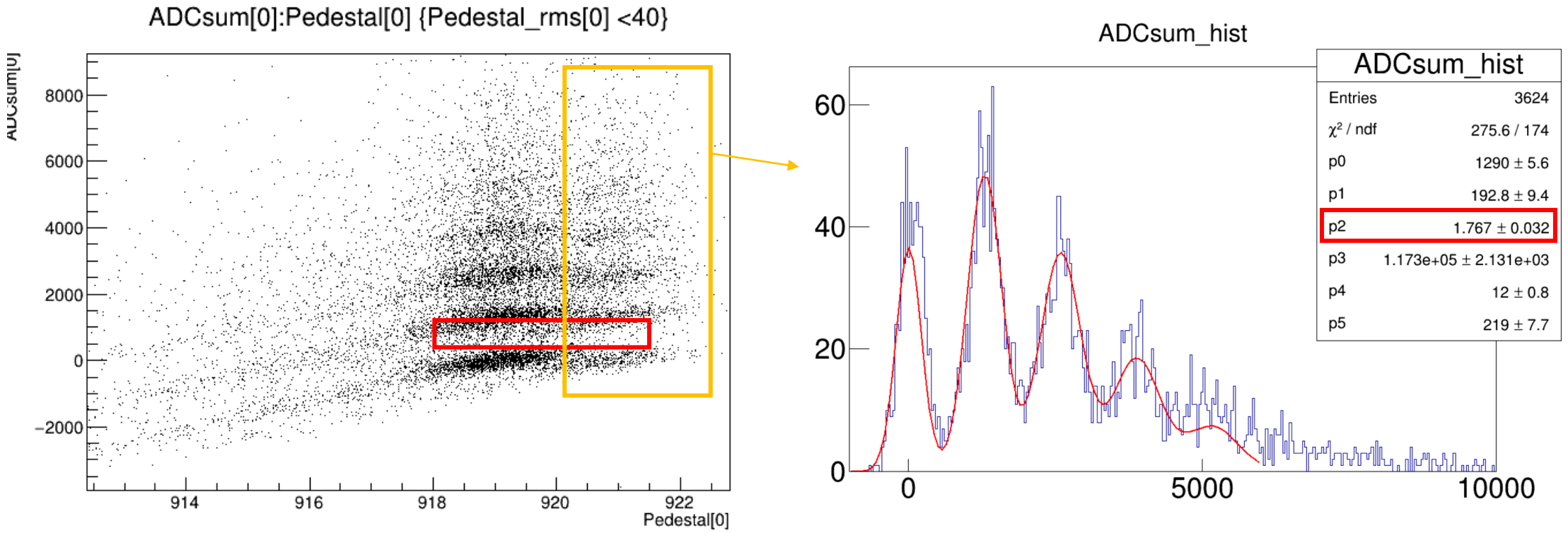
200401

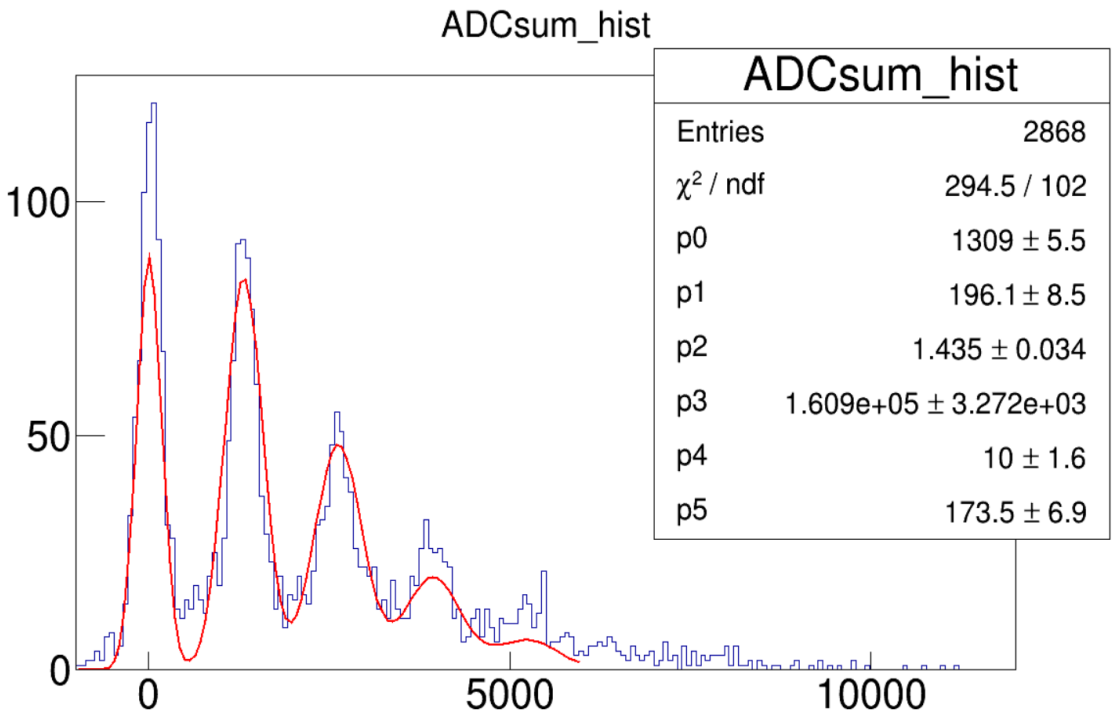
Random trigger

Pedestal cut > 920

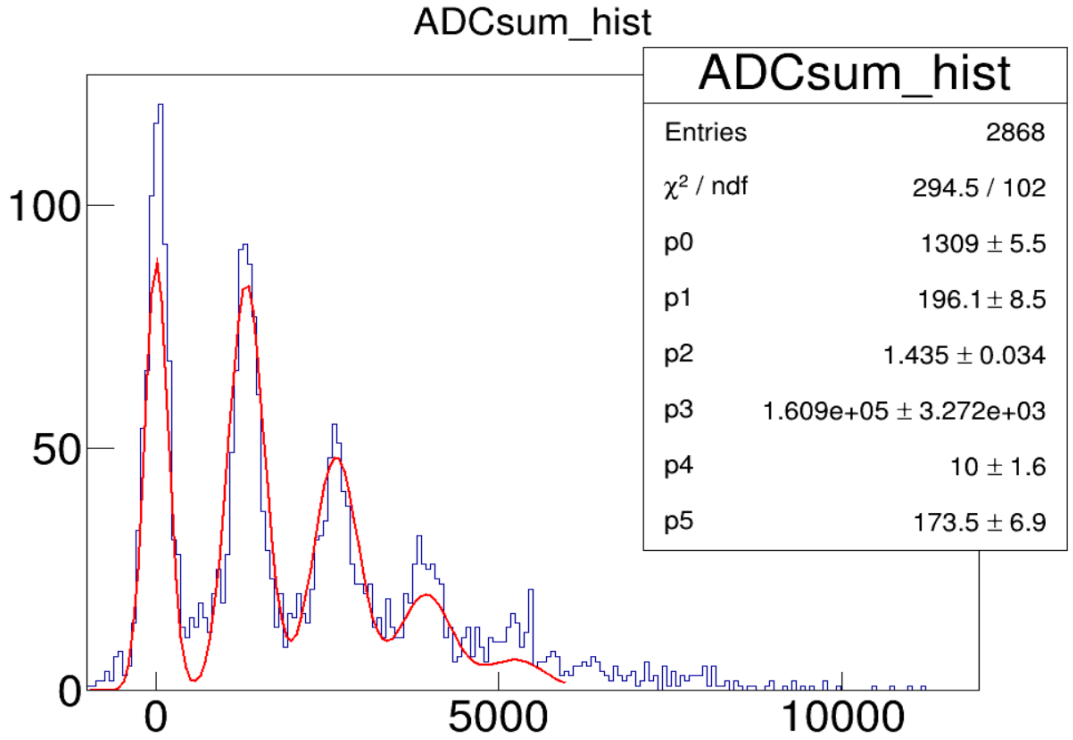


Pedestal이 920 이상인 event에 대해서 Poisson * Gaussian fit을 할 경우 chi-square 값이 1 근처로 나타났다.

