DAC0 Scan for Run25

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DAC0 Scan
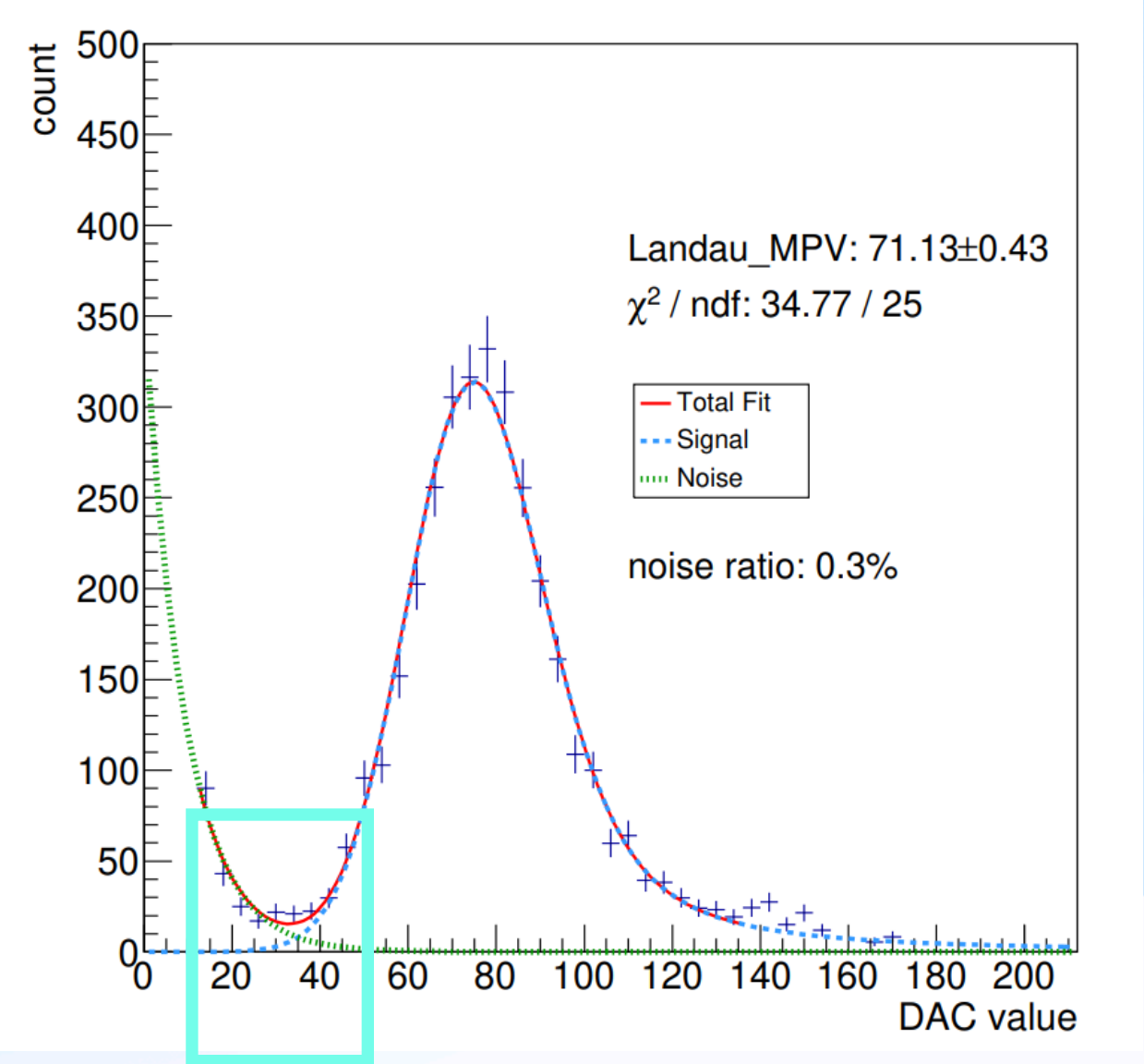## contents

- Purpose of DAC0 Scan

- The difference between INTTRAWHIT and TRKR HITSET

- Data with hot/cold

- Data without hot/cold ch

- Data without hot with cold ch

- Difference between top and bottom ladders

- My Suggestion / Conclusion

Purpose of DAC0 Scan

The problem we have : There are noise when we take data.

Aim : Testing DAC0 Scan for different three types of data .

Data with beam / magnetic (Au Au collision in 2025)

1. Data with hot/cold

2. Data without hot/cold ch

3. Data without hot with cold ch

Number of run	DAC0	Number of event	Date
66711	15	159160	2025/06/10
66709	20	162210	2025/06/10
66706	25	161755	2025/06/10
66703	30	145423	2025/06/10
66695	35	171177	2025/06/10
66700	40	168058	2025/06/10

The difference between INTTRAWHIT and TRKR HITSET

Node structure of DST file

```
List of Nodes in Fun4AllServer:
Node Tree under TopNode TOP
TOP (PHCompositeNode)/
    DST (PHCompositeNode)/
        INTT (PHCompositeNode)/
            INTTRAWHIT (IO,InttRawHitContainerv2)
            INTTEVENTHEADER (IO,InttEventInfov1)
            G4HIT_INTT (IO,PHG4HitContainer)
        TRKR (PHCompositeNode)/
            TRKR_HITSET (IO,TrkrHitSetContainerv1)
            TRKR_CLUSTER (IO,TrkrClusterContainerv4)
            TRKR_CLUSTERHITASSOC (IO,TrkrClusterHitAssocv3)
            TRKR_CLUSTERCROSSINGASSOC (IO,TrkrClusterCrossingAssocv1)
```

With hot ch

Without hot ch

Hit format for INTT data
Hits from tracking detector

common hit format in MVTX ,INTT ,TPC ,TPOT
Hits without noise from tracking detector
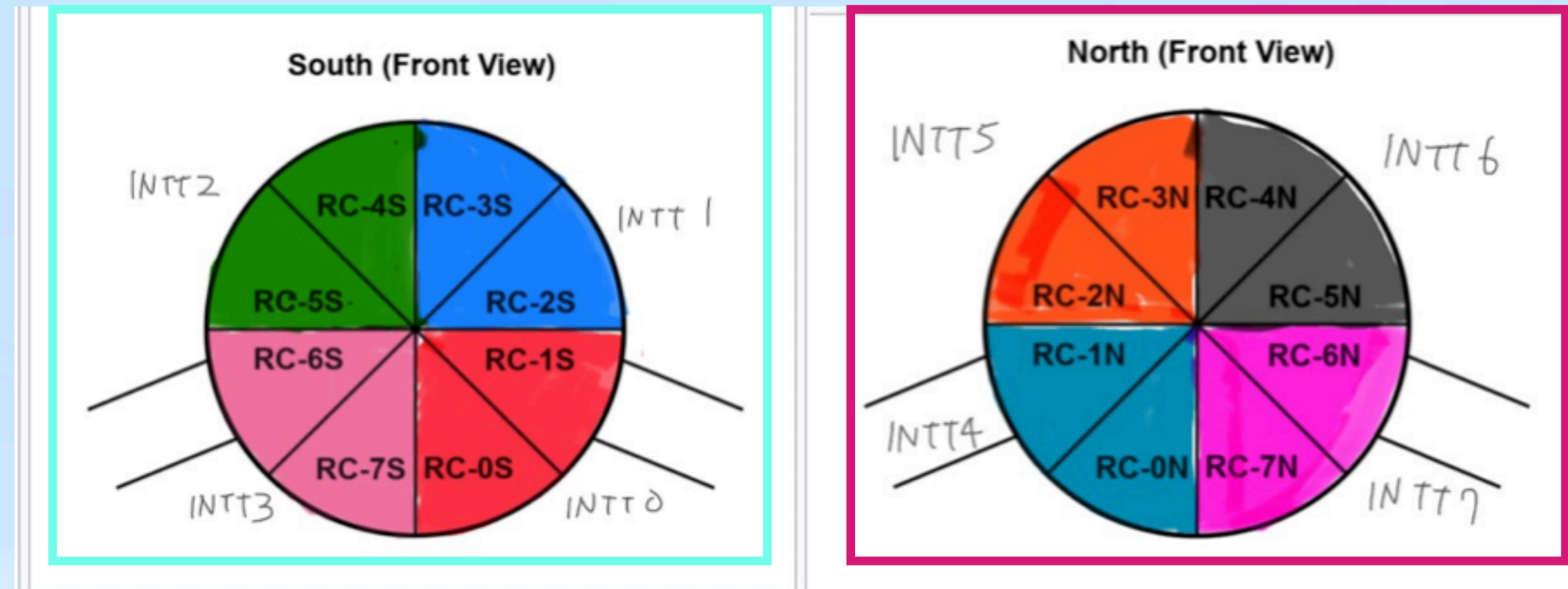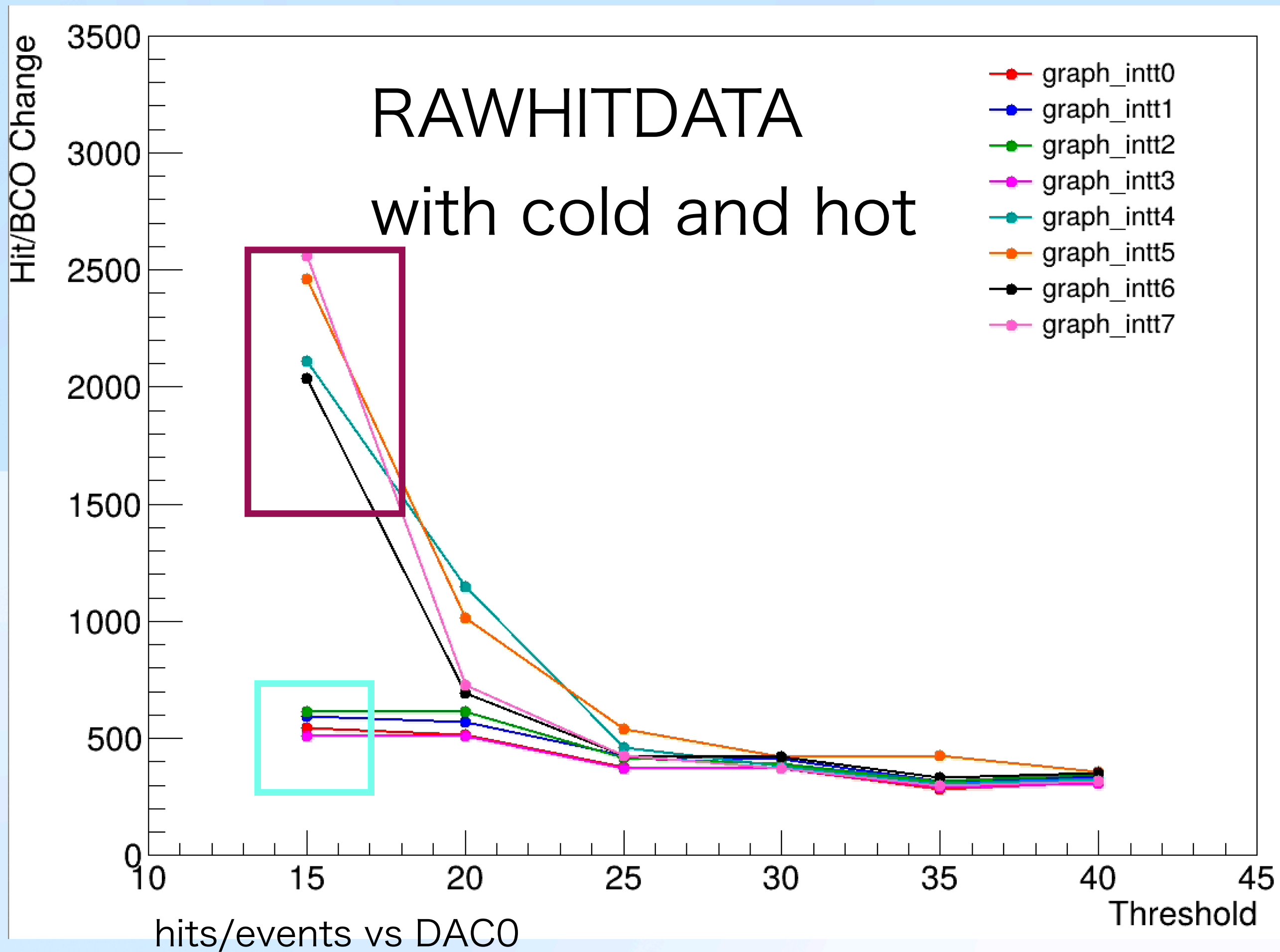
INTTRAWHIT ➡ TRKR HITSET

