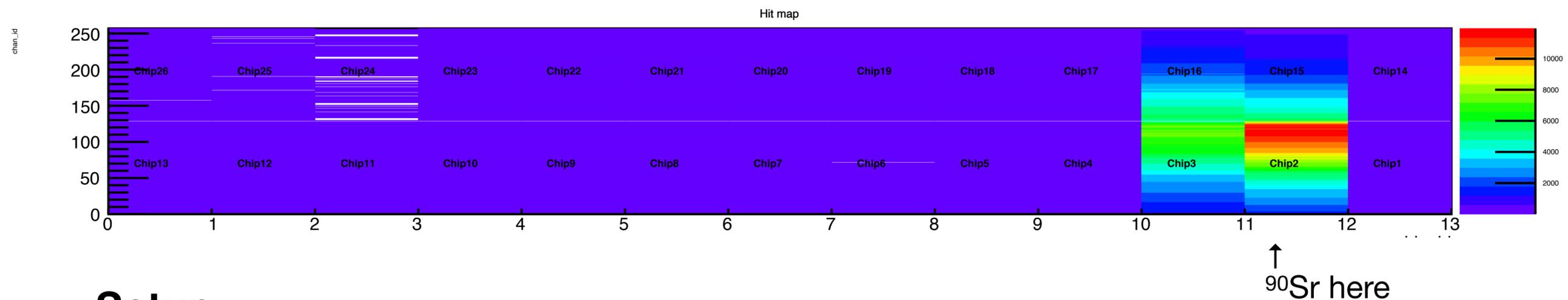
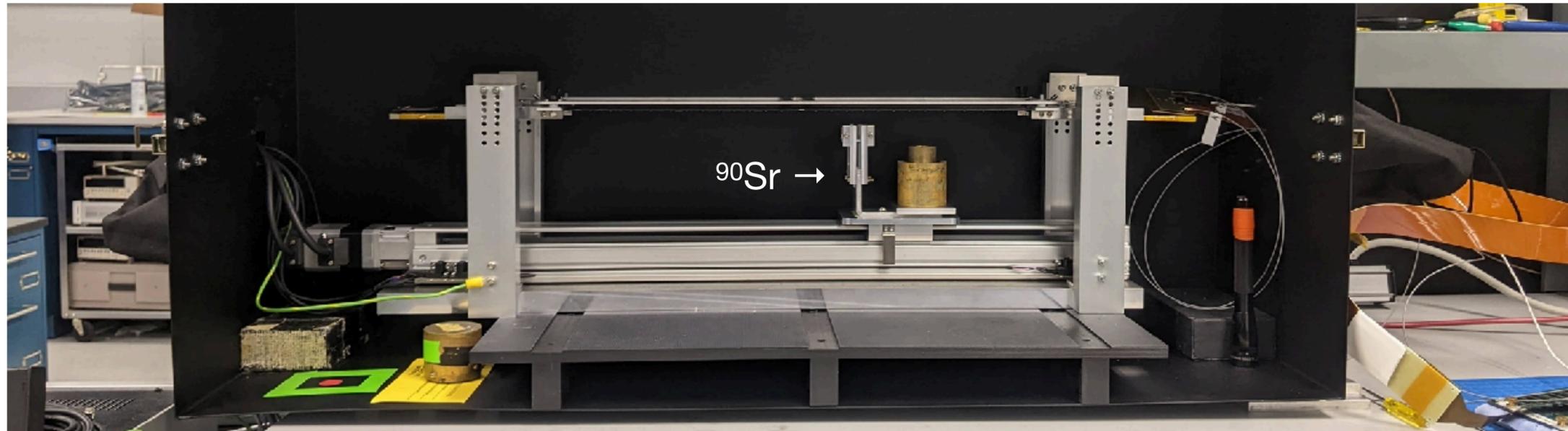


Radiation measurement with the Felix readout

Raul Cecato (BNL)

Genki Nukazuka (RBRC)

Measurement condition



Setup

Ladder: PB1-L007N

Duration: 5 min

^{90}Sr : below chip2&15

Measurements

- FEM/FEM-IB slow control + **FEM readout**
- FEM/FEM-IB slow control + **Felix readout**

