

# May FD Shift Executive Report

**Period** | 2015-05-09 to 2015-05-27

## Shifters

**Local** | Ana Botti, Ariel Bridgeman, Nathan Griffith, Daniela Mockler, François Montanet

**Remote** | Ingolf Jandt, Sebastian Mathys, Philipp Papenbreer

## Overview

- Loma Amarilla's LIDAR was not operational for several days near the end of the shift.
- Cal C (and B) at Loma Amarilla was (were) not completable for three nights throughout the shift.
- We had relatively good weather throughout the shift; only Coihueco and HEAT were not operated one night due to high wind speeds.
- We modified the Rate.C root macro to plot the rates for each individual FD building (Rates.C). This could be added to the standard analysis for the FD shift. The plots for this shift can be seen in the T3 Event Rates section.

## Main Issues

Start Night	Issue of Interest
10 May	For Loma Amarilla, Cal C was not completable.
11 May	Loma Amarilla's bay 1 was not operational. For the running bays at LA, the lv/hv-camera turned off without warning a couple of times. This issue was found via the SlowControl after investigating a persistent 0 uptime fraction. We were able to resolve the issue by power-cycling the electronics.
13 May	For Loma Amarilla, Cal B and C were not completable.
14 May	The relevant bays were closed late for the Raman shots; data contaminated.
15 May	Cal B in Los Morados did not work despite several power cycles, cal-system tests, Power Control Restarts etc.. After being called, Mariano took over and ended the session.
17 May	A few of the modules were turning off and on on the NAGIOS map; check the FDLLog for more details. At Los Leones, eight rows of dead pixels were seen in all calibrations; the HV went down near the start of the calibrations. As instabilities were expected after a power-cycle, we decided not to restart the HV and perform the calibrations again.
18 May	Around 06:00 ART, a power cut in Loma Amarilla prevented further operation.
20 May	Wind prevented the running of the LIDAR and FD telescopes at Coihueco/HEAT.
21 May	At Loma Amarilla and Los Leones, T2 and T3 rates were considerably high. We assumed that the LIDAR's laser was reflected by the low clouds to the telescopes. Thus, we decided to turn off Loma Amarilla's LIDAR. Every hour, thereafter, we tried to restart it; however, the persistently high T2 and T3 event prevented us from leaving the LIDAR on until 06:00 ART. For Loma Amarilla, Cal B and C were not completable.
24 May	The relevant bays were closed late for the Raman shots; data contaminated.
22 - 27 May	Loma Amarilla's LIDAR telescope cover had difficulty opening; this LIDAR was not used.

## Local

The IRENE NX-CLIENT froze on at least two occasions; this was circumvented by using IRENE directly until the NX-CLIENT was again usable. Nevertheless, this could present major issues to remote shifters.

## Remote

At one point, the LIDAR in CO was blocked and could no longer be moved. Several power cycles, unblocks, server resets etc. did not solve the problem. We called Jorge who found that there was an emergency shutdown due to connection problems inside the array; this had caused the closing of the cover. After opening the cover again, we could continue operation.

Sometimes it took up to about 5 minutes until we were able to react to problems or proceed with the schedule because from time to time the connection was quite slow (VNC session froze for that time).

