Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Influence of In-Flight Shape on Stagnation Performance in Direct-Drive Laser Implosion Experiments[1] RAHUL SHAH, I. V. IGUMENSHCHEV, C. J. FORREST, D. CAO, V. N. GONCHAROV, E. M. CAMPBELL, S. P. REGAN, Laboratory for Laser Energetics — In laser-driven implosions modest input (drive) pressure is amplified ∼1000× by spherical convergence to reach fusion conditions. The impact of deviation from sphericity (typically described in terms of spherical harmonic decomposition) will depend on the presence of other performance limitations. Results are presented of ambient implosions conducted with a range of on-target laser fluence asymmetries, which were quantified by a 3-D measurement of the in-flight symmetry. The measured yield was observed to correlate to these input symmetry changes with ∼2× drop over ∼3% ℓ=1 asymmetry of the on-target laser fluence. The implosion experiments are modeled with 3-D radiation-hydrodynamic simulations which include both shape asymmetry and laser imprint. The agreement of yield between the modeling and experiment falls from 70% to 40% as the symmetry improves. The smaller discrepancy for the larger symmetry suggests a saturation of performance limiters present in the integrated experiment.

[1]This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0003856.

Rahul Shah
Laboratory for Laser Energetics

Date submitted: 02 Jul 2019 Electronic form version 1.4