

parameter	symbol	PS
bunch population	N_b	2×10^{12}
beta function	$\beta_{x,y}$	16 m
rms beam size	$\sigma_{x,y}$	4.186 mm (normalized emittance= $2.5\mu m$)
rms bunch length	σ_z	11.24 m (bunch full length= $150ns$)
rms momentum spread	δ_{rms}	1.132×10^{-4}
synchrotron tune	Q_s	0.0266 (f= $650Hz$)
circumference	C	628m
nominal tunes	$Q_{x,y}$	6.22
chromaticity	ξ	-1
relativistic factor	γ	2.49211 (kinetic energy= $1.4GeV$)
cavity voltage	V	25kV
cavity harmonic number	h	8
wakefield (Broad Band Resonator)		
resonator frequency	f_r	1.4GHz
quality factor		1
transverse impedance	Z_x	1M Ω/m

Maximum tune shift due to space charge:

$$\Delta Q \approx 0.35$$

Ongoing:

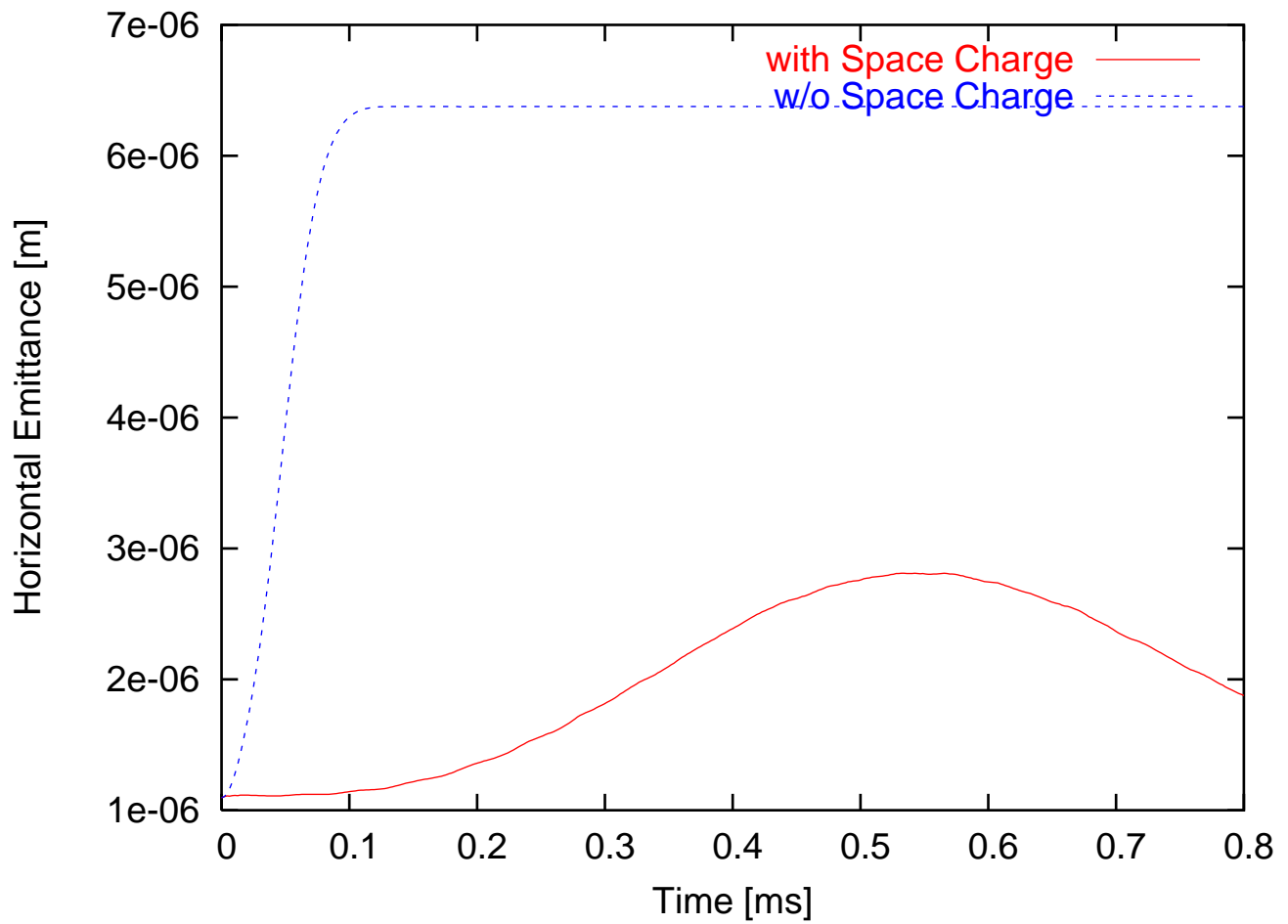
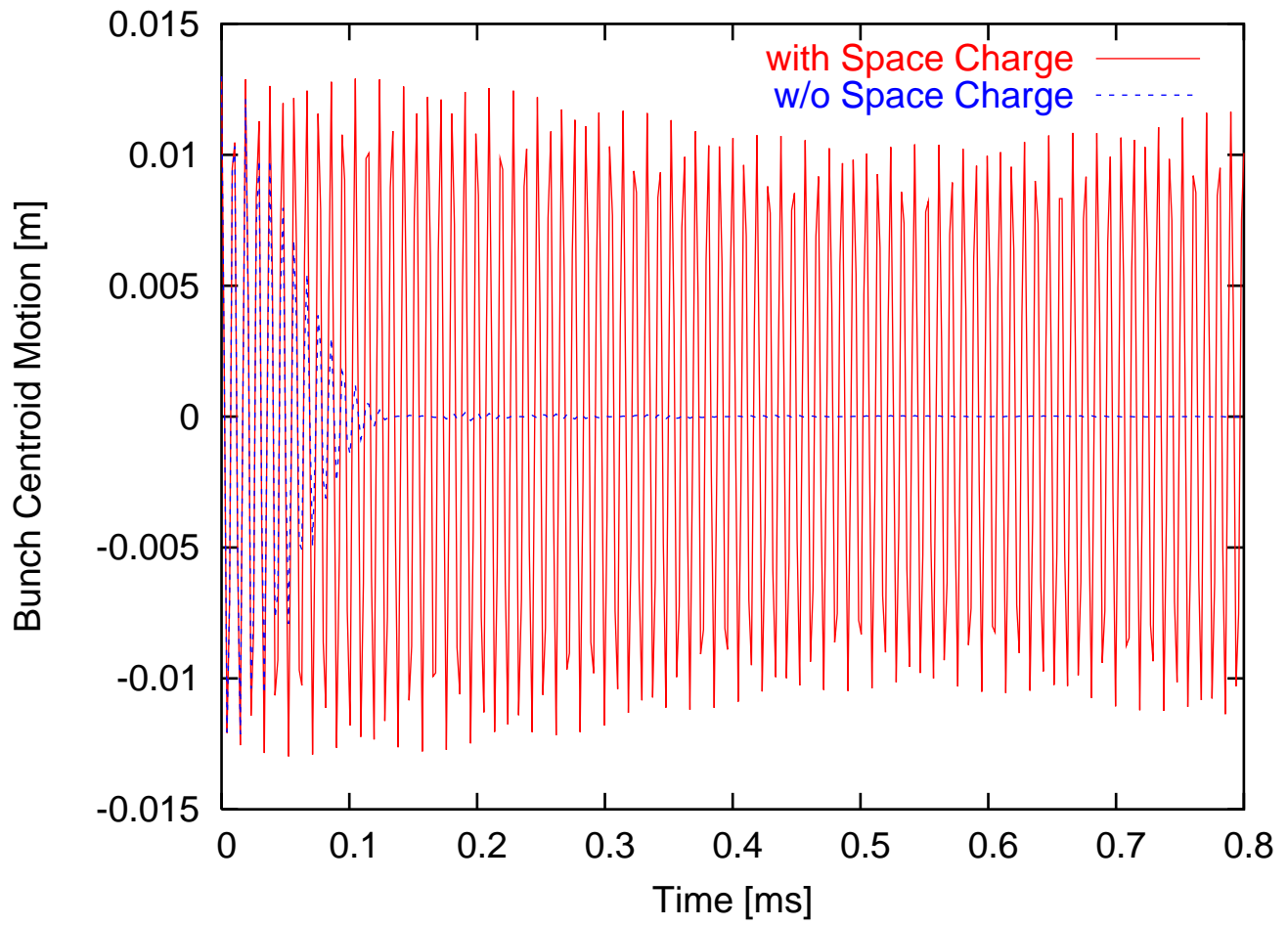
Analytical studies by EM and FZ.

