Comparison of ECloud Calculations in Dipole and Quadrupole Fields (reprise)

Cloud buildup over a full CESR turn (2.5 μsec, 183 bunches)

-- 22 December 09: added buildup plots for two full turns for both 1x45 and 9x1 --

Slides 8-13

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Conditions of June, 2008 tune shift measurements: 5.3 GeV 14-ns spacing 1.2e10 e+/bunch
11 filled bunches followed by 172 empty ones.
Assumed 1.1 photons/m/e (the ring-average for dipoles) and 15% reflectivity.
The SEY model parameters are the PAC2009 values, whereby ECLOUD now includes the rediffused component.

The beam-pipe-averaged density indeed shows the cloud to be trapped in quadrupoles.
Some of the trapped cloud remains in the beam region.
Some of the trapped cloud will contribute to tune shifts.
Asymptotic Cloud Profile in the Quadrupole

Cloud charge profile after bunch 184 at time = 2562 ns

No energy cut: 23724 macroparticles, 122649696 e-

$E_{\text{kin}} > 10$ eV: 1716 macroparticles, 44987528 e-
Cloud snapshot immediately prior to passage of bunch 11

Cloud charge profile after bunch 10 at time = 140 ns

No energy cut: 196928 macro-particles, 912873664 e-

$E_{\text{kin}}>10$ eV: 8134 macro-particles, 159781760 e-
Cloud Density Profile in the Quadrupole Averaged over One Turn (e/m³)

ECLOUD-Quad_5.3GeV: Cloud Density (e/m³) Averaged Over 2575.6 ns
Conditions of June, 2008 tune shift measurements: 5.3 GeV 14-ns spacing 1.2e10 e+/bunch
Two turns, each comprising 11 filled bunches followed by 172 empty ones.
Assumed 1.1 photons/m/e (the ring-average for dipoles) and 15% reflectivity.
The SEY model parameters are the PAC2009 values, whereby ECLoud now includes the rediffused component.

The beam-pipe-averaged density indeed shows cloud trapped in quadrupoles carrying over to the second turn.
Some of the cloud trapped in the beam region carries over to the second turn.
The beam-averaged cloud density does not carry over to a second turn (within statistical fluctuations).
5.3 GeV 14-ns spacing 1.2e10 e+/bunch
Two turns, each comprising 9 sets of 1 filled bunch followed by 19 empty ones (uniformly filled ring).
Assumed 1.1 photons/m/e (the ring-average for dipoles) and 15% reflectivity.
The SEY model parameters are the PAC2009 values, whereby ECLoud now includes the rediffused component.

The beam-pipe-averaged density does not show cloud trapping in quadrupoles.
No evidence of cloud trapping in the beam region.
The beam-averaged cloud does not show trapping.