Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

On energy required for achieving ignition on NIF[1] BAOLIAN CHENG[2], Los Alamos National Laboratory — Inertial confinement fusion experiments on the National Ignition Facility (NIF) have significantly improved hohlraum behavior, implosion symmetry and capsule yield in the last several years, but the gap between the record capsule yield (1.8x1016 neutrons) performance and ignition is still prominent. Recently, a series of theoretical studies and numerical simulations suggest that the highest performing NIF ignition capsules are close to ignition; in particular, the capsules would be able to achieve ignition with a modest upgrade of laser driver energy. In this presentation, we will present a physics analysis of the NIF ignition capsules and the minimum energy required for achieving ignition on NIF using both forward and inverse models. We find that the required minimum driver energy strongly depends on the adiabat of the main fuel and remaining ablator mass, which determines the energy partition between the main fuel and hot spot. Our analysis is consistent with experimental data, but differs from the recent published theoretical and numerical analysis. We suggest the hot spot areal density may have been overestimated, especially for the record yield capsule, and that the ignition threshold has been underestimated (LA-UR-19-25576).

[1]This work was conducted under the auspices of the U.S. Department of Energy by the Los Alamos National Laboratory under Contract No. 89233218CNA000001.
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Date submitted: 02 Jul 2019 Electronic form version 1.4