

At PPPL THIS WEEK

WEDNESDAY, AUGUST 12

Poster session for summer students
LSB lobby

UPCOMING

FRIDAY, AUGUST 21

Open Public Tour
10 a.m.
tours@pppl.gov

THURSDAY, AUGUST 27

Tour Guide Meeting
10 a.m. ♦ MBG Auditorium

MONDAY, SEPTEMBER 7

Labor Day
Laboratory Closed

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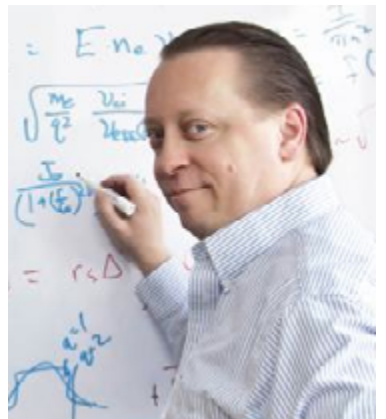
Scientists propose new model of source of mysterious barrier to fusion known as the “density limit”

By Raphael Rosen

Researchers at PPPL have developed a detailed model of the source of a puzzling limitation on fusion reactions. The findings, published in June in *Physics of Plasmas*, complete and confirm previous PPPL research and could lead to steps to overcome the barrier if the model proves consistent with experimental data. “We used to have correlation,” said physicist David Gates, first author of the paper. “Now we believe we have causation.”

At issue is a problem known as the “density limit” that keeps donut-shaped fusion facilities called tokamaks from operating at peak efficiency. This limit occurs when the superhot, charged plasma gas that fuels fusion reactions reaches a certain density and spirals apart in a flash of light, shutting down the reaction. Overcoming the limit could facilitate the development of fusion as a safe, clean and abundant source of energy for generating electricity.

The key to this barrier lies in the runaway growth of bubble-like islands that form within the magnetically confined plasma and cool it, according to the paper. While physicists had long suspected that this cooling effect was linked to the density limit — also known as the “Greenwald limit” after MIT physicist Martin Greenwald, who derived an empirical rule for it — they lacked insight into the mechanics.



David Gates

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Science Education brings energy to the dog days of summer for students

By Jeanne Jackson DeVoe

Middle and high school students from as far away as Jersey City and as close as Trenton spent time at PPPL at the end of July learning about various types of energy as part of Science Education’s community outreach program.



Shannon Greco, a program leader in Science Education, third from left, and the students participating in a four-day energy camp get ready to race their solar-powered cars.

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New website warns PPPL'ers to be on guard against phishers

The cyber security team of PPPL's IT Department has created a new internal website on phishing (<http://phishing.pppl.gov>) that is aimed at increasing awareness of the persistent phishing problem at PPPL.

The website was the brainchild of Stacia Zelick, the head of Information Technology, and was created by IT's Chris Minervini and Kevin Czarnecki and will be updated when new widespread phishing attempts are discovered.

"Phishing continues to be the top threat we have in the cybersecurity world, not just here but at the DOE and in the private sector," said Chief Information Security Officer Jim Hirsch. "We continue to receive phishing emails on a daily basis and some of them get through our filters."

The phishing emails are harmless-looking emails that seem to be from an individual or organization, but can threaten the entire IT system if opened, Hirsch said. An email can trick a staff member into revealing sensitive information that can not only threaten his or her passwords and personal information, but can reveal information about the staff in an entire organization and lead to a major compromise

Email from phishers may be from criminal organizations trying to get access to passwords and financial information,

or could even be espionage from countries trying to compromise government information, Hirsch said.

While PPPL has deployed software that can detect phishing attempts, numerous phishing emails may be sent before the email is stopped. One recent phishing email that came from "Naomi Kruger," with the subject line "IT services" was sent to Princeton University email and was delivered to PPPL'ers whose email is forwarded from their Princeton University accounts. The email was sent to 60 people before it was detected, Hirsch said.

