CsI Photon Detector Calibration using Kmu2

2015/12/15
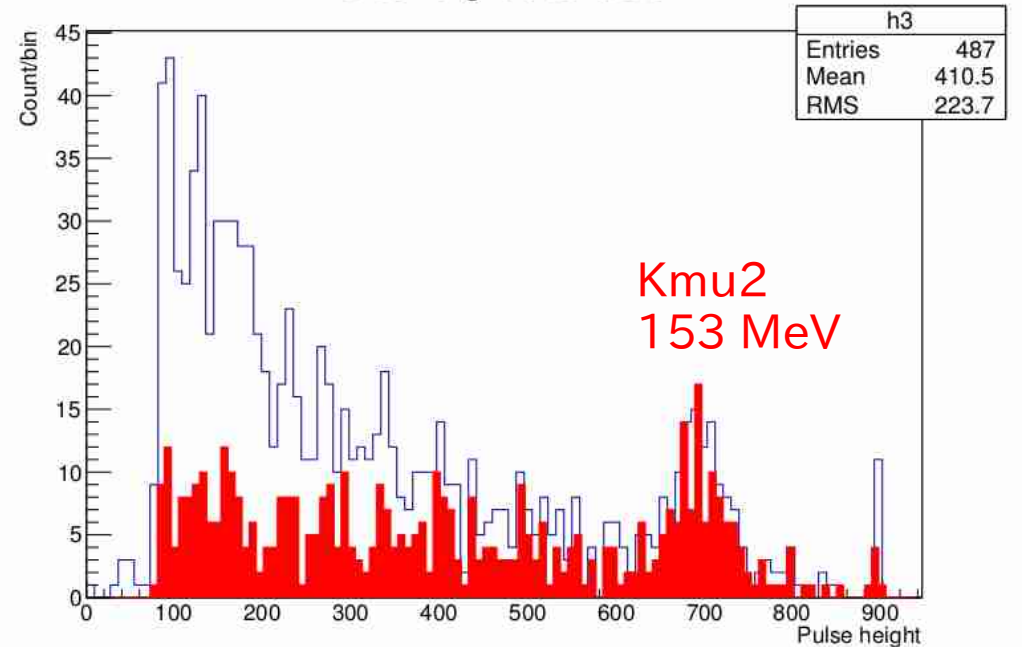H. Ito

How to Calibration

Waveform

max

charge

min

tpeak

ADC channel / TDC channel
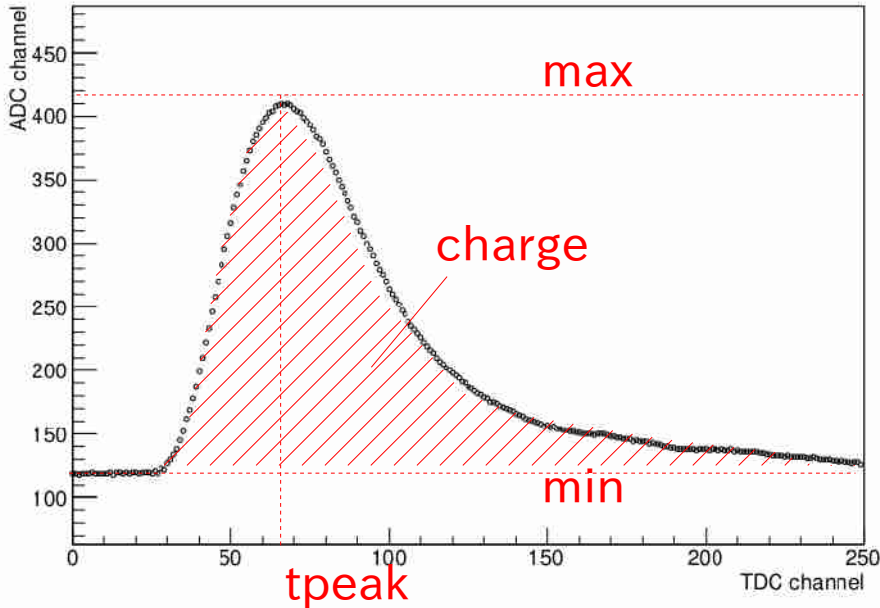
Pulse height distribution

