

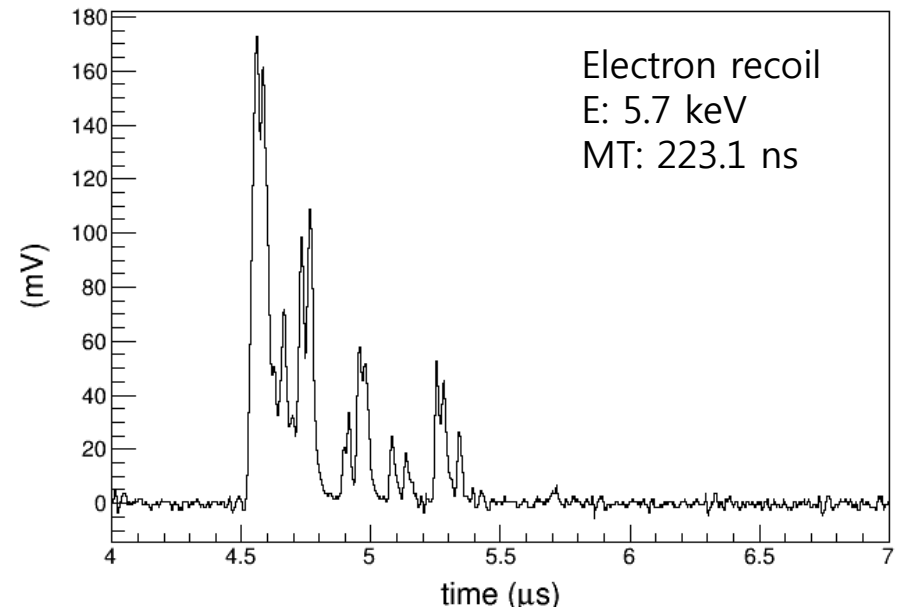
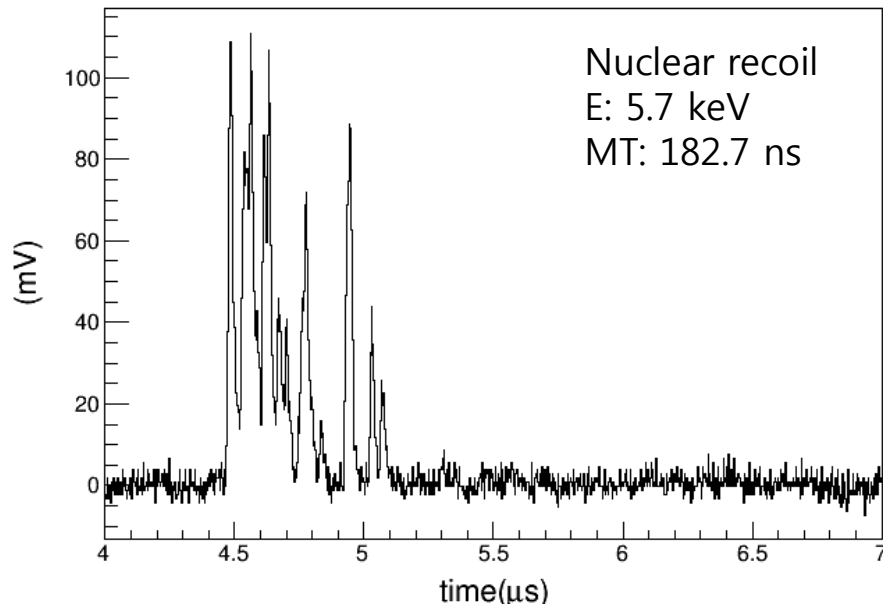
KIMS-NaI analysis

Kim, Kyungwon

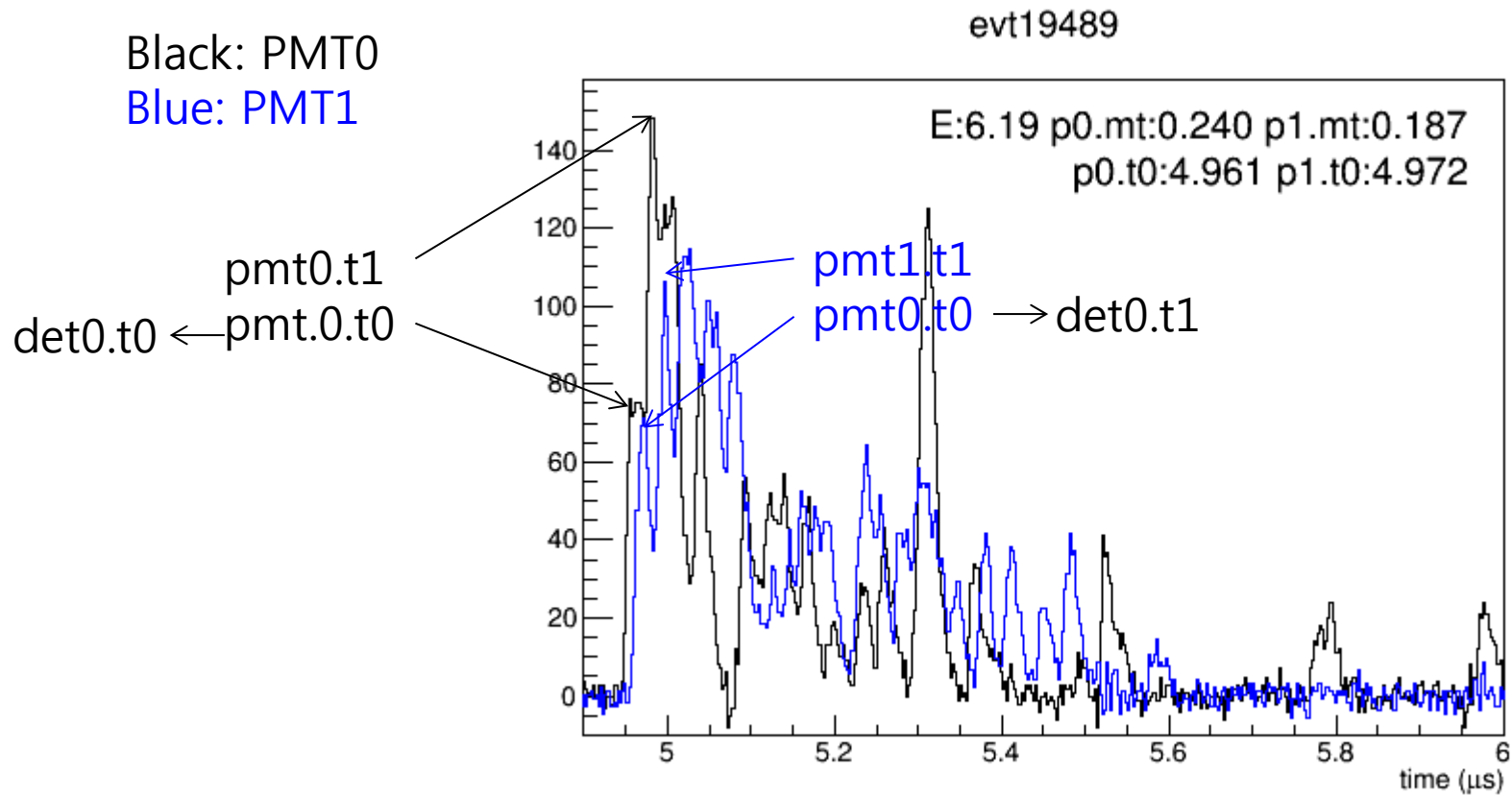
2016. 8. 17.

