Field Gradients and Cloud Densities for 20+1 0.75 mA Positron Bunches at 2.1 GeV in Drift and Dipole Regions

– Updated with slide 5 showing fit results and slide 7 showing cloud charge for 4x bunch current --

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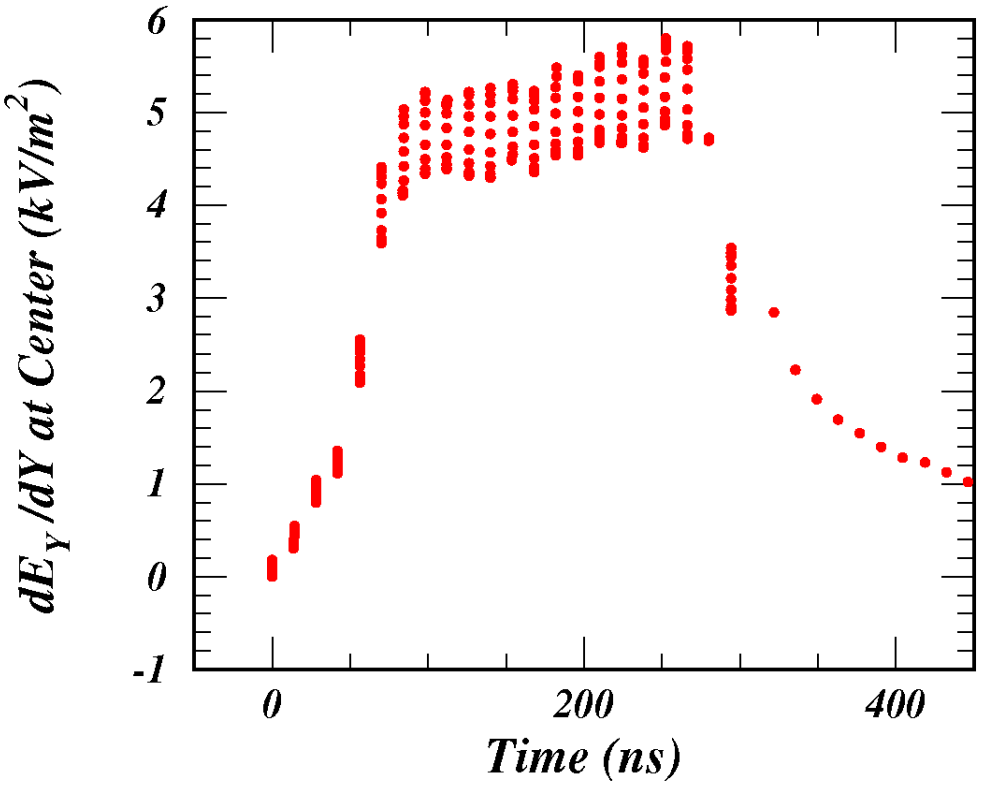
Electron Cloud/Impedance Meeting

