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Laser-Driven Magnetic Field Compression N. JANG, J.P. KNAUER, R. BETTI, D.D. MEYERHOFER, Fusion Science Center for Extreme States of Matter and Fast Ignition Physics, Laboratory for Laser Energetics, U. of Rochester — An experiment was designed to compress magnetic fields to ultrahigh intensities through laser-driven implosions. A seed axial magnetic field is produced through two Helmholtz coils using a capacitor charged by the hot electrons produced by an intense laser pulse as a power supply. The seed-field generation circuit is designed to produce an initial field of several Tesla (5–10 T) inside a cylindrical CH shell. The plastic shell is then imploded by direct laser irradiation with a 23-kJ laser pulse. Two implosion pulse shapes have been considered: a square pulse and a shaped, low-adiabat pulse. One-dimensional simulations of the magnetic field compression resulting from the shell convergence show magnetic field amplifications of 300 for the square pulse and 1000 for the shaped pulse, thus leading to peak magnetic fields of 3×10^3 T and 10^4 T, respectively (for a 10-T seed). Details of the experimental design and simulations are presented, and the experimental plans for implementation are outlined. This experiment is intended to study ways to improve the hot-spot energy confinement through magnetic insulation. This work has been supported by the US-DOE under grant ER54768 and under cooperative agreement DE-FC52-92SF19460.

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