

At PPPL
THIS WEEK

FRIDAY, JULY 4

HAPPY

FOURTH OF JULY

Lab Closed

Independence Day Holiday

UPCOMING EVENTS

July 9-11

Theory and Simulation of Disruptions Workshop
PPPL

August 8

Annual PPPL Bluefishing Trip
5 p.m. ♦ Belmar Marina

Aboard the 80' Suzie Girl

Reserve by July 25



Quest magazine focuses on grad students' "aha" moments

by Jeanne Jackson DeVoe

The second annual issue of Quest magazine, which this year focuses on Princeton University graduate students at PPPL, will be mailed this week to the 90,000 subscribers of the Princeton Alumni Weekly.

The 20-page, full-color glossy magazine, with "Aha! New Faces of Discovery at PPPL" on the cover, includes eight interviews representing a spectrum of interests of the 40 graduate students working at PPPL. It will be sent with the alumni magazine.

"We decided to feature the graduate program here at PPPL on the cover because it's a vital part of Princeton University's graduate education, and it's not something that people always associate with the Laboratory," said John Greenwald,

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The second issue of Quest magazine is being mailed out with the Princeton Alumni Weekly this week.

Patent dinner celebrates Lab R&D

By John Greenwald

More than 60 inventors and their guests gathered in Princeton University's Prospect House on June 19 to celebrate the latest inventions flowing from the science and technology laboratories at PPPL. "The pursuit of patents is the lifeblood of research and development at the Laboratory," said Adam Cohen, PPPL deputy director for operations. Cohen applauded the effort and inspiration that

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Front row left to right: Larry Grisham, Patricia Hillyer, Richard Majeski, Kenneth Hill, Charles Gentile, Manfred Bitter; center row left to right: Yevgeny Raitses, Andrew Bigley, of the USDA, Lew Meixler, Michael Knyszek, a University of California sophomore and intern with Eliot Feibush; Masa Ono, Philip Efthimion, Andrei Khodak, Leonid Zakharov, Alexander Merzhevskiy, Christopher Brunkhorst; back row left to right: Rich Hawryluk, Gary Pajer, of Princeton Satellite Systems; Winston Kong Chan, of Stanford Research Institute; Michael Paluszek, of Princeton Satellite Systems; Arturo Dominguez, Jared Miller, a sophomore at Northeastern University and Matthew Lotocki, a sophomore at Princeton University, both interns with Eliot Feibush; Eliot Feibush, Andrew Zwicker, and David Geveke, USDA.

(Photo Illustration by Elle Starkman)

Quest

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PPPL's science writer, who developed and edited the magazine and wrote most of the articles.

A "striking" cover

The cover features a compelling photo taken by PPPL photographer Elle Starkman of a circle of graduate students. She took the photo from the ground looking up at the students gathered around her. "The cover is as striking as last year's because of the creative efforts of Elle," Greenwald said.

Greenwald credits Kitta MacPherson, PPPL's director of communications, with coming up with the idea of focusing on PPPL's graduate students. "Science is all about discoveries and these students are all in the process of making discoveries for their graduate work, and we thought it would be fun to zero in on those "Aha!" moments," Greenwald said. He thanked Graduate Program Director Nat Fisch for his help with the issue.

The annual magazine debuted last year and received an enthusiastic reception. One reader wrote, "I received a copy of the premiere issue of Quest with my PAW today and I am just elated!"

Students describe research

Students interviewed in the current issue discuss the experience of pursuing their research in their own words. Jeff Parker, a sixth-year graduate student from Brecksville, Ohio, who earned his doctorate this year, describes "burning the midnight oil" as he excitedly developed a formula that offered a key to his research. When he succeeded, he said, it felt as if he was coming into the light from "a dark and terrible storm."

Leland Ellison, a fifth-year graduate student from Denver, recounts a similar moment in his research. "When the cement starts to crack after months of hitting your head against the wall, the feeling is irresistible," he said.

