(A partial view of) AstroPix tests at NASA GSFC

Adrien Laviron

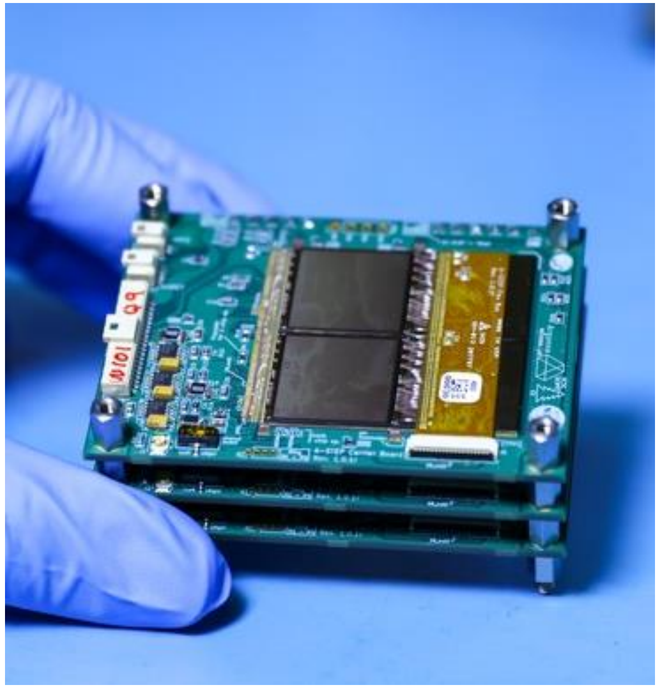
5th BIC workshop

June 18, 2026

On-going projects: A-STEP

3 layers of 2x2 AstroPix v3
In the movable box (ORU)

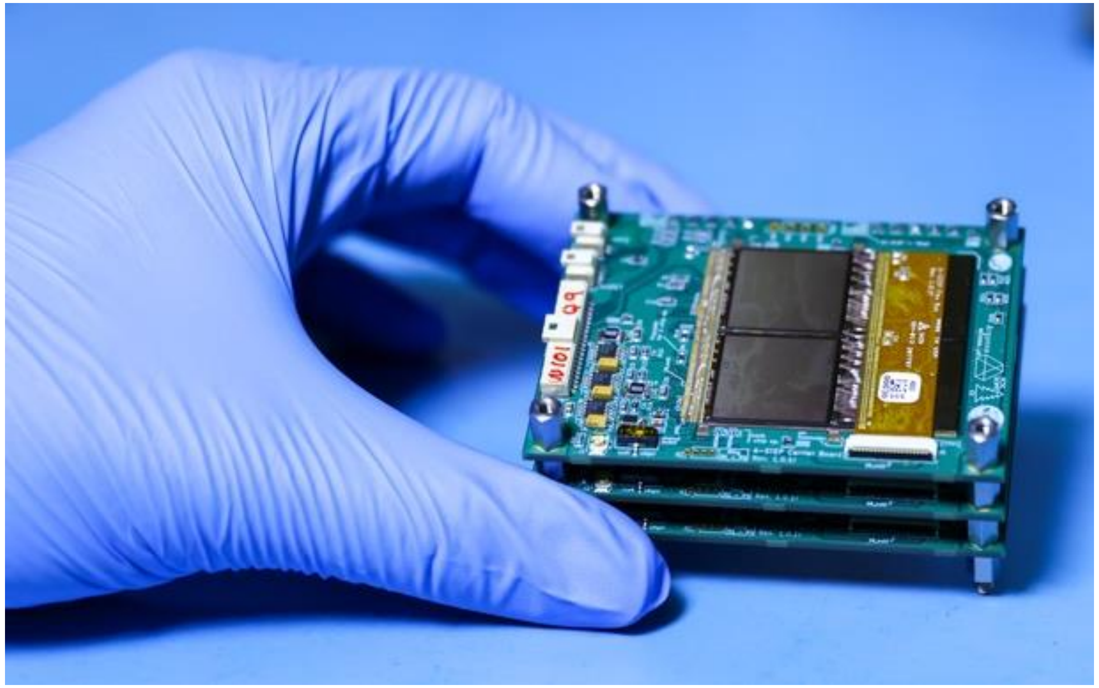
A-STEP onboard FFR
(Fly Foundational Robots)