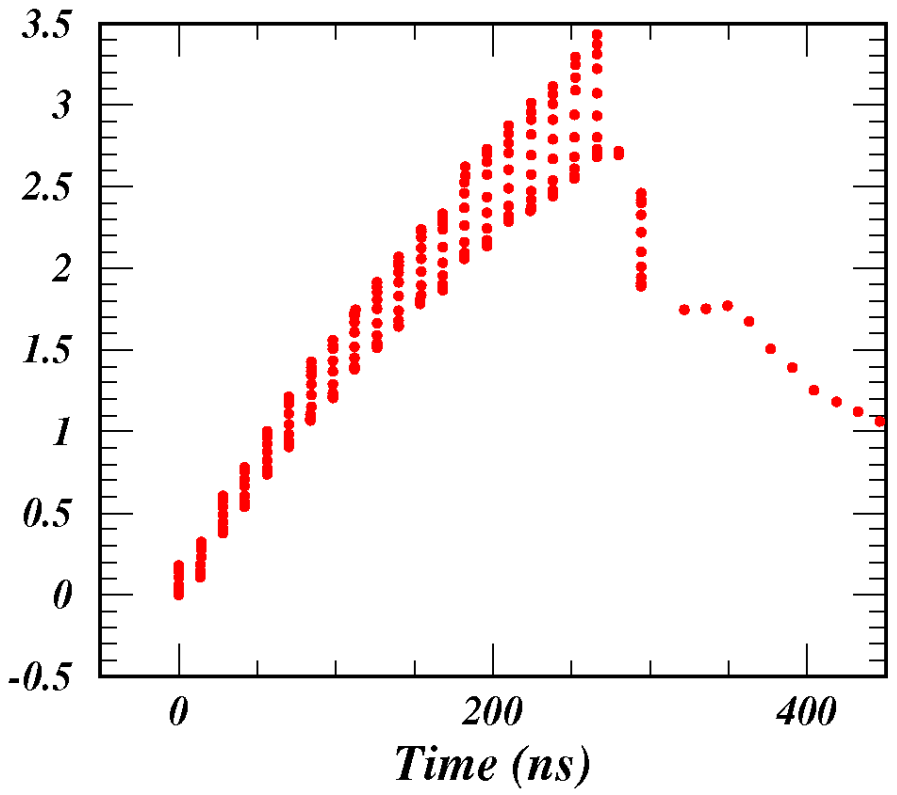
30 September 2015

Vertical field gradients
2.1 GeV 20+1 0.75 mA e+ bunches

Drift region



800 G dipole field

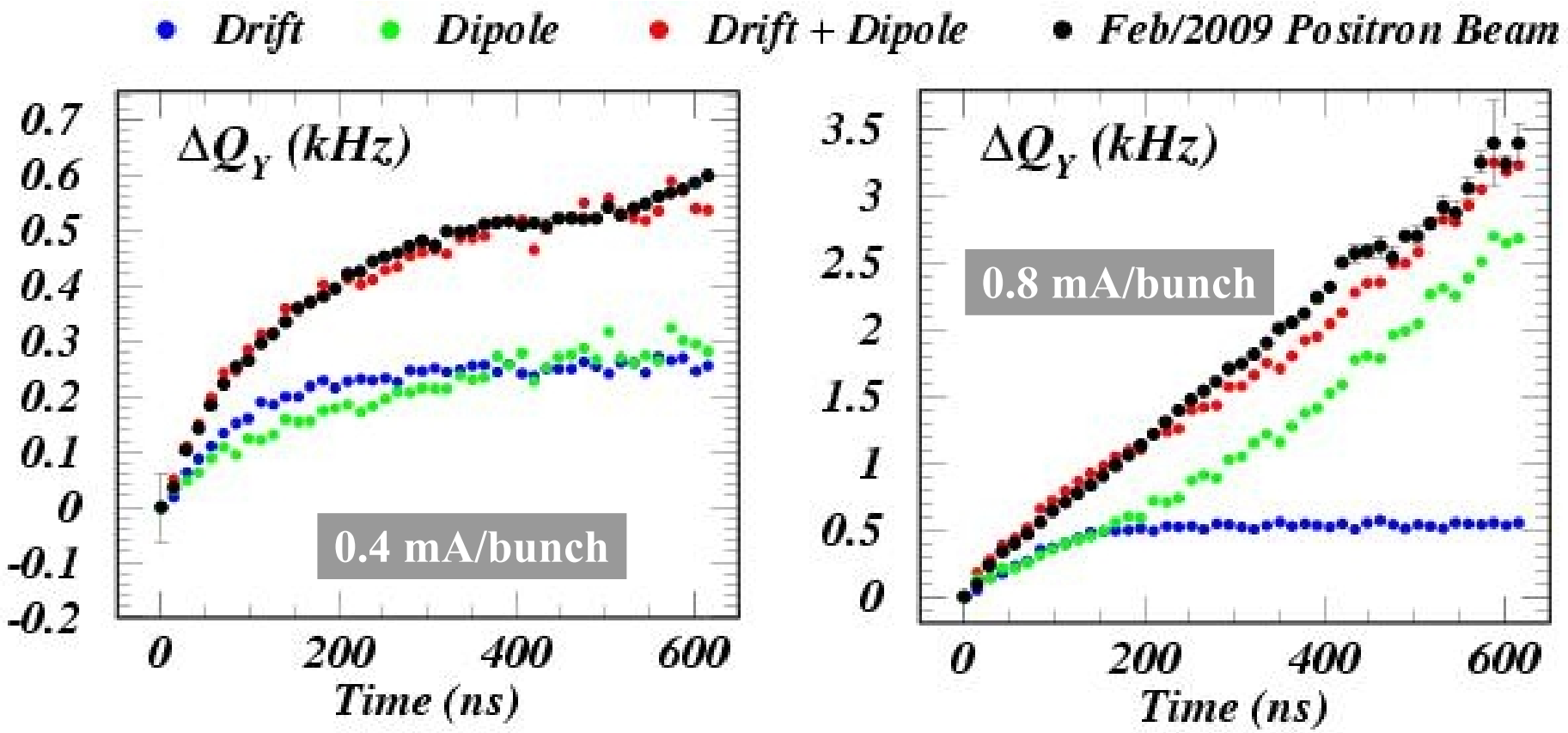


The magnetic field suppresses the vertical field gradient at the beam, and does not show the saturation following six bunches observed without the magnetic field.