Data

Setup

Ladder: PB1-L007N

Duration: 5 min

⁹⁰Sr: below chip2&15

FEM readout

Measurement Duration (min) **5**

Parameters Module, chip, ch, ADC, BCO, BCOfull, etc

#hits from C3 port **2176188**

#hits on chip2 from C3 port **867372**

Felix readout

Measurement Duration (min) **5**

Parameters Chip, ch, ADC, BCO,

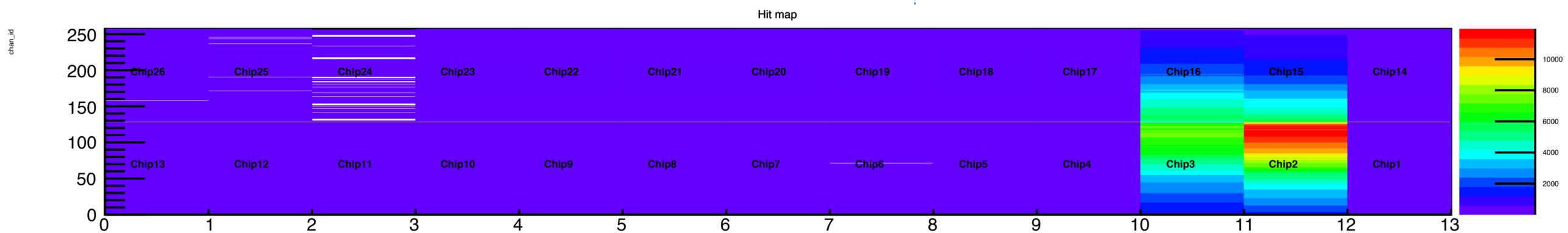
#hits from C3 port **6973600**

#hits on chip2 from C3 port **2359665**

Felix/FEM

320%

272%



Data: BCO distribution

Setup

Ladder: PB1-L007N

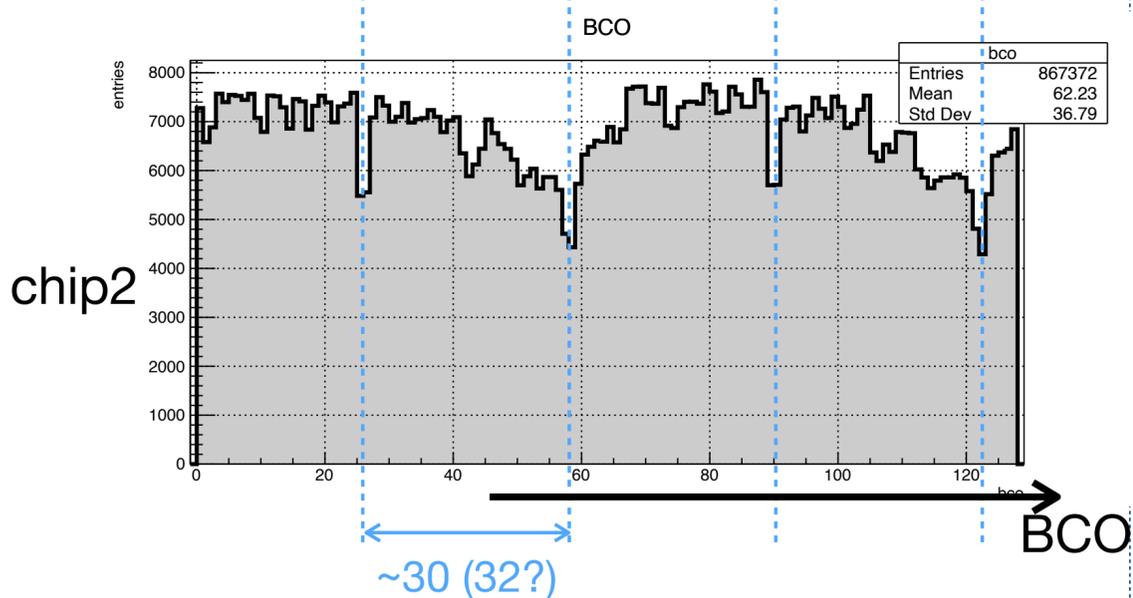
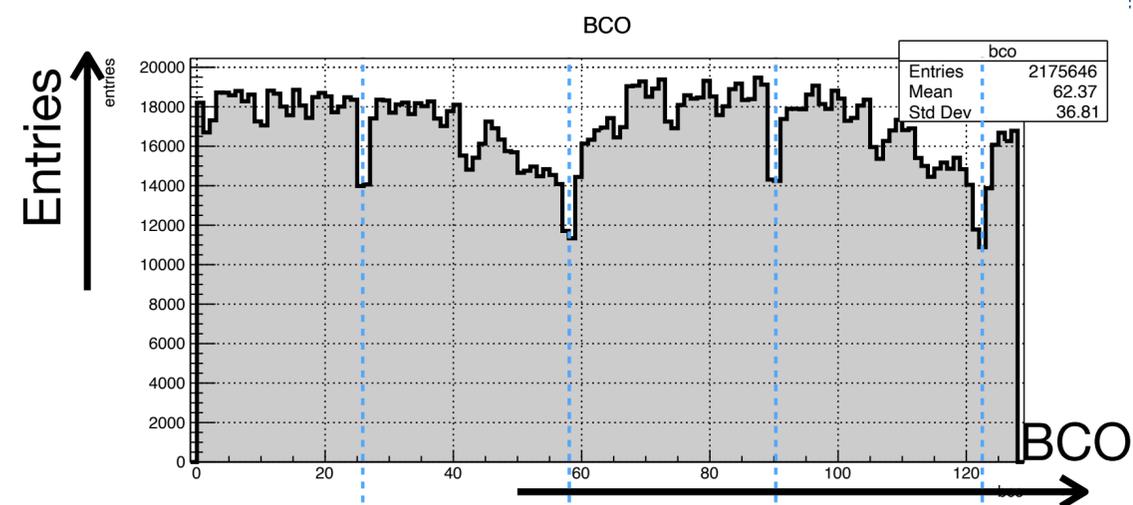
Duration: 5 min

