



First glimpse on Run4

Giorgio Dho on behalf of CYGNO coll.

Istituto Nazionale di Fisica Nucleare (INFN-LNF), Frascati (RM), Italy

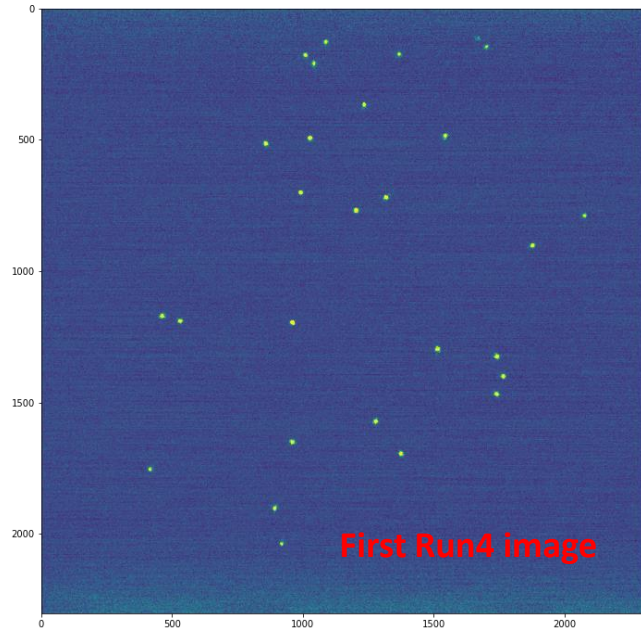


Part of this project has been funded by the European Union's Horizon
2020 research and innovation programme under the ERC Consolidator
Grant Agreement No 818744



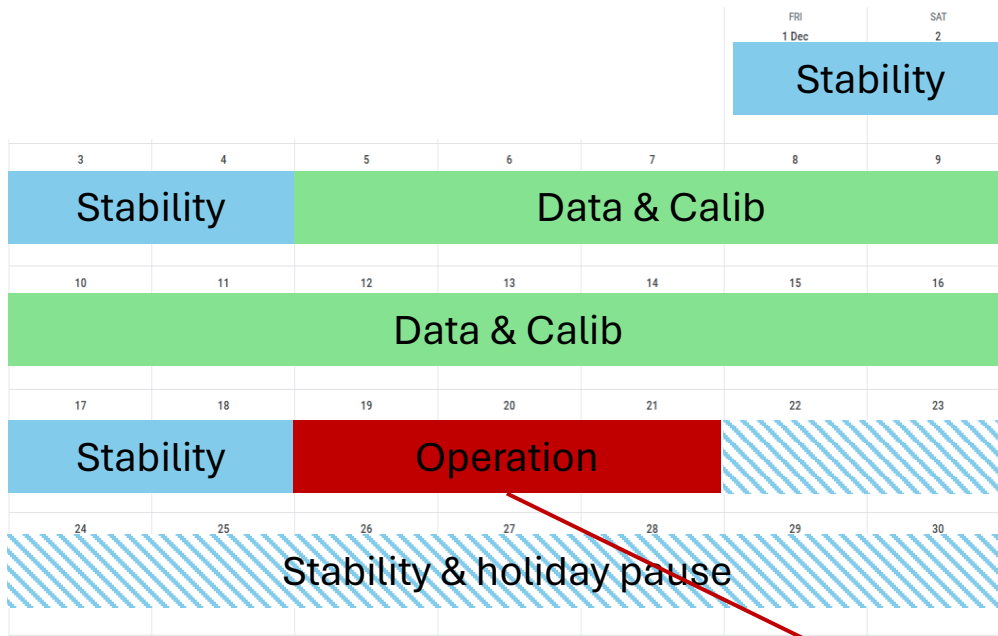
RUN4 TIMELINE

- Run3 ended on 16th Nov and the water shielding installation started immediately
- First data taken for Run4 on 1st December
- Decommissioning of the water shielding is happening now

