GM 菊池陸大

04/15/2024

今週のこと

- INTT検出器で用いている、FPHX-chipのスローコントロールの調査
- スローコントロールの内4bitで表されるデジタルコントロールが機能しているかを調べた。

Digital control in testbench

Takahiro Kikuchi 04/15/2024

Digital control

- I took some data with changing digital control status and checked how it works.
- Digital control is one of the slow control and it consist of 4 bits.

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.
- In FIFO, decreasing serial lines just means to reduce read clock and grab clock by half.

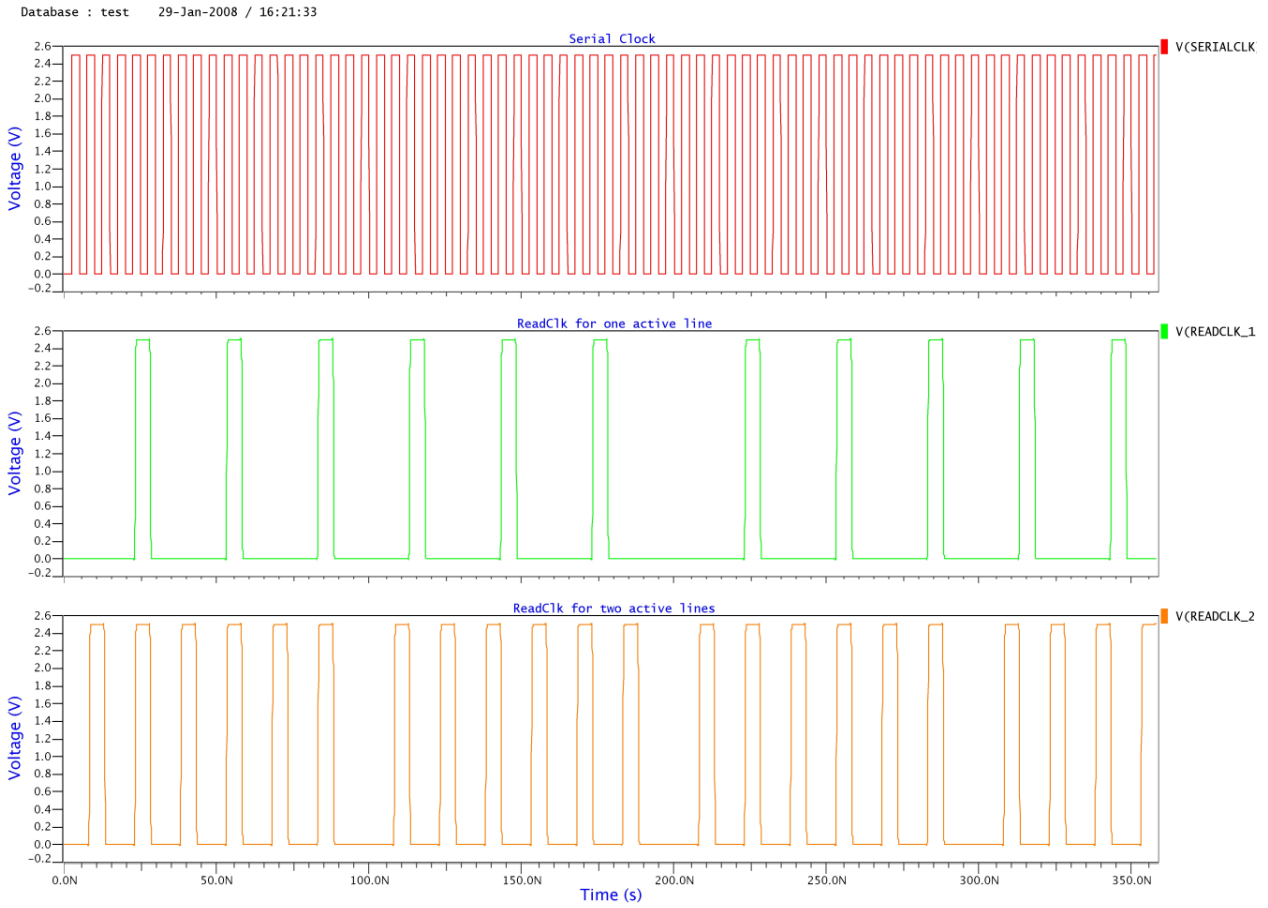


Figure 15 - A comparison of Read Clock frequencies under one and two active lines

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.

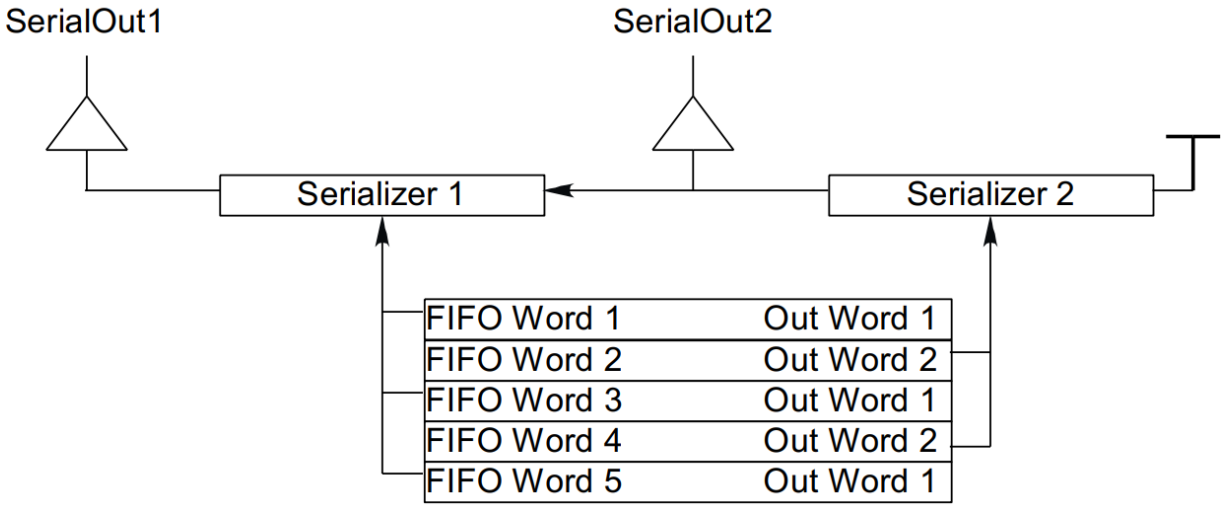


Figure 16 - The Serializers

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 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 send signals to entire channels not to acquire data in channel control circuit.

