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# Status Update
Testbeam Analysis ATLASpix_Simple

WG vertex and tracking detector technology meeting

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Reminder

- data from SPS testbeam in **November 2018**

- sample:
  - → **ATLASpix ap1b02w23s15**
  - → (200 Ohm cm, 100 um thick)

- external clock: 125 MHz

- ckdivend = 15
  - → slows down readout state machine

- default:
  - → bias = -75V
  - → threshold = 845mV ~ 490 electrons
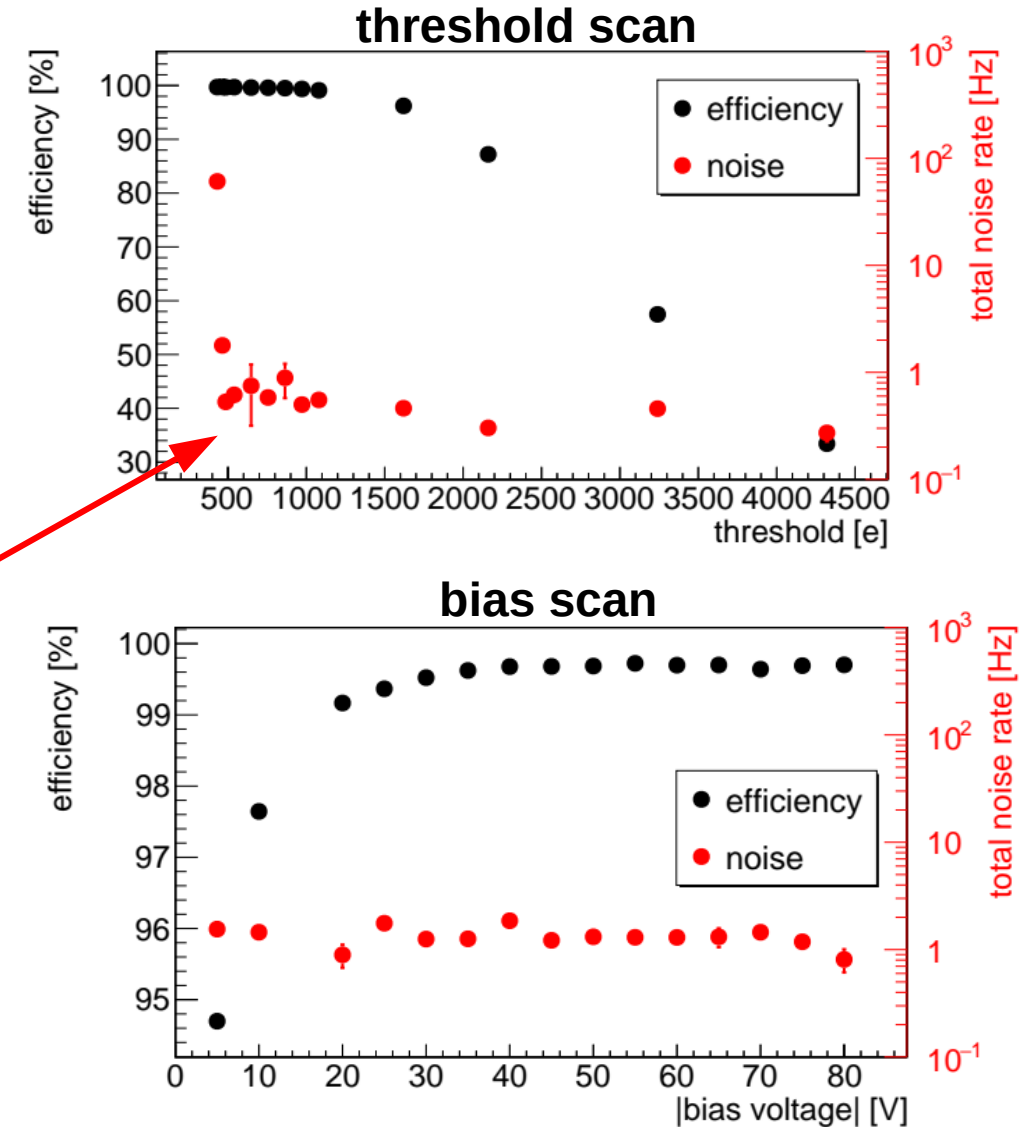   (baseline at 800mV)
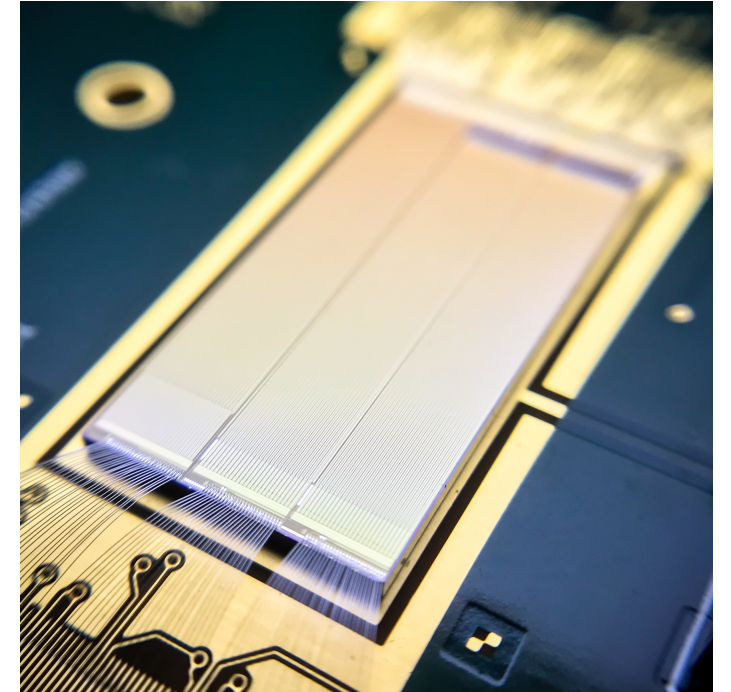
Noise Estimation

