First light of the Rubin Observatory / LSST

LSST Camera Commissioning

Purpose

Ensure the LSST camera's readiness for high-precision observations by thoroughly testing and calibrating its capabilities.

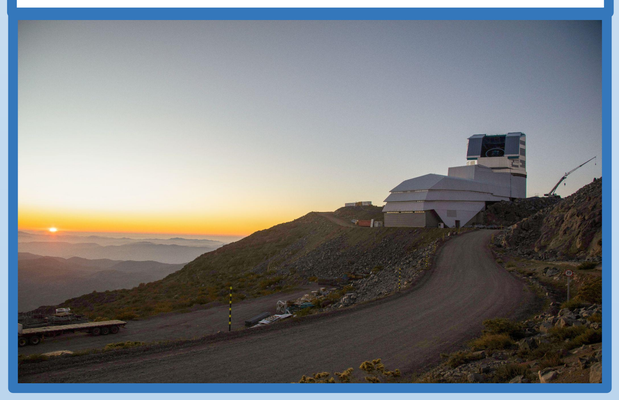
Key Steps

- **Installation & Setup**: Secure mounting on the telescope, integration with data systems, and software configuration.
- **Sensor Calibration**: Adjustment of sensitivity and correction for biases to capture accurate celestial data.
- **Photometric Calibration**: Calibration using standard stars to ensure precise brightness measurements.
- **Performance Verification**: Extensive testing through initial observations to assess image and data quality under operational conditions.

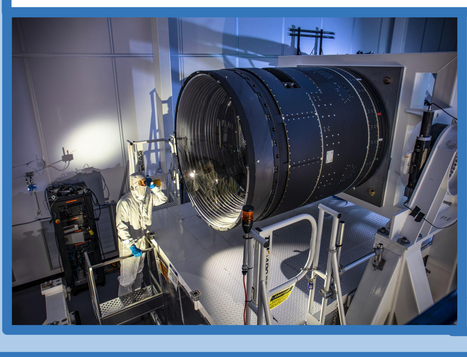
Goals

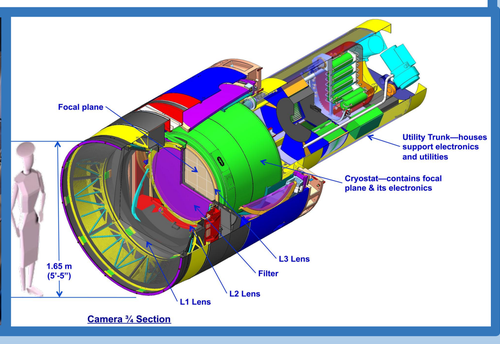
- **Accuracy**: Maximize the precision in measurements of cosmic parameters.
- **Reliability**: Ensure consistent performance with minimal downtime.
- **Data Quality**: Achieve high-quality data for advanced cosmological research.

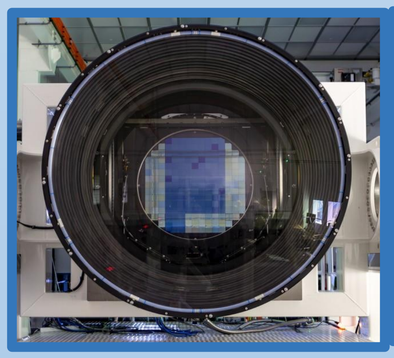
Rubin Observatory



LSST camera







Focal plane :

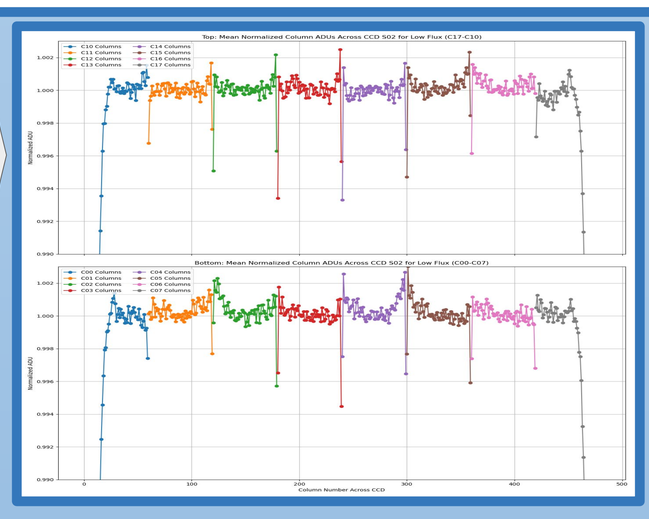
-25 science rafts with 9 CCDs per raft
- 4 technical rafts for focus and guiding
-E2V (blue)
-ITL (white)

