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Museo Storico della Fisica e Centro Studi e Ricerche Enrico Fermi

Extreme Energy Events
Science inside Schools

The E.E.E. Project
Data Quality Monitor

Erice, 6 Dec. 2017

M. Garbini, Centro Fermi Rome, University & INFN Bologna

Outline

Chapter 1-The EEE Project

- The EEE Project
- The detector
- Working principles
- Working parameters

Chapter 2-The EEE Project telescope & DQM

- What is a DQM
- The EEE Project DQM
- What can we learn from DQM
- Examples

Chapter 3-Exercises

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Chapter 1

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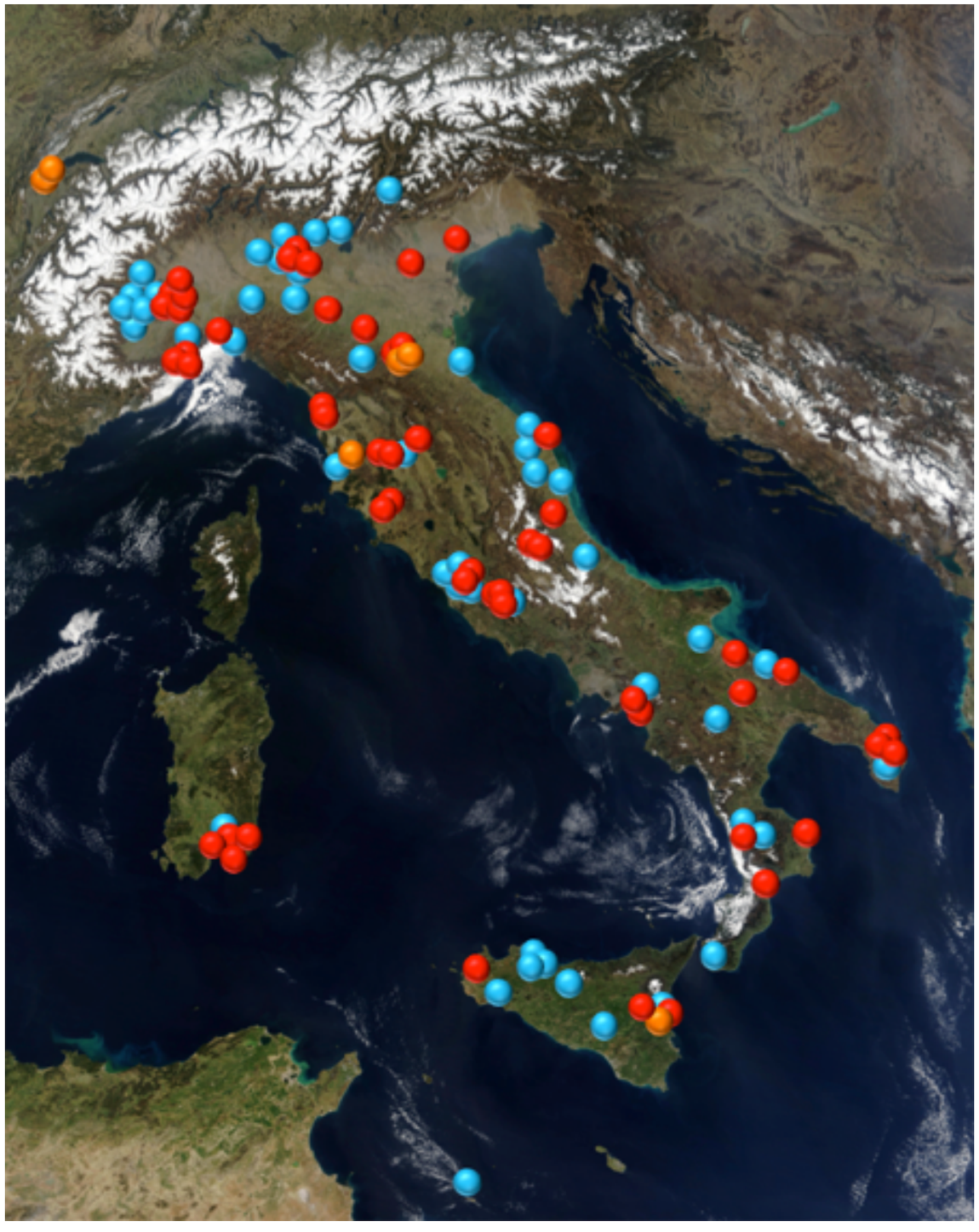
The EEE Project

Extreme Energy Events
Science inside Schools

I think most of you knows the goal of the EEE Project, correct? anyway I'll try to recall some of the main purposes.

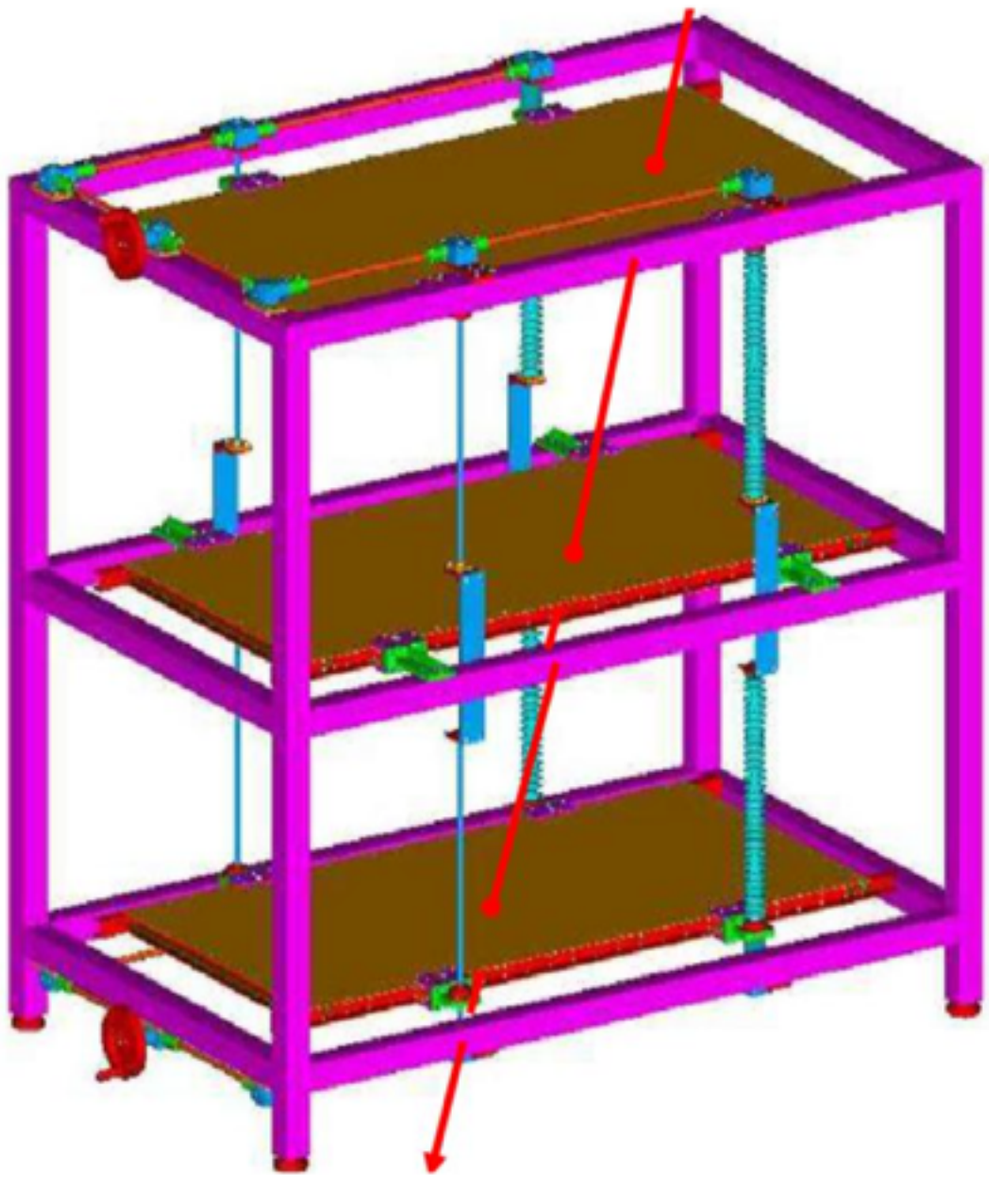


- **Study of cosmic rays**
  - Detection of EAS
  - Cosmic rays variations
  - Climate connections
- **Scientific education**
  - Students and teachers directly involved
  - Detectors mostly inside schools

total: 56 telescopes
Inside schools: 50
INFN + CERN: 6 telescopi

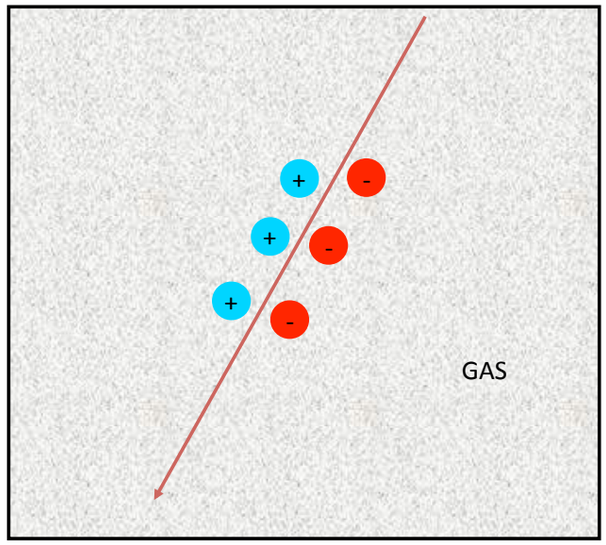
How do we study cosmic rays…

First: we detect them using a cosmic ray telescope!

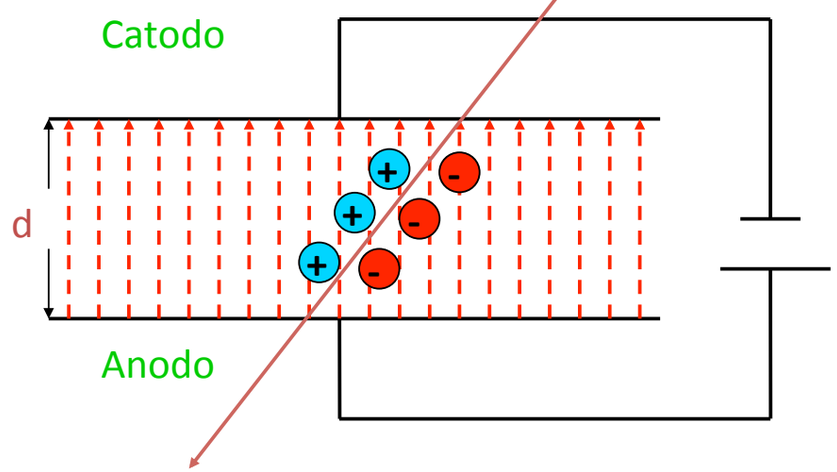


And how does the detector work?

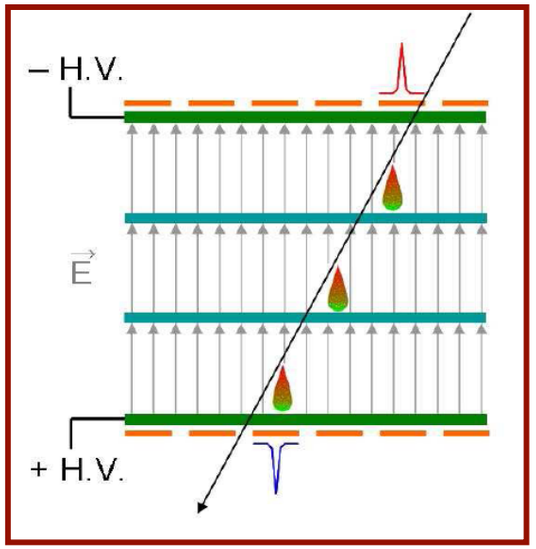
MRPC…a frontier gaseous detector!

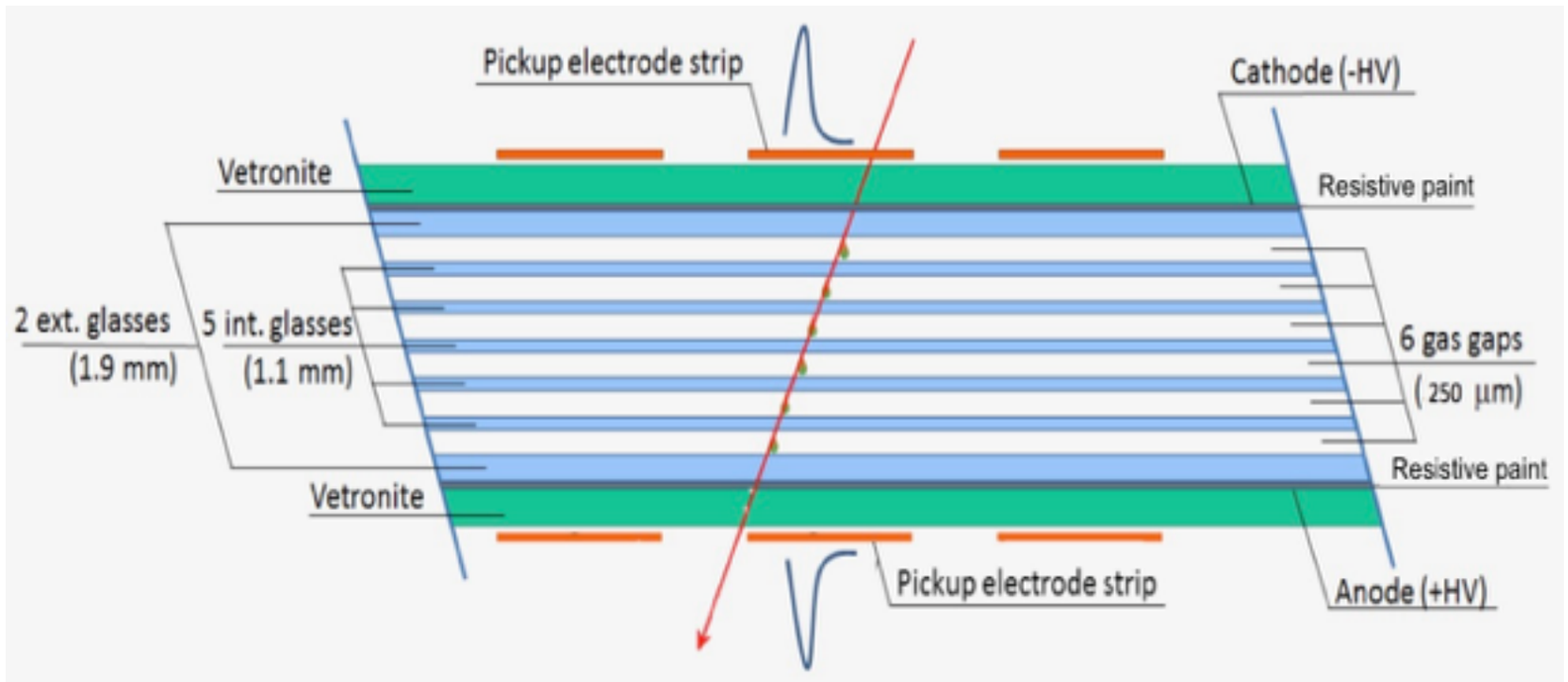


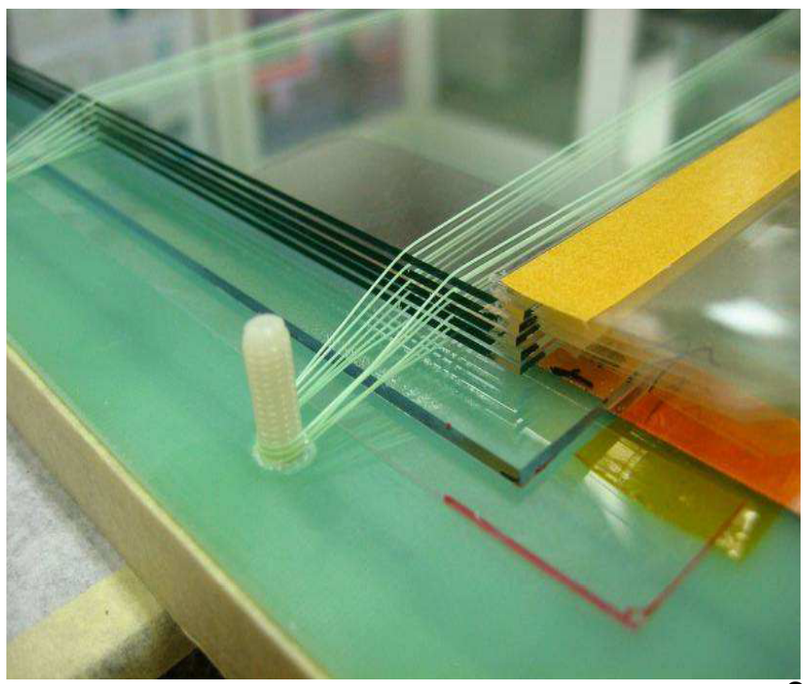
Add Electric field!



