

Abstract Submitted
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High spatial and temporal resolution phase contrast imaging of shock wave using the LCLS beam¹ HAE JA LEE, E. GALTIER, B. NAGLER, A. SCHROPP, J.B. HASTINGS, R.W. LEE, SLAC National Accelerator Laboratory, G.W. COLLINS, Y. PING, Lawrence Livermore National Laboratory, C.G. SCHROER, Technische Universität Dresden — A new technique using the Linac Coherent Light Source (LCLS), the x-ray free electron laser source, was developed at Matter in Extreme Conditions (MEC) endstation to provide high spatial and temporal resolution phase contrast imaging of shock waves in matter. The LCLS has high peak brightness enabling a high beam current of a few mJ/pulse to be focused into a small spot to achieve high imaging resolution $< 1 \mu\text{m}$. 150 ps, 140 mJ, 800 nm short pulse laser beam was focused to produce shock waves in a material. We collected the first high resolution phase contrast movies of shock propagation inside materials. These results provide the first in-situ imaging of the shock front width, deformation length and time scale behind the shock of materials with free electron laser.

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