

# Summary of first optics measurements

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## • **MEASUREMENTS**

- Starting measurements at approx 480 ms.
- Two excitations are performed in the same measurements. One first kick with the tune kicker and a second kick with the ADT.
- The first kick it is used to estimate the value of the tune and to evaluate the stability of the tune
- In the first kick the first 1000 turns are analyzed for the obtaining the tune
- In the second kick 4000 turns are analyzed, in order to make sure that we only analyze the flat part of the excitation.
- The kicks are applied in one plane at a time.
- Ring 1 ,Ring 2 and Ring 4 were measured both in horizontal and in vertical.
- Ring 3 was measured in horizontal and vertical but the horizontal excitation has not been analyzed. The output of the generator was saturated and therefore the excitation was not a sinusoidal wave.

## • **ANALYSIS**

- The method that is being used for the reconstruction of the optics relies on the knowledge of the errors of the machine in order to estimate the uncertainties of the measurements.
- Error definition files. The error definition files contain the misalignments of the BPMs and the errors of the quadrupoles. This file is an input of the code for using the N-BPM method.

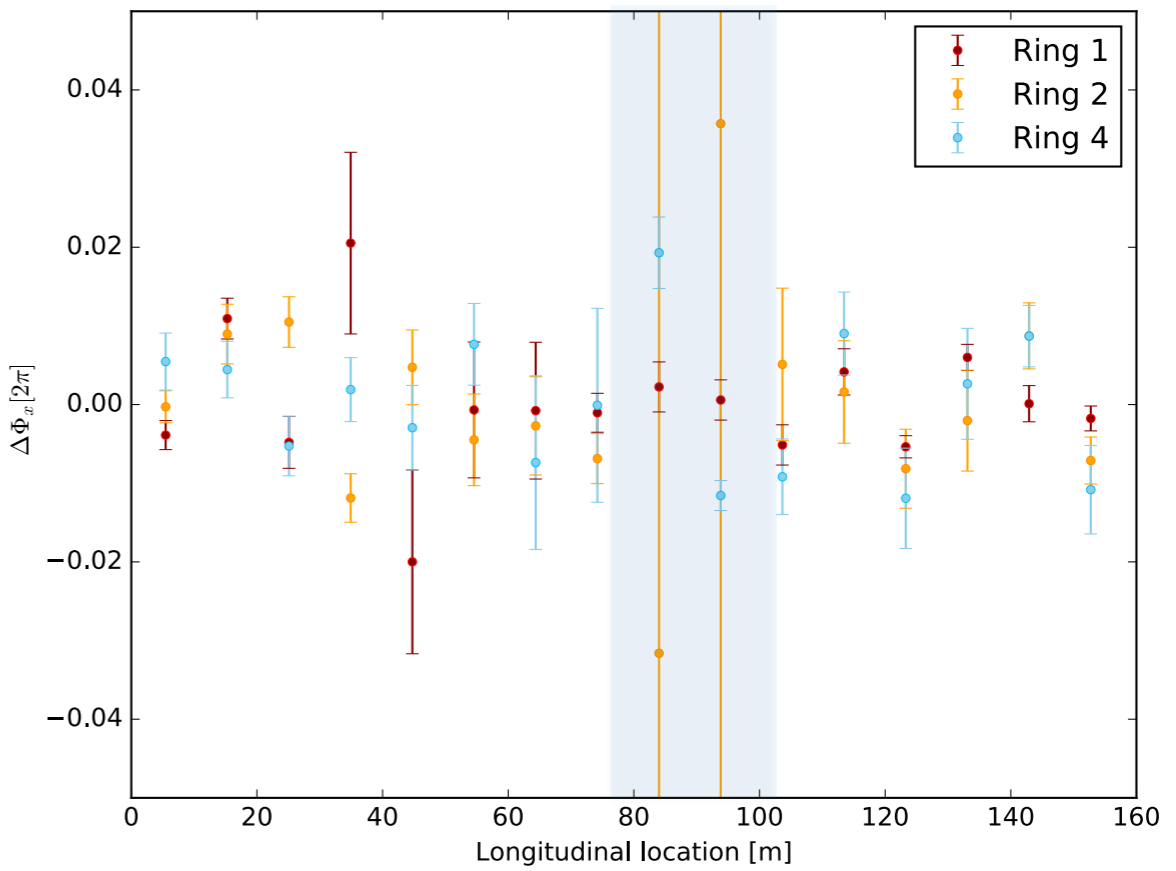
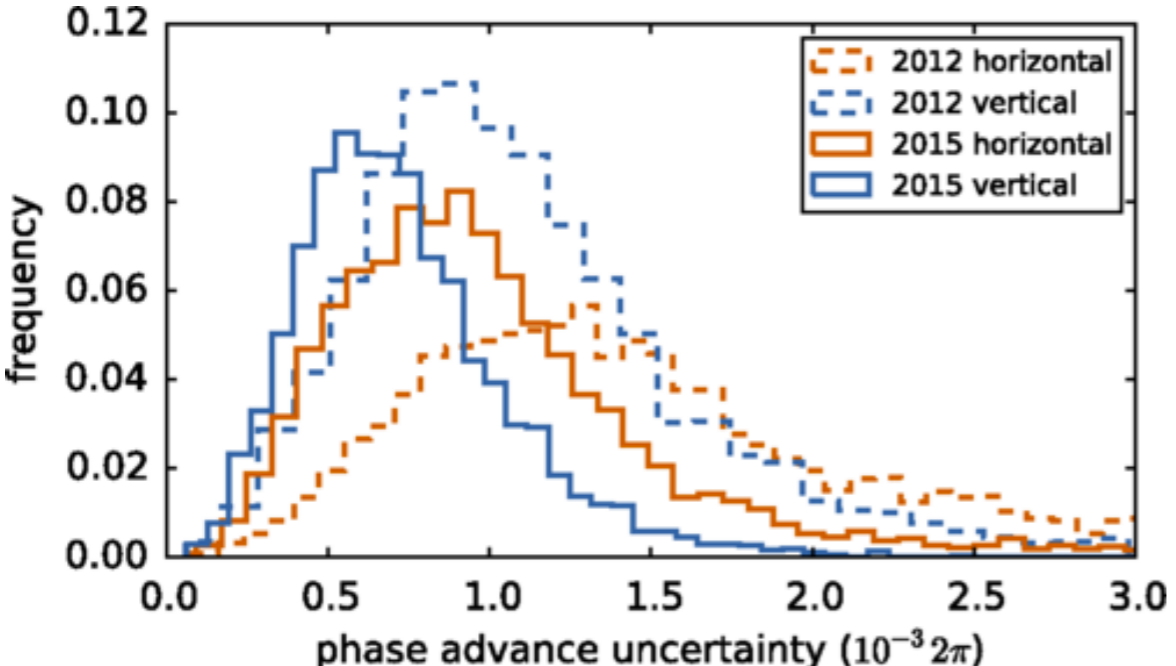
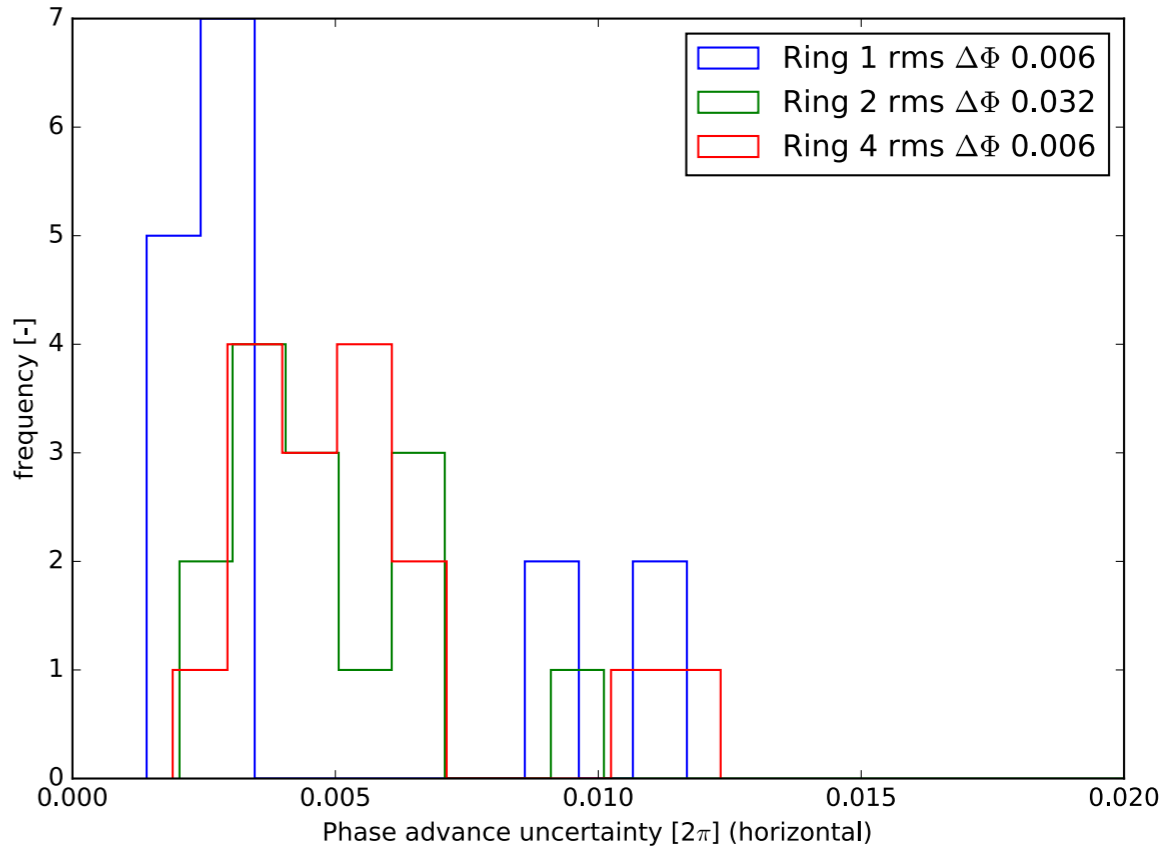
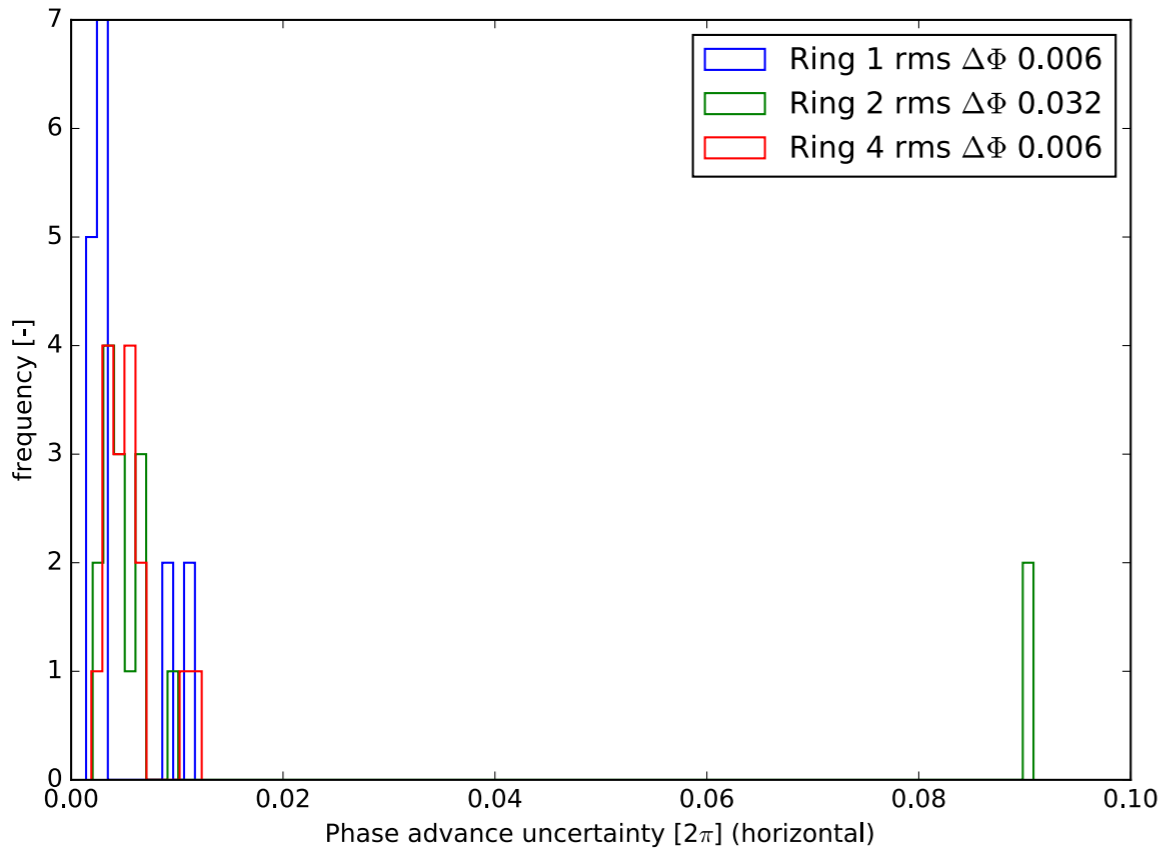
- Different parameters analyzed per ring: Natural tune, driven tune and noise of the BPMs
- Each ring was measured at a slightly different working point
  - RING 1  $Q_x = 0.170$  driven  $Q_x = 0.167$   $Q_y = 0.2778$  driven  $Q_y = 0.2740$
  - RING 2  $Q_x = 0.175$  driven  $Q_y = 0.173$   $Q_y = 0.28$  driven  $Q_y = 0.276$
  - RING 3  $Q_y = 0.295$  driven  $Q_y = 0.2892$
  - RING 4  $Q_x = 0.165$  driven  $Q_x = 0.163$

