Clustering algorithm

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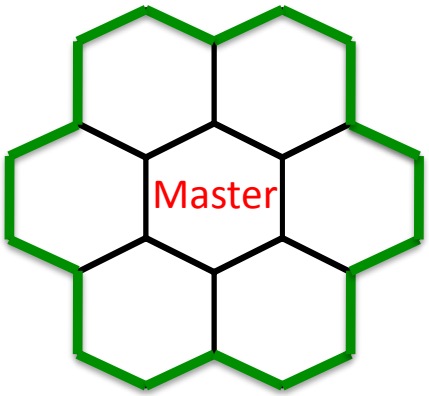
Idea

Current clusterizer

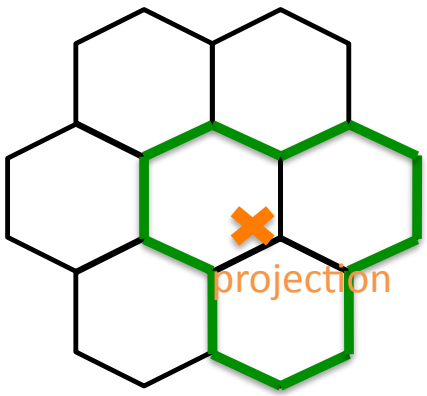
1. Find master pad (charge > 3 p.e)
2. Sum six first neighbors

<u>There is large probability to pick up scintillation for central collisions.</u>
(fake clusters, large cluster charge)



New

1. Use CA projection points to define potential clusters



Outline

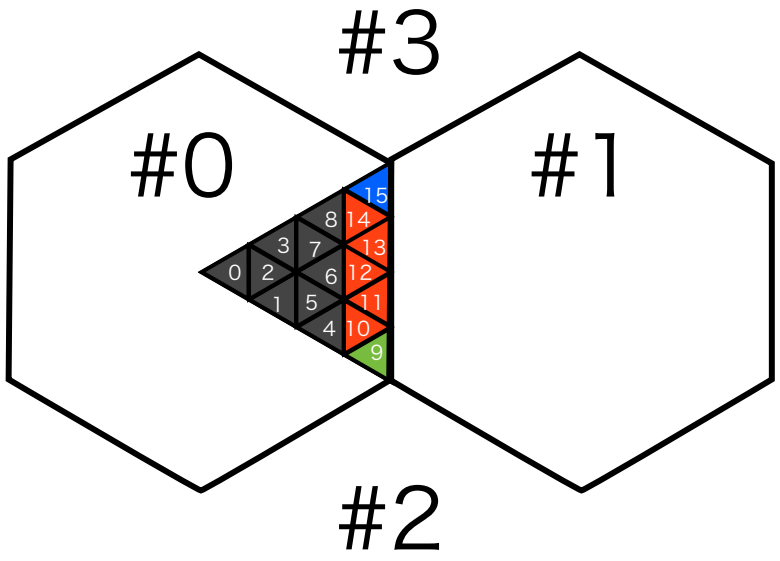
1. Random rejection
2. Double rejection

Random rejection

Analysis procedure

1. Subtract the average charge per pad on event-by-event basis for each module

2. Decide which pad to use according to projection point



Expected cluster

Black:	#0
Red:	#0, #1
Green:	#0, #1, #2
Blue:	#0, #1, #3

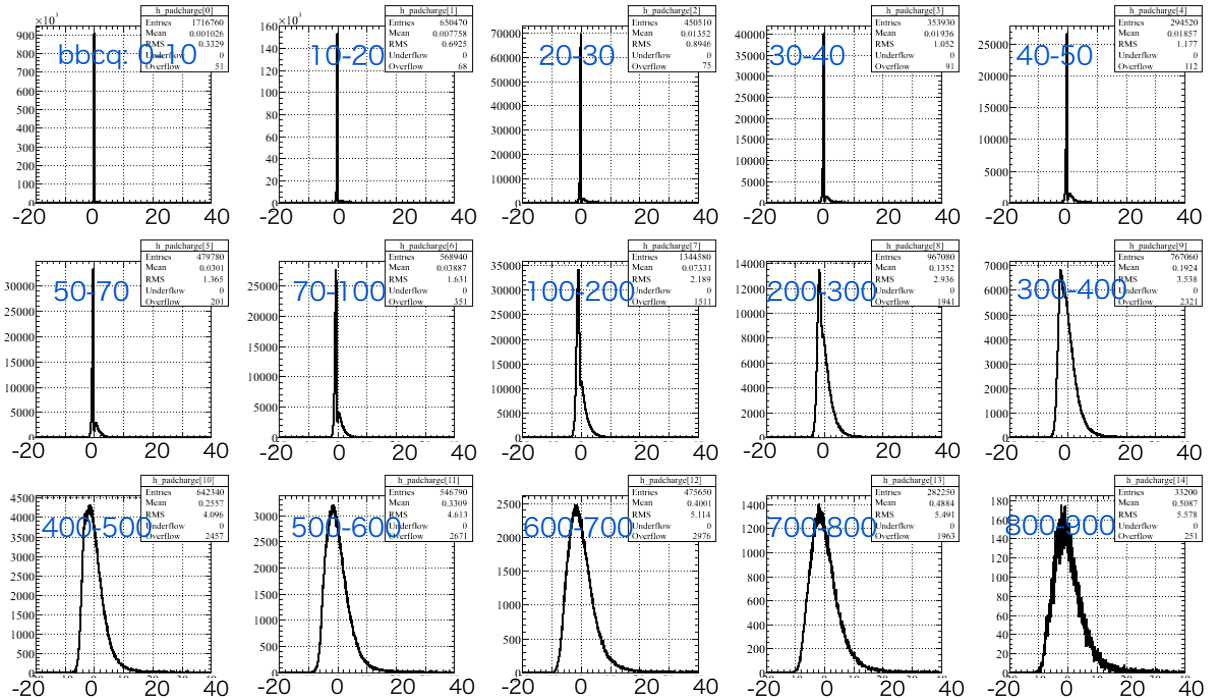
This choice will be justified in slide 10

