Digital control in testbench

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Uncontrollable hot channels

- We see some too hot channel in channel 0.
- Changing DAC0 value or masking by slow control don’t work.

- But bit 1 of Digital-control in slow-control seems also be able to control these hot channel.
- So, I took data with changing slow control status.

- (This slide is same as I send to Cheng-Wei last week.)

Digital control

- I took some data with changing digital control status and checked how it works.
- Digital control is part of the slow control and it consist of 4 bits.
- I will explain about each bit from next slide.

2	Digital Control	7:0	1	Bit 0 = Active Serial Lines (1=Two, 0=One) Bit 1 = Accept (1=Accept Hits, 0=Reject) Bit 2 = Global Inject Enable Bit 3 = Serial Output Order

Table from FPHX manual page 41

Bit 0 : Active serial line

- It enable to switch using one or two serial lines.
- Active serial line is part of the FIFO and serializer.
- For FIFO, decreasing serial lines just means to reduce the number of read clock and grab clock by half.

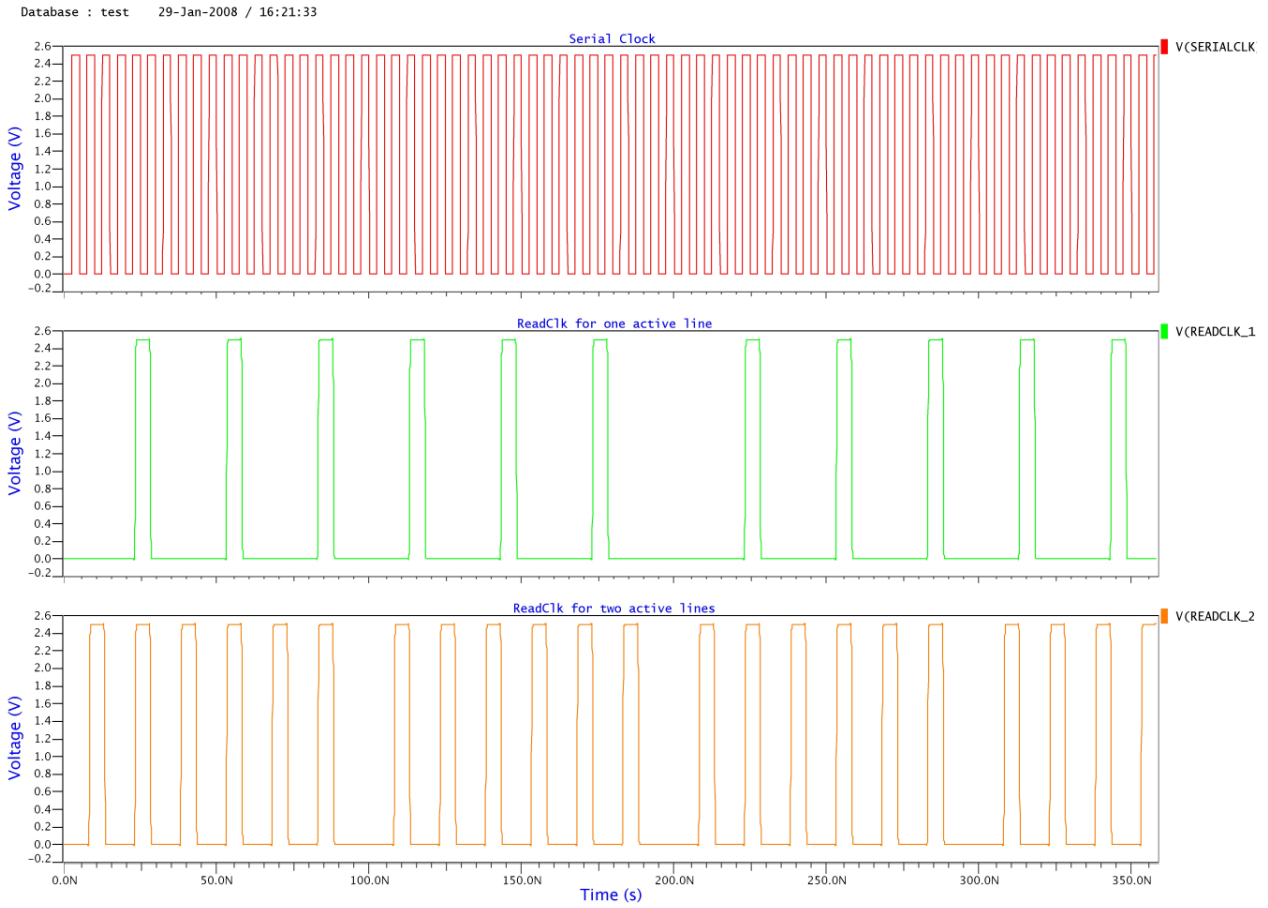


Figure 15 - A comparison of Read Clock frequencies under one and two active lines

From page 49

Bit 0 : Active serial line

- Each chip have two serializer after FIFO.
- The top word of FIFO is sent to serializer 1 and the second one is sent to serializer 2.
- Disabling one active line means stop to use SerialOut2 in Figure 16.

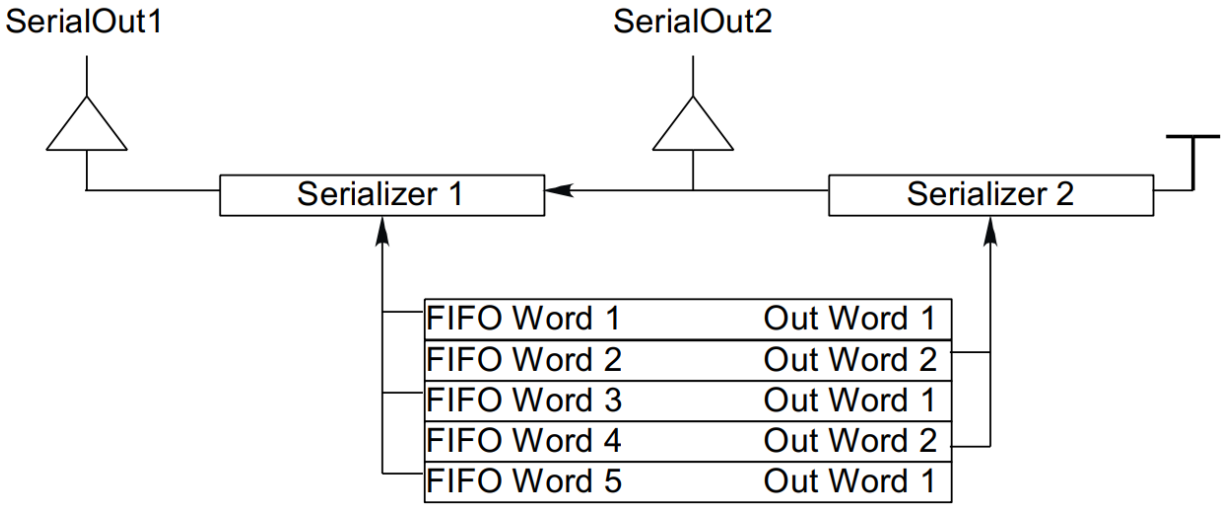


Figure 16 - The Serializers

From page 50

Bit 1 : Accept

- Bit 1 is part of channel control and phase block.
- Each channel has four circuit to acquire 8-lines (one is discriminator) data from front-end.
- Channel control circuit encode thermometer-code (7lines) to binary-code (3 bit).
- Each circuit receive signals from phase block, that send signals to acquire data or not and which phase will be used.
- Changing bit 1 (accept hits) to reject will send signals to entire channels not to acquire data in channel control circuit.

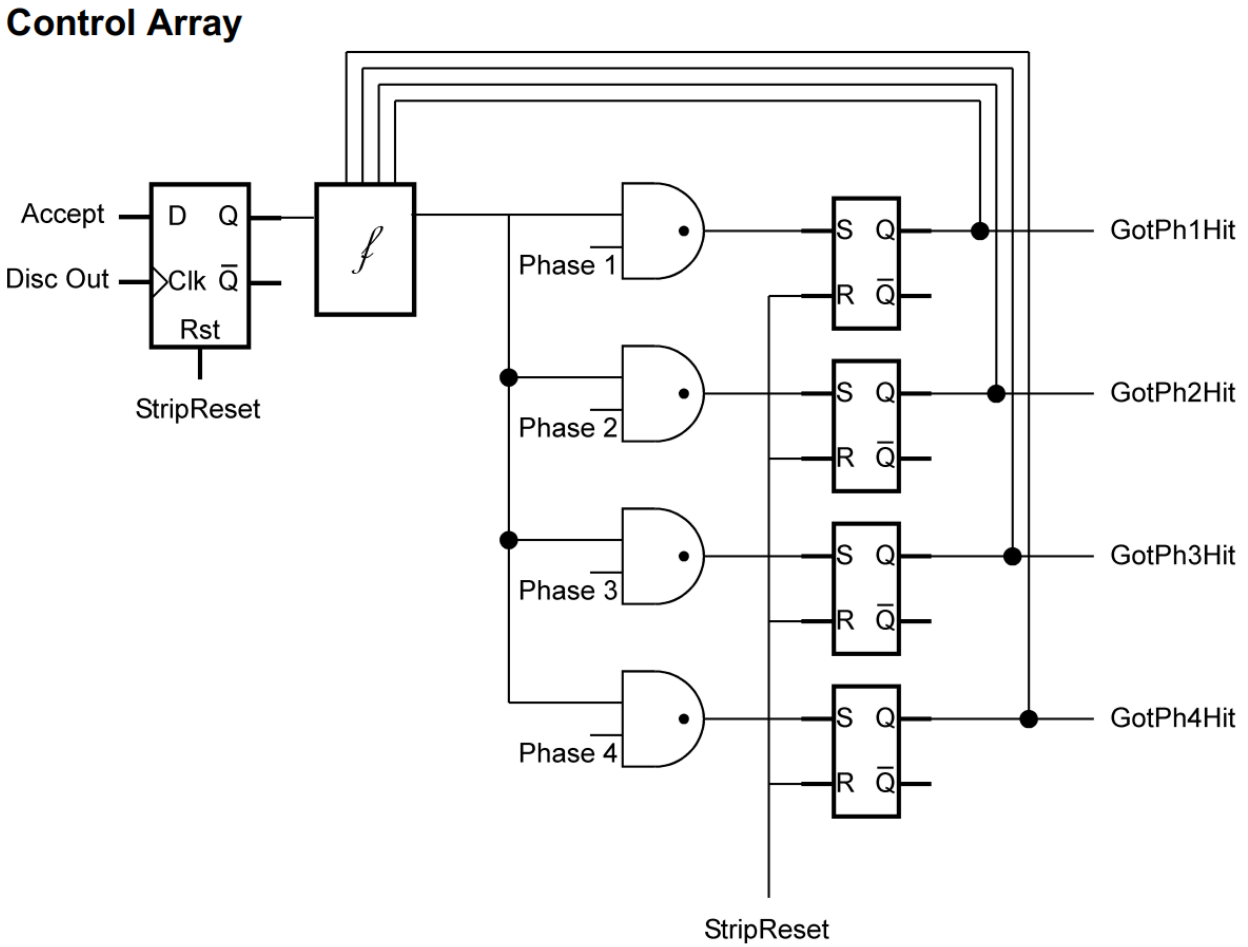


Figure 18 - How the Control Circuit Acquires Hits

From page 52

I read fphx chip manual, but still not sure about this bit. Maybe I do some misunderstanding.

Bit 2 : Global Inject Enable

- Global inject is a system to do some test by itself.
- In integrator part, this bit can switch whether front-end will accept signals which come from NOT detectors.