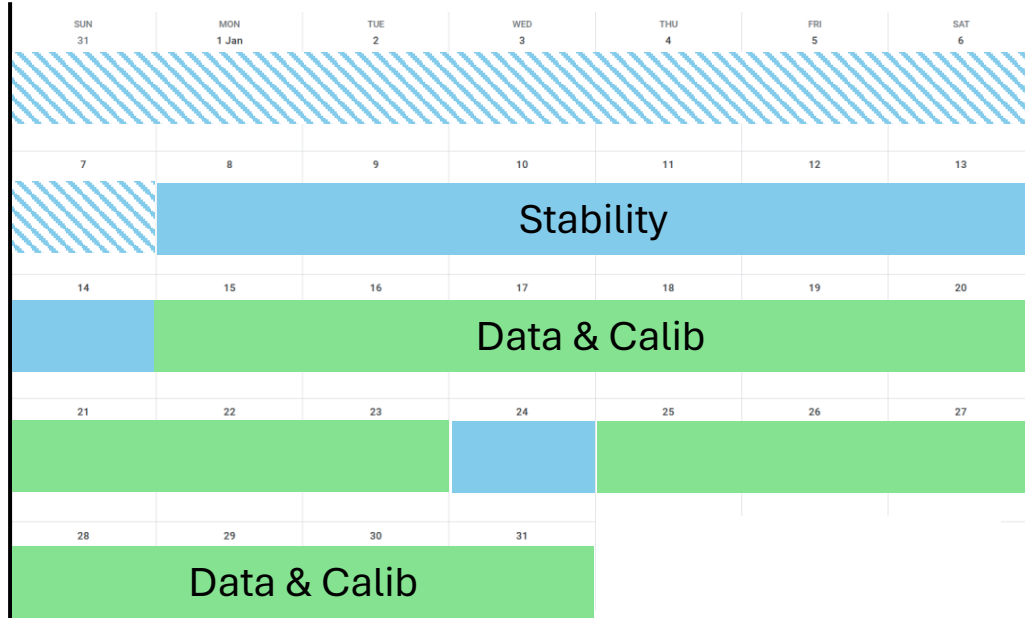


RUN4 DATA TAKING

December



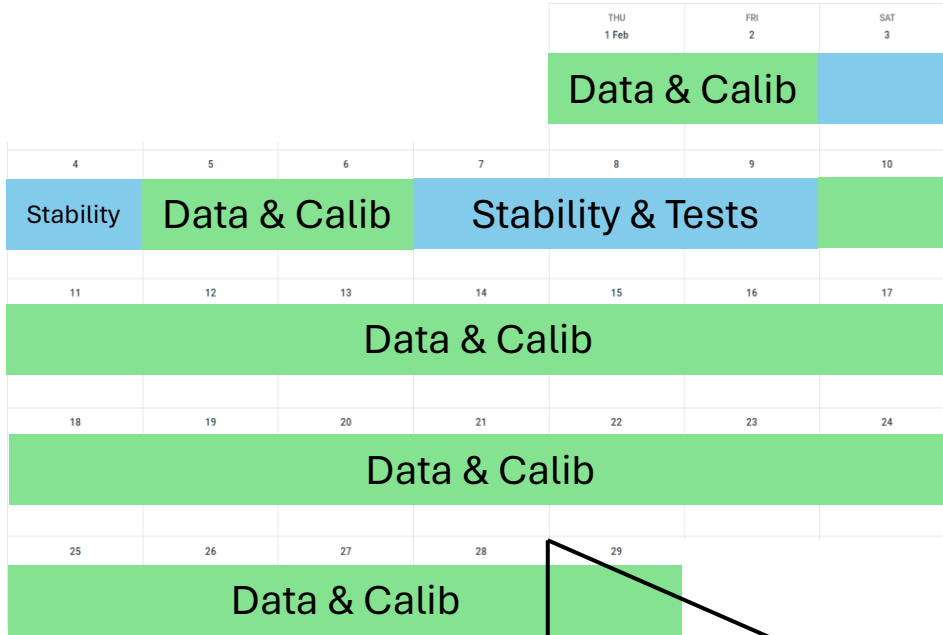
January



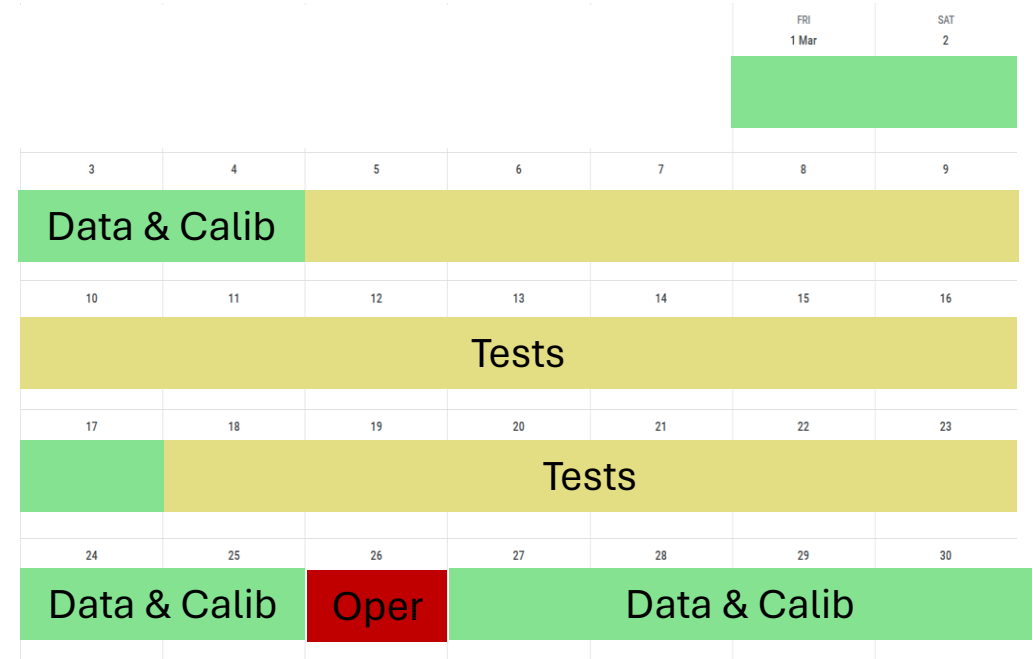
Key moment: Both humidity and oxygen filters employed in series

RUN4 DATA TAKING

February



March



Key moment: PMT analysis integrated in the automatic reconstruction
of the data

RUN4 DATA TAKING

April

SUN 31	MON 1 Apr	TUE 2	WED 3	THU 4	FRI 5	SAT 6
Data & Calib		Stability		Data & Calib		
7	8	9	10	11	12	13
14	15	16	17	18	19	20
Data & Calib						