Ge Dong, a first-year graduate student from Shanghai, China, talked about how she learned "how important even the tiniest things can be," in her work on computer codes and algorithms to "solve a problem about the transport of plasma particles."

Quest also features a photo essay by Starkman and Greenwald on the construction of the center stack of the National Spherical Torus Experiment Upgrade (NSTX-U) that forms the heart of the upgrade. The essay describes how the four quadrants of the center stack were constructed and assembled, and how the ohmic heating coil was then wrapped around the column.

Articles on new research efforts

The magazine includes articles on several new research efforts at PPPL. These include a joint PPPL and Princeton University center that studies the heliosphere, and plans for a device called the Facility for Laboratory Reconnection Experiment (FLARE), that will be a new and more powerful version of the Magnetic Reconnection Experiment (MRX).

A new section of the magazine on "People" highlights the arrival of two new top managers at PPPL over the past year: Chief Financial Officer Kristen Fischer and Director of Human Resources Paulette Gangemi.

Greenwald credits the magazine's attractive look to designer Burcu Tezcan-Ruggeri with the help of business manager Barbara Valenza. Both are with the University's Digital Print Center. Senior PPPL budget analyst Jaclyn Pursell assisted Chandra Sanders of the PPPL Procurement Division in delivering pre-publication material to the Government Printing Office, which took bids for the printing, Greenwald said.

If you do not receive PAW at home and would like a copy of Quest, please contact John Greenwald at jgreenwa@pppl.gov. The magazine will also be available on the PPPL website in PDF format later this summer. ☑

Patent Dinner

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went into the inventions, which ranged from fusion and plasma-science innovations to educational and recreational software tools.

Also thanking the inventors was Lewis Meixler, the head of technology transfer at the Laboratory and chair of the Committee on Inventions, which hosted the dinner. Meixler hailed the "creative ideas" of the PPPL scientists and their colleagues at other institutions who participated in the inventions.

Among the 24 inventions were two that have become the subject of patent applications. These are a "Method and Apparatus for Pasteurizing Shell Eggs Using Radio Frequency Heating," which could improve food safety for the general public and is being licensed to a regional egg producer; and a "Method to Produce High Specific-Impulse and Moderate Thrust from a Fusion-Powered Rocket Engine," which has been licensed to Princeton Satellite Systems.

Inventors of the egg-pasteurizing process were PPPL engineer Christopher Brunkhorst and David Geveke and Andrew Bigley of the U.S. Department of Agriculture. Inventors of the method for a fusion-powered rocket engine were PPPL physicist Samuel Cohen and Michael Paluszek, Yosef Razin and Gary Pajer of Princeton Satellite Systems.



Arturo Dominguez, a postdoctoral fellow in the Science Education Department, is all smiles as he is recognized by PPPL Deputy Director Adam Cohen for his invention of the Remote Glow Discharge Experiment along with Andrew Zwicker, David Liao and Michael Aboody.

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Patent Dinner

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Here is a list of all the other recognized inventions, with their inventors and a brief description of each new process or device:

Method to Improve Electrical Voltage Breakdown Across Vacuum Gaps — Larry R. Grisham.

A method to potentially increase the performance of devices with high electric fields within a vacuum by increasing the magnitude of the electric-field gradient that can be sustained by removing bacteria, fungi, and other microbial organisms and their spores.

Radiative Liquid Lithium (metal) Divertor — Masayuki Ono.

This invention aims to solve the highly challenging fusion reactor divertor heat-handling problems utilizing the strong radiative property of lithium ions in the divertor chamber.

Transverse Focusing of Intense Charged Particle Beams with Chromatic Effects for Heavy Ion Fusion — James Mitrani, Igor D. Kaganovich and Ronald C. Davidson.

This invention mitigates chromatic effects on the transverse focusing of charged particle beam pulses with a velocity tilt.