## Suggestions for Future Shifters

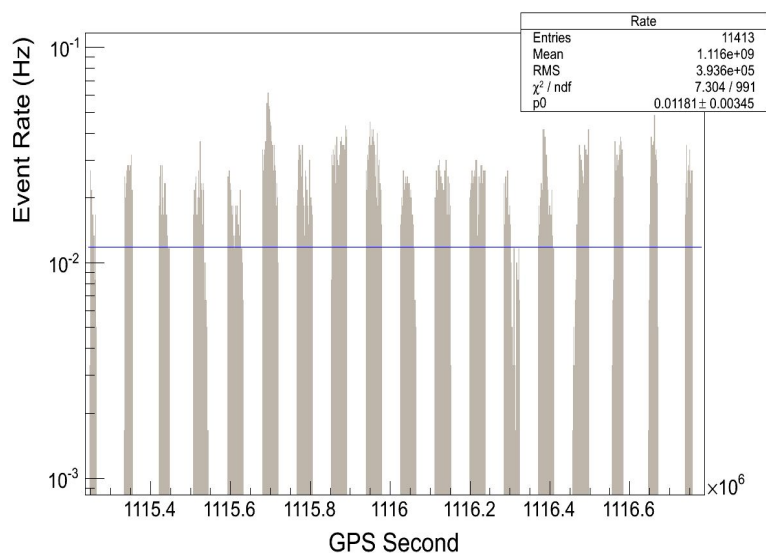
### General

- Within the FD checklist, it would be useful to have the offline reconstruction instructions given prior to the initial calibration for the night. We would suggest that these instructions be provided after opening the FD Elog or putting the telescopes into calibration mode to warm up for an hour.
- In the same spirit, we would have liked a set of macros to automatize the every day actions such as checking if the data files from the previous night exist on /Raid/data/Fd\* and if not the copy from GINA, then copying these files in the proper directory structure (TodaysEyes). In many instances, the files on GINA were not closed or not complete and we had to replace them by the copies from the Raid disks.
- A maybe trivial thing to ease the preparation of this shift report would be to have some easy way to make plots from the EventBrowser. This is in principle foreseen with the option to "save the event as PS" (actually PDF would be better) but there are apparently missing csh macros:
  - sh: 1: /home/auger/offline/v2r9-oct2013-install/bin/SdEvent2ps.csh: not found
  - sh: 1: /home/auger/offline/v2r9-oct2013-install/bin/MergePostscript.csh: not found
- The LIDAR checklist could be improved by making all instructions use the exact name of the application or words used within GUIs. Currently, some of the instructions do not have such explicit wording.
- It might be useful for future shifts if the Offline tools were also available for the remote shifters.
- For the angular distribution of events, would it be more meaningful to plot as function of  $\cos(\theta)$  or  $\sec(\theta)$  ?

