



Special Joint HiLumi WP2/WP5 Meeting

Tuesday 28th February 2023, 09:00 – 11:00

Chairs: Rogelio Tomas, Stefano Redaelli

Speakers: Rogelio Tomas, Stefano Redaelli, Miguel Bastos

Participants: 15 Hannes Bartosik, Xavier Buffat, Rongrong Cai, Marco D'Andrea, Riccardo De Maria, Kay Dewhurst, Mario Di Castro, Lorenzo Giacomelli, Massimo Giovannozzi, Pascal Hermes, Giovanni Iadarola, Bjorn Lindstrom, Michele Martino, Lotta Mether, Elias Metral, Nicolas Mounet, Francois-Xavier Nuiy, Joao Oliveira, Kostantinos Paraschou, Axel Poyet, Stefano Redaelli, Volodymyr Rodi, Gianmarco Ricci, Giovanni Rumolo, Benoit Salvant, Guido Sterbini, Rogelio Tomas, Natalia Triantafyllou, Frederik Van Der Veken.

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MEETING ACTIONS

Actions:

- 1: **Action Riccardo** to contact Daniel for optimal CC-TCP phase advance.

(see [action list](#) on the WP2 webpage, for the complete list of current actions).

1. GENERAL INFORMATION (ROGELIO TOMAS, STEFANO REDAELLI)

Rogelio went through the minutes of the last meeting that were approved without comments.

In the last TCC, it was mentioned that a fourth vertical core might be needed for the HL-LHC baseline equipment. The wire compensator may need an extra core for the power cable if it is not compatible with the cables in the new fourth core.

It was announced that **Lotta** replaces **Gianni** as e-cloud task leader.

Rogelio announced that the HL-LHC Sharepoint website will be upgraded and the task leaders will be informed when it will be done.

Stefano reported about the successful installation of the two horizontal crystal collimators in February. There are ongoing discussions on the strategy for the ion energy, which is coupled with crystal performance. A report was made by Roderik to the LPC last Monday following the results discussed at the last ColUSM. Feedback by the experiments is expected within 1-2 weeks.

2. NEWS (OUTCOMES OF THE CHAMONIX WORKSHOP, ...) (ROGELIO TOMAS, STEFANO REDAELLI)

Rogelio and **Stefano** presented the numerous outcomes of the Chamonix Workshop that are relevant for HL-LHC. **Rogelio** prepared and shared a document open for comments and **Stefano's** points are posted directly on Indico. For the list of points the reader can refer to these documents.

Discussion

- The e-cloud issues hinder the feasibility of the Run 4 baseline in the number of bunches. A new option for 8b4e at 2.5e11 looks promising, but needs further studies (including feasibility in the injectors). Flat optics needs clarification on TCL settings. This year, a new Run 4 optics configuration will be studied to integrate flat optics and prepare a detailed scenario for MD studies in 2024-25.
- Machine protection requested a better phase for CC to TCP, **Riccardo** to follow up with **Daniel (Action)**. **Stefano** reported from discussions with Enrico that it is not clear that BI backs up the coronagraph performance at 7σ .
- The collimation team requested tight collimator settings in the first year of Run 4. **Stefano** asked what are the assumptions on the crab cavities impedance for the impedance check. **Nicolas** commented that studies are still ongoing. **Rogelio** recommended to perform estimates with and without the foreseen mitigations for the CC main mode instability. **Stefano** observed that if it was not for the crab cavities, tight or tighter collimator gaps should be compatible with 1.8e11 ppb.

Riccardo proposed to use new IR7 optics for Run 4 optics and MD for 2024-25. **Stefano** recalled that the new optics is not exactly for free due to the additional operation complexity, but he is in favour of using it if it brings advantages, assuming that the issue of the crab cavity impedance should be solved independently. **Riccardo** reinforced that any reduction in octupole current is very significant for DA and beam lifetime. **Lorenzo** added that also asymmetric settings should be considered as impedance mitigation. **Pascal** and **Stefano** stressed that the cleaning efficiency cannot be compromised, therefore all mitigation measures should be carefully tested experimentally.

- **Stefano** asked about the timeline on the studies on the triplet polarity inversion. **Riccardo** replied that the polarity inversion has a strong impact on β^* reach and needed only to extend HL-LHC runs beyond 4000 fb⁻¹, therefore he sees a potential interest starting from Run 6.
- On TOTEM and high $\beta^*>30\text{m}$ optics, **Rogelio** clarified that there is no request for HL-LHC.

3. DESCOPING OF 60A PC AND RELATED NOISE ISSUE (MIGUEL BASTOS)

Miguel presented the outcome of the measurements of the noise of the 120A DCCT in the LHC. Typically, DCCTs present modulation noise in their output. In the case of the LHC 120A DCCTs this is in average 16ppm pkpk. However some units had an excess noise of about 100ppm pkpk. The specification for class 4 is 45ppk for noise in a 500Hz bandwidth. Because the regulation sample the measurement at 50Hz, the DCCT noise is aliased down to 20Hz. At this frequency, due to the high inductance, the expected noise in the current of the magnets is at 1 ppm peak-to-peak, which is well within specifications. **Michele** stressed that the estimates should be considered as worst-case scenario. **Guido** reported that he did not recall seeing 20 Hz and harmonics (50, 70, 120...) in the beam spectrum.

4. AoB

The next meeting will be on March 7th.

Reported by Riccardo De Maria