

Minutes of the HL-LHC WP2 Task 2.4

14th (VIDYO) meeting on Wednesday 01/10/2014 (11:00-12:30, 6/R-018)

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, **Juan Esteban Muller**, **Carlo Zannini**.

1) General information (EliasM):

- Plan of the 3 coming meetings: 01/10, 08/10 and 15/10.
- Final report to be sent to GianluigiA on 17/10 (Action: EliasM).
- The PDR has been written and will be sent soon to all the contributors for comment.
- Task 2.7 (see web site: <https://espace.cern.ch/HiLumi/WP2/task7/SitePages/Home.aspx>) => Some explanations have been given.
- Comment from BenoitS: we are still waiting for the CC modes.

2) Calculations of HOMs of the ALICE beam pipes (Olga Zagorodnova): <https://indico.cern.ch/event/341817/contribution/3/material/slides/0.pptx>

- Olga presented her results, starting first with a description of the geometry:
 - A 2D model of the ALICE beam pipe has been used for the HOMs calculations with the MAFIA code (f-domain solver).

- In some region, there is a ovalization (95 mm vertical, 67.5 mm horizontal) => A round pipe with a radius of 95 mm has been used in this region.
- The ALICE “cavity” maximal radius is 225 mm.
- The length of the outgoing pipe is ~ 30 cm.
- Different sets of boundary conditions were used for the calculation of 100 monopole and 100 dipole modes.
- Monopole results are the same for 3 boundary conditions.
- Dipole mode results depend on boundary conditions => The length of the outgoing pipe has been increased to ~ 1.3 m to have independent results.
- Most of the monopole and dipole modes are trapped in the region of ovalization (between 9 m and 12 m left from the IP) and in the region of the taper (between 7 m and 19 m right from the IP).
- Some modes (not all the 100) have already been sent to BenoitS and the next step for OlgaZ is to send all the 100 modes to BenoitS.
- There was a discussion with RainerW that the resonant case is (indeed) the worst case but as discussed, this is what we put in place for all our studies to be on the safe side. And furthermore, for cases as the present one where many modes are observed, this case is in fact the most probable (see also below).

3) Update of beam-induced RF heating issues for HL-LHC: ALICE beam pipe, etc. (Benoit Salvant)

- BenoitS showed the slides he presented at the internal CERN TREX meeting held on 31/07/14 => Impedance of new ALICE beam pipe: <https://indico.cern.ch/event/341817/contribution/0/material/slides/3.pdf>.
- BenoitS also showed the talk he gave at the hilumi meeting last year in Daresbury with some updates included => Heat load from impedance on existing and new hardware in the LHC era: <https://indico.cern.ch/event/341817/contribution/0/material/slides/1.pdf>.
- Reminder on the cooling for the beam screens:
 - Beam screen heat load local limit (due to the dimensions of the beam screen capillaries): 2.4 W/m/aperture => 4.8 W/m.
 - Global limit for the cryo-plant: 3.8 W/m.
- In addition to what BenoitS presented last year, he presented the power loss results with the new beam screens. **Next step: check the effect of the beam screens of IP2 and IP8, which will not change.**

- On slide 20, BenoitS presented the power losses from the resonant modes of the ALICE beam pipe, where we clearly see the density of the modes and that the likelihood of hitting a mode is very high.

- There is a significant increase of power loss with HL-LHC parameters.

- Even the modes at higher frequencies are significant (of the order of 20 to 50 W).

- Similar case for CMS and LHCb.

- Summary of potential issues with the experimental chambers:

- CMS chamber (e.g. mode 750 MHz, $R=1.5$ kOhm): from 50 W before LS1 to potentially more than 350 W.

- ATLAS chamber: no significant mode expected.

- ALICE chamber (e.g. mode 530 MHz, $R=1.5$ kOhm): from 150 W before LS1 to potentially more than 1 kW.

- LHCb chamber (e.g. mode 620 MHz, $R=0.6$ kOhm): from 30 W before LS1 to potentially more than 250.

=> Actions / follow-up needed:

- What are the corresponding temperatures? (this is a LMC action from 189th LMC held on 10/09/14).

- Monitor what will happen in the LHC in 2015 (this is a LMC action from 189th LMC held on 10/09/14).

- Would we then be able to extrapolate to what will happen for HL-LHC?

- What about recombination chambers? => PaulC raised this question for instance at Chamonix14. To be followed up.

4) Next meeting

- The next (15th) VIDYO meeting will take place on Wednesday 08/10/2014 from 11:00 to 12:30 in the room 6/R-018 for the CERN people. The agenda is

1) General information (EliasM)

2) Interplay of impedance and octupoles with beam-beam (Claudia Tambasco and Tatiana Pieloni)

3) AOB (EliasM)

Minutes by EliasM, 11/10/2014.