

Abstract for an Invited Paper
for the DPP07 Meeting of
The American Physical Society

Control of the Fast Electron Beam Divergence for Fast Ignition Inertial Fusion

PETER NORREYS, STFC Rutherford Appleton Laboratory

The fast electron beam divergence in intense laser-plasma interactions is a vital ingredient in determining the success of fast ignition inertial fusion. If it is too large, then the short pulse laser energy required to generate the temperatures needed for hot spark formation becomes impractical to implement on ignition scale facilities. In this talk, I will review the recent experiments performed on the Vulcan PW laser facility to investigate this question. The pulse duration was changed from 0.5 ps - 10 ps and a wide range of plasma diagnostics were fielded. An intensity dependence to the beam divergence has been identified for the first time from these measurements. Two dimensional particle-in-cell simulations reproduce this effect. I will present new ideas on how the divergence can be controlled and the fast electron transport collimated. These are supported by analytic theory and validated by hybrid Vlasov-Fokker-Planck and hybrid particle-in-cell modeling.