- so far no noise estimation

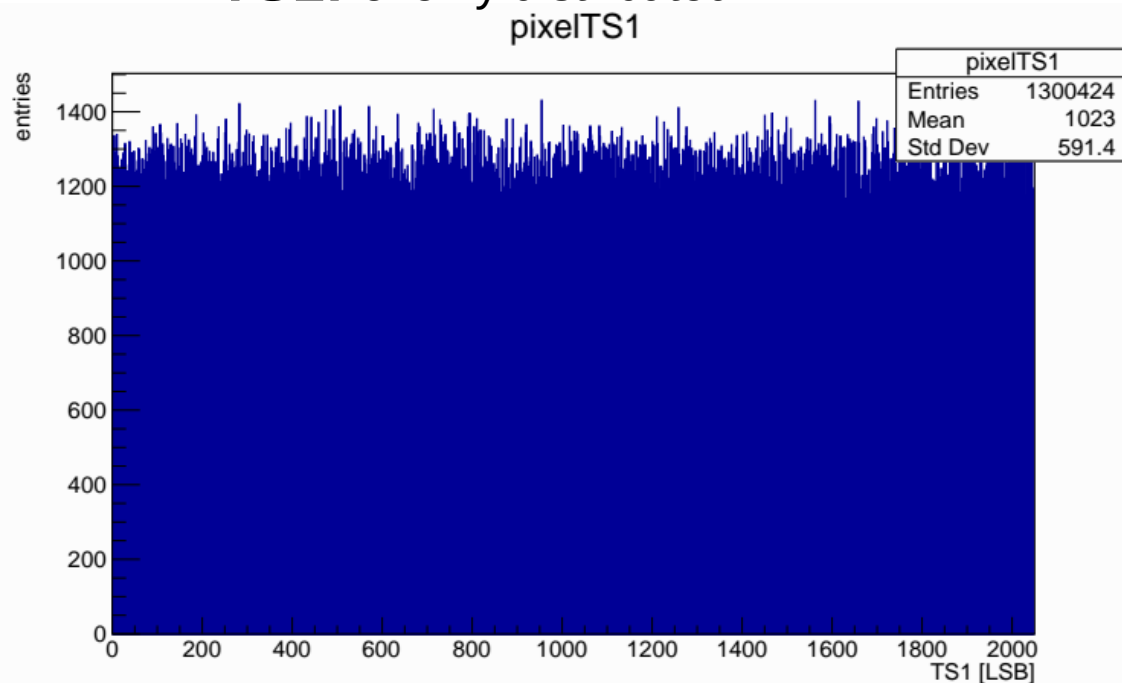- now:
  - → extract from **intervals between spills**

$$error = \frac{\sqrt{noise\ count}}{time}$$

- **very low noise rate:**
  - → **total** noise rate (full chip) ~ 1 Hz

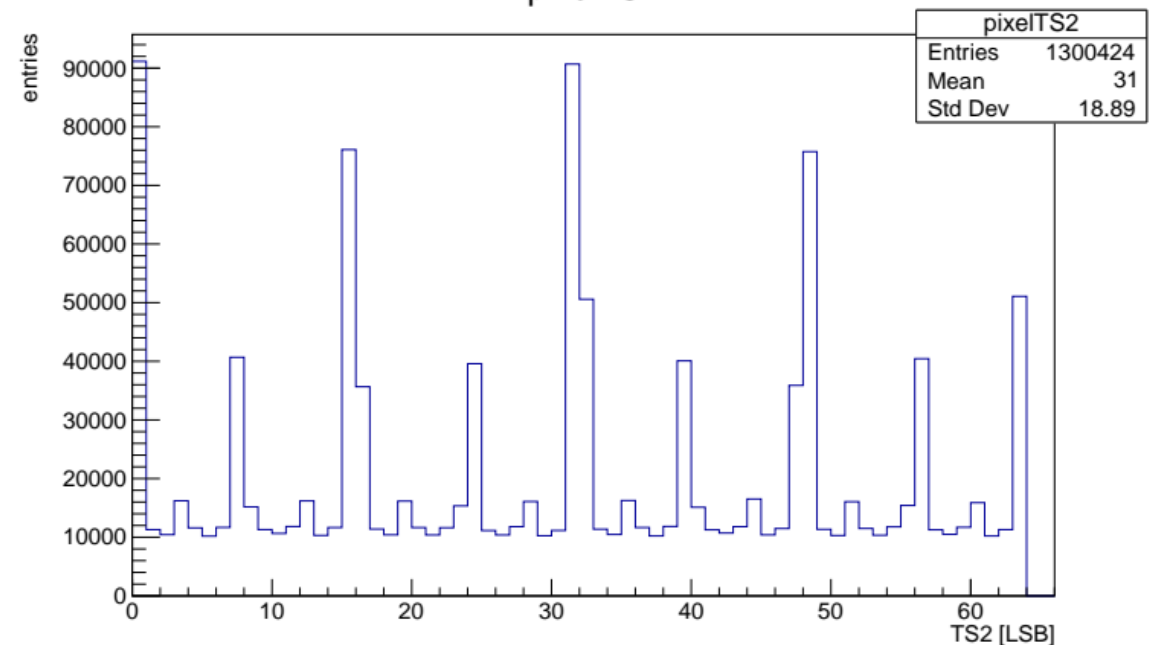- large error bars → very short runs!

