NEWS

22 April 2021

LIME Commissioning

LIME is going to be installed al LNGS by the summer;

After a long period of tests of different setup, time has come to freeze the detector and characterise it;

There was a first Commissioning Meeting a couple of weeks ago and a preliminary list of tasks of compiled

LIME Commissioning

DAQ and slow control:

- high voltage control integration in Midas - done;
- gas system control integration in Midas - second half of May;
- trigger system prototype design (VME based) - done;
- DAQ for fast signals design (VME based) - done;
- material procurement - undergoing;
- DAQ-Trigger integration and test - second half of May;

LIME Commissioning

Study the performance of fast signals (optical and electrical)

First round of PMT, filled of helium;

While trying to solve this issue, we tested SiPM solution. Chiara is analysing the data, but preliminary results are encouraging: very clear peak with ^{55}Fe events.

Good candidate for triggering;

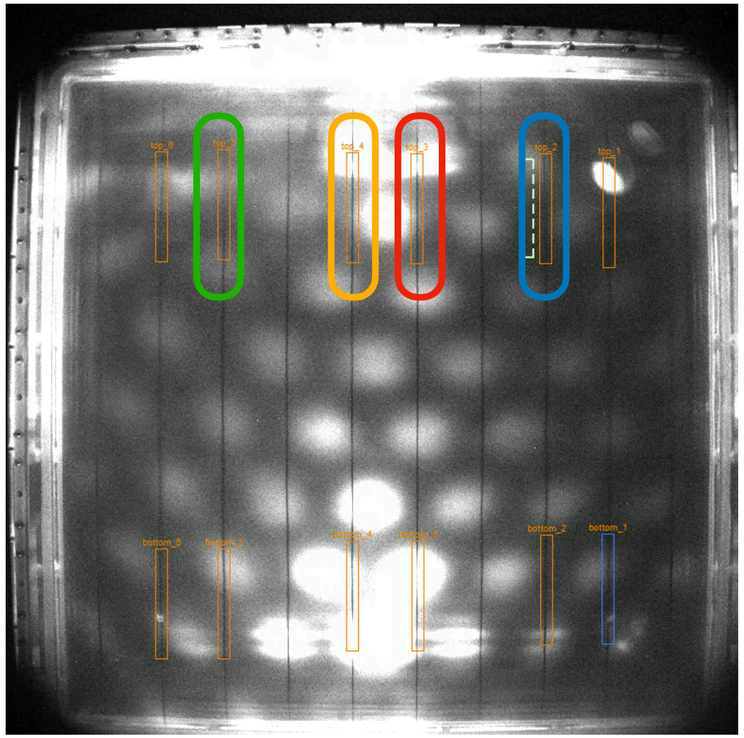
Electrical signal from GEM#2 was tested with cosmics and ^{55}Fe. Promising results in both cases, but very highly affected by GEM#3 ion back-flow.

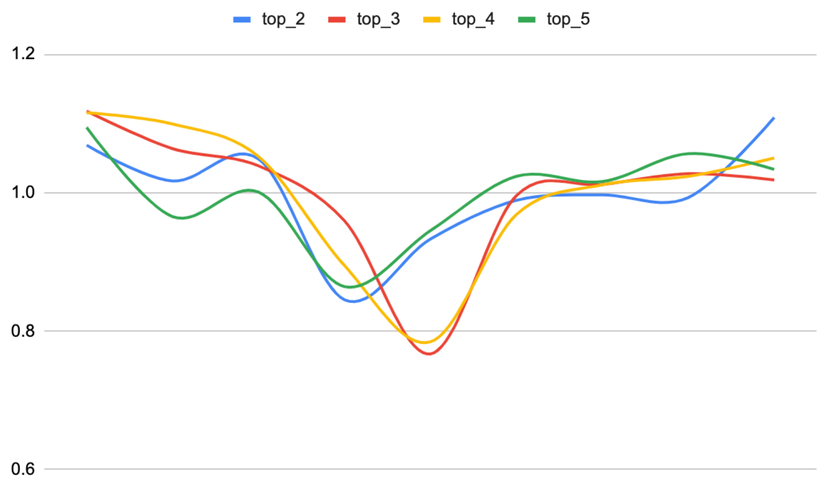
Not a good solution to correct the saturation.

