Hit Energy

Using DWC and AHCAL

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DESY, 16th December 2018

HELMHOLTZ RESEARCH FOR GRAND CHALLENGES

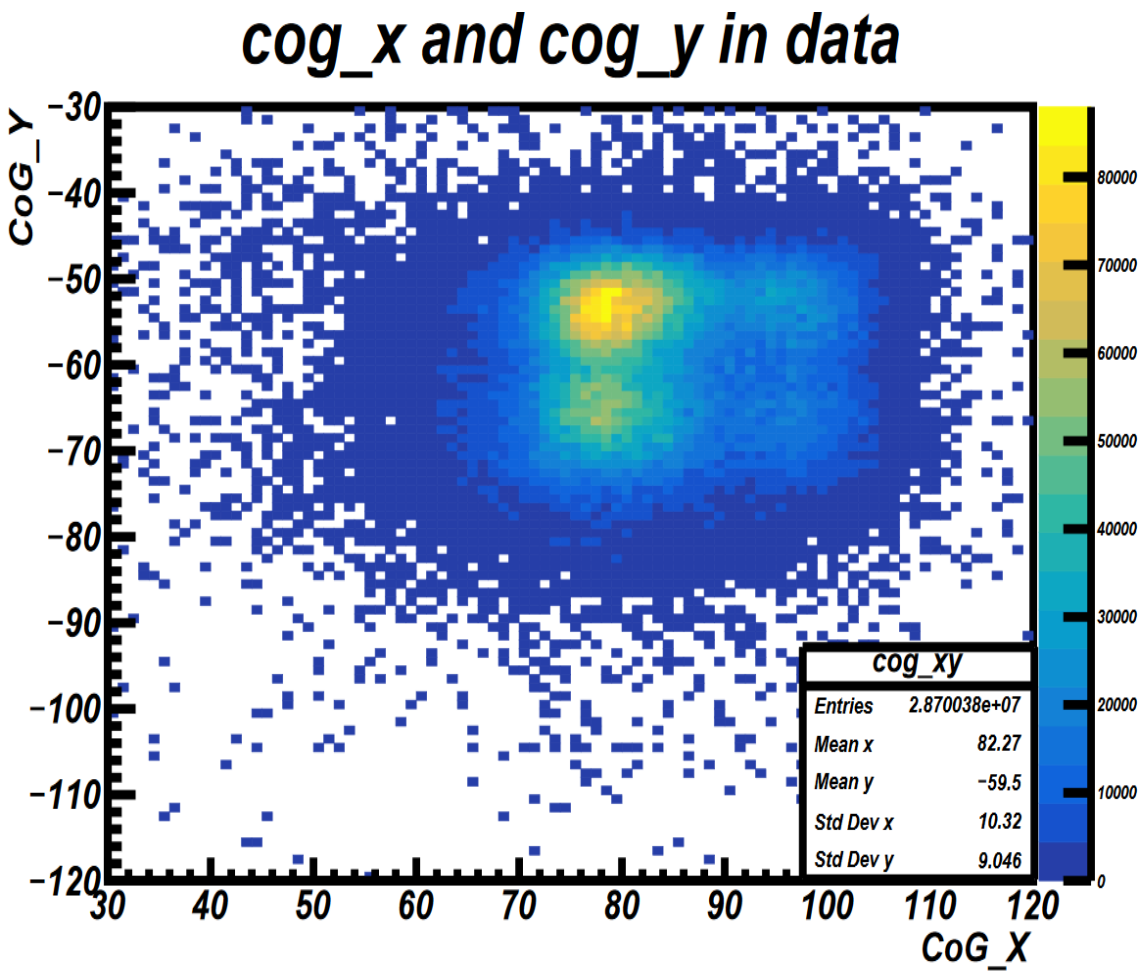
CALICE

Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

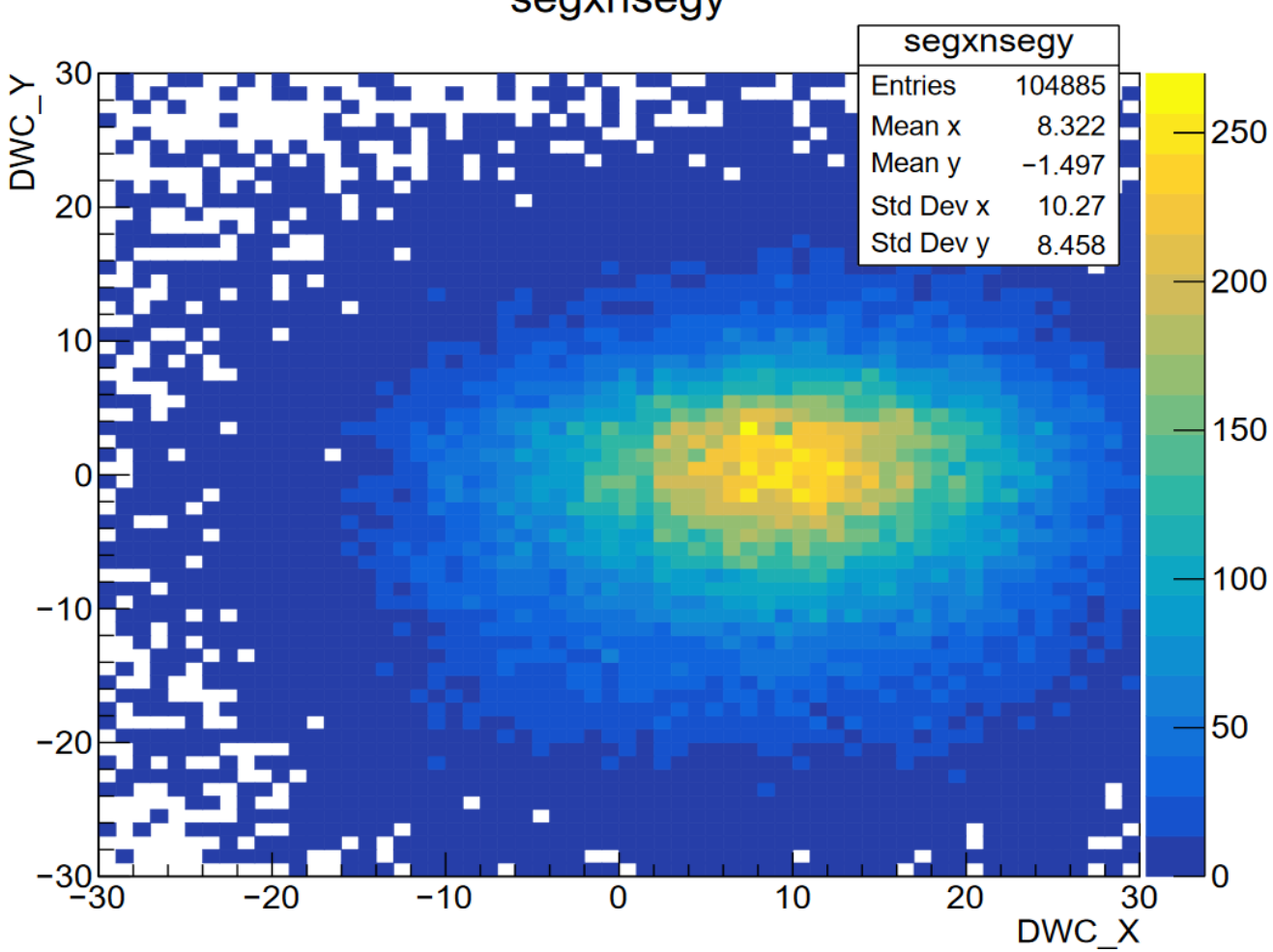
DESY.