By using CDB (calibration database/conditional database)
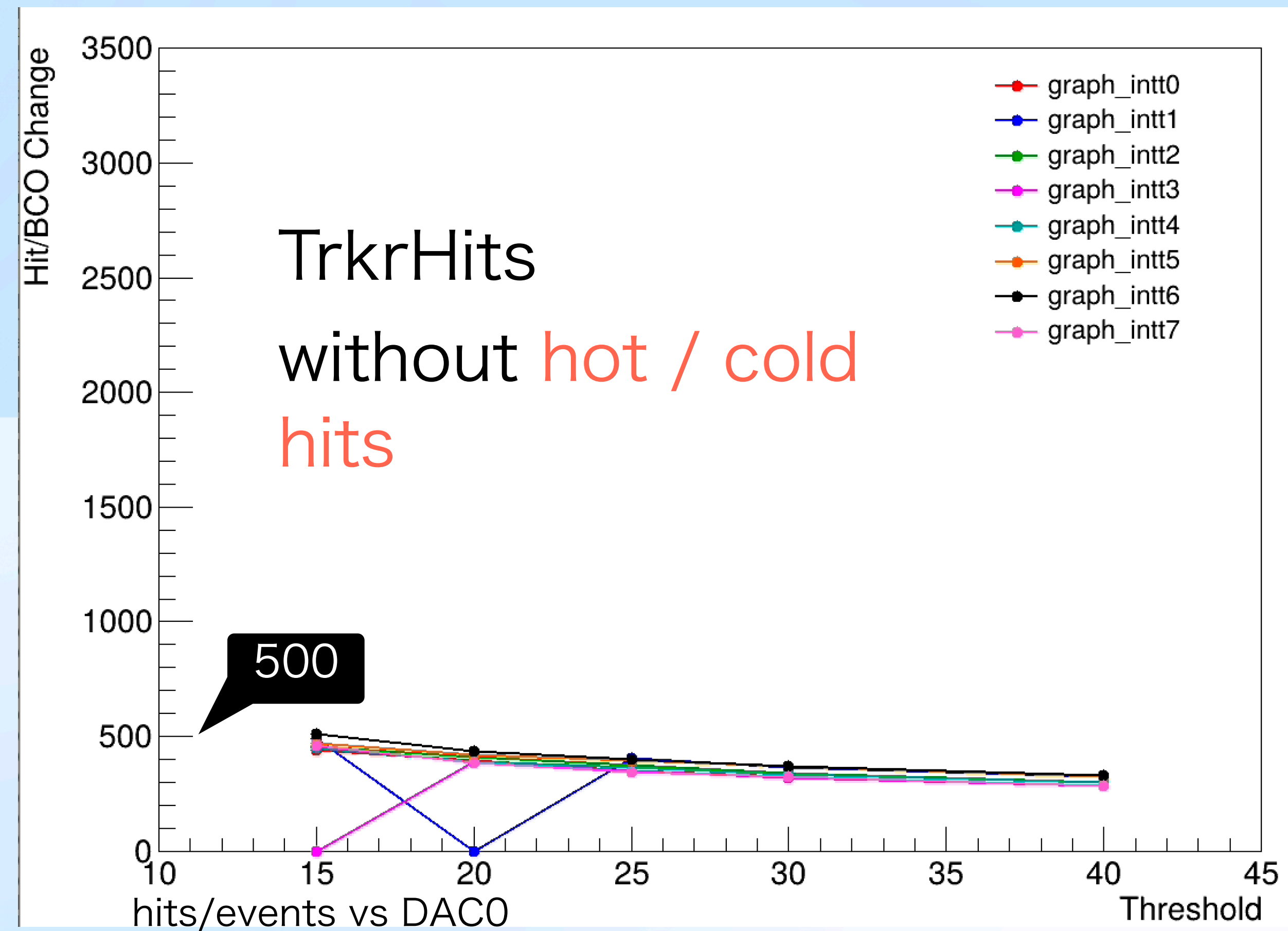
Removing hot ch hits

BCO　filter

Removing clone hit

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1.with hot/cold

RAWHITDATA
with cold and hot

hits/events vs DAC0

South (Front View)

North (Front View)

- The maximum hit rate is 2500 (hits/event)

- There are big gap between north and south

- Increasing DAC0 causes less hit rate

2. without hot/cold
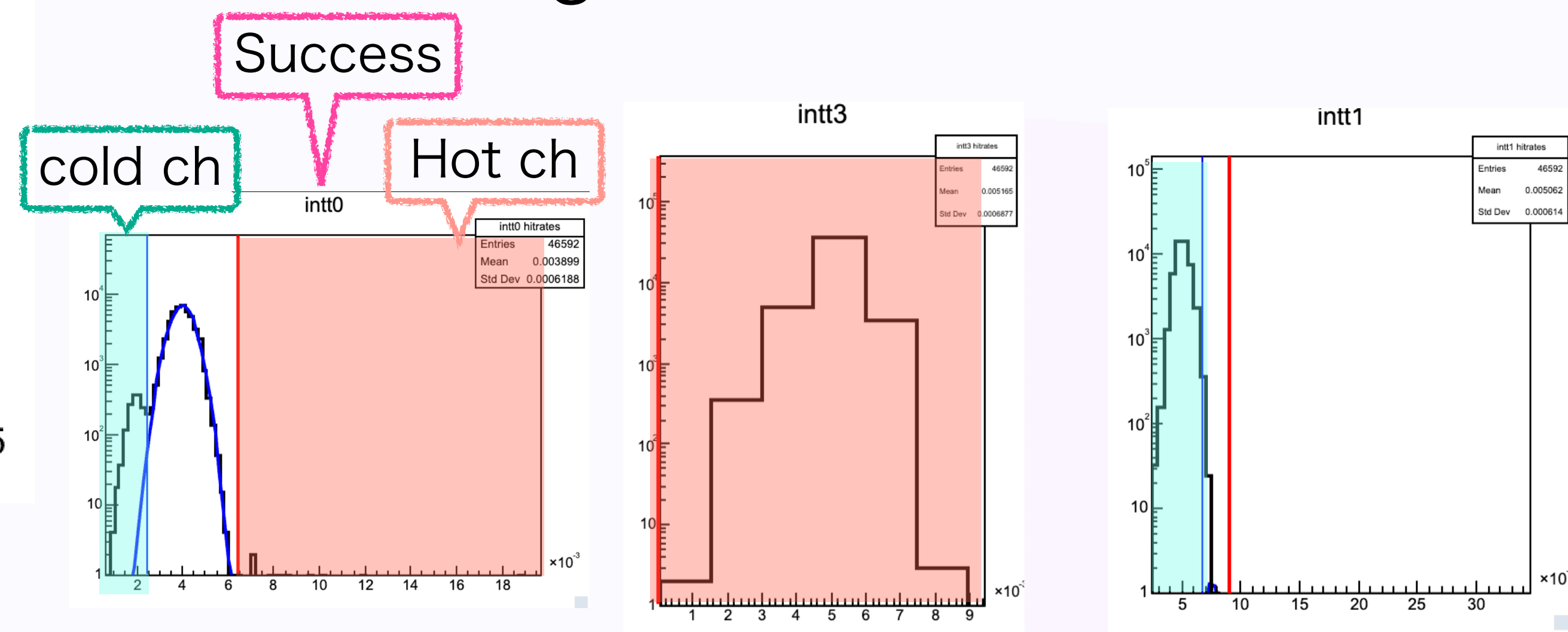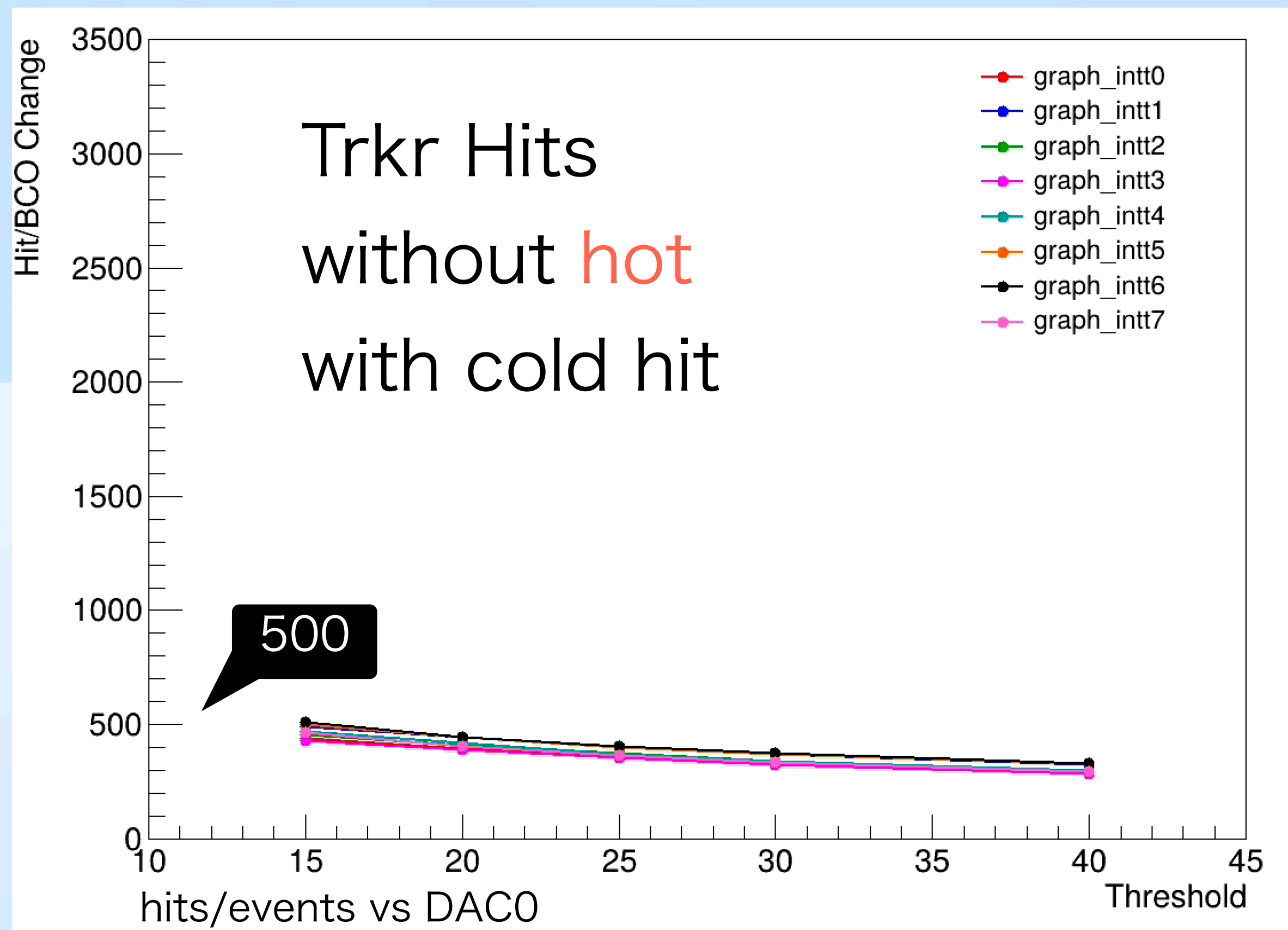

