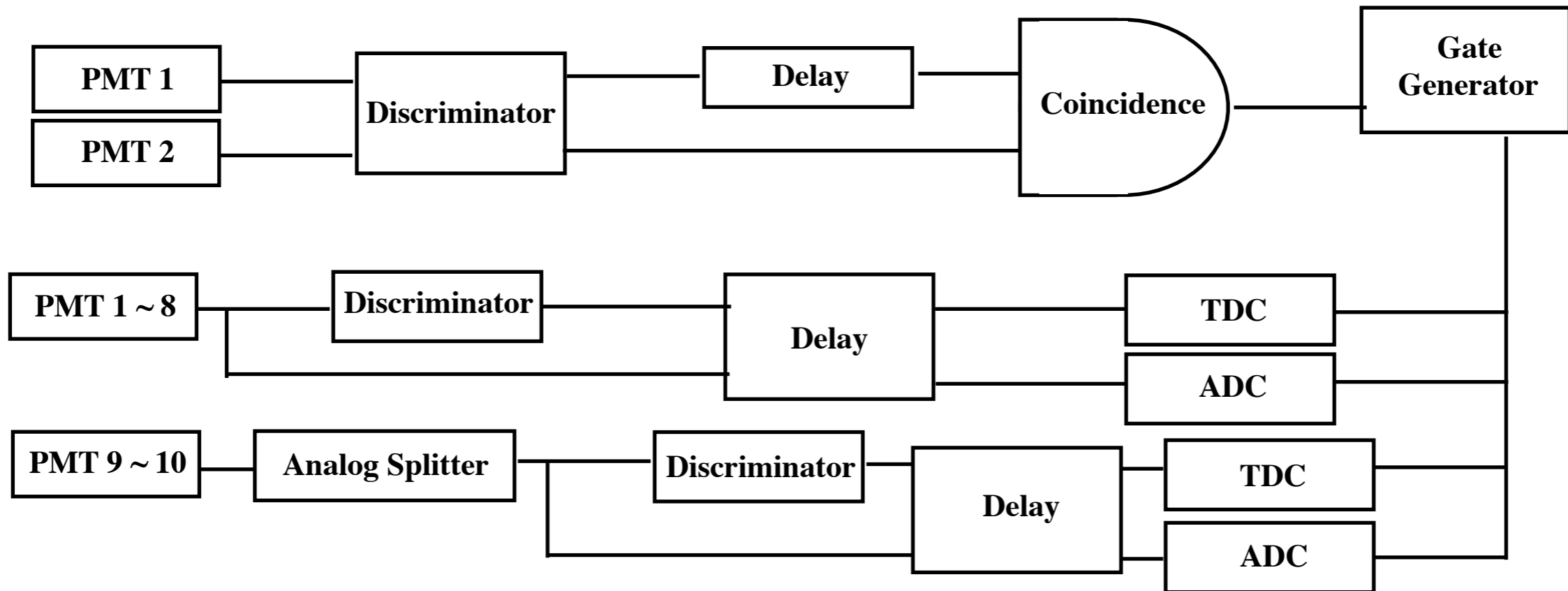# WC Test Progress
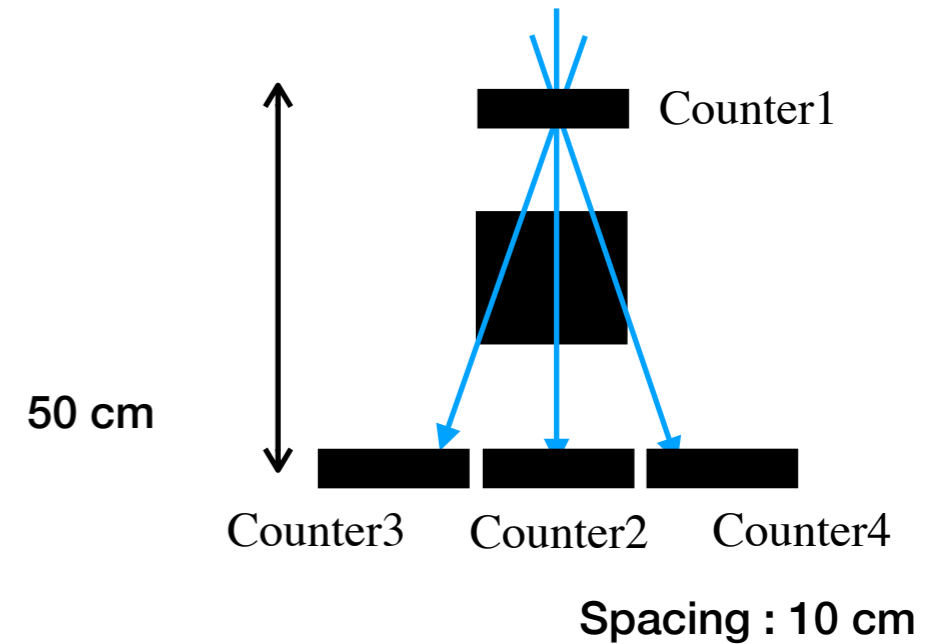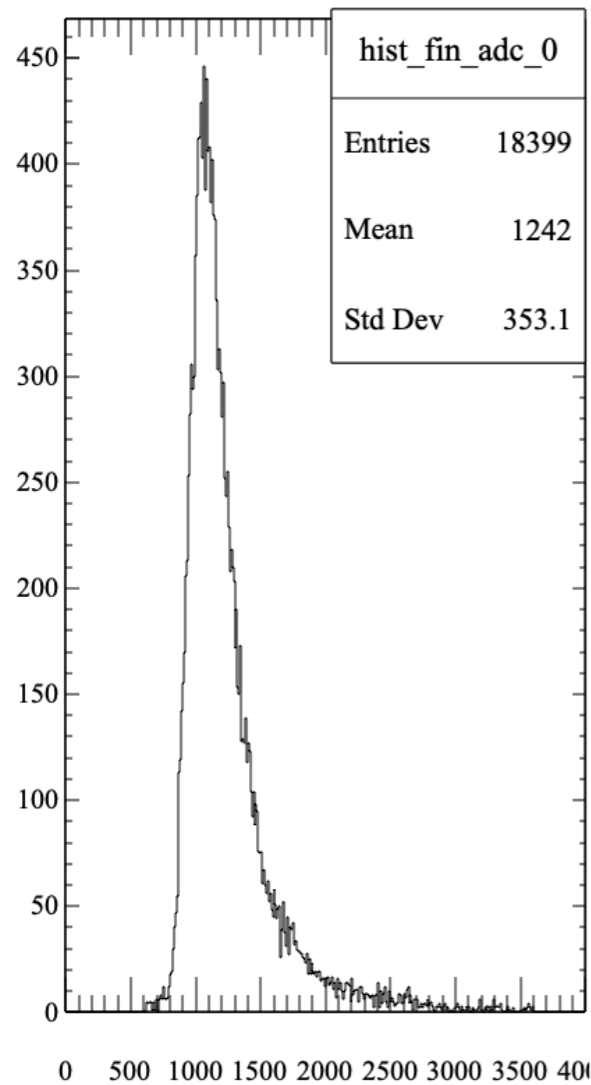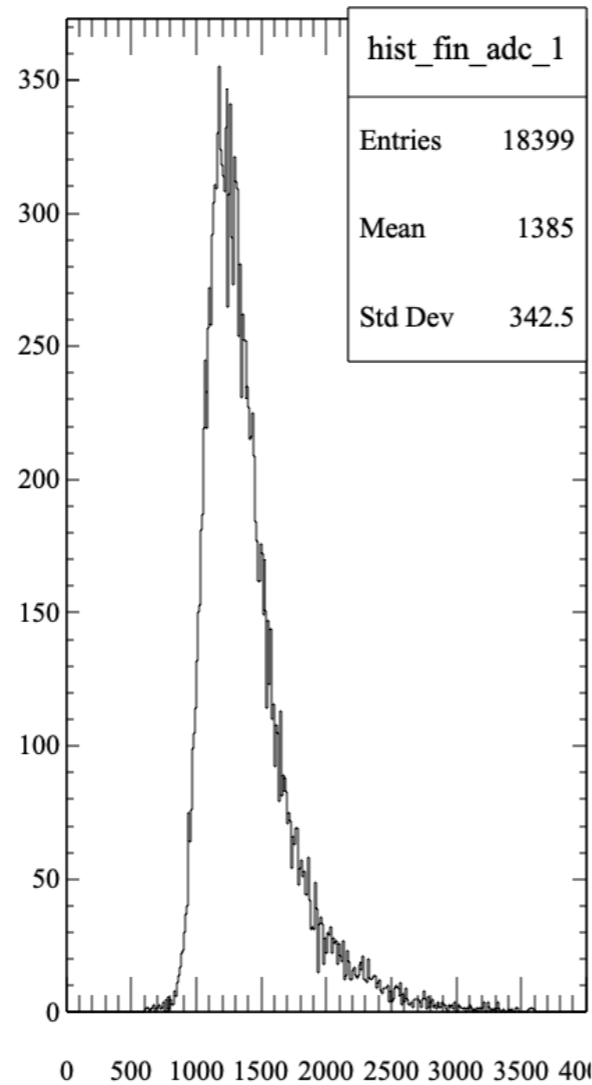
Sungwook Choi

Test Setup

Center Position Trigger

ADC Distribution with Cut-Off Ch_0 | ADC Distribution with Cut-Off Ch_1 | ADC Distribution with Cut-Off Ch_2 | ADC Distribution with Cut-Off Ch_3

hist_fin_adc_0	
Entries	18399
Mean	1242
Std Dev	353.1

hist_fin_adc_1	
Entries	18399
Mean	1385
Std Dev	342.5

hist_fin_adc_2	
Entries	18399
Mean	1340
Std Dev	502.6

hist_fin_adc_3	
Entries	18399
Mean	1331
Std Dev	497.5
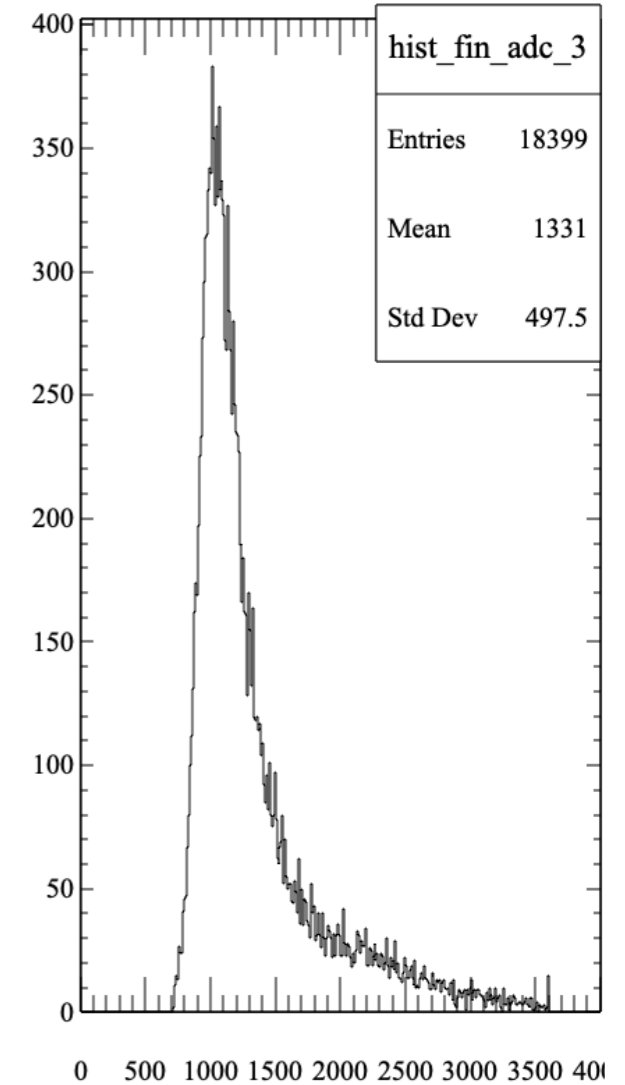
- Data taken for 14 days (from Jan.25)

- Final ADC distribution of trigger counters (Trigger : Channel 1 & Channel 2)

- After neglecting overshoot and applying coincidence cut and position cut
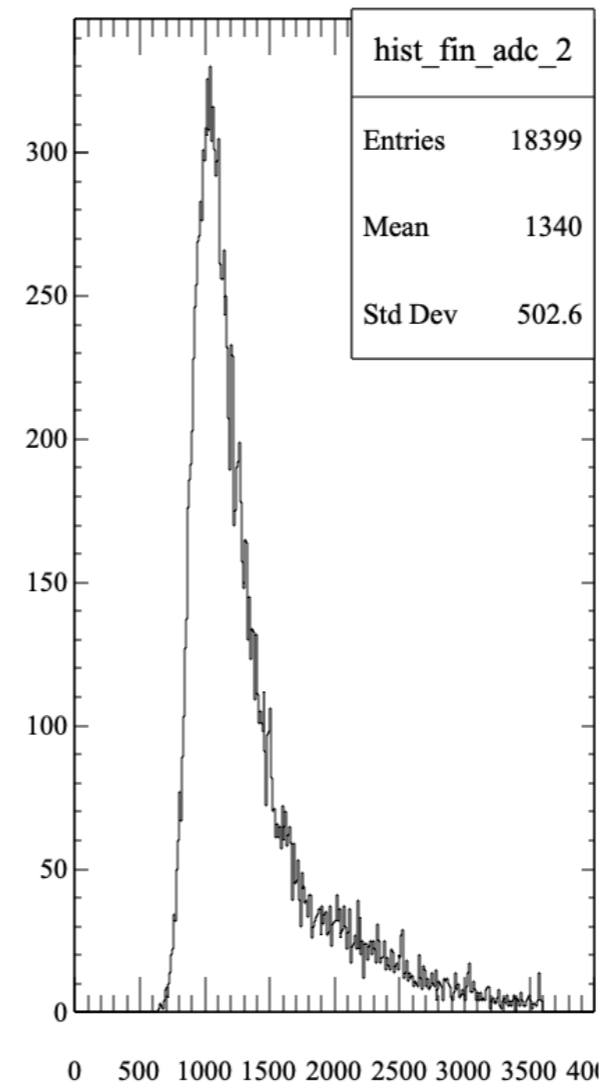
Center Position Trigger

