A first look at 50um thick sensors on CLICpix

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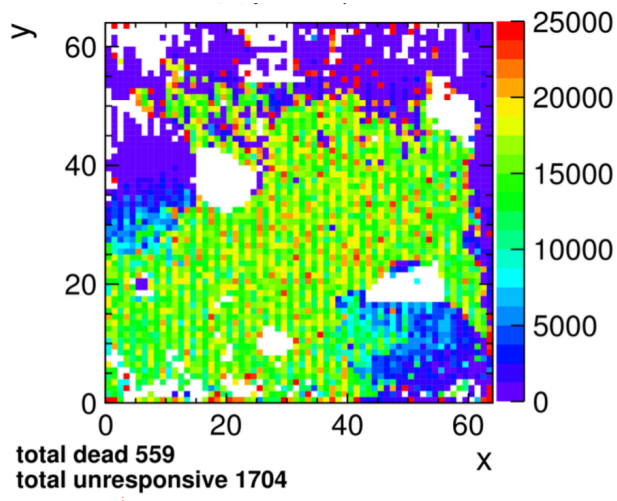
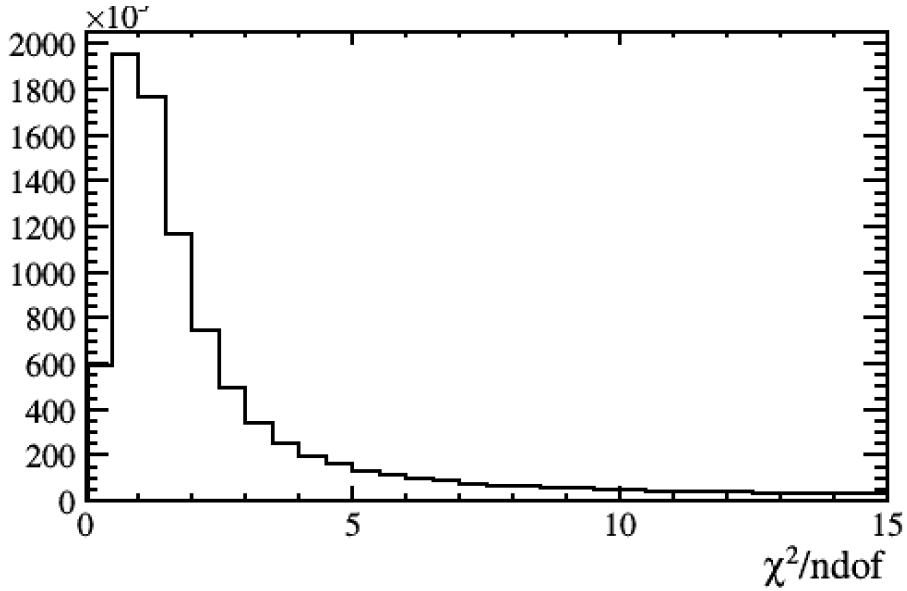
Reminder

