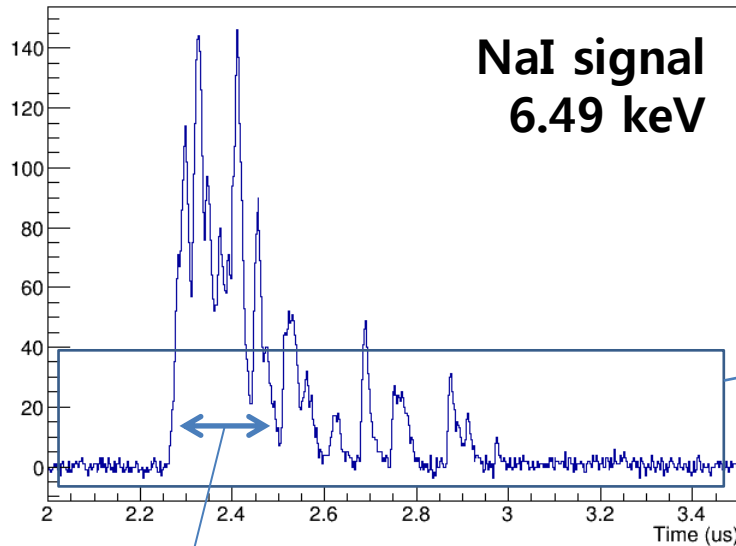
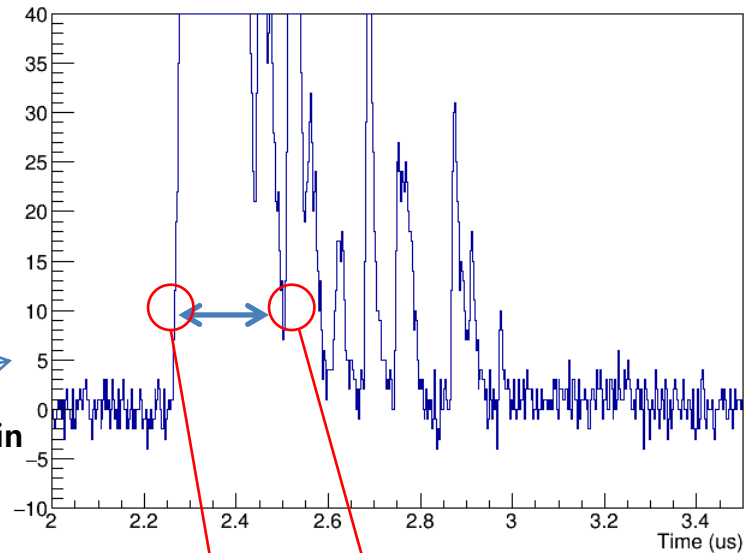


Pulse width over threshold



Pulse width over threshold
(threshold : 10 mV)

Zoom in



Second cluster is counted

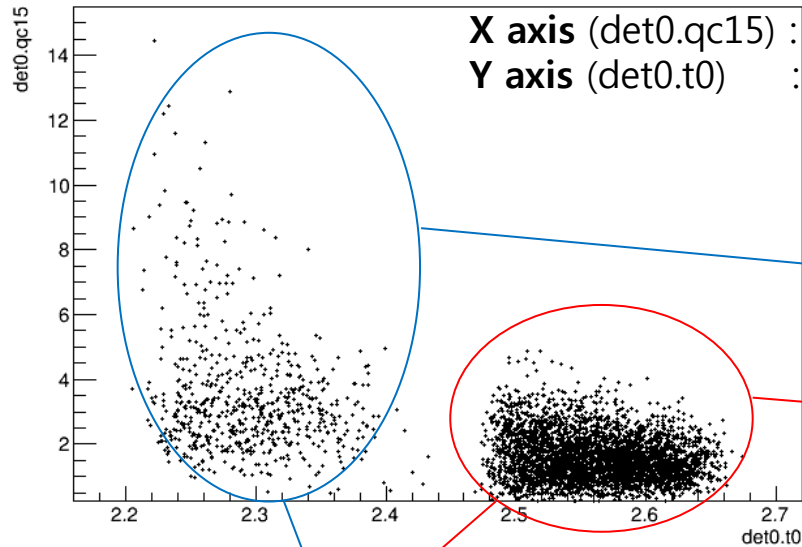
First cluster is counted

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

*Current Pulse count trigger in FADC

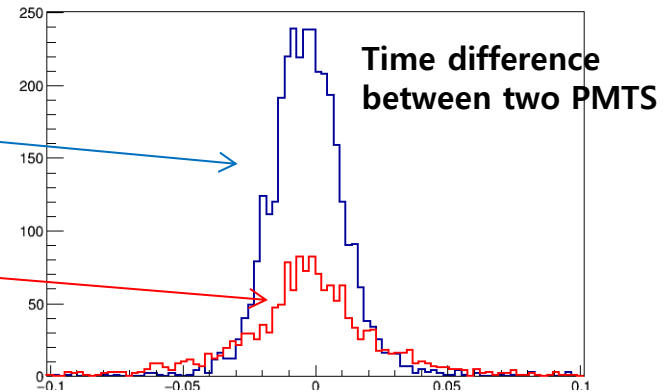
- : 2 or more pulses in each PMT in 200 ns
- 4 or more pulses in sum of PMTs in 400 ns

NaI deposit energy vs det0.t0 & pulse width

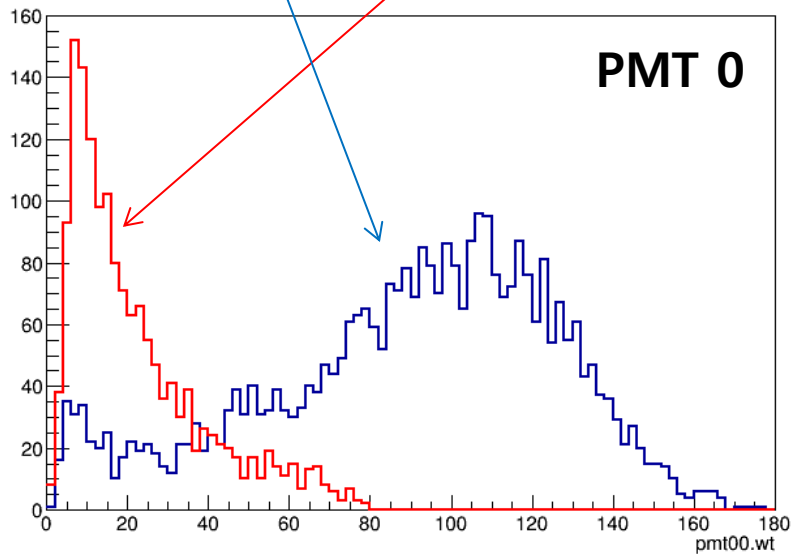


X axis (`det0.qc15`) : deposit energy on NaI within 1.5 μ s (keV)

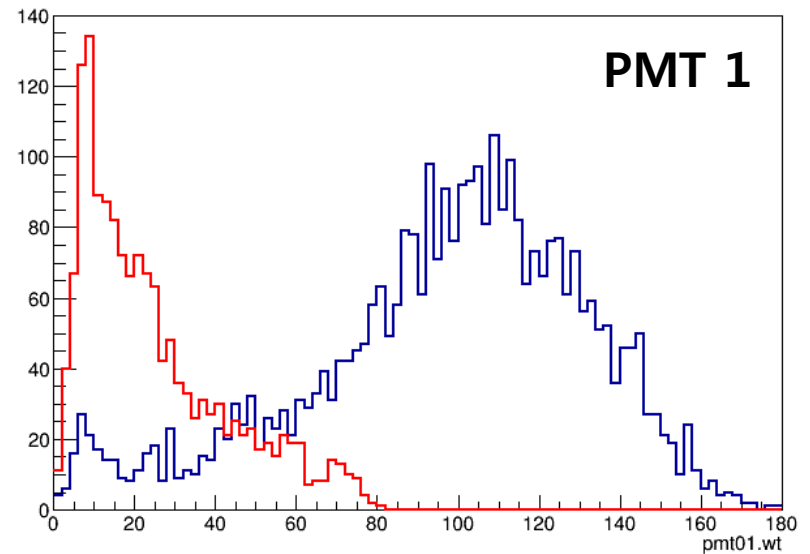
Y axis (`det0.t0`) : mean time of 1st cluster of NaI signal



