



Electron Cloud Buildup Analysis for the DTC03 ILC Damping Ring Lattice

Parameters for Electron Cloud Buildup and Instability Simulations 2012: M.T.F. Pivi 29.02.2012

Photon Absorption Rates and Distributions for the ILC Damping Ring (dtc03) by Ring Region: G. Dugan, 02.03.2012

20 March 2012: Updated with higher statistics, corrected bunch pattern and corrected sextupole magnet count

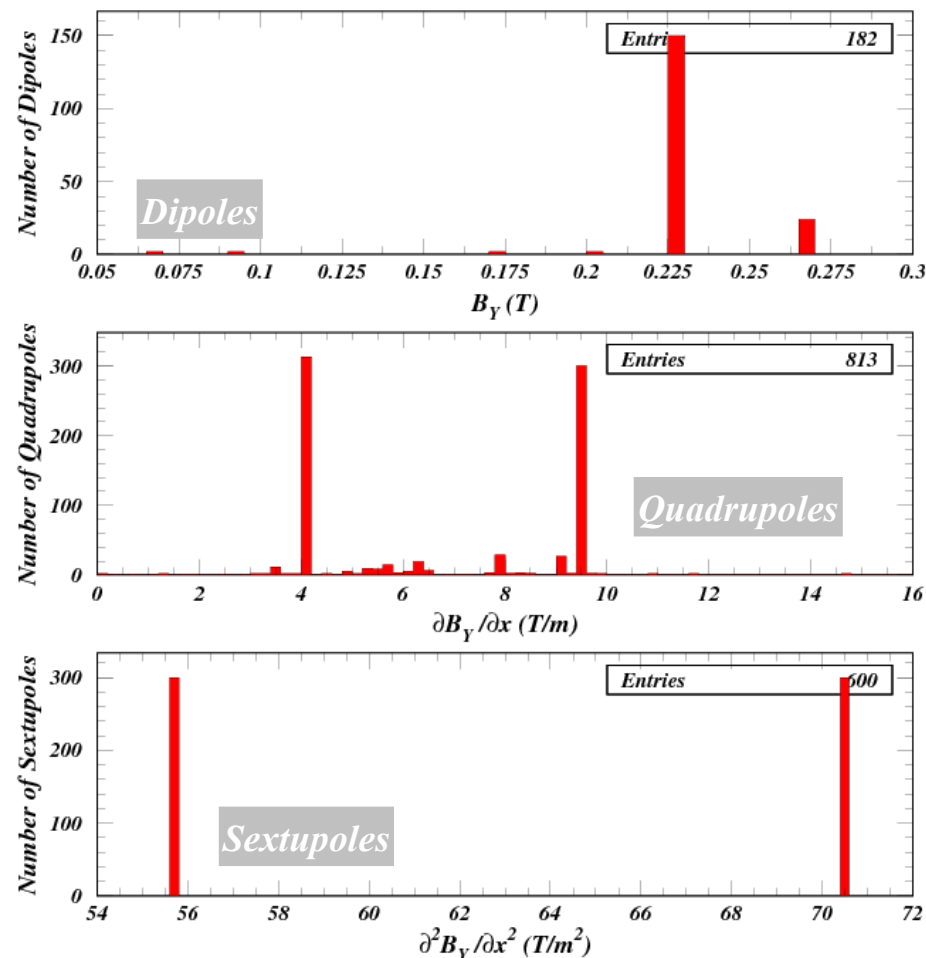
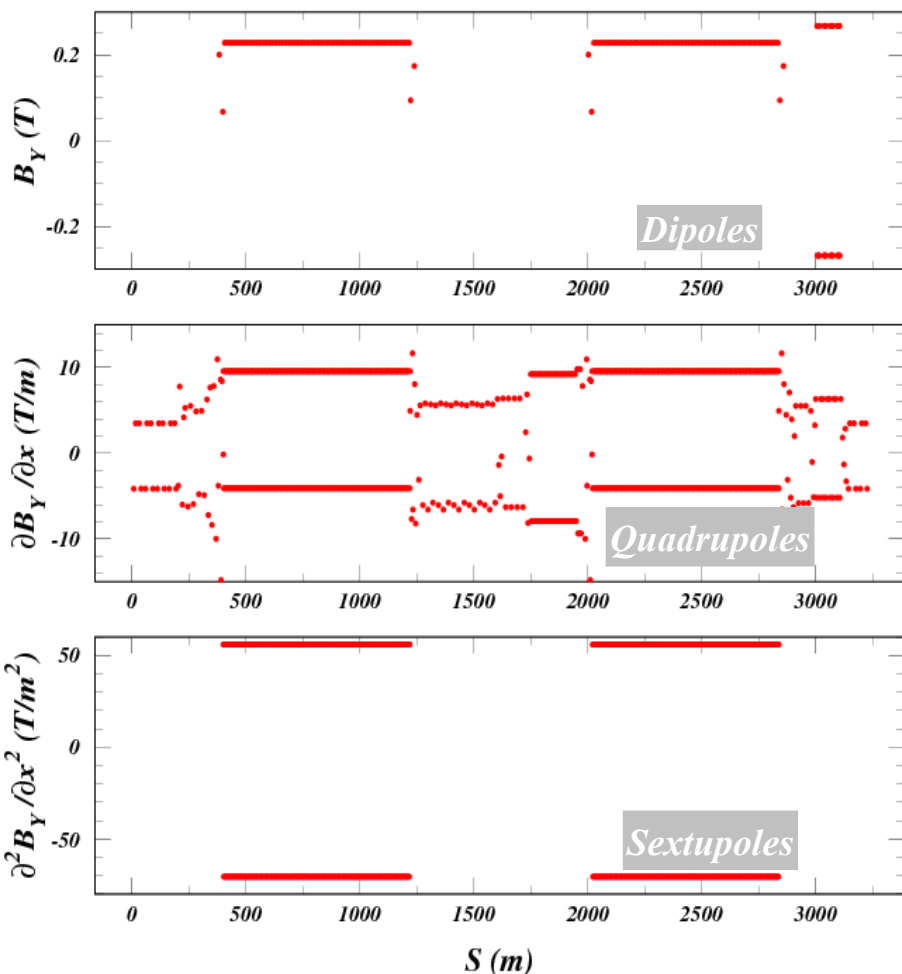
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Electron Cloud Meeting

