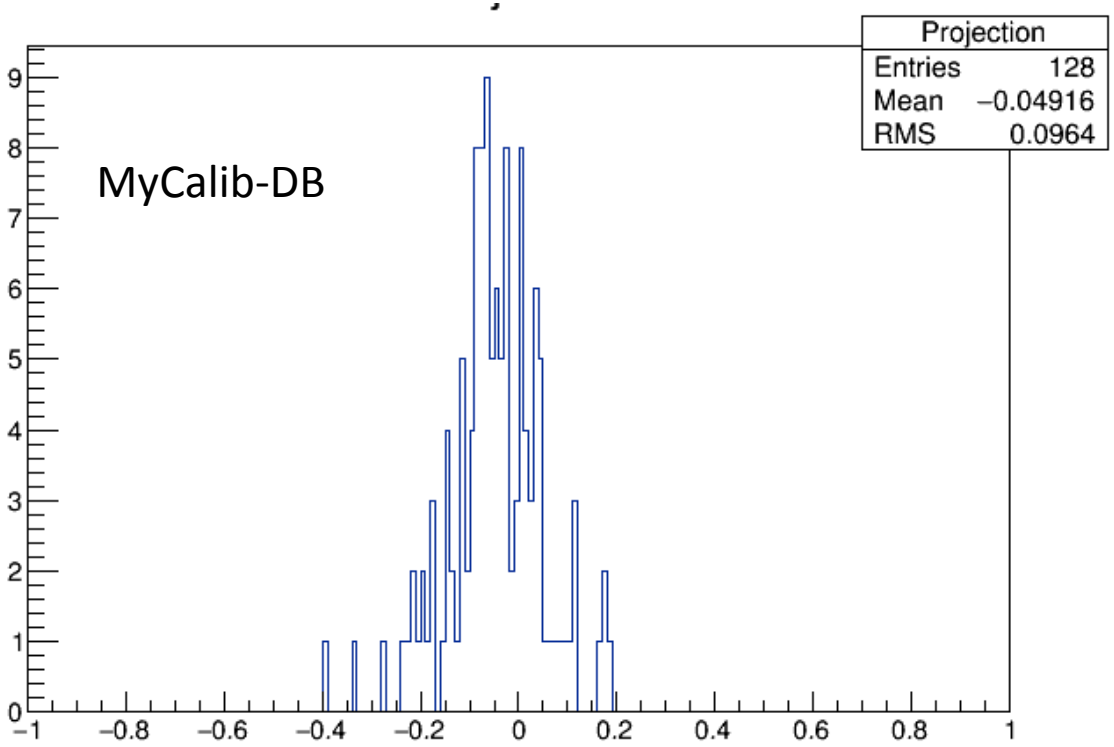
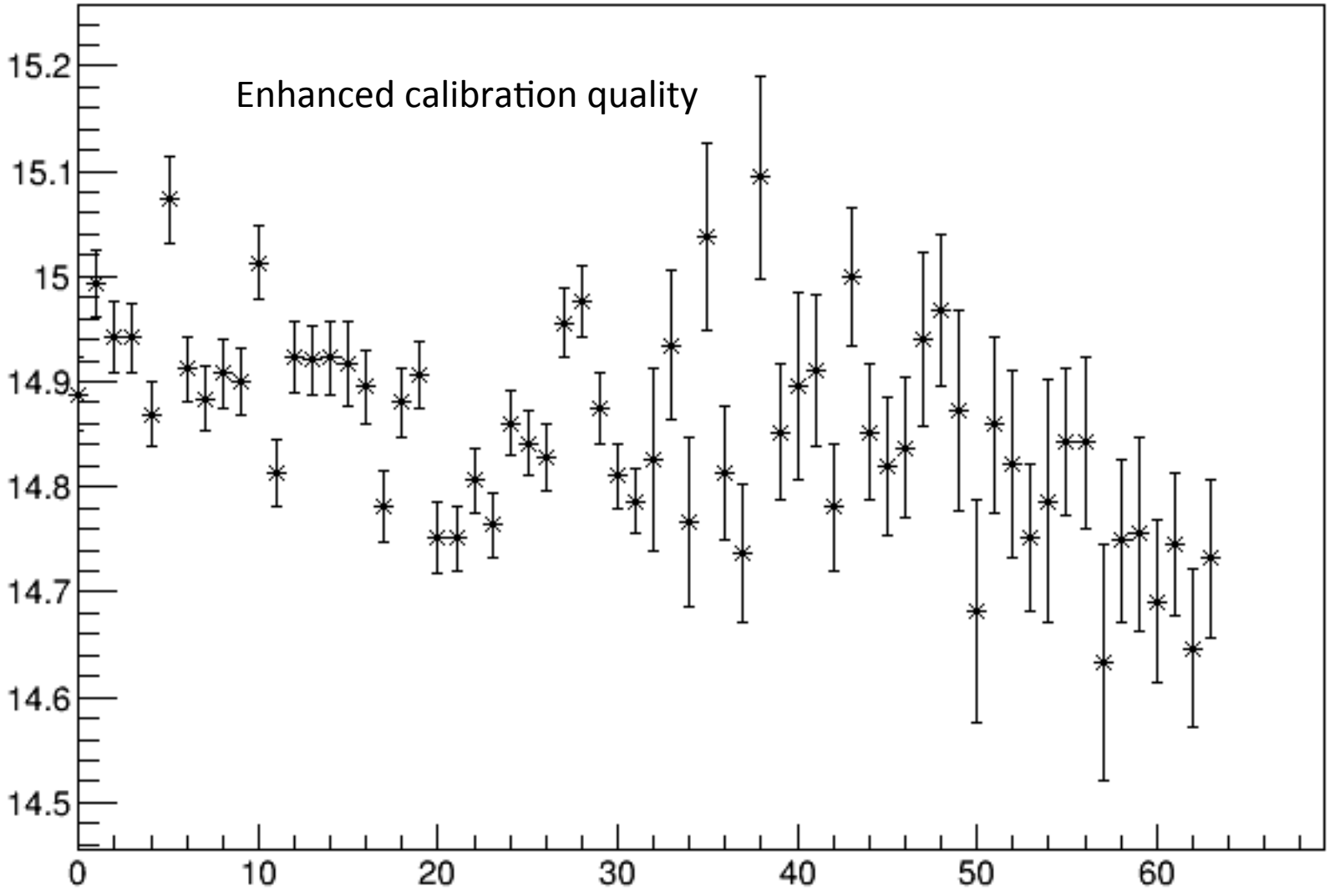
Report_161213

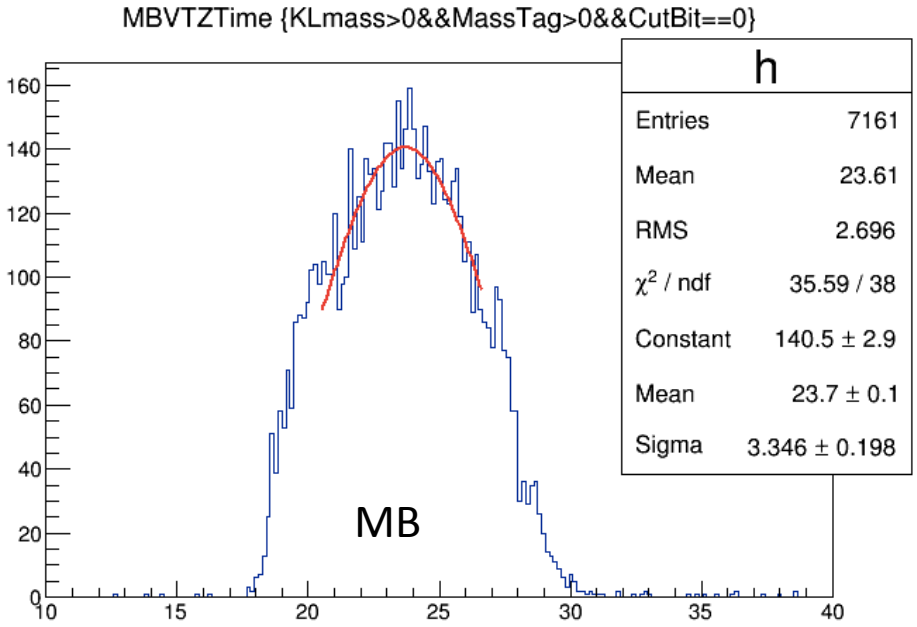
Run62 Time Calibration

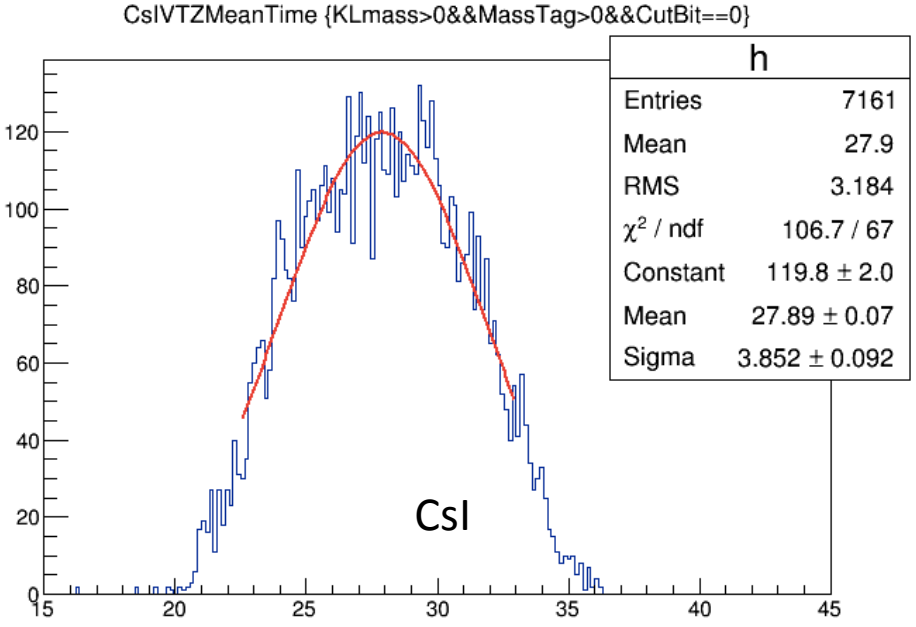


VertexTime difference of Run69 MB



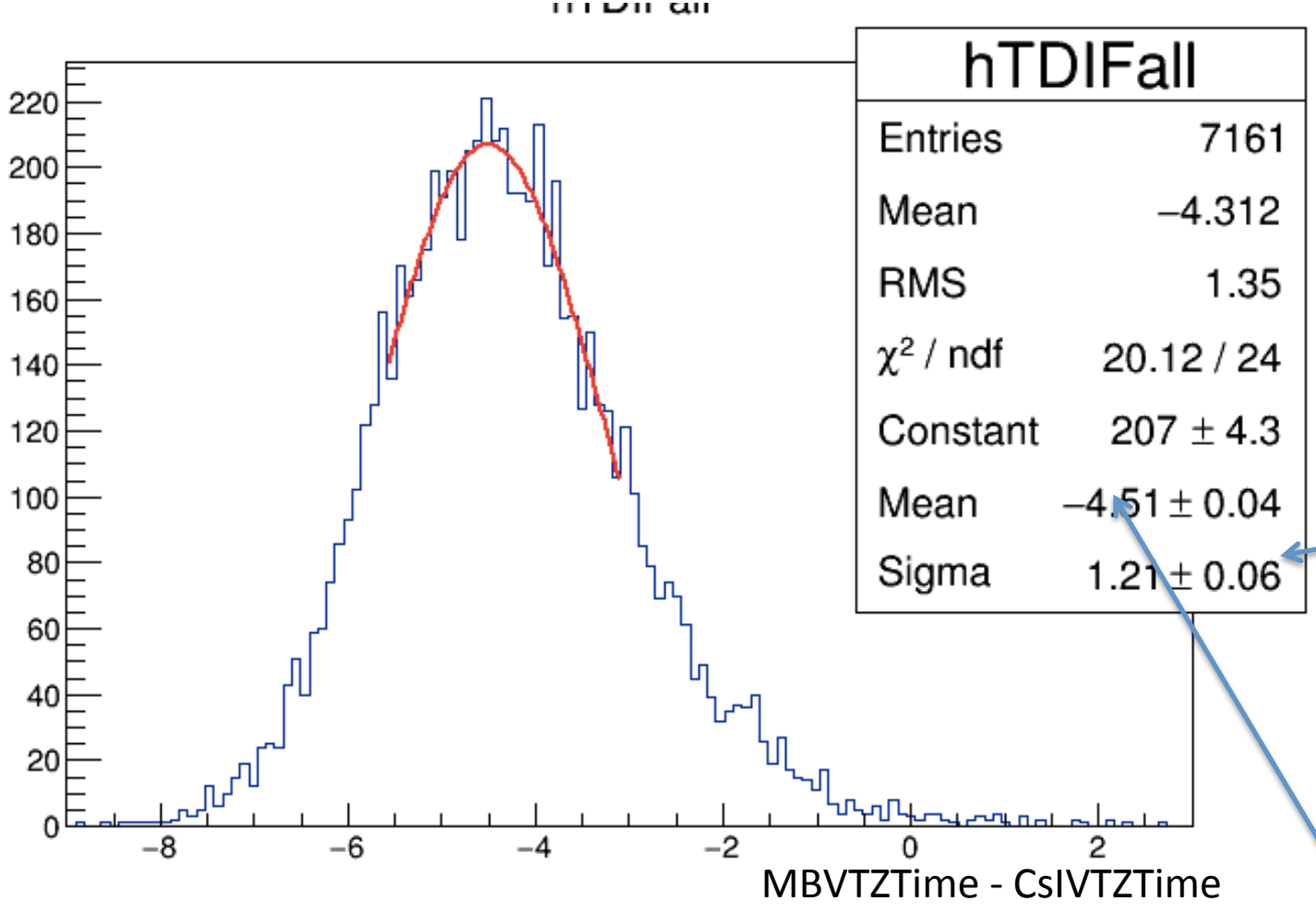
MBVTZTime, CSIVTZTime (MC)





Time resolution

- In MC, only CsI time resolution is applied

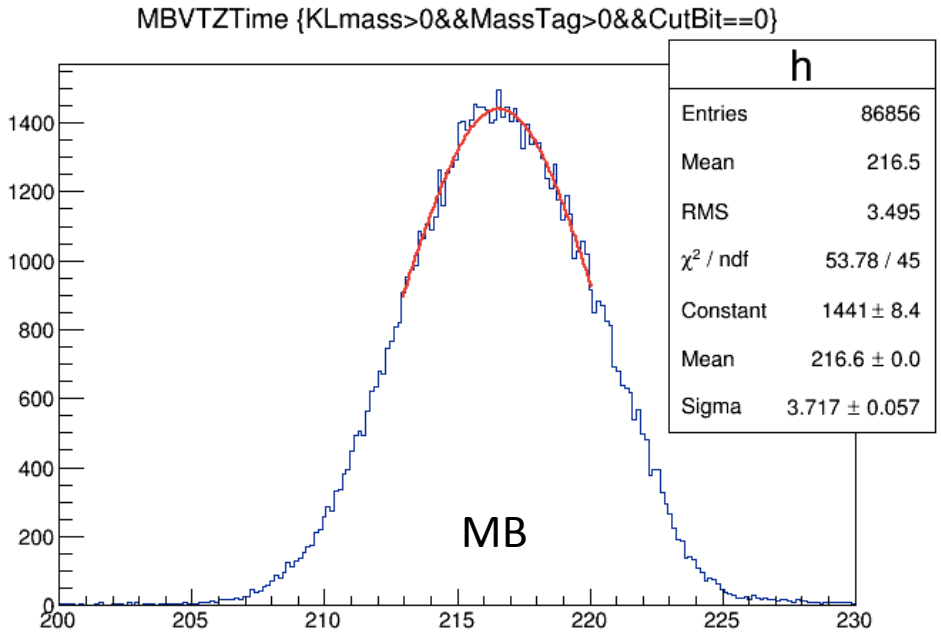


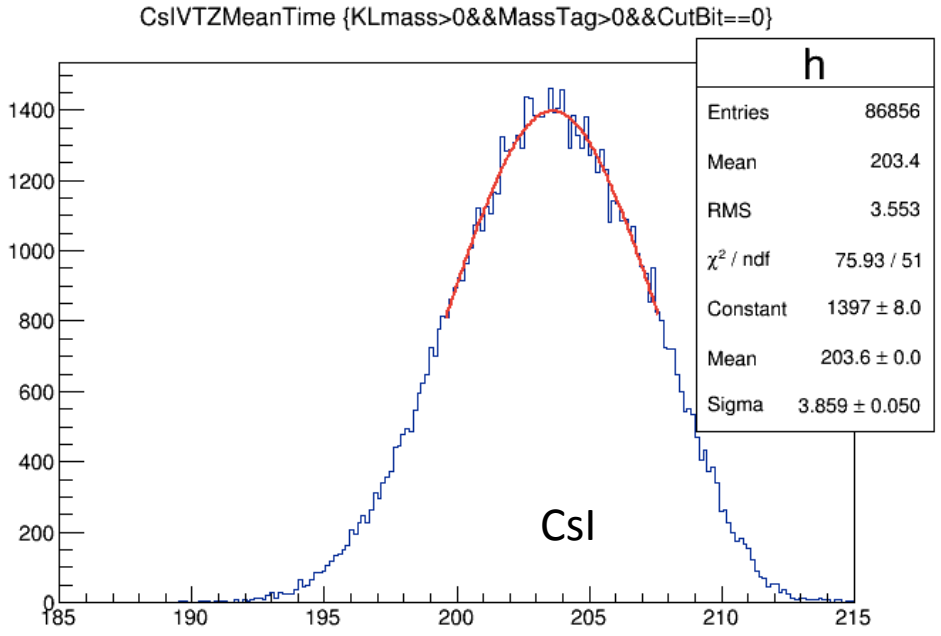
sigma come from only CsI

In gsim2dst

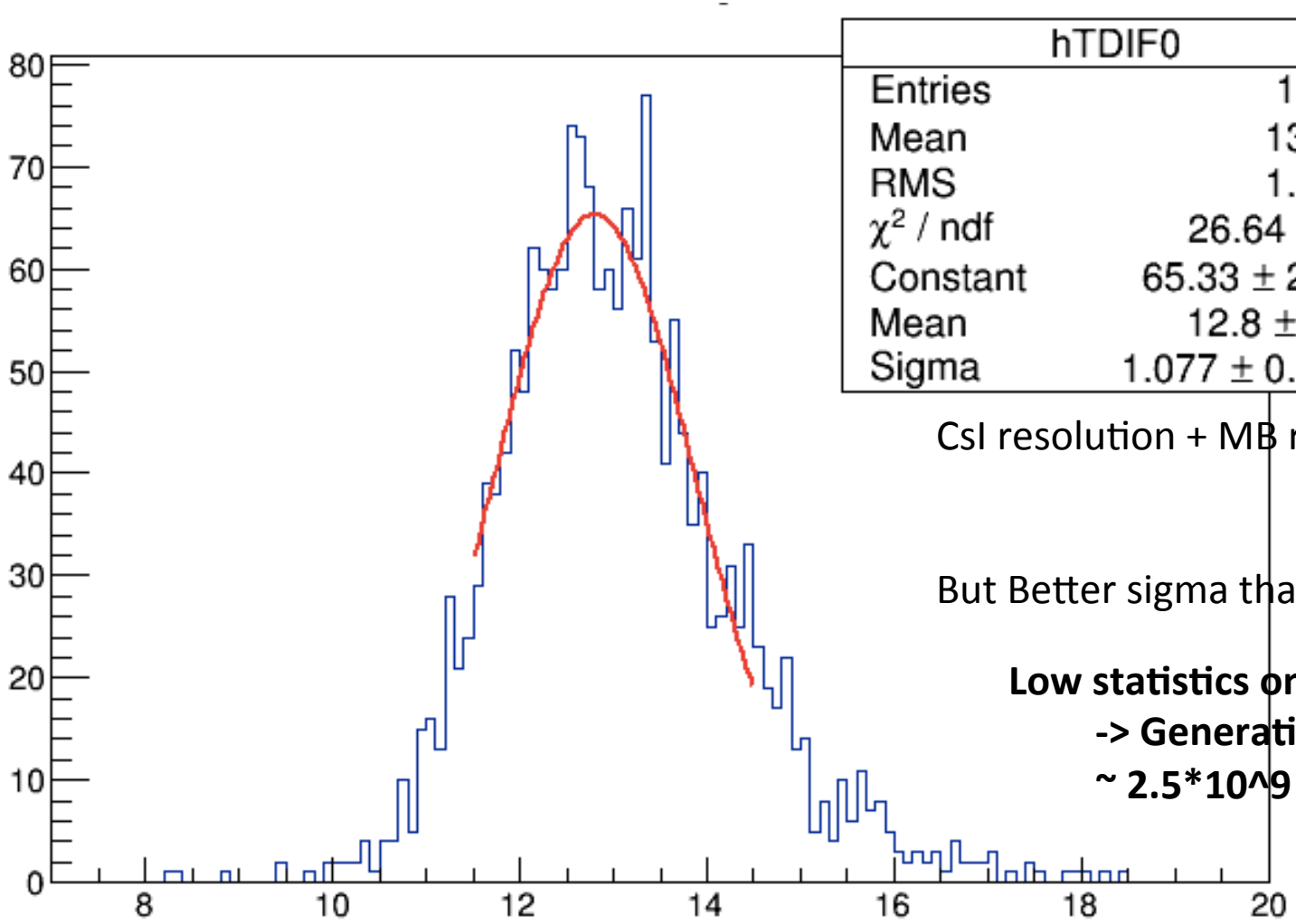
```
const float MTConvertCBAR::dataSimTimeOffset = 4.446; // [ns]
```

