SiWECAL
Test Beam @DESY 2017

Re-triggering analysis

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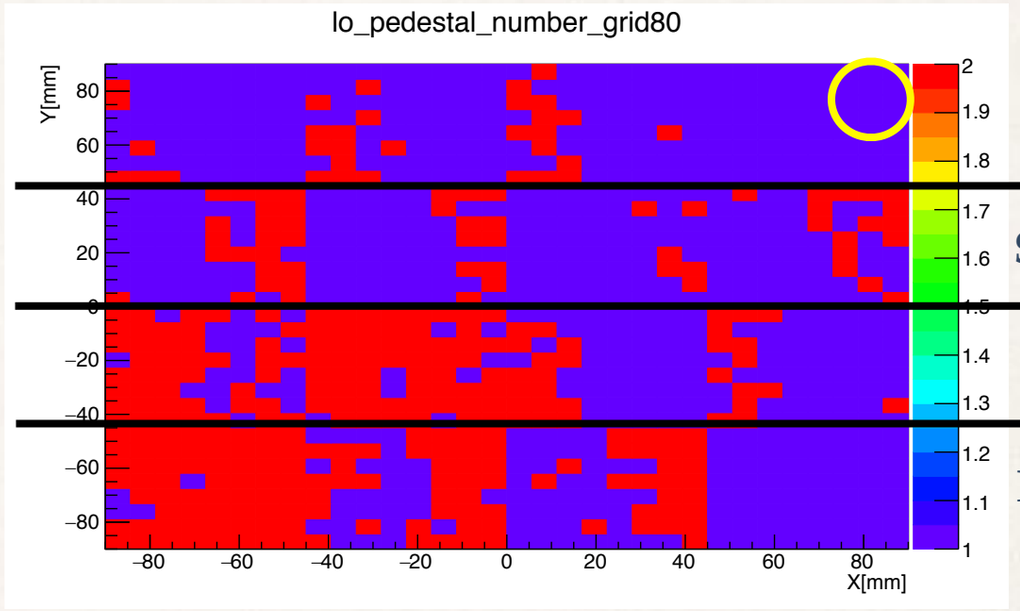
19/ JUL /2017

Last Review

Double pedestal

- Double pedestal was seen at Red region.
- Beam was shoot at Yellow point.
- <u>But I had mistakes.
—>This MAP was not made of Charge Low Gain.This MAP was made of Charge High Gain.
—>Double pedestal was not searched correctly at some point.</u>
- Define four chips as First row, second row, third row and fourth row from the top.
- <u>On the Left side of First and Third row, Double pedestal was appeared in the wide area.</u>
- <u>On the Right side of Second and Fourth row, Double pedestal was appeared in the wide area.</u>



Red : Double pedestal was seen

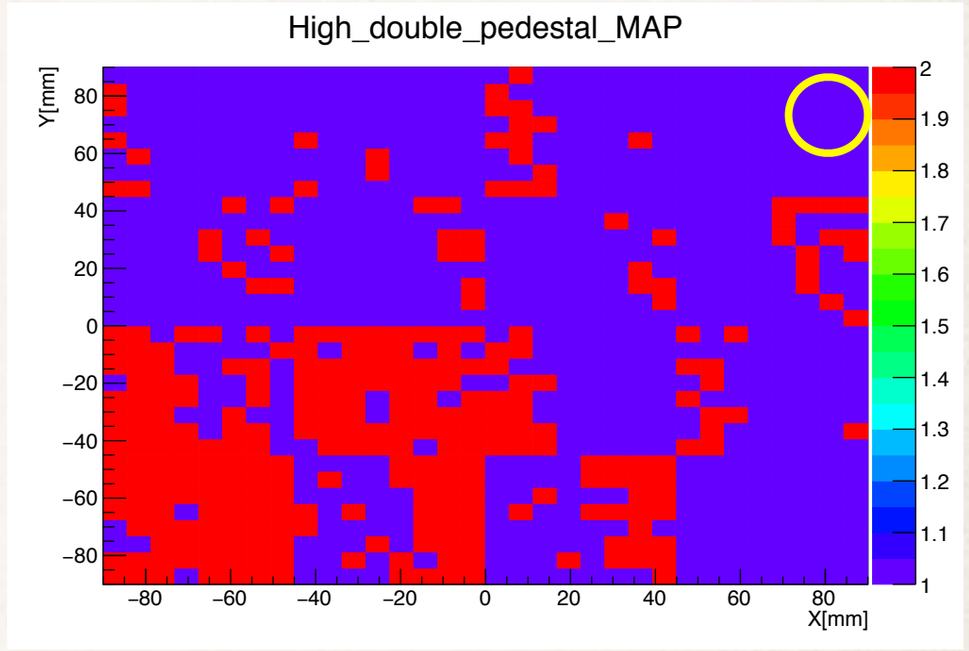
Blue : Double pedestal was not seen

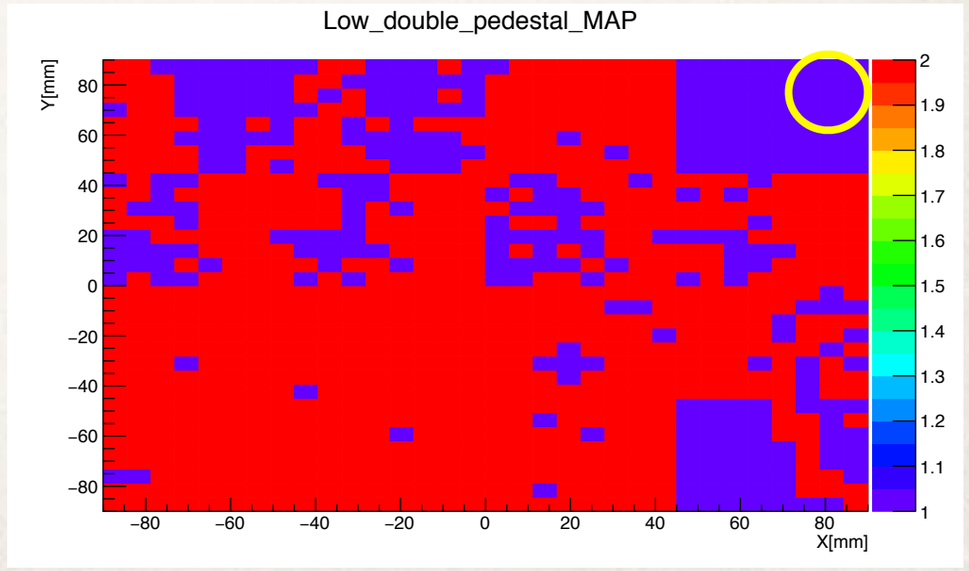
- Data
  run number : 20170616_175712
  MIP scan : 1800 seconds
  Beam shout point : grid 80
  Beam energy : 3 GeV
  DIF : 1_1_4
  SCA : 0
  Charge : ~~Low Gain~~ —> High Gain
  Tungsten (W) : none

Two types of Double pedestal MAP

Double pedestal MAP

- The figure above is double pedestal MAP which was made of Charge High Gain.
- The figure below is Double pedestal MAP which was made of Charge Low Gain.
- Double pedestal was appeared at Red region, not appeared at Blue region.
- Beam was shoot at Yellow point.
- <u>Double pedestal was appeared more often in Low Gain than High Gain.</u>
- Post MAPs that was shoot beam at difference point.





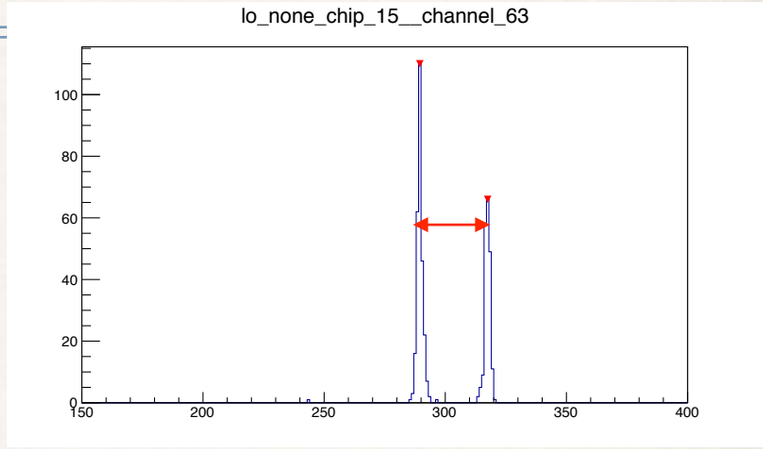
Left and Right peak Difference

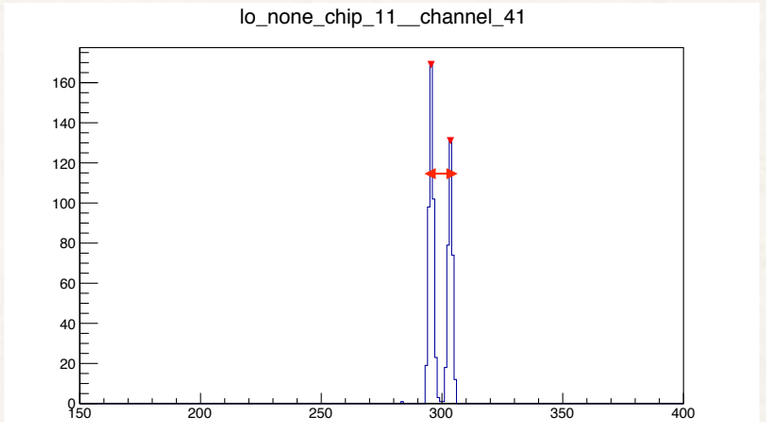
- Right figures are pedestal at three channel. Vertical axis is ADC and Horizontal axis is Count.

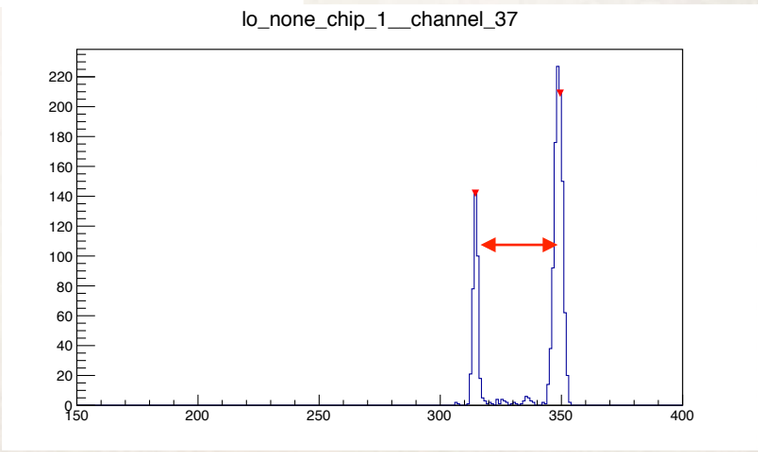
- Difference of two peaks have various distance at each channel. This distance is Red range at right figure.