⁹⁰Sr: below chip2&15

FEM readout

Measurement Duration (min) 5

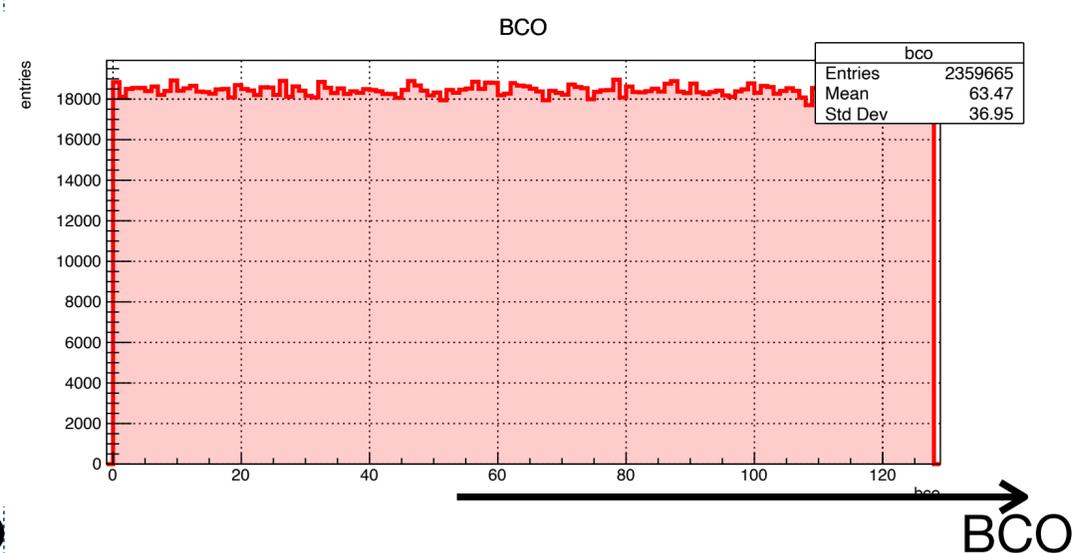
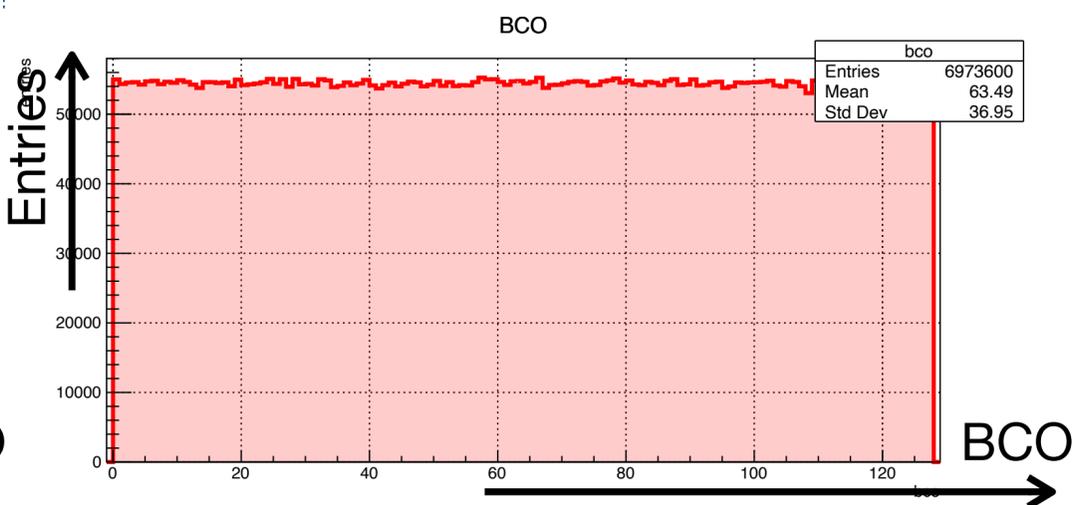
Parameters Module, chip, ch, ADC, BCO, BCOfull, etc



Felix readout

Measurement Duration (min) 5

Parameters Chip, ch, ADC, BCO.



The BCO distribution is predictable: random distribution.

BCO 1D distribution

FEM readout obtained a surprisingly dirty distribution.

Data: Chip distribution

Setup

Ladder: PB1-L007N

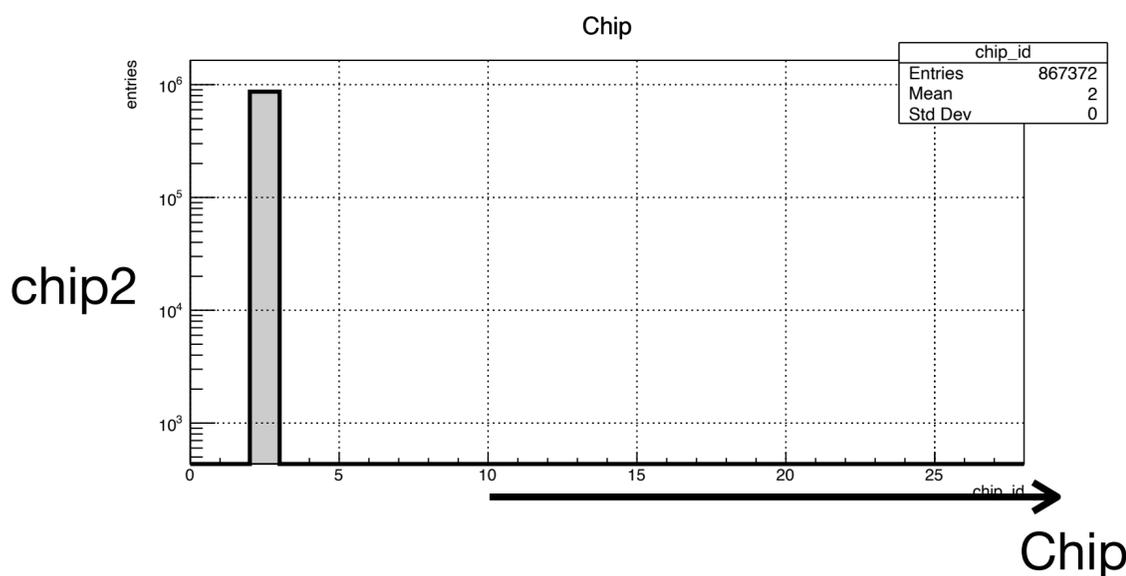
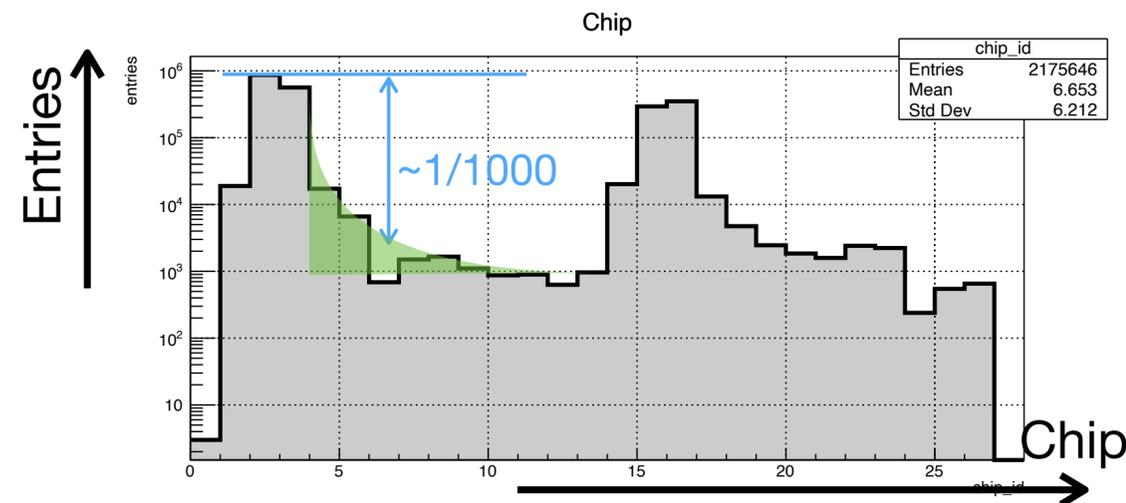
Duration: 5 min

