

Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

New Spectral Method for Halo Particle Definition for Intense Charged Particle Beams¹ MIKHAIL DORF, RONALD DAVIDSON, EDWARD STARTSEV, Princeton Plasma Physics Laboratory — Spectral analysis of a mismatched charged particle beam has been utilized in particle-in-cell simulations performed with the WARP code. It is shown that the betatron frequency distribution function of a mismatched space-charge-dominated beam has a bump-on-tail structure attributed to beam halo particles. A new spectral method for halo particle definition is proposed in this work that provides the opportunity to carry out a quantitative analysis of halo particle production by beam mismatch. Furthermore, the spectral analysis of the mismatch relaxation process provides important insights into the emittance growth attributed to the halo formation and the core relaxation processes. Numerical simulations are performed using the smooth focusing approximation, which describes the average effects of an alternating-gradient lattice, and by using a full quadrupole focusing field model, taking into account the effects of the alternating-gradient quadrupole field.

¹Research supported by the U.S. Department of Energy.

Mikhail Dorf
Princeton Plasma Physics Laboratory

Date submitted: 12 Jul 2007

Electronic form version 1.4