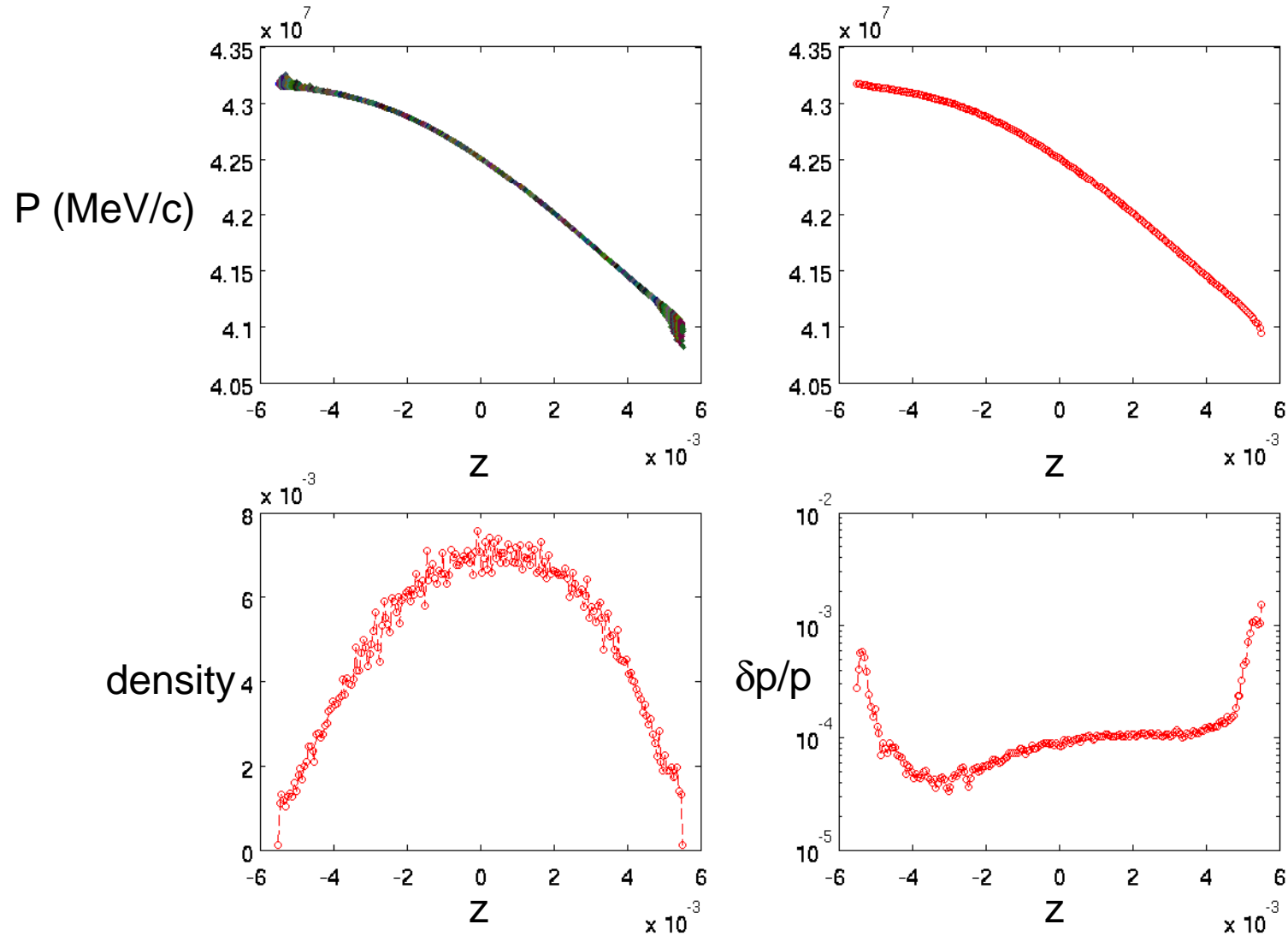# Bunch compressor, FODO channel and dogleg for NML
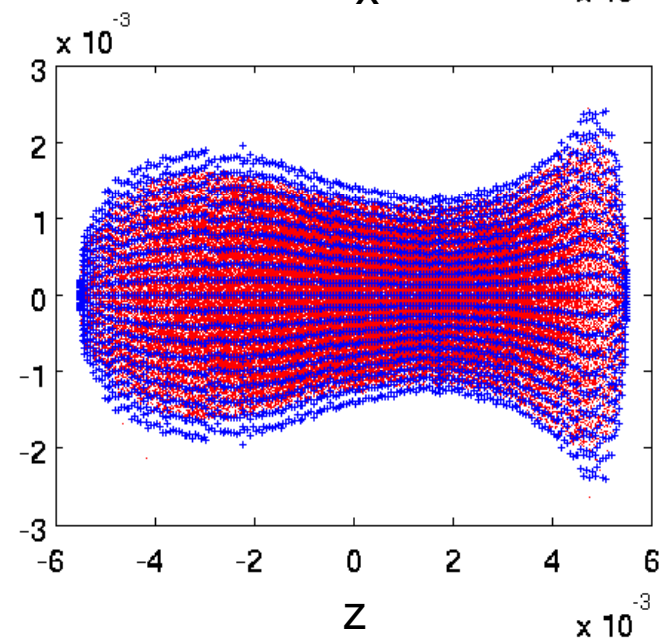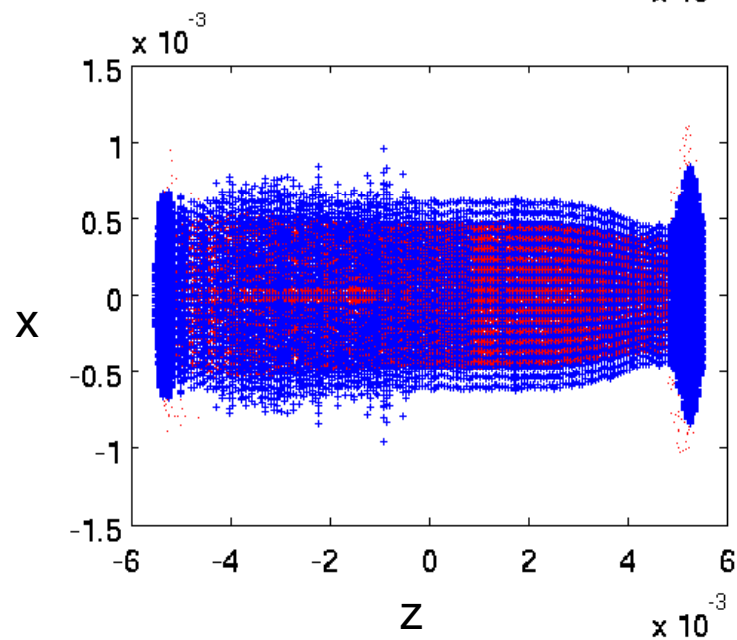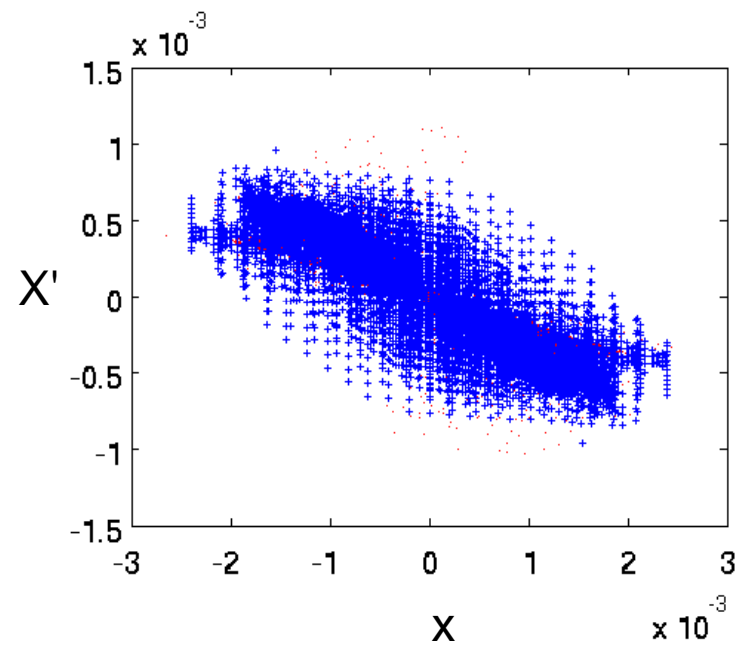