Centre of gravity

Run number: 61156

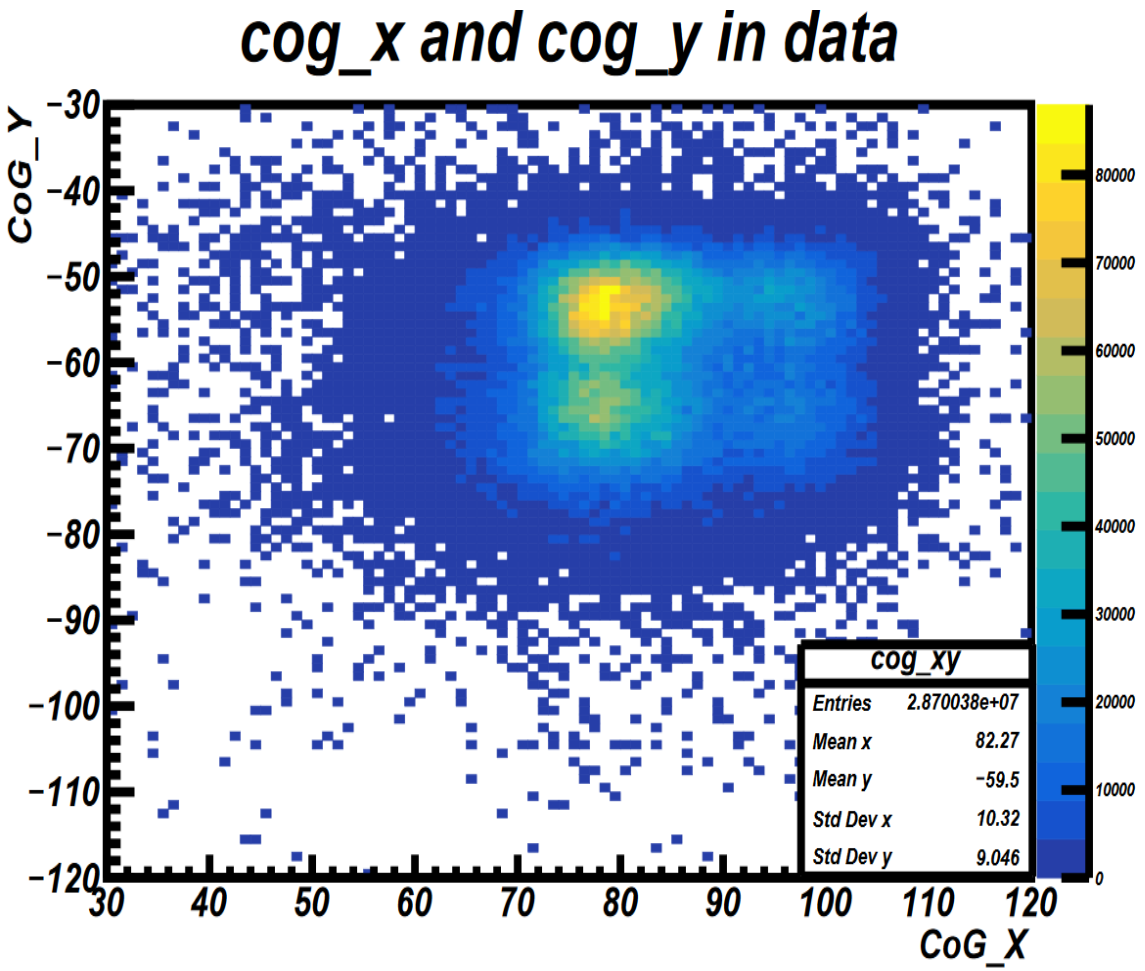


From Wire Chamber



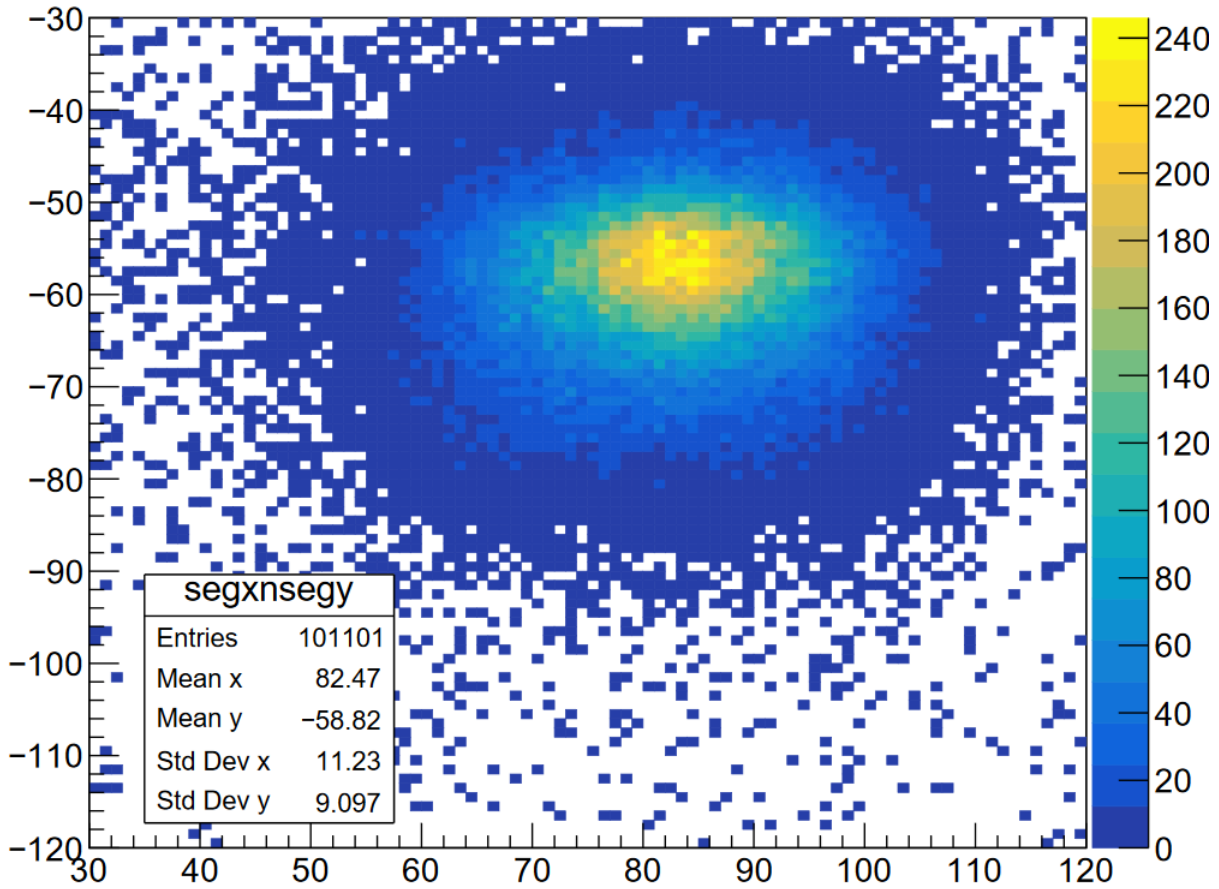
Centre of Gravity

Offset applied to DWC



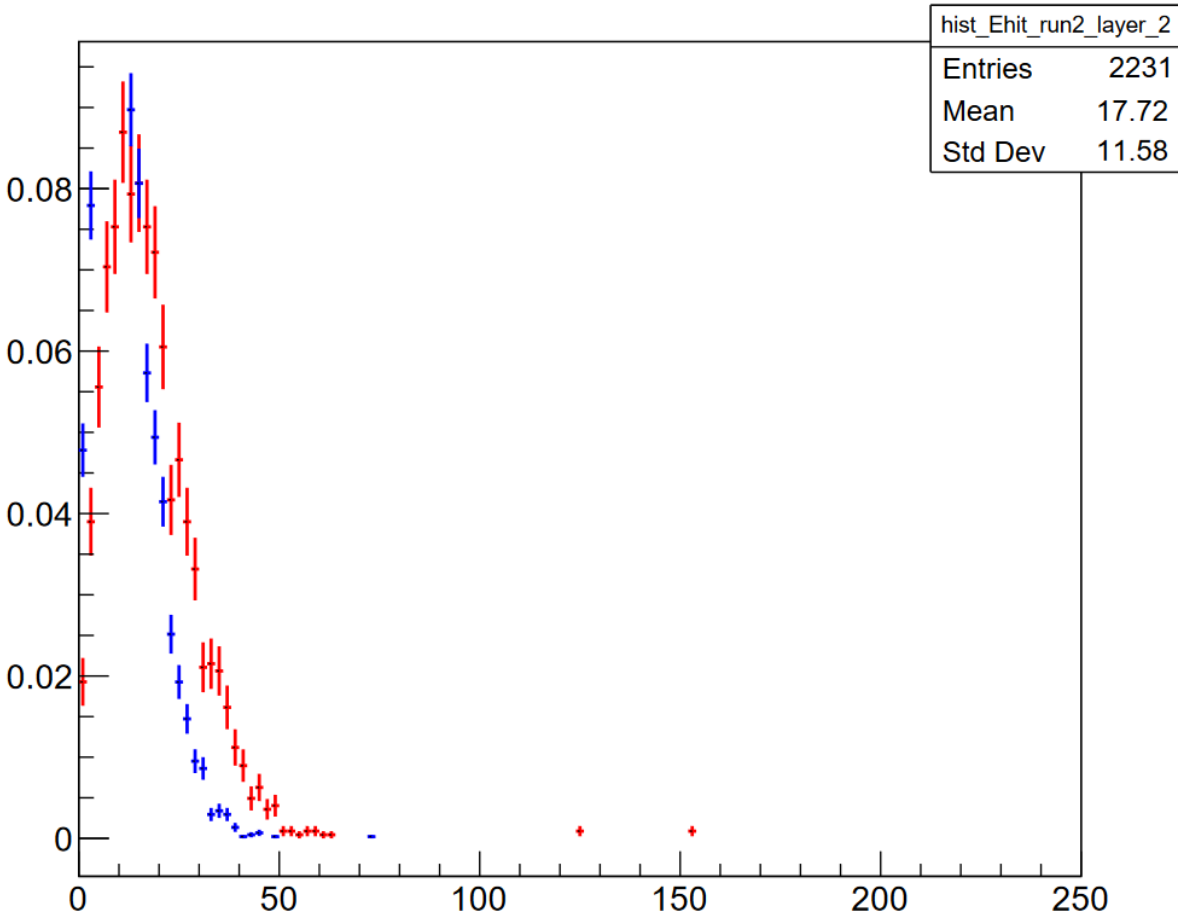
From Wire Chamber

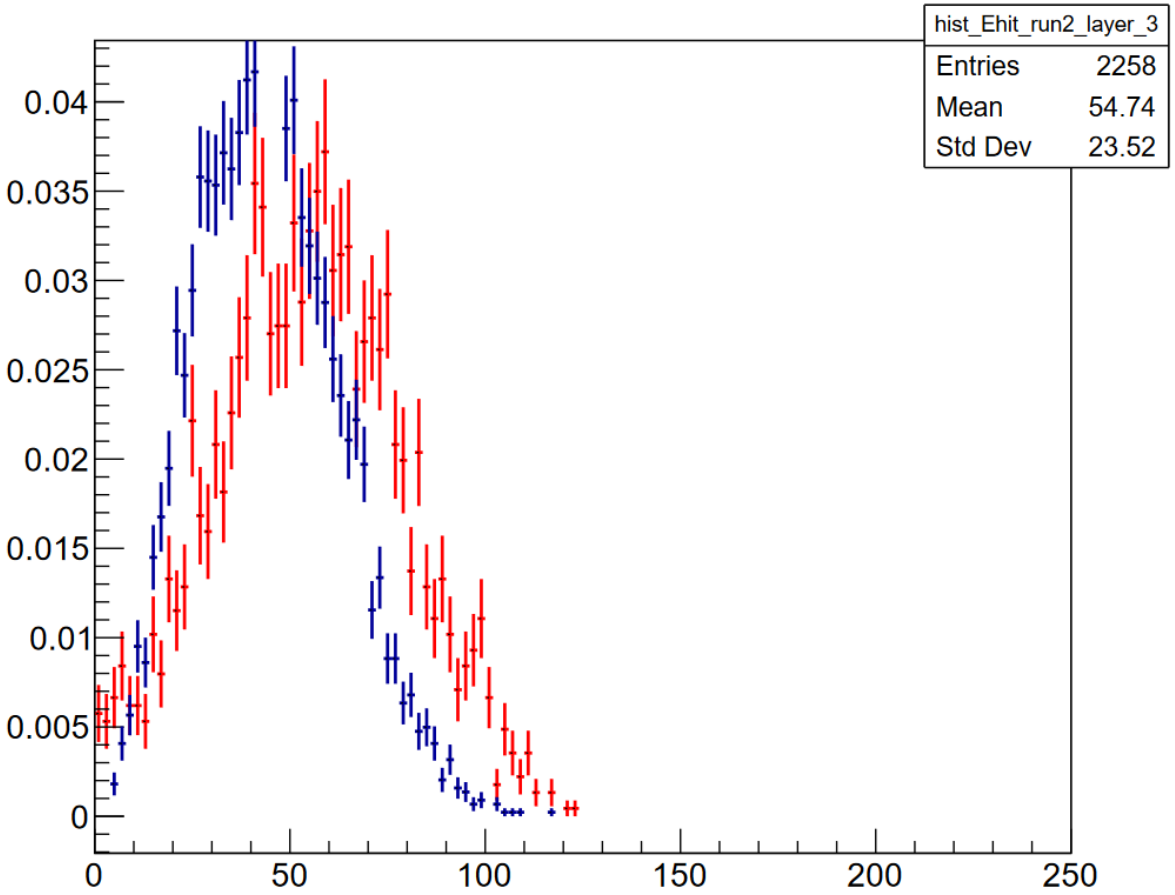
segxnsegy



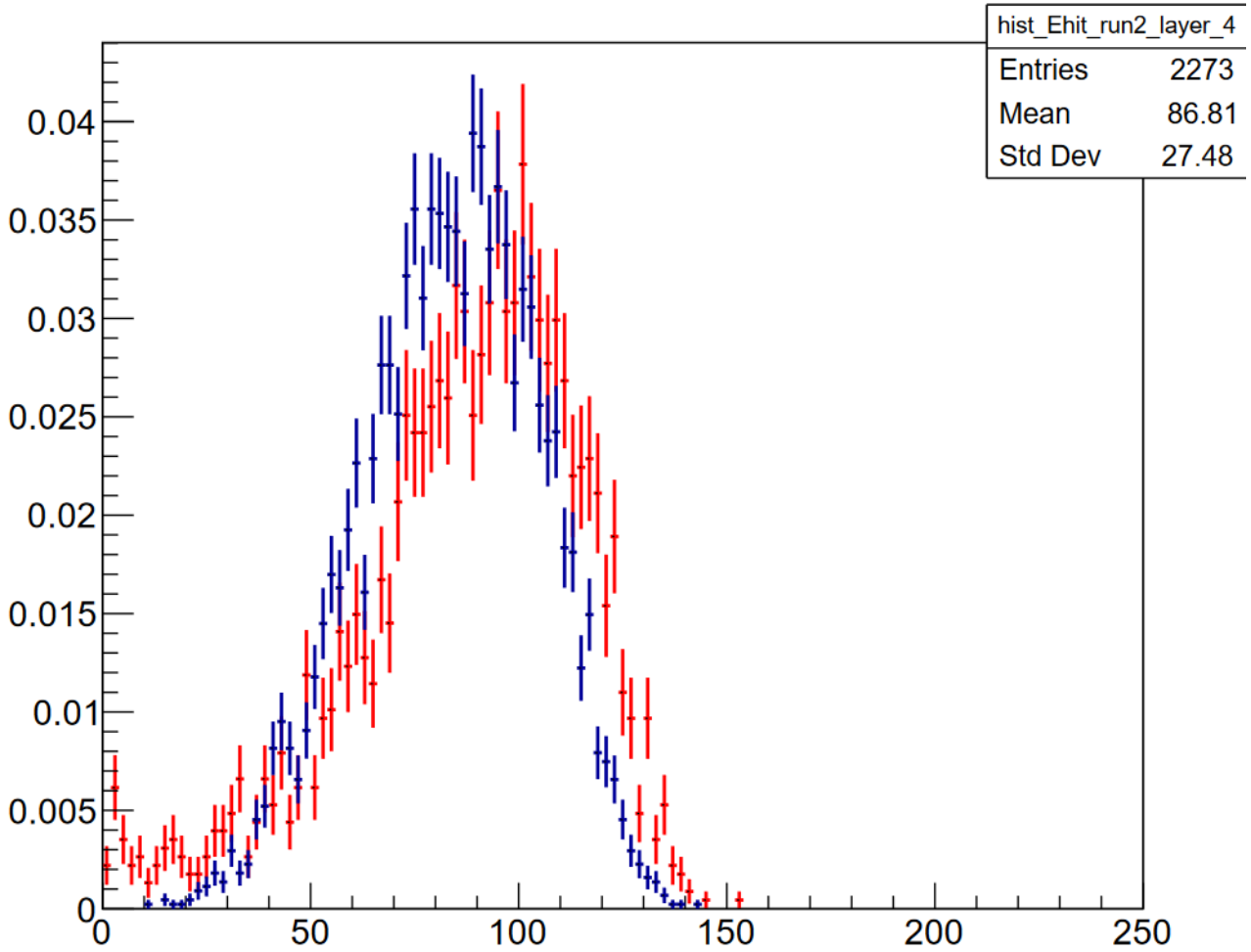
Hit Energy: Layer-wise Comparative study

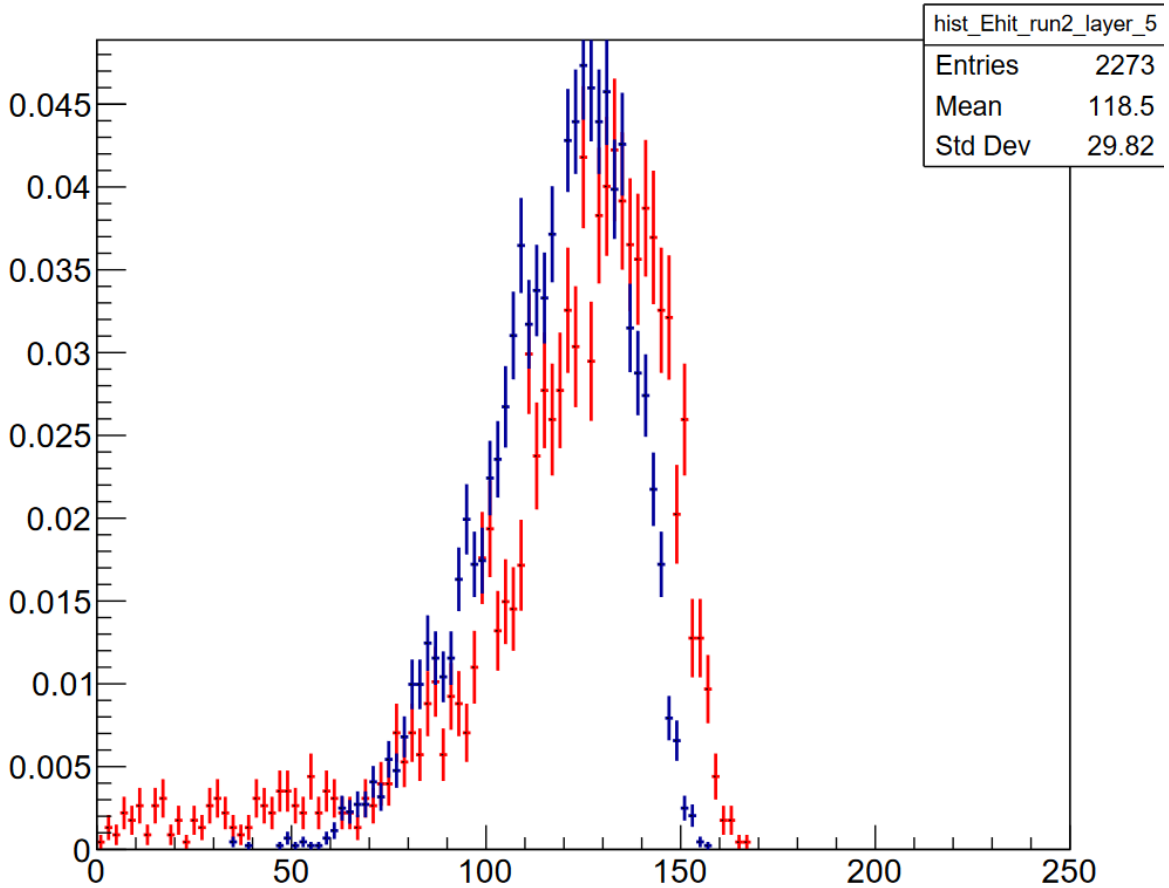
Layer 2 and 3


hist_Ehit_run2_layer_2
Entries 2231
Mean 17.72
Std Dev 11.58
0.08
0.06
0.04
0.02
0
0
50
100
150
200
250

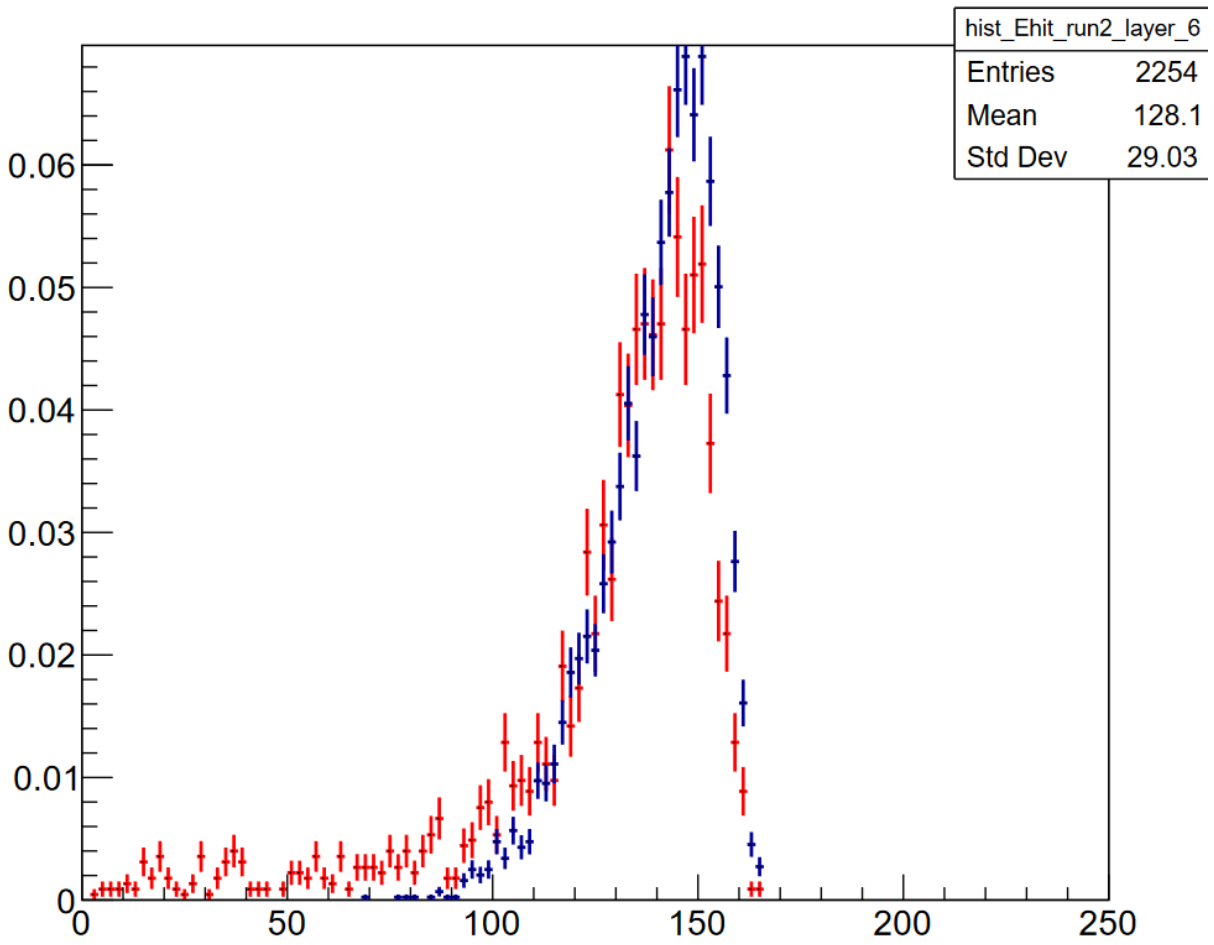

hist_Ehit_run2_layer_3
Entries 2258
Mean 54.74
Std Dev 23.52
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
0
50
100
150
200
250

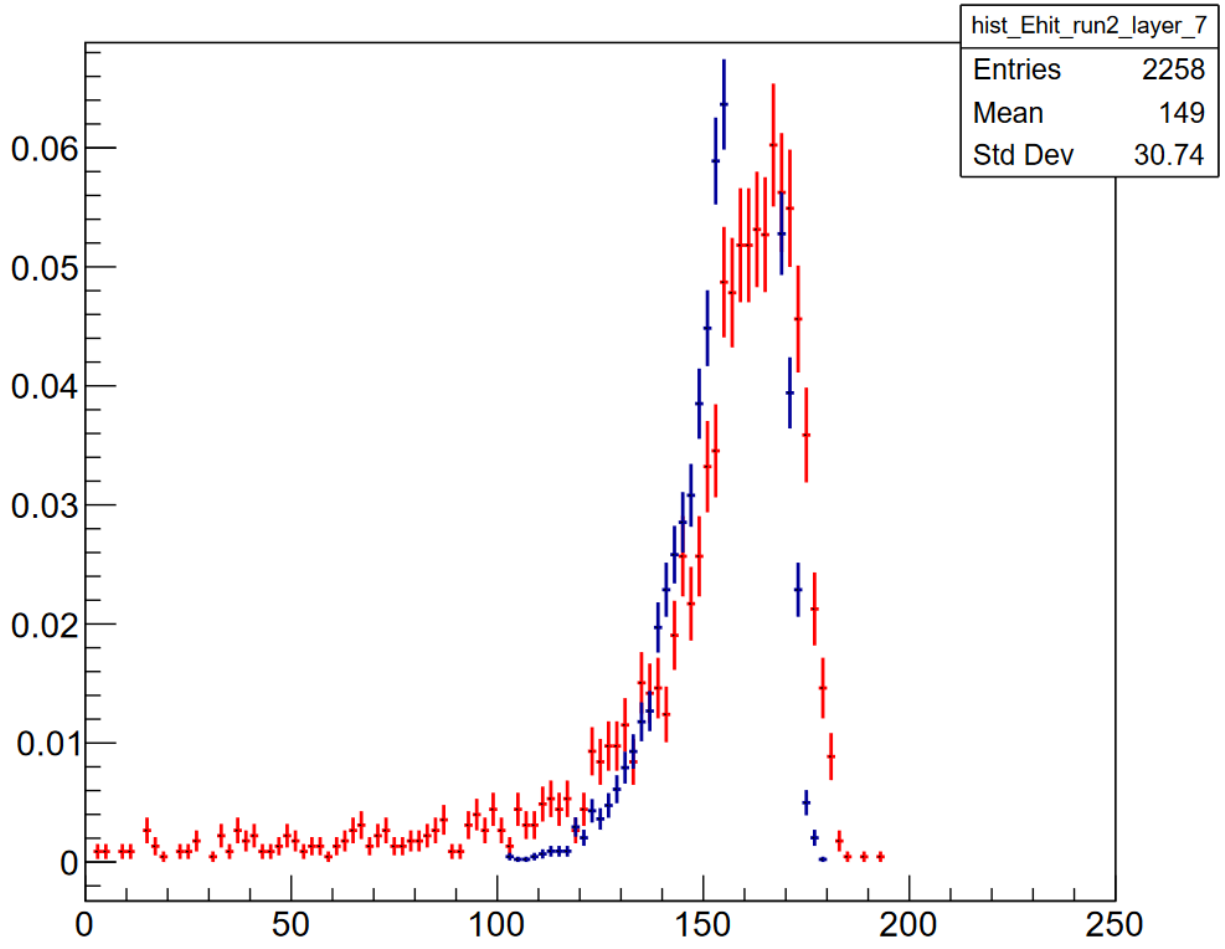
Layer 4 and 5


hist_Ehit_run2_layer_4
Entries 2273
Mean 86.81
Std Dev 27.48
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
0
50
100
150
200
250

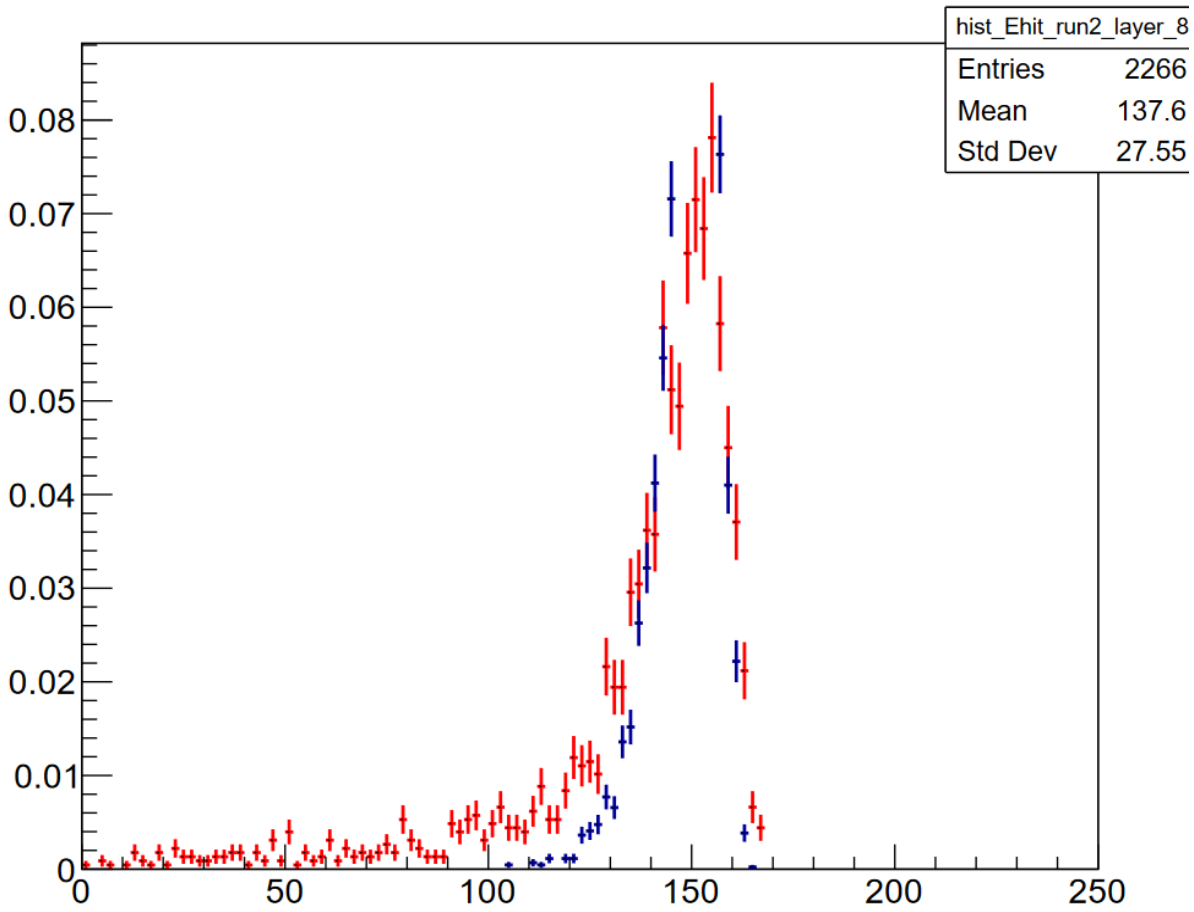

hist_Ehit_run2_layer_5
Entries 2273
Mean 118.5
Std Dev 29.82
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
0
50
100
150
200
250

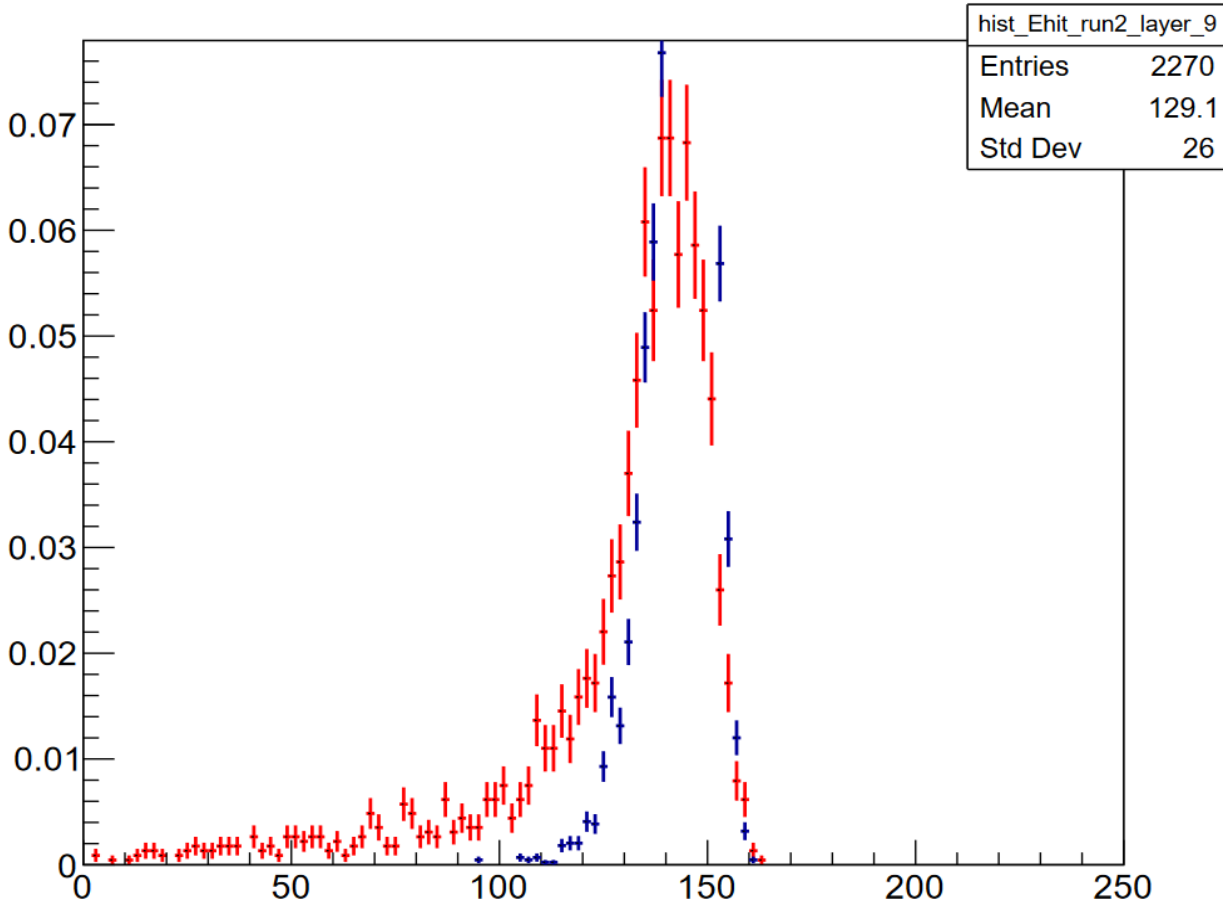
Layer 6 and 7


hist_Ehit_run2_layer_6
Entries 2254
Mean 128.1
Std Dev 29.03
0.06
0.05
0.04
0.03
0.02
0.01
0
0
50
100
150
200
250