Lithium Droplet Injector — A. Lane Roquemore and Daniel Andruczyk.

Liquid-metal injection is novel and has the potential to inject larger quantities of lithium throughout the duration of long pulse discharges.

Method and Process to Enhance the Performance of Plasma-Based Particle Accelerators Using Magnetized Plasma Compression — Nathaniel J. Fisch and Paul F. Schmit.

A new concept for improving energy gain in modern plasma-based particle accelerators by using time-varying magnetic compression by a longitudinal, uniform magnetic field in the acceleration channel.

Stationary Flowing Liquid Lithium System for Pumping Out Atomic Hydrogen Isotopes and Ions — Leonid E. Zakharov and Charles A. Gentile.

Concept for an entirely new flowing-liquid lithium system that has no mechanically moving components and can dramatically improve plasma conditions in fusion devices.

Non-spectroscopic Method of Determining Gas Constituents through Rotation — Nathaniel J. Fisch and Vasily Geyko.

A method for determining the components of a compressed, spinning ideal gas contained in a closed cylinder by taking external measurements only, without opening the gas container and without spectroscopic interrogation of the gas.

Optimization of Efficiency of Internal Combustion Engines Via Spinning Gas — Nathaniel J. Fisch and Vasily Geyko.

A method to use gas rotation to increase energy storage in the gas and thereby improve thermal-cycle efficiency.

Self-cooled, Recirculating, Liquid Metal Plasma-Facing Wall System for Fusion Applications — Richard Majeski.

Design for a fully axisymmetric, fast-flowing liquid lithium plasma-facing “wall,” or surface, that is intended for implementation in a tokamak.

Burn Control of Magnetic Fusion Power Plant Using Non-axisymmetric Coils — Richard J. Hawryluk and Wayne Solomon.

A new approach to controlling the burn phase of a magnetic fusion power plant using non-axisymmetric magnetic fields to control the stored energy in the plasma.

Heat Exchange Enhancing Insert — Andrei Khodak and Michael A. Jaworski.

Device for applications in heat exchangers, or heating or cooling devices, for improved local heat-transfer enhancement.

A Novel Objective for EUV Microscopy and EUV Lithography — Manfred Bitter, Kenneth W. Hill and Philip Eftthimion.

A new X-ray scheme for stigmatic imaging, which consists of two convex and concave spherically bent crystals.

Permanent Magnet Generator-Like AC Current Drive for Toroidal Fusion Devices — Ali Zolfaghari.

This process uses large, strong permanent magnets placed toroidally on the outside of a torus to create a magnetic flux that links the center of the torus through an iron spherical shell connected to an iron center column core.

Plasma Thruster with Magnetically Insulated Anode — Yeogeny Raitses.

The key innovations of this thruster allow it to effectively ionize different propellants, including gases, liquids and solids, at different flow rates and to operate without wall losses.

Method For Controlling Spatial and Temporal Variations of Plasma Properties in Plasma Devices with Crossed Electric and Magnetic Fields — Yeogeny Raitses and Alexander Merzhevskiy.

A method for crafting spatial variations of the electron cross-field transport by means of localized current-conducting plasma structures in order to control spatial variations of macroscopic plasma properties.

Increasing Solar Panel Efficiency and Reliability by Evaporative Cooling — Lewis Meixler, Charles Gentile, Patricia Hillyer, Dylan Carpe, Jason Wang and Caroline Brooks.

Evaporative cooling may be applied to both new and existing solar panel arrays and is especially effective in hot, dry climates where many solar panels are currently deployed.

A Heterodyne Laser-Induced Fluorescence Technique to Determine Simultaneously the Bulk and Time-Varying Molecule Velocity Distribution — Ahmed Diallo and Stephane Mazouffre.

The primary goal of this invention is to determine the bulk and the time-varying part of the molecule velocity distribution using a heterodyne laser-induced fluorescence technique. The two parts of the velocity distribution are key in the characterization of a physical system.

