Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Evolution of the laser pulse profile and spectrum in particle-in-cell simulations of laser-plasma accelerators[1] D.A. DIMITROV, R.E. GIACONE, D.B. BRUHWILER, J.R. CARY[2], P. MESSMER, C. NIETER, Tech-X Corp., C. GEDDES, E. ESAREY, W. LEEMANS, LBNL — Propagation of intense laser pulses in plasmas has demonstrated accelerating electric fields of the order of 100 GV/m and the production of high quality electron beams with energies near 100 MeV. Moreover, laser pulse guiding (by either self-focusing or plasma channels) is necessary to further increase the electron energy in laser-plasma accelerators. The laser wakefield excitation mechanism produces specific signatures in the frequency spectrum and intensity profile of the laser pulse. Thus, it is of considerable interest to determine the frequency spectrum and intensity profile of a guided laser pulse interacting with plasma. We discuss how the calculation of the spectrum of the laser intensity as a function of frequency or wavelength was implemented in the VORPAL PIC code and then applied to study the mode structure of laser pulses propagating in specific plasma density profiles. These results will be compared to laser-plasma accelerator experiments at LBNL and elsewhere.

[1]Work funded by DOE contract DE-FG03-02ER83557, SciDAC and use of NERSC.
[2]also with Univ. of Colorado

D. A. Dimitrov
Tech-X Corp.

Date submitted: 24 Aug 2005 Electronic form version 1.4