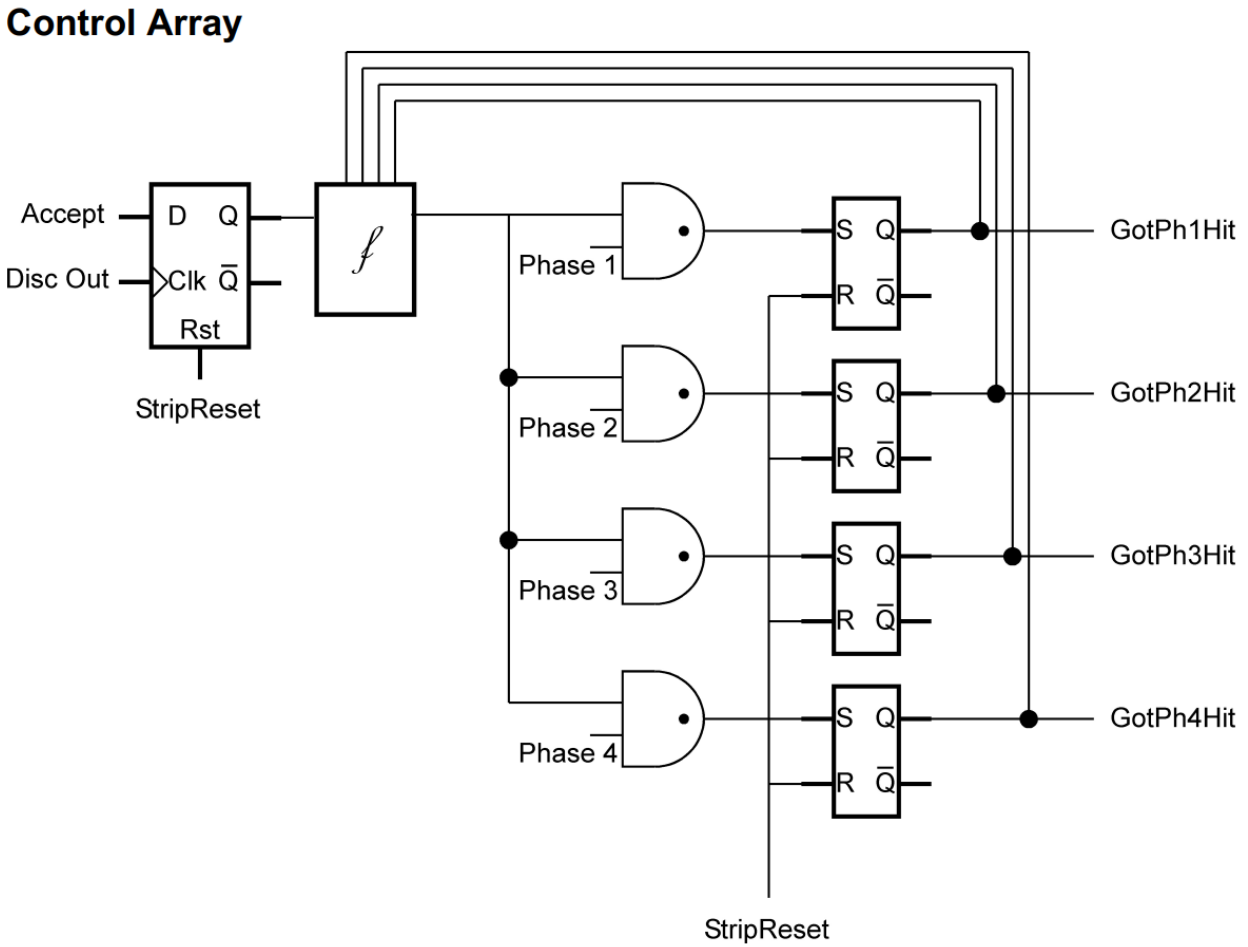


Figure 18 - How the Control Circuit Acquires Hits

From page 52

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.

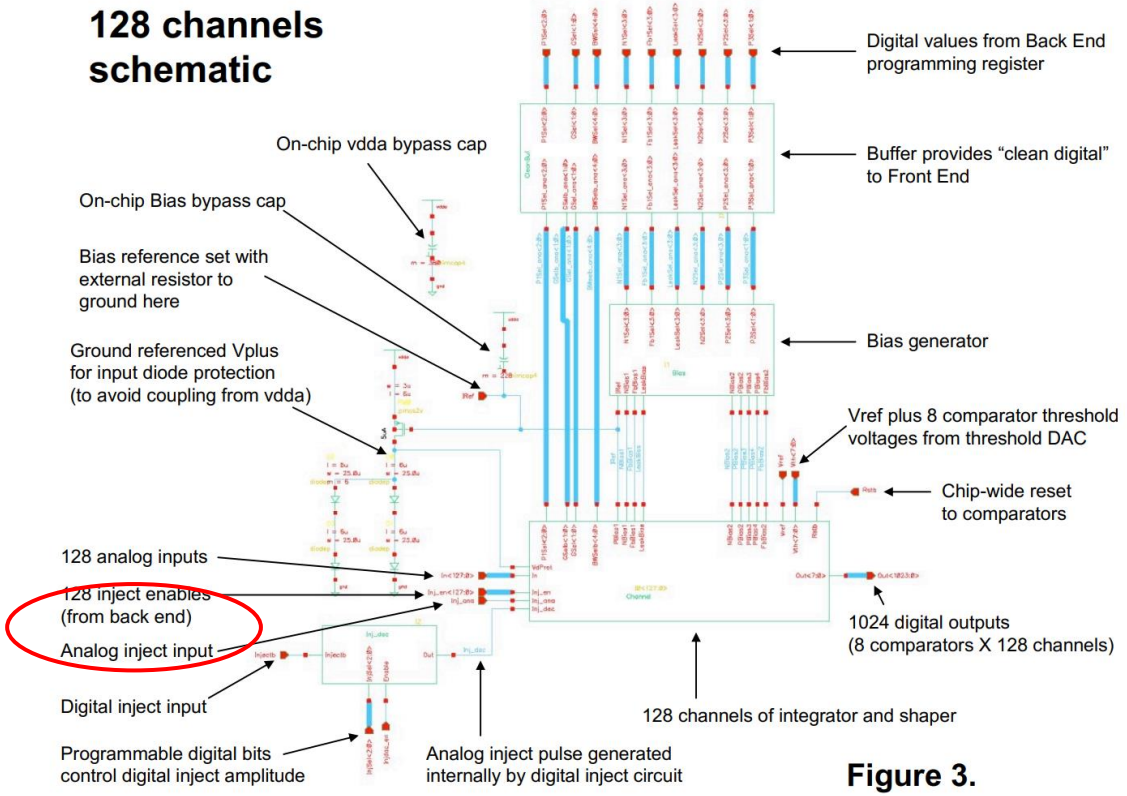


Figure 3.

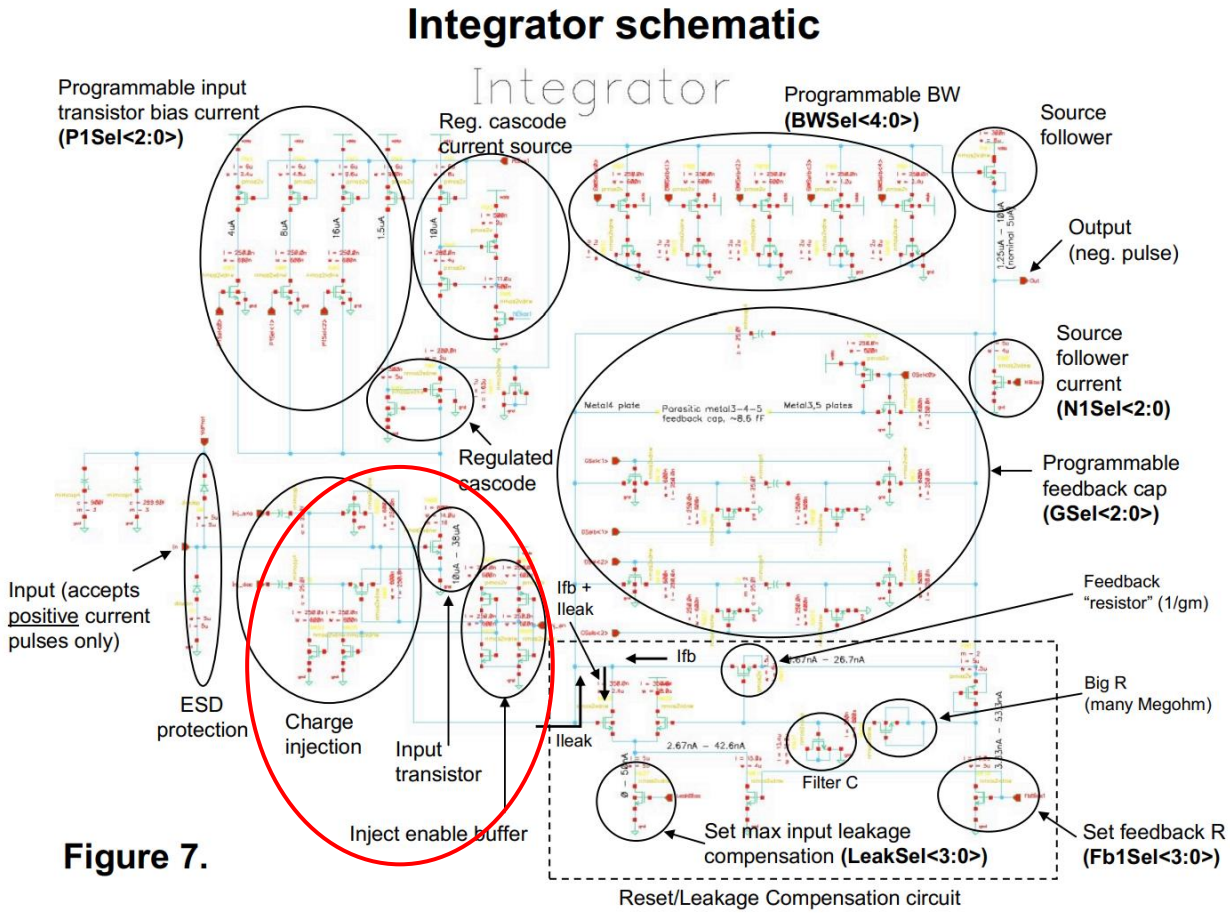


Figure 7.

From page 7 and 11

Bit 3 : Serial Output Order

- There’s no information about this bit, 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 error for serializer.
- Bit 1 will make channel stop to acquire data.
- Bit 2 will make front-end stop to accept calibration pulse.

