Cover Photos

Top left: A novel statistical model was used to predict and design multiple cryogenic deuterium–tritium implosions on the OMEGA Laser System, leading to the tripling of the fusion yield to its highest value so far for direct-drive laser fusion. The work was published in the January 2019 issue of the journal Nature with graduate student Varchas Gopalaswamy as the lead author.

Top center: LLE is constructing a new mid-scale ultrashort-pulse laser facility: an all optical parametric amplifier line (OPAL) pumped by the Multi-Terawatt (MTW) laser that will produce 7.5 J in 15 fs. Shown are Jake Bromage and Mike Spilatra working on the integration of MTW-OPAL inside the grating compressor chamber.

Top right: LLE has developed a novel angularly resolved Thomson-scattering (ARTS) diagnostic to measure the plasma electron distribution function. Shown is the installation of the ARTS inside its ten-inch manipulator for an experiment on OMEGA.

Middle left: Two 5-in. × 6-in. optics in a circular containment were coated with a broadband-enhanced metal reflector (BEMR) film inside the Optical Manufacturing's 54-in. coating vacuum chamber. The BEMR coating was developed for use in a short-pulse laser system.

Middle Center: Drs. Millot and Coppari from Lawrence Livermore National Laboratory and Dr. Rygg at LLE led the discovery of superionic water, a new "strange" form of water that is simultaneously solid and liquid, in the laboratory using the OMEGA Laser System. The work was published in the May 2019 issue of the journal Nature.

Middle right: A prototype of a neutron time-of-flight diagnostic designed for the National Ignition Facility using a new type of crystal, known as bibenzyl, was fielded and tested at the Omega Laser Facility.

Bottom left: Katelyn Cook, a recent alumna of LLE's undergraduate student programs, received the 2019 American Physical Society's LeRoy Apker Award for her outstanding research into measuring low-energy nuclear cross sections using inertial confinement fusion while a student at Houghton College in collaboration with LLE and SUNY Geneseo. Shown here is her poster presentation at the 2019 OLUG workshop.

Bottom right: Visible camera image of the first LaserNetUS experiment on OMEGA EP in November 2019 led by Johns Hopkins University to develop Talbot–Lau x-ray deflectometry for the measurement of the electron density profile at the laser ablation front. The LaserNetUS Initiative is funded by the Department of Energy's Office of Fusion Energy Sciences to provide U.S. scientists increased access to unique high-intensity laser facilities at ten institutions.

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