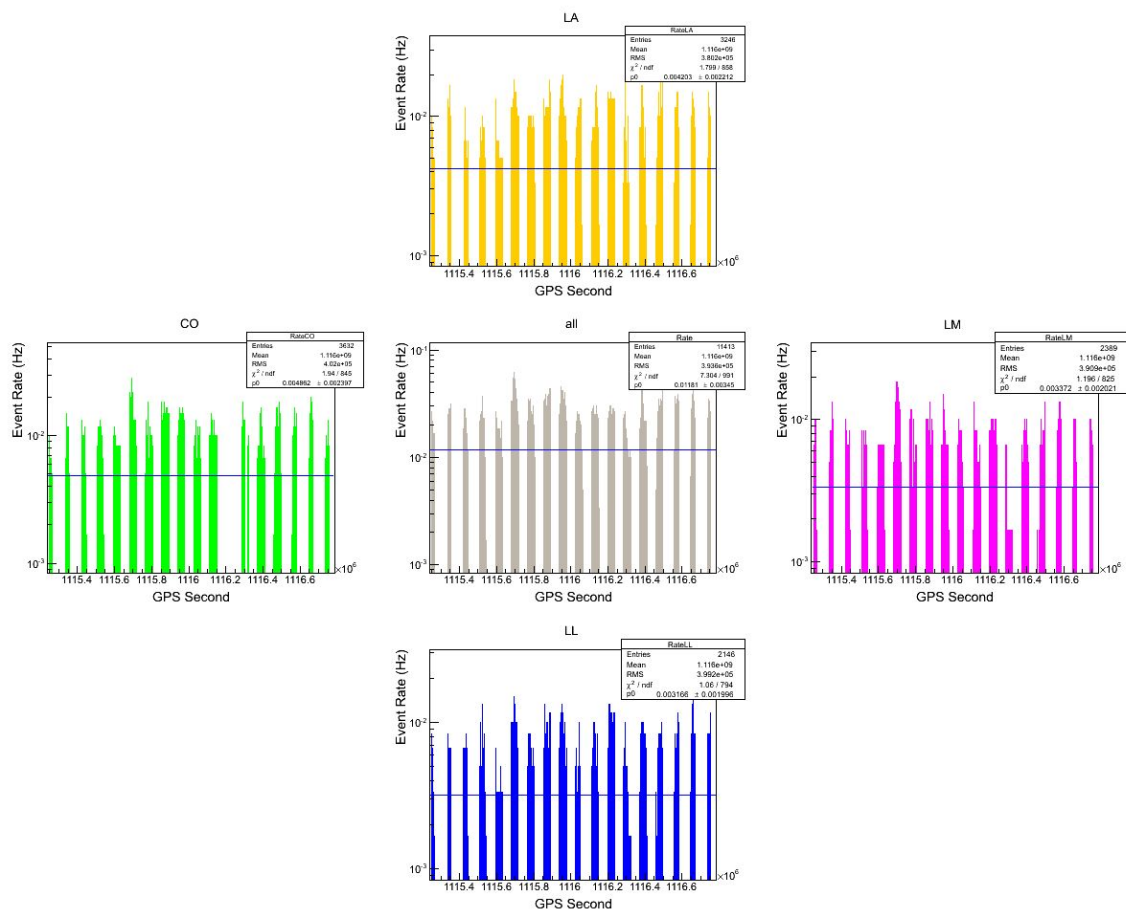
### Remote

- If the VNC session is not responding, have patience before calling an expert. The session can