- Faulty BPMs detected in TbT data:
  - RING 1 both planes 4, 6, 12, 14 (spikes)
  - RING 2 in horizontal 4, 6, 12 and 14 more noise (spikes)
  - RING 3 BPM 13 flat signal
  - RING 4 BPM 8 flat signal

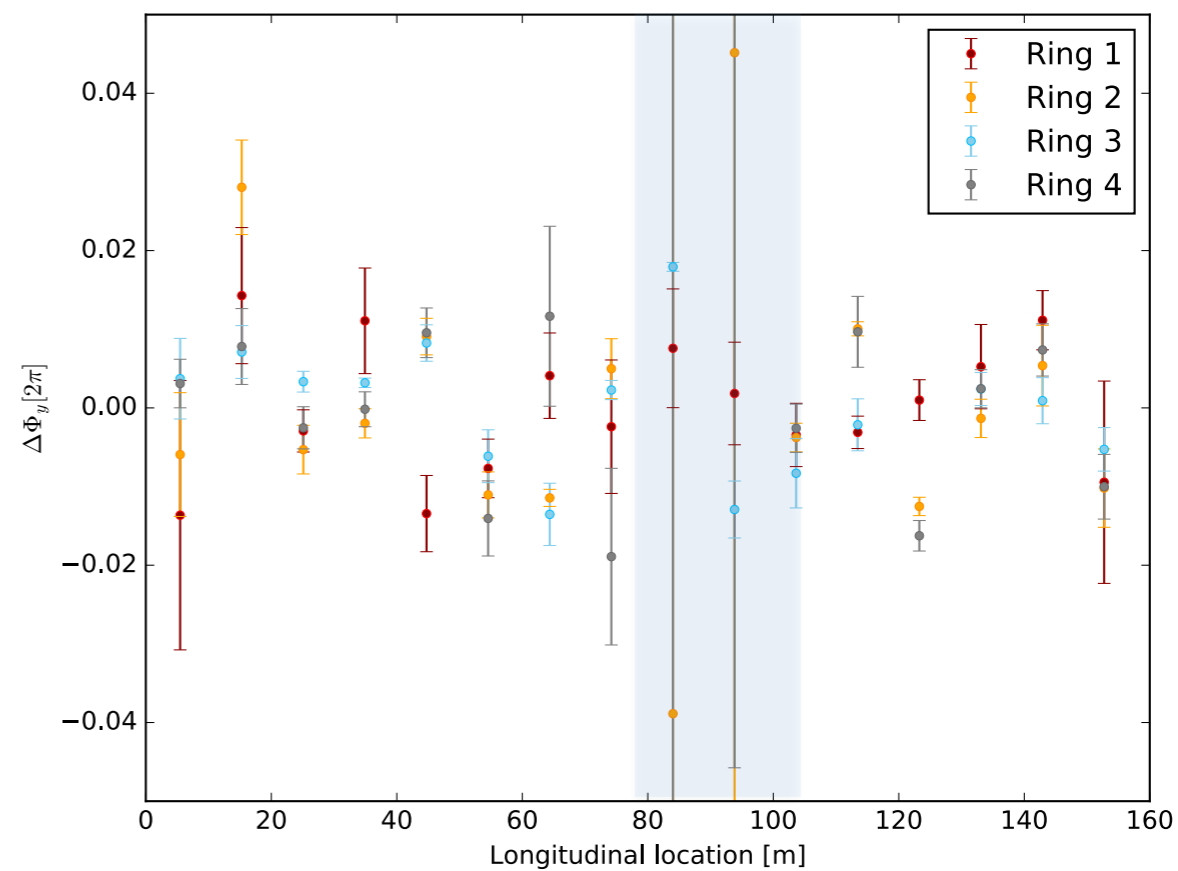
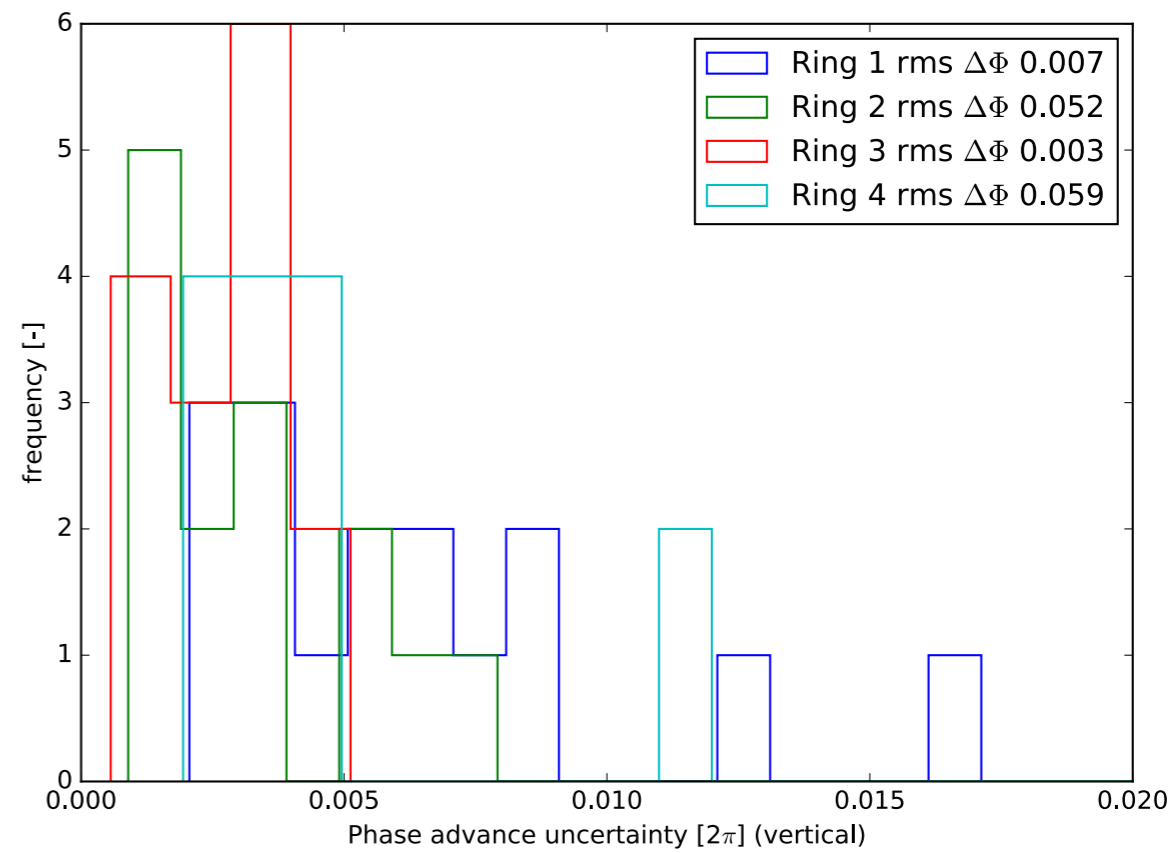
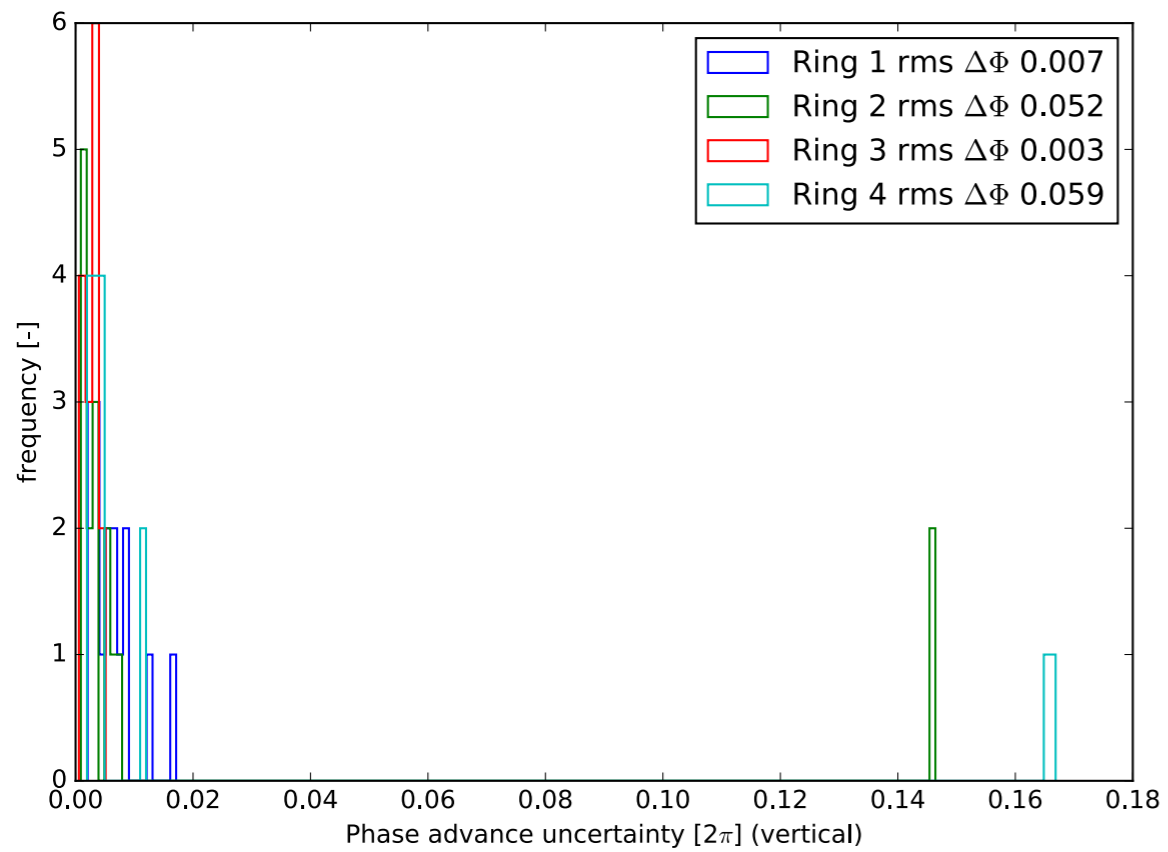
# Phase uncertainty measurements ADT (I): Horizontal