The website notes that valid messages will come from an individual at PPPL rather than a group with a generic name such as "Help Desk," "Account Services," or "the IT Management Team." Most emails sent by the IT Department have a [PPPL] preceding the subject line. Most importantly, valid messages from IT or legitimate organizations will never ask you for your password or other sensitive information.

The phishing site will be updated as new phishing attempts are discovered, so check the site often. The cyber team is asking for PPPL'ers to send comments giving feedback on the site to cyberadmin@pppl.gov.

Congratulations to the Tokabats for winning second place in the league!

PPPL's graduate student softball team, the Tokabats, took second place in the B League this year after losing 10-12 against the Backside Attackers, the Princeton University

Chemistry Department team. This is the second year in a row the Tokabats came in second in the championship game. The team won the championship game in 2013.



Tokabats team members (including a few staff members, summer interns, and post grads), back row left to right: Derek Hung, Denis St. Onge, David Li, Adam Fox, Mark Hughes, Jack Matteucci, Peter Jandovitz. Front row: Dennis Boyle, Ansel Dow, Emily Ho, Peter Bolgert, Jeff Lestz, Brian Kraus. Not pictured: Seth Davidovits, Alex Hammons, Eli Kolmes, Jackey Liu, Matt Lucia, Noah Mandell, Charles Swanson. (Photo by Melanie Fox)



Virginia Finley

A passion for the environment translates to a greener PPPL

Virginia Finley has been helping to keep PPPL green since she arrived at the Laboratory 25 years ago. Before coming to PPPL, she spent a year teaching high school biology in Charleston, South Carolina, and worked for 11 years in environmental compliance at JCP&L energy company. As head of environmental compliance at PPPL, Finley has helped PPPL meet new federal mandates imposed on PPPL, and other facilities funded by the federal government, through executive orders signed by President Obama that set strict guidelines for reducing carbon emissions and greenhouse gases. Finley and others in the Environmental Services Division have worked hard with other departments at PPPL to meet those goals and the Laboratory has generally exceeded them. The Lab has won numerous awards for its green practices, including being named by the New Jersey Department of Environmental Protection (DEP) as the top facility in the state for environmental stewardship in 2013. “Virginia is a dedicated professional who has helped steer the Lab through complex environmental compliance issues for decades,” said Robert Sheneman, the head of the Environmental Services Division and Finley’s supervisor for more than a decade.

Finley and other members of the staff can be found roaming the PPPL grounds early in the month to take samples of the surface water. Much of her time is spent compiling the data for reports to both the DEP and the DOE, including the Annual Site Environmental Report. Finley is head of PPPL’s Environmental Review Committee, which meets quarterly to review the Laboratory’s environmental performance. In addition to her numerous daily tasks, Finley plays a key role in planning PPPL’s two big yearly environmental events, America Recycles Day in November and Earth Day in April. She also volunteers for events like the annual Young Women’s Conference in March. She rarely misses the twice-weekly yoga classes at PPPL.

Finley describes herself as a “Sansei,” a third-generation Japanese American. She was born in Manhattan, grew up in northern New Jersey and graduated from Goucher College (then an all women’s school) with a B.A., and a master’s degree in biology from Rutgers University. She lives in West Windsor and has two grown daughters, Megan, who lives at home, and Jocelyn in Arlington, Virginia, and a stepdaughter, Casimir, who lives in Chicago. Her husband of 20 years, Joe Finley, died in 2010. When she is not at PPPL, Finley enjoys outdoor activities like gardening, walking and bicycling and loves traveling and spending time with family and friends. Because of Joe, she is a sports fan and roots for the Boston Red Sox and the Patriots.



Finley on an Alaskan cruise in 2014.

What is the most fun or rewarding thing about your job?

I started my career teaching middle and high school science, so education holds a special place for me. I find the outreach experiences when I can mentor teachers and students most rewarding, whether it’s high school or college students, or younger kids at the Young Women’s Conference, Take our Children to Work Day, the [Boy Scout and next time Girl Scouts] STEM events, and other opportunities to interact with young minds.

What attracted you to do environmental work?