Tech. demo for a robotic arm in low-earth orbit

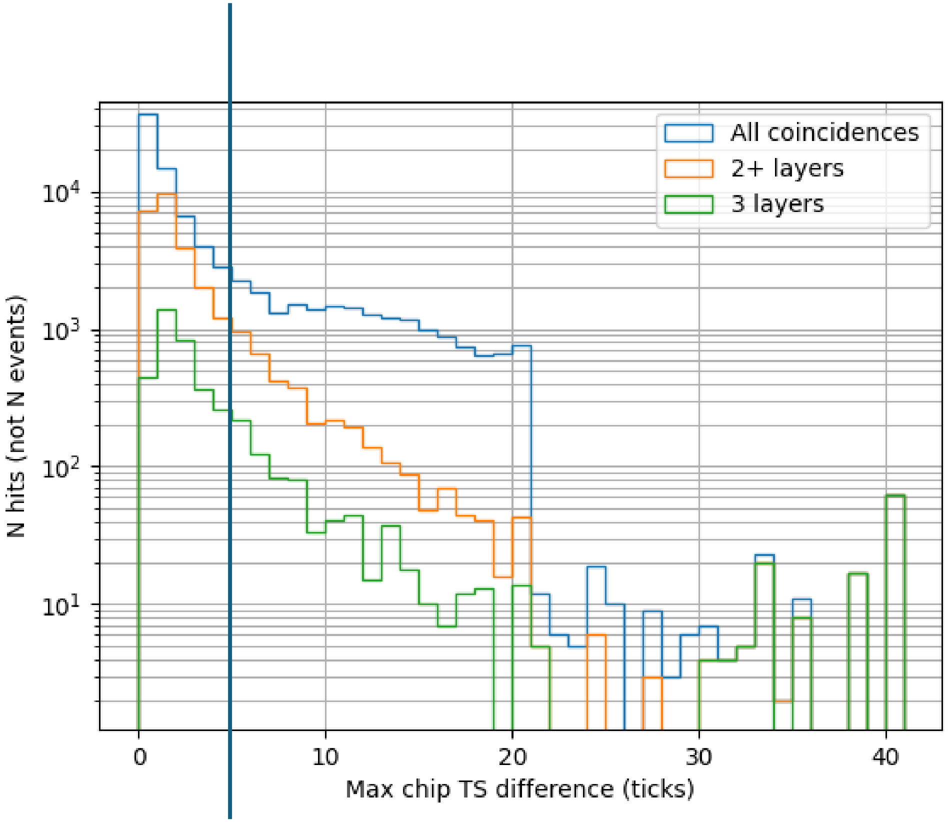
Objective:
See a few cosmic rays to demonstrate AstroPix operation in space

