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Development of 2D Shocks with Tunable Geometry and Profiles LEORA COOPER, MIT, EMMA MCBRIDE, European XFEL, SLAC, DMITRO MARTYNOWYCH, MIT, SUZANNE ALI, LLNL, ARIANNA GLEASON, LANL, MARYLESA HOWARD, National Securities Technology, BENJAMIN OFORI-OKAI, SLAC, MIT, KEITH NELSON, MIT — We have developed an experimental setup to generate and measure 2D-confined shocks with adjustable spatial geometry and temporal profile. The technique is demonstrated for waveguide shocks in three geometries: planar, colliding planar, and cylindrically converging. The shock profile for the waves may be temporally adjusted to set the duration of the stable high-pressure period and the onset of release. The laser-induced shock is generated with an intense pump laser pulse by imaging a partially reflecting mask onto an absorbing sample layer. The mask sets the geometry of the shock by specifying the spatial shape of the drive laser (e.g. a linear or ring pattern of light) on the sample. Absorption-induced volume changes generate the shock within the thin sample layer. Confinement of the shock within the sample occurs through the high impedance mismatch between the layer and stiff surrounding substrates. The method is demonstrated for liquid and solid samples using phase and amplitude-sensitive single-shot multi-frame imaging.

Leora Cooper
Massachusetts Inst of Tech-MIT

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