

Halo Formation in Spheroidal Bunches with Self-Consistent Stationary Distributions,

A.V. FEDOTOV, R.L. GLUCKSTERN, Univ. of Maryland (College Park); S.S. KURENNOY, R.D. RYNE, LANL - A new class of self-consistent 6-D phase space stationary distributions is constructed both analytically and numerically. The beam is then mismatched longitudinally and/or transversely, and we explore the beam stability and halo formation for the case of 3-D axisymmetric beam bunches using particle-in-cell simulations. We concentrate on beams with bunch length-to-width ratios varying from 1 to 5, which covers the typical range of the APT linac parameters. We find that the longitudinal halo forms first for comparable longitudinal and transverse mismatches. An interesting coupling phenomenon - a longitudinal or transverse halo is observed even for very small mismatches if the mismatch in the other plane is large - is discovered.