Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Imaging Shape Transfer to a Metal Inner Shell in Double Shell Implosions[1] JOSHUA SAUPPE, ERIC LOOMIS, BRIAN HAINES, DAVID MONTGOMERY, RYAN SACKS, TANA CARDENAS, SEAN FINNEGAN, SASIKUMAR PALANIYAPPAN, ELIZABETH MERRITT, PAUL KEITER, DOUGLAS WILSON, Los Alamos National Laboratory — The double shell concept for inertial confinement fusion utilizes a low-Z ablator that delivers energy to a high-Z inner shell via collisional transfer. The inner shell then compresses the fuel quasi-adiabatically leading to volumetric ignition. Asymmetries in the outer shell that arise from either the x-ray drive or engineering features can imprint on the inner shell during the collision, and this ultimately impacts the shape of the fuel region. Radiation hydrodynamics codes predict that deviations from round result in reduced performance, setting an upper limit on the allowable levels of low mode asymmetries. We present designs for surrogate double shells using chromium and molybdenum inner shells with deuterated foam fills. These mid-Z inner shells allow for efficient imaging with high-energy photons produced by the ARC backlighter, and the neutrons produced in the deuterated foam fuel will be used to assess mixing of the inner shell into the fuel without the added complexity of fill tube fabrication. Performance degradation due to low mode shape will be assessed in these surrogate designs, and the feasibility of imaging the inner shell shape will be discussed.

[1]Work performed by Los Alamos National Laboratory under Contract 89233218CNA000001 for the National Nuclear Security Administration of the U.S. Department of Energy.

Joshua Sauppe
Los Alamos National Laboratory

Date submitted: 02 Jul 2019 Electronic form version 1.4