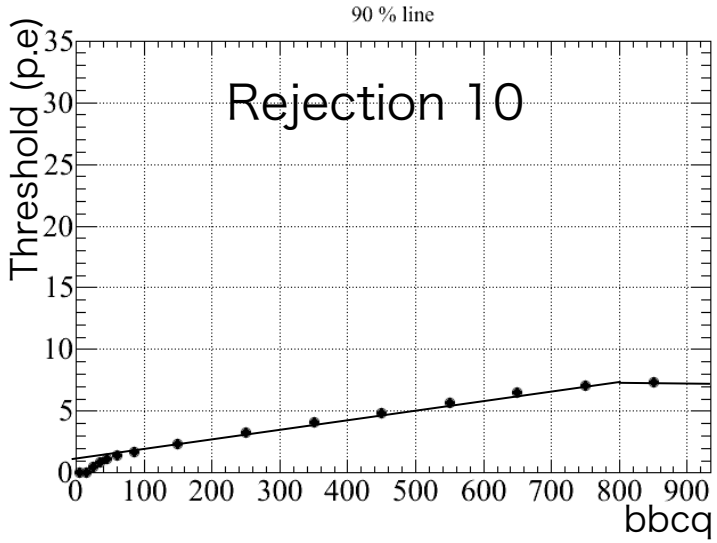
3. Calculate the total charge in the cluster

4. Regard tracks as electron when total charge exceeds threshold. Threshold is determined so that it picks up 10 % of random.

Threshold for 1pad cluster

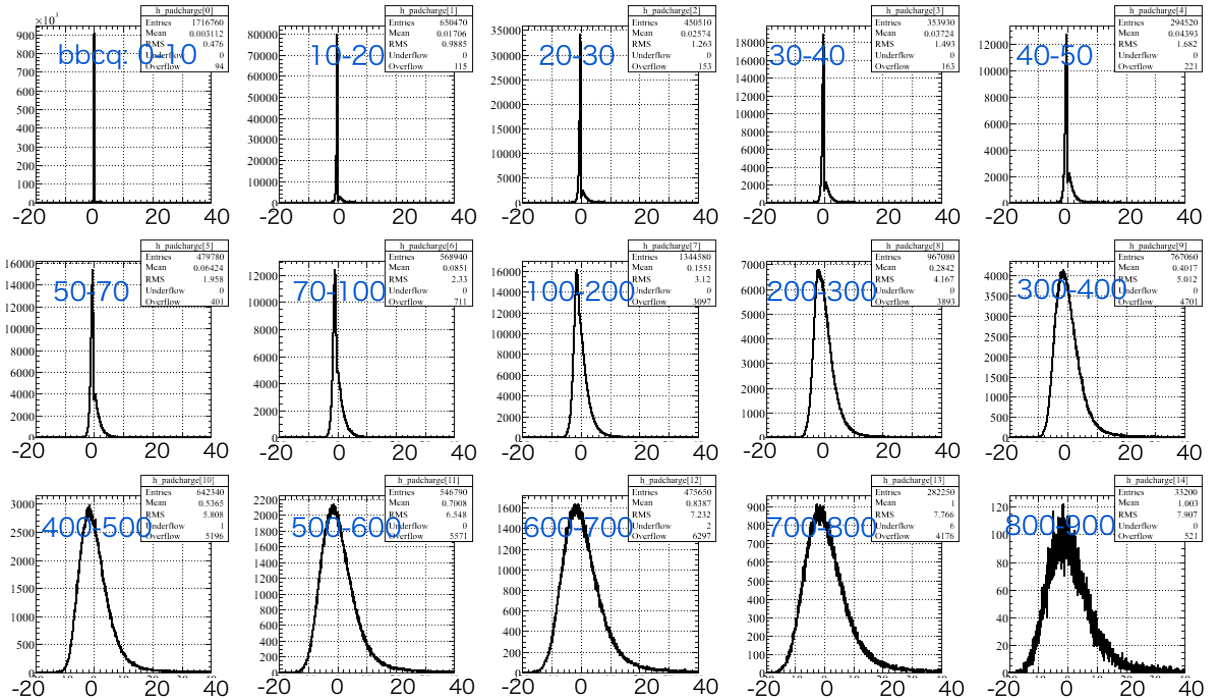
- Charge distribution of single pad as a function of bbcq (WS3)(restricted to hexagonal pads)
- A few 62 GeV runs are used to determine the threshold
- The graph is fitted to a straight line between 100 and 800
- This threshold for 90% rejection is determined for each module

