Digitization Thresholds in Gleam

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Beamtest VRVS Meeting

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The Problem

In the course of looking at the multiple scattering in Geant, Tracy started looking at digitization, and discovered that the code wasn't doing what I said it was. In fact, the threshold for keeping a strip in the "simple" digitization was a fixed number, and not only that, higher than the correct average value.

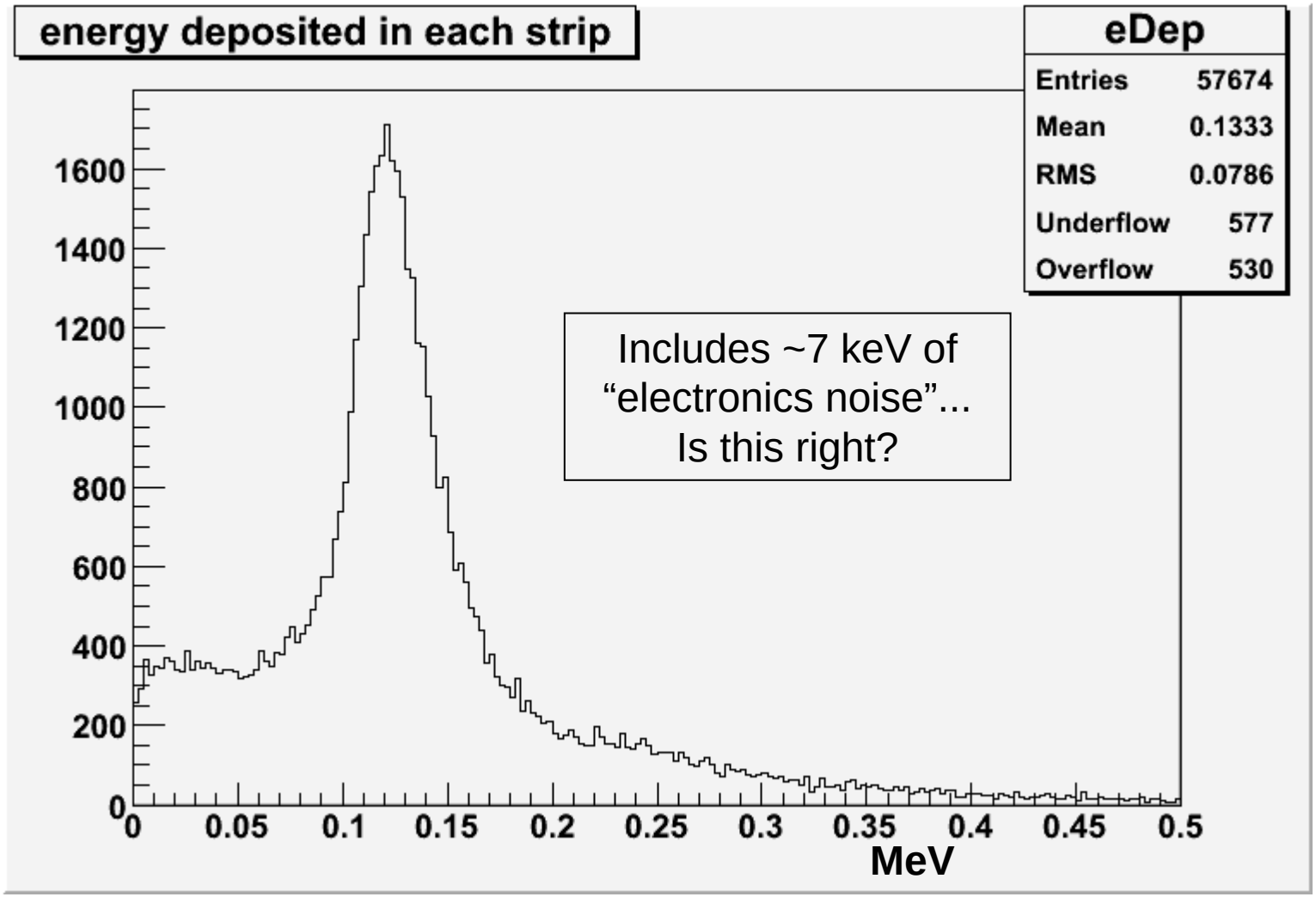
The deposited energy is tested against 0.03875 MeV, which corresponds to 34% of the minI MPV. The correct value should be about 0.0265 MeV, or about 24%.