21	22	23	24			
	Operation					

$3.2 * 10^6$ pictures collected at a 0.9 Hz

30.9 equivalent days

- Long stretches of data collected in these 5 months
- Duty cycle around 95%
- High reliability of all components

Run3 had $2.7 * 10^6$ pictures with 1.3 Hz rate

19.7 equivalent days (with one more month)

REMOTE SHIFTS AND MONITOR

- The remote control system was improved and extended. Allows to check:

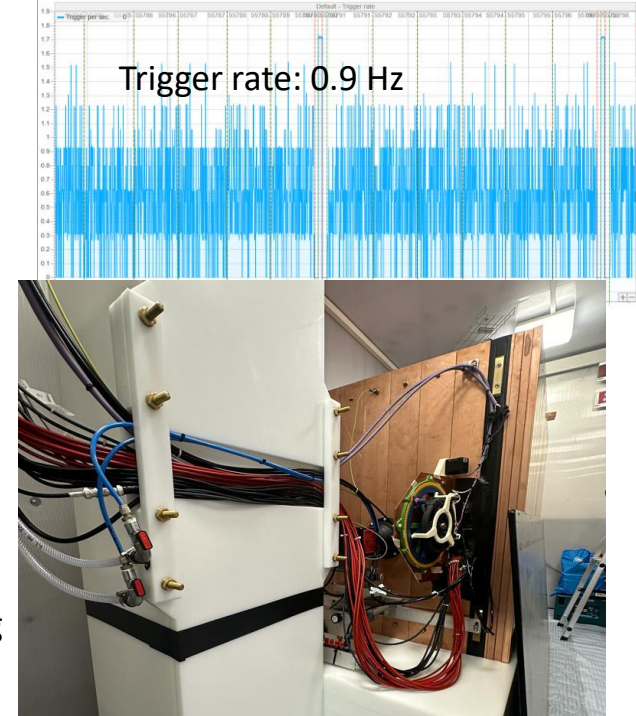
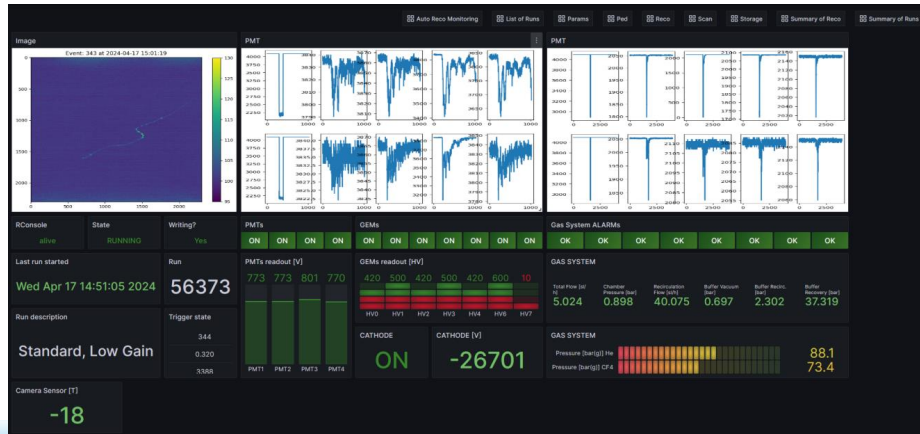
Environmental variables

