

## Minutes of the 4th meeting of the SPS Upgrade Study Team on **5 July 2007**

**Present:** G. Arduini, S. Calatroni, F. Caspers, K. Cornelis, R. Garoby, G. Rumolo, E. Shaposhnikova

**Excused:** M. Jimenez, M. Taborelli, F. Zimmermann

### • **SPS limitations to injection energy and intensity - K. Cornelis**

The SPS limitations which were reviewed in the talk include: injection channel (up to 26 GeV/c), beam dump (energy range is limited by fast switches, probably some improvement can already be foreseen now), MKE kicker heating, the e-cloud effect, RF power for the CNGS beam, transverse damper and beam control. Beam instrumentation was added to the list of equipment to be upgraded in future. The necessity of beam collimation for high intensities should also be studied. The impedance of MKI should be addressed during new design for higher injection energy.

→ Karel will verify the intensity limitation of the beam dump

→ The intensity limitation (heating) for shielded MKE should be estimated

### • **Preliminary results of the e-cloud instability MDs in the SPS - G. Rumolo**

Measurements were performed during two MDs: at the end of week 23, before the scrubbing run, and on 26.06, after scrubbing run. Horizontal motion was stabilised by a high chromaticity. Single bunch instability at the end of the batch was observed at 37 GeV/s and coupled bunch at 26 GeV/c. Results obtained during the two MDs are similar in terms of threshold chromaticity which was  $2.2 \pm 0.2$  and  $3.3 \pm 0.2$  correspondingly at 26 GeV/c and 37 GeV/c. No strong dependence on beam intensity was observed. Simulations can only be done for a single bunch and therefore any comparison with measurements is difficult. During the calibration of chromaticity measurements along the batch showed a significant variation with lower values in the batch tail. No dependence on V-damper settings was observed. Not all data was yet analysed.

It is not clear why similar results were obtained before and after scrubbing run if these instabilities are both due to the e-cloud.

Measurements with different transverse emittances at constant energy could verify a mechanism of stability loss at higher energies due to reduction of the transverse beam sizes.

### • **FT/CNGS beam in the SPS now and with PS2 - E. Shaposhnikova**

Future FT and CNGS beams (slow and fast extraction from the SPS) will be injected into the SPS above transition at 26 GeV/c or at 50 GeV/s after one PS2 cycle using the 5-turn multi-turn extraction. Only 150 ns are needed for the PS2 extraction kicker, but 1.1  $\mu$ s for the SPS MKE in the CNGS case. Another limitation is intensity on target which is assumed to be  $3.5 \times 10^{13}$ . These two conditions together with the PS2 size, which at the moment is fixed at SPS/5.13, define the future beam structure in the SPS. The analysis of other possibilities was done in case these conditions could be relaxed (whole intensity on beam target and/or smaller kicker rise time). The conclusion - the ratio 5.13 seems to be optimum both for the future FT and CNGS type beams.

### • A.O.B.

Proposed topics for future meetings:

- Update on TiN coating studies
- Beam loss and radiation in the SPS for higher intensities and injection energy (G. Arduini)
- SPS impedance (E. Metral)
- Beams from PS2 (M. Benedikt)
- SPS beam for LHC upgrade (E. Shaposhnikova)
- Beam instrumentation upgrade (in November 2007 in agreement with Roland)

Elena Shaposhnikova, 10.07.2007