Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Enhancement of Laser Wakefields via a Backward Raman Amplifier[1] JOSHUA LUDWIG, University of Alberta, PAUL-EDOUARD MASSON-LABORDE, Commissariat l'nergie Atomique , WOJCIECH ROZMUS, University of Alberta, STEFAN HULLER, Ecole Polytechnique, SCOTT WILKS, Lawrence Livermore National Laboratory — The Backward Raman Amplifier (BRA) is proposed as a possible scheme for improving laser driven plasma wakefields. One- and two-dimensional particle-in-cell code simulations with SCPIC [1] and a 3-Wave coupling model are presented and compared to demonstrate how the BRA can be applied to the laser wakefield accelerator (LWFA) in the non-relativistic regime to counteract limitations such as pump depletion, diffraction, and dephasing [2]. Simulation results show that amplification of the driving pulse is strongest in the central high amplitude portion, causing the pulse to shorten both transversely and longitudinally. This results in a reduction or alleviation of the effects of diffraction, an increase in wake amplitude and sustainability, and provides direct insight into new methods of controlling plasma wakes in LWFA and other applications. [1] K. I. Popov et al, Physical Review Letters 105, 195002 (2010) [2] E. Esarey, C. B. Schroeder, and W. P. Leemans, Rev. Mod. Phys. 81, 1229 (2009)

[1]JL is grateful for support from LLNL through the summer scholar program. JL and WR would like to acknowledge partial support from NSERC

Joshua Ludwig
University of Alberta

Date submitted: 14 Jul 2017 Electronic form version 1.4