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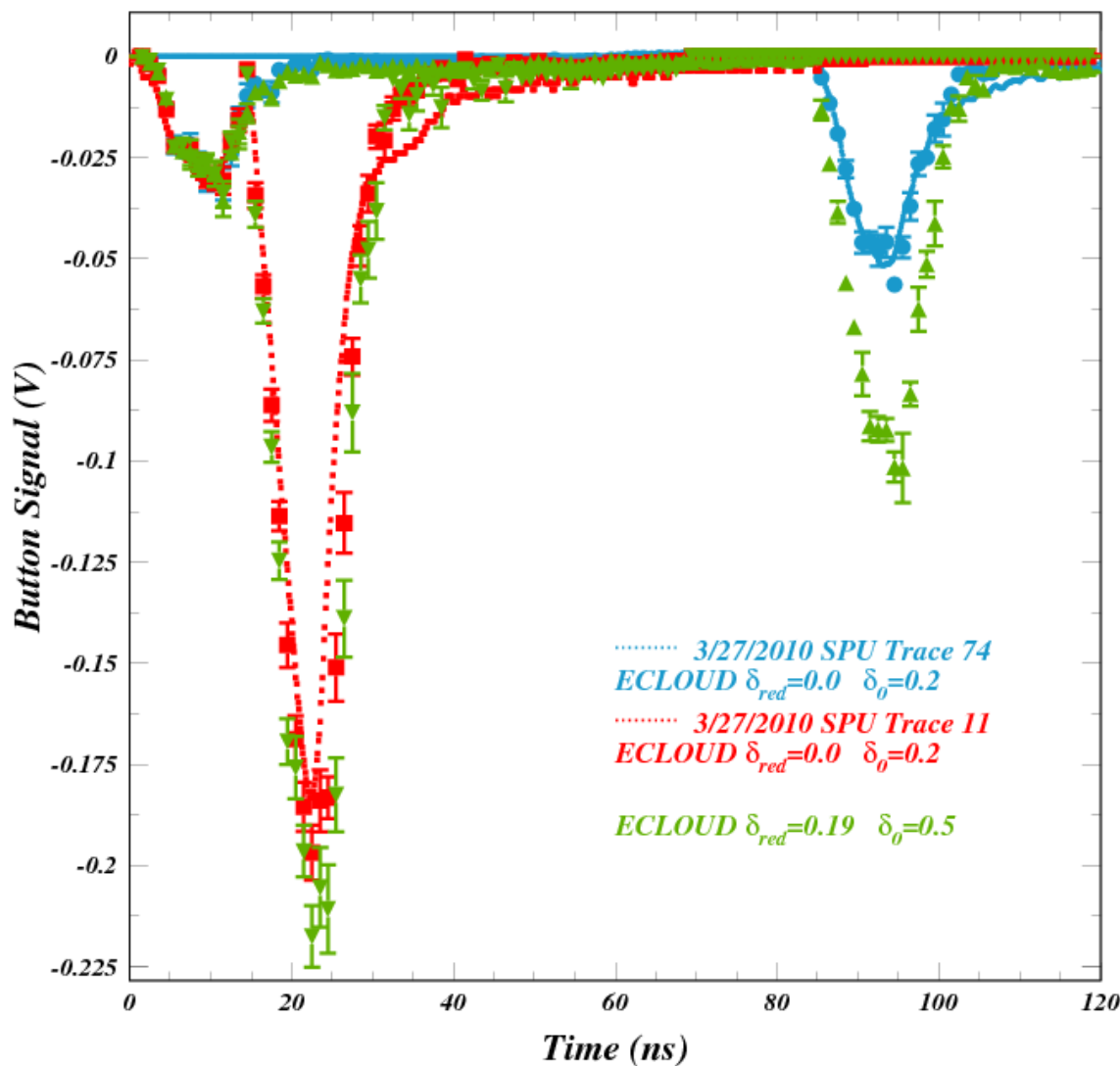