Is this the reason for the discrepancy in the number of hits between Data and MC?

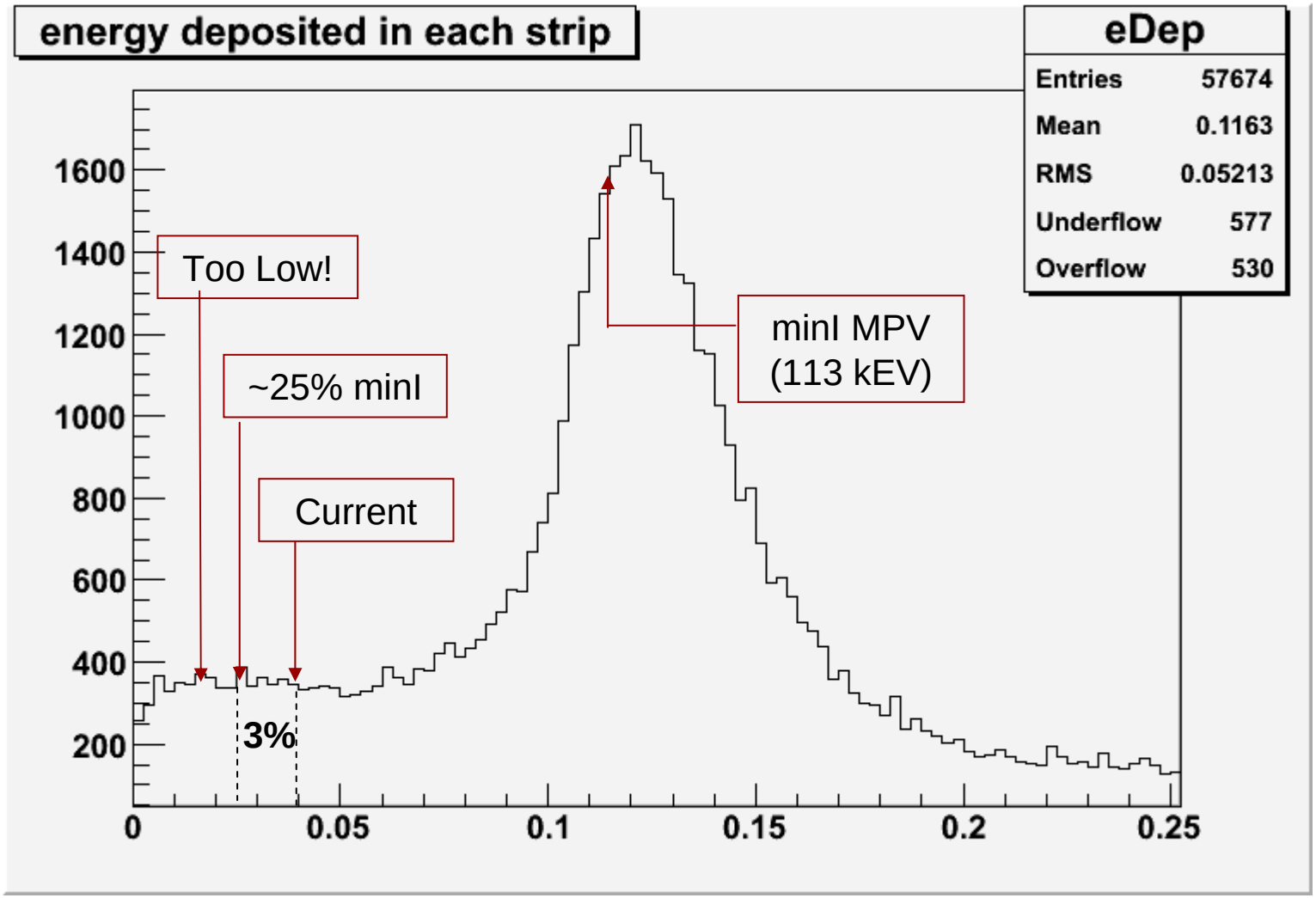
Shouldn’t we be using the calibrated threshold?

