

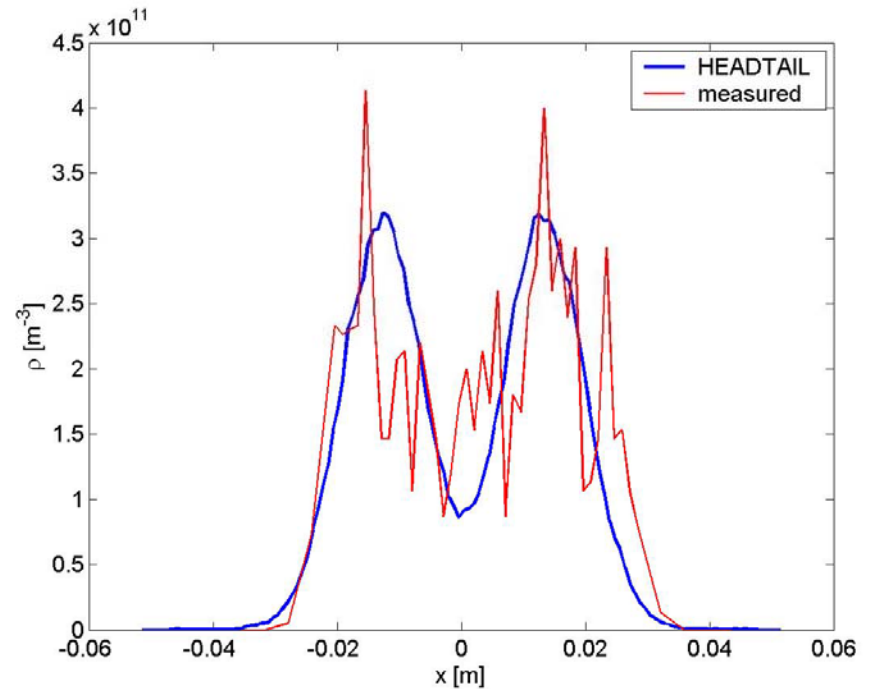
Electron cloud effect in dipoles with stripes