I always liked playing outside as a kid. Nature has always been a big interest. Mrs. Fiorello, my eighth grade science teacher, caused me to gravitate to environmental science at a time before there was an EPA (U.S. Environmental Protection Agency) or an Earth Day.

What was the biggest accomplishment in PPPL’s environmental program in the years you’ve been here?

We have always done fairly well. I’d say our biggest progress over the years was cutting back on our water use. We’ve dramatically reduced it by millions of gallons. And reducing our waste by recycling and composting has been successful to lower our environmental impact.

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I Am the Lab: Virginia Finley

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What was your most memorable experience at PPPL?

My first most memorable experience was the 1991 Open House — celebrating PPPL's 40th anniversary. Such a beautiful day! I attended with my husband, Joe, and our two young daughters, and we all had a really good time! I volunteered for three out of the next four and loved seeing the public's positive reaction and employees' enthusiasm.



Virginia Finley, second from right, with other Green Team members modeling recycled dresses during America Recycles Day in 2014. From left to right: Leanna Myers, Lena Scimeca, Carl Scimeca, Margaret Kevin-King, Finley, and Bob Hitchner, and in front, Dana Eckstein.

What do you like to do when you're not at work?

I like to do fun-things with my high school, widow and/or widower friends – concerts, picnics, walks, lectures, dinners, movies, theatre, and trips to Williamsburg and Las Vegas! I'm an avid traveler and have been to all 50 states — Alaska was my 50th in 2014 and perhaps my favorite. I plan to visit all seven continents (on the bucket list: three down, four to go). Something near and dear to me is writing about my family's history and organizing our photos. I am part of three generations of photographers, which means tons of photographs!

What are you most proud of in your job?

Looking at the broad picture, I'm most proud of the Lab's mission. We have been good environmental stewards — that's what I'm proudest of. We try to do the right thing.

What is one thing you'd like PPPL'ers to know about you or your job?

I am most fortunate to be a part of a great team and to be working in the energy and environmental field for over 35 years! I hope that in some small way I have contributed to helping fusion become a viable energy source in the near future.

And I identify with PPPL because of a special sense of connection with its beginning. I came into this world just about the same time as the laboratory – spring of 1951! 🇺🇸

Tour Guides and Tour Hosts Wanted!

We are looking for engineers and physicists who are willing to donate a couple of hours of their time each month to show off the Laboratory to students, clubs, and local people who are interested in science. Our growing tour program is a great way to educate the community about fusion energy and the Lab's mission and to let them know about the cutting-edge research taking place at PPPL. We are also looking for hosts to greet visitors, hand out giveaways and make sure the tours run smoothly.

[Please plan to come to our tour meeting on Aug. 27 at 10 a.m.](#)



Please email Jeanne Jackson DeVoe, jjackson@pppl.gov, to volunteer.

Density limit

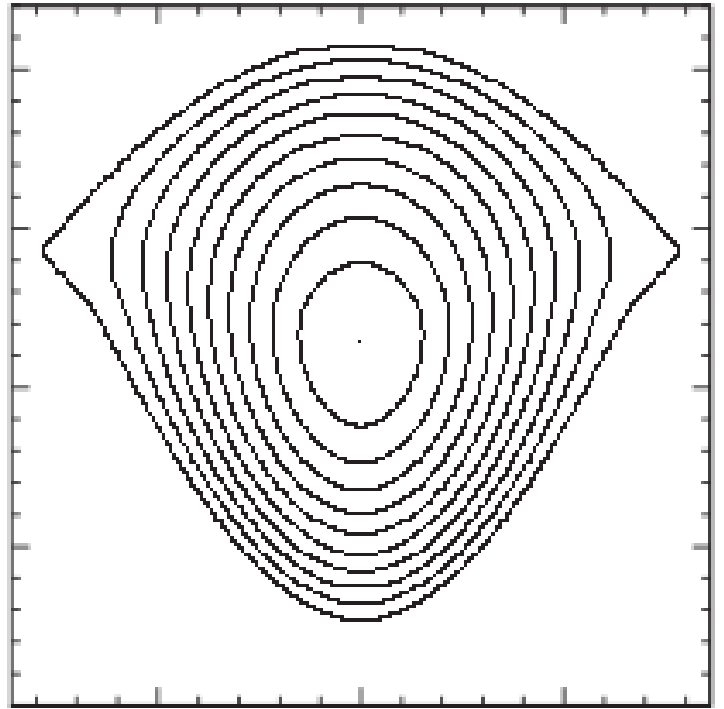
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The apparent breakthrough came when Gates and coauthors studied the process by which the islands are cooled by impurities that stray plasma particles kick up from the walls of the tokamak. Countering this cooling is heating that researchers pump into the plasma. But the scientists found that even a tiny bit of net cooling in the interior of the islands can cause them to grow exponentially, leading to disruption of the crucial current that runs through the plasma and completes the magnetic field that holds the hot gas together.