⁹⁰Sr: below chip2&15

FEM readout

Measurement Duration (min) 5

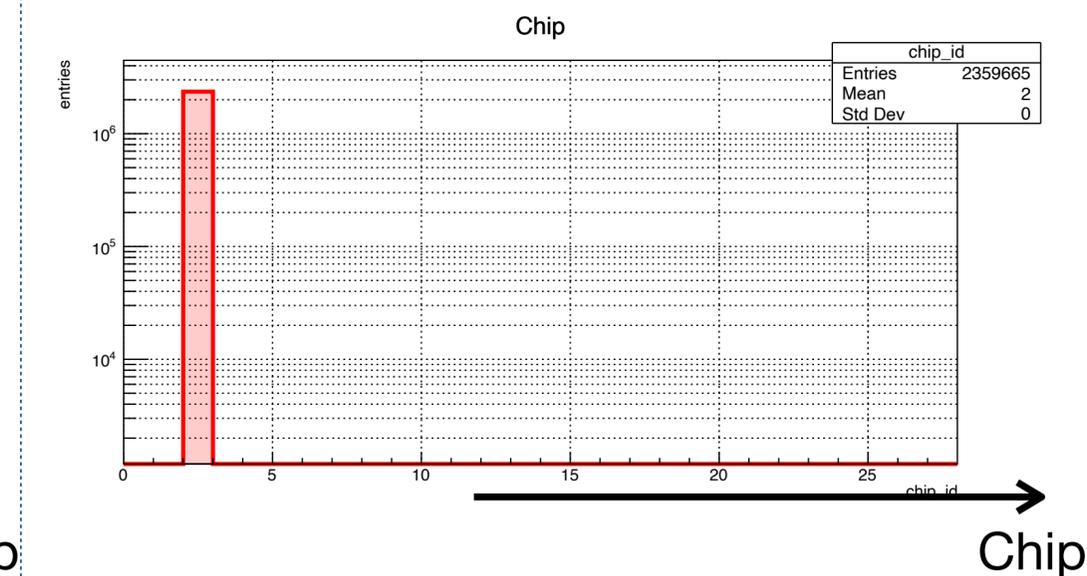
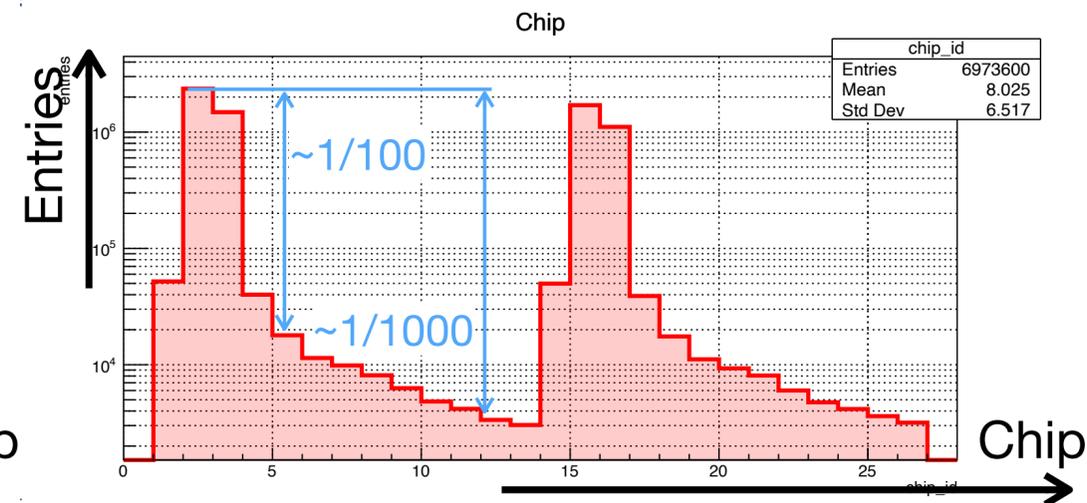
Parameters Module, chip, ch, ADC, BCO, BCOfull, etc



Felix readout

Measurement Duration (min) 5

Parameters Chip, ch, ADC, BCO.



