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PXD6 Characterization

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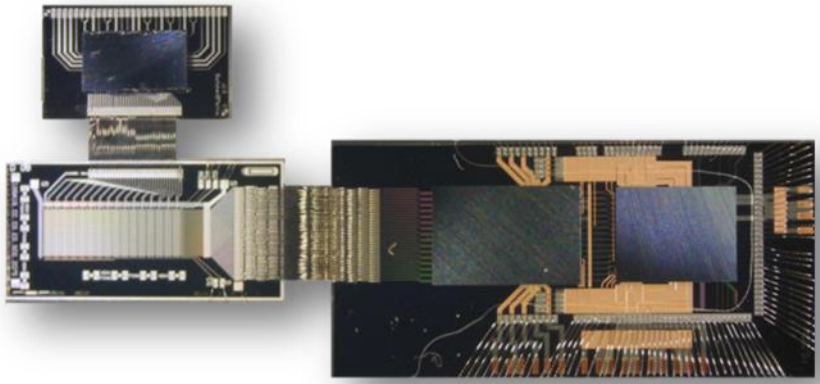
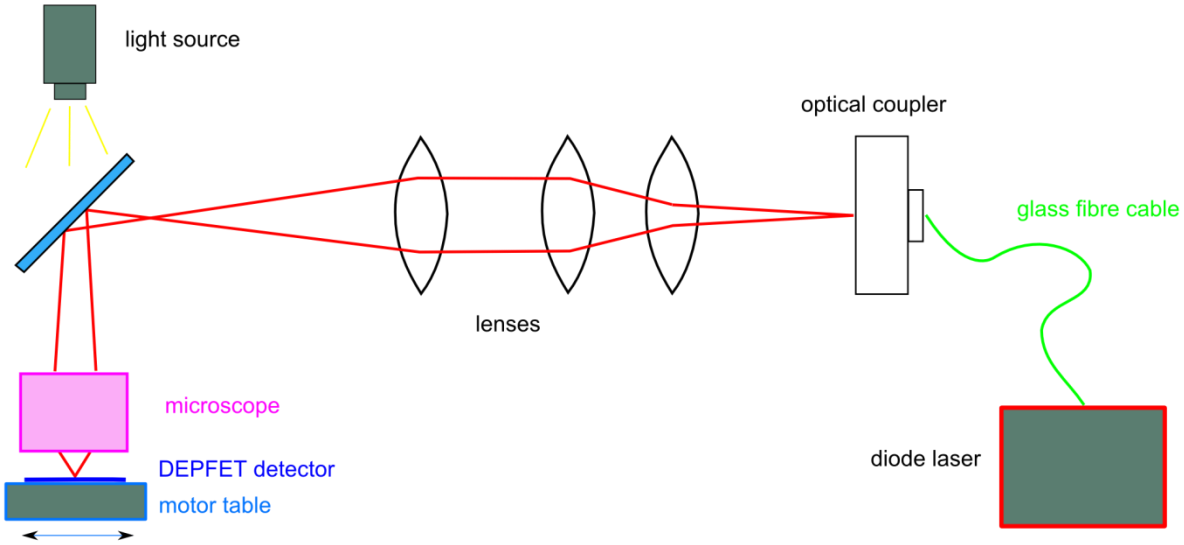
Sensor description

