

Event rate for different trigger conditions

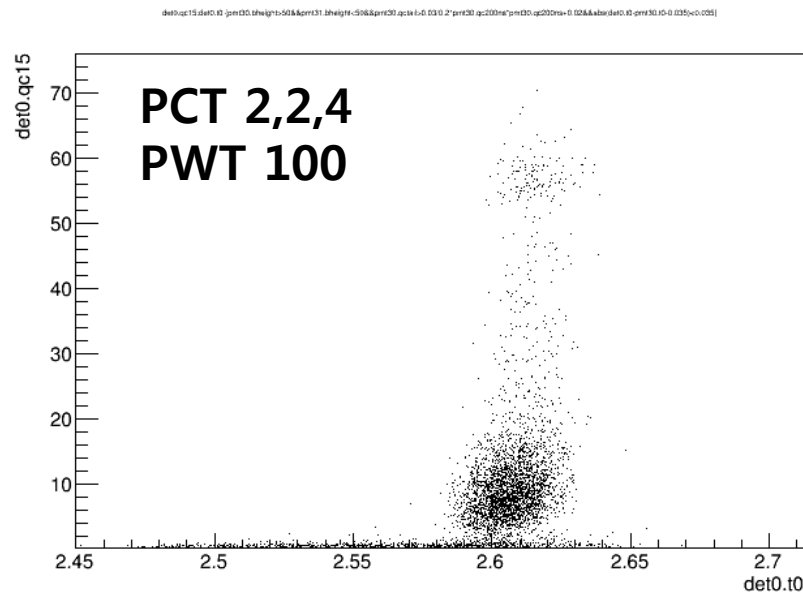
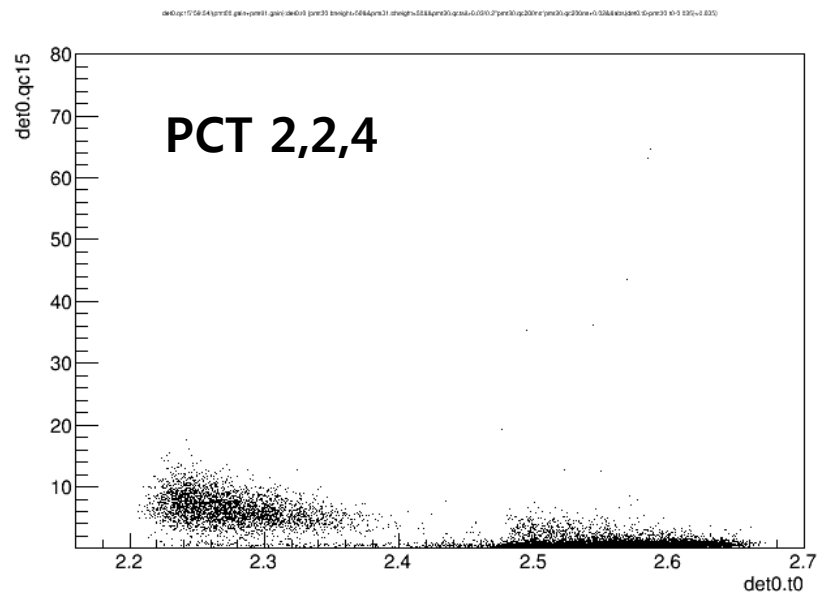
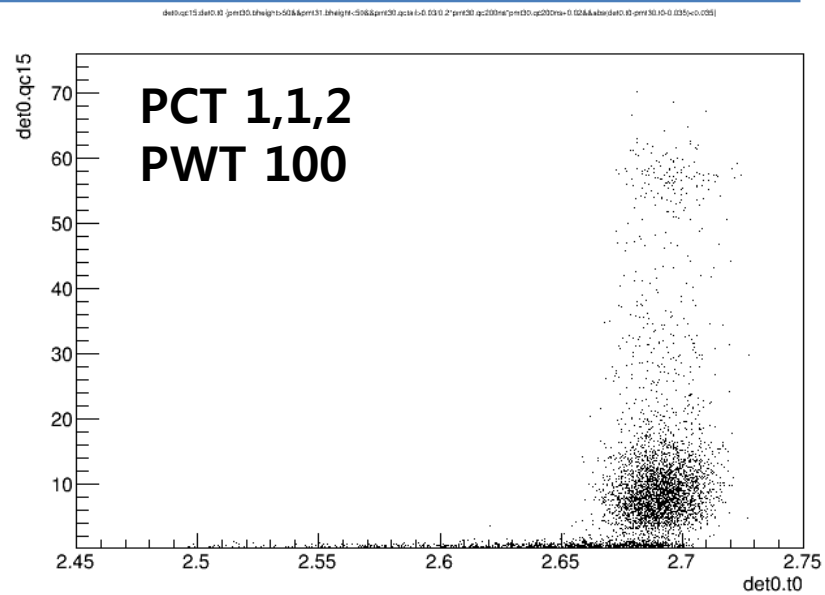
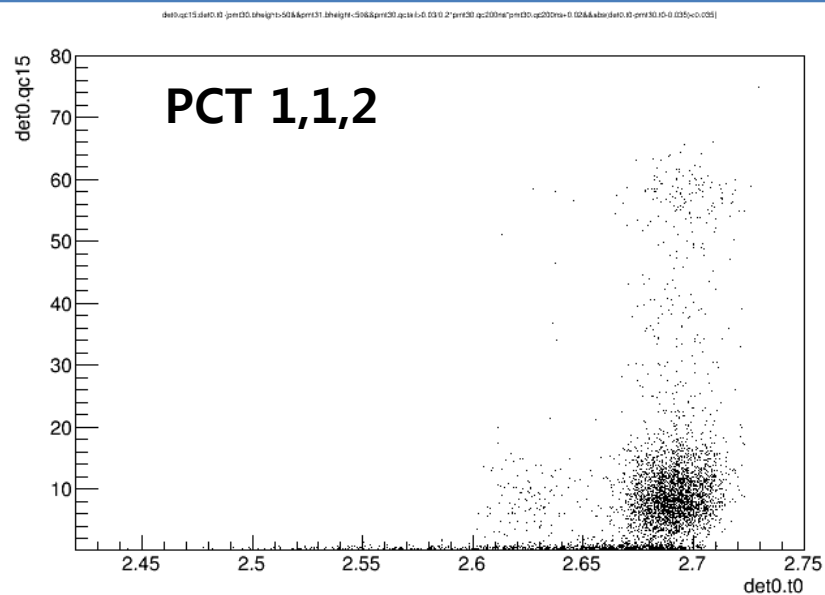
Trigger condition	DAQ rate (Hz)	Coincidence event rate (Hz)
PCT (2,2,4) only	1.48	0.14
PCT (2,2,4) + PWT	3.61	0.57
PCT (1,1,2) only	6.96	0.52
PCT (1,1,2) + PWT	6.56	0.52

PCT : Pulse count threshold

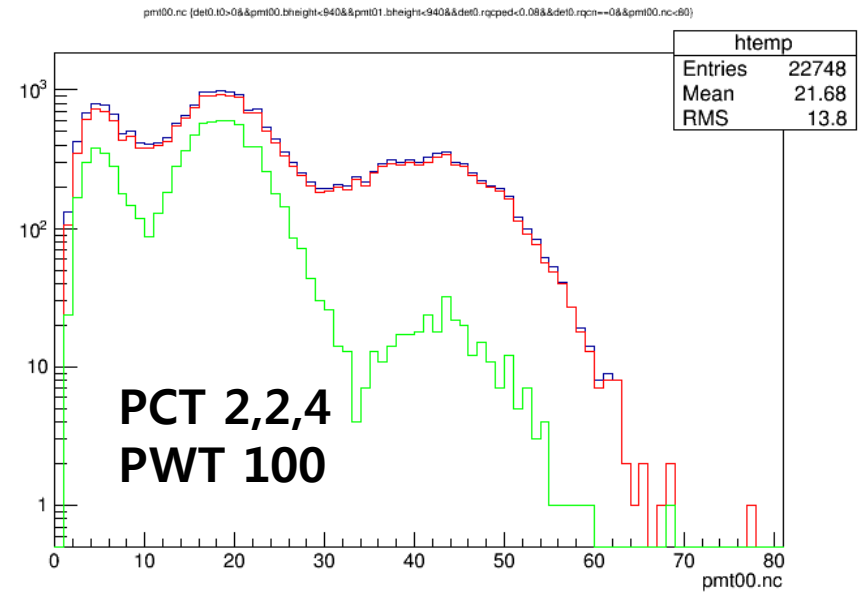
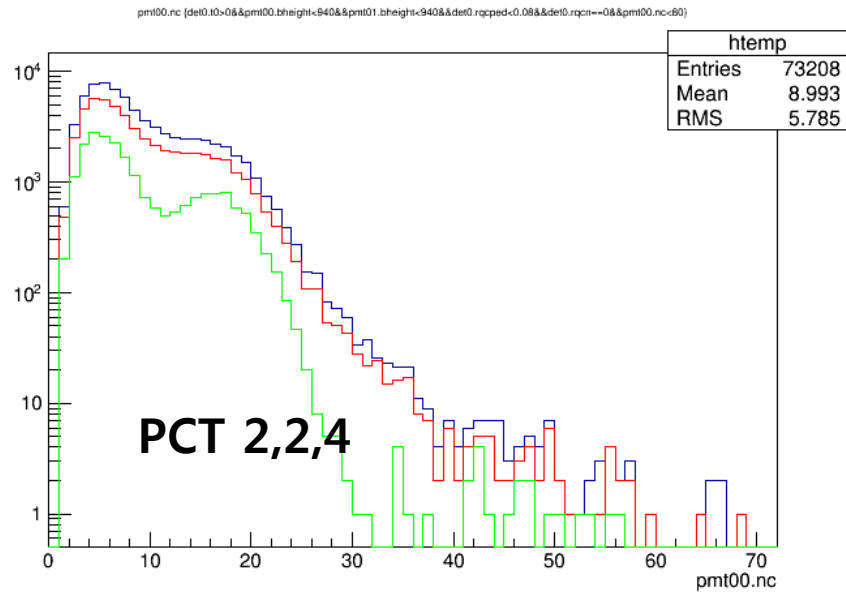
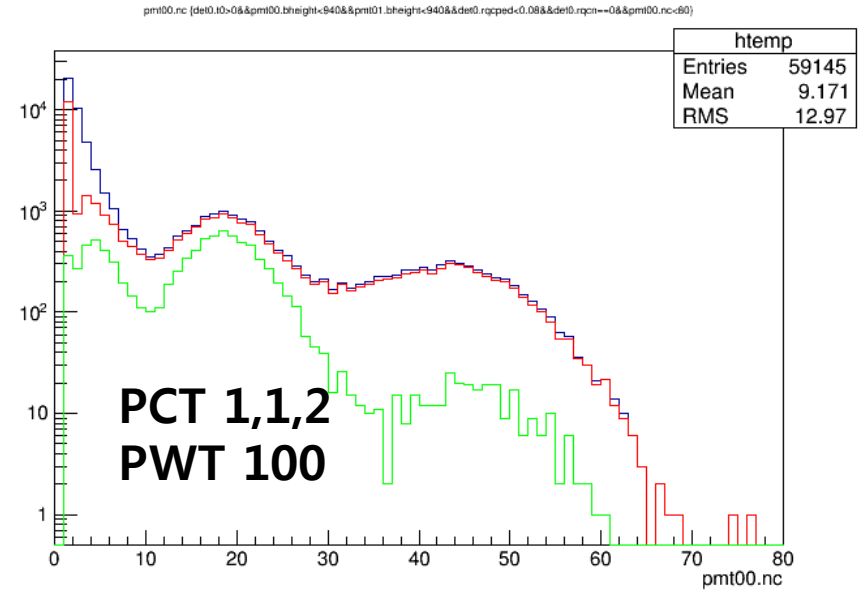
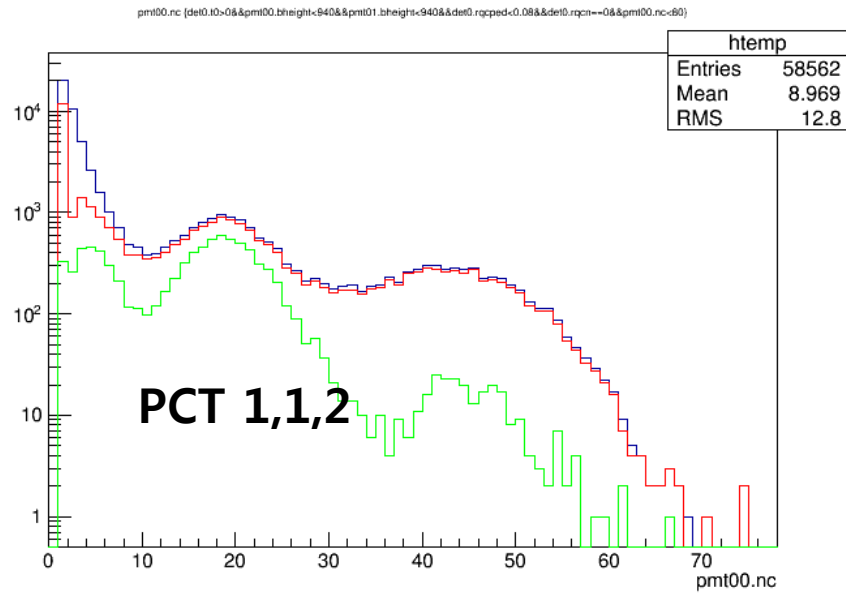
PCI : Interval of pulse count threshold

