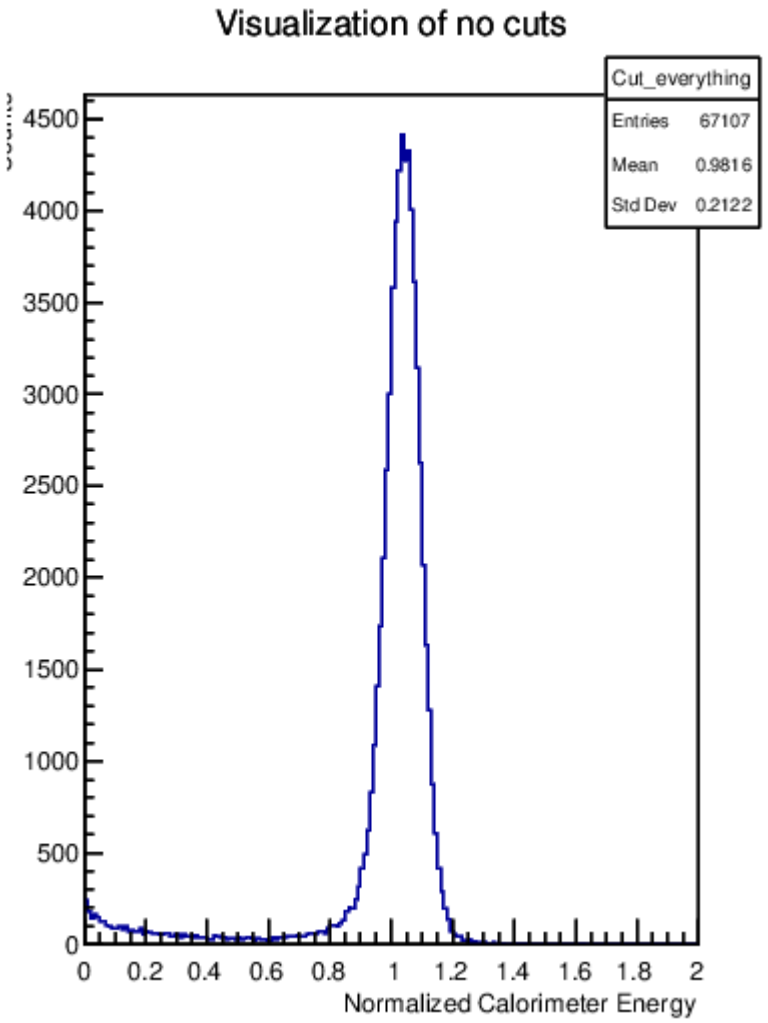
HMS Cer Calib Update

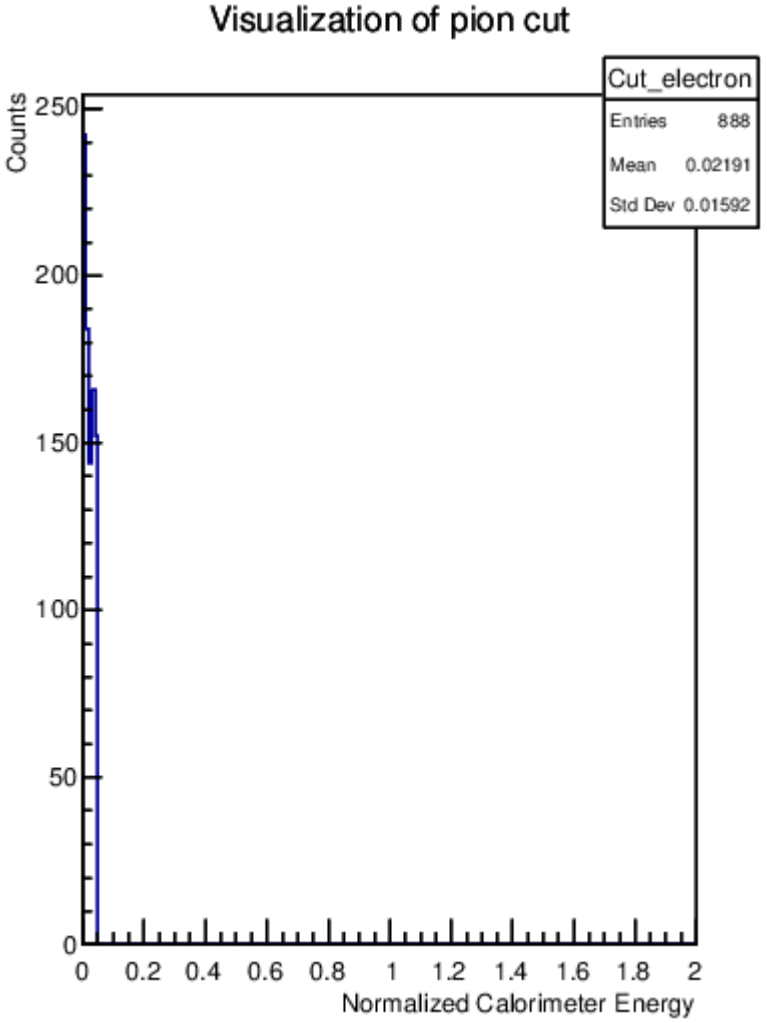
I’ve been working on calibrating the HMS cherenkov.
Noticed a weird second peak in the distribution.
Would appreciate some input.

I will show you a series of plots from the same 2 runs where all I change is the calorimeter cut.

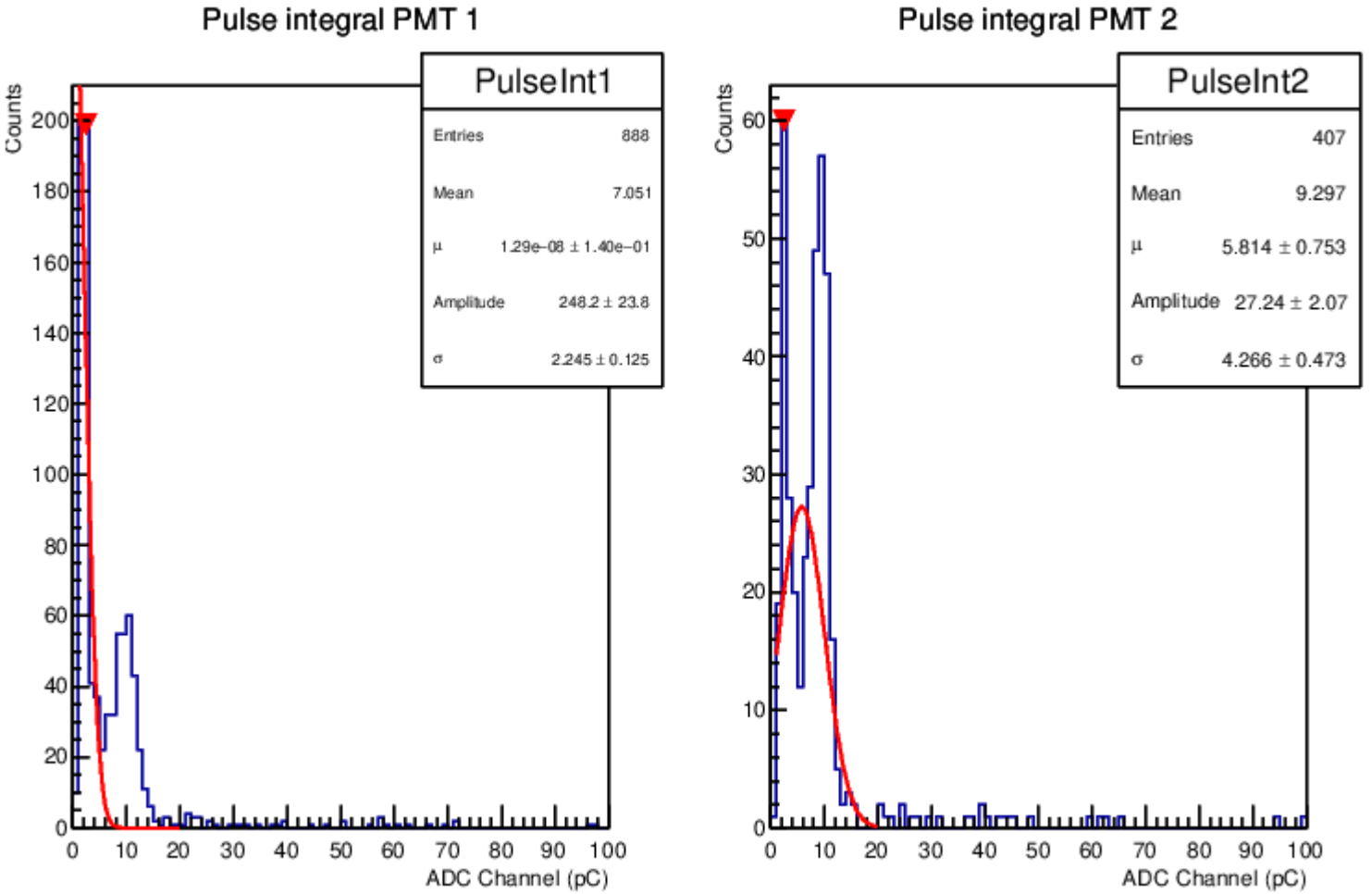
Runs 15107 (pions above threshold)
and 15213 (pions below threshold)

