Status of Muon System

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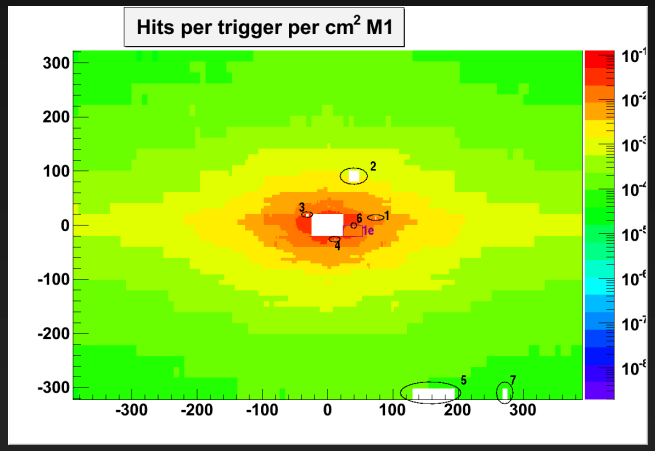
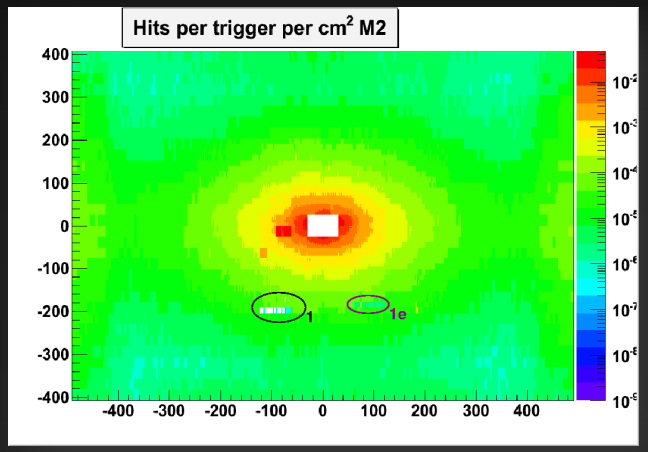
Outline

- Status of muon system
  - ★dead channels, HV, DAQ, timing, efficiency
- Running the muon system at L >300$\mu b^{-1}Hz$
- MOF-B

System status: dead channels

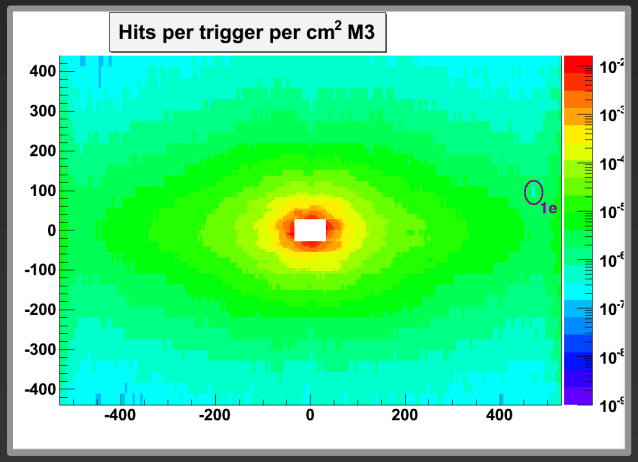


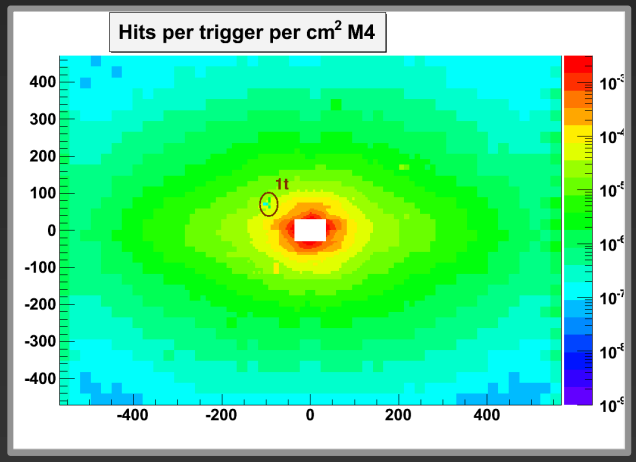


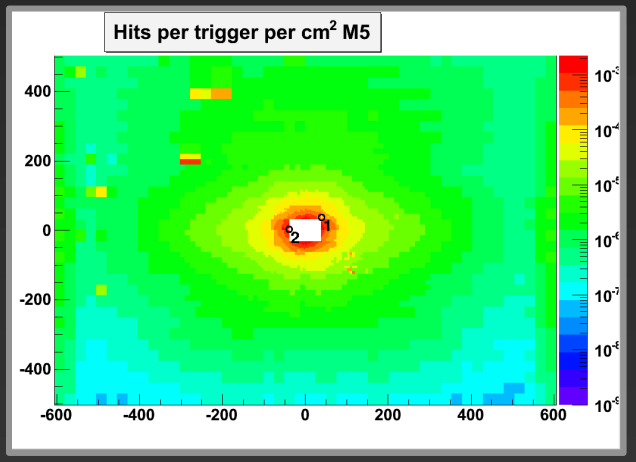
System very stable
Very little noise
Very few dead channels
M1:
0.05% dead + 0.35% ineff.