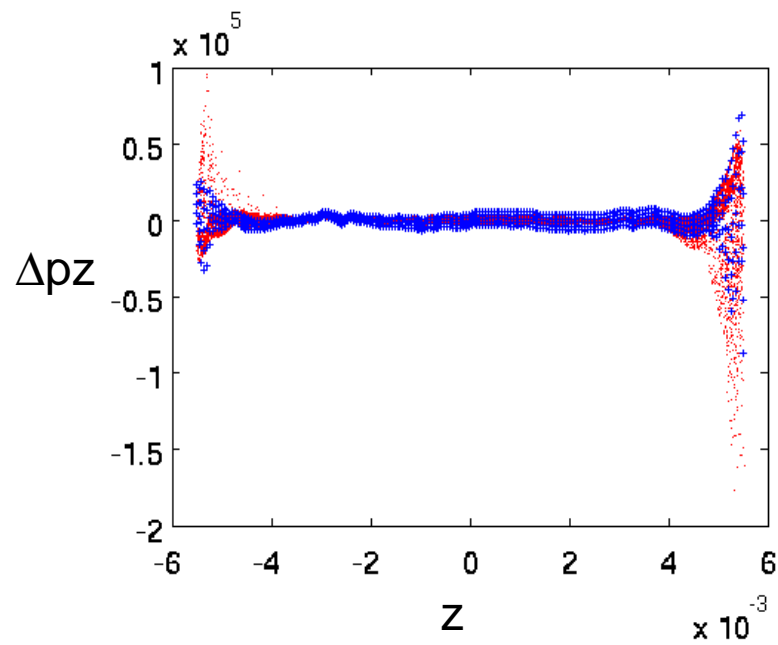
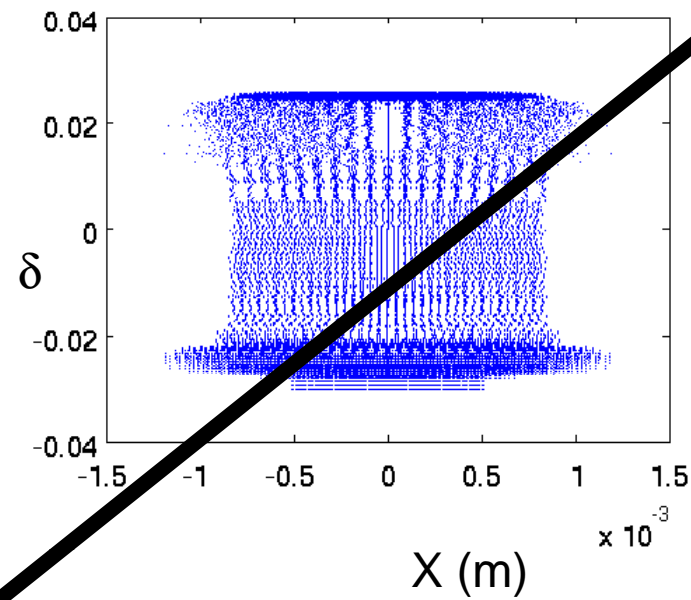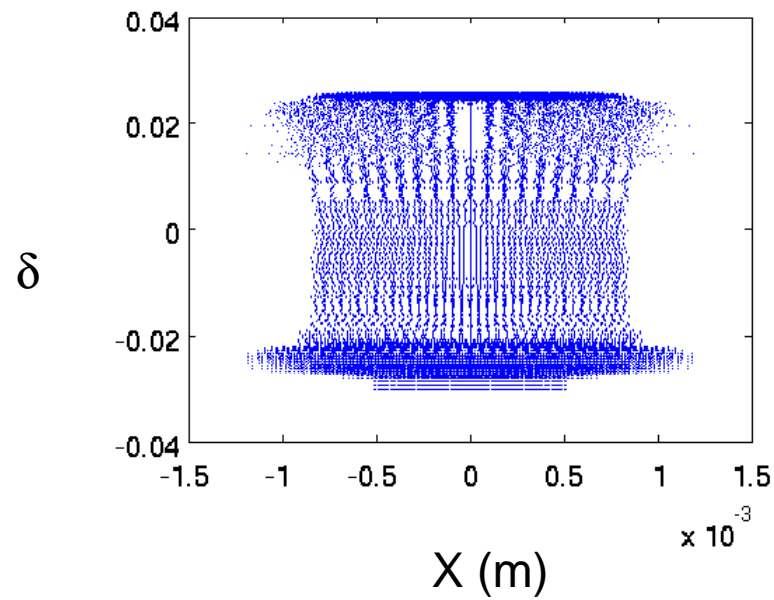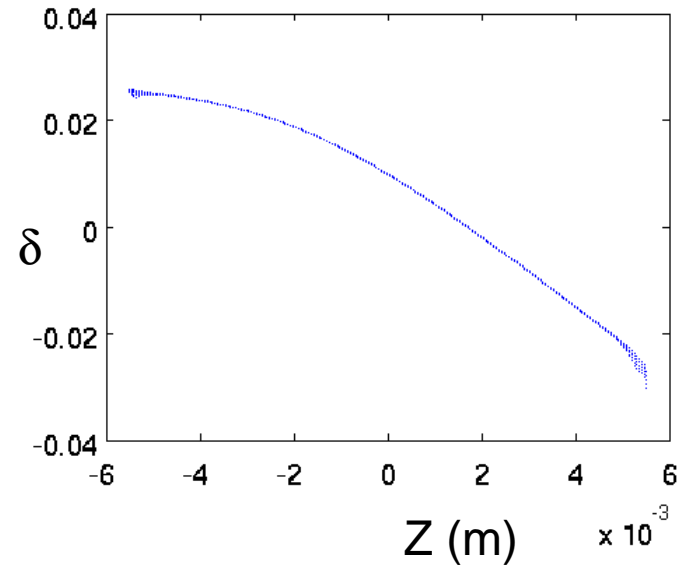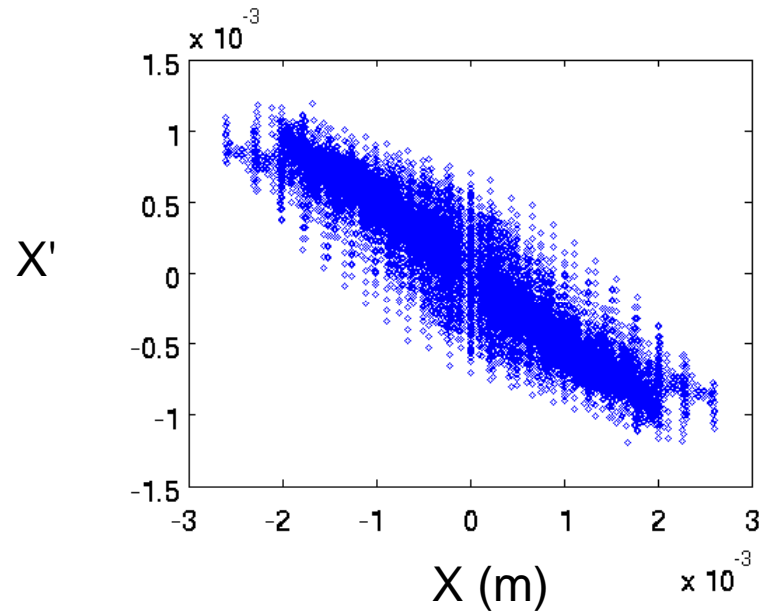P. Piot, July 10th, 2007