Add gaps!







So we got 2 basic ingredients…

1.Gas

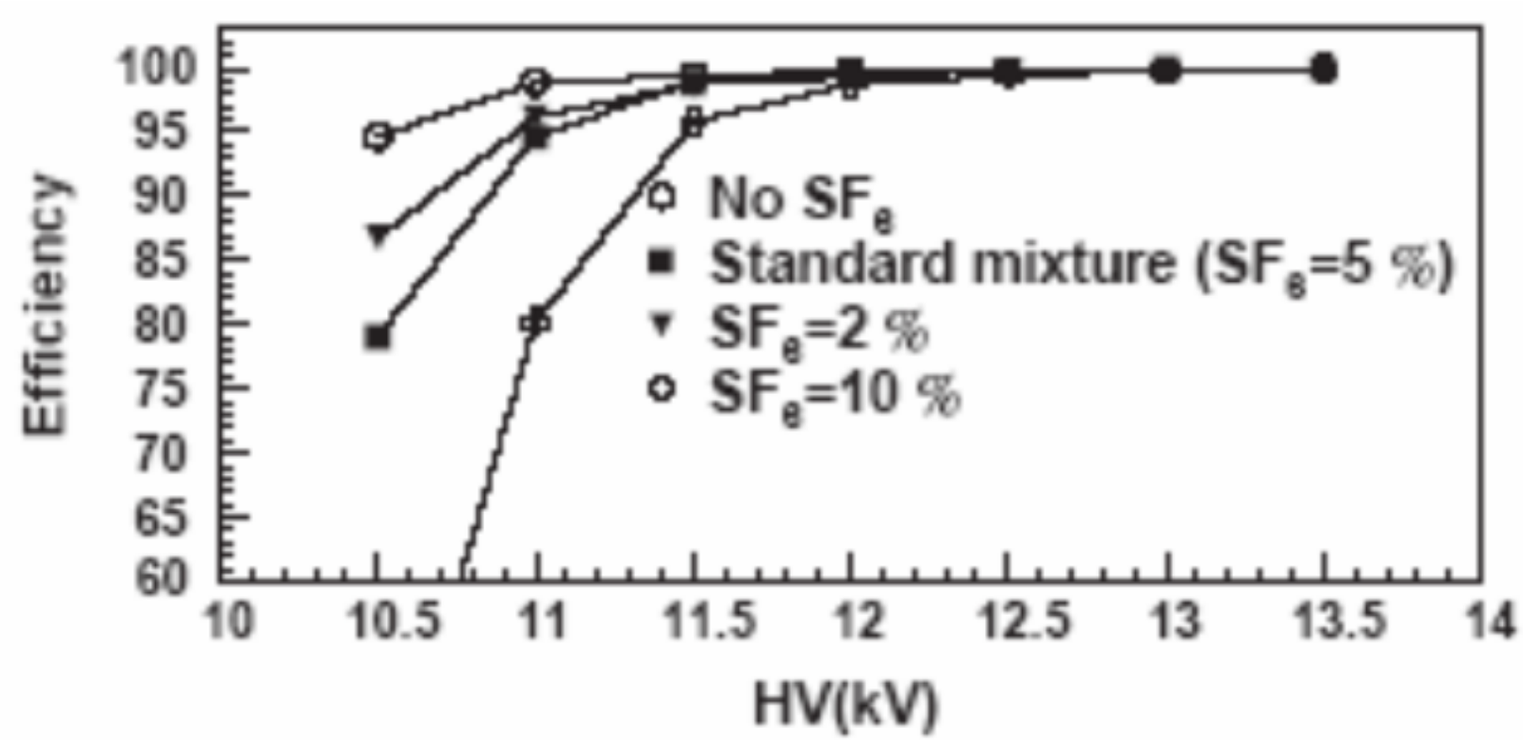
we use a mixture of Freon And SF_6 …you may ask why

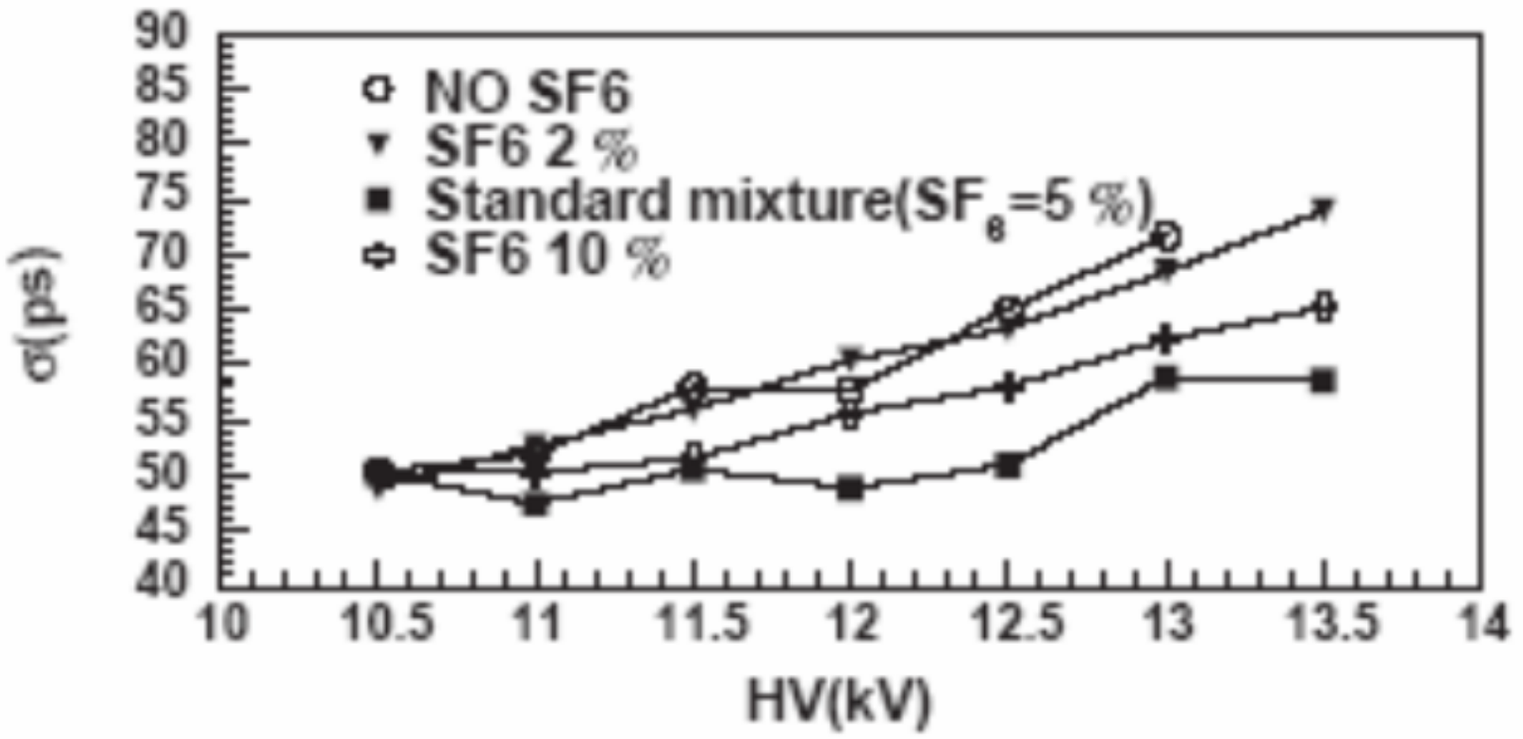
2. High Voltage

we keep the $\Delta V \sim 19$ kV…and again you may ask why

To make it work

To answer your possible questions





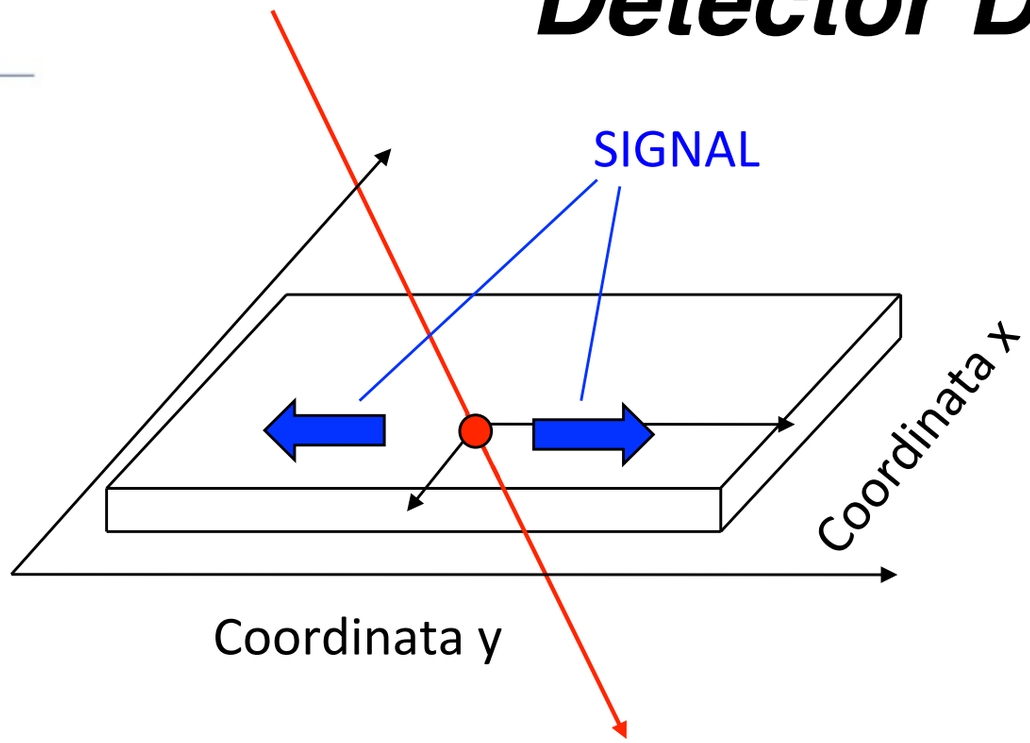
And these are monitored by the elog..

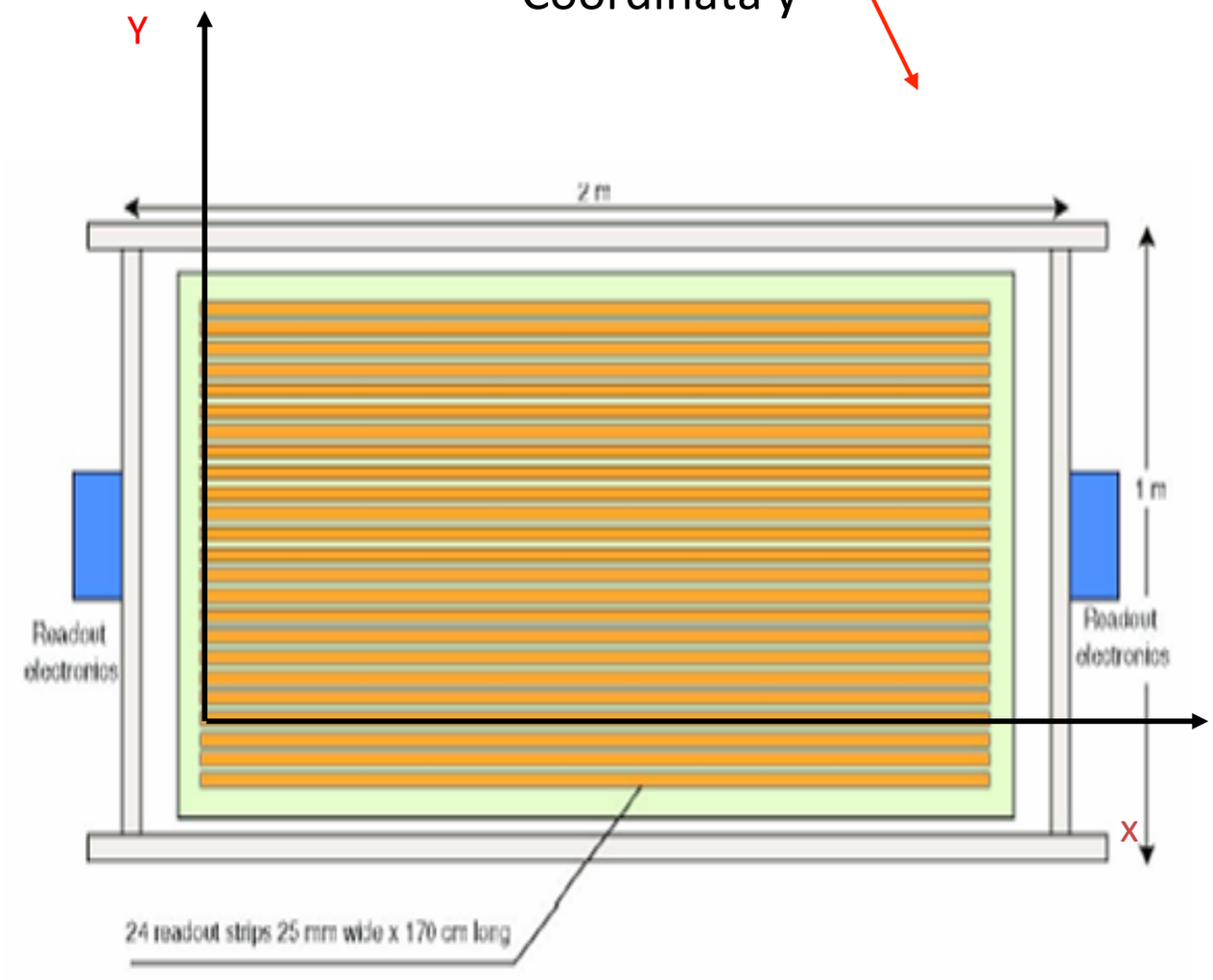
Scuola: **Codice EEE dell'Istituto Scolastico**	TORI-04
Operatore: **Nome e Cognome di chi inserisce i dati**	Ivan Gnesi
MRPC1 HV_POS (V): **MRPC1: misura Alta Tensione [+] (valore di esempio: 9100)**	8043
MRPC1 HV_NEG (V): **MRPC1: misura Alta Tensione [-] (valore di esempio: 9100)**	8432
MRPC1 I_POS (microA): **MRPC1: misura Corrente [+] (valore di esempio: 0.03 [usare il punto per i decimali])**	0.121
MRPC1 I_NEG (microA): **MRPC1: misura Corrente [-] (valore di esempio: 0.03 [usare il punto per i decimali])**	0.160
MRPC1 LV (V): **MRPC1: misura Bassa Tensione (valore di esempio: 4.5 [usare il punto per i decimali])**	4.2

