PPPL PRINCETON PLASMA PHYSICS LABORATORY
A Collaborative National Center for Fusion & Plasma Research
U.S. DEPARTMENT OF ENERGY
WEEKLY
May 11, 2015

At PPPL THIS WEEK

TUESDAY, MAY 12

Colloquium
4:15 p.m. ◆ MBG Auditorium
In Silico Plasmas Under Extreme Intensities
Professor Luis Silva, Department of Physics, Instituto Superior Técnico

MAY 13–14

PPPL Advisory Committee

FRIDAY, MAY 15

Remembrances of Val Logsdon Fitch
Princeton University Physics Department
See page 6 for more information.

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

UPCOMING

FRIDAY, MAY 29

Tours of PPPL for Princeton University Reunions
10 a.m. and 1:30 p.m.

INSIDE

An improvement to the global standard for modeling fusion plasmas

By Raphael Rosen

The gold standard for modeling the behavior of fusion plasmas may have just gotten better. Mario Podestà, a staff physicist at PPPL, has updated the worldwide computer program known as TRANSP to better simulate the interaction between energetic particles and instabilities – disturbances in plasma that can halt fusion reactions. The program's updates, reported in the journal *Nuclear Fusion*, could lead to improved capability for predicting the effects of some types of instabilities in future facilities such as ITER, the international experiment under construction in France to demonstrate the feasibility of fusion power.


Mario Podestà

Podestà and co-authors saw a need for better modeling techniques when they noticed that while TRANSP could accurately simulate an entire plasma discharge, the code wasn't able to represent properly the interaction between energetic particles and instabilities. The reason was that TRANSP, which PPPL developed and has regularly updated, treated all fast-moving particles within the plasma the same way. Those instabilities, however, can affect different parts of the plasma in different ways through so-called "resonant processes."

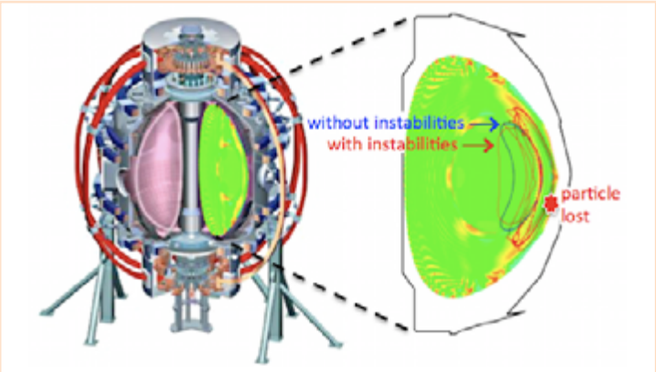
The authors first figured out how to condense information from other codes that do model the interaction accurately – albeit over short time periods – so that TRANSP could incorporate that information into its simulations. Podestà then teamed up with TRANSP developer Marina Gorelenkova at PPPL to update a TRANSP module called NUBEAM to enable it to make sense of this condensed data. "Once validated, the updated module will provide a better and more accurate way to compute the transport of energetic particles," said Podestà. "Having a more accurate description of the particle interactions with instabilities can improve the fidelity of the program's simulations."

continued on page 2


An auditorium session during last week's Plasma-Materials Interactions workshop, which brought more than 80 physicists from around the country to PPPL. "This workshop provided the necessary face-to-face discussions toward building community consensus on critical issues involving plasma-materials interactions," said physicist Rajesh Maingi, the overall chairman of the event. "The discussions were both vibrant and dynamic, and both the organizers and participants felt the discussions were extremely productive and worthwhile."

TRANSP

continued from page 1

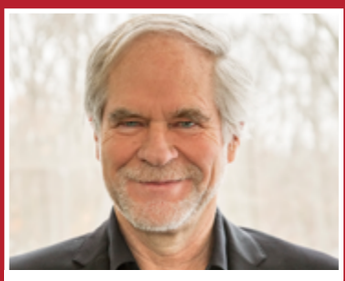


Schematic of NSTX tokamak at PPPL with a cross-section showing perturbations of the plasma profiles caused by instabilities. Without instabilities, energetic particles would follow closed trajectories and stay confined inside the plasma (blue orbit). With instabilities, trajectories can be modified and some particles may eventually be pushed out of the plasma boundary and lost (red orbit). Image by Mario Podestà.

Fast-moving particles, which result from neutral beam injection into tokamak plasmas, cause the instabilities that the updated code models. These particles begin their lives with a neutral charge but turn into negatively charged electrons and positively charged ions – or atomic nuclei – inside the plasma. This scheme is used to heat the plasma and to drive part of the electric current that completes the magnetic field confining the plasma.