The two cases show similar pinch effects.

Measurement and ECLOUD modeling for Feb/2009 tune shift measurements with 45-bunch 2.1 GeV positron trains

(Slide 4 of talk on 11 Nov 2009)



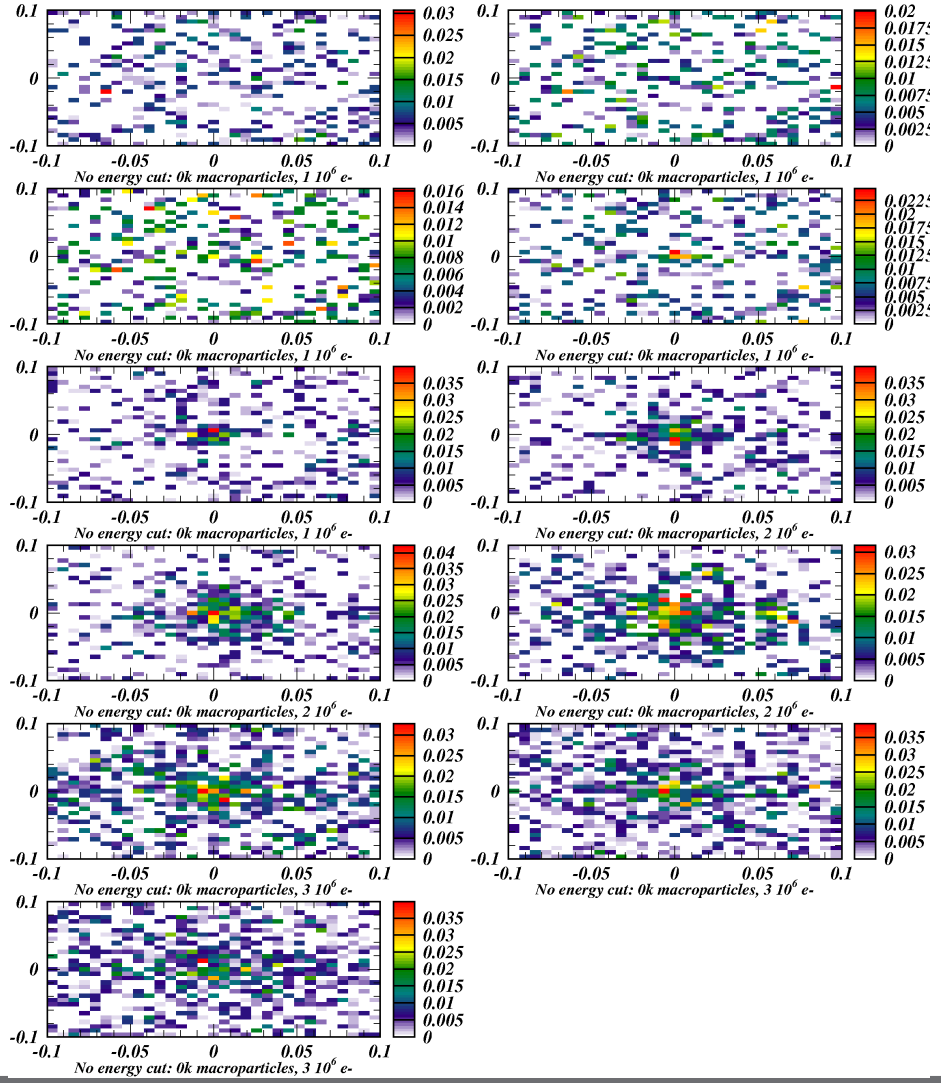
Remarkably successful modeling of vertical tune shift along 45-bunch positron trains showing the relative contributions of the drift (23%) and dipole (62%) regions.