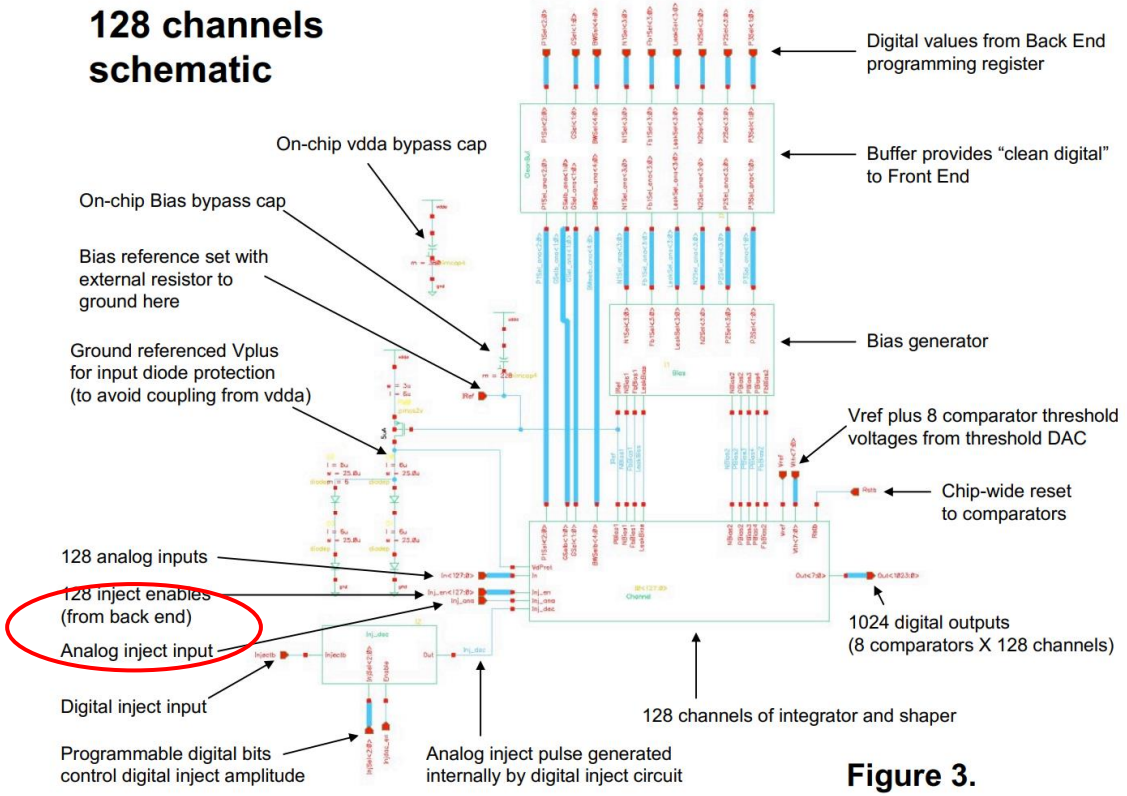


Figure 3.

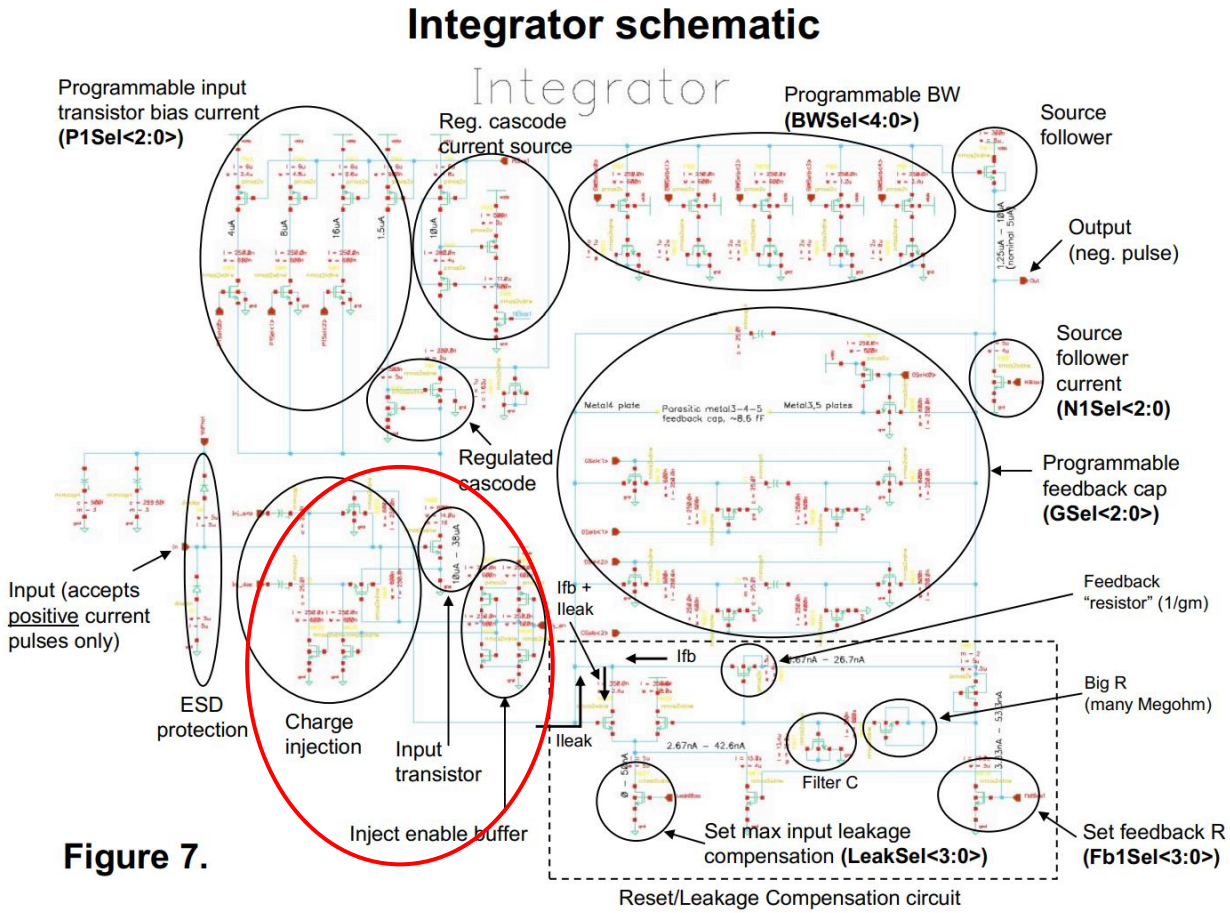


Figure 7.

From page 7 and 11

Bit 3 : Serial Output Order

- There’s no information about this bit, I think. But some people says that this bit just changing the relationship between 2 output line.

Assumed effects on results

- Bit 0, bit 1, bit 2 affect these blocks.
- Bit 0 will cause some difference for daq.
- Bit 1 will make channel stop to acquire data.
- Bit 2 will make front-end stop to accept calibration pulse.

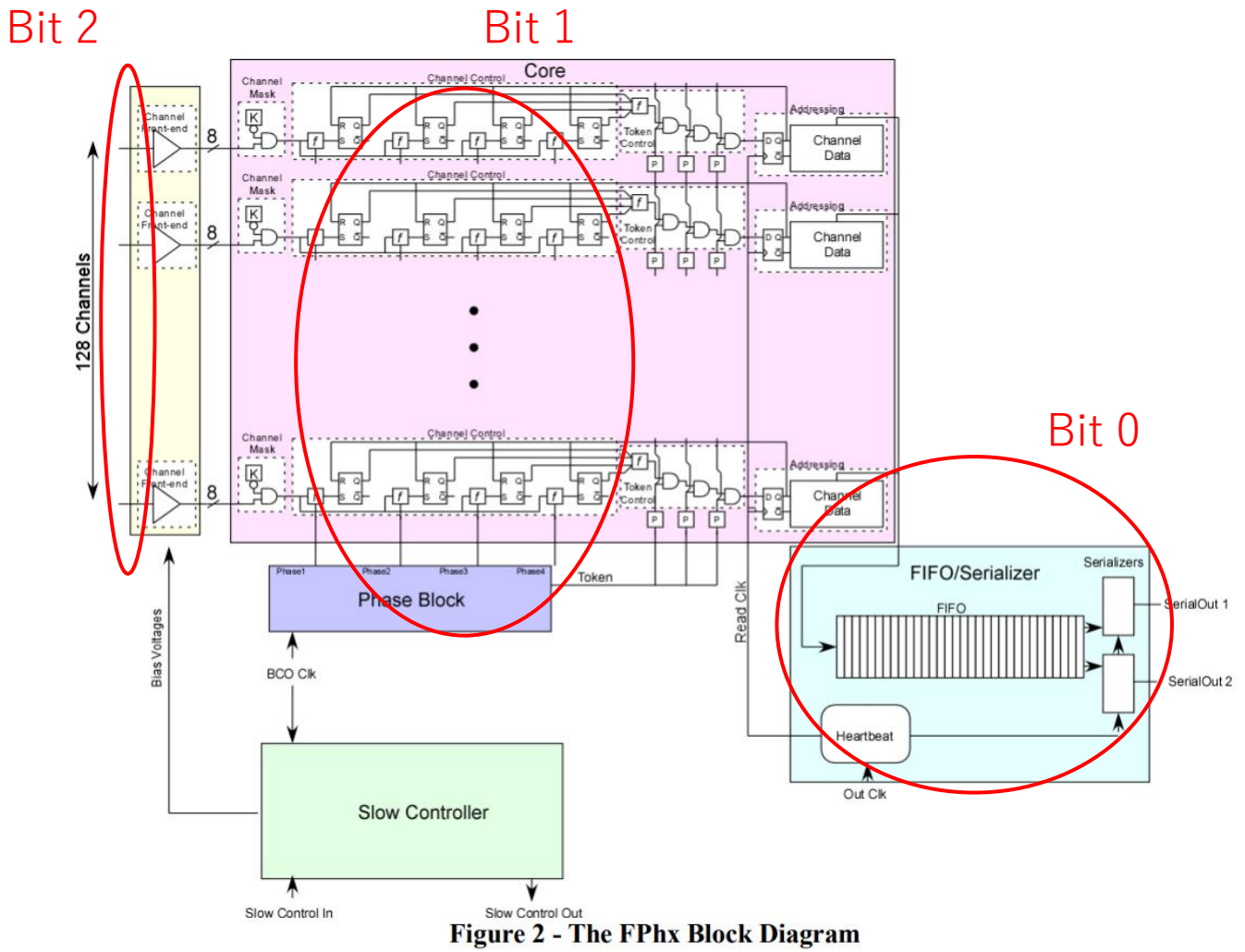


Figure 2 - The FPhx Block Diagram

Taking calibration data in testbench

- I took calibration data of ROC 21, port A2 with no-bias for about 90 sec.

→In order to see noise data, I didn't apply bias voltage.

Results

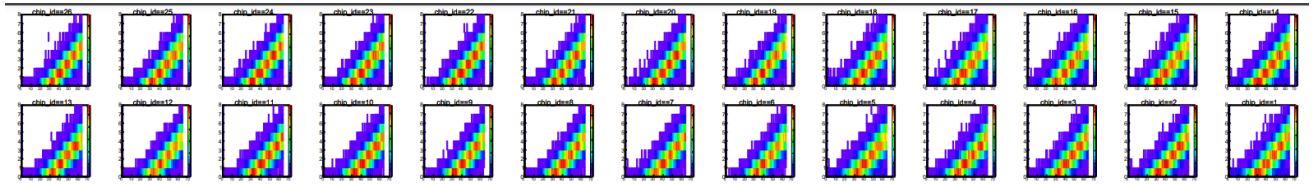
- Bit 0, 2 is working well.
- But bit 1 (stop daq in control array) seems not working.

→Even bit 1 = 0, it still contains noise or calibration data.

