MDs 25-26 June

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June 28, 2022

Outline

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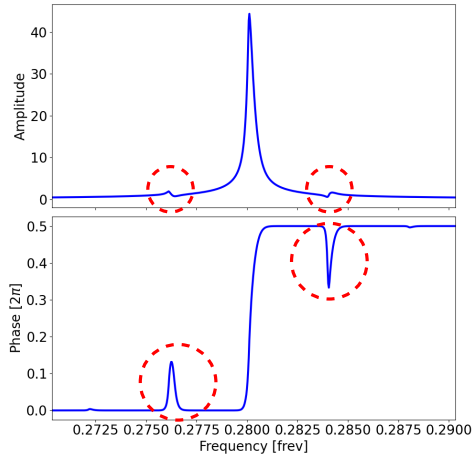

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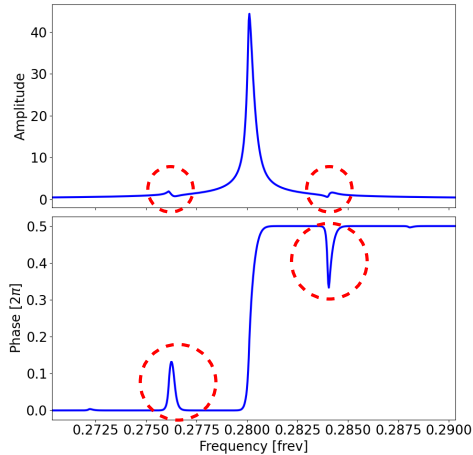

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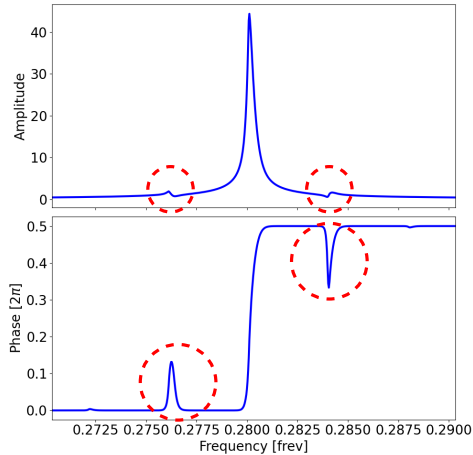

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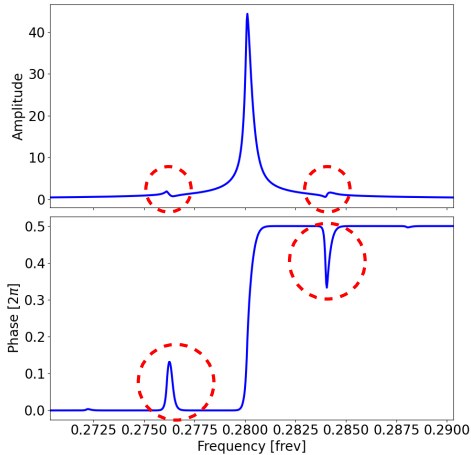
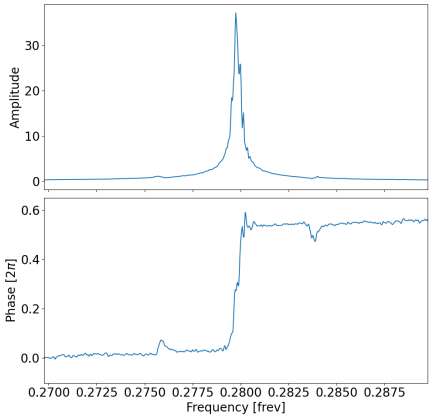
- We repeated the procedure for different accelerator configurations (chromaticity, damper gain, octupoles..) to check the impact on the measured BTFs