Converting Astra to CSRTrack

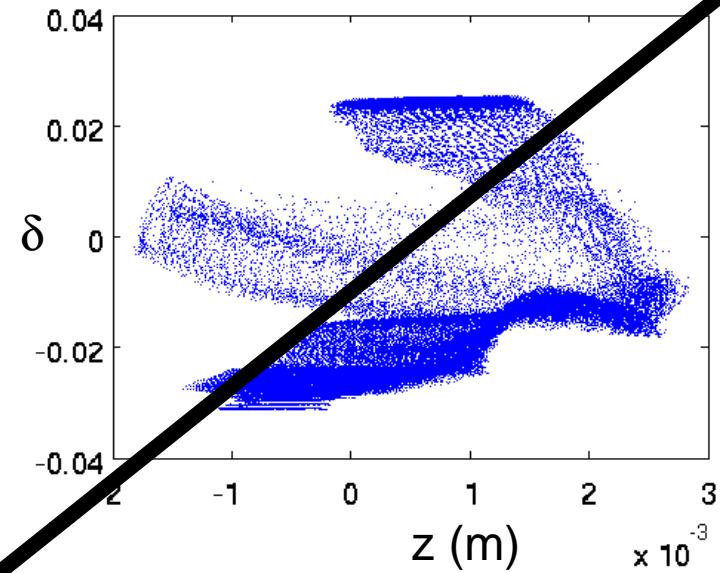2nd cavity ~-25 deg off crest
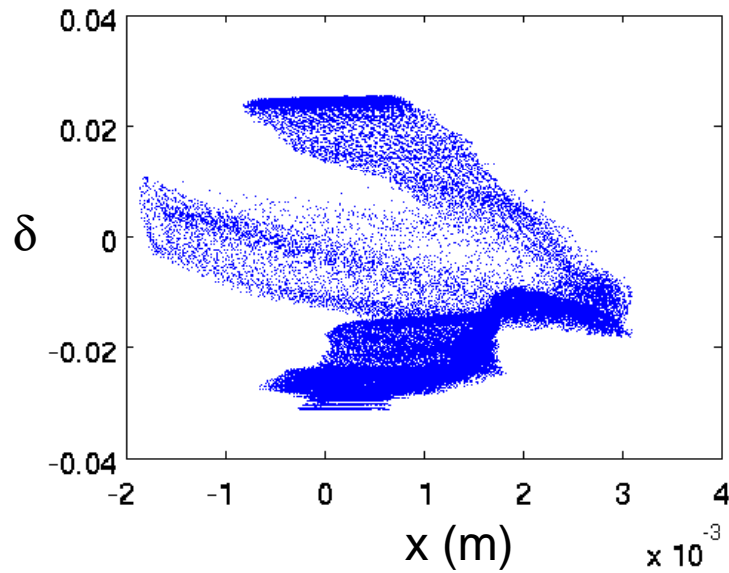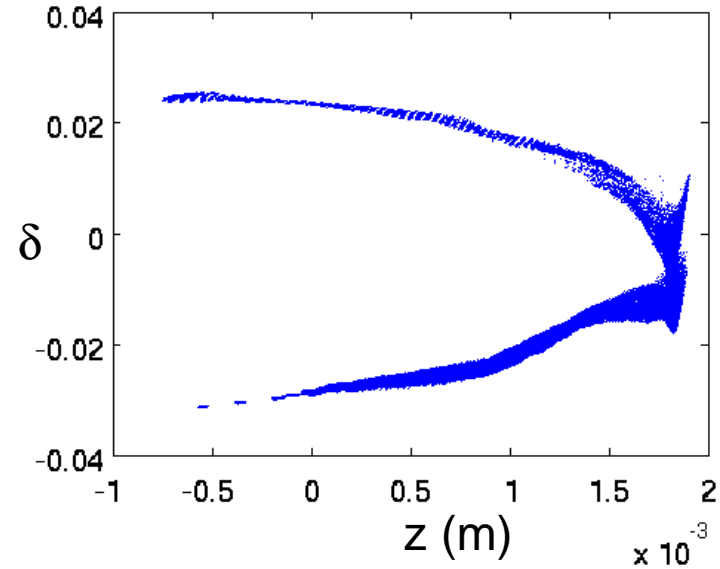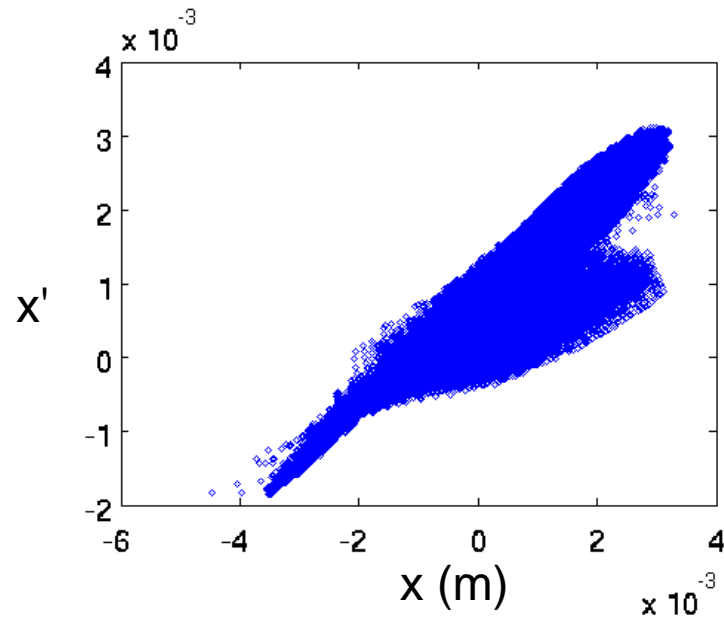Q=3.2 nC, phase space out of the 2nd cavity
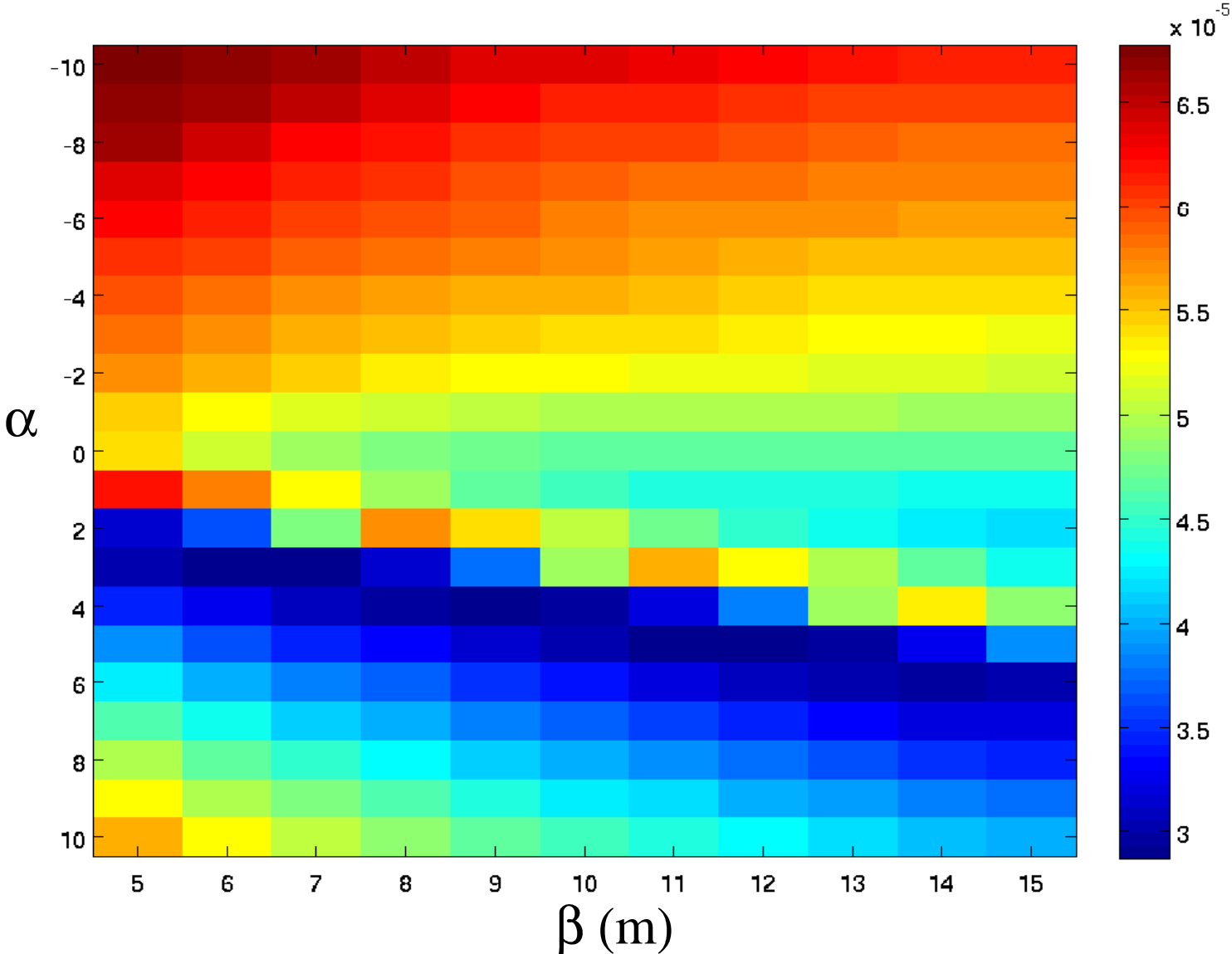
Input phase spaces passed to CSRTrack

Input phase spaces from CSRTrack

Output phase spaces from CSRTrack

Horizontal emittance versus
incoming Courant-Snyder parameters (Q=3.2 nC)

Best emittance: 29 mm-mrad (horizontal)

