RECENT DEVELOPMENTS IN ELECTRON CLOUD MODELING FOR TIME-RESOLVED SHIELDED PICKUP MEASUREMENTS OF ELECTRON CLOUD BUILDUP AT CESRTA

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The Cornell Electron Storage Ring Test Accelerator (CesrTA) program includes investigations into the mitigation of electron cloud buildup using a variety of techniques in custom vacuum chambers. Two such chambers are equipped with pickup detectors shielded against the direct beam-induced signal. The signals recorded by a digitizing oscilloscope provide time-resolved information on cloud development. Results for diamond-like carbon, amorphous carbon, and titanium-nitride coatings have been obtained and compared to those for an uncoated aluminum chamber. Here we report on extensions to the ECLOUD modeling code which refine its description of a variety of new types of measurements, including the use of weak solenoidal fields to characterize the cloud kinetic energy, as well as in situ vacuum chamber comparisons. Our results highlight the sensitivity afforded by these measurements to model parameters such as the quantum efficiency for producing photoelectrons, their production location and energy distributions, as well as to the secondary yield properties of the coatings, including differentiating determination of the true secondary, rediffused, and elastic yield values.

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