ADCsum histogram for other pedestal

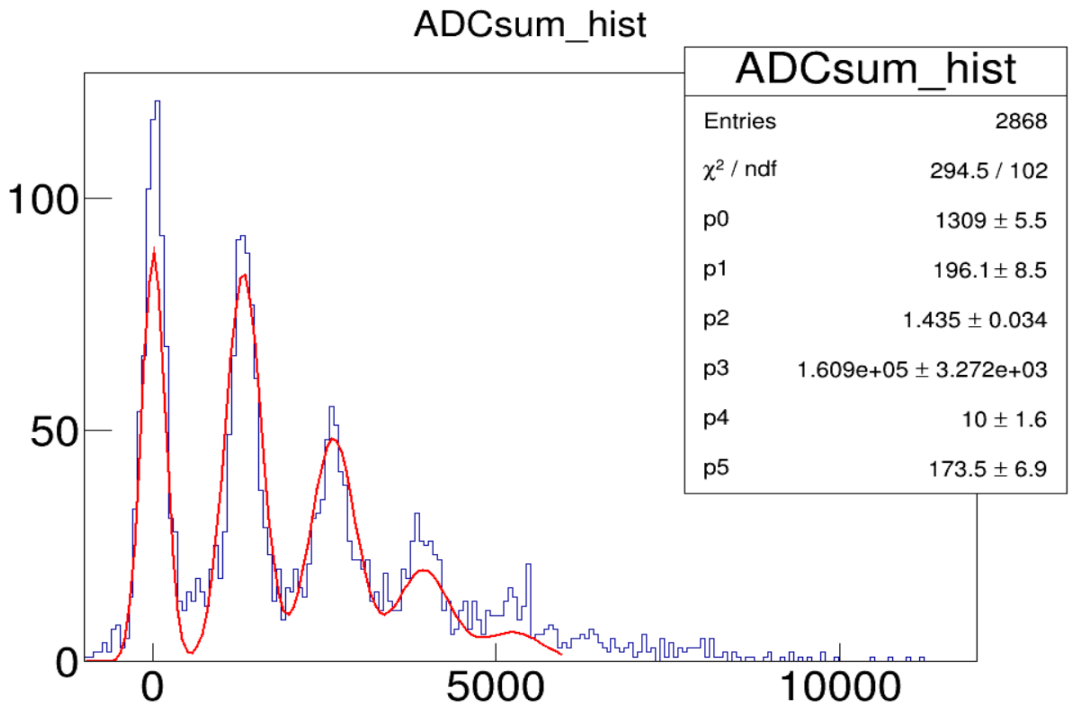


919.5 < Pedestal < 920

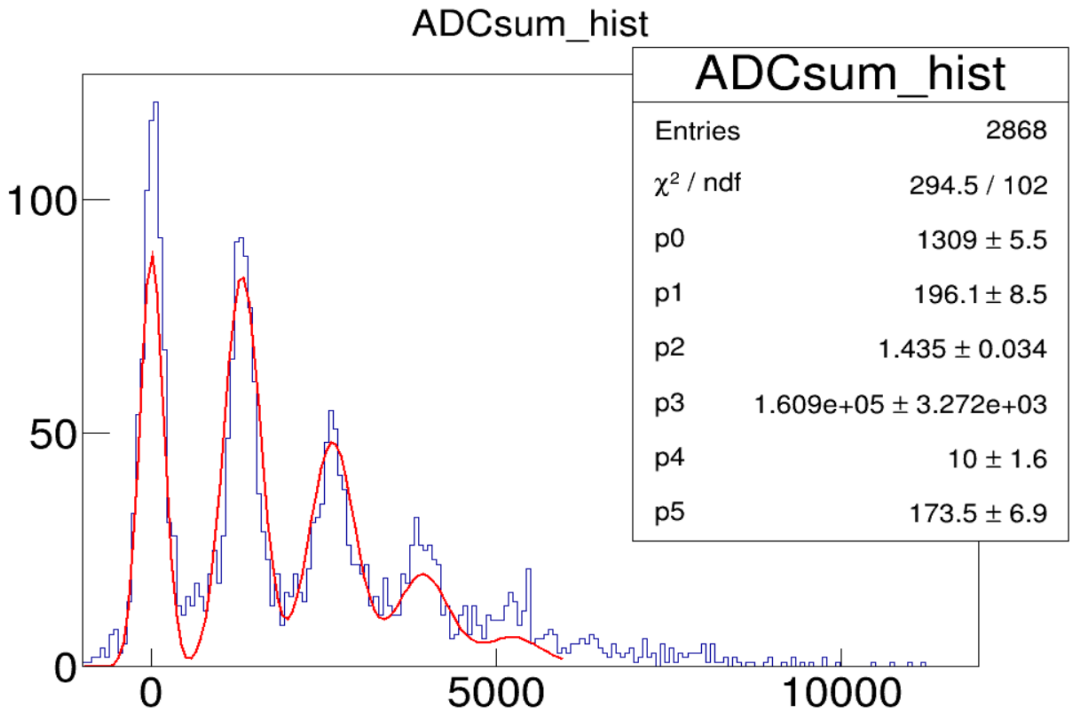


919 < Pedestal < 919.5

ADCsum histogram for other pedestal



918.5 < Pedestal < 919



918 < Pedestal < 918.5

하지만 Pedestal이 920보다 작은 영역에서 pedestal을 0.5 단위로 잘라 각각의 ADCsum histogram을 그렸을 때, 모두 1st peak가 가장 크게 나타나고, Poisson * gaussian fit이 잘 되지 않았다.

결론

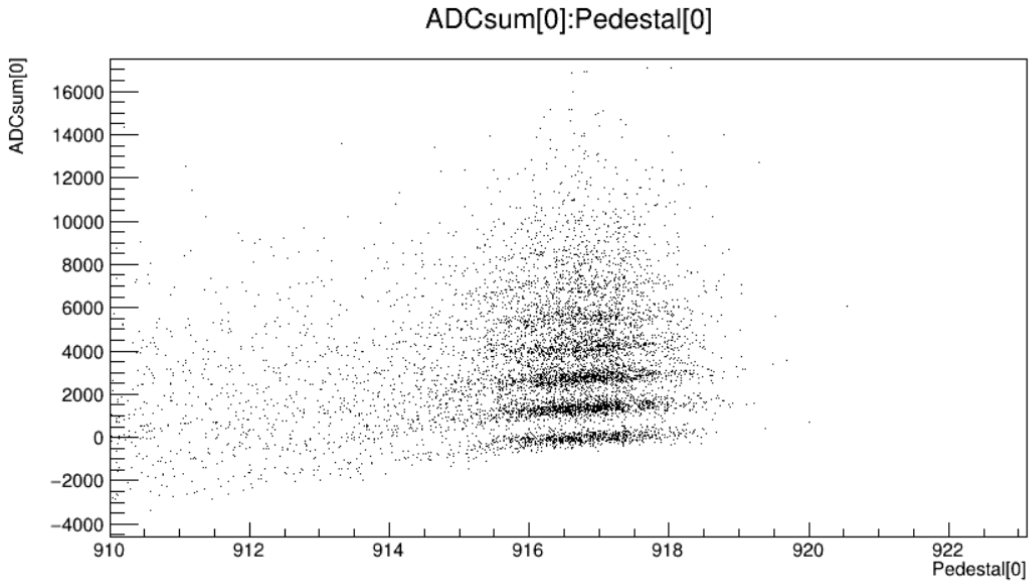
- Pedestal에 따라 dark pulse의 수의 분포가 바뀐다.

- 가설

- Pedestal은 보통 920인데, 앞쪽 pulse의 falling time의 영향으로 인해 918 정도로 측정되는 경우가 존재한다.

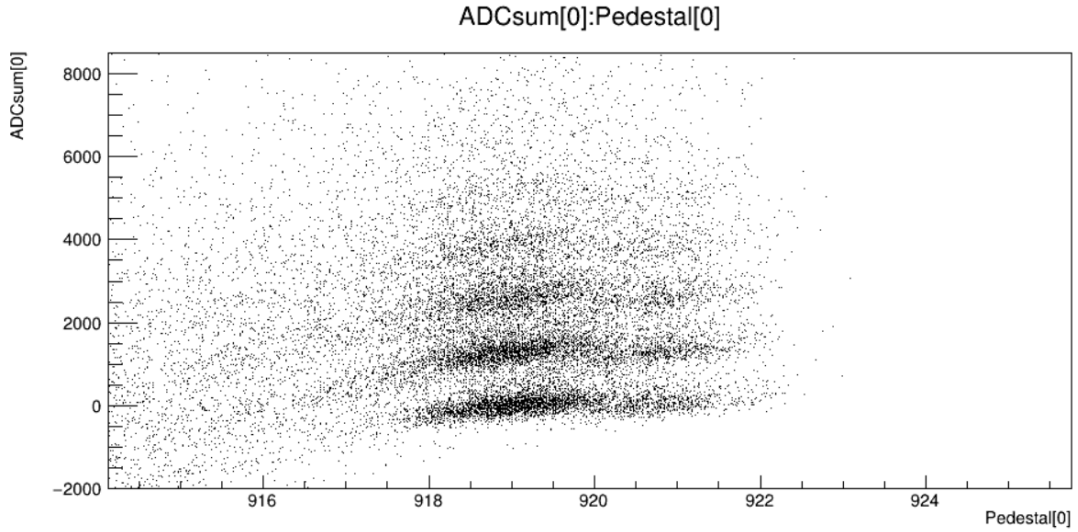
- 연속해서 dark pulse가 들어올 확률은 줄어들기 때문에 0번째 photon의 개수가 더 증가한다.

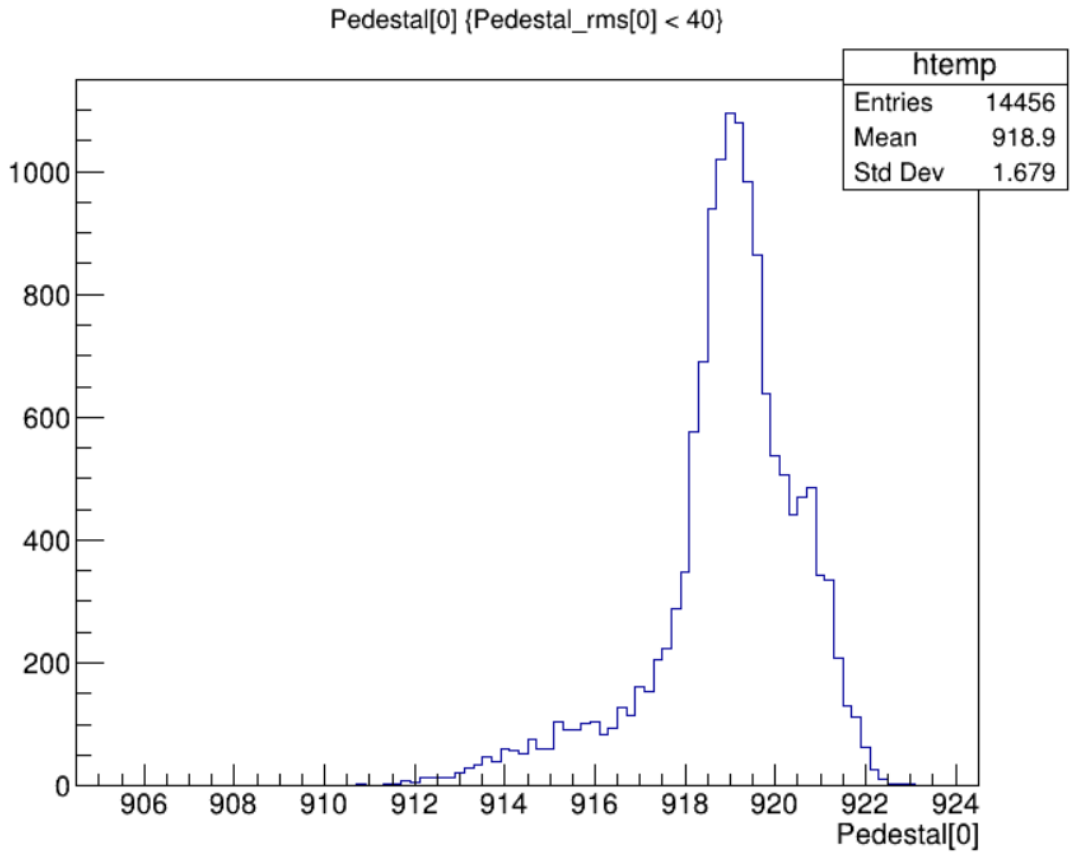
>> 그런데 이렇게 될 경우 모든 사건이 독립사건이라는 Poisson distribution의 가정에 어긋나는 게 아닐까?



