Follow-up of DA estimation

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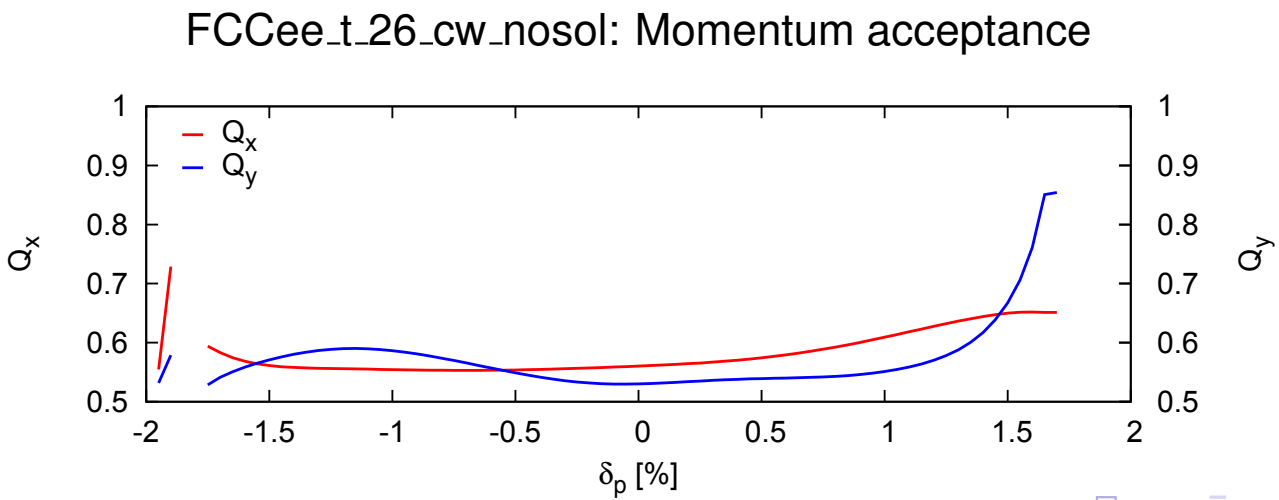
Contents

