Code Changes

The code changes I have made are mainly the additional canvases that provide information on details such as the locations of signal hits and the analysis of neighbours and the clustering. These are mainly contained within AsciiRoot.cc, alongside another implementation, the method of loading masking from a masked.txt file.

Sin_Preguntas

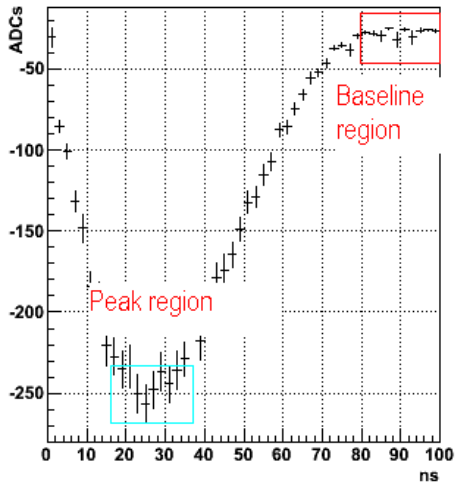
Other changes have been made to the main file, sin_preguntas.C, or more specifically, the initial call routine.

From the standard;
Sin_preguntas("rs.dat", "calibration.dat", "pedestals.dat", polarity, dofit)

It has now changed to

Sin_preguntas("rs.dat", "calibration.dat", "pedestals.dat", polarity, dofit, peak time 1, peak time 2, baseline time 1, baseline time 2)

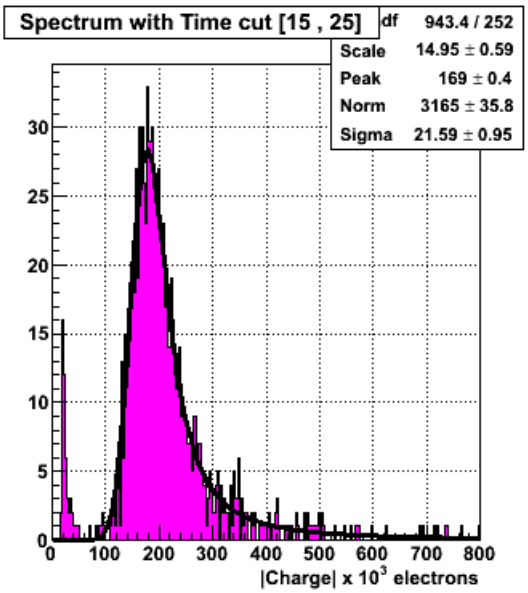
These provide greater flexibility in our powers to be able to analyze data files, as such:



I would suggest finding the peak and taking a 10 nanosecond window around it (e.g. 5 nanoseconds left, and another 5 right).

By specifying the macro to fit to our specific peaks (this filers through all the analysis, primarily and most importantly on the spectrum for a time-slice, on the top right of the analysis canvas, but also to the other cluster, neighbour, and imax canvases), we can look at the pulse shape as it varies with time – an important attribute for the different settings

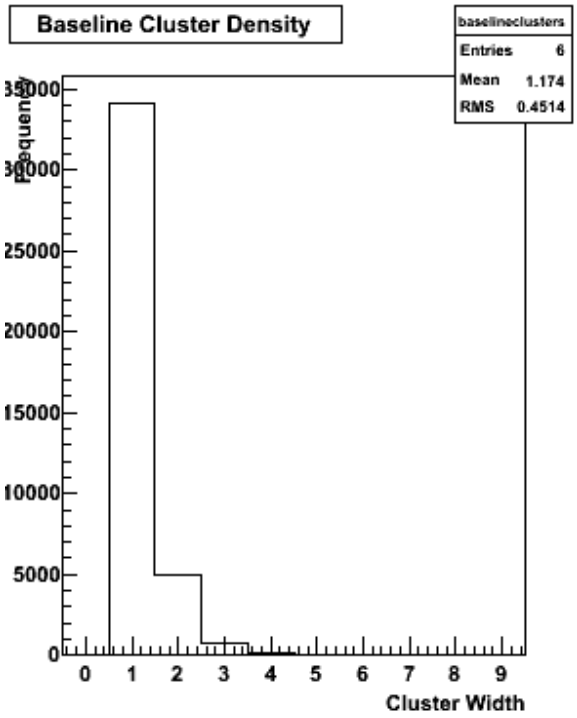
we can operate the system on, and also it provides compensation for the addition of extra cable lengths, etc.



