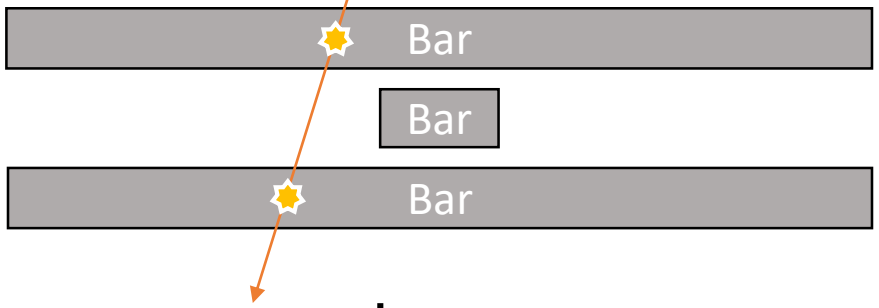
Weekly Meeting

03/01/2020

ByungChan Lee

Random coincidence

Previous slide



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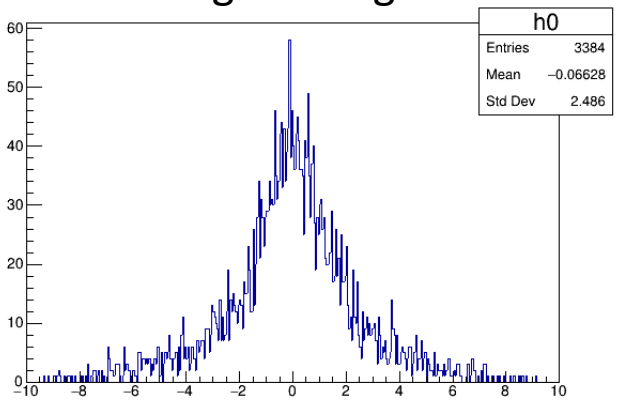

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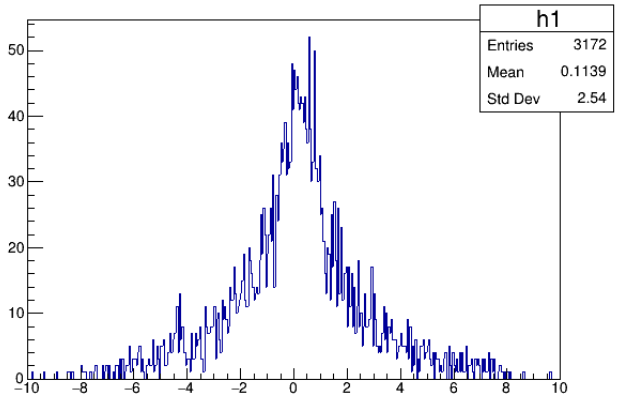
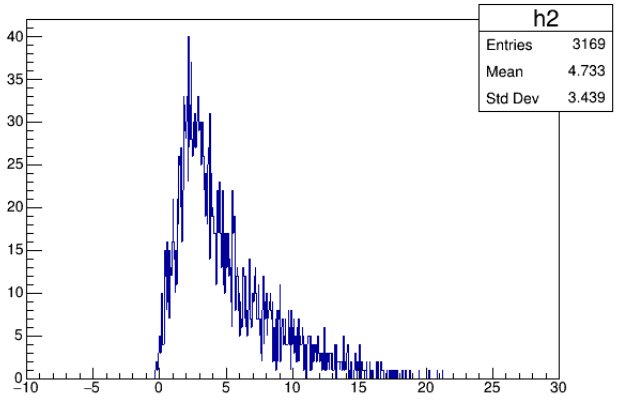
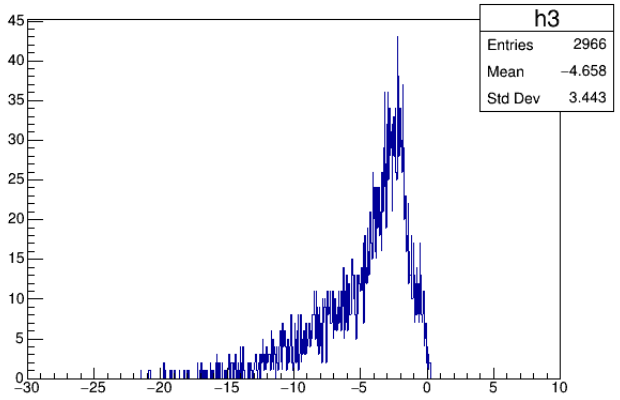
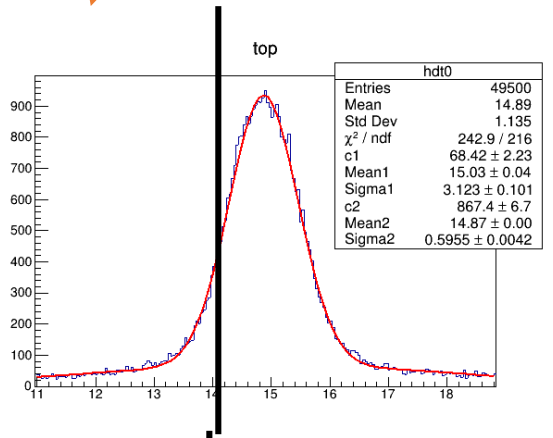