MBVTZTime, CSIVTZTime (Run62)





In data (run62)



CsI resolution + MB resolution

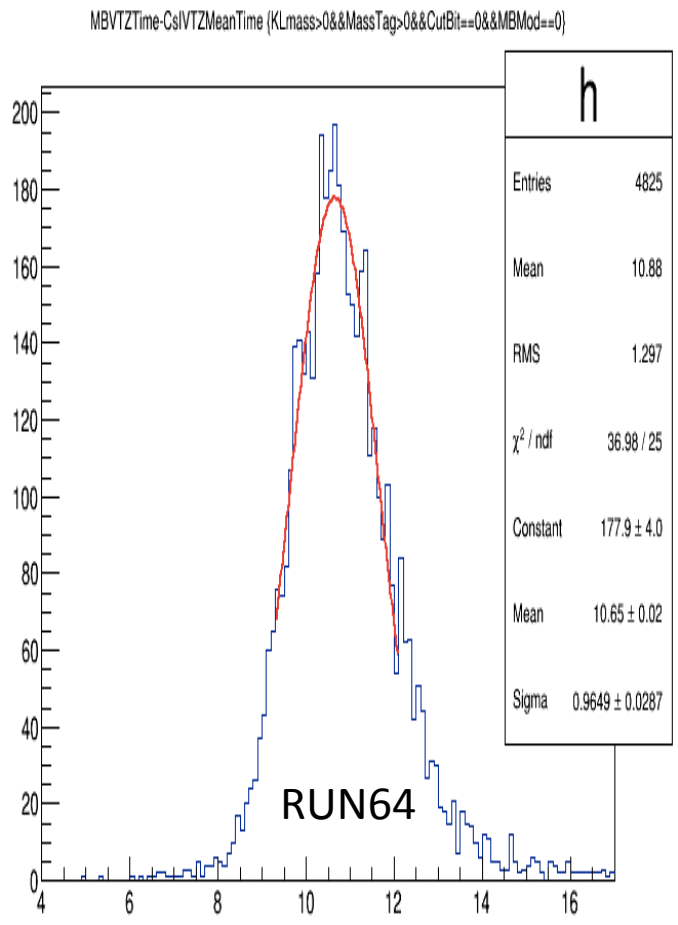
But Better sigma than MC

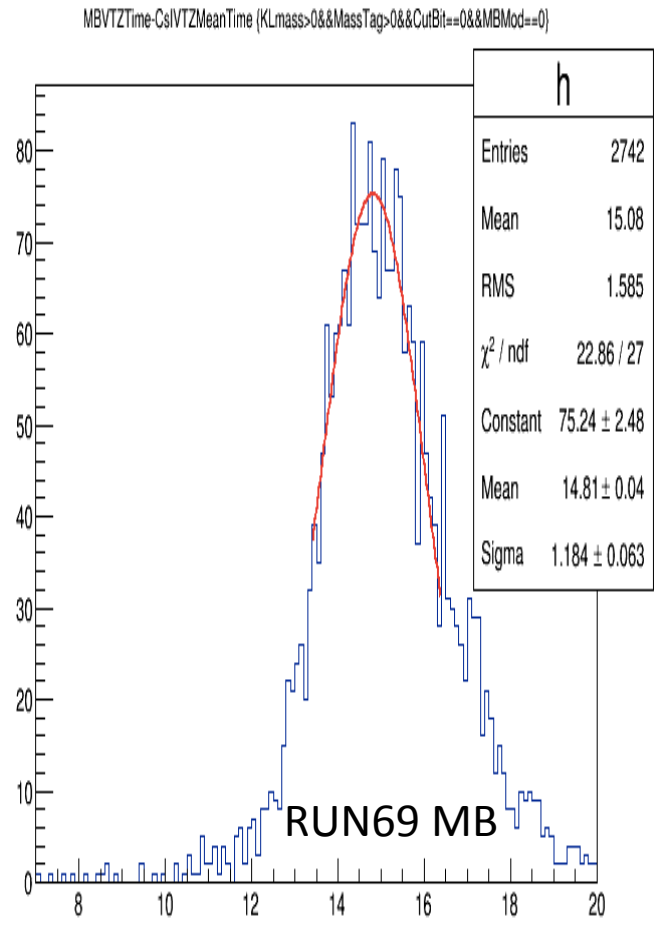
Low statistics on MC?

