Abstract Submitted for the DPP09 Meeting of The American Physical Society

Laser Wakefield Accelerator Injection Control and X-Ray Sources C.G.R. GEDDES, E. CORMIER-MICHEL, E.H. ESAREY, T. LE CORRE, C. LIN, N.H. MATLIS, K. NAKAMURA, G.R. PLATEAU, C.B. SCHROEDER, R.A. VAN MOURIK, W.P. LEEMANS, LBNL, D.B. THORN, GSI, D.L. BRUHWILER, B. COWAN, K. PAUL, J.R. CARY, Tech-X — Reduced beam energy spread, fluctuation, and emittance are important to applications of compact, high gradient laserplasma wakefield accelerators including Thomson gamma sources and high energy colliders. Experiments and simulations will be presented on control of injection to improve beam quality compared to use of self-injection by the wake. Trapping of electrons in the wake can be controlled using the beat between multiple laser pulses to via kick electrons in momentum and phase into the wake accelerating phase. Laser and gas target shaping and control are used to further control the accelerator structure. Simulations demonstrate the tuning of accelerator structure required to accelerate such bunches to high energies while retaining high bunch quality. Electron beam source size and position are measured using betatron X-ray emission produced when electrons oscillate in the focusing field of the wake to improve understanding of beam emittance and stability, while also producing a broadband, synchronized fs source of keV X-rays. Supported by US DOE NA-22 and HEP including DE-AC02-05CH11231, SciDAC, and SBIR.

> C.G.R. Geddes LBNL

Date submitted: 19 Jul 2009

Electronic form version 1.4