Timewalk Measurements MuPix6

PANDA Collaboration Meeting 2018/1

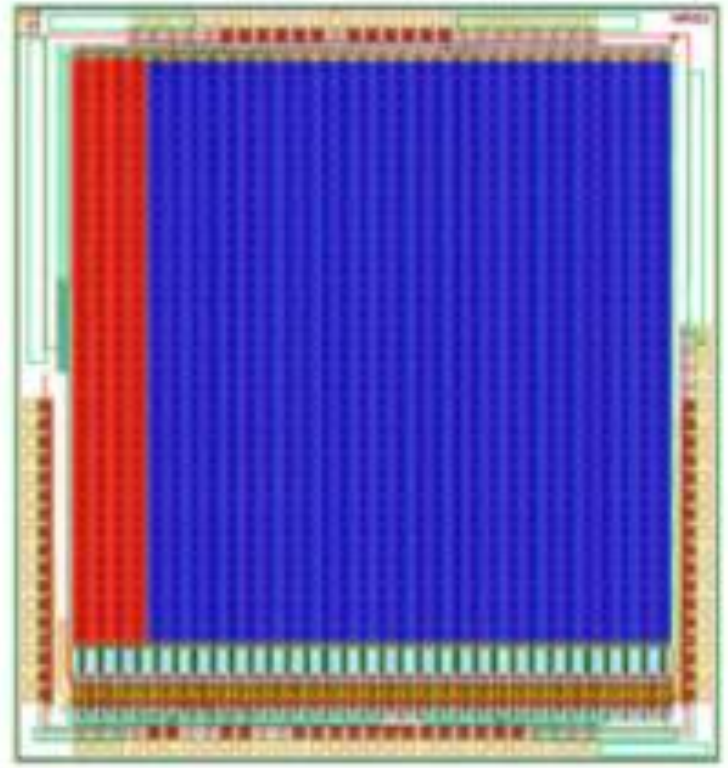
Luminosity Detector Session

Tabea Röthemeyer

Ruhr-University Bochum

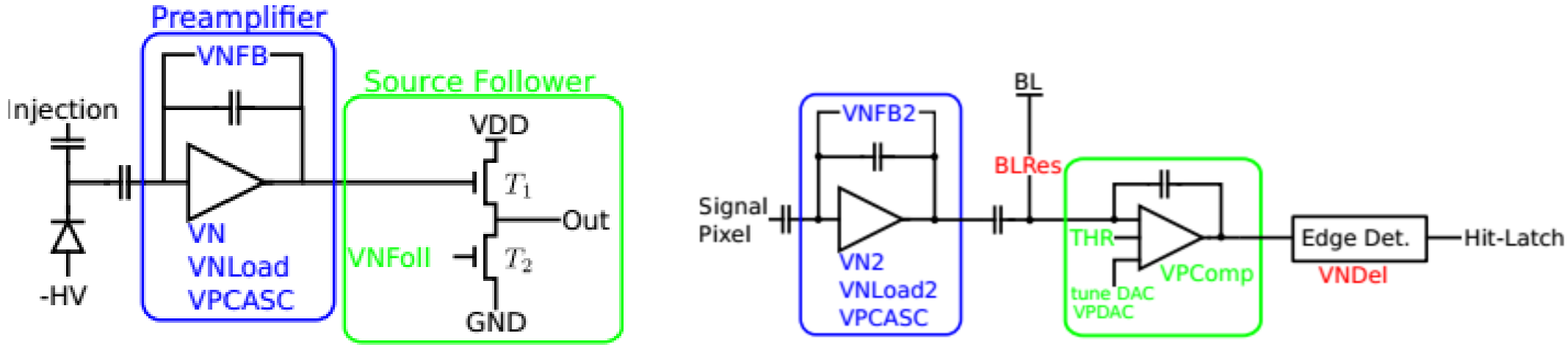
MuPix 6

- Pixel matrix: 40 rows x 32 columns
- Pixel size: 80 x 102 µm
- Active area: 3200 x 3264 µm²
- Every pixel has its own analog readout part
  - Causes the timewalk



MuPix 6 chip layout (red single, blue double stage amplification)