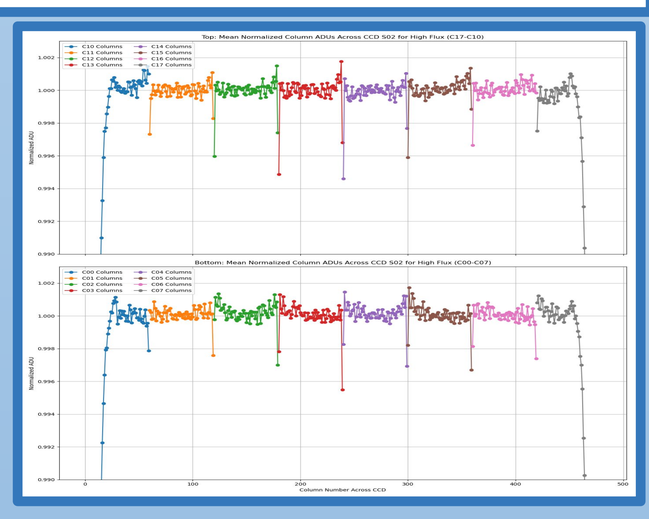
Sensors calibration :

The results presented here were derived from exposures during run 13590, utilizing stability flats where the focal plane was uniformly illuminated to assess system stability. For this purpose the focal plane is lighted with an uniform light for the entire run.

Border effect :

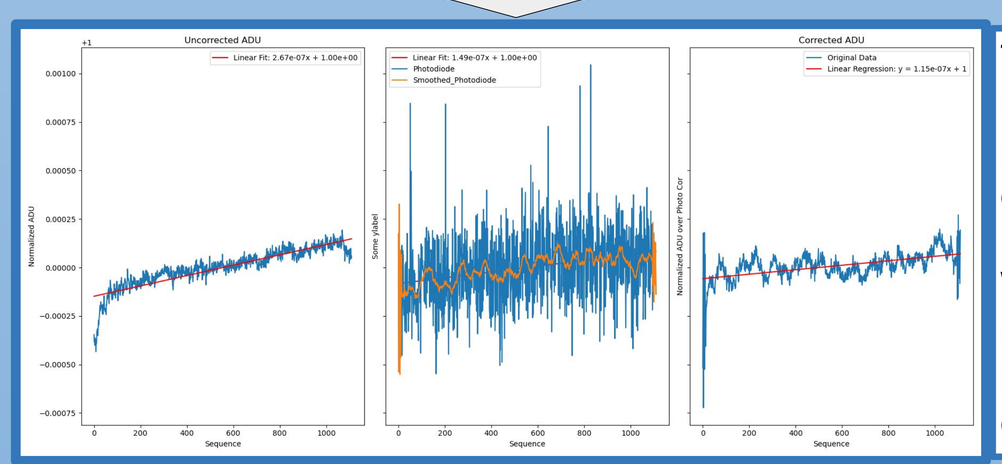
- In addition to being problematic due to image distortion from edge effects, the flux-dependent nature of this effect complicates its correction





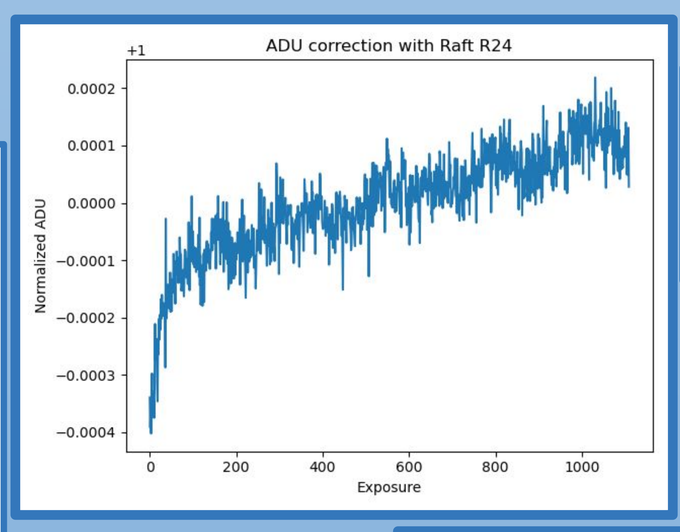
Dispersion and “family effect” in ITL rafts :

- We observed gain jumps in the ITL rafts, producing “families”. These variations in gains are correlated with bias shifts, allowing us to classify different exposures into distinct families. This classification helps reduce problematic dispersions that cause flickering on the focal plane

