Preliminary investigation on SPS space charge effect

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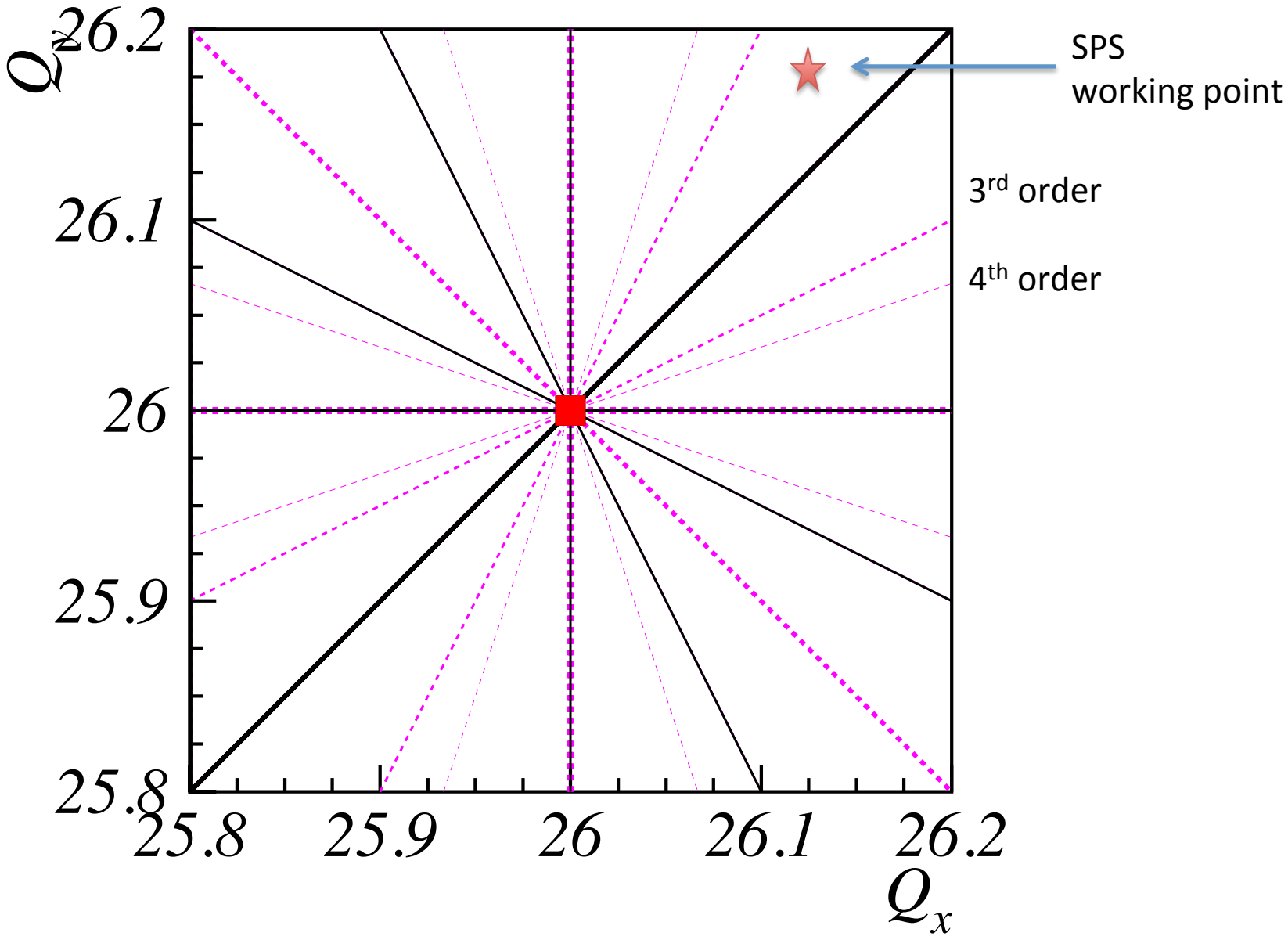
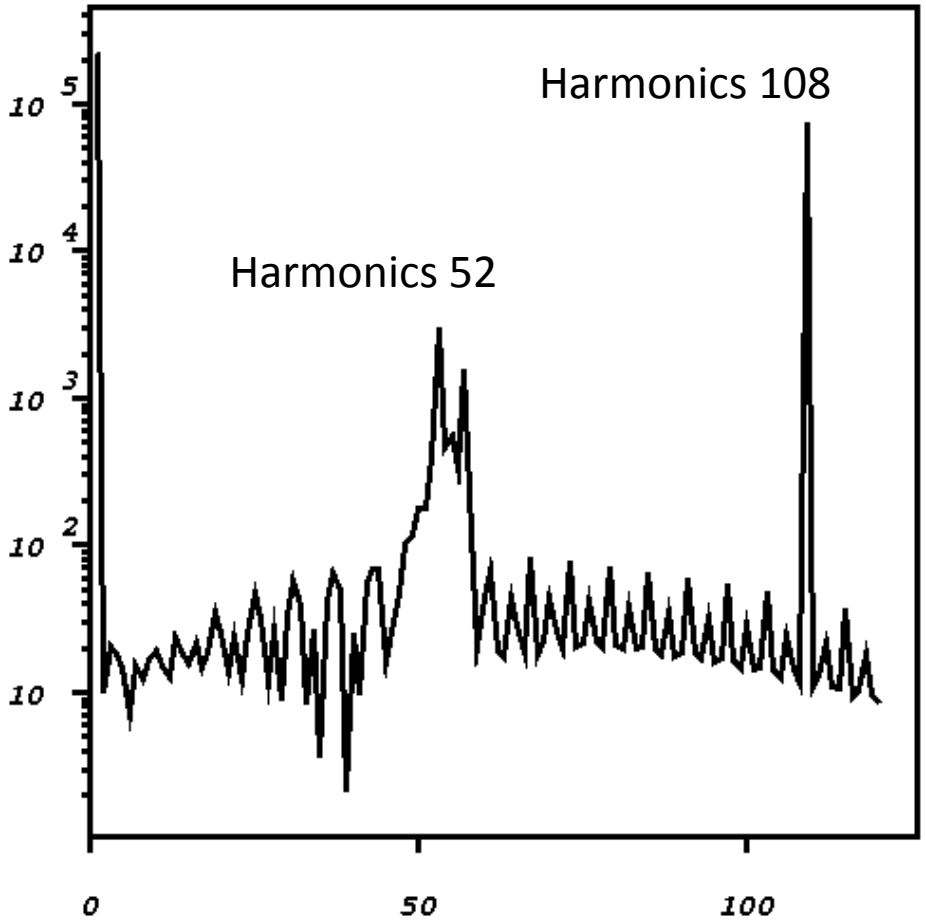
Thanks to B. Salvant, H. Bartosik