- The threshold test is on the energy, not the ToT.
- The ToT threshold should correspond to roughly the same energy in each strip, even though the response of each front end is different.
- Yes, we probably should, but it won’t make very much difference.
- For the test that follows, a fixed value of the threshold will be used.

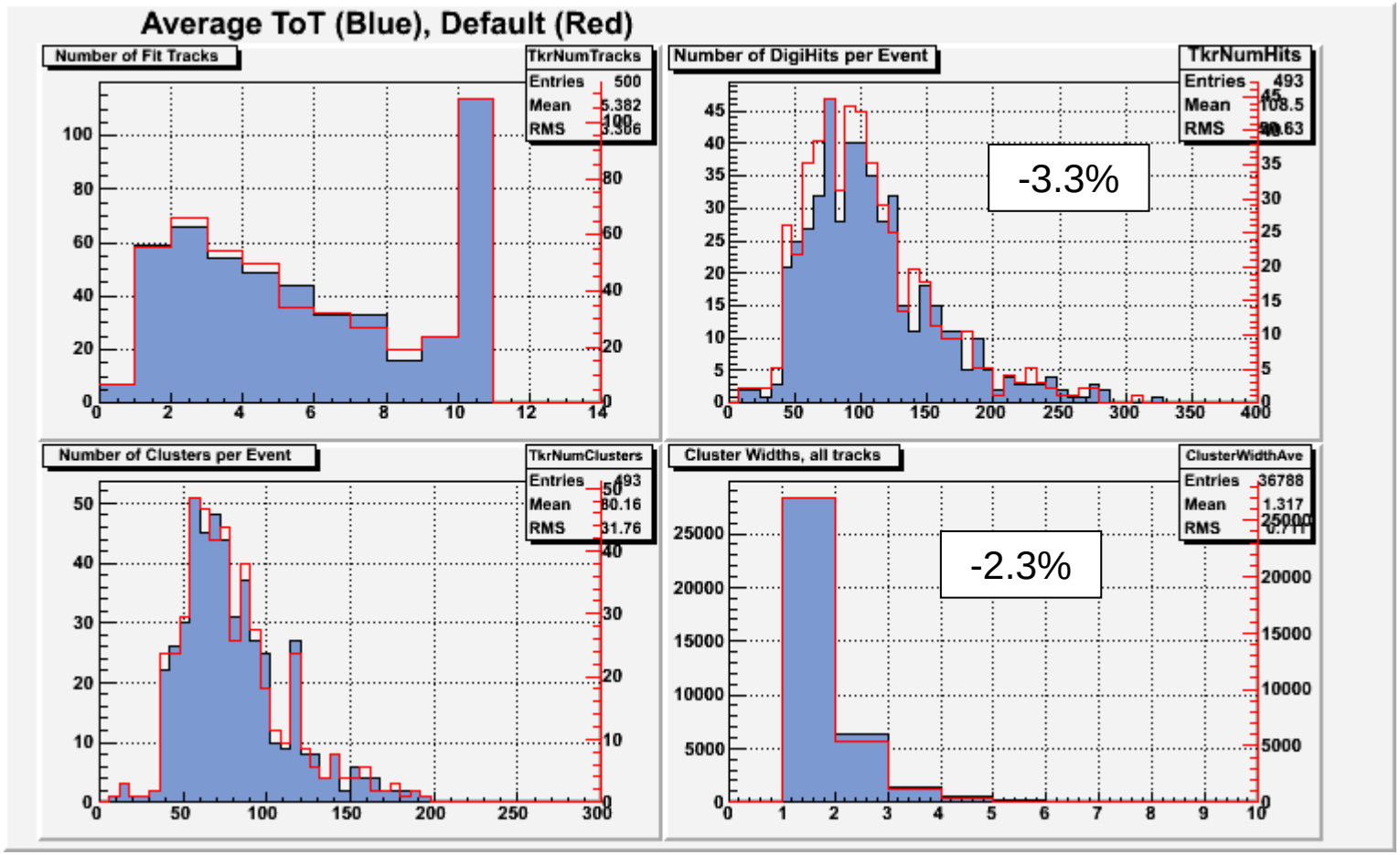
Energy Deposit, 2-GeV Normally-incident Electrons (LAT Geometry)



