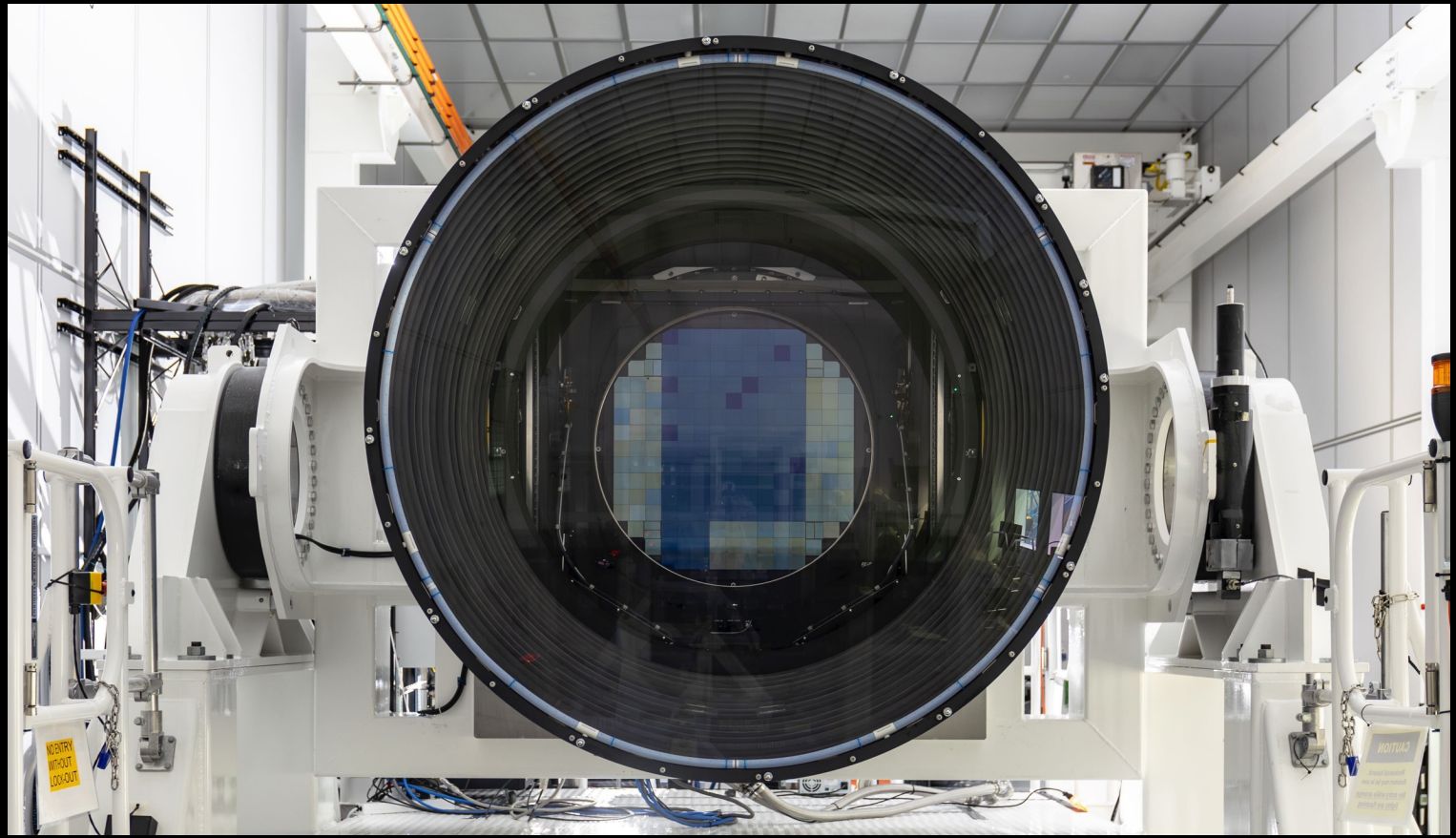
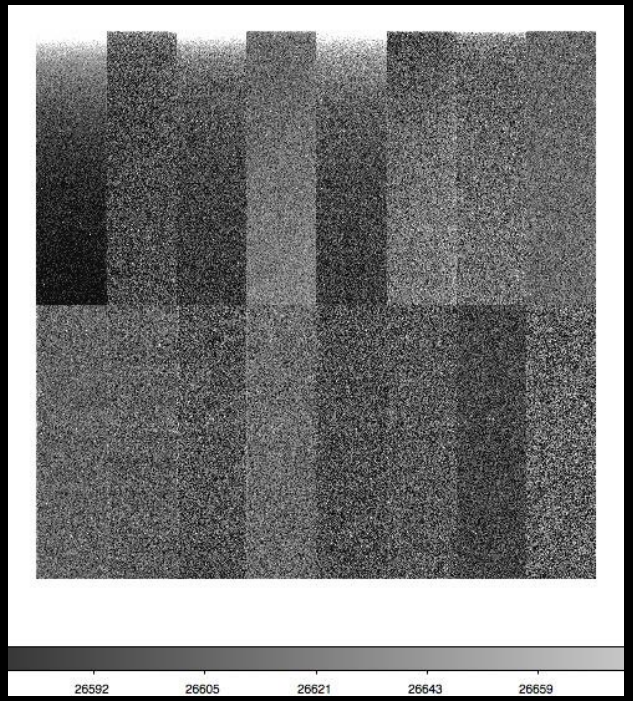
LSST CCDs anomalies

