Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Physics and Designs of Ignition Capsules Using High-Density Carbon (HDC) Ablators: Robust Designs, Stability, and Shock Mergers[1] D. HO, J. SALMONSON, S. HAAN, D. CLARK, J. LINDL, N. MEEZAN, C. THOMAS, Lawrence Livermore Natl Lab — We present six ignition designs using W-doped HDC ablators with, respectively, 2, 3, and 4-step increases in Tr. Fuel adiabat α ranges between 1.5 and 4. The 4-step design has the lowest α of 1.5 but has the highest ablation front Rayleigh-Taylor (RT) growth. Consequently, the overall robustness of the 4-step design is inferior to the intermediate-α 3-step design, assuming typical currently measured surface roughness spectrum. As the foot level is increased further and the shocks merge inside the fuel, the fuel adiabat is raised to 4. The RT growth and mix are reduced but the 1D margin is decreased making it overall more susceptible to surface roughness. The 2-step $\alpha = 2.5$ design turns out to be the most robust against surface roughness and still can deliver very high 1D yield of 14.5 MJ. Systematic evaluation of the robustness of these capsules with respect to low-mode radiation asymmetries, will also be discussed. Different paths to achieve low-convergence-ratio implosions (i.e. high velocity and high α as one option versus low velocity and low α as another option), while still giving respectable neutron yield will be presented. Finally, we discuss how the performance of these doped capsules changes; if the Au wall of the hohlraum is replaced by U.

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

Darwin Ho
Lawrence Livermore Natl Lab

Date submitted: 22 Jul 2015 Electronic form version 1.4