High-Resolution X-Ray Imaging (HRXI): For several years, the Commissariat à l'Énergie Atomique of France (CEA/DIF Center[1]) has been developing HRXI, a high-resolution, time-resolved, x-ray imaging diagnostic. Recently, HRXI was implemented and tested for the first time on OMEGA. HRXI combines two state-of-the-art x-ray technologies: a high-resolution x-ray microscope and a high-speed x-ray streak camera. The resulting instrument achieves a spatial and temporal resolution of ~5 μm and ~30 ps, respectively. The experimental configuration is shown in Fig. 1. The Wolter x-ray microscope for HRXI was used previously on Phebus experiments,[2] and consists of two similar off-axis toroidal mirrors. The microscope had a focal length of 218 mm and a magnification ratio of 16. The mirrors were coated with a 30-nm Ni coating (energy cutoff ~6 keV). The microscope features an integrated visible-light alignment system enabling the simultaneous projection of two crosses in the object plane and the image plane.

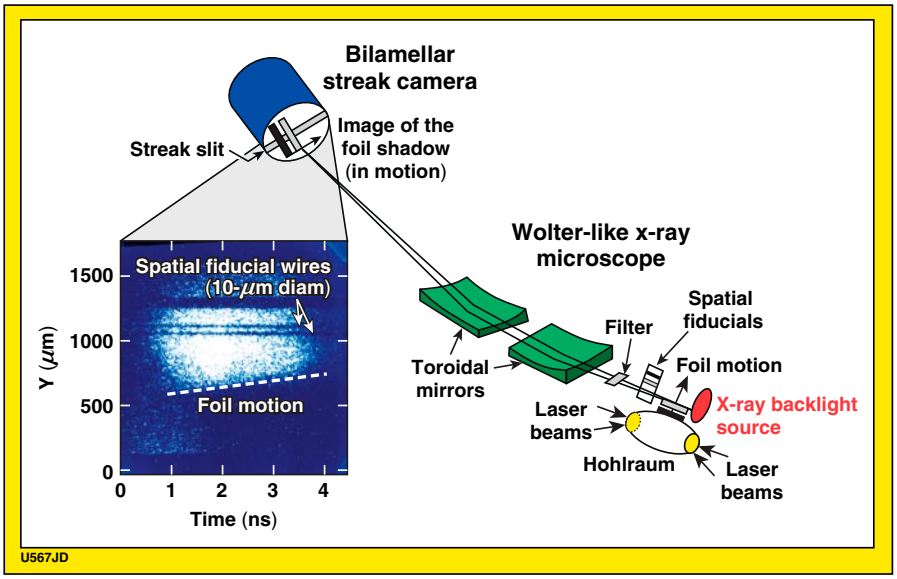

Figure 1. HRXI setup with a streaked image recorded during OMEGA shot #43418.

The streak camera includes a bilamellar-type streak tube[3] that achieves both high temporal (30 ps) and spatial resolution (15 lp/mm). To match to the emitted x-ray backlighter spectrum used for these experiments (Ti foil emission near 4.8 keV), a transmission-mode photocathode was used with a thin CsI coating (10 nm) that was deposited on a self-sustaining CH foil of 800 nm thickness. The streak tube's P20 phosphor screen was read out with a cooled 1340-px × 1300-px CCD with a 20-μm pixel size.

HRXI was successfully tested for the first time on OMEGA during a joint CEA/DOE-LLE campaign on 27 April 2006. For these tests, HRXI recorded the acceleration of a thin Ge-doped CH (45-μm) foil driven by radiation from a rugby-wall-shaped hohlraum heated by 40 OMEGA beams with a 2-ns time duration, PS26 pulse shape. The foil was accelerated to a velocity of 60 μm/ns. The inset in Fig. 1 shows a streak record of the motion of this thin foil in time using a 3-ns x-ray backlighter source. Three test objects were placed close to the foil to assess the spatial resolution of the diagnostic. Two 10-μm-diam wires are clearly visible in the middle and along the streak image, leading to an actual estimated spatial resolution on the streaked image of less than 5 μm.

OMEGA Operations Summary: OMEGA conducted 59 LLE target shots during the month of June. On 6 June, a high-yield, ignition-scaled, cryogenic target containing a 50/50 mixture of deuterium and tritium was imploded on the OMEGA laser. This is the first time that such a target was imploded on an ICF facility. OMEGA is now fully capable of fielding high tritium-fraction cryogenic targets. The last two weeks in June were scheduled OMEGA maintenance weeks. During this extended maintenance period, significant OMEGA target-area facility modifications were performed to facilitate integration of the OMEGA EP short-pulse transport arm to the OMEGA target chamber.

1. CEA/DIF, service SCEP, BP 12, 91680 Bruyères le Châtel, France, J. L. Bourgade, P. Troussel, C. Remond, D. Gontier, and A. Casner.
2. Ph. Troussel *et al*., Rev. Sci. Instrum. **76**, 063707 (2005).
3. A. Mens *et al*., in *19th International Congress on High-Speed Photography and Photonics*, edited by B. Garfield and J. Rendell (SPIE, Bellingham, WA, 1990), Vol. 1358, p. 315.

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