M2-M5:
0.05% dead + 0.02% ineff.

Total estimated tracking inefficiency: ~1%. M1 inefficiency is dominated by two dead GEMs
Faulty channels regularly documented in the twiki.







System status: HV

- The HV system is continuously monitored by and it is fully operational.
- Tripping gaps are automatically excluded and reincluded after conditioning
- Normally, excluded gaps are not kept OFF but generally at a lower HV value ⇒ no inefficiency !
- Status now:
  - ★ 12 excluded gaps (under conditioning)
  - ★ 5 permanently excluded (broken) gaps.

Table regularly updated by O. Maev

Present: HV problems (disabled Gaps):

20-Jun-11

GAPS

A-side	R1	R2	R3	R4	total
M1		0	0	1	1
M2	1	0	0	1	2
M3	0	0	0	0	0
M4	0	0	0	0	0
M5	0	1	1	1	3
total	1	1	1	3	6

C-side	R1	R2	R3	R4	total
M1		0	0	2	2
M2	0	0	0	2	2
M3	0	0	0	1	1
M4	0	0	0	1	1
M5	0	0	0	0	0
total	0	0	0	6	6

Total gaps 12

CHAMBERS

A-side	R1	R2	R3	R4	total
M1		0	0	1	1
M2	1	0	0	1	2
M3	0	0	0	0	0
M4	0	0	0	0	0
M5	0	1	1	1	3
total	1	1	1	3	6

C-side	R1	R2	R3	R4	total
M1		0	0	1	1
M2	0	0	0	2	2
M3	0	0	0	1	1
M4	0	0	0	1	1
M5	0	0	0	0	0
total	0	0	0	5	5

Total chambers 11

there are inefficient gaps

efficient , but under training still

Gaps affected in 2011, despite 5 short/permanently OFF (M2AR1 -1, M5AR4 -1, M3CR3 - 2 and M3CR4 -1): 84

Serious: Q2M2R1_15A2_GapD - maximum HV~ 600V - keep it OFF

Q3M1R4_11D - both gaps affected, HV reduced by ~50V

Q3M3R4_(9,11,13,15)D_GapC - broken ch. in RDB - RDB#08 has to be replaced NEW !

News: Had an intervention on HV 17.06.2011:

Q1M5R4_30B_gapD - short - gap disconnected from HV system - jumper removed from PP

Four RDBs replaced by spares - no radiation demages discovered

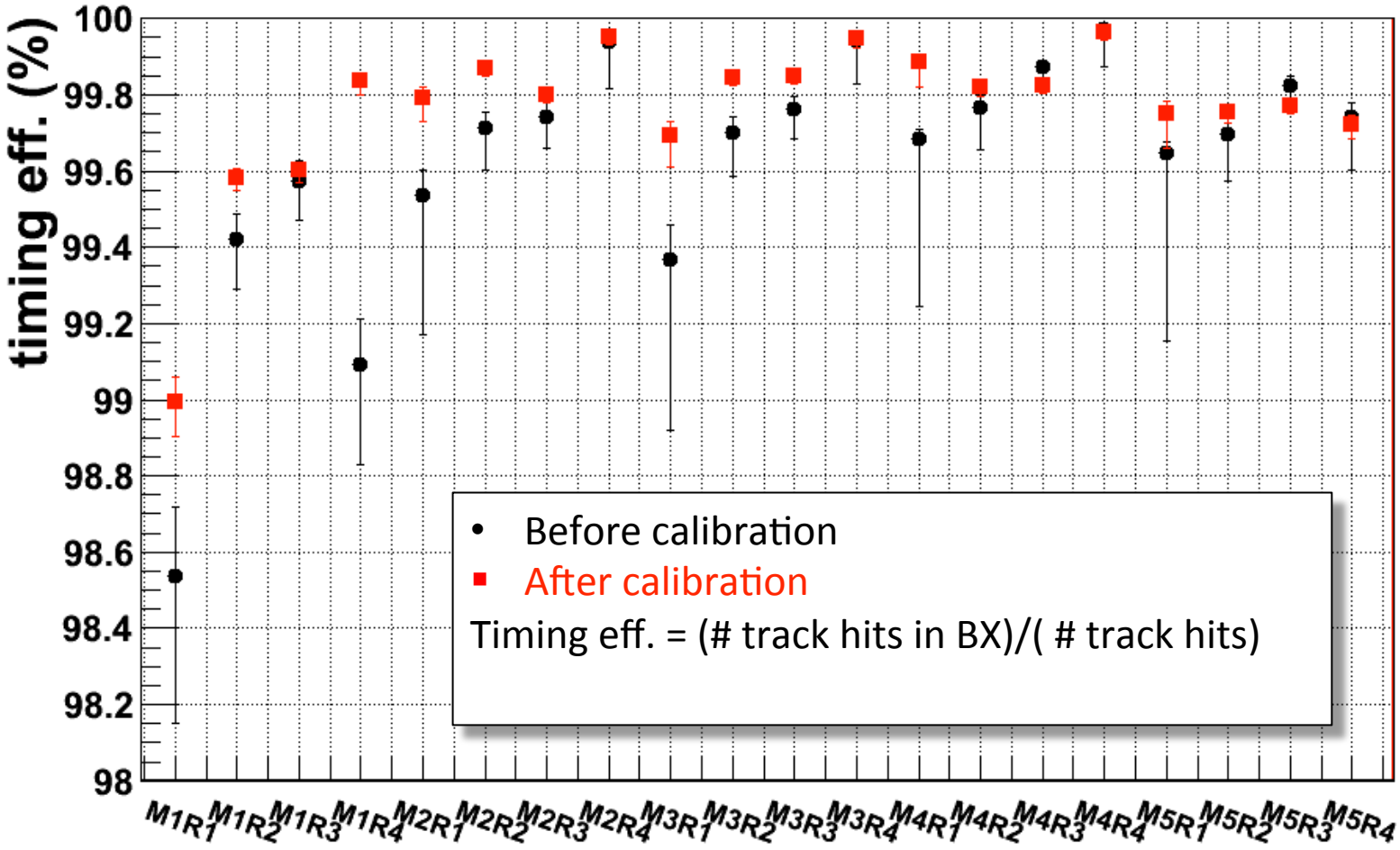
Threshold for I0 increased from 10 muA to 20 muA for 18 tripping gaps in M2CR4 to reduce the number of tripps - most of them (16) are reincluded - I expect some of them tripped soon