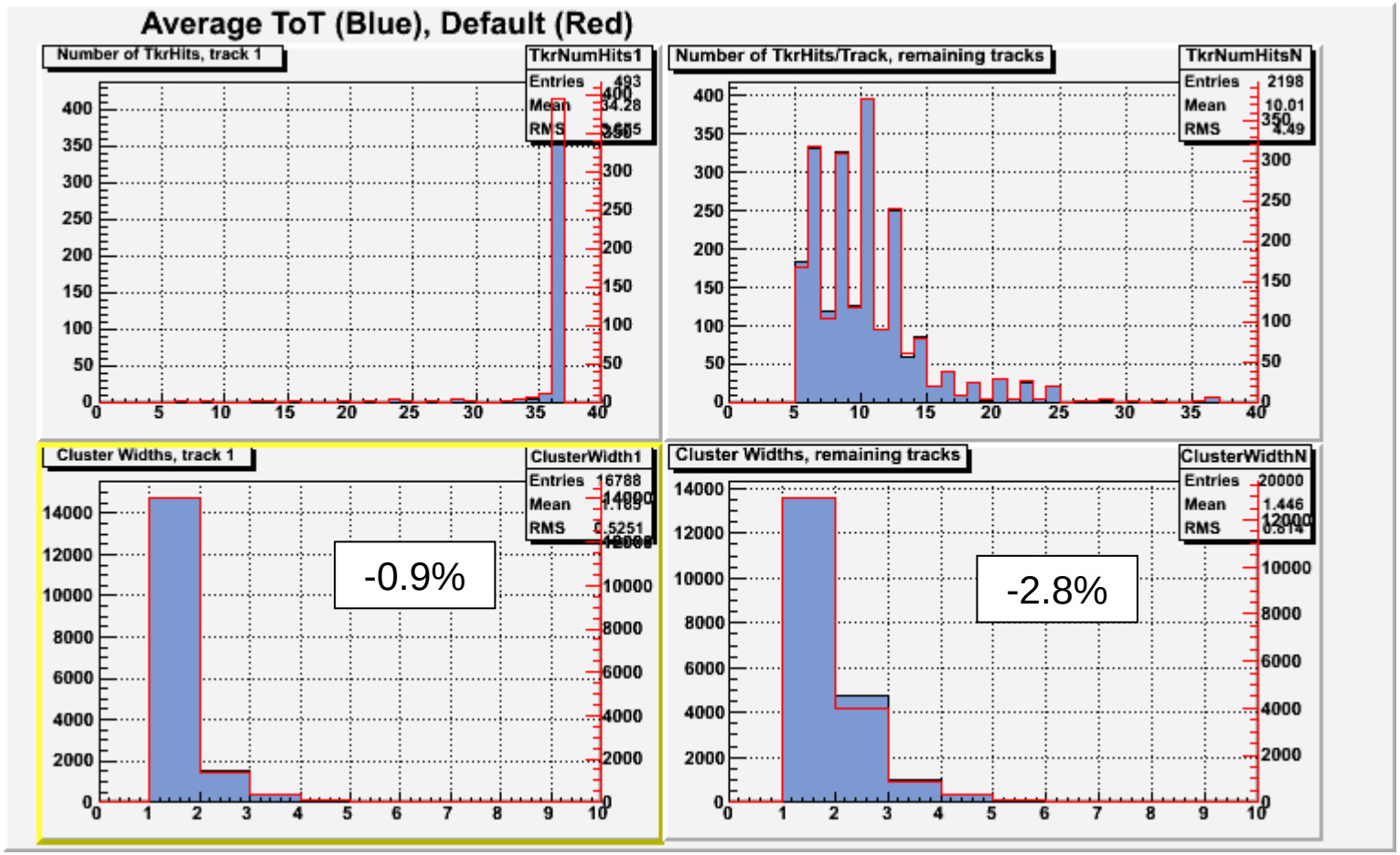
Same Energy Deposit, Showing some Thresholds