take some time to react due to connection issues.

## T3 Event Rates

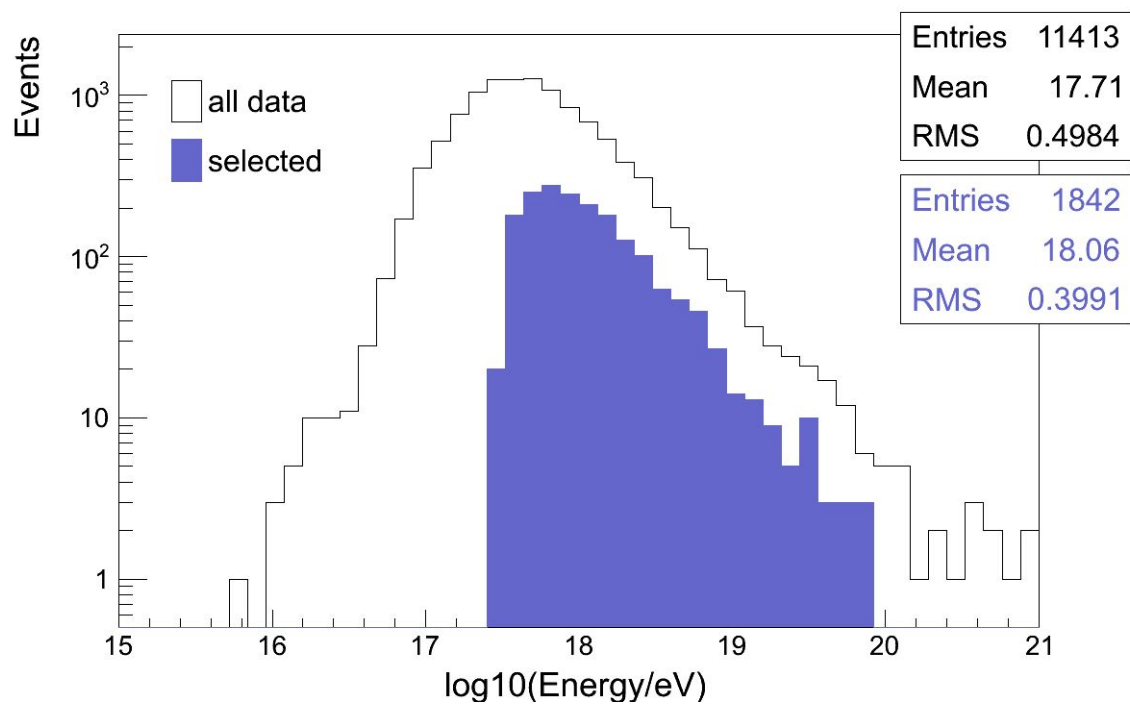
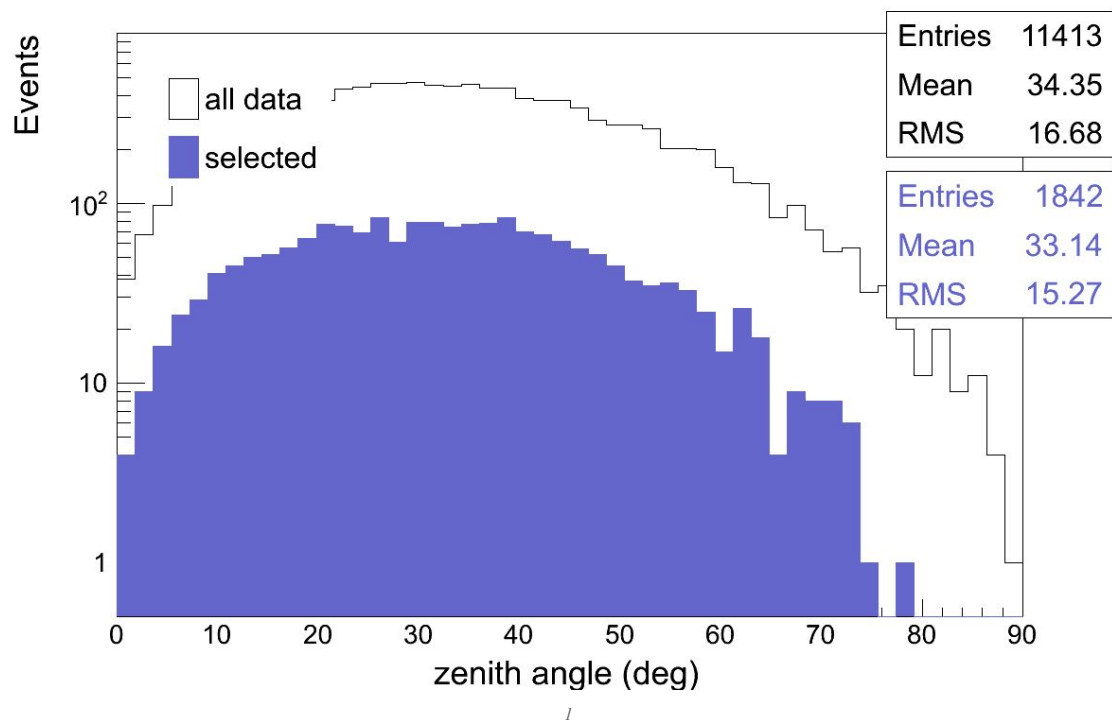