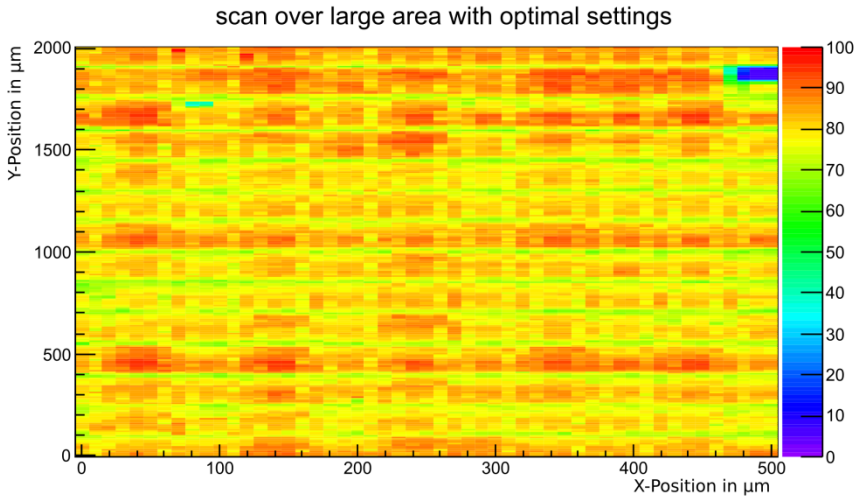


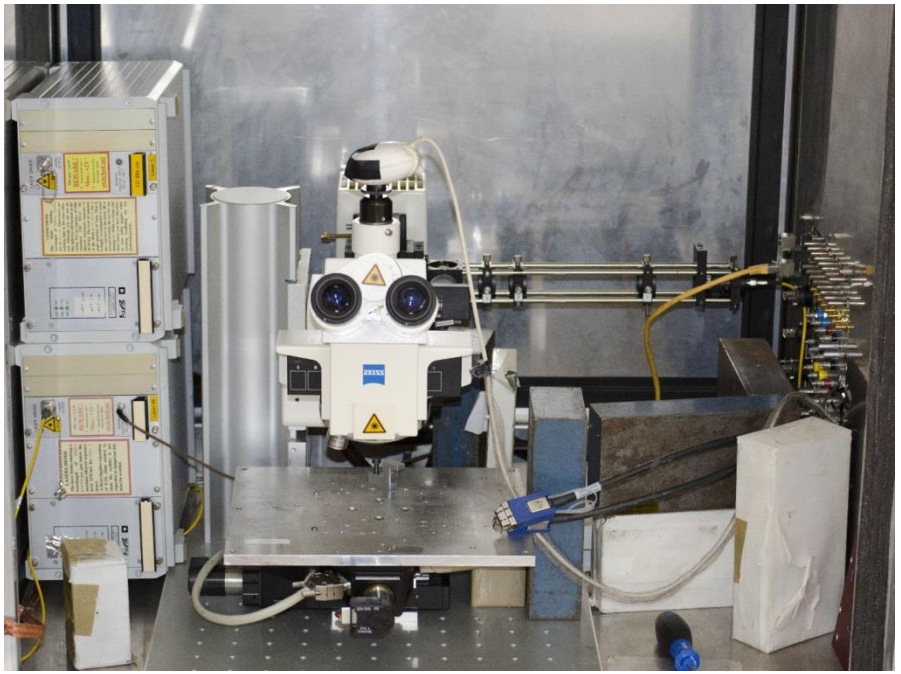
- PXD6 on Hybrid 5.0.03
- F07, 128x16_CC_CD_ED_SCG_Z075
  - Standard design
  - Pitch = 50 x 75 µm^2
  - L = 6 µm
- DCDBv2
- DHP0.2

Experimental set-up

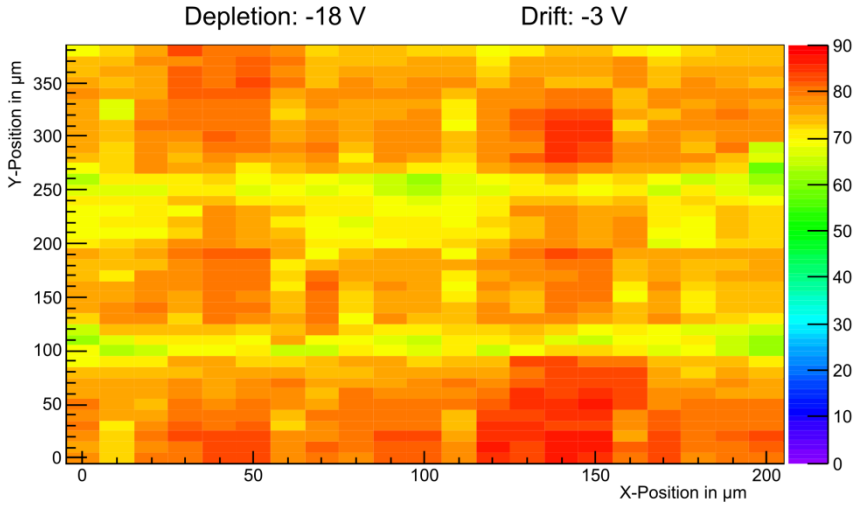
Homogeneity studies through position dependent laser scans

