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X-ray diffraction measurements of polycrystalline diamond near the Hugoniot elastic limit under shock compression M. J. MACDONALD, Univ of Michigan - Ann Arbor, E. E. MCBRIDE, Helmholtz Zentrum Dresden-Rossendorf, P. SUN, Stanford University, M. GAUTHIER, E. J. GAMBOA, SLAC National Accelerator Lab, D. KRAUS, Helmholtz Zentrum Dresden-Rossendorf, W. SCHUMAKER, SLAC National Accelerator Lab, J. VORBERGER, Helmholtz Zentrum Dresden-Rossendorf, E. GALTIER, T. B. VAN DRIEL, X. ZHOU, E. GRANADOS, I. NAM, SLAC National Accelerator Lab, R. P. DRAKE, Univ of Michigan - Ann Arbor, S. H. GLENZER, L. B. FLETCHER, SLAC National Accelerator Lab
— Direct measurements of the crystal structure under dynamic compression can be made using angularly resolved x-ray scattering at the MEC instrument at LCLS. Diffraction from several lattice planes using the x-ray beam at LCLS enabled time resolved measurements of elastic and plastic waves in polycrystalline diamond near the Hugoniot elastic limit. The behavior of diamond in these conditions is important to the understanding of the early stages of compression in inertial confinement fusion targets, meteorite impact events, and planetary interiors. Data were analyzed in the Reuss limit as described in a recent publication [M. J. MacDonald et al., J. Appl. Phys. 119, 215902 (2016)] to model the stresses near the Hugoniot elastic limit. This material is based upon work supported by the NSF under Grant No. 2013155705. This work was supported by the DOE Office of Science, FES under FWP 100182, by the NNSA-DS and SC-OFES Joint Program in HED Laboratory Plasmas, Grant No. DE-NA0002956, and used resources of the NERSC under Contract No. DE-AC02-05CH11231.

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