Abstract Submitted
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Backward Raman Amplifier for Laser Wakefield Accelerator JOSHUA LUDWIG, Theoretical Physics Institute, Department of Physics, University of Alberta, Edmonton, Canada, PAUL-EDOUARD MASSON-LABORDE, CEA DAM DIF, STEFAN HULLER, Centre de Physique Theorique, Ecole Polytechnique, Palaiseau, France, WOJCIECH ROZMUS, Theoretical Physics Institute, Department of Physics, University of Alberta, Edmonton, Canada, SCOTT C. WILKS, Lawrence Livermore National Laboratory, Livermore, USA — Particle in cell simulations via SCPIC [1] and theoretical work on Raman amplification and laser wake field acceleration will be presented. Laser energy depletion has been shown to be a limiting factor during wake field acceleration [2]. This work focuses on optimizing parameters for Raman amplification to work in conjunction with wake field acceleration in order in order to sustain an accelerating laser pulse as it generates plasma waves. It has been shown that laser pulses undergo red shifting during wake generation [2]. Our work demonstrates that this red shifting results in a detuning between pump and seed in the backward Raman Amplifier. This detuning limits the amount of energy that can be transferred from the pump to the seed, and places new limits on backward Raman amplification. To overcome this limiting factor, this study makes use of a chirped pump allowing for extended coupling to the accelerating pulse. Three wave coupling model of Raman amplifier with a frequency shift term due to wake field will also be discussed and compared with PIC simulations. [1] K. I. Popov et al, PHYSICAL REVIEW LETTERS 105, 195002 (2010) [2] B. A. Shadwick,C. B. Schroeder, and E. Esarey, PHYSICS OF PLASMAS 16, 056704 (2009)

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