



## Status of ARCADIA Digital Readout Tests

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# Introduction

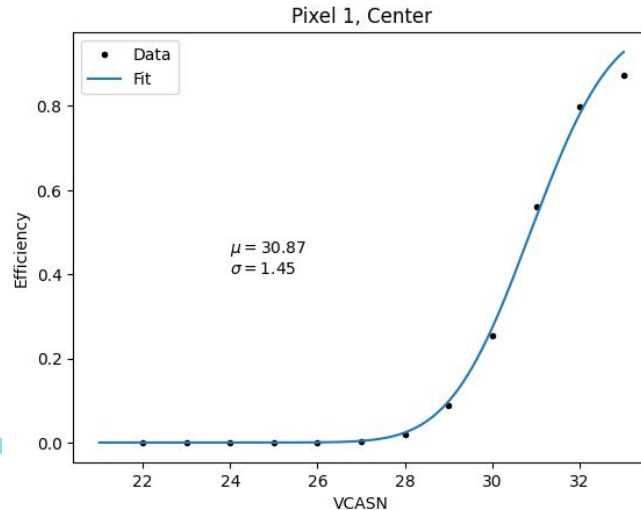
Last time:

- Presented digital efficiency readout with ARCADIA of two pixels
- Saw some unexpectedly low efficiency readout with IR laser

This time:

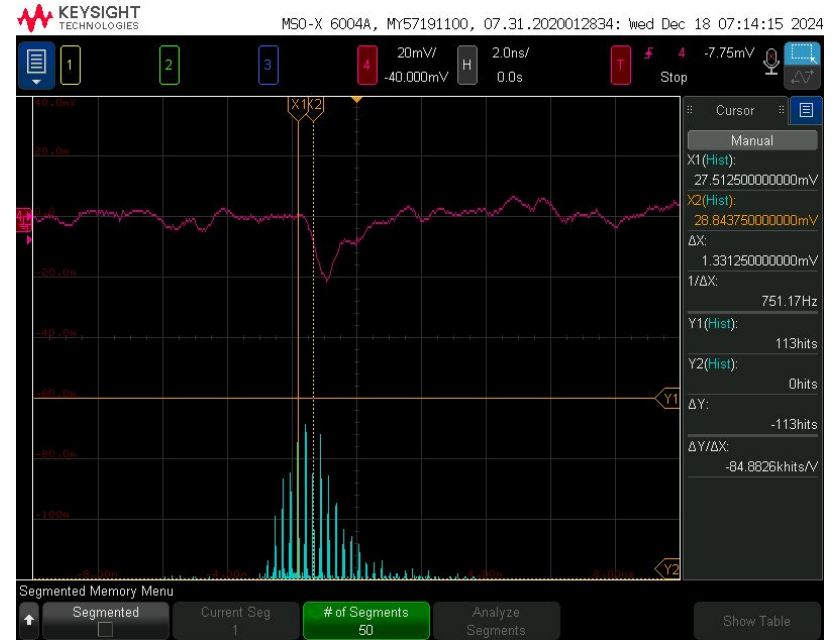
- Measuring a 2x2 pixel setup at the center using a 10 kHz laser frequency
- Automating VCASN scans, with the test range set from 1 to 20, but not limited to this range

Previous measurement:



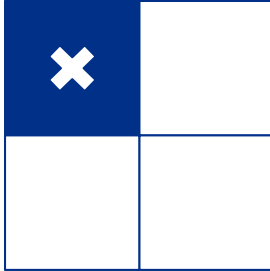
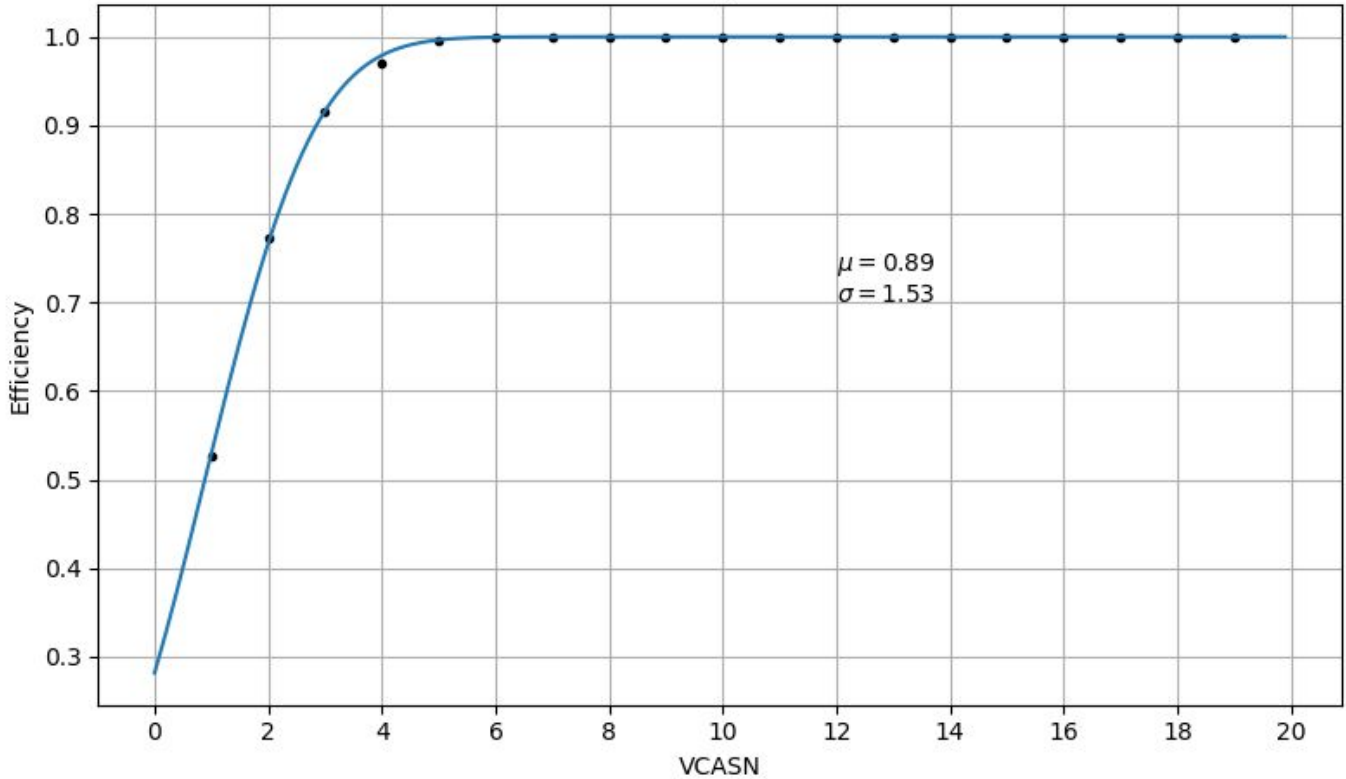
# Laser Corrections

- Previous iris on beam expander closed to minimal position
  - Restricts the amount of total power
  - Now opened to optimal spot
- Found issue actual laser pulse frequency
  - An average frequency of approximately 97.6% of the expected 10 kHz was found, which is used as a correction factor in the efficiency calculation
- Tuned laser power to MIP with new LGAD measurements at new lab location
- Found varying laser pulse frequency affected readout signal in the LGAD
  - Higher frequencies have higher output power, requiring attenuation adjustment to maintain tuned laser power to MIP



