

Abstract Submitted
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Recent results from optical probe measurements of PWFA at FACET RAFAL ZGADZAJ, M.C. DOWNER, University of Texas at Austin, ZHENGYAN LI, National Research Council of Canada, SPENCER GESSNER, JAMES ALLEN, MIKE LITOS, ERIK ADLI, CHRISTINE CLARK, SELINA GREEN, MARK HOGAN, VITALY YAKIMENKO, SLAC National Laboratory — We report first MOPI (multi object plane imaging,[1]) optical probe measurements of plasma structures in electron beam driven plasma acceleration (PWFA) experiments performed at the FACET facility in SLAC. Experiments were performed in hydrogen and Argon, using FACET's 20.35 GeV electron beam. Plasma structures were observed with laser pre-ionization and electron beam self-ionization, and at densities as low as $\sim 2 \cdot 10^{17} \text{ cm}^{-3}$. Under some conditions instabilities imprint a transverse structure in the plasma column whose evolution is directly observable. The measurements also allow the study of long term evolution of the plasma column, which is an important factor limiting the maximum operating rate of possible future PWFA based colliders.

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

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