

Abstract Submitted
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Optical Frequency Domain Visualization of Electron Beam Driven Plasma Wakefields RAFAL ZGADZAJ, M.C. DOWNER, UT Austin, PATRIC MUGGLI, USC, VITALY YAKIMENKO, MARCUS BABZIEN, KARL KUSCHE, MIKHAIL FEDURIN, BNL/ATF — Beam-driven plasma wakefield accelerators (PWFA), such as the “plasma afterburner,” are a promising approach for significantly increasing the particle energies of conventional accelerators. The study and optimization of PWFA would benefit from an experimental correlation between the parameters of the drive bunch, the accelerated bunch and the corresponding, accelerating plasma wave structure. However, the plasma wave structure has not yet been observed directly in PWFA. We will report our current work on noninvasive optical Frequency Domain Interferometric (FDI) and Holographic (FDH) visualization of beam-driven plasma waves. Both techniques employ two laser pulses (probe and reference) co-propagating with the particle drive-beam and its plasma wake. The reference pulse precedes the drive bunch, while the probe overlaps the plasma wave and maps its longitudinal and transverse structure. The experiment is being developed at the BNL/ATF Linac to visualize wakes generated by two and multi-bunch drive beams.

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