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Laser-driven focusing surface shock waves in glass DAVID VEYSSET, ALEX MAZNEV, MIT, THOMAS PEZERIL, Université du Maine, STEVE KOOI, KEITH A. NELSON, MIT — Direct real-time visualization of converging surface shock waves in glass is demonstrated in an all-optical experiment. The optical set-up includes an axicon that focuses an intense picosecond excitation pulse into a ring-shaped pattern at the surface of a gold coated glass substrate. Optical excitation induces a surface acoustic wave that propagates in the plane of the sample and converges toward the center resulting in cylindrical focusing of the shock front. The nonlinear evolution of the SAWs and the shock formation is observed at the micro-scale using interferometry with a femtosecond probe pulse at variable delays. A series of images is obtained tracing the converging wave as it collapses in the focal point. The quantitative analysis of the full-field images provides direct information about the surface displacement and the shock velocity. The results open the prospect of spatially resolved studies of shock-compressed materials in a small-scale all-optical experiment.

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