- The range is defined by following formula.
  Right peak ADC - Left peak ADC = DPP
  *DPP : **D**ifference between left **P**eak and right **P**eak*

Example

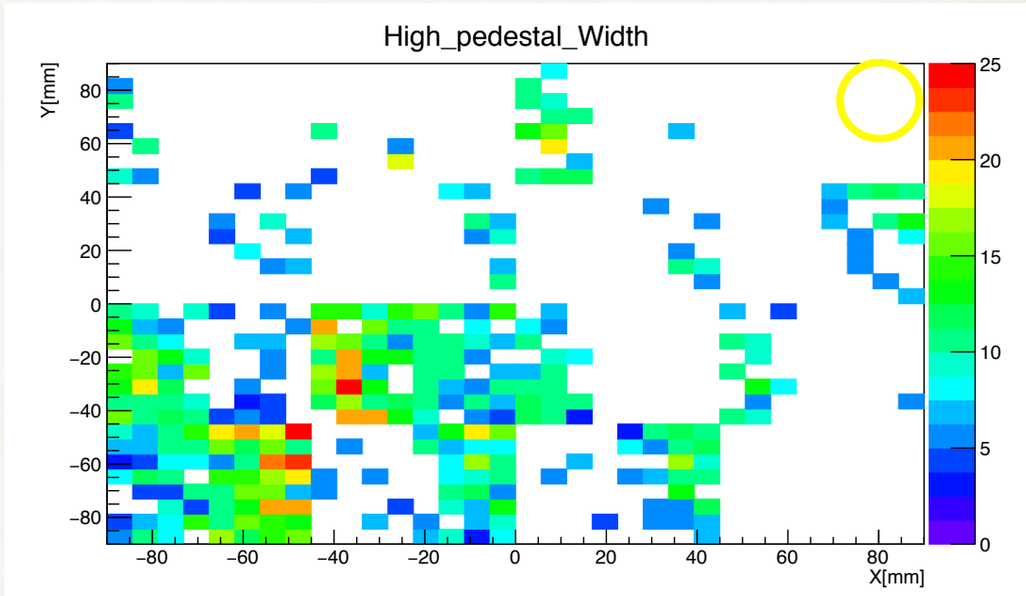


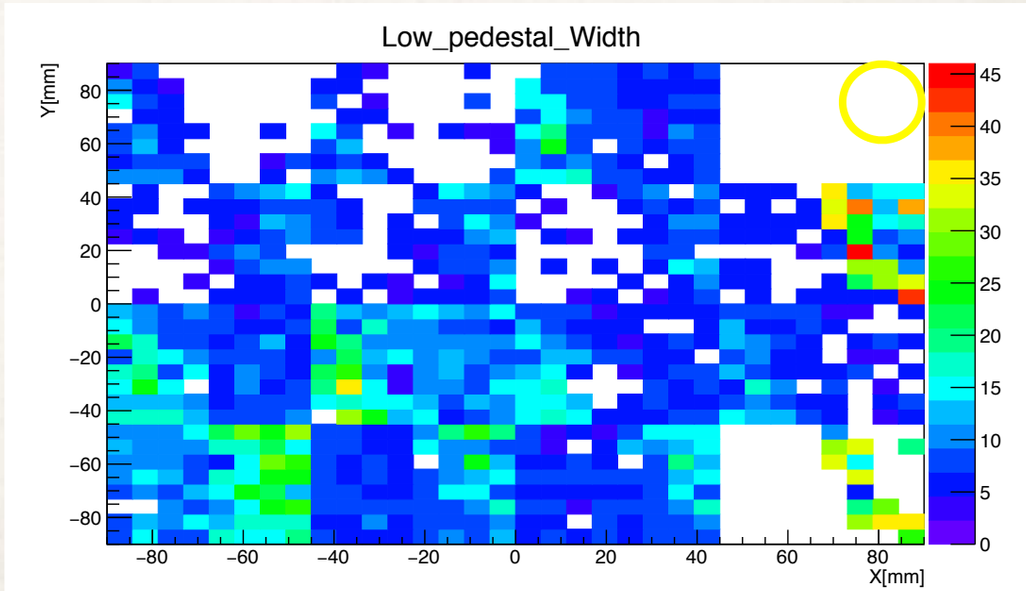




Pedestal Width MAP

- The figure above is double pedestal MAP which was made of Charge High Gain.
- The figure below is Double pedestal MAP which was made of Charge Low Gain.
- Double pedestal was not appeared at white region.
- <u>When Double pedestal which was made of Charge High Gain was appeared, DPP of Charge Low Gain is more large.</u>





Two peaks on ADC for each event

Define two peaks ADC

- First, histogram was made by all event which was not included hit ADC in SCA=0.

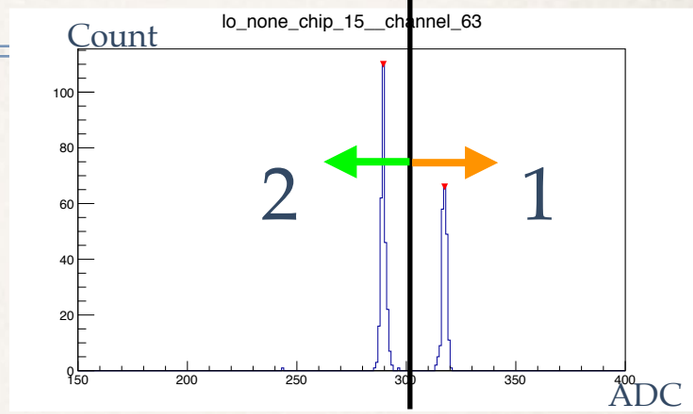
- Second, average was calculated with each Chip-Channel by following formula.
  ADC Average =(Right peak ADC+Left peak ADC)/2

- Third, Define five range
  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 : none data

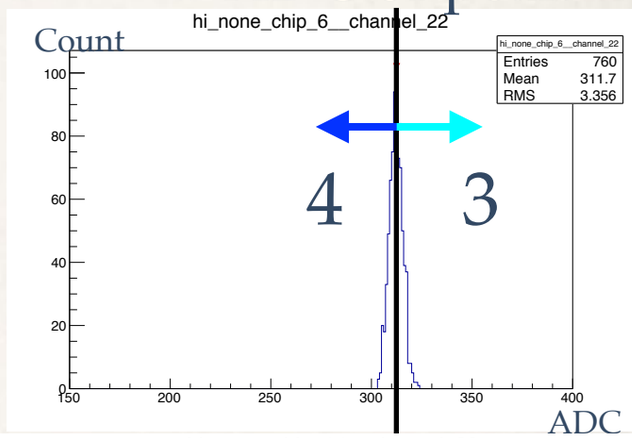
- Fourth, make a MAP for each event

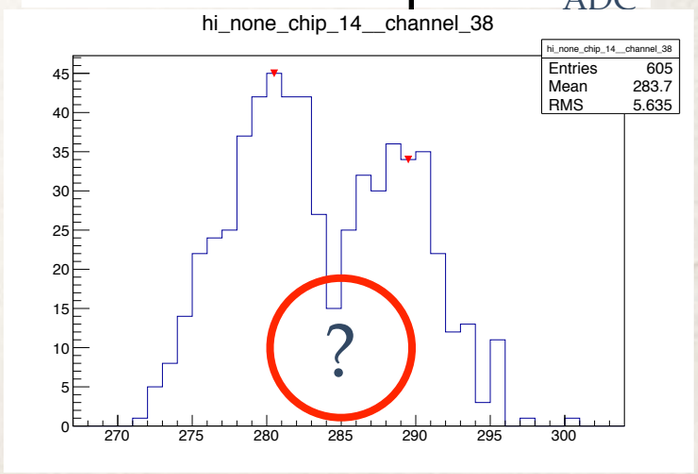
- But, Double pedestal which was made of Charge High Gain was not separated less than made of Charge Low Gain.
  So, MAP that was made of Charge High Gain for each event might be more incorrect than made of Charge Low Gain.

Average of two peaks



ADC of peak





Two peaks on ADC for each event

- In this page, MAP of event number 0-15 is put on.
- The above figure is maps of each event. Made of Charge High Gain.
- The below figure is maps of each event. Made of Charge Low Gain.
- Five colors were defined by their respective condition in the MAP.

