The analysis of the beam test
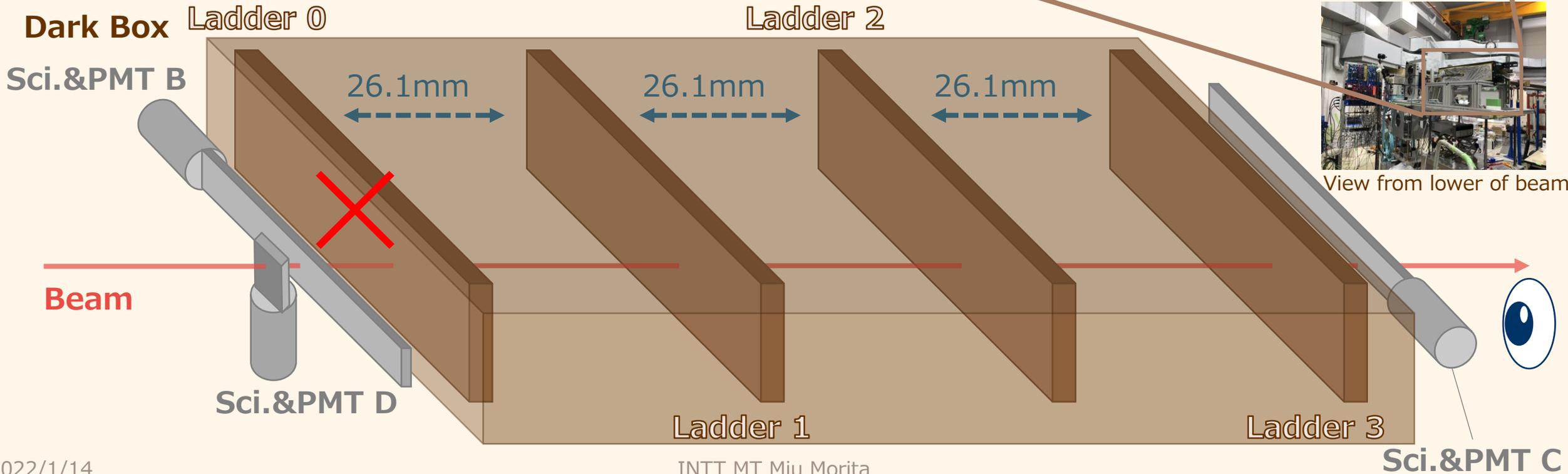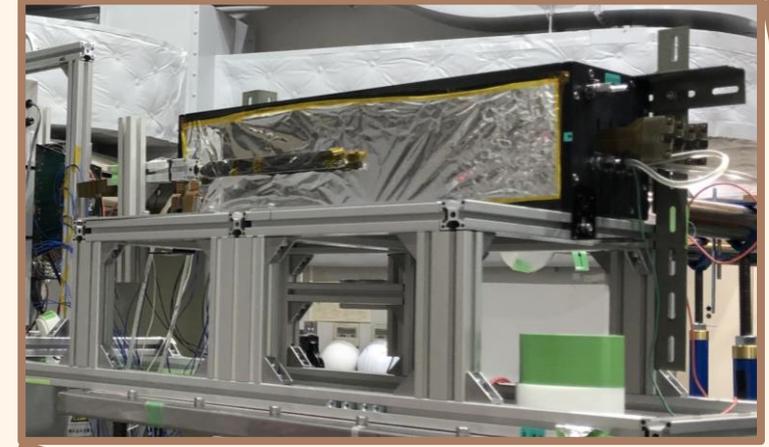# -BCO Block-

Nara WU : Miu Morita

Presentation

1. Setup of the beam test
2. A problem of data by DAQ system of external trigger
3. Check the data
4. Summary

Setup of the beam test

- Shoot electron or positron beam that is 700MeV using GeV gamma accelerator
- The coincidence of Sci. B and Sci. C is an external trigger
- The Sci. A was broken and we removed it
- The Sci. D whose size is 9mm × 9mm didn't include an external trigger but we only acquisition the data from it
- All scintillator's thickness is 5mm
- We used only three ladders without Taiwan ladder

Ladders in dark box

View from lower of beam

**Dark Box** **Ladder 0**   **Ladder 2**

Sci.&PMT B

26.1mm   26.1mm   26.1mm

Beam

Sci.&PMT D   **Ladder 1**   **Ladder 3**

Sci.&PMT C

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Setup of the beam test

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One sci. hit   Real data

```
************** **********************
*    Row    * Instance *  bco_full  *
************** **********************
*       7 *        0 *     32768 *     ⎤ bco block 0
*       7 *        1 *     17848 *     ⎤ bco block 1
*       7 *        2 *     17848 *     ⎦
*       7 *        3 *     14083 *     ⎤ bco block 2
*       7 *        4 *     14083 *     ⎦
*       7 *        5 *     14084 *     ⎤ bco block 3
*       7 *        6 *     14084 *     ⎦
*       7 *        7 *     50547 *     ⎤ bco block 4
*       7 *        8 *     50547 *     ⎦
*       7 *        9 *     50548 *     ⎤ bco block 5
*       7 *       10 *     60315 *     ⎤
*       7 *       11 *     60315 *     ⎥ bco block 6
*       7 *       12 *     60315 *     ⎦
*       7 *       13 *     57625 *     ⎤ bco block 7
*       7 *       14 *     57626 *     ⎤ bco block 8
*       7 *       15 *     57626 *     ⎦
*       7 *       16 *     34524 *     ⎤ bco block 9
*       7 *       17 *     34524 *     ⎦
```



```
└── trigger_3
    ├── INTT_hit_1     ⎤ made by
    ├── INTT_hit_2     ⎥ the beam particle fired trigger
    ├── INTT_hit_3     ⎦
    ├── INTT_hit_4     ⎤ completely same hits as ones
    ├── INTT_hit_5     ⎥ in the first BCO group (sometimes BCO+1)
    ├── INTT_hit_6     ⎦
    ├── INTT_hit_7     ⎤ made by another beam particle
    ├── INTT_hit_8     ⎥ they can be identified with their BCO
    ├── INTT_hit_9     ⎥ i.e. these hits are not associated with the
    ├── INTT_hit_10    ⎥ trigger
    ├── INTT_hit_11    ⎦
    ├── INTT_hit_12    ⎤ another group(s)…
    ├── INTT_hit_13    ⎥
    └── INTT_hit_14    ⎦
```

explanation by G.Nukazuka

- Row is sci. hit number
- Instance is INTT hit number
- bco_full is time (1bco ≈ 106ns) in INTT DAQ system

INTT has some beam event's data in one external trigger hit

A problem of data by DAQ system of external trigger

trigger

Hard veto

CAMAC
DAQ
process

~250 ms

INTT data
process

event   event   event
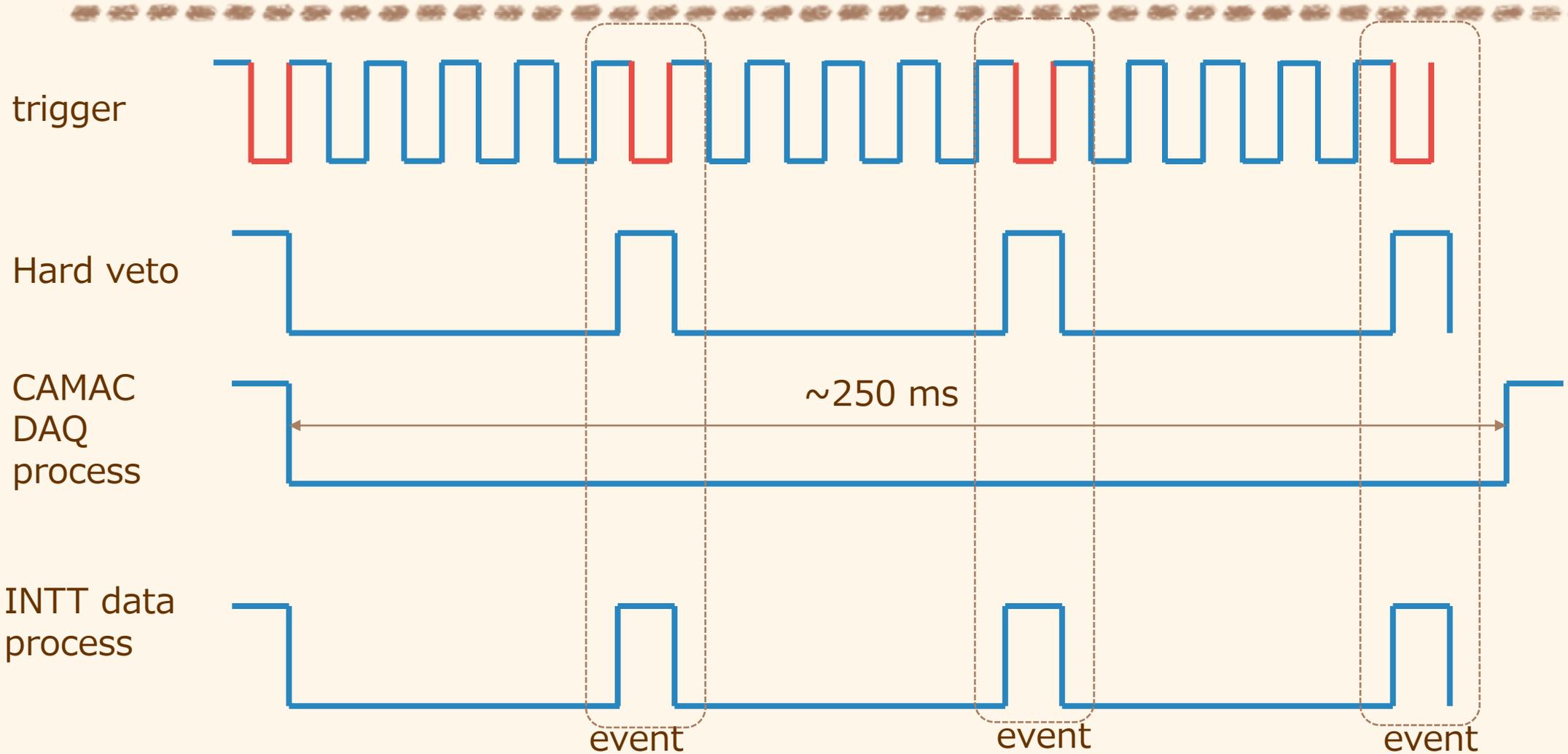
INTT has some beam event's data in one external trigger hit