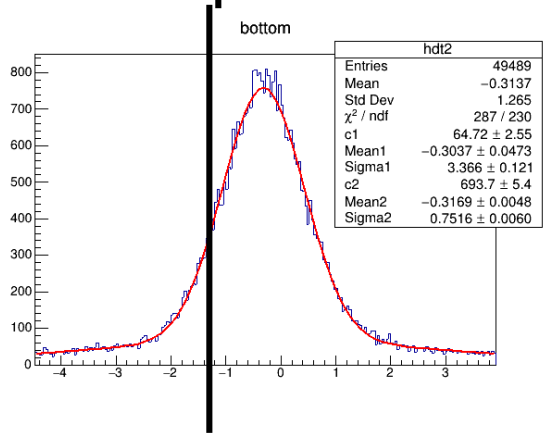
h2



h3

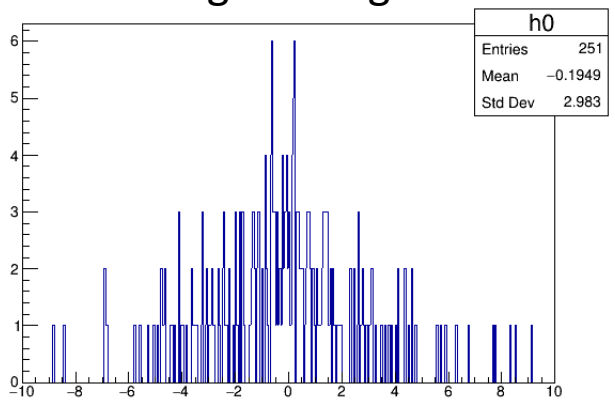






Random coincidence

Right -> Right



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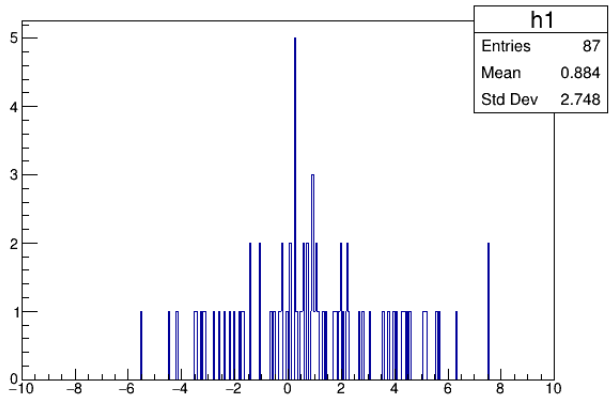
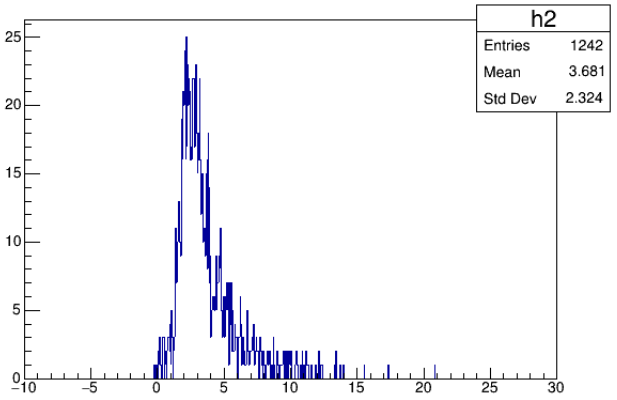


h2



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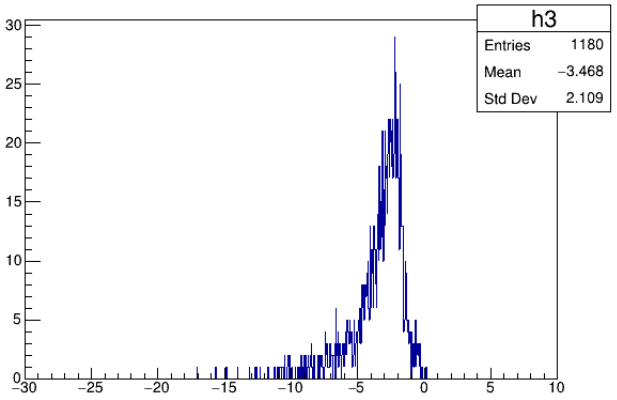
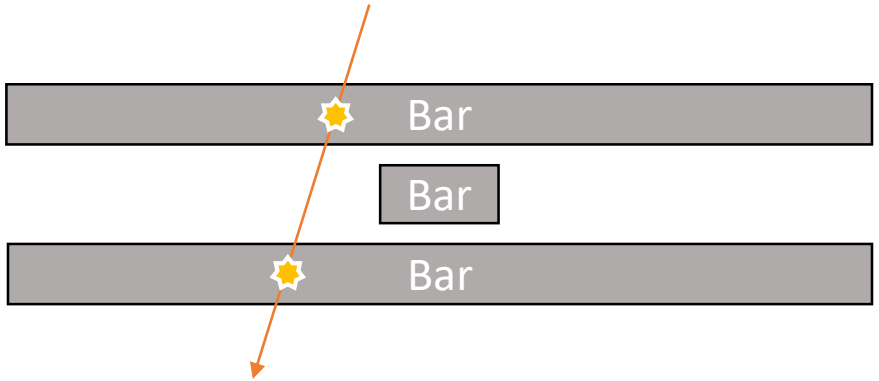