< Colors >

Red : hit point

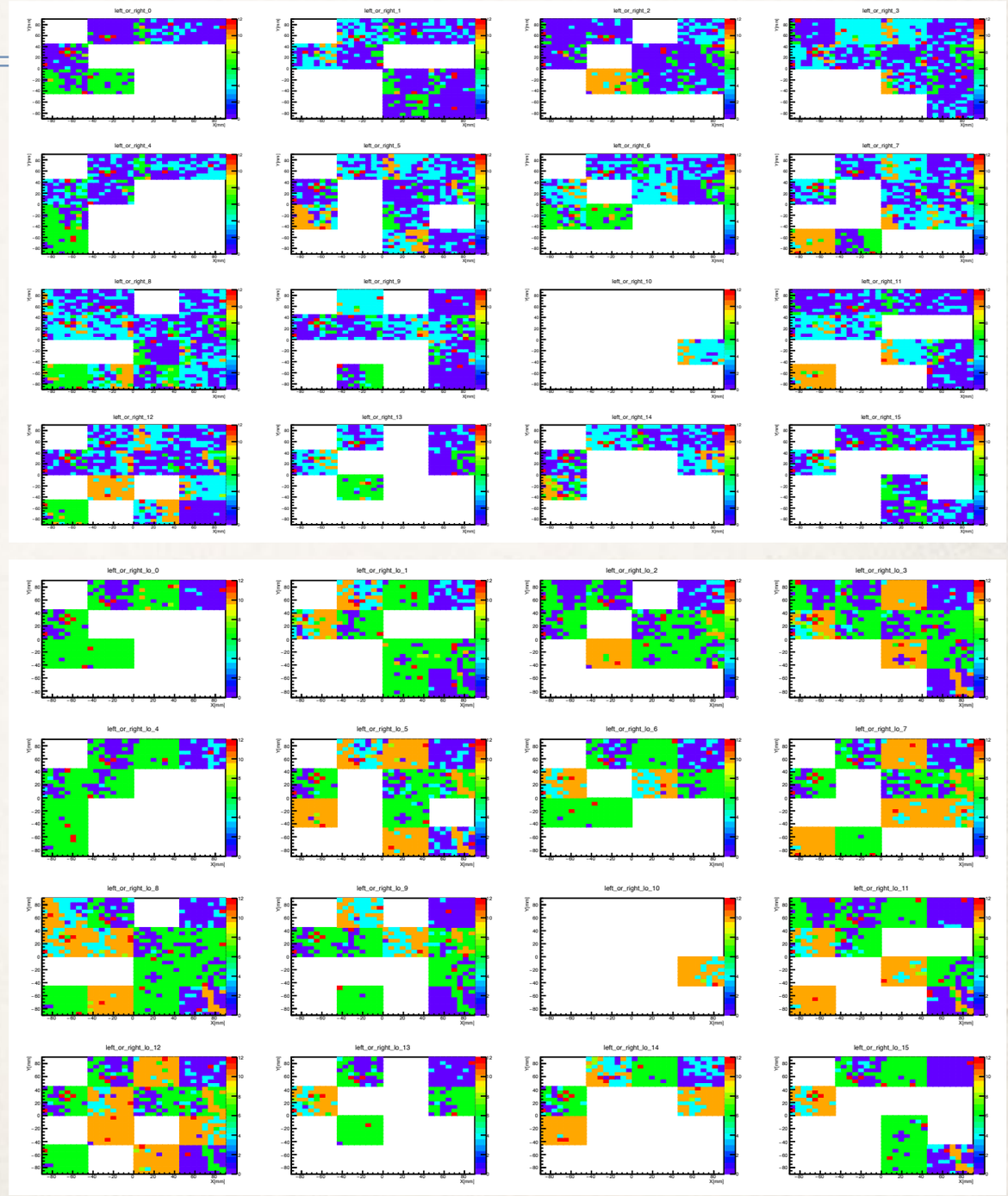
Orange : Double pedestal & Right ADC

Green : Double pedestal & Left ADC

Sian : One pedestal & Right ADC

Blue : One pedestal & Left ADC

White : Don't get data

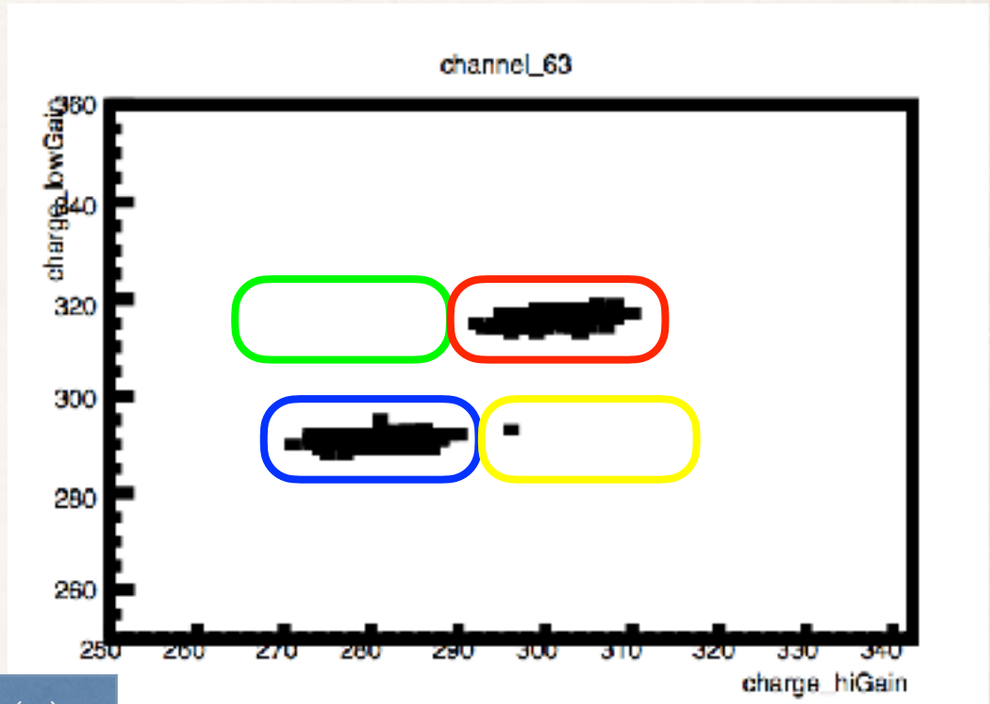


Correlation between High Gain and Low Gain

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.

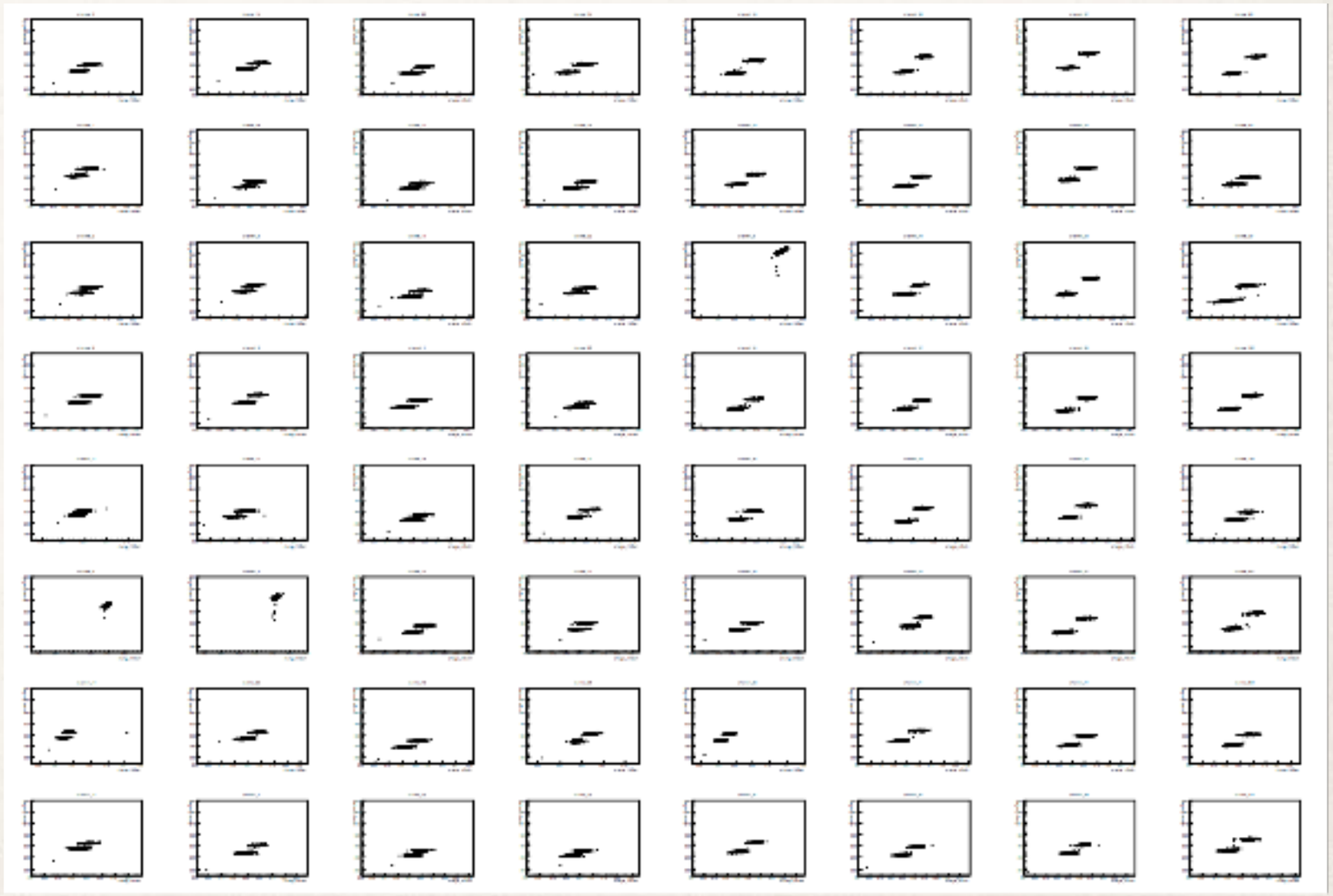


Colors	Charge High Gain(x)	Charge Low Gain(y)
Red	High ADC	High ADC
Green	Low ADC	High ADC
Yellow	High ADC	Low ADC
Blue	Low ADC	Low ADC