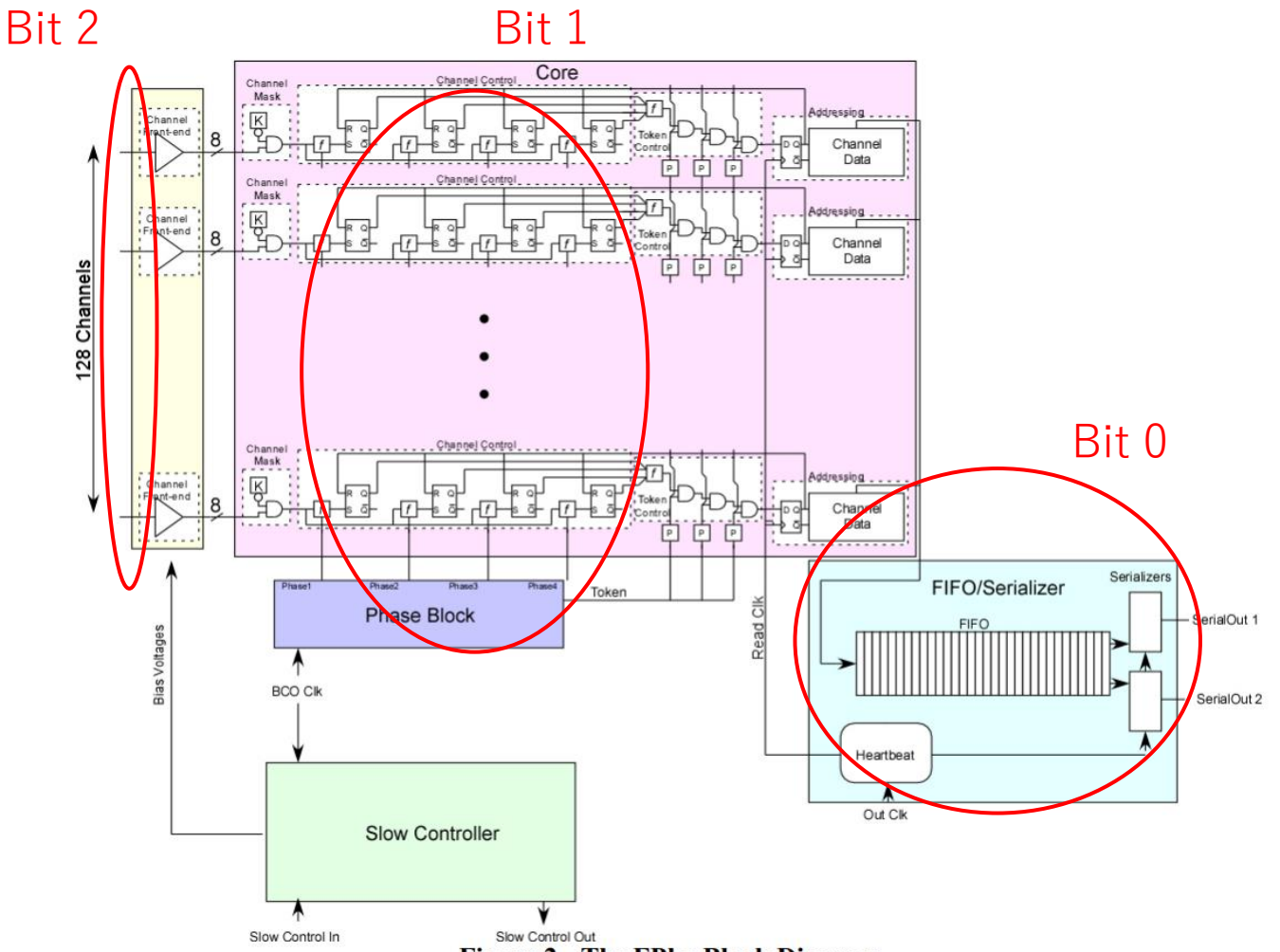


Figure 2 - The FPhx Block Diagram

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.

- Bit 2 (rejecting calibration data) is working well.

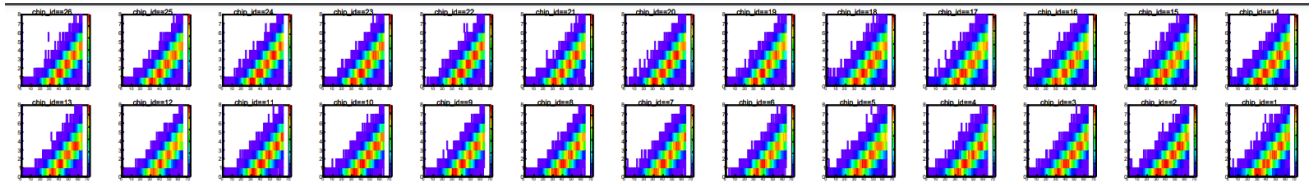
- But bit 1 seems not work.

