**Meeting of LIU SPS-BD WG on 22/05/2014**

**Present:** Theodoros Argyropoulos, Hannes Bartosik, Thomas Bohl, Fritz Caspers, Jose Ferreira Somoza, Alexandre Lasheen, Kevin Li, Danilo Quartullo, Benoit Salvant, Elena Shaposhnikova, Jose Varela Campelo, Carlo Zannini;

**Excused:** Gianluigi Arduini, Giovanni Iadarola, Giovanni Rumolo

**Agenda:**

1. Update on the SPS impedance model and results of the recent SPS survey – Jose Varela Campelo
2. First ideas on possible SPS layout inspection – Mauro Taborelli/Jose Ferreira Somoza
3. Update on impedance of the WS and highlights from the Erice workshop – Benoit Salvant
4. Progress with longitudinal simulations – Kevin Li, Danilo Quartullo et al.

Elena reported from the last LIU-SPS coordination meeting:

* Action for LIU-SPS-BD: What is the effect of the MKP impedance on longitudinal stability? Should it be tried to reduce the MKP impedance or is it sufficient to cool the magnet for high intensity operation?
* It was encouraged to improve the knowledge about the SPS layout and the status of the flanges
* Wolfgang was giving a detailed presentation about the status of the SPS feedback

1. **Jose Varela Campelo: Update on the SPS impedance model and results of the recent SPS survey**

200 MHz cavities

* The 2 impedance peaks around 200 MHz in the simulation are due to a small mismatch of the main couplers; the simulation results are very sensitive to the matching of the main couplers
* It seems that the main couplers excite HOMs in the simulations; in the real cavity, there are HOM couplers which are not yet included in the model; They can be taken into account, however the termination of the couplers at frequencies other than 200 MHz is unknown

Flanges

* The effect of the damping resistors on the impedance of the different flanges is being studied with CST simulations; unexpected results were obtained using the ohmic sheet model for modelling the Nickel-Chrome coating of the damping resistors
* CST simulations of the non-enamelled QD-QD flanges show a high frequency resonance above cutoff, which was not observed in previous HFSS simulations

BPMs

* Simulations of the BPMs are based on the CST model of Benoit, but taking into account refined material properties of the lossy metals (special alloy and stainless steel) 🡪 the resonance at 1.6 GHz has now a reduced peak and smaller Q
* The new simulations were done in time domain with a short bunch, while Benoit was using the Eigenmode solver 🡪 this explains the difference in the high frequency part of the spectrum

Other elements

* COLDEX - Y chambers:
  + Several resonances with high shunt impedance and high Q; In reality the R and Q values are probably smaller, as the bellow was not included in the simulations
* Unshielded pumping ports (QF-MBA)
  + Simulations with CST are not in agreement with HFSS simulations; Clarification is expected from measurements planned for the second half of June

Update of the total 2014 impedance

* The 1.4 GHz resonance of the flanges has been broadened to account for the scattering caused by small geometrical differences of bellows
* The high Q resonances from the Y chambers have been included
* The new high frequency resonance of the non-enamelled QD-QD flanges was added

Machine survey – discrepancies between the machine layout drawings and the actual installations

* Many enamelled flanges are not ok any more (enamel is broken, i.e. cracks due to ageing and mechanical stress → short circuit and not insulating any more) – they will need to be replaced
* Jose Ferreira Somoza mentioned that in some cases there are RF fingers inside the enamelled flanges close to the QF – this doesn’t make any sense; He also pointed out that in the layout drawings produced after an ECR the damping resistors are usually not included!

1. **Jose Ferreira Somoza – First ideas on possible SPS layout inspection**

* Xray scans would cost about 10-20k CHF for 200 measurements and about 10 days would be needed for the scans. The measurements need to be done during the night, as the machine needs to be closed for radiation protection reasons. As it is probably too late for performing the scans during LS1, it is proposed to plan them for the next Christmas shutdown.
* Another possibility for detecting the presence of damping resistors could be to measure gamma rays: It was discovered recently that the springs that hold the damping resistors contain Cobalt and are thus activated.
* A flange mockup that is presently used to test the different measurement techniques
* Xray scans seem to be the most promising option.

1. **Benoit Salvant – Update on SPS wire scanners:**

* The SPS wirescanners will be reinstalled with Tungsten wires to reduce heating. Shielding plates will be installed in the WS 416. The behavior of the plates and the tungsten wires will be checked with beam after the startup.
* Only the empty tank of the new SPS prototype wirescanner will be installed into the SPS during LS1. The measured impedance spectrum is similar to the simulations, but a much lower Q is measured for certain resonances and in addition less modes are observed in measurements (this could be related to the probe used in the measurement)
* All these results should be included in the impedance model

1. **Kevin Li, Danilo Quartullo et al. – Progress with longitudinal simulations**

* It was agreed within the developers of PyHEADTAIL that the global coordinates are z and dp/p; different coordinates will be used within the longitudinal tracking
* Danilo was working on the slices class and looking at the longitudinal equations of motion
* There will be a meeting for the PyHEADtAIL development in the middle of next week

Minutes written by Hannes Bartosik