K_α Fluorescence Examination of Relativistic Electron Transport in the Context of Fast Ignition

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Abstract. Electron transport within solid targets, irradiated by a high-intensity short-pulse laser, has been measured by imaging K_α radiation from high-Z layers (Cu, Ti) buried in low-Z (CH, Al) foils. Although the laser spot is ~10 μm (FWHM), the electron beam spreads to ~70 μm diameter within <20 μm of penetration into the Al target, then diverges with a 40 deg cone angle. Monte Carlo and analytic modeling identify factors affecting the transport. The results are relevant to the coupling of short pulse laser energy to an ignition hotspot in fast-ignition inertial confinement fusion.