

DAQ testbeam analysis

(tile related issues and ideas)

2020.05.11

Tiancheng Zhong

Goals of testbeam

- Read out data of 3 sub-detectors with one DAQ system
- Check correlation between different sub-detectors
 - Spatial
 - Timing

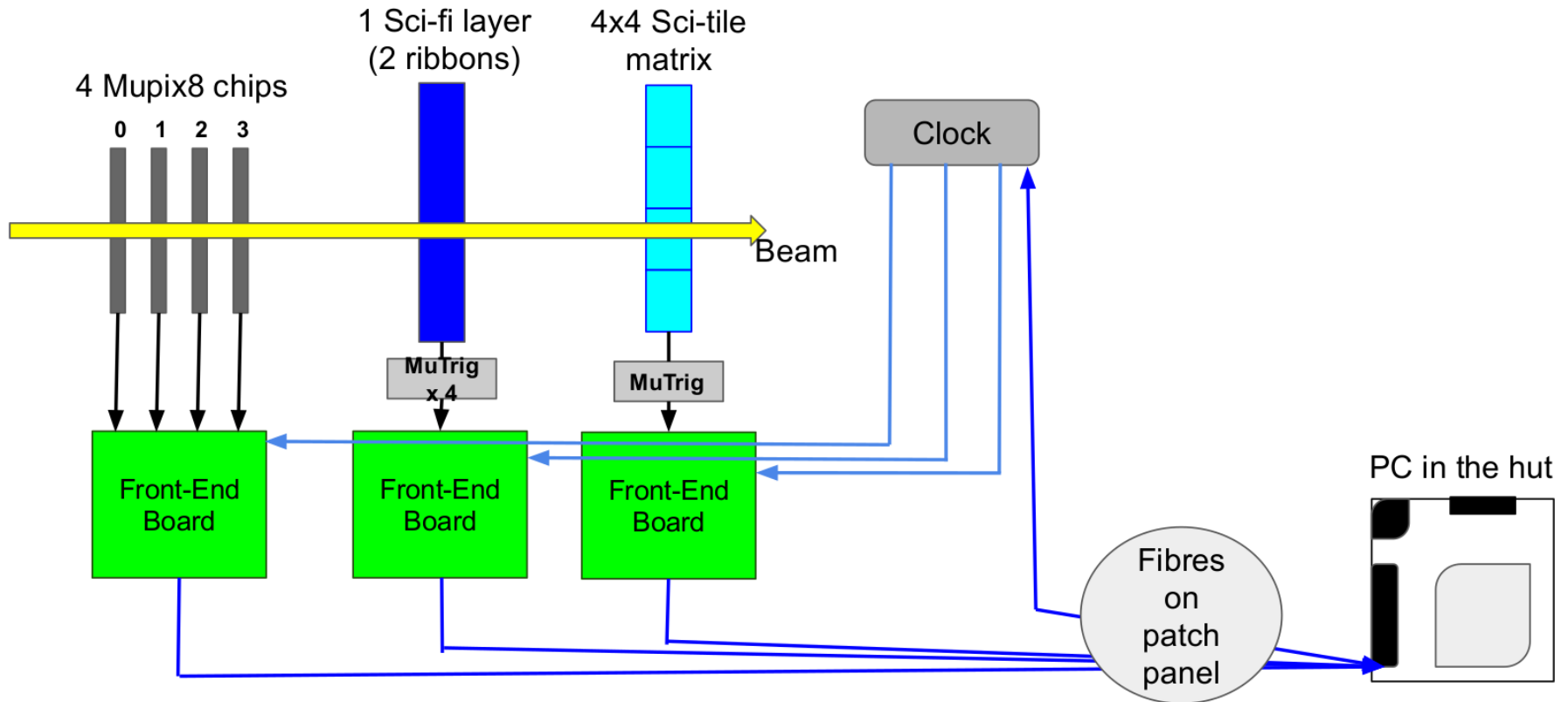
Goals of testbeam

- Read out data of 3 sub-detector with one DAQ system
- Check correlation between different sub-detectors
 - Spatial
 - Timing: not fully understood