Timestamp Distributions

- **TS1 =** time-of-arrival

- **TS2 − TS1 =** time-over-threshold (ToT)

- **expect:**
  even distribution as all timestamps are equally likely
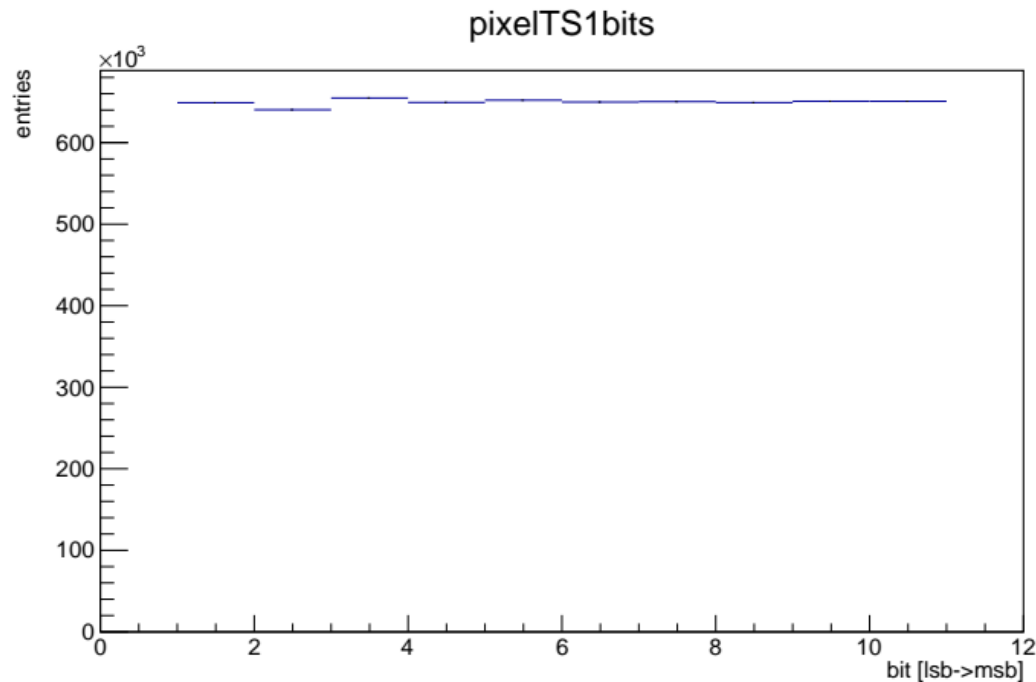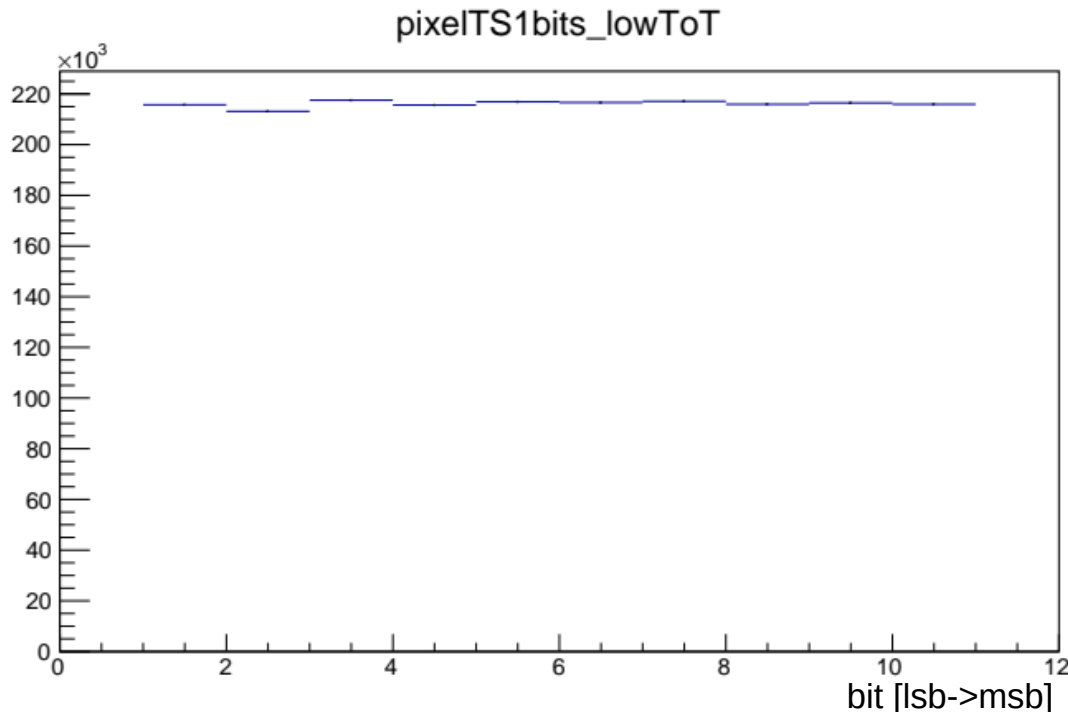
- **TS1:** evenly distributed

- **TS2:** clearly spiked

Timestamp Distributions

- **here:** histogram individual TS bits
  - → histogram gets entry when respective bit is 1