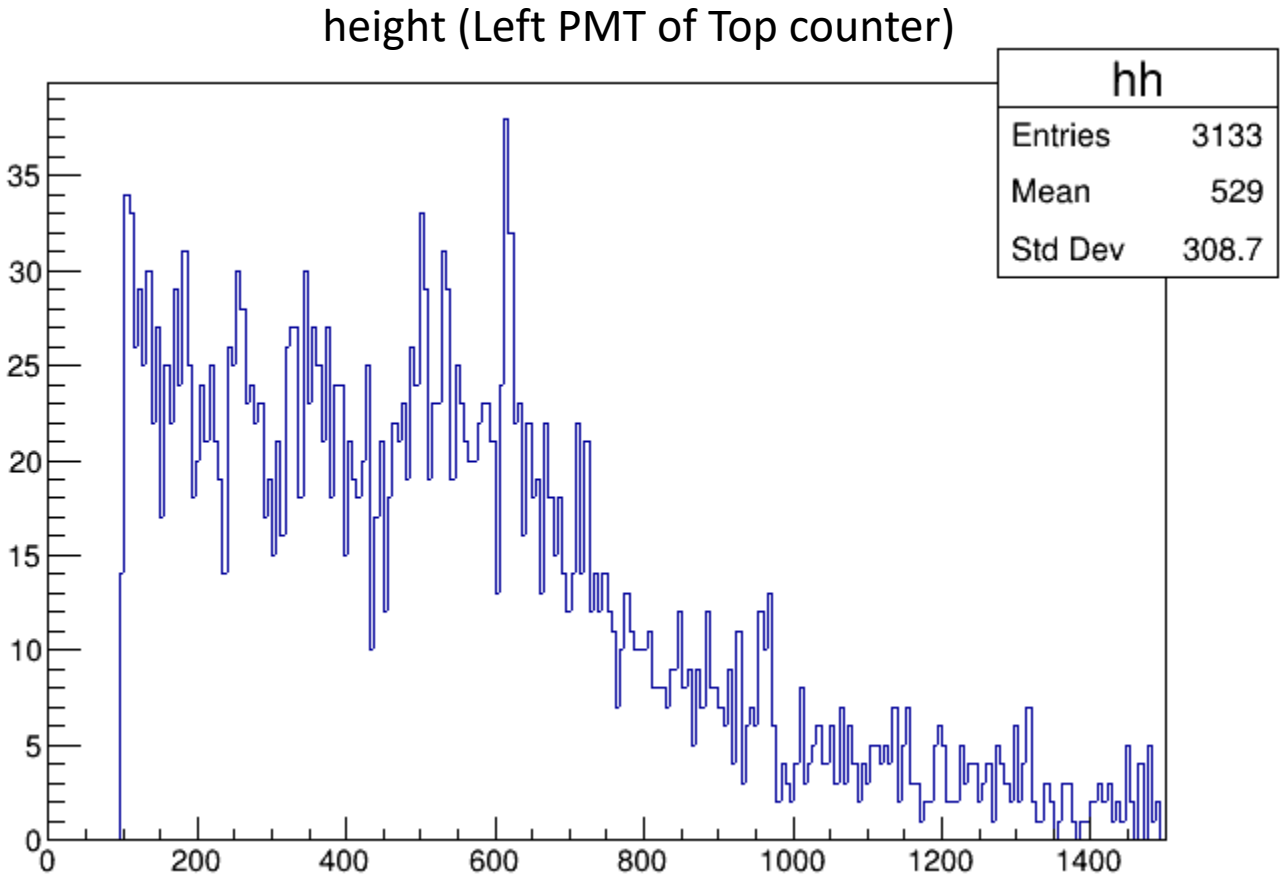


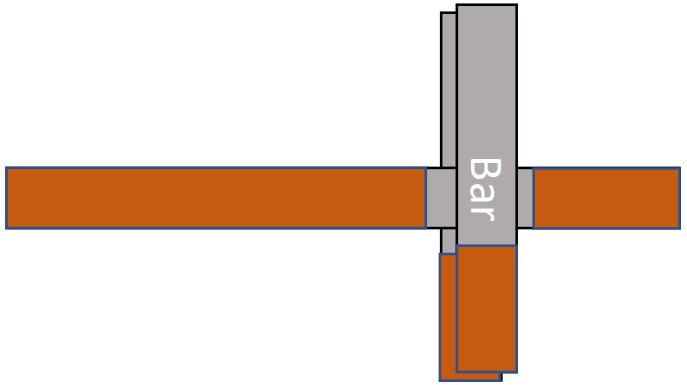
- Position cut, Center Bar
  (Δt0(L-R) : mean±FWHM)

# of events

- R->R : 3384 -> 251
- L->L : 3172 -> 87

Random coincidence





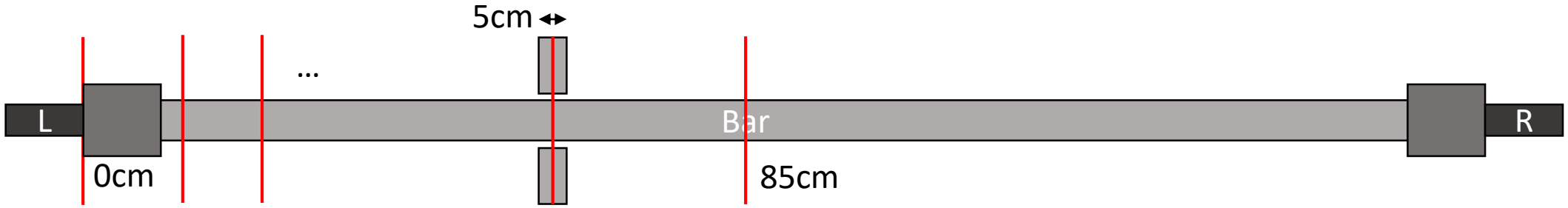
- Random coincidence mostly arise at the low energy level
- 6000 events / 40hours = 0.04 Hz

Single trigger rate (with threshold 100)