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RLC meeting, 18-11-05

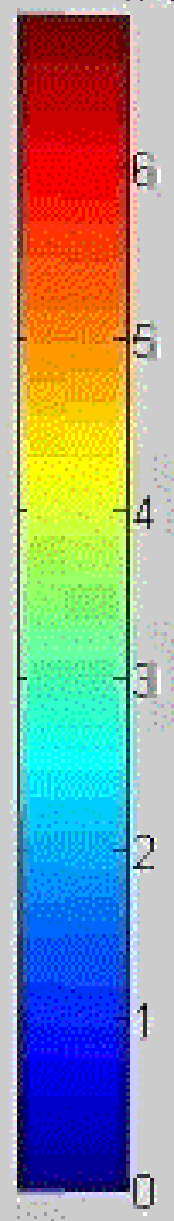
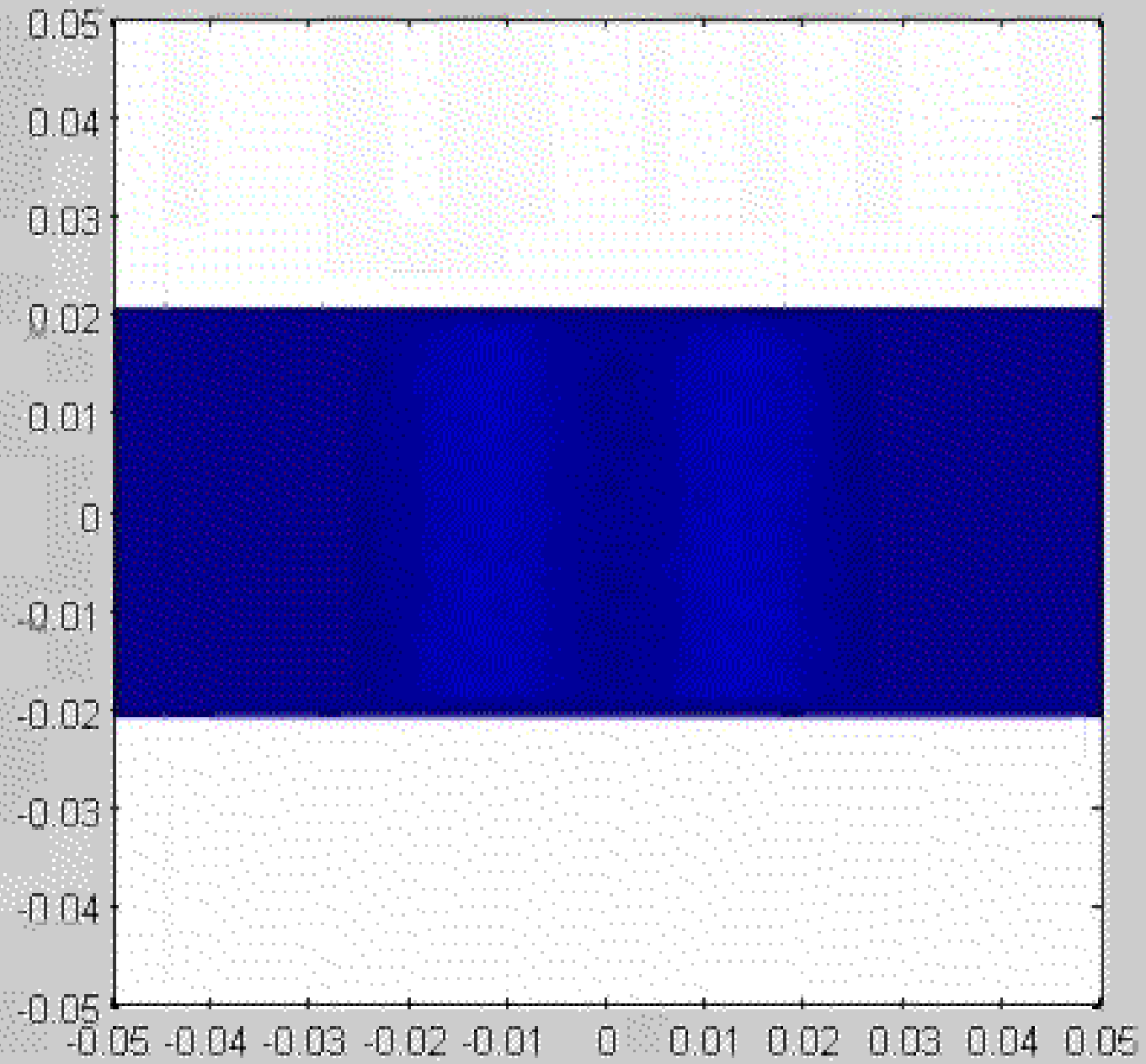
Modeling the stripes

- SPS @ inj, LHC beam
- Dipole field
 - electrons move only vertically
- Stripes
 - from measurements
(Coasting beam 25 Aug.2004)



