PPPL PRINCETON PLASMA PHYSICS LABORATORY
A Collaborative National Center for Fusion & Plasma Research
U.S. DEPARTMENT OF ENERGY
WEEKLY
JULY 1, 2013

At PPPL THIS WEEK

MON. - FRI., JULY 1 - 5

European Physical Society Conference on Plasma Physics
Helsinki, Finland

THURSDAY, JULY 4

Independence Day Holiday
Laboratory Closed

Welcome Stew Smith!

Please extend a warm welcome to A.J. Stewart Smith who becomes PPPL's first vice president today, July 1. Smith, the Class of 1909 Professor of Physics at Princeton university, served as Princeton's first dean for research from 2006 until this year. Go to http://www.pppl.gov/news/2013/06/aj-stewart-smith-princetons-first-dean-research-becomes-vice-president-pppl-1 for a full story on Smith's legacy at the university.

Guest Corner

25th SOFE Meeting: Fusion researchers gather at a critical moment in history

By **Hutch Neilson** - Head, PPPL Advanced Projects

More than 35 Laboratory staff members joined fusion colleagues from around the world for the 25th IEEE Symposium on Fusion Engineering (SOFE) in San Francisco from June 10 through 14. The meeting occurred at a moment in fusion's history marked by both enormous opportunity and tremendous challenges. Participants at the symposium agreed that fusion researchers must not let fusion's challenges cause us to lose sight of the opportunities.

Several ITER speakers highlighted impressive technical progress in areas such as blankets, heating and current drive, magnets, safety and licensing. Still, the challenges of building ITER were not glossed over, and Deputy Director-General Rem Haange dealt candidly with schedule and organizational issues in his overview presentation.

On the inertial fusion side, the symposium featured a tour of the magnificently engineered National Ignition Facility (NIF) at Lawrence Livermore National Laboratory (LLNL). Michael Dunne, Director of Laser Fusion Energy Systems at LLNL, spoke frankly about the gaps between predicted and achieved performance in NIF. He described science-based strategies aimed at closing the gaps.

The completion of NIF and ITER's transition from design to construction mark a transition to a new phase of the world fusion enterprise — one in which the focus is increasingly on the final steps to fusion's energy goals. The 25th SOFE helped to advance the international discussion concerning next-step programs and facilities on the roadmap to the realization of fusion. Attendees heard presentations on accomplishments in support of fusion next-steps from NSTX and several other currently operating tokamaks and stellarators, and on the construction status of Wendelstein 7-X and JT-60 SA — devices that will come into operation later this decade. Several speakers described evolving plans, both broad strategies and specific facilities and programs, aimed at moving from ITER and NIF to fusion-generated electricity by about mid-century.

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Inventors honored at Patent Awareness Dinner

Photo by Elle Starkman

PPPL honored the Laboratory's many inventors at the annual Patent Awareness Dinner on June 24 at Princeton University's Prospect House. Pictured here are many of the inventors: Rear row from left: Eliot Feibush, C. Leland Ellison, Michael Paluszek, (Princeton Satellite Systems), Charles Skinner, Frank Jones, Henry Kugel, Gary Pajer, (PSS), Renaud Gueroult, Hans Schneider. Front row from left: Philip Efthimion, Kenneth Hill, Manfred Bitter, Lane Roquemore, Charles Gentile, Robert Woolley, Steve Jurczynski, and Nathaniel Fisch.

STORY - MORE PHOTOS ON PAGE 2

Invention event showcases core ideals of Laboratory

By John Greenwald

Scientists and engineers celebrated their latest inventions last week at a dinner that honored the creativity of the PPPL staff. The annual event brought more than 60 inventors and guests to Princeton University's Prospect House to recognize inventions ranging from a novel tool for visualizing complex data to a proposed method for propelling a fusion-powered rocket to Mars.

The inventions demonstrate "the true concept of the Laboratory" as a source for ideas that can push the frontiers of technology, said Adam Cohen, PPPL deputy director for operations, who served as emcee for the event.

Among the 19 inventions honored was an optimized radiation detector that has drawn the attention of the U.S. Department of Homeland Security and the Transportation Security Administration, as well of other laboratories. The process enables a single detector to simultaneously identify radiation or images from different types of sources — an ability derived from an information theory first developed at Bell Laboratories.

"This is an exceptional example of taking a concept developed in one field of technology and creatively applying it to an entirely new area," said Lewis Meixler, the head of technology transfer at PPPL. "The Department of Homeland Security recently visited the Laboratory to learn more about the concept for possible applications in transportation security and other related fields." Joining that session were PPPL physicists Manfred Bitter and Kenneth Hill, who co-invented the radiation-detection technique with colleagues Luis Delgado-Aparicio and Novimer Pablant.