The buildup simulations use 40 G for solenoids, 10 T/m for quadrupoles and 70 T/m² for sextupoles.



Witness bunch study: 5.3 GeV 5.1 mA/bunch e+ 15E TiN



The cloud lifetime measurements made with the shielded pickup detectors in the TiN-coated vacuum chamber are clearly inconsistent with a value for the elastic yield as high as 50%.

The measurements did find such a high value in the uncoated aluminum vacuum chamber, consistent with the SEY model used by both ECLLOUD and POSINST for the coherent tune shift measurements. See the talk on 3 March 2011.

So we should check whether such a high value for the elastic yield changes our conclusions for the ILC damping ring, especially since trapping in the solenoids, quadrupoles and sextupoles will also affect long-term cloud buildup.



http://www.lepp.cornell.edu/~critten/ilcdr/dtc03/dtc03_electron_cloud_buildup.html



Summary

Electron cloud buildup simulations using the ECLOUD code have been obtained for N 34-bunch trains in the DTC03 lattice for the ILC damping ring for field-free (N=16), solenoid (N=16) and quadrupole (N=8) environments in the wiggler regions and for field-free (N=16), solenoid (N=16), quadrupole (N=8) and sextupole (N=8) environments in the two arc regions.

Central cloud densities have been calculated for the $\pm 5\text{-}\sigma$, $\pm 20\text{-}\sigma$, and $\pm 100\text{-}\sigma$ regions (σ is the beam size) both prior to and at peak current for each of the filled bunches.

The calculated 20- σ central cloud density averages have reached equilibrium in the quadrupoles and sextupoles after the four trains. The beampipe-averaged cloud densities have not.

The solenoidal fields are so effective at eliminating the central density that it is not clear how to present the result.

Reducing the elastic yield value in the SEY model to a value consistent with cloud lifetime measurements reduces the values calculated for the central densities by less than 50%.

Next Steps

Develop an algorithm for presenting the central density results with uncertainty evaluation.