

# 240th Machine Protection Panel Meeting (LHC)

Friday 17 November 2023 (Zoom)

[Indico](#)

## Participants

C. Boucly (SY-ABT), C. Bracco (SY-ABT), A. Butterworth (SY-RF), A. Calia (BE-OP), C. Durmus (SY-ABT), J. Garnier (TE-MPE), M. Gasior (SY-BI), D. Jacquet (BE-OP), D. Lazic (EP-UCM), T. Levens (SY-BI), N. Magnin (SY-ABT), A. Radeva Poncet (BE-CSS), M. Saccani (SY-BI), R. Secondo (TE-MPE), M. Solfaroli Camillocci (BE-OP), J. Wenninger (BE-OP), C. Wiesner (TE-MPE), D. Wollmann (TE-MPE), C. Zamantzas (SY-BI)

## Minutes from previous LHC MPP meetings (D. Wollmann)

No comment was raised regarding the minutes of previous MPP LHC meetings. Therefore, the circulated minutes are considered approved and all items discussed have been implemented.

## Remote LBDS generator validation and condition system (C. Boucly)

C. Boucly explained that the LHC Beam Dumping System integrates multiple validation sequences that need to be run by LBDS experts. These sequences are run during commissioning and when it is considered necessary during operations, for example following a fault.

These functionalities are only available when the LBDS is in local mode, which requires the expert to be present on site (tunnel). This can be a problem during operations since it would require opening the machine and giving access to the LBDS expert, interrupting operations.

C. Boucly recalled how the internal simulator of the LBDS can be used to validate the LBDS system. It provides convenient simulation of several input signals that are useful to reproduce faults and nominal behavior of the LBDS: Pulse Generator, Energy Scan, Cycle Generation, Retriggering Generation and Sparking Activities Monitoring (SAM).

C. Boucly continued by discussing the proposal of having access to the validation and simulation functionalities remotely, in contrast to the local access needed at the moment.

C. Durmus explained the technical details of the remote access via software by stressing that the remote validation mode can be enabled only when the LBDS is not armed, the PLC is ready for simulation and the BIS loop is open (interlock).

C. Boucly commented that the deployment of this system is foreseen during YETS 23/24, standalone tests to be done before the end of the year and the validation can be done early 2024. In case of problems, all the changes can be safely reverted.

## Discussion

J. Wenninger asked if there is a way from OP to prevent the system from going into simulation. N. Magnin explained that this can be done and a specific RBAC role can be required to go into simulation and OP can assign this role on-demand.

D. Wollmann asked if it is expected to do the revalidation of the LBDS regularly. C. Bracco answered that there is a request to validate the system ideally during every ramp-down. Many checks can be done remotely to reduce the risk of erratics and flashover. D. Wollmann summarized the discussion by stating that more experience is needed with remote validations and it can be foreseen to be added to the operational sequencer during the standard preparation.

D. Wollmann asked how the simulation mode will be visualized in the CCC. C. Boucly commented that the new state will be included in the LBDS GUI that is used in the CCC. J. Wenninger commented that OP will add a check in the nominal sequencer to assert that the LBDS is not in simulation.

D. Wollmann commented that the introduction of this remote simulation functionality would require a change in the PLC critical code, he then asked how this would be tested. C. Boucly answered that the hardware and software tests that are part of the re-validation of the system will also cover the PLC code.

D. Wollmann summarized the discussions and stated that the proposal for the LBDS change is endorsed by the MPP and that a CCR documenting all the changes to the LBDS will be circulated and approved (**Action**). In particular, the document should detail the conditions for safe LBDS remote simulation of only one beam and the testing/commissioning steps planned.

## BCCM - Experience from 2023 and strategy for 2024 operation (M. Gasior)

M. Gasior recalled the functionality of the BCCM system and the changes made for 2023. BCCM systems A and B are deployed without any change since June 2023.

M. Gasior explained that the calibration of the BCCM system is based on the signal of the fast BCT. Due to the BCCM design, there is a weakness in the system that significantly overestimates the intensity of single bunches. Another weakness of the system is the reaction to spurious  $dl/dt$  signals during injections and during the ramp mainly due to the bunch length dependence.

M. Gasior explained that new algorithms have been developed during 2023 to cope with these limitations. He then presented 2 options for commissioning of 2024:

- scenario 1: perform both required (minor) and algorithm upgrades to all the systems and commission them according to procedure when intensity reaches  $\sim 600e11$
- scenario 2: perform required (minor) updates on system A and B and deploy the new algorithms to system C (to be tested during 2024). Since system A and B are mostly

the same as 2023, assume that the interlock works and enable it before the first beam 2024. When intensity reaches  $\sim 600e11$  perform the full commissioning according to procedure

## Discussion

J. Wenninger asked if the BCCM behavior has been studied during the 2023 ion run. M. Gasior answered that they checked the system during the ion run and they didn't see a limitation for ions with respect to the thresholds.

J. Wenninger commented that OP should mask the BCCM in the BIS during the lossmaps from now on.

J. Wenninger proposed a more relaxed operational safety margin for the dump threshold and M. Gasior answered that they will consider this when setting up the thresholds for 2024.

D. Wollmann summarized the discussions and stated that the MPP endorse commissioning scenario 2. M. Gasior will update the BCCM commissioning procedure (**Action**) and C. Hernalsteens will add the BCCM as part of the checklist for commissioning (**Action**).

## New BCT5 Connection to the SPS-SMP and Implications for the YETS 2023-24 (R. Secondo, T. Levens)

R.Secondo and T.Levens presented the changes to the SPS SMP-BCT connections to be done in the YETS 23/24.

They started by reminding the current BCT source signal for the SPS SMP-A which still relies on BCT3 and BCT4 devices. Due to recent issues with BCT4, their end of life electronics and lack of spares, the SPS SMP-A system BCT3/4 connections will be replaced with BCT5-B. This is a redundant identical pair of BCT-A already connected to the SMP-B system.

These changes will be reflected in the SMP GUI.

## Discussion

Following a short discussion, R. Secondo and T. Levens will prepare a short ECR documenting the proposed changes to the system (**Action**).

## AOB

J. Wenninger raised some concern about the injection problems experienced in 2023 for B1. C. Zamantzas will design a plan to have more BLMs for detailed diagnosis of this sensitive area. The goal is to study the issue in detail to improve 2024 operation. D. Wollmann proposed to follow up this topic before the end of January in another MPP meeting.

## Actions

Remote LBDS generator validation and condition system

- CCR describing changes in LBDS remote validation feature (C. Boucly and N. Magnin)

BCCM - Experience from 2023 and strategy for 2024 operation

- Update BCCM commissioning procedure (M. Gasior)
- Add BCCM in the commissioning checklist (C. Hernalsteens)

New BCT5 Connection to the SPS-SMP and Implications for the YETS 2023-24

- ECR describing the changes in SPS SMP-BCT changes in YETS 23/24 (R.Secondo and T.Levens)