

Minutes of the HSC section

119th meeting on Monday 11/09/2017 (10:30, 6/R-012)

Present: See <https://docs.google.com/spreadsheets/d/1fZiu3vtf546odhd2ONxtW0mx9p8cV-fURT9Kxi7QCys/edit#gid=0>

1) Newcomers / visitors

- Alexey Burov (from FNAL) is at CERN with us for one week and he will be with us also next week at the impedance and instability workshop in Benevento.

2) Comments on the minutes of the previous 118th meeting + Actions

- **Action ArekG:** Is the issue with dBLMs vs ADT due to some intrinsic limitations from the dBLMs or do we need just more time for the detailed analysis? => Some limitations solved and analysis still ongoing. Might need to postpone the LMC talk.

- It is followed-up by MassimoG.

- Reminder: It is important to know which bunches are losing and we hope we will be able to correlate the ADT and dBLM data.

- Info from BenoitS on FR 08/09/17: FBCT post-mortem data (100 turns total with ~3 turns after dump) now available to see which bunches are losing (in complement) => Let's see what it will give at the next 16L2 dumps.

- **Actions XavierB:**

- What happens to the injection oscillations in the presence of beam-beam, impedance, e-cloud, etc.? => It might be wise to try and minimize the beam-beam coupling, which is mainly due to the BBLR, i.e. we should increase the Xing angle (but the effect goes linearly with the BBLR distance).

- Check the different roles of IP1 and/or 5, or 2 and/or 8? Similar for all of the them due to the linear dependence.

- Effect of polarity? Probably it has an impact...

- Effect of the parallel separation? It is small compared to the one of the crossing angle.

- The orbit effect at injection (~ 0.4 sigma oscillation) is predicted to have a negligible effect of the transverse emittance growth, even for intermediate (~ 50 turns) ADT gains
=> What about HL-LHC?
- HL-LHC at ultimate energy of 7.5 TeV => Some actions from us by the end of September
 - StefanoR should send us the settings for collimators asap.
 - Then we should assess the impact on beam stability (Action: [SergeyAnt](#), [AdrianO](#), [AnnalisaR](#))
 - Impact of higher energy on beam stability for proposed collimator settings.
 - Assuming sextupoles and octupoles being able to operate to 600 A, assuming constant kick voltage from the damper.
 - Electron cloud driven instabilities => Impact of higher energy.
 - Any intensity (number of bunches or bunch population) limitation?
 - E-cloud and synchrotron radiation effects => Action [GianluigiA](#), [GiovanniR](#) and [GianniI](#)
- Actions from last WP2 meeting => Action [NicoloB](#) and [SergeyAnt](#)
 - "... This needs to be done in any case for the high frequency HOMs which are present also with longitudinal RF fingers installed".
 - "Gianluigi proposes to identify one or two critical HOMs close to delicate components to be provided for a thermo-mechanical analysis to assess heating and outgassing".
 - "Chiara asks if issues could appear also in the transitions next to the TDI. This is confirmed by Elias and Nicolo. Evaluate the impact of the transitions".
 - "Elias adds that at some point stability studies need to be performed in addition of heating studies".
- Long-term upgrade/replacement of TRAIN => To be finalized with [YannisP](#) and [XavierB](#) by end September (Action [EliasM](#), [YannisP](#) and [XavierB](#)).
- aC coating of HL-LHC: What would be the effect on beam stability and TMCI? Action [NicoloB](#) and [SergeyAnt](#).
 - Reminder from [Giovannis](#): If the sectors would be as the good one, then we would not need to coat.

- If fact LHC could be coated $\sim 1/2$ or $\sim 1/3$.
- Might be good to review the effect for the SPS.
- HE-LHC impedance model: after discussion with FrankZ, the goal would be to have a first model by mid October (**Action BenoitS**).
- Invitation to write an ICFA BD NL article.
- Low-impedance HL-LHC collimators (**Action SergeyAnt**): only show the delta in Ioct (for a certain chromaticity and ADT gain) for the different cases (and the different contributions to the impedance model) compared. It might be good to have this info both on plots and in tables. We should also put ourselves in the most critical case, i.e. assume the transverse emittance that we have at injection (as the blow-up might not occur at injection) => Update the plots etc. using the emittance at injection, i.e. 2.0 for the nominal HL-LHC and 1.7 for the BCMS beam.
 - Also update the plots with the measured Mo resistivity and then the results could be presented at a WP2 meeting.
- Action from last WP2 meeting (Themis, Riccardo and Elias)
 - The CC feedback system appears to be effective in fighting the emittance growth due to CC noise; however there are additional points to be addressed:
 - Pick up location and achievable beta function.
 - Interplay with the ADT, especially in the presence of impedance.
- Possible movies for HL-LHC communication (everybody) => To be discussed on HSC section meeting on 25/09/17.

3) General infos and follow-up (EliasM)

- News from LHC, 16L2 issue and 08:30 meeting
 - Better with 8b4e than nominal (1916 bunches) than nominal.
 - BUT, still instabilities if we increase the bunch intensity from $\sim 1.1E11$ p/b to $\sim 1.2E11$ p/b.
 - Heat loads (GianniI):
 - https://indico.cern.ch/event/664579/contributions/2714072/attachments/1520854/2375851/20170909_heatloads_overview.pdf
 - and
 - https://indico.cern.ch/event/664579/contributions/2714072/attachments/1520854/2375850/20170910_alook_at_16L2.pdf
 - 16L2: Head load was there already last year. No abrupt change from

1.1E11 to 1.2E11 p/b.