HV currents and stability

Step motor for dail scan calibration

Trigger rate

- A complementary online monitor based on Grafana server was extended to grant monitoring without direct access to DAQ machines

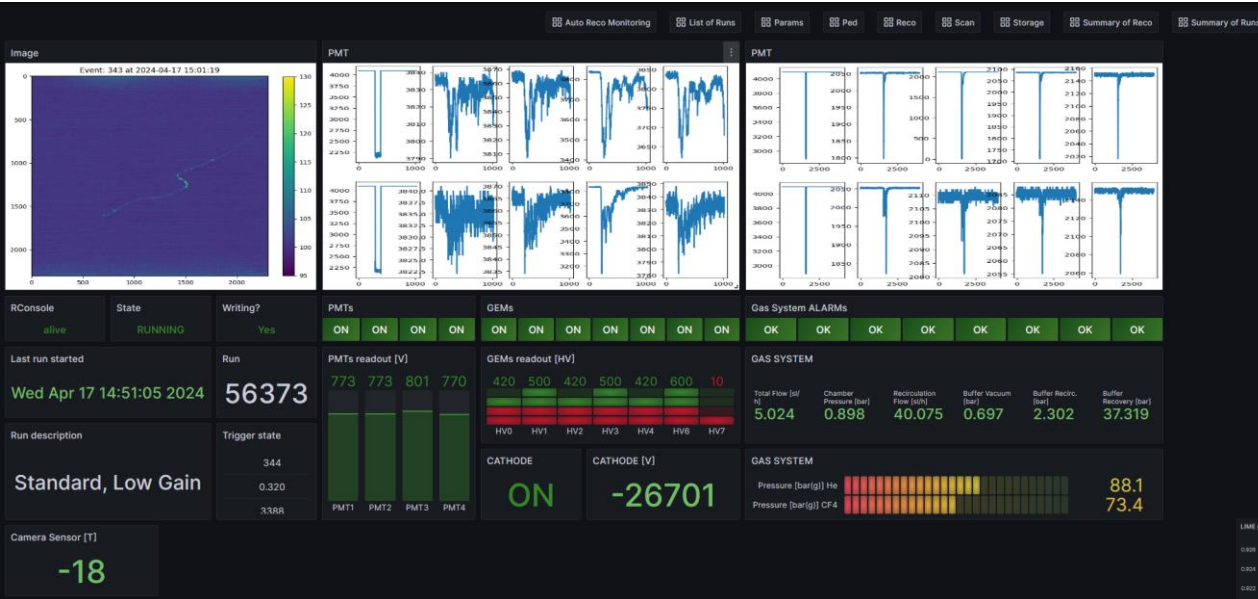


**No in person
shifter was
required anymore**
(except for gas bottle changes)

GRAFANA IMPROVEMENTS

- The Grafana-based monitor was extended and serves multiple purposes

Check on-line status



LIME pressure



Current Run

HV status

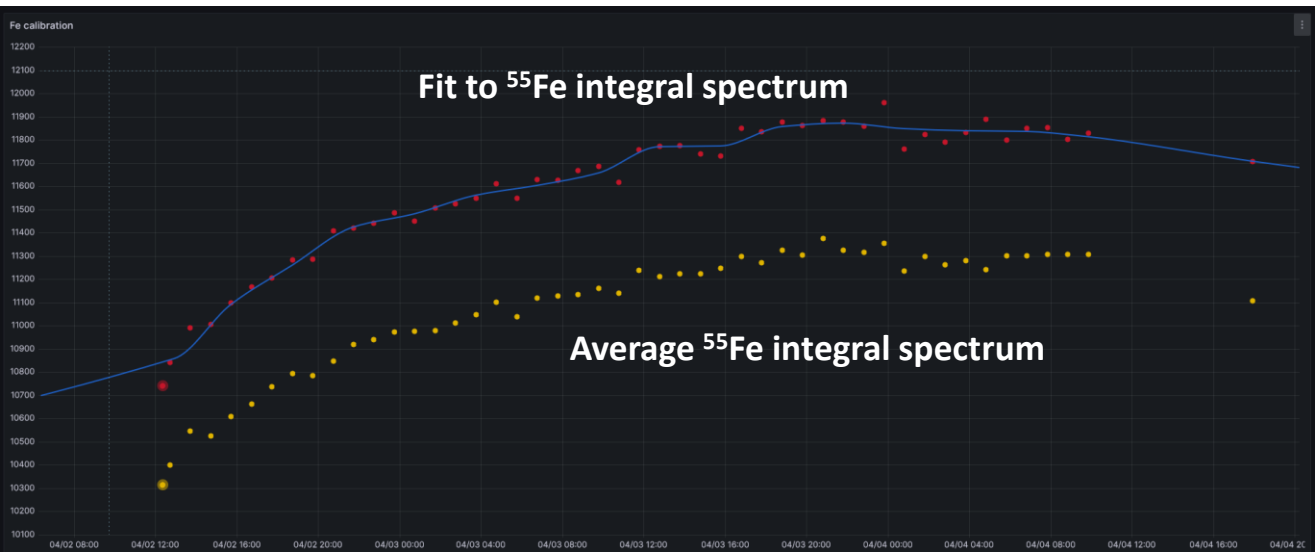