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

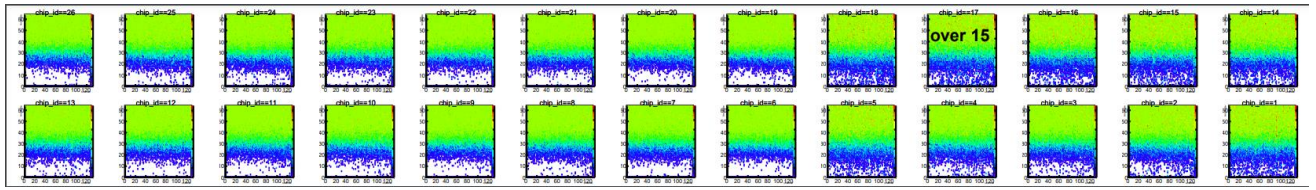
Sample

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

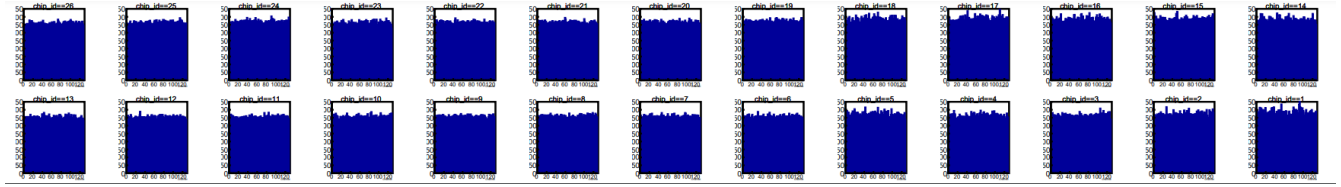
Adc vs amplitude



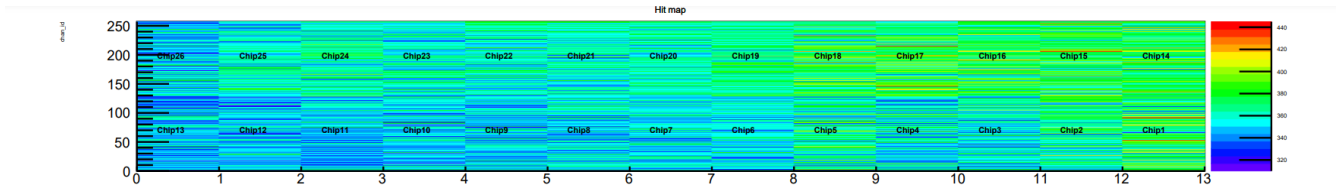
Amplitude vs channel



Entry vs channel

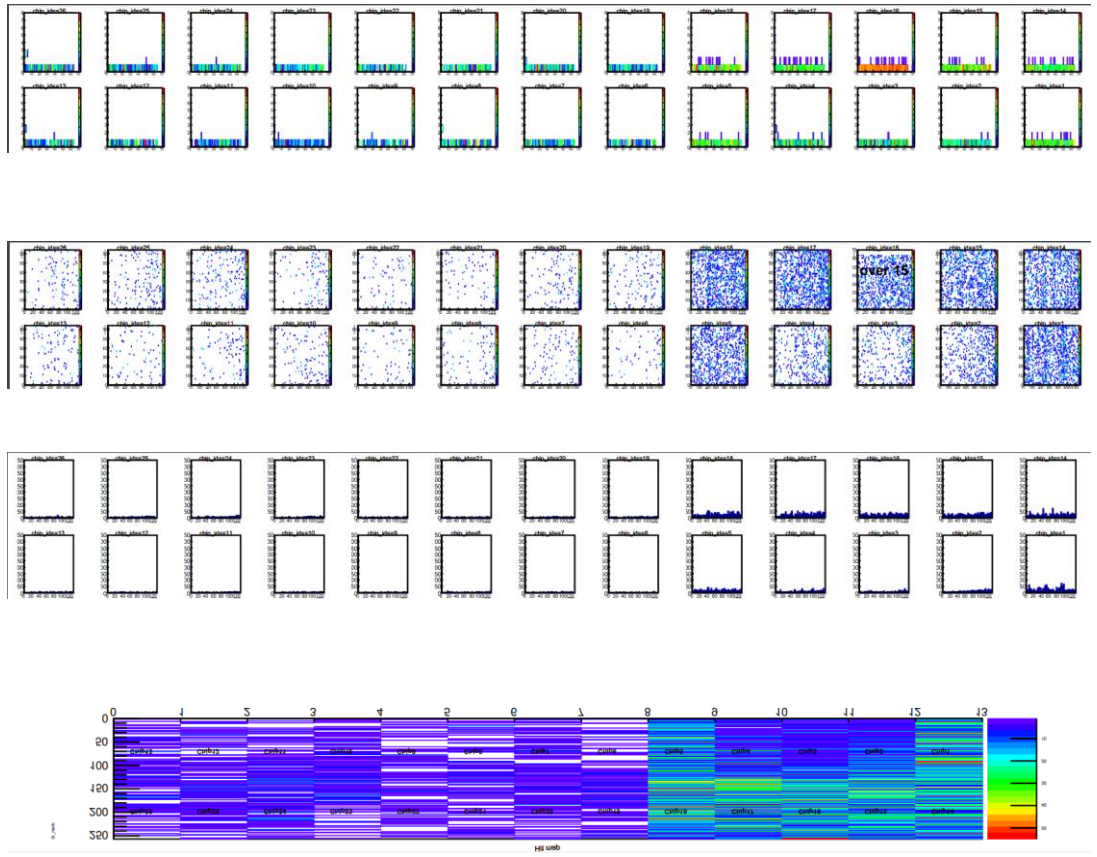


hitmap

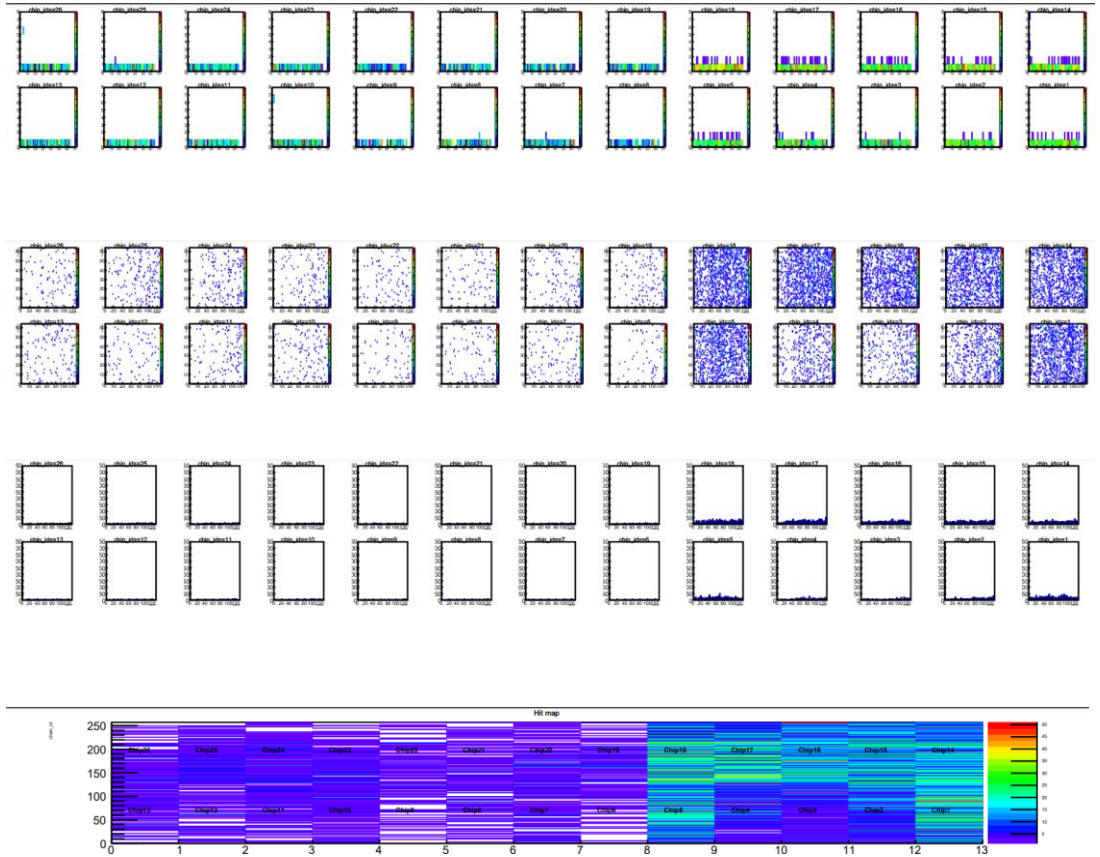


data

0000



0001



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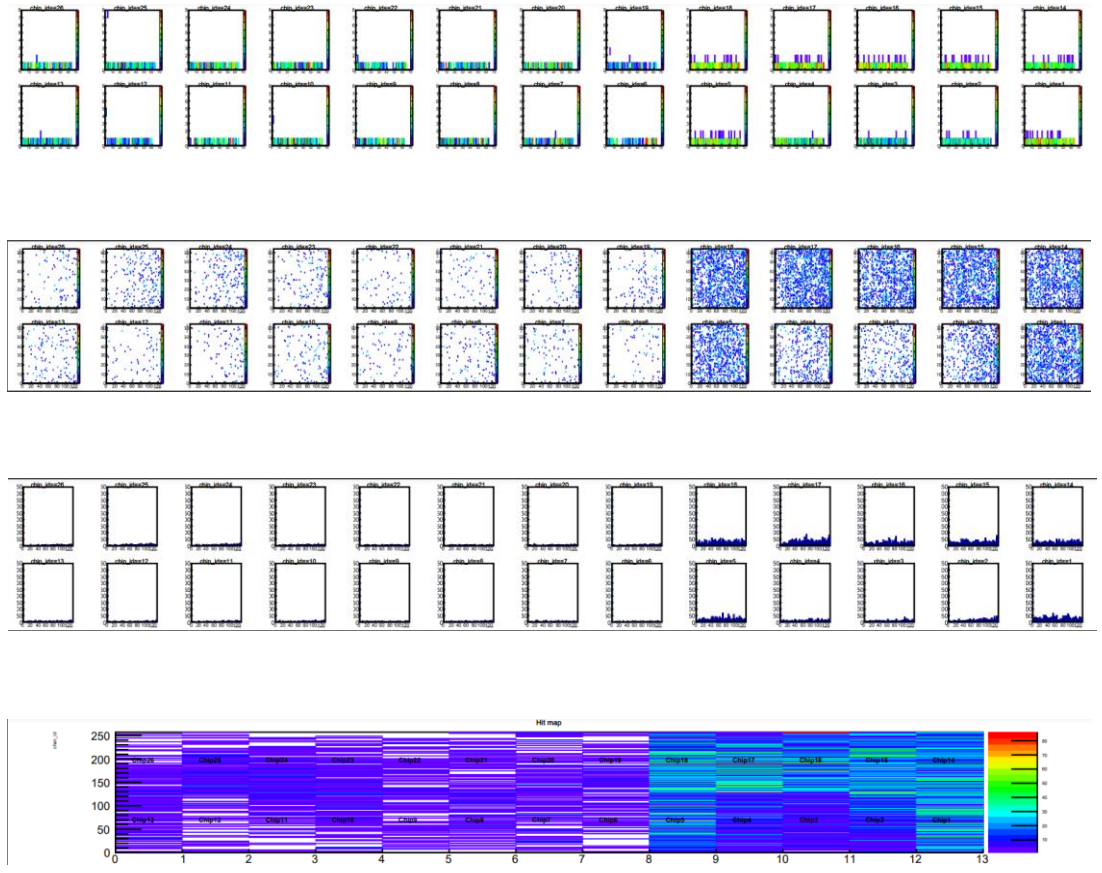

