Measurement of resoance terms in ATF DR and octupole tail folding in ATF2

R. Tomas, K. Kubo, S. Kuroda, T. Naito,
T. Okugi, J. Urakawa & F. Zimmermann

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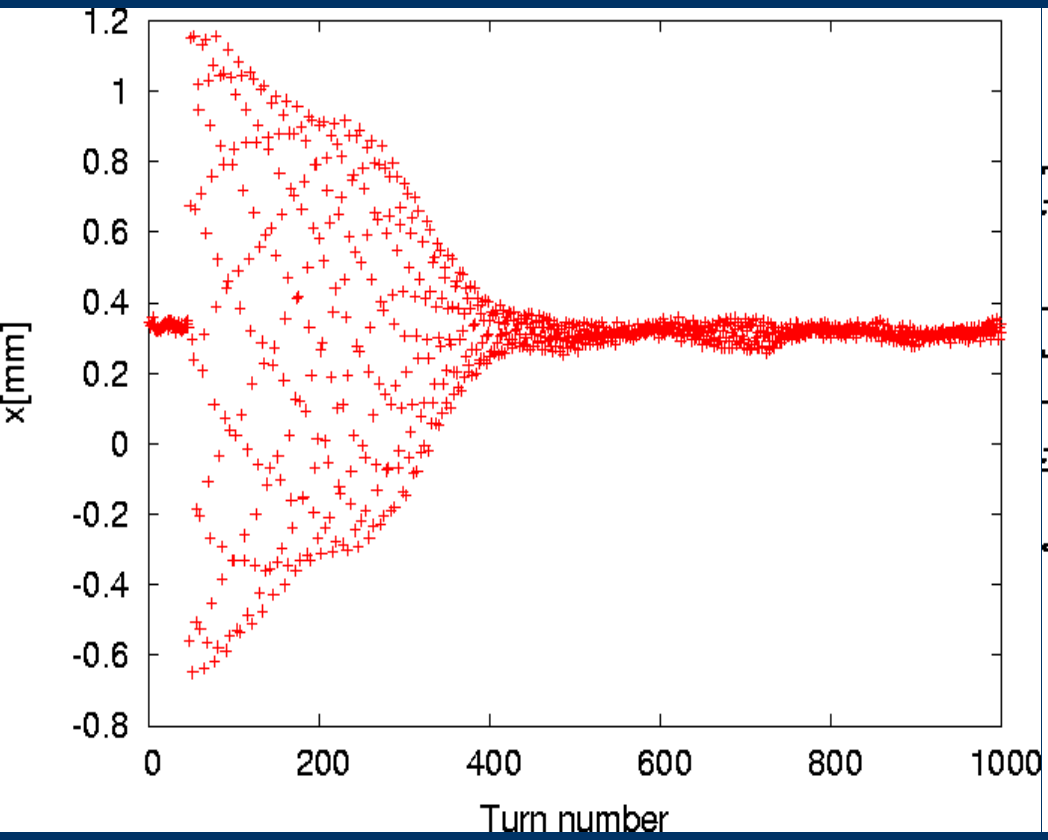
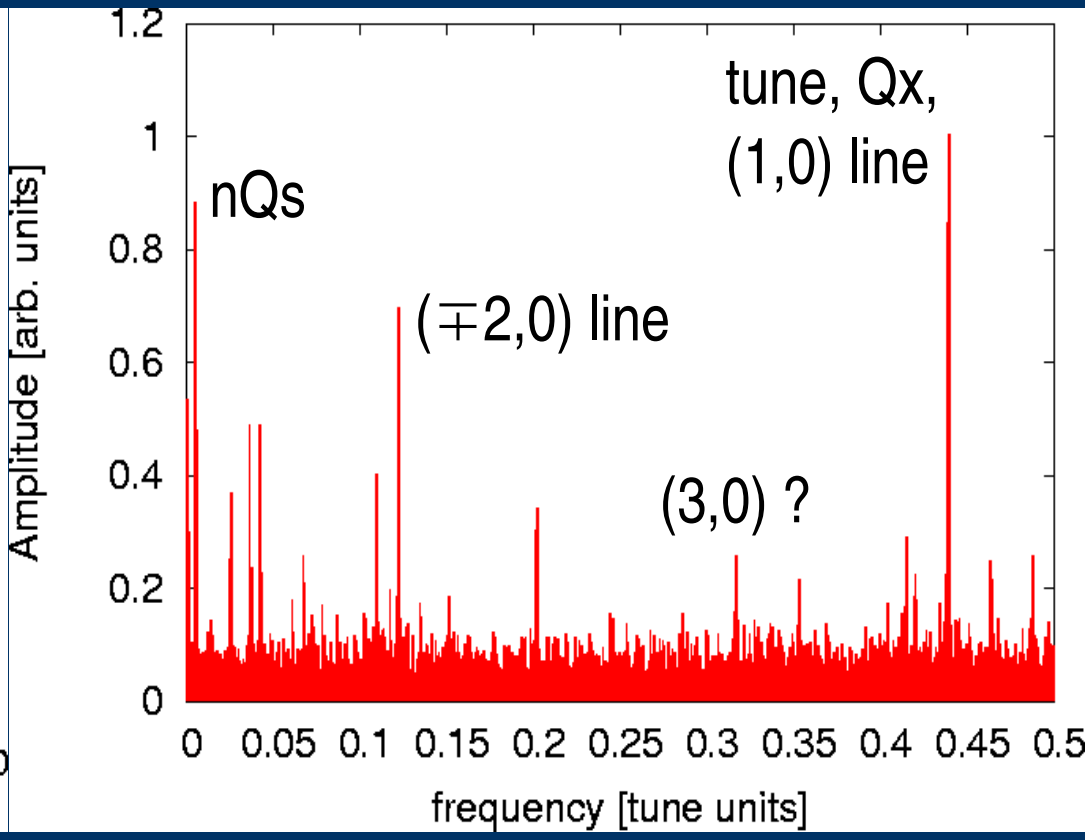
Measurement of resonance driving terms