- Sci. D is not trigger so we guessed true BCO block has a relationship with sci.D
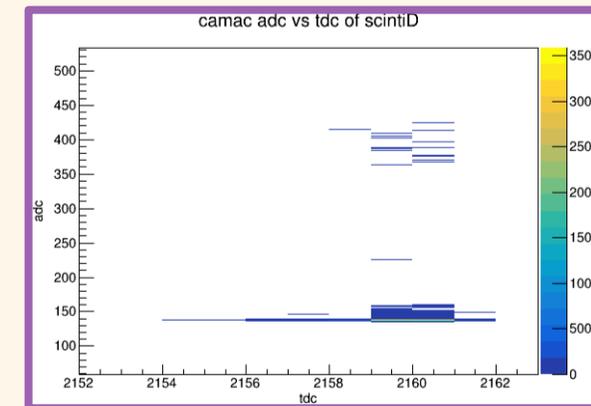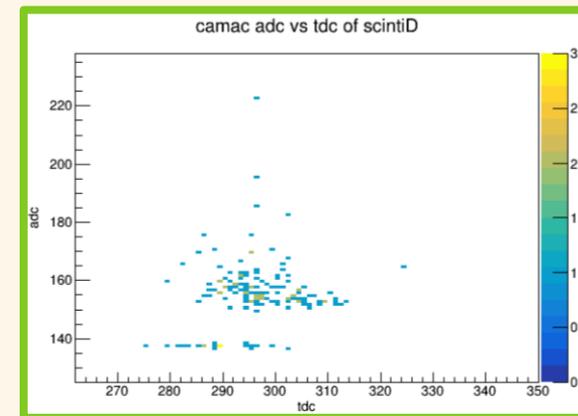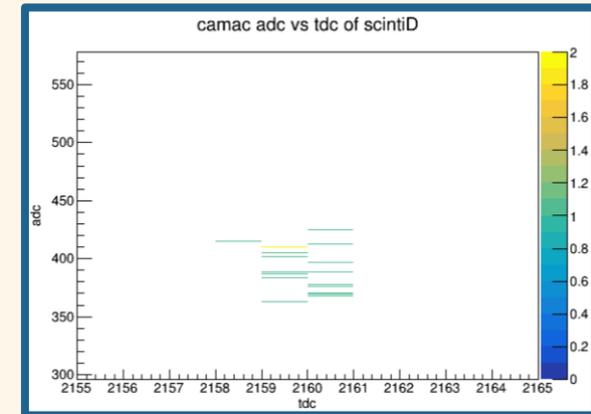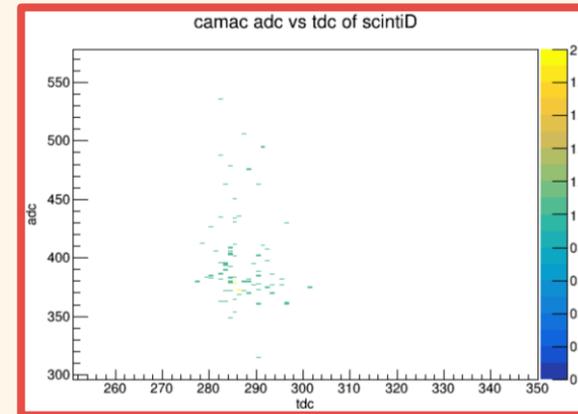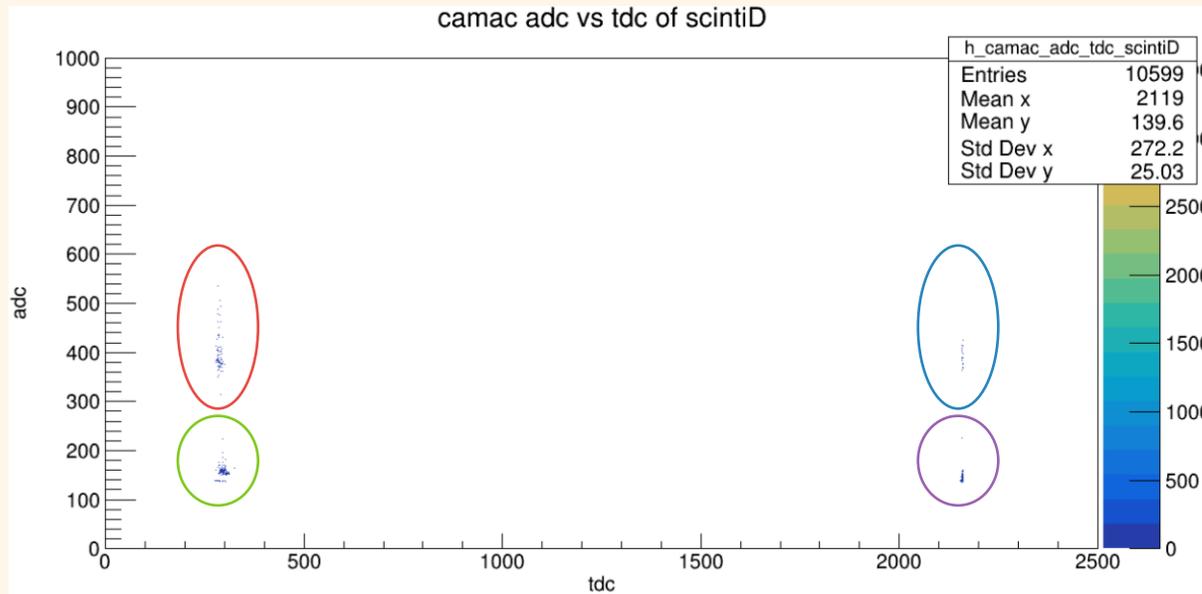
- Sci. D data is divided 4 blocks

Guess
- Red circle is the true data
- Green one is the data through the lite-gide
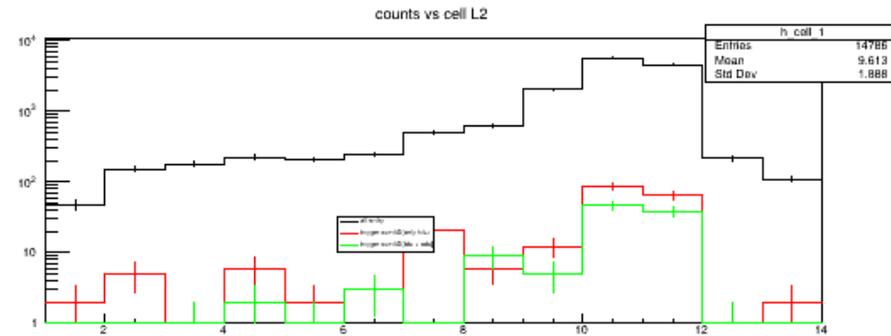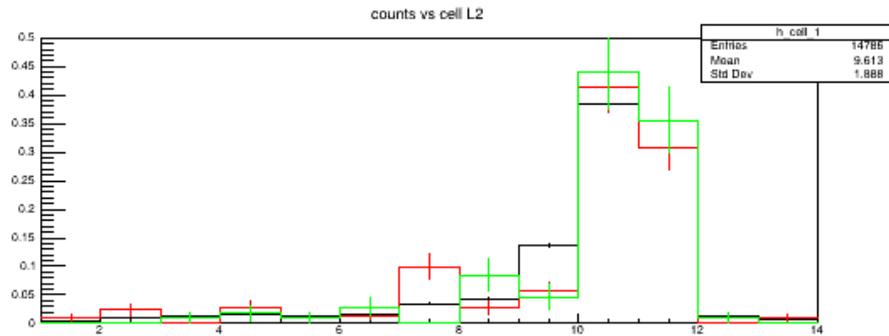- Blue and purple one is not data because tdc is overflow

Check the data

1st BCO block

L1
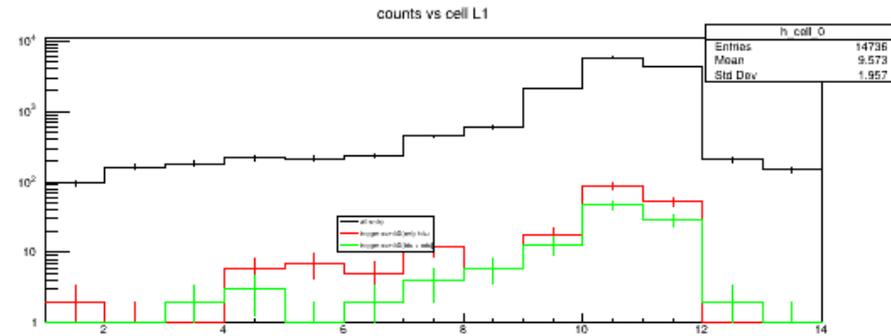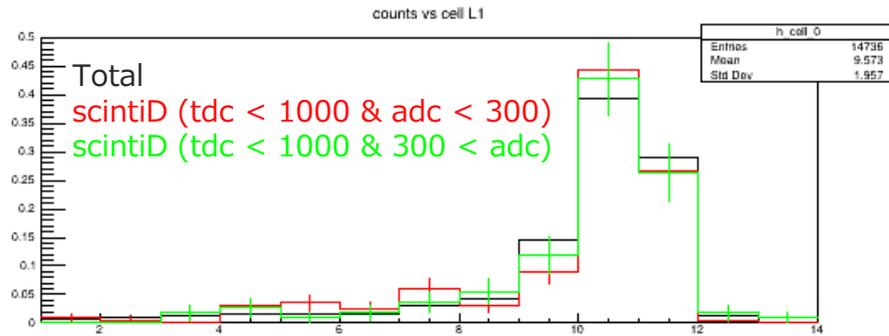
L2

L3
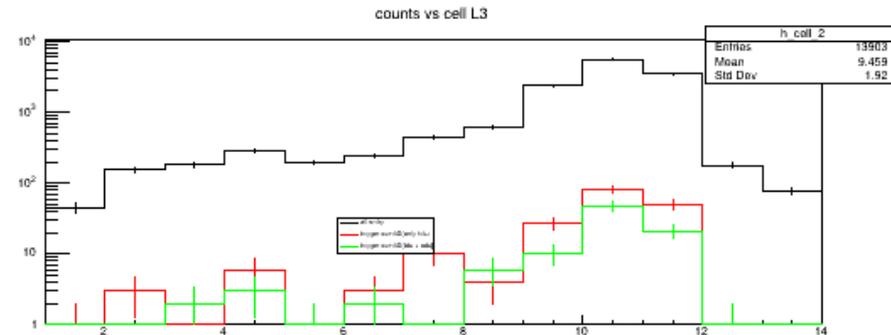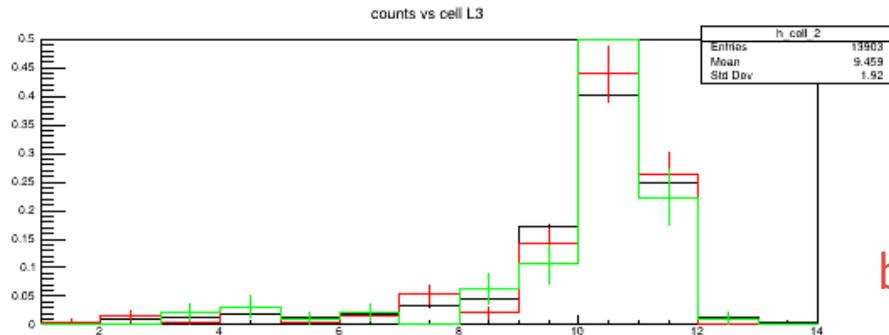
Total
scintiD (tdc < 1000 & adc < 300)
scintiD (tdc < 1000 & 300 < adc)

beam

X axis is chip number(14=1), y axis is rate of hits

X axis is chip number(14=1), y axis is hits number(log scale)

2022/1/14

INTT MT Miu Morita

2nd BCO block

2nd BCO block

L1

L2

L3

beam

X axis is chip number(14=1), y axis is rate of hits

X axis is chip number(14=1), y axis is hits number(log scale)