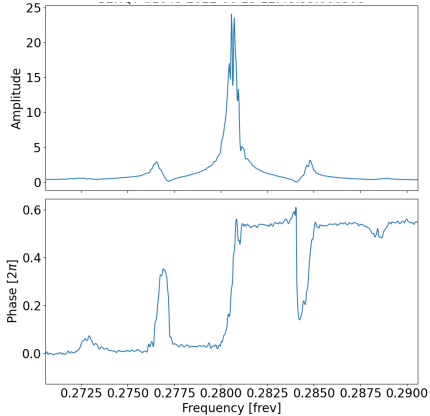


Effect of the Chromaticity

Chromaticity 4:



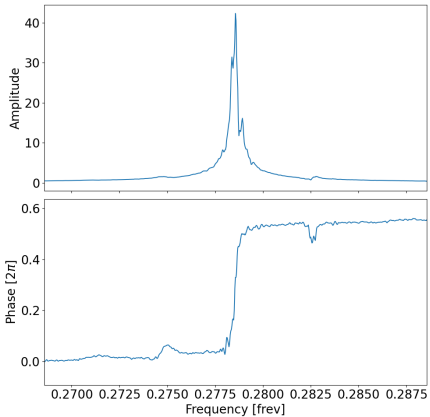
Chromaticity 12:



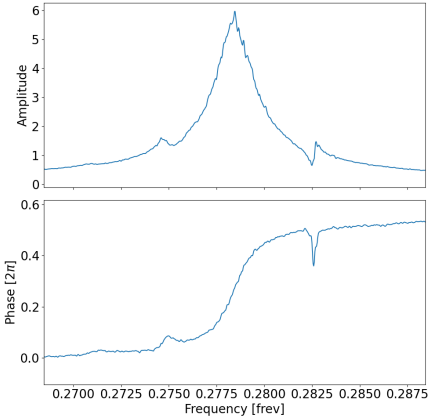
Effect: with higher chormaticity the side-bands are higher and probably easier to fit.

Effect of the Damper

No damper:



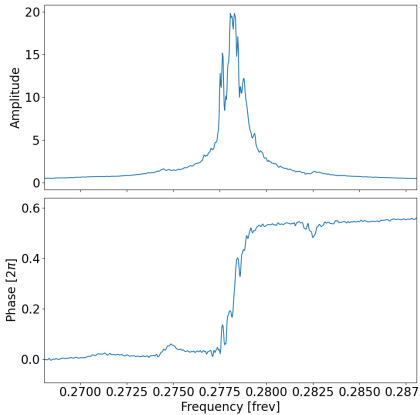
Damper gain 200 turns:



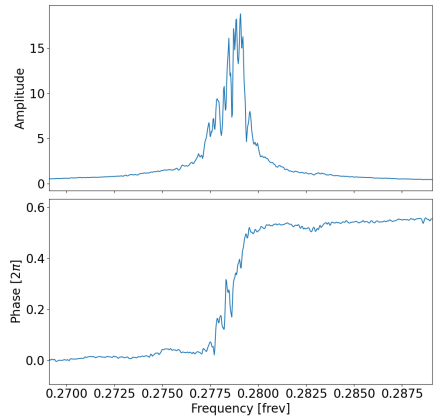
Effect: high damper gain makes the central peak wider.

Effect of the Octupoles

Octupole current -0.1 (knob value):



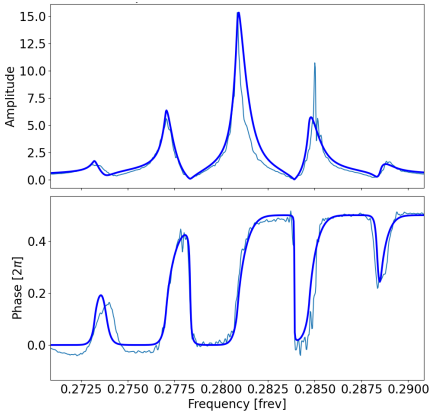
Octupole current -0.4 (knob value):