Reaching this finding called for rethinking some long-held ideas about the growth of the islands. These included a 1977 paper on the stability of islands by theorist Roscoe White of PPPL that extended the analysis of a 1973 paper by British physicist Paul Harding Rutherford. The 1977 work showed a stabilizing effect that appeared to override the impact of a later effect by French physicist Paul-Henri Rebut that attempted to demonstrate runaway growth of the islands.

Ironically, it was White himself who showed that his 1977 paper was not really the last word on the subject. In a new paper published in *Physics of Plasmas* last February, White demonstrated that when the thermal balance in an island tips from heating to cooling, the island also becomes asymmetric. The asymmetry cancelled the effect of the 1977 equation that indicated island stability and caused the Rebut model of island growth to be dominant. "I don't know why we didn't think of the thermal balance in the island before," White said.

His discovery grew out of conversations with Gates, a coauthor with PPPL physicist Dylan Brennan of White's February paper. Gates had reviewed data on the evolution of islands in fusion experiments and noticed that they became asymmetric at the density limit. After consulting with White,



Magnetic island geometry showing the asymmetry effect that is crucial in determining the mechanism for the density limit. (Image courtesy of Physics of Plasmas)

Gates hypothesized that the development might be important. He and White then added the effect of this asymmetry to the Rutherford/White and Rebut equations to complete a revised model of the source of the density limit.

Still to come are papers on a numerical simulation of the model by Brennan and the impact of different mixtures of impurities on the density limit by physicist Luis Delgado-Aparicio of PPPL. Both had joined White in coauthoring the Gates paper. Also ahead are comparisons of the new model with past experiments that disrupted at the density limit. Graduate student Qian Teng is to make these comparisons. "So far we've shown that in principle the full equation works," said White. "Now we must check it against detailed disruption cases." 📄

Tour Guide Meeting Aug. 27 at 10 a.m.

Please come to a tour meeting on Aug. 27 from 10 a.m. to 11 a.m. in the MBG Auditorium, where we'll have refreshments, give out tee shirts, and discuss some new developments in the tour program. Both experienced and new tour guides are welcome. After we discuss some changes and improvements to the tour program, experienced tour guides will be free to leave at 11 a.m. New tour guides will stay for a tour-training session from 11 a.m. to noon.

Science Education programs

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Shannon Greco, a program leader in Science Education, hosted a four-day Energy Camp ending on July 30 for half a dozen students from Trenton Central High School who are part of the Mercer County Community College “Smile/Gear Up” academic enrichment program. The students take classes in math, science, communications, and other topics in a six-week camp during the summer and on Saturdays during the school year.

It was a busy four days for the students. They learned about various types of energy through hands-on activities like building wind turbines and making solar cars. They learned that alternative energy makes up just a fraction of U.S. energy supplies. They also found out firsthand about the limits of some of those energy forms when the wind turbines didn’t work outside because there was no breeze. Greco showed them a chart the growing demand for fossil fuel compared to the supplies and discussed how that could affect developing countries.



Greco, second from left, helps students construct a battery powered by a lemon.

