Minutes of the HSC section

122nd meeting on Monday 09/10/2017 (10:30, 6/R-012)

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

1) Newcomers / visitors

- None.

2) Comments on the minutes of the previous 121th meeting + Actions => To be discussed today

- 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 ~ ½ or ~ 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.

- Movies for HL-LHC project (everybody) => Still to be discussed today.

3) General infos and follow-up (EliasM)

- News from LHC

- Instability observed (B1H) with BCS (smaller emittance) and Landau octupoles were increased for the next fill.

- Some coupling measurements reveal quite some high values, which seems to confirm that it comes from collision process itself => To be followed up.

- Future studies to be done to tackle the single-bunch B1H instability at flat-top? => Try and have situations from last years (larger beta*)? BenoitS is looking into it.

- LHC seems to run very nicely with peak lumi of ~ 1.7E34 and ~ 33 fb^-1 accumulated and 2016 curve reached already.

- We are doing levelling now.

- XB: some instabilities => Campaign for coupling. With BCS scheme, 490 A for B1 and 450 for B2.

- SLM:

- IPAC18: the list of proposed participants has been discussed at the BEMB, and so far all have been retained.

- Pictures or animations for HL-LHC, to be sent to GianluigiA.

- GianluigiA reminded about the deadline for the contributions to the document on LHC Ultimate energy operation (end of September).

- CERN has decided to phase out analogue phones before end 2018; the new service will be based on Skype for Business, most users will access through PCs and MACs. Some physical phones interfaced to the same service will be kept for labs and control rooms. Therefore the group won't buy new phones except for such use.

- Council week, feedback from "special" SPC: very good impression on LHC running. The finance committee went also smoothly. CERN has received 99% of the financial contributions, including the ones from associate members. The cost variation index is now slightly positive. It is not clear yet if it will translate in an increase of available budget. The secretary for the European Strategy working group has been nominated: professor Halina Abramowicz from Tel Aviv University.

- MikeL gave a short summary on the HL-LHC consolidation meeting for long-term operation. There are more requests than money available, and a few items concern us, e.g., collimation and replacement of tertiaries (2 MCHF requested, not approved for now). The magnet group also made a request for additional spares for correctors (5 MCHF), which is not approved yet.

- A review of LHC dipole (diode) insulation was announced on 10 October.

- Labview Realtime middleware is proposed by EN-STI, CO is not agreeing, and input for CO3 is requested. Richard should check with Stefano if it would have any implications for us for collimation.

- Today starts the 40h of SPS scrubbing run:

- 24h starting Monday October 9, at 9:00 (—> until Tuesday 9:00).

- 16h starting Wednesday October 11, at 8:00(—> until midnight).

- SC workshop last week and follow-up started to compare with theory of AlexeyB et al.

- Report heat load HL-LHC triplets by GiovanniI => Thanks.

- Note on buildup simulations for the LHC arcs at 6.5 TeV by GiovanniI => Thanks.

- Impedance and stability aspects for SPS tests with CCs => Slidex sent by BenoitS et al. to FanouriaA.

- UPDATE: scenarios for HLLHC impedance (nominal and pushed settings) by SergeyAnt.

- Stability with HOMs: DQW by SergeyAnt.

- Ultimate energy operation by GianniI et al.

- Effect of Hollow Electron Lens magnetic field on LHC beams by SergeyAnt.

- WP2 meeting last Tuesday => We will try and review all this during the coming HSC section meetings (on 30/10 and 06/11).

4) HL-LHC ultimate scenario (SergeyAnt): **https://indico.cern.ch/event/670745/contributions/2743115/attachments/1537270/2411771/UpdateOnCoatingInIR7HL-LHC_SergAnt.pdf**

- HL-LHC nominal scenario: without HOM from CC. Bad conductivity is the factor 5 higher. The results are consistent with the past ones but still to update the plots with the HOMs from CCs, with the nominal beta* of etc. => IMPORTANT! On TH, SergeyAnt will have to report at the ABP info meeting.

5) Stability diagram with a Gaussian electron lens in HL-LHC (SergeyAnt): **https://indico.cern.ch/event/670745/contributions/2743115/attachments/1537270/2409558/GaussianelectonlensforHLLHC_SAnt.pdf**

- The plots of the stability diagrams are already in the PHD of XavierB as he did it for BB and it is very similar.

- In HL-LHC with 1 electron lens we can increase the stability diagram by a factor of 10 compared to octupoles.

5) Movies for HL-LHC project (for general public): impedance, space charge, beam-beam, e-cloud (Everybody): **https://indico.cern.ch/event/670745/contributions/2743117/attachments/1537213/2408895/TMBF_Diamond_EK.wmv**

- From EiriniK: Movie of the use of the transverse feedback (real measurements in the control room) in Diamond => We can see in the video:

- Without the feedback -> beam is horizontally unstable

- With the horizontal feedback on --> beam is vertically unstable

- With feedback on in both planes --> beam is stabilized.

6) 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):

  - Follow-up of coating.

- Ecloud (GianniI):
https://indico.cern.ch/event/670745/contributions/2743115/attachments/1537270/2408984/000_update_on_ecloud_activities.pdf.

  - LottaM is working on the generalization to several ion species => Plan with AdrianO still has to be clearly defined.

- Beam-beam (XavierB)

  - Not discussed.

- Space charge (AdrianO)

  - Not discussed.

- ABP-CWG (GiovanniR):

  - Not discussed.

- PyHEADTAIL (KevinL)

  - 2000 bunches are running.

- 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.

7) Miscellaneous

- The next (123th) meeting will take place on Monday 16/10/2017 (in room 6/R-012 at 10:30) => Current agenda:

    1) General info and follow-up (EliasM)

    2) Follow-up of actions (see last minutes) (Everybody)

    3) First highlights (wrt beam stability) from SPS high-intensity run (E-cloud team)

    4) LHC MD proposals for MD4 and before EoY (BenoitS and XavierB)

    5) Changes in LHC between 2015, 2016 and 2017 (BenoitS and XavierB)

    6) Progress/status in the different activities/projects, reports from meetings and in particular 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, 15/10/2017.