

Minutes of the SPS Studies Working Group (SSWG)

8th meeting -5th July 2000

Present: G. Arduini (chairman), T. Bohl, R. Cappi, Yu-Chiu Chao, W. Hoffe, M. Jimenez, L. Jensen, J. Klem, T. Linnecar, D. Manglunki, E. Shaposhnikova, R. Tomas, M.P. Zorzano (secretary)

1 Discussions on the PS beam for high intensity at SPS (R. Cappi, G. Arduini)

The SPS can accept the parameters of the proposed 3 continuous turn extraction for the high intensity proton beam ($3 \times 2.5 \times 10^{13} = 7.5 \times 10^{13}$ p/supercycle). The SPS can operate with emittances of the order of $\epsilon_x^* = 12\mu\text{m}$ and $\epsilon_y^* = 7.5\mu\text{m}$ (1σ emittances). The expected emittance for the 3 CT beam would be $\epsilon_x^* = 15/3 = 5\mu\text{m}$ and $\epsilon_y^* = 15\mu\text{m}$ (the vertical parameter is a pessimistic estimate) and after exchange of emittances in TT10 this could be injected into the SPS at 14-16 GeV (if we keep the momentum spread $\Delta p/p$ that we have presently).

2 Results from recent MDs

2.1 Resonance driving terms (R. Tomas)

Two MDs have been performed using single proton bunches at 26 GeV and 120 GeV. Preliminary analysis of the 26GeV MD show a large variation of the remanent sextupolar field of the dipoles, causing an improvement in the dynamic aperture and the linearity of the tuneshift. This is due to the fact that last year's supercycle was different and because of the magnetic history of the supercycle, the dipole had some remanent sextupole component that could be detected in the proton MD cycle.

2.2 Electron cloud (M. Jimenez)

4 additional pick ups have been installed in the straight section BA5 and in the following order: 2 new pick-ups in a treated section, then last years pick-up, and the other 2 new pick-ups in an untreated section. During the first checks the new pick-ups could not detect the electron cloud since they were installed too close to the proton beam and the induced currents distorted the signal. After being reinstalled further away only one of them shows an electron cloud signal that is at most 1/4 of the observed electron cloud signal with the old pick up (see the figures in the document presented by M. Jimenez). The installation and length of the cables will be revised.

2.3 LHC beam damper pick-ups with 120 MHz filter (W. Hofle)

A 120 MHz bandpass filter (Gaussian) with flat group delay of 1ns has been installed at the two vertical and two horizontal pick-ups that are used for the vertical and horizontal damper. The feedback of the LHC beam has been successfully commissioned for both planes. A problem rises during the acceleration since the system requires the revolution frequency to synchronise the beam signal with the rf signal. Due to the 1 Km distance between the Faraday cage (from where the revolution frequency is extracted) and BA2 (where the pick ups are) there is a phase slip of almost 180° that makes the damper excite instead of damp. A phase shifter has been installed to solve this problem. The residual slip of 10° is negligible. The phase shift scheme has been successfully tested on a ramp to 120 GeV. Similar tests will be done with the full LHC cycle (ramp to 450 GeV).

3 Long MDs planning (G. Arduini)

The long MD starting at midday of Wednesday 19/07/00 and finishing at midday of Thursday 20/07/00, will operate on an LHC-like ramp from 26 GeV to 120 GeV, to study beam on coast, coherent tune shifts and to test feedback filter on LHC beam.

The next long MDs will be on the 30th August (with PS providing triple+double+double splitting with one batch of 48 bunches) and the 10th September. It would be convenient to get the double batch LHC beam with sufficiently short bunches before October to be able to test the LHC beam acceleration.

4 Remarks from the emittance workshop

Three of the 5 devices proposed to measure the emittance (mainly for the LHC, but also for the SPS and PS) have been chosen for further development: synchrotron light monitor, rest gas profile monitor and luminescence profile monitor. The two other proposals (spectrometer of electrons in residual gas and ion beam scan) have, for the time being, less priority. PS will develop and build a quadrupolar pick-up monitor to be installed in the SPS.

5 Next meeting

The next meeting is scheduled for Tuesday 18th July, at 09:15, Room 865-1D17. A reminder will be sent by email in due time and the agenda will be announced on the web page of the working group

<http://cern.ch/sl-mgt-sps-swg>

M.P. Zorzano 5th July 2000