ALICE BCM & Subdetectors

Observations during kicker failure

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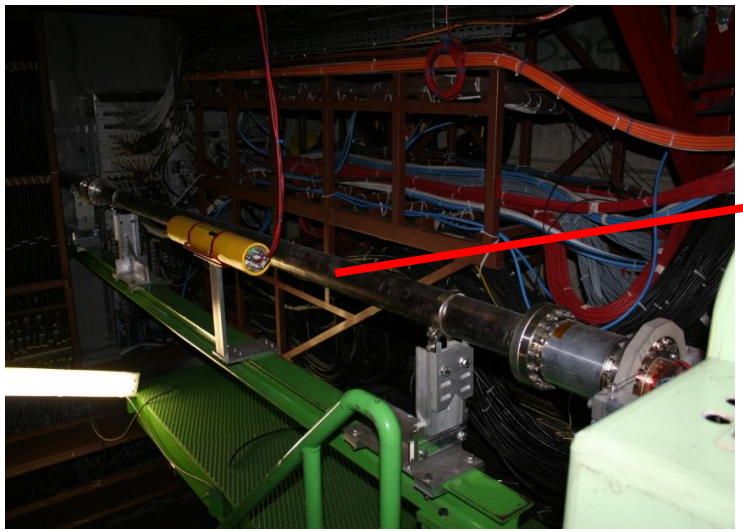
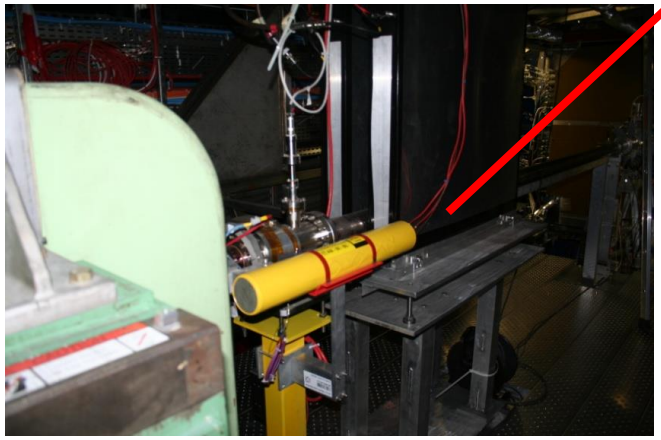
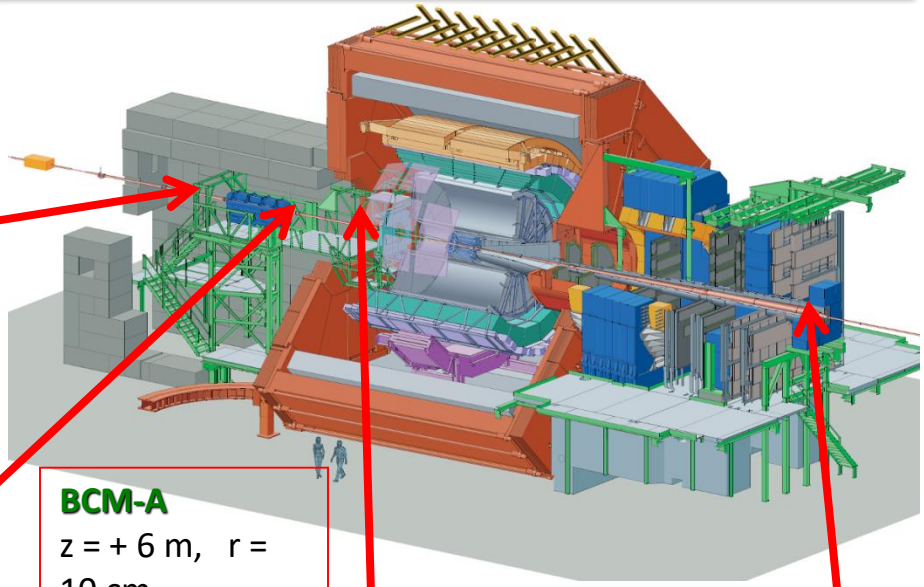
BCM response and thresholds studies

