Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Controlling the Direct Laser Acceleration Inside a Plasma Bubble Using Lasers' Polarization and Wavelength XI ZHANG, VLADIMIR KHUDIK, RAFAL ZGADZAJ, AARON BERNSTEIN, MIKE DOWNER, GENNADY SHVETS, The University of Texas at Austin — The combination of the direct laser acceleration and laser wakefield acceleration (DLA and LWFA) mechanisms has been recently proposed [1,2] for increasing the total electron energy gain. Here we will report on the effects of the polarization and wavelength of the DLA pulse on the properties of the accelerated beam. Specifically, we address the moderate-power regime, where the laser powers of the leading LWFA and the trailing DLA pulses are not very much larger than the critical power. Three cases will be discussed: (a) the DLA pulse has the same wavelength and polarization as the LWFA pulse, (b) the wavelengths are the same but the polarizations are orthogonal, and (c) the wavelength of the DLA pulse is twice shorter than that of the LWFA pulse. LWFA via particle-in-cell (PIC) simulations. It is found that both (b) and (c) scenarios result in higher tolerance to pulse-delay jitter. The most promising scenario is (c) because it enables higher final electron bunch energy and charge.This work is supported by the US DOE grant DE-SC0007889 and the AFOSR grant FA9550-14-1-0045. [1] X. Zhang, V. N. Khudik and G. Shvets, Phys. Rev. Lett. , 184801 (2015). [2] X. Zhang, V. N. Khudik, A. Pukhov and G. Shvets, Plasma Phys. Control. Fusion 58 034011 (2016)

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Date submitted: 19 Jul 2016 Electronic form version 1.4