Emittance growth induced by electron cloud

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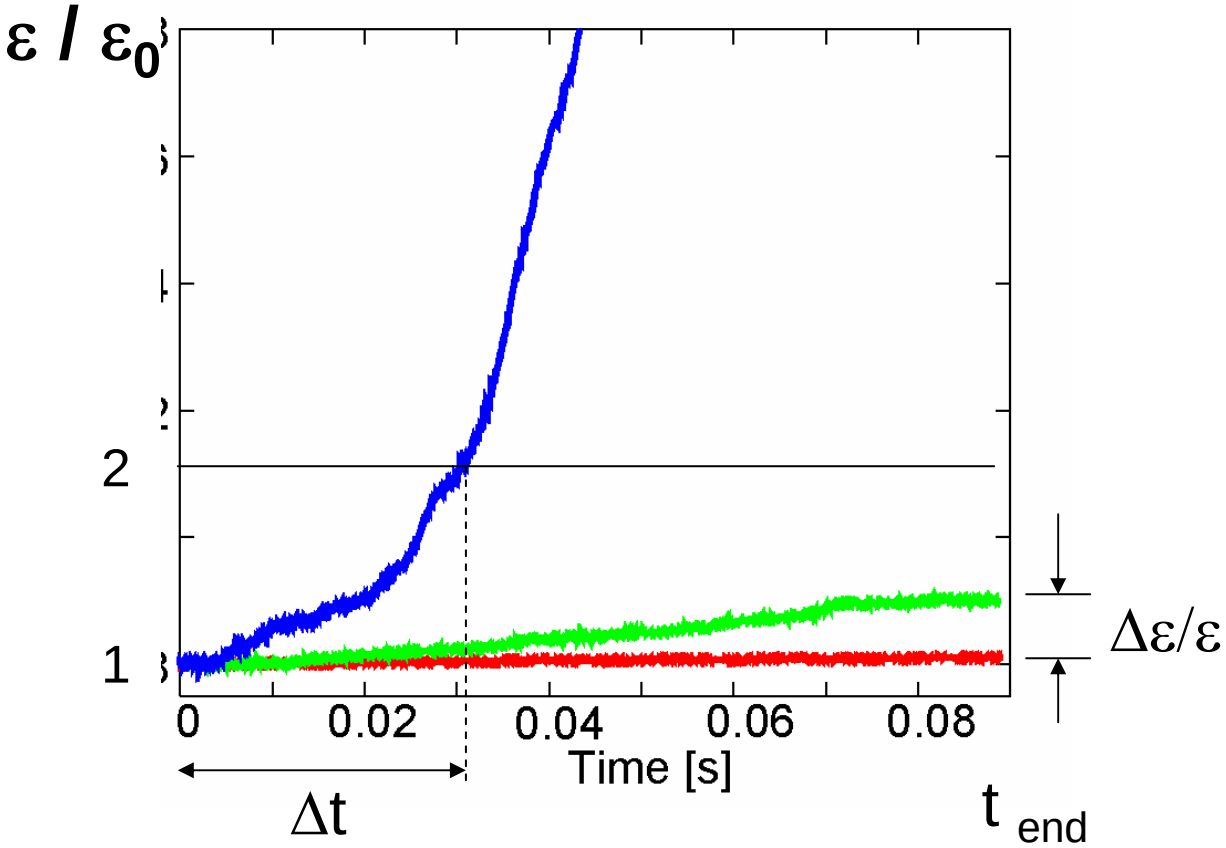
Simulation ingredients

- Simulations with HEADTAIL
- LHC at injection parameters
- Round beam
- Q’=2
- Variable EC density
- Rectangular chamber with electric conducting b.c.

2 diferent cases

- Field free region
- Dipole regions:
  - e- motion frozen in horiz. plane
  - stripes