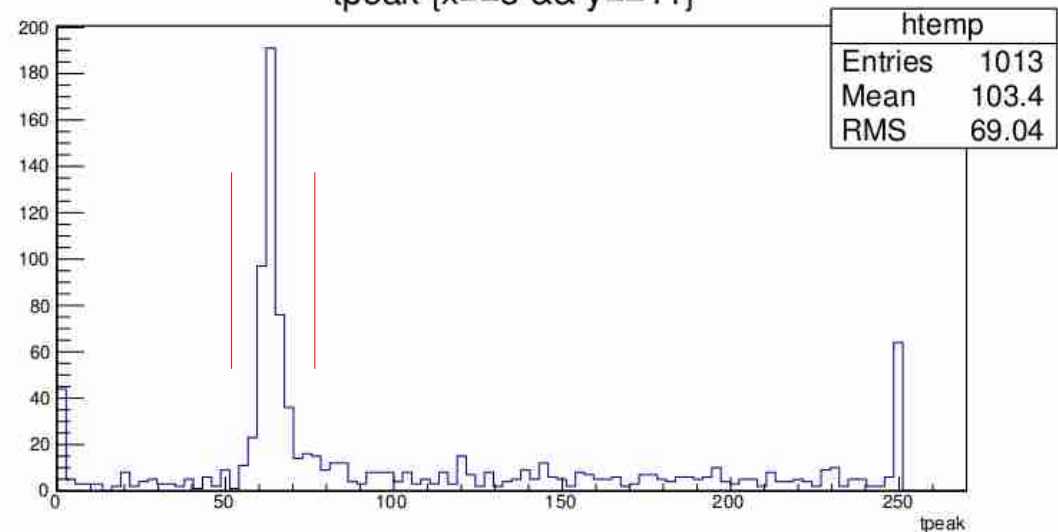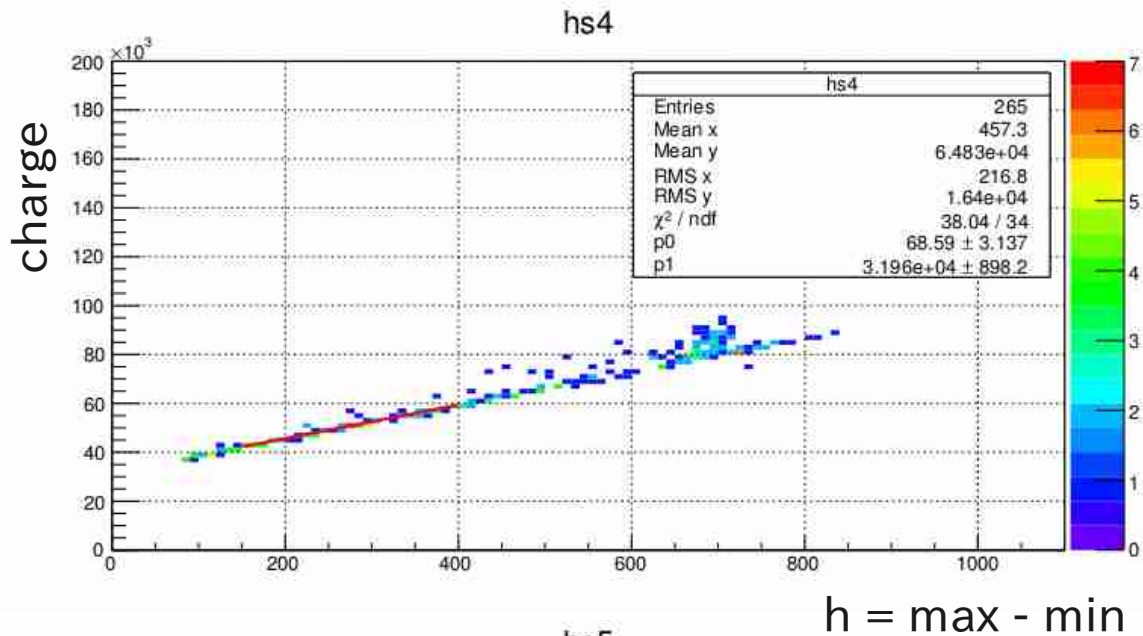| h3	
Entries	487
Mean	410.5
RMS	223.7

