PPPL PRINCETON PLASMA PHYSICS LABORATORY
A Collaborative National Center for Fusion & Plasma Research
U.S. DEPARTMENT OF ENERGY
WEEKLY
September 28, 2015

Calendar of Events

WEDNESDAY, SEPT. 30

Patent Awareness Program Recognition Dinner
6–9 p.m. ◆ Prospect House, Princeton University

FRIDAY, OCT. 2

American Red Cross Blood Drive
8 a.m.–1 p.m. ◆ the American Red Cross Mobile van, Lower End parking lot

Public Tour
10 a.m.
Register at tours@pppl.gov.

UPCOMING

WEDNESDAY, OCT. 21

PPPL Colloquium
4:15 p.m. ◆ MBG Auditorium
Reconnection at the Dayside Magnetopause from MMS
Dr. James Burch, Southwest Research Institute

INSIDE

Michael Williams retires as head of engineering after 39 years at PPPL

By Jeanne Jackson DeVoe

When Mike Williams, the associate director for Engineering and Infrastructure, retires on Sept. 30 he takes with him nearly four decades of experience on every major experiment at PPPL from the Princeton Large Torus (PLT) in the mid 1970s to the recently completed National Spherical Torus Experiment Upgrade (NSTX-U).


Michael Williams

Those years of experience have made Williams invaluable to the Laboratory, said Lab Director Stewart Prager. "Mike's energy, conviction, enthusiasm, and his strong will have made it both exciting and a real pleasure to work with him," Prager said. "His dedication to the Laboratory over the decades has been profound. His contributions to the construction and operation of many one-of-a-kind experiments at the Laboratory is legendary and the loss of his corporate knowledge will be enormously difficult, if not impossible, to replace."

Larry Dudek will serve as the interim head of Engineering and Infrastructure after Williams' retirement, while Erik Perry will be deputy department head for Facilities and Site Services and Al Von Halle will be deputy department head for Engineering and Operations.

PPPL was Williams' first job following his graduation from Rutgers University with a degree in engineering in 1976. After working on the PLT, he went on to work on the Poloidal Divertor Experiment (PDX) and the Princeton Beta Experiment (PBX).

By the mid 1980s, he was heading the neutral beam team for the Tokamak Fusion Test Reactor. After becoming head of the engineering department in 1991, he oversaw the construction of both the National Spherical Torus Experiment and the upgrade.

Pushing technological limits

"They were all equally challenging in that whenever we do something from an engineering point of view, it's because it hasn't been done before," Williams said. "We're always pushing the technological limits in order to get the most bang for the buck so to speak, so all of these experiments are sort of equivalent in that regard."

Williams said he always planned to retire early but was prompted to step down when the NSTX-U was nearly completed at about the same time that his wife Sue retired from her job as a technology teacher at the Trenton Catholic Academy. Retiring will give him more time to help Sue care for their first grandson, Dylan Michael, who was born in February while their daughter Michelle, who is also an educator, is at work. Another daughter, Christine, works for the Walt Disney Company in Orlando, Florida. "With everything coming together the way it did, it just seemed like the right time," Williams said.

A nearly lifelong resident of Hamilton Township, Williams said he also plans to devote more time to his hobbies: riding his bicycle, going to the gym, doing carpentry and playing the piano and helping to renovate his daughter's house. "I'm not at all worried about having something to do when I retire," he said.

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Science writer Raphael Rosen's book focuses on everyday mathematics

By Jeanne Jackson DeVoe

PPPL Science writer enjoys being able to walk into a bookstore and see his book, "Math Geek: From Klein Bottles to Chaos Theory, a Guide to the Nerdiest Math Facts, Theorems, and Equations," for sale.

"I am very happy," Rosen said. "It was exciting to see it on the shelves at Barnes and Noble. It's exciting to see my name on Amazon."

