

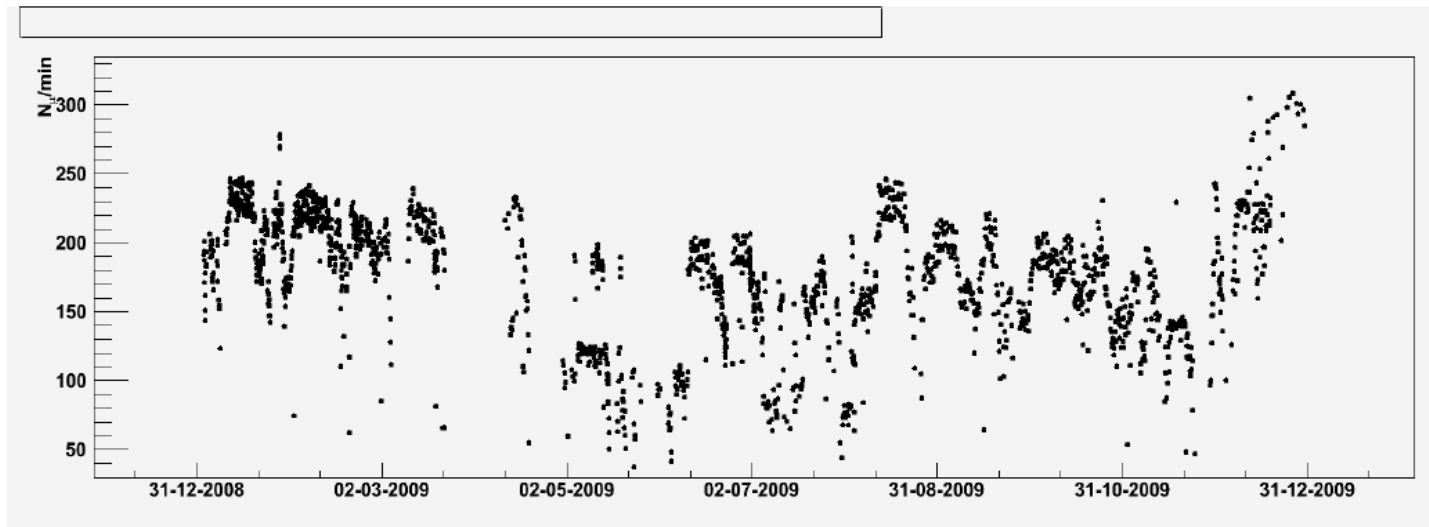
High Level Data Quality

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Muon rate

- The rate of down going reconstructed muons evaluated for each Antares run in 2009.



- One should expect that in an ideal detector this rate is kept constant. On the contrary, strong fluctuations can be observed.
- The aim of the work is to understand what factors affect on this rate, find quality criteria for runs and apply them on 2008-2010 data.