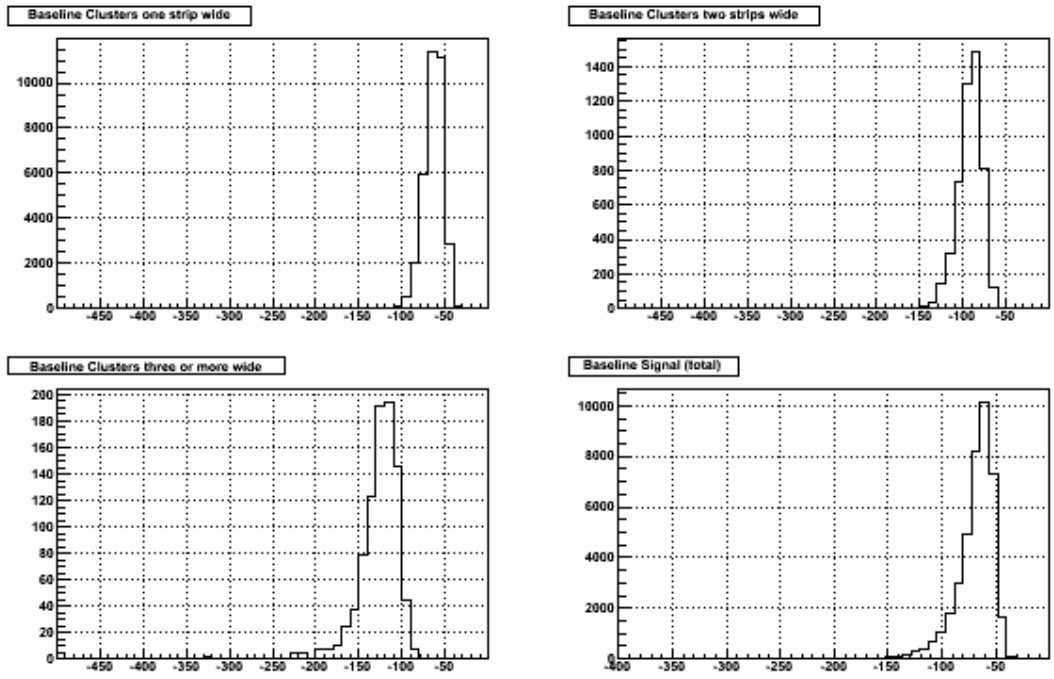
We can see on the graph above an optimized peak curve (it does not correspond to the previous graph) looking at a specific timeslice.