- **TS1 bits:** evenly distributed

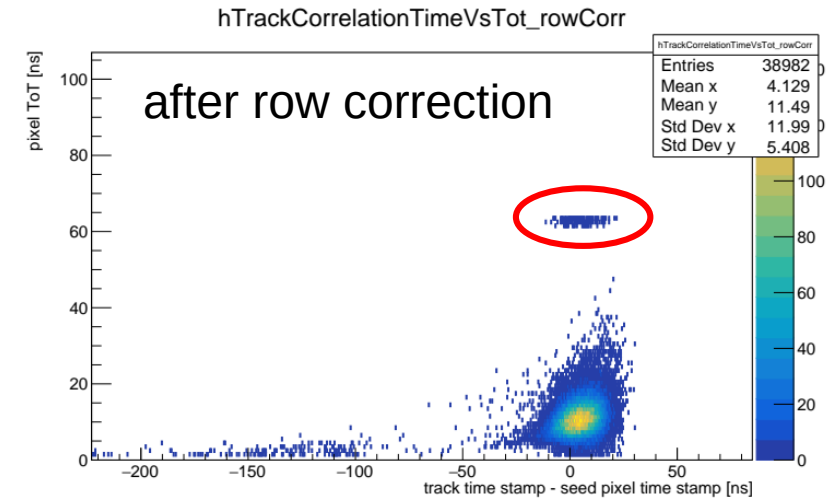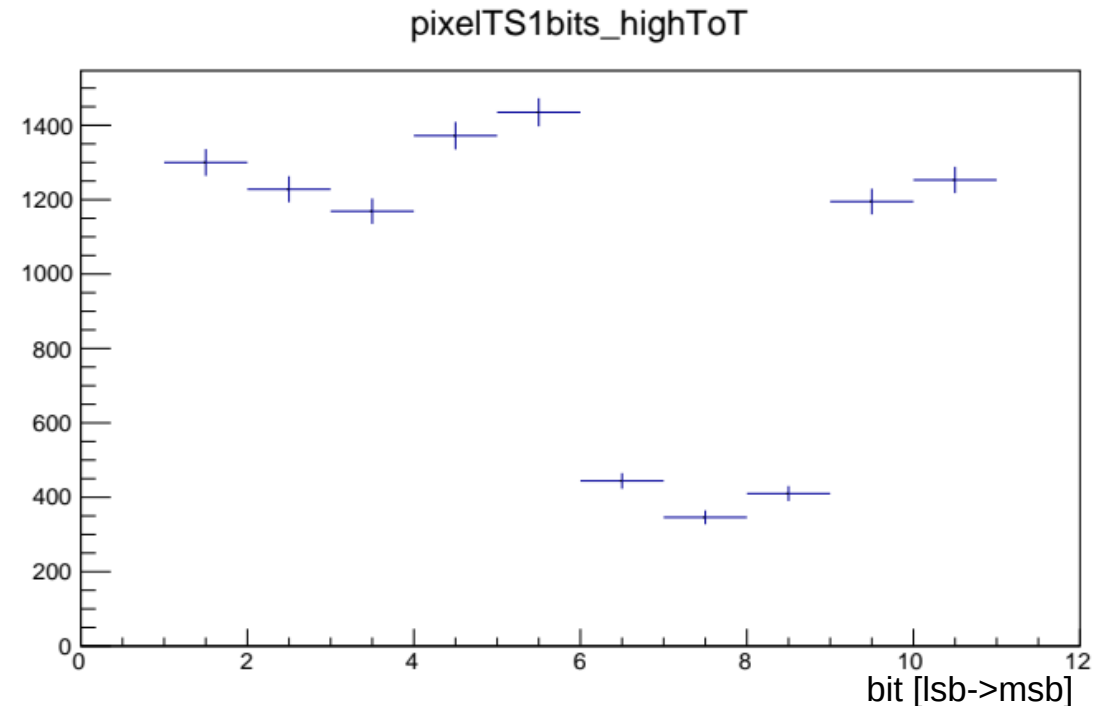- **TS2 bits:** MBS "sticky", i.e. more often 0 than 1

Now Low vs. High ToT Events

after row correction

- low ToT:

- **ToT < 40 lsb: TS1 bits**
  → all fine

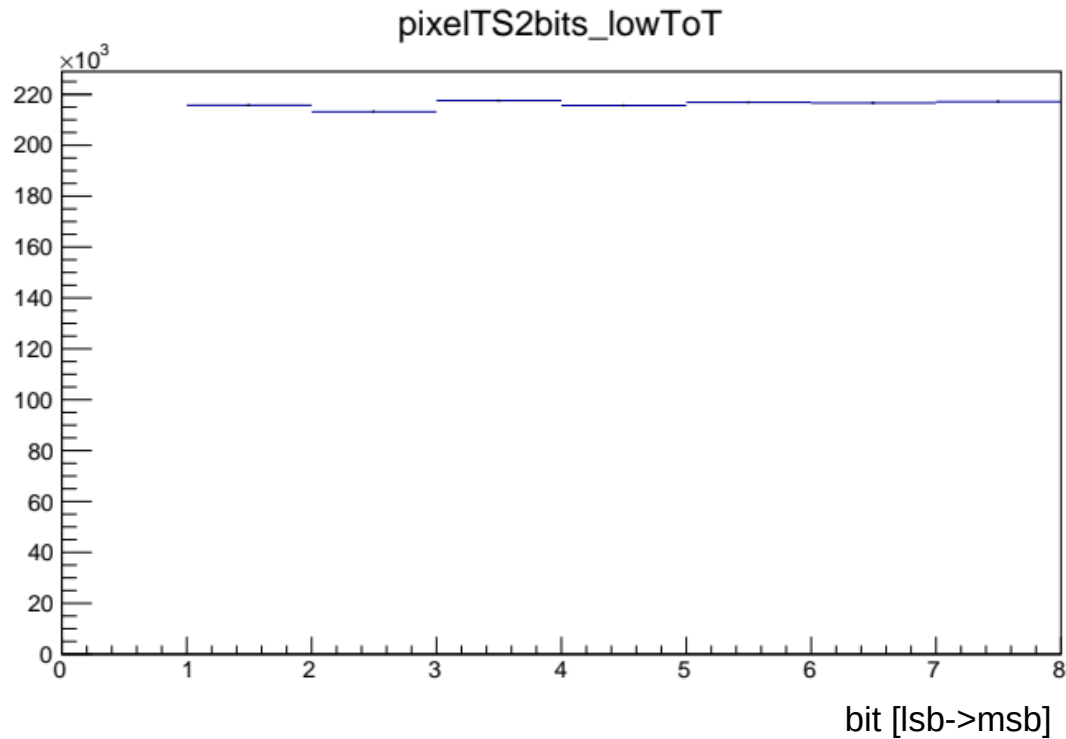- high ToT:

- **ToT >= 40 lsb: TS1 bits**
  → low statistics or also TS1 "sticky"?