Signal in NaI(Tl) crystal

Scintillation signal in NaI(Tl) crystal

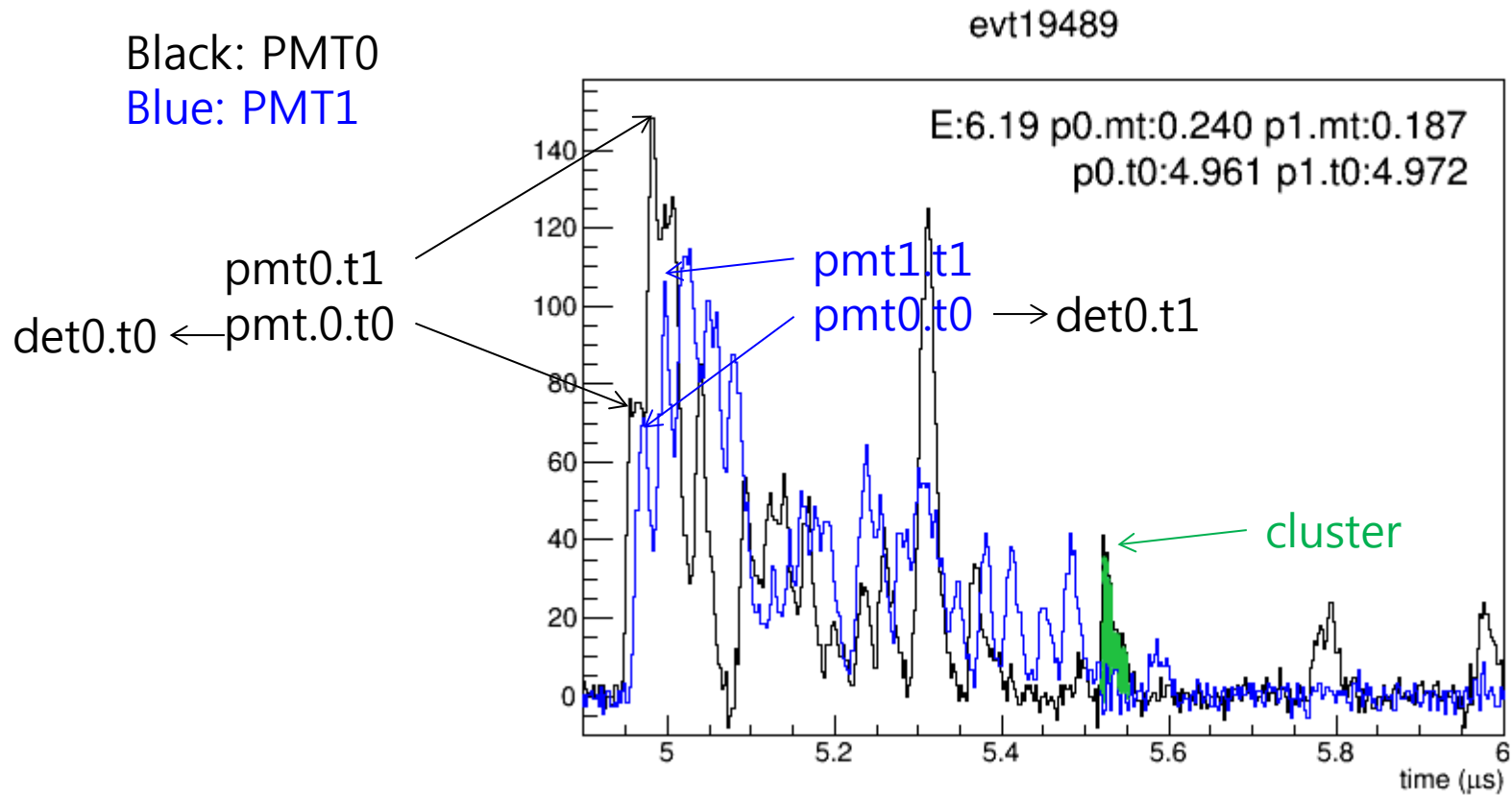


KIMS-NaI analysis



t0: first cluster time
t1: second cluster time

KIMS-NaI analysis



t0: first cluster time
t1: second cluster time

KIMS-NaI analysis – mean time

- Mean time

$$pmt.mt = \frac{\sum A_i \times t_i}{\sum A_i} \quad \begin{array}{l} A_i: \text{charge of } i\text{th signal cluster} \\ t_i: \text{time of } i\text{th signal cluster} \end{array}$$

$$det.mt = \frac{(pmt0.mt + pmt1.mt)}{2} - det.start\ position$$

$$det.mt = \left(\frac{pmt0.mt - pmt.start\ position}{2} + \frac{pmt1.mt - pmt.start\ position}{2} \right)$$

start position:

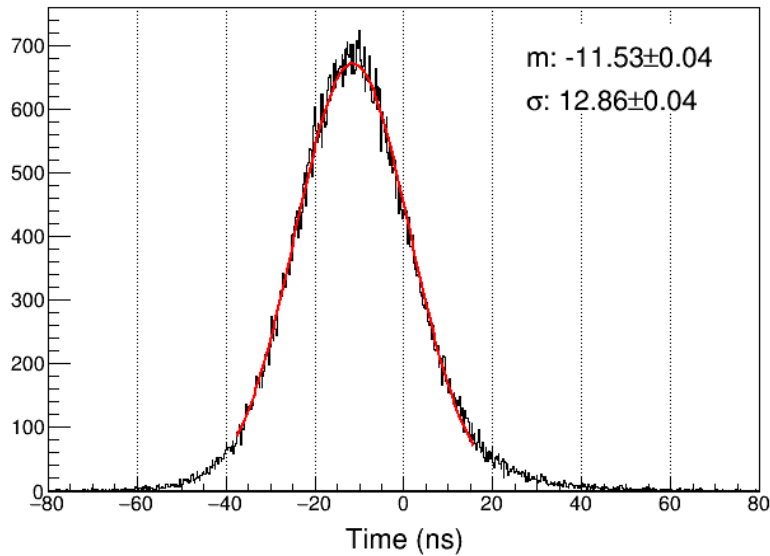
if $t_0 > \text{trigger position} - 0.2\ \mu s$, start position = t_0

else, start position = t_1

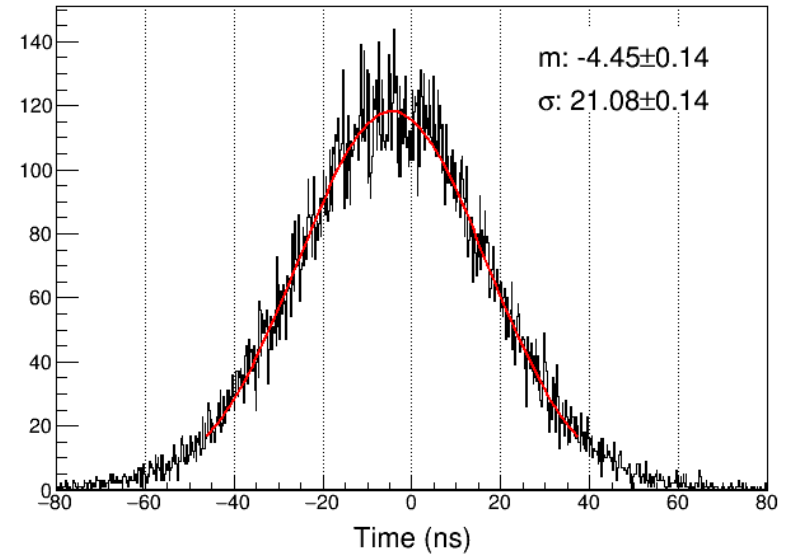
Time difference between first cluster in two PMTs

- $pmt0.t0 - pmt1.t0$

Small NaI002 crystal
(neutron calibration)

