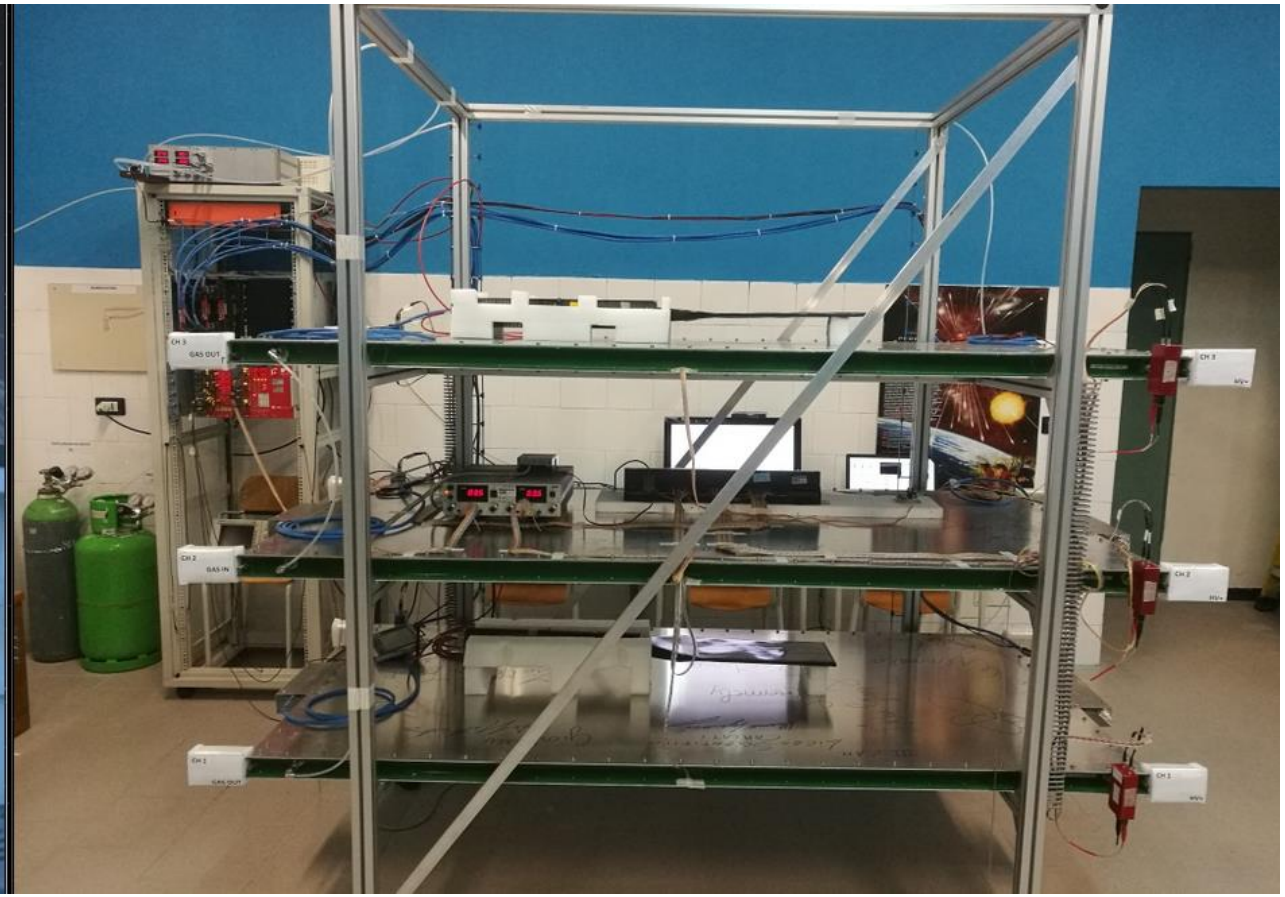
EEE Run coordination meeting 2019/10/02

CARI-01: condition after the reduction of the gas flow

Domenico Liguori

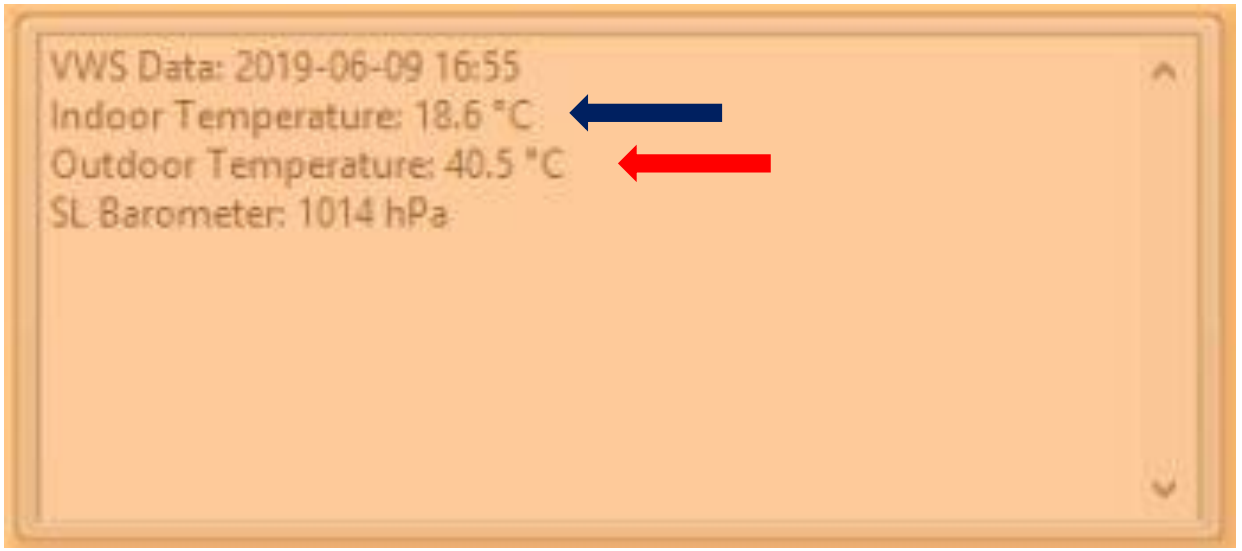


As RUN 5 ended and at the moment there is lack in the provision of freon, we need to stop almost all telescopes