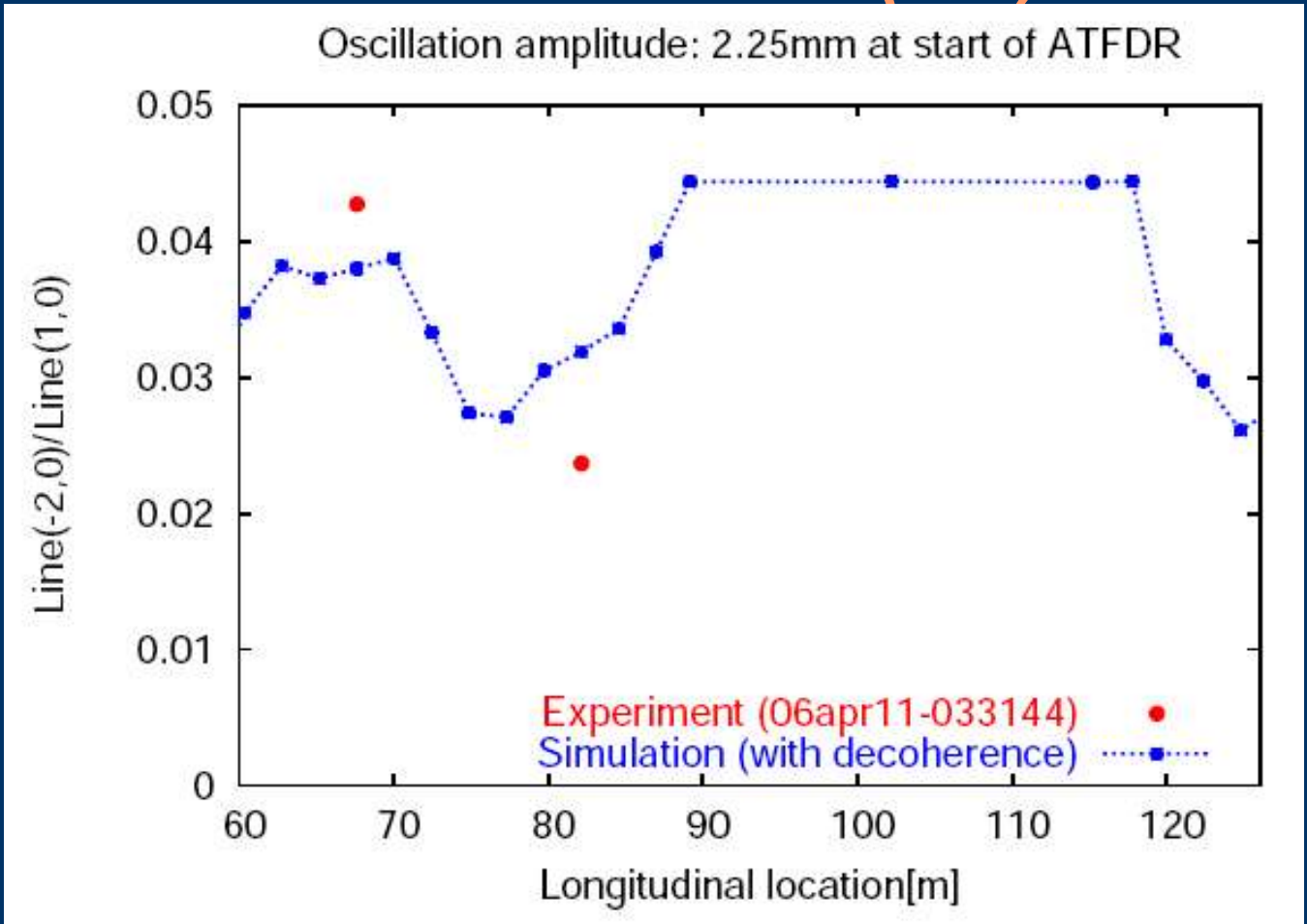
BPM turn-by-turn data → Fourier Spectrum