**Time difference
between two PMTs**



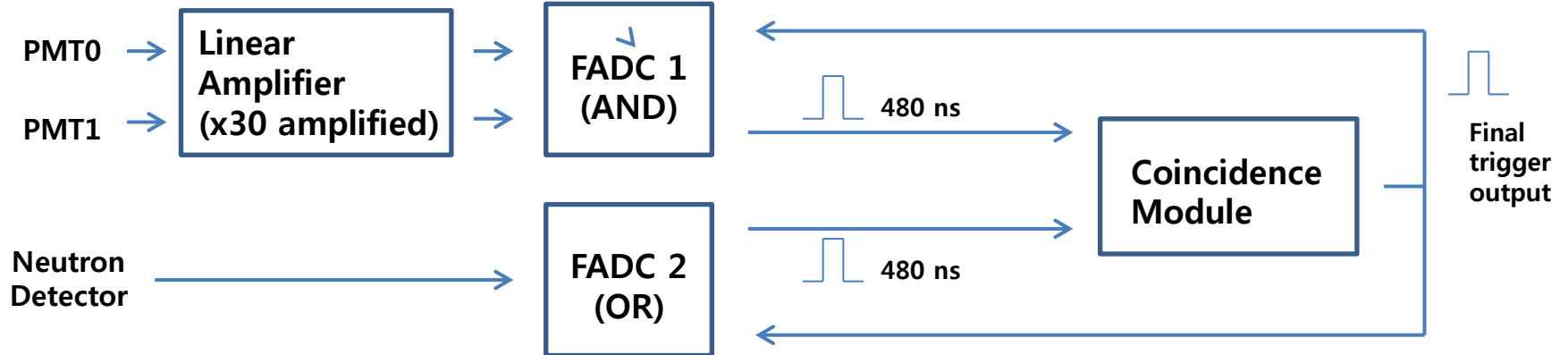
PMT 0



PMT 1

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

Trigger logic



Threshold voltage

- PMT : 10 mV
- Neutron Detectors : 50 mV

Pulse width trigger for neutron detector

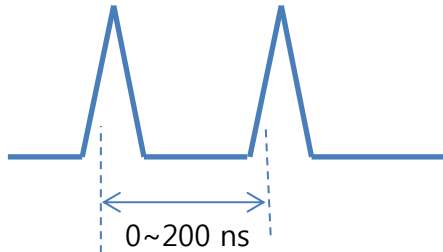
- Neutron detectors : 10 ns

Pulse count trigger for NaI crystal

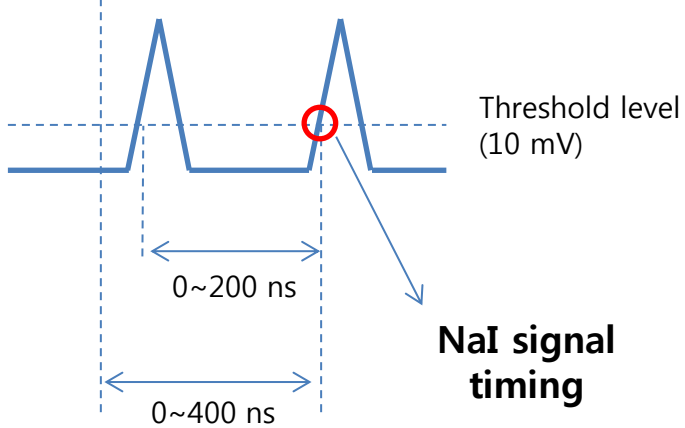
- Two or more pulses in each PMT
& Sum of pulse count of PMTs is larger than four within 400 ns