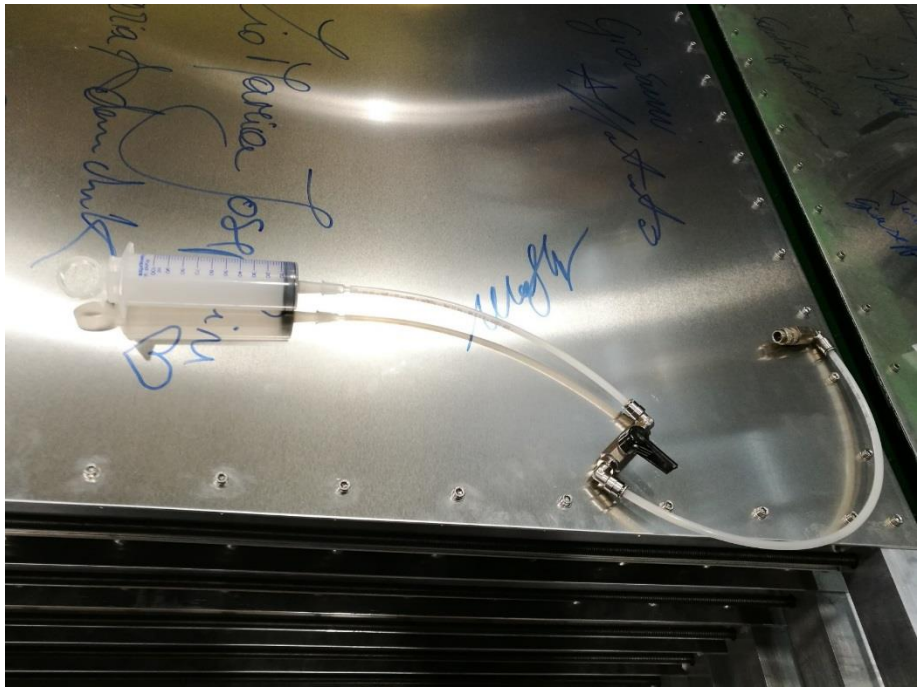
A few selected telescopes will stay on during the summer, with the following requirements:

- ☆ Air conditioning (or room usually not too warm)
- ☆ Room easily accessible (not too many days of school closure)
- ☆ Telescope constantly monitored (remotely and on site)
- ☆ Gas flow reduced from 2l/h to 1l/h (absence of gas leakage)

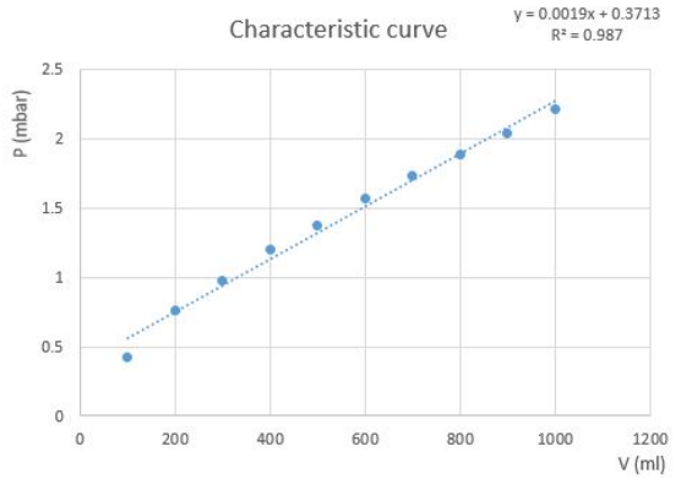
Efficiency of the air conditioning on CARI-01

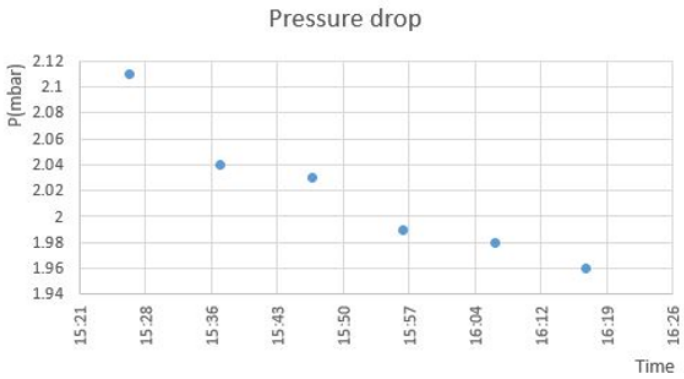


FLOW TEST



Gas tightness test of the chamber
(Example for Top chamber)



