Spectrally Resolved Imaging of X-Ray Self Emission from NIF Implosions

T. MA, N. IZUMI, D.K. BRADLEY, C.J. CERJAN, S. DIXIT, O.L. LANDEN, A.J. MACKINNON, N.B. MEEZAN, R.R. PRASAD, P.T. SPRINGER, R.P.J. TOWN, S.V. WEBER, S.H. GLENZER, Lawrence Livermore National Laboratory, J.L. KLINE, G. KYRALA, Los Alamos National Laboratory — Accurately assessing and optimizing the implosion performance of inertial confinement fusion capsules is a crucial step to achieving ignition on the NIF. We have applied differential filtering (matched Ross filter pairs) to provide spectrally resolved time-integrated absolute emission images of the imploded core of cryogenic layered targets. By limiting the spectral range of imaging, we can diagnose the hydrodynamic mix of Ge-doped ablator mass within the hot spot, core symmetry without interpenetration mix, shell assembly, and distribution of temperature and hot spot mass. Further, the measured brightness of Ge K-shell emission and bremsstrahlung allows for the inference of burn-weighted electron temperature, hot spot mass, rhoR, density, and pressure. Experimental results and a simple hot spot pressure model will be presented.

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