Status of Simulations for the April 2014 Shielded Button Electrode Measurements at 15E

-- 20-bunch trains of positrons, 2, 4, 6, 8 mA/bunch --

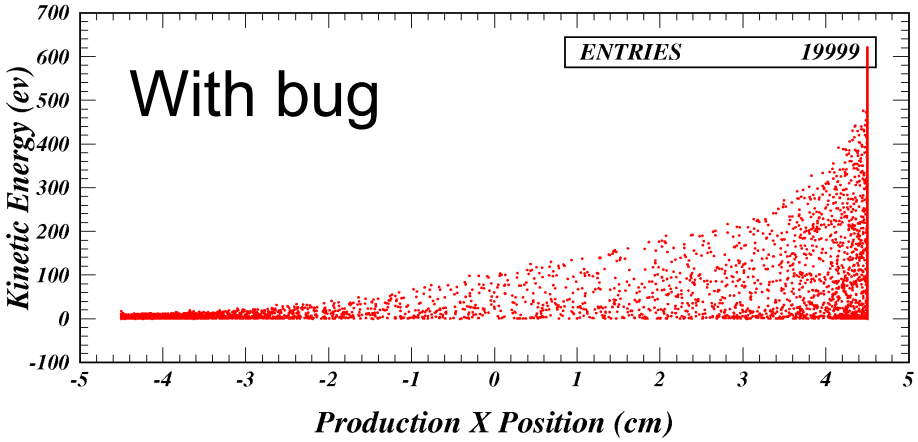
Presented by John Sikora at IBIC'14 for purposes of intercalibrating the SBE, RFA and microwave measurements