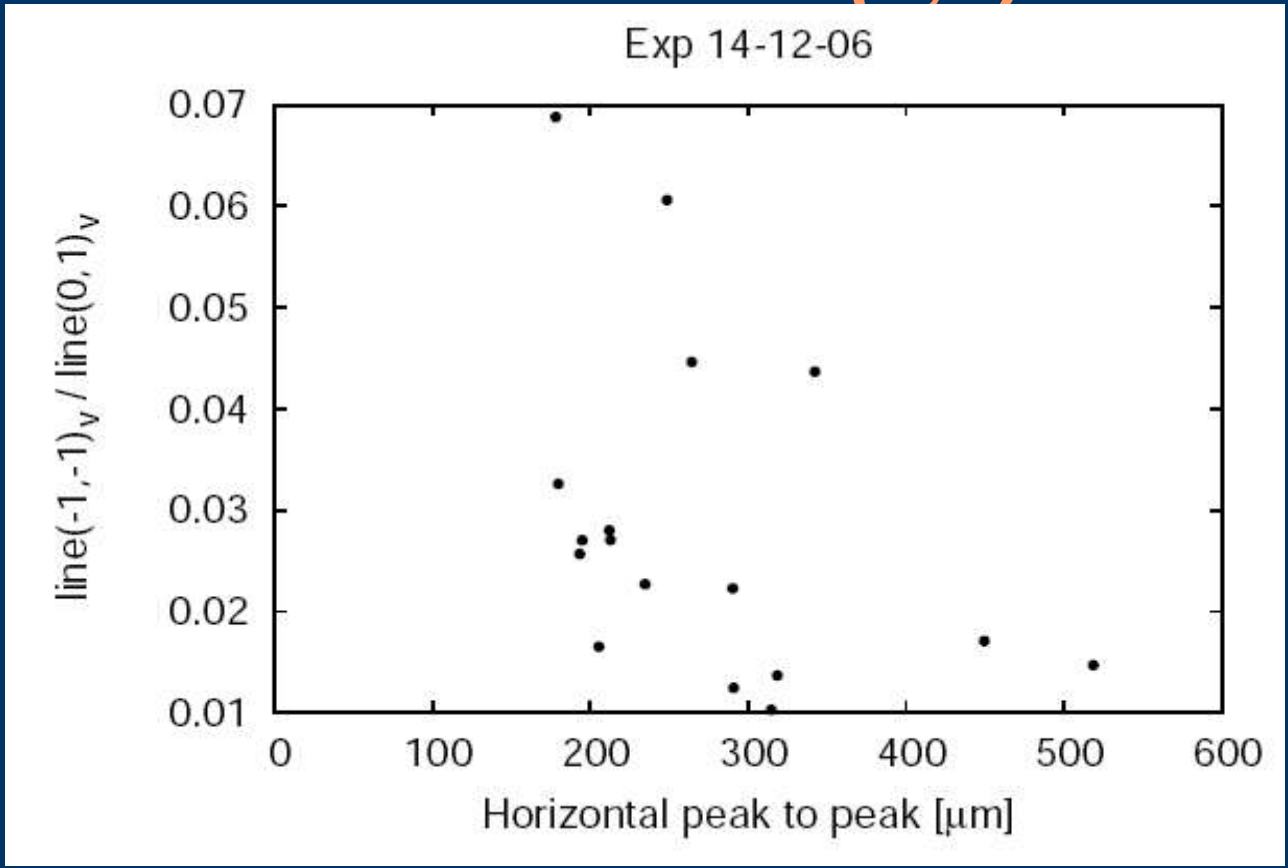
The spectral lines are related to resonance driving terms.
For example the line (-2,0) is related to the (3,0) resonance

Measurement of resonance (3,0)



First measurement of the resonance (3,0) at two BPMs in ATFDR.
Reasonable agreement with model but lack of long. information.

