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Fast-Electron Temperature Measurements in Laser Irradiation at 10^{14} W/cm^2 A.A. SOLODOV, B. YAAKOBI, J.F. MYATT, C. STOECKL, D.H. FROULA, Laboratory for Laser Energetics, U. of Rochester — The temperature T of the fast electrons in planar-target irradiation using 2-ns UV pulses at 10^{14} W/cm^2 was measured on the OMEGA EP laser using the bremsstrahlung radiation [hard x-ray (HXR)] and the K_α radiation from high-Z signature layers. The HXR was measured by a nine-channel filter spectrometer [hard x-ray image plate (HXIP)]. Two types of experiments used the K_α radiation. The first used a thick Mo (or Ag) target and the ratio of K_α emitted toward the front and the back of the target, measured and simulated by a Monte Carlo (MC) code. The ratio decreases with increasing T (since K_α is emitted deeper in the foil and therefore absorbed less on the way back out). The second type used a target composed of five consecutive-Z layers (Nb, Mo, Rh, Pd, Ag) and K_α lines emitted from the back (highest-Z), measured and simulated by the MC code. For higher temperatures, the K_α energy decreases more slowly with Z. All of these measurements agree with each other. However, a three-channel scintillation photomultiplier system systematically yields higher temperatures. This indicates a higher-energy radiation component that is not detected by the HXIP because of the sharp drop in image plate (IP) sensitivity. Extending the HXIP detection to higher energies (using K_α fluorescence, for which the IP sensitivity is high) is planned. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

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