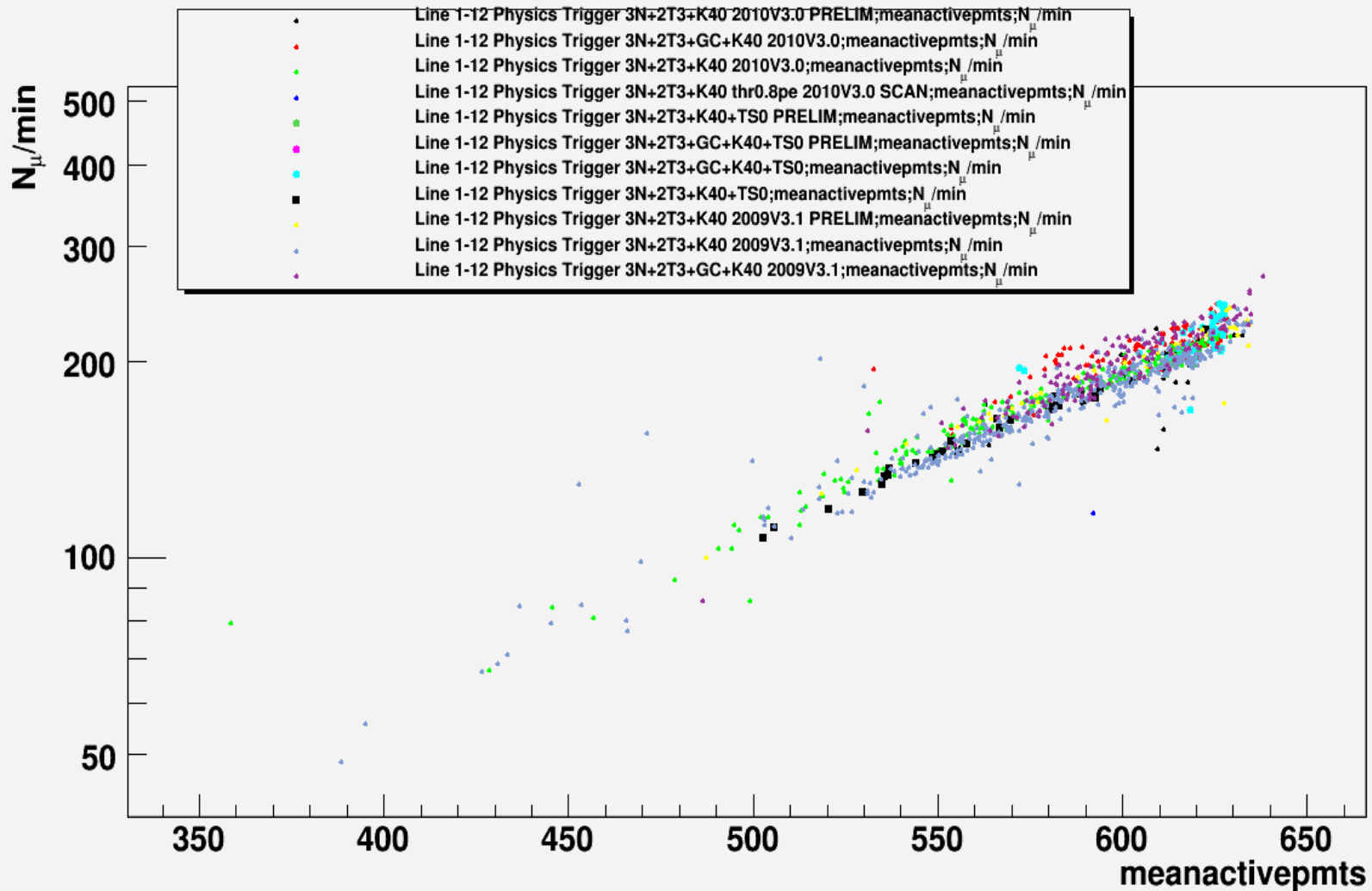
Procedure

- The data is reconstructed with a BBfit + online calibrations. Standart $n_{hit} > 5$ && $t_{chi2} < 5$ cuts are applied.
- Muon rate should depend from:
 - detector configuration;
 - trigger type;
 - environmental conditions;
 - number of active photomultipliers (PMT). PMT is considered “active” if it gives more than 1000 hits per time slice.
- The last one is rather different from run to run due to the bioluminescence. Even if during the run number of working PMTs is constant, not all the data from them is available offshore due to Xoff and HRV.

