

Minutes of the HL-LHC WP2 Task 2.4

**19th (VIDYO) meeting on Wednesday 04/03/2015
(11:00-12:30, 18/3-008)**

Task 2.4 members: Alexey Burov (AB), Alessandro Drago (AD), Alessandro Gallo (AG), Andrea Mostacci (AM), Alessandro Vivoli (AV), Benoit Salvant (BS), Bruno Spataro (BrunoS), David Alesini (DA), Deepa Angal-kalinin (DAK), Elias Metral (EM), Elena Shaposhnikova (ES), Fabio Marcellini (FM), Fritz Caspers (FC), Frank Zimmermann (FZ), Gianluigi Arduini (GA), Giovanni Rumolo (GR), Hugo Alistair Day (HAD), John Jowett (JJ), Kevin Li (KL), Luigi Palumbo (LP), Mauro Migliorati (MM), Michel Martini (MM), Mikhail Zobov (MZ), Nicolas Mounet (NM), Nicolo Biancacci (NB), Oliver Boine-Frankenheim (OBF), Olga Zagorodnova (OZ), Oscar Frasciello (OF), Paul Goergen (PG), Rainer Wanzenberg (RW), Uwe Niedermayer (UN), Wolfgang Hofle (WH).

Present/Excused: AB, AD, AG, AM, AV, **BS**, BrunoS, DA, DAK, **EM**, ES, FM, FC, FZ, GA, GR, HAD, JJ, KL, LP, MM, MichelM, MZ, NM, **NB**, OBF, OZ, OF, PG, RW, UN, WH, **JuanEM**, **FritzC**, **ChristineV**, **TatianaP**, **GianluigiA**, **Cedric Garion**, **Jaime Perez Espinos**.

1) General information (EliasM):

- Goal: Follow-up of actions + update the impedance model + answers to ErkJ for the Crab Cavities + finalize the operational scenarios.
- GianluigiA informed us recently that the new (back-up) RF fingers have been proposed to be installed in the triplets. Cedric Garion mentioned that 20 (5 / IP) such equipment could be installed in the HL-LHC => This is a bit worrying due to the high beta in the triplets. To be followed up.
 - Reminder: initially these RF fingers were foreseen to replace the ones around the VMTSA (long RF fingers with a spring to keep them together around an insert), where issues were observed in the past.
 - Reminder of measurements by ChristineV, FritzC and JosephK (see <https://indico.cern.ch/event/358583/contribution/2/material/slides/1.pdf>), which revealed important resonances when the bellow around the RF fingers is installed => Pb of EM leak through the RF fingers and in particular the convolutions. We should try and reduce the depth of the convolutions.
- Next step: reproduce this in simulation as so far we could not. Once

done, we will study the transverse impedance with simulations. Mitigation measures (like ferrite or others to de-Q the resonances) could then be discussed. But reminder: this will be in a cold and radiation area.

2) Follow-up of the impedance of the crab cavities (NicoloB):
<https://indico.cern.ch/event/377643/contribution/1/material/slides/0.pdf>

- Motivation: We want to evaluate the effect of crab cavities focusing on their single bunch and coupled bunch transverse kick factors in comparison with already existing equipment.
- Considering all the crab cavities (8 per plane per beam), this leads to a transverse kick factor of $\sim 1.4 \text{ V} / \text{pC mm}$. A single HL-LHC bunch (2.2×10^{11} p/b) displaced by 1 mm at the Crab cavities location would then induce a voltage of $\sim 50 \text{ kV}$.
- The TCP.D6L7.B1 collimator with a half gap of $\sim 1 \text{ mm}$ would give a transverse kick factor of $\sim 3.14 \text{ V} / \text{pC mm}$ and all the collimators together would give $\sim 45.3 \text{ V} / \text{pC mm}$.

3) Follow-up of the impedance of other equipment (BenoitS):
<https://indico.cern.ch/event/377643/contribution/1/material/slides/6.pdf>

- BenoitS reviewed the status for the 11 T dipoles, triplet BPMs, beam screens (<https://indico.cern.ch/event/377643/contribution/1/material/slides/3.pdf>), crab cavities, LHCb velo (<https://indico.cern.ch/event/377643/contribution/1/material/slides/4.pdf>), stochastic cooling, hollow e- lens and TDI.

4) Operational scenarios (TatianaP and EliasM):

- EliasM showed the current HL-LHC operational scenario (<https://indico.cern.ch/event/377643/contribution/3/material/slides/0.pdf>) with the answers, which remain to be given.
- TatianaP showed briefly the slides from ClaudiaT presented at HSC section meeting in December 2014 (https://espace.cern.ch/be-dep/ABP/HSC/Meetings/17_12_2014_section_meeting.pdf).
 - Proposition to play with the ATS optics starting at $\sim 70 \text{ cm}$ to avoid any restriction of the stability diagram during the squeeze. If this can be done then we could use $\text{LOF} < 0$. TatianaP is in discussion with RiccardoDM. The final result should be presented.
- Next steps:
 - The RF parameters will be provided by the RF team (ElenaS) next

week.

- Q": which values one would like to have to improve beam stability?
Input to be given to the optics team (KevinL).

- Several answers required from BB team to explain the // separation
(why these values and what are the reasons? Scaling with energy? Etc.)

4) Next meeting

- The next (20th) VIDYO meeting will take place on Wednesday 18/12/2014 from 11:00 to 12:30 in the room 6/R-018 for the CERN people. The agenda is

- 1) General information and AOB (EliasM)
- 2) Review of all the past recommendations for the impedance of the Crab Cavities (EliasM and BenoitS)
- 3) Follow-up of the operational scenarios (TatianaP, EliasM, ElenaS, JuanEM)

Minutes by EliasM, 15/03/2015.