

Abstract Submitted  
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**Optical Probing of Meter Scale Beam Driven Plasma Wakefield Accelerator** RAFAL ZGADZAJ, ZHENGYAN LI, M.C. DOWNER, University of Texas at Austin, SPENCER GESNER, SEBASTIEN CORDE, MIKE LITOS, CHRISTINE CLARKE, MARGAUX SCHMELTZ, JAMES ALLEN, SELINA GREEN, MARK HOGAN, VITALY YAKIMENKO, Stanford Linear Accelerator Center, E224 TEAM — We report results of optical visualization experiment at the FACET/SLAC user facility. Experiment E224, carried out in parallel to the ongoing e-beam driven wakefield experimental campaign at FACET, has the aim of optically observing both the short term and long term plasma structure produced by the e-beam driver. The SLAC plasma wakefield experiments have demonstrated the highest energy gain to date and continue work on further optimization. Direct visualization of the plasma wake structure would aid in the understanding of the dynamics of the beam plasma interaction and acceleration, and its optimization. It also would serve to benchmark simulations results which have been so far the main window into visualizing the beam plasma interaction. We will describe the optical probing geometry used in this initial run, a variation of a method previously developed in our group [1], as governed by the unique experimental challenges of the FACET beam driven experiments in their current configuration. We will discuss the current results, the limitations of the current experimental configuration, and the changes planned for future experiments.

[1] Z. Li, et al., “Single-shot visualization of evolving, light-speed structures by multiobject-plane phase-contrast imaging,” *Opt. Lett.* 38, 5157-5160 (2013).

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