

Abstract Submitted  
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**Laser Wakefield Electron Acceleration and Frequency-Domain Holography Using the 1.1 PW Texas Petawatt Laser System** STEPHEN REED, WATSON HENDERSON, XIAOMING WANG, PENG DONG, SERGUEI KALMYKOV, ERHARD GAUL, MIKAEL MARTINEZ, GENNADY SHVETS, TODD DITMIRE, MICHAEL DOWNER, DEPARTMENT OF PHYSICS, UNIVERSITY OF TEXAS AT AUSTIN, AUSTIN, TX 78712-1081 TEAM — Preparation for multi-GeV electron acceleration in an underdense plasma driven by the 1.1 PW, 160 fs Texas petawatt laser system will be presented. Laser wakefield acceleration (LWFA) experiments have demonstrated 1 GeV electron beams with multi-TW class lasers and scaling laws suggest, that 3 - 10 GeV electrons can be produced with a short pulse PW system without external guiding. The Texas Petawatt laser uses an F/# 40 focusing geometry creating a long interaction and transverse region while still maintaining intensities above  $10^{19}$  W/cm<sup>2</sup>. Such geometry creates an opportunity to “image” the large wakefield structures using the single shot visualization technique of frequency-domain holography (FDH) in the longitudinal direction. The presented material will include details of the Texas petawatt laser systems, experimental setup and designs for electron generation and detection, FDH measurements and PIC simulations of laser wakefield acceleration for the given laser parameters, as well as preliminary results from anticipated test runs during the fall of 2009.

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