Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Hot-electron preheat and energy deposition in polar-direct-drive experiments at the National Ignition Facility[1] A.A. SOLODOV, M.J. ROSENBERG, A.R. CHRISTOPHERSON, R. BETTI, R. EPSTEIN, P.B. RADHA, R.K. FOLLETT, W. SEKA, C. STOECKL, S.P. REGAN, J.P. PALASTRO, D.H. FROULA, V.N. GONCHAROV, Laboratory for Laser Energetics, U. of Rochester, J.F. MYATT, U. of Alberta, M. HOHENBERGER, B. BACHMANN, P. MICHEL, LLNL — Laser–plasma instabilities (LPI's) can degrade the performance of direct-drive inertial confinement fusion implosions by generating hot electrons that preheat the target. To assess the extent of hot-electron preheat, polar-direct-drive experiments have been performed at the National Ignition Facility to study the hot-electron energy deposition in an unablated shell. The experiments employed mass-equivalent plastic targets with Ge-doped layers to measure the radial energy deposition profile of hot electrons in the unablated capsule. Hot-electron properties and energy deposition have been inferred through comparisons of hard x-ray spectra to simulations of electron transport and x-ray generation. Recent experiments used thin silicon layers in the outer portion of the ablators, designed to pass through the quarter-critical region during the period of hot-electron generation in order to suppress LPI. Analysis indicates a reduction in hot-electron generation by a factor of $\sim$2, showing promise as a preheat-mitigation strategy that can expand the ignition-design space to higher intensity.

[1]This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0003856.

Andrey Solodov
Lab for Laser Energetics

Date submitted: 28 Jun 2020 Electronic form version 1.4