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

- **Non-astigmatic Imaging with Matched Pairs of Spherically Bent Crystals —** *Manfred Bitter, Kenneth Hill, Steven Scott, Russell Feder, Jinseok Ko, John E. Rice, Alexander Charles Ince-Cushman and Frank Jones.* A patented system for point-to-point and distortion-free imaging of a broad spectrum of electromagnetic radiation.
- **Production of Radionuclide Molybdenum 99 in a Distributed and In Situ Fashion —** *Charles Gentile, Adam B. Cohen and George Ascione.* A patent application for a method to produce Technitium-99m, the most widely used medical isotope for diagnostic examinations, through on-site preparation in hospitals and other venues.
- **Method of Preparing Super-Concentrated Jets from Dense Aerosol Suspensions —** *Michael J. Hay, Ernest J. Valeo and Nathaniel J. Fisch.* The design for a nozzle that will allow much greater control of the shape and dimensions of a jet for producing plasma.
- **Natural Gas Compressor for Residential Use —** *Robert Cutler.* A cost-effective system for compressing gas to ultra-high pressures for residential and light-industrial applications.
- **Two Novel X-ray Optical Schemes for Spectroscopy with Fast Time Resolution and Two-dimensional Imaging with High Magnification —** *Manfred Bitter, Kenneth W. Hill, Luis Delgado-Aparicio, Novimir Pablant, Steve Scott and Frank Jones.* Two concepts with immediate applications for diagnostic imaging of high-density, laser-produced plasmas, and additional applications for medicine, industrial manufacturing and other fields.

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From left clockwise: Charles Skinner, Henry Kugel, Sharon Kugel, Masa Ono and Dagmar Skinner.

On the left side of the table from front to back: Deb Meixler, Lew Meixler, Karen and Stewart Prager. On the right side of the table from front to back: Debra Cohen, Sue Williams, Mike Williams.

From left to right clockwise: Kelsey Tresemer, Amnon Fruchtman, of the Holon Academic Institute of Technology in Israel, Liberty Sveke and Leland Ellison.

Masa Ono, left, and Dagmar Skinner chat with Sharon Kugel, far right, and Mechtild Bitter in white.

2nd safety survey results

The results from PPPL's 2nd quarterly safety culture survey echoed the positive sentiments of the first group that participated in January. With 60 percent of those surveyed responding, participants noted strengths such as management's commitment to safety, a belief in personal safety responsibility, and the presence of a questioning attitude among staff.

Staff also indicated opportunities for improvement in areas such as supervisor acknowledgement of safe behaviors, a clearer line between acceptable/unacceptable behavior, and workers' belief that they can influence health and safety performance.

Some results overlapped with those received in January, which may indicate where attention is needed. However, we need to hear from the remaining 50 percent of the staff before we take any definitive action.

The third quarter of the staff will have an opportunity to respond to the safety culture survey in mid-July. We encourage everyone who is contacted to take a few moments to respond.

Thank you to everyone who has participated so far and to those who will share their opinions over the next two quarters! Your input will influence the safety program and help make PPPL a safer place to work.