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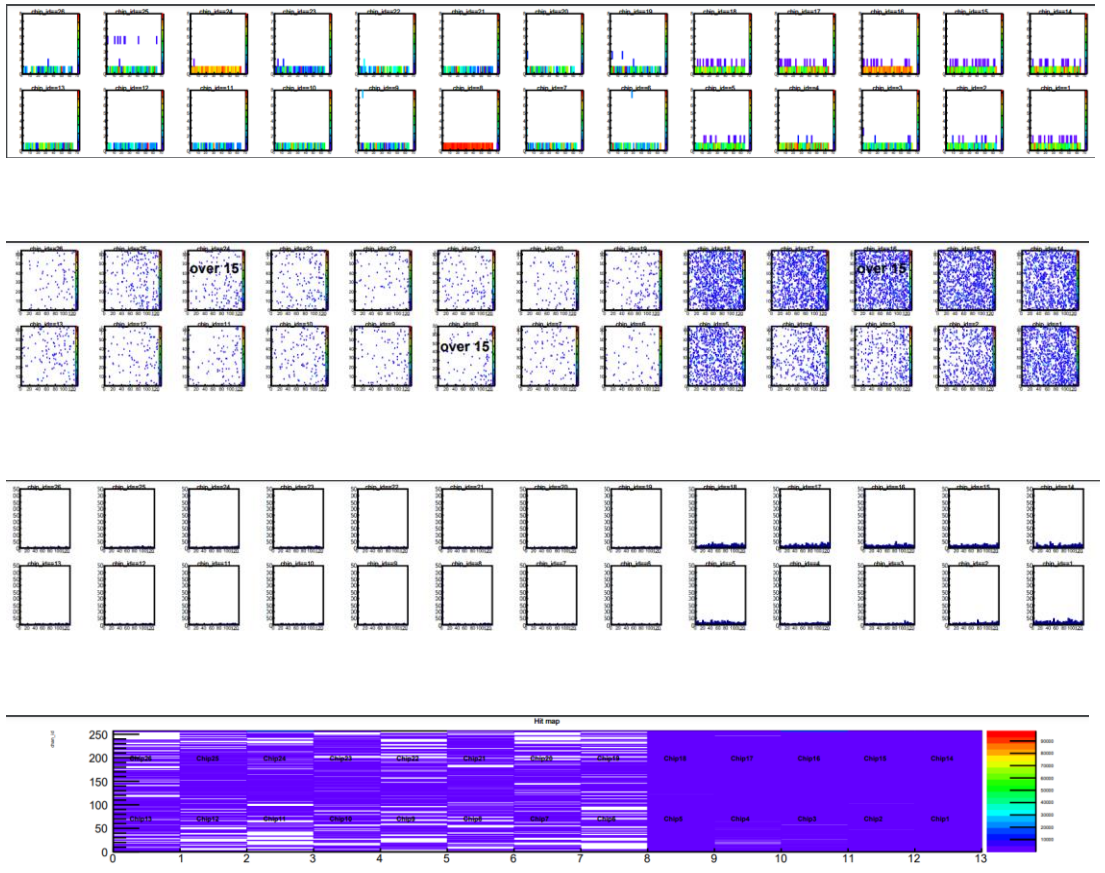

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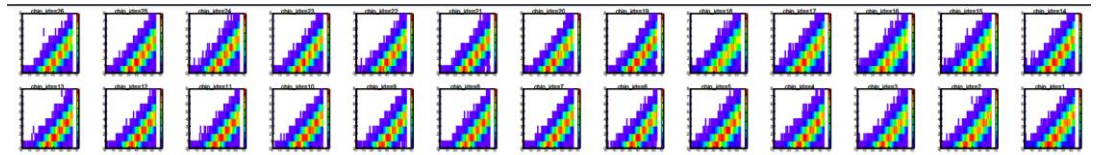
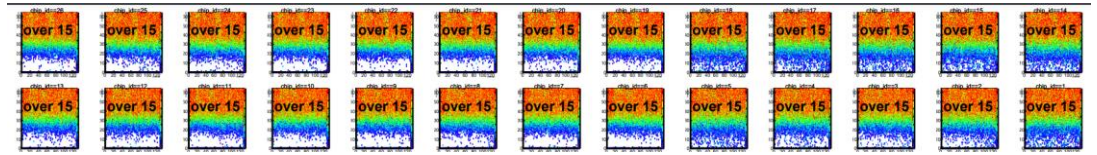
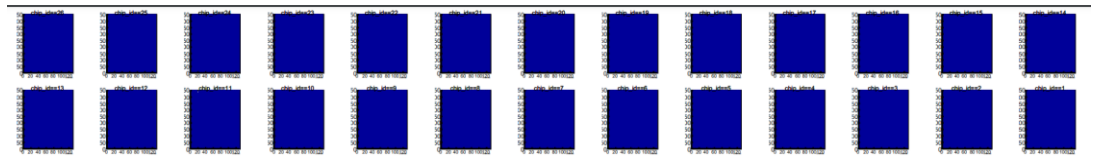
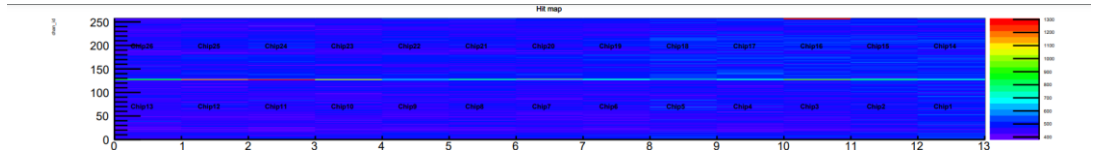
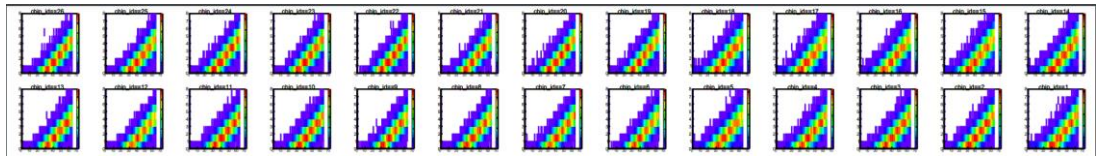


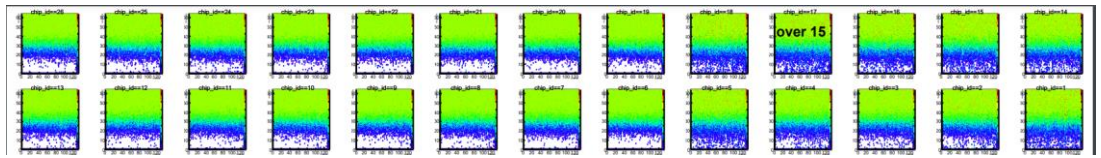


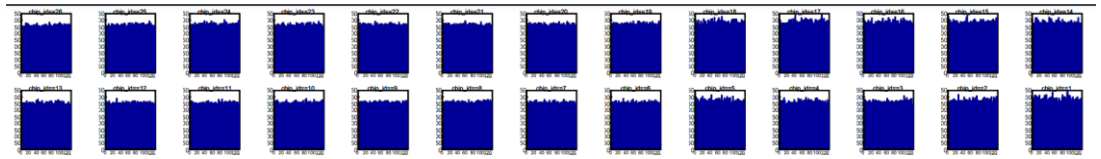


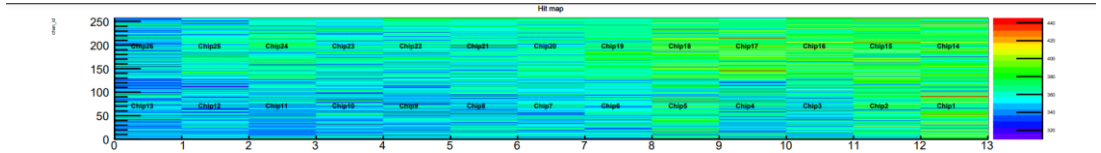


0101









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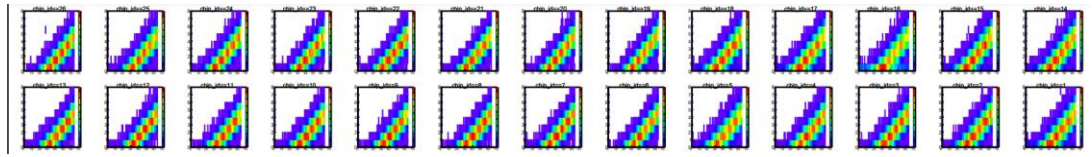

