Status Report #19

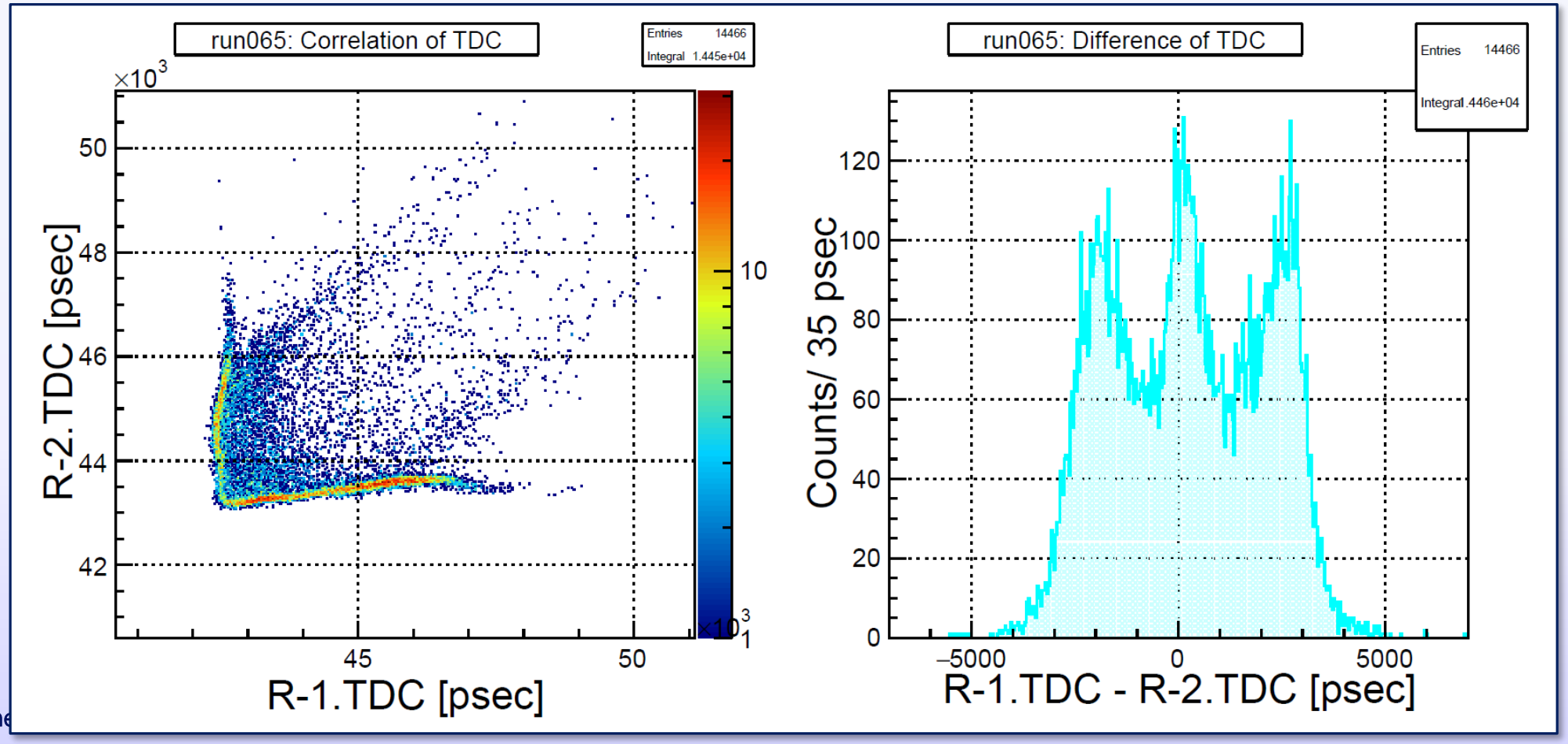
2020. Mar 19 (Thu)

B4 FUJIWARA Tomomasa

- ToF: TDC study
- Test of $5^{t} \times 44^{w}$ mm^2 scintillator
- **Making poster for JPS**
- **Making Presentation files**

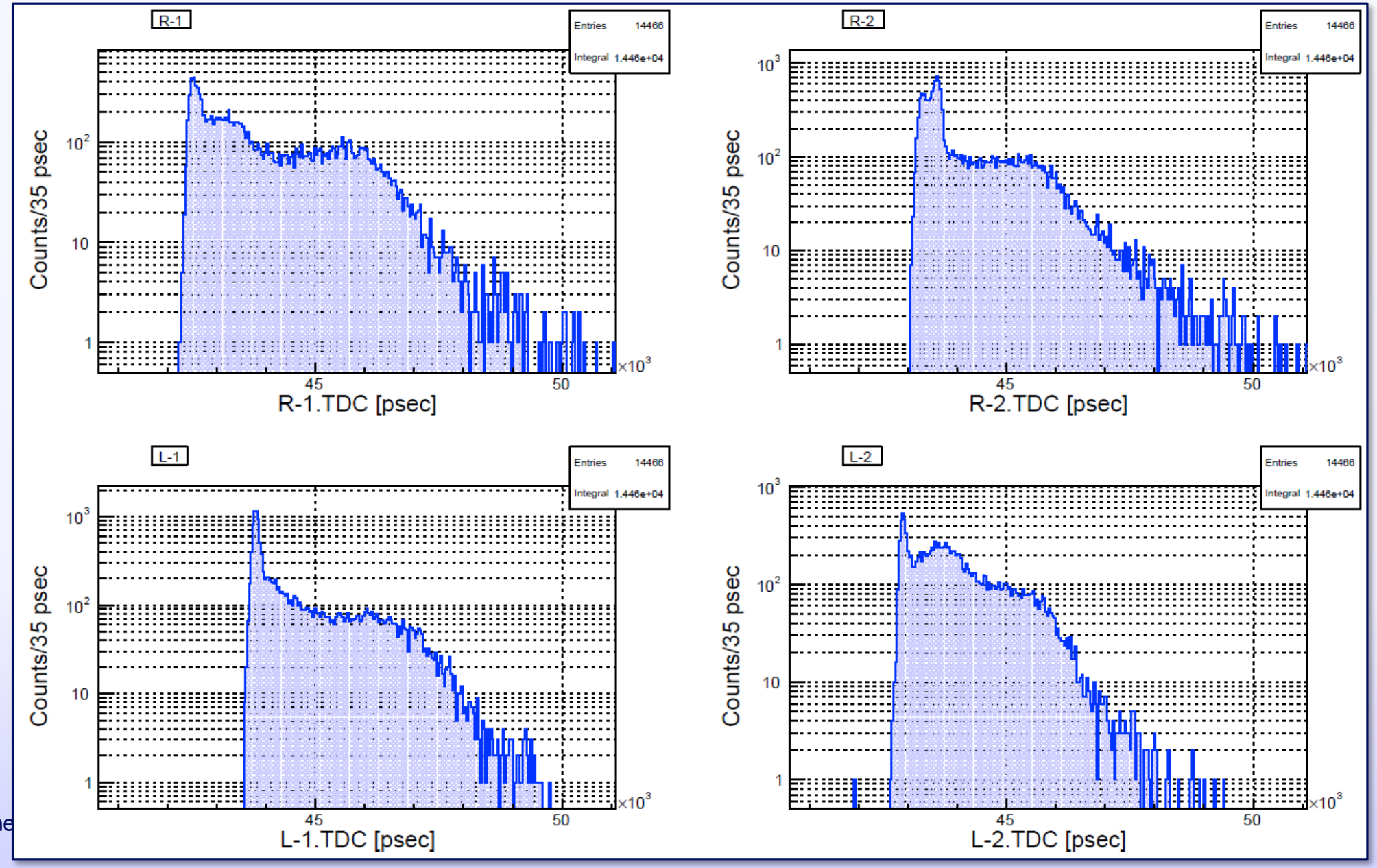
TDC study

- At last NKS2 meeting, distribution of difference of TDC at same scintillator has strange structure.
- Study about that.



TDC study

- First, checked raw TDC dist.

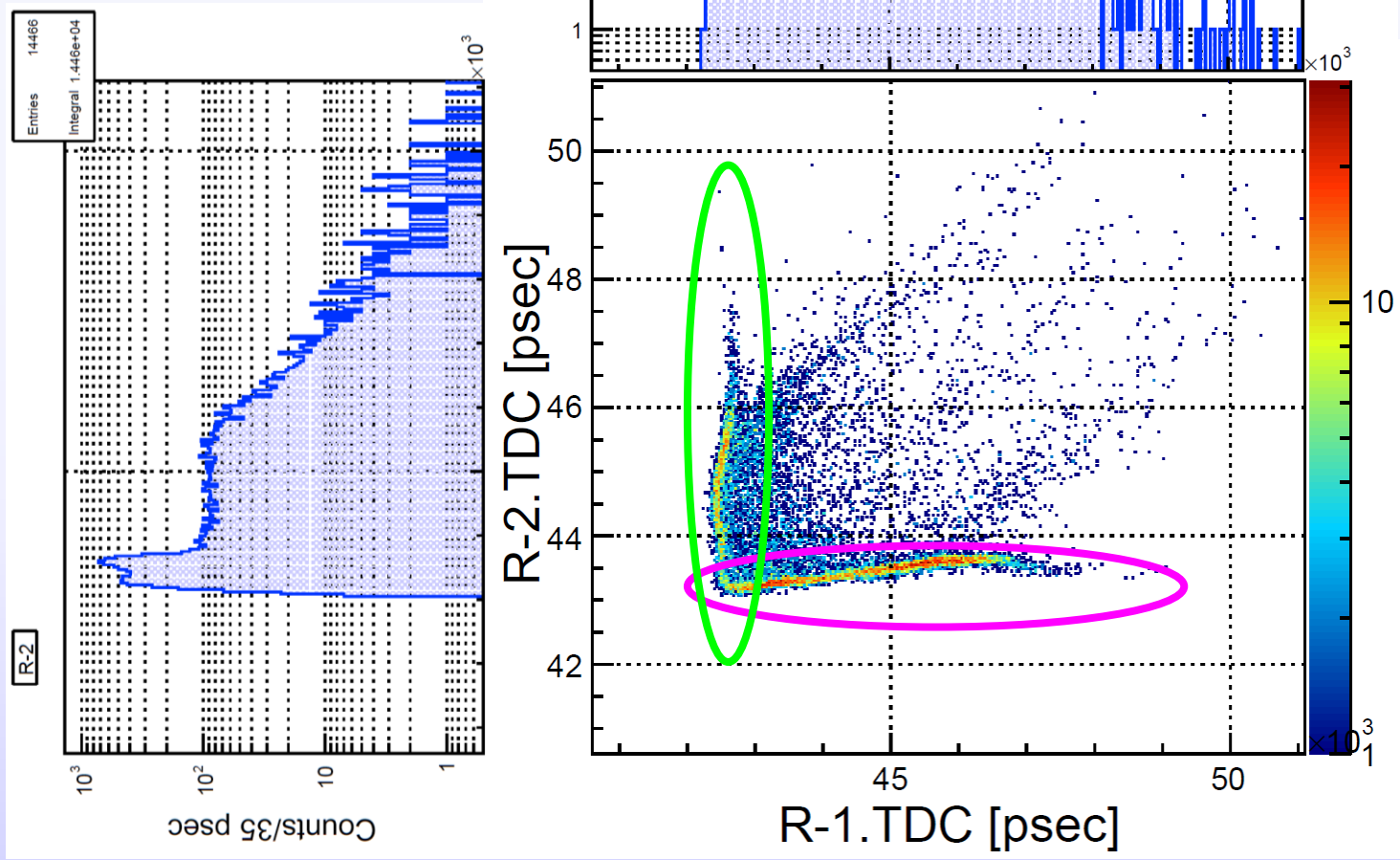


TDC study

- These are corresponding like “L” region.

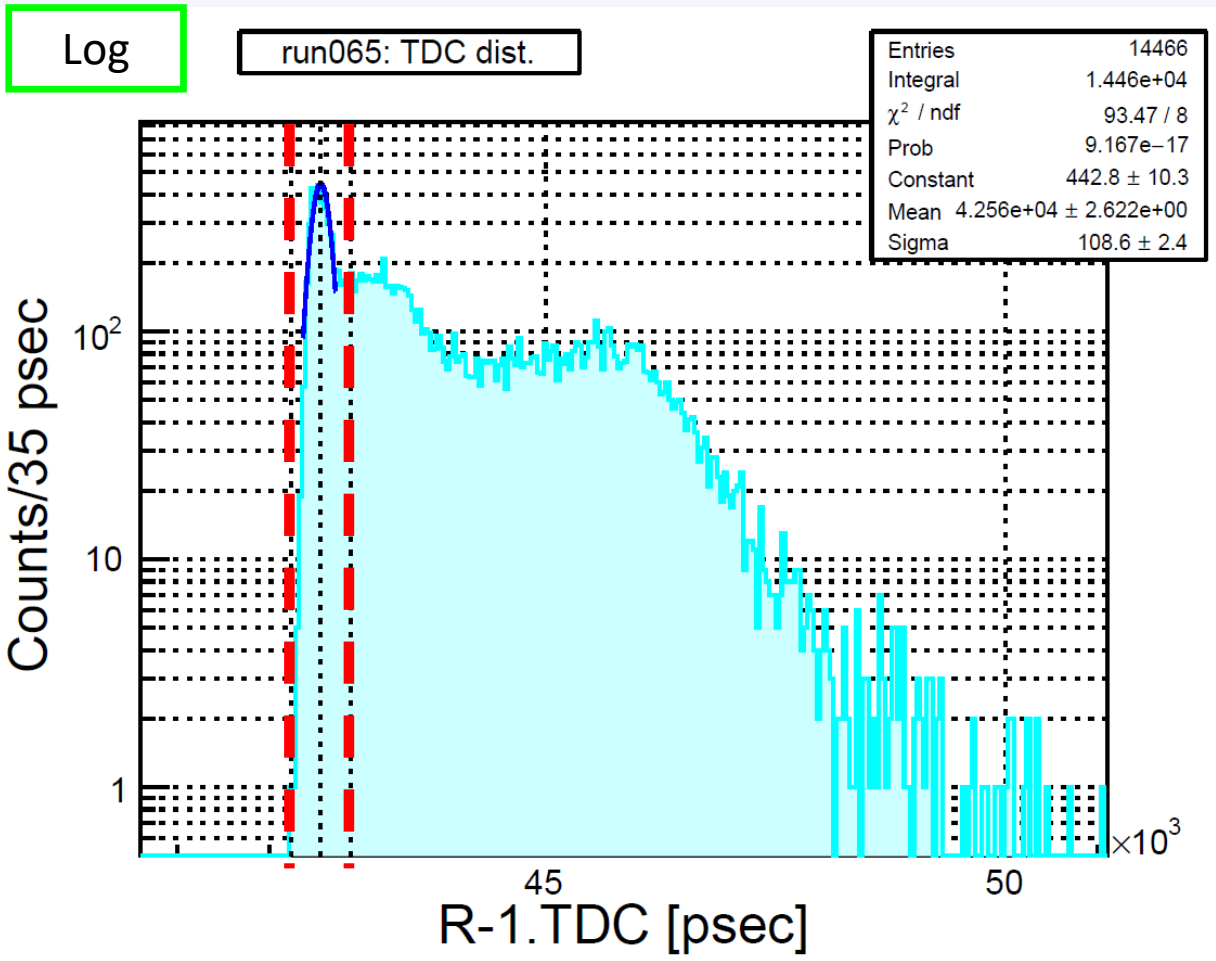
- I thought,

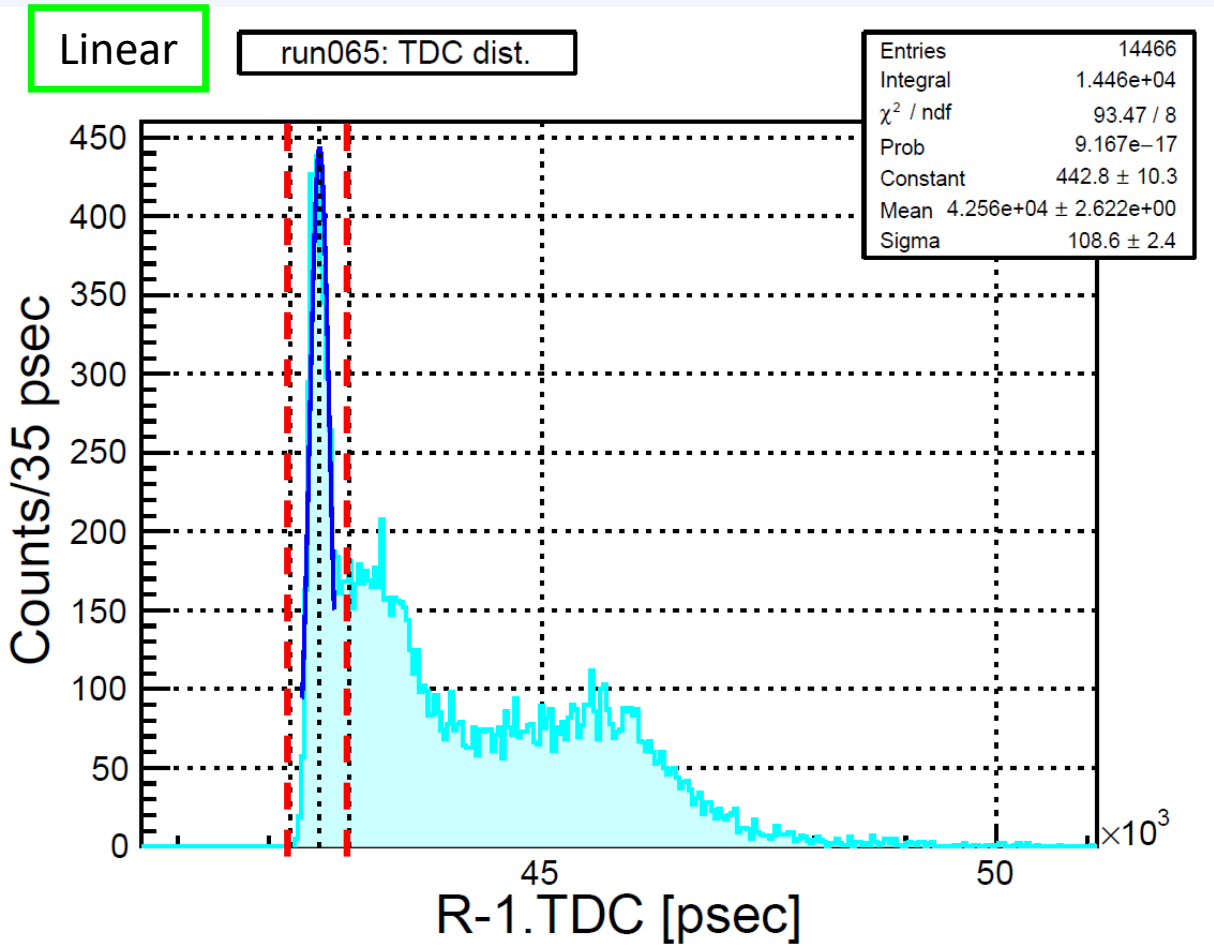
Check “L” region ≈ check peak region at 1D hist of TDC