System status: DAQ

- DAQ system essentially stable and running smoothly
- Continuously and efficiently monitored both through the ECS and the online monitoring system
- Reaction to problems is usually prompt thanks to the chain shift leader/data manager -> piquet ->experts (Cadeddu, Cardini, Carletti, Graziani,Passaleva, Pinci,…)

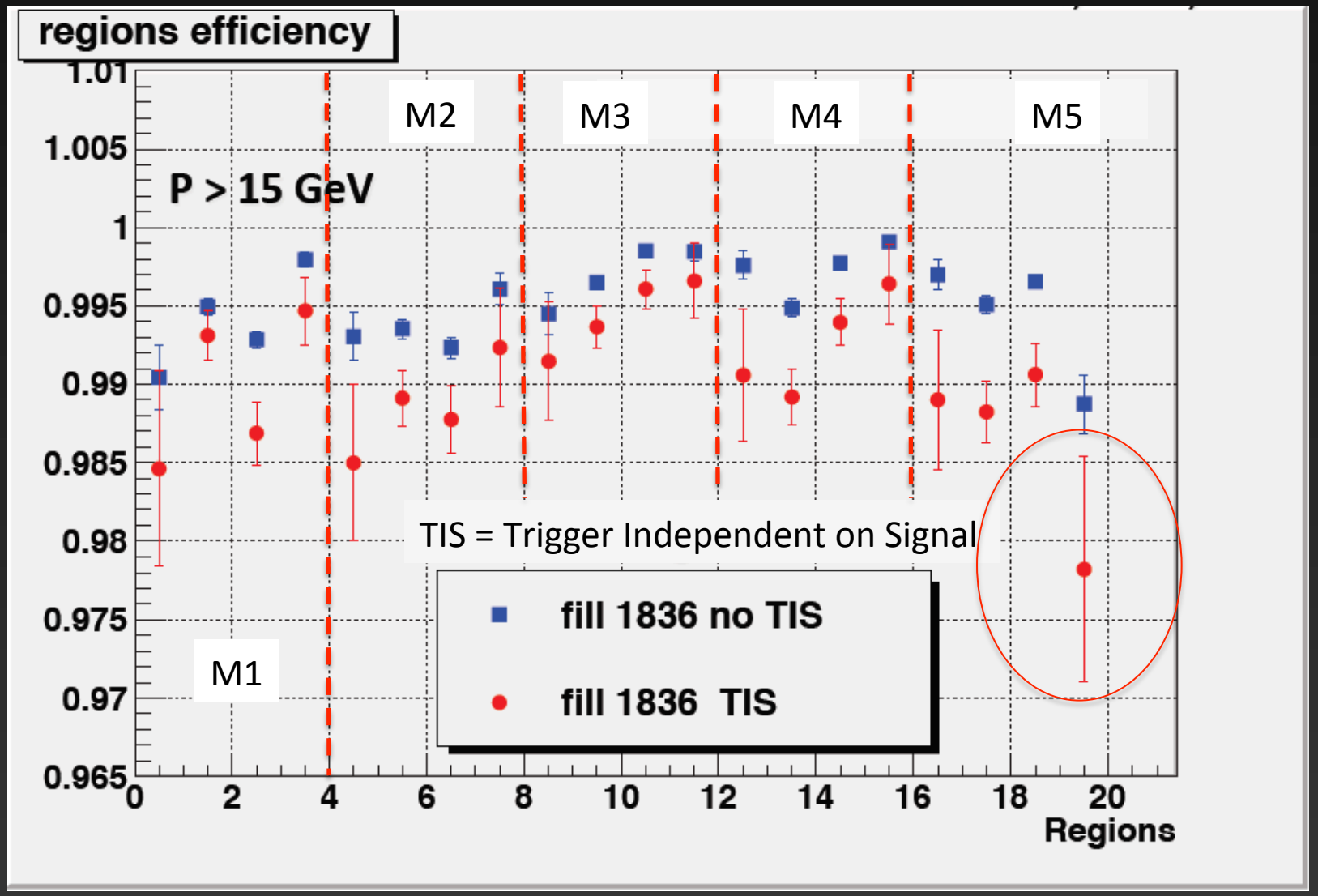