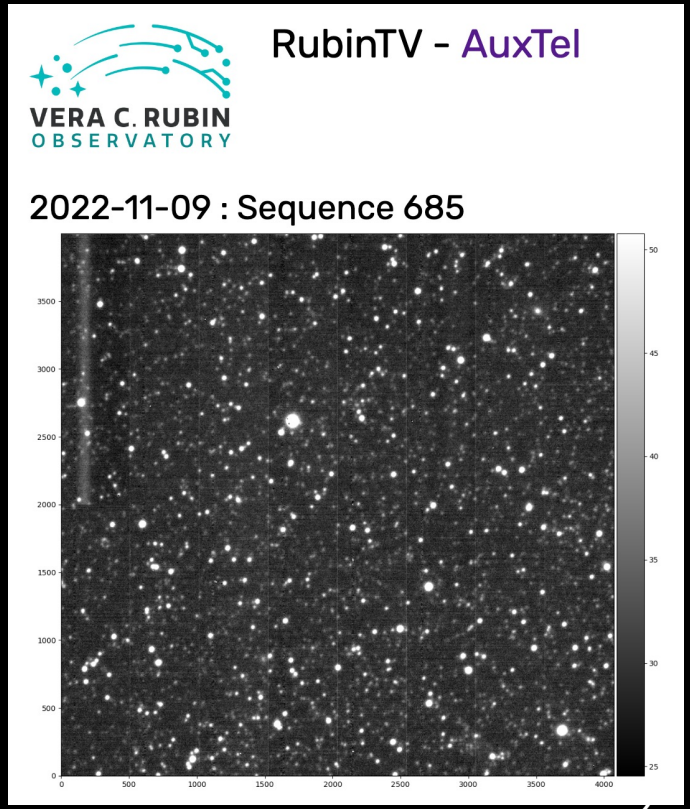


Claire Juramy

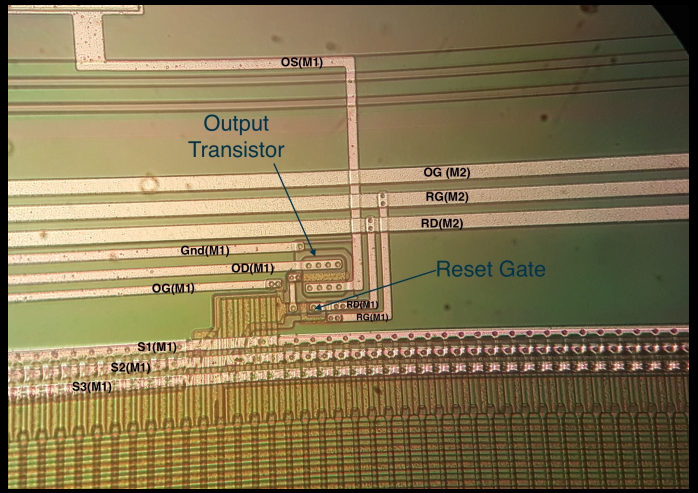
Bias stability

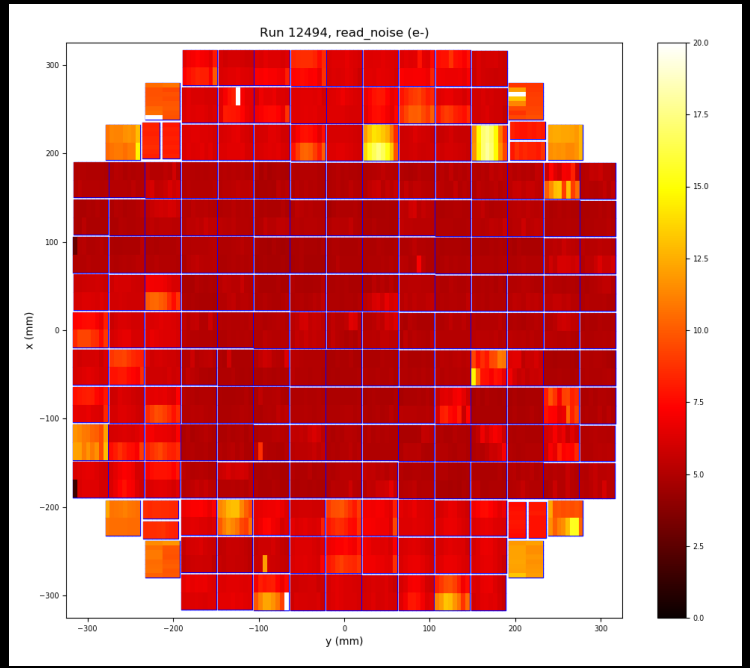
- e2v ‘yellow corner’: charge-like accumulation between readouts, depends on previous operation
- ITL: profile vs column (clocks)
  - Jumps in values, instability of profiles