3rd BCO block

L1

L2

L3

Total
scintiD (tdc < 1000 & adc < 300)
scintiD (tdc < 1000 & 300 < adc)
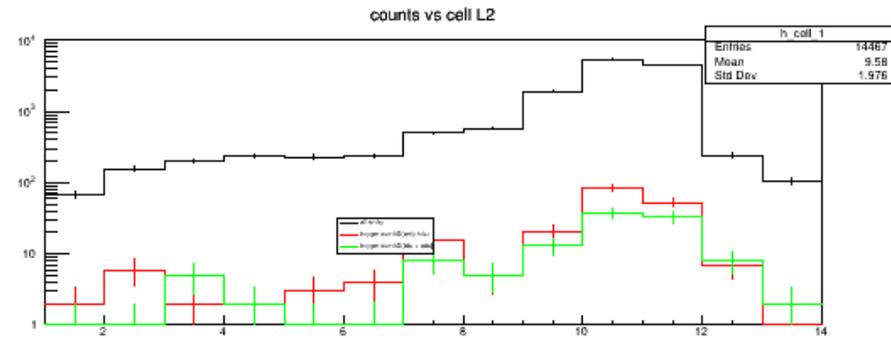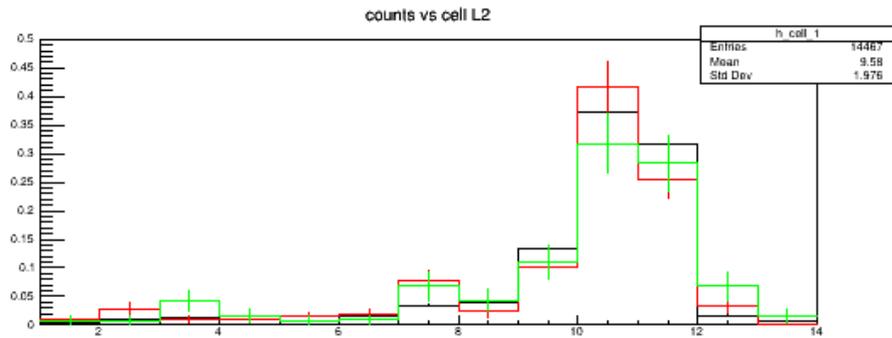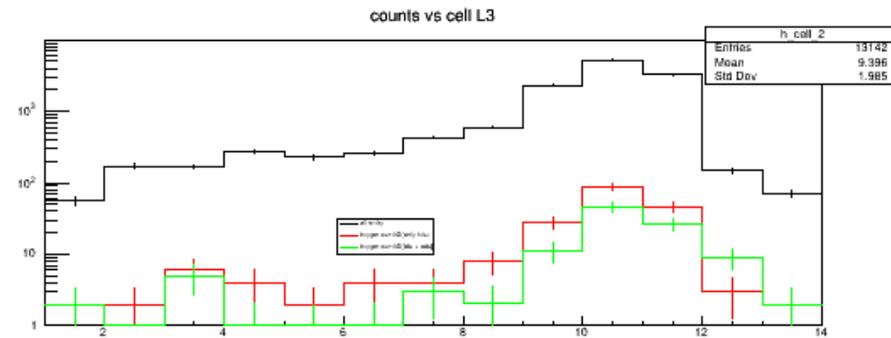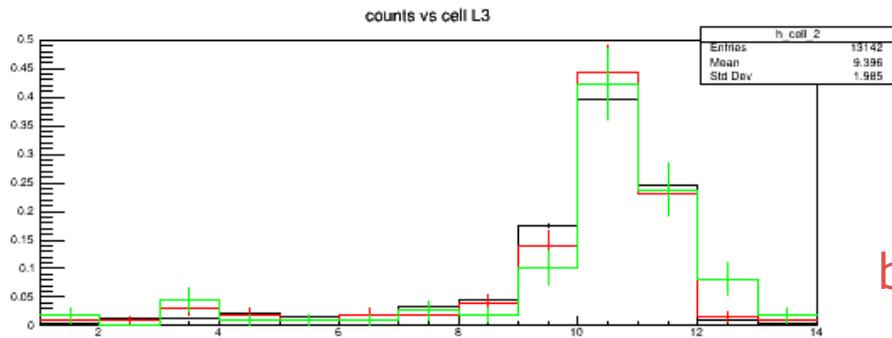
beam
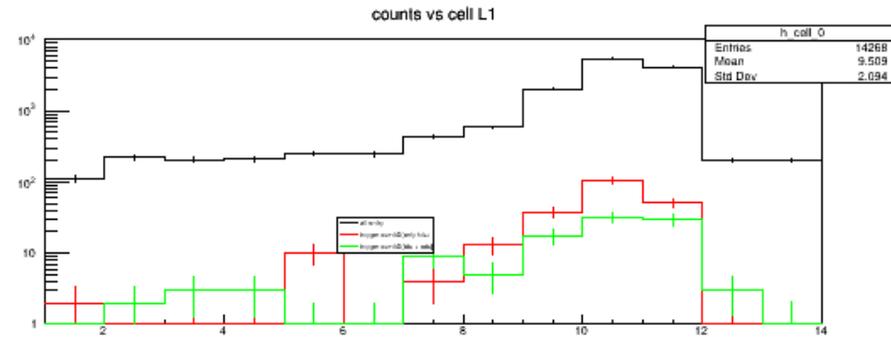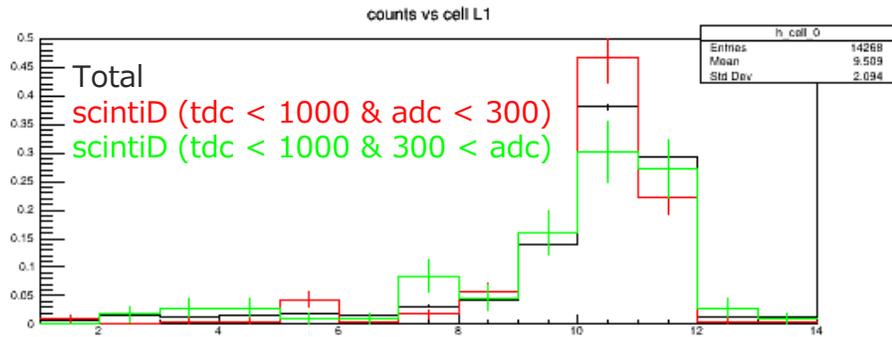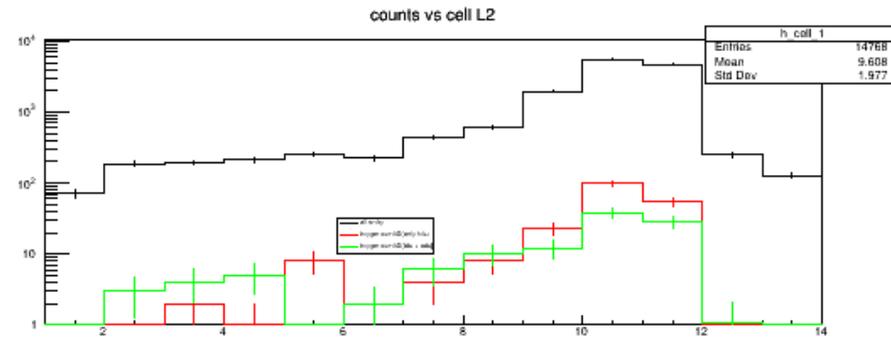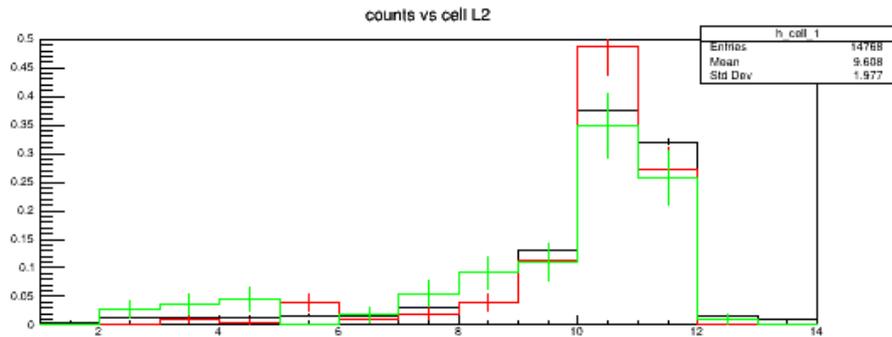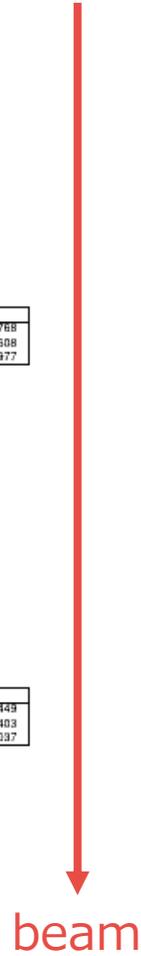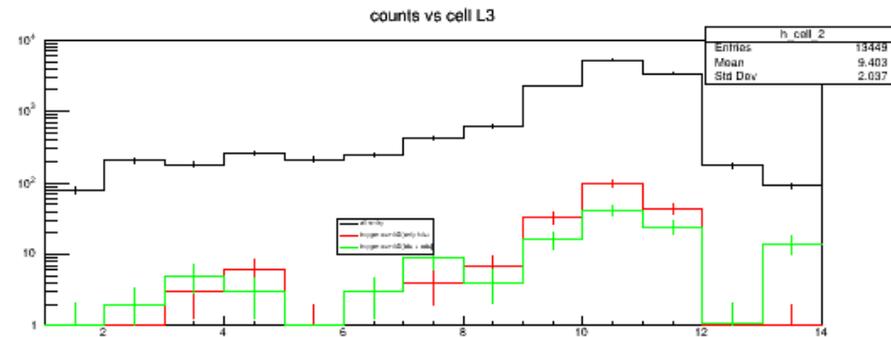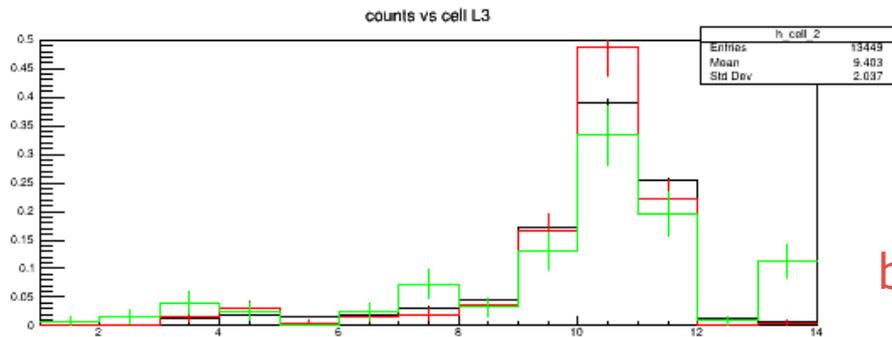
I can't distinguish the difference

X axis is chip number(14=1), y axis is rate of hits

X axis is chip number(14=1), y axis is hits number(log scale)

Summary

- INTT has a problem of data by DAQ system of external trigger
  - It takes ~250ms for CAMAC from read to output the data
- INTT has some beam event's data in one external trigger data(hit)
  - INTT only output the data with external trigger so all INTT events are true
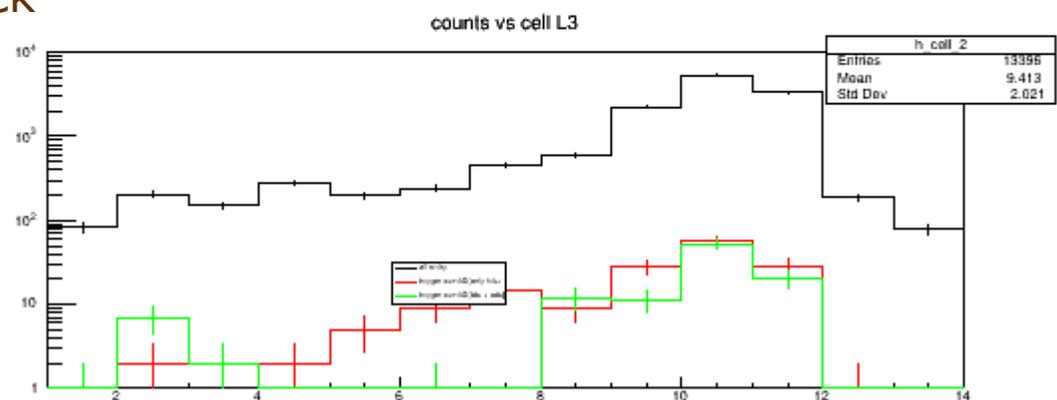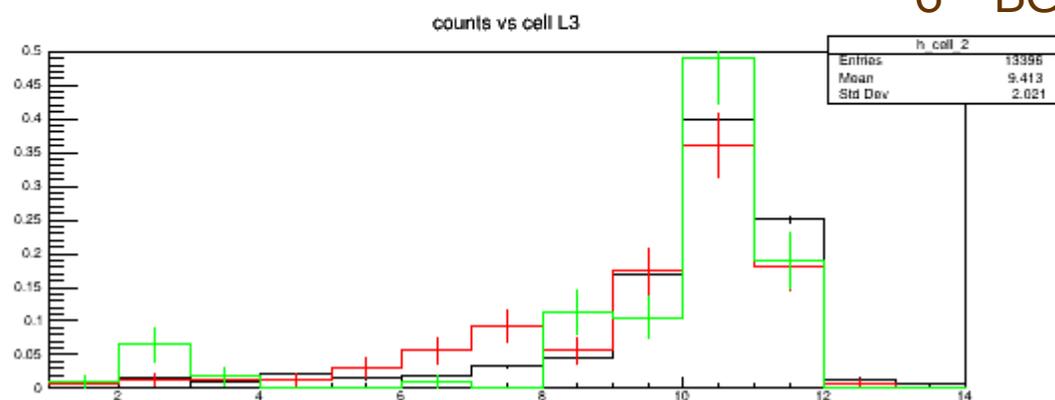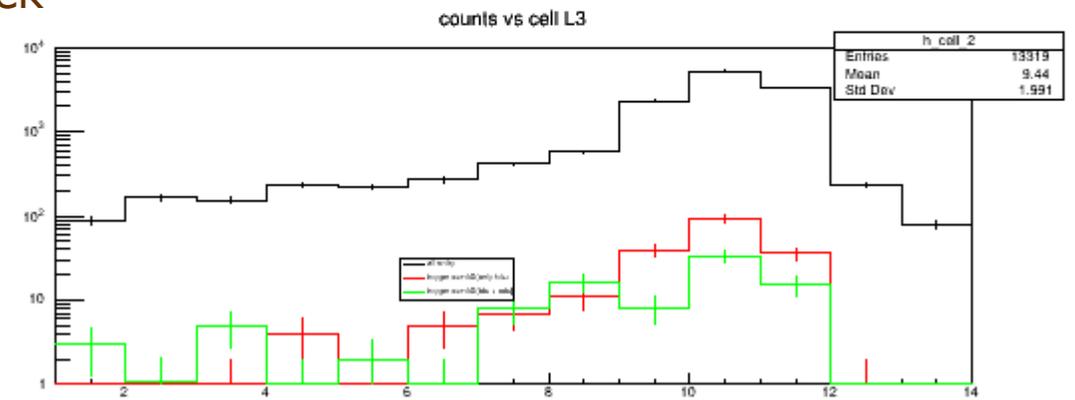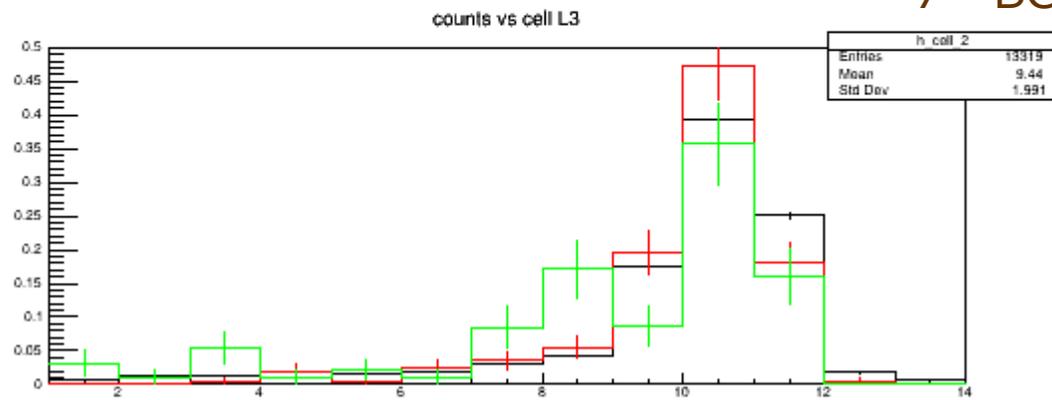 - It is not possible to know which BCO block is related to external trigger data

Back Up

INTT MT Miu Morita

Run87-89

1st BCO block

Total
scintiD (tdc < 1000 & adc < 300)
scintiD (tdc < 1000 & 300 < adc)

