Studies of Electron Cloud Growth and Mitigation in a Field Free Environment Using Retarding Field Analyzers (10/12)

1. Introduction
   1. Electron cloud
   2. CesrTA
   3. RFAs
2. Drift RFA Hardware
   1. Drift RFA styles: APS, segmented I, thin, segmented II
   2. Bench tests
   3. 14E/W test sections
   4. 15E/W mitigation comparisons
   5. L3 NEG test section
3. Data acquisition system
   1. Electronics
   2. MATLAB GUI
4. Measurements
   1. Voltage scans (examples from each RFA type)
   2. Current scans
   3. Comparisons under different beam conditions (?)
      1. Bunch length, bunch spacing, beam energy, species, bunch charge
   4. Mitigation comparisons
      1. 14E Cu vs TiN
      2. 15E/W: Al, TiN, aC, DLC
      3. NEG chambers: activation?
5. RFA Modeling
   1. Blue room measurements
   2. Simulated model
      1. Beam pipe hole secondaries
      2. Non-ideal field
      3. Drift within RFA
6. Simulations
   1. Methodology
      1. Description of POSINST and synrad3d
      2. PEY and SEY parameters
      3. Advantages of integrated model
   2. Data fitting
      1. Procedure: chi squared minimization
      2. Different conditions sensitive to different parameters
      3. Show fits for a wide variety of beam conditions
      4. Best fit parameters
      5. Quantifying errors?

Studies of Electron Cloud Growth and Mitigation in Dipoles and Quadrupoles Using Retarding Field Analyzers (1/13)

1. Introduction
   1. Review of electron cloud, CesrTA, RFAs, DAQ system
2. Dipole RFA Hardware
   1. CESR dipole
   2. SLAC chicane
   3. 48E Quad
3. Measurements
   1. Voltage scans
   2. Current scans
   3. Interesting phenomena
      1. Bifurcation of central peak
      2. Cyclotron resonances
   4. Bunch spacing studies
      1. Multipacting resonances in dipole
      2. Cloud persistence in quad
   5. Mitigation comparisons
      1. Chicane comparison: bare Al, TiN coating, grooves + coating
      2. Quad comparison: bare Al vs TiN coating
4. RFA Modeling
   1. Blue room measurements?
   2. Simulated model
      1. Need to model exact hole locations
      2. “Trampoline” effect?
5. Simulations
   1. Review methodology
   2. Simulation of cyclotron resonances?
   3. Data fitting (?)
      1. Show fits for a wide variety of beam conditions
      2. Best fit parameters

Studies of Electron Cloud Growth and Mitigation in Wigglers Using Retarding Field Analyzers (4/13)

1. Introduction
   1. Review of electron cloud, CesrTA, RFAs, DAQ system
2. Wiggler RFA Hardware
   1. L0 and 19E wigglers
   2. Center pole, longitudinal, and intermediate RFAs
   3. Clearing electrode
3. Measurements
   1. Voltage scans
   2. Current scans
   3. Clearing electrode scans
   4. Interesting phenomena
      1. “Trampoline effect”
      2. Wiggler ramp studies
   5. Mitigation comparisons
      1. Bare Cu, TiN coating, grooves, grooves + coating, clearing electrode
4. RFA Modeling
   1. Marco’s wiggler model
   2. Blue room measurements?
5. Simulations
   1. Review methodology
   2. Christine’s simulations of longitudinal field region?
   3. Data fitting (?)
      1. Show fits for a wide variety of beam conditions
      2. Best fit parameters

Thesis (8/13)

1. Mainly just a compilation of the papers
2. Loose ends
   1. New measurements
   2. Detailed comparison with SPU, TE-Wave
   3. Any improvements to simulation
   4. Instability simulations?
   5. Ion effects?
   6. Implications for future machines