Minutes of the HSC section

45th meeting on Monday 18/05/2015 (14:00, 6/R-012)

**HSC members:** Olav Berrig (OB), Christian Carli (CC), Elias Metral (EM), Giovanni Rumolo (GR), Frank Schmidt (FS), Elena Wildner (EW), Elena Benedetto (EB), Michael Bodendorfer (MB), Kevin Li (KL), Tatiana Pieloni (TP), Benoit Salvant (BS), Guido Sterbini (GS), Daria Astapovych (DA), Meghan McAteer (MM), Nicolo Biancacci (NB), Alexander Huschauer (AH), Giovanni Iadarola (GI), Adrian Oeftiger (AO), Serena Persichelli (SP), Tatiana Rijoff (TR), Letizia Ventura (LV), Claudia Tambasco (CT), Magdalena Kowalska (MK), Andrea Passarelli (AP), Annalisa Romano (AR), Michael Schenk (MS), Vincenzo Forte (VF), Javier Barranco (JB), Joseph Kuczerowski (JK), Aaron Paul Axford (APA), Malte Titze (MT), Francesco Paciolla (FP), Mario Stefan Beck (MSB), Stefan Hegglin (SH), Alpo Valimaa (AV), Hannes Bartosik (HB), Lee Robert Carver (LRC).


1) **Newcomers / visitors**

- Everton Souza since ~ beginning of May and will stay with us for 2 months.
- TatianaP will remain with us until September 2016 (extension by 1 year).

2) **Comments on the minutes of the previous 44th meeting + Actions**

- No comment.

3) **General infos**

- SL meeting:
  
  - No meeting as we were at the HiLumi workshop in Chicago.

  - Still ongoing discussions about the impedance of the crab cavities with their possible intensity limitation and difficulty to be measured in the SPS (NicoloB and BenoitS). Ecloud effects discussed by Gianni: no e-cloud instability from quadrupoles foreseen what about the interplays with other mechanisms (next step). TatianaP presented the field quality requirements including beam-beam effects. I presented the machine and beam parameters for the 2 HL-LHC
operational scenarios (nominal and ultimate). Concerning the BBLR wire compensation (see picture), as discussed during the session the next steps could be to 1) check the beneficial effect starting from the real situation of the machine (i.e. BBHO + BBLR + LOF = -570 A) to see what can be the gain in this case; 2) compute the beneficial effect on the integrated luminosity (as mentioned by StefanoR). JohnF discussed the recent SPS MDs with the high bandwidth transverse feedback.

- Next events:

- May 11–3 LARP CM24 (LARP-HiLumi Spring Meeting)
- 17th-18th September: HL-LHC/LIU day (4th event of that type including RLIUP).
- 19-23 October HiLumi LHC/Larp 5th joint annual meeting. Closing FP7 HiLumi LHC.

- Info from SimoneG (04/05/15): user operation at the Hadron Experimental Facility of J-PARC was resumed on April 24, 2015 after the shutdown for one year and 11 months due to the radioactive material leak incident. J-PARC restarted with a beam power of 24 kW, the same intensity as that of before the incident.

- Info from BenoitS about the MDB: For information, Jakub Wozniak confirmed that the data stays at full sampling in the MDB for 3 months (instead of 7 days before LS1).

- Some measurements by BB team of collision at 450 GeV and TDI tune shift => Some slides sent by TP and we wanted to do a study on TH 07/05 but finally it was not necessary as the tune shifts measured seem close to 2012 => To be confirmed. The BB observations will be discussed later today in the BB meeting.

4) Brief performance reports for the different machines

- PSB (ElenaB)

- See picture: https://espace.cern.ch/be-dep/ABP/HSC/Meetings/tuneR3.png and https://espace.cern.ch/be-dep/ABP/HSC/Meetings/tuneR4.png. Issue with tune of Ring 4, the measured one is not the same as programmed (contrary as for Ring 3). The pb is fixed now and the measured and programmed tunes are the same (could be a pb after LS1). 1/3 was missing on one of the current.

- A week without too many worries for the PSB, but there were a couple of issues that cut the beam.

We had an intervention planned during 1.5 hours on Tuesday afternoon for the problem with the ring 4 Q Strip supply, but they found there was a missing winding on the DC
transformer and had it fixed within 10 minutes. The vacuum group took the opportunity to do a sublimation since the PS were still down, but we had beam back after about an hour. The cycles then had to have the R4 Q strips corrected for all the operational users.

Thursday night we lost about 2 hours due to the power cut that took down the complex. We then lost about 2 hours on Friday morning when we lost contact with the radiation monitors for the complex which was related to the power cut the previous night.

Work was carried out on a couple of the beams (notably BCMS & LHC50) to reduce the transverse emittances, and good results were achieved (5-10% reduction) through fine tuning of the working point by the team.

There was significant work carried out setting up and adjusting the many MD beams required in the complex, but we seemed to keep up with the constant demand. We did run out of MD users on Wednesday, and this may become even more of a problem as the MD program really takes off, so we'll have to keep this in mind.

So, I think we can say that we kept up with demand for another week and our wee machine came out of the week in better shape than it went into it.

- PS (GuidoS)
  - See picture: https://espace.cern.ch/be-dep/ABP/HSC/Meetings/H54_GS.pdf.

