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X-ray scattering measurements of laser-driven shock compressed plastic and deuterated plastic targets MAXENCE GAUTHIER, LUKE FLETCHER, ALESSANDRA RAVASIO, SLAC National Accelerator Laboratory, TILO DÖPPNER, Lawrence Livermore National Laboratory, SIEGFRIED GLENZER, SLAC National Accelerator Laboratory, HED SCIENCE COLLABORATION
— The study of materials under extreme conditions, i.e., high energy density, has gathered enormous scientific interest in various domains from inertial confinement fusion to planetary physics. The material response of plastic to shock and its behavior is important because of its common use as an ablator in inertial confinement fusion experiments. In this study, simultaneous measurements of spectrally and wavenumber resolved x-ray scattering emission from laser-shock compressed plastic foils allow us to study the structural transition from a polymer to a liquid-like state. The 527 nm, 2 GW laser system available at the MEC station of the LCLS facility has been used to compress CH and CD foils using laser-driven shocks. 40 to 57 μm thick CH and CD targets were compressed using 3 ns square pulses with total laser energy of 6 J per beam. A drive intensity of $3x10^{13}$ W/cm^2 on each irradiated surface was used to generate high-pressure shock waves into the sample, while 8 keV x-rays from LCLS was used to probe the target.

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