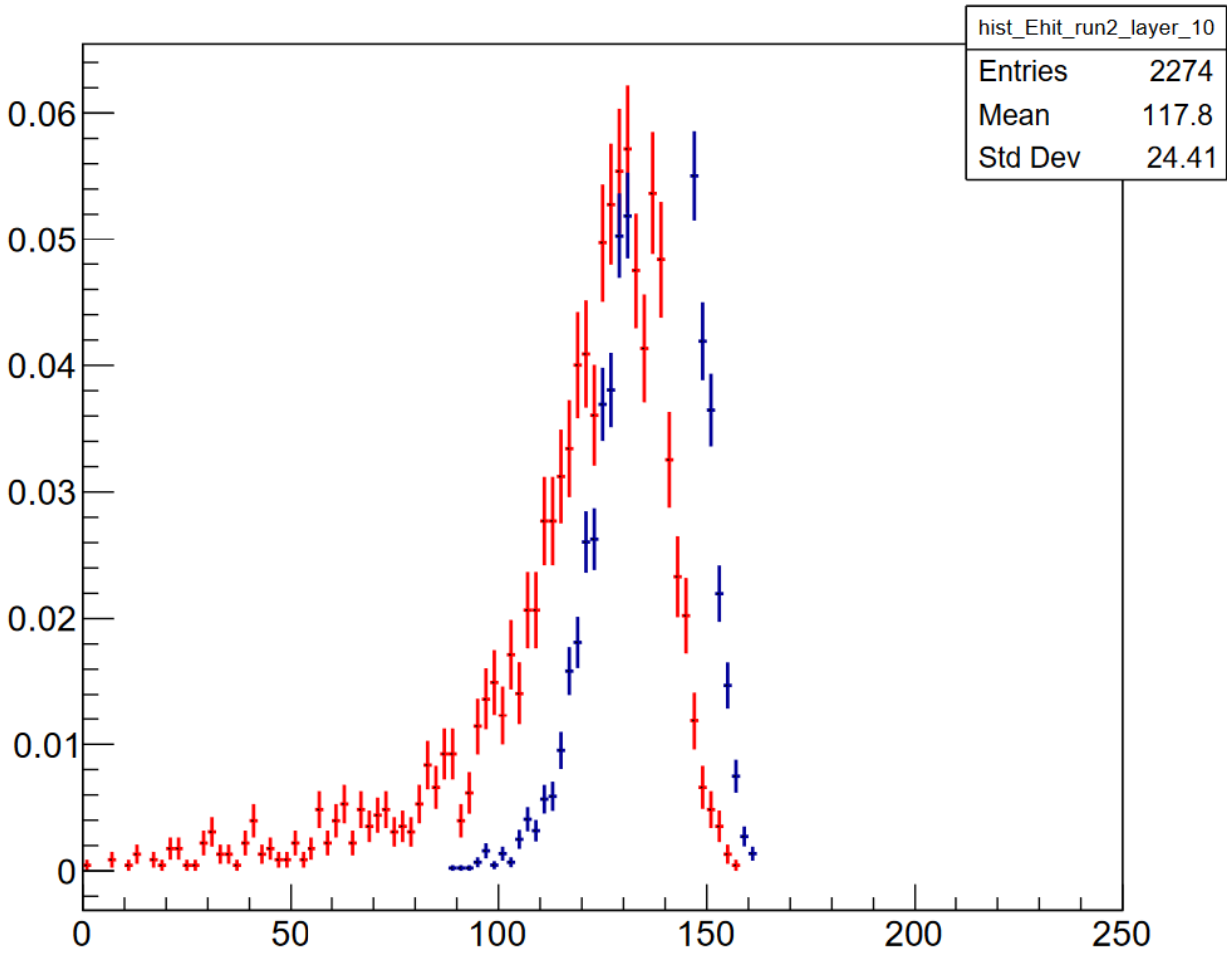

hist_Ehit_run2_layer_7
Entries 2258
Mean 149
Std Dev 30.74
0.06
0.05
0.04
0.03
0.02
0.01
0
0
50
100
150
200
250

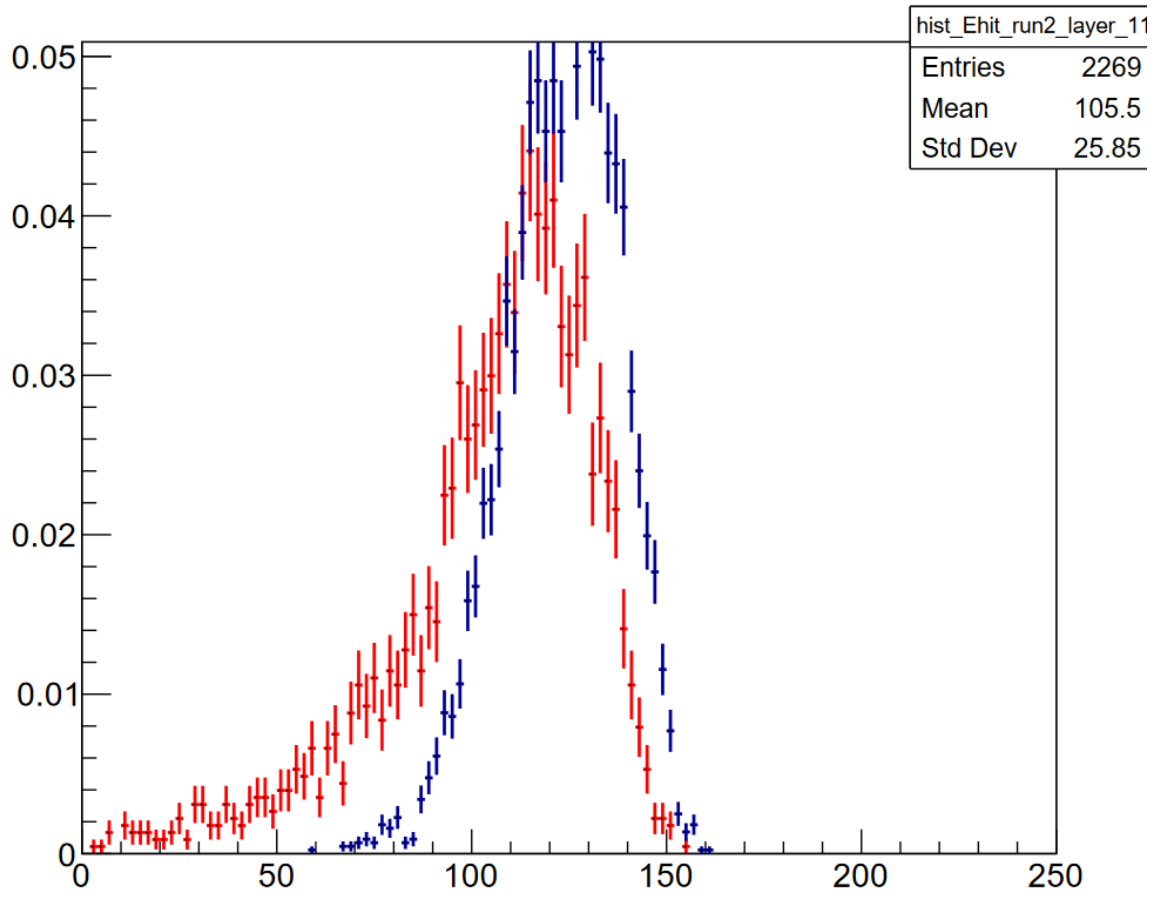
Layer 8 and 9


hist_Ehit_run2_layer_8
Entries 2266
Mean 137.6
Std Dev 27.55
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0
50
100
150
200
250

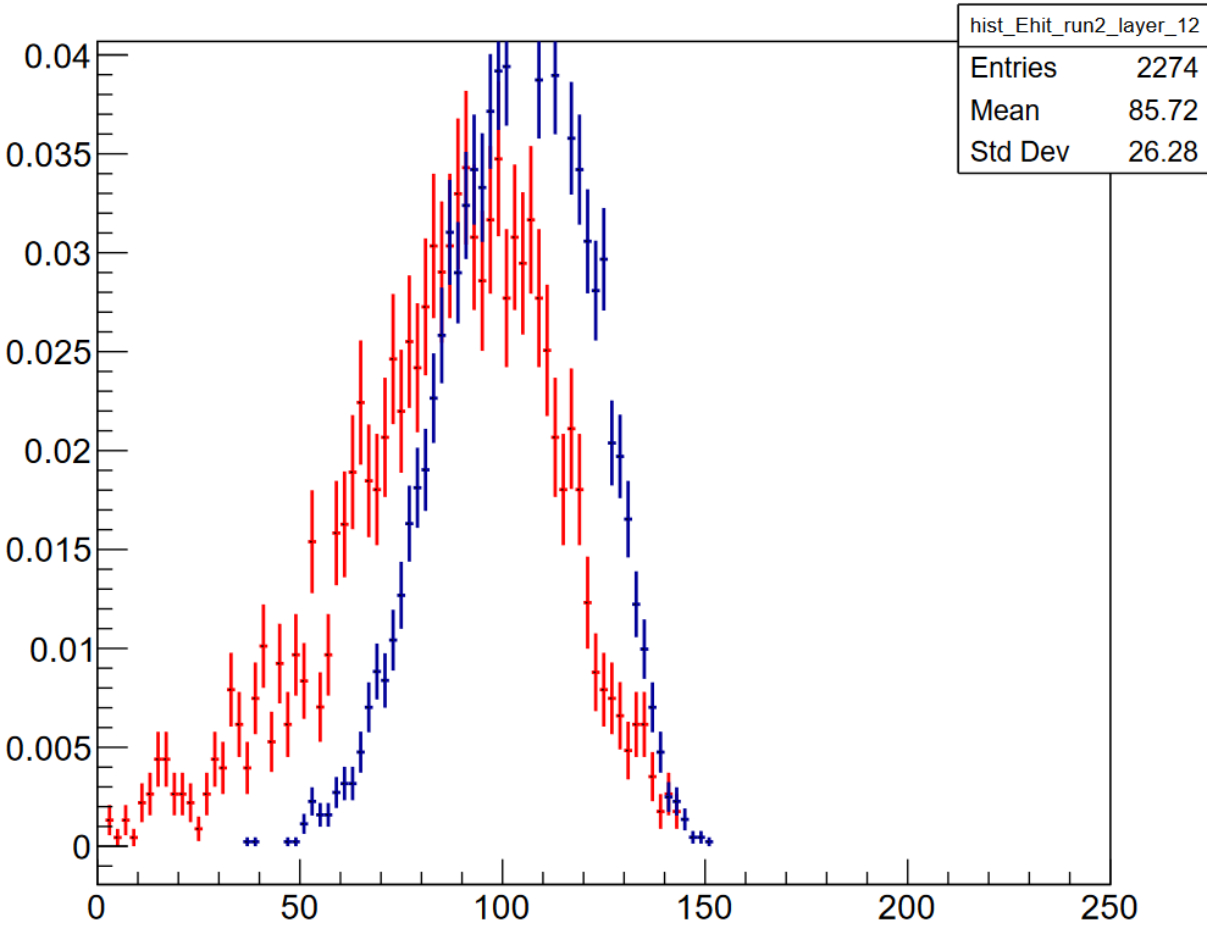

hist_Ehit_run2_layer_9
Entries 2270
Mean 129.1
Std Dev 26
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0
50
100
150
200
250

