

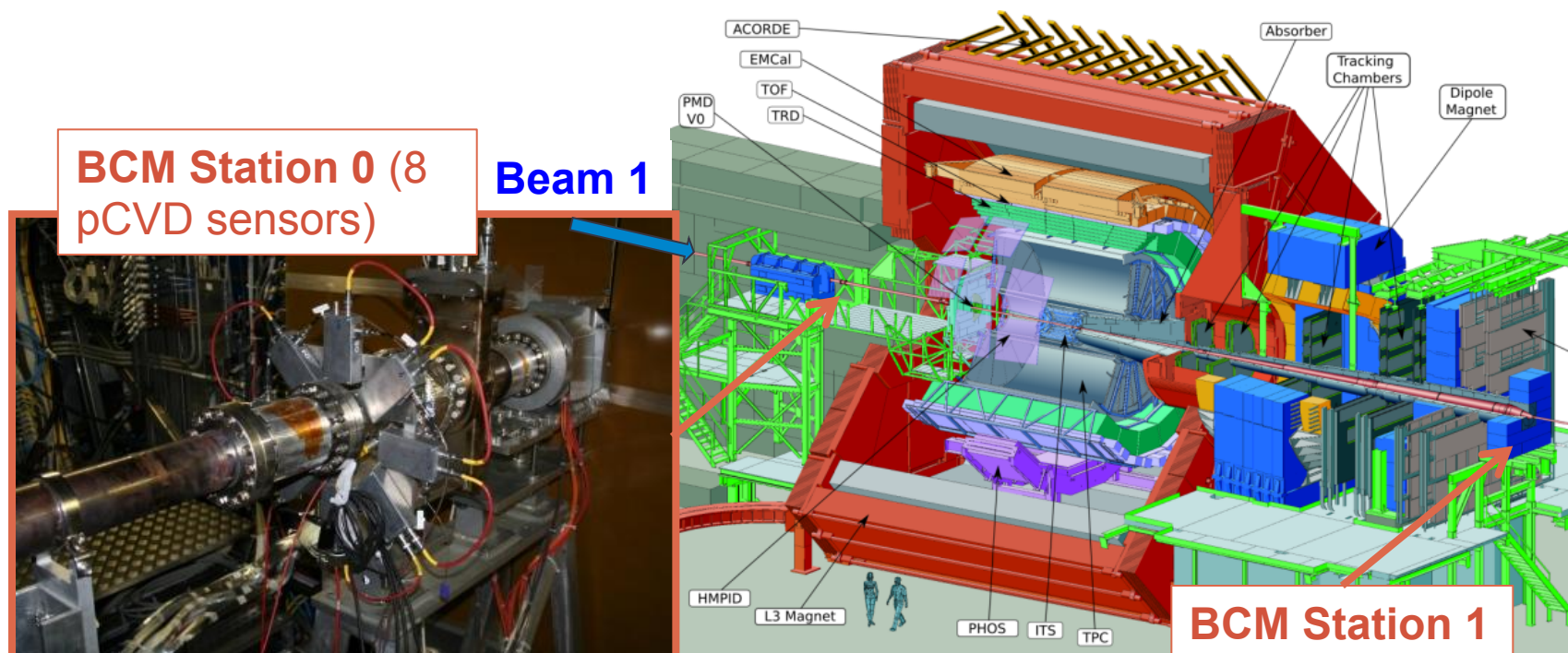
ANALYSIS OF BLM THRESHOLDS FOR ALICE

A. Alici, A. Di Mauro

20th BLM Thresholds Working Group, 8th September 2015

ALICE Beam Condition Monitor system

The protection against beam failures in ALICE is provided by the **B**eam **C**ondition **M**onitor (BCM) system. Measurements are provided by means of pCVD diamond sensors grouped in two stations located close to the beam pipe on both sides of the interaction point.



