Abstract Submitted
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Measurements of the temporal onset of mega-Gauss magnetic fields in a laser-driven solenoid CLEMENT GOYON, B. B. POLLLOCK, D. T. TURNBULL, A. HAZI, J. S. ROSS, D. A. MARISCAL, S. PATANKAR, G. J. WILLIAMS, W. A. FARMER, J. D. MOODY, LLNL, S. FUJIOKA, K. F. F. LAW, ILE — We report on experimental results obtained at Omega EP showing a nearly linear increase of the B-field up to about 2 mega-Gauss in 0.75 ns in a ˜1 mm3 region. The field is generated using 1 TW of 351 nm laser power (˜8*10ˆ15 W/cm2) incident on a laser-driven solenoid target. The coil target converts about 1% of the laser energy into the B-field measured both inside and outside the coil using proton deflectometry with a grid and Faraday rotation of probe beam through SiO2 glass. Proton data indicates a current rise up to hundreds of kA with a spatial distribution in the Au solenoid conductor evolving in time. These results give insight into the generating mechanism of the current between the plates and the time behavior of the field. These experiments are motivated by recent efforts to understand and utilize High Energy Density (HED) plasmas in the presence of external magnetic fields in areas of research from Astrophysics [1] to Inertial Confinement Fusion [2]. We will describe the experimental results and scale them to a NIF hohlraum size. This work was performed under the auspices of the U.S. Department of Energy by LLNL under Contract DE-AC52-07NA27344. [1] G. Fiksel et al., Phys. Rev. Lett. 113, 105003 (2014). [2] L. J. Perkins, et al., Phys. Plasmas 20, 072708 (2013).

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