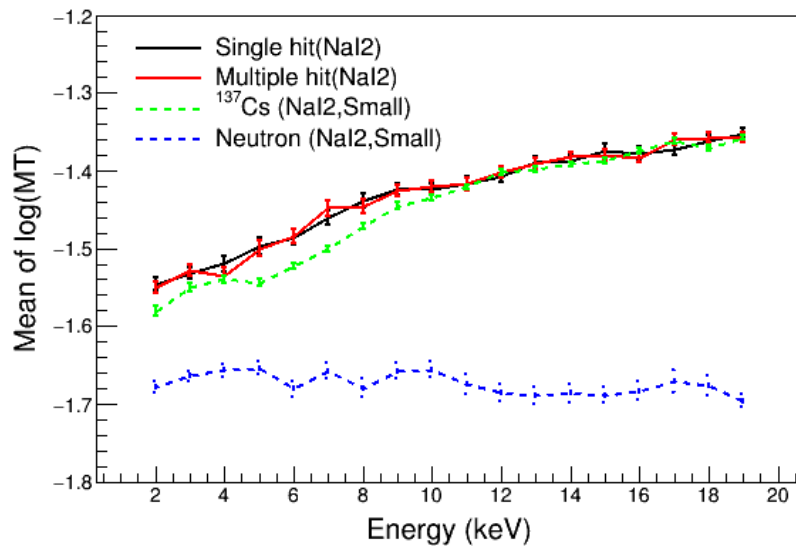


Large NaI002 crystal
(underground data)

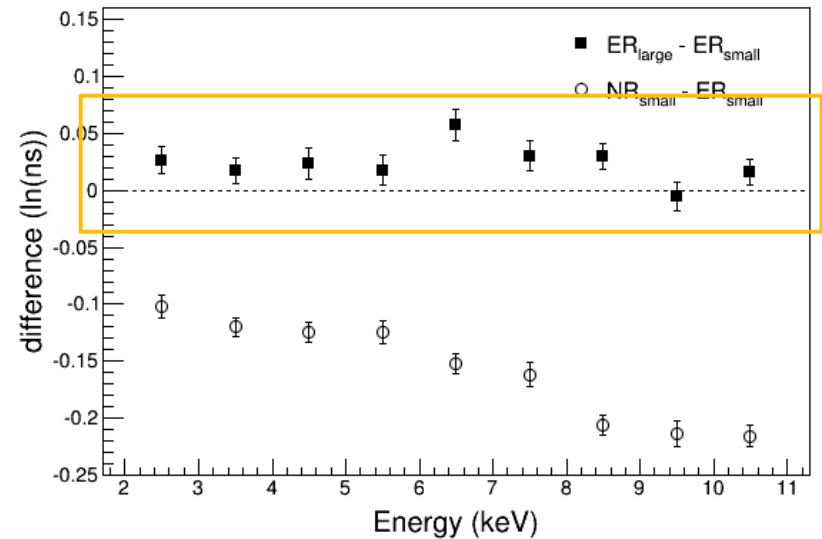


Mean of $\ln(MT)$ distribution (NaI002)

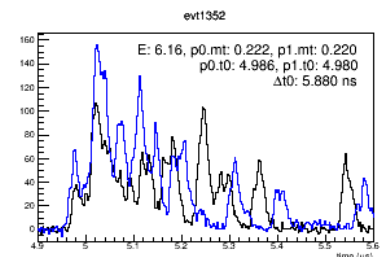
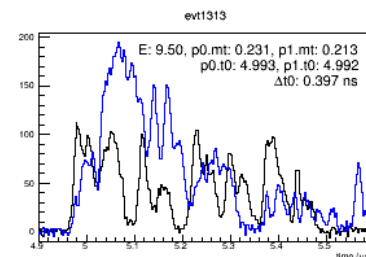
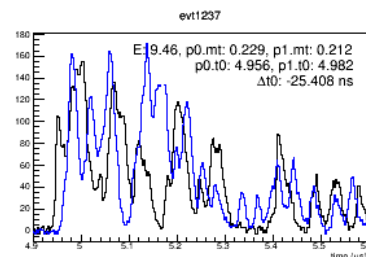
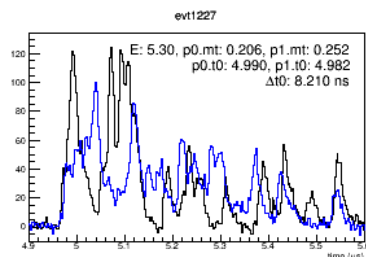
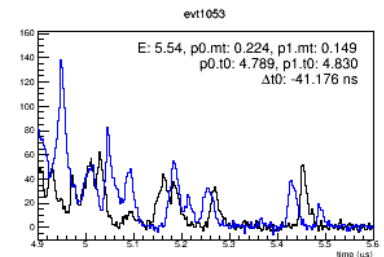
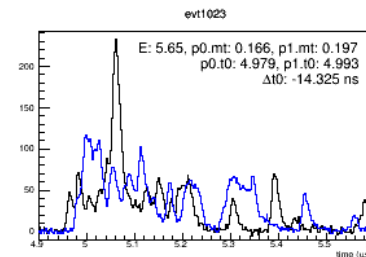
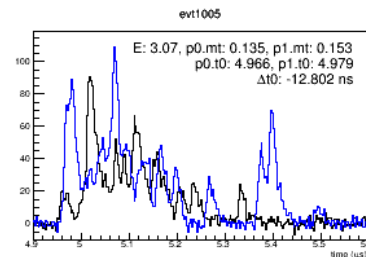
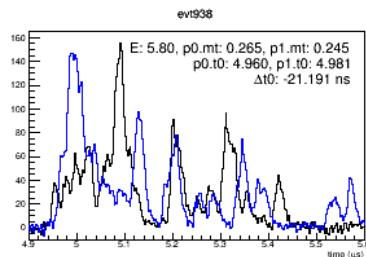
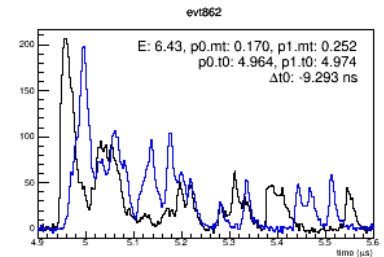
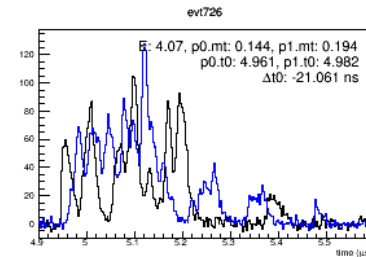
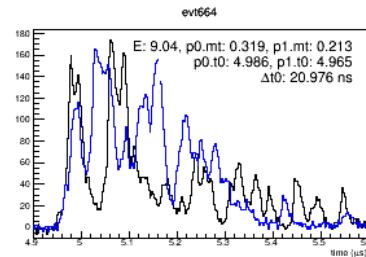
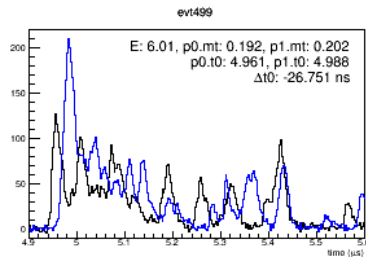
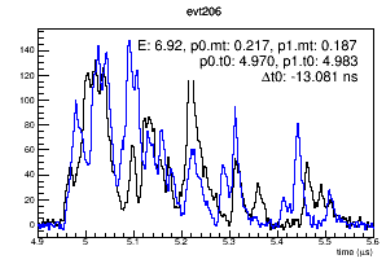
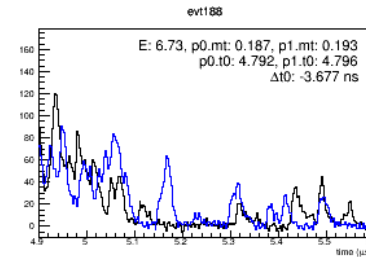
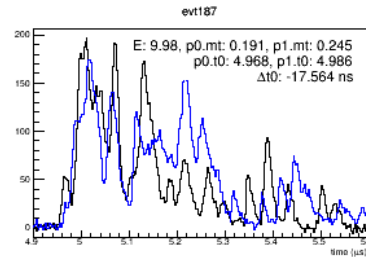
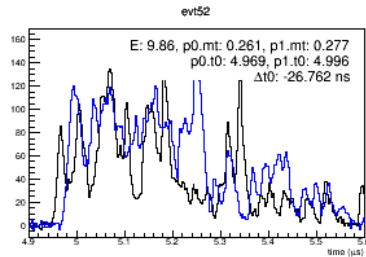
■ NaI002