By the way, one point in this talk was that there was a significant dependence of the model on the vertical beam size, the tune shifts increasing for larger beam size.

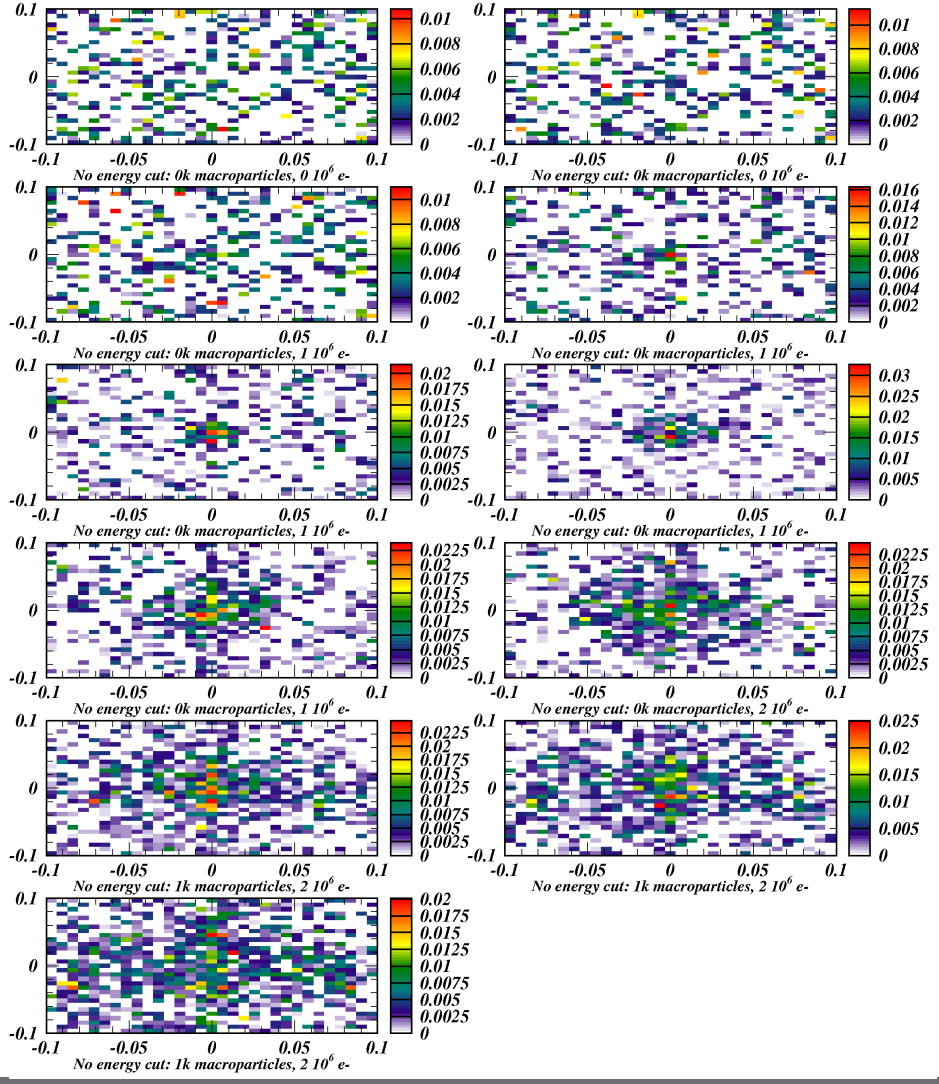
Pinch effect

Transverse cloud charge distributions for 11 time slices during bunch 20 in a 2 mm x 2 mm area