일반적인 ADCsum : Pedestal graph

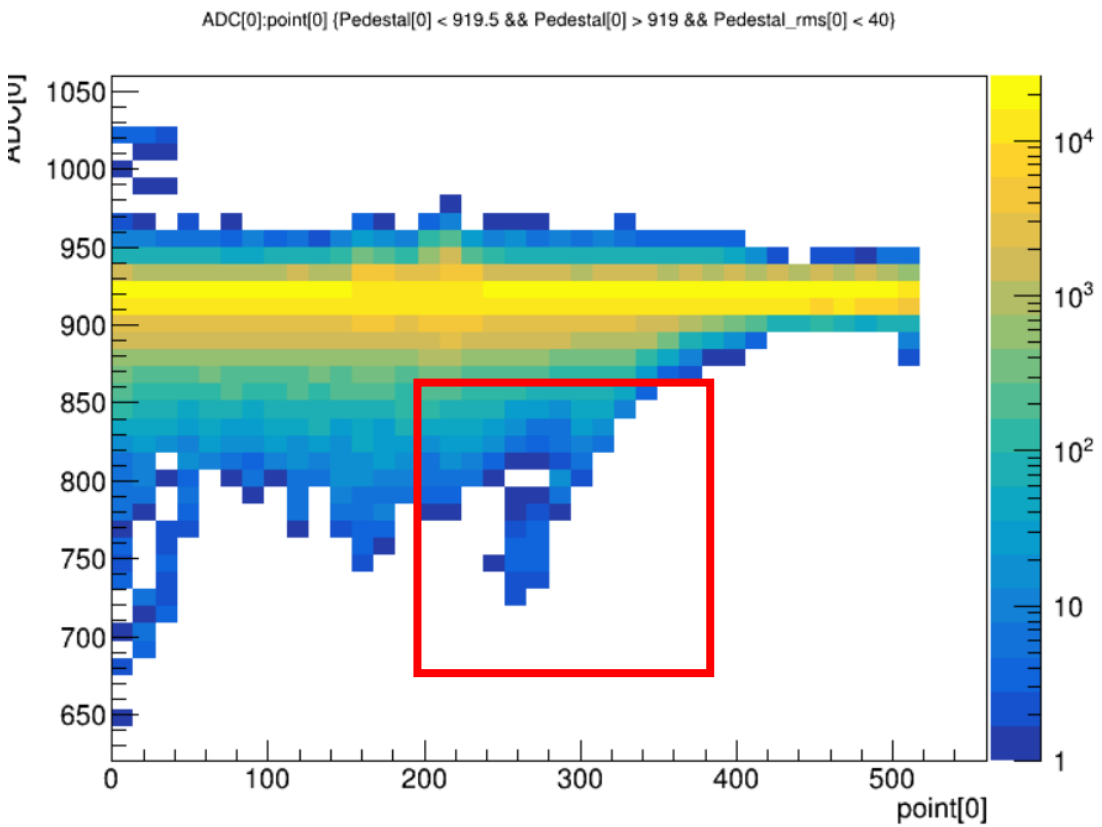
Pedestal from backward

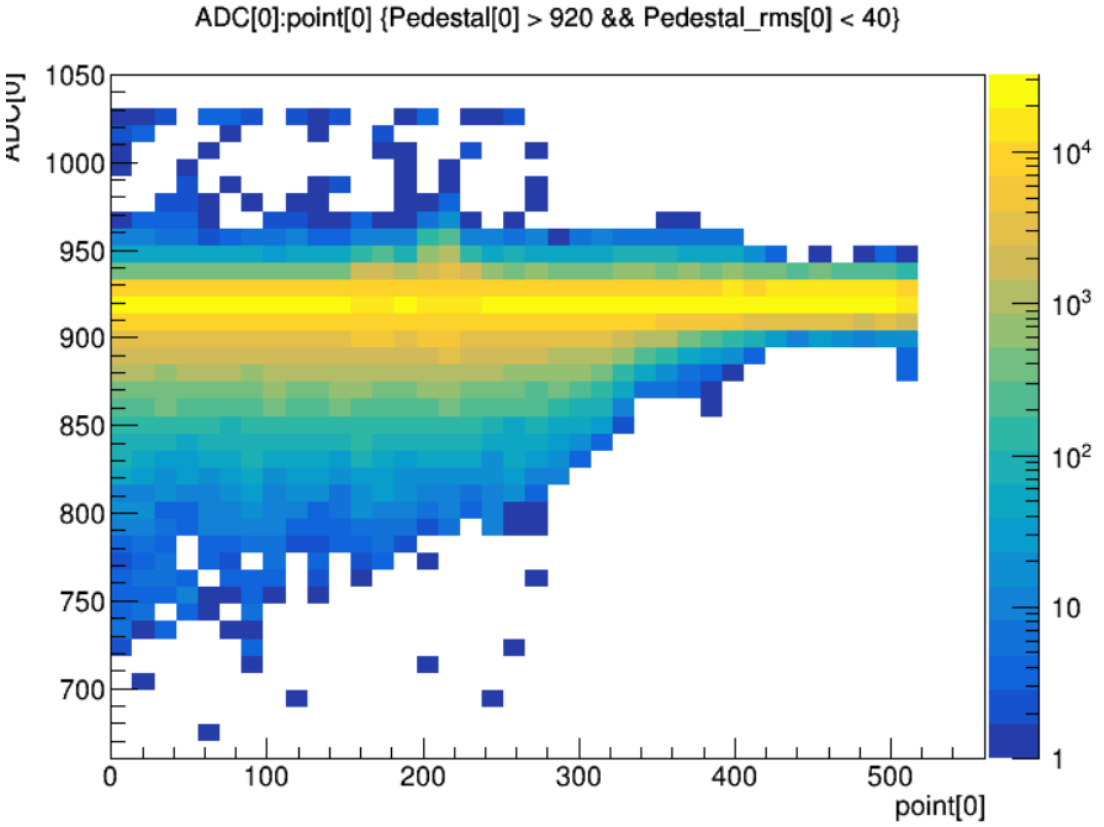




앞에서 봤던 가설을 확인하기 위해서, Pedestal을 뒤의 100 point를 기준으로 만들어 보았다. 그리고 앞에 어떤 일이 일어나는지를 확인해보았다.

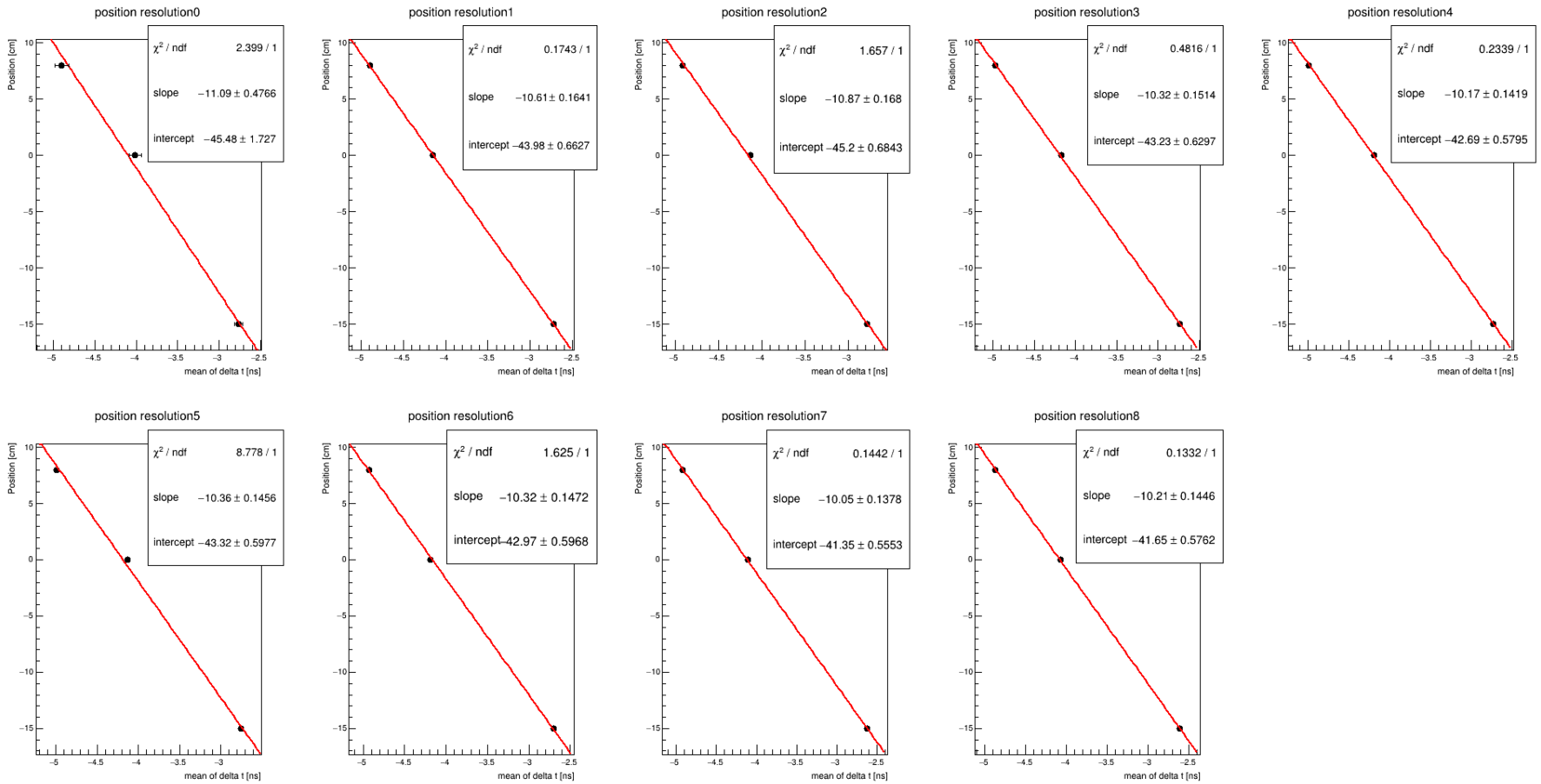
Waveform


ADC[0]:point[0] {Pedestal[0] < 919.5 && Pedestal[0] > 919 && Pedestal_rms[0] < 40}
ADC[0]
1050
1000
950
900
850
800
750
700
650
0
100
200
300
400
500
point[0]
10^4
10^3
10^2
10
1

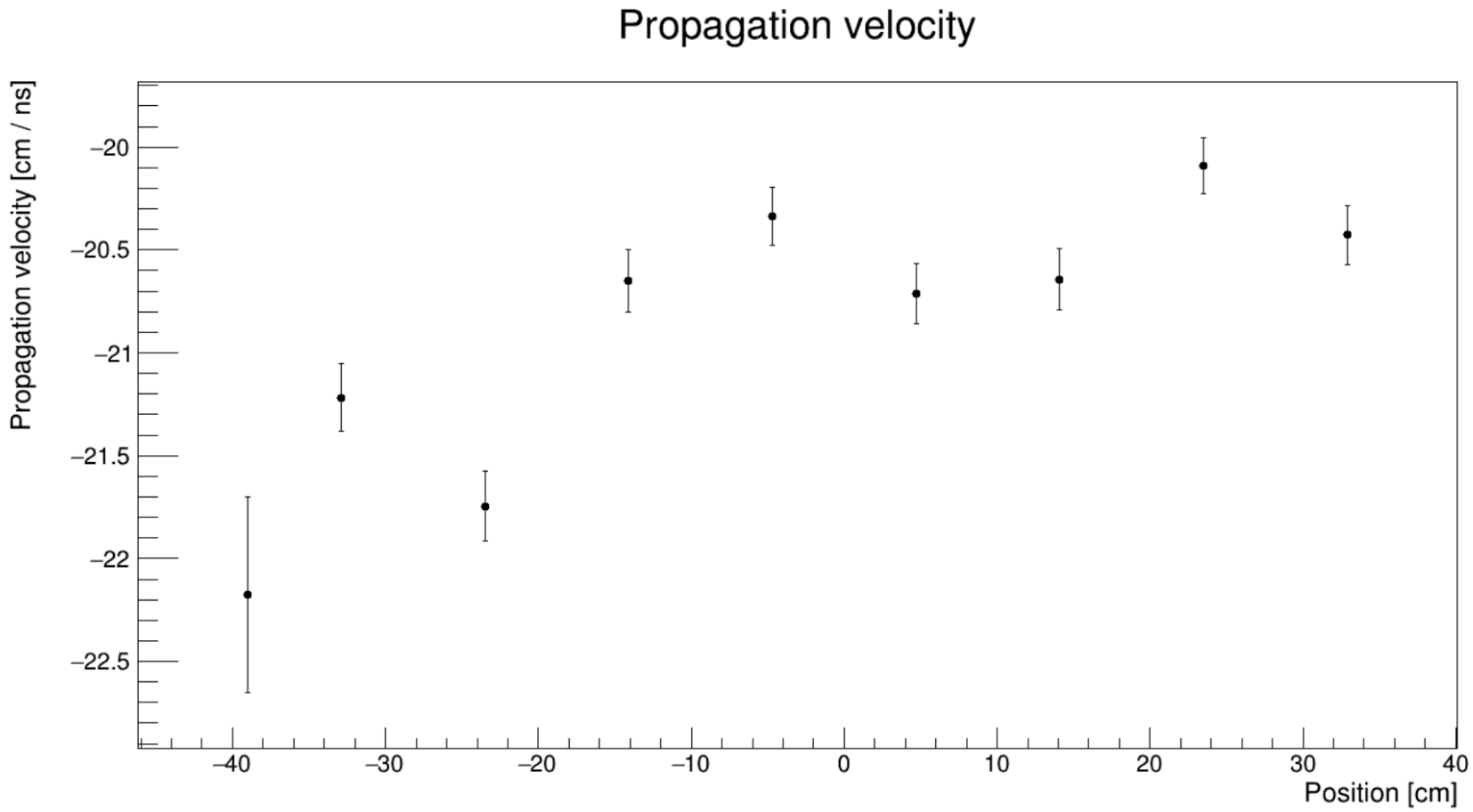

ADC[0]:point[0] {Pedestal[0] > 920 && Pedestal_rms[0] < 40}
ADC[0]
1050
1000
950
900
850
800
750
700
0
100
200
300
400
500
point[0]
10^4
10^3
10^2
10
1