Trigger logic

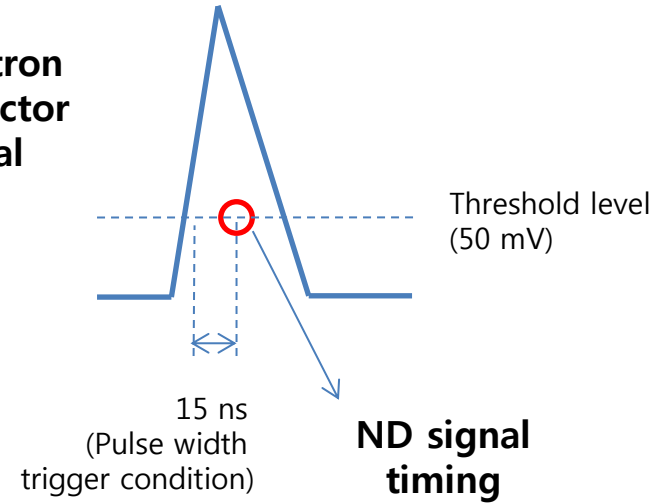
PMT0
Signal



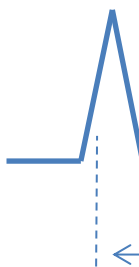
PMT1
Signal



Neutron
Detector
Signal

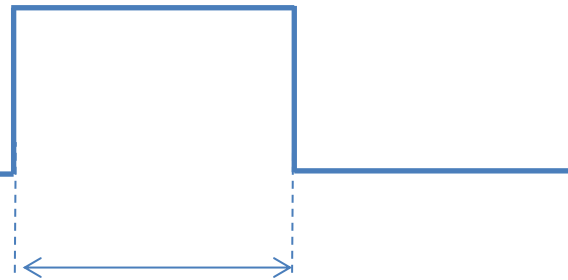


NaI or ND signal



~ 400 ns

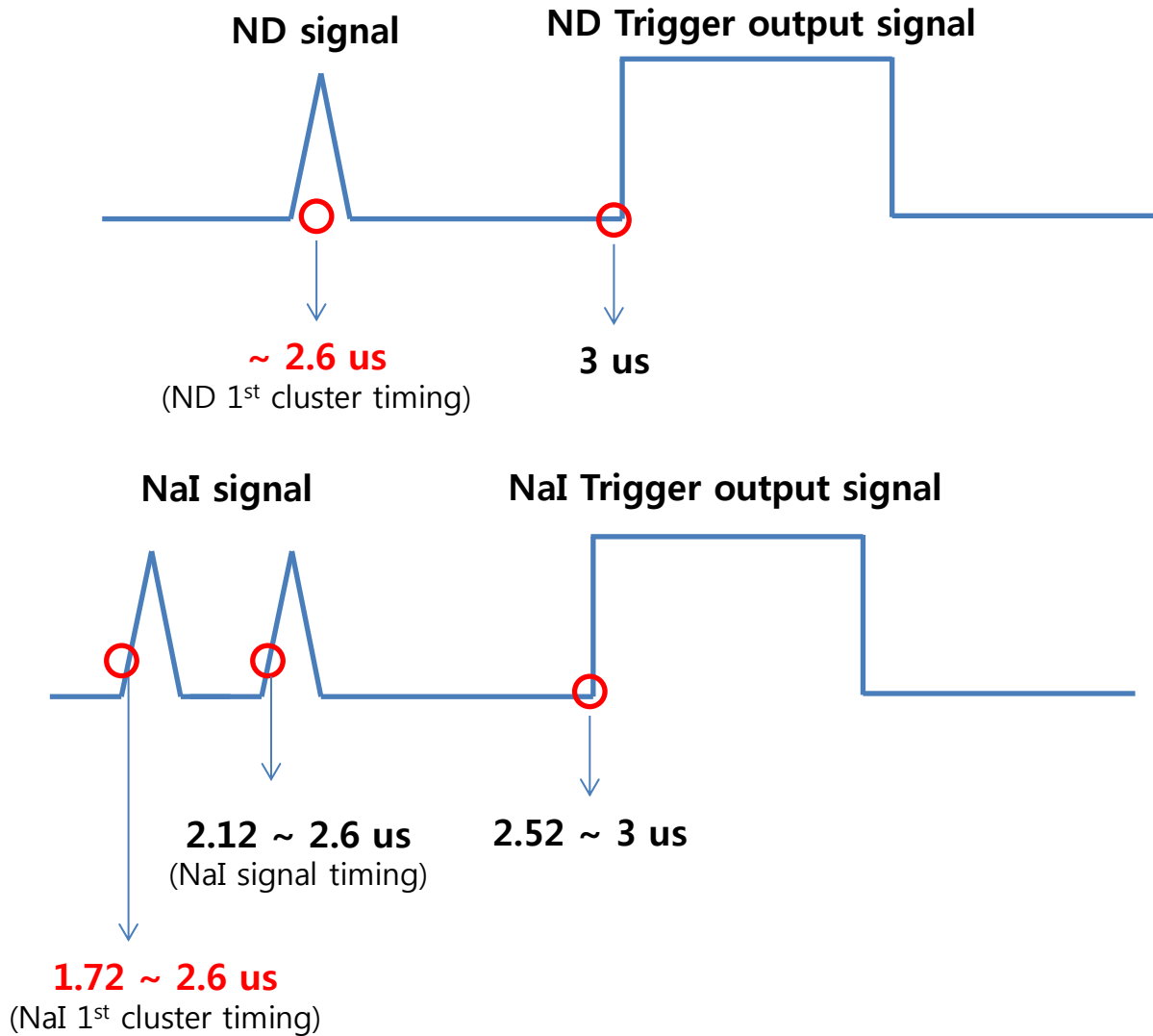
NaI or ND Trigger output signal



480 ns

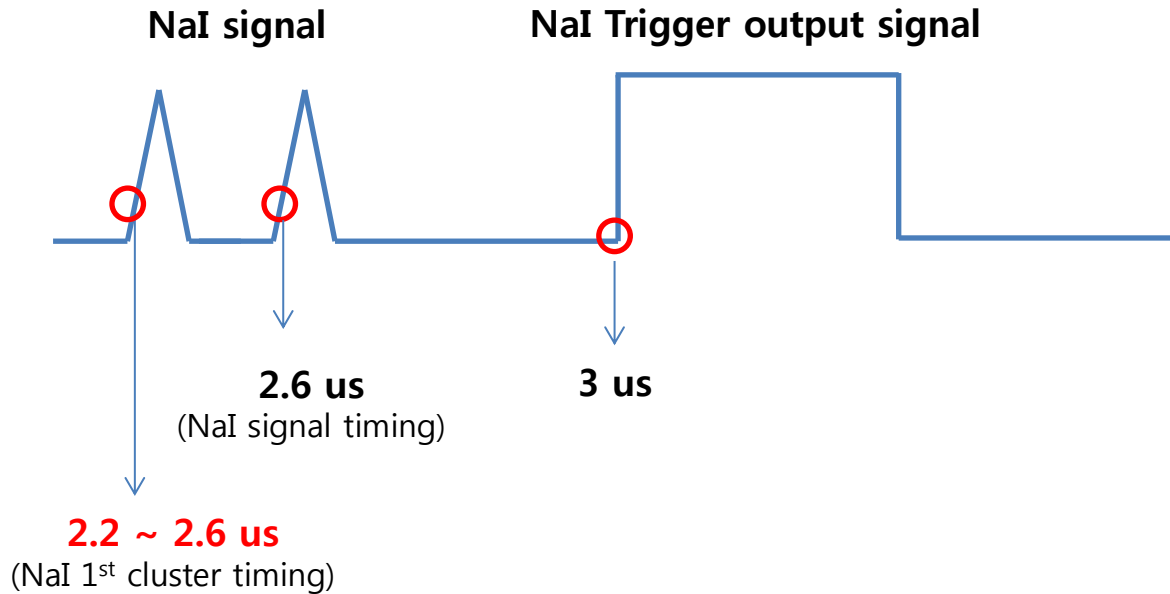
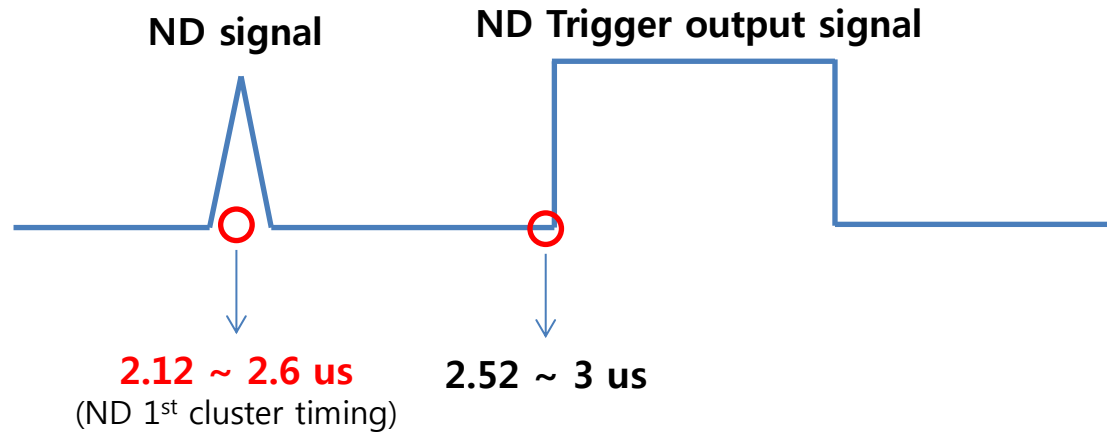
Trigger logic

a) Neutron Detector signal trigger position을 결정

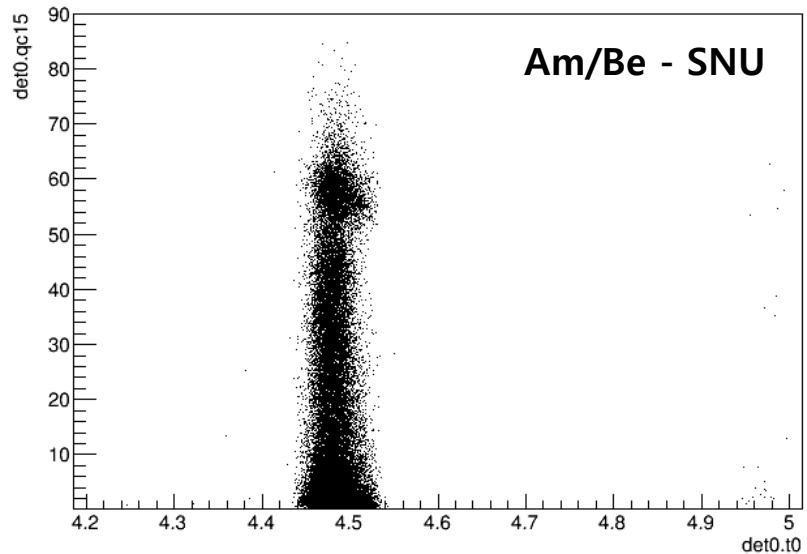
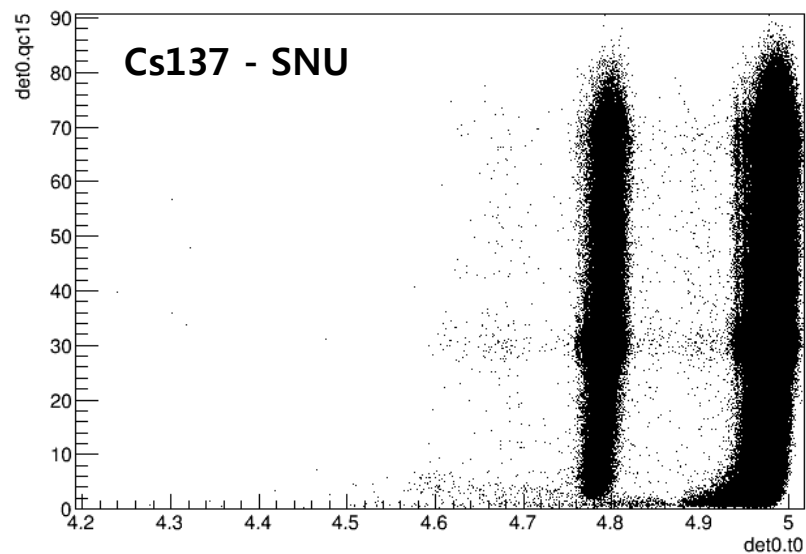
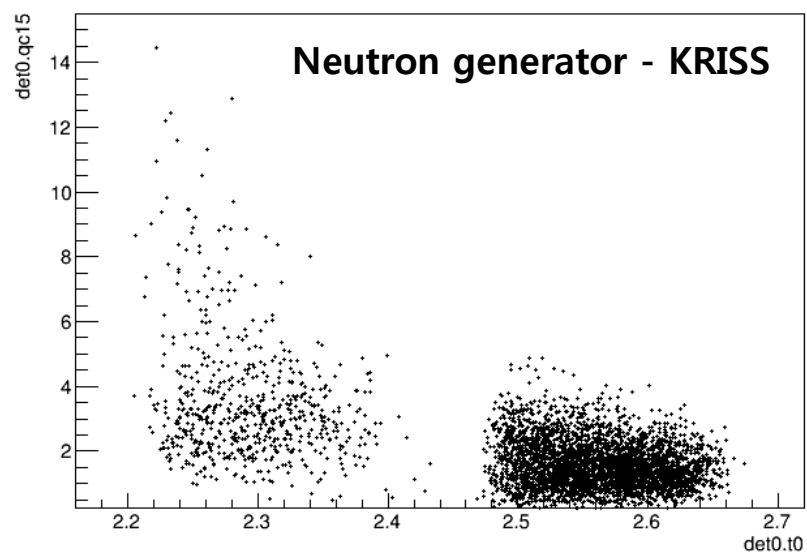
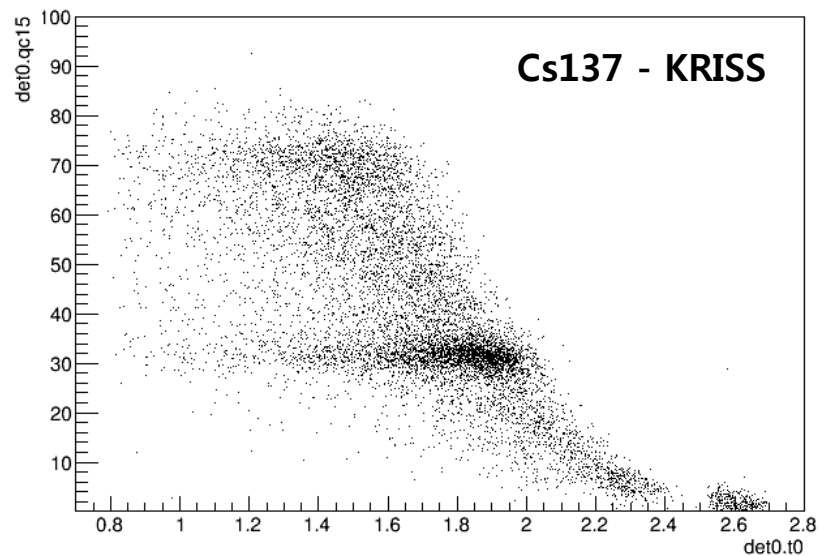