15213 Zero only

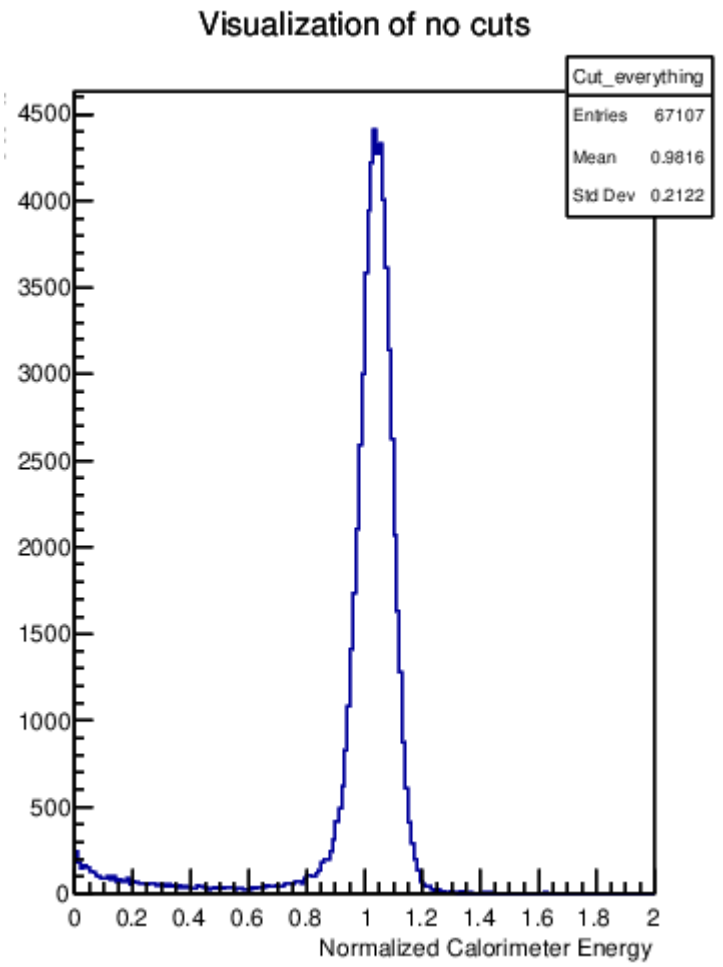


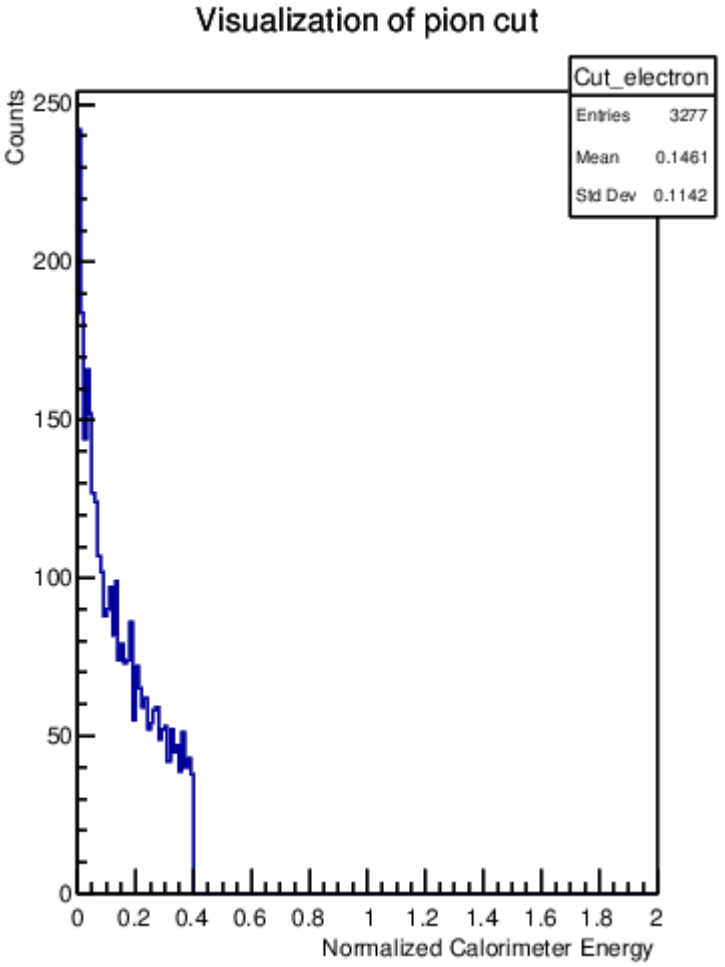


15213 Zero only

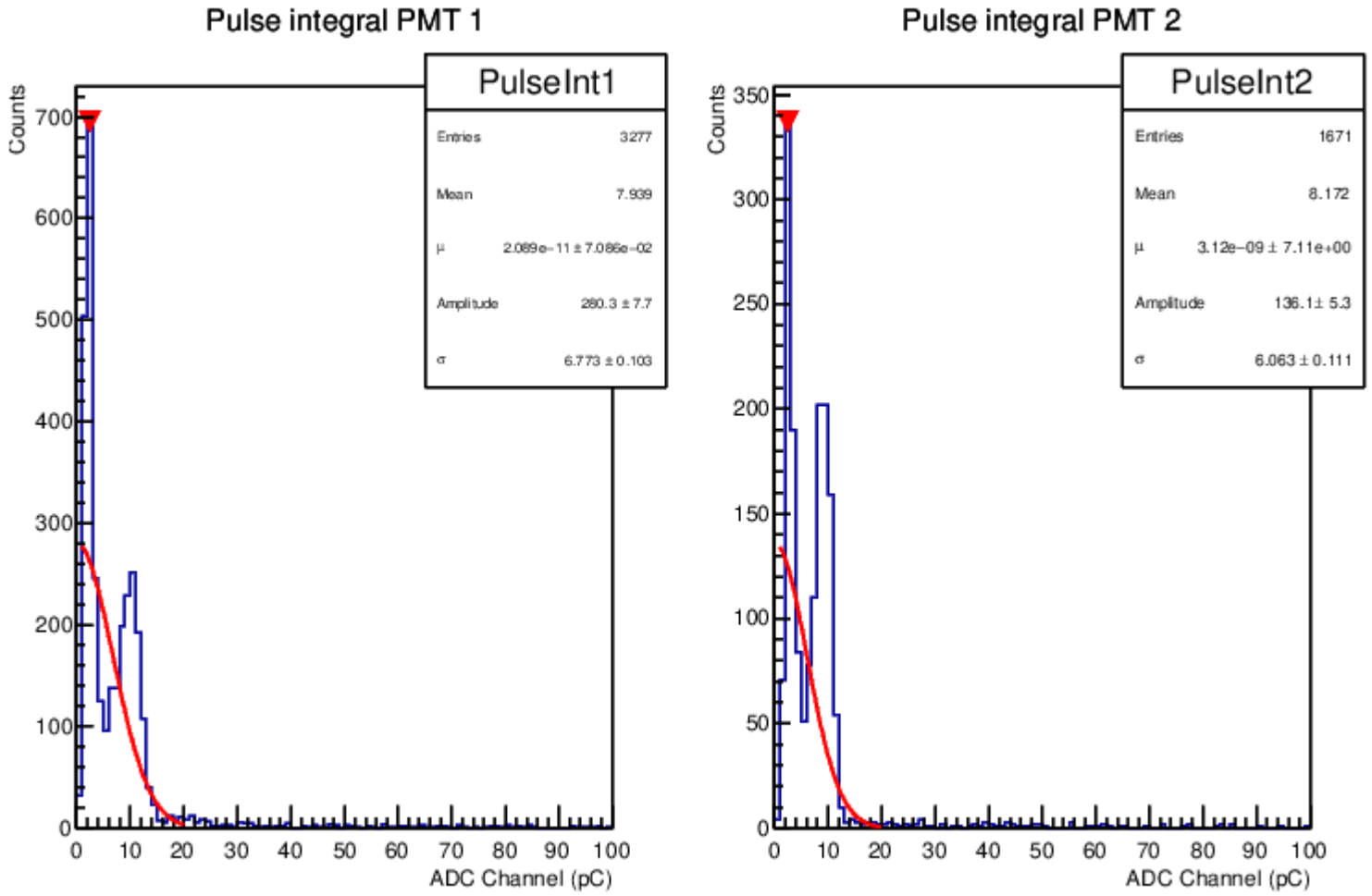


15213 Low

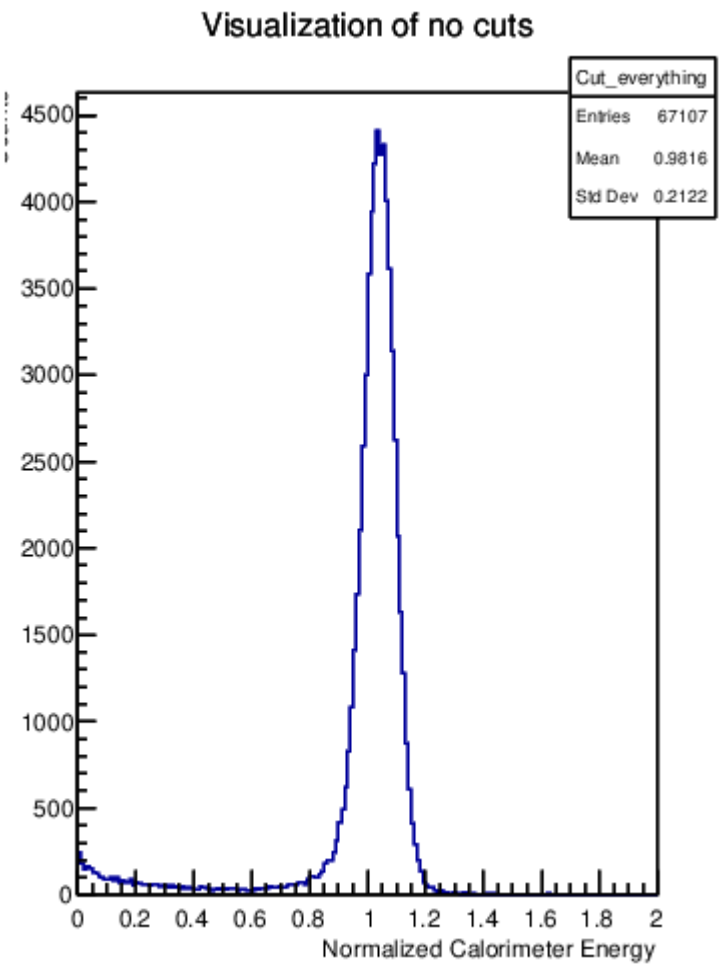

Visualization of no cuts
Cut_everything
Entries 67107
Mean 0.9816
Std Dev 0.2122
4500
4000
3500
3000
2500
2000
1500
1000
500
0
0 0.2 0.4 0.6 0.8 1 1.2 1.4 1.6 1.8 2
Normalized Calorimeter Energy