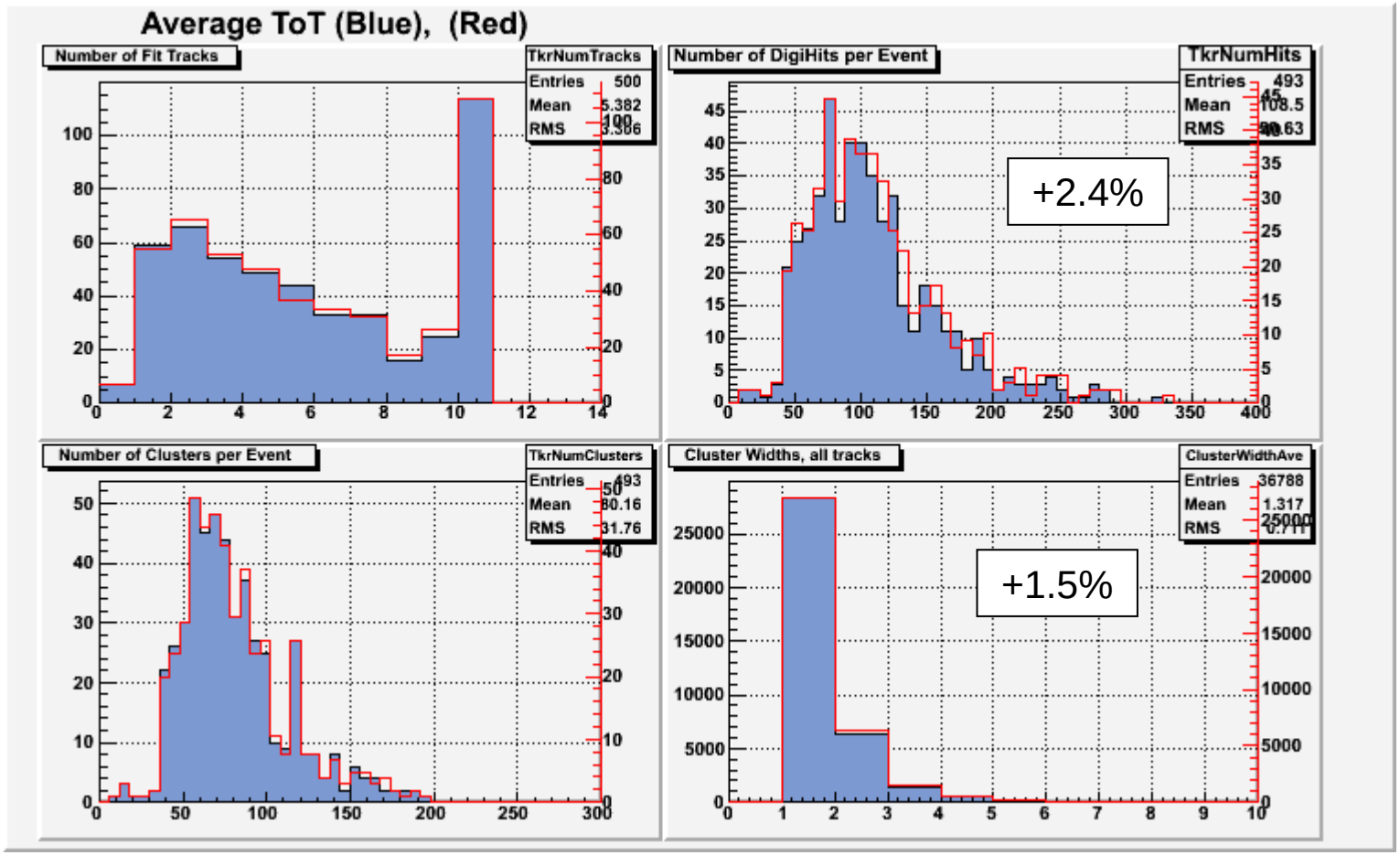
Current vs “Correct”