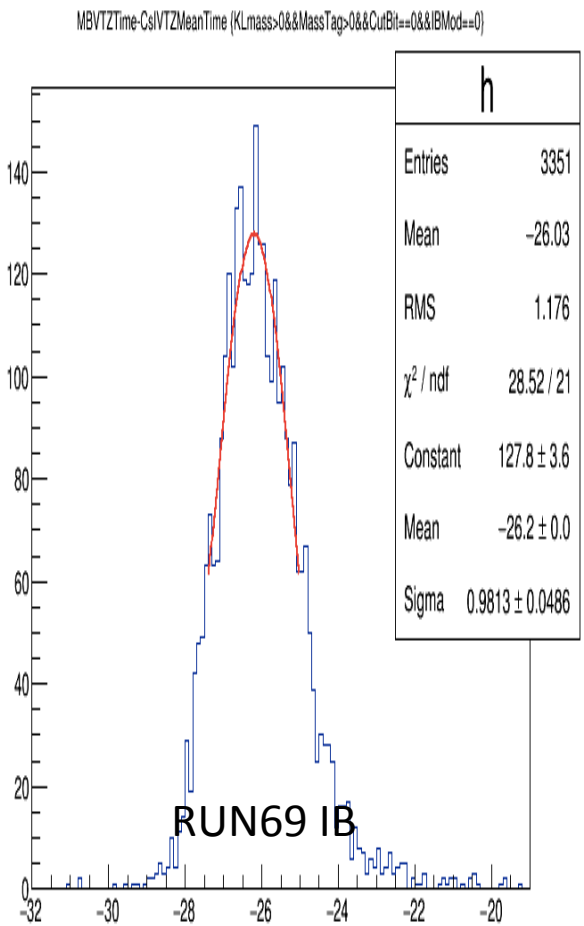
-> Generation of 5*10^8 KL3pi0

~ 2.5*10^9 KL

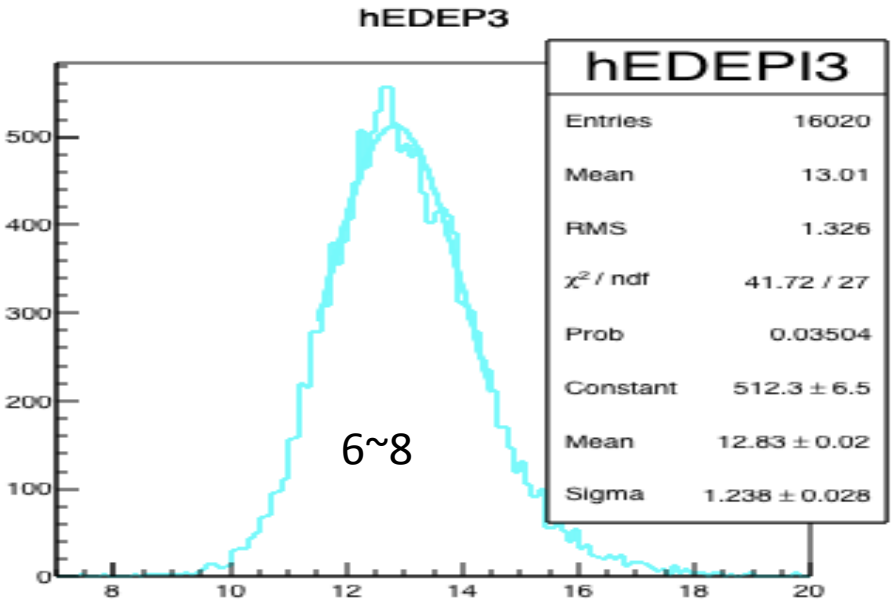
Run64, run69 MB, run69 IB

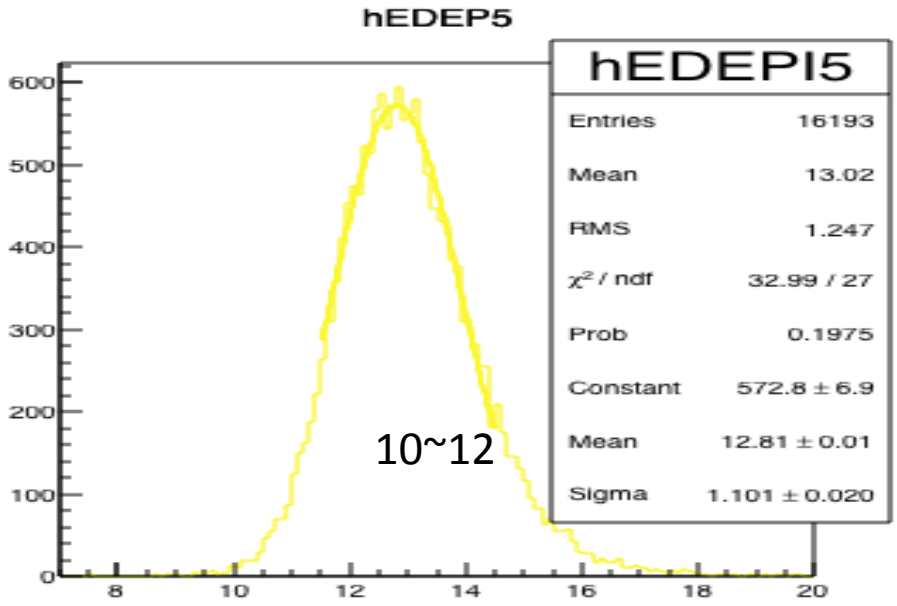


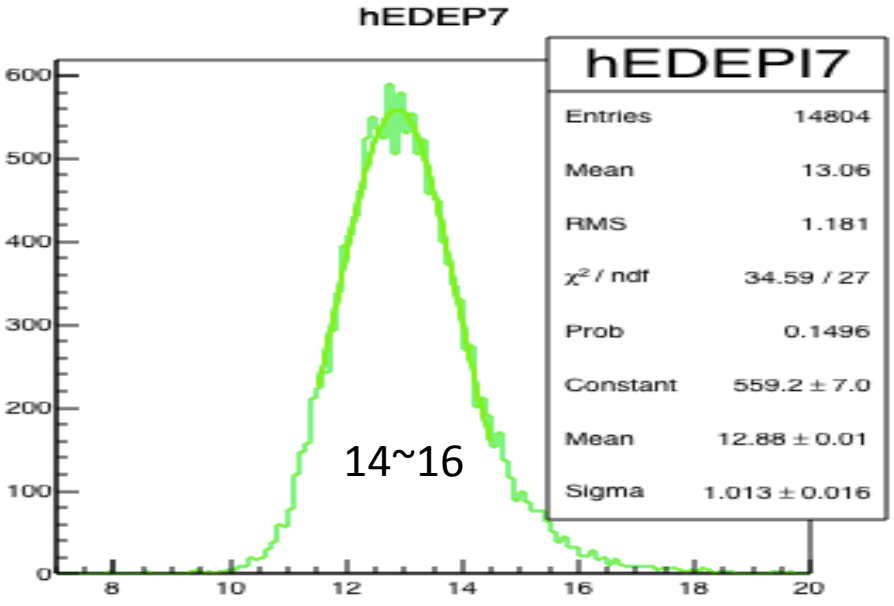


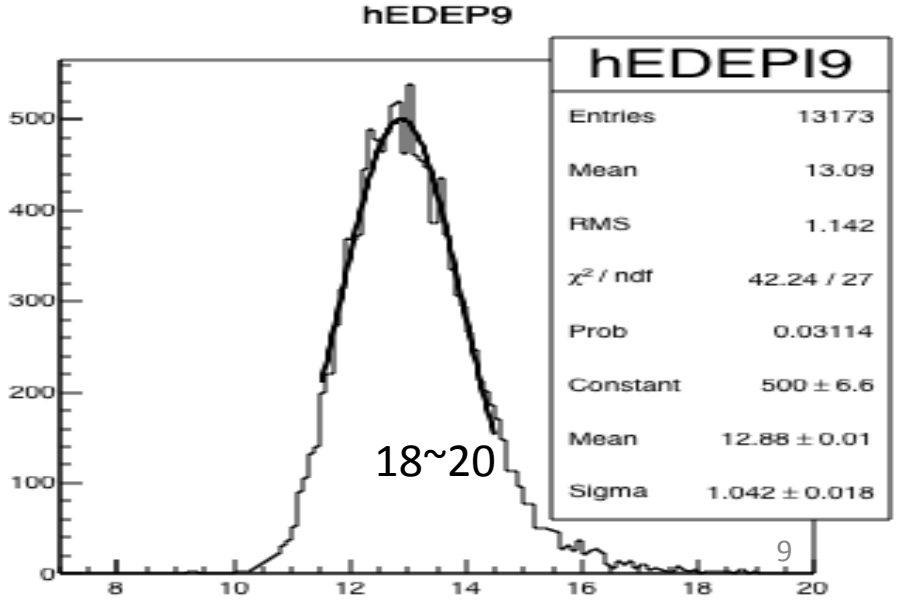


MB energy deposit dependence

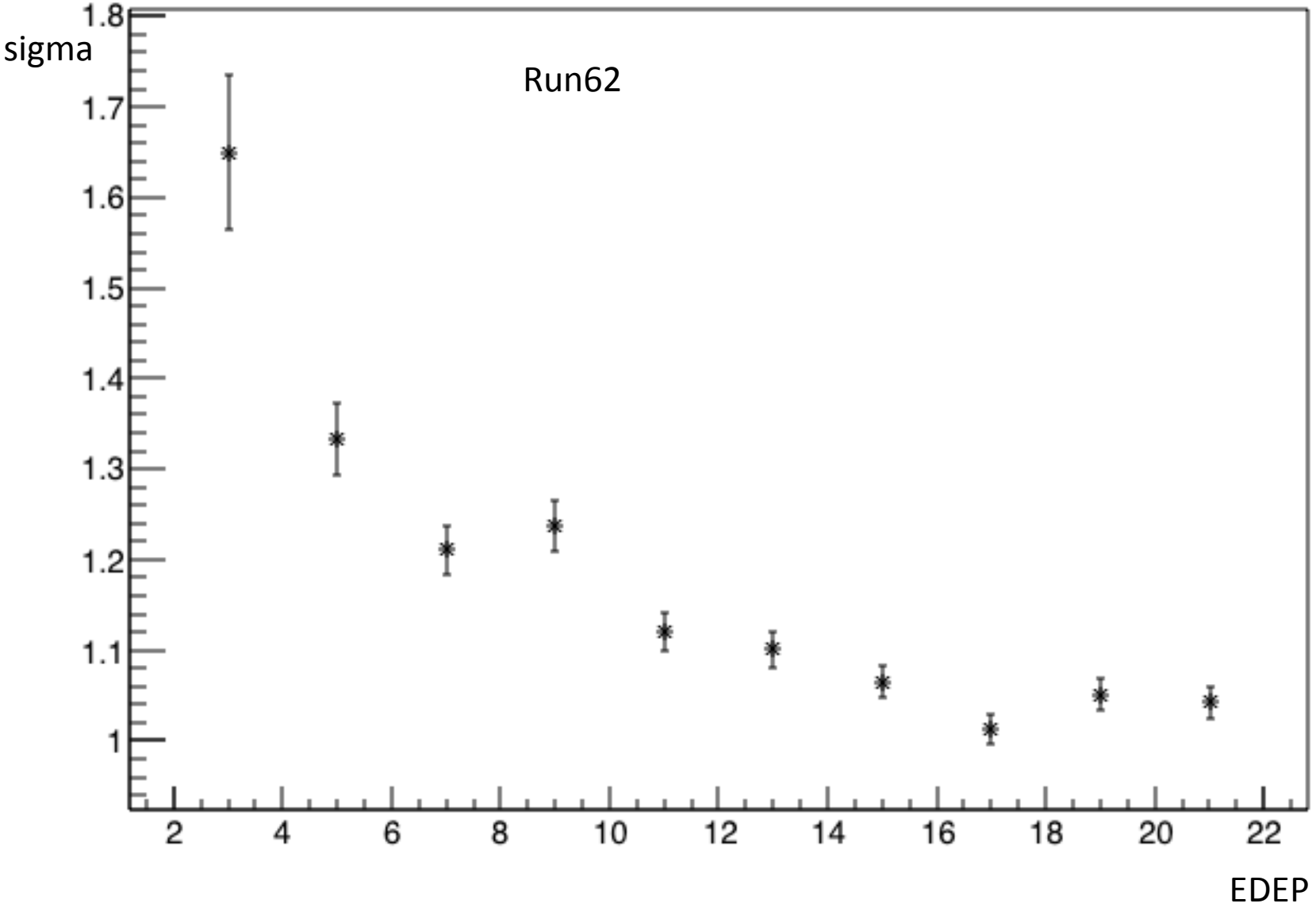


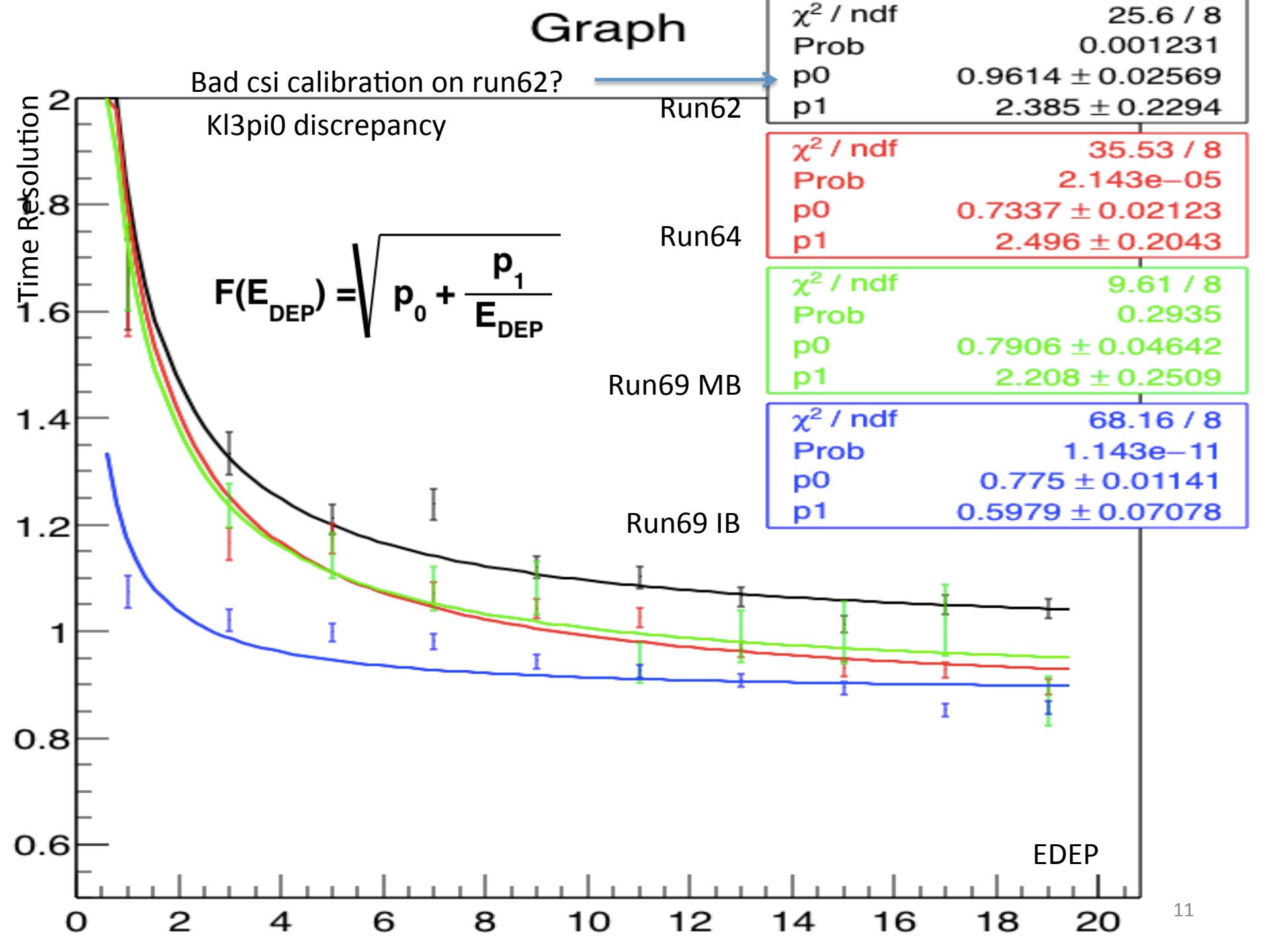




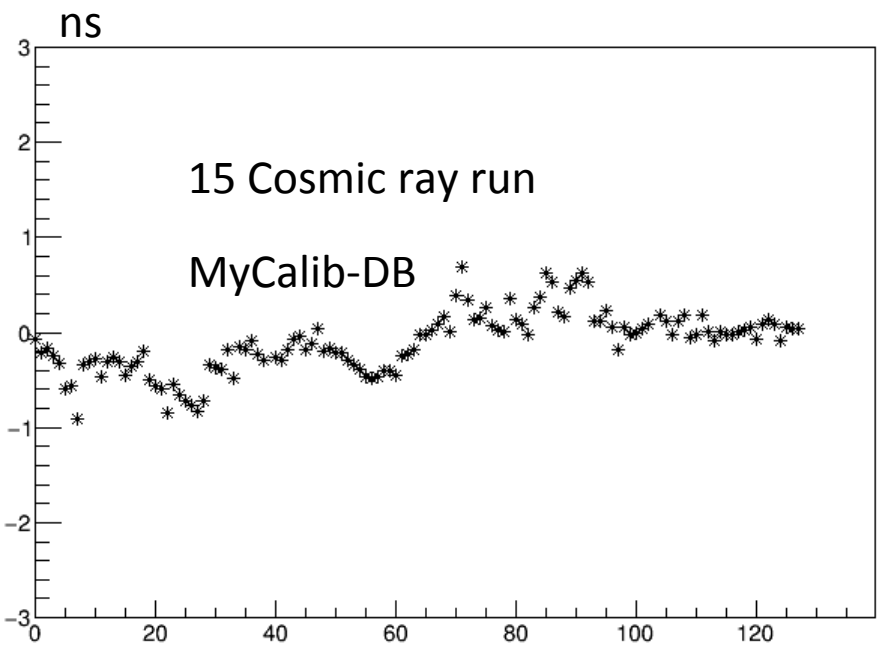


MB energy deposit dependence(2)

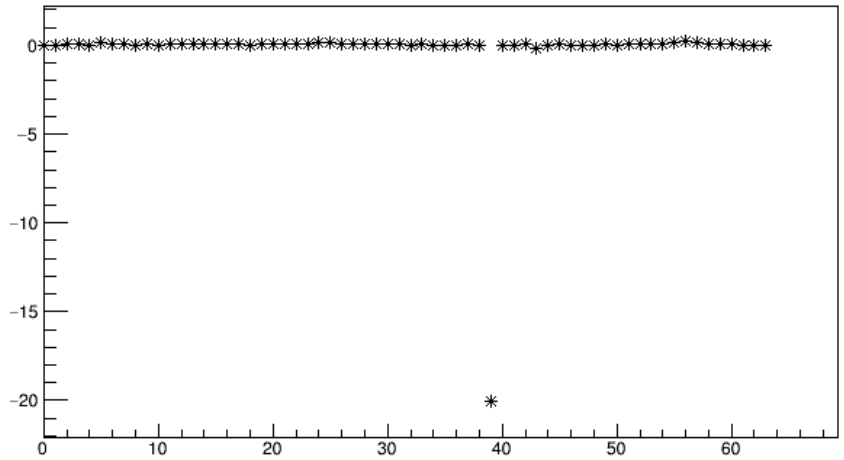



Graph
Bad csi calibration on run62?
Kl3pi0 discrepancy
Run62
Run64
Run69 MB
Run69 IB
$F(E_{DEP}) = \sqrt{p_0 + \frac{p_1}{E_{DEP}}}$
χ² / ndf 25.6 / 8
Prob 0.001231
p0 0.9614 ± 0.02569
p1 2.385 ± 0.2294
χ² / ndf 35.53 / 8
Prob 2.143e−05
p0 0.7337 ± 0.02123
p1 2.496 ± 0.2043
χ² / ndf 9.61 / 8
Prob 0.2935
p0 0.7906 ± 0.04642
p1 2.208 ± 0.2509
χ² / ndf 68.16 / 8
Prob 1.143e−11
p0 0.775 ± 0.01141
p1 0.5979 ± 0.07078
Time Resolution
EDEP
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0
2
4
6
8
10
12
14
16
18
20

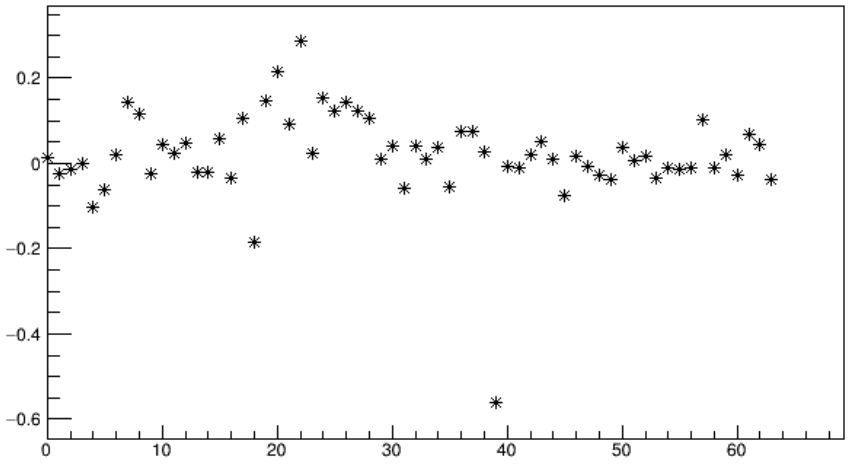
Run64 check with my calibration constant



MeanTime Difference



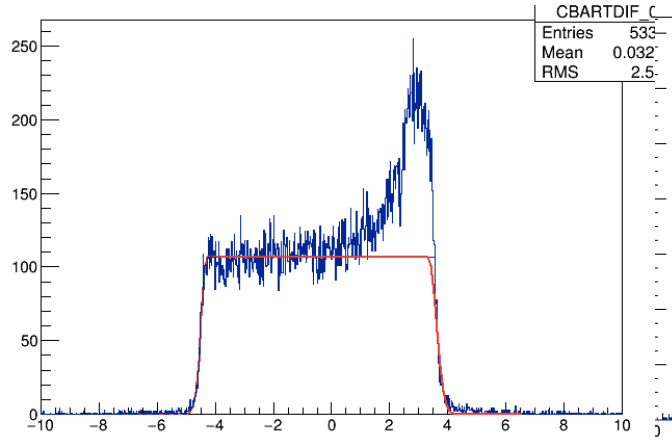
Center Difference



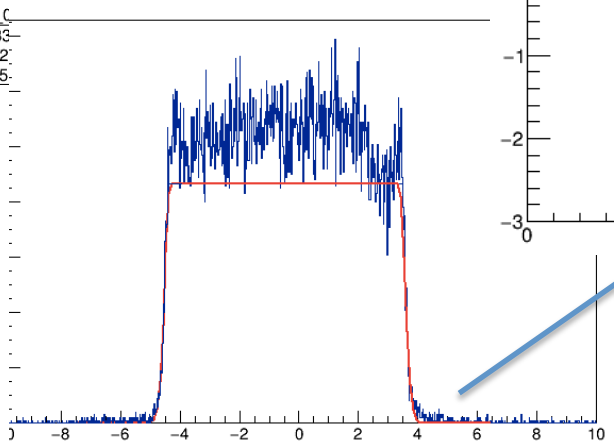
Finding Center of MB in Run64

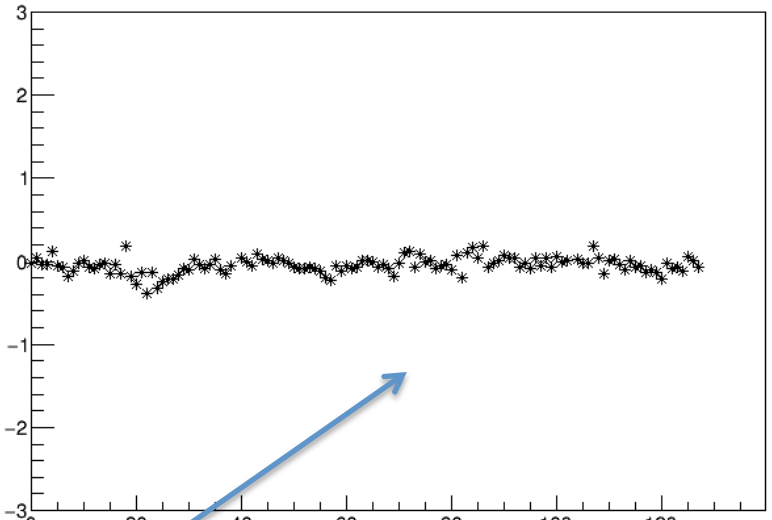
- In Run62, Prescale of CBAR is 2 (Run69 also)
- In Run64, Prescale of CBAR is 4
  - Makes difference
- Usually, we don't select trigger number
  - In my new Calib. for Run64, I selected CBAR Trigger number

Before selection
(Triggers from
many Downstream detector)