$i=2$

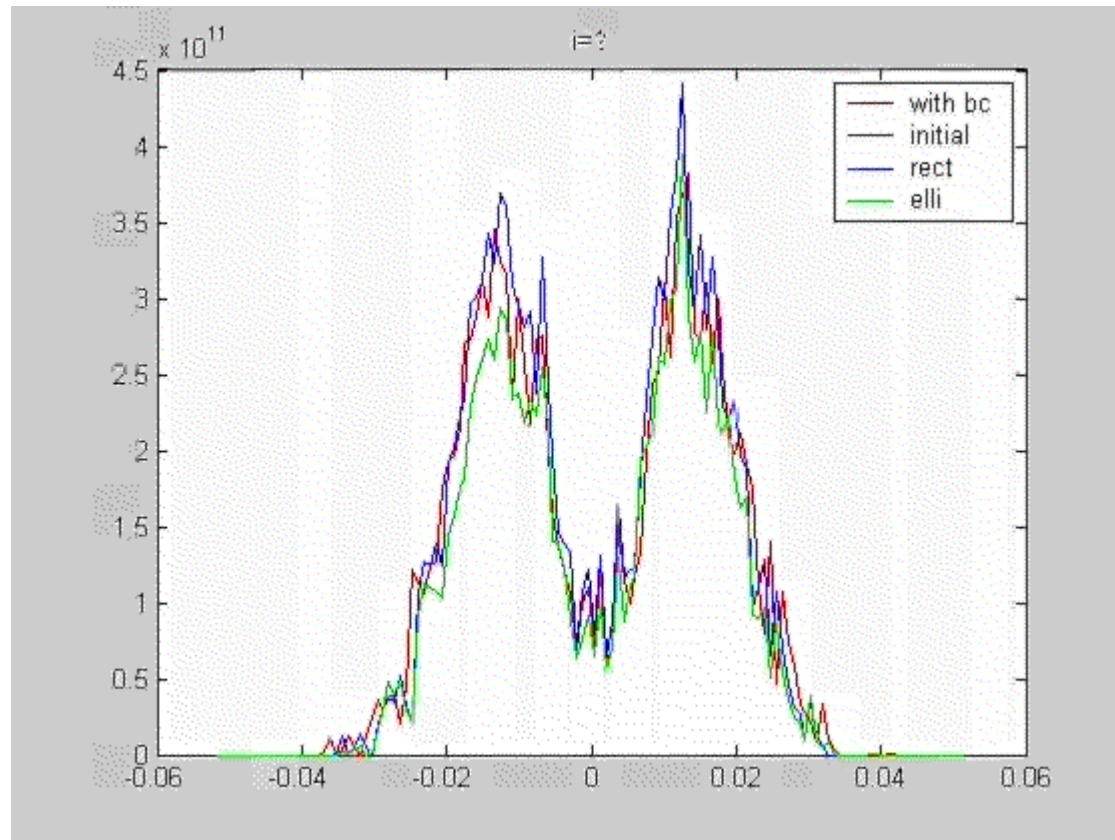
$\times 10^{12}$



EC evolution during bunch passage (2)

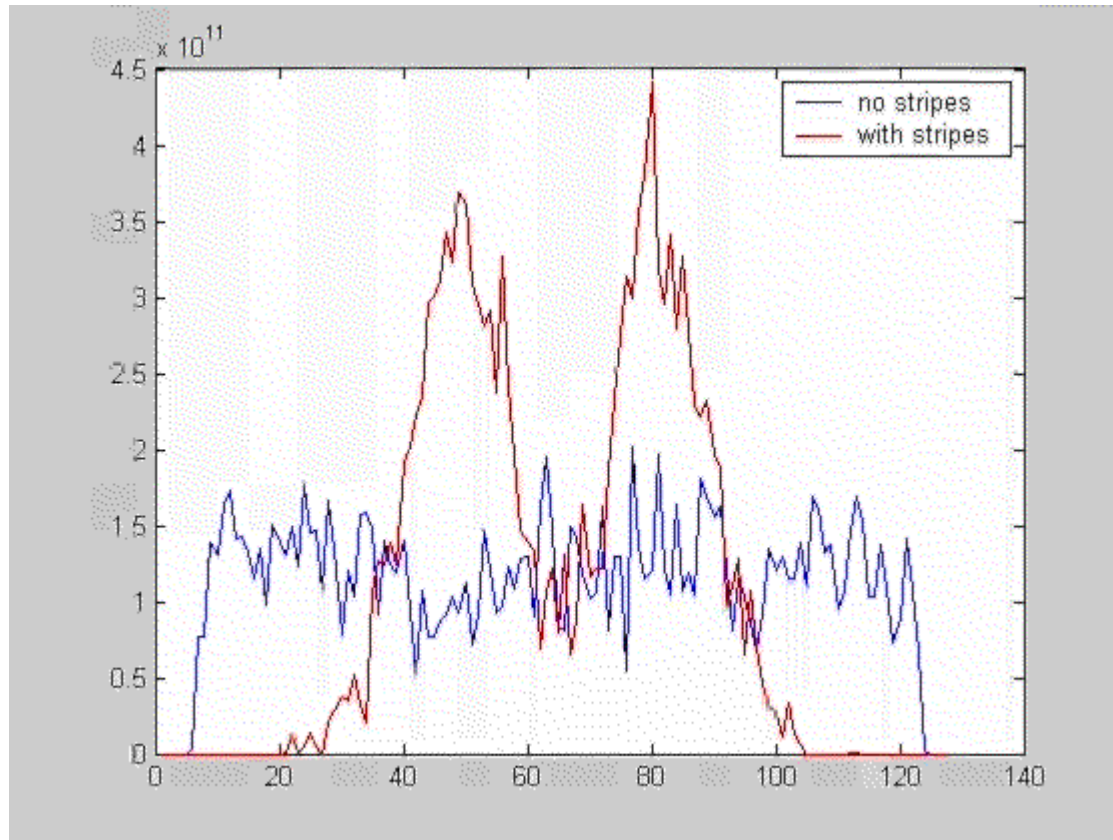
Density on the x-axis ($y=0$)

Different curves refers to different b.c.