PWT : Pulse width threshold

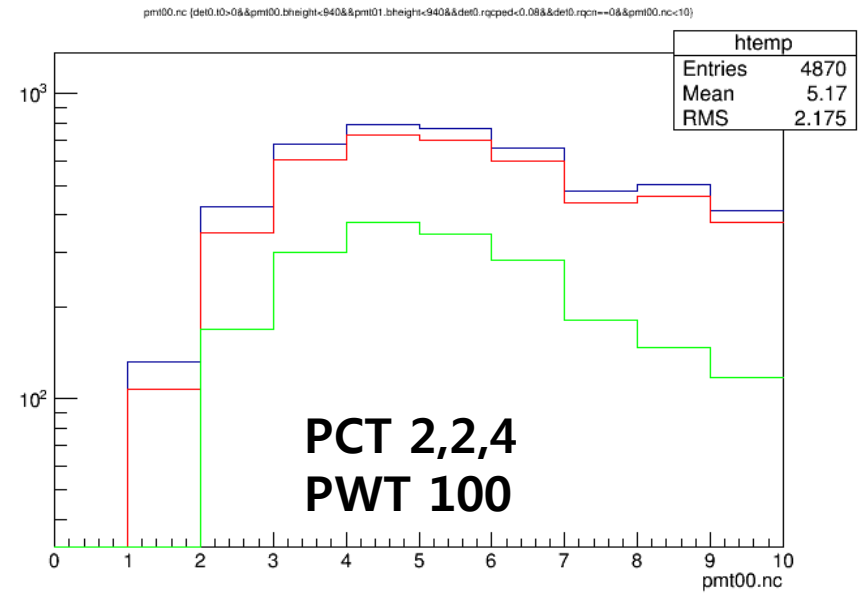
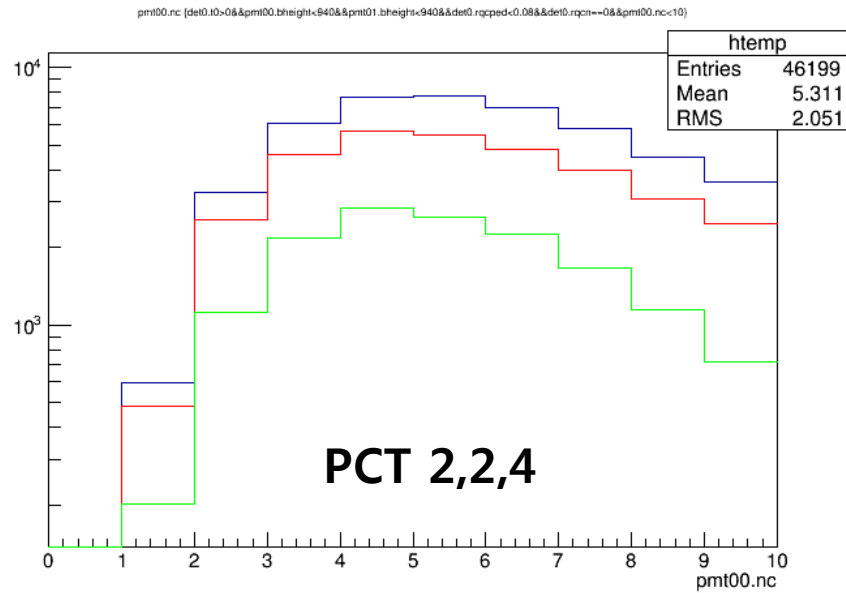
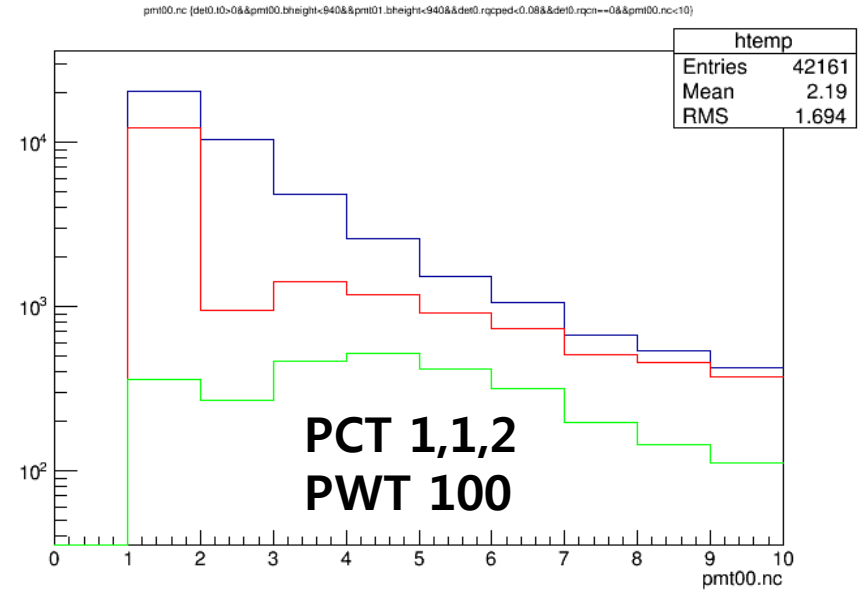
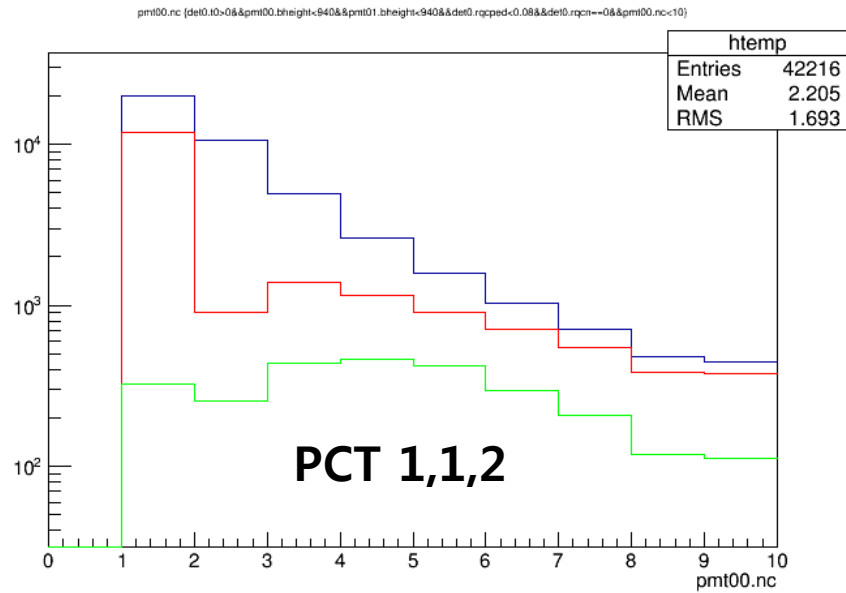
NaI deposit energy vs t0



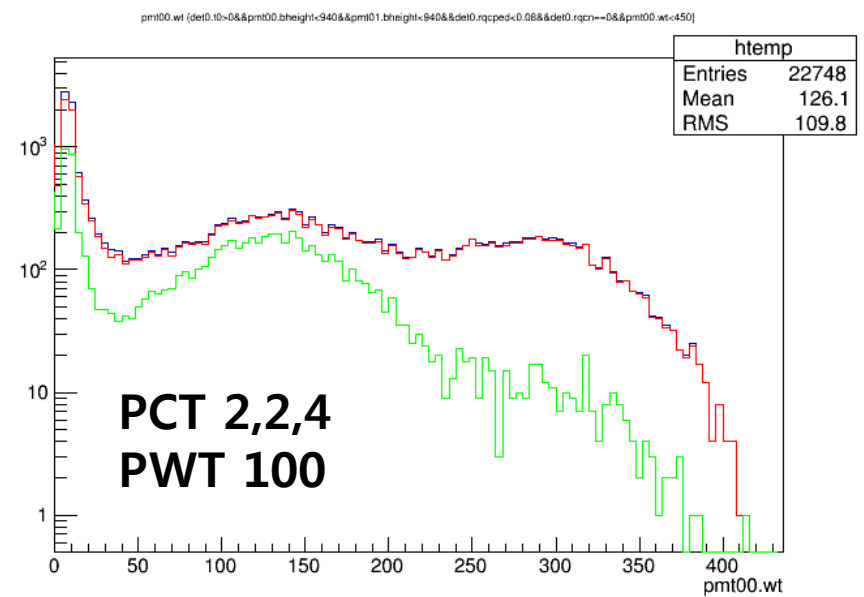
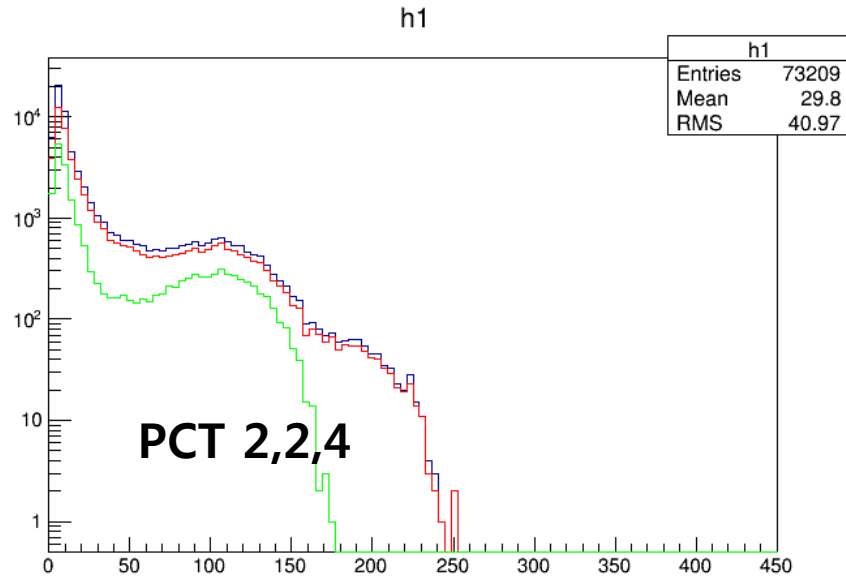
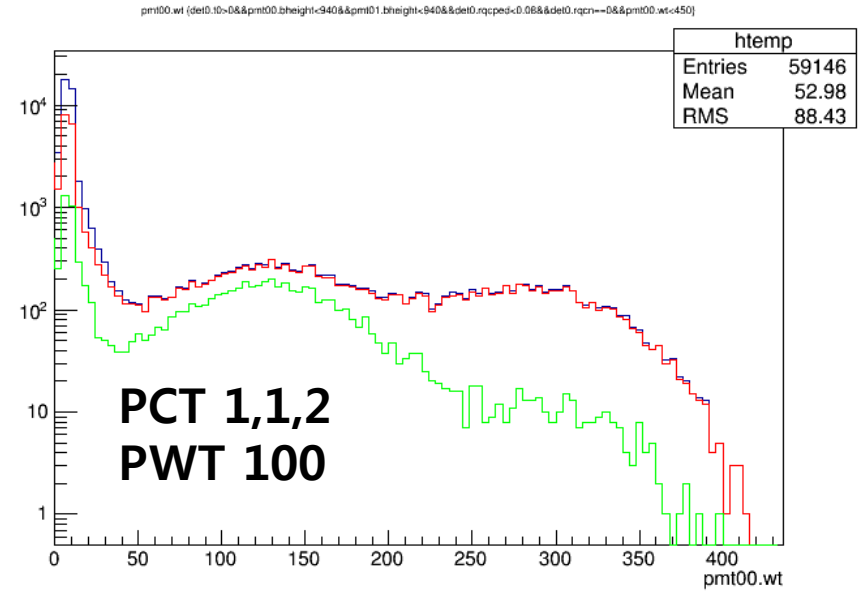
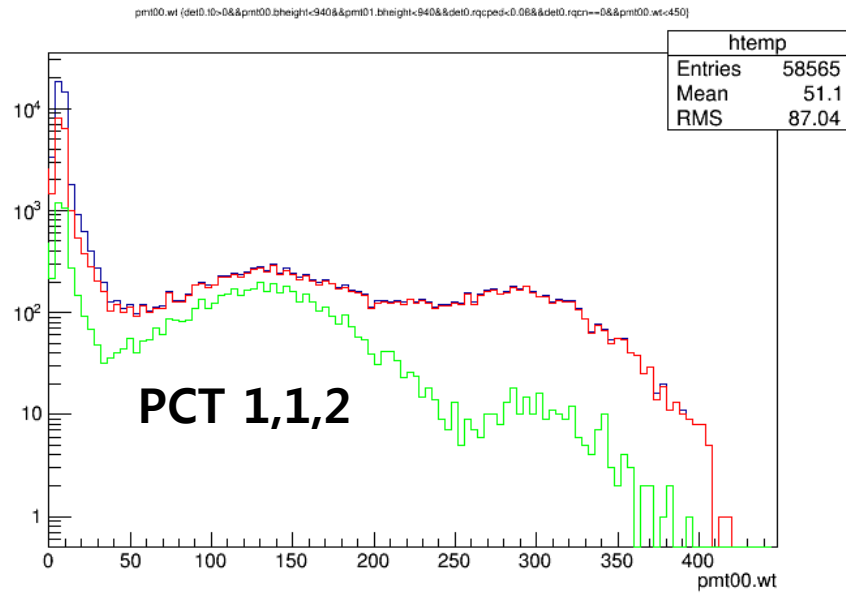
Number of clusters



