

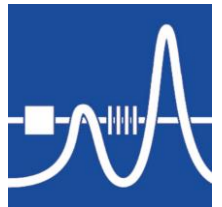


RUB

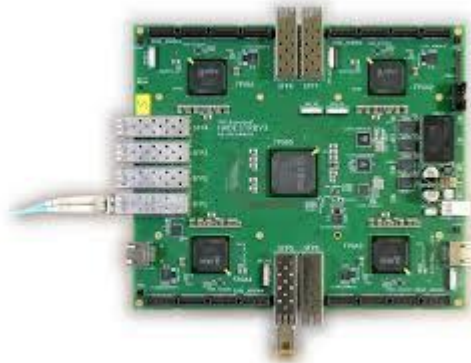
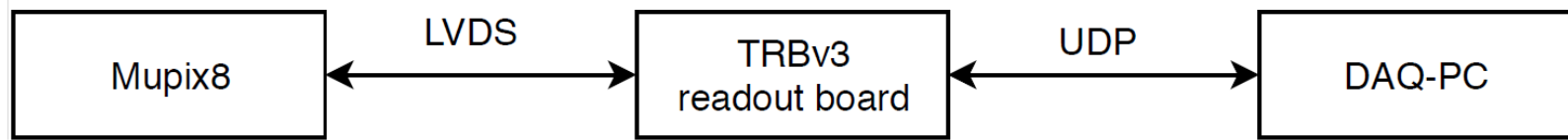
RUHR-UNIVERSITÄT BOCHUM

MUPIX8 – TIME WALK MEASUREMENTS

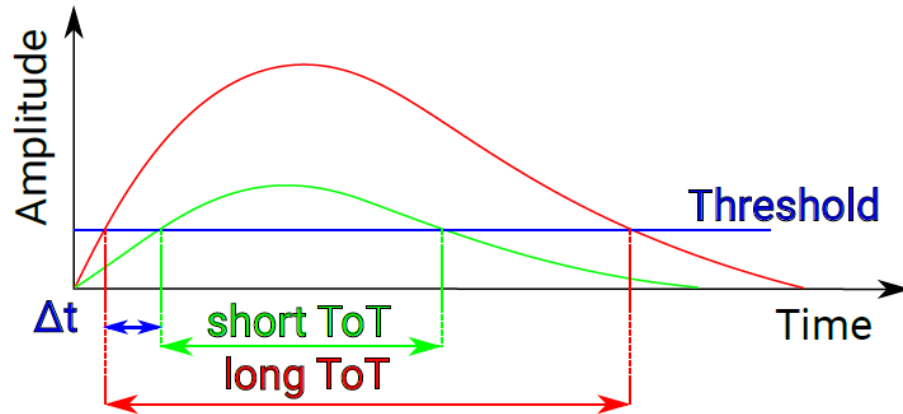
Sven Heihoff (sheihoff@ep1.rub.de) EPI (AG)



How does the readout of the Mupix works?

