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Monochromatic x-ray radiography of laser-driven spherical targets using high-energy, picoseconds LFEX laser HIROSHI SAWADA, University of Nevada Reno, S. FUJIOKA, S. LEE, Y. ARIKAWA, K. SHIGEMORI, H. NAGATOMO, H. NISHIMURA, Insittute of Laser Engineering, Osaka University, A. SUNAHARA, Institute for Laser Technology, W. THEOBALD, LLE, Univ. of Rochester, F. PEREZ, Ecole Polytechnique, P.K. PATEL, LLNL, F.N. BEG, UCSD
— Formation of a high density fusion fuel is essential in both conventional and advanced Inertial Confinement Fusion (ICF) schemes for the self-sustaining fusion process. In cone-guided Fast Ignition (FI), a metal cone is attached to a spherical target to maintain the path for the injection of an intense short-pulse ignition laser from blow-off plasma created when nanoseconds compression lasers drive the target. We have measured a temporal evolution of a compressed deuterated carbon (CD) sphere using 4.5 keV K-alpha radiography with the Kilo-Joule, picosecond LFEX laser at the Institute of Laser Engineering. A 200 μm CD sphere attached to the tip of a Au cone was directly driven by 9 Gekko XII beams with 300 J/beam in a 1.3 ns Gaussian pulse. The LFEX laser irradiated on a Ti foil to generate 4.51 Ti K-alpha x-ray. By varying the delay between the compression and backlighter lasers, the measured radiograph images show an increase of the areal density of the imploded target. The detail of the quantitative analyses to infer the areal density and comparisons to hydrodynamics simulations will be presented. This work was performed with the support and under the auspices of the NIFS Collaboration Research program (NIFS13KUGK072). H.S. was supported by the UNR's International Activities Grant program.

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