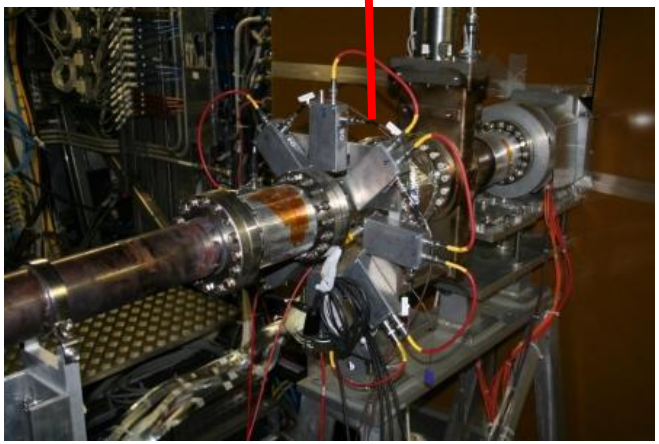


BLM-MWBMD





BCM-A
z = + 6 m, r = 10 cm



BCM C
z = -18.5 m, r=10 cm

Source: A. Di Mauro, ALICE-LHC Interfaces-TF250310

BCM response and thresholds studies

- Beam dump logic:
  - Fast abort on RS1 (integration over 40 μs) or RS2 (integration over 80 μs) coincidences:
    dump the beam if 3 adjacent diamond sensors out of 4 show a current > thr_{RS1} or thr_{RS2} , respectively
  - Slow abort on RS32-Sum (1.28 ms):
    Sorting out the two highest and the lowest of 8 sensors, dump the beam if RS32-Sum > thr_{RS32}

Source: A. Di Mauro, ALICE-LHC Interfaces-TF250310

Main observations:

- The Beam Condition Monitoring system sent the signal to dump the beam two times on 28/07/2011: at 16:30 and 18:03.

- The values of the threshold for the beam background were exceeded:

  - 16:30 - 80 times (the RS1 and RS2 conditions on station A)

  - 18:03 - 3559 times (the RS32Sum condition on station A)

- Values from station A were higher that those from station C
  2 – 25 times

Summary - station A

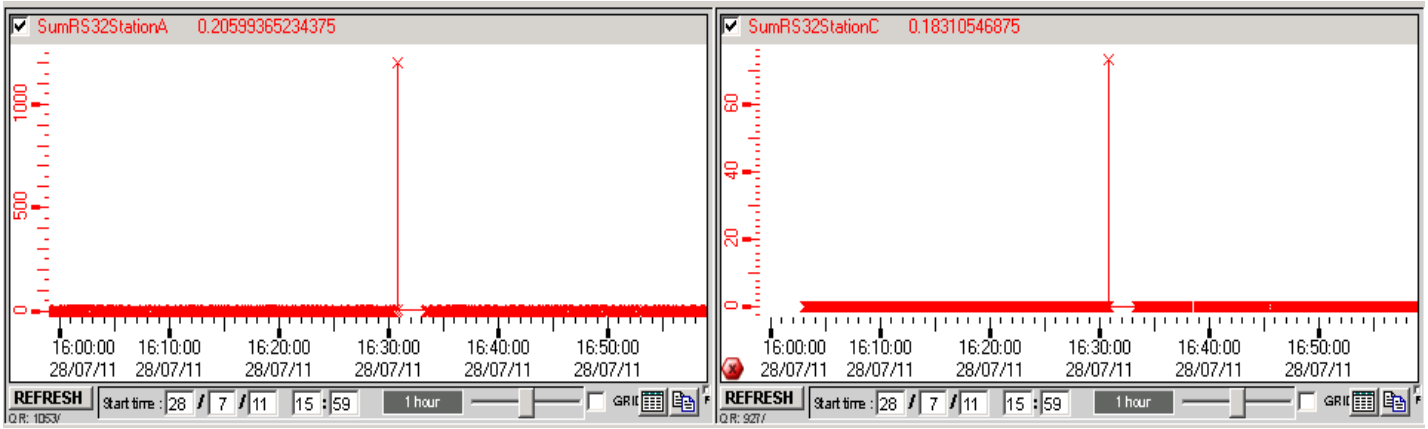
Event	16:30	18:03
Max RS1 value [nA]	40449	1145000
RS1 Threshold [nA]	500	
Max RS2 value [nA]	20071	840930
RS2 Threshold [nA]	250	
RS32Sum [nA]	1200	56947
RS32Sum [nA]	16	

