MINUTES

LIU-SPS BD WG  
MEETING No. 09/19

21 November 2019

**Present:** H. Bartosik, P. Kramer, A. Farricker, H. Timko, M. Schwarz, E. Shaposhnikova, V. Kain, R. Calaga, A. Lasheen, T. Argyropoulos, L. Medrano, H. Damerau, I. Karpov, G. Papotti, C. Vollinger, G. Rumolo, K. Li, B. Salvant, C. Zannini, F. Caspers

# Matter Arising and Follow-up of Actions

* **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
* **~~M. Schwarz~~**~~: BLonD simulations of ‘worst case’ scenario of 915 MHz HOM impedance~~
* **C. Zannini**: Simulate what happens if the 460 MHz couplers were removed (to make room for potential 915 MHz couplers)

**New:**

* **Markus:** Scan multi-batch threshold around multiples of revolution frequency.

# General News

As of 2020, Ivan Karpov will be new scientific secretary.

# Presentations

## **Update on effect of 915 MHz HOM on LHC beam – M. Schwarz**

The parameters for the 915 MHz HOM are not well known. Patrick performed CST simulations with open boundary conditions as a ‘worst case’ scenario. This gives factor 2 higher R and larger Q, but R/Q is reduced.

* **Elena:** Is a Q of 18k realistic?
  + **Patrick:** Yes.

The resulting multi-batch threshold is nearly identical to the one obtained from the present model. The 6 cavities will (likely) have a spread in 915 HOM frequencies. Assuming a spread of several hundred kHz for the ‘worst case’, gives a threshold similar to the present model. Shifting the resonant frequency yields higher thresholds at multiples of the inverse bunch spacing, but also reveals a 2.5 MHz modulation.

* **Discussion:** A spread of hundreds kHz is too much. Need to scan around integer multiples of revolution frequencies -> action list

## **Effect of 915 MHz HOM on fixed target beam (longitudinal) – I. Karpov**

Instabilities associated with the 915 MHz HOM were observed already in 1999 for the fixed target beam. Since macro-particle simulations are not feasible, thresholds are computed analytically. The parameters (RF voltage, etc.) were computed along the cycle and the bunch emittance was obtained by fit to measured bunch length evolution. It was found that the threshold impedance after transition crossing is 3 MOhm at flat top. The next step would be to study how the 800 MHz TWC can stabilize the beam.

* **Verena:** For the fixed target beam, the ‘worse’ the beam (i.e. no structure) the better, as long as you don’t loose the beam.
  + **Elena:** But losses occur at flat top, and it is better to have the beam in a controlled state and then start manipulations.

## **Effect of 940 MHz HOM on fixed target beam (transverse) – C. Zannini**

The 940 MHz HOM drives horizontal instabilities for both LHC and fixed-target beams. Simulations were performed including resistive wall, damper, and kicker impedances. The beam is stable without the 940 HOM. A scan of R and Q of the 940 HOM was performed for the LHC beam. So far only one of the two modes is included in the simulation.

* **Elena:** Two extra couplers affect the fundamental 200 MHz passband, but do they effect the 940 MHz modes?
  + Studies needed -> action list
* **Elena:** How long takes one simulation for the fixed target beam?
  + **Carlo:** About one month.

# Next Meeting 19 December 2019

Minutes written by M. Schwarz