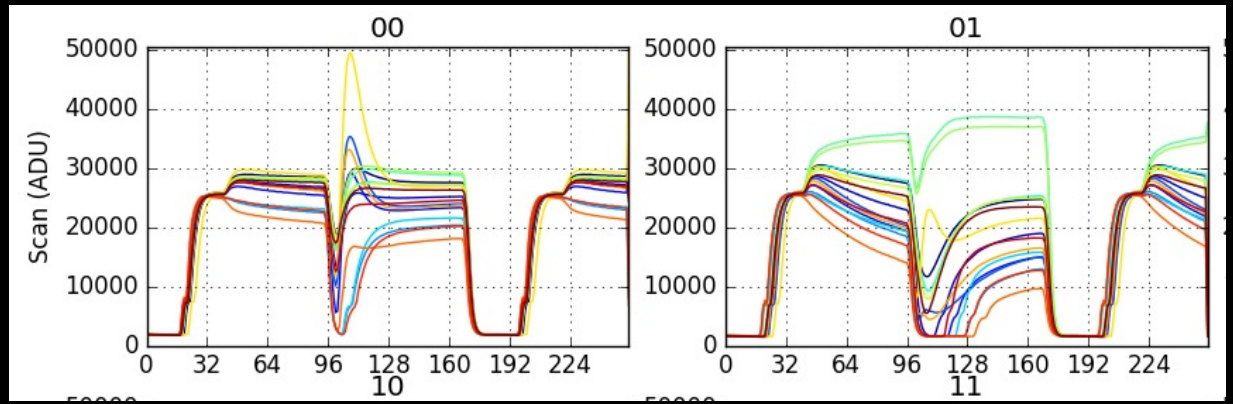


Clock injection in ITL CCDs



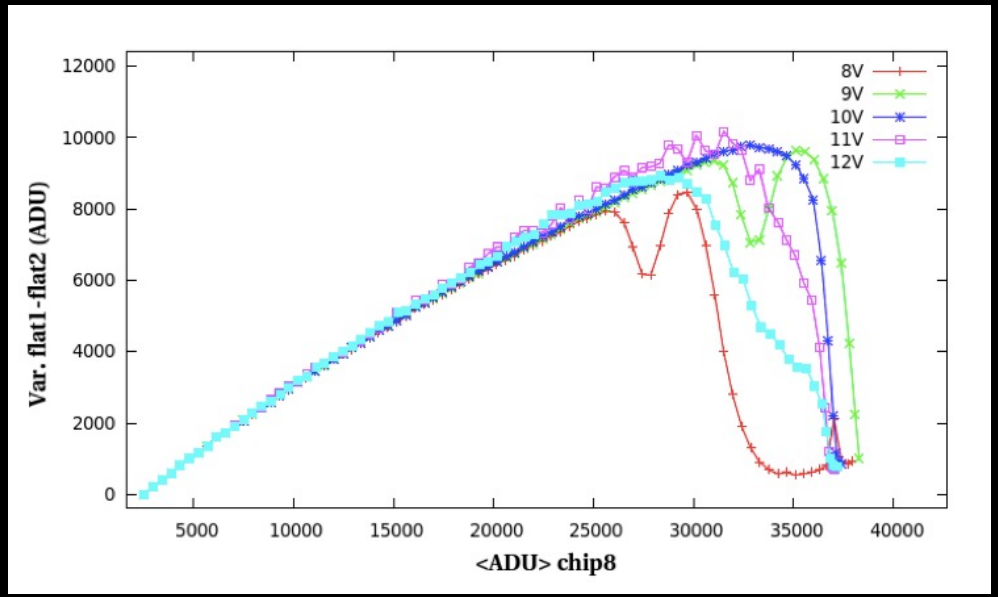


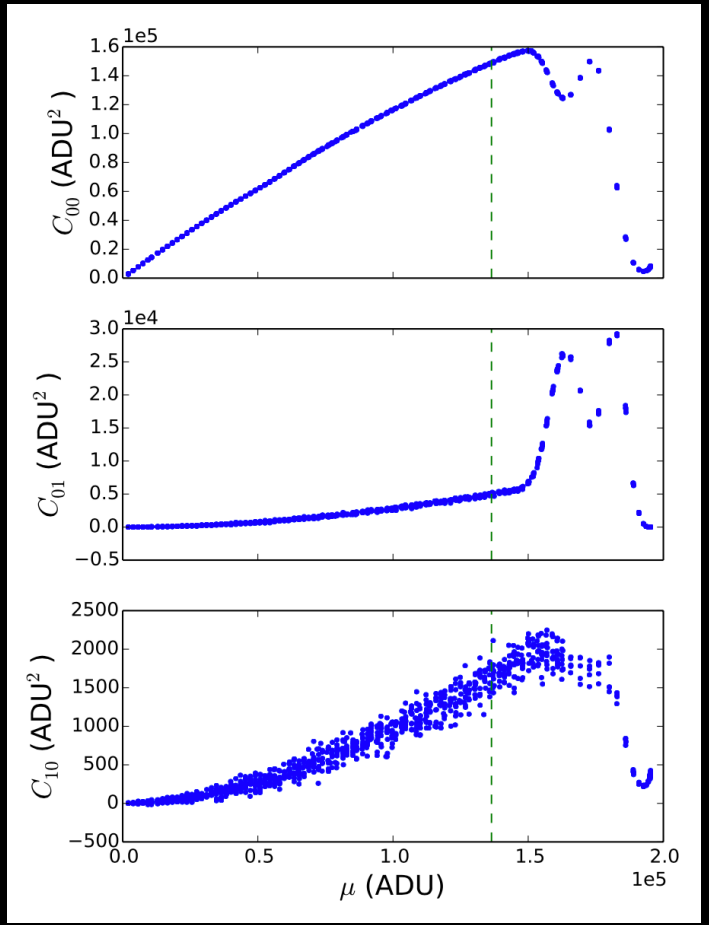
- Extra noise in raft tests
- Abnormal injection from serial clocks into output amplifiers
- Long settling times
- Selection of sensors: bias levels



Full well

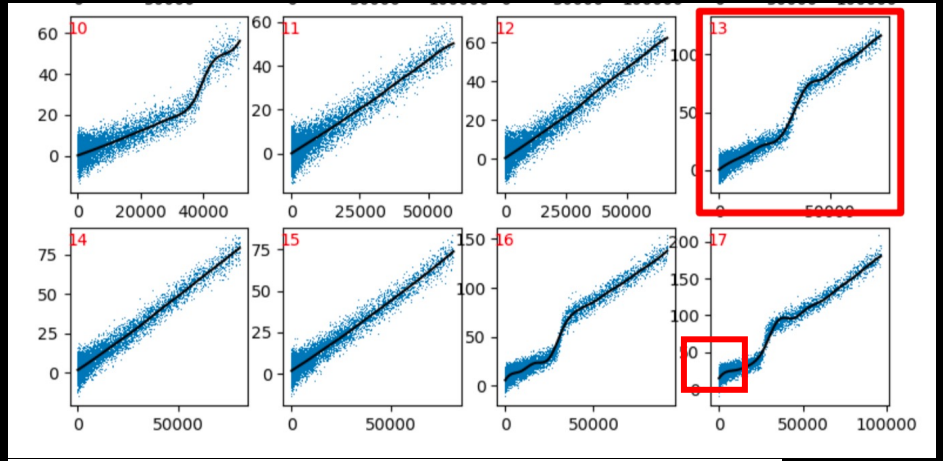
- Photon Transfer Curve (variance of pair differences vs flux): gain, linearity, full well
- Various definition for full well
- Dependency on parallel clock levels, dips (see persistence)

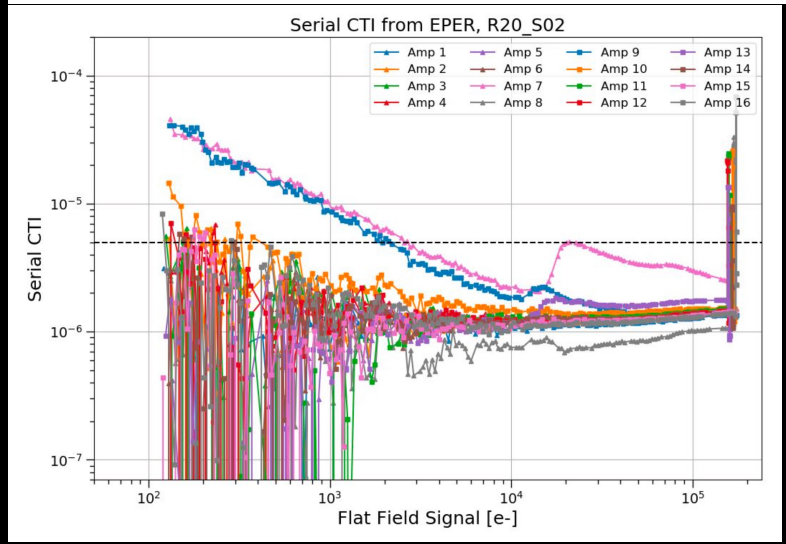




Transfer efficiency, traps, and pockets

- Charge Transfer Efficiency
- Traps:
  - Seen at low flux (EPER)
  - Measurement of traps in frame with parallel transfer back-and-forth: issue with lifetime of traps
  - Traps in serial register ?
- Pockets (with threshold):
  - Dip of variance in the PTC
  - Parallel: due to transfer to serial register
  - Corner turn in serial register (e2v: fixed with bipolar mode)