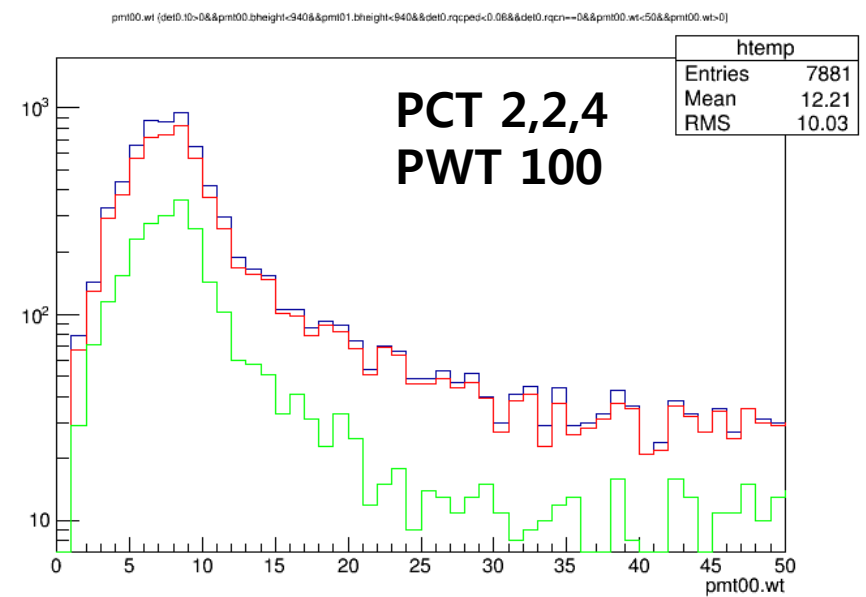
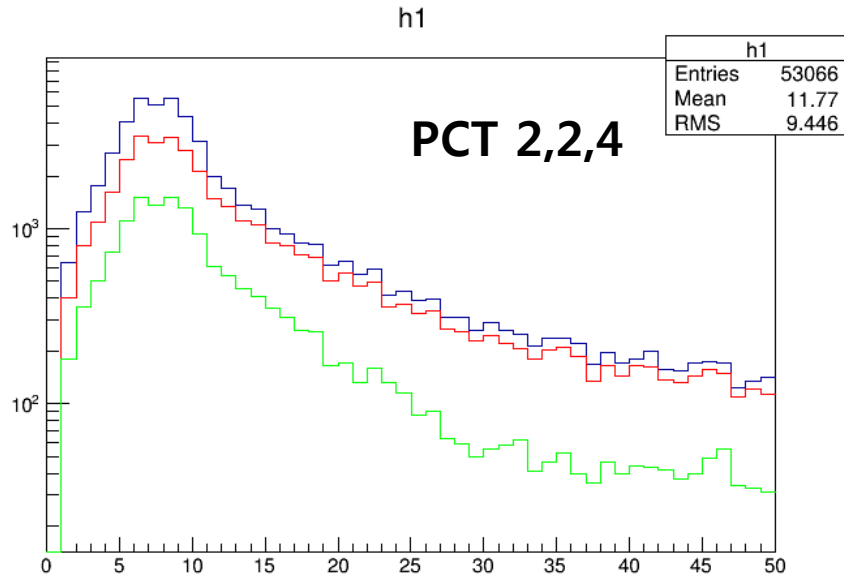
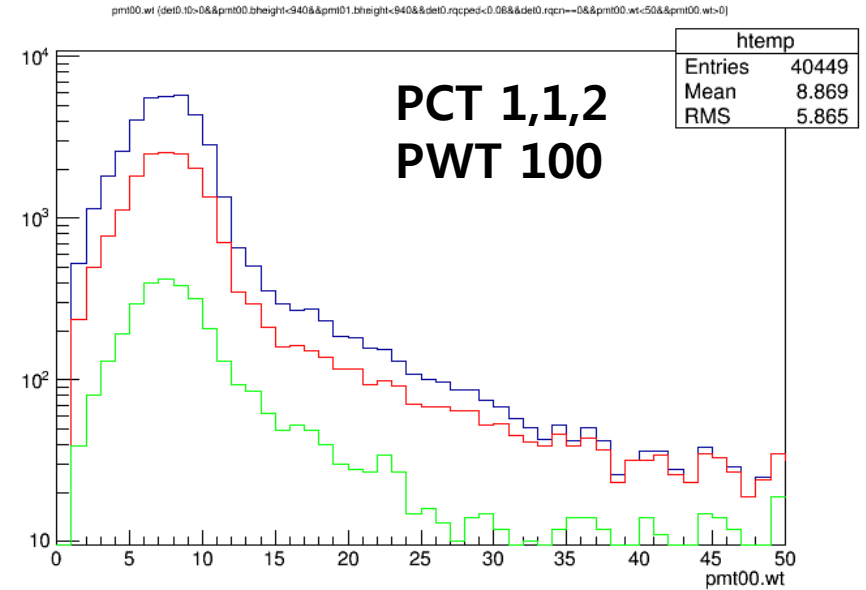
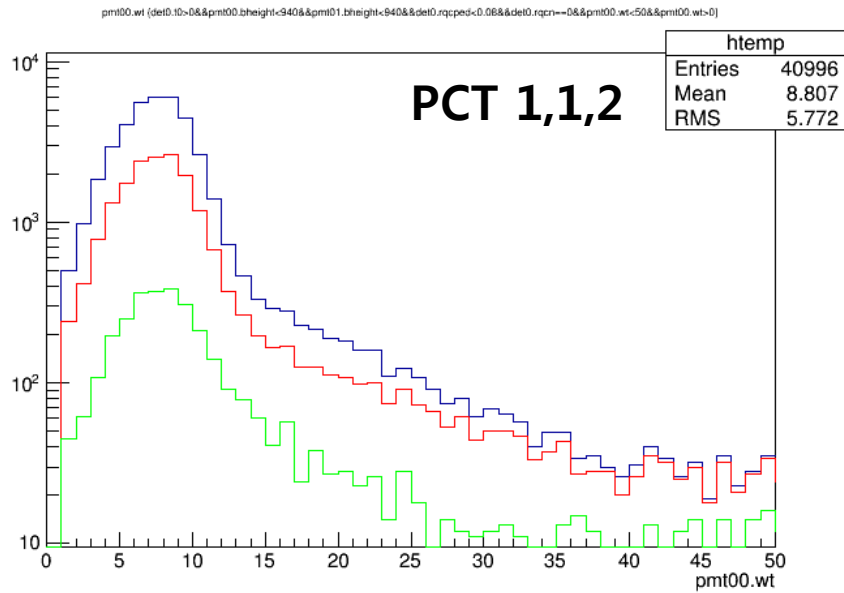
Number of clusters (zoomed in X axis)



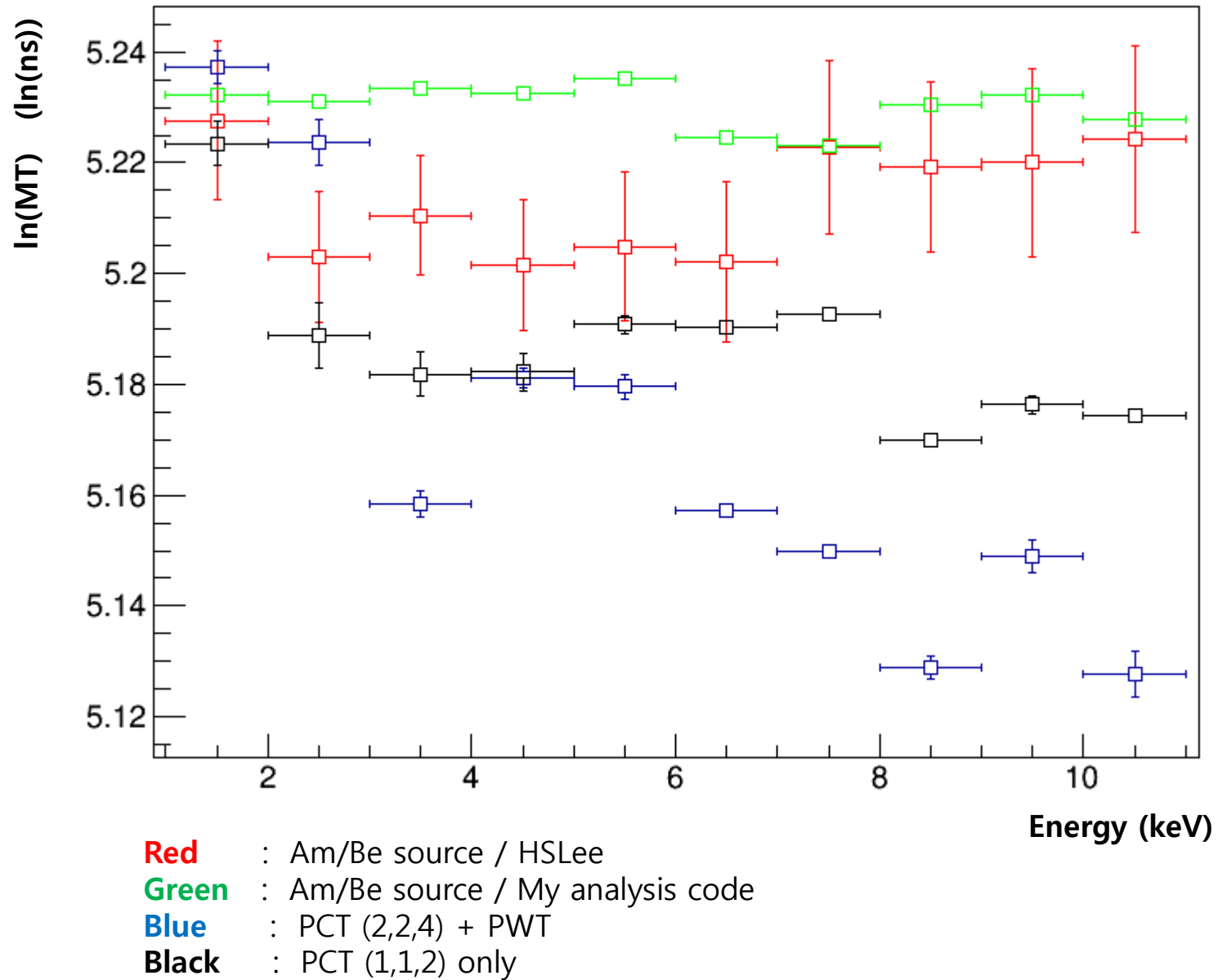
Pulse width over threshold



Pulse width over threshold (zoomed in X axis)

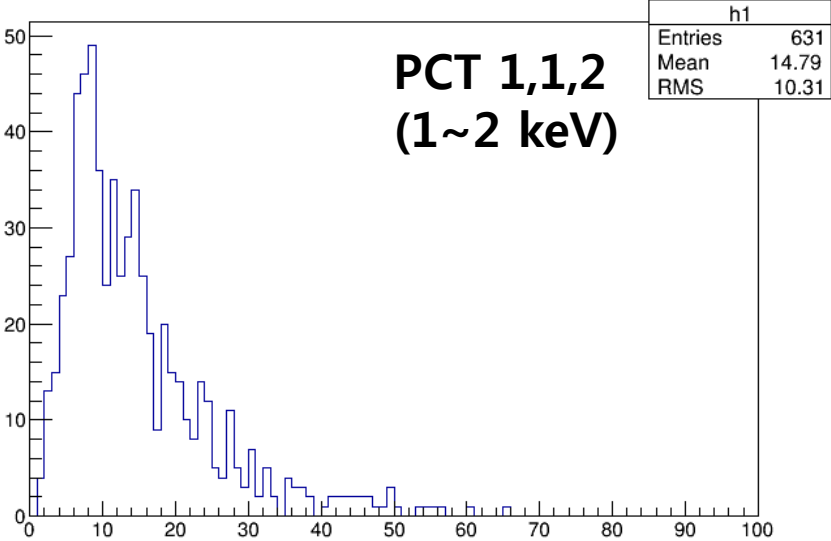


ln(MT)