INTT MT Miu Morita

Run87-89

2nd BCO block

Total
scintiD (tdc < 1000 & adc < 300)
scintiD (tdc < 1000 & 300 < adc)
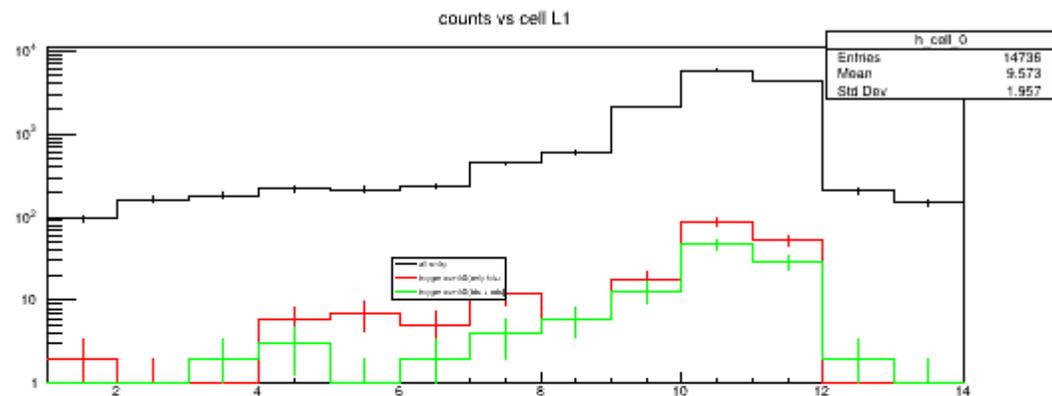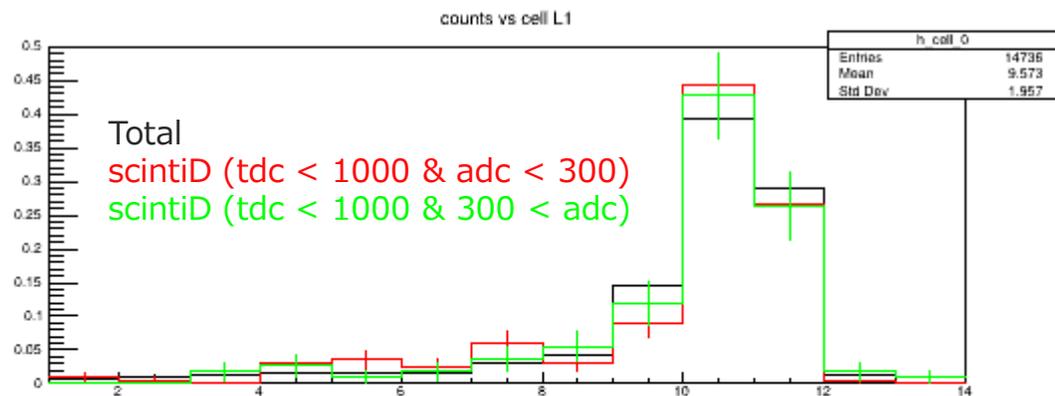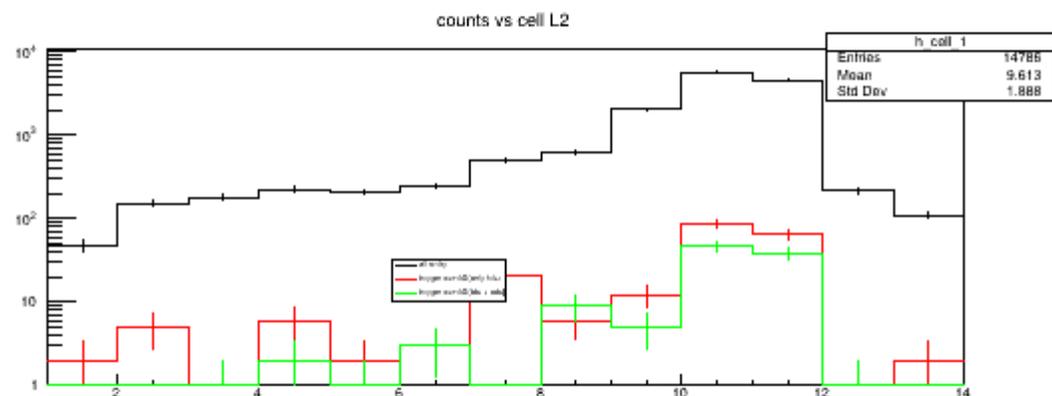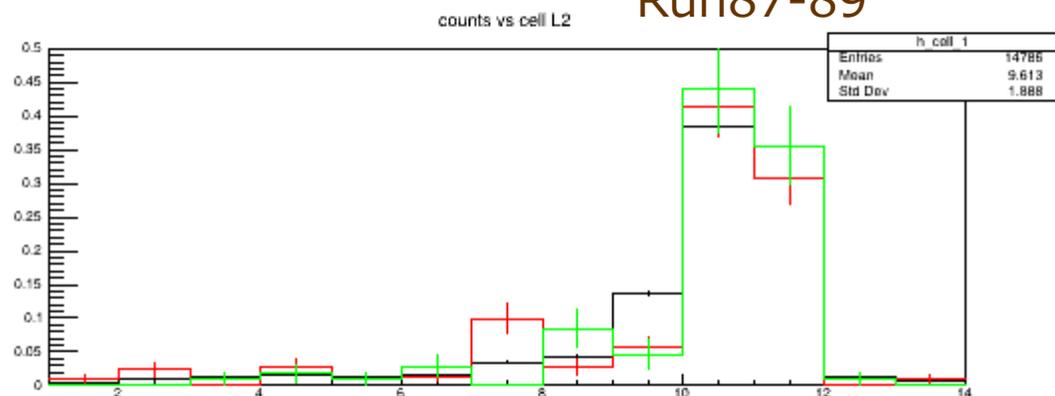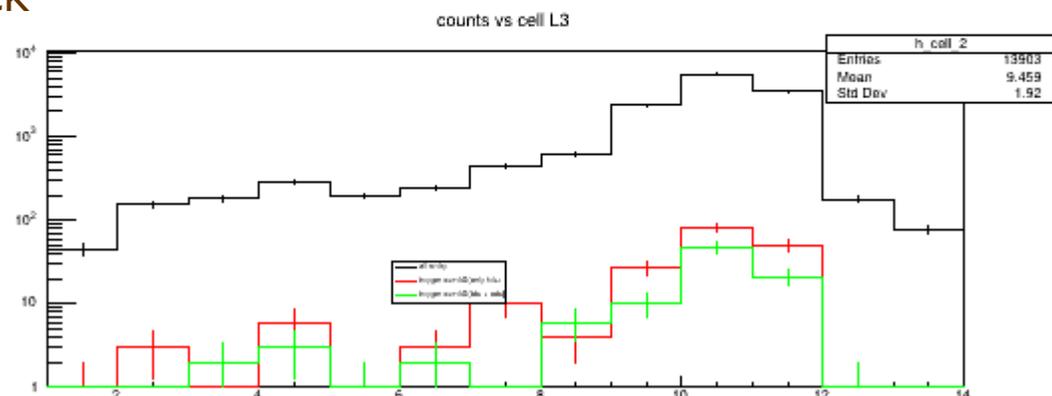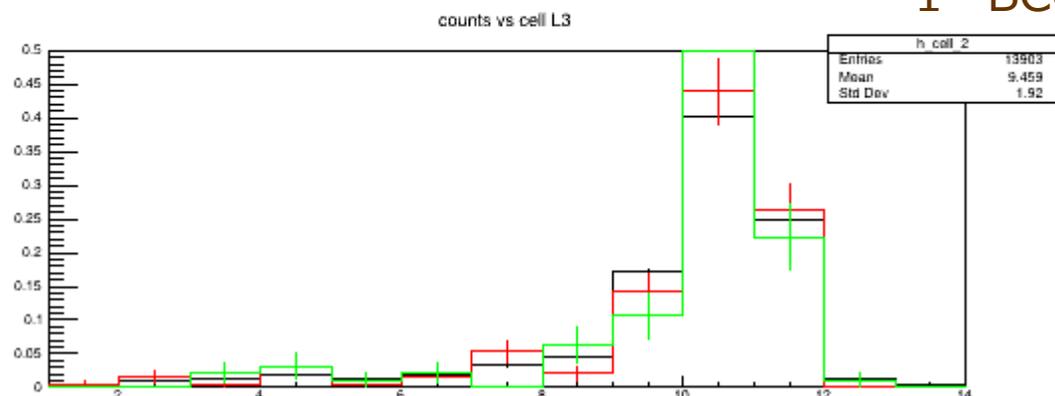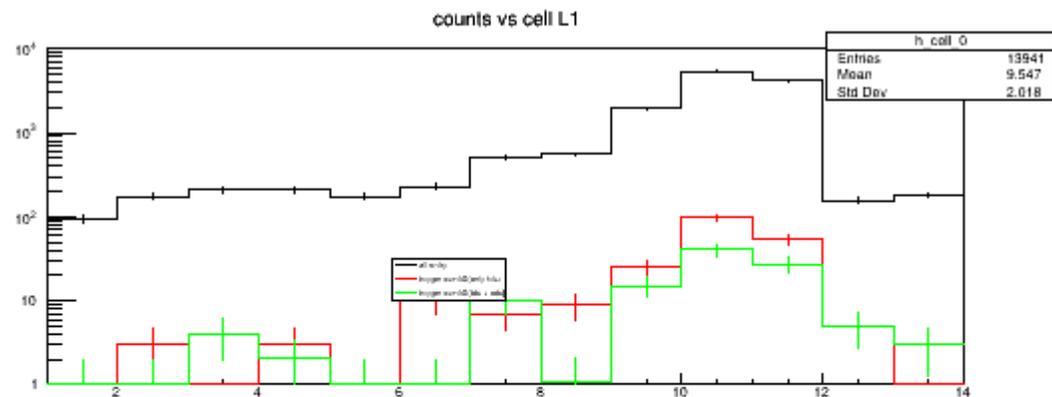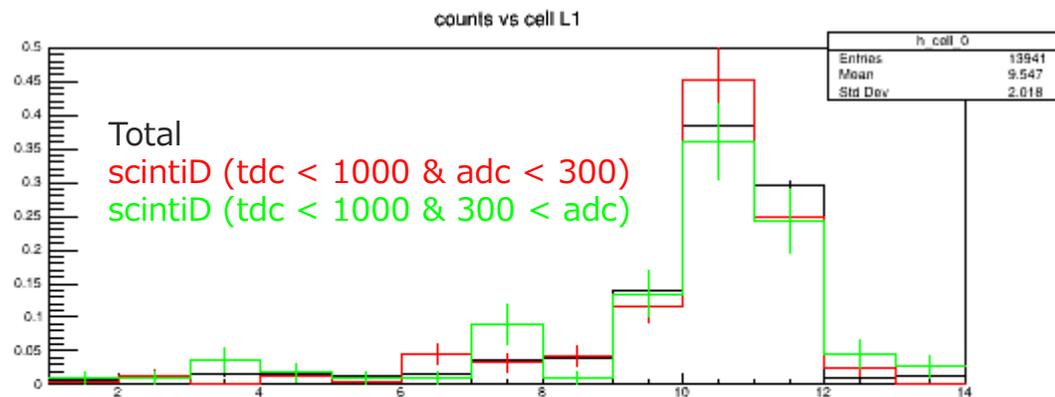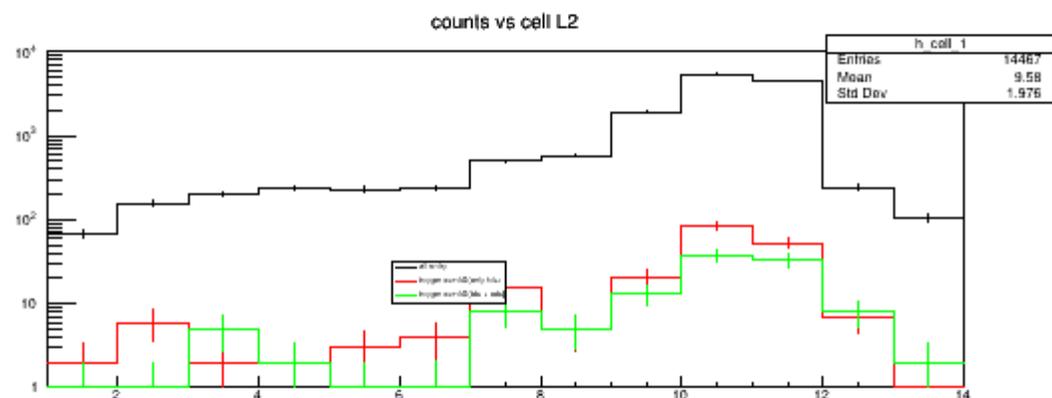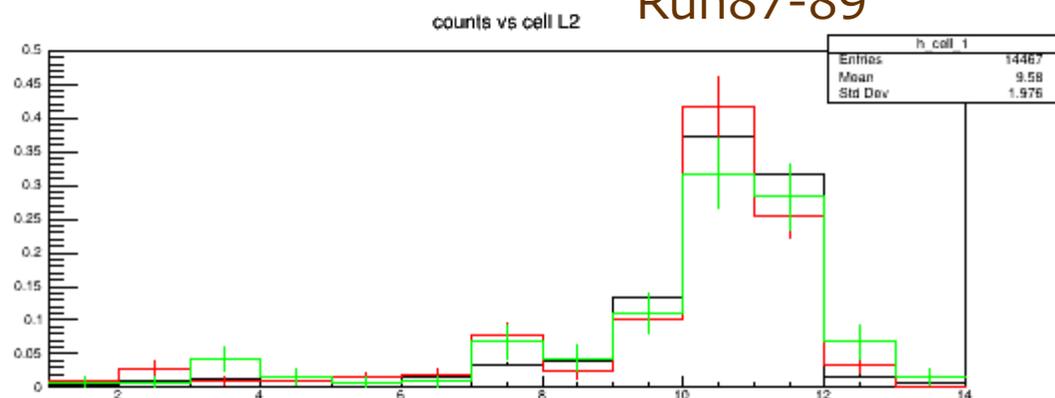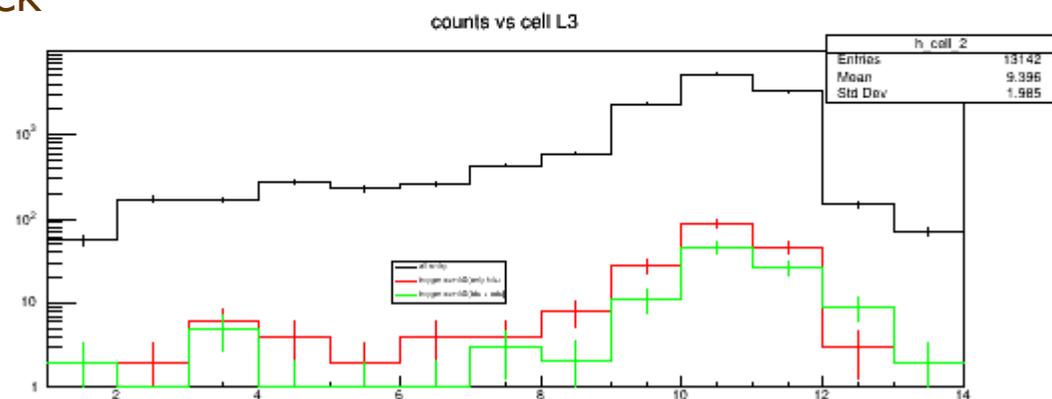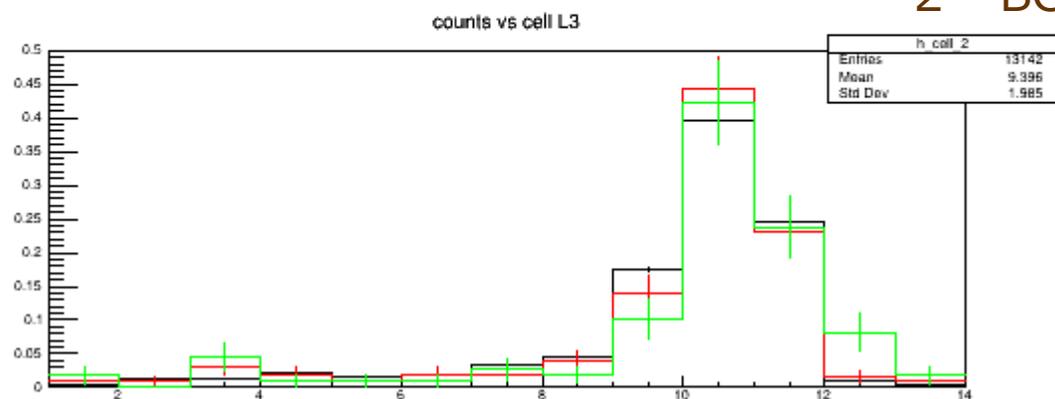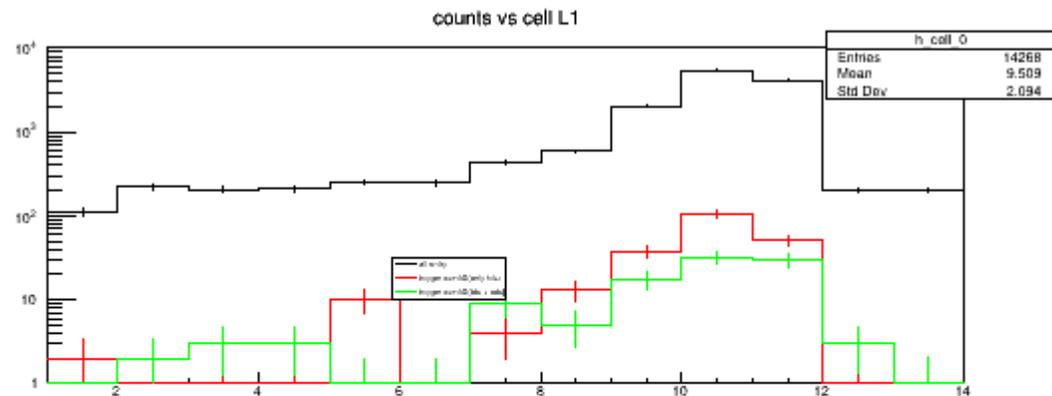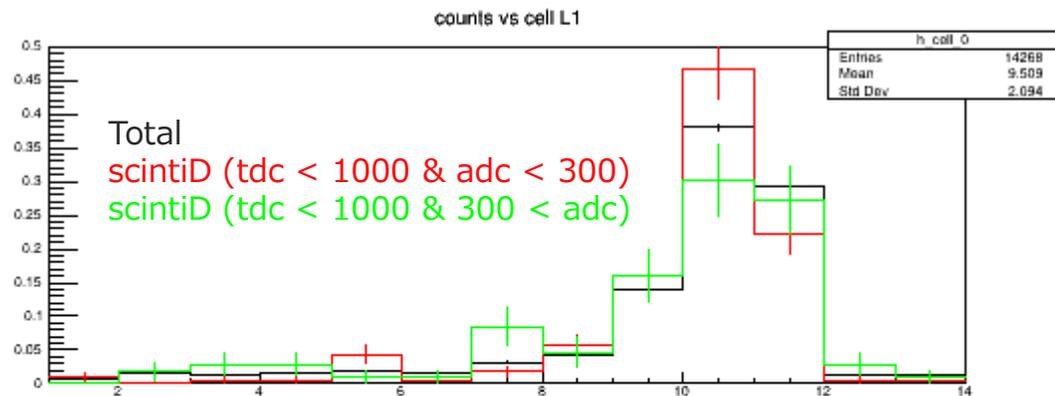
Run87-89