TrkrHits
without hot / cold hits

500

hits/events vs DAC0

- In this case, we can see hits rate go down rapidity in DAC0=15,20.

- It may caused by my code lack or judging Hot and cold ch

→searching

Success

cold ch

Hot ch

Result of InttCalib

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3. without hot with cold

Trkr Hits
without hot
with cold hit

hits/events vs DAC0

- Hit rate is always under 1000.

- There are no gap between north and south

My suggestion

1. with cold and hotとwithout hot with cold
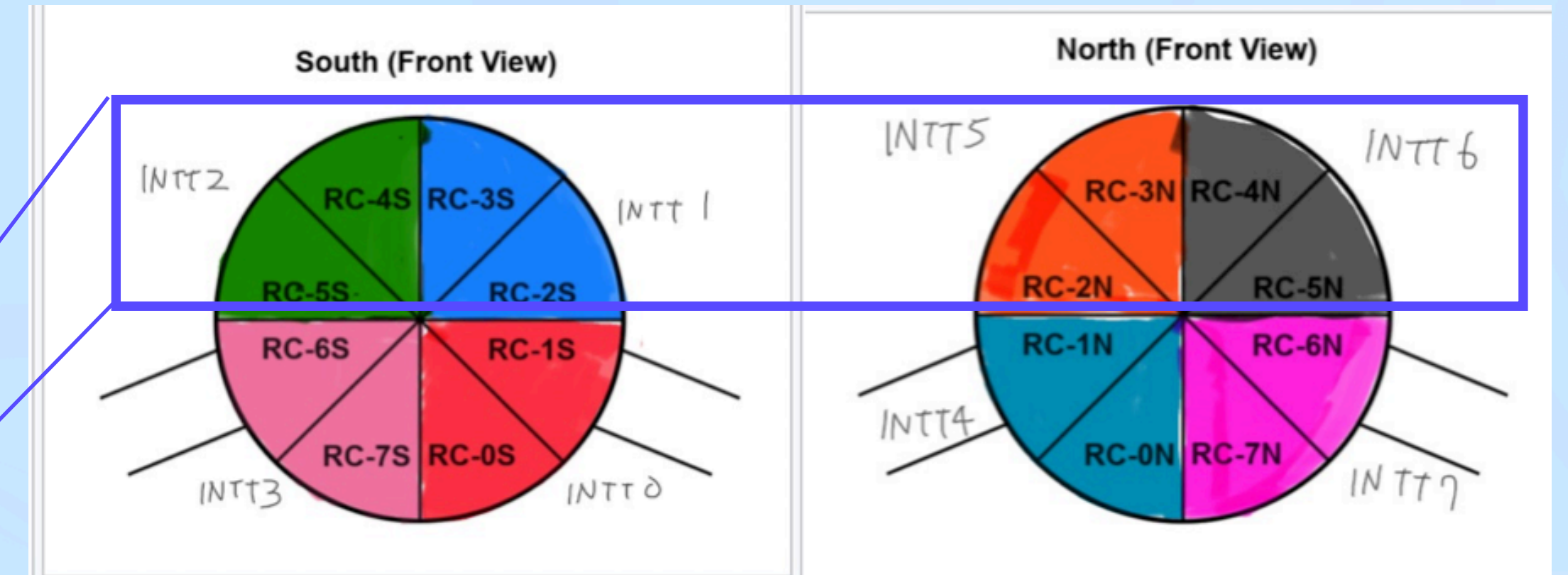
DAC0 = north 25, south under15

DAC0 > 25

2. without hot / cold
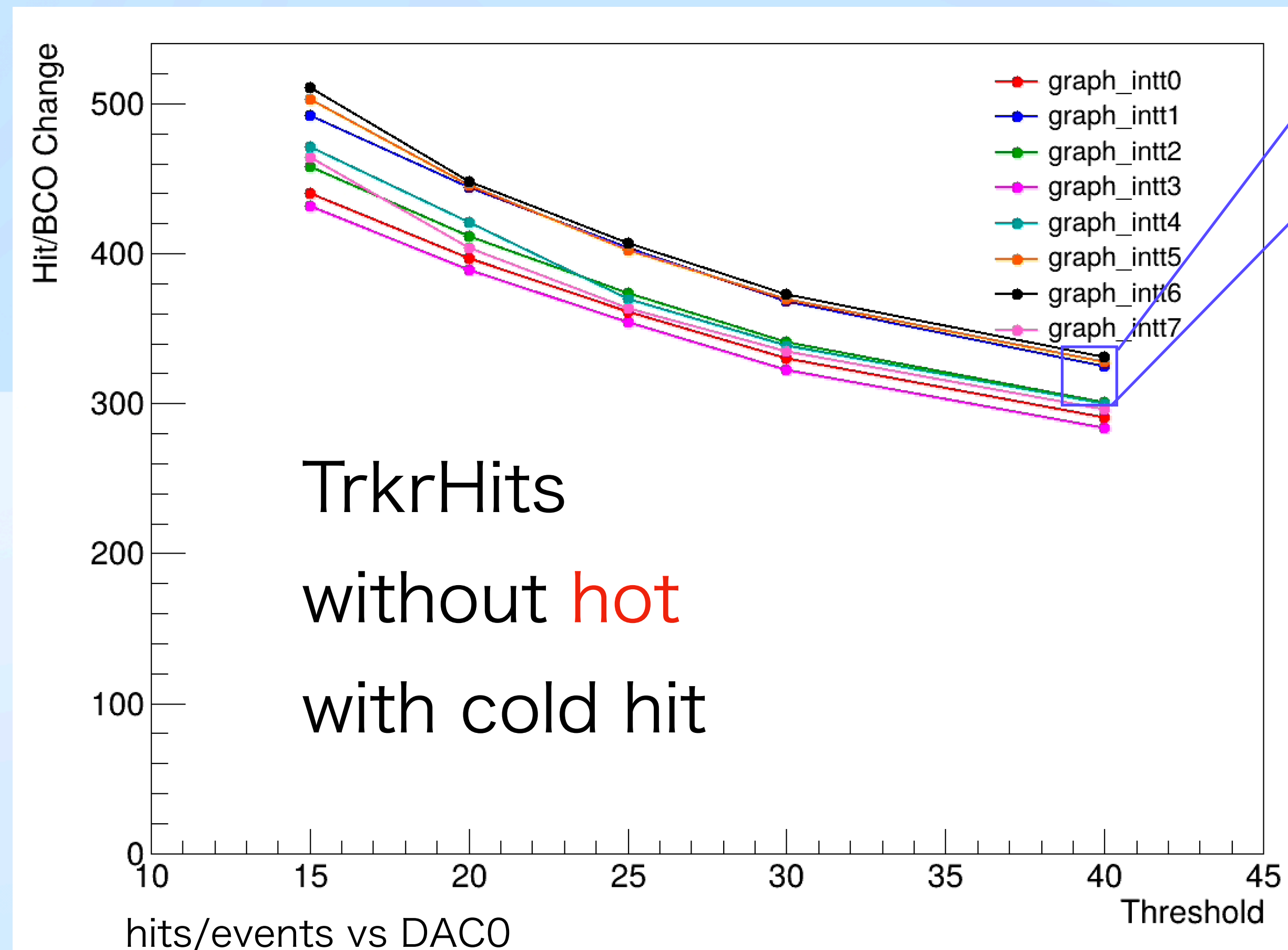
DAC0 > 25

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Differnce between top and bottom ladders