- Mid : 25Hz
- Top & Bot : 20Hz (× : 2Hz)
- Coincidence window : 200ns

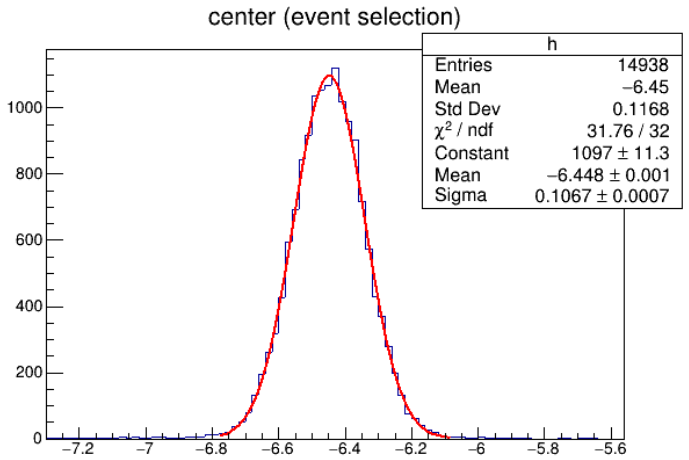
expected trigger rate ~ 10^{-5}

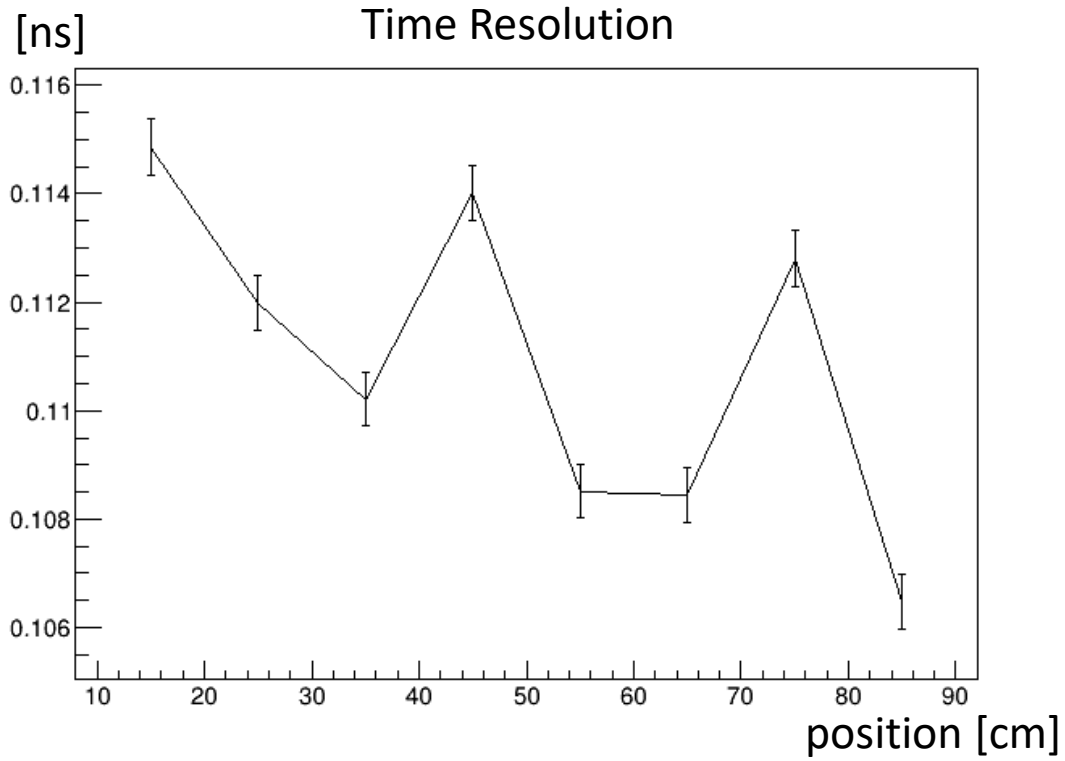
Position dependence



- Data taken from **15cm**(±2.5cm), **25cm**(±2.5cm), …, **85cm**(±2.5cm)
- **5cm**(±2.5cm) data was broken..

Position dependence – Time Resolution





- t0avg(2nd bar) – t0_ref
  - * t0_ref = (t0avg(1st bar)+ t0avg(3rd bar))/2
- Event Selection (1st & 3rd bars) : |dt(L-R) – dt_mean| < FWHM
- Gaussian fitting, 1 Sigma = Time Resolution

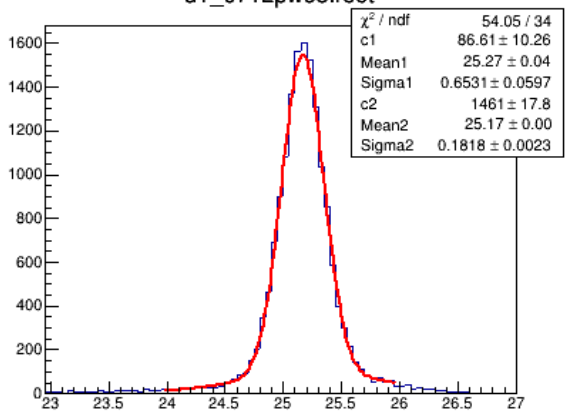
- 106ps (center) ~ 115ps (15cm from the left end) ~8% deviation

