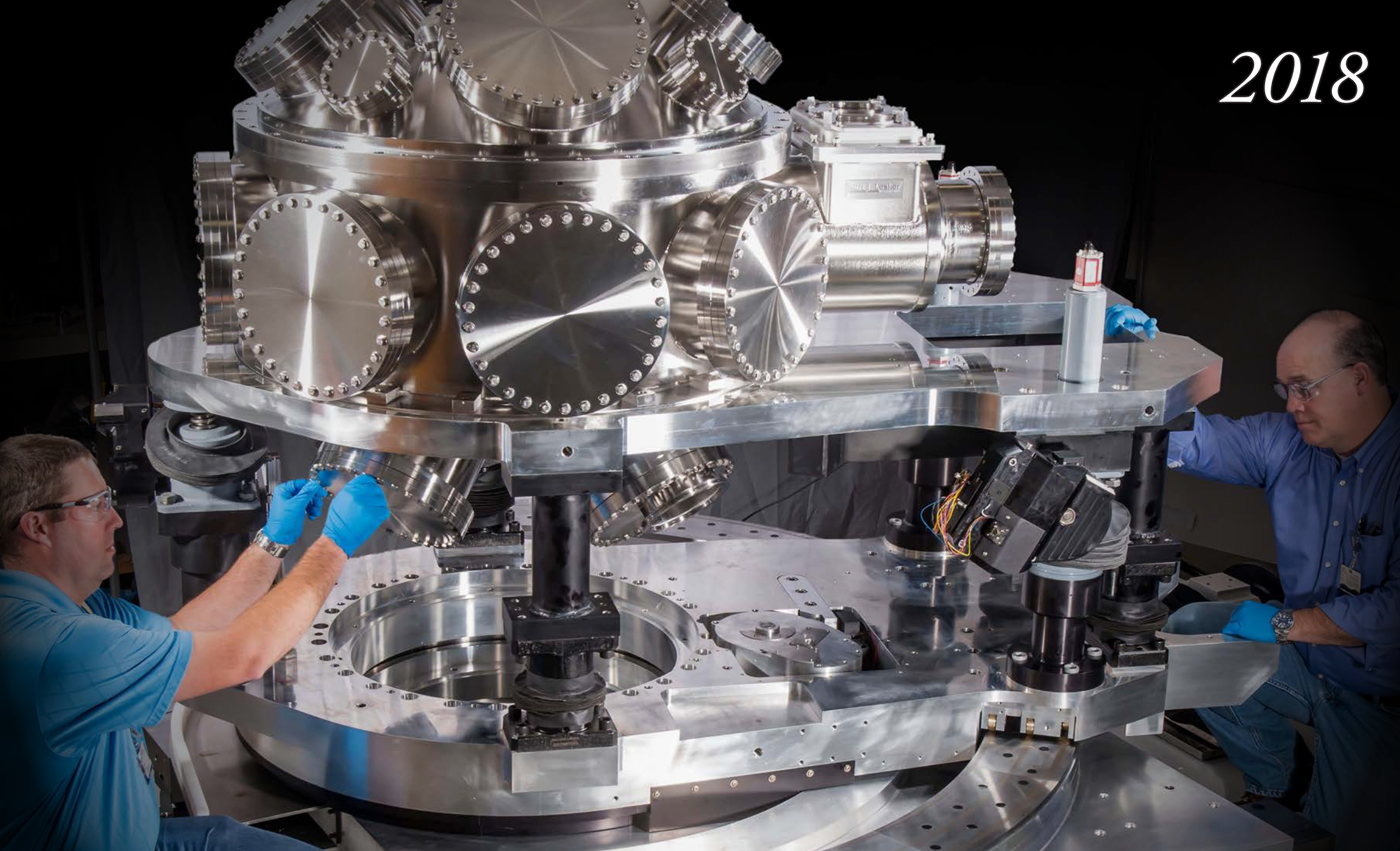


2018



LABORATORY *for* LASER ENERGETICS

University of Rochester • Laboratory for Laser Energetics

www.lle.rochester.edu



Mission Statement

The Laboratory for Laser Energetics (LLE) of the University of Rochester is a unique national resource for research and education in science and technology. The Rochester area has a history of innovation, providing a unique setting for LLE within a technologically sophisticated community. Established in 1970 as a center for the investigation of the interaction of intense radiation with matter, the Laboratory has a five-fold mission:

1. to conduct implosion experiments and basic physics experiments in support of the National Inertial Confinement Fusion (ICF) Program;
2. to develop new laser and materials technologies;
3. to provide graduate and undergraduate education in electro-optics, high-power lasers, high-energy-density physics, plasma physics, and nuclear fusion technology;
4. to operate the National Laser Users' Facility (NLUF); and
5. to conduct research and development in advanced technology related to high-energy-density phenomena.

The 2018 LLE Calendar contains information about many of the Laboratory's programs. We hope that you enjoy using your copy of the LLE Calendar and wish you a productive and fulfilling 2018.

LLE is funded by the National Nuclear Security Administration (NNSA) to support its Stockpile Stewardship Missions.

Photography by Eugene Kowaluk



LABORATORY
for
LASER ENERGETICS
UNIVERSITY of ROCHESTER
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LLE 

Welcome to 2018



LLE Vision

LLE envisions a secure, environmentally neutral, and inexhaustible energy source for mankind. This future energy source—fusion—is the basis of the sun's energy and is carbon and radioactive-waste free.

2018 will be a year of challenges and opportunities

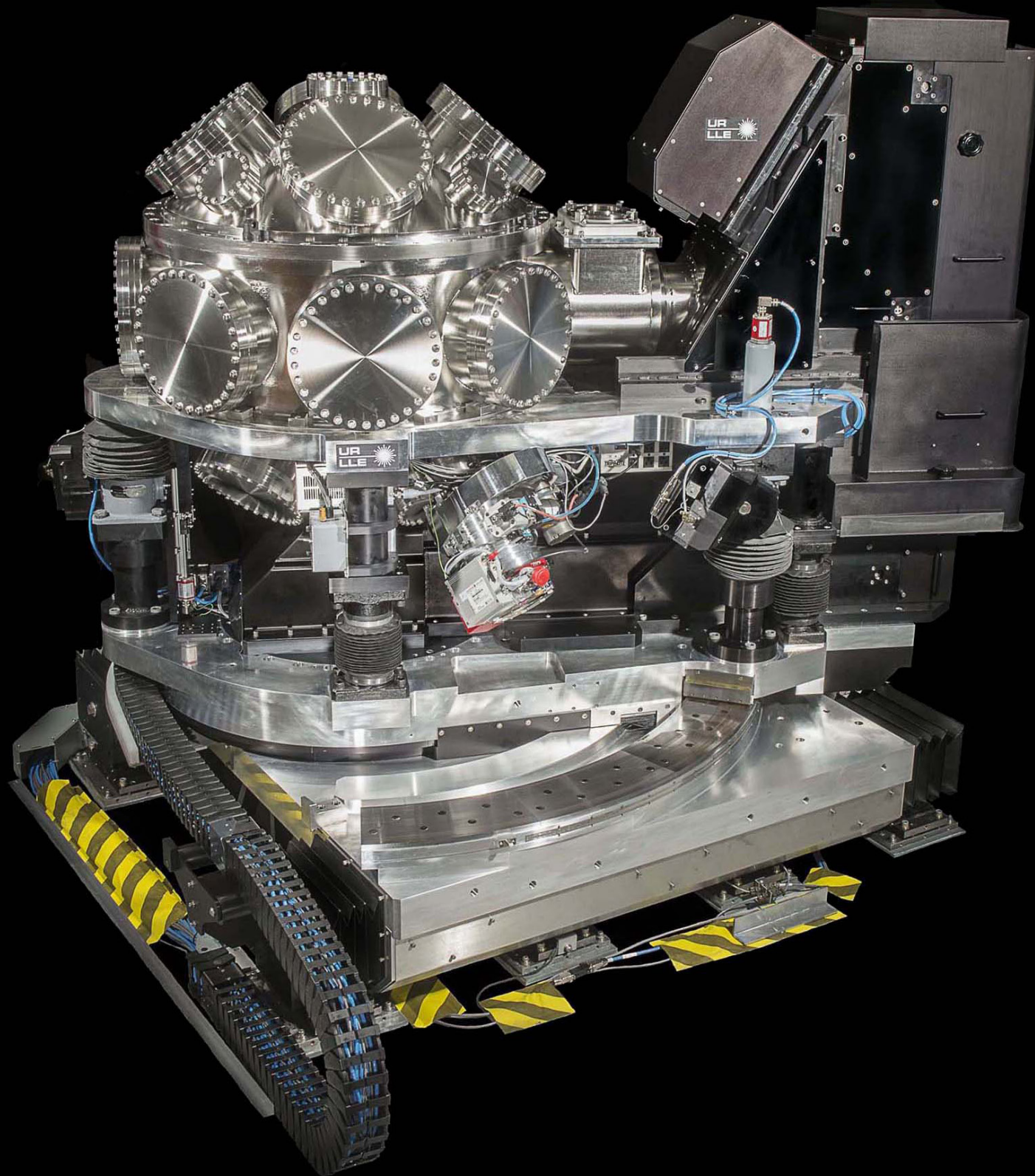
- Ongoing pursuit of ignition and the development of ignition alternatives
- Conduct direct-drive implosions on OMEGA to achieve conditions that will scale to ignition at National Ignition Facility (NIF) energies
- Expand LLE and the University of Rochester's role in high-energy-density physics
- OMEGA will remain the premier high-energy-density physics facility in support of Stockpile Stewardship, fundamental science, and growing the community
- Continue to conduct experiments at the National Ignition Facility to explore the physics of laser direct drive
- Expand LLE's role in advanced laser science and technology
- Education and training of students and young staff (from high school to Ph.D. and early career) remains a high priority