Trigger logic

b) NaI signal trigger position을 결정



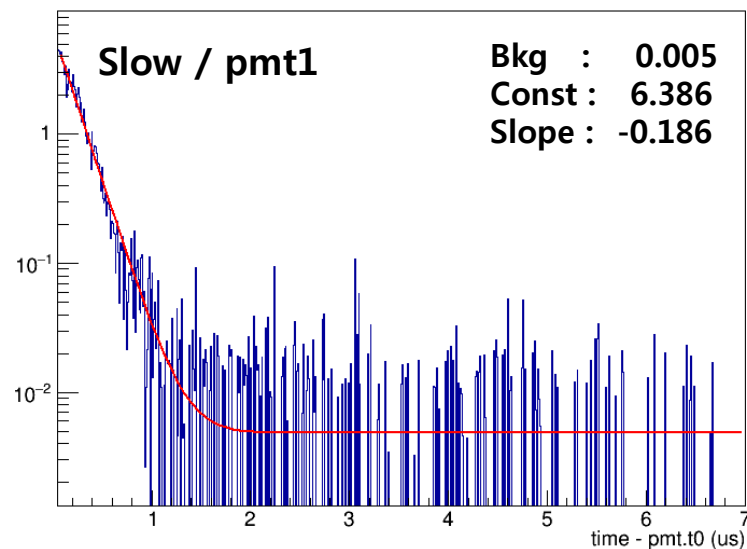
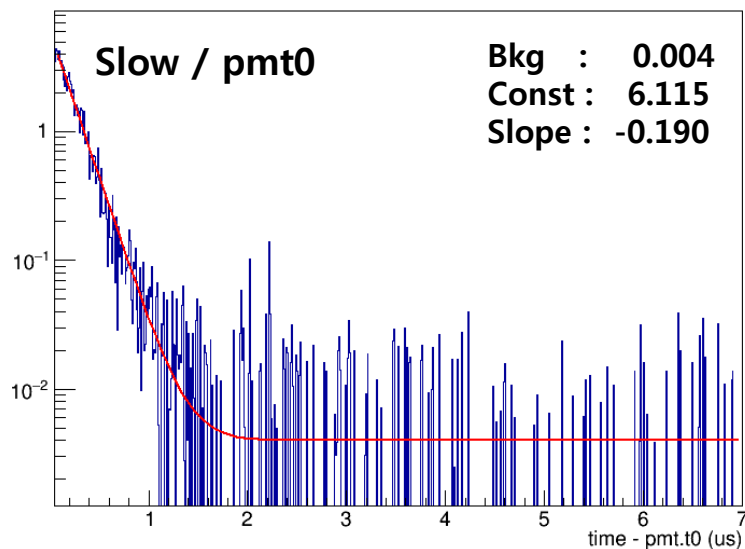
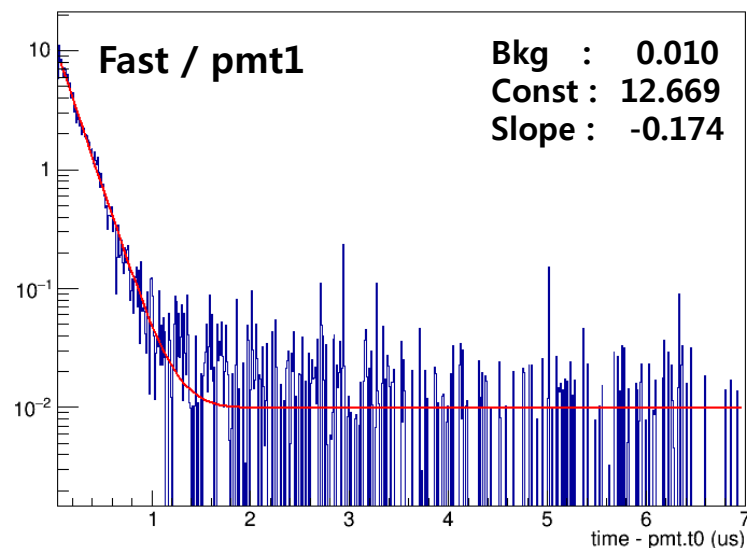
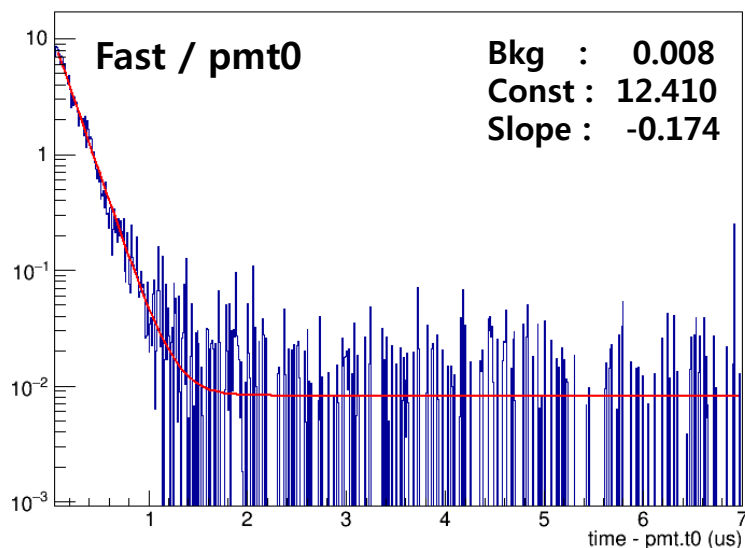
NaI deposit energy vs det0.t0



Backup Slides

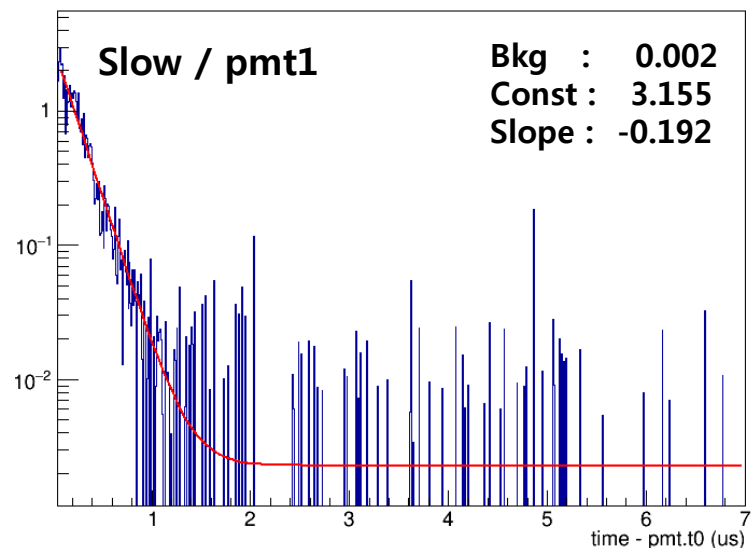
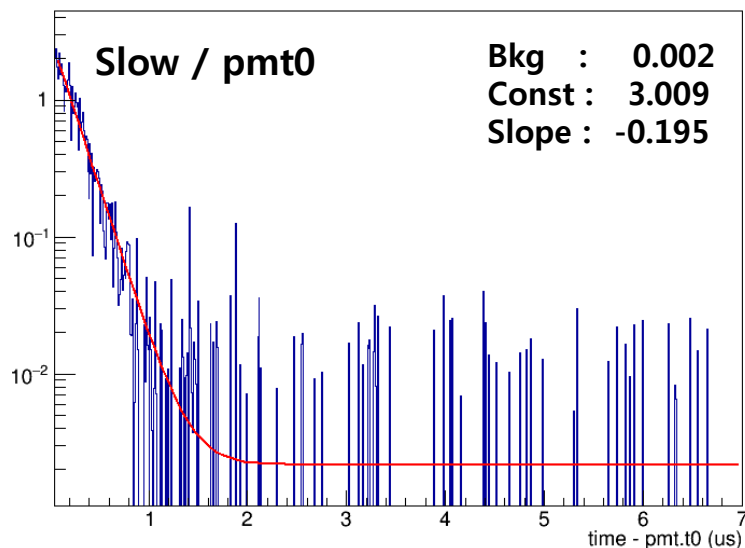
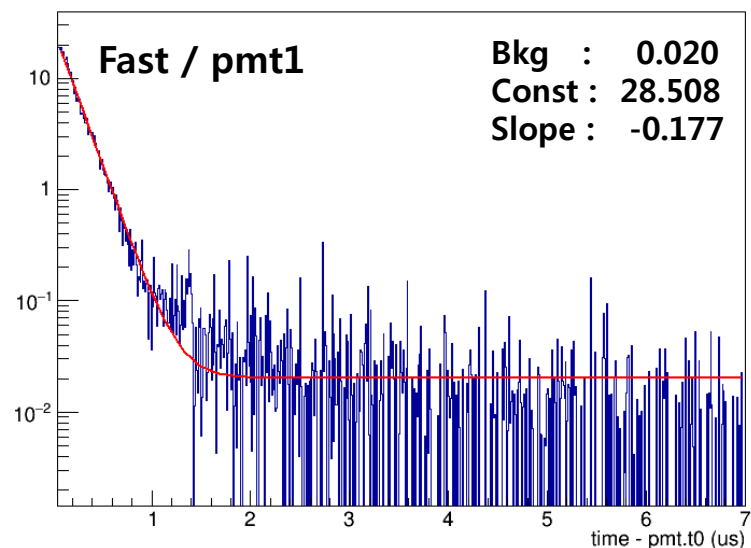
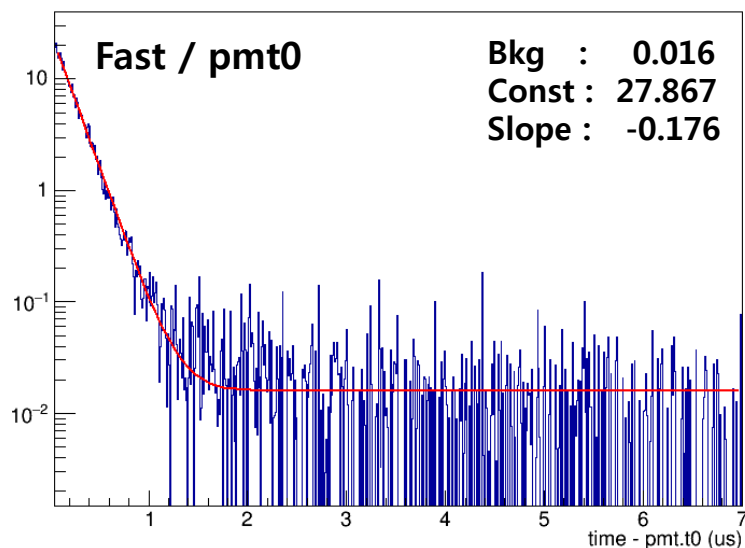
Cluster charge sum vs cluster time (3~4 keV)

