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Integrated Design For Magnetically-Driven Liner Inertial Fusion of Preheated and Magnetized Fuel on the Z Accelerator A.B. SEFKOW, K.J. PETERSON, R.A. VESEY, S.A. SLUTZ, C.W. NAKHLEH, Sandia National Laboratories, J.M. KONING, M.M. MARINAK, Lawrence Livermore National Laboratory — Magnetically-driven implosions of metal liners containing magnetized and preheated fuel may enable significant ICF yields to be obtained on pulsed-power accelerators. Simulations of dense (ρ=1-5 mg/cc), axially-magnetized (B_z=3-30 T), and preheated (T_i=200-500 eV) DT fuel, driven by a pulsed-power accelerator similar to the Z machine (I_{max}=25-60 MA in 100-300 ns), indicate Gbar pressures and high yields (E_{fus}=100s kJ-10s MJ) may be feasible. Reduced heat conduction losses and alpha particle trapping can be provided by B_z flux compression, and the fuel ρR ignition requirement is replaced by one for $B_z R$. Preheating the fuel prior to compression permits access to ignition temperatures without large convergence ratios or implosion velocities. Integrated simulations allow realistic designs for Z experiments (I_{max}=27 MA) with fuel preheat provided by the ZBL laser (E_{las}=2-6 kJ). Physics issues include laser deposition timing, evolution of thermal energy and B_z field, magneto-RT instability growth, electrode and laser entrance hole end effects, and anisotropic conductivity and fusion burn in the B_z field. Fusion yields on the order of the absorbed target energy may be possible on Z+ZBL, and high-gain designs using I_{max}=60 MA are studied.

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