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**Characterization of a Short-Pulse Laser-Based Broadband X-Ray Source for Radiography of High Areal Density Objects** L CHEN, H SAWADA, T DAYKIN, C SALINAS, T HUTCHINSON, B BAUER, V IVANOV, UNR, F BEG, UCSD, H CHEN, A LINK, G WILLIAMS, P PATEL, Y PING, H MCLEAN, LLNL — A broadband hard x-ray source is necessary for radiography of high areal density objects in high energy density and inertial confinement fusion experiments. We have studied characterization of short-pulse laser-produced broadband x rays and demonstrated modeling of laser-based x-ray radiography. Fast electrons produced by a UNR's 50-TW Leopard laser were characterized by modeling measured bremsstrahlung signals with a hybrid particle-in-cell code, LSP, to calculate angularly resolved x-ray spectra. Radiographic images of a spark plug object were then simulated using a Monte Carlo code incorporating an LSP-calculated spectrum, realistic 3D CAD-like spark plug model, an x-ray attenuation filter, and an IP detector into a photon transport calculation. Simulated transmission profiles of the test object agree with the experiments for various filter materials and source targets, suggesting that the inferred x-ray spectrum from the bremsstrahlung analysis is consistent with one used for the radiography. The simulations reproduce a high-quality radiographic image recorded through a plastic filter compared to aluminum or brass filters. Details of the experiment and comparisons will be presented. This material is based upon work supported by the National Science Foundation under Grant No. 1707357.

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