

Minutes of the 9th meeting of the SPS Upgrade Study Team on 20 November 2007

Present: G. Arduini, S. Calatroni, F. Caspers, P. Chiggiato, R. Garoby, J. M. Jimenez, G. Rumolo, E. Shaposhnikova, M. Taborelli, F. Zimmermann

• Dependence of the e-cloud build up on bunch current and spacing - G. Rumolo

In general with increase in bunch spacing, the e-cloud build up threshold for the maximum SEY δ_{max} also increases: $\delta_{max} = 1.3$ was found for 25 ns spacing and $\delta_{max} = 1.6$ for 50 ns (with bunch intensity fixed at the LHC nominal). According to the simulations, the effect of bunch current increase for fixed bunch spacing is not monotonic and above some critical value (which depends on the value of δ_{max} and bunch spacing) the current increase does not lead necessarily to more e-cloud. The increase of the batch length by factor 2 (with PS2) does not seem to have a significant effect.

⇒ It was suggested that more points in the range between nominal and ultimate intensities should be obtained and the sensitivity of this critical bunch current to the vacuum chamber geometry (simulations were done for MBB-type vacuum chamber) and beam energy should be evaluated.

⇒ With permanently increasing request for different e-cloud simulations it becomes clear that some help (from a technical or PhD student) for Giovanni is required.

• Thin film coatings for SPSU - P. Chiggiato

Three main objectives of TS-MME-CCS were presented in the progress report. (1) To be ready for the test of materials under study (nitrides and carbides of elements of the 4th group) in the SPS in March 2008 after preliminary rough optimization. This needs two different sputtering systems to be functional in bld. 181. The characterization protocol of samples includes structural and metallurgical tests as well as a test for UHV compatibility. (2) Availability of a combined XPS-SEY system in March'08. IN addition to available manpower the contribution from a PhD student (shared with AB) could be very useful. (3) Application of the selected techniques for coating the SPS chambers. The film thickness can be well controlled and could vary from 300 to 30 nm. It is also planned to go to the ESRF for radiation tests.

⇒ **F. Caspers** suggested verifying the imaginary impedance of these very thin films which probably could still be non-negligible if it is a dielectric with very high ϵ . If available information is not sufficient to clarify the issue, impedance measurements could be also envisaged.

M. Jimenez informed the meeting about the development of a new technique for production of holes (for e-cloud collector) based on water jets instead of a laser.

• Beam loss and radiation in the SPS for higher intensities and injection energy - G. Arduini

The particle loss associated with the FT/CNGS and LHC beams during the last few operation years were considered. Different measures to reduce them have already been implemented. For the FT/CNGS beam the main improvements expected in future, with PS2 in operation, are connected with higher (25 or 50 GeV) injection energy and will be due to a smaller transverse beam size for fixed normalised emittance and absence of the transition crossing. In addition the LHC-type beam

structure will replace the actual 200 MHz line density modulation. The total losses of the nominal LHC beam in the SPS were reduced during the last few years to approximately 6-7%. They are proportional to beam intensity and probably connected to e-cloud. The need to upgrade Emittance Reduction Dipoles in TT2 and the beam dump (will not work at 50 GeV!) and the absence of any real collimation system in the SPS were also underlined.

- **Aob**

Elena informed the meeting about the online meeting with SLAC team, working on groove design and production for the SPS, which should take place on November 21 at 18:00 in 874-R-018.

Roland proposed to advance the SPSU meeting in future by 1/2 hour (at 15:30) to avoid overlapping with his other meeting.

- The next (and the last in 2007!) meeting will be on **18 December 2007** at 16:00 in the JBA room (bld. 864).

Tentative agenda:

- (1) Results of the last e-cloud MD in the SPS in 2007 - G. Rumolo
- (2) Progress reports on preparation for the 2008 tests in the SPS - K. Cornelis, P. Chiggiato, F. Caspers, M. Jimenez

Elena Shaposhnikova, 21.11.2007