

The background is a gradient of dark blue and purple, speckled with small white dots. On the left side, there are several concentric circles and a large circular scale with degree markings from 140 to 260. Some circles have arrows indicating a clockwise direction.

190211

BYUNGCHAN LEE

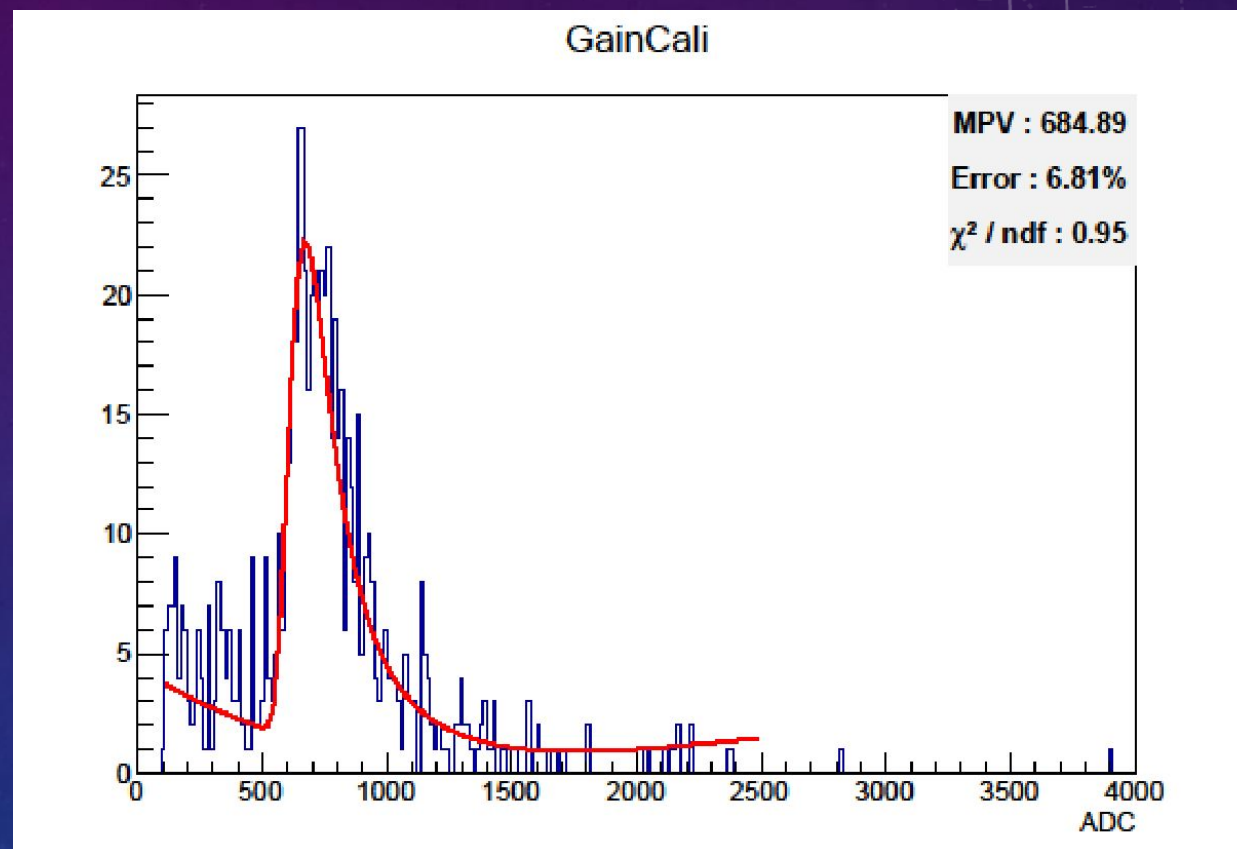
EVREC

```
[bclee@localhost Test]$ ls
180518YT1314.root.00000      FADCT_000665.root.00001      include
180518YT1314.root_evrec.root FADCT_000665.root.00002      Makefile
evrec                       FADCT_000665.root.00003      Makefile~
FADCT_000665.root.00000      FADCT_000665.root_evrec.root  src
[bclee@localhost Test]$ ./evrec -i 'FADCT_000665.root.00001'
Start reconstruction.
Progress: 100%
Finish reconstruction.
Total number of events: 695
=====
```

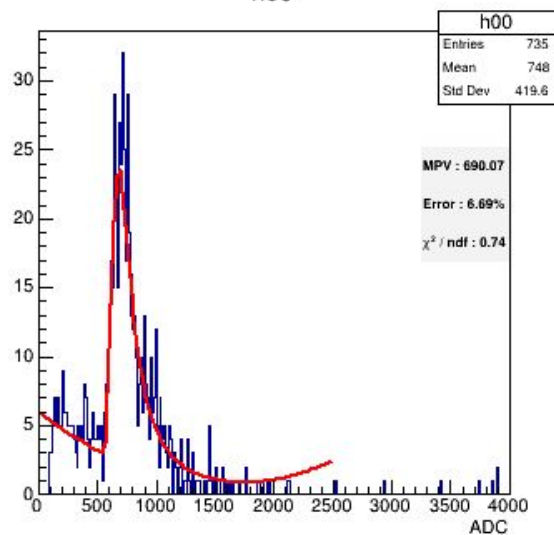
- Extracts t0, Maximum pulse height, Integrated area, etc. from RAW data

