DPP13-2013-001685

Abstract for an Invited Paper
for the DPP13 Meeting of
the American Physical Society

Design of MagLIF experiments using the Z facility[1]

ADAM SEFKOW, Sandia National Laboratories

The MagLIF (*Mag*netized *L*iner *I*nertial *F*usion) concept has been presented as a path toward obtaining substantial fusion yields using the Z facility [S.A. Slutz, *et. al.*, Phys. Plasmas 17, 056303 (2010)], and related experiments have begun in earnest at Sandia National Laboratories. We present fully integrated numerical magnetohydrodynamic simulations of the MagLIF concept, which include laser preheating of the fuel, the presence of electrodes, and end loss effects. These simulations have been used to design neutron-producing integrated MagLIF experiments on the Z facility for the capabilities that presently exist, namely, D_2 fuel, peak currents of I_{max} =15-18 MA, pre-seeded axial magnetic fields of B_{z0} =7-10 T, and laser preheat energies of E_{laser} =2-3 kJ delivered in 2 ns. The first fully integrated experiments, based on these simulations, are planned to occur in 2013. Neutron yields in excess of 10^{11} are predicted with the available laser preheat energy and accelerator drive energy. In several years, we plan to upgrade the laser to increase E_{laser} by several more kJ, provide B_{z0} up to 30 T, deliver I_{max} =22 MA or more to the load, and develop the capability to use DT fuel.

[1]Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.