Fitting Low Energy Gammas

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Milagro Collaboration Meeting
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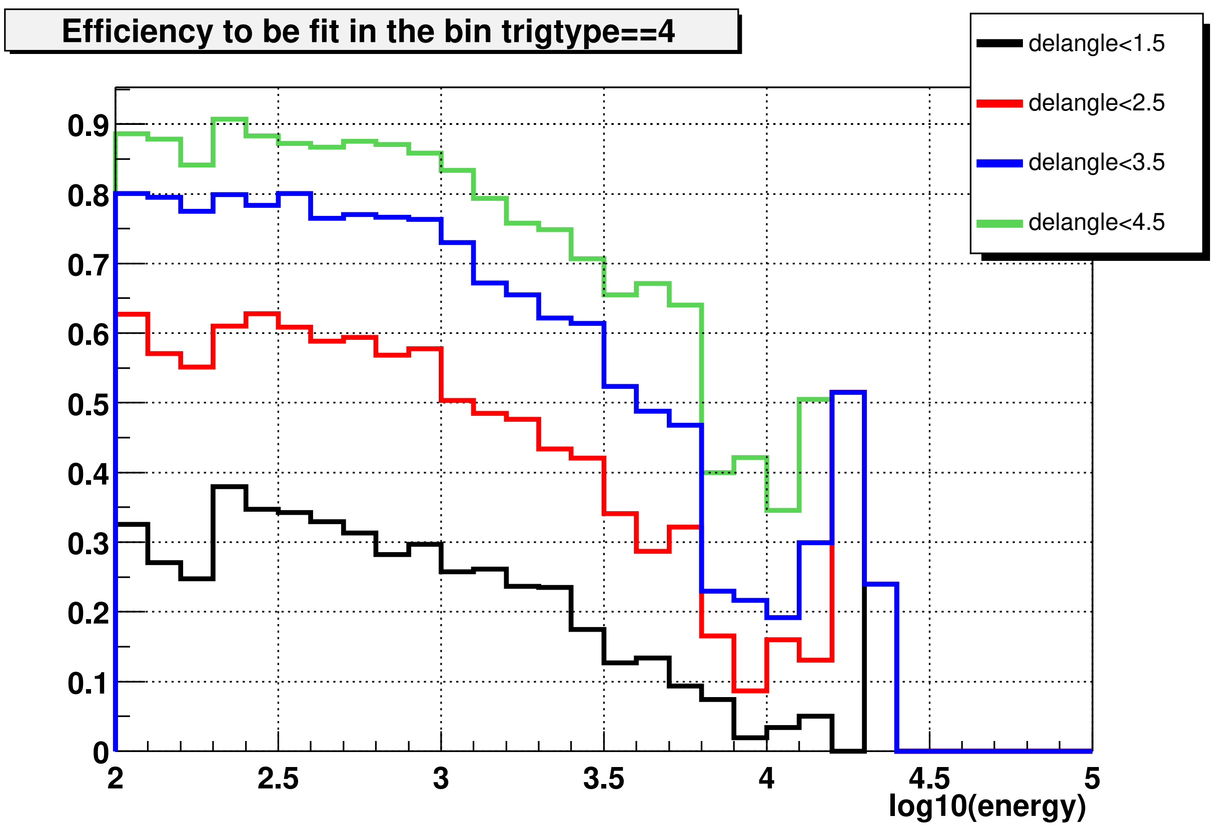
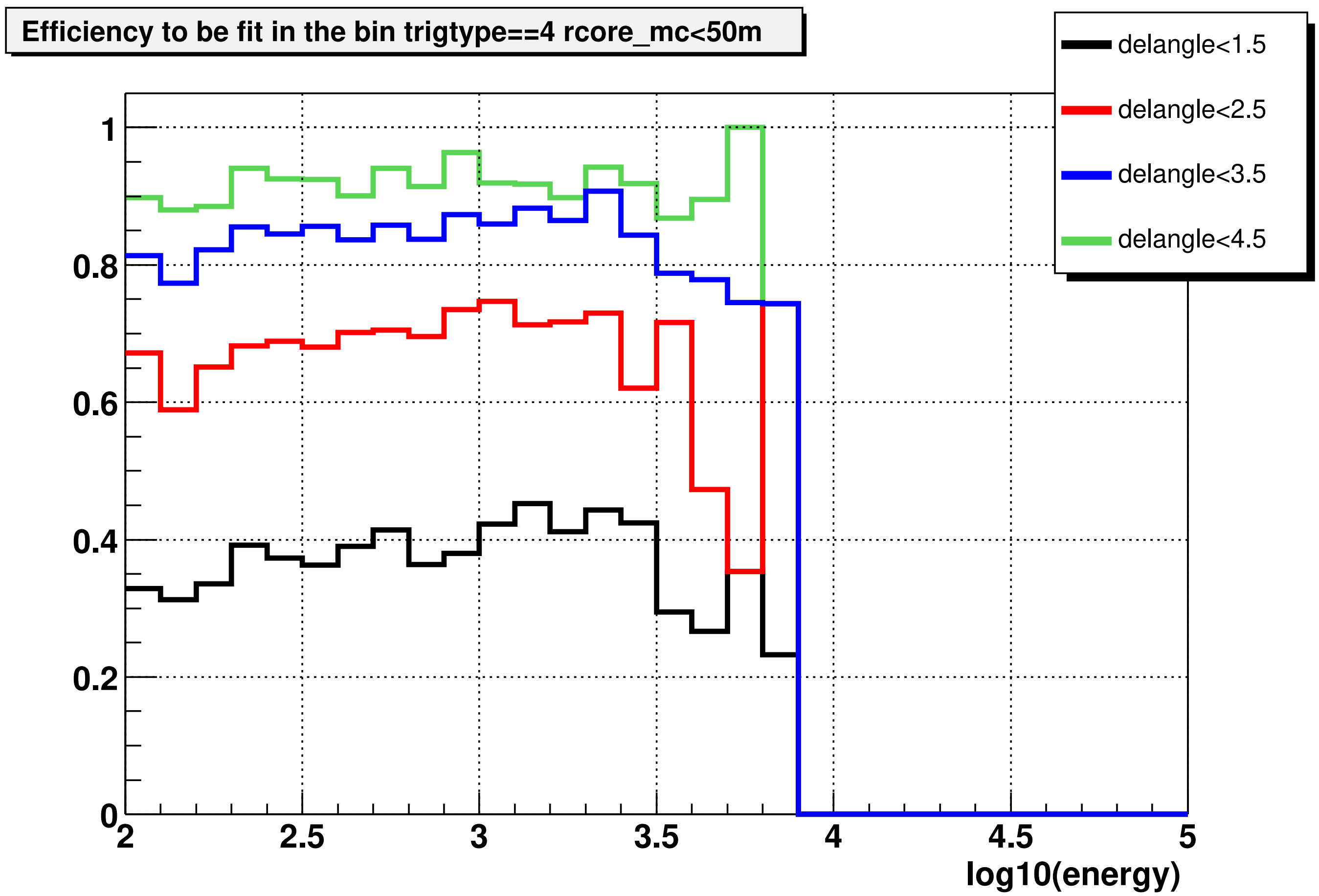
The Problem