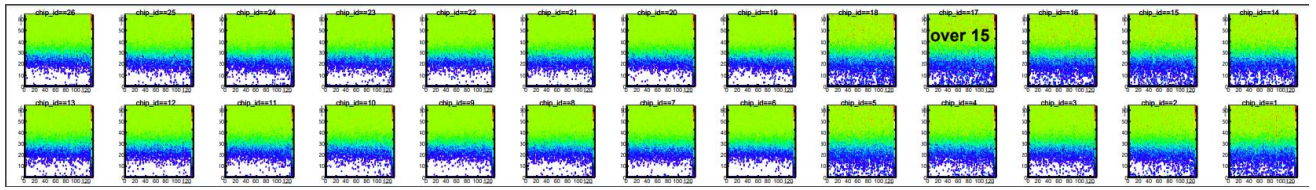
Sample

- This is our usual calibration data with no-bias.
- Digital control is 0101 (Bit 3, Bit 2, Bit 1, Bit 0).

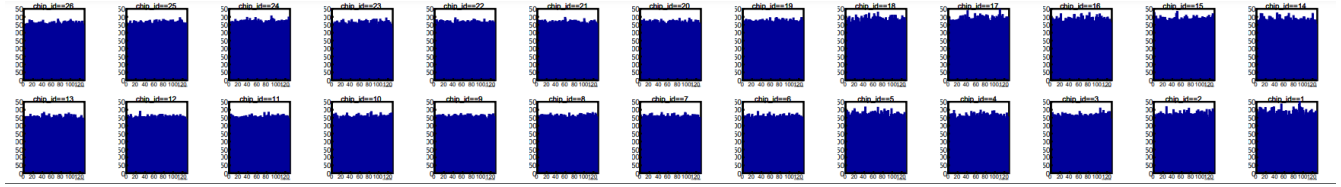
Adc vs amplitude



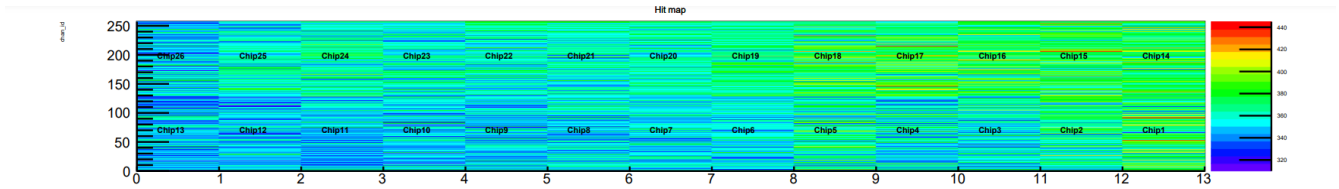
Amplitude vs channel



Entry vs channel

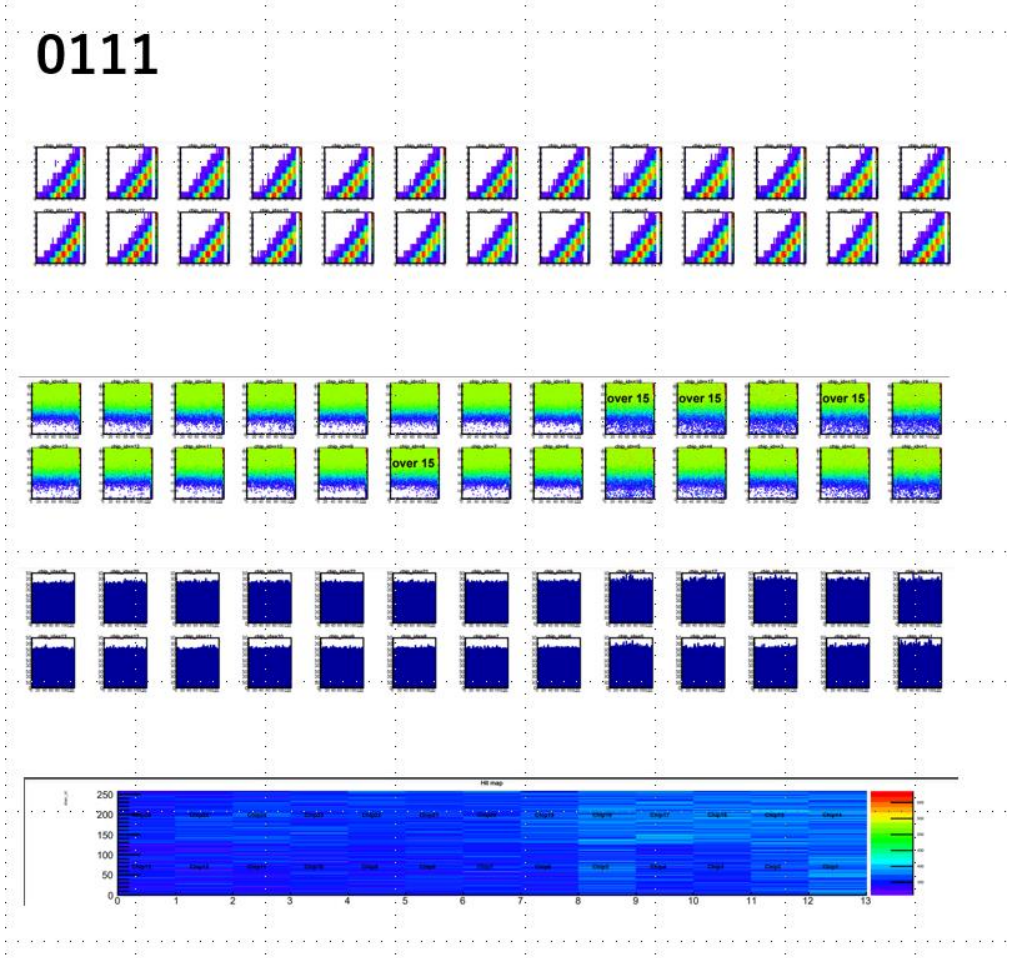


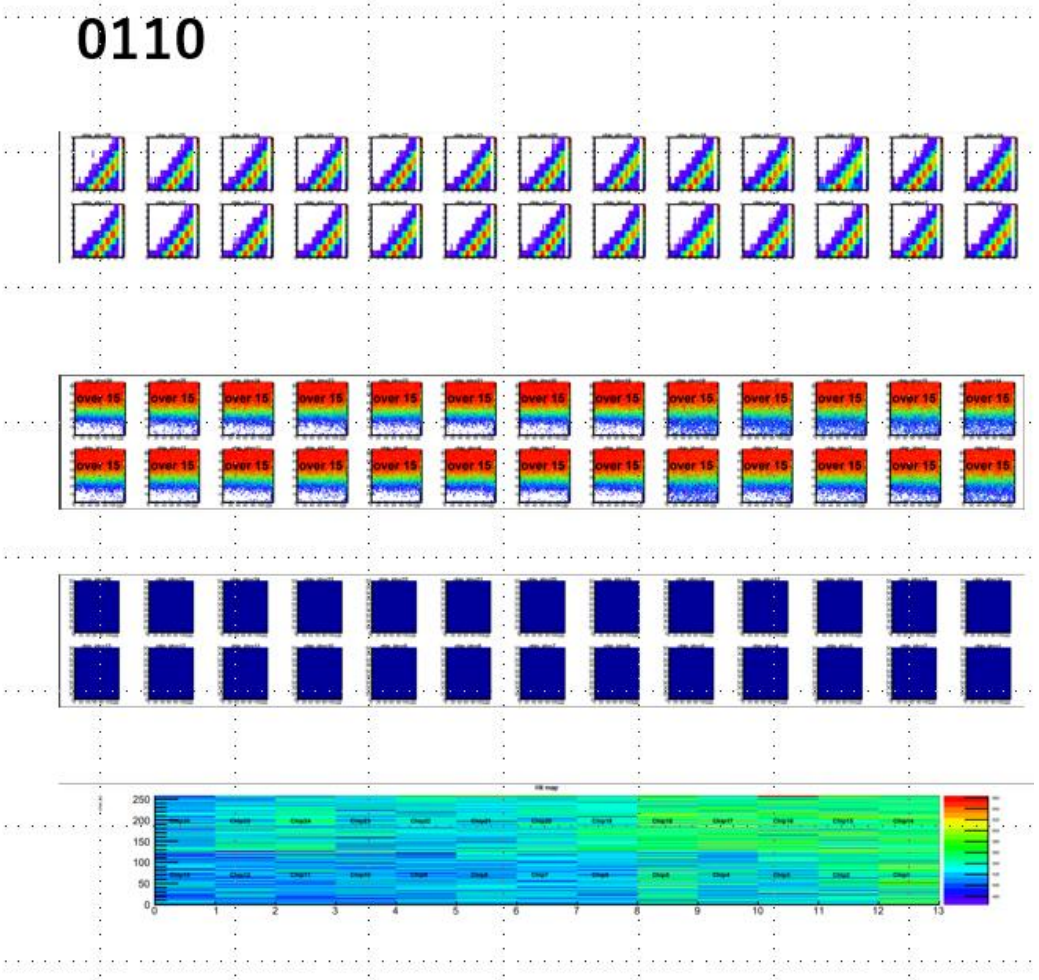
hitmap



Results : Bit 0

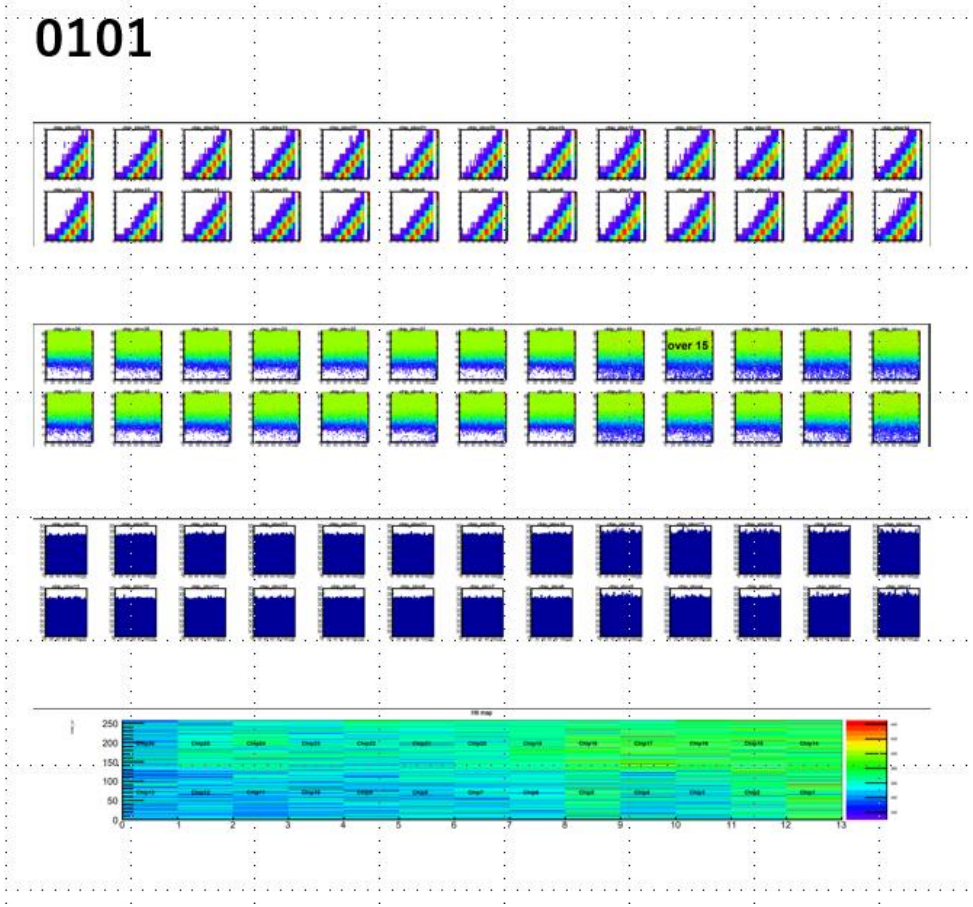
- Still, we can take calibration data from all channels.
- But the number of hit was changed.