System status: timing

Time calibration using TAE runs 91558-91559 – G. Graziani



System status: efficiency

Fill-by-fill effciency monitoring - P. De Simone



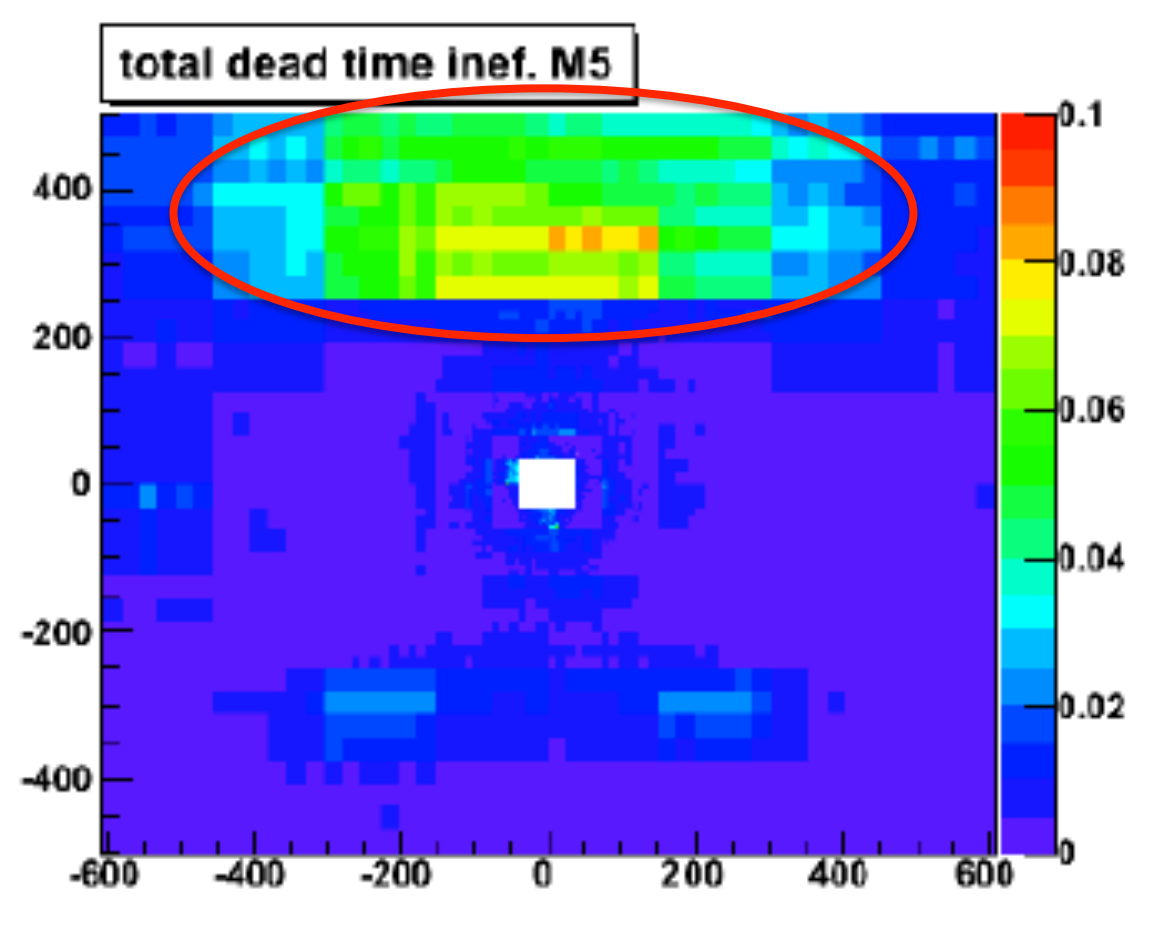
System status: efficiency

Refined efficiency analyis – Satta, Santacesaria

In some regions worst efficiency than last year: dead time !