$$\text{Bkg} + \text{Const} * \text{Exp}(x/\text{Slope})$$

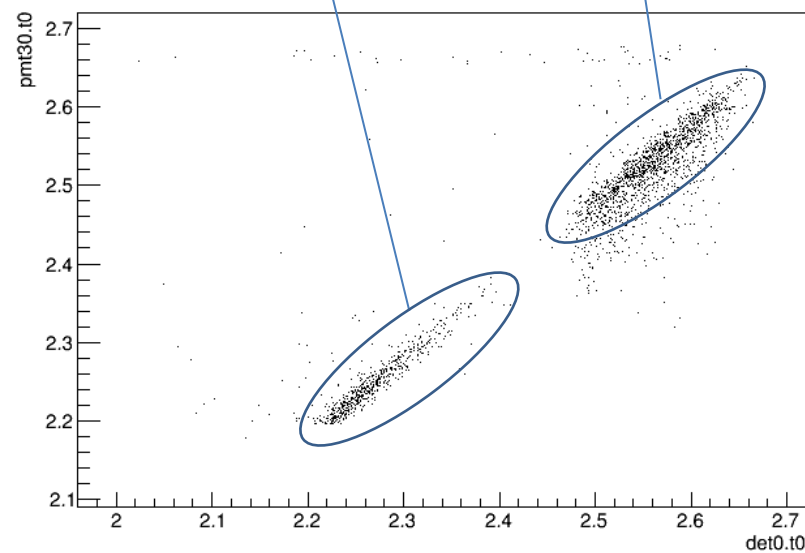
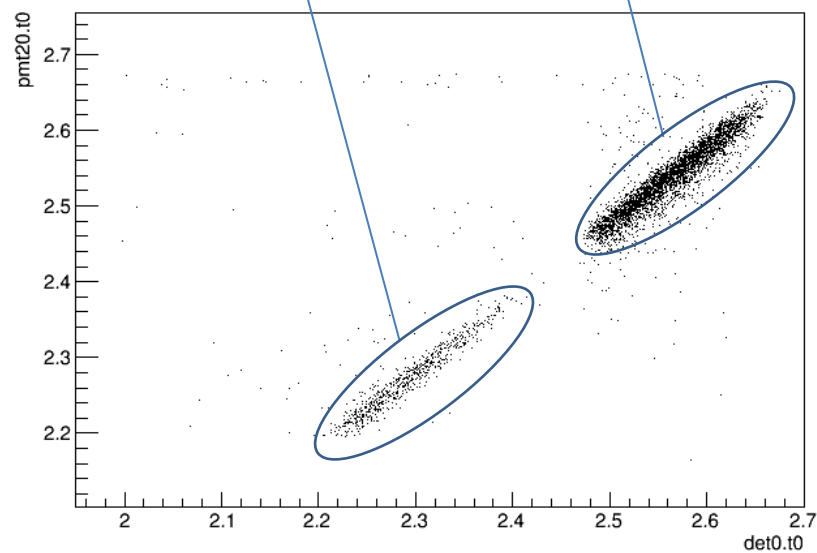
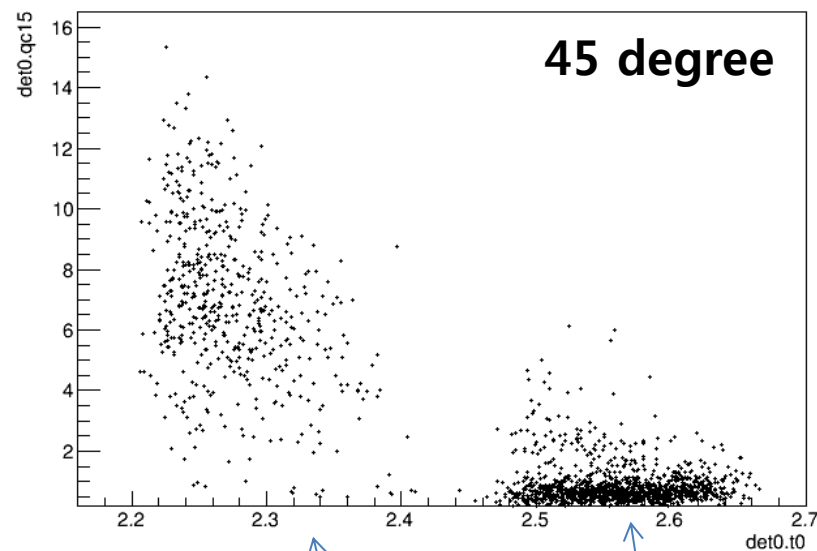
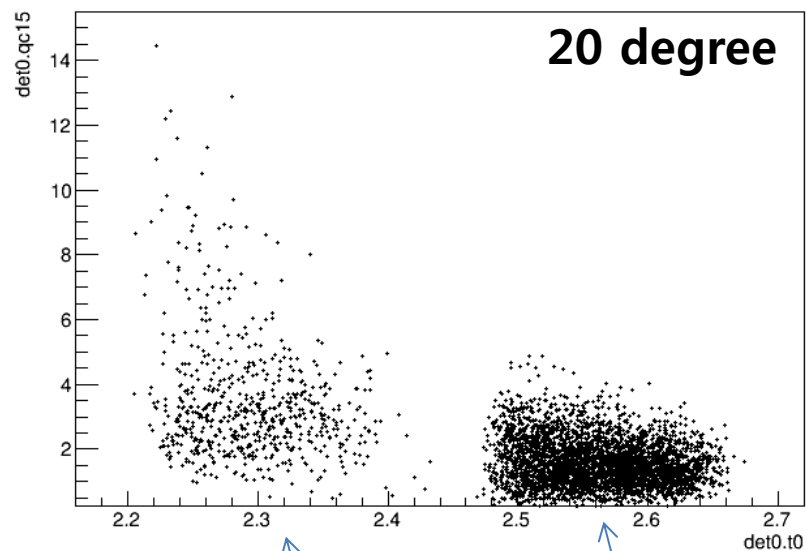


Cluster charge sum vs cluster time (3~4 keV)

$$\text{Bkg} + \text{Const} * \text{Exp}(x/\text{Slope})$$



NaI deposit energy or ND.t0 vs det0.t0

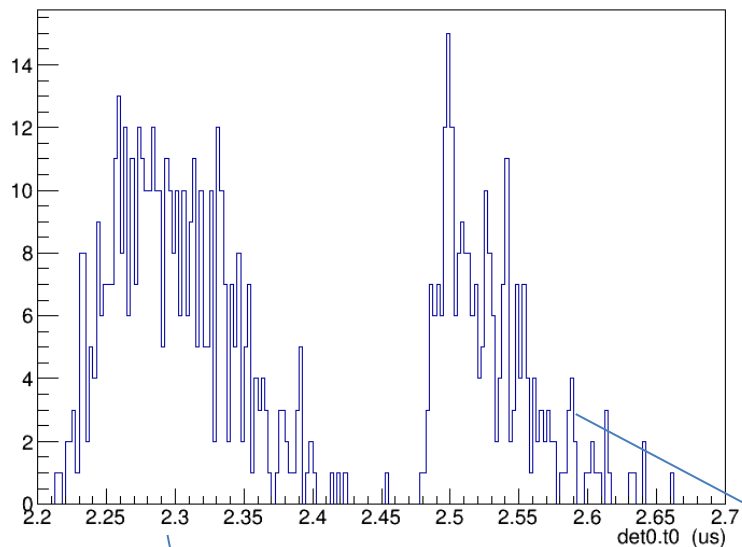


det0.qc15 : deposit energy on NaI within 1.5 us (keV)

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)

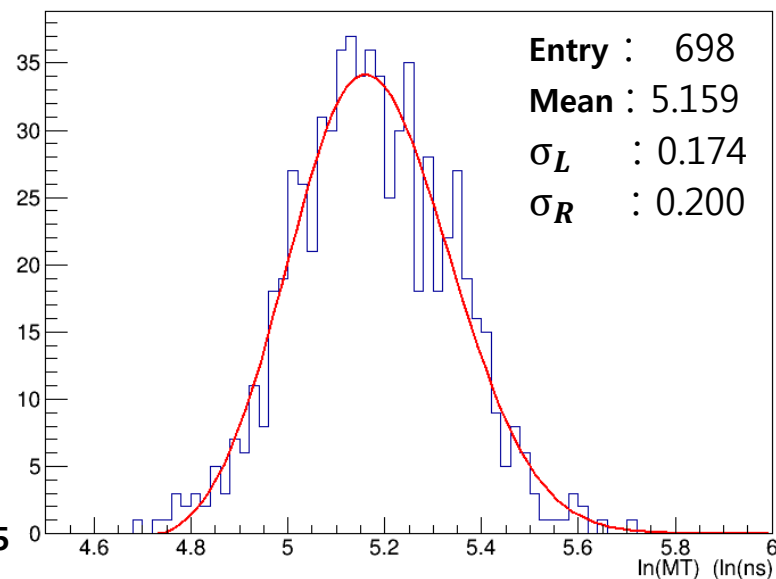
3 keV to 4 keV



total

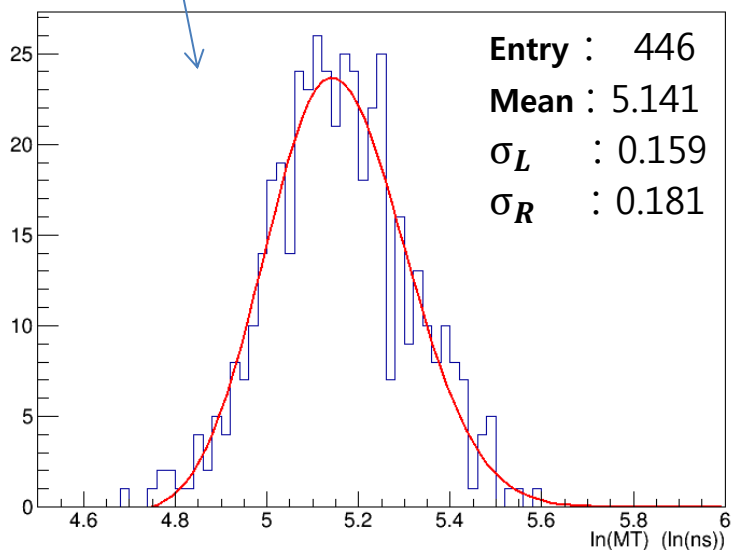
$\text{det0.t0} > 2.45$

(3 keV to 4 keV)

