Orbit drift and Feedback

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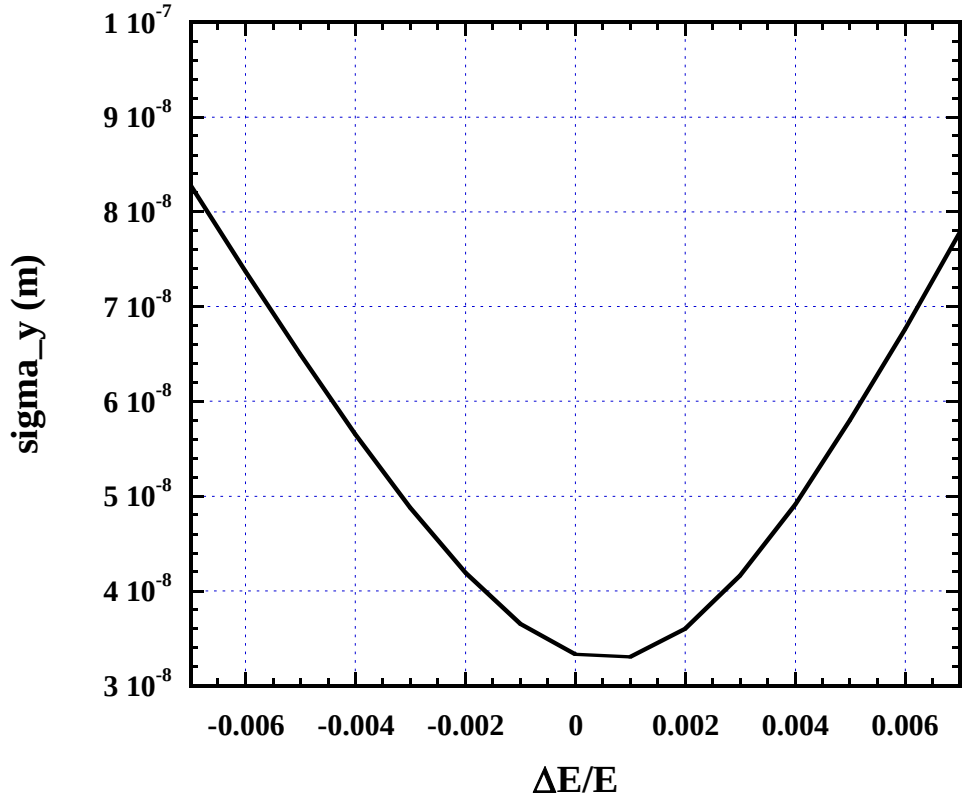
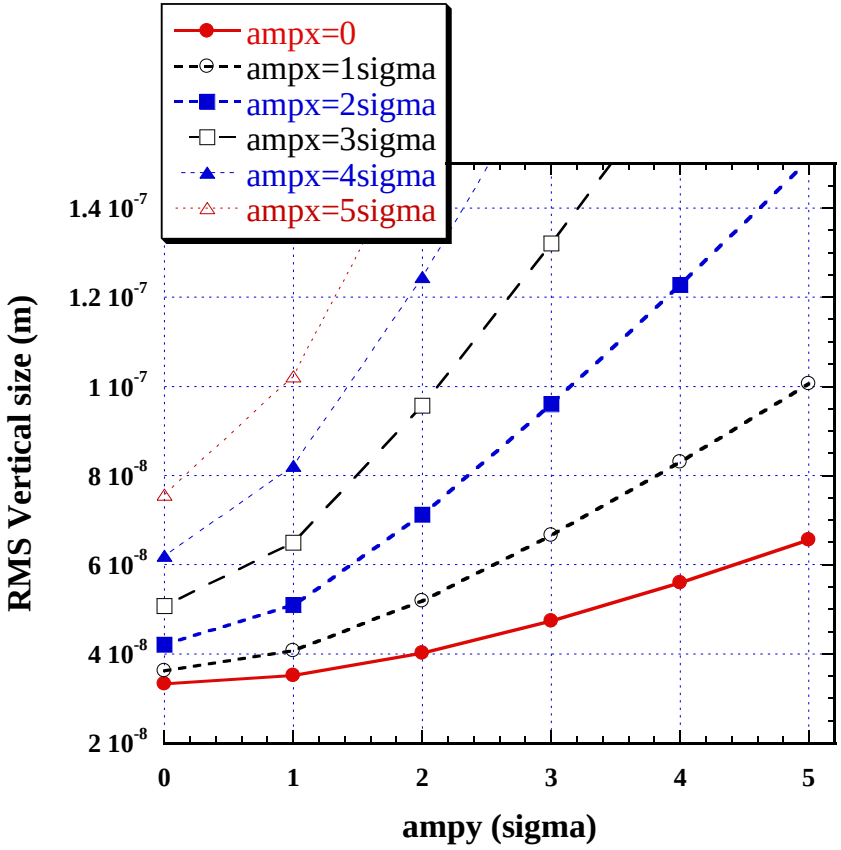
Effect of beam energy change
Beam size at IP vs. $\Delta E/E$