Dr. E. Michael Campbell
Director, Laboratory for Laser Energetics

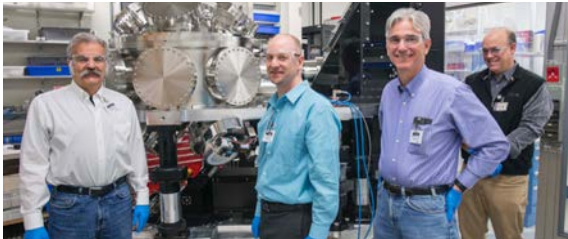


Prof. Robert L. McCrory
University Professor



Dynamic Compression Sector Target Chamber System

LLE developed, constructed, installed, and activated a 100-J UV laser and Target Area System for the Dynamic Compression Sector at the Advanced Photon Source located at Argonne National Laboratory.

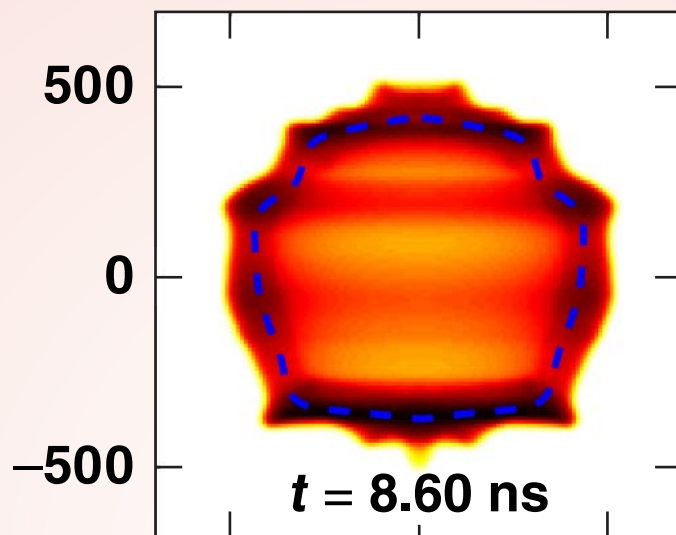
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JANUARY 2018

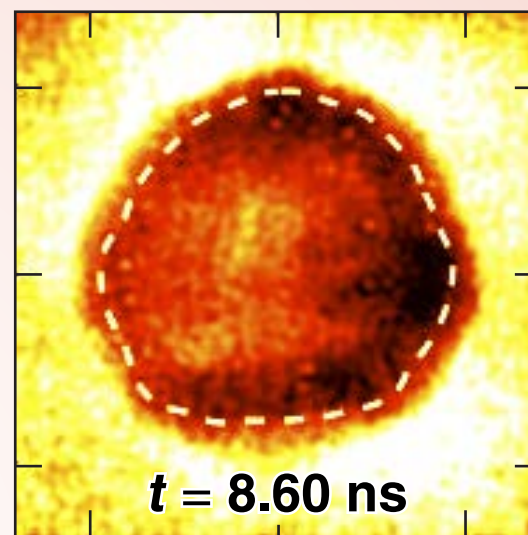
*The dates of the various phases of the moon and the equinox and solstice dates are from the U.S. Naval Observatory data tables and are based on Universal Time (UT); see: <http://aa.usno.navy.mil/data/docs/MoonPhase.php> and <http://aa.usno.navy.mil/data/docs/EarthSeasons.php>, respectively.

N160405-002
 $\Delta\lambda_0 = 0 \text{ \AA}$

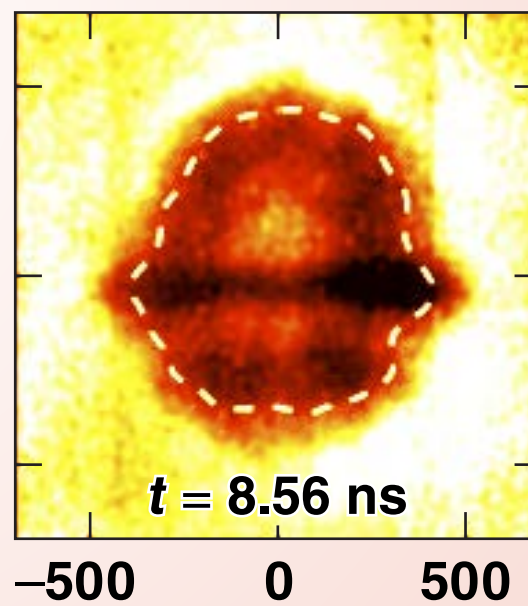
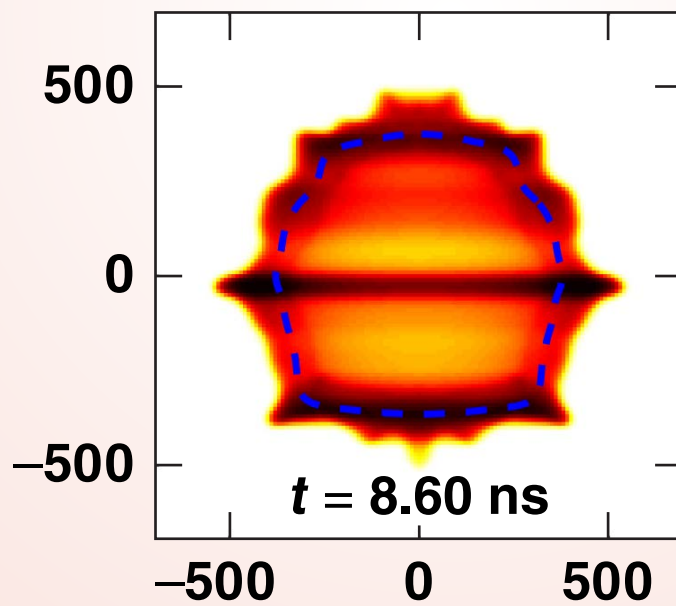
Simulation