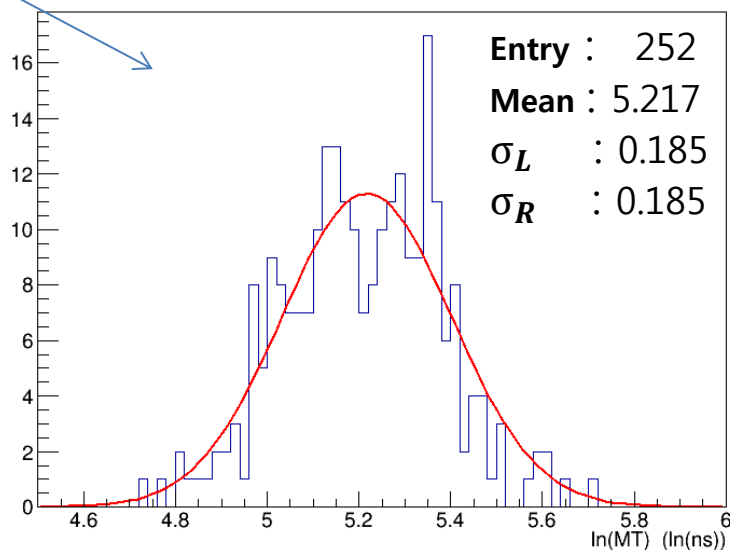


$\text{det0.t0} < 2.45$

3 keV to 4 keV

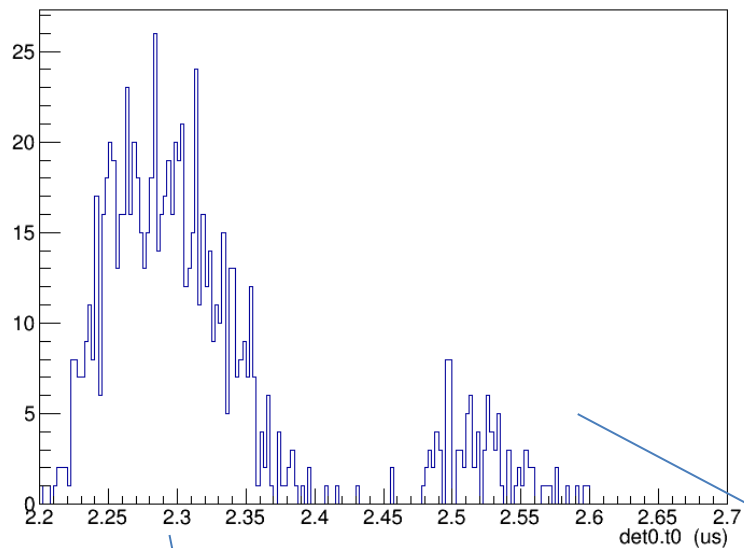


3 keV to 4 keV



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

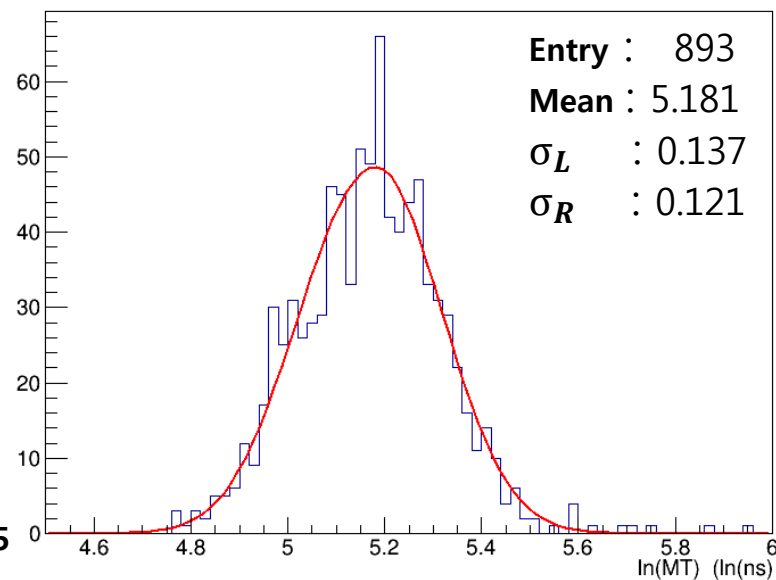
4 keV to 5 keV



total

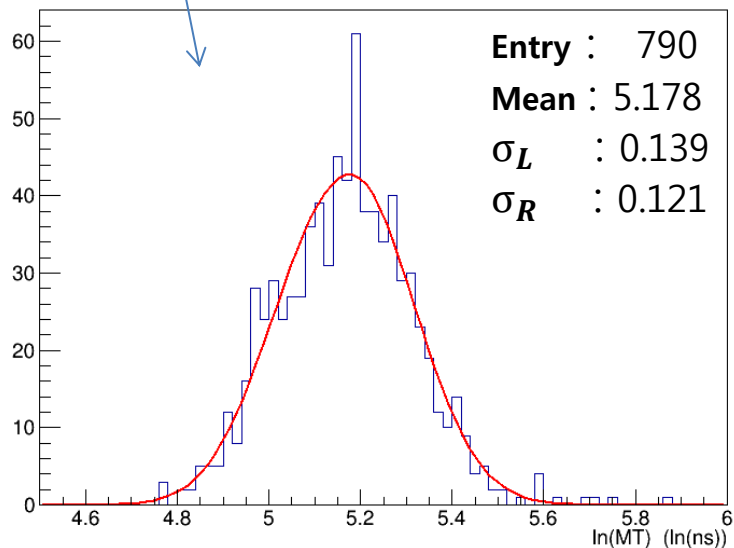
$\text{det0.t0} > 2.45$

(4 keV to 5 keV)