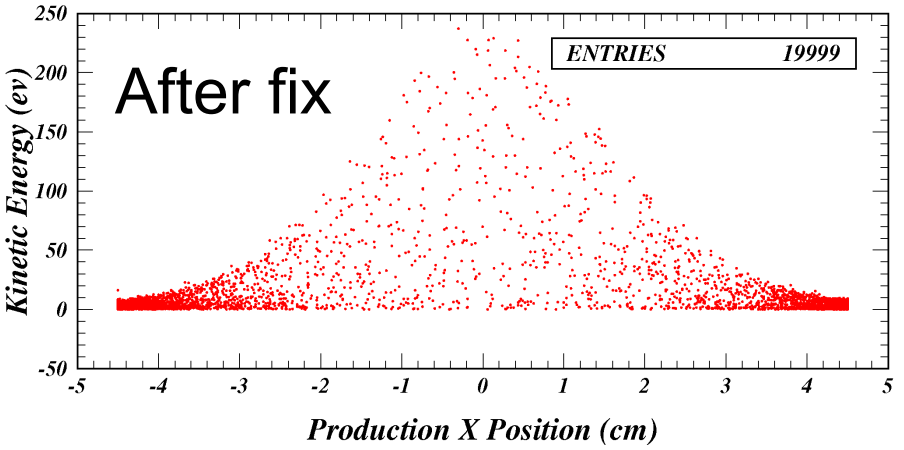
Jim Crittenden

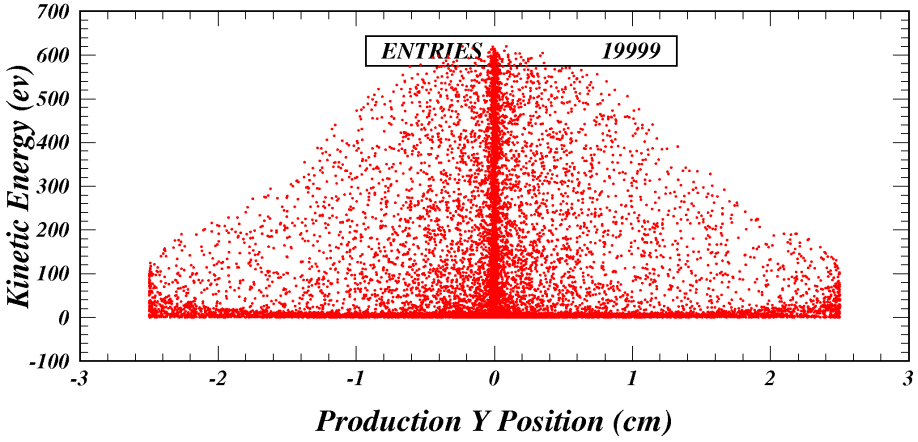
Electron Cloud Meeting

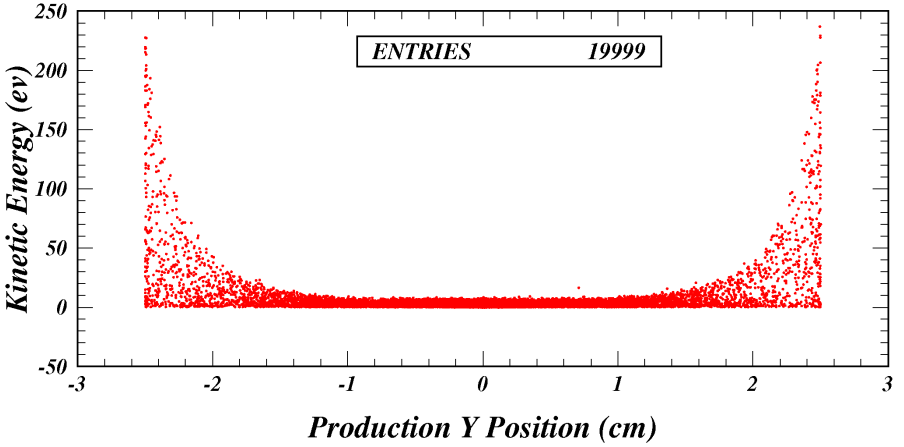
10 December 2014

Discovered incorrect calculation of elliptical coordinates in ECLOUD in October





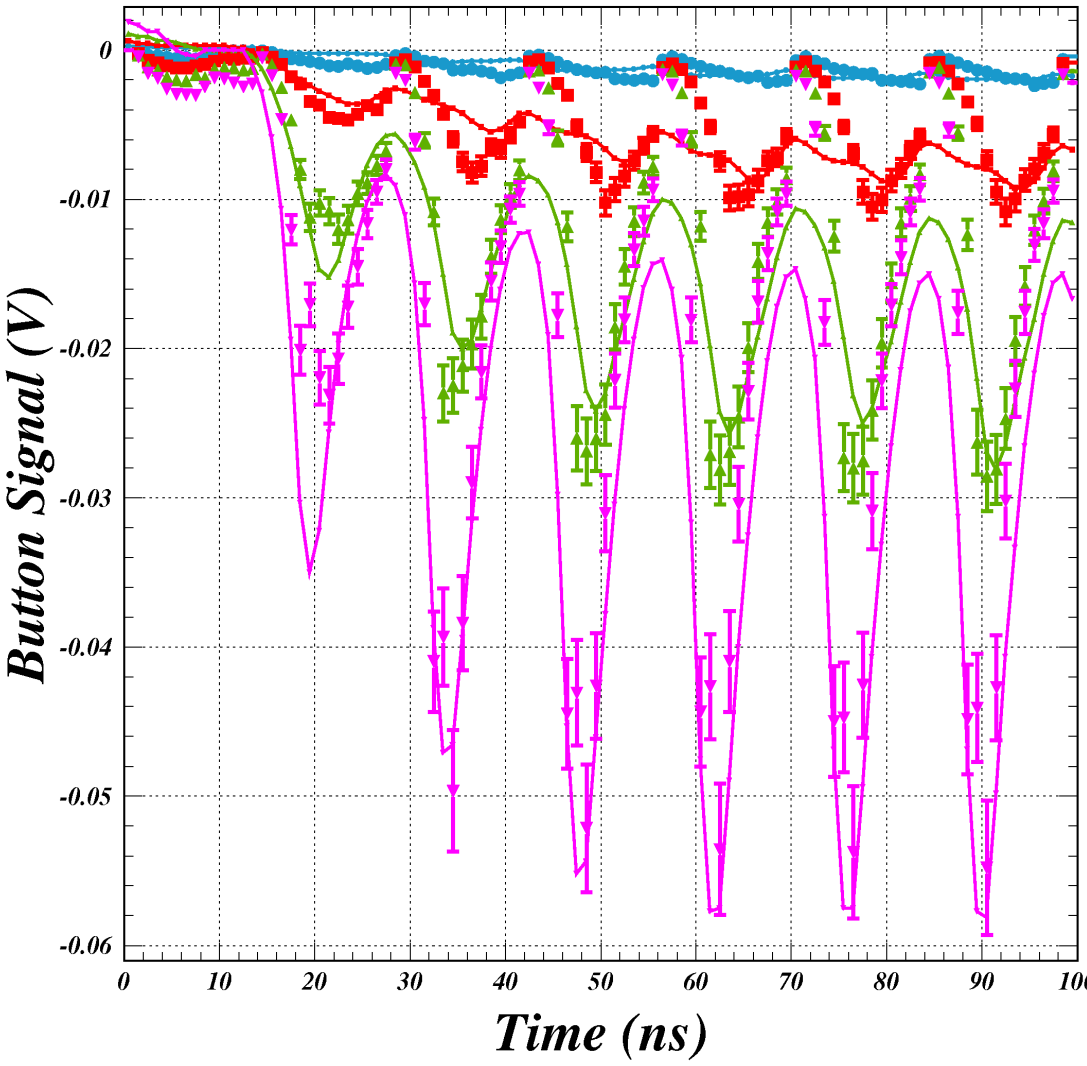




The effect of the bug was to transfer vertical beam kicks to horizontal. The above example shows the effect for a 6-mA bunch of positrons. The correct calculation gives a kick of 240 eV to an electron on the bottom or top of the beam-pipe, resulting from equal contributions from the direct and image charge. On the sides of the beam-pipe, the two contributions nearly cancel, leaving a kick of 4 eV.
For photo-electron-dominated simulations, the bug can be partially compensated with the p.e. energy distribution.

Present status of simulation for the space-charge-limited cloud measurements of April 2014

Bunch current dependence: 5.3 GeV 15E Al e+



Outstanding Issues

-Source of the signal immediately following a bunch passage

- The simulated signal is a factor of 50 too high

- The measurement does not allow for low-energy photo-electrons, nor for photo-electrons from the bottom or top of the beampipe.

- The trailing edge of the signals requires a large contribution from low-energy electrons with glancing arrival angle (hole secondaries?)

Good News

- The timing of the lower bunch current signals is about right without extra tuning.

- The ratio of signals from buttons 1 and 3 are now approximately correct.

- The cloud densities are similar to those found for the RFA and microwave measurements: 4.6e12, 7.8e12, 11.1e12, 13.5e12.

Updated ECLOUD Simulation Densities

Results with a 20-bunch train of Positrons at 5.3 GeV