Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Fast Electron Transport with Ionization Effects and Proton Acceleration ALEX ROBINSON[1], Rutherford-Appleton Laboratory, TONY BELL, ROBERT KINGHAM, Imperial College London — In ultraintense laser-solid interactions ($> 10^{18}\mathrm{Wcm}^{-2}$), two of the phenomena of great interest are the absorption of laser energy into relativistic electrons and the emission of multi-MeV protons from the back of the target. We have studied both the role of ionization in fast electron transport, and the electrostatic acceleration of protons using kinetic simulation. We have developed a version of the Vlasov-Fokker-Planck code KALOS that includes ionization processes for studying fast electron transport. We have studied the propagation of fast electrons into an un-ionized carbon target. We find that ionization affects the electric field structure. This may have consequence for magnetic field generation in 2D and 3D. We have also developed a three species relativistic Vlasov solver for studying proton acceleration. We have studied the effect of varying the proton density of the target. The Gurevich-Mora model is good at high density, whereas at low proton density the maximum proton energy is reduced, and a definite peak in the spectrum is produced at the highest energy.

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Date submitted: 18 Jul 2005 Electronic form version 1.4