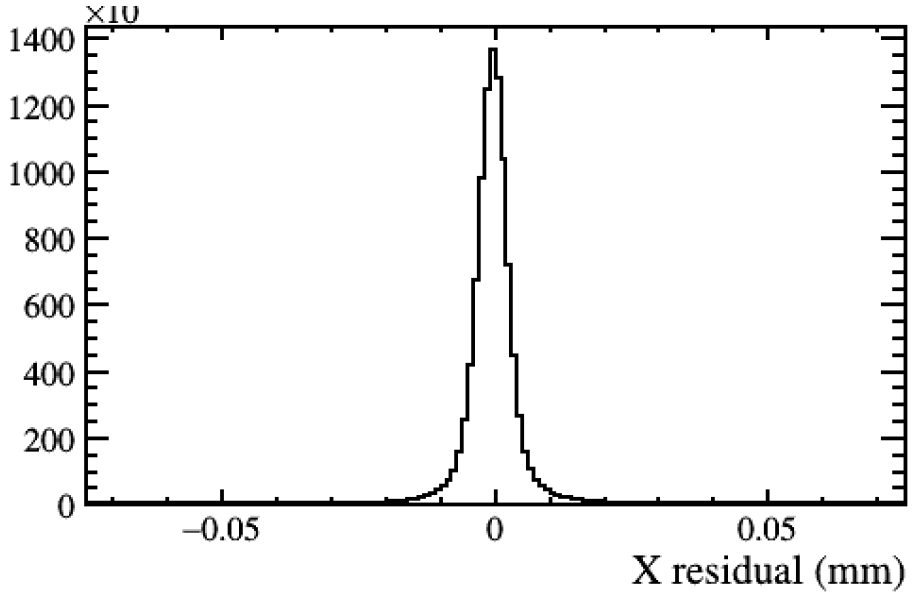
- Data taken with 200um thick sensor ealrier in the year (with EUDET telescope)
  - Decided that it was worth investing some time to integrate CLICpix with Timepix3 telescope to take data with new 50um sensor
  - Required some firmware updates, software updates to remove interaction with TLU (data packaging etc.)

- Lab tests on this sample shown by Matthew (http://indico.cern.ch/event/548987/contributions/2262156/attachments/1318123/1975572/activeEdgeSensors_MB_29-07-16.pdf)
  - Sample showed large dead regions, could only be biased to ~5 V