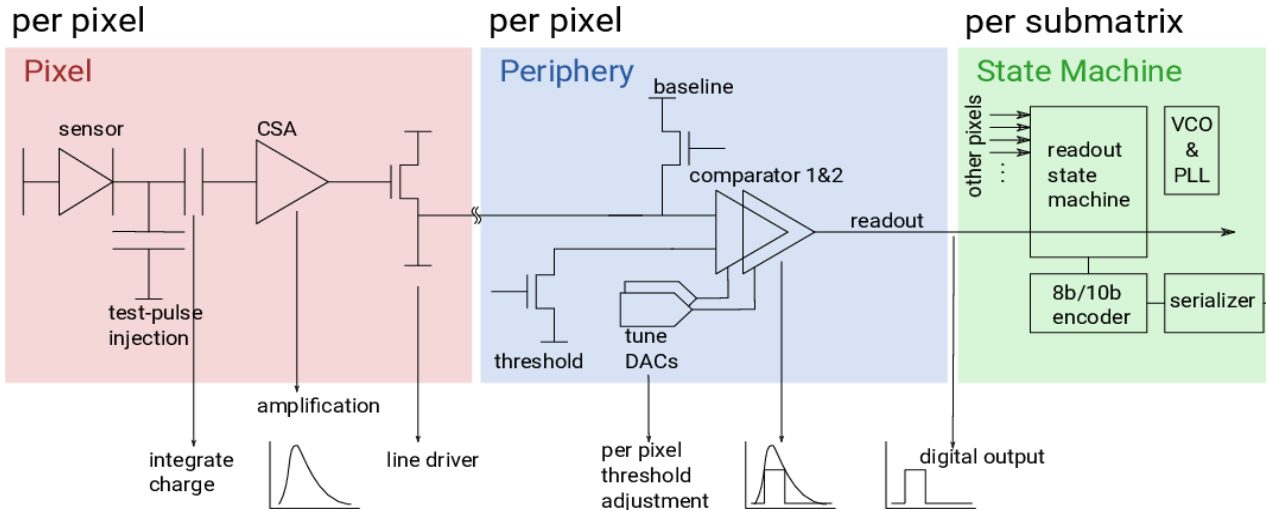


What is the time walk effect?



- Signal above threshold → Hit detected
- High amplitude → Earlier detection
- Low amplitude → Later detection
- Variation in charge deposition → Variation in amplitude
- Time-over-Threshold (ToT) also affected by amplitude
- Two timestamps (derived from the same counter) are set for each hit by the Mupix8:
 - TS1 (10bit) at the rise
 - TS2 (6bt) at the fall

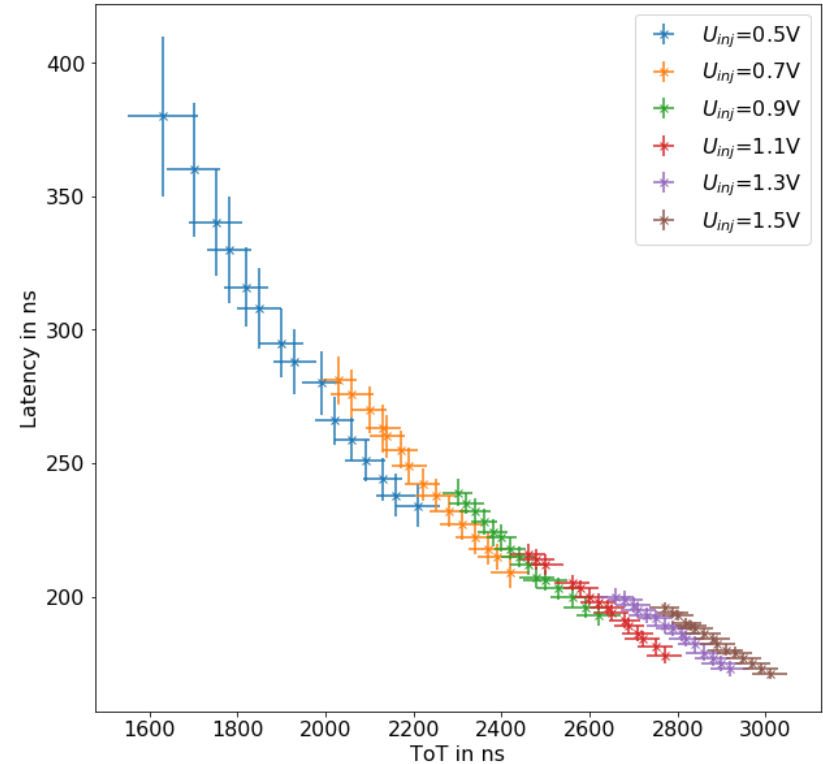
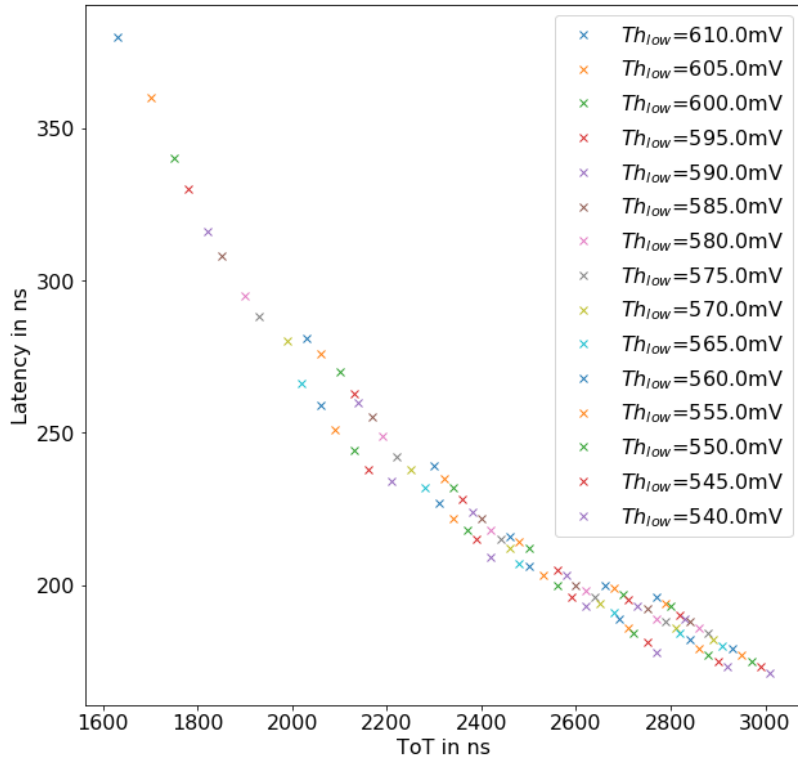
Architecture of Mupix8



