# Meeting of LIU SPS-BD WG on 25.09.2018

Present

Participants:

Elena Shaposhnikova, Rama Calaga, Hannes Bartosik, Joël Repond, Christine Vollinger, Aaron Faricker, Giovani Rumolo, Markus Schwarz, Giulia Papotti, Helga Timko, Nasrin Nasresfahani, Ivan Karpov, Theodoros Argyropoulos, Alexandre Lasheen, Marcin Patecki, Kevin Li

Agenda

1. Overview of the last SPS MDs – H. Bartosik
2. Measurements of the synchronous phase shift – A. Faricker
3. Longitudinal instabilities on SPS flat bottom – M. Schwarz

Actions

* pending
* **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.
* **A. Farricker**: Provide an updated longitudinal SPS impedance model for the present and future cases.
* **D. Quartullo**: Check the loss of Landau damping in Q26 for the ion cycle (are the oscillations more violent than in Q20?).
* Calculate the maximum voltage in the 800 MHz RF system due to power limitations and beam-loading.
* Ask the feedback team if it is possible to program a separated voltage program for a slip-stacking MD.
* **C.** **Vollinger:** Check how many cross section step-like changes are in the SPS
* New
* **A. Farricker:** measurement of synchronous phase
* **G. Papotti:** measurements of long bunches

**General**

**E. Shaposhnikova:** To compare SPS before and after LIU upgrade, need the following measurements as reference:

* Synchronous frequency spread -> use previous measurements by Alex
* Synchronous phase shift -> Aaron
* Measurements with long bunches -> Giulia

**1 –** **Overview of the last SPS MDs – H. Bartosik**

* Achieved 2e11 ppb with 4x12 bunches BCMS
* Losses during acceleration are concentrated in high dispersion region; will try to localize losses at TIDP momentum scraper
  + **E. Shaposhnikova:** Can future collimation system help during ramp?
  + **H. Bartosik:** Yes
* Losses due to limited RF power at start of ramp
  + **E. Shaposhnikova:** these losses also caused during previous high intensity MDs; need to study momentum program for Q22 optics
* Chromaticity was reduced in Q20 optics by reconnecting previously unused octupoles
  + **E. Shaposhnikova:** Coupling is provided by phase loop. We need measurements without phase loop.
* MDs to compare Q20/Q26 optics with ions; so far Q26 yields better transmission
  + **G. Rumolo:** What is the cause of the better transmission?
  + **H. Bartosik:** Q26 has more aperture
  + **E. Shaposhnikova:** Above transition, you get more RF bucket area in Q26 for the same voltage

**2 – Measurements of the synchronous phase shift – A. Faricker**

* Measuring the synchronous phase shift gives information about the machine impedance, which can be used to test the SPS impedance model
* Measured data are consistent with impedance model predictions, but data for low bunch lengths have large errors
  + **R. Calaga:** Why do you only take data during flat bottom, and not also during ramp when the bunches get shorter?
  + **E. Shaposhnikova:** This is possible in principle, but you get additional effect like blow-up during the ramp. Also, this cycle has only a short ramp.

**3 – Longitudinal instabilities on SPS flat bottom – M. Schwarz**

* Measured instability threshold around nominal 12 bunches (FB off, FF off, LD off, PL on)
  + **E. Shaposhnikova:** You should also acquire data for higher intensities.
* Different LLRF system settings for 1x12 bunches with 2.5e11 ppb at injection; with FB on, bunches are stable; when FB is off all bunches are unstable when PL is on, while only last bunches are unstable when PL is off
* With the longitudinal damper on (FB on, FF on, PL on, V800 off), all bunches become unstable at the same time
  + **E. Shaposhnikova:** Turn off longitudinal damper in future measurements

Next meeting 23 October.

Minutes written by M. Schwarz