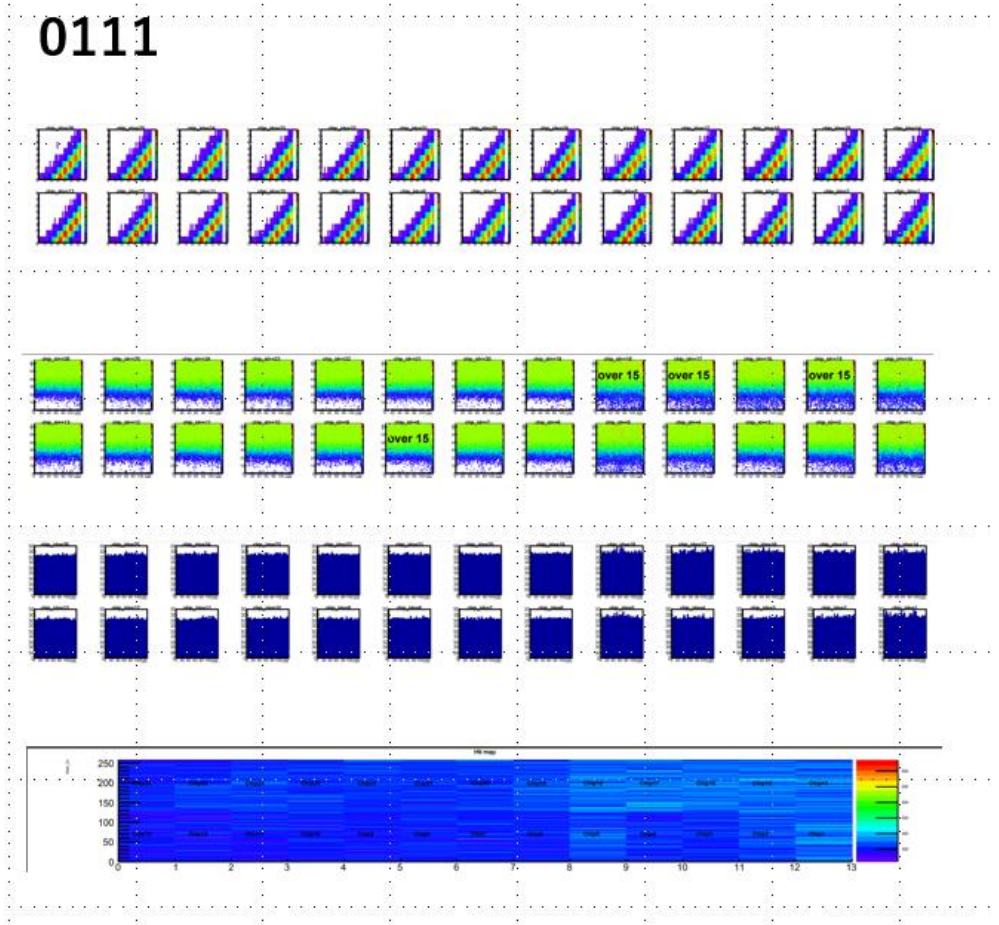




Results : Bit 1

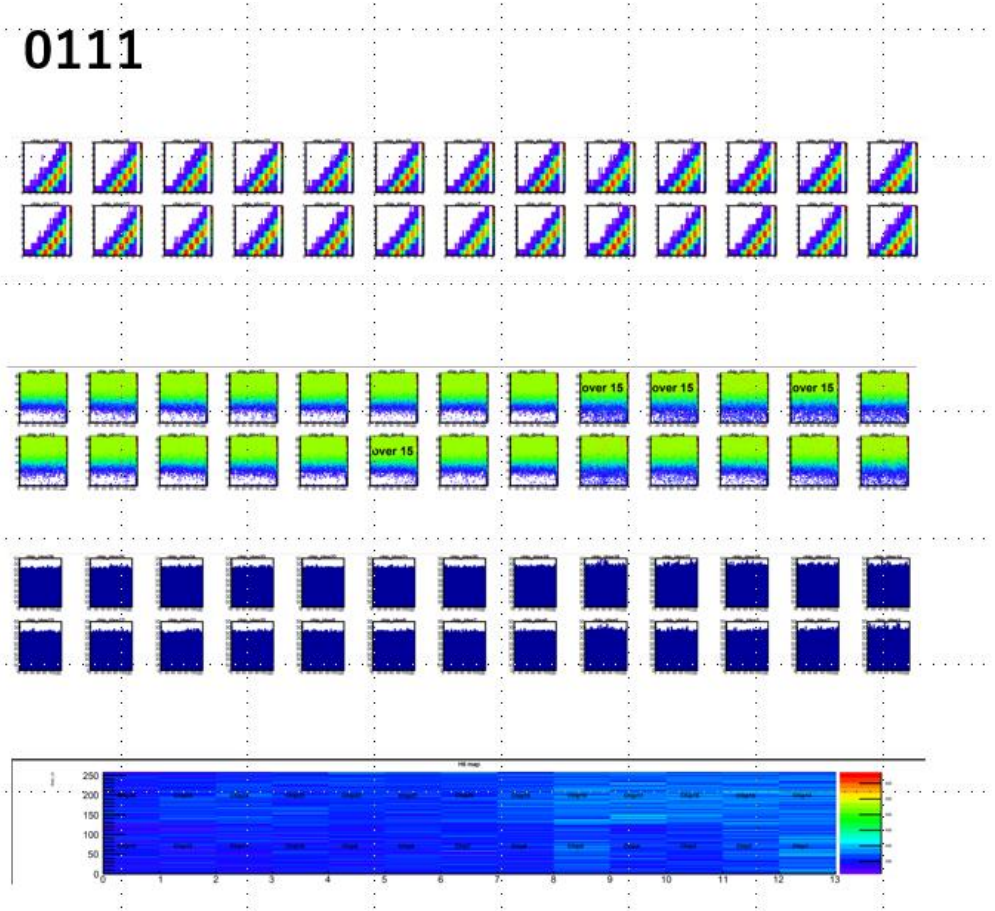
- Nothing is changed

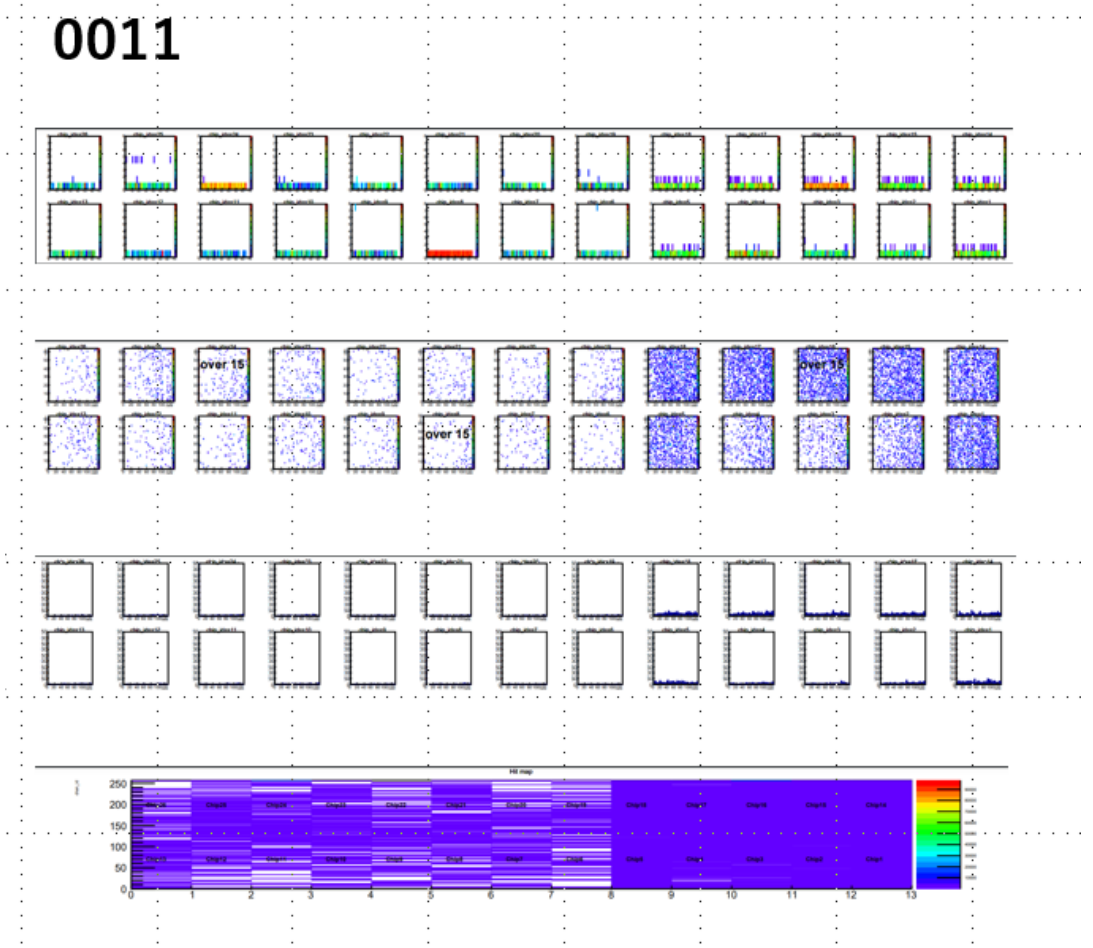




Results : Bit 2

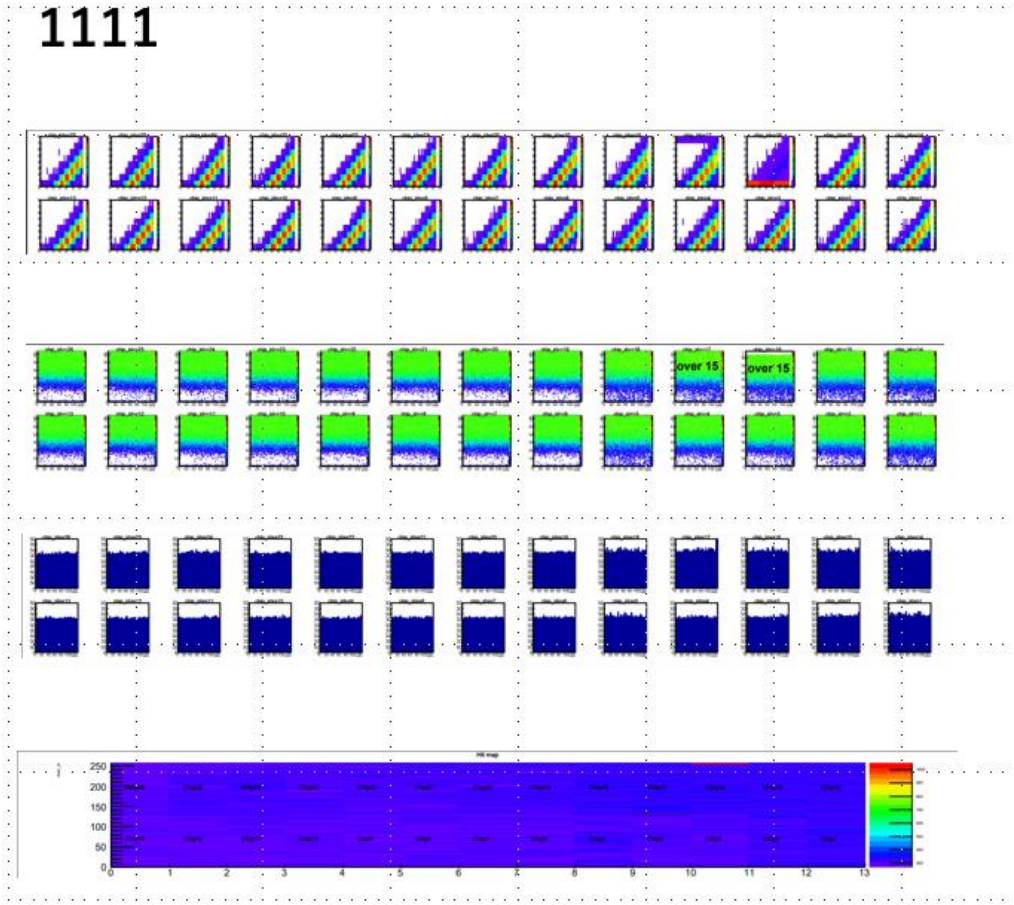
- Bit2 rejects calibration pulse well

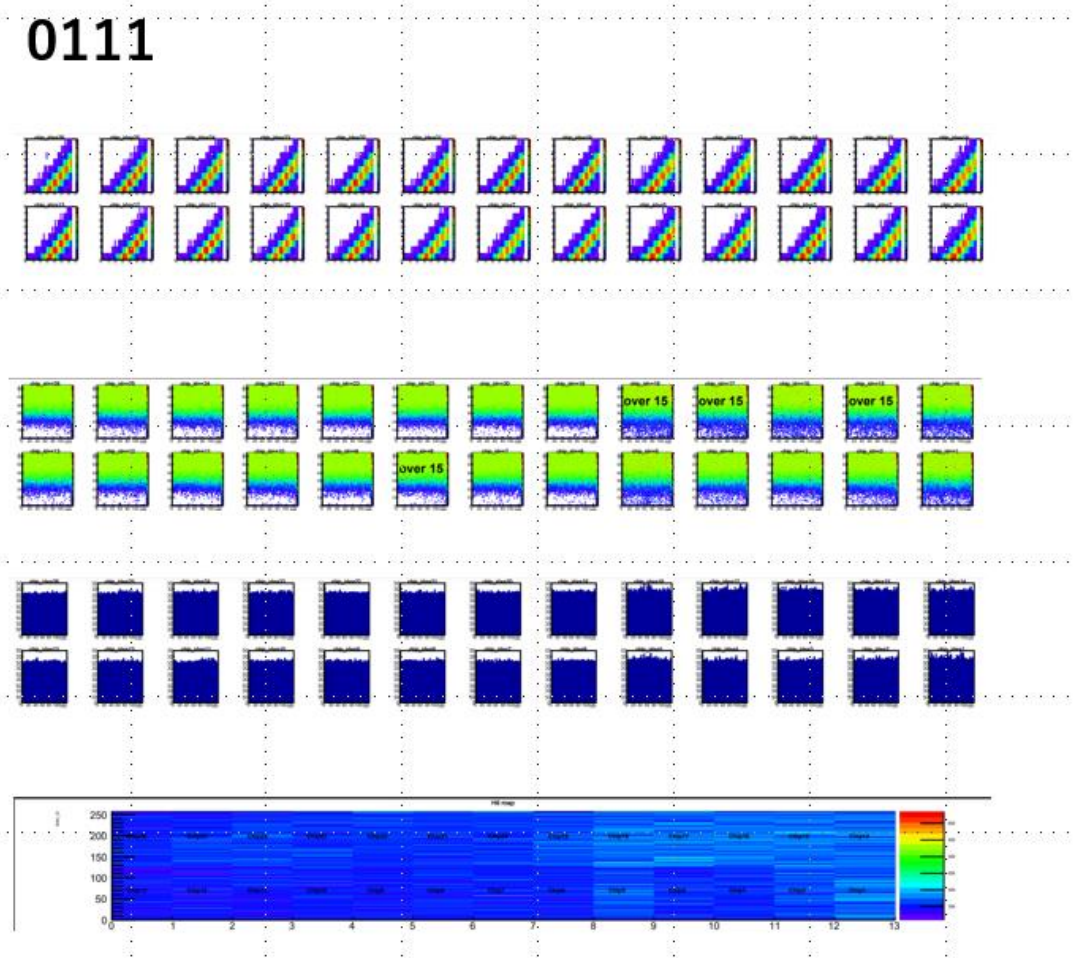