# Pixel 0

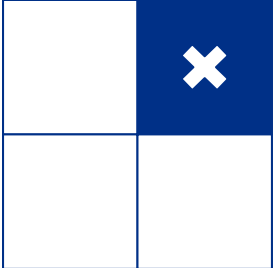
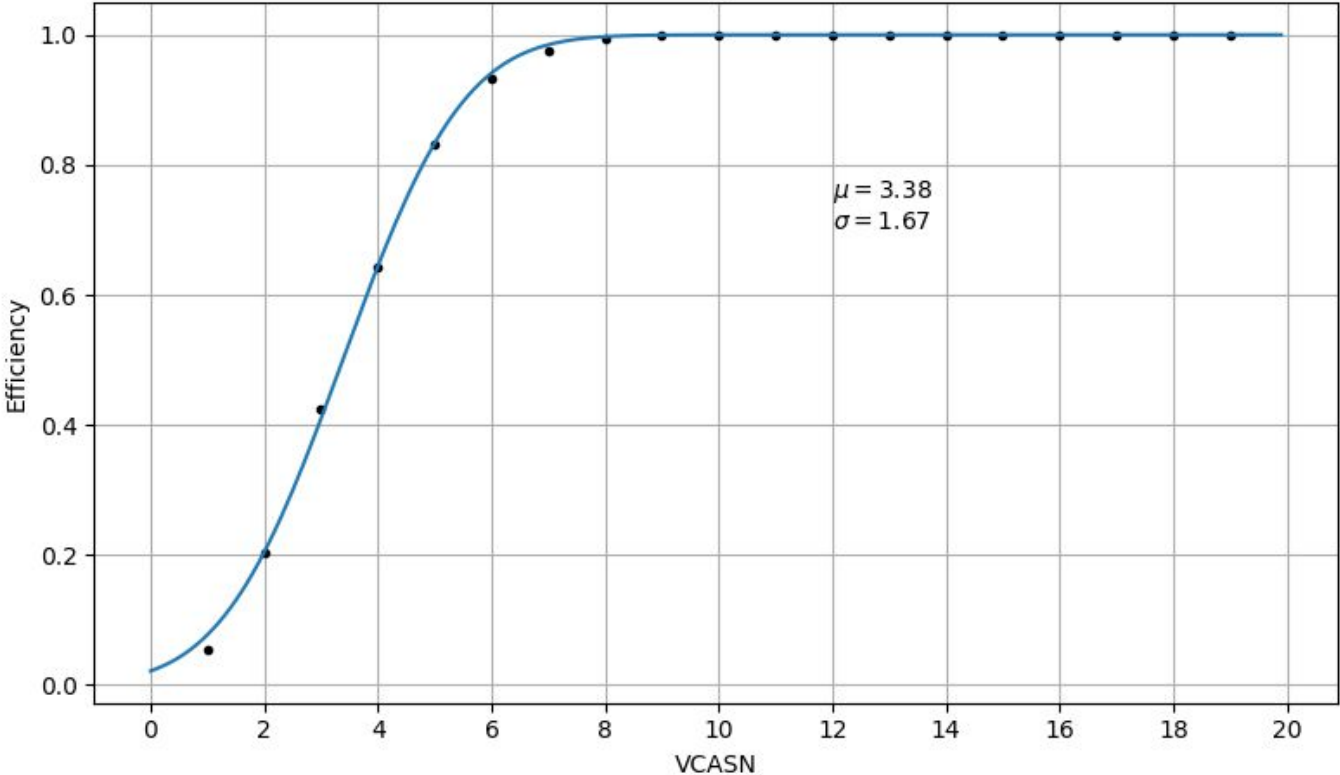
Pixel 0 Efficiency Measurement