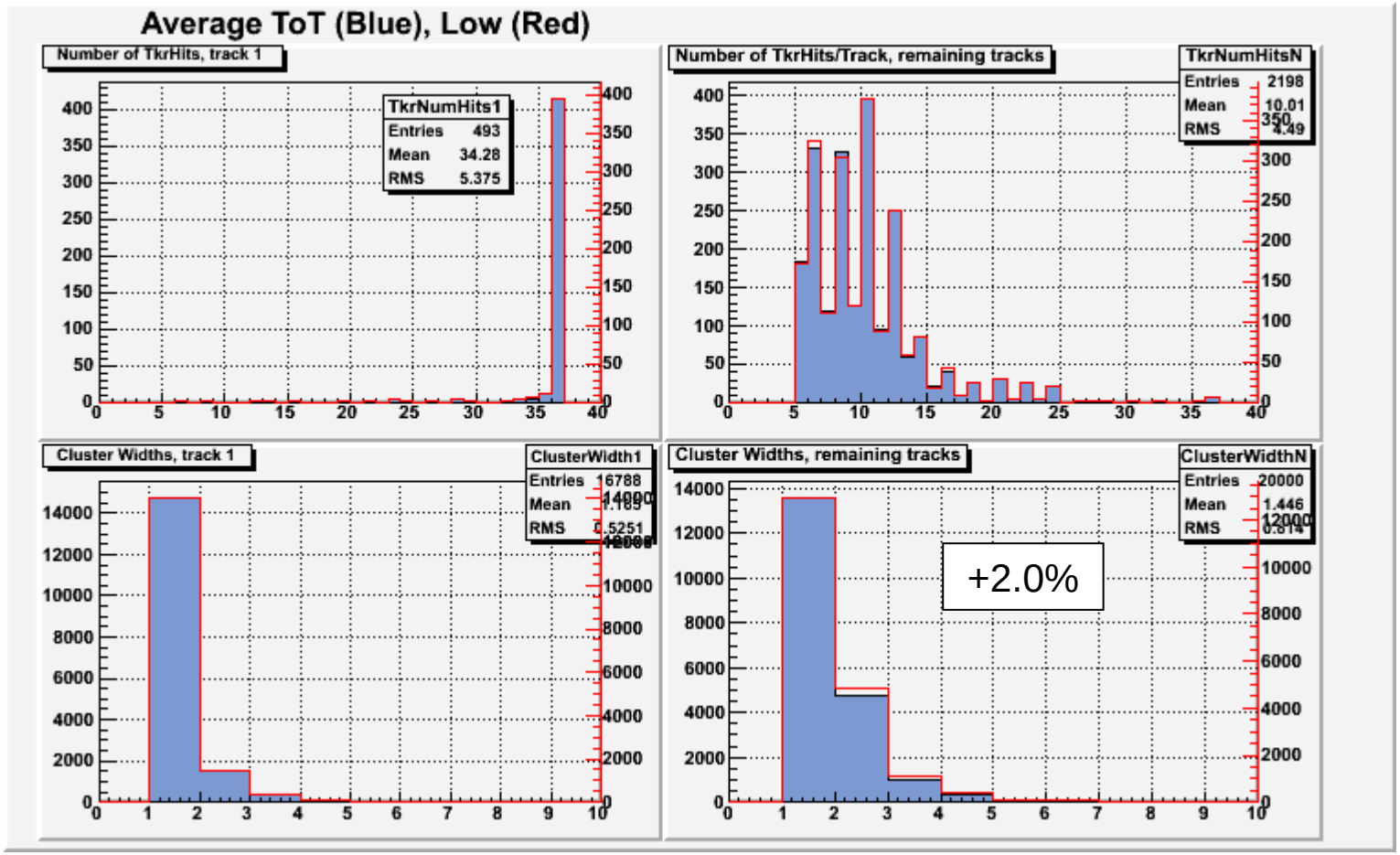
Current vs “Correct”