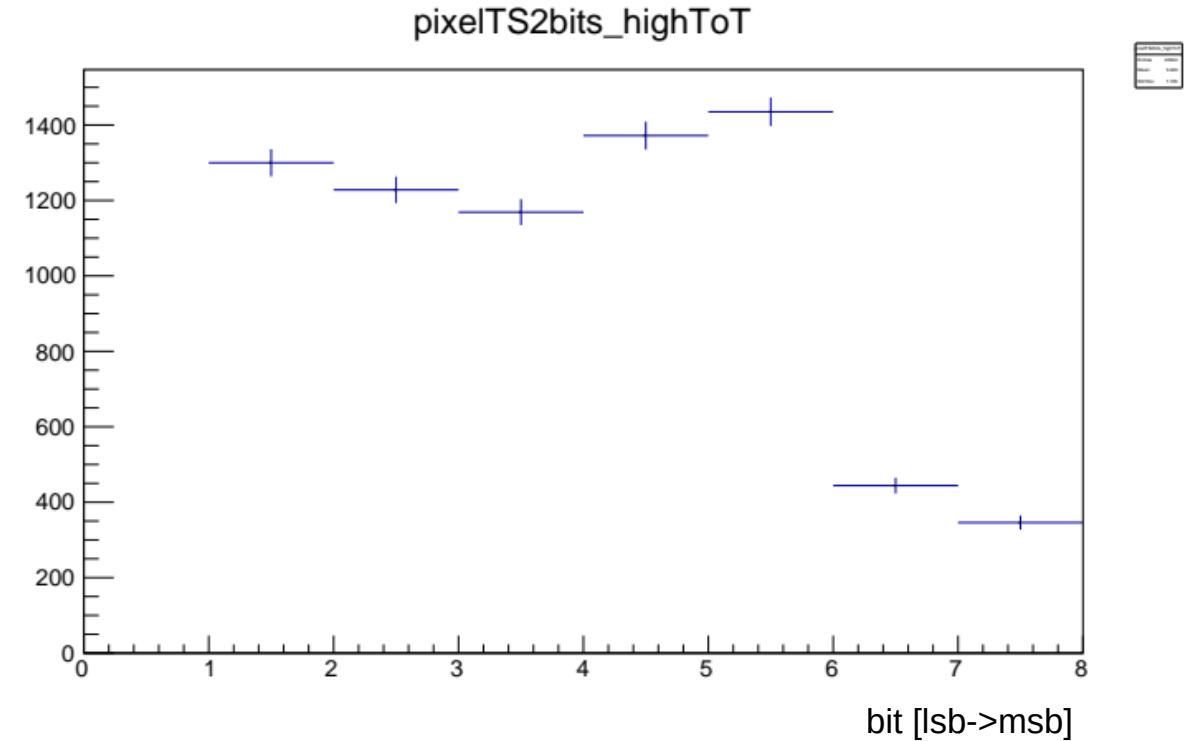# Low vs. High ToT Events
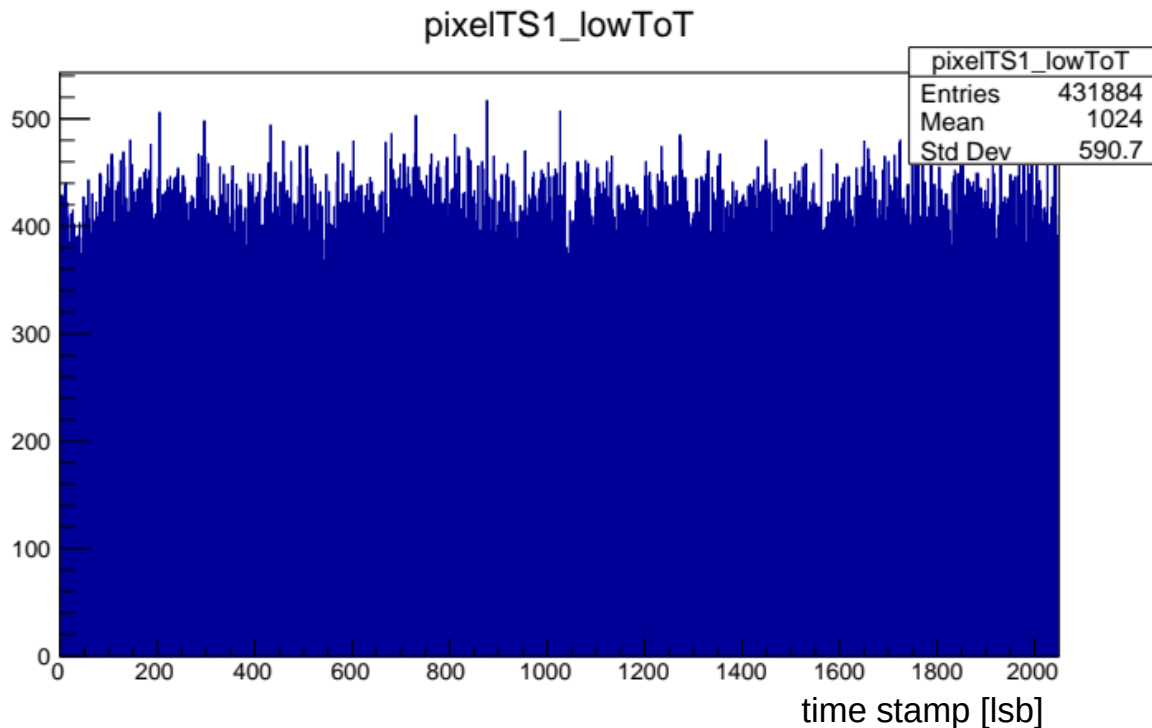
- **ToT < 40 lsb : TS2 bits**
  → evenly distributed