The chip distribution is more or less predictable: peaks in chip2, 3, 15&16.

BCO 1D distribution

Why are hits on chip0, which doesn't exist?

FEM readout: Chips except the hot chips have $\sim 1/1000$ events wrt the peaks and almost the same amount.

Felix readout: Chips except the hot chips have from $1/100 - 1/1000$ events wrt the peaks.

Data: Channel distribution

Setup

Ladder: PB1-L007N

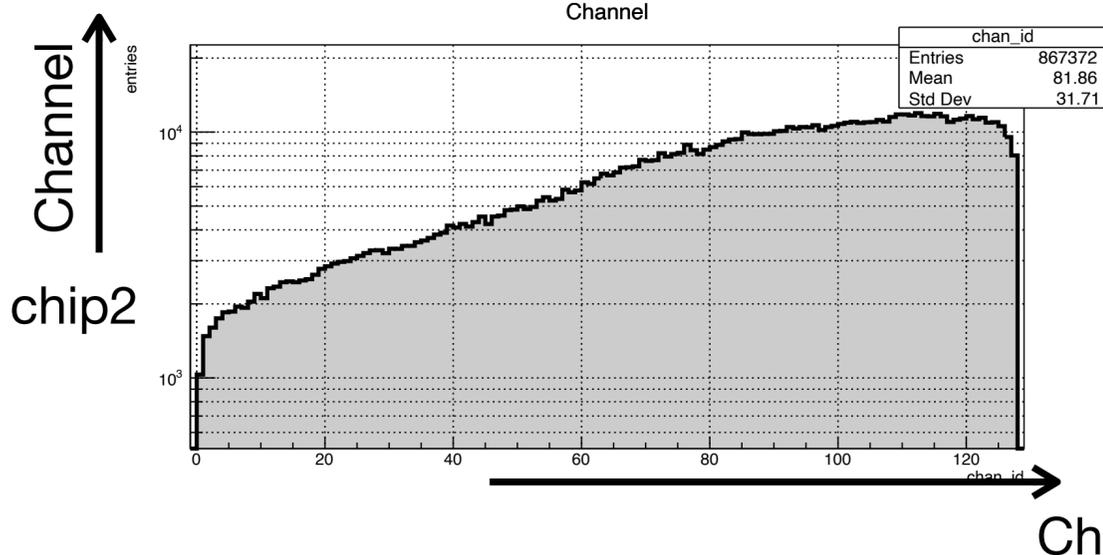
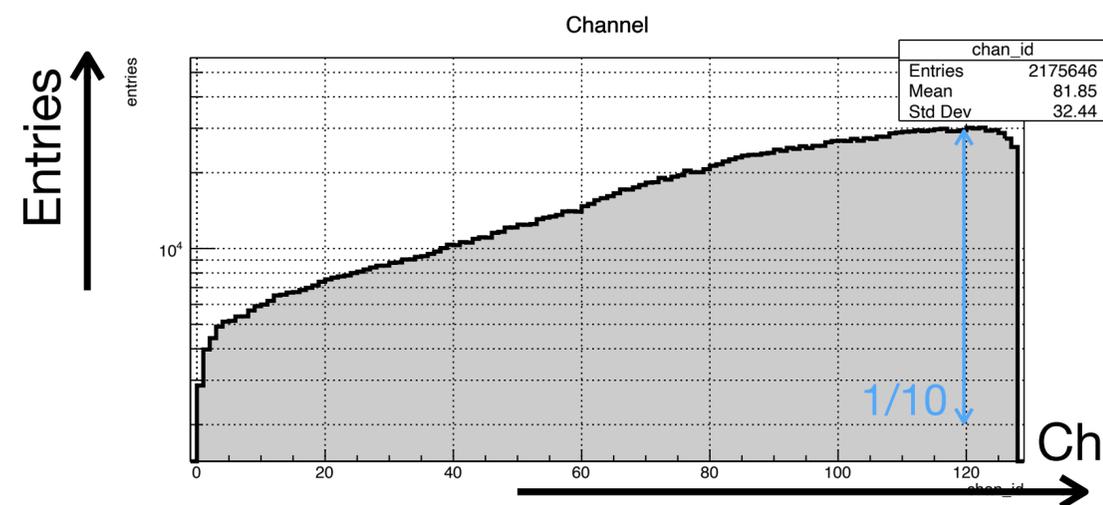
Duration: 5 min