TDC Distribution with Cut-Off Ch_0 | TDC Distribution with Cut-Off Ch_1 | TDC Distribution with Cut-Off Ch_2 | TDC Distribution with Cut-Off Ch_3
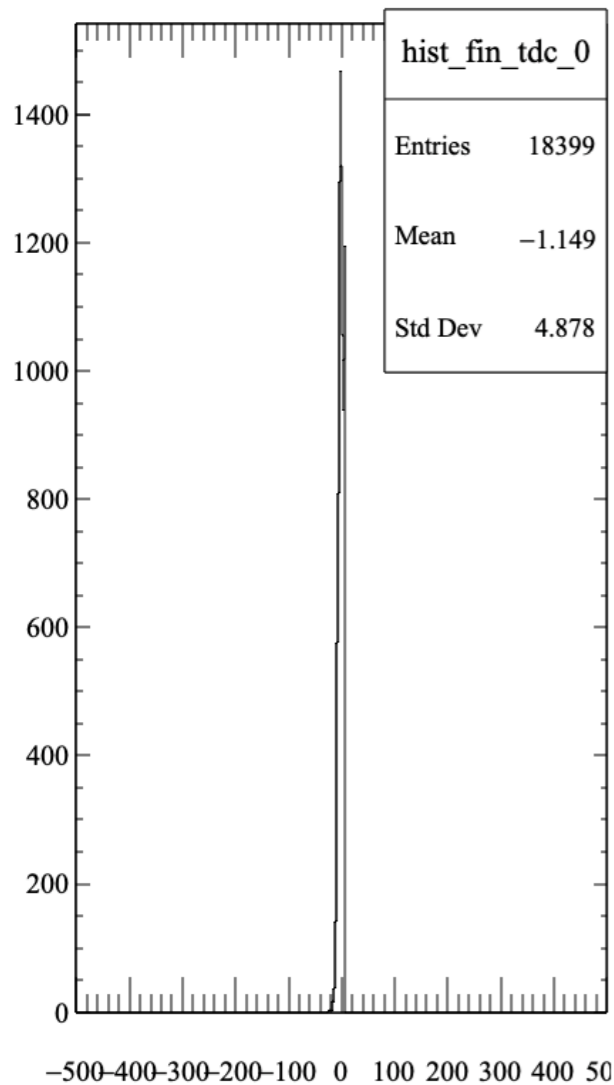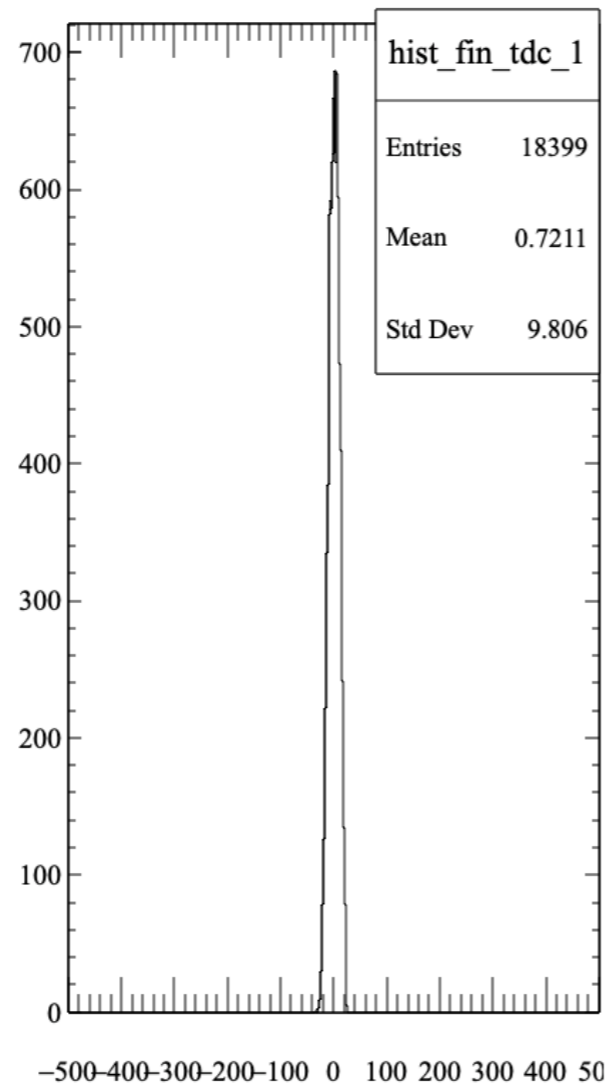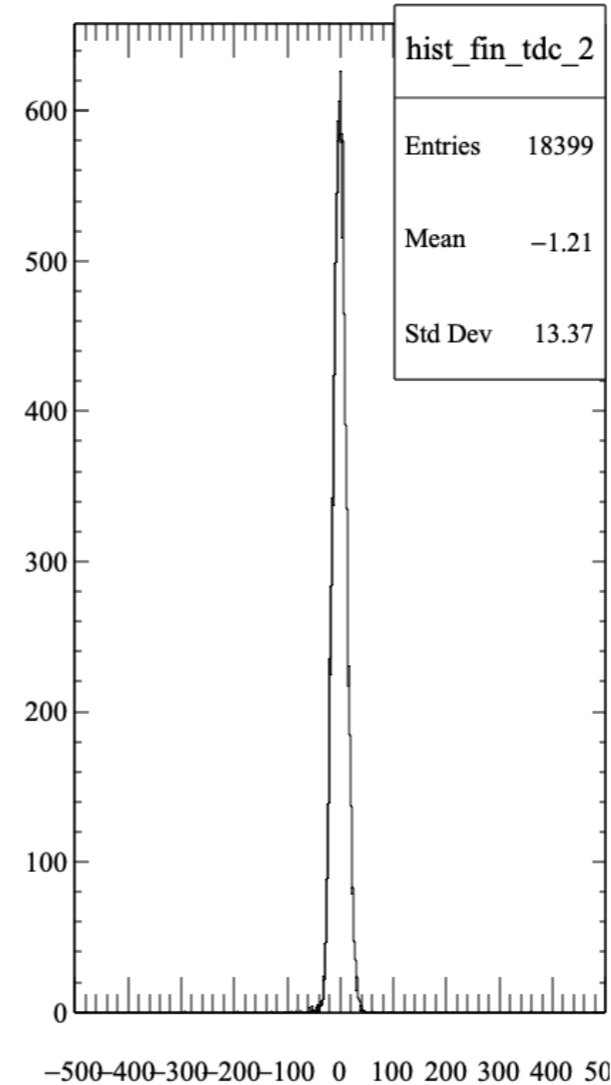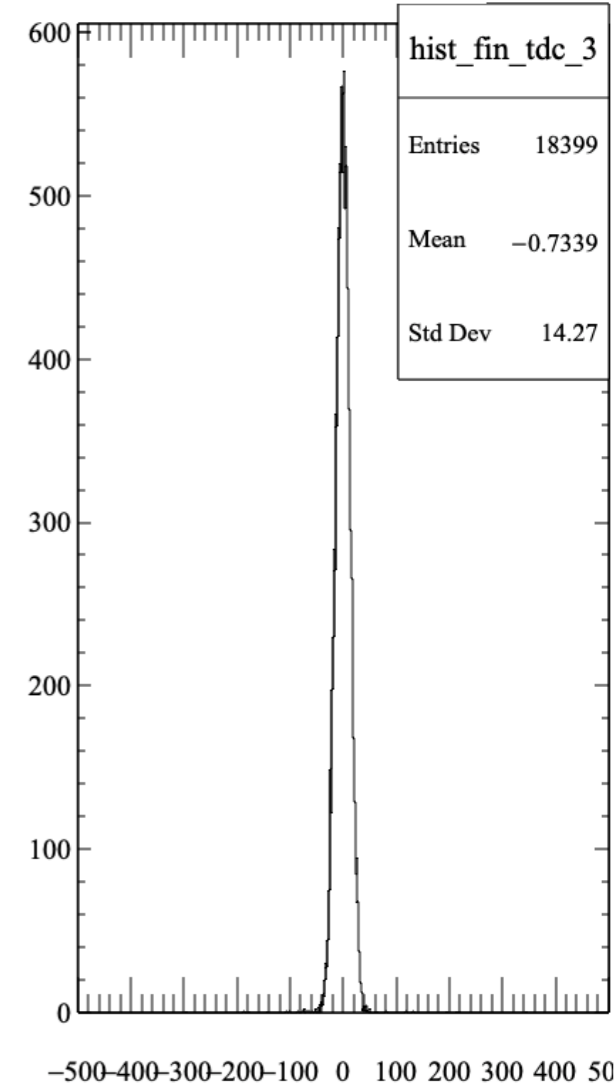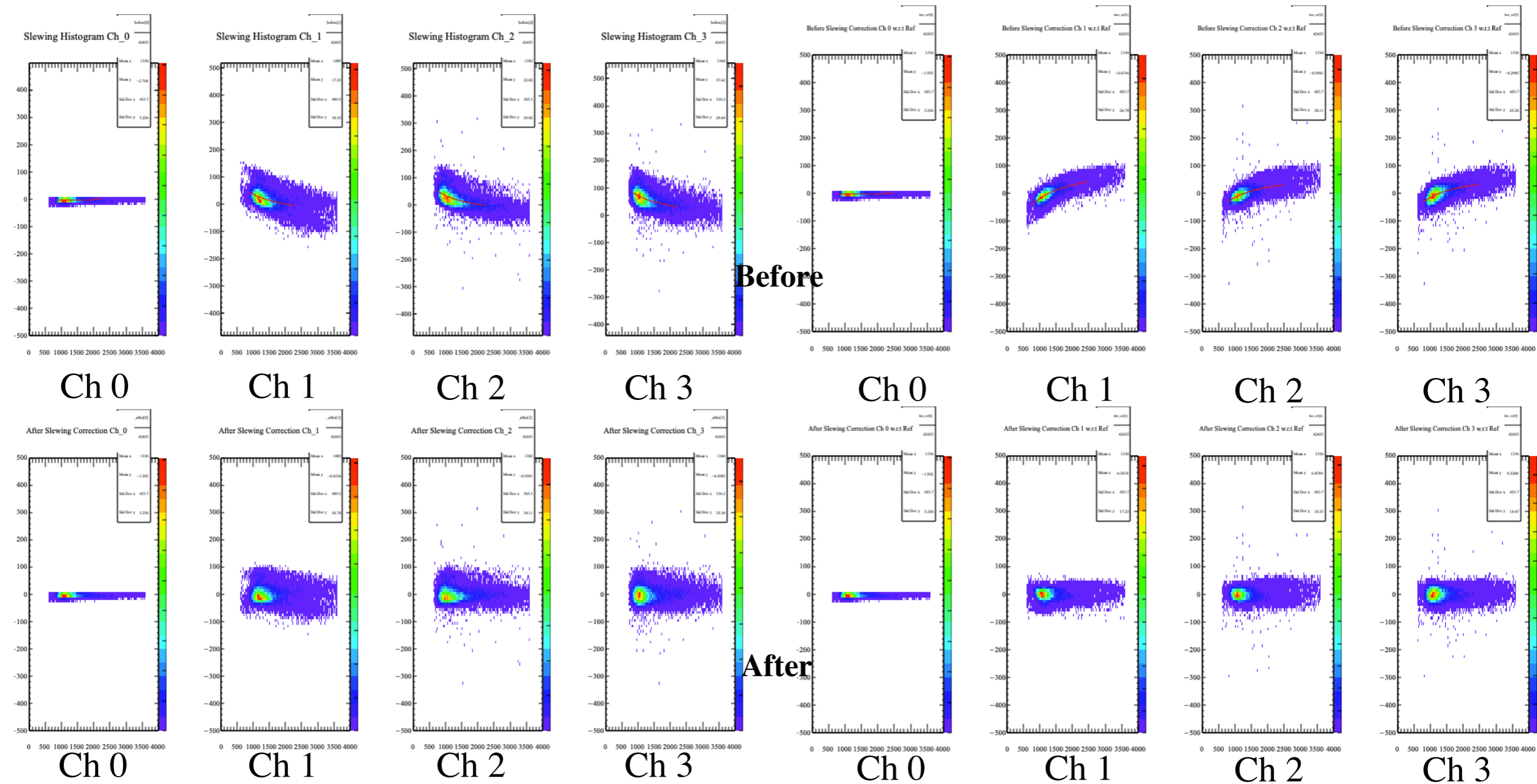
hist_fin_tdc_0	
Entries	18399
Mean	−1.149
Std Dev	4.878

hist_fin_tdc_1	
Entries	18399
Mean	0.7211
Std Dev	9.806

hist_fin_tdc_2	
Entries	18399
Mean	−1.21
Std Dev	13.37

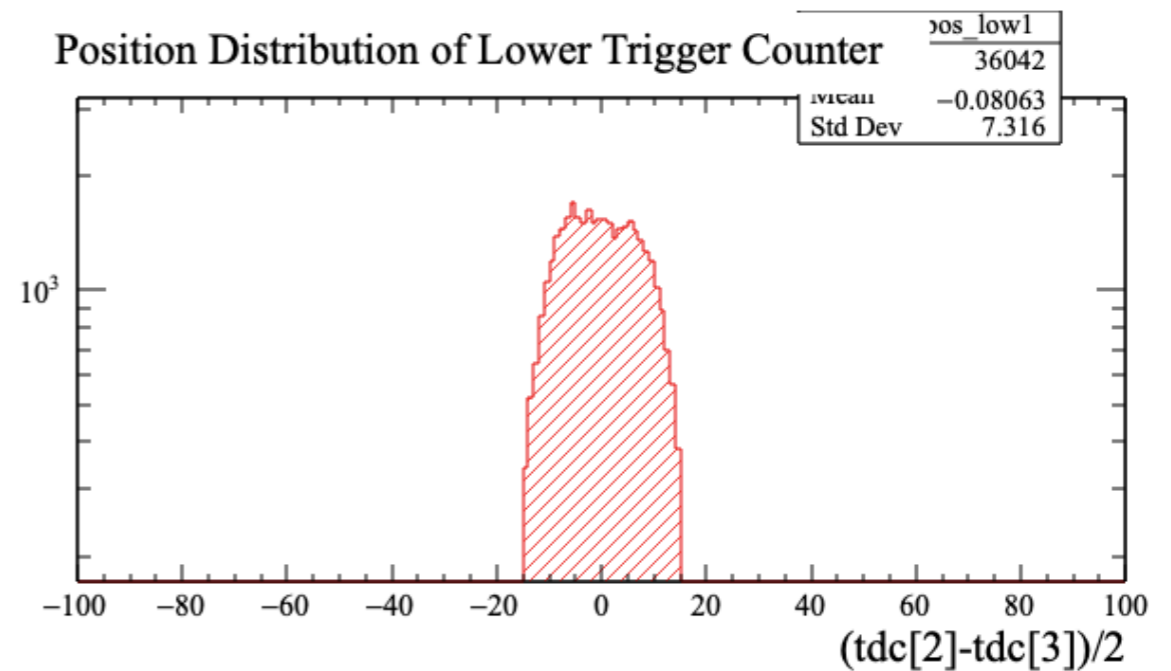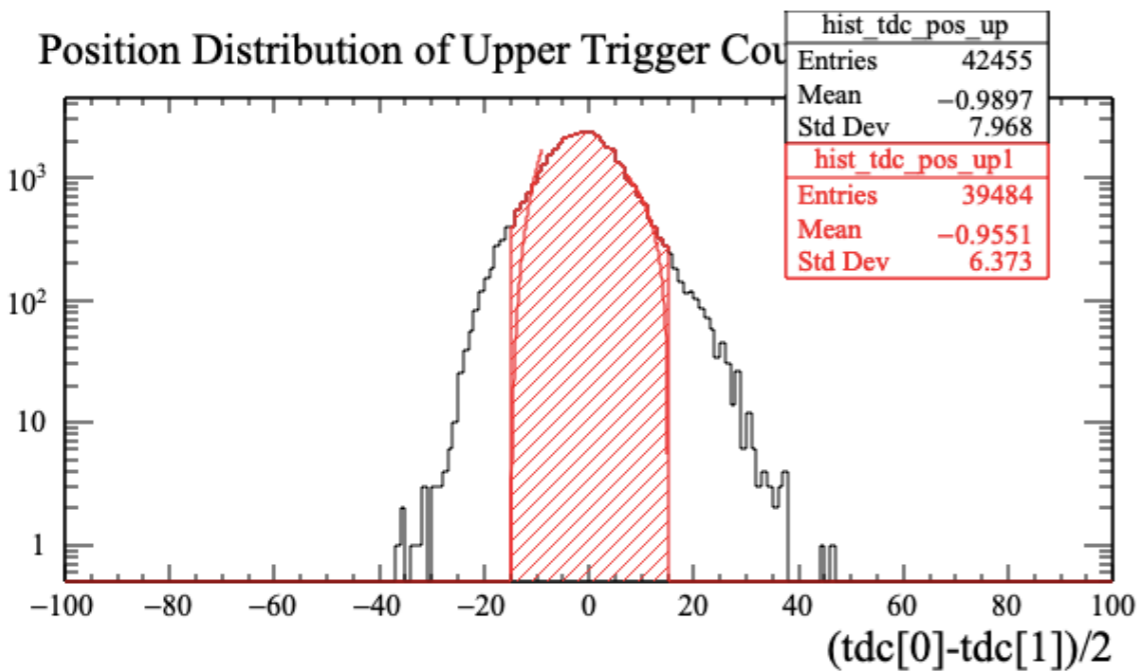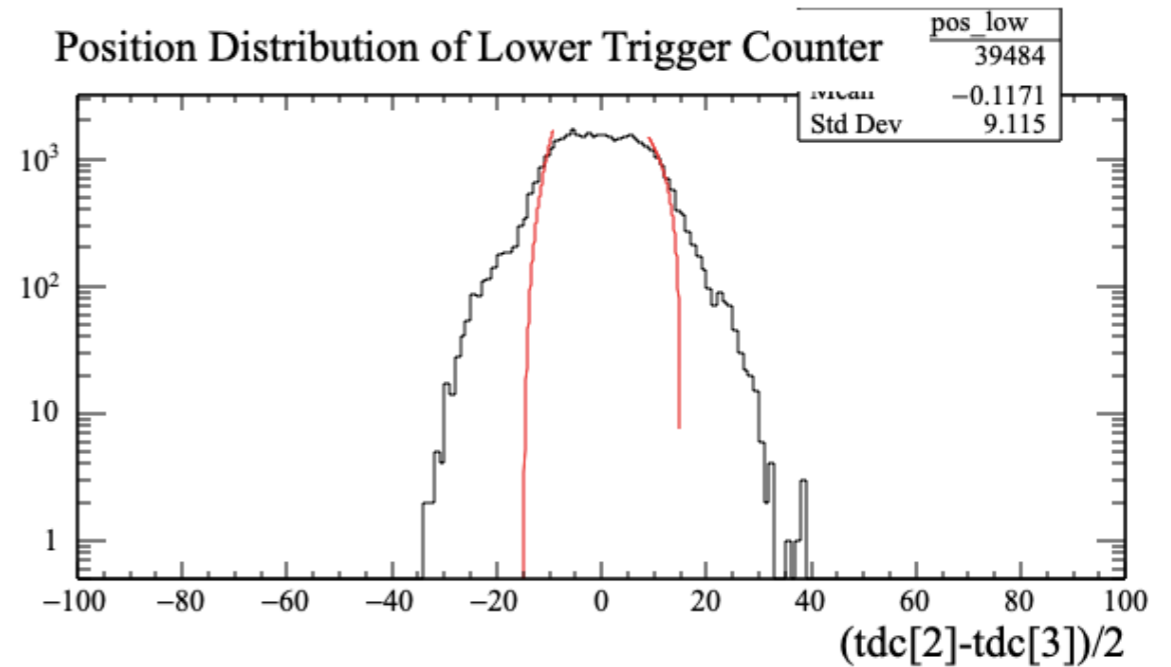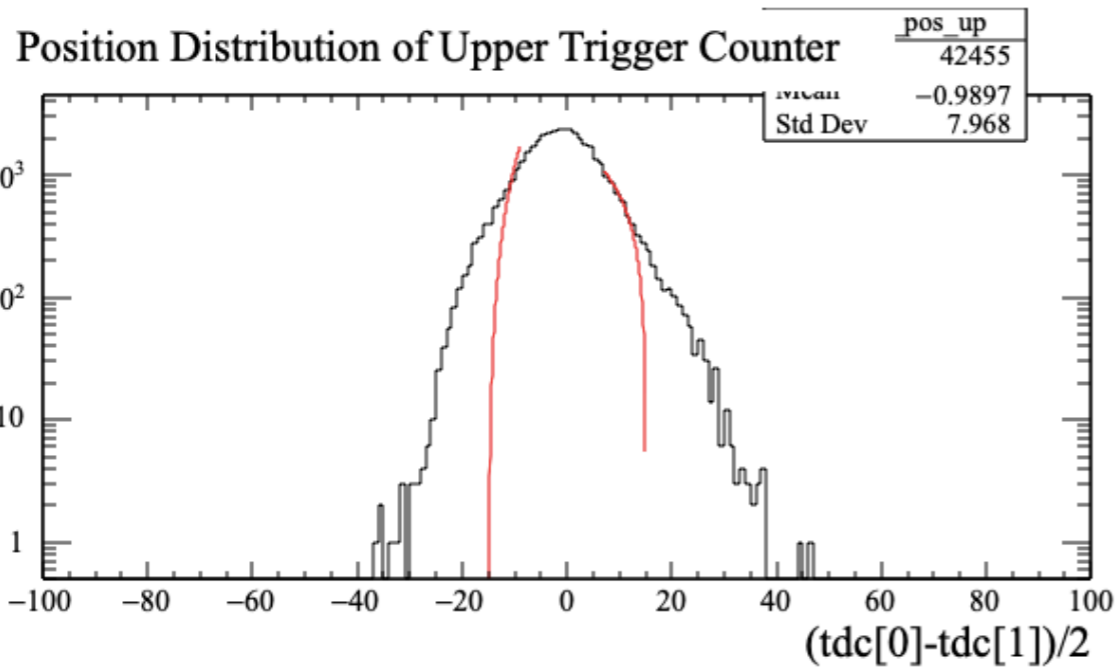| hist_fin_tdc_3	
Entries	18399
Mean	−0.7339
Std Dev	14.27