TrkrHits

without hot

with cold hit

hits/events vs DAC0
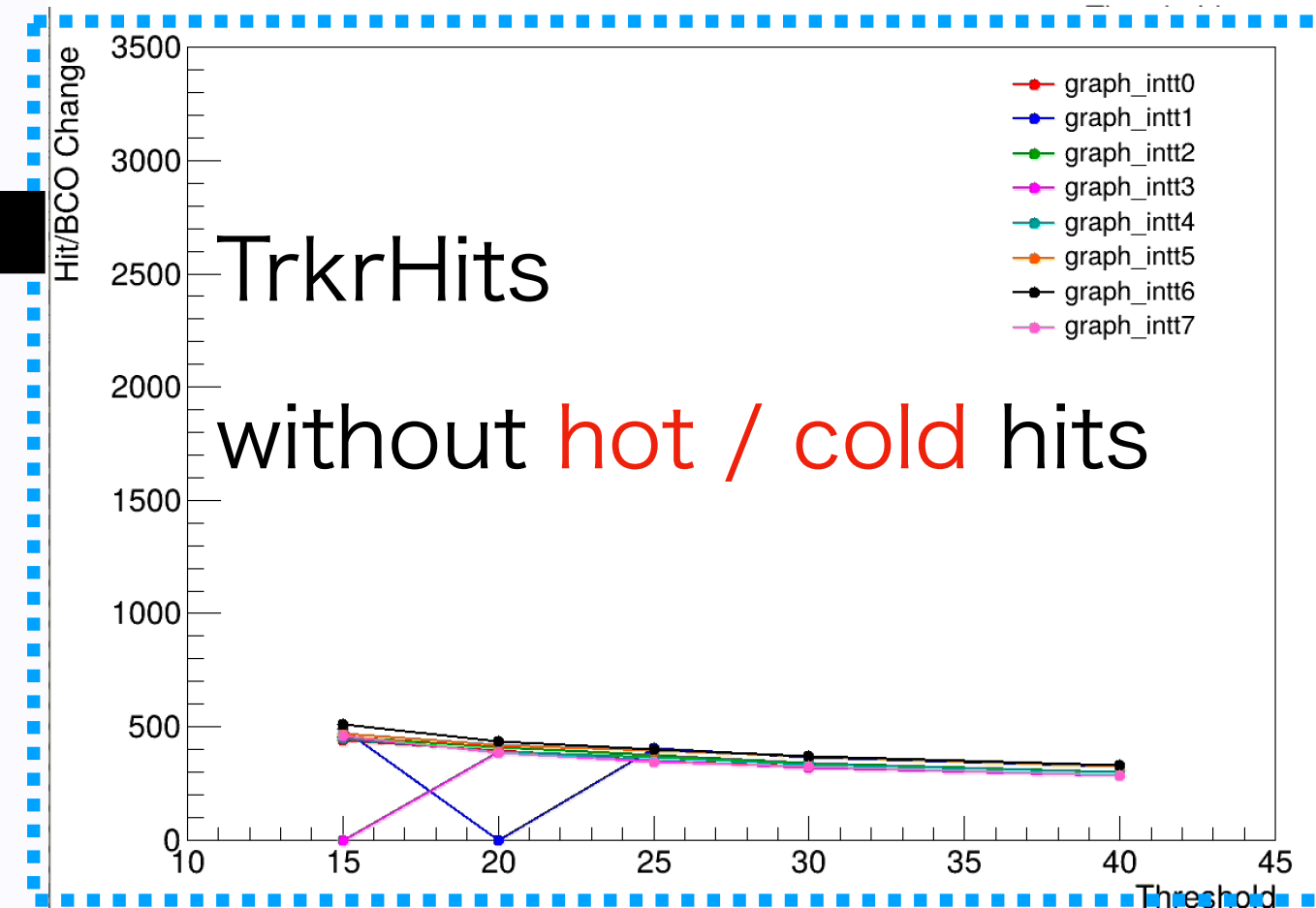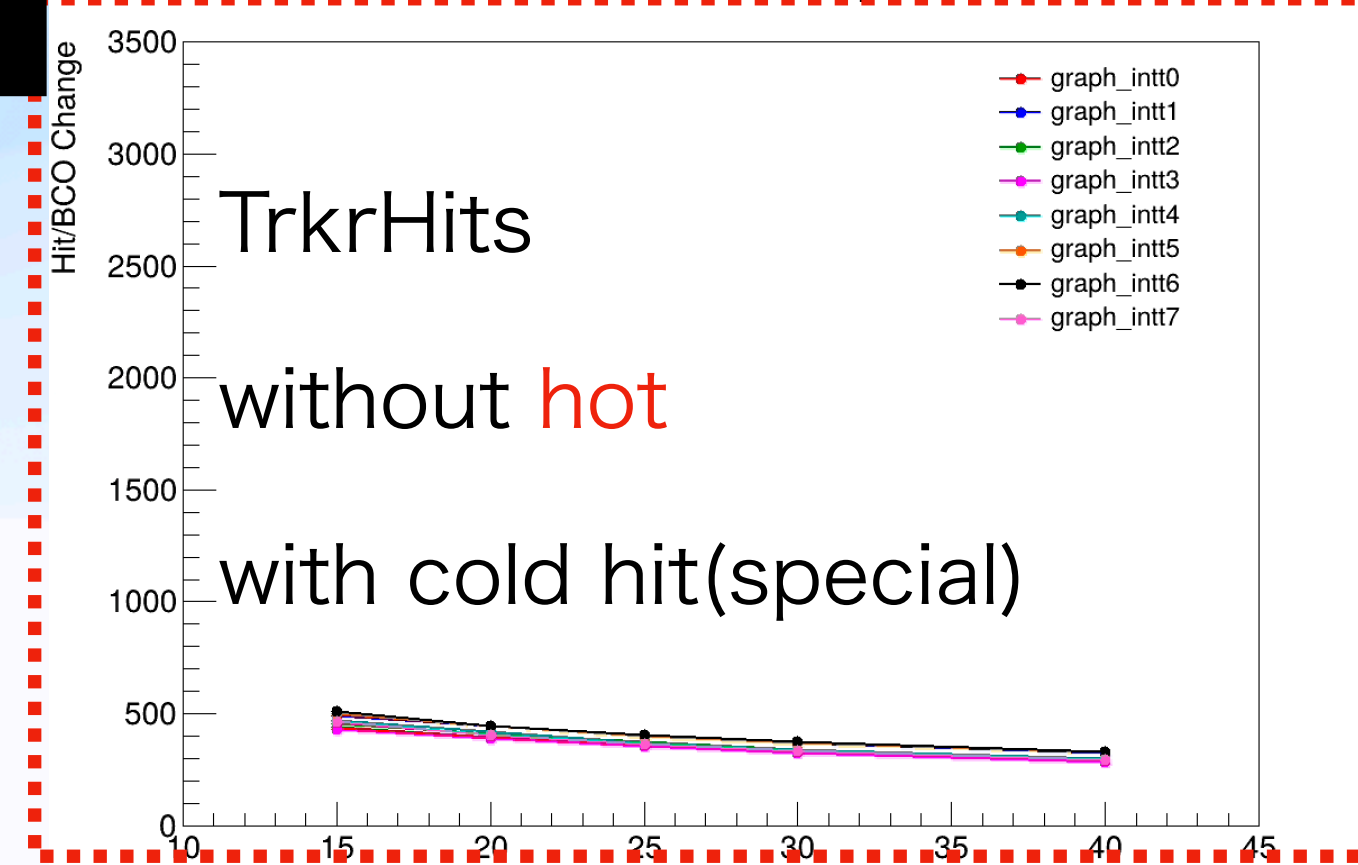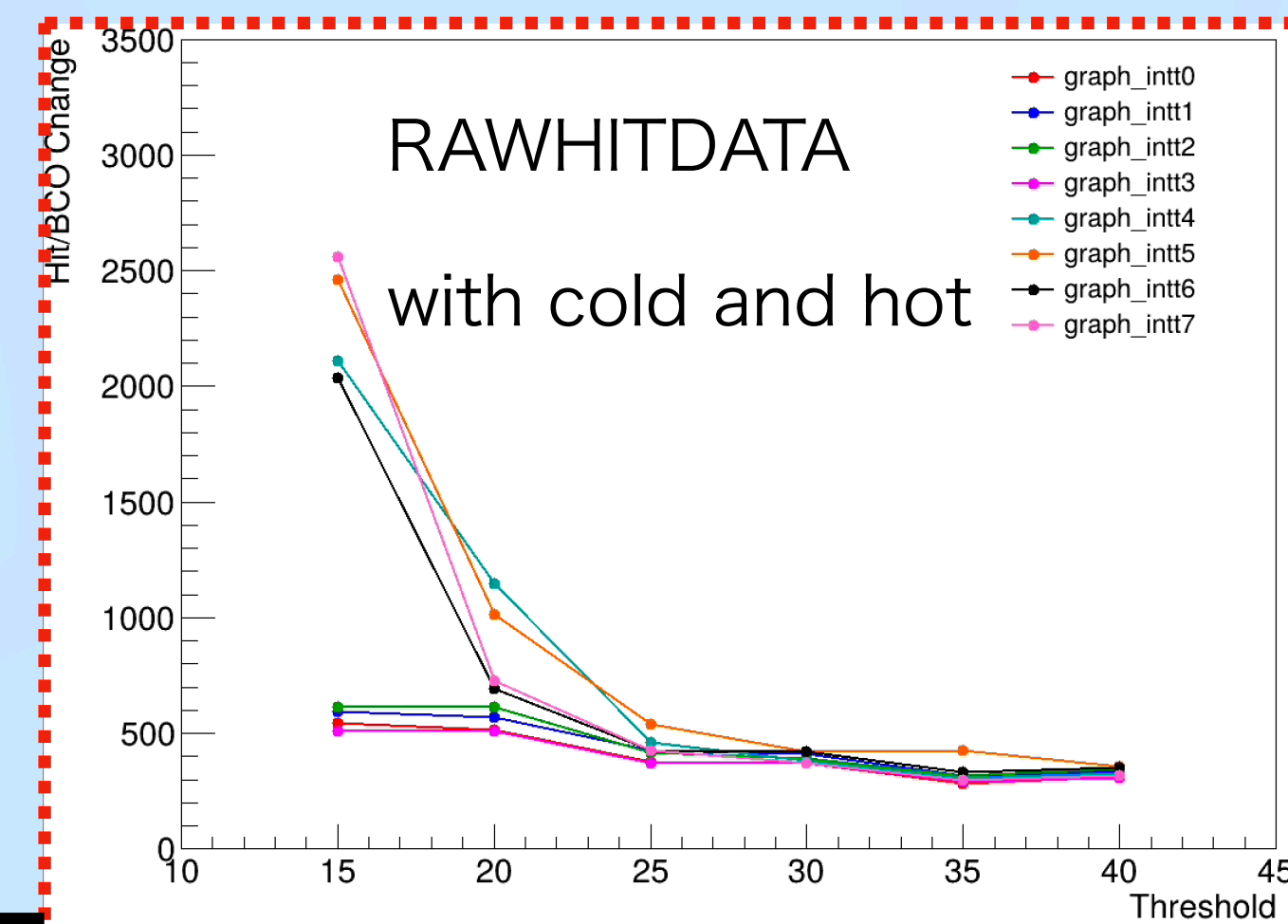
- The top part of detector(INTT1,5,6) are tend to have large hit rate.

・In this time, the collision happened at higher place than y=0.(by Mahiro)

→ It may be show us collision vertex goes up or down.

Conclusion

Comparing with hot ch , without hot ch

- North：Hit rate go down → a lot of noise must be there

- South：Hit rate does not change a lot → noise must exit little

From result without hot ch

- Hit rate does not depend on DAC0 →removing noise is working with hot ch CDB

- Hit rate get much less in DAC0＝15、20 without hot/cold ch.

- Data without hot ch may be show us how collision vertex goes up or down.