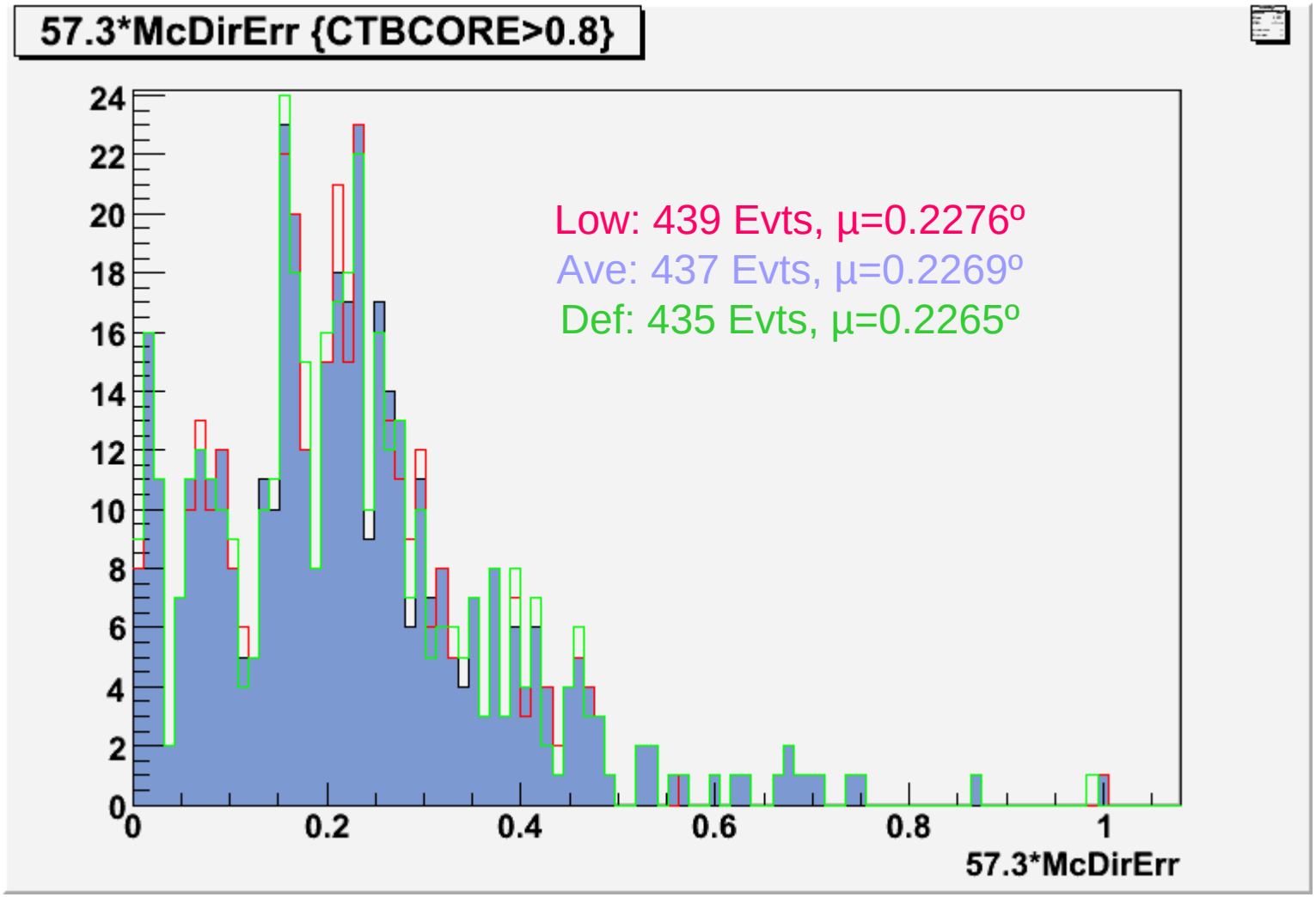
Low vs “Correct”



Low vs “Correct”



“PSF”


57.3*McDirErr {CTBCORE>0.8}
Low: 439 Evts, μ=0.2276º
Ave: 437 Evts, μ=0.2269º
Def: 435 Evts, μ=0.2265º
0
2
4
6
8
10
12
14
16
18
20
22
24
0
0.2
0.4
0.6
0.8
1
57.3*McDirErr

Conclusion

- Fixing the digi threshold doesn’t appear to be the solution to the “extra-hits” problem.
- The “electronic noise” contribution needs to be checked, but it doesn’t look like it will help, since the distribution is flat in the vicinity of the threshold.
- Diffusion, cross-talk should be looked at, but are probably not going to change the answer either.