Measurands:

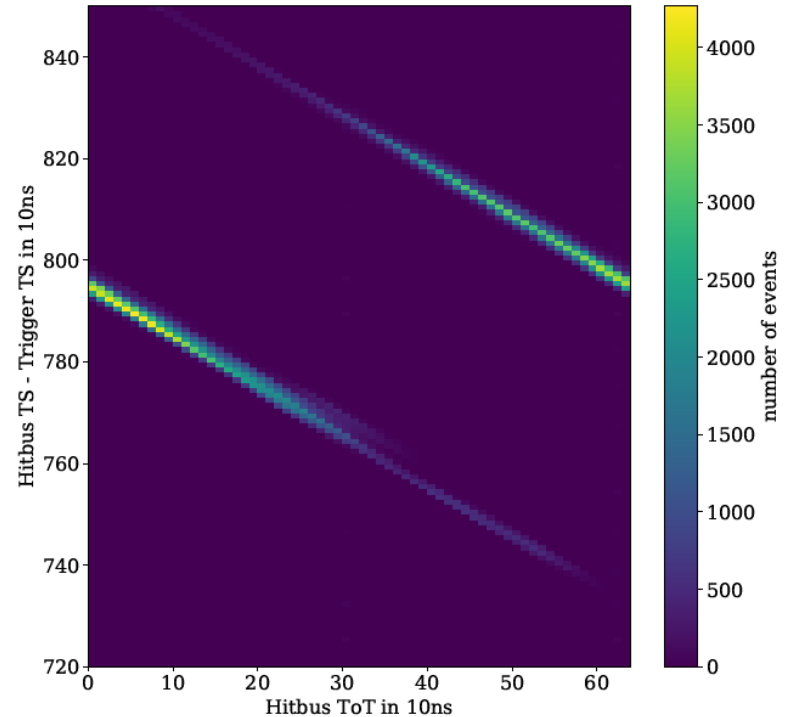
- Hit (data analyzed by the Mupix)
- Hitbus (digital output of comparator 1)
- Injection-pulse