Kmu2
153 MeV

Count/bin / Pulse height

Selection of Event Tag
 - K+ Stopped
 - mu event (TOF, AC, PGC)
 - CsI single HIT

Run #3059 – 3067
Total event: 47,352

tpeak {x==3 && y==11}

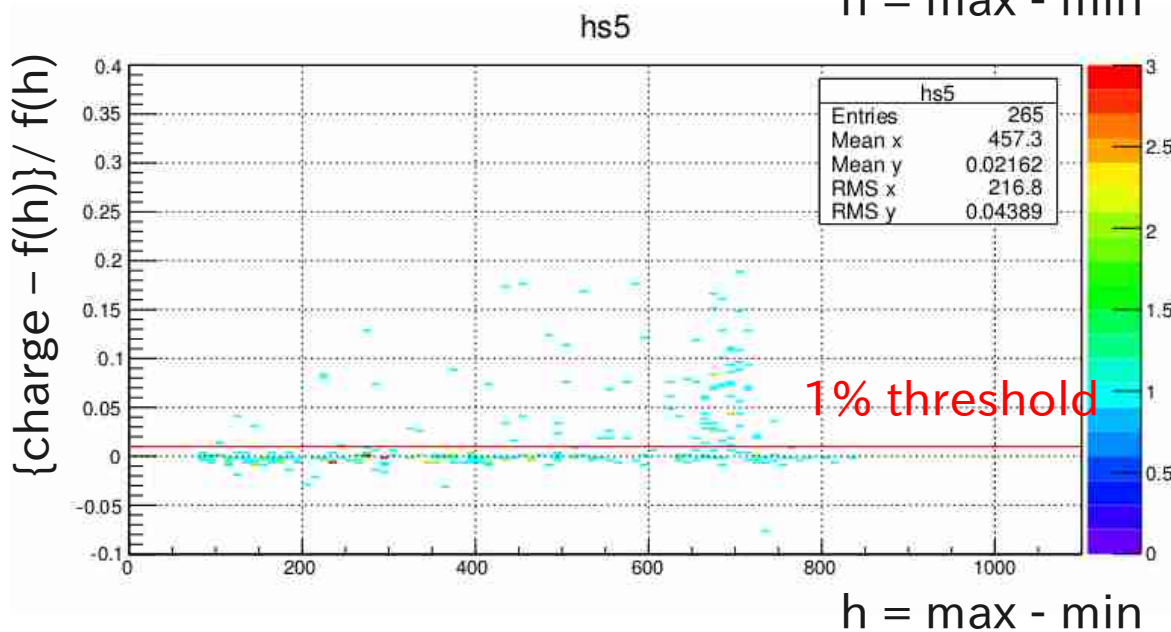| htemp	
Entries	1013
Mean	103.4
RMS	69.04

Extracted Kmu2

Charge vs. pulse height

Waveform is similar.
The wave has linearity.
But, a deviation is in 600-800.

Why?

