Abstract Submitted
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Multi-GeV electron acceleration driven by the Texas Petawatt laser[1] X. WANG, D. DU, S.A. YI, E. D'AVIGNON, S. KALMYKOV, S. REED, W. HENDERSON, P. DONG, R. ZGADZAJ, G. DYER, E. GAUL, M. MARTINEZ, T. DITMIRE, G. SHVETS, M. DOWNER, Department of Physics, University of Texas at Austin — We present the preparation for high energy (multi-GeV) electron generation in underdense plasmas interacting with 1PW, 150fs Texas Petawatt laser pulses. Electron laser wakefield acceleration experiments have demonstrated that 1GeV electron beams can be produced with multi-TW class laser systems. Scaling laws and simulations have predicted that 3-10GeV electrons can be generated with a short pulse PW laser system without any external guiding mechanism. The Texas Petawatt system has an F /40 focusing geometry, which along with laser self-guiding creates a long laser plasma interaction length while still maintaining intensity above 10^{19}W/cm^2. This configuration also creates an opportunity to "visualize" the plasma wakefield structures using the single shot frequency-domain holography (FDH) technique. This presentation includes the Texas Petawatt laser, laser wakefield experimental setup, plasma diagnostic setup and anticipated preliminary experimental results during 2010. Particle-in-cell (PIC) simulations of laser wakefield electron acceleration and the FDH diagnostic are also presented.

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