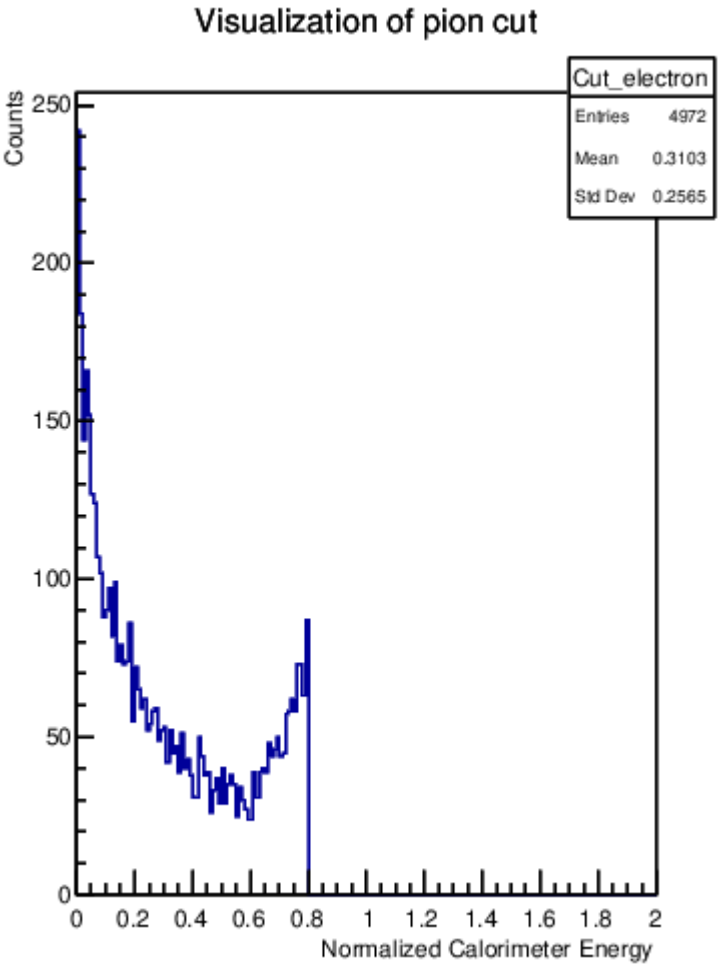

Visualization of pion cut
Cut_electron
Entries 3277
Mean 0.1461
Std Dev 0.1142
Counts
250
200
150
100
50
0
0 0.2 0.4 0.6 0.8 1 1.2 1.4 1.6 1.8 2
Normalized Calorimeter Energy

15213 Low

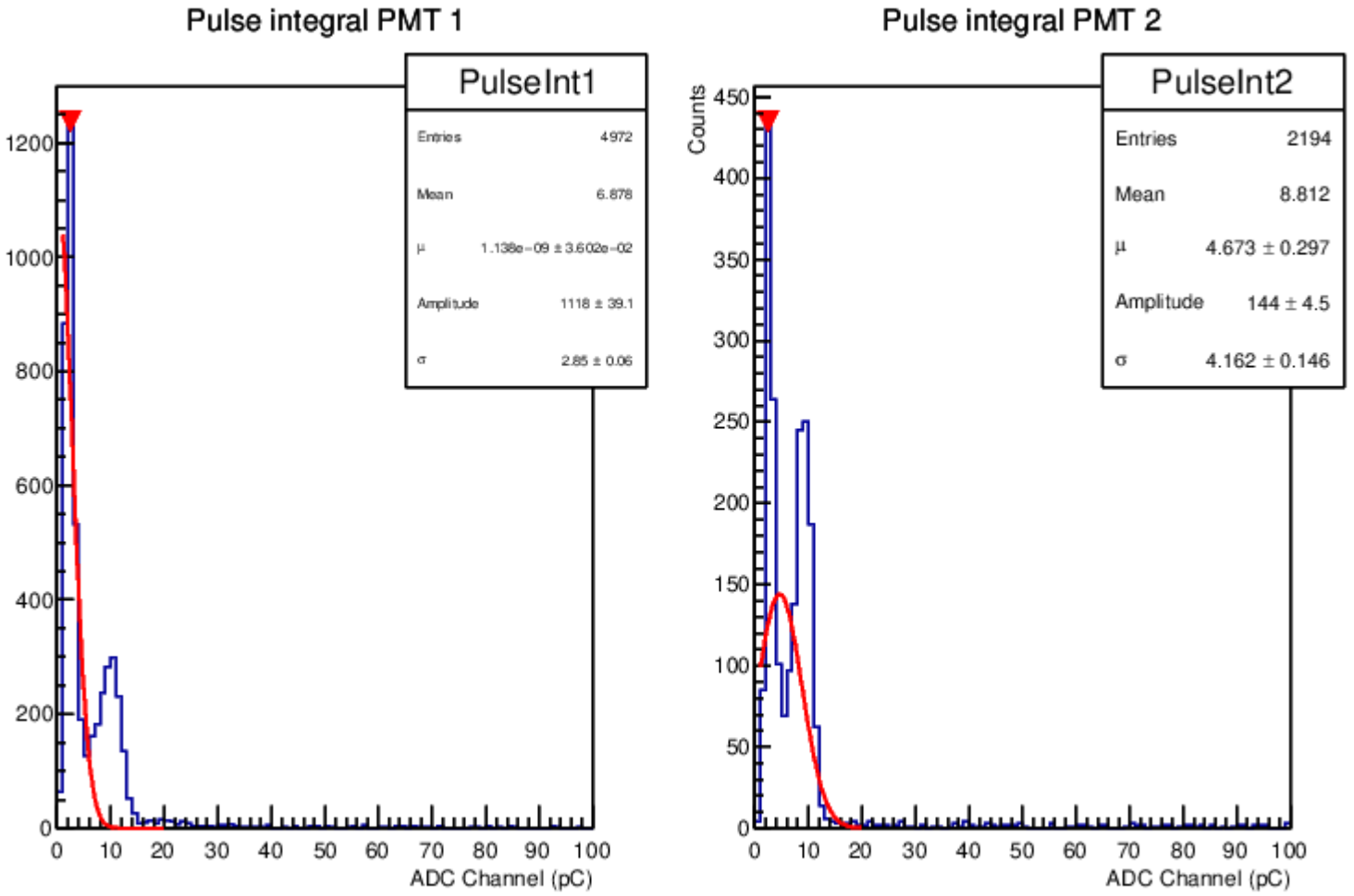

Pulse integral PMT 1
PulseInt1
Entries 3277
Mean 7.939
μ 2.089e−11 ± 7.086e−02
Amplitude 280.3 ± 7.7
σ 6.773 ± 0.103
Counts
ADC Channel (pC)
Pulse integral PMT 2
PulseInt2
Entries 1671
Mean 8.172
μ 3.12e−09 ± 7.11e+00
Amplitude 136.1 ± 5.3
σ 6.063 ± 0.111
Counts
ADC Channel (pC)