Transverse beam size and emittance evolution through the chicane
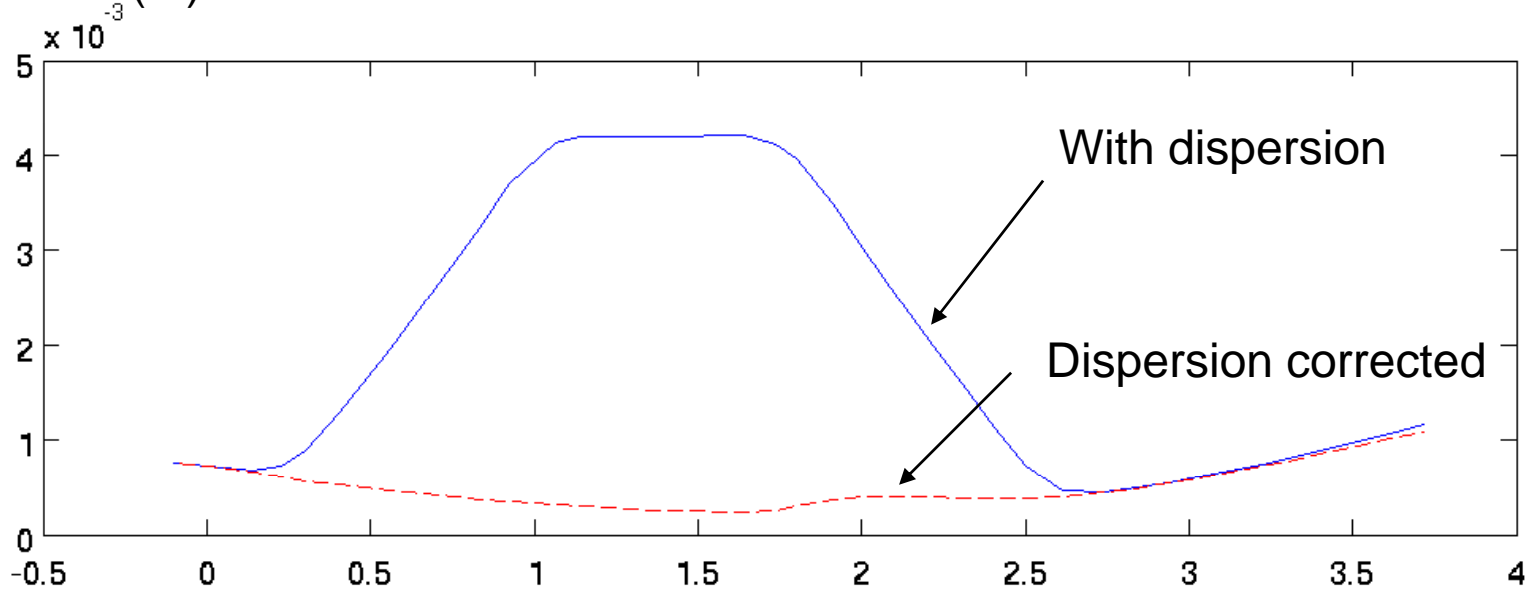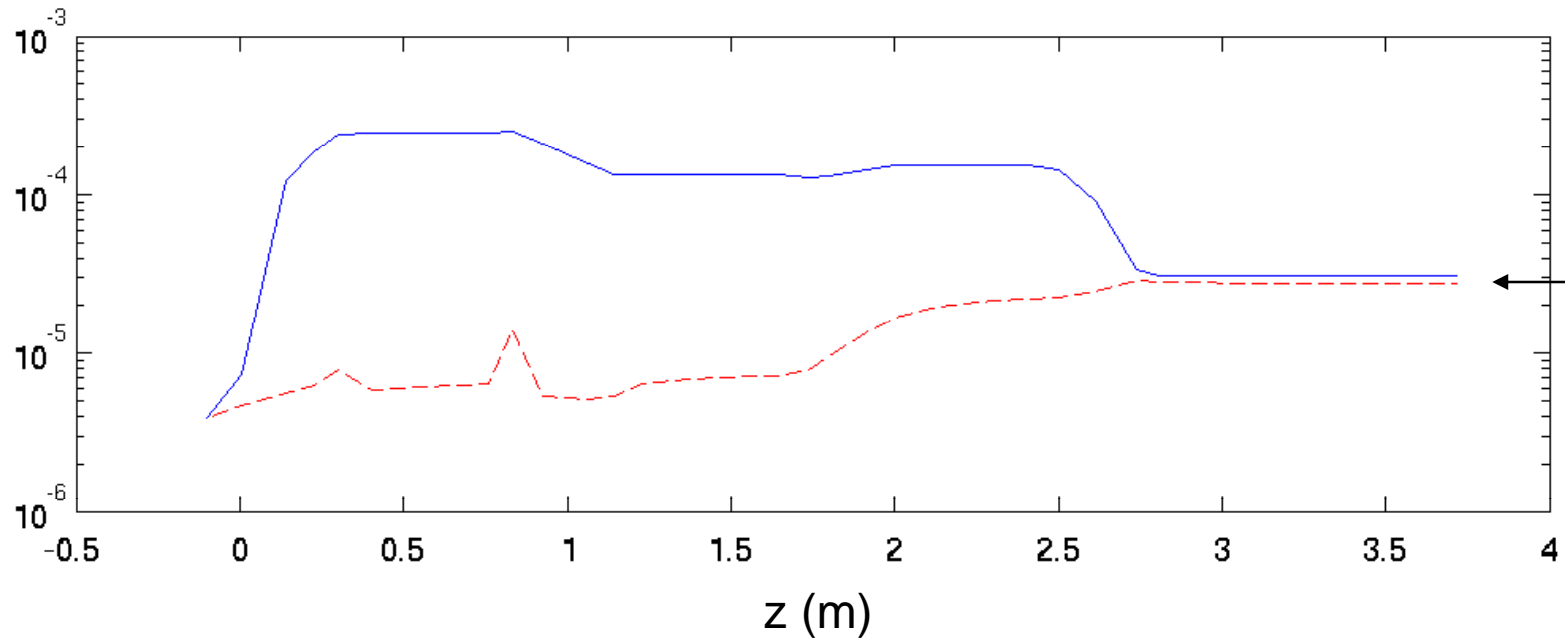
FODO channel for emittance measurement

- FODO with 90 deg/cell provides

- OTR located every 45 deg phase advance

- Space charge at 40 MeV might be a problem

- Investigated (see two next slides) the effect of space charge (3.2 nC bunch with a rms bunch length of 300 um). Note the bunch is assumed to follow a Gaussian distribution in x, y, and z.

