Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

First directly-driven double shell implosions on the National Ignition Facility M.J. SCHMITT, B.S. SCHEINER, C.A. WILDE, D.W. SCHMIDT, L. KOT, LANL, M.J. ROSENBERG, LLE, H. HUANG, GA, P.W. MCKENTY, LLE, B. KEENAN, KIM MOLVIG, LANL — Recent progress validating the concept of multi-shell direct-drive ignition has been made on NIF using both single shell and double shell polar direct drive (PDD) implosions. The intent of these experiments is to validate the outer ablator shell hydro-efficiency and the kinetic energy transfer efficiency between two concentric shells. The Revolver triple-shell ignition target requires high (>90%) coupling of direct-drive laser energy to its large 5-6 mm outer shell to demonstrate high hydro-efficiency (˜10%) of PDD laser energy into inward kinetic energy for small laser beam to capsule radius ratios (˜1/3). Moreover, high implosion kinetic energy transfer efficiency between the outer two colliding shells (>50%) is needed. These experiments employed 5 mm outer shells driven with surface intensities and laser pulse lengths consistent with the Revolver ignition design. Outer shell trajectories were measured using both x-ray self-emission imaging and x-ray backlit radiography. The post-collision inner shell trajectory was measured with backlighting showing good agreement with simulation. The evolution of the outer shell joint also was observed for the first time. In contrast to indirect-drive double shells, no discernable impact on the inner shell from the outer shell joint was observed. Diagnostic measurements indicate low levels of scattered light from these targets. Details and comparisons with simulations will be shown. Research supported under LANL's LDRD Program project 20180051DR.

Mark Schmitt
Los Alamos Natl Lab

Date submitted: 29 Jun 2020 Electronic form version 1.4