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The ALICE BCM readout electronics (CFC card + LHCb TELL1) calculates running sums (RS) over 1, 2 and 32 CFC data frames with corresponding integration times of 40 μs (RS1), 80 μs (RS2) and 1.28 ms (RS32), respectively.

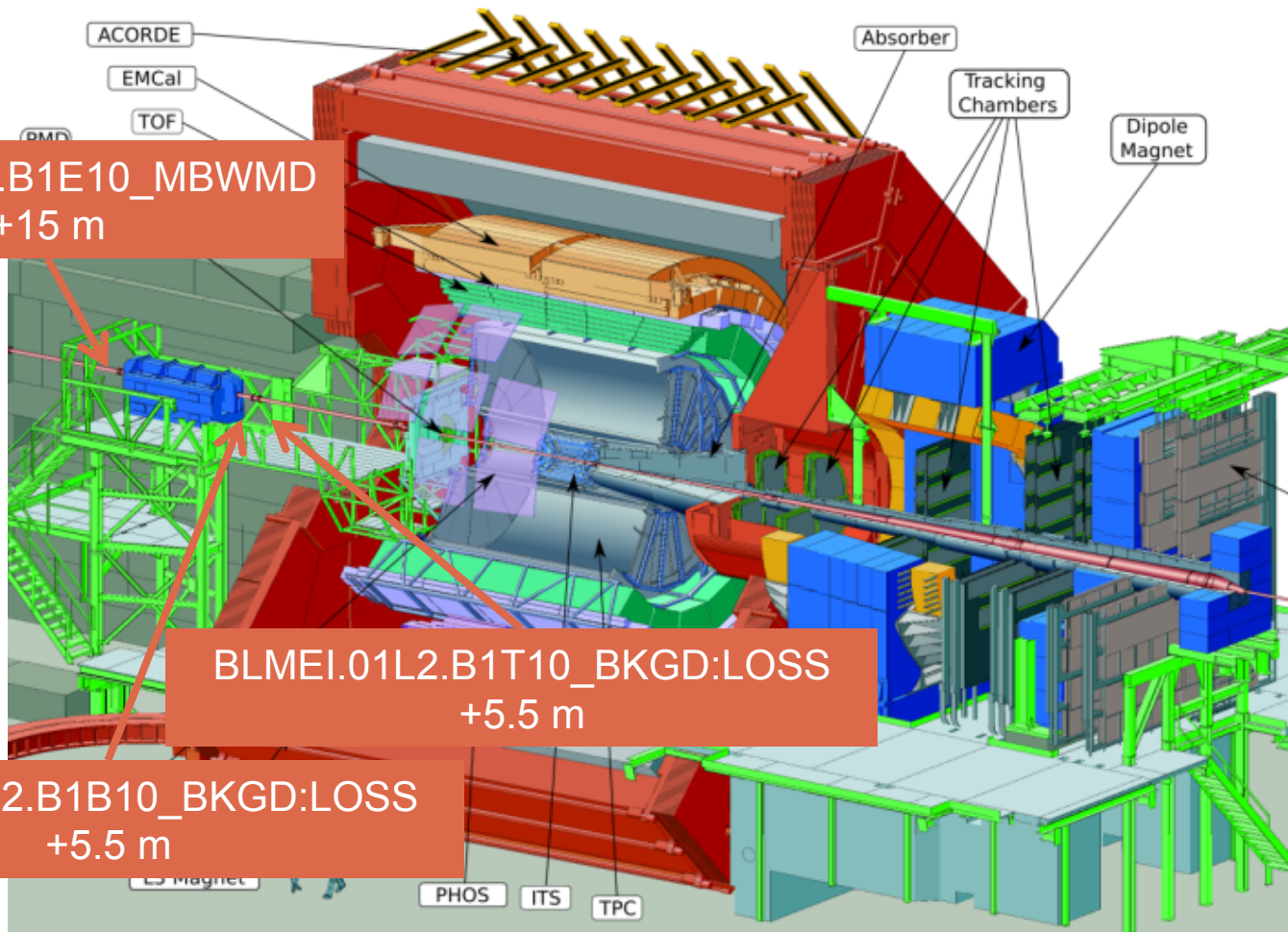
A beam dump is triggered if:

- two consecutive **single frames** of at least 3 adjacent diamond sensors exceed their threshold values;
- the **RS2** of a least 3 adjacent sensors exceed their threshold values;
- the **RS32 Sum** of one of the two stations (A/C) exceeds its threshold.

