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Beam Dynamics with Synchrotron Radiation

Saturday 16 November 2024 09:30 (1 hour)

Synchrotron radiation affects the motion of particles in storage rings in various ways. In the absence of radiation, particle motion is symplectic, and the beam emittances are conserved. In this lecture, it is shown that the inclusion of radiation effects in a classical approximation leads to emittance damping: expressions for the longitudinal and transverse damping times are derived. Then, it is shown that quantum radiation effects lead to excitation of the beam emittances. General expressions for the equilibrium longitudinal and horizontal (natural) emittances in a synchrotron storage ring are derived.

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