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Direct measurement of the effect of early time hot electron preheat on a deuterium-tritium cryogenic ice layer JAMES ROSS, HARRY ROBEY, JOHN MOODY, PETER CELLIERS, LAURENT DIVOL, LAURA BERZAK-HOPKINS, SEBASTIEN LE PAPE, Lawrence Livermore National Laboratory, MATTHIAS HOHENBERGER, Laboratory for Laser Energetics, JOE RALPH, OTTO LANDEN, JOHN EDWARDS, Lawrence Livermore National Laboratory — The direct effect of early time supra-thermal electron preheat on a deuterium-tritium (DT) cryogenic ice layer has been measured for the first time in indirect drive inertial confinement fusion experiments on the National Ignition Facility. Controlled changes in the early-time laser power are used to vary the hot electron (E > 170 keV) energy over the range of <1 J to 27 J. At the 27 J energy level the DT ice layer was measured to expand from the initial thickness of 71.5 μm to a thickness of 82.4 μm prior to the breakout of the first laser generated shock using the layered keyhole platform. There was no measurable expansion of the DT ice layer when the hot electron level was 5 J or less. Hot electron levels >5 J increase the entropy of the fuel and can significantly degrade the quality of the implosion. The experimental results are compared to post shot simulations.

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