BLM threshold changes for the 2016 p-Pb run at 4 ZTeV and 6.5 ZTeV

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(strongly based on the work of A. Mereghetti)

rMPP

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Motivation for threshold changes

- **Remove bottlenecks due to leakage of ion fragments from IR7**
  - → Collimation Pb quench test 2015 (MB quench at 6.37 ZTeV): BLM signals at cold magnets **up to a factor of 5.4 above the present thresholds**
  - → Scaling to 4 ZTeV indicates only minor bottlenecks, hence only **FT correction** for 6.5 ZTeV foreseen (no change of **MF**)
- **Adjust the dumping hierarchy for Pb losses in IR7**
  - → Cleaning inefficiency about a factor of 100 worse for Pb than for protons
  - → With present proton thresholds, **sig/thr ratio at IR7 collimators more than 10 times lower than in adjacent DS**
  - → Reduction of **MFs** at selected IR7 collimator BLMs foreseen such that they dump first [discussion triggered in Evian 2015, Chamonix 2016]
- **Remarks:**
  - → Changes planned to be applied to B1&B2 independently if B1/B2 is Pb
  - → Implementation in TS3, kept throughout the p-Pb runs at both energies

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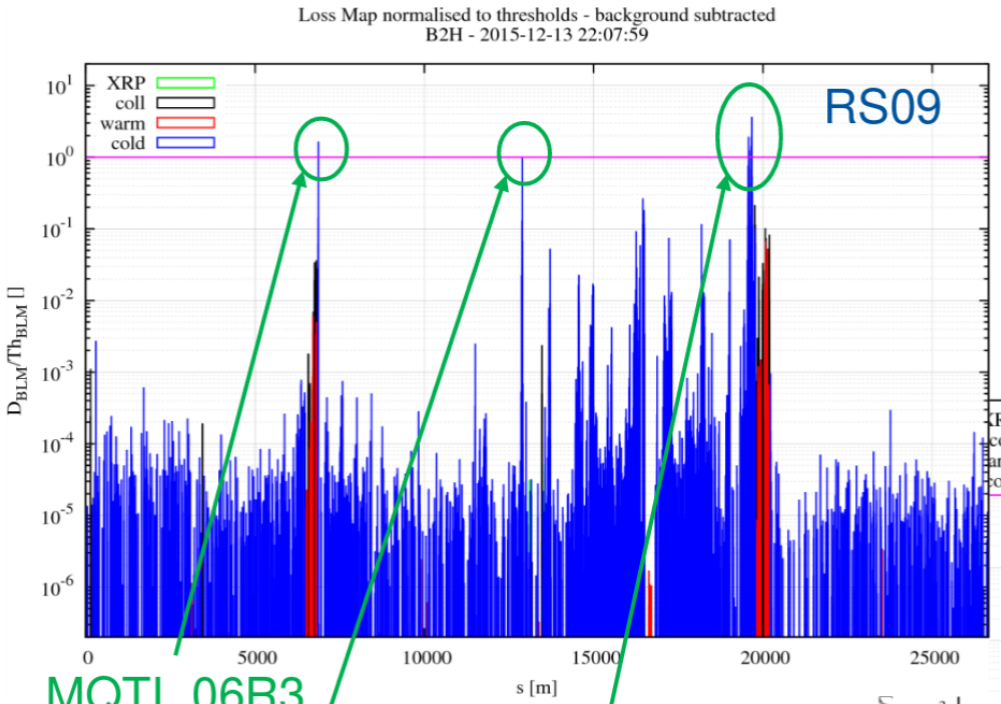
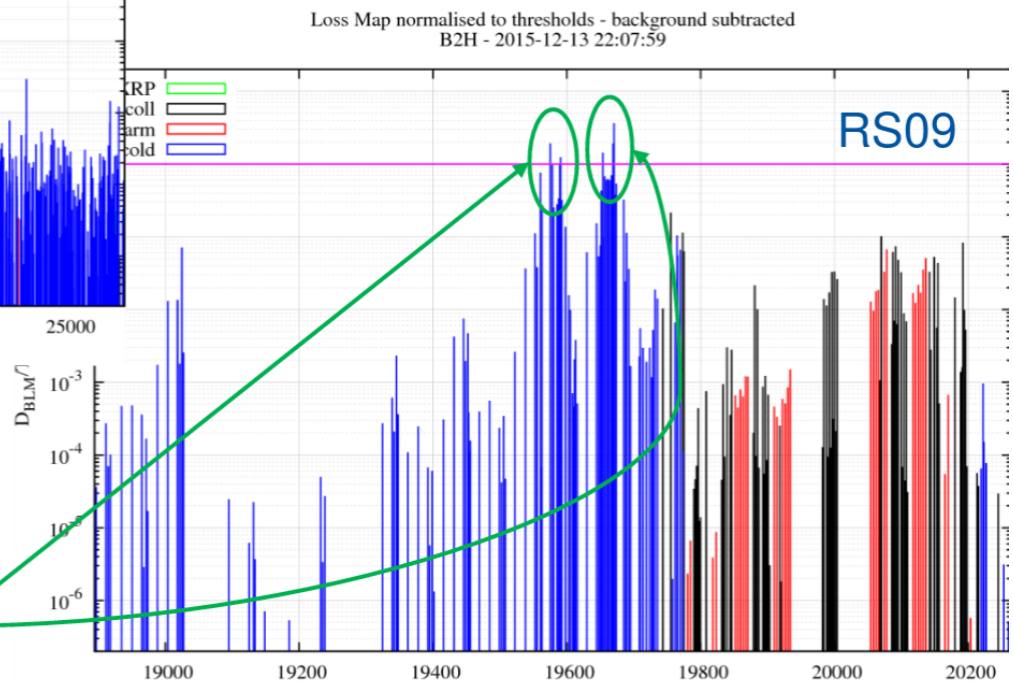
Sig/thr ratios

