Abstract Submitted
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Characterization of laser-based broadband x-ray spectrum for high areal density objects[1] LEI CHEN, HIROSHI SAWADA, TYLER DAYKIN, TREVOR HUTCHINSON, BRUNO BAUER, VLADIMIR IVANOV, University of Nevada, Reno, FARHAT BEG, University of California San Diego, HUI CHEN, GERALD WILLIAMS, HARRY MCLEAN, Lawrence Livermore National Laboratory — X-ray radiography is essential to probe high areal density objects in high energy density and inertial confinement fusion experiments. To characterize laser-produced broadband x-ray spectrum, x-ray radiography experiments were carried out by using a 50-TW Leopard laser at the Nevada Terawatt Facility. In these experiments, bremsstrahlung and electrons spectra were measured to determine characteristics of fast electrons, while radiographic images of three Al wires with different diameters were recorded using the laser-produced broadband x rays. The measured bremsstrahlung is modeled with a hybrid Particle-in-cell code to infer fast electron spectrum and divergence angle. Calculated x-ray spectra are used in the Monte Carlo code to simulate transmission profiles of the Al wires. The measurements agree with calculations when a simulated x-ray spectrum composed of line emissions and bremsstrahlung is used. Simulations with only 22 keV Ag Kα or exponential x-ray spectrum cannot reproduce the measurement, suggesting that the proper x-ray source spectrum and photon sensitivity of detector are critical in the transmission calculations to infer the density of an object.

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