- Data taken for 14 days (from Jan.25)

- Final TDC distribution of trigger counters (Trigger : Channel 1 & Channel 2)

- After neglecting overshoot and applying coincidence cut and position cut

Center Position Trigger

Before

Ch 0   Ch 1   Ch 2   Ch 3   Ch 0   Ch 1   Ch 2   Ch 3

After

Ch 0   Ch 1   Ch 2   Ch 3   Ch 0   Ch 1   Ch 2   Ch 3

- Timewalk correction of raw TDC w.r.t each channel and reference

Center Position Trigger

Position Distribution of Upper Trigger Counter

pos_up	
	42455
Mean	−0.9897
Std Dev	7.968

Position Distribution of Lower Trigger Counter

pos_low	
	39484
Mean	−0.1171
Std Dev	9.115

Position Distribution of Upper Trigger Counter

hist_tdc_pos_up	
Entries	42455
Mean	−0.9897
Std Dev	7.968
hist_tdc_pos_up1	
Entries	39484
Mean	−0.9551
Std Dev	6.373

Position Distribution of Lower Trigger Counter

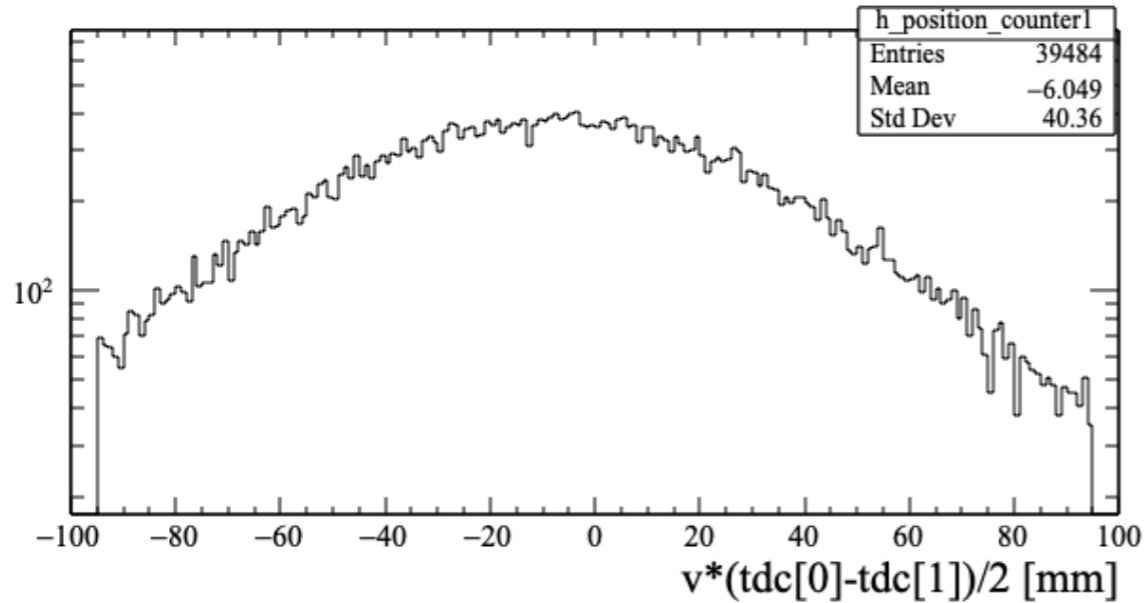| pos_low1	
	36042
Mean	−0.08063
Std Dev	7.316