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

All Channel in 15 Chip

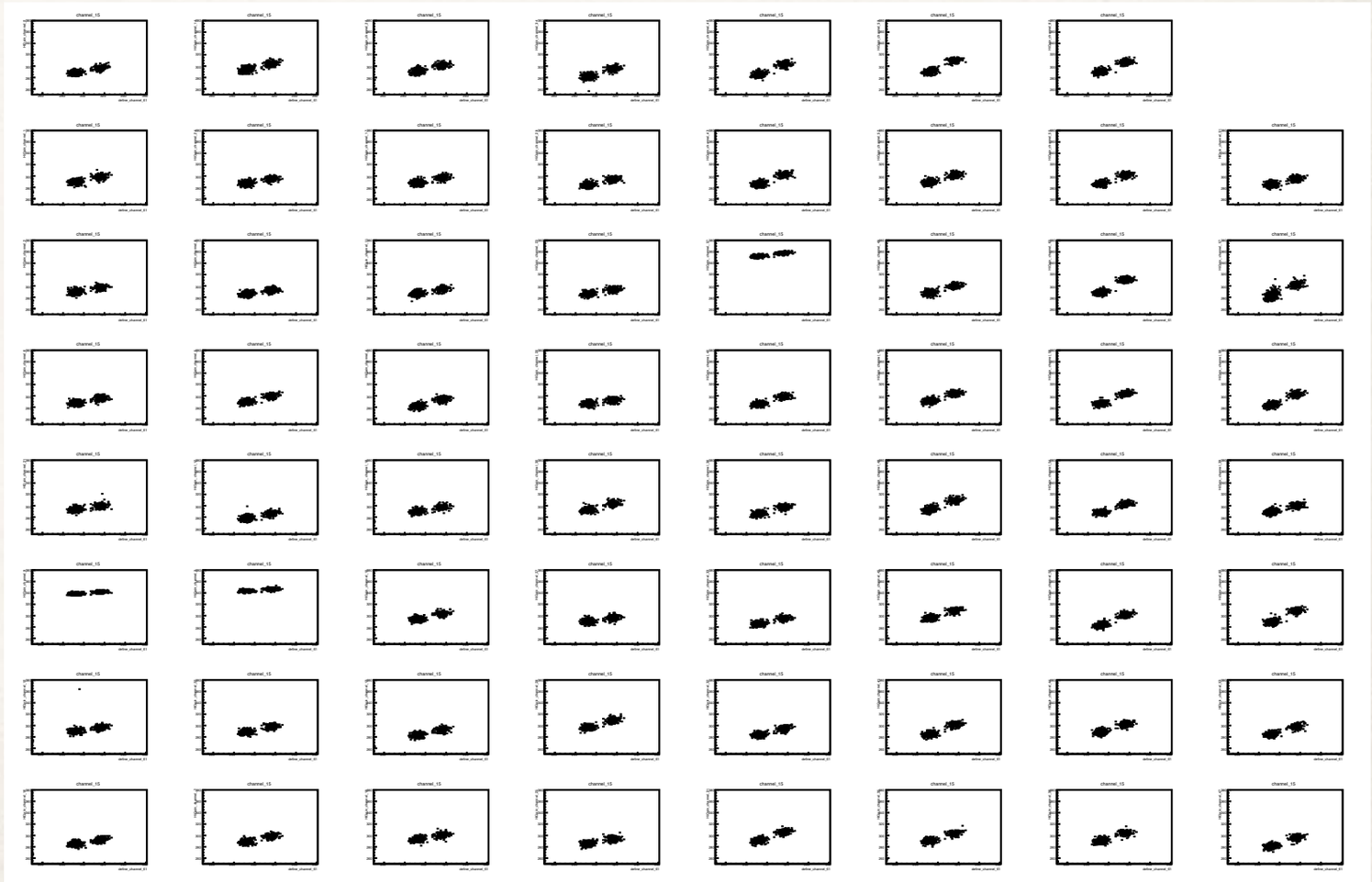
- The figure below is correlation diagrams of all channel.
  It is correlation between Charge High Gain and Charge Low Gain at the same Chip-Channel.
- Each correlation diagram corresponds to the position of the channel
- The vertical axis is Charge High Gain.
  The horizontal axis is Charge Low Gain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



Correlation between two Chips

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.

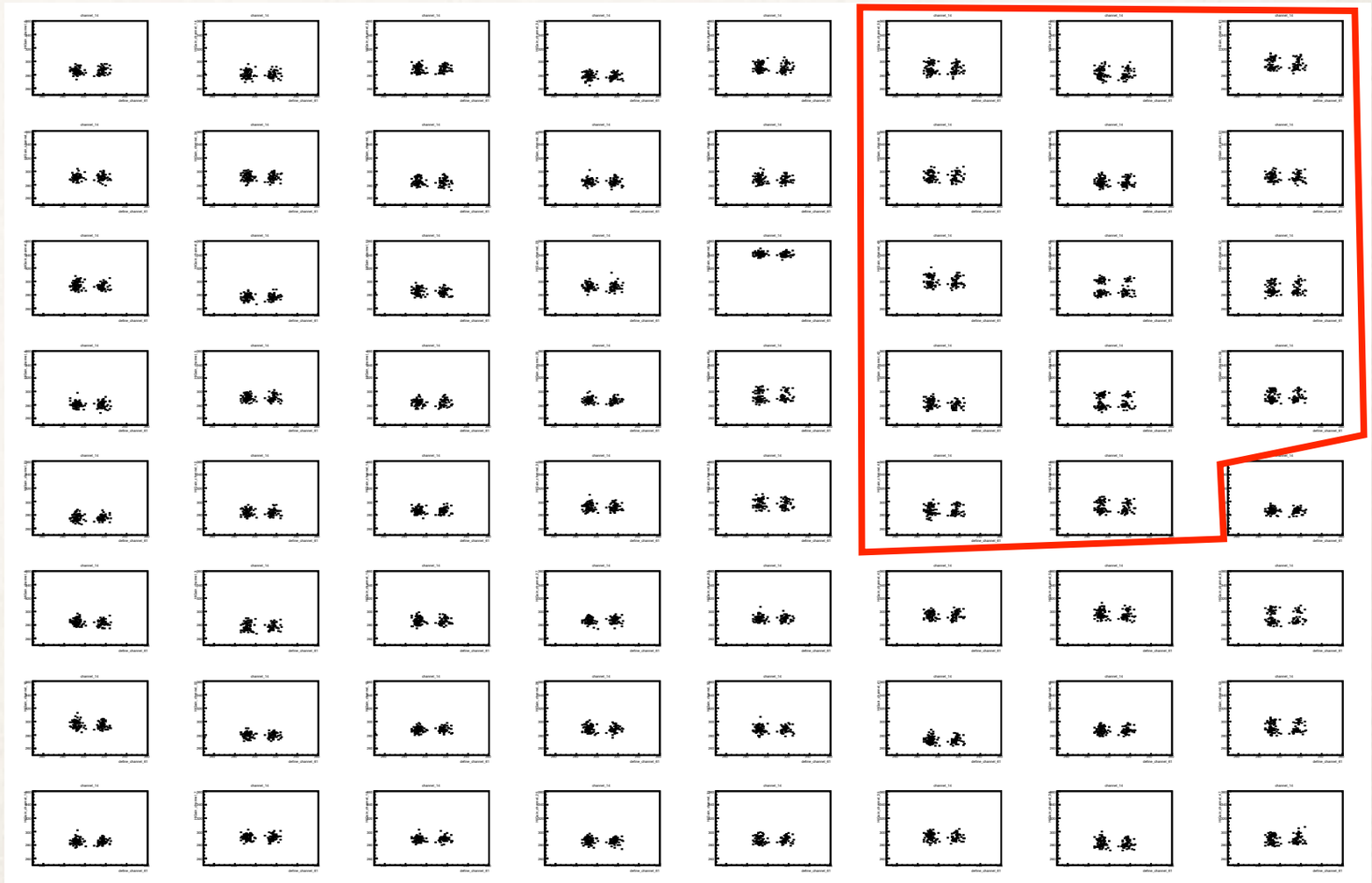


- Each correlation diagram corresponds to the position of the channel
- The vertical axis is Charge High Gain ADC of Chip 15 Channel 61 .
  The horizontal axis is Charge High Gain ADC of Chip 15 other Channels.
- <u>There is correlation between the same Chips.</u>

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 .
- <u>There is no correlation between difference Chips.</u>

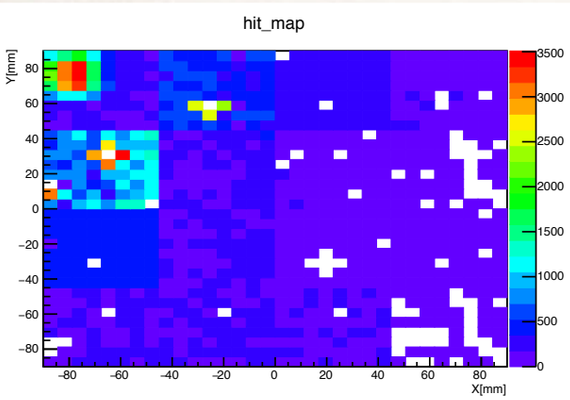


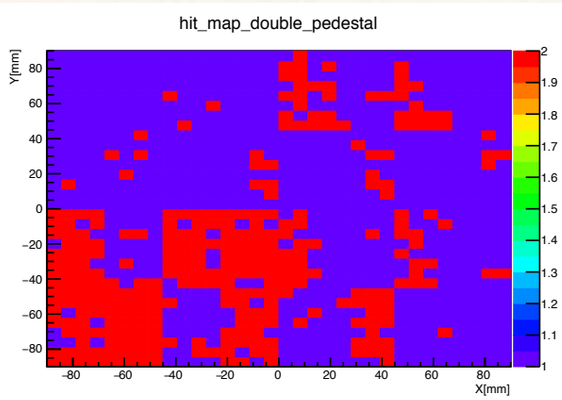
Summary

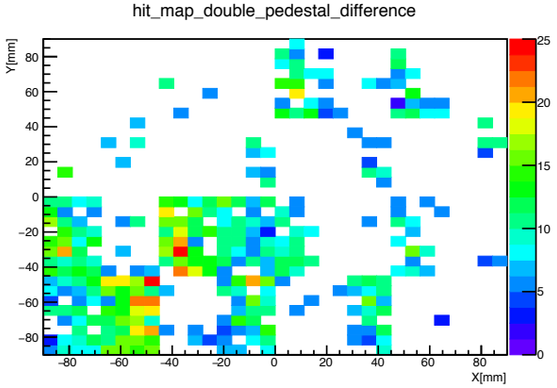
- Double pedestal was appeared more often in Low Gain than High Gain.
- When Double pedestal which was made of Charge High Gain was appeared, DPP of Charge Low Gain is more large.
- Charge High Gain and Charge Low Gain are synchronized is dominant at the same Chip
- There is correlation between the same Chips, but There is no correlation between difference Chips.