Canvases

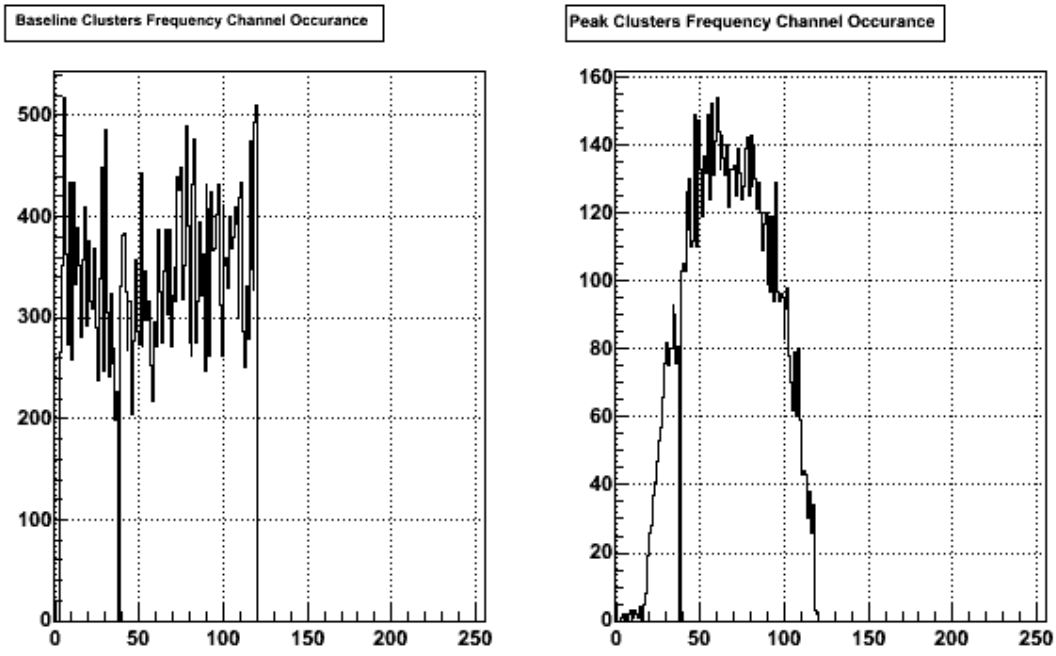
The following canvases have been implemented into the code:



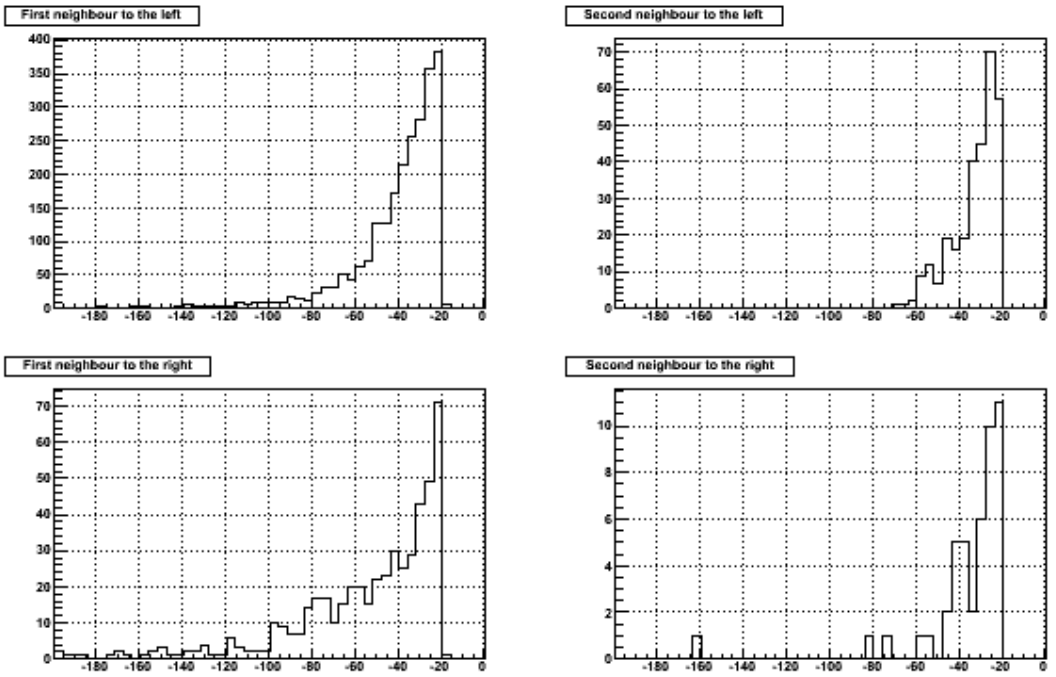
Cluster width vs frequency in the baseline