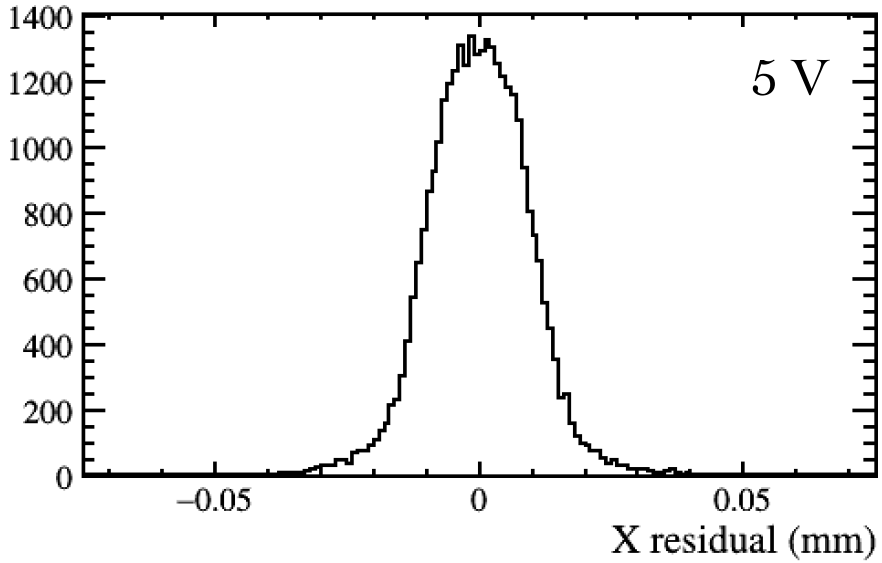


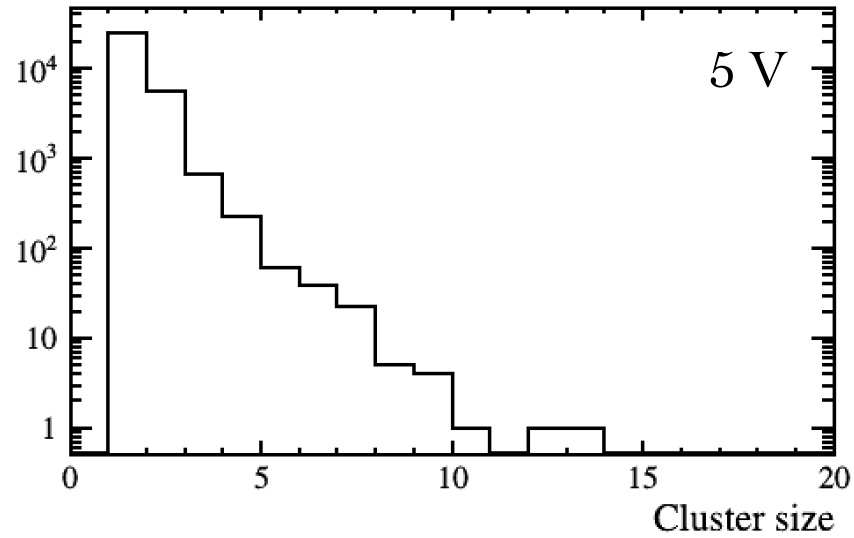
Telescope quality plots

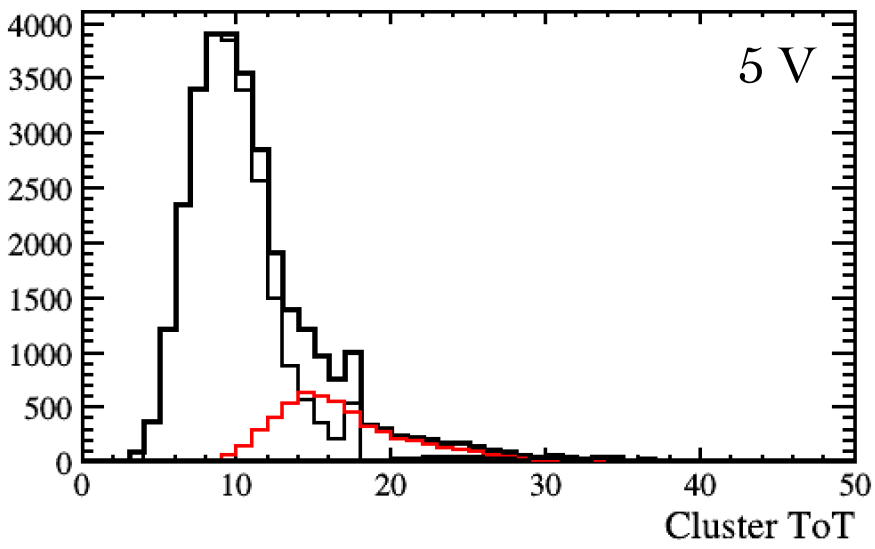


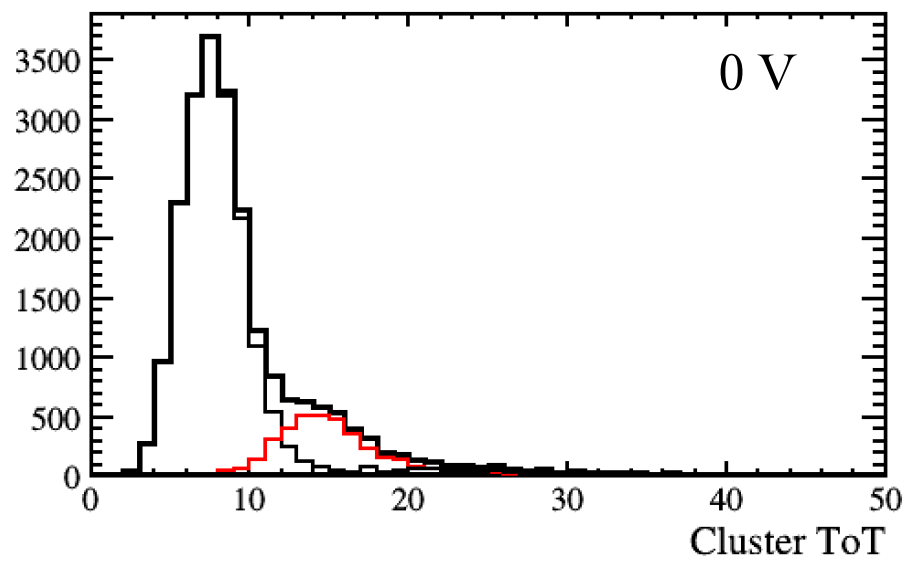


CLICpix sanity plots





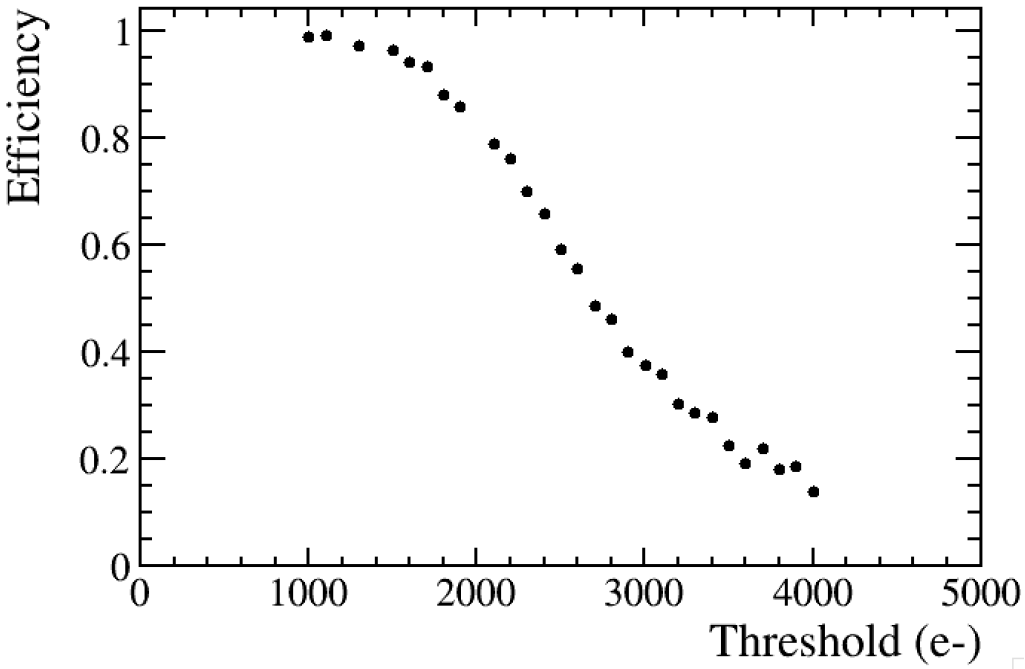


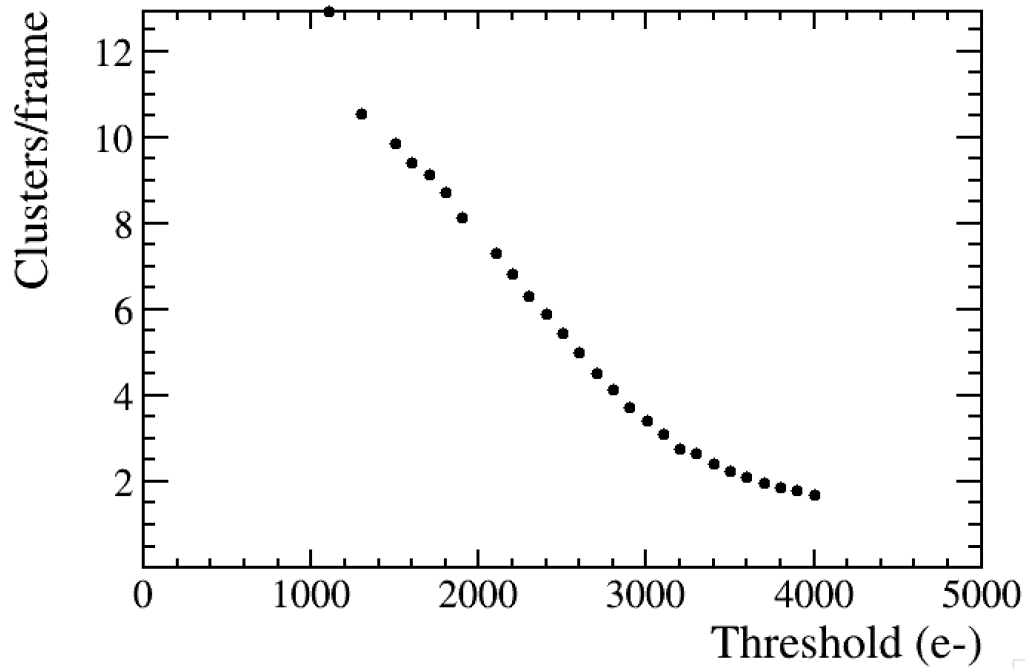