3rd BCO block

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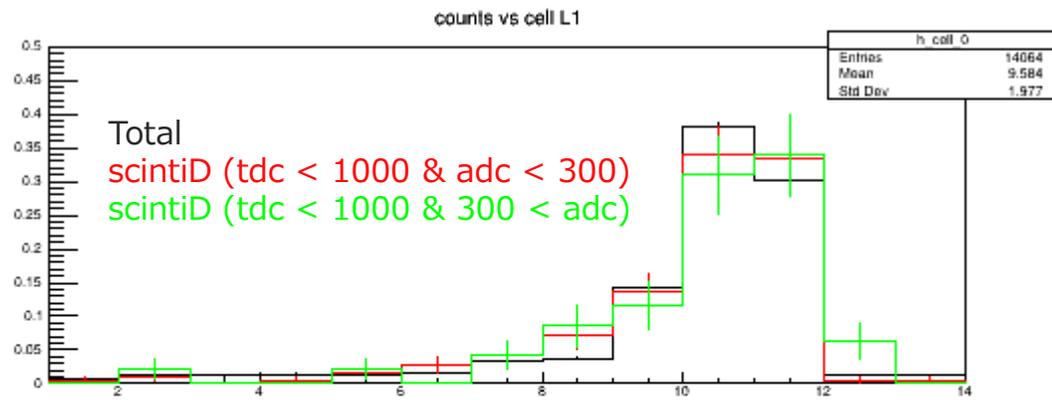Run87-89

4th BCO block

Total
scintiD (tdc < 1000 & adc < 300)
scintiD (tdc < 1000 & 300 < adc)

INTT MT Miu Morita

Total
scintiD (tdc < 1000 & adc < 300)
scintiD (tdc < 1000 & 300 < adc)

Run87-89
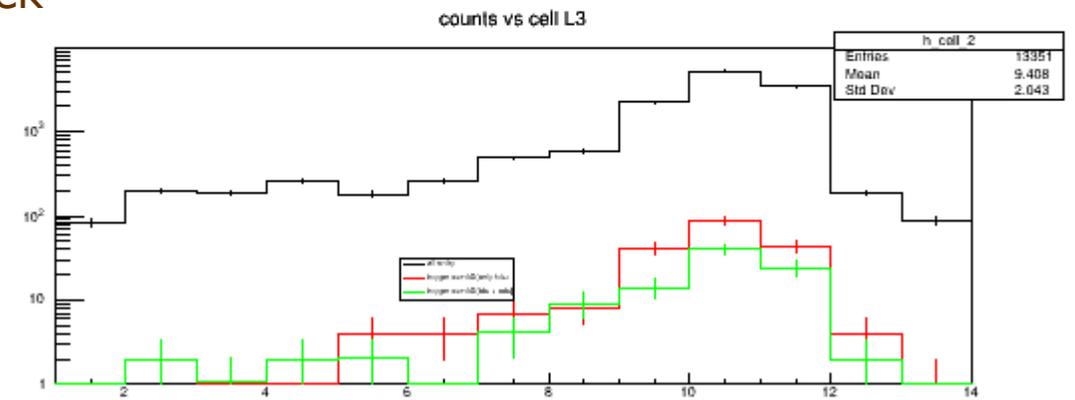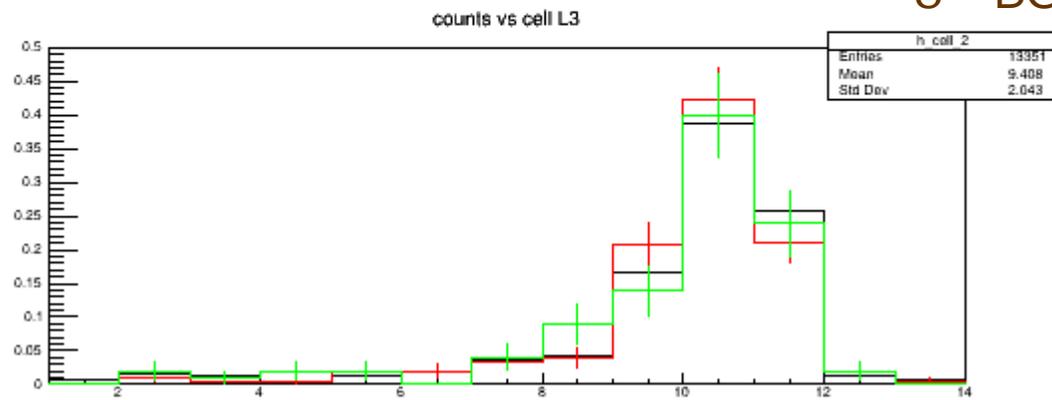
5th BCO block