Position Dependence – with Externa

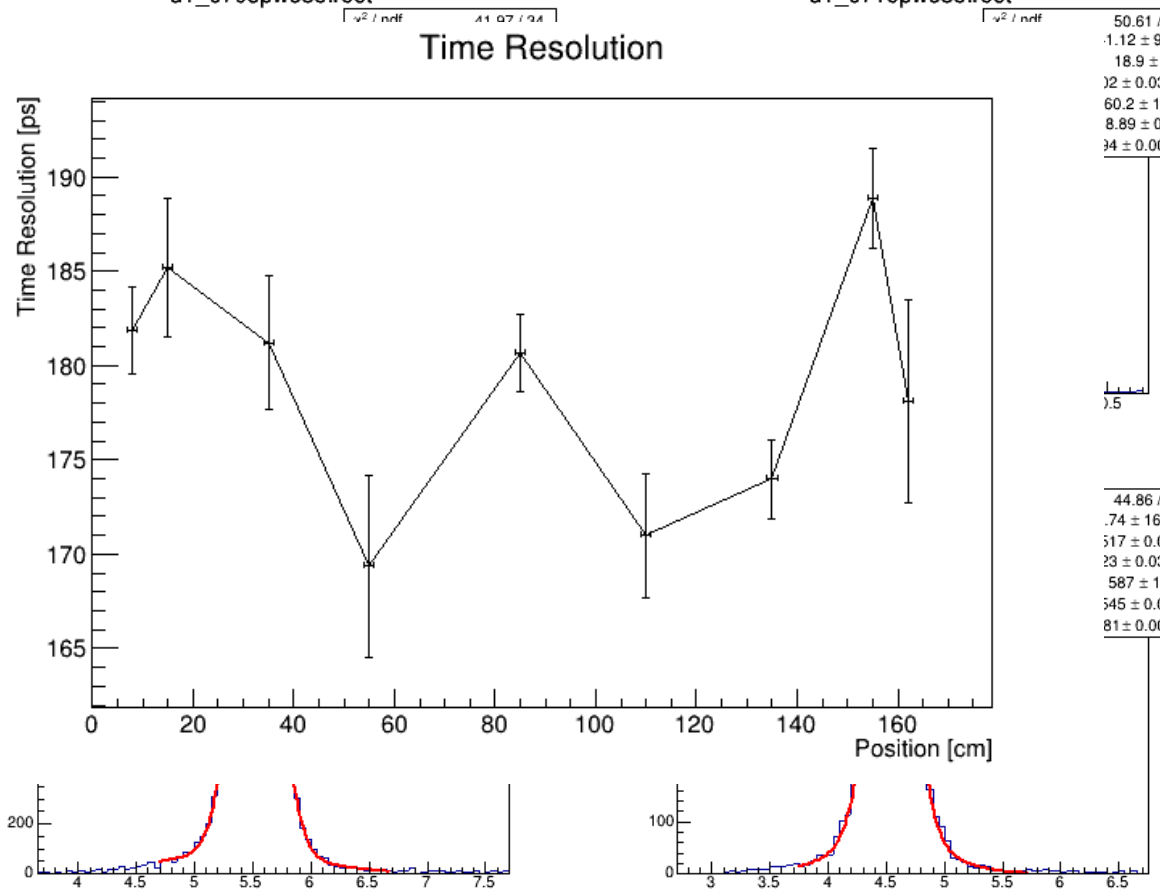
Previous slide

Double Gaussian Fitting

dT_0712pwo8.root

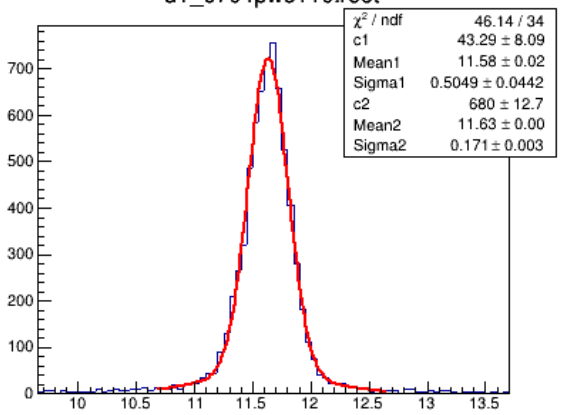


dT_0708pwo35.root

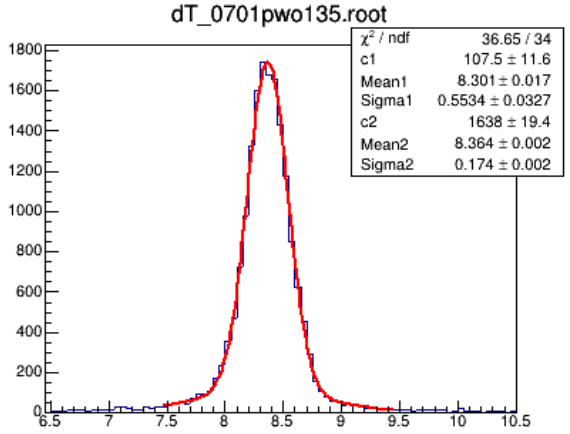


dT_0710pwo55.root

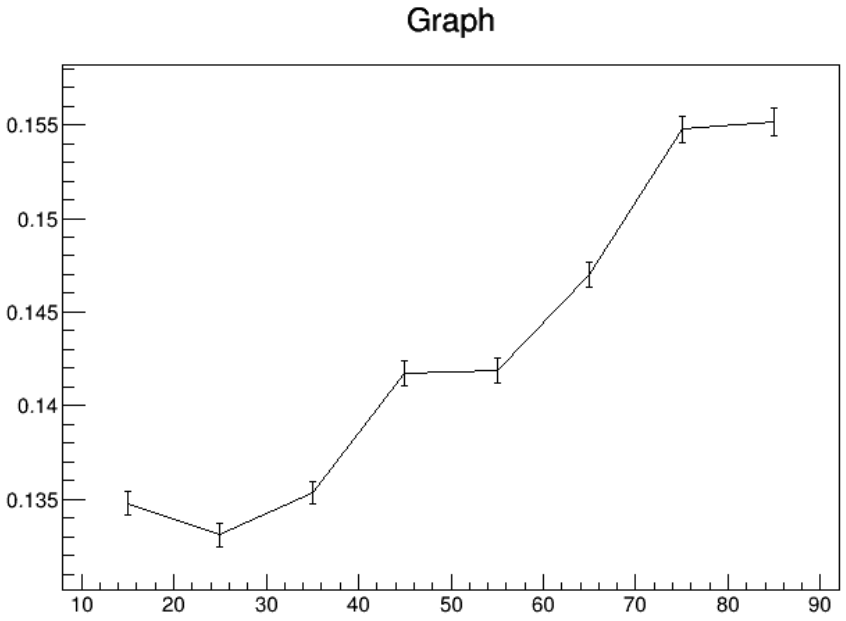
dT_0704pwo110.root

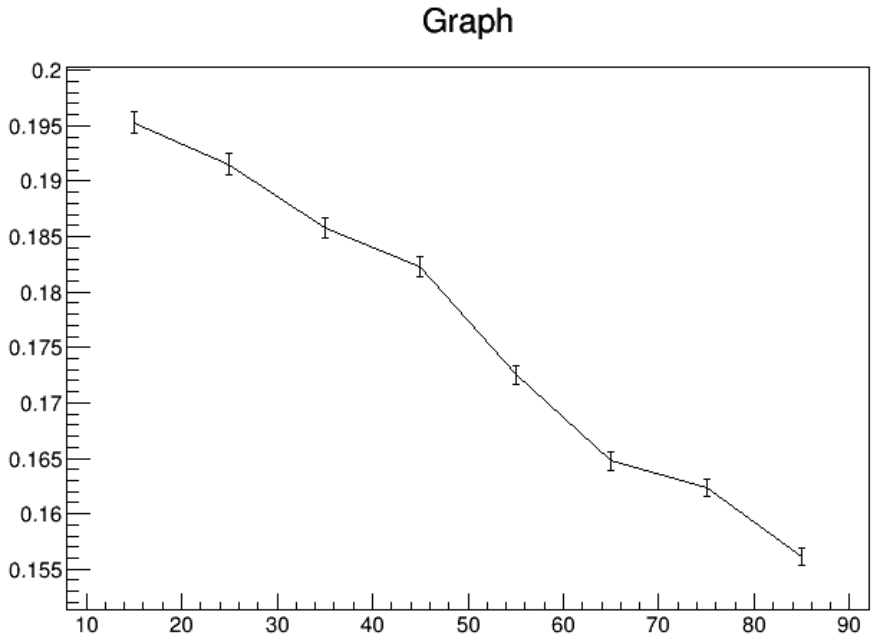