- Ratio of **BLM signals@quench (Pb@6.37 *Z*TeV)** and **present BLM thr. (@6.5 TeV)**:



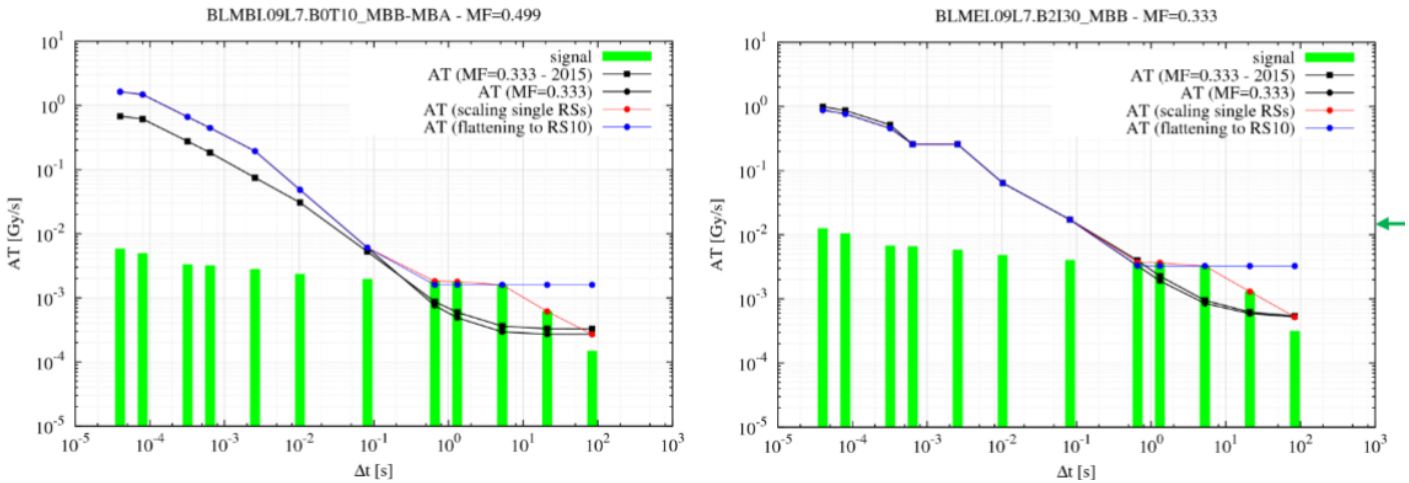
Ratio of BLM signals just before the dump (noise-subtracted) and BLM thresholds *used during 2016 proton operation* (fill #5393, from 2016-10-09 to 2016-10-10, physics):
→ BLMs above 1 would prematurely dump the beam, i.e. before actually reaching the quench level;