EC evolution during bunch passage (2)

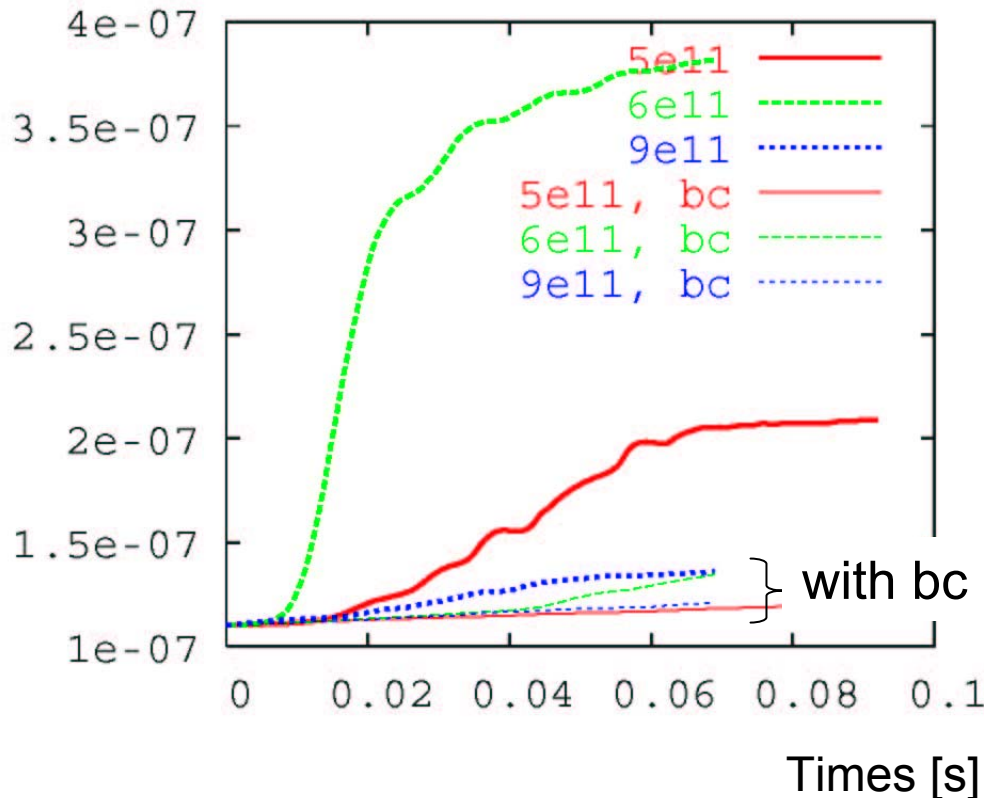
Comparison EC evolution
with stripes and without stripes (only B field)



Density on the x-axis (y=0)

Emittance growth w and w/o conducting boundaries

Vert. Emittance [m]



