Cover Photos

Upper Left: Over 300 liquid crystal (LC) optics are used in OMEGA for beam polarization control. Buffed polymer layers are critical for establishing macroscopic alignment over the large apertures required in the system. Here, Ph.D. student Tanya Kosc validates the long-term quality of alignment for a prototype LC distributed polarization rotator that was manufactured over 15 years ago.

Lower Left: A two-dimensional smoothing by spectral dispersion (2-D SSD) system recently installed on OMEGA is capable of producing phase-modulated spectra that can be frequency tripled to 1-THz bandwidth in the ultraviolet. This 2-D SSD system incorporates a high-frequency bulk-phase modulator operating at 10.4 GHz to produce 11 Å of bandwidth in the infrared. Efficient frequency tripling of this broadband signal requires dual-tripler frequency-conversion crystals that are currently installed on only 13 beams. The high-frequency bulk-phase modulator can also be operated at 3 Å with a higher dispersion grating to produce three SSD color cycles, which significantly improves beam smoothing at lower bandwidths on all 60 OMEGA beams.

Center: The moving cryostat maintains a target at a constant temperature to layer the DT ice and transports the target to the center of the target chamber. The cryostat base is shown. At the bottom is the cryo cooler. Above the cooler are the 4-axis positioner and two thermal shrouds that are maintained at 45 K and 16 K. The target assembly is at the top. The target is mounted on spiders silk in a C-shaped beryllium support.

Upper Right: The cryogenic target positioner (cryostat base) is used to place a 4-mm-diam pointing sphere at the center of the OMEGA chamber.

Center Right: Hope D'Alessandro, electronics technician, prepares a NIF deformable mirror substrate for surface figure testing on LLE's 18-in.-aperture interferometer. The mirror will allow wavefront correction of the NIF beam when the 39 posts on the back of the mirror are bonded to actuators on a reaction block. LLE will be coating the substrates with a low-stress, dielectric high reflector and assembling the deformable mirrors for Lawrence Livermore National Laboratory.

Lower Right: The experimental setup for off-line tuning of the dual-tripler, OMEGA frequency-tripling crystals. The frequency-tripling scheme for high-bandwidth conversion was proposed by D. Eimerl *et al*. [Opt. Lett. **22**, 1208 (1997)] and experimentally demonstrated by LLE [Opt. Lett. **23**, 927 (1998)]. In the off-line setup, a single laser pulse of 1053-nm wavelength, 100-ps duration, and approximately Gaussian spatial profile with 4-mm FWHM is generated using a Nd:YLF-based amplifier configuration. Broad bandwidth is simulated by varying the angle of incidence on the crystals. The off-line technique allows crystal phase-matching angles to be accurately determined and transferred into OMEGA. Conversion of 1-μm radiation to its third harmonic with an overall energy conversion efficiency approaching 70% and a UV bandwidth of ~1 THz was recently demonstrated on OMEGA.

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