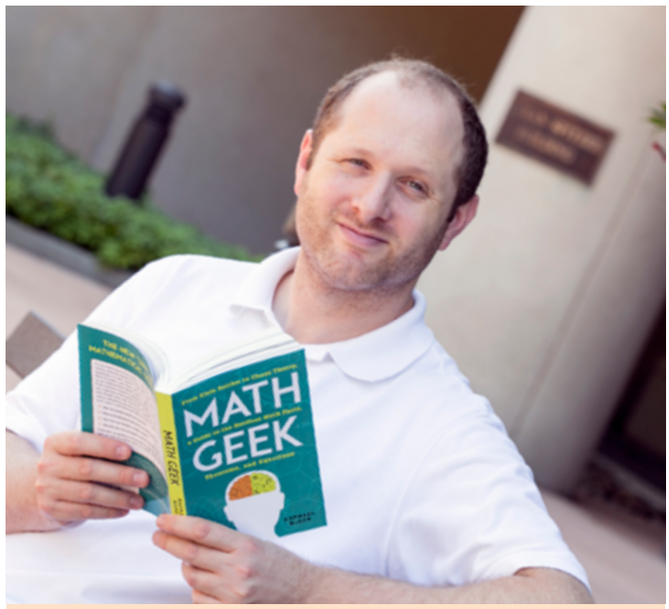
The paperback book, which was published in June by Adams Media, explores interesting math concepts borrowed from the everyday world. Rosen examines, for example, why you can wait for a bus at a bus stop for a long time with no bus in sight and then suddenly have two or three buses arrive at once. It also takes a look at how music is translated into a file on your iPod.

"Besides showing you that mathematics is a living feature of the world we live in, I also hope to persuade you that math is pretty," Rosen writes in the introduction to the book. "Learning about math is like looking at a sunset, reading a poem, or listening to your favorite band. Math has a beauty that can stop you in your tracks."

A self-described "math groupie," Rosen came up with his own ideas for the 100 small chapters in the book, which is aimed at young adults. "It's meant for people who might want to know about math's various aspects and how it's not just a school subject but it's something all around them," Rosen said.

The book was featured in an article in the Los Angeles Review of Books, in which reviewer Sidney Perkowitz wrote that the topics of the book "will be familiar to anyone with a math background, but Rosen makes them enticing to beginners by writing in a relaxed conversational style, assuming little math knowledge, and relating the math to pop culture and ordinary events."

Rosen wrote the book in 2014 before joining the PPPL staff last February. He was previously a freelance science writer whose work appeared in numerous publications, including



Raphael Rosen with his book.

the Wall Street Journal, Scientific American, Discover, Space.com, Earth Magazine, and the NASA website. He also penned a children's book about outer space, entitled "Space," that is part of the Read, Search & Find Series. He has a master's degree in science journalism from the University of Southern California in Los Angeles.

He spent at least nine months in 2014 on the book. "It was mostly research that was the hard part and then I had to spend time making sure that I understood all of the mathematical concepts," he said. He relied on two mathematicians, Francis Su, a mathematics professor at Harvey Mudd College and head of the Mathematics Association of America, and Dave Auckly, a mathematics professor at Kansas State University, for help and advice.

Rosen said he would like to write another book some day but is now enjoying writing about physics at PPPL. "I enjoy writing and I enjoy explaining complicated topics to people," he said. "That's very satisfying to me."

Emergency exercise

The Lyman Spitzer Building was evacuated during a drill that took place in conjunction with the annual emergency exercise on Sept. 23. (Photo by Raphael Rosen)

Michael Williams retires

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Rich Hawryluk, head of ITER and Tokamaks, who has known Williams for his entire career at PPPL, said Williams is passionate about everything he does. "He's actually quite intense, whether it's bicycling or a physical fitness program or getting the machine running and the systems working," Hawryluk said. "It's enabled him to accomplish some really amazing things."