Which value is good for DAC0：

- DAC0 > 25
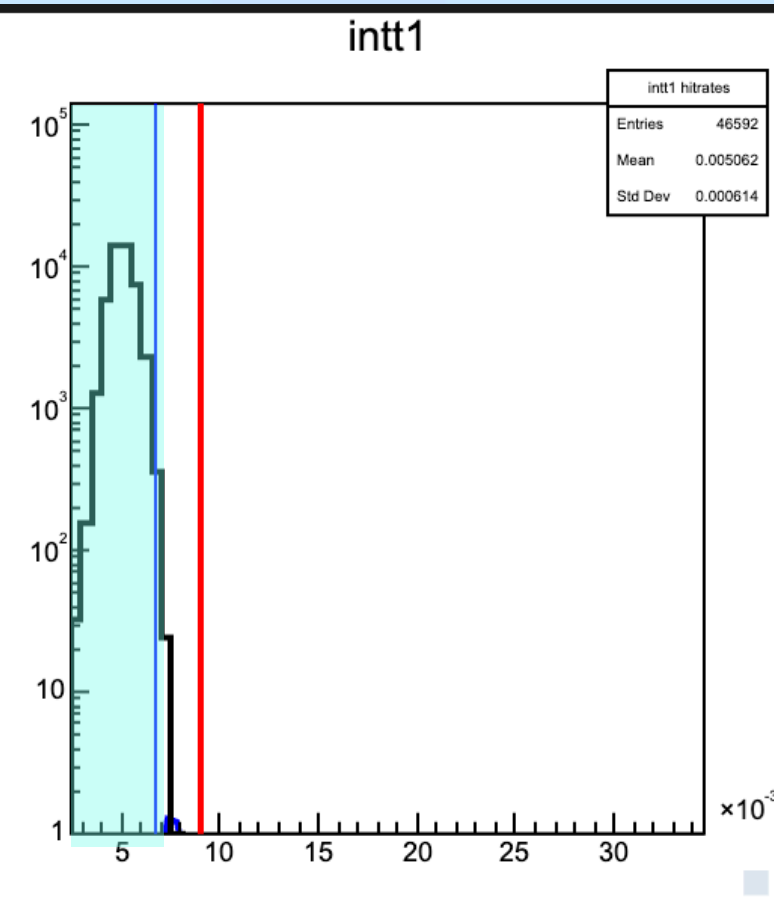
- It might be better, if we divide DAC0 at South and North

What to do next：

Making histogram of number of cluster distribution by changing DAC0.

Back up

run番号	閾値	イベント数	ヒット数
66711	15	159160	522678082
66709	20	162210	1010047067
66706	25	161755	482198027
66703	30	145423	305835697
66695	35	171177	16999
66700	40	168058	351487236
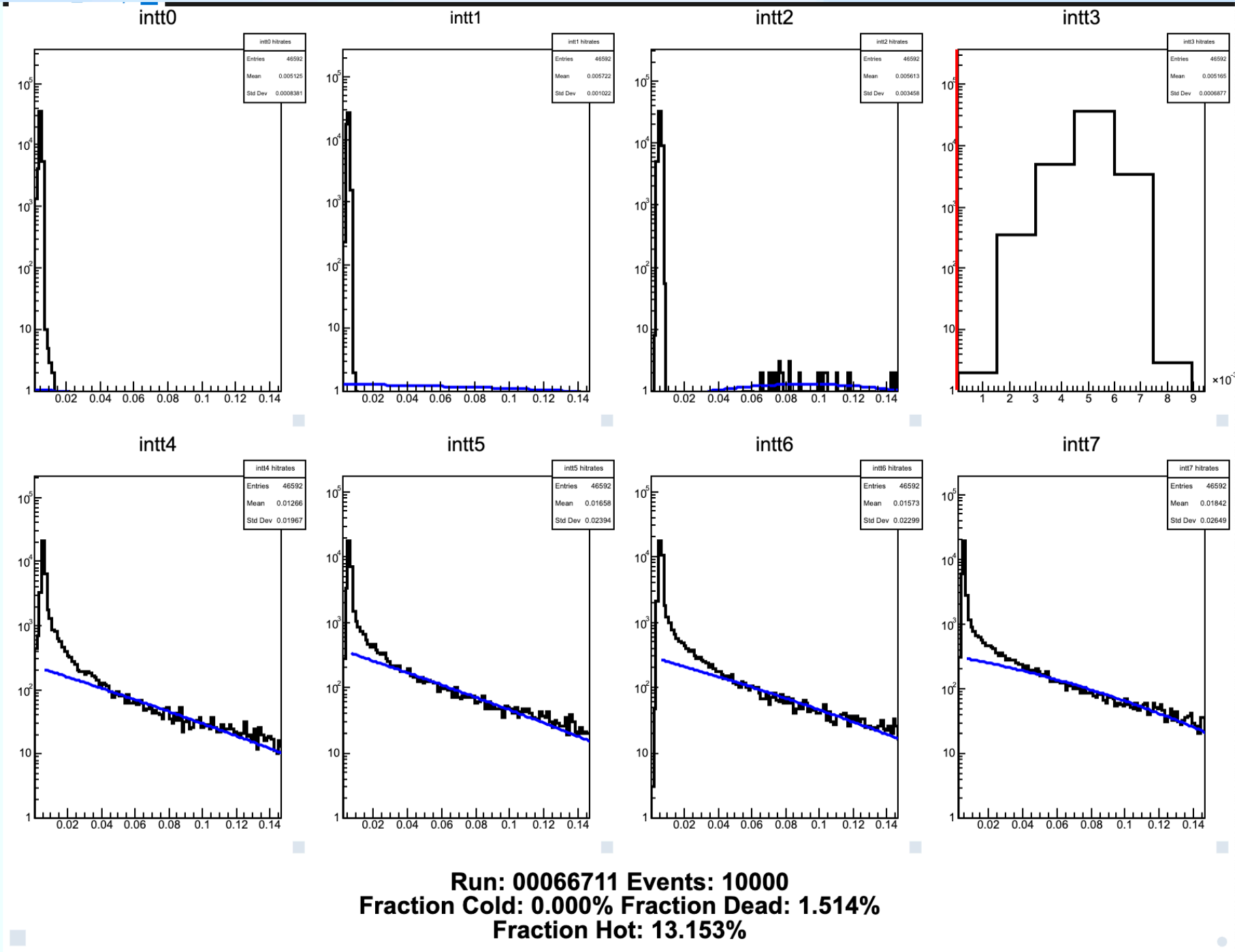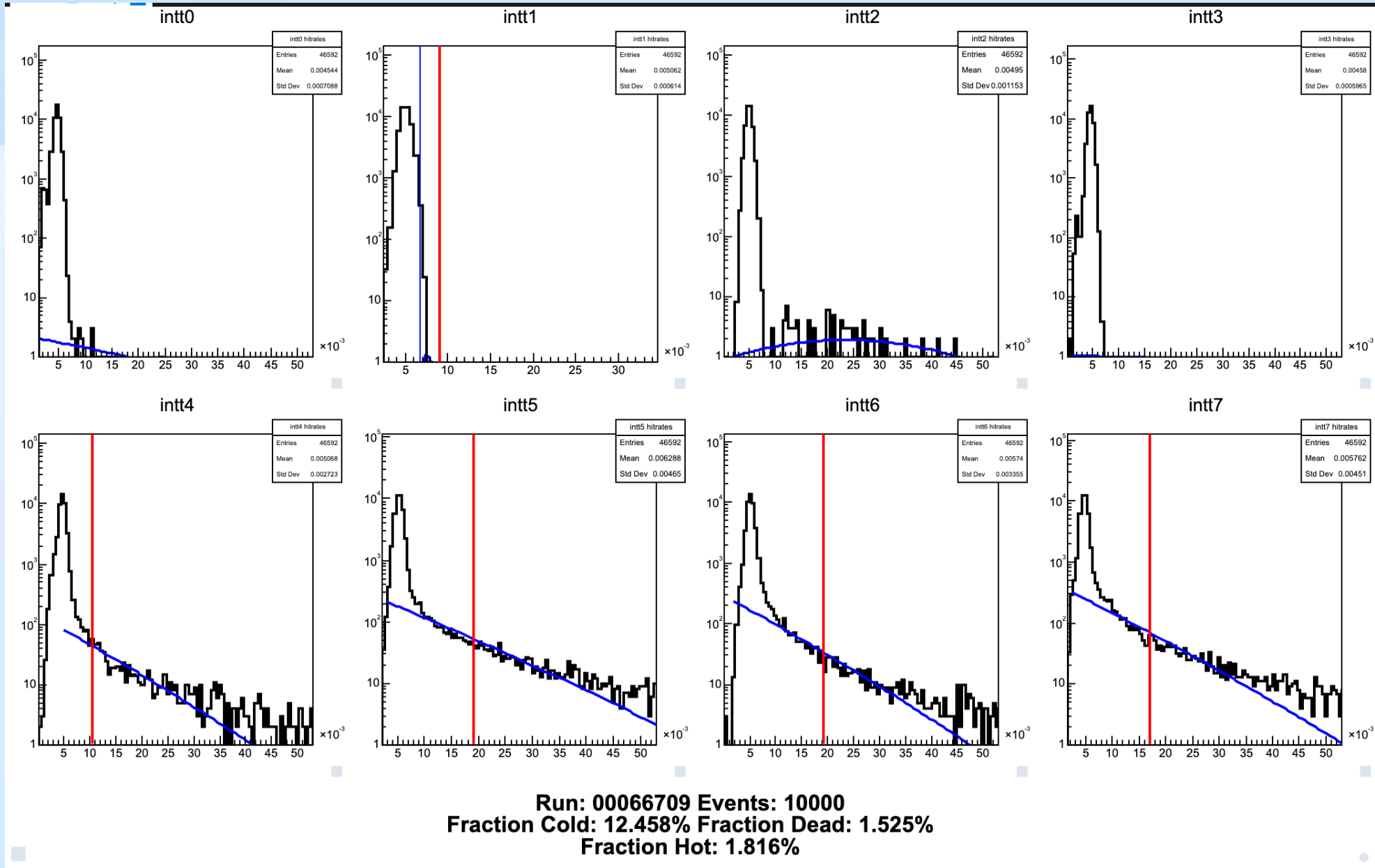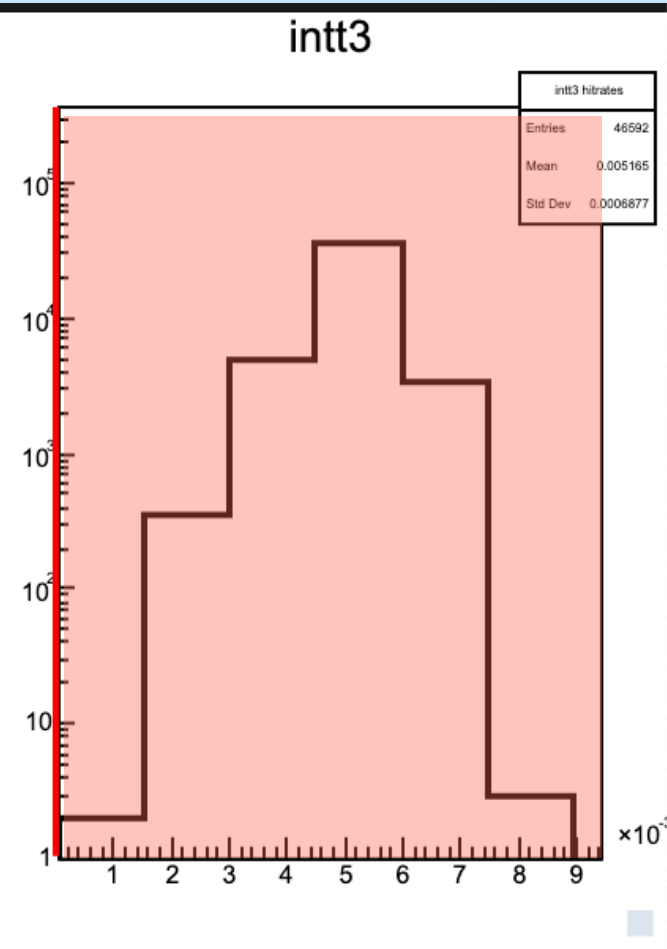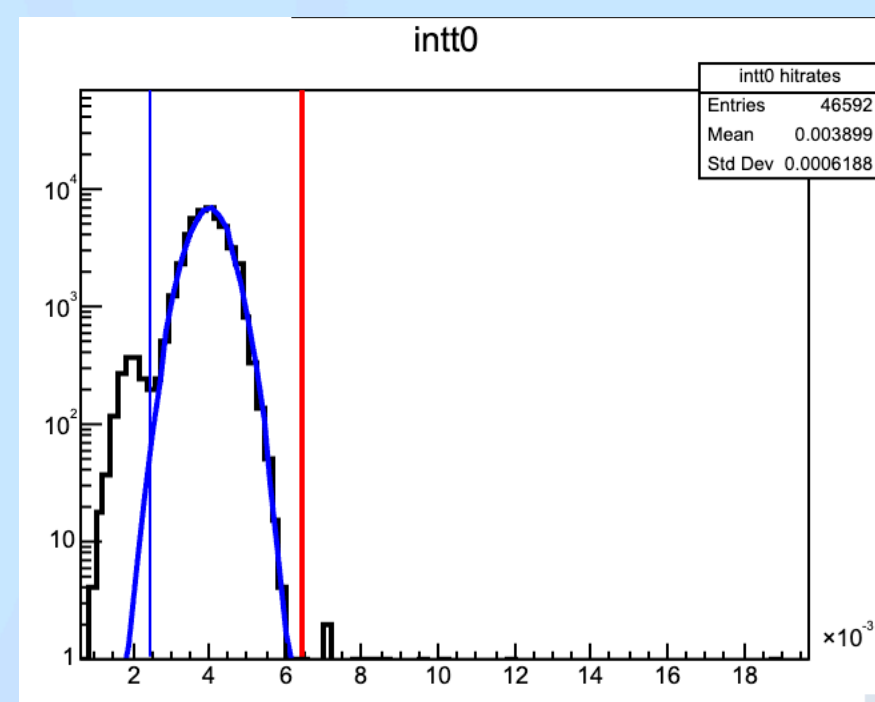
Run: 00066709 Events: 10000
Fraction Cold: 12.458% Fraction Dead: 1.525%
Fraction Hot: 1.816%

