

# SPS Studies Working Group

## Twelfth Meeting – 23 November 1999

**Present:** G. Arduini, T. Bohl, H. Burkhardt, E. Chapirova, P. Collier, K. Cornelis (chairman), J. Gareyte, J. Klemm, P. Knaus, F. Schmidt, R. Tomas, J. Tückmantel, L. Vos, F. Zimmermann, M.P. Zorzano, G. Roy (secretary)

**Excused:** R. Bailey, T. Linnecar

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## 1 MD Results

### 1.1 LHC Beam

K. Cornelis recalled the measurements reported by G. Arduini at the last meeting and presented new results of sampling the position signal inside the batch at each passage using six different gates. At injection all six signals look similar and an injection oscillation is visible. After 600 ms for an intensity of  $2 \times 10^{12}$  the tail starts to oscillate; this is interpreted as a known instability originating in broad-band impedance. This was done with chromaticities set to zero and octupoles set such that the total contribution is zero; dampers were ON.

Beyond a threshold of around  $4 \times 10^{12}$  the sampling of the position shows that while the  $Q_h$  signal remains visible, a signal at  $Q_v$  starts appearing later in the batch. Larger oscillations in the horizontal plane also develop in the tail of the batch. Karel reported also that the  $Q_h$  signal was increasing along the batch. An estimate of growth rates of a few hundred turns was given for this instability. It was not tried to change octupole settings.

G. Arduini reported on additional data on the same subject. He checked the pickup response time for three different intensities:  $3 \times 10^{12}$ ,  $4.5 \times 10^{12}$  and  $6 \times 10^{12}$ .

For  $3 \times 10^{12}$ , the signal is very clear in the horizontal plane and the batch is easily identified. For  $4.5 \times 10^{12}$ , the batch is not flat in the horizontal plane on the first turn and over a few turns the baseline of the signal is changing. No problem was seen in the vertical plane. For  $6 \times 10^{12}$ , the same phenomenon is seen in both planes and the signal from the Q-meter becomes “normal” only after a few tens of milliseconds. The total octupole component could not be reduced to zero with this intensity.

Gianluigi also checked the time constants by gating the acquisition such that it is triggered just before the head of the batch. The surprise is that a signal is already visible before the head of the batch. The same effect is seen at injection. He concluded that one must be careful at interpreting the results using this setup. Something similar was reported linked to the electron cloud problem on the damper pickups.

## 1.2 Damper Studies

J. Tückmantel reported on successful tests of signal mixing for the damper pickups.

## 1.3 Transverse Impedance

M-P. Zorzano reported on the last MD aimed at checking the reproducibility of the measurements. Fits of the tune signals extracted as a function of the beam intensity were presented although care must be taken to interpret these results since the bunch length also varies with the intensity depending on the method used by PS to modulate the intensity.

K. Cornelis also reported on measurements, done with J. Klemm, of the difference of phase advance measurements for different intensities. The total difference is the intensity detuning from the impedance of the machine, but structures along the machine can be guessed on their measurements which point at larger sources of impedance in LSS1 and LSS3, corresponding respectively to the injection kicker tanks and the RF cavities.

## 1.4 Longitudinal Impedance

E. Chapochnikova reported on making reference measurements of the impedance situation of the SPS in view of validating the changes to be made on the pumping ports next year and further identifying the sources from the spectra. For this one needs similar beam characteristics from year to year and Elena reported on various reasons why this was not the case. The damper situation has changed in the SPS with respect to last year, the CPS has changed their intensity modulation techniques and we had to develop a similar technique of scraping in the SPS. T. Bohl also explained why the previous was not successful and requested more time to finish these measurements.

## 1.5 Resonances

R. Tomas presented some preliminary results of measurements done with F. Schmidt on resonance strengths. They could identify the coupling resonance and the effect of sextupoles.

## 2 MD Notes

K. Cornelis recalled that as the shutdown now approaches it is time to think about writing down the results of MD experiments this year as MD Notes. A report is being prepared on intensity limitations in the SPS in view of the CNGS project.

### **3 Next Meeting**

The next meeting is scheduled for Tuesday 7th December 1999, at 09:15, Room 865 1-D17. A reminder will be sent by email in due time and the announcement made on the web page of the working group <http://wwwinfo.cern.ch/~ghislain/sswg/sswg.html>

G. Roy  
26 November 1999