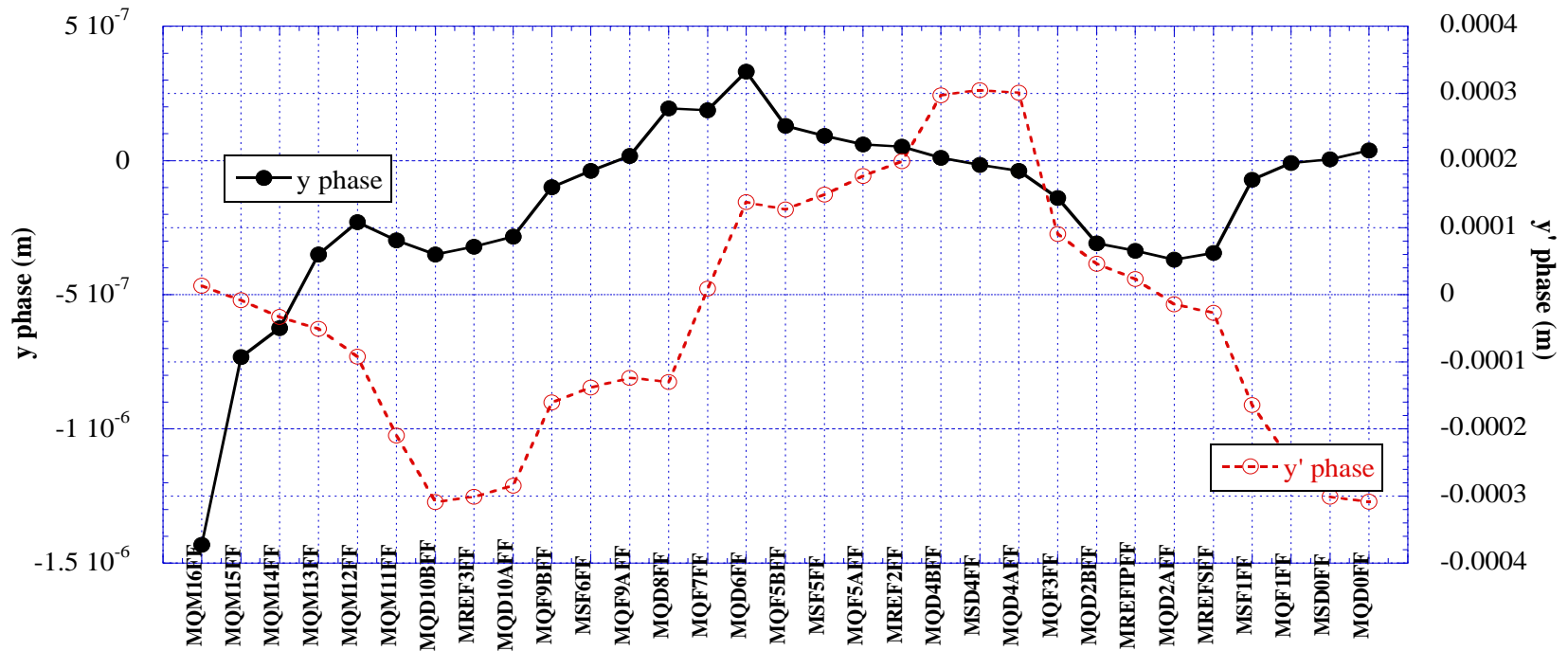


Beam position jitter at IP
Comparable to nominal beam size existed?
(simulation)