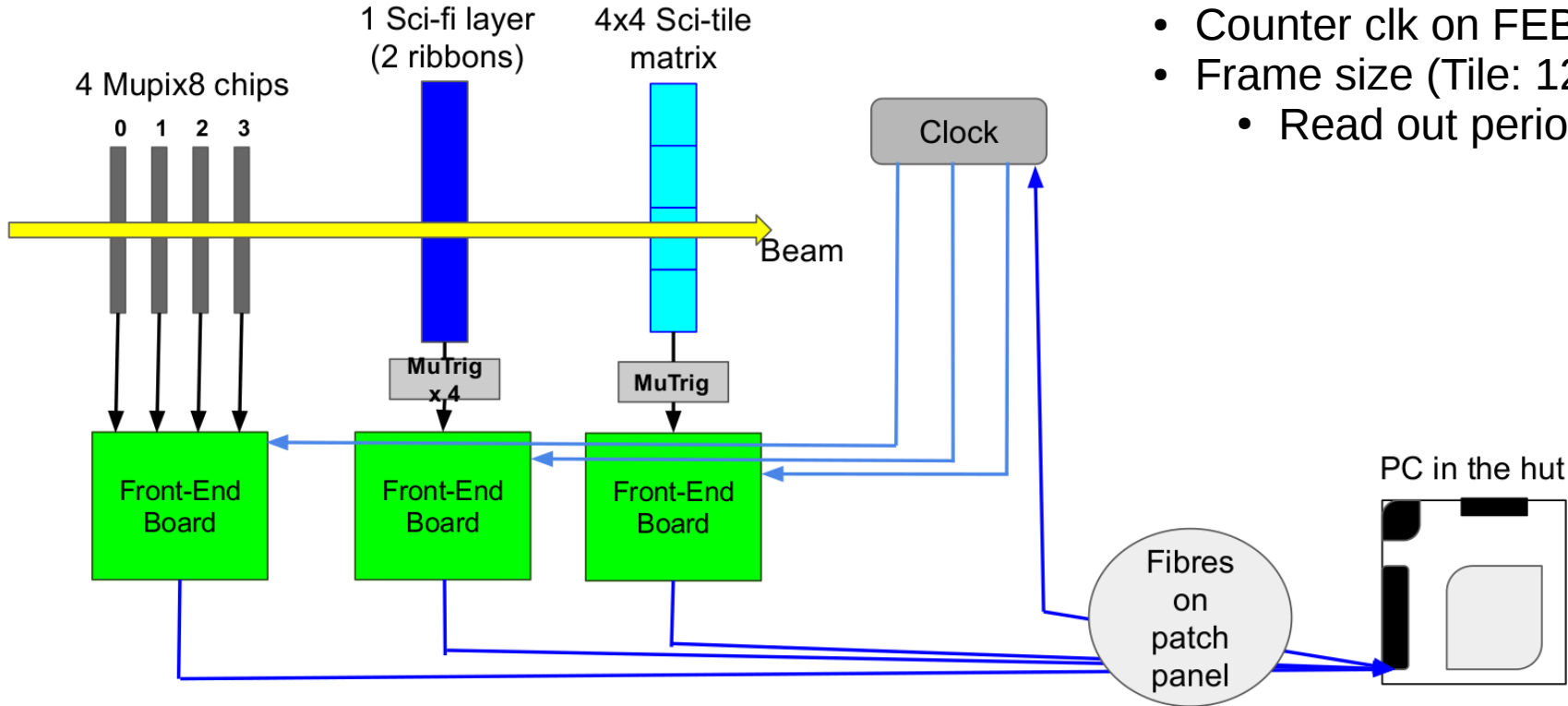


Today: tile related issues

Setup



Setup



Timing system

- Sub-detector clk (Tile CC: 1.6 ns)
- Counter clk on FEB (8 ns)
- Frame size (Tile: 12.4 us)
 - Read out period