Run: 00066711 Events: 10000
Fraction Cold: 0.000% Fraction Dead: 1.514%
Fraction Hot: 13.153%
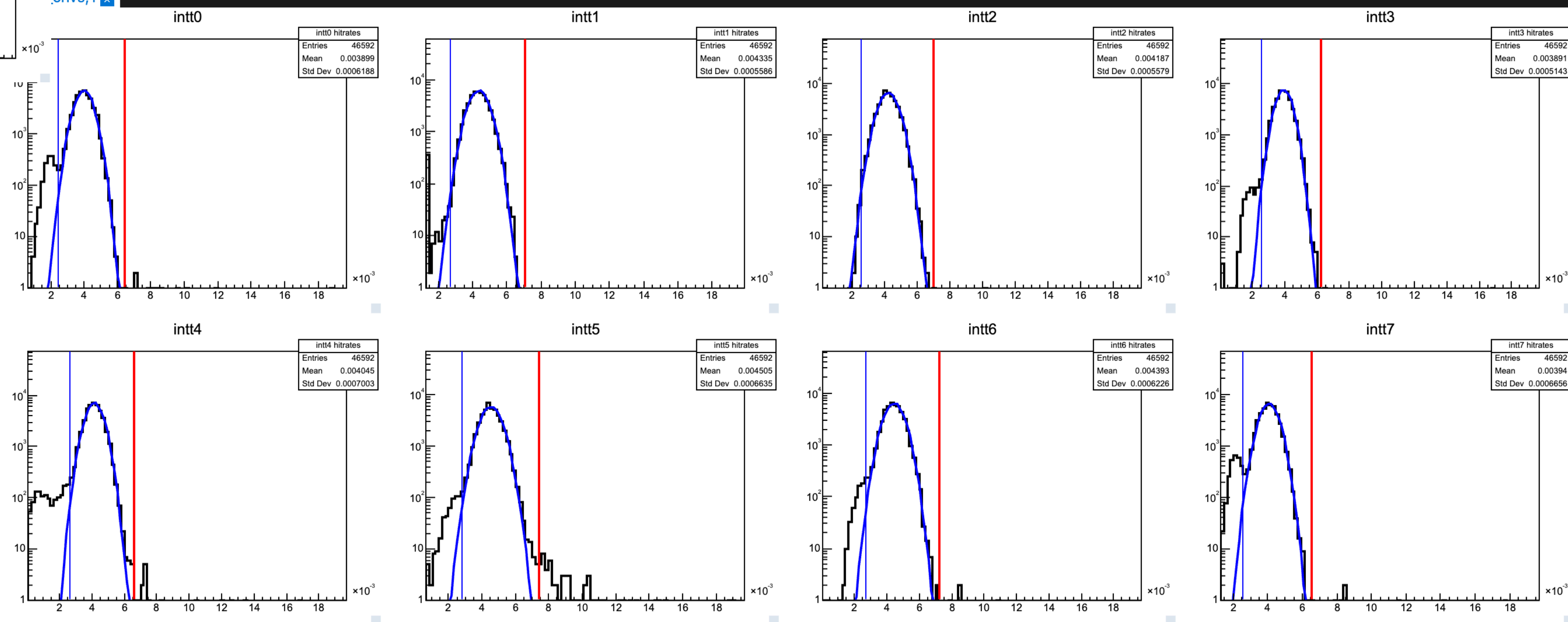
Run: 00066703 Events: 10000
Fraction Cold: 3.465% Fraction Dead: 1.539%
Fraction Hot: 0.032%

Search about distribution of the number of hits
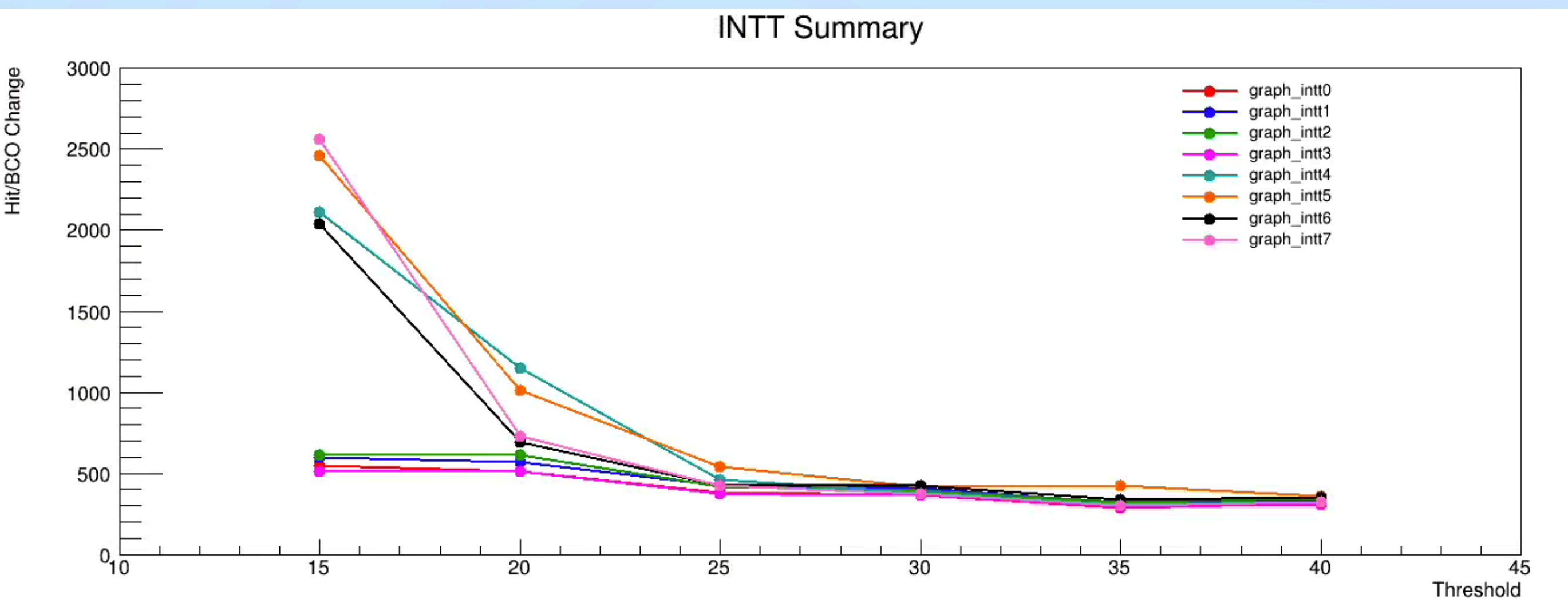# 1. ADC histgram
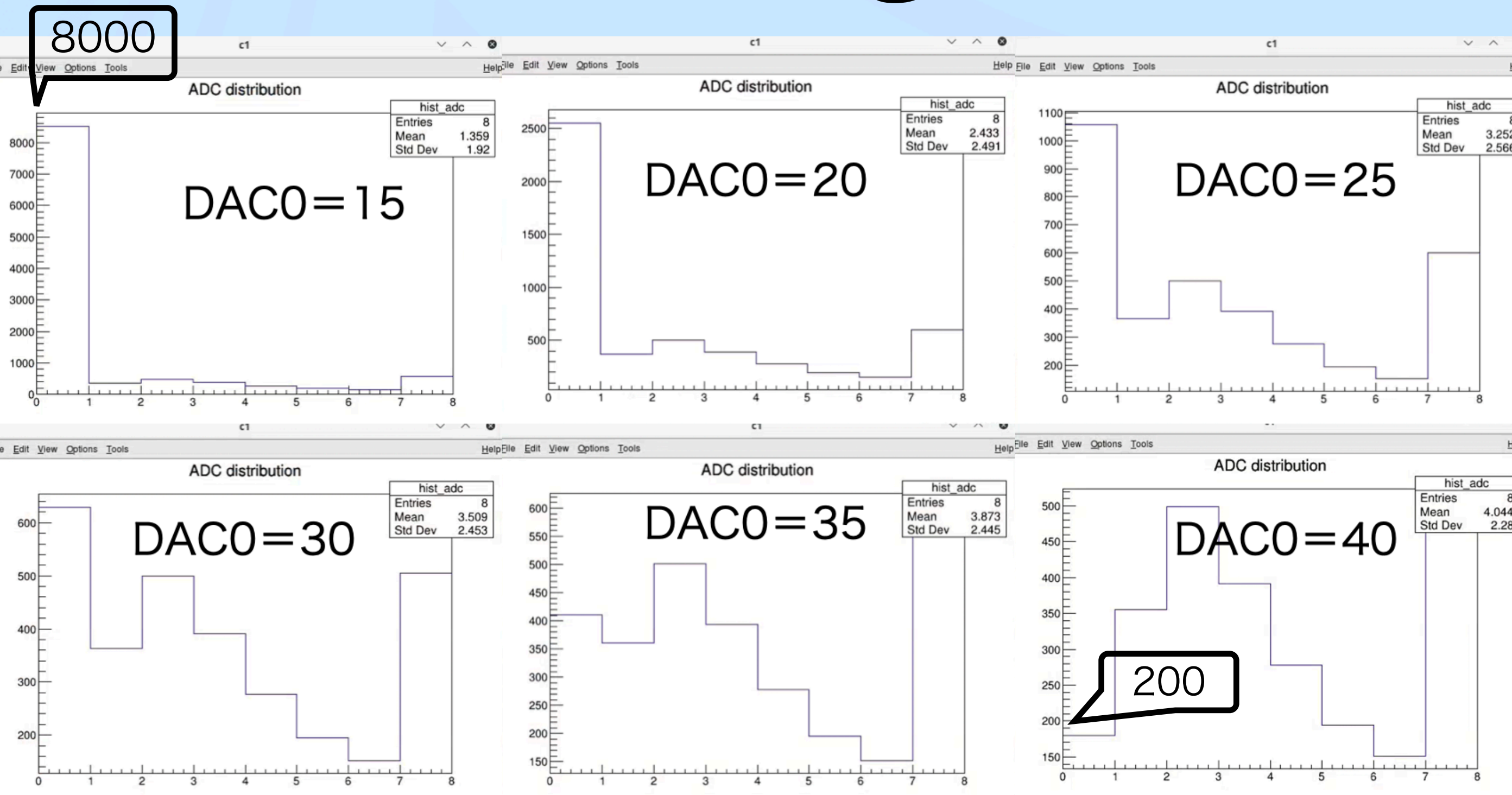
↑ hits/events vs ADC value