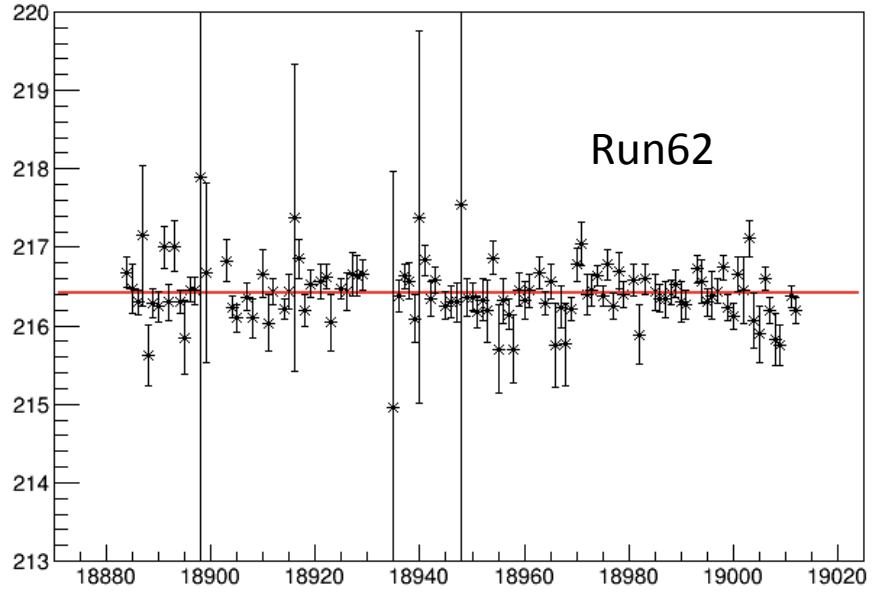
After selection

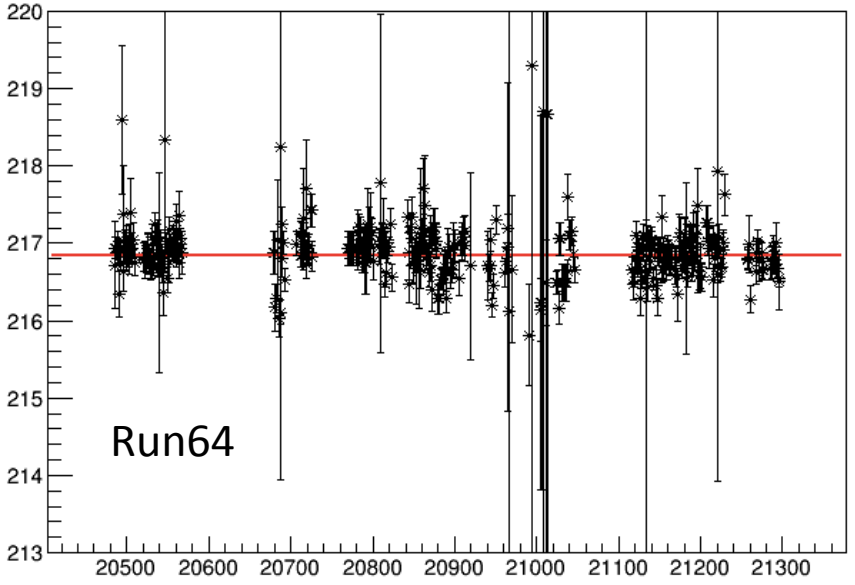


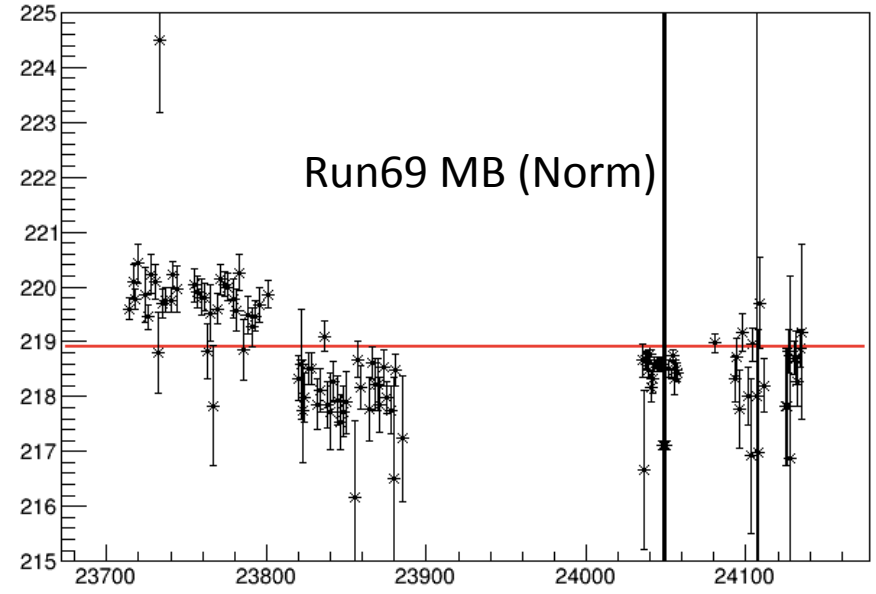


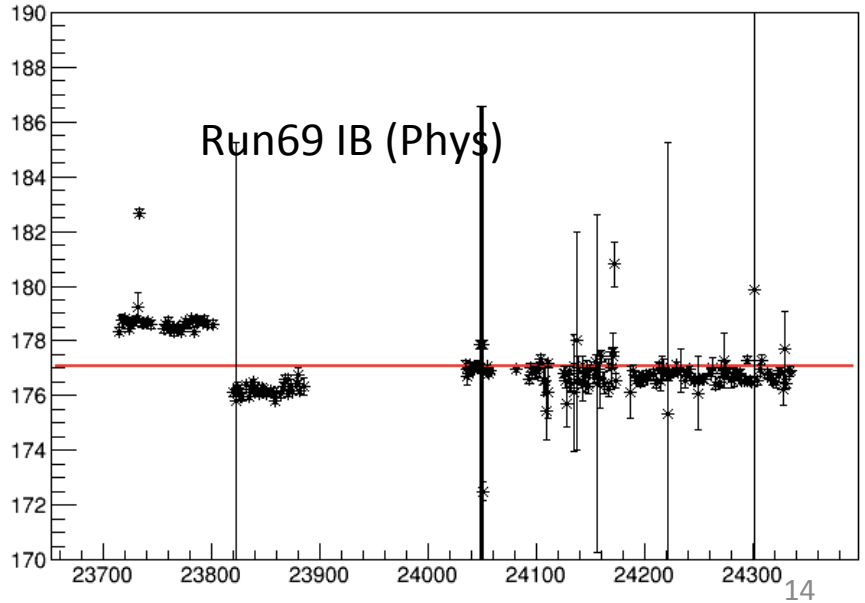
Run stability of MBTime

MBTime = Mean of Vertex Times of all modules



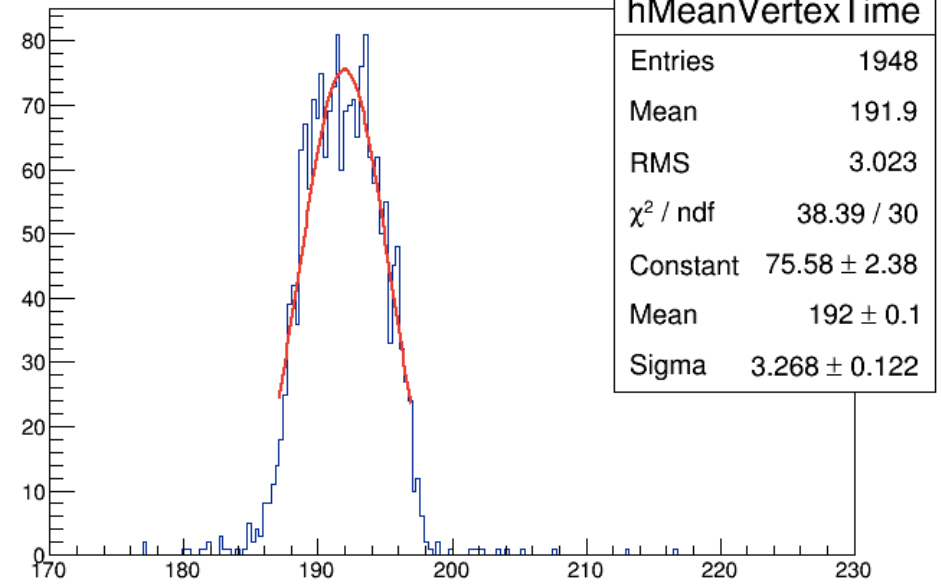




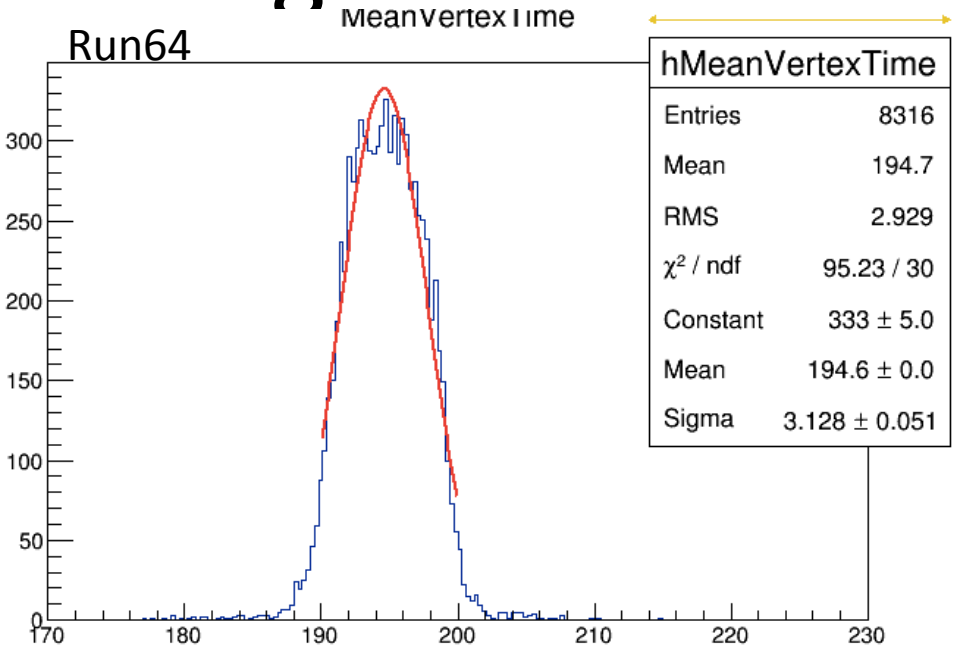


CsIVertexTime in g6ana

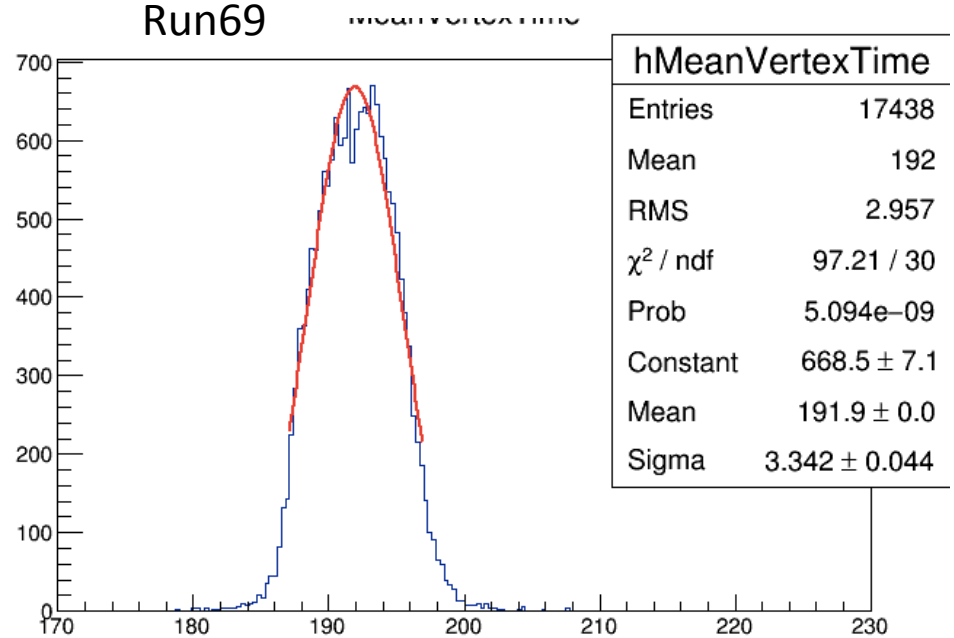
Run62



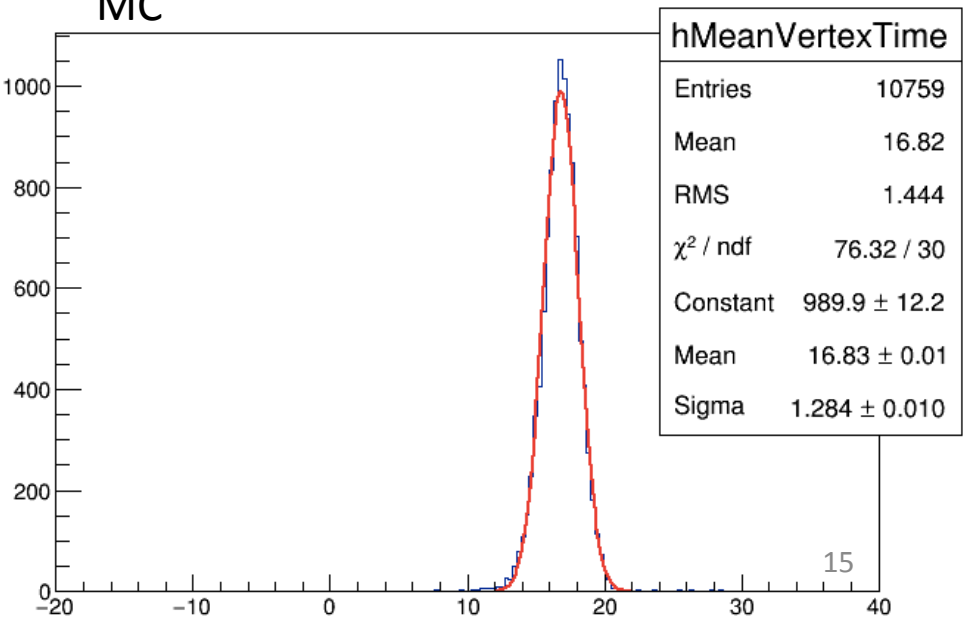
Run64

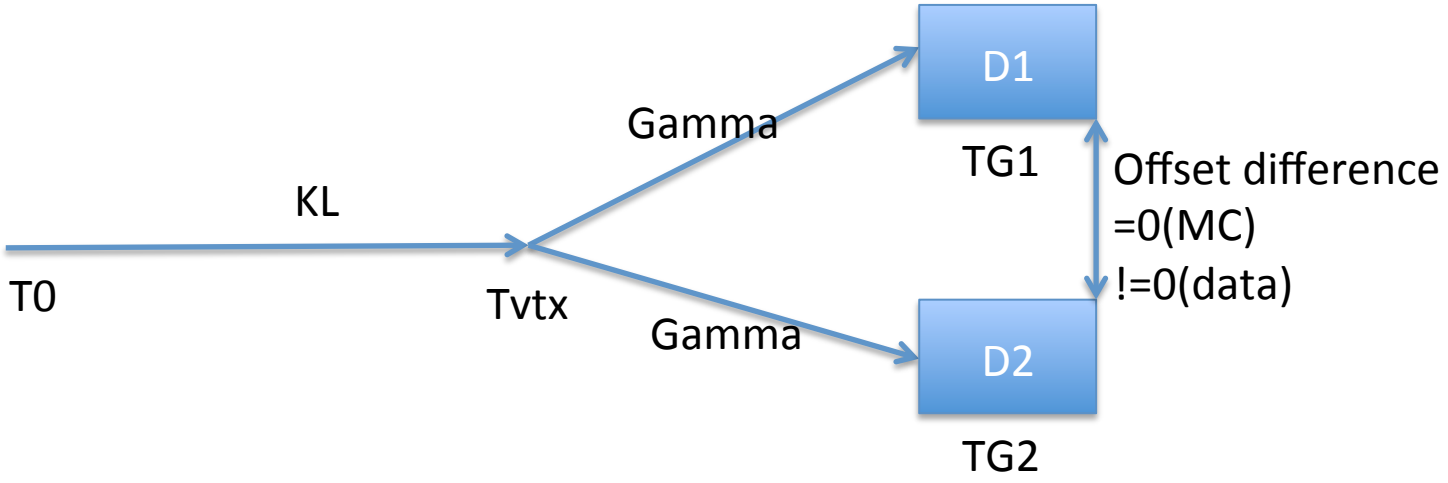


Run69



MC





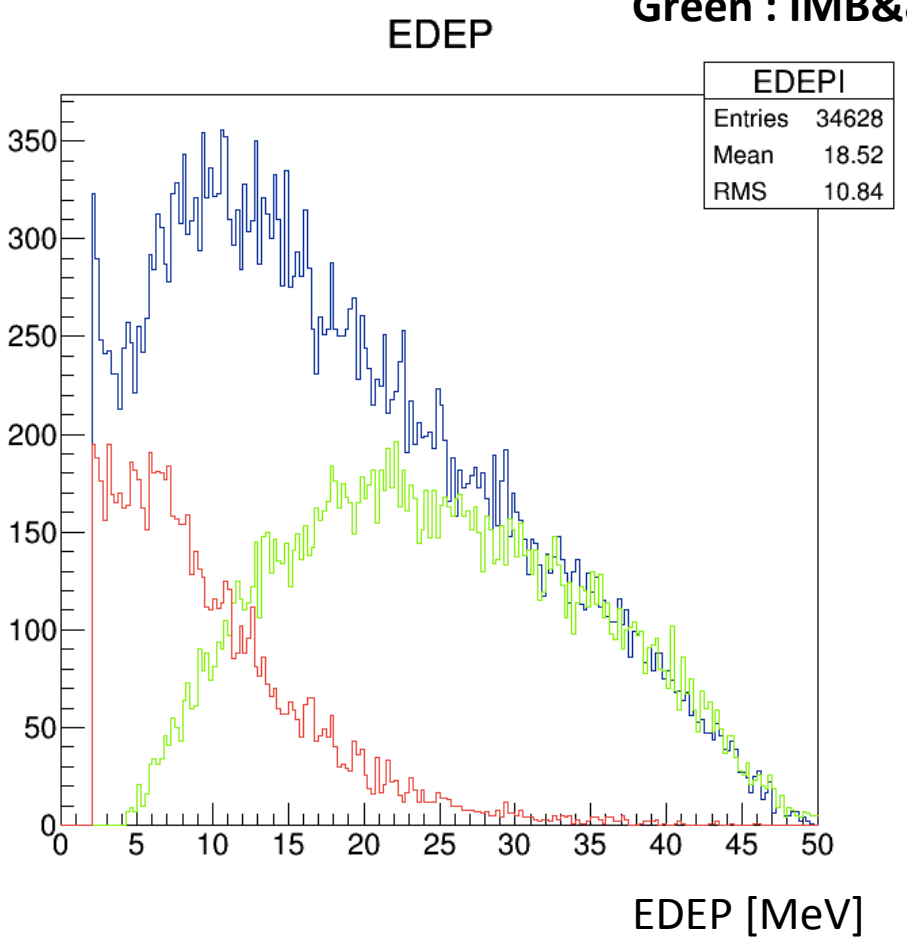
Intrinsic Resolution of D1, D2
D1~D2

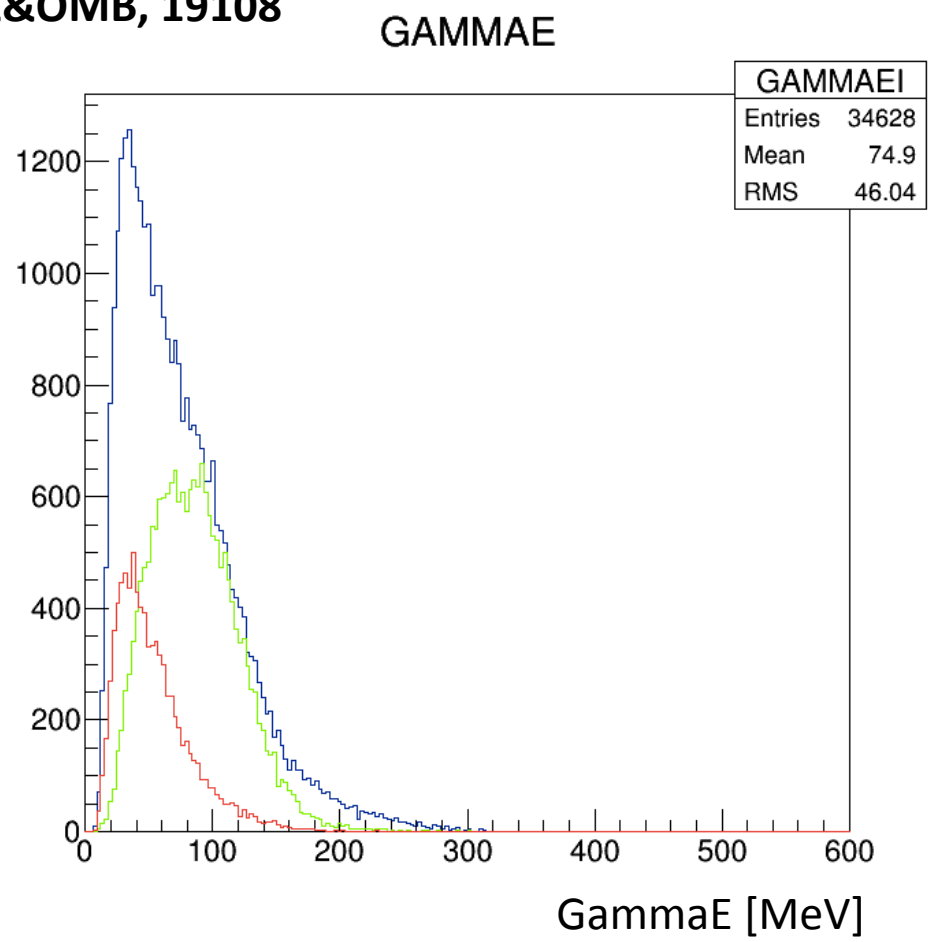
Deposited energy on barrels

- Deposited energy, Gamma Energy
- Selections
  - 1hit
    - On IMB
    - On OMB
  - 2hits
    - IMB + OMB
- Run62

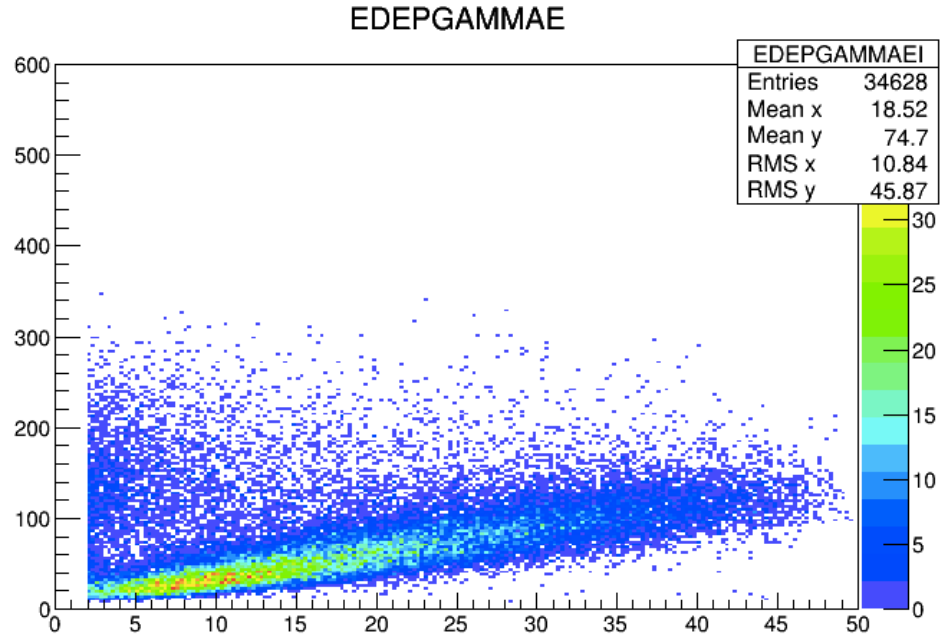
Deposited energy, gamma energy

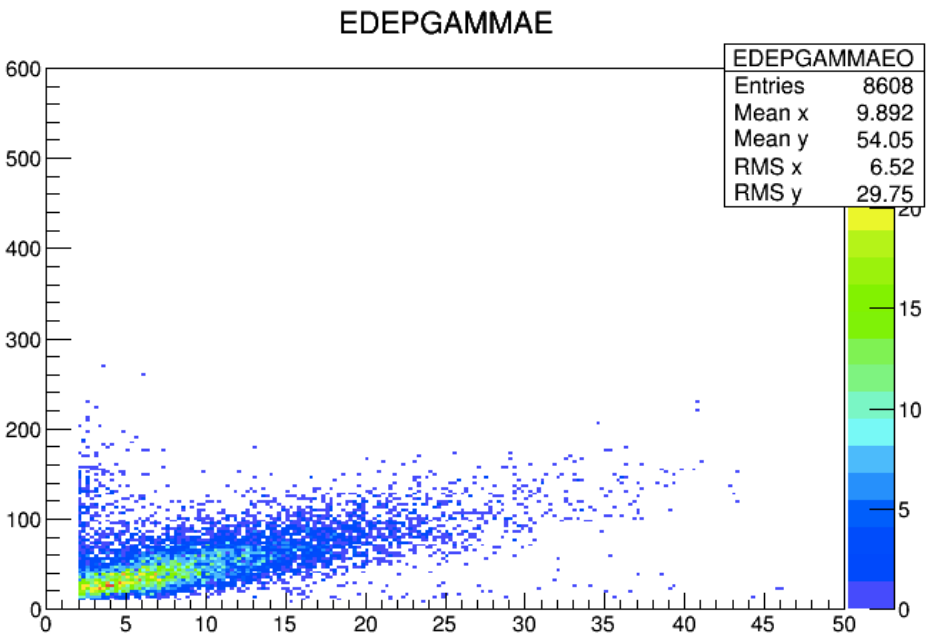
Blue : IMB, 34628
Red : OMB, 8608
Green : IMB&&OMB, 19108