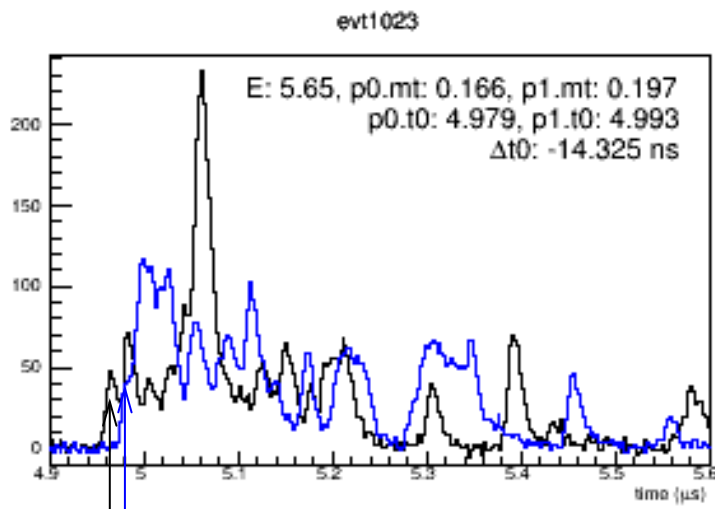
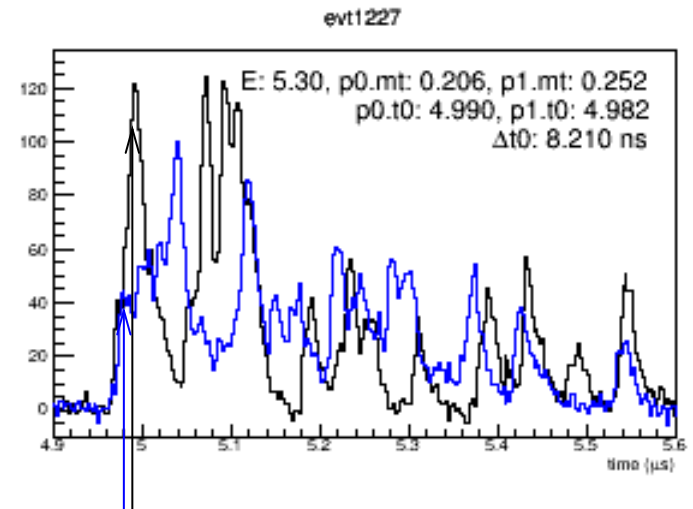
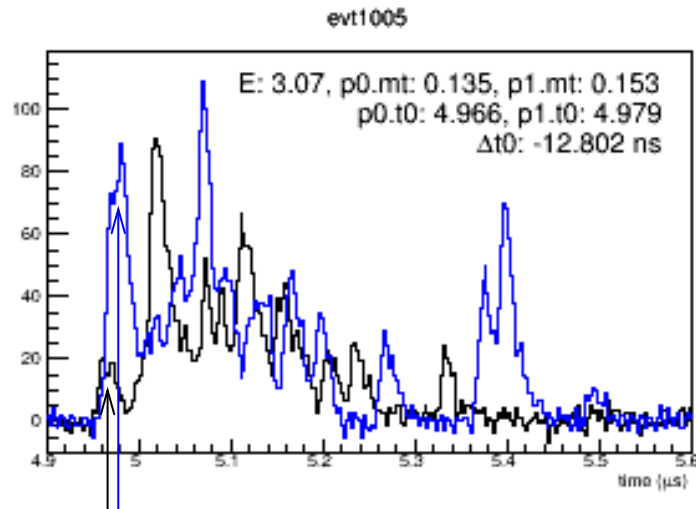
Mean_large - Mean_small



Signals (t0 difference)



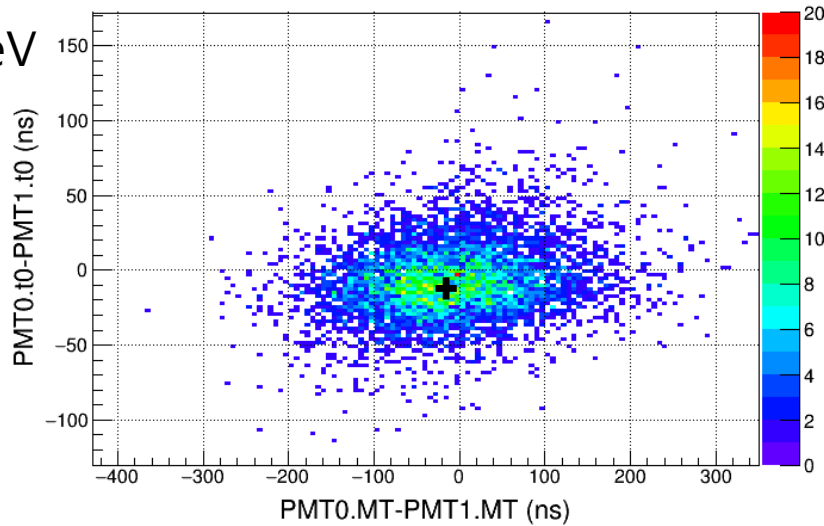
Signals (t0 difference)