FODO channel with 45 deg/cell (L=75 cm)
[w 3.2 nC (solid) and 0 nC (solid)]
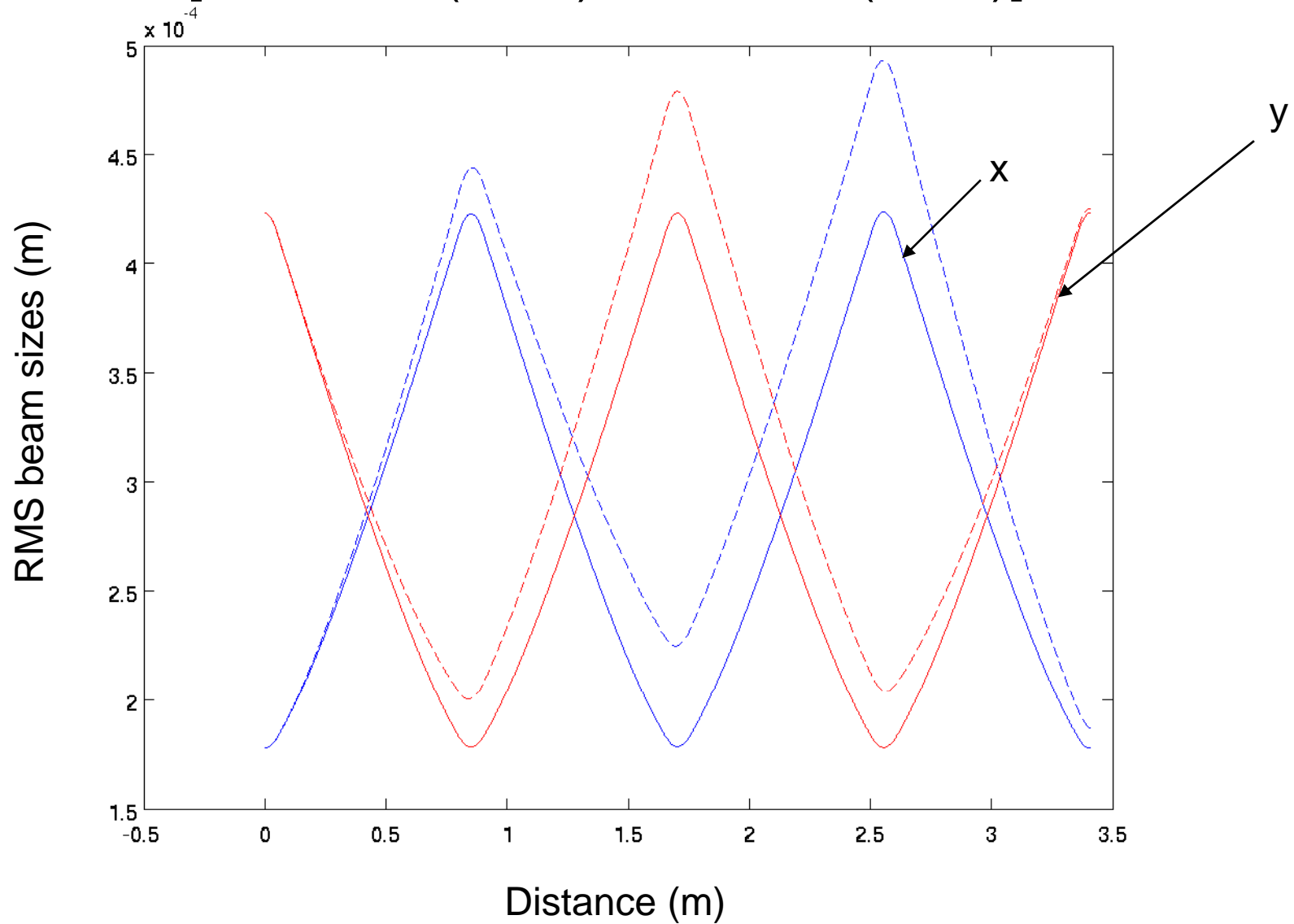

For 3.2 nC, no emittance growth in the channel beam size increase compared to 0 nC comes from space-charge-induced tune shift

