Minutes of the HSC section

24th meeting on Wednesday 01/10/2014 (09:00, 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), Adriano Garonna (AG), Meghan McAteer (MM), Nicolas Mounet (NM), Carlo Zannini (CZ), Nicolo Biancacci (NB), Xavier Buffat (XB), 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), Danilo Banfi (DB), Javier Barranco (JB), Joseph Kuczerowski (JK).


1) Newcomers / visitors

- KOWALSKA Magdalena, DOCT, 01.10.2014, with Elena BENEDETTO => Analysis and control of beam losses in the CERN PS-Booster for highly space charge dominated beams.

- PASSARELLI Andrea, DOCT, 01.11.2014, with Hannes Bartosik => Characterization of impedance and wakefields of accelerator devices in the short bunch limit for CLIC Damping Rings.

- CALGEER Gian, COAS, 01.10.2014, with Giovanni Rumolo and Hannes Bartosik => To renovate the web pages.

2) Comments on the minutes of the previous 23rd meeting + Actions

- None.


3) General infos

- No particular comment from anyone.
- SL meeting:

- BE amphitheatre in Prevesin will be converted to labs/office space, as a new auditorium will be available in B774.

- As a result of the fire some offices and the PS Auditorium will not be available for 2 months. Information Meetings are suspended until the auditorium will become available.

- Norbert Holtkamp is the designated new C-MAC chairman as from 2015.

- Staff/users/fellows wishing to take their computers must purchase them from the recuperation service in all cases (also for Marie-Curie fellows).

- New Injectors and LHC Schedules were agreed and published (still pending Research Board approval in December). A second shut down for the NA was removed so proton time has been gained and 2 weeks’ scrubbing has been added in 2015 for the SPS.

- Fellows: I asked you the extensions and requests and it will be discussed soon.

- I. Laugier will join the ASR Group as APT departmental coordinator on 1/1/2015 and will already help out with the cost review of the HL-LHC.

- Small projects: I sent you an email and the deadline is tomorrow.

- LMC => New dates for the Transfer line and Sector tests have been announced as a result of the schedule changes:


- EM has taken over from R. Jones the role of Task 2.7 Coordinator.

- Group Structure from 1/10:

  - Alessandra Lombardi takes over from Richard Scrivens the role of HSL Section Leader.

  - Richard Scrivens will represent ABP at the IEFC (Gianluigi will act as
- EM has taken over as LBOC deputy chairman from Gianluigi.

- Discussion with TP about BB contribution from IP2 and 8 => To be discussed in detail during HSC meeting on 15/10.

- TDI meeting on 10/10 to conclude on the Ti and Cu thicknesses for the 2 spare TDIs to be installed during the 2015/2016 break.

- FCC => Lenny Rivkin has been appointed as chair of FCC collaboration board.

- HTWG meeting:

  - Very nice and promising results from MichaelS about Landau damping with an RFQ => Will be discussed in detail in few weeks during a HSC meeting.

  - Next steps (as discussed with AlexejG): identify an instability in the SPS that we can well reproduce by simulations (we have several possible cases, see below) and then damp it with either octupoles or RFQ (from simulations) to see which kind of RFQ one would need and then we could go for a prototype to be installed in the SPS:

    - Negative chromaticity to have an unstable bunch (but this is not really “operational situation”) => https://espace.cern.ch/be-dep/ABP/HSC/Meetings/cmp_Theory_Meas_HEADTAIL_SPStau.png.


    - Other cases where we stabilize the beam by octupoles only, i.e. without the transverse damper.

- LIU-PSB meeting:

  - Beta < 1 should be studied in detail.

  - 1st beam dynamics studies by KevinL with the impedance model of CarloZ => Nice pictures which are not understood yet…(the detailed study above might help).

- LIU-PS meeting => Nice summary of the Chamonix workshop by HeikoD.

- HL-LHC: PDR written and should be sent soon to all the contributors for comments.

4) Follow-up form MichaelB on lumi formulae: https://espace.cern.ch/be-dep/ABP/HSC/Meetings/2014_10_Luminosity_10-2.pptx
As a follow-up of the last meeting, MichaelB gave more explanations about the maximum integrated luminosity, which has been observed in the LHC with ions => Linear with the number of bunches.

5) Brief reports for the different machines

From now on, we will report only the major events for each machine and concentrate only on the machine performance issues (and successes of course!).

- PSB (ElenaB)

The PSB had an excellent week. Nothing special to report.

- PS (GuidoS)

The LHC 72 bunches almost recovered the pre-LS1 performance.

The two broken wire scanners were repaired and can be used again (min 10 s between 2 consecutive scans).

There is an additional delay on the MTE kickers repair (news on the second week of October).

SPS added on the list of the users (EAST, AD, TOF, SPS and of course the MD).

