

SPS Studies Working Group

Second Meeting – 18 May 1999

Present: G. Arduini, R. Bailey, H. Burkhardt, E. Chapochnikova, P. Collier, K. Cornelis (chairman), K. Hanke, W. Höfle, T. Linnecar, M. Lamont, D. Manglunki, G. Roy (secretary)

Excused: R. Assmann, T. Bohl, F. Ruggiero, J. Tückmantel

1 Follow-Up of Previous Meeting

- Alignment: (GR) No movement due to LHC Civil Engineering seen so far.
- MOPOS – First Turn and Orbit acquisition on same cycle: (GA) still waiting for new CPUs
- Damper 1 and 3: (WH) no problem.
- LHC Beams: (DM) “Single Bunch” beam is ready ; “84 Bunch” beam will be ready this afternoon.

2 High Intensity

Karel Cornelis introduced the subject; there is some interest from the CERN management to have an answer by the end of the year to the question of the maximum intensity that can be accelerated by the SPS for the NGS project.

The local density studies can be started with the 2 μ s batch with 8×10^{12} protons given by CPS. This beam can be provided to SPS at 14 GeV/c on the p2 MD cycle since kickers are used for fast extraction from CPS. Apparently the TT2 optics is not a problem for this cycle. The question of going from 26 GeV/c to 14 GeV/c on the p2 MD cycle was raised. This is possible using a different supercycle sharing the same segments (and trims) for the p1 physics cycle and the leptons cycle.

Coupled bunch mode instability have been seen already but apparently can be reduced by lowering the octupole settings. Apparently zero setting does not give zero octupole content (WH). The frequency is beyond the range of the damper.

BI actions: nobody was there to report but requests from Karel Cornelis included an increased bandwidth of the Q-meter pickup and a 1000-turn facility where the pickups would be grouped into 5 families of 10 pickups gated at different timings in the batch.

The question of the injection scheme from CPS into SPS for the highest possible intensity in SPS was then discussed. Karel Cornelis showed that pressure is on CPS to provide the highest possible intensity per batch since more batches with lower intensity mean a longer filling time in SPS, in which case the SPS will not profit fully from the increased maximum intensity.

We now have to find injection schemes where the intensity per batch is maximum in the CPS and the emittances and number of injections are minimum in the SPS. Ideas mentioned and questions raised include:

- Injection energy: 14.4 or 20 GeV/c. Apparently not above 20 GeV/c.
- Extraction CT from SPS. This depends on emittance requirements.
- SPS lattice studies in SL/AP: γ_t schemes.
- Aperture studies of extraction lines: transverse vs. longitudinal aperture.
- How do we get through transition with a 2 μ s batch? Some measurements have been made (T. Bohl).
- Setup of p2 MD cycle for acceleration through transition.
- Setup of p2 MD cycle for injection at 20 GeV/c above transition.
- Upgrade of hardware in CPS to allow CT extraction above 20 GeV/c.

Various possibilities were discussed and the program of the SPS MD of next Wednesday was discussed. This can be found on the SPS MD page accessible from <http://nicewww.cern.ch/sl/opnews/spsnews.html>

3 TT2/TT10 Optics Measurements

K. Hanke reported on a first series of measurements of the dispersion in TT2 and TT10. The best settings found in 1998 were kept and the main aim of this measurement was to check the stability of the optical parameters with respect to 1998. The energy was precisely measured from the RF (T. Bohl) and found to be 13.978 ± 0.036 GeV/c for a nominal 14 GeV/c. The individual currents in the power supplies were also measured. These precise data will be used in a second step to refine the analysis. The results presented today use nominal settings.

Other beam parameters were: $I = 2 \times 10^9$ protons per bunch, $\sigma_l = 5$ ns, $\epsilon_h = 0.7$ mm.mrad and $\epsilon_v = 1.0$ mm.mrad (2σ not normalized, in TT2) and $\delta p/p = 0.35 \times 10^{-3}$. Five momentum points were used for the data presented.

K. Hanke concluded that there was little changes with respect to last year. The betatron mismatch however is slightly increased and the vertical dispersion appears to be a bit larger than last year. The table below gives a comparison of the 1998 and 1999 measurements:

Klaus concluded that the measurements need to be redone and the measured energy and power supply settings used for the fit.

	1998 (“best optics”)	5 May 1999 (Preliminary)
β_h [m]	21.45	31.18
α_h	-1.61	-2.35
β_v [m]	13.48	13.72
α_v	0.77	0.88
G_{bh}	1.58	1.60
G_{bv}	1.09	1.60
D_h [m]	1.42 ± 0.01	1.83 ± 0.02
D'_h	0.108 ± 0.0021	0.13 ± 0.01
D_v [m]	-0.112 ± 0.004	-0.19 ± 0.01
D'_v	0.011 ± 0.001	0.03 ± 0.01

Table 1: Optical Parameters at start of TT2 – 1998 vs 1999

4 Next Meeting

The next meeting is scheduled for Tuesday 1st June 1999, at 09:15, Room 865 1-D17. The agenda will be announced on the web page: <http://wwcn.cern.ch/~ghislain/sswg/sswg.html>

G. Roy
19 May 1999