The improved simulation tool may have applications for ITER, which will use fusion end-products called alpha particles to sustain high plasma temperatures. But just like the neutral beam particles in current-day-tokamaks, alpha particles could cause instabilities that degrade the yield of fusion reactions. "In present research devices, only very few, if any, alpha particles are generated," said Podestà. "So we have to study and understand the effects of energetic ions from neutral beam injectors as a proxy for what will happen in future fusion reactors."

PPPL bids a fond farewell to retiring employees!



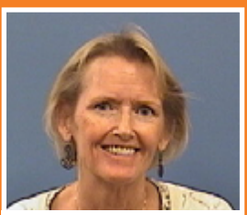
BOB BUDNY
Principal research physicist
ITER and Tokamaks

PHIL HEITZENROEDER
Head of Mechanical Engineering
Engineering

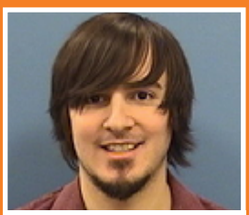
LARRY NIXON
Senior computer operator
Information Technology

PPPL Welcomes New Employees!

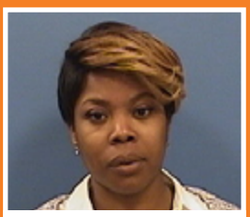
LAURIE BAGLEY
Head of Technology Transfer
Best Practices and External Affairs



LAURA BIRINGER
Business Operations, senior budget analyst
Business Operations



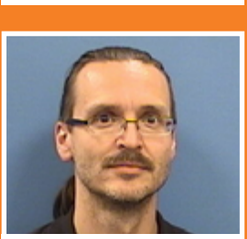
GREG BUSILLO
Scientific software engineer
Information Technology



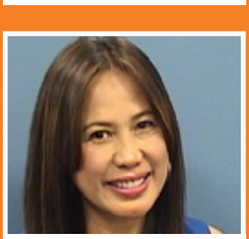
LA'RETTA CASTRO
Budget analyst
Business Operations

SHAUN HASKEY
Associate research physicist
ITER and Tokamaks

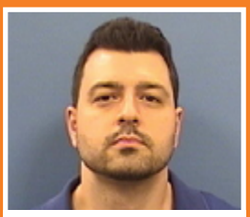
KIM SHIDLOWSKI
Staff accountant
Accounting



VLADISLAV VEKSELMAN
Associate research physicist
Plasma Science and Technology



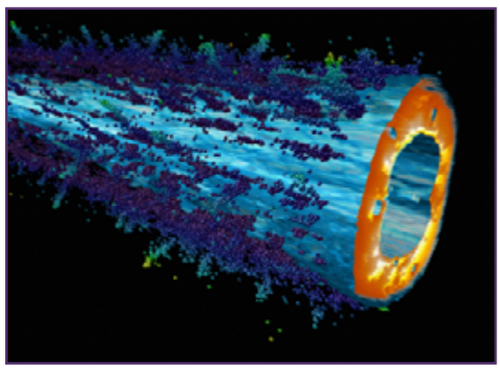
MARISSA ZARA
Procurement specialist
Business Operations/ Procurement



TOM KUCKER
Facilities mechanical CAD designer
Engineering/Drafting

COLLOQUIUM

In Silico Plasmas Under Extreme Intensities



Professor Luis Silva
Department of Physics, Instituto Superior Técnico

Tuesday, May 12
4:15 p.m. (coffee/tea at 4 p.m.), M.B.G Auditorium, Lyman Spitzer Building

Remembrances of **Val Logsdon Fitch** (1923 -2015)

Friday May 15, 2015

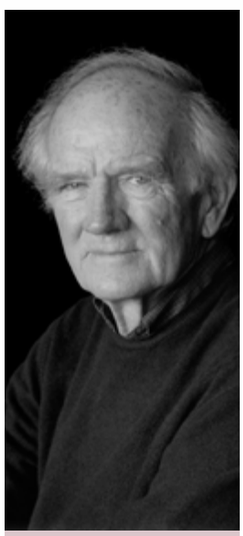


Photo © Mariana Cook 2003.

The Princeton Physics Department is hosting a day of events on Friday May 15, in celebration of Val Fitch's extraordinary life and accomplishments. We very much hope you will be able to join us – for more information please take a look at the University website: http://www.princeton.edu/main/news/archive/S42/92/81I76/index.xml?section=announcements

Also, please forward this announcement to others who may be interested.