Experiment



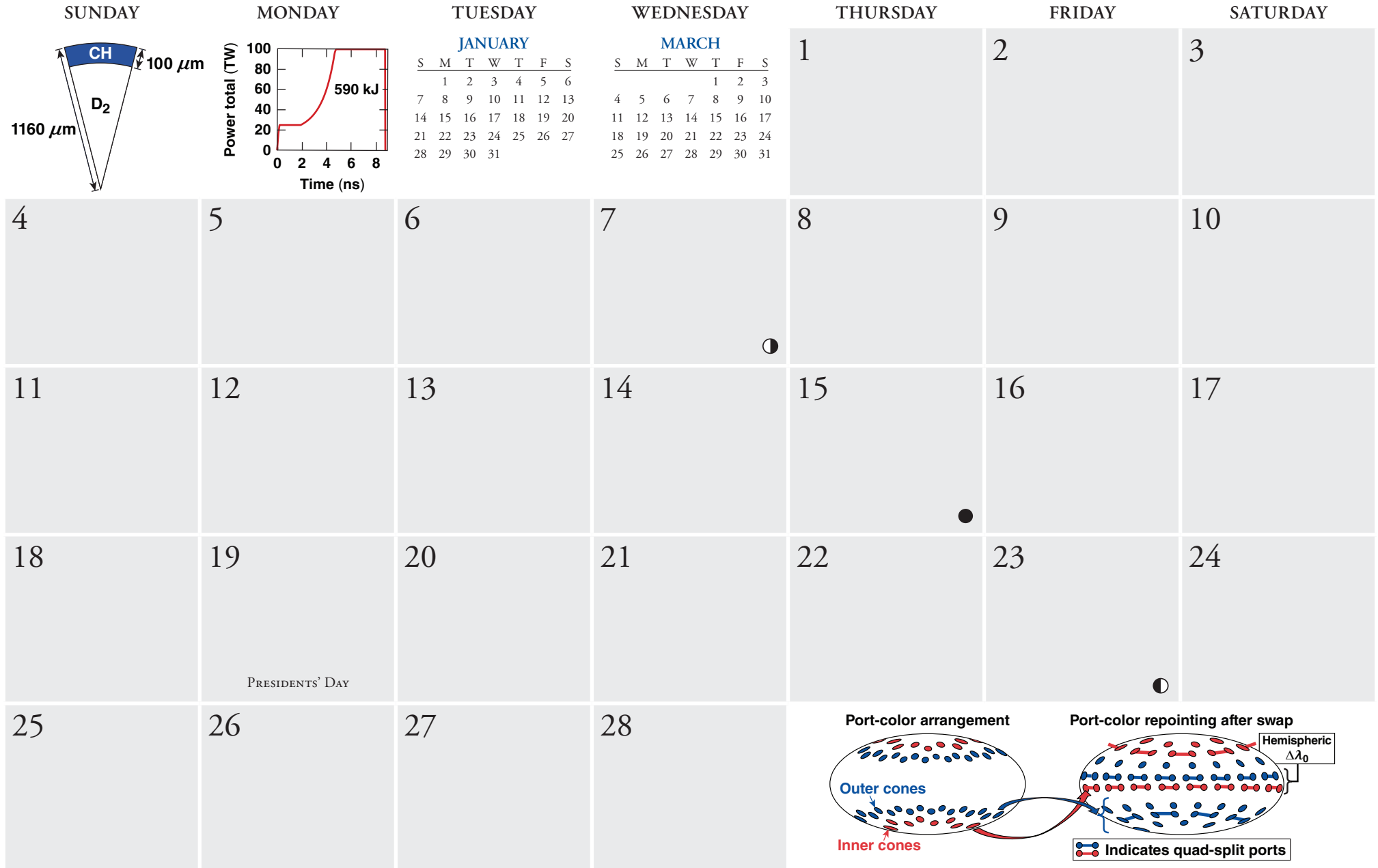
N160821-001
 $\Delta\lambda_0 = 4.6 \text{ \AA (UV)}$



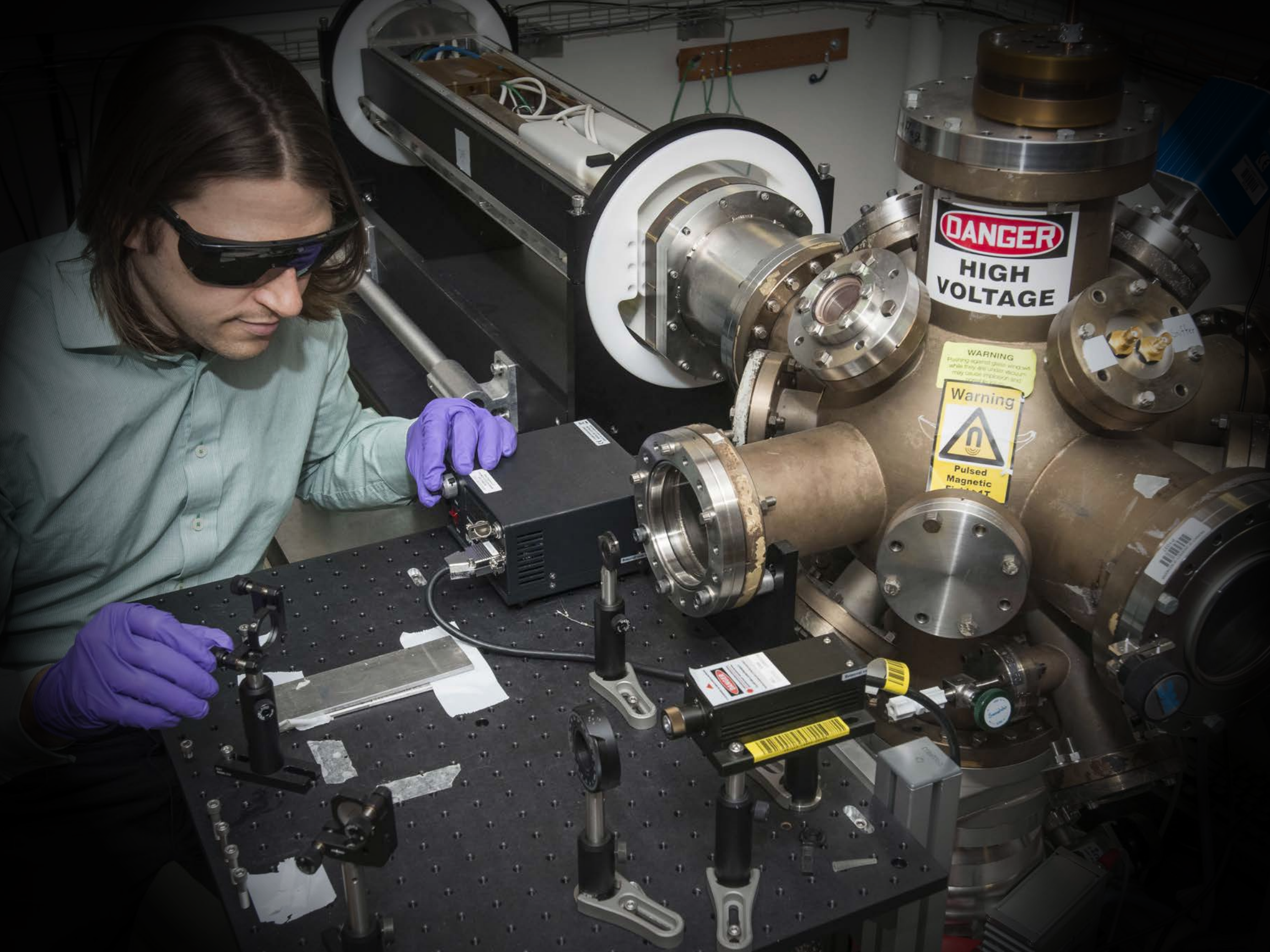
$x (\mu\text{m})$

CBET Mitigation Campaign

A demonstration of wavelength detuning as a mitigation strategy for cross-beam energy transfer (CBET) was conducted at the National Ignition Facility: pre-shot 2-D *DRACO* simulated (left) and backlit x-ray measured (right) radiographs of implosions without detuning (top) and with 4.6-Å (UV) detuning (bottom).



FEBRUARY 2018



DANGER
HIGH VOLTAGE

WARNING
Pushing against glass windows
while they are under vacuum
may cause implosion and
serious injury or death.

