

Highlights from the April 2014 CESRTA Measurements:

Electron Cloud Trapping in a CESR Quadrupole Magnet

Jim Crittenden & John Sikora CESRTA Collaboration Meeting 27 May 2014







Summary of the 5.3 GeV Measurements

• Instruments:

* First-Time Measurements*

- Quad Shielded Pickup in Q48W (QSPU)
- Time-Resolved Retarding Field Analyzers in the L3 Chicane (TR-RFA)
- TE Wave measurements in the L3 Chicane, 13E-15E and Q48E (TEW)
- Shielded Pickups at 15E/15W (SPU)
- Retarding Field Analyzers (34) Cross-calibration measurements (SPU-15E/W, TEW-15E)
- There are also some *turn-turn CBPM measurements of witness bunches* by KGS.

Beam Configurations:

- Positrons: 10-bunch and 20-bunch trains, with and without a witness bunch
 - Data versus total current and chicane field (QSPU, TR-RFA, SPU (20 dB), TEW, RFA)
 - Data versus witness spacing and current (QSPU, TR-RFA, SPU, TEW)
 - Data versus bunch spacing: 4, 8, 12, 14, 16, 20, 24, 28 ns (QSPU, TR-RFA, SPU, TEW)
- Electrons: 20-bunch train
 - Data versus total current and chicane field (SPU, TEW)
 - Data versus witness bunch spacing and current (SPU, TEW)
- Positrons and electrons 2-bunch (SPU, long-term TiN and Al conditioning)



- -0.06 **Detector Holes** 400 100 200 300 500 1200 1300 1400 1500 Time (ns)
- The single positron bunch at 8 mA results in a very small signal (magenta trace)
- The blue trace shows the signal from 20-bunches of positrons with 16-ns spacing at 8mA/bunch.
- The red trace shows the signal when a 8 mA witness bunch is added about 1 µs after the train. The 20-bunch signal decreases when the witness bunch is added and the witness signal is much larger than that of a single bunch.

x4



Cornell Laboratory for Accelerator-based Sciences and Education (CLASSE)

Dependence of trapping on bunch spacing and population



CESRTA Collaboration Meeting / Jim Crittenden