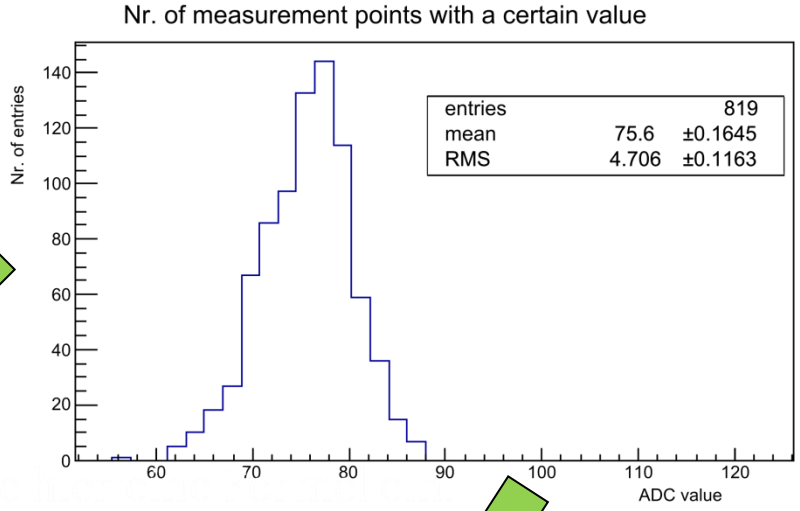


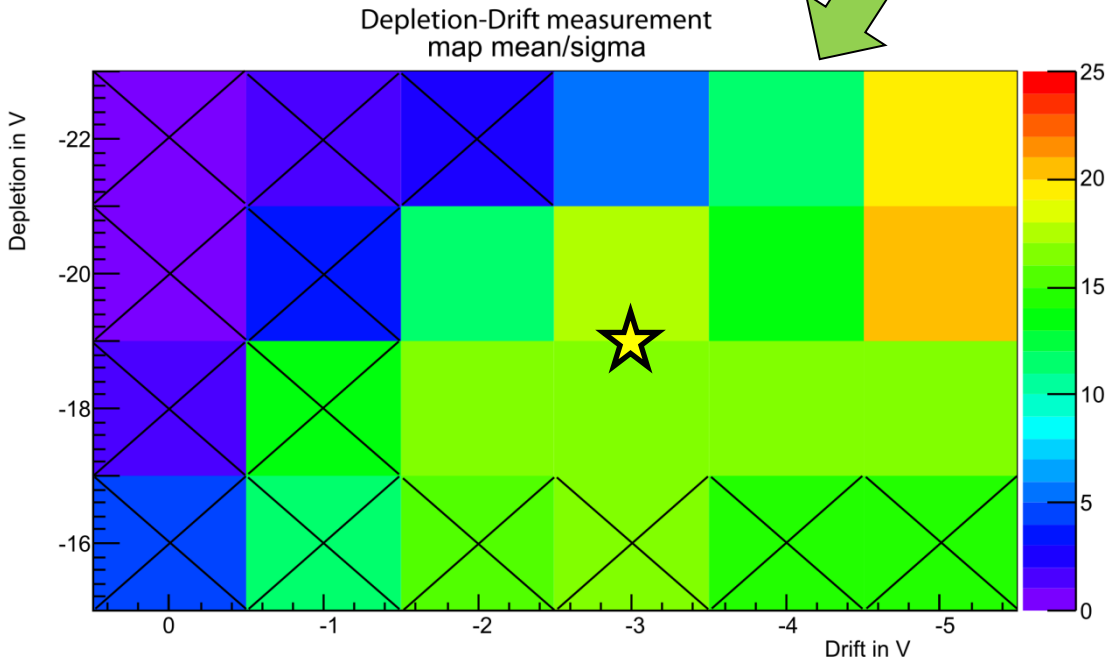




Depletion-Drift measurement



