

SiWECAL

Test Beam @DESY 2017

Double pedestal problem

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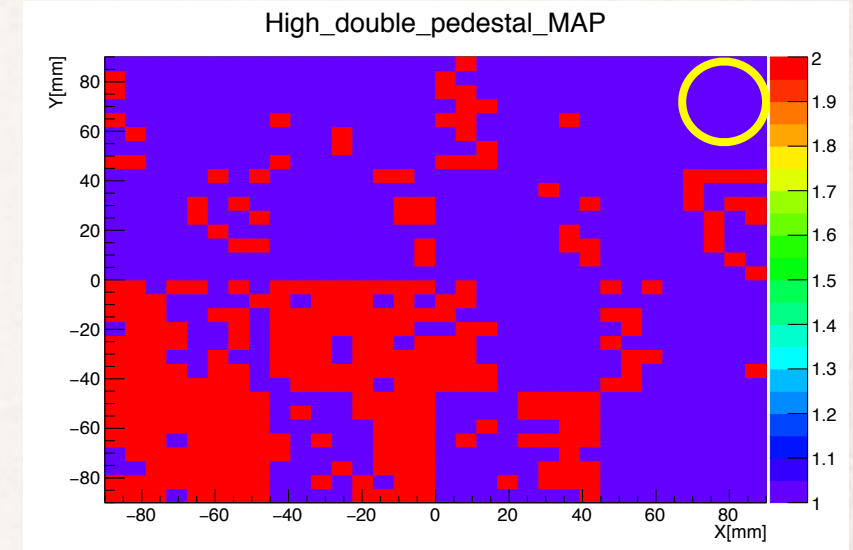
27/ JUL /2017

Double pedestal MAP

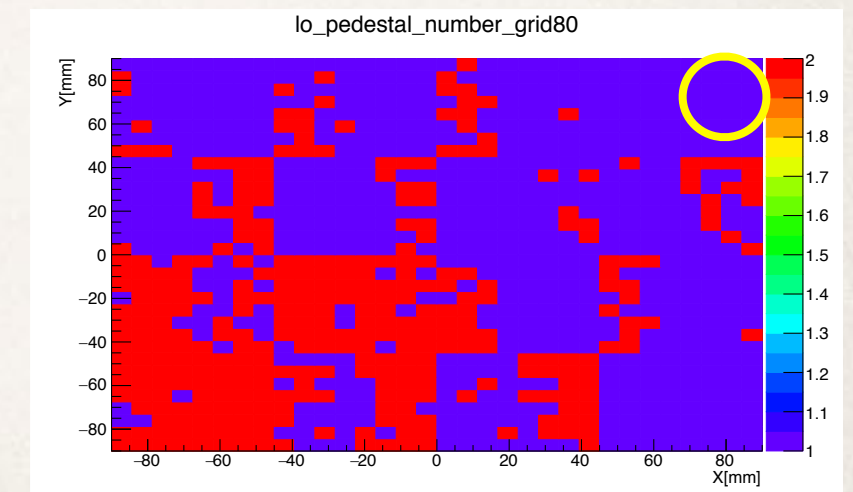
Reminder

- ❖ I showed double pedestal MAP at the meeting two times ago.
- ❖ But I have mistakes. The MAP was not made of Charge Low Gain. The MAP was made of Charge High Gain.
- ❖ And Double pedestal was not correctly searched at some point.
- ❖ Figure above is new MAP. Figure below is old MAP.
- ❖ Beam was shoot at Yellow point.

New MAP



Old MAP

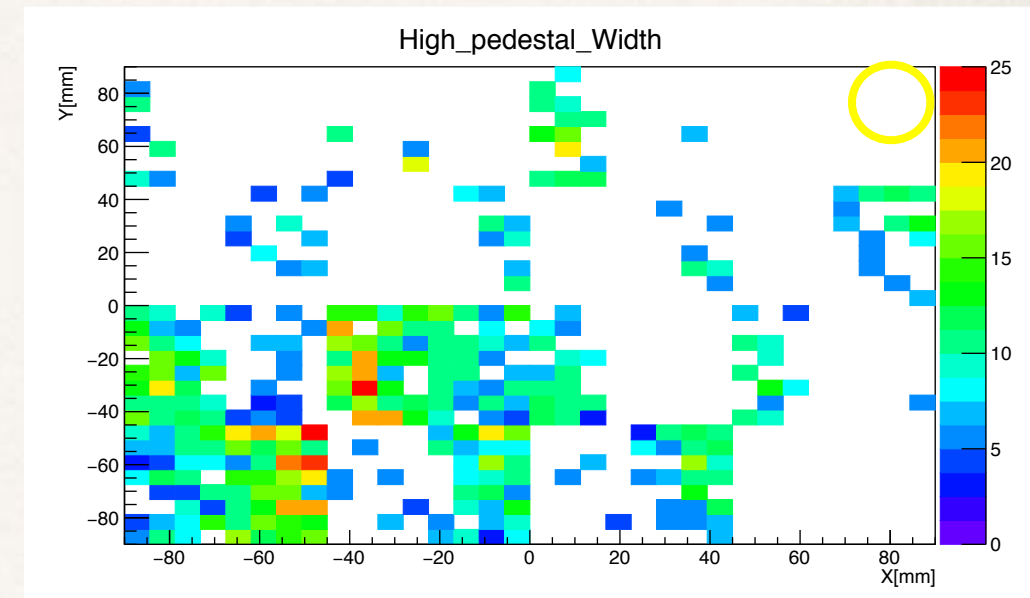


Pedestal Difference MAP

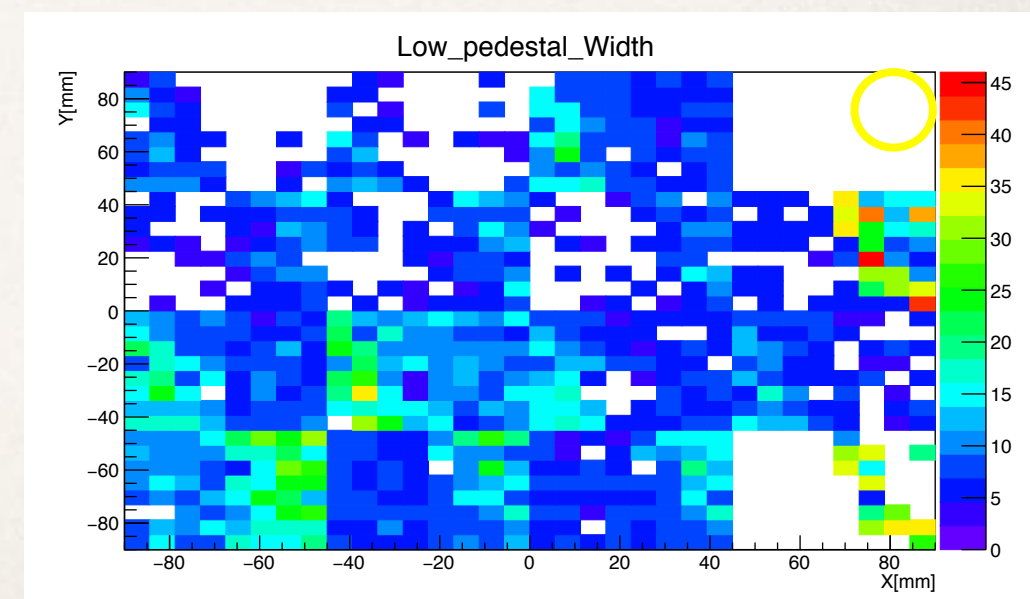
Reminder

- ❖ Difference of two peaks have various distance at each channel. Right figure was made of distance between two peaks.
- ❖ Double pedestal was not appeared at white region.
- ❖ Beam was shoot at Yellow point.