Pixel cluster and pixel 0 position

# Pixel 1

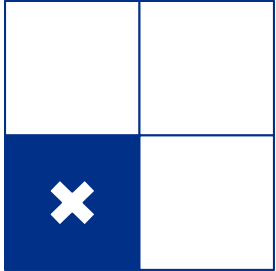
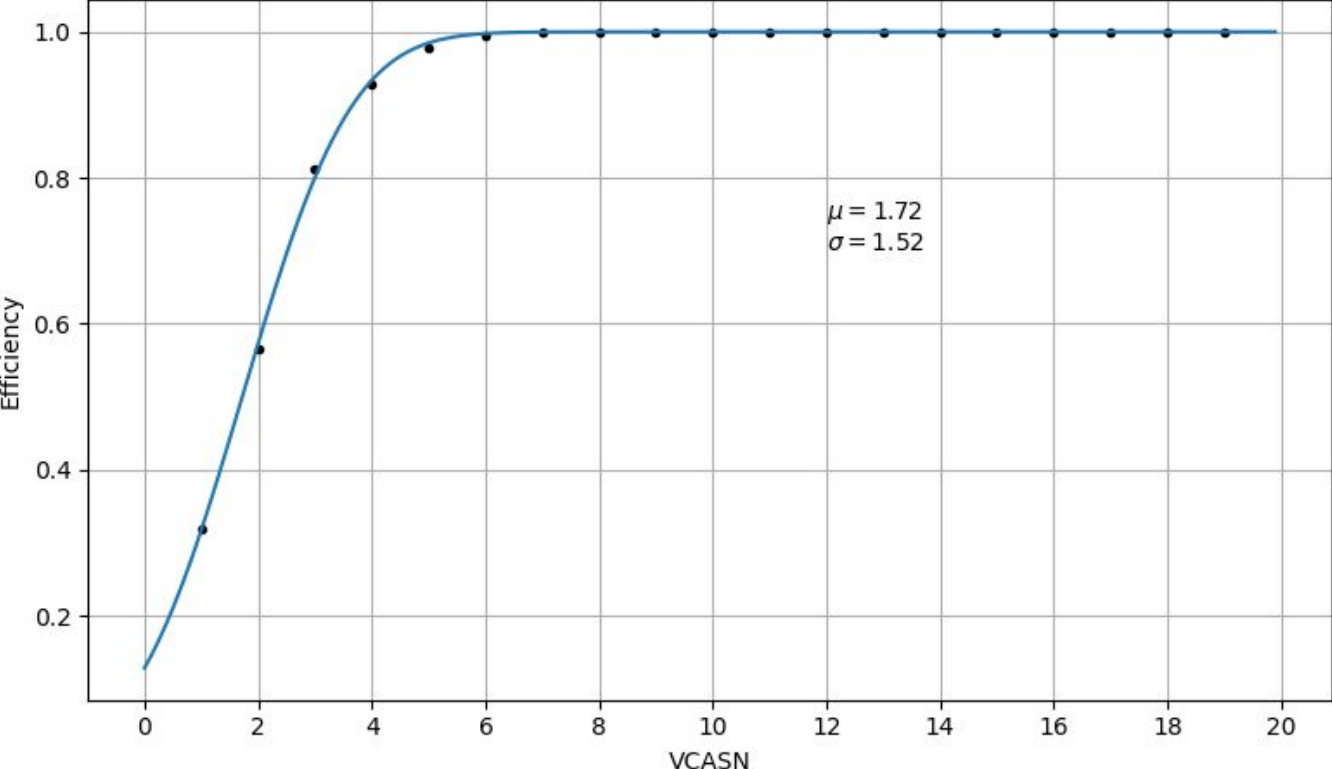
Pixel 1 Efficiency Measurement