Phase uncertainty: phase rms of a set of measurements

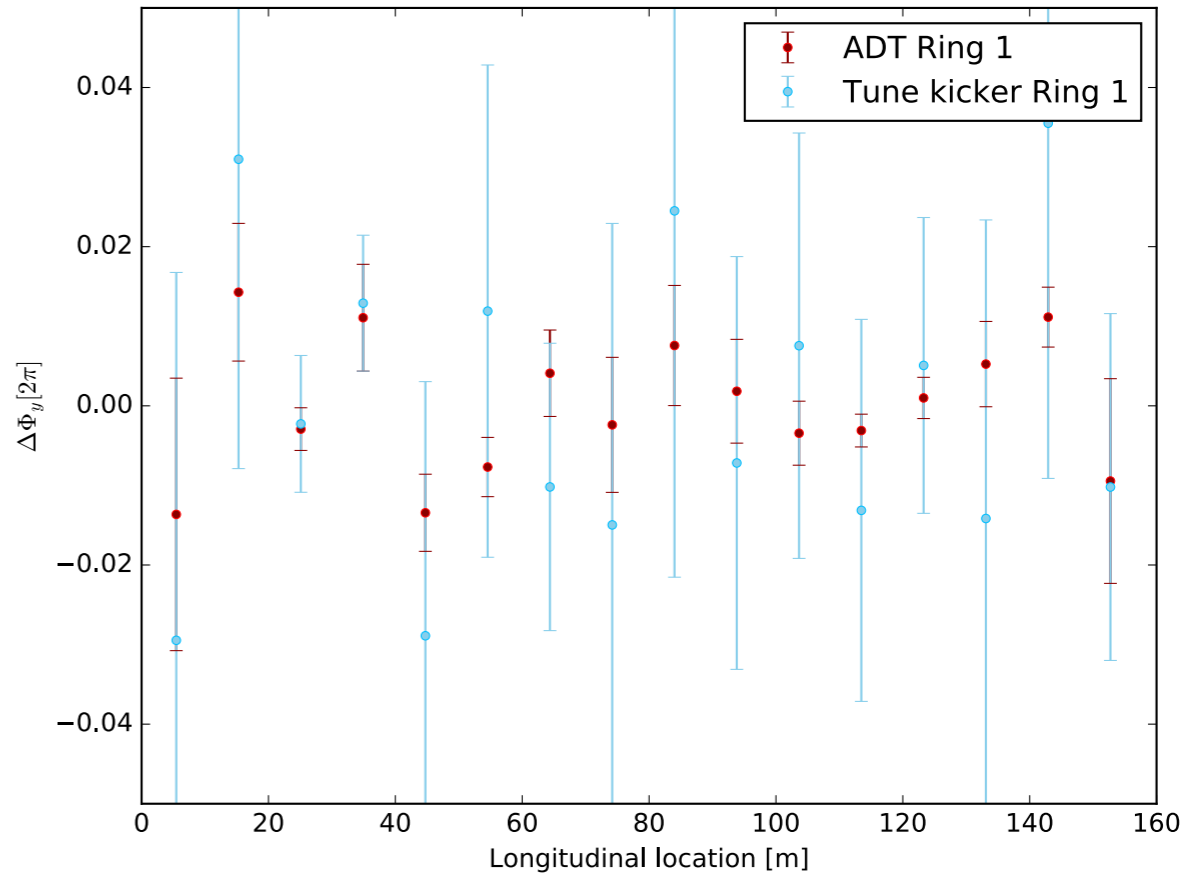
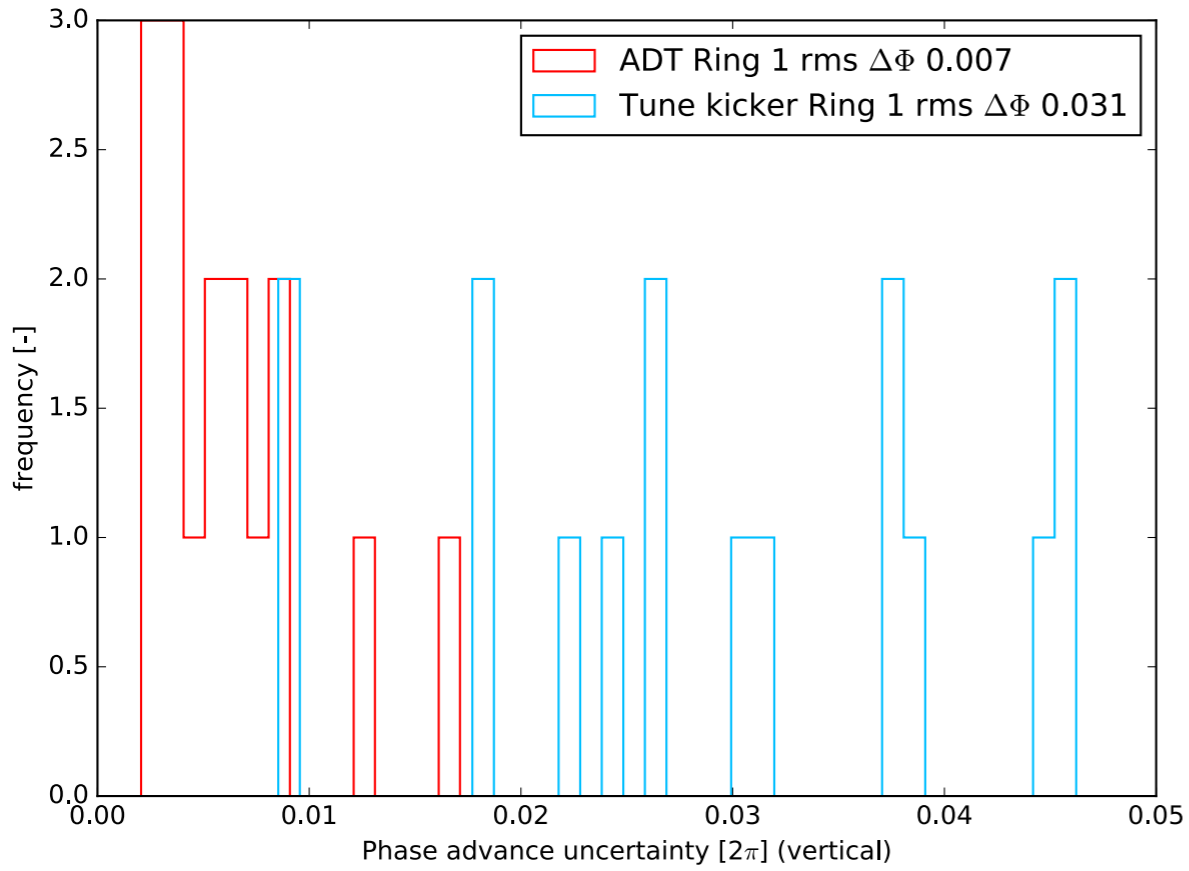