Steps to find timing correlation

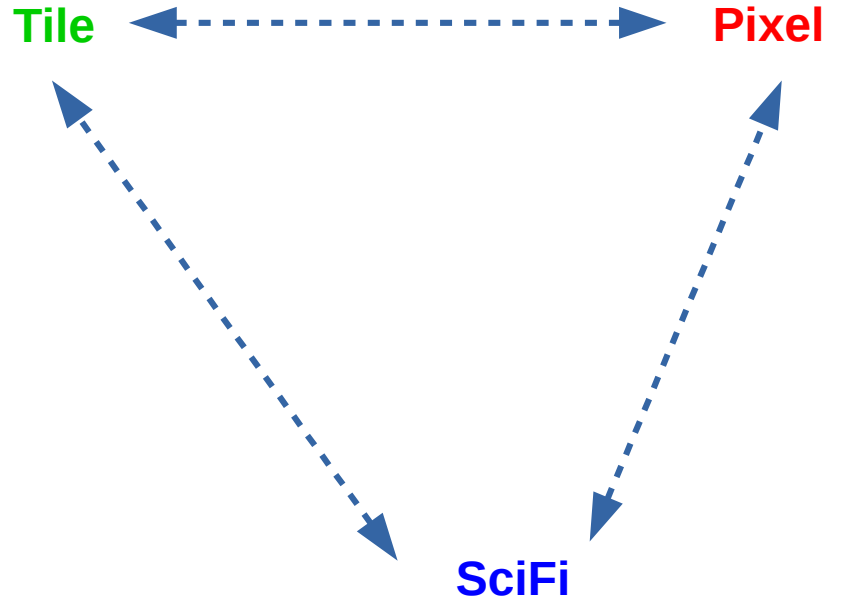
Steps:

1. check detector data
2. sub-detector to FEB
3. between FEBs

→ Directly between sub-detector

Analysis:

- Tile detector (Tiancheng, Yonathan)
 - Fiber detector (Konrad, Lukas...)
 - Pixel detector (Luigi, Ben...)
 - Read-out system (Marius, Martin...)
- 
- Correlation finding (Mainly Luigi)



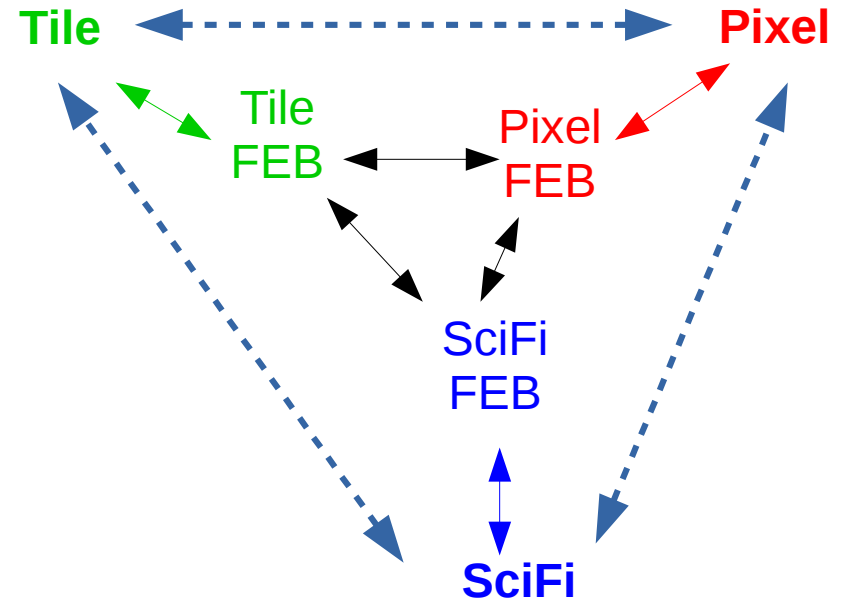
Steps to find timing correlation

Steps:


1. check detector data
2. sub-detector to FEB
3. between FEBs



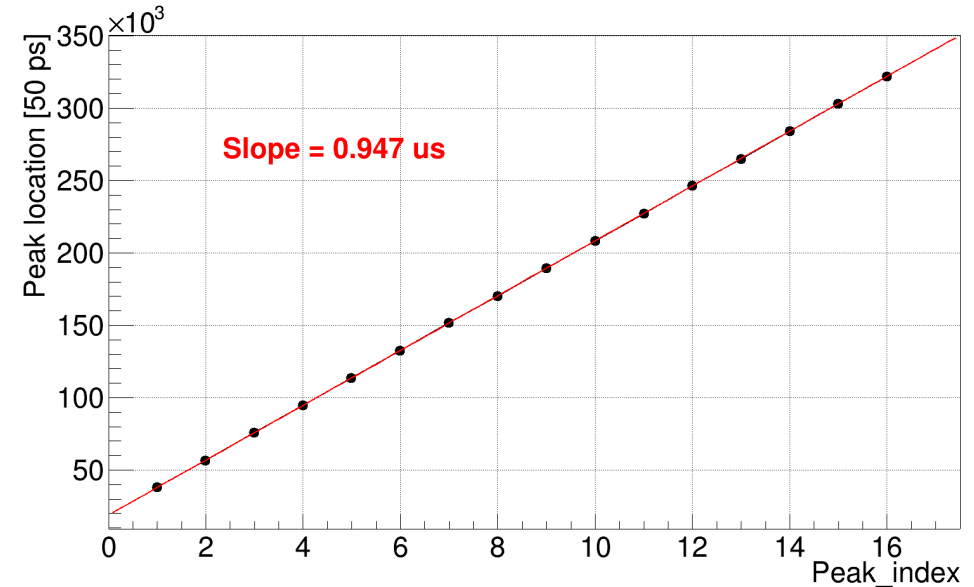
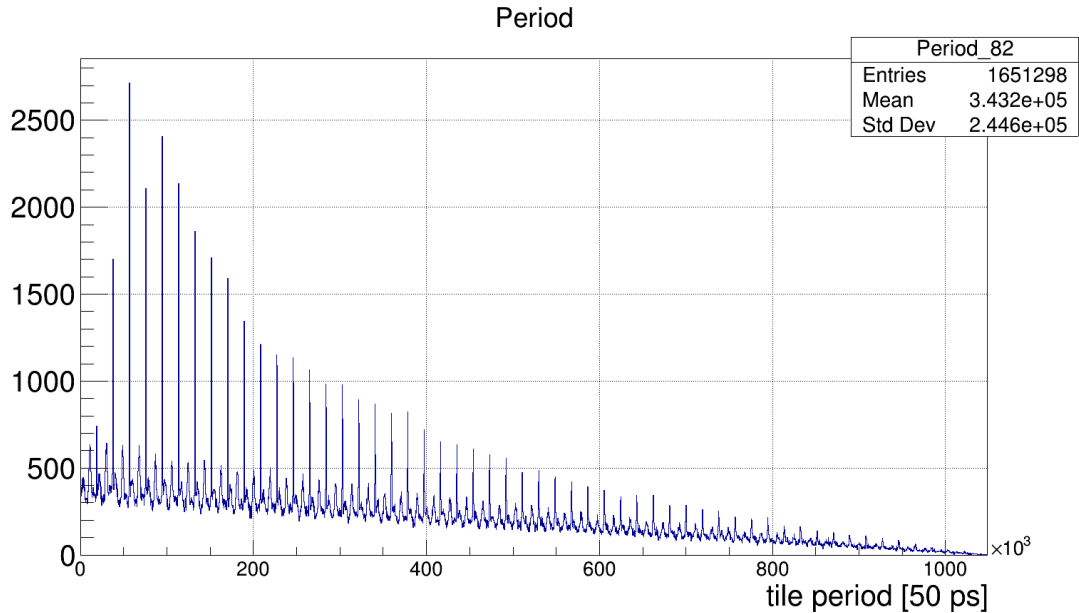
Directly between sub-detector



Analysis:

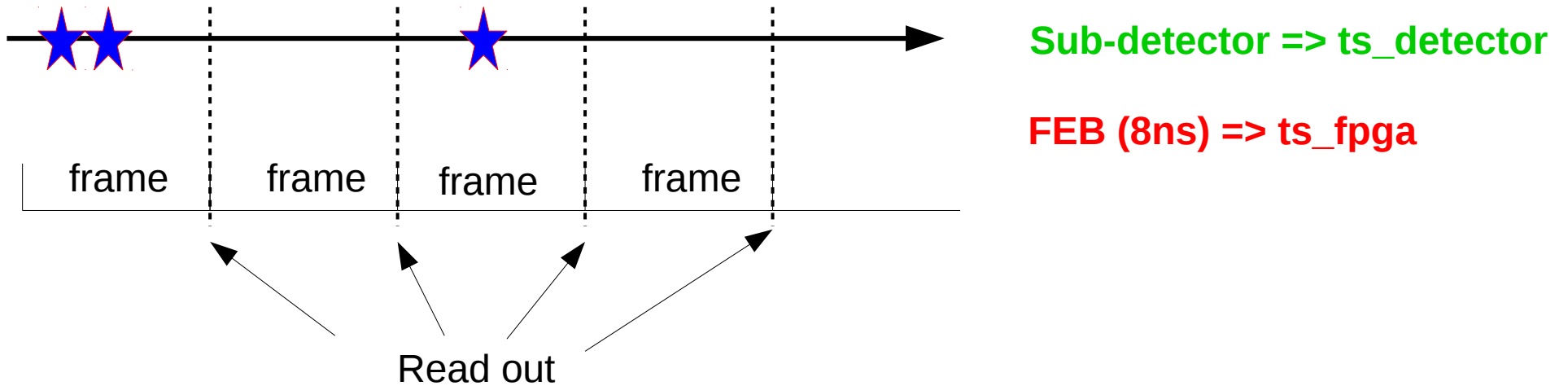
- Tile detector (Tiancheng, Yonathan...)
 - Fiber detector (Konrad, Lukas...)
 - Pixel detector (Luigi, Ben...)
 - Read-out system (Marius, Martin...)
- 
- Correlation finding (Mainly Luigi)