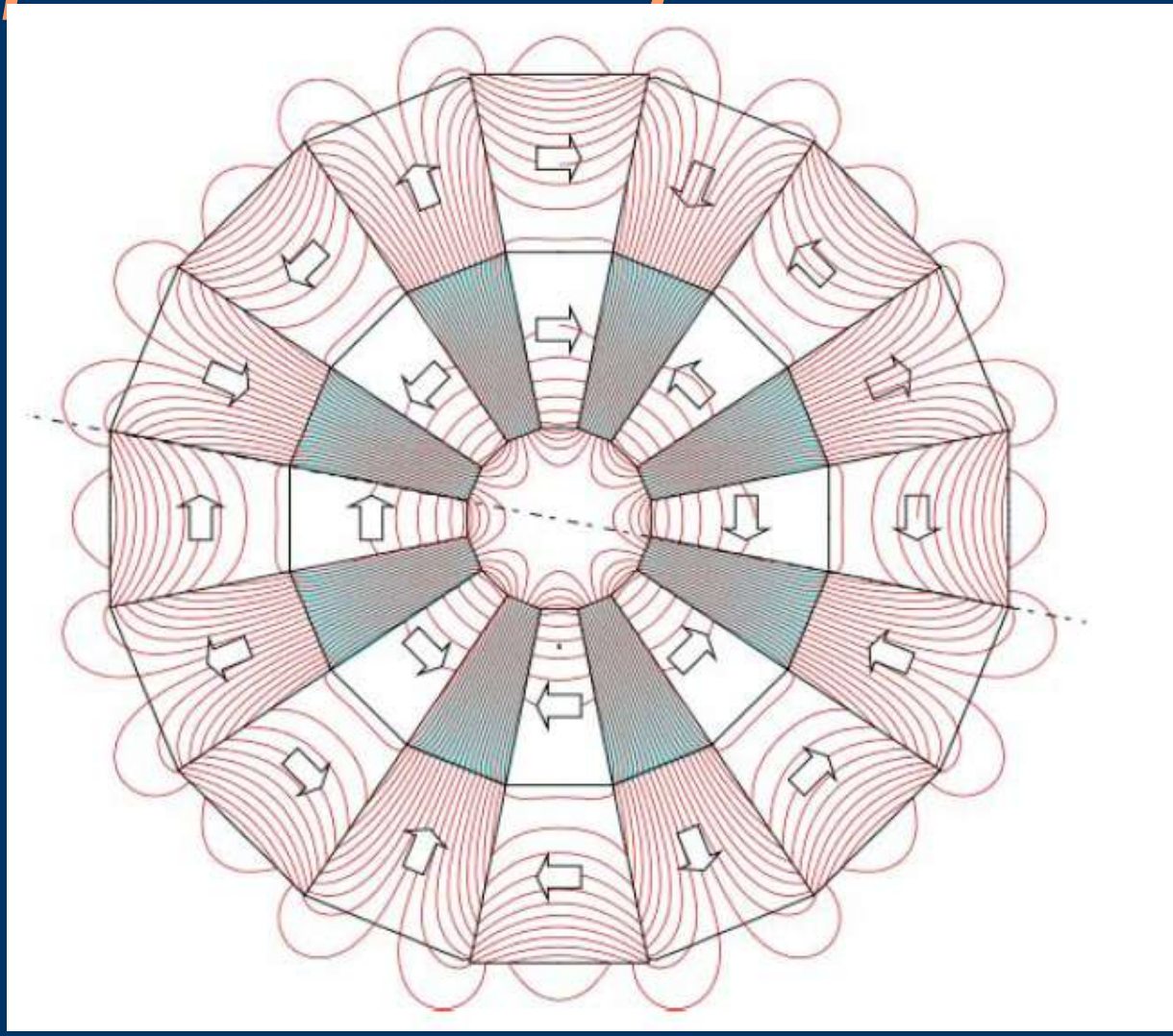
Measurement of resonance (1,2)



Attempt to measure resonance (1,2) failed because of not enough kick strength in both planes (simultaneously). Vertical plane remains not probed.

