Fitting algorithm for Coincidence histograms in Offline

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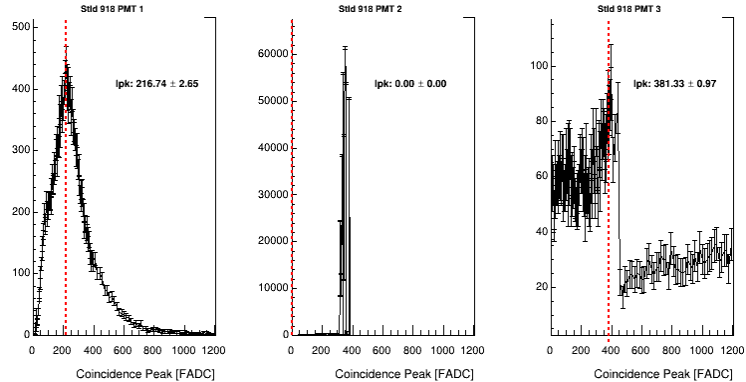
How to fit the coincidence histograms?

Let's start with height coincidence histograms, and fitting a second order polynomial

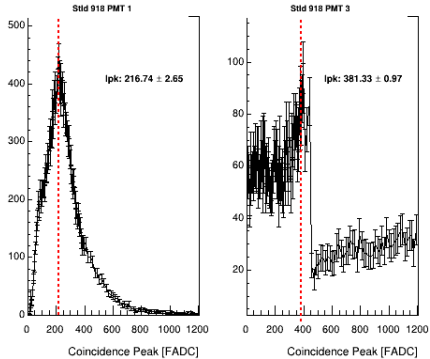


So, the first task is to identify wrong height coincidence histograms.

Identifying wrong height coincidence histograms

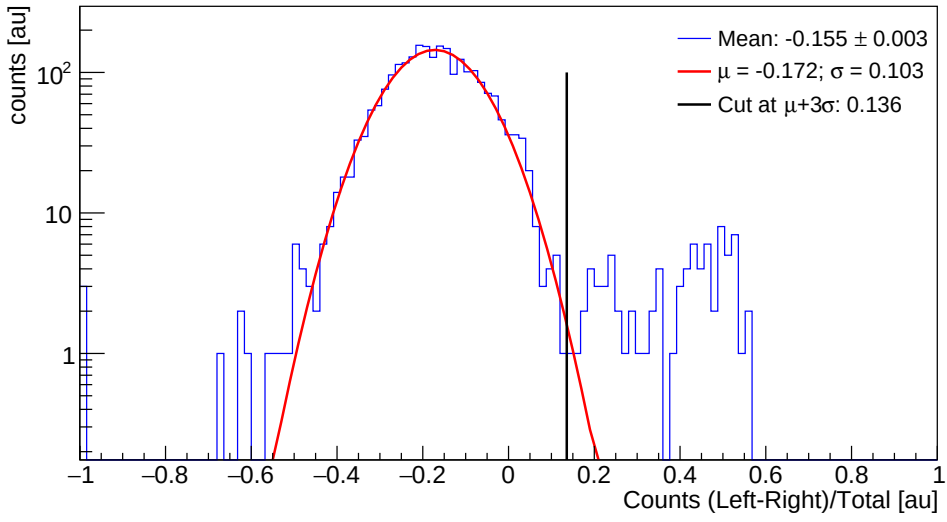
Using the symmetry of the coincidence histograms

- Find the bin with the maximum of counts (binMax)
- From bin 25 until 100 (beginning of big-bins), counts the number of entries leftward and rightward, respect the binMax.
- Plot the distribution of (EntrLeftward-EntrRightward)/TotEntr.



Identifying wrong coincidence height histograms: results

Using the symmetry of the height coincidence histograms



Setting the properly range to fit height coincidence histograms

Using the symmetry of the height coincidence histograms

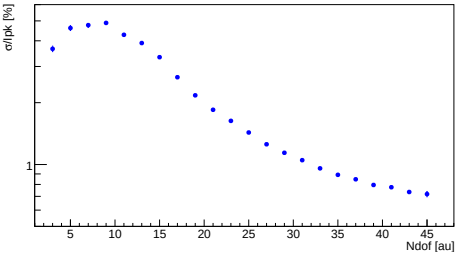
- Find the bin with the maximum of counts (binMax)
- From binMax, fit a second order polynomial from binMax - n to binMax + n.
- Check for the distribution of χ^2, error of fit as a function of the number of degree of freedom.

