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Laser heating challenges of high yield MagLIF targets[1] STEPHEN SLUTZ, ADAM SEFKOW, ROGER VESEY, Sandia National Laboratories — The MagLIF (Magnetized Liner Inertial Fusion) concept is predicted by numerical simulation to produce fusion yields of about 100 kJ, when driven by 25 MA from the existing Z accelerator [S.A. Slutz et al Phys. Plasmas 17, 056303, 2010] and much higher yields with future accelerators delivering higher currents [Slutz and Vesey PRL 108, 025003, 2012]. The fuel must be heated before compression to obtain significant fusion yields due to the relatively slow implosion velocities ($\sim$ 100 km/s) of magnetically driven liners. Lasers provide a convenient means to accomplish this pre-compressional heating of the fusion fuel, but there are challenges. The laser must penetrate a foil covering the laser entrance hole and deposit 20-30 kJ within the $\sim$ 1 cm length of the liner in fuel at 6-12 mg/cc. Such high densities could result in beam scattering due to refraction and laser plasma interactions. Numerical simulations of the laser heating process are presented, which indicate that energies as high as 30 kJ could be deposited in the fuel by using two laser pulses of different wavelengths. Simulations of this process will be presented as well of results for a MagLIF design for a potential new machine delivering 50 MA of current.

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