218th HiLumi WP2 Meeting

Tuesday 19th September 2023, 09:30 – 11:00

Chairs: Rogelio Tomas

Speakers: Rogelio Tomas, Nicolas Mounet.

Participants (17): Yannis Angelis, Hannes Bartosik, Roderik Bruce, Xavier Buffat, Riccardo De Maria, Joschua Dilly, Lorenzo Giacomelli, Massimo Giovannozzi, Lotta Mether, Nicolas Nounet, Yannis Papaphilippou, Kostantinos Paraschou, Stefano Redaelli, Guido Sterbini, Rogelio Tomas Garcia, Carlo Zannini, Markus Zerlauth

AGENDA

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MEETING ACTIONS

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

1. GENERAL INFORMATION (ROGELIO TOMAS)

Rogelio reported on the recent news:

- The new schedule will not be addressed at the annual meeting.

Minutes and actions of the 20230704 WP2/WP4 special meeting were discussed.

- Lorenzo will advance on the crab cavities growth rate next week.
- Few hours were assigned for crab cavities MD, but there was no conclusive result to report.
- WP13 needs to check if crab cavities pickup can have good signal with offsets

Minutes and actions of the 20230829 WP2 meeting were discussed, but no follow-up reported.

2. IMPEDANCE AND INSTABILITIES (NICOLAS MOUNET)

Nicolas presented the draft on the transverse instabilities for the next HL-LHC annual meeting. **Nicolas** recalled the impedance studies carried out during last year. The impedance model has been fully reimplemented in the PyWIT framework by Lorenzo and others. In addition, the model now has new collimator materials, resistive-wall effect of collimator tapers, crab cavities fundamental mode and 160 m of stainless-steel warm pipes close to the triplets.

The fundamental model of the crab cavities has been studied extensively because the foreseen feedback cannot completely damp. One mitigation consists in implementing using the comb filter, which needs however a bunch-by-bunch tune shift below 5 10-3. Another mitigation consists in using flat optics. A global split down of the impedance has been shown using relaxed collimator settings.

Nicolas recalled MD studies to measure tune shifts, growth rate, octupole thresholds.

The final stability results show that the stability threshold reduced after a review of tail assumption.

Nicolas presented 3 scenarios for flat top:

- Relaxed settings with comb filter
- Relaxed settings without comb filter, but flat topics without ATS factors
- Tight settings with comb filters

An outlook slide will be added.

Discussion:

- **Riccardo** suggested checking if the new HL-LHC Y-Chamber is in the model. After the meeting Lorenzo checked and the Y-chamber (geometric impedance) is in the HL impedance model.
- **Rogelio** proposed adding a scenario with relaxed collimators and std feedback (no comb filter).
- **Riccardo** asked if it is possible to add the scenario with negative polarities. Nicolas will mention, but probably results will not be able to show for the annual meeting.
- **Yannis** also asked if tight settings with flat optics + std feedback could also be added.
- **Lorenzo** also recalled worth mentioned IR3 + IR7 studies (optics, collimator settings, materials), which have the potential to improve the impedance by 30%.

3. BASELINE (ROGELIO TOMAS)

Rogelio presented the outline of the presentation, which will focus on describing why we need a new baseline for Run 4:

- New additions to the baseline: MS10 & BETS upgrade
- Removal of the 11T dipoles and HEL from the baseline
- Newly found CC main mode instabilities
- Newly found e-cloud limitations in Run 3
- Evolving schedule

A new schedule with updated accounting of MD days, scrubbing, TS.

Rogelio showed flat optics options for the end of levelling for nominal and ultimate luminosity. **Rogelio** will add reference to the new studies from WP10.

Discussion:

- **Markus** clarified that the schedule did not shift, but LS3 takes longer because it takes now into account activities that do not belong to the HL-LHC project. A new baseline will be presented at the C&S review and potential approved which shows a longer LS3, however several optimizations are not yet factored in, and therefore the next schedule has margin to shrink again.
- Upon request of **Roderik**, **Markus** clarified that there is still the option of having ion run in Run 5 and 6.
- **Roderik** clarified the missing 11 T does not require a new IR7 optics.
- **Roderik** remarked that the worst case for the crab cavity failure is 8 time lower than the damage limit. **Rogelio** remarked that still the crab failure cases are considered critical and mitigation required.
- **Rogelio** clarified that the baseline should find gains.
- **Riccardo** asked if possible to clarify the relation between baseline Run 4 and Run 5/6 baseline.

4. AOB

The next meeting will be announced in two days.

Reported by Riccardo De Maria