SF6 (press): **Pressione del Gas SF6 (letta sul mixer nel display n.1) (valore di esempio: 3.5)**	9.2
C2H2F4 (press): **Pressione del Gas C2H2F4 (letta sul mixer nel display n.2) (valore di esempio: 4.1)**	10.5
SF6 (flusso): **Flusso del Gas SF6 (letto sul mixer nel display n.3) (valore di esempio: 30.0)**	30.5
C2H2F4 (flusso): **Flusso del Gas C2H2F4 (letto sul mixer nel display n.4) (valore di esempio: 30.2)**	30.6

Let's quickly see some details

Detector Details

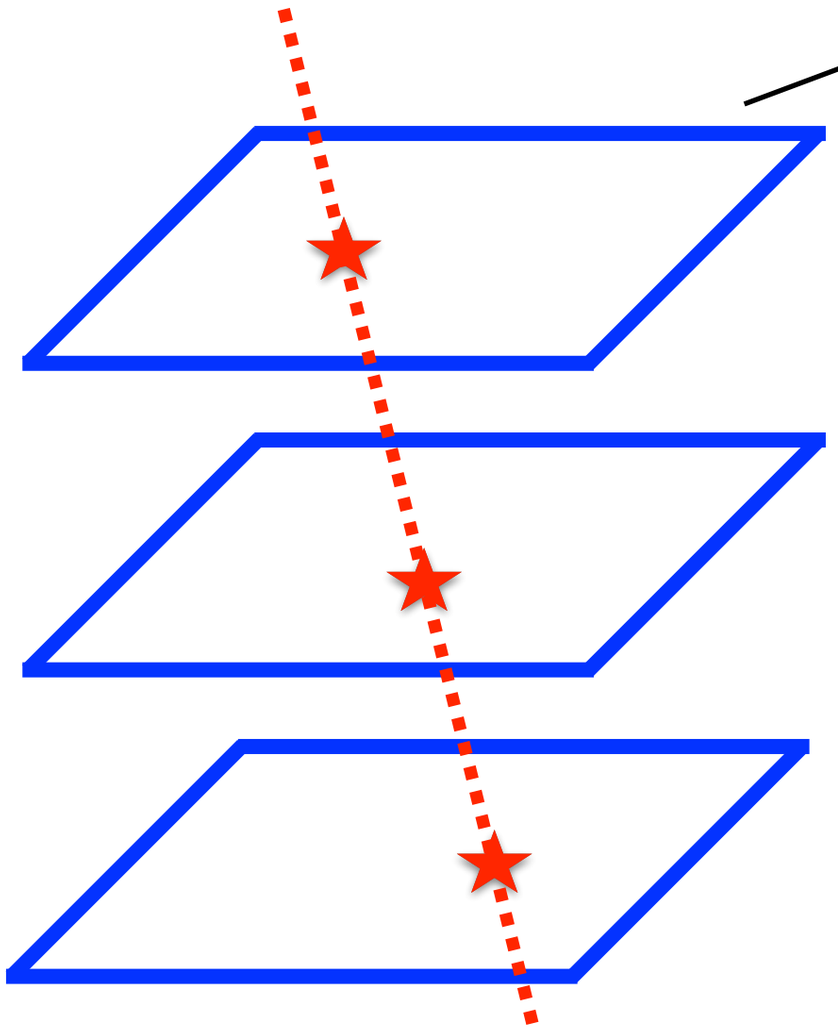




y coord. -> channel with signal

x coord. -> Signal arrival time difference

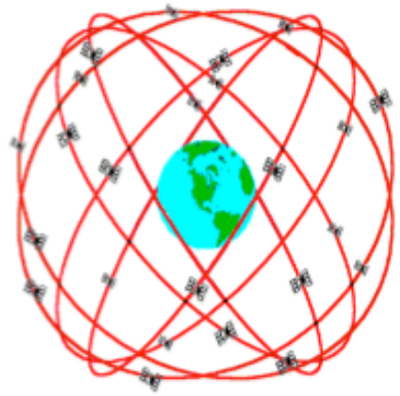
Available infos



Acquisition

Storage

Data analysis



GPS Receiver

at least…

- ***3 points….***
- ***1 line…..***
- ***1 time…***

NB: this is the minimal set of infos

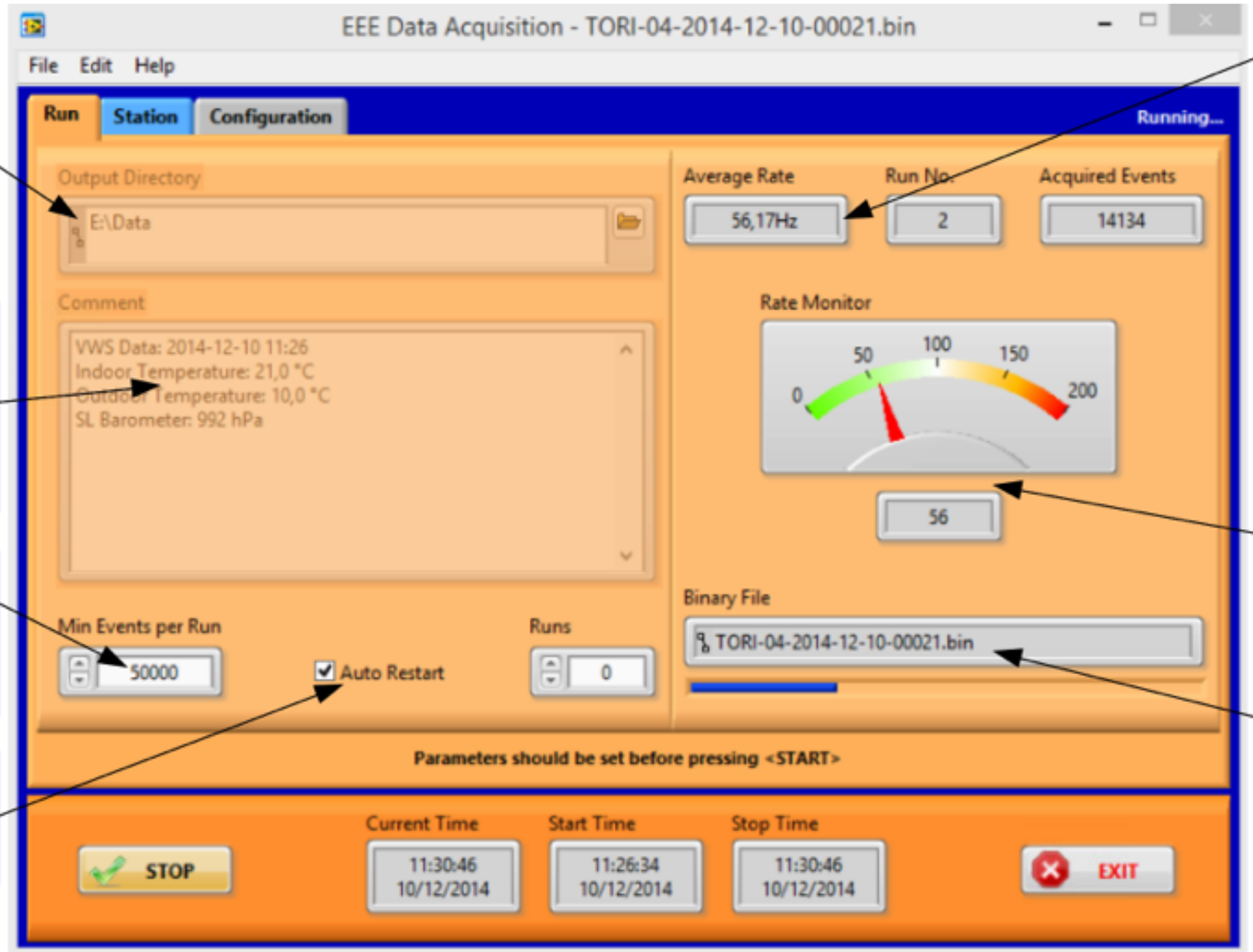
How do we run EEE Telescopes

Data folder

Weather station data

Max Nb.of events per run

Run auto restart



Average number of muons in the run

"online" number of muons

Current data file

So can we measure

1. *The point of passage of the cosmic ray (i.e. muon)*
2. *The cosmic ray direction*
3. *The time of flight of the cosmic ray*
4. *We can discover if our cosmic ray is in coincidence with particles detected by other telescopes*

Now we know how the telescope works and what we can get from it, so

We are ready for

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Chapter 2

What the DQM is

Now we know how the telescope works and what we can get from it…

1.we can check if the data we are acquiring are of "good" quality…

2.Take action if they are not!

…to do this, we should analyse the data locally or…use a centralised procedure, indeed

the acquired data are automatically copied to CNAF servers in Bologna and automatically analysed

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The EEE Project DQM

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Extreme Energy Events Monitor

Ultimo aggiornamento: ore 15:21 - ven 12 dicembre 2014

ELOGBOOK delle SCUOLE | ELOGBOOK dello SHIFTER | Stato trasmissione CNAF

EEE Main Monitoring Table

Questa tabella mostra la situazione dei telescopi in acquisizione
In **verde** sono indicati i telescopi in presa dati e trasferimento nelle ultime 4 ore.
In **giallo** sono indicati i telescopi in cui trasferimento e/o acquisizione sono sospesi da più di 4 ore.
In **rosso** sono indicati i telescopi in cui trasferimento e/o acquisizione sono sospesi da più di un giorno.

Scuola	Giorno	Ora	Nome dell'ultimo File trasferito	Numero Files trasferiti oggi	Ultima Entry nell'e-logbook delle Scuole	Report giornaliero DQM	RATE of Triggers for the last Run in DQM	RATE of Tracks for the last Run in DQM	Link DQM
ALTA-01	mer 10 dicembre	08:06	ALTA-01-2014-12-10-00020.bin	20 [History]	10:56 21/11/2014	11/12 [History]	27.4	21.0	ALTA-01
BARI-01	ven 12 dicembre	15:06	BARI-01-2014-12-12-00024.bin	24 [History]	09:59 06/12/2014	12/12 [History]	21.7	18.8	BARI-01
BOLO-01	ven 12 dicembre	15:02	BOLO-01-2014-12-12-00024.bin	26 [History]		12/12 [History]	47.4	26.9	BOLO-01
BOLO-03	gio 11 dicembre	18:08	BOLO-03-2014-12-11-00054.bin	54 [History]	13:22 12/12/2014	12/12 [History]	40.2	29.6	BOLO-03
CAGL-01	ven 12 dicembre	15:07	CAGL-01-2014-12-12-00020.bin	20 [History]	08:25 11/12/2014	12/12 [History]	18.8	15.5	CAGL-01
CAGL-02	ven 12 dicembre	14:48	CAGL-02-2014-12-12-00044.bin	44 [History]	12:01 03/12/2014	12/12 [History]	37.9	33.3	CAGL-02

The EEE Project DQM

Now at this point of the talk all the people wants to try to look to the monitor…

You know we had a problem…but now a backup is ready and running at

http://eee.centrofermi.it/monitor

👏

Many thanks to Fabrizio, Francesco & Carmelo

before entering the DQM let me introduce you another instrument…

Connectivity Report

if you connect to EEE monitor you can find

How does it work?

Progetto Extreme Energy Events - La Scienza nelle Scuole

EEE connectivity Report at CNAF

Last update: 17:30 Monday 04 December 2017

EEE Transfers performed with SYNCTHING

Scuola-TEL	Connessione ultime 2h	Trasferimenti ultimi 90 min	File in coda	Ultimo errore nella DAQ (solo se sull'ultimo file)
AREZ-01	efficienza = -nan	0.0 MB	0 (0.0 MB)	
ALTA-01	efficienza = -nan	0.0 MB	0 (0.0 MB)	
ANCO-01	efficienza = 0.27	180.6 MB	103 (691.8 MB)	
BARI-01	efficienza = -nan	0.0 MB	0 (0.0 MB)	
BOLO-01	efficienza = 1.00	38.5 MB	0 (0.0 MB)	
BOLO-02	efficienza = 1.00	43.1 MB	0 (0.0 MB)	
BOLO-03	efficienza = 1.00	37.9 MB	0 (0.0 MB)	
BOLO-04	efficienza = 1.00	11.0 MB	0 (0.0 MB)	

LEGENDA
Se il telescopio è verde nella seconda colonna e rosso nella terza probabilmente non sta acquisendo.
Se il telescopio è rosso nella seconda colonna c'è un problema di connessione con il CNAF (syncthing è attivo sul pc?)

Let's go back to The EEE Project DQM

Progetto Extreme Energy Events - La Scienza nelle Scuole

EEE MONITOR - DQM

[Web address: http://eee.centrofermi.it/monitor]

Ultimo aggiornamento: ore 13:55 - martedì 05 dicembre 2017 [by e3monitor]

EEE Home Page | Connectivity Report

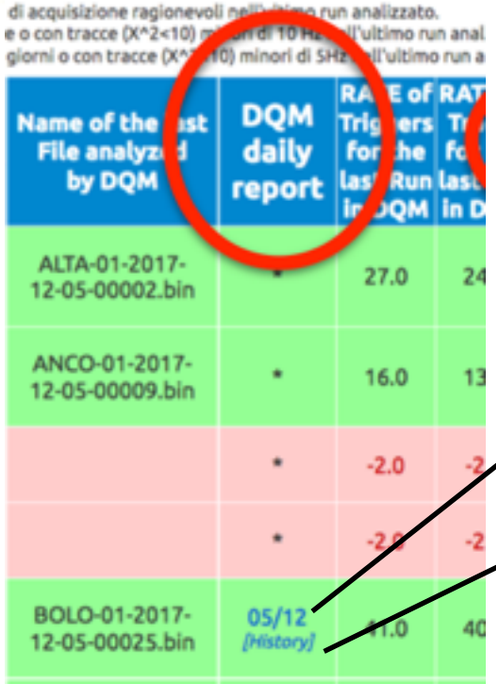
[EEE Monitor] Back from the abyss of the waters...
[EEE Monitor] ... running in ReCas - Bari
[EEE Monitor] Start of RUN4: October 2, 2017
[EEE Monitor] RUN 4 - Data Taking - Day number: 65

Total number of candidate tracks (X^2<10) in this database: 321187029

Questa tabella mostra la situazione dei telescopi in acquisizione:
In **verde** sono indicati i telescopi in presa dati e trasferimento nelle ultime 3 ore e con parametri di acquisizione ragionevoli nell'ultimo run analizzato.
In **giallo** sono indicati i telescopi in cui trasferimento e/o acquisizione sono sospesi da più di 3 ore o con tracce (X^2<10) minori di 10 Hz nell'ultimo run analizzato.
In **rosso** sono indicati i telescopi in cui trasferimento e/o acquisizione sono sospesi da più di due giorni o con tracce (X^2<10) minori di 5Hz nell'ultimo run analizzato.

