A.B. Zylstra et al., Beryllium implosion experiments at high case-to-capsule ratio on the National Ignition Facility
S.A. Yi et al., Quantifying design trade-offs of beryllium targets on NIF
S. MacLaren et al., Relationship between symmetry and laser pulse shape in low-fill hohlraums at the National Ignition Facility
G. Kyrala et al., Imaging and spectroscopy of copper dopant migration of indirectly driven Beryllium capsule implosion on the National Ignition Facility
M.J. MacDonald et al., Spatially resolved x-ray fluorescence spectroscopy of beryllium capsule implosions on the NIF

Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Relationship between symmetry and laser pulse shape in low-fill hohlraums at the National Ignition Facility[1] STEVE MACLAREN, LLNL, A.B. ZYLSTRA, A. YI, J.L. KLINE, G.A. KYRALA, L.B. KOT, E.N. LOOMIS, T.S. PERRY, R.C. SHAH, LANL, L.P. MASSE, J.E. RALPH, S.F. KHAN, LLNL — Typically in indirect-drive inertial confinement fusion (ICF) hohlraums cryogenic helium gas fill is used to impede the motion of the hohlraum wall plasma as it is driven by the laser pulse. A fill of ˜1 mg/cc He has been used to significantly suppress wall motion in ICF hohlraums at the National Ignition Facility (NIF); however, this level of fill also causes laser-plasma instabilities (LPI) which result in hot electrons, time-dependent symmetry swings and reduction in drive due to increased backscatter. There are currently no adequate models for these phenomena in codes used to simulate integrated ICF experiments. A better compromise is a fill in the range of 0.3˜0.6 mg/cc, which has been shown to provide some reduction in wall motion without incurring significant LPI effects[1]. The wall motion in these low-fill hohlraums and the resulting effect on symmetry due to absorption of the inner cone beams by the outer cone plasma can be simulated with some degree of accuracy with the hydrodynamics and inverse Bremsstrahlung models in ICF codes. We describe a series of beryllium capsule implosions in 0.3 mg/cc He fill hohlraums that illustrate the effect of pulse shape on implosion symmetry in the "low-fill" regime. In particular, we find the shape of the beginning or "foot" of the pulse has significant leverage over the final symmetry of the stagnated implosion. [1]G.N. Hall et al., Phys Plasmas **24**, 052706 (2017)

[1]This work was performed under the auspices of the Lawrence Livermore National Security, LLC, (LLNS) under Contract No. DE-AC52-07NA27344

Steve MacLaren
LLNL

Date submitted: 14 Jul 2017 Electronic form version 1.4