Tile detector period



Beam? => to be check with periodic signal [pll test or laser]

Correlation (sub-detector to FEB)



Frame:

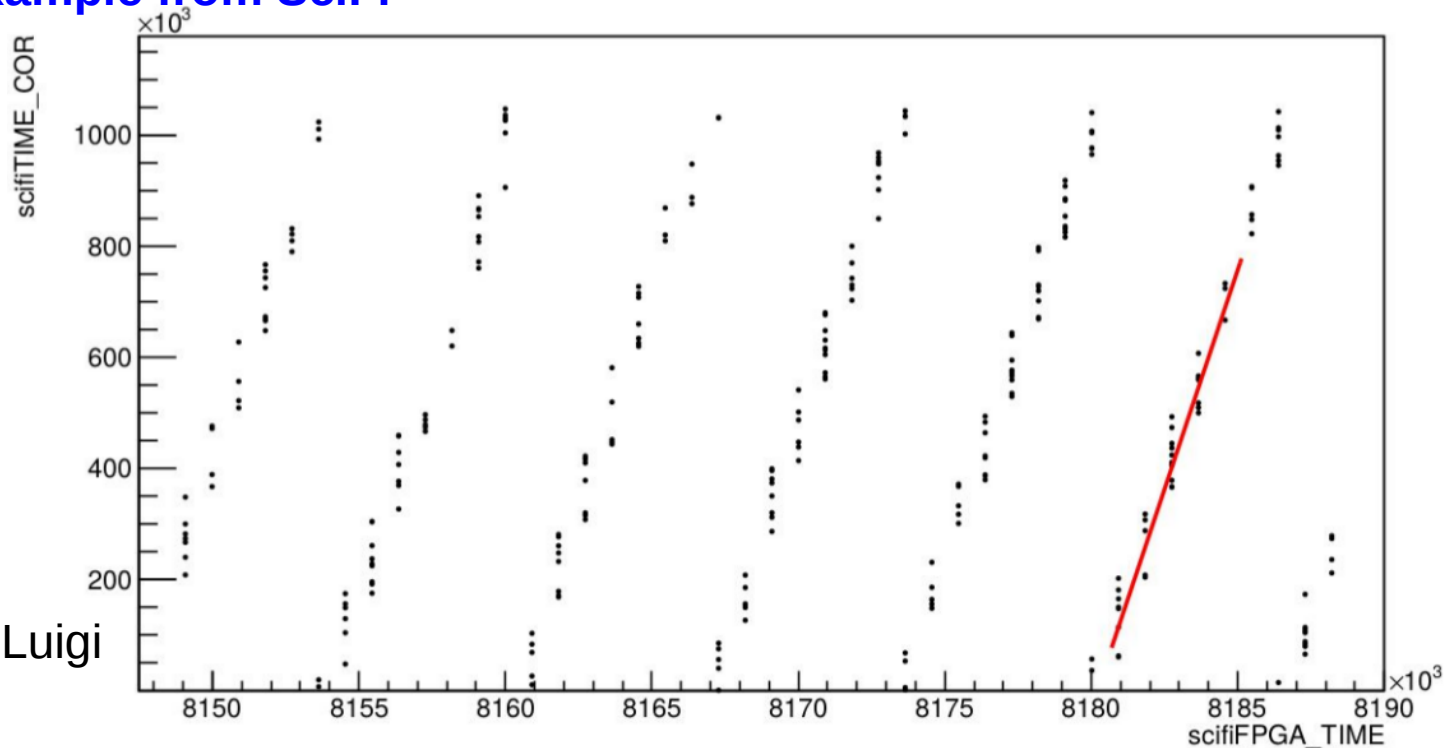
- Size different for different sub-detector
- Hits info from frame from last frame
- FPGA timestamp at read-out point



