

**Minutes of the 19th meeting of the SPS Upgrade Study Team
on 14 October 2008**

Present: G. Arduini, S. Calatroni, F. Caspers, P. Chiggiato, E. Shaposhnikova, M. Taborelli, C. Yin Vallgren, F. Zimmermann

Excused: R. Garoby, E. Mahner

• Results from the SPS run week 41 - C. Yin Vallgren

Measurements of e-cloud signal as a function of accumulated dose done for 50 ns, 75 ns and 25 ns spaced bunches during the last SPS MD were presented. For a 25 ns beam the e-cloud signal in the Stainless Steel (StSt) liner is similar to the previous MD (on 12.08.08), for NEG it is 5 times higher and for Carbon is 10 times lower.

With a 50 ns and 75 ns beam the e-cloud signal for StSt was 5 times below the signal with a 25 ns beam. No e-cloud current (positive noise-like signal) could be detected on Carbon coated liner in both cases and on NEG for a 50 ns beam. This could be also the result of different pressures.

In conclusion, no ageing could be observed for Carbon coating after two weeks of air exposure and after two months in the ring (under vacuum). \Rightarrow It has been decided to keep these StSt and Carbon liners during the 2008/2009 shutdown in the ring for studies of their ageing with beam in 2009.

• Progress report on coatings - M. Taborelli

Pump-down measurements of C-coated tubes were done to study the effect of pressure increase after re-installation of the C-coated liner exposed to air during the previous SPS MD (12-14 August). The measured pressure increase for the same coating CNe8 as in the SPS liner is an order of magnitude lower than that measured in the SPS ring during that MD and therefore the observed effect is most probably due to a kapton foil also exposed before to the air and not due to the liner itself. However for some other versions of C-coating the measured pressure was significantly higher (two orders of magnitude). This pressure is not necessary correlated with the SEY, but probably with ageing, and has been controlled for all new coatings.

Studies show that ageing is also a function of magnetron sputtering configuration. Ageing of tubes seems to be faster than of liners. One possible reason is a rougher coating of liners which is also confirmed by measurements of SEY as a function of electron energy. Note that in all studied cases maximum SEY did not exceed 1.0.

A 35% reduction of SEY was measured at low electron energies for the Al grooves provided by M. Pivi. CERN workshop still has difficulties (tools used too much) in manufacturing of the StSt grooves.

Progress on prototype coating of the SPS magnet was reported. A general design should work for both MBB and MBA magnets, but some details (as support) are different and correspond to MBB-type magnet. Drawing should be approved at the end of this week.

\Rightarrow Despite very promising results already obtained for C-coatings, the rough surface should be considered as an important additional measure against ageing which should be studied even if this

could significantly delay possible implementation in the SPS.

Status report on enamel electrodes - F. Caspers et al.

The status of enamel electrodes was presented. During the last MD studies done with a 25 ns LHC beam in the PS, the functionality of an enamel electrode (installed in SS84) similar to a metallic one (installed in SS98) in terms of the e-cloud suppression was demonstrated. It was also seen that the coating of an enamel layer by a resistive layer at 850 deg C led in some places to its diffusion through the isolating enamel and caused sparking during the test. A solution could be to use a resistive layer with lower melting point (of about 650 deg instead of 850 deg). Another anticipated difficulty, which also exists for a ceramic coating, is working inside long beam tubes on a non-flat surface.

⇒ The future steps which could be taken in this direction for the SPS upgrade should be discussed and clarified (enamel electrodes in the SPS).

Highlights from MULCOPIM'08 workshop - F. Zimmermann

The MULCOPIM workshop (Multipactoring, Corona and Passive Intermodulation in high power microwave systems for satellite applications) took place on 23-25 September 2008 in Valencia, Spain (see also <http://www.mulcopim08.com>). It is one in the ESA/ESTEC series. Three participants (from total 140) were from CERN (and SPSU team) and were supported by CARE-HHH. As was shown a lot of studies carried out by this community are common to accelerators. For example, the preferred cure for multipactoring is considered to be a porous surface which should not change over time. The simulation codes used in this field could be of large interest for the accelerator domain as well. More collaboration with these people is expected in the future and invitations have been sent for the e-cloud workshop at CERN (20-21 November 2008). There also will be different talks from CERN participants related to the SPSU activities.

Shutdown activities

Plans for 2009 operation year and shutdown activities connected with e-cloud were briefly discussed. The final decisions cannot be taken without participation of representatives of the different groups involved.

In case of successful coating tests on the spare SPS magnet it was proposed to coat a few SPS magnets during this shutdown. The microwave diagnostics can be used for e-cloud detection with beam in 2009. The required calibration could be done using measurements on coated and standard magnets with one emitter and two receivers. This could need re-cabling. It was also suggested to install in addition the vacuum gauges and residual gas analyser.

Other e-cloud installations in the SPS test area will be discussed during the next SPSU meeting (e.g. enamel electrodes, NEG and so called "Macek" detector).

- The next meeting will be on **18 November 2008** at 15:30 in the JBA room (bld. 864).

Agenda:

Coating of the SPS magnets: logistics - J. Bauche

Progress report on coatings - M. Taborelli

SPSU activities for 2008/2009 shutdown - everybody

Elena Shaposhnikova, 17.10.2008