Rising quickly through the ranks

Williams rose quickly through the ranks at PPPL. As head of the neutral beam team until the early 1990s, he and his colleagues took on the challenge of converting neutral beams designed for 27 megawatts of power using just deuterium to 40 megawatts of power using both deuterium and tritium, a critical task for TFTR. "Today we forget how much of an effort and how big a challenge it was," Hawryluk said. In 1994, TFTR produced a record-breaking 10.7 million watts of fusion power, enough to light 3,000 homes due in large part to the success of the neutral beam systems.

Williams worked closely with well-known physicist Harold Eubank on neutral beams before taking charge of the team. "He was dedicated and energetic," said Dale Meade, a former deputy director at PPPL, who hired Williams to work on PDX and then worked with him on TFTR when Meade headed the experiment. "Mike's enthusiasm carried over to the beam team as they pushed the TFTR beam system to high reliability and record powers that enabled the successful DT experimental program."

Tim Stevenson, whom Williams hired in 1984 to work on the neutral beam team, said Williams "was already a legend" when he started work at the Laboratory. "The things that struck me about Mike then remain true all these year later. It's this clear-eyed honesty about things and this sort of cut to the chase technical ability," Stevenson said. "It's a strange combination – he is unbelievably driven but he doesn't lose his balance. He remains objective about the business at hand and yet he's always been extremely passionate about what he does. That combination led to monumental successes in the face of predicted failure."

The neutral beam team often worked double shifts and weekends to get the work done, Stevenson said, but no matter how early Stevenson came in, Williams was at work before he got there. "His work effort was just unparalleled," Stevenson said. "It still is."

A "zigzag streak of brilliance"

Williams brought a quality of "zigzag streak of brilliance" to his work, Stevenson said, that often allowed him to come up with an answer to problems that nobody else had. "It's like playing chess with somebody and he's 10, 12 moves ahead and he figures it out faster than you can make the moves," Stevenson said.

Mark Cropper, who was a technician on the neutral beam team and is now a neutral beam operations supervisor, said he liked Williams' egalitarian attitude. "He's always appreciated the work that you did," Cropper said. "He didn't judge you based on your title or your education. He basically judged you on what you did, which was very unusual back then."

This photo of Williams seated at a diagnostic port in the TFTR vacuum vessel mockup was published in the Sept. 20, 1993 issue of the Princeton Weekly Bulletin. (Photo by Dietmar Krause).

Williams was in charge of getting NSTX online in the late 1990s. The project was completed within budget and six weeks ahead of schedule in 1999 and earned Williams the 1999 Kaul Foundation Prize for Excellence in Plasma Physics Research and Development from Princeton University and the Excellence in Engineering Award by Fusion Power Associates. "I think his big contribution was to come up with a way of supporting the Lab's engineering function with a much smaller engineering department and getting NSTX built and online," said Larry Dudek, who has worked for Williams for 25 years. "NSTX ran fairly reliably for 10 years before the upgrade."

Dudek said he appreciated Williams' optimism even during challenging times. "He really knows how to lead through really tough times and I'm going to miss that," Dudek said. "He doesn't panic, he just gets thing done."

As associate director, Williams also guided the $94 million NSTX-U construction project from its start in 2009 to the first test plasma in August.

Deputy Director for Research Michael Zarnstorff, who met Williams when he joined PPPL as an experimentalist on TFTR in the 1980s, said Williams' knowledge and abilities are in some ways irreplaceable. "He's been a huge resource to the Lab and a huge enabler of all the projects we have here and for that he will be deeply missed," Zarnstorff said. "His huge reservoir of knowledge and his ease with working with people and levelheadedness made him a tremendous asset. The Lab will move on but it will be a big set of shoes to fill."

Volunteer for all-girls FIRST Lego League Robotics Team

Volunteers are still needed for a new all-girl FIRST Lego League Robotics team. The team is being organized by PPPL's Science Education staff in collaboration with the YWCA-Princeton. We are looking for volunteer coaches for a new all-girls FIRST Lego League Robotics team and future teams. This level of robotics competitions targets students in grades 4 through 8, and you can be a part of it from the very start of this new team! No experience necessary! The teams will meet throughout the fall semester.