Back up

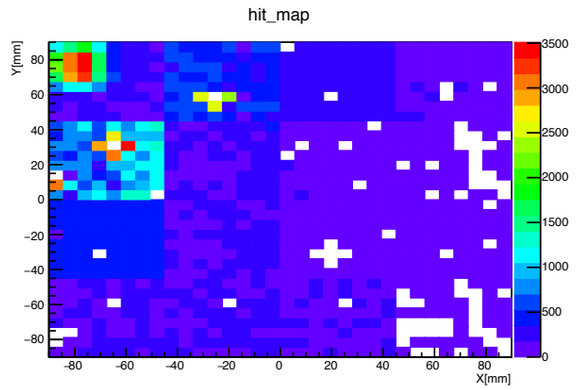
run_1500s_grid72_dif_1_1_4

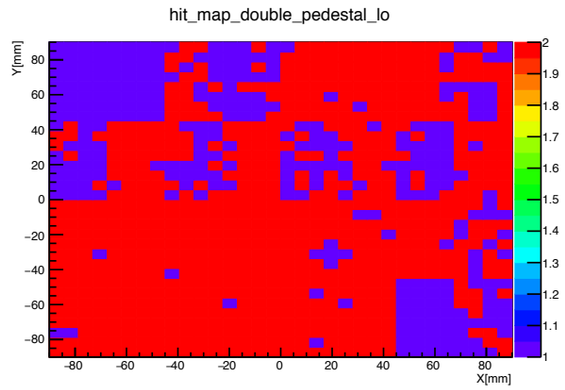


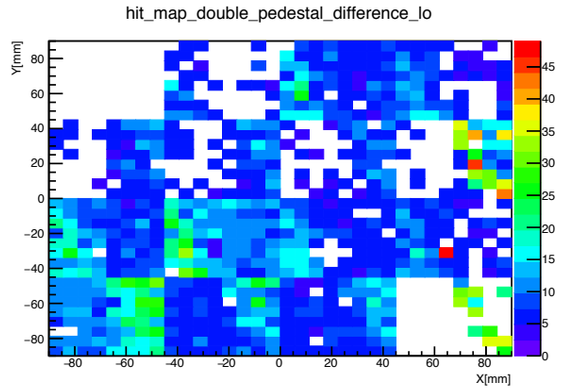




High Gain



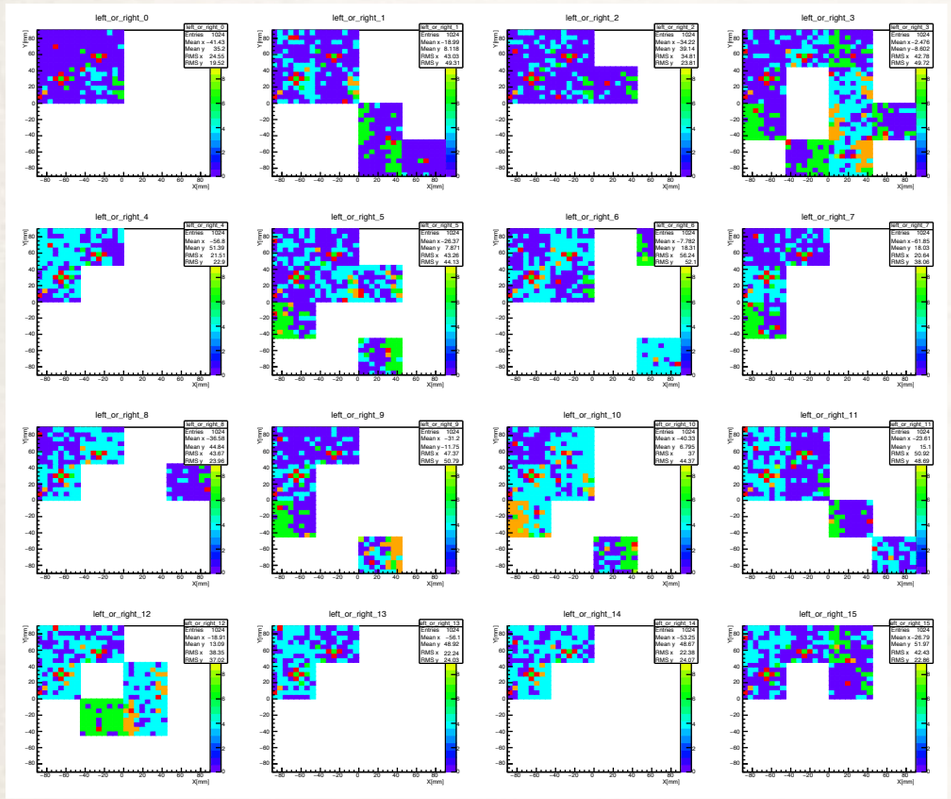




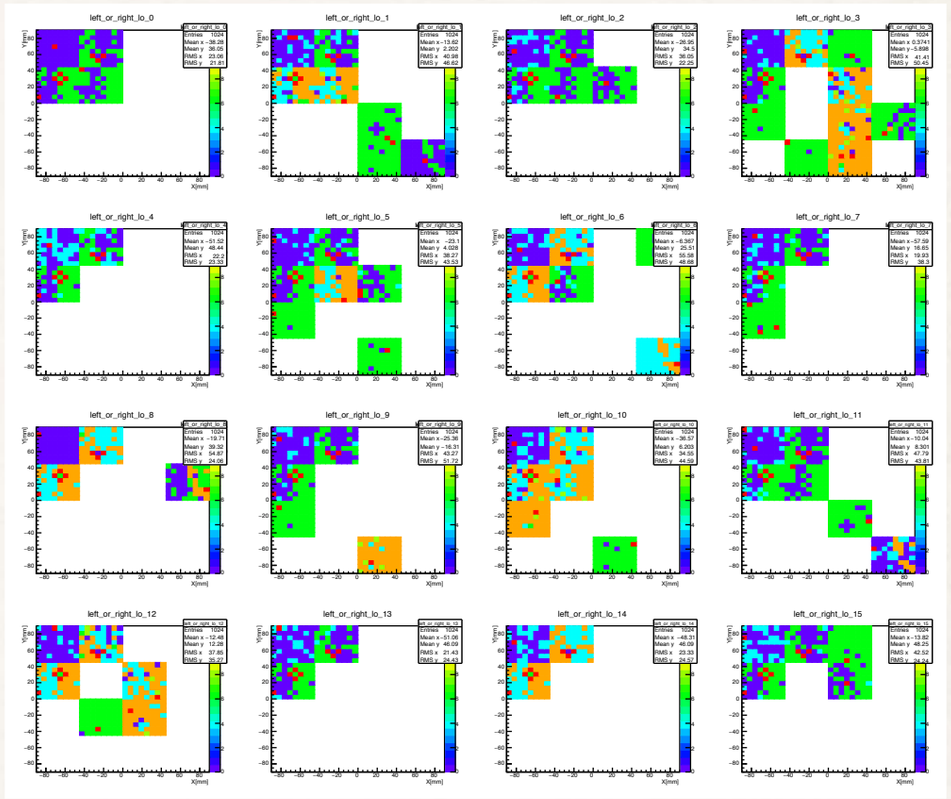
Low Gain

run_1500s_grid72_dif_1_1_4

High Gain



Low Gain



< Colors >

Red : hit point

Orange : Double pedestal & Right ADC

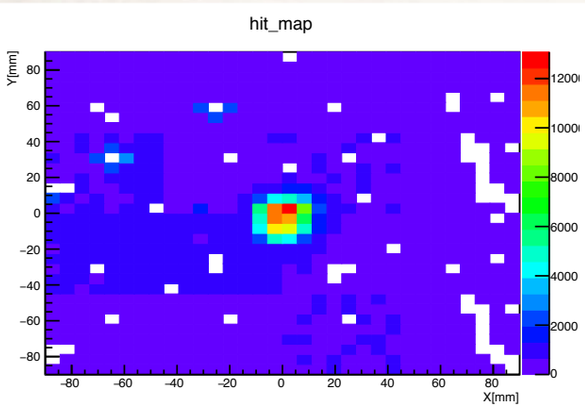
Green : Double pedestal & Left ADC

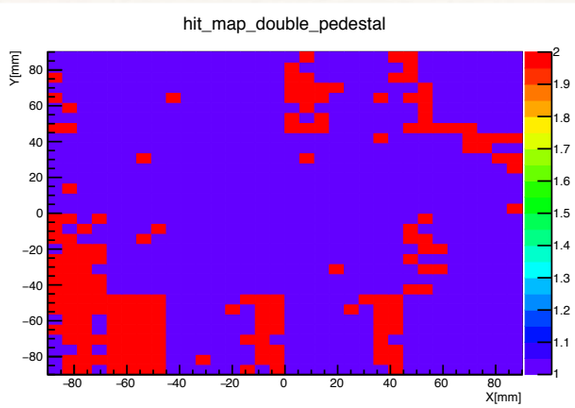
Sian : One pedestal & Right ADC

