Abstract Submitted
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Study of laser preheating dependence on laser wavelength and intensity for MagLIF[1] M.S. WEI, GA, A.J. HARVEY-THOMPSON, M. GLINSKY, T. NAGAYAMA, M. WEIS, M. GEISSEL, K. PETERSON, SNL, J. FOOKS, C. KRAULAND, E. GIRALDEZ, GA, J. DAVIES, E.M. CAMPBELL, R. BAHR, D. EDGELL, C. STOECKL, V. GLEBOV, LLE, J. EMIG, R. HEETER, D. STROZZI, LLNL — The magnetized liner inertial fusion (MagLIF) scheme requires preheating underdense fuel to 100's eV temperature by a TW-scale long pulse laser via collisional absorption. To better understand how laser preheat scales with laser wavelength and intensity as well as to provide data for code validation, we have conducted a well-characterized experiment on OMEGA to directly compare laser propagation, energy deposition and laser plasma instabilities (LPI) using 2ω (527 nm) and 3ω (351 nm) lasers with intensity in the range of (1-5)x10^{14} Wcm^{-2}. The laser beam (1 - 1.5 ns square pulse) enters the gas-filled plastic liner though a 2-m thick polyimide window to heat an underdense Ar-doped deuterium gas with electron density of 5.5% of critical density. Laser propagation and plasma temperature are diagnosed by time-resolved 2D x-ray images and Ar emission spectroscopy, respectively. LPI is monitored by backscattering and hard x-ray diagnostics. The 2ω beam propagation shows a noticeable larger lateral spread than the 3ω beam, indicating laser spray due to filamentation. LPI is observed to increase with laser intensity and the 2ω beam produces more hot electrons compared with the 3ω beam under similar conditions. Results will be compared with radiation hydrodynamic simulations.

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