- SPS (BenoitS)

Beam commissioning: extraction for North Area setup, 2 alignment campaigns (using combined minimization on both Q20 and Q26), transverse damper setup, issues with BPMs are being solved using kick response measurements (with Hannes, Stephane and BI).

LHC 25nsec beam is limited by the vacuum in MKP4. Beam is warming up the kicker yoke and a temperature rise from 33 degrees to 36 degrees is sufficient to come to our interlock level of 2 10E-7. We used the week to condition MKP and MKD with beam and we can now have 48 bunches for 3 seconds, 36 bunches for the whole cycle.

Several hardware issues on the way, latest one is a leak on a ZS instrumentation bellow, for which access yesterday and this morning.

- LHC (EliasM)

Chamonix workshop last week. See few highlights below.

- LEIR (MichaelB)

It was a productive week for LEIR.

On the RF front, several MDs were carried out. The final outcome is that now LEIR produces a beam conform to the emittance requirements of the PS (1.5 eVs in a bunch). The intensity
we have now at extraction is on average 1E10 charges (fluctuations typically from 0.8 E10 to 1.2 E10 charges). The emittance is typically 1.4 eVs max. This means that LEIR can now deliver a beam that the PS can deliver to the SPS without the need of doing any splitting.

Yesterday (Tuesday), Steven Hancock, Alan Findlay and I did RF MDs on LEIR to improve the RF capture. We came to the conclusion that the beam loss at RF capture is most likely due to a transverse phenomenon. More investigation is needed.

Today, Wednesday, we don't have any RF capture. I am investigating.

6) Highlights and follow-up of the Chamonix workshop (EliasM)

- Intro from FrederickB:
  - Spirit: no status but open questions and options.
  - ~ 130-140 participants / session. In total, ~ 230 people coming to the workshop.
- For the vacuum, MiguelJ mentioned that he wrote some specifications in the past, where it was said that nothing should heat more than 50 deg.
- BCMS beam in the LHC: interesting in some aspects, could be used with larger emittance first (SimoneG made this proposition) due to issues with protection devices (VerenaK) – but can we be sure of the emittance sent to the LHC (a quality monitor would be needed)?:
  - TDI => issue with low emittance beam and need to have < 192 bunches.
  - Transfer line collimators => Need < 144 bunches / batch.
- Limit from the experiments: pile-up of ~ 50 => Should not be a pb for us in 2015.
  - 12 non-colliding bunches are of paramount importance for background studies => This is an important input for our instability and beam-beam studies => Would be nice to compare our performance predictions without and with 12 non-colliding bunches (See Action 1 below).
- Question from ThomasR about the requested lumi from experiments and the prediction. No official value given for the moment but MikeL said that it should be between ~ 10 and 20 fb^{-1}.
- Comment from PaulC: Collide and squeeze needs a robust feedback to keep the beams together and for the moment he did not see such a thing. Once we will have this we can think of using it.
- Comment about the bunch length from RogelioT => Why not use nominal bunch length?
- Concerning the scrubbing run, comment/reminder from cryo experts: 250 W is the local limit (we used in our estimates) but it was mentioned that if all the machine is filled, the limit will not become local but global and it should be something like ~ 200 W => To be followed up.
- Comment from MalikaM: why not skip the 50 ns beam as the machine will be new anyway => We could then have more time for 25 ns scrubbing. During some discussions, there were also some suggestions by some people from the CMAC to restart at 4 TeV to be really like in 2012.

- Concerning the possible SPS a-C coating, FrederickB mentioned that there is no reason to decide in 2015 and that this can be done during LS3. BrennanG answered that the idea would be to have all this done in LS2 to have then 3 years to recover and be ready.

- Comment from AlessandraL for PSB SC studies and the use of the LINAC4: we should try and consider a low current from the source but inject many turns (instead of the opposite) => To be studied in detail in simulations.

7) Actions to be taken for the next meeting(s)

- New actions:
  
  - **Action 1 (Beam-Beam team):** Compare our LHC performance predictions without and with 12 non-colliding bunches.

- 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).

8) Miscellaneous

- The next (25th) meeting will take place on 15/10/2014 => Agenda:

  1) General info and follow-up (EliasM)

  2) Performance reports for the different machines (PSB, PS, SPS, LHC and LEIR)

  3) Follow-up of beam-beam actions: IP2/8 contributions wrt IP1/5 in 2012 and 2015; Future BTF measurements in the LHC; etc. (TatianaP et al.)

  4) AOB (EliasM)

- Important events and dates for HSC: [https://espace.cern.ch/be-dep/ABP/HSC/SitePages/EventsAndDates.aspx](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](https://espace.cern.ch/be-dep/ABP/HSC/SitePages/MinutesOfMeetings.aspx).

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

Minutes by E. Metral, 07/10/2014.