GAIN CALIBRATION

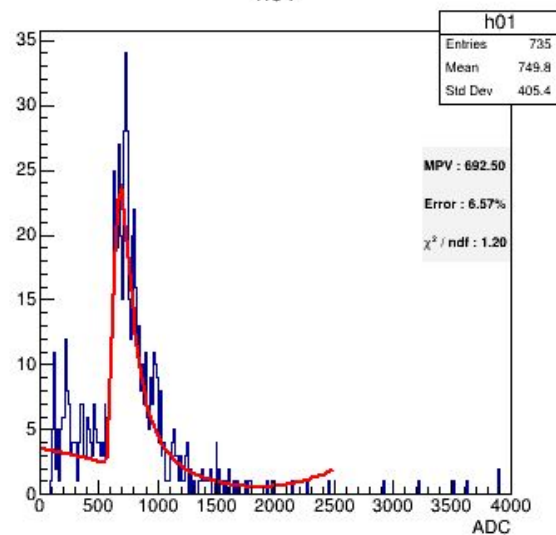
- Data : 'FADC_000551_evrec.root'
- Selected Event Number : 724
- Position Cut : 80 ~ 90 cm
- Height > 100 counts
- Landau + Poly3 Fitting



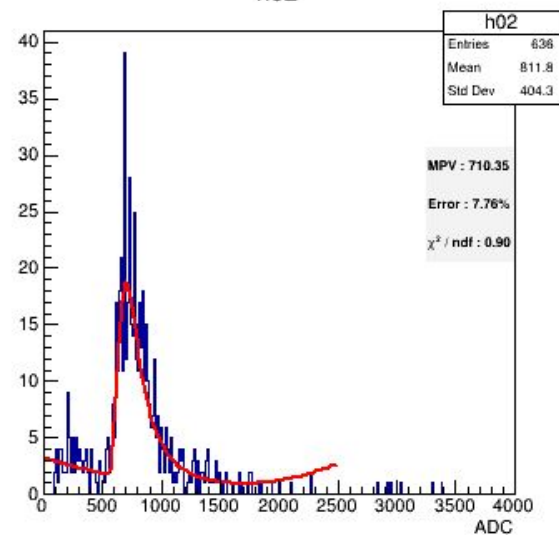
h00



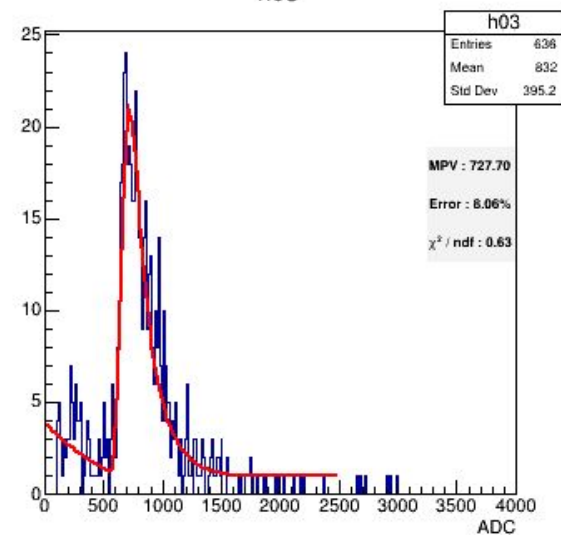
h01