FD event rates with “zerocuts” selection for the whole shift

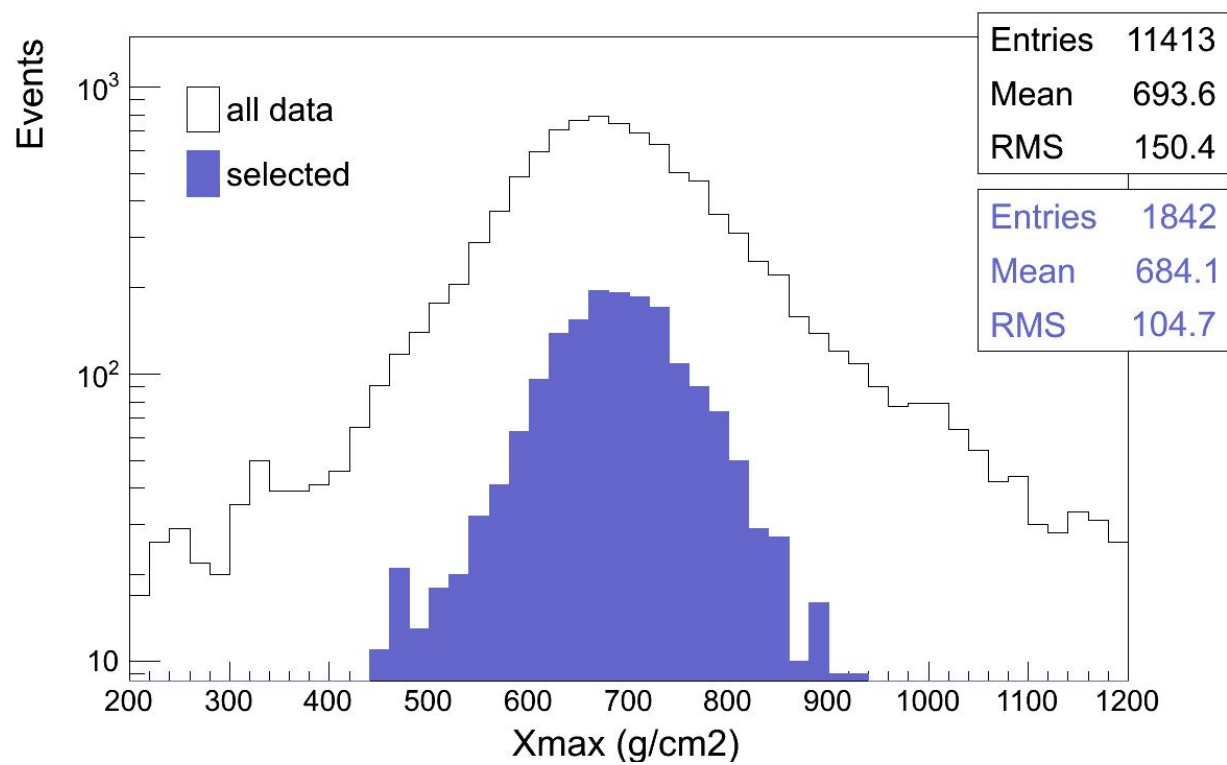


FD event rates with “zerocuts” selection for each FD building. Coihueco has