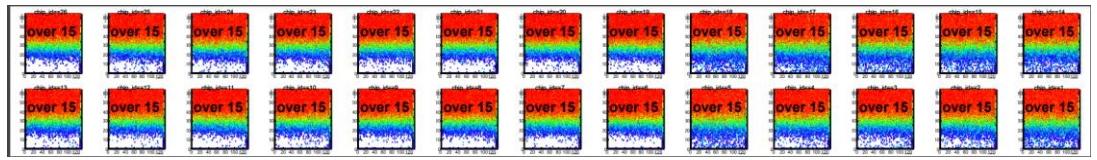

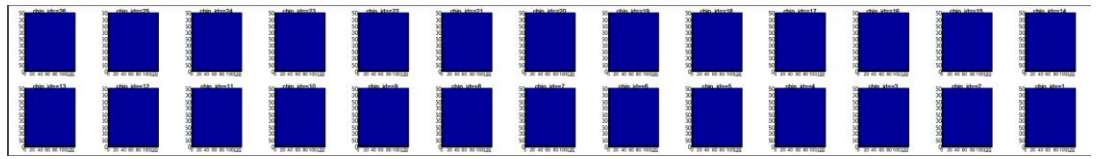

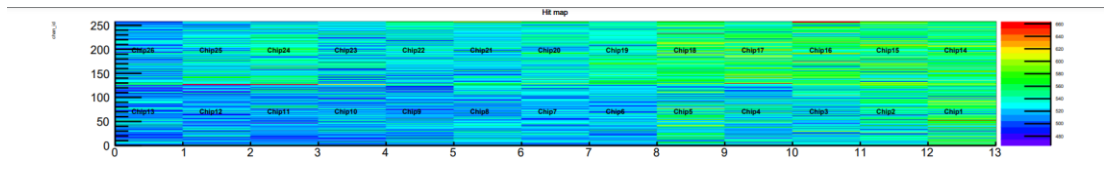

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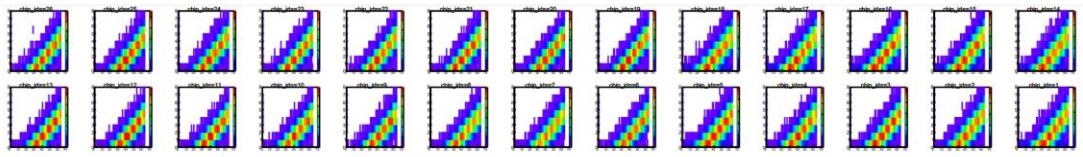

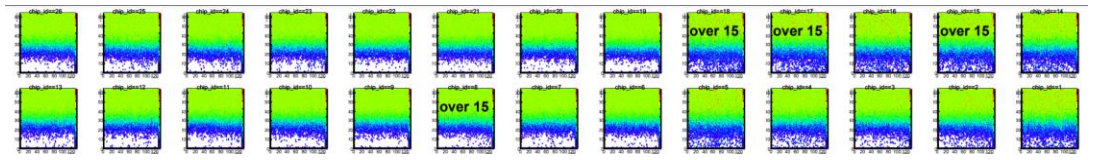

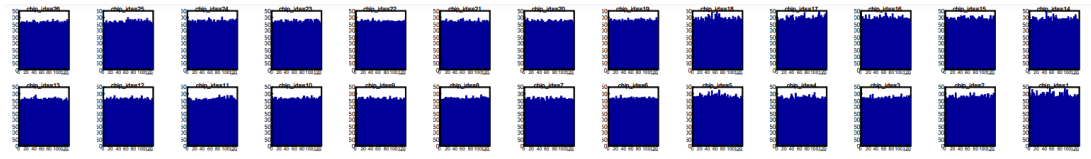

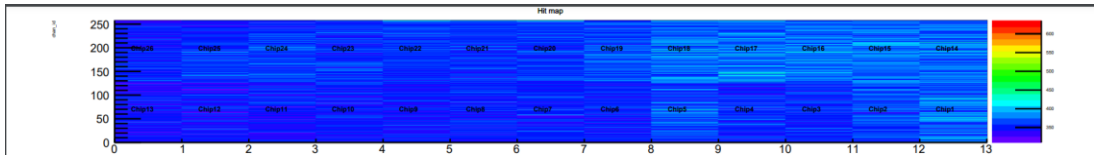

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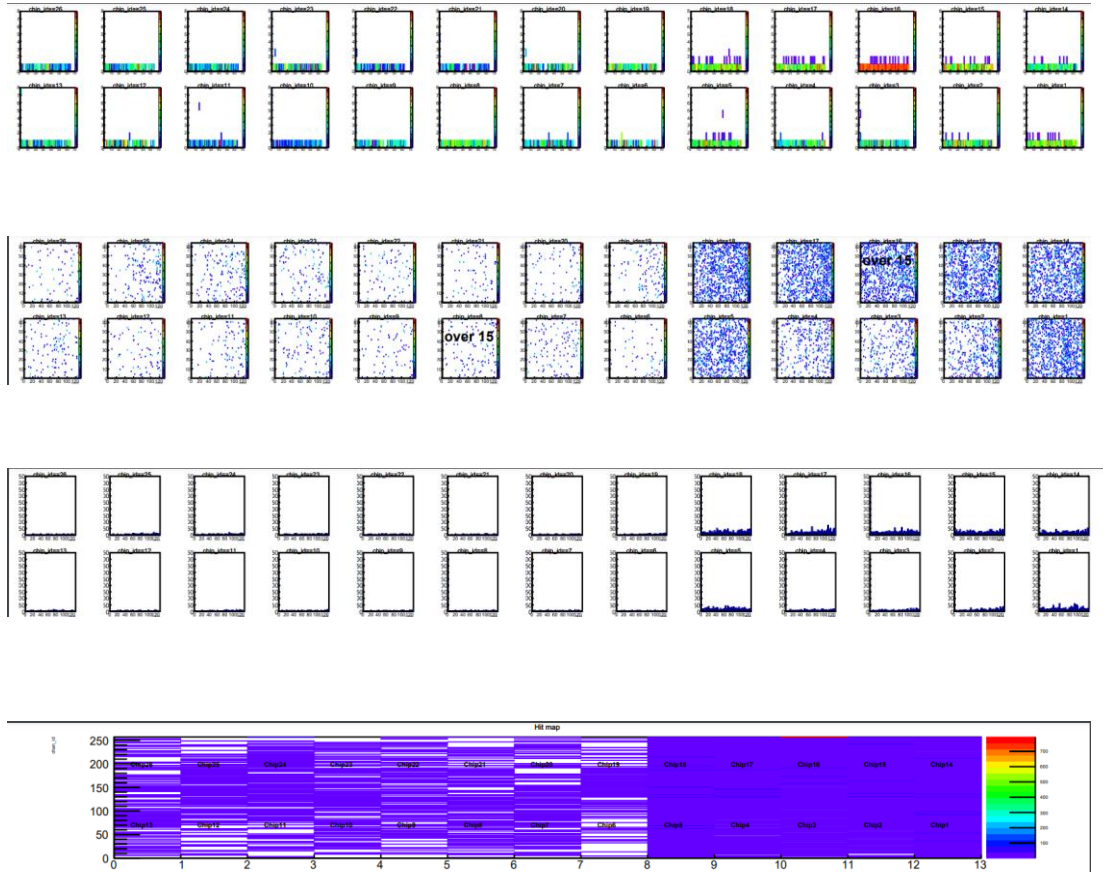

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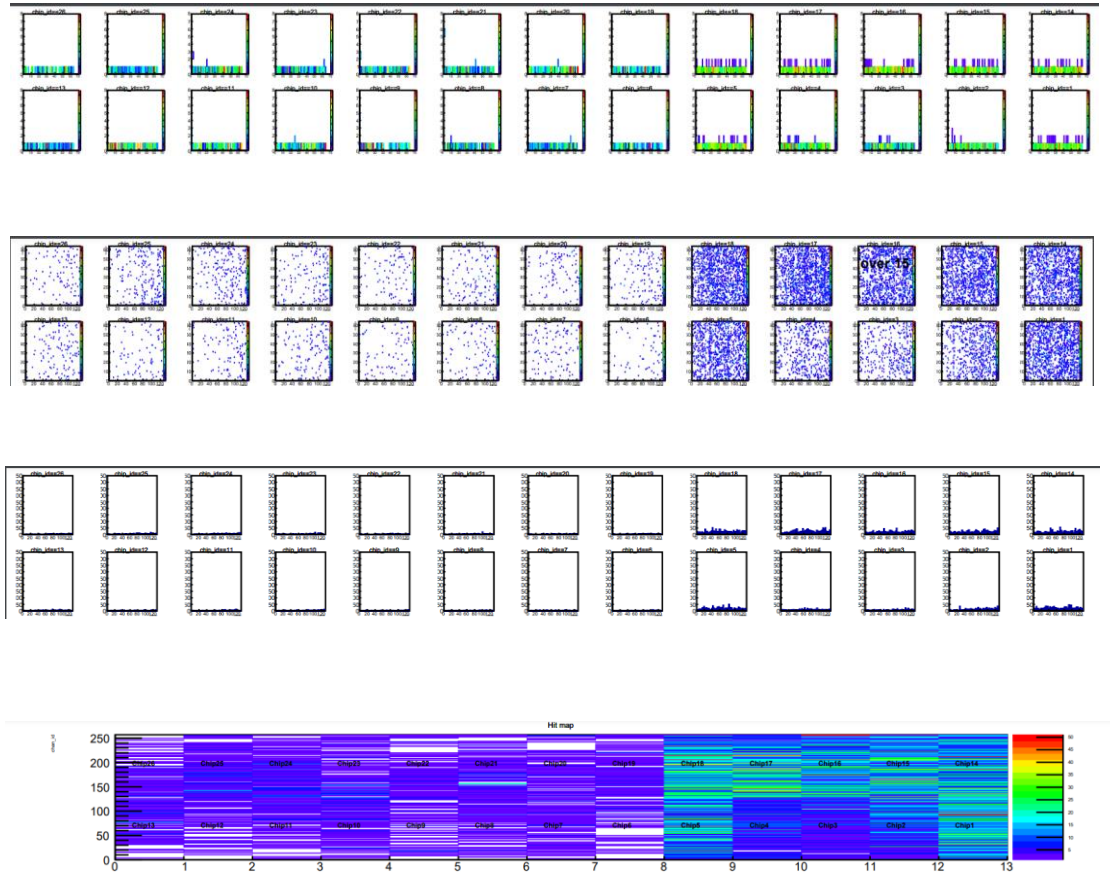

