About the Cover:

The nonlinear scanning cross-correlator is the main instrument used to measure the temporal contrast of the laser pulse in the Multi-Terawatt (MTW) Laser Facility at the Laboratory for Laser Energetics (see “Pump-Induced Temporal Contrast Degradation in Optical Parametric Chirped-Pulse Amplification: Analysis and Experiment” on p. 135). The cross-correlator is being aligned by LLE Scientist Christophe Dorrer. A cross-correlation between the 1ω pulse under test and a frequency-doubled 2ω pulse is obtained after the recombined pulses pass through a frequency-tripling crystal. The energy of the 3ω pulse measured as a function of the delay between the 1ω and 2ω pulses is a representation of the intensity of the pulse under test. Third-order-scanning cross-correlations of the optical parametric chirped-pulse–amplifier (OPCPA) output pulse are seen on the adjacent computer screen. This diagnostic is used to study and improve the temporal contrast of the MTW Laser Facility. The influence of the pump-intensity noise on the temporal contrast of the OPCPA pulses has been experimentally shown and reduced by using a newly demonstrated pump-filtering architecture. The glass-slab amplifier used for high-energy full-system shots is illuminated in the background.

The entire MTW Laser Facility is depicted from both ends of the system. The photo on the left shows the seed laser and grating-based pulse stretcher enclosed with clear plastic. The pump laser and OPCPA are located beyond Laboratory Engineer Jay Brown, who is adjusting controls. The right-hand photo shows the open-vacuum grating compressor chamber (to the left) and the target chamber (to the right). Jay Brown positions the lead shielding used to protect an adjacent area from high-energy x rays produced during some target shots. Research Engineer Ildar Begishev is shown working in the background in both photographs. Starting with a 1-nJ seed pulse, a full-system shot routinely produces 5-J, subpicosecond pulses with a high-order super-Gaussian square spatial profile on a 20-min shot cycle.

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