Drift region



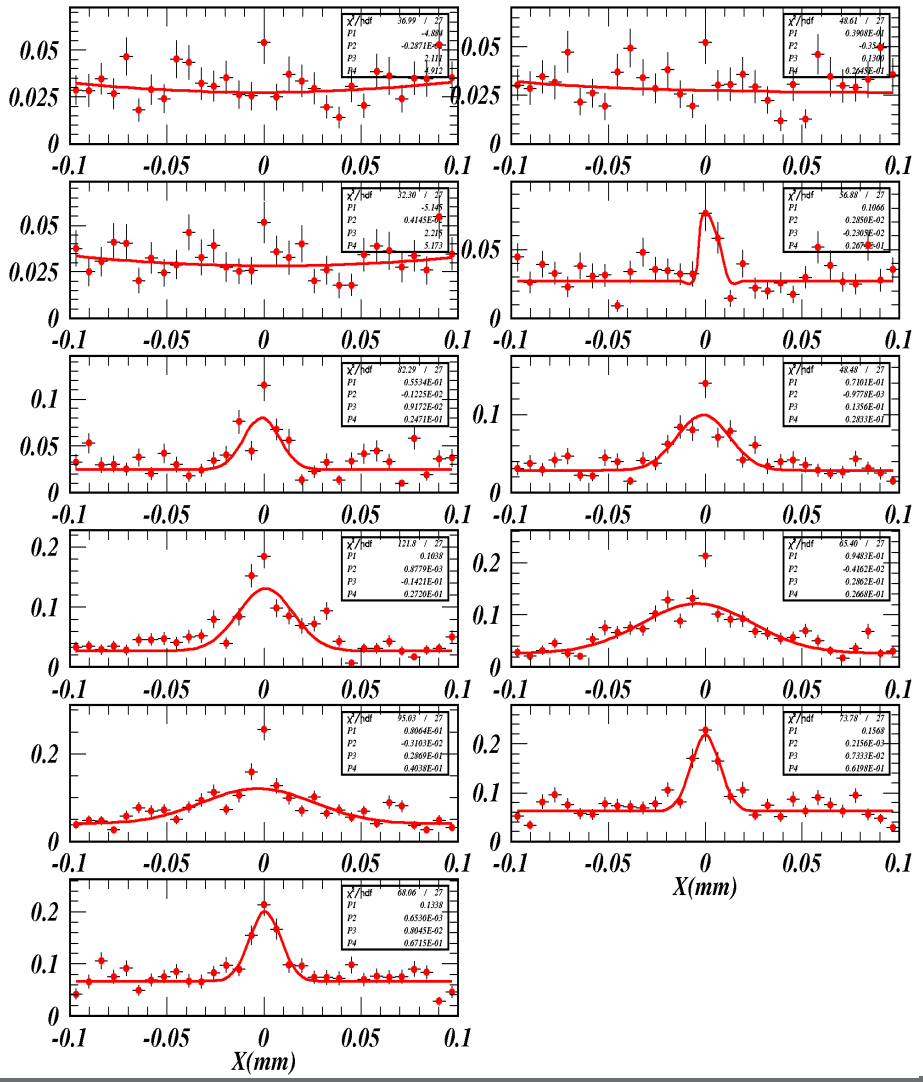
800 G dipole field



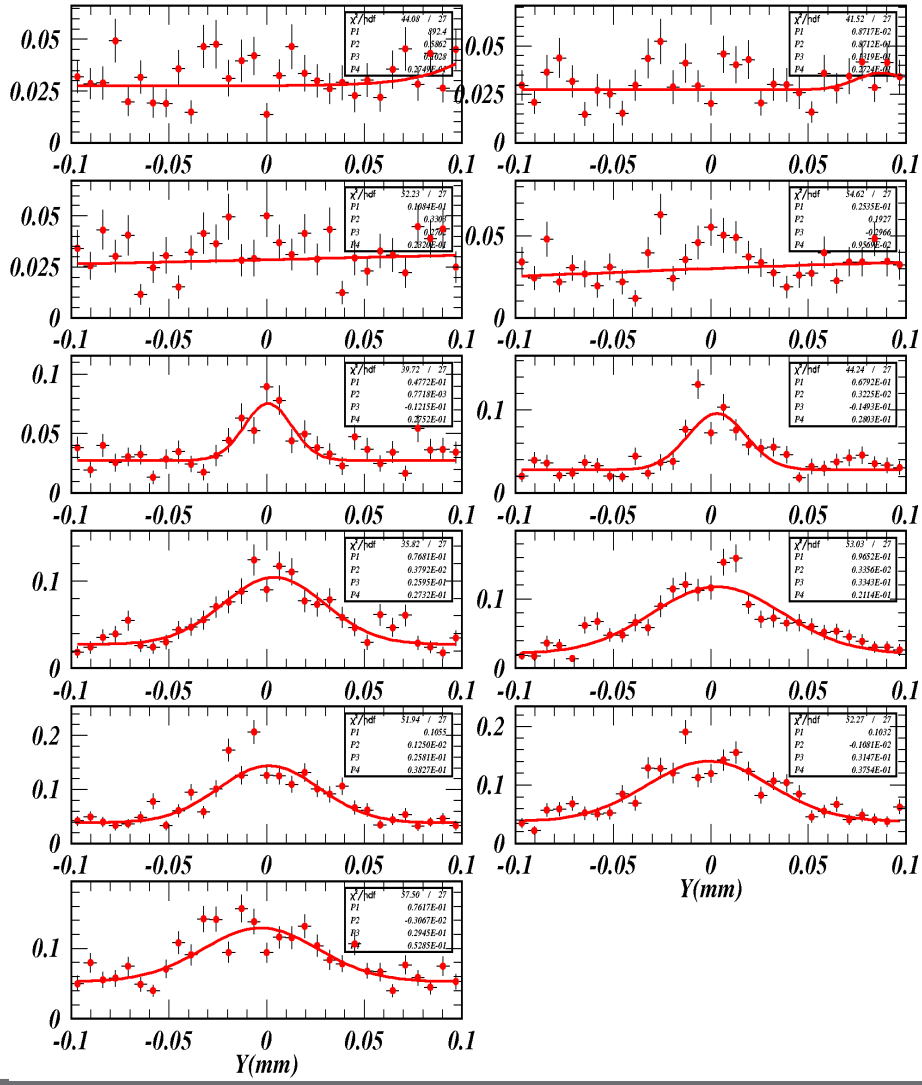
Pinch effect

Gaussian + flat background fits to the pinched cloud in bunch 20 for the 800-G dipole

