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Hot-electron preheat and energy deposition in direct-drive implosion experiments at the National Ignition Facility[1] A.A. SOLODOV, M.J. ROSENBERG, A.R. CHRISTOPHERSON, R. BETTI, M. STOECKL, W. SEKA, R. EPSTEIN, R.K. FOLLETT, P.B. RADHA, S.P. REGAN, D.H. FROULA, J.P. PALASTRO, V.N. GONCHAROV, Univ of Rochester, J.F. MYATT, Univ of Alberta, M. HOHENBERGER, B. BACHMANN, P. MICHEL, LLNL — Laser–plasma instabilities 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 in polar-direct-drive implosions an experimental platform at the National Ignition Facility has been developed and fielded to study the hot-electron energy deposition in an unablated shell. The target consists of an outer plastic ablator and an inner Ge-doped plastic layer (payload). Hot-electron transport and energy deposition in the imploded shell is studied by comparing hard x-ray production between the mass-equivalent plastic and multilayer implosions. The experiments demonstrate how the divergence of hot electrons and the extent to which they slow down in the ablator reduce the preheat. Measurements indicate that 0.28±0.05% of laser energy is deposited in the unablated shell, with 0.1±0.04% deposited in the outer 20% portion and 0.18±0.03% deposited in the inner 80% of the imploding shell. This platform will be used to study hot-electron preheat mitigation using buried mid-Z layers in the ablator.

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