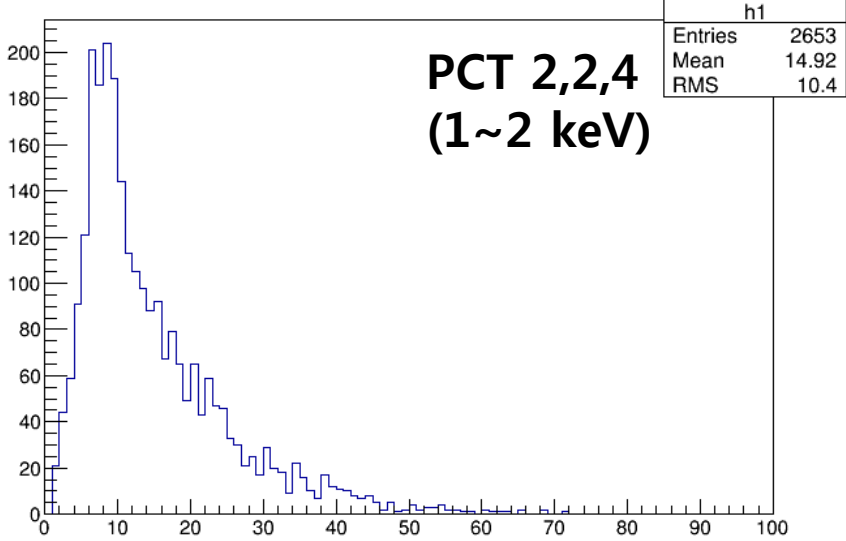


Pulse width over threshold per keV

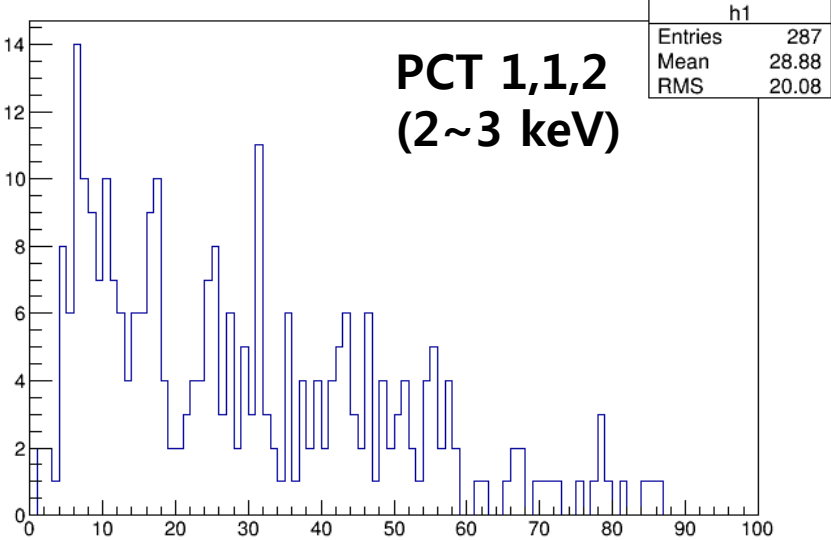
h1



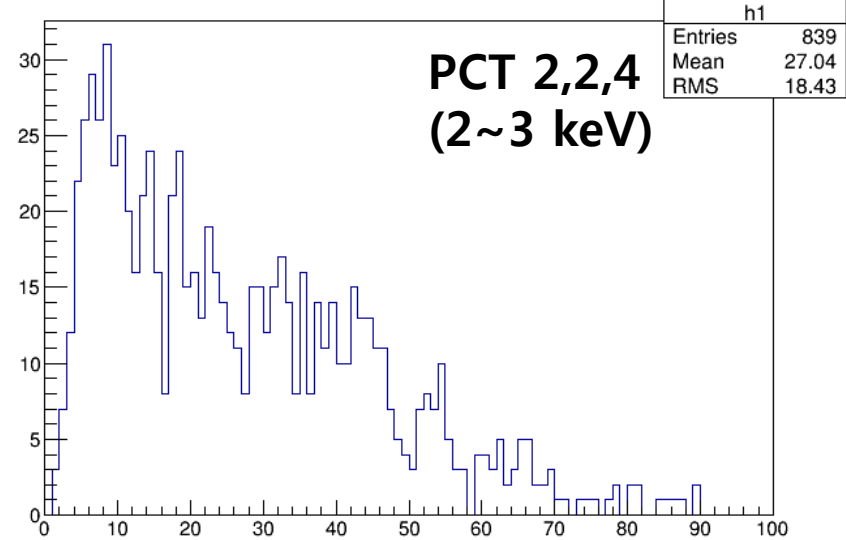
h1



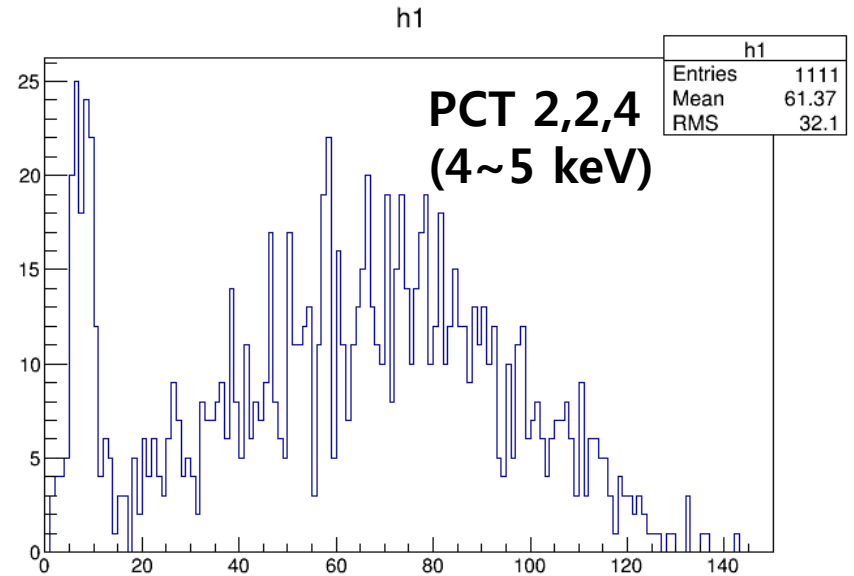
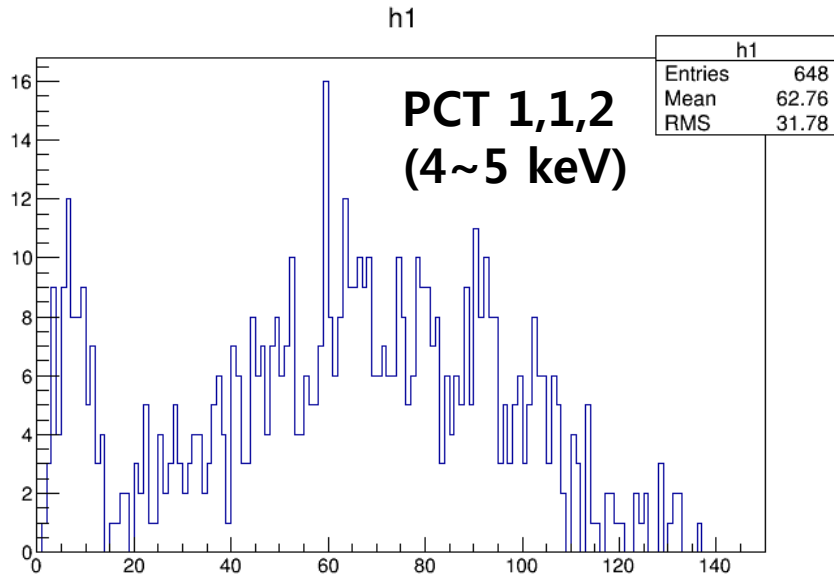
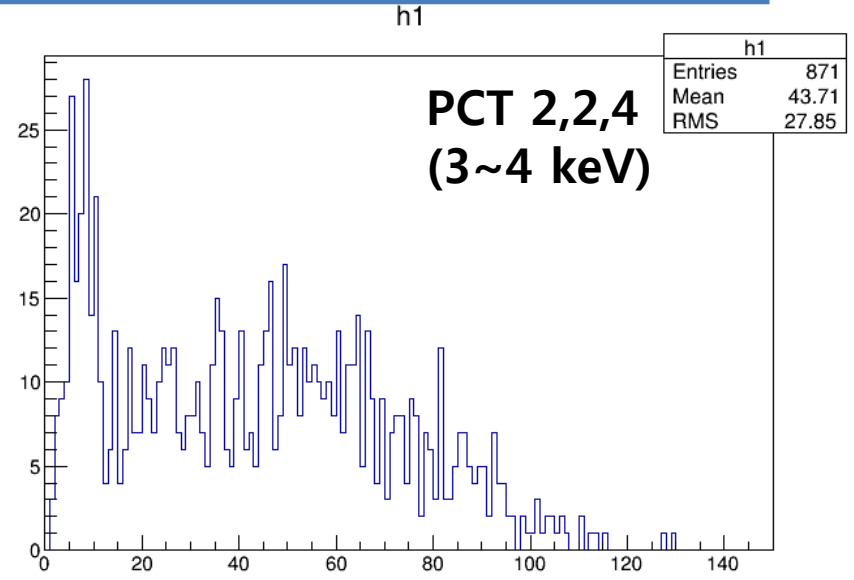
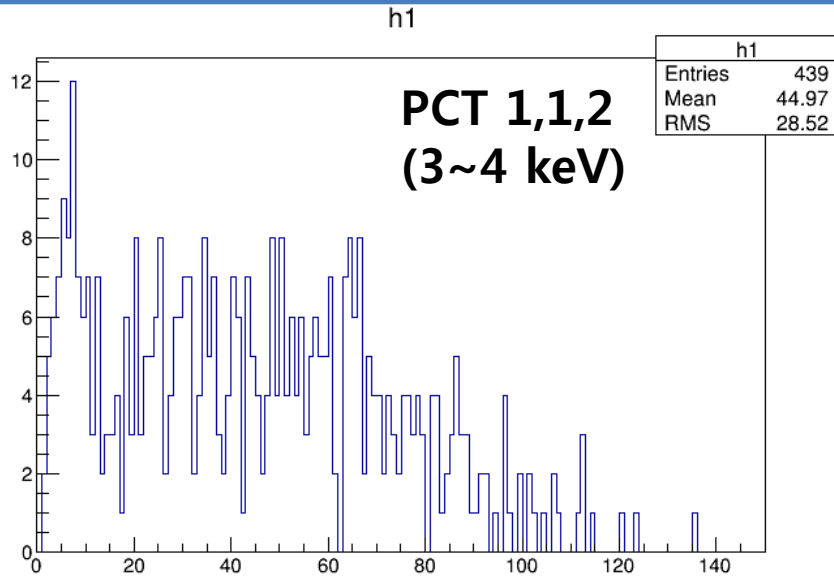
h1



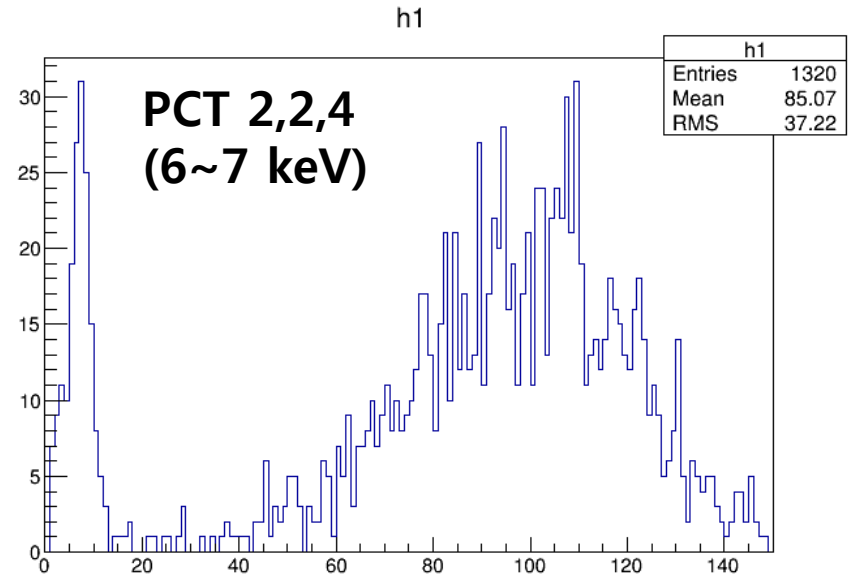
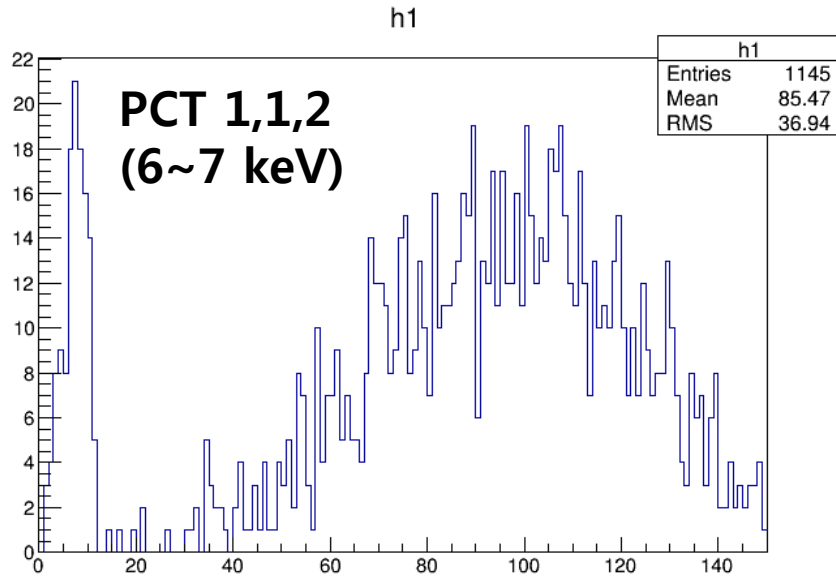
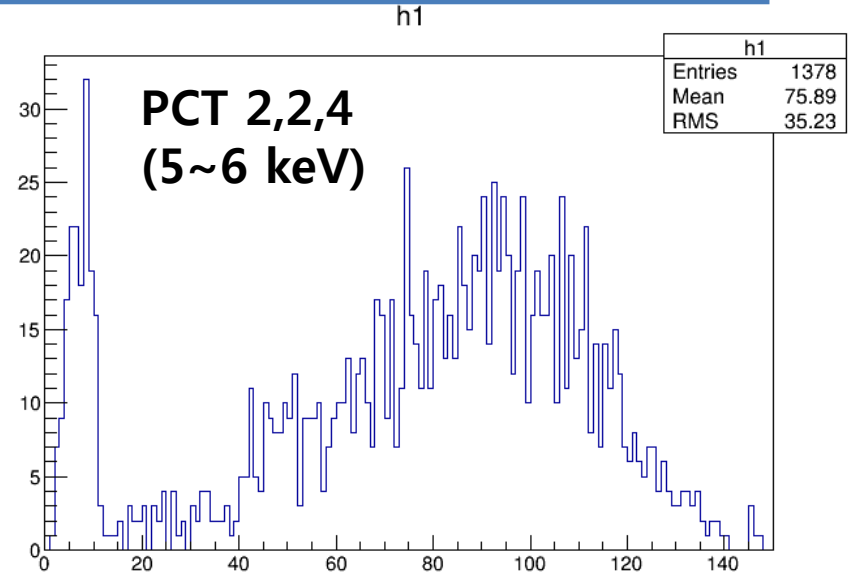
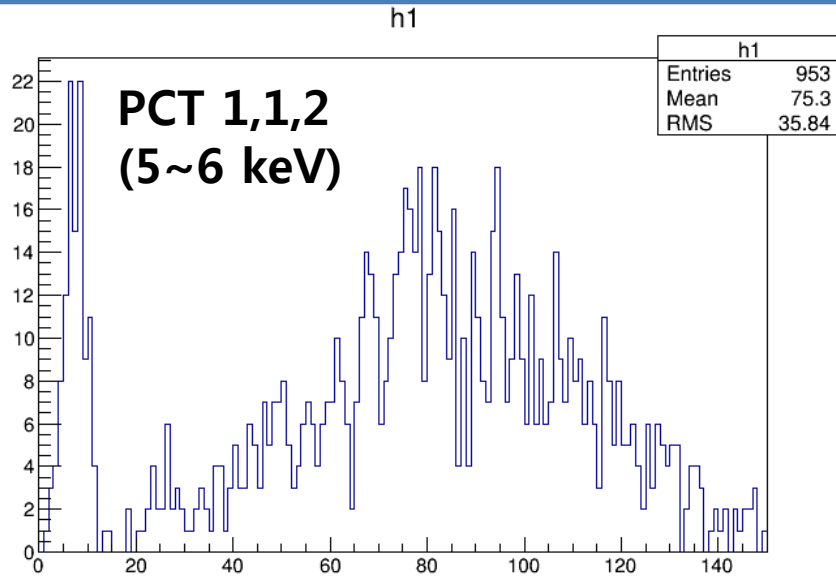
h1