an event rate of 0 for 20-May, as it was not operated due to high wind speeds.

## Distributions

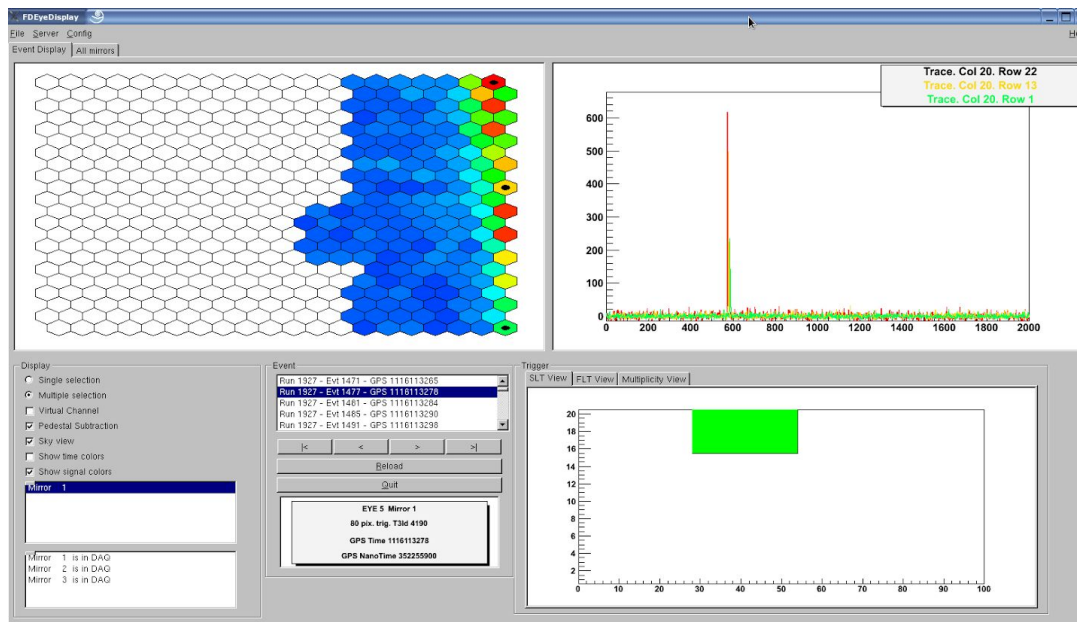
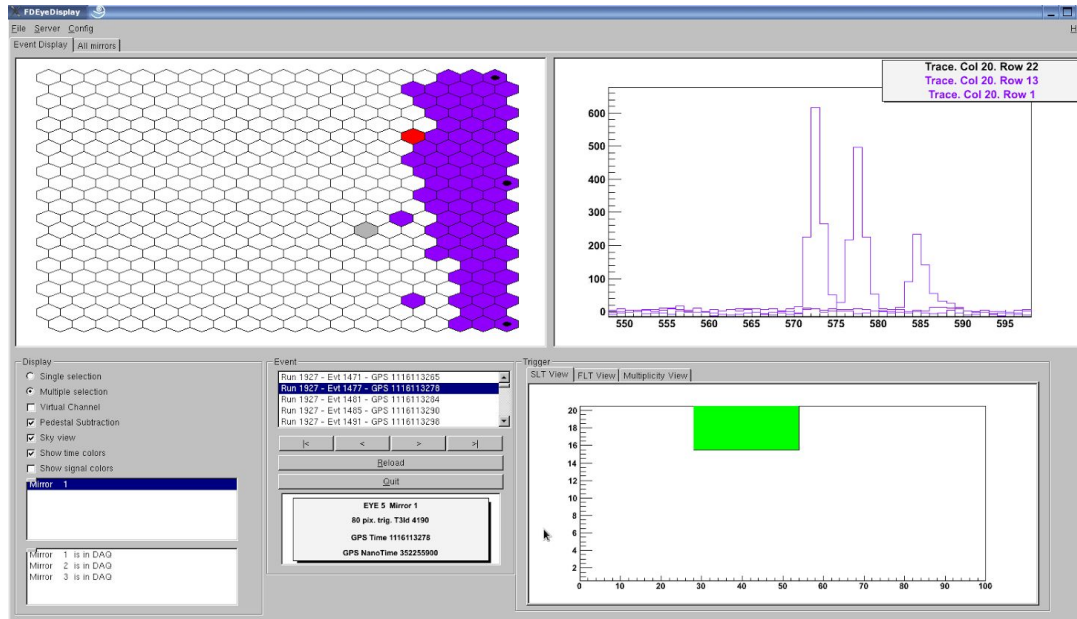