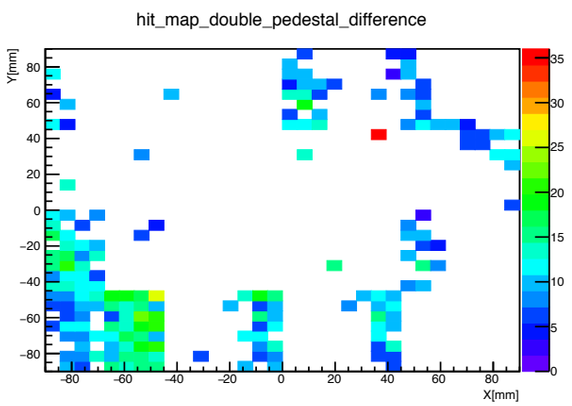
Blue : One pedestal & Left ADC

White : Don’t get data

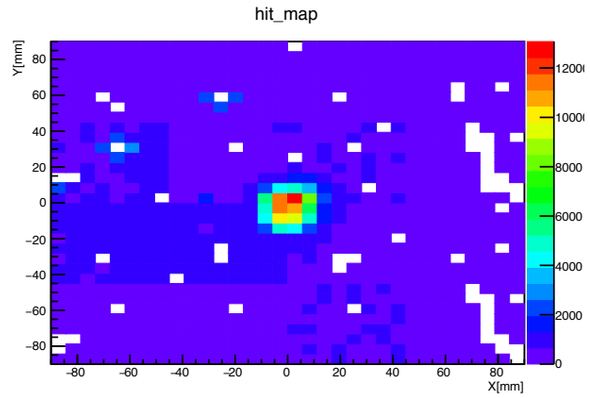
run_1800s_grid40_dif_1_1_4

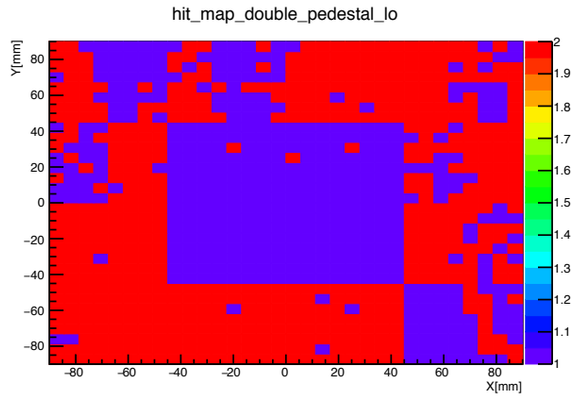


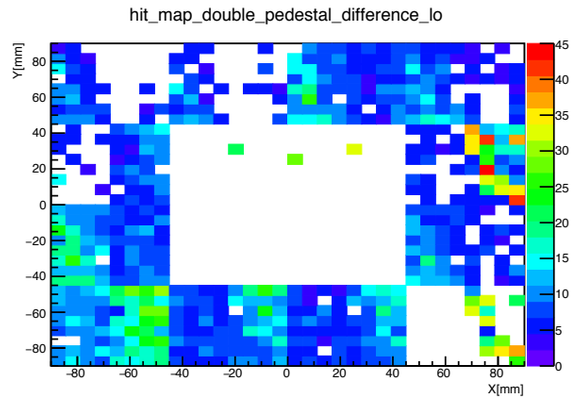




High Gain



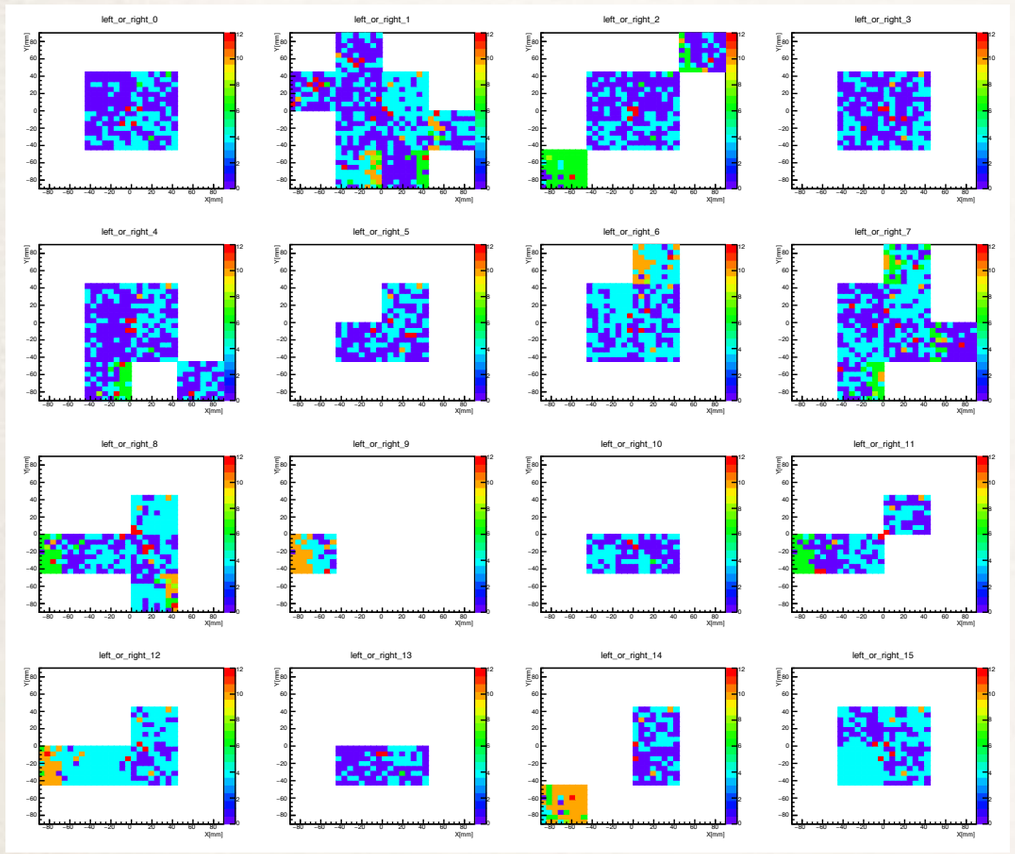




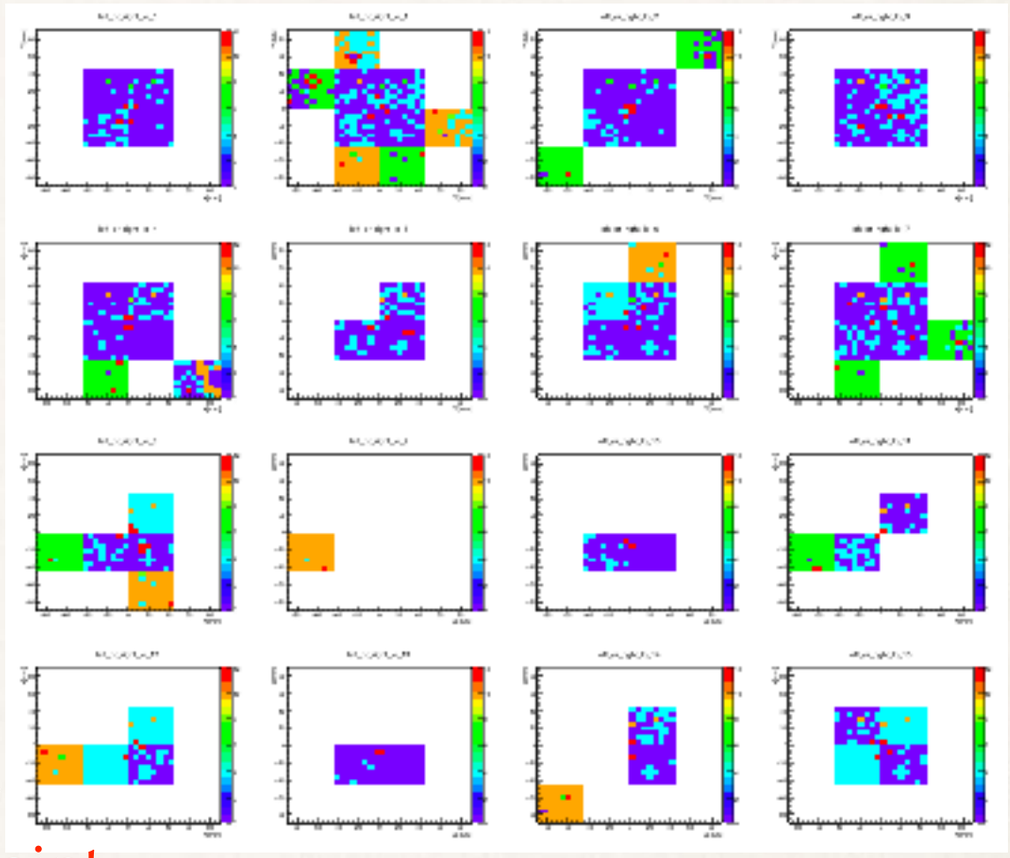
Low Gain

run_1800s_grid40_dif_1_1_4

High Gain



Low Gain



< Colors >

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Orange : Double pedestal & Right ADC