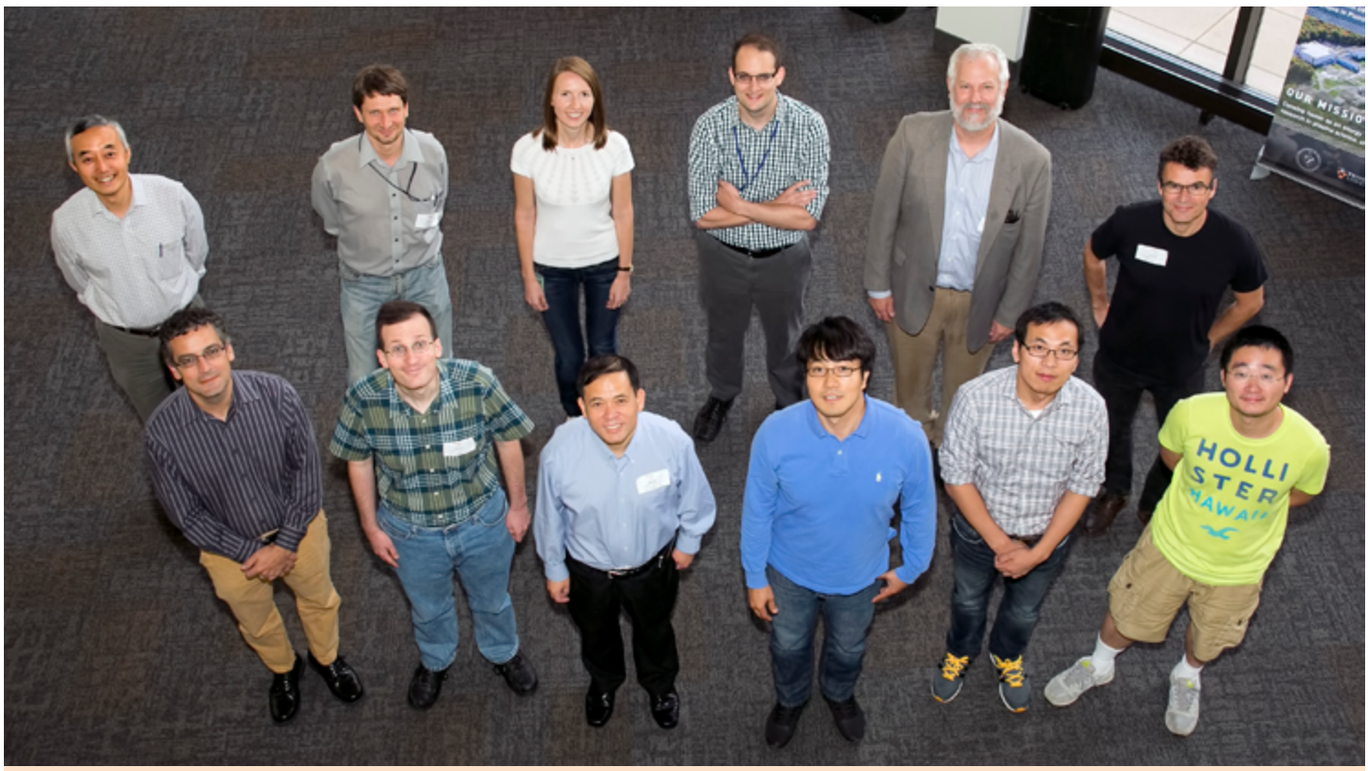
The FIRST Lego League introduces younger students to real-world engineering challenges by building LEGO-based robots to complete tasks on a thematic playing surface. FLL teams, guided by their imaginations and adult coaches, discover exciting career possibilities and, through the process, learn to make positive contributions to society.

—From the FIRST website

Please contact Shannon Greco, sgreco@pppl.gov, ext. 2208, as soon as possible.