Total
scintiD (tdc < 1000 & adc < 300)
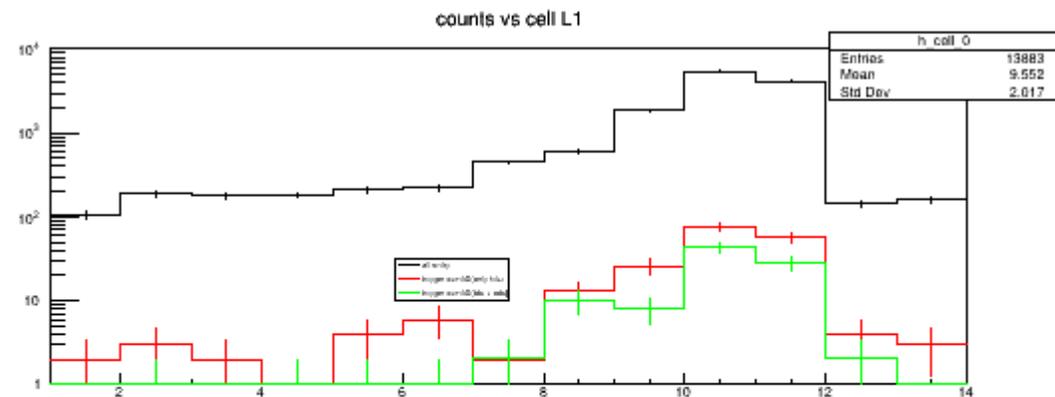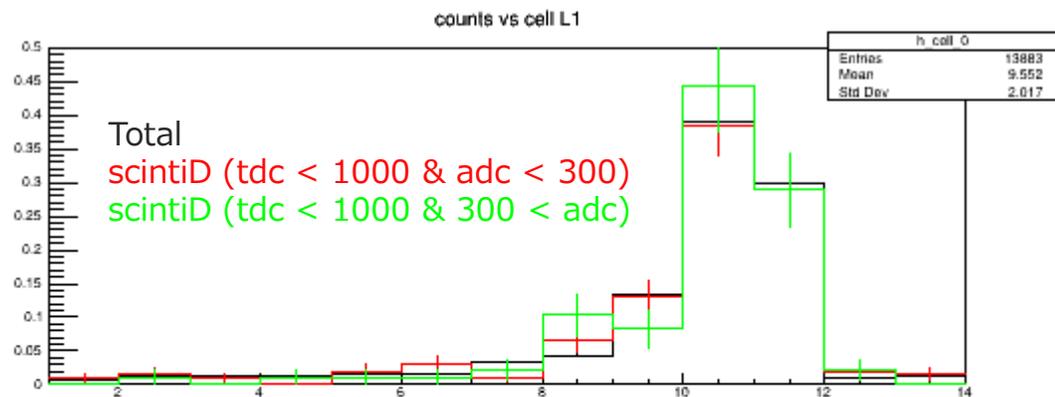scintiD (tdc < 1000 & 300 < adc)
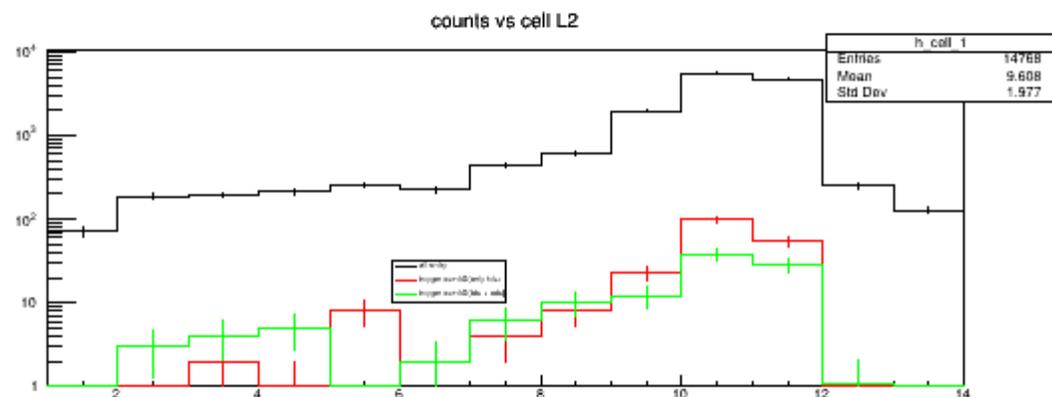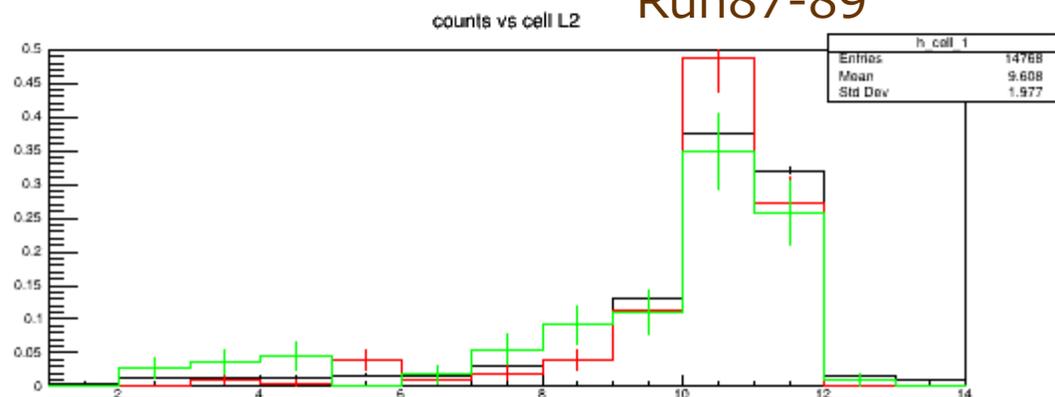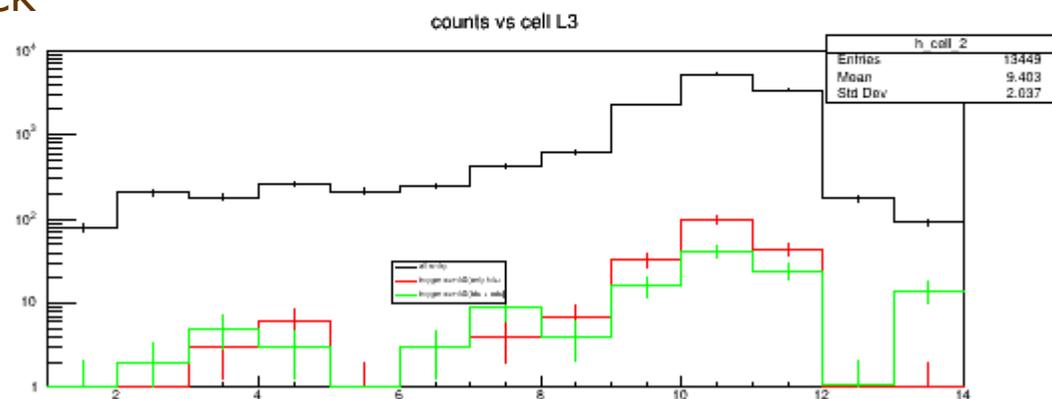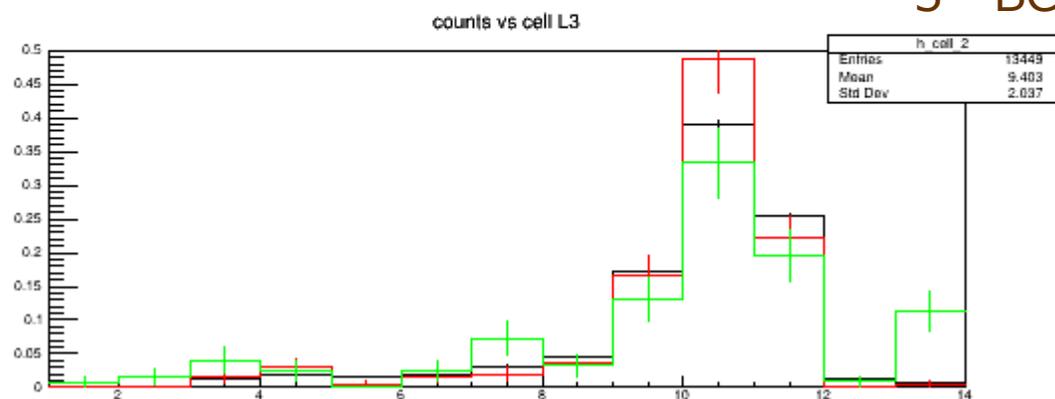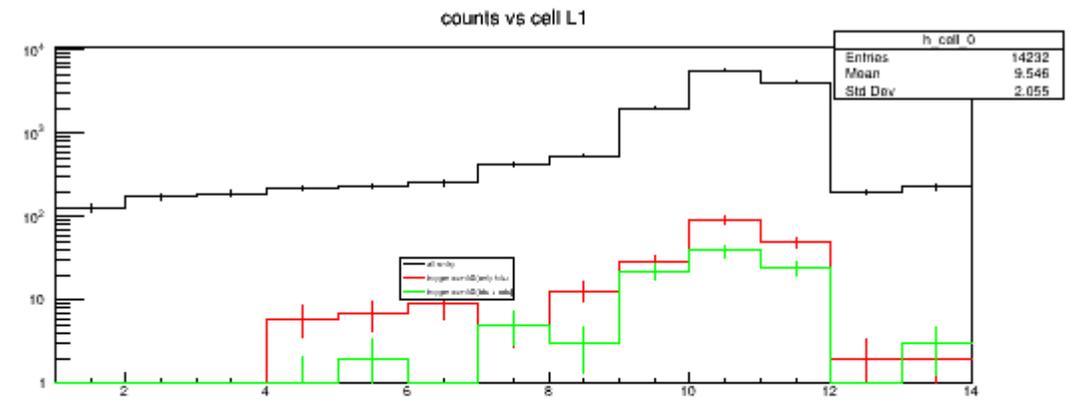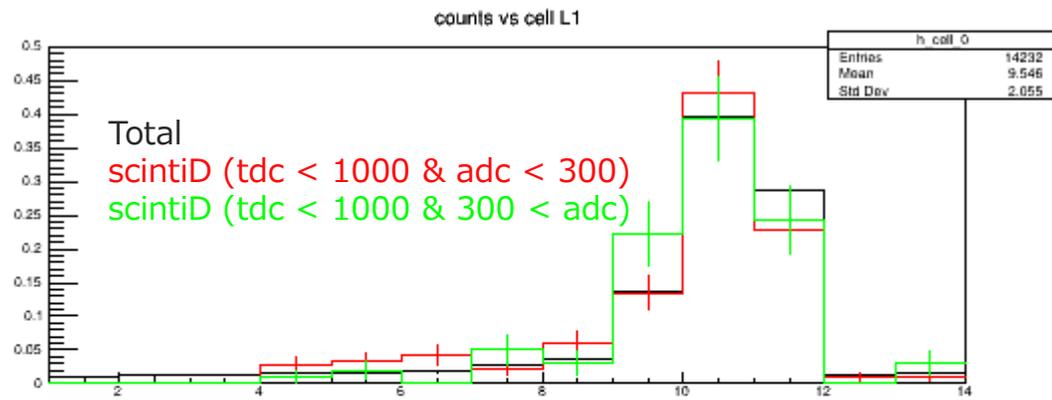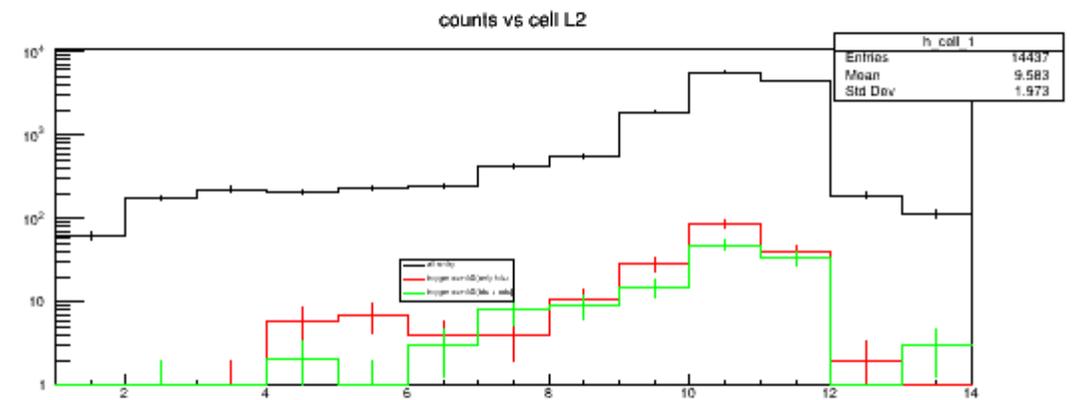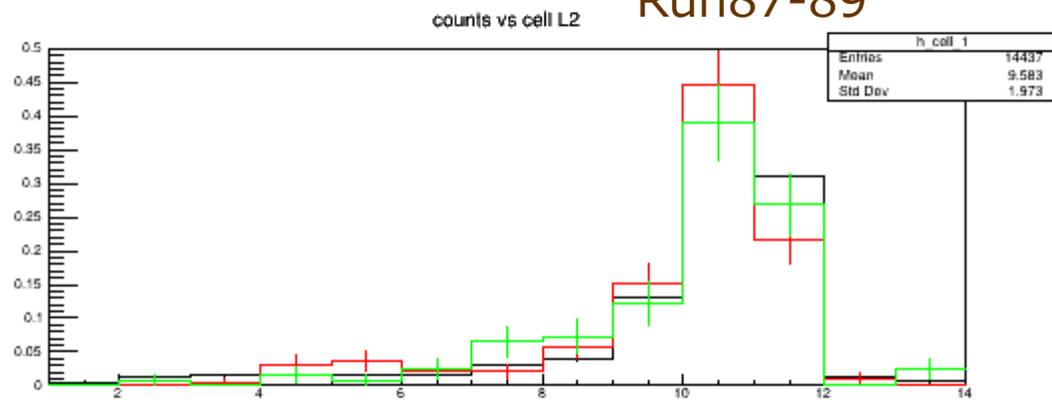