TDC study

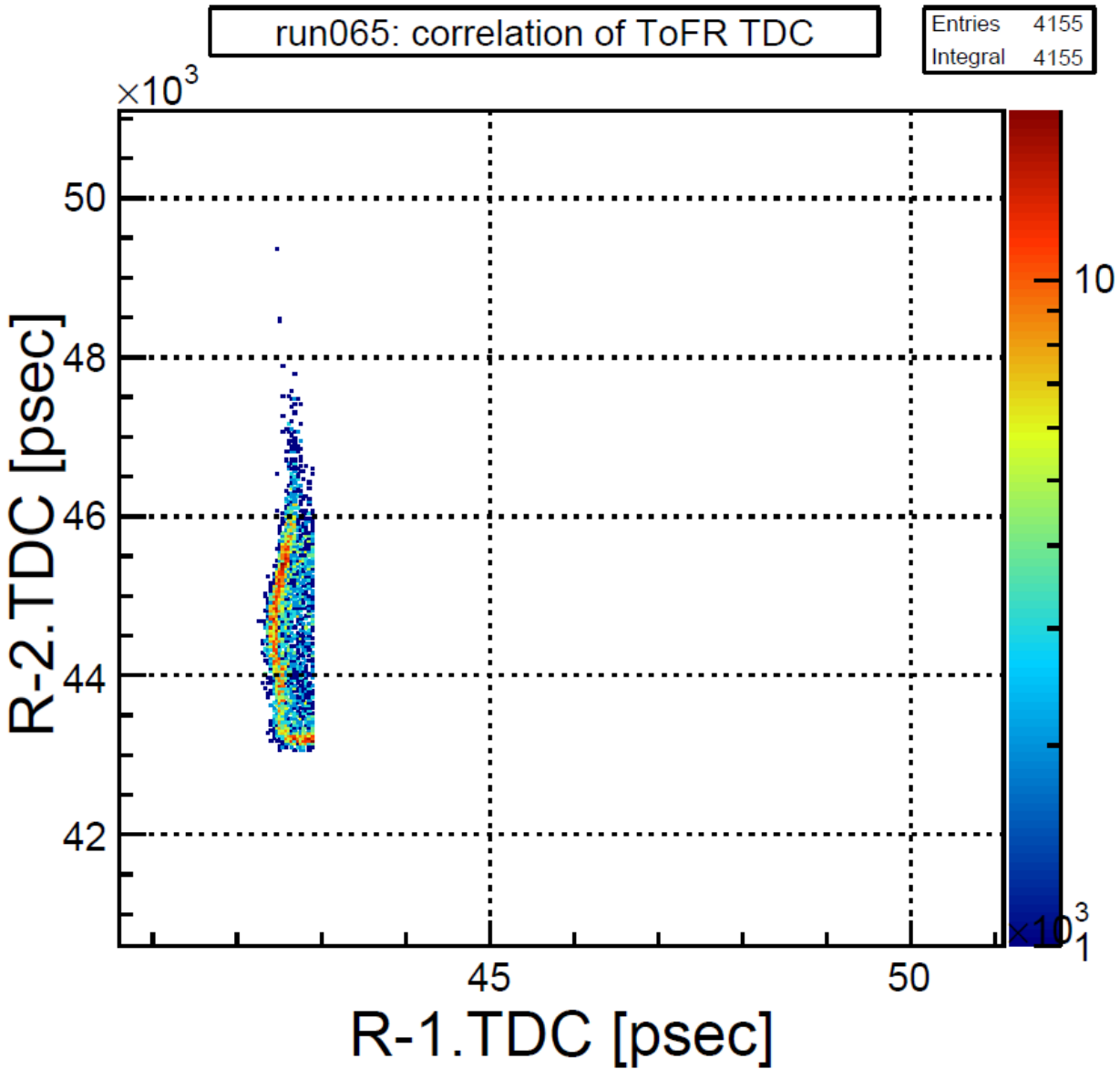
- TDC: Fitting with gaussian.
- Select μ±3σ region.