MRX-Solar Collaboration Workshop at PPPL Sept. 21 to 22

PPPL sponsored a two-day workshop last week on collaboration between researchers working on the Magnetic Reconnection Experiment (MRX) and on solar observatories, including the Interface Region Imaging Spectrograph (IRIS) space mission that is studying magnetic reconnection in partially ionized plasmas in the solar chromosphere, and the Big Bear Solar Observatory (BBSO), a ground facility that measures the solar magnetic field.



Back row: Hantao Ji, distinguished research fellow at PPPL and organizer of this workshop; Slava Lukin, National Science Foundation, a collaborator of numerical modeling of magnetic reconnection in partially ionized plasmas; Elena Provornikova, Naval Research Laboratory; Clayton Myers, PPPL and former graduate student with MRX; Edward DeLuca, Harvard Smithsonian Center for Astrophysics; Bart De Pontieu, Lockheed Martin Solar and Astrophysics Laboratory. Front row: Dylan Brennan, Princeton University; Nick Murphy, Harvard Smithsonian Center for Astrophysics; Haimin Wang, New Jersey Institute of Technology; Byungkeun Na, PPPL; Yangao Chen, PPPL; and Yang Ren, PPPL.

Register now for American Red Cross Blood Drive Oct. 2

The need for blood is constant and the gratification is instant.

Your donation is important for maintaining a healthy and reliable blood supply. One pint of donated blood can save up to 3 lives.

The American Red Cross Mobile van will be in the Lower End parking lot On Friday, Oct. 2 from 8 a.m. to 1 p.m. to collect as many units of blood as we can supply. Please give blood. All blood types are needed.

Thank you. — American Red Cross and OMO Staff

To schedule a donation appointment, please contact the Occupational Medicine Office (OMO) at extension 3200.

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 **September 28**	Tuesday **September 29**	Wednesday **September 30**	Thursday **October 1**	Friday **October 2**
COMMAND PERFORMANCE **Chef's Feature**	**Chicken Pecan** with Apple Walnut Stuffing served with Italian Green Beans	**Chicken Mushroom Stroganoff** served over Fettuccine	CELEBRATING OCTOBERFEST **Roast Pork** with Red Cabbage & German Potato Salad	**Chicken Fajita** served with Beans & Rice	**Linguine** with Red or White Clam Sauce served with Artisan Bread
Early Riser	**French Toast** with Cranberries & Apples	**Cream Chipped Beef on Toast** with 2 Eggs and Potatoes	**Grilled Cheese Texas Toast** with Egg, Sausage, Jalapeno & American Cheese	**Sausage & Gravy over Biscuits** with 2 Eggs & Potatoes	**Spanish Omelet**
Country Kettle	**Creamy Vegetable**	**Italian Wedding Soup**	**Vegetable Barley**	**Baked Potato Soup**	**Wild Mushroom Bisque**
Grille Special	**Texas BBQ Beef Sloppy Joe** with Southwest Slaw & Onion Rings	**Pulled Pork** with Broccoli Rabe and Provolone on French Bread	**Bratwurst & Sauerkraut Torpedo** with German Potato Salad	**Fried Chicken Tenders & Waffles** with Spicy Maple Syrup	**Tofu Parmesan Sub**
Deli Special	**Loaded Baked Potato**	**Tossed Salad** with Cowboy Beef Brisket & Ranch-Style Beans	**Caesar Chicken Club Sandwich Wrap**	**Fried Flounder Torpedo** with Lettuce, Tomato & Tartar Sauce	**Tarragon Chicken Salad** on Focaccia Bread
Panini	**Egg Salad BLT** on Toasted Sourdough Bread	**Chicken Parmesan Sub**	**Chicken Schnitzel Sandwich** on a Kaiser Roll with Anchovy, Lemon Caper Sauce	**Portobello Mushroom, Roasted Pepper, Spinach & Feta Cheese** on Focaccia Bread	**Roast Beef & Cheddar** with Grilled Onions & Chipotle BBQ Sauce on Ciabatta Roll

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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Comments: commteam@pppl.gov ◇ **PPPL WEEKLY** is archived on the web at: http://w3.pppl.gov/communications/weekly/.