Inventors

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- **A Method to Reduce Neutron Production in Small Clean Fusion Reactors —** *Samuel A. Cohen.* A process for advancing the development of fusion reactors by alleviating the need for nuclear materials and tritium-breeding testing programs.
- **An Advanced Liquid Centrifuge Using Differentially Rotating Cylinders and Optimized Boundary Conditions —** *Hantao Ji, Adam Cohen, Philip Efthimion and Eric Edlund.* A concept for a centrifugal device that utilizes inner and outer cylinders for blending or separating fluids.
- **Granular Lithium Injector —** *Lane Roquemore and Dennis Mansfield.* A device that employs an impeller that rotates at up to 15,000 rpm to inject lithium granules into tokamak plasmas.
- **Combined Reflectivity/Imaging Method for Assessing Diagnostic Mirror Cleaning Treatments —** *Charles H. Skinner.* A novel process for restoring the reflectivity of diagnostic mirrors.
- **Feedback Control of Azimuthal Oscillations in E×B Devices —** *Martin E. Griswold, C. Leland Ellison, Yevgeny Raitses and Nathaniel J. Fisch.* A device and process for improving the performance of Hall thruster propulsion systems.
- **Metered Evaporator for Tokamak Wall Conditioning —** *Charles H. Skinner, Dennis Mansfield, Henry Kugel, Hans Schneider and Lane Roquemore.* A novel system for the controlled application of lithium to condition the inner walls of tokamaks.
- **Method to Produce High Specific Impulse and Moderate Thrust from a Fusion-powered Rocket Engine: (ARE-Aneutronic Rocket Engine) —** *Samuel A. Cohen, Michael Paluszek, Yosef Razin and Gary Pajer.* A description of a fusion-driven rocket engine that could advance space exploration and open commercial opportunities.
- **Practical Considerations in Realizing a Magnetic Centrifugal Mass Filter —** *Renaud Gueroult and Nathaniel J. Fisch.* A concept for a rotating plasma configuration for processing nuclear waste.
- **Radially Cooled Toroidal Field Centerpost —** *Robert D. Woolley.* A design for improving the cooling of centerpost magnets in spherical torus fusion facilities.
- **Hold Down Clamp with Integral Thermocouple Probe —** *Hans Schneider, Stephan Jurczynski and John Vaccaro.* A device that provides the clamping point and temperature measurement of clamped objects.
- **Stainless Steel Hotplate Heater for Long Objects —** *Stephan Jurczynski and Hans Schneider.* An invention to aid the soldering of large conductors.
- **Vacuum Attachment for Collection of Lithium Powder —** *Hans Schneider and Stephan Jurczynski.* Part of an integrated system to collect lithium for storage in mineral oil or to passivate it in vinegar or chilled water.
- **Visualization of Multivariate Data —** *Eliot Feibush.* A novel software tool that clearly shows more dimensions of complex data than existing methods can present.

PPPL inventors from left to right: Adam Cohen, Manfred Bitter, Kenneth Hill and Frank Jones. Bitter displays the patent for a system for point-to-point and distortion-free imaging of a broad spectrum of electromagnetic radiation.

New Colloquium Committee Named

Deputy Director for Research Mike Zarnstorff named new members to the colloquium committee for the coming year.

The new members are:

- **John Greenwald, science writer**
- **Charles Skinner, principal research physicist**
- **Daren Stotler , principal research physicist**

Zarnstorff also thanked the outgoing colloquium members for the past year:

- Ron Bell, principal research physicist
- Bill Tang, head of the Fusion Simulation Program
- Kelsey Tresemer, engineer

Anyone with suggestions for interesting colloquium speakers should email colloquium@pppl.gov.

SOFE Meeting

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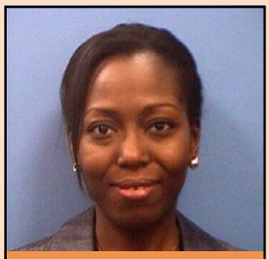
PPPL has strongly supported the conference throughout its history, and this year was no exception. Laboratory engineers and physicists presented 39 of the 320 papers at the symposium, contributing to nine of its 16 topical areas. In addition, PPPL was deeply involved in the organization of the conference, providing leadership of the technical program and fundraising committees as well as critical administrative and financial contributions.

At the symposium, the 2013 Fusion Technology Award was presented to PPPL's Phil Heitzenroeder for his career-long leadership contributions to fusion engineering and technology. General Chair Wayne Meier (LLNL) publicly thanked PPPL for its many contributions, including the efforts of Lynda Lauria, Kathleen Lukazik, and Pamela Hampton for administration; Charlie Gentile for fundraising; Mike Viola, Ninaad Desai, and Irving Zatz for publication; and Charlie Neumeyer, Irving Zatz, and Hutch Neilson for technical program planning. Jean Paul Allain, chair of the IEEE Fusion Technology Committee, congratulated the LLNL and PPPL teams for a successful conference, and past chair Dennis Youchison said that the 25th SOFE set a "new standard" for future Symposia.

Among fusion conferences, the biennial SOFE event is unique in its strong focus on engineering issues. In fact, the first symposium, held in 1965 in Livermore, Calif., was called "Symposium on Engineering Problems of Controlled Thermonuclear Research." Today the scope of the series has expanded to include such topics as project management, system integration, and fusion roadmap planning, while maintaining a primary focus on fusion's challenging engineering problems and their solutions. As fusion research has broadened internationally over the years, so has SOFE. This year, about two-thirds of the papers were from outside the United States.

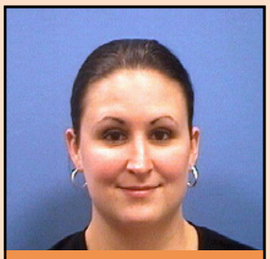
Welcome PPPL New Hires

PPPL welcomes the employees pictured below who have recently joined our staff.

