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**Single Shot Dynamic Ellipsometry Measurements of Laser-Driven Shock Waves**

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A technique has been developed to measure the time-resolved position of a laser-driven shock wave and the subsequent material flow. Ultrafast Dynamic Ellipsometry using a chirped femtosecond laser pulse probes picosecond material dynamics in a single shot by capitalizing on the refractive index changes in the material. For transparent materials, the shock velocity, the particle velocity, and the shocked material's refractive index are extracted. A range of Hugoniot data is measured by taking advantage of the Gaussian spatial profile of the shock-driving laser that generates a distribution of pressures in the shocked media. Details of the experimental technique will be presented along with results from its application to transparent thin films.