	M2	M3	M4	M5
R1 2010	99.3 ±0.3	99.2 ±0.2	99.8 ±0.1	99.79 ±0.06
R1 2011	98.7 ±0.1	99.2 ±0.1	99,78 ±0.04	99.57 ±0.03
R2 2010	99.7 ±0.1	99.6 ±0.1	99.8 ±0.1	99.61 ±0.06
R2 2011	98.88 ±0.06	99.29 ±0.06	99.24± 0.02	99.34 ±0.03
R3 2010	99.5 ±0.1	99.75 ±0.06	99,86± 0.04	99,83± 0.05
R3 2011	98.53 ±0.05	99.57 ±0.06	99.63 ±0.02	99.17 ±0.04
R4 2010	99.7 ±0.1	99.89 ±0.08	99,89 ±0.01	99,62 ±0.2
R4 2011	99.4 ±0.05	99.74 ±0.08	99,84 ±0.03	97.7 ±0.1

System status: efficiency and dead time



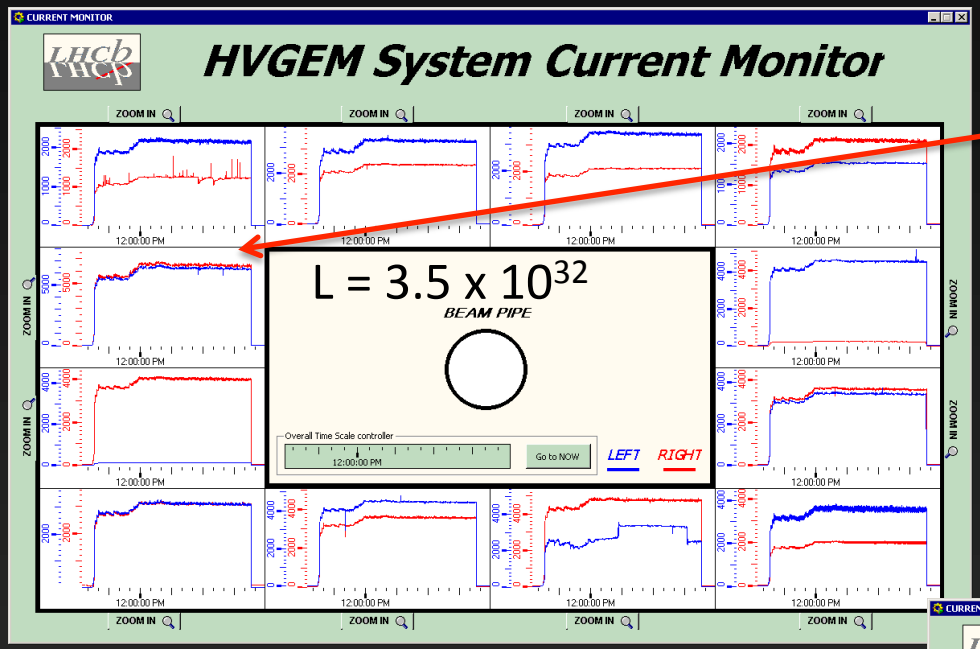
Inefficiency up-down asymmetry

Will be largely cured by reducing the FE output signal width and possibly with additional shielding

Running the muon system at L > $3x10^{32}cm^{-2}s^{-1}$

- To monitor the behavior of the muon system we looked at 3 indicators:
  - ★ GEM currents
  - ★ Trips
  - ★ Station occupancies and ODE saturation

