Electron Cloud Modeling for the ILC Damping Ring Lattice Designs

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Electron cloud buildup is a primary concern for the performance of the damping rings under development for the International Linear Collider. We have performed synchrotron radiation profile calculations for the 6.4-km DC04 and 3.2-km DSB3 lattice designs using the SYNRAD utility in the Bmad accelerator software library. These results are then used to supply input parameters to the electron cloud modeling package ECLOUD. Contributions to coherent tune shifts from the field-free sections, and from the dipole and quadrupole magnets have been calculated, as well as the effect of installing solenoid windings in the field-free regions. For each element type, SYNRAD provides ring occupancy, average beam sizes, beta function values, and beta-weighted photon rates for the coherent tune shift calculation. An approximation to the antechamber design has been implemented in ECLOUD as well, moving the photoelectron source point to the edges of the antechamber entrance and removing cloud particles which enter the antechamber.

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