Abstract Submitted
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The Effect of LEH Foil Thickness on MagLIF-Relevant Laser Preheat[1] ADAM HARVEY-THOMPSON, MATTHEW WEIS, DANIEL RUIZ, Sandia National Laboratories, MINGSHENG WEI, ADAM SEFKOW, Laboratory for Laser Energetics, TAISUKE NAGAYAMA, Sandia National Laboratories, MICHAEL CAMPBELL, Laboratory for Laser Energetics, JULIE FOOKS, General Atomics, MICHAEL GLINSKY, KYLE PETERSON, Sandia National Laboratories — The Magnetized Liner Inertial Fusion (MagLIF) scheme relies on coupling laser energy to an underdense fuel to raise the fuel adiabat at the start of the implosion. To deposit energy into the fuel the laser must first penetrate a laser entrance hole (LEH) foil which can absorb energy and introduce mix. We report on a series of experiments where a single beamline from the OMEGA-EP laser was coupled into Ar-filled gas cells. The LEH foil thickness containing the Ar was varied from 0.5-3 m. Time-gated x-ray images captured the extent of the laser-heated plasma channel as a function of time. Two-dimensional (2D) HYDRA simulations accurately predicted the extent of the plasma channel for the 0.5 m and 1 m LEH foil cases but exhibited excessive self-focusing for the 2 m and 3 m LEH foil cases. This was corrected for the 2 m LEH foil case by using a more conductive model for the LEH foil material. However, 3D simulations were required to reproduce the data for the 3 m LEH foil case. This work highlights the challenges of simulating multi-micron thick LEH foils but gives confidence that simulations can capture energy deposition into MagLIF-relevant targets.

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