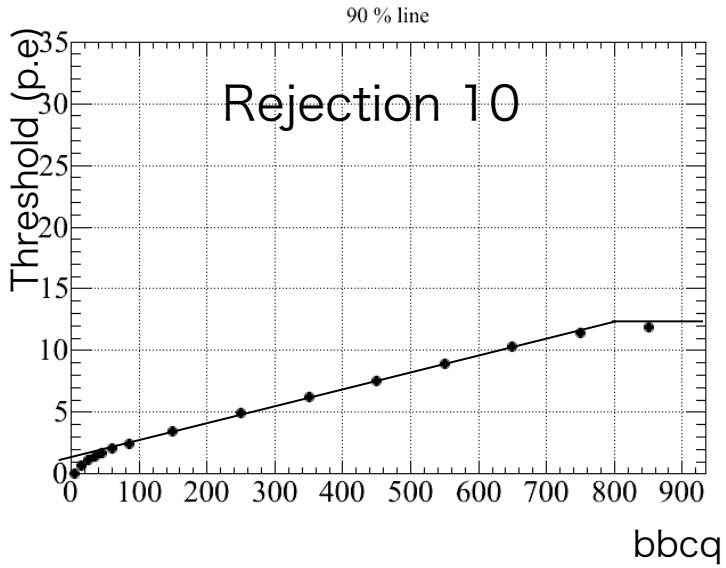




Threshold for 2 pad cluster

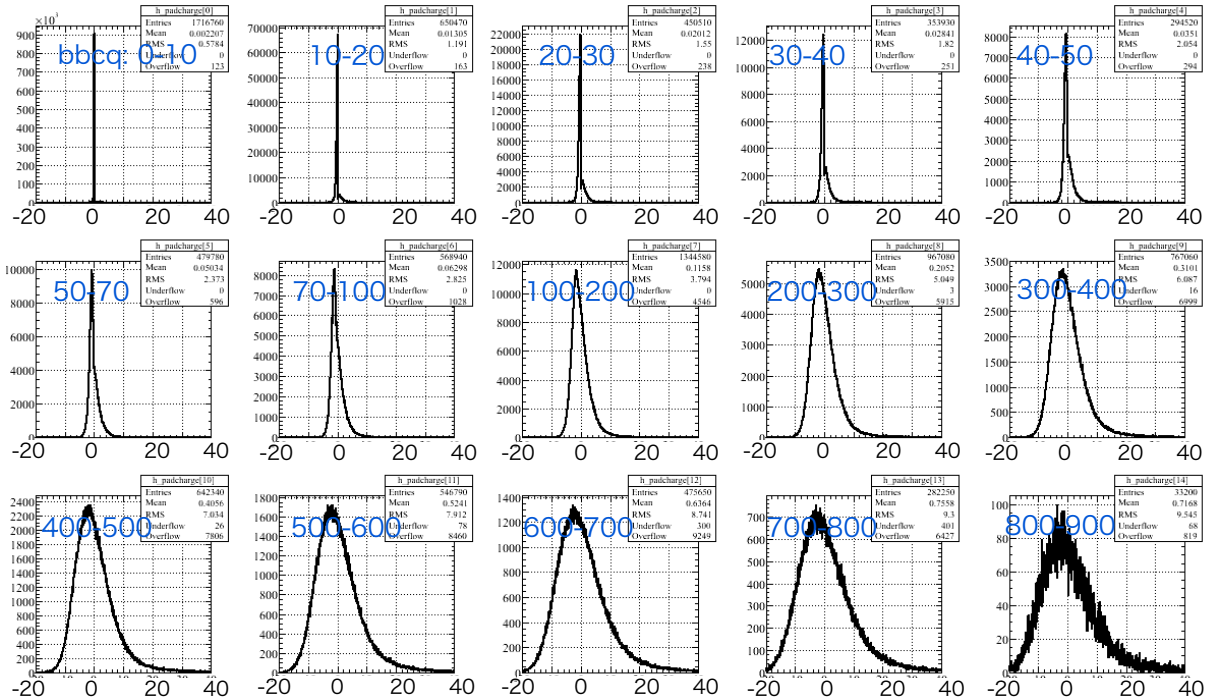
- Charge sum of 2pads as a function of bbcq (WS3)

