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12.35 Measuring the optical conductivity of strongly coupled plasmas with steepened density gradient

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Studying the optical conductivity of strongly coupled plasma as function of density is important to understand and model warm dense matter [1]. In high-intensity ultrafast laser excited solids, self-similar plasma expansion occurs in picosecond time scale after the sample is molten, resulting in steepened density gradients [2]. Here we report a new method combining single-shot frequency domain interferometry (FDI) [3] and reflectivity/transmissivity [4] measurements to probe the expanding plasma. The measured observables are dictated by the profile of the conductivity gradient. Such measurements will provide important tests to theoretical simulations of optical conductivities as a function of plasma densities [5-8].

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