⁹⁰Sr: below chip2&15

FEM readout

Measurement Duration (min) 5

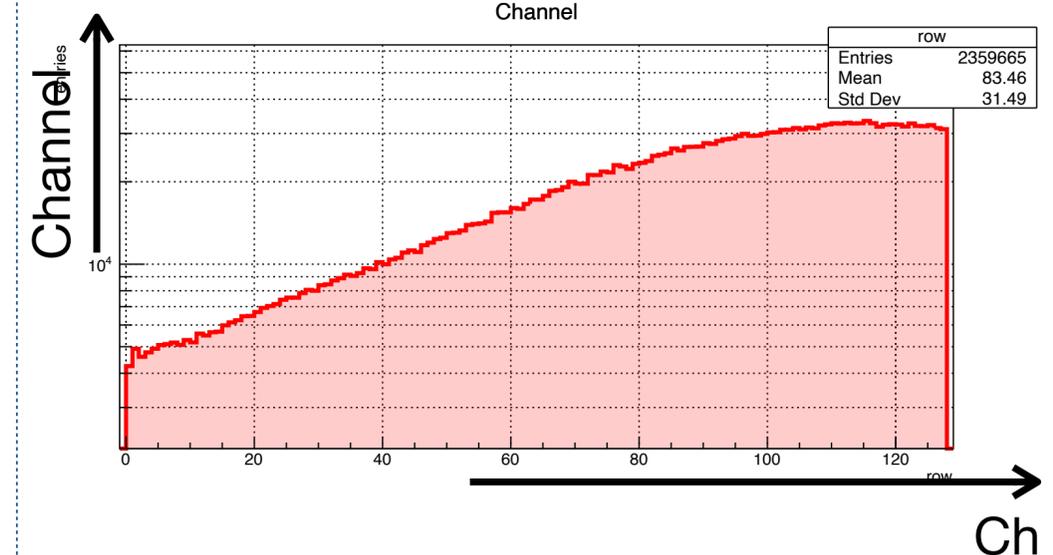
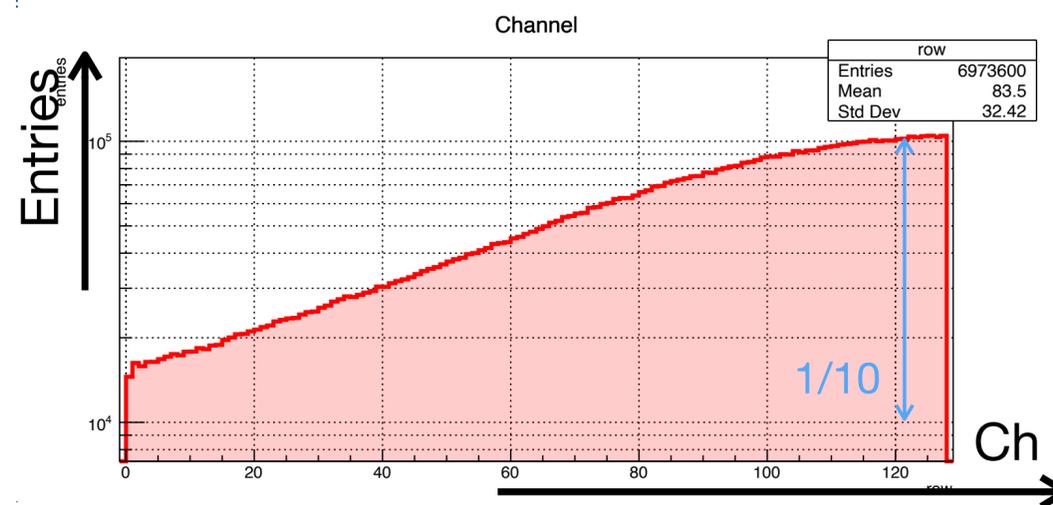
Parameters Module, chip, ch, ADC, BCO, BCOfull, etc



Felix readout

Measurement Duration (min) 5

Parameters Chip, ch, ADC, BCO.



The channel distribution should be smooth.

BCO 1D distribution

FEM readout: Drops on both ends of the distribution can be seen as usual.

Felix readout: No drop can be seen.