<sup>1</sup> *Selected* is defined by the Minimal FD cuts file.

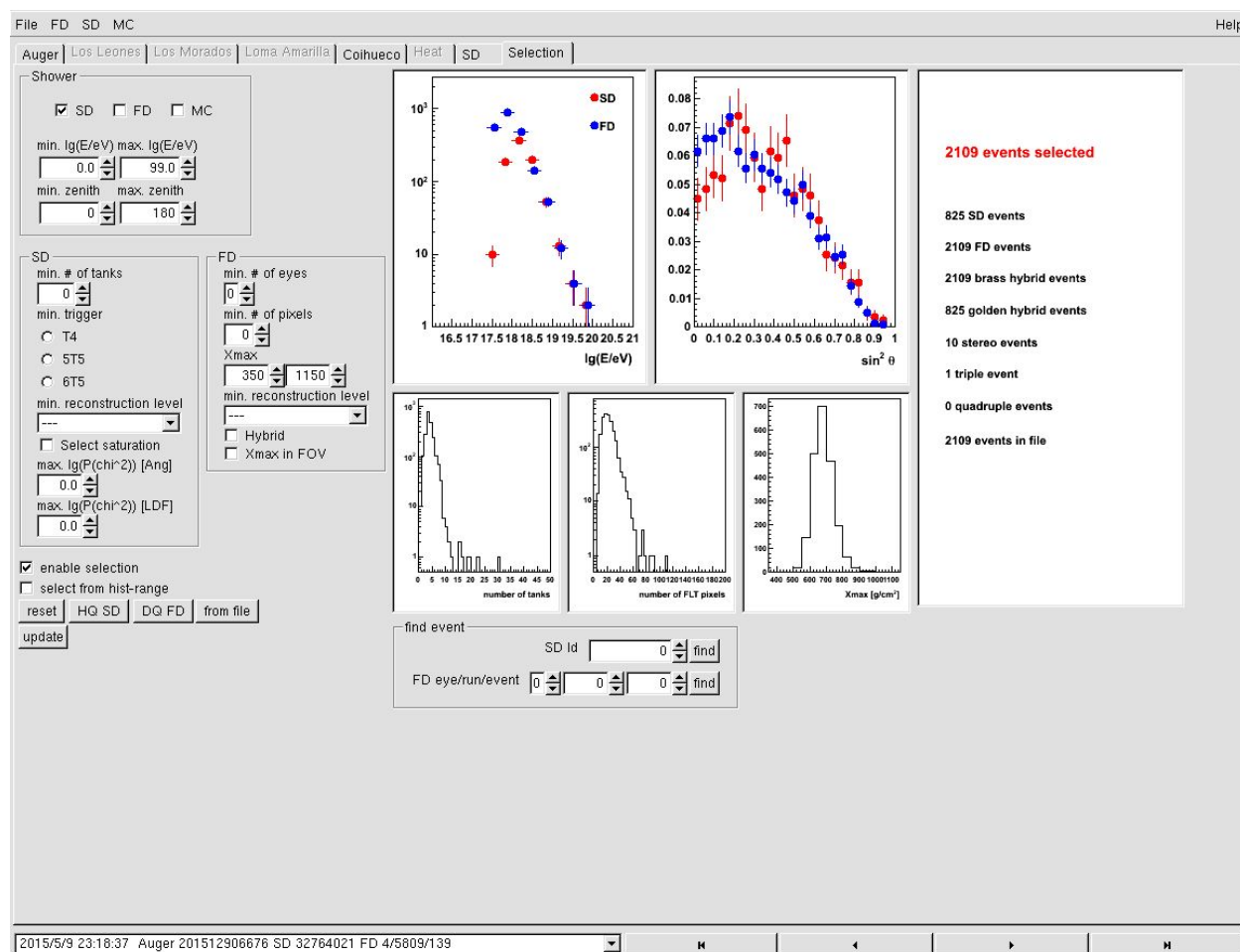


## Curious Events

During the 19-May shift, Ana found some unusual events that she has been trying to understand. Attached are two screenshots that illustrate an example of these events at HEAT (Run ID: 1927, Event ID: 1477, Timestamp: 1116113278). The screenshots correspond to the same event with: 1. timing colours and 2. signal colours. Of note is the time coincidence and intensity of the signals coupled with the detection of the event by a major part of the array. The very short time difference between pixels ( $\sim 5$  ns across the camera) indicates that the size of the phenomenon is of the order of 1 m, which favours a local or internal explanation for these events such as static discharges on the camera, the mirror, or the filter.



# Hybrid reconstruction

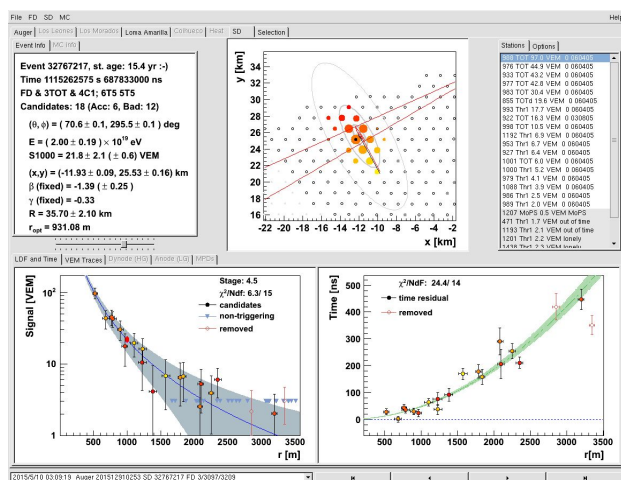
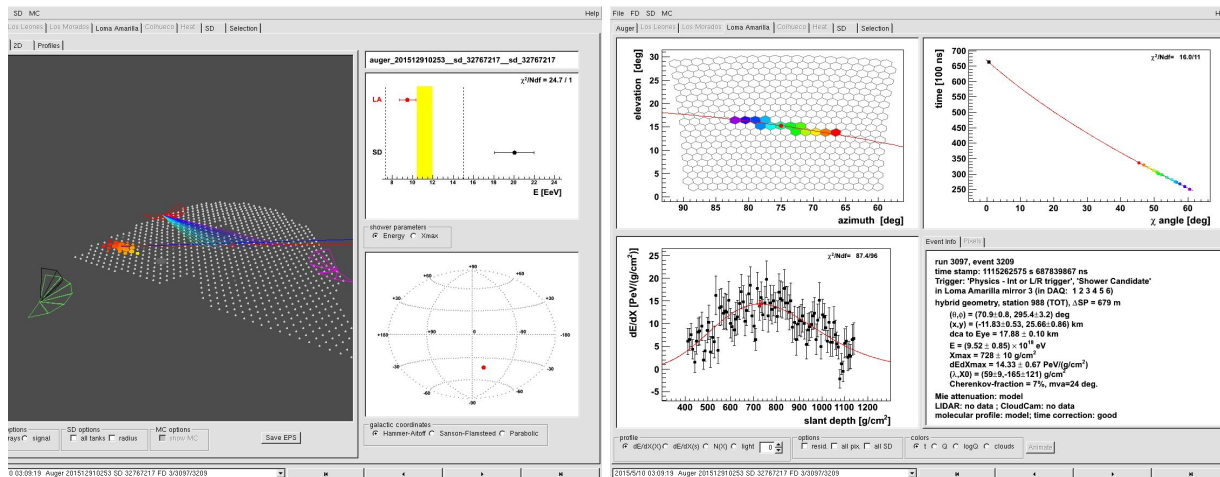