Results : Bit 3

- Aaa





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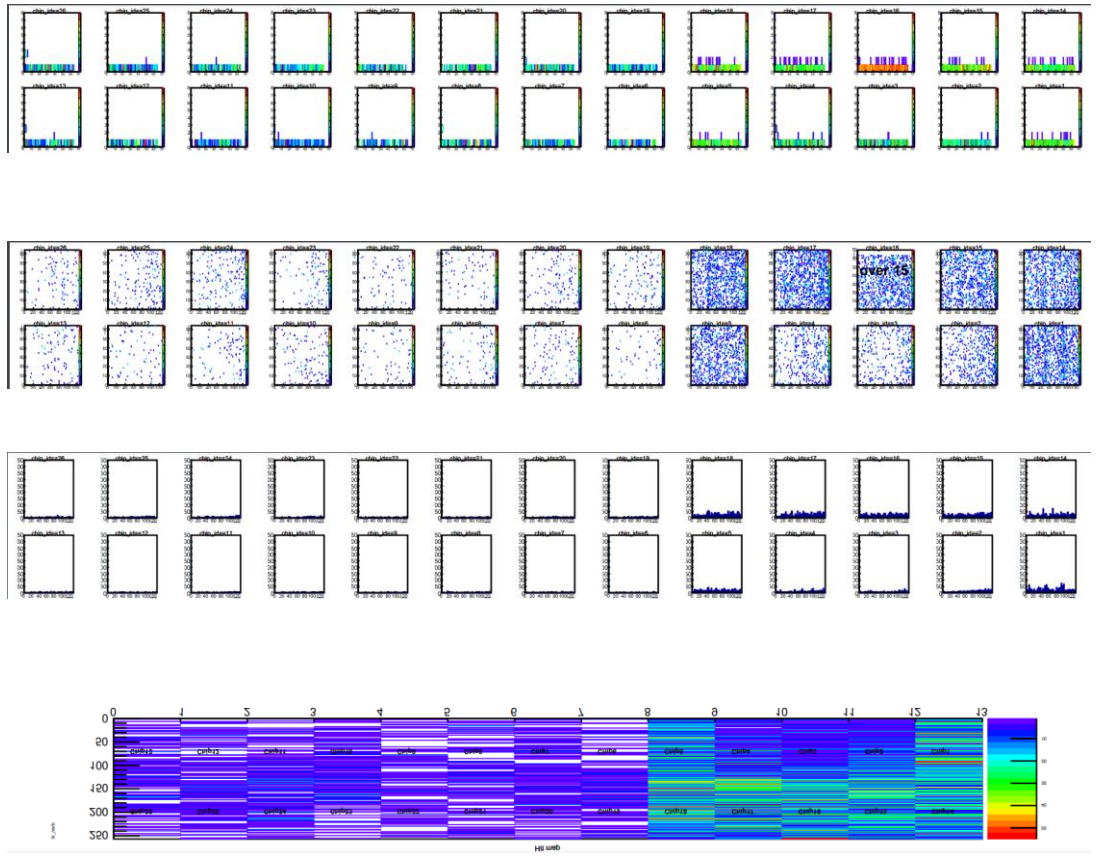

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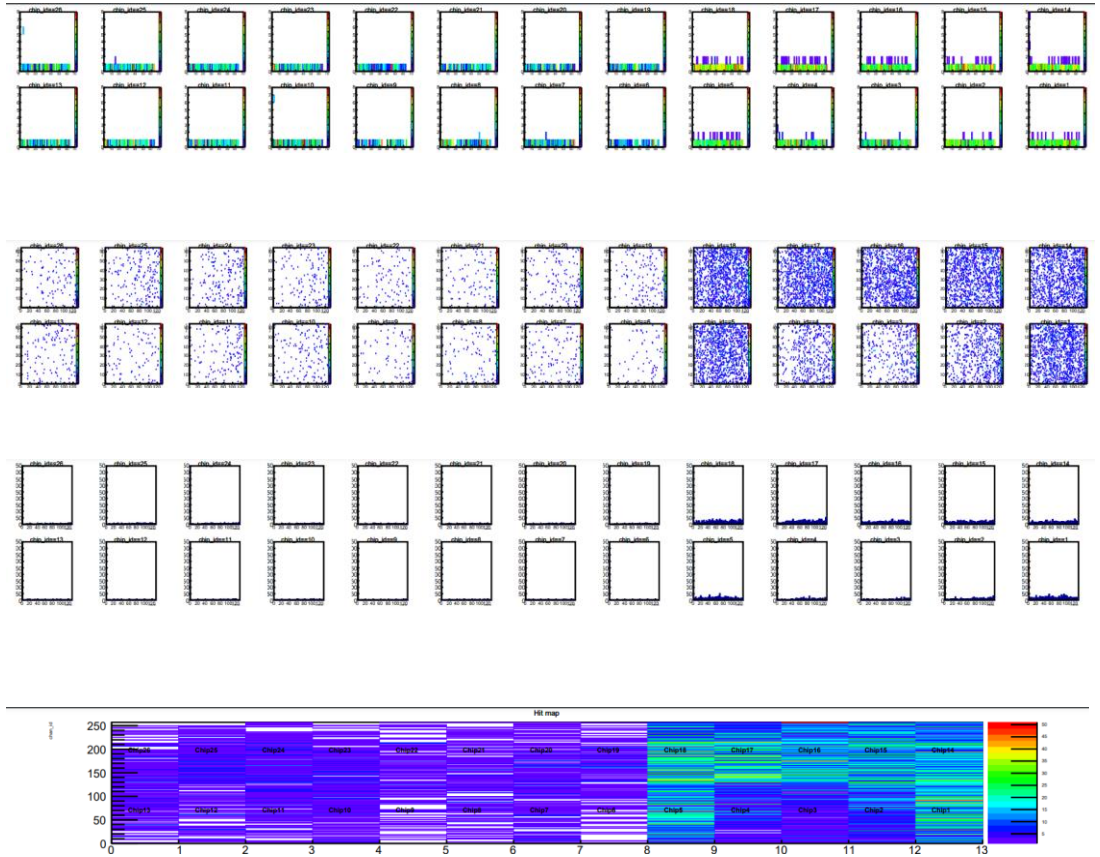

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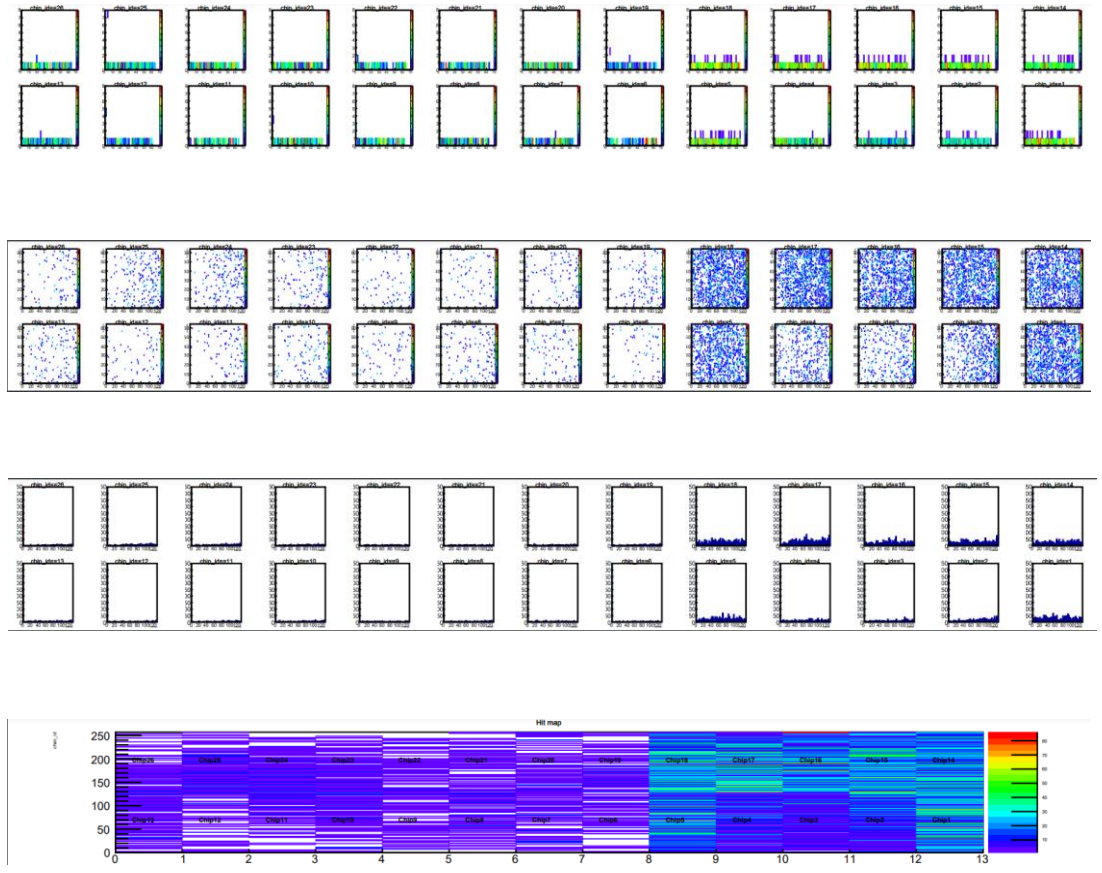

