APTS Charge Calibration

A Using Test-Pulses, 55Fe and X-ray Fluorescence

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HELMHOLTZ RESEARCH FOR GRAND CHALLENGES

DESY.

Analogue Pixel Test Structures (APTS)

To tune our simulations

- Collaboration of several institutes with an interest in 65 nm MAPS development
- Test structures to optimize the sensor layout
- Test-beam measurements at DESY June 22
- Need charge calibration to compare to simulation
- First step: Equalize the pixel response
  - Inject calibration pulses at different amplitudes
  - Measure the pixel response
  - Fit the obtained 'gain curves'

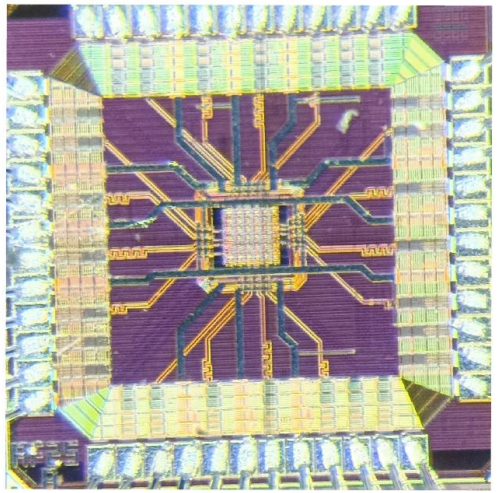


Fig. 1: Analog Pixel Test Structure (APTS).

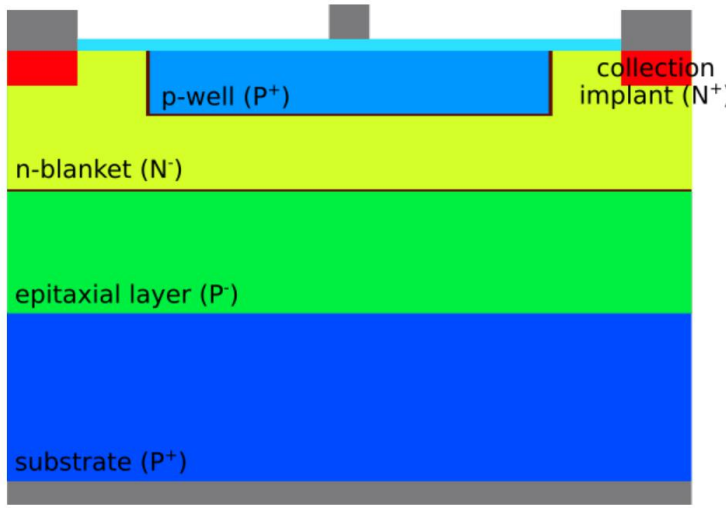
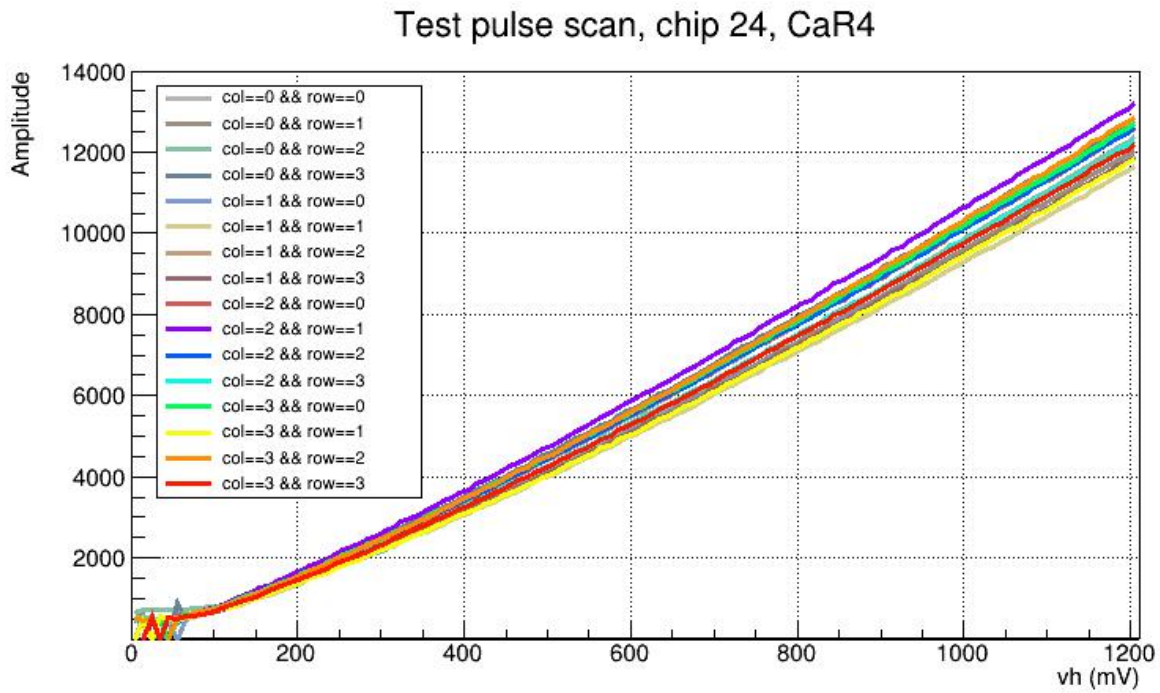


Fig. 2: Layout example of the Tangerine sensor.