- **ToT >= 40 lsb : TS2 bits**
  → sticky bits again

Low vs. High ToT Events
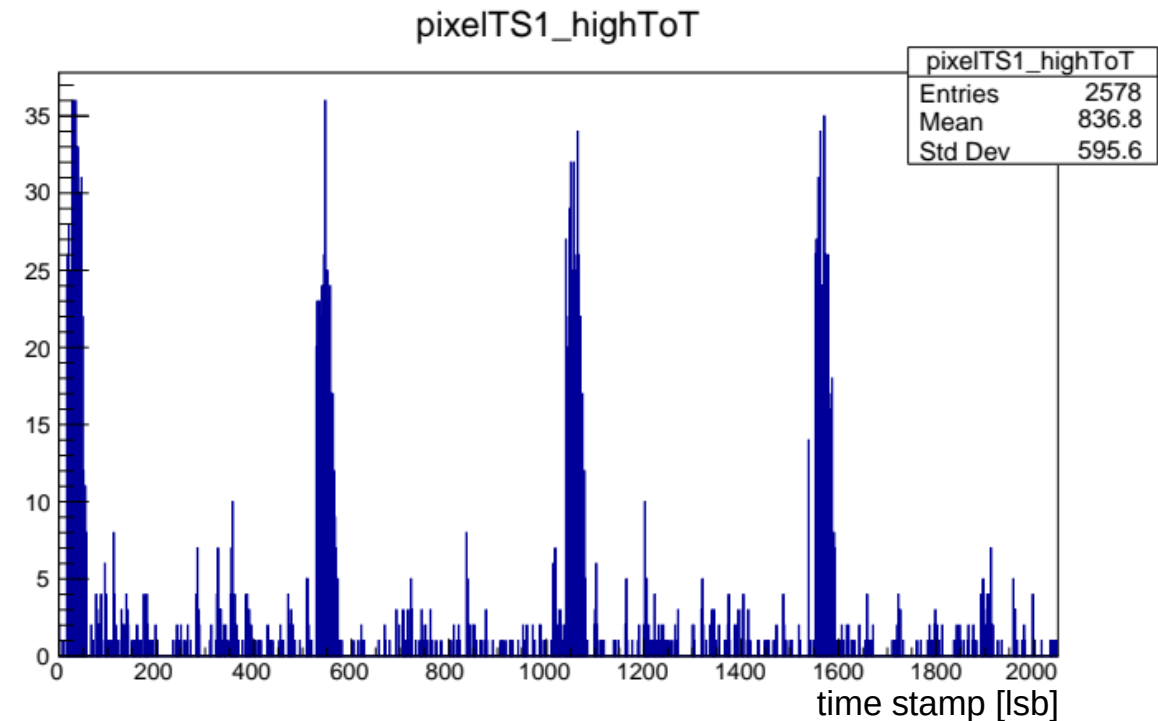
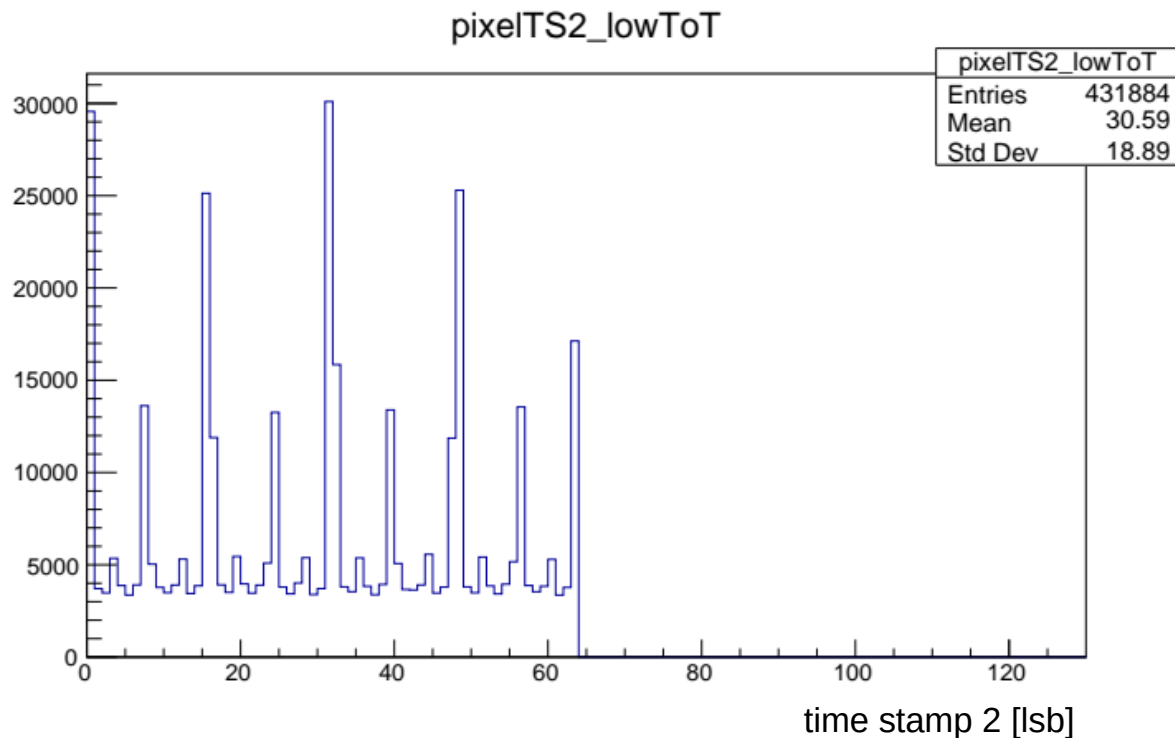- **ToT < 40 lsb : TS1 distribution**
  → evenly distributed, looks good