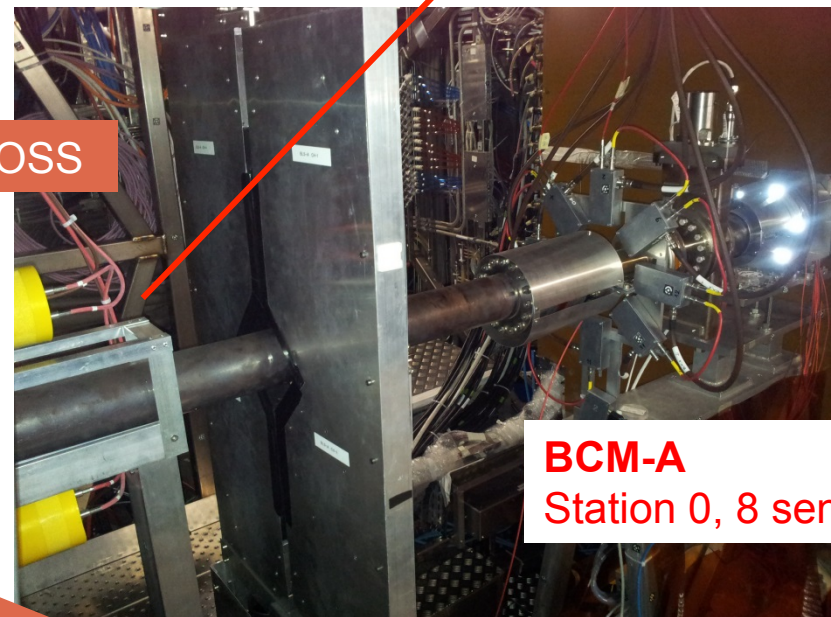
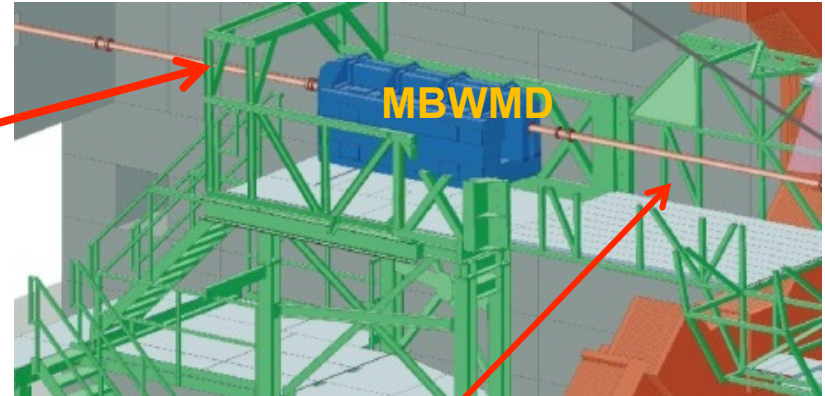
The RS32 Sum is calculated by summing up the RS32 values of 5 out of 8 sensors of one station discarding the two highest values and the lowest value.

BLMs in IP2

During the LS1 three **BLMs** were installed close to IP2.