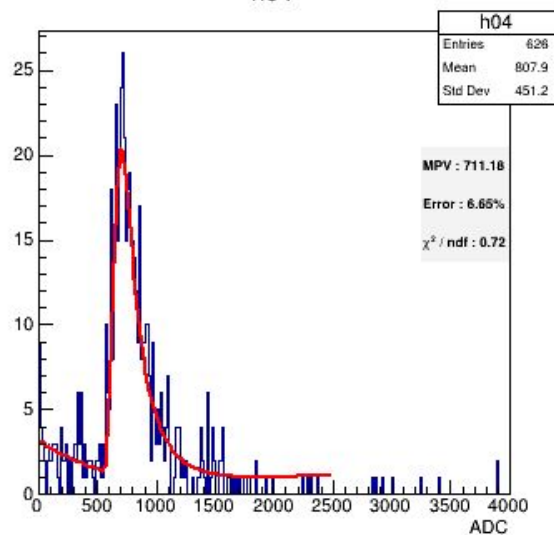
h02



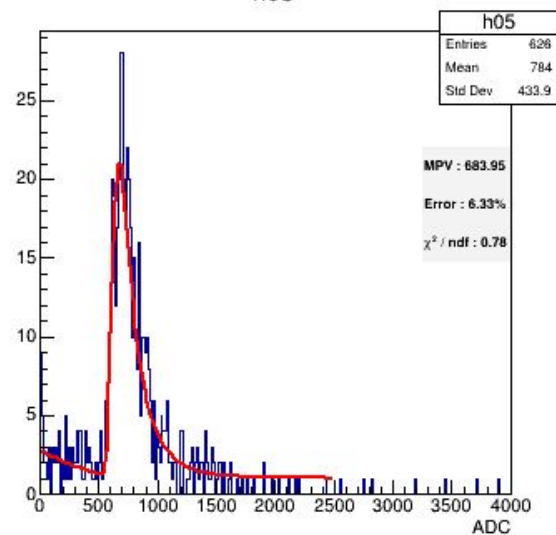
h03



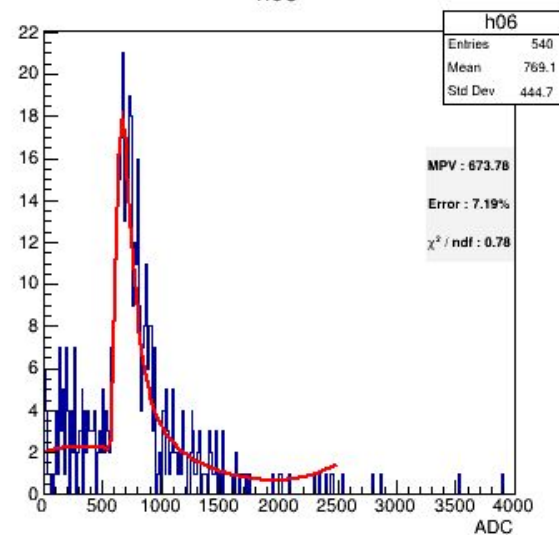
h04



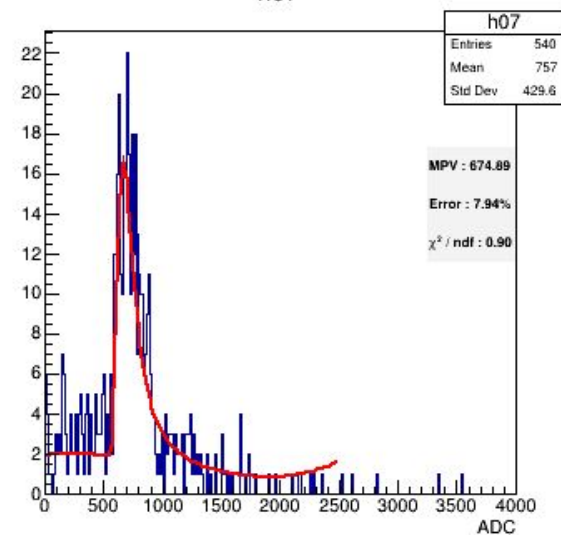
h05



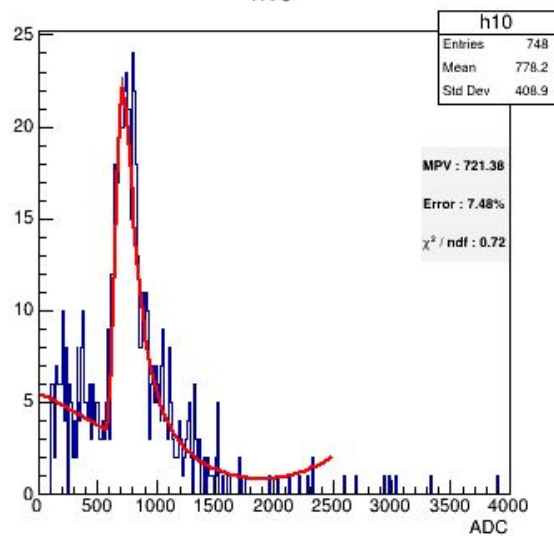
h06



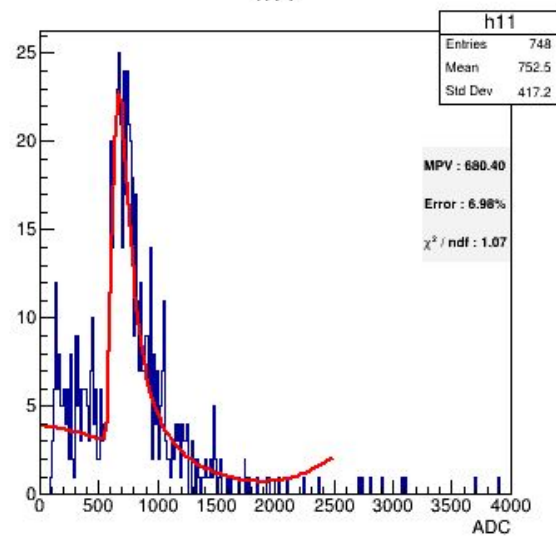
h07