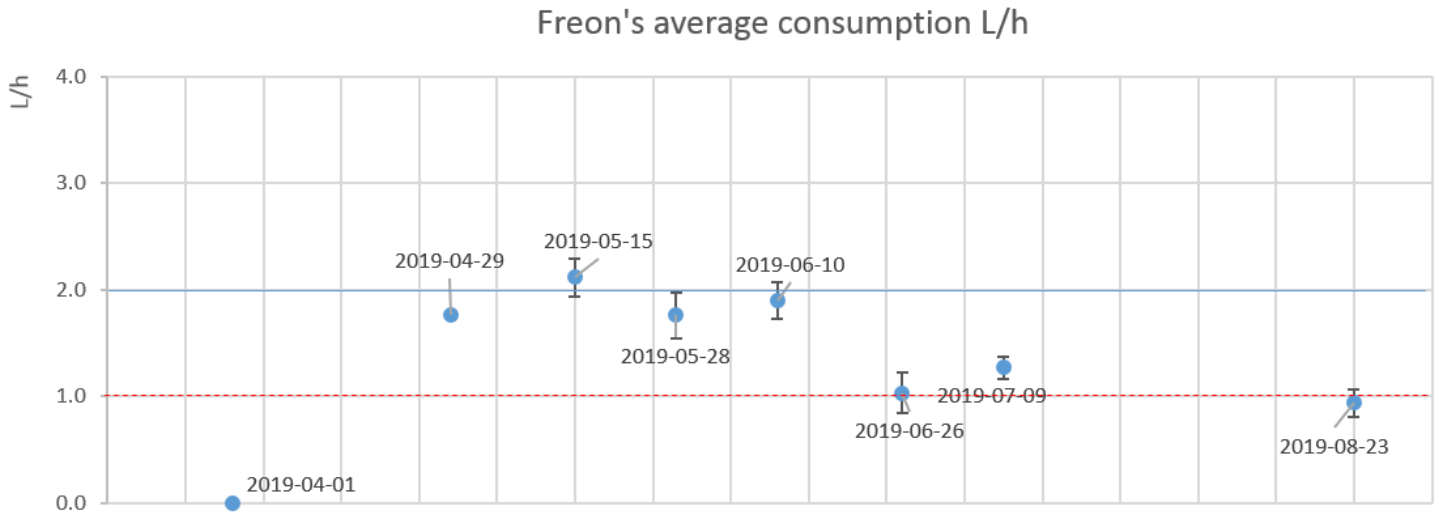


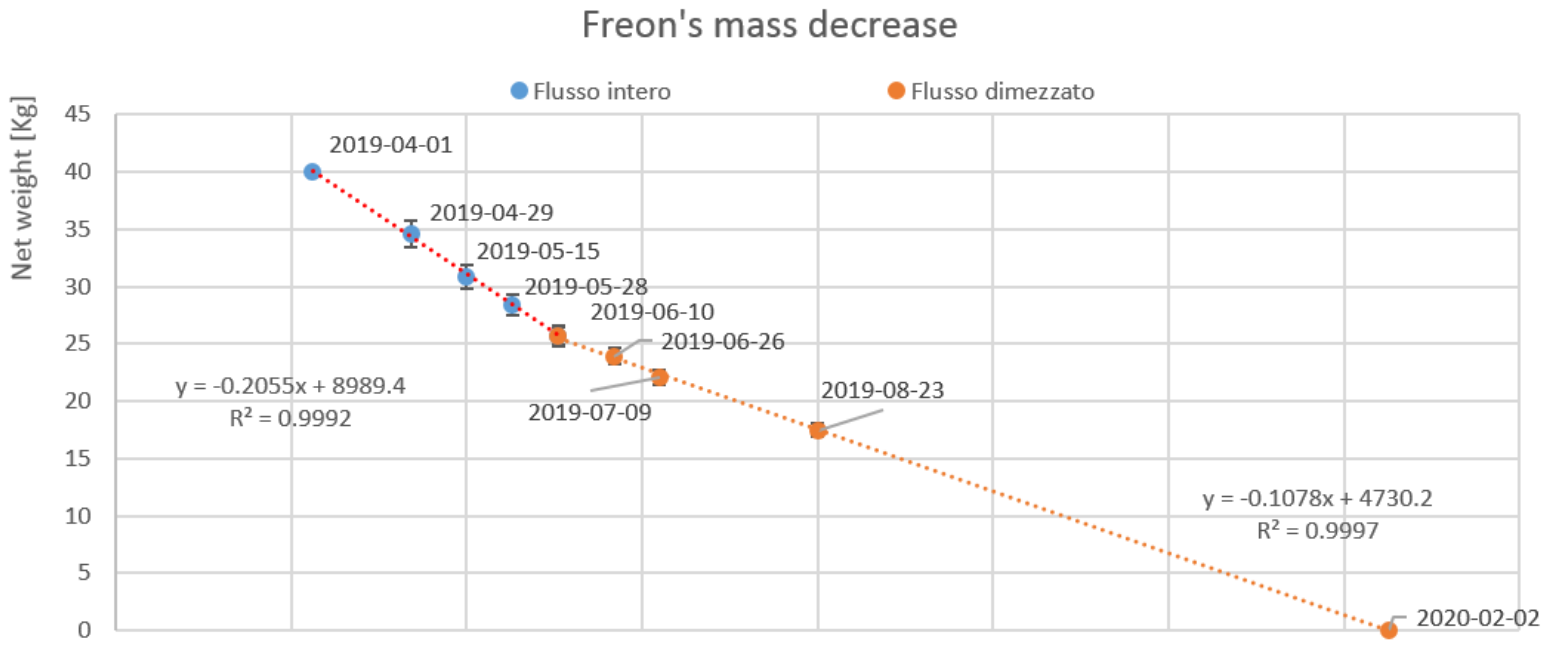
Chambers leaks

Top 0.09 l/h

Middle 0.24 l/h

Bottom 0.21 l/h





Tools
http://eeeliceocariati.altervista.org/cari01.html

Estimation of the flow outgoin with the bubblator

Gas Flow 2 l/h

Bubble diameter≈0.8 cm

Bubbles number per minute ≈116

$V_{Bubble} = 4/3\ \pi\ r^3 \approx 0.27\ cm^3$

$V_{outgoin\ gas} = V_{bubble} * \text{Bubble Number per minute} \approx 31.32\ cm^3/min \approx 1879\ cm^3/h \approx 1.9\ l/h$

Gas Flow 1 l/h

Bubbles number per minute ≈65

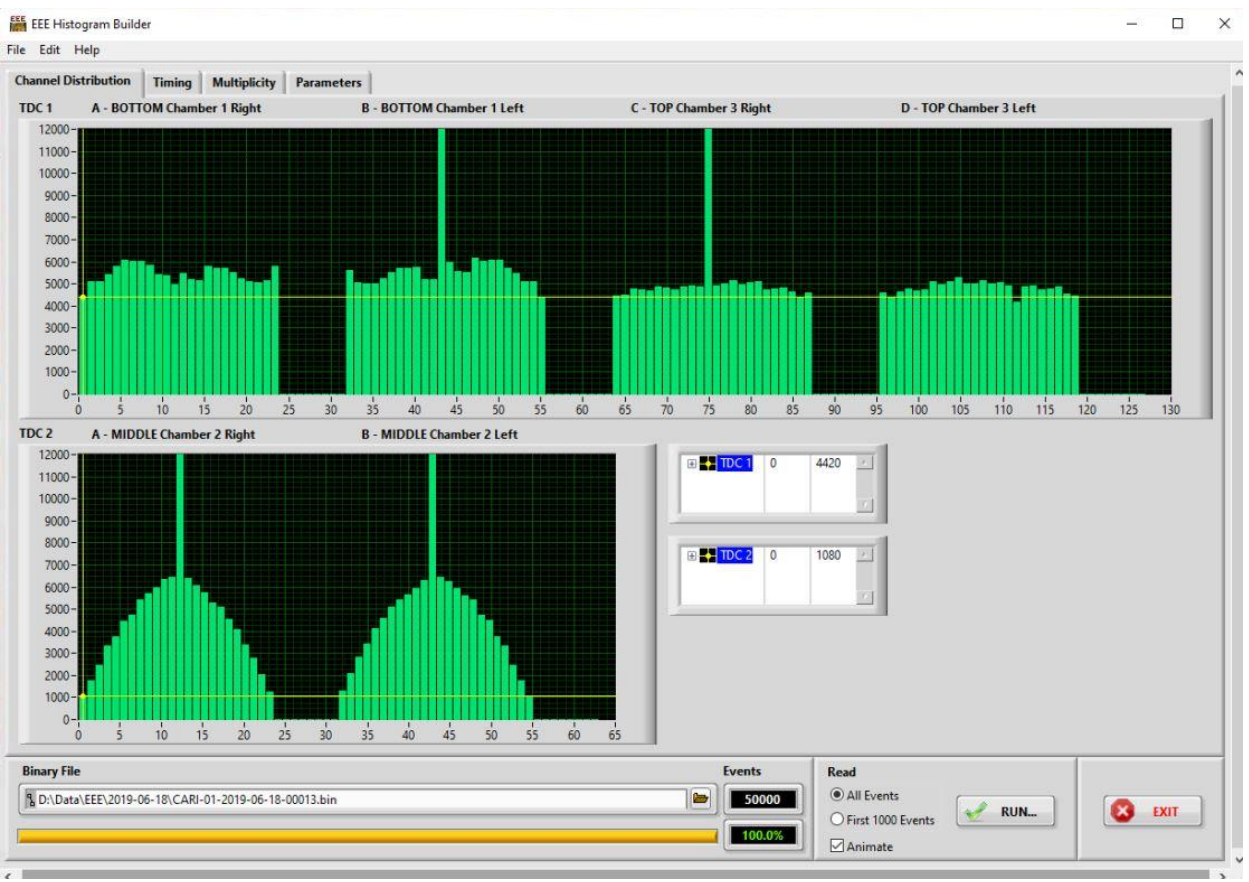
$V_{outgoin\ gas} \approx 17.55\ cm^3/min \approx 1.1\ l/h$