dT_0701pwo135.root



Position dependence – Time Resolution

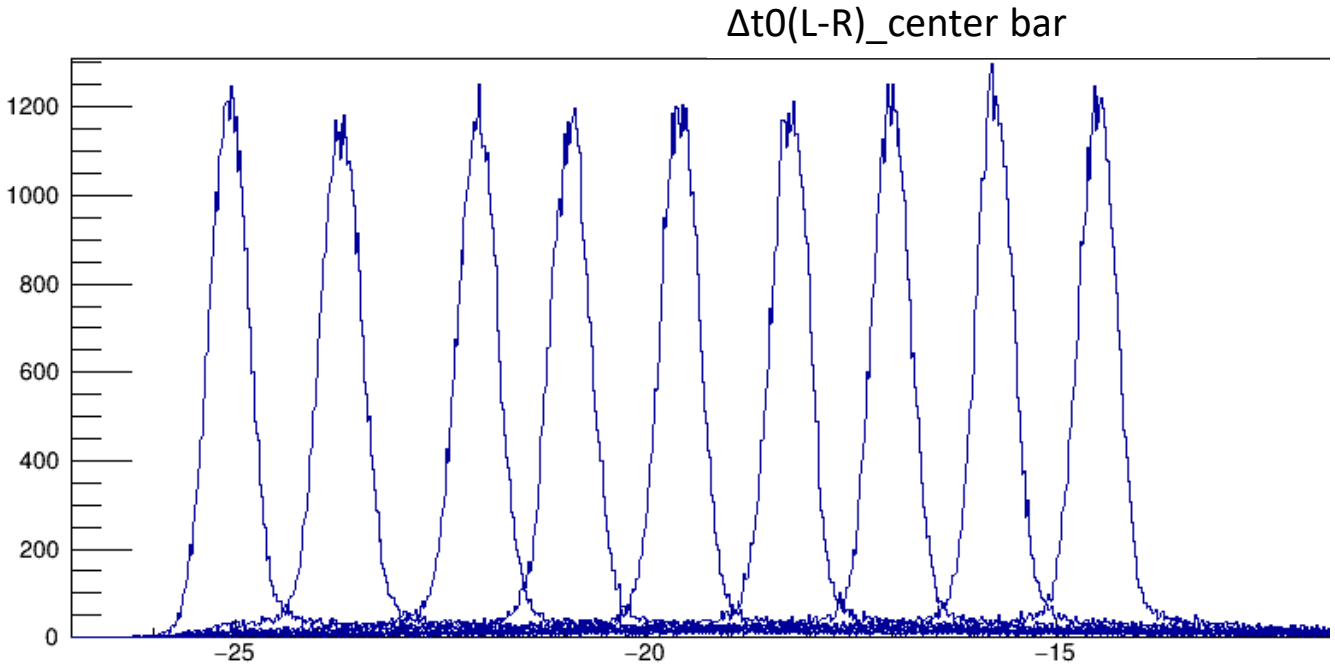


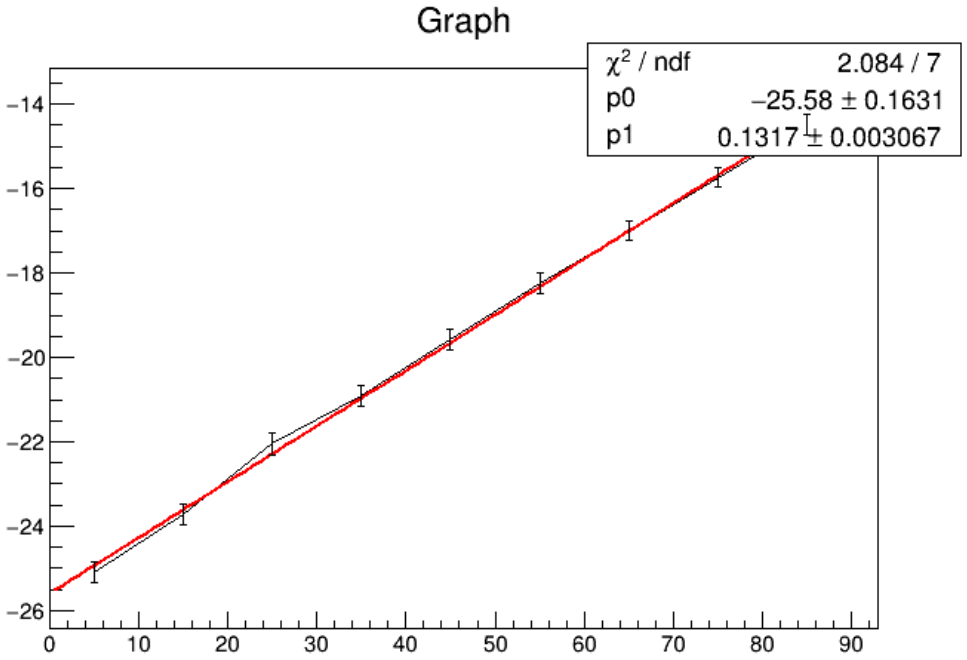


- t0(L or R)(2nd bar) – t0_ref
  - * t0_ref = (t0avg(1st bar)+ t0avg(3rd bar))/2
- Event Selection (1st & 3rd bars) : |dt(L-R) – dt_mean| < FWHM
- Gaussian fitting, 1 Sigma = Time Resolution