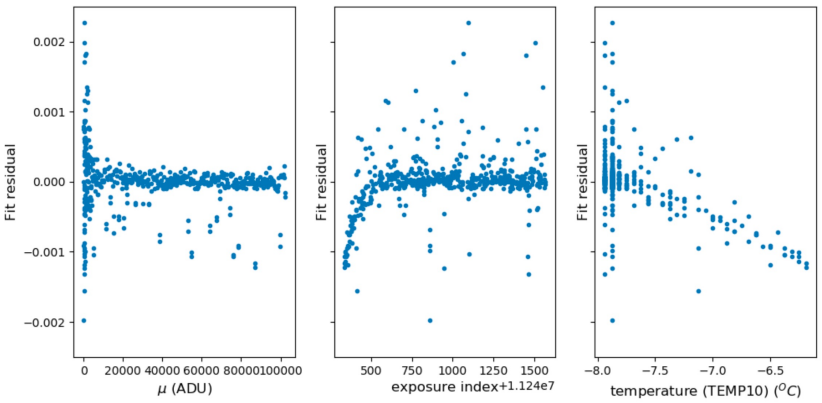




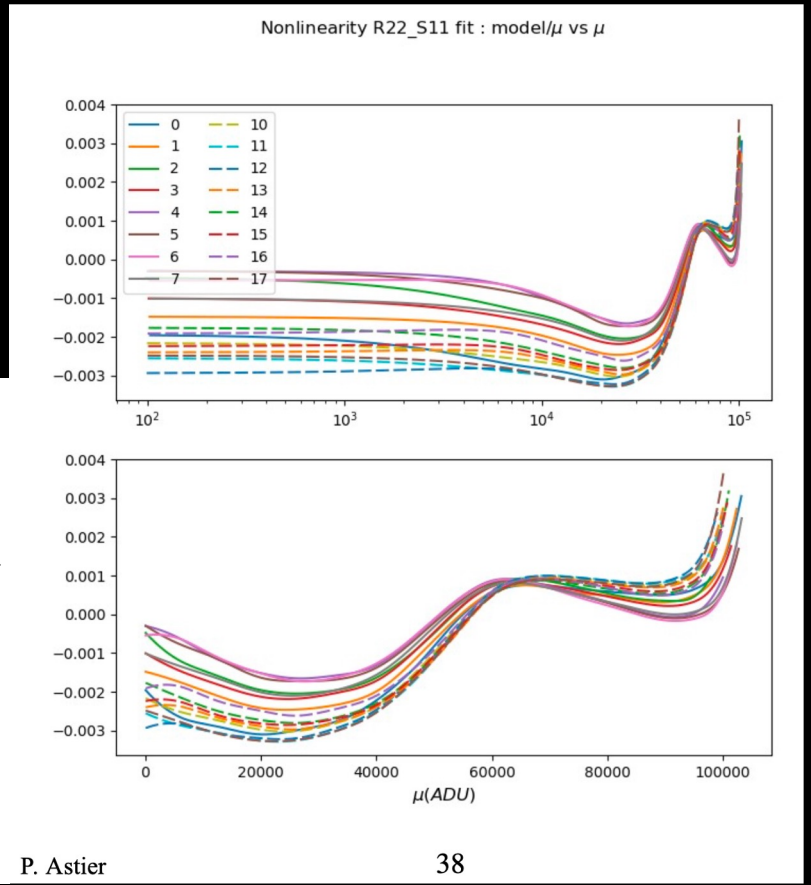
ITL

Non-linearity and gain variations

- Non-linearity correction: common shape, per-channel, need for sufficient sampling and flux calibration
- Gain variation due to electronics temperature, limited with operating plan