Iron 55 Measurements

Characteristic X-ray Source

Un-calibrated:

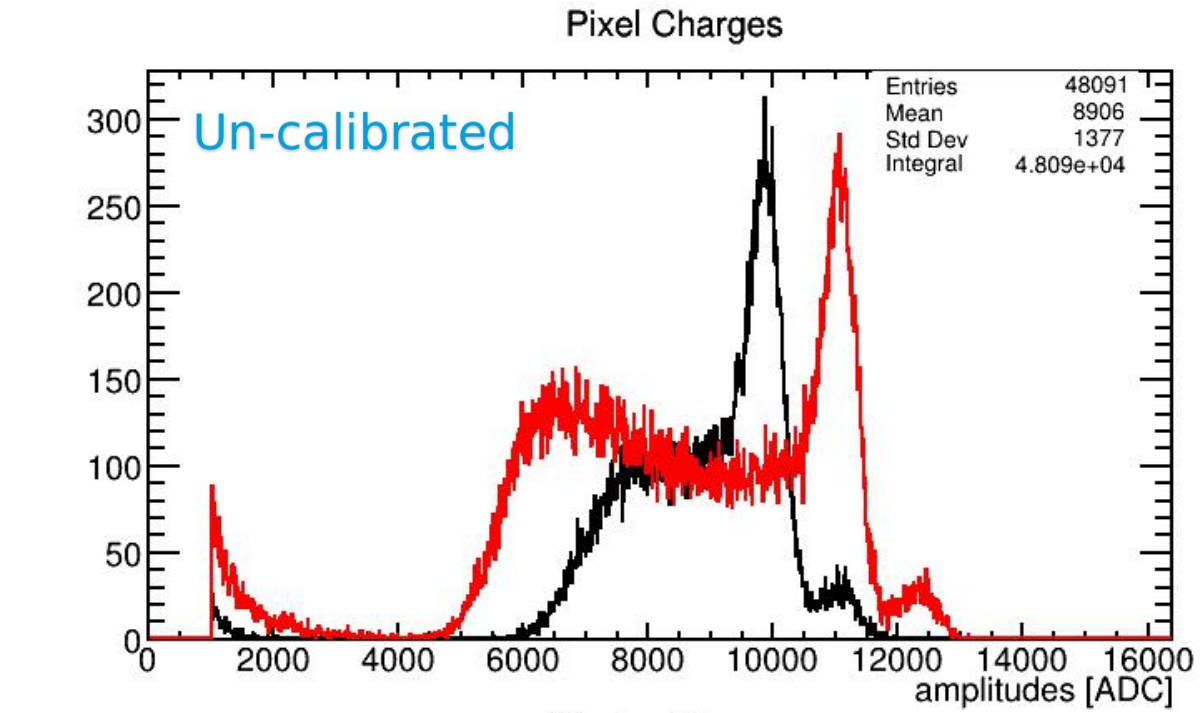
- Different pixels, different gain, different spectrum

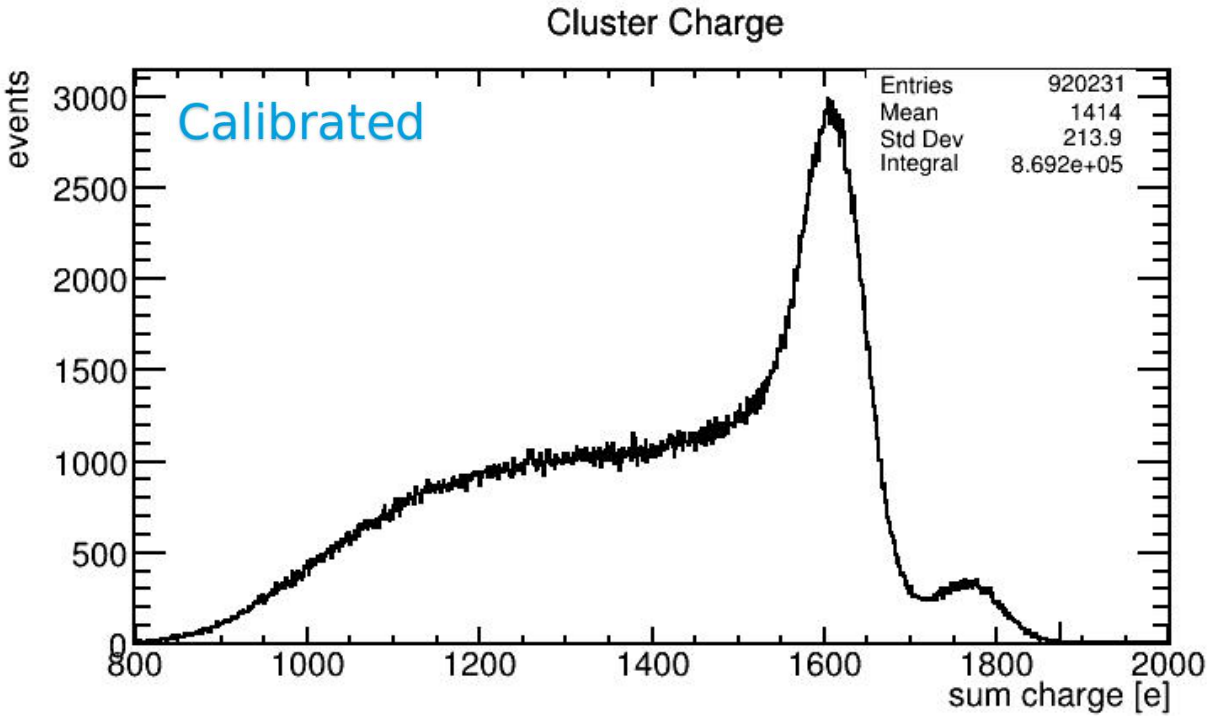
Calibrated:

- First apply the inverse gain curves
- K-alpha line (1.6 ke), K-beta line (1.8 ke) both visible now
- Find the peak position, compare to literature value and derive calibration factor

Tested:

- Using titanium as x-ray fluorescence target
- Peak expected 1.2 ke, agreement within 1 %





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