Pulse width over threshold per keV

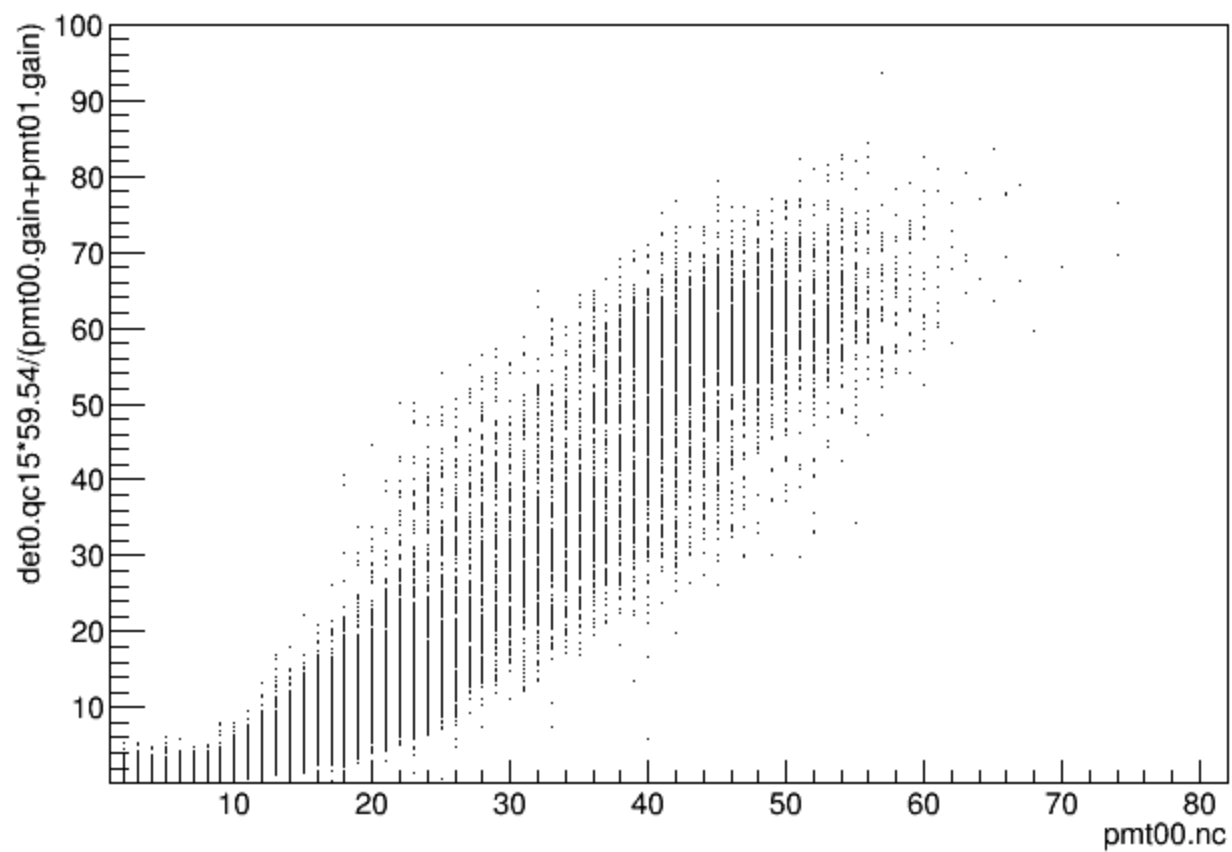


Pulse width over threshold per keV

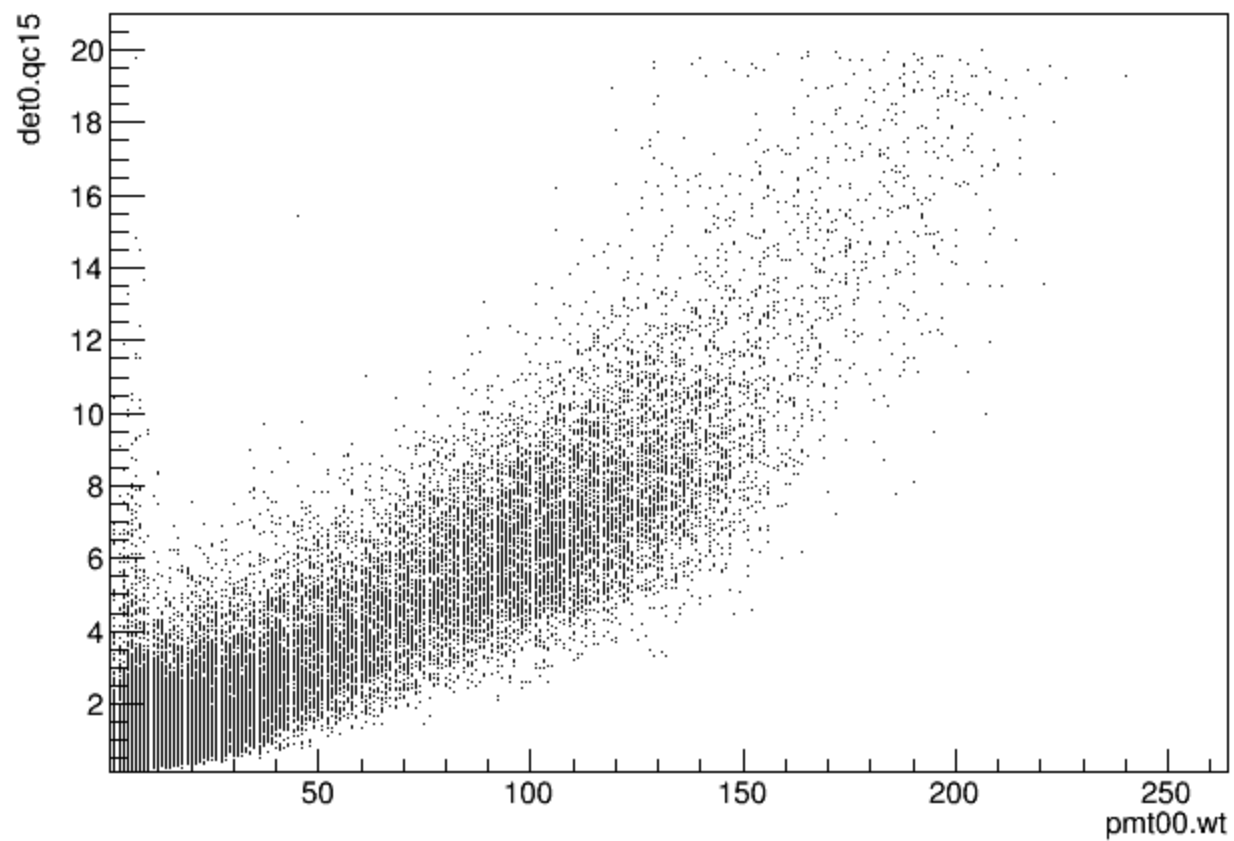


Backup Slides

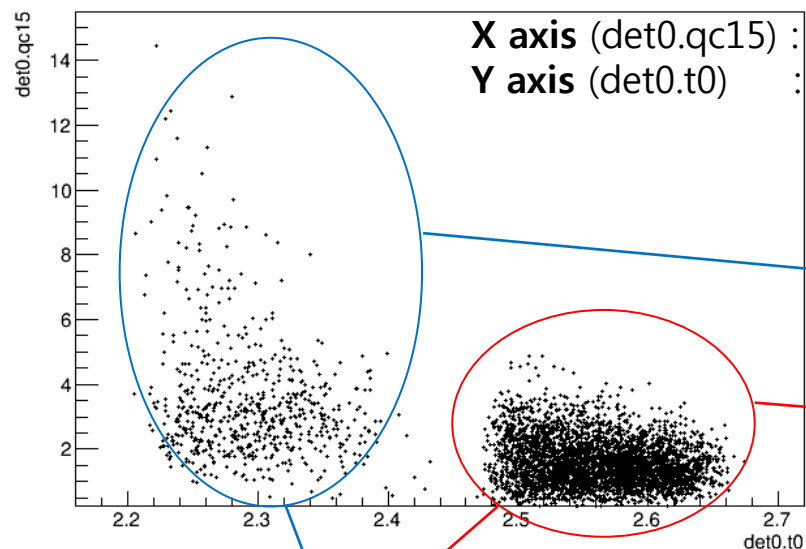
det0.qc15*59.54/(pmt00.gain+pmt01.gain)pmt00.nc | det0.xc0.18&det0.qcnc=-0&&det0.roppedc0.0&&pmt00.bheightc940&&pmt01.bheightc940&&pmt00.nc<80



det0.qc15:pmt00.wt {det0.qc15<20&&pmt00.wt>0}

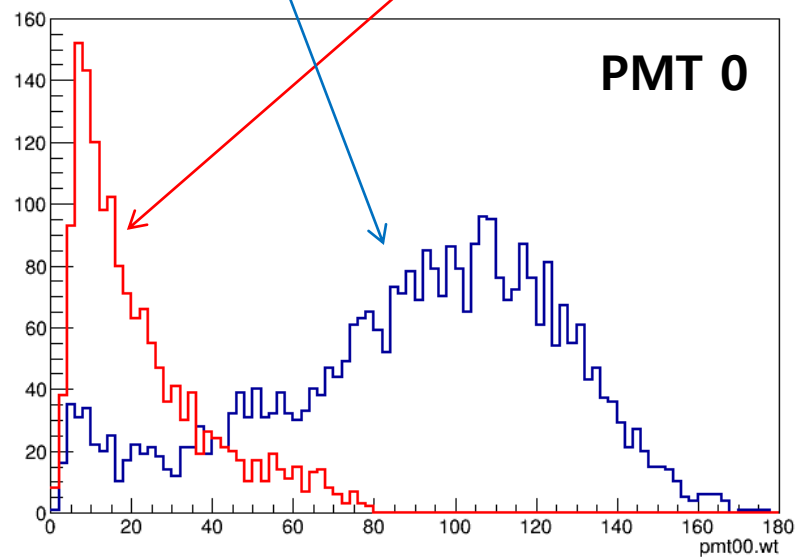
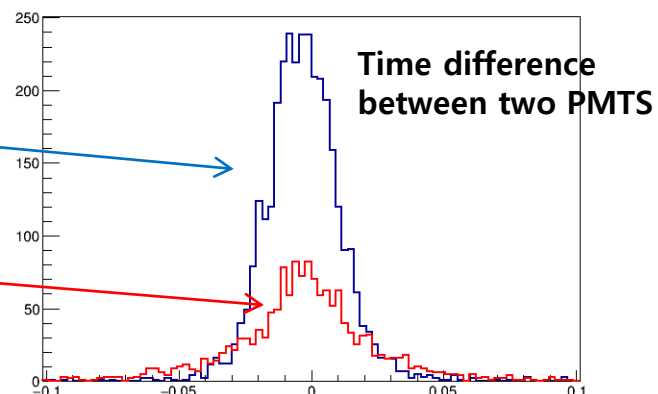


NaI deposit energy vs det0.t0 & pulse width

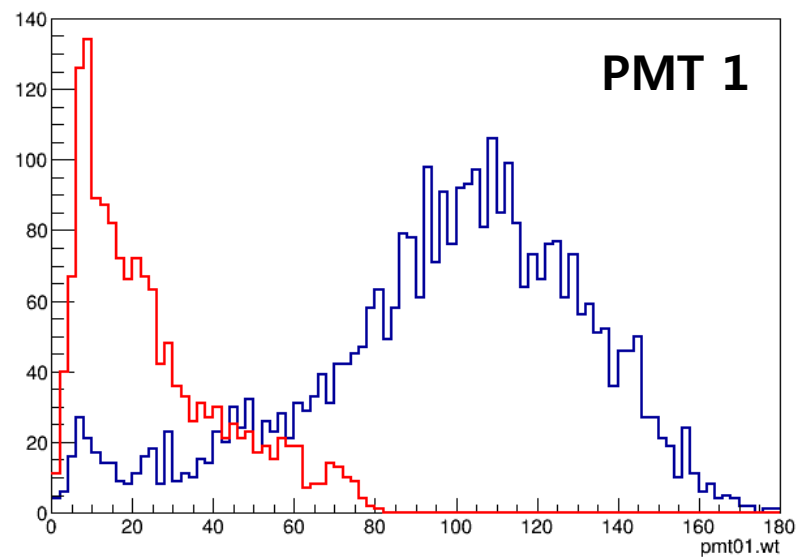


X axis (det0.qc15) : deposit energy on NaI within 1.5 μ s (keV)

Y axis (det0.t0) : mean time of 1st cluster of NaI signal



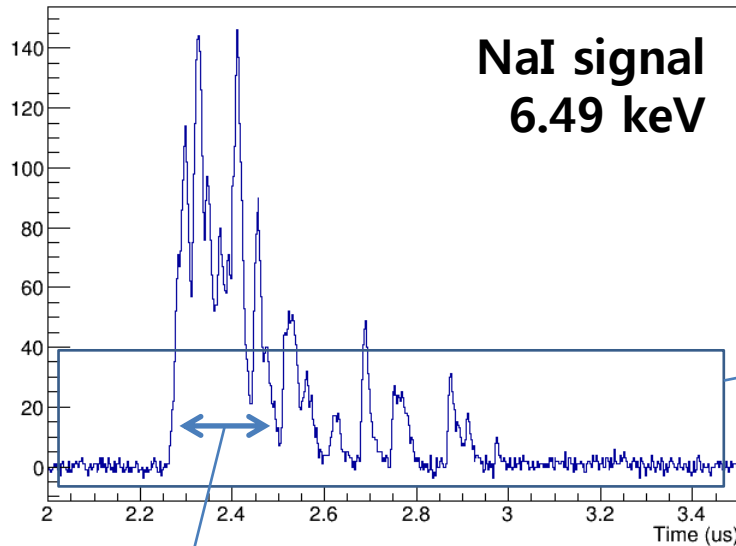
PMT 0



PMT 1

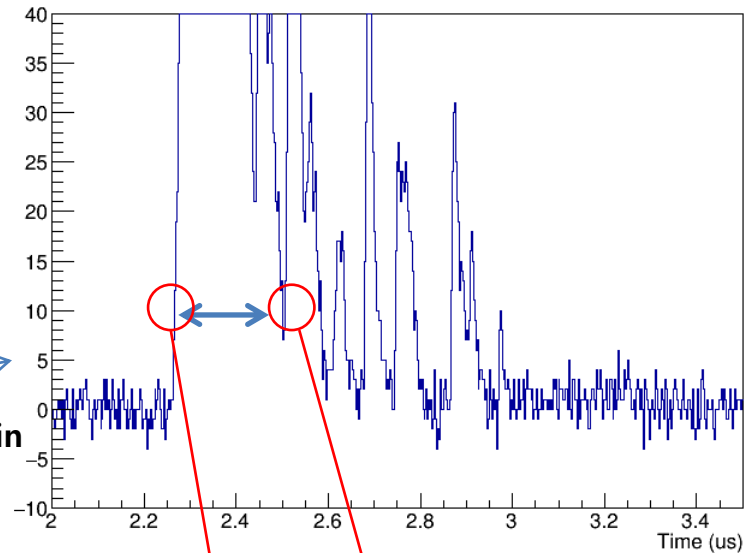
pmt.wt : Pulse width over threshold level (1 ch = 2.5 ns)

Pulse width over threshold



Pulse width over threshold
(threshold : 10 mV)