Propagation velocity

Position resolution

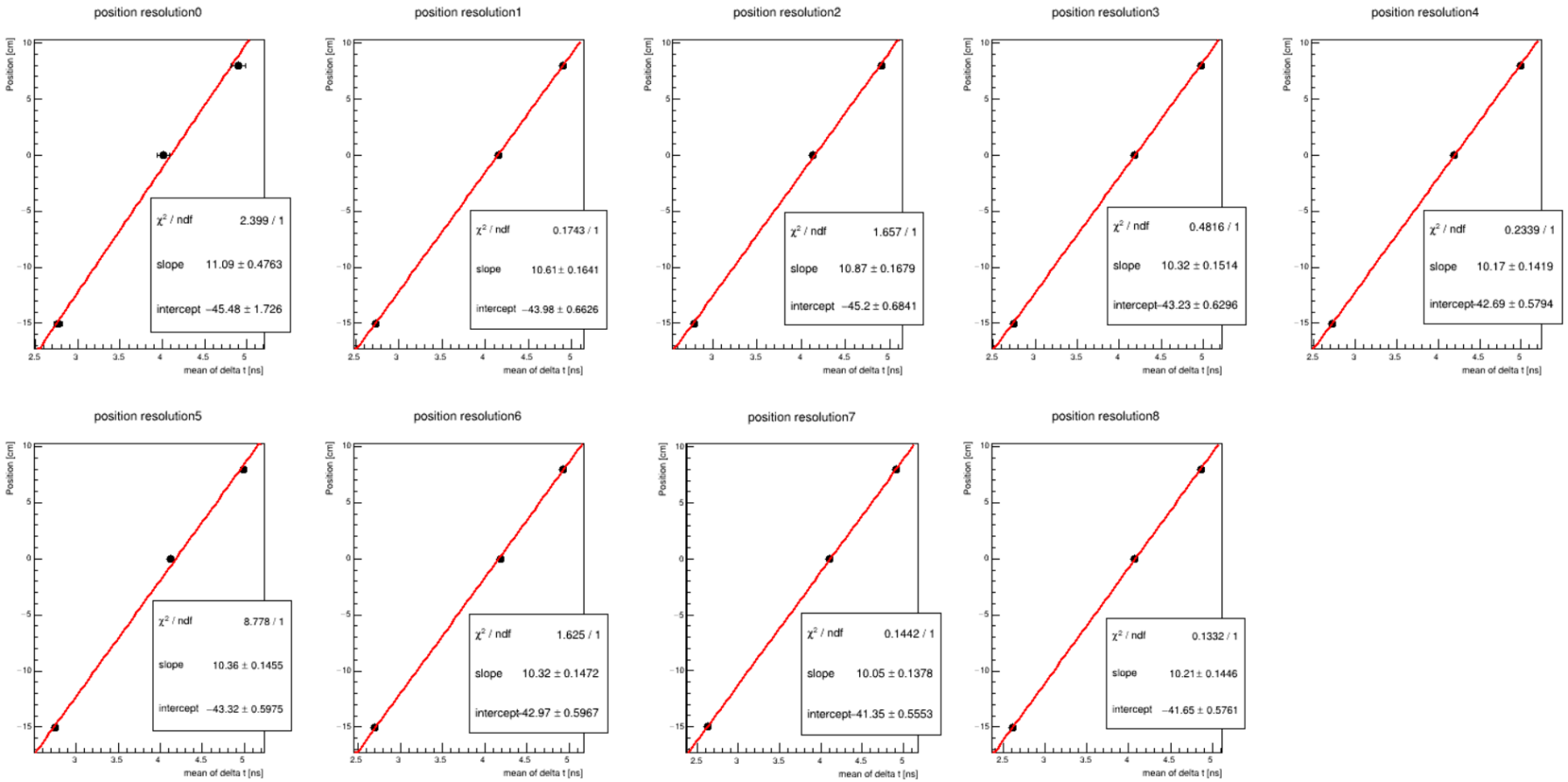


Propagation velocity

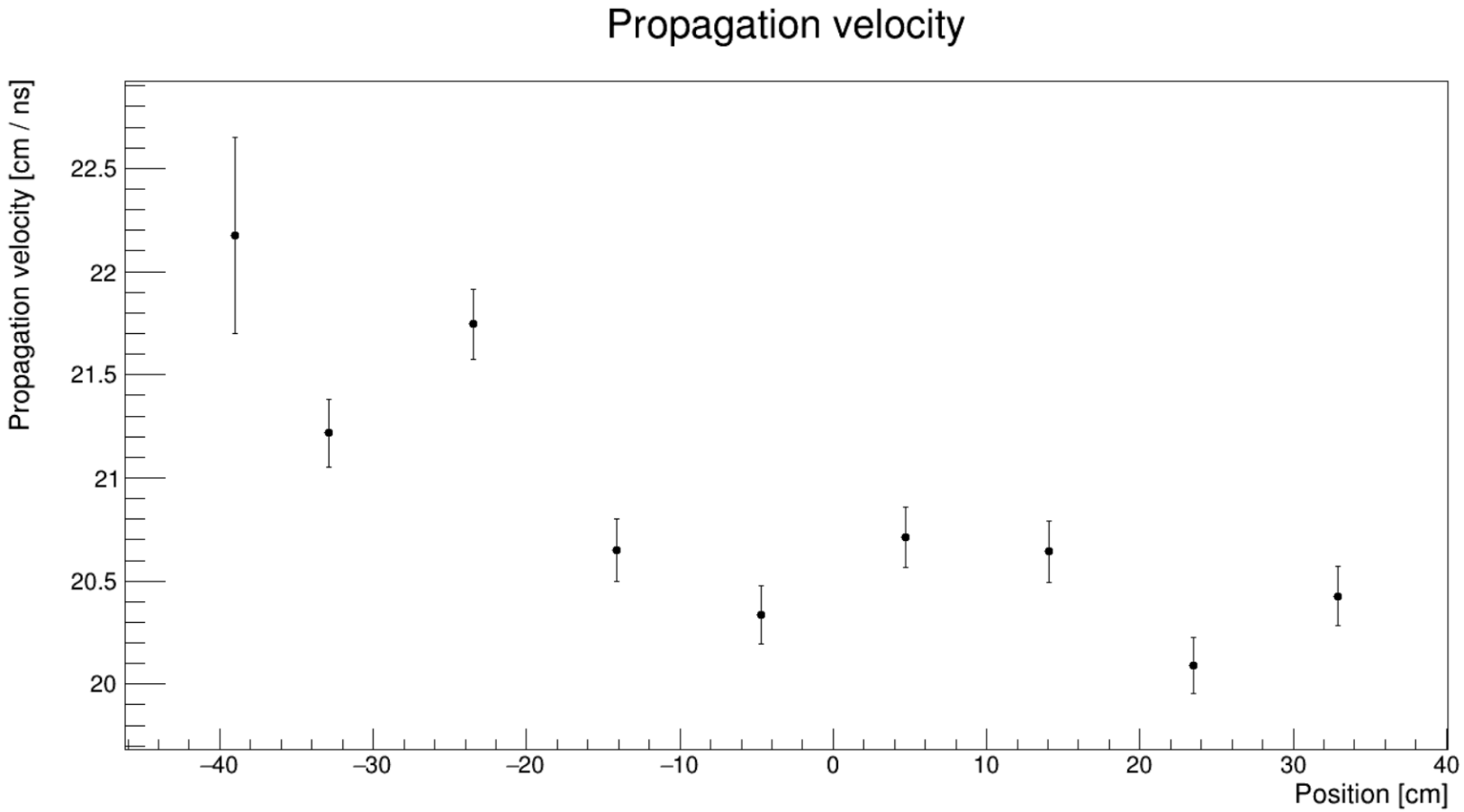


Error 랑 단위 교환? >> 이거 지금 속도의 역수 그래프임

Position resolution(부호 변경)



Propagation velocity(부호 변경)