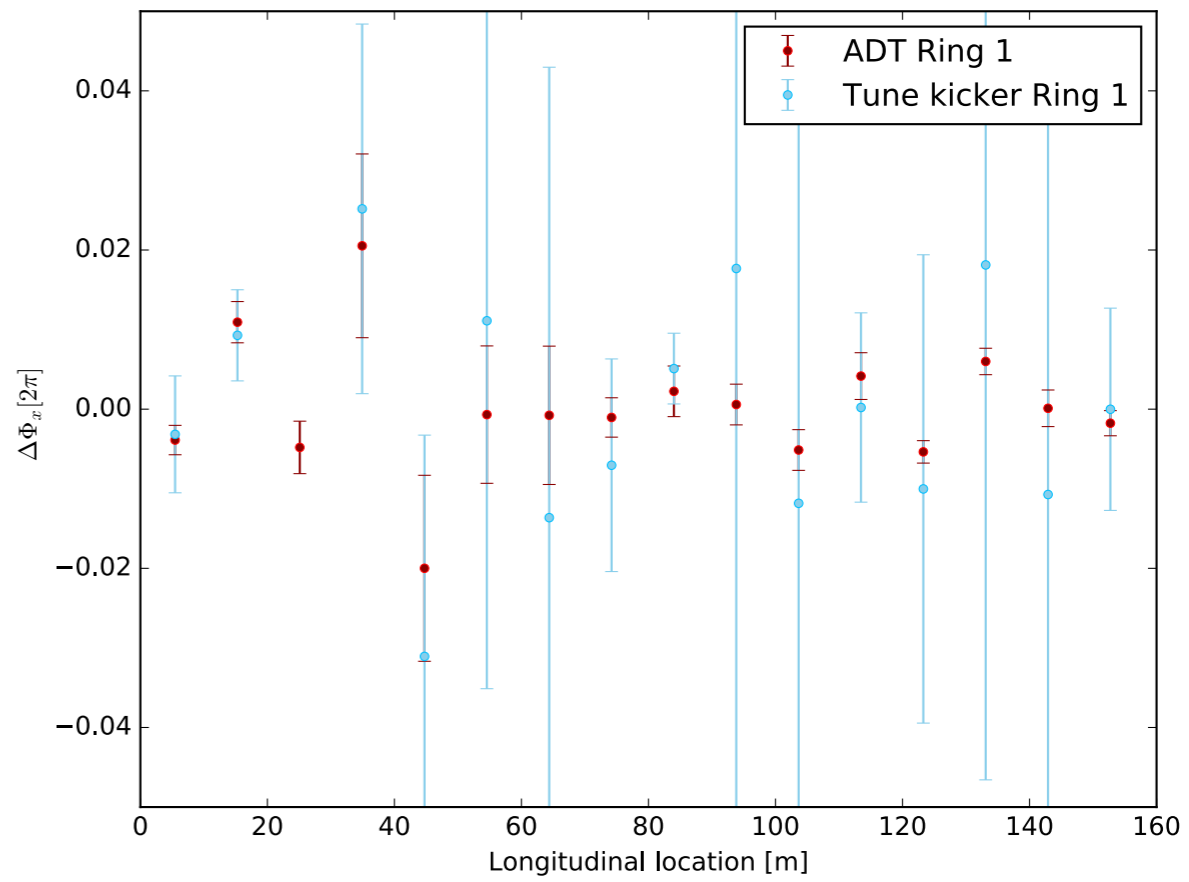
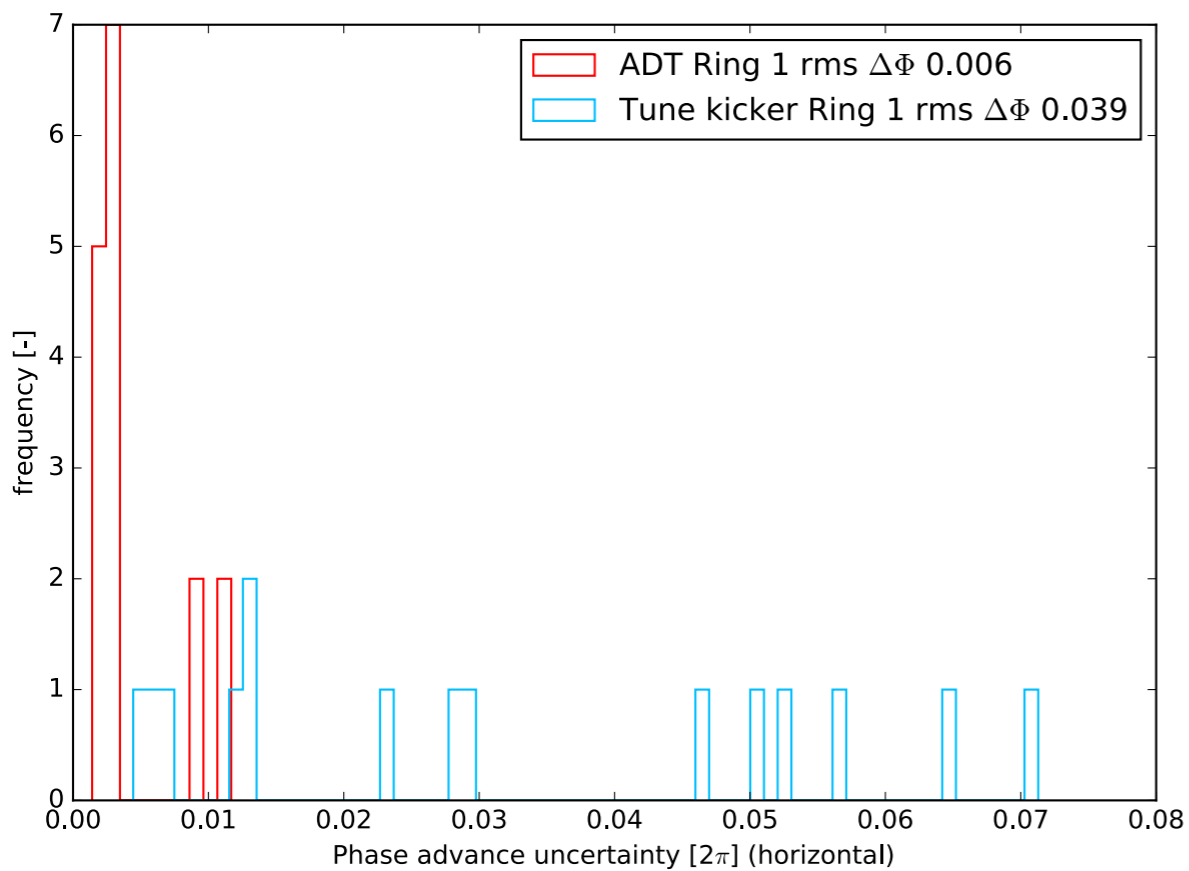
Key value in order to control the beta-beating of the machine.



