Simulation and calculation of particle trapping using a quasistatic simulation code[1] SEPEHR MORSHED, JOHN PALASTRO, THOMAS ANTONSEN, IREAP, University of Maryland, CHENGKUN HUANG, WARREN MORI, UCLA — In LWFA schemes the laser pulse must propagate several centimeters and maintain its coherence over this distance, which corresponds to many Rayleigh lengths. These Wakefields and their effect on the laser can be simulated in quasistatic approximation [1, 2]. In this approximation the assumption is that the driver (laser) does not change shape during the time it takes for it to pass by a plasma particle. As a result the particles that are trapped and moving with near-luminal velocity can not be treated with this approximation. Here we have modified the 2D code WAKE with an alternate algorithm so that when a plasma particle gains sufficient energy from wakefields it becomes trapped to satisfy the trapping conditions. Similar implementations have been made in the 3D cod QUICKPIC [2]. We also have done simulation and comparison of results for centimeter scale GeV electron accelerator experiments from LBL [3] with WAKE. These changes in WAKE will give users a tool that can be used on a desk top machine to simulate GeV acceleration. [1] P. Mora and T. M. Antonsen Jr., Phys Plasma 4, 217 (1997) [2] C. Huang et al. Comp Phys. 217 (2006) [3] W. P. Leemans et al. Nature Phys 2, 696 (2006) Letters

Sepehr Morshed
University of Maryland