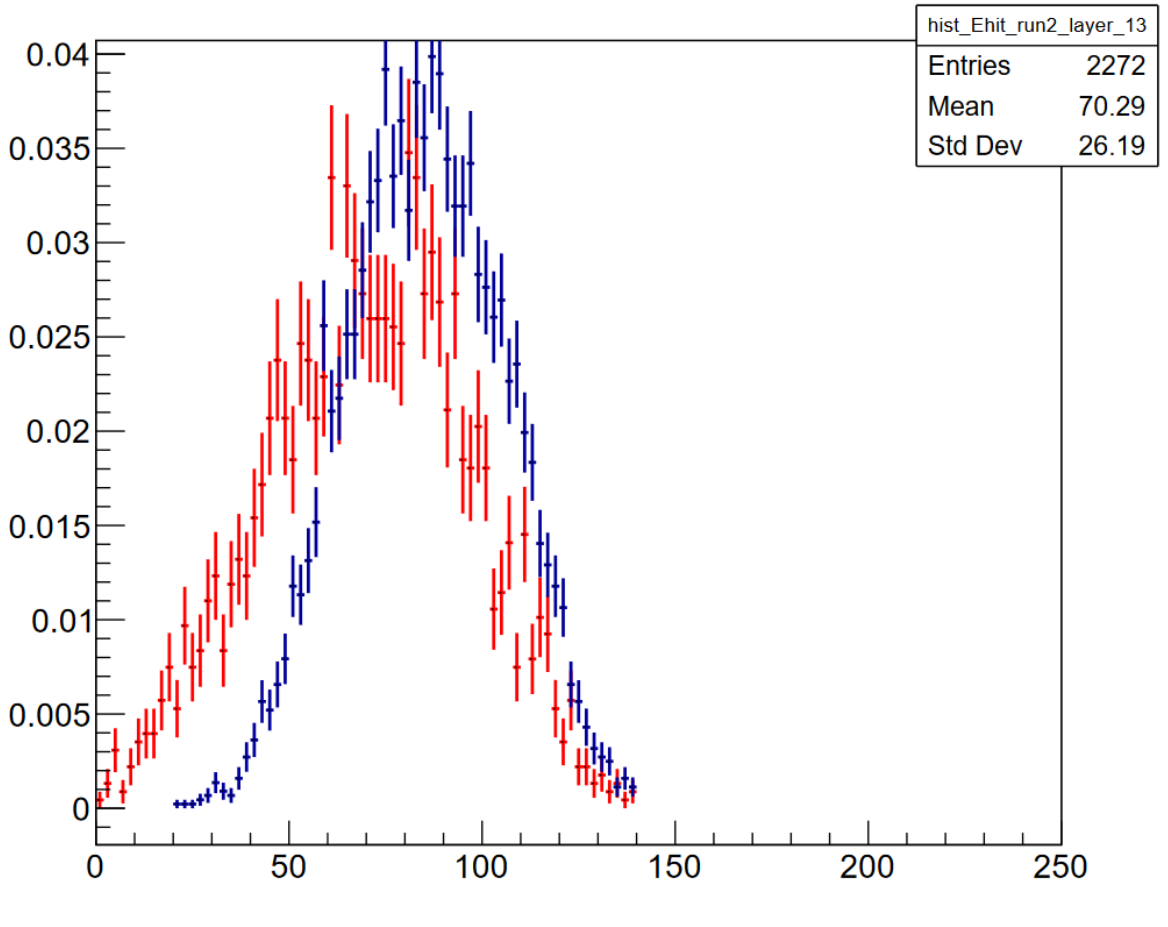
Layer 10 and 11



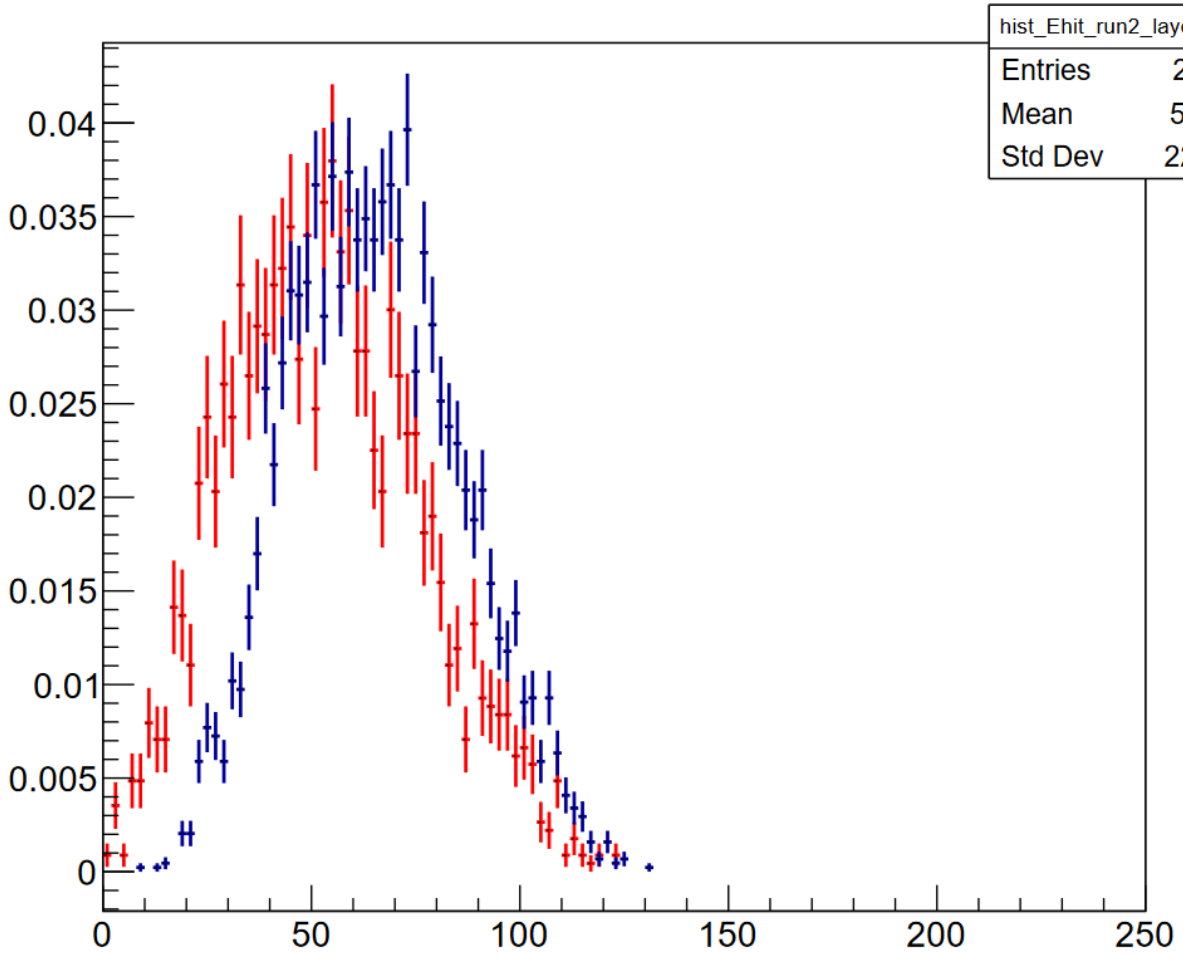


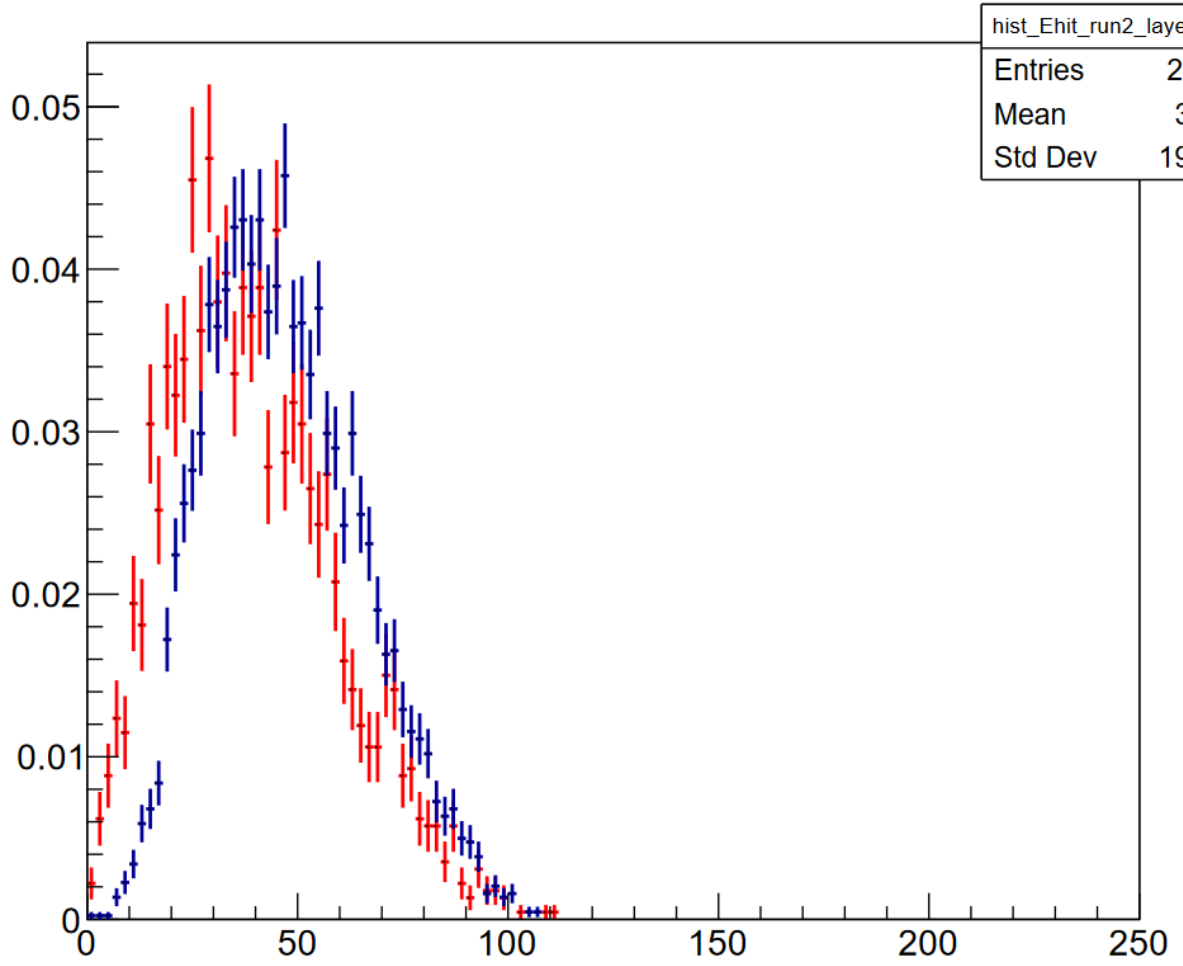
Layer 12 and 13





Layer 14 and 15



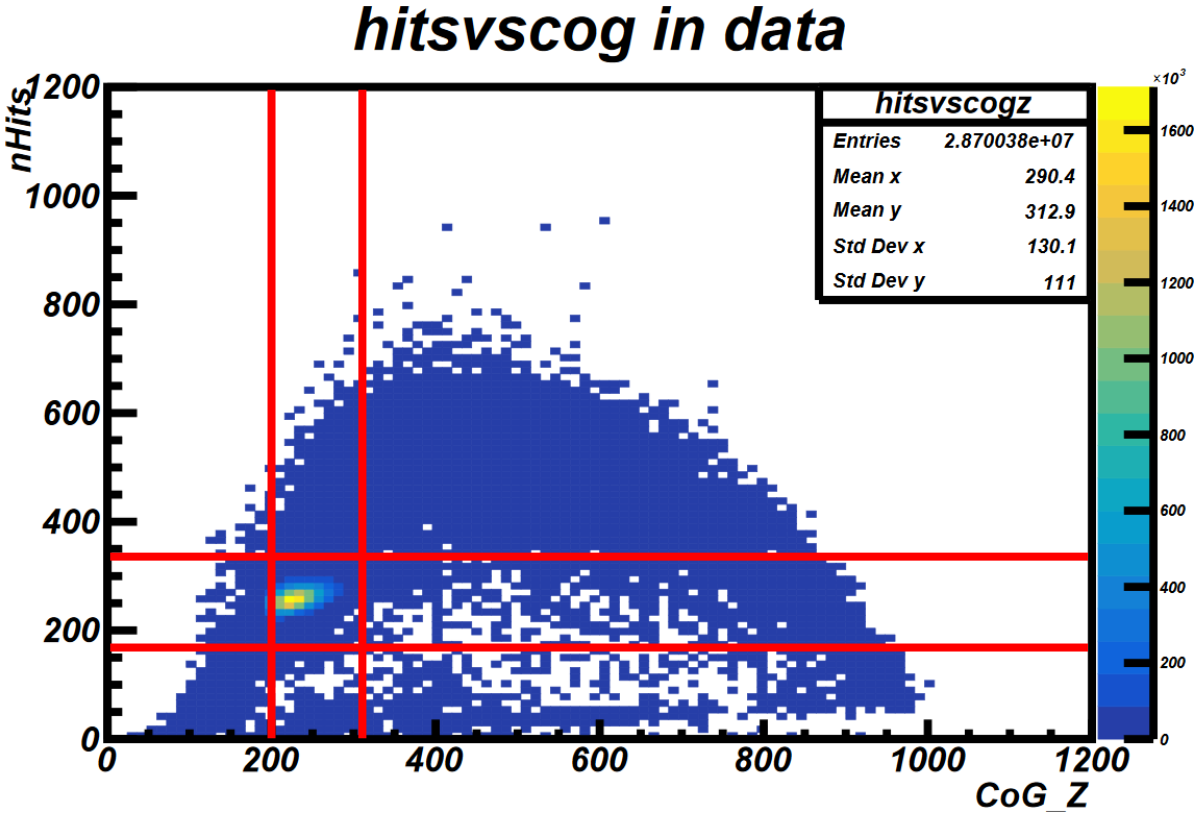


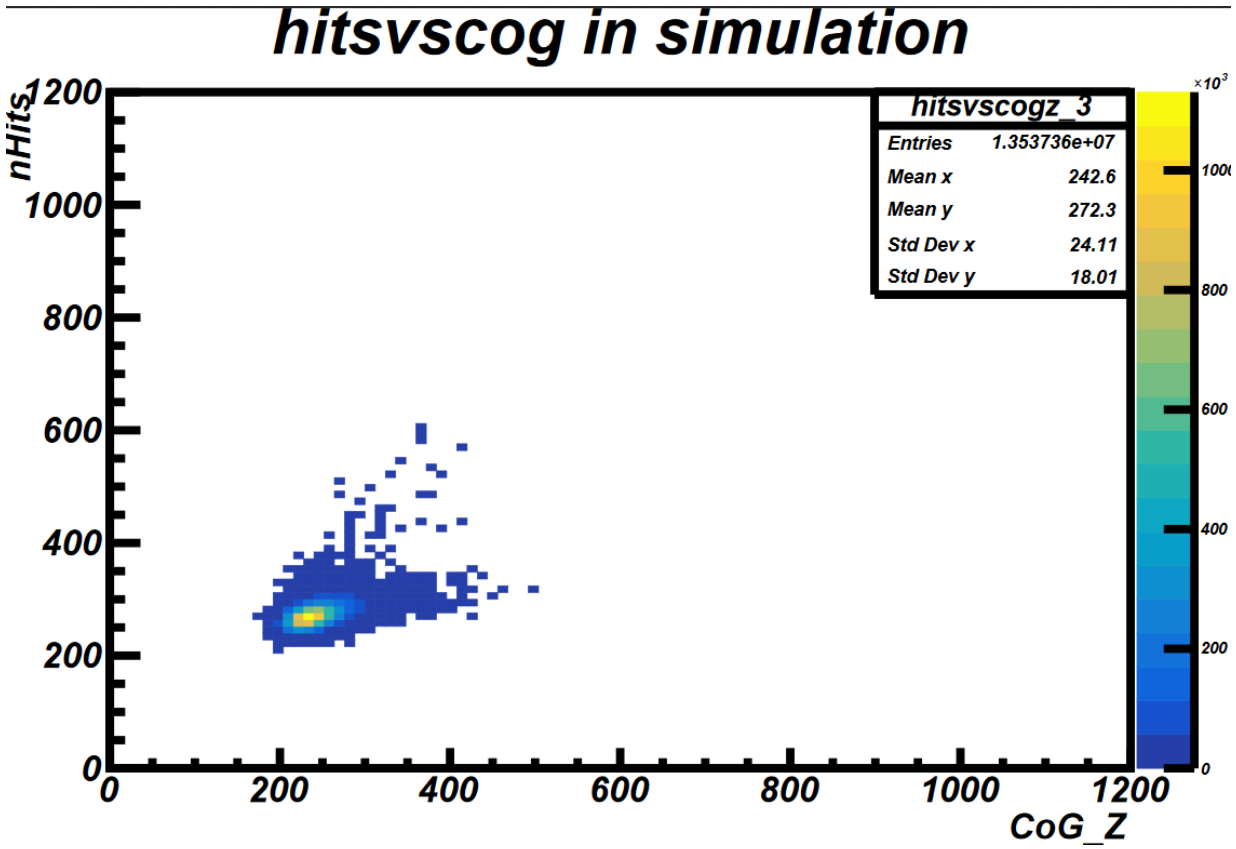
Thank you

Basic event selection for 80 GeV electron – June 2018 data

Run number: 61156

- Number of hits: Between 200 to 300 hits
- Center of gravity along Z: 180 mm to 280 mm





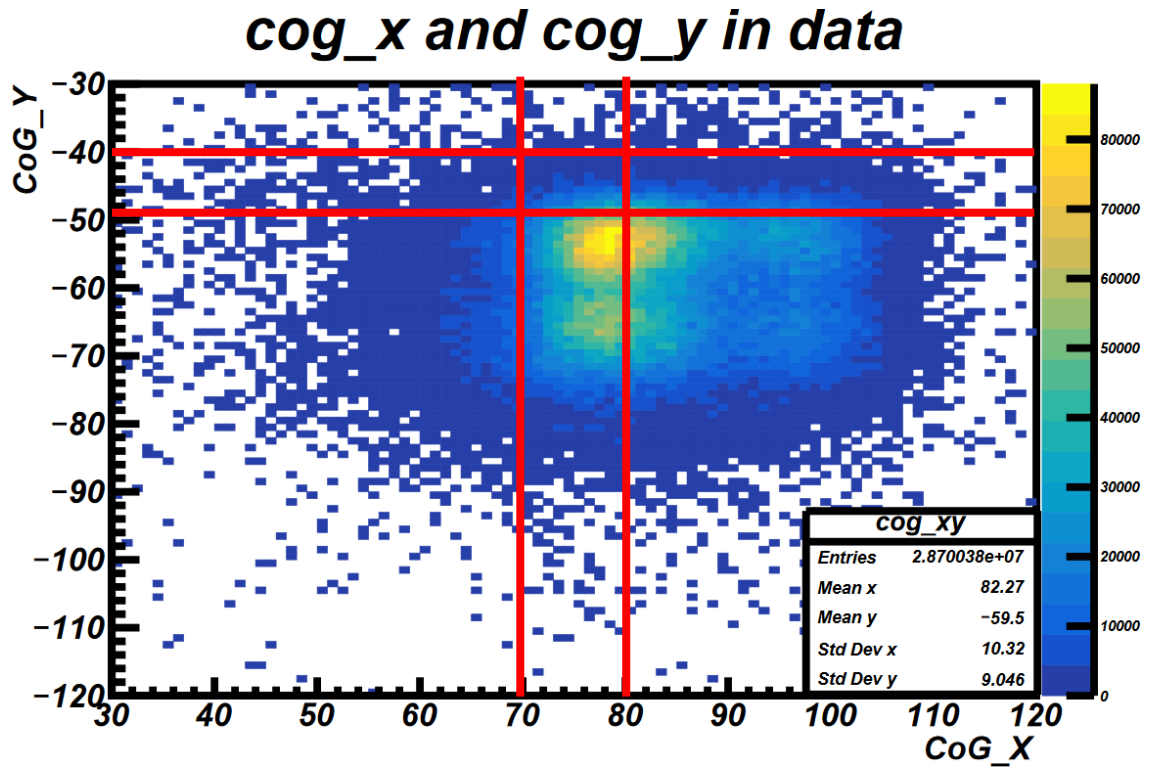
Basic event selection for 80 GeV electron – June 2018 data

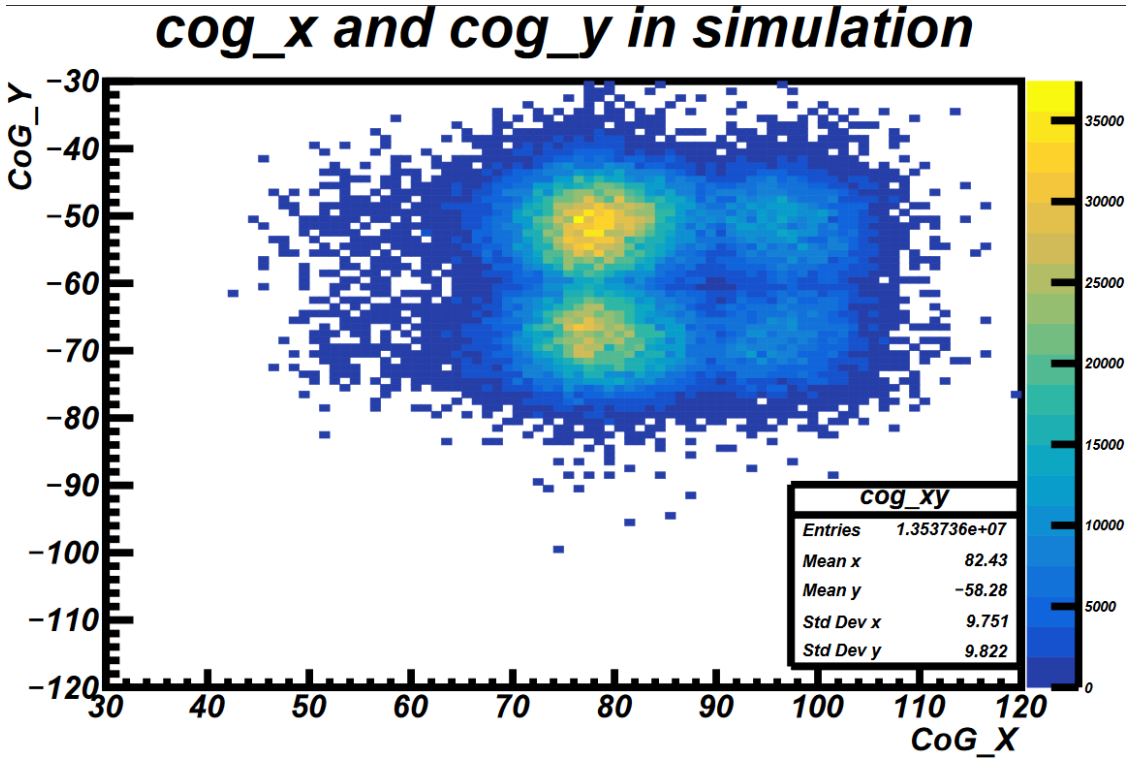
Run number: 61156

Centre of gravity X: Between 70 mm to 80 mm

Centre of gravity Y: Between -50 mm to -40 mm

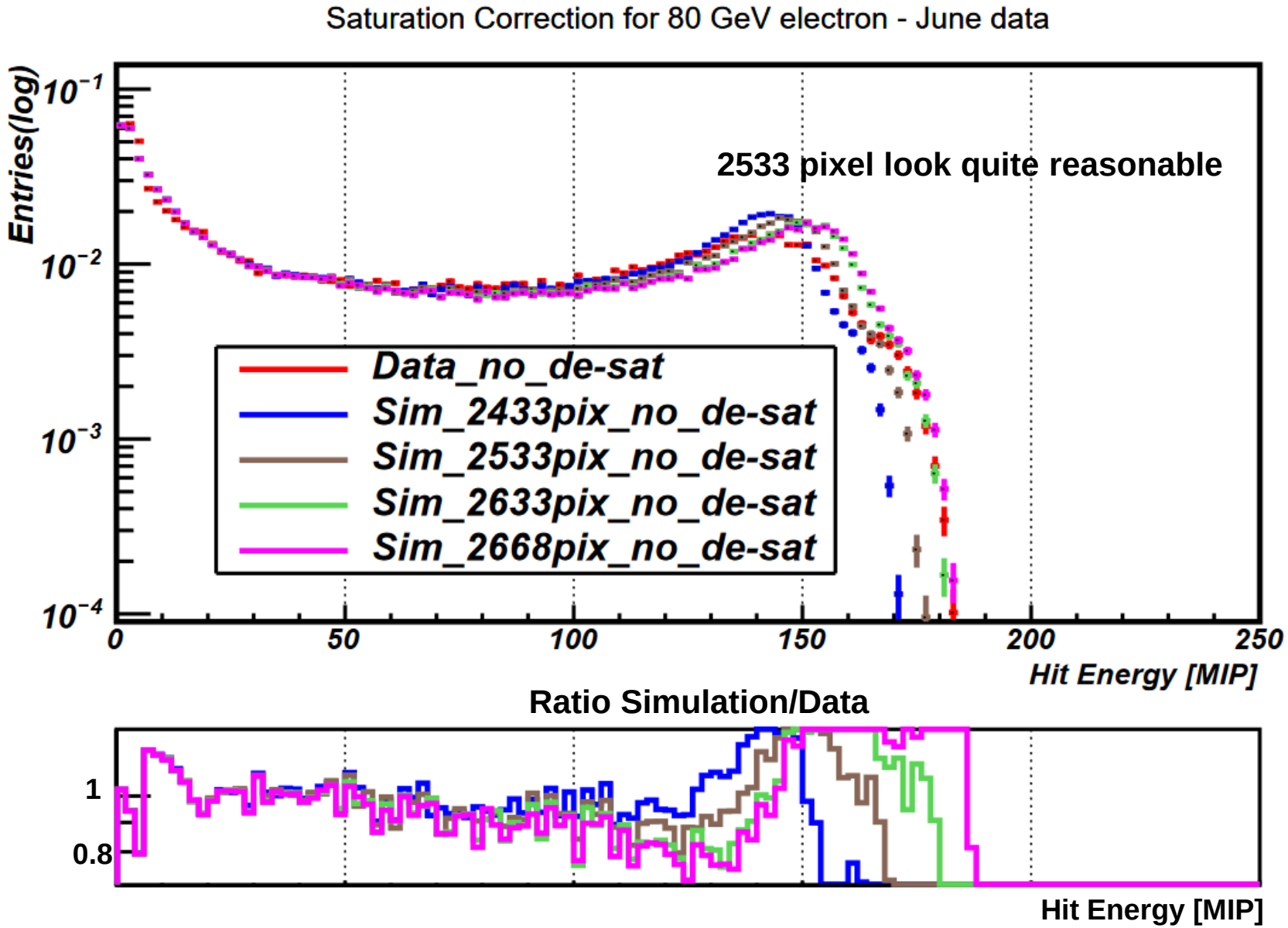
Choosing 1cm in centre of a tile: Pick events with maximum amplitude