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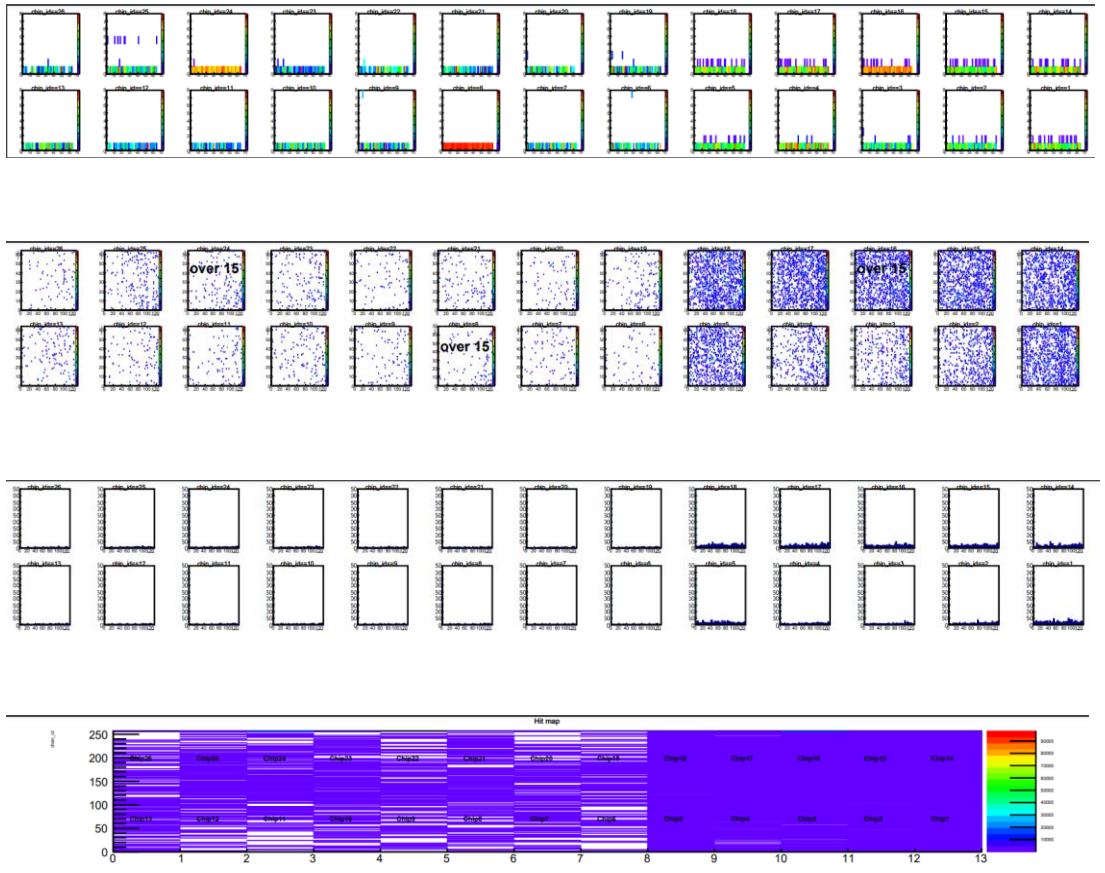

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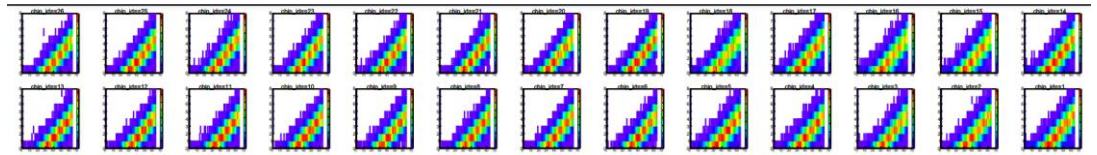

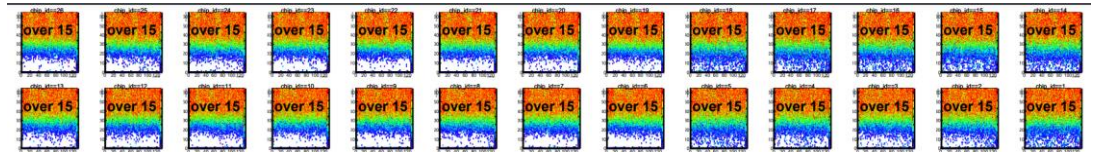

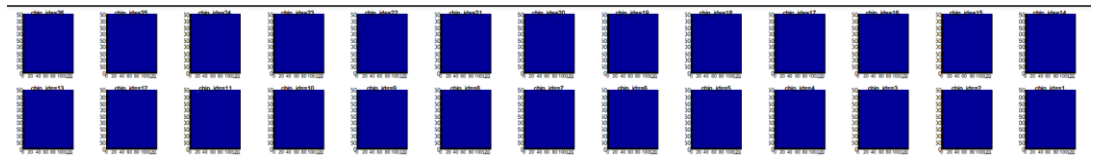

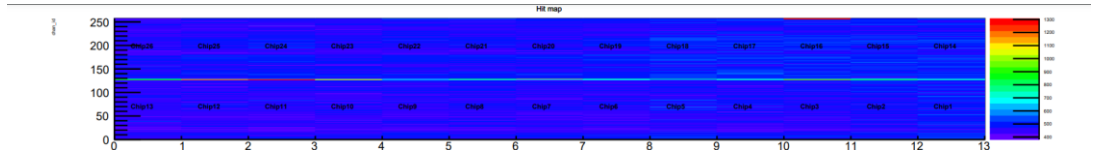

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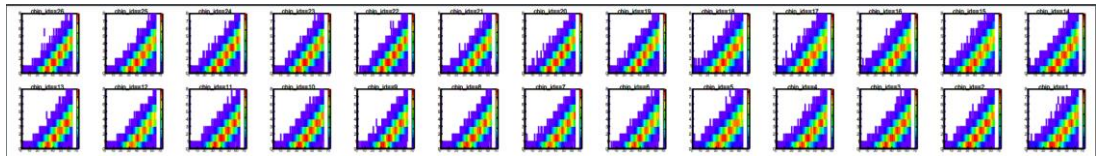

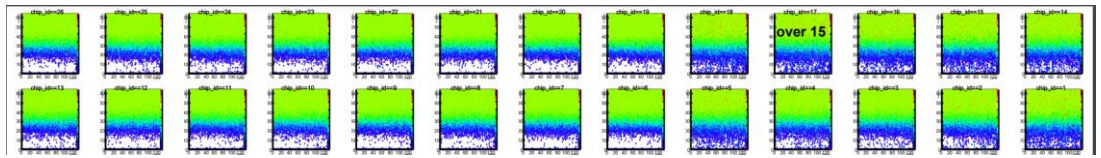

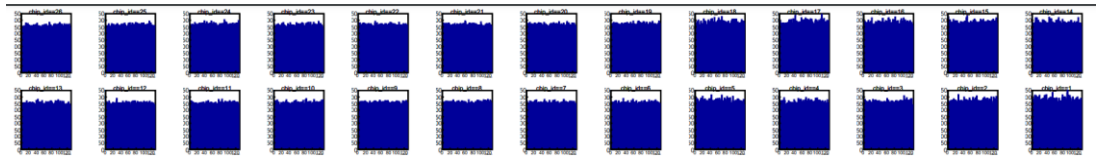

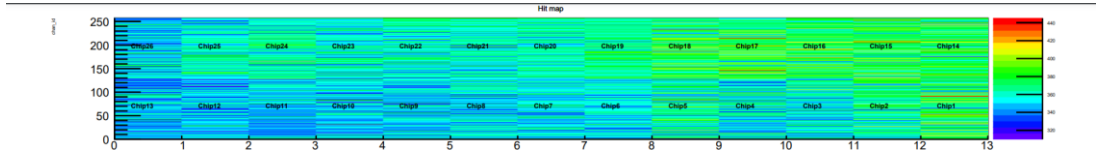

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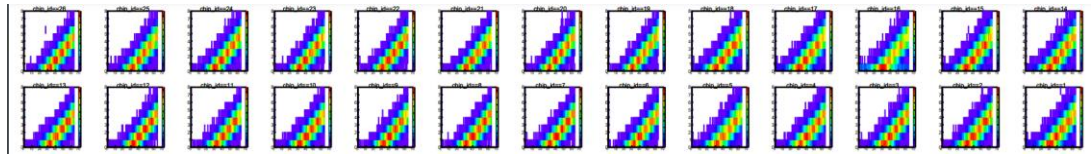

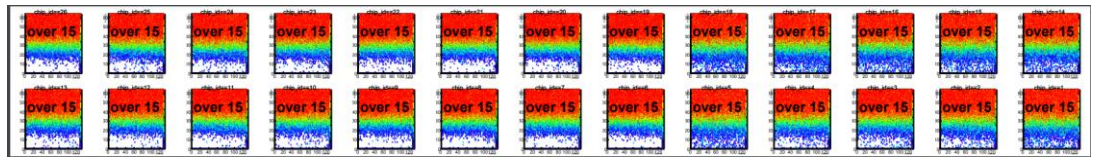

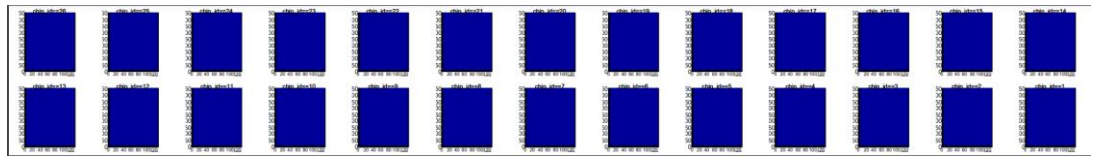

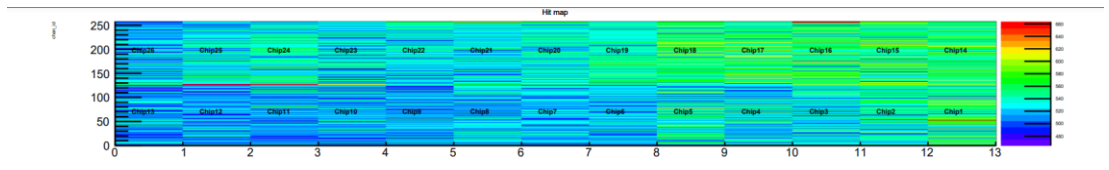

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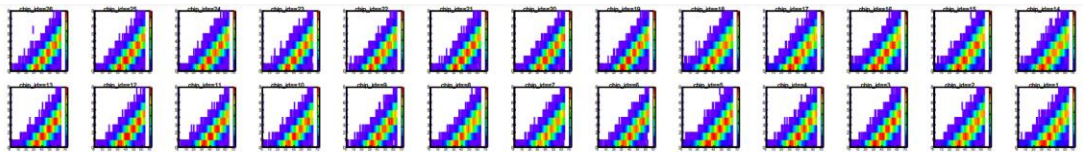