A-STEP: Search for cosmic muons

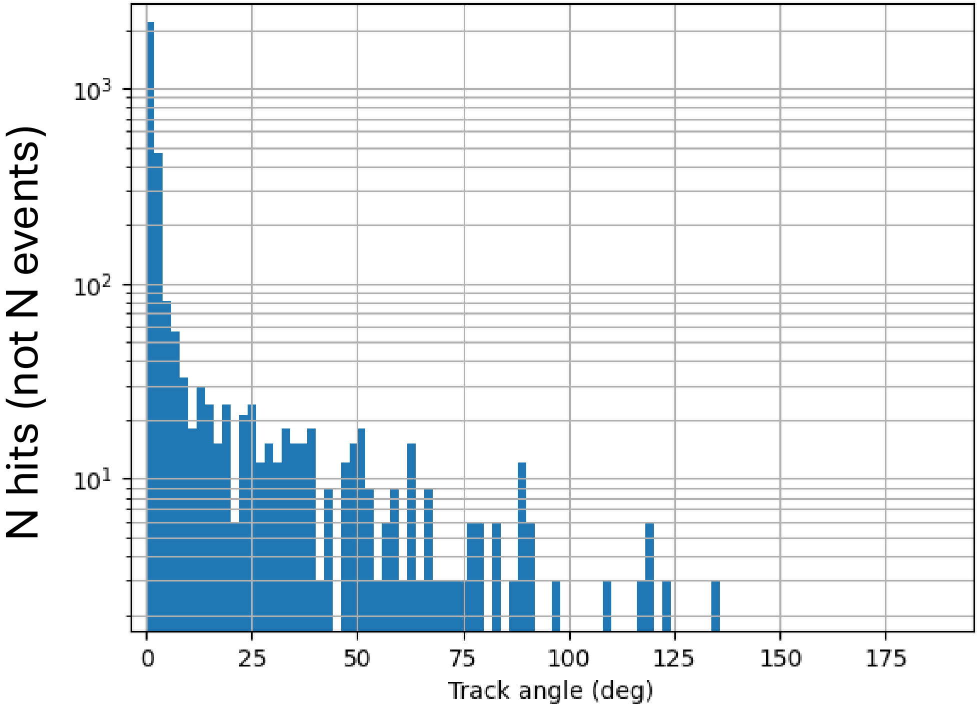


- 3 layers separated by ½” (twice the photo)
  - Lower layer has only 3 working chips
- Algorithm: Create groups of hits that have
  - FPGA_TS < 200 from seed
  - |TS diff| < 5
  - These parameters are a non-final educated guesses (see conversation this week about absolute time)

A-STEP muons: Proof of concept and first results



max(TS)-min(TS) in the group

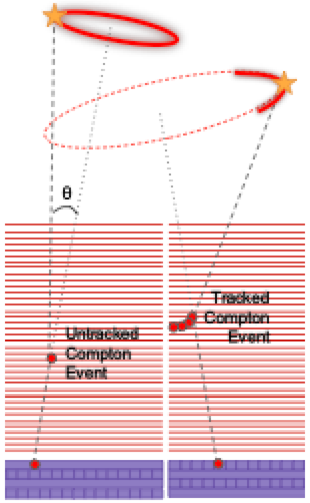


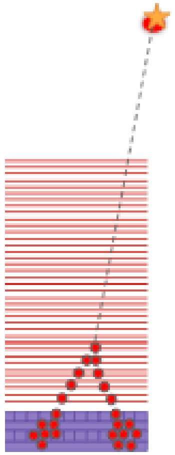
3-layer tracks are predominantly straight
Bin size = 2° = 1-pixel angular shift on-axis