Cuts applied

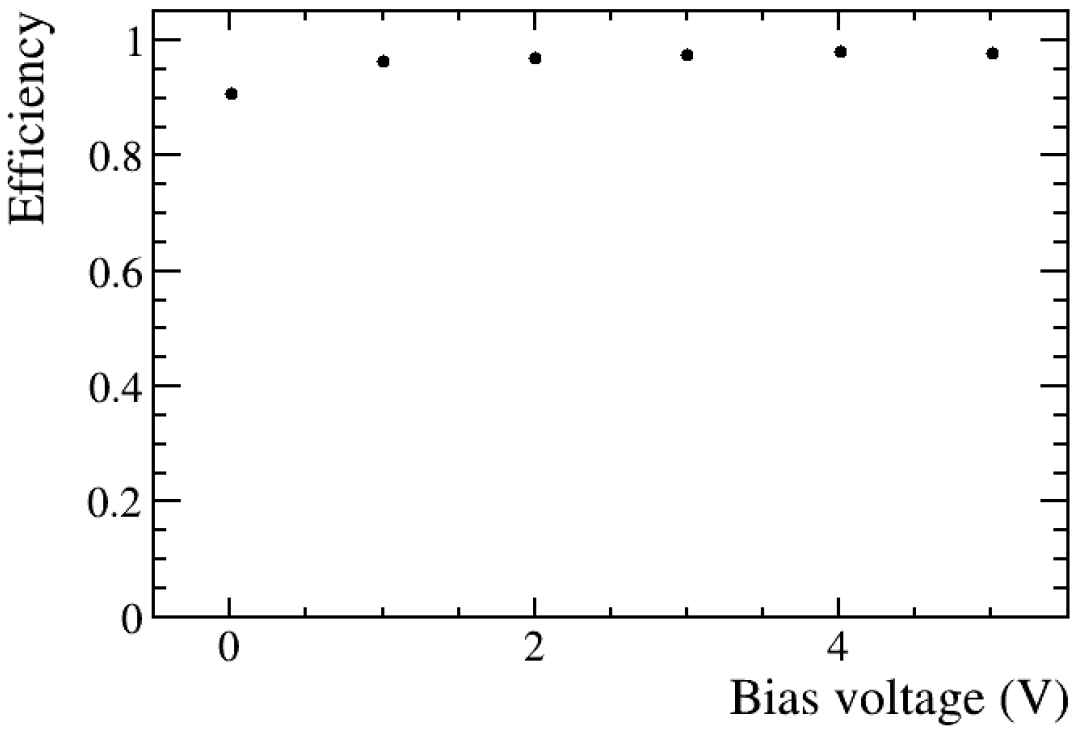
- Following what was shown by Matthew for unresponsive pixels, a mask was created which removed ~40% of all pixels
  - Tracks are additionally not considered if they hit within 0.5 pixels of a masked pixel
    - cle appeared to have some affect on the noise level, had initially intended to have order magnitude higher cycling (10 ms on, 10 ms off)
- A track quality cut was applied - only tracks with a χ^2 /degrees of freedom < 2.5 were used
- Association of tracks and clusters used a cut of 50um in both x- and y-directions