High Gain



Low Gain



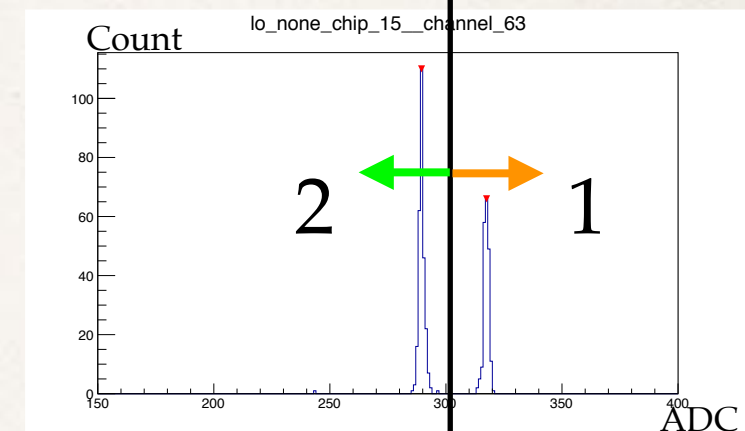
- ❖ Charge High Gain and Charge Low Gain are synchronized is dominant in the same Chip.
- ❖ There is correlation between the same Chips.
- ❖ There is no correlation between difference Chips.
- ❖ Please look at Buck up slide for detail.

Define four areas

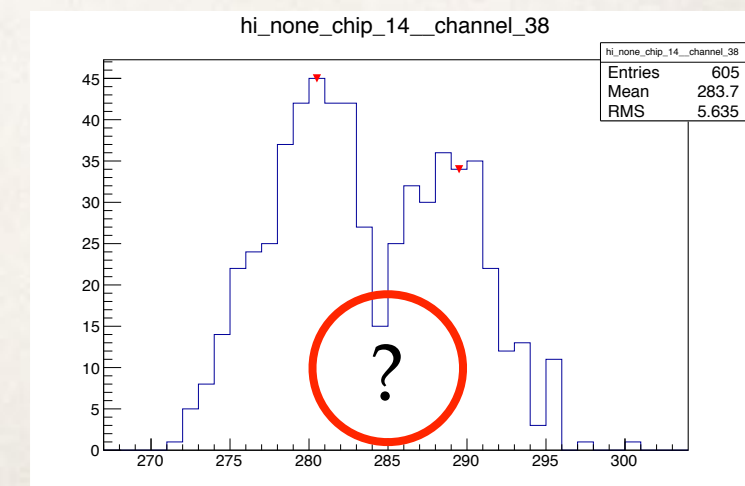
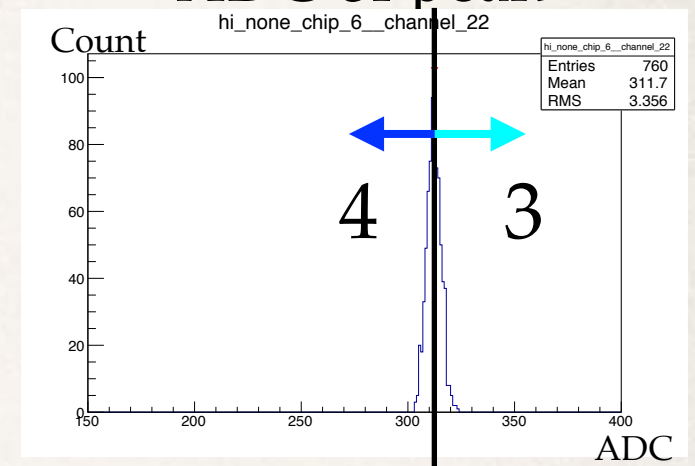
Two peaks on ADC for each event

- ❖ Right figures are histogram which were made of Charge Low Gain(two from the top) and Charge high Gain (bottom) .
- ❖ I defined four areas. At the channel which double peak appeared, Divide by the average value of the two peaks. And at the channel which double peak didn't appeared, Divide by value of the peak.
- ❖
 - 1 : Double pedestal & ADC of Average < ADC of per event
 - 2 : Double pedestal & ADC of Average > ADC of per event
 - 3 : One pedestal & ADC of peak < ADC of per event
 - 4 : One pedestal & ADC of peak > ADC of per event
 - 5 : Don't get data
- ❖ But, Double pedestal which was made of Charge High Gain was not separated less than made of Charge Low Gain.
So, Don't know whether it is derived from the peak on the left side or the peak on the right side. Because I make MAP with Charge Low Gain.
- ❖ Match the time information and make a MAP for each event with Charge Low Gain.

