Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

NIF Hohlraum Modeling for Magnetically-Assisted Ignition[1] D. J. STROZZI, J. D. MOODY, J. M. KONING, J. D. SALMONSON, D. D. HO, S. O. KUCHEYEV, S. BHANDARKAR, LLNL, C. A. THOMAS, LLE — LLNL is exploring imposed magnetic fields to improve ICF performance toward ignition on NIF [L. J. Perkins et al., PoP 2017]. For current implosion experiments, an imposed axial field of 30-50 Tesla is shown in simulations to significantly reduce hotspot energy loss, due to electron conduction perpendicular to the field, and increase alpha-particle energy deposition. Here, we present radiation-magneto-hydrodynamic simulations with the Hydra code that study the effect of the imposed field on hohlraum dynamics. We expect modest effects, even though the hohlraum fill gas is well magnetized. Our short-term experimental focus is on room-temperature NIF experiments with a gas-filled capsule, based on the BigFoot campaign [C. A. Thomas, APS-DPP 2017]. Future experiments are planned using magnetized cryogenic targets. The goal is to demonstrate field compression in the capsule comparable to the MHD frozen-in law, and increased hotspot temperature and fusion yield. A significant challenge is having the field imposed by external coils diffuse through the hohlraum. Materials with lower electrical conductivity than gold are being considered, including pure uranium and gold alloys - which may have improved radiation drive due to the cocktail "effect" [O. S. Jones, PoP 2007].

[1]Work at LLNL performed under the auspices of the US DOE by LLNL under contract DE-AC52-07NA27344

David Strozzi
Lawrence Livermore Natl Lab

Date submitted: 01 Jul 2019 Electronic form version 1.4