Saturation Correction

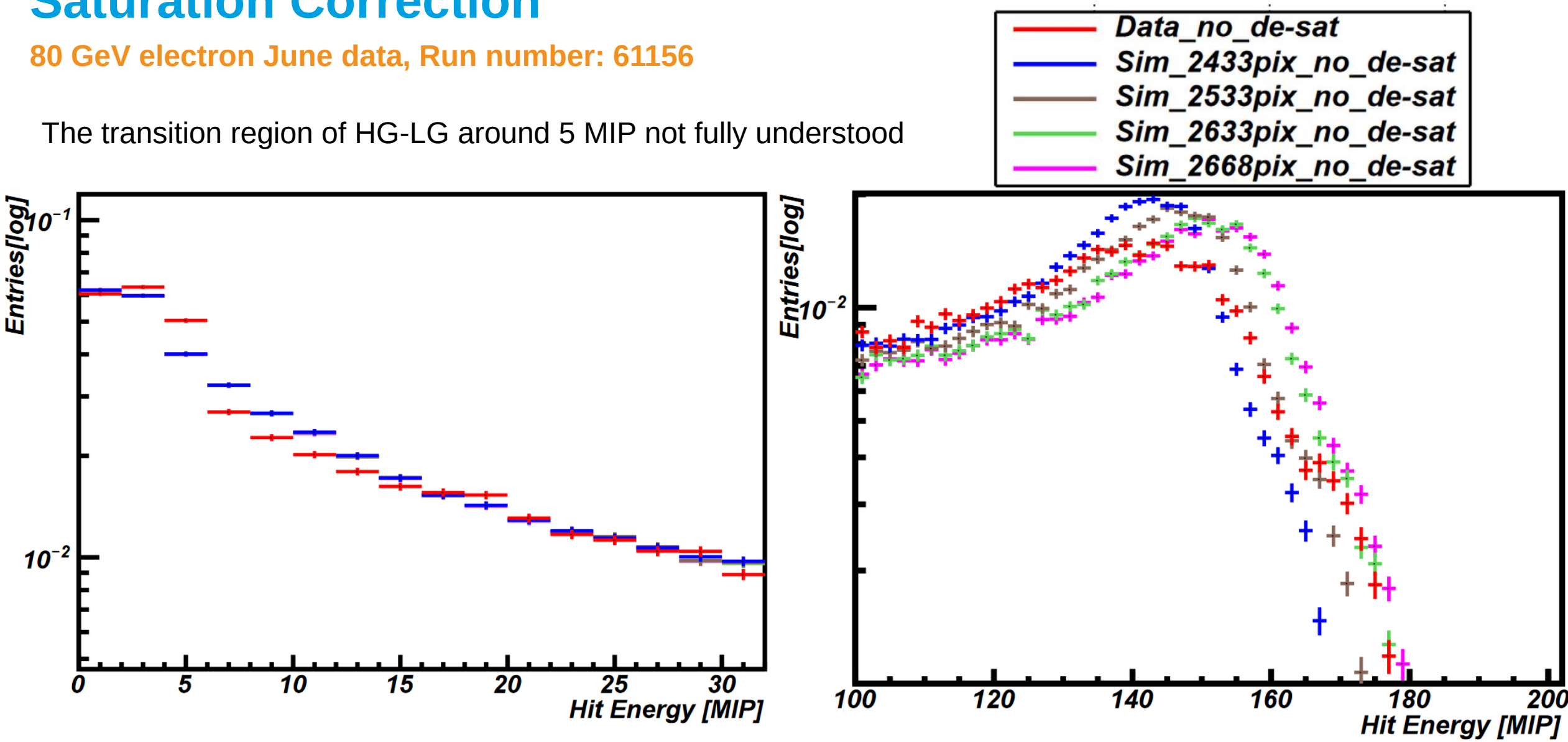
80 GeV electron June data, Run number: 61156



Saturation Correction

80 GeV electron June data, Run number: 61156

The transition region of HG-LG around 5 MIP not fully understood



BACKUP

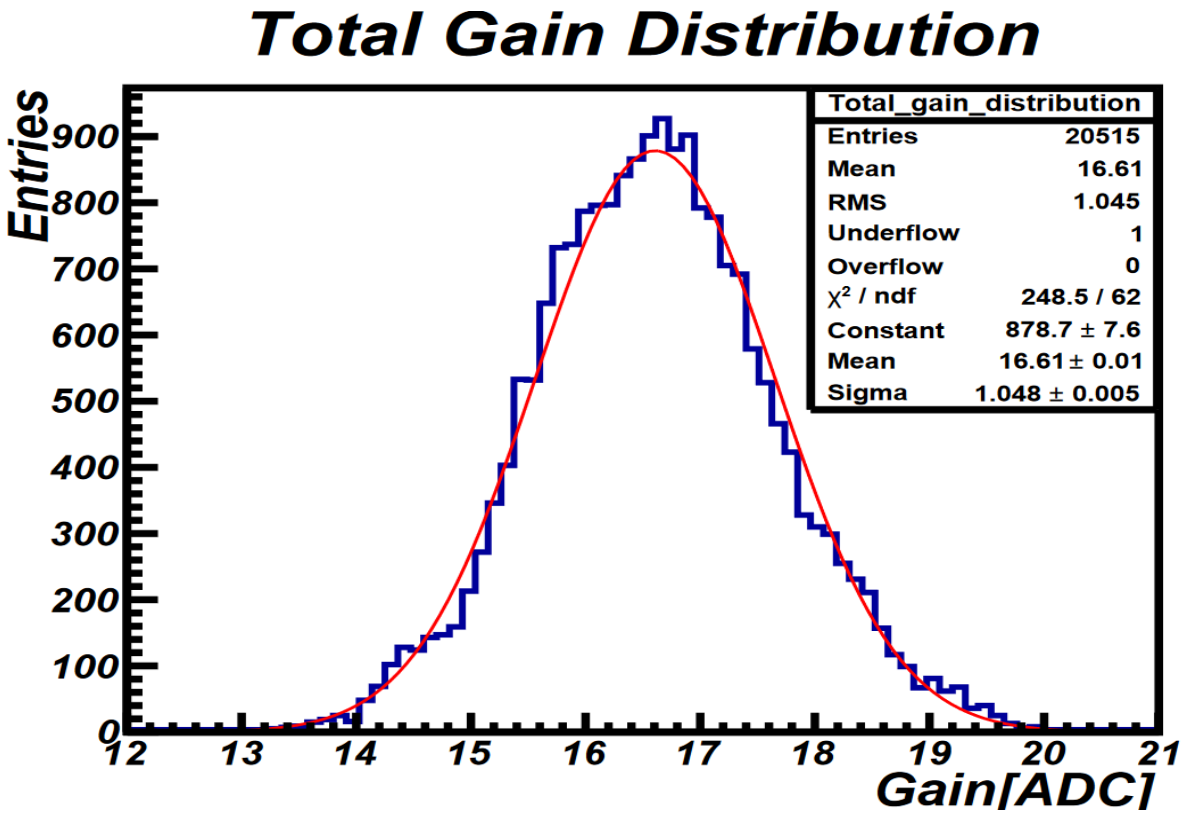
Gain Calibration

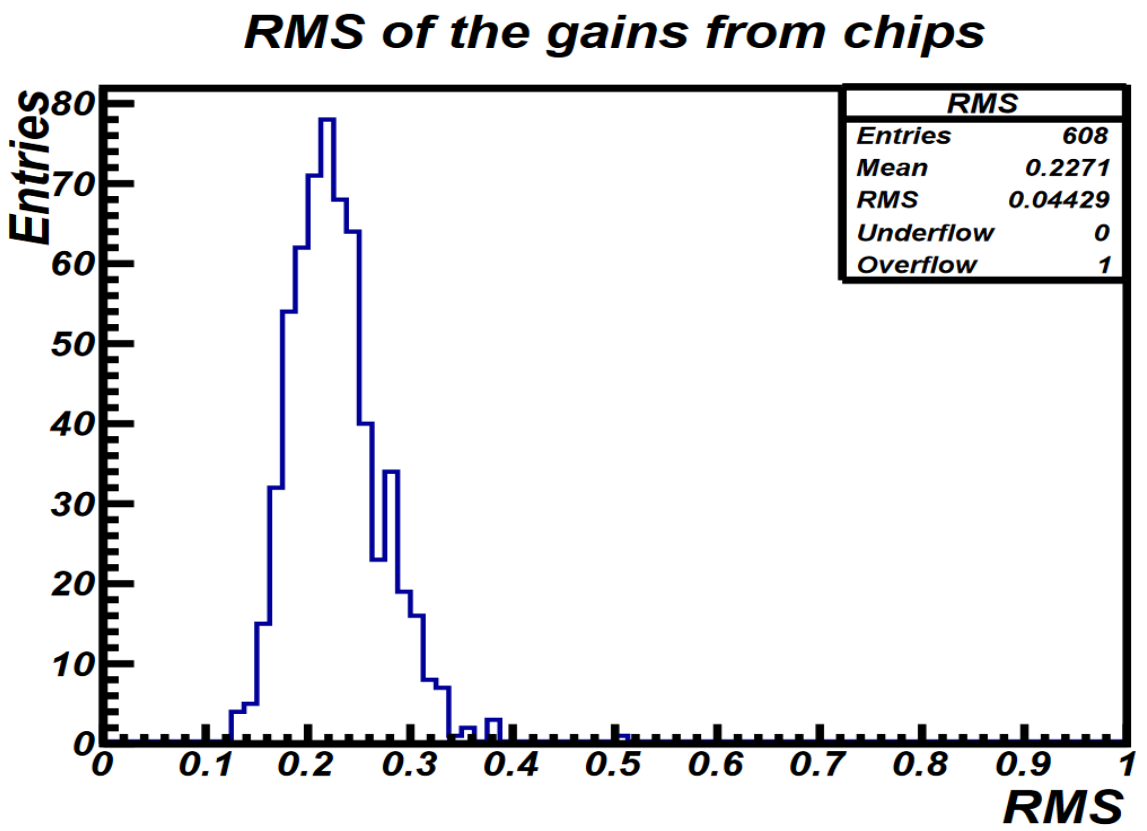
May 2018

- Fitted channels from each LED voltages are combined.

May: Short LED - no power pulsing run.

- Gain distribution for May which consists only AHCAL(21, 888 channels). **94% channels fitted**
- Remaining 1373 channels - acquire gain value from the mean of the corresponding chip.



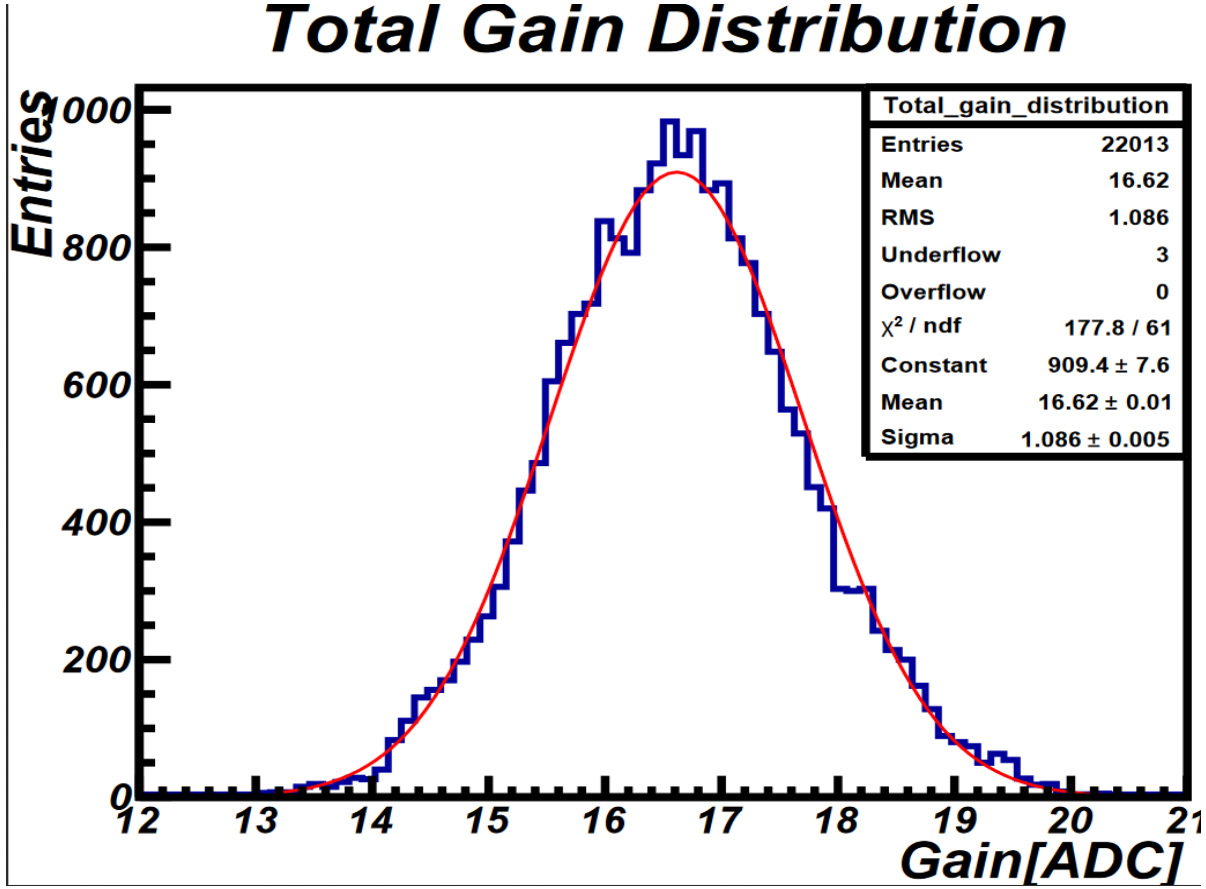


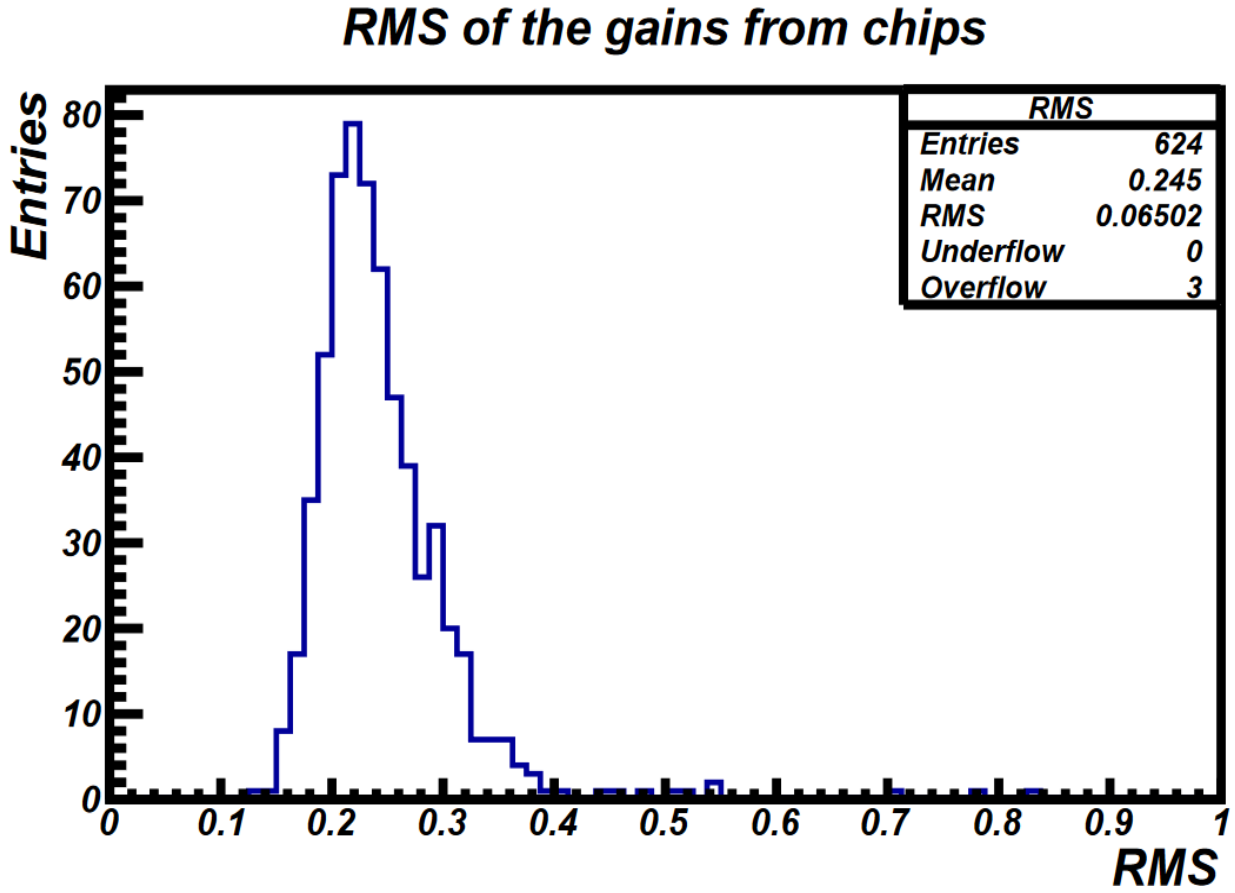
Gain Calibration

June 2018

- Gain distribution from June, includes the Tokyo layer (22464 channels).
- Long LED no power pulsing run on 25.06.2018

98% channels fitted



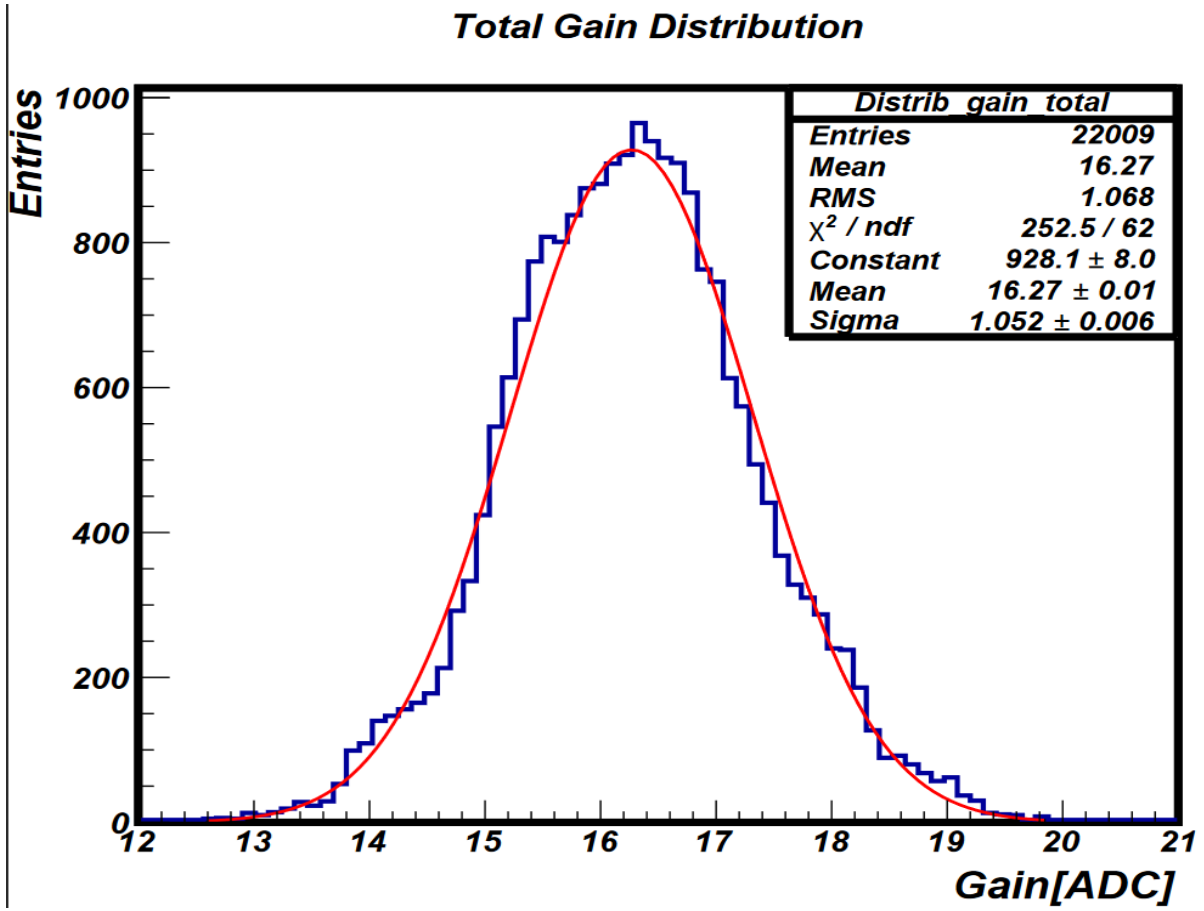


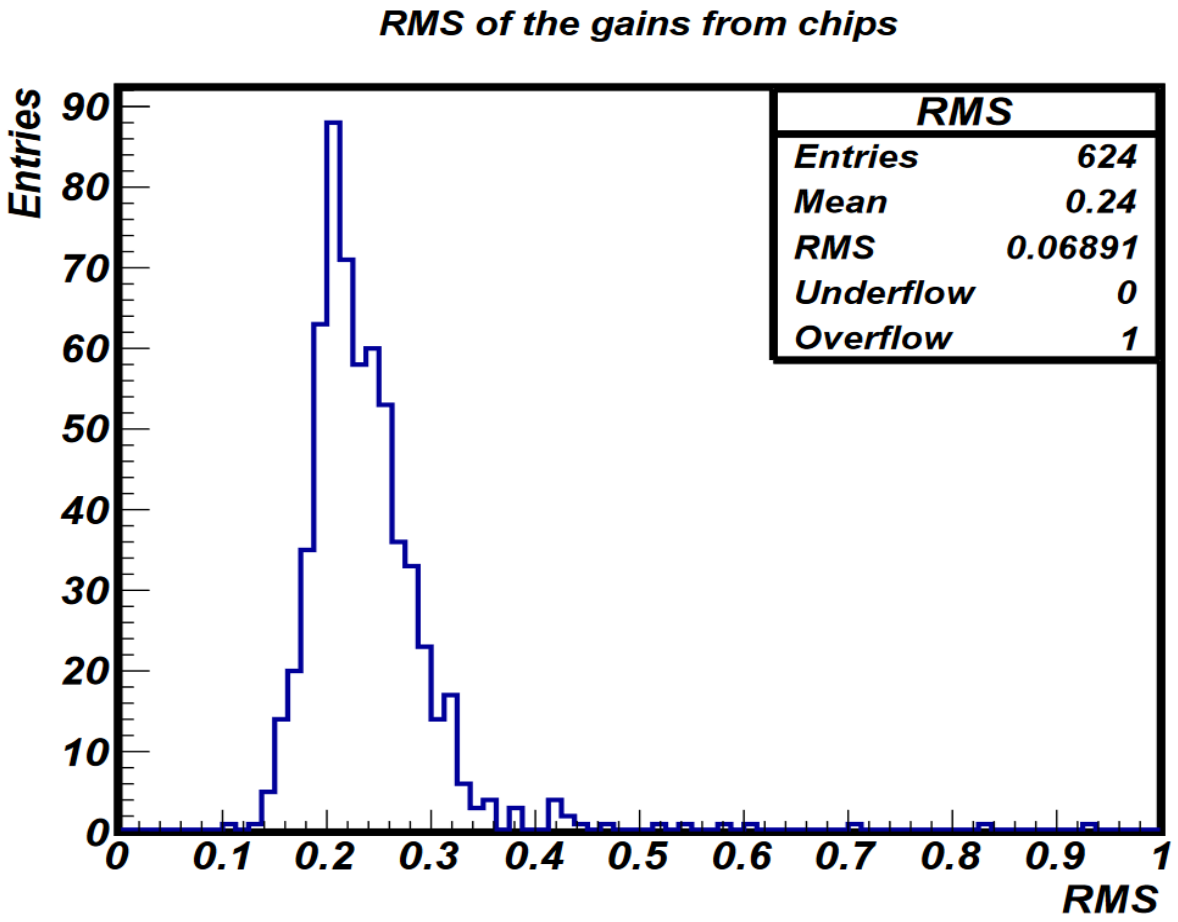
Gain Calibration

October 2018

- AHCAL + Tokyo layer.
- Long LED - power pulsing run on 17.10.2018
- 20 mV steps with 2000 cycles each run.