Pixel cluster and pixel 1 position

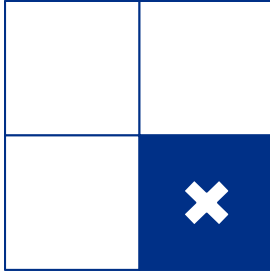
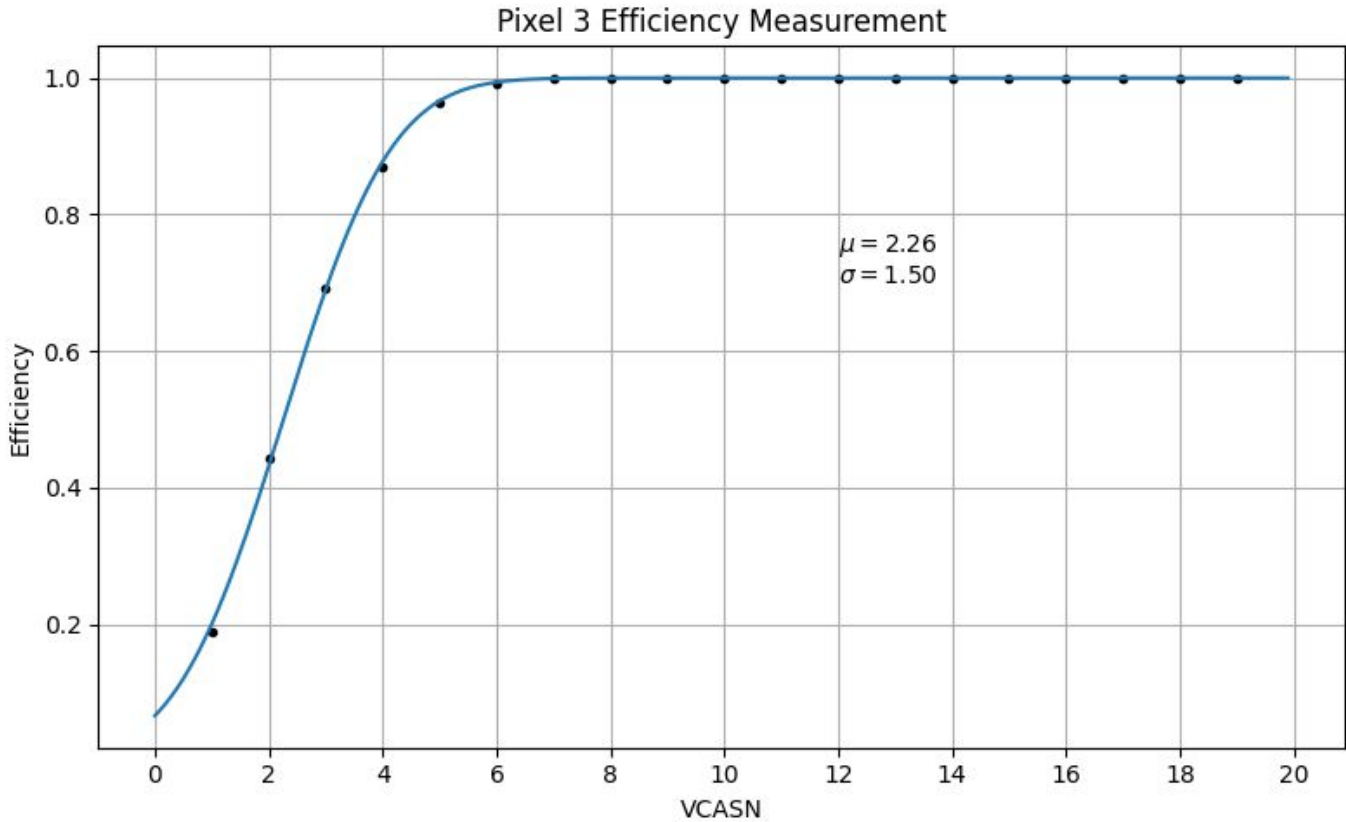
# Pixel 2