15213 Not Electrons

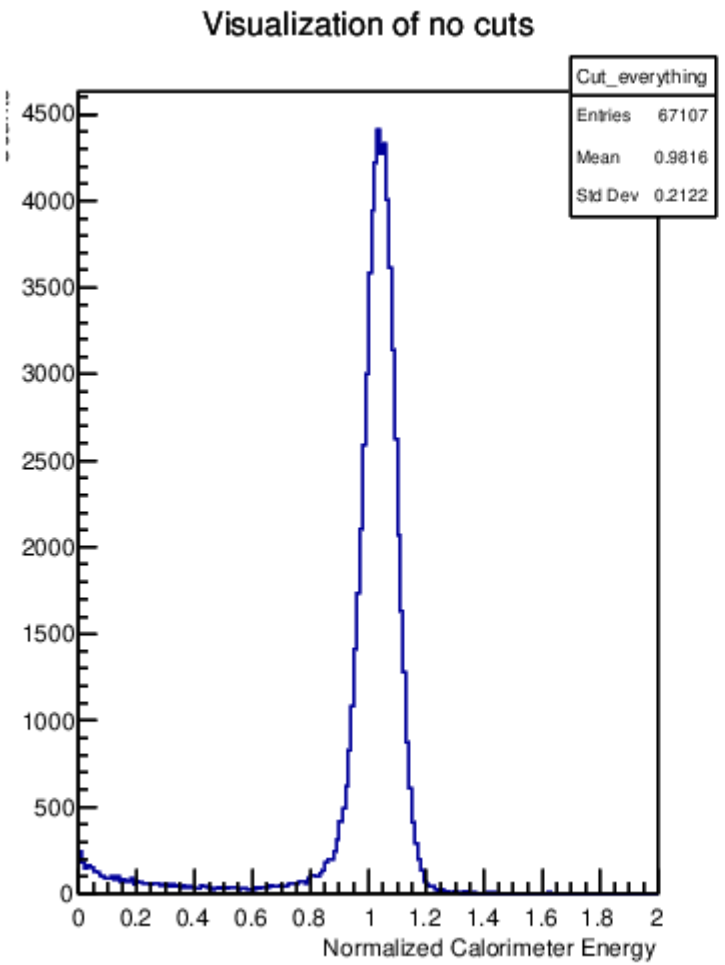


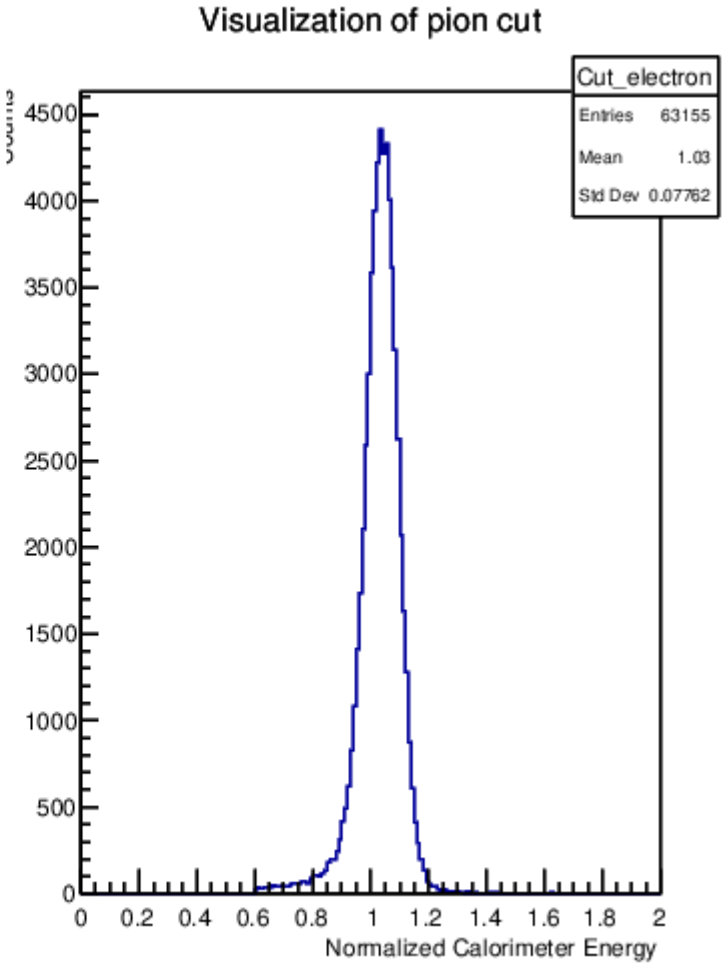


15213 Not Electrons

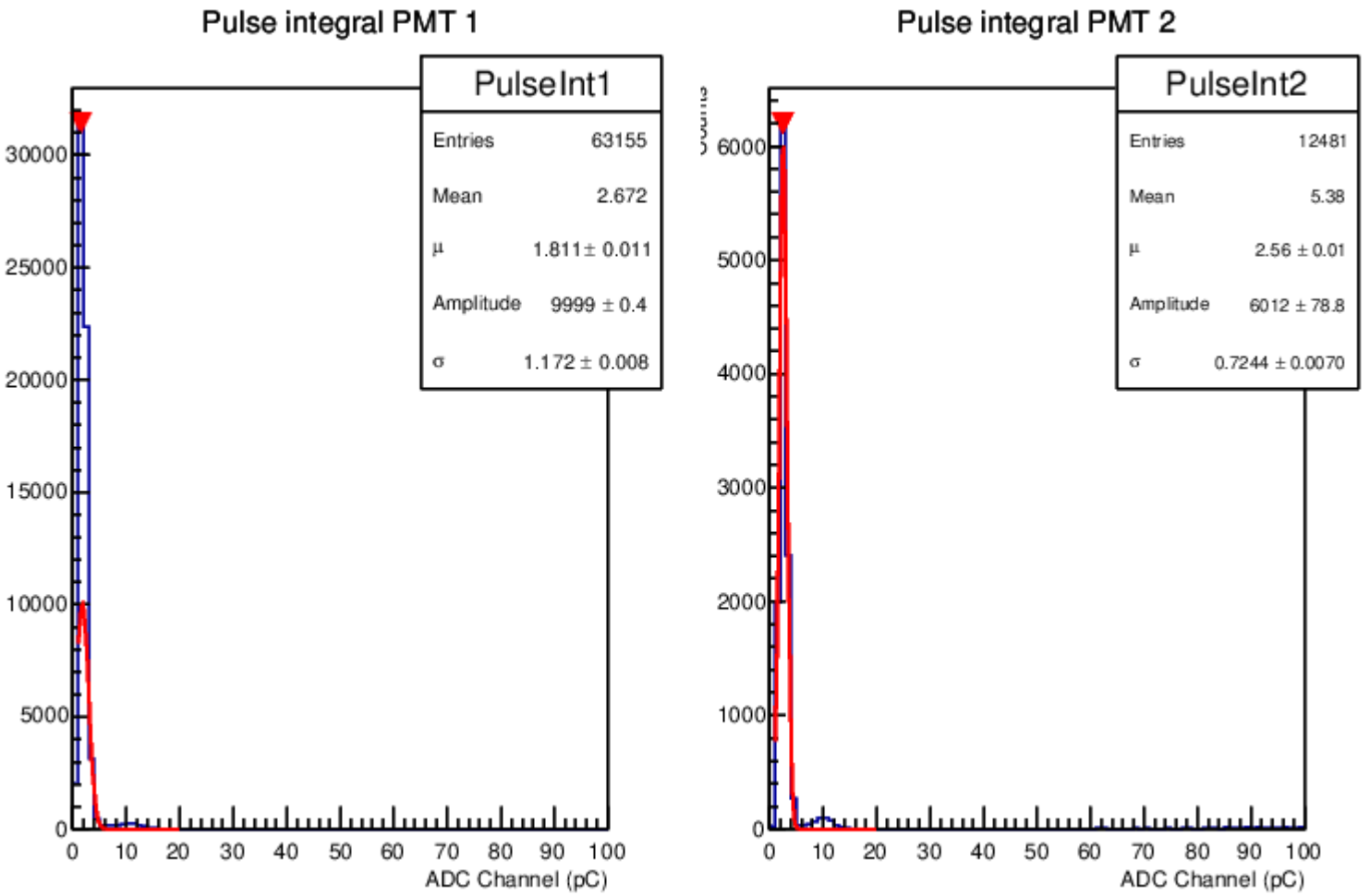


15213 electrons

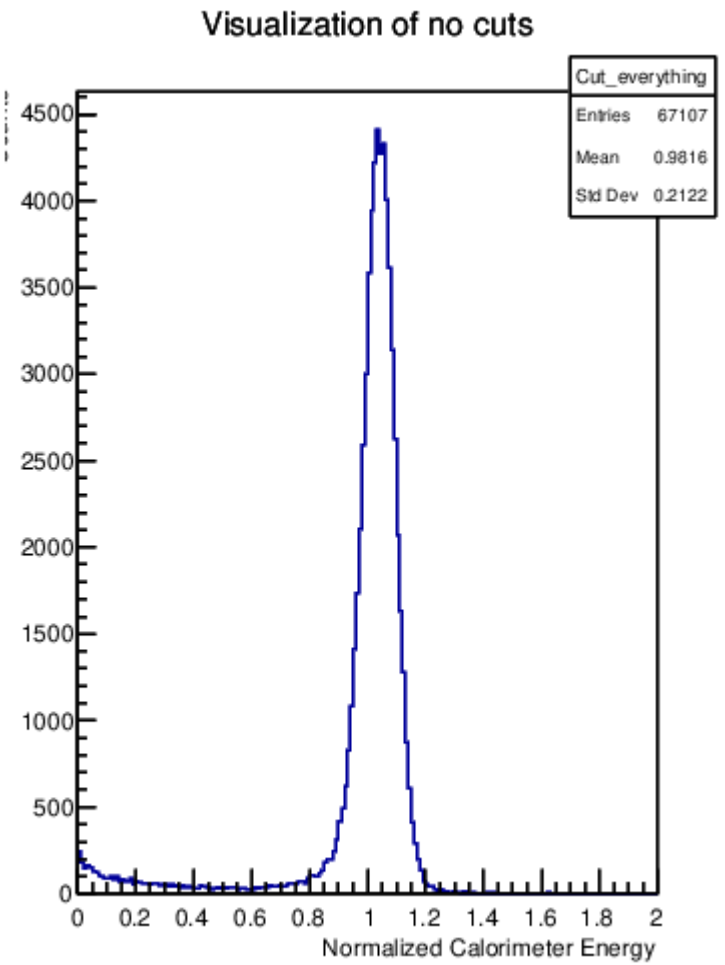


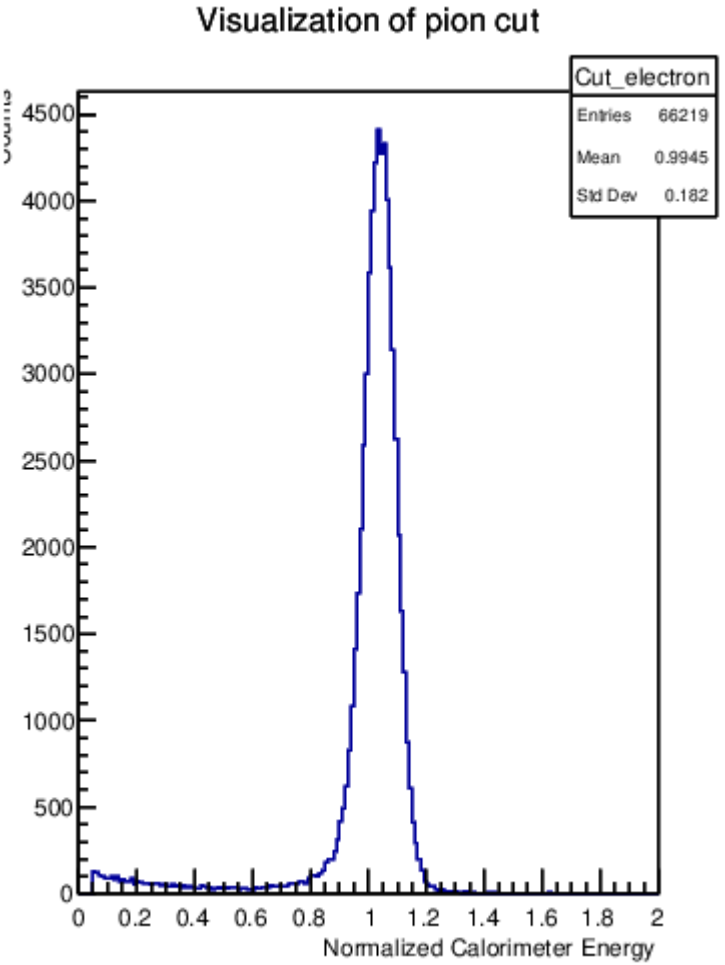


15213 electrons

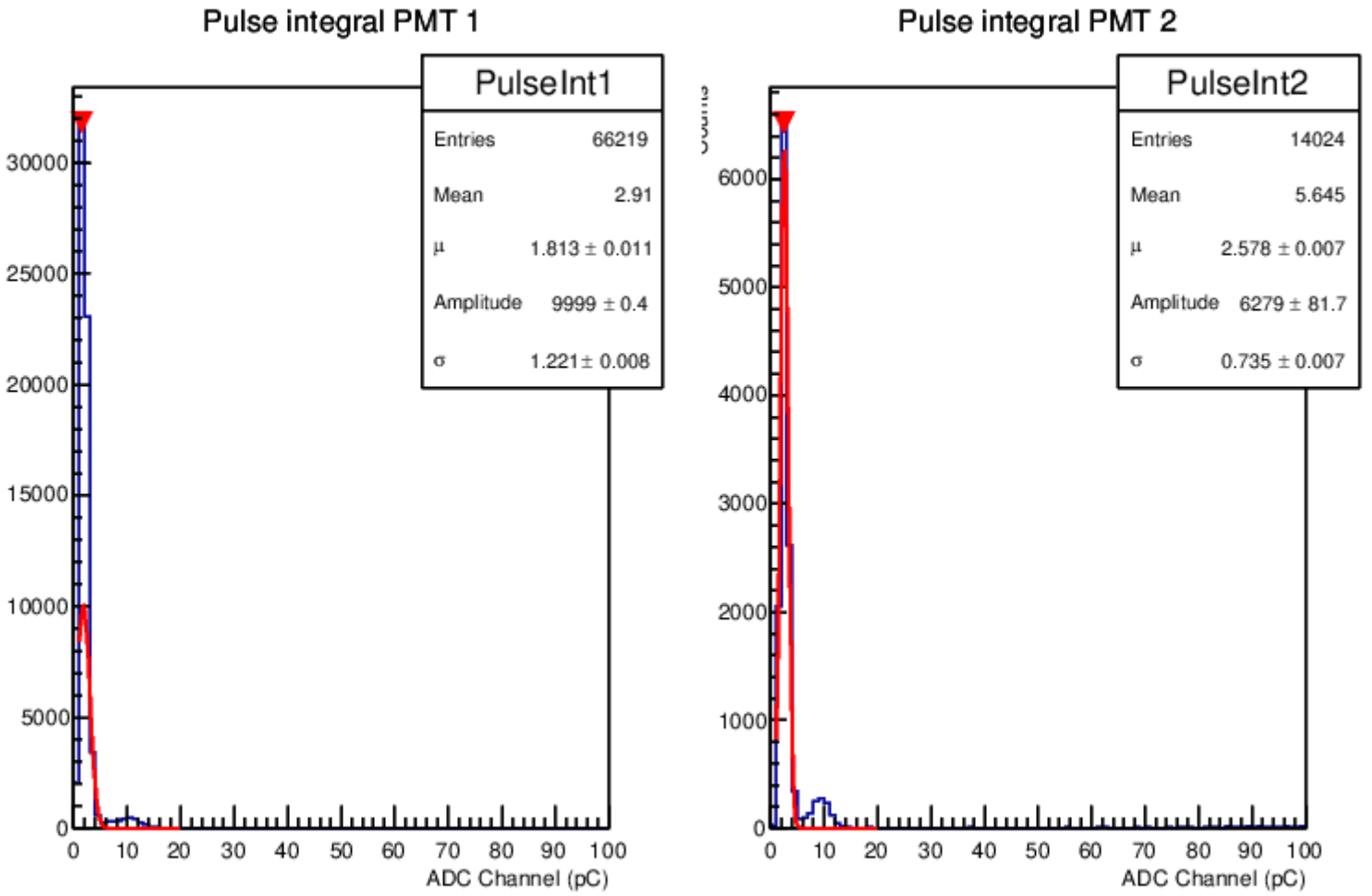


