Minutes of the HSC section

75th meeting on Monday 11/04/2016 (14:00-16:00, 6/R-012)

HSC members: Javier Barranco Garcia (JBG), Mario Stefan Beck (MSB), Eleonora Belli (EleoB), Olav Berrig (OB), Nicolo Biancacci (NB), Edoardo Bonanno (EdoB), Xavier Buffat (XB), Lee Robert Carver (LRC), Everton Granemann Souza (EGS), Stefan Eduard Hegglin (SH), Giovanni Iadarola (GI), Kevin Li (KL), Elias Metral (EM), Mauro Migliorati (MM), Adrian Oeftiger (AO), Francesco Paciolla (FP), Tatiana Pieloni (TP), Tatiana Rijoff (TR), Annalisa Romano (AR), Giovanni Rumolo (GR), Benoit Salvant (BS), Michael Schenk (MS), Claudia Tambasco (CT), Alpo Valimaa (AV), Elena Wildner (EW), David Amorim (DA).


1) Newcomers / visitors

- None.

2) Comments on the minutes of the previous 74th meeting + Actions

- See last minutes and in particular the WP2 actions.
- Last talk from ClaudiaT => Slide 14: Rise time of the instabilities observed at flat top: 10-15 s and faster during the squeeze (5 s) (L. Carver) => One should also mention the predicted instability rise-times (with HL-LHC parameters) => Action NicoloB (with ClaudiaT). This should be ready for the future talk at WP2 meeting on 19/04/16.
- Follow-up on LESS (last talk from OlavB):
  o Meeting with Gennady Stupakov + check that the formula is similar to the one used by Chao.
  o Linked to this subject, EliasM showed the slides from VincentMaire => See below.
  o GianniI mentioned some discussions he has with MauroT as it takes time to treat the surface and they would like to minimize the total length which need to be treated => Ongoing action by GianniI. EliasM mentioned that it is even more important therefore to finalize the heat load table with the best precision we can to really see what needs to be coated or not.
  o GianniI mentioned also some further discussions with SergioC to try and optimize the surface to be coated to avoid e-cloud build-up. Ongoing also.

3) General infos

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- SL meeting: nothing special to mention.

- Reminder of deadlines
  
  - IPAC16 papers => Today.
  
  - Fellows => 03/05/16.

- Machines’ performance update => LHC commissioning


  - Reminder: Still issue with BSRT so no emittance measurement => In fact we should deduce the emittance from the BB tune shift meas. 3 microns seem to work well (GianniI mentioned that it was ~ 2 microns at injection).

  - Scan of the injection working point (see [https://espace.cern.ch/be-dep/ABP/HSC/Meetings/working_point_GI.pptx](https://espace.cern.ch/be-dep/ABP/HSC/Meetings/working_point_GI.pptx)). GianniI mentioned that there is also now a table for the ADT phase to be used for each working point. As concerns the gain, it seems that a knob of 0.1 corresponds to 50 turns damping time.

  - ADT ObsBox scripts from LeeC work well. However, it takes much more time (~ 30 s compared to the ~ 1 s shown at some point by DanielV) to send the values to the CCC consoles => Still need to find the correct place to run LeeC’s scripts.

  - TDI: 3 tests made (see [https://espace.cern.ch/be-dep/ABP/HSC/Meetings/TDilandau.pptx](https://espace.cern.ch/be-dep/ABP/HSC/Meetings/TDilandau.pptx)). The conclusion is that the effect is small, as expected which is very good news. To be followed up during the year (if grazing impact, etc.)

  - See also instability with pilot on fill#4761 => LeeC (and BenoitS): [https://espace.cern.ch/be-dep/ABP/HSC/Meetings/Fill4761_LeeC.pdf](https://espace.cern.ch/be-dep/ABP/HSC/Meetings/Fill4761_LeeC.pdf)

    - BenoitS saw a mode - 1 whereas LeeC sees a mode + 1 => To be understood.