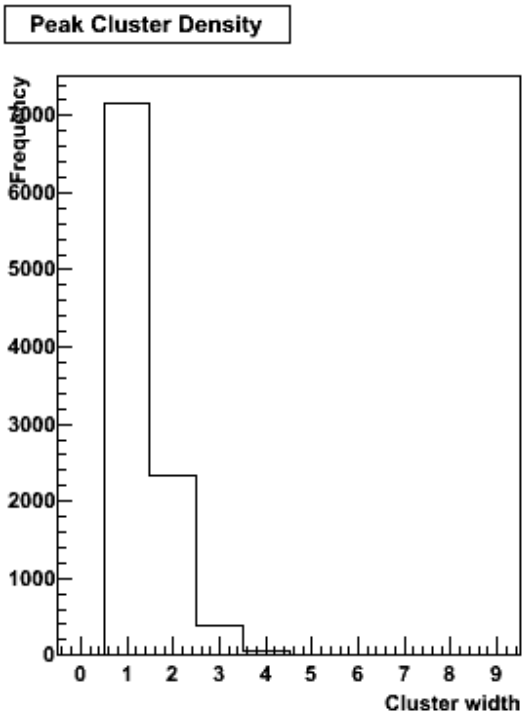
Cluster distribution vs signal vs frequency for the baseline



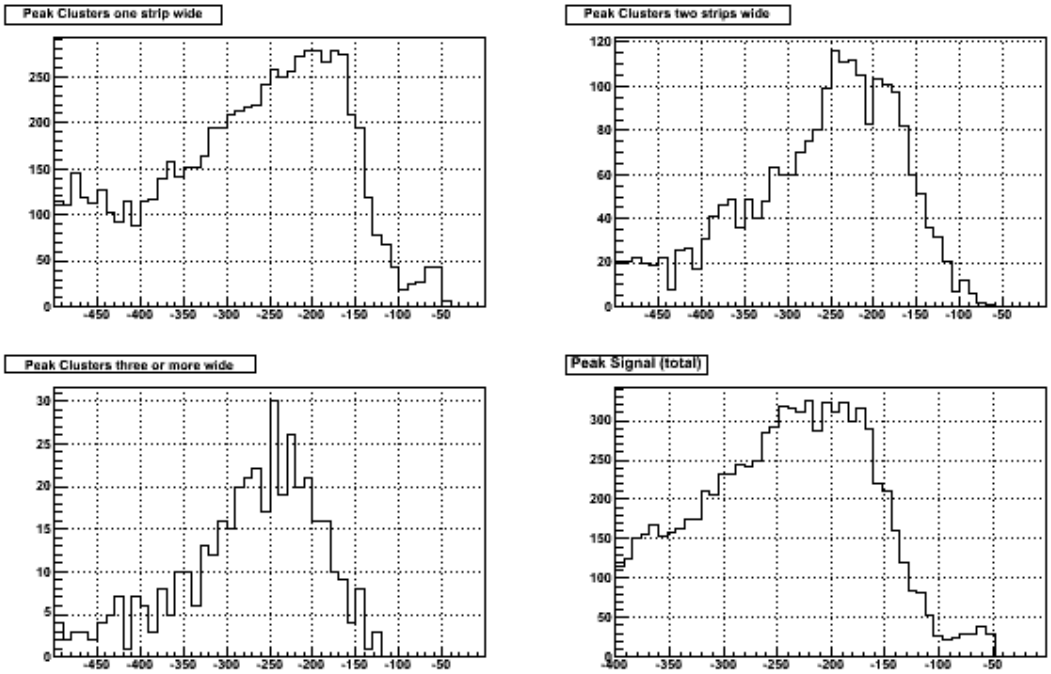
Imax location (imax is the seed channel in the cluster analysis) for both peak and baseline. Chip 2 has been masked out, as well as a noisy channel in chip 1