15213 no Zeros





15213 no Zeros



15213 Conclusion

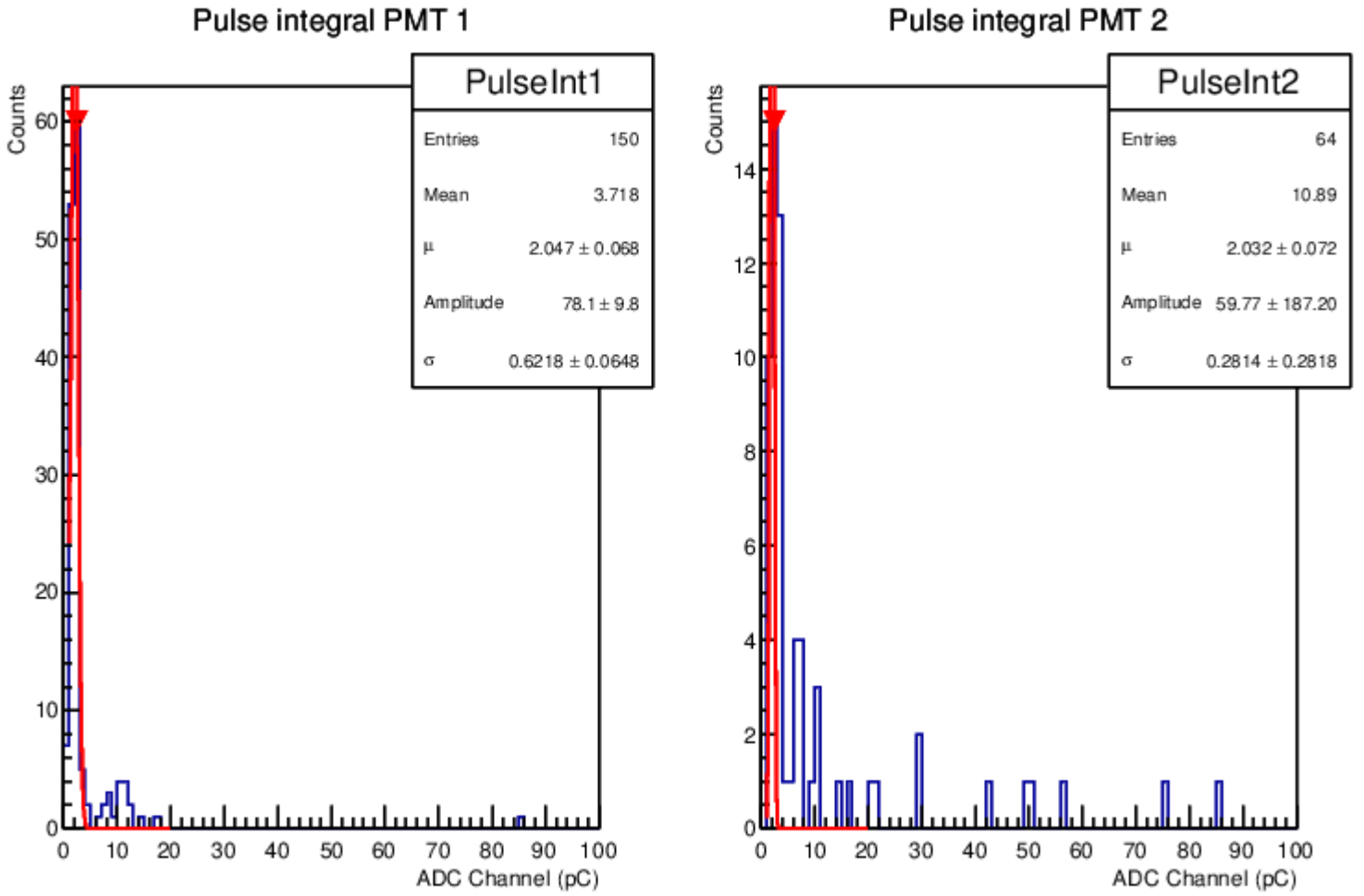
From this I concluded that the electrons are in the left peak and pions in the right one.

This does not make sense, from a detector response point of veiw though.

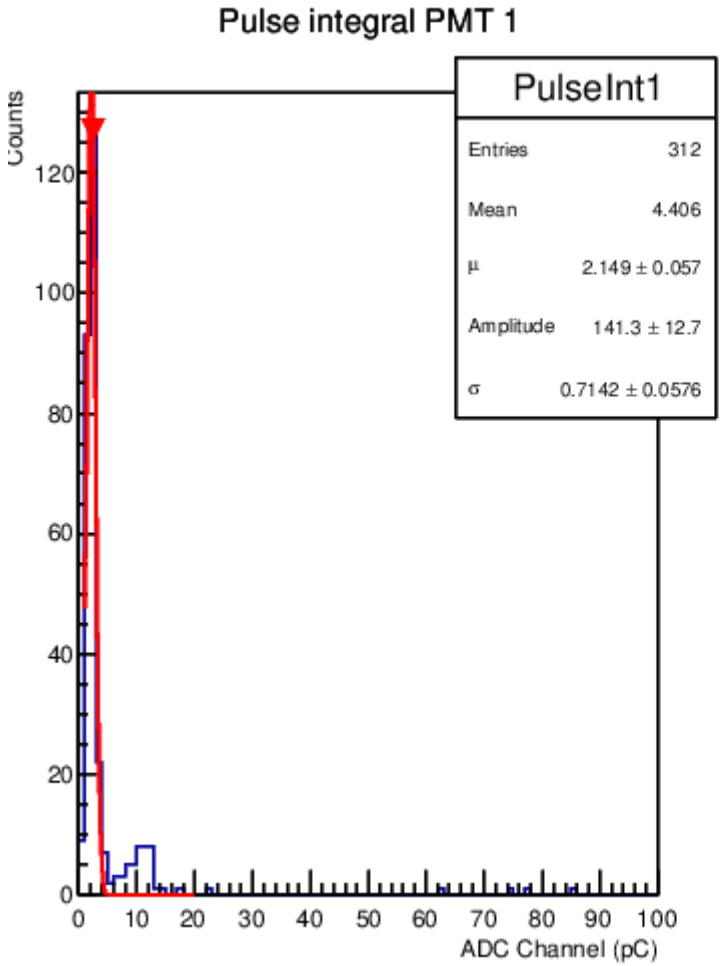
I then checked a run with pions above threshold.