Zoom in



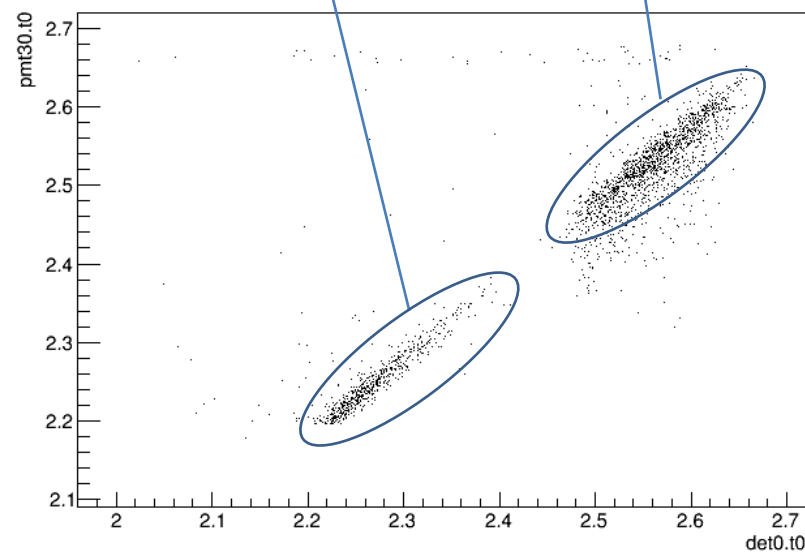
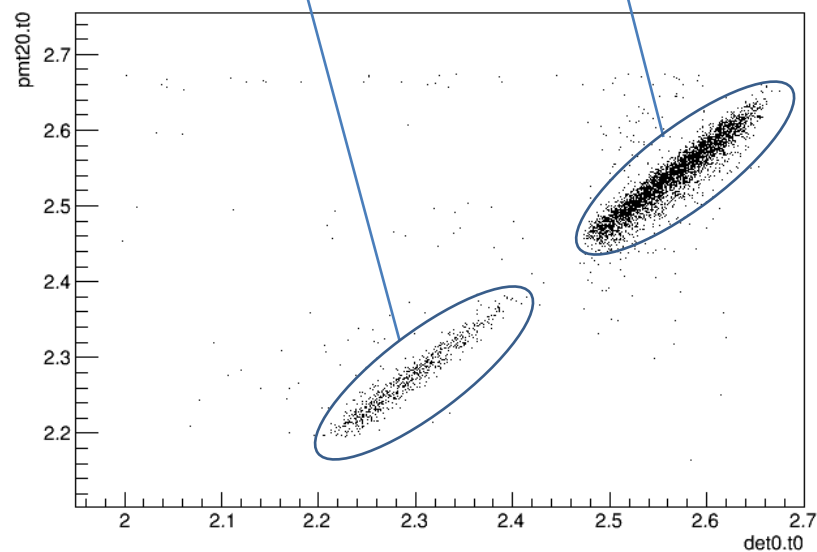
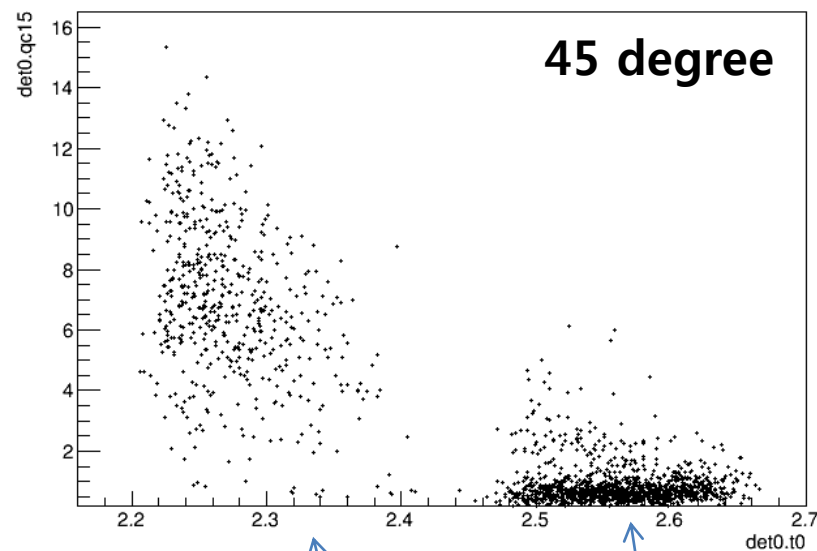
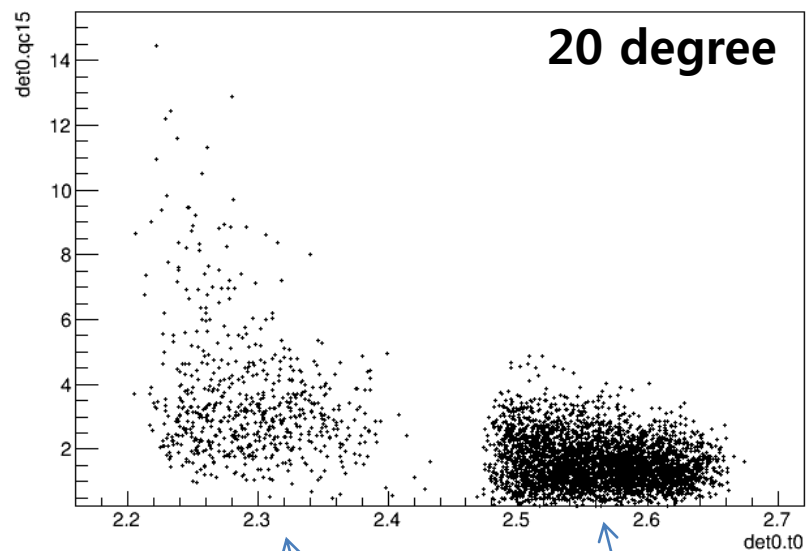
Second cluster is counted

First cluster is counted

Pulse is counted in FADC
whenever the pulse rising edge passes
the discriminator threshold level.

***Current Pulse count trigger in FADC**
: 2 or more pulses in each PMT in 200 ns
4 or more pulses in sum of PMTs in 400 ns

NaI deposit energy or ND.t0 vs det0.t0

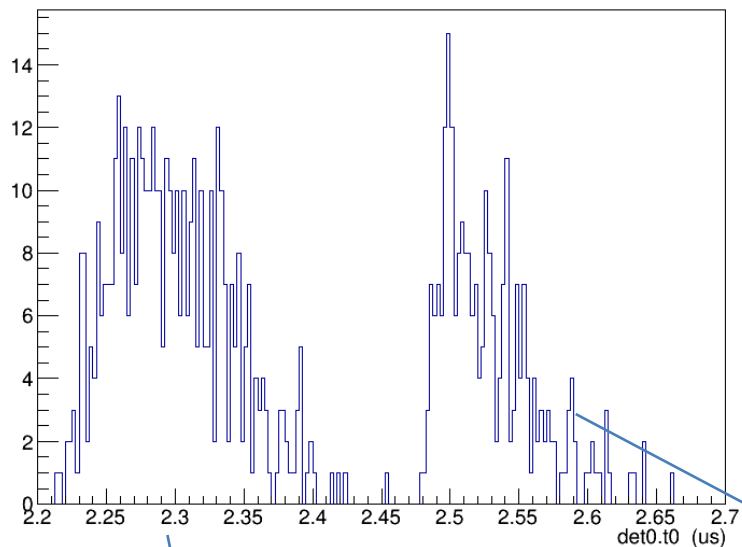


det0.qc15 : deposit energy on NaI within 1.5 us (keV)

det0.t0, pmt20.t0 : mean time of 1st cluster of NaI, Neutron detector signal

$\ln(MT)$ for $\text{det0.t0} > 2.45$ and $\text{det0.t0} < 2.45$ (setup2, 3~4 keV)

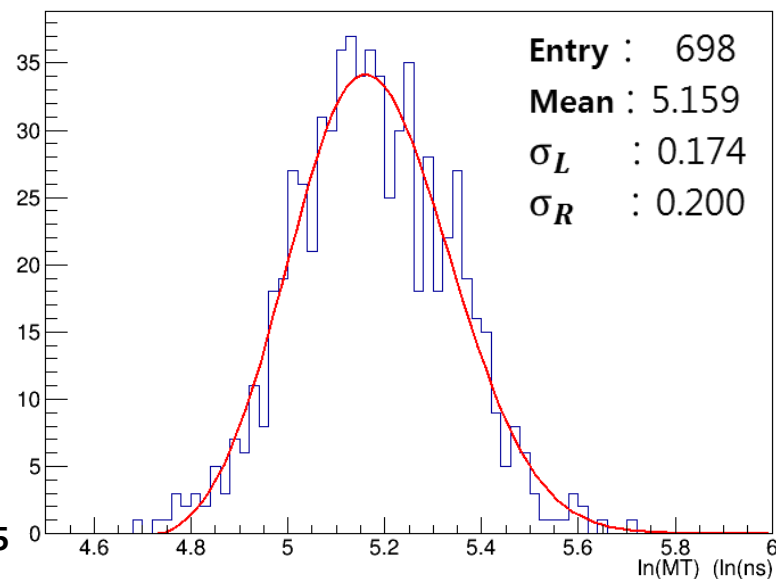
3 keV to 4 keV



total

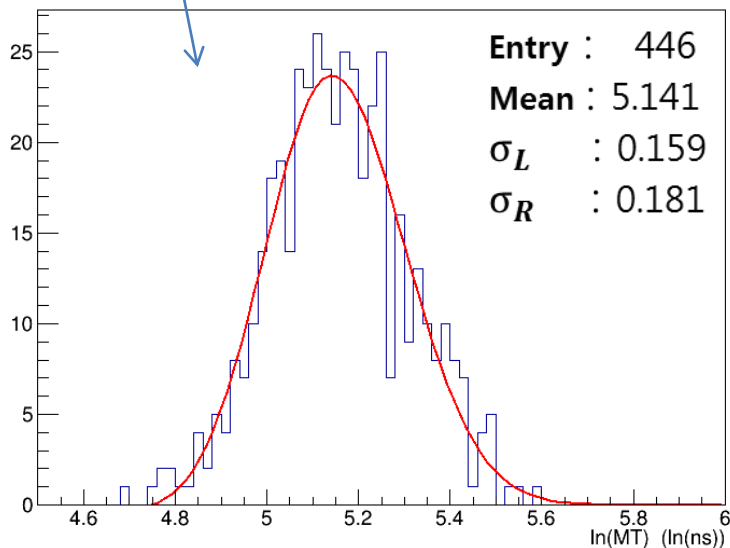
$\text{det0.t0} > 2.45$

(3 keV to 4 keV)

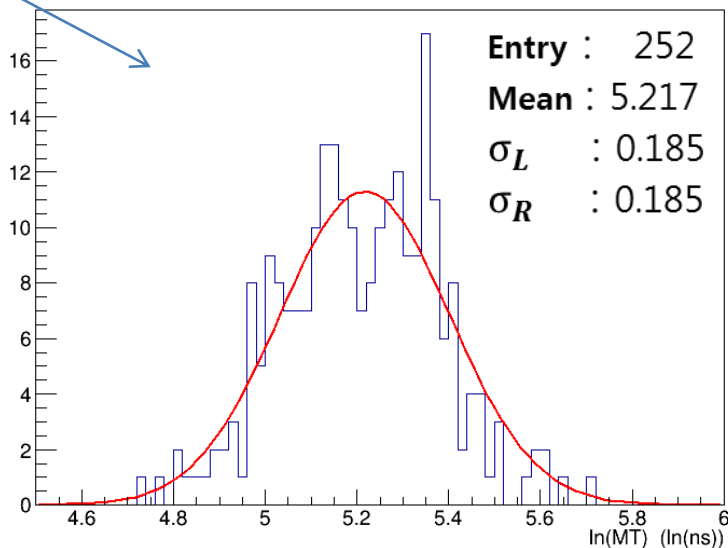


$\text{det0.t0} < 2.45$

3 keV to 4 keV

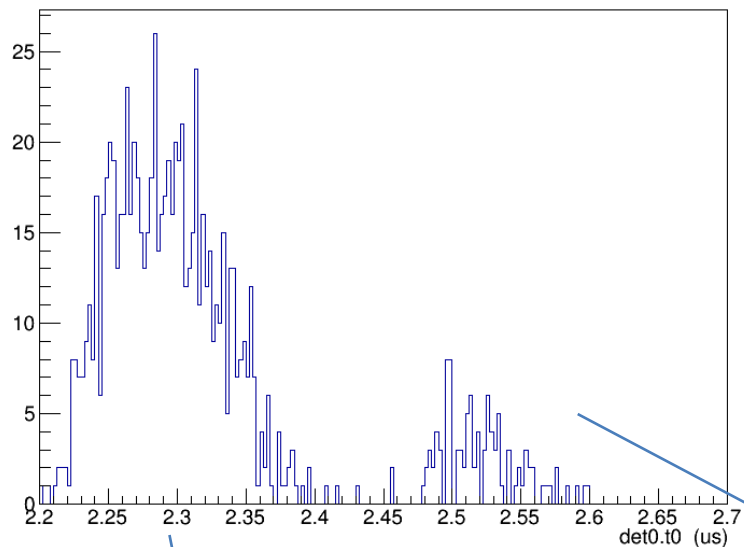


3 keV to 4 keV



$\ln(MT)$ for $\det0.t0 > 2.45$ and $\det0.t0 < 2.45$ (setup2, 4~5 keV)

4 keV to 5 keV

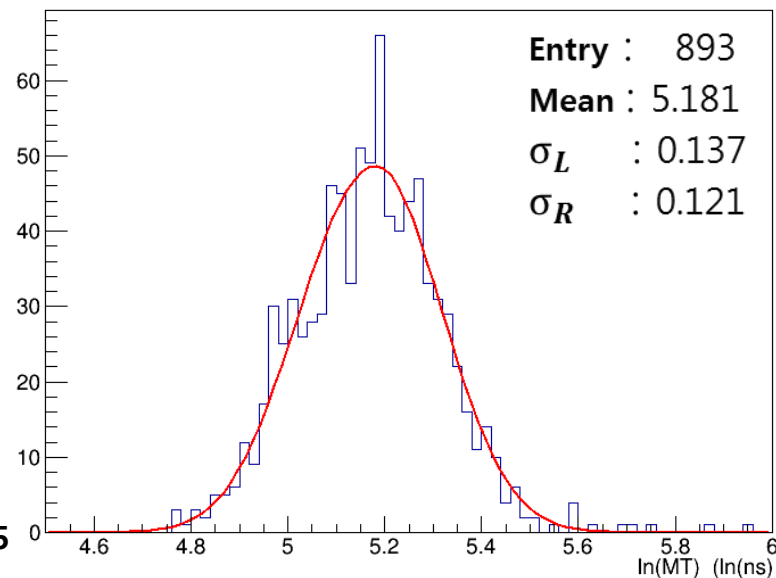


total



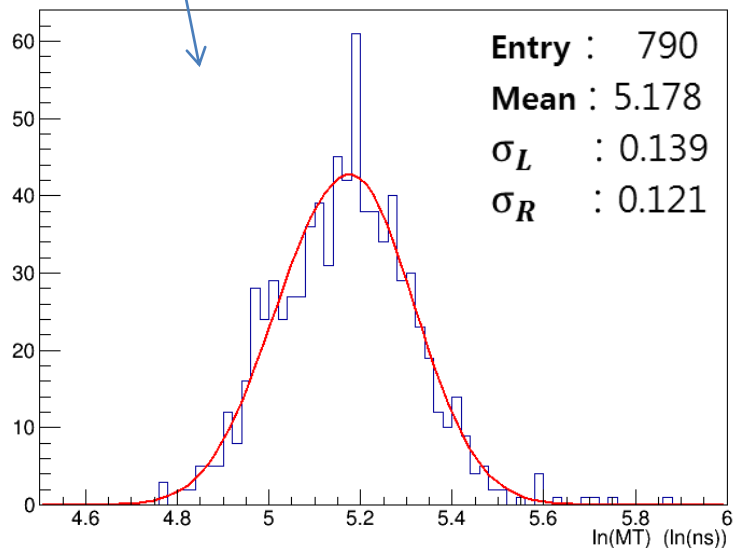
(4 keV to 5 keV)