SPS possible resonances



Harmonics excited by SPS optics

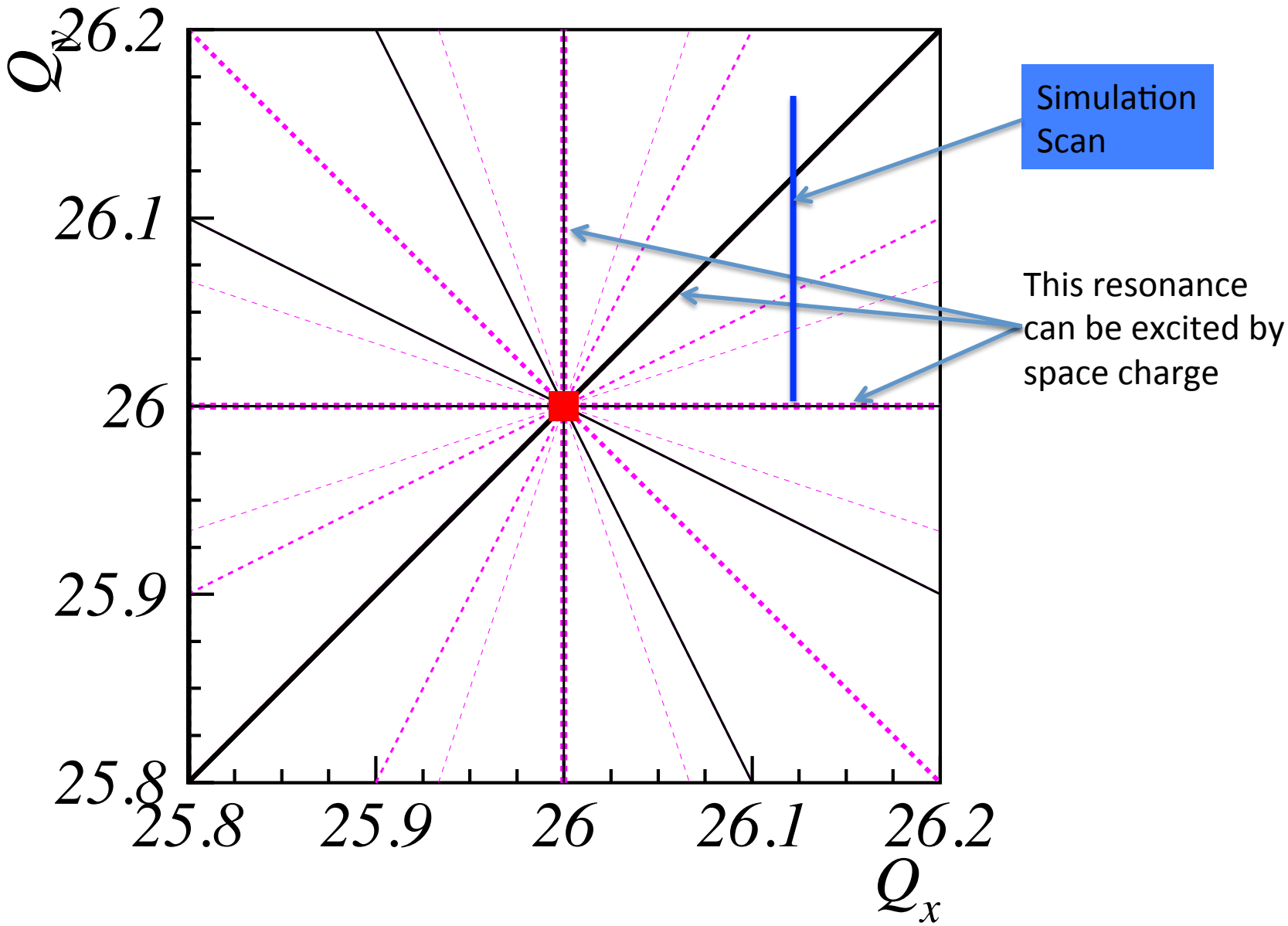


108 is the periodicity
of beta functions (FODO)