R22_S11
C01

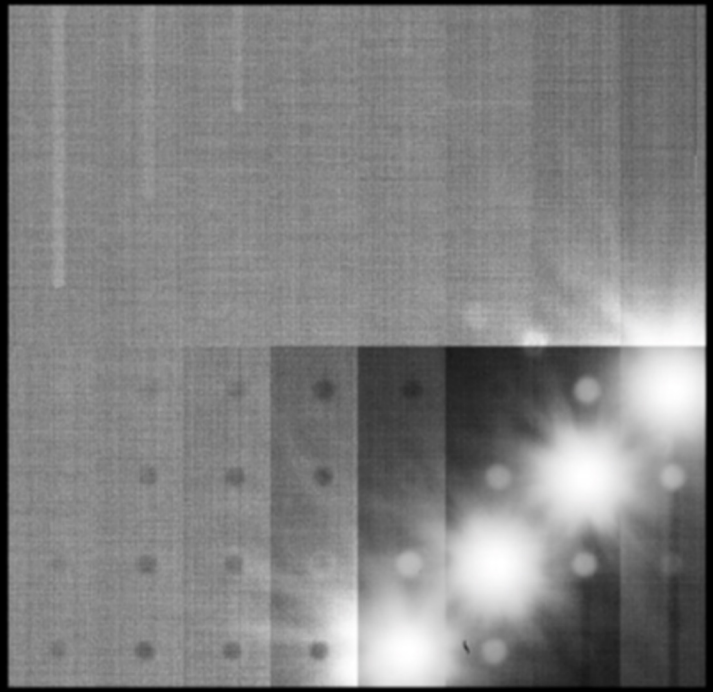


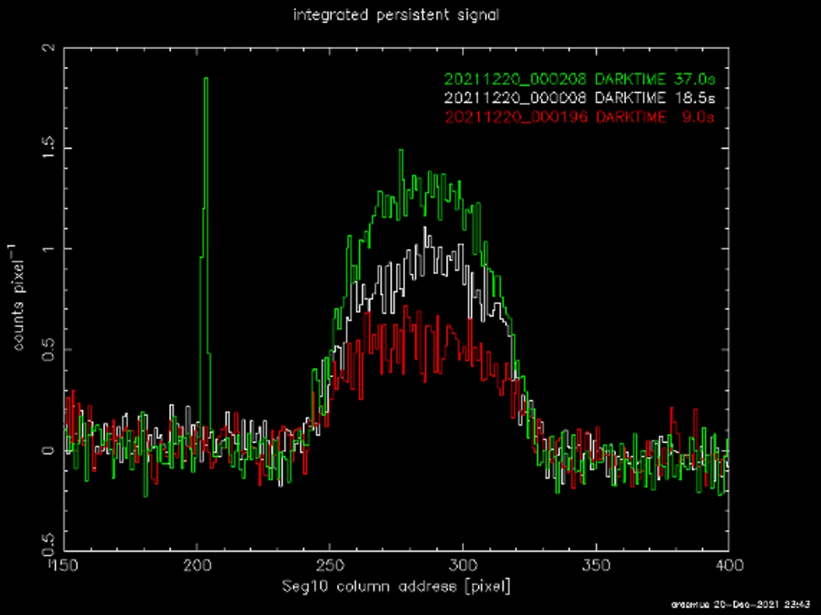
Residuals span more than 0.1% for a range of about 2 degrees C

P. Astier 38

Persistence

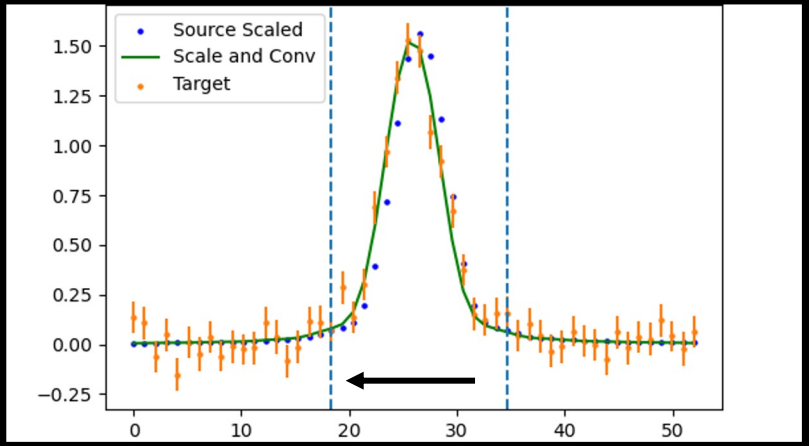
- Still investigating removal through operating change
- Long lifetime (several frames), dependency on operation sequence
- Also after saturated flat exposure

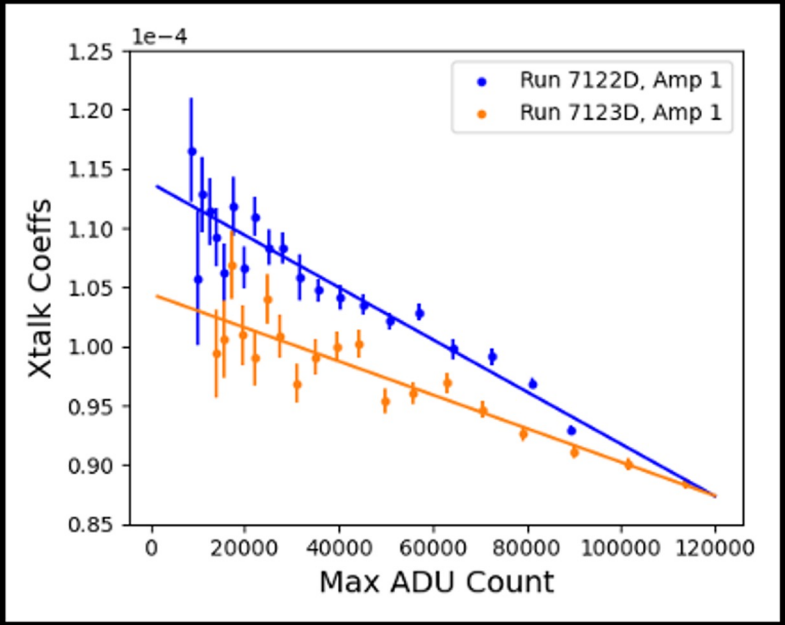


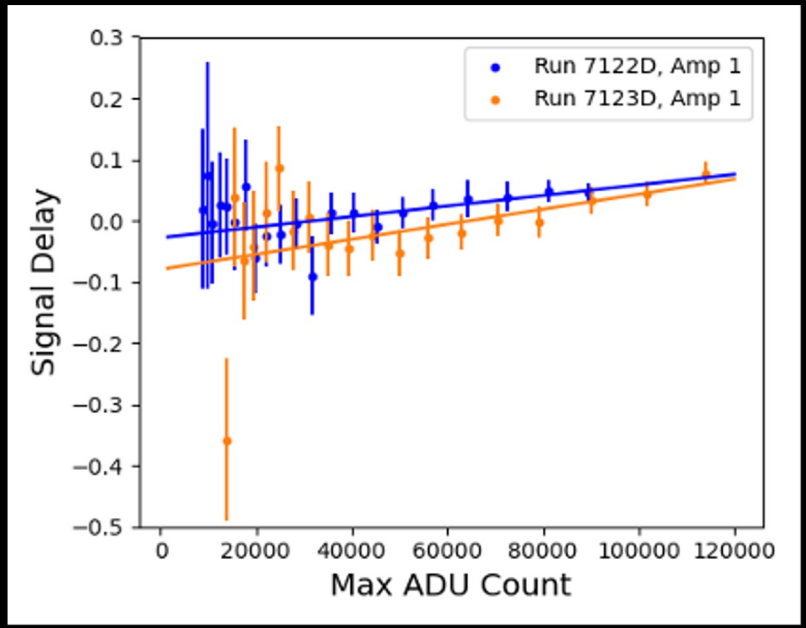


Non-linear crosstalk

- More than a single matrix of coefficients
- Measurements of delay, non-linearity