Oscilloscope Measurements



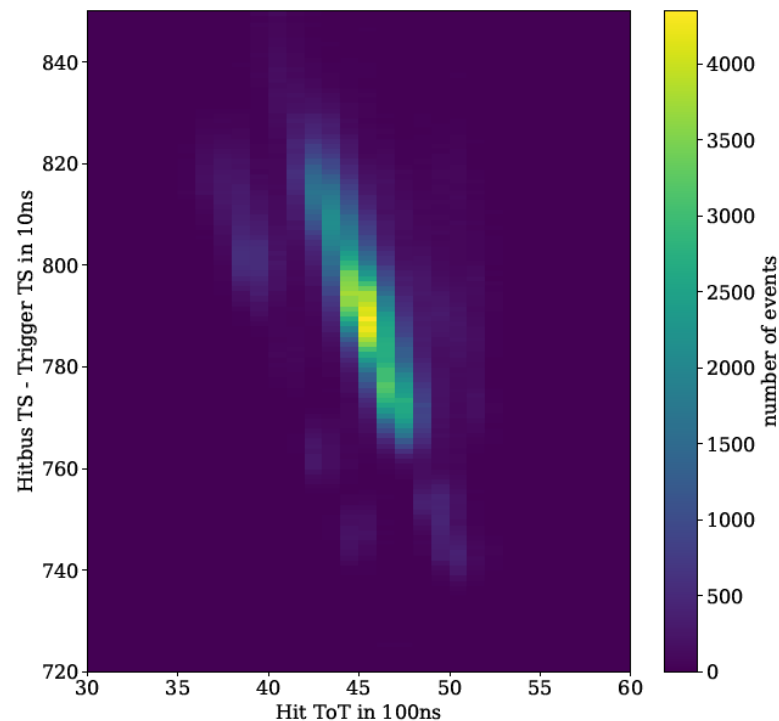
FPGA Measurements (Hitbus data)

- Measurement of over 100 pixels
- Injection Voltage: 0.7 V
- Threshold from 545 mV to 610 mV
- Overflow of the TS visible



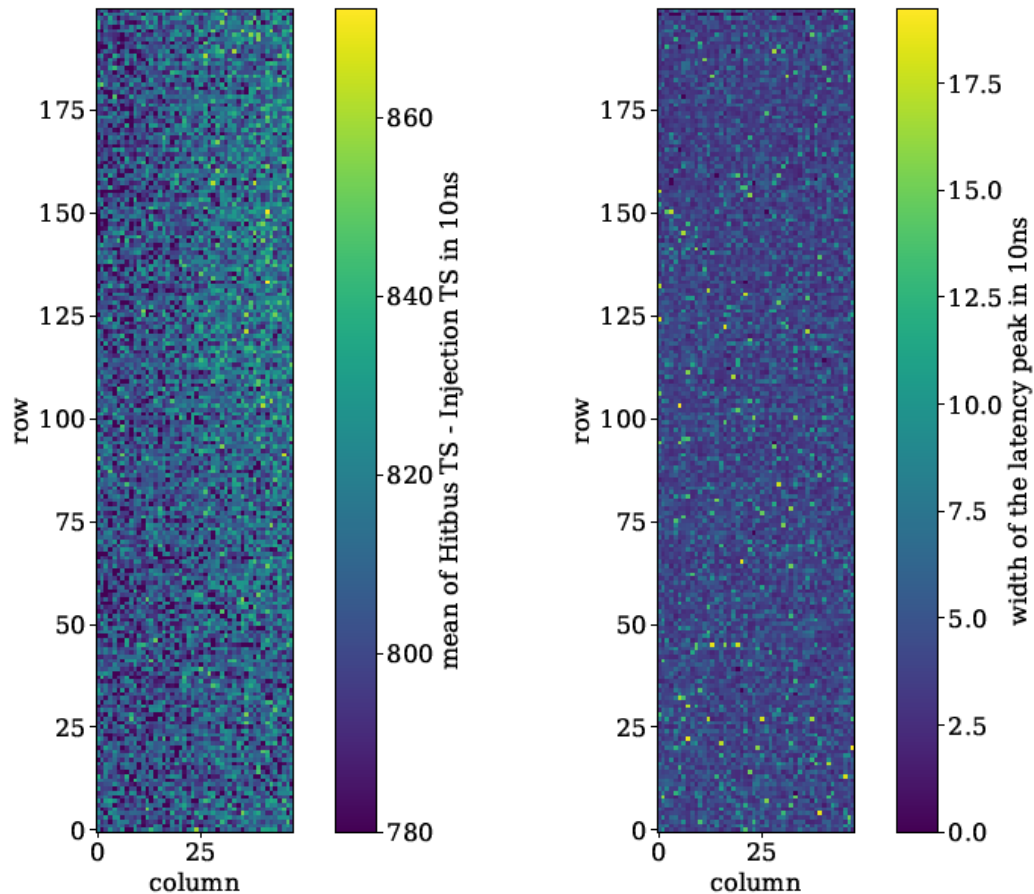
FPGA Measurements (Mupix8 data)