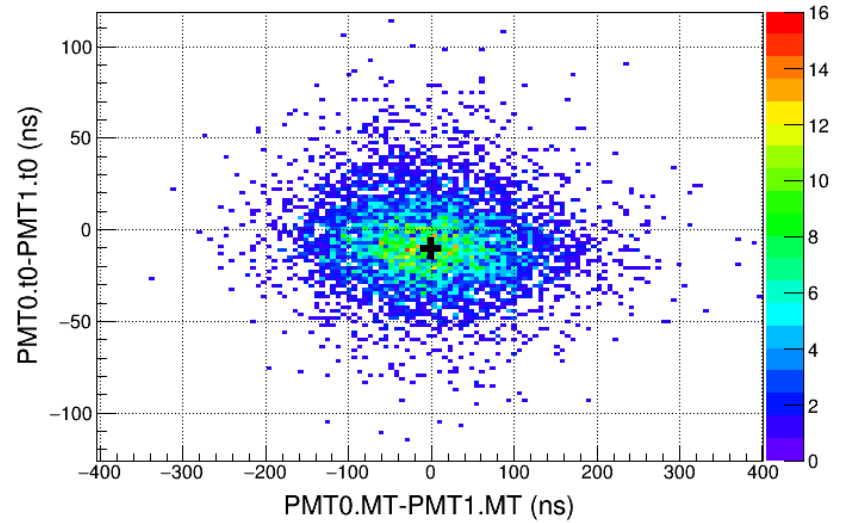
Start position correction

det.start_position

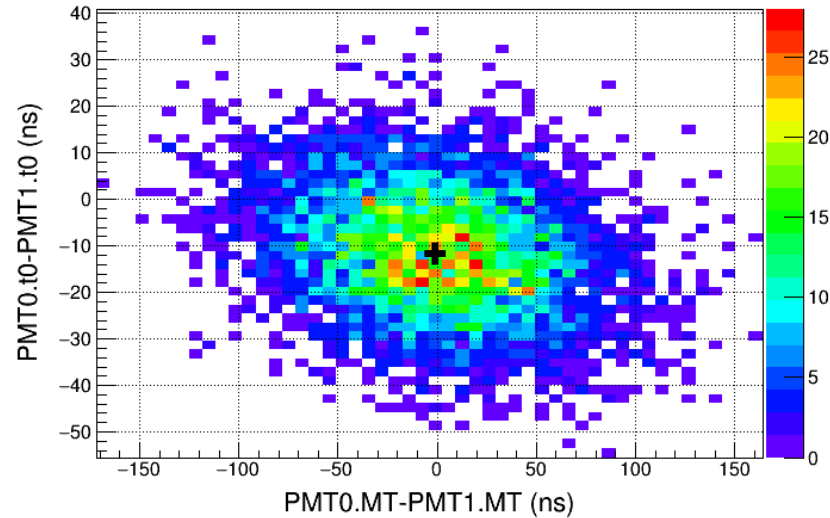
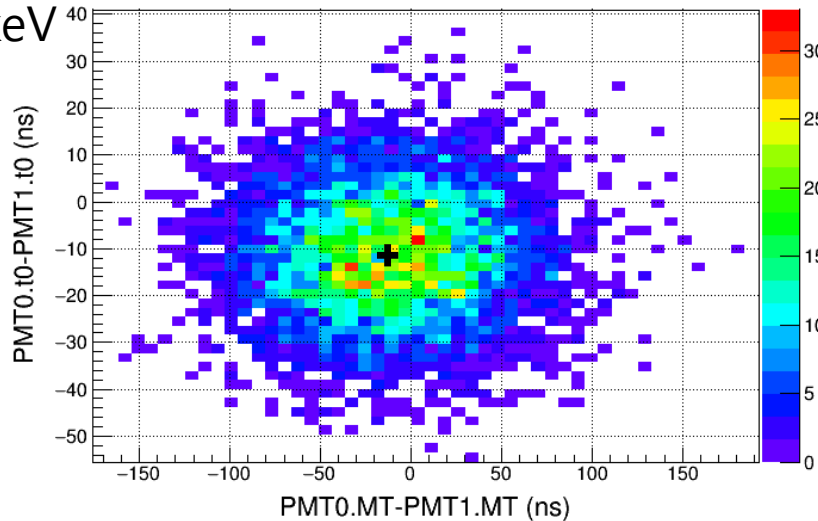
2 keV



pmt.start_position



10 keV



KIMS-NaI analysis – cluster

- Total charge sum
(used for energy calculation and noise rejection parameter)

$$pmt.qc = \sum A_i \quad A_i: \text{charge of } i\text{th signal cluster}$$

$$det.qc = \frac{(pmt0.qc + pmt1.qc)}{2}$$

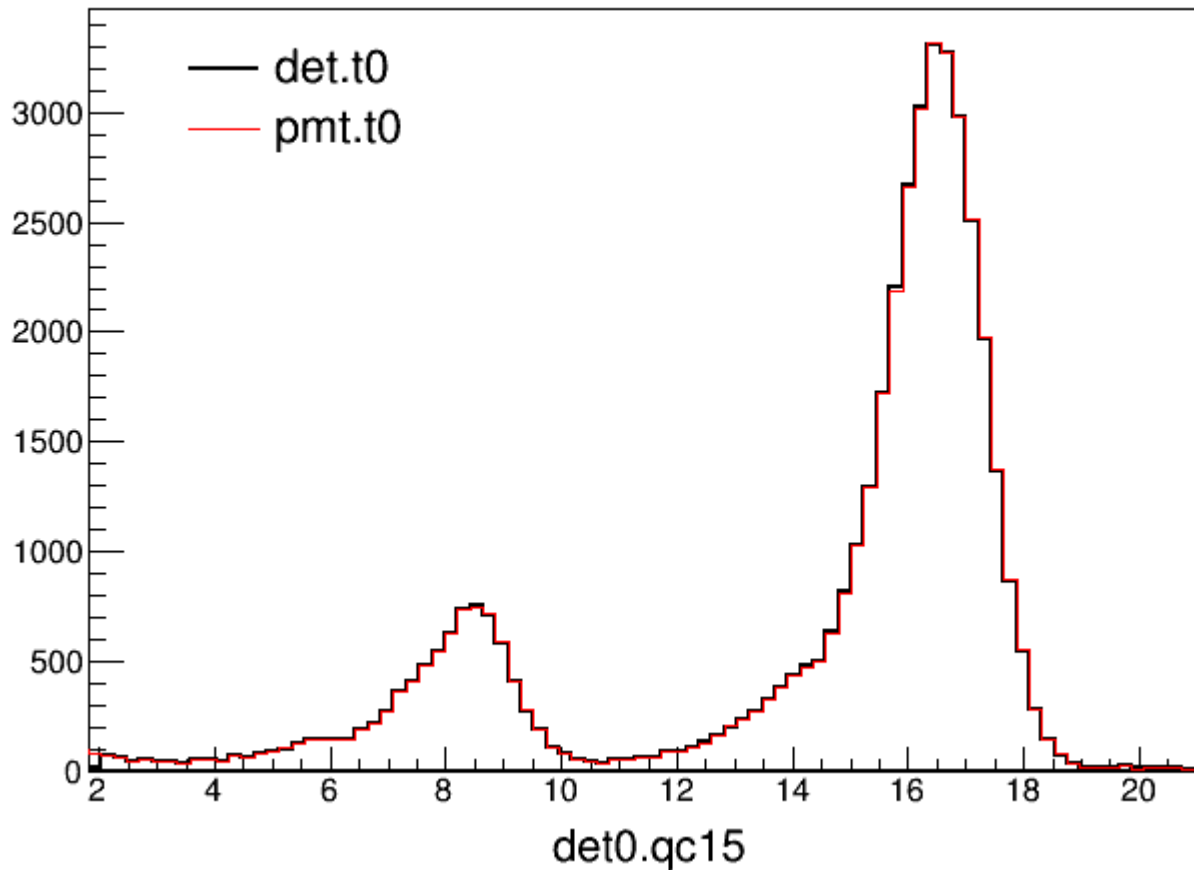
$\sum A_i$: Sum of cluster area

Under time of i th signal cluster below $det.start_position + T$

T: specific time window (ex: $1.5 \mu s$, $5 \mu s$ etc.)