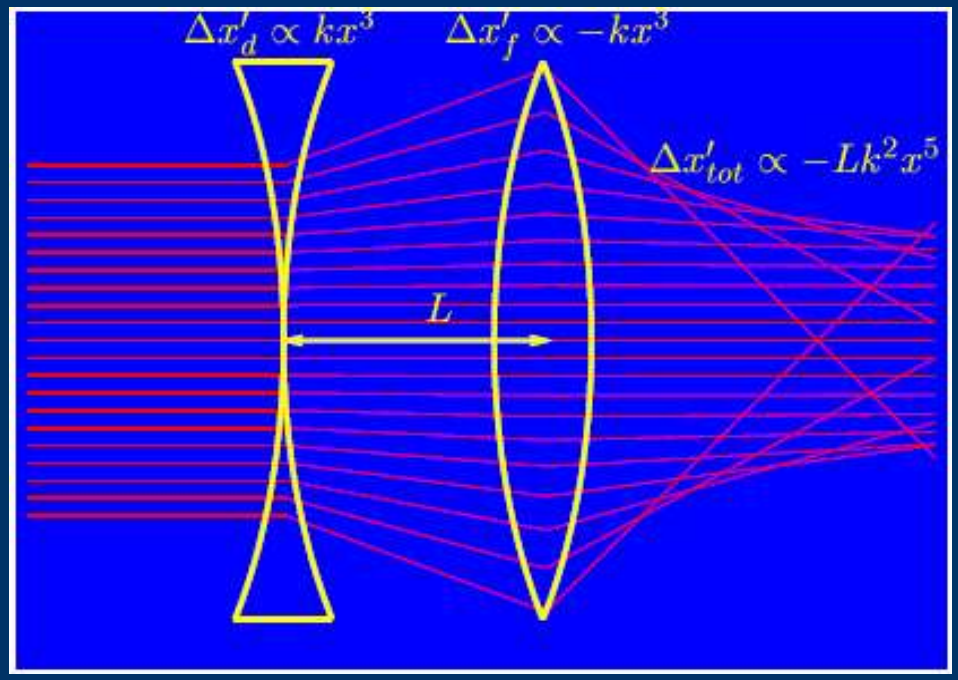
Octupole for Octupole Tail Folding in ATF2

Permanent octupole magnets have been proposed to test octupole tail folding.



Y. Iwashita

Principle of octupole tail folding



Requirements for efficient halo folding:

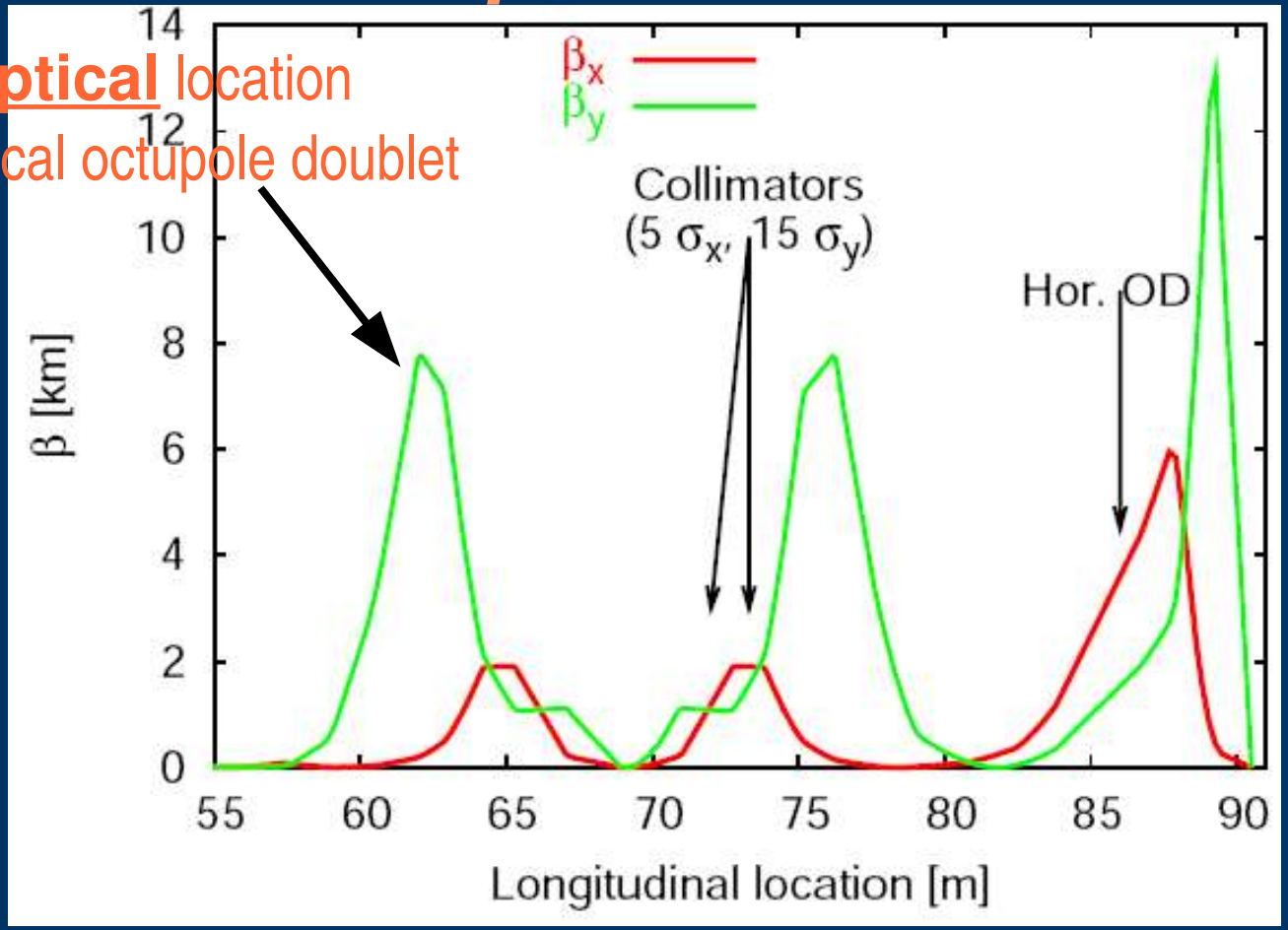
-Low halo divergence (large beta)