The Hybrid reconstruction brought some nice and interesting events. In total, we ended up with 2109 selected hybrid, 10 stereo, and 1 3-fold events. For illustrative purposes, we selected: 2 very inclined events and our only 3-fold FD hybrid. To note, the Hybrid data processing was not finished at the time we wrote this report; the four last nights (14-18) still to be added.

## Two hybrid inclined events

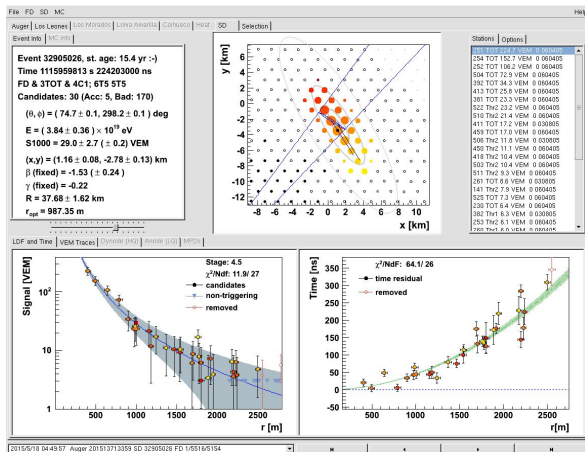
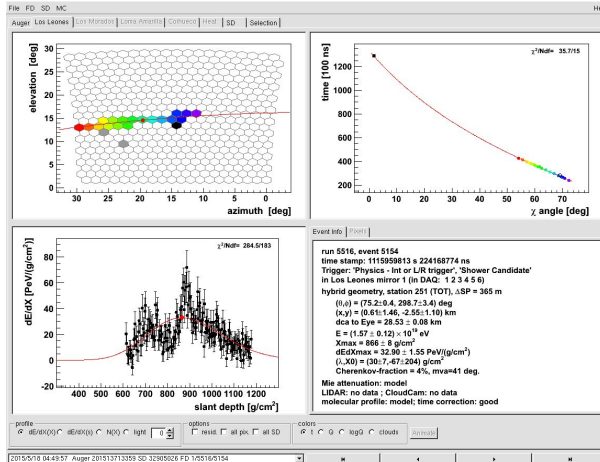
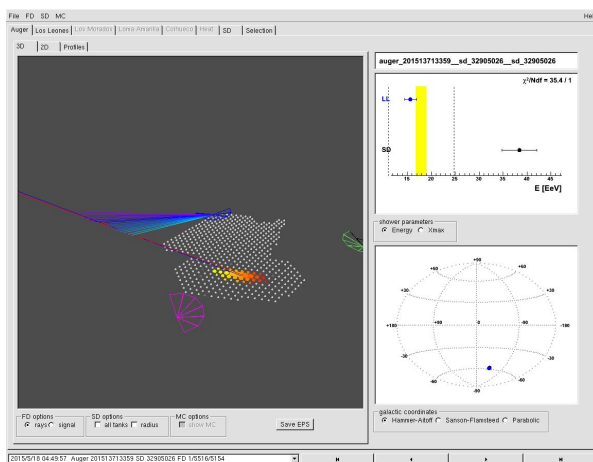
While they may not contribute much to physics, we found these inclined events quite spectacular  
Unfortunately, the ADSTs produced here do not include the SD fadc tracks. It would have been nice to show that these events have most probably very short traces indicating “old” showers i.e. not neutrinos!

Event 201512910253, a  $\sim 70^\circ$  event:



## Event 201513713359, a 75° event:

In this case, the FD profile is chaotic, probably distorted by clouds.



# A 3-eyes trans-GZK hybrid event

Event 201513515553 is a beautiful 3 eyes event and our highest energy trans-GZK event !