Runs grouping

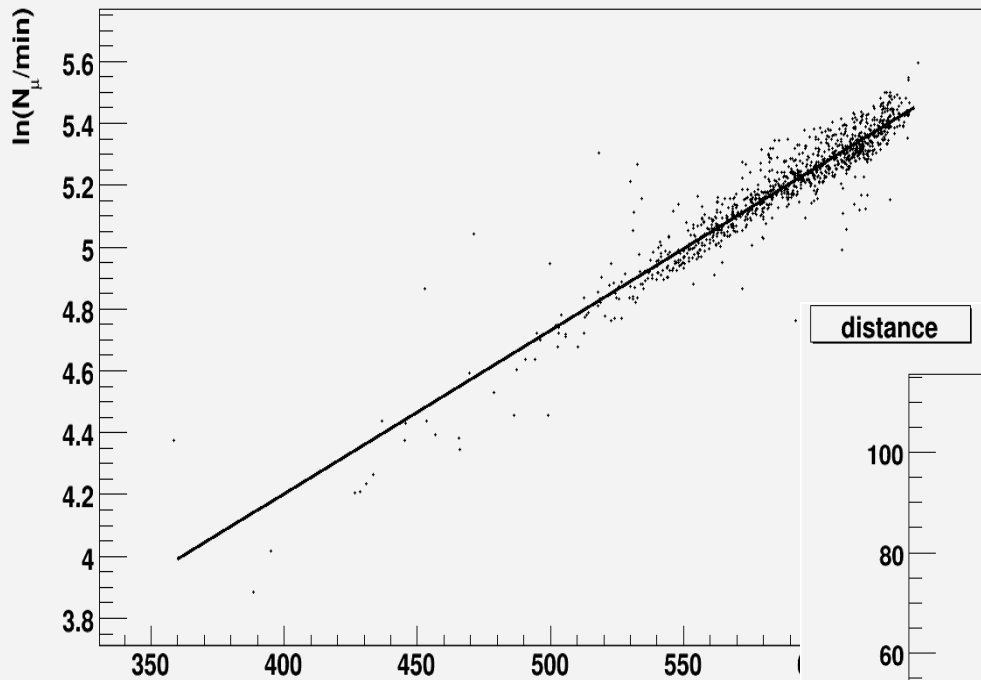
- By the trigger setup
 - 3N
 - 3N+2T3 {Noisy channels treated} +- GC
 - 3N+2T3+GC+TQ
 - 3N+2T3+GC+TQ+T2
- By detector configuration
 - Working lines
 - High voltage tuning
 - Calibration (important in 2008, later not so much)
 - Gain (normal, half gain, gain/4, gain/8)
- Special treatment of PRELIM & SCAN runs
 - Added to the normal groups which are later in time if it's possible
 - Look run by run (in runnumber order). Usually runs in the end of a calibration period are acceptable
- GroupID format is YYGG.S – a float, YY – year {8,10}, GG – group {1,99}, S – subgroup {1,∞} (possibly YYGG.S.S)

