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Cryogenic THD and DT layer implosions with high density carbon ablators in near-vacuum hohlraums[1] N.B. MEEZAN, L.F. BERZAK HOPKINS, S. LE PAPE, S.F. KHAN, A.E. PAK, L. DIVOL, D.D. HO, T. MA, T. DOEPPNER, J.R. RYGG, J.E. FIELD, O.S. JONES, J.L. MILOVICH, B.J. KOZIOZIEMSKI, A.V. HAMZA, A.J. MACKINNON, W.W. HSING, M.J. EDWARDS, Lawrence Livermore National Laboratory — High Density Carbon (HDC or diamond) is a promising ablator material for use in near-vacuum hohlraums, as its high density allows for ignition designs with laser pulse durations < 10 ns. A series of experiments in 2013 on the National Ignition Facility culminated in a DT layered implosion driven by a 6.5 ns, 2-shock laser pulse. This talk describes these experiments and comparisons with the design code HYDRA. Backlit radiography of a THD layered capsule demonstrated an ablator implosion velocity of 385 km/s with a slightly oblate hot spot shape; however, other diagnostics suggested an asymmetric compressed fuel layer. The streak camera-based SPIDER diagnostic showed a double-peaked history of the capsule self-emission. Simulations suggest that this is a signature of a low-temperature hot spot. Changes to the laser pulse-shape and pointing for a subsequent DT implosion resulted in a higher temperature, prolate hot-spot and a thermonuclear yield of 1.8×10^{15} neutrons.

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Nathan Meezan
Lawrence Livermore National Laboratory

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