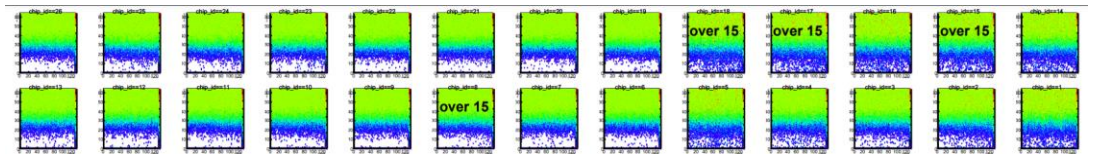

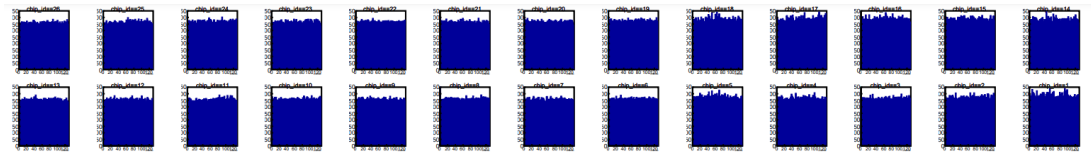

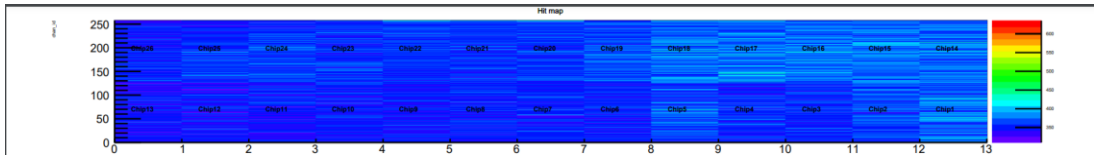

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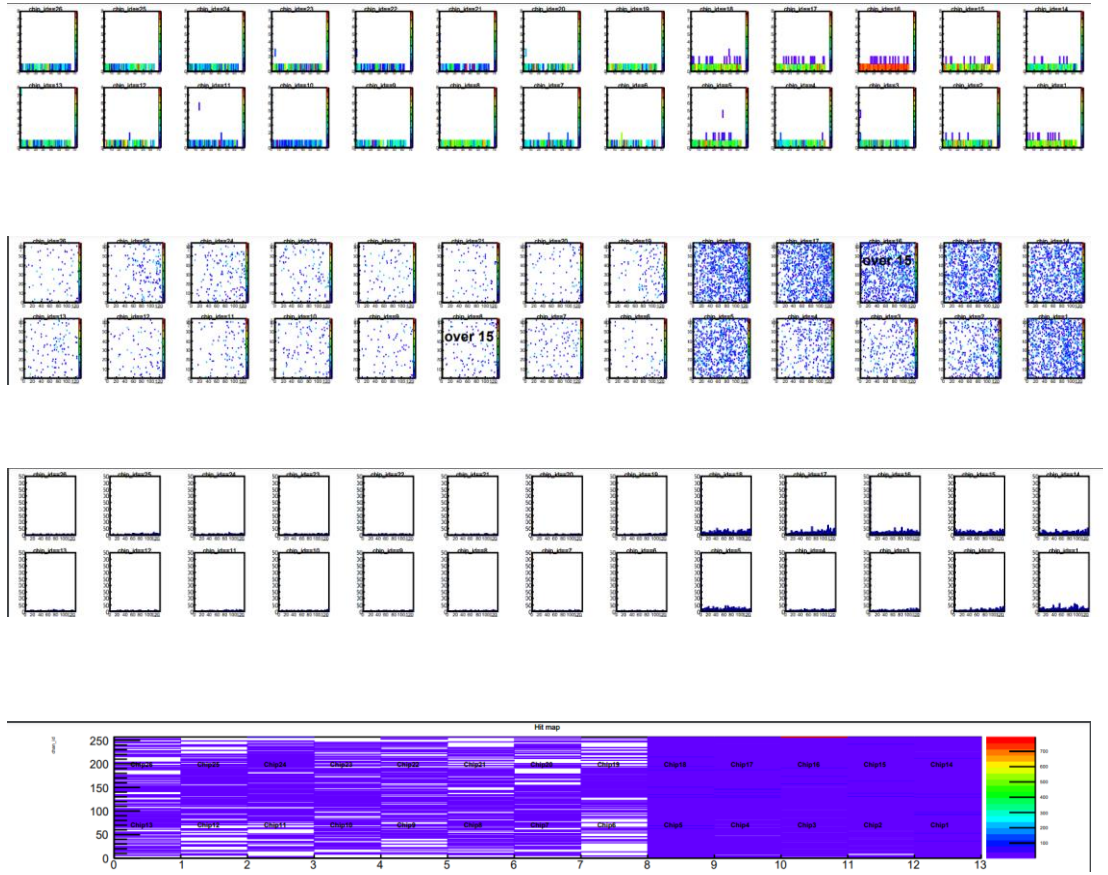

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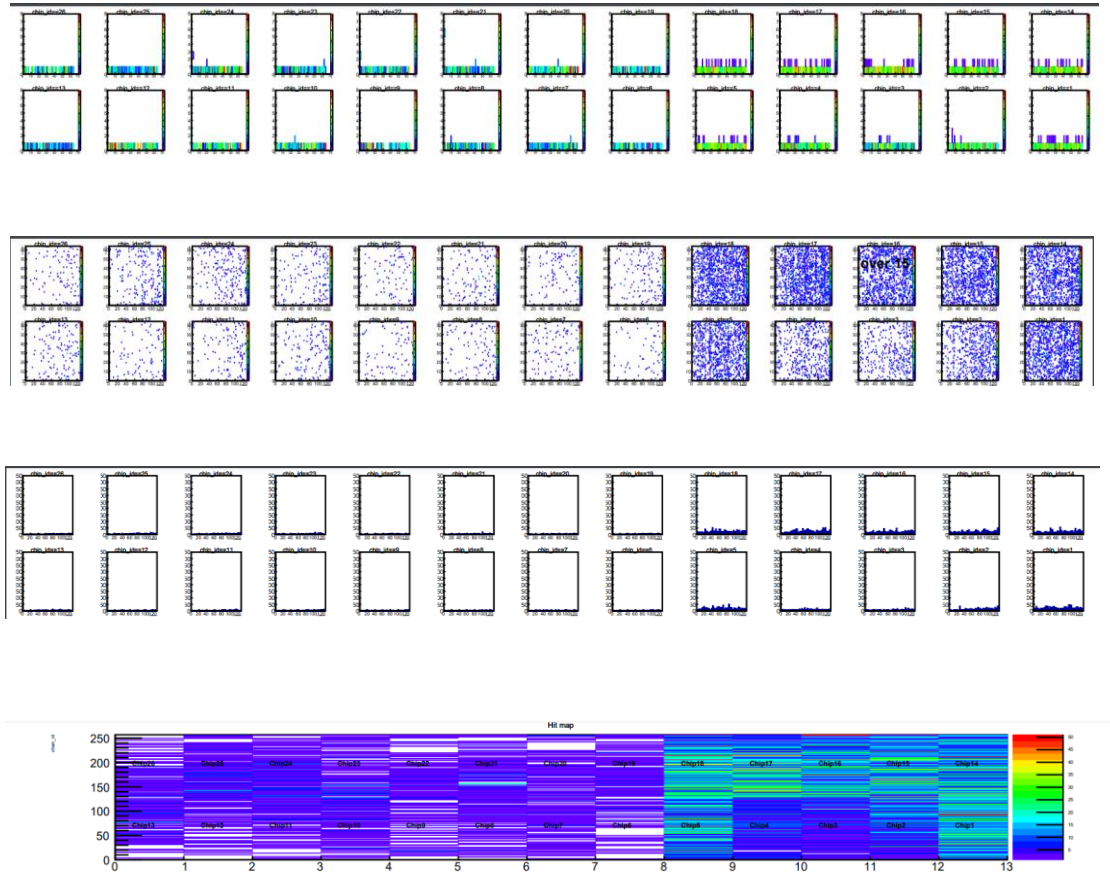

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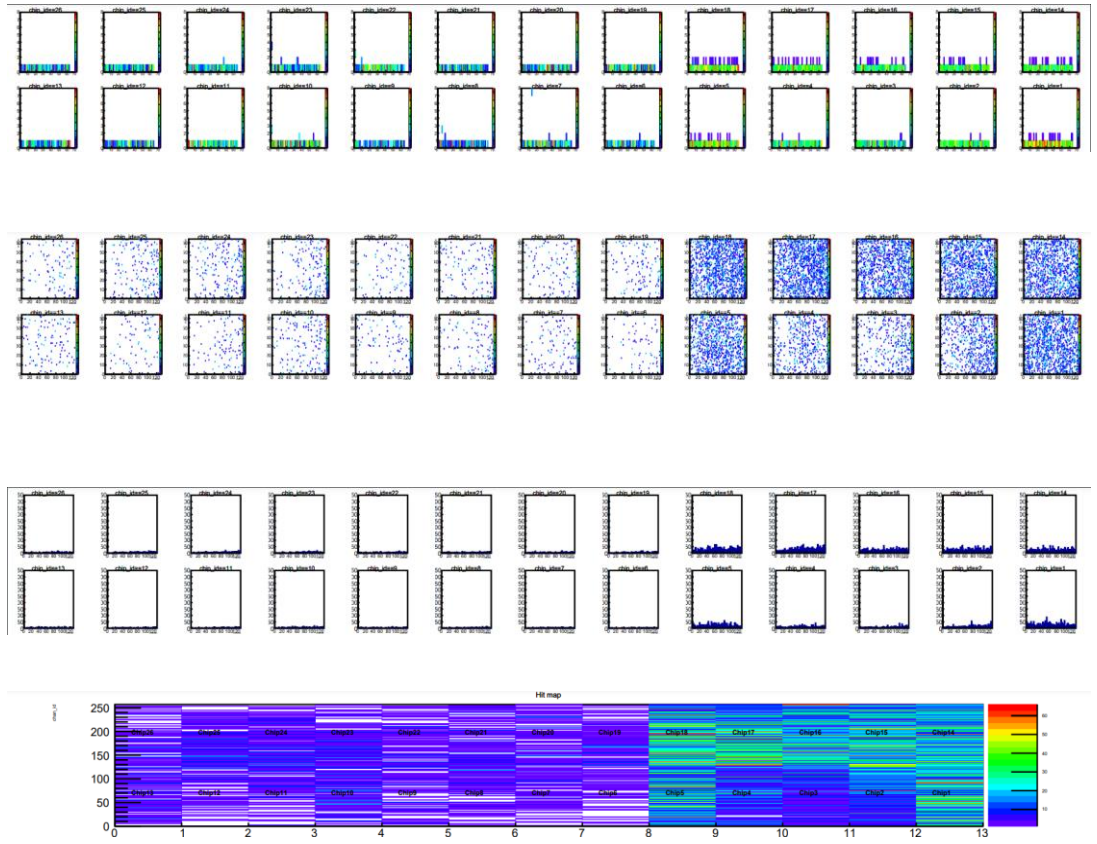