Example of a group

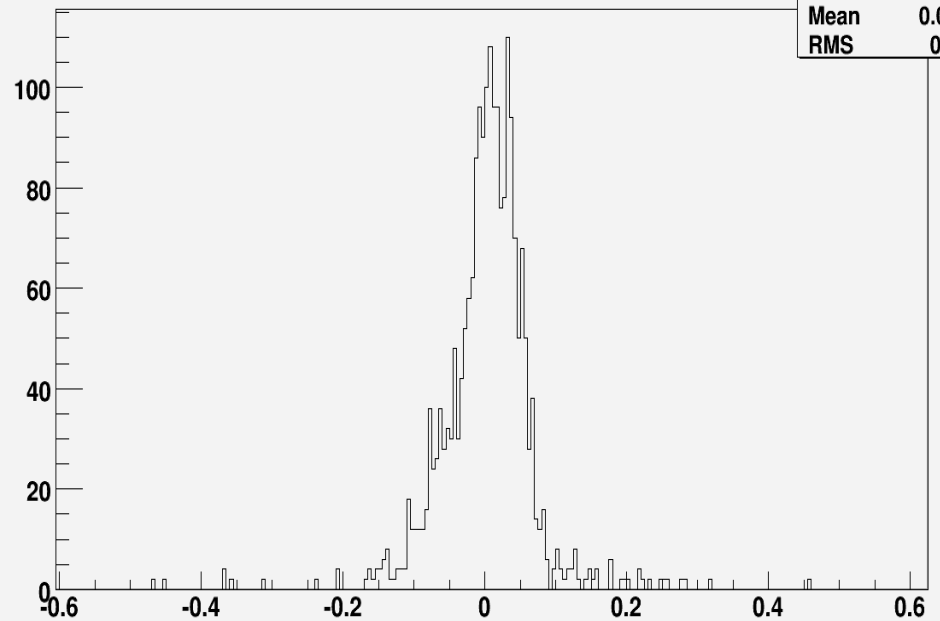


Fit and distance

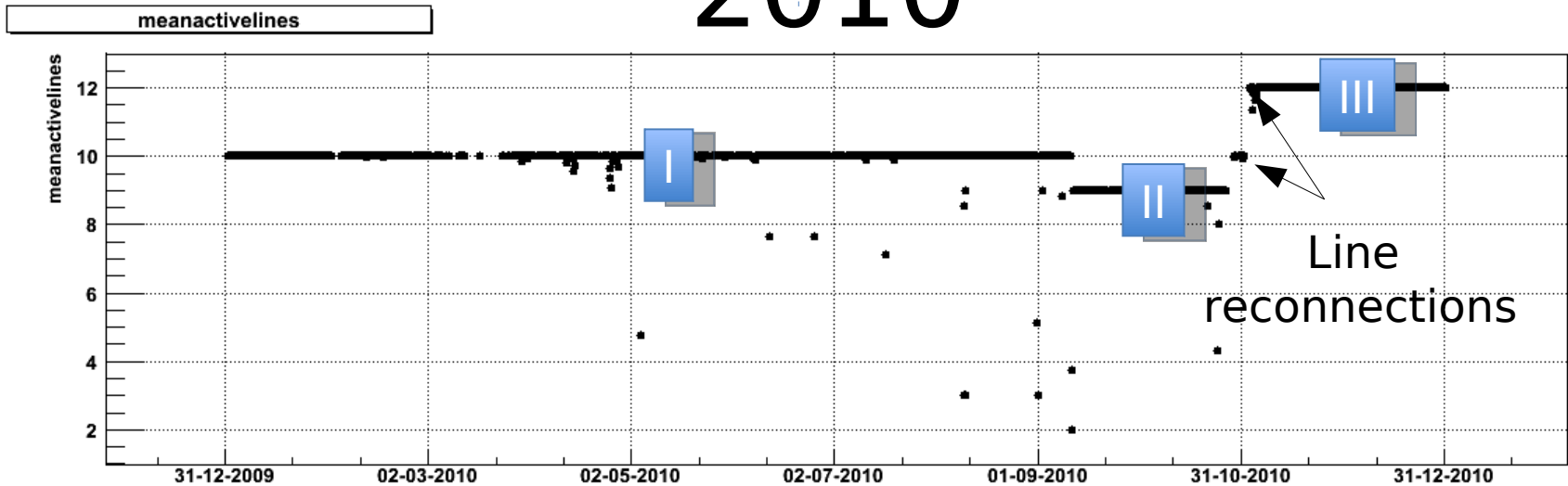
Linear prefit



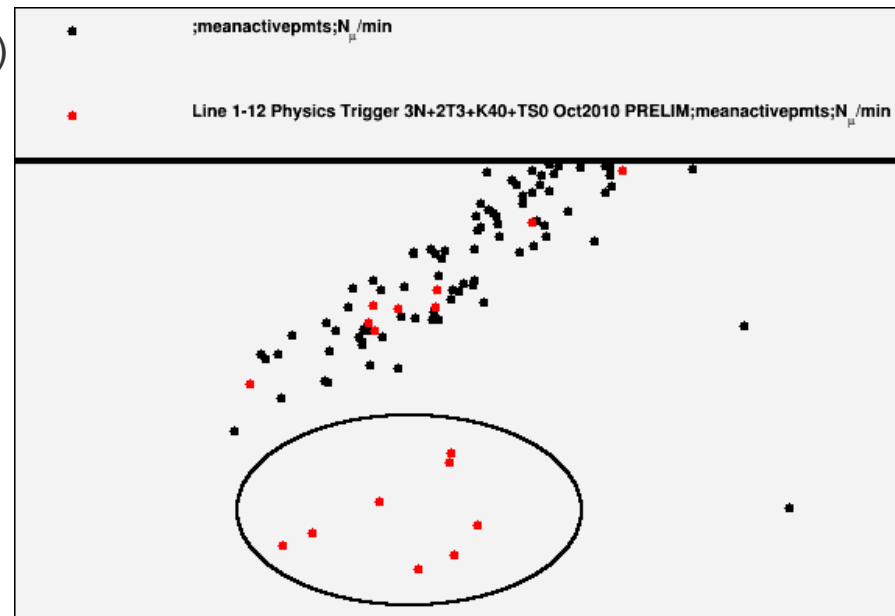
distance



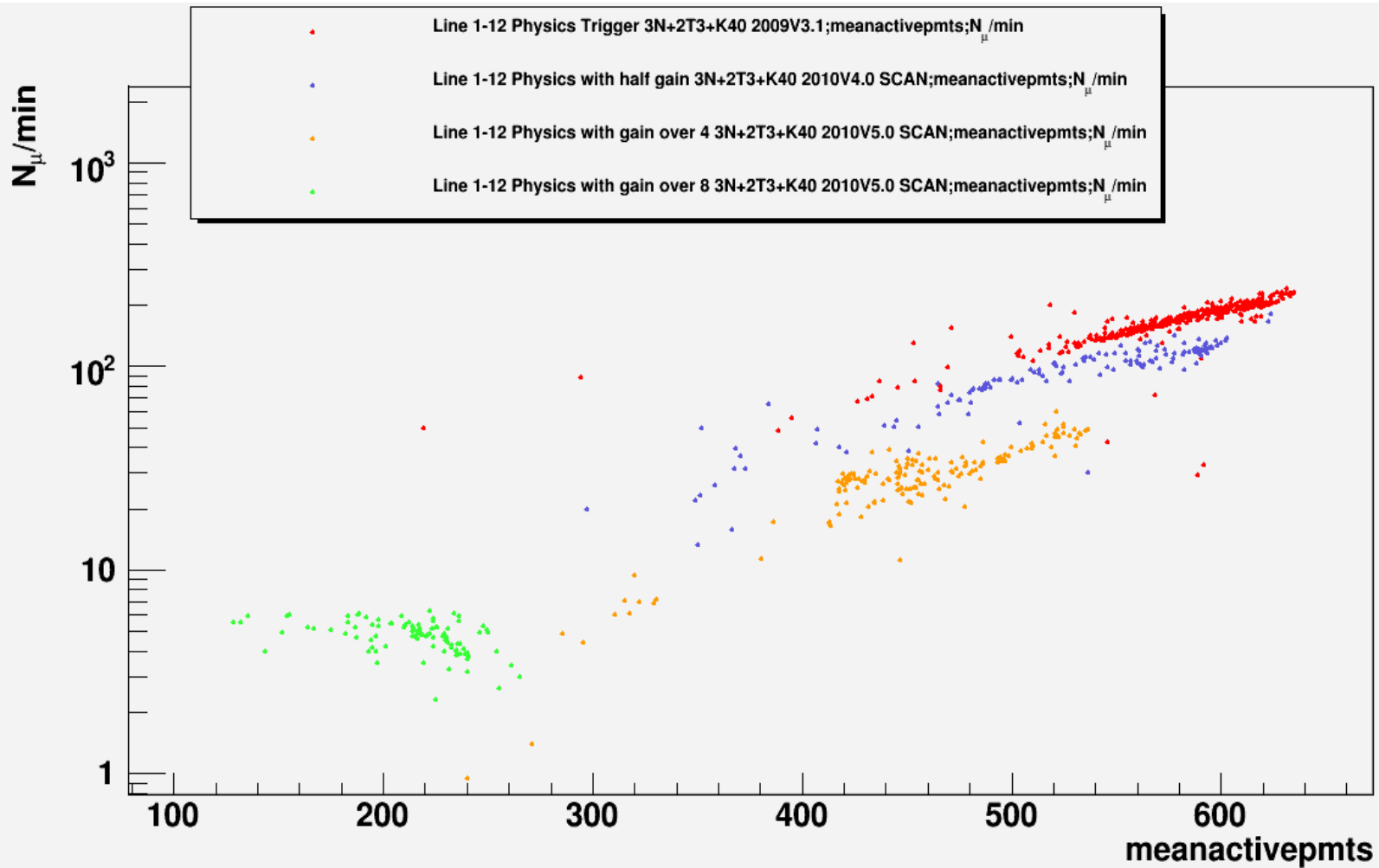
2010



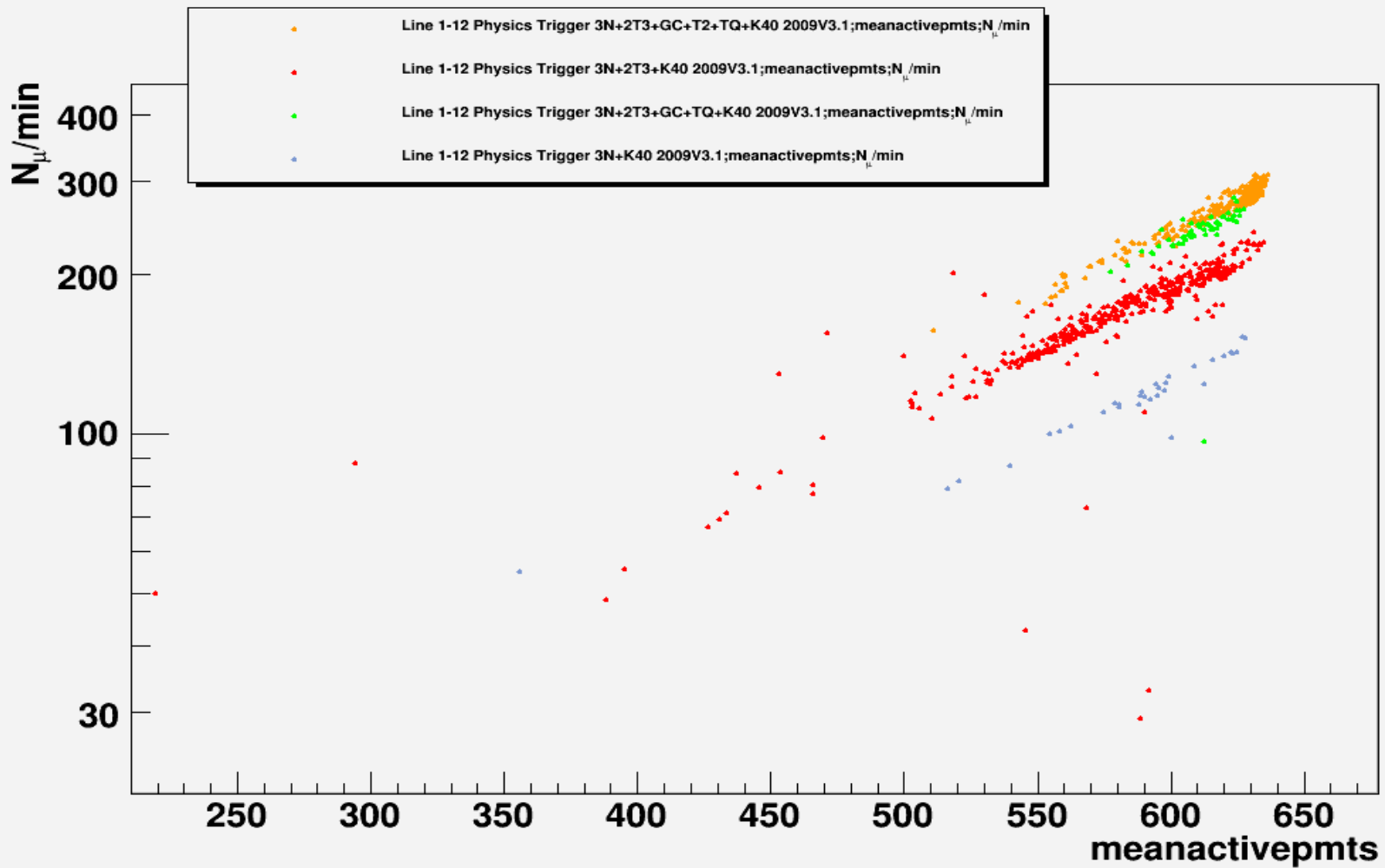
- I. 14/11/2009 – 11/09/2010, 10 lines
 - 3N+2T3, 1001.1, 187316 min (130 days)
 - 1/2 gain, 1001.2, 14231 min (10 days)
 - 1/4 gain, 1001.3, 34230 min (24 days)
 - 1/8 gain, 1001.4, 25560 min (18 days)
 - TQ, 1001.5, 9417 min (6,5 days)
 - TQ+T2, 1001.6, 52216 min (36 days)
 - L1, 1001.7, 613 min (0,5 day)
 - 3N, 1001.8, 3435 min (2,5 days)
- II. 12/09/2010-27/10/2010, 9 lines
 - TQ+T2, 1002.1, 33458 min (23 days)
 - 3N+2T3, 1002.2, 282212 min (20 days)
- III. 3/11/2010-01/01/2011, 12 lines
 - TQ+T2, 1003.1, 35060 min (24 days)
 - 3N+2T3, 1003.2, 43858 min (30 days)