School	Day	Time	Name of the last trasferred File	Number of Files trasferred today	Name of the last File analyzed by DQM	DQM daily report	RATE of Triggers for the last Run in DQM	RATE of Tracks for the last Run in DQM	Link DQM
ALTA-01	mar 05 dicembre	13:31	ALTA-01-2017-12-05-00008.bin	29	ALTA-01-2017-12-05-00002.bin	*	27.0	24.0	ALTA-01
ANCO-01	mar 05 dicembre	13:43	ANCO-01-2017-12-05-00009.bin	57	ANCO-01-2017-12-05-00009.bin	*	16.0	13.0	ANCO-01
AREZ-01				0		*	-2.0	-2.0	AREZ-01
BARI-01				0		*	-2.0	-2.0	BARI-01
BOLO-01	mar 05 dicembre	13:43	BOLO-01-2017-12-05-00025.bin	156	BOLO-01-2017-12-05-00025.bin	05/12 *[History]*	41.0	40.0	BOLO-01
BOLO-02	mar 05 dicembre	13:39	BOLO-02-2017-12-05-00046.bin	135	BOLO-02-2017-12-05-00036.bin	05/12 *[History]*	45.0	42.0	BOLO-02
BOLO-03	mar 05 dicembre	13:44	BOLO-03-2017-12-05-00030.bin	119	BOLO-03-2017-12-05-00028.bin	05/12 *[History]*	43.0	41.0	BOLO-03
BOLO-04	mar 05 dicembre	13:27	BOLO-04-2017-12-05-00009.bin	31	BOLO-04-2017-12-05-00004.bin	05/12 *[History]*	13.0	12.0	BOLO-04
CAGL-01				0		*	-2.0	-2.0	CAGL-01

The EEE Project DQM-Report giornaliero



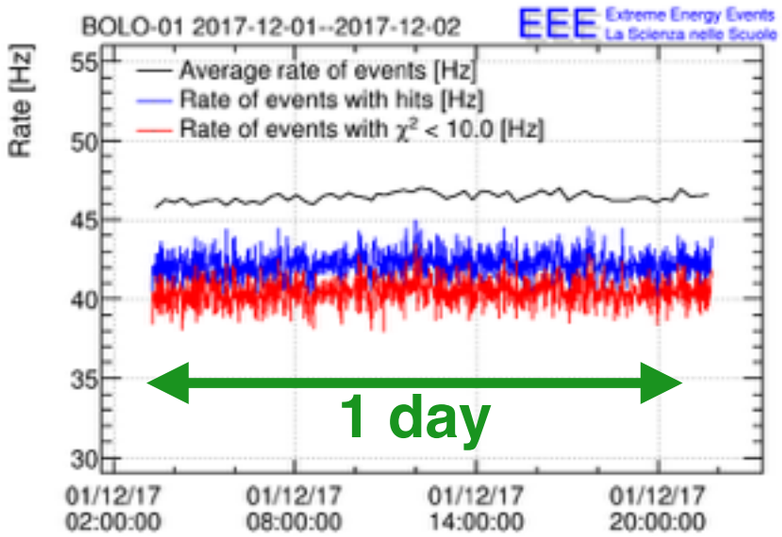
Once a day relevant summary plot are automatically produced

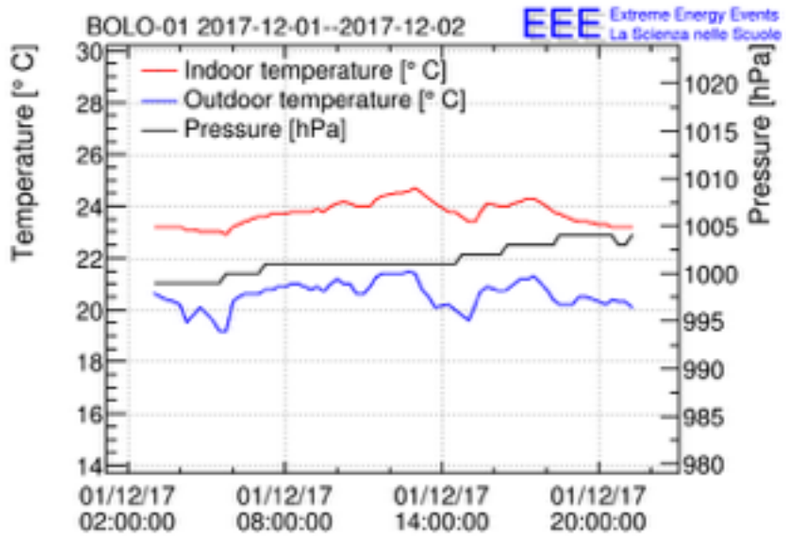
And you have some history too

What if you choose one of them?

The EEE Project DQM-Report giornaliero

EEE DQM summary report





Summary

- Station: BOLO-01
- Time period: 2017-12-01--2017-12-02
- Number of runs processed: 65
- Total number of events: 3079214
- Number of events with hits: 2797984
- Number of events with a track: 2681009
- Data files: root, csv header, csv trending, csv weather

Set of trending files

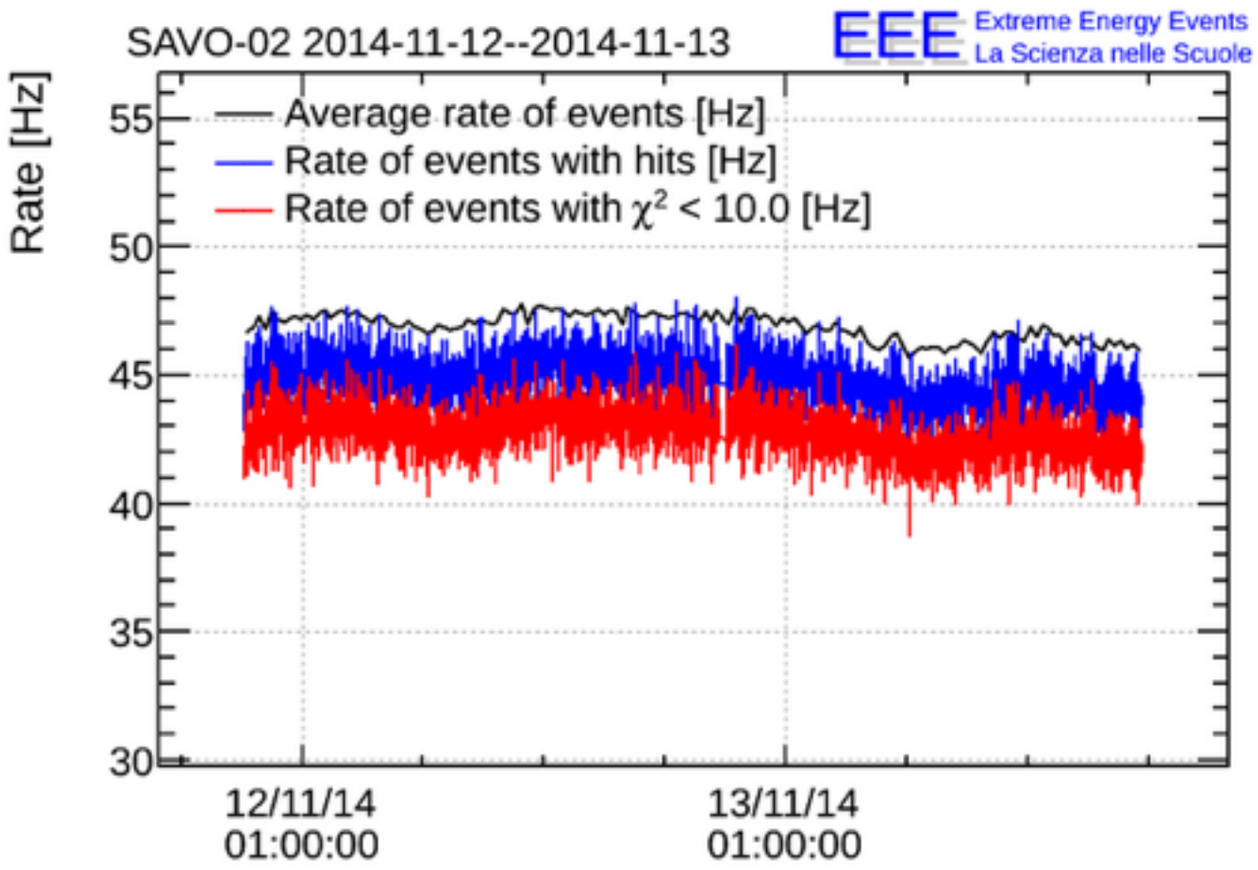
Summary plots

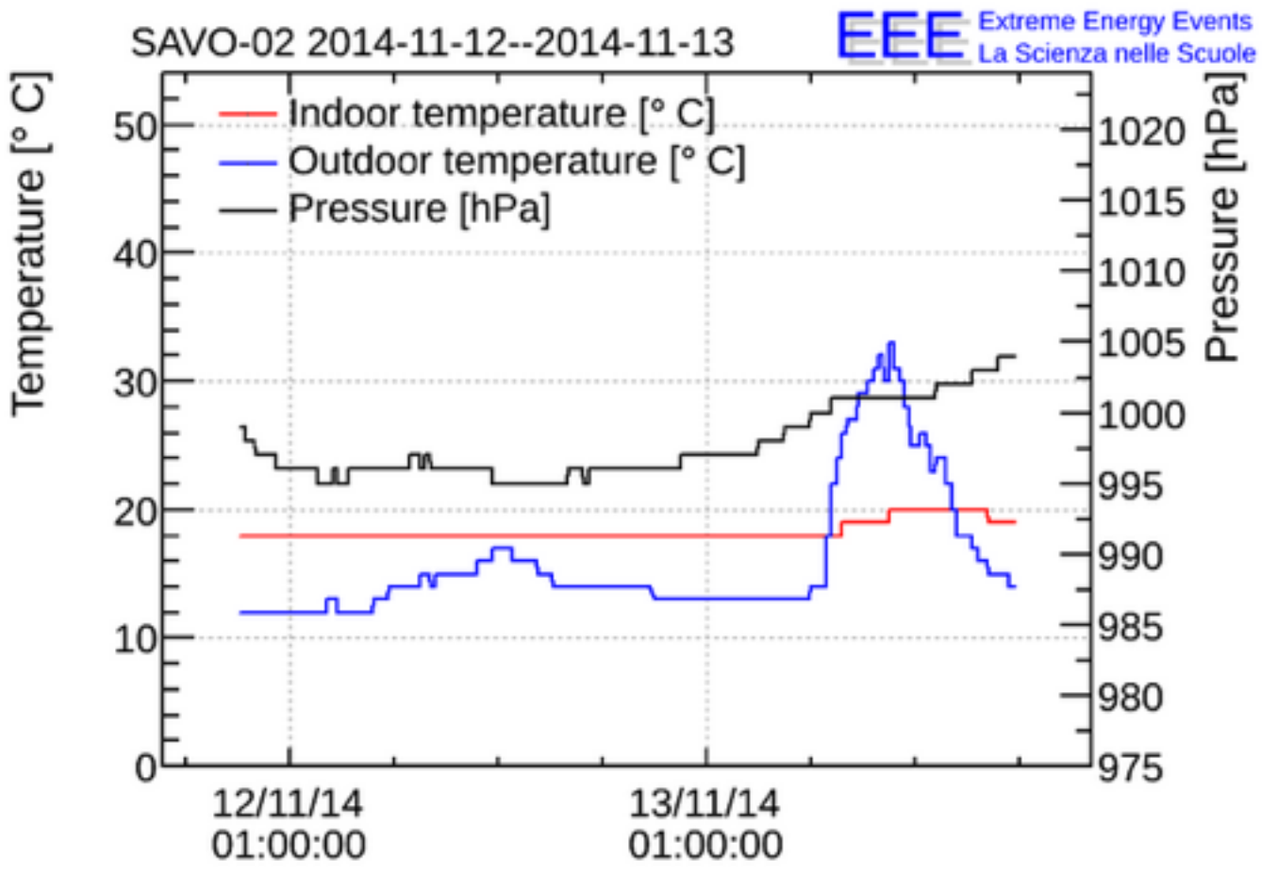
Plot
RunDuration
NumEvents
AverageRate
NumTrackEvents
NumMalformedEvents
NumBackwardEvents
NumNoHitsEvents
NumNoHitEvents
RateHitEvents
RateTrackEvents
FractionTrackEvents
IndoorTemperature
OutdoorTemperature
Pressure

Set of trending plots…click and see

Daily Report

EEE DQM summary report



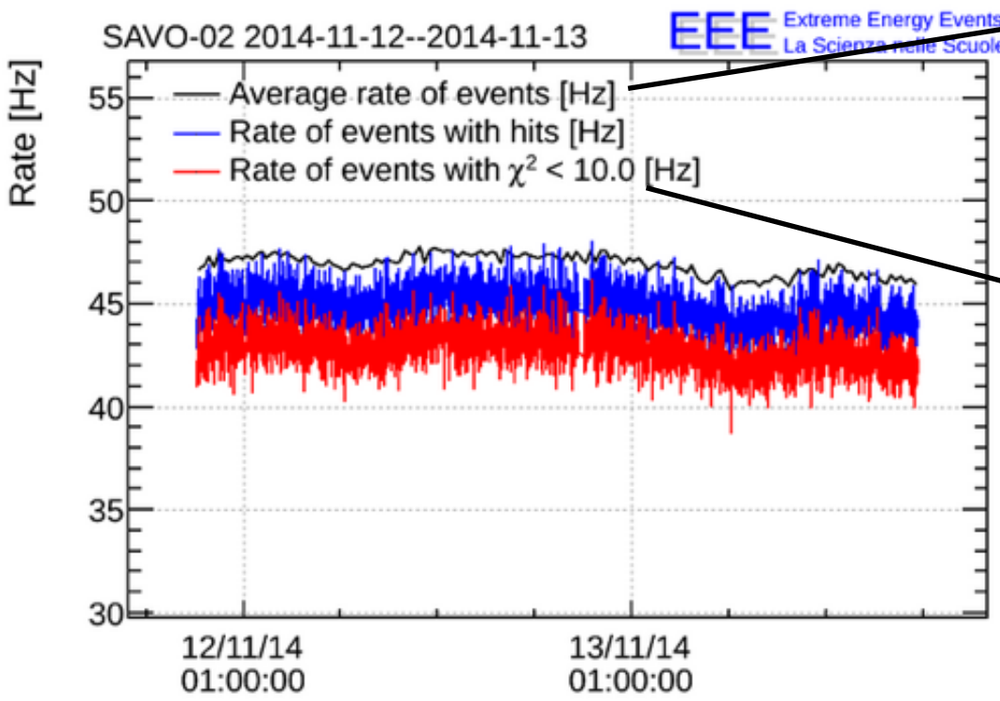


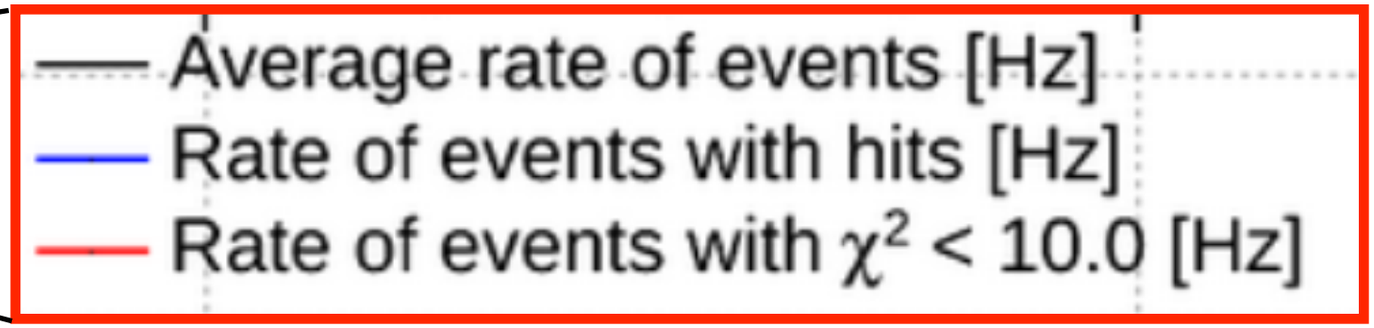
Each plot provides useful informations…we need to look at them carefully to understand the message, and decide if an action needs to be taken

Let's try to understand some plots from the daily report and use them as exercises

For example

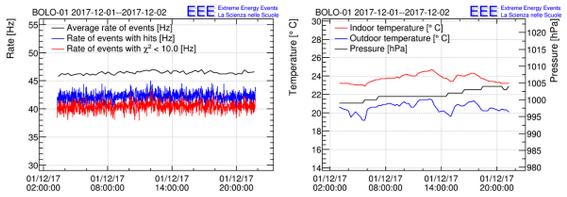
EEE DQM summary report





- first…during this period the telescope works
- we learn also that there exist three rates…what's that?