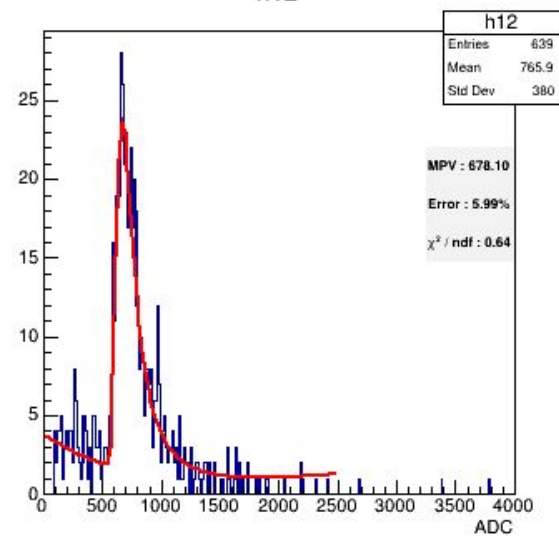
h10



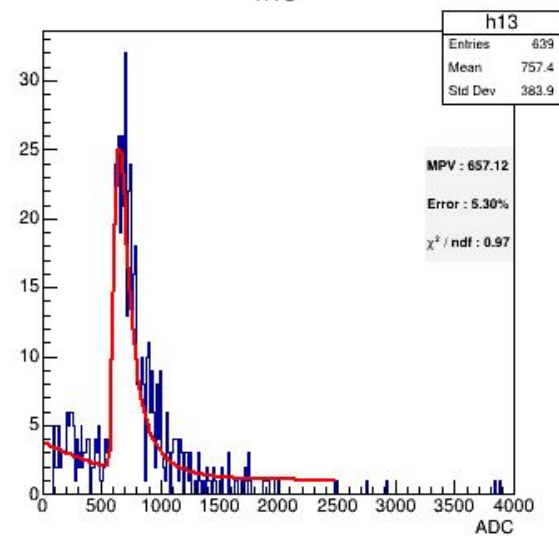
h11



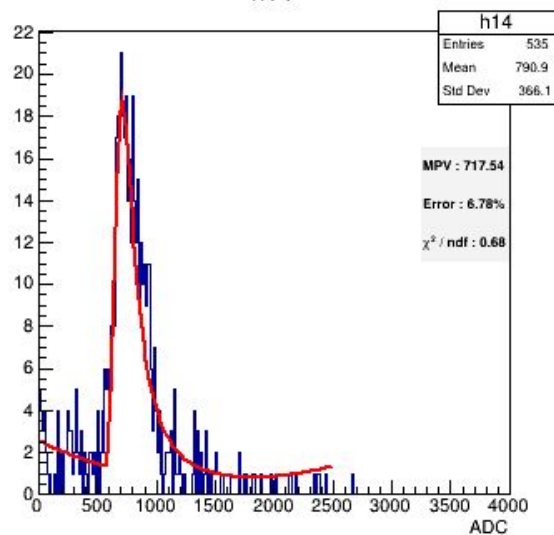
h12



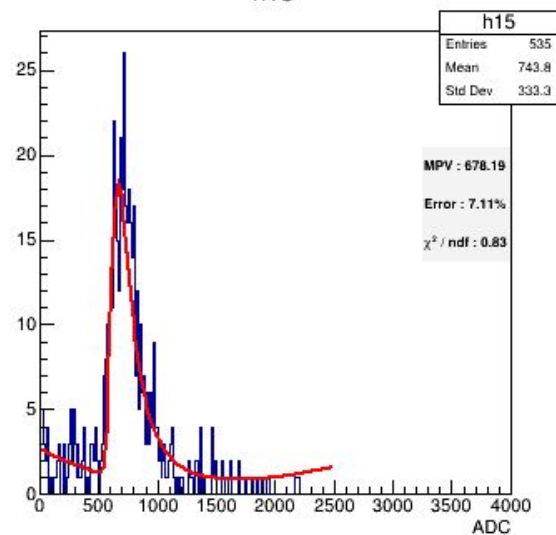
h13



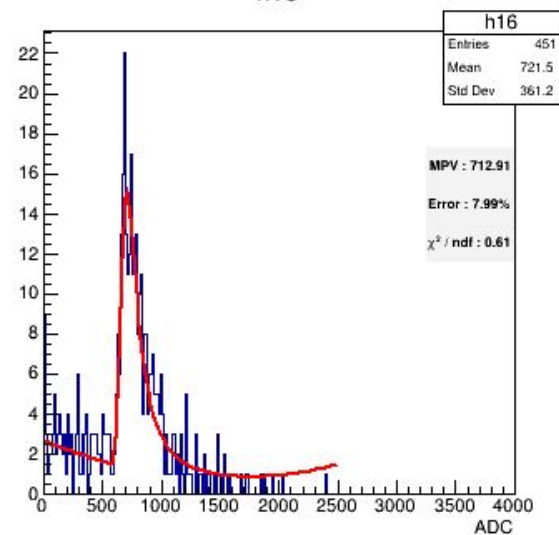
h14



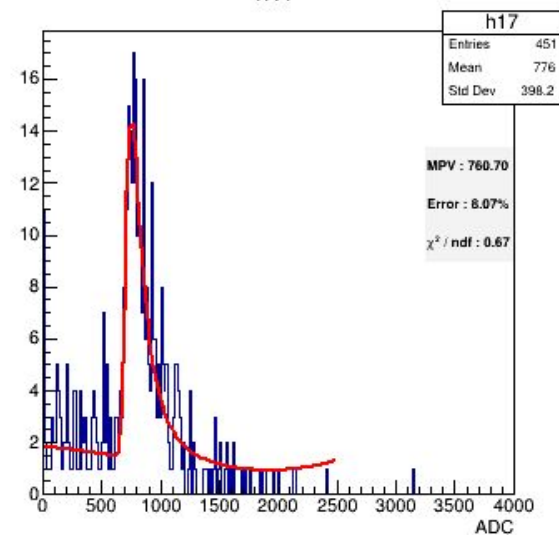
h15



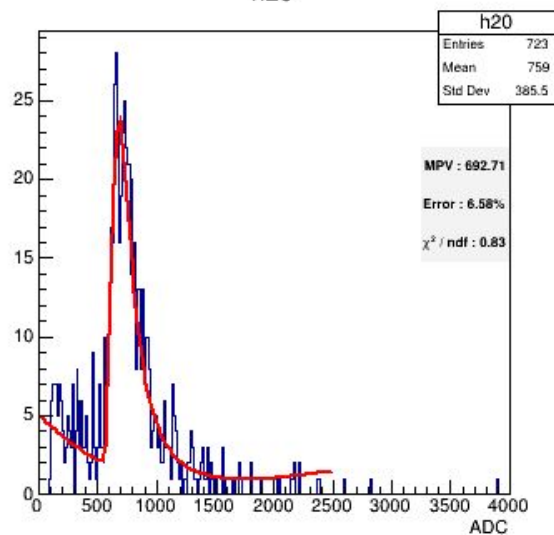