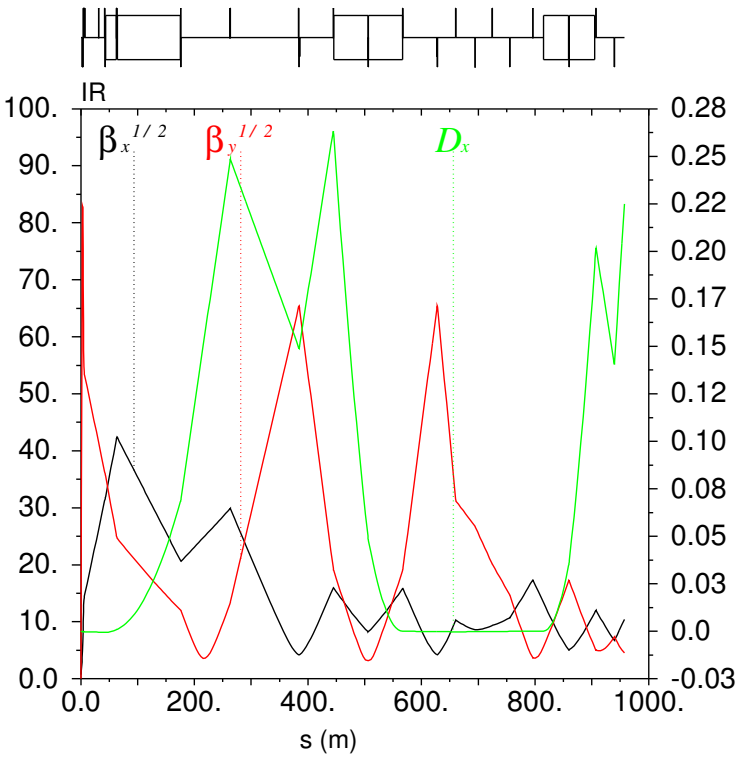
Introduction

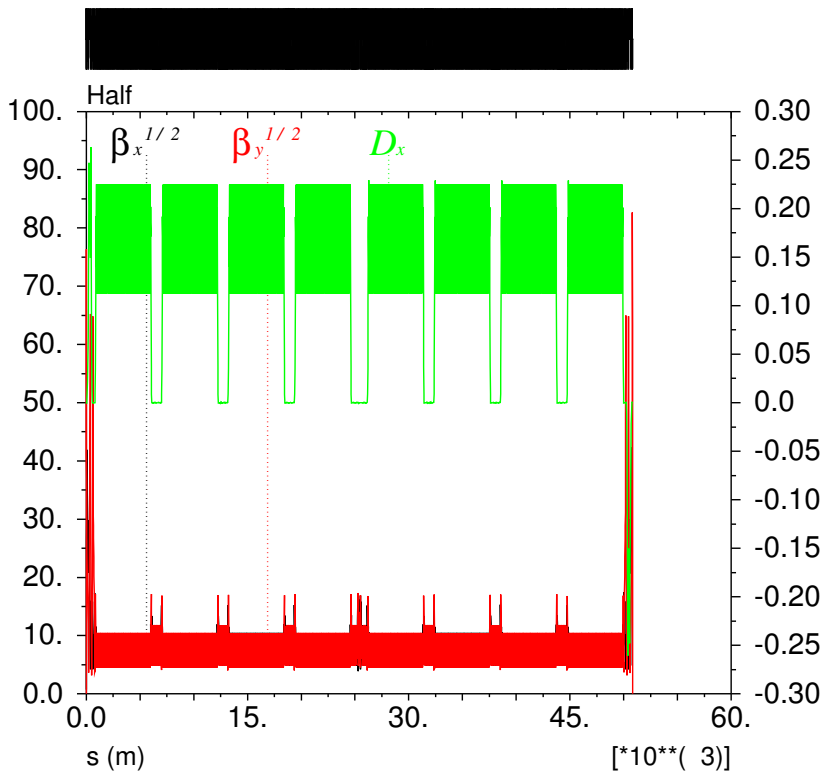
- DA studies on **FCCee_t_26_cw_nosol** (K. Oide).
  - Crab waist, non-interleaved sextupoles.
  - Comparison between SAD and MAD-X/PTC.
- Emittances: $\epsilon_y/\epsilon_x = 0.1\%$ and $\epsilon_y/\epsilon_x = 20\%$.
- Consideration of fringe effects and RF cavities (34.375 MV, π rad, 400 MHz).
- Trial on **FCCee_t_35_11_cw**.