EEE DQM summary report



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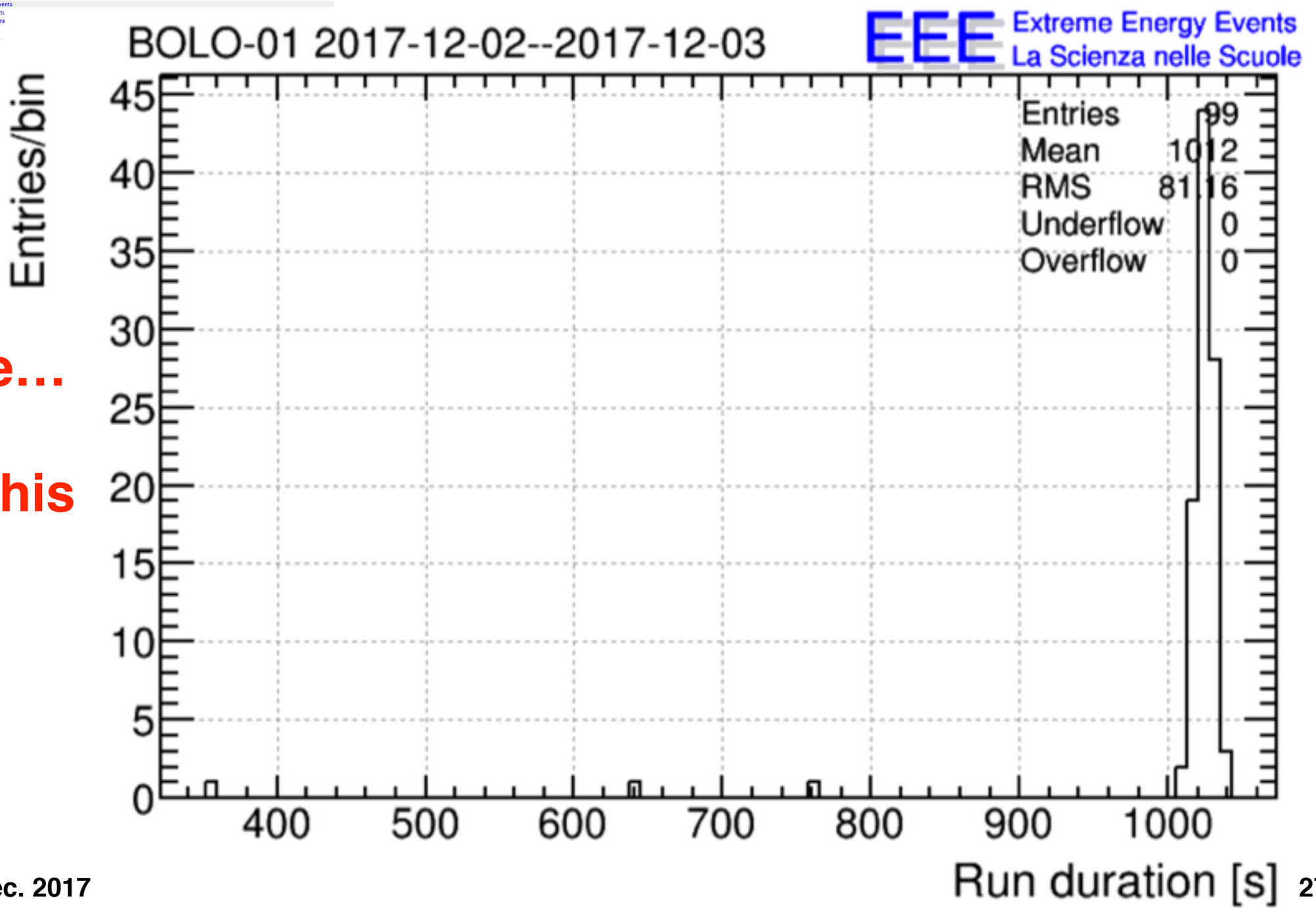
Plot
RunDuration
NumEvents
AverageRate
NumTrackEvents
NumMalformedEvents
NumBackwardEvents
NumNoHitsEvents
NumNoHitEvents
RateHitEvents
RateTrackEvents
FractionTrackEvents
IndoorTemperat.
OutdoorTempera
Pressure

RunDuration

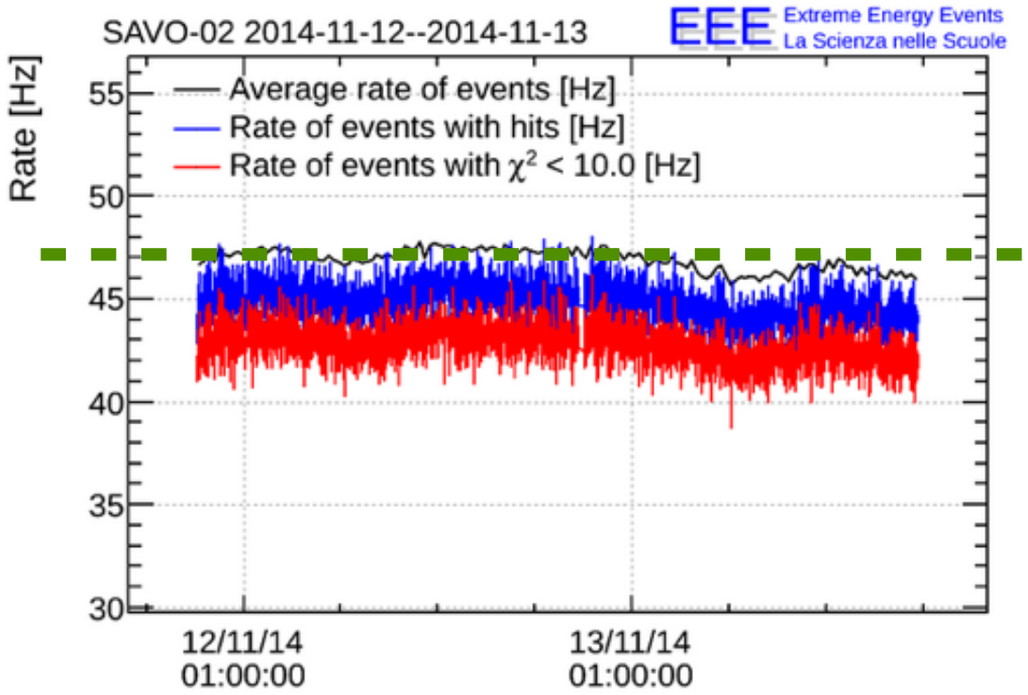
First exercise…

What does this plot mean?

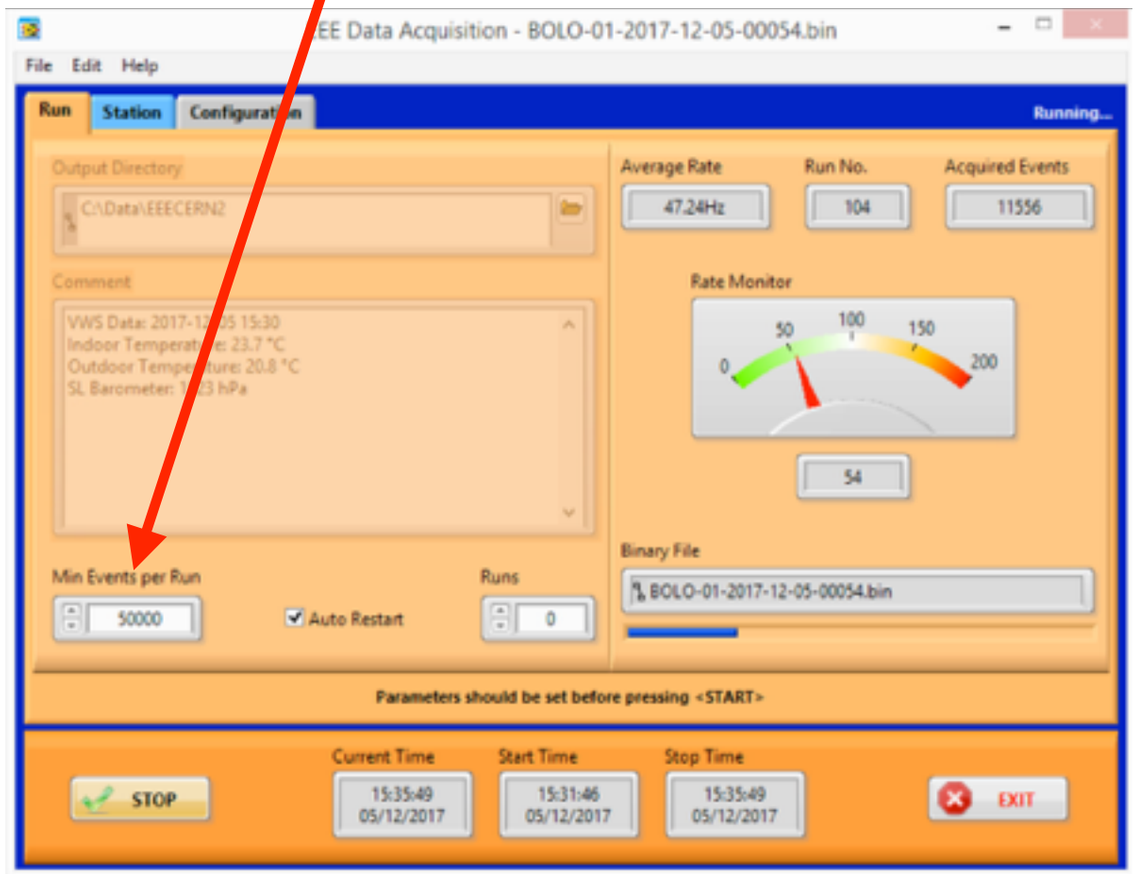


Again…let's try to answer

EEE DQM summary report

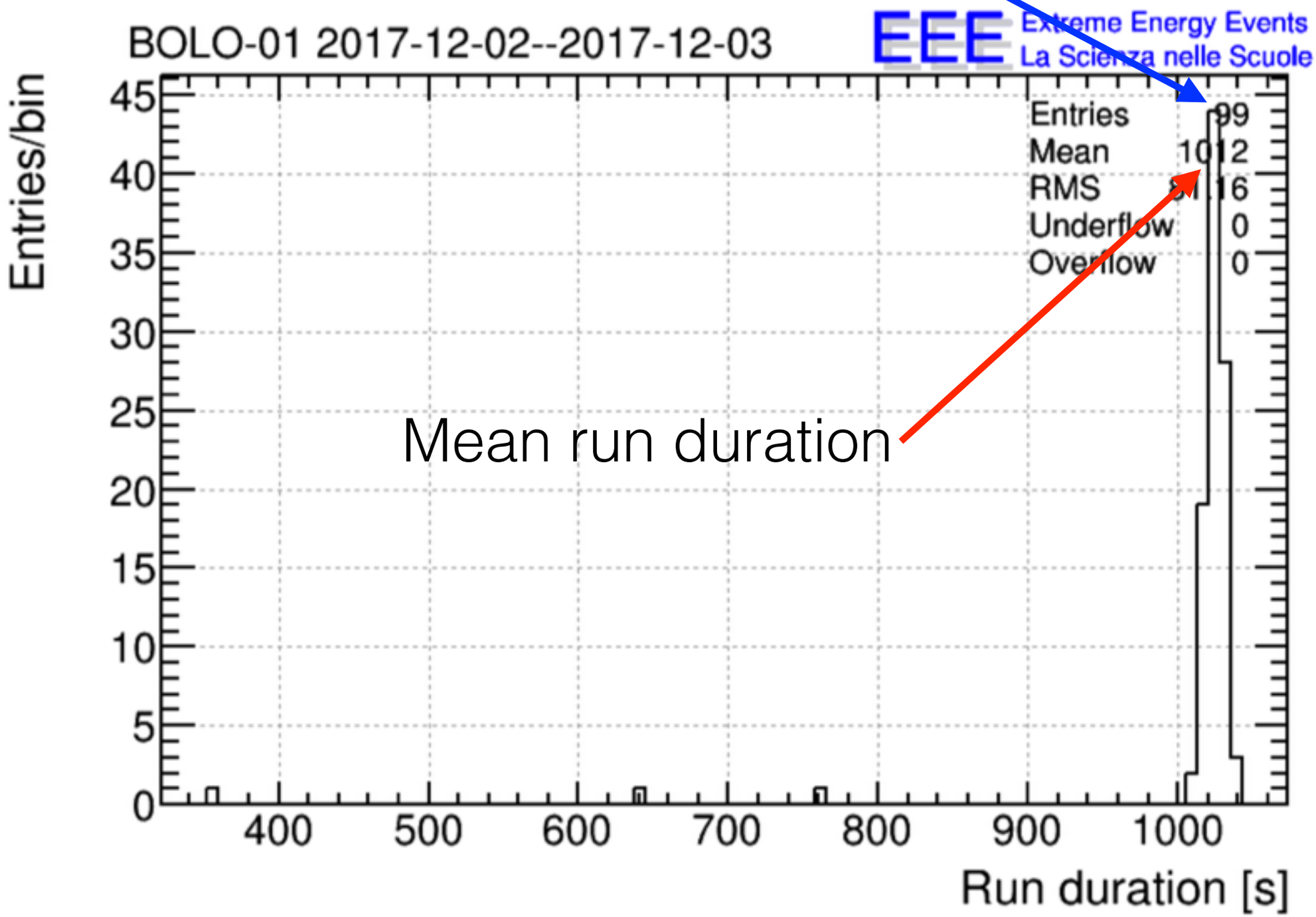


During this day the telescope acquired about 47 events/s
And we make 50000 events long run



Duration of 1 run = 50000/47~1000 s
Seconds in a day 86400
Nb. of run in a day = 86400/1000~90

How many runs



Mean run duration

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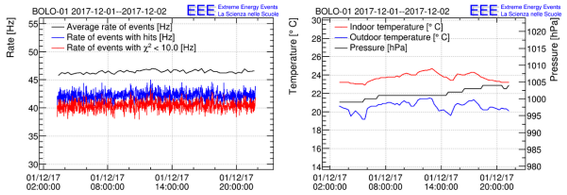
EEE DQM summary report



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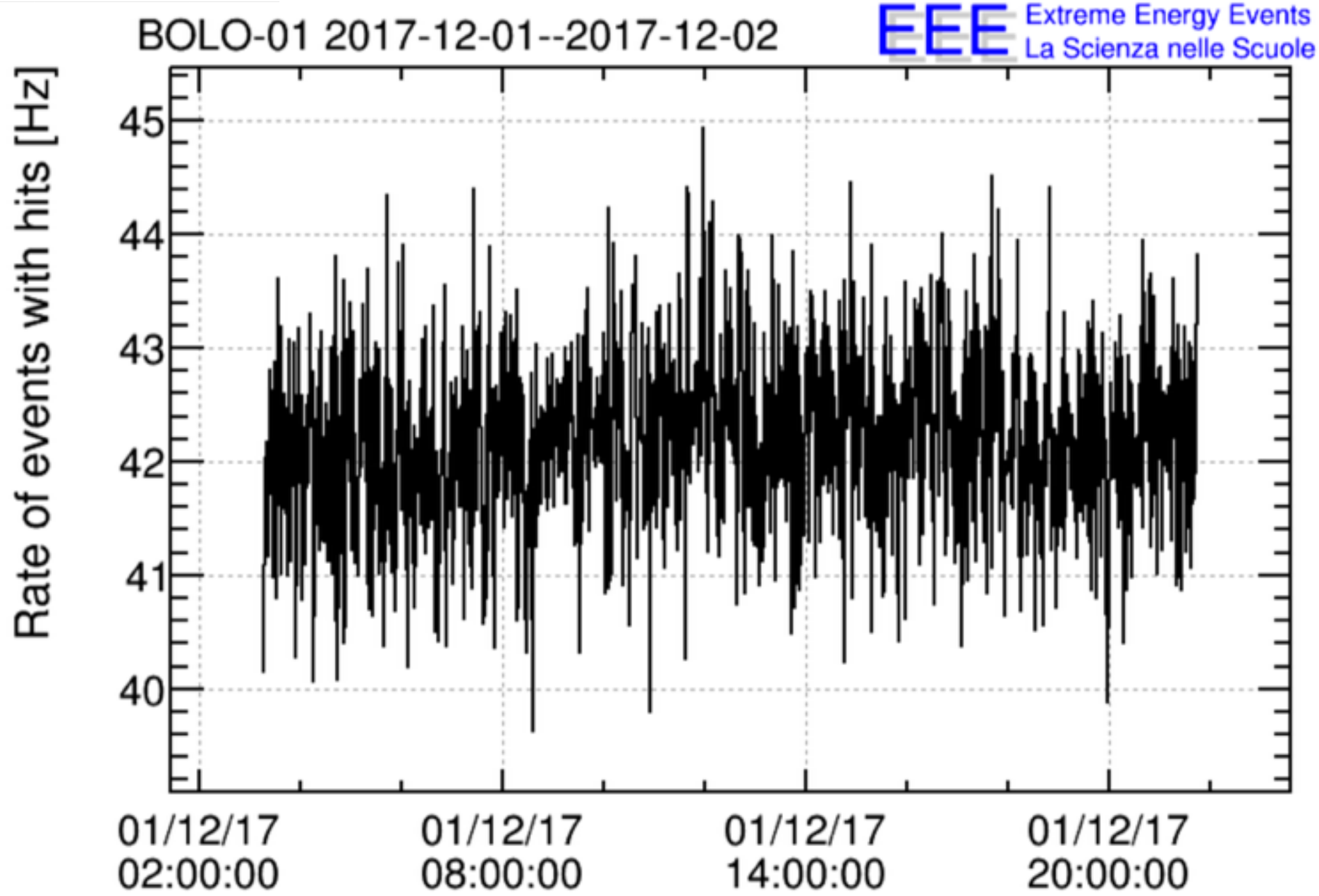
SUMMARY PLOTS

PLOT
RunDuration
NumEvents
AverageRate
NumTrackEvents
NumMalformedEvents
NumBackwardEvents
NumNoHitsEvents
NumNoHitEvents
RateHitEvents
RateTrackEvents
FractionTrackEvents
IndoorTemperature
OutdoorTemperature
Pressure

RateHitEvents

so…
what does this plot mean?



