

Beam Current Effects on Inverse Bremsstrahlung Electron Acceleration*, R. PAKTER, MIT Plasma Science & Fusion Center, Cambridge, MA - In the inverse bremsstrahlung electron acceleration [1], high electron densities are necessary in order to obtain efficient energy transfer between the laser and the particle beam. However, beam plasma effects become pronounced at high densities, imposing a limitation on particle energy gain. In this paper, we analyze beam current effects in this acceleration scheme. In particular, a self-consistent one-dimensional Hamiltonian formalism that takes into account both particle and wave dynamics is developed. Results of the analysis are discussed for bunched and unbunched beams. A method is presented to overcome the limitation on particle energy gain imposed by beam plasma effects.

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[1] S. Kawatana, et al., Phys. Rev. Lett. 66, 2072 (1991); M.S. Hussein and M.P. Pato, *ibid.* 68, 1136 (1992).