Warning


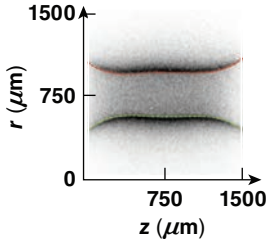


Pulsed Magnetic Field 1T

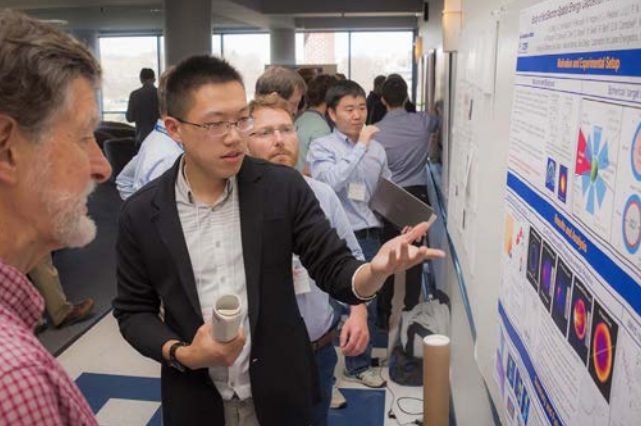
Warning

Laser-Driven Magnetized Liner Inertial Fusion (MagLIF)

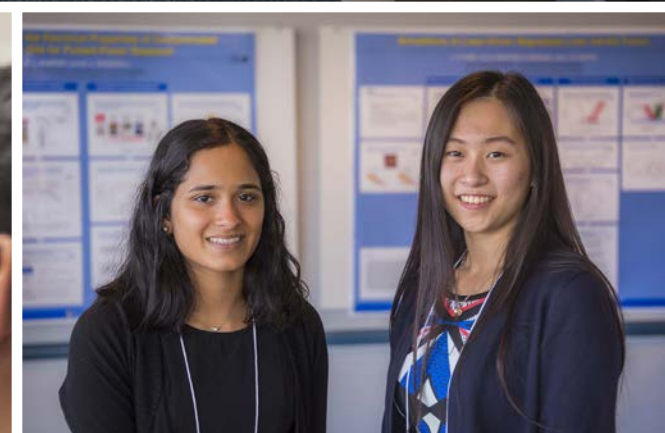
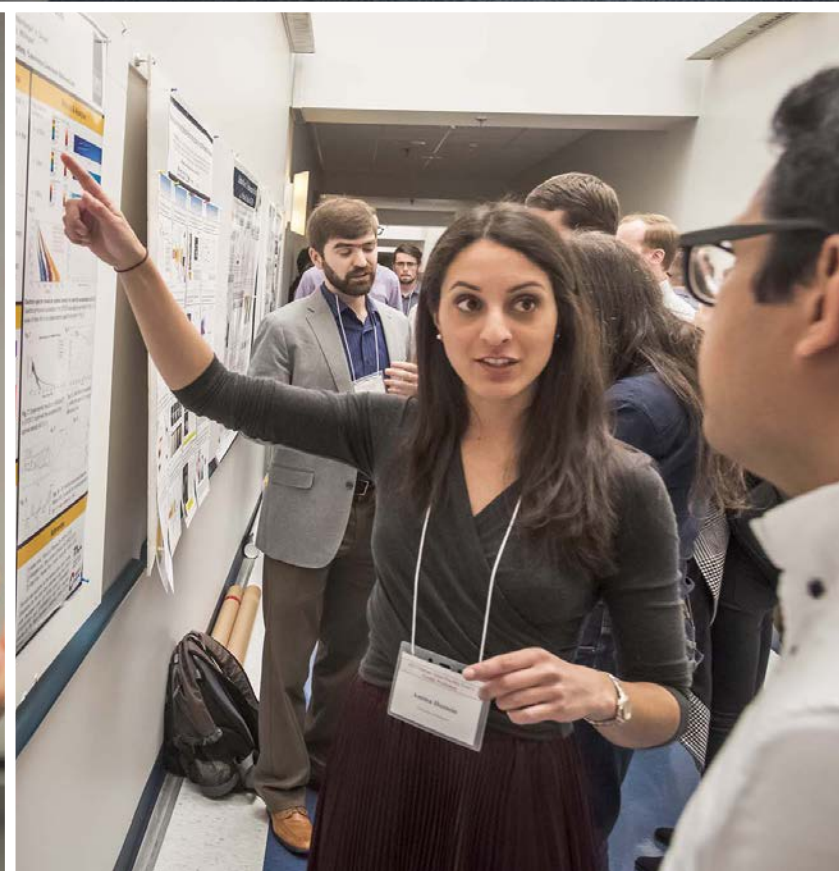
Sandia National Laboratories and LLE are collaborating to test the MagLIF concept. Shown in the photograph is graduate student, Daniel Barnak, preparing components to be used on a MagLIF experiment on the OMEGA Laser System.

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MARCH 2018



University of Illinois
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Laboratory of Plant Genetics, University of Rochester
J. Fooks, M. E. Schoff
Genetics
O. ...
E. ... - Chuck Sorce
E. ... Jacobs-Perkins, Jack Armstrong



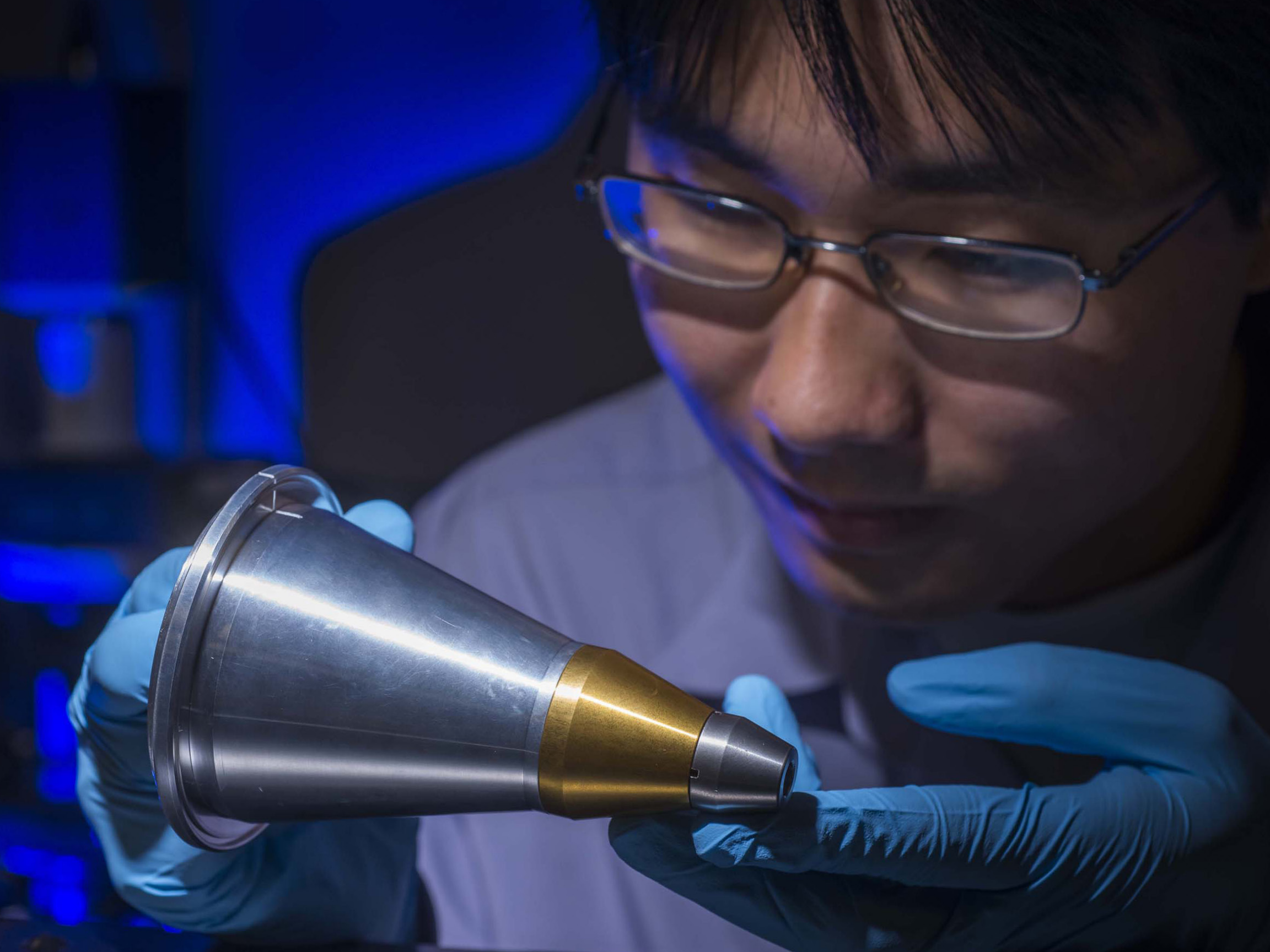
Omega Laser Facility Users Group (OLUG)

The Ninth Omega Laser Facility Users Group Workshop, held 26–28 April 2017, attracted 110 researchers from around the globe. The purpose of the workshop is to facilitate a continuing dialog among individual users and between the users and LLE. Most of the 76 contributed posters at the workshop were given by the students and postdocs attending.