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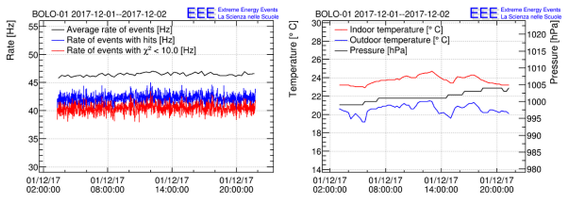
EEE DQM summary report



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- Total number of events: 3079214
- Number of events with hits: 2797984
- Number of events with a track: 2681009
- Data files: root, csv header, csv trending, csv weather

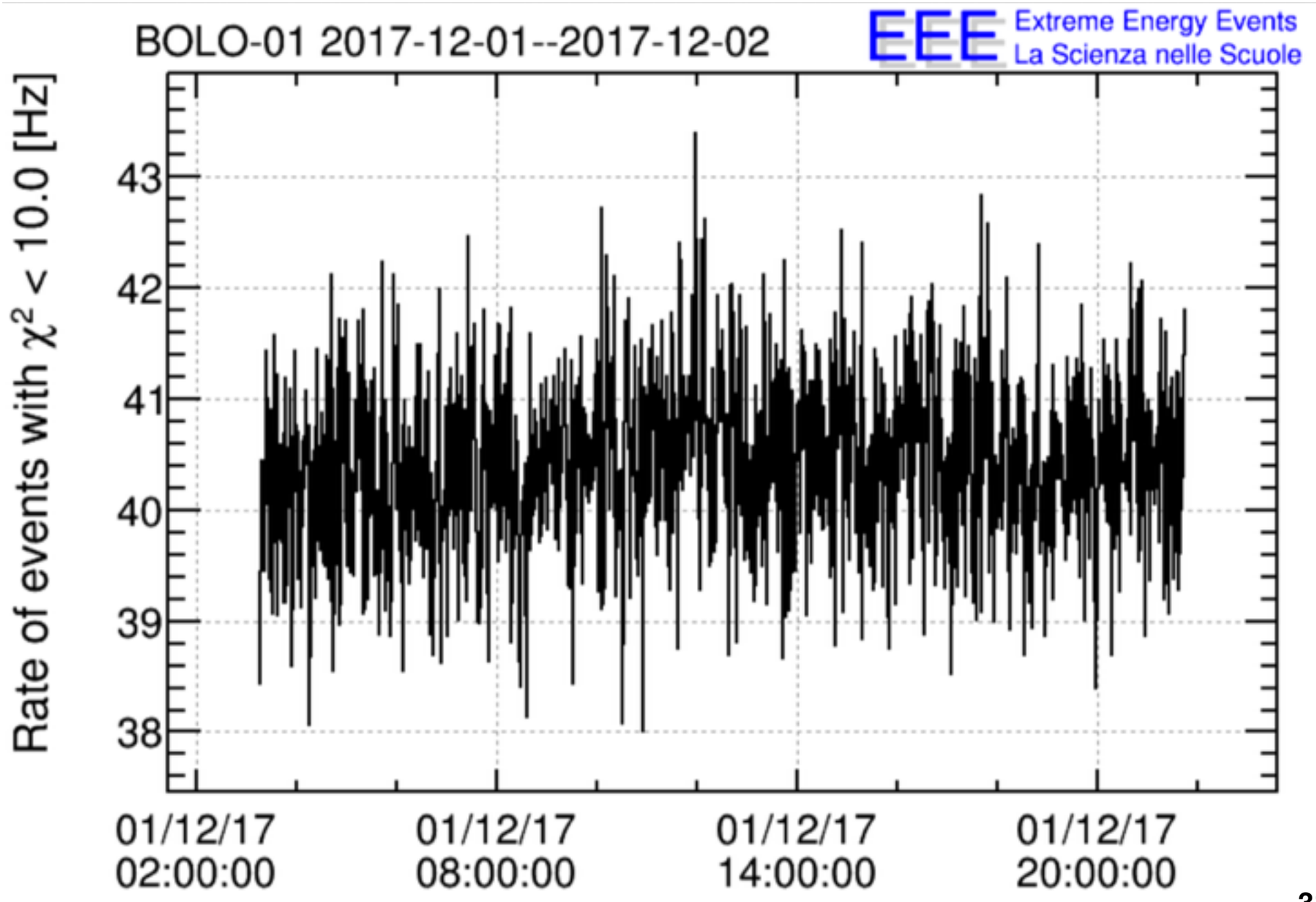
SUMMARY PLOTS

PLOT
RunDuration
NumEvents
AverageRate
NumTrackEvents
NumMalformedEvents
NumBackwardEvents
NumNoHitsEvents
NumNoHitEvents
RateHitEvents
RateTrackEvents
FractionTrackEvents
IndoorTemperature
OutdoorTemperature
Pressure

RateTrackEvents

Extreme Energy Events
Science inside Schools

and this one?



And you can compare different days

Index of /monitor/dqm2/BOLO-01

Name	Last modified	Size	Description
Parent Directory		-	
2017-12-05/	05-Dec-2017 15:46	-	
2017-12-04/	05-Dec-2017 00:08	-	
2017-12-03/	04-Dec-2017 10:49	-	
2017-12-01/	02-Dec-2017 09:21	-	
2017-11-30/	01-Dec-2017 07:52	-	
2017-11-29/	29-Nov-2017 20:17	-	
2017-11-28/	28-Nov-2017 21:35	-	
2017-11-27/	28-Nov-2017 00:05	-	

and maybe find if something is going on

The EEE Project DQM

RATE of Tracks for the last Run in DQM	Link DQM
21.0	ALTA-01
18.8	BARI-01

Choosing one telescope you can access the list of daily data folders

Index of /monitor/dqm2/BOLO-01

Name	Last modified	Size	Description
Parent Directory		-	
2017-12-01/	02-Dec-2017 09:21	-	
2017-11-30/	01-Dec-2017 07:52	-	
2017-11-29/	29-Nov-2017 20:17	-	
2017-11-28/	28-Nov-2017 21:35	-	
2017-11-27/	28-Nov-2017 00:05	-	

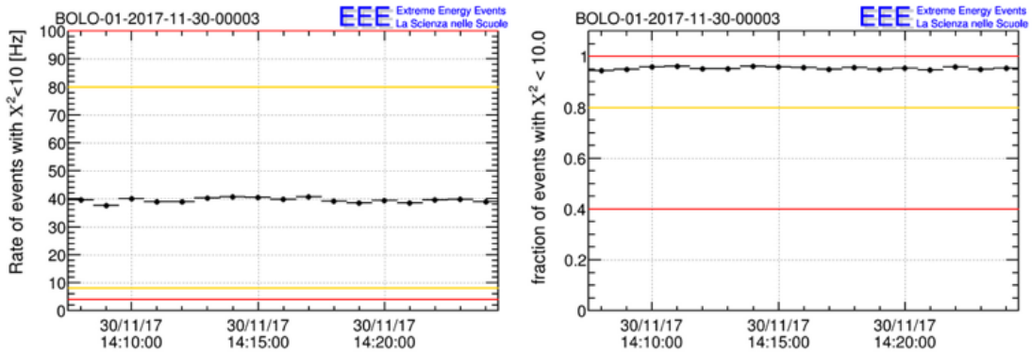
Index of /monitor/dqm2/BOLO-01/2017-11-30

Name	Last modified	Size	Description
Parent Directory		-	
BOLO-01-2017-11-30-00001/	30-Nov-2017 15:05	-	
BOLO-01-2017-11-30-00002/	30-Nov-2017 15:14	-	
BOLO-01-2017-11-30-00003/	30-Nov-2017 15:35	-	
BOLO-01-2017-11-30-00004/	30-Nov-2017 16:51	-	
BOLO-01-2017-11-30-00005/	30-Nov-2017 17:51	-	
BOLO-01-2017-11-30-00006/	30-Nov-2017 18:51	-	
BOLO-01-2017-11-30-00007/	30-Nov-2017 19:03	-	
BOLO-01-2017-11-30-00008/	30-Nov-2017 19:20	-	
BOLO-01-2017-11-30-00009/	30-Nov-2017 19:42	-	
BOLO-01-2017-11-30-00010/	30-Nov-2017 19:57	-	
BOLO-01-2017-11-30-00011/	30-Nov-2017 20:09	-	
BOLO-01-2017-11-30-00012/	30-Nov-2017 20:40	-	
BOLO-01-2017-11-30-00013/	30-Nov-2017 21:21	-	
BOLO-01-2017-11-30-00014/	30-Nov-2017 21:36	-	
BOLO-01-2017-11-30-00015/	30-Nov-2017 21:38	-	
BOLO-01-2017-11-30-00016/	30-Nov-2017 22:04	-	
BOLO-01-2017-11-30-00017/	30-Nov-2017 22:33	-	
BOLO-01-2017-11-30-00018/	30-Nov-2017 22:51	-	
BOLO-01-2017-11-30-00019/	30-Nov-2017 23:21	-	
BOLO-01-2017-11-30-00020/	30-Nov-2017 23:55	-	
BOLO-01-2017-11-30-00021/	01-Dec-2017 00:28	-	
BOLO-01-2017-11-30-00022/	01-Dec-2017 00:59	-	

…and finally you can access the single run data quality plots

Run Report

EEE DQM run report



RUN SUMMARY

- DST file path: /data/eeesoft/eeetmp/BOLO-01-2017-11-30-00003_dst.root
- Unique run identifier: 5398600003
- Smallest event timestamp: 344441249.075 s UTC
- Largest event timestamp: 344442301.991 s UTC
- Run duration (largest - smallest timestamp): 1052.916 s
- Total number of events: 47880
- Number of events with hits: 43650
- Number of events with a track: 41638
- Number of "no hits" (GPS?) events: 4230
- Number of malformed events: 0
- Number of events out of order: 1

WEATHER STATION

- Readout at 344440800.000 s UTC (449.075 s before the
- Outdoor temperature: 23.60 deg C
- Indoor temperature: 26.60 deg C
- Pressure: 994 hPa

ALARM SUMMARY

PLOT	ALARM	S
RateHitEvents	y_values	C
DeltaTime	exp_fit_lambda	C
HitMultTop	x_average	C
HitMultMid	x_average	C
HitMultBot	x_average	C
HitMultTotal	x_average	C
ClusterMultTop	x_average	C
ClusterMultMid	x_average	C
ClusterMultBot	x_average	C
ClusterMultTotal	x_average	C
ChiSquare	x_average	C
RateTrackEvents	y_values	C
FractionTrackEvents	y_values	C
Phi		
Theta		
TimeOfFlight		
TrackLength		

The analysis code produces automatically

Automatically produced a set of histograms

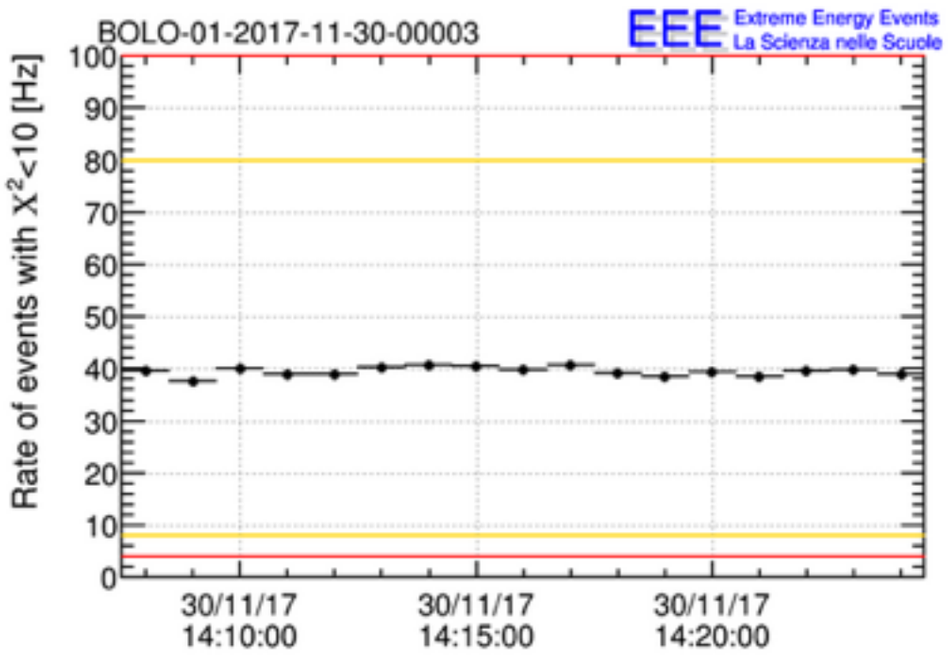
Automatically checked for goodness

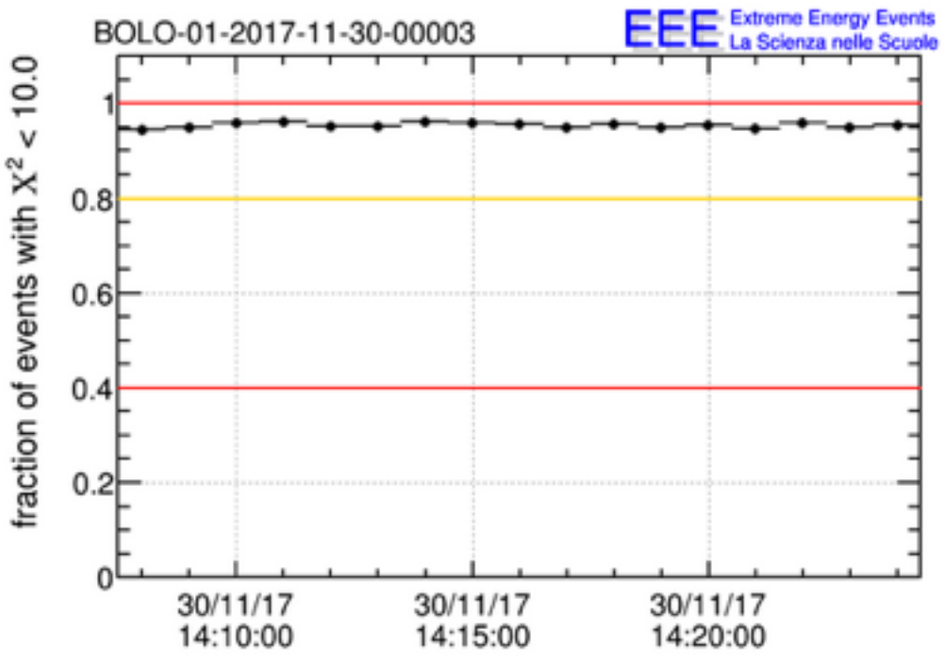
ALARM SUMMARY

PLOT	ALARM	STATUS	OUTPUT	LIMITS
RateHitEvents	y_values	Clean	39.61 +- 0.81	[4 / 8 - 80 / 100]
DeltaTime	exp_fit_lambda	Clean	45.62 +- 0.22	[4 / 8 - 80 / 100]
HitMultTop	x_average	Clean	1.3150 +- 0.0033	[0.500 / 0.750 - 2 / 3]
HitMultMid	x_average	Clean	1.3557 +- 0.0036	[0.500 / 0.750 - 2 / 3]
HitMultBot	x_average	Clean	1.3895 +- 0.0035	[0.500 / 0.750 - 2 / 3]
HitMultTotal	x_average	Clean	4.0575 +- 0.0074	[1.50 / 2.50 - 6 / 9]
ClusterMultTop	x_average	Clean	1.0831 +- 0.0020	[0.500 / 0.750 - 2 / 3]
ClusterMultMid	x_average	Clean	1.1102 +- 0.0022	[0.500 / 0.750 - 2 / 3]
ClusterMultBot	x_average	Clean	1.0891 +- 0.0020	[0.500 / 0.750 - 2 / 3]
ClusterMultTotal	x_average	Clean	3.2814 +- 0.0050	[1.50 / 2.50 - 6 / 9]
ChiSquare	x_average	Clean	2.096 +- 0.019	[1 / 2 - 6 / 10]
RateTrackEvents	y_values	Clean	37.61 +- 0.79	[4 / 8 - 80 / 100]
FractionTrackEvents	y_values	Clean	0.9610 +- 0.0038	[0.400 / 0.800 - 1 / 1]
Phi				
Theta				
TimeOfFlight				
TrackLength				