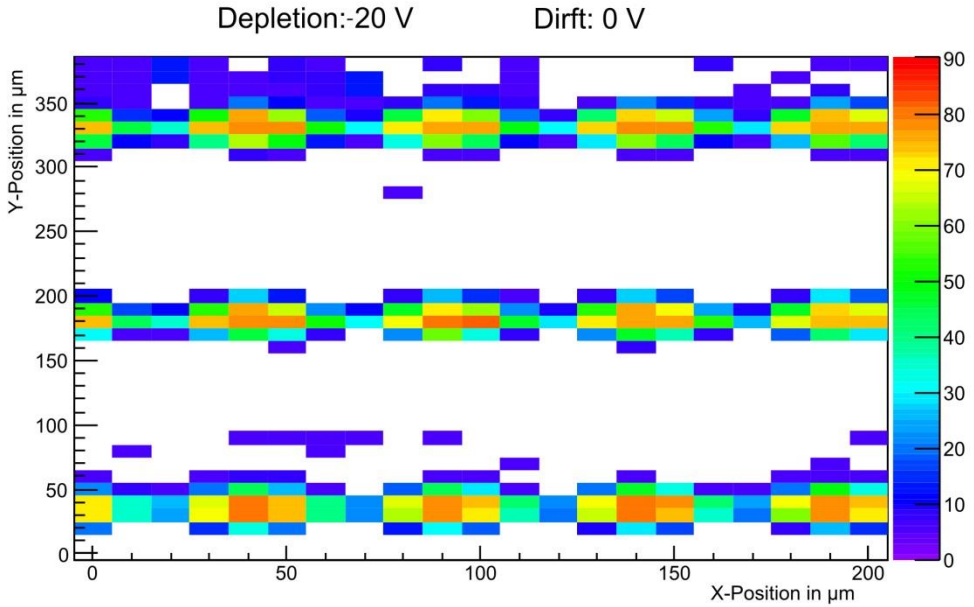




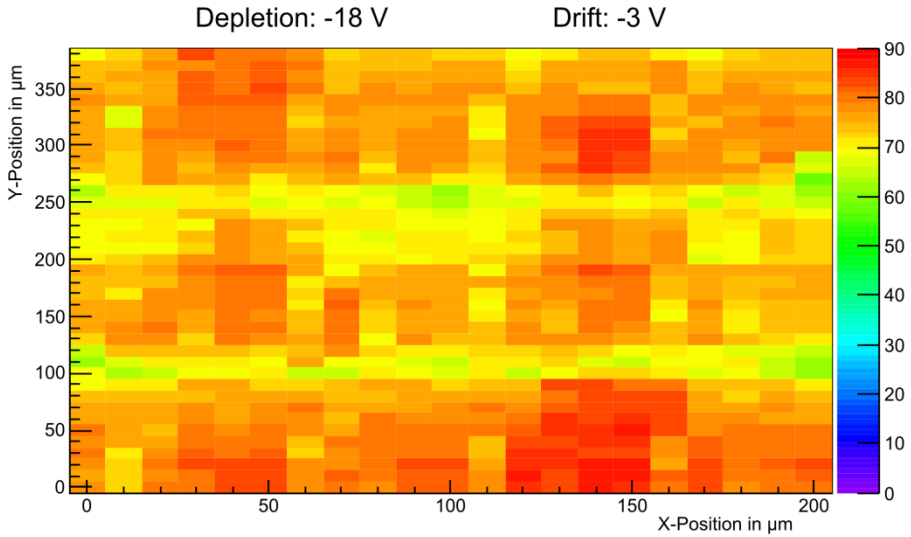
- Stable working point:

Depletion: -19 V
Drift: -3 V

Depletion-Drift measurement

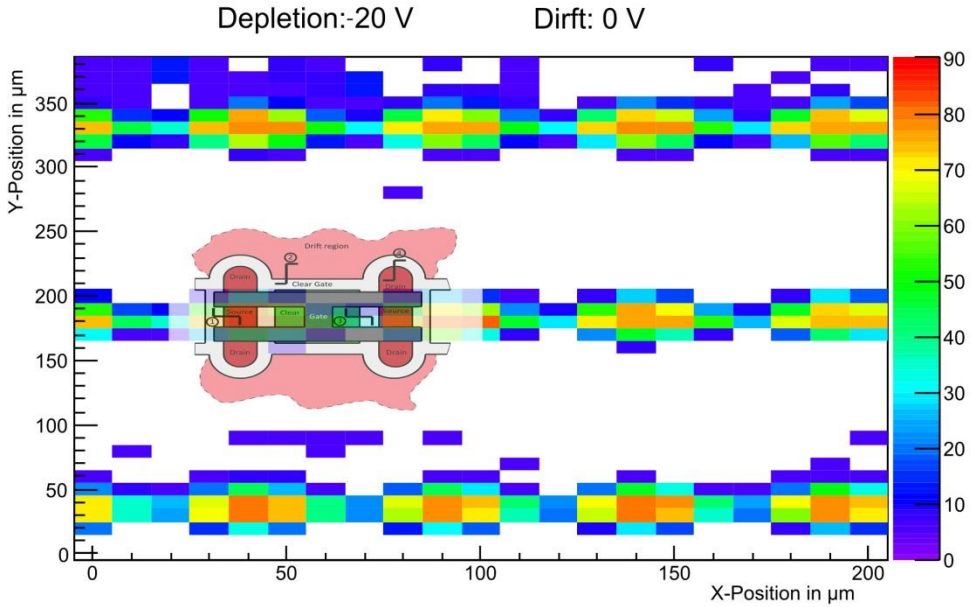


If Drift voltage too low
→ Charge loss in large Drift regions

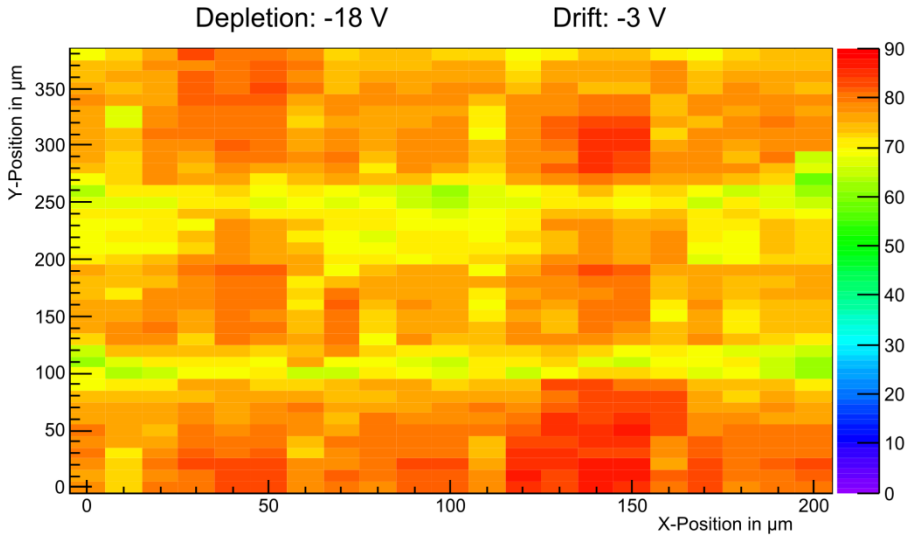


With optimal Drift and Backplane
→ Uniform charge collection

Depletion-Drift measurement



If Drift voltage too low