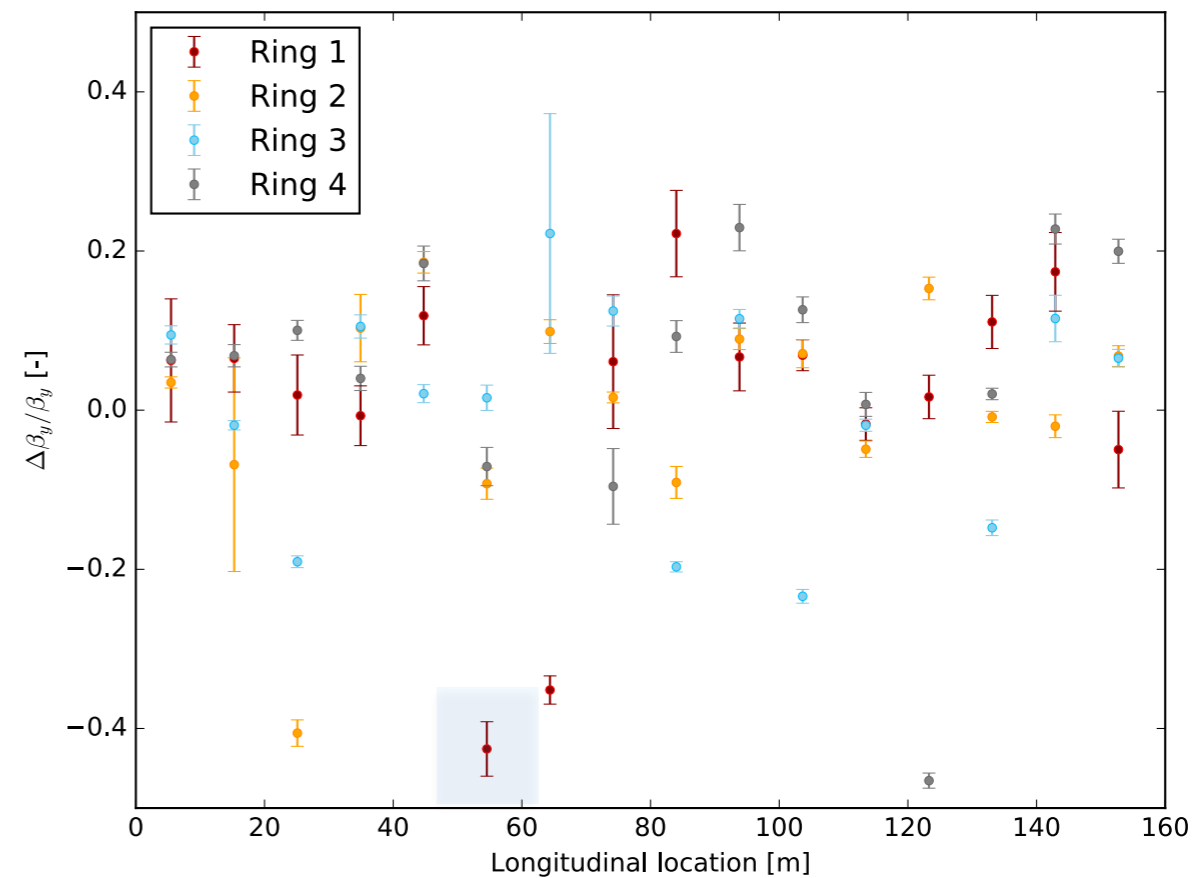
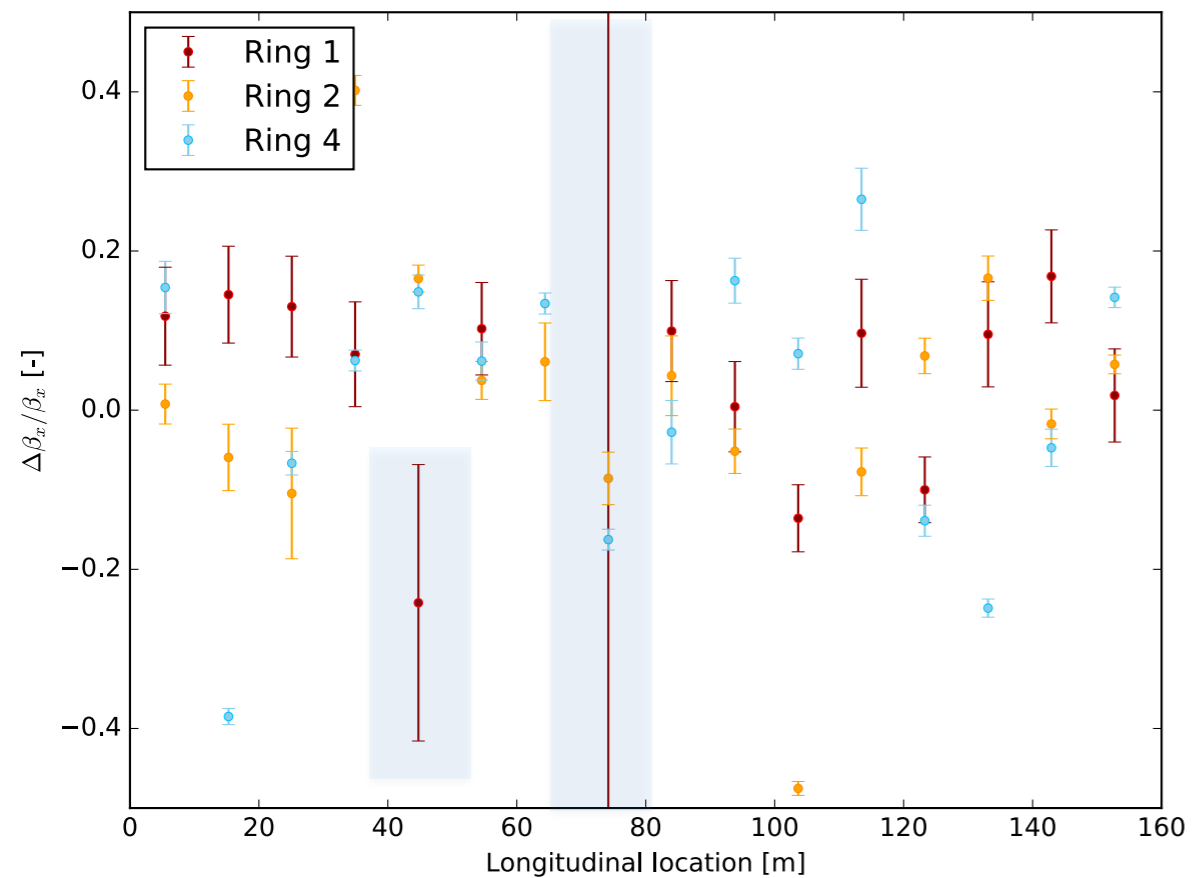
# Phase uncertainty measurements ADT (II): Vertical