Annual consumption with flow at 2l/h

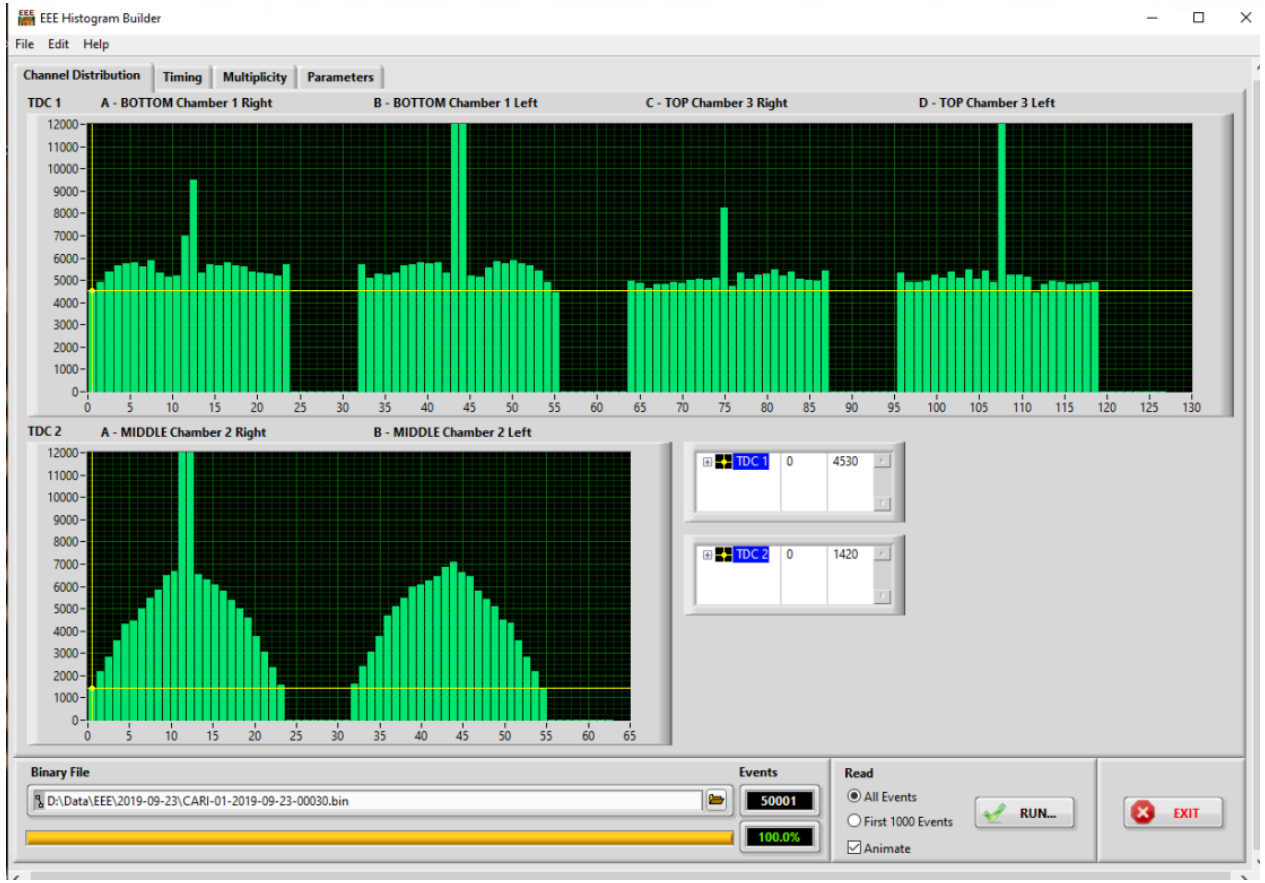
Annual consumption with flow at 1l/h

Before gas flow reduction

After gas flow reduction

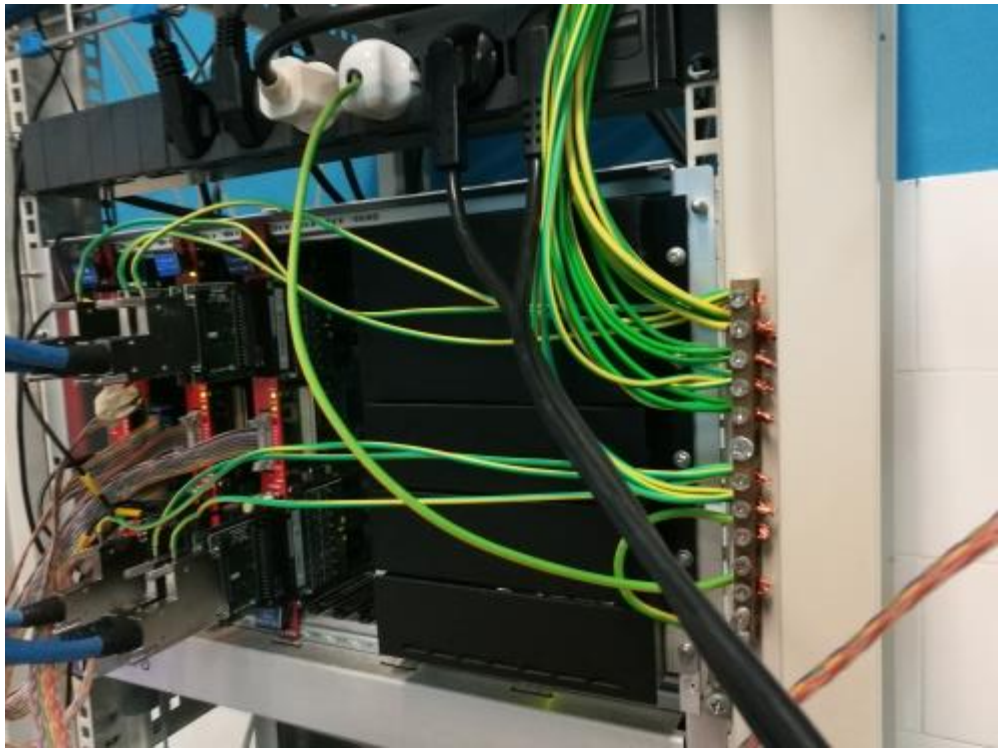