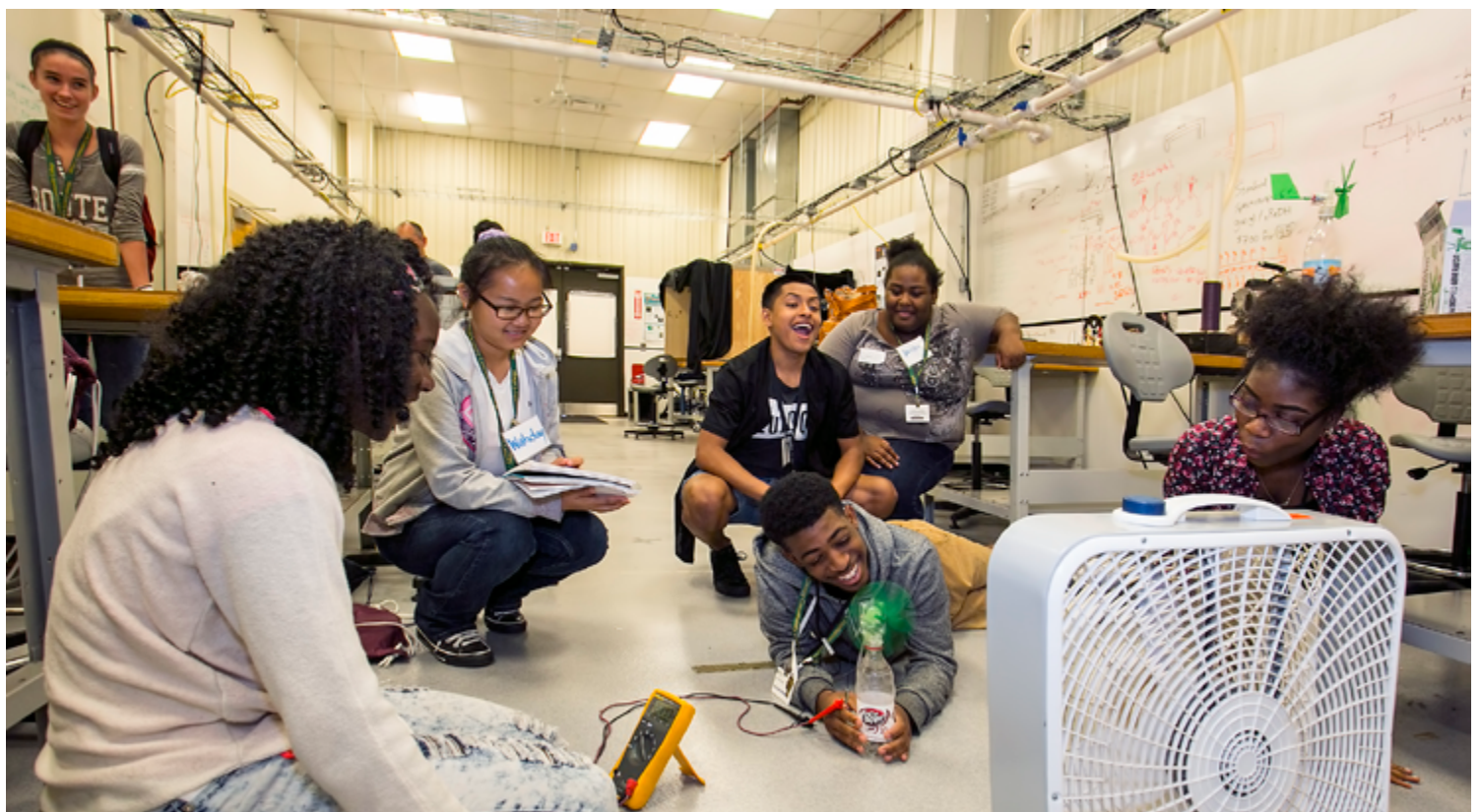


Sierra Winder prepares a solar oven to bake chocolate chip cookies.

At the end of the Energy Camp, the students received certificates of appreciation in an impromptu ceremony in the LSB lobby. Andrew Zwicker, head of Science Education, urged the students to continue their studies and consider careers working in a laboratory like PPPL, or at PPPL itself. He pointed out that there are plenty of opportunities at PPPL not only for scientists and engineers, but also for accountants, writers, and technicians. “If you like science, why not work on something that can really help?” he asked the students. “If you like writing, why not write about a new form of energy? If you like fixing things, why not fix machines that will save the world?”