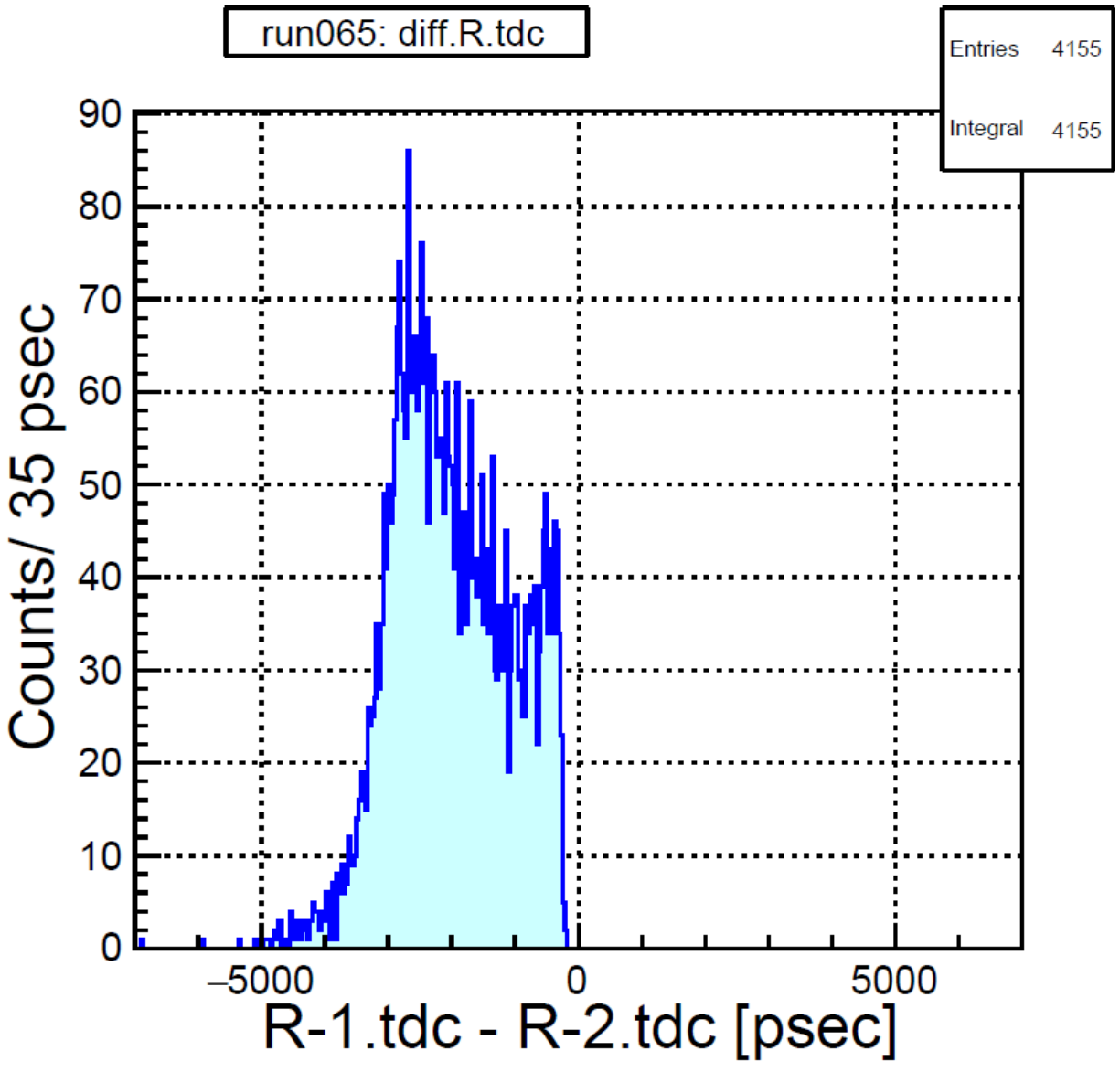




TDC study

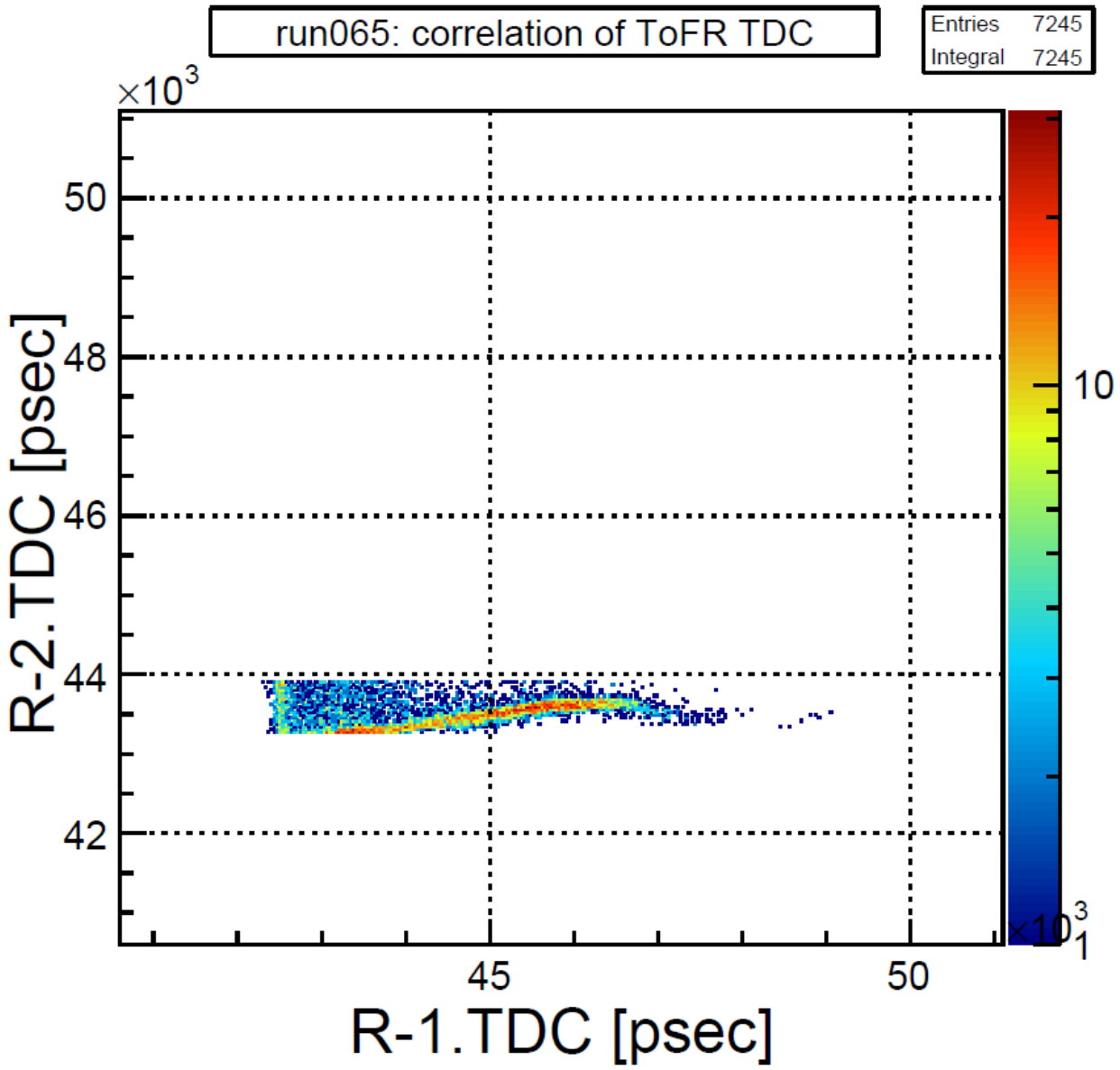
- Cut by R-1.TDC

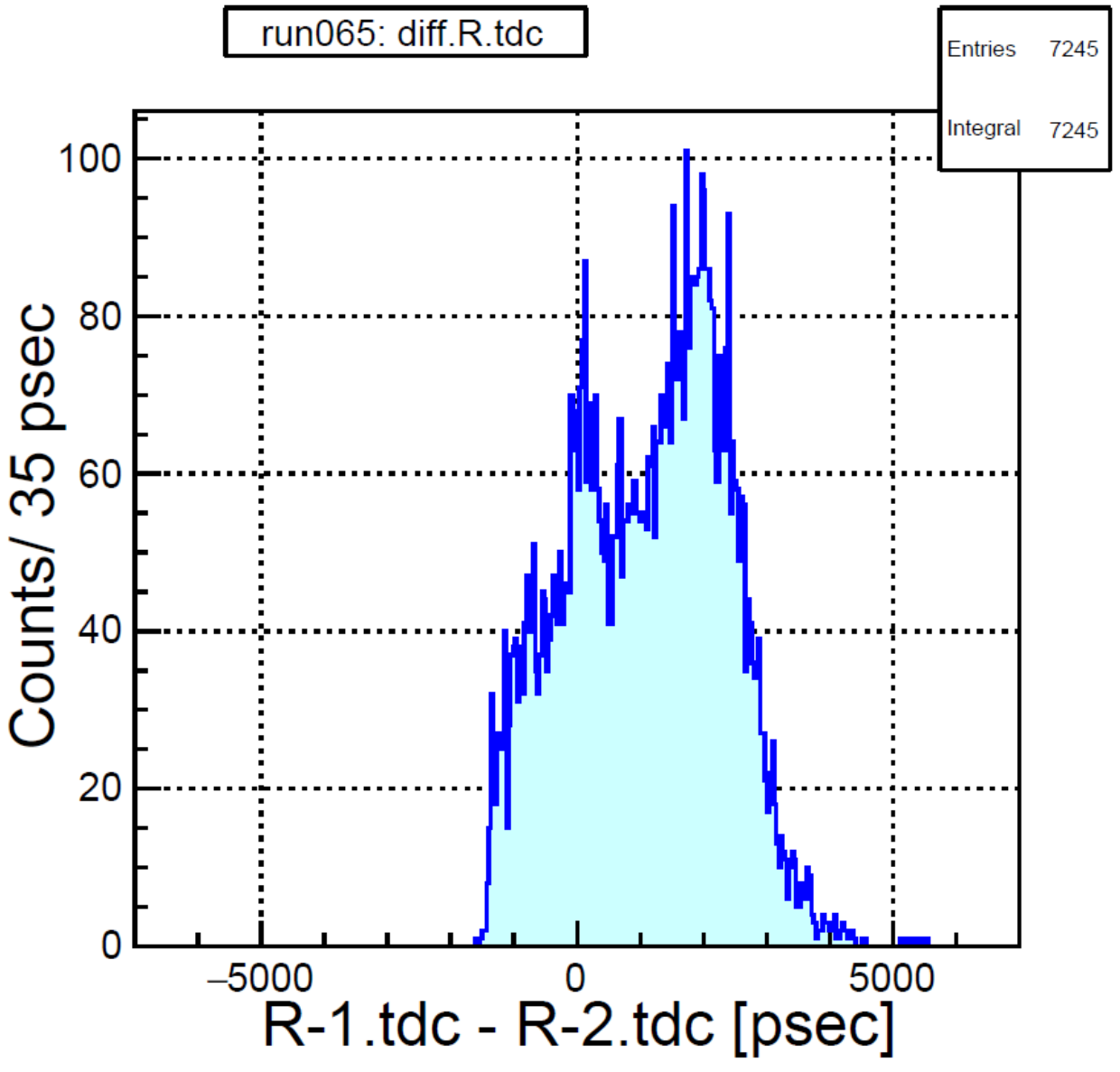




TDC study

- Cut by R-2.TDC

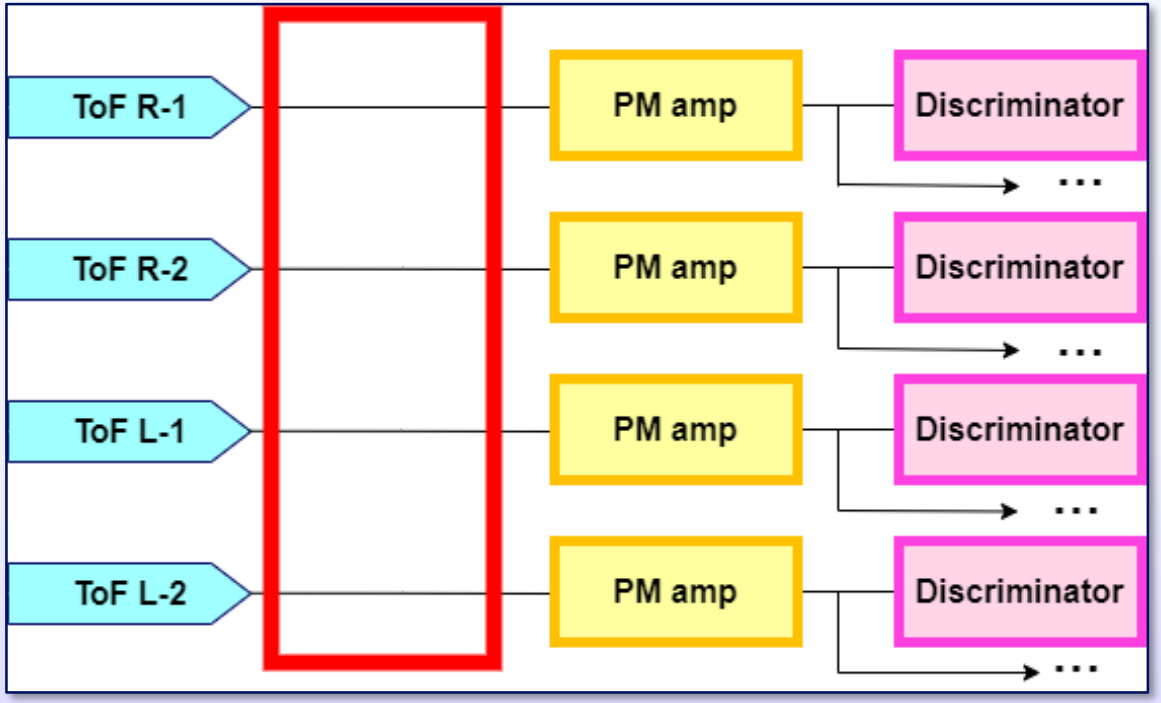




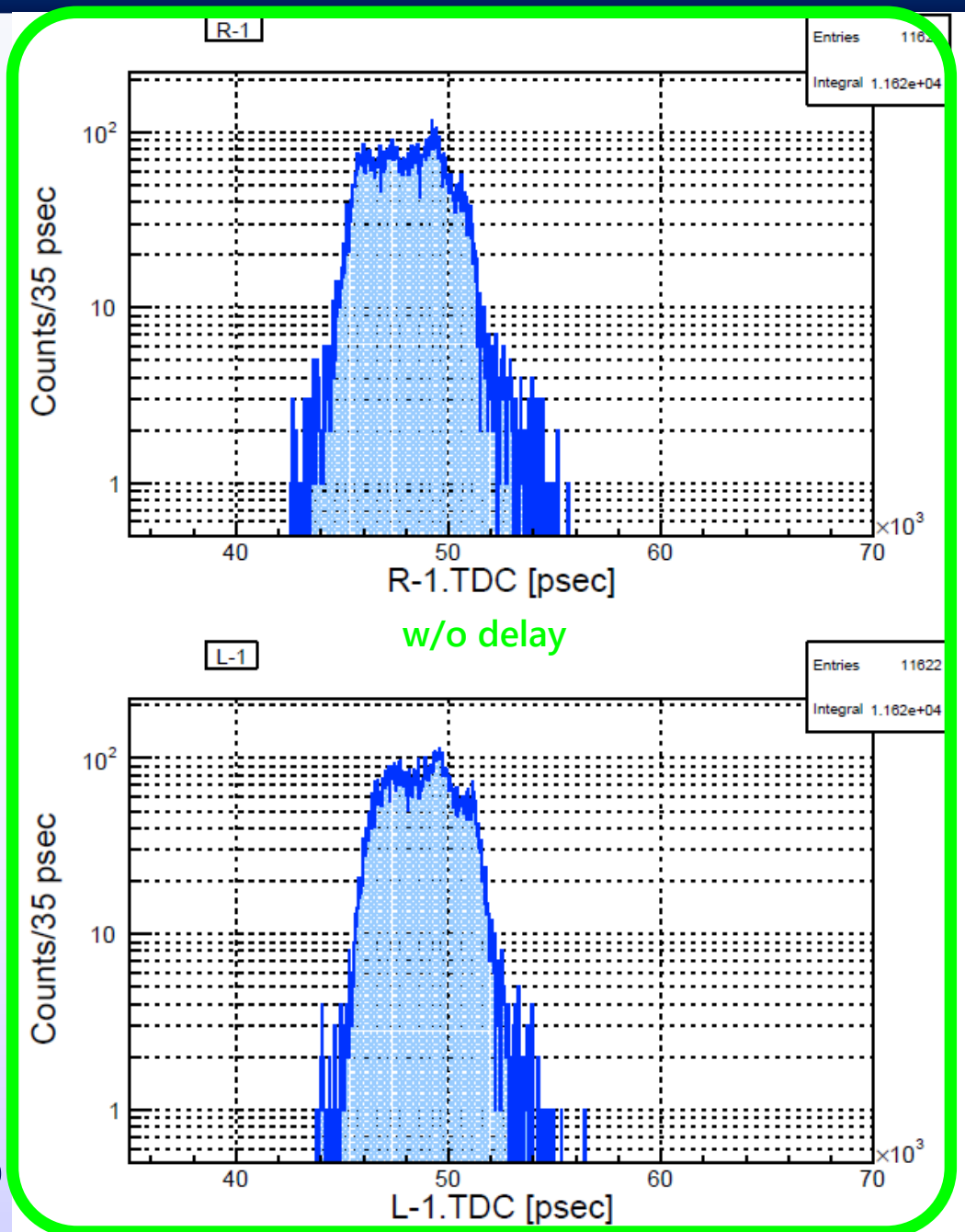
- At last meeting, Fujiwara talked “I couldn’t relation of TDC & Real time”.

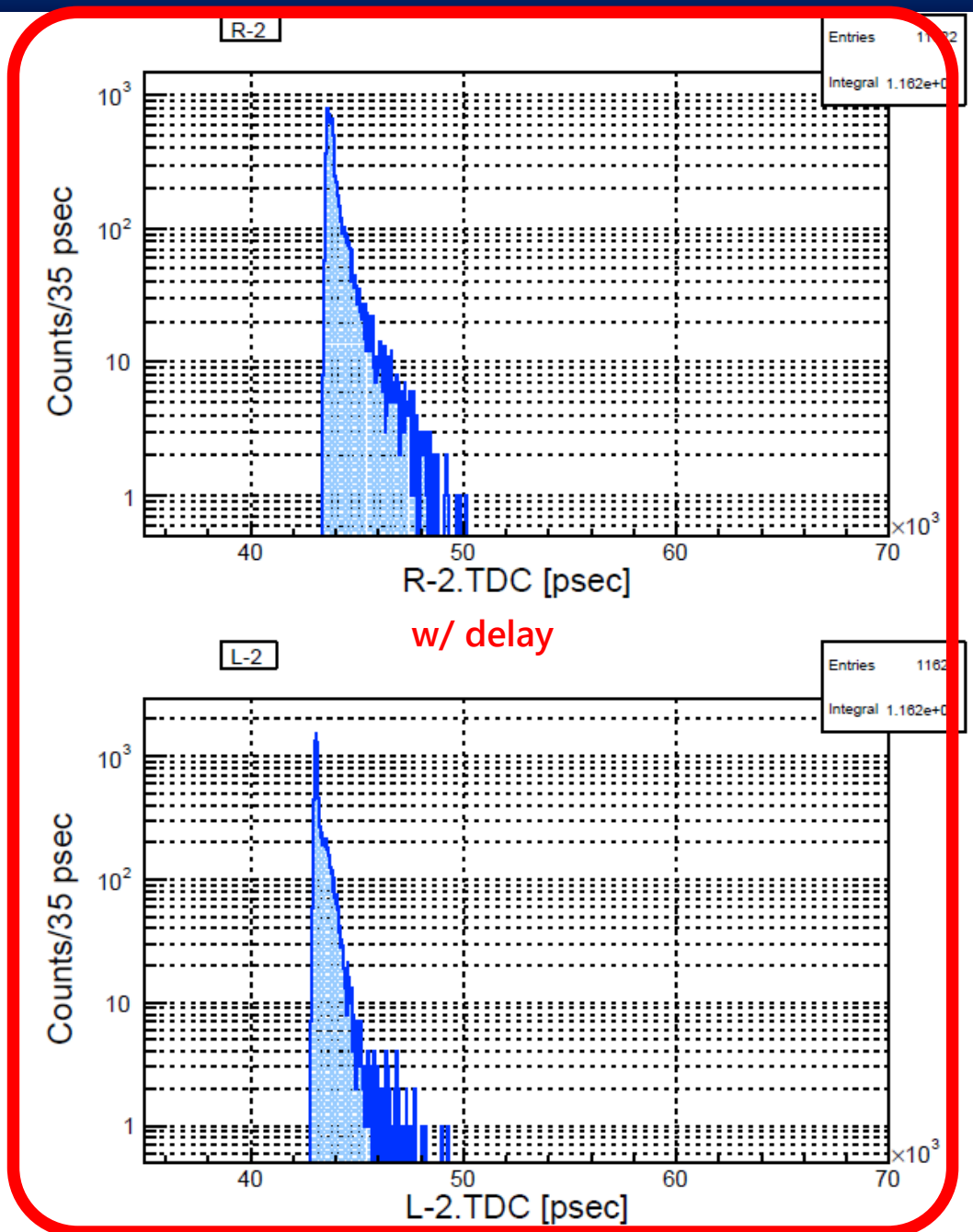
- To check relation of TDC value, adding 5 nsec delay for some CHs.

ToF CH	Cable [m]	Delay [nsec]
R-1	1.2	6
R-2	1.2 + 1.0	6 + 5
L-1	1.2	6
L-2	1.2 + 1.0	6 + 5



TDC study

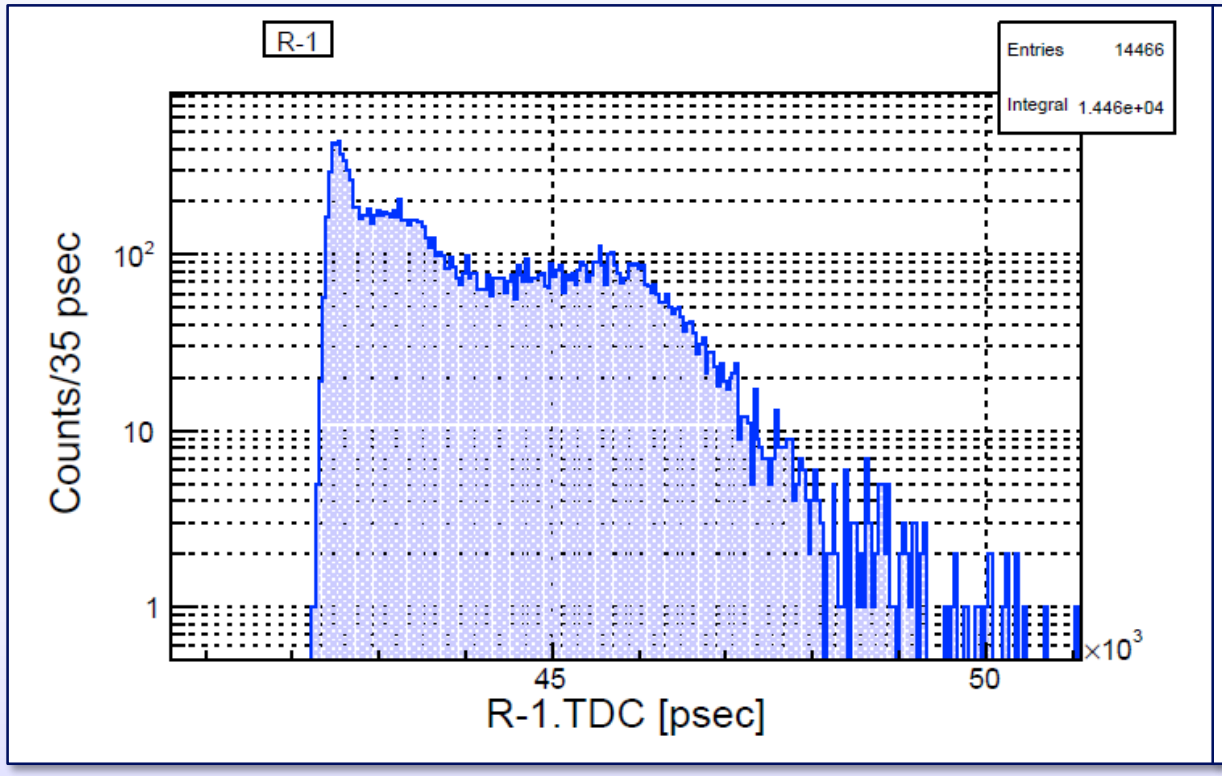

R-1
Entries 1162
Integral 1.162e+04
Counts/35 psec
R-1.TDC [psec]
w/o delay
L-1
Entries 11622
Integral 1.162e+04
Counts/35 psec
L-1.TDC [psec]


R-2
Counts/35 psec
R-2.TDC [psec]
w/ delay
L-2
Counts/35 psec
L-2.TDC [psec]

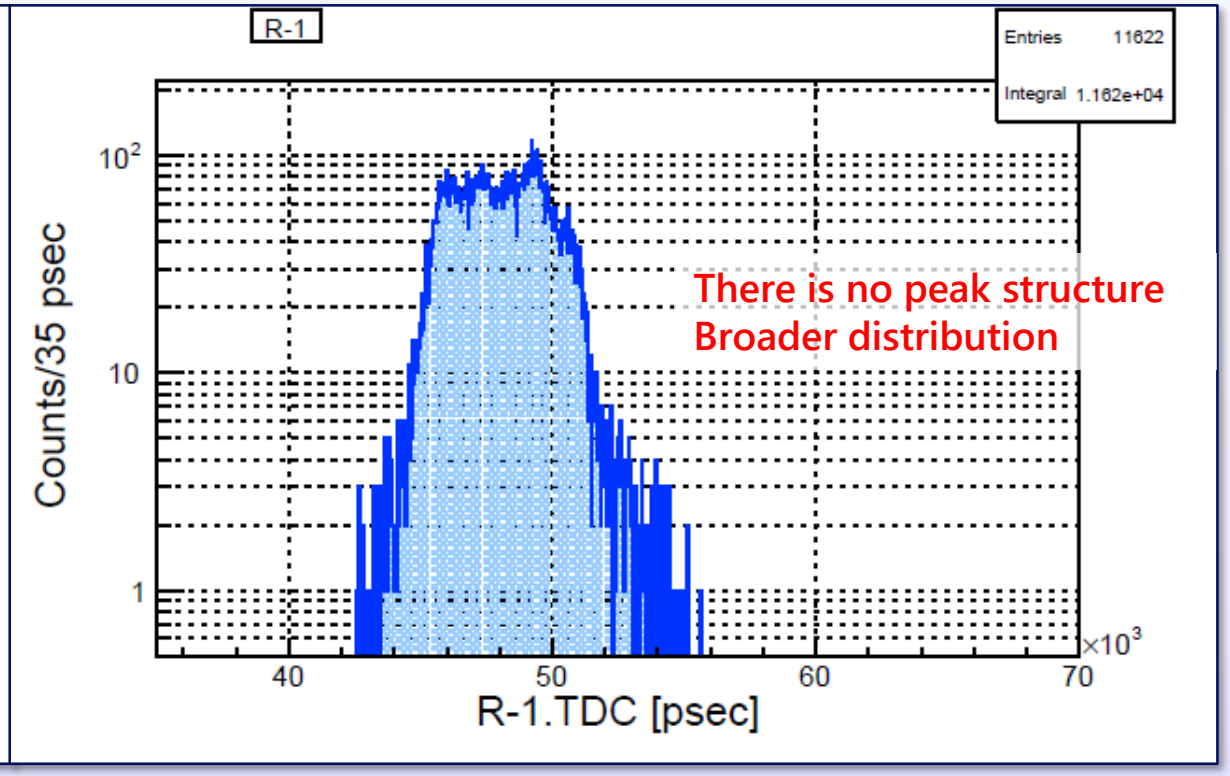
Comparison w/ delay vs. w/o delay

※ R-1自身には遅延を入れていない.
R-2, L-2 を遅延させた.

w/o delay



w/ delay



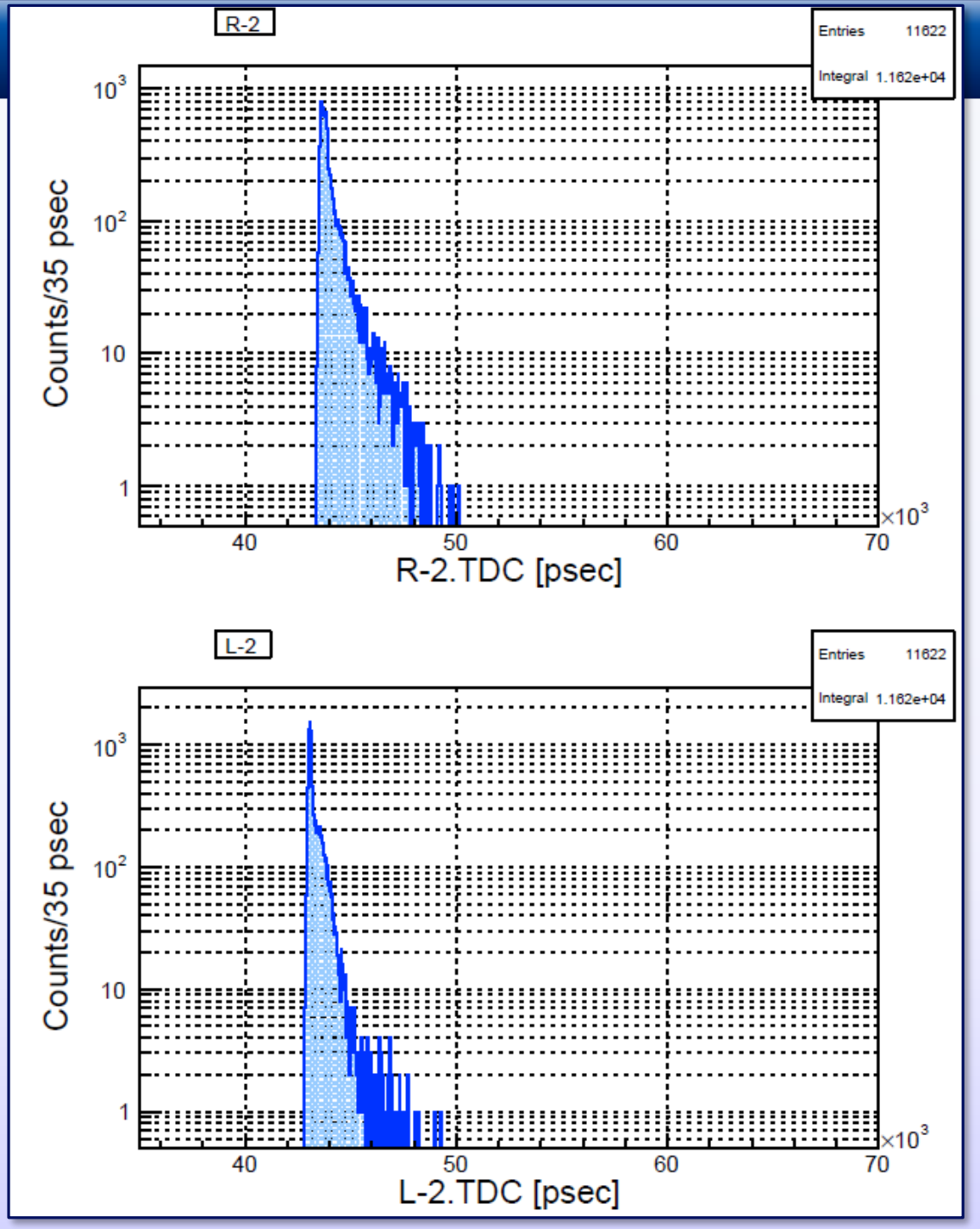
TDC study

- 遅延を入れた CH の分布にピーク
- ToF宇宙線測定時のトリガー: 全CHのコインシデンス
- コインシデンスするかどうかは遅延を入れた CH が決めていることになる
  ⇒ コインシデンスのタイミングを決定している