- **ToT >= 40 lsb : TS1 distribution**
  → clearly spiked

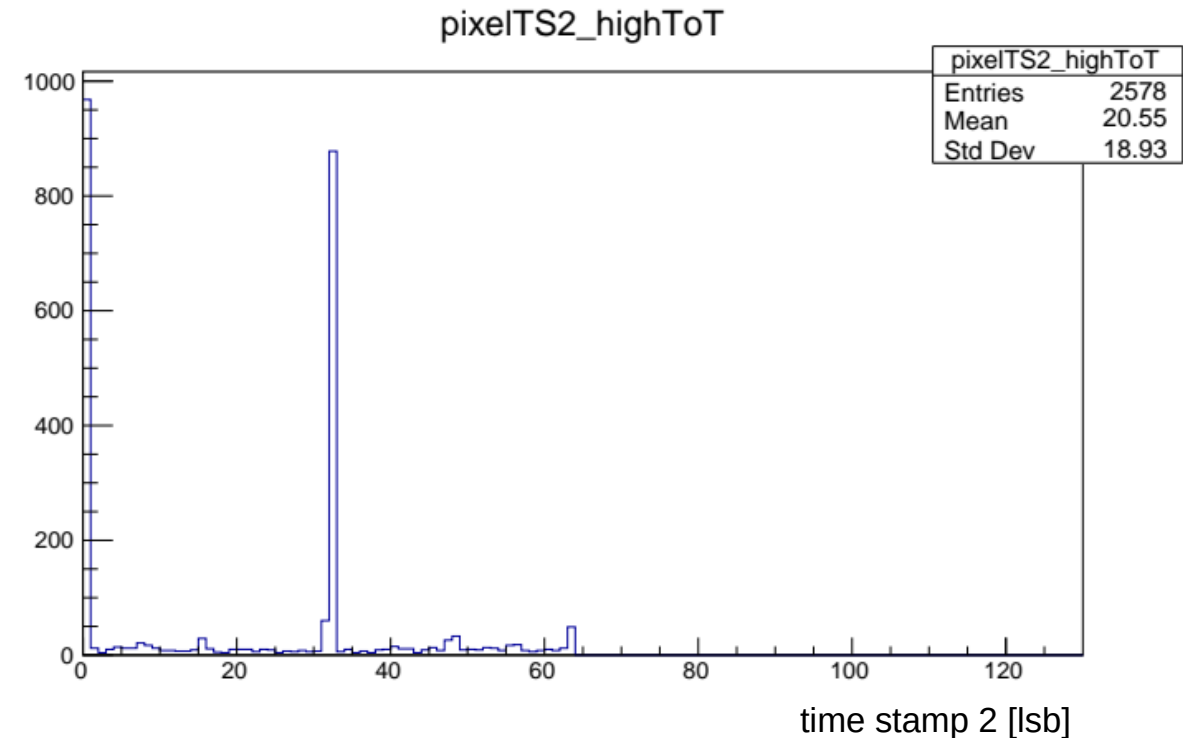# Low vs. High ToT Events
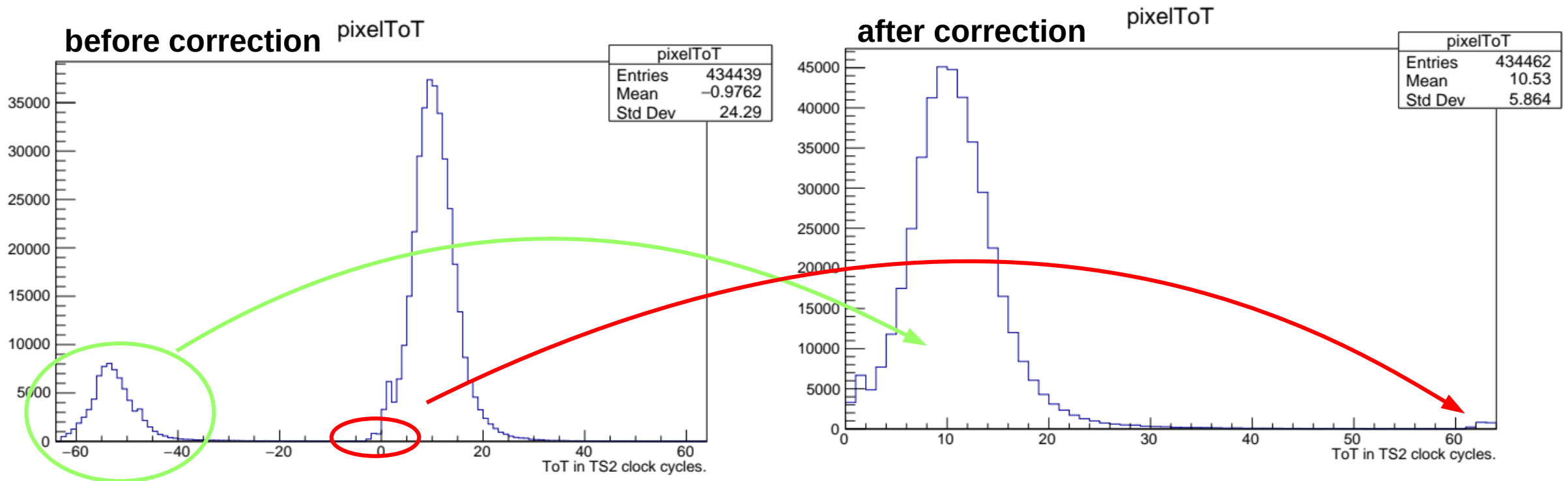
- **ToT < 40 lsb : TS2 distribution**
  → also spiky

- **ToT >= 40 lsb : TS2 distribution**
  → strongly peaked

Pixel ToT Correction

- **ToT is only high because of**

- **if(tot < 0) tot += 64;**
  in [EventLoaderATLASpix]

- So should we keep this correction?