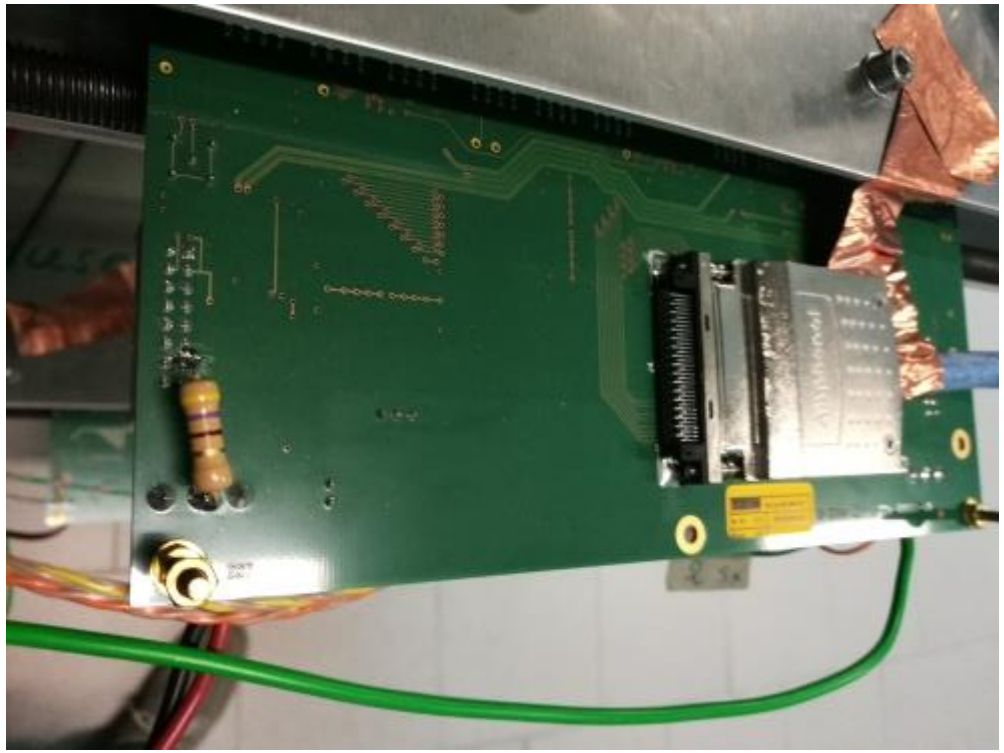
Channel Distribution 2019-06-18 run 13



Channel Distribution 2019-09-23 run 30

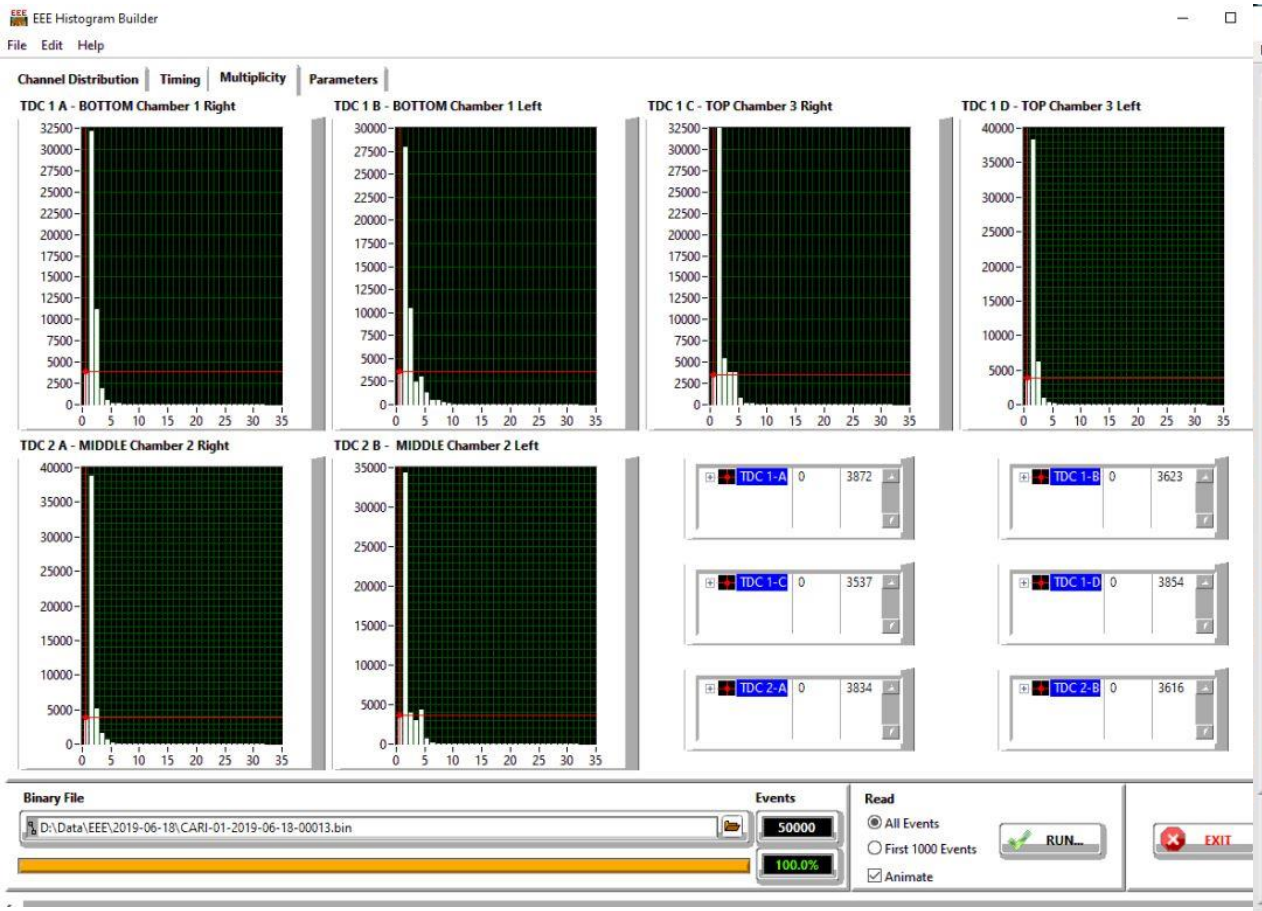
Some remedies to try to reduce the noise