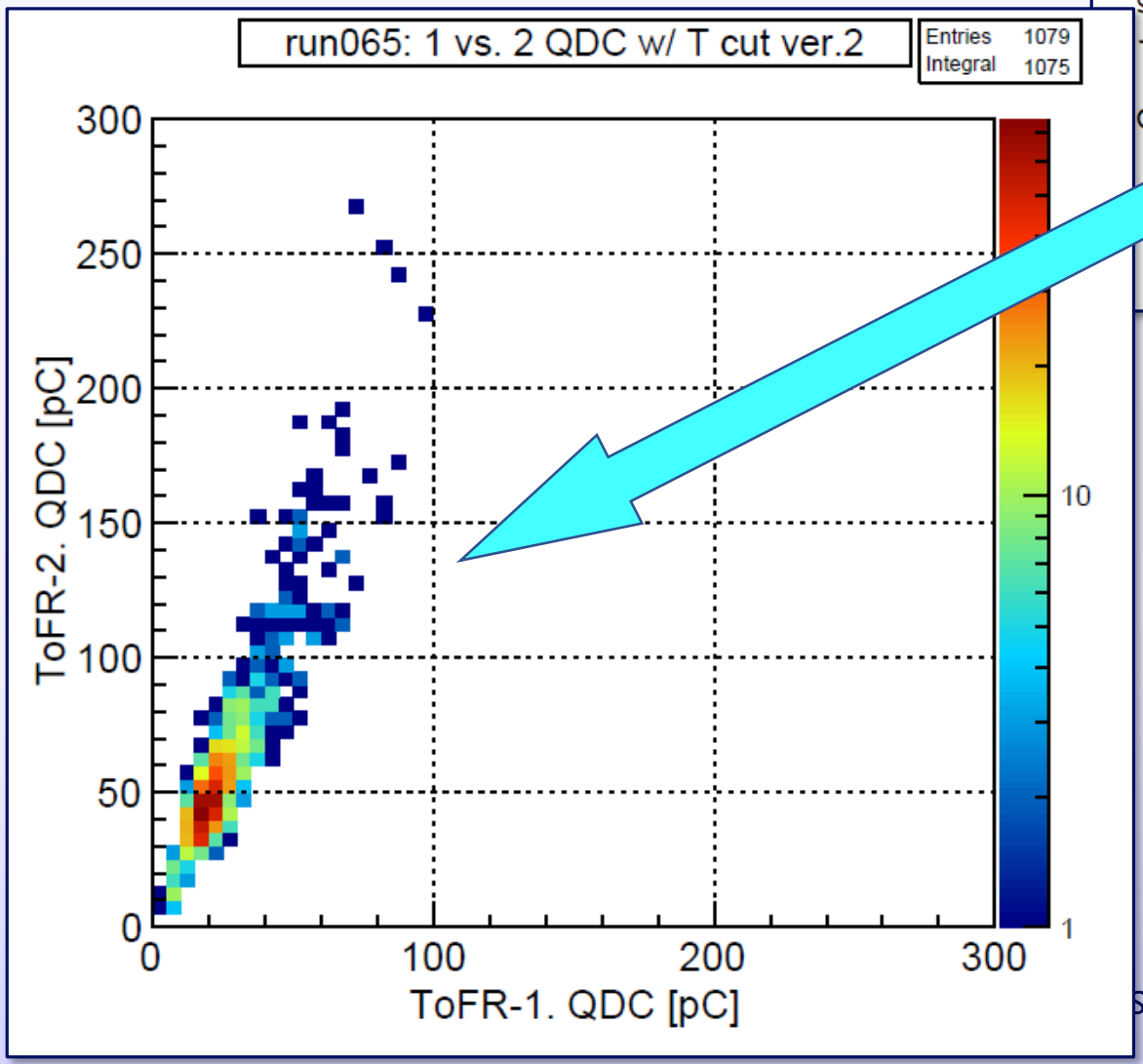
- 遅延なし: 全CHが同じケーブル長 = 同じ伝送時間
  ⇒ どのCHが遅れる or 早くなるかは宇宙線のヒット位置に依存
  ⇒ランダムな事象
  ⇒ どのCHが一番遅く光るかは自明ではない
  ⇒ コインシデンスのタイミングを決めるCHはイベント毎に異なる

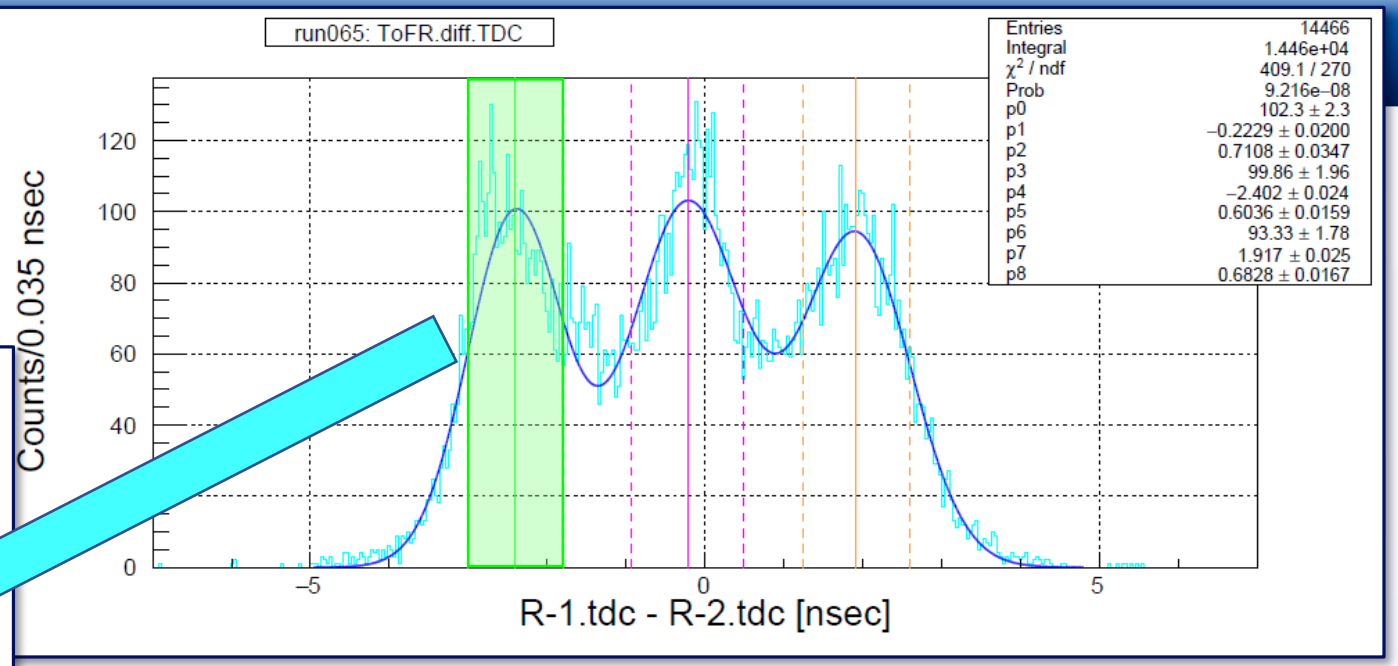
  ⇒ それぞれの CH にピークが立つ

- 遅延なしの CH がTDCの大きい側に広がった分布
  ⇒ **実際のタイミングが早い = TDC が大きい**



TDC study





TDC上では... R-1<R-2 ⇒ R-1の方が遅れて光っている

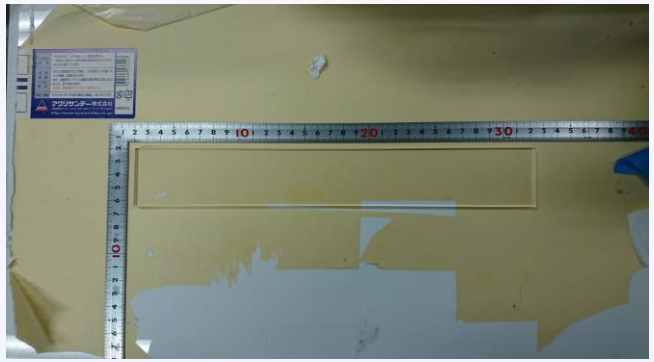
⇒ 宇宙線のヒット位置は R-1 から遠く, R-2に近い

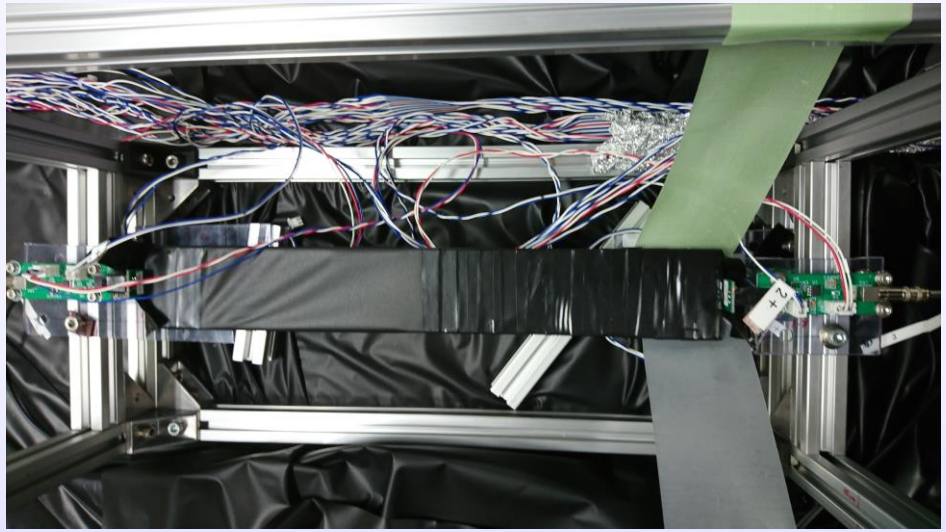
⇒ R-2 の側で光量が多くなる

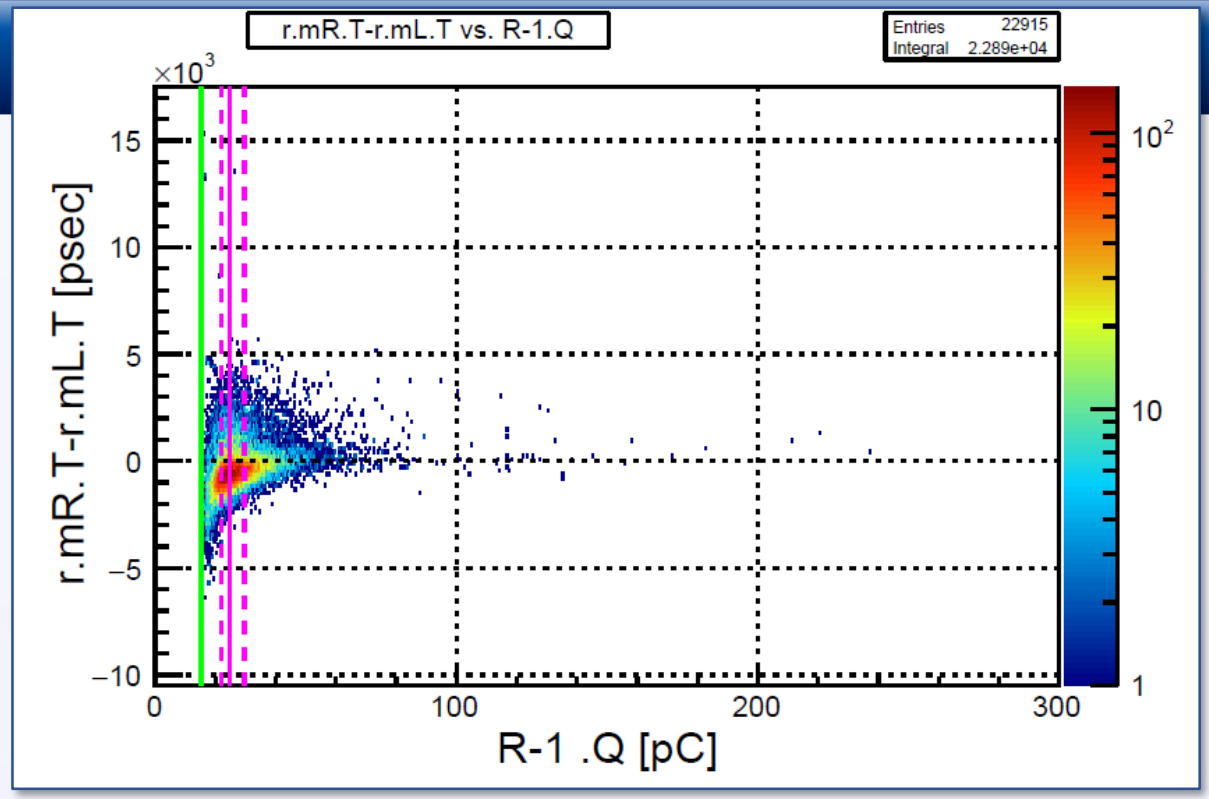
お騒がせしました...

Test of $5^t \times 44^w$ mm^2 scintillator

- Started test of $5^t \times 44^w$ mm^2 scintillator (from Monday)