h16



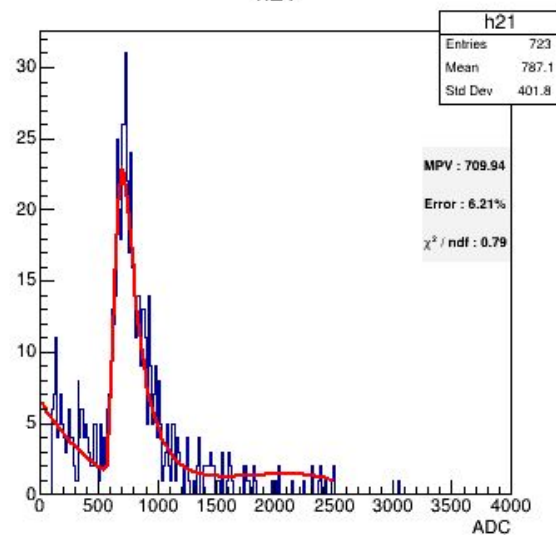
h17



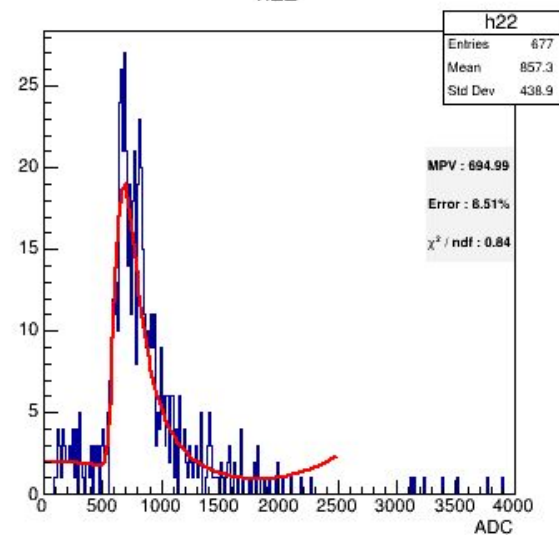
h20



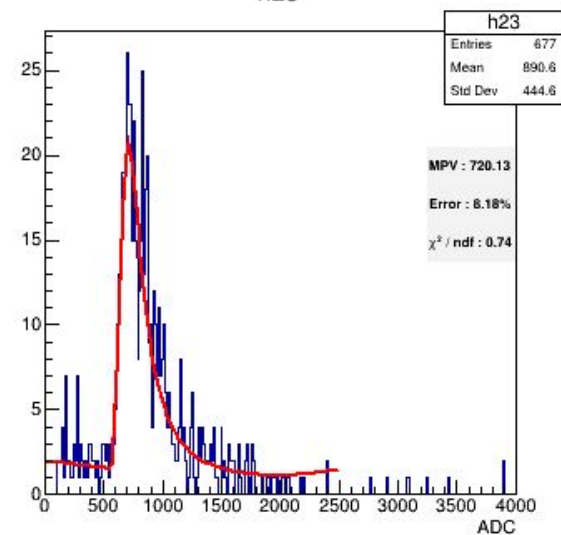
h21



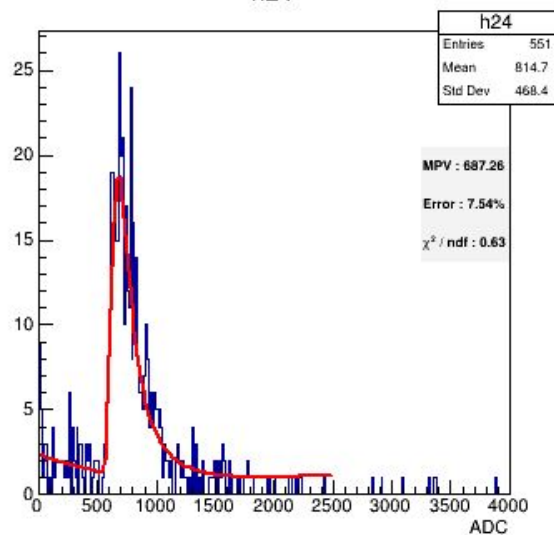
h22



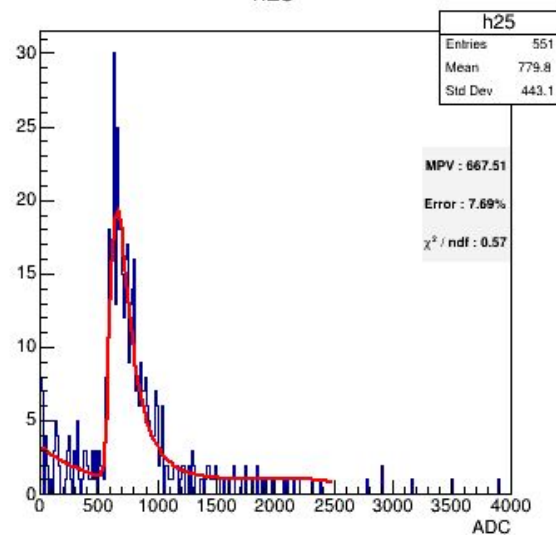
h23



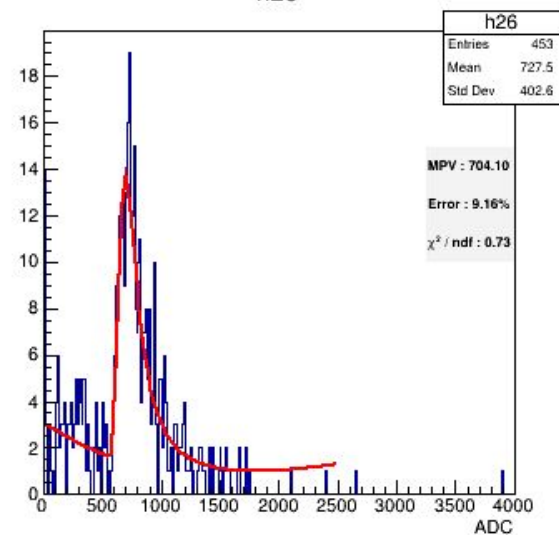