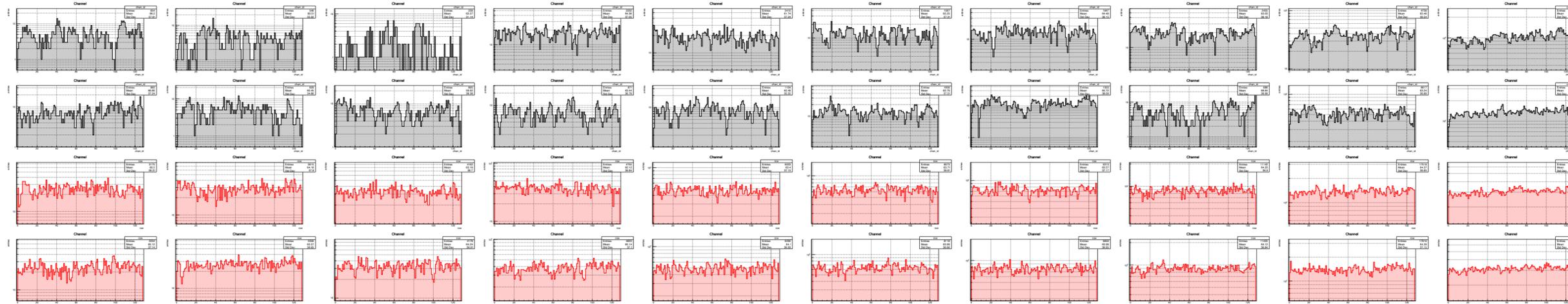
Data: Channel distribution of a chip

chip26

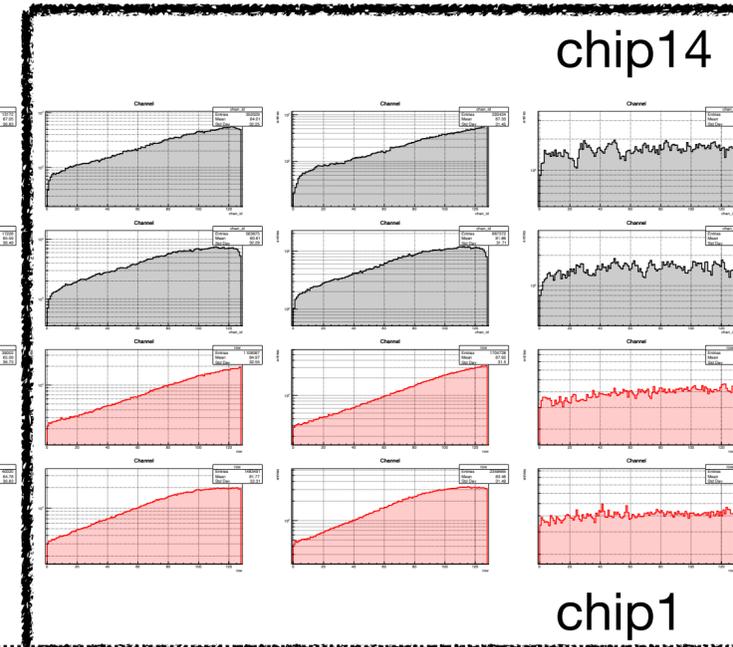
FEM

Felix

chip13



chip14



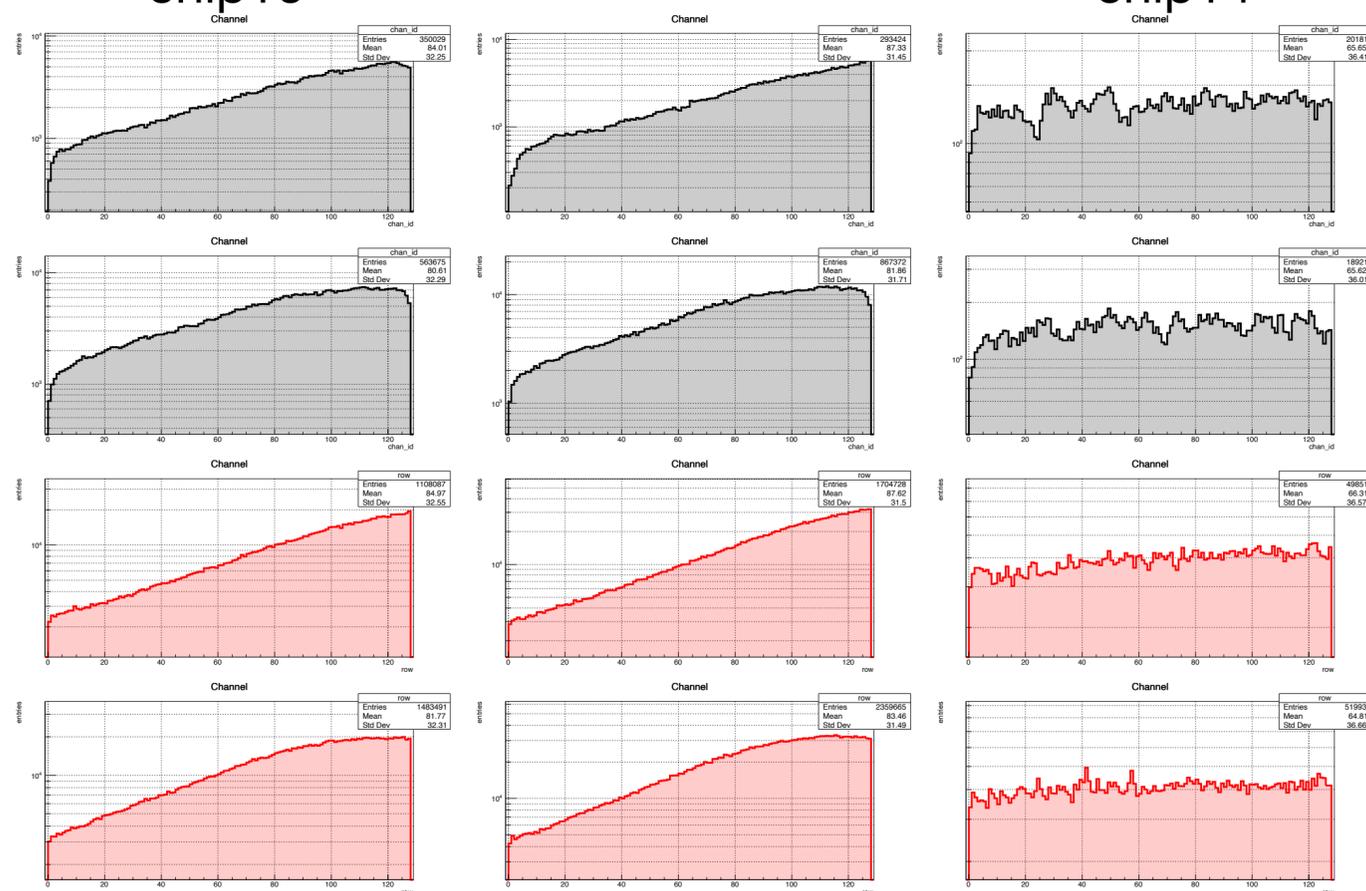
chip1

chip16

chip14

FEM

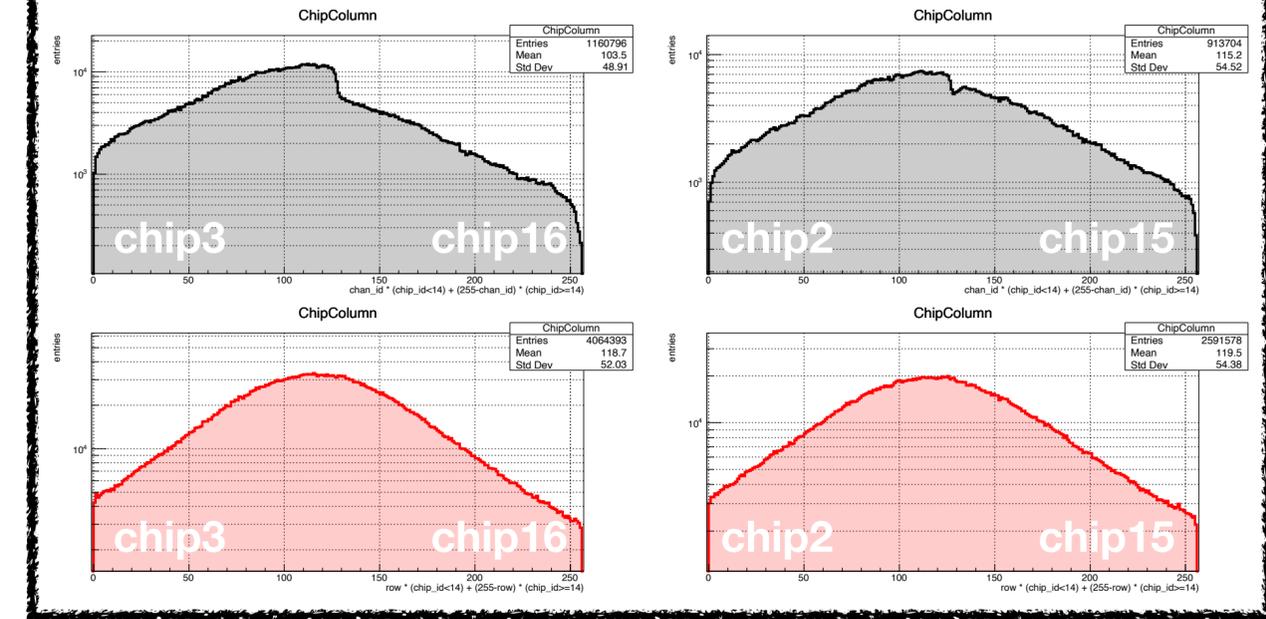
Felix



chip3

chip1

If chip columns are connected:



Setup

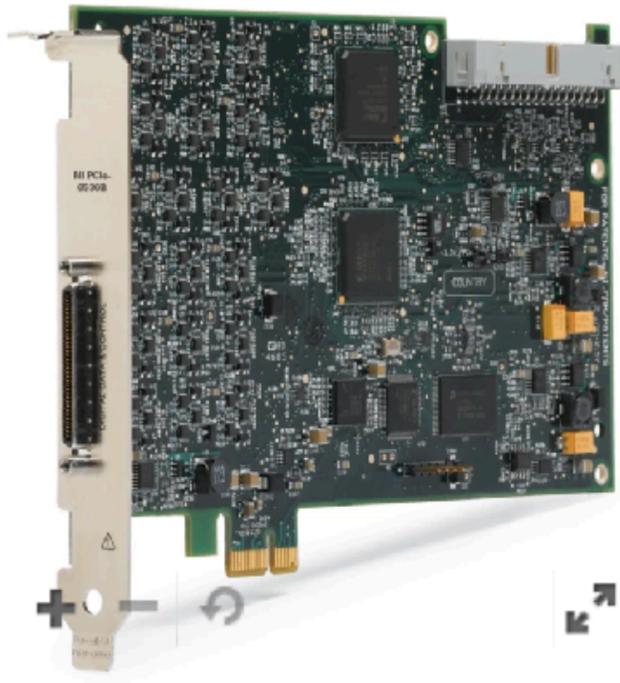
Ladder: PB1-L007N

Duration: 5 min

⁹⁰Sr: below chip2&15

Comparison of the hot chips 2, 3, 15, and 16 is possible. In all cases, Felix readout got smooth distribution without drops on the edges.

NI's DAQ board PCIe-6536B



PCIe-6536B
Digital I/O Device

Starting from \$ 3,766.00

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32-Channel, 25 MHz, 100 MB/s Digital I/O Device—The PCIe-6536 can continuously stream data over the PCI Express bus. It's an ideal