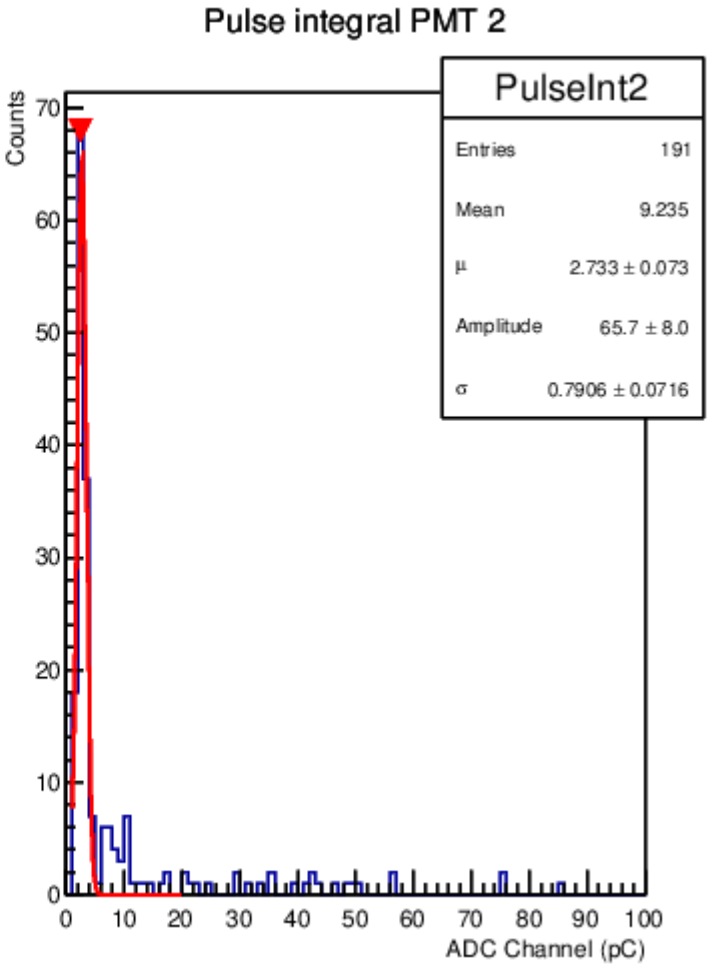
15107 Zeros

- Note that the cal cuts are the same as previously labeled

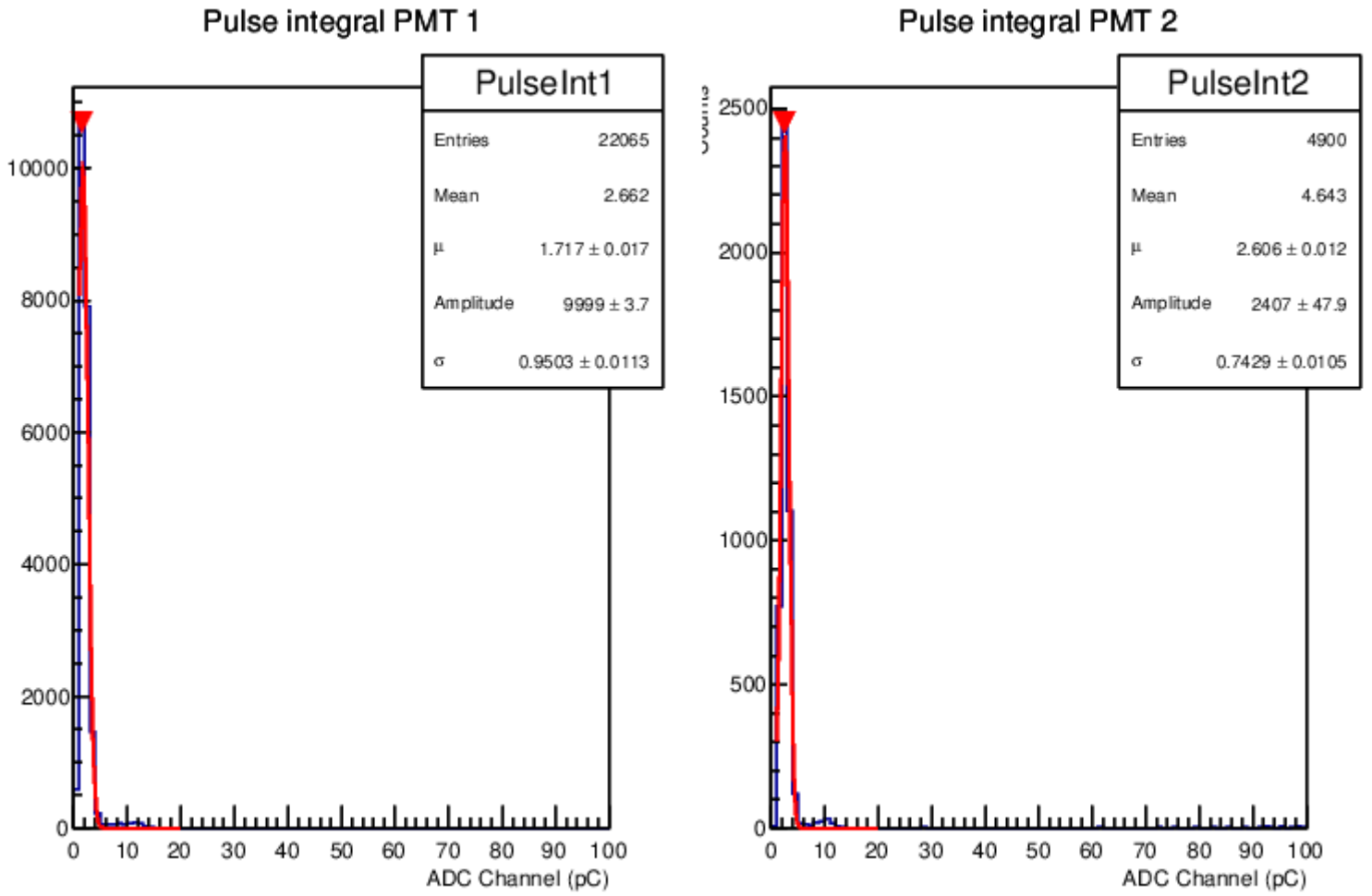


15107 Low

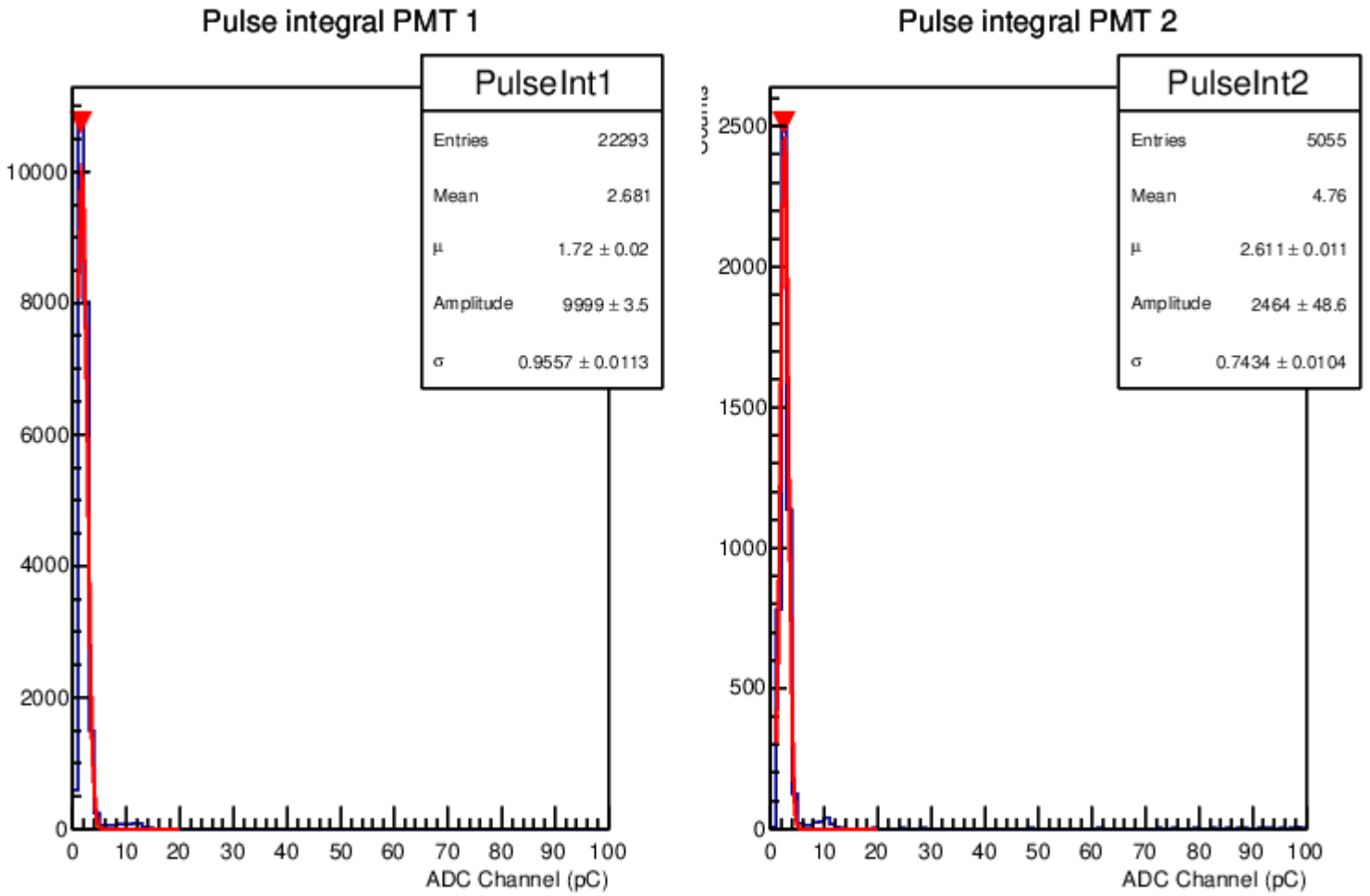

Pulse integral PMT 1
PulseInt1
Entries 312
Mean 4.406
μ 2.149 ± 0.057
Amplitude 141.3 ± 12.7
σ 0.7142 ± 0.0576
Counts
ADC Channel (pC)