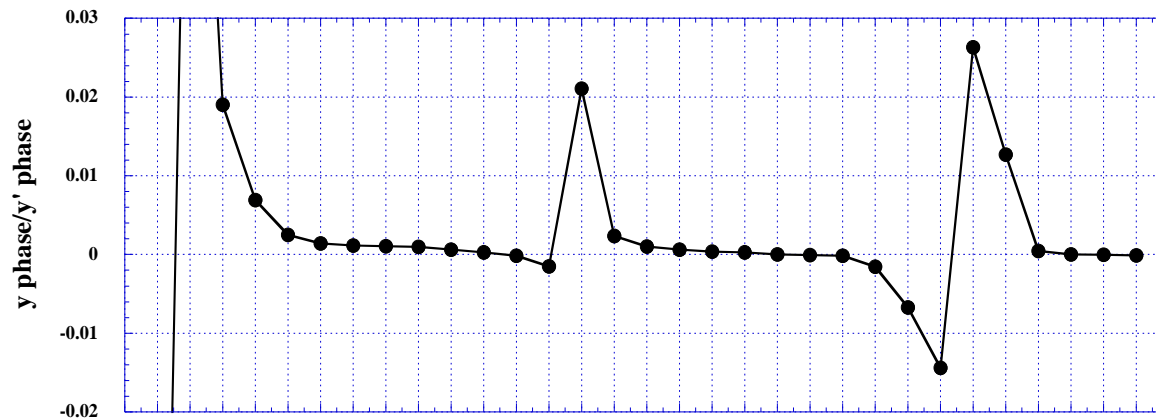
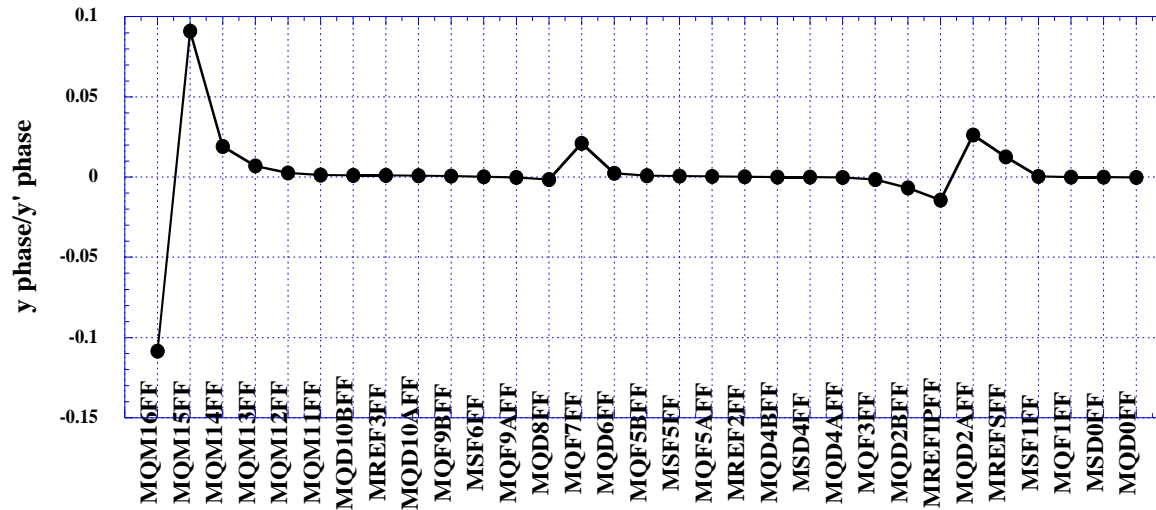
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K.KUBO

Orbit of “y at IP phase” and “y' at IP phase” (1-sigma of y at IP, 1-sigma of y' at IP)



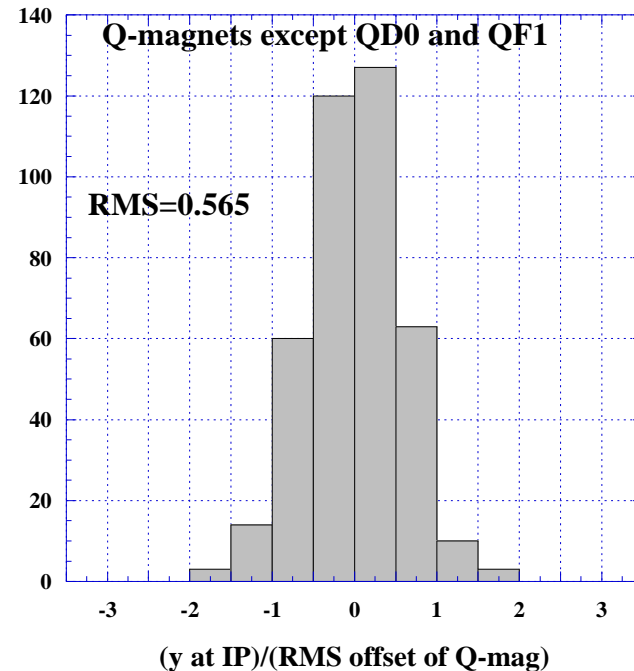
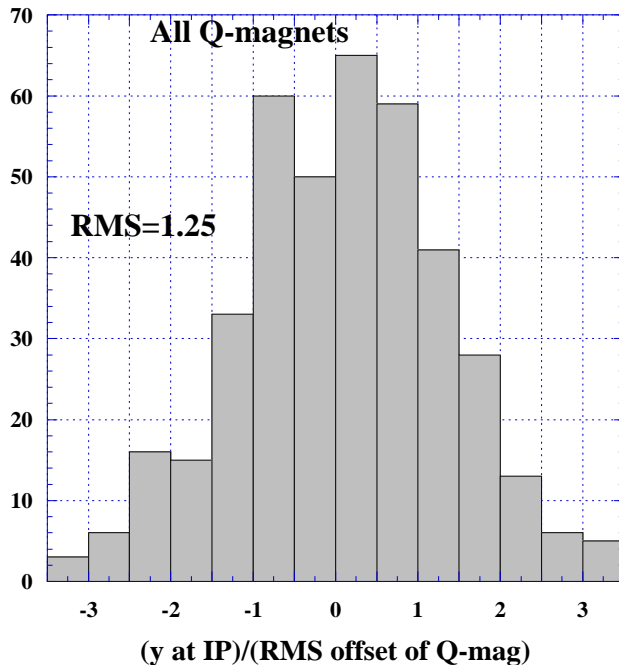
Ratio of Orbits “y at IP phase” and “y’ at IP phase”



