2012

Riccardo Betti Honored with DOE Award

Department of Energy Secretary Steven Chu amd Riccardo Betti, recipient of the Ernest Orlando Lawrence Award

On 21 May 2012 in Washington DC, Dr. Riccardo Betti, Professor and Director of the Fusion Science Center for Extreme States of Matter and Fast Ignition, University of Rochester, and Assistant Director for Academic Affairs at LLE, accepted the Ernest Orlando Lawrence Award from Department of Energy Secretary Steven Chu for research in fusion and plasma sciences. The E.O. Lawrence Award honors scientists for their exceptional contributions in research and development in support of the Department of Energy.

photo by Eugene Kowaluk

Solid-State Pockels-Cell Driver Development

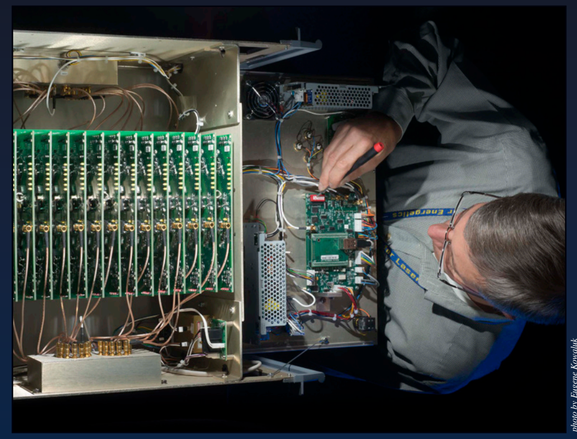

photo by Eugene Kowaluk

Research engineer Wade Bittle shown inspecting an all-solid-state Pockels-cell driver developed by LLE

To meet the demands of both the OMEGA and OMEGA EP lasers, LLE tests and refines its own design of a solid-state Pockels-cell driver. The motivation behind this new design is to replace the currently used pulsers that suffer from the degradation and ultimate failure of a thyratron electron tube—the single-action "closing" switch that performs the basic pulse-generation function within the current design.

A vital component in the OMEGA laser, a Pockels cell is an electro-optic crystal that, when a voltage is applied to it, rotates the polarization of laser light coming through the device. Depending on the voltage employed, the Pockels cell, combined with a polarizer, can either let light pass through unabated or completely reflect light, effectively establishing an optical switch. The operation of a Pockels cell requires timed rectangular electrical pulses from a special pulse generator, or pulser, with amplitudes ranging from hundreds of volts to tens of kilovolts and pulse widths from tens to hundreds of nanoseconds.

Ultrafast Optical Parametric Amplifier

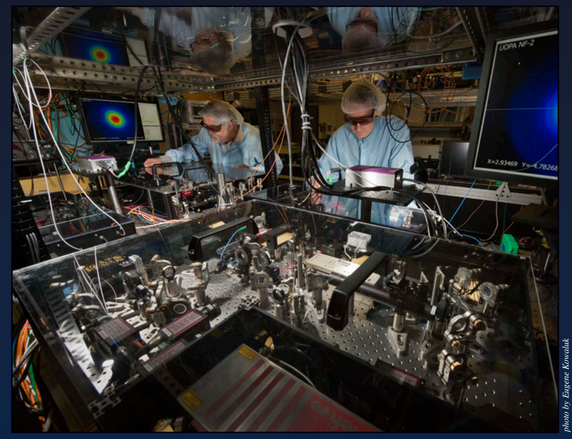

photo by Eugene Kowaluk

Senior research engineer Rick Roides (left) and senior scientist Christophe Dorrer (right) working on a UOPA

A picosecond-pumped ultrafast optical parametric amplifier (UOPA) was deployed on OMEGA EP to enhance temporal contrast and to support additional user experiments.

Multilayer-Dielectric Diffraction Gratings

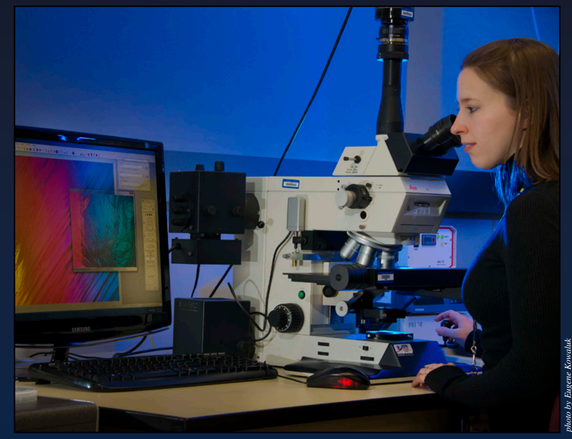

photo by Eugene Kowaluk

Horton fellow Heather Howard inspecting a multilayer dielectric grating coupon

Multilayer dielectric (MLD) diffraction gratings, used in OMEGA EP's pulse compressors, must be cleaned with aggressive chemicals to remove manufacturing residues. Here, graduate student and Horton fellow Heather Howard uses Nomarski differential interference contrast (DIC) microscopy to inspect an MLD grating coupon for defects and mechanical damage following chemical cleaning.

Multi-FM SSD Beam Smoothing on OMEGA EP

photo by Eugene Kowaluk

◀ *NIF preamplifier module with research engineer Albert Consentino*

With the goal of designing a cryogenic polar-drive–ignition platform compatible with existing National Ignition Facility (NIF) laser specifications, LLE has created, tested, and deployed a system of smoothing by spectral dispersion (SSD) using multiple-frequency modulations in a single dimension (multi-FM 1-D) on OMEGA EP. The architecture of one of the four OMEGA EP beamlines is compatible with the NIF and has been adapted with the addition of a NIF preamplifier module (PAM). Proof-of-concept experiments, propagating light from the front end all the way to target interaction, have been successfully performed.