What we can know from this result

・ Number of hits of ADC1 is depending on DAC0 is how big

Search about distribution of the number of hits
2. How number of hits decrease in INTT0~7 level

↑ hits/events vs DAC0

What we can know from this result

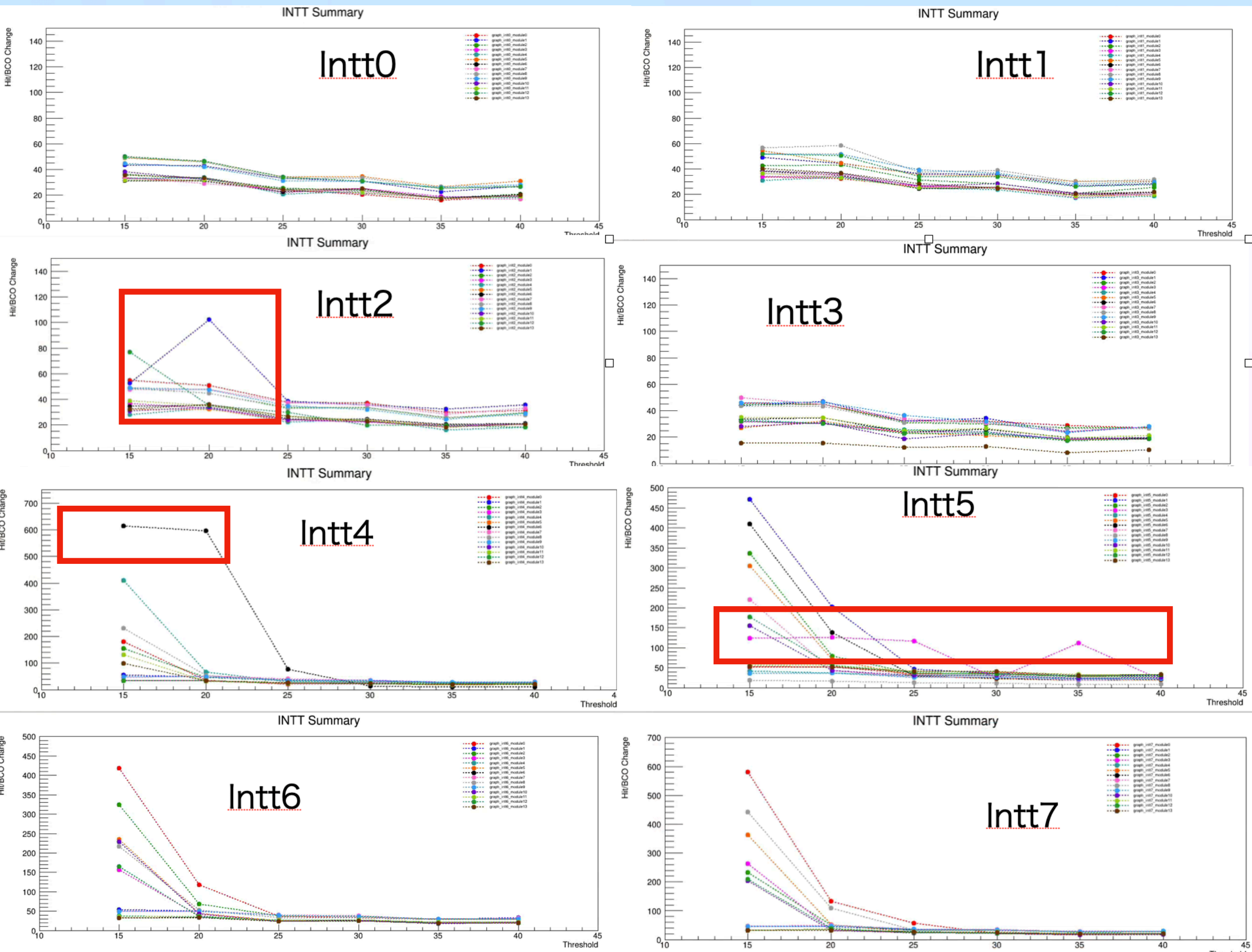・The number of amount hits is very decrease by changing DAC0.

From these two result , It can say changing DAC0 have effect in hit rate.

Search about distribution of the number of hits
3. How number of hits decrease in module level

↑ hits/events vs DAC0

What we can know from this

- DAC0 become bigger, hit rate get less.

- There are some module which take strange behavior.

Removing noise by myself
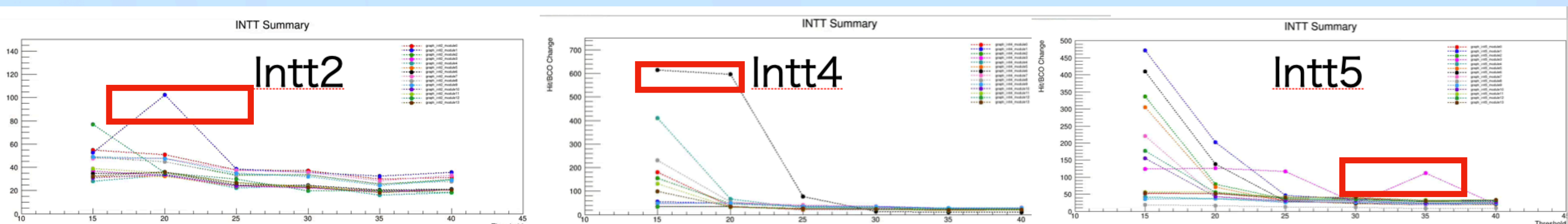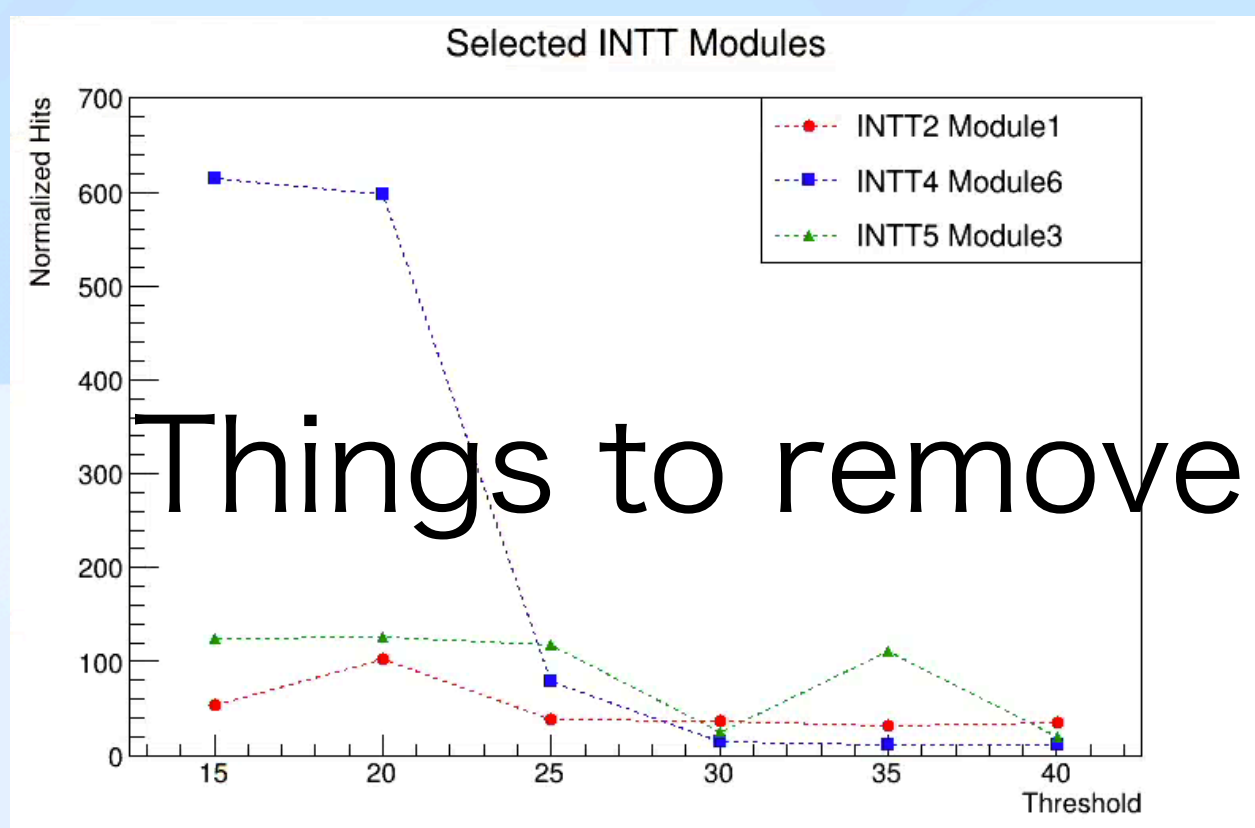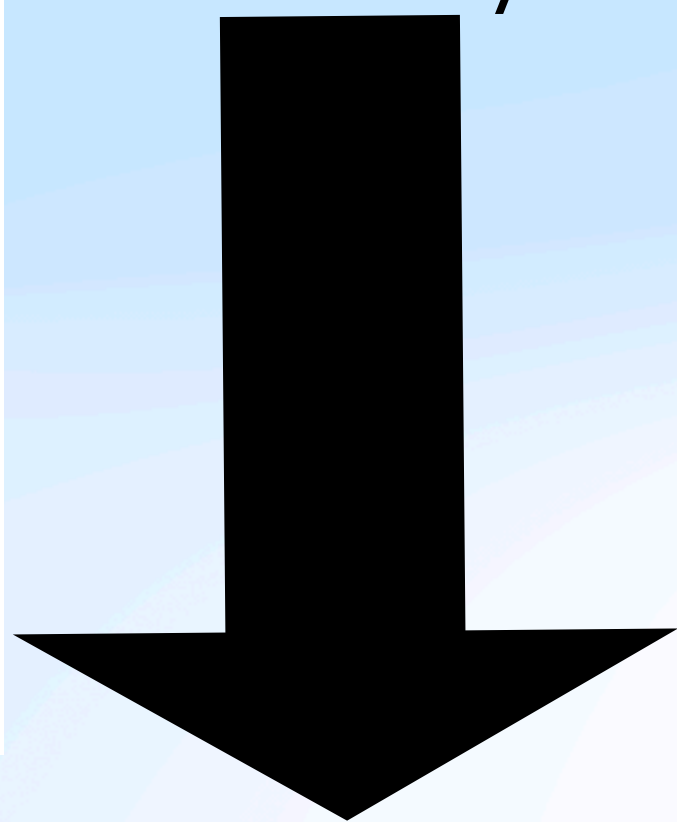## About how I did