Reduced gain runs



Normal gain runs



Final statistics

Group Number	Comments	Runs tot	Time tot (min)	Bad runs		Bad runs		Time efficient (days)	Lines
				Quant.	%	Time (min)	%		
1001.1.1	triggers with 3N+2T3 without TQ or T2	1078	173886	55	5,10%	6480	3,73%	116,25	10
1001.1.2	Good part of the PRELIM triggers 3N+2T3	71	13430	5	7,04%	339	2,52%	9,09	
1001.2.1	half gain triggers	141	13200	40	28,37%	3845	29,13%	6,50	
1001.2.2		9	1031	0	0,00%	0	0,00%	0,72	
1001.3	trigger with gain 4	163	34230	67	41,10%	14474	42,28%	13,72	
1001.4	trigger with gain 8	95	25560	33	34,74%	8502	33,26%	11,85	
1001.5	trigger with TQ without T2	58	9417	1	1,72%	304	3,23%	6,33	
1001.6	triggers with TQ+T2	397	52216	0	0,00%	0	0,00%	36,26	
1001.7	trigger L1 Offshore	10	613	4	40,00%	268	43,72%	0,24	
1001.8	trigger 3N without 2T3, TQ, T2	33	3435	2	6,06%	39	1,14%	2,36	
1002.1	triggers with TQ+T2	254	33458	2	0,79%	252	0,75%	23,06	9
1002.2	triggers with 3N+2T3 without TQ or T2	152	28212	1	0,66%	109	0,39%	19,52	
1003.1	triggers with 3N+2T3 without TQ or T2	238	35060	11	4,62%	1956	5,58%	22,99	12
1003.2	triggers with TQ+T2	415	43858	3	0,72%	139	0,32%	30,36	

Conclusion

- Three years of data analysed. Data quality parameters are in DB. They may be used for effective cuts of runs for different statistic analyses.
- For preliminary and problematic runs. As an additional check for future run by run simulation.
- Internal note with the method will be published soon.

Thanks for attention!

Triggers

- 1D

A fit of L1 hits and a given direction is performed, cut on quality is done

- 3D

More than 5 L1 coincidences within $2.2\mu\text{s}$ + causality relation for them

$$Dt_{ij} \leq \frac{d_{ij}}{c/n} + 20 \text{ ns}$$

- 3N

3D + 1D scan for set of the directions, is done to reduce a background

- T2

2 L1 coincidences on the 2 adjustment floors within 100ns

- T3

2 L1 coincidences on the same floor within 100ns or 2 L1 coincidences on next to adjustment floors withing 200ns

- 2T3

2 pairs or L1 coincidences, any L1 hit cannot belong to 2 triggered clusters

- TQ

Time and charge trigger

- GC

1D trigger with L0 hits (and one L1 hit), is done for the direction to Galactic Center

- K40, TS0, T0 – special calibration triggers. Don't act in the muon reconstruction.