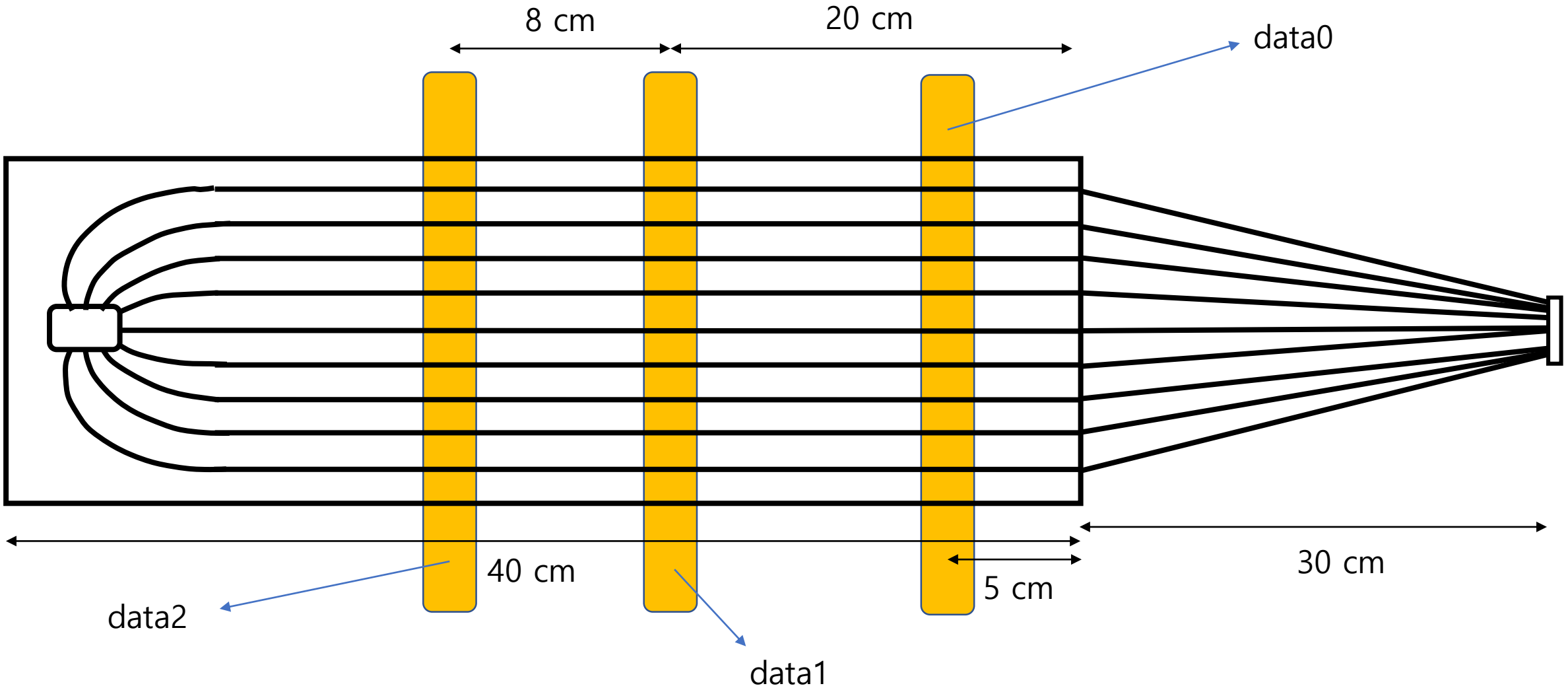


Analysis

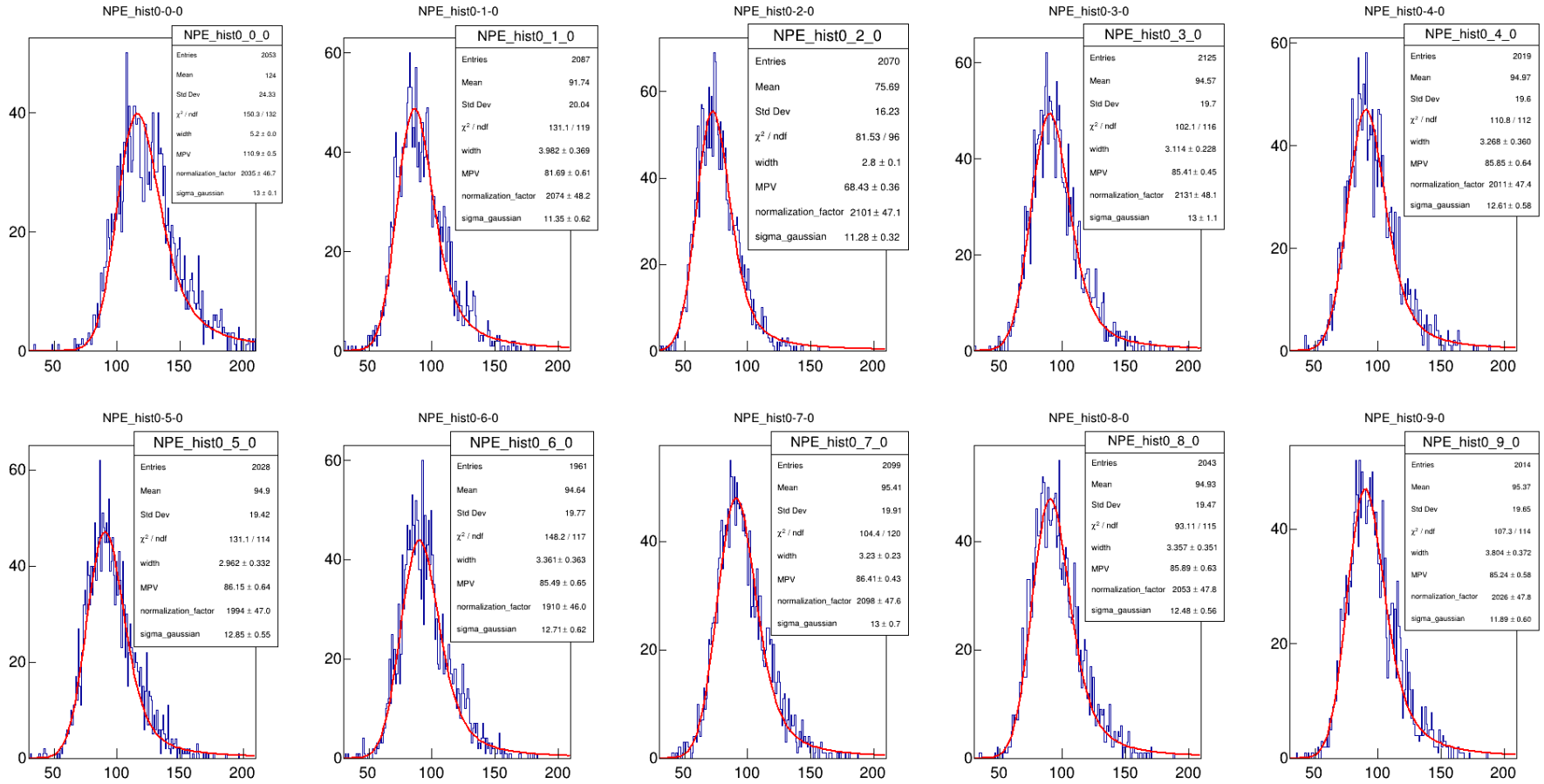
- Fitting 결과 propagation velocit는 약 20.5 cm/ns 로 측정되었다.
- 단위를 환산하면 약 $2.05\ X\ 10^{8} m/s$ 로 나타났다.
- WLS fiber의 굴절률은 1.59, Scintillator의 굴절률은 1.58 임을 고려했을 때 약간 큰 값이 나타남을 확인할 수 있다.

Comparison with simulation

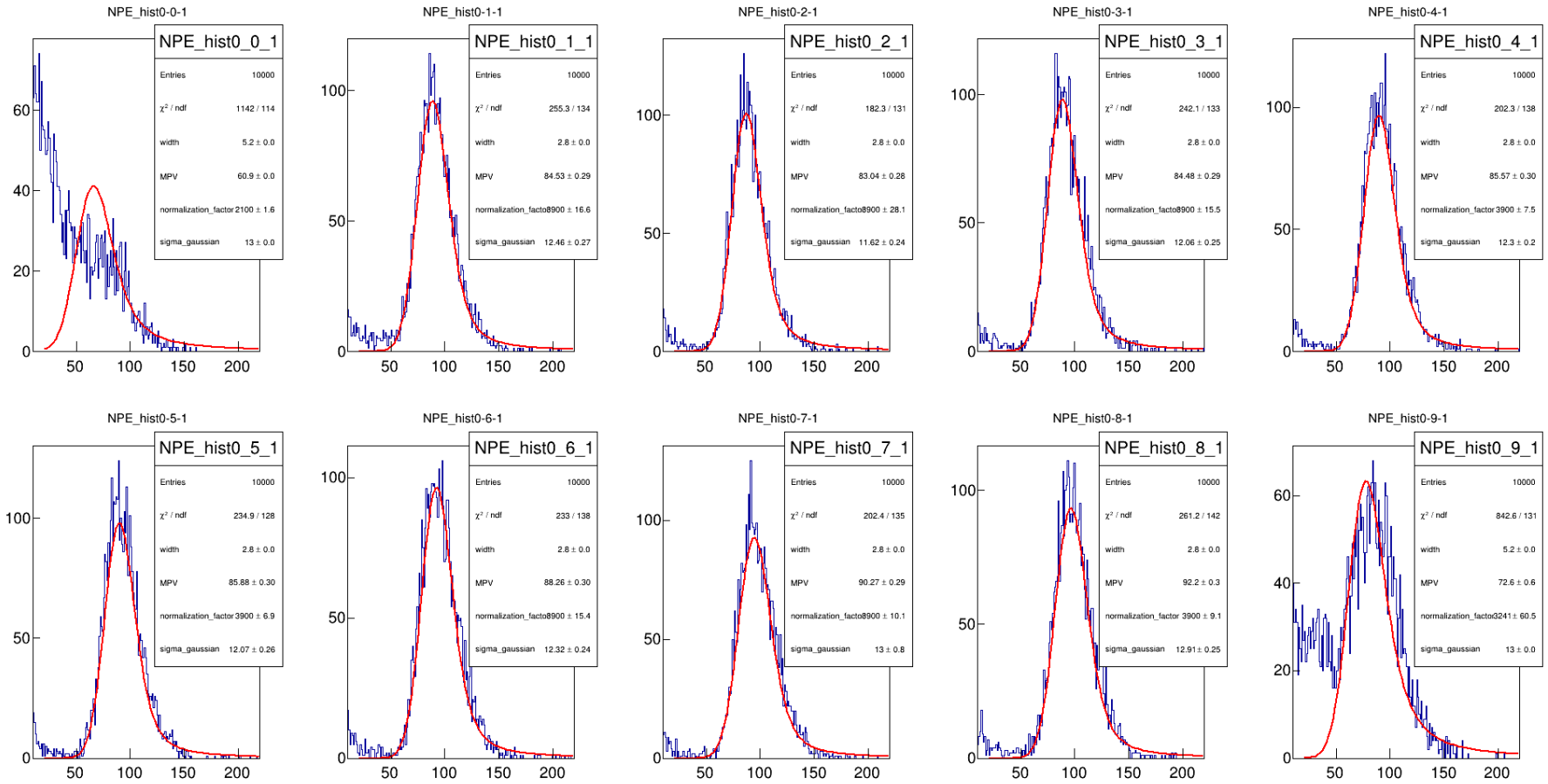
data0



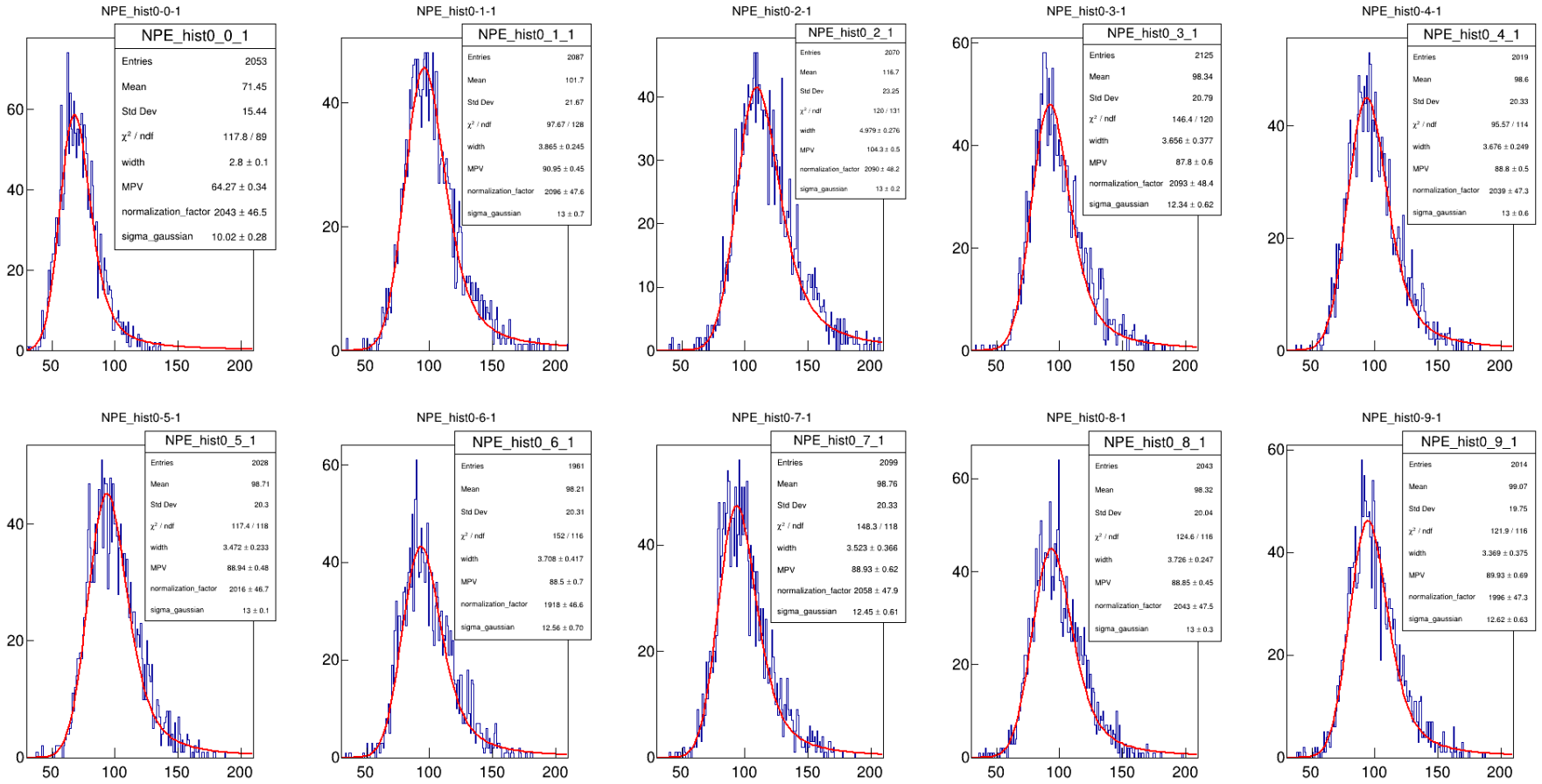
Simulation data(aluminum box, data 0)