Examples…

EEE DQM run report



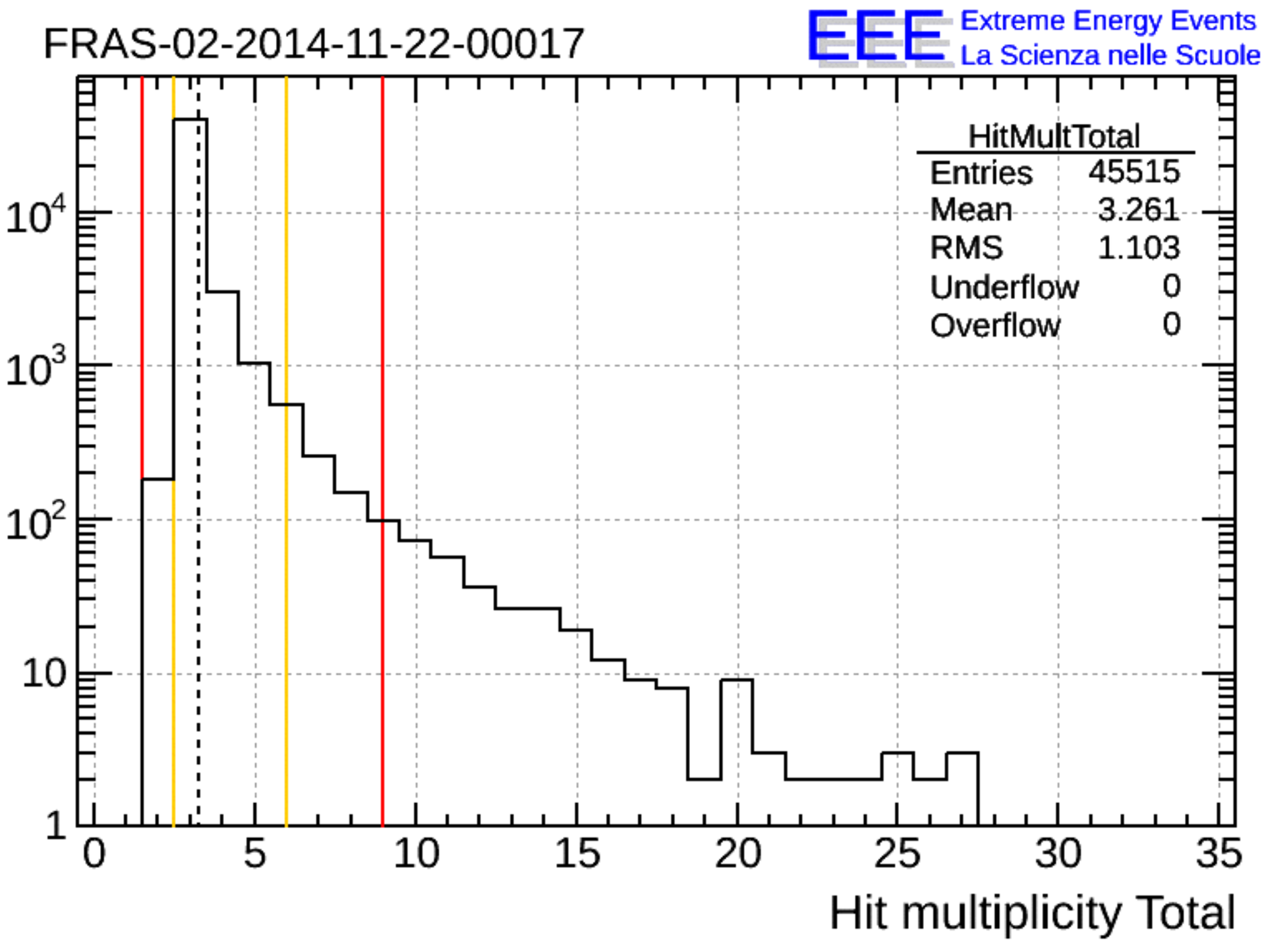


when you choose a run and click…you get these 2 plots and below you have the run summary…

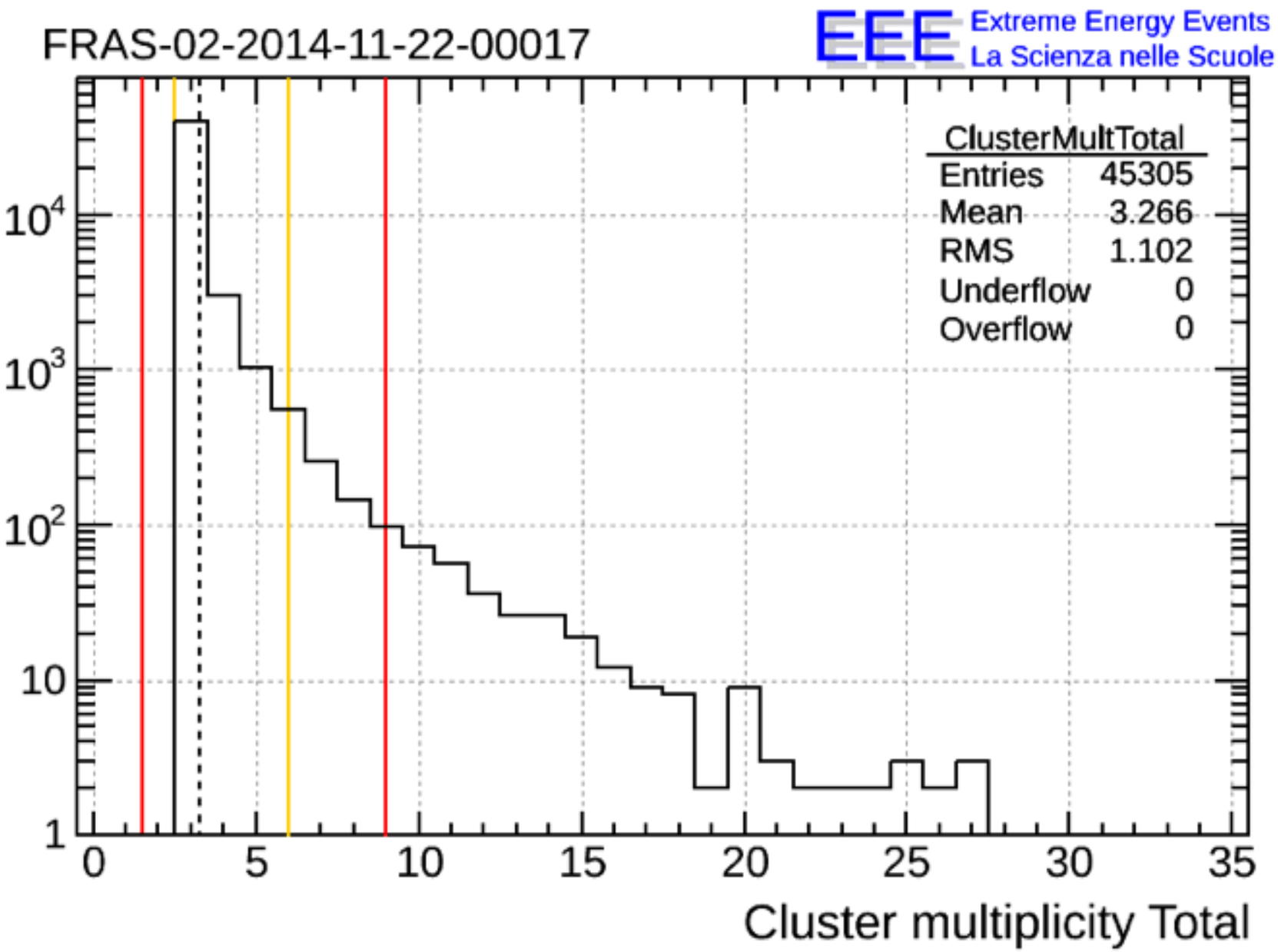
RUN SUMMARY

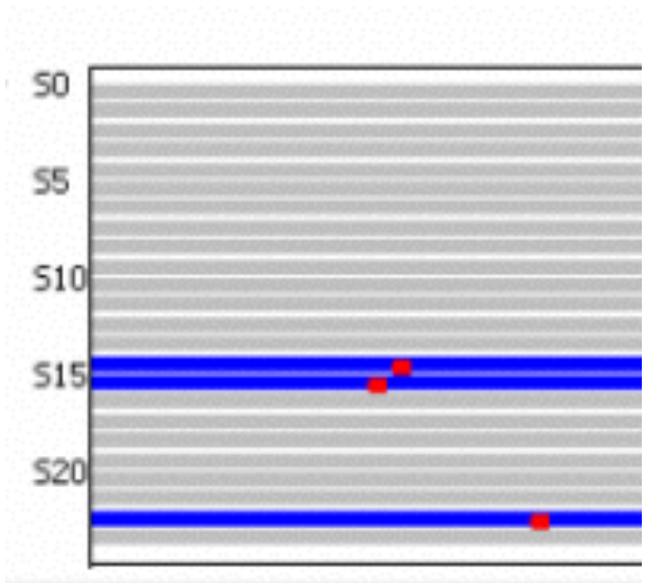
- DST file path: /data/eeesoft/eeetmp/BOLO-01-2017-11-30-00003_dst.root
- Unique run identifier: 5398600003
- Smallest event timestamp: 344441249.075 s UTC
- Largest event timestamp: 344442301.991 s UTC
- Run duration (largest – smallest timestamp): 1052.916 s
- Total number of events: 47880
- Number of events with hits: 43650
- Number of events with a track: 41638
- Number of "no hits" (GPS?) events: 4230
- Number of "no hit" events: 4230
- Number of malformed events: 0
- Number of events out of order: 1