- SPS (HannesB)
  - See picture: https://espace.cern.ch/be-dep/ABP/HSC/Meetings/2015.05.18_SPS_picture_of_the_week.pptx.

It was a good week for the SPS with only few longer periods of downtime for fixed target physics.

Fixed target beam:

- The intensity of the fixed target beam was increased in the middle of the week. The requested intensities of 50/50/120e11 p+ on the North Area targets could not be fully met yet due to losses at PS extraction. The present sharing is 40/45/100e11 p+.

- Downtime was mainly accumulated on Monday, where the beam for the North Area was stopped for 2.5 hours for switching to the spare power supply for the MSI injection septum, for more than 5 hours due to an earth fault on the bypass power supply for the bending magnet MBE 3103 in TT20 and for 3.5 hours due to a power glitch during the night. Roughly 6 hours downtime over the week were caused by the PS complex.

HiRadMat:

- The long HiRadMat cycle for LHC-type bunch trains was setup for 4x72 bunches with 1.3e11 p/b on Monday and Tuesday.
- During extraction tests with 12 bunches losses in the LSS6 extraction region were encountered, which could be reduced by a correction of the beam position at the extraction point.

- First extractions to the HiRadMat experimental area were performed on Friday. However, with 72 bunches the losses in LSS6 were beyond the operational BLM limits. The issue is being investigated by TE-ABT experts.

LHC beams:

- The LSS6 extraction settings of the LHC single bunch beams were optimised in the course of the investigations for the HiRadMat extraction. LSS6 extraction losses with LHC multi-bunch LHC beams are not yet understood and investigations are ongoing.

- The long cycle for four LHCINDIV bunches was fully setup apart from extraction.

- A few hours were spent on the doublet beam commissioning. Transverse emittances below 4um were measured for intensities of around 1.5e11 p/doublet at flat top.

- LHC and HL-LHC (EliasM)

  - See picture: https://espace.cern.ch/be-dep/ABP/HSC/Meetings/LHCRampWithNominalBunch.png. Ramp with nominal bunch and JorgW said this morning at the LHC 08:30 meeting that it was fine with the ADT as the ADT took care of the negative chromaticity. I asked the value of the chroma and it was said that it was certainly below – 2 (due to the snapback) and MikeL said that the snapback should be now corrected => Would be nice to have a look to it in more detail.


- LEIR (MichaelB)

  - Excused.

5) Summary of 1-beam and 2-beam stability predictions for LHC in 2015, from injection till collision (All people involved): Part 5

=> In particular

- we need to know what the chromaticity changes (x and y) are, due to BBLR during the squeeze and BBHO during the collapse.

- All sources of tune footprints, alone first and then with some combinations of them (FrankS et al., TatianaP et al., GiovanniR et al., etc.)
- Talk from TatianaP => Chromaticity change with BBLR and BBHO:
  
  - Tatiana presented old results (using the TRAIN code) but which should be close to the case of 2015.

  - With only 1 IP we have some effects but with 2 IPs everything should be compensated (tune and chroma). But, some few things can break the symmetry: emittance fluctuations, intensity fluctuations, beta changes and IP2 and Ip8 which are not symmetric => Maximum expected of ~ 0.5 unit (and even below as there was no // separation in the studies). So during the squeeze, if chroma is + 3 even if this shifts a bit by ~ 0.5 unit, there is no need to correct and it should be OK.

  - Collapse studies for 2012, which should be ~ 2.5 microm.

  - Next step would be to know what is the effect of octupoles on the chroma => Predictions made by optics team + measurements to be done in the machine.

  - GianniI prepared some slides about the tune spread introduced by an e-cloud (see [https://espace.cern.ch/be-dep/ABP/HSC/Meetings/for_hsc_meeting.pptx](https://espace.cern.ch/be-dep/ABP/HSC/Meetings/for_hsc_meeting.pptx)), but this has been postponed to the next meeting.

6) Actions to be taken for the next meeting

- List of all actions: [https://espace.cern.ch/be-dep/ABP/HSC/SitePages/Actions.aspx](https://espace.cern.ch/be-dep/ABP/HSC/SitePages/Actions.aspx).

7) Miscellaneous

- The next (46th) meeting will take place on 25/05/2015 => Agenda:

  1) General info and follow-up (EliasM)

  2) Brief performance reports for the different machines (PSB, PS, SPS, LHC and LEIR) => With ideally a picture of the week!

  3) Summary of 1-beam and 2-beam stability predictions for LHC in 2015, from injection till collision (All people involved): 5th part => All sources of tune footprints, alone first and then with some combinations of them (FrankS et al., TatianaP et al., GianniI, etc.).

  4) LHC single-bunch (and single-beam) stability predictions at injection and 6.5 TeV and comparison with some recent observations/measurements (NicoloB - who will not be around - et al.).
- Important events and dates for HSC: https://espace.cern.ch/be-dep/ABP/HSC/SitePages/EventsAndDates.aspx.

- Preliminary agendas for the next meetings: https://espace.cern.ch/be-dep/ABP/HSC/SitePages/MinutesOfMeetings.aspx.


Minutes by E. Metral, 01/06/2015.