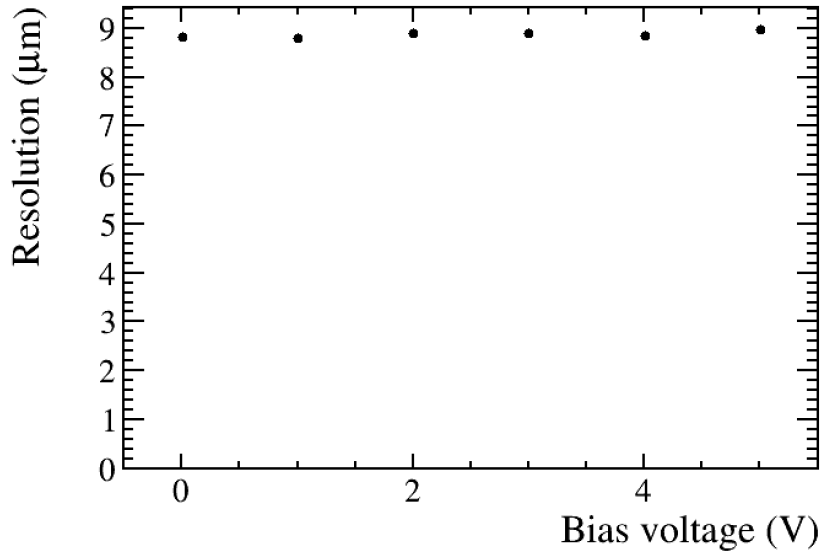
Threshold scan results

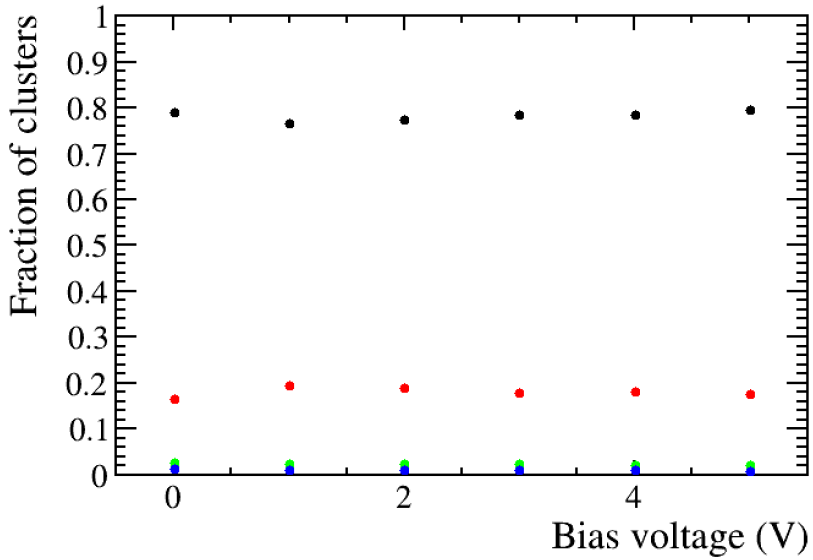




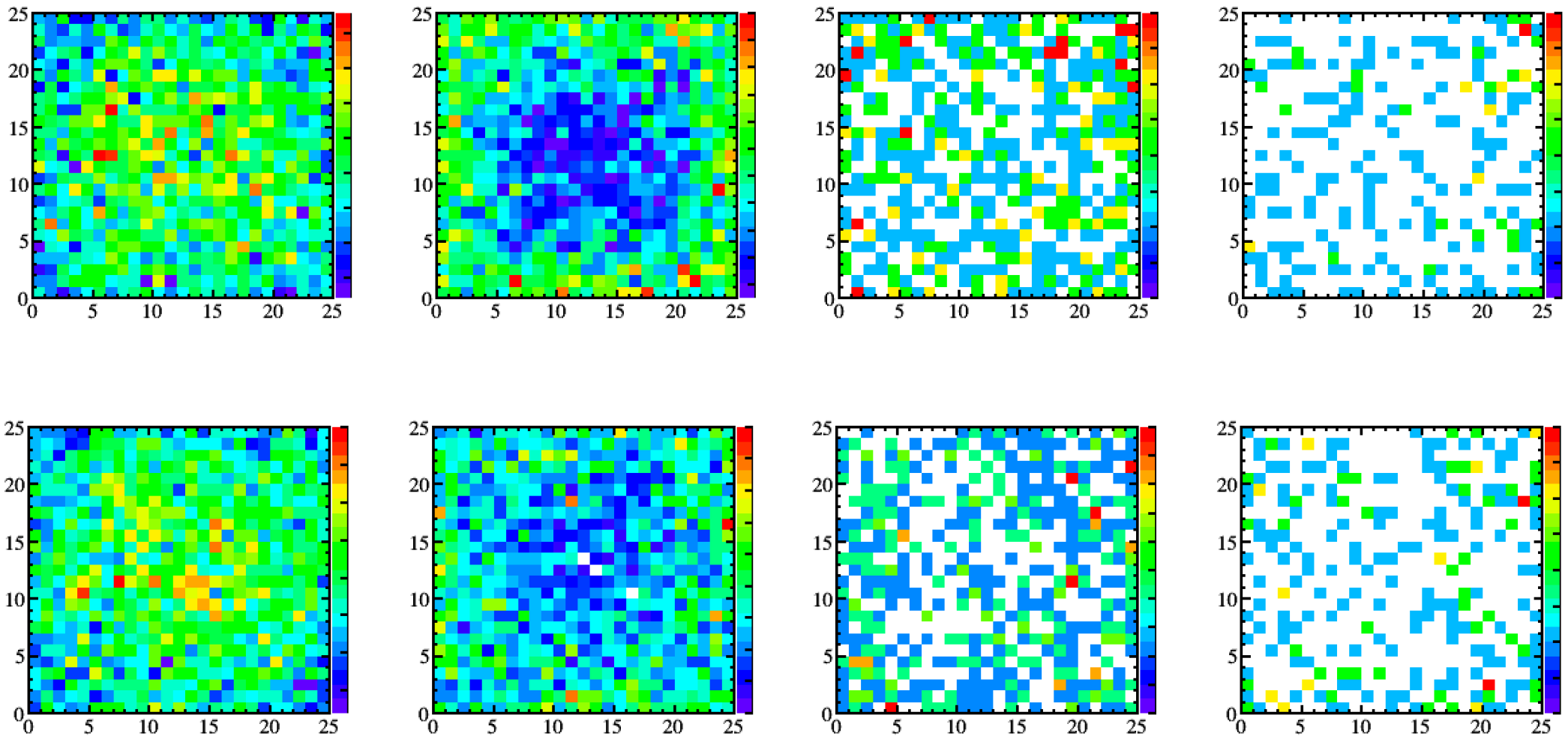
Bias scan results







Bias scan results - in-pixel cluster positions



Summary

- Data taking worked very well!
  - Surprisingly smooth once a few initial bugs were chased out - quickly got device taking (good) data and analysed shortly after taking it
- Sensor is not "great" (known from pre-beam lab tests)
  - High noise from CLICpix + quality of bump-bonding makes it difficult to reach full efficiency without significant number of noise hits
  - Can expect improvements with CLICpix2, but will bump quality be any better? Ask other vendors?
- Nonetheless, interesting (preliminary) results
  - Very little charge sharing, doesn't look likely that we will get resolution much better than binary, even if we do reach full efficiency (and biasing at lower voltages not possible…)
- More thorough look at the data should be performed (and put together with 200um data, plus simulations)