Average of two peaks



ADC of peak



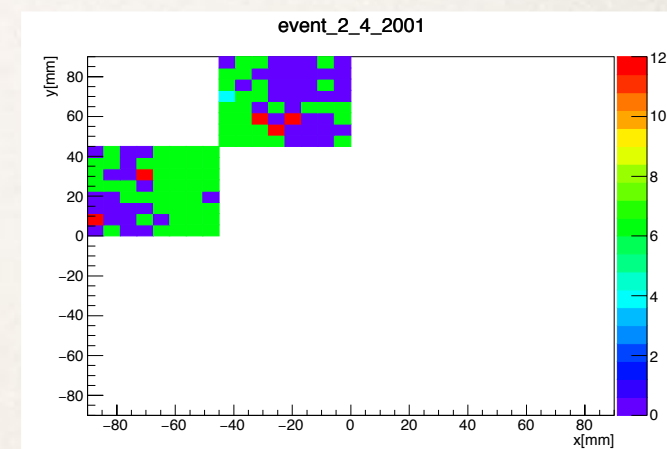
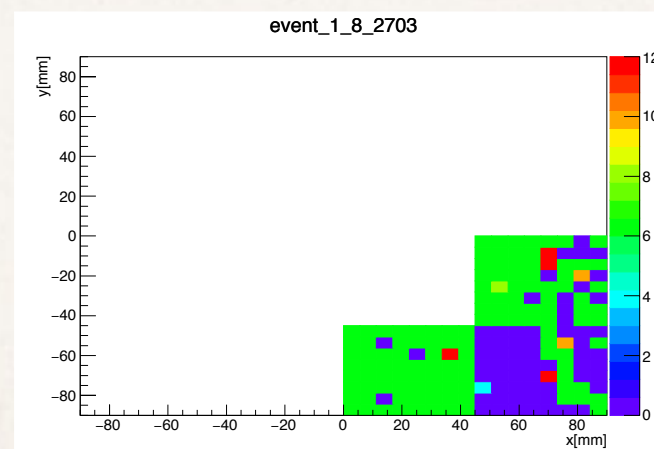
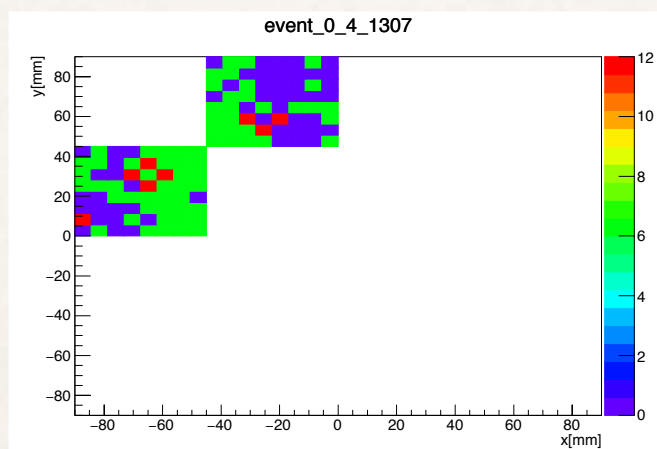
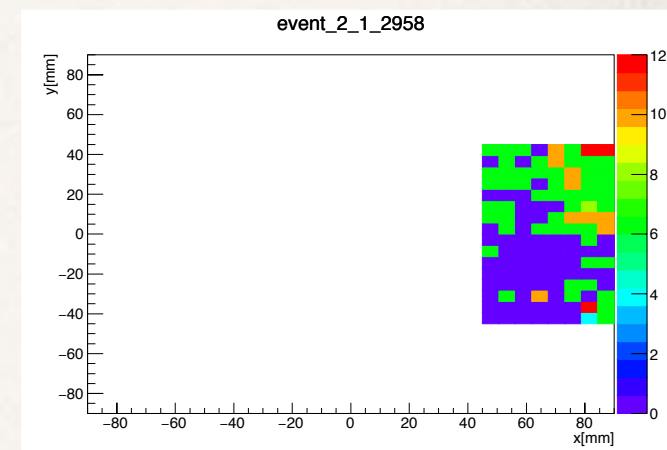
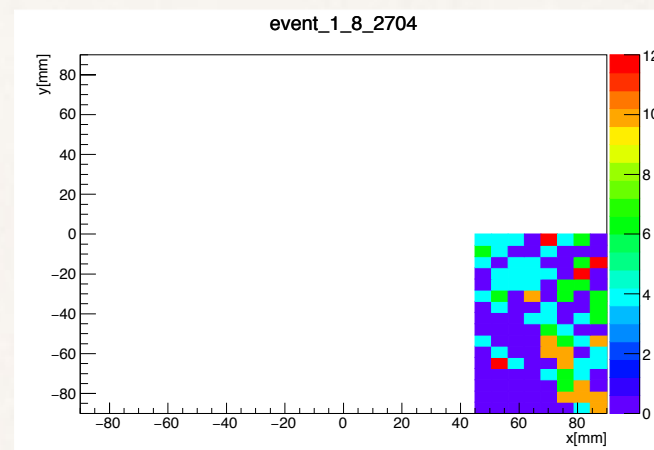
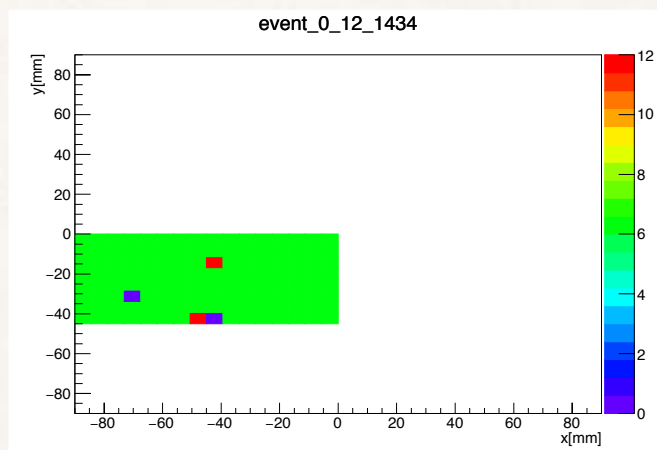
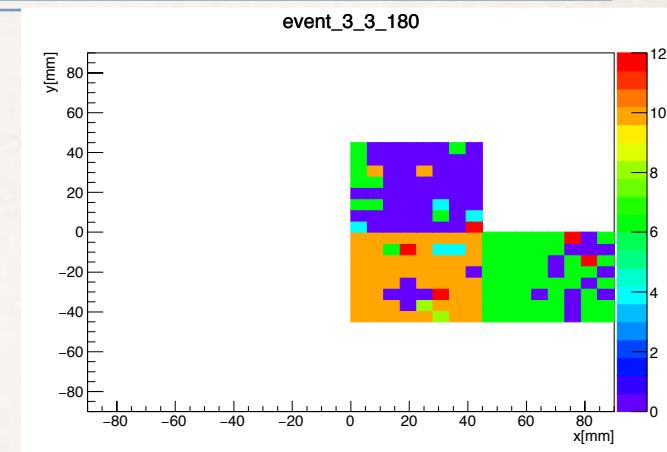
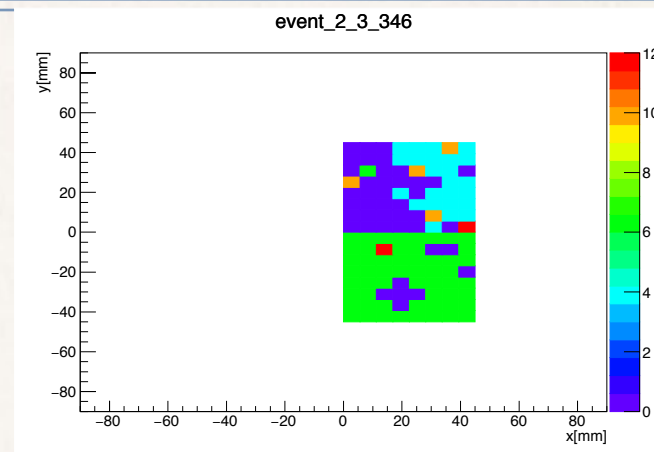
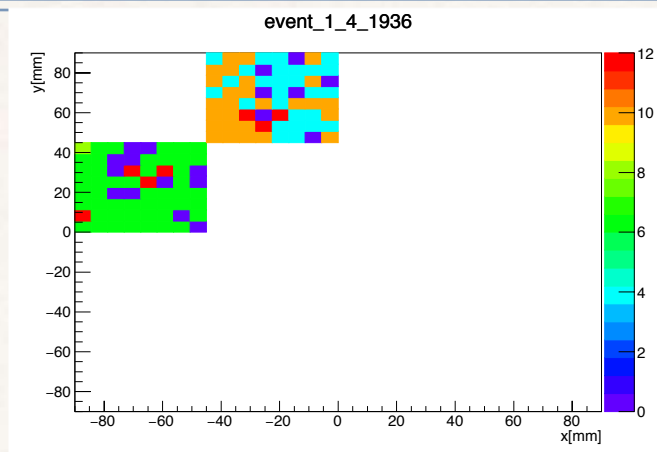
MAP of each event (1)

Two peaks on ADC for each event

- ❖ Colors
 - Red : hit point
 - Orange : Double pedestal & Right ADC
 - Green : Double pedestal & Left ADC
 - Cyan : One pedestal & Right ADC
 - Blue : One pedestal & Left ADC
 - White : Don't get data