Gas system

GRAFANA IMPROVEMENTS

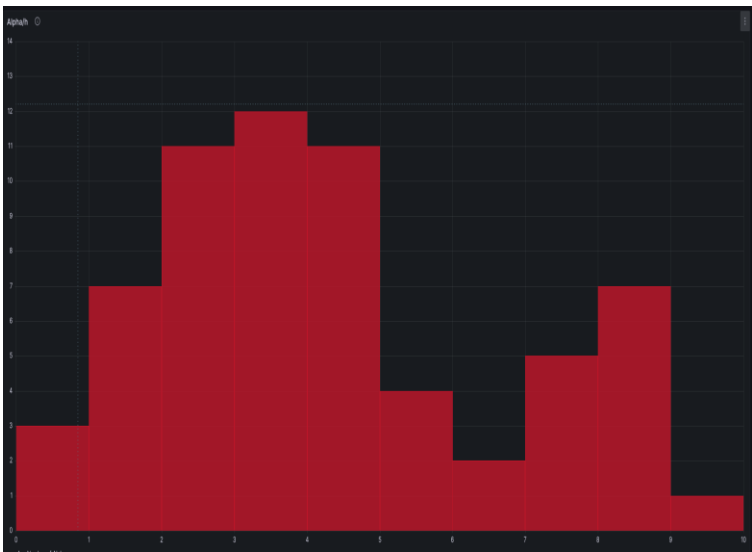
- The Grafana-based monitor was extended and serves multiple purposes

Exploit reconstructed files for small analysis

^{55}Fe calibration vs Time



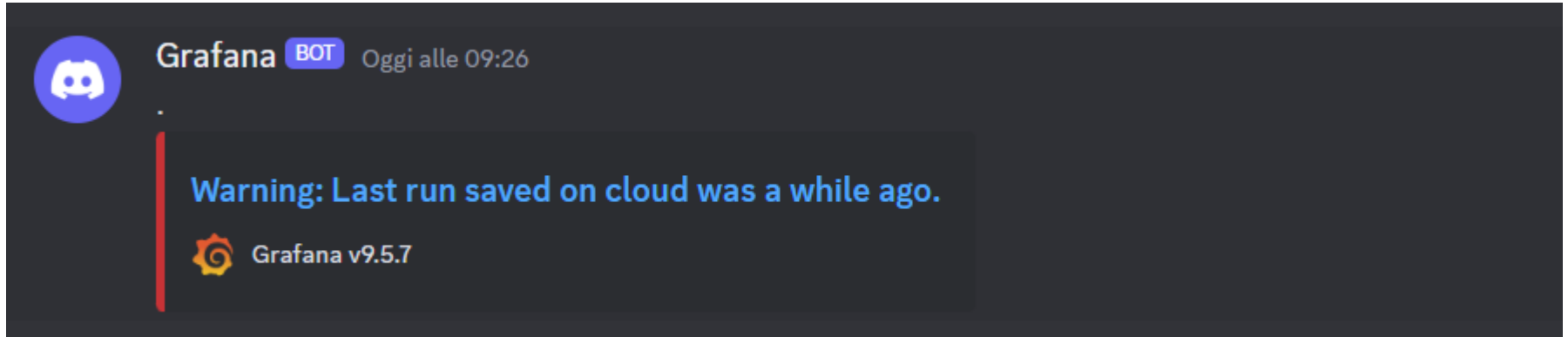
Alpha rate vs Time



GRAFANA IMPROVEMENTS

- The Grafana-based monitor was extended and serves multiple purposes

Send alarm to our Discord server



Example: the DAQ crashes and no new files are taken and uploaded to the cloud -> Alarm triggered

