

Status of the machine studies

APC meeting, 24/10/08

1) Transverse feedback in the PS (A. Blas)

- Good results discussed.
- Some more time might/will be taken in parallel.

2) Study of the wide-band transverse SPS PU BPWA 319.01 (W. Hofle)

- I think this still has to be continued.

3) Controlled transverse emittance blow-up in the SPS (E. Métral)

- The objective has been reached, on the single-bunch LHC PROBE beam:
 - At 450 GeV/c, $\sigma_{\text{max}} = 0.7 \text{ mm} \Rightarrow \text{NormRmsEx} = 3.5 \text{ micrometers}$ ($4\sigma_{\text{max}} = 1 \text{ ns}$ and $\sigma_{\text{mapsurp}} = 1.7\text{E-}4$).
 - At 450 GeV/c, $\sigma_{\text{y}} = 0.58 \text{ mm} \Rightarrow \text{NormRmsEy} = 3.2 \text{ micrometers}$.
 - Reminder: The initial horizontal and vertical emittances were 1.3 and 0.9 respectively.
- The next step is to redo this next Friday 24/10, using a multi-bunch beam: the 72 bunches of the PS nominal LHC25 cycle at 10% intensity.

4) Coast preparation in the SPS at 270 GeV/c (E. Métral for the OP team)

- At ~ 08:30, CNGS transmission was bad for a few SC. Vacuum pressure increase was observed in sextant 6. The valves were closed and many vacuum pumps off in sector 660 (lowest vacuum pressure was around $1\text{E-}4$). This issue was studied during the day, in parallel to the coast study. The vacuum pressure (envelope) was observed to decrease slowly during the day. However, there was also a periodic (every ~ 20 min) oscillation in the vacuum pressure. Finally it was observed at ~ 15:40, that the oscillation suddenly disappeared. This observation is not yet understood and needs therefore to be followed up. In fact, in the evening the vacuum level was raised drastically in LSS6 again.
- Coast preparation for the Injector Long MD of week 45:
 - 1) The name of the supercycle is LHCMD25.92-55-270_PDOT_V2, the name of the user timing is LHC1, and the RF MMI is mapped to LHC25.
 - 2) We needed to prepare 3 cycles, which was done:
 - COASTPR1 (prepare),
 - COAST1,
 - COASTRE1 (recovery).
 - The coast time is defined at 24000 (we will do only coasts at 270 GeV/c this year).
 - The Trims have to be done on LHC1 (at the very end of the cycle).
 - 3) We went into coast but were not able to recover from the coast due to the absence of a proper recover function in the Rocs/mugef system. This caused a trip of the MPS when the following cycle was played (a function for the pulse stop/pulse start).
Michel Jonker found that the coast and recover function were not present due to missing information in the cycle configuration file (/user/pcsp/rocs/configuration/CycleCatalogue.xml) which is used by the rocs system to locally create derived coast, recover, economy function from the main function. Michel Jonker modified the file, but for these changes to take effect, the rocs systems have to be restarted (with the next version of the rocs software these parameters can be updated without the need to restart the rocs systems). The rocs system for the MPS has been rebooted to verify that after the change the derived coast and recover functions are properly generated.
 - 4) The things which remain to be done/checked are
 - 4.1) Reboot all Rocs/mugef systems not rebooted since 22 october 14:00 (any time when there is no beam); reload the LHC1 function with driveHw. Validate the coast/recover cycles for discontinuities by inspecting the reference value only (i.e. with the MPS off).
 - 4.2) We need to go in coast and check that the instrumentation is working (BCT, FBCT, BWS...).
 - 4.3) Check that everything is fine also for the RF.
 - 4.4) Reminder: The SIS interlock MKD_EARLY_ENABLED triggered during coast. It will have to be disabled before going into coast with beam.

5) PS transition studies (S. Aumon and W. Bartmann)

- Seems that nice measurements could have been done from the Central Building with the longitudinal pick-up. Data still to be analysed.

6) Test of LHC75 single batch synchronisation & transfer between the PSB & PS (A. Findlay)

- Biggest problem was trying to get the signals to work on OASIS, without the scope freezing or giving an error that could not be understood.
- We successfully synchronised 2 unevenly spaced bunches in the 3 required rings and transferred them to the PS, where they were captured and split. This synchronisation was an H=1 type but with a H=2 beam transferred, but this worked well. There was also a significant H=1 component used (2.5kV in place of 0.5kV) to give the uneven bunch spacing, but the matching between machines was still found to work well.
- Next steps: Investigation of a small jitter in the synchronisation. Vertical trajectory correction for the R2 transfer. Methods of reducing the transverse emittances will have to be looked into. Further studies into the matching voltages between the machines will have to be carried out.
- New requirements: We will require further MD sessions to address the points above that cannot be done with only a PSB cycle to the dump.

7) Wire damage tests in the SPS (M. Sapinski)

- Seems that it was a successful MD (data still to be analysed). As expected, by lowering the scan speed the BWS416V broke (at ~ 15:55 on TH 23/10) and BWS416H broke (at ~ 17:20 on TH 23/10).

8) BBLR in the SPS (G. Sterbini)

- Seems it was also a successful MD (data still to be analysed). In addition to the usual measurements (excitation and compensation modes), the transverse coherent tunes were measured vs. intensity, as well as the linear coupling at 37 GeV/c (the machine was almost decoupled at Kskew ~ -7E-4).

9) Controlled transverse emittance blow-up in the SPS (multi-bunch)

- This MD took place today and is finished. We succeeded to blow-up the 72 bunches with 10% intensity, with initial transverse emittances (rms, norm) slightly below 1 micrometers to ~ 3-3.5 micrometers, with good reproducibility (in sigmas and in shapes).