- ❖ Event
 - 0 - 3

- ❖ SCA
 - 0 - 15



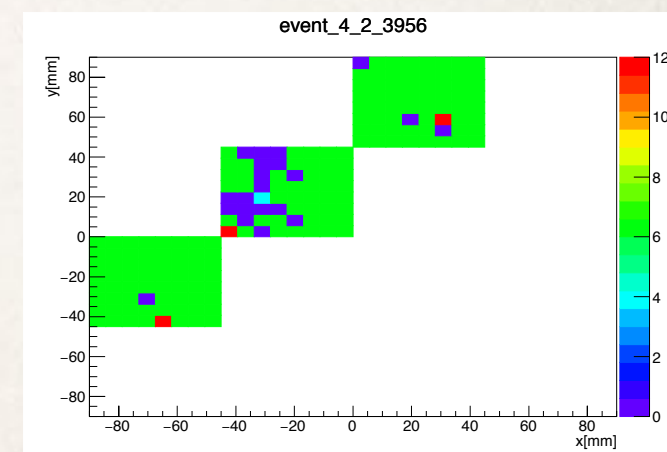
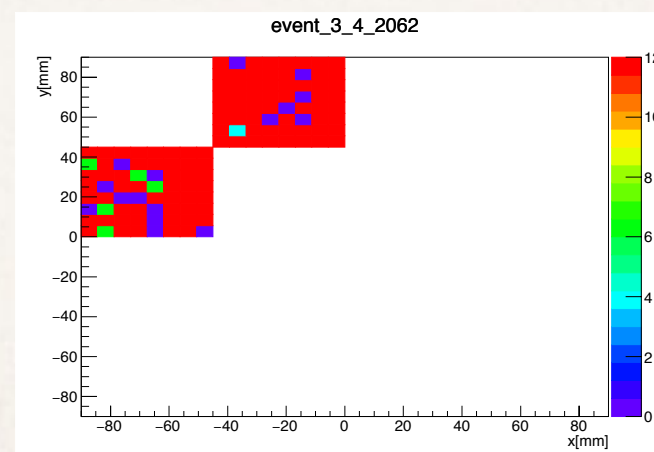
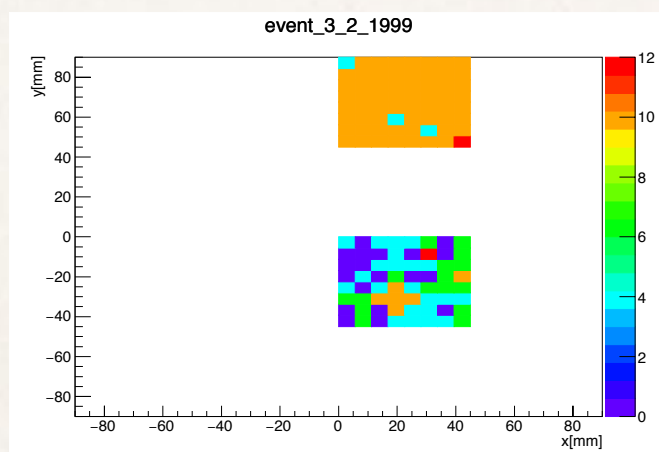
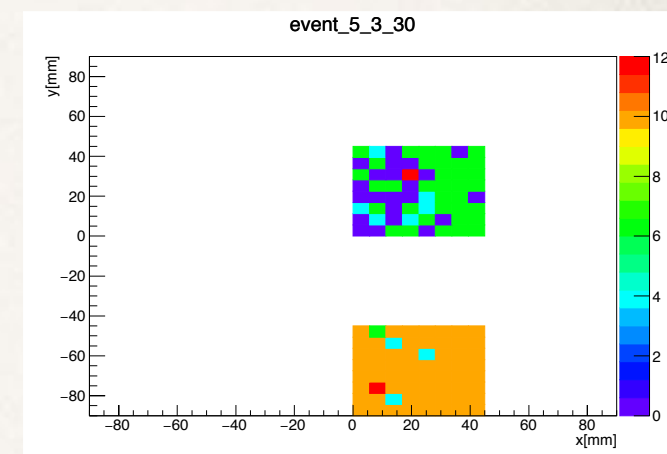
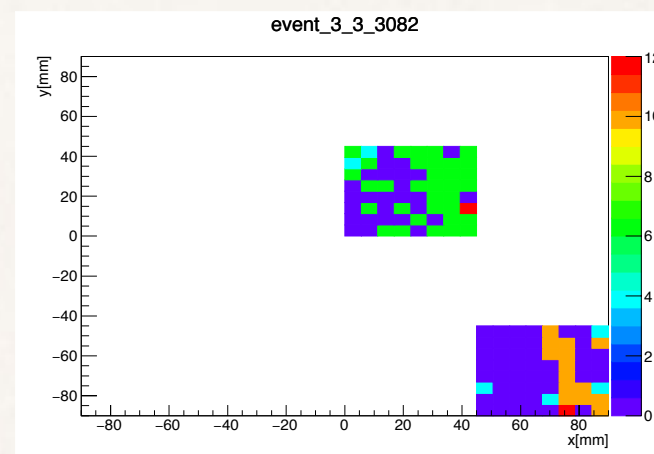
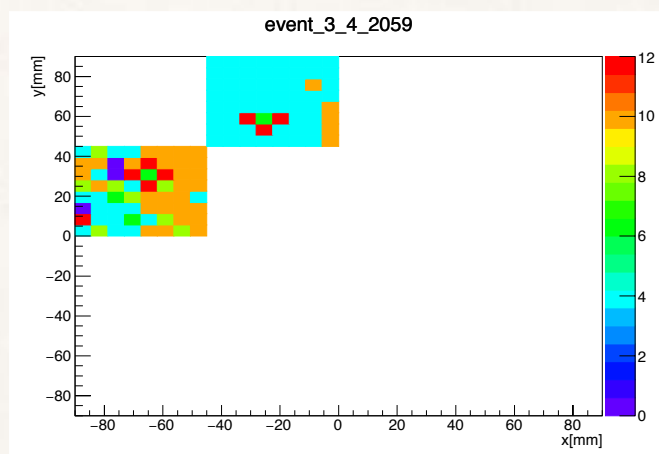
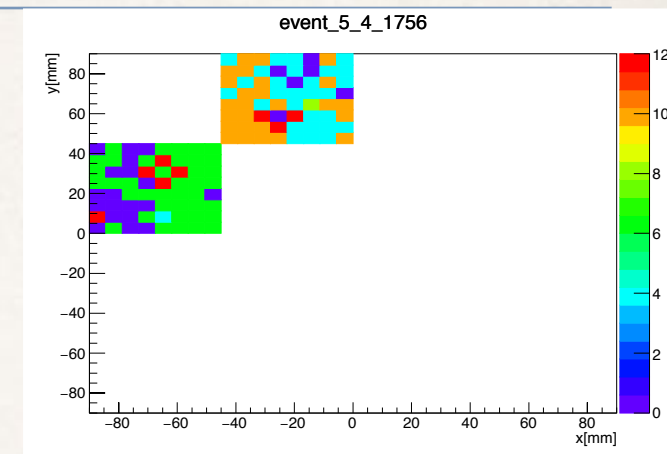
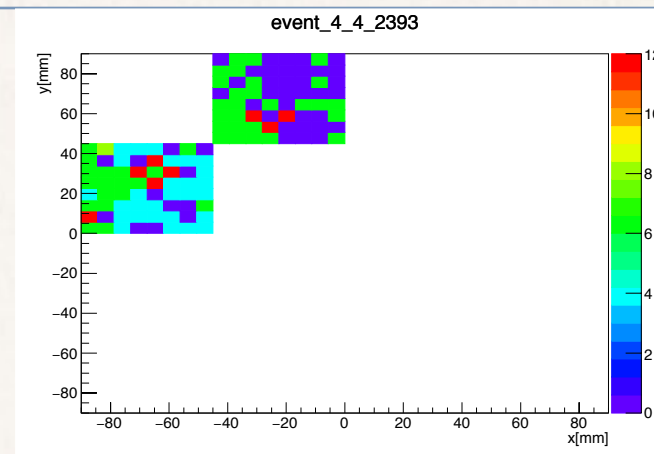
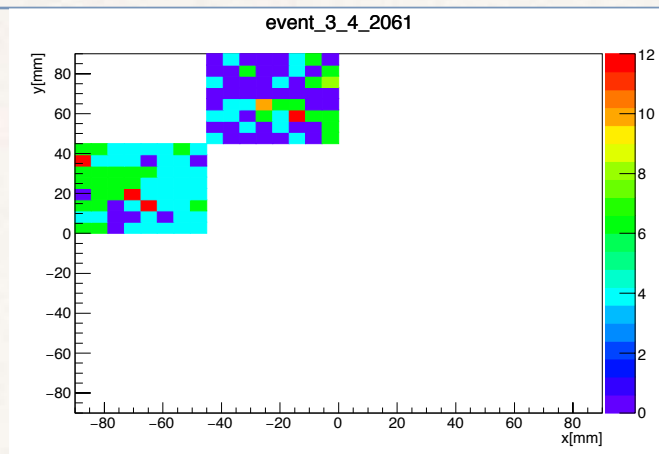
MAP of each event (2)

Two peaks on ADC for each event

- ❖ Colors
 - Red : hit point
 - Orange : Double pedestal & Right ADC
 - Green : Double pedestal & Left ADC
 - Cyan : One pedestal & Right ADC
 - Blue : One pedestal & Left ADC
 - White : Don't get data