    - LeeC mentioned also several instabilities seen by RoderikB

      - Nominal bunch unstable when cutting the beam at ~ 2.5 sigmas by moving the TCPs in => To be followed up / simulated as there are 2 effects going in the instability direction: more impedance by closing the gap of the TCP and less landau
damping by cutting the tails.

- Seems there were also some instabilities with pilots during the week-end (LeeC from RoderikB): more bunches went unstable at flat top sometime in the afternoon on Sunday. They had 5 non colliding pilots and 1 colliding pilot per beam. At flat top they turned off the octupoles, and saw all the non colliding pilots in B1 completely disappear. Only the colliding pilot was stable (from bb head-on), while for B2 all the non colliding pilots were stable. TatianaP mentioned that also last year beam 1 non colliding bunch was unstable while beam 2 non colliding bunch was stable at zero octupole => To be followed up.

- Some linear coupling measurements were also started during some TDI studies.

- Finally, at the end of the TDI MD of this week-end, the chroma was decreased from ~ +5 units down to ~ -5 units (with ADT OFF and octupoles knob at -2 => ~ 26 A) => After ~ 1 min an instability developed. The prediction was ~ 6 A (for 1E11 p/b and 2 microm transverse emittance from Gaussian profile) and we therefore measured ~ 4 times more. Is it due to the fact that the tails were cut due to previous manipulations => To be followed up and maybe some other studies should be planned: either redoing this without cutting the tails before but also with octupoles, to measure the instability rise-time vs. chroma.

- E-cloud meeting => Scrubbing run preparation on track.

- Online tool for the LHC heat loads from SR and impedance => See below.

- New scaling law from GianniI => See below.

- ADT ObsBox scripts from LeeC are working.

4) Discussion about surface state requirements at CERN (EliasM): https://espace.cern.ch/be-dep/ABP/HSC/Meetings/CERNrugosity.pptx

=> In the frame of our discussions with LESS, it is good to review the recommendations from the impedance team as concerns the roughness of the surface.

5) New scaling law for heat load from e-cloud (GianniI): https://espace.cern.ch/be-dep/ABP/HSC/Meetings/heatloads_GL.pptx
Gianni reminded that the cryogenic system was designed with a feedback loop but it is extremely slow and it could not cope with abrupt changes from e-cloud heat load (due to new injections or dumps of the beam). They added a feedforward to solve this problem.

Gianni explained the formula he proposed to estimate the heat load from e-cloud (which did not exist, as opposed to SR and impedance) => It had to be simple (there is no dependence on SEY, no dependence on bunch length, etc.), robust and to run on PLC. Gianni showed that it works well.

6) Update on LHC tools => Everybody involved (and not in Rome...):


- Summary:

- Know how to do it now (compute virtual variables).

- One should not average as it takes a lot of time.

- We can go back in time as long as the initial variables (from which the computed variables are derived) are available.

- Everything is ready and the next step is to have it in the fixed displays (already used for the monitoring of the beam-induced RF heating of the different equipment).

- LHC tune footprint viewer will be discussed next week.

7) Impact of TDI8 in the 2015 LHC instabilities at injection (BenoitS) => Postponed

8) Miscellaneous

- The next (76th) meeting will take place on Monday 18/04/2016 (in room 6/R-012 from 14:00 till 16:00) => Agenda:

1) General info and follow-up (EliasM)

2) News from LHC and LHC injectors (EliasM and everybody involved)

3) Multi-bunch instabilities with uneven fills (Gennady Stupakov)

4) Fast Poisson Solver for Self-Consistent Beam-Beam and Space-Charge Field
Computation in Multiparticle Tracking Simulations (Adrien Florio)

5) Status of the LHC tune footprint viewer (XavierB)

6) Impact of TDI8 in the 2015 LHC instabilities at injection (BenoitS)

7) AOB (everybody)

- 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, 11/04/2016.