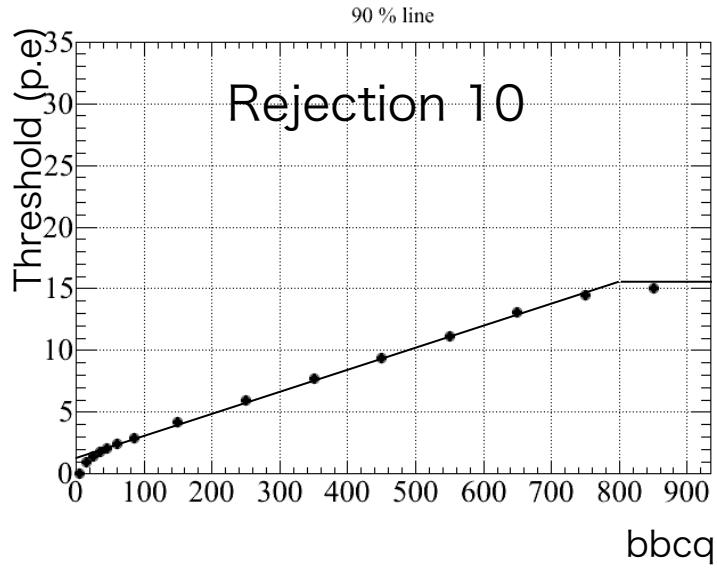




Threshold for 3 pad cluster

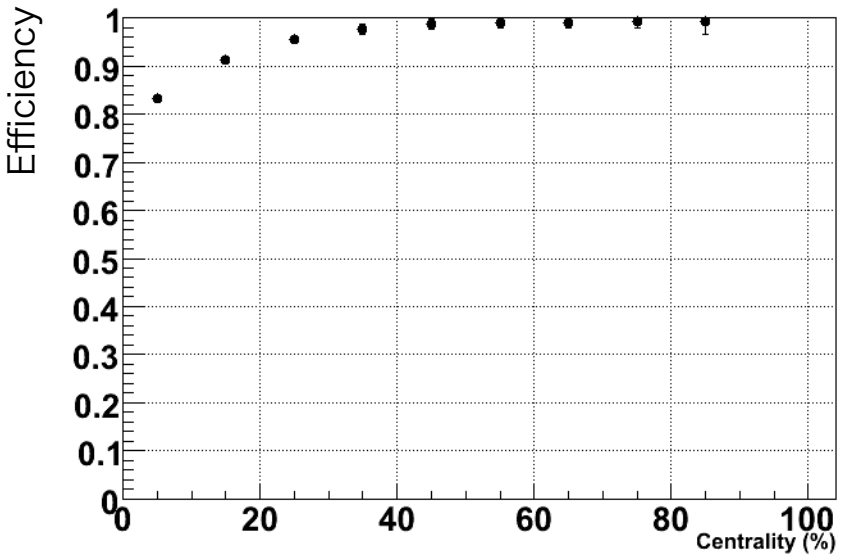
- Charge sum of 3 pads as a function of bbcq (WS3)

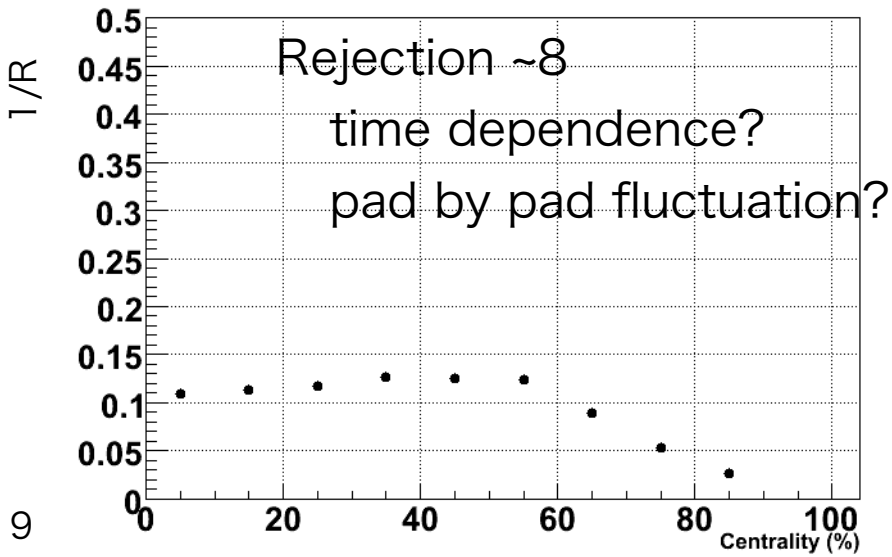




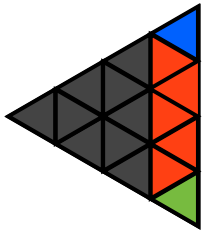
Estimation of efficiency

- Embedding setup
  - Electrons from ϕ decays are used
  - Data: 62GeV compact CNT files
  - Central Arm cuts
    - qual = 31||51||63, n0>=3, dep>-2, disp<5, chi2/npe0<10
    - sqrt(semcdphi**2+semcdz**2)<3, prob>0.01
    - Projection restricted to hexagonal pads
- Rejection is estimated using swapped tracks as a cross check