Muon system at L > 3x10^{32}cm^{-2}s^{-1}: GEM currents

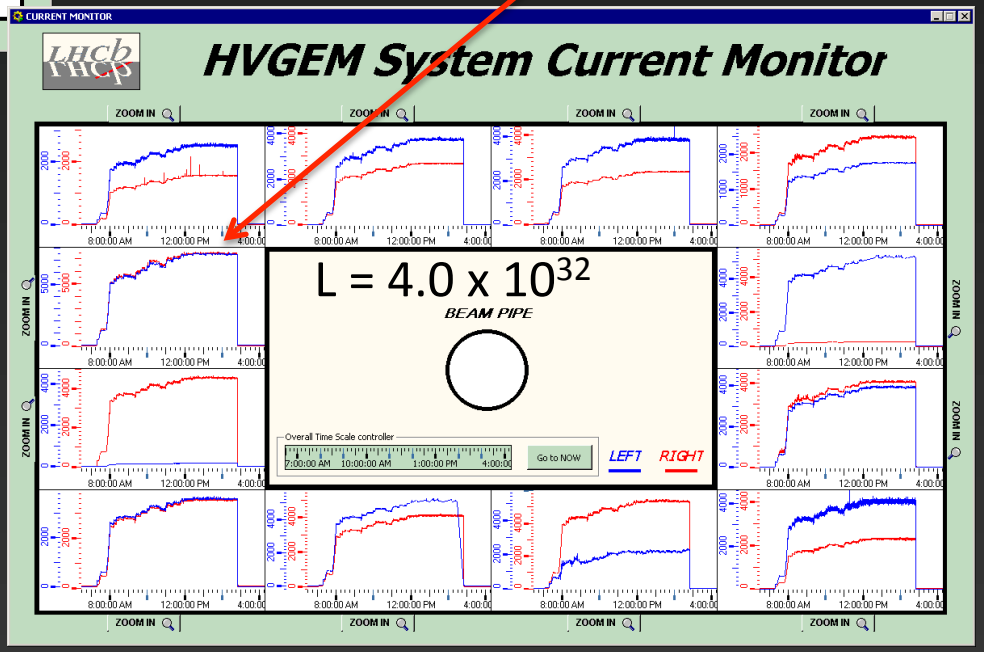


Max current @3.5x10^{32}: 6.5µA

Other currents: 3-4µA

Max current @4.0x10^{32}: 7.5µA

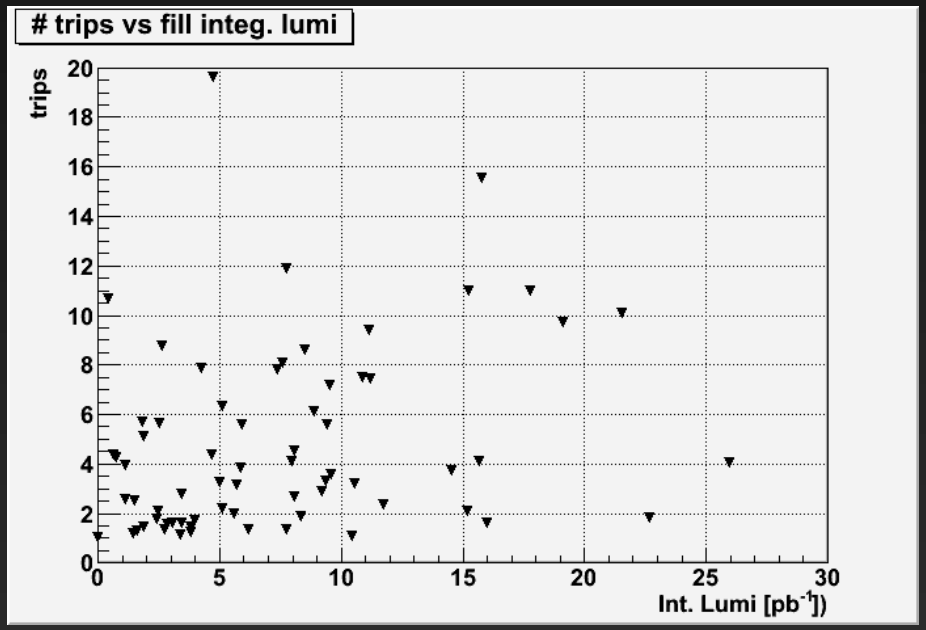
Other currents: 4-5µA

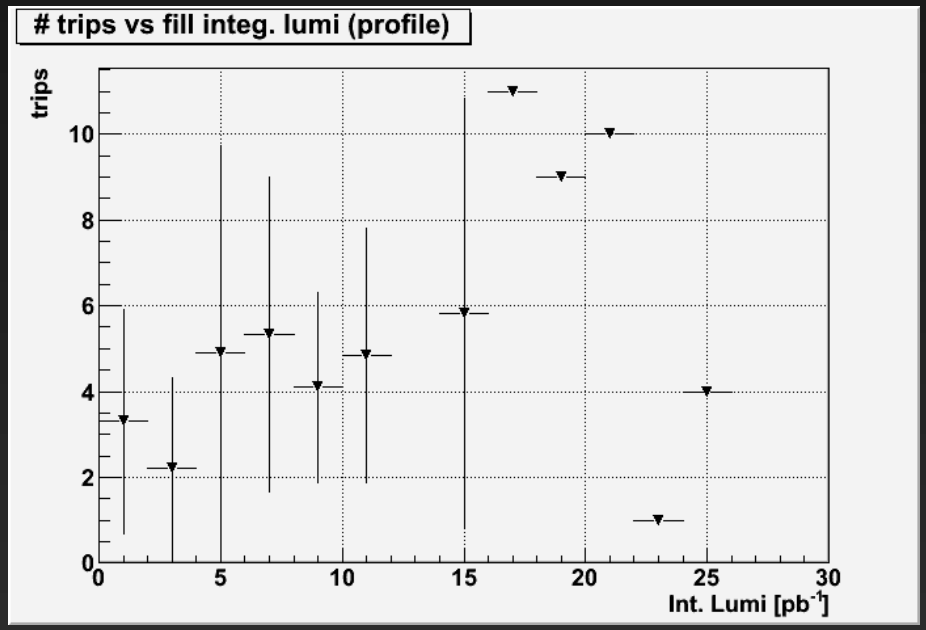


Currents as high as 7.5 µA are observed at the "equatorial" GEMs
This is considered by the expert close to the safety limit (8 µA should be reached only "accidentally")

