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Laser–Plasma Interaction Experiments at Direct-Drive Ignition-Relevant Plasma Conditions at the National Ignition Facility A.A. SOLODOV, M.J. ROSENBERG, J.F. MYATT, J.G. SHAW, W. SEKA, R. EPSTEIN, R.W. SHORT, R.K. FOLLETT, S.P. REGAN, D.H. FROULA, P.B. RADHA, Laboratory for Laser Energetics, U. of Rochester, P. MICHEL, T. CHAPMAN, M. HOHENBERGER, LLNL — Laser–plasma interaction (LPI) instabilities, such as stimulated Raman scattering (SRS) and two-plasmon decay, can be detrimental for direct-drive inertial confinement fusion because of target preheat by the high-energy electrons they generate. The radiation–hydrodynamic code *DRACO* was used to design planar-target experiments at the National Ignition Facility that generated plasma and interaction conditions relevant to ignition direct-drive designs ($I_{\mathrm{L}} \sim 10^{15}\,\mathrm{W/cm^2}$, $T_{\mathrm{e}} > 3$ keV, density gradient scale lengths of $L_{\mathrm{n}} \sim 600$ μm). Laser-energy conversion efficiency to hot electrons of ∼0.5% to 2.5% with temperature of ∼45 to 60 keV was inferred from the experiment when the laser intensity at the quarter-critical surface increased from ∼6 to $15 \times 10^{14}\,\mathrm{W/cm^2}$. LPI was dominated by SRS, as indicated by the measured scattered-light spectra. Simulations of SRS using the LPI code *LPSE* have been performed and compared with predictions of theoretical models. Implications for ignition-scale direct-drive experiments will be discussed. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

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