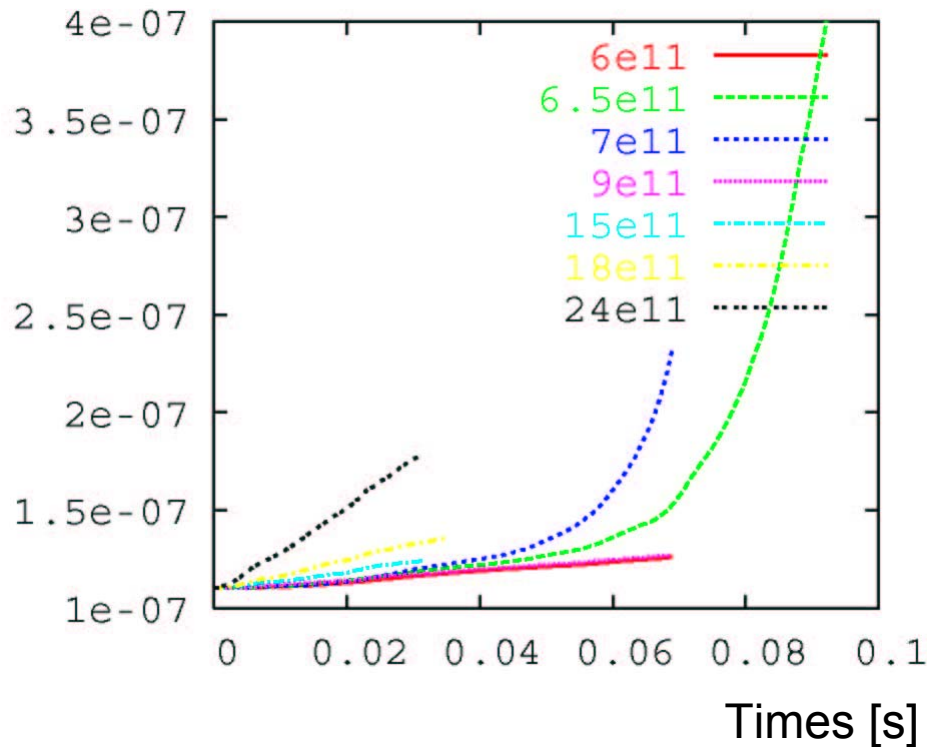
Two puzzles:

- 1) Big difference w and w/o conducting bc
→ not yet solved
- 2) Non-monotonic dependence on the ec-density
→ next slides...

Non-monotonic with ec-density

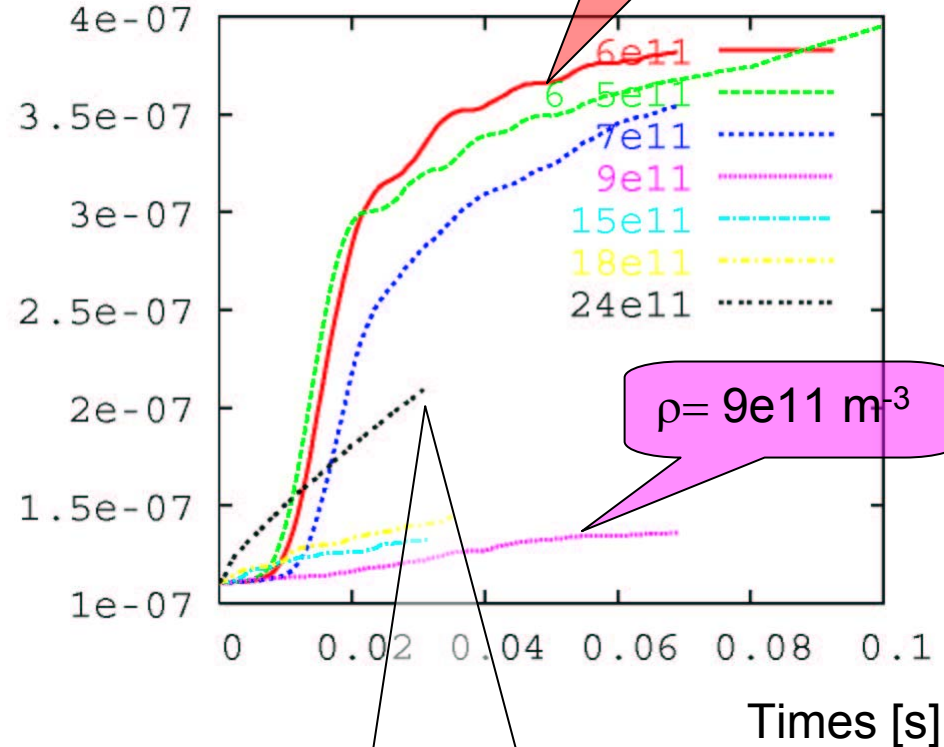
(case w/o boundary condition)

Horiz. Emittance [m]



Instability also in the horizontal plane

Vert. Emittance [m]



$\rho = 24e11 \text{ m}^{-3}$
(not enough kicks/turn)