Muon system at L > $3x10^{32}cm^{-2}s^{-1}$: trips

trips/fill vs fill integrated luminosity

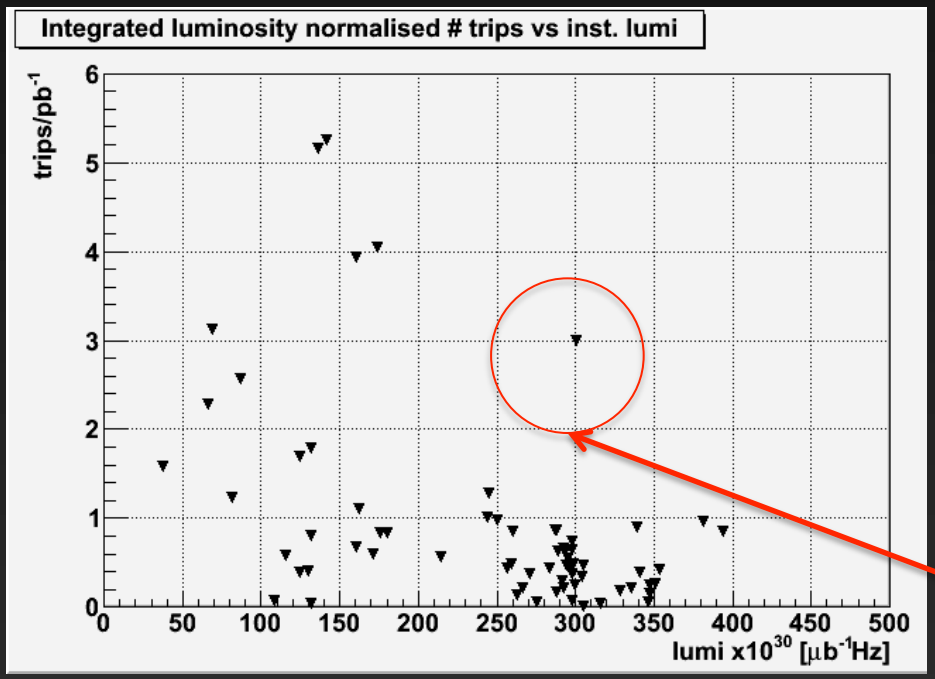


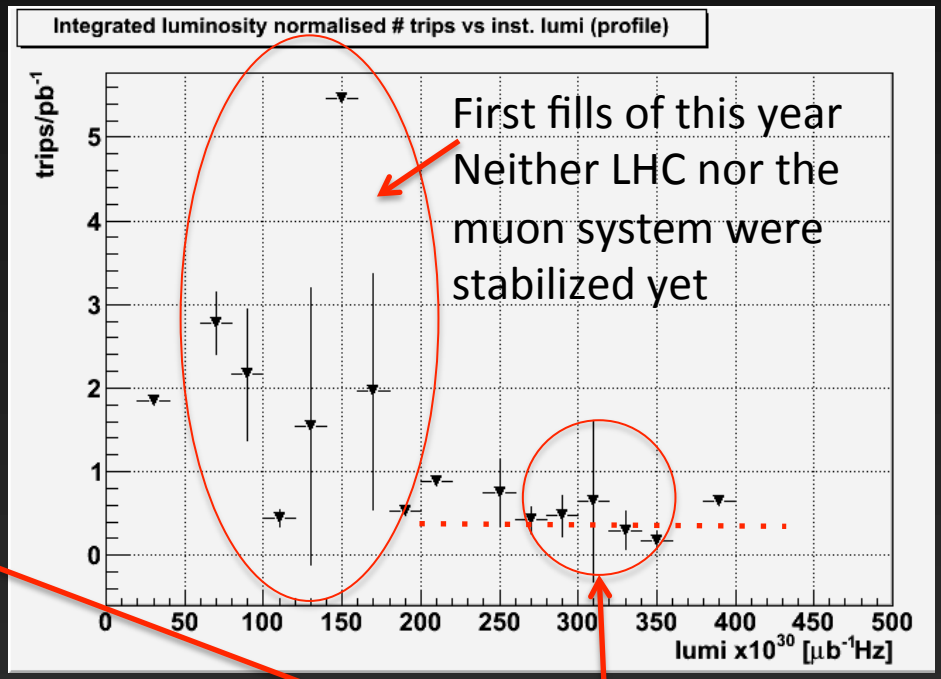


- Nice correlation: but this is expected because essentially the number of trips is proportional to beam time (see next slides)

Muon system at L > $3x10^{32}cm^{-2}s^{-1}$: trips

trips/fill normalised to the fill integrated lumiosity vs fill instantaneous luminosity