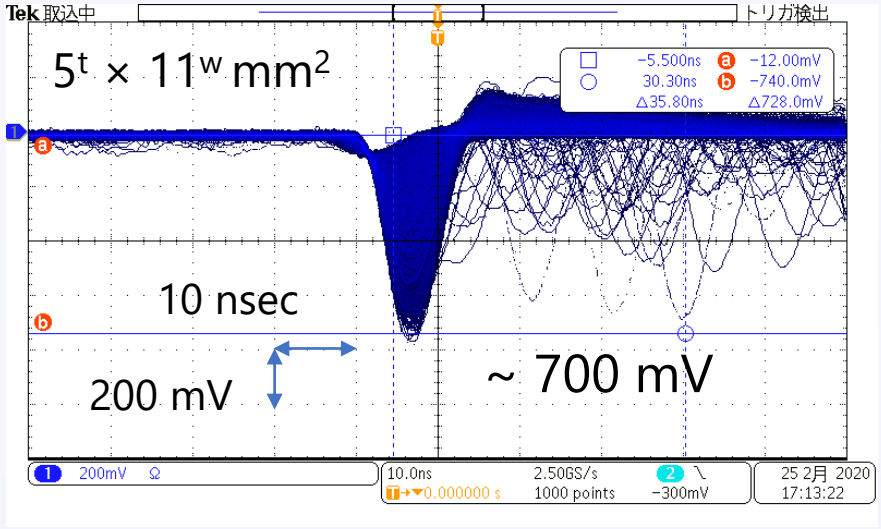


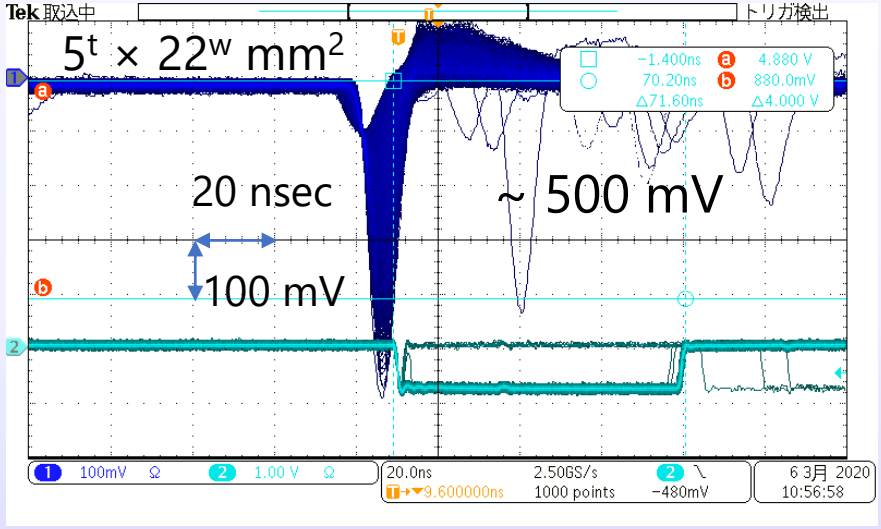


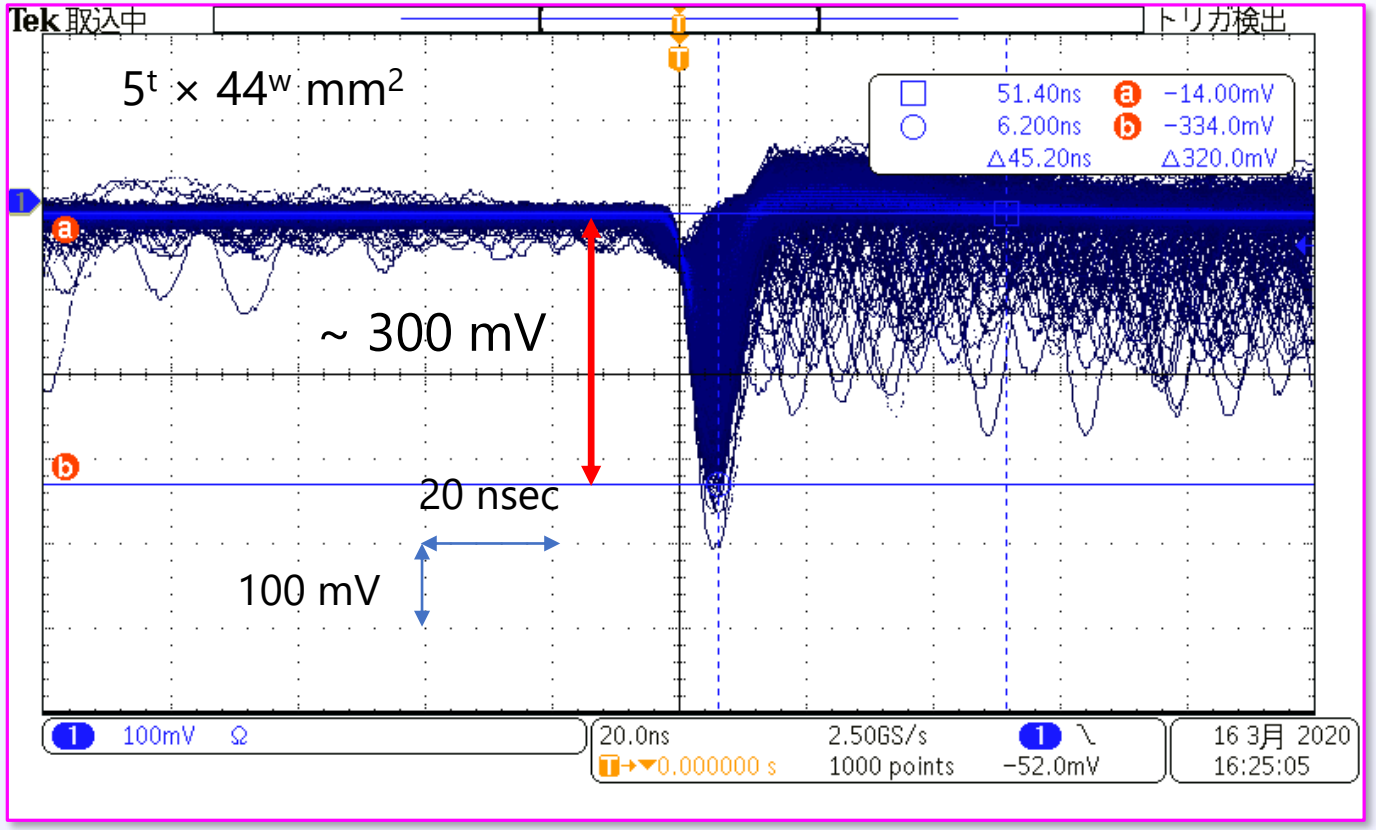
- ~23000 events for ~ 1 day
  → ~ 16 ev / min.
  → ~ higher rate.

- Smaller gain

Test of $5^t \times 44^w$ mm^2 scintillator



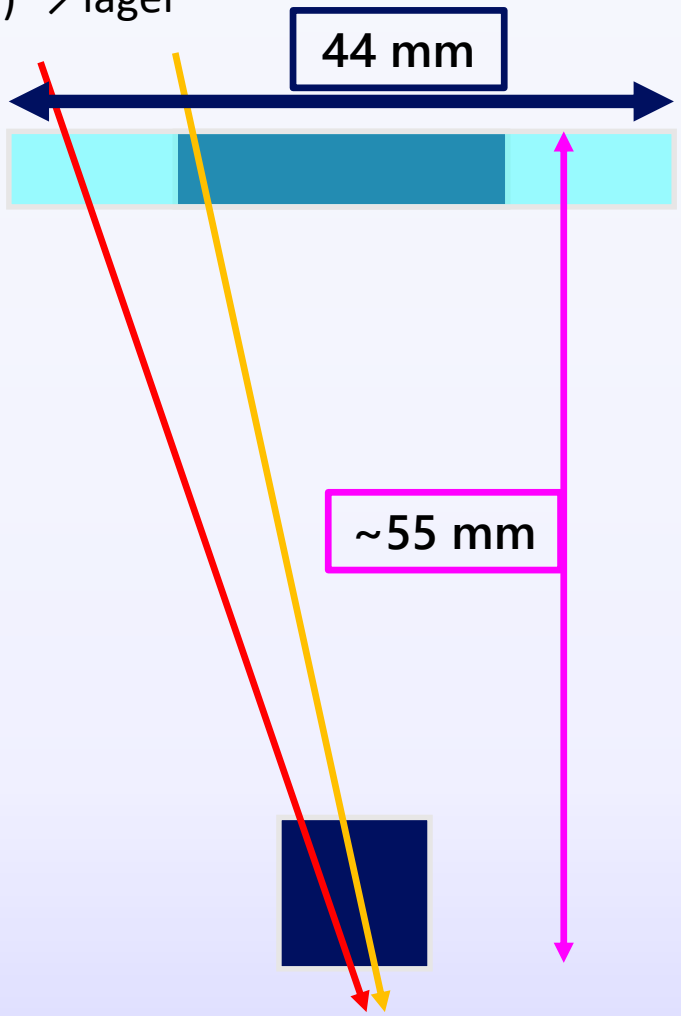


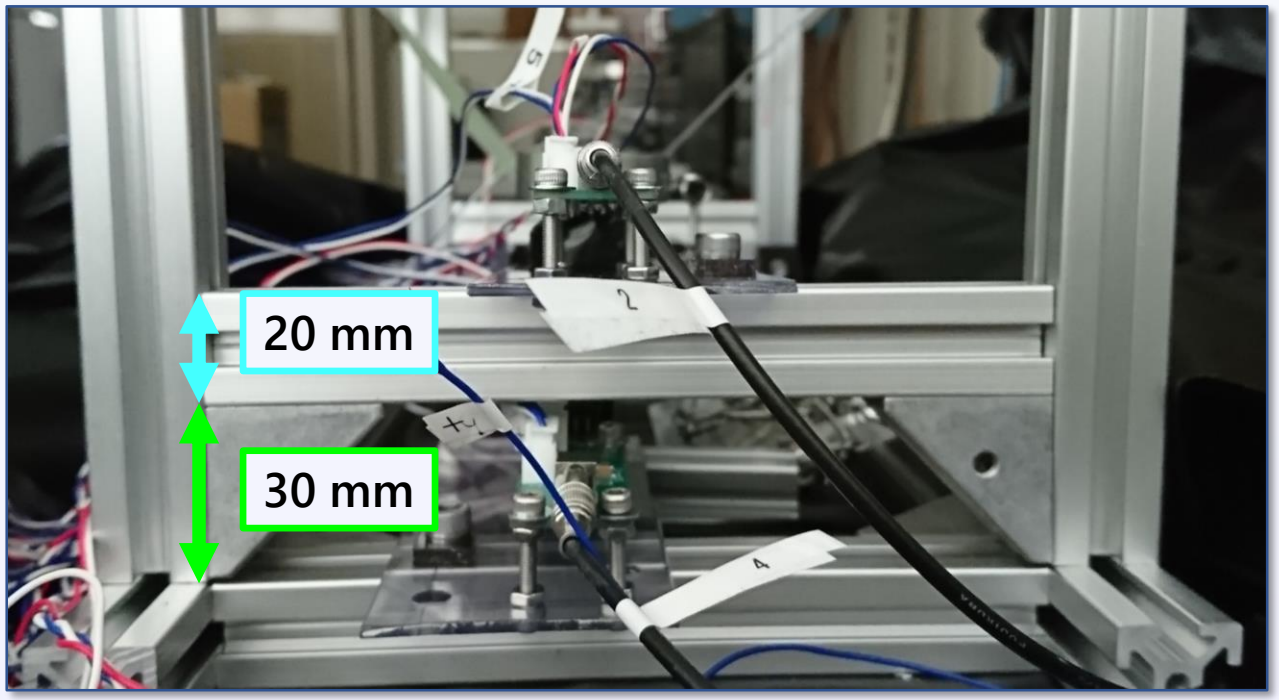


Test of $5^t \times 44^w$ mm^2 scintillator

Width → lager

⇒ Acceptance (?) → lager





Rough estimate

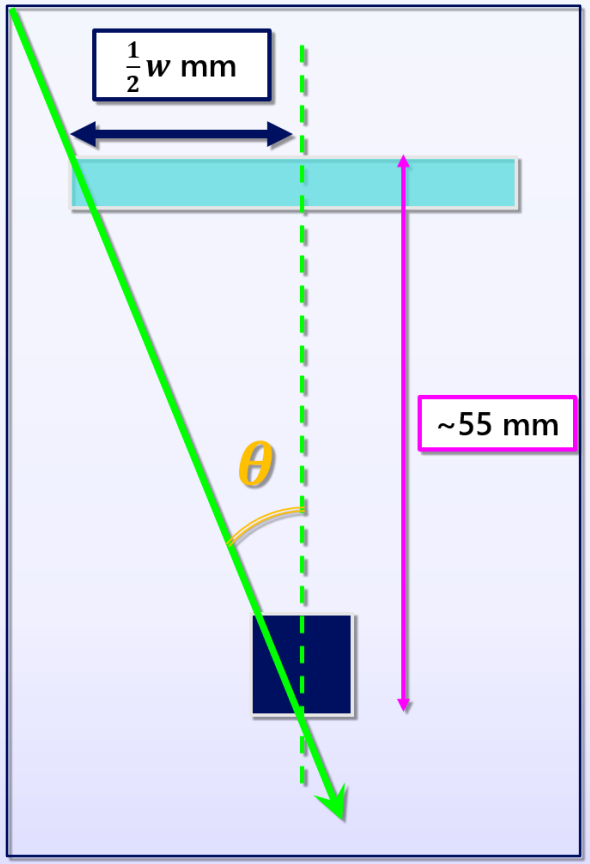
✓ Generally, zenith (θ) distribution of cosmic-ray $\propto \cos^2\theta$

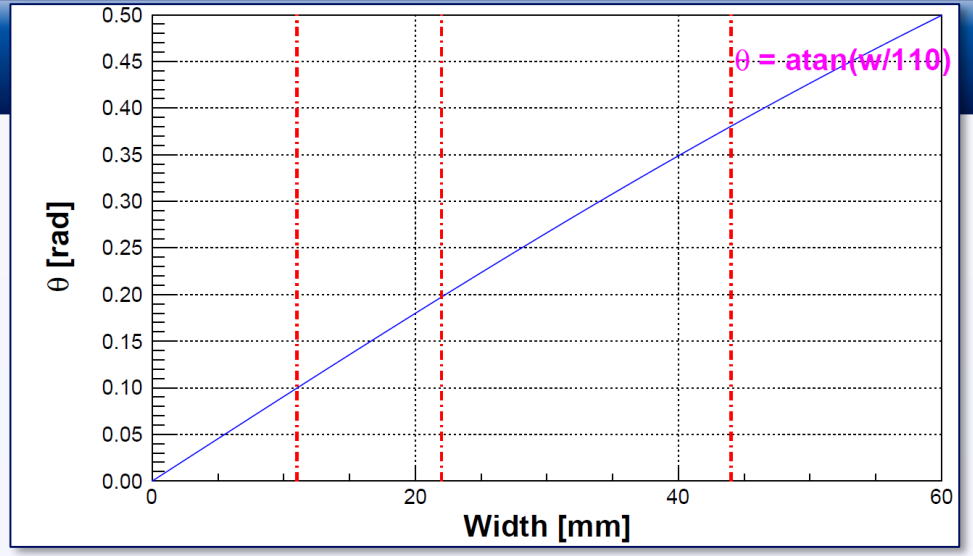
✓ What's theta ?

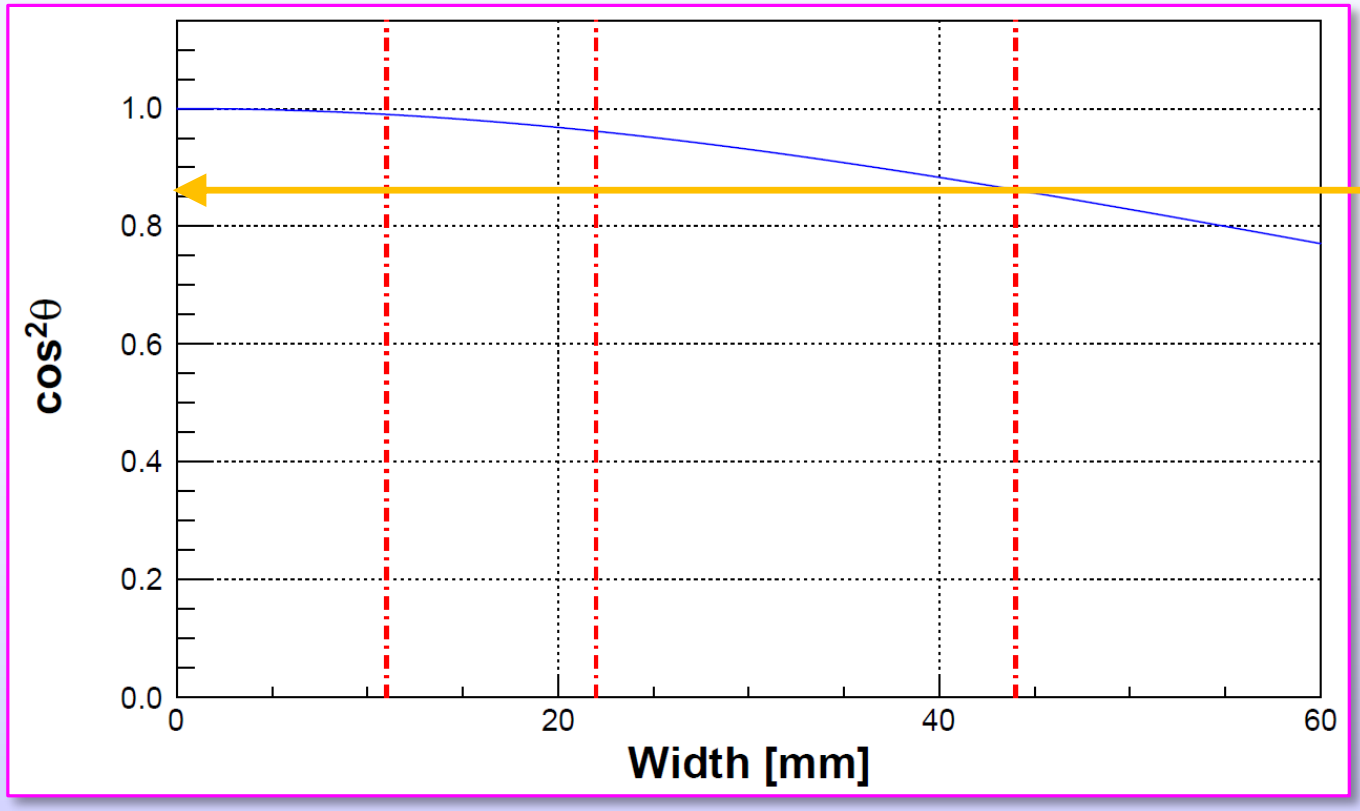
I think ↓ ...

