

# Update on BLM thresholds written to hardware

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# Prioritized List of Threshold Updates

1. Arc and DS thresholds (protection from UFO-induced quenches, new BLM locations).
2. Injection regions (New monitors/monitor configurations).
3. Inner triplets, IPQs, IPDs (updated beam-loss scenarios, quench levels).
4. Remaining injection-region monitors (beam-loss scenarios, quench levels)
5. MQWs (improved beam-loss scenarios, new damage-level analysis).
6. Collimators (new FLUKA models, updated damage levels)
7. DS-region horizontal BLMs on MBs for ion runs.
8. In absence of updates, pre-LS1 thresholds apply.

**Green:** Driven to electronics. Can be seen in measurement and logging db.

**Blue:** Analysis complete. To be implemented and validated according to prioritized list until startup. Remainder follows at latest during TS1.

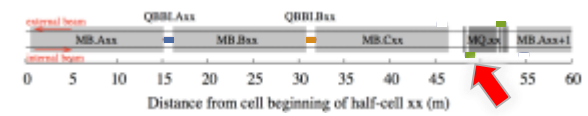
**Violet:** Analysis approaching completion. Additional modifications based on early Run-2 data. To be implemented at latest during TS1.

**Orange:** Analysis not yet started.

# New Thresholds Driven to Electronics

- MQ and MBx-MBx families in ARCs and DS
  - 5 families, 2393 monitors
- MQM families in DS
  - 3 families, 208 monitors
- Families for injection losses
  - 9 families, 11 monitors
- Families for WS
  - 3 families, 8 monitors
  
- At least 2620 monitors with new thresholds

# Thresholds on MQ Position 1.



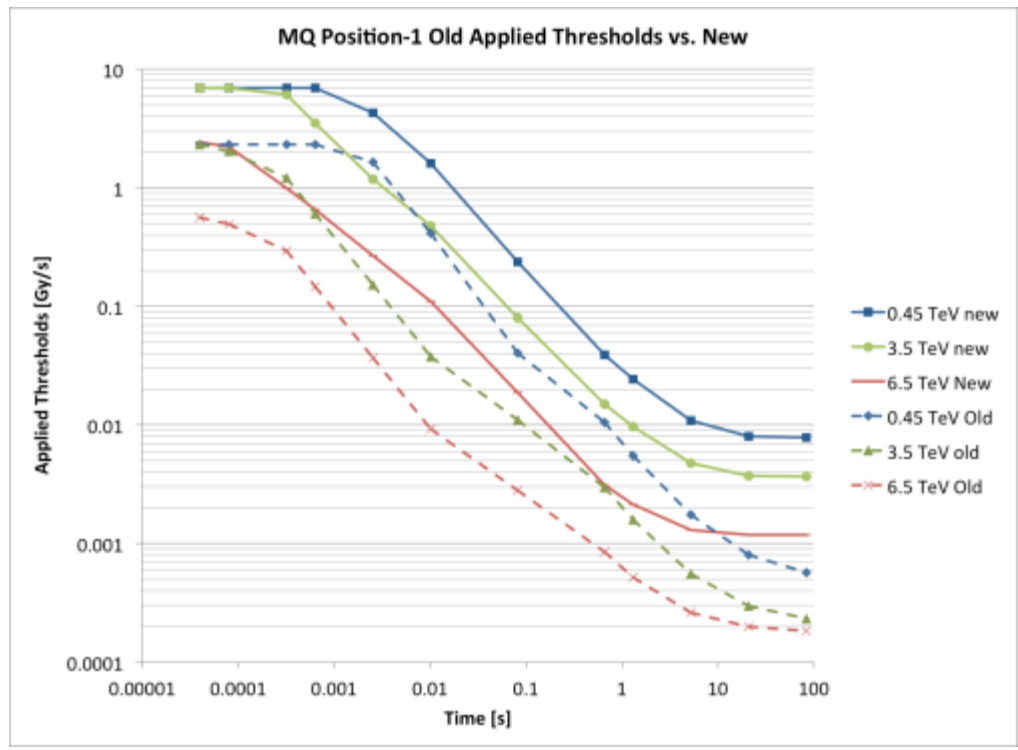
$$\text{BLMSignal@Quench}(E, t) = \frac{\text{BLMResponse}(E, t) * \text{QuenchLevel}(E, t)}{\text{EnergyDeposit}(E, t)}$$

$$\text{Gy} = \frac{\text{Gy/p} * \text{mJ/cm}^3}{\text{mJ}/(\text{cm}^3 \text{p})}$$

$$\text{MasterThreshold}(E, t) = 3 * \text{BLMSignal@Quench}(E, t) * \text{AdHoc}(E, t)$$

$$\text{AppliedThreshold}(E, t) = \text{MonitorFactor} * \text{MasterThreshold}(E, t)$$

1. Pre-LS1 Thresholds
2. Remove AdHoc corrections for short RSs (UFO) and long RSs (orbit-bump QT interpretation)
3. QP3 QuenchLevel instead of Report 44.
4. AdHoc corrections for short RSs according to quench test analysis.
5. Introduce UFO beam-loss scenario instead of BLMResponse for losses on interconnect and EnergyDeposit of Note-422 strong-kick.
6. Increase MonitorFactor from 0.1 to 0.333.



# Next Steps

- Check the thresholds from MCS checks
  - Comparison of thresholds within a family
  - Comparison of thresholds of all monitors in a one type of magnet/element
- Verify that the thresholds are sufficiently high in comparison to the noise level