- Data from the same measurement as before
- Correlation between Latency and ToT as expected
 - Timewalk correction seems to be possible

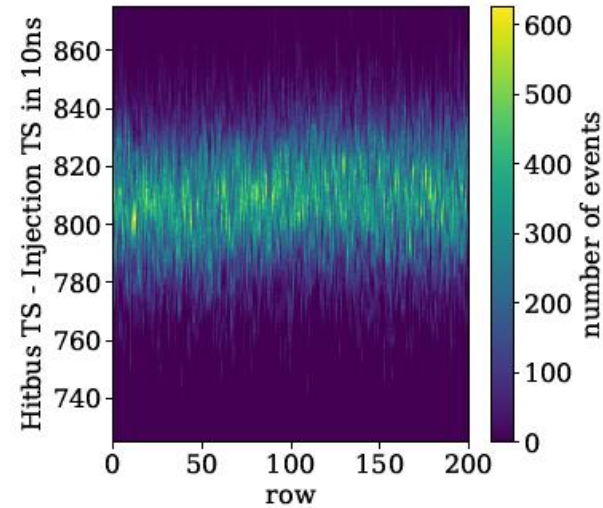
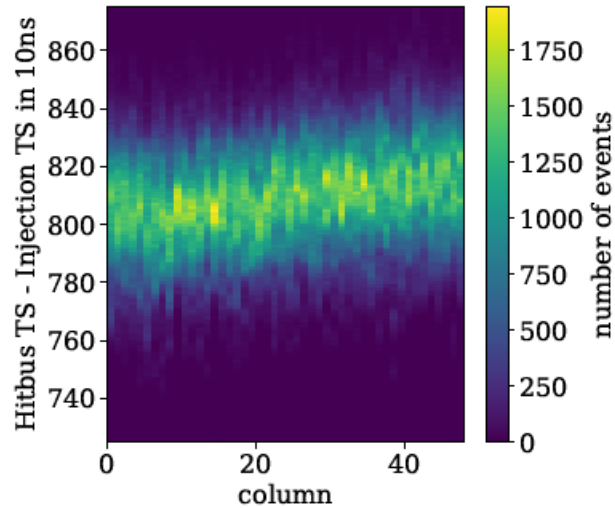


Delay Effect

- How does the latency varies from pixel to pixel?
- Injection: 1 V
- Threshold: 600 mV



Delay Effect – row or column dependent?



