Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Magnetizing NIF Sub-Scale Capsules For Reaching Ignition Using Laser Energy in the 1 MJ Range[1] G. ZIMMERMAN, D. HO, J. PERKINS, LLNL, G. KAGAN, LANL, G. LOGAN, J. SALMONSON, M. RHODES, D. BLACKFIELD, LLNL — Fusion yield for ICF can be amplified by imposing a seed B-field around 50 T to confine alphas and to reduce electron heat conduction. Achieving 58 T in offline lab tests in sample hohlraum coils driven by a pulsed-power supply was demonstrated by Rhodes. Three topics are addressed. (1) The derivation of a 0D energy balance equation that including the effect of B-field. The ignition boundary obtained from this equation shows that a strong compressed B-field substantially reduces the minimum hotspot ρR required for ignition by about 50%. (2) The design of a near-term experimental demonstration of the effect of B-field on yield improvement based on our sub-scale gas-filled Symcap design for the NIF experiment (non-magnetized) that gave 1D yield and showed good symmetry. (3) The quest and design of magnetized sub-scale capsule with DT ice layer that gives robust ignition and requires only about 1 MJ of laser energy. Our baseline non-magnetized sub-scale design, with a seed field of 50T, gives a robust ignition with 1 MJ yield.

[1]This work performed under auspices of U.S. DOE by LLNL under Contract DE-AC52-07NA27344

Darwin Ho
LLNL

Date submitted: 20 Jul 2016 Electronic form version 1.4