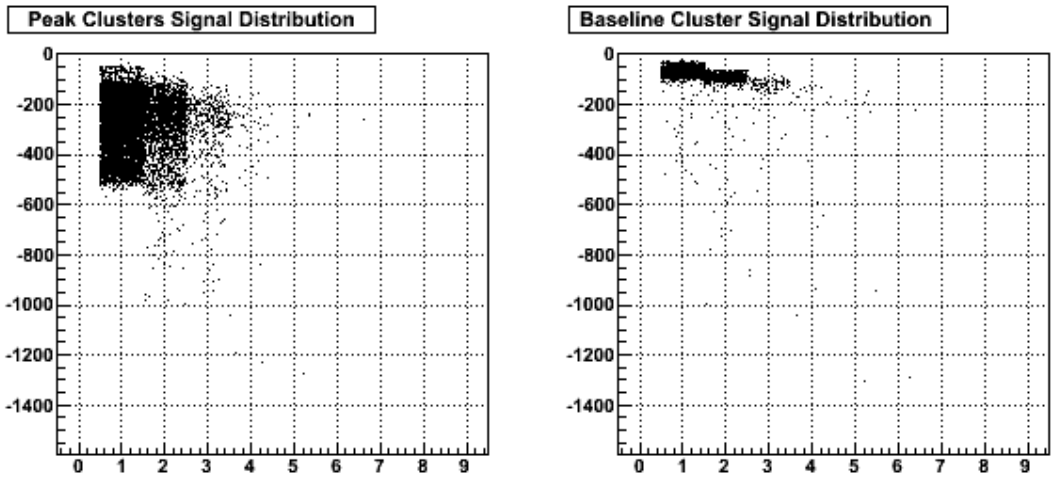
Neighbour analysis – signal distribution for one left and one right, and two left two right (to look at _neighcut variation)



Peak cluster distribution



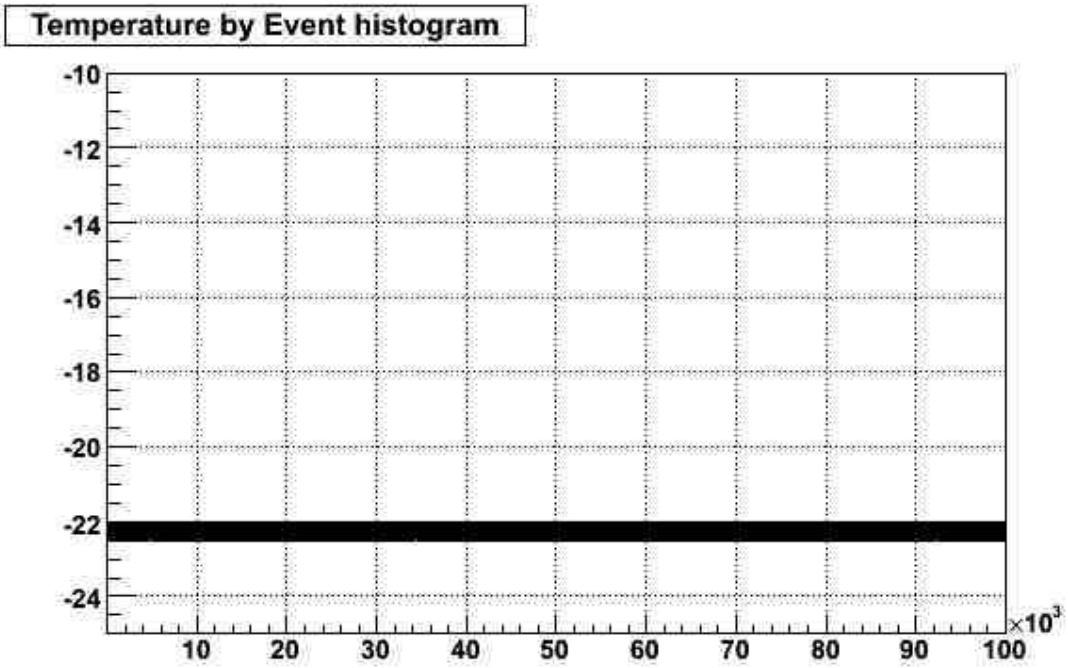
Signal distribution in the peak – looking at one strip wide, two strip wide, and three or more strip wide signals.