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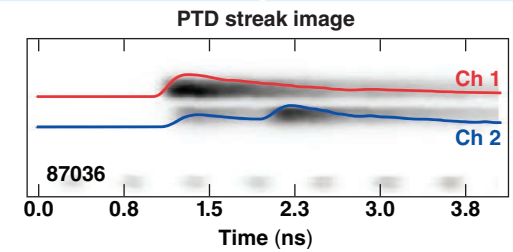
APRIL 2018



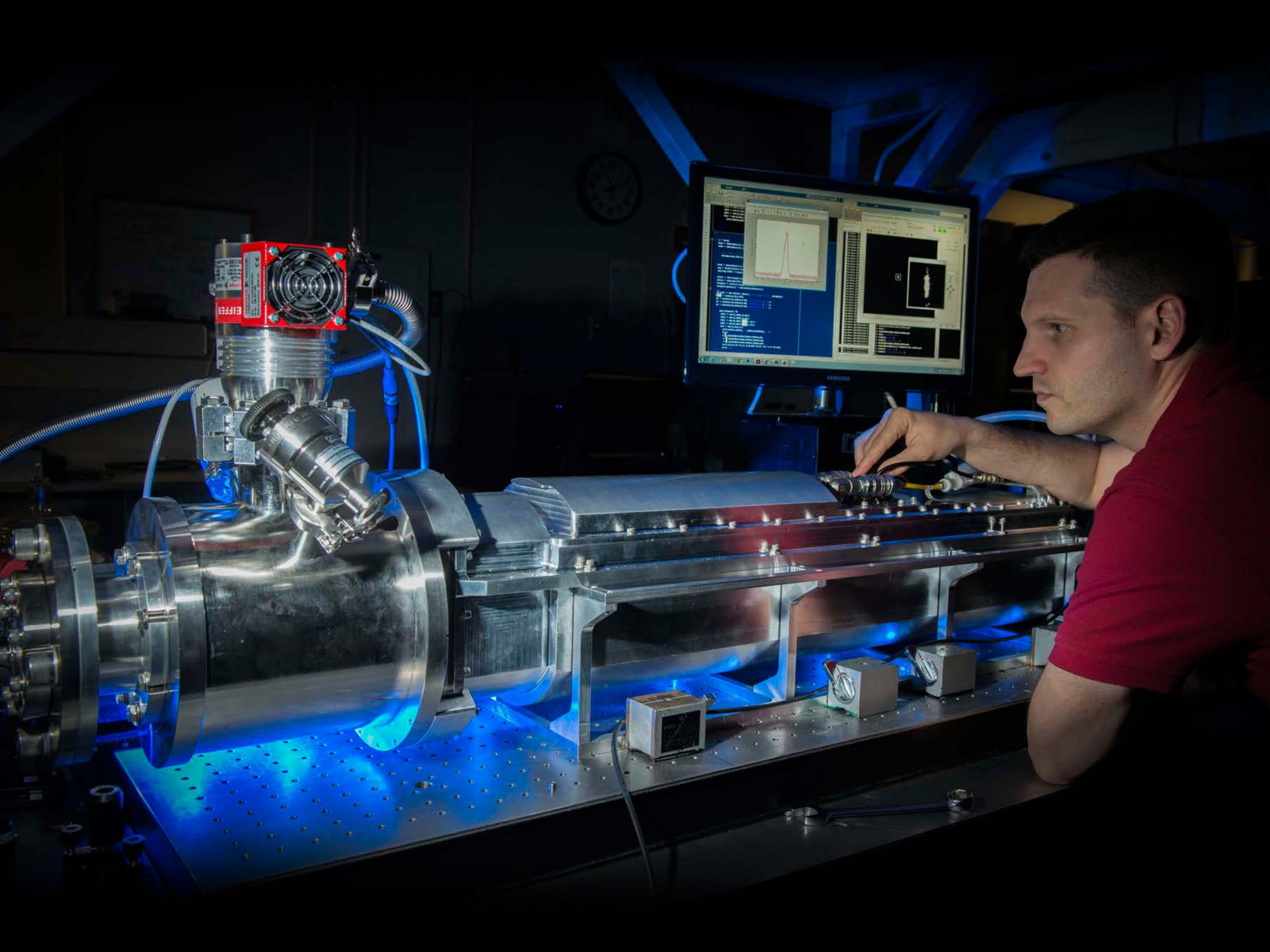
Particle Temporal Diagnostic

Hong Sio (MIT grad student) is shown holding the new 3-cm x-ray and charged-particle nose cone for the particle temporal diagnostic. It is a joint project between LLE and MIT, designed to simultaneously measure DD-n and D³He-p reaction histories in inertial confinement fusion implosions with high relative precision.

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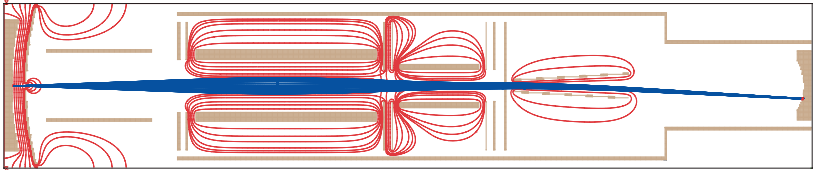


MAY 2018

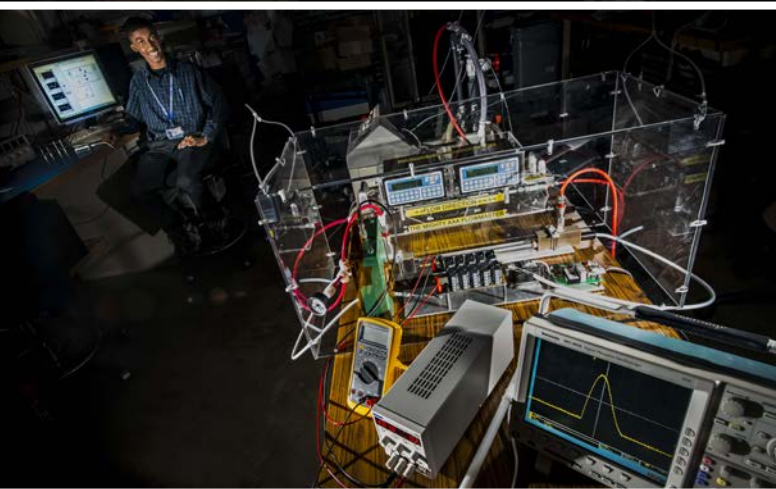
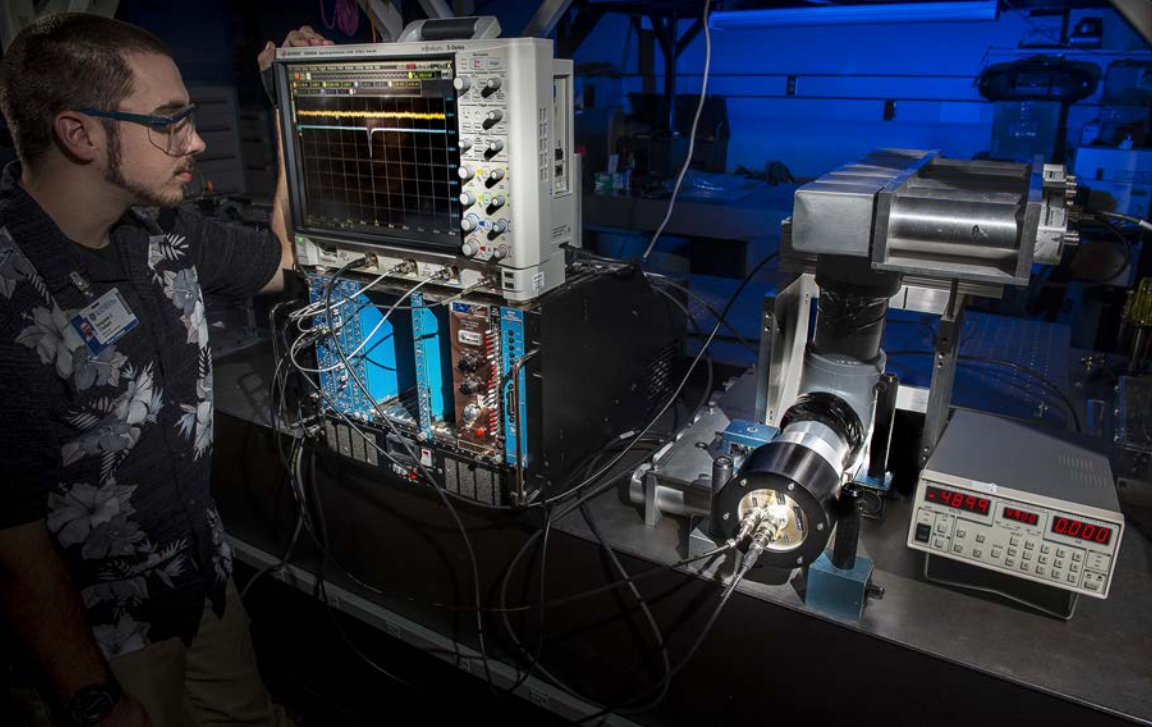