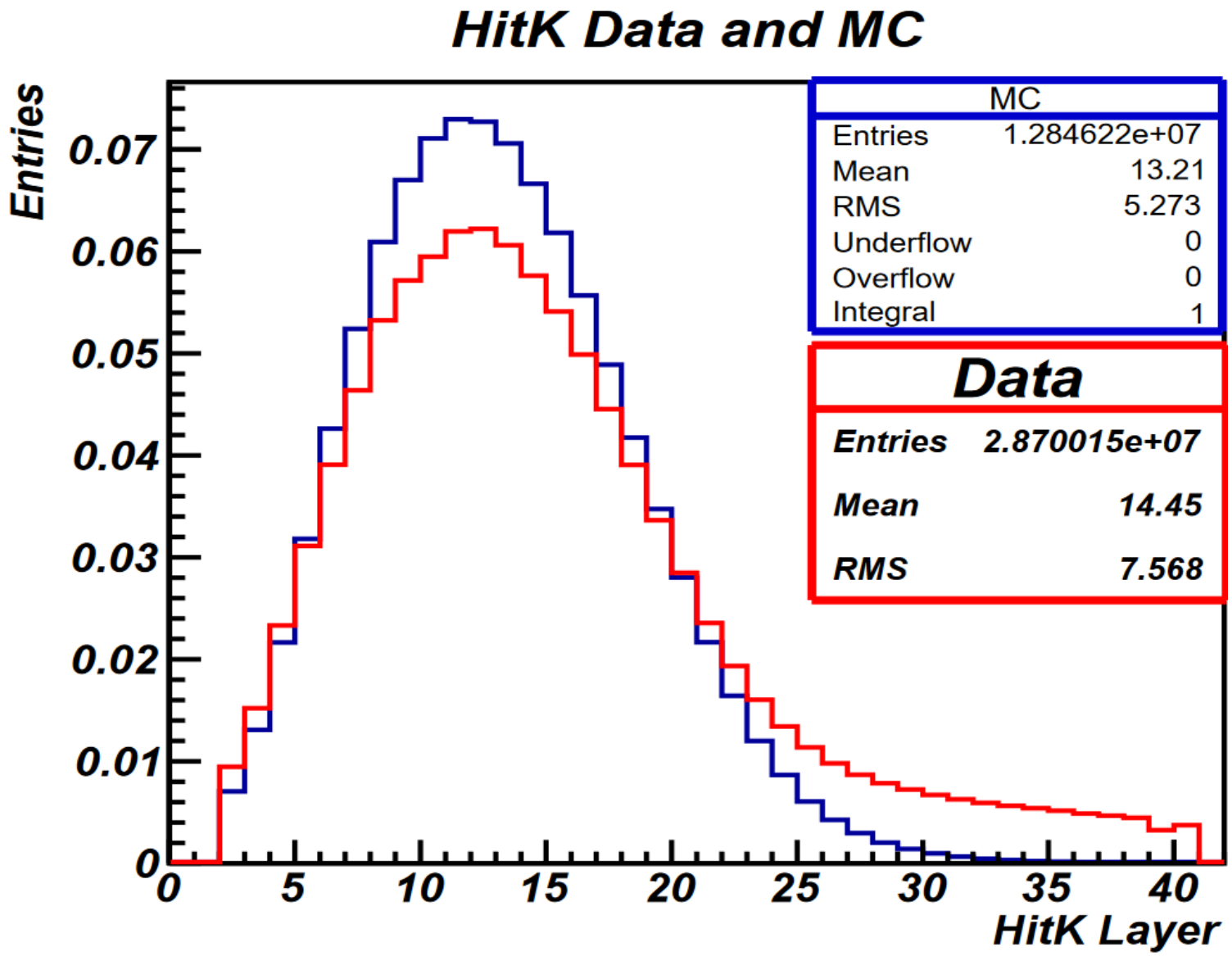
98% channels fitted





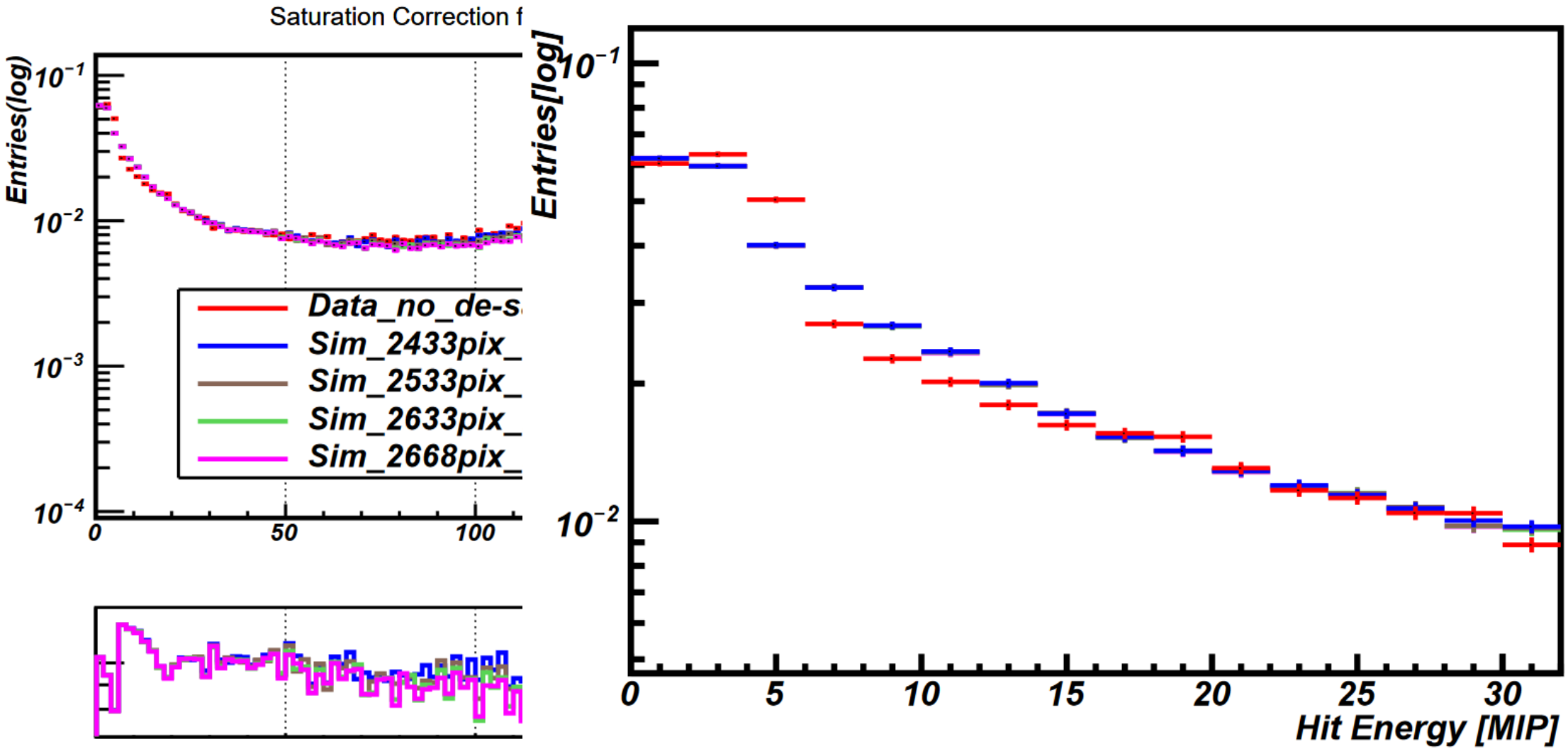
Hit K

Data and MC



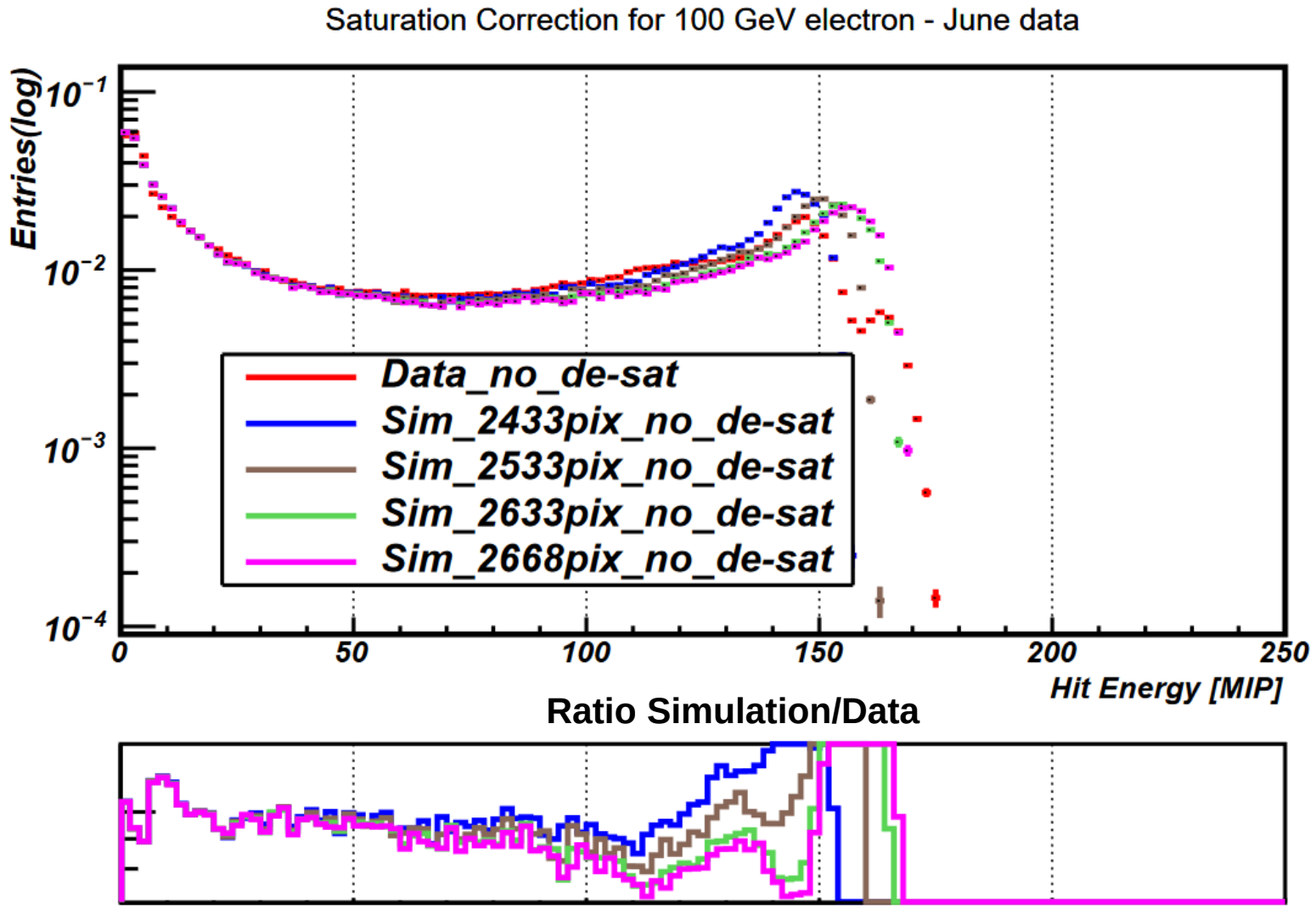
Hit energy

At lower MIP values



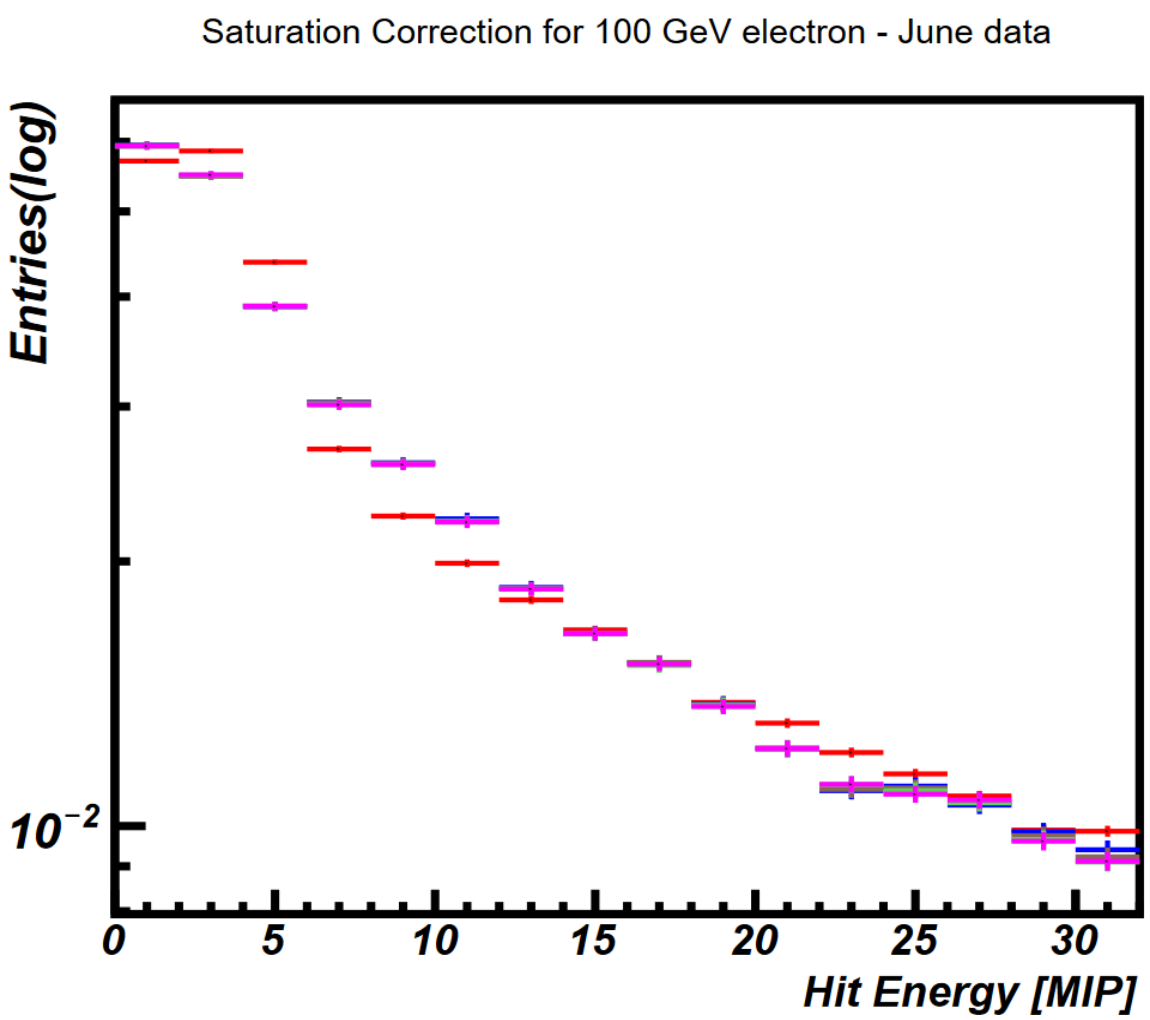
Saturation Correction

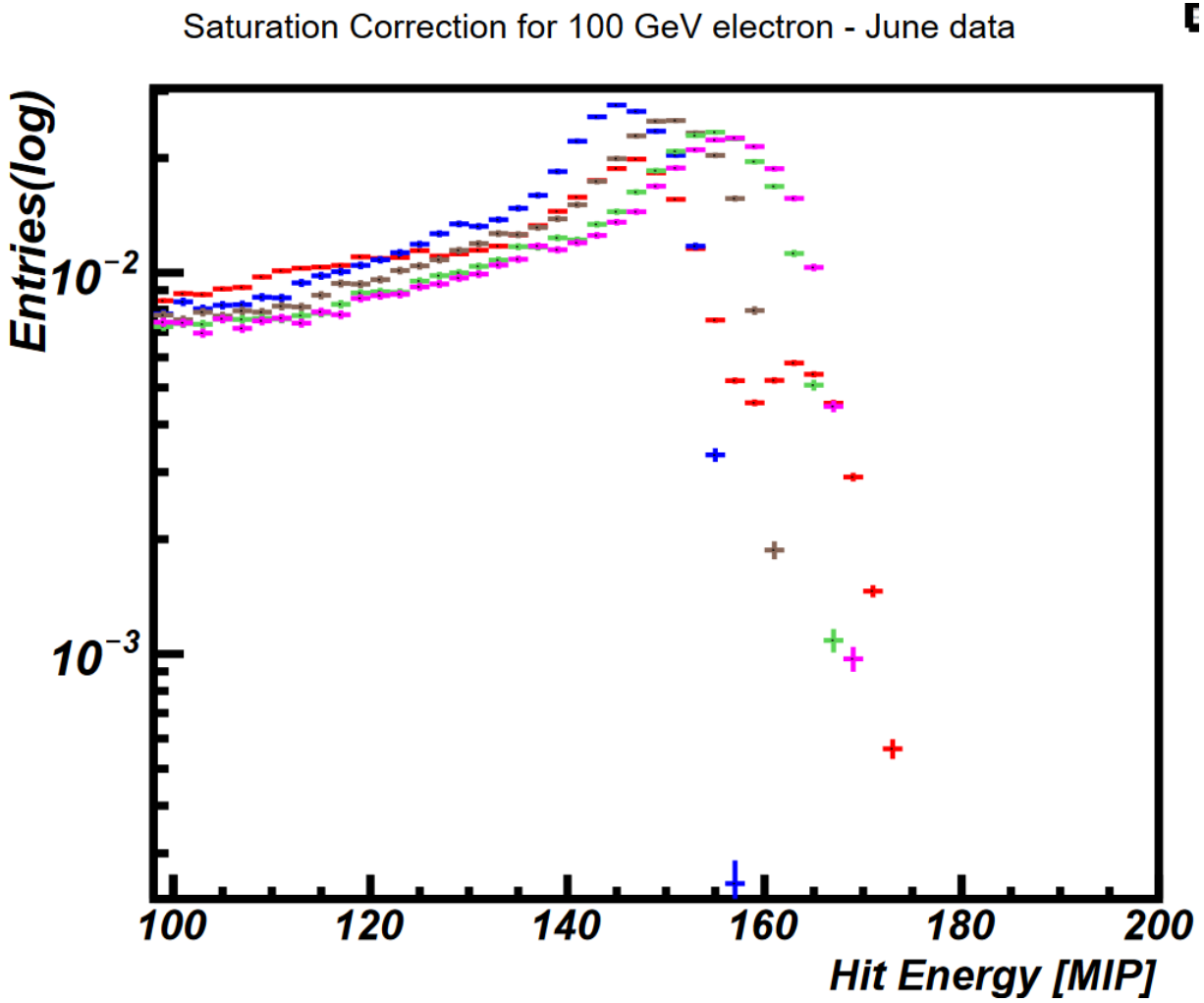
100 GeV electron June data, Run number: 61217