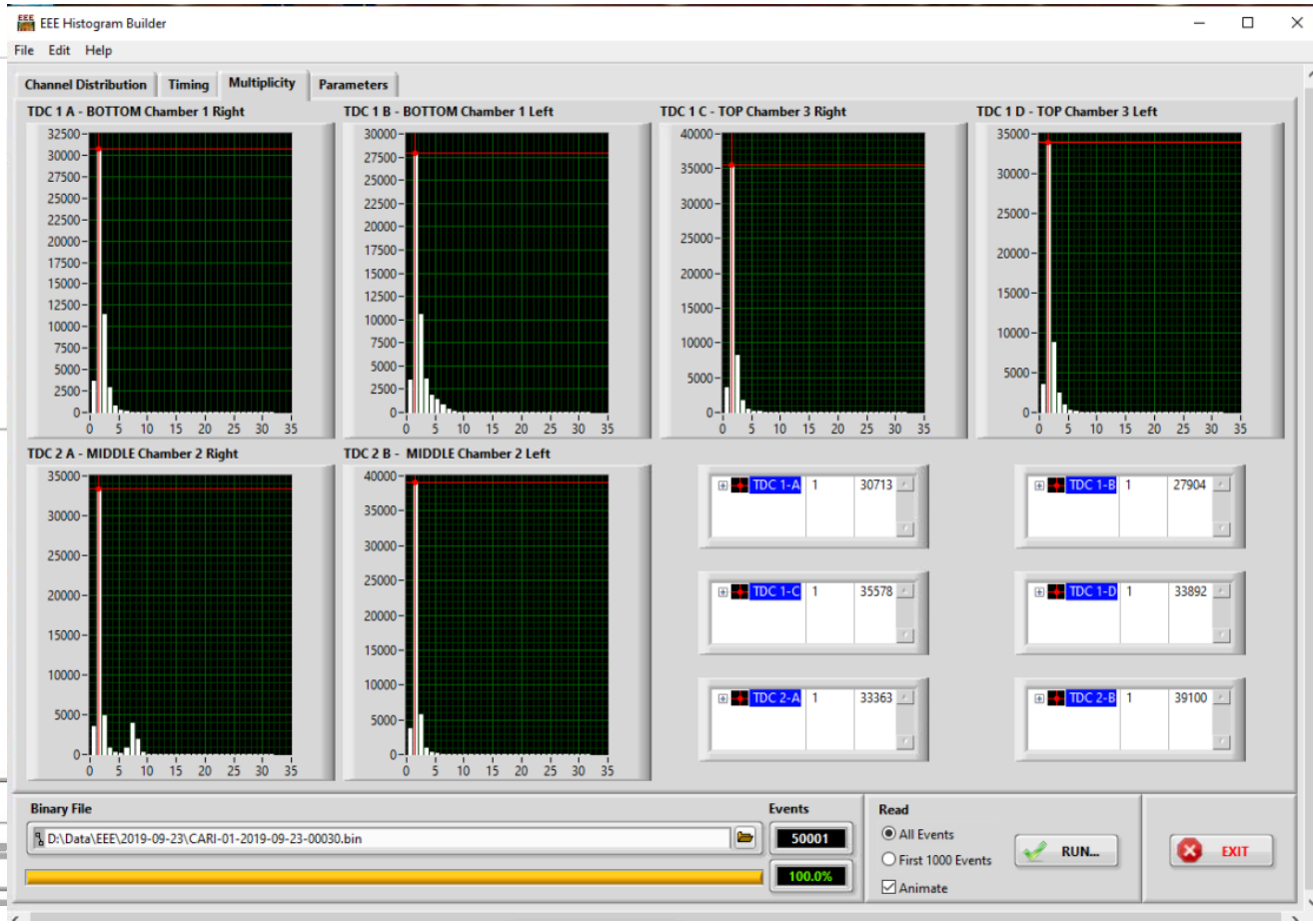




Before gas flow reduction

After gas flow reduction



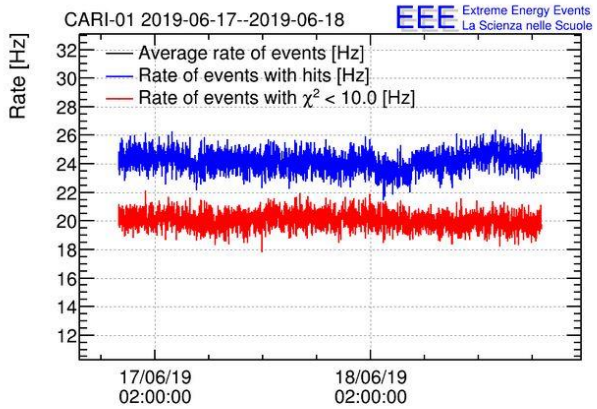


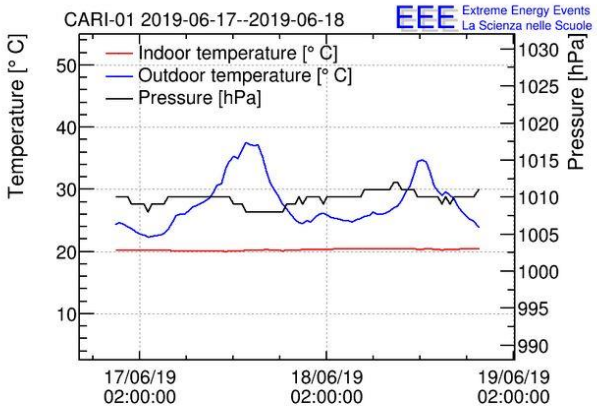
Multiplicity 2019-06-18 run 13

Multiplicity 2019-09-23 run 30

Before gas flow reduction

EEE DQM summary report



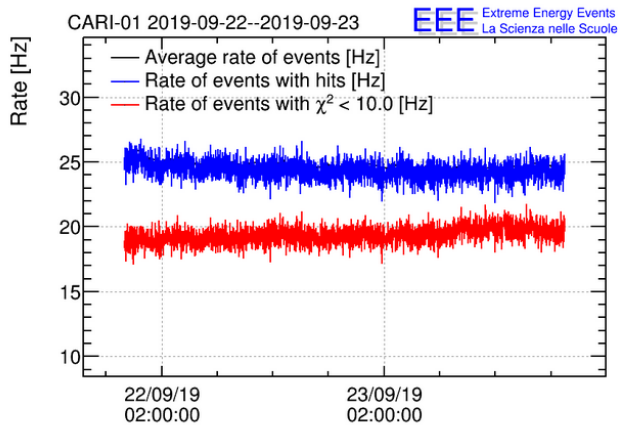


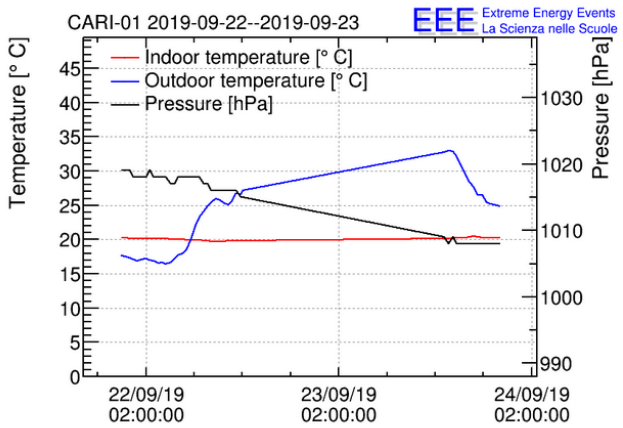
SUMMARY

- Station: CARI-01
- Time period: 2019-06-17--2019-06-18
- Number of runs processed: 90
- Total number of events: 4148156
- Number of events with hits: 4092068
- Number of events with a track: 3392264
- Data files: root, csv header, csv trending, csv weather

After gas flow reduction

EEE DQM summary report





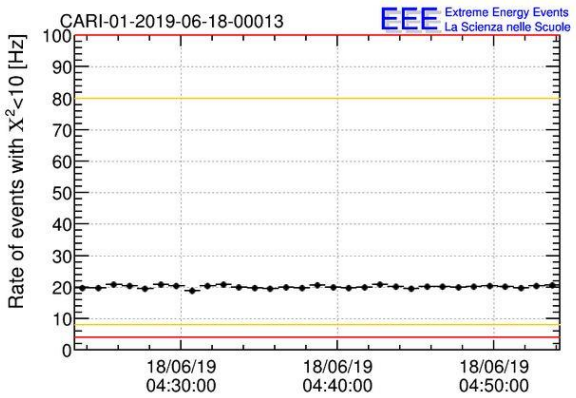
SUMMARY

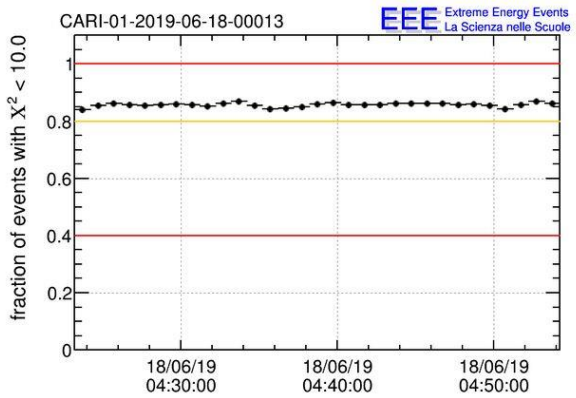
- Station: CARI-01
- Time period: 2019-09-22--2019-09-23
- Number of runs processed: 92
- Total number of events: 4238493
- Number of events with hits: 4160871
- Number of events with a track: 3305501
- Data files: root, csv header, csv trending, csv weather

