**Meeting of LIU SPSU-BD WG on 26/01/2012**

**Present:** Gianluigi Arduini, Theodoros Argyropoulos, Hannes Bartosik, Chandra Bhat, Nicolo Biancacci, Thomas Bohl, Alexey Burov, Fritz Caspers, Roland Garoby, Simone Gilardoni, Brennan Goddard, Steven Hancock, Giovanni Iadarola, Juan Esteban Mueller, Giovanni Rumolo, Benoit Salvant, Elena Shaposhnikova, Mauro Taborelli, Helga Timkó, Joachim Tuckmantel.

**Excused:** Yannis Papaphilippou

**Elena Shaposhnikova: Q20 optics for FT/CNGS beam**

* *Summary:*

Elena summarized the differences between the LHC and CNGS beam in the SPS (injection at lower energy, transition crossing, full ring - continuous RF power regime and lower bunch spacing for CNGS). At the moment the maximum available RF voltage is used after transition crossing to minimize beam losses. For Q20, the voltage should be significantly increased to keep the same acceptance as for Q26 after transition. It is not clear if it is necessary to run with the same optics for all cycles/beams.

**Actions:**

1. **Perform MDs with the CNGS beam in the Q20 optics in 2012 and study in particular what happens around transition**
2. **Study possibility to have different optics for CNGS cycle (with OP - Karel)**
* *Discussion*

Roland wondered if the fact that the bucket would be more filled with Q20 would generate more Landau damping and be beneficial.

Thomas said that the bucket is small after transition so that emittance should be kept low. As there is a lot of uncaptured beam, there is a need for high voltage to increase transmission.

Roland asked how many MDs would be needed.

Simone said that the CNGS intensity could be increased but nor for a long time to preserve the septum. He added that a lot of work is needed to increase the intensity, and he PS needs to know it early. Elena said that first the nominal intensity should be improved and only in a second step the intensity could be increased.

Hannes said that we should look out for the aperture in Q20 during transition crossing due to the increased dispersion.

Thomas said that the transients could be higher with Q20 at transition, which is at different Bdot.

Roland asked if the transfer line needs to be matched for Q20. Brennan answered that it should be ok in principle but a few things should be checked.

**Actions:**

1. **Check the matching of the TT41 transfer line (Brennan/ABT)**
2. **Check consequences of different transition crossing with Q20 for the 200 MHz RF system (Thomas B./RF)**

**Giovanni Rumolo: Planning and goals of 2012 scrubbing week**

* *Summary:*

The main goal of the scrubbing week is to answer if we can rely on scrubbing for the SPS upgrade. The scrubbing week (5 full days maximum) is planned for week 13 and will be like a floating MD, i.e. LHC operation has priority. The objectives of the scrubbing week are: (1) scrubbing the vented zones and scrubbing more the other areas if possible, (2) testing the techniques that are expected to enhance electron cloud generation, (3) monitoring the electron cloud and beam observables under scrubbing, (4) validating the simulation tools.

* *Discussion:*

Brennan asked what LHC is doing at that time. Gianluigi answered that LHC will be in the last week of commissioning. There was a general agreement that maybe this is not ideal for the SPS. Probably the second period can be found for the scrubbing later in the year, but it is safer to use this one as well.

Elena said that since 2 serigraphed MKE kickers were installed, scrubbing is expected to be needed for them as well (at the FOM it was also said that 10 magnets were exchanged and 2 magnets coated).

Mauro said that the machine would be closed on Jan 27. Some time is needed beyond week 8 to install the strips.

**Hannes Bartosik and Giovanni Iadarola: Collecting ideas for the 2012 SPS scrubbing run**

* *Summary:*

Hannes and Giovanni presented the expected effect of the different feasible scenarios:

* nominal 25 ns beam
* 5 ns beam (currently investigated if actually possible)
* 10% un-captured beam
* Bunch shortening in the SPS (voltage increase)
* Higher intensity
* More batches (up to 6)

**Action: check in simulations expected efficiency of the 5ns beam for low SEY as a function of bunch intensity.**

The 10+15 ns option was abandoned for week 13 due to significant preparation work required in the PS.

Besides the nominal LHC cycle, the main requested cycle should have a long flat bottom with maximum possible length and varying batch spacing. A backup solution would be a coastable cycle. The draft schedule was presented with nights to be used for reference measurements.

Requested instrumentation includes time resolved e-cloud strip monitors (also for the a-C coated pipes with solenoids), pressure measurements, and microwave measurements for uncoated magnets. The classical beam observables should be saved, including the signal from the transverse damper pick-up and from the BPMs in 1000 turns mode.

Finally the opportunity to study the effect of local transverse beam displacement was presented. The idea is to see if the stripes move quickly or not when moving the beam, and see how well the area around is scrubbed.

* *Discussion:*

There is no strict requirement for injected transverse emittance.

For the scrubbing with 5 ns beam injected at 26 GeV/c, many difficulties were mentioned, in particular the need to retune locally the 200 MHz cavities (10h stop) in the PS. Simone added that no other beam can be produced by the PS if the 5ns beam is produced in this way. Simone asked if we can inject at 14 GeV. It was answered there would be a problem of intensity and emittance required and Gianluigi also pointed to the limited aperture at low energy.

Simone asked if the 200 MHz structure on the beam is really needed and if no capture or only the 2 remotely accessible 200 MHz cavities could be used. => Minimum beam modulation at 200 MHz is required for initial capture set-up in the SPS and probably one or 2 cavities will be enough.

Giovanni said that it should be checked more carefully if 5 ns is indeed efficient at low SEY, and check the minimum intensity for which it would be interesting to scrub.

Simone said that with debunched beam at 26 GeV there is a problem for the kicker rise time in the PS. It should be a hole in the beam to avoid irradiating the septum.

It was reminded that 2E13 are needed on harmonic 420, i.e. around 5e10/bunch. The CNGS beam with 5- turn extraction is not enough to generate e-cloud.

Elena said that it is an interesting study, but she expressed doubts to make it actually working during short MD period. The 10+15ns scheme seems even more unrealistic.

Elena asked if we will be able to scrub enough fresh stainless steel surface and asked how much time is needed (50h?). The question is what happens below SEYs of 1.3 and not at initial high SEY. Mauro said that it is hard to assess as it saturates at 1.3 in the lab.

Elena asked if conditioning could be done for the MKE for a few days before the scrubbing. This could be seen with Karel. Hannes asked if it would be a good idea to split the scrubbing run. 8h are needed to prepare the RF.

Elena said that there is some margin to decrease bunch length with the voltage.

Gianluigi asked if indeed the scrubbing run could be split to prepare the more exotic beams.

Elena asked what would happen during the nights and Hannes answered that the scrubbing run would continue with reference measurements.

Interlocking of the magnet should be changed during this period.

Finally proposals are:

* See a possibility for MKE kickers conditioning before
* No exotic beams this time
* Ask for more days after this week (how late?)

Steve Hancock said that the 5ns beam is off the table.

Time resolution of fraction of second can be obtained with the microwave setup in BA5. The setup with a-C is gone, but not the one with the stainless steel (vented unfortunately as the rest of the sector).

**Action for Mauro and Fritz: see if the system could be put back to work.**

Mauro and Fritz agreed to go in BA5 to see what can be done.

Gianluigi asked if it was checked that the measurement of emittance is ok. The answer was no.

**Action for the scrubbing team: check if the transverse emittance measurement is up and running.**

Minutes taken by B. Salvant