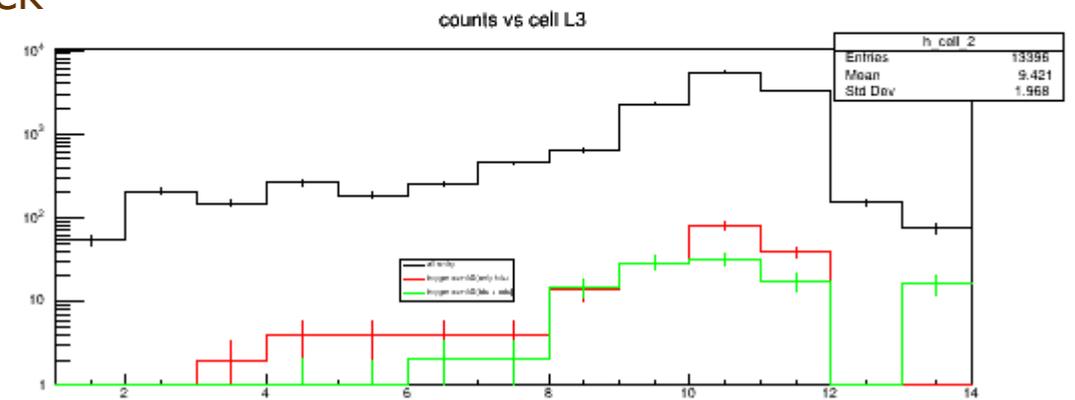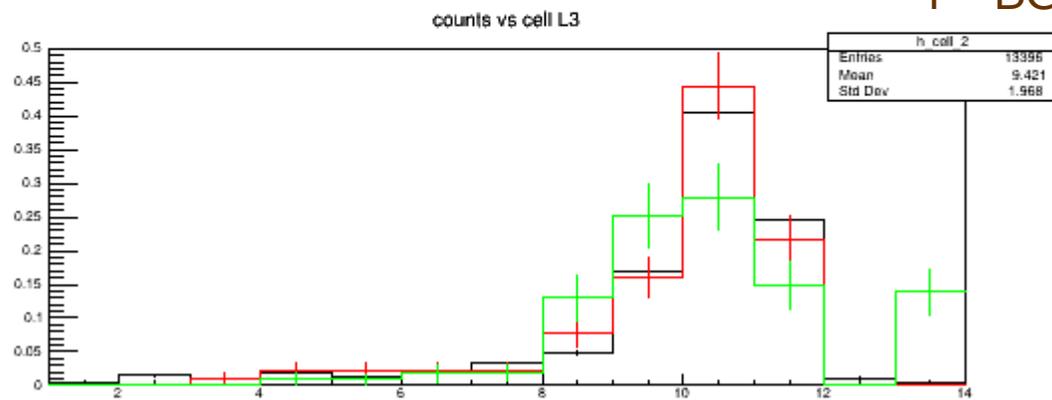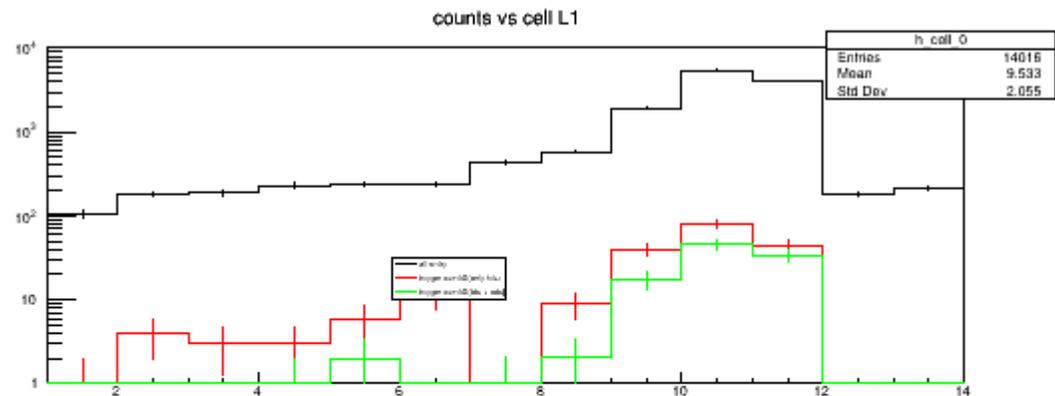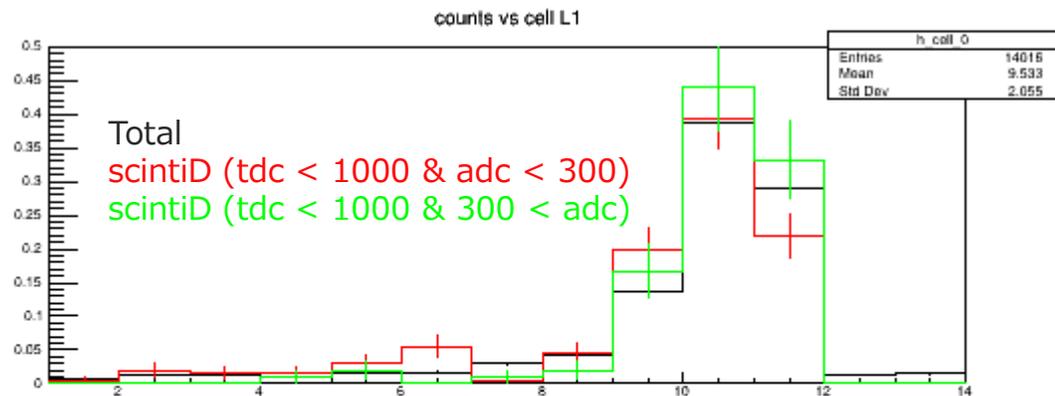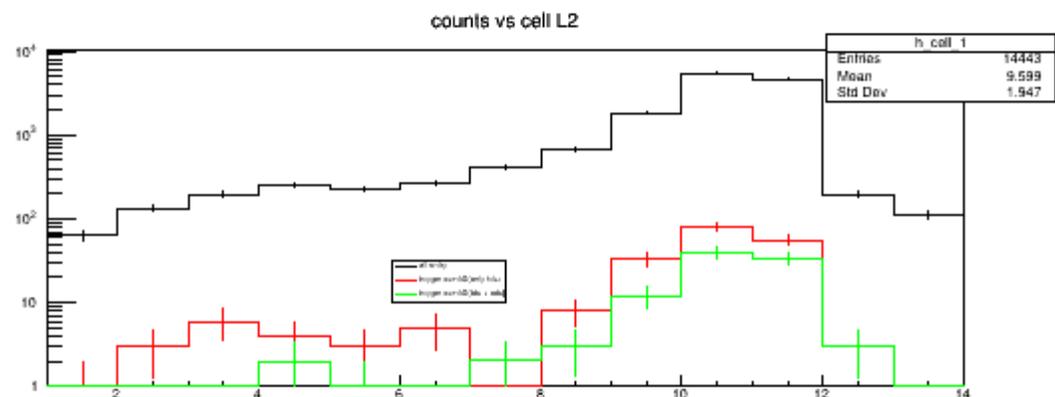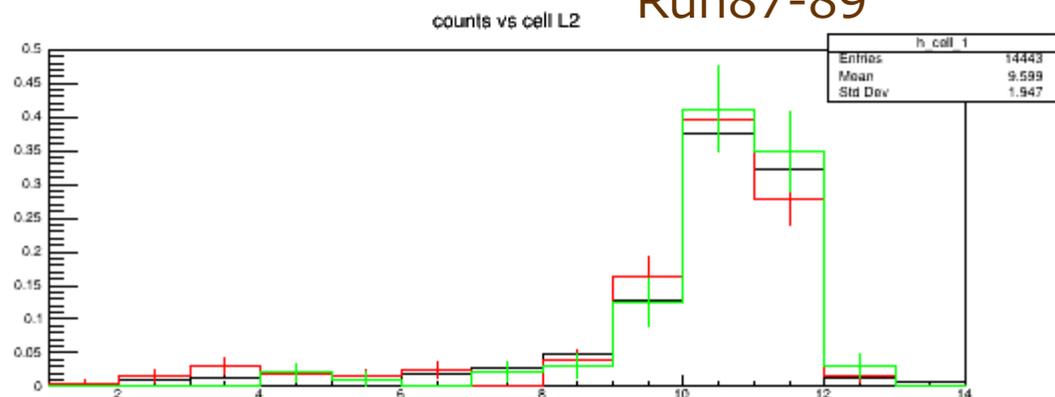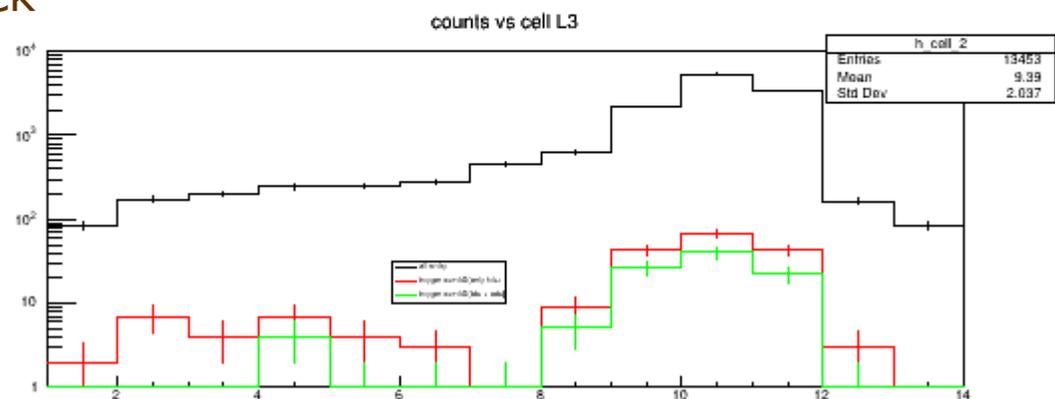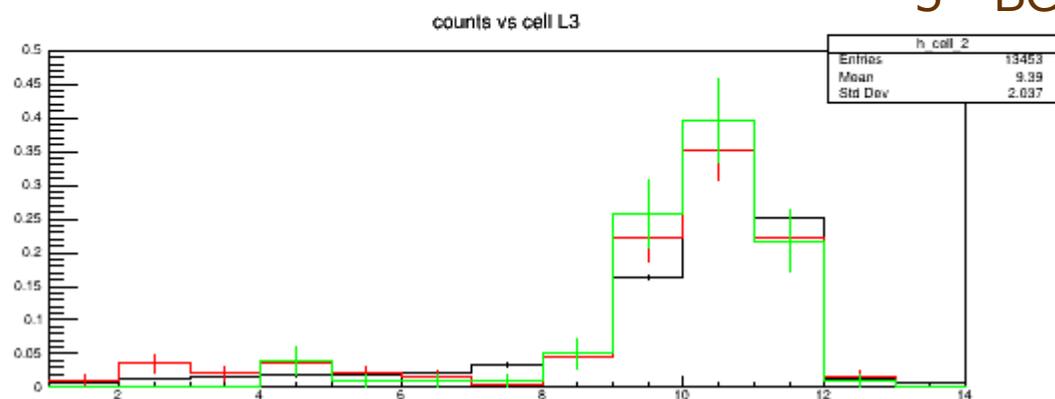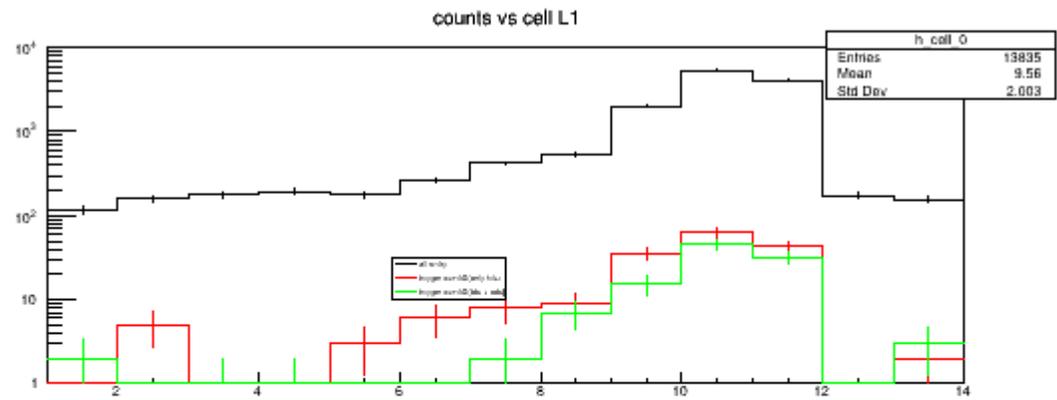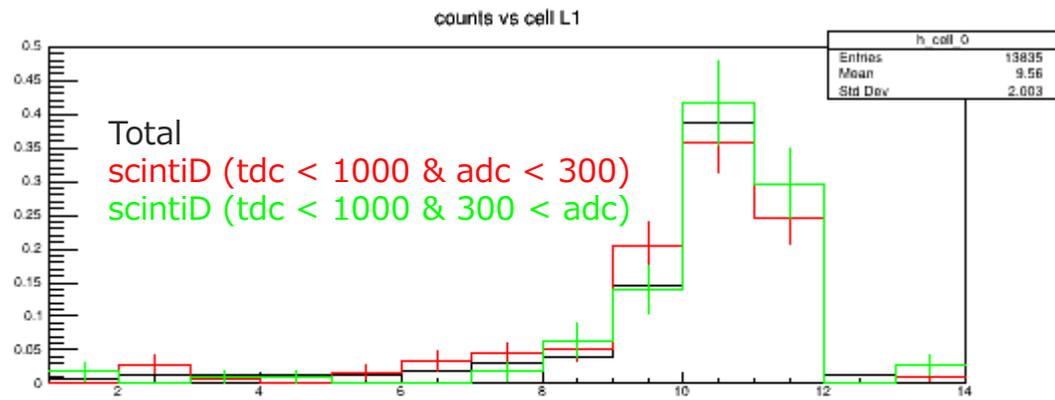
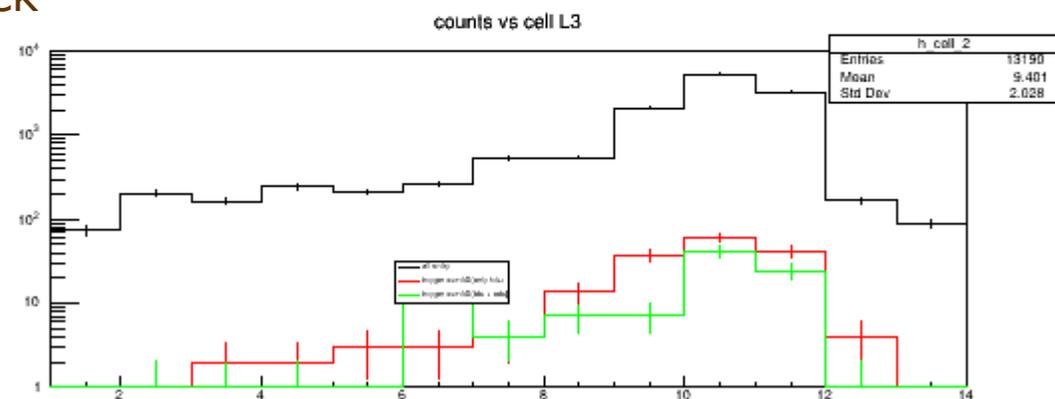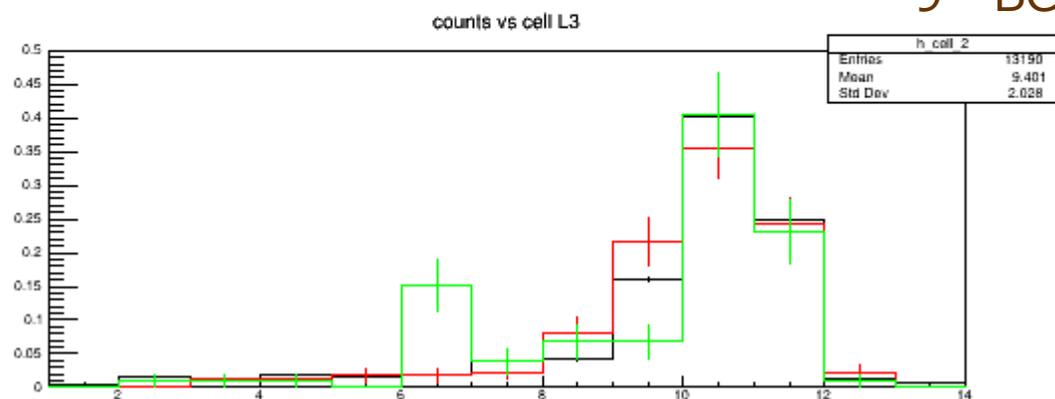Run87-89

