**Kielbasa** with Braised Cabbage & Pierogies	LUNCH & A MOVIE— CLOUDY WITH A CHANCE OF MEATBALLS **Spaghetti & Meatballs**
Early Riser	**Italian Omelet** with Mushrooms, Onions, Mozzarella, Marinara & Hash Browns	**Scrambled Eggs** with Cheddar Ham Biscuits	**Breakfast Tortilla** with Ham, Green Onions & Cheddar Cheese Sauce	**Corned Beef Hash** with 2 Eggs any style	**Banana Chocolate Chip Pancakes**
Country Kettle	**Pasta Fagioli**	**Turkey Corn Chowder**	**Broccoli Cheddar**	**White Chicken Chili**	**Black Bean Cilantro**
Grille Special	BURGERLICIOUS **The Simple Man** Grilled Beef Burger with American Cheese, Tomatoes, Onions, Dill Pickle Chips, Shredded Lettuce & Secret Sauce on a Grilled Brioche Roll Served with Sweet Potato Fries (Available all week)	**Hot Pastrami & Cheddar Cheese** on French Bread	**Fish & Chips Wrap** with Tartar Sauce, Malt Vinegar and a Side of Slaw	**Chicken Breast** on a Kaiser Roll with Caramelized Onions & Mushrooms with Pepper Jack Cheese	**Potato Pancakes** served with Sour Cream & Apple Sauce
Deli Special	**Hummus, Avocado,** Roasted Peppers, Feta Cheese & Fresh Basil in a Wheat Wrap Served with Maple Glazed Pears	**Roast Beef & Swiss Club Sandwich** with Bacon on Choice of Bread	**Smoked Beef Brisket** on an Onion Roll	**Popcorn Chicken Po' Boy**	**Smoked Turkey & Swiss Cheese** on French Bread with Lettuce & Tomato
Panini	**Meatball Torpedo** with Peppers, Onions, Pepperoni & Provolone	**Tuna Quesadilla**	**Turkey & Stuffing Wrap** served with Gravy and a side of Fries	**Veggie Burger** with Guacamole, Tomato, Cilantro, Red Onion & Salsa on a Kaiser Roll	**Cheddar French Dip** on Ciabatta served with Fries

MENU SUBJECT TO CHANGE WITHOUT NOTICE

VEGETARIAN OPTION

WEEKLY
Editor: **Jeanne Jackson DeVoe** ◇ Layout and graphic design: **Kyle Palmer**
Photography: **Elle Starkman** ◇ Science Editor: **John Greenwald** ◇ Webmaster: **Chris Cane**

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DEADLINE for calendar item submissions is noon on WEDNESDAY. Other stories should be submitted no later than noon on TUESDAY.
Comments: commteam@pppl.gov ◇ **PPPL WEEKLY** is archived on the web at: http://w3.pppl.gov/communications/weekly/.