Pulse integral PMT 2
PulseInt2
Entries 191
Mean 9.235
μ 2.733 ± 0.073
Amplitude 65.7 ± 8.0
σ 0.7906 ± 0.0716
Counts
ADC Channel (pC)

15107 electron



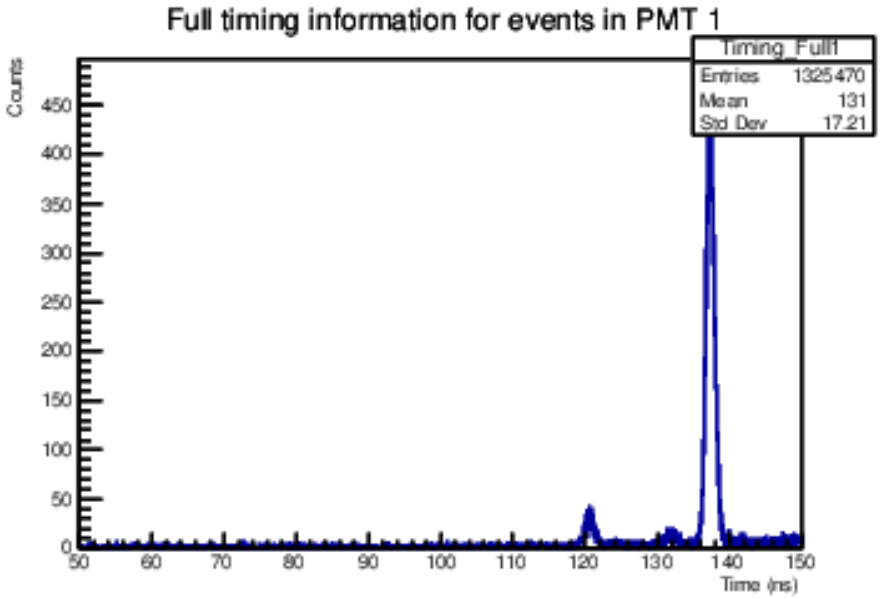
15107 No Zero

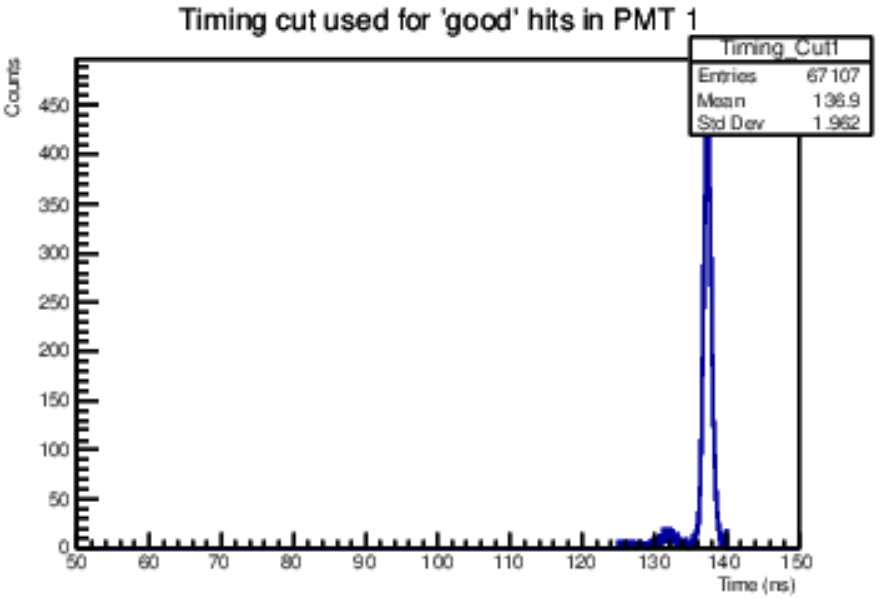


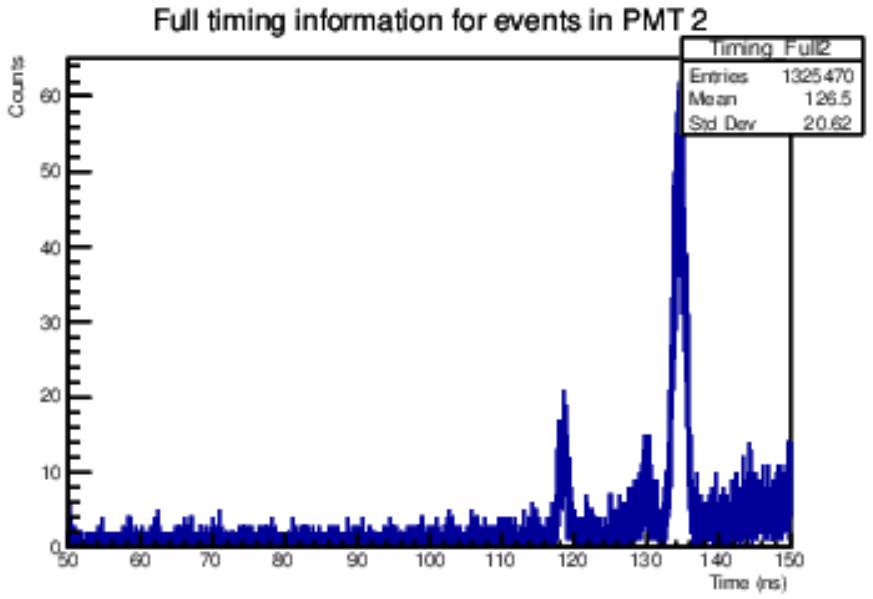
15107 Conclusions

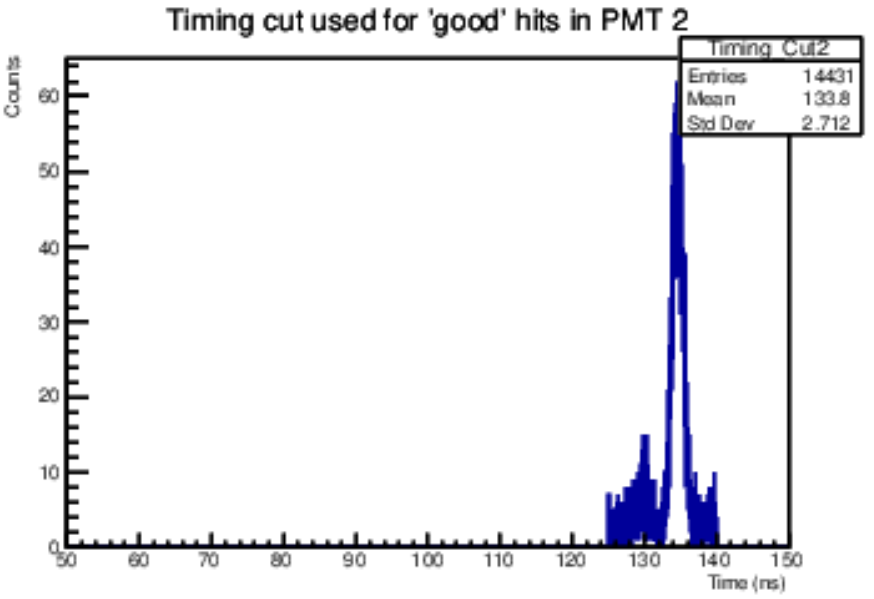
- The peak on the left does indeed correspond to particles producing good cherenkov light.
- The right peak is still sorta there, not sure why.
- I am running a set of calibrations selecting the left peak on several different settings.
- Garth suggested looking into the timing cuts