Start position correction – energy calculation

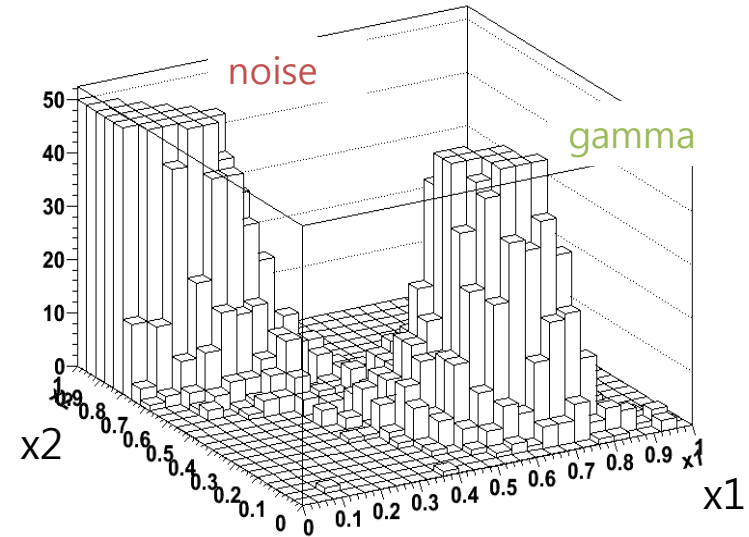
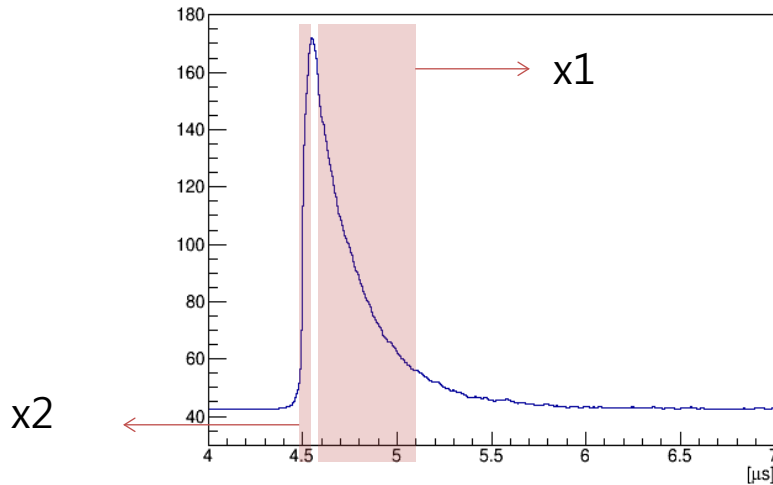
- Total charge sum $\rightarrow$ qc in $1.5 \mu\text{s}$



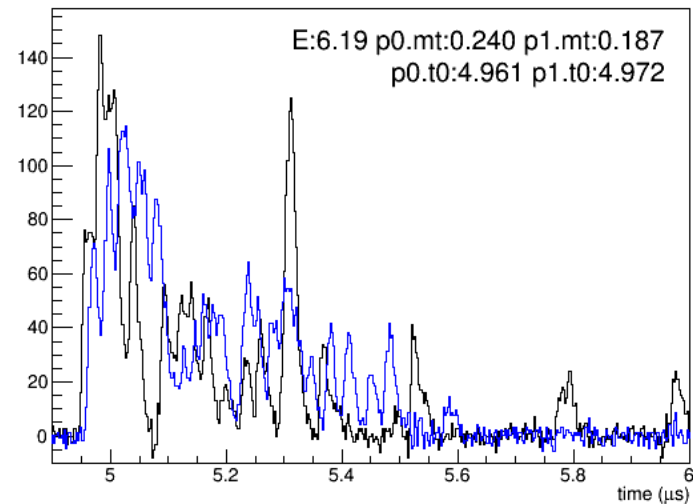
No effect on energy calibration

Start position correction – noise rejection parameter

- Charge ratio

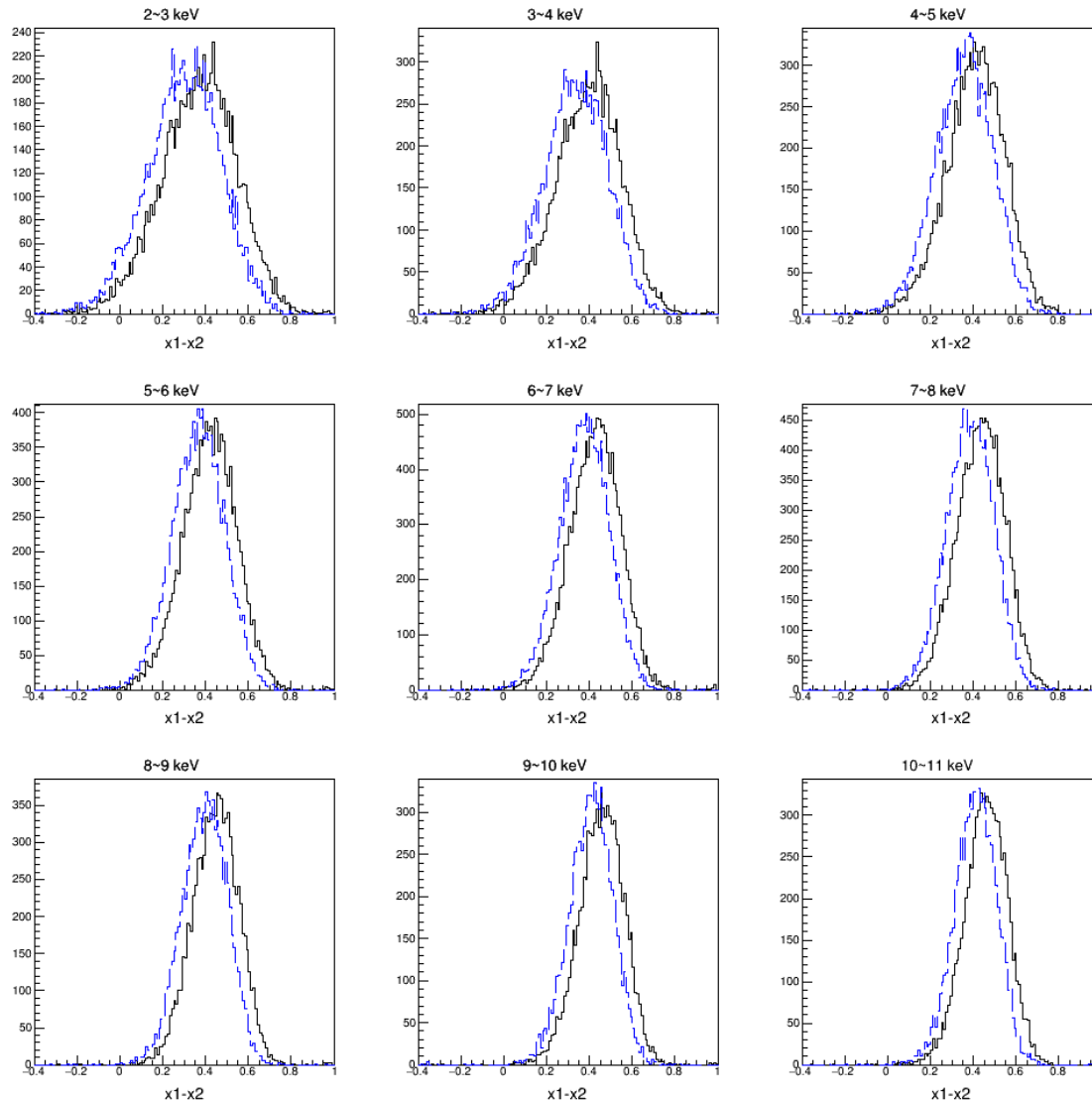


$$X1 = \frac{\text{Area}(100\text{ns} \sim 600\text{ns})}{\text{Area}(0 \sim 600\text{ns})}$$
$$X2 = \frac{\text{Area}(0 \sim 50\text{ns})}{\text{Area}(0 \sim 600\text{ns})}$$



