228th Meeting of the Machine Protection Panel

LHC topics

July 1st, 2022, via Zoom

Participants:
M. Deile (EP-CMT), Y. Dutheil (SY-ABT), C. Hernalsteens (TE-MPE), D. Lazic (EP-UCM), A. Lechner (SY-STI), S. Mazzoni (SY-BI), D. Mirarchi (BE-OP), F. Moortgat (EP-CMG), A. Radeva Poncet (BE-CSS), M. Saccani (SY-BI), B. Salvant (BE-ABP), B. Schofield (BE-ICS), R. Secondo (TE-MPE), M. Soderen (SY-RF), M. Solfaroli Camillocci (BE-OP), G. Sterbini (BE-ABP), M. Trzebinski (EP-UAT), J. Uythoven (TE-MPE), F. Van Der Veken (BE-ABP), J. Wenninger (BE-OP), C. Wiesner (TE-MPE), D. Wollmann (TE-MPE), C. Zamantzas (SY-BI).

The slides of all presentations can be found on the website of the Machine Protection Panel and on Indico (228th meeting).

Minutes and actions from the 226th (LHC topics)

The minutes of the previous meeting have been distributed and are approved.

Readiness of Machine Protection and related systems for stable beams with 3-12 bunches at 6.8 TeV

Collimation (D. Mirarchi)

Daniel confirmed that the loss maps have been completed and that a preliminary analysis is on-going. Frederic ran most of the offline analyses already. No showstopper has been identified at this stage.

Larger than expected losses right of IR1 at the TCL6 and RPs are being investigated. Daniel asked to confirm that this is not related to the prior issue in the settings generation for the TCL. Daniele replied that it is not and that the newly generated settings have been verified online and with NXCALS.

Jan asked about the loss maps summary table and which loss maps are already performed and validated, also for the ones at injection energy. Especially Jan asked for the asynchronous dump at injection, as this one is not marked. Yann confirmed that the asynch dumps at injection have been indeed already validated. Daniele will include that information in the table.

Injection (Y. Dutheil)

Yann stated that the RBAC protection issue (update at the FECs level) is still present. An action is open on this topic. ABT devices are being updated and require manual change.

Concerning the ring BLMs, at injection most of the losses are observed at the TCTs in IR7. The injection BLMs are, thus, not limiting the injection. The blindable BLMs are not setup and ring BLMs threshold have not been changed.

Jan asked how close we are to the dump thresholds. For 144bpi for b2 we are above the 50% dump threshold. Jorg commented that this is not re-assuring. Yann commented that hopefully switching to BCMS will reduce the losses. Yann commented that the phase space coverage of the TCDIS is not perfect and that more cleaning might be happening in IR7. This is a single turn effect.

Daniel asked if the steering with 12 bunches is performed regularly. Jorg commented that there are differences of up to 0.5mm between nominals, the 12-bunch trains, and the full trains.

LBDS (Y. Dutheil)

There is still an issue with missing BLM data to the XPOC. Christos commented that the timing team has produced a new firmware for the timing card (CTR) as it was understood that the problem originates from there. Lab tests are being performed and it will then be deployed to the operational systems.

The TDE monitoring is followed-up by STI. All parameters are nominal so far. Cedric commented about the data available in NXCALS. It has been confirmed after the meeting that all signals are available in NXCALS.

The interlock BPMs tests have been completed and one surprising result was observed. This is followed-up by BI.

The direct BLM tests will be performed next week.

Nothing critical for stable beams with nominals and short trains at flat top.

BLM (C. Zamantzas)

Christos commented on an issue triggering the SIS (from the BLM rack in SR5) giving a false high-voltage interlock to the SIS. This has been fixed. The CPU timing card has been replaced and it can be unmasked from SIS. Jorg agreed to unmask it on July 6.

The blindable BLMs can be tested if needed. Daniel agreed that this should be done.

Daniel summarized that the BLM systems is ready for stable beams.

MI (R. Secondo)

Raffaello summarized that the BPMs in IR6 has been tested with the BIC and that the BCCM, which will not be used operationally this year has not been tested. The RF tests were performed.

The LHCb VELO has not been tested. Jan commented that the goal is to protect the experiments, however, if we proceed to stable beams without having tested the full interlock

chain to LHCb a risk is present, but we cannot test further. Jorg added that the connection of the VELO to the CIBU has been tested but that the full interlock chain has not. It has been confirmed after the meeting that this has been tested.

The SMP has been tested, except for pending beam tests, waiting on higher intensities at flat-top.

FMCM for RD1 and RD34 has been performed, except one last missing test. It was decided that other FMCM test on other system will not be performed. The checklist tool has been updated accordingly.

Vacuum system

Gregory confirmed prior to the meeting that the vacuum system is ready.

SIS

Jorg confirmed that the TDE pressure thresholds are published. The ADT intensity interlock was tested by the ADT team in Jorg's absence. Jorg would like it to be repeated. The bunch length interlock during the ramp was not yet tested. The collimator BPMs are all set-up. Jorg commented that in IR7 the thresholds are very tight and some BPM are already within 50% of the threshold values. This must be followed-up.

One missing test is the redundant powering of the LBDS frontend computer. This must be re-tested. It will be planned during one of the coming accesses.

Daniel asked if it is planned to unmask the global post-mortem in the SIS. Jorg replied that this and the IQC will be unmasked.

ADT

Martin confirmed that the ADT is fully tested and ready for stable beams.

XRPs

Maciej asked if the loss maps are fine. Jorg commented that the loss maps in IR1 are not "OK" for high intensity. This is being followed-up by the collimation team.

Conclusion

Daniel concluded that all the systems are in good state and ready for stable beams with three bunches.

AOB

Status and next steps of the BBWC commissioning in Run 3

Guido presented the status of the wires in the LHC for Run 3. The goal is to switch the wires embedded in the TCTs in IR1 and 5 only after the "End of Levelling" (EOL) at 350A.

All the commissioning and interlock tests have been successfully performed without beam. The wire polarity was tested with beam in May. The 5th axis alignment was done on June 22. The next steps concern the tune feed-forward, OMC optics measurements and loss maps with wires powered. These tests mist the creation of settings to be performed; a new software tool is being developed to drive the functions of the Q4L/R tune correction. The algorithm was presented at the 135th LBOC.

Daniel commented that that these should be integrated in the PC interlock. Jorg replied that the first step is to be able to generate the settings. Then the tests can be performed. Michi will prepare the software to be able to drive this beam process, including the PC interlock settings.

Matteo commented about the PC interlock will not protect in case the wires go off; this is protected by the WIC. The PC interlock is not fast enough.

Action: Perform all BBWC tests to allow the powering of the wires during the ramp-up once the software is ready (Guido, MPP). Comment from after the meeting: it was agreed to finalize the test of the powering fault in the missing two horizontal wires during the validations after TS1.

Summary of actions

The actions from the meeting are:

- Status and next steps of the BBWC commissioning in Run 3
    1. Perform all BBWC tests to allow the powering of the wires during the ramp-up once the software is ready (Guido, MPP).