BLMs in IP2



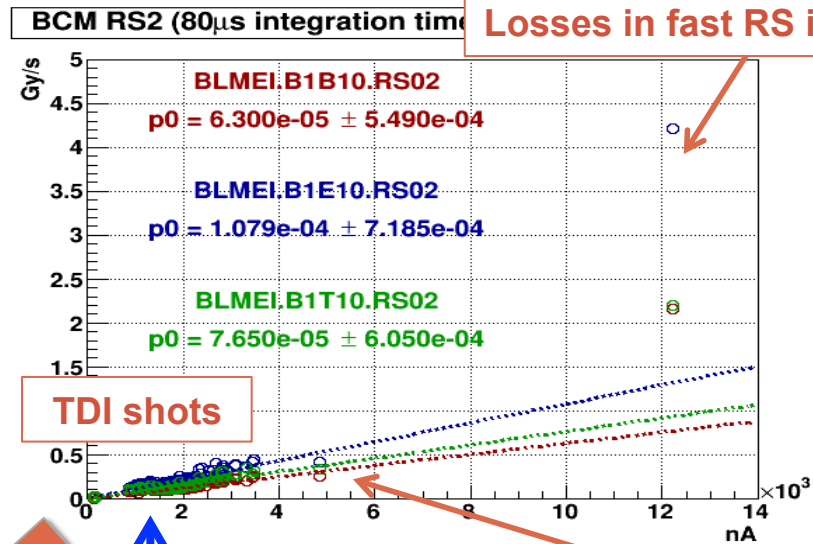
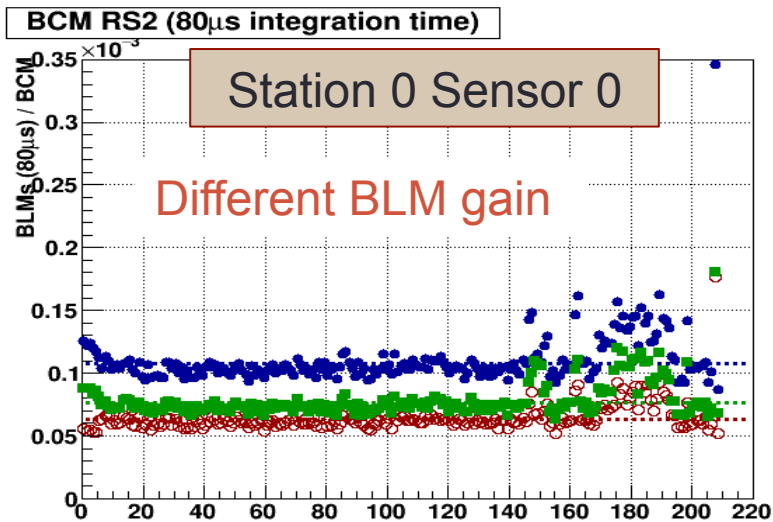
Dump threshold on BLMs

Response of **BCM** and **BLMs** were checked during TDI shots in March and July 2015 looking for correlations among their measurements:

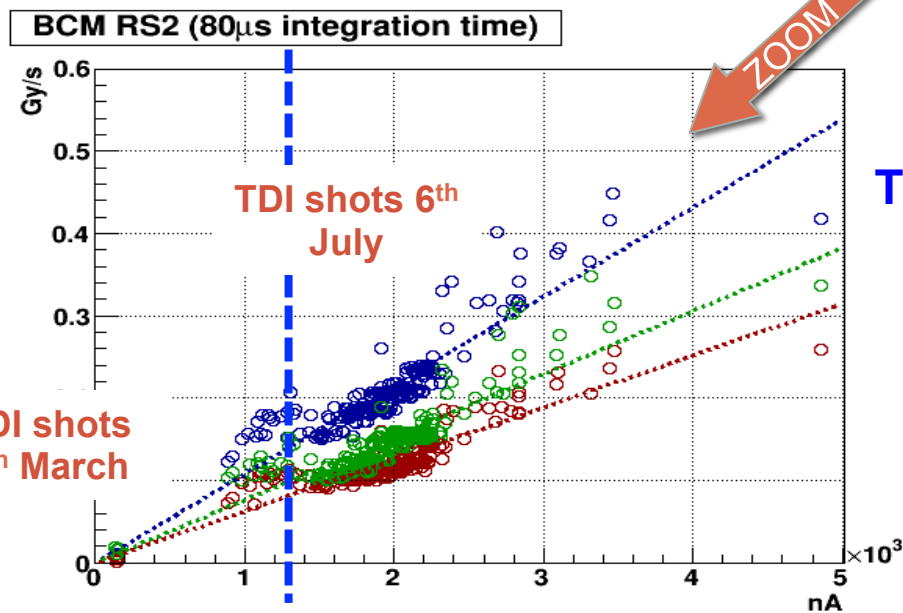
- check if dump thresholds can be set on those BLMs (equivalent to those implemented in the BCM);
- possible issue: dynamic threshold mechanism.