→ Charge loss in large Drift regions

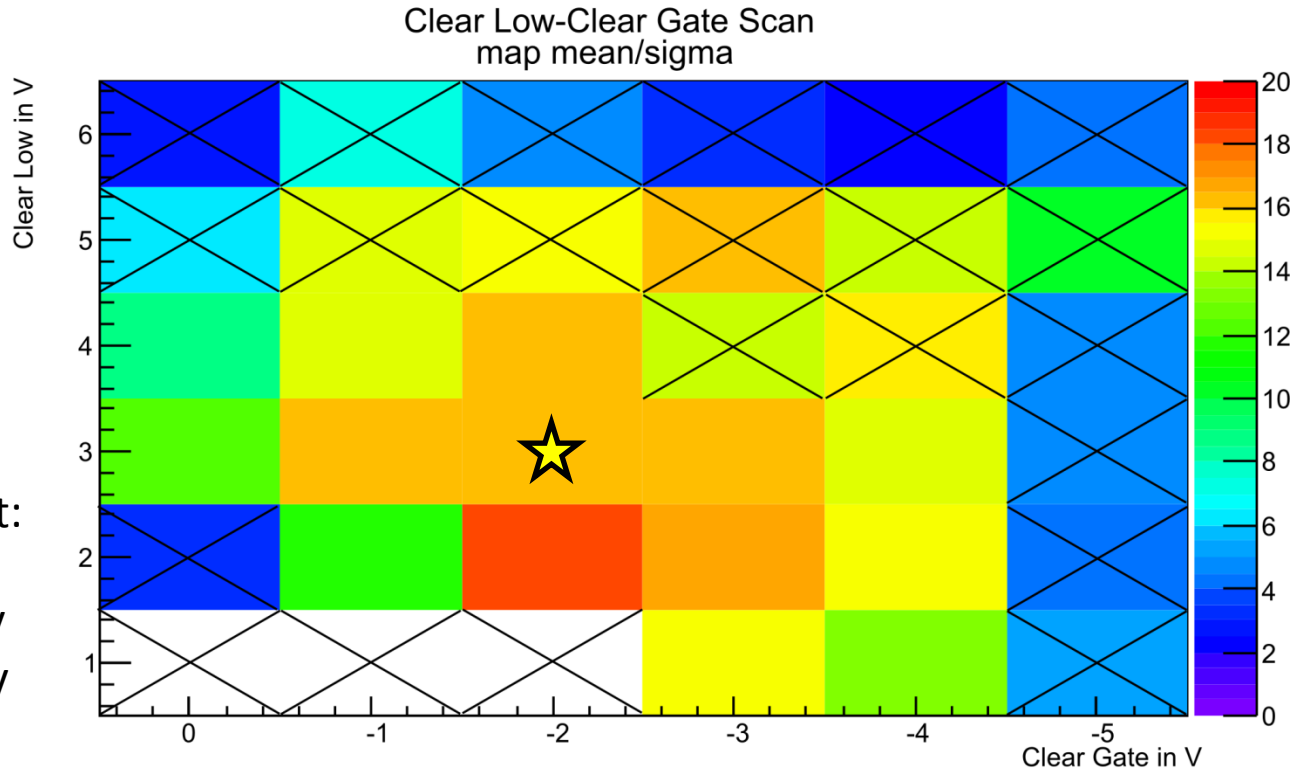


With optimal Drift and Backplane
→ Uniform charge collection

Clear Low-Clear Gate measurement

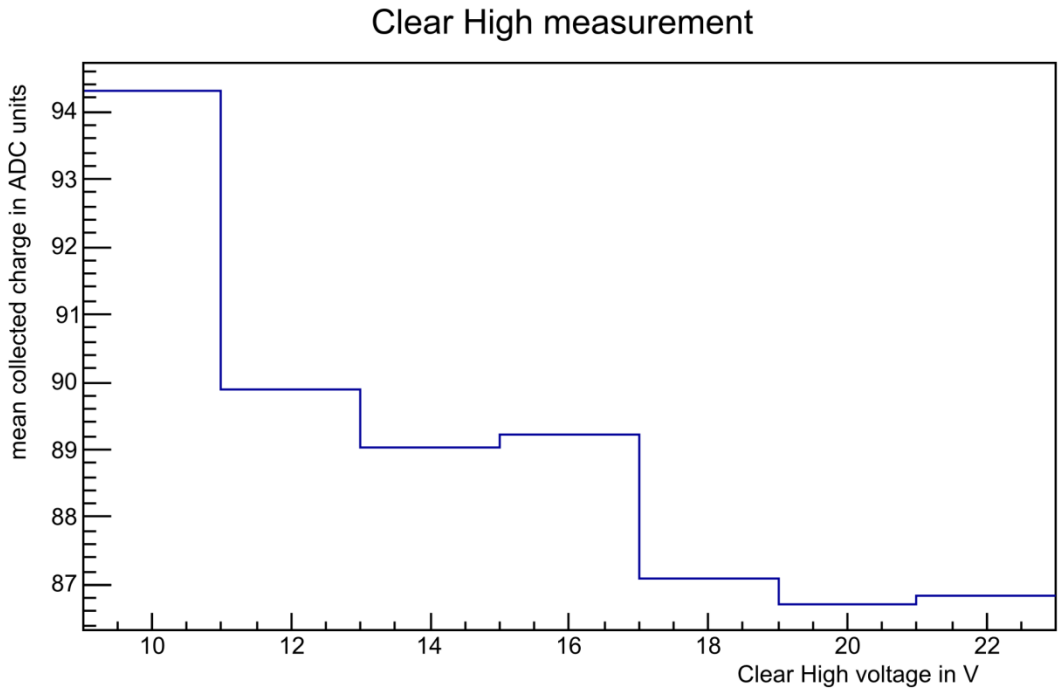
- Stable working point:

Clear Low: 3 V
Clear Gate: -2 V



Clear High measurement

A single pixel is illuminated with high intensity.