solution for interfacing and testing image sensors or display panels. The module is also well-suited for other common digital applications such as pattern I/O, change detection, protocol emulation, or other custom digital interfacing. It features selectable voltage levels and per-channel directional control of the digital lines.

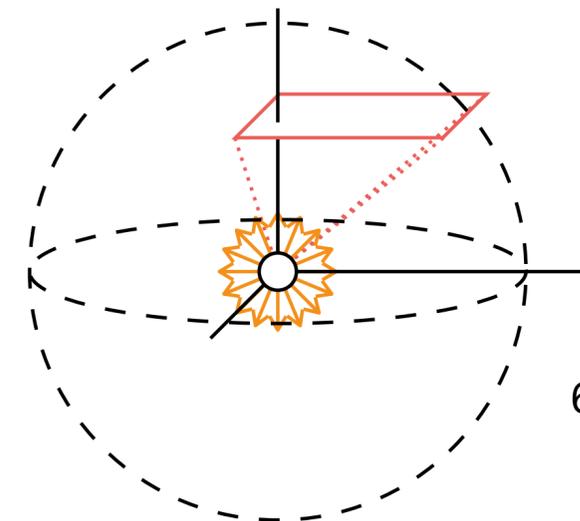
I didn't find the dead time when reading out... I'll ask at the NI support forum.

Next steps (if Raul is available)

I'd like to perform some additional measurements:

- different source position
- lower intensity (by collimator?)
- measurements without the source

The #hit difference (Felix got $\times 3$ more hits than FEM) may be explained by a rough estimation of the source intensity with acceptance correction. I'm trying.



6.3 Rd/h @ contact (July/6/2021)