BCM running sums	Detectors READY, STABLE BEAM: Low thresholds	Detectors SAFE, .not.STABLE BEAM: High threshold
BCM RS1	500 nA	2700 nA
BCM RS2	250 nA	1350 nA
BCM RS32 Sum	35 nA (1E32 Hz/cm ²)	300 nA (8.5E32 Hz/cm ²)

BLMs vs BCM



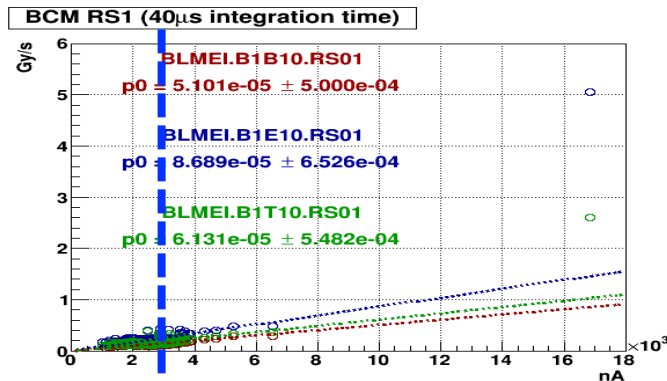
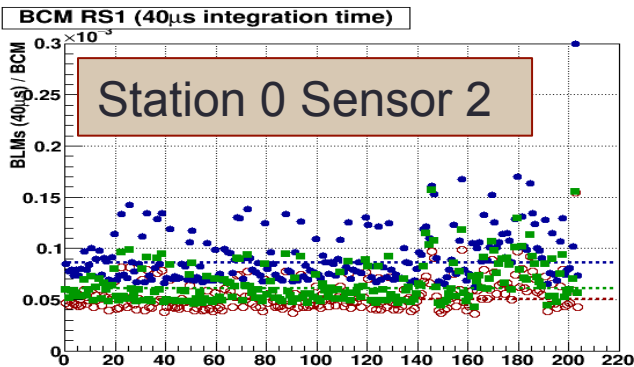
28/07/15 23:54:13
MKI of Beam 1 did not fired,
144b were dump into the TDI.
Losses in fast RS in IP2



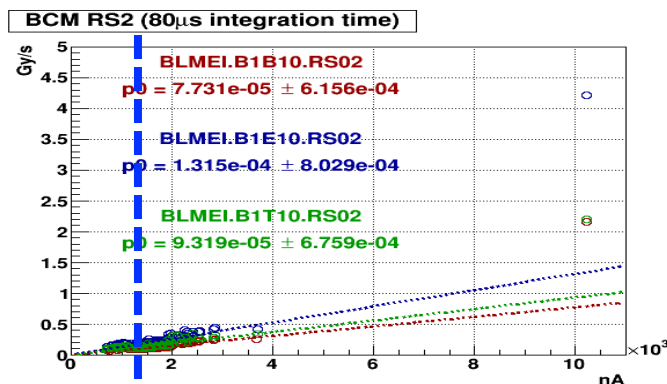
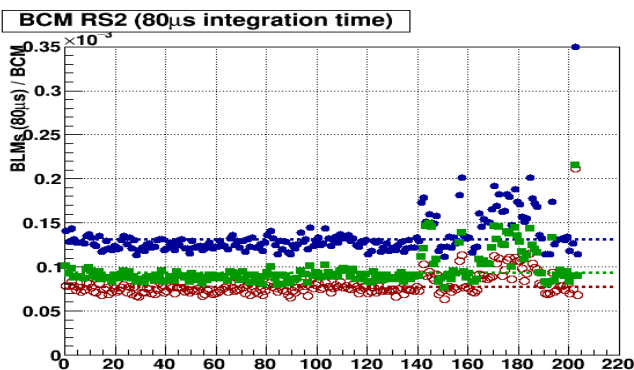
29/07/15 19:07:40
B1 kicker ejected one
circulating nominal bunch
onto TDI.4L2, with
showers onto MQX.3L2.
BLM in TCT in IP2 above
threshold.