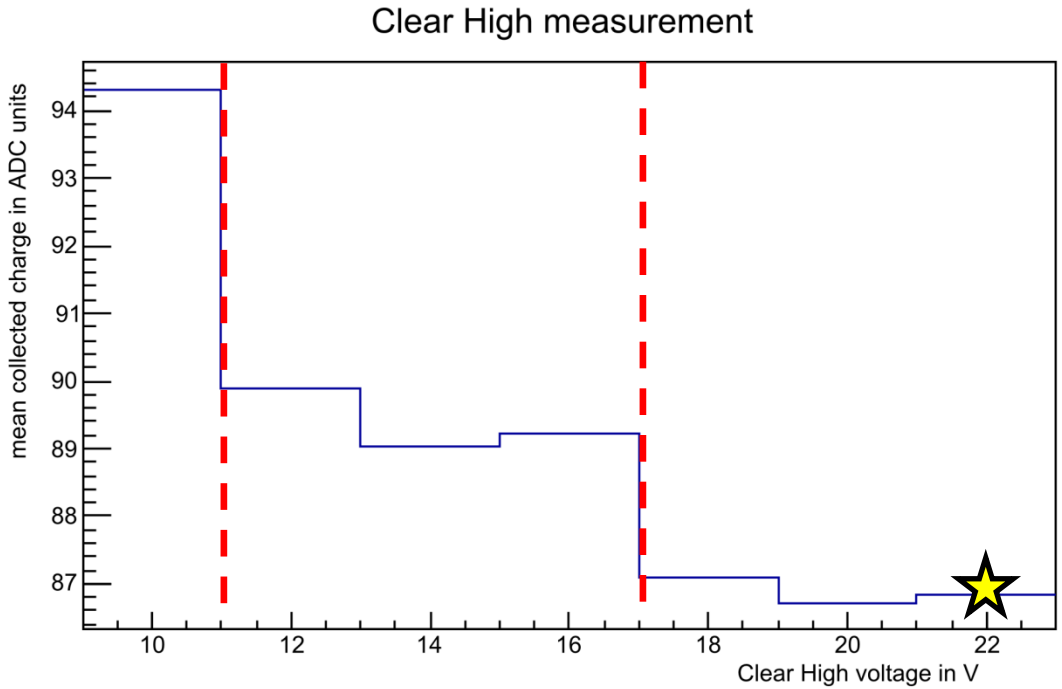
Clear High measurement

A single pixel is illuminated with high intensity.

Clear High: <10 V
→ Below punch through

Clear High: 12-16 V
→ Incomplete clear

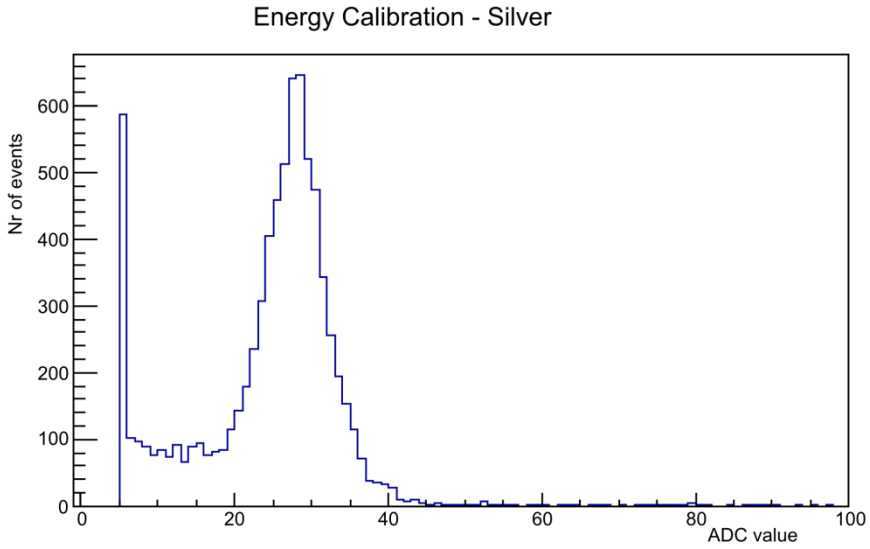
Clear High: >18 V
→ Full clear



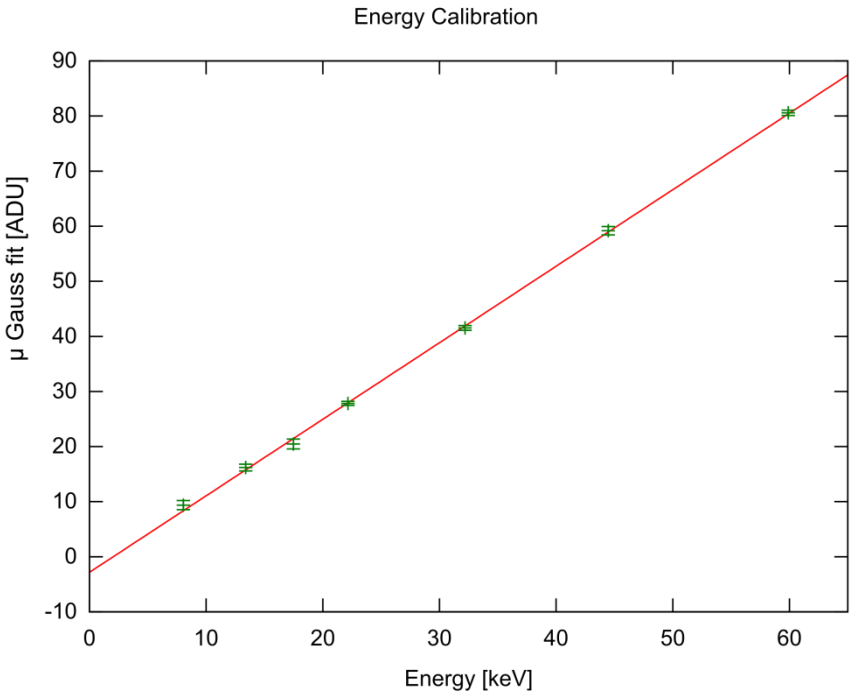
Determination of g_q

Energy = (0,72±0,01) ADC value+ (2,04±0,29) keV

Variable X-Ray Source lines:
Tb, Ba, Ag, Mb, Rb, Cu.