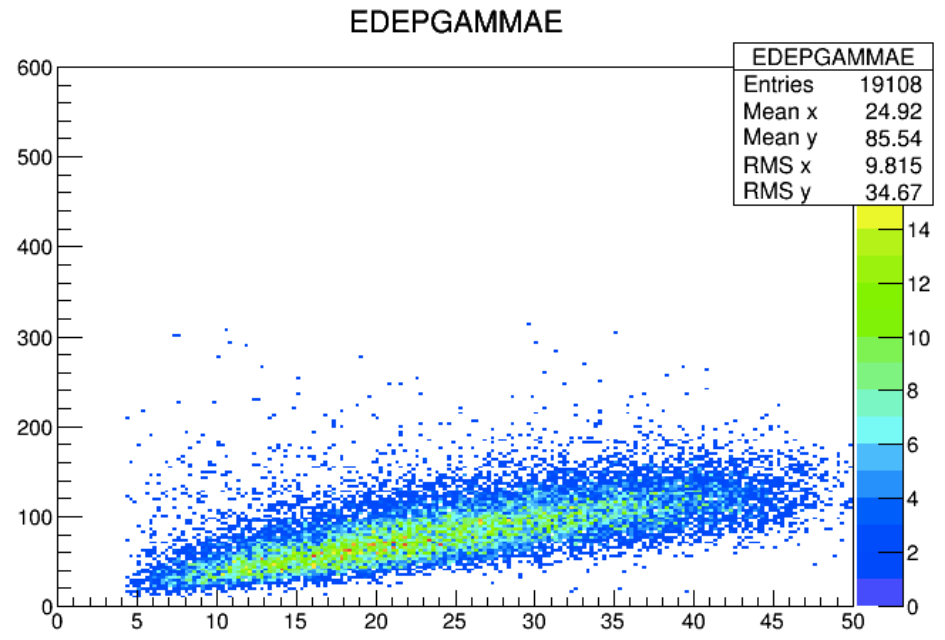


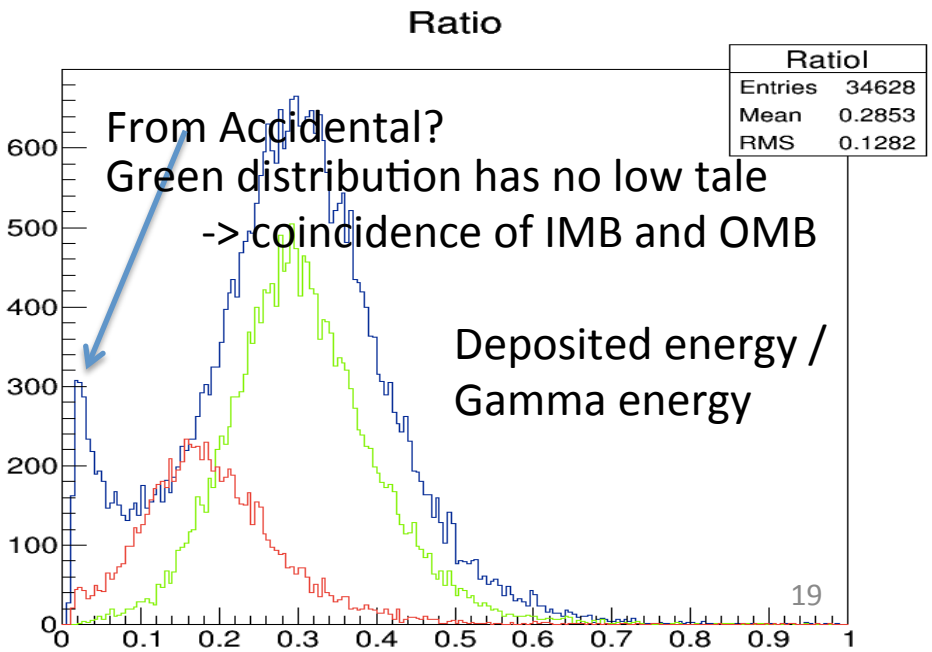


Deposited energy vs Gamma energy

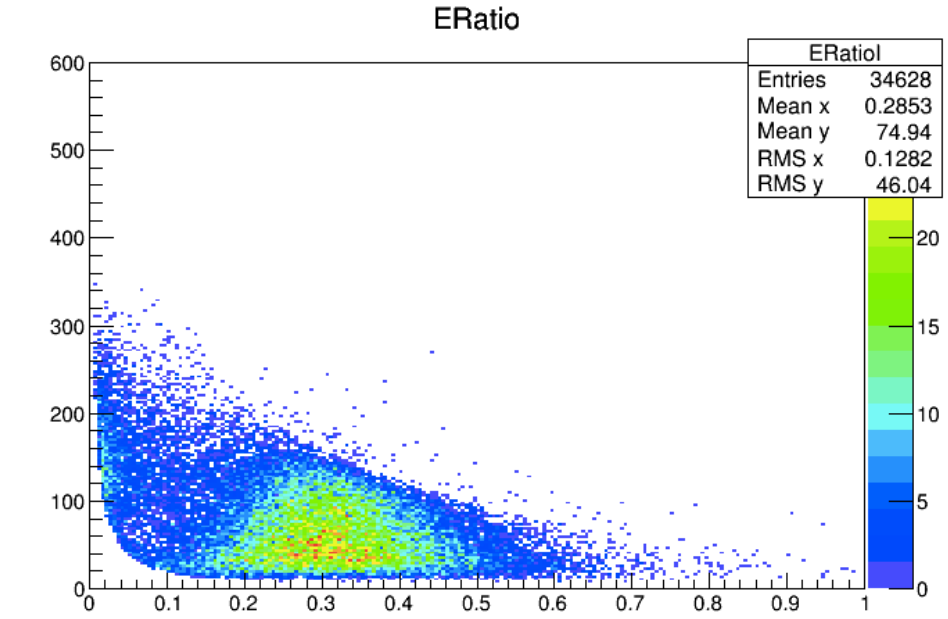


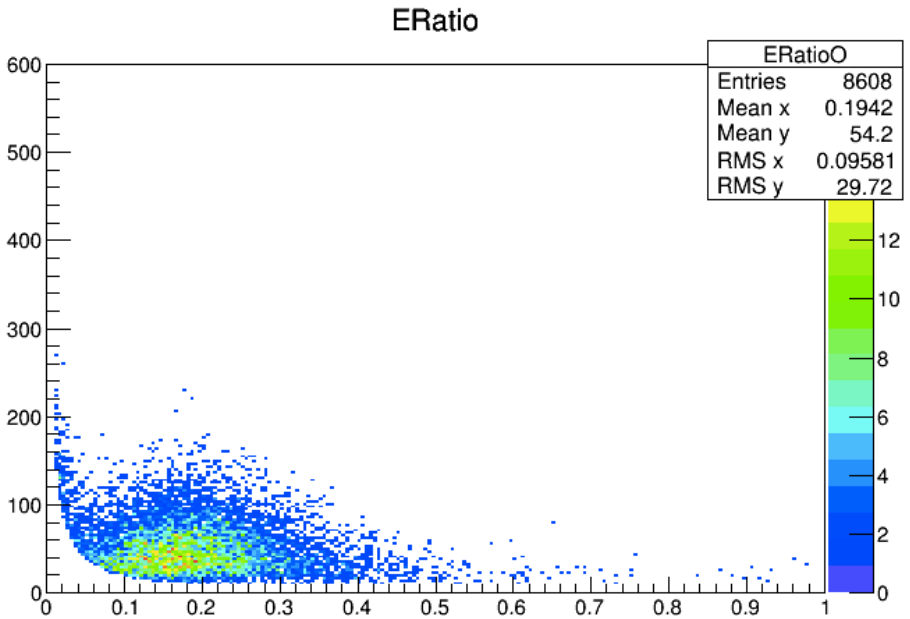


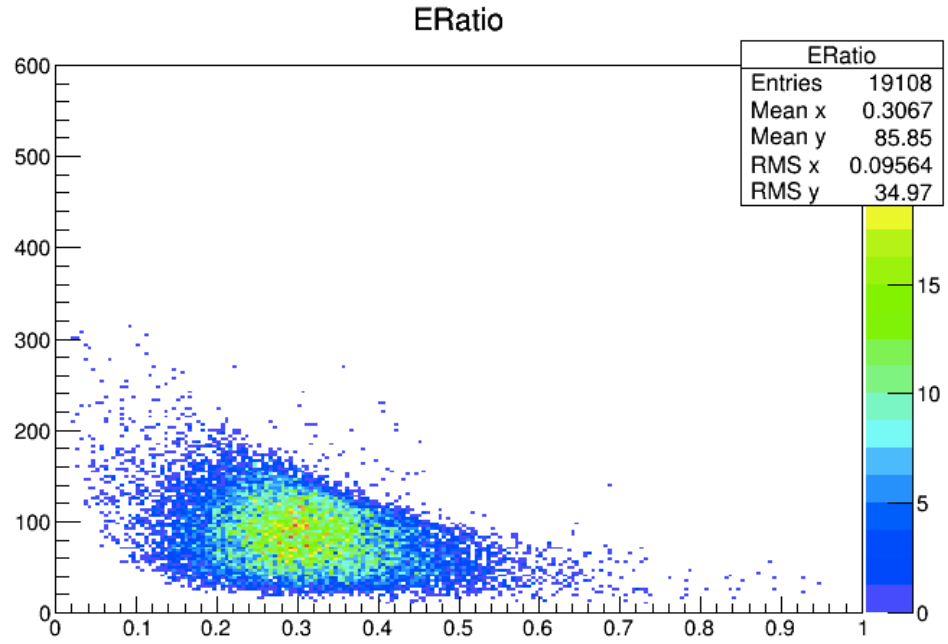




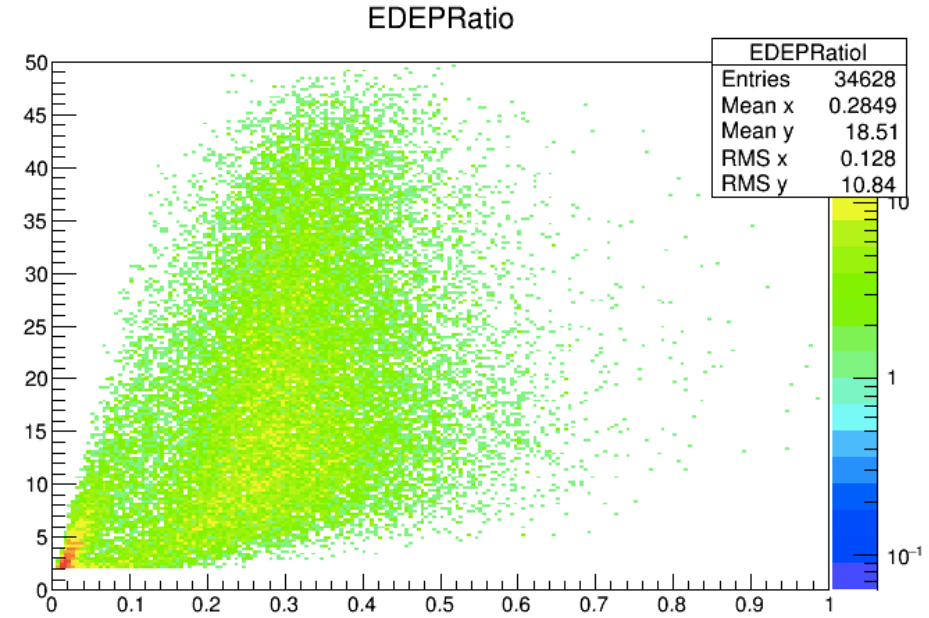
Ratio vs Gamma energy

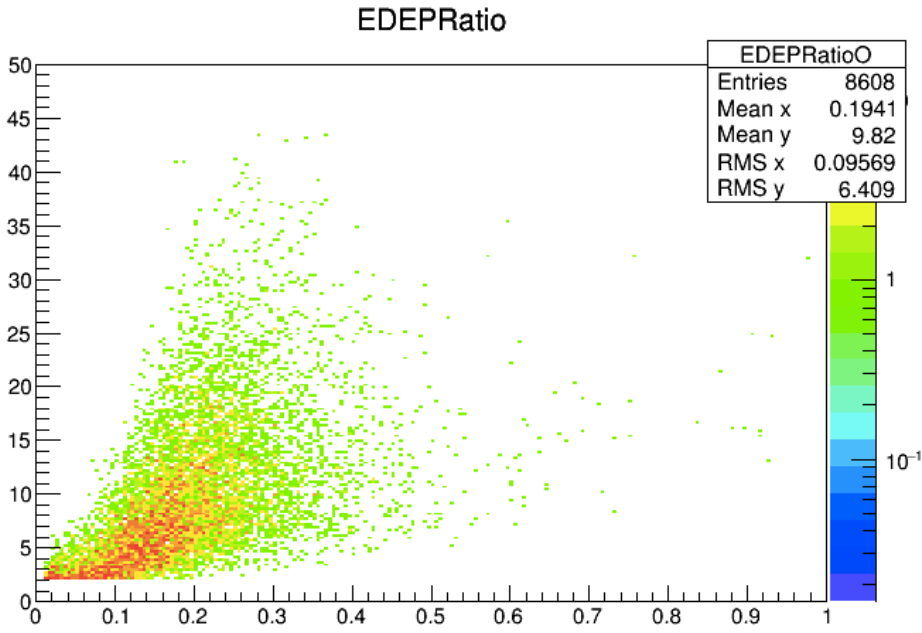


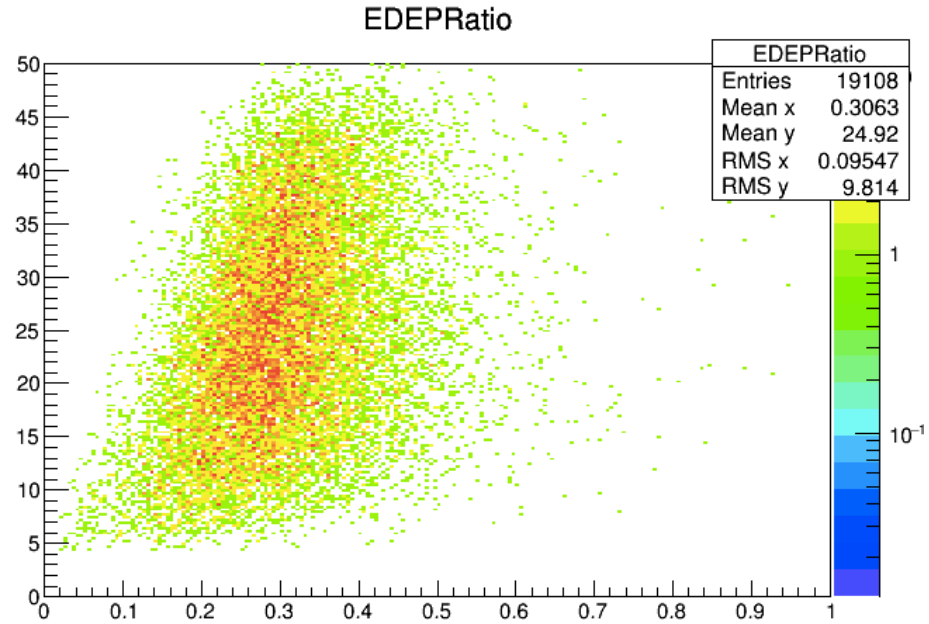




Ratio vs Deposited energy

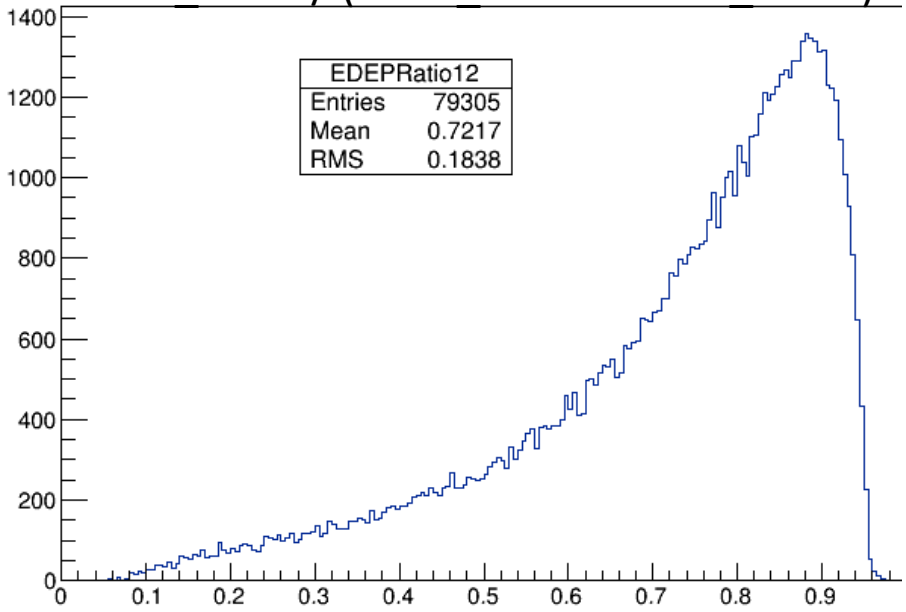






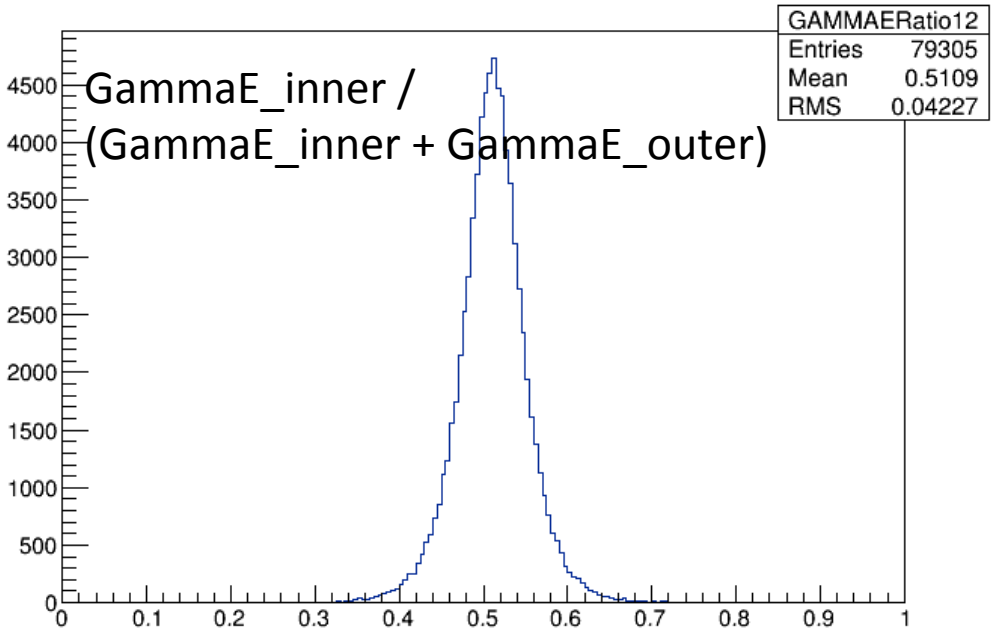
Comparison of OMB and IMB in the case of 2hits

EDEP_inner / (EDEP_inner + EDEP_outer)



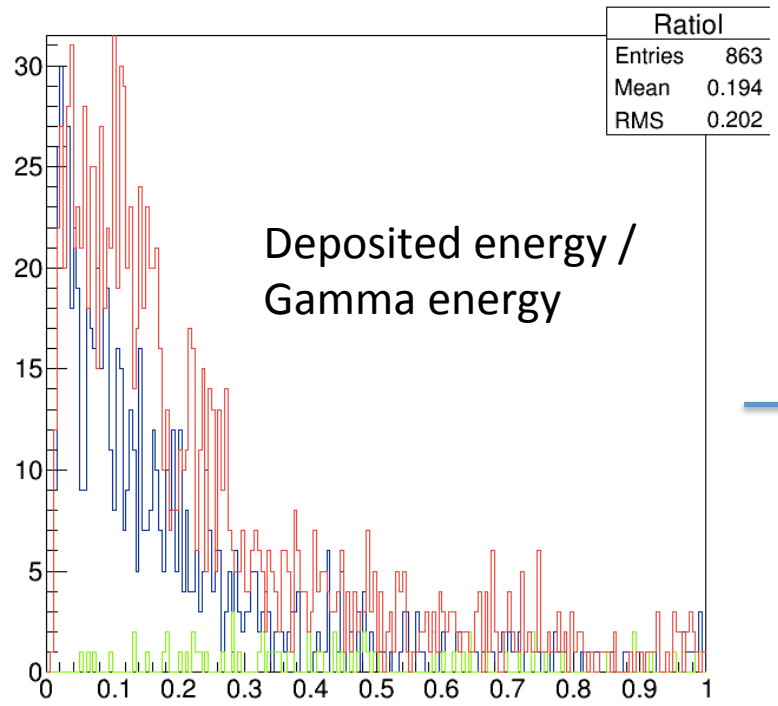
GAMMAERatio12

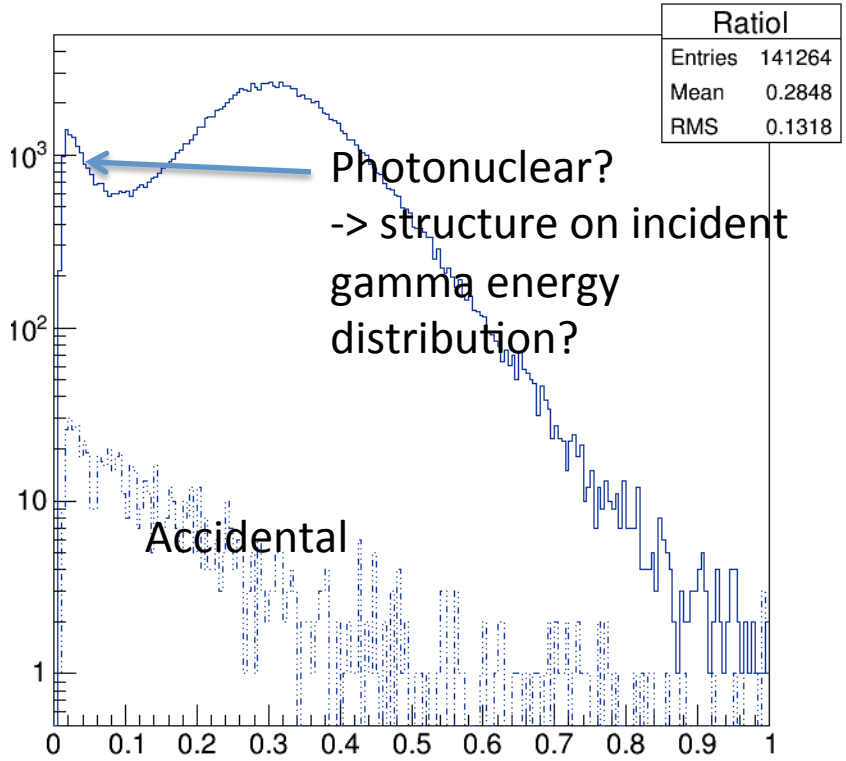
GammaE_inner / (GammaE_inner + GammaE_outer)