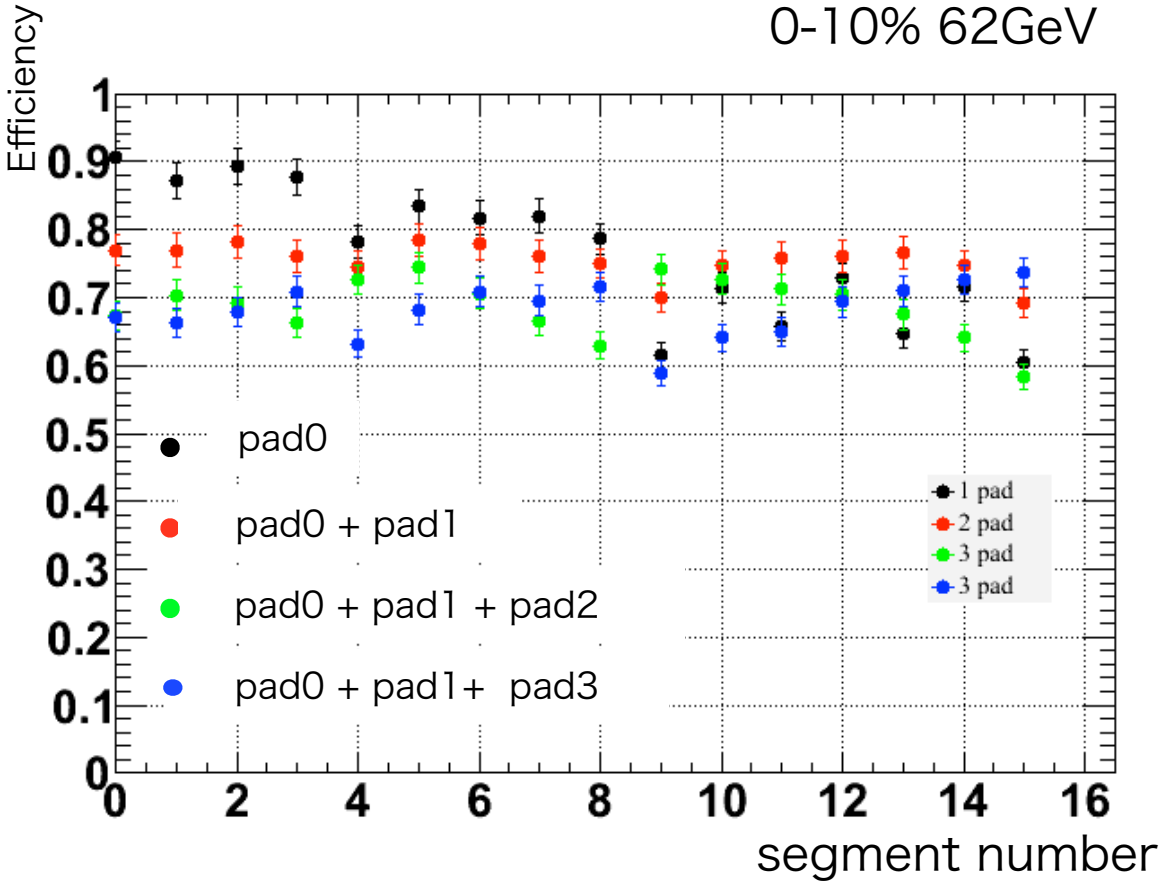


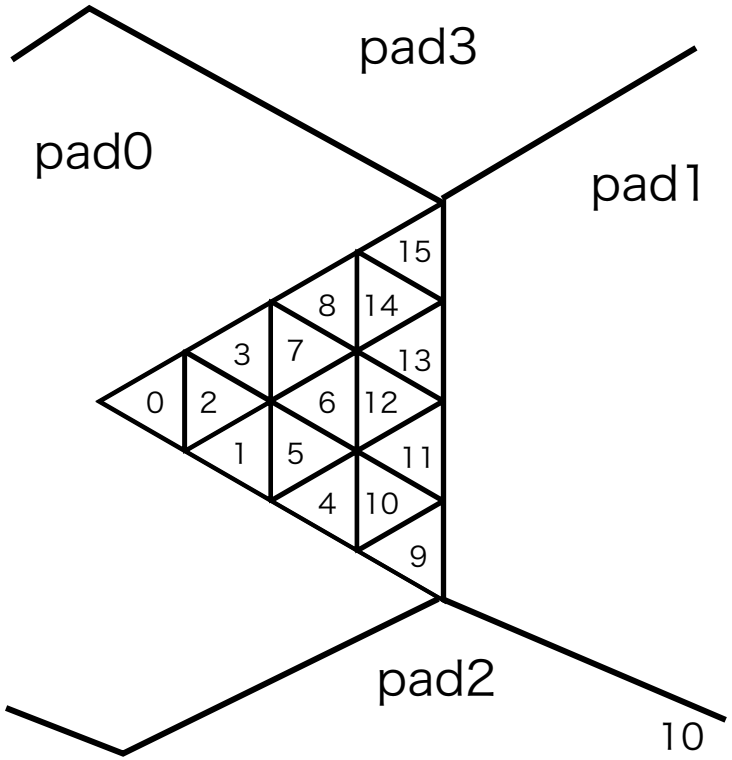


How was the topology determined?