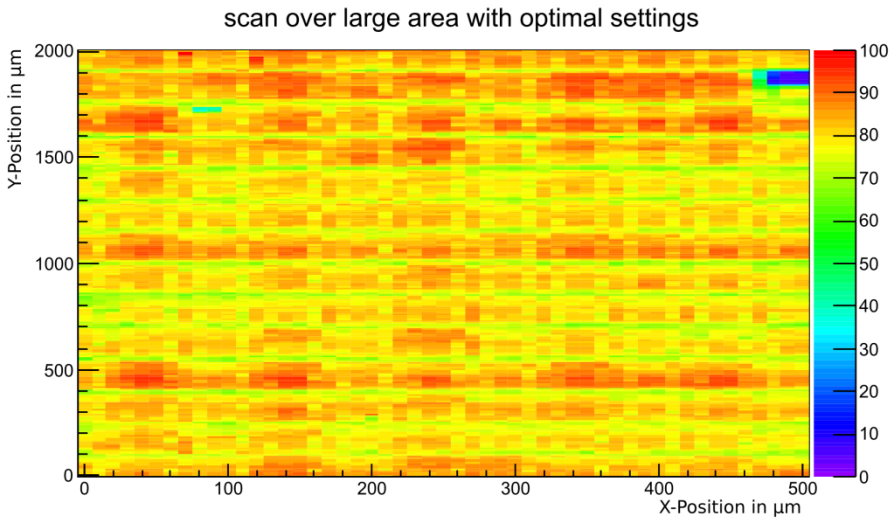


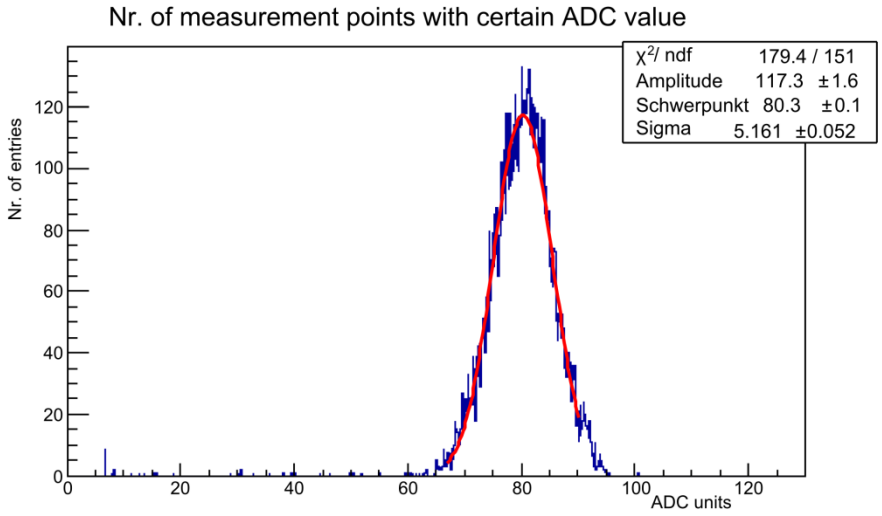
$\chi^2/_{\mathrm{ndf}} = 0{,}852$



$$g_q = \frac{1\ \mathrm{ADC}}{0{,}72\ \mathrm{keV}} \cdot \frac{86\ \mathrm{nA}}{1\ \mathrm{ADC}} \cdot \frac{3{,}6\ \mathrm{eV}}{1\ \mathrm{e}^-} \sim 430\ \frac{\mathrm{pA}}{\mathrm{e}^-}$$

Long final homogeneity scan





Depletion:	-18 V
Drift:	-3 V
Clear Low:	3 V
Clear Gate:	-2 V
Clear High:	22 V

Measurement time around 28 hours.
~6% signal spread in a large sensor area.

Summary

- PXD6 small sensor optimized on Hybrid 5.0
- Voltages compatible with similar sensor types
- Performance as expected by design specifications
- Optimal configuration has been used in the 2013 DESY test beam

Thank you