# Phase uncertainty measurements Tune kicker vs ADT (I): Ring 1



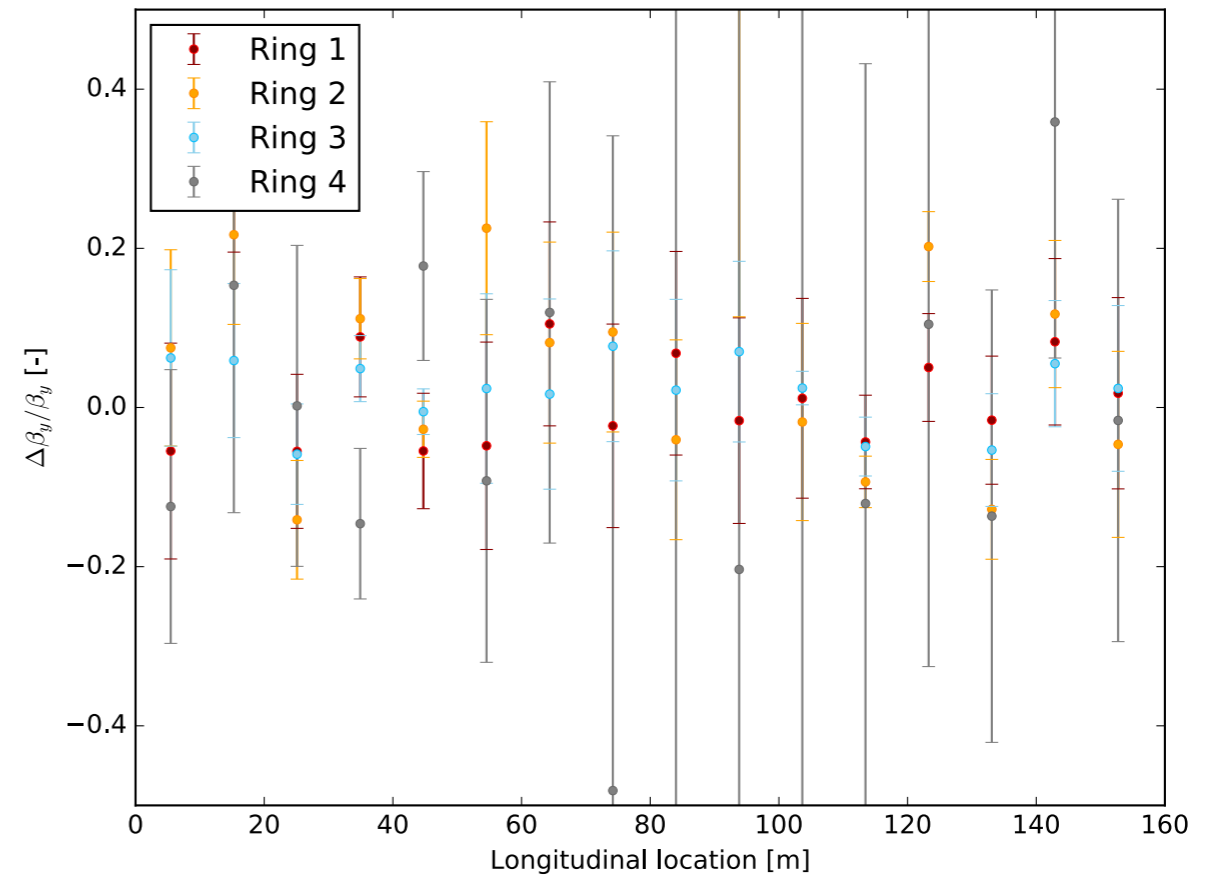
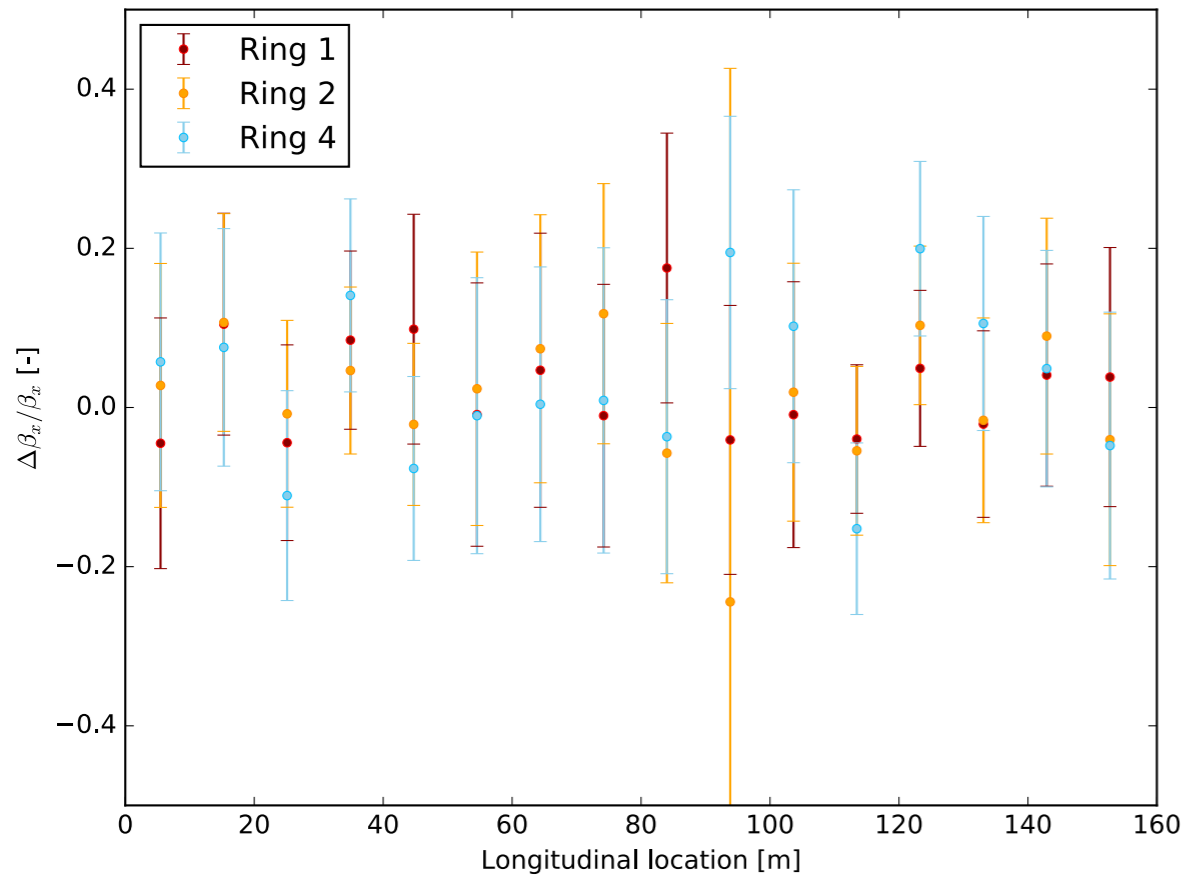
Not expecting 40% beta-beating, so faulty BPM





Large error bar due to phase uncertainty & phase advance

For the ring with good phase uncertainty a different working point can lead to a more accurate beta-beating results



- Try to understand the faulty BPMs. Specially in ring 2 and ring 4. It is not clear why the uncertainty of the phase advance is so large in those rings.
- Perform more measurements, preferably using horizontal and vertical excitations at the same time. It simplifies the analysis of the measurements and also it allows higher statistics.
- Perform measurements at different working points.