$(tdc[0]-tdc[1])/2$

$(tdc[2]-tdc[3])/2$

- Applying position cuts

Center Position Trigger

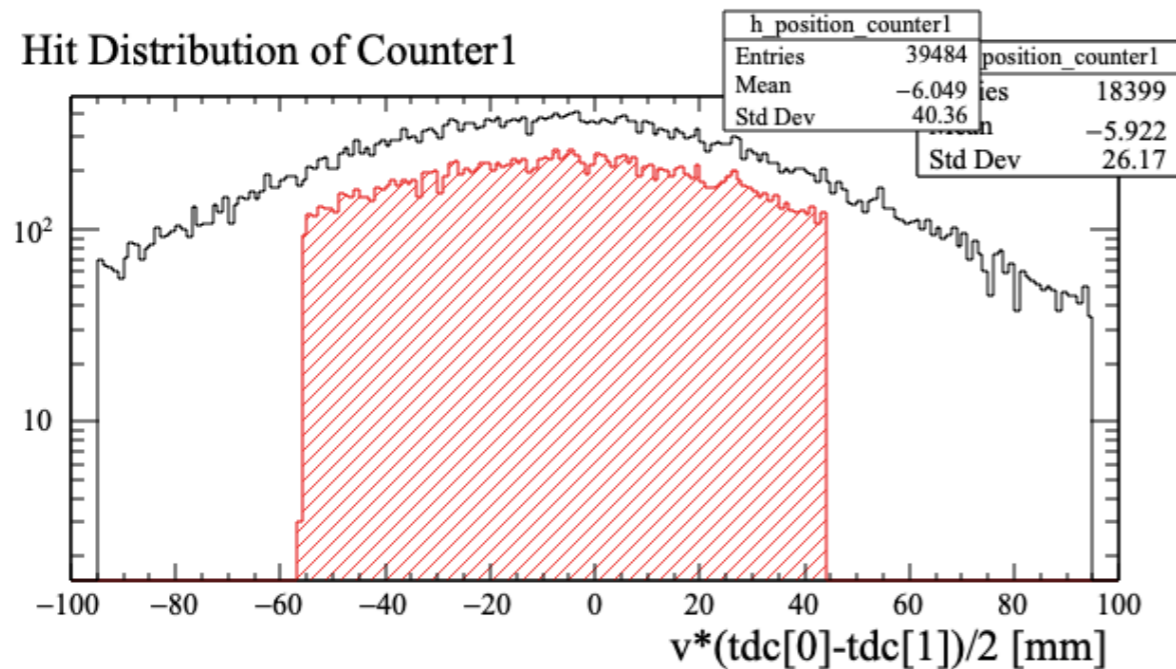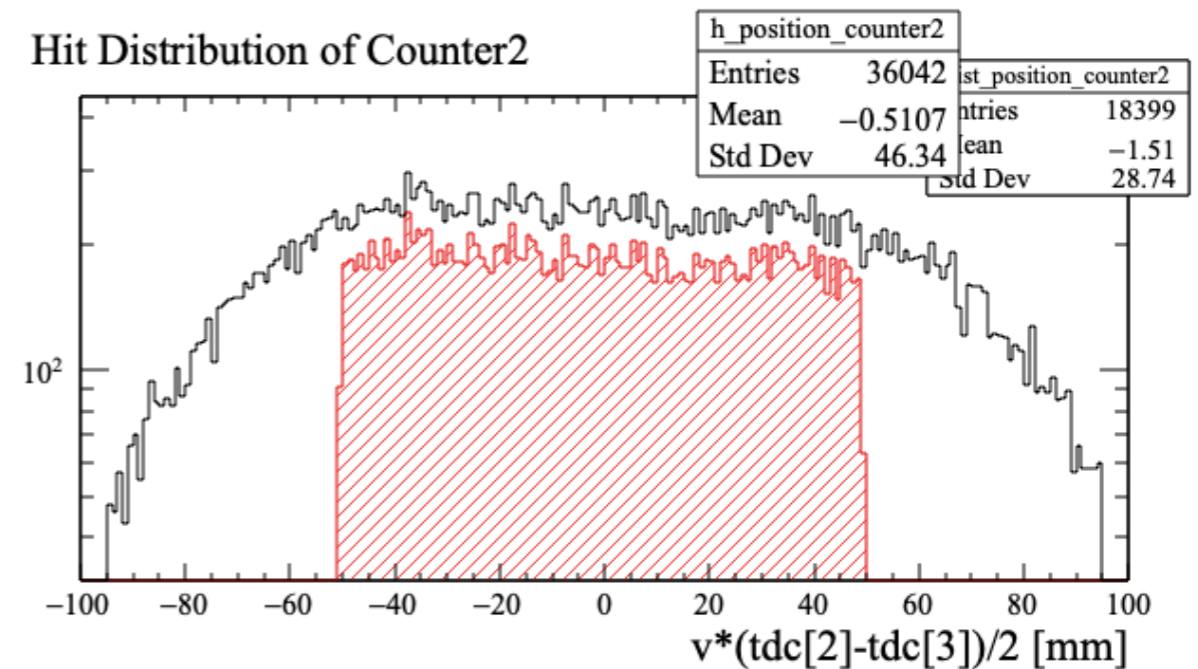- Selecting hits between -50 mm and 50 mm (15 cm = radiator length)
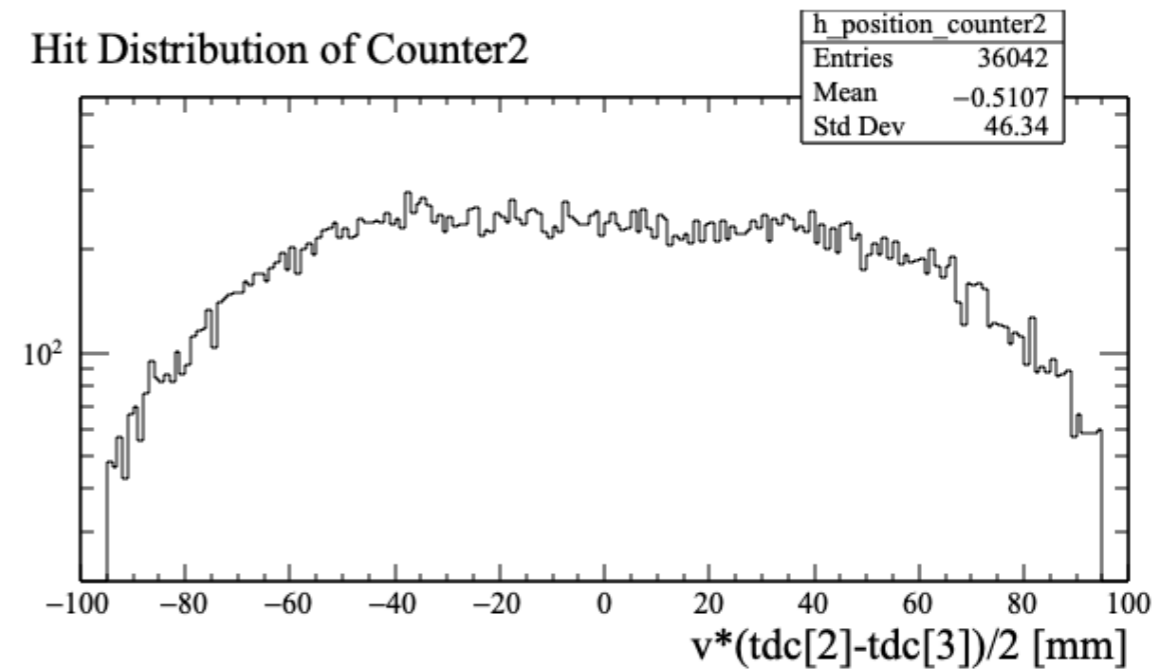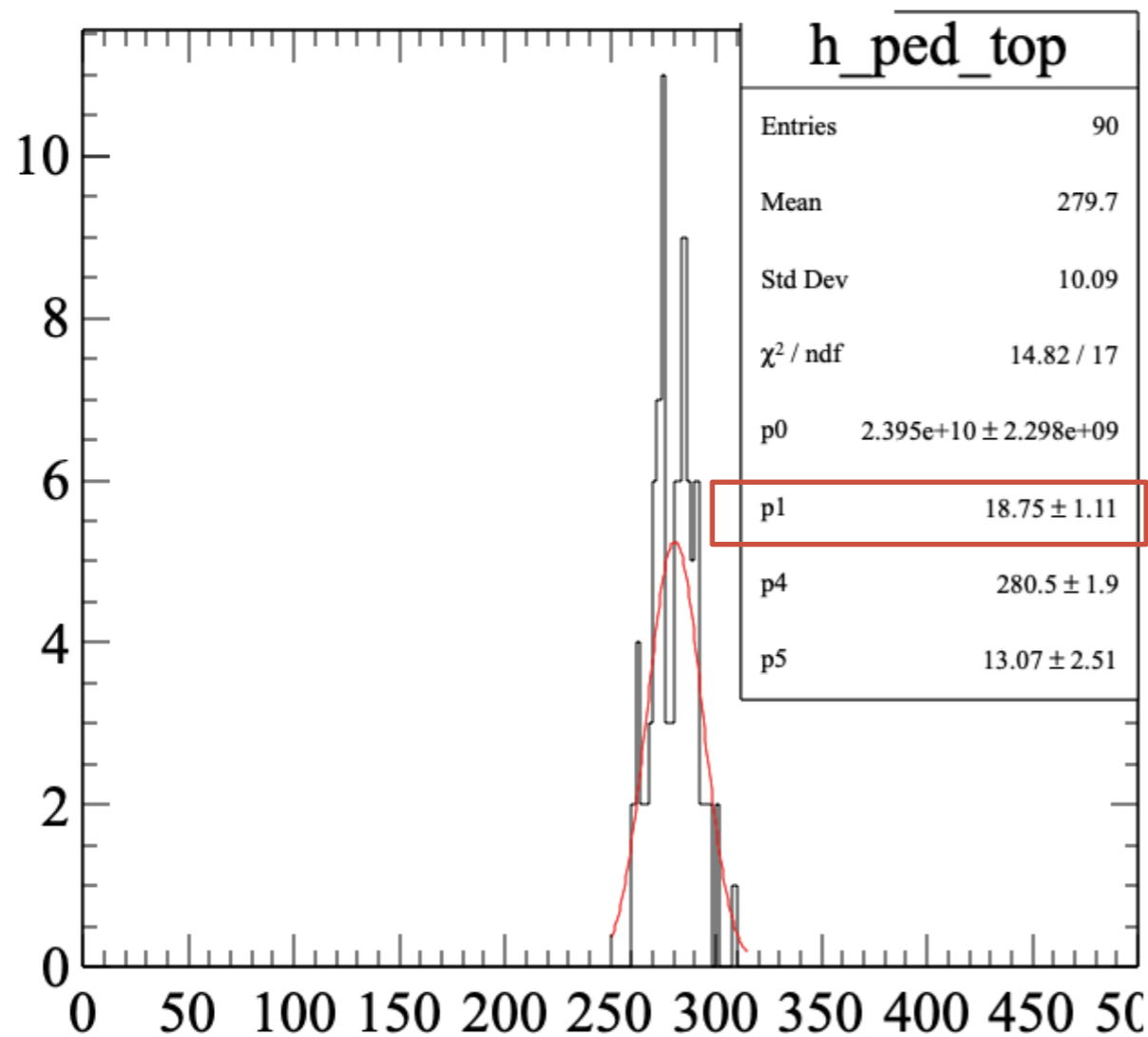
Center Position Trigger
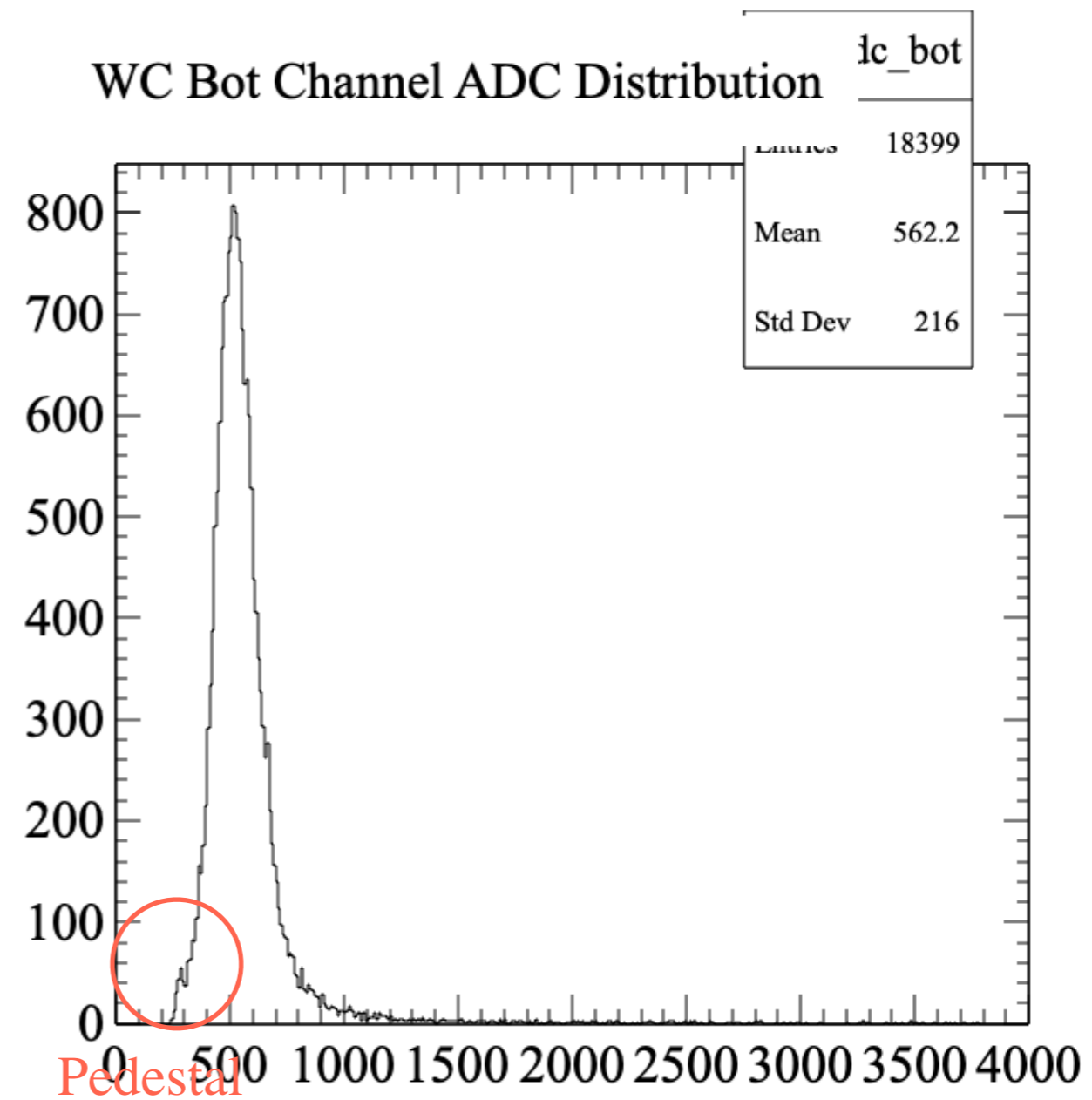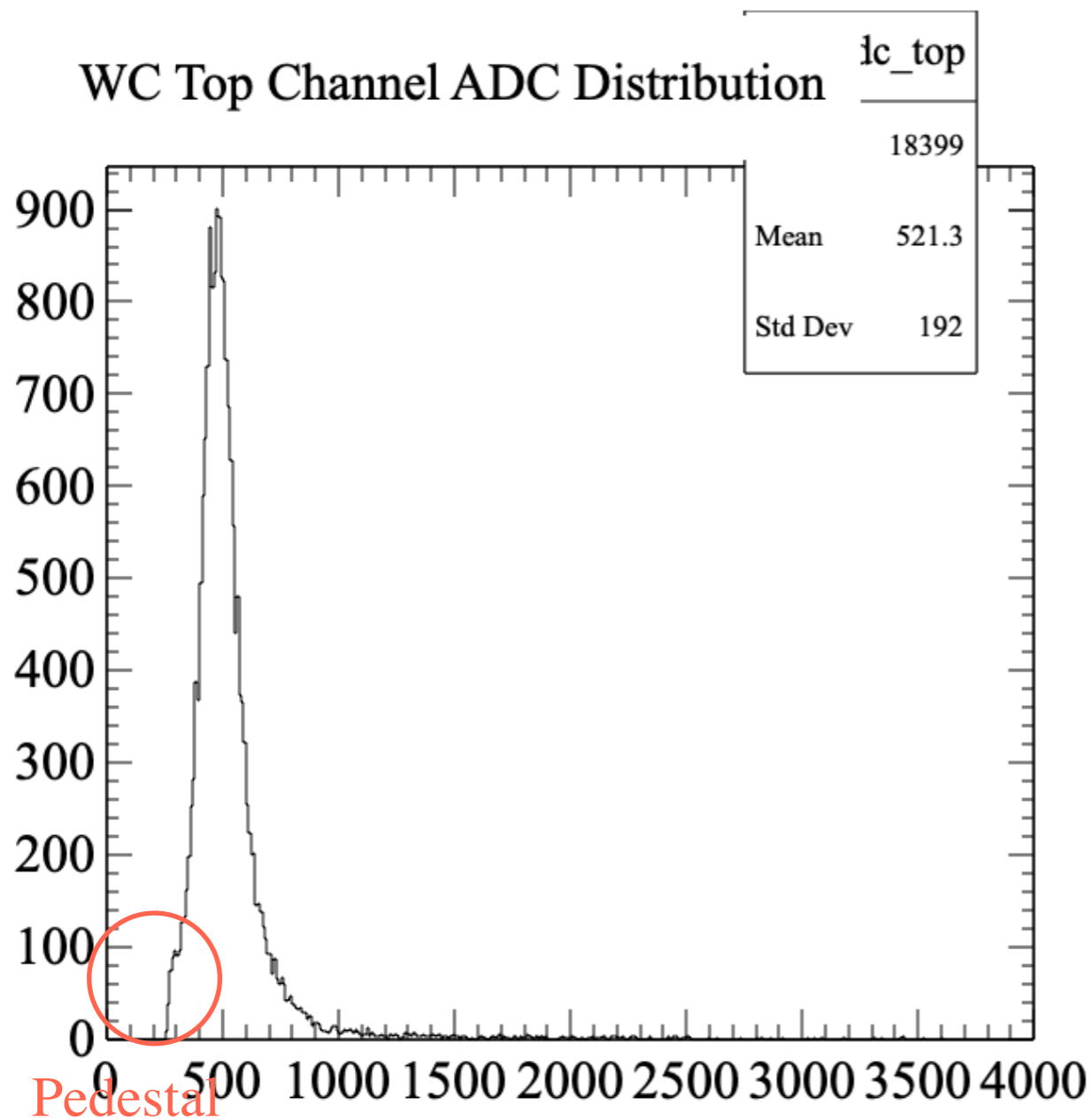
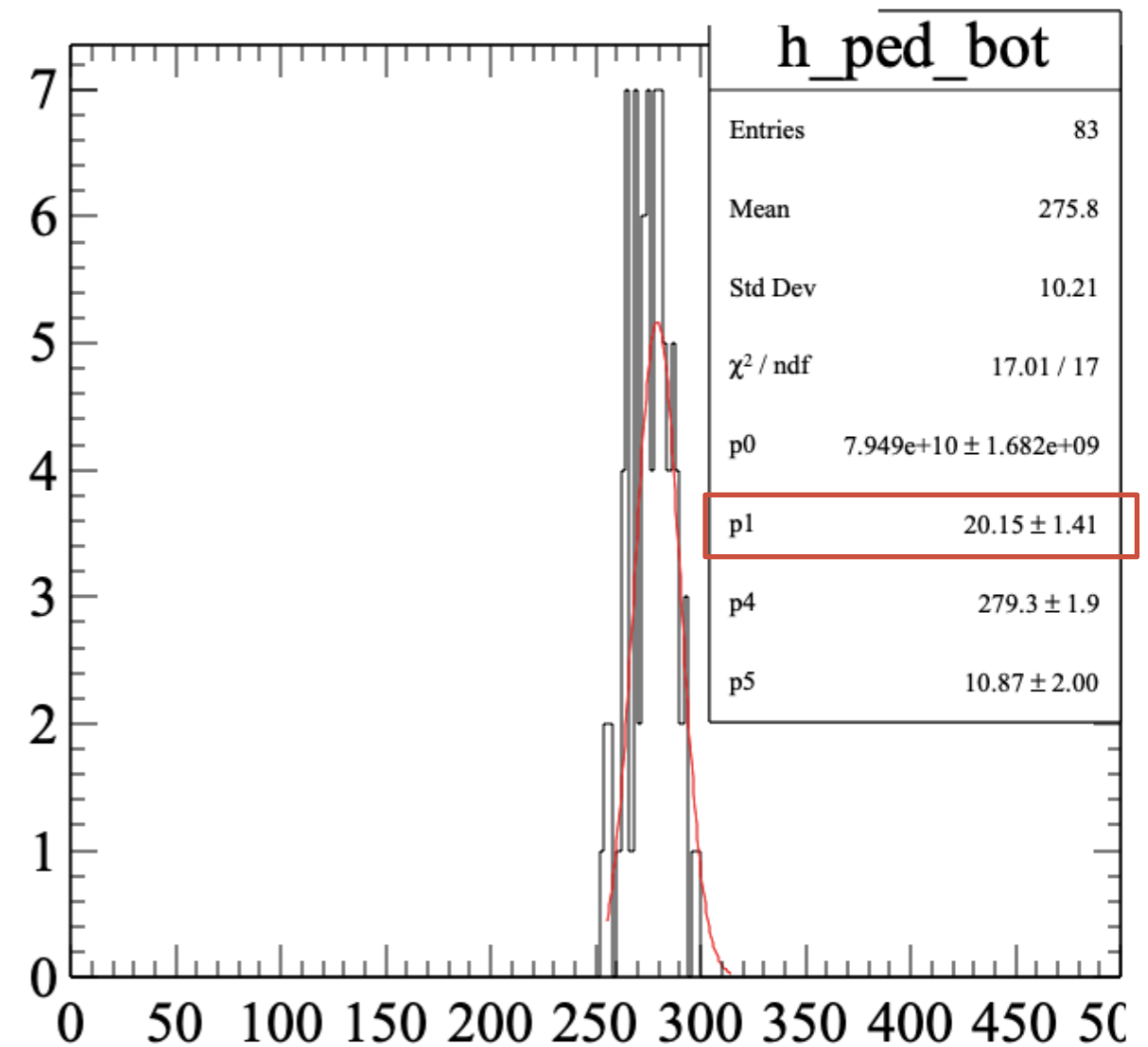- After the data sorting, raw ADC distribution of WC top and bottom

Center Position Trigger

- Pedestal is fitted with the convolution of gaussian and poisson distribution.