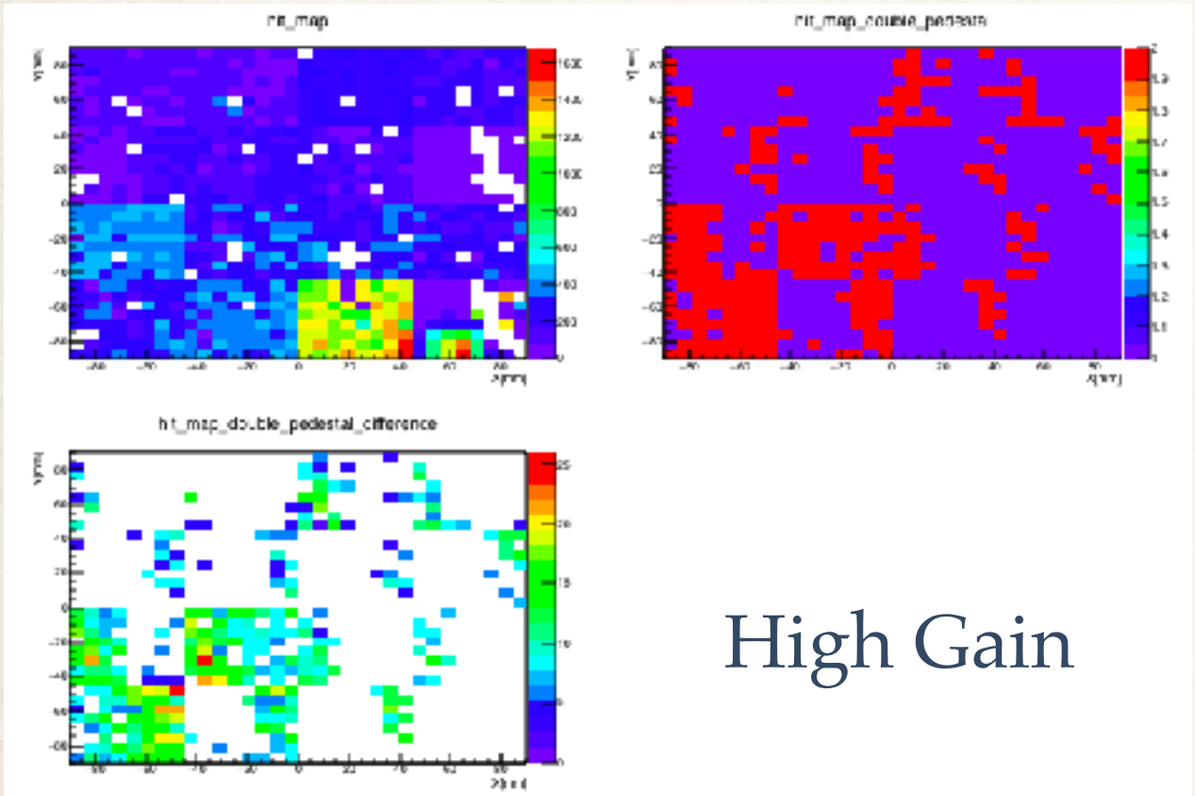
Green : Double pedestal & Left ADC

Sian : One pedestal & Right ADC

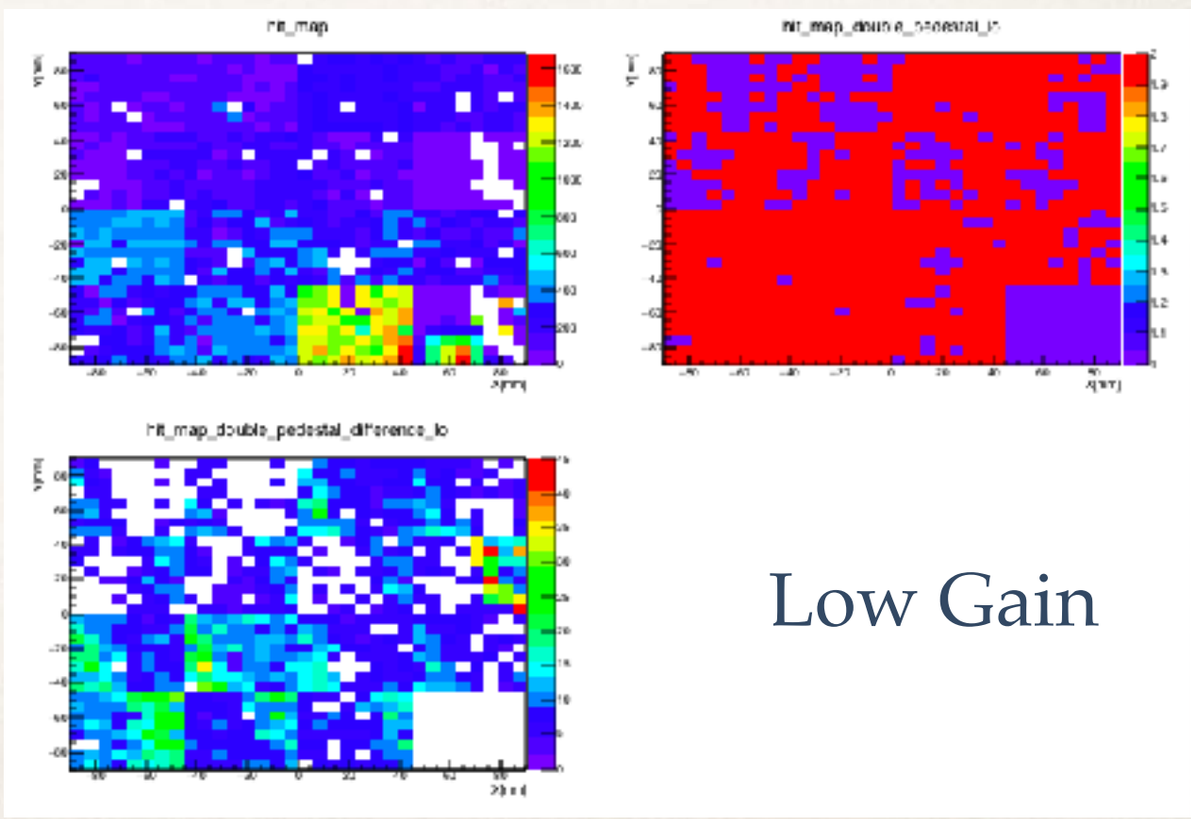
Blue : One pedestal & Left ADC

White : Don’t get data

run_1800s_grid8_dif_1_1_4



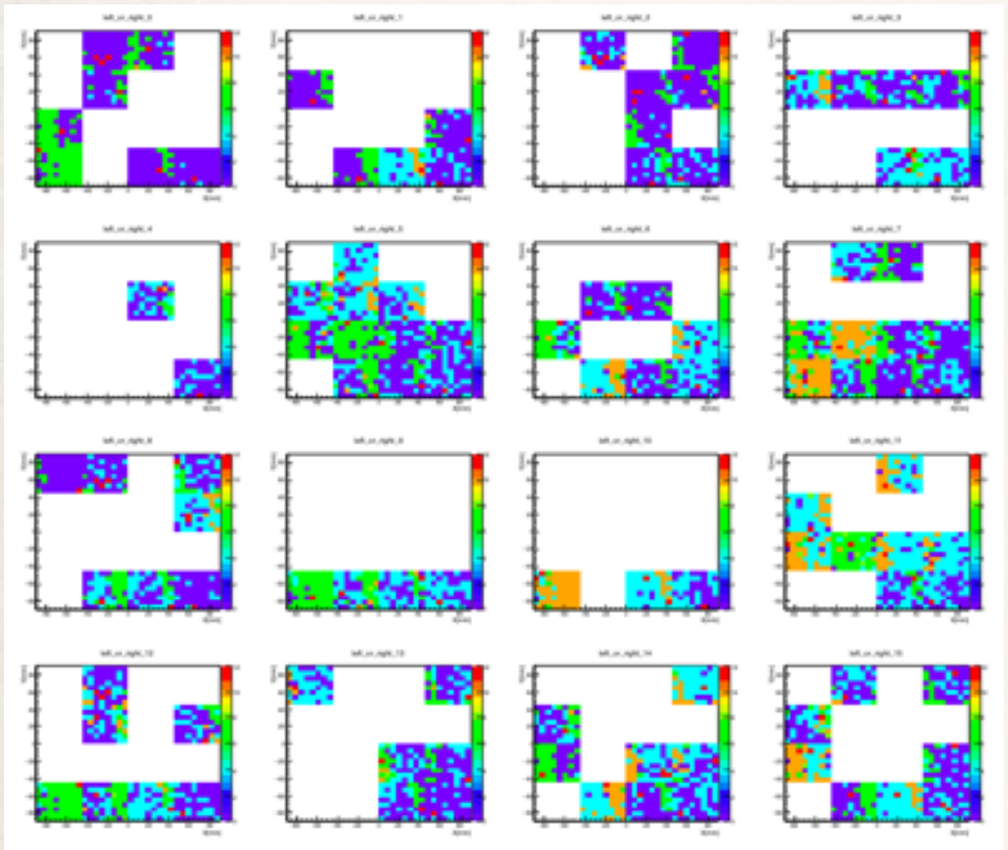
High Gain



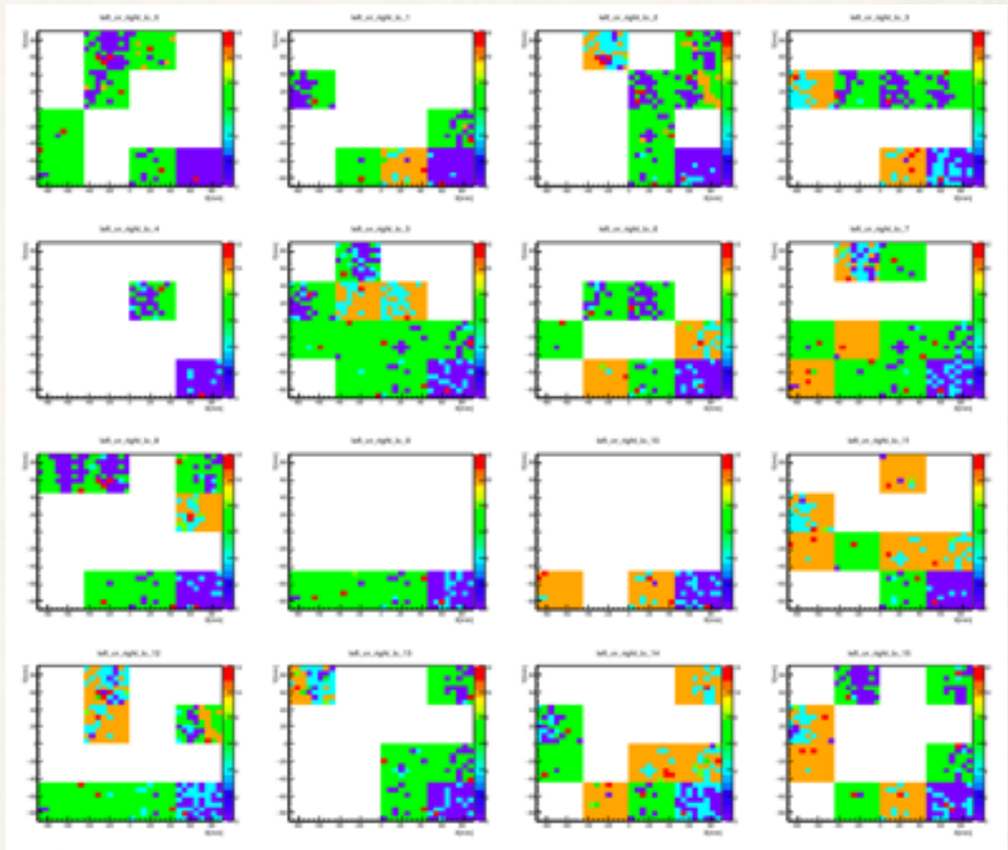
Low Gain

run_1800s_grid8_dif_1_1_4

High Gain