PJX Streak Camera

The PJX-3 x-ray streak camera is used to provide temporal resolution for several diagnostic systems, including the OMEGA EP high-resolution x-ray spectrometer. Here, the linear dynamic range of the streak camera is being studied on the bench by Research Associate, Steven Ivancic.

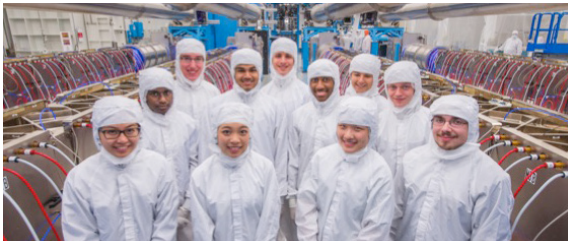
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JUNE 2018

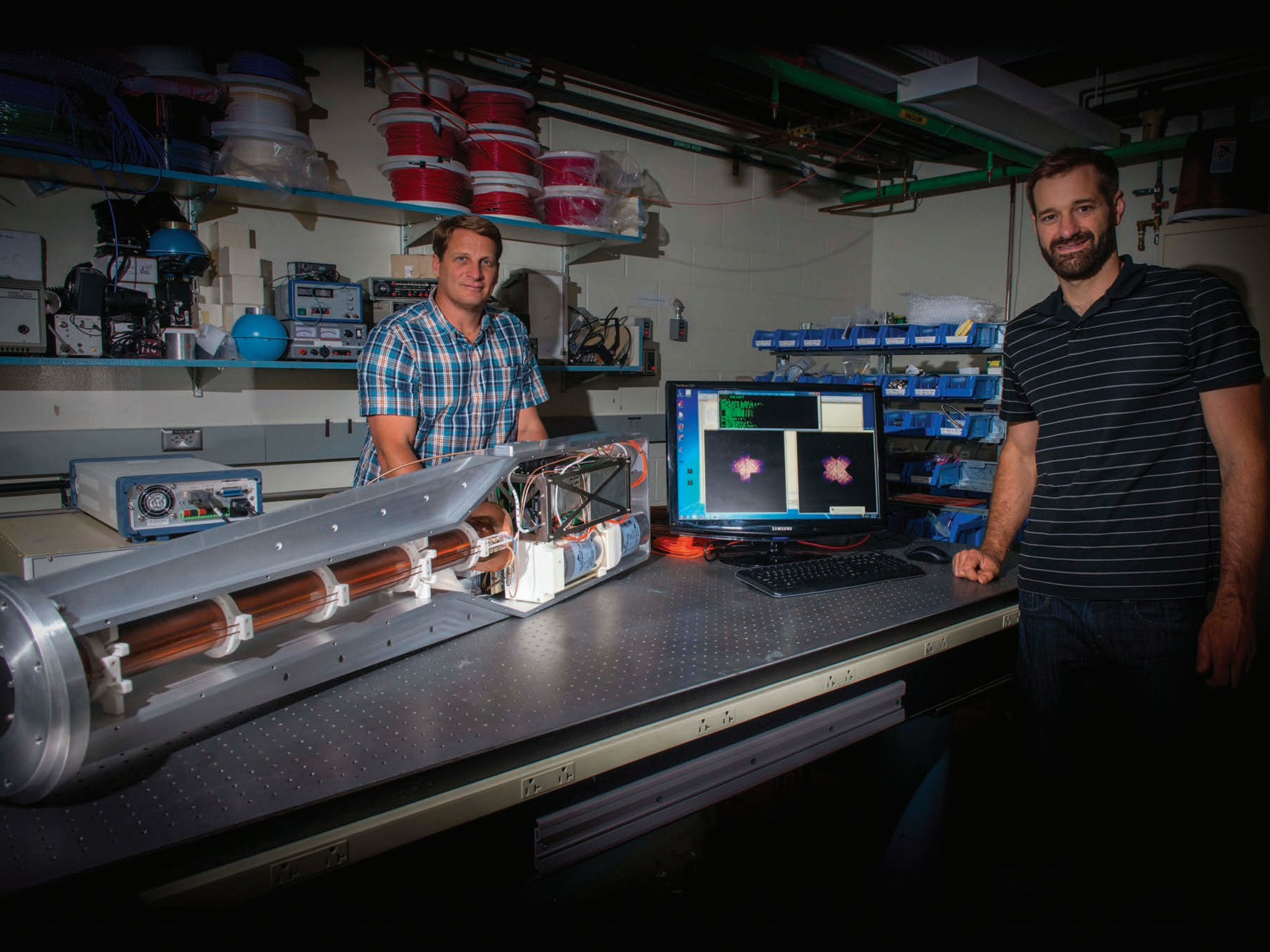


Summer High School Research Program

Eleven students from Rochester area high schools participated in the 2017 LLE Summer High School Research Program. Since its inception in 1989, 364 high school students have participated in this program. The program is led by Dr. Stephen Craxton, shown above with the students. Insets show some of the research activity engaged by the students and Mrs. Lois Houlihan of Pittsford-Mendon High School, the recipient of the 2017 William D. Ryan Inspirational Teacher Award.

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JULY 2018



Single-Line-of-Sight Time-Resolved X-Ray Imager

Scientists Terry Hilsabeck (left) and Kyle Engelhorn (right) from General Atomics prepare the single line-of-sight time-resolved x-ray imager (SLOS-TRXI) for installation at the Omega Laser Facility. SLOS-TRXI is a joint project with General Atomics, Kentech Instruments, Lawrence Livermore National Laboratory, and Sandia National Laboratories. This multi-frame, ultrafast framing camera provides time-resolved x-ray imaging of the self-emission from a hot spot that is formed in an implosion of a cryogenic deuterium–tritium shell.

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AUGUST

2018



OMEGA EP 4 ω Probe Diagnostic System

The fourth-harmonic (263-nm) probe diagnostic system provides the capability to study the plasma conditions for a variety of high-energy-density (HED) and basic physics studies. Located on the upper deck of the OMEGA EP Target Area Structure, the inset shows a wide-field view of the diagnostic's location along with Senior Laboratory Engineer, Jay Brown, accessing the diagnostic at the enclosure.

