Cornell University
Laboratory for Elementary-Particle Physics

Electron Cloud Simulations and RFA data analysis

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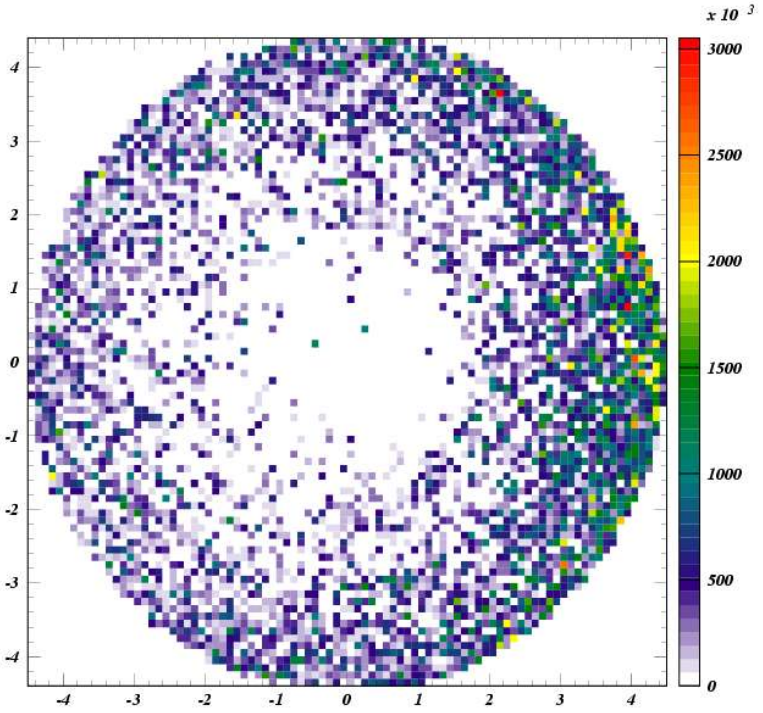