$$\tan\theta = \frac{\frac{1}{2}w}{55} = \frac{1}{110}w$$

$$\Rightarrow \theta \equiv \operatorname{atan}\frac{w}{110}$$

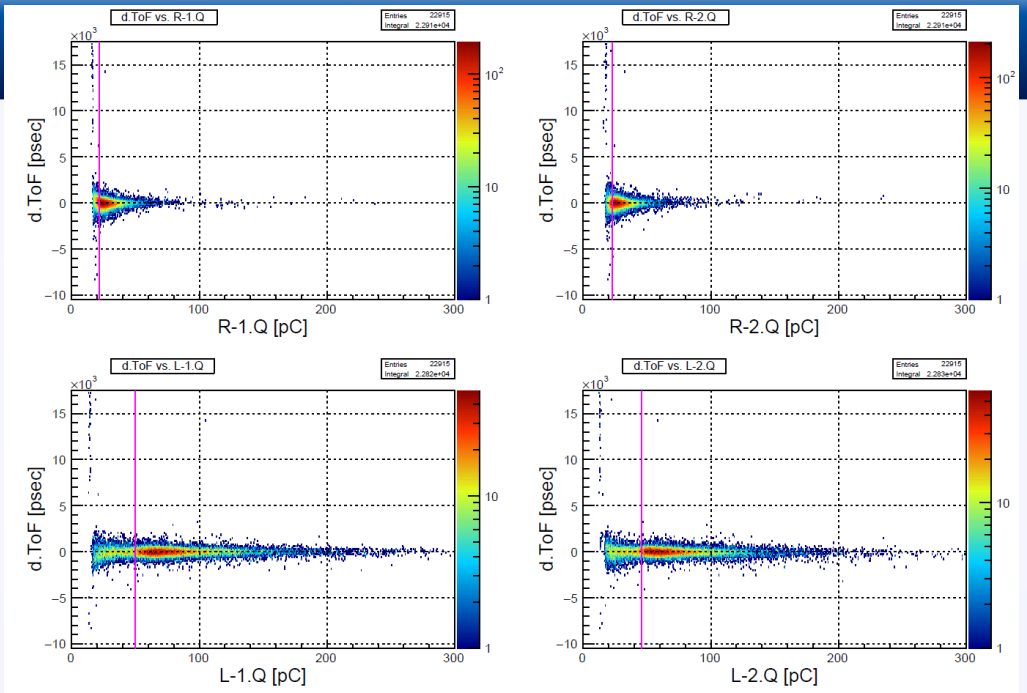


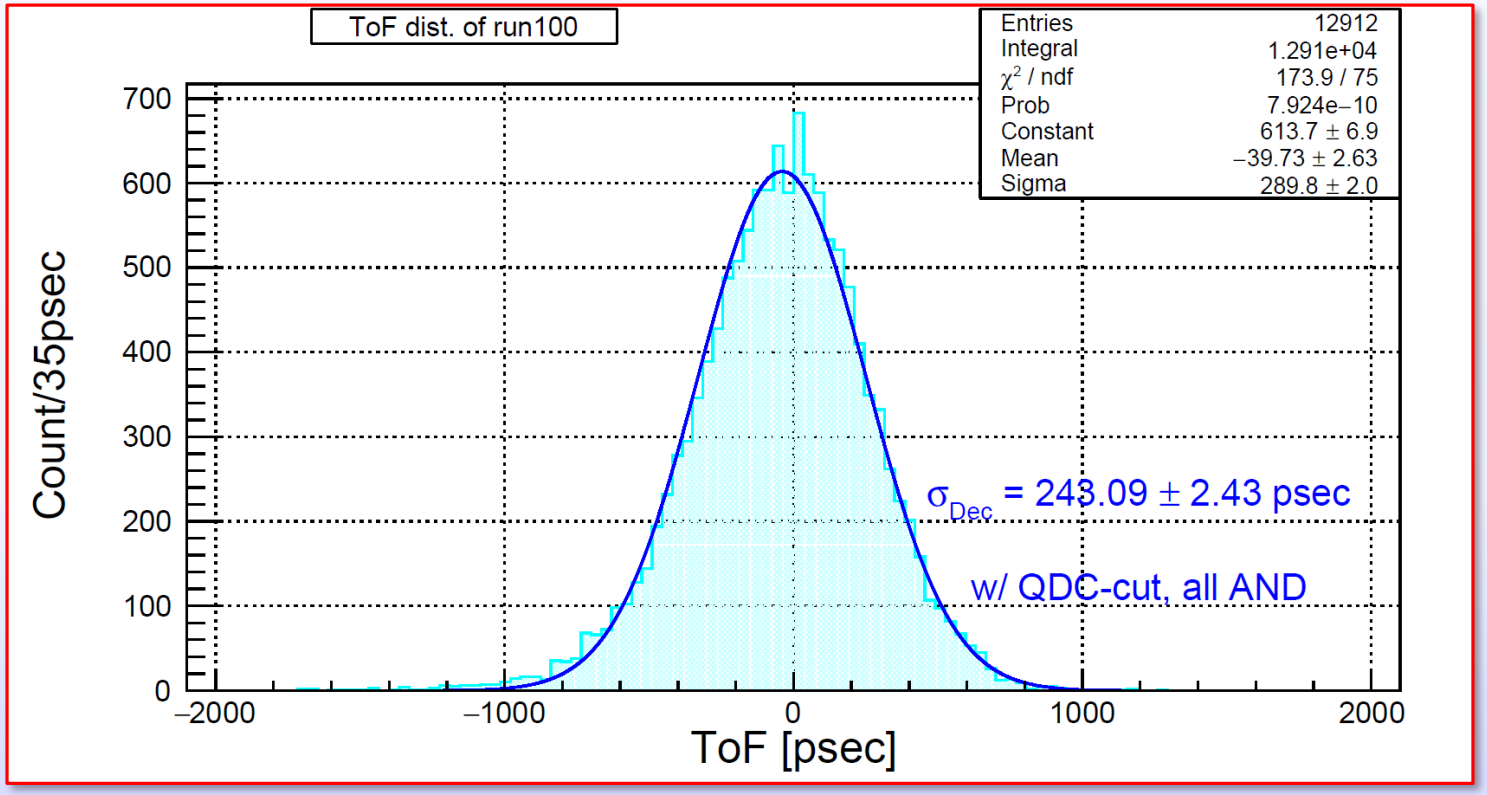




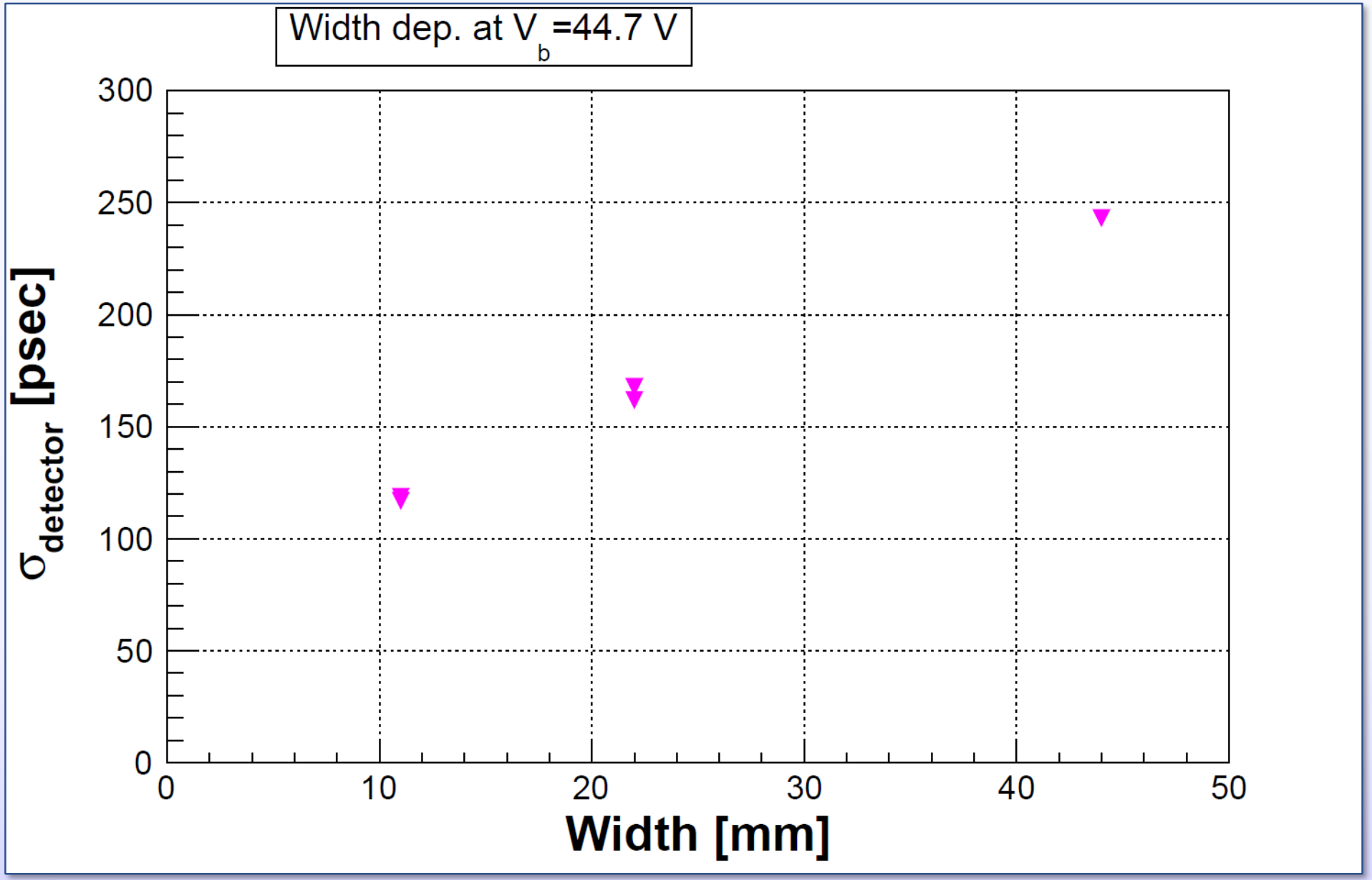
~ 0.85

角度に対しては飛来する線量は
大きく変わらないと予想
⇒ レートが上がること自体は
不自然ではない??


d.ToF vs. R-1.Q
d.ToF vs. R-2.Q
d.ToF vs. L-1.Q
d.ToF vs. L-2.Q
d.ToF [psec]
R-1.Q [pC]
R-2.Q [pC]
L-1.Q [pC]
L-2.Q [pC]


ToF dist. of run100
Entries 12912
Integral 1.291e+04
χ² / ndf 173.9 / 75
Prob 7.924e−10
Constant 613.7 ± 6.9
Mean −39.73 ± 2.63
Sigma 289.8 ± 2.0
σDec = 243.09 ± 2.43 psec
w/ QDC-cut, all AND
Count/35psec
ToF [psec]

Width dependence

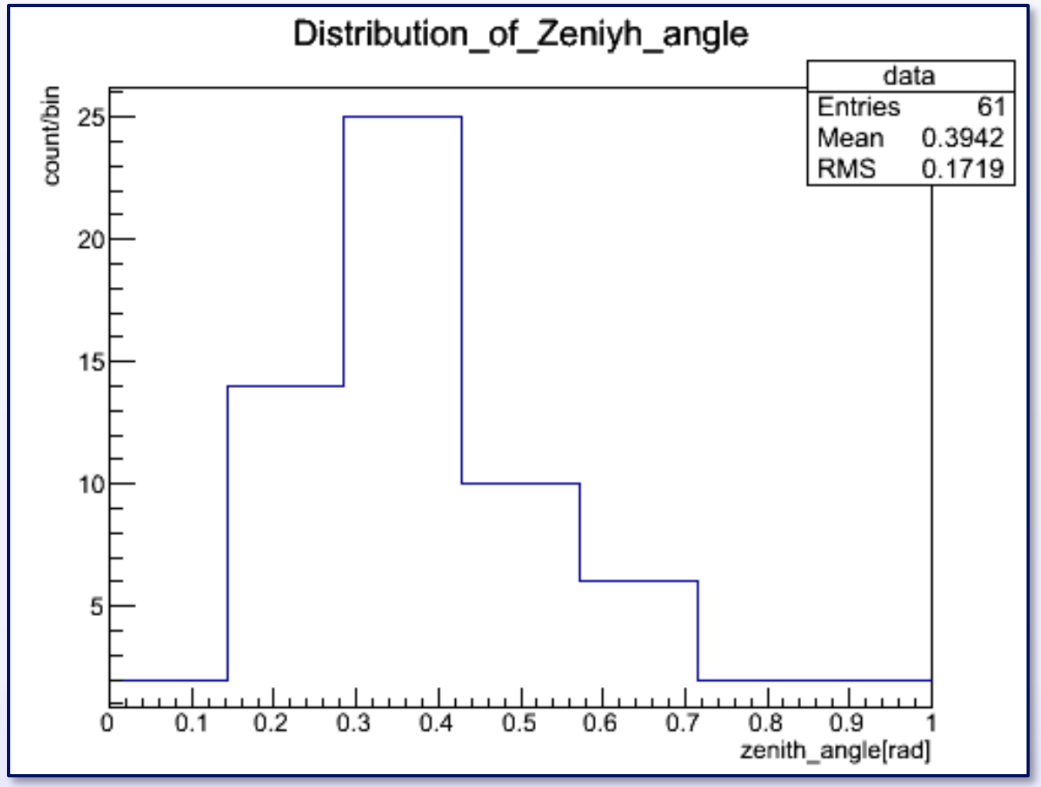


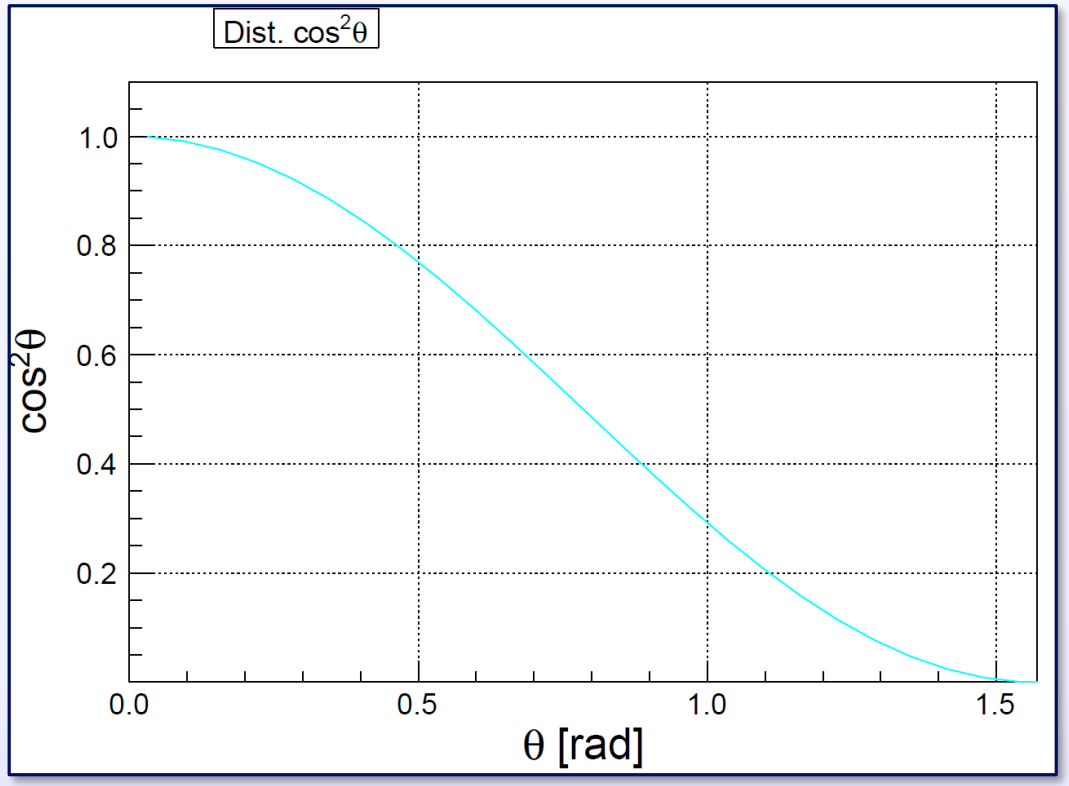
To do next

- Consideration for relation between timing resolution and scintillator size
- Test for readout method (series or parallel)

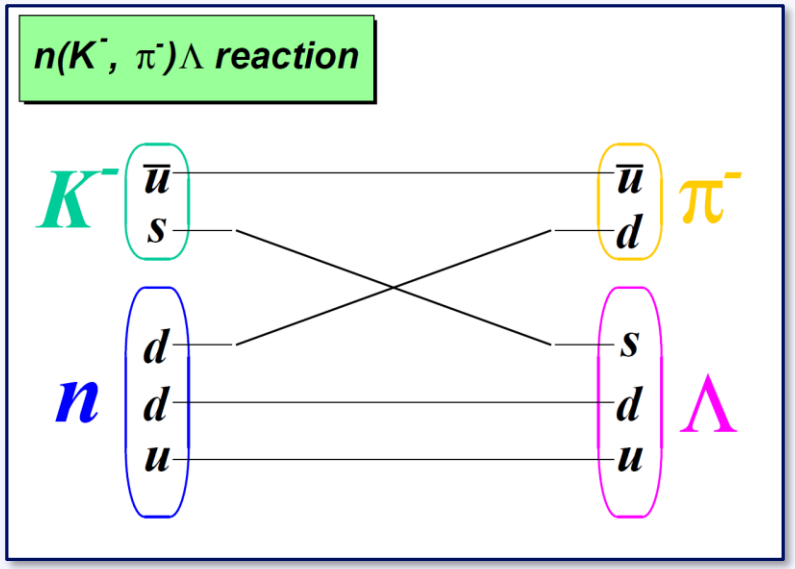
- Prepare for B4 presentation
- Update JPS poster