- Fitted mean of poisson distribution is **18.75 ± 1.11 [top], 20.15 ± 1.41 [bottom]**
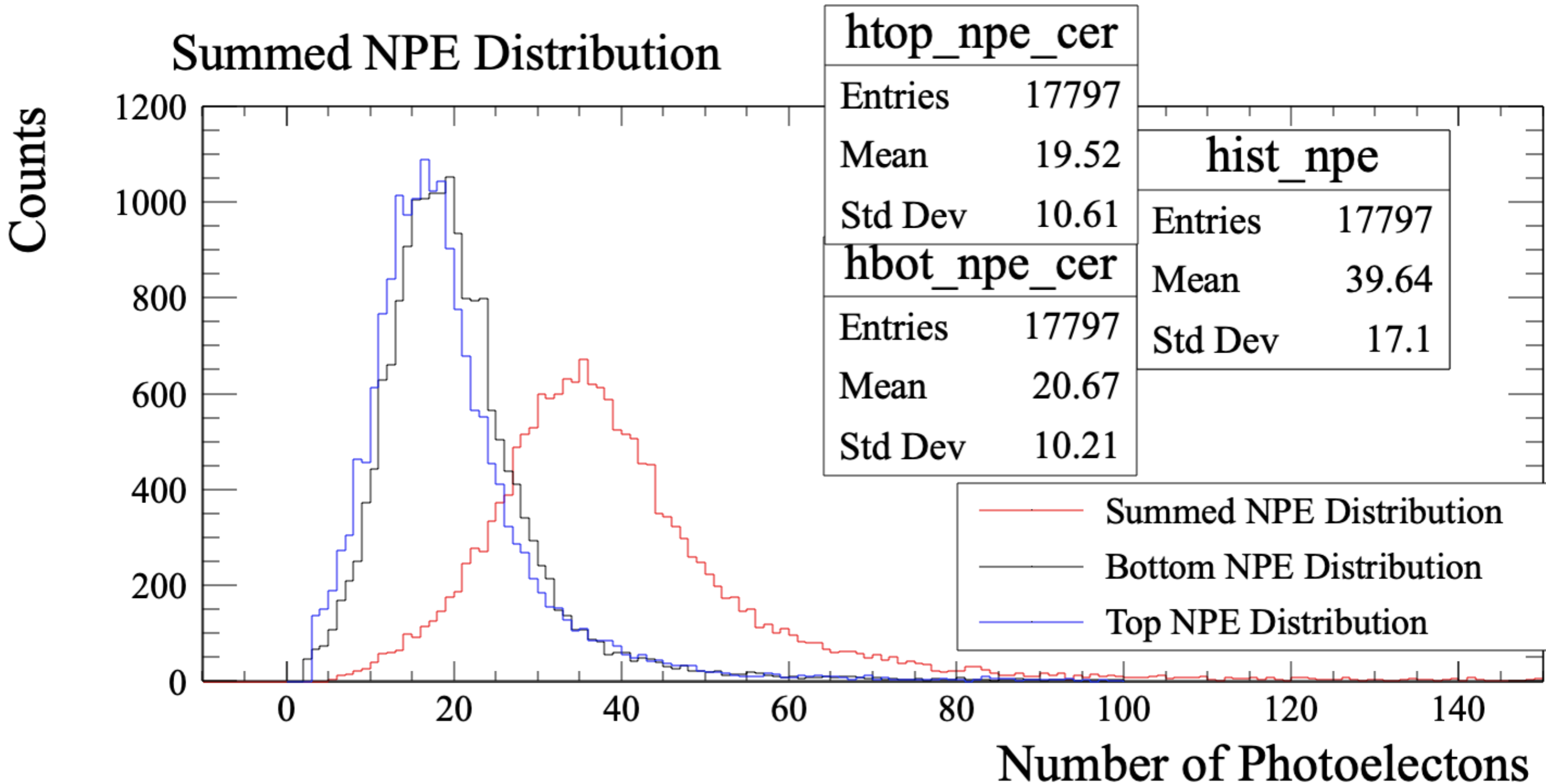

WC Top Pedestal Distribution

h_ped_top	
Entries	90
Mean	279.7
Std Dev	10.09
χ^2 / ndf	14.82 / 17
p0	2.395e+10 ± 2.298e+09
p1	18.75 ± 1.11
p4	280.5 ± 1.9
p5	13.07 ± 2.51

WC Bot Pedestal Distribution

h_ped_bot	
Entries	83
Mean	275.8
Std Dev	10.21
χ^2 / ndf	17.01 / 17
p0	7.949e+10 ± 1.682e+09
p1	20.15 ± 1.41
p4	279.3 ± 1.9
p5	10.87 ± 2.00

Center Position Trigger

- Summation of top and bottom NPe distribution has a mean value of 39.64

Summed NPE Distribution

htop_npe_cer	
Entries	17797
Mean	19.52
Std Dev	10.61

hbot_npe_cer	
Entries	17797
Mean	20.67
Std Dev	10.21

hist_npe	
Entries	17797
Mean	39.64
Std Dev	17.1

— Summed NPE Distribution
— Bottom NPE Distribution
— Top NPE Distribution

Center Position Trigger

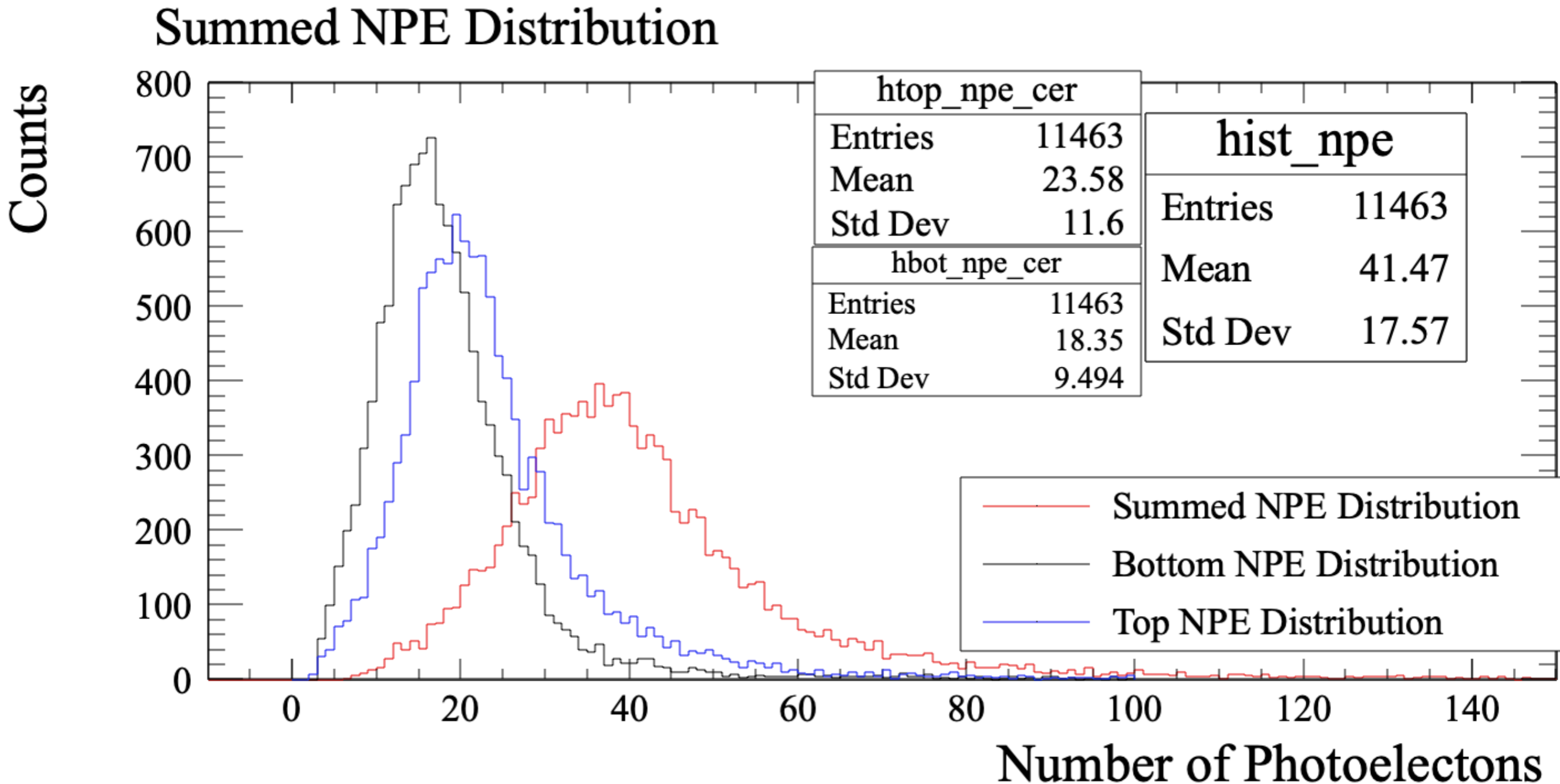- Summation of top and bottom NPe distribution has a mean value of 40
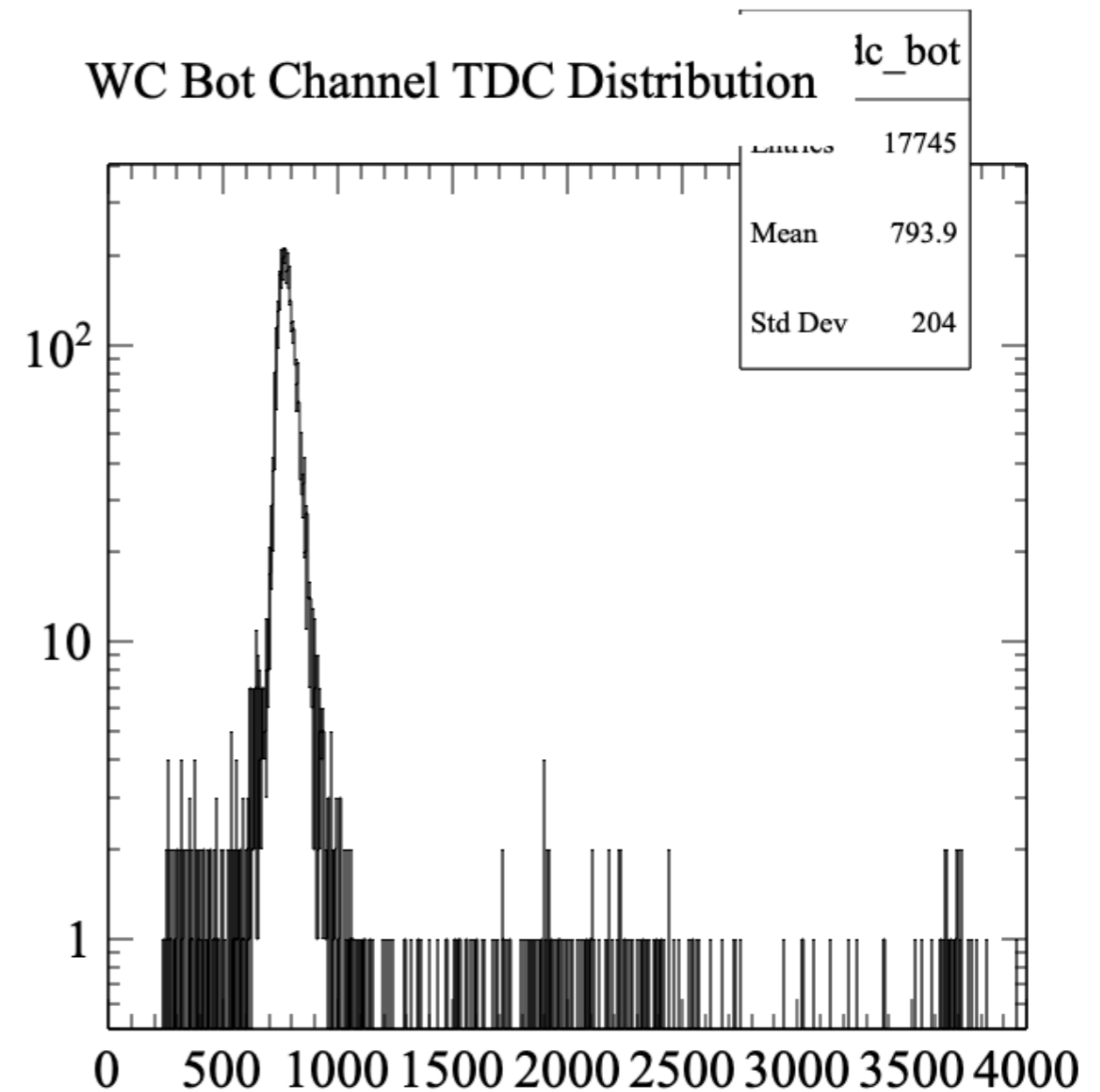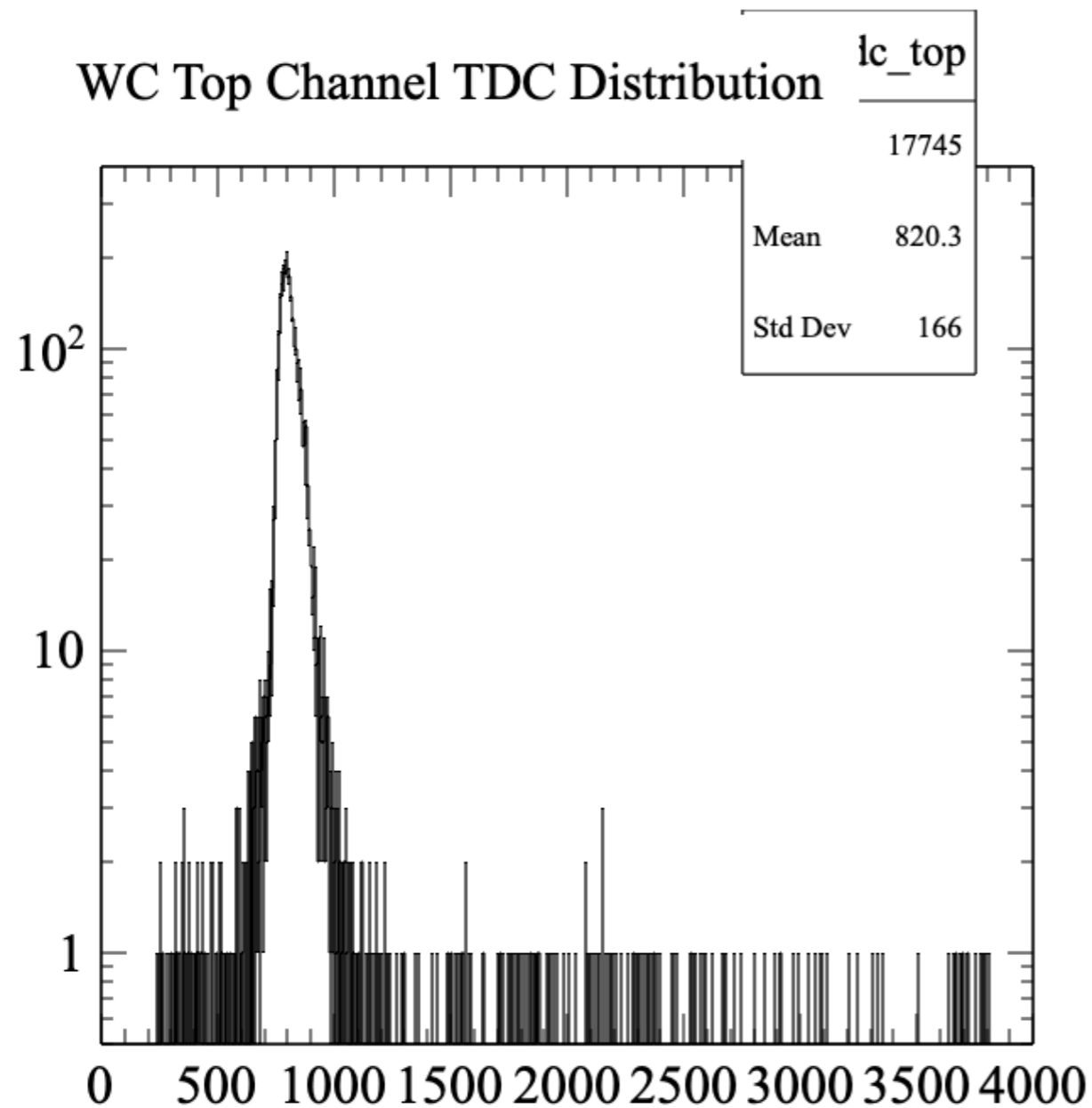
Low Position Trigger

