Electron Cloud Simulations and RFA data analysis
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Electron Cloud Basics

• Primary Source: Synchrotron Light
• Charges accelerated by beam passage
• Secondary Electrons generated from high-velocity electrons impacting the beam pipe wall

• We are using ECLOUD V3.2 to model 2d electron cloud dynamics
• Sample ECLoUD output:
  • Showing the cloud density around the beampipe.
  • Rather than using individual Electrons, model using macro-particles with constant charge/mass ratio
RFA Basics

• RFA = Retarding Field Analyzer
• Basically consists of a retarding grid (negative charge) and a collector plate (positive charge)
• Retarding grid keeps out electrons below an energy cut-off
• Measure current on collector plate to find out how many electrons above cut-off energy
• Currently two kinds of RFAs in CESR

  – APS RFAs
    • been in use at the Advanced Photon Source at Argonne National Laboratory, many published results
    • rather bulky
    • use large wire screens for retarding grid

  – Cornell RFAs
    • Recently developed as a result of size considerations (need to fit inside the wiggler magnets that produce the synchrotron light)
    • Use very small etched screen for retarding grid
    • Being benchmarked against the APS style
Displays current on collector plate as a function of retarding grid voltage. This gives us an energy spectrum of the electrons.
My Role

• Run ECLOUD simulations with parameters relevant to the operation of CesrTA, and analyze the resulting data

• Aid in the collection of further data from the RFAs currently installed
  – Some difficulty exists with the newly installed RFAs, they may or may not produce data before the summer down

• Analyze and interpret RFA data
Any Questions?