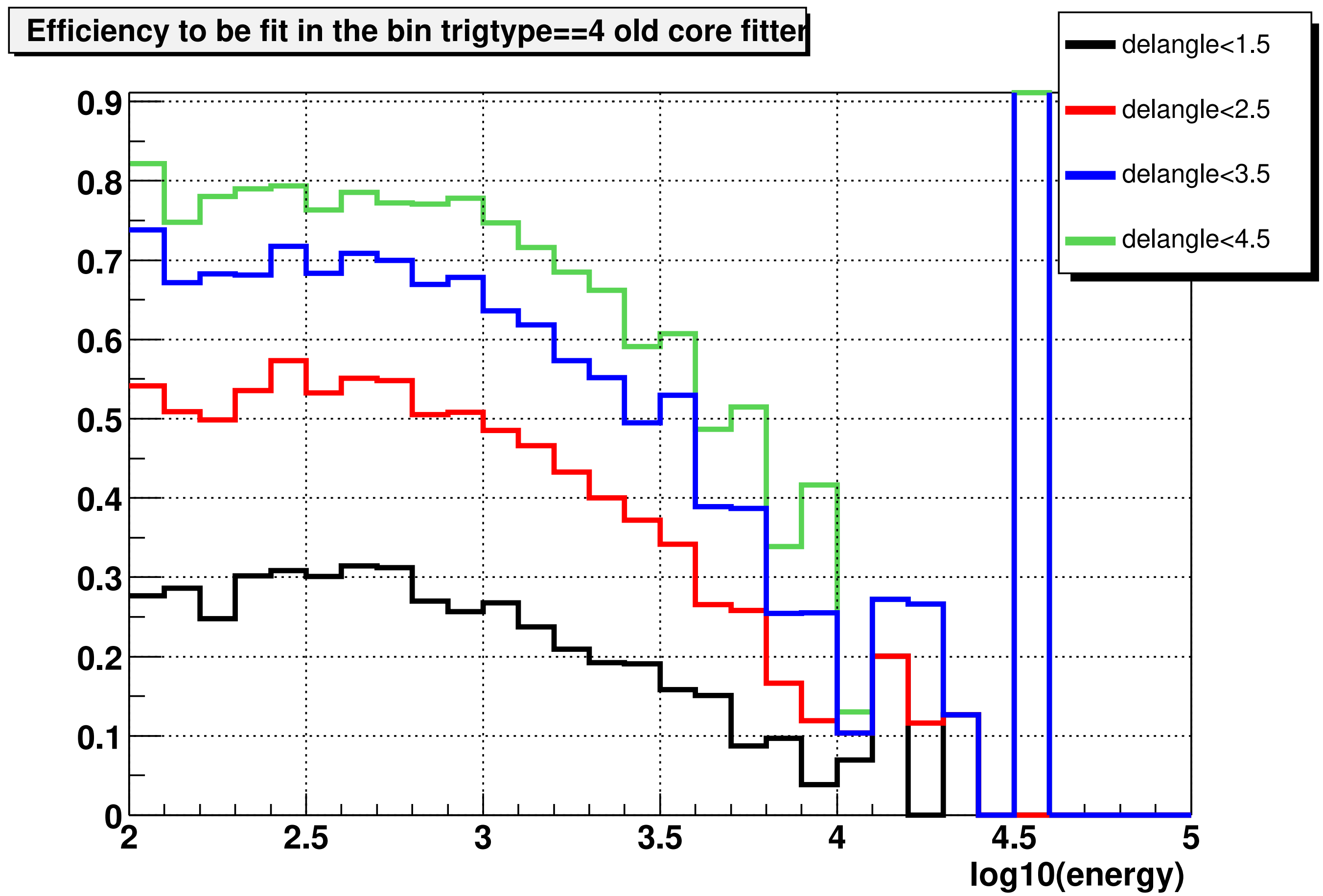
- We fit the trigger 4 (nhitas>20 risetime<=50ns) quite poorly.