- Summation of top and bottom NPe distribution has a mean value of 40.56
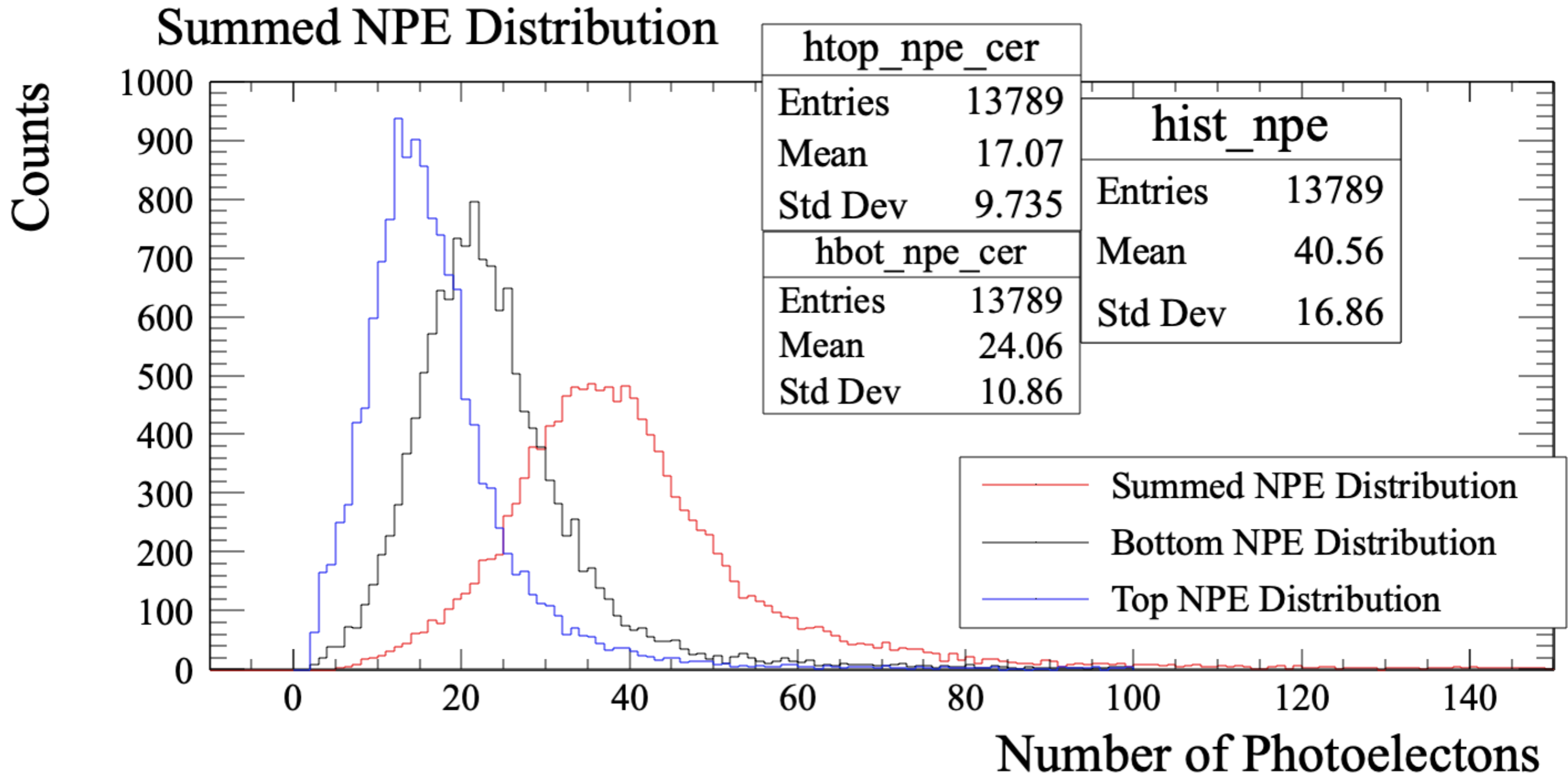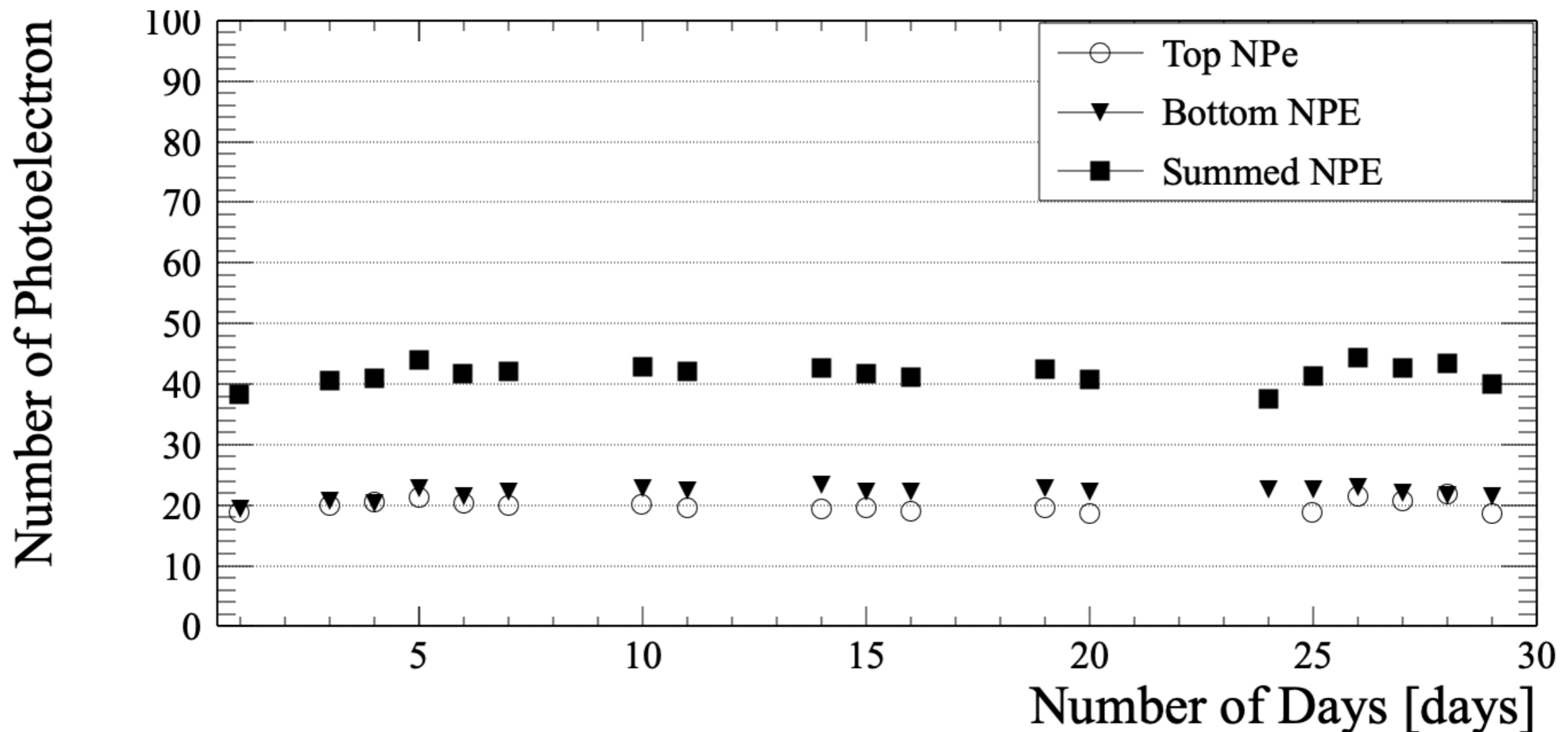
Upper Position Trigger

- Summation of top and bottom NPe distribution has a mean value of 41.47
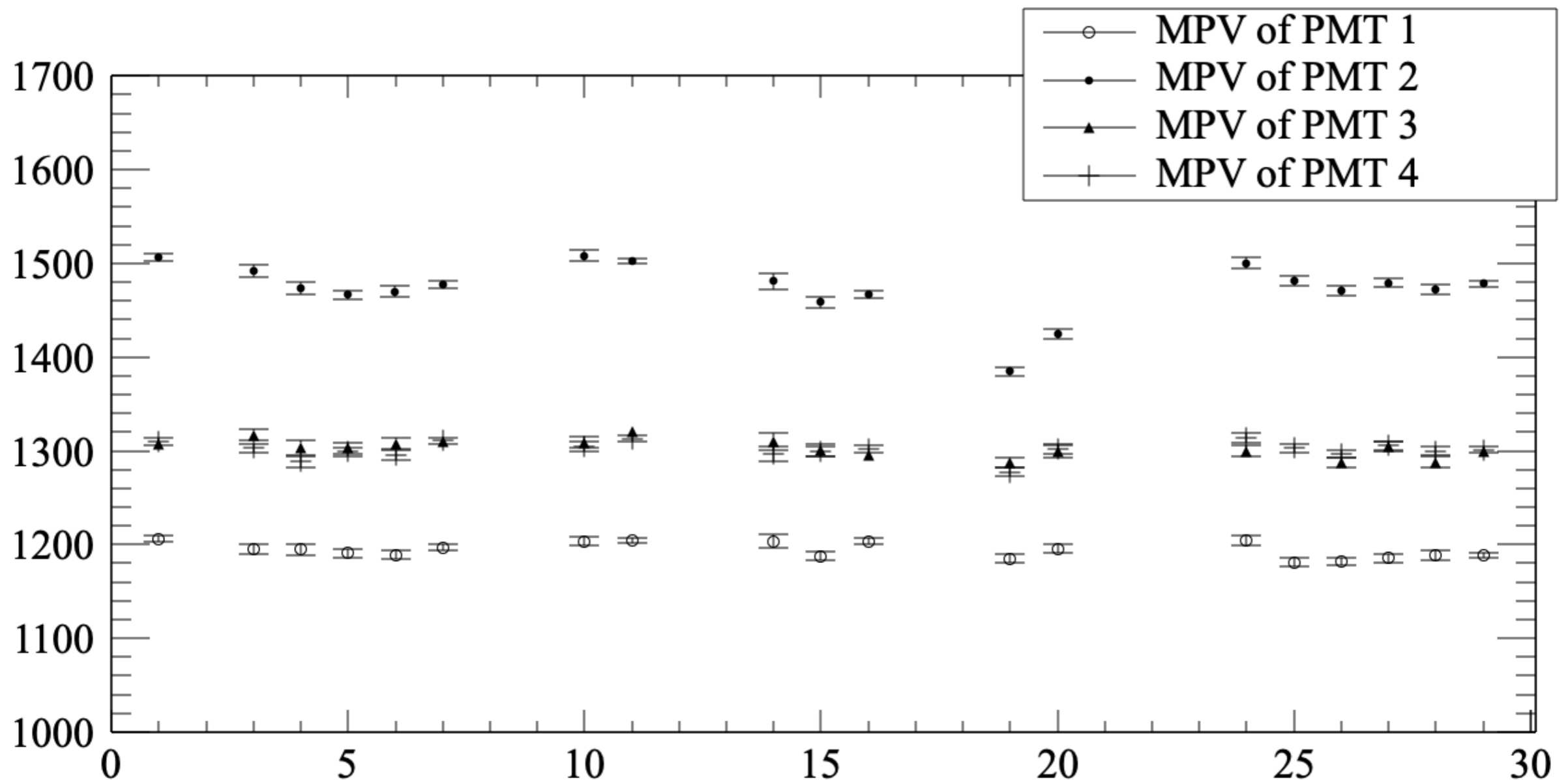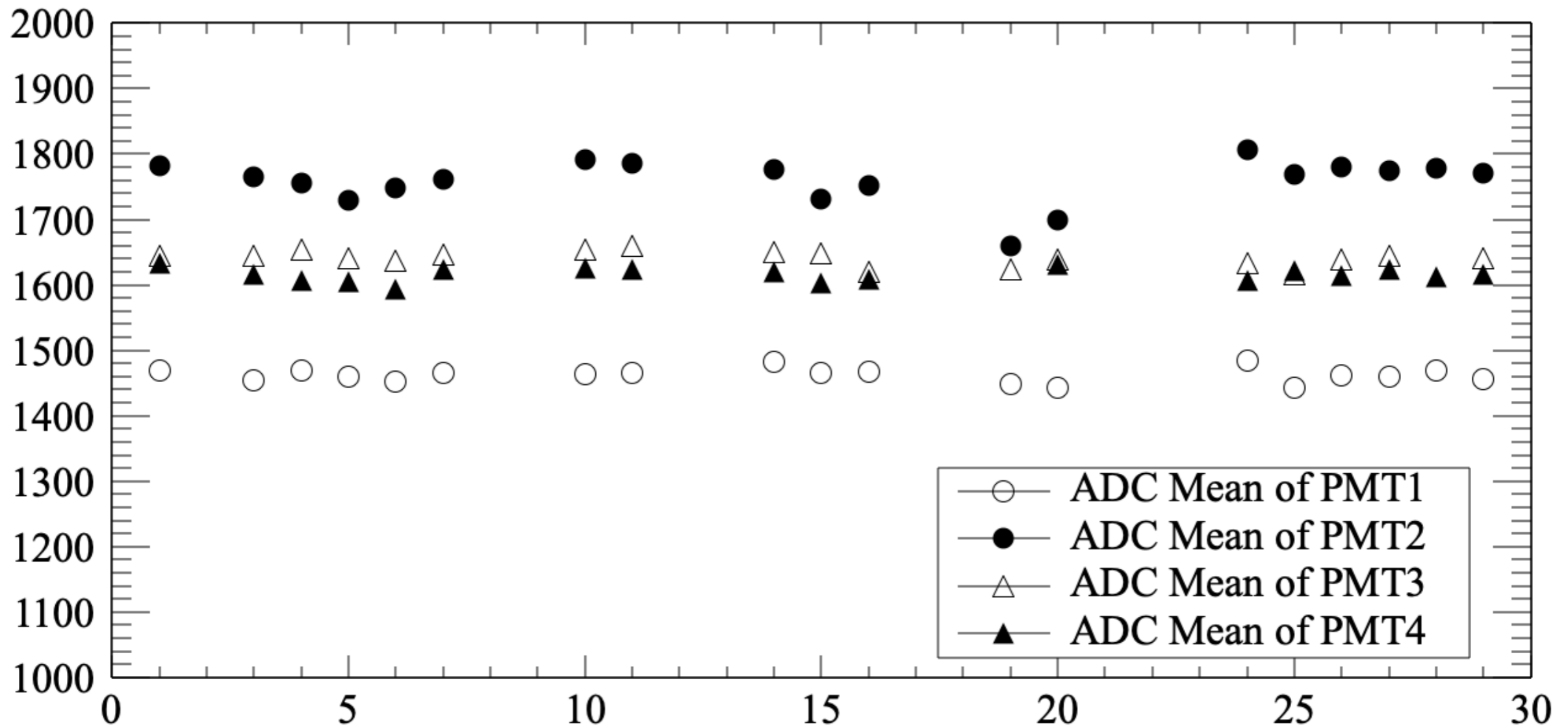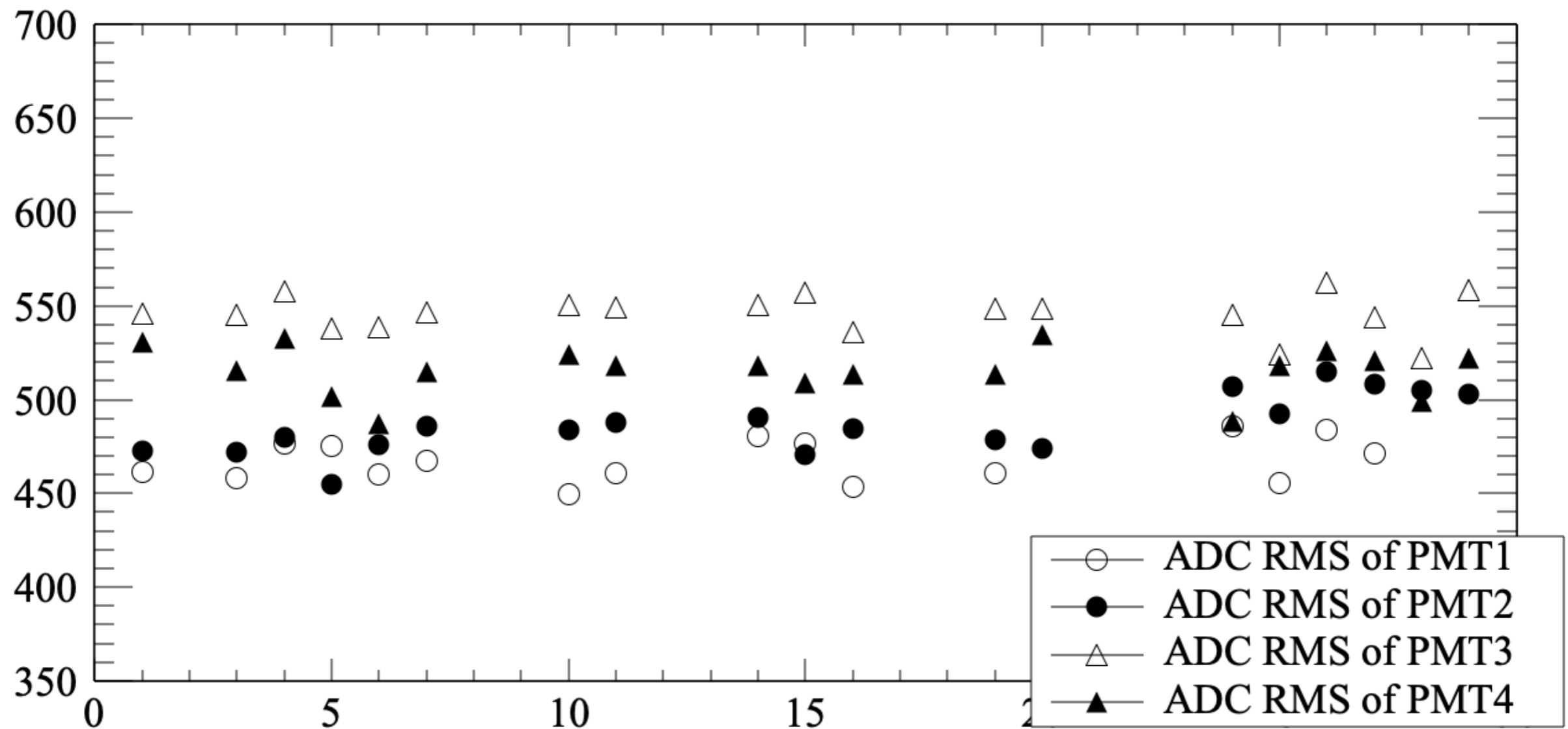
Monitoring - Center