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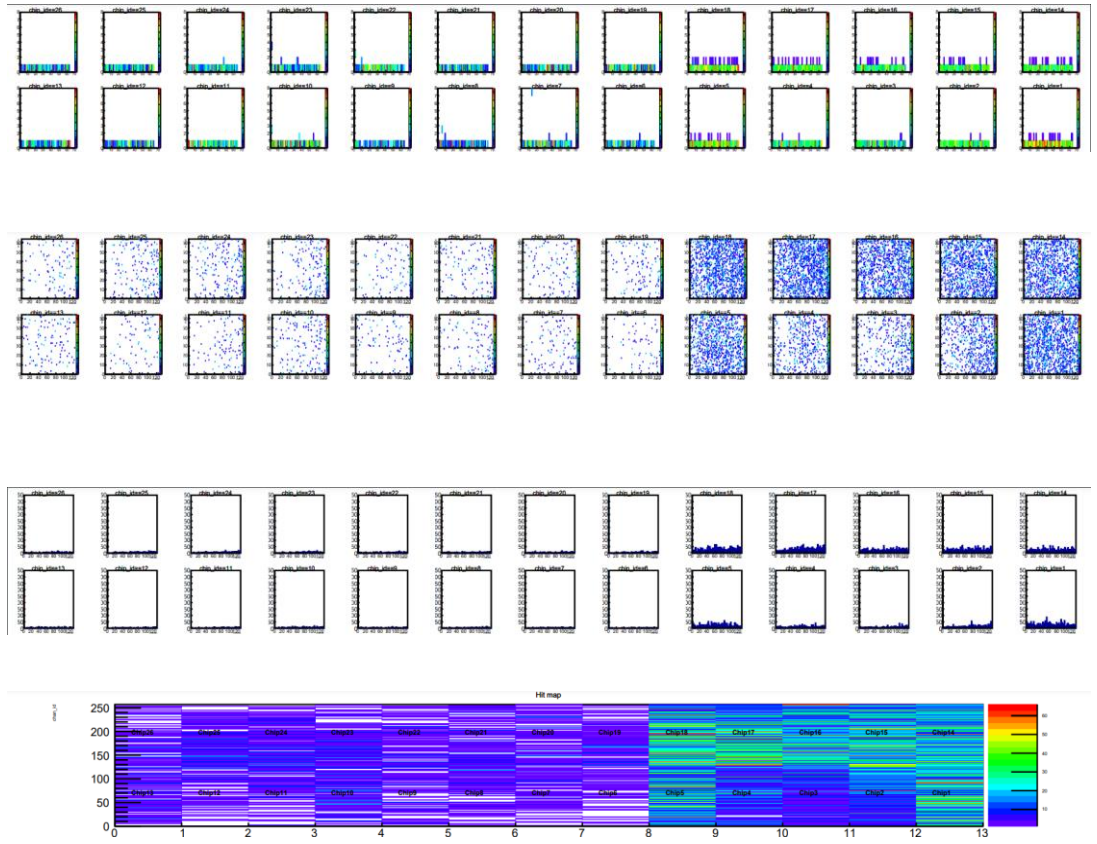

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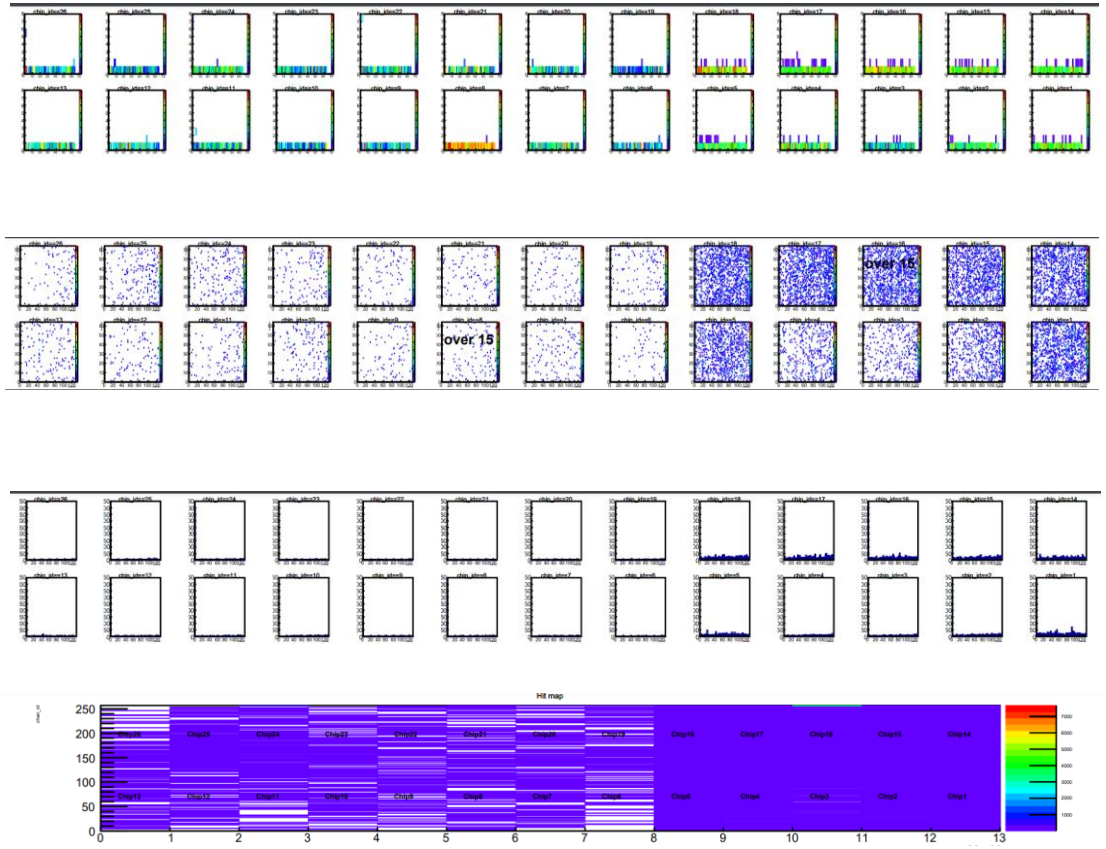

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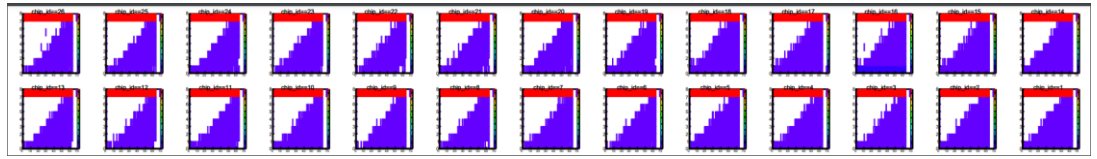