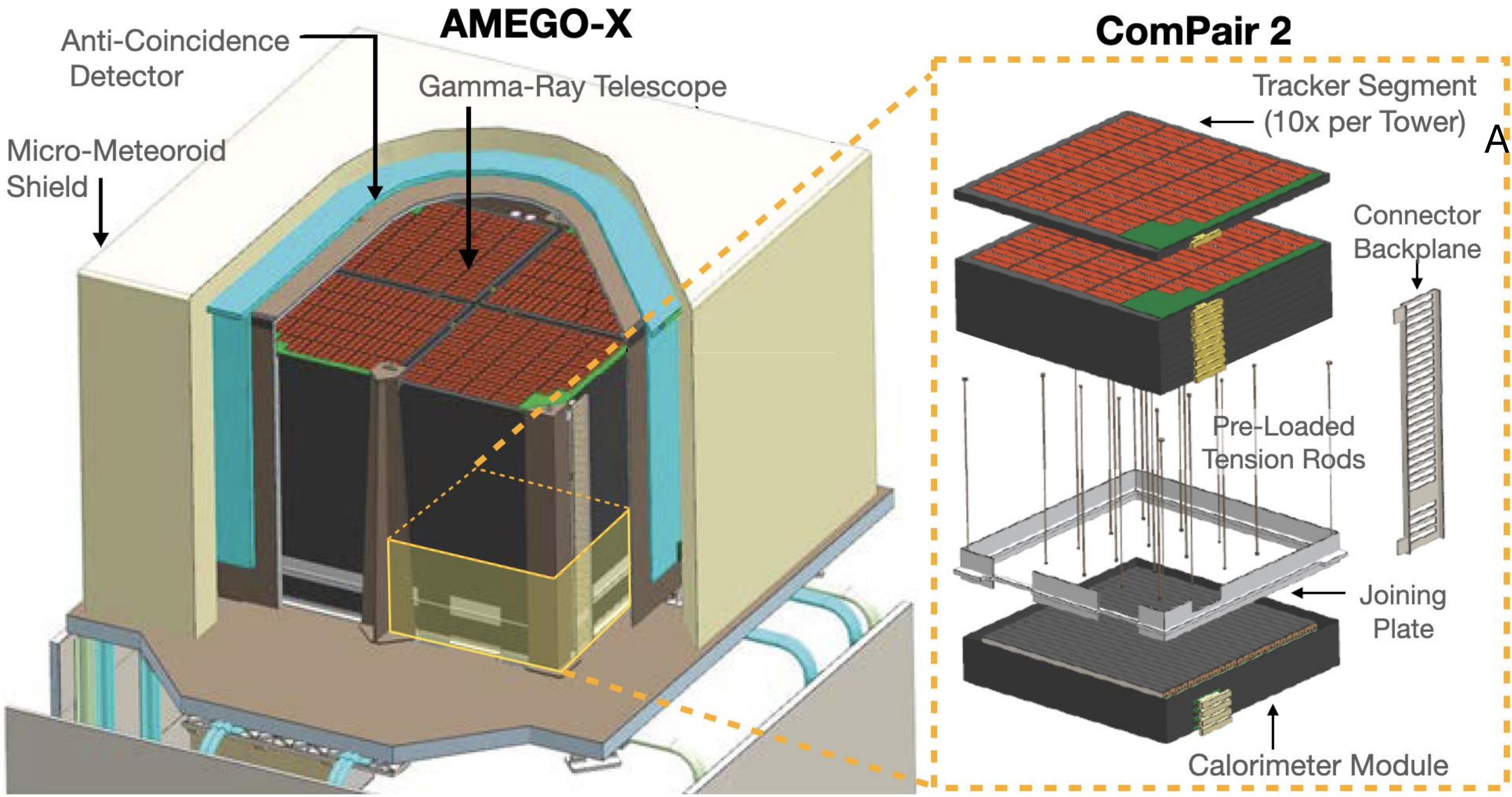
A-STEP thermal testing

- In-pixel signal amplification is higher at lower temperatures
  - Reproducible ToT shift
- Hot:
  - T > +45°C: Increase in count rate. Noise?
  - More tests this week to mitigate this.
  - T > +70°C: Data not decodable (under investigation)
- Cold:
  - T ~ -20°C to -40°C breaks detector permanently
  - Non-encapsulated chips survive -40°C

