Abstract Submitted
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Magnetized Inertial Fusion (MIF) Research at the Shiva Star Facility[1] JAMES DEGNAN[2], Retired, C. GRABOWSKI, M. DOMONKOS, E.L. RUDEN, D.J. AMDAHL, W.M. WHITE, Air Force Research Laboratory, Directed Energy Directorate, Kirtland AFB, NM87117 USA, M.H. FRESE, S.D. FRESE, NumerEx LLC, Albuquerque, NM USA, G.A. WURDEN, T.E. WEBER, Los Alamos National Laboratory, Los Alamos, NM USA — The AFRL Shiva Star capacitor bank (1300 μF, up to 120 kV) used typically at 4 to 5 MJ stored energy, 10 to 15 MA current, 10 μs current rise time, has been used to drive metal shell (solid liner) implosions for compression of axial magnetic fields to multi-megagauss levels, suitable for compressing magnetized plasmas to MIF conditions. MIF approaches use magnetic field to reduce thermal conduction relative to inertial confinement fusion (ICF). MIF substantially reduces required implosion speed and convergence. Using profiled thickness liner enables large electrode apertures and field-reversed configuration (FRC) injection. Using a longer capture region, FRC trapped flux lifetime was made comparable to implosion time and an integrated compression test was conducted. The FRC was radially compressed a factor of ten, to 100x density $>10^{18}$ cm^{-3} (a world FRC record), but temperatures were only 300-400 eV, compared to intended several keV. Compression to megabar pressures was inferred by the observed liner rebound, but the heating rate during the first half of the compression was less than the normal FRC decay rate. Principal diagnostics were soft x-ray imaging, soft x-ray diodes, and neutron measurements.

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