Optics

FCCee_t_26_cw_nosol

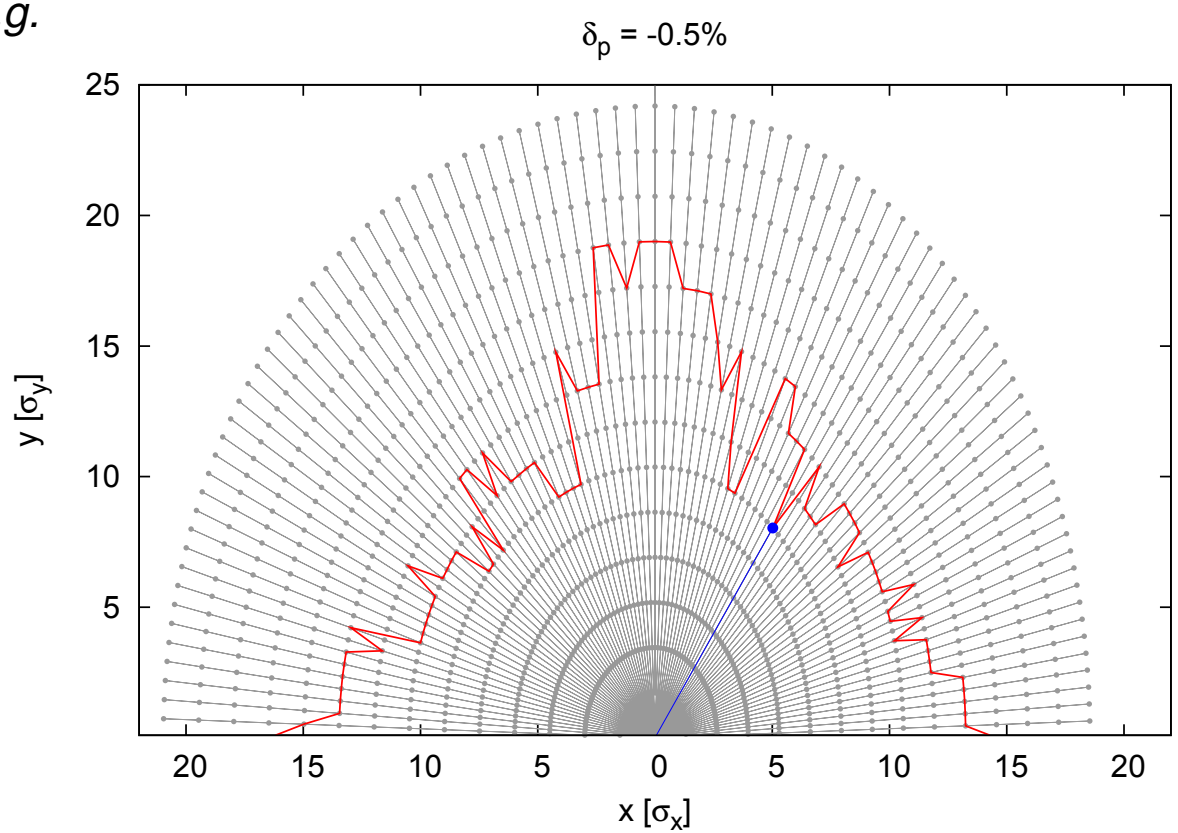


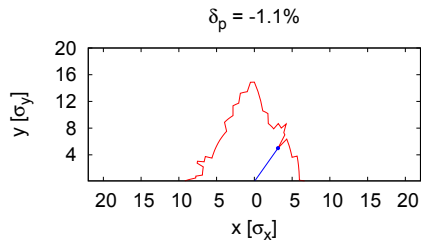


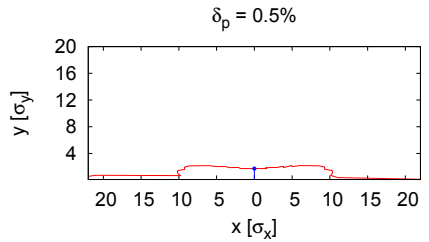
Minimum DA

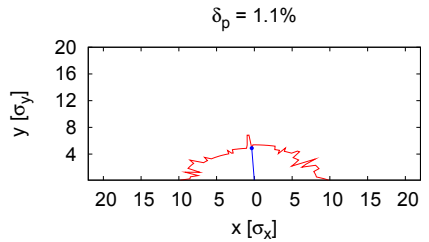
- For each set of parameters, the DA corresponds to the line in which its magnitude is minimum (for each δ_p).

e.g.