-Octupole doublet placed after collimators

-Octupole doublet placed in front of a quadrupole

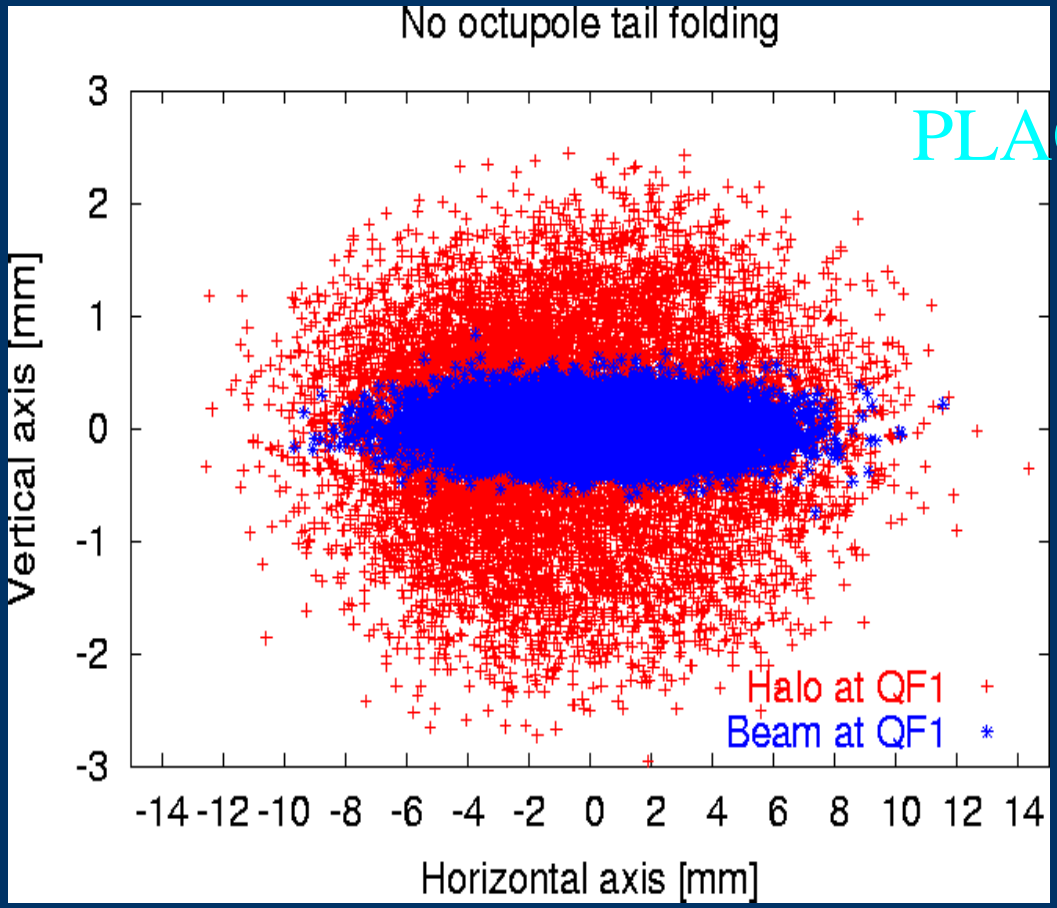
ATF2 Final Focus optics

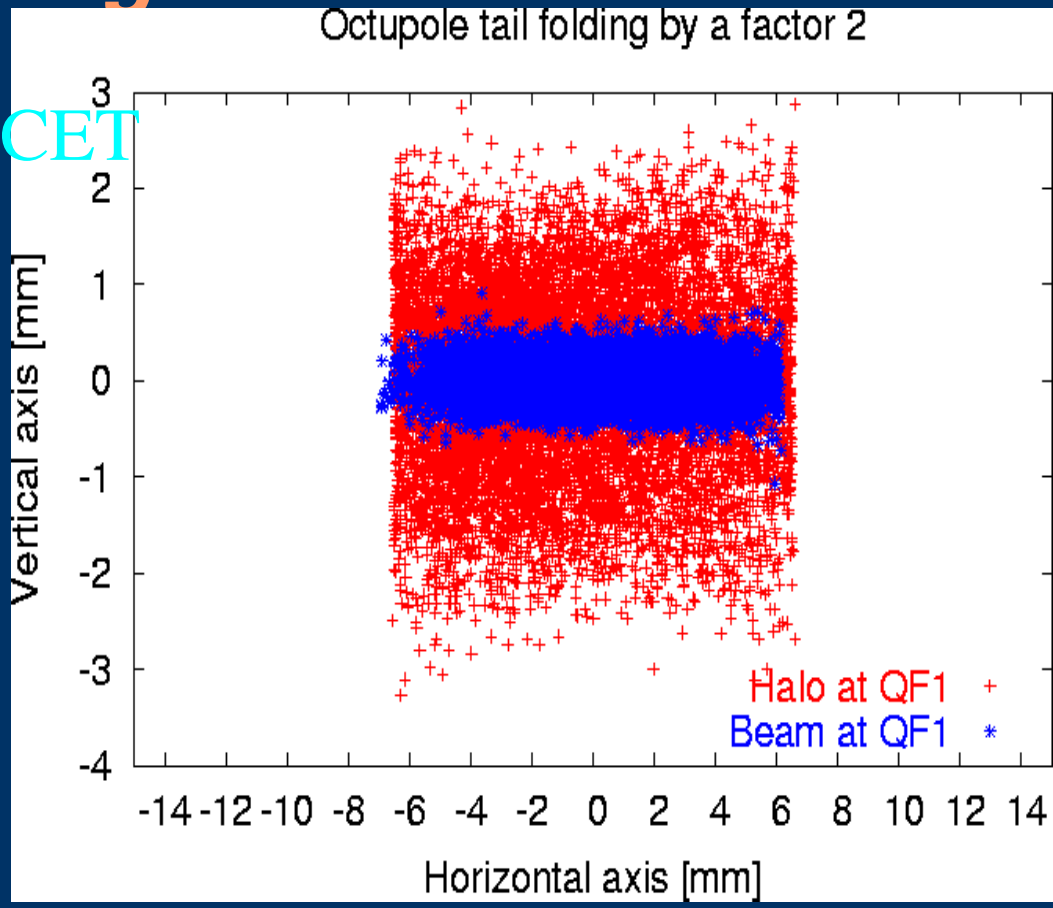
good **optical** location
for vertical octupole doublet