Summary - station C

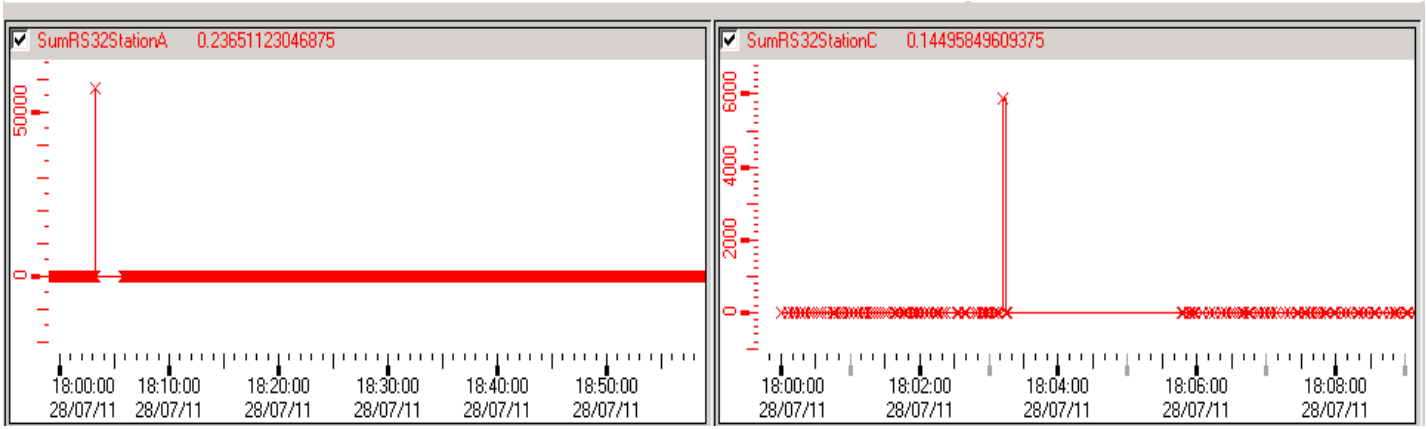
Event	16:30	18:03
Max RS1 value [nA]	1566	456159
RS1 Threshold [nA]	500	
Max RS2 value [nA]	1414	404604
RS2 Threshold [nA]	250	
RS32Sum [nA]	73	5883
RS32Sum [nA]	16	

RS32Sum plots (PVSS):

