Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Simulations of Converging Shock Collisions for Shock Ignition[1]
JOSHUA SAUPPE, EVAN DODD, ERIC LOOMIS, Los Alamos National Laboratory — Shock ignition (SI) has been proposed as an alternative to achieving high gain in inertial confinement fusion (ICF) targets [Betti et. al. Phys. Rev. Lett. 103 045004 (2007)]. A central hot spot below the ignition threshold is created by an initial compression pulse, and a second laser pulse drives a strong converging shock into the fuel. The collision between the rebounding shock from the compression pulse and the converging shock results in amplification of the converging shock and increases the hot spot pressure above the ignition threshold. We investigate shock collision in SI drive schemes for cylindrical targets with a polystyrene foam interior using radiation-hydrodynamics simulations with the RAGE code. The configuration is similar to previous targets fielded on the Omega laser [Tubbs et. al. Laser and Particle Beams Vol. 17 No. 3 437-449 (1999)]. The CH interior results in a lower convergence ratio and the cylindrical geometry facilitates visualization of the shock transit using an axial X-ray backlighter, both of which are important for comparison to potential experimental measurements. One-dimensional simulations are used to determine shock timing, and the effects of low mode asymmetries in 2D computations are also quantified.

[1]LA-UR-16-24773

Joshua Sauppe
Los Alamos National Laboratory

Date submitted: 13 Jul 2016 Electronic form version 1.4