***Streaked Optical Pyrometer Upgrade:*** The upgrade of the streaked optical pyrometer (SOP) was completed on 6 December 2011, in time for a planned series of materials-studies experiments. The SOP detects self-emission from materials that are compressed by laser-driven shocks or ramp drives. It uses the same TIM-based optical telescope as the VISAR system and is used to infer temperatures of compressed samples under study. The SOP comprises an imaging system that relays an image of the target (typically its rear surface) to the slit of an optical streak camera. Optical filters and the photocathode response limit the detected wavelength range to ~590 to 850 nm.

In July 2011, the Hamamatsu streak camera in the original SOP failed and had to be replaced. An LLE project was initiated to redesign the optical system to accommodate a new Rochester Optical Streak System (ROSS) supplied by the High-Energy-Density-Physics Section at LLNL. This required a complete redesign of the system, its cabinet and mount, and the associated support hardware. The upgraded system includes an optical source (LED) and a high-resolution Pi-Max camera. These aid in the SOP alignment and obviate the need for backlighting targets during daily alignment, which would save a significant amount of time.

Figure 1 shows the inside of the SOP cabinet. The large red square is the input window made of OG590 filter glass. The new system has a larger (60-mm-square aperture) Dove prism to ease alignment. The ROSS is mounted in the base of the cabinet with its input slit facing upward. The horizontal beam (red line in Fig. 2) is directed downward to the slit by simple mirrors.

Figure 3 shows data from shock waves in planar targets comprising three separate sections of quartz and fused silica, taken with (a) the old SOP and (b) the new system with a ROSS. These are temporal streaks of self-emission from shocks in the samples. The vertical axis is space and the horizontal axis is time. The new system has a larger field of view (~1 mm). Note that the temporal response of the ROSS is significantly better than the previous system, as evidenced by the detail in detected emission at the material interfaces. Preliminary analysis indicates that the ROSS has adequate sensitivity and a significantly higher signal-to-noise ratio than the previous system. These attributes are expected to enhance future high-pressure experiments on OMEGA.

***20,000 OMEGA Target Shots:*** The OMEGA laser reached its 20,000 target shot milestone in November (recorded since the facility was activated as a 60-beam laser in 1995).

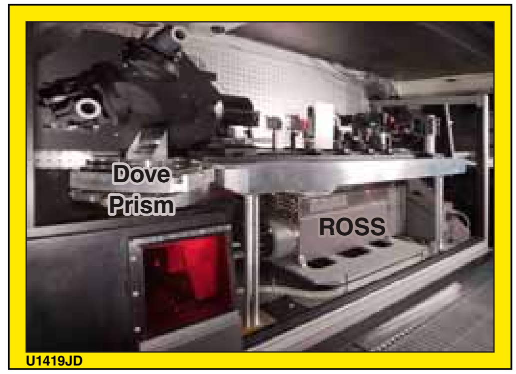


Figure 1. View of the SOP system showing the input window and Dove prism.

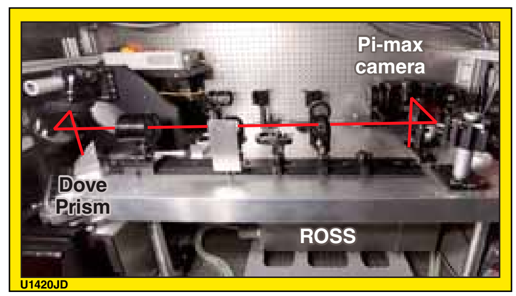


Figure 2. Side view of SOP system showing the beam path.

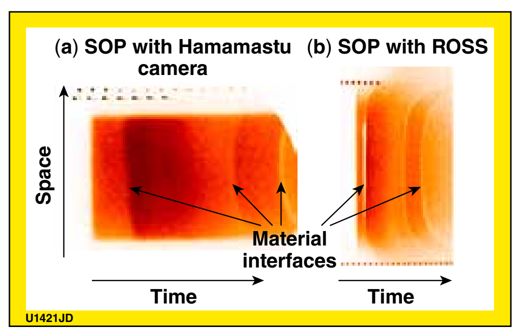


Figure 3. Streak camera records of shocks transiting three-layer targets for two shots under similar conditions. (a) Data from the old SOP with a Hamamastsu streak camera and (b) data from the new ROSS. Note that the new system has a larger field of view and higher temporal resolution, as evidenced by the detail at the material interfaces.

***Omega Facility Operations Summary:*** The Omega Facility conducted 174 target shots in November (142 on the OMEGA laser and 32 on the OMEGA EP laser). The average experimental effectiveness of the facility in November was 96.8% (98.6% for OMEGA and 89.1% for OMEGA EP). A total of 68 target shots were conducted for the NIC, while the HED program recorded 72 target shots taken by teams led by LLNL and LANL scientists. The LBS program accounted for 29 shots for experiments led by LLNL and LLE scientists and there were 5 shots taken for an NLUF experiment led by MIT-PSFC.