e^+ from μ^+ make second pulse.
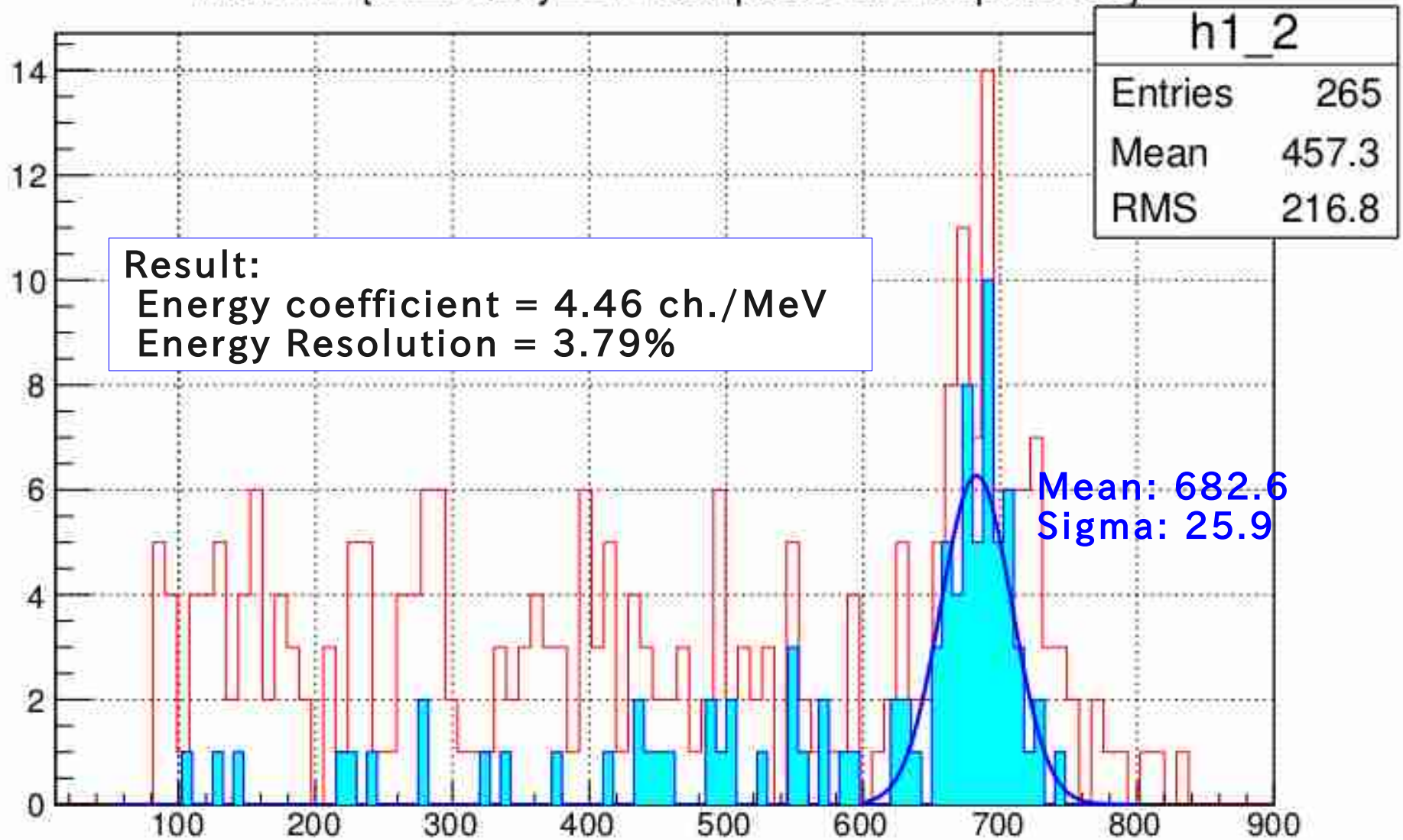μ tends to stop in Kmu2 region.

Fitting by the line

The function defined f(h).
In the projection of the line,
selected over the threshold,
Kmu2 is only extracted.

Result

max-min {x==3 && y==11 && tpeak>60 && tpeak<65}

h1_2	
Entries	265
Mean	457.3
RMS	216.8

Result:
 Energy coefficient = 4.46 ch./MeV
 Energy Resolution = 3.79%

Mean: 682.6
Sigma: 25.9

Future

Really?

The deviate is almost multiple wave.
Second pulse properties is confirmed.
Dose different of the time mean τ_μ?
Is second height, max. 52 MeV?

Future Work

All crystal energy calibration
Confirmation the dt and h2
  from all crystal.
Cosmic ray calibration
  from e+ emitted stopped mu+

wf_445 (n=25978, run=3063)

χ^2 / ndf	1489 / 235
p0	563.2 ± 8.642
p1	23.1 ± 0.112
p2	25.37 ± 0.2221
p3	17.02 ± 0.1256
p4	18.55 ± 0.2177
p5	0.07918 ± 0.005978
p6	31.34 ± 1.47
p7	130 ± 0.01932
p8	190.5 ± 2.27
p9	111.1 ± 0.3516
p10	30.91 ± 0.2149
p11	19.93 ± 0.3794
p12	16.22 ± 0.2384
p13	0.07904 ± 0.004195
p14	63.37 ± 8.944

Second pulse height vs. peak time difference

hs11	
Entries	54
Mean x	2947
Mean y	57.8
RMS x	1508
RMS y	11.88