Before gas flow reduction

EEE DQM run report

After gas flow reduction



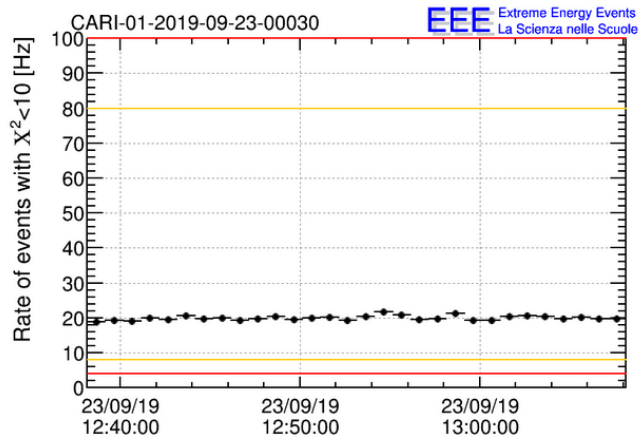


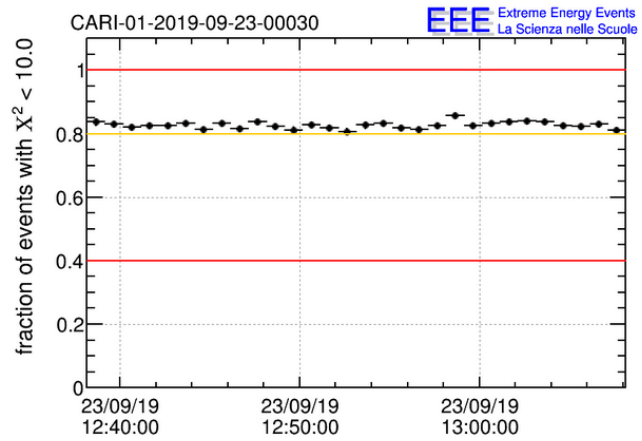
Run summary

- DST file path: /home/analisi/tempNewAnalyzer2/CARI-01-2019-06-18-00013_dst.root
- Unique run identifier: 62455100013
- Smallest event timestamp: 393222193.332 s UTC
- Largest event timestamp: 393224139.963 s UTC
- Run duration (largest - smallest timestamp): 1946.630 s
- Total number of events: 46097
- Number of events with hits: 45598
- Number of events with a track: 39080
- Number of "no hits" (GPS?) events: 499
- Number of "no hit" events: 499
- Number of malformed events: 0
- Number of events out of order: 1

Weather station

- Readout at 393225600.000 s UTC (3406.668 s after (!!) the start of the run)
- Outdoor temperature: 24.76 deg C
- Indoor temperature: 20.43 deg C
- Pressure: 1010 hPa





Run summary

- DST file path: /home/analisi/tempNewAnalyzer2/CARI-01-2019-09-23-00030_dst.root
- Unique run identifier: 62464800030
- Smallest event timestamp: 401632688.462 s UTC
- Largest event timestamp: 401634571.942 s UTC
- Run duration (largest - smallest timestamp): 1883.480 s
- Total number of events: 46233
- Number of events with hits: 45445
- Number of events with a track: 37582
- Number of "no hits" (GPS?) events: 788
- Number of "no hit" events: 788
- Number of malformed events: 0
- Number of events out of order: 2

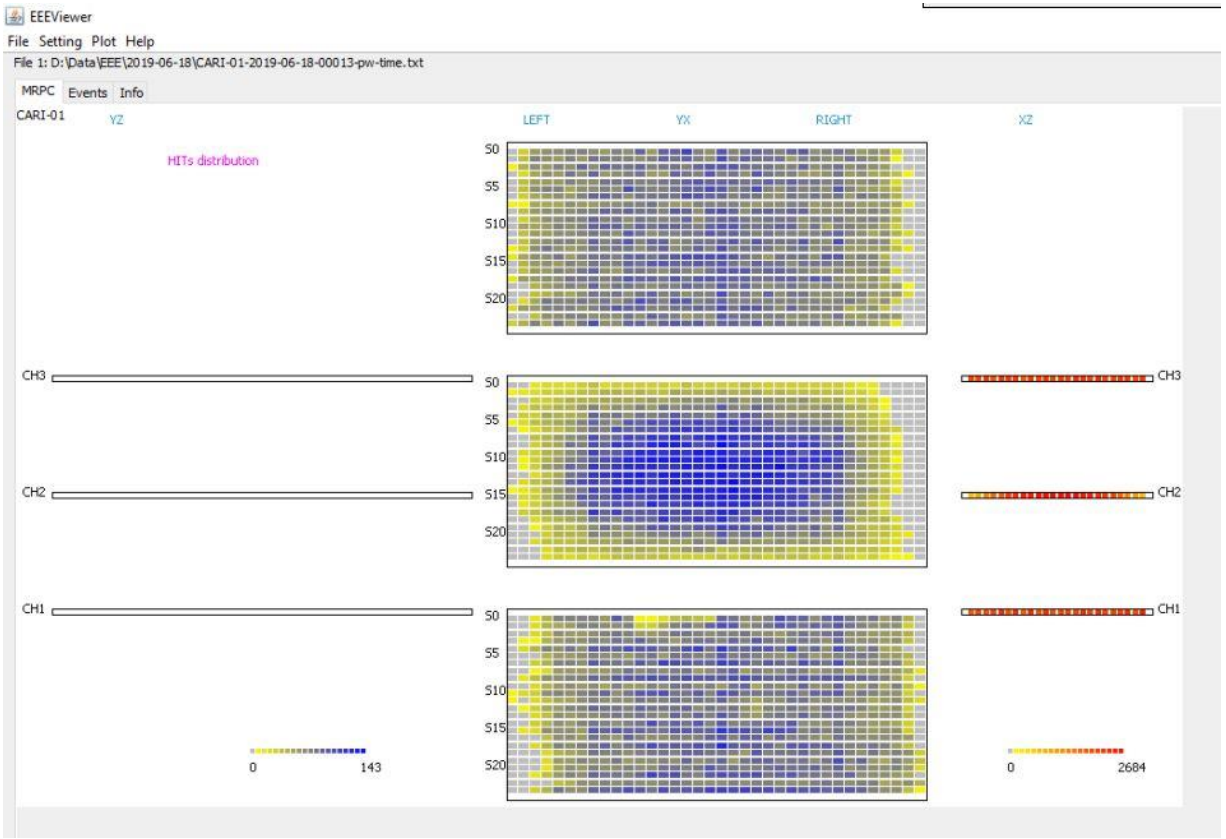
Weather station

- Readout at 401551500.000 s UTC (81188.462 s before the start of the run)
- Outdoor temperature: 27.12 deg C
- Indoor temperature: 19.82 deg C
- Pressure: 1015 hPa