h24



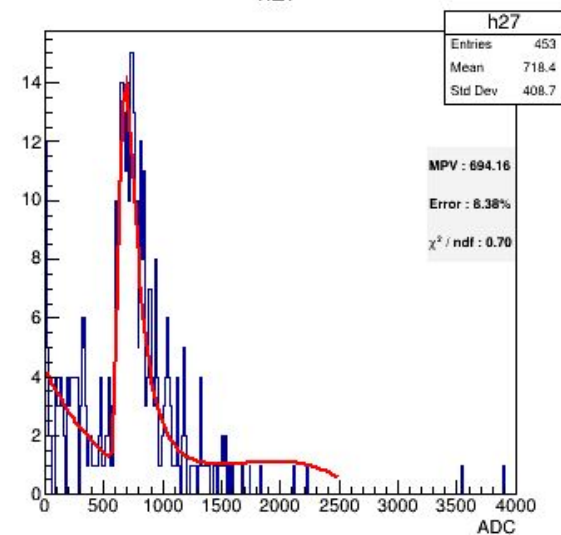
h25



h26

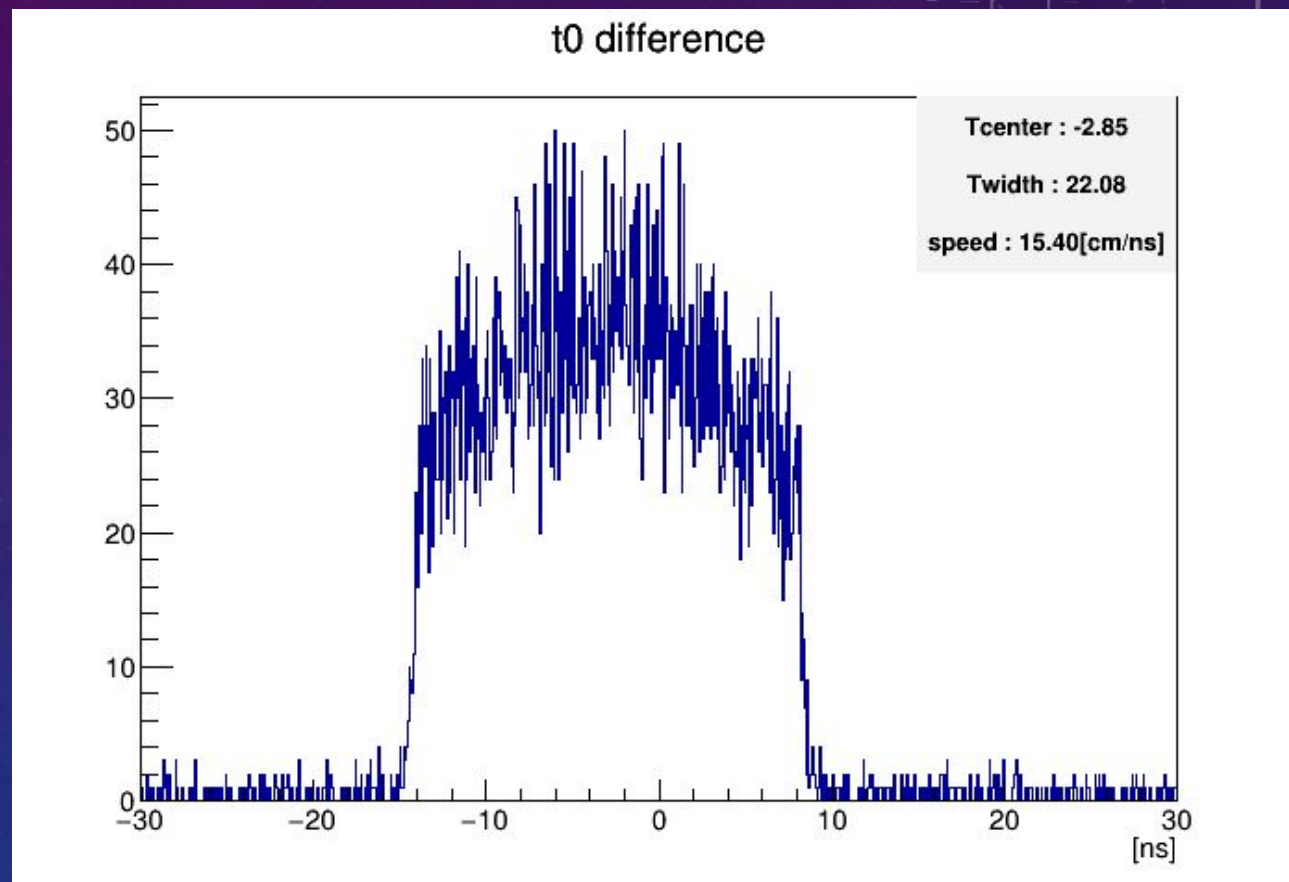


h27



TO DIFFERENCE

- Total Event Number : 20004
- Time difference between Two PMTs in a scintillation counter
- Speed = $2 * (\text{length of bar}) / (\text{Time width})$ [cm/ns]