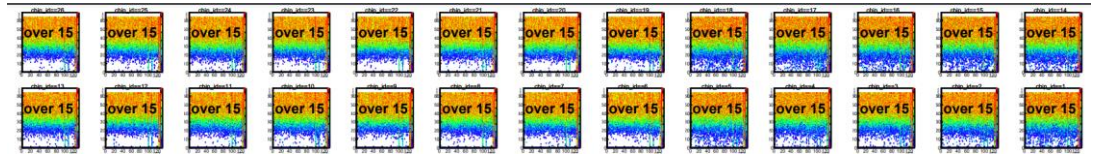

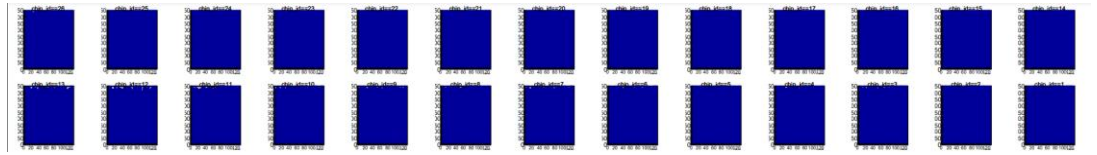

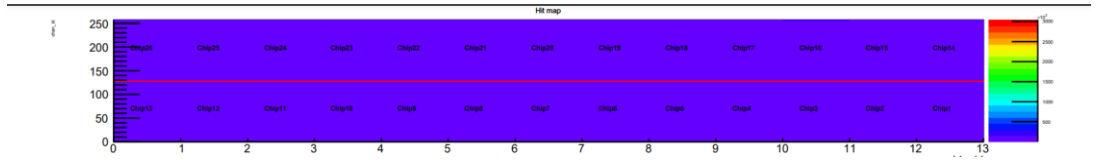

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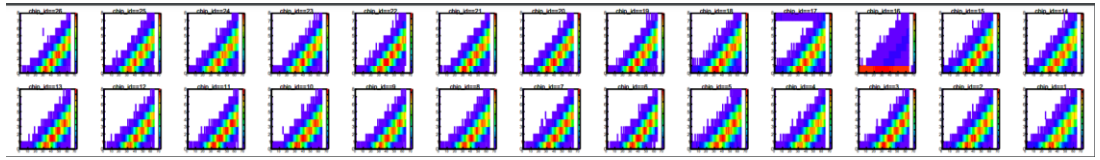

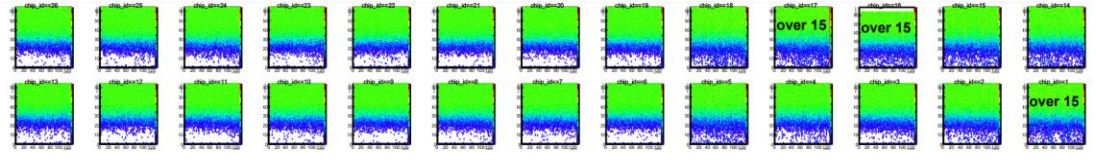

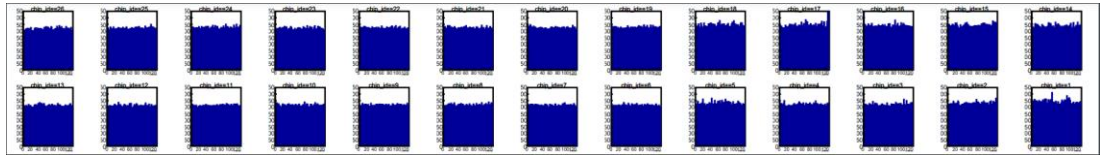

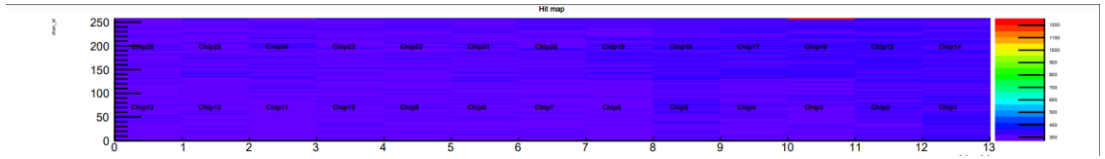

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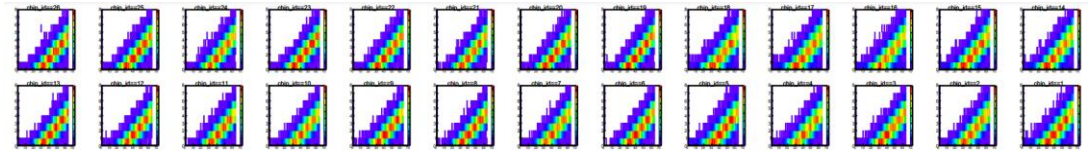
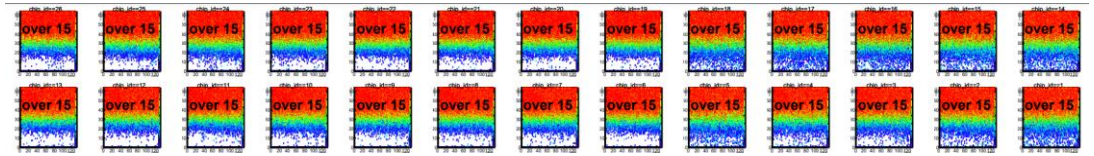
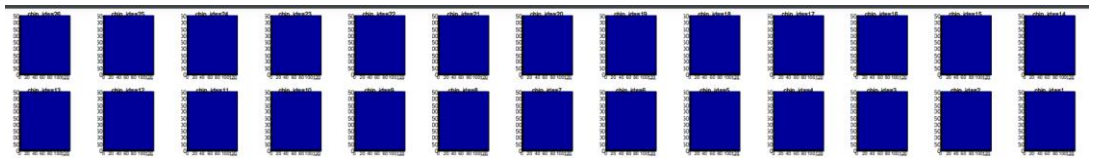
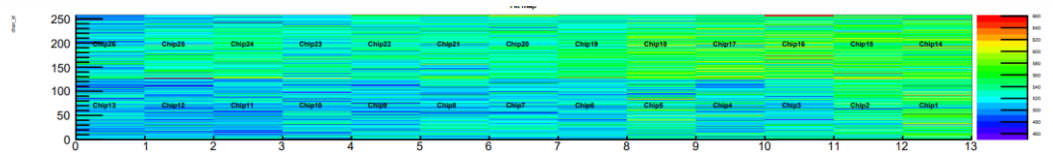



over 15

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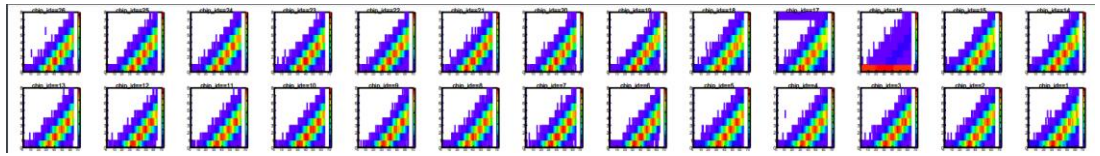
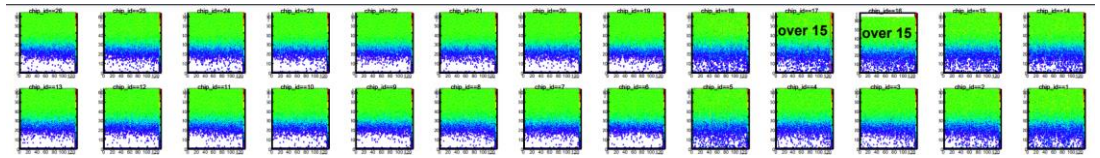
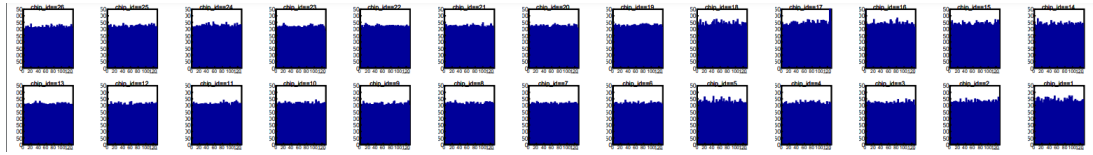
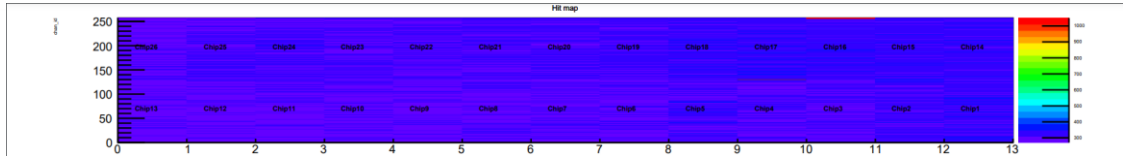



over 15
over 15




Hit map
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