The day will begin with a symposium of colloquium-level talks in Jadwin Hall, on the approximate theme "CP Violation past, present and future."

The afternoon program, for the general public, will take place in Richardson Auditorium in Alexander Hall, featuring a concert interspersed with tributes, to be followed by a reception in the adjacent Mathey College Common Room. Please register on the following website, to give us an idea of how many people will be coming: http://phy-webserver.princeton.edu/indico/internalPage.py?pageId=0&confId=4

An obituary of Val Fitch is available at: http://www.princeton.edu/main/news/archive/S42/32/62C77/index.xml?section=topstories.

Science Symposium, Room A10 Jadwin Hall

10 a.m.
Coffee, foyer in front of Jadwin A10

10:15 a.m.
Val Fitch as scientist and human being
Stewart Smith, Princeton University

10:30 a.m.
The Discovery of CP Violation: Remembrances after 50 years!
James Cronin, University of Chicago

11:15 a.m.
Break

11:30 a.m.
CP Violation in the 21st Century
Hassan Jawahery, University of Maryland

12:15 p.m.
CP Violation and Cosmology
Edward Witten, Institute for Advanced Study

12:50 p.m.
Lunch - list of suggestions will be provided

Memorial Concert and Tributes, Richardson Auditorium, Alexander Hall

2:30–3:45 p.m.
Speakers: Linda Fitch, James Cronin and Alan Fitch
Musical Selections — Salomé Chamber Orchestra, New York
- Bach, Suite #3 in D Major, Adagio
- Schubert, Quintet in C Major, Movement 1
- Schubert, Quintet in C Major, Movement 2
- Händel, Xerxes -- Ombra mai fu

4:00-5:30 p.m.
Light reception, Mathey College Common Room

There's still time to sign up for PPPL's Bike Challenge

May is National Bike Month and PPPL's Bike Challenge has already gotten rolling with 40 PPPL'ers signed up for the Bike Challenge and five teams organized. With five teams, the group can handle up to 50 participants, so there's plenty of room for more bikers! So far, 32 of the 40 people have officially registered with their team on the Challenge website and PPPL has officially logged 44 bike trips for a total of 443 miles.

To sign up, go to http://tinyurl.com/k6huwz7. You'll be invited to join one of PPPL's teams and to register on the Bike Month Challenge website, which will track your bike rides during May, including trips outside of work!

For more information, please contact Rob Sheneman at ext. 3392.

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 May 11	Tuesday May 12	Wednesday May 13	Thursday May 14	Friday May 15
COMMAND PERFORMANCE Chef's Feature	**Fried Chicken Macaroni & Cheese**	**Chicken Parmesan** served with Risotto & Broccoli Rabe	**Made to Order Burrito Bar**	CELEBRATING PIZZERIA DAY **PPPP-Princeton Plasma Physics Pizzeria** Assorted Pizzas	**White Seafood Lasagna** served with Garlic Bread
Early Riser	**Bacon, Cheddar Cheese Omelet Wrap**	**Bacon, Peas & Goat Cheese Frittata**	**Raisin Bread French Toast**	**Chocolate Banana Pancake Breakfast Casserole**	**Broccoli Cheddar Breakfast Pizza**
Country Kettle	**Tomato Fresh Basil Soup**	**New England Clam Chowder**	**Lentil Soup**	**Chicken Rice**	**Cream of Mushroom** with Sherry
Grille Special	**Patty Melt-Hamburger,** Caramelized Onions and Swiss on Rye	**Italian Sausage, Brocoli Rabe, Roasted Peppers and Provolone** on French Bread	**Fried Catfish** with Mango Tango Black Bean Salsa served with Hushpuppies	**Mushroom Pepperoni Cheesesteak**	**Chicken Tender Po' Boy**
Deli Special	**Italian Vegetable Sandwich** with Whole Wheat Tortilla Chips	**French Dip Sandwich**	**New Orleans Muffaletta**	**Italian Hoagie** cut from our 3-footer	**Fish Parmesan Sandwich**
Panini	**Roast Beef, Ham, Provolone and Roasted Peppers** on Ciabatta with Pesto Mayonnaise	**Buffalo Chicken Quesadilla**	**Turkey, Ham & Swiss Melt** on Ciabatta	**Assorted Calzones & Strombolis**	**Teriyaki Beef & Broccoli** with Asian Noodles

MENU SUBJECT TO CHANGE WITHOUT NOTICE

Menu Item is in keeping with American Heart Association (AHA) and U.S. Department of Agriculture (USDA) guidelines.

VEGETARIAN OPTION

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

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/.