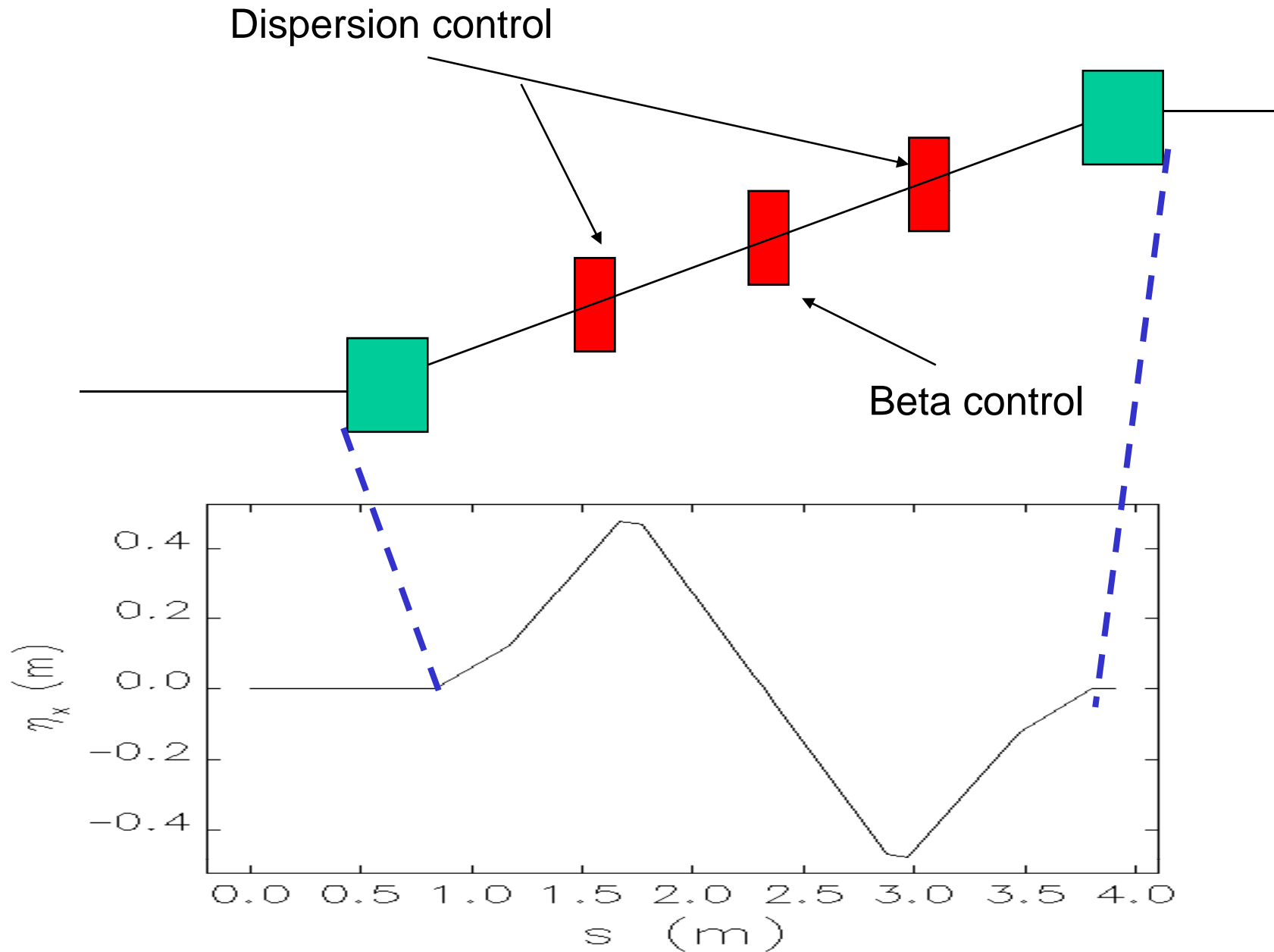# FODO channel with 45 deg/cell (L=30 cm) [w 3.2 nC (solid) and 0 nC (solid)]
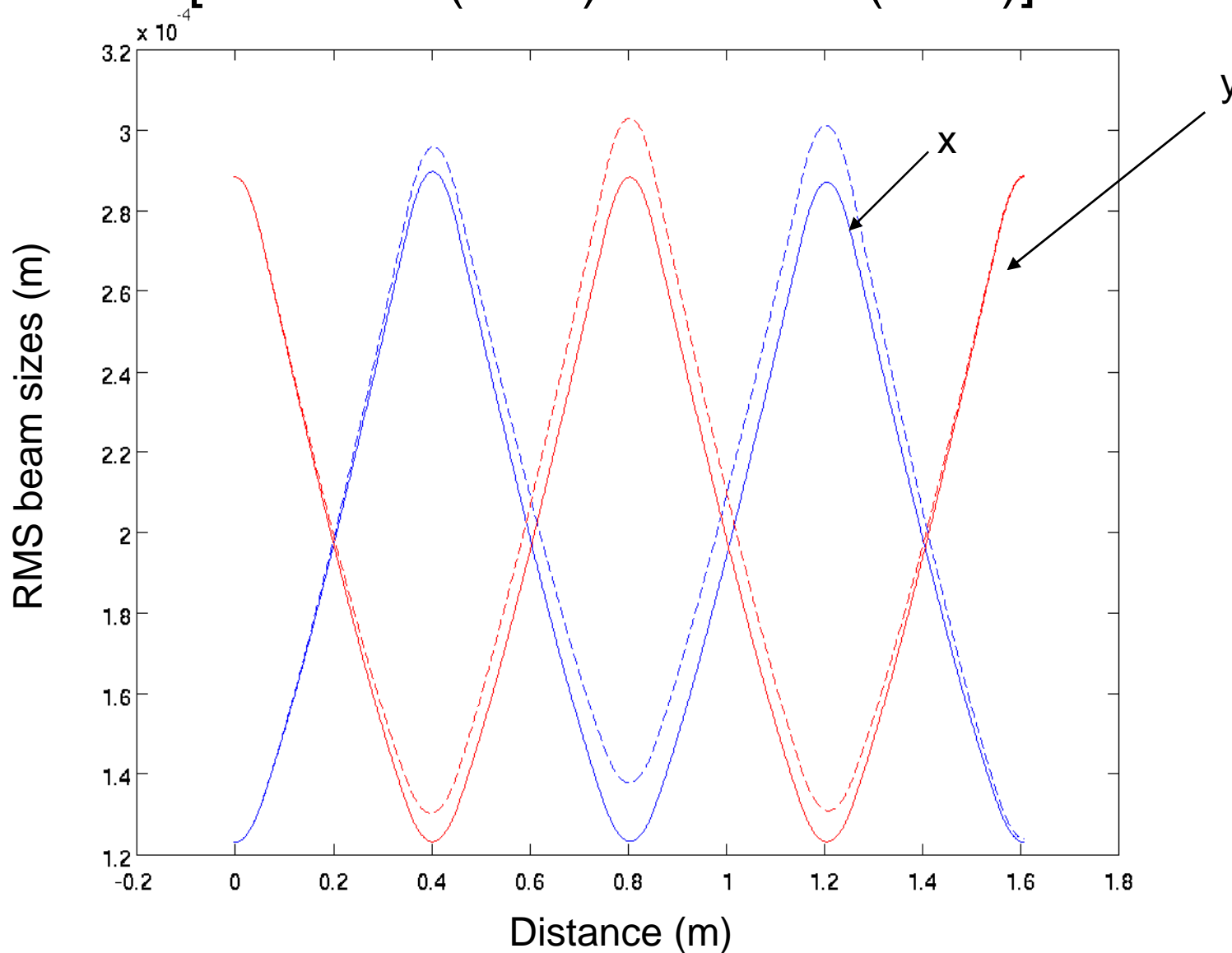
Reduce distance between quadrupole