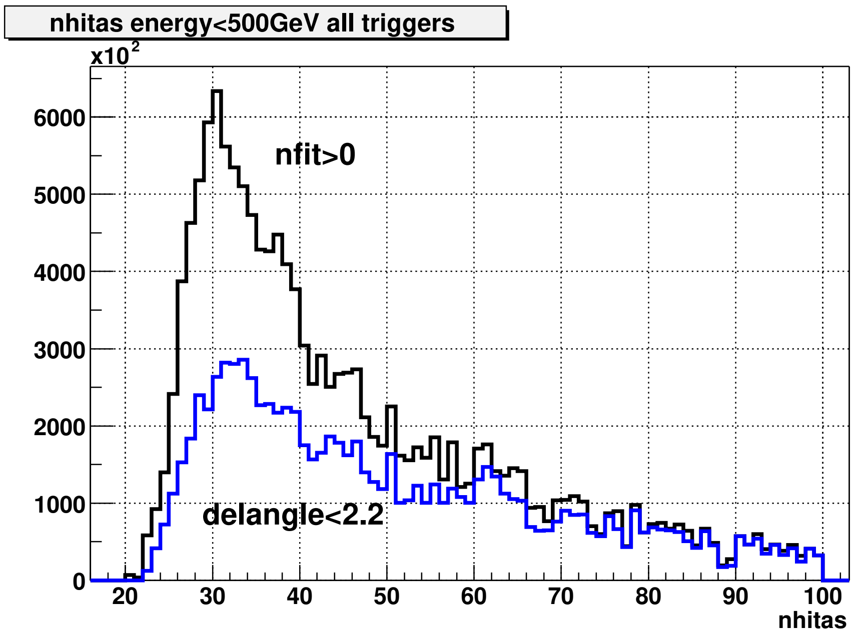


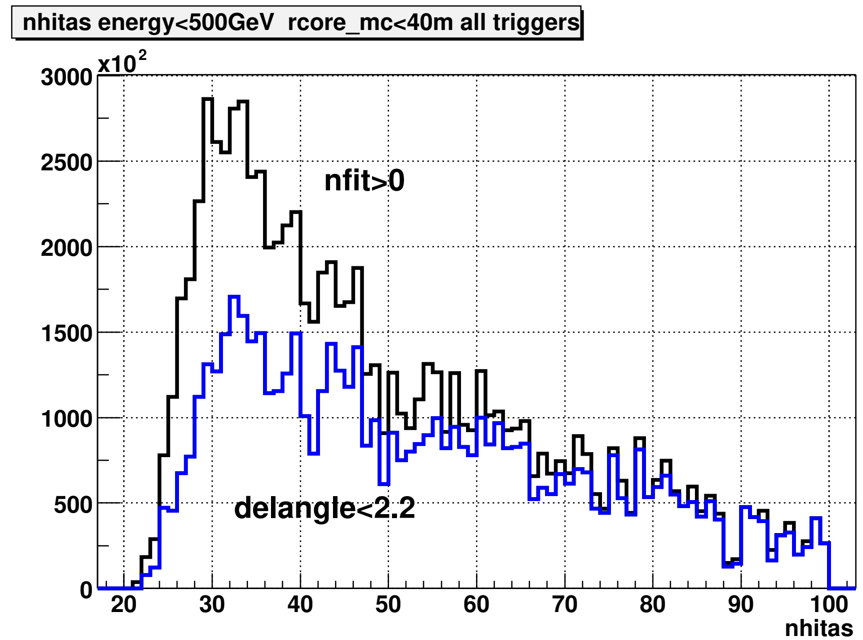
Core Near the Pond

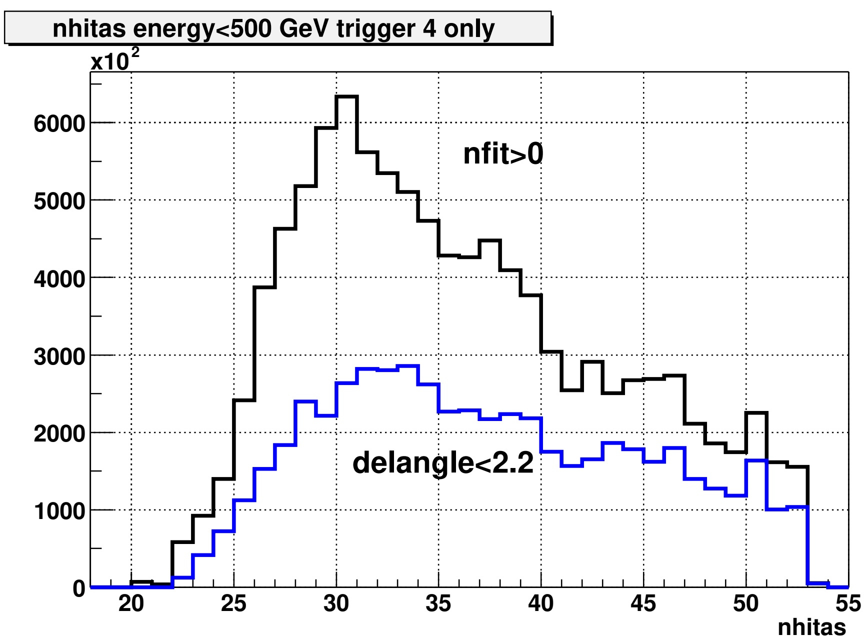


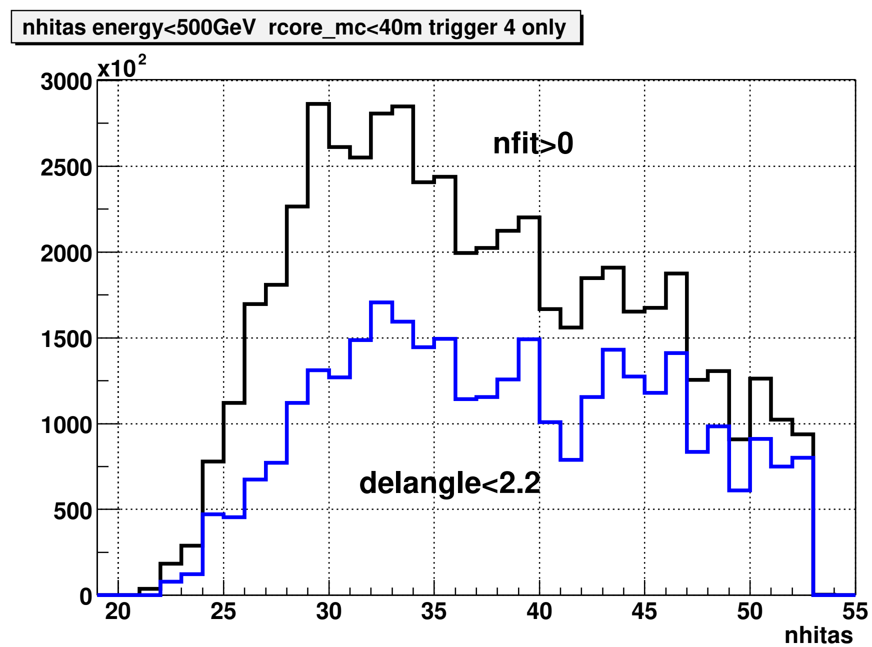