BLMs vs BCM

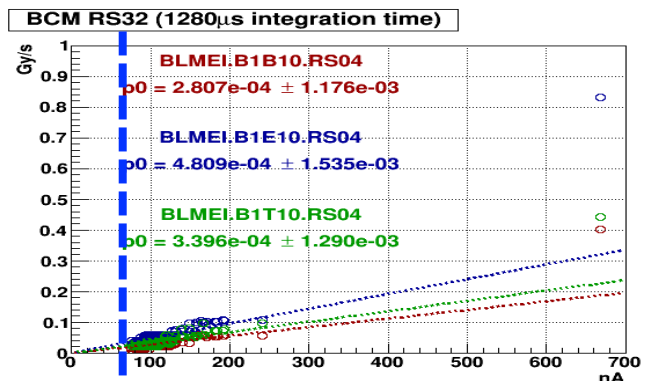
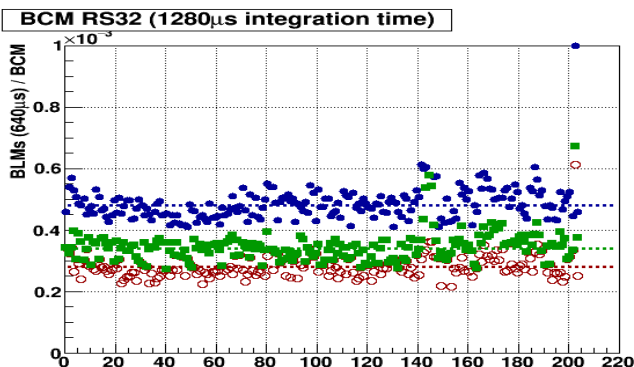
Dump Threshold



BLMs RS1 (40 us)
vs BCM RS1 (40 us)



BLMs RS2 (80 us)
vs BCM RS2 (80 us)



BLMs (640 us) vs
BCM RS32 (1280
us)

BLMs equivalent thresholds (high)

	B1B10			B1E10			B1T10		
	RS01 eq. thr (Gy/s)	RS02 eq. thr (Gy/s)	RS32 eq. thr (Gy/s)	RS01 eq. thr (Gy/s)	RS02 eq. thr (Gy/s)	RS32 eq. thr (Gy/s)	RS01 eq. thr (Gy/s)	RS02 eq. thr (Gy/s)	RS32 eq. thr (Gy/s)
Sensor 0	0.11	0.09	0.014	0.19	0.15	0.024	0.14	0.10	0.017
Sensor 1	0.10	0.08	0.013	0.17	0.13	0.022	0.12	0.09	0.016
Sensor 2	0.14	0.10	0.017	0.23	0.18	0.029	0.17	0.13	0.020
Sensor 3	0.12	0.09	0.015	0.21	0.16	0.026	0.15	0.11	0.018
Sensor 7	0.13	0.10	0.016	0.22	0.16	0.027	0.15	0.12	0.019

Equivalent dump thresholds:

BLM 40 us: 0.12 (0.2, 0.15) Gy/s

BLM 80 us: 0.09 (0.16, 0.11) Gy/s

BLM 640 us: 0.015 (0.026, 0.018) Gy/s

