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Laser-driven focusing shock waves in a thin liquid layer[1] DAVID VEYSSET, THOMAS PEZERIL, GAGAN SAINI, STEVEN KOOI, ALEX MAZNEV, KEITH NELSON, Massachusetts Institute of Technology — Direct real-time visualization of converging shock waves in a few micron thick liquid layer is demonstrated in an all-optical experiment. The 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 yield real-time records of the entire shock propagation. Talbot imaging and interferometry with a femtosecond probe pulse are used to obtain full field images at variable delays. Shock pressure values calculated from the velocity of the shock front demonstrate the effect of shock focusing and agree with density profiles obtained by quantitative analysis of interferometric images. 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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Alexei Maznev
Massachusetts Institute of Technology

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