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Time-Resolved X-Ray Brightness Measurements from Short-Pulse, Laser-Irradiated Thin Foils B. EICHMAN, W. THEOBALD, C. STOECKL, C. MILEHAM, T.C. SANGSTER, Laboratory for Laser Energetics and Fusion Science Center, U. of Rochester — The production of soft x rays (∼keV) from high-intensity, short-pulse laser plasmas is important for future applications such as backlighting cryogenic targets on OMEGA. The physics of short-pulse laser–plasma interactions and the coupling of laser energy into both the thermal plasma and fast electrons were studied to optimize x-ray production from mass-limited aluminum foil targets. Foil targets of various sizes from 50 to 500 μm were irradiated with picosecond pulse duration laser pulses at intensities similar to OMEGA area backlighter schemes (10^{18} to $>10^{19}$ W/cm^2). The time-resolved x-ray emission was measured with a conically curved crystal coupled with an ultrafast x-ray streak camera. The He$_\alpha$ and the Ly$_\alpha$ line emission from aluminum foils was spectrally measured and temporally resolved. In addition, the x-ray source was characterized with a calibrated time-integrated spectrograph and spatially resolved images were taken with a spherically curved Bragg crystal. The combination of these measurements allows the brilliance of the x-ray line source to be inferred. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-FC52-08NA28302.

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