Analogue readout



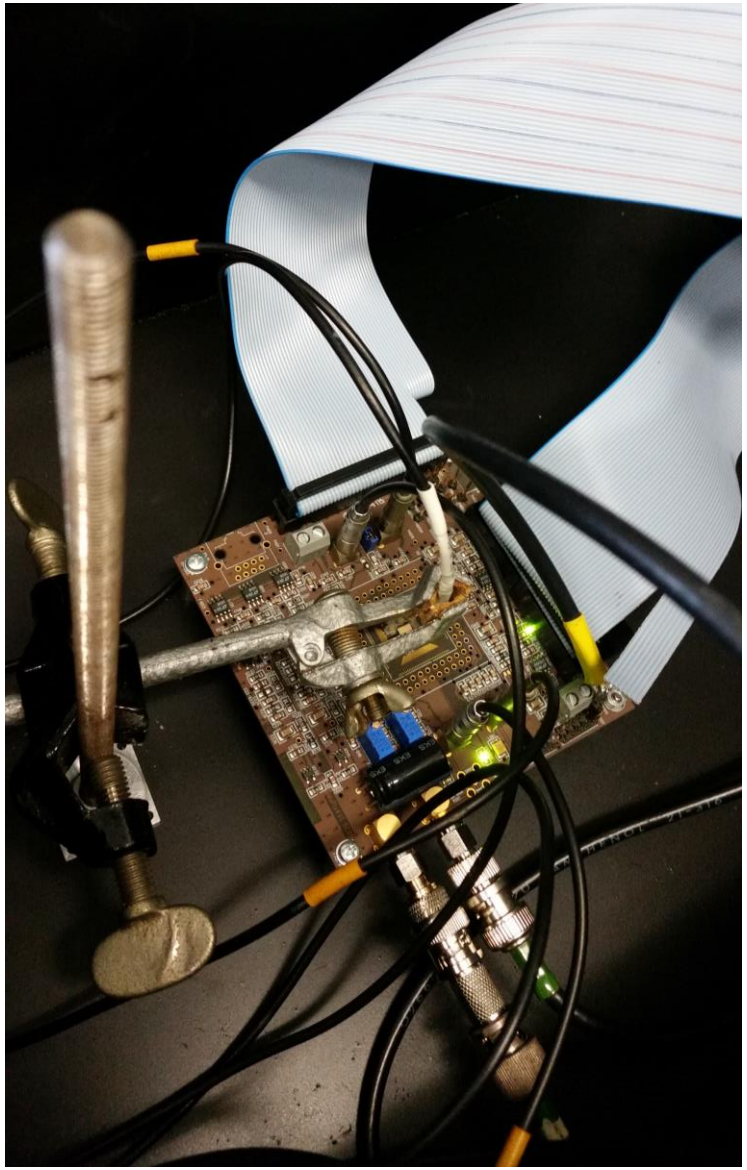
- Every pixel has its own amplifying stage
- Second amplifier in peripherie
  - Signal is driven by source follower
- Charge sensitive preamplifier: voltage signal

Timewalk

- Time over threshold and latency correlate
- question: when did the particle hit? (only timestamp when signal occured known)
  - functional correlation to calculate estimated latency depending on the tot (timewalk correction)
- Influence of high voltage on timewalk