For all the hits in same frame
plot ts_fpga vs $ts_detector$

Correlation (sub-detector to FEB)

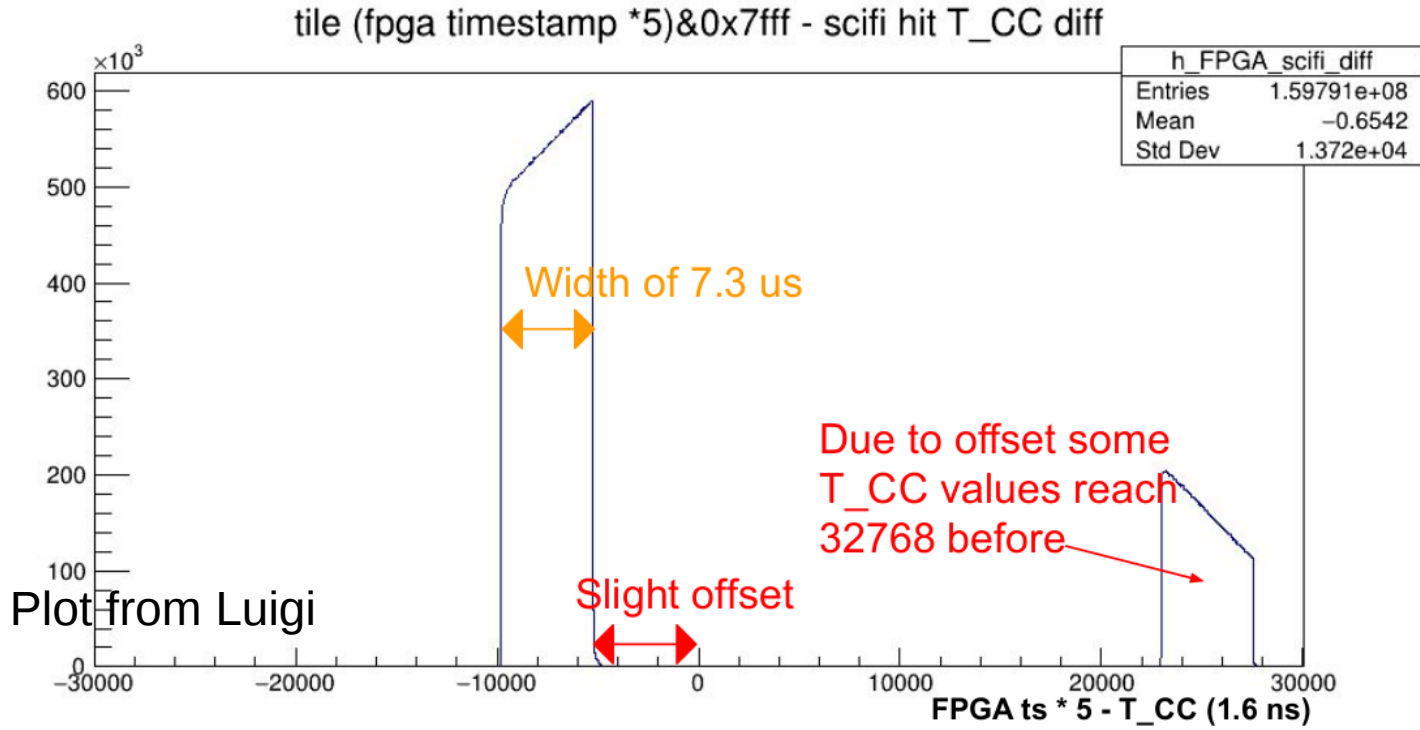
Good example from SciFi



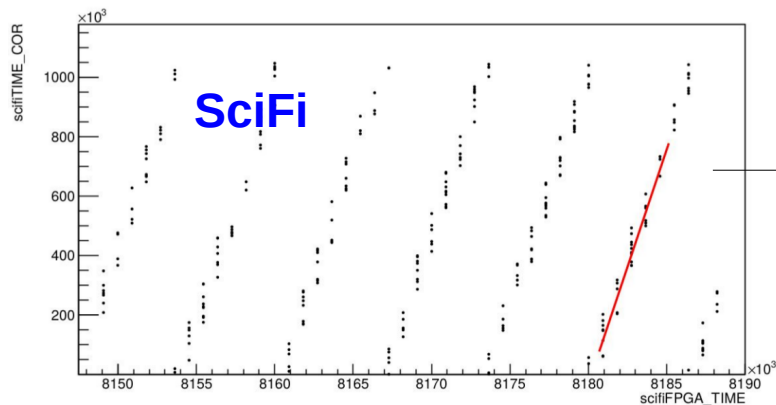
Plot from Luigi

Correlation (sub-detector to FEB)

Good example from SciFi



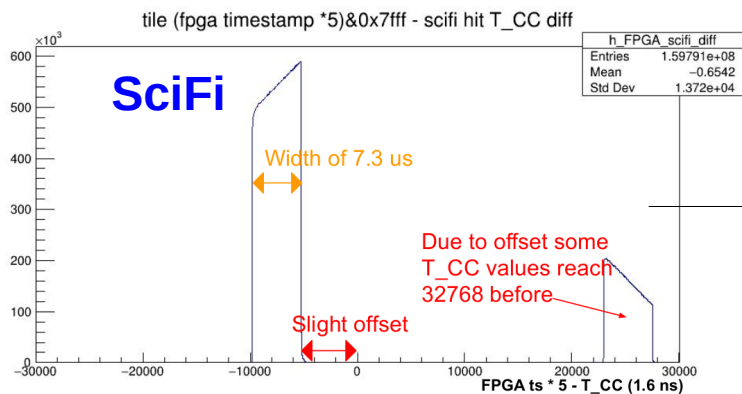
Correlation (sub-detector to FEB)



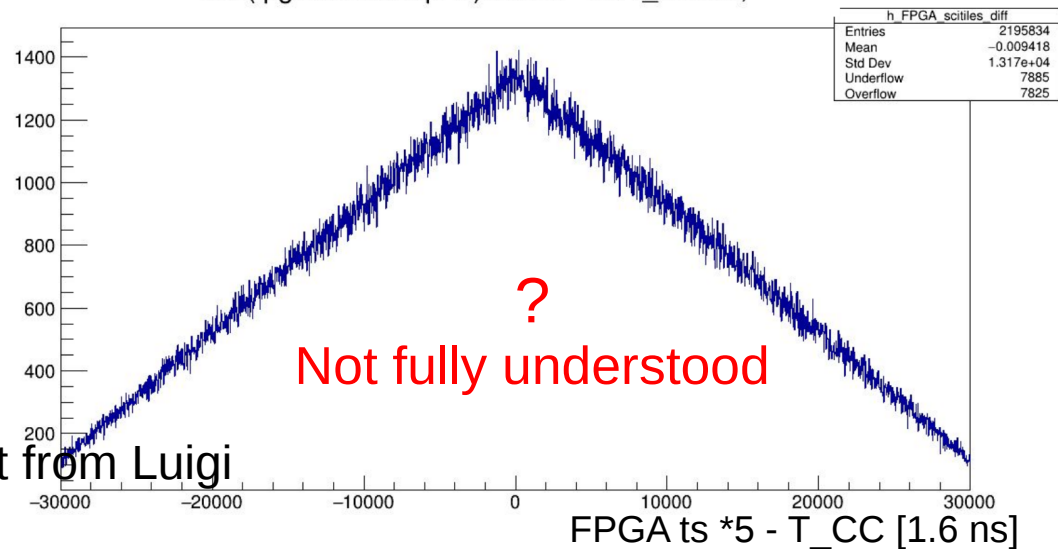
For tile

Very hard to see clear structure because of super low rate
Can be check with **higher rate signal**

tile (fpga timestamp *5)&0x7fff - hit T_{CC} diff,



Plot from Luigi



?
Not fully understood

Idea about test in lab

Laser/pll signal test for tile

- Check the multi-peak structure in period plot
- Check the FPGA ts vs. tile ts plot

Correlation test between pixel and tile (PLL signal)

- Also interesting/easy to check correlation between pixel and tile with know input

END