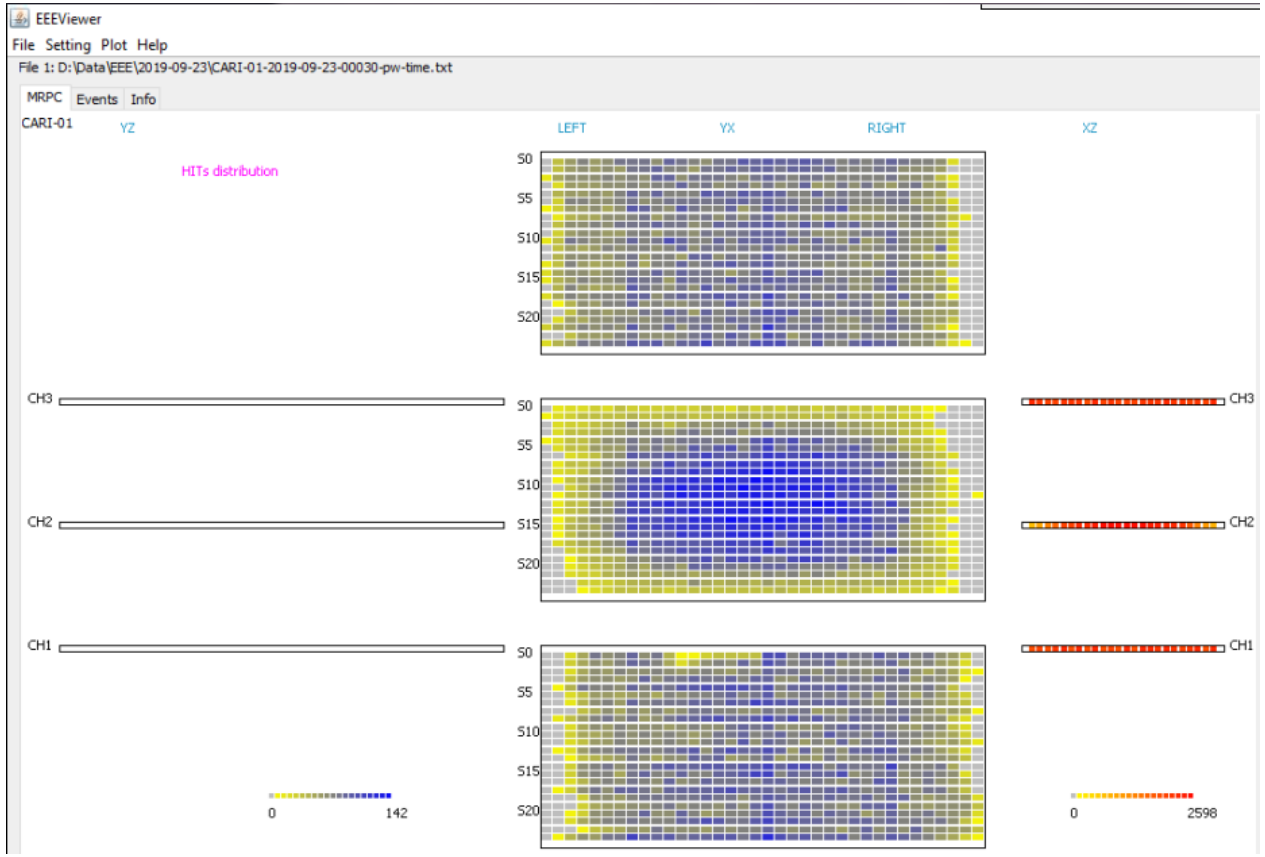
Before gas flow reduction

After gas flow reduction

EEE Viewer 2019-06-18 run 13



EEE Viewer 2019-09-23 run 30



Conclusions

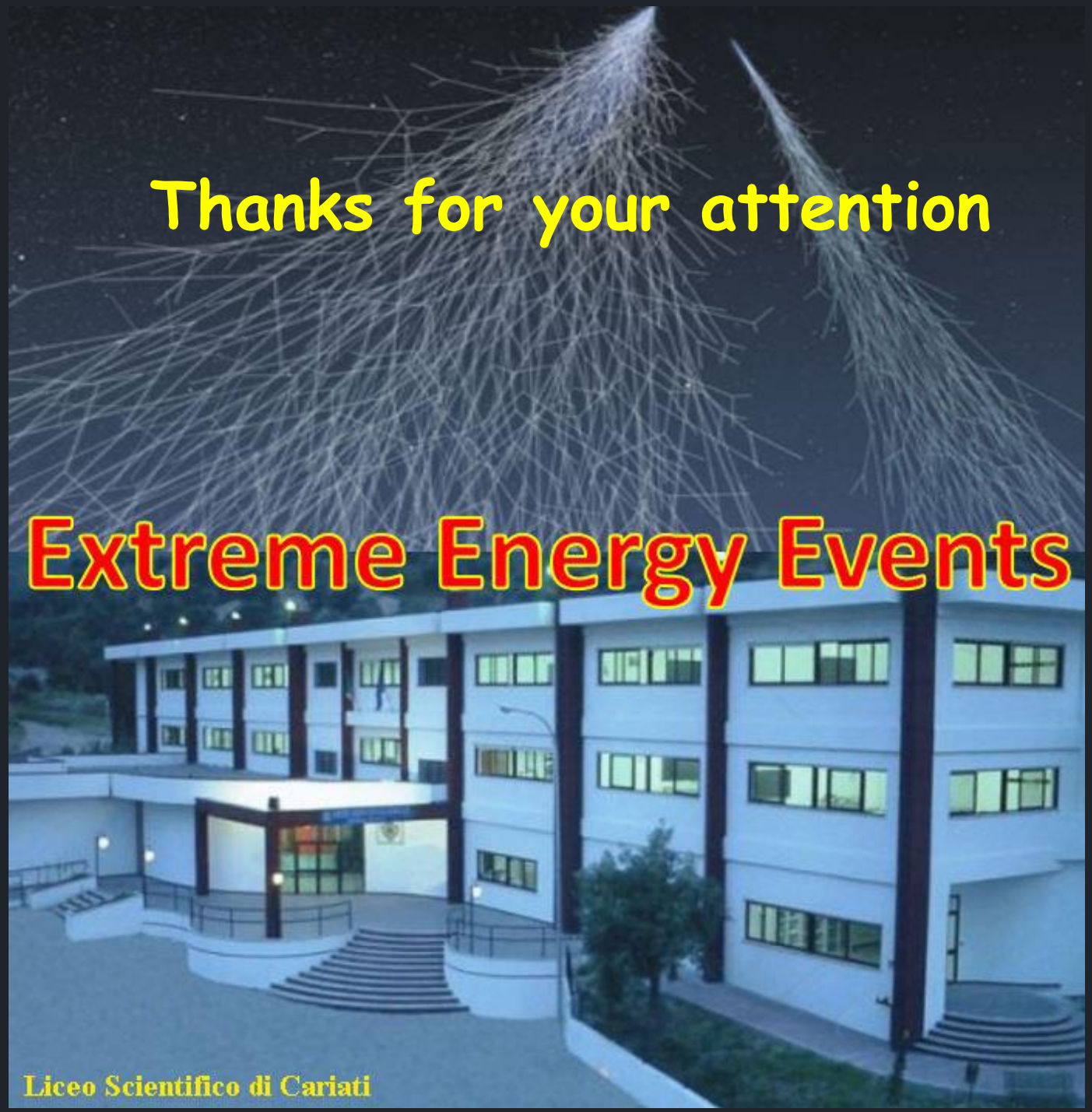
The telescope operates at reduced gas flow(1 l/h) without its performance having been compromised

CARI-01 is working with the following parameters

LV = 4.2 V
HV= 16÷17 KV
i = 1÷2 μA → 1÷3 μA

The leakage current absorbed by the chambers is increased after the reduction of the gas flow. The currents oscillate a lot (suspect the box are not stable)

The chambers grounding have to be improved in order to reduce the molteplicity and then increase the tracking efficiency


Thanks for your attention
Extreme Energy Events
Liceo Scientifico di Cariati