Accidental check

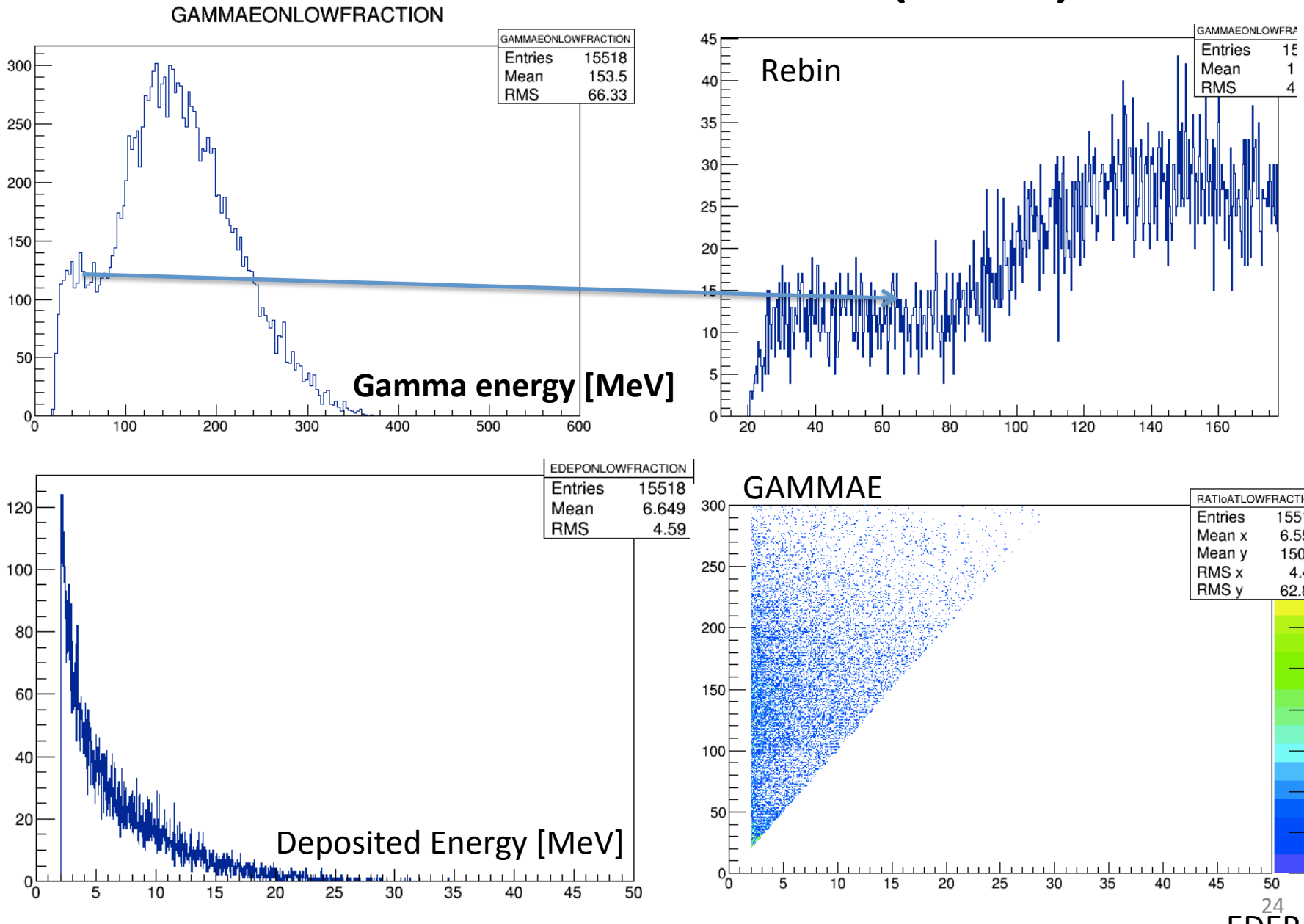
- Use CBAR data at accidental window





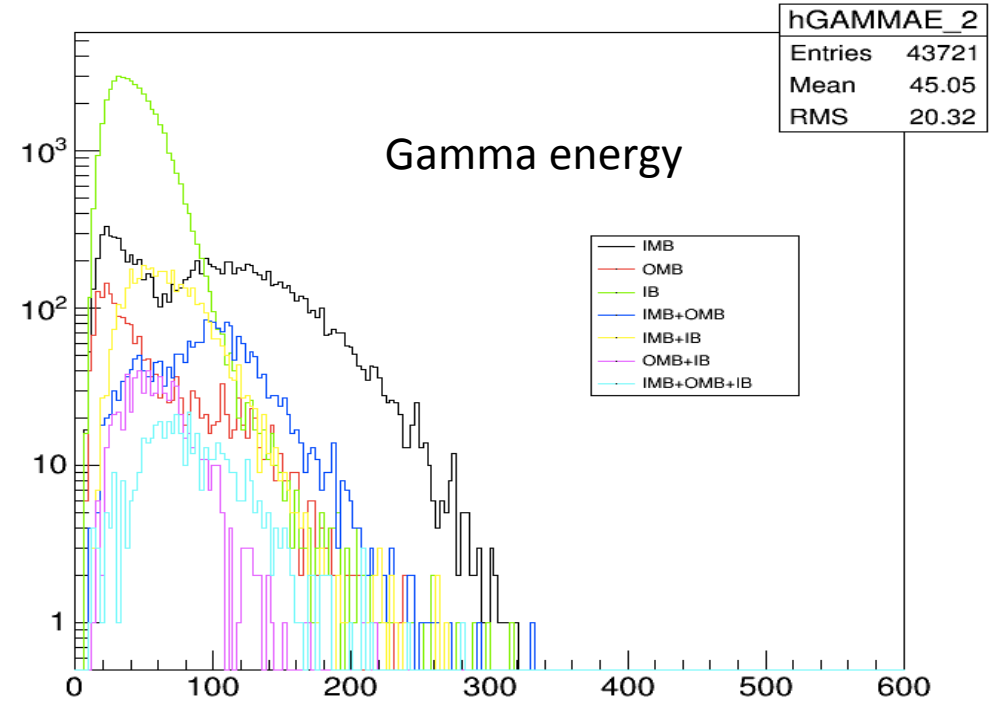
Small effect of Accidental hit on low tale

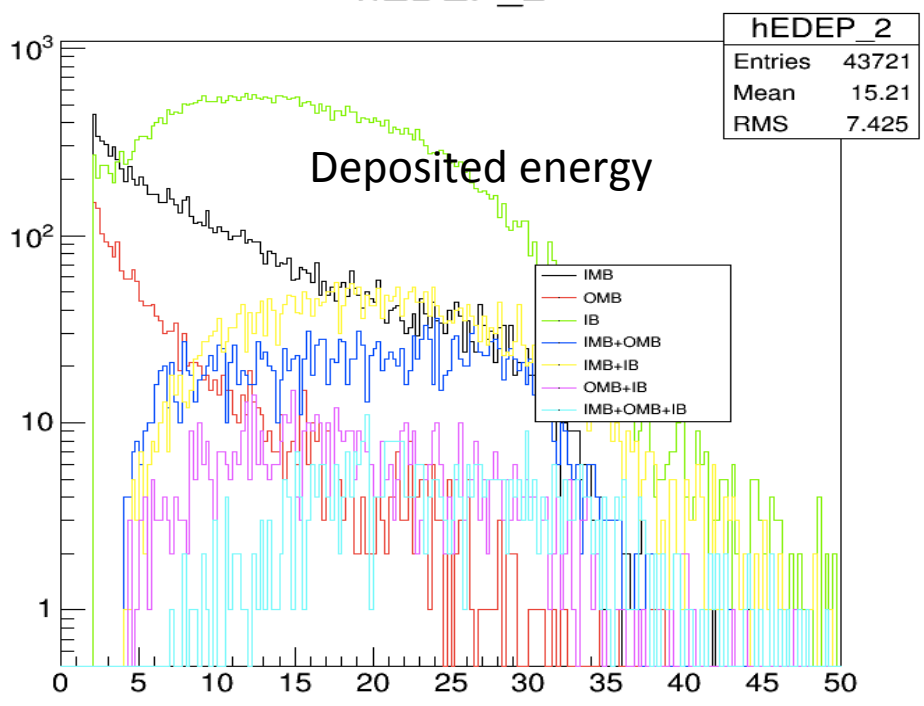
At low Ratio < 0.1 (IMB)

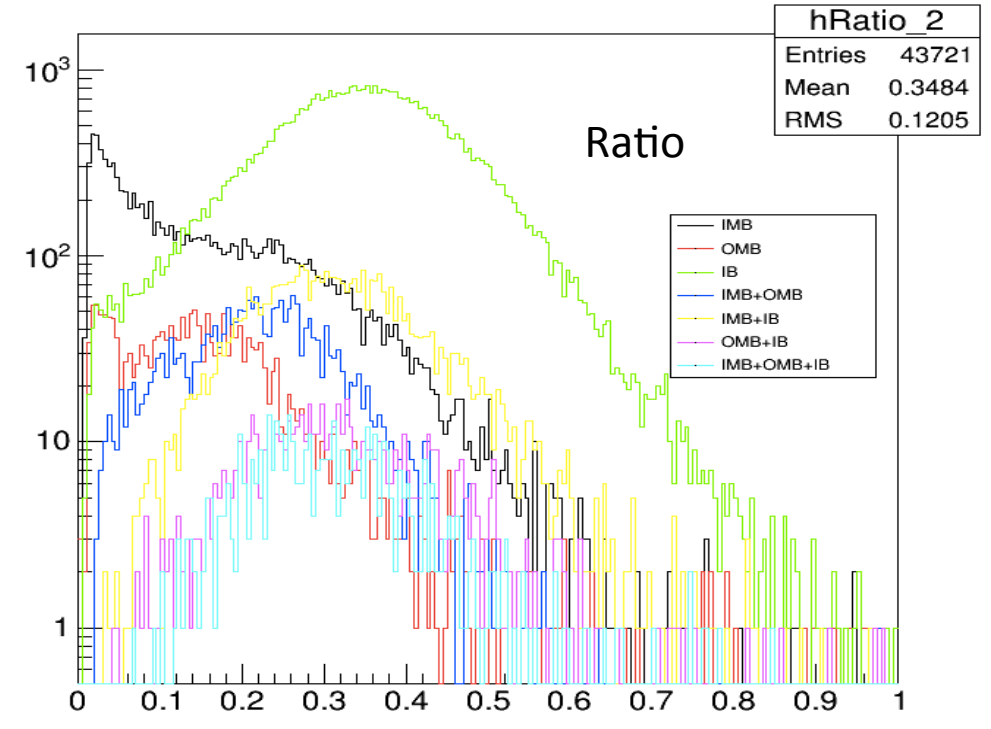


In Run69,

- Maximum Hit : 3hit
- One hit
  - IB. IMB, OMB
- Two hits
  - IB+IMB, IMB+OMB, IB+OMB(?)
- Three hits