Old Core Fitter

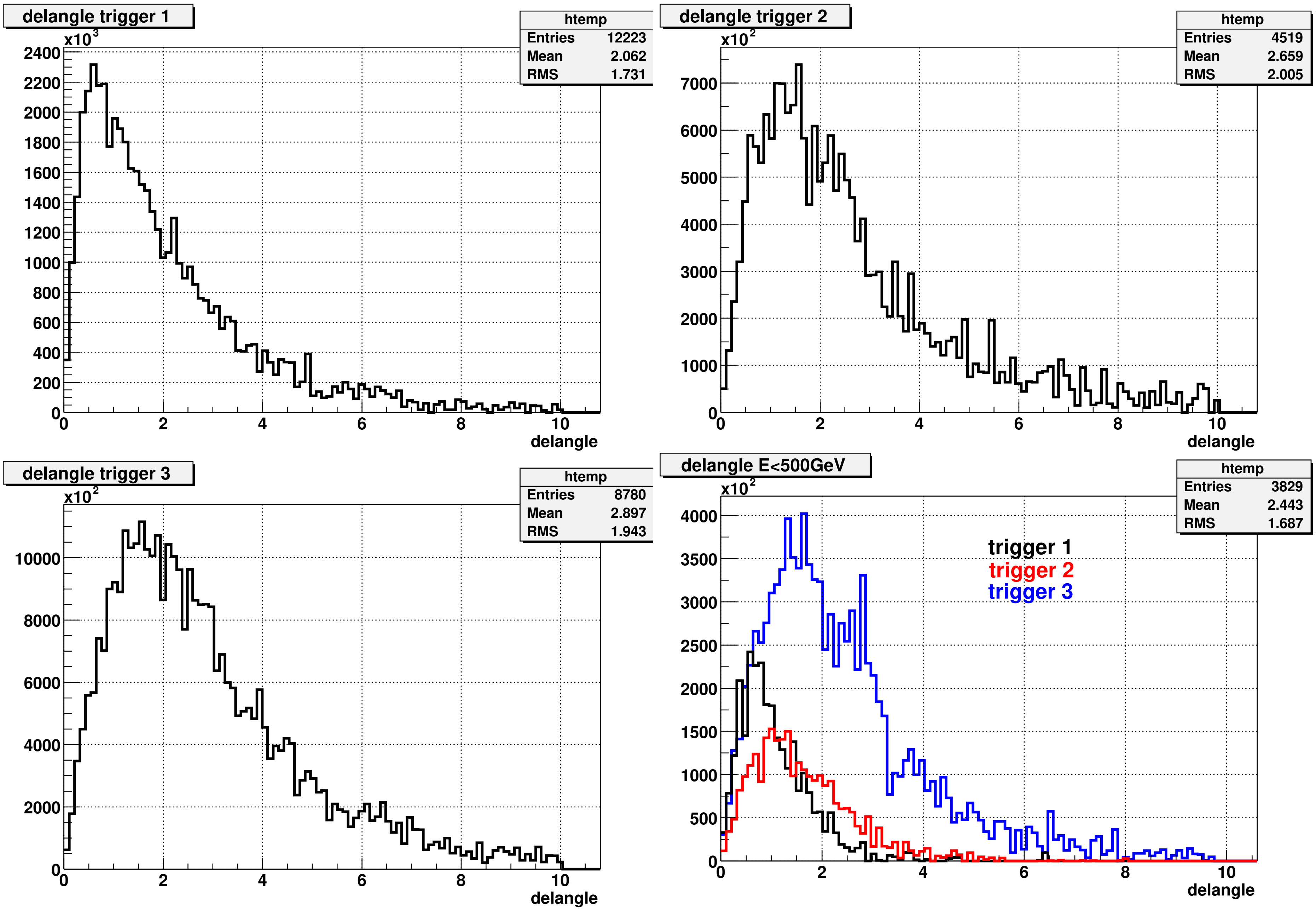



nhitas energy<500GeV all triggers
x10^2
6000
5000
4000
3000
2000
1000
0
20
30
40
50
60
70
80
90
100
nhitas
nfit>0
delangle<2.2

