Minutes of the 11th BLM Threshold Working Group Meeting March 31, 2015

Present: B. Auchmann, E. B. Holzer, M. Kalliokoski, M. Kuhn, V. Raginel, R. Schmidt, E. Skordis, D. Wollmann, M. Zerlauth

Noise Checks for New Threshold Families (M. Kalliokoski)

Matti shows the recorded noise for time periods spread over four days. Based on this data, improvements have already been made in certain regions with unexpectedly high noise. The noise is expected to diminish roughly by the same factor, by which the integration time increases from running sum to running sum. It should, therefore, suffice, to perform the check over RS1 (40 µs integration time). For the new families, the lowest applied threshold/noise ratio was found in the MB_MB monitors in certain arc locations. For all monitors the target of a ration >=10 was respected. Note that the warning level is at a third of the applied threshold, so that all new families should start operating without giving warnings. In order to better perform the noise checks, the old noise-analysis tools have now to be fixed, and monitors with new RC-filters should receive special analysis.

New Thresholds for BLMs Near Wire Scanners (B. Auchmann)

Bernhard recalled that the wire-scanner scenario was studied in some detail for the analysis of the wire-scanner quench test of 2010. Anton Lechner has used the same FLUKA model to perform the identical analysis for 6.5 TeV beam. The quench-test analysis had revealed considerable uncertainties, warranting an appropriate safety factor in the setting of BLM thresholds to protect magnets from quenching during wire scans.

Rüdiger asks whether the thresholds are set to protect magnets from quenching, or also to protect the wire. Bernhard answers that the current rationale is that the BLMs protect only the magnets. The protection of the scanner wire is on the side of the wire-scanner interlock.

New thresholds have been computed for the two MBRB (D4) monitors, as well as the MQY (Q5) monitors in position 1 and 2 (closer to the scanner) on the side scanned beam. The other Q5 monitors have the standard IPQ thresholds. It was checked by Ondrej Picha that these would not interfere with the wire-scanner losses. Moreover, for each pair of monitors (D4 and Q5), the more sensitive BLM was used to compute the thresholds. The second monitor provides redundancy for protection from damage, but not for protection from quench.

The new wire-scanner scenario gives a considerable increase in thresholds wrt. pre-LS1 thresholds. Since the wire-scanner scenario is valid only in relatively short running sums, and only one scenario per thresholds-table is allowed,

AdHoc factors are used to artificially reduce the MasterThreshold in higher running sums to pre-LS1 values.
Matti showed plots of old vs. new AppliedThresholds, taking into account that in the past the MonitorFactor had been equal to 1, whereas after LS1 it will be equal to 0.1. The comparison shows that, with MonitorFactor 0.1 in the new thresholds, injection-energy scans will be limited by the electronic limit of the BLM electronics. If the MasterThreshold were reduced by a factor 10, and a MonitorFactor of 1 were used, this problem could be partially mitigated. Moreover, the comparison showed that in terms of AppliedThresholds, the long running sums of certain monitor will see a considerable reduction in thresholds. This will need to be monitored during the period leading up to the first technical stop in order to implement modifications if necessary.

MQW Thresholds (V. Raginel)

Vivien gave an update on the calculation of thresholds for MQW magnets. The input from FLUKA (E. Skordis) and the rationale for new thresholds have been discussed in BLMTWG Meetings 5 and 7. Following the previous decision to discard background from collimation showers in the calculation of the thresholds, new thresholds were computed and compared to the thresholds used in Run 1. The thresholds are remarkably similar, given the very different nature of input data.
Bernhard mentions that for the computation of a maximum number of protons lost, the threshold generator uses a linear scaling with energy injection and collision energies. In reality this should be a 1/energy scaling. Due to this unphysical fit, the monotonicity correction in the threshold generator eliminated all computed energies but the injection energy. An adjustment to the threshold generator will be needed for the implementation of new MQW thresholds during the first technical stop.
Vivien also studied whether in the presence of steady-state showers from collimation, the above strategy gives conservative thresholds. The question boils down to the question whether the BLMResponse/EnergyDeposit ratio is larger or smaller for collimation showers than for the dynamic-orbit bump scenario. FLUKA values provided by Eleftherios indicate that the ratio is three times larger for collimation showers, meaning that the above-computed thresholds are conservative.

Next Meeting

The next BLMTWG meeting will be on Tuesday, April 14, 10h30 in Bldg 864 1-C02. Topics will include

- First experience with beam and status of BLM applications (M. Kalliokoski).
- AOBs
    - Warm-magnet threshold-generator specification update (B. Auchmann).
    - Update on wire-scanner thresholds and limits on the number of bunches to be scanned (B. Auchmann).
    - Planning of the two months up to first technical stop.

Minutes by B. Auchmann (TE-MPE)