A Fueling Method for Small, Steady-State, Advanced-Fuel FRC Fusion Reactors — Samuel A. Cohen, Michael Buttolph and Daren Stotler.

A method for fueling small, steady state magnetic fusion reactors by injection of beams of keV deuterium and helium-3 atoms. This invention enables steady state operation of small, aneutronic, field-reversed-configuration fusion reactors and has been licensed to Princeton Satellite Systems.

Display of Tournament Bracket — Eliot Feibush, Michael Knyszek, Matthew Lotocki, Jared Miller and Andrew Zwicker.

This system creates a diagram to display the rounds of a tournament. The current implementation can display an entire double-elimination tournament for up to 32 teams on a single high-definition display.

Uses of Hyperthermal Atomic Beam for Low-Temperature Diamond Growth — Samuel A. Cohen, Erik Gilson and Winston Kong Chan.

This invention has successfully demonstrated that a hyperthermal atomic beam — of H_e , N_e or the like — incident on the substrate at a low angle can enhance surface diffusion of the diamond-film precursors, i.e. hydrocarbons.

Software for Remote Control of Laboratory Equipment by Any Web Browser — Arturo Dominguez, Andrew Zwicker, David Liao and Michael Aboody.

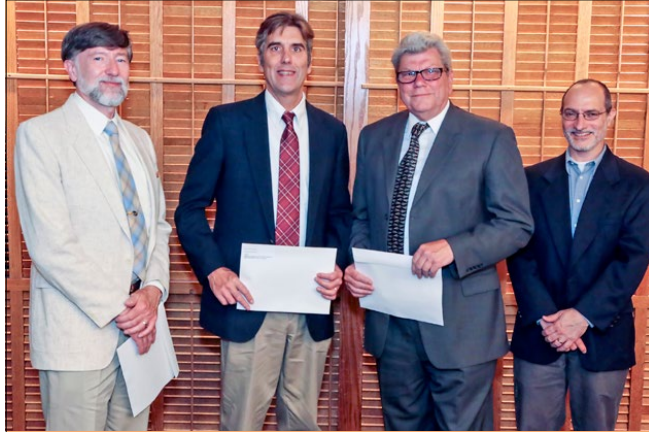
A software invention that allows anyone to control scientific hardware via a web browser as if in the Laboratory.

Patent Dinner

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Larry Grisham, left, and Philip Efthimion enjoy themselves at the festivities.



PPPL Deputy Director Adam Cohen, far right, with PPPL's Christopher Brunkhorst, left; David Geveke, center, and Andrew Bigley, right, both of the USDA. The three inventors were recognized for developing a method and device for pasteurizing shell eggs using RF heating.



PPPL Deputy Director Adam Cohen, far right, with Gary Pajer, left, and Michael Paluszek, of Princeton Satellite Systems, who were recognized for their patent application for a fusion-powered rocket engine. Not shown are PPPL's Samuel Cohen and Yosef Razin of PSS.



Andrew Zwicker, left, chats with Eliot Feibush and his wife, Julie.



Lew Meixler, head of Technology Transfer & Applications Research and chair of the Committee on Inventions, which organized the event, addresses the audience in Princeton University's Prospect House.

PPPL Weekly Summer Schedule

The PPPL Weekly will move to a summer schedule after this issue and will be published every two weeks in July and August.

The next issue will be on July 14 and the following issues will be: July 28, Aug. 11 and Aug. 25. The Weekly will resume its regular schedule on Sept. 8.



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

HOW TO REDUCE RISK FROM A THUNDERSTORM

Thunderstorms are dangerous because of lightning, which can kill or seriously hurt people. Over the past 50 years, at least one New Jerseyan on average has been killed by lightning each year.

You can reduce the risk of being injured by lightning by taking the following precautions suggested by the Federal Emergency Management Agency.