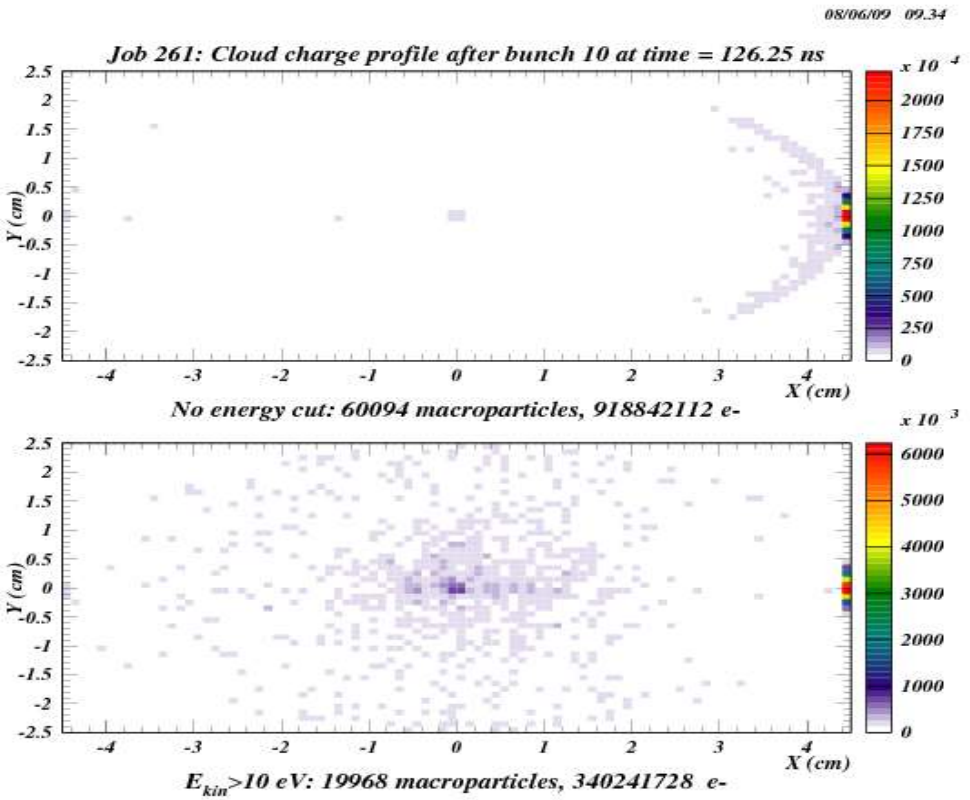
Electron Cloud Basics

- 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

ECLOUD Results

- 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

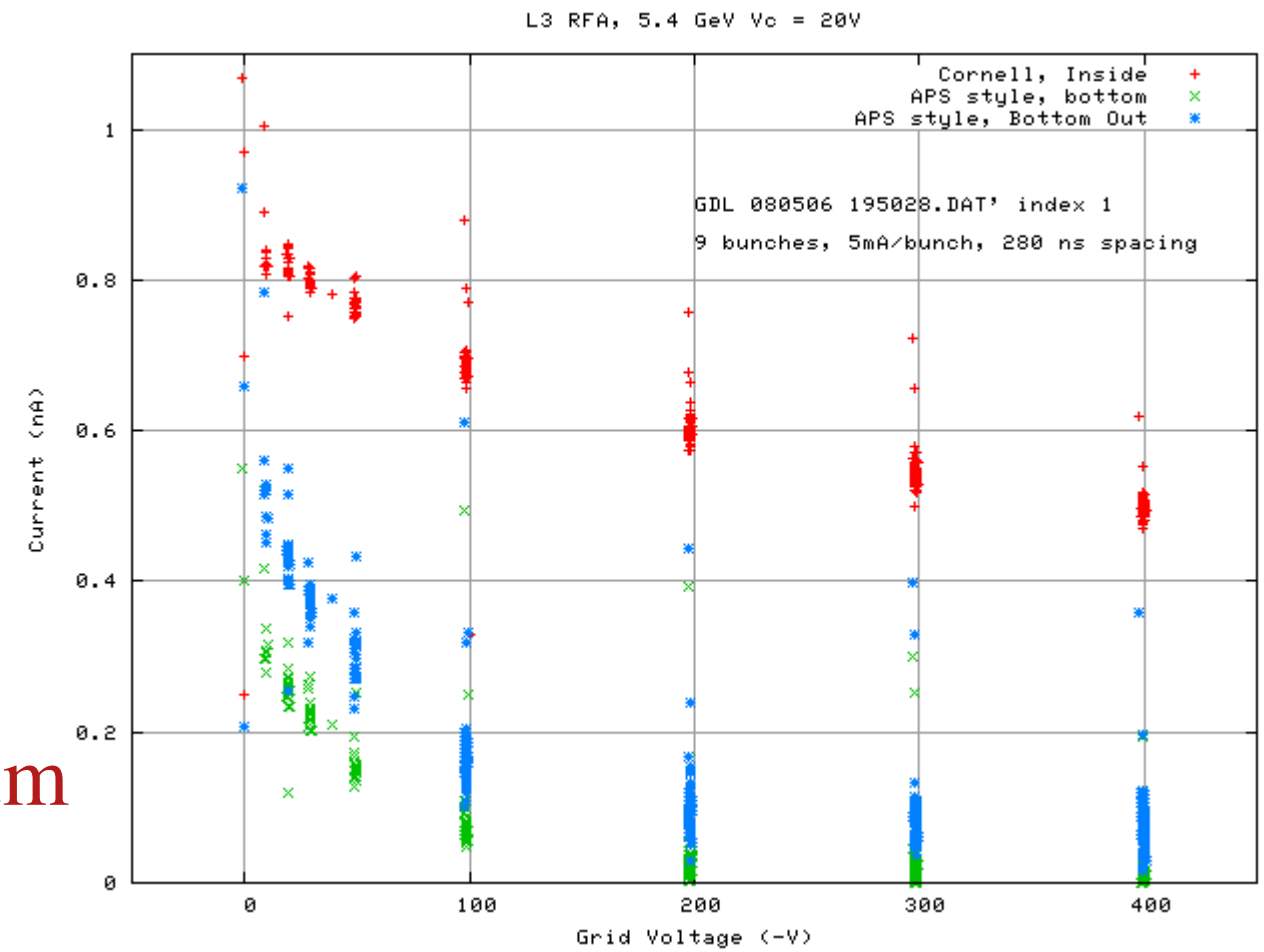
Types of RFAs

- 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

RFA Data

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

Questions?

Any Questions?