The topology shown on slide #3 is determined so that efficiency is maximum



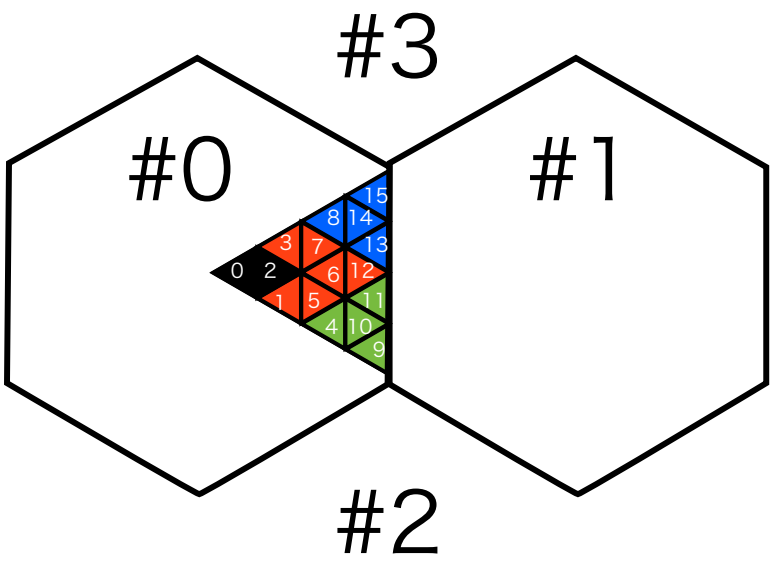


Double rejection

Several types of double

- Fully overlapped This presentation
- Partially overlapped
- Fully separated

Double rejection



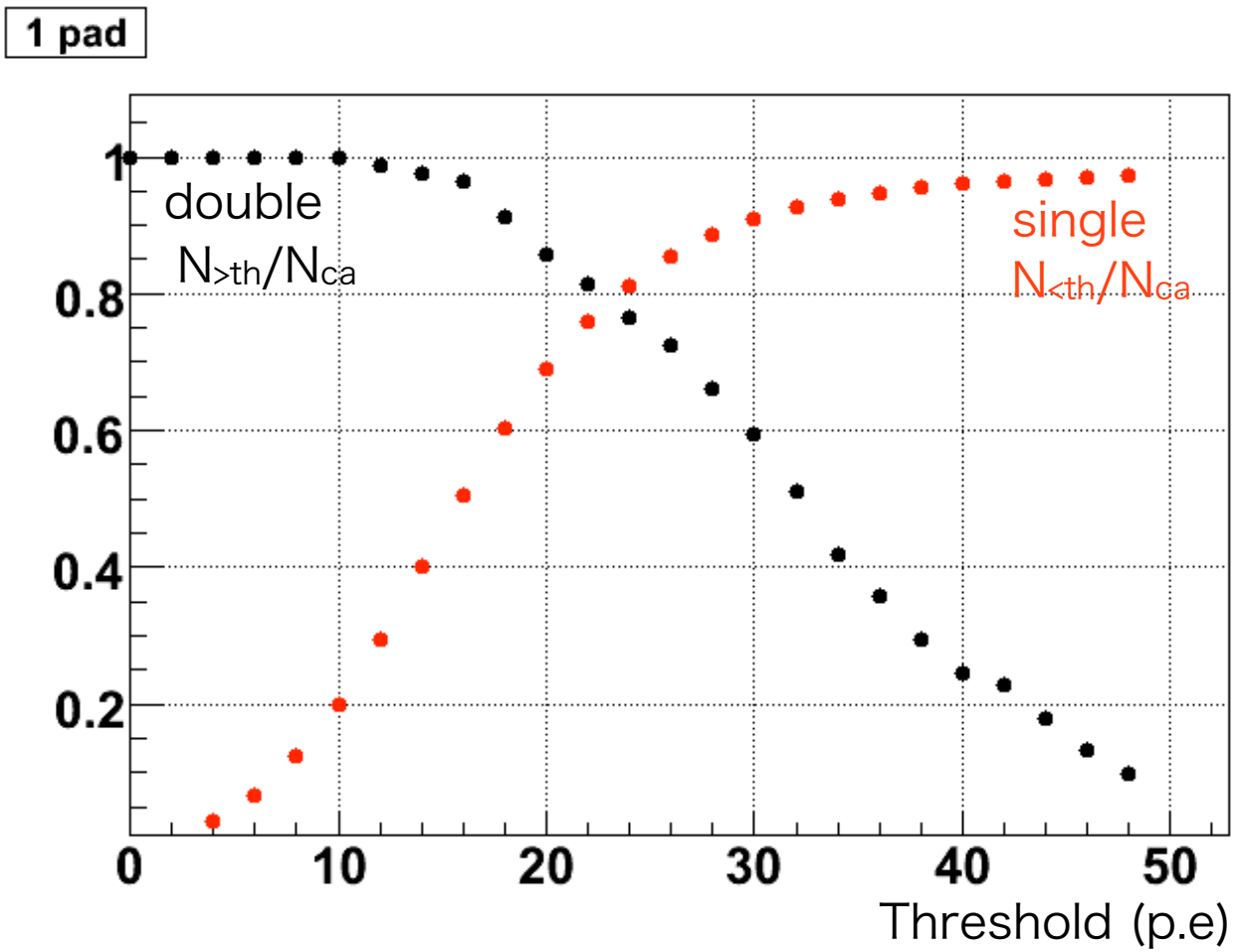
Expected double cluster

Black:	#0
Red:	#0, #1
Green:	#0, #1, #2
Blue:	#0, #1, #3