Start position correction – charge ratio

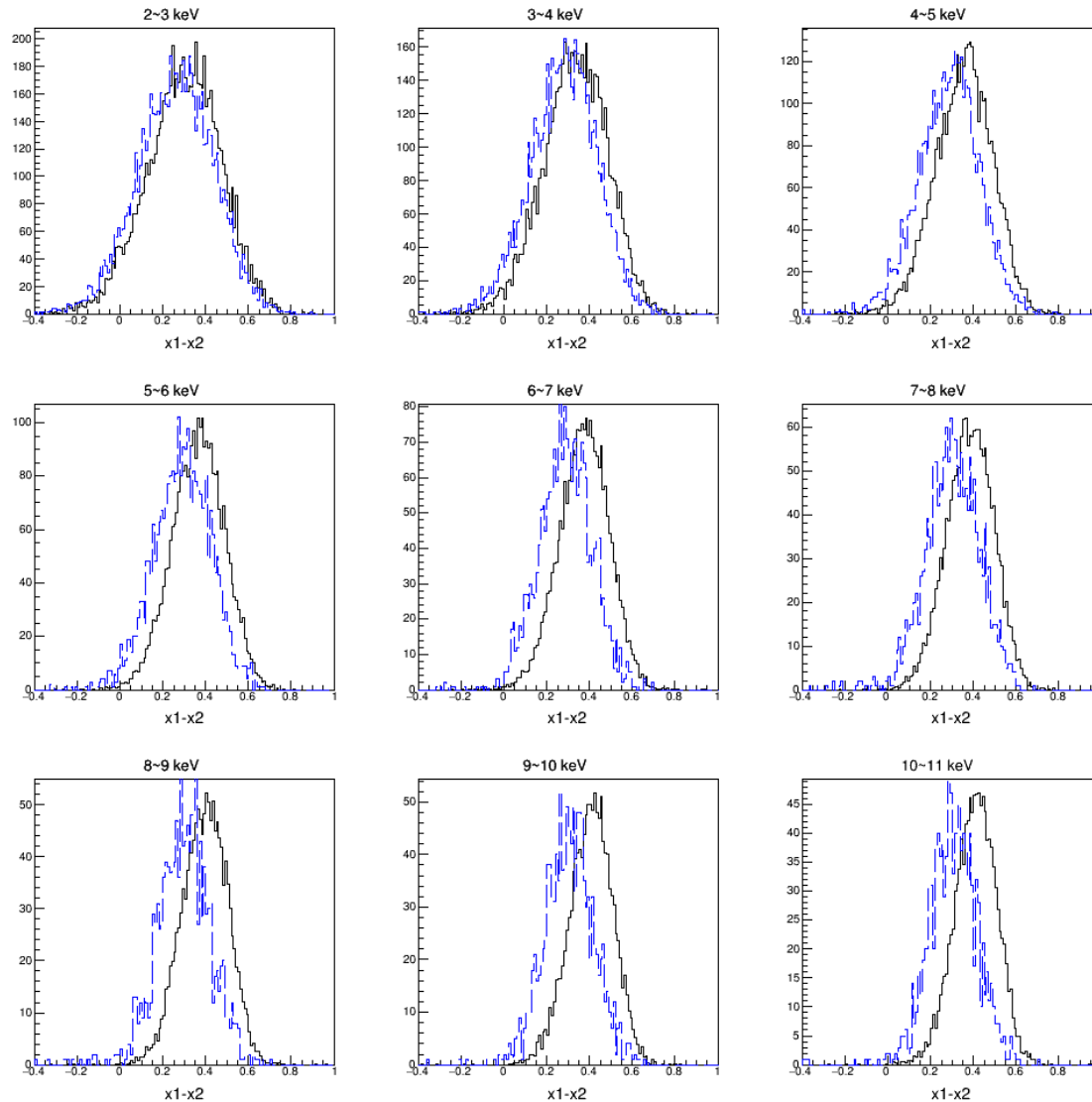
Black: det.t0
Blue: pmt.t0



$x_1 - x_2$ values are changed.

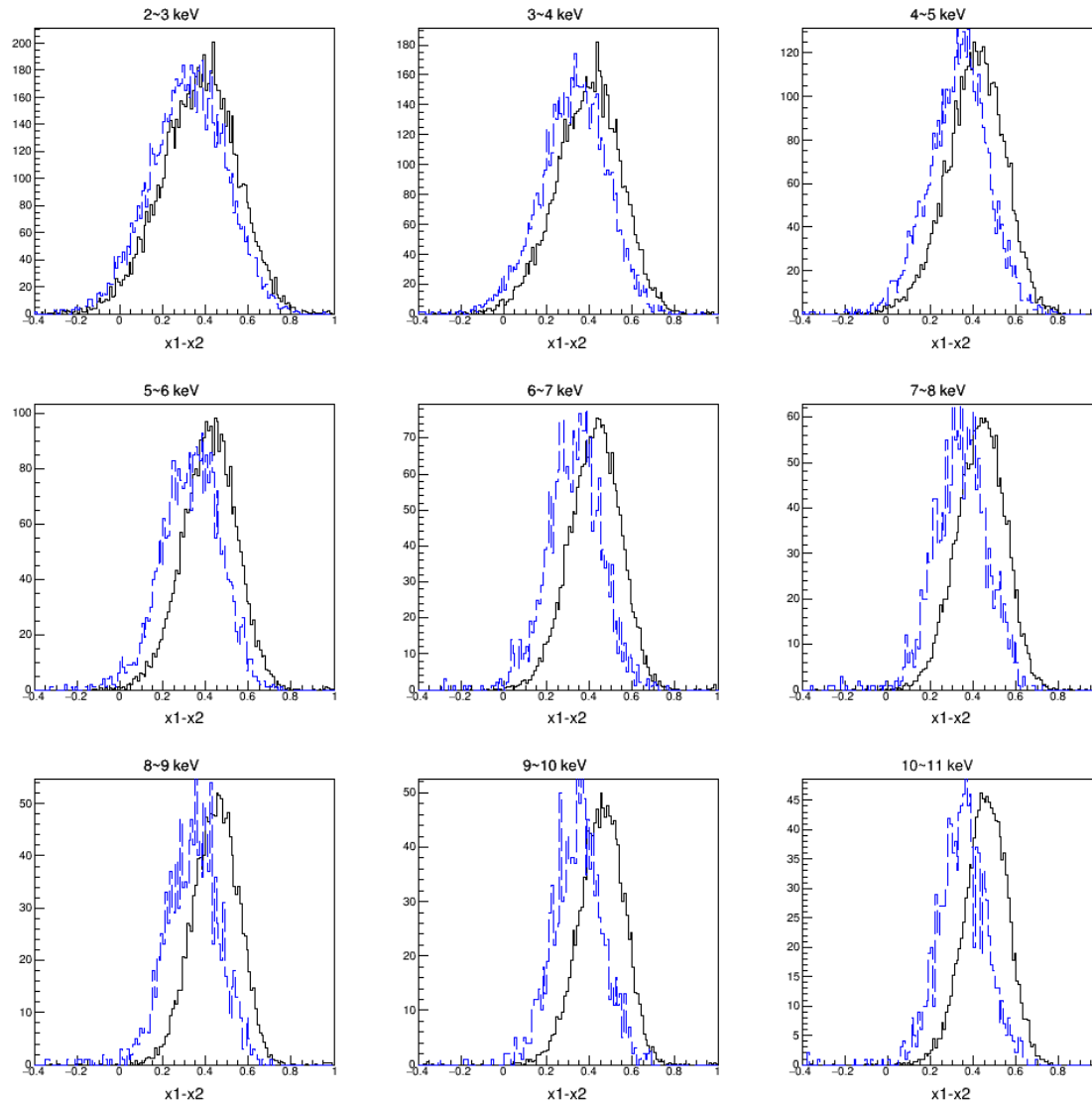
Charge ratio – gamma vs neutron (pmt.t0)