4 Qx = 104

and

2 Qx = 52

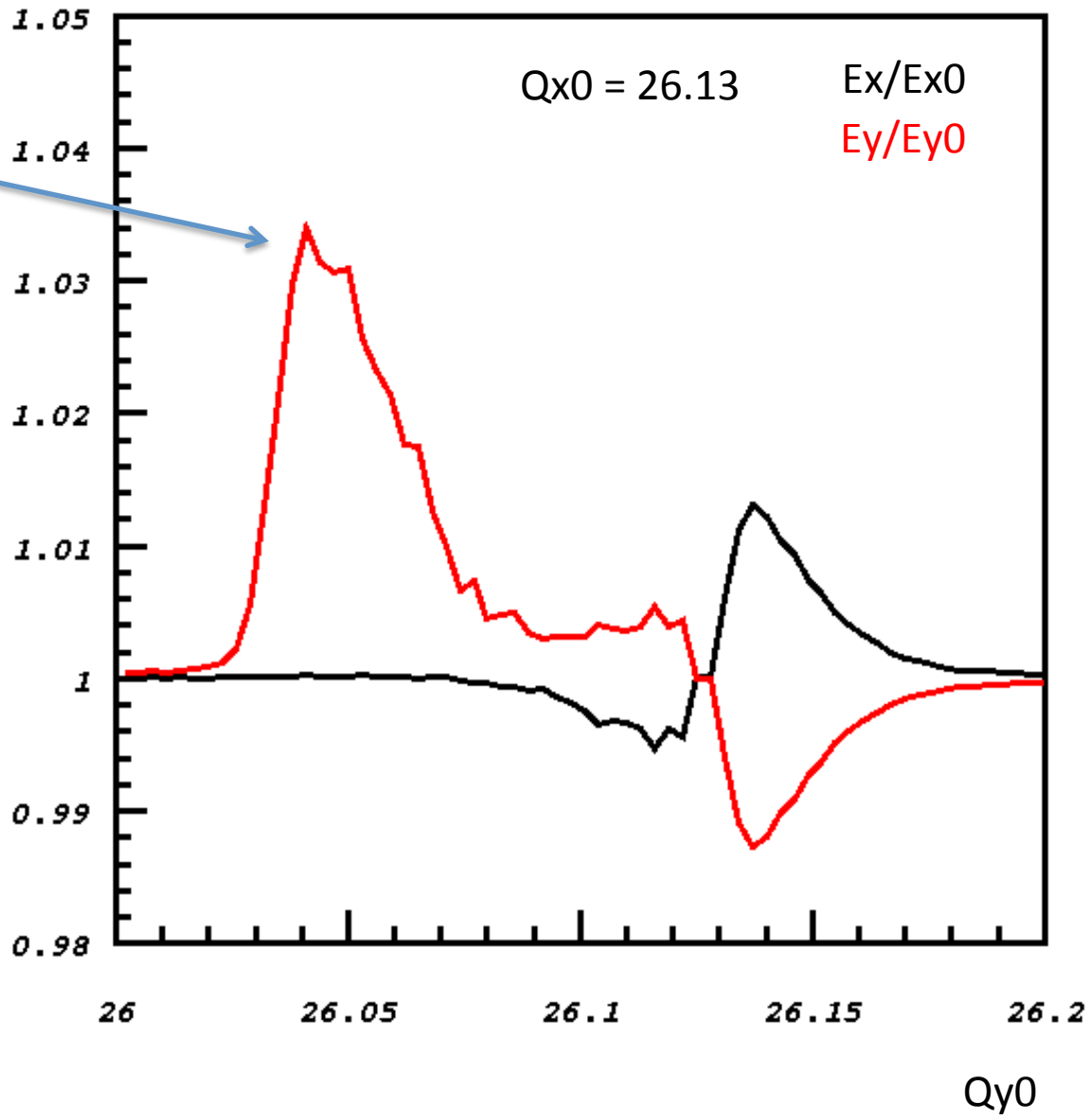

Q_y
26.2
26.1
26
25.9
25.8
25.8
25.9
26
26.1
26.2
Q_x
Simulation Scan
