

Minutes of the HSC section

118th meeting on Monday 04/09/2017 (10:30, 6/R-012)

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

1) Newcomers / visitors

- KOUKOVINI PLATIA Eirini started as fellow on September 1st with GiovanniR to work on “Performance of non-LHC physics beams in the injectors in LIU era” for the PBC (Physics Beyond Colliders).
- BITSIKOKOS Loizos started as TECH on September 1st with GianniI to work on “Electron cloud studies for the LHC”.
- RIBES METIDIERI Ariadna as TECH on September 1st with XavierB to work on “Optics distortions from coherent beam-beam for HL-LHC”.

2) Comments on the minutes of the previous 117th 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 will be 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.

- **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 by the end of the week.
 - 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 Nicolob. 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) \Rightarrow 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 M_0 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.
- I checked with VincentB that there is no baffle in quadrupoles.

3) General infos and follow-up (EliasM)

- SLM:
 - IPAC18 discussions started \Rightarrow Will be discussed during next HSC section meeting on 11/09/17. Reminder (see email): send me all your proposals by Friday 08/09/2017.
 - Fellows to be discussed at SLM 02/10 \Rightarrow Any particular requests, changes of plans, etc.? Please send me the info/motivations/etc. at the latest on Wednesday 27/09/2017.
 - From January it is likely that everybody accessing the CERN site will need an access card, even for a short visit. More information will come on the subject.

- LHC EIC OP position with ABP skills.

- HL-LHC:

1) Approved participation:

- SergeyAnt
- XavierB
- GianniI
- EliasM
- AnnalisaR
- GiovanniR

2) Possible animations:

Could you please try and think about some nice movies for the HL-LHC communication side? We should turn it into a positive side (i.e. not showing that we can destroy the beam/machine...), i.e. show that with our recommendations the situation will be much better... As XavierB told me, we could run an instability movie in reverse...

Let's try and think about it, the deadline should be in the next few weeks => **Deadline: HSC section meeting on 18/09/2017.**

By the way, I think it is also a very nice exercise for our team to better communicate what we are doing and show clearly to others why our work is important... => So I propose to have animations for all our main activities:

- Impedance
- E-cloud => I received the build-up in octupoles from Philipp.
- Beam-beam
- Space charge

- Last LMC talk by GianniI => Went very well with a lot of important information.

- Other meetings

- WP14 on TDIS? Went well with nice slides from GiacomoM.

- 16L2 task Force
- LBOC
- LMC
- ATS IWG
- ABP CWG
- WP2

- LHC 08:30 meeting => See slides and in particular the emittance growth observed at the beginning of a batch. Is it coherent or incoherent?

- LHC octupoles knob => To be followed up with OP that the knob for the Landau damping for beam 1 is changed to avoid that the ROD.A56.B1 family is run at lower values than the others?

- 16L2 follow-up

- 3 dumps after a trip of an ADT module (as when we had the first dump of this kind at injection during scrubbing run).

- What about the tune shift along the batches? Can we infer an ion/e- density? Is it consistent with what Antons finds from the BLM?

- HEADTAIL motion revealed by the HeadTail monitor (BenoitS and TomL) => Can we reproduce the signals of the HEADTAIL monitor with our e-cloud simulations?

- Endoscopies arc 1-2 EYETS (from BenoitS)

- An inspection was asked on the neighbouring magnets of the exchanged magnets in 31L2, Giuseppe and Julien provided the links to the endoscope videos performed during the EYETS. One does not see much special on the length of dipole probed, keeping in mind that both apertures should be equally bad from heat load point of view. It seems that the copper is in very good shape and some small “stuff” – already seen in other endoscopies for non-conforming contacts - are observed in one aperture and not in the other. This of course does not mean that the surface at the level required by the SEY is ok, and more precise surface investigations such as the ones proposed by Serge would be needed to investigate more.

- Link to the videos (made during the EYETS):

<G:\Departments\TE\Groups\VSC\BVOJ Finelle\2017\EYETS\ARC 1-2\Endoscopies>

- The videos QBBI.A31L2 show the beam screens of the dipole du B31L2.

- The videos QBQI.31L2 show the beam screens of the SSS Q30L2.
- 8b+4e: status from SPS => The 8b+4e was taken again on Friday with a bunch intensity of about 1.2×10^{11} . The emittances had been improved in the PS and are now $\sim 2 \text{ um}$ in the horizontal plane and 1.8 um in the vertical plane.
- Should we revert all the settings, ADT gain etc.?
- The injection settings might need to be optimized at some point if we continue with this beam.

4) ATS MD3 study (SergeyAnt):
https://indico.cern.ch/event/663461/contributions/2709189/attachments/1517732/2369500/ATS_MD.pdf

- Slide 5: plots are made up to 10 sigmas.
- Conclusions

- 1) Proposed crossing angle of 150 microrad seems challenging => Need - 500 A to be close to the nominal case with the positive polarity.
- 2) Proposition to increase the crossing angle to 190 microrad => In this case -350 A are enough to be in the similar situation as point 1) and we could in fact use more octupoles to be on the safe side.

5) 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):
https://indico.cern.ch/event/663461/contributions/2709188/attachments/1517740/2369560/IWG_report_04sept2017.pdf

- Proposed recommendation for BGI (and to be presented at the LMC on 27/09/17):
 - Do not reinstall as is.
 - Keep it away from the proton beam (e.g. installation only for ion run before LS2?).
 - Work on a robust design to be installed after LS2.

- HSC-IWG (NicoloB):
https://indico.cern.ch/event/663461/contributions/2709188/attachments/1517740/2369467/MoGr_and_Cu.pdf

- Follow-up of resistivity measurements (bench measurement of TCSPM block) with GiacomoM: Conclusions and next steps

- Benchmark measurement proves:

- Reliability of the setup.

- Capability of inferring resistivity from IW2D simulations for ~50um Cu layer.

- Potential to deduce Mo on MoGr/CFC, Cu on MoGr/CFC in accurate way.

- Next steps:

- Coating the full face of the block with 5um Mo to clear out the effect of stripe width.

- Performing similar measurements on CFC and coated CFC.

- Ecloud (GianniI):

- Nothing special to report.

- Beam-beam (XavierB)

- Nothing special to report.

- Space charge (AdrianO)

- Nothing special to report.

- ABP-CWG (GiovanniR):

- HT-CONDOR issues reported the last time.

- PyHEADTAIL (KevinL)

- Nothing special to report.

- DELPHI (DavidA)

- Nothing special to report.

- NHTVS (SergeyAntipov)

- Nothing special to report.

- LIU (GiovanniR)

- Nothing special to report.
- HL-LHC
 - TCC:
 - Nothing special to report.
 - WP2:
 - I commented about the recent measurement of the Mo resistivity which revealed a much larger value than expected with beam-based measurements (factor ~ 5) => Update of the impact on beam stability and necessary Ioct ongoing. Next: make all the updates and then report at the WP2.
- FCC
 - Nothing special to report.
- PBC (GiovanniR)
 - EiriniK just joined to start to work on it.
- Machines
 - LEIR (NicoloB). Very bad week and no Xe could be used.
- MDs (past and future)
 - Nothing special to report.

6) Miscellaneous

- The next (119th) meeting will take place on Monday 11/09/2017 (in room 6/R-012 at 10:30)
=> Current agenda:

- 1) General info and follow-up (EliasM)
- 2) Can we reproduce the LHC HEADTAIL monitor signals during the 16L2 fast single-bunch instability with e-cloud (and/or "equivalent" impedance) simulations? (LottaM et al.)
- 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, 06/09/2017.