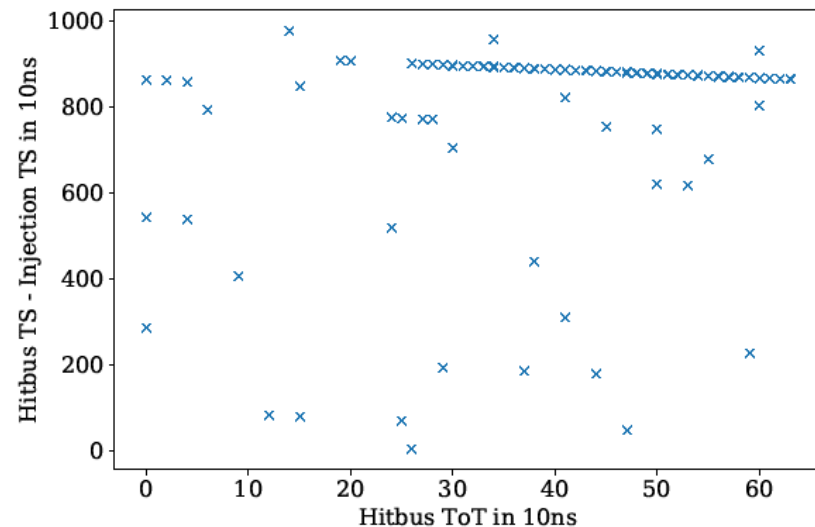
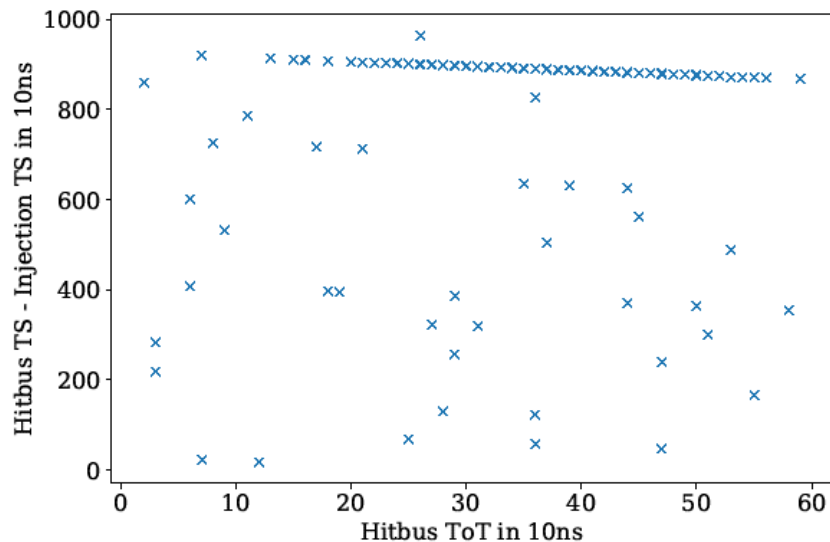
- Unexpected effect
 - Columns are identical copies of each other
 - Propagation time is rather small, compared to the bin size

Thank you for your attention!

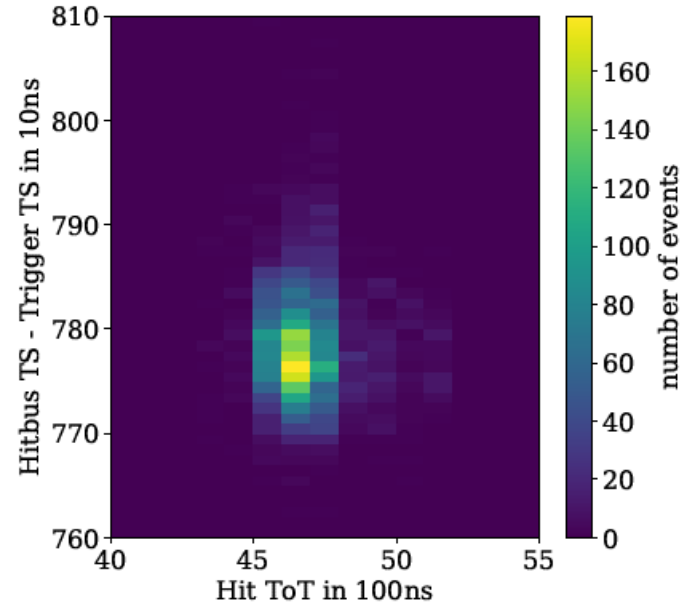
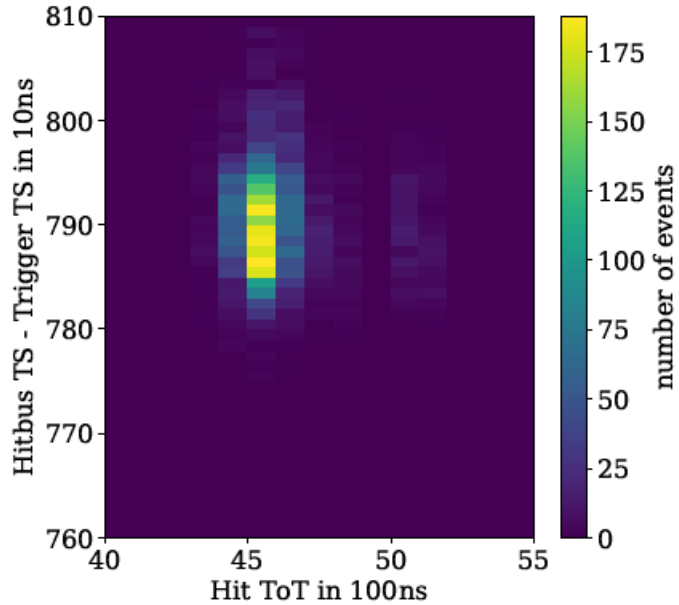
Difficulties