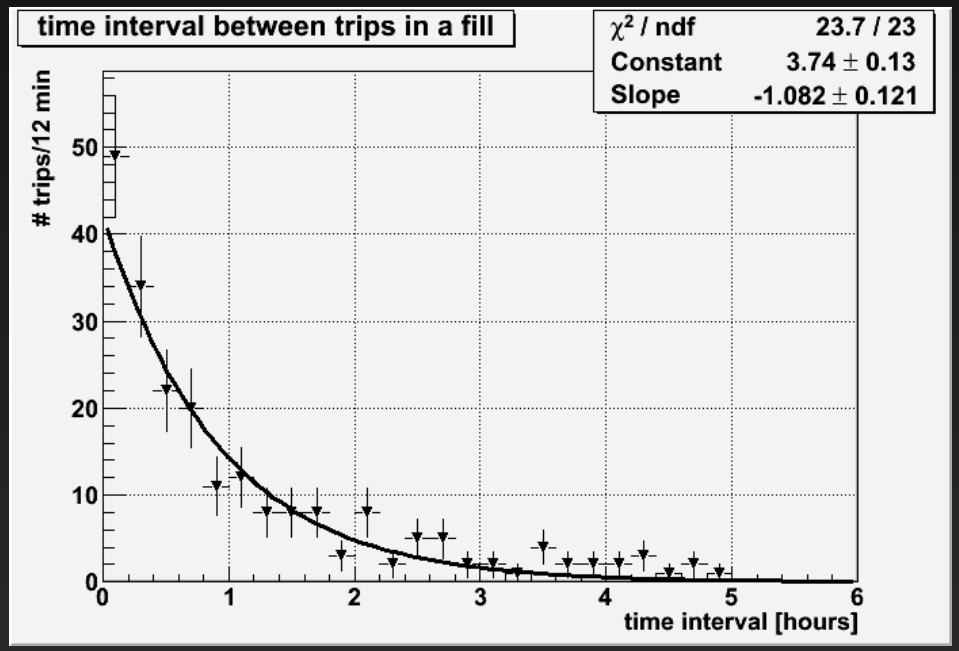


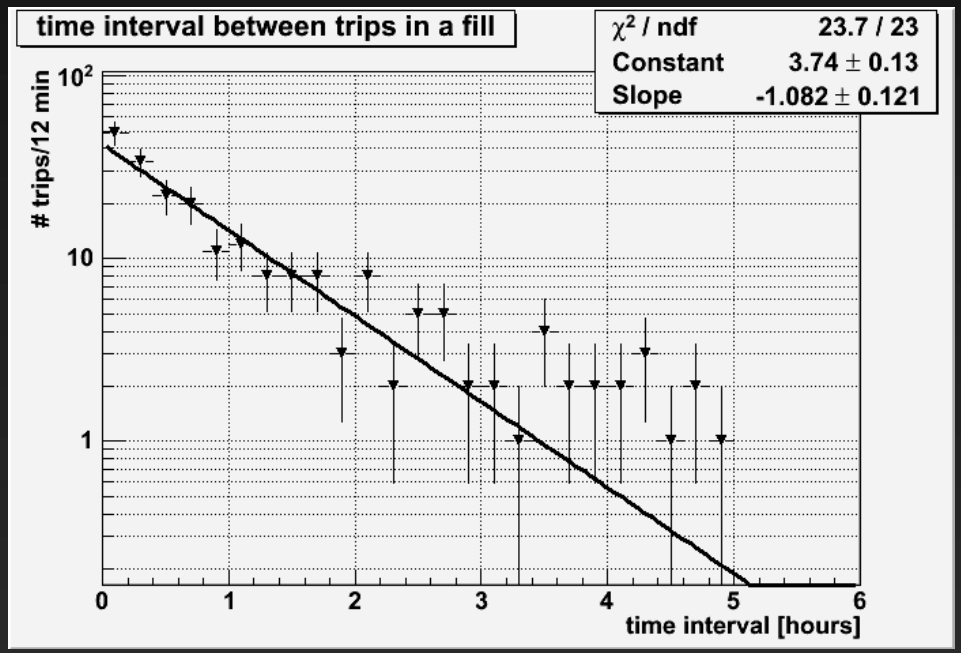
- Normalizing to the integrated luminosity the number of trips is essentially independent on the instantaneous luminosity, **provided the highest luminosity is properly approached**

First fill at 300 μb^{-1}Hz on May 27: No preparation, immediate jump at high luminosity

Muon system at L > $3x10^{32}cm^{-2}s^{-1}$: trips

Time distribution of trips: distribution of time intervals between trips in a fill





- Time distribution of trips is exponential => trips are random processes, apparently no correlation with any particular event (e.g. beam conditions etc.)
- From the fit: average trip rate ≈ 1 $hour^{-1}$

MOF-B

- L'MoU interno con cui abbiamo stabilito i MOF-B per il muon detector e' valido anche per il 2012

- Total 151 kChF
- 106 kChF per l'INFN (70%)