Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Signatures of hot-spot asymmetries in secondary DT neutron spectra in NIF implosions BRANDON LAHMANN, JOHAN FRENJE, MARIA GATU-JOHNSON, FREDRICK SEGUIN, CHIKANG LI, RICHARD PETRASSO, MIT, ED HARTOUNI, CHARLES YEAMANS, LLNL, HANS RINDERKNECHT, LLE, DAN SAYRE, GARY GRIM, KEVIN BAKER, DAN CASEY, EDUARD DEWALD, CLEMENT GOYON, CHARLIE JARROTT, SHAHAB KHAN, LLNL, SEBASTIAN LEPAPE, CEA, TAMMY MA, RYAN NORA, LOUSIA PICKWORTH, LLNL, RAHUL SHAH, LLE, JOHN KLINE, AUSTIN YI, LANL, ALEX ZYLSTRA, LLNL — To achieve ignition, Inertial Confinement Fusion (ICF) implosions must converge symmetrically as any asymmetries can have deleterious effects on the implosion performance. As such, the measurement of asymmetries has long been an important tool for assessing and improving the performance of ICF implosions. Traditionally this has been accomplished through a combination of neutron and x-ray imaging and neutron down-scatter measurements. On the NIF, surrogate D_2 and D^3He filled implosions are often used, for reasons of practicality, in place of fully integrated DT layered experiments. These experiments lack the performance required for neutron imaging and must rely entirely on x-ray imaging to measure implosion asymmetries. However, directional neutron spectra from secondary DT reactions also encode information about implosion symmetry, opening the door for alternative and complementary asymmetry measurements. In this work, we demonstrate this capability using four neutron time of flight spectrometers on the NIF. This work was supported in part by the U.S. DOE, the MIT/NNSA CoE, and LLNL.

Brandon Lahmann
Massachusetts Institute of Technology MIT

Date submitted: 08 Jul 2020 Electronic form version 1.4