Inverse Interpolation using Bessel Function

- Interpolation : Linear, Polynomial, Spline, Newton, Sterling, Bessel..
- Using Central Differences
- Bessel's interpolation formula

$$y = \frac{1}{2}(y_0 + y_1) + \left(u - \frac{1}{2}\right)\Delta y_0 + \frac{u(u-1)}{2!} \cdot \frac{1}{2}[\Delta^2 y_{-1} + \Delta^2 y_0] + \frac{(u - \frac{1}{2})u(u-1)}{3!} \Delta^3 y_{-1} \\ + \frac{(u+1)u(u-1)(u-2)}{4!} \cdot \frac{1}{2}[\Delta^4 y_{-1} + \Delta^4 y_{-2}] + \dots$$

y₀

Δy₀

y₁

Δ² y₀

Δy₁

Δ³ y₀

y₂

Δ² y₁

Δy₂

y₃



Inverse Interpolation using Bessel Function

- $\text{eps} = 0.001$: ps accuracy

```
const double eps = 0.001;
```

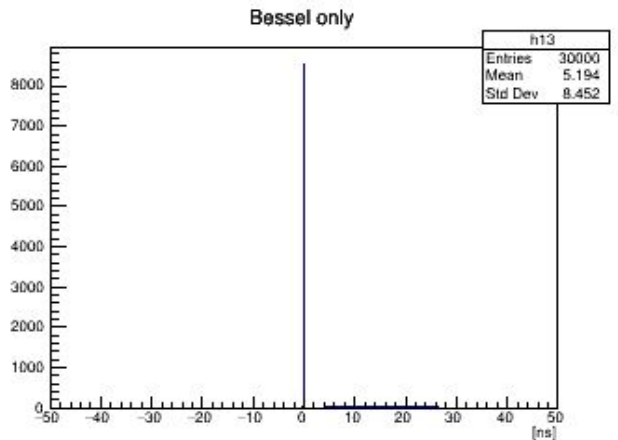
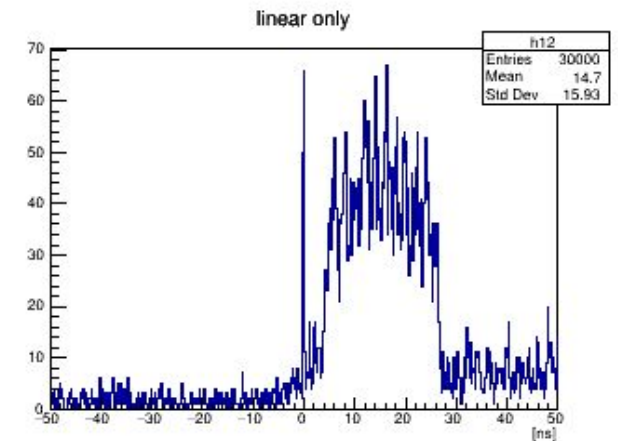
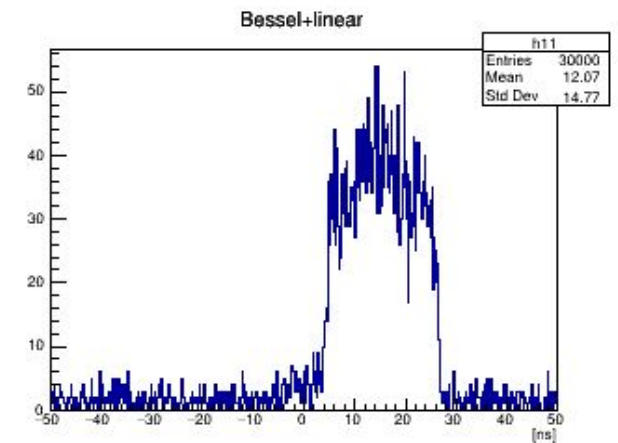
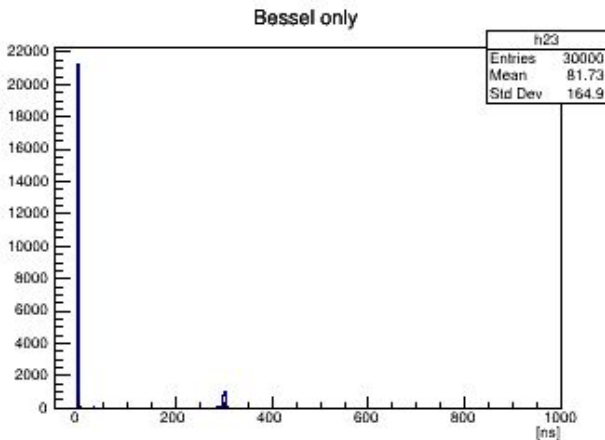
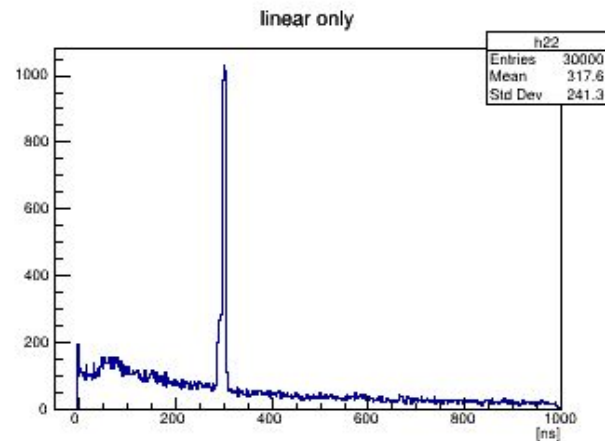
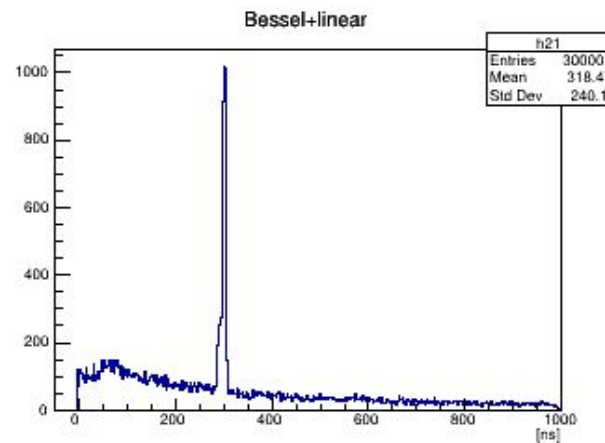
- Use Bessel Function

