

Status of the machine studies

LIS meeting, 03/09/07

1) Non-linear chromaticity measurement in the SPS (R. Tomas, 23/08)

- Acquired enough data to measure nonlinear chromaticity for the full LHC cycle from BBQ and PLL.
- Next step: correction tests.

2) BBLR-wire (U. Dorda, 27/08)

- No initial settings for the BBLR were set in the trim editor. This caused problems, which could be solved but cost some time (this should be fixed in the software).
- Wire results at 55GeV, current, distance and chromaticity scans.
- Next step: Data evaluation, tune scan.
- Requirement: Still to rotate the BBLR at next possible time => Certainly not this year!

3) 75 ns LHC variant (S. Hancock, 23/08)

- Pb: The beam was shaved due to a severe mis-steering at injection then Linac 2 went off, so we only worked in the afternoon.
- PA.GSPC20 was commissioned and four bunches of near-nominal intensity were ejected inside spec (longitudinally, at least).
- Next step: The fine synchro is not yet active. Also, stability is marginal when more than one Booster ring is injected. Work needs to be done to turn on the CBI feedback (this will be the first time on h=14).
- New requirement: No new beam requirements, but sharing the available time slots for parasitic work may be an issue.

4) Beam stability in a double RF system (E. Chapirova, 27/08)

- Pb: Could not have high intensity back at the end of MD after working with lower intensity.
- Single bunch was stable during coast at high intensity in all regimes. It had un-damped oscillations at lower intensity in bunch lengthening mode. In general bunch was more stable in bunch shortening mode than in bunch lengthening mode, but comparison with case of 800 MHz off is less clear.
- Next step: To have more than one bunch in the coast and continue studies with a single bunch on the flat bottom (could be done on parasitic cycle if available).

5) Investigation of C04 cavity behaviour with high intensity H1 MERIT type beams (A. Findlay, 29/08)

- Could confirm that the C04 system does not have the power or cooling required to maintain the voltage on the extraction flat top with a high intensity (more than 600 E10 protons accelerated per ring) beam.
- Next step: To quantify the limitations due the C04 on bunch length and emittance for the required intensities.
- New requirement: Further tests should be done during normal setting up sessions with the beam in the PSB, so no further dedicated MD sessions presently required.

6) Slow extraction septupoles in SS1 instead of SS3 (R. Steerenberg, 29/08)

- Pb: The MD time came with short notice in the shadow of SPS magnet repairs. Therefore the total time was a little short.
- Reasonable extraction efficiencies (I was told ~ 90%?). Experiment crew satisfied, but we need to try to optimize the extraction efficiency over the next week(s).
- Next step: Optimize extraction efficiency and reduce losses.
- New requirement: Not really if successful, if not then access to re-cable XSE in SS3.

7) LEIR to PS matching (C. Carli, 29/08)

- A large horizontal betatron mismatch (90% so-called geometric mismatch, which would lead to 22% rms emittance blow-up) was found. Some (not dramatic) dispersion mismatch was measured as well.
- A rather small vertical mismatch was found.
- When we switched to the very first transfer line setting (before the first measurement), we found very large mismatches (just from the application program).
- A new setting of the LEIR to PS transfer line based on these last measurements exists. However, the observed mismatch may be at the limit where such iterative procedures to improve matching do not work any more.
- People are working to improve the Secondary Emission Profile monitors in the ETL line. Hopefully, this will allow understanding better the transfer from LEIR ejection to a location just upstream from the PS field.

- If time is available next week, some measurements can be redone. Parasitic measurements in the ETL line should be performed first and, possibly, find a setting which yields the design Twiss functions there. At a later date, we would like to measure PS injection matching with different transfer line settings in one MD (to disentangle changes of the setting of the line from possible other effects).

8) TMCI at SPS injection (G. Arduini, 27/08)

- Some data taken for 3 intensities in parallel to Elena's MD. The threshold is between 4×10^{10} and 8×10^{10} p/b.
- What is strange is that the instability seems to develop first in the H-plane.
- => To be looked at in detail.