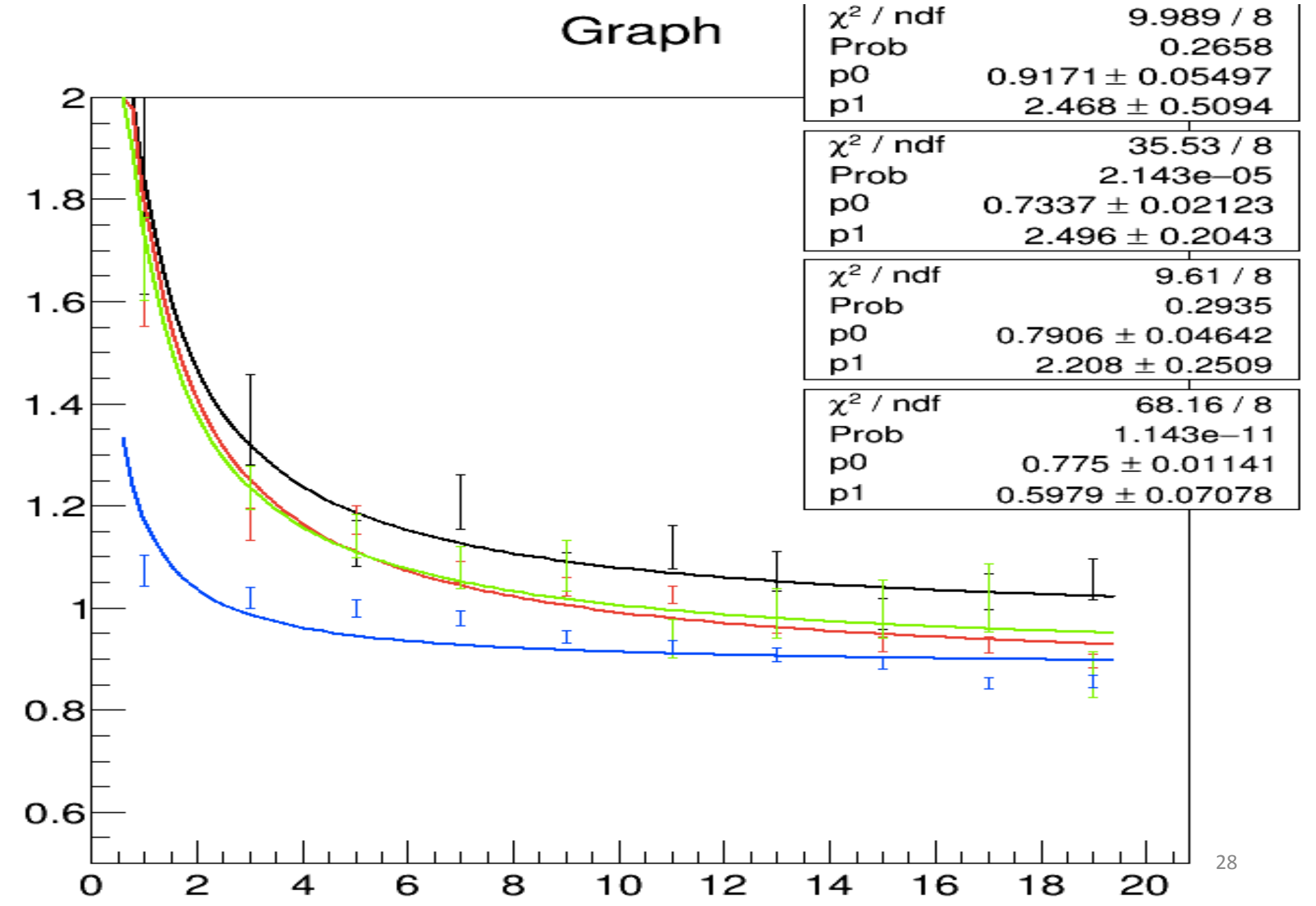
Entries

IMB : 10611
OMB : 2078
IB : 43721
IMB+OMB : 2331
IMB+IB : 4020
IB+OMB : 681
IMB+OMB+IB : 474

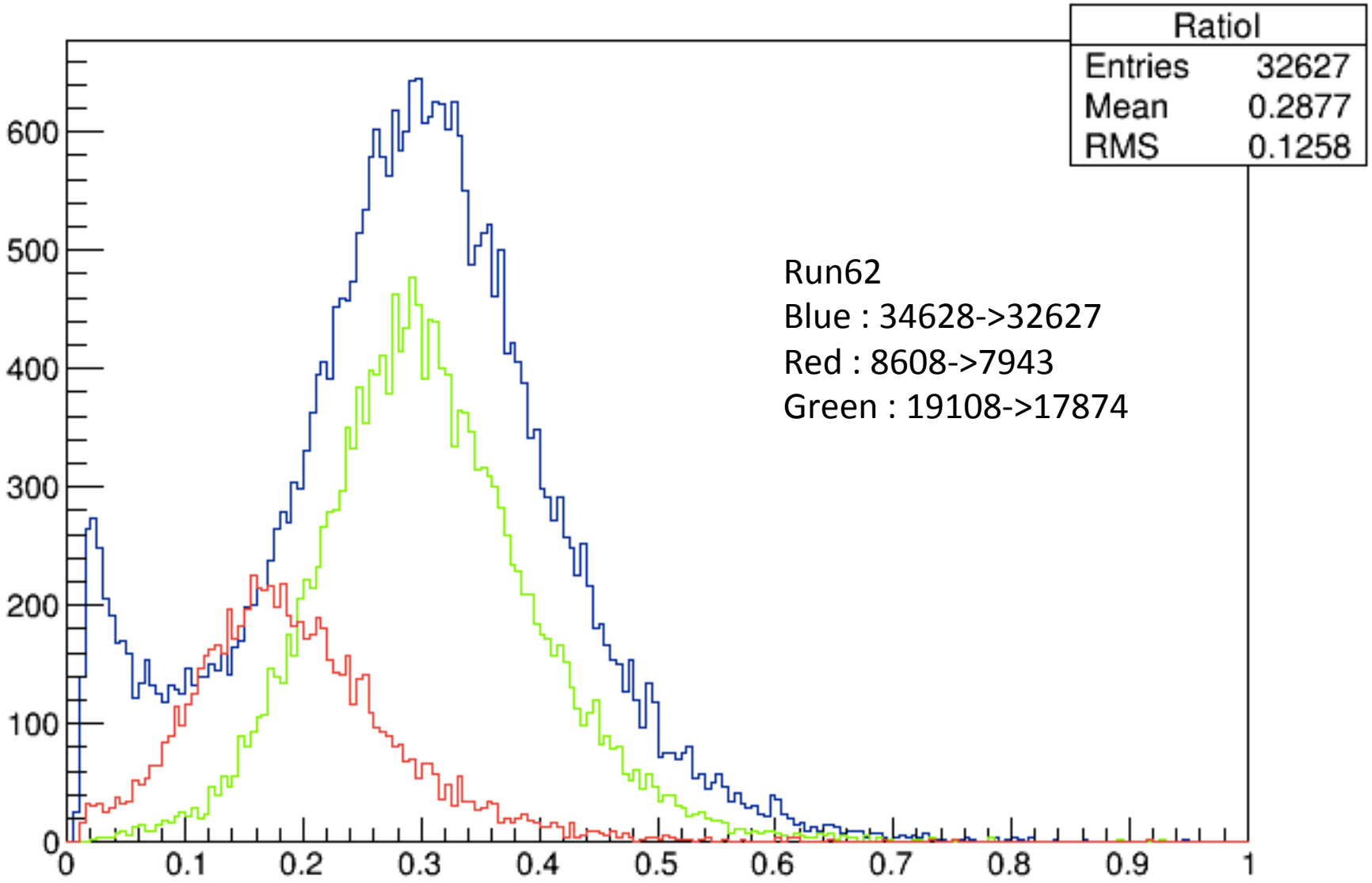
Plots After KlongMass Cut 28, 29

- KlongMass [482.7,512.7] (selection region)
  - +/- 15MeV/c^2

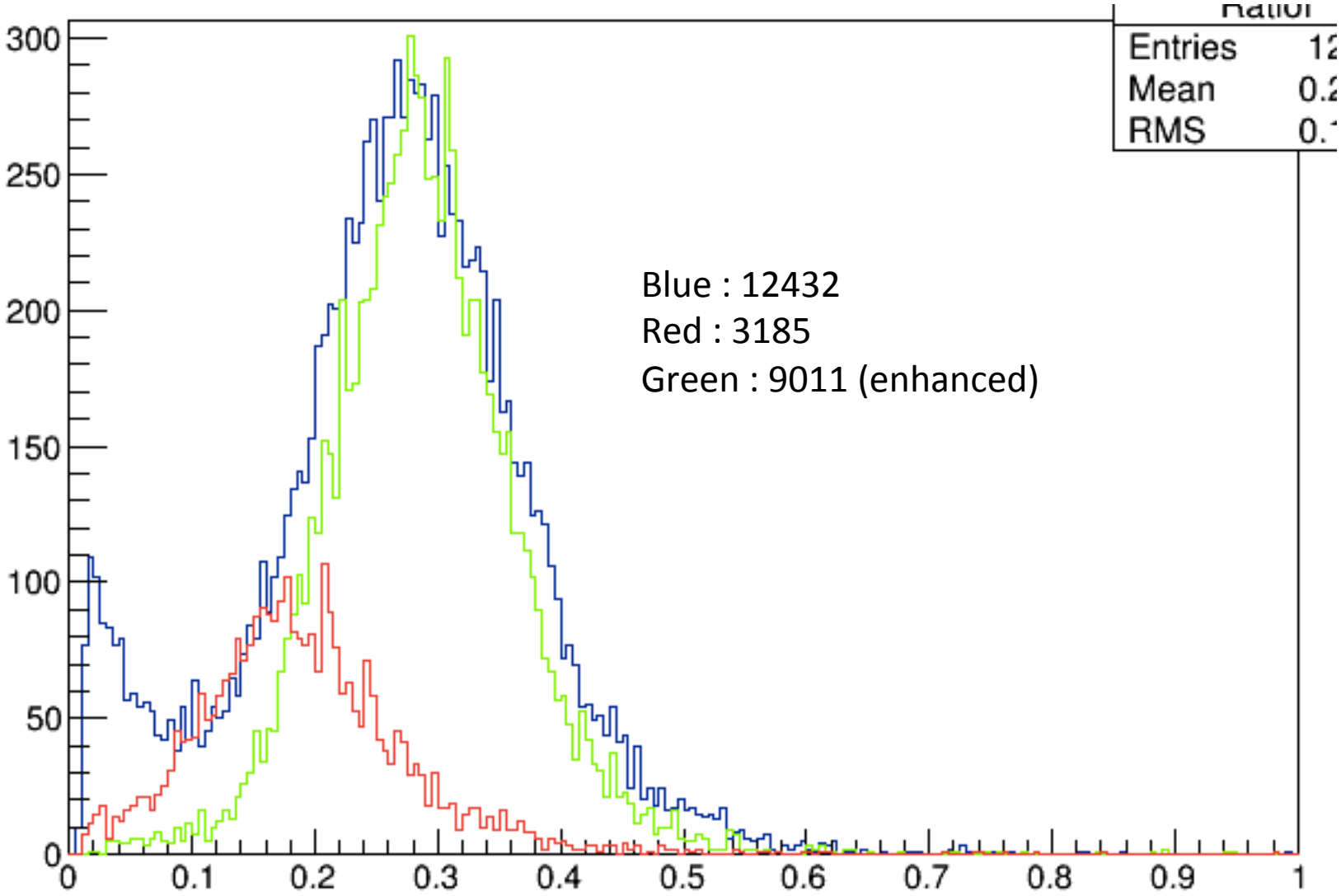
Vertex Time Difference



Sampling Fraction



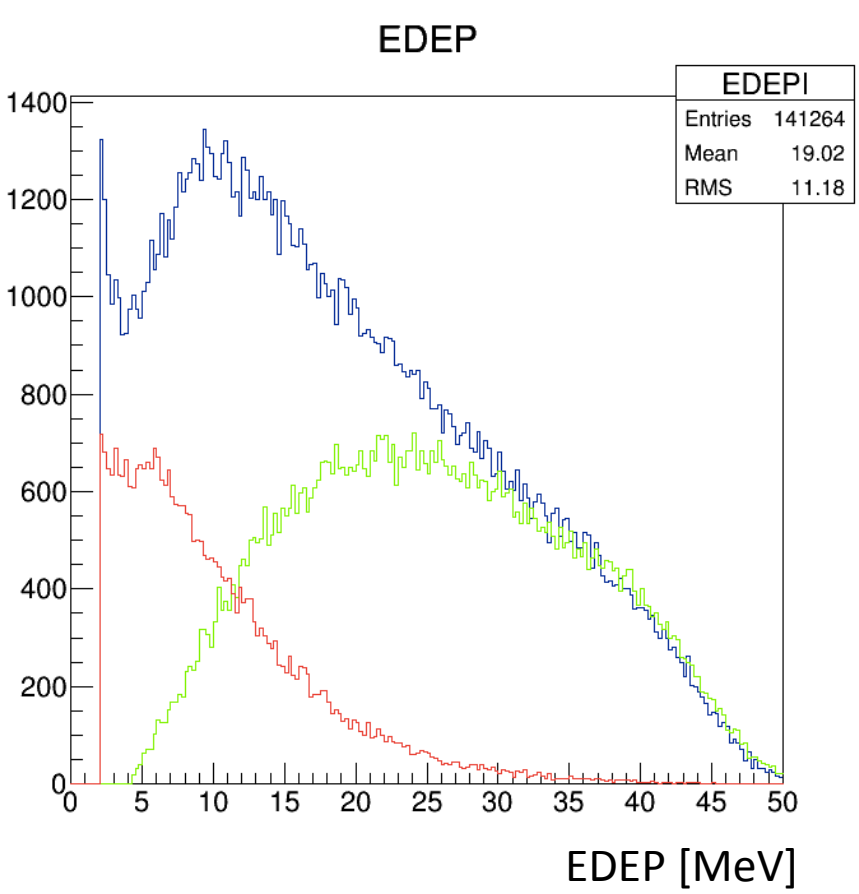
MC

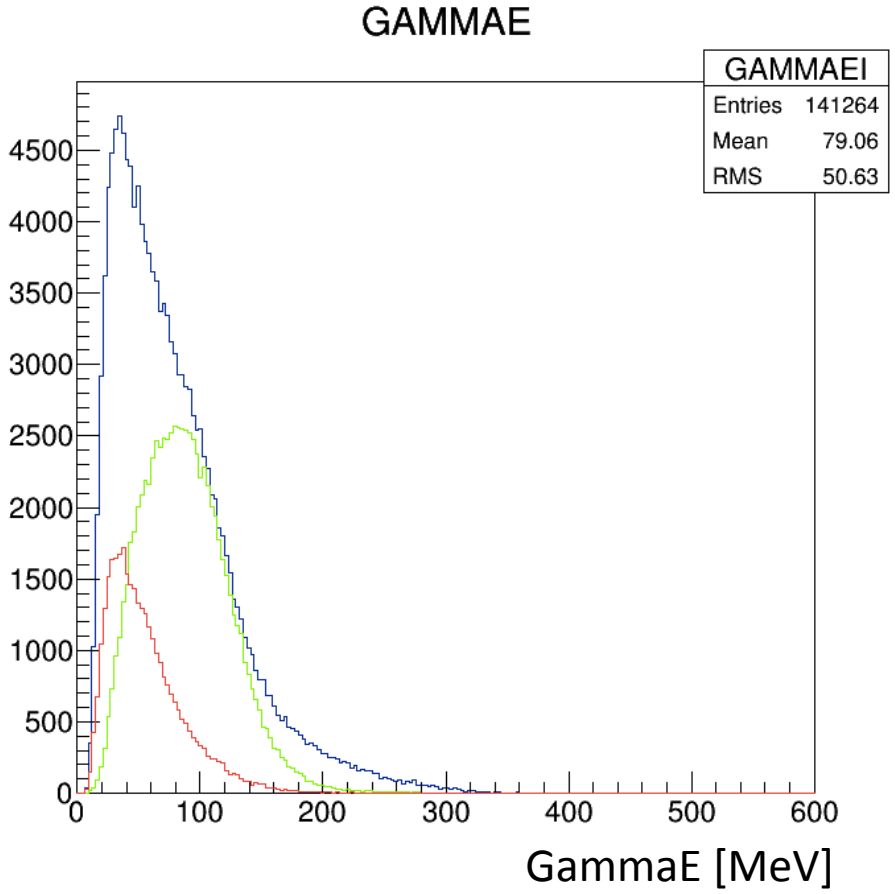

Entries
Mean
RMS
Blue : 12432
Red : 3185
Green : 9011 (enhanced)
300
250
200
150
100
50
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

Physics Trigger

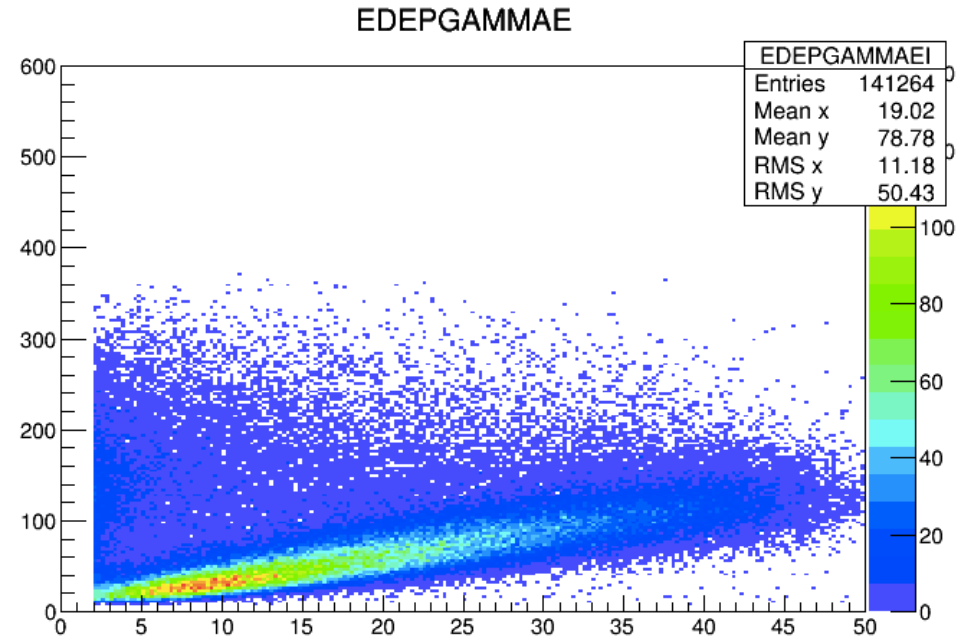
Deposited energy, gamma energy

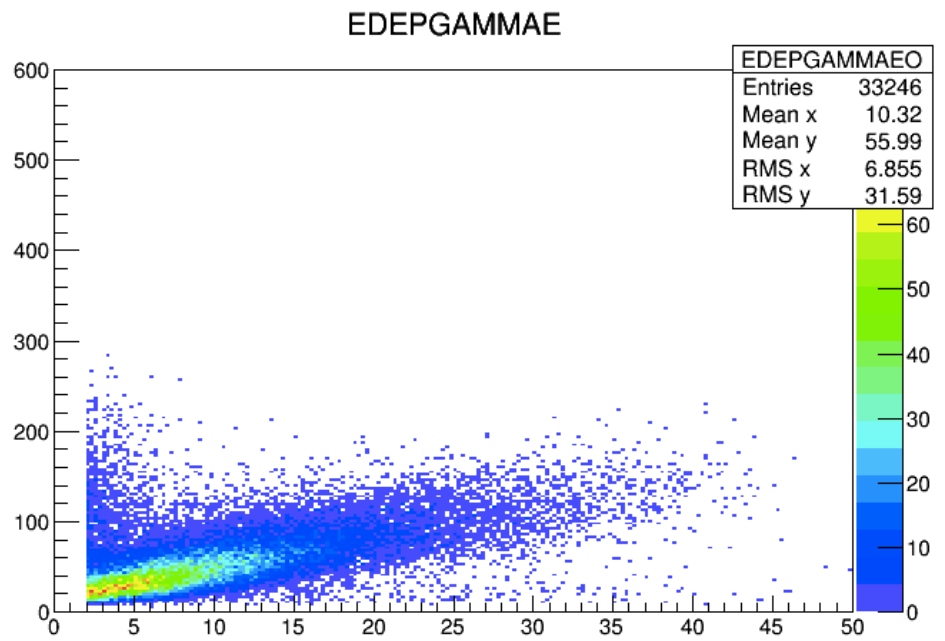
Blue : IMB, 141264
Red : OMB, 33246
Green : IMB&&OMB, 79305