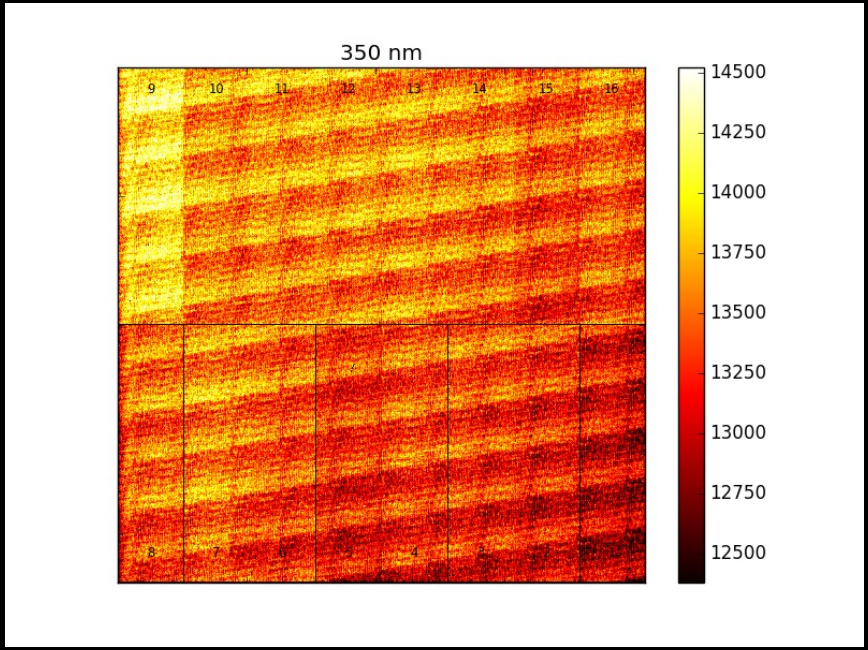


S. Liang
A. Snyder

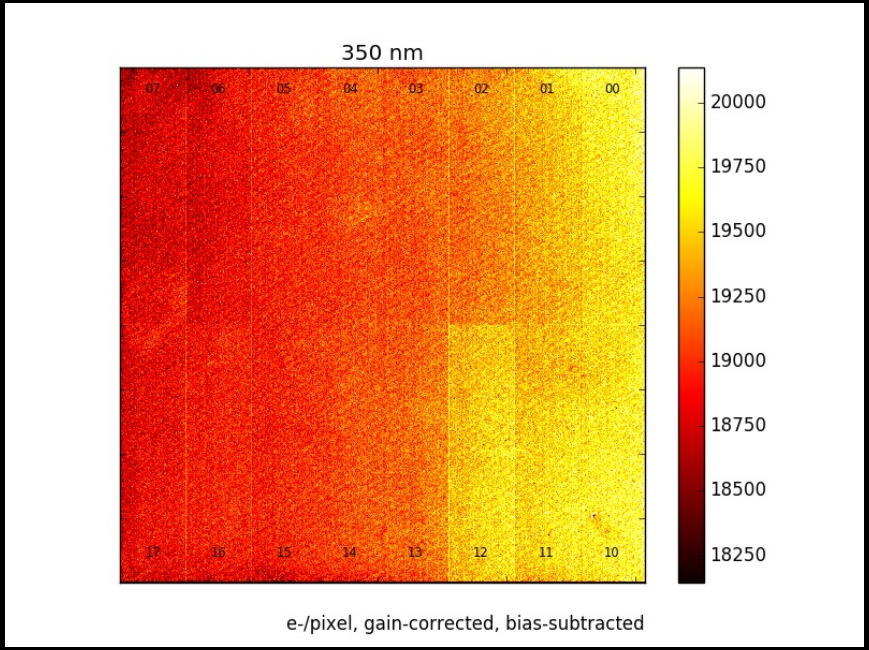
Quantum Efficiency

- Quantum Efficiency, mapping of Photo-Response Non-Uniformity
- Processing effects on the back side
- Real QE non-uniformity vs other effects

