

241st Machine Protection Panel Meeting (LHC)

Friday 01 December 2023 (Zoom)

[Indico](#)

Participants

C. Bracco (SY-ABT), A. Butterworth (SY-RF), A. Calia (BE-OP), E. Calvo (SY-BI), C. Hernalsteens (TE-MPE), M. Hostettler (BE-OP), D. Jacquet (BE-OP), D. Lazic (EP-UCM), N. Magnin (SY-ABT), S. Morales Vigo (SY-BI), A. Radeva Poncet (BE-CSS), M. Saccani (SY-BI), B. Salvachua Ferrando (SY-BI), G. Sanchez (TE-MPE), M. Solfaroli Camillocci (BE-OP), G. Trad (BE-OP), M. Tsvarkaleva (TE-MPE), J. Uythoven (TE-MPE), J. Wenninger (BE-OP), C. Wiesner (TE-MPE), D. Wollmann (TE-MPE), C. Zamantzas (SY-BI), P. Ziegler (TE-MPE)

Minutes from previous LHC MPP meetings (D. Wollmann)

D. Wollmann recalled the actions from MPP 240th:

- CCR describing changes in LBDS remote validation feature (C. Boucly and N. Magnin)
- Update BCCM commissioning procedure (M. Gasior)
- Add BCCM in the commissioning checklist (C. Hernalsteens)
- ECR describing the changes in SPS SMP-BCT changes in YETS 23/24 (R.Secondo and T.Levens)

New beam loss analysis module in the Post Mortem system (C. Wiesner)

C. Wiesner presented the new Beam Loss Analysis Post Mortem module. The goal of the new module is to provide an automatic analysis of the losses and an overall result OK or NOT OK. The analysis is based on individual BLM classification thresholds that are derived from the BLM data of Run2 and 2022.

C. Wiesner then explained in detail how the BLM thresholds are calculated and how they have been validated. The new analysis module has been used in operations since October 2023 and already proved useful to understand the reason for beam dumps.

Discussion

G. Trad asked if OK/NOT OK flag is sufficient to detect more complex failure scenarios. C. Wiesner answered that this clear, binary classification was chosen on purpose. The tool is designed to support the OP and expert teams in spotting potential anomalies by showing BLMs that have higher than expected losses. Nevertheless, providing complementary

information about known beam-loss patterns (e.g. 10Hz, UFO and instability) is currently studied based on supervised ML techniques.

G. Trad asked if there is a link from this new PM module and the Machine Protection OK (latching) flag of the PM analysis. C. Wiesner answered that the idea of this module is to provide easier diagnostic to the EiC on shift but is not blocking operations in case of a NOT OK event. However, this is technically possible and can be studied for the future.

C. Zamantzas commented on the mentioned lack of BLM data on a few occasions during 2023. They investigated on their side and they observed that the UFO Buster is oversaturating the BLM system and therefore sometimes it is not responding correctly. OP will follow up on this and collaborate with the BLM team to alleviate this issue.

MKBH erratics and experience with MKB retrigger system (N. Magnin)

N. Magnin recalled the former re-triggering system and presented in detail the new retriggering system for the MKB that had been developed and deployed during LS2. The new retriggering system has been put in place to protect the integrity of the beam dumps in case of failure of MKBs.

The correct functioning of the system is validated automatically after each beam dump by checking that the different triggers arrived in time.

In 2023 the system correctly functioned during two MKBH erratics. Thanks to this, in the first event the dilution was only minimally altered and in the second case the dilution pattern was reduced but not to a critical level for the TDE. In both cases, the retriggering system is accounted for by the TDE specification and all the possible dilution patterns will not cause a failure of the TDE even with HL-LHC beam.

Discussion

D. Wollmann asked about the update of the procedure to recover in case of a MKB erratic event. N. Magnin explained that since the new MKB retriggering system ensures that the dilution is never reduced to a critical level for the TDE, some mitigation actions can be relaxed. For example, it may not be required anymore to perform a visual inspection with an endoscope and cleaning after each MKB erratic. N. Magnin also mentioned that some changes had already been applied for the second MKBH erratic in 2023. N. Magnin will update the recovery procedure accordingly.

D. Wollmann thanked N. Magnin for the presentation which closes a long standing action and congratulated SY-ABT for this successful implementation of the system.