$\det0.t0 > 2.45$

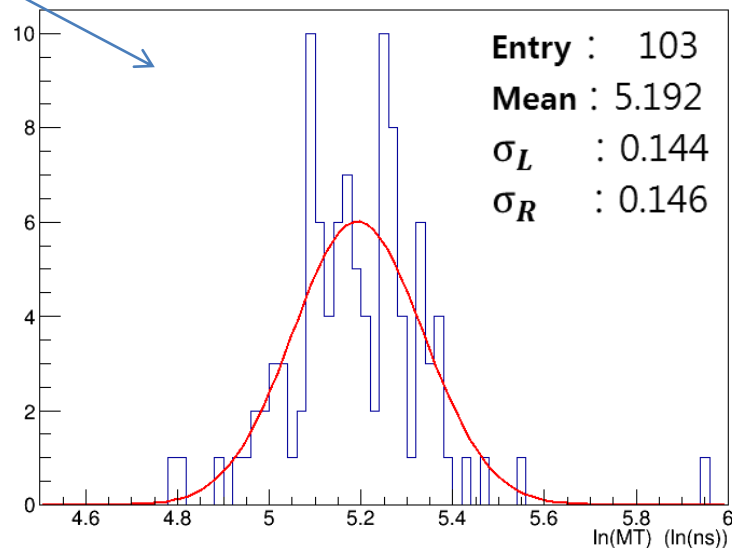


$\det0.t0 < 2.45$

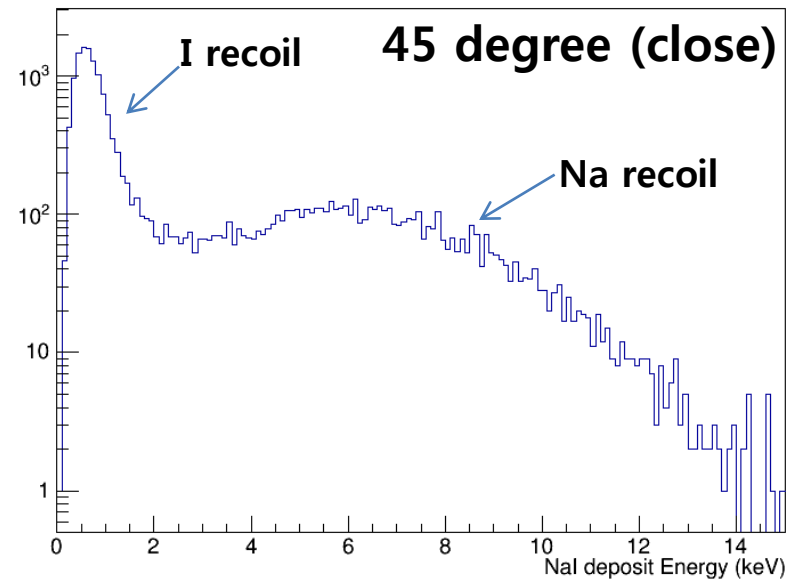
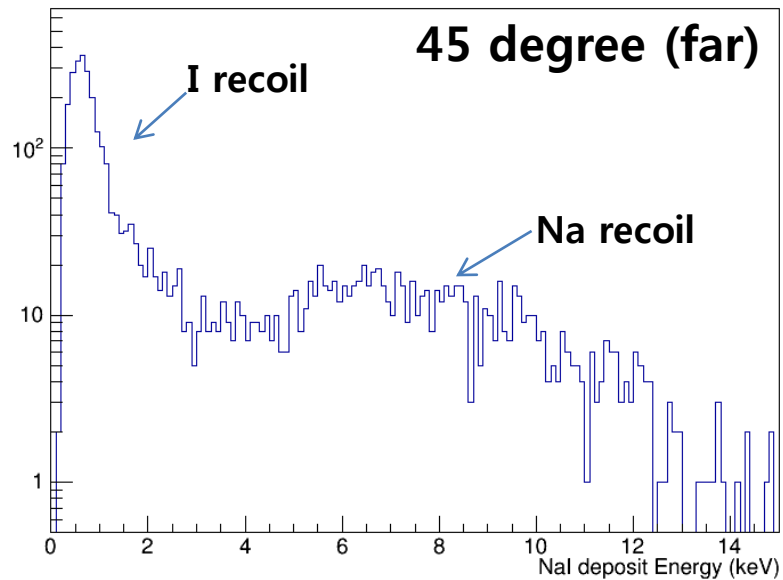
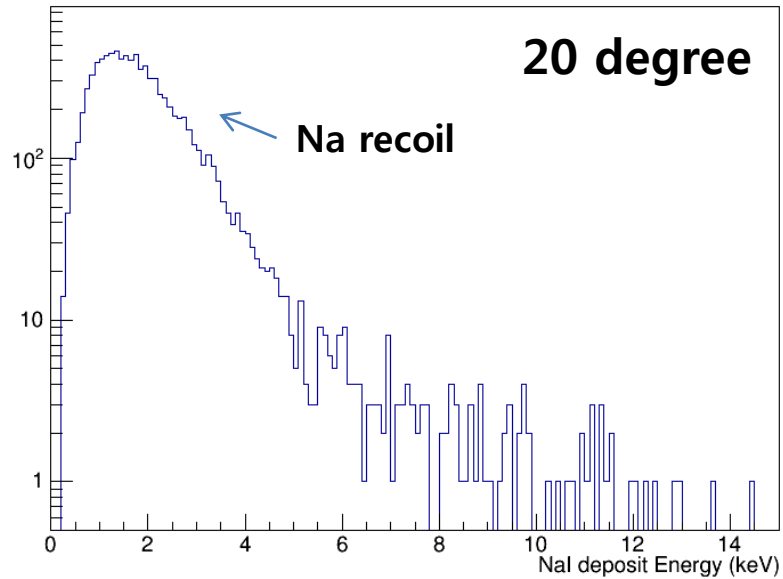
4 keV to 5 keV