- 16:30

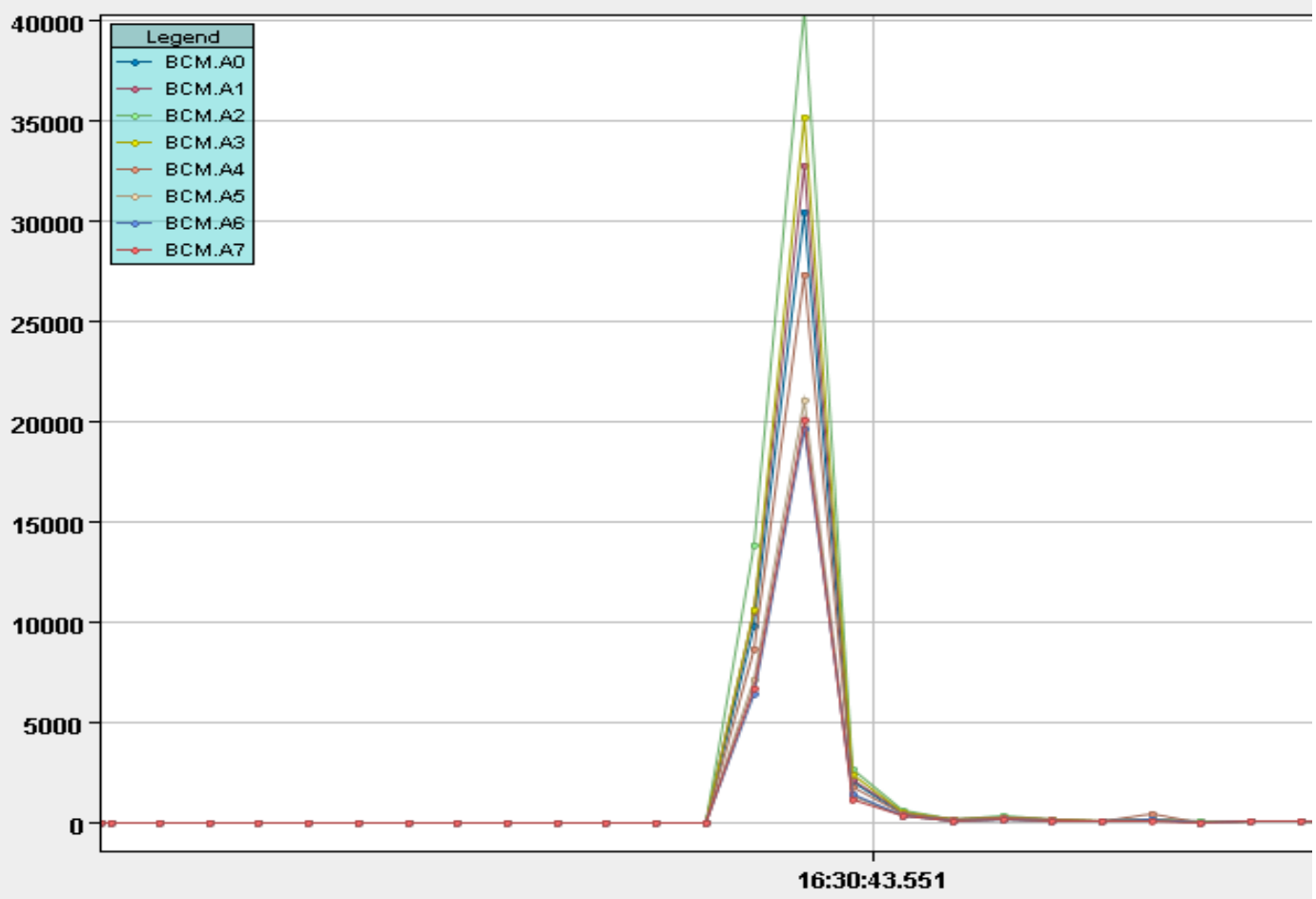


- 18:03

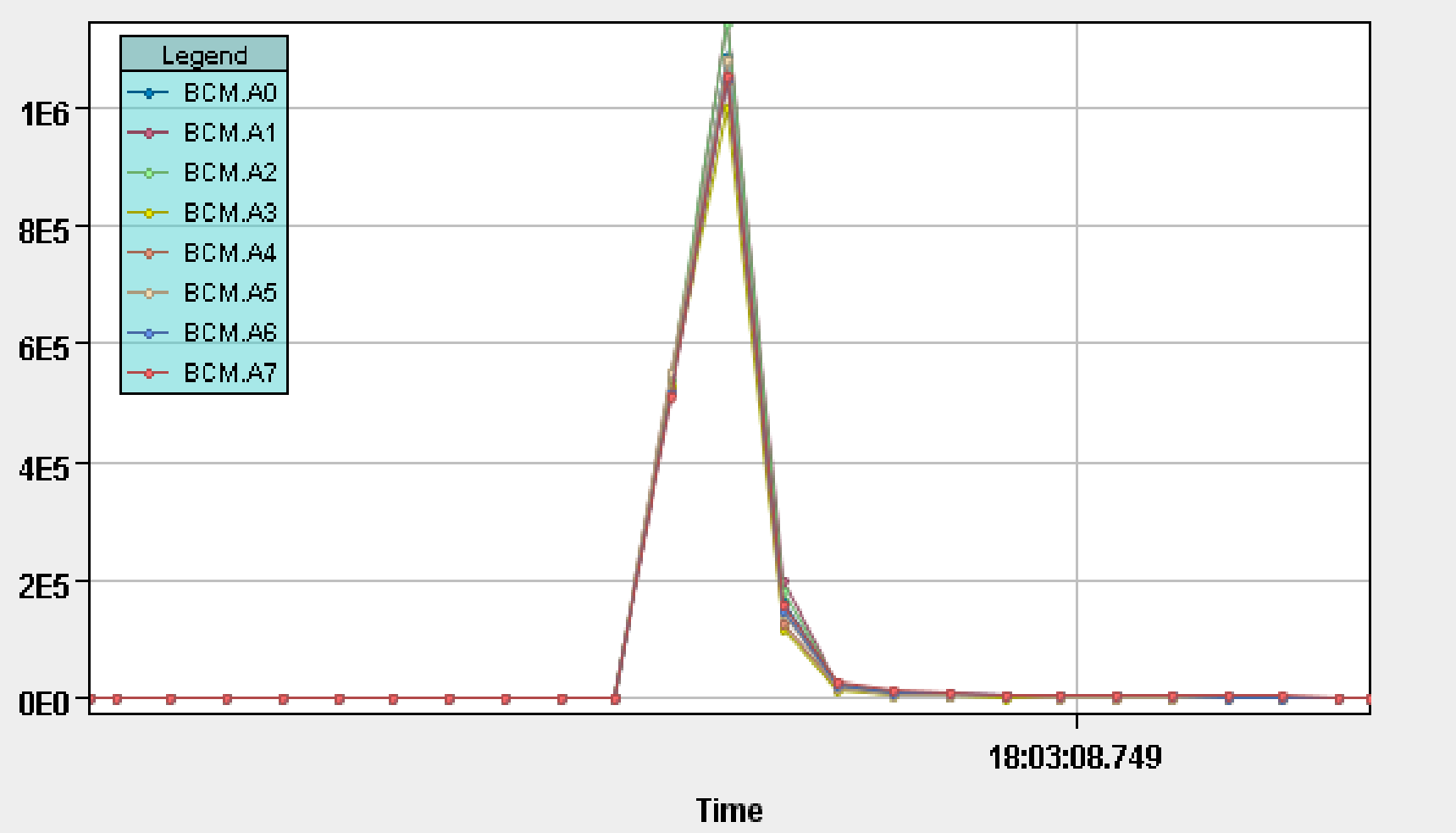


PM Report - 16:30 – station A

RS1, sampling 40 microseconds

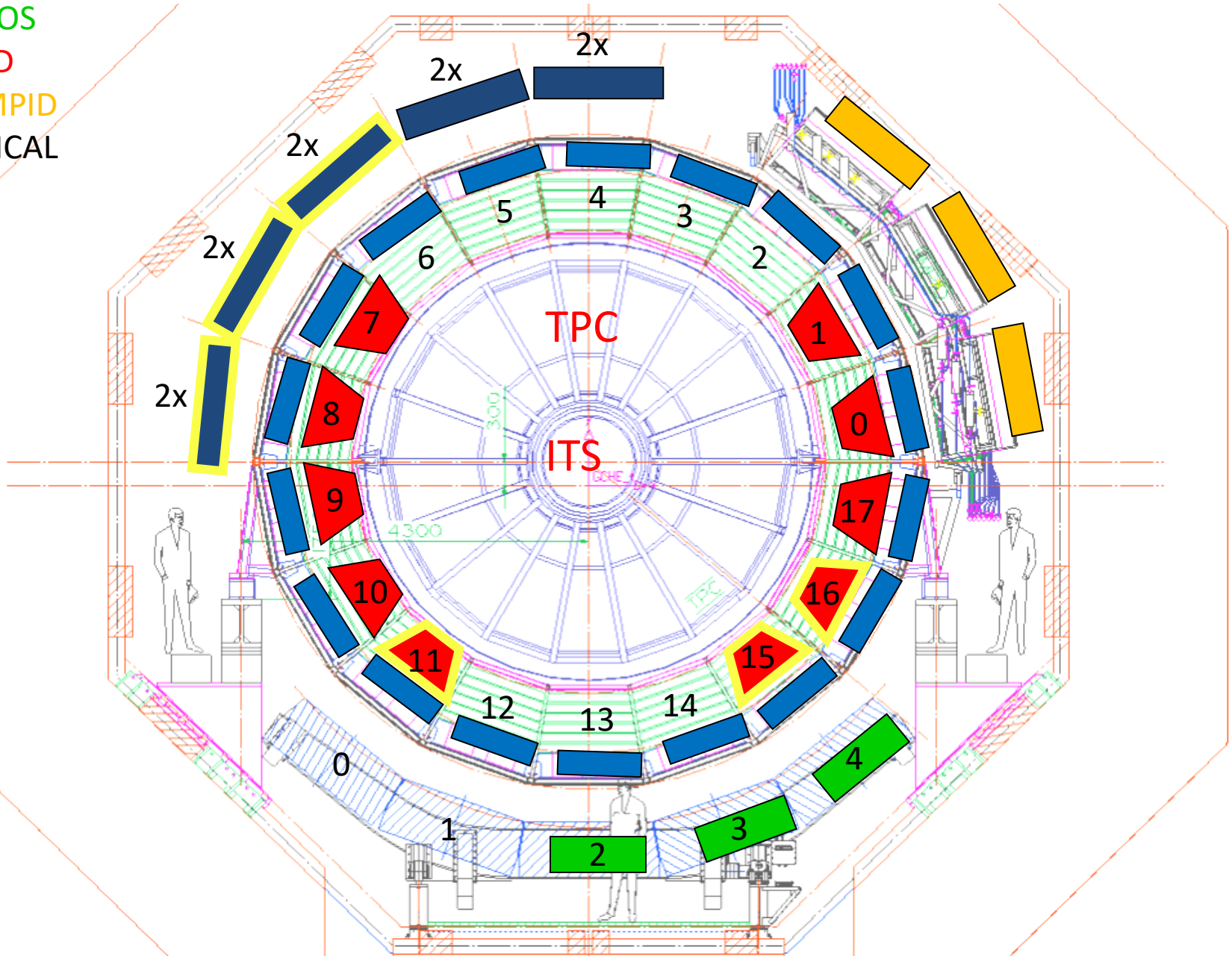


PM Report - 18:03 – station A



ITS = SPD+SDD+SSD

PHOS
TRD
HMPID
EMCAL



Affected subdetectors

Subdetector	Event 16:30	Event 18:03
EMCAL (electromagnetic calorimeter)	no issues	HV-related errors (incl. +13 LV) for SMC1,2,3 (not SMC0 or SMC4); 110 < phi < 170
FMD (silicon detector)	no issues	FMD 2&3 errors
HMPID	1 chamber trip	all 48 HV channels tripped