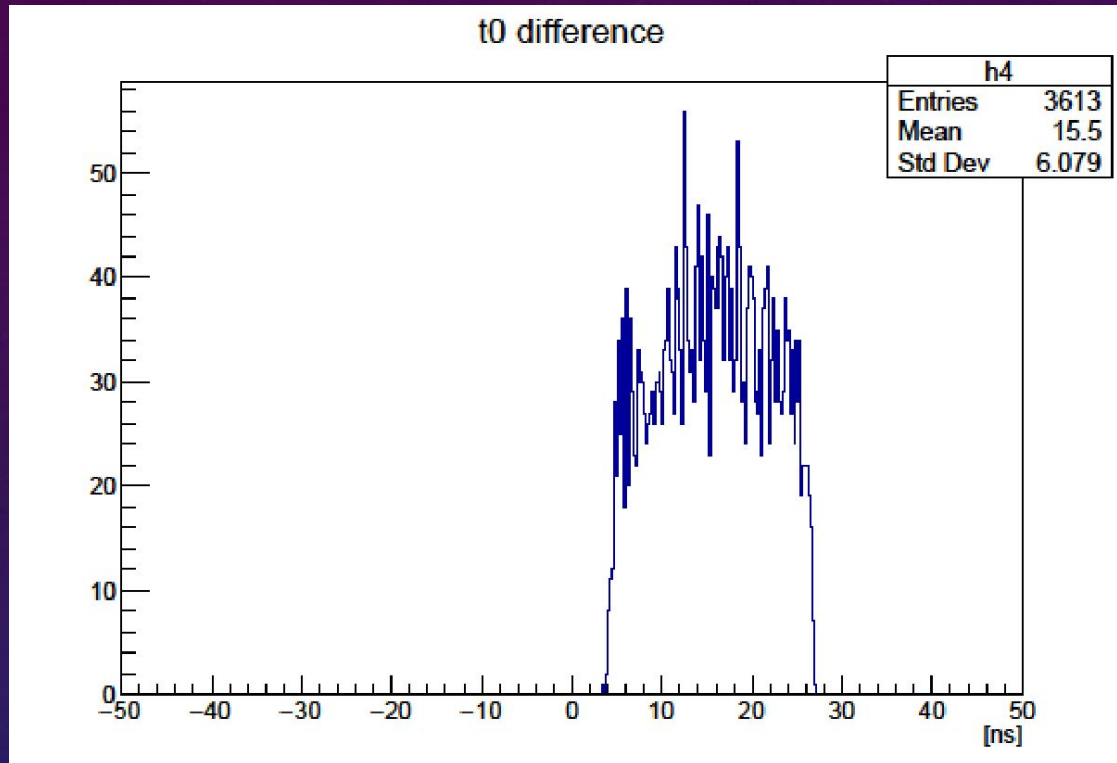
```
do {  
    counter++;  
    p_old = p_new;  
    p_new = (y - f_0 - d_2*p_old*(p_old - 1.0)/2.0  
            - d_3*p_old*(p_old - 1.0)*(p_old - 0.5)/6.0  
            - d_4*(p_old*p_old - 1.0)*p_old*(p_old - 2.0)/24.0)/d_1;  
    if (counter > 100) return 0;  
} while (abs(p_new - p_old) > eps);
```

- Or use Linear Interpolation

```
t0[j] = CalcT0InvIntPol(data->Get(j));  
if (t0[j] == 0)  
t0[j] = CalcT0LinIntPol(data->Get(j));}
```

- 180518 data
- Total event number : 30,000
- In 21,251 out of 30,000 events, 2-points linear interpolation method is used





- Maximum waveform Height > 100 counts
- 3705 events are selected

