Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Two-Stage Laser Wakefield Acceleration Experiments in the Bubble Regime B. POLLOCK, University of California, San Diego, J. MEINECKE, J. SHAW, University of California, Los Angeles, J. RALPH, Lawrence Livermore National Laboratory, C. CLAYTON, K. MARSH, C. JOSHI, University of California, Los Angeles, S. GLENZER, Lawrence Livermore National Laboratory, G. TYNAN, University of California, San Diego, D. FROULA, Laboratory for Laser Energetics
— We present experiments with the goal to produce high energy (∼500 MeV), narrow energy spread (<10%) electron bunches produced in a two-stage gas cell via Laser Wakefield Acceleration. The experiments are performed at the Jupiter Laser Facility, Lawrence Livermore National Laboratory, using the 800 nm, 200 TW, 60 fs Callisto laser focused onto the entance pinhole of the gas cell. The first stage is filled with He and <1% of a high-Z dopant gas, while the second stage is filled with pure He to balance the electron densities between the stages. Rather than injecting charge throughout the experiment, electrons are injected into the wake over a limited distance in the first stage by ionization-induced trapping of the dopant K-shell electrons at densities that are too low to self-trap He electrons (<3x10^{18} cm^{-3}). These electrons need to be coupled into the second stage, which continues to accelerate the bunch without contributing additional charge. Comparison to 3-D PIC simulations using OSIRIS are also presented. This work was performed under the auspices of the U.S. DoE by LLNL under Contract DE-AC52-07NA27344 and was partially funded by the Laboratory Directed Research and Development Program under project tracking code 06-ERD-056.

Bradley Pollock
University of California, San Diego

Date submitted: 19 Jul 2010 Electronic form version 1.4