

Status of the machine studies

APC meeting, 11/10/07

1) Scraper MD (H. Burkhardt, 29/09)

- More parasitic than main MD users! No beam first 35 min. Beam only after 1.5h under their full control. In the remaining time, they had to concentrate on the most essential work and drop the extended plan to repeat measurements at higher intensity.
- The scraper application works quite well and the scraper can already be used as very sensitive diagnostics tool. They could measure tail repopulation. It was small in vertical and much larger in horizontal. They also used the primary collimators in addition to the scrapers.
- They reached their main goal to get a high level scraper control application running and demonstrate its usability. This opens possibilities to use the scrapers as very sensitive diagnostics tool - both in operation as well as MDs. Other issues, in particular the question if it is safe to use the scrapers with high intensities remain but would require substantial work in addition to MDs.

2) Rephasing p for LHC (P. Baudrenghien, 26/09)

- The module generating the SPS frequency program (SPS10270) could not cope with the 31.6 seconds long cycle.
- SPS10270 must be modified.
- The module has now been upgraded so that it memorizes only the Bfield ramp and not the injection and extraction plateau.
- Continue rephasing test with upgraded hdw. Long MD wk 42. Will be integrated in the RF MD time requested by T. Bohl.

3) Bunch rotation on TSTLHC25 using a double voltage step (S. Hancock, 05/10)

- Worked as predicted by ESME (see also http://ab-div.web.cern.ch/ab-div/Meetings/APC/2006/apc061215/minutes_061215.html) If the electron cloud problems of last year return, it offers the possibility so keep the time window of short LHC bunches to a minimum in the PS.
- It remains to be seen if the bunch quality is acceptable to the SPS.
- My comment: Shouldn't we make a test with the ecloud monitor to see the effect of this double voltage step on the ecloud signal?

4) Lead Ion Beam at injection in the SPS (J. Jowett, 03-04/10)

- Due to delays with RF, RF capture had only just been established and it was not yet possible to ramp. Moreover the compromise plan to store beam beyond the injection plateau at injection energy was not possible because of a problem with injection prepulse distribution that could not be solved.
- Only 60-70% of nominal intensity was available so it was not possible to fully explore the limits of interest.
- Emittance measured with the wire scanner at various points in the injection plateau, with a view to checking for any influence of intra-beam scattering or space charge on the LHC lead ion beam at injection in the SPS. Results have still to be fully analysed but at these intensity levels there does not seem to be any significant blowup. The last two hours (from 06:00-08:00 on 4/10/2007) were devoted to further measurements on loss maps and will be reported on by Roderik Bruce.
- Next step: Once acceleration becomes possible, prepare ion beam for LHC injection and check its properties. Then establish stored ion beam at 270 Z GeV/c, check beam properties and make definitive loss map studies with the LHC collimator.

5) Lead ion loss maps with LHC collimator in the SPS (R. Bruce, 04/10)

- Acceleration was not possible, so measurements were performed with captured beam at injection. Further, beam could not be stored beyond injection plateau.
- LHC BLMs sometimes give no signal. SPS BLMs not logged between 6:48 and 7:38 (not understood).
- Observed loss maps agree with previous MD without RF capture. We saw significant losses at predicted impact locations specific for the ion beam.
- We would like to repeat measurements with stored beam at 270 GeV/c proton equivalent.

6) Testing the madx online model in view of LHC (I. Agapov, 25/09)

- Pb: Closed orbit acquisition; new knobs appeared not trimmable.
- Settings read from lsa; Orbit correction and bump creation in the online model tested; Scan of skew quadrupoles to measure local coupling performed. Multiturn data retrieved for post-processing.
- Next step: Testing 'virtual trim' application in parasitic mode.

7) PS radiation tests (S. Gilardoni, 04/10)

- Tests done.
- Data being analysed. While for the road Goward one does not expect improvements compared to last year, for the PS bridge the situation should be much better thank to the loss displacement using the QKE16CT (CT losses displaced from SS09 to ~ SS75).

8) Electron cloud effects with LHC75 beam in the PS (T. Kroyer, 10/10)

- Measurements performed on the LHC75 beam, 24 bunches, intensity $\sim 310e10$.
- An electron cloud signal above noise level was found only during the last ~ 60 microseconds before ejection; the maximum electron cloud signal on the shielded PU 1 is 15 mV, which is about a factor 20 below that with LHC25 beam. The noise level was of the order of 2 mV rms on shielded PU1.
- Next step: Interesting topics include: direct comparison between LHC25 and LHC75, check for SS98 chamber conditioning since the scrubbing run in June, variation of filling pattern and intensity of LHC25.
- My comment: Shouldn't we make a test with the ecloud monitor to see the effect of the double voltage step on the ecloud signal?

9) Ions (Django, 10/10)

- New optics for LHCION in TT2-TT10 => Smaller transverse emittances in the SPS than before (in particular for the horizontal one).
- Beam accelerated (for the first time) up to \sim transition.
- The bunch is clearly shortening on the SPS injection flat bottom (decreased bunch length but also decreased peak intensity) => Particles leave the RF bucket. However, the particles are not lost as the BCT is almost constant.
- My comment: Could this be due to the Touschek effect?

10) IPMs in the SPS (J. Koopman, 10/10)

- The signal of the camera for the horizontal IPM is now available at the CCC. For the vertical one it still does not work.
- The next step was to have a look on TH 11/10 (during the SPS access during the PS dedicated MD) to the vertical signal.
- One will then tries and see something next week with the CNGS beam.

11) Orbit distortion studies at transition (S. Gilardoni, 11/10)

- Losses reduced as expected by disabling one of the 3 radial loop pickups.
- Next step: After data analysis, measure the losses wrt other PU or other triplet combination.

12) New frequency programme for the ions (H. Damerau, 11/10)

- It has been installed and this is better as concerns the longitudinal emittance. However losses remain at the start of the ramp => To be continued.

13) Qmeas studies in the PS (S. Gilardoni)

- New system installed.
- Work operationally but not for MDs ("exotic") studies.
- Much more precise in the horizontal plane than in the vertical plane.
- Measure the effect of bunch length and see if the matrices can be measured.

14) 75 ns variant in the PS (S. Hancock)

- Deliverable.