LIME Commissioning

Develop a reliable method to check the quality of the camera position and the lens focus:

- Several sets of pictures were taken in different focus conditions;
- Now under study to identify the best/fast method to check the focus conditions on different regions;
- First attempt is working, a more stable a root-based method ander development

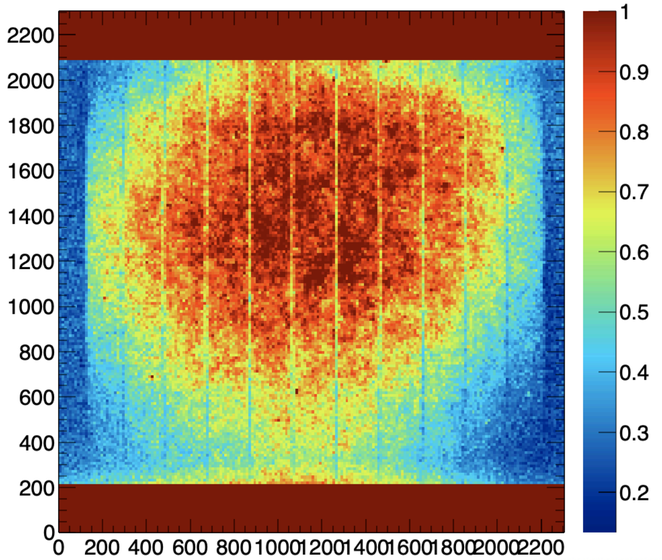


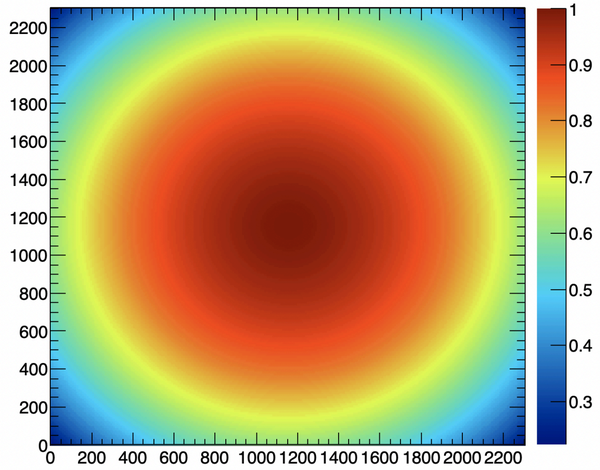


LIME Commissioning

Study the optical effects (vignetting, aberration, distortions) and decouple them from electric field effects:

- data were taken with cosmics and in different FC field strength;
- pictures of a blank wall were acquired to study the optical component;
- undergraduate students are analysing them to evaluate the different contributions;





LIME Commissioning

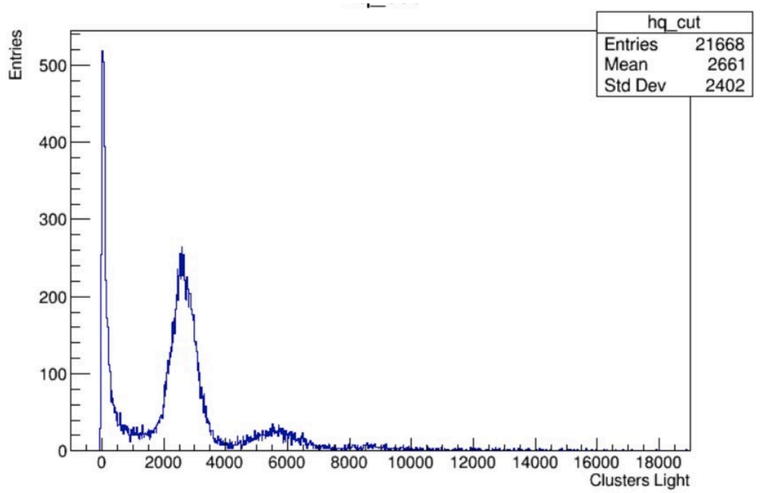
Refurbishing:

- provide electrical connections to acquire electrical signal from all the 3 GEMs - done by Roberto and Emiliano;
- optimise HV decoupling and filtering for those signals - undergoing;
- develop a fresh air circulation system to keep PMT safe from helium contamination - prototype developed by Daniele ready for test;
- study and realise a micrometrical system to align the camera to LIME - undergoing;
- ensure a light tight box - to be done;

LIME Commissioning

➔ Source 55Fe at 21 cm

➢ Light Distribution



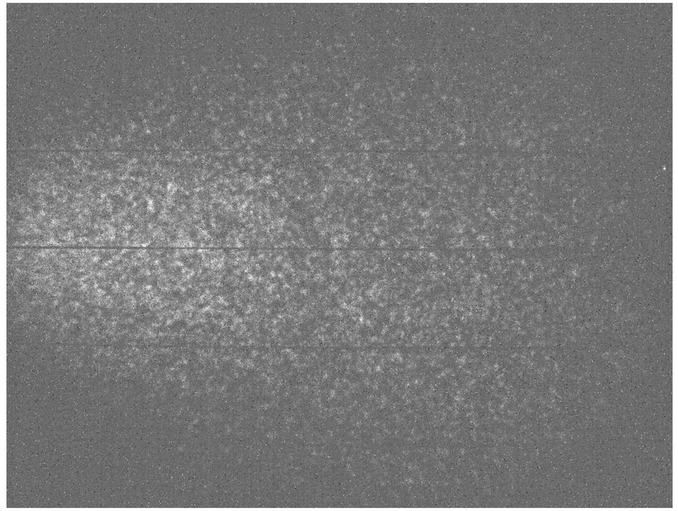
Calibration and characterisation of the CMOS response:

- data were taken with cosmics and ^{55}Fe in different conditions of GEM gain;
- Donatella is looking at them, with the aim of developing tools to measure performance as a function of Z and “energy” released;
- After the refurbishing we’ll take data with ^{55}Fe (again), ^{137}Cs (for an electrical map of the FC uniformity), AmBe;
- No other interesting sources present at LNF. Feasibility of X-ray tube tests under study;
- Underground long term calibration method (laser, source) under study

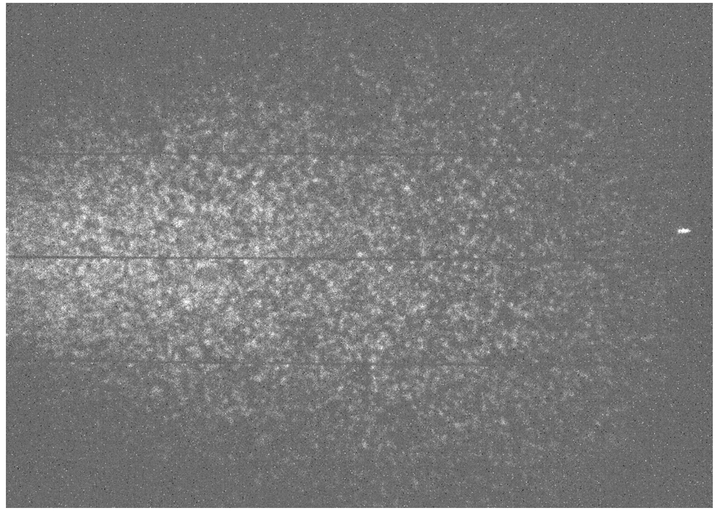
LEMON

Data analysis with Ar/CF_4 ongoing. First results indicate a 5 time lower light yield. To be investigated;

We are now taking data with He/CF_4 plus ITO glass to study electroluminescence. Some HV instability.



0 kV/cm



10 kV/cm - light increase of 20%

We need a more reliable test bench.

Cesidio is finalising designs for a small LIME based on 10x10 cm^2 GEM, with a drift path of 25 cm