

162nd Meeting of the Machine Protection Panel

The meeting took place on April the 20th in 774/1-079.

Participants: C. Bracco, F. Giordano, E.B. Holzer, D. Lazic, A. Mereghetti, Y. Nie, B. Peterson, S. Redaelli, C. Schwick, J. Uythoven, M. Valette, J. Wenninger, D. Wollmann, M. Zerlauth.

The slides of all presentations can be found on the website of the Machine Protection Panel:

<http://lhcbmpwg.web.cern.ch/lhc-mpwg/>

1.1 Approval of MPP#160 and MPP#161's minutes

- Actions from the 160th MPP:
 - A. Rossi: send schematics of interlock to MPE to verify the interlock card and if re-testing is required. **Done and approved.**
- Actions from the 161st MPP:
 - Jorg: the TDE over-pressure interlock should be masked with the new expert mode and unmasked when needed; the associated injection veto interlock will not be touched.
 - MPP: verify with MP3 if a SIS interlock for the temperature excess in a DFB is required or if it is sufficient to take care of this via procedures.
- No additional comments were received on the minutes; they are therefore considered approved.

1.2 MPS readiness for intensity ramp-up & intensity increase checklist (M. Zerlauth)

- Markus gave a summary of the machine protection systems tests done during the commissioning. The tracking of the tests results is done in the file at this [link](#).
- All interlock tests were done, a few items were specifically done this year or still require some follow-up:
 - The test with FMCM masked and pilots were done at flat top for RD1.LR1/5, so one can see how much margin the FMCM is giving wrt to the BLM trigger and how the orbit changes until the dump by BLMs.
 - Jorg commented the losses went to a cold magnet behind the TCSP due to coarse collimation settings so a dump was triggered without modifying BLM thresholds.
 - The BLMs validated the interlock functionality. Threshold changes in 2 and 8 are still to be implemented by Barbara and Belen. The SIS monitoring of the BLM high voltage was not yet tested this year. The tests of the direct dump BLM is yet to be done, just as the injection inhibit of blindable BLMs, which will have to wait for nominal trains.

- Chiara commented the scrubbing run would be a perfect opportunity to do this test, with long trains and higher injection losses expected.
- BI validated the DOROS tests. A calibration shift is needed. An occasional shift of PM data of a few turns is under investigation. Some BTV went stuck in the dump channel, which required an access and interrupted injection validation.
- For collimators, all hardware tests were done, position and temperature. The validation for the new interlock for crystal collimators is pending, the FESA class was late and RBAC roles were not ready and would have to be re-released. This test is not time critical as it is for MDs, it will be done for the next TS.
 - Stefano commented there is no danger as the movement is not accessible from the CCC. Jorg added there is a dedicated SIS interlock as well.
- The wire collimator team proposed to test the relative position of the wire with the beam using the fifth axis with a nominal bunch at top energy. This test was delayed in its current form as requested by Jorg. During loss maps, some AFP pots were stuck after extraction.
 - Jorg would prefer the collimator movement to be disabled during beta* levelling, the current levelling application is generic and allows the movement of all collimators.
- The vacuum tests were done by Gregory. The only pending task is the validation of the alarms going from vacuum to the MKI and RF/ADT for high intensity beams; it is an analogue signal on top of the binary interlock.
- LBDS: the limits for the newly installed dump BLMs have to be added to a new release of the XPOC (already done by Nicolas et al).
- Regarding the SIS, Jorg would like a review of the crystal collimator and TDE pressure interlocks. A clean up of old and unused interlock mentioned in the previous MPP was already done (IT motor movement, ELQA interlock and BSRA dump interlock). The bunch length interlock is now active.
- The SMP has a new header for the SPS BCTs to identify where the data is coming from. There are now final flags for stable beams and movable devices in.
- There will be checklists for each filling scheme; Daniel will send the lists to be completed for the ones that are already done. The plan is to go to 300b on Monday.
- The commissioning is as efficient as it can get. There are now automatic tests providing data to be validated faster than the experts can keep up with.
 - Chiara commented the most important thing is to avoid doing critical steps in a rush. Stefano added many things could be performed in the meantime like preparation for MDs which require only beams at low intensity.

**AOB - ADT vs e-cloud measurements - proposal for machine protection verification
(D. Wollmann)**

- Daniel presented machine protection considerations for a measurement of e-cloud parameters already done in the Tevatron and SPS where an RF signal from the ADT will be measured by BPMs.
- The BPMCS plane not used by the ADT (left of IR4) will be used as pickups. Some additional cabling was necessary. The 4 GHz signal will be generated by a 25 W source (36 dB of signal), while the actual measurement will only be done using ~5 W of operating power. The e-cloud signal should be hardly measurable (in the ADT noise level) due to the attenuation across the BPM planes and the coaxial cable towards the LLRF in SR4.
- The LMC requested to make sure this use of the ADT is not affecting the beam. As was demonstrated by Bjorn in MPP149, one can dump in time even if the ADT is exciting the beam coherently with full strength. A dump should be triggered in time if the parasitic RF signal causes losses.
 - Barbara asked when this was planned; it would be done during MD block 1.

Proposal: perform the test without beam first to have a reference measurement for the attenuation. Then, with trains at injection, which will allow to verify the ADT is still performing its damping functionality.

AOB - all

- Barbara has two fast AOBs:
 - A document on the procedure to change Monitor Factor will be released and presented in the BLMTWG, some MPP members could comment on it beforehand.
 - A document on the disabling rules was distributed and should be approved by MPP members.
- Next week, there will be another MPP on MKB retrigerring and protection of the AGK fine delay parameter, which is a follow-up from Chamonix.