to 0.3 m → cumulated space-charge-induced tune shift smaller – can correct by a clever choice of quadrupole strength? (coming soon)
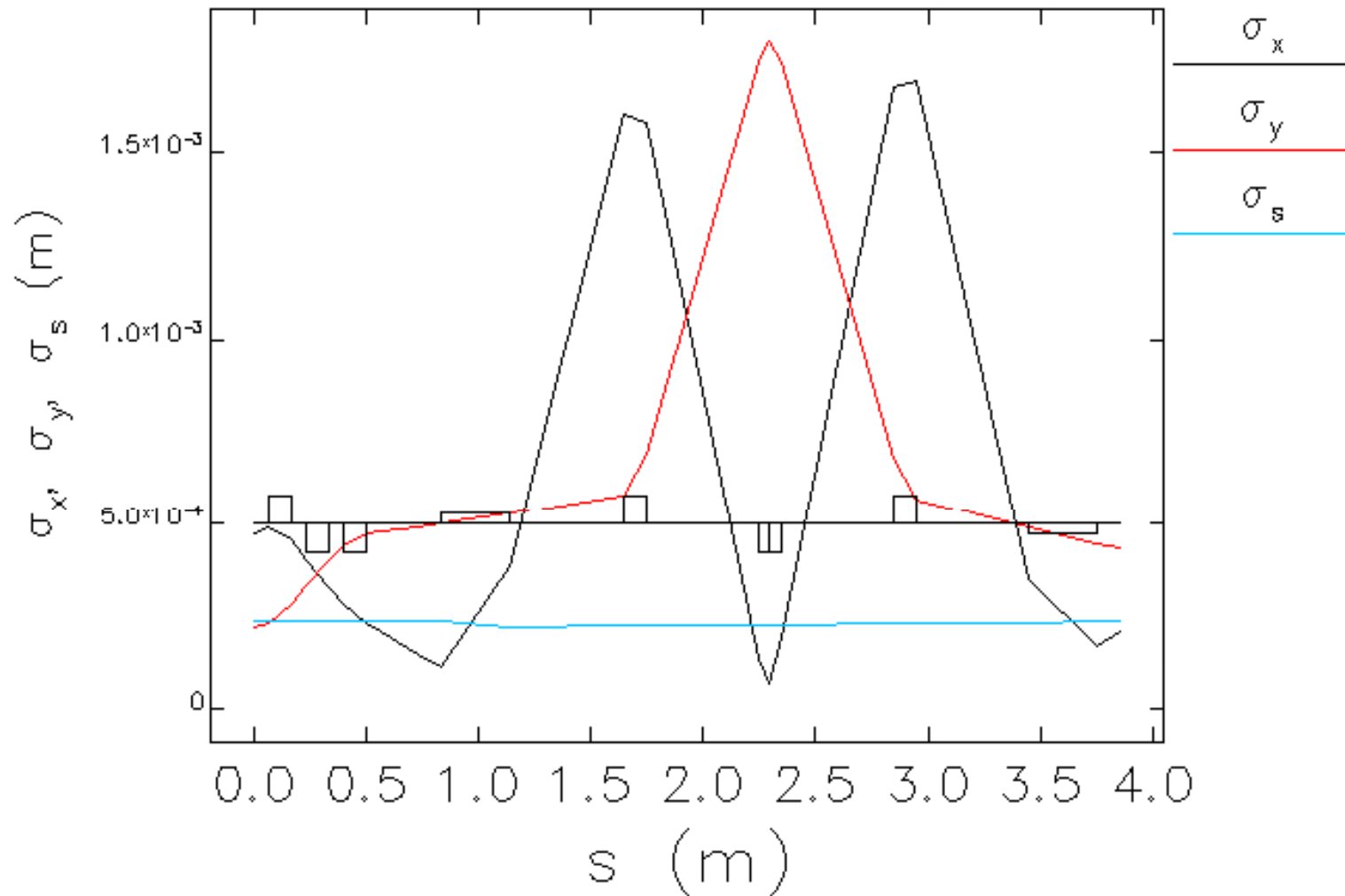
Thoughts on dogleg