Simulations for longer time ($> 2ms$), including the effect of:

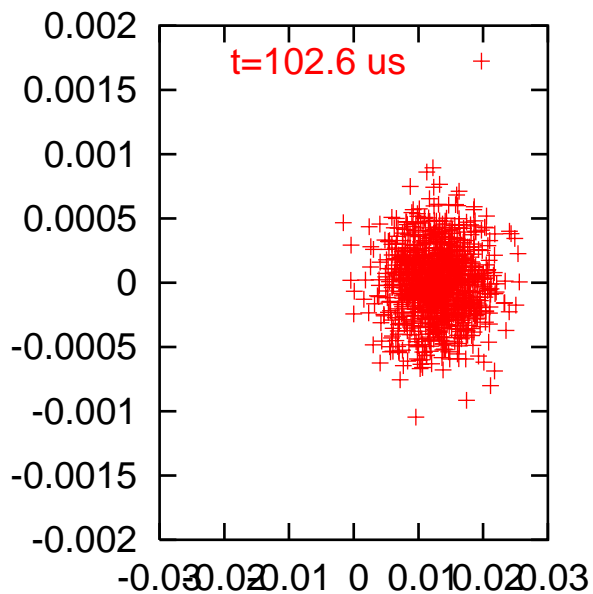
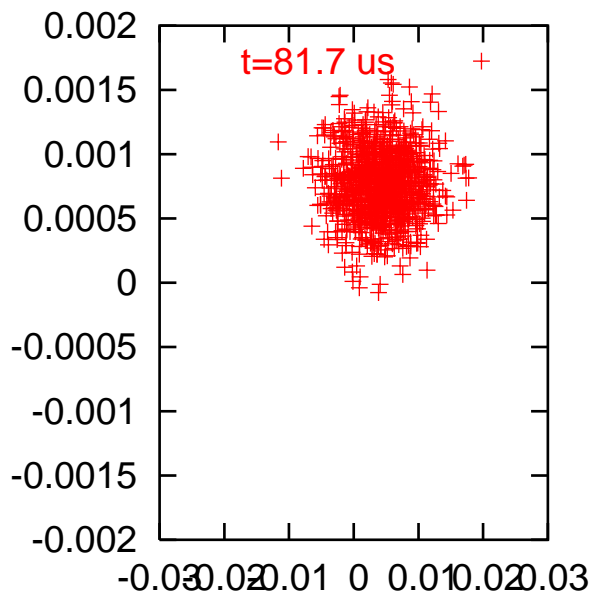
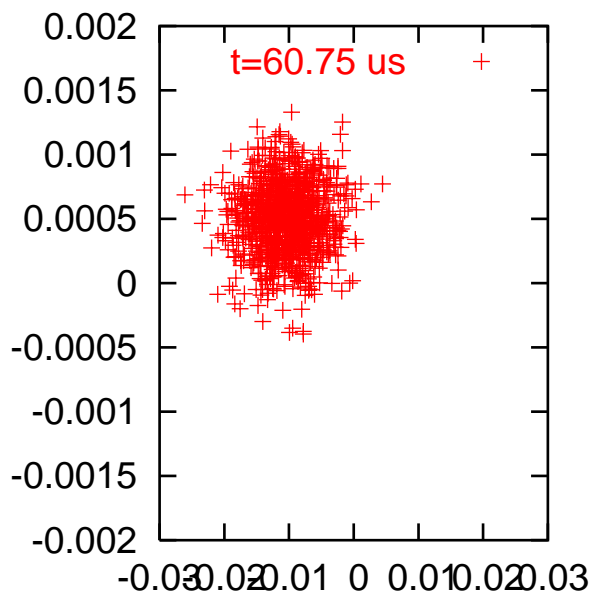
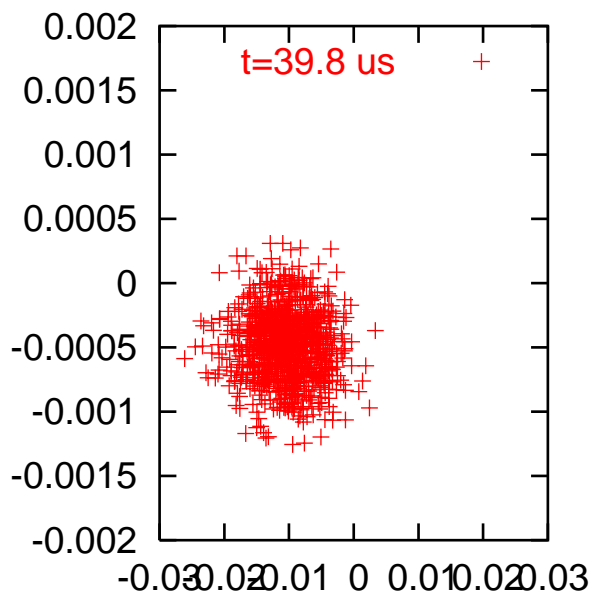
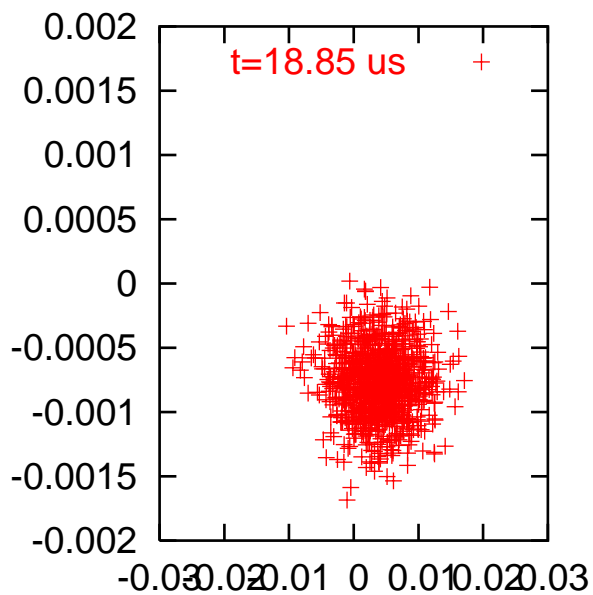
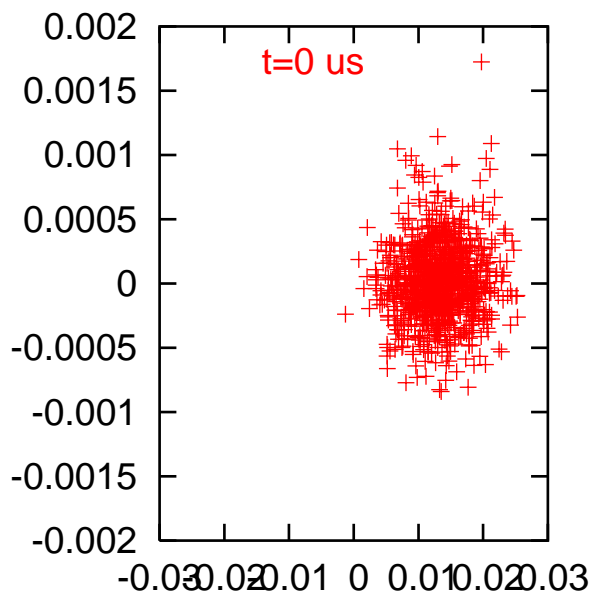
- space charge
- wake field
- second order chromaticity [1]

References

- [1] R.Cappi et al. "Optics Studies for the CERN Proton Synchrotron Machine: Linear and Nonlinear Modelling using Beam Based Measurements", PAC'03 and CERN-AB-2003-017 ABP, (2003)



Phase space $x-x'$ of the beam at different time steps, simulations WITH SPACE CHARGE



Phase space $x-x'$ of the beam at different time steps, simulations WITHOUT SPACE