- ❖ Event
3 - 5

- ❖ SCA
0 - 15



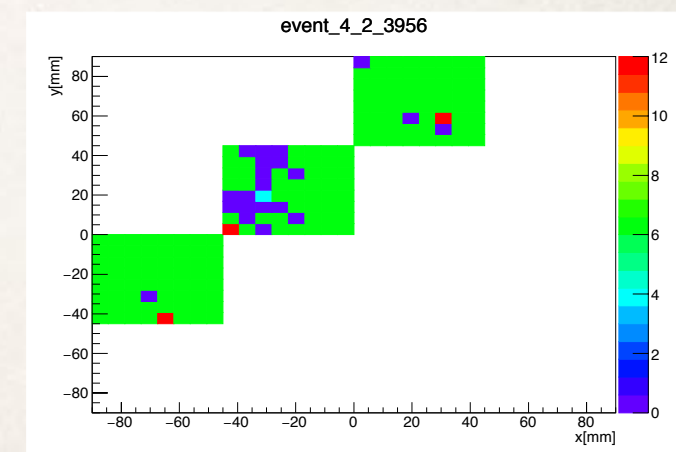
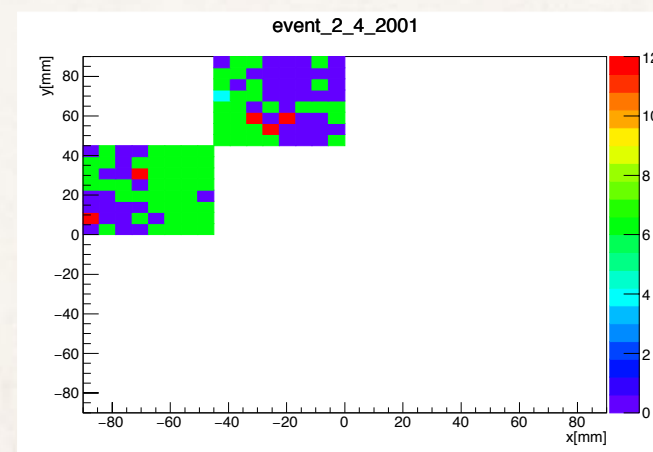
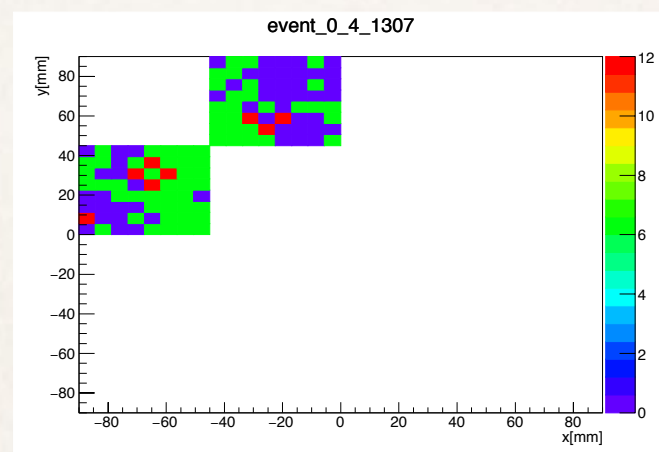
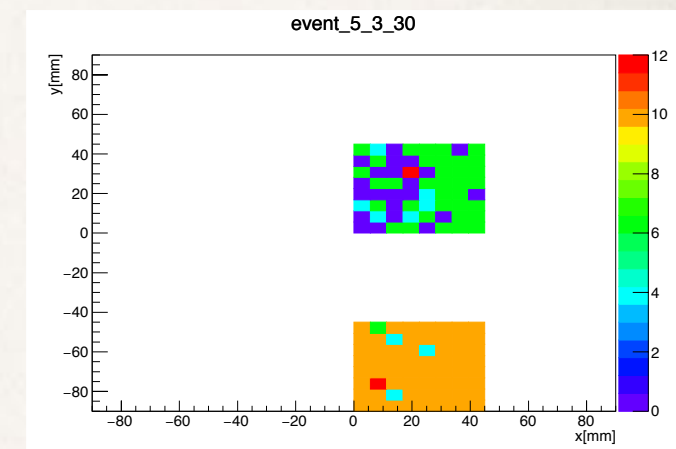
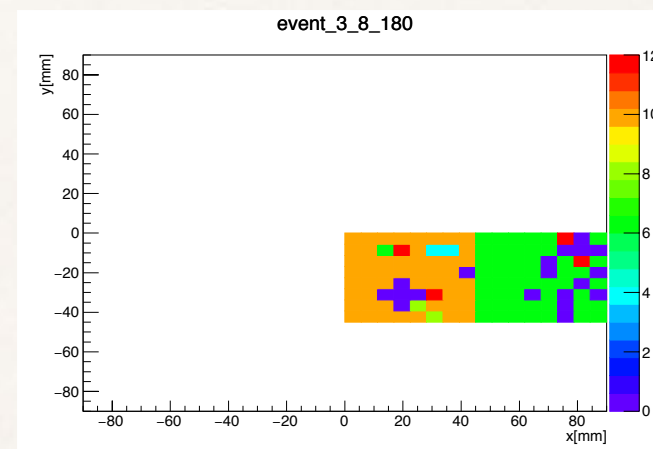
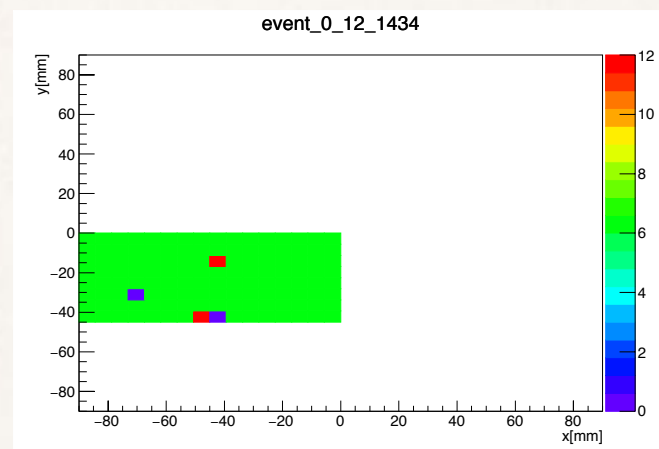
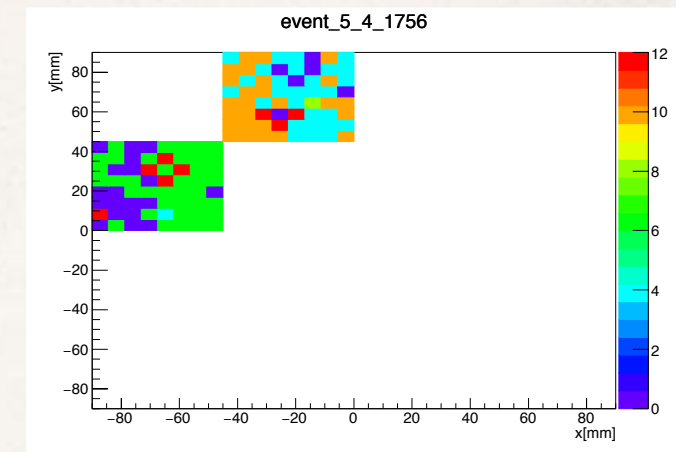
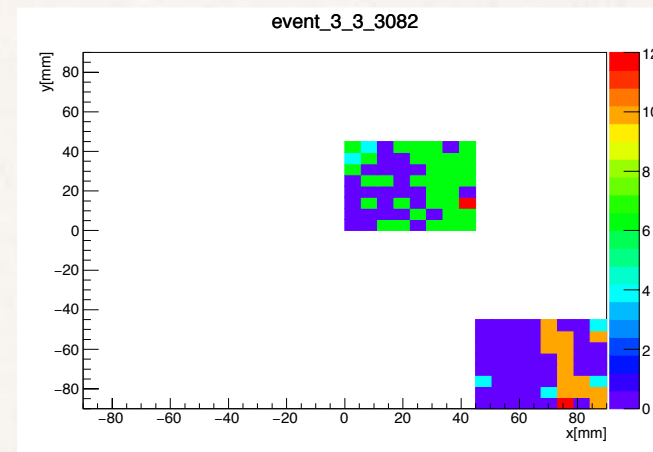
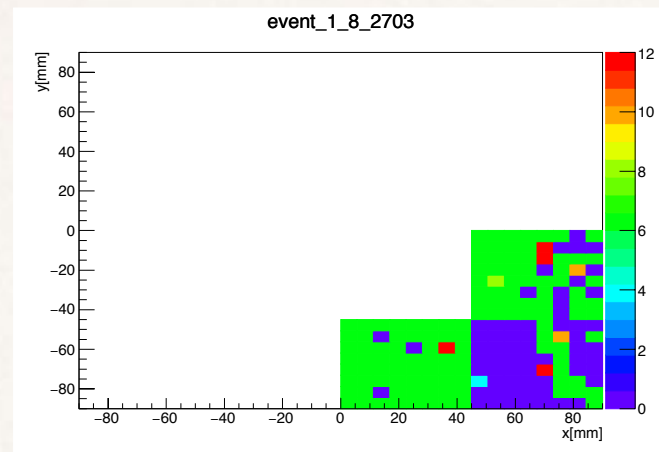
MAP of each event (1) SCA = 0

