Summary

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CesrTA will address most of the highest priority R&D

- Demonstrate
  5-10 pm for positrons in a wiggler dominated ring
- Characterize electron cloud build up
  - Dipoles, drifts, quadrupoles, and wigglers at 5GeV
  - For both electrons and positrons
- Develop and test electron cloud suppression techniques
  - In superferric wigglers at 5GeV
- Develop modeling tools for electron cloud instabilities
- Determine electron cloud instability thresholds
  - For positrons in the ultra-low emittance regime
- Characterize ion effects
- Specify techniques for suppressing ion effects

- On a timescale consistent with an Engineering Design Report in 2010
Core needs of program

- **Low emittance tuning**
  - Survey equipment
  - Bunch by bunch beam position monitors
  - X-ray beam size monitor
  - Machine time

- **Electron cloud characterization**
  - Chambers to measure cloud density
  - Chambers designed to suppress cloud
  - Photon stop for 5GeV operation with 2.1 T wigglers
  - Machine time

- **Electron cloud induced instability thresholds**
  - Low emittance beam and monitor to measure beam size
  - 4ns longitudinal feedback
  - Machine time

- **Simulation, modeling, analysis**
  - Collaborators and students
Train students

Students have already made important contributions

- **Graduate students**
  - Rich Helms - Low emittance tuning
  - Jeremy Urban - Wiggler characterization
  - Jim Shanks - Space charge effects

- **Undergrad and REU (Research Experience for Undergraduates)**
  - Mike Ehrlichman - Intrabeam scattering,
  - Jim Shanks - Lattice design
  - Joseph Burrell - Beam Position monitor
  - Daniel Carmody - Electron cloud modeling
  - Pauli Kehayias - Fast Ion Instability
  - Chris Cude-Woods - Diagnostics for electron cloud measurements in CESR
  - Jennifer Yu - Electron cloud simulation in wigglers
  - Joshua Kennedy - Mechanical design and layout of CesrTA
  - Sheng Xu - Mechanical design and layout of CesrTA

We will continue to involve students (and to depend on them)
Outreach at LEPP

- 30-35 undergraduates employed each year
- Internships for local high school students
- 10 students from Cornell SPS participated in LEPP sponsored enrichment programs for middle school and elementary school
- Hosted 153 REU and 17 RET students since 1998
- 1000 people tour the lab each year
- 525 middle/high school students and 85 teachers received guided tours in 2006
- In 2006, 35 physics educators participated in lab sponsored Preparing Future Physics Teachers Conference
- Hosted two conferences dedicated to improving high school science curriculum
- Participant in the international collaboration InterActions
Benefits to other accelerator activities

• Instrumentation
  – Xray beam size monitor (~1µm resolution)
    • ILC damping ring, light sources
  – Multibunch turn by turn beam position monitors
    • Light sources, ERL

• Electron cloud physics
  • Light sources, LHC, SNS - beam physics

• Low emittance tuning algorithms
  • Light sources, damping rings

• Training of students and accelerator scientists
  • All future accelerators