This resonance can be excited by space charge

Self consistent 2D coasting beam

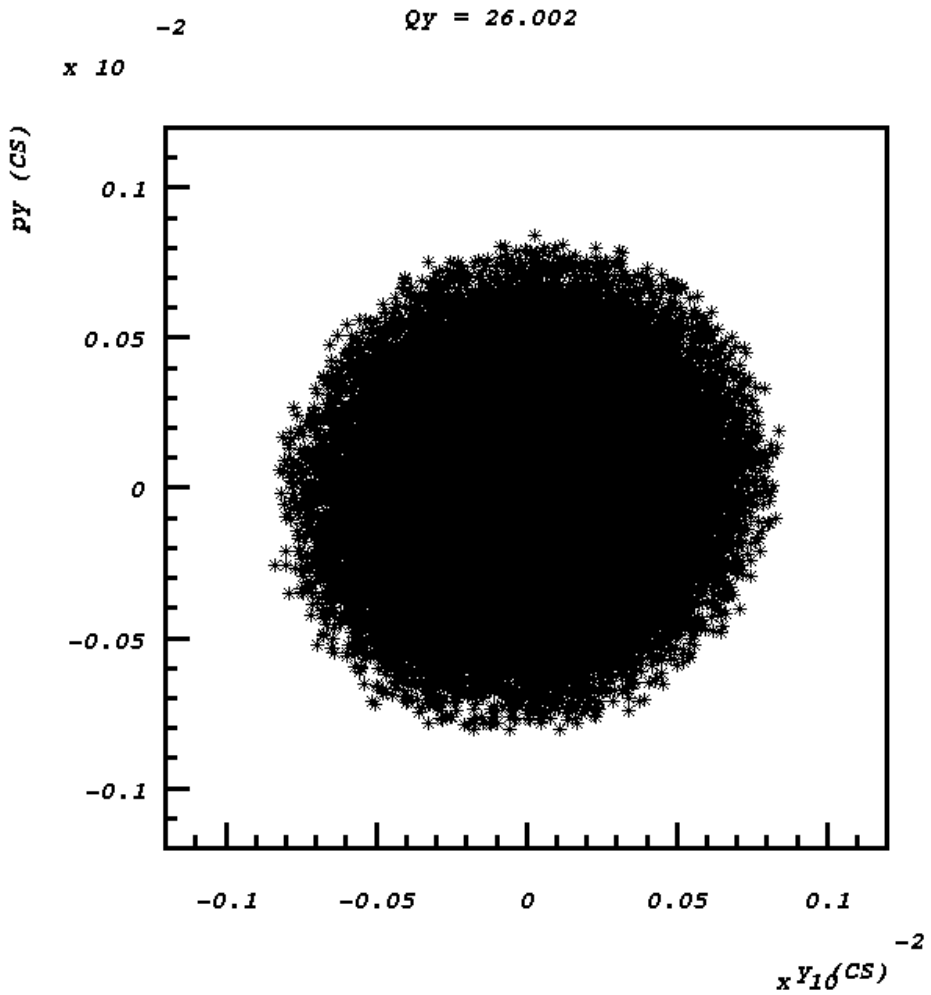
Is it a second order resonance ?