Dispersion control

Beta control

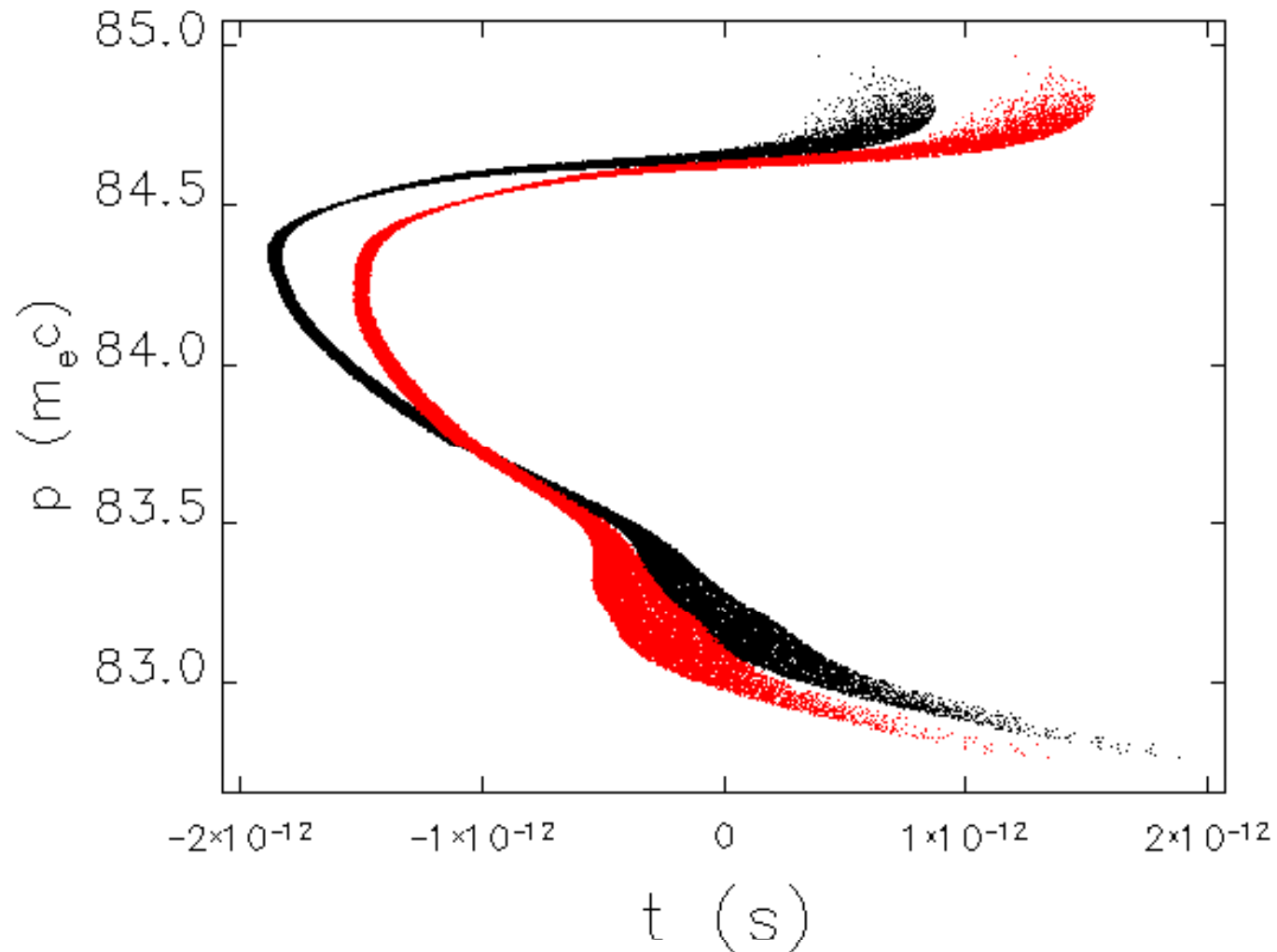Twiss parameters--input: ilctadogleg.ele   lattice: ilctadoglegfit.new2

22.5 deg

R56 = 1.570329e-002 m
T566 = -1.738298e-003 m

22.5 deg

watch-point phase space—input: ilctafeb06_injector.ele   lattice: ilctafeb06_injector.lte