On-going projects: ComPair-2



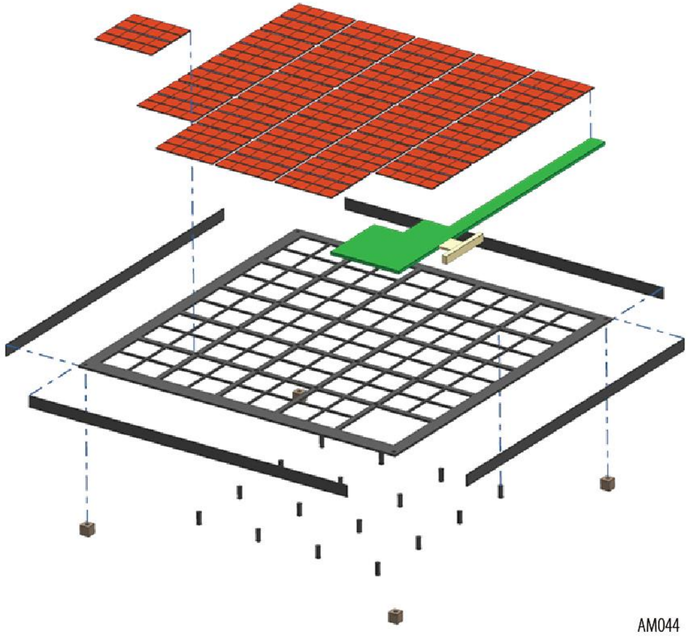




AstroPix v5/6

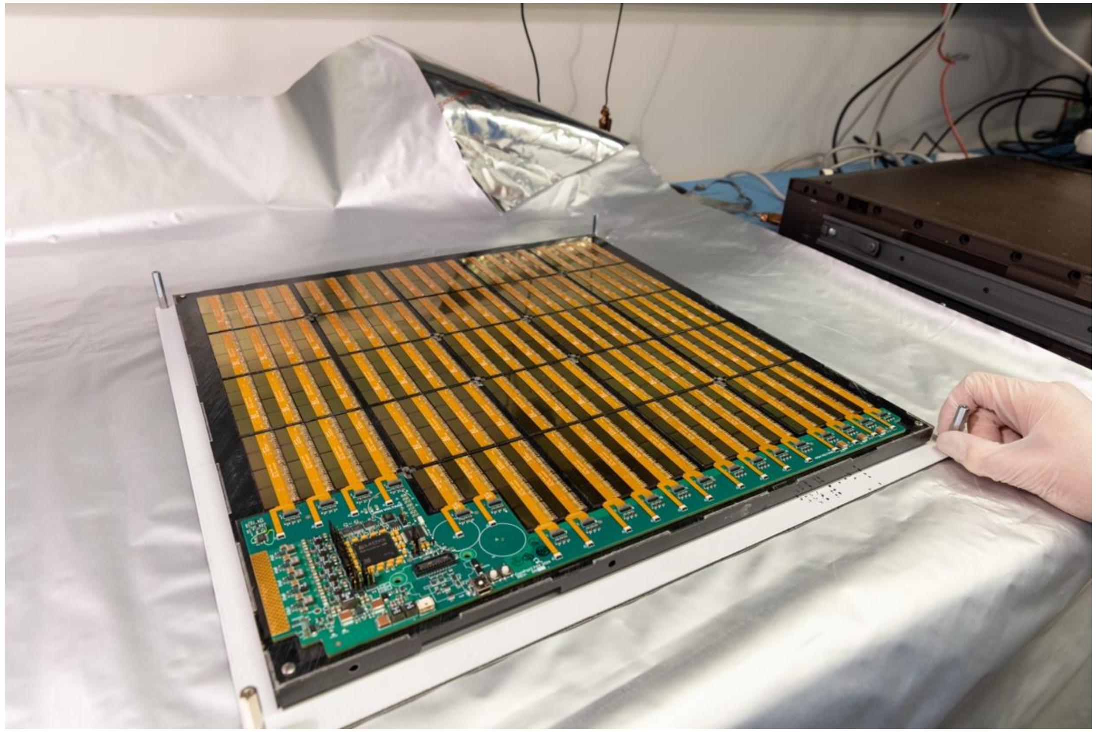
Hodoscopic CsI

ComPair-2 developments



One ComPair-2 tracker layer
- Carbon fiber structure
- FEE located on the side (green)

