Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Planar Two-Plasmon–Decay Experiments at Polar-Direct-Drive Ignition-Relevant Scale Lengths at the National Ignition Facility M.J. ROSENBERG, A.A. SOLODOV, W. SEKA, J.F. MYATT, S.P. REGAN, M. HOHENBERGER, R. EPSTEIN, T.J.B. COLLINS, Laboratory for Laser Energetics, U. of Rochester, D.P. TURNBULL, J.E. RALPH, M.A. BARRIOS, J.D. MOODY, LLNL — Results from the first experiments at the National Ignition Facility (NIF) to probe two-plasmon−decay (TPD) hot-electron production at scale lengths relevant to polar-direct-drive (PDD) ignition are reported. The irradiation on one side of a planar CH foil generated a plasma at the quarter-critical surface with a predicted density gradient scale length of $L_{\rm n} \sim 600 \mu m$, a measured electron temperature of $T_e \sim 3.5$ to 4.0 keV, an overlapped laser intensity of $I \sim 6 \times 10^{14}$ W/cm^2, and a predicted TPD threshold parameter of $\eta \sim 4$. The hard x-ray spectrum and the K_α emission from a buried Mo layer were measured to infer the hot-electron temperature and the fraction of total laser energy converted to TPD hot electrons. Optical emission at $\omega/2$ correlated with the time-dependent hard x-ray signal confirms that TPD is responsible for the hot-electron generation. The effect of laser beam angle of incidence on TPD hot-electron generation was assessed, and the data show that the beam angle of incidence did not have a strong effect. These results will be used to benchmark simulations of TPD hot-electron production at conditions relevant to PDD ignition-scale implosions. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

M.J. Rosenberg
Laboratory for Laser Energetics, U. of Rochester

Date submitted: 20 Jul 2015 Electronic form version 1.4