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Measurement of Stellar Opacities with Short-Pulse Lasers[1]
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— Radiative opacity is a key physical property determining the structure and evolution of stars. It is fundamental to check the theoretical opacities that are used in stellar models with direct experimental measurements. Due to a disagreement between model predictions and helio-seismic observations, there is current interest in opacity in the radiative zone of the Sun. Previous experimental techniques, based on long pulse lasers and Z-pinch machines cannot easily obtain the high temperatures and densities required to address this problem. A complementary technique using short-pulse lasers can access higher temperature and density regimes. We discuss radiation-hydrodynamic simulations of such experiments, considering a range of laser and target parameters. We present experimental designs that can achieve the conditions of the upper radiative zone of the Sun with sufficient spatial and temporal uniformity to enable accurate opacity measurements.

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