Figures courtesy of A. Mereghetti

Foreseen changes to remove bottlenecks at magnets

- Selected BLMs assigned to **new dedicated BLM families**:
  - All monitors mounted on MBs (horizontally) in cell 9&11 (R7 and L7)
  - 6 MB-MB monitors + 2 MQ P1 monitors in cell 9&11 (R7 and L7)
  - 2 MQTL monitors in IR6
  - 1 MQ monitor in cell 11L5 (B2)
- **FT correction** (for 6.5 ZTeV) introduced based on the **most constraining monitor** in the new family (RS08-RS12)
  - Correction follows signals measured during quench test (rising losses)



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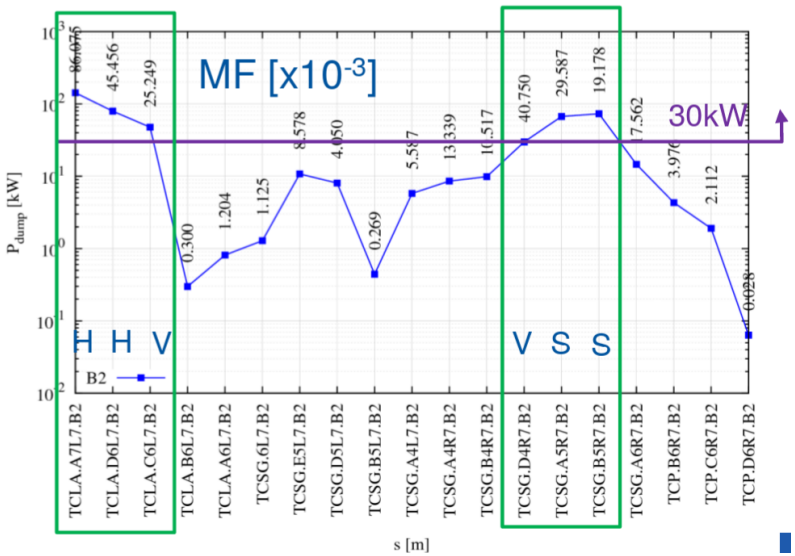
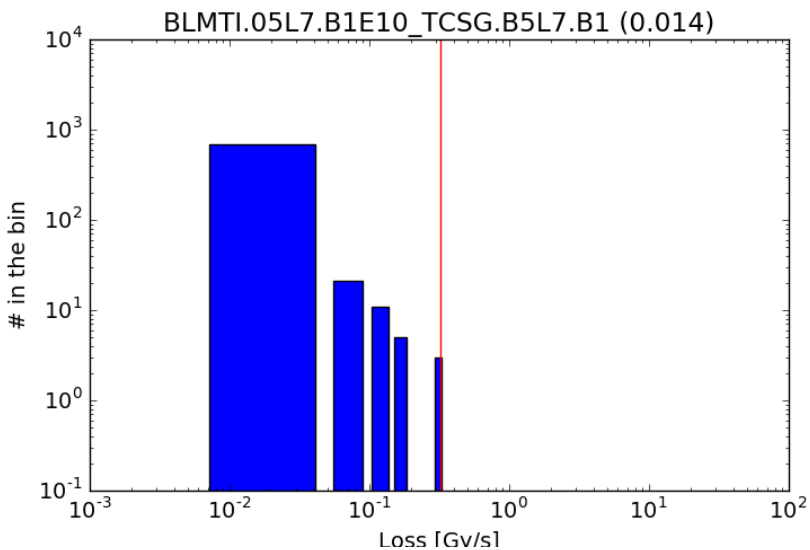
- **MF** kept at **0.333** (i.e. applied thresholds at quench level)

Foreseen changes to adjust the dumping hierarchy in IR7

- **MF** at 2 skew TCSGs reduced (per beam)
  - to **0.014-0.020** (from **0.4**)
  - dump first at TCSGs in case of instabilities, slightly below quench level of DS magnets
- **Expect no limitation for proton beam**, but will monitor closely
  - During injections: no risk of dumps with recent clean injections (last 5 weeks)
  - At flat-top: power loss up to $\sim$50 kW





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