Not yet justified, just intuition

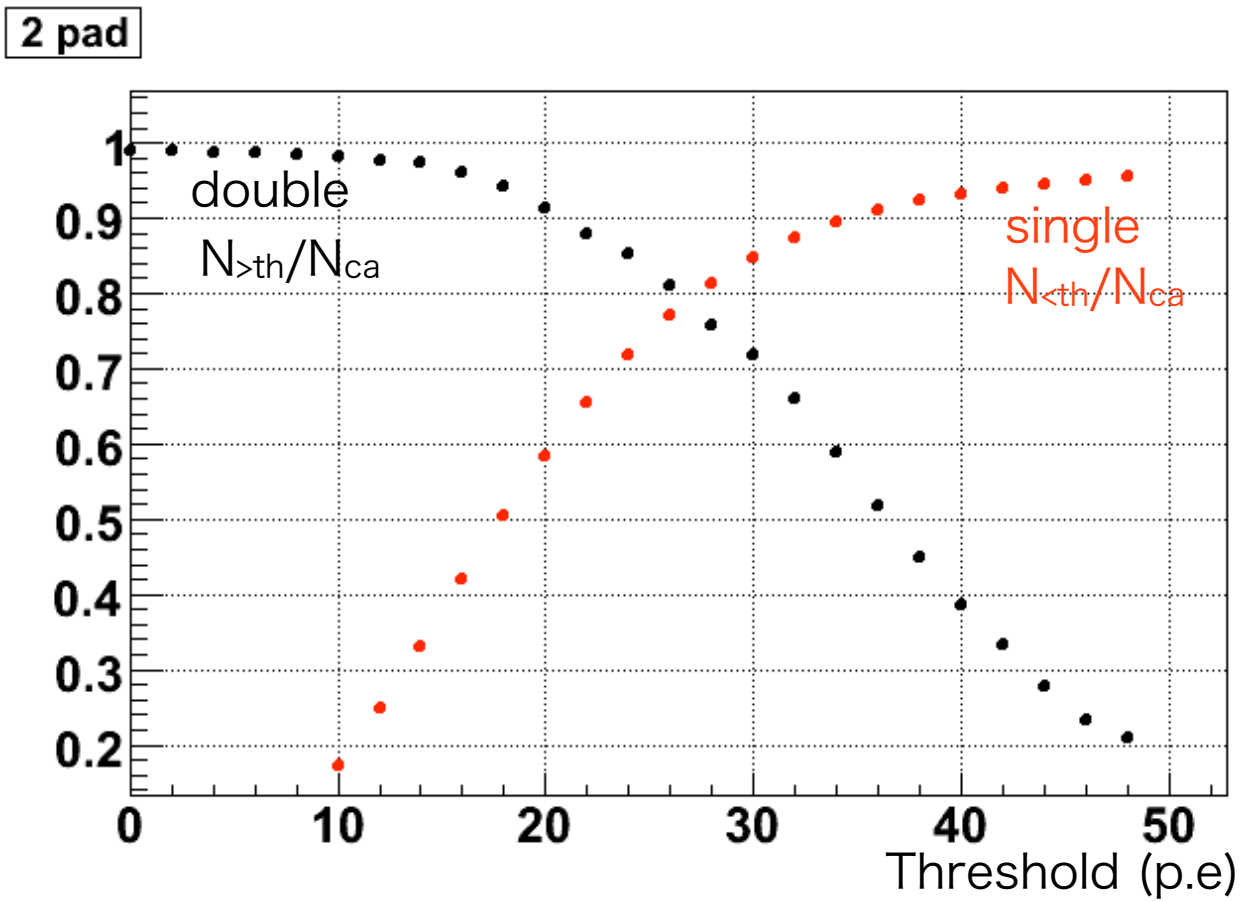
- Charge distribution of “single” and “double” is compared in each area shown with different colors
- Embedding setup
  - Electrons from ϕ decay are used as “single”
  - Electrons from beam pipe conversion are used as “double”
  - Data: 62GeV compact CNT, 0-10% centrality
  - CA cuts: same as slide 9