Two peaks on ADC for each event

- ❖ Colors
 - Red : hit point
 - Orange : Double pedestal & Right ADC
 - Green : Double pedestal & Left ADC
 - Cyan : One pedestal & Right ADC
 - Blue : One pedestal & Left ADC
 - White : Don't get data

- ❖ Event
 - 0 - 5

- ❖ SCA
 - 0



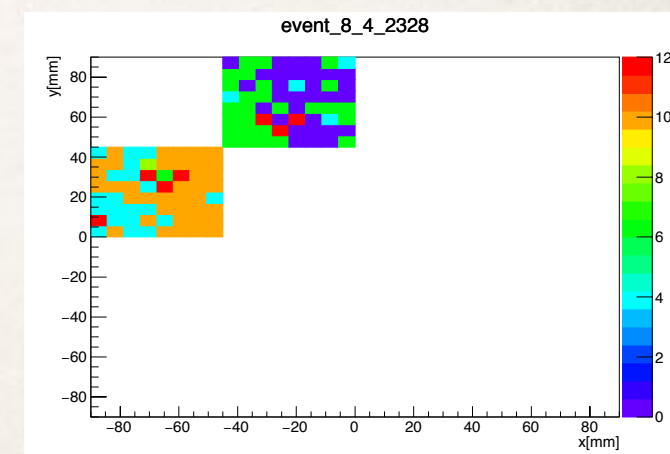
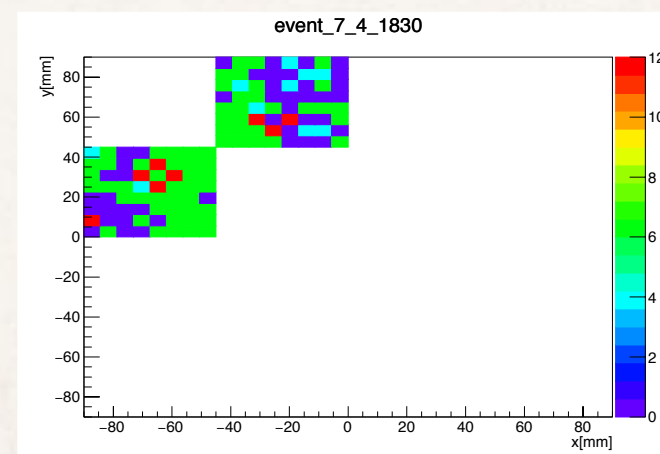
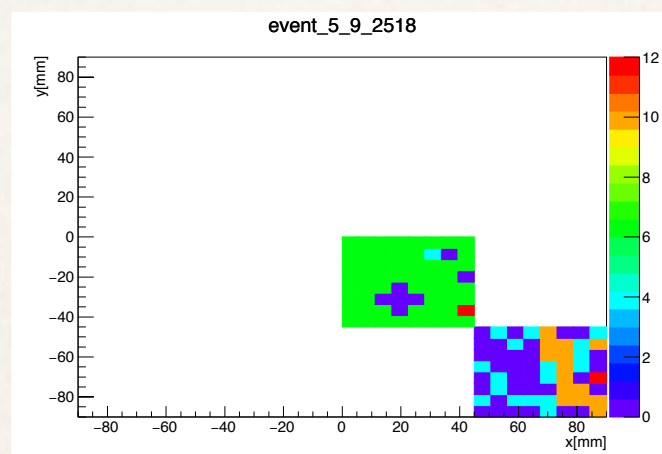
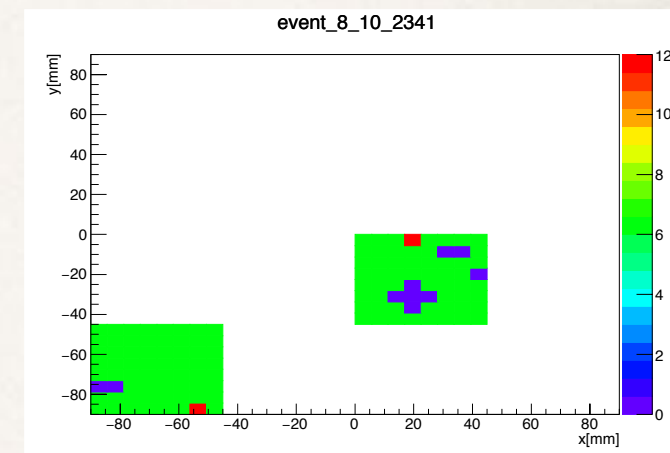
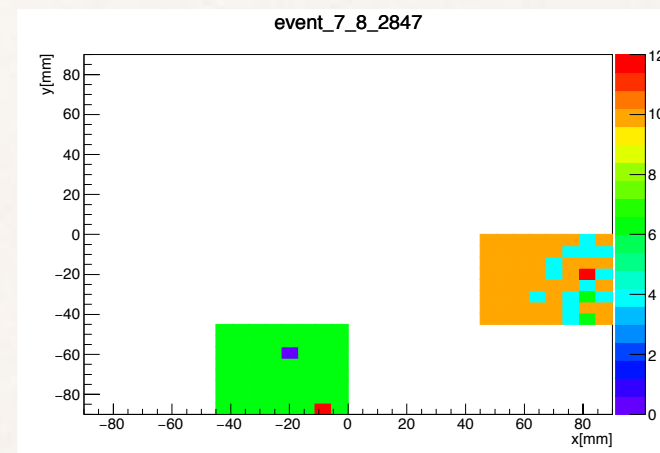
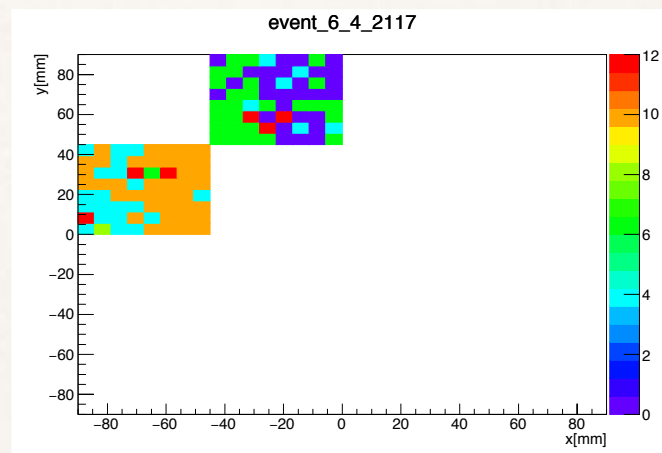
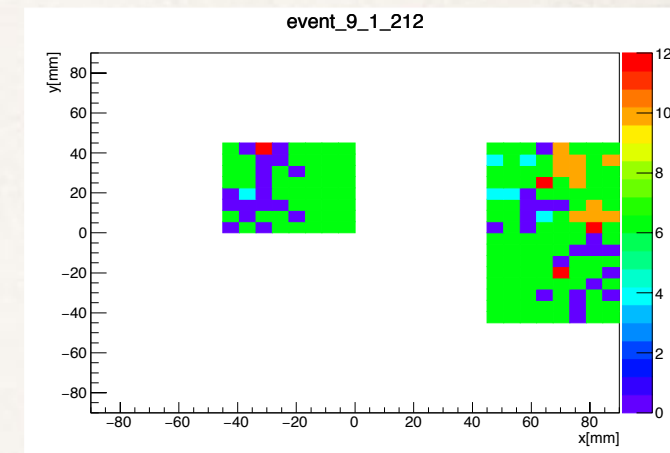
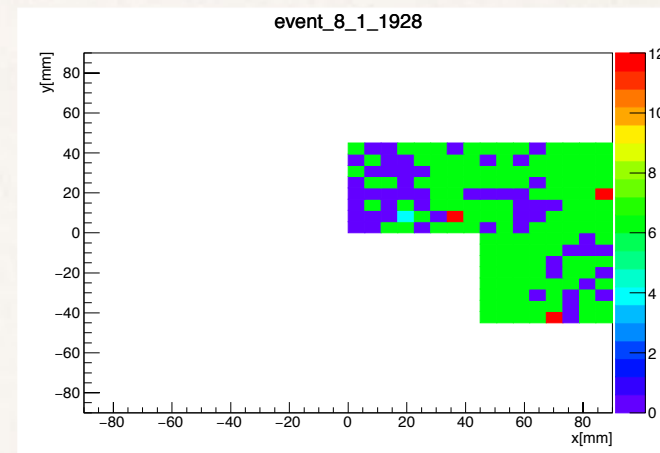
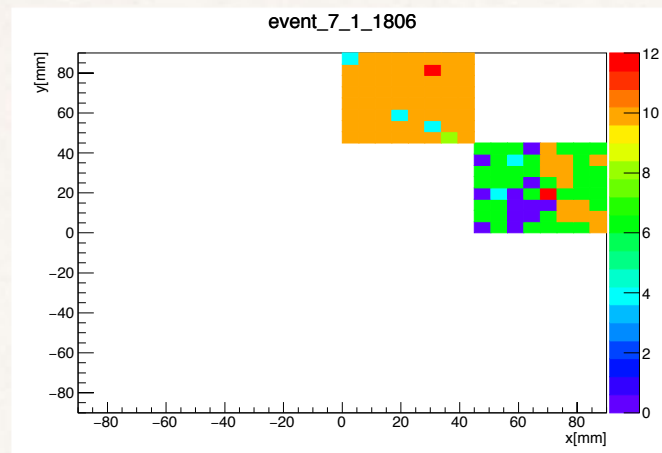
MAP of each event (2) SCA = 0