MCH - C side	HV trips	also LV trips; recovered
MTR – C side	~30% tripped	~30% tripped
PHOS (calorimeter detector)	HV-related errors (incl. +13,-6 LV) for mod 2,3 (not 4)	HV-related errors (incl. +13,-6 LV) for mod 2; recovery OK

Affected subdetectors

Subdetector	Event 16:30	Event 18:03
TPC (gaseous detector)	FC trip; OROC C01 HW	FC (Field Cage)trip; OROC (outer readout chamber) A03,C00,C01,C02,C04,C05,C06,C07,C10,C12,C16,C17 HW trip; Skirt A,C trip + 1 DCS board went to no control (power-cycled for recovery) – probably evidence of SEU (Single Event Upset) ~0.5 m from beam pipe
TRD (gaseous detector)	all HV (anode) channels tripped	many HV (~all of anode) channels tripped; 2 DCS board went to no control (power-cycled for recovery)
SDD – silicon drift detector		injectors to calibrate drift velocity: 50 % of them on the layer closer to Beam Pipe are not working – under investigation if permament (most serious incident)

Conclusions

- ❑ Many (9 of 17) subdetectors affected
- ❑ All subsystems but SDD recovered using standard procedures
- ❑ SDD calibration system - investigation ongoing
- ❑ We are close to limits of safety