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Proton Radiography of Spontaneous Fields, Plasma Flows and Dynamics in X-Ray Driven Inertial-Confinement Fusion Implosions[1]

C.K. LI, F.H. SEGUIN, J.A. FRENJE, M. ROSENBERG, A.B. ZYLSTRA, H.G. RINDERKNECHT, R.D. PETRASSO, PSFC-MIT, P.A. AMENDT, O.L. LANDEN, R.P.J. TOWN, LLNL, R. BETTI, J.P. KNAUER, D.D. MEYERHOFER, LLE-UR, C.A. BACK, J.D. KILKENNY, A. NIKROO, GA — Backlighting of x-ray-driven implosions in empty hohlraums with mono-energetic protons on the OMEGA laser facility has allowed a number of important phenomena to be observed. Several critical parameters were determined, including plasma flow, three types of spontaneous electric fields and megaGauss magnetic fields. These results provide insight into important issues in indirect-drive ICF. Even though the cavity is effectively a Faraday cage, the strong, local fields inside the hohlraum can affect laser-plasma instabilities, electron distributions and implosion symmetry. They are of fundamental scientific importance for a range of new experiments at the frontiers of high-energy-density physics. Future experiments designed to characterize the field formation and evolution in low-Z gas fill hohlraums will be discussed.

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