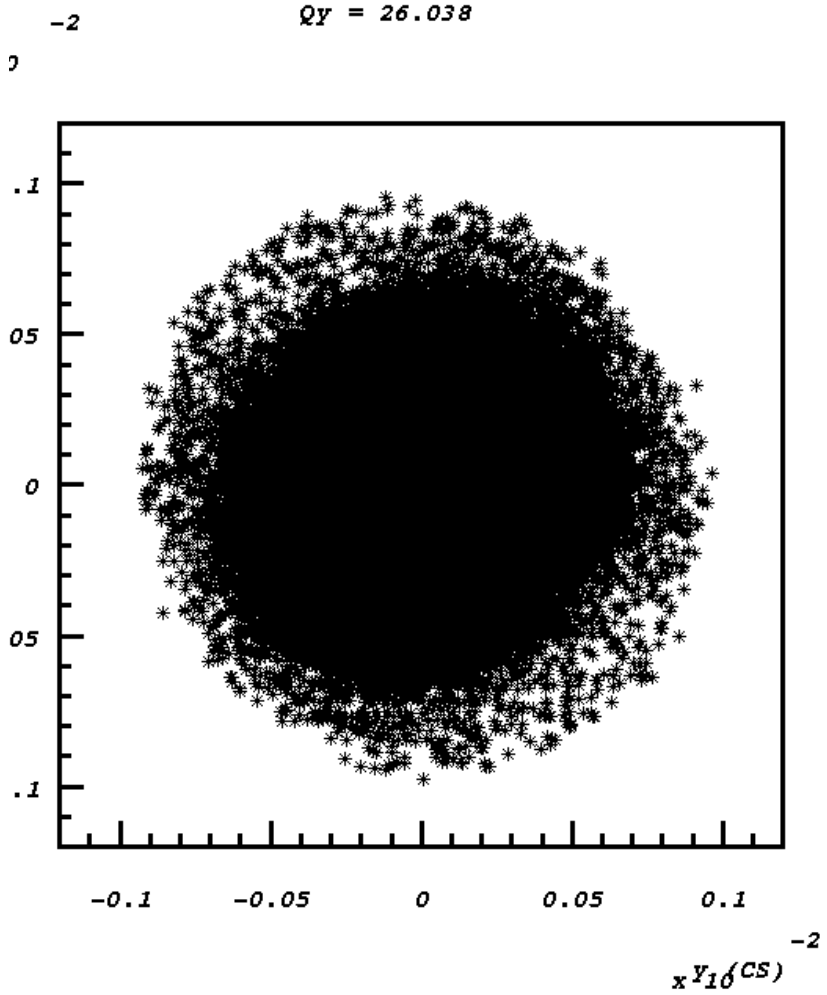
Ex = Ey = 0.072 mm-mrad
Peak current 13 A
DQx = DQy ~ 0.2
Gaussian distribution truncated at 3 sigma

