## Sustainable PPPL

PPPL has won numerous awards for its environmental programs, including being named the state's top environmental steward by the New Jersey Department of Environmental Protection. The Lab has a serious commitment to green purchasing, recycling, reducing energy use, cutting greenhouse gases and waste reduction. The Lyman Spitzer Building that houses research and administration offices is Leadership in Engineering and Environmental Design (LEED)-gold certified.

## A good neighbor

PPPL's Emergency Service officers provide mutual aid to neighboring communities and respond to hundreds of mutual aid calls in the community each year.

## Opening our doors to the community

In addition to providing tours to school and community groups throughout the year, PPPL offers open public tours on the first and third Friday of each month at 10 a.m. For more information, go to **www.pppl.gov/about/tours**.

## Keep track of our progress!

- facebook.com/PPPLab
- pinterest.com/princetonplasma
- youtube.com/ppplab
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- Instagram @PPPLab
- Twitter @PPPLab

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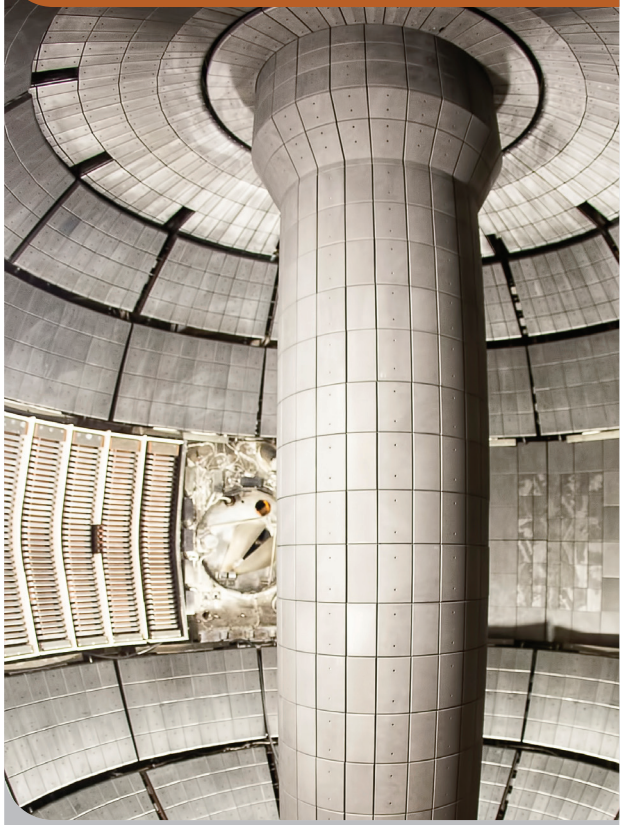
PPPL PRINCETON PLASMA PHYSICS LABORATORY · U.S. DEPARTMENT OF ENERGY · PRINCETON UNIVERSITY

# PPPL

PRINCETON PLASMA PHYSICS LABORATORY



## A Collaborative National Center for Fusion and Plasma Research

## A World Leader in Fusion Energy and Plasma Science Research

The U.S. Department of Energy's Princeton Plasma Physics Laboratory (PPPL) is a collaborative national center for fusion energy and plasma science research. The Laboratory is a world leader in developing the knowledge, understanding and key innovations needed to make fusion energy a plentiful, safe and environmentally friendly energy source for future generations.

The Laboratory, managed by Princeton University, has a more-than 60-year history of discovery and leadership in the field of fusion energy. PPPL researchers are developing the scientific understanding for harnessing fusion, the process that powers the sun and stars. Fusion takes place when the atomic nuclei—or ions—in hot, electrically charged gas called a plasma fuse together and release bursts of energy.

PPPL is researching how to recreate this process on Earth by heating plasma to tens of millions of degrees Celsius and confining it in powerful magnetic fields within a facility called a tokamak. The released energy could then be used to fuel the generation of electricity.

The Laboratory's major fusion facility, the National Spherical Torus Experiment (NSTX-U), has undergone a $94 million upgrade that makes it the most powerful fusion facility of its kind in the world. The spherical, cored apple-like design of the NSTX-U enables it to confine highly pressurized plasma within lower magnetic fields than conventional, donut-shaped tokamaks require, thus making it more cost-effective.

PPPL has many international collaborations. The Laboratory develops components and scientific data for ITER, the huge international tokamak under construction in France to demonstrate the feasibility of fusion power. PPPL conducts research on fusion facilities in China and South Korea and leads U.S. participation in Germany's Wendelstein 7-X, the world's most advanced stellarator. Stellarators confine plasma in twisty magnetic fields, compared with the symmetrical fields that tokamaks produce.

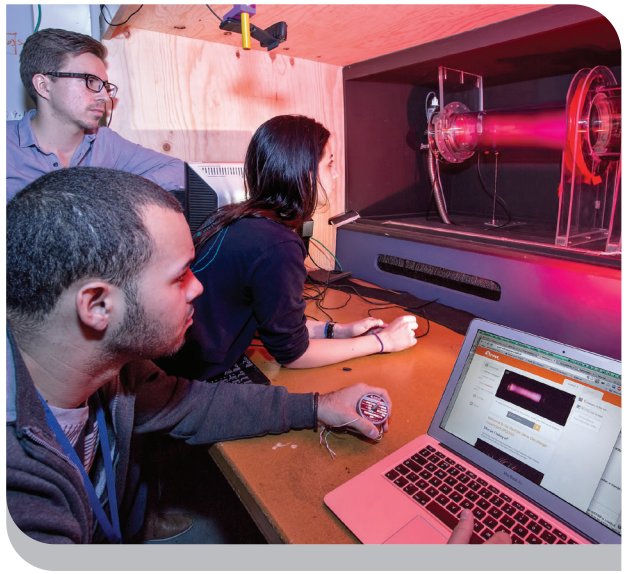
## Plasma Physics

PPPL's study of plasma, often called the fourth state of matter, ranges from its use in fusion energy to its role in fields as vast as astrophysics and as small as nanotechnology. PPPL's Magnetic Reconnection Experiment (MRX) is a world-leading facility that probes the mechanism behind an astrophysical phenomenon that gives rise to the northern lights, solar flares and geomagnetic storms. An expanded version of the device, called the Facility for Laboratory Reconnection Experiment (FLARE), is under construction. PPPL is also expanding its nanotechnology laboratory, which studies the use of plasma for synthesizing nanomaterials — substances measured in billionths of a meter — for use in everything from golf clubs and swimwear to microchips, paints and pharmaceutical products.

## Graduate Program in Plasma Physics

More than 390 students have earned Princeton doctorates through the Program in Plasma Physics that is substantially based at PPPL. Graduates have gone on to key positions at laboratories in the United States and around the world, contributing to breakthroughs in fusion and plasma science research.

## Training Future Scientists:

PPPL's Science Education program helps train future scientists through a rich variety of programs for students of every age, from classroom visits for kindergarten through 12th grade students to our popular Science on Saturday lecture series each winter and Young Women's Conference in the spring.

PPPL sponsors internships and fellowships for high school students, undergraduates and graduate science students. For more information visit our Science Education page at **https://www.pppl.gov/education/science-education**.