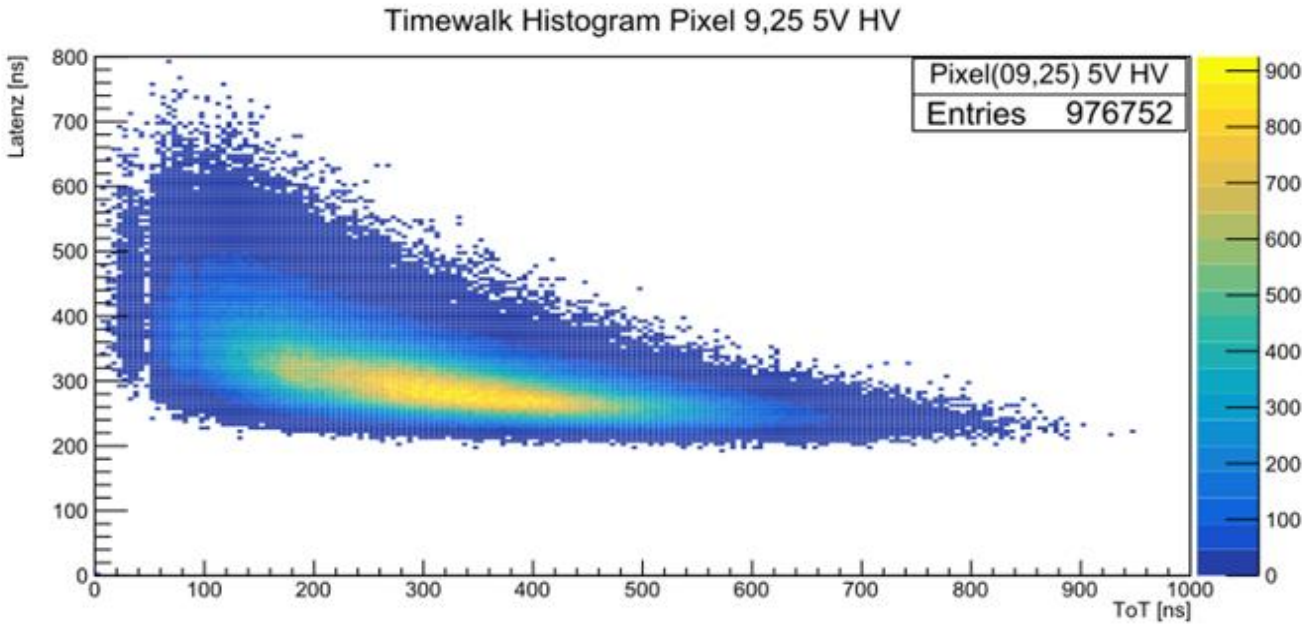
Experimental Set-Up

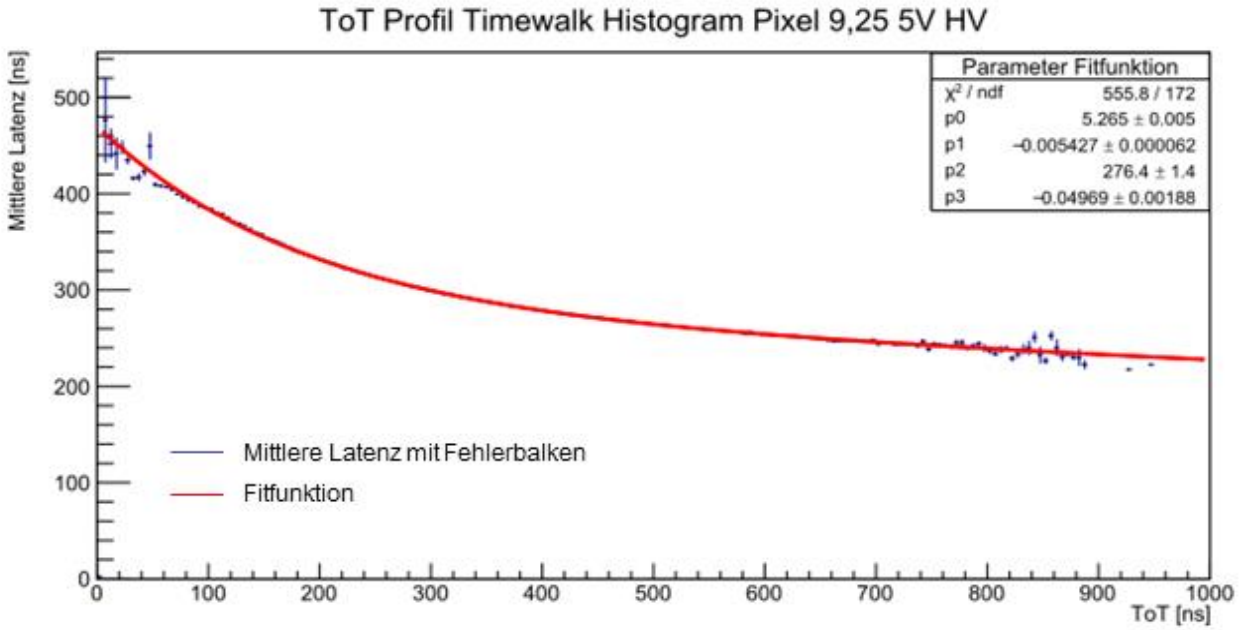
- sensorboard in black-painted aluminium box
- Testsource: laserdiode (860nm)
  - Triggered with a function generator (which also starts latency measurement)
- Readout with TRBv3 and Software (by Tobias Weber)
  - GUI (based on Qt): visualized settings and measurements