Two peaks on ADC for each event

- ❖ Colors
 - Red : hit point
 - Orange : Double pedestal & Right ADC
 - Green : Double pedestal & Left ADC
 - Cyan : One pedestal & Right ADC
 - Blue : One pedestal & Left ADC
 - White : Don't get data

- ❖ Event
5 - 9

- ❖ SCA
0

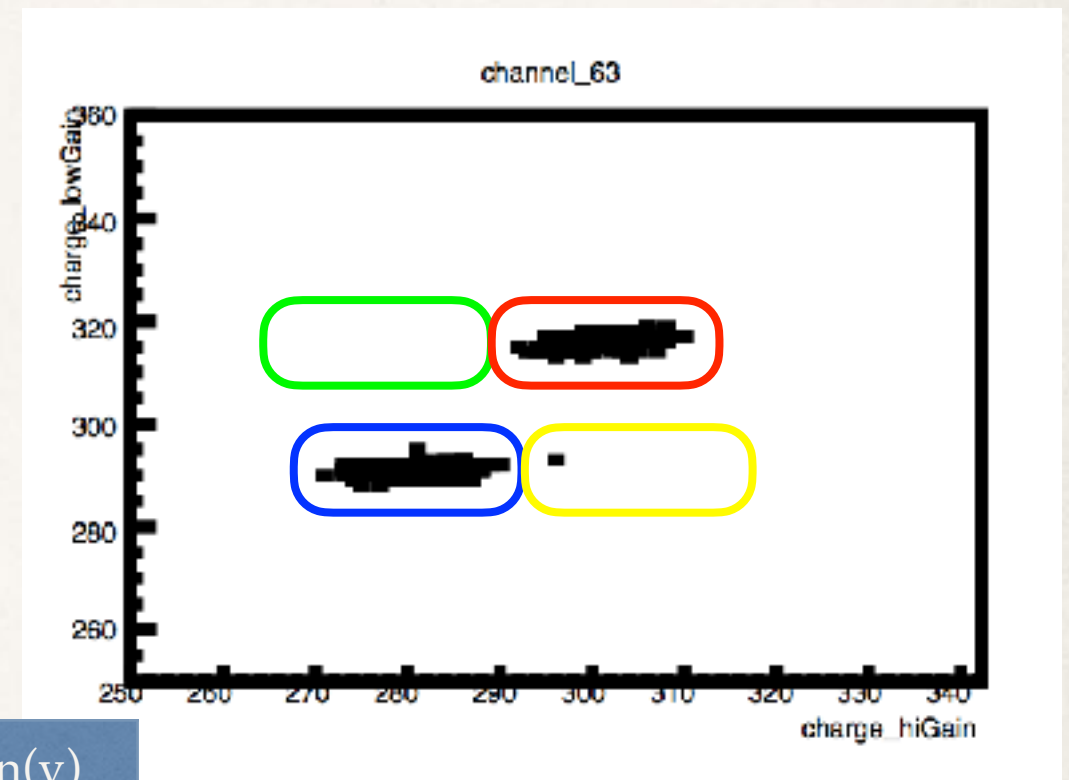


- ❖ I defined four areas with number of pedestal .
- ❖ MAP of four areas for each event was made.
- ❖ In particular, There is nearly not correlation.
- ❖ Next, statistically search for correlation.

Buck up

One Channel(ex:Chip 15-Channel 63)

- ❖ The figure on this right is a correlation diagram between High Gain and Low Gain.
- ❖ Vertical axis is Charge High Gain ADC.
Horizontal axis is Charge Low Gain ADC.