Large y-phase orbit jitter might not be noticed if small y'-phase orbit jitter existed?

Beam position jitter induced by Q-magnet random offset change (vibration)

Position at IP / RMS of Q-mag position



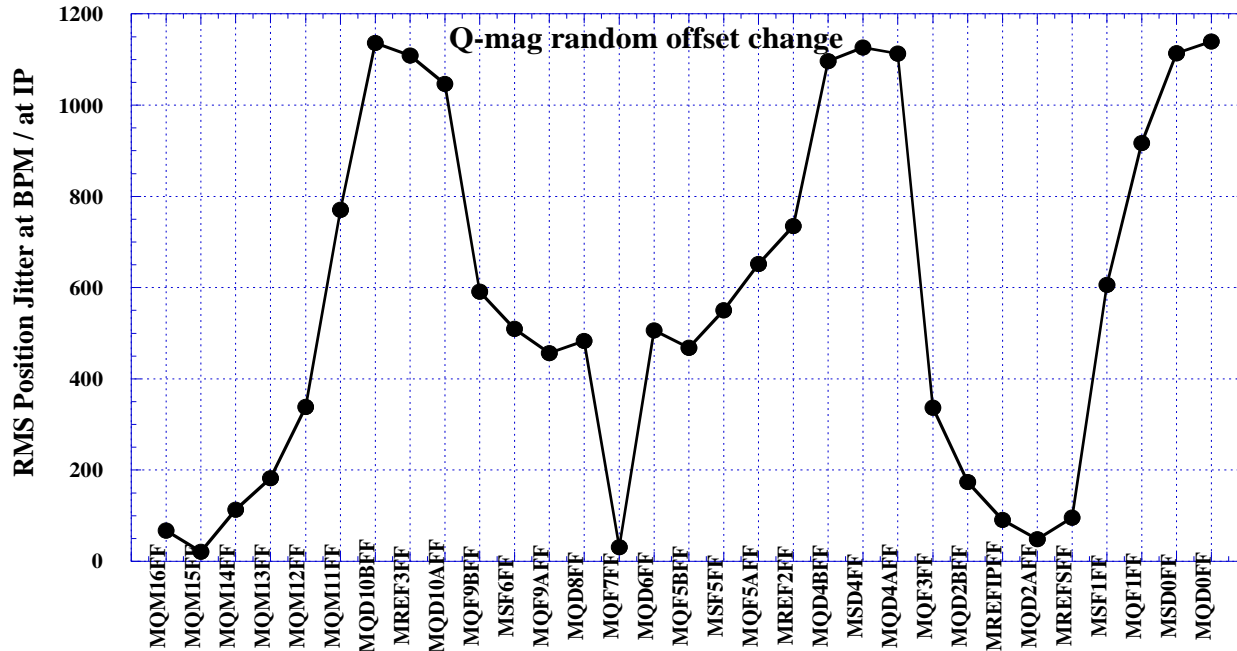
40 nm beam jitter at IP can be induced by

30 nm (all Q-mag) ~ 70 nm (except QD1 and QF1) random offset change
or, e.g. 300 μm fixed offset + $1\text{E-}4 \sim 2.3\text{E-}4$ strength change

With change of angle at IP $\sim < 15\%$ sigma of angular divergence.