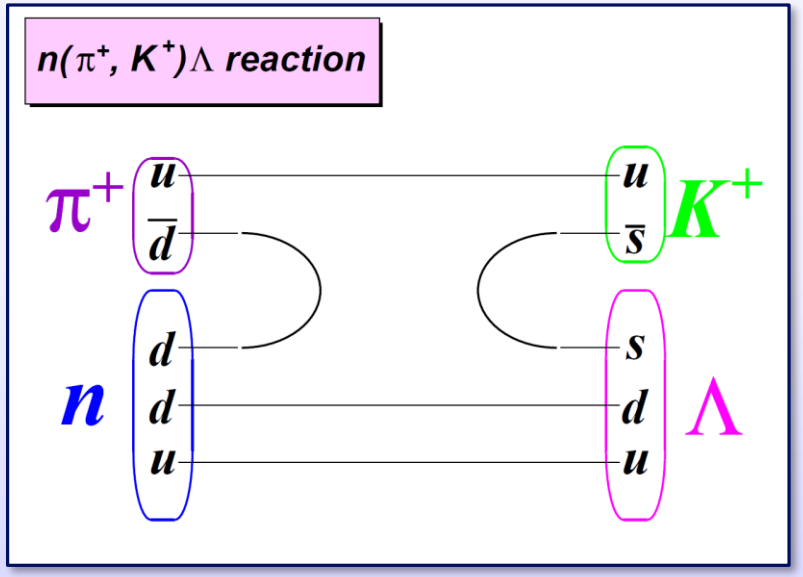
Back up

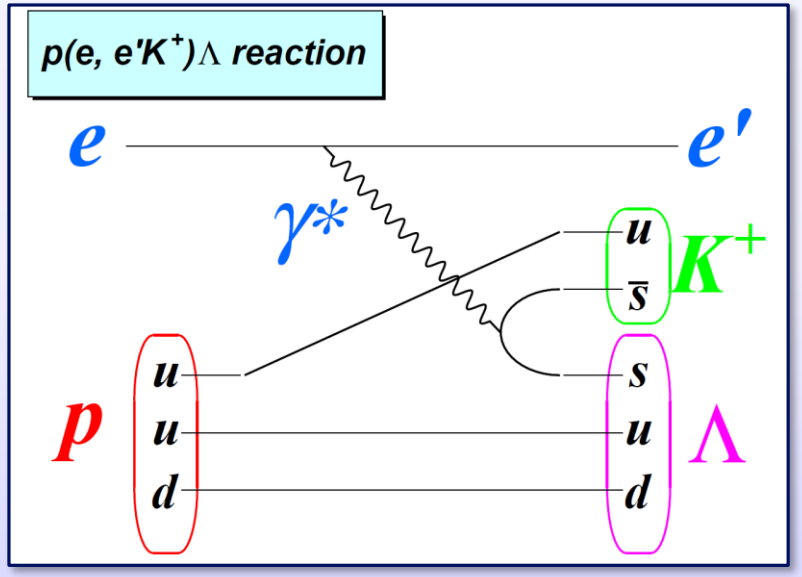




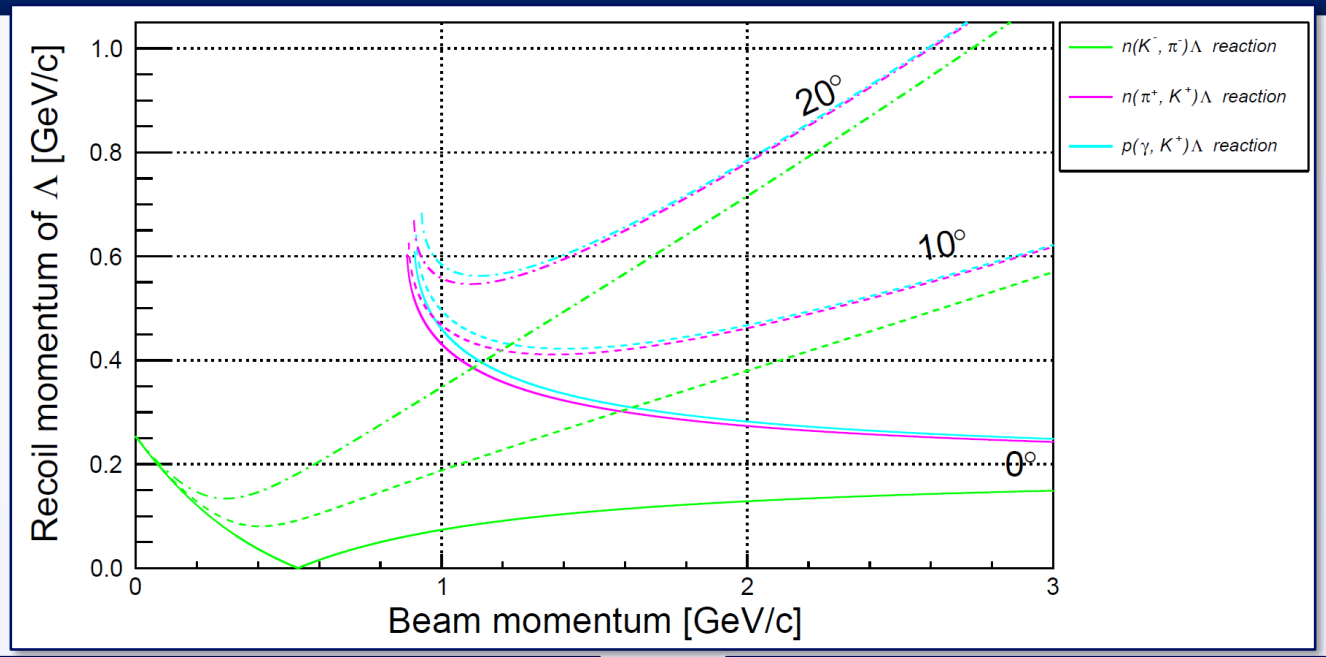
Studied by Yuya Ishikawa & Shunsuke Wada