9) Cancellation of the next (first) dedicated ion MD (initially foreseen on TU 04/09)

- After several discussions with Django, Christian, Paul, Christoph etc..., the next (first) ion dedicated MD of 8 hours, initially foreseen on 04/09 has been cancelled (the 8 hours are lost).

10) Nominal LHC beam in the SPS (22/08)

- MKDV is out gassing with 4 times 72 (nominal) bunches, which dumps the beam just before 450 GeV/c => We decreased the intensity per bunch (the limit for the MKDV was $\sim 700 \times 10^9$ p / PS batch) and then after few minutes due to the beam dump TIDVG, which is also out gassing, the beam was cut (there is an interlock on the MKP's vacuum) => Laurent Ducimetiere, Etienne Carlier and Jan Borburgh informed.
- Idea of GA: Make a horizontal bump (using MDH11407 and MDH11832) at the MKDV which is at 117 => Effect still to be analyzed.
- 5 TSTLHC25 in the PS => Rms pb with the 8 loop (it cuts the beam even with 4 TSTLHC only, due to the other EAST beams in the supercycle) => To be redone another time.
- An instrumentation timing is needed when the beam is in COAST, otherwise many types of equipment do not work (BCT, FBCT, scrapers, orbit, beam loss... However, wire scanners do work!) => Jorg will follow-up this issue to be ready for the next SPS Long MD.

11) QKE16CT in the PS (S. Gilardoni, 23/08)

- The CT losses have been displaced from SS09 to \sim SS75 using the QKE16CT as foreseen from simulations and the PS is now operating like this => Perfect (no loss anymore in SS09)! We are waiting now for the measurements from RP (movable monitor installed...), but already congratulations!

12) IPMs in the SPS (I. Koopman, 20/08)

- As we had no signal we went with Jan to the point 5 and found that the camera was dead. As there is no spare, we need to buy another one and it may take 2-3 months... meaning 2008. I asked Jan to clearly look at it in detail and keep me inform if the camera is really dead and if we cannot have one before the end of the run...

13) Ions (D. Manglunki => Ion meeting on 22/08)

- Good news:
 - Beam on d3.
 - Beneficial effect of the radial loop as expected (\sim 20-30 % of losses now compared to \sim 50-60 % last year).
 - Limitation on the power supply at 20 A is not HW but software => Solved and it can be decreased to 12 A.
- Bad news:
 - Stripper too slow => Tech. Stop.
 - ABS not ready in TT2 for ions.
- Long SPS MD foreseen in week 43 on SA => week 45 on TH => This has been approved.
- 3 cycles required (the supercycle length will be 16.8 s):
 - MD parallel => 17 protons equivalent at injection, flat-bottom of 2.4 s + 60 ms (for the RF) to have 2 injections and then go to the highest energy.
 - Early (up to 4 bunches) => Reduced injection plateau (7.2 s) and "fast" ramp to 450 GeV/c.
 - MD for collimator: coastable at 270 GeV/c.

14) 5-current mode for the PFWs in the PS (23/08)

- The PS is operating in 5-current mode since TH 23/08 => Congratulations to all the people involved (OP, PO, ABP...).
- DIRAC now claims that the 5-CM is better than the 3-CM.

- Still some pbs, less critical, to be solved.
- Measure matrices in parallel MDs.

16) Setting-up of the "LHC pilot beam" in the SPS MD cycle with 72 bunches (K. Cornelis, weeks 33&34)

- Succeeded to accelerate the 72 bunches up to 450 GeV/c with ~ half nominal intensity.
- Fast BCT shown in the Logbook (24/08) at top energy with $3E10$ p/b.

17) Optics measurements on AD beam without QKE58 (S. Gilardoni, 30/08)

- ?.

18) 2008 MD planning

=> APC planned to discuss this (the 2008 injector accelerator schedule will be presented by P. Collier).