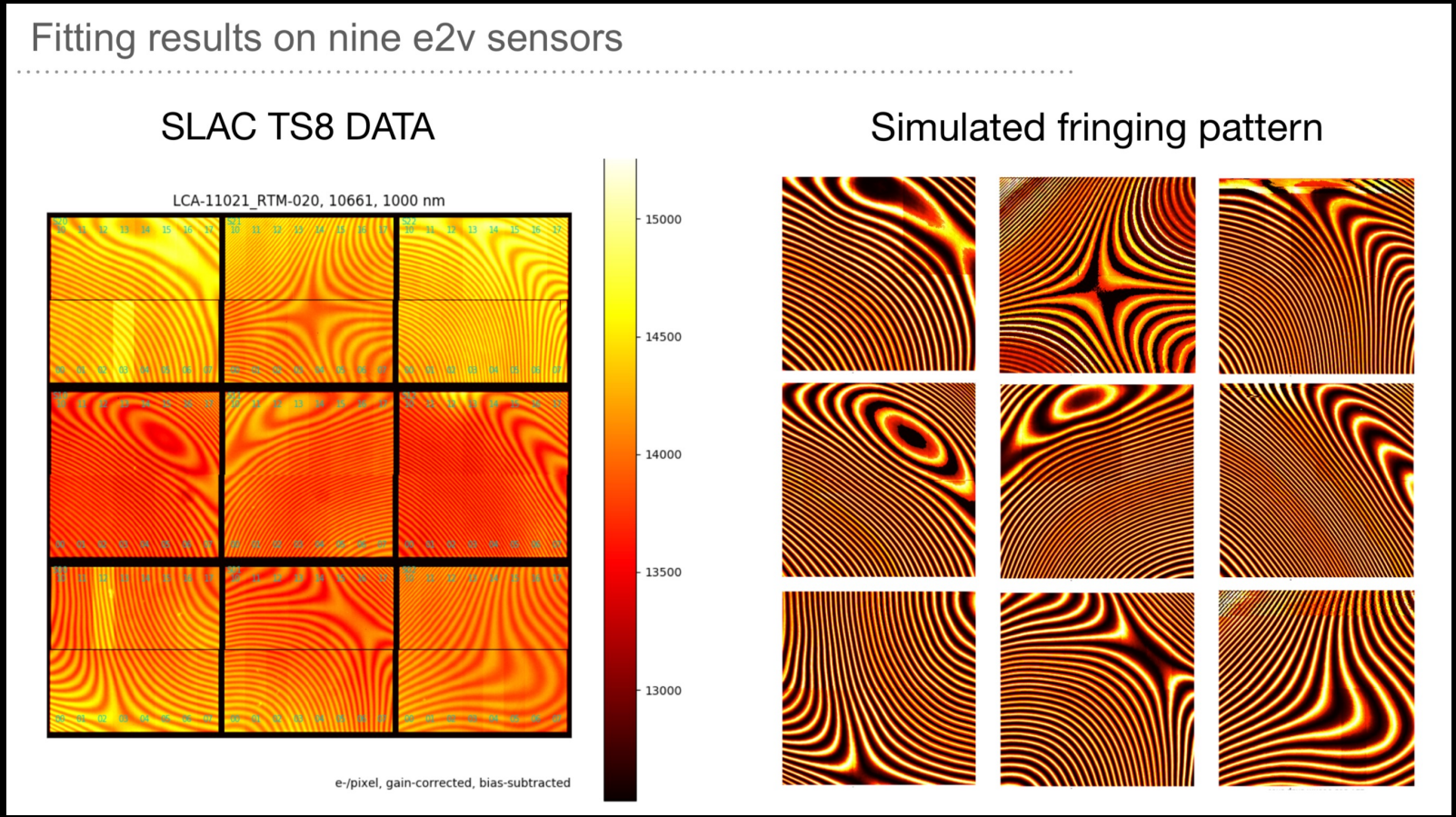
e2v



ITL



Fringing in NIR

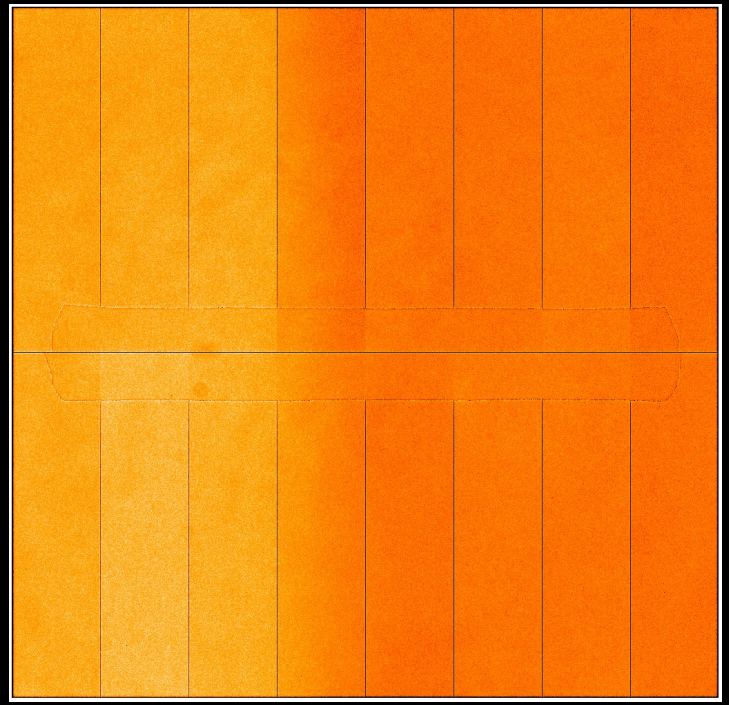


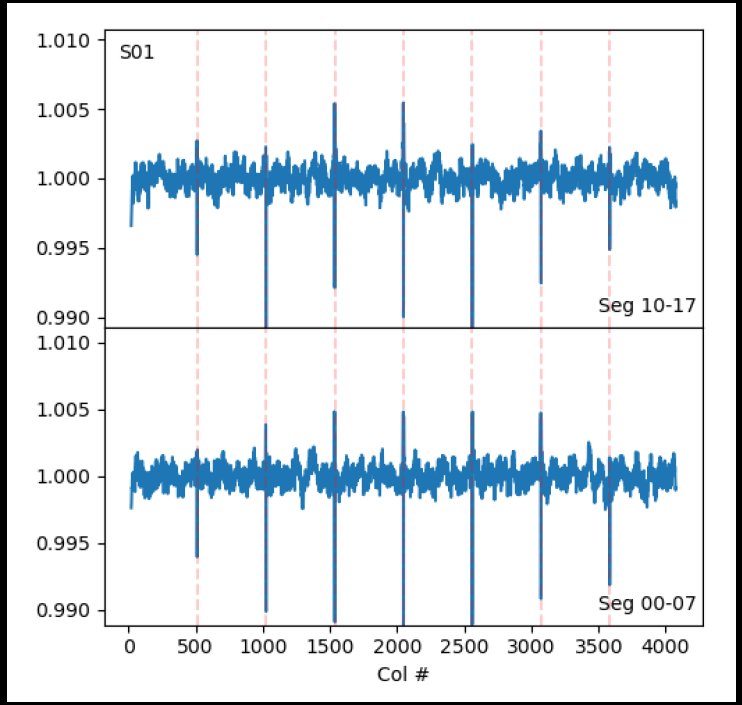
Z. Guo

- Two interfaces on the ‘front’ side of the CCDs

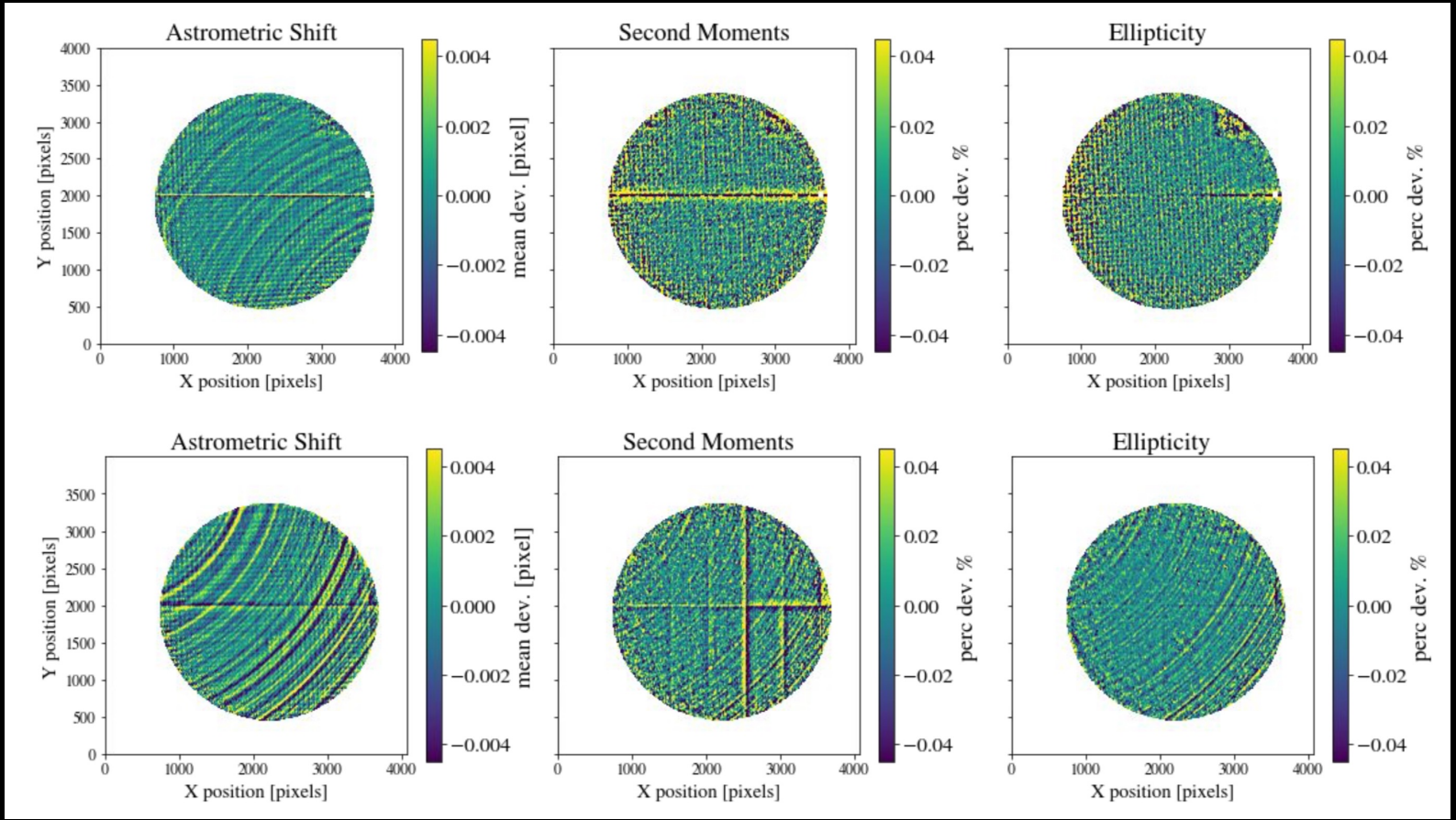
Distortions at the edges

- Sensor edges, mid-line
- ‘Divisadero’ at the segment edges in e2v CCDs: non-uniform distribution of holes in the channel stops