No good location for vertical Octupole Doublet

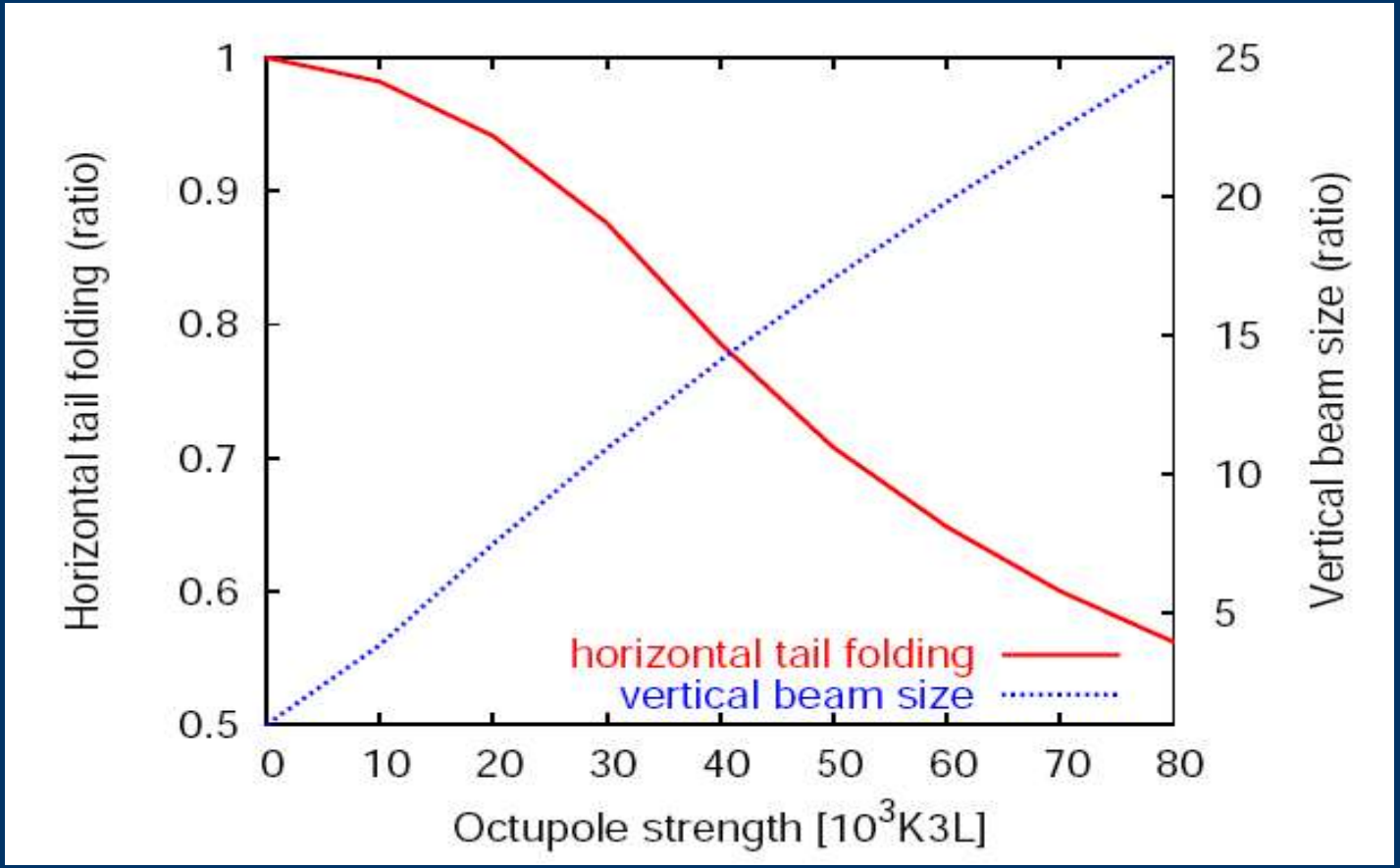
Horizontal tail folding simulations





Folding the halo from 5 to 2.5σ is possible, but...

Emittance blow up due to octupole doublet



Octupole tail folding in ATF2 needs either larger collimator gaps or different collimator location (for the vertical case).

Summary & conclusions

- Measurement of resonance (3,0) shows good agreement with model -> No big magnet errors (?)
- An improvement on the measurement of resonance driving terms in the ATFDR requires:
  - more BPMs around the ring or
  - larger simultaneous horizontal and vertical kicks
- Horizontal tail folding in ATF2 requires:
  - Larger collimator gap
- Vertical tail folding in ATF2 requires:
  - Different location of vertical collimator