Non-monotonic with ec-density

- Is it similar to TMCI? (merging of the 2 modes and then some regions of stability again)
 - Use the “resonator model for EC”
 - Simulation with increasing bunch intensity by 50%
 - BUT also the electron frequency will increase, and the pinch will be different

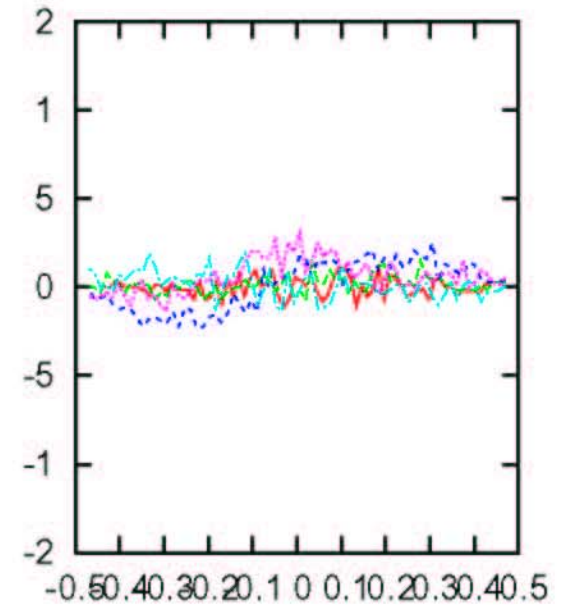
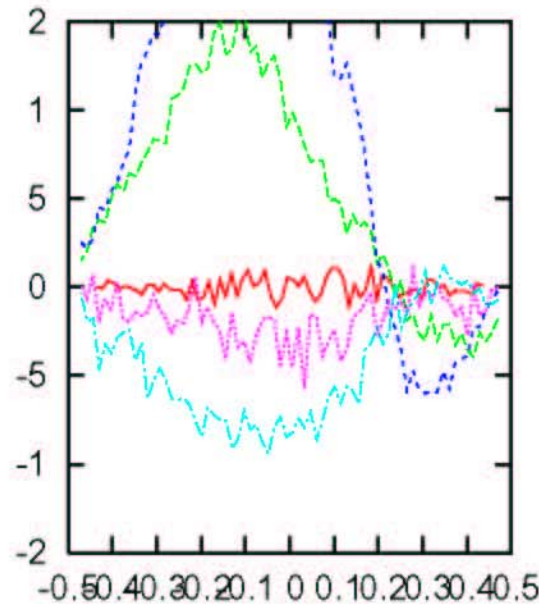
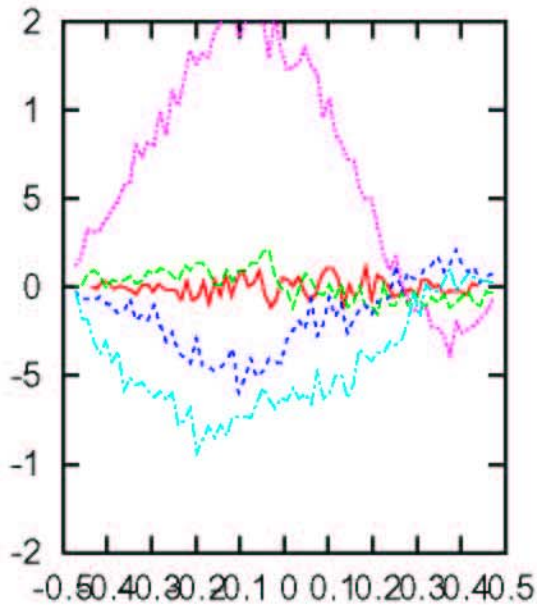
Non-monotonic with ec-density

Vertical pick-up signal $N\langle y \rangle$ as function of longitudinal position

5e11

6e11

9e11



BTW... PAY ATTENTION!!!

- During scan with different # of grid points, found that

ROUTINE for BOUNDARY CONDITION has
probls w. different # grid points in x and y

Conclusions

- Simulations for SPS, with LHC type beam
- Stripes shape from measurements
- To be explained:
 - Big difference between conducting b.c. and without
 - Help from GR to see how the field changes
 - Non monotonic dependence from ρ
 - Is it TMCI?
- What to do next?
 - Scan on the stripes rms size
 - Increase chromaticity (now it was $Q'=1$)
 - Prediction for LHC