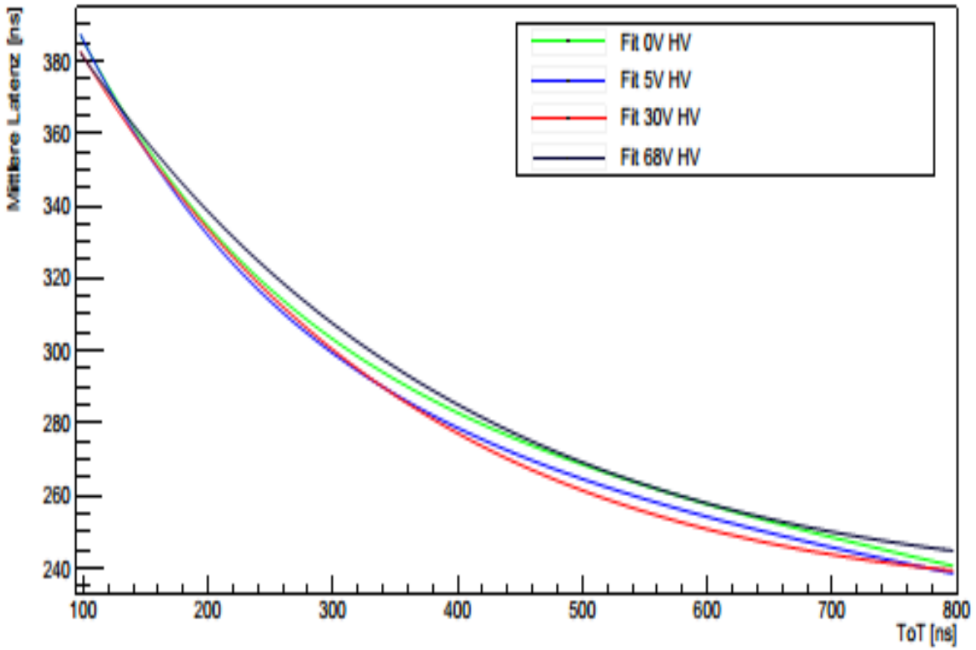
Evaluation and Plots

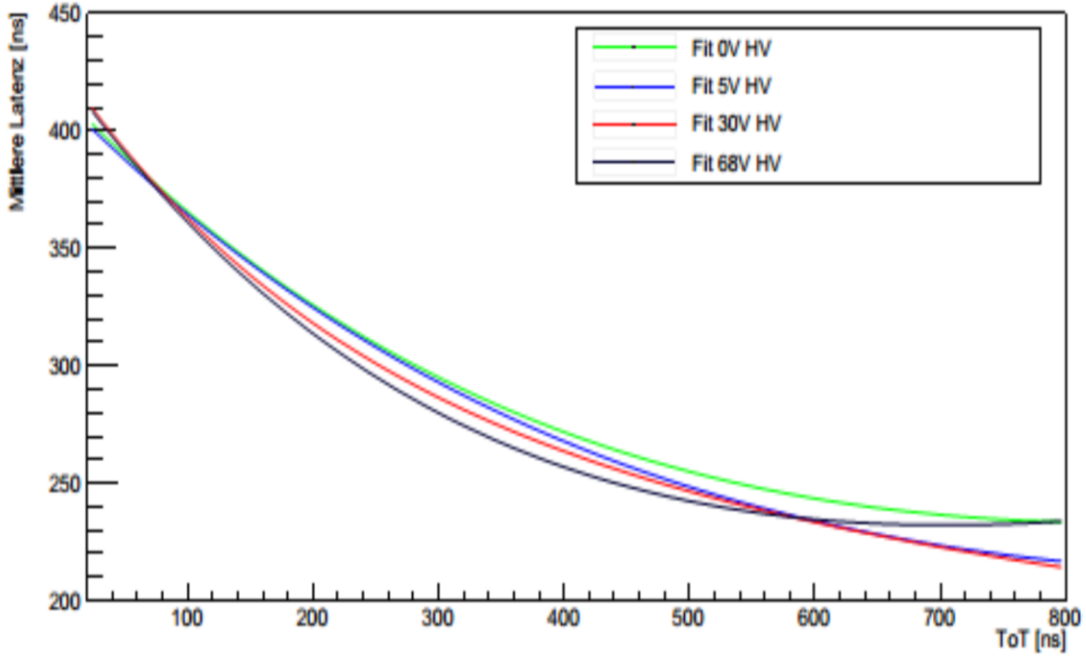
- Fit Function:
  - exp(p0 + p1*x)+ p2 + p3 * x
- Fit for every taken measurement (static high voltage, one pixel)





Results





- left Pixel (9,25), right Pixel (9,26)
- Fit functions for one pixel at different hv values
- Latency range differs, similar latency for high tot values

Results

- Influence of HV is small, not systematic
- Pixel differ: correction for every single pixel needed?
- Working set-up for timewalk measurements