Repetition

- Two Measurements of the same pixel
- One Power-Cycle in between



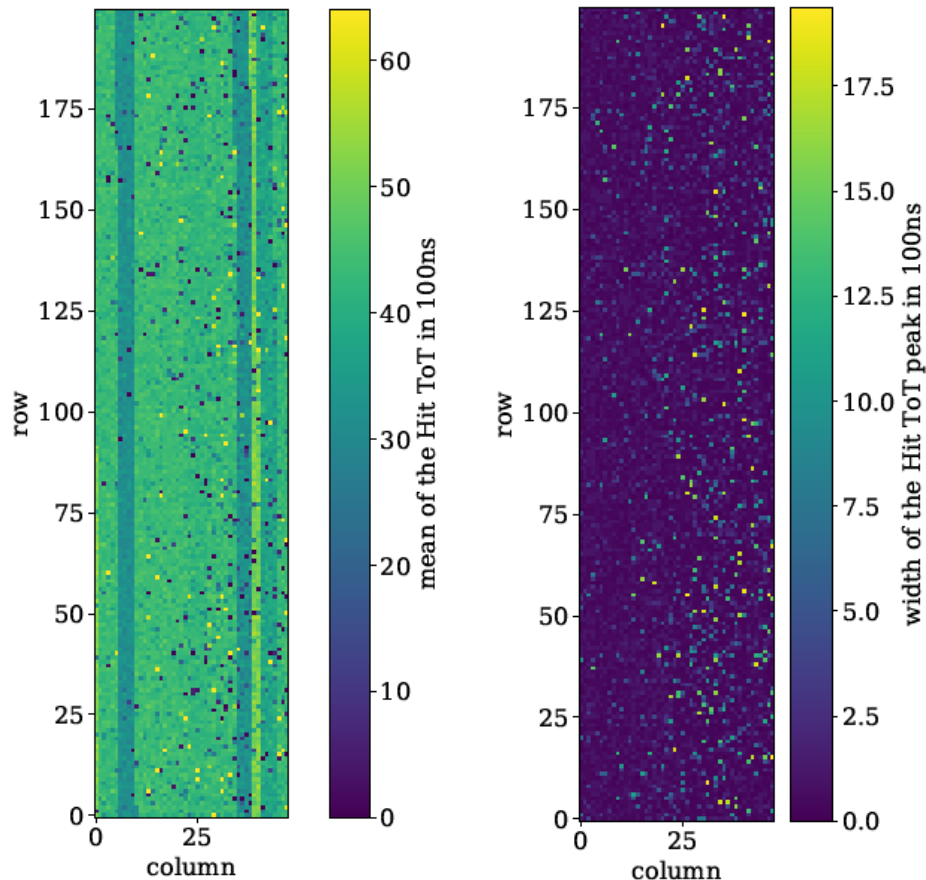
Timewalk for one pixel



- Pixel row 9 and column 2 (left) and row 7 and column 8 (right)
- No correlation visible

Pixel to Pixel Variations

- How does the Hit ToT varies from Pixel to Pixel?
- Injection: 1 V
- Threshold: 600 mV
- Strange bars
 - Measurement problem?



Pixel to Pixel Variations

- How does the Hitbus ToT varies from Pixel to Pixel?
- Injection: 1 V
- Threshold 600 mV

