

Minutes of the 23th meeting of the SPS Upgrade Study Team on 17 February 2009

Present: S. Calatroni, F. Caspers, R. Garoby, N. Gilbert, E. Mahner, E. Metral, B. Salvant, E. Shaposhnikova, D. Seebacher, M. Taborelli

Excused: G. Arduini, J. Bauche, G. Rumolo, G. Vandoni

• **Progress report on coatings for SPSU - S. Calatroni et al.**

Three coating tests were performed so far on MBB 096 with liner. Test N1 was done with 2 cathodes and 1 anode and power limited by arcs at 400 W. Test N2, made with 2 anodes and power of 700 W, resulted in more uniform color (and thickness) of coating. Measurements on a 50 cm long strip in the center of liner confirm a uniform SEY with a maximum around 1.0. A problem with coating on the insulator was observed. Test N3 with increased sputtering power is underway. Its purpose is also to find a solution for better shielding of feedthroughs.

Temperature on the liner is limited to 120 deg (150 deg on the sides and 300 deg on the top are allowed by Jereme). Time of coating is around 24 hours. The quality of coating is less good on the first 20 cm due to the fringe B field. Thickness of 50 nm is sufficient for SEY reduction, it is planned to have 200-300 nm.

The coating quality checks on MBB magnets are possible with an endoscope (at least the first 2 m without a special sliding support). At the moment all (4) endoscopes in the Vacuum group are used in the sector 3-4 of LHC.

The present schedule foresees the end of coating of the last (third) MBB (040) on March 5 and March 9 remains as the hard deadline.

The first reference μ wave measurements should be done after installation of the MBB in position 51490, before the SPS tunnel is closed.

For 2009 tests places for 4 liners are available in the SPS experimental set-up (to be compared with 2 in 2008). The present proposal:

- (1) old (2008) liner with a-C coating,
- (2) new StSt for reference,
- (3) new a-C on rough (Zr) surface,
- (4) free for suggestions

The deadline for the end of installations is **March 19**, the tunnel is closed on March 20.

A new sample holder for the C-magnet available this year will be used for the sample coated with a-C on 1.10.2008 and kept in vacuum.

The correlation of layer characteristics made using different pressure and power settings during sputtering with SEY is under study.

• **Measurement of electromagnetic properties of NEG coating in the microwave range - D. Seebacher**

The review of different measurement of the NEG coating impedance was presented. The increase of impedance at ELETTRA was still an issue in 2006 after 4 years from modifications. A factor 2

increase in the imaginary part of the transverse impedance (in 0.1-10 GHz range) was calculated by R. Nagaoka in 2003. The theoretical attempts to explain the results of ELETTRA miss an order of magnitude either in resistivity or layer thickness.

On the other hand no adverse effect of the NEG coating was noticed in ESRF and measured there in the lab (at 14 GHz). However the measurement set-up used leaves some questions open. In particular, taking into account the thickness of the coating ($2 \mu\text{m}$), and NEG skin depth ($20 \mu\text{m}$ at 3 GHz) the method could give similar results for a conducting and a high ϵ dielectric layer.

For the SPS the relevant frequency range is much lower than for electron rings with very short bunches. By the resonator method it should be possible to measure the impedance of the coating on a glass rod up to 4 GHz. The measurements of the quality factor and detuning should give correspondingly qualitative (metal or dielectric) and quantitative information about the layer properties.

The dielectric constant of the NEG coating needs to be very large to explain a high impedance reported in some publications.

David will be at CERN till July 2009 and will work with Fritz on this project.

- **AOB**

Work going at KEKB for e-cloud mitigation is very similar to the SPS upgrade. We need to have more close look at their activities and probably establish a collaboration.

- The next meeting will be on **24 March 2009** at 15:30 in the JBA room (bld. 864).

Preliminary agenda:

Results of SPS magnets coating - P. Costa Pinto/S. Calatroni

What was installed in the SPS - M. Taborelli

Update on measurement of NEG and a-C layer impedance - D. Seebacher

e-cloud MDs in 2009 - E. Shaposhnikova

Elena Shaposhnikova, 26.02.2009