hits/events vs DAC0
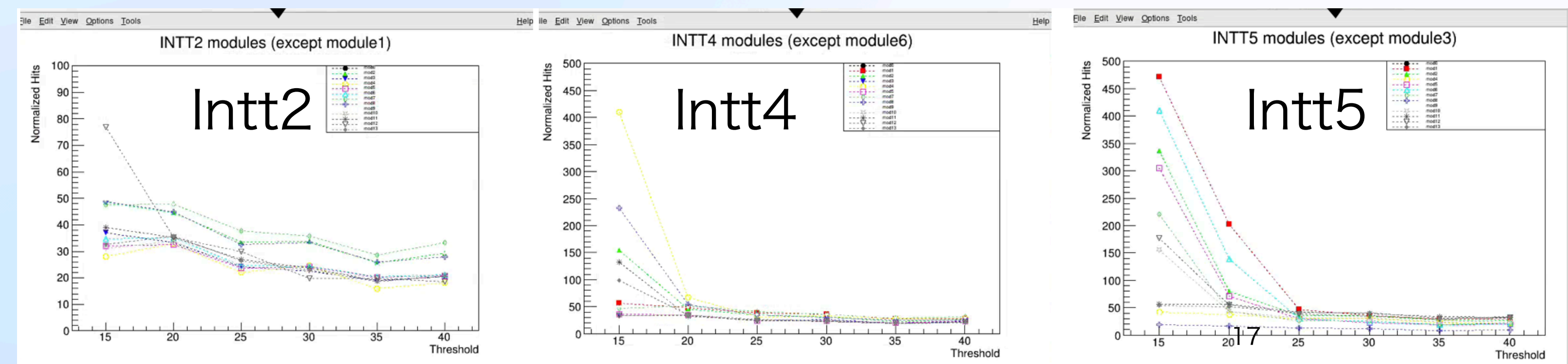
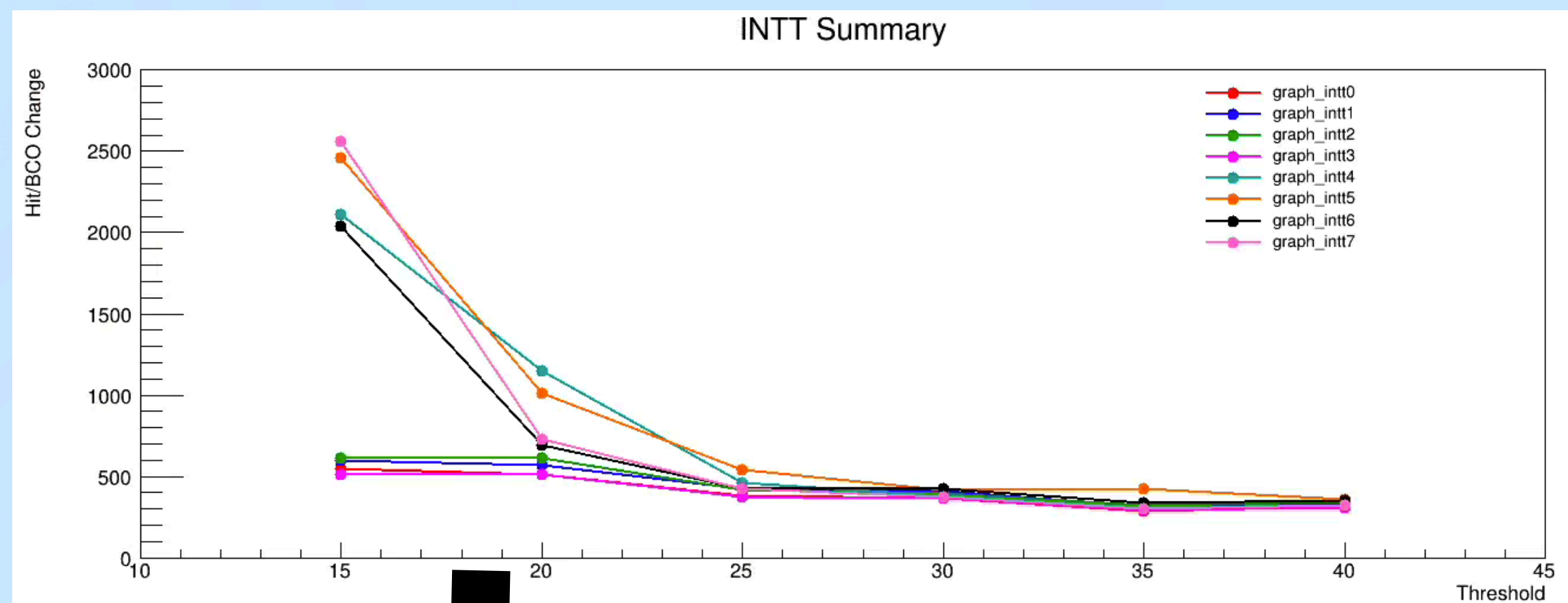1. I remove some module which behavier is strange (it is surrounded by red line)

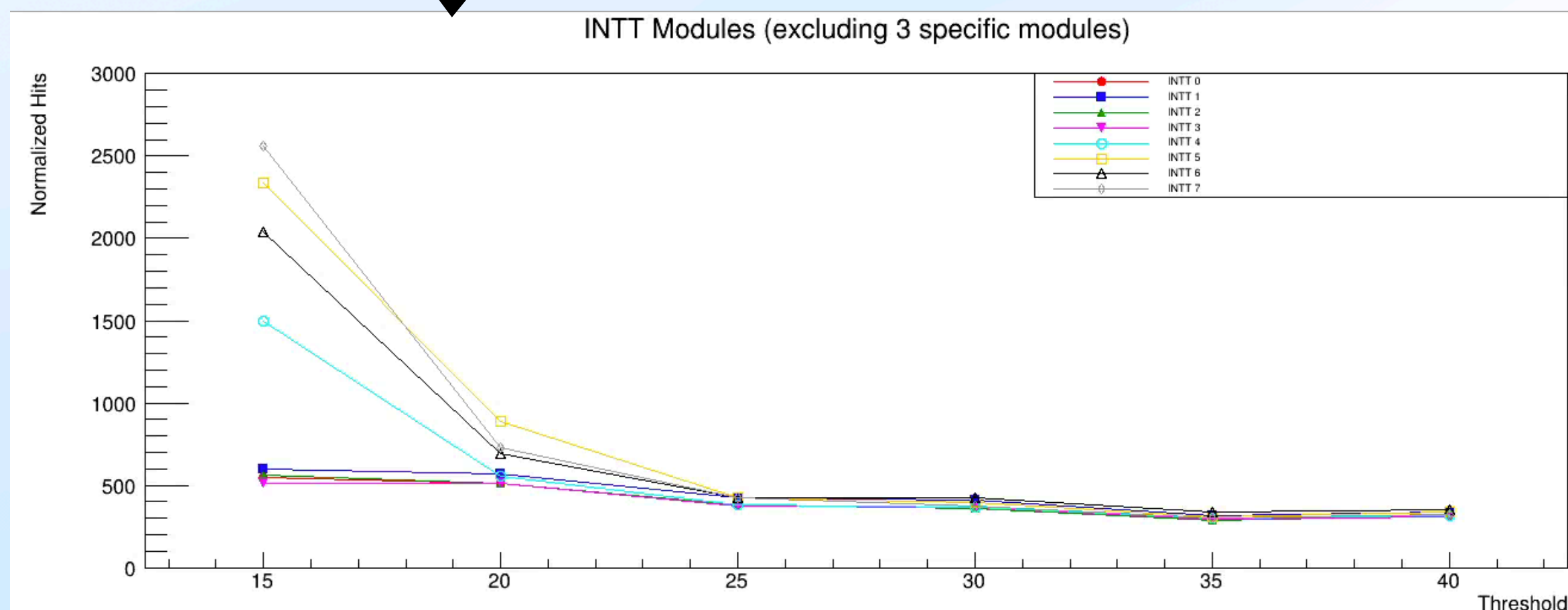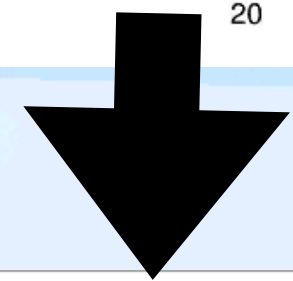2. I calculate again the hit rate without them.

Removing noise by myself
The result

hits/events vs DAC0

Result :

I cannot see difference between them.

However, it is important to judge which is good for DAC0 with data without hot ch's hits.

I use CDB to adjust this.