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SEPTEMBER 2018

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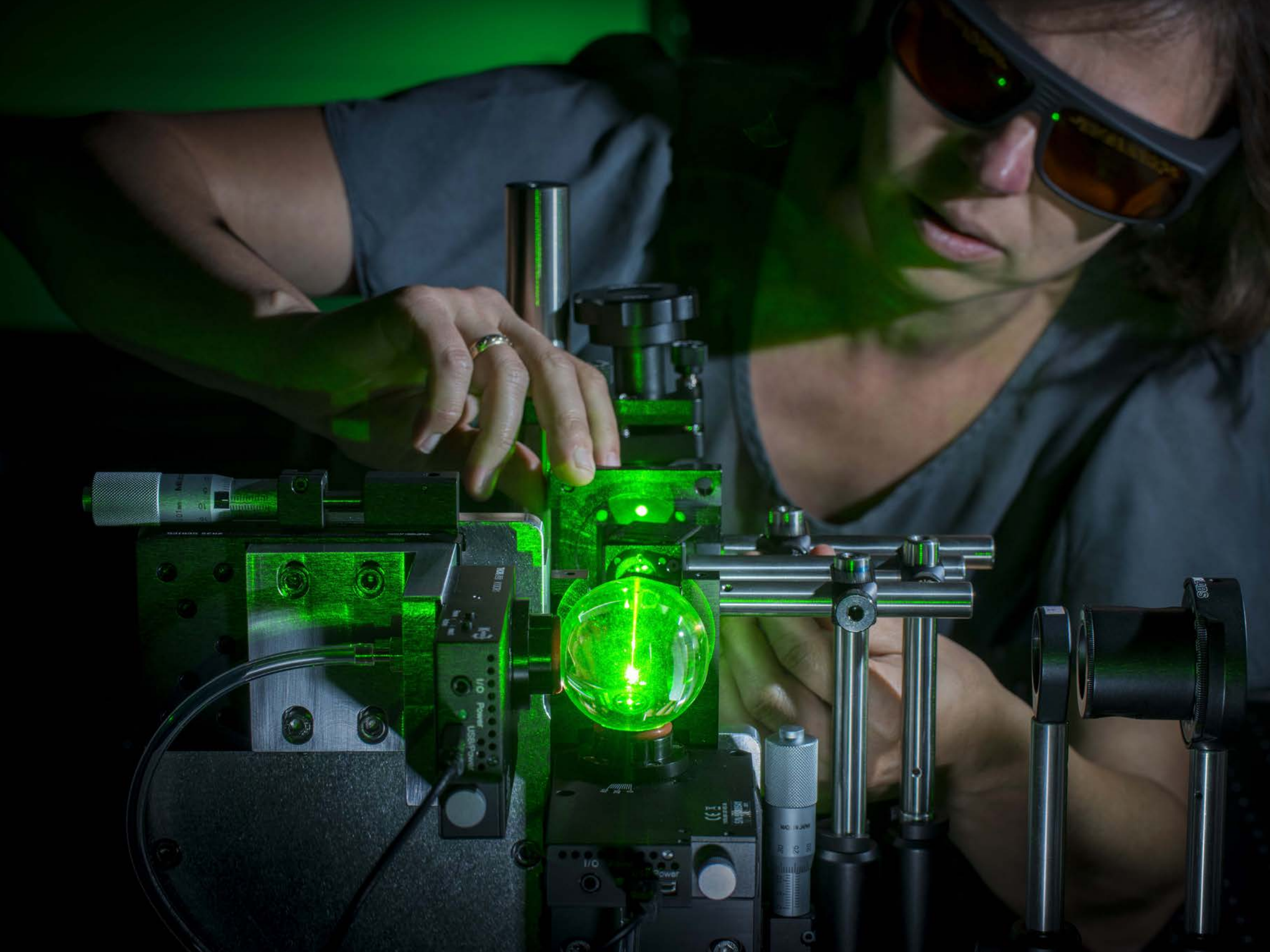




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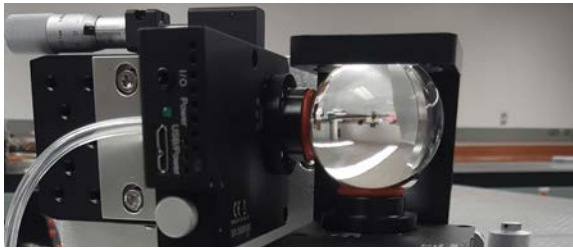
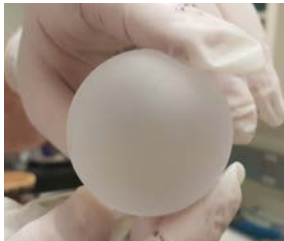
OCTOBER

2018



Measuring Raman Scattering Tensor

Scientist, Tanya Kosc, is shown conducting a measurement of the complete Raman scattering tensor of dihydrogen phosphate. These measurements are carried out using spherical samples manufactured at LLE to develop a predictive capability for transverse stimulated Raman scattering in various designs of distributed polarization rotators.

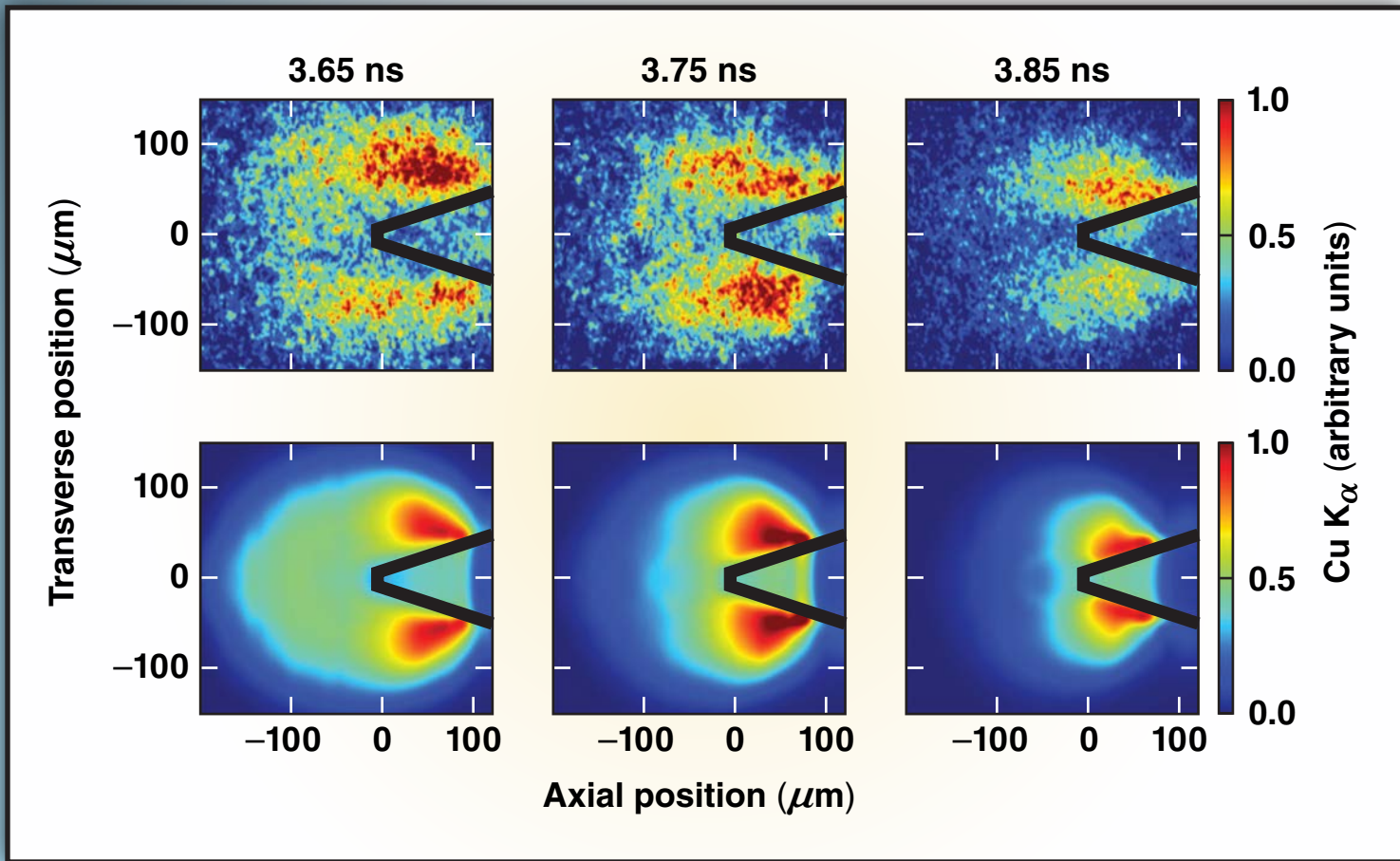
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NOVEMBER 2018