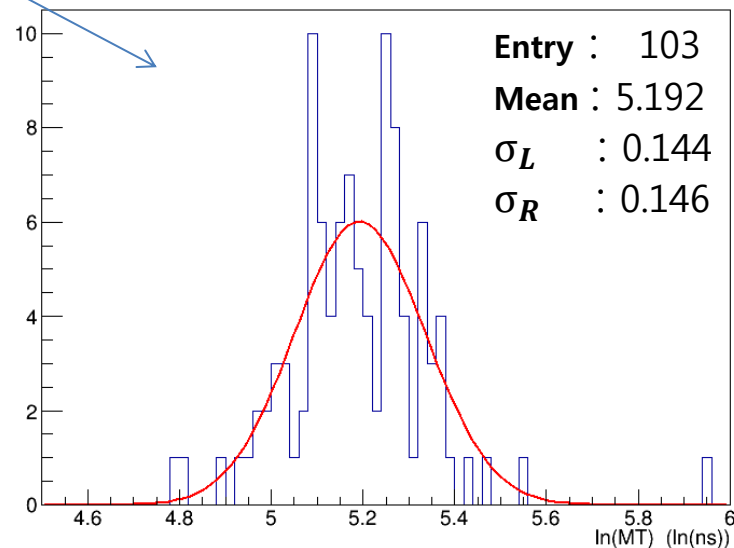


$\text{det0.t0} < 2.45$

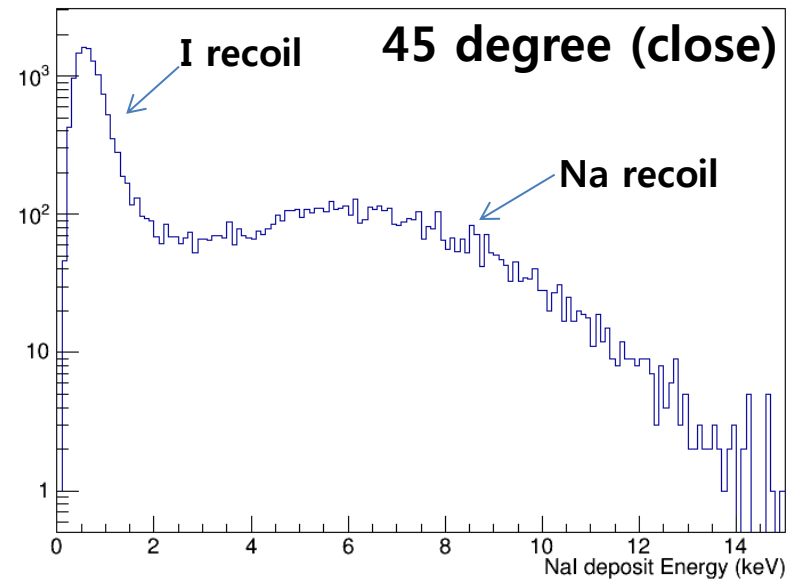
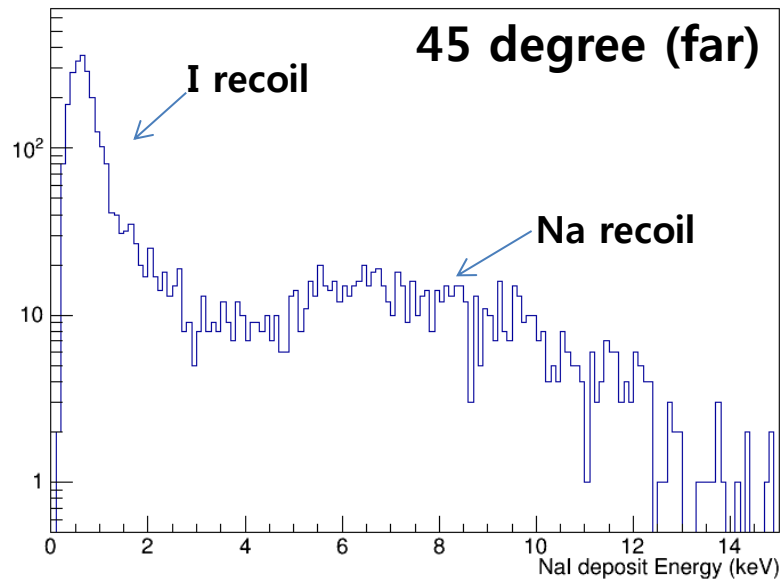
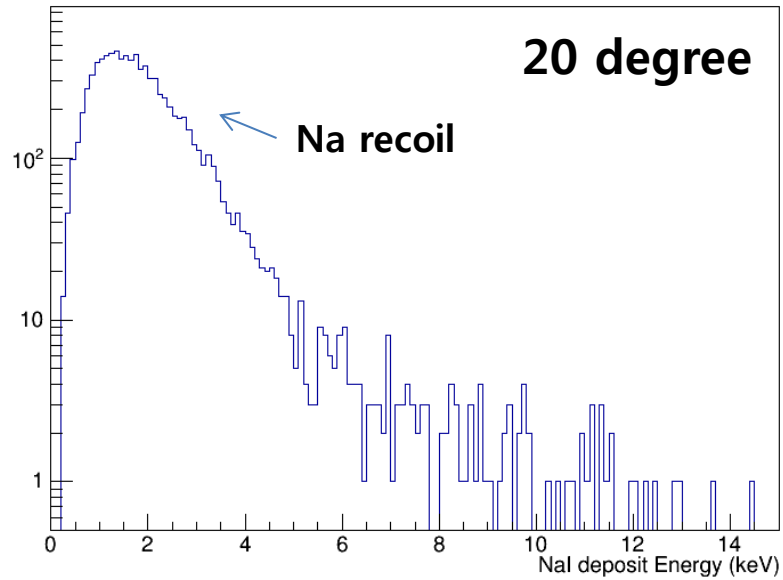
4 keV to 5 keV



