**Meeting of LIU SPS-BD WG on 03/12/2015**

**Present:** Hannes Bartosik, Thomas Bohl, Fritz Caspers, Juan Esteban Muller, Brennan Goddard, Alexej Grudiev, Wolfgang Höfle, Thomas Kaltenberger, Gerd Kotzian, Alexandre Lasheen, Danilo Quartullo, Toon Roggen, Giovanni Rumolo, Benoit Salvant, Elena Shaposhnikova, Helga Timko, Christine Vollinger;

**Agenda:**

1. The SPS transverse damper: status 2015, plans 2016 – G. Kotzian
2. Simulations of the HOM damping for the 200 MHz TW RF system – T. Roggen (for Y. Shashkov)
3. Summary of 2015 and outlook for 2016 – E. Shaposhnikova
4. AOB
5. **Gerd Kotzian – The SPS transverse damper: status 2015, plans 2016**

* Six damper modules are commissioned and used operationally (2 for LHC protons, 2 for fixed target beams and 2 for doublet beams “scrubbing”). During the 2015 ions run the modules for LHC proton beams could be used successfully to damp injection oscillations.
* The beam position for LHC beams is measured at 200 MHz using the BPCR stripline pickups and down-sampled to 40 MHz. For the doublet beam (“scrubbing module”) the signal processing is done at 40 MHz since the signal at 200 MHz disappears during splitting at injection.
* To reduce the sensitivity of the transverse damper performance on the tune setting the position of the BPCR pickups could be optimized (in particular for vertical, while in horizontal the position of one of the BPCRs is already optimal for the present horizontal tune). Possible locations will be investigated in 2016.
* The present horizontal fraction tune of 0.13 is very challenging for damper – a higher tune would be preferred. Possible alternative working points for LHC beams further away from the integer resonances will be investigated in MDs in 2016.
* Increasing the horizontal kick strength could be an interesting option to improve the gain and the performance of the damper in view of the coupled bunch horizontal instability observed with high intensity 25 ns beams (presently only 1/3 of vertical kick strength).
* A real bunch-by-bunch transverse feedback could be achieved by gain equalization on the cost of an overall reduced gain. Running with a similar gain in this high bandwidth configuration would result in higher noise and possible problem of blow-up.

1. **Toon Roggen (for Y. Shashkov) – Simulations of the HOM damping for the 200 MHz TW RF system**

* Damping the HOMs at around 630 MHz was studied in the CST simulations. The model consisted of a single cavity section including power couplers and longitudinal HOM couplers. Transverse HOM couplers were not included in the model.
* No big reduction of Q-external could be achieved by modifying the design of the already existing 630 MHz HOM couplers.
* A reduction of Q-external by a factor 2.5 could be obtained by adding more couplers in combination with using the fundamental power coupler as damping. It needs to be checked if the ports used for the additional couplers are already used for transverse mode damping.
* Fritz Caspers proposed to use “anti-resonant loading” for HOM damping. The idea is to install a sliding shorted coaxial line at one of the existing couplers in order to find the point of strongest interaction with the HOM. He expects that a suppression of the HOM at 630 MHz by a factor 10 could be possible. **Action Fritz Caspers**: start investigating feasibility and present results in future at the LIU-SPS BD meeting.

1. **Elena Shaposhnikova – End of year talk**

* The main focus of beam dynamics studies in 2015 with proton beams was put on e-cloud/scrubbing to decide baseline for aC coating, longitudinal impedance and instability studies in view of the remaining intensity limitations and impedance reduction campaign, and space charge studies for working point optimization.
* Further studies in 2016 will focus on the longitudinal impedance reduction campaign and the HOM suppression in the TWC cavities, possibilities for reduction of losses in the SPS and beam stability issues for high intensity proton beams.

**AOB – ECR on installation of sector vacuum valve (B. Salvant)**

* The installation of a new sector valve in vacuum sector 460 of the SPS is planned for the YETS ([ECR](https://edms.cern.ch/ui/file/1543081/0.1/SPS-V-EC-0002-00-10.pdf)). This is the first part of a larger campaign of installing a total of 12 additional sector valves in the SPS to improve sectorization.
* The sector valve itself does not have RF fingers. The impact of 12 additional valves on the longitudinal impedance needs to be checked carefully before their installation. It could be that the resonant modes of 12 additional valves would be comparable to HOMs of 200 MHz cavities.
* Green light was given to install the one sector valve discussed in the pending ECR, but the impedance checks need to be done before proceeding with the remaining 11 valves.

Minutes written by Hannes Bartosik