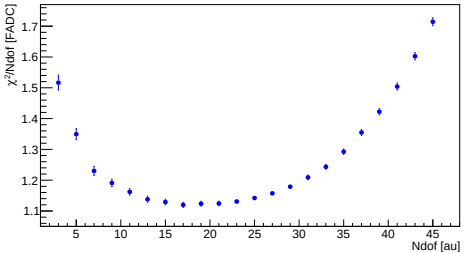
A temporary algorithm was implemented in the SdHistogramFitterKGB.cc module in order to find the best range:

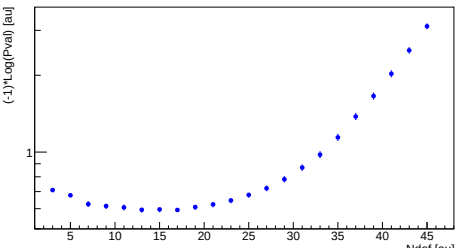
```
if ( cntsLeft-cntsRight/totCnts < 0.14 ) {
  for ( int nFADC=8; nFADC<100; nFADC+=4 ) {
    [...]
    MakeQuadraticFitter(coinciPeakHisto, binMax - nFADC, binMax + nFADC).GetFitData(qf);
    [...]
  }
}
```

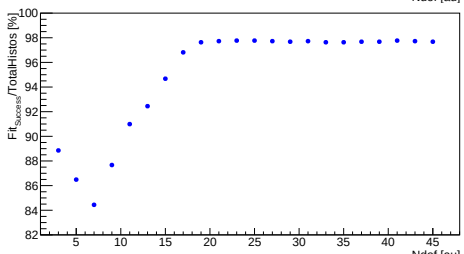
Setting the properly range to fit height coincidence histograms: results

Using the symmetry of the height coincidence histograms





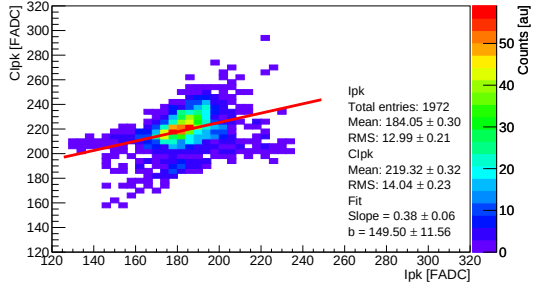


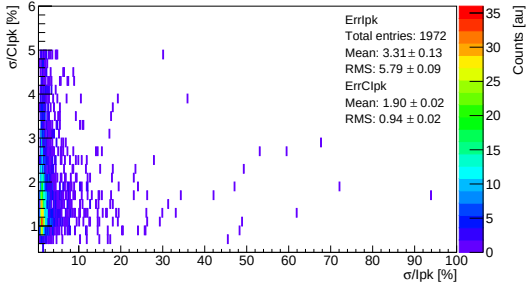


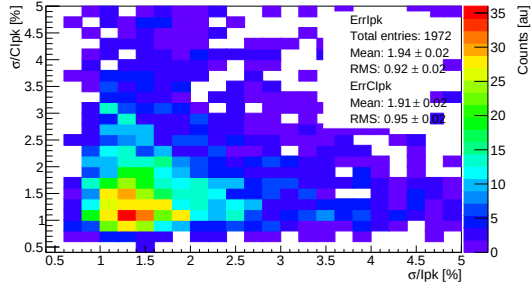
Algorithm to fit height coincidence histograms

1. Find the bin with the maximum of counts (binMax)
2. From binMax, fit a second order polynomial to range: binMax-44 (44 is equivalent to 19 Ndof).
3. Check if the previous range fulfill that: $\sigma/\text{Ipk} < 0.05$ and $\chi^2/\text{Ndof} < 2.0$
4. If not, steps 2 and 3 are repeated for the range: binMax-48.
5. The steps 2 and 3 are repeated until for some range the step 3 is fulfilled or until the final range of binMax-80 is reached. If it is the last case, so Ipk gets zero.

Results for height pulse histograms







Algorithm to fit height coincidence histograms: results