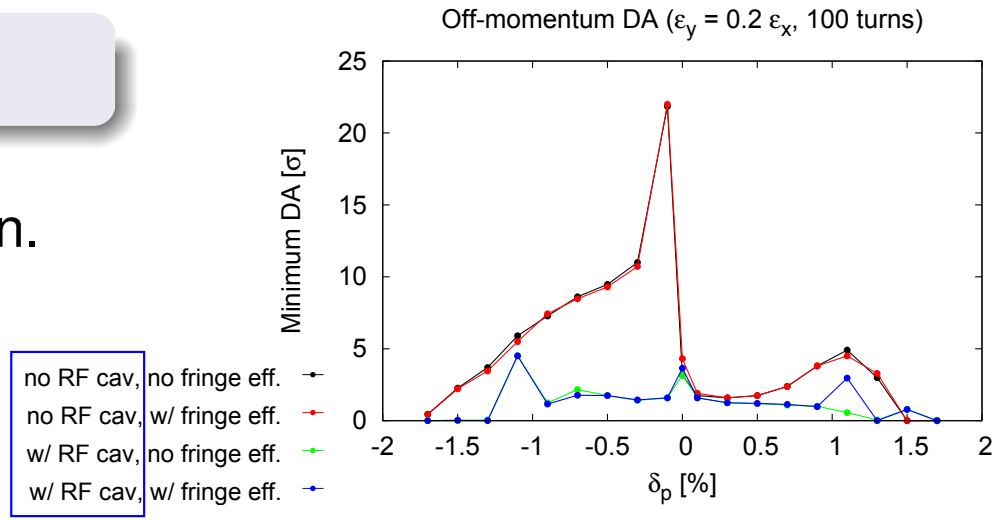


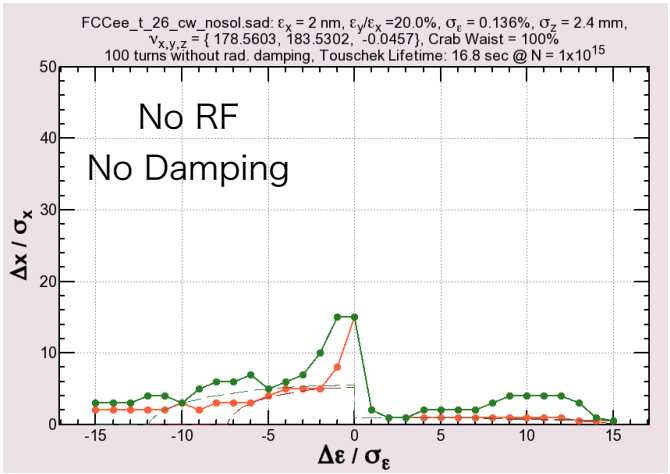


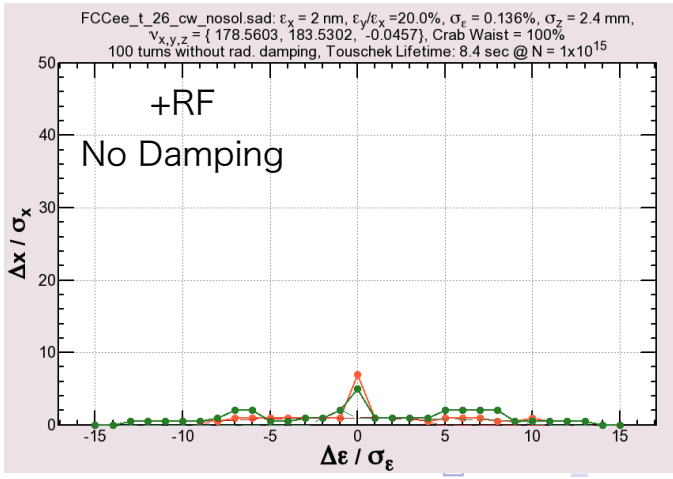
Effect of RF cavities

$$\epsilon_y/\epsilon_x = 20\%$$

- Corresponds to injection.
- Large momentum acceptance not required.