When Greco asked the group what they had learned after the program was over, a few said they were inspired to think about a science career. “I liked science before but I didn’t think I would work as a scientist,” one student told her. “Now I think I might major in science.”

[continued on next page](#)



Energy Camp student Julian Newman, center, and other students test a wind turbine in the Science Education Laboratory that was constructed by students.

Science Education programs

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Three boys begin building their solar-powered car. (Photo by Jeanne Jackson DeVoe)



Liberty Science Center camp students look down at the NSTX-U Control Room from the overlook during a tour of PPPL in July. (Photo by Jeanne Jackson DeVoe)

Liberty Science Center

On July 24, PPPL hosted a group of campers from the Liberty Science Center in Jersey City as part of a continuing collaboration with the museum. Zwicker led the two-dozen middle schoolers on a tour of the Laboratory and visited the “Power in a Box”™ display, which is located in a trailer acquired from Princeton University.

Zwicker and his staff are rebuilding the display and have been working on it over the past several months. Princeton University students originally built it in 2010 to demonstrate various types of renewable energy and provide power to communities without power due to disasters. The display is fitted with solar cells and contains wind turbines and other alternative energy wares.

Zwicker discussed the various kinds of energy related to the sun, including solar power and fusion energy, which he described as “growing a star.”

After the tour, the students broke into groups of three to build solar-powered cars and race them around an empty parking lot. Siane Streater, 13, of Jersey City, who said she wants to be a pathologist when she grows up, said she liked seeing the solar panels. “I’ve never seen them before and I think it was amazing to see,” she said. “I love the experience here. Andrew really showed us what it’s like to work here and work on the big project.”

“I don’t know what I want to be,” said her friend Mae Maddox, 11, of Short Hills. “But I love learning all the cool facts and I love watching all the cool experiments and things you do and learning what it can create and how it’s going to save the world.” 📷

Guidelines for PCard cardholders

It's important for PCard cardholders to submit their records on time in order for the Lab to have an accurate accounting of expenses.

PCard cardholders are responsible for maintaining a log of the items ordered at the time of purchase, reconciling the log to their monthly PCard statement, submitting their reconciliation for approval, and sending the paper statement, with all supporting documentation, to Accounting.

Reconciliations must be completed, approved, and submitted to Accounting by the 15th of each month. There are a few exceptions to this rule and PCard holders will be notified in advance of any changes in the due date.

Accounting reviews all reconciliations before posting cost distributions. By not completing reconciliations by the 15th of the month, the PCard costs may remain in a default account and may not be distributed to the correct account entered on the PCard statement.

Any reconciliation that is received by Accounting after the 15th due date, or that is not approved by the 15th of each month, will be tracked and reported as

late. Repeat offenders may receive a notification from Kristen Fischer, CFO, informing them that they will be subject to disciplinary action in accordance with section 8.0 of the PCard Manual, which describes the disciplinary measures for cardholders who violate the PPPL PCard policy.

Anyone encountering problems with PCard reconciliation or approval should contact the Procurement PCard Administrator, Usha Patel (upatel@pppl.gov or x2011), and/or the Accounts Payable Supervisor, Maria Huber (mhuber@pppl.gov or x 3523) .

If a PCard holder or approver has scheduled vacation during the reconciliation and approval period, the individual should contact the Procurement PCard administrator for guidance on how to proceed or complete the reconciliation before taking time off.

More information is available in the PCard manual found on the Procurement website/PCard Information/PCard-Procurement Card Program Policies and Procedures (<http://procurement-int.pppl.gov/PCard%20Information.htm>).

PPPL Welcomes New Employees!