Examples…Hit Multiplicity

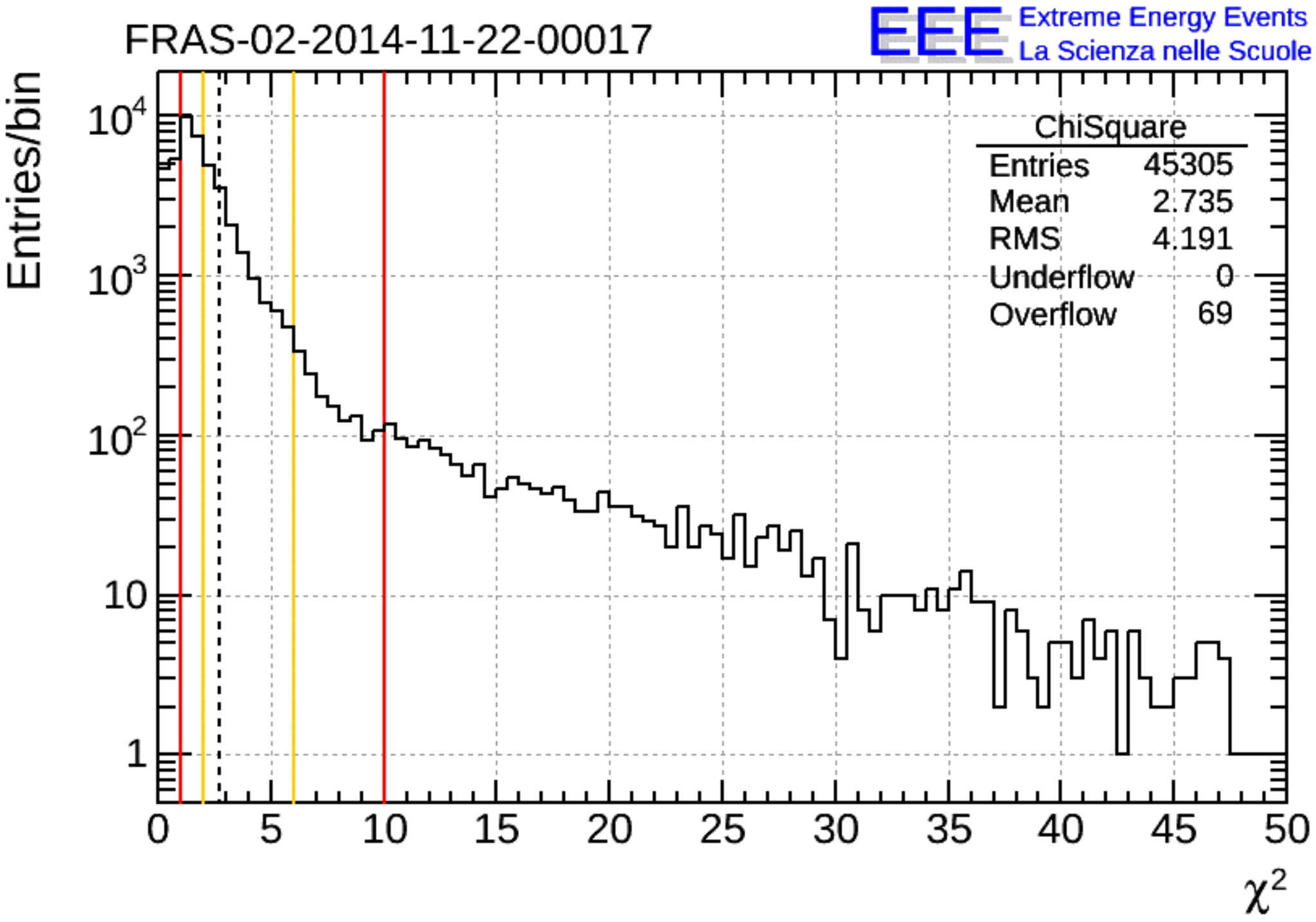


Examples…Cluster multiplicity

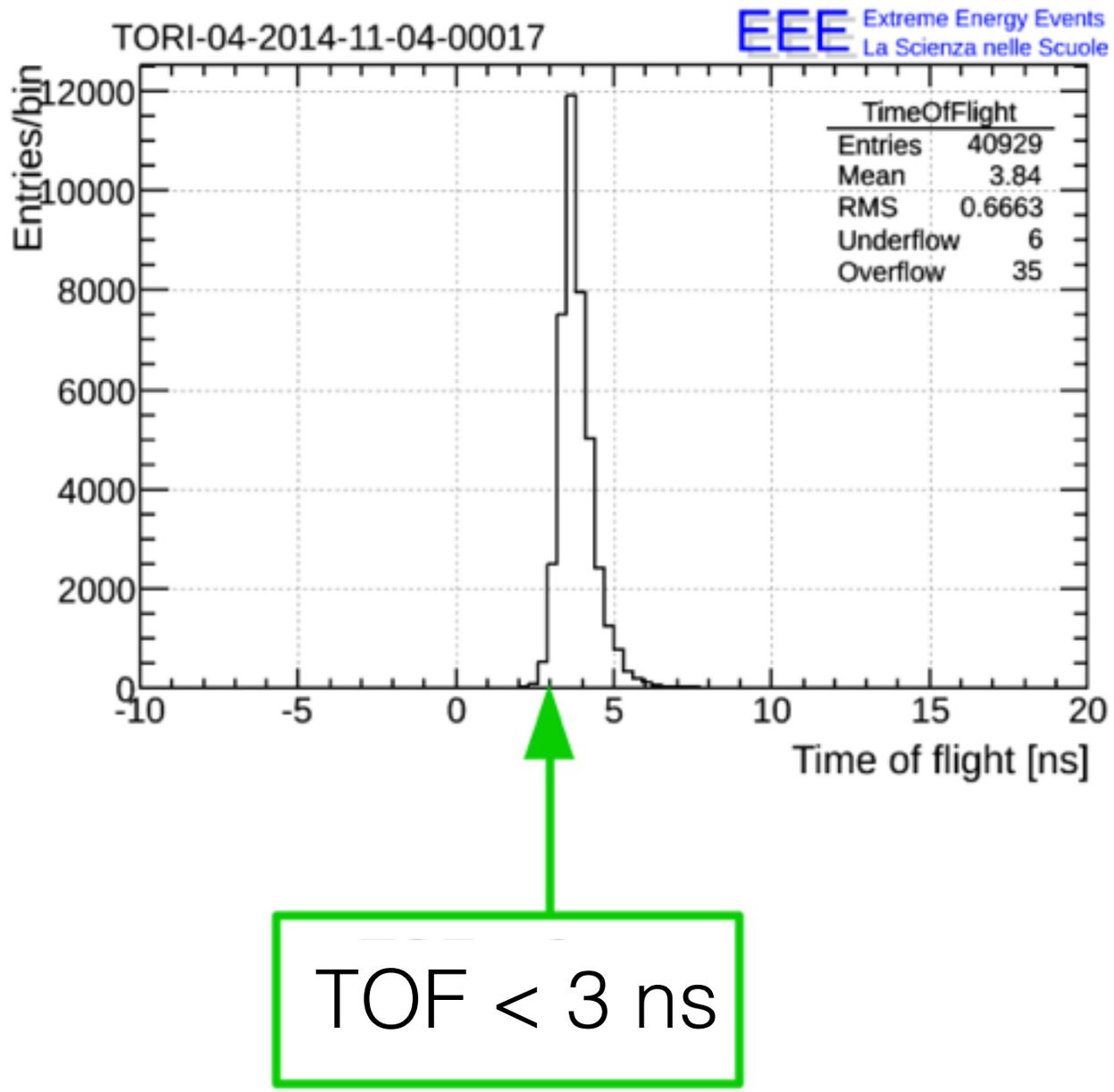


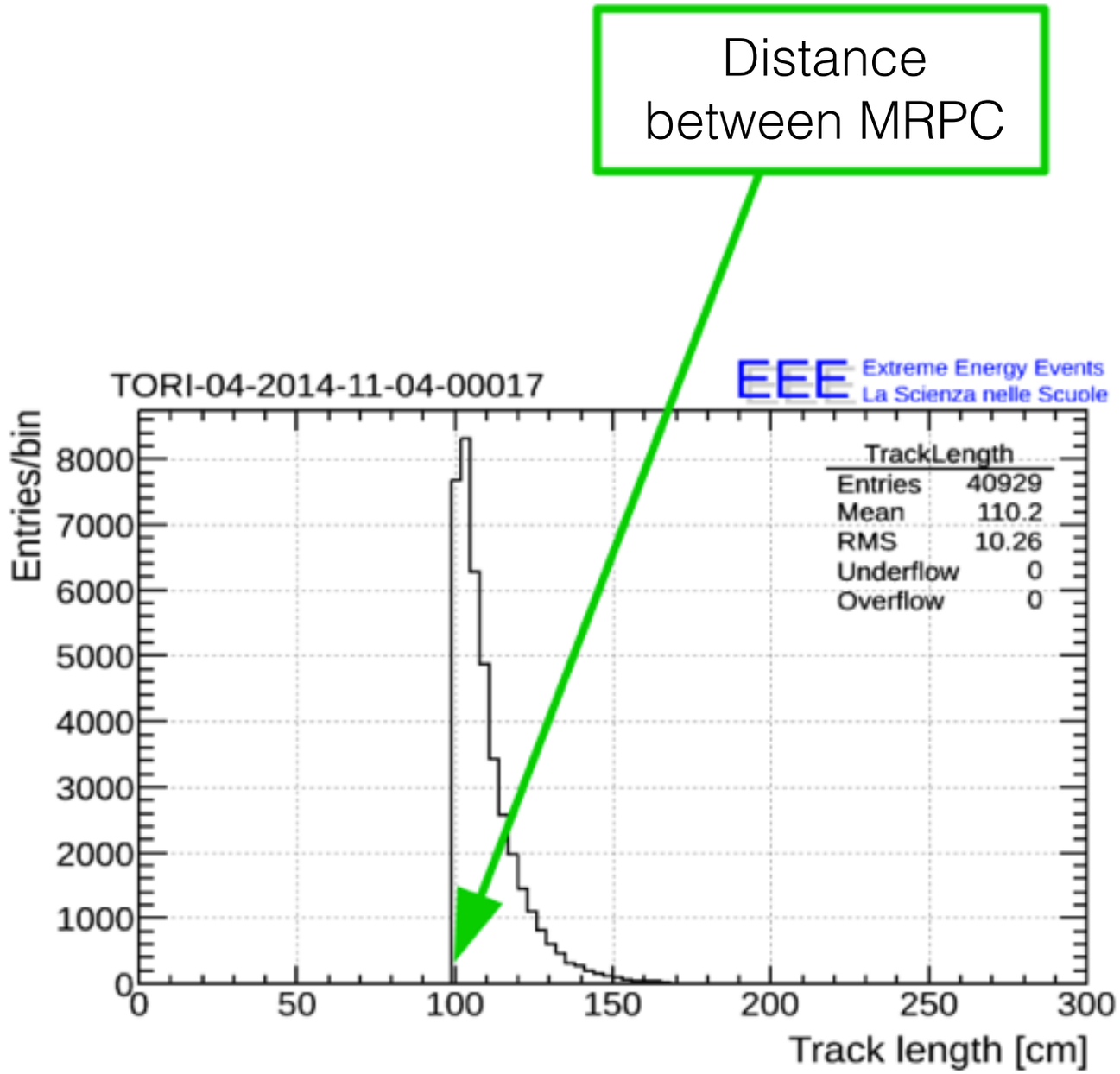


Examples…Chi square



Examples…


TORI-04-2014-11-04-00017
EEE Extreme Energy Events
La Scienza nelle Scuole
TimeOfFlight
Entries 40929
Mean 3.84
RMS 0.6663
Underflow 6
Overflow 35
Entries/bin
Time of flight [ns]
TOF < 3 ns


Distance between MRPC
TORI-04-2014-11-04-00017
EEE Extreme Energy Events
La Scienza nelle Scuole
TrackLength
Entries 40929
Mean 110.2
RMS 10.26
Underflow 0
Overflow 0
Entries/bin
Track length [cm]

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Extreme Energy Events
Science inside Schools

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Ehi…no wait!!!

EEE MONITOR - DQM

[Web address: http://eee.centrofermi.it/monitor]

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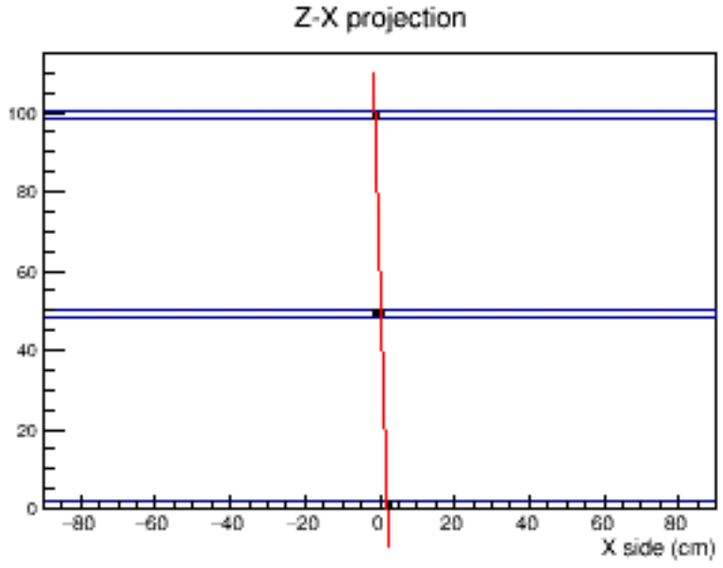
Ultimo aggiornamento: ore 12:05 - mercoledì 06 dicembre 2017 [by e3monitor]

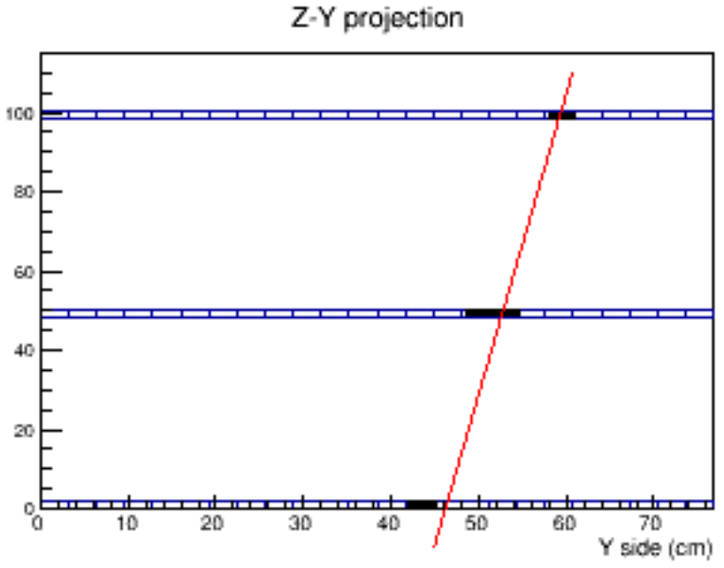
EEE Home Page | Connectivity Report

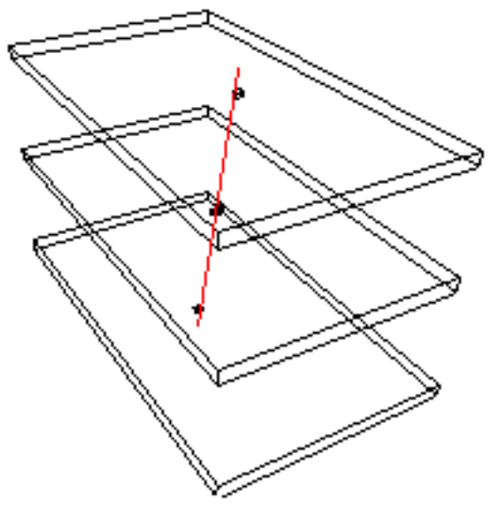
[EEE Monitor] Back from the abyss of the waters...
[EEE Monitor] ... running in ReCas - Bari
[EEE Monitor] Start of RUN4: October 2, 2017
[EEE Monitor] RUN 4 - Data Taking - Day number: 66
Total number of candidate tracks (X^2<10) in this database: 1468891404

Questa tabella mostra la situazione dei telescopi in acquisizione:
In **verde** sono indicati i telescopi in presa dati e trasferimento nelle ultime 3 ore e con parametri di acquisizione ragionevoli nell'ultimo run analizzato.
In **giallo** sono indicati i telescopi in cui trasferimento e/o acquisizione sono sospesi da più di 3 ore o con tracce (X^2<10) minori di 10 Hz nell'ultimo run analizzato.
In **rosso** sono indicati i telescopi in cui trasferimento e/o acquisizione sono sospesi da più di due giorni o con tracce (X^2<10) minori di 5Hz nell'ultimo run analizzato.

School	Day	Time	Name of the last trasferred File	Number of Files trasferred today	Name of the last File analyzed by DQM	DQM daily report	RATE of Triggers for the last Run in DQM	RATE of Tracks for the last Run in DQM	Link DQM
ALTA-01 *[Event Display]*	mer 06 dicembre	11:54	ALTA-01-2017-12-06-00021.bin	1445	ALTA-01-2017-12-05-00025.bin	*	27.0	23.0	ALTA-01
ANCO-01 *[Event Display]*	mer 06 dicembre	11:54	ANCO-01-2017-12-05-00006.bin	2251	ANCO-01-2017-12-05-00027.bin	06/12 *[History]*	15.0	13.0	ANCO-01
AREZ-01 *[Event Display]*				0		*	-2.0	-2.0	AREZ-01
BARI-01 *[Event Display]*				0		*	-2.0	-2.0	BARI-01
BOLO-01 *[Event Display]*	mer 06 dicembre	11:55	BOLO-01-2017-12-03-00069.bin	5644	BOLO-01-2017-12-05-00015.bin	06/12 *[History]*	41.0	40.0	BOLO-01
BOLO-02 *[Event Display]*	mer 06 dicembre	11:55	BOLO-02-2017-12-05-00007.bin	6673	BOLO-02-2017-12-05-00018.bin	06/12 *[History]*	46.0	43.0	BOLO-02
BOLO-03 *[Event Display]*	mer 06 dicembre	11:55	BOLO-03-2017-12-04-00032.bin	4635	BOLO-03-2017-12-05-00049.bin	06/12 *[History]*	43.0	40.0	BOLO-03
BOLO-04 *[Event Display]*	mer 06 dicembre	11:54	BOLO-04-2017-12-04-00002.bin	2000	BOLO-04-2017-12-05-00017.bin	06/12 *[History]*	8.0	7.0	BOLO-04
CAGL-01 *[Event Display]*				0		*	-2.0	-2.0	CAGL-01
CAGL-02 *[Event Display]*	mer 06 dicembre	11:55	CAGL-02-2017-12-05-00012.bin	5608	CAGL-02-2017-12-05-00033.bin	06/12 *[History]*	39.0	35.0	CAGL-02
CAGL-03 *[Event Display]*	mer 06 dicembre	11:55	CAGL-03-2017-12-05-00004.bin	3632	CAGL-03-2017-12-05-00034.bin	06/12 *[History]*	19.0	16.0	CAGL-03
CATA-01 *[Event Display]*	mer 06 dicembre	11:55	CATA-01-2017-12-06-00007.bin	1572	CATA-01-2017-12-05-00014.bin	06/12 *[History]*	19.0	15.0	CATA-01
CATA-02 *[Event Display]*	mer 06 dicembre	11:50	CATA-02-2017-12-06-00003.bin	944	CATA-02-2017-12-05-00001.bin	06/12 *[History]*	8.0	7.0	CATA-02
CATZ-01 *[Event Display]*	mer 06 dicembre	11:55	CATZ-01-2017-12-05-00041.bin	5603	CATZ-01-2017-12-05-00041.bin	06/12 *[History]*	38.0	34.0	CATZ-01







BOLO-03
event 1
Date 5/12/2017
Run 00060
UTC: 15:48:06

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DQM Exercise

You can download the file with the exercises at:

http://agenda.centrofermi.it/indico/event/49/

So

Good luck with the exercises!!!