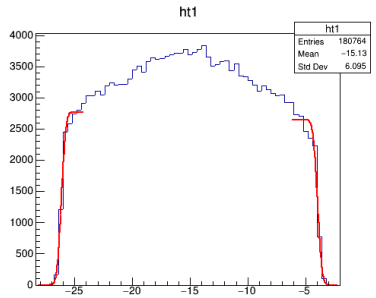
- 133ps (15cm from the PMT) ~ 195ps (155cm from the PMT) ~45% deviation

Position dependence – Light Speed



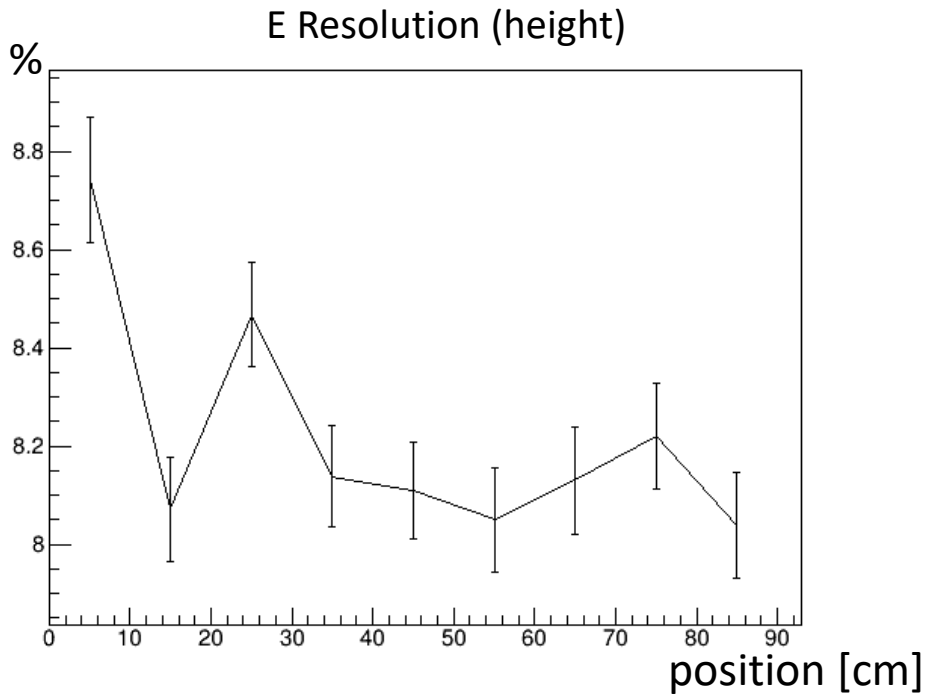


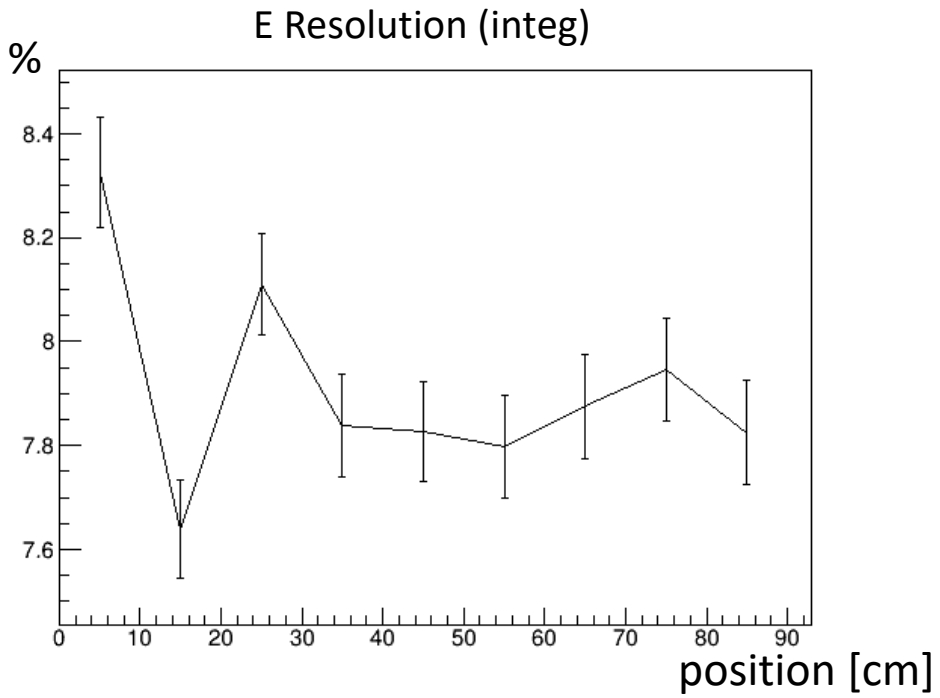
- Δt0(L-R) mean Graph
- Error : Δt0(L-R) sigma (gaussian fitting)



- Light Speed : 15.18 ± 0.35 cm/ns (from the previous method : 15.32 ± 0.01 cm/ns)

