MINUTES

LIU-SPS BD WG  
MEETING No. 06/19

08 August 2019

**Present:** A. Lasheen, P. Krämer, L. Medrano, M. Schwarz, E. Shaposhnikova, I. Karpov, C. Zannini, C. Vollinger, A. Farricker, H. Bartosik

# Matter Arising and Follow-up of Actions

* **N. Nasresfahani**: Study the possibility to use the new coupler design to replace all existing 630 MHz HOM couplers
* **M. Schwarz**: Include the momentum acceptance limitation in simulations.
* **M. Schwarz**: Is it possible to understand if the instability observed with the radial-loop is real or only related to numerical problems?
* For the slip-stacking cycle, determined the aperture needed for the collimation system.
* A list of the key moments in the various cycles (slip-stacking!) is necessary to adjust the design of the collimation system.
* Measurements of the beta beating to include optics errors in simulation of the collimation system.
* Check the impedance of the new collimation system.
* **M. Schwarz**: Quadrupole oscillations are observed at flat bottom with the feedforward activated. Study where this is coming from.
* **A. Farricker**: Check with C. Zannini for the discrepancy in MKEs impedance.
* **C.** **Vollinger:** Check how many cross section step-like changes are in the SPS
* **M. Schwarz:** Organize meeting to discuss issues with bunch length measurements
* **T. Argyropoulos:** Include intensity effects in emittance calculations

**New:**

# General News

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# Presentations

## **Effect of the 940 MHz resonance from the RF200 MHz cavities on the SPS horizontal instability – C. Zannini**

Multi-bunch/batch horizontal instabilities were observed during run II. PyHEADTAIL simulations are benchmarked against measurements. Simulations were performed with and without the 940MHz HOM to investigate its effect. R and Q were varied independently. Since the values of R and Q are uncertain (see discussion below), the threshold plot should be used as a guideline. The simulated growth rates were cross-checked against Nested Head-Tail Vlasov solver and agree on the percent level.

* **Elena:** Do you have results only for chromaticity 0.2?
  + **Carlo:** Yes
* **Elena:** Did you also consider other beams, like fix-target beam?
  + **Carlo:** We are currently investigating.

**General discussion on the correct values for the 940MHz HOM** (same arguments also apply for 915MHz HOM) The values of R, Q, and f\_r are very sensitive to the boundary conditions used in the CST simulations! See e.g. [slides](https://indico.cern.ch/event/823855/contributions/3507640/attachments/1883446/3104218/19.07.2018_HOM_damping.pptx) by N. Nasresfahani at HOM Status meeting on 19 July 2019. Only a measurement of the feeder line will provide the correct boundary conditions to use in the simulations. One avenue under investigation is the introduction of an electrical short for frequencies in the 900MHz range by modifying the area surrounding the input coupler. This could make the mode in a standing wave, with a known field profile, which can be damped.

## **Effect of the 915MHz HOM on multi-batch stability – M. Schwarz**

The 915MHz HOM drive longitudinal coupled batch instability, and a damping factor 2 is sufficient to recover the single batch threshold. New CST simulations give new values for the 915MHz HOM, which would also be sufficient. But same remarks as for the 938MHz HOM apply. When increasing the V800 to 16%, there is a large margin for stability. When the power limitation gets included, however, this margin decreases, but is still sufficient.

* **Hannes:** When does the beam get unstable? Maybe it is enough to run for 1s?
  + **Markus:** I have the data, but haven’t looked at the start time of the instability yet.
* **Elena:** What feedback model did you use when you computed the flat-bottom instability threshold?
  + **Markus:** I used the complex impedance reduction factor. But in light of the recent results for the flat-top instability, the computed threshold might be too optimistic. I need to investigate.

# Next Meeting ~middle September 2019, organized by Hannes

Minutes written by M. Schwarz