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Laser-driven shock waves in a thin liquid layer DAVID VEYSSET, THOMAS PEZERIL, GAGAN SAINI, STEVE KOOI, KEITH NELSON, MIT — Optical shock generation and imaging techniques have been developed to allow direct real-time visualization of a converging shock front in a few micron thick liquid layer. The optical set-up includes an axicon that focuses an intense picosecond excitation pulse into a ring-shaped pattern in a water layer. Optical excitation induces a shock wave that propagates in the plane of the sample and converges toward the center resulting in cylindrical focusing of the shock front. Streak-camera images with a quasi-cw probe beam yielded real-time continuous time-resolved images of the entire shock propagation. Talbot imaging and interferometry with a femtosecond probe pulse were used to obtain full field images at variable delays. Shock pressure values calculated from the velocity of the shock front were found in agreement with refractive index changes determined from interferometric images, demonstrating the effect of shock focusing. The configuration of the experiment provides ample access for optical diagnostics of the shocked material and can be combined with a wide range of spectroscopic probes.

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