Recent Operational Experience and Future Plans for the Cornell Electron Storage Ring

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Abstract

Operation of the Cornell Electron Storage Ring CESR for the production of charm quark bound states from 2002 to 2008 has resulted in world record data sets of dozens of \( \psi(2S) \), \( \psi(3770) \) and \( D^0 \) mesons. The CESR-II project required the installation of a unique array of accelerator physics instruments and with the wigglers-dominated optics which resulted from the installation of twelve wigglers magnets to induce the damping time from 300 ms to 50 ms. Future plans for CESR excluding its continued operation as the synchrotron light source CHESS, its near-term conversion to CESR-TA, an ILC damping ring R&D testbed, and its use as an essential component for a proposed Energy Recovery Linac are presented as well.

CesrTA

Test Accelerator for the International Linear Collider Damping Rings R&D

- CESR-TA program has been funded jointly by the U.S. NSF and DOE ILC Damping Ring R&D program starting in mid-2008
- CESR-CHESS operation to 20 day/year

CesrTA Configuration:
- 12-damping wigglers located in zero-dispersion region for ultra low emittance operation. Requires moving 6 wigglers from the arcs to L0. (NB: The ILC DR wigglers baseline design adopts the CESR-II pole parameter.)
- Diagnostic vacuum chambers with electron cloud (EC) measurement and mitigation techniques
- Designed sections available for installation of ILC prototype devices
- Precision instrumentation
  - Multi-bunch turn-by-turn BPM system
  - Fast X-ray beam profile monitors
  - 4 as bunch main operation

CESR-TA Baseline Configuration

- No of Wigglers: 12
- Wigglers Field: 2.0 T
- Beam Energy: 0.5 GeV
- Energy Spread (AEK): \( \pm 1 \times 10^{-5} \)
- Target Vertical Emittance: <20 pm
- Damping Time: 67 ms
- Bunch Spacing: 0 ns
- Bunch Length: 5 mm

LEPP, the Cornell University Laboratory for Elementary-Particle Physics, has joined with CHESS to become the Cornell Laboratory for Accelerator-based Sciences and Education (CLASSSE). LEPP's primary source of support is the National Science Foundation.