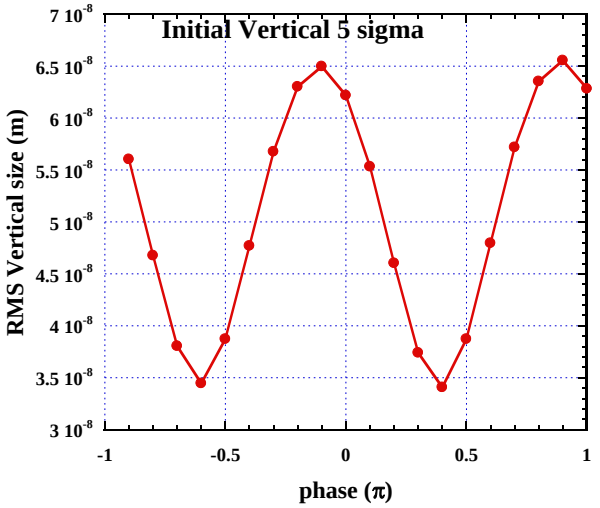
Designed beam line + injection energy error

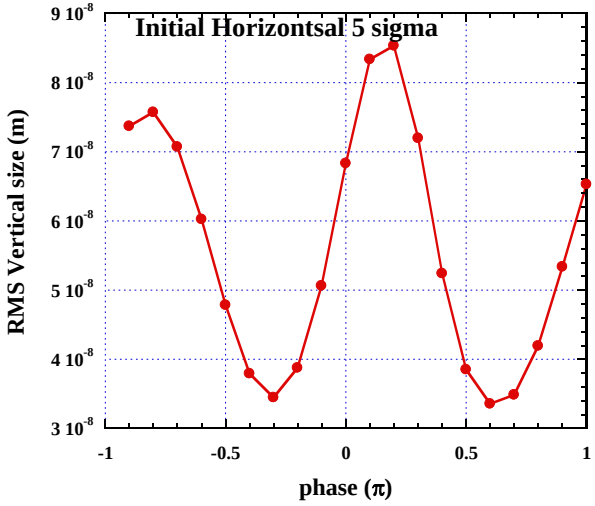


Effect of orbit change
Beam size at IP vs. Orbit

Designed beam line + injection error
assume worst betatron phase.







Observation

- Closed orbit in DR drifted.
  - DR Tune also drifted (not always?)
    - Current of some magnets monitored. No clear drift ?
    - Reason unknown..
  - Mostly from circumference change?
  - Feedback (use steering magnets)
    - Could not correct well with circumference change.
    - Not really necessary, without rapid DR circumference change. (Last two weeks.)

Tried DR COD Feedback

- **Try to adjust COD using two steering magnets in each plane.**
- Using SAD
  - (basically the same as present COD correction using 2 steers)
- Use all BPMs or BPMs in Straight sections
- Intensity cut (no feedback without beam)
- No feedback if RF Frequency Ramp ON
- Set calculated setting if (dk0 angle change)
  - 1e-6 < Max(Abs(dk0)) < 2e-5
    - No change if orbit change is small.
    - No change if difference is abnormally large.
- Every 30 sec.

It may be better using more steering magnets than 2?

Observation 2

- Orbit in EXT/FF drifted
  - From DR?
  - Feedback
    - Result is not good with DR circumference change.
    - Worked well, in the last (two) operation week(s), without rapid DR circumference change.

EXT/FF Orbit Feedback

- Adjust orbit to reference.
  - Prepared by Okugi.
  - Some modifications (improvements) during last operation weeks.

EXT/FF Dispersion Monitoring

- Continuous monitor from orbit jitter.
  - Prepared by Yves

Effects of DR Circumference Change

Uniformly expanding or shrinking:

- Beam energy change
  - Affect EXT/FF optics. Less than 1E-3 Should be OK (?)
- Orbit change.
  - Should be small effect in EXT/FF, if DR is well tuned (Small dispersion at EXT kicker in straight section)

Non-uniform change:

- Effects cannot be predicted.

What to do?

- Adjust RF frequency more often (?)
- Study effectiveness of DR COD Feedback.
- Study EXT/FF orbit Feedback more (?)
  - Which BPMs, steering magnets should be used?
- Study tolerable dispersion change.
- ? ? ? ? ? ? ? ? ? ?