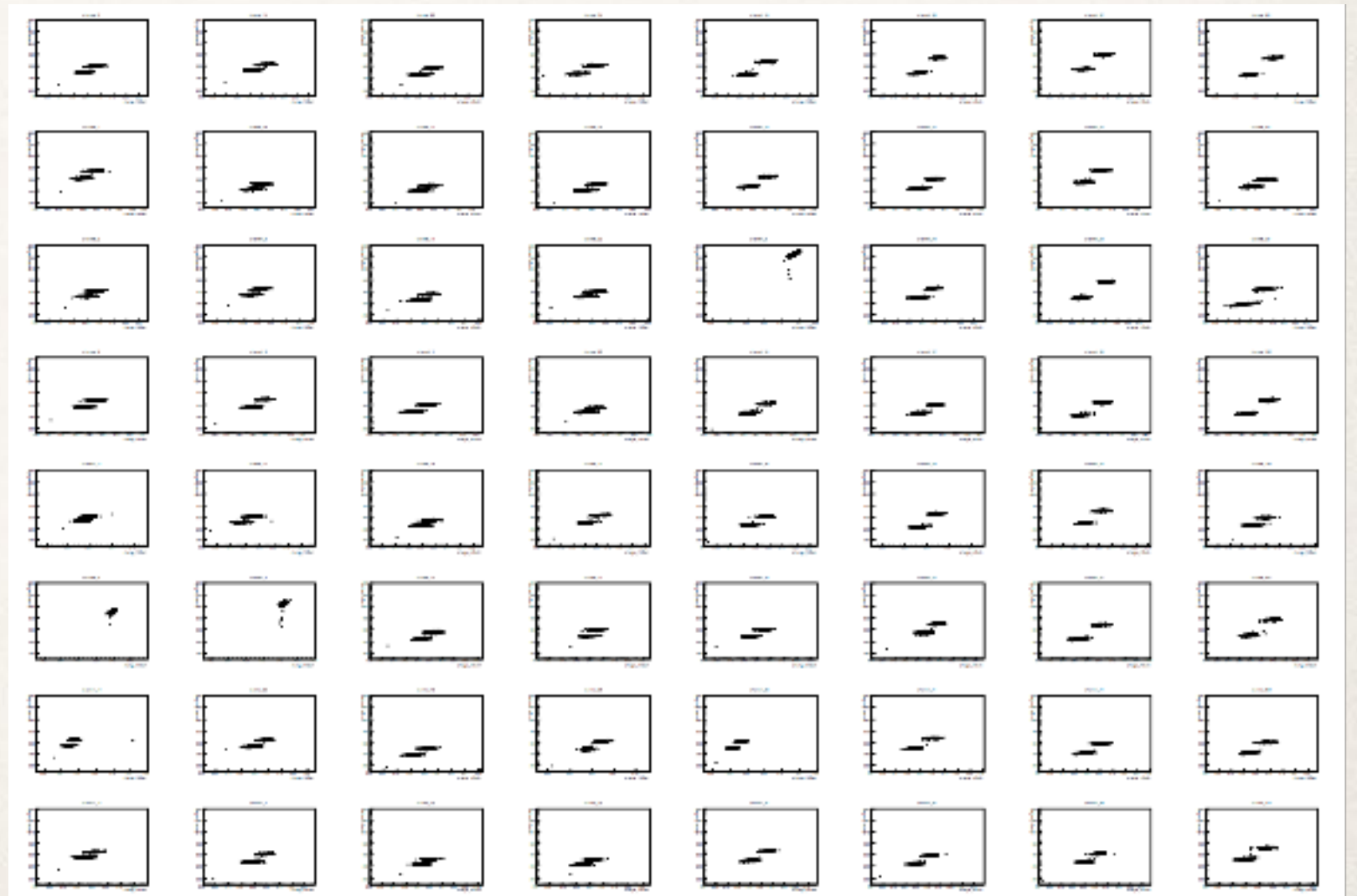


Colors	Charge High Gain(x)	Charge Low Gain(y)
Red	High ADC	High ADC
Green	Low ADC	High ADC
Yellow	High ADC	Low ADC
Blue	Low ADC	Low ADC

- ❖ What can be read from this figure is that Charge High Gain and Charge Low Gain are synchronize.

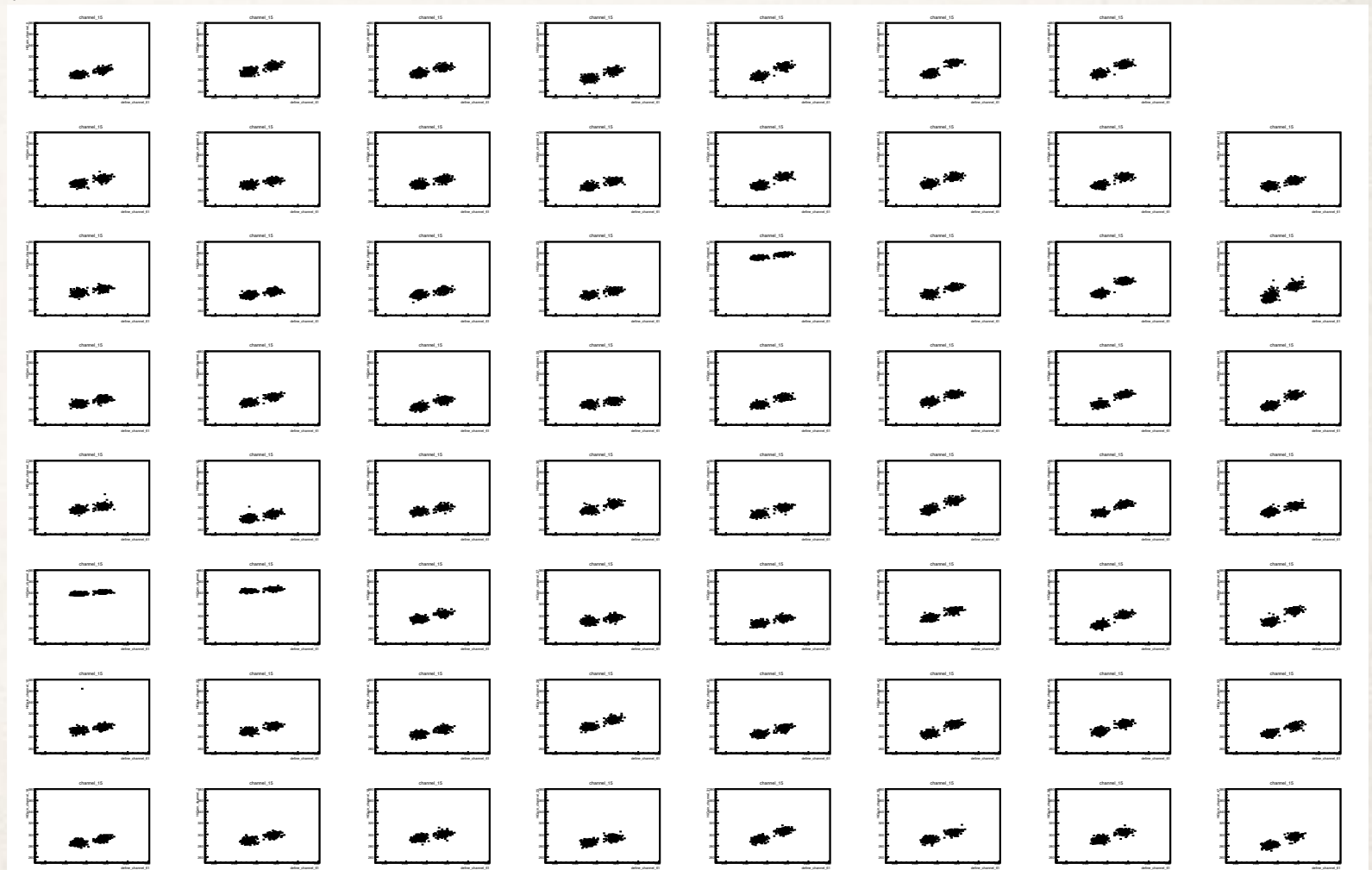
All Channel in 15 Chip

- ❖ The figure below is correlation diagrams of all channel.
It is correlation between Charge High Gain and Charge Low Gain at the same Chip-Channel.
- ❖ Each correlation diagram corresponds to the position of the channel
- ❖ The vertical axis is Charge High Gain.
The horizontal axis is Charge Low Gain .
- ❖ Charge High Gain and Charge Low Gain are synchronized is dominant.



Correlation between channels in the same Chip

- ❖ The figure below is correlation diagrams.
It is a correlation between Charge High Gain of Chip 15-Channel 61 and Charge High Gain of Chip 15-other Channels.
- ❖ Each correlation diagram corresponds to the position of the channel
- ❖ The vertical axis is Charge High Gain ADC of Chip 15 Channel 61 .
The horizontal axis is Charge High Gain ADC of Chip 15 other Channels.
- ❖ There is correlation between the same Chips.



Correlation between difference Chips

- ❖ The figure below is correlation diagrams.
It is a correlation between Charge High Gain of Chip 15-Channel 61 and Charge High Gain of Chip 14-all Channel.

- ❖ Each correlation diagram corresponds to the position of the channel
- ❖ The vertical axis is Charge High Gain of Chip 15 Channel 61 .
The horizontal axis is Charge High Gain of Chip 14 all Channel .
- ❖ There is no correlation between difference Chips.

