

# Minutes of the 15<sup>th</sup> BLM Threshold Working Group Meeting

## May 26, 2015

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*Present:* B. Auchmann, S. Damjanovic, E. B. Holzer, M. Kalliokoski

### **Modifications to the Threshold Calculator Application (M. Kalliokoski)**

#### **Presentation**

Matti presented the latest and planned modifications to the BLM Threshold calculator. The Technical specification of the application is presented in LHC-BLM-ES-0002, EDMS No. 1280100. Current version in the EDMS is outdated and the document will be updated with the changes that are discussed in the presentation, but also with the changes that have been made previously to allow the use of QP3 models.

The main changes to the underlying models are to be made to the methods of how the number of lost protons are calculated for warm magnets and collimators (sections 2.1.3.1 and 2.1.4.1 in the document).

For the beam energy level table (section 2.3.1) that is used in the calculation of the BLM thresholds, the first energy level will be replaced by the second to get rid of the current problem affecting the use of decrease correction for the energy levels. At the bottom of the table the energy levels from 29<sup>th</sup> will be set to 7 TeV.

In the documentation there was a mistake in the IL Correction (section 3.3) that affected the previous versions of the API. This has been fixed in the current version by the presented modifications.

For the Ad-Hoc corrections (sections 3.8-3.10) the automatic energy level selection is removed since it was not visible for the user. It is replaced by a check button that allows user to set and unset all beam levels. Completely empty table is not accepted anymore.

In the original version of the documentation the Ad-hoc Bits correction (section 3.10) no fields could be left empty for the selection of the running sums. Due to this the correction was completely unusable. This is fixed by passing -1 flag from the application for every empty field. This is interpreted by the API that the value for the empty RS does not change from its previous value.

## Verification of BLM Filter Installations Using Beam Losses (M. Kalliokoski)

### Presentation

In the high loss regions of the LHC there are 181 monitors with RC filters (80 ICs and 101 LICs). There are two types of filters with 2 000 pF (small) and 47 000 pF (big) capacitors. The resistor is always 150 k $\Omega$ . There are also 34 monitors in the dump lines with filters of 100 k $\Omega$  resistor and 1 000 000 pF capacitor but these were not discussed in this presentation.

On two occasions, on 4<sup>th</sup> and 5<sup>th</sup> of April BLMTI.04L2.B1E20\_TDI.4L2.B1 monitor dumped the beam with no apparent reasons. When the issue was further investigated it was noticed that there was no filter installed for the monitor. When the issue was further investigated, it was noted that similar issues could be found from 50 other monitors. In addition another issue that the order of resistor and capacitor did not follow the same design. This did not affect the performance of the monitoring system but the filters were still replaced for consistency.

The existence of a RC filter can be seen either from the change in the mean noise level of the smallest running sums or by comparing the ratio of different running sums in a loss event. The latter one is mainly used, since it allows to distinguish the difference between big and small filters. This can only be detected by observing the ratio of the mid running sums (RS5 and 6).

Only ICs have been analyzed so far. One missing filter, from monitor BLMQI.07L2.B1E30\_MQM, can be seen from the data. Two other suspicious ones have been seen but they cannot be confirmed due to missing losses in the region. In addition there were 8 monitors where the losses were not high enough to state anything from the existence of the filters. Six of these are in cells 4 and 6R8.

In general the losses that have occurred in the regions where the LICs are located have been too small to state anything about the installations. Dedicated splash event might be needed for this.

## BLM Warning Levels in the Inner-Triplet Magnets (B. Auchmann)

### Presentation

Monitors on inner-triplet magnets are crossing the 30% warning level in the presence of normal luminosity-debris for higher running sums, RS6-12.

The underlying protection scenario assumptions are that the debris from pp interactions in the IPs will not quench triplet magnets and that the Q2B orbit-bump scenario is sufficient for quench prevention.

The threshold families are divided according to the 9 positions on the magnet and grouped by putting IP1 and 5, and IP2 and 8 monitors in one family, resulting in total of 18 families.

To get rid of the warning level problem, an AD-Hoc correction that fixes the maximum level at 6.5 TeV and above to specific running sum to move the thresholds over the debris signal limit.

## **AOB**

### **New time and location for the BLMTWG meetings**

There will be a change in the location and time of the BLMTWG meetings due to coming overlaps with other meetings. The new time and location for the meetings will be Tuesdays at 2 pm in 774-2-058.

### **Next Meeting**

2<sup>nd</sup> June 2015 at 14:00 in 774-2-058.

Minutes by M. Kalliokoski (BE-BI)