4 keV to 5 keV

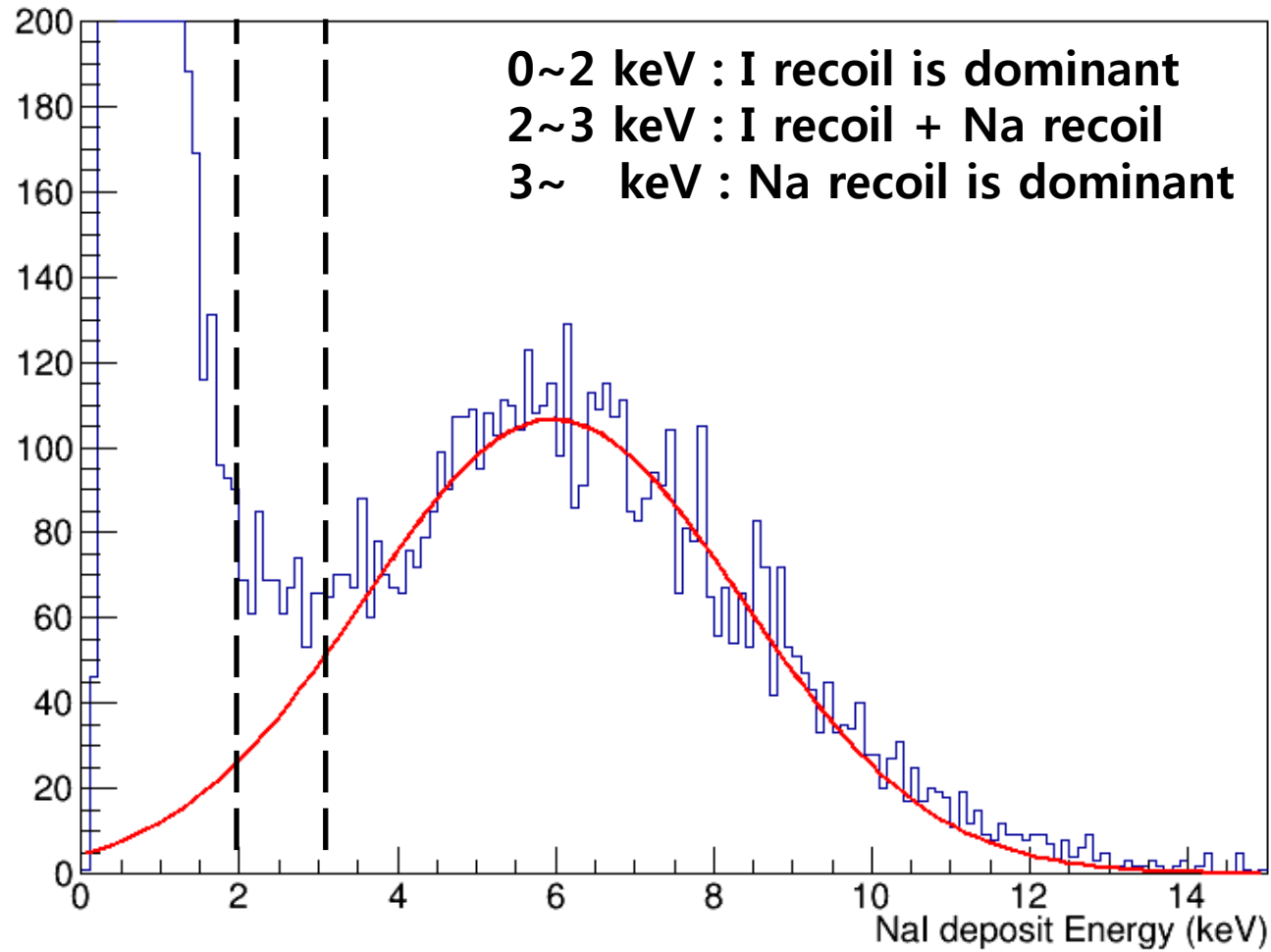


Deposit energy on NaI

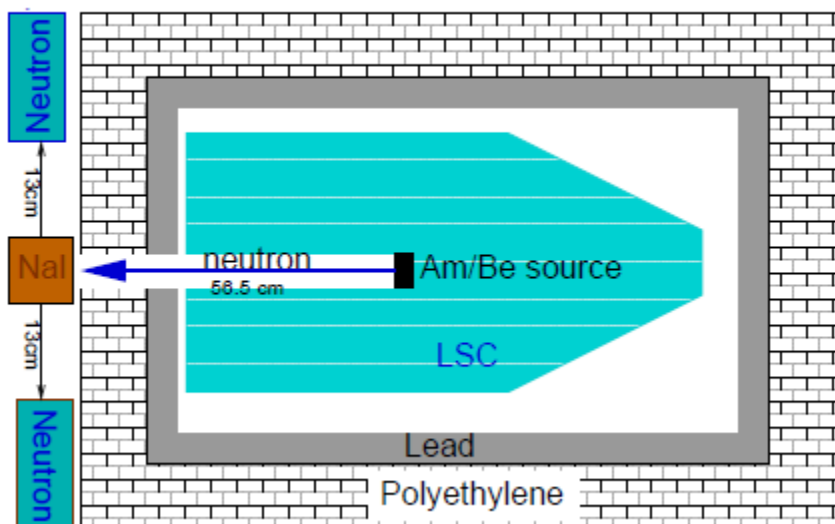


Deposit energy on NaI

ND3

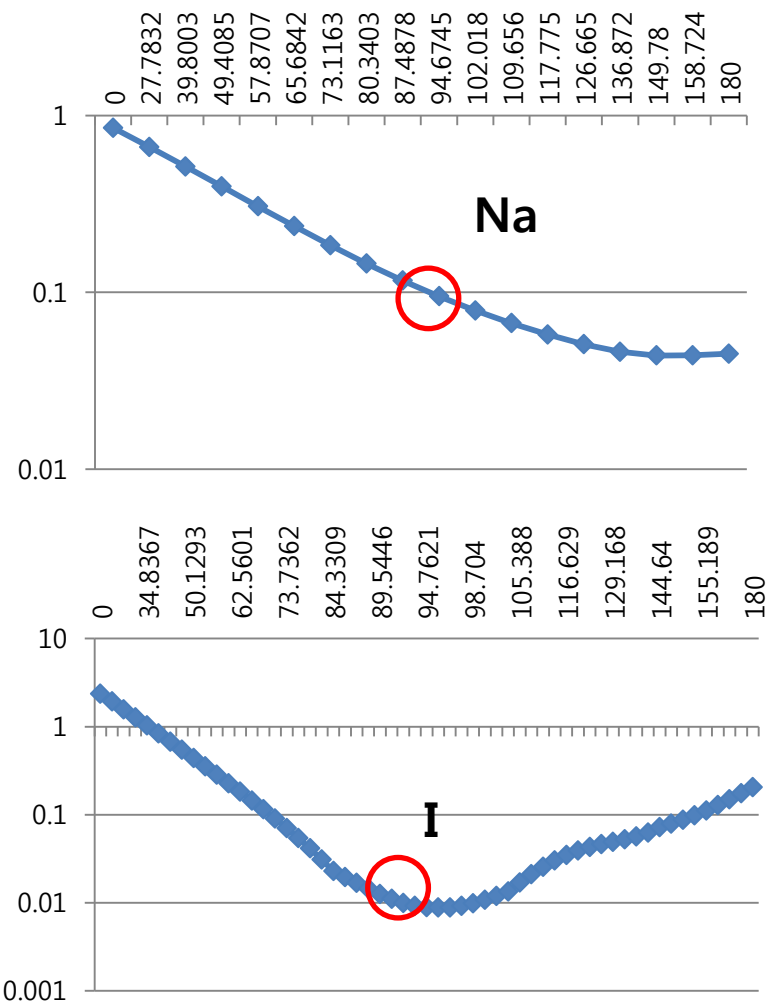


Am/Be experimental setup and cross section of Na and I

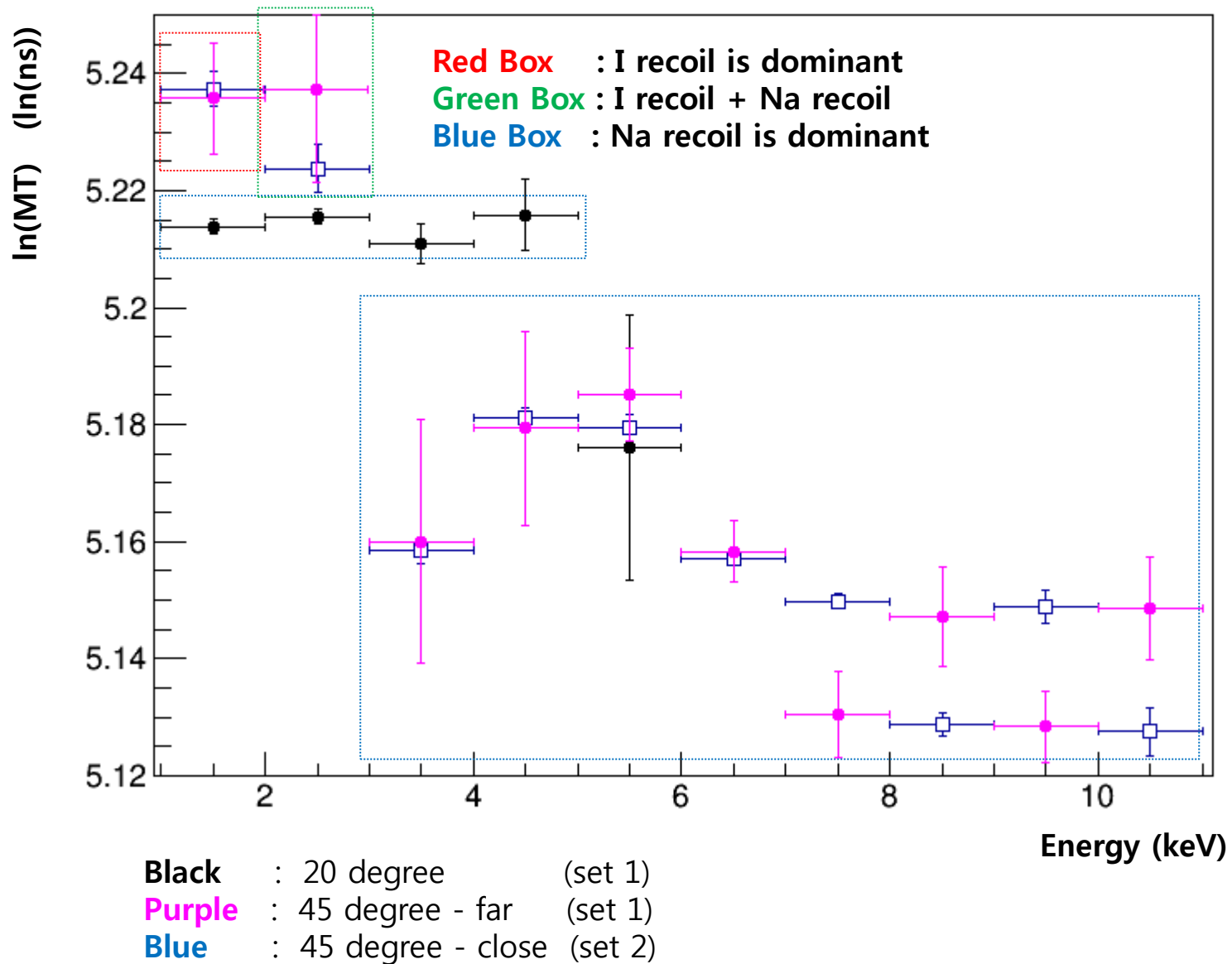


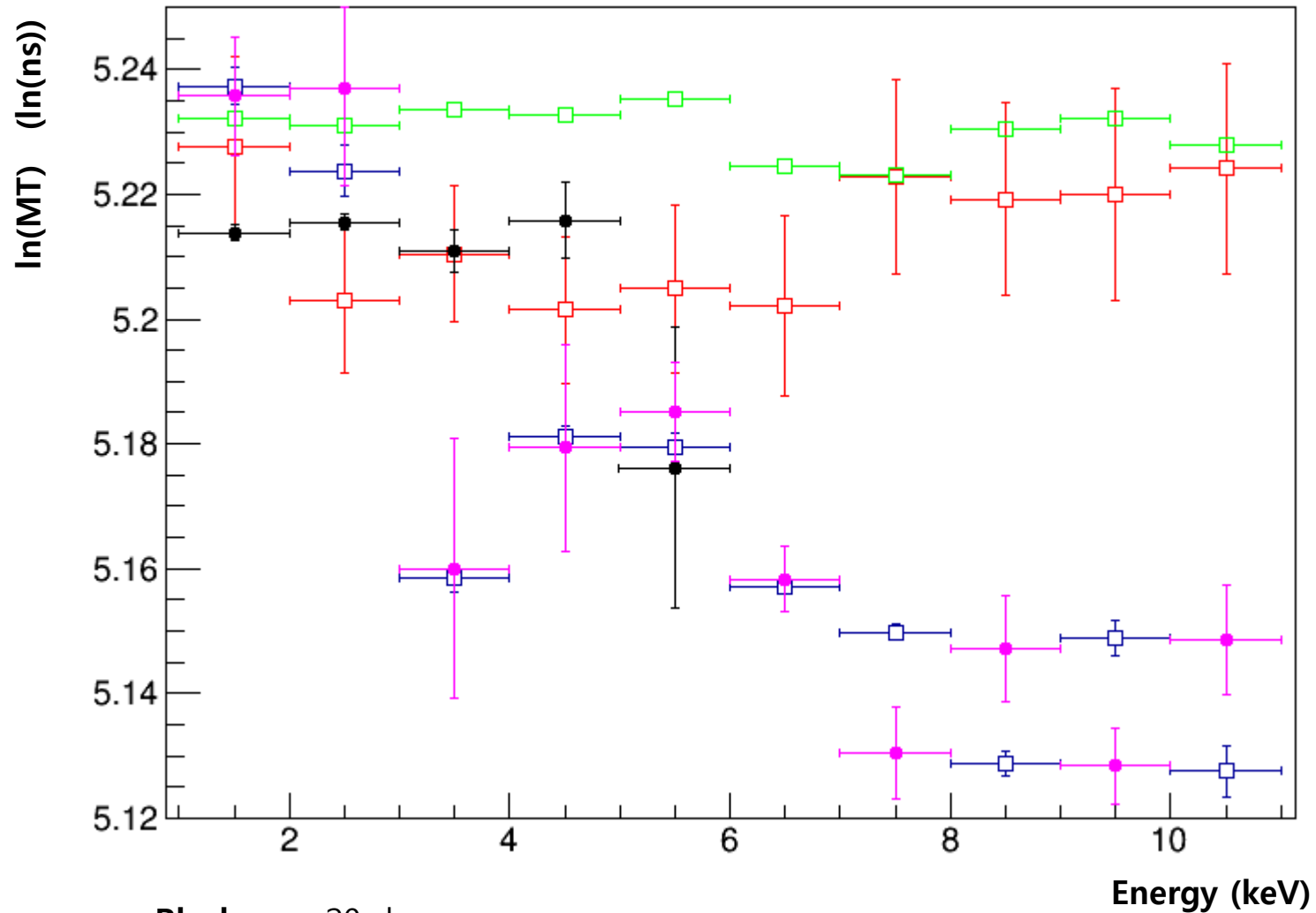
Calculated visible energy of
I recoil events < 10 keV

(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 / HSlee
- Green** : Am/Be source / My analysis code