Saturation Correction

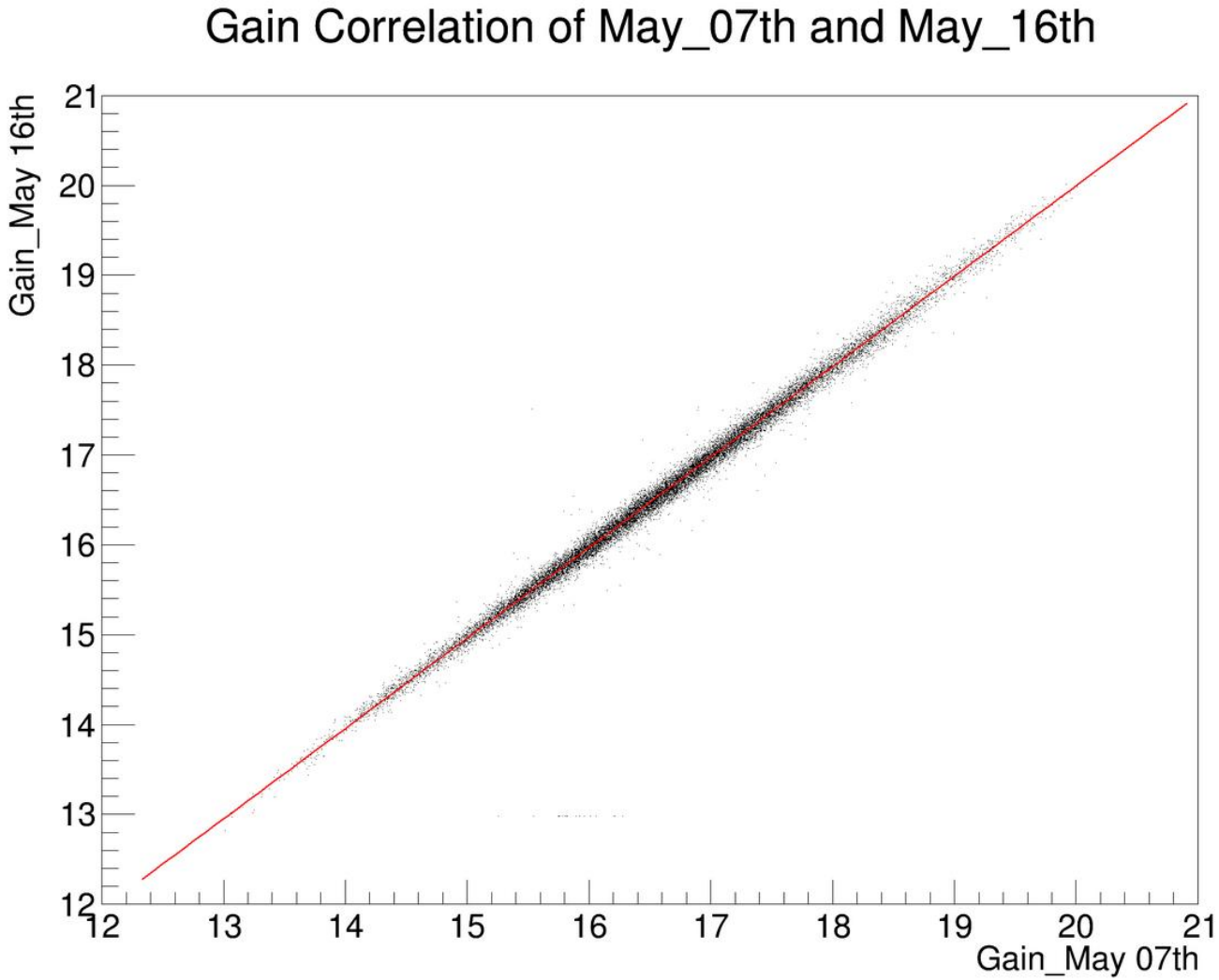
100 GeV electron June data, Run number: 61217





