**Meeting of LIU SPS-BD WG on 26/06/2014**

**Present:** Theodoros Argyropoulos, Hannes Bartosik, Thomas Bohl, Fritz Caspers, Roland Garoby, Jonas Ghini, Wolfgang Höfle, Giovanni Iadarola, Alexandre Lasheen, Kevin Li, Elias Métral, Danilo Quartullo, Giovanni Rumolo, Benoit Salvant, Elena Shaposhnikova, Jose Varela Campelo, Carlo Zannini;

**Excused:** Gianluigi Arduini

**Agenda:**

1. SPS MDs in 2014 and discussion on their prioritisation - G. Rumolo, H. Bartosik
2. Latest longitudinal simulations with SPS impedance model – T. Argyropoulos, A. Lasheen
3. **Giovanni Rumolo: SPS MDs in 2014 and discussion on their prioritisation**

The requests for MDs in the SPS for 2014 have been presented together with the boundary conditions and the latest version of the 2014 SPS machine schedule.

* The two weeks of the SPS scrubbing run have been split into two blocks of seven days, one at after the startup (week 39) and one in the middle of the SPS run (week 45); this was requested by LIU-SPS as outcome of the Evian workshop for maximizing the chances of success for the scrubbing;
* During the first weeks after the startup in 2014, 4 days per week parallel MD time were requested for the setup of the Argon beam in preparation for the run in 2015, in order to test new RF hardware, the new RF manipulations and to gain experience with the new ion species; On the other hand, lots of parallel MD time is also required for the setup of the LHC proton beams and studies related to LIU. Furthermore, the optimization of the LHC beams has high priority, as also the second part of the scrubbing run will profit from an improved beam quality. A compromise of the allocated parallel MD time has to be found, since measurements in the longitudinal plane cannot be done in parallel to the setup of ion beams due to limitations of hardware and manpower 🡪 It was proposed during the discussion to share the parallel MD time during the first weeks after the start-up such that 2 days per week are used for ions and 2 days per week for LIU related studies.
* The setup of the doublet beam with acceleration, which will be needed for the LHC scrubbing in 2015, will be done in dedicated MDs.
* New MD cycles of special types such as the slow acceleration of the doublet beam and cycles with intermediate plateaus need to be requested well in advance of the actual MDs, as the new cycles need to be approved by Karel (to check machine protection aspects).
* Wolfgang mentioned that the new hardware for the transverse damper is not finished yet, but is on the critical path. It has to be commissioned in the first weeks after the startup, as it will be needed for the SPS scrubbing. Furthermore, the preparation of the prototype high bandwidth feedback system is being organized with the LARP collaborators in view of the second week of the scrubbing run.
* The MD coordinators will present a first planning of the 2014 dedicated MDs and parallel MDs in the next LIU-SPS BD meeting.

1. **Alexandre Lasheen: latest longitudinal simulations with the SPS impedance model**

An overview of the available measurement data and the corresponding simulation studies of the SPS longitudinal impedance were presented.

* Both measurements and simulations of the bunch spectrum during the debunching without RF at injection are very sensitive to the particle distribution.
* The simulation results for the debunching for the Q20 optics are not yet understood. The synchrotron motion in Q20 is much faster compared to Q26 🡪 probably more macro particles are needed …
* In simulations of the quadrupole synchrotron frequency shift there is still some part of the impedance missing to match the experimental data. Adding the step transitions to the impedance model brings the simulation closer to the measurements, but when adding the effect of space charge the agreement becomes worse (two different analytical approaches were used for calculating the space charge impedance). Further studies are needed to better understand the space charge contribution 🡪 experimental studies are planned at different beam energies and with different bunch lengths in order to disentangle the space charge from the rest of the imaginary Z/n. Also a new simulation tool for arbitrary pipe geometry and bunch distributions will be tested for calculating the space charge impedance.
* The measured bunch length at flat top as a function of the bunch intensity cannot be reproduced by the potential well distortion in simulations with the present SPS impedance model. One of the possible explanations is that a microwave instability might have occurred in the measurements already during the ramp.
* It was proposed to investigate the low frequency inductive impedance that could originate from ground loops as possible source for the missing longitudinal impedance.
* It was proposed to study in more detail the effect of the direct space charge during the micro bunching with long bunches.
* The transverse beam size should be measured in all future experimental studies on the longitudinal impedance in order to be able to calculate the longitudinal space charge impedance.

Minutes written by Hannes Bartosik