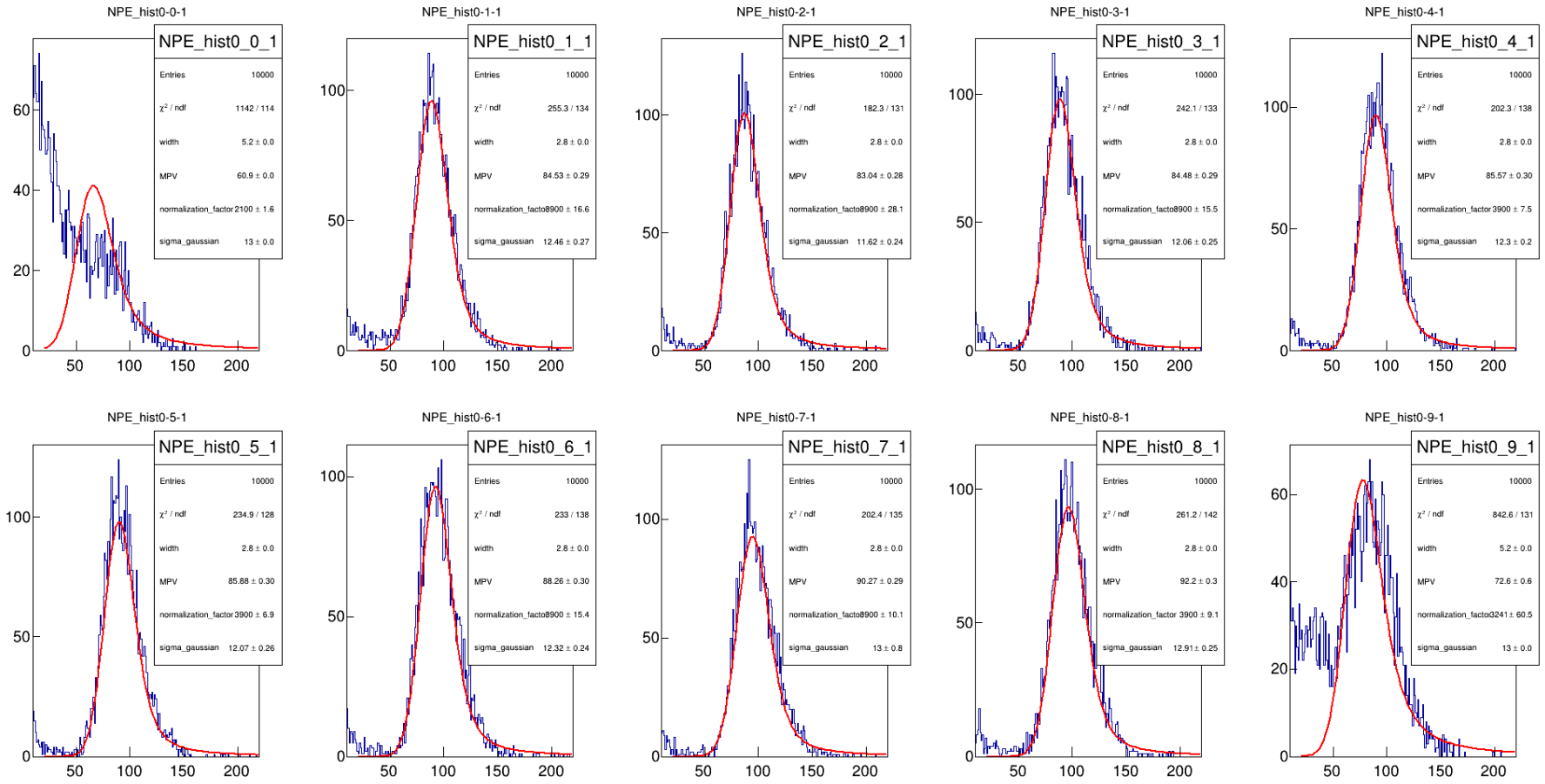
Experimental data(aluminum box, data0)



Simulation data(bunched part, data 0)

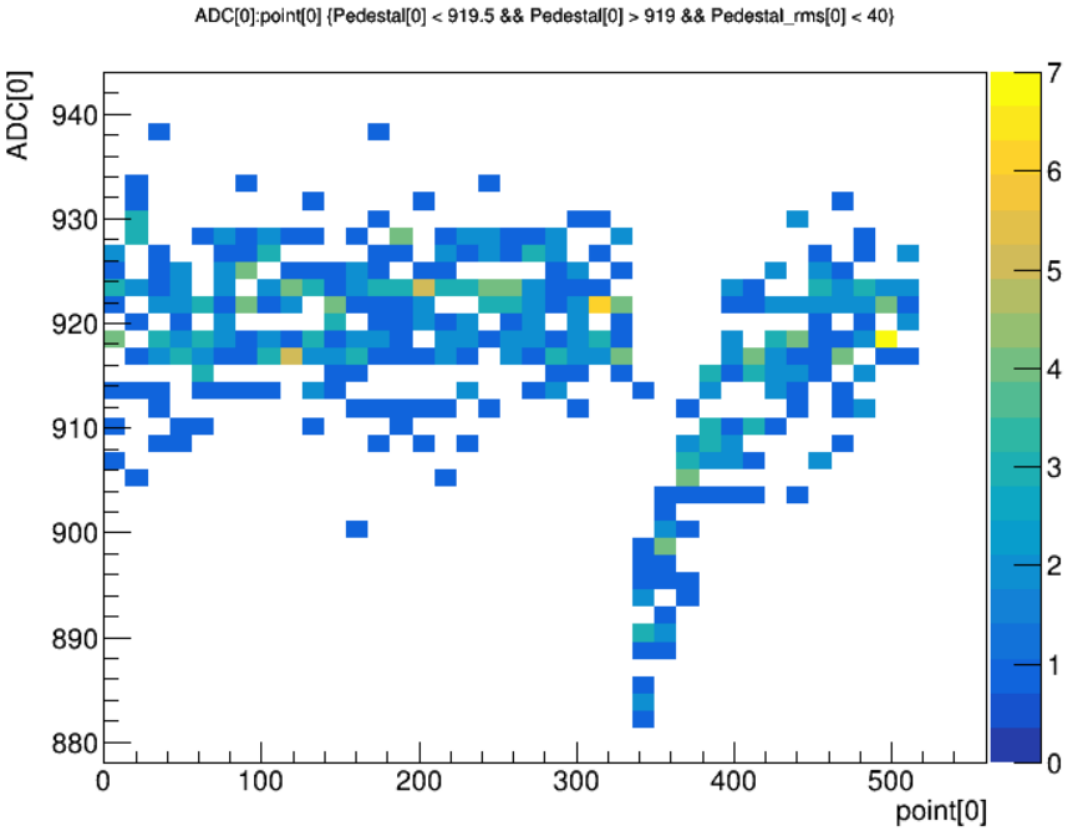


Experimental data(bunched part, data0)

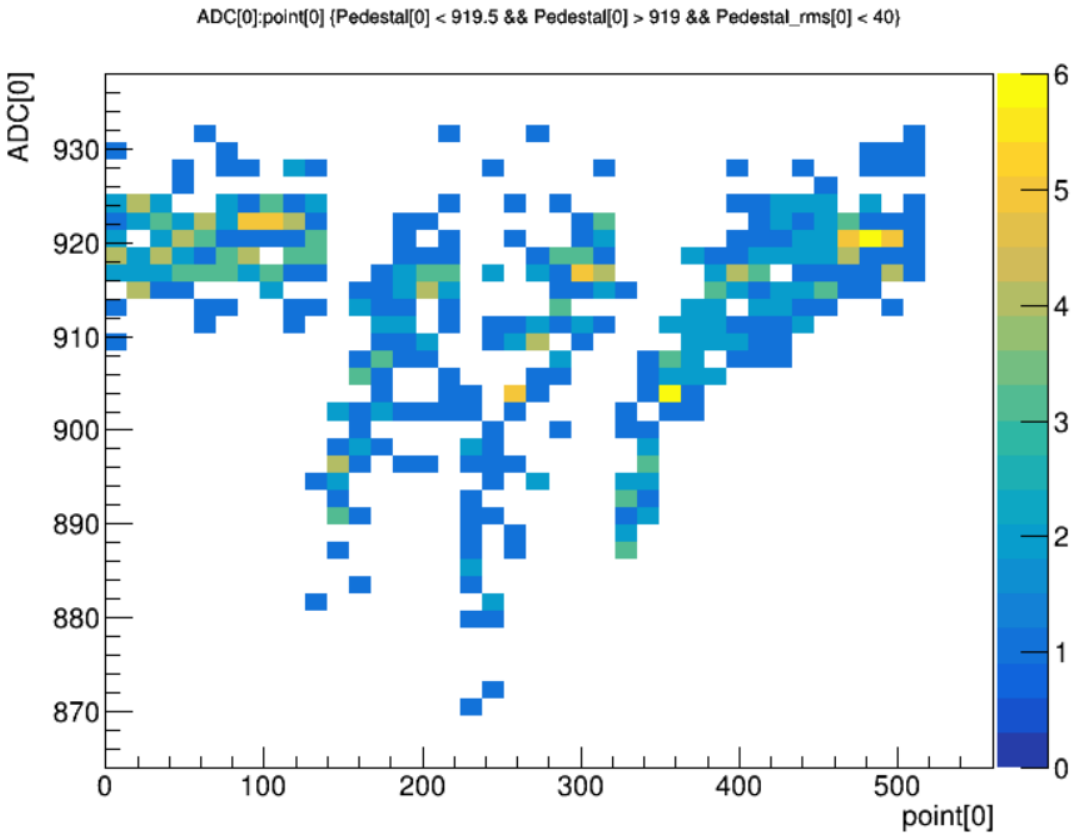


backup

Waveform (919 < Pedestal < 919.5)

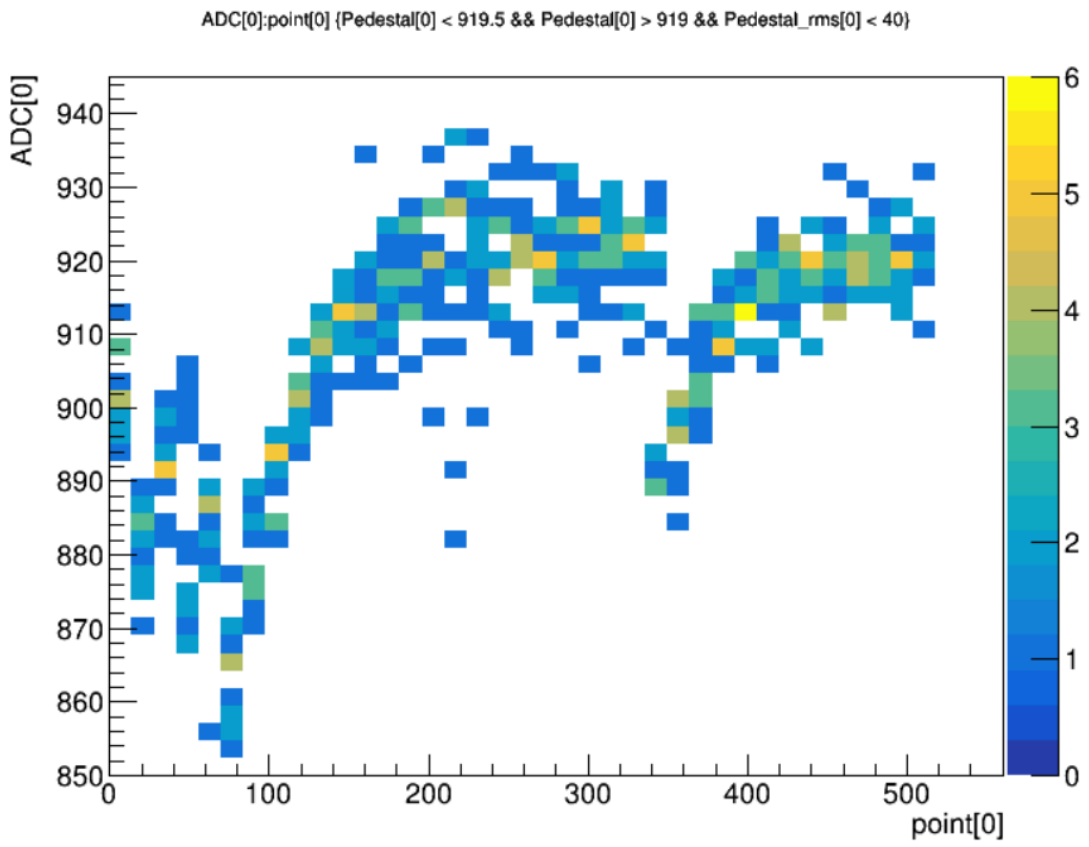



```
root [15] tree->Draw("ADC[0]:point[0]","Pedestal[0] < 919.5 && Pedestal[0] > 919
 && Pedestal_rms[0] < 40","COLZ",40,40)
```

