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Design of multi-axis keyhole experiments for benchmarking L-band x-ray preheat in double shell implosions ERIC LOOMIS, DOUG WILSON, JOSH SAUPPE, RYAN SACKS, ELIZABETH MERRITT, DAVID MONTGOMERY, TANA CARDENAS, Los Alamos National Laboratory, JEREMY KROLL, Lawrence Livermore National Laboratory, PAUL KEITER, SEAN FINNEGAN, STEVE BATHA, JOHN KLINE, Los Alamos National Laboratory — Double shell implosions rely on the efficient transfer of kinetic energy from an outer shell to an inner shell in order to generate the conditions for a burning fusion plasma. With indirect-drive methods used at the National Ignition Facility (NIF) laser heating of the Au hohlraum plasma can generate significant fractions of M-band (2-5 keV) and L-band (9-12 keV) hard x-rays that may affect the shell collision process. The magnitude and symmetry of L-band is especially concerning due to its ability to readily penetrate Al outer shells and deposit its energy within the high-atomic-number inner shell. This deposition and subsequent outward expansion can alter in-flight density profiles and have significant impact on hydrodynamic stability [J.L. Milovich et al., Phys. Plasmas 11 (2004)]. Non-LTE x-ray emission and transport being notoriously challenging to simulate makes L-band preheating of the inner shell a critically important uncertainty that limits our ability to reliably simulate many double shell physics processes. We have measured early time expansion of a W inner shell along the equatorial axis finding about 3x lower expansion velocities than predicted by integrated hohlraum simulations. In this presentation we will discuss these results further as well as designs for upcoming multi-axis preheat symmetry measurements.

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