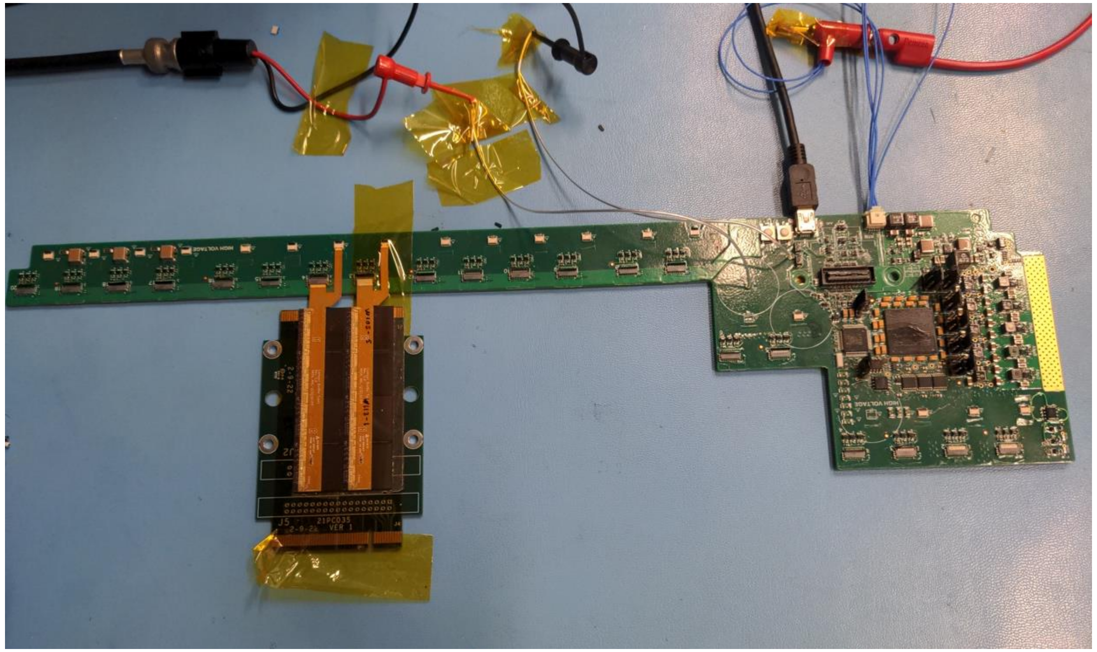
As close as possible to 100% active material