Cumulative distributions for all the signals – "basically" a Landau

Masking

To load the channels we want to be masked, you need a textfile masked.txt in the root_macros folder. The channel that is masked corresponds to the value you put into the textfile +1 (e.g. to mask channel 49, we put the value 48 into the txt). The impact should be immediately apparent on the imax histograms (please note that this does not effect noise/gain calculations otherwise, only the spectrum displayed and where we analyze for signal hits).



Above we have a temperature graph, to show the variation of a thermistor on the board with respect to event number. This is an important judge of the cooling system – to help us see if we have some degree of stability, or if the sensor continually heats up over the course of the run.

Trouble Shooting

Loading different settings into the GUI via the menu do not make any changes to the pulse shape.

Loading the values into the GUI via the menu does not load them into the chip. If you type in the settings (in decimal) that you want, and then close the GUI, it will create a file in the /bin/ directory called 'last.ini'. Rename this file to correspond to what you want, and then to load it, type;
./alibava-gui name.ini

I cannot analyze the data in the \bin\ directory.

The data should be stored in the root_macros directory. Previous attempts (albeit not tried recently) to make the macro find the bin directory (e.g. "../bin/x.dat") did not work.

After successfully taking a pedestal and calibration run, attempting to run an RS run does not work. The red light on the motherboard is permanently on, and the program eventually times out due to lack of triggers.

The most frequent issue arising here is with the scintillator. If the scintillator power is on, then the next step to is to check the settings on the Alibava gui. On the right hand side of the gui, there is a button for "trigger". The thresholds should be checked, but more importantly, the Trigger Pulse. Press the check box for the "OR" triggering mechanism, and the problem should be solved.

Running the GUI causes the board to display a constant red light, and the GUI comes up with errors.

The most likely reason in this case is a problem with loading the settings onto the daughter board or the motherboard. Aside from checking the obvious cable connections (the USB, power supplies, etc) the direction of the ribbon cable can be very important. If the ribbon cable is symmetric (e.g. it can be inserted both regularly and upside-down) then it is important to check which way it is meant to be before inserting it. If this is not the case, then the most common remaining error requires a power cycling.

Turn off the motherboard power supply, and then turn it back on. Press the reset button and then try to run the GUI.

The analysis presents a flat pulse shape.

The most common cause for this is use of the wrong masking file. If we have signal in the region of channels 30-40, and we've accidentally masked these out, then the analysis

will be attempting to look for signal in noise. Try removing the masking (rename masked.txt to masked-backup.txt or similar) and see if a pulse shape is produced. Failing this, the next check would be the seedcuts (note, this is set within the macro Sin_Preguntas.C, and not within AsciiRoot.cc) – if they are too high then it can distort the baseline to single events with very high ADC counts, causing it to distort the scale of the pulse shape graph and make any pulse appear small.

The Landau fit does not fit well to the data in the spectrum graph.

In the latest set of macros, a line in analysis under the show_spectrum macro has been changed from; [Line 755]

Fland->SetParameters(10, hx->GetMaximum(), hx->GetSumOfWeights(), noise);

To: [Line 760]

hx->Fit("fFitLandSimple", "wr", "", 40, 200);

The last two values, 40 and 200 correspond to the low and high ADC values you require for your fit region – these should be changed as necessary.

Beyond this, if there is too much noise in the spectrum graph, that will distort the Landau low. Try changing the seedcuts in sin_preguntas.C to a higher value, and the fit box should converge towards the by-eye-inspection of the peak.