Black: gamma
Blue: neutron



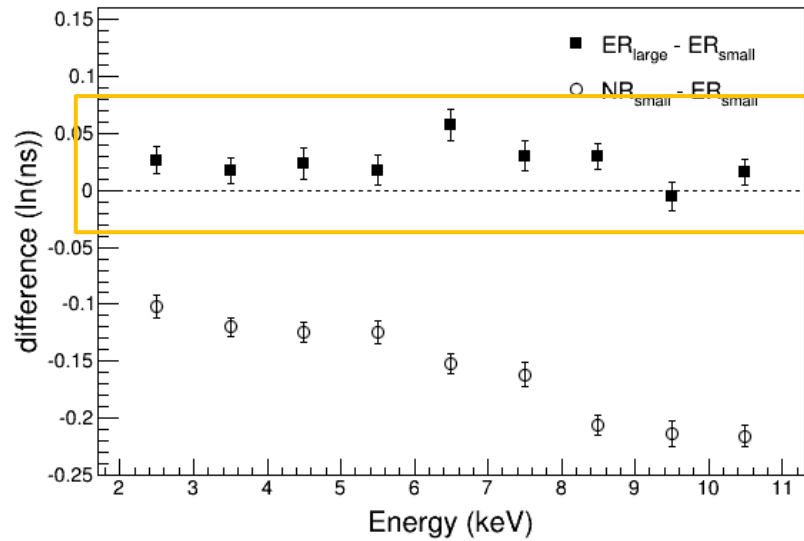
Charge ratio – gamma vs neutron (det.t0)

Black: gamma
Blue: neutron



Plan

- Check mean time distribution in small and large crystal after start position correction



KIMS data

KIMS data

Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/sda6	48G	40G	5.0G	89%	/
/dev/sda5	48G	7.9G	37G	18%	/usr
/dev/sda3	965M	30M	886M	4%	/boot
/dev/sda8	230G	59G	159G	28%	/belle
/dev/sda9	184G	20G	155G	12%	/var
/dev/sda10	96G	100G	277G	27%	/opt
tmpfs	3.9G	0	3.9G	0%	/dev/shm
/dev/sdb1	917G	717G	155G	83%	/home
/dev/sdc1	12T	2.3T	9.6T	19%	/strg0709
/dev/sdd1	24T	21T	3.4T	86%	/strg0710
/dev/sde1	24T	12T	12T	50%	/strg0711
hep2011:/scratch1		19T	16T	2.5T	87% /scratch1

KIMS-CsI data

/scratch1/

hep2000, hep2009_home, scratch01~scratch11

KIMS data

/strg0709/

drwxr-xr-x 3 kwkim users 17 Dec 16 2013 CsI_strg (ntp data: ~SET21)
drwxr-xr-x 5 jileeee users 4096 Dec 30 2011 jilee
drwxr-xr-x 4 wgkang users 34 Nov 14 2013 kims+nai
drwxr-xr-x 3 kwkim users 21 Dec 7 2013 ntpdata
drwxr-xr-x 4 kwkim users 35 Jan 7 2011 S35_data
drwxrwxr-x 8 kwkim users 73 Jun 27 2012 ssmyoung

/strg0710/

drwxrwxr-x 7 root users 76 Oct 29 2010 CsI_strg (raw, ntp data: SET22)
drwxrwxr-x 3 root users 20 Mar 28 2013 Env_strg
drwxrwxr-x 6 root users 65 Aug 10 2010 Neutron_strg

/strg0711/

drwxrwxr-x 6 belle users 57 Nov 14 2013 belle_data
drwxr-xr-x 3 jhchoi users 30 Dec 3 2014 LIBRA
drwxrwxr-x 6 root users 69 Oct 2 2014 strg1
drwxr-xr-x 4 bhokim users 63 Nov 21 2013 test

KIMS CsI data

hep2009

- raw data: (9T)
/strg0710/CsI_strg/RAWDATA/SET14~SET22
SET22: #100 (2009.9.9.) ~ 9365 (2012.3.24.)
- ntp data:
/strg0709/CsI_strg/DATA/ (1.5T)
SET14 ~ SET21

/strg0710/CsI_strg/DATA/SET22 (5.6T)
50 (2009.9.4.) ~ 9460 (2012.4.3.)
calibration files (2011, 2012),
lowE skim files,
ntuple_sadc_alpha, rmt10, sep
50 ~ 9110

S. C. Kim: 2009. 9. ~ 2010. 8.
J. H. Choi: 2009. 9. ~ 2012. 2.

CUP cluster

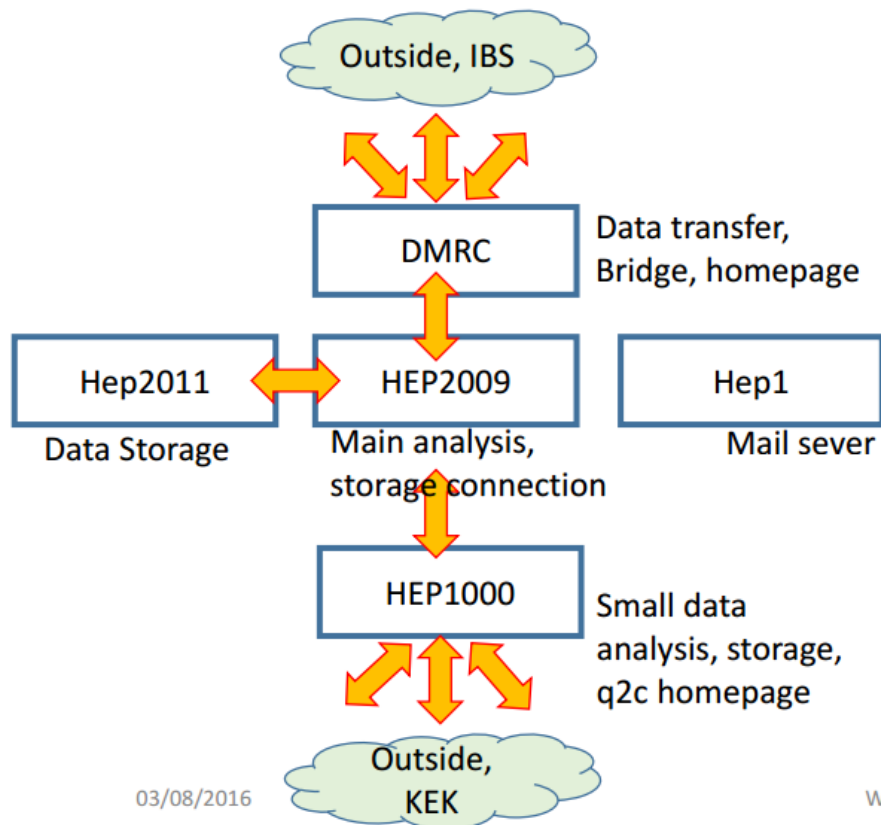
- no raw data
- ntp data:

/data/KIMS/CsI_strg/NTPDATA/SET22/ (3.3T)
50 (2009.9.4.) ~ 9460 (2012.4.3.)

ntuple_sadc_alpha
/data/KIMS/CsI_strg/SNTPDATA/SET22/ (39G)
50 ~ 9110

Backup slides

KIMS server status



- Connection log

DMRC : 25/month (from 2015.5)

- Main users : kwkim, jin lee

HEP2009 : 6/day (from 2016.7.25)

- Main users : arlee, jklee

HEP1000 : 25/month (from 2016.01)

- Main users : bhokim, jklee

HEP1 : 보통 pop3 나 imap 으로

접속하므로 로그체크외의 방법이 요구됨

Weekly meeting

9

KIMS Server (from J. K. Lee's slide)

Computer Log

KIMS Server

▪ Server Status

서버	구입시기	교체 및 추가	용도
hep1	2009-05		mail server
hep1000	2009-05		data analysis, storage, q2c homepage
hep2009	2009-06		main analysis, storage connection
L storage	2009-06 10TB	2009-11 5TB 추가	
dmrc	2013-09	2013-09	data transfer, bridge, homepage
hep2011	2011-07	2014-01	data storage
L storage	2011-07		