Vertical orbit change induced by random offset change of Q-magnet (vibrations)

RMS position change at BPM / RMS position change at IP Except QF1 and QD0

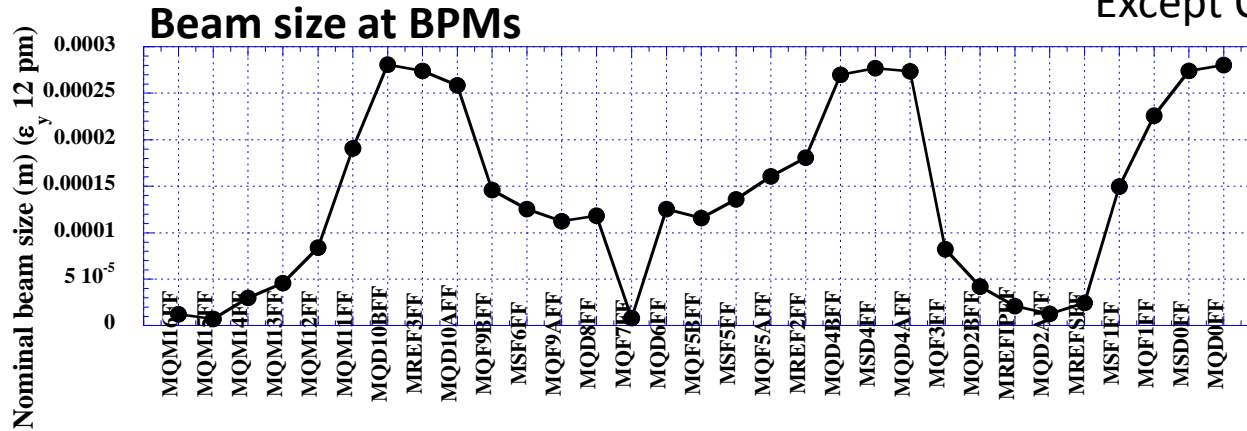


RMS beam position change at BPM
<1200 times of RMS position change at IP
For 40 nm RMS at IP, < 50 μ m at BPMs

Almost y-at- IP phase. (y' change is very small)

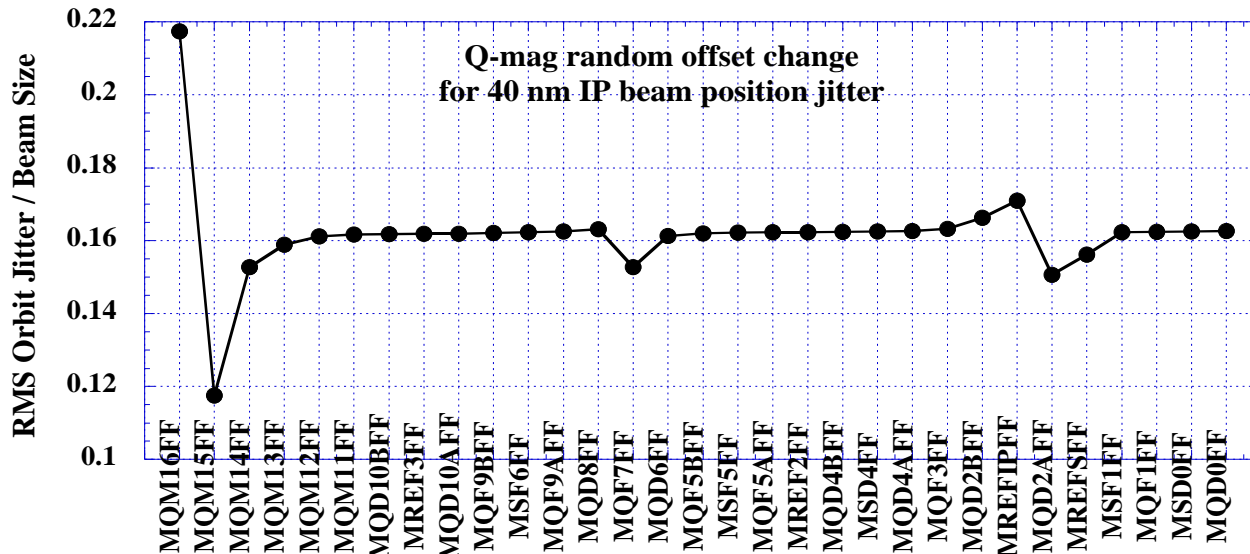
Vertical orbit change induced by random offset change of Q-magnet (vibrations)

Except QF1 and QD0



Setting RMS Q-mag random offset change for 40 nm beam position change at IP.

RMS position change / Beam size



Summary

- If there is orbit jitter of about 16% of nominal beam size at BPM in FF line, induced by Q-magnets' random offset change (vibrations), or similar phase (y at IP phase) ,
 - Beam position jitter at IP will be about 40 nm, nominal beam size
 - 16% of beam size at BPMs, but 100% at IP
- There were BPM reading jitter more than 16% of beam size. (?)
 - Cannot tell y at IP phase or y' at IP phase?
- There might be significant beam position jitter at IP.
 - By Q-magnet vibration, or strength jitter. Or other sources?
 - Can such orbit jitter excluded from available data so far?