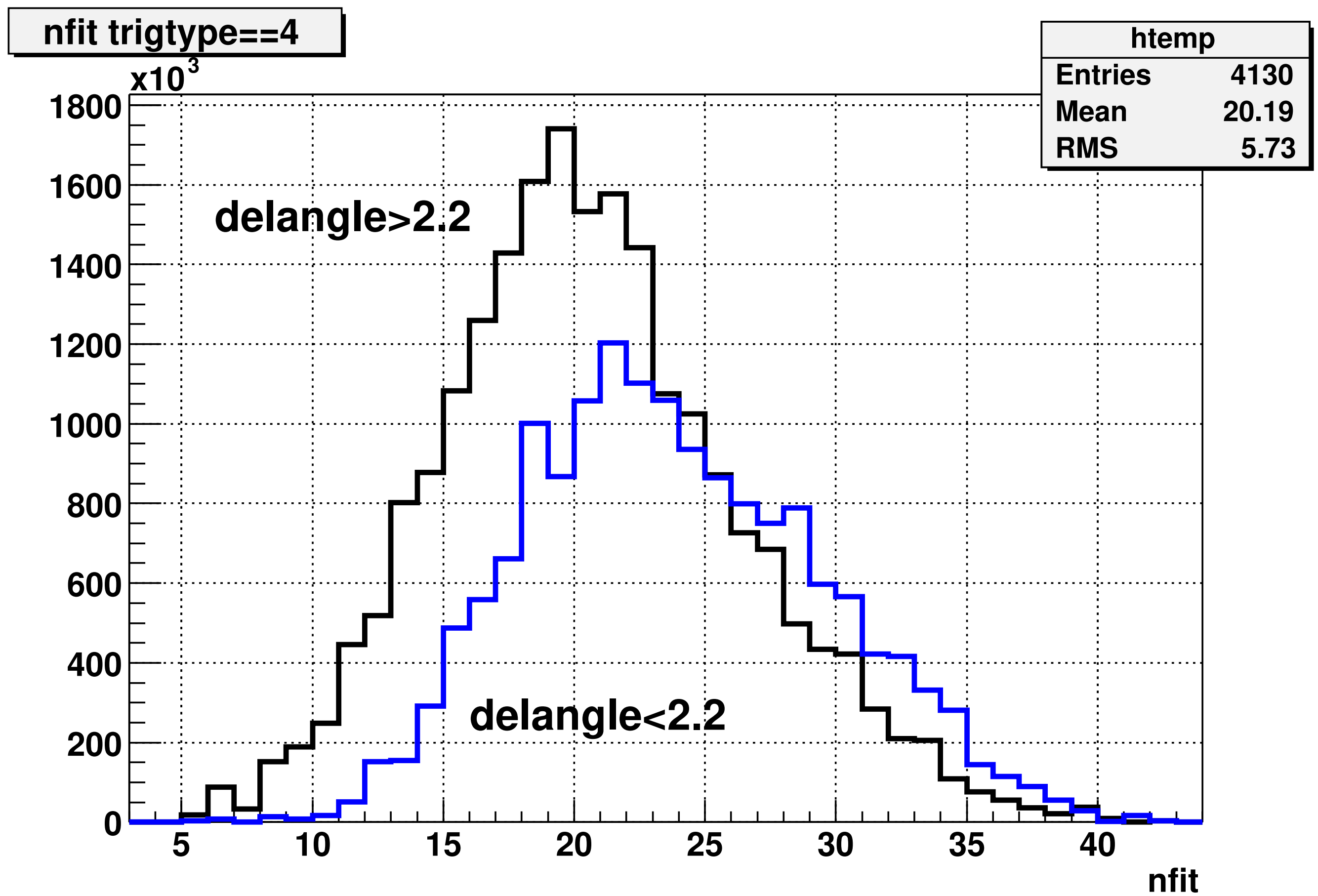

nhitas energy<500GeV rcore_mc<40m all triggers
x10^2
3000
2500
2000
1500
1000
500
0
20
30
40
50
60
70
80
90
100
nhitas
nfit>0
delangle<2.2


nhitas energy<500 GeV trigger 4 only
x10^2
6000
5000
4000
3000
2000
1000
0
20
25
30
35
40
45
50
55
nhitas
nfit>0
delangle<2.2


nhitas energy<500GeV rcore_mc<40m trigger 4 only
x10^2
3000
2500
2000
1500
1000
500
0
20
25
30
35
40
45
50
55
nhitas
nfit>0
delangle<2.2


delangle trigger 1
htemp
Entries 12223
Mean 2.062
RMS 1.731
x10^3
delangle
delangle trigger 2
htemp
Entries 4519
Mean 2.659
RMS 2.005
x10^2
delangle
delangle trigger 3
htemp
Entries 8780
Mean 2.897
RMS 1.943
x10^2
delangle
delangle E<500GeV
htemp
Entries 3829
Mean 2.443
RMS 1.687
x10^2
trigger 1
trigger 2
trigger 3
delangle

nfit


nfit trigtype==4
htemp
Entries 4130
Mean 20.19
RMS 5.73
x10^3
1800
1600
1400
1200
1000
800
600
400
200
0
5
10
15
20
25
30
35
40
nfit
delangle>2.2
delangle<2.2

Some things I have looked at

- Adjusting the pecuts.
- Adjusting the weights.
- Sampling correction.
- Adjusting the sigma cuts.
- Using the bottom layer only.
- Using the outriggers.
- Putting MC core into the fitter.

Weights

- Derived from width of tchi distribution.

  exp(2.5267 + -0.5217*log10(pes)))

- Derived new weights. No improvement.
- Tried varying the parameters. No improvement.

