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Analysis of Synchrotron Radiation using SYNRAD3D and Plans to Create a Photoemission Model

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Electron cloud data from electron rings suggest that the photoelectron model in electron cloud generation codes is incomplete. The photoelectron model will be important in modeling the cloud generation on components downstream of wigglers, which can produce a very high photon flux on the wall in a local region. The code SYNRAD3D has been developed in the context of the Bmad accelerator physics software library. SYNRAD3D includes computation of synchrotron radiation and propagation in 3D through a vacuum chamber. The probability of reflection vs. absorption of the photons on the chamber wall is included, using data from the literature. We used SYNRAD3D to model the photon flux for the ILC damping ring. For simplicity in modeling, we started with a round chamber and varied parameters such as the number of simulation-generated photons, bin size, photon energy cutoff, and whether photons reflect off the wall. With a realistic photon flux and distribution, we can study models for the photoemission. Preliminary work has begun to develop a photoelectron model using Retarding Field Analyzer (RFA) data. The work to date and future plans are described.

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