15213 Timing

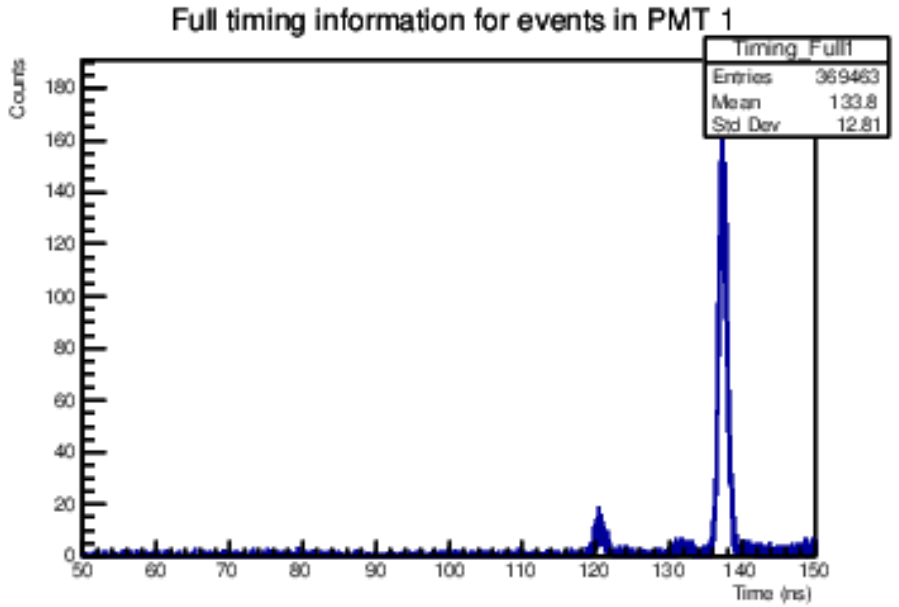


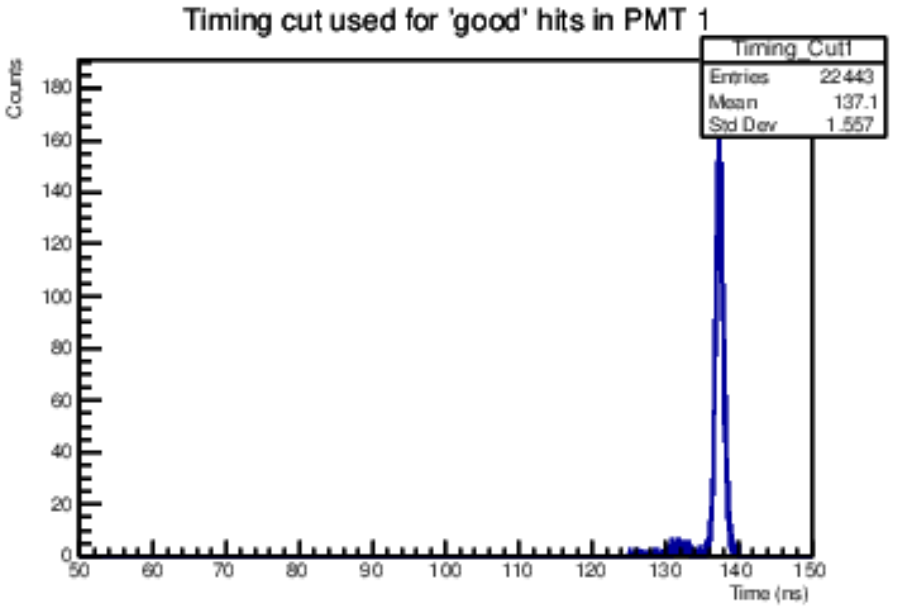


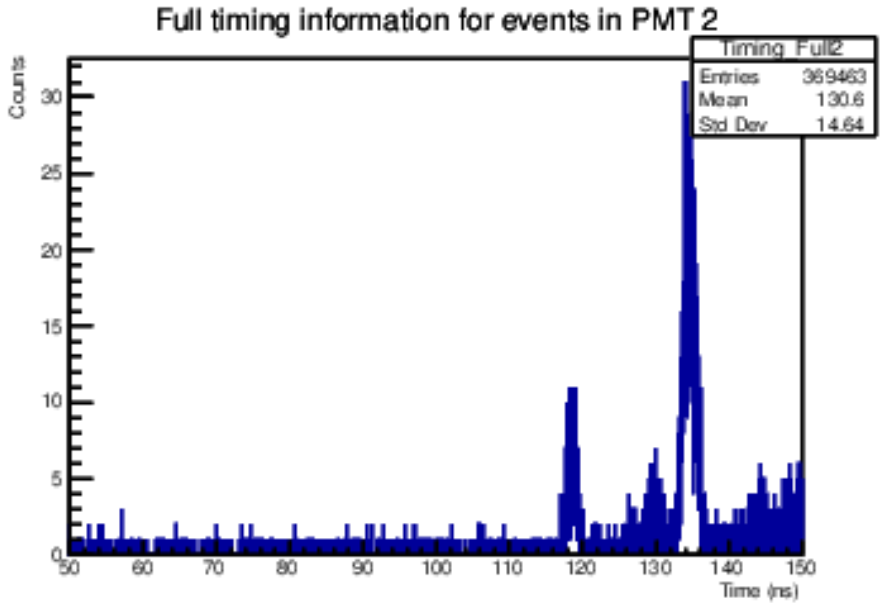


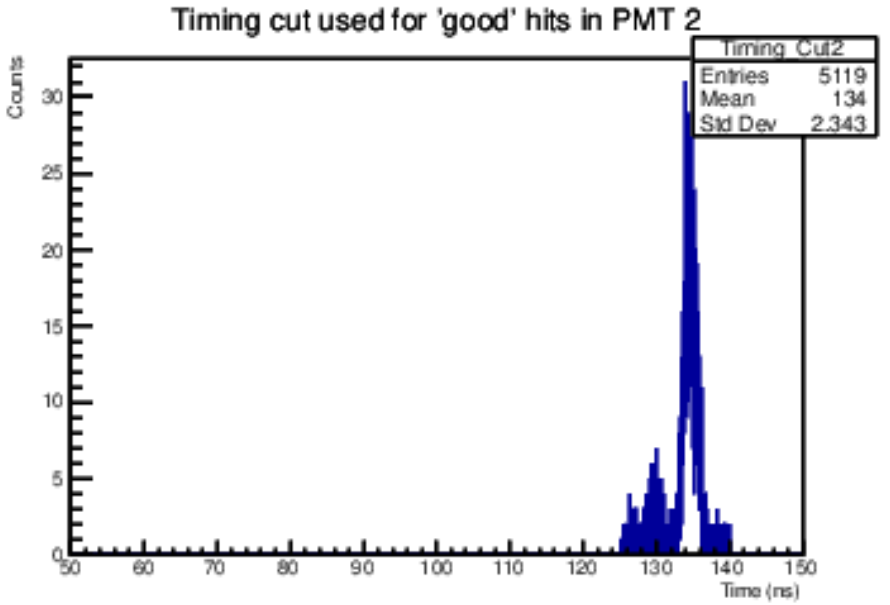


15107 Timing



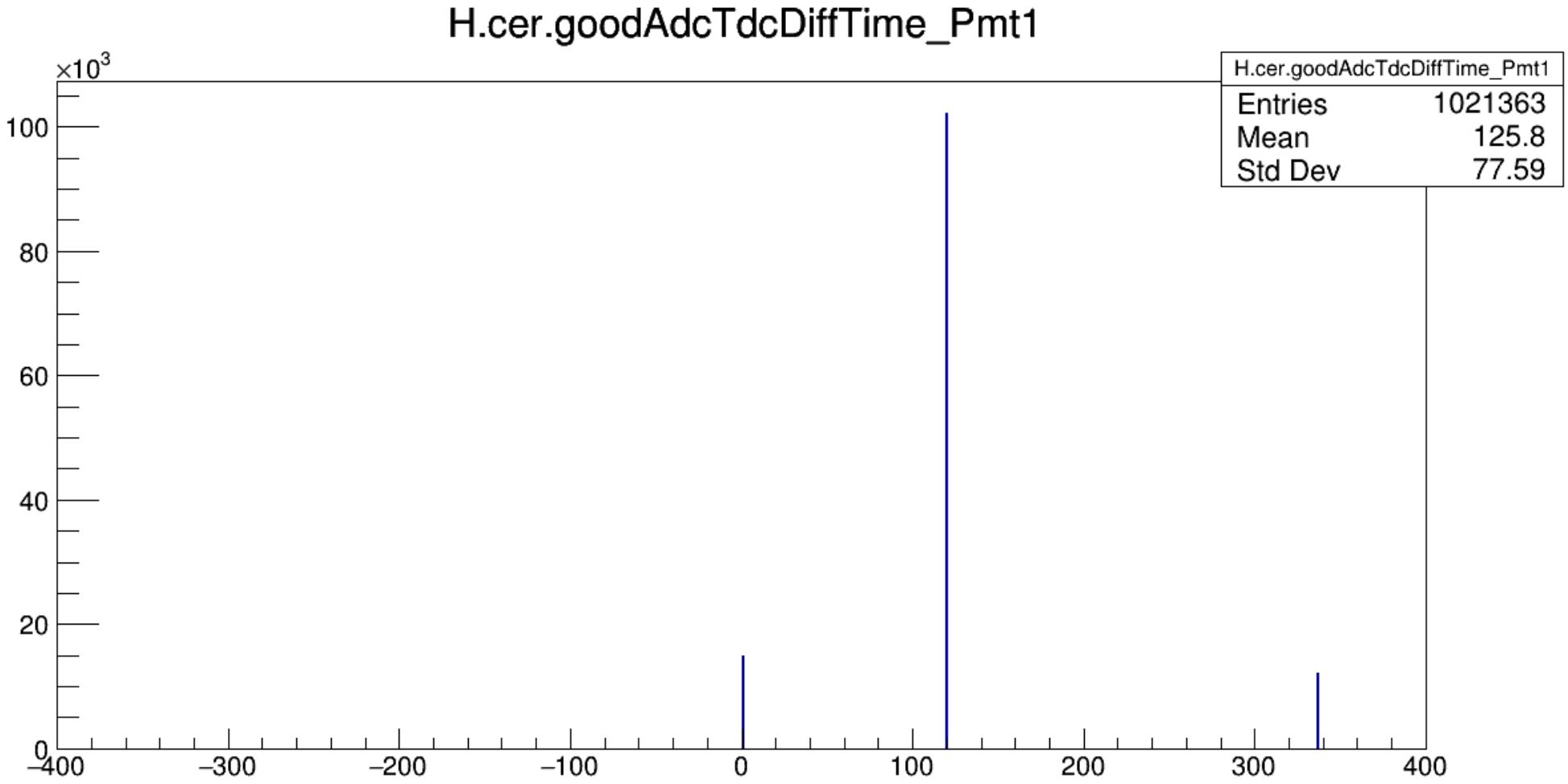






HMS Detector Time cuts

Presently I am selecting -1000 to 1000.
This distribution does not look right to me though



Det time pmt 2