Abstract Submitted
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Laser-Driven Magnetic-Flux Compression Experiments on the OMEGA Laser O.V. GOTCHEV, N.W. JANG, J.P. KNAUER, D.D. MEYERHOFER, R. BETTI, Laboratory for Laser Energetics, U. of Rochester — Magnetic-flux compression with lasers relies on the kinetic energy of the target shell to compress magnetic flux frozen in the highly conductive target plasma. It is expected to facilitate implosions where seed fields amplified to multimegagauss levels can reduce the thermal losses in the ICF hot spot by inhibiting the electron thermal transport out of it. This can potentially provide for implosions with higher gain (or lower ignition energy requirements) than what is possible in conventional ICF. The successful generation of very strong magnetic fields can also be used in a variety of non-fusion experiments such as laboratory astrophysics, material science, etc. The main concept and the use of a compact magnetic pulse system to seed a macroscopic magnetic field into cylindrical DD-filled targets, which are radially driven with the OMEGA laser, are described. A Helmholtz-type, single-turn coil provides the ∼0.1-MG seed field. Compression of the internal magnetic flux is measured by the proton deflectrometry technique[1] optimized for this application. Results from the initial proof-of-principle experiments are discussed. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement DE-FC52-92SF19460.

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