Position dependence – Energy Resolution

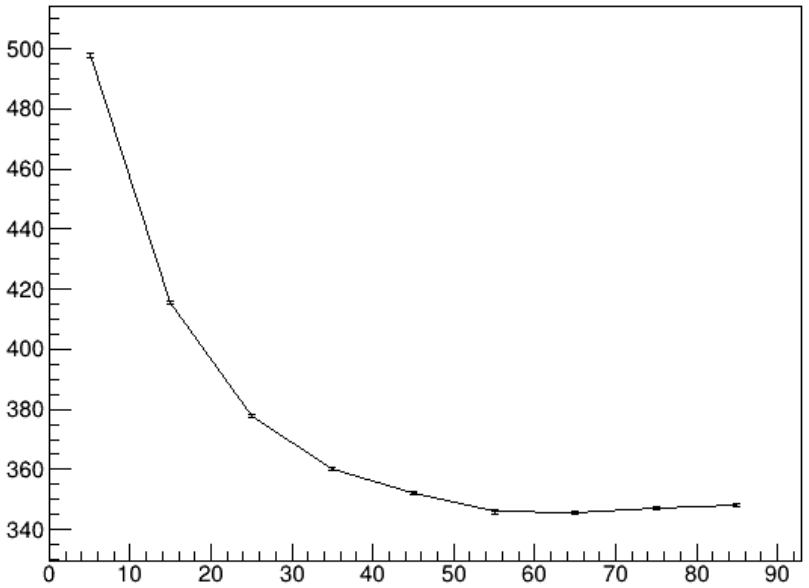




- Energy Resolution = σ / MPV (Landau fitting)

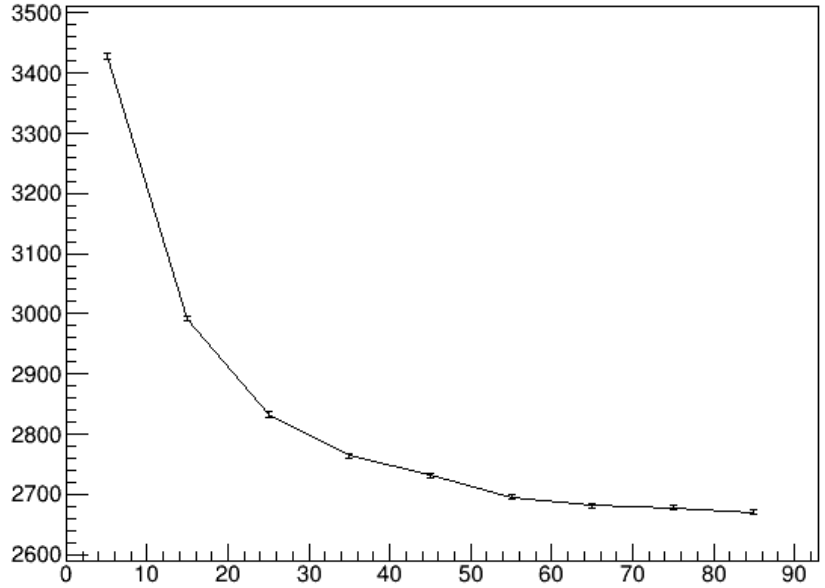
Position dependence – Total Charge

sqrt(height L * height R)



position [cm]

sqrt(integ L * integ R)

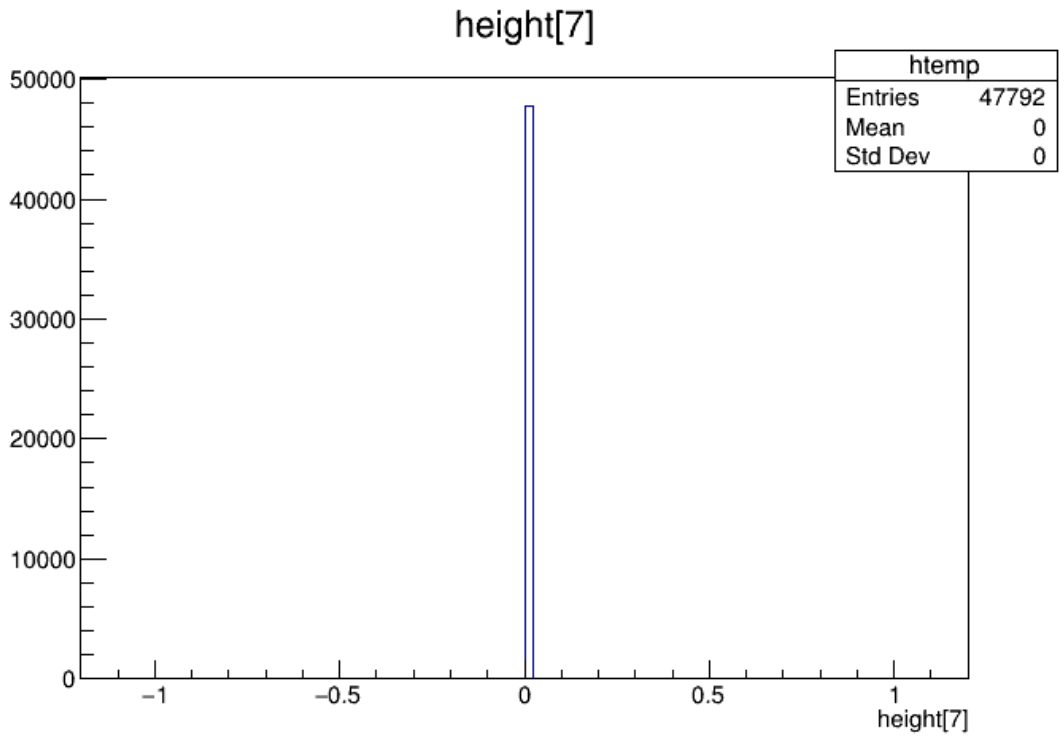


position [cm]

(Maximum – Minimum) ÷ (Maximum)

- height : ~ 0.46
- integ : ~ 0.26

DAQ



5cm data

- channel 3R was broken
- channel 4R sometimes does not record the data