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Demonstration of x-ray fluorescence imaging to diagnose high-energy-density plasmas M.J. MACDONALD, P.A. KEITER, University of Michigan, D.S. MONTGOMERY, Los Alamos National Lab, M.M. BIENER, Lawrence Livermore National Lab, J.R. FEIN, University of Michigan, K.B. FOURNIER, Lawrence Livermore National Lab, E.J. GAMBOA, SLAC National Accelerator Lab, S.R. KLEIN, C.C. KURANZ, H.J. LEFEVRE, M.J.-E. MANUEL, University of Michigan, J. STREIT, Schafer Corporation, W.C. WAN, R.P. DRAKE, University of Michigan — X-ray diagnostic techniques are widely used to diagnose high-energy-density experiments. Radiography is used to create 2D images of plasma density using the relative transmission of the source x-rays, but the path-integrated nature of this process limits its usefulness when diagnosing large-volume or geometrically-complex targets. A technique capable of measuring local conditions is required to characterize plasmas in these geometries. Here we describe an x-ray fluorescence imaging (XRFI) diagnostic that uses a collimated probe beam to sample a small portion of the system [1]. The x-ray fluorescence induced in the probed region was used to calculate material density, shock velocity, and temperature simultaneously using an imaging x-ray spectrometer. Data from recent experiments performed at the Trident laser facility at Los Alamos National Lab will be presented. *This work is funded by the NNSA-DS and SC-OFES Joint Program in HED Laboratory Plasmas, grant number DE-NA0001840 and supported by the NSF GRFP Grant No. 2013155705.

[1] L.J. Suter et al. Rev. Sci. Inst. 70, 663 (1999), N.E. Lanier et al. Rev. Sci. Inst. 74, 2169 (2003).

M. J. MacDonald
University of Michigan, Ann Arbor, MI

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