Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

**Direct Laser Acceleration in Laser Wakefield Accelerators** J.L. SHAW, D.H. FROULA, Laboratory for Laser Energetics, U. of Rochester, K.A. MARSH, C. JOSHI, UCLA, N. LEMOS, LLNL and UCLA — The direct laser acceleration (DLA) of electrons in a laser wakefield accelerator (LWFA) has been investigated. We show that when there is a significant overlap between the drive laser and the trapped electrons in a LWFA cavity, the accelerating electrons can gain energy from the DLA mechanism in addition to LWFA. The properties of the electron beams produced in a LWFA, where the electrons are injected by ionization injection, have been investigated using particle-in-cell (PIC) code simulations. Particle tracking was used to demonstrate the presence of DLA in LWFA. Further PIC simulations comparing LWFA with and without DLA show that the presence of DLA can lead to electron beams that have maximum energies that exceed the estimates given by the theory for the ideal blowout regime. The magnitude of the contribution of DLA to the energy gained by the electron was found to be on the order of the LWFA contribution. The presence of DLA in a LWFA can also lead to enhanced betatron oscillation amplitudes and increased divergence in the direction of the laser polarization. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

J.L. Shaw
Laboratory for Laser Energetics, U. of Rochester

Date submitted: 16 Jul 2017 Electronic form version 1.4