Low Gain



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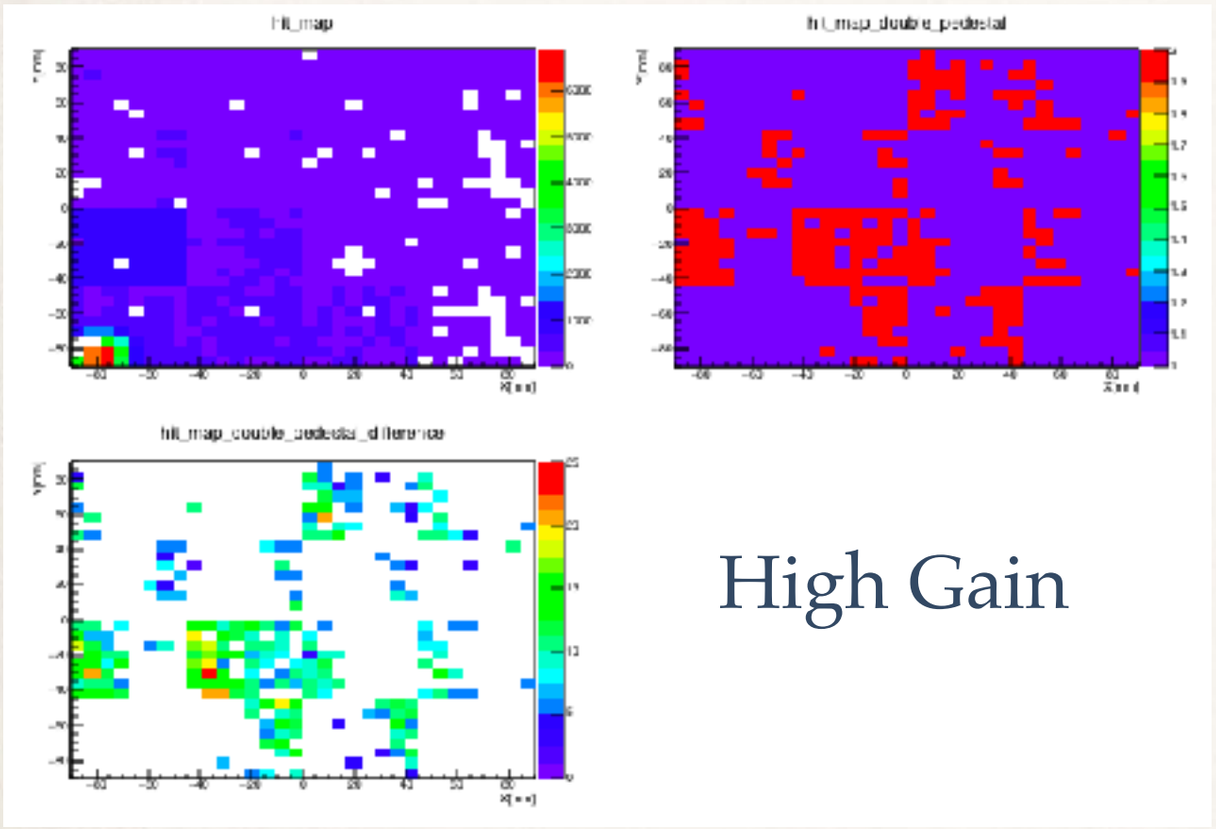
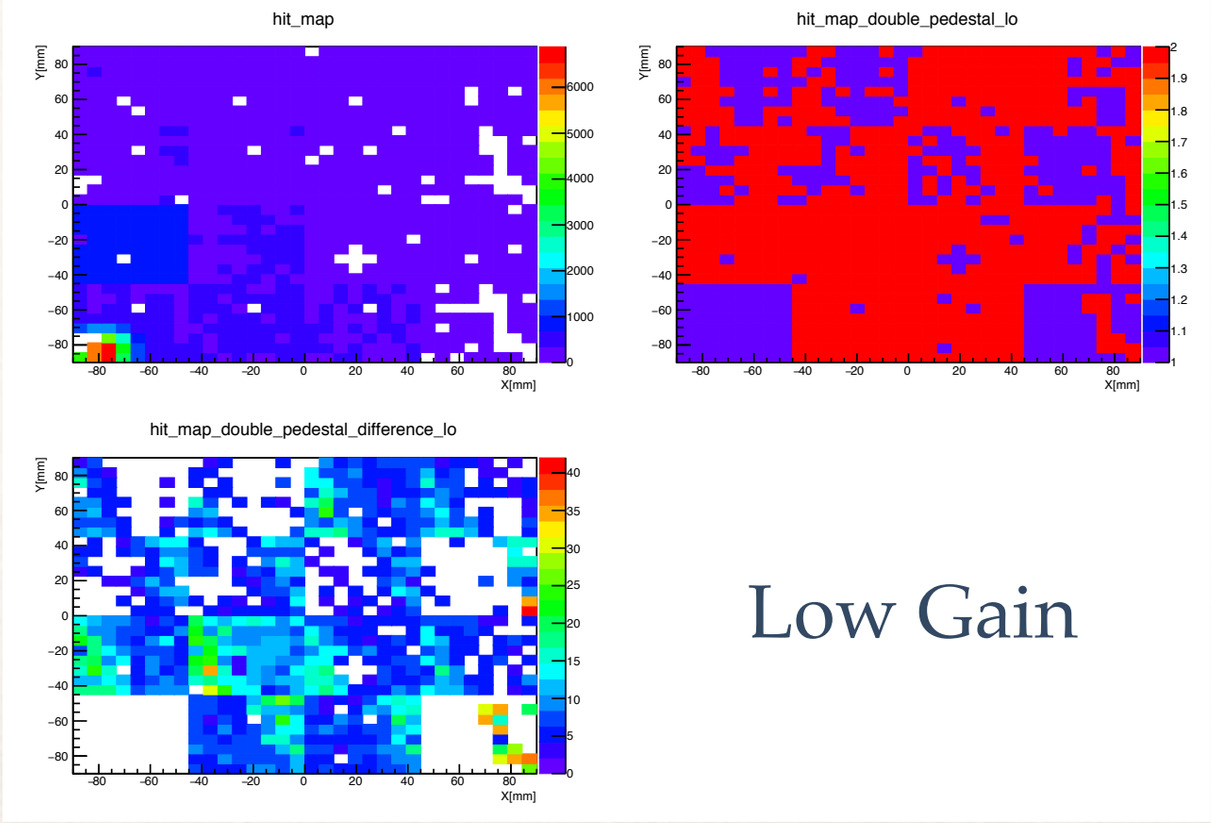
run_1800s_grid0_dif_1_1_4



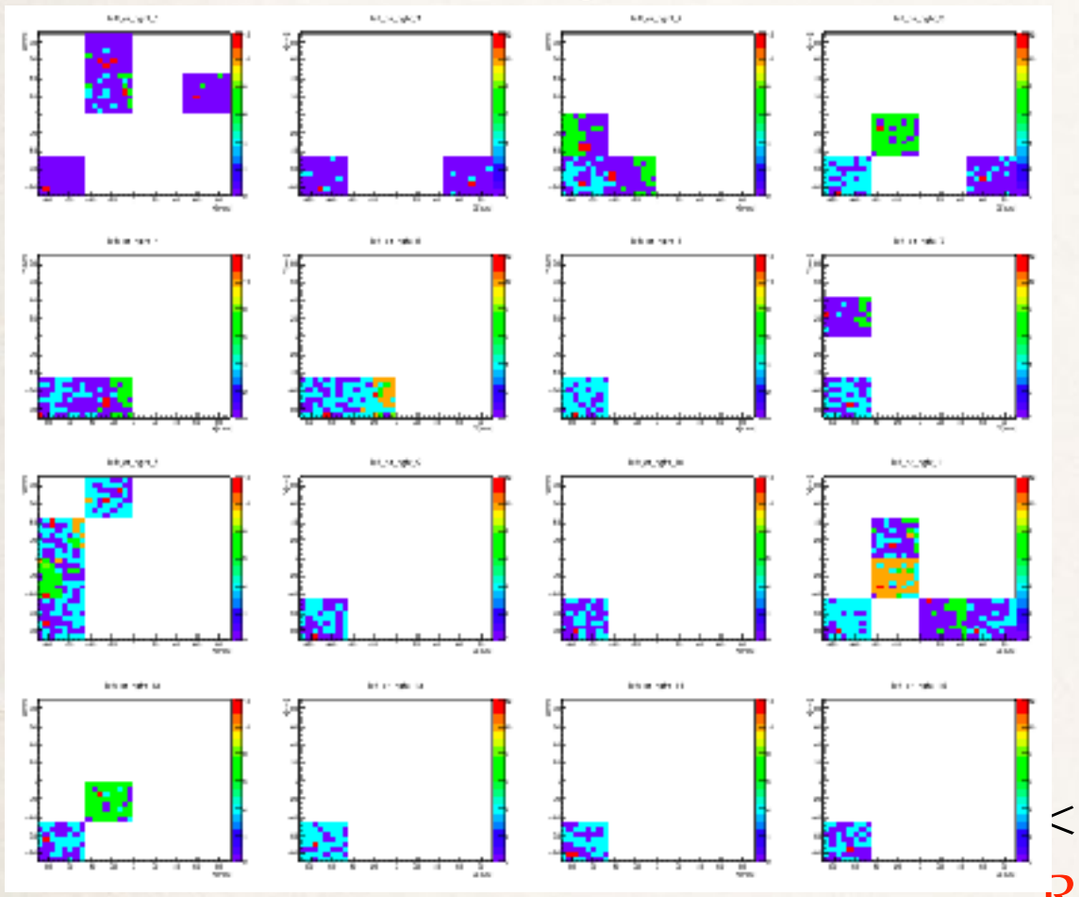
High Gain



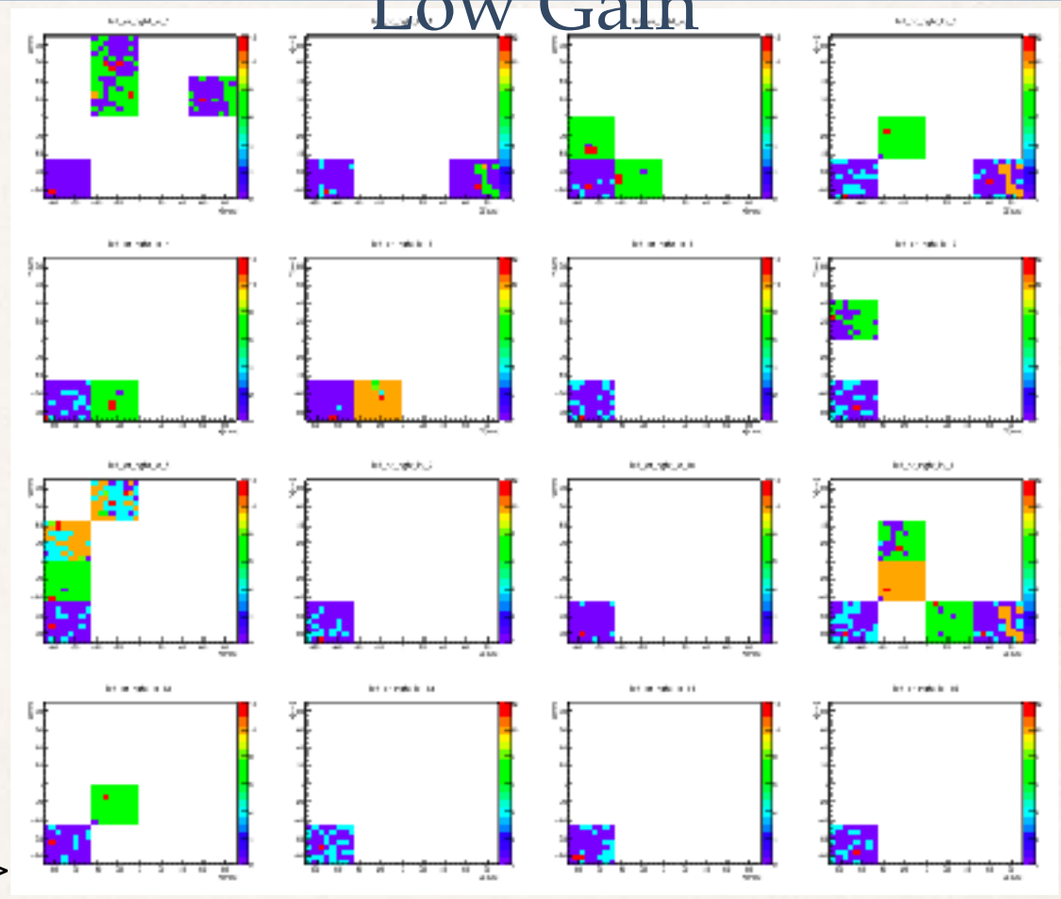
Low Gain

run_1800s_grid0_dif_1_1_4

High Gain



Low Gain



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