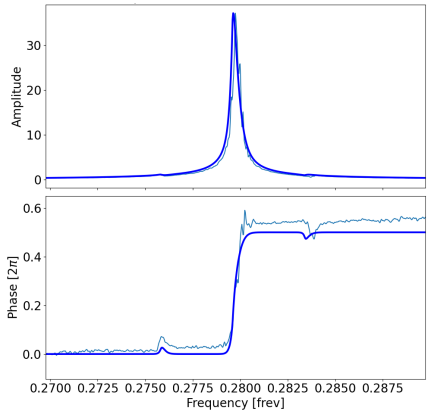
Effect: with higher octupoles current the sidebands are less visible.

Fitting the BTF

To extract the chromaticity we have to fit a BTF to the data, which is not always straightforward:



- Chromaticity trim value: 16
- Chromaticity from BTF fit: 15:54



- Chromaticity trim value: 4
- Chromaticity from BTF fit: 1.69

Next steps

Data analysis: we need to improve our fitting algorithms to extract more robustly the theoretical BTF from the data. High dimensional multiparamteric fit: difficult task (neural networks might do the trick).

Repeat the experiment at flat top. This could also just be an end-of-fill MD.

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- Fill 1:
  - Inject and ramp 3 nominals per beam.
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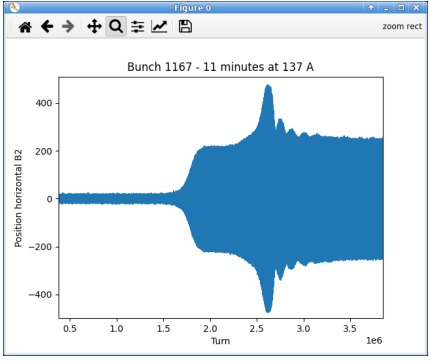
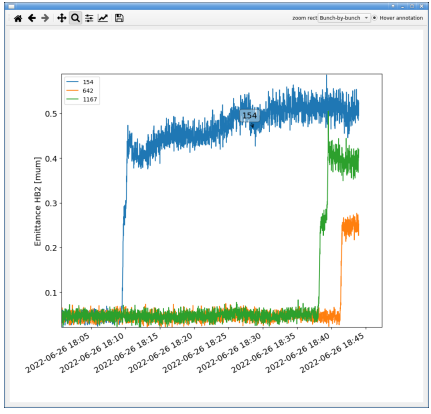
- Fill 2: Same as Fill 1 but reduce octupoles current every minute

Slow Scan (15mins per step)

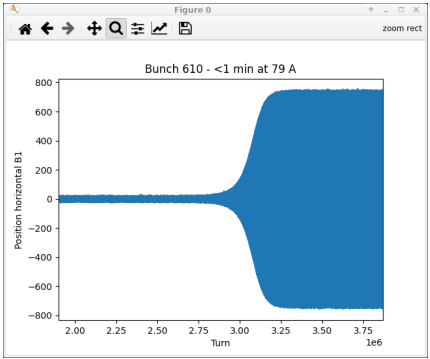
Instability threshold between 177A and 157A (depending on the bunch)

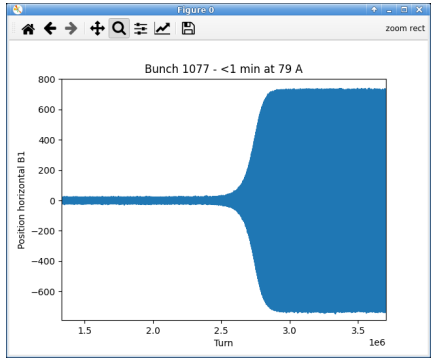




Fast Scan (1mins per step)

Instability threshold: 79A





Next steps

The instability thresholds we observed are way lower than expected. It seems that there might be some additional detuning coming from the optics. This should be investigated in order to gain better understanding of the thresholds.

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- Both the values are lower than our expectations (optics detuning?)