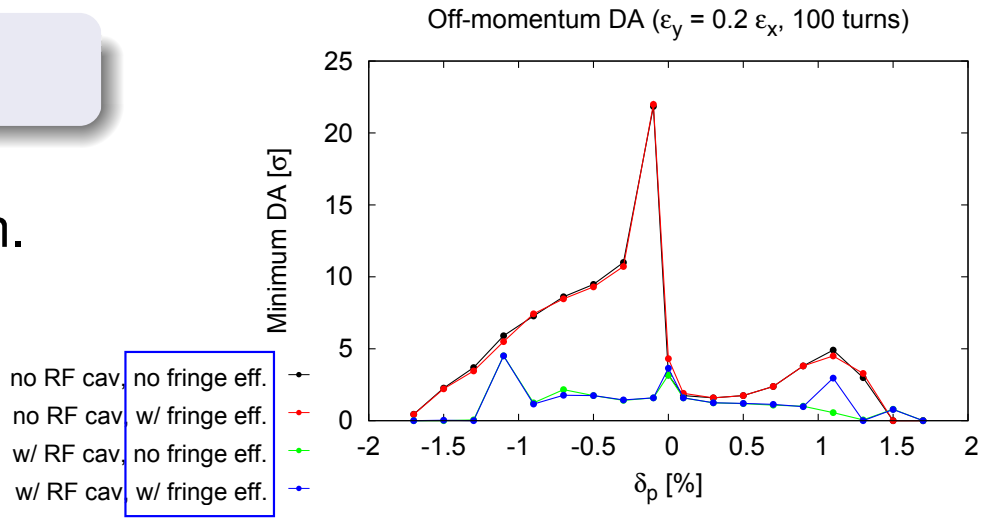


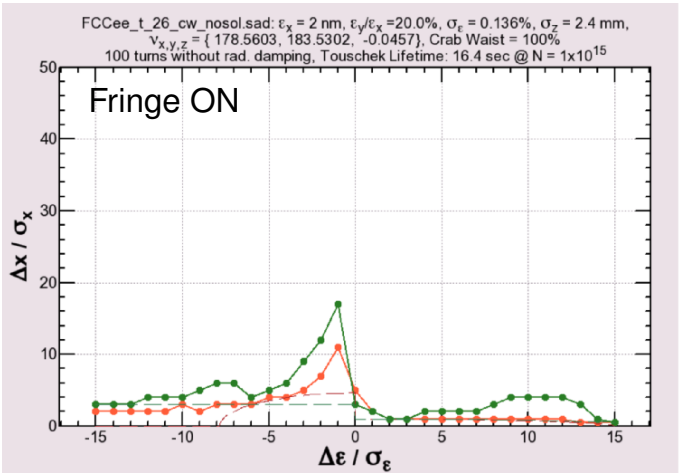


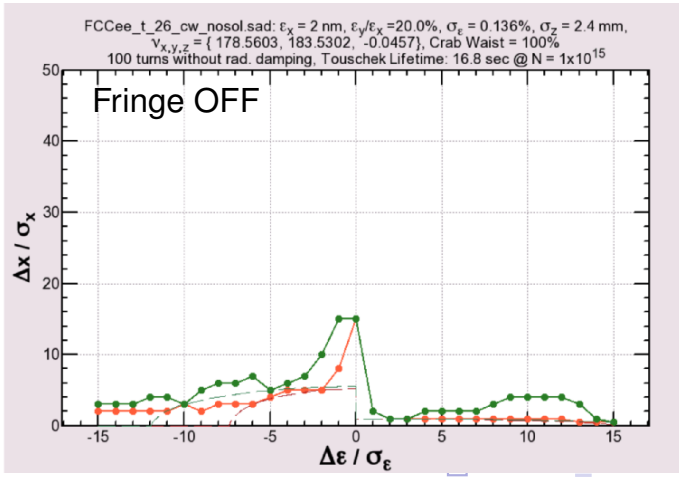
Fringe effects

$$\epsilon_y/\epsilon_x = 20\%$$

- Corresponds to injection.
- Large momentum acceptance not required.