EXAMPLE: CAMERA TEMPERATURE

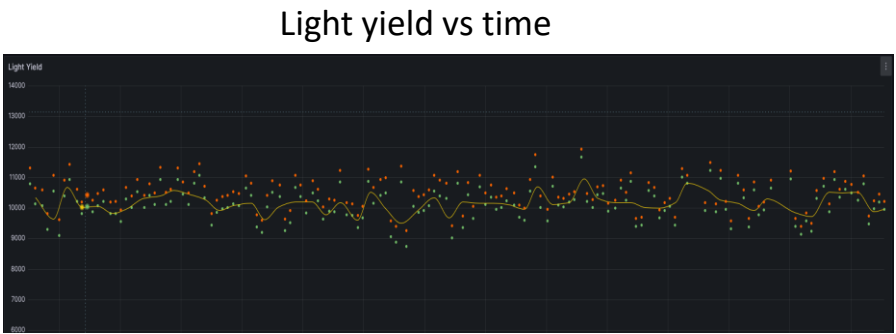
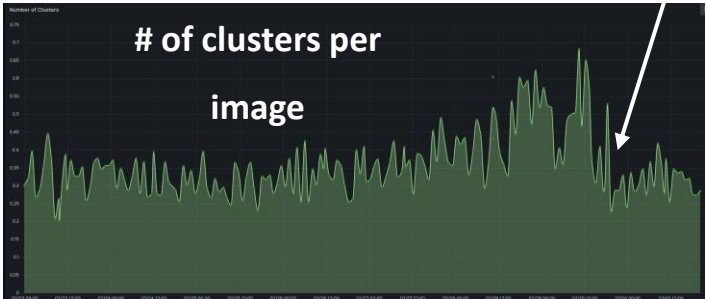
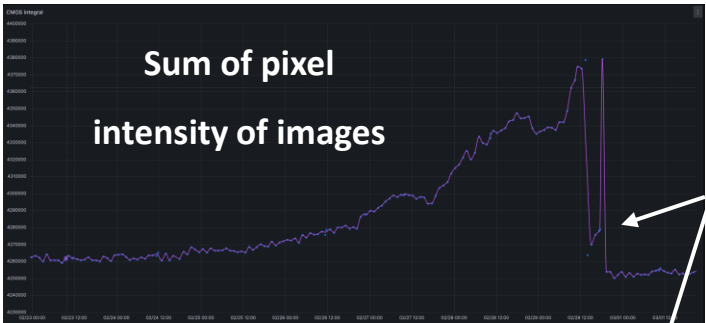
- This tool helped us to improve our response to detector issues:

We noticed the total counts of the camera pixels was increasing

The average clusters found by the reconstruction algorithm increased too

More noise in the camera

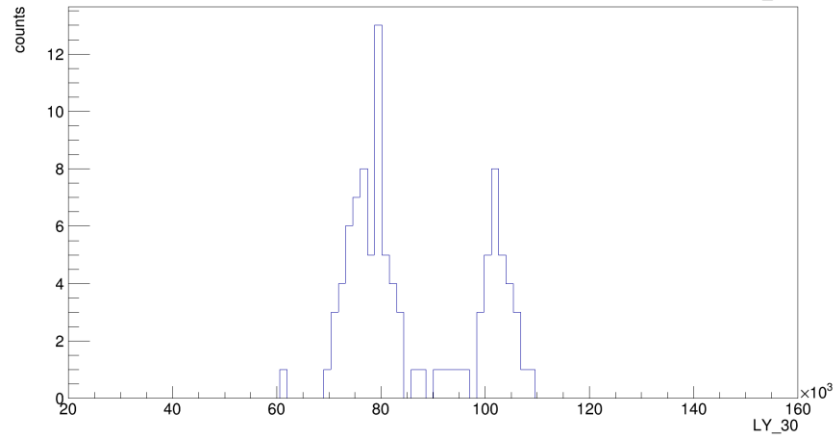
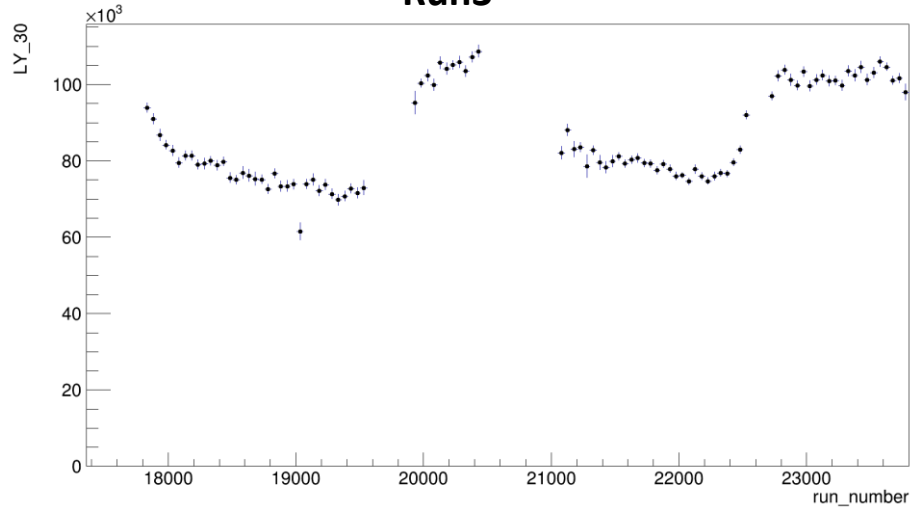
Thus, we found the water cooling of the sCMOS was not properly working and repaired it before it could affect the data