How do I compute the emittance growth rate

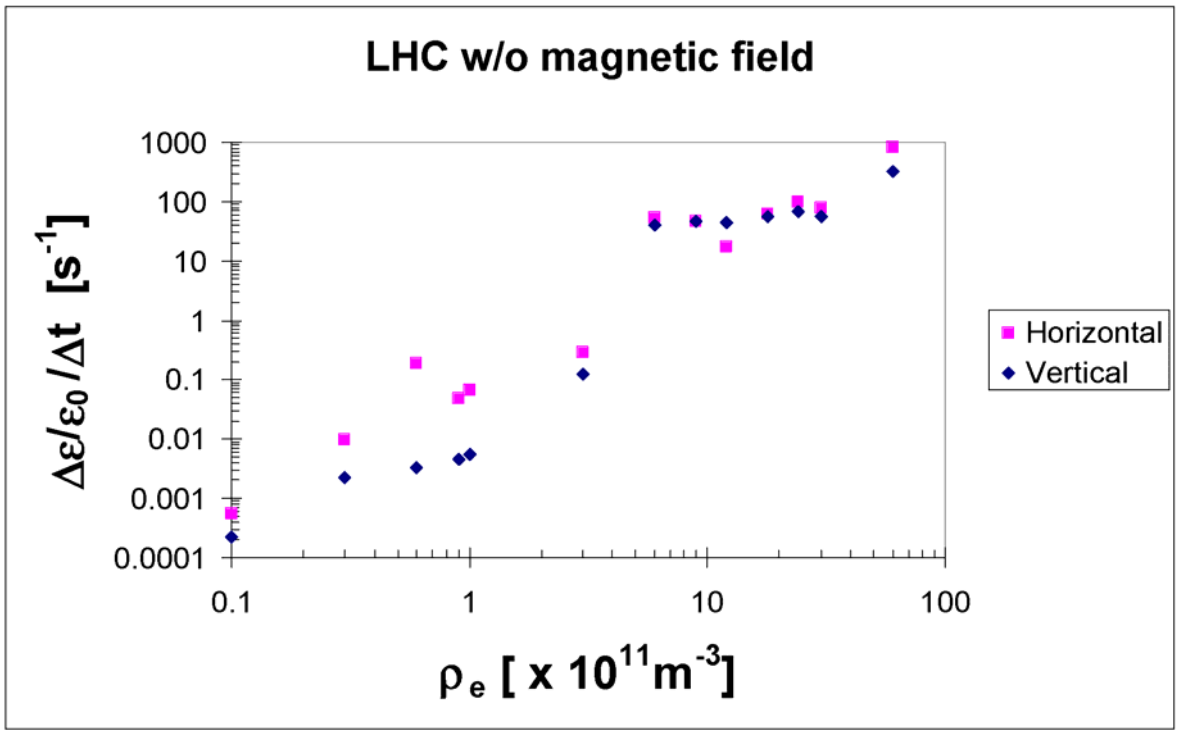


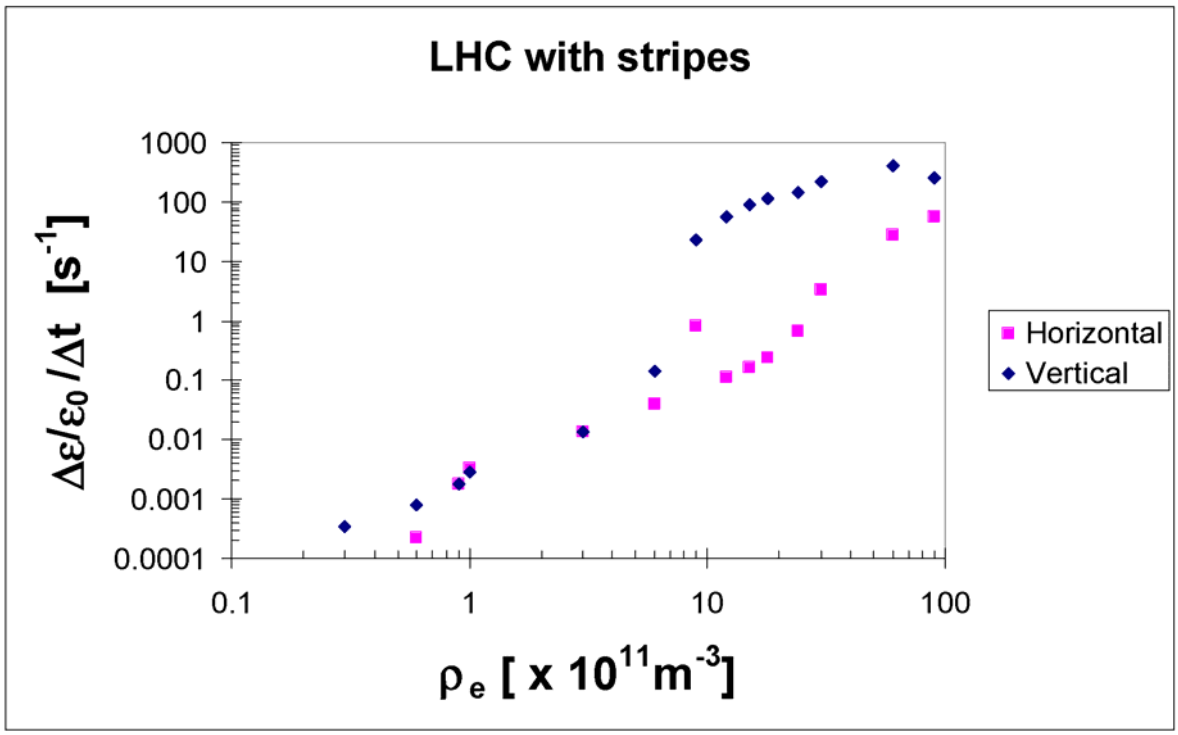
- If the emittance is doubled:

$(2-1)/\Delta t$

- If the growth is smaller:

$(\Delta\varepsilon/\varepsilon) / t_{end}$


LHC w/o magnetic field
1000
100
10
1
0.1
0.01
0.001
0.0001
0.1
1
10
100
Δε/ε0 /Δt [s-1]
ρe [x 10^11 m^-3]
Horizontal
Vertical


LHC with stripes
1000
100
10
1
0.1
0.01
0.001
0.0001
0.1
1
10
100
Δε/ε0 /Δt [s-1]
ρe [x 10^11 m^-3]
Horizontal
Vertical