MICHAEL D'AGOSTINO
NB electrical engineer
Engineering



NAKIA TOWNSEND
Staff specialist/generalist
Human Resources



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 August 10	Tuesday August 11	Wednesday August 12	Thursday August 13	Friday August 14
COMMAND PERFORMANCE Chef's Feature	Chicken Enchilada served with Rice & Beans	Cheese Manicotti served with Garlic Bread	COMMAND PERFORMANCE Create Your Own Cajun Gumbo over Rice	Country-Fried Steak with Mashed Potatoes, Country Gravy, Collard Greens & Cheddar Biscuit	Baked Parmesan Tilapia served with Spinach Tomato Salad & Seasoned Potato Wedges
Early Riser	Egg McMuffin with Ham served with Hash Brown	Chicken & Cheddar Omelet with Spinach & Home Fries	Biscuit with Bacon, Egg, Avocado & Swiss Cheese Smothered with Sausage Gravy, served with Home Fries	Italian Omelet with Sausage, Peppers, Onions, Mozzarella, Sauce & Hash Brown	Corned Beef Hash & 2 Eggs Any Style
Country Kettle	Potato Leek	Coconut Curry Chicken Soup	Black Bean	Chicken Barley	Cream of Wild Mushroom
Grille Special	Classic Burger Patty Melt	Pork Carnitas Taco with Pickled Onions & Slaw	Steak Sandwich with Cheese, Roasted Peppers & Onion on French Bread	Pulled Chicken, Broccoli Rabe & Provolone Cheese on French Bread	Homemade Black Bean Burger on a Whole Wheat Roll
Deli Special	Grilled Vegetable on Whole Wheat Roll with Goat Cheese, Kalamata Olives & Sundried Tomato Pesto	Corned Beef & Swiss on Rye with Russian Dressing & Slaw	Turkey Club Sandwich	Caesar Salad with Grilled Tuna Steak served with Garlic Texas Toast	Turkey & Smoked Gouda on a Kaiser Roll
Panini	Gyro	Fried Fish Torpedo with Bang Bang Sauce	Buffalo Chicken Wrap	Tofu Parmesan Sub	Cubano-Roast Pork, Ham, Swiss, Pickles & Dijonnaise on Ciabatta Bread

	Monday August 17	Tuesday August 18	Wednesday August 19	Thursday August 20	Friday August 21
COMMAND PERFORMANCE Chef's Feature	Breaded Chicken Cutlet with Pasta, Garlic & Oil served with Cucumber Tomato Salad	Cheese Ravioli with Wild Mushrooms in a Sherry Cream Sauce	COMMAND PERFORMANCE Oriental Stir Fry	Carved Beef Brisket with Mashed Potatoes & Roasted Carrots	Orange-Glazed Salmon with Vegetable Couscous
Early Riser	Steak, Egg & Cheese Quesadilla	Scrambled Eggs & Cheese Pita	Eggs Benedict	Cranberry Pancakes served with Choice of Breakfast Meat	Sausage, Egg & Cheese Croissant
Country Kettle	Chicken Noodle	Cream of Vegetable	Hot Dog Stew	Chicken & Broccoli Alfredo Soup	Summer Squash & Corn Chowder
Grille Special	Coney Island Chili Dog	Hot Pastrami & Cheddar on French Bread	Bacon Cheddar Cheeseburger	Open-Faced Sloppy Joe	Chicken Caesar Salad served with Garlic Texas Toast
Deli Special	Peppers & Egg Torpedo with Cheddar Cheese & Potatoes	Roast Beef, Swiss, Spinach, Roasted Peppers & Honey Mustard	Muffaletta	Tuna Burger with Lettuce & Tomato on a Kaiser Roll	Chicken Sliders with Buffalo Ranch Dressing served with 3 Bean Salad
Panini	BBQ Pork Carnitas Nachos	Seafood Quesadilla	Caribbean Jerk Chicken Wrap	Eggplant Parm Sandwich	Roast Beef & Provolone Torpedo au Jus

MENU SUBJECT TO CHANGE WITHOUT NOTICE

VEGETARIAN OPTION

WEEKLY

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The PPPL WEEKLY is published by the [PPPL Office of Communications](#) on Mondays throughout the year except for holidays.

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/>.