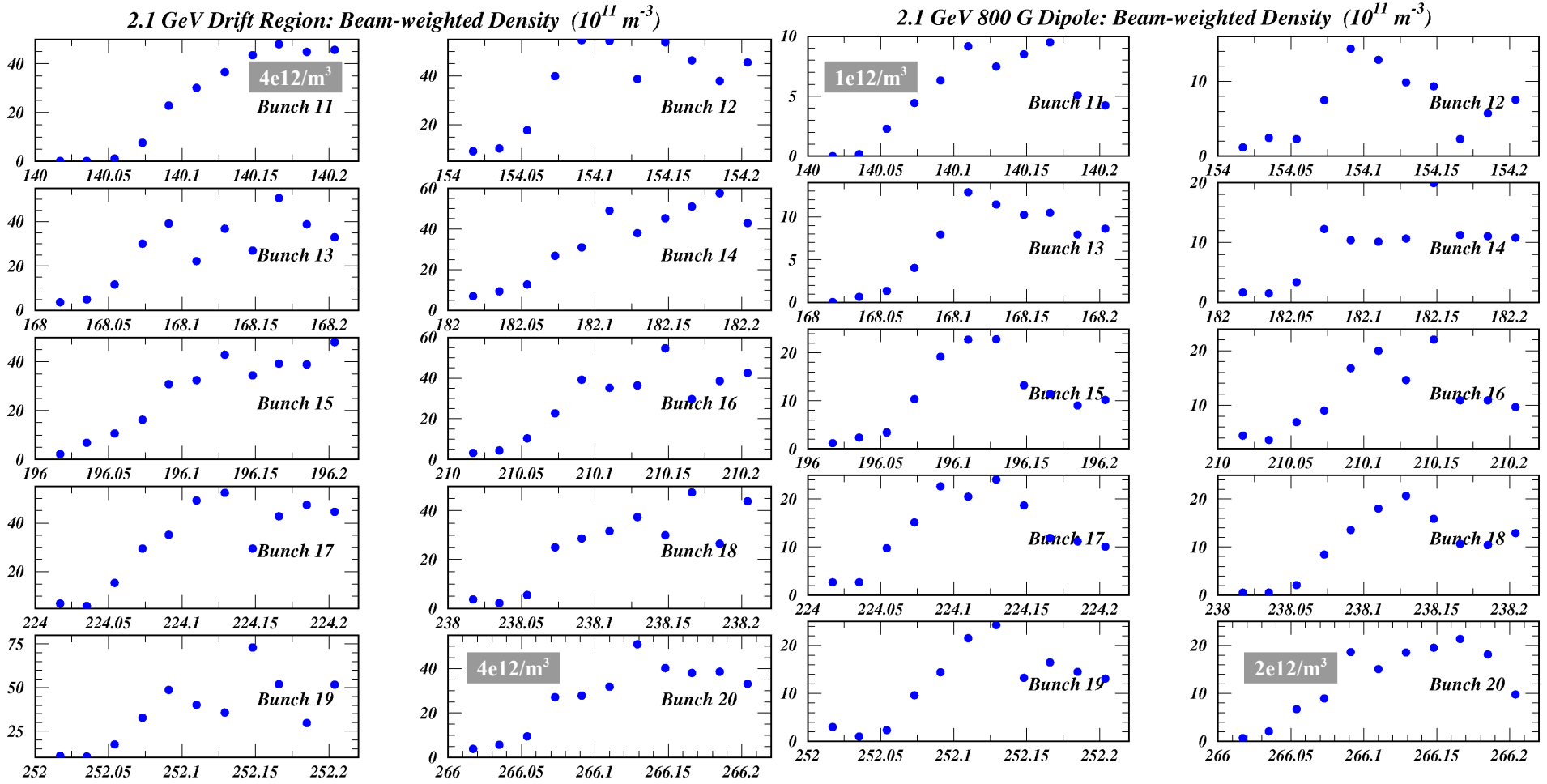
Horizontal



Vertical



Pinch effect
Beam-weighted cloud densities for bunches 11-20

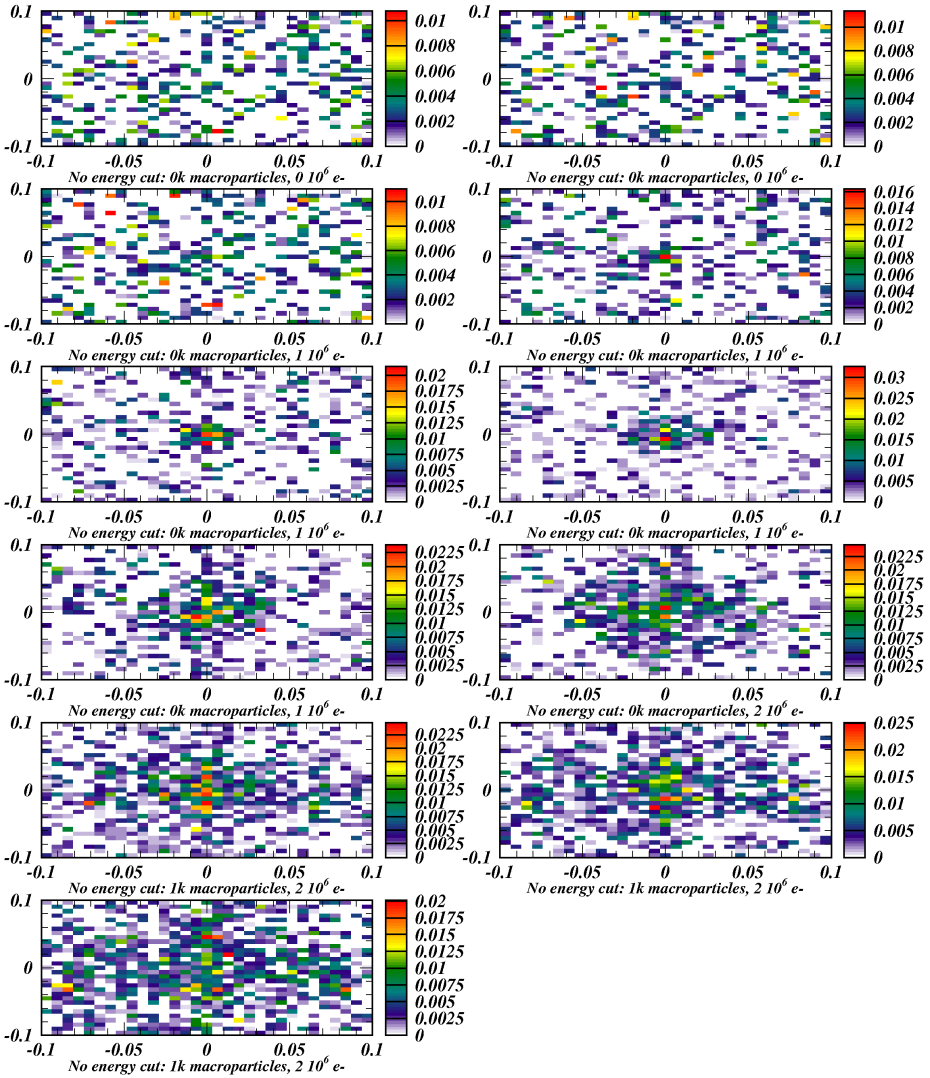


**We don't yet know which cloud characteristic will describe the emittance blowup.
If the density averaged over the beam region varying along the bunch length is important,
a dependence on train length would indicate the relative contribution of the drift regions.**

Pinch effect

Effect of quadrupling the bunch current for the 800-G dipole case

1.2e10 e+/bunch



4.8e10 e+/bunch