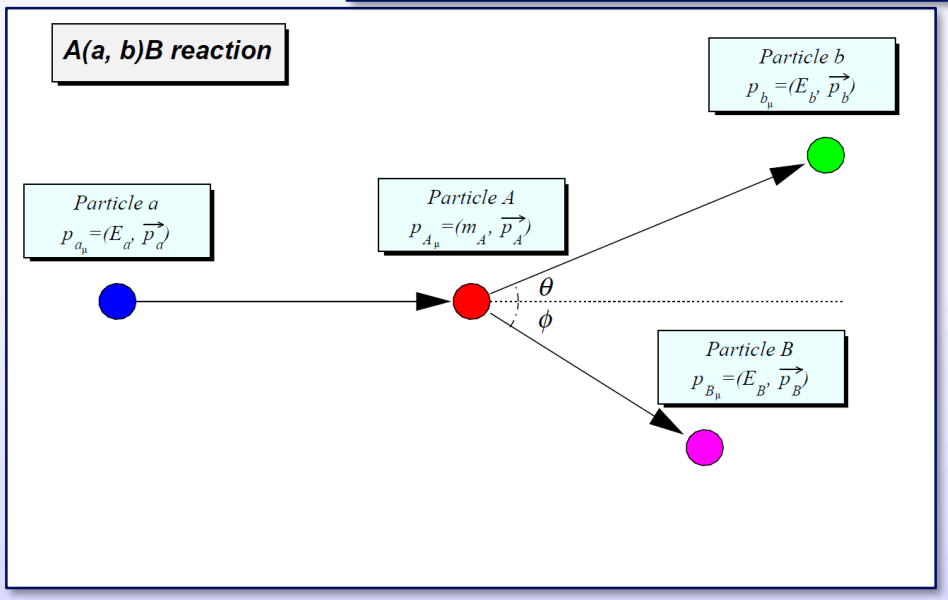

n(K⁻, π⁻)Λ reaction
K⁻
ū
s
π⁻
ū
d
n
d
d
u
s
d
u
Λ

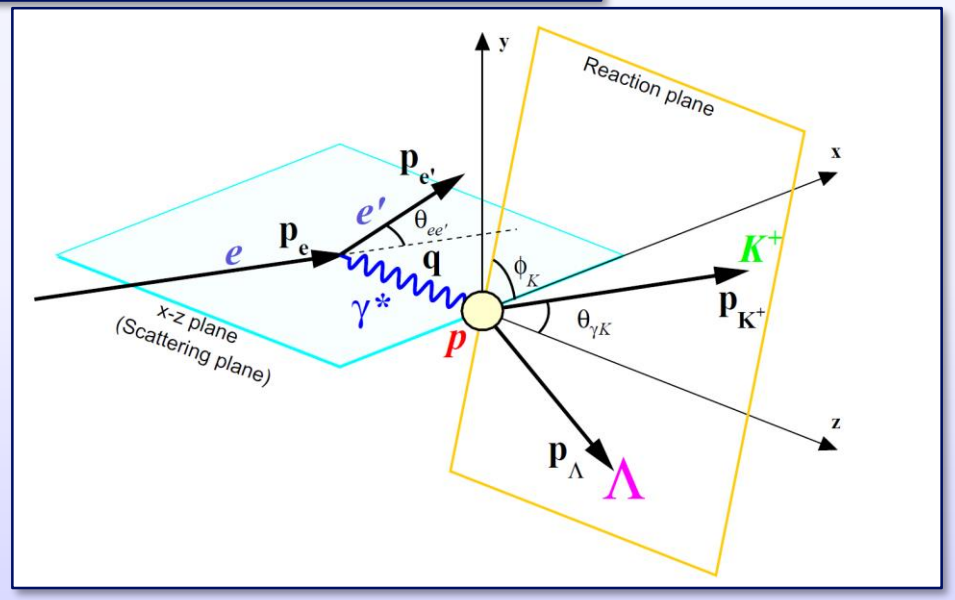

n(π⁺, K⁺)Λ reaction
π⁺
u
d̄
K⁺
u
s̄
n
d
d
u
s
d
u
Λ


p(e, e'K⁺)Λ reaction
e
e'
γ*
K⁺
u
s̄
p
u
u
d
s
u
d
Λ

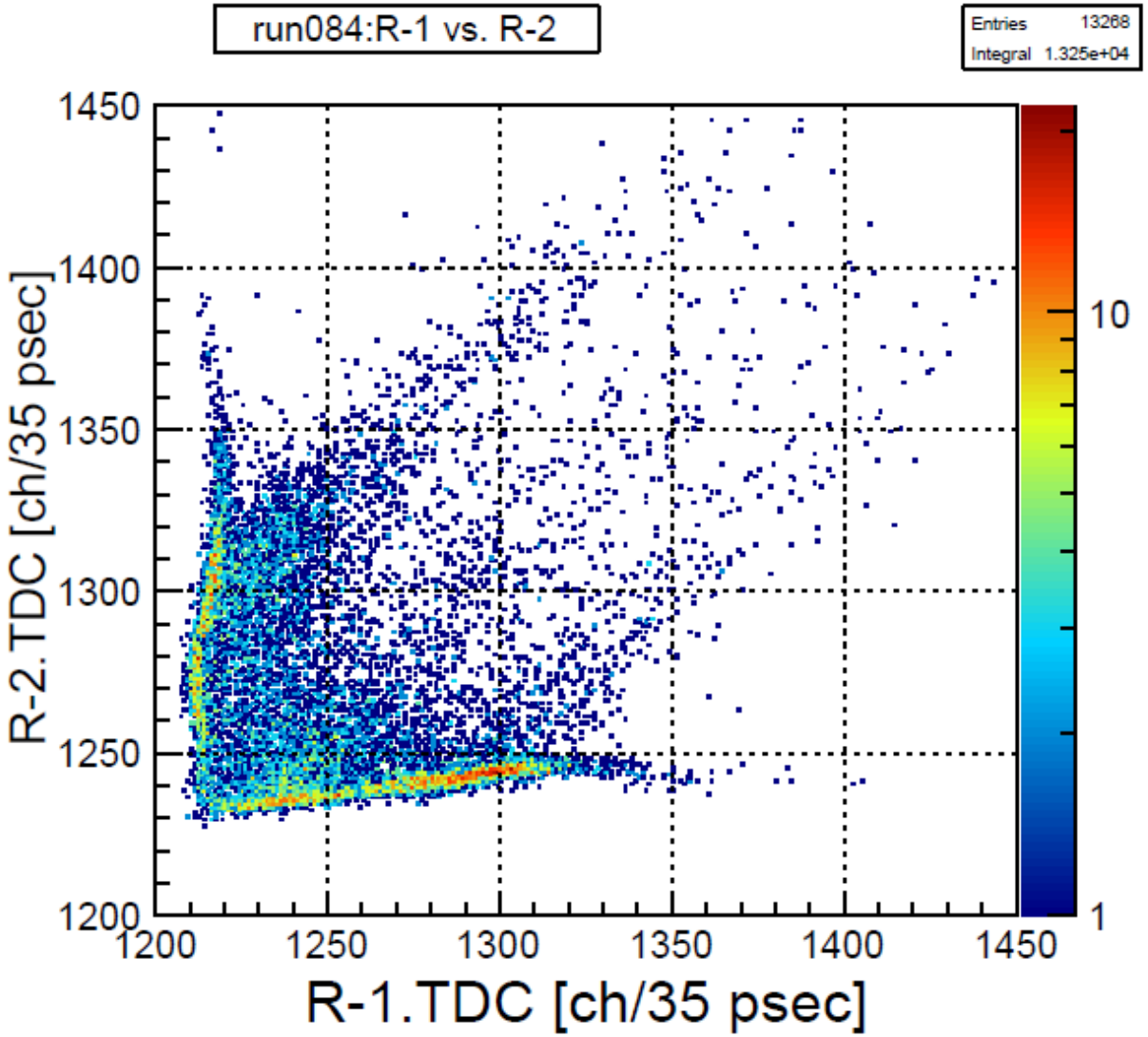
つくってみた。その２

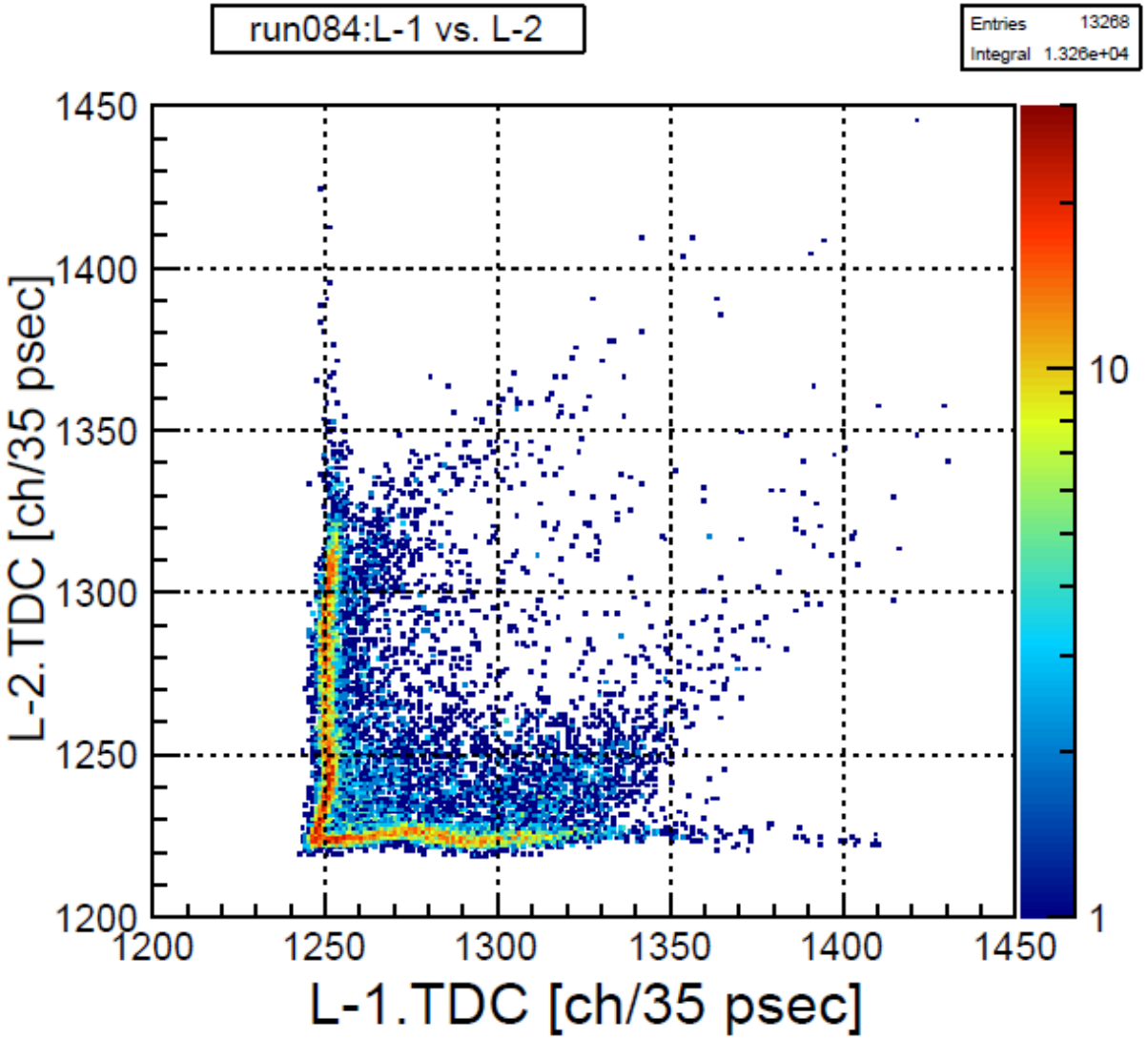


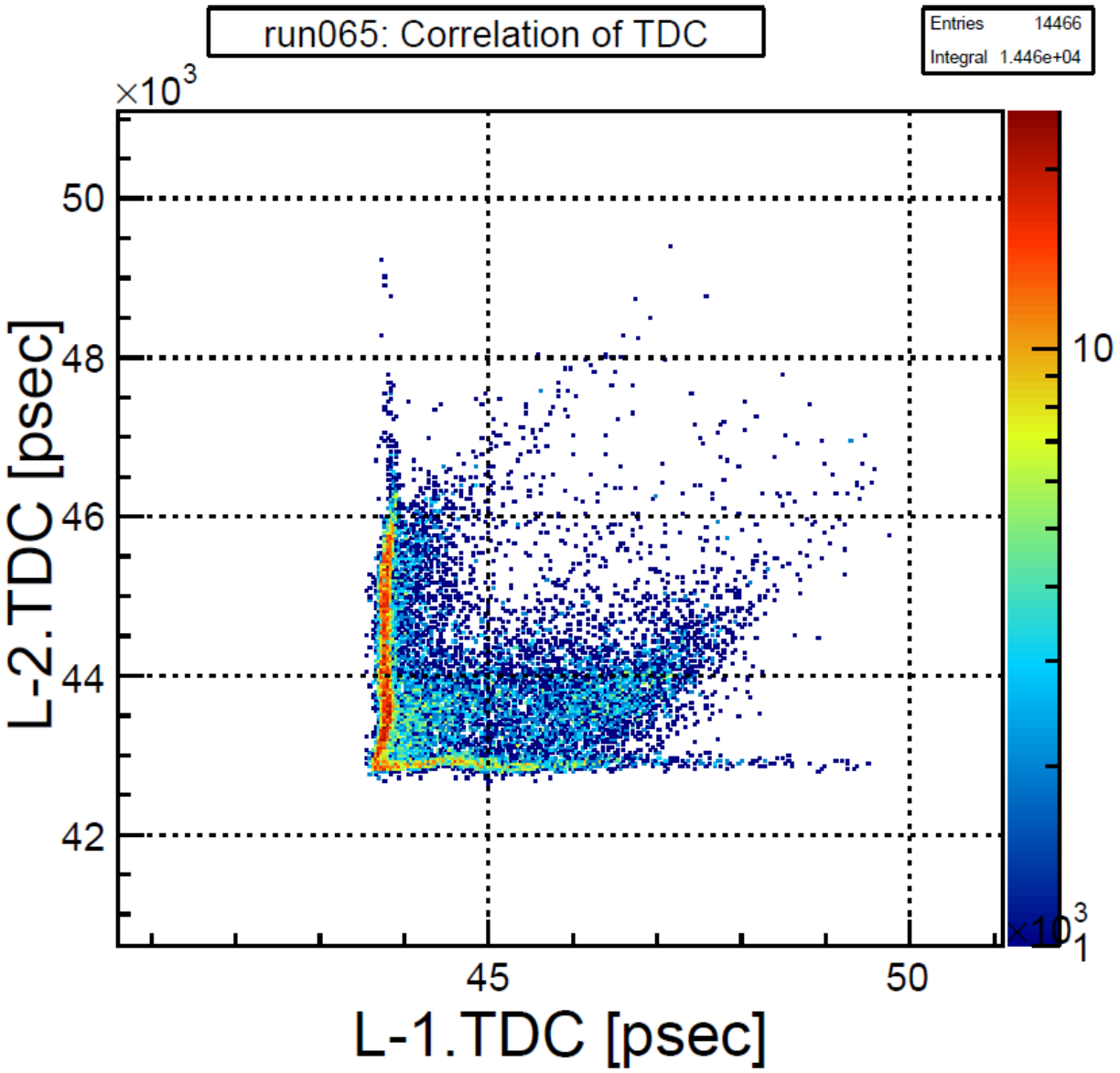


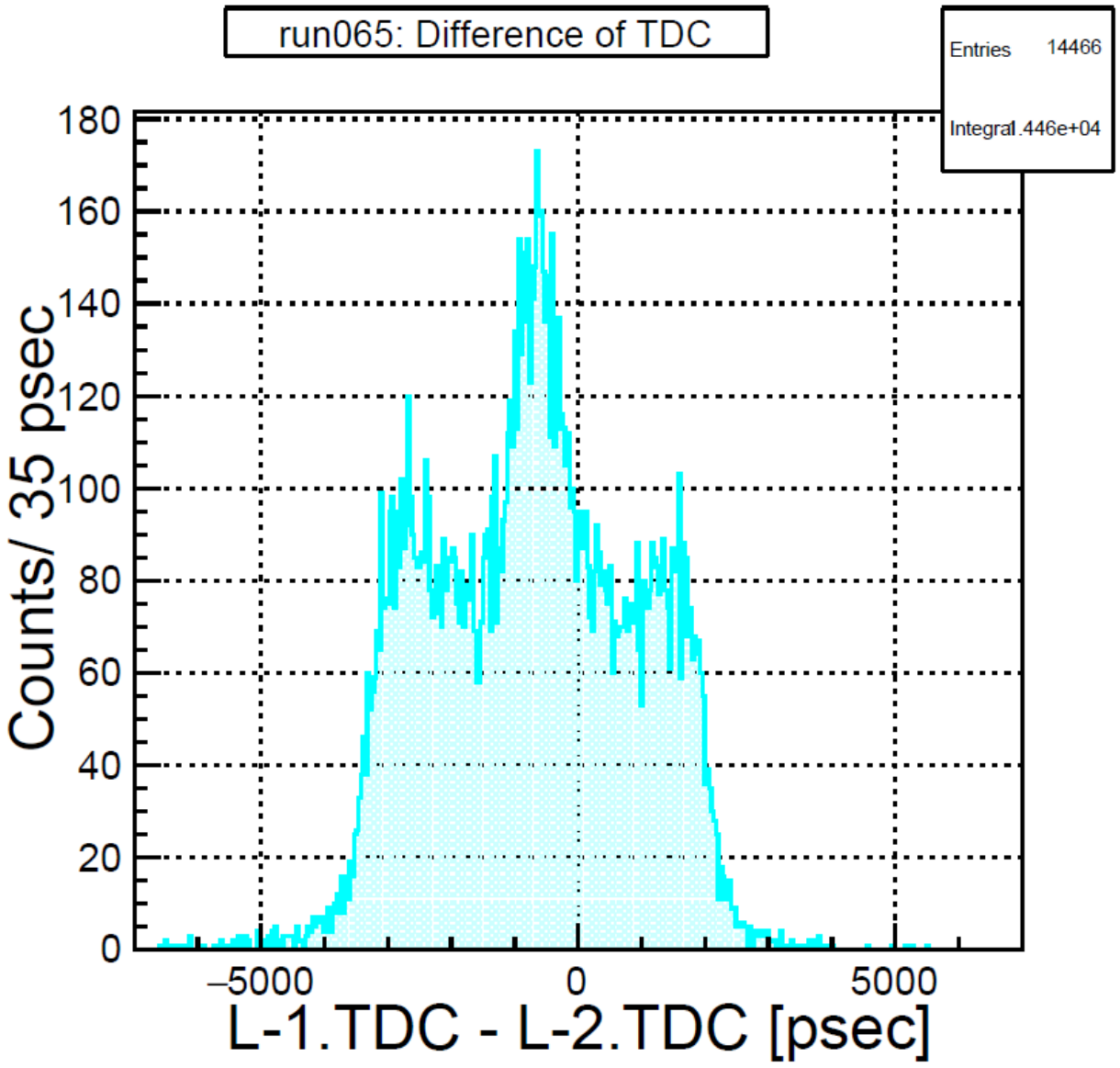


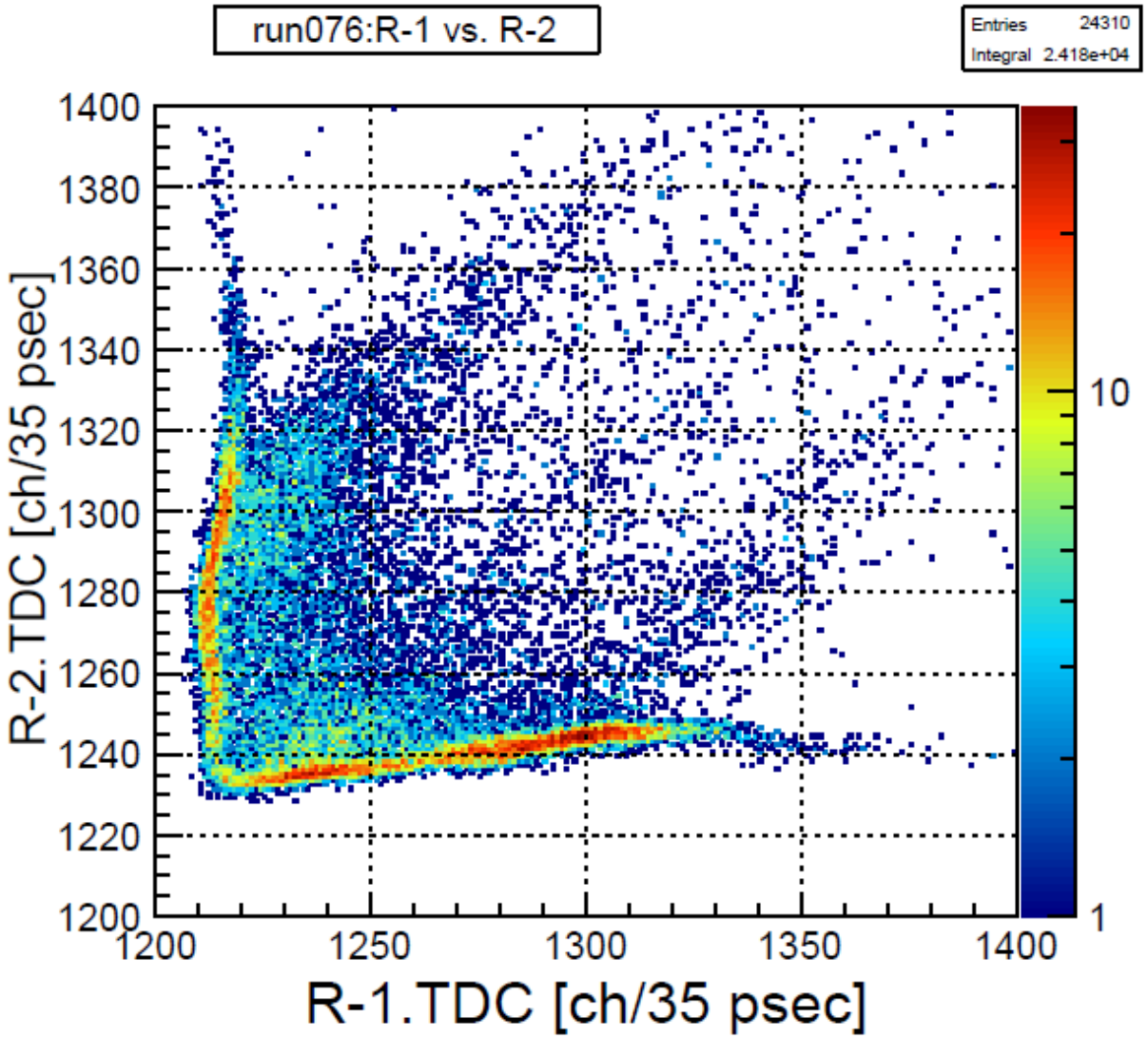
（関係ないことしてサボってました。すみません。）

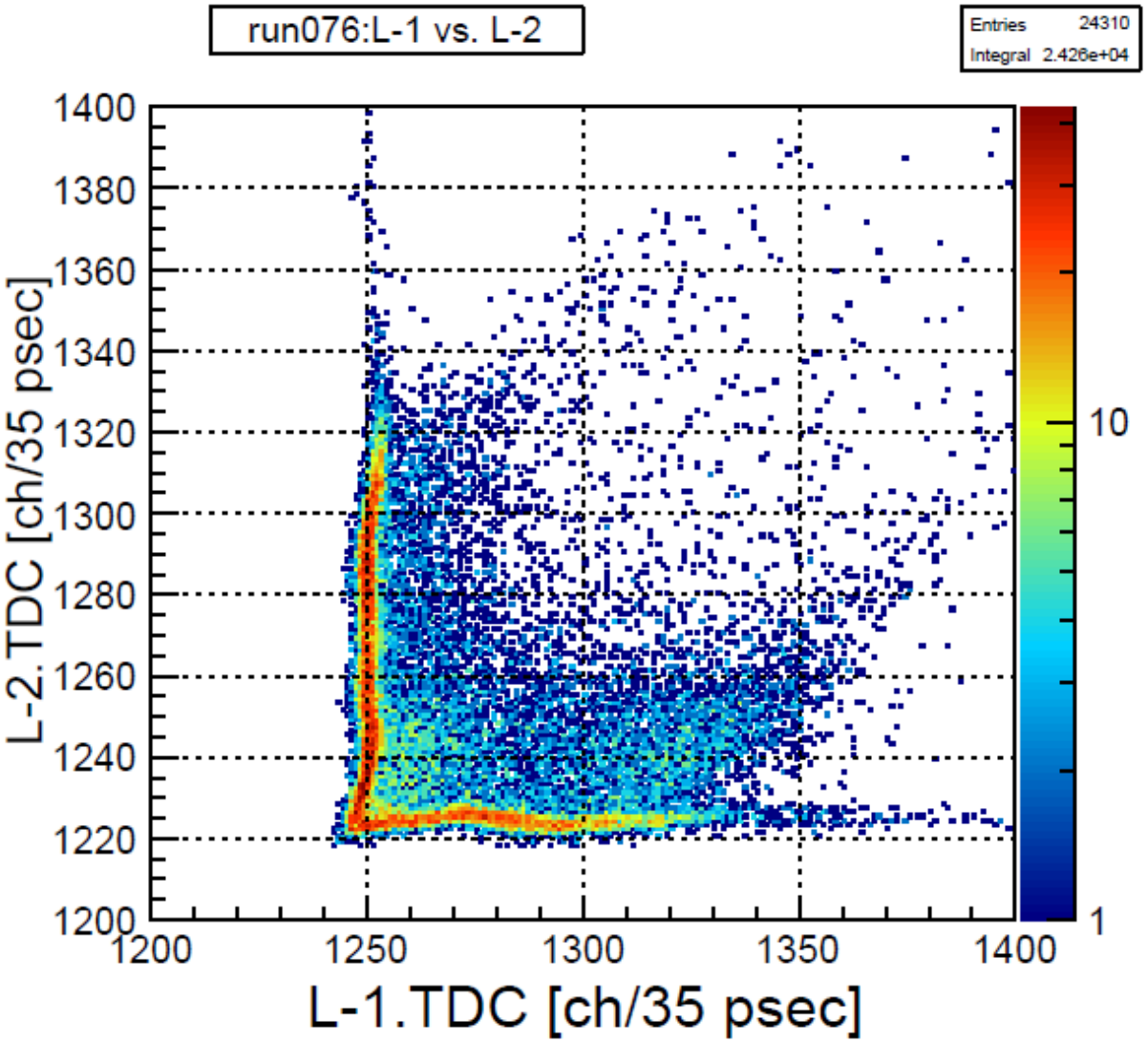

run084:R-1 vs. R-2
Entries 13268
Integral 1.325e+04
R-2.TDC [ch/35 psec]
R-1.TDC [ch/35 psec]
1450
1400
1350
1300
1250
1200
1200
1250
1300
1350
1400
1450
10
1

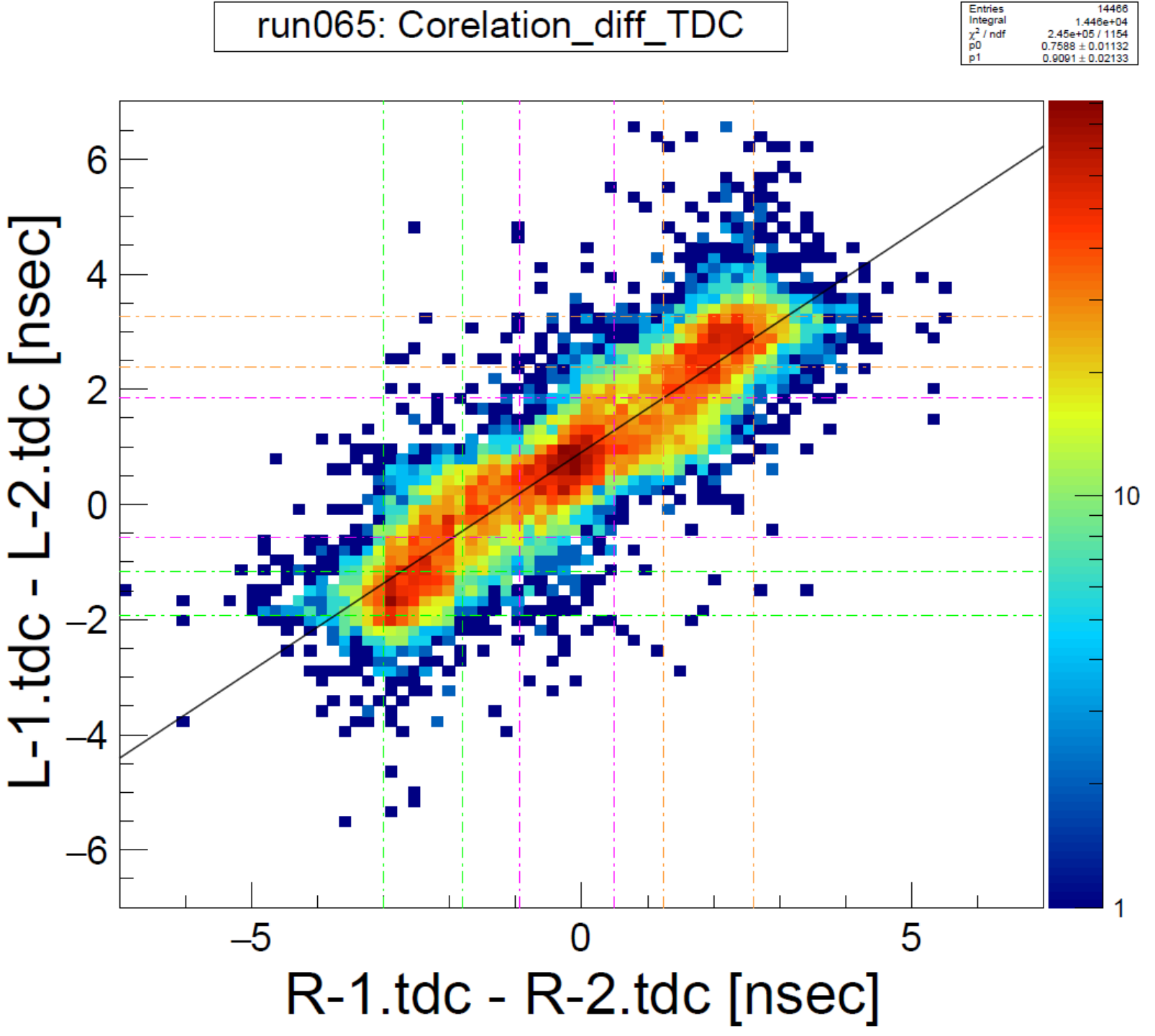

run084:L-1 vs. L-2
Entries 13268
Integral 1.326e+04
L-2.TDC [ch/35 psec]
L-1.TDC [ch/35 psec]
1450
1400
1350
1300
1250
1200
1200
1250
1300
1350
1400
1450
10
1


run065: Correlation of TDC
Entries 14466
Integral 1.446e+04
×10^3
50
48
46
44
42
L-2.TDC [psec]
45
50
L-1.TDC [psec]
10
×10^3
1


run065: Difference of TDC
Entries 14466
Integral .446e+04
180
160
140
120
100
80
60
40
20
0
Counts/ 35 psec
−5000
0
5000
L-1.TDC - L-2.TDC [psec]


run076:R-1 vs. R-2
Entries 24310
Integral 2.418e+04
R-2.TDC [ch/35 psec]
R-1.TDC [ch/35 psec]
1400
1380
1360
1340
1320
1300
1280
1260
1240
1220
1200
1200
1250
1300
1350
1400
10
1


run076:L-1 vs. L-2
Entries 24310
Integral 2.426e+04
L-2.TDC [ch/35 psec]
L-1.TDC [ch/35 psec]
1400
1380
1360
1340
1320
1300
1280
1260
1240
1220
1200
1200
1250
1300
1350
1400
10
1


run065: Corelation_diff_TDC
Entries 14466
Integral 1.446e+04
χ² / ndf 2.45e+05 / 1154
p0 0.7588 ± 0.01132
p1 0.9091 ± 0.02133
L-1.tdc - L-2.tdc [nsec]
R-1.tdc - R-2.tdc [nsec]
6
4
2
0
−2
−4
−6
−5
0
5
10
1