1 pad (Black area)



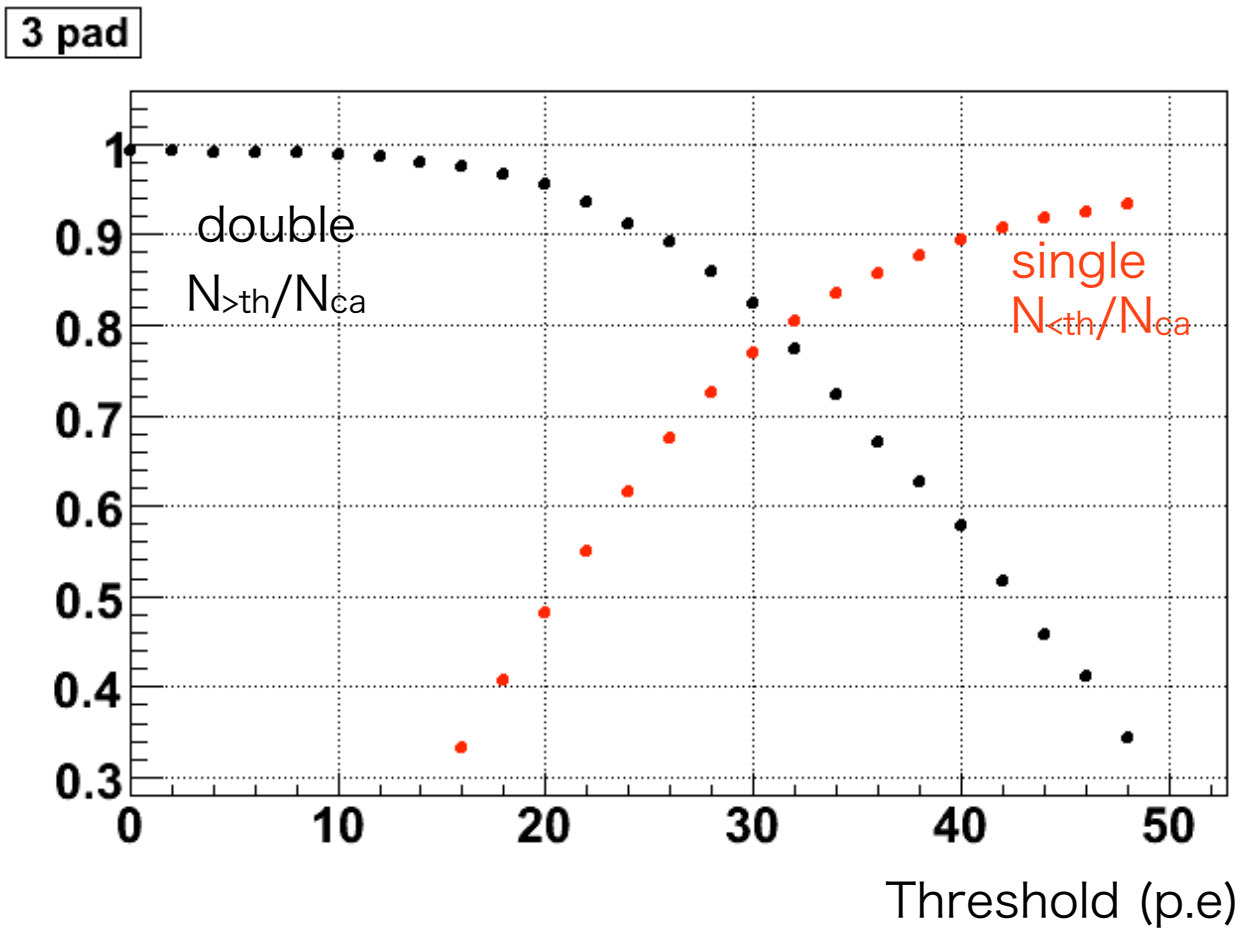
Simulation electrons embedded in 62GeV 0-10%

2 pad (Red area)



Simulation electrons embedded in 62GeV 0-10%

3 pad (Green area)



Simulation electrons embedded in 62GeV 0-10%

To-do

- Rejection of π^0 open Dalitz
- Make threshold for non-hexagonal pads