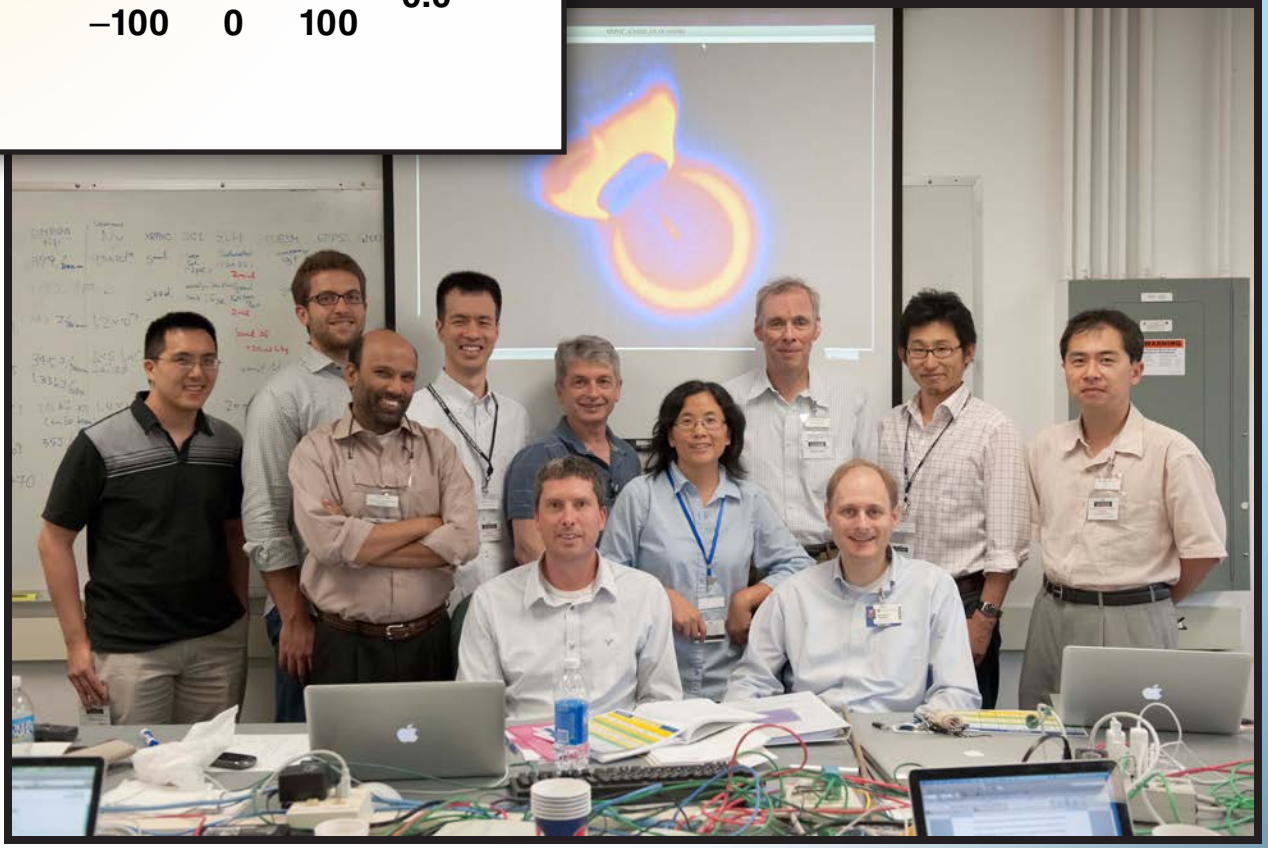
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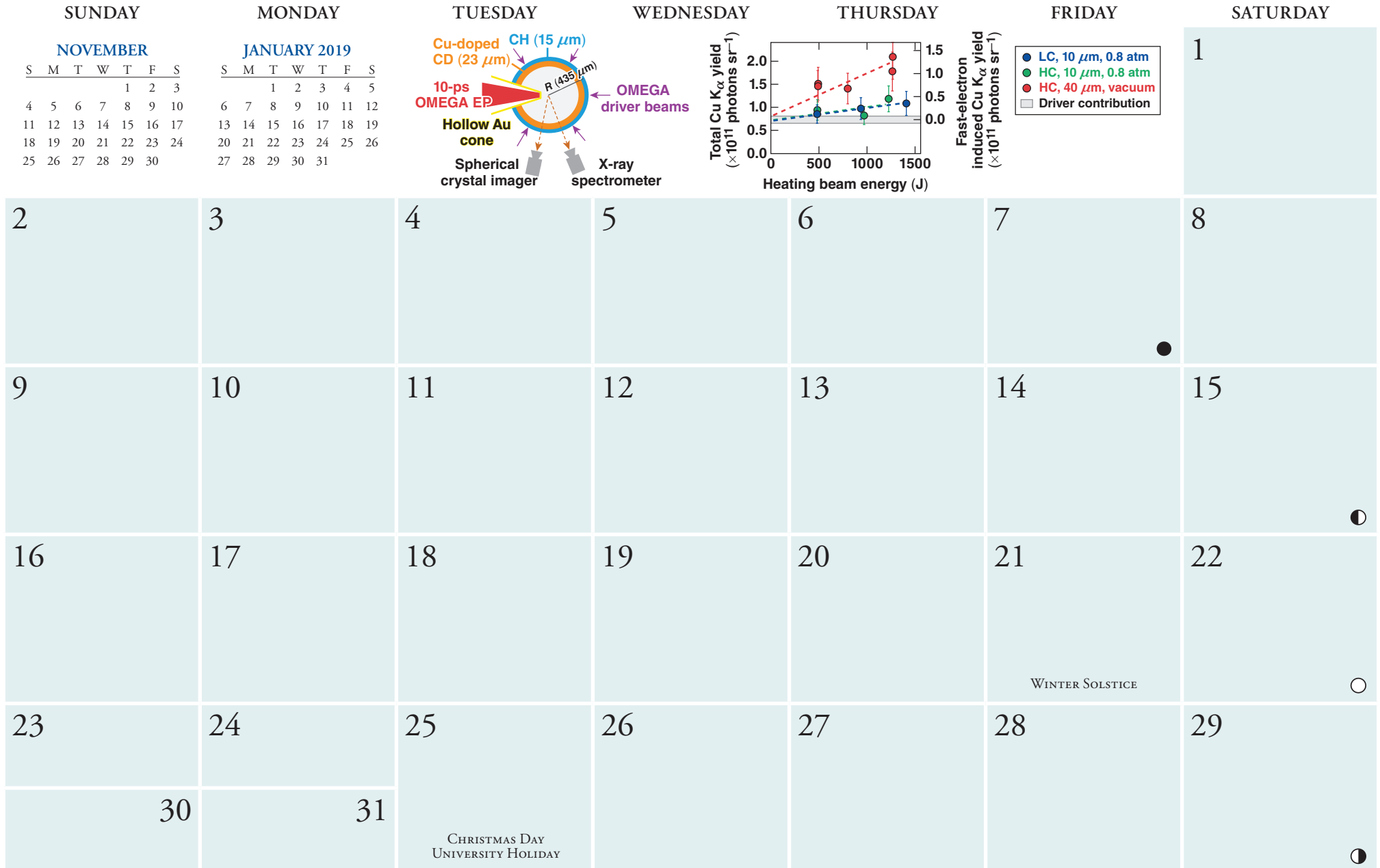




Data from an NLUF experiment by L. C. Jarrott *et al.*, *Nat. Phys.* **12**, 499 (2016).



Top left: Experimentally measured and simulated Cu K_{α} images from a cone-in-shell target National Laser Users' Facility (NLUF) experiment by L. C. Jarrott *et al.*. Measured Cu K_{α} emission from fast electrons produced by the OMEGA EP beam interacting with the target imploded by OMEGA (top line of images). Simulated Cu K_{α} images (bottom line of images). Black lines indicate the approximate position of the cone. Photo in lower right shows some of the participants in the experiment.



DECEMBER 2018

2019

JANUARY

Calendar grid for January 2019 showing days of the week and dates.

FEBRUARY

Calendar grid for February 2019 showing days of the week and dates.

MARCH

Calendar grid for March 2019 showing days of the week and dates.

APRIL

Calendar grid for April 2019 showing days of the week and dates.

MAY

Calendar grid for May 2019 showing days of the week and dates.

JUNE

Calendar grid for June 2019 showing days of the week and dates.

JULY

Calendar grid for July 2019 showing days of the week and dates.

AUGUST

Calendar grid for August 2019 showing days of the week and dates.

SEPTEMBER

Calendar grid for September 2019 showing days of the week and dates.

OCTOBER

Calendar grid for October 2019 showing days of the week and dates.

NOVEMBER

Calendar grid for November 2019 showing days of the week and dates.

DECEMBER

Calendar grid for December 2019 showing days of the week and dates.

2020

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Calendar grid for November 2020 showing days of the week and dates.

DECEMBER

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