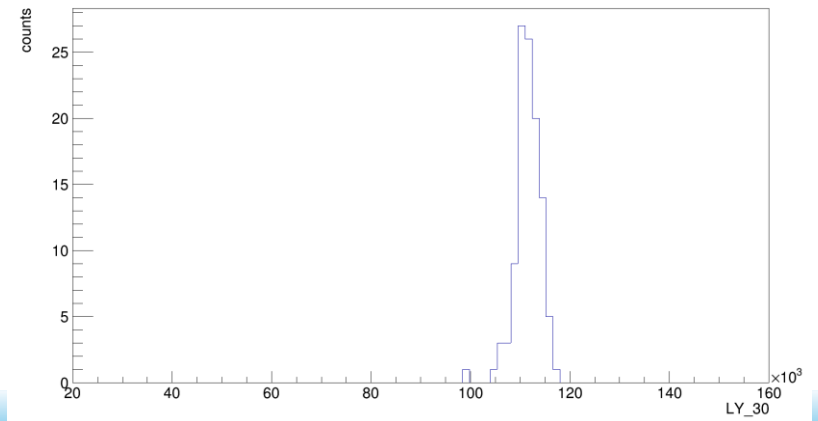
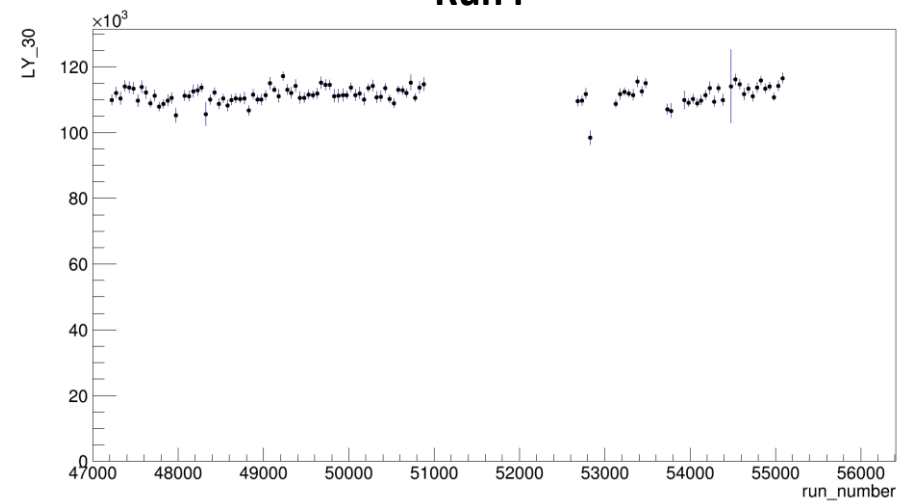
COSTANT LIGHT YIELD

- Given what was learnt from past Runs, Run4 was operated with rather constant light yield.