- NPe and ADC mean of WC are monitored

- Also, MPV, ADC Mean, RMS of 4 channels of trigger counter are also monitored

Monitoring - Center

- NPe and ADC mean of WC are monitored

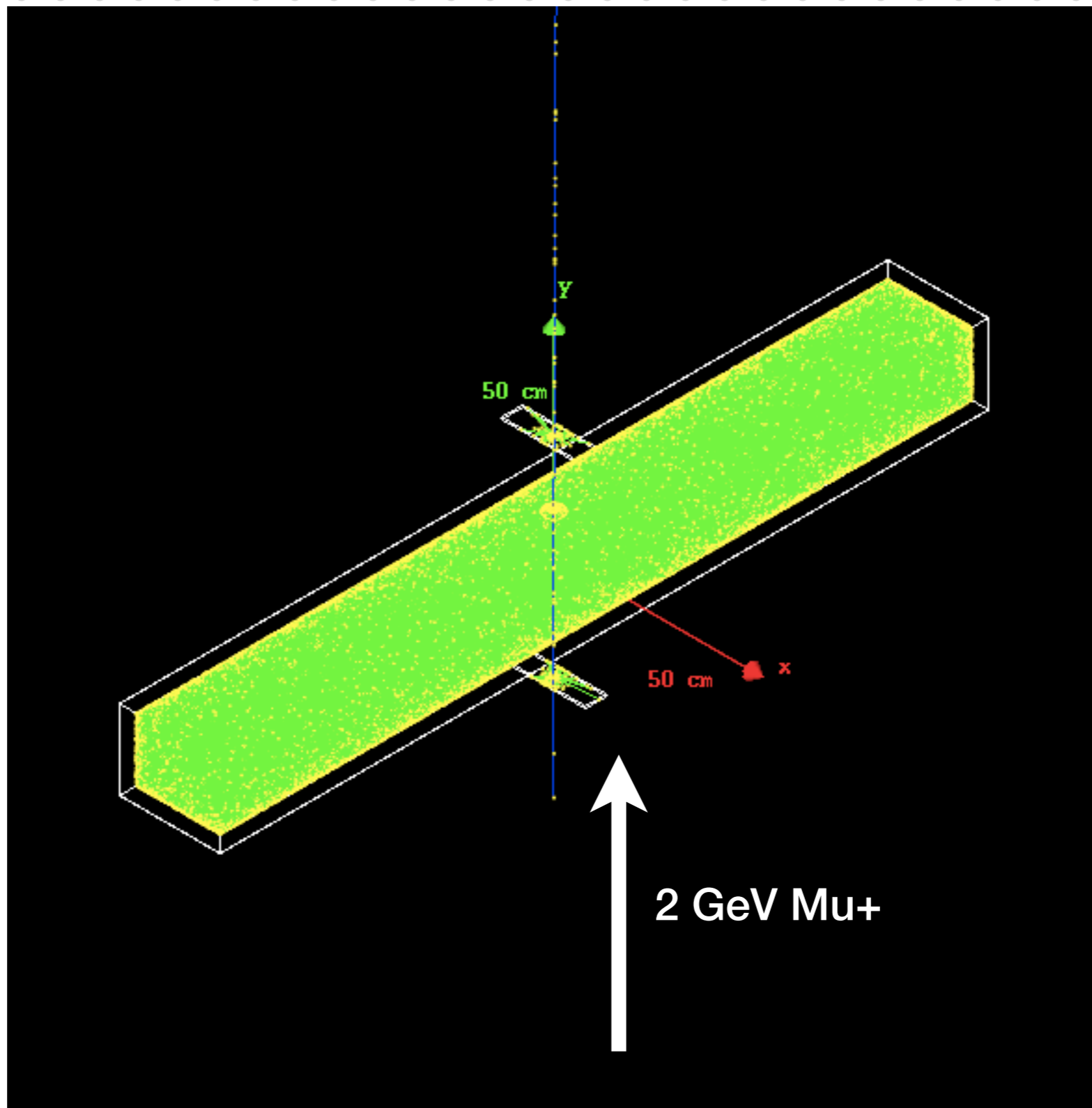- Also, MPV, ADC Mean, RMS of 4 channels of trigger counter are also monitored

Monitoring - Center

- NPe and ADC mean of WC are monitored

- Also, MPV, ADC Mean, RMS of 4 channels of trigger counter are also monitored

Monitoring - Center

- NPe of WC are monitored

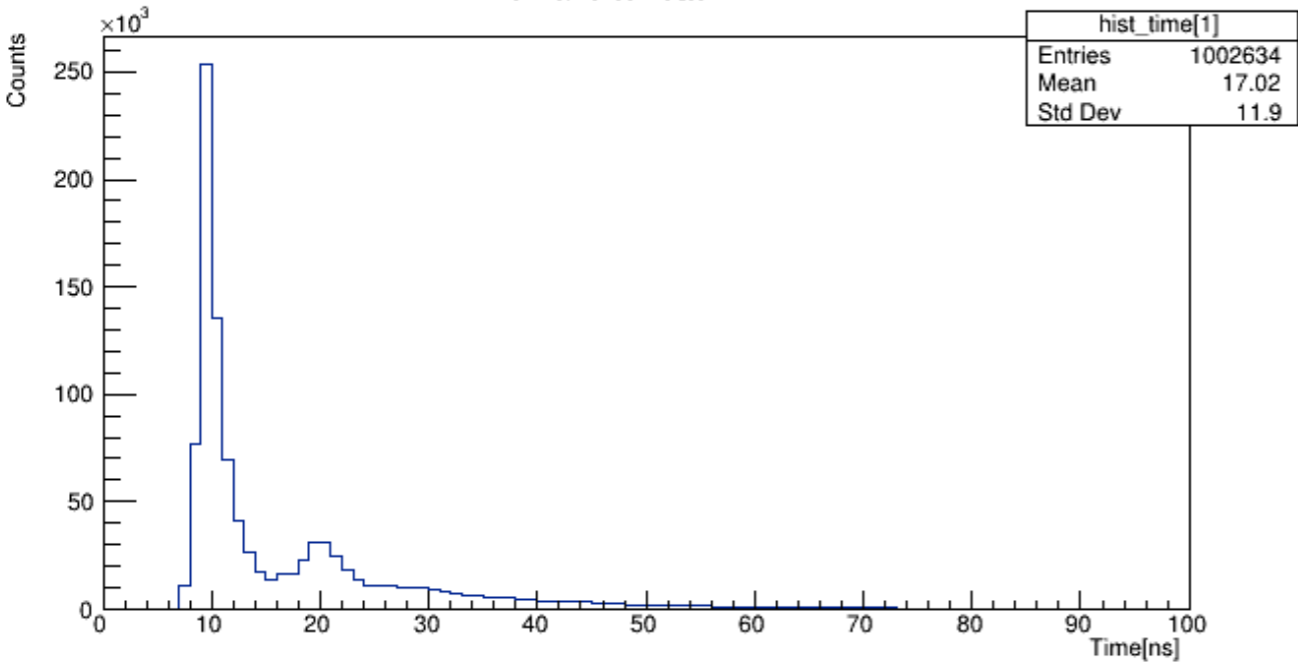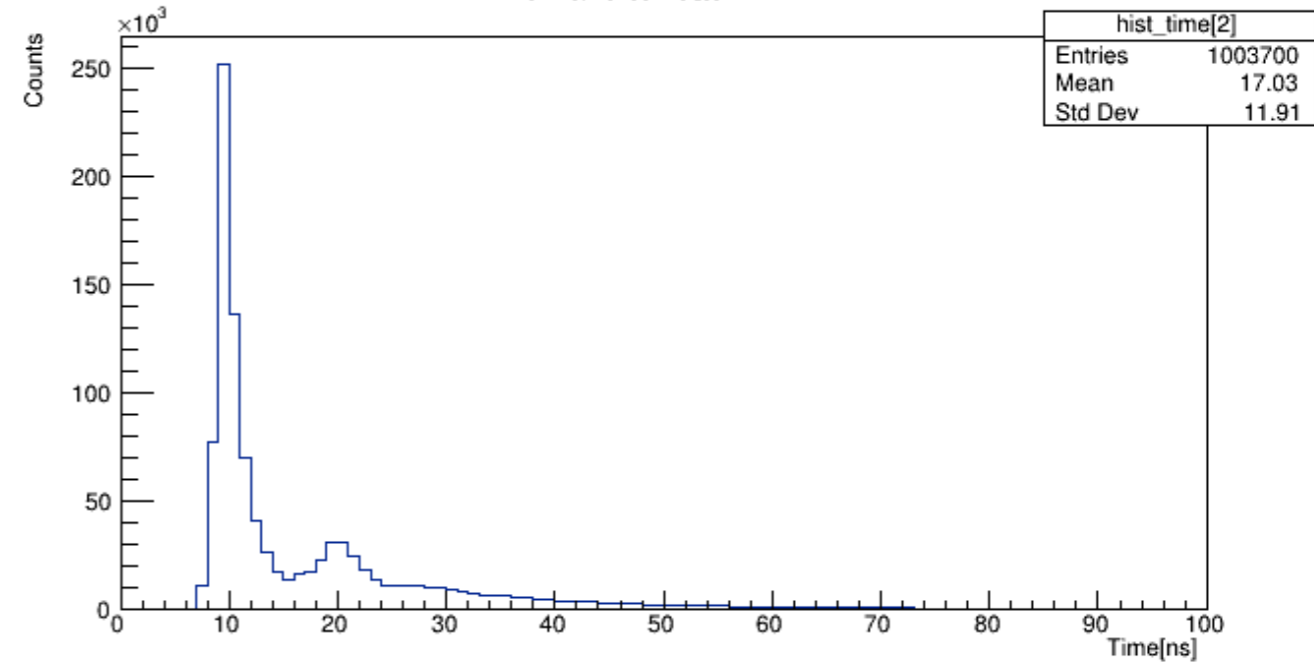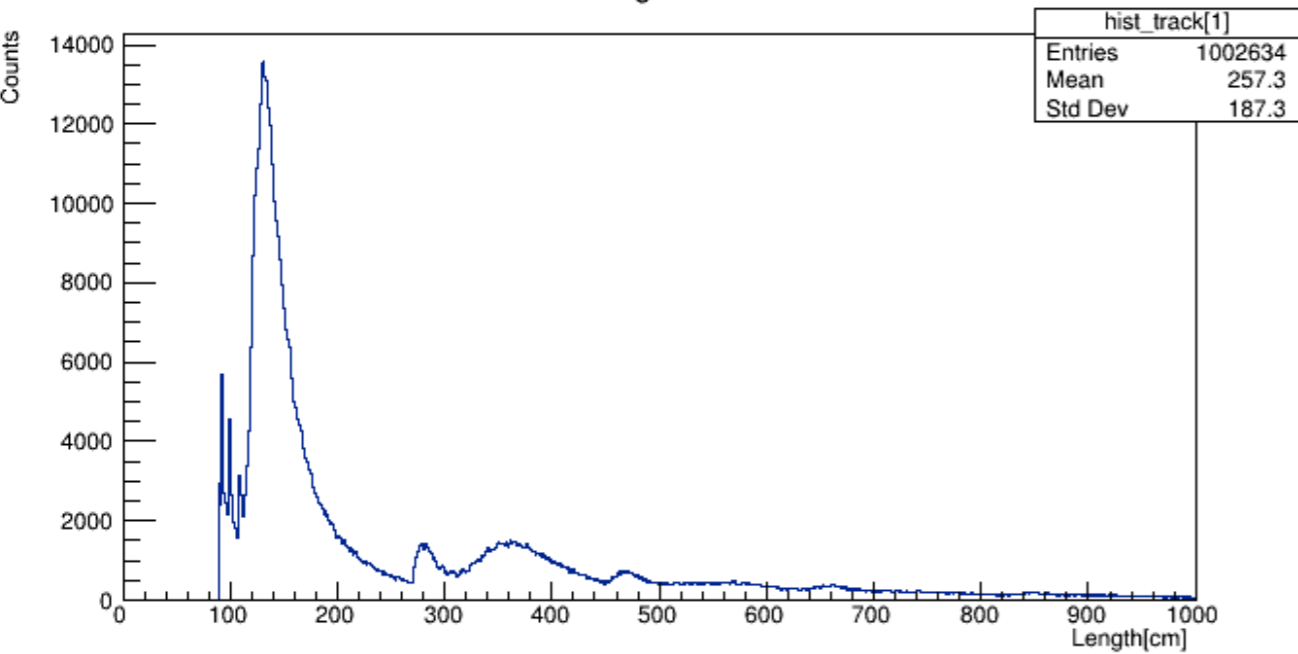- Also, MPV, ADC Mean, RMS of 4 channels of trigger counter are also monitored