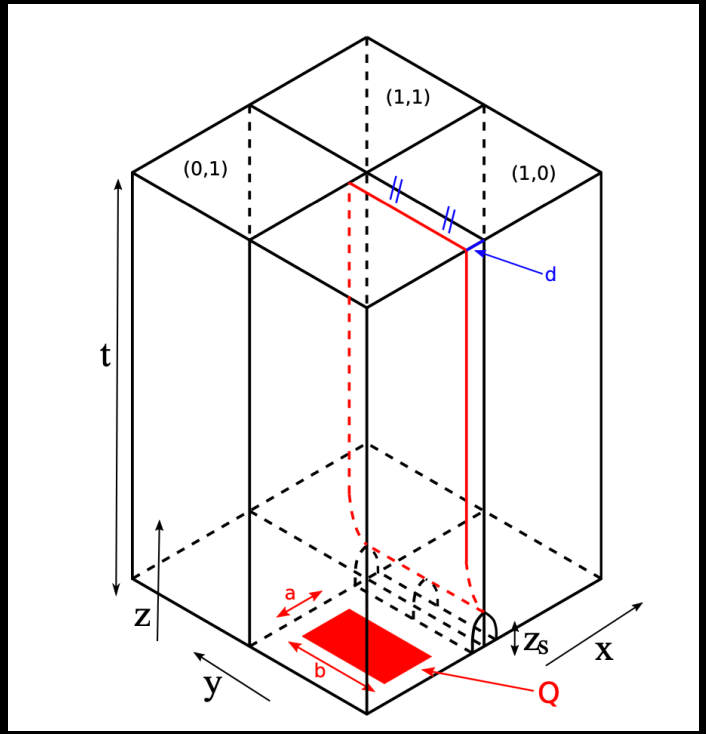
‘Tree rings’ and other distortions

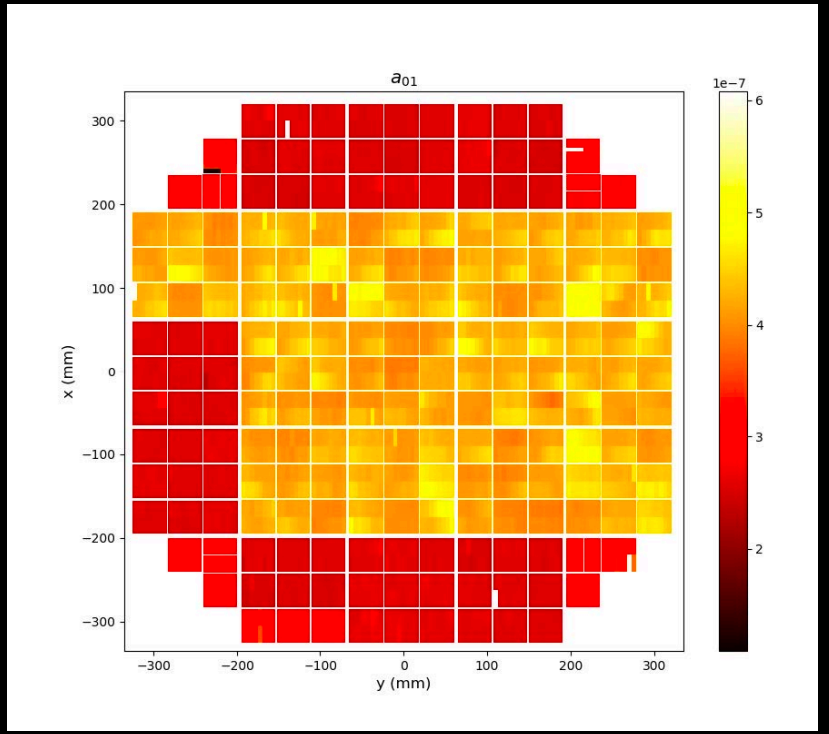


- Measured with spot grid data on two sensors

Dynamic distortions: brighter-fatter

- Correction from per-sensor coefficients
- Computed from densely-sampled PTC, using fit on variance + covariances





Astier et al. 2023