- If you are caught outside during a sudden thunderstorm, get inside a building or take shelter in a hardtop (not a convertible) automobile.
- If you are in an open area without shelter, go to a low place such as a ravine or valley (be alert for flash floods).
- If you are in a forest when a storm approaches, seek shelter in a low area under a thick growth of small trees.
- If you feel your hair stand on end, which may indicate that lightning is about to strike, get low to the ground on the balls of your feet, put your hands over your ears and put your head between your knees in order to make yourself as small a target as possible. It's important to minimize your contact with the ground. Do not lie flat on the ground.
- Before you make plans for the beach, a baseball game or other outdoor events, check the weather report to see if there is a severe thunderstorm watch or warning for your area.

For more information go to:

<http://www.ready.gov/thunderstorms-lightning>

<http://www.fema.gov/>

<http://emergency.cdc.gov/disasters/lightning/safetytips.asp>

2014 Annual PPPL Bluefishing Trip Aboard the 80ft "Suzie Girl"



FRIDAY, AUGUST 8, 2014

Departure: 5pm SHARP!

BELMAR MARINA HWY. 35, BELMAR, NJ 07719

Cost: \$75 Per person • All inclusive
Money due by Friday July 25. NO REFUNDS.

Cost includes everything:






Rods, Bait, Fish Cleaning, Food, Beverages, Prizes etc.
ALL YOU NEED TO DO IS SHOW UP!

Contact Andy Carpe ext. 2118 acarpe@pppl.gov
Bob Tucker Jr. ext. 3190 rtucker@pppl.gov

BROCK Café Menu

BREAKFAST 7 a.m. • 10 a.m.
CONTINENTAL BREAKFAST 10 a.m. • 11:30 a.m.
LUNCH 11:30 a.m. • 1:30 p.m.
SNACK SERVICE until 2:30 p.m.

— MARK GAZO, Chef Manager

	MON. 30 JUNE	TUE. 1 JULY	WED. 2 JULY	THU. 3 JULY	FRI. 4 JULY
COMMAND PERFORMANCE CHEF'S FEATURE	 Chicken Parmesan with Pasta & Vegetable	 Pasta Puttanesca	 3 Cheese Lasagna with Meat Sauce and Garlic Bread	 Western Chopped Salad with Ham & Fried Garbanzo Beans	
EARLY RISER	Blueberry Pancakes served with Sausage	Strawberry Banana Pancakes with Whipped Cream	Egg White Omelet with Turkey, Broccoli & Cheese	Bacon & Egg Lasagna	
COUNTRY KETTLE	Split Pea with Ham	Mushroom Barley	Cream of Chicken	Tomato with Spinach & Lentil	
GRILLE SPECIAL	BBQ Bacon Supreme Burger	Spicy Andouille Sausage Sandwich with Onion Rings	Corned Beef Reuben	Turkey Bacon & 3 Cheese Quesadilla	
DELI SPECIAL	Focaccia Sandwich with Spring Greens, Mozzarella & Tomatoes	Salami & Swiss with Spicy Mustard, Lettuce & Tomato	South Florida Mango & Grapefruit Chicken Salad with Wheat Berry	Tuna Salad Club Sandwich with Hard-cooked Egg	
PANINI	Turkey, Pepperoni, & Mozzarella Wrap Panini	Open-Faced Seafood Salad Melt with Provolone & Cheddar	Crispy Buffalo Chicken Tender Wrap	Eggplant Parmesan Torpedo	

MENU SUBJECT TO CHANGE WITHOUT NOTICE

VEGETARIAN OPTION

CLICK HERE FOR A PRINTABLE WEEKLY MENU

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 Thursday. Other stories should be submitted no later than noon on Wednesday. Comments: commteam@pppl.gov ♦ PPPL WEEKLY is archived on the web at: <http://w3.pppl.gov/communications/weekly/>.

The PPPL WEEKLY is currently on a summer bi-weekly schedule. The next issue will be published on July 14.