

Minutes of the SPS Studies Working Group (SSWG)

3rd meeting 11th June 2002

Present: G. Arduini, T. Bohl, P. Collier, K. Cornelis (chairman), M. Giovannozzi, J. Gareyte, W. Höfle, G. Rumolo, E. Shaposhnikova, J. Tückmantel, L. Vos, J. Wenninger, F. Zimmermann (secretary)

1 Orbit studies in the SPS (J. Wenninger)

The closed orbit response analysis determines corrector and BPM calibrations, and also verifies the beam optics.

Closed orbit response data were taken at two occasions in 2002, namely on 26.05. and 31.05. These measurements were performed with the fixed target beam at 82 and 56 GeV, respectively, about 2000 ms into the cycle, and for $1 - 2 \times 10^{13}$ protons.

The first observation was that, unlike for last year's measurements with the LHC beam, the radial loop is active on the fixed target beam. If the orbit changes at the pertinent 'rf BPM', the radial loop attempts to adjust the beam energy. Therefore, a momentum shift is evident in most of the horizontal orbit data. J. Wenninger used the energy change detected for various corrector excitations so as to fit for the position of the rf BPM, which could unambiguously be identified. The measured dispersion agrees with the model to within 1%.

The BPM calibration factors were found to be reproducible. This year, only 5 bad BPMs were noticed. The corrector calibration factors showed a similar signature as last year. No peculiarity was noted for the vertical correctors, but the calibration factors for the horizontal correctors exhibited a long tail with a significant number of correctors at close to half the nominal strength.

A test with closed orbit bumps indicated that bumps employing such 'bad' horizontal correctors do not close. However, the bad correctors appeared to track well, when their current was monitored, in contrast to good correctors, for which the current exhibited an overshoot. For the bad correctors the bump amplitude grew after the peak in excitation current, which suggests that the corrector field was not following the current!

Resistance of magnet and cables were measured. There is a slight difference between good and bad correctors by about 10–20%, but this difference lies within the window of resistance values thought to be acceptable. It appears that in certain sectors (1 and 5) the fraction of bad correctors is larger.

The reason why the bad correctors are only observed in the horizontal plane is not yet understood. A possible explanation could be synchrotron radiation during lepton operation, which only stroke horizontally. On the other hand, there does not appear to be a clear difference between arcs and straight sections (this question was raised by G. Arduini).

Magnetic material in the corrector environment would produce an effect opposite to that observed. The correctors are under investigation by the hardware groups.

A final interesting point in the analysis is that the tune measured on the Q-meter is systematically higher by ~ 0.01 than the tune predicted by the fitted MAD optics model. This difference is seen in both planes.

2 Highlights from EPAC (G. Arduini, T. Bohl, J. Gareyte, F. Zimmermann, et al.)

G. Arduini mentioned the significant progress made at RHIC, in particular regarding the acceleration of 40% polarized protons to top energy, demonstrating the functionality of the siberian snakes at high energy. Another highlight was the excellent performance of the light sources, *e.g.*, the Swiss Light Source, with an impressive performance of global orbit feedback.

Tevatron and HERA are both having problems. The recycler ring is still not operational. A number for the HERA luminosity was not given. J. Wenninger recalled that the HERA background is caused by backscattering from masks behind the IP.

F. Zimmermann mentioned EPAC presentations on orbit-response measurements in HERA by G. Hoffstaetter and J. Keil, impedance for a flat chamber by J. Gareyte, and on a ‘monopole’ electron-cloud instability by V. Lotov.

K. Cornelis announced that an electron-cloud scrubbing day is planned for the end of this month. He reported results of his recent analysis of electron-cloud and TMCI instabilities, according to which the TMCI instability should disappear in the limit of a flat chamber, whereas it is enhanced by the electron cloud.

3 Next Meeting

The next meeting of the SPS SWG is tentatively scheduled for Tuesday, 25th June, at 09:15, in Room 865-1D17. The agenda will be posted on the web page of the working group <http://cern.ch/sl-mgt-sps-swg>, and an invitation will be sent by email.

F. Zimmermann, 11th June 2002