Pixel 2 Efficiency Measurement



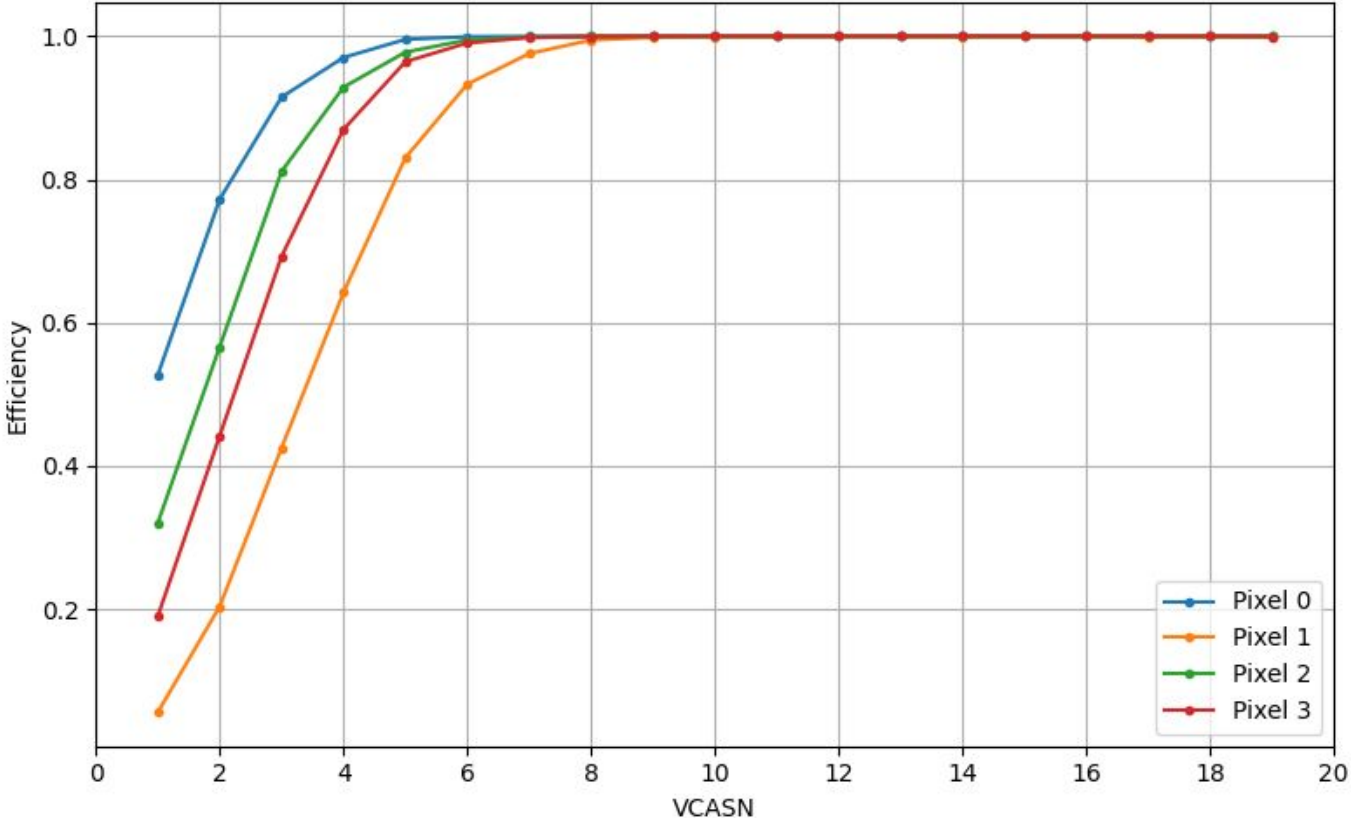
Pixel cluster and pixel 2 position

# Pixel 3



Pixel cluster and pixel 3 position

# All Efficiency Measurements





# Conclusions

- Based on the presented results there is a considerable improvement in efficiency after calibrating the laser and the optical structure.
- The automation of the tests is further improved, allowing different scenarios and configurations to be tested with only an initial user intervention to set up the various configurations.
- Next to do:
  - Improve the processing of large amounts of data so that it is equally automated.
  - Perform efficiency tests (s-curve) on several groups of pixels and within each pixel.