- LBOC / 16L2 Task Force meeting last Tuesday.

- News from cleaning at injection (LeeC):

<https://indico.cern.ch/event/664579/contributions/2714072/attachments/1520854/2375810/cleaningBlowup.pdf>

- It seems that some bunches are blowing-up due to coherent activity (from ADT) and they end up with emittances similar to the emittance of other bunches slowly blowing up...

- ADT kicks all the beam and the bunches reacting are the ones with low gain.

- LeeC got the Fellow position in Liverpool (previously held by FanouriaA) => Congratulations!

- No meeting next week due to the workshop in Benevento.

- SLM:

- IPAC18 abstracts and participation to be discussed.

- Fellows => Deadline for 27/09/17.

- CAS last/current week.

- LHC MD3 block this week.

4) Master thesis rehearsal: mode-coupling instability of colliding beams in HL-LHC (Laurent Barraud):
https://indico.cern.ch/event/664579/contributions/2714422/attachments/1520873/2375846/Master_Thesis_slice_HSC_final.pdf

- Landau damping: In plasma physics, we look at the velocity space whereas in accelerators we focus on the frequency space.

5) Can we reproduce the LHC HEADTAIL monitor signals during the 16L2 fast single-bunch instability with e-cloud (and/or "equivalent" impedance) simulations? (LottaM, NicoloB and SergeyAntipov):
https://indico.cern.ch/event/664579/contributions/2714071/attachments/1520860/2375824/16L2_Estimates.pdf

- 3 simple models were proposed to be analysed:

- Equivalent impedance model (due to e-cloud) + DELPHI analysis (see slides from Nicolob et al.) => 2 observables (instability rise-time and intra-bunch motion) could be reproduced, which is great. Next: detailed analysis/check of the effect of chromaticity.

- Equivalent impedance model (due to e-cloud) + pyHEADTAIL simulations (ongoing work by LeeC et al.).

- E-cloud simulation (ongoing work by LottaM et al.).

- I combined the results from the 3 approaches 2 days after this HSC section in these slides: https://indico.cern.ch/event/664579/contributions/2714072/attachments/1520854/2381062/16L2_Ecloud_EM_12-09-2017_v2.pdf. This is promising, to be continued...

6) Possible abstracts and participation to IPAC18 (EliasM):
https://indico.cern.ch/event/664579/contributions/2714424/attachments/1520859/2381087/AllHSCAbstractsForIPAC18_v2.xlsx

- The list of abstracts was discussed as well as the possible participation from HSC taking into account the subjects to be presented, the past participations to IPACs and the other important events for the team in 2018.

- To be discussed next within ABP.

7) MD3 block organisation (EliasM)

- Several MDs from our team this week => Each MD session seems to be well covered. Let's collect nice data!

8) Effect of Crab cavity HOMs on the couple-bunch stability of HL-LHC (Sergey Antipov):

https://indico.cern.ch/event/664579/contributions/2715263/attachments/1520876/2375991/Crab_HOM_Transverse_Instability_9.11.pdf

- SergeyAntipov is checking with NTHVS the effect of a high-frequency HOM from the crab cavities and it seems that the effect is larger than what was anticipated in the past with DELPHI => This should be carefully studied (including the assumptions etc.) with high priority and we should come with a strong number and plan for the HiLumi meeting in Madrid in November.

9) Progress/status in the different activities/projects and reports from meetings and in particular the issues/successes in the different machines (Everybody)

- ATS-IWG (BenoitS):

- Not discussed.

- HSC-IWG (NicoloB):

- Not discussed.

- Ecloud (GianniI):

- Not discussed.

- Beam-beam (XavierB)

- Not discussed.

- Space charge (AdrianO)

- Not discussed.

- ABP-CWG (GiovanniR):

- Not discussed.

- PyHEADTAIL (KevinL)

- Not discussed.

- DELPHI (DavidA)

- Not discussed.

- NHTVS (SergeyAntipov)

- Not discussed.

- LIU (GiovanniR)

- Not discussed.

- HL-LHC

- TCC:

- Not discussed.

- WP2:

- Not discussed.

- FCC

- Not discussed.

- PBC (GiovanniR)

- Not discussed.

- Machines

- Not discussed.

- MDs (past and future)

- Not discussed.

10) Miscellaneous

- The next (120th) meeting will take place on Monday 25/09/2017 (in room 6/R-012 at 10:30)
=> Current agenda:

1) General info and follow-up (EliasM)

2) Possible movies for HL-LHC communication (Everybody)

3) Progress/status in the different activities/projects, reports from meetings and in particular the issues/successes in the different machines (Everybody)

- Important events and dates for HSC: <https://espace.cern.ch/be-dep/ABP/HSC/SitePages/EventsAndDates.aspx>.

- Web site: <https://espace.cern.ch/be-dep/ABP/HSC/default.aspx>.

Minutes by E. Metral, 14/09/2017.