6th BCO block

INTT MT Miu Morita
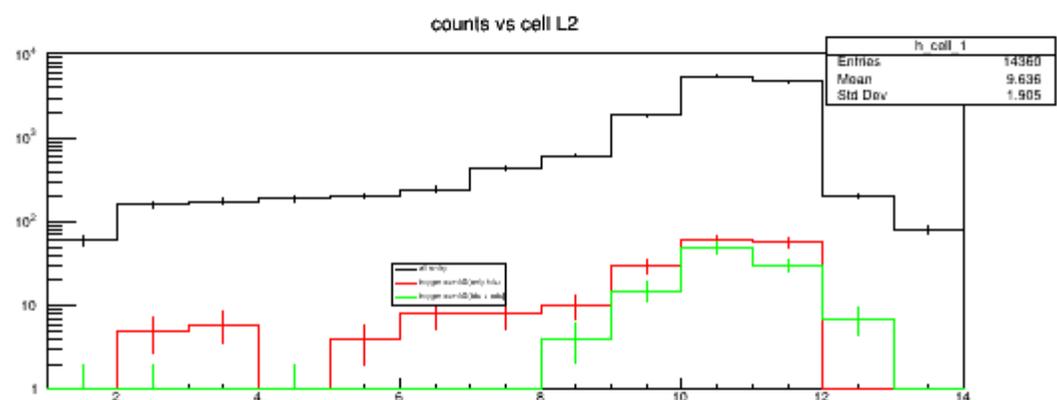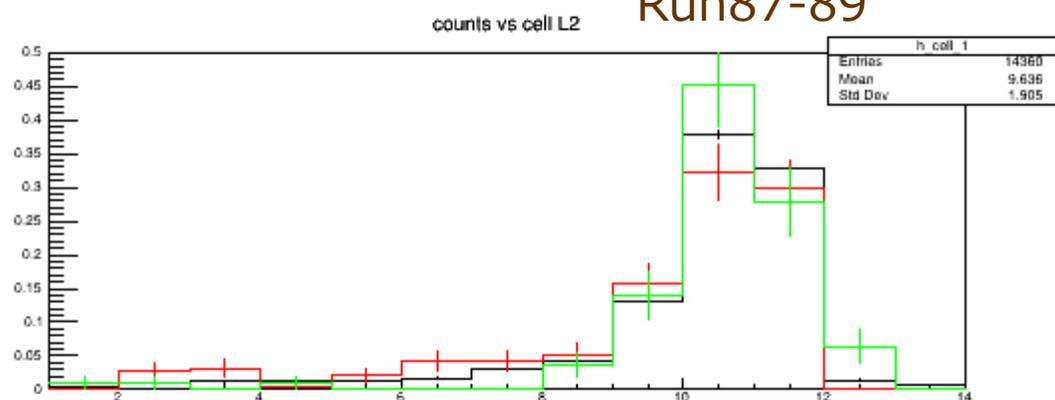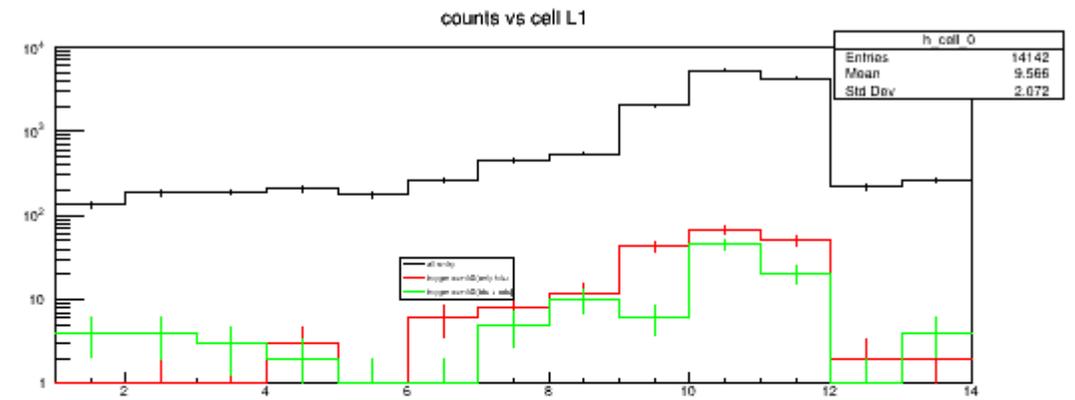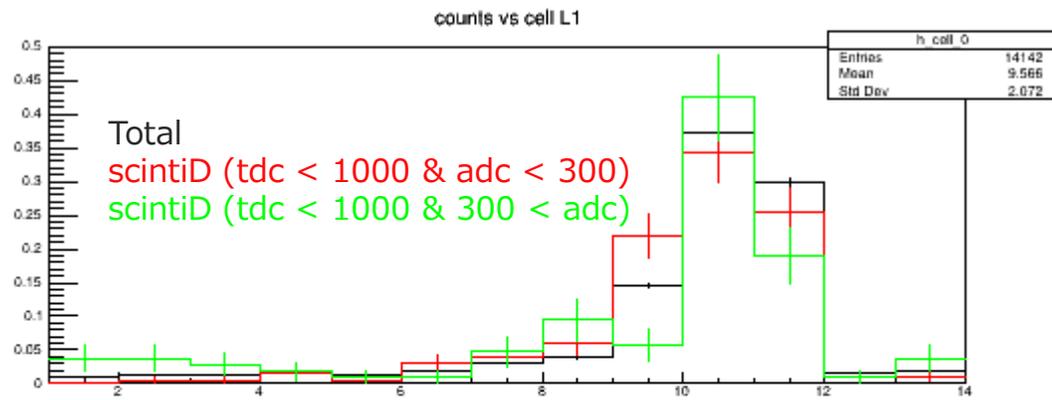
Run87-89

7th BCO block

INTT MT Miu Morita
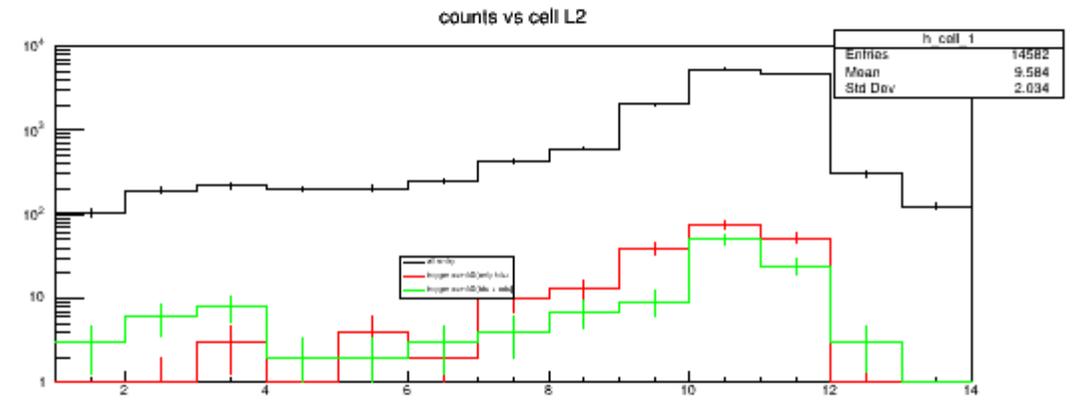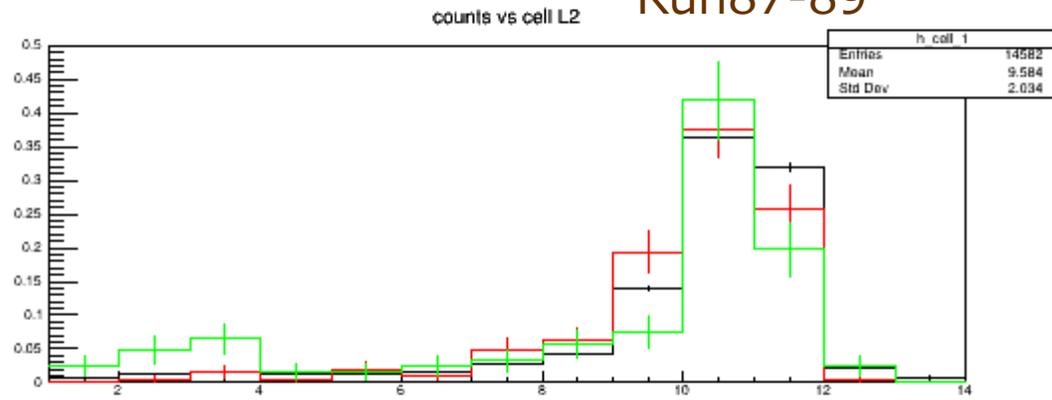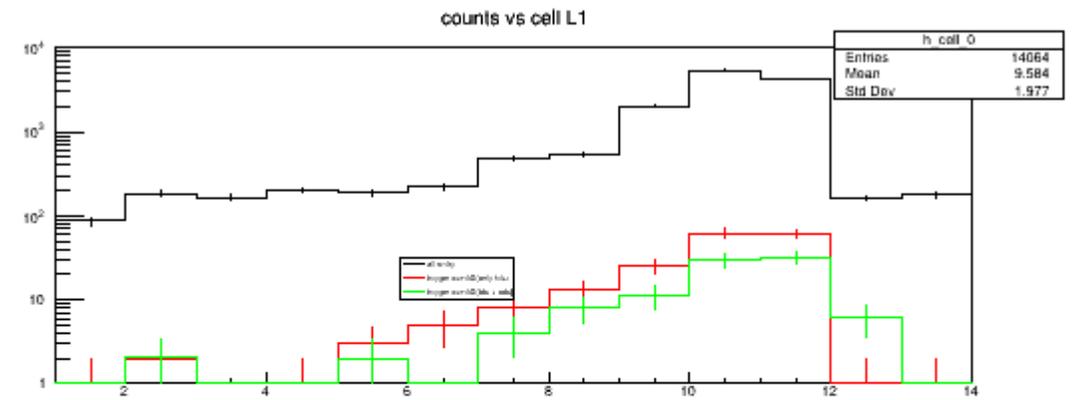
Run87-89

8th BCO block

INTT MT Miu Morita

Run87-89

9th BCO block

Total
scintiD (tdc < 1000 & adc < 300)
scintiD (tdc < 1000 & 300 < adc)

INTT MT Miu Morita

Run87-89

10th BCO block