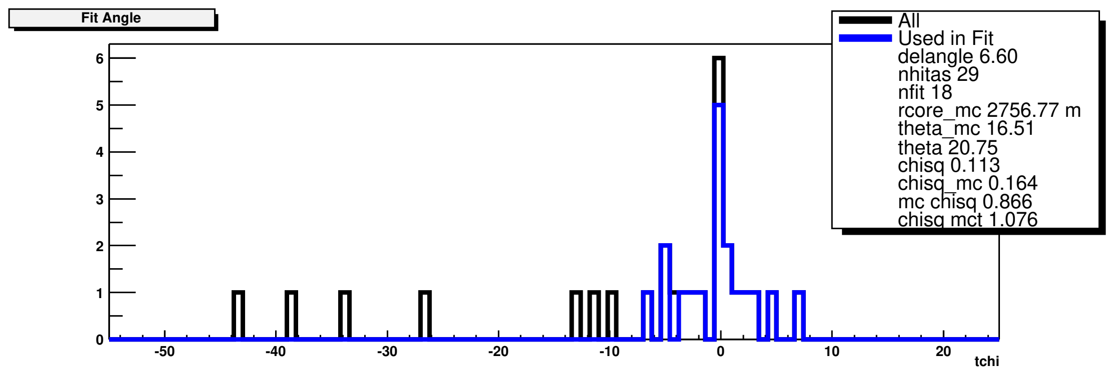
Cuts

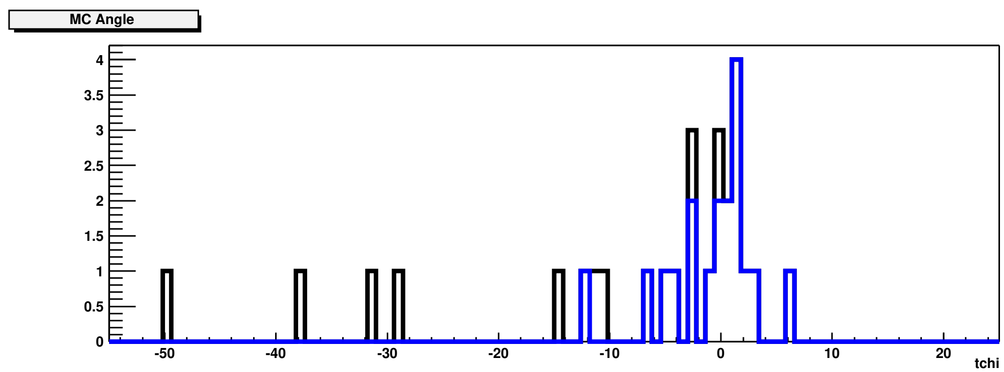
- Pecuts and Sigma cuts. Tried varying them (tighter and looser). No improvement.
- Pe level cutoff.
- Varying the weights for tubes that do not pass the sigma cut and including them in the fit.

Why Don't They Fit???

- Tubes not used in fit:

pes	tchi	tchi_true
1.1198	-14.391	-14.2921
1.501	-12.0019	-11.7389
1.0147	-10.9363	-13.5052
0.9945	-13.8515	-16.2423
1.0228	-8.35018	-11.0346
0.8437	-19.0674	-15.0433
1.5621	-8.03324	-7.55735