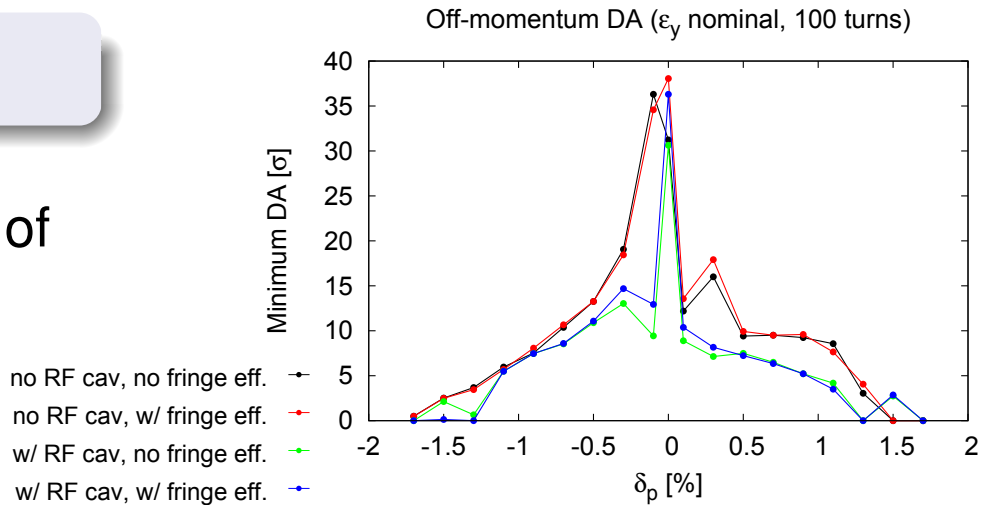


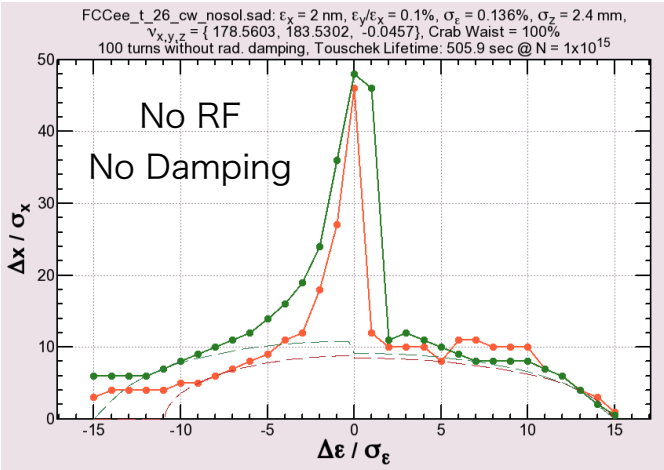


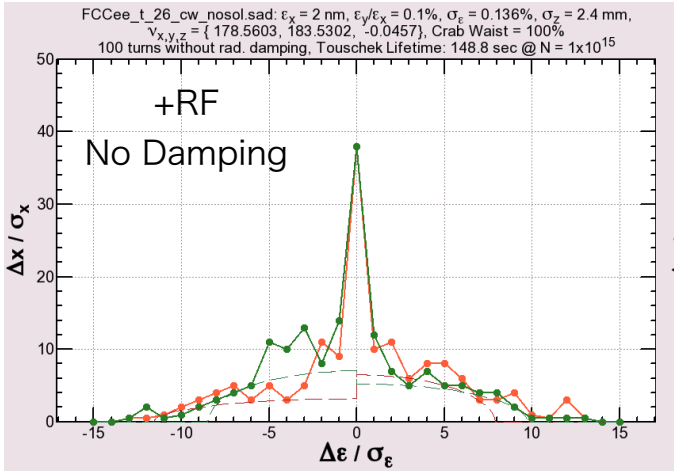
Results for equilibrium emittances

$$\epsilon_y/\epsilon_x = 0.1\%$$

- Momentum acceptance of $\pm 1.3\%$ (w/ RF cavities, w/ fringe eff).
- Larger DA.



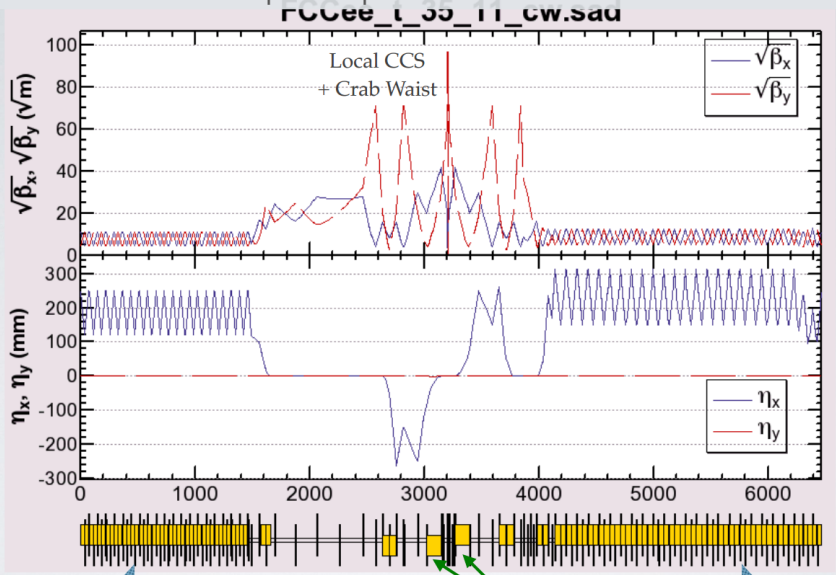




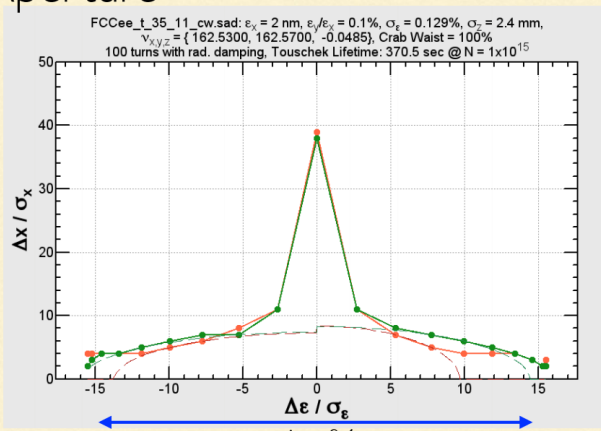
FCCee_t_35_11_cw

- No DA found with MAD-X/PTC.
- Beam unstable (No RF, no fringe effects, no radiation).

An example optics around the IR



Dynamic Aperture



- Momentum acceptance (dynamical) of ±2% is achieved assuming synchrotron radiation damping.
- Crab waist, solenoids, synchrotron motion, damping are included.
- Crab waist reduces the dynamic aperture, but recovered by re-optimizing the sextupoles.
- Skew sextupoles are added on some sexupoles near the IR to compensate the chromatic coupling.

Conclusions

- Qualitative agreement between SAD and MAD-X/PTC on DA computation.
- Momentum acceptance of $\pm 2\%$ is not achieved.
- Fringe effects do not have a significant impact on DA.
- RF cavities play an important role in its deterioration.
- No DA found for FCCe_t_35_11_cw.