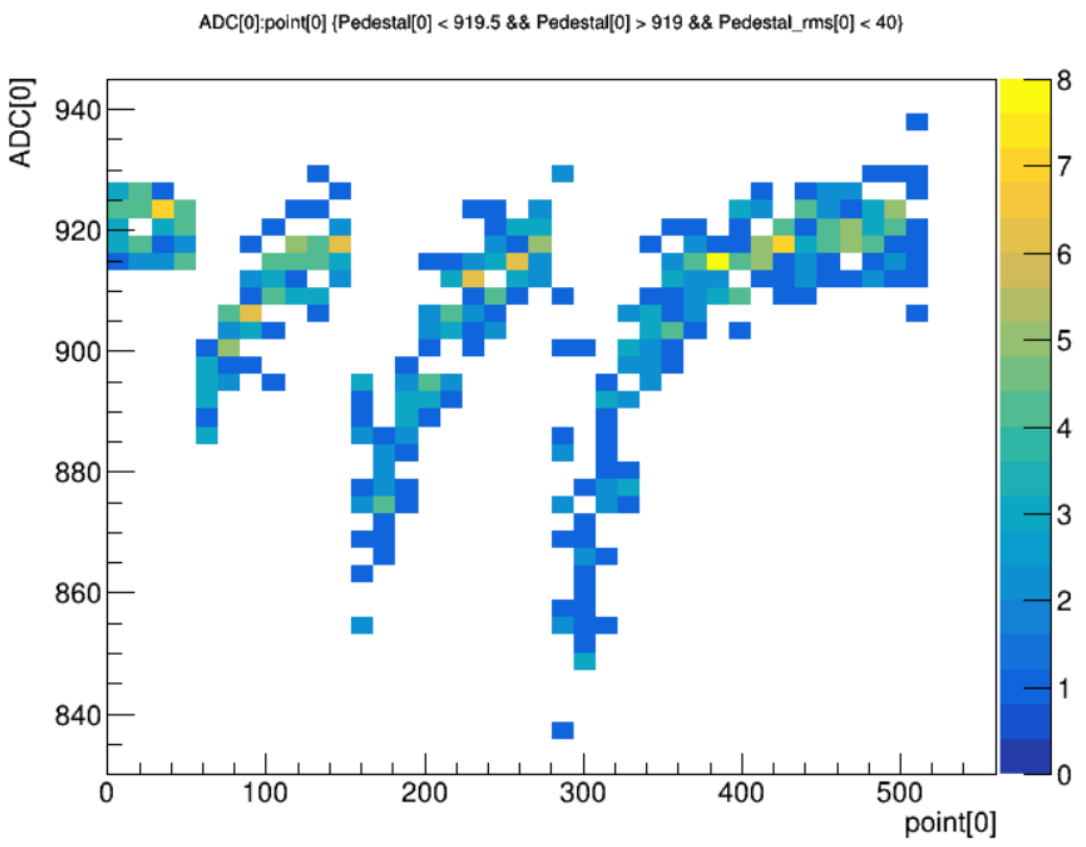



```
root [16] tree->Draw("ADC[0]:point[0]","Pedestal[0] < 919.5 && Pedestal[0] > 919
 && Pedestal_rms[0] < 40","COLZ",40,80)
```

Waveform (919 < Pedestal < 919.5)

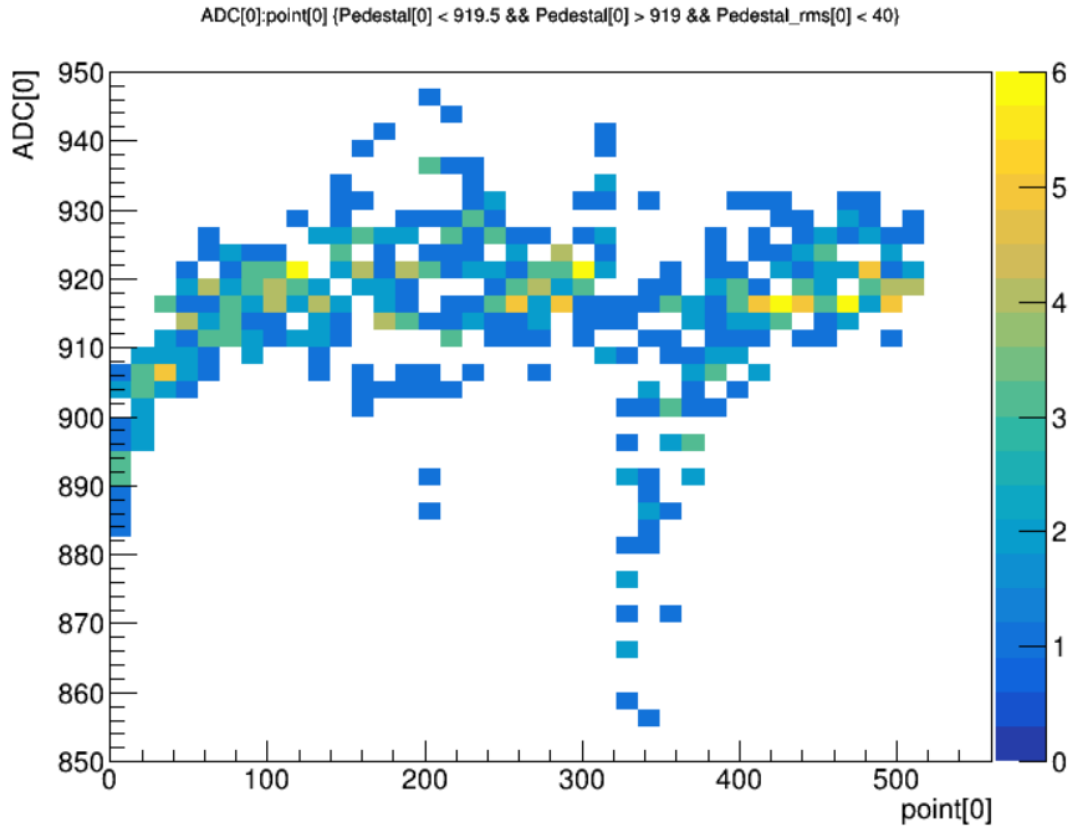



```
root [18] tree->Draw("ADC[0]:point[0]","Pedestal[0] < 919.5 && Pedestal[0] > 919
 && Pedestal_rms[0] < 40","COLZ",10,120)
```

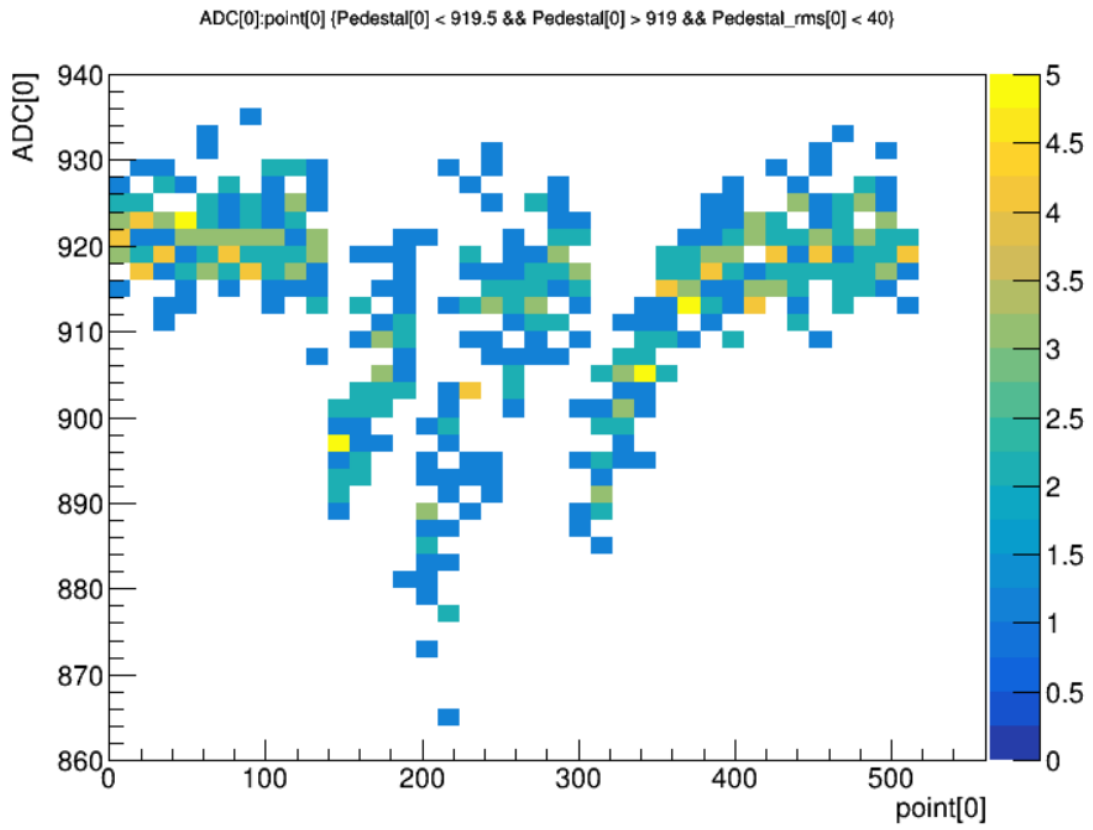



```
root [21] tree->Draw("ADC[0]:point[0]","Pedestal[0] < 919.5 && Pedestal[0] > 919
 && Pedestal_rms[0] < 40","COLZ",7,130)
```

Waveform (919 < Pedestal < 919.5)