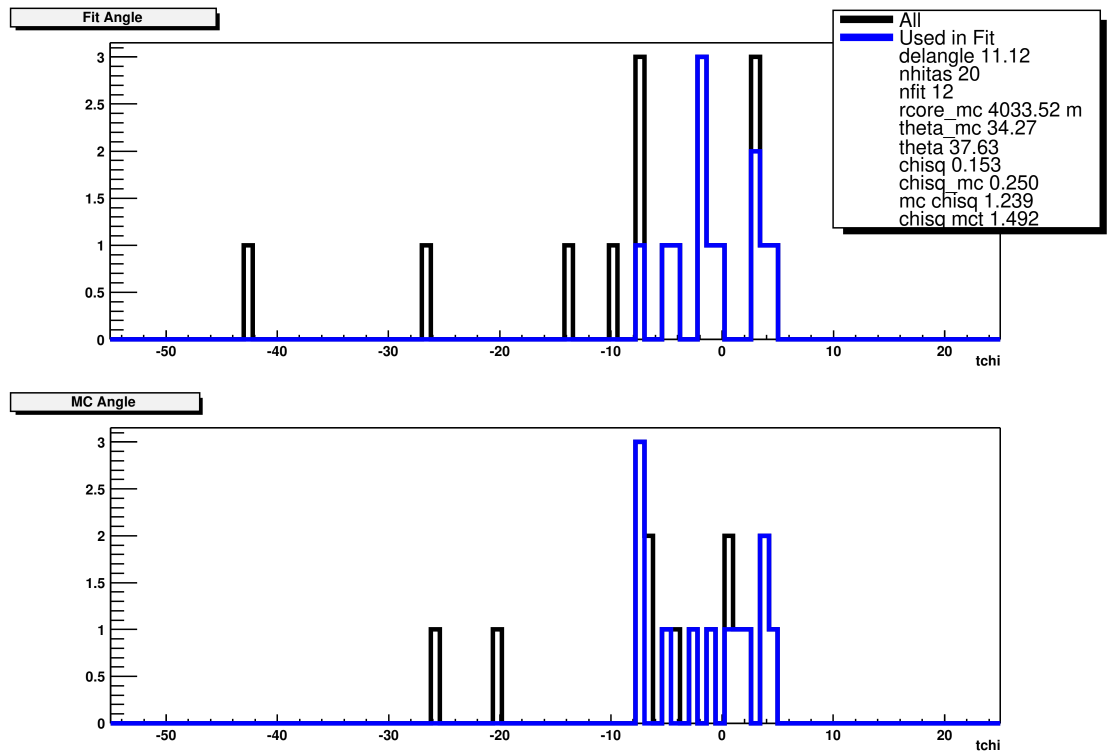




Another Example

- Tubes not used in fit:

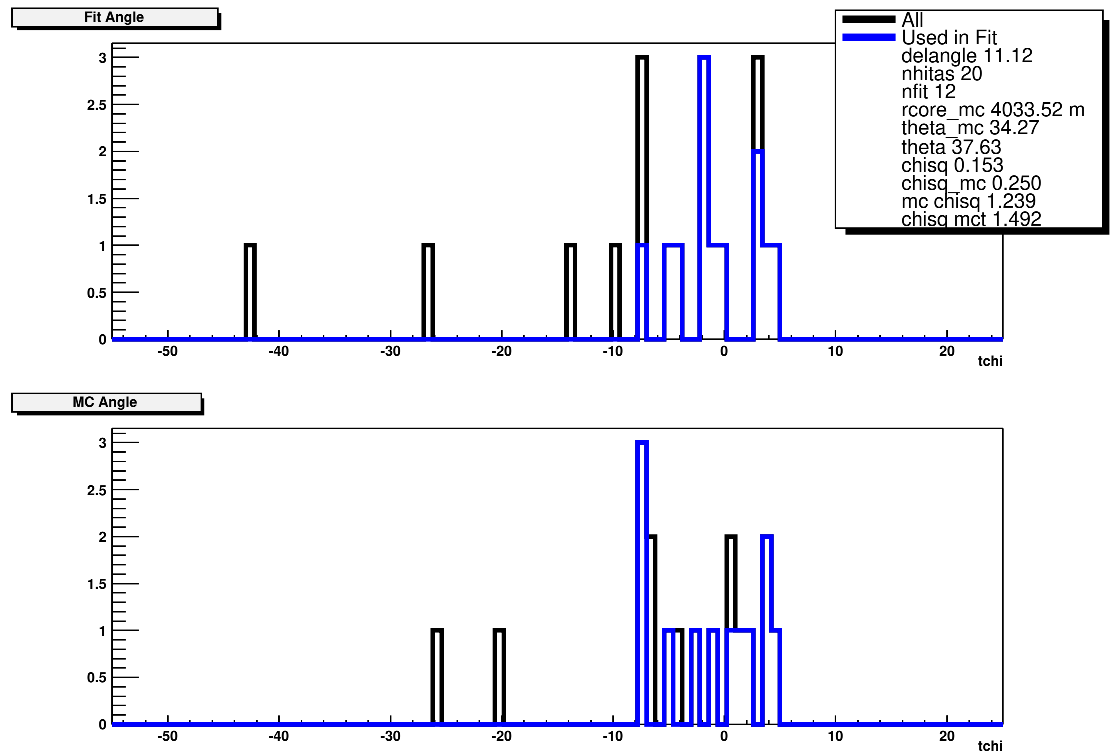
pes	tchi	tchi_true
0.9058	-42.847	-60.04
1.7167	-9.63829	-6.3742
3.1495	-7.69214	-4.58211
1.6733	-58.8212	-64.6935
1.2934	-26.6216	-25.8496
0.2734	3.18787	0.760041
1.2286	-14.0601	-20.2185
2.2987	-7.28825	-6.94283



How about the tubes used in the fit?

- Tubes used in the fit:

pes	tchi	tchi_true
1.8078	-2.09005	-0.600762
0.9046	3.299	4.63369
2.627	2.93526	-2.33465
0.6749	4.37626	4.04675
3.2482	-0.09388	1.21973
1.1685	-4.44886	-4.93353
2.7557	-2.0077	-7.43497
0.7716	-4.98584	-7.27491
13.9391	-1.03446	1.94096
32.2111	3.40618	3.9159
0.926	-1.47969	0.428337
0.989	-7.70376	-7.7044



What else?

- More of the same?
- Likelihood fitter?
- Suggestions?