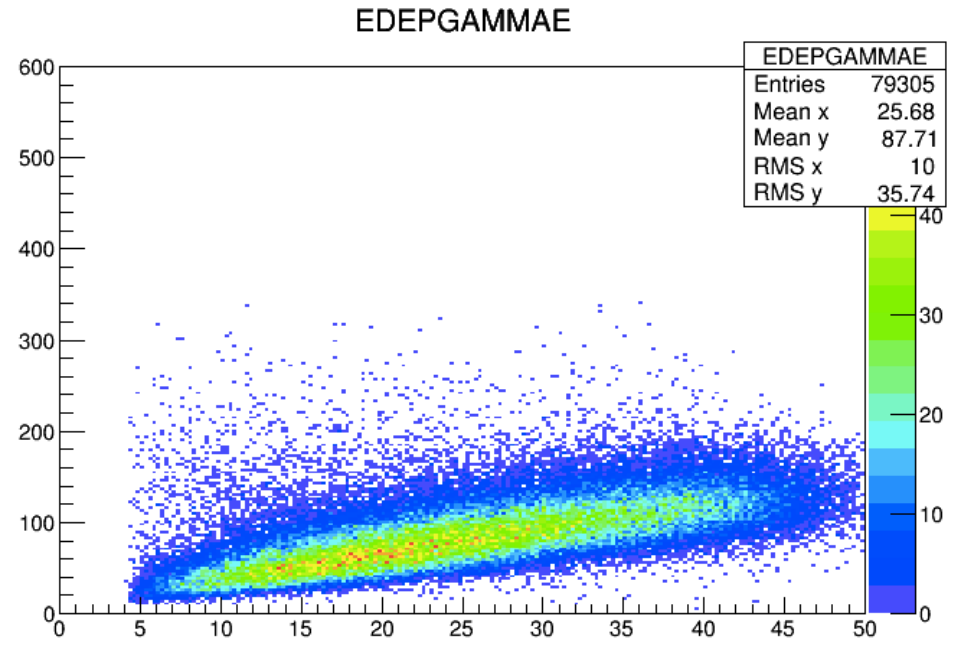


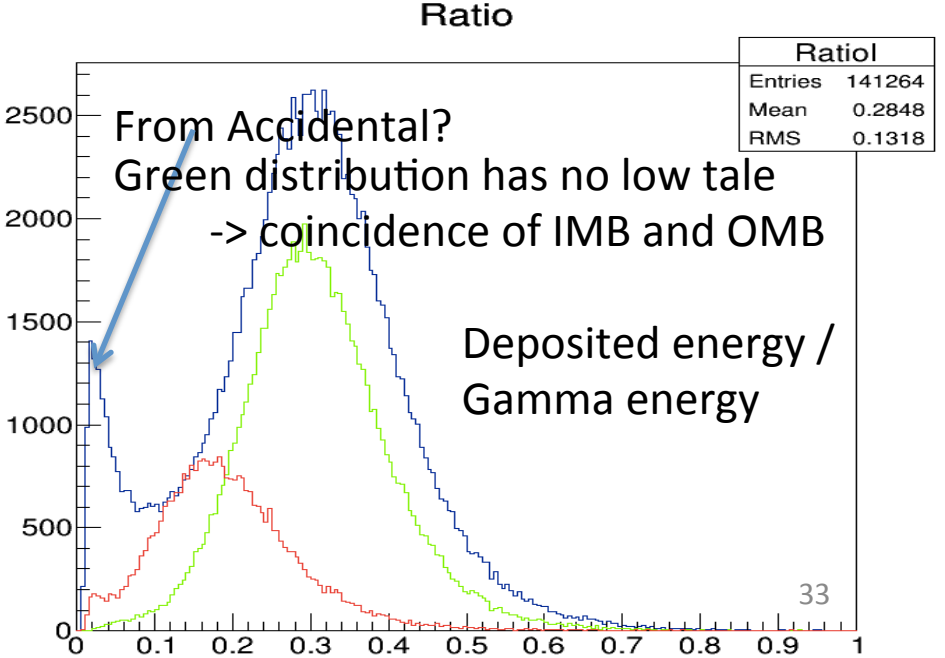


Deposited energy vs Gamma energy

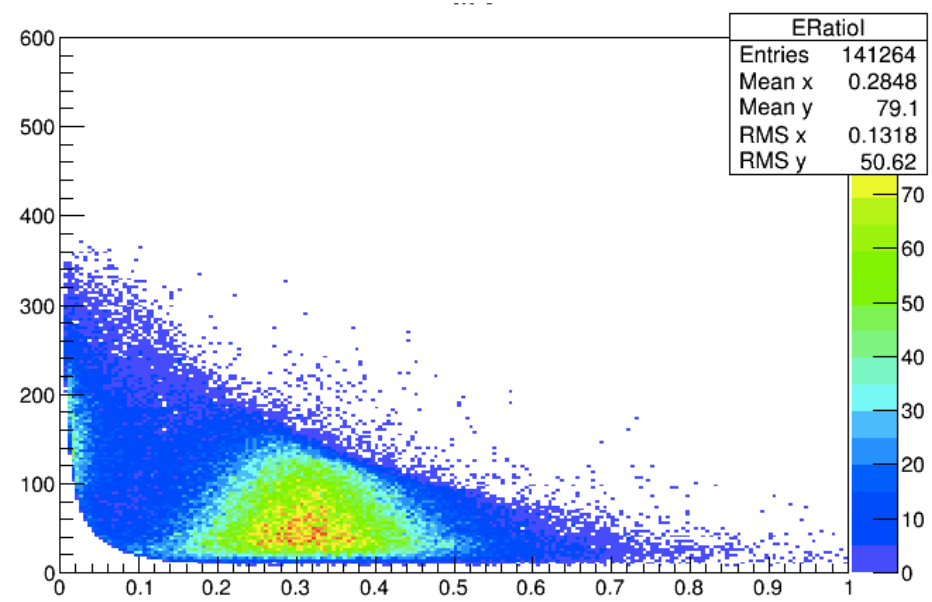


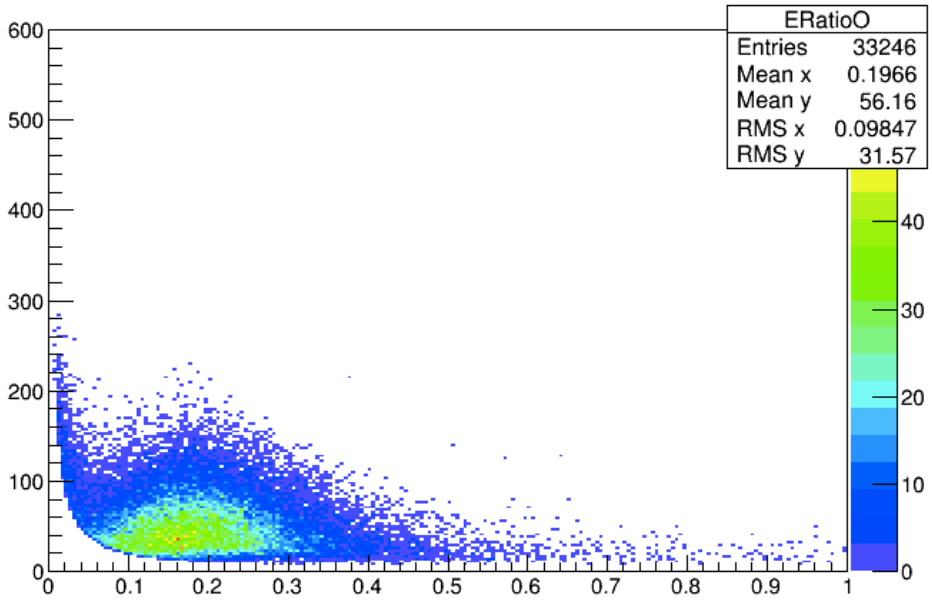


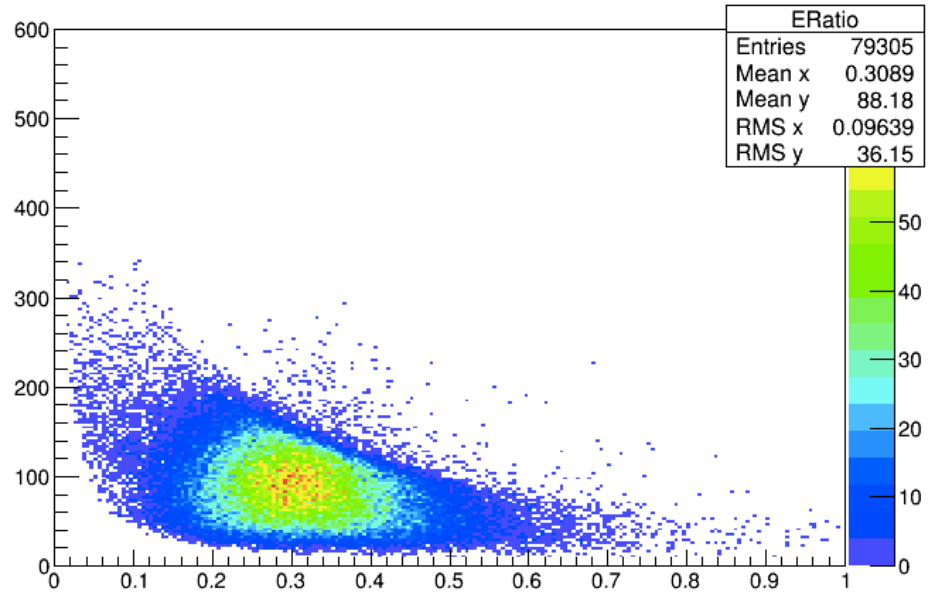




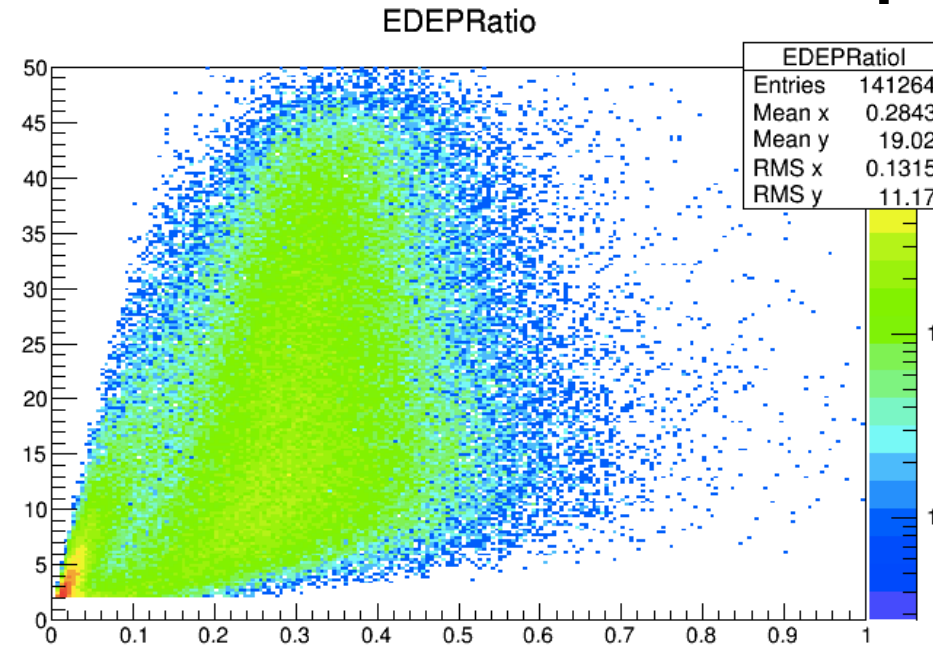
Ratio vs Gamma energy

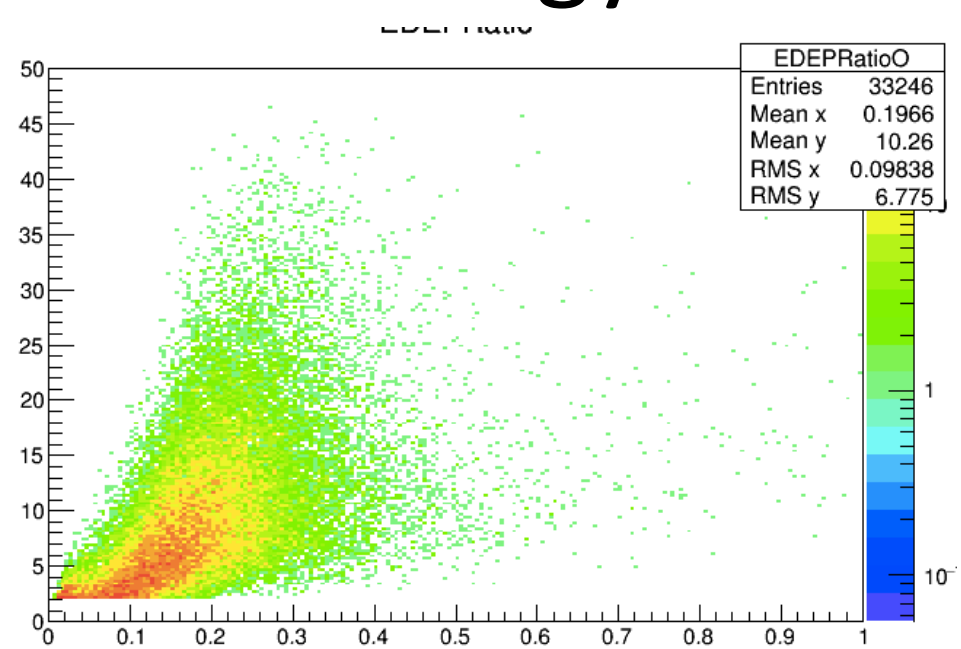


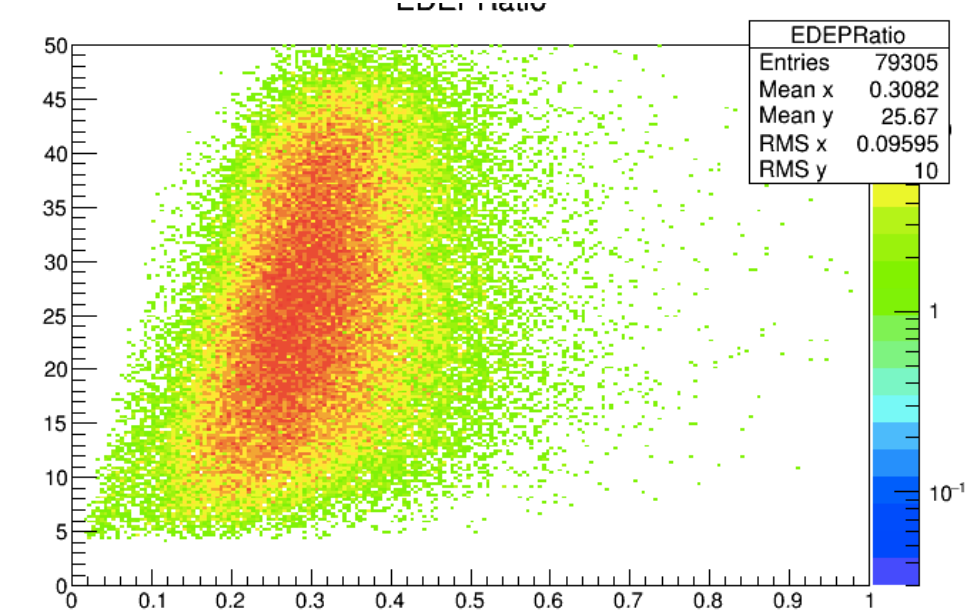




Ratio vs Deposited energy

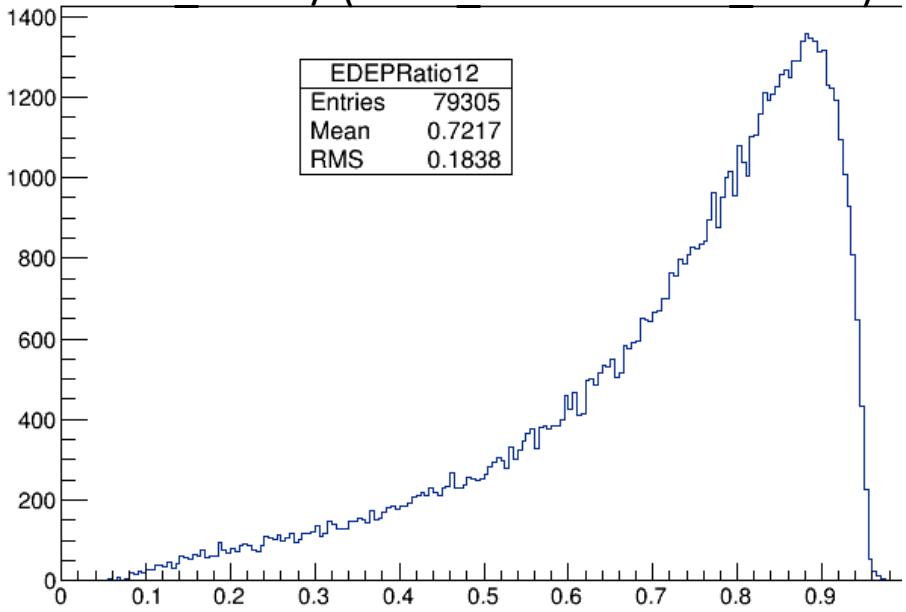




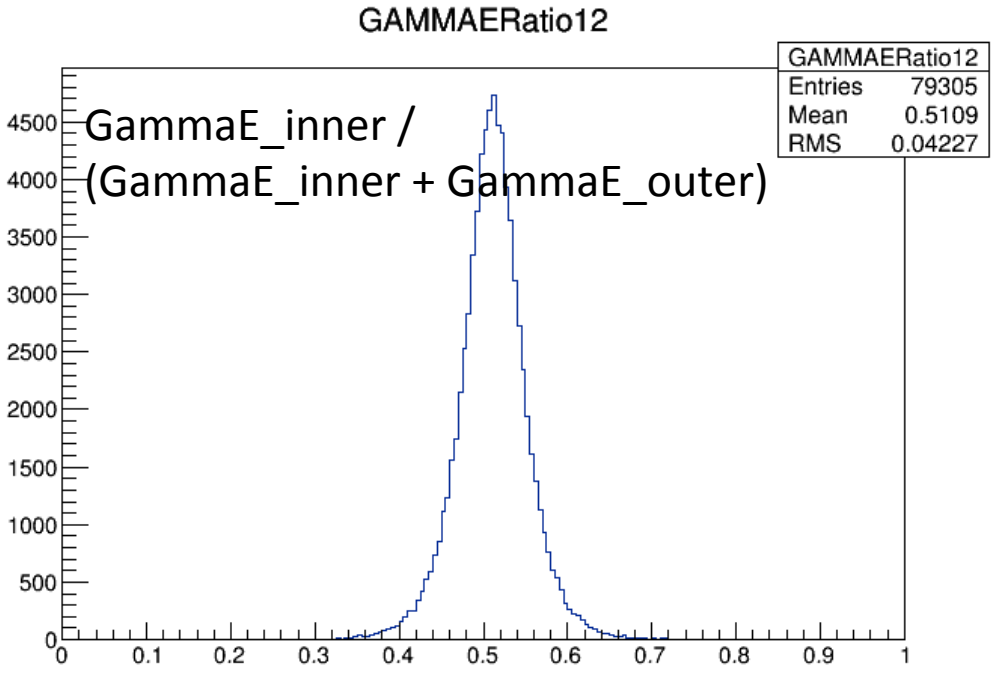


Comparison of OMB and IMB in the case of 2hits

EDEP_inner / (EDEP_inner + EDEP_outer)

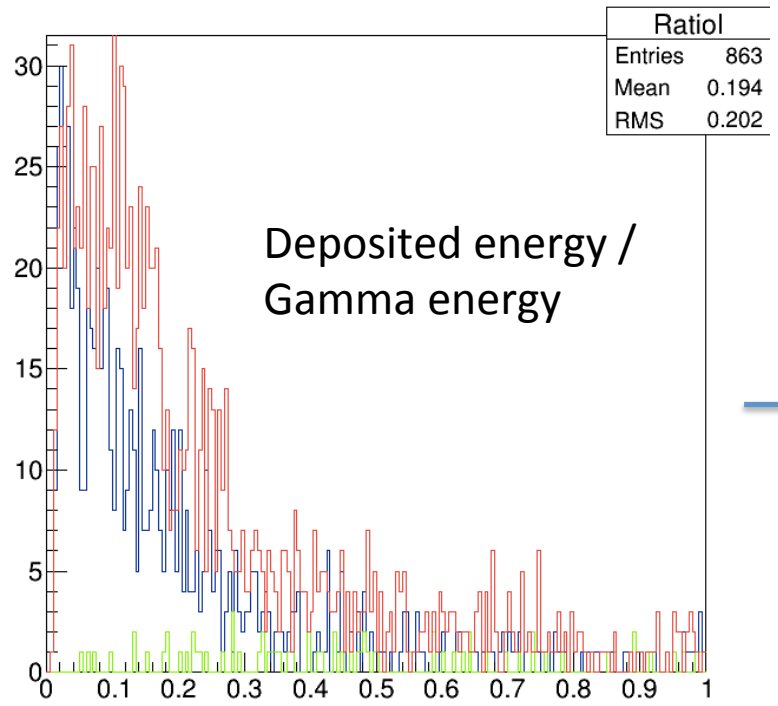


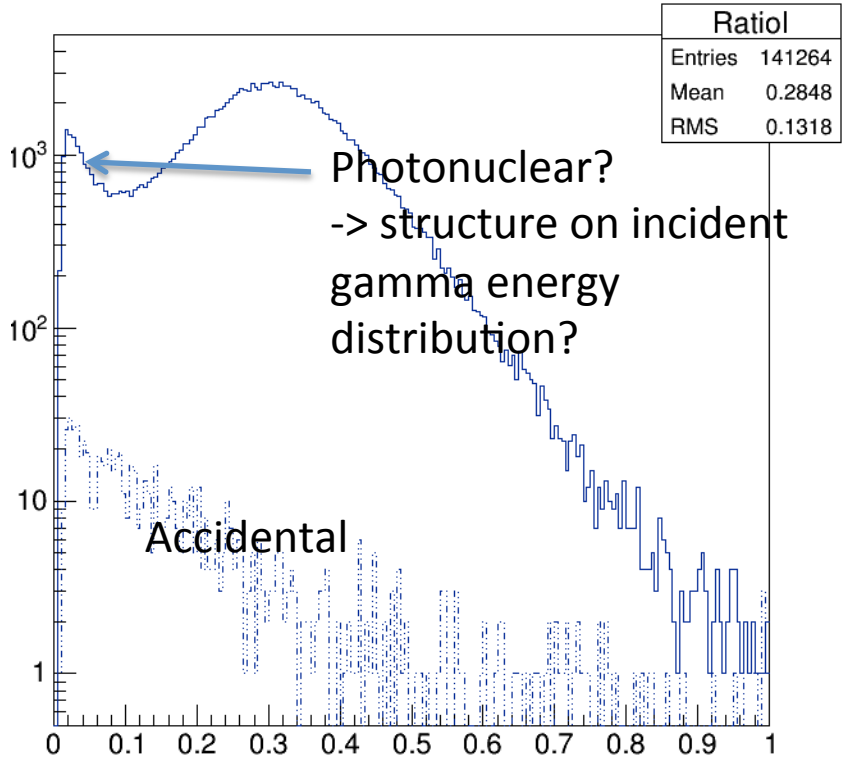
GammaE_inner / (GammaE_inner + GammaE_outer)



Accidental check

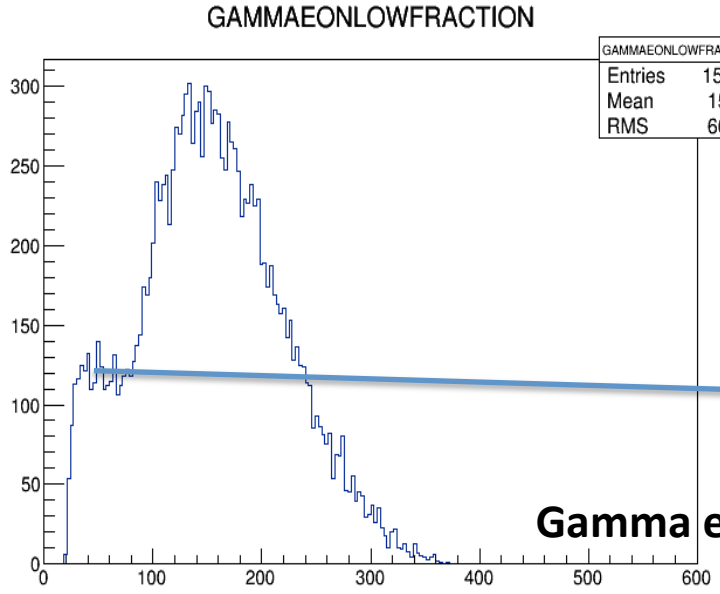
- Use CBAR data at accidental window

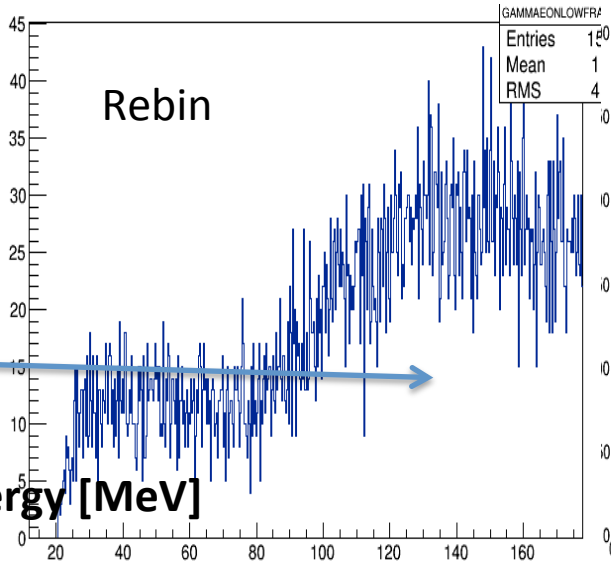


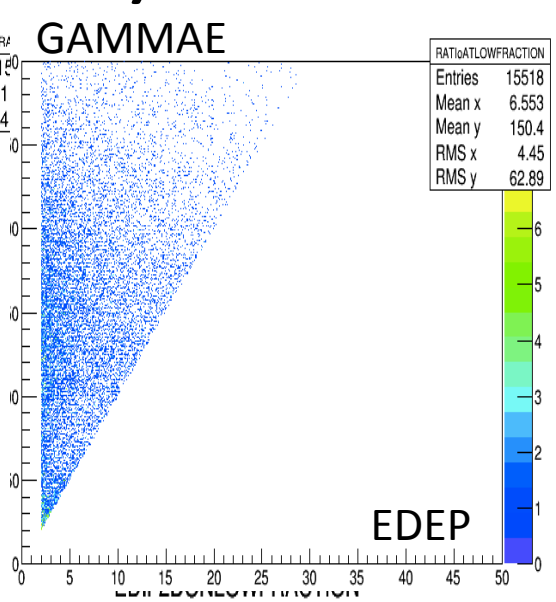


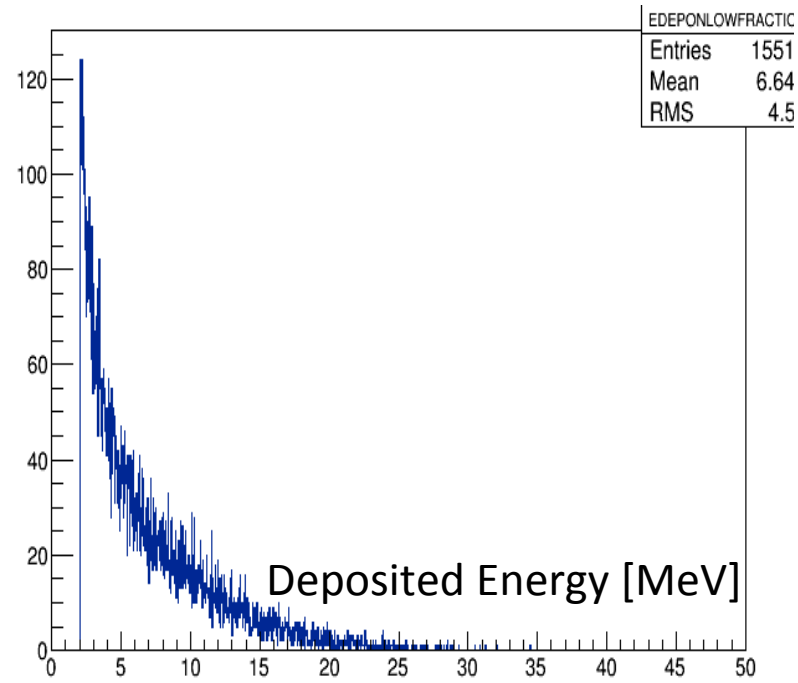
Small effect of Accidental hit on low tale

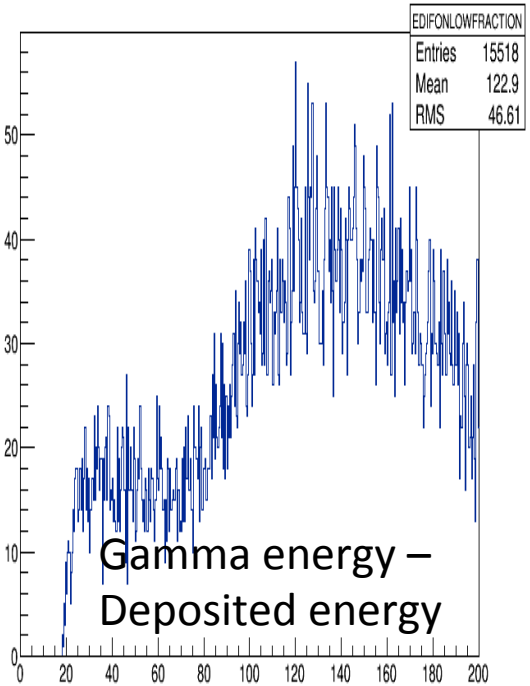
At low Ratio < 0.1 (IMB)

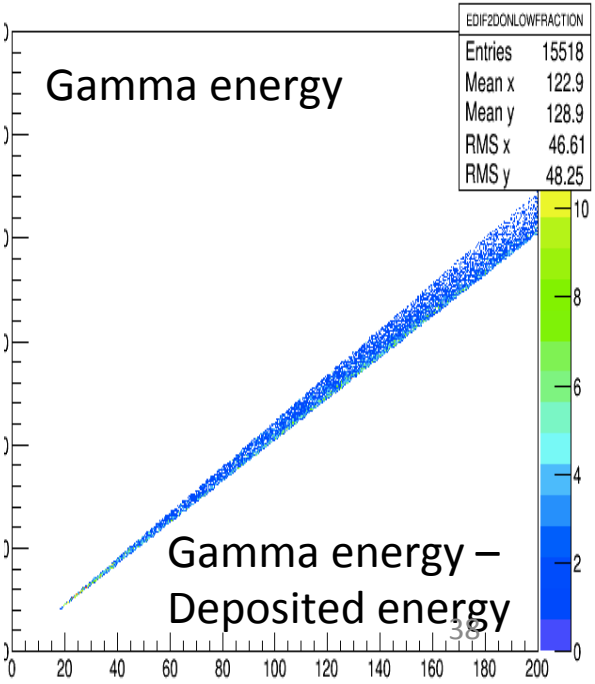












Things to do

- CsI term of time resolution at Run62
- MC has worse resolution than data ???
- Study of events which have low Sampling Fraction
- Discrepancy btw MC and data(19, 30)