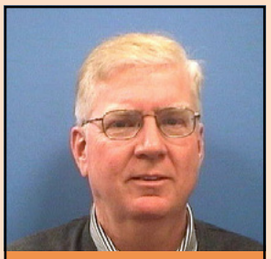


SAMANTHA BURROWS
Industrial Hygienist
ESH&S

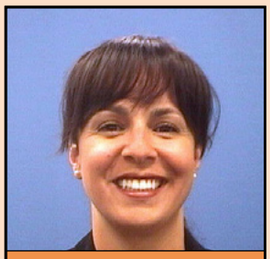
SCOTT DECKER
Fire Protection Engineer
Engineering & Infrastructure



CHRISTINA DE ZUANI
Emergency Services Officer
ESH&S



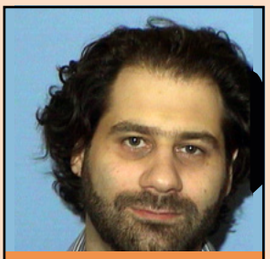
MARTIN DONAHUE
Network Engineer
Engineering & Infrastructure



KRISTEN FISCHER
CFO
Business Operations

ALLEN GONDECK
Emergency Services Officer
ESH&S

SCOTT KEMPEL
Network Engineer
IT

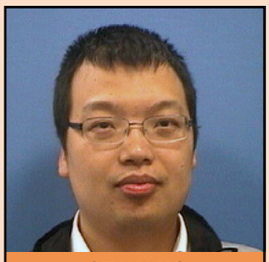


EMIL NASSAR
Project Control Analyst
Business Operations

USHA PATEL
Subcontract Administrator
Business Operations

JOHN PETERSON
Subcontract Auditor
Business Operations

CHANDRA SANDERS
Procurement Analyst
Business Operations



GE WANG
Associate Research Physicist
Theory

JONGSOO YOO
Associate Research Physicist
Plasma Science

2013 PPPL Bluefishing Trip

Aboard the 120'

Miss Belmar Princess

Date: Friday July 26, 2013

Departure: 5 p.m. SHARP!!!

Location: Belmar Marina,
Hwy. 35, Belmar, N.J.

Cost: $75 per person All inclusive
Money due by July 19. NO REFUNDS.

Cost includes everything.
Rods, bait, fish cleaning, food, beverages etc.

ALL YOU NEED TO DO IS SHOW UP!

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Bob Tucker Jr. ext. 3190 rltucker@pppl.gov

New online interactive map of national labs

Symmetry: Dimensions of Particle Physics, the online magazine, has published an interactive map of all 17 of the U.S. Department of Energy's national laboratories, including PPPL. You can view the map at http://www.symmetrymagazine.org/labsmap/ and download and print a poster at www.symmetrymagazine.org/sites/default/files/symmetry-national-lab-stats.pdf.

Symmetry is a joint publication of SLAC National Accelerator Laboratory and Fermi National Accelerator Laboratory.

Due to the Independence Day holiday on July 4 the Weekly will not be published on July 8. The next issue of the PPPL Weekly will appear on Monday, July 15.

Brock 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 JULY 1	TUESDAY JULY 2	WEDNESDAY JULY 3	THURSDAY JULY 4	FRIDAY JULY 5
					
	EGGPLANT PARMESAN	CHICKEN TENDERS WITH MAC & CHEESE	CHICKEN TRATTORIA	4th of JULY	MOROCCAN GRILLED SALMON
EARLY RISER	Corned Beef Hash & 2 Eggs	Tomato, Basil, Fresh Mozzarella Omelet	Italian Sausage, Peppers & Onion Omelet		Egg Whites, Turkey Sausage and Tomato Wrap
COUNTRY KETTLE	Seafood Chowder	Velvet Corn Cilantro Soup	Chili con Carne		Summer Squash & Corn Chowder
GRILLE SPECIAL	Santa Fe Chicken Sandwich	Crab Cake Sandwich with Lettuce and Tomato	Mediterranean Chicken Kabob Salad		BBQ Bacon Cheddar Burger
DELI SPECIAL	Tuna Club Wrap	Turkey, Swiss, & Coleslaw on Rye	Grilled Portobello with Tomato, Peppers & Fresh Mozzarella		Spinach Pie served with Greek Salad
PANINI	Hot Beef & Cheddar on a Kaiser Roll	Italian Panini	Shredded Chicken Quesadilla		Boardwalk Italian Sausage & Peppers

MENU SUBJECT TO CHANGE WITHOUT NOTICE

CLICK HERE FOR A PRINTABLE WEEKLY MENU

WEEKLY

Editor: **Jeanne Jackson DeVoe** ◆ Layout and graphic design: **Gregory J. Czechowicz**
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