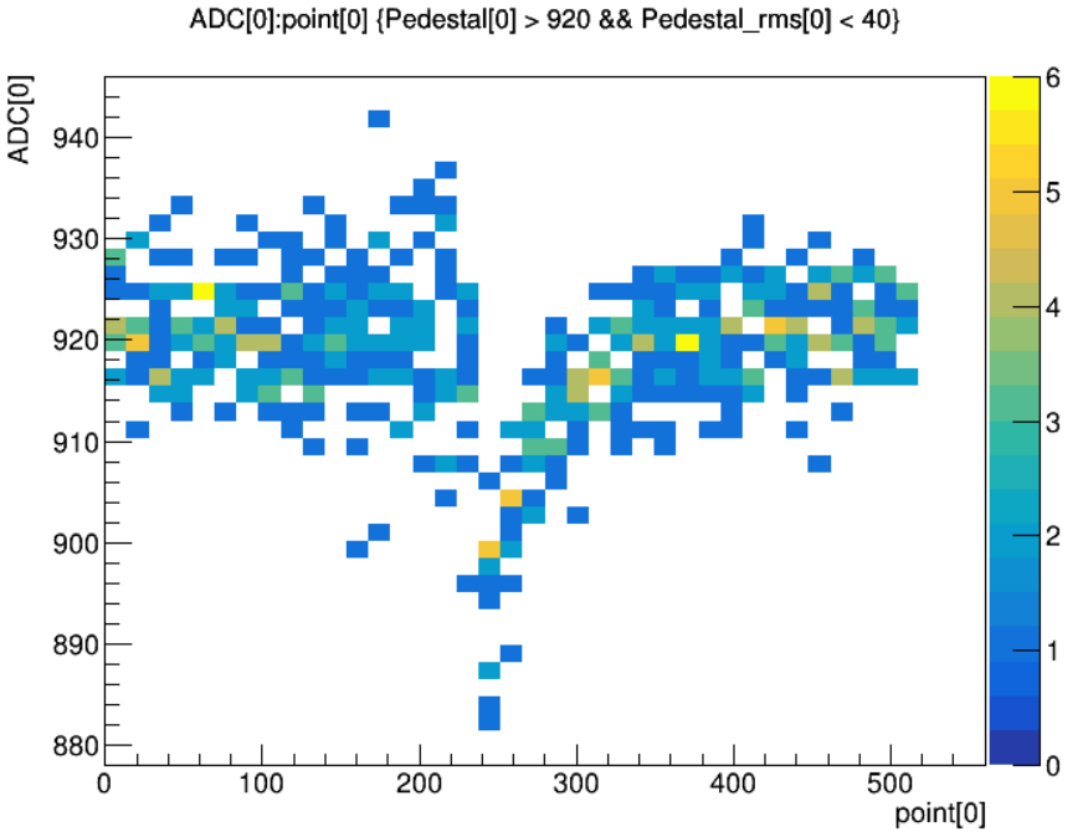



```
root [22] tree->Draw("ADC[0]:point[0]","Pedestal[0] < 919.5 && Pedestal[0] > 919
 && Pedestal_rms[0] < 40","COLZ",7,137)
```

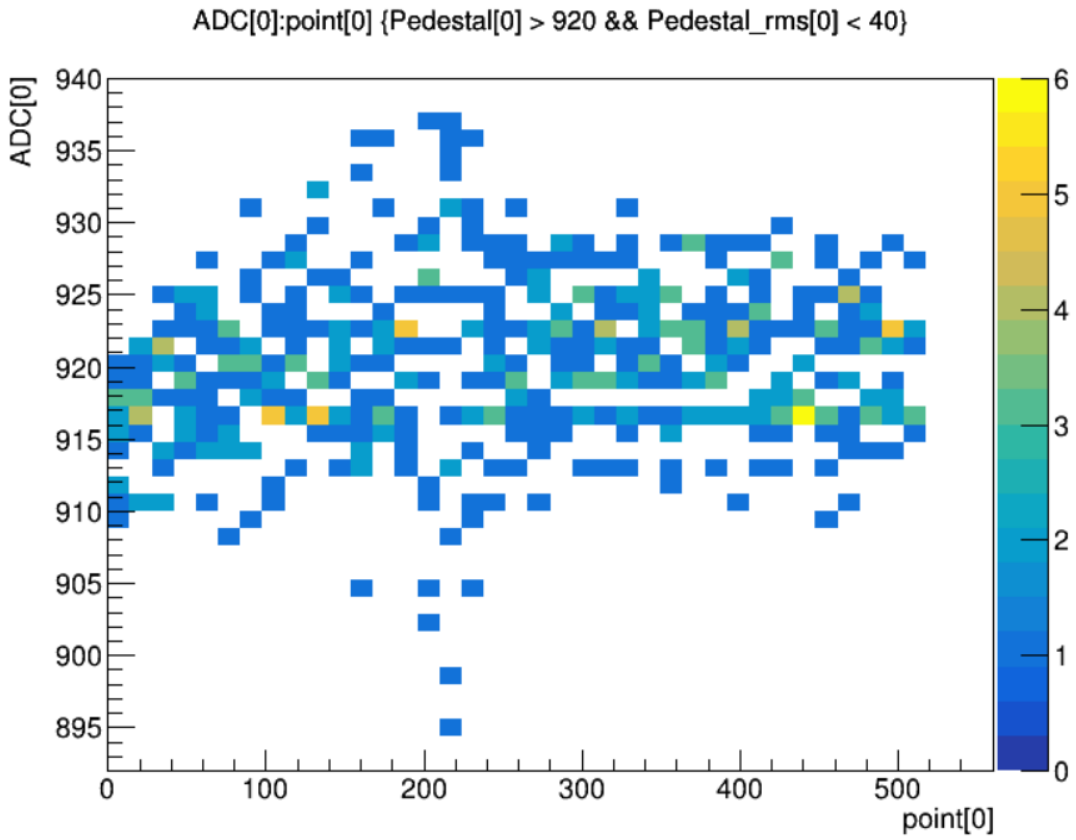



```
root [23] tree->Draw("ADC[0]:point[0]","Pedestal[0] < 919.5 && Pedestal[0] > 919
 && Pedestal_rms[0] < 40","COLZ",20,140)
```

Waveform(Pedestal > 920)

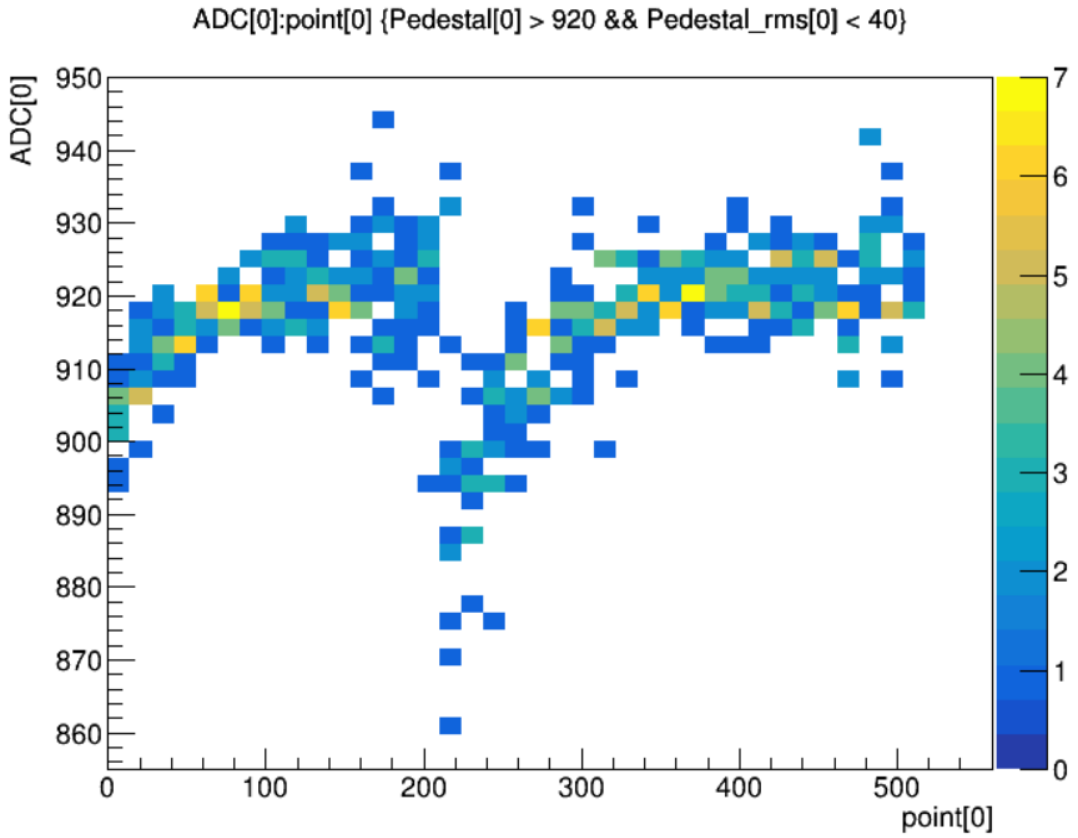



```
root [25] tree->Draw("ADC[0]:point[0]","Pedestal[0] > 920 && Pedestal_rms[0] < 40","COLZ",10,140)
```

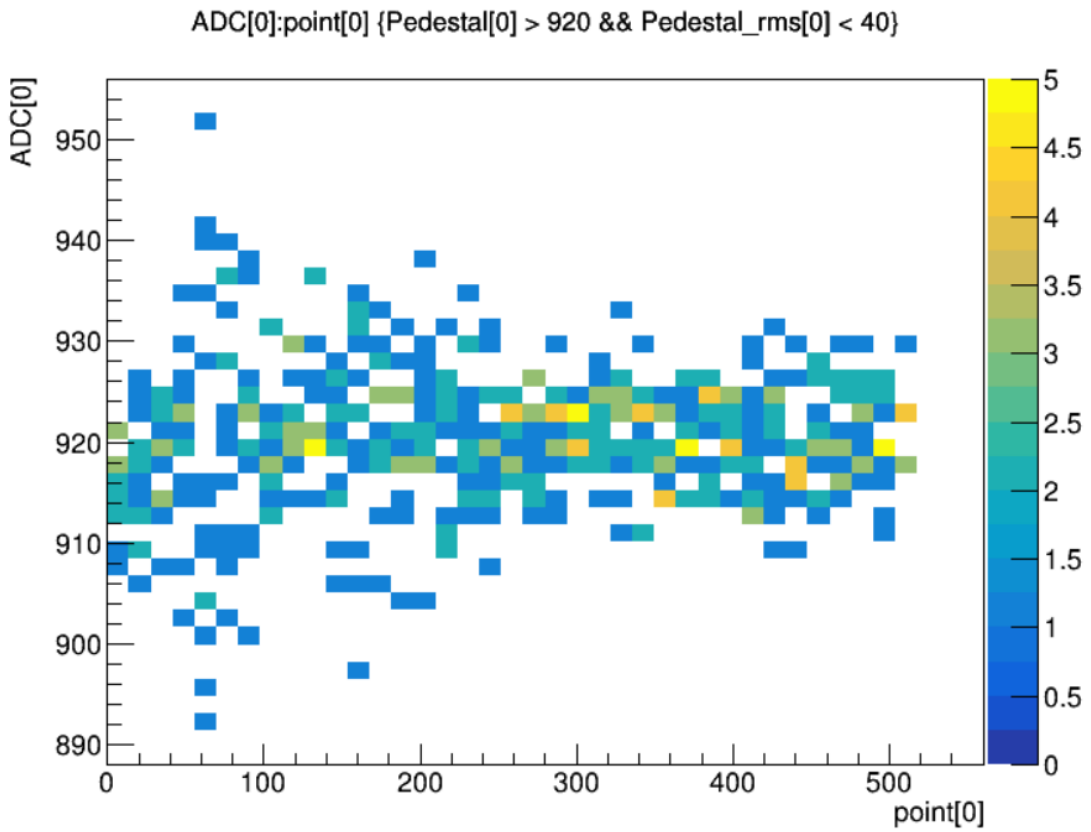



```
root [27] tree->Draw("ADC[0]:point[0]","Pedestal[0] > 920 && Pedestal_rms[0] < 40","COLZ",5,150)
```

Waveform (Pedestal > 920)




```
root [28] tree->Draw("ADC[0]:point[0]","Pedestal[0] > 920 && Pedestal_rms[0] < 4
0","COLZ",5,155)
```




```
root [30] tree->Draw("ADC[0]:point[0]","Pedestal[0] > 920 && Pedestal_rms[0] < 4
0","COLZ",3,160)
```