Two layers built in ANL last year with AstroPix v3
- 20 lanes of 20 chips

Passed: Thermal, Vacuum and Vibration tests

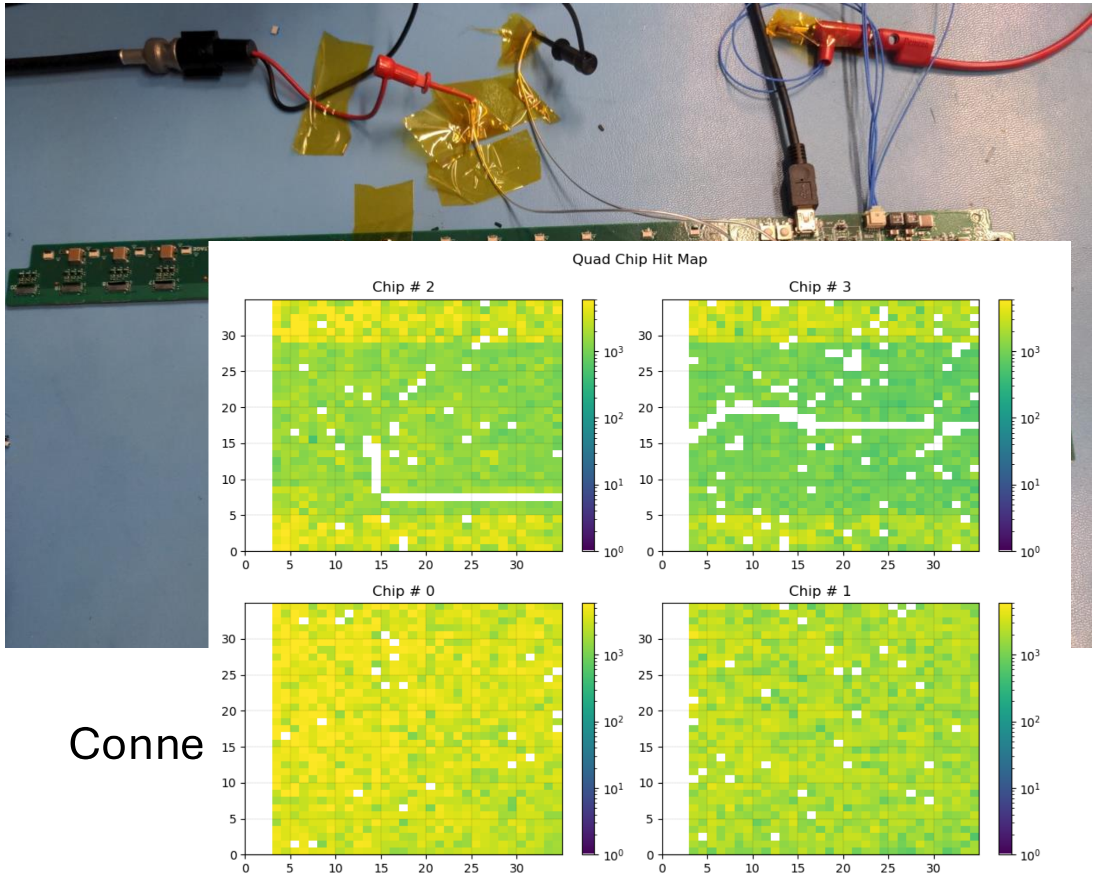
ComPair-2 tests: Status



Connected: 1 lane, 4 chips

- 4 chips working (incl. injection)
- Lessons learned:
  - MISO lines were switched
  - INT needs pull-up resistor
  - SR and/or final MISO lines need to be grounded
- Pixels under the busbar behave in a noisy way – under investigation

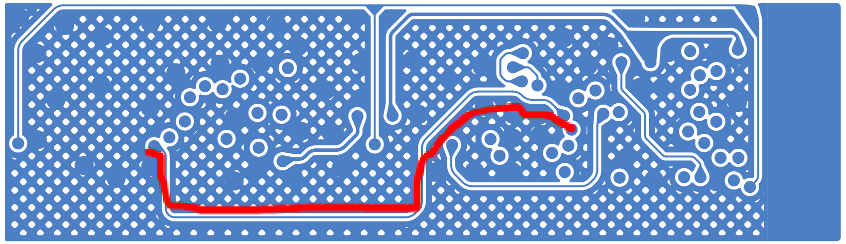
ComPair-2 tests: Status



Conne

Reminiscent of A-STEP interrupt line

- 4 chips working (incl. injection)
- Lessons learned:
  - MISO lines were switched
  - INT needs pull-up resistor
  - SR and/or final MISO lines need to be grounded
- Pixels under the busbar behave in a noisy way – under investigation



Summary

- A-STEP and ComPair-2 are good test-beds for AstroPix deployment at scale.
  - Validated multi-chip and multi-lane (=module) operation on A-STEP
  - Validated chip operation with the ComPair-2 FEE
- Demonstrated AstroPix v3 coincidences and tracking with A-STEP
- Current testing campaign focusing on A-STEP/FFR
  - Thermal testing to validate A-STEP for orbital use
  - Payload integration in July, environmental tests in August
  - Payload delivery deadline early September