MINUTES

LIU-SPS BD WG  
MEETING No. 03/19

28 March 2019

Present: H. Timko, A. Lasheen, G. Papotti, M. Schwarz, E. Shaposhnikova, H. Damerau, A. Farricker, I. Karpov, C. Vollinger, V. Kain, K. Li, R. Calaga, T. Argyropoulos, P. Kramer, G. Hagmann, N. Nasresfahani

# 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.
* Calculate the maximum voltage in the 800 MHz RF system due to power limitations and beam-loading.
* **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

---

# Presentations

## **LLRF specification for RF manipulations – G. Papotti**

* **Gregoire:** Will the phase jump be the preferred method for the AWAKE beam?
  + **Giulia:** We will try to implement both non-adiabatic voltage step and phase jump. This was also specified in the documentation
  + **Alexandre:** In simulations, I did not see a big improvement, but intensity effects were not included.
  + **Elena:** In future, the microwave instability might become an issue with higher intensity.
* **Elena:** For LHC beam, we have BQM, but what diagnostics can be used for beam quality check in fixed target beams?
  + **Verena:** We will have new monitor that can resolve 200MHz and allows us to observe debunching.

## **LLRF specifications for ion slip-stacking – T. Argyropoulos**

* **Elena:** It would be useful to have the functionality to change key parameters and have the system compute and apply the depending machine parameters (e.g. the bucket area for RF-system settings) without having to run a full simulation
  + **Theodoros:** Strictly speaking, this is not part of the LLRF specifications, but a high-level specification.
* **Gregoire:** Was the 800MHz TWC on or off in simulations?
  + **Theo:** We need the 800MHz system after transition crossing or at least after slip-stacking.
* **Rama:** How was the value of 300GeV determined?
  + **Elena:** We used some basic arguments, but never did a systematic study.
  + **Theodoros:**  The exact value still needs to be specified.
* **Elena:** We found out that we could only displace one beam. Is this helpful to the RF?
  + **Gregoire:** The system is designed to follow a given function, which we can set to a constant. But this ‘asymmetric’ setting might not be optimal for the RF-system.

**Elena** passed on a comment by Thomas Bohl, that we would need also the one-turn delay feedback after slip-stacking because of the high intensity.

## **LLRF specification for controlled emittance blow-up – H. Timko**

* **Elena:** Thomas used scaling functions that are constant in time, but they should be adapted as a function of time.
  + **Helga:** I added in the specifications to have a set of phenomenologically determined parameters

## **Update on work on impedance reduction and 200 MHz TWCs – A. Farricker**

QA measurements did reveal any issues with new installed shielding, but an unexpected mode was found in existing shielding

* **Elena:** Was this mode found in only one location?
  + **Aaron:** We found it in two
  + **Elena:** This mode could also serve as one measure of non-conformity
* **Christine:** Why does the impedance at 630MHz only have one peak?
  + **Nasrin:** Because now the 938MHz couplers are now included
* **Elena:** Is it possible to remove some of the 938MHz couplers?
  + **Nasrin:** Reduction from 8 to 6 couplers possible without degradation
* **Elena:** When were the bead-bull measurements done?
  + **Patrick:** Two years ago. New measurements are foreseen this month.

## **Effect of 200 MHz TWC frequency shift on instabilities – M. Schwarz**

* **Elena:** The passband is not symmetric around fr due to HOM couplers
  + **Aaron:** We have measured this impedance; need to work with Markus how to include this in BLonD simulations
* **Elena:** This also touches the question if the couplers should be matched to the RF or resonant frequency?
  + **Rama:** We decided to match within +/-500kHz

**General discussion:** How does the feedback react to a shift in the fundamental frequency of the cavity? Does it follow the actual fr or is it set to the design fr=200.222MHz? Detailed discussion between Markus & Helga planned.

## **Milestones for longitudinal beam dynamics studies – E. Shaposhnikova**

# Next Meeting 25 April 2019 (to be confirmed)

Minutes written by M. Schwarz