4 keV to 5 keV

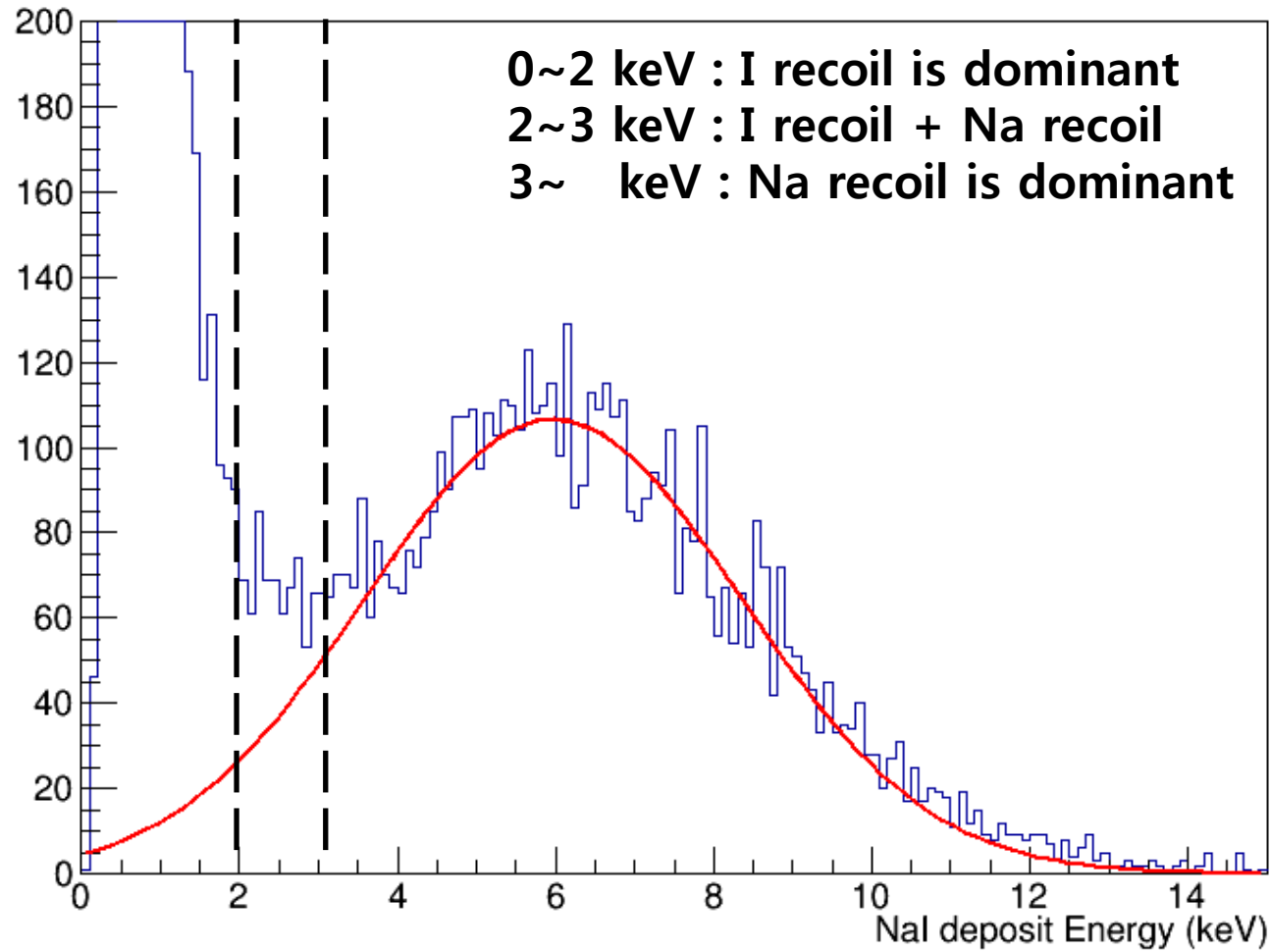


Deposit energy on NaI

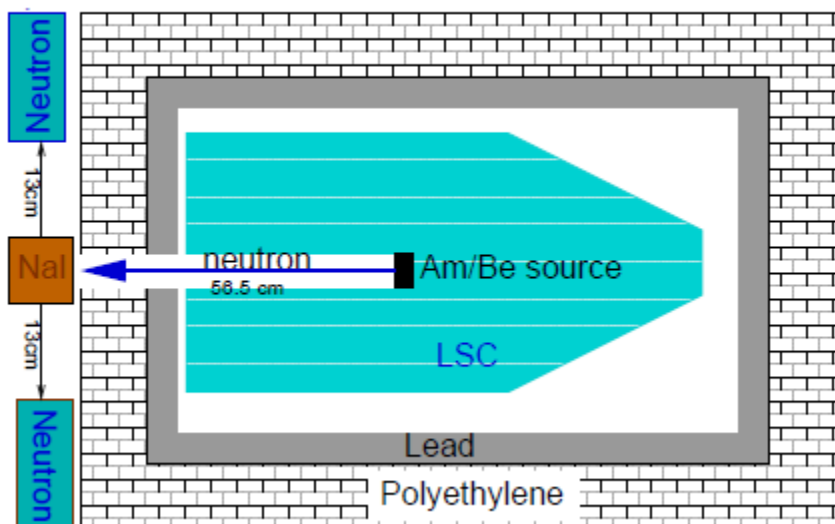


Deposit energy on NaI

ND3

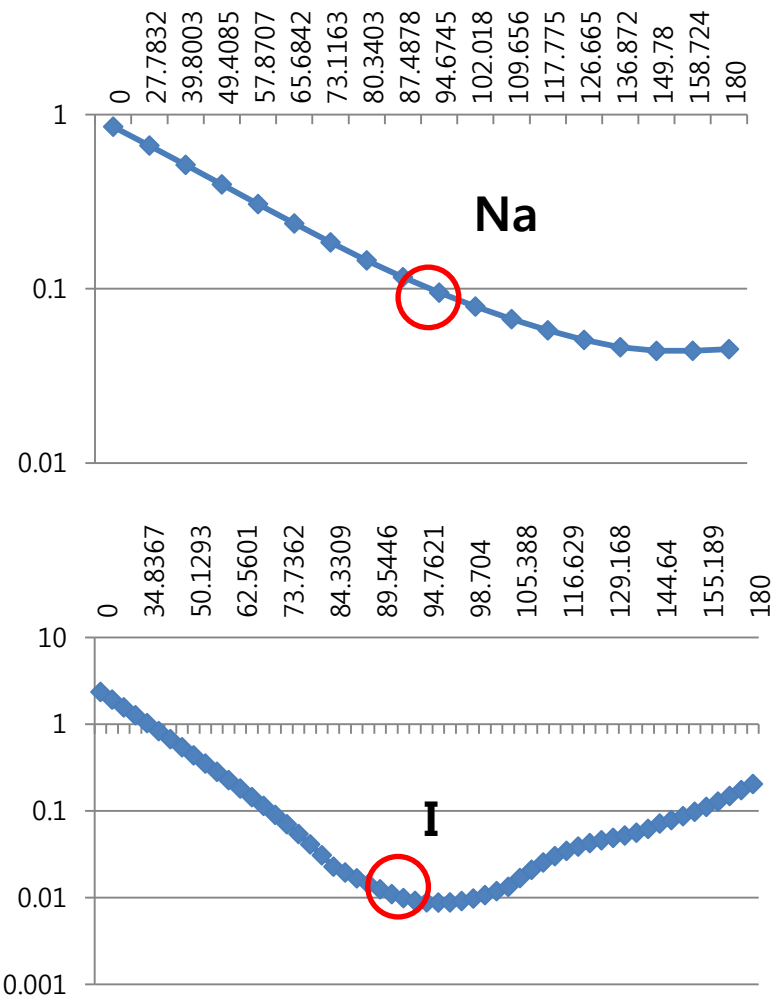


Am/Be experimental setup and cross section of Na and I

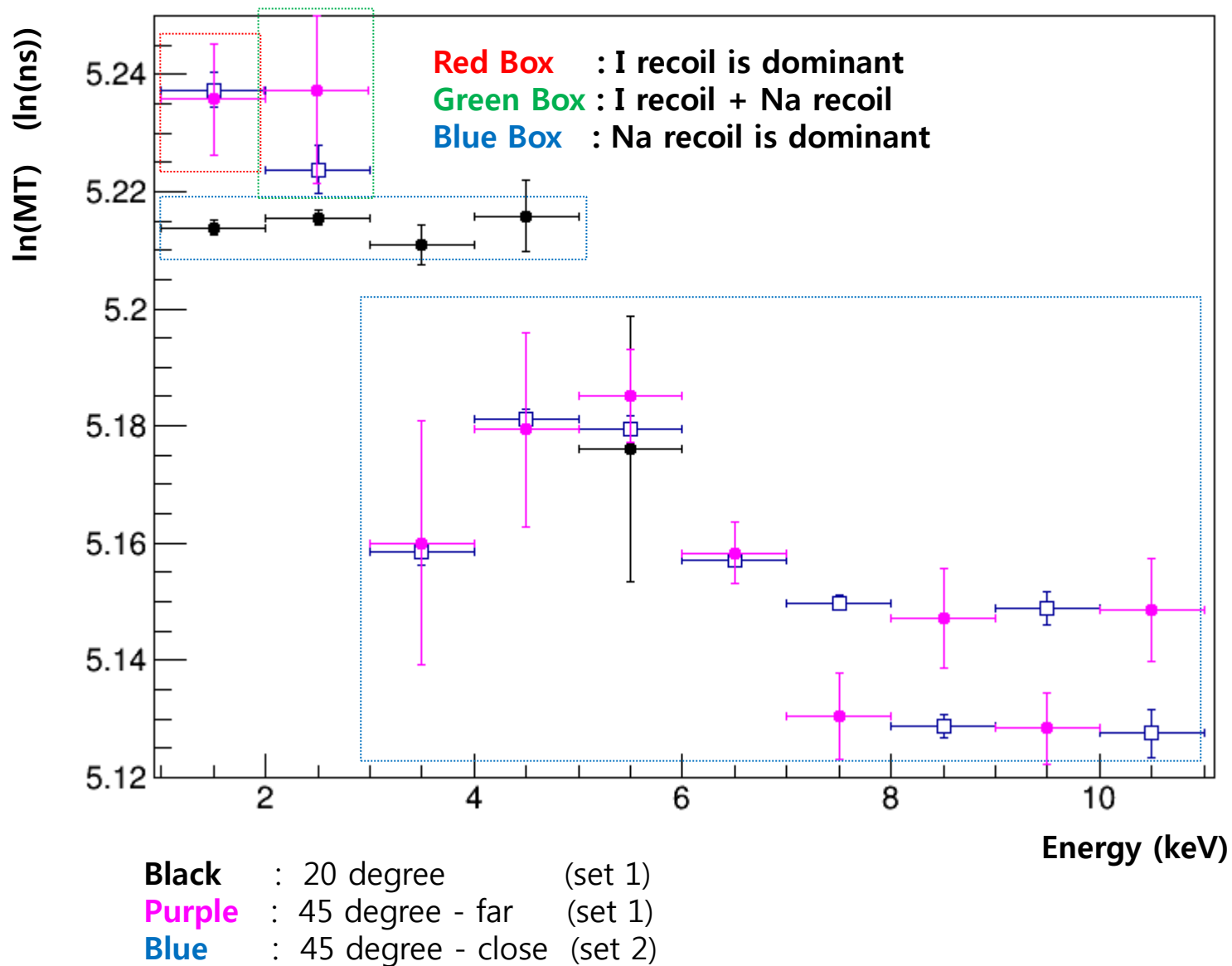


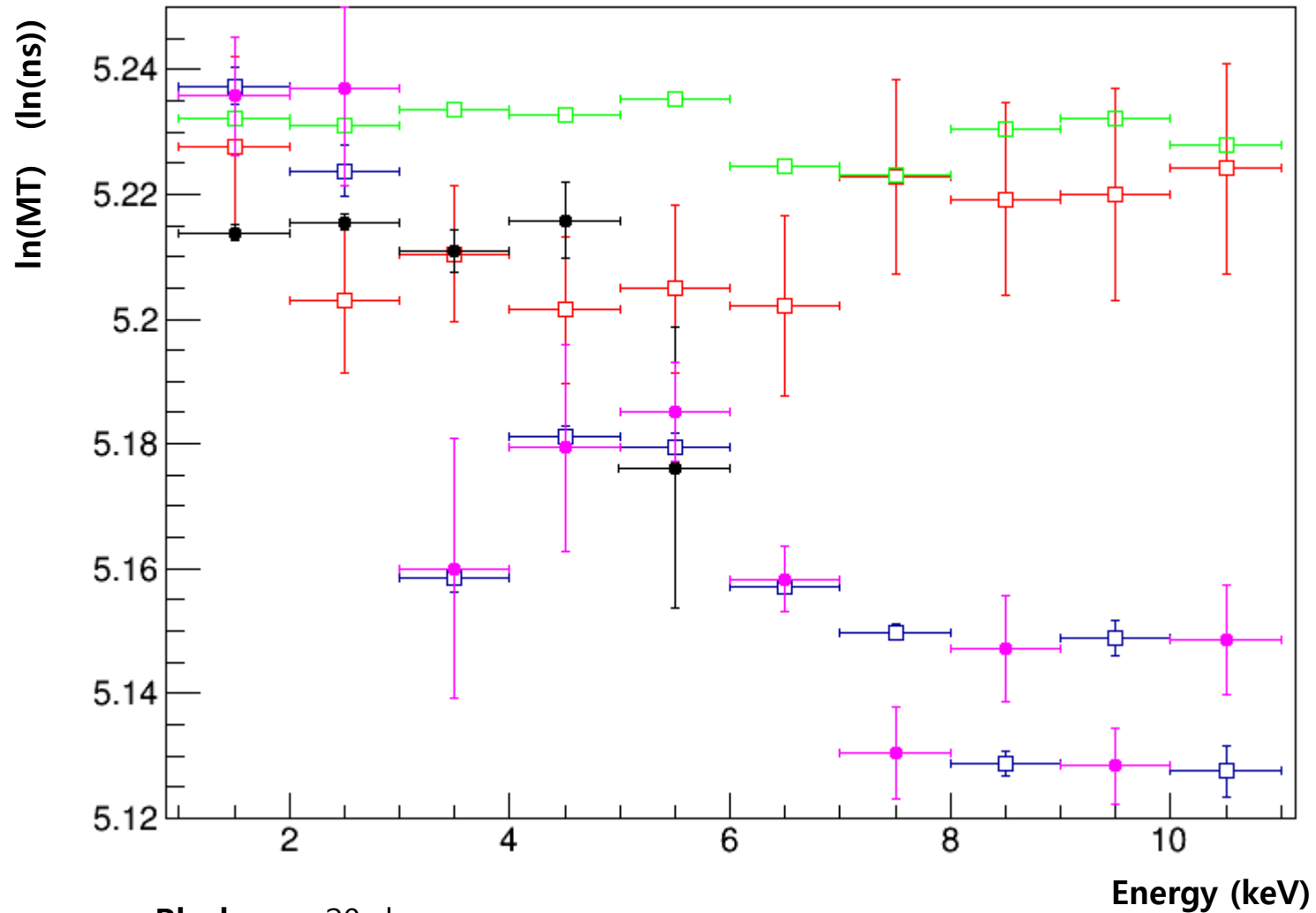
Calculated visible energy of
I recoil events < 10 keV

(energy of neutron < 8 MeV)



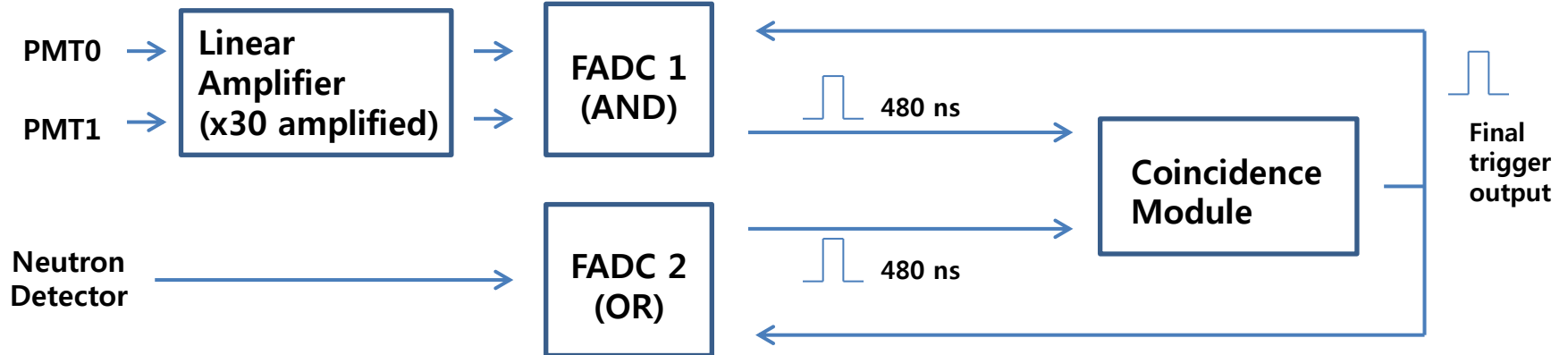
X axis : Neutron scattering angle
Y axis : Cross section
(data from ENDF)





- Black** : 20 degree
- Purple** : 45 degree - far
- Blue** : 45 degree - close
- Red** : Am/Be source / HS Lee
- Green** : Am/Be source / My analysis code

Trigger logic



Threshold voltage

- PMT : 10 mV
- Neutron Detectors : 50 mV

Pulse width trigger for neutron detector

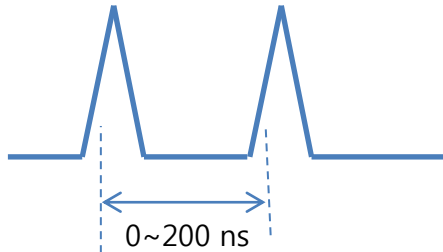
- Neutron detectors : 10 ns

Pulse count trigger for NaI crystal

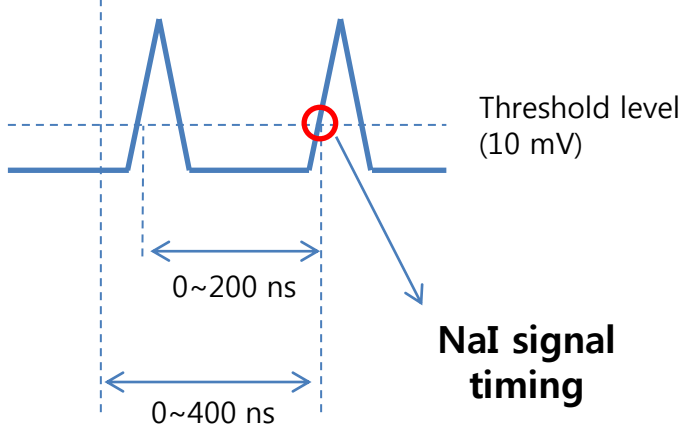
- Two or more pulses in each PMT
& Sum of pulse count of PMTs is larger than four within 400 ns

Trigger logic

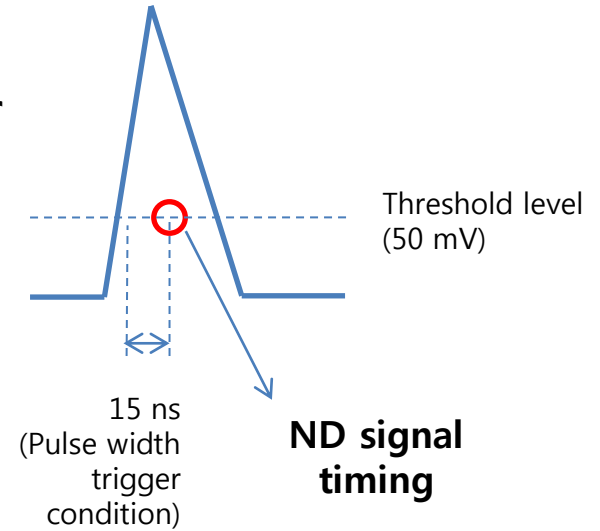
PMT0
Signal



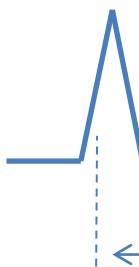
PMT1
Signal



Neutron
Detector
Signal

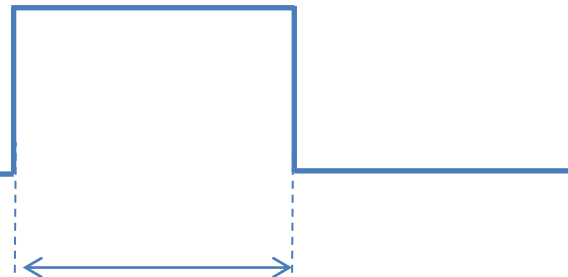


NaI or ND signal



~ 400 ns

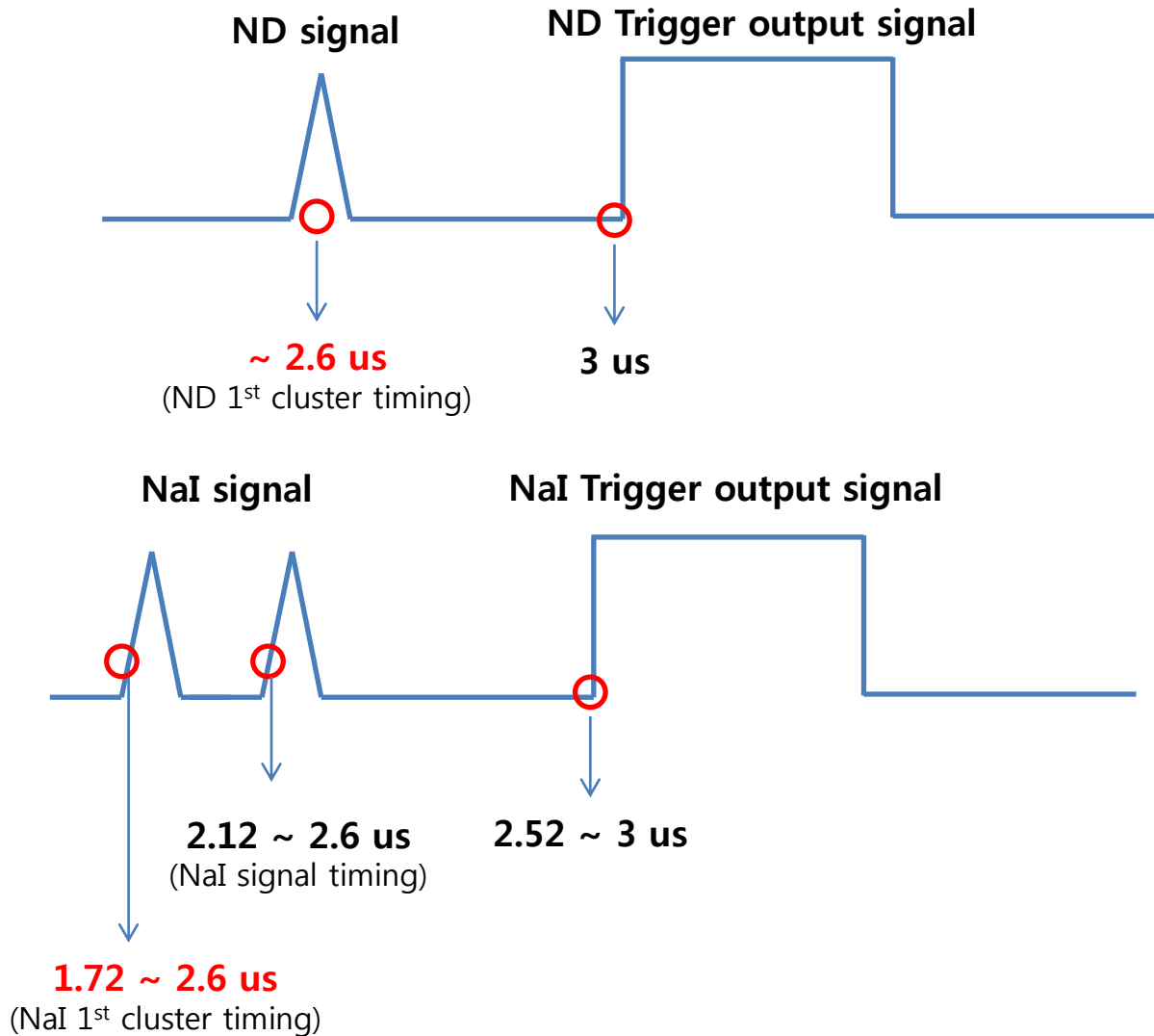
NaI or ND Trigger output signal



480 ns

Trigger logic

a) Neutron Detector signal trigger position을 결정



Trigger logic

b) NaI signal trigger position을 결정