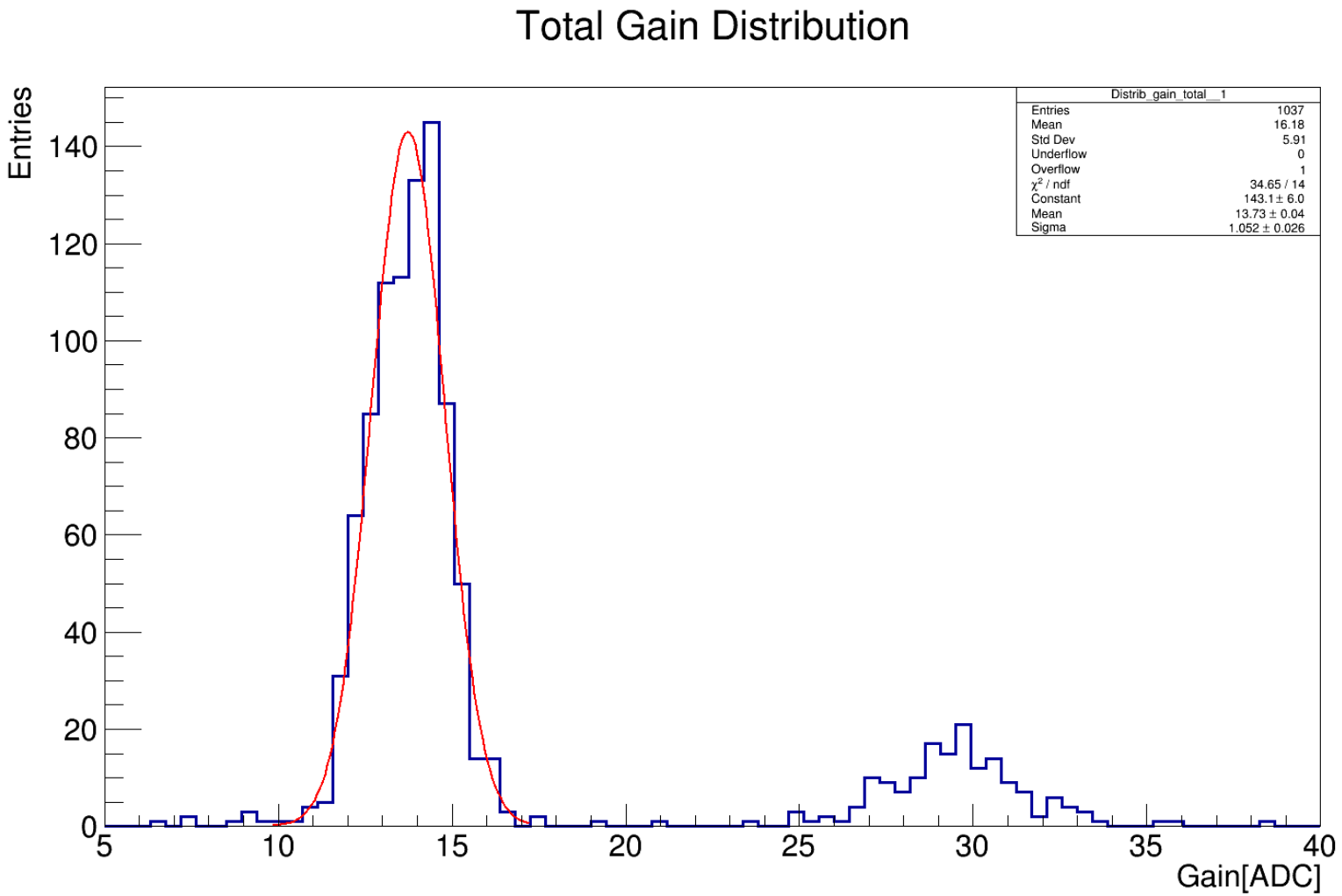
Gain Correlation

Between two days



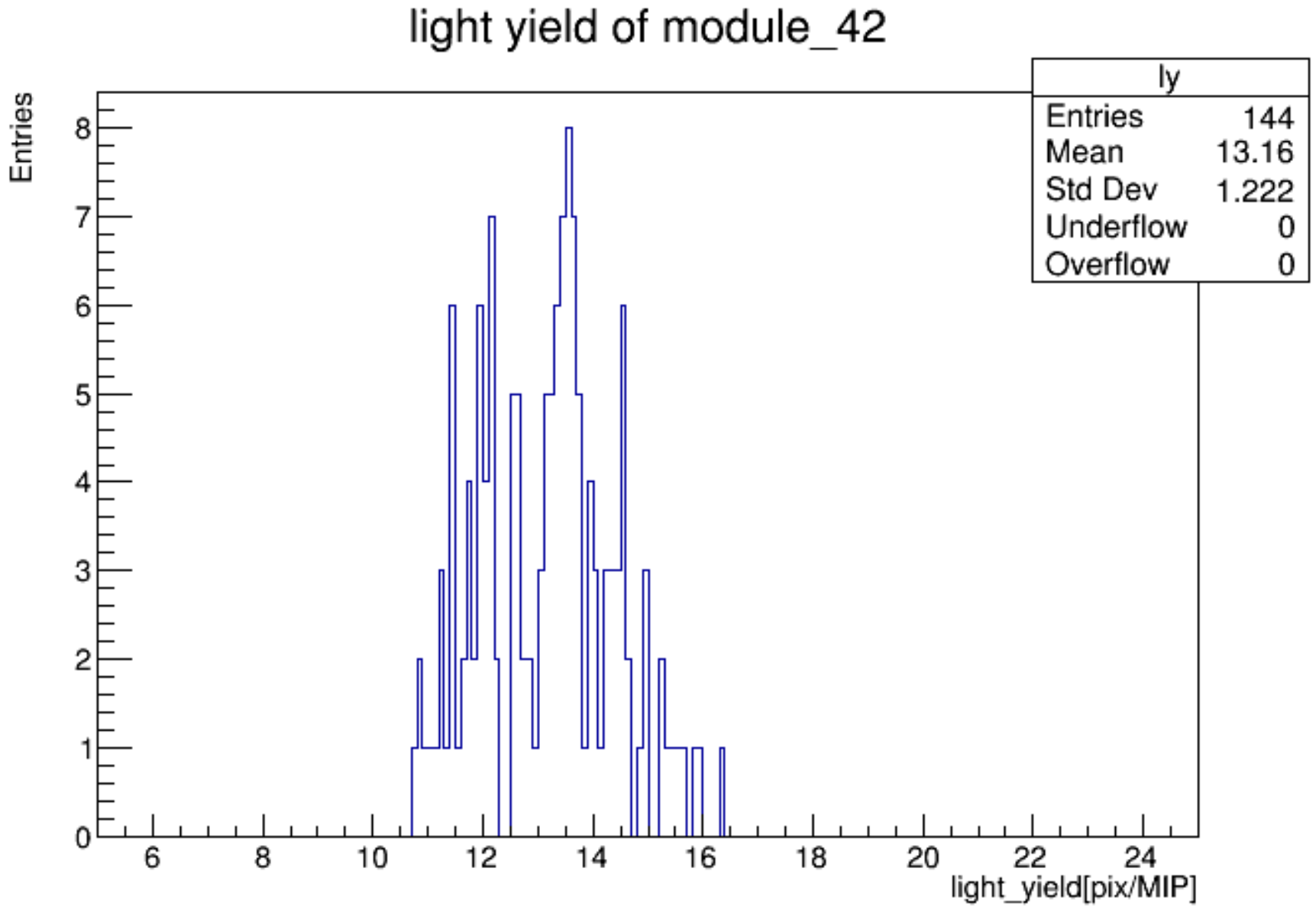
Gain of Tail Catcher

Module 43 to 54



Light Yield

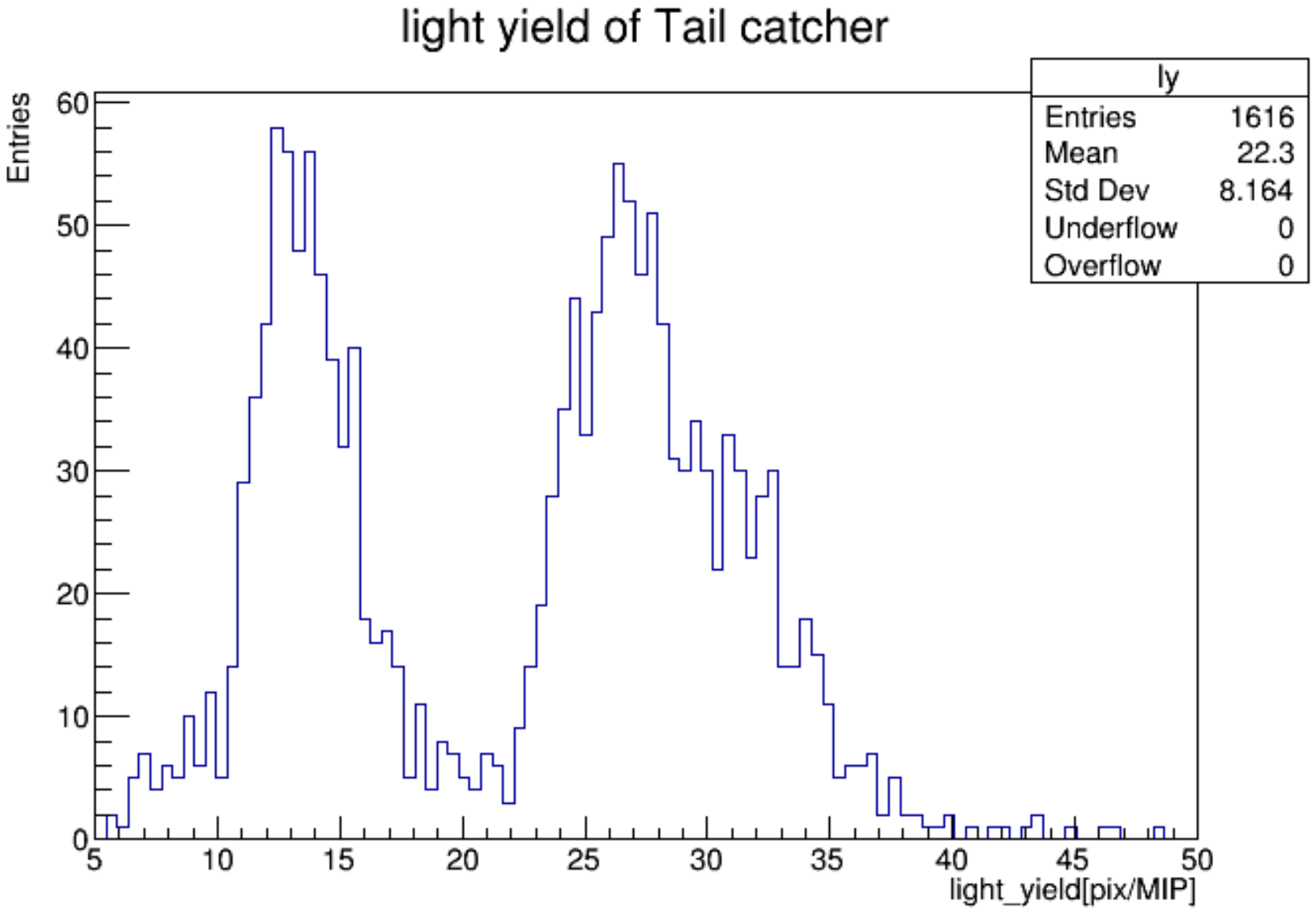
Pre-shower



Light Yield

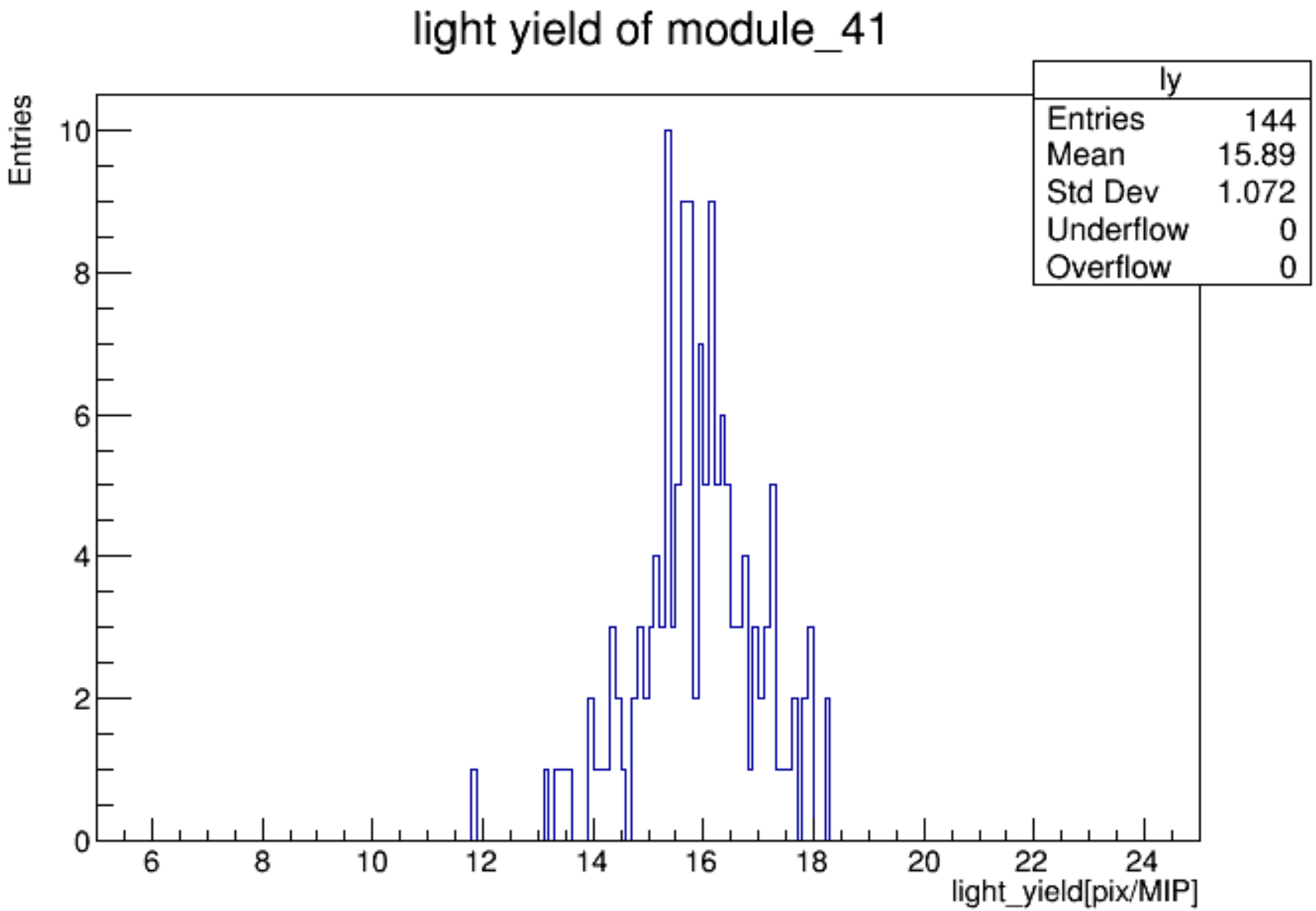
Tail Catcher

New one here



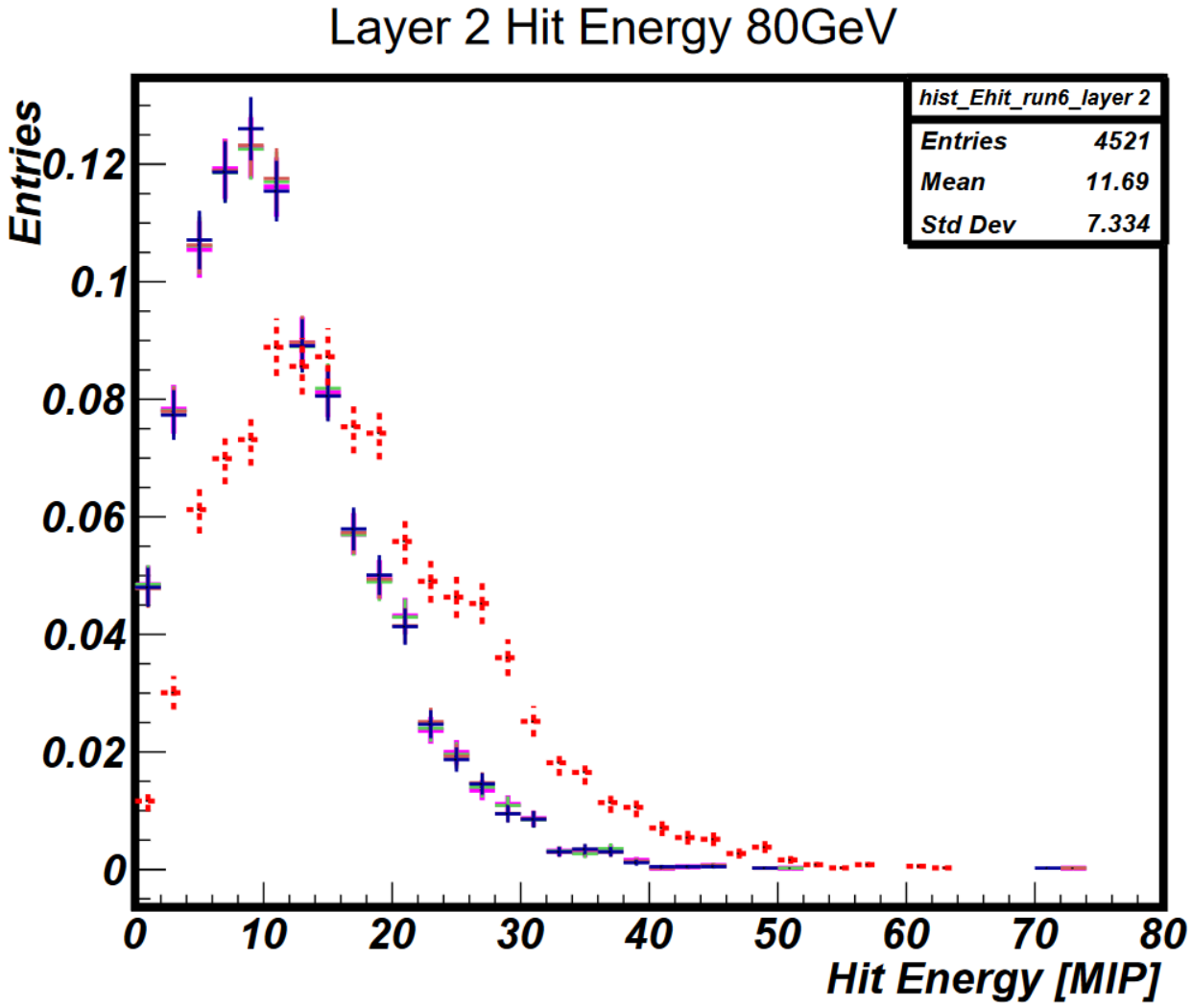
Light Yield

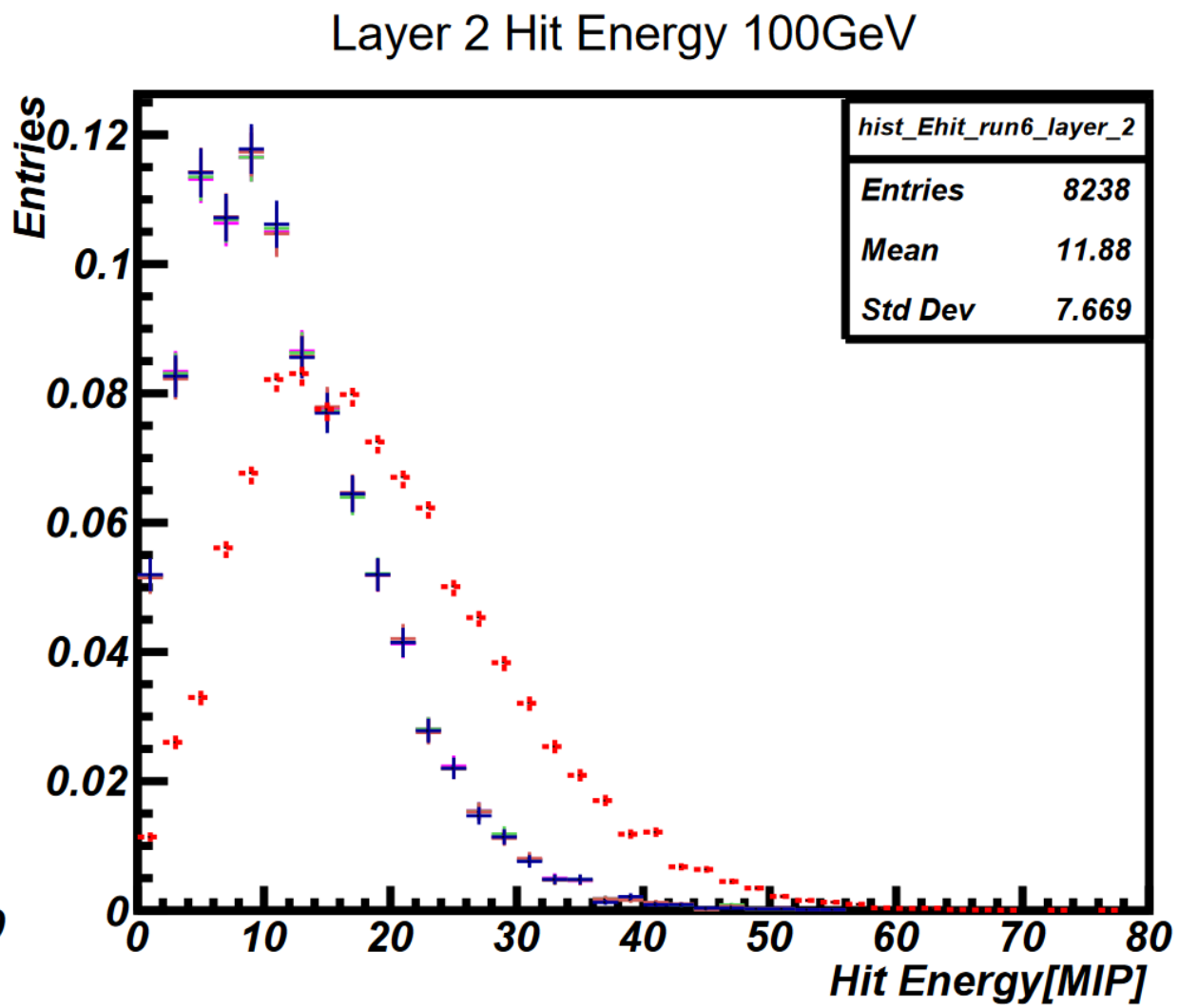
Tokyo layer



Hit energy for 80 GeV and 100 GeV electron

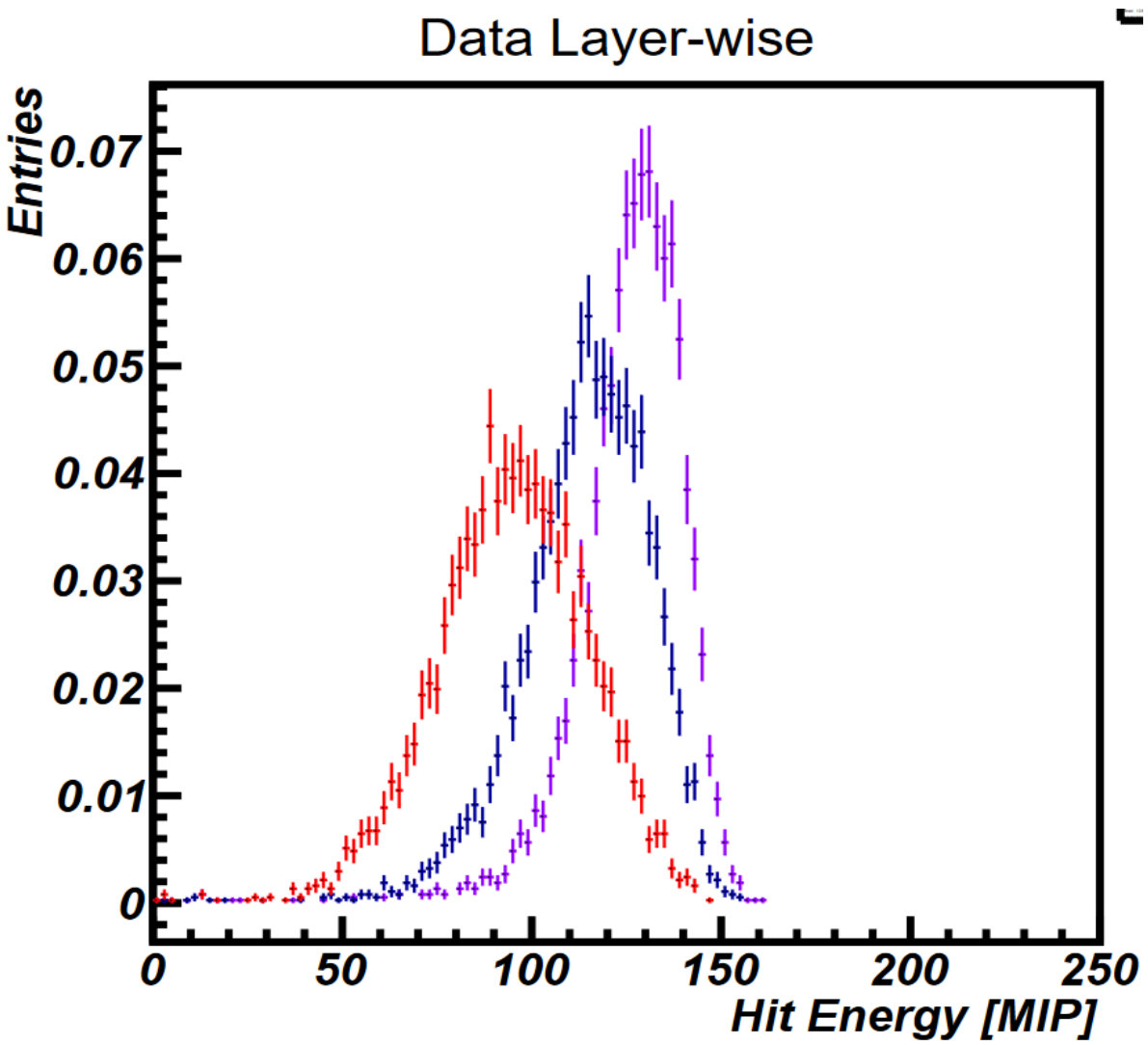
Layer 2

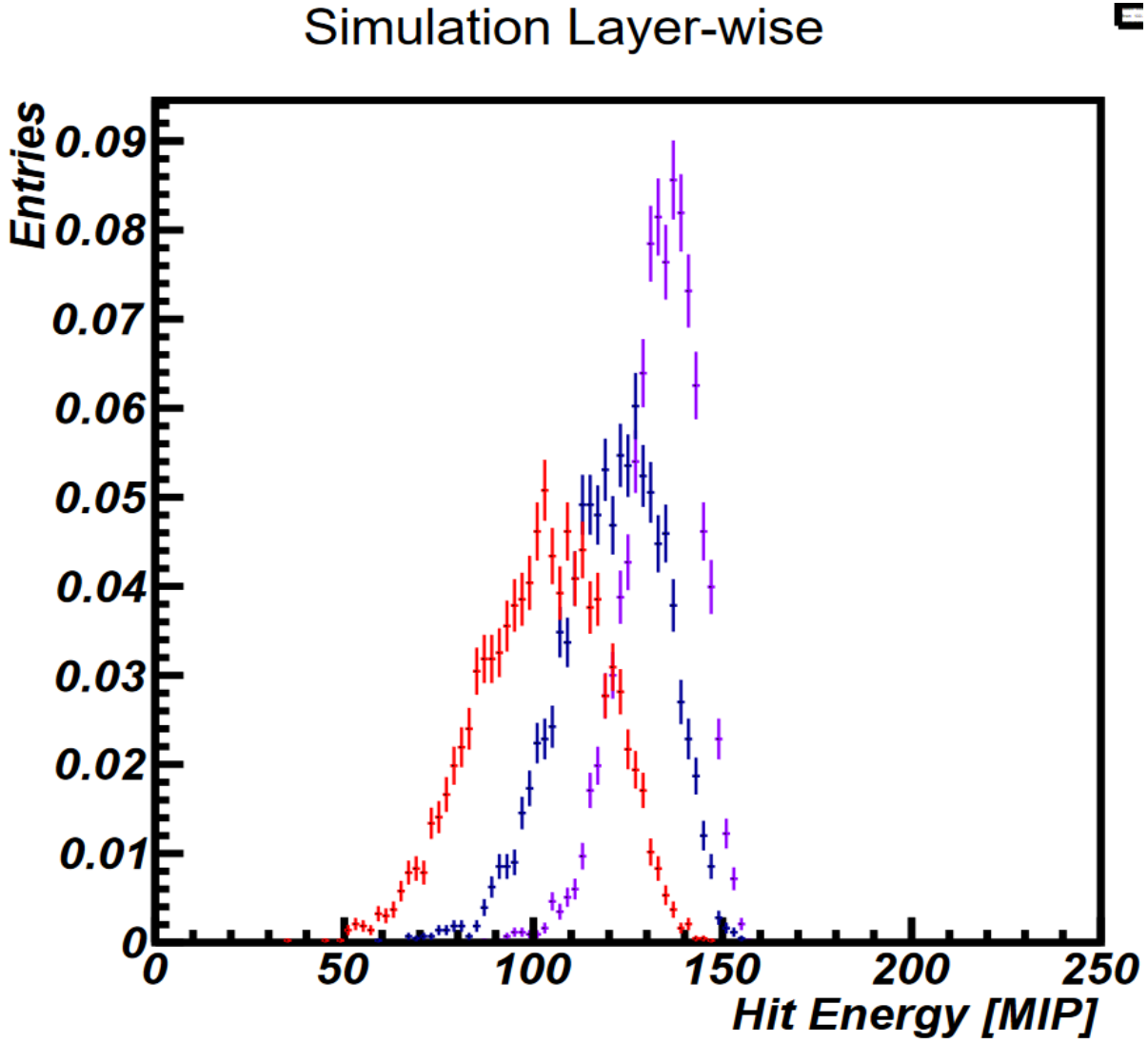




Hit energy layer wise

80 GeV electron

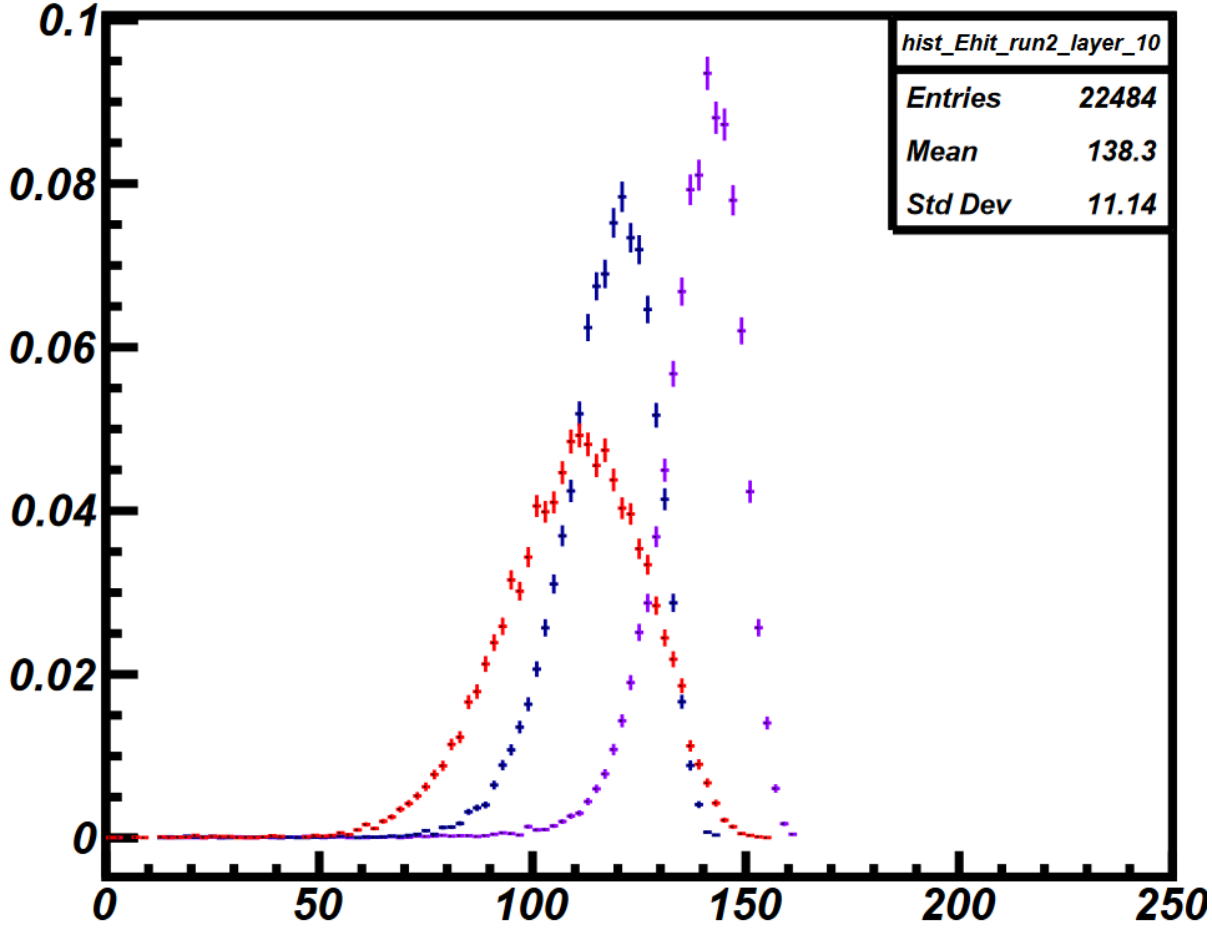




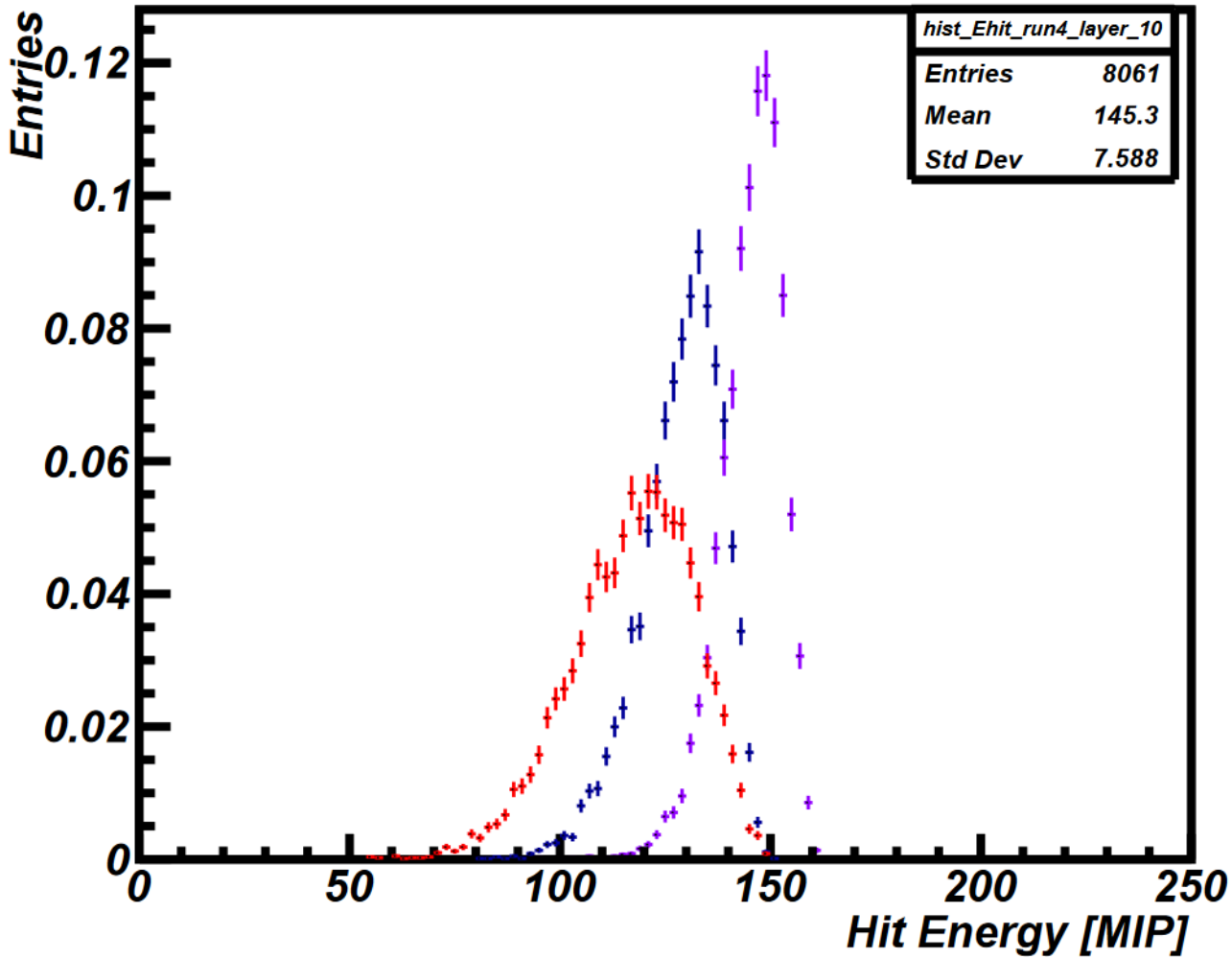
Hit energy layer wise

100 GeV electron

Data layer-wise



Simulation Layer-wise



Conclusion

	Gain	
AHCAL	Pre-Shower	Tail Catcher
~16 ADC	Varying from ~15-16 ADC	~15 and ~30 ADC
	Light Yield	
AHCAL	Pre-Shower	Tail Catcher
~14 pix/MIP	Varying from ~14 pix/MIP	~13 and ~27 pix/MIP
	Saturation Correction	
2433	2533 and 2668	2533
Under-estimates the data	Over-estimates the data	Agrees to certain extent with data