Run3



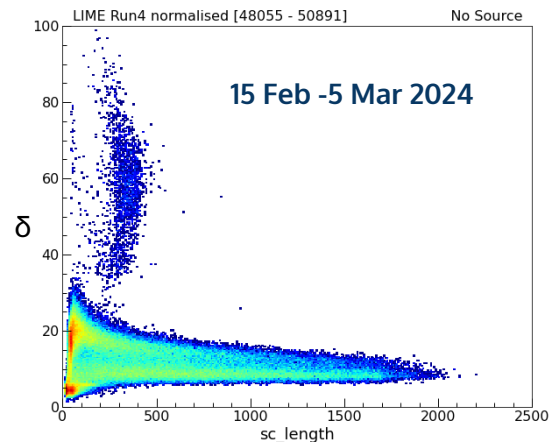
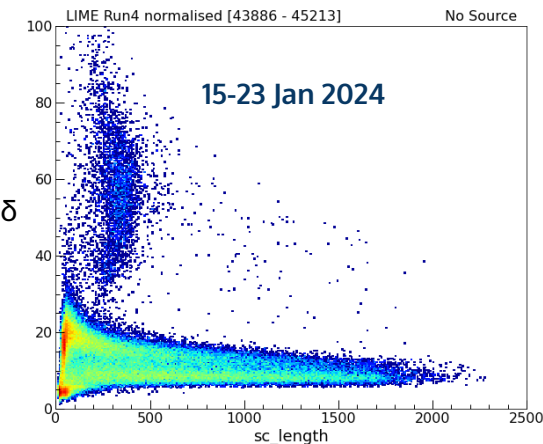
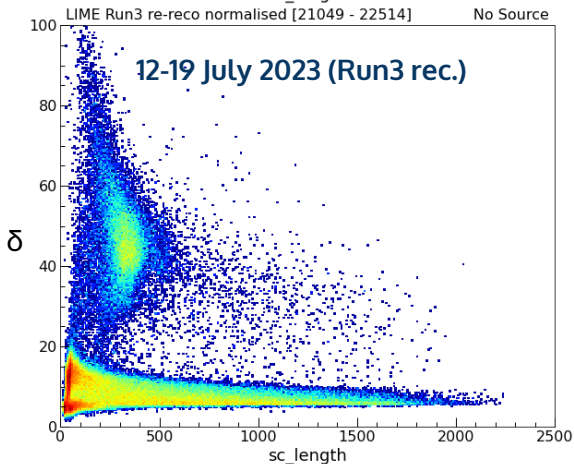
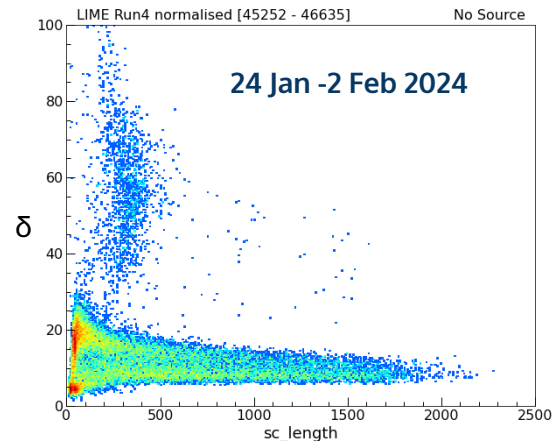
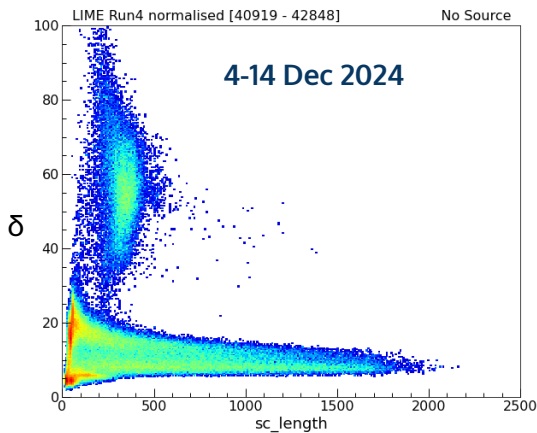
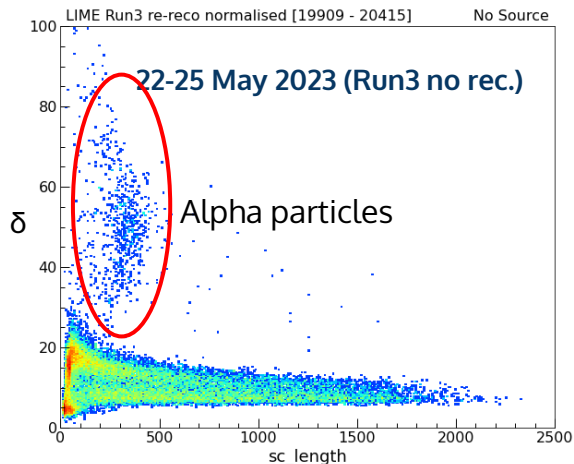
Run4



ALPHA RATE DECREASE

- We had a preliminary look at the reconstructed data. **Density vs length**

Run4 periods



ROUGH LOOK AT THE SPECTRA

- Only the quality cuts applied to the data (no extremely thin tracks, no borders)
- We can compare the light equivalent spectra (Run3 data set corrected for light yield difference and rate difference)