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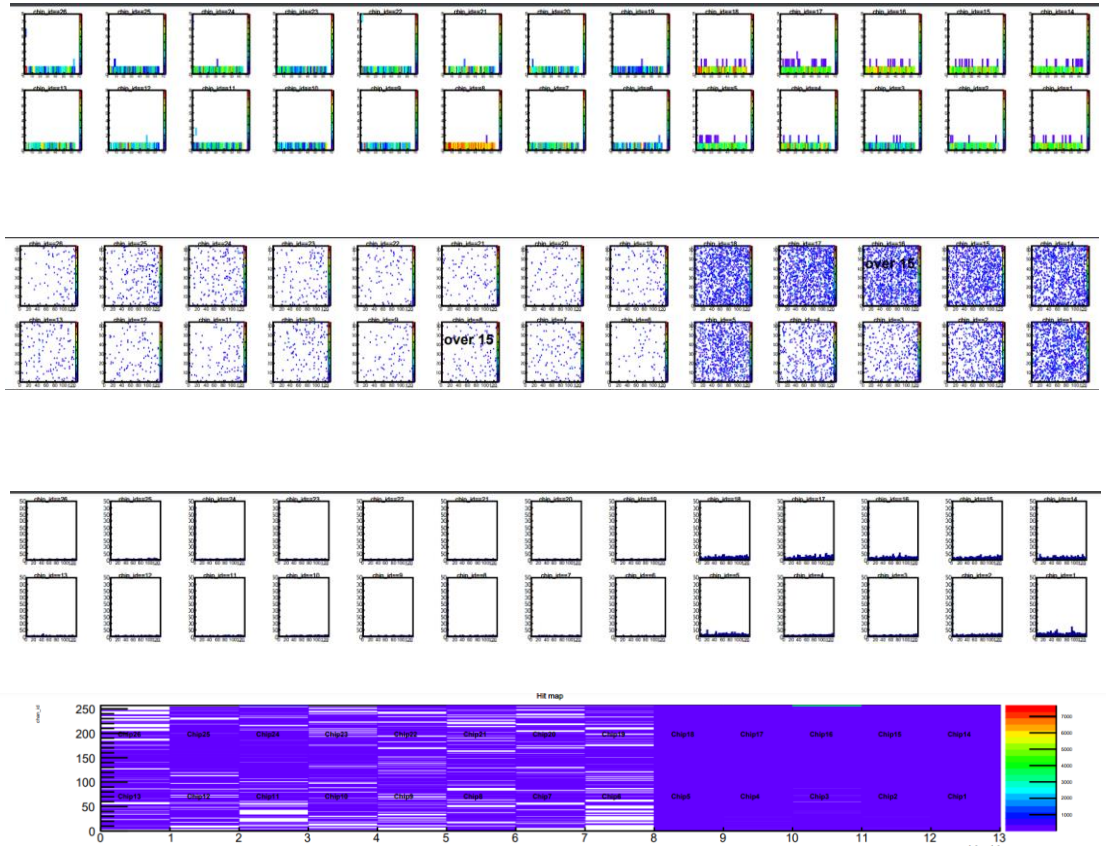

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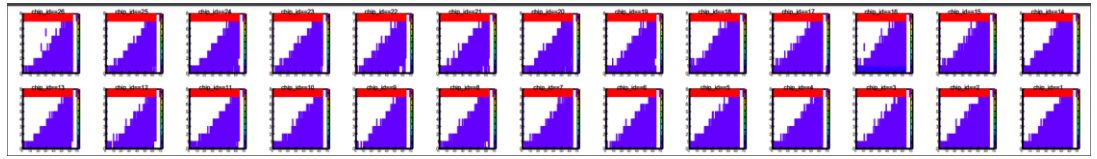

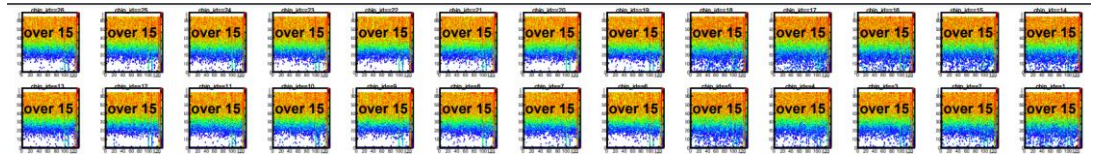

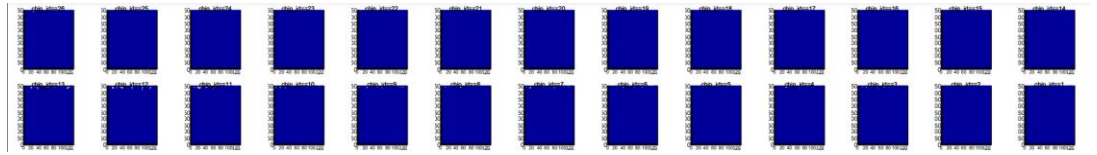

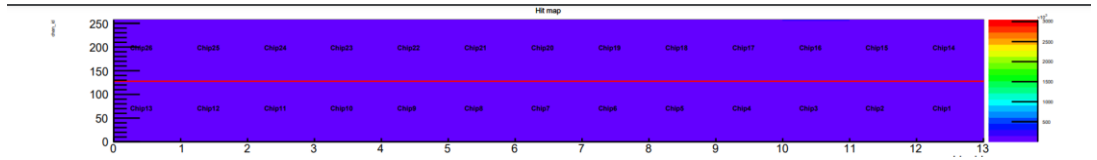

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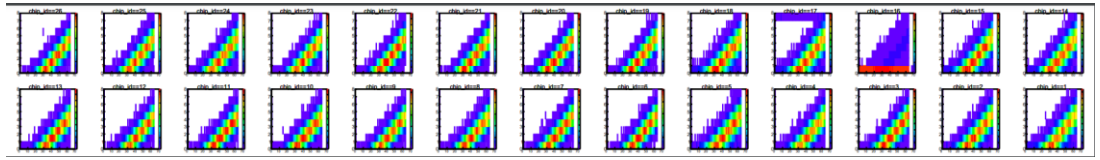

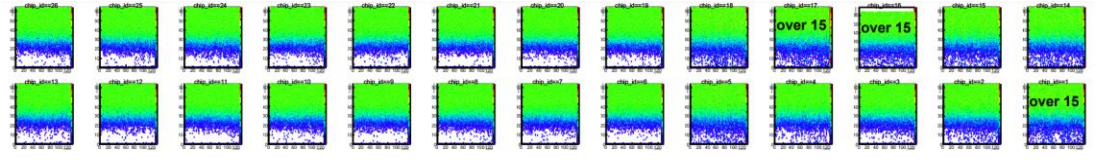

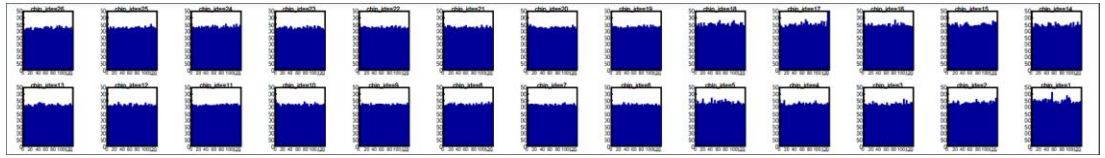

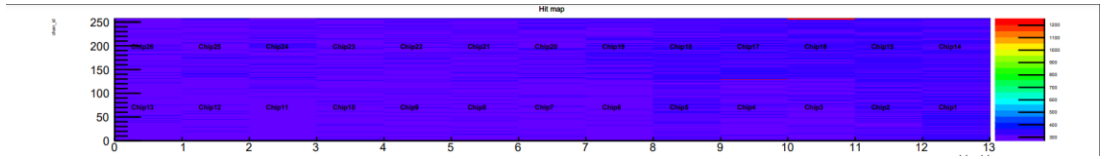

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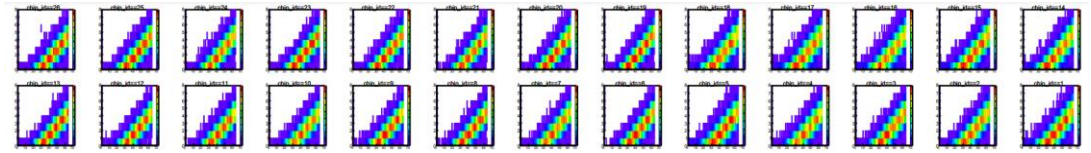

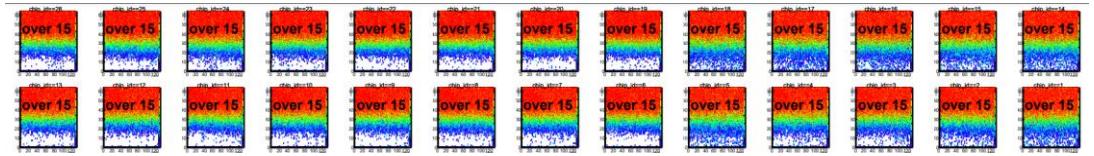
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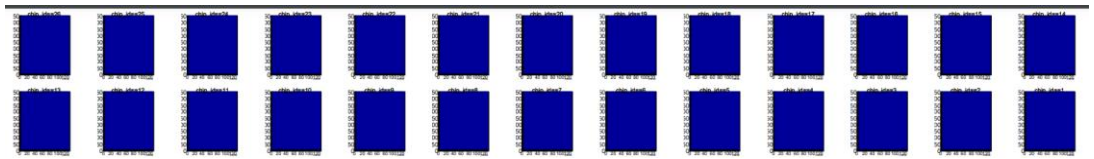

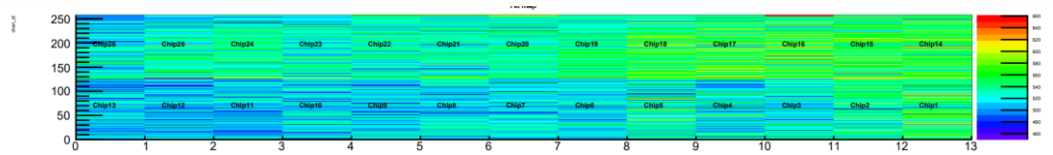
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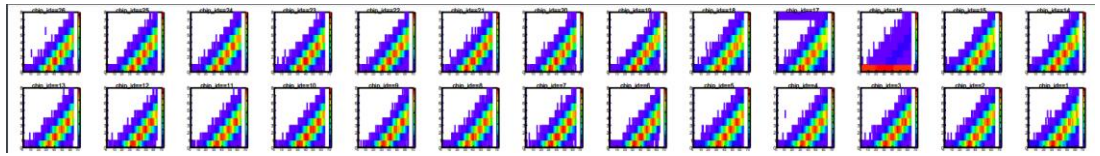

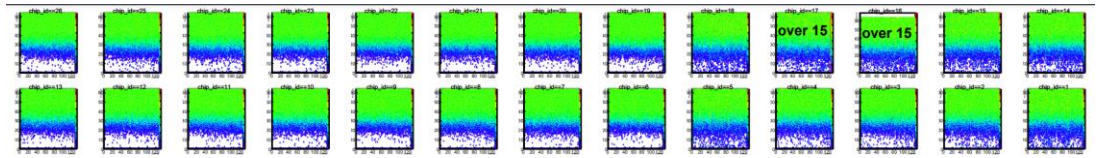
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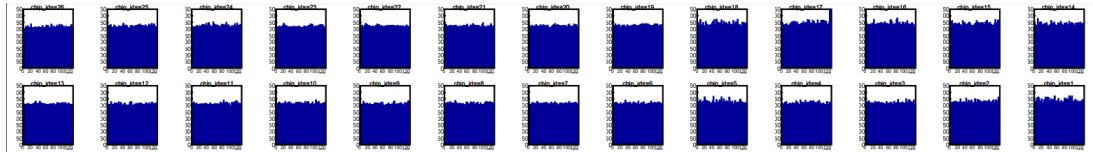

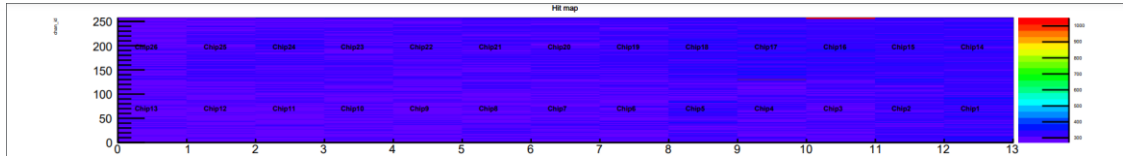
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