- **Yes** → see next slide!
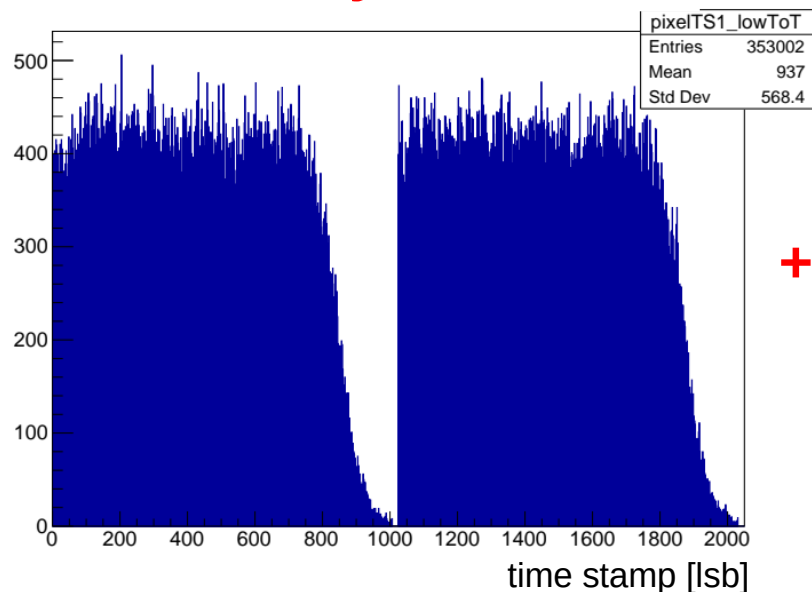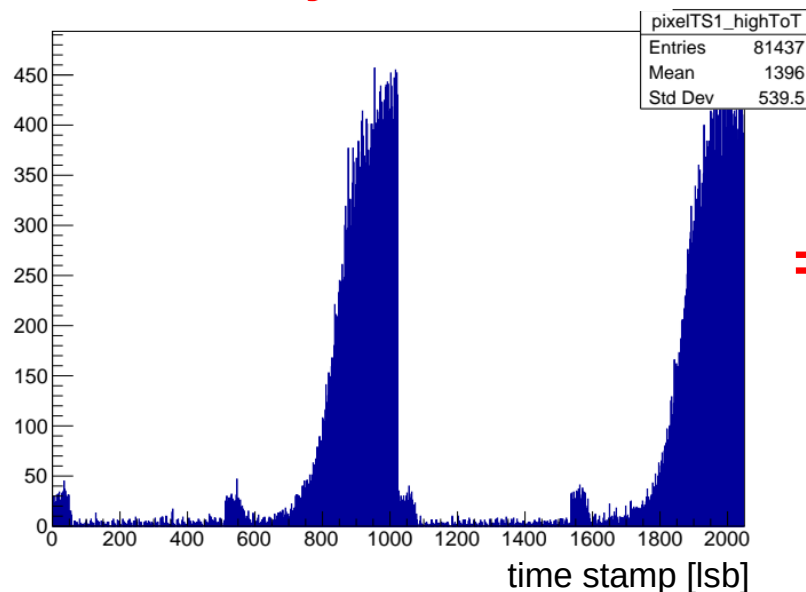
What about the Pixel ToT?

- **Yes**, that's why Tomas introduces this correction!

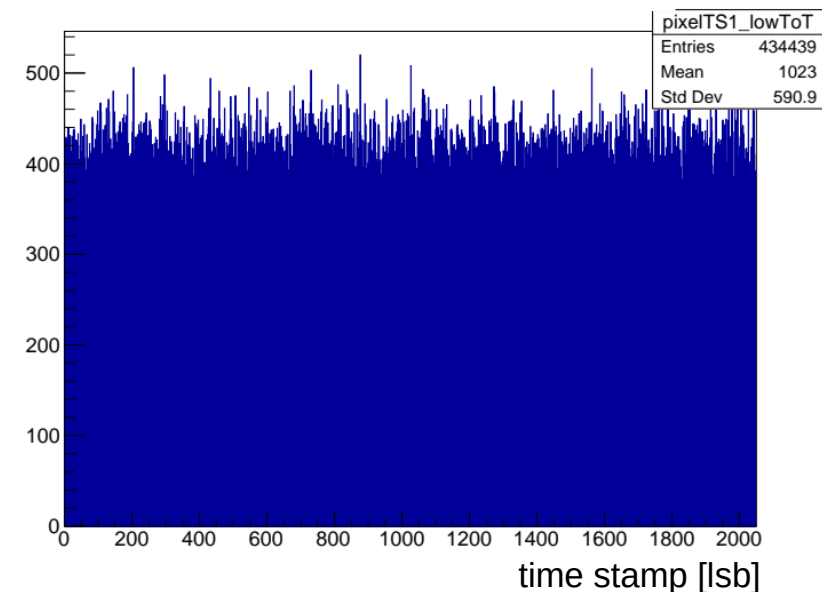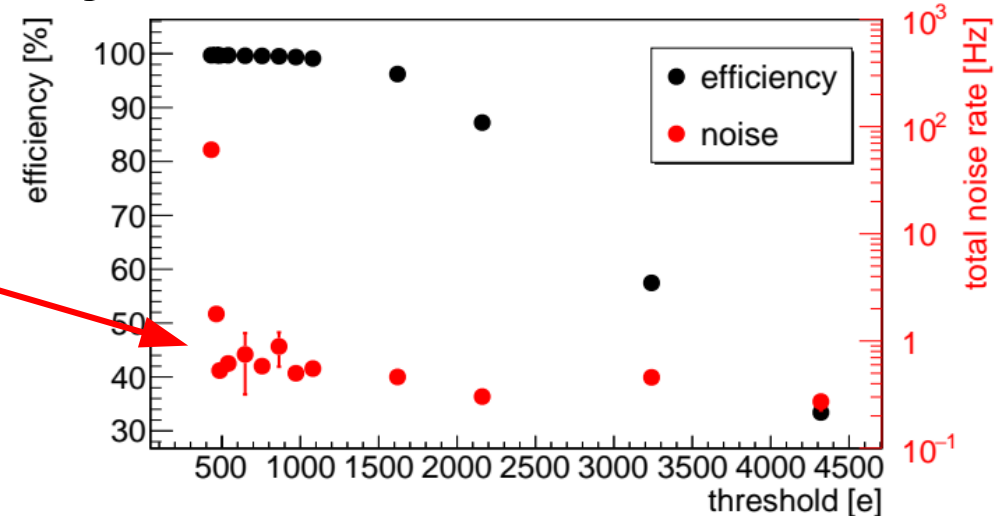- **without** applying the correction:

Summary:

- Noise estimation confirms:
  → **very low noise rate** of ~ 1 Hz on full chip

_____

- TS2 corrupted in both high
  and low ToT events, **but**

- high ToT events:
  → can easily be cut away for timing analysis
    (should they?)

- low ToT events:
  → cannot filter "good"/"bad" timestamps
  → have to live with them

hTrackCorrelationTimeVsTot_rowCorr

hTrackCorrelationTimeVsTot_rowCorr	
Entries	38982
Mean x	4.129
Mean y	11.49
Std Dev x	11.99
Std Dev y	5.408

high ToT events

low ToT events