(parameters to be checked)

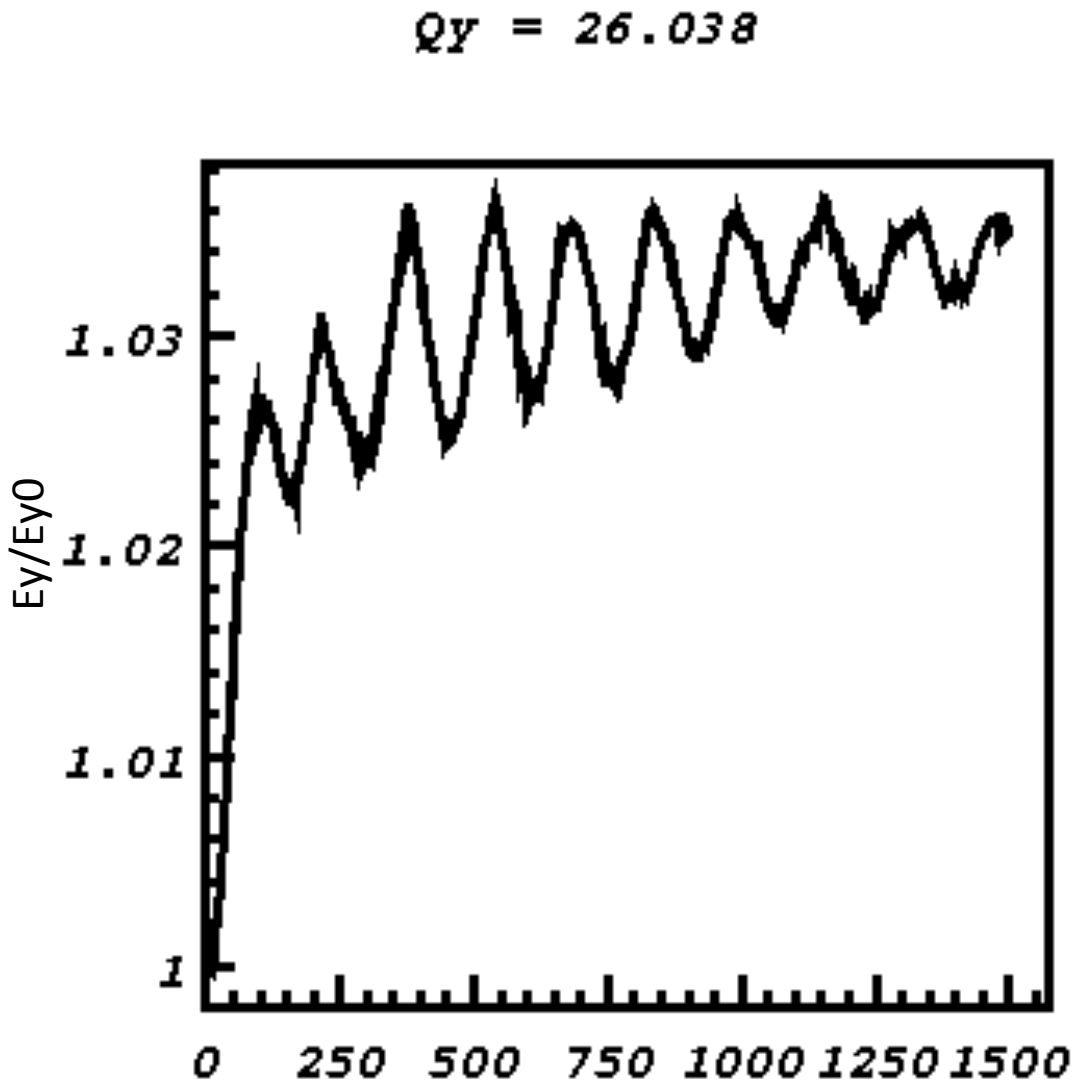


Phase space after 1500 turns





2 islands appears



The excitation of the 2nd order structure resonance might play a role for a high intensity bunched beam

(Periodic crossing of a space charge structure resonance…. to be checked)

Possible new working point