Simulation

50 cm

50 cm

2 GeV Mu+
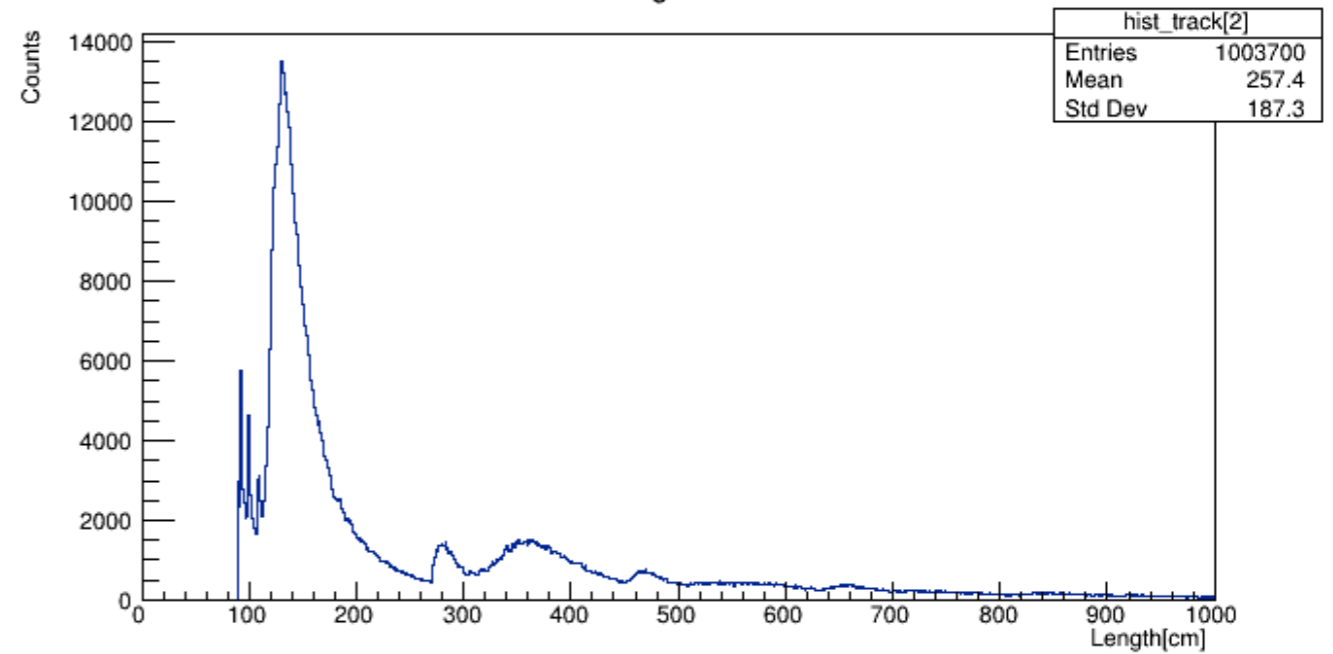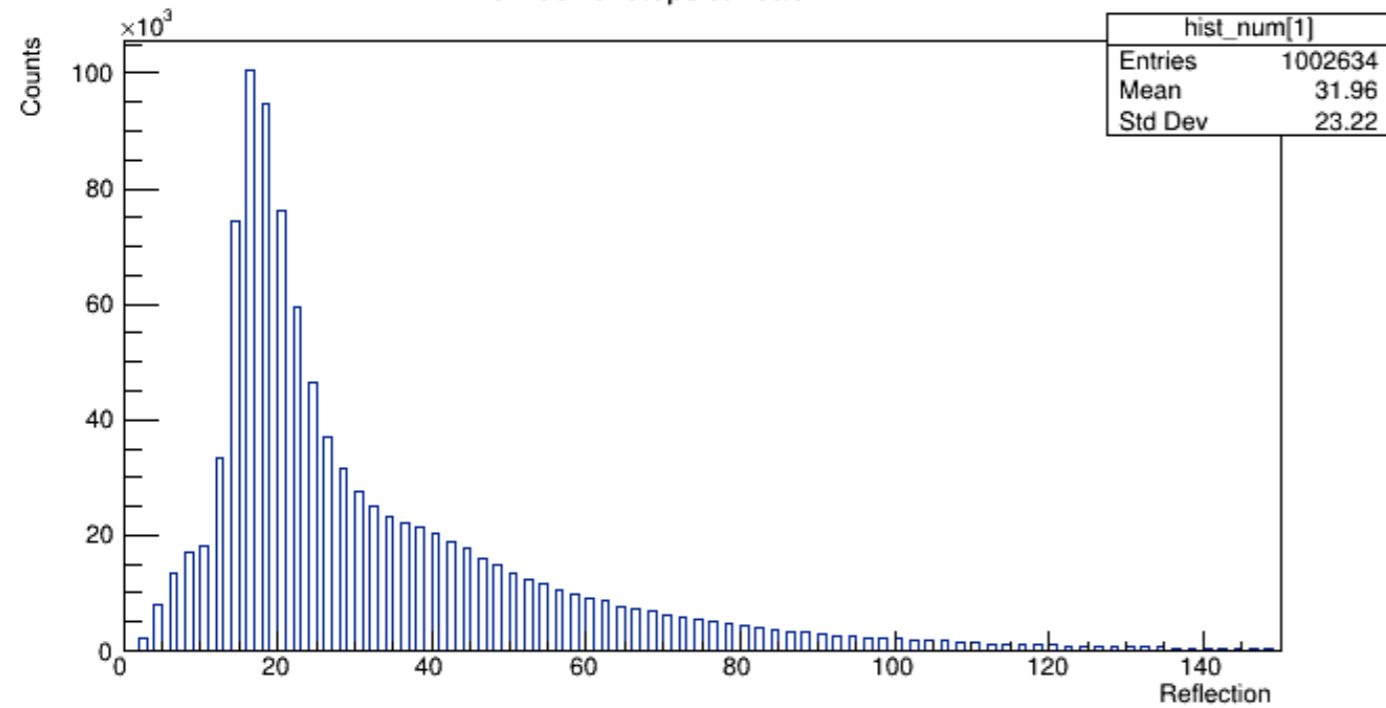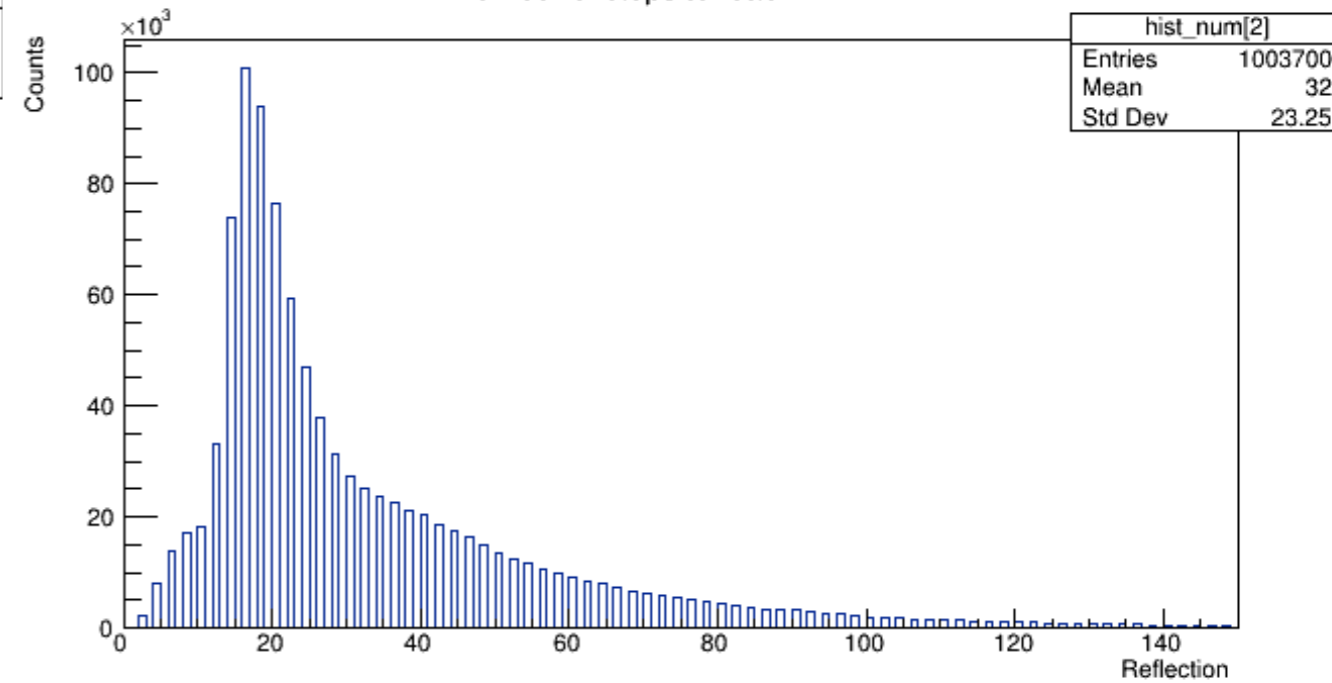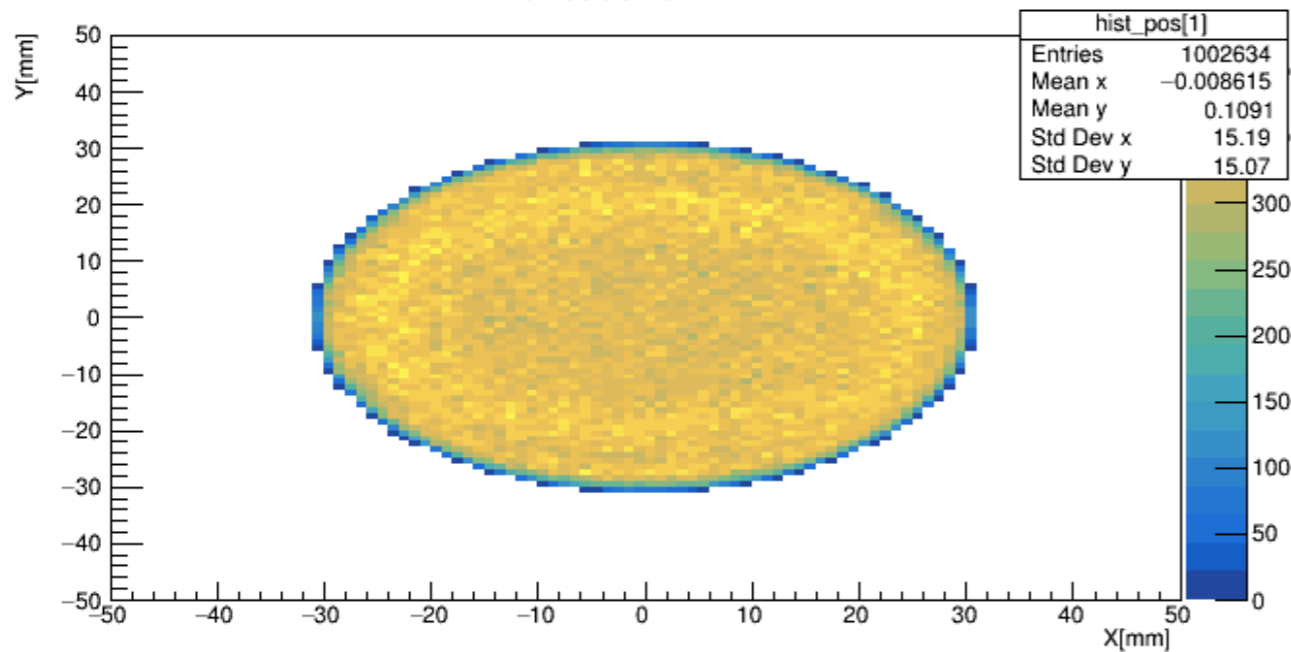
Simulation
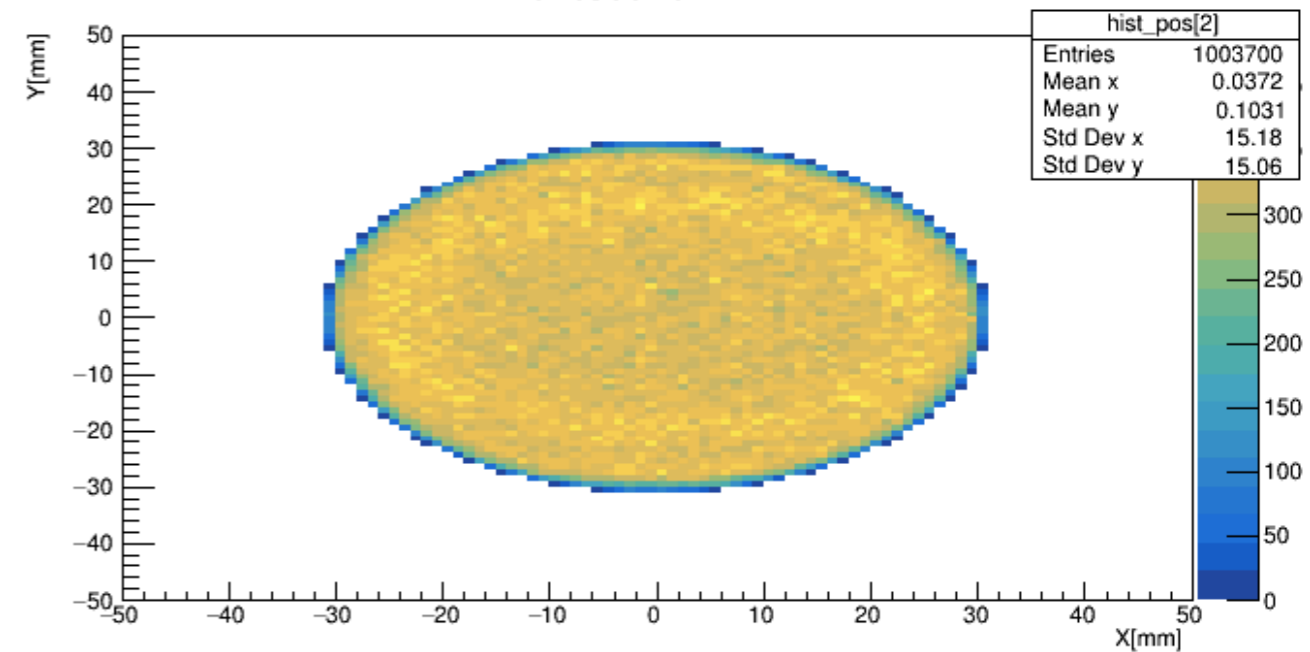
Simulation

Simulation

Summed NPE Distribution

hist_npe[1]	
Entries	10000
Mean	25.29
Std Dev	5.067

hist_npe[2]	
Entries	10000
Mean	25.39
Std Dev	5.096

hist_npe_sum_long	
Entries	10000
Mean	50.68
Std Dev	7.295

Legend:
— Summed NPE Distribution
— NPE Distribution of PMT 1
— NPE Distribution of PMT 2
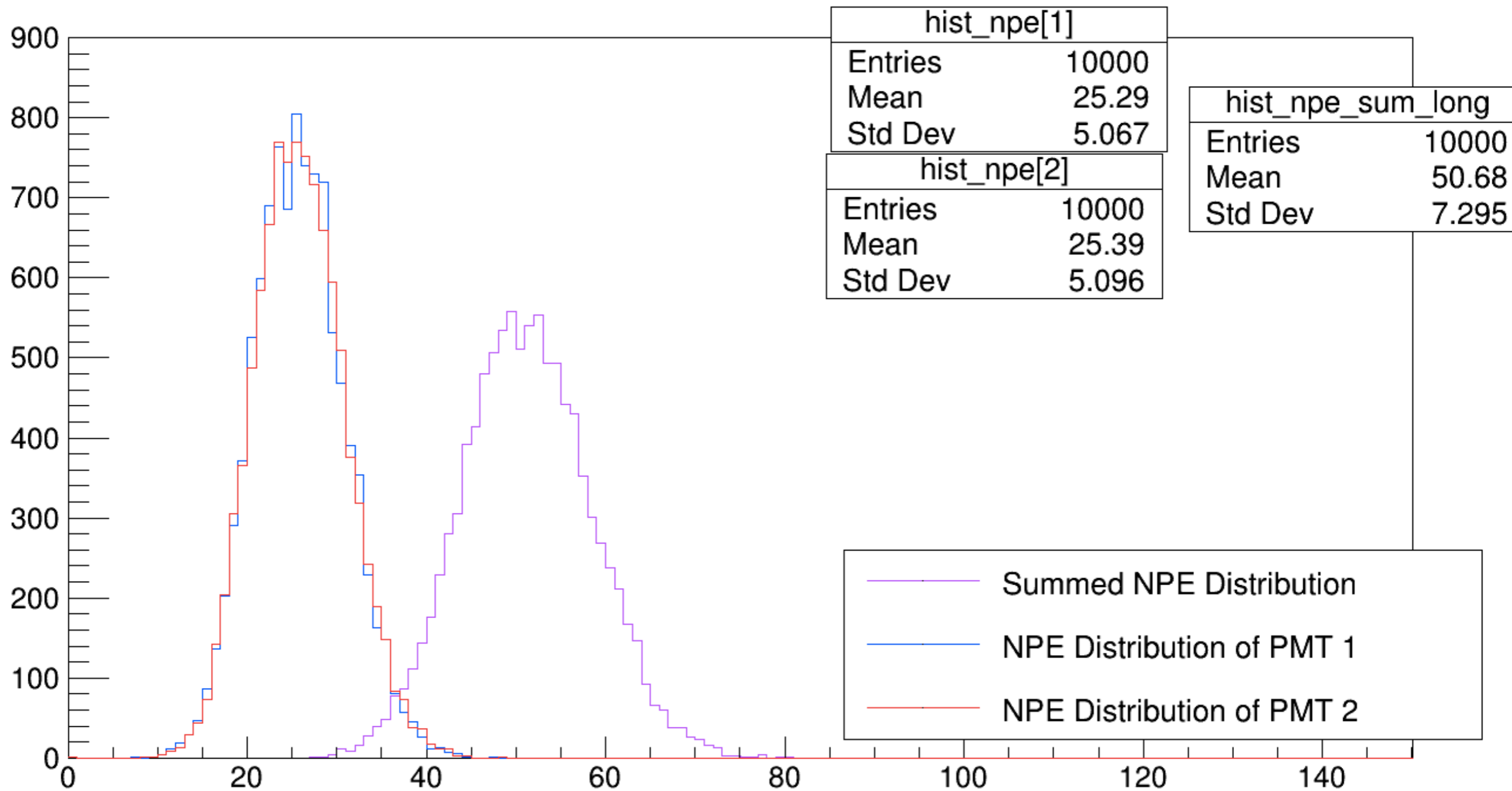
Summary

	Lower Trigger	Center Trigger	Upper Trigger	Simulation
Top NPE	17.07	19.52	23.58	25.29
Top Poisson Mean		18.75 ± 1.11		
Bottom NPE	24.06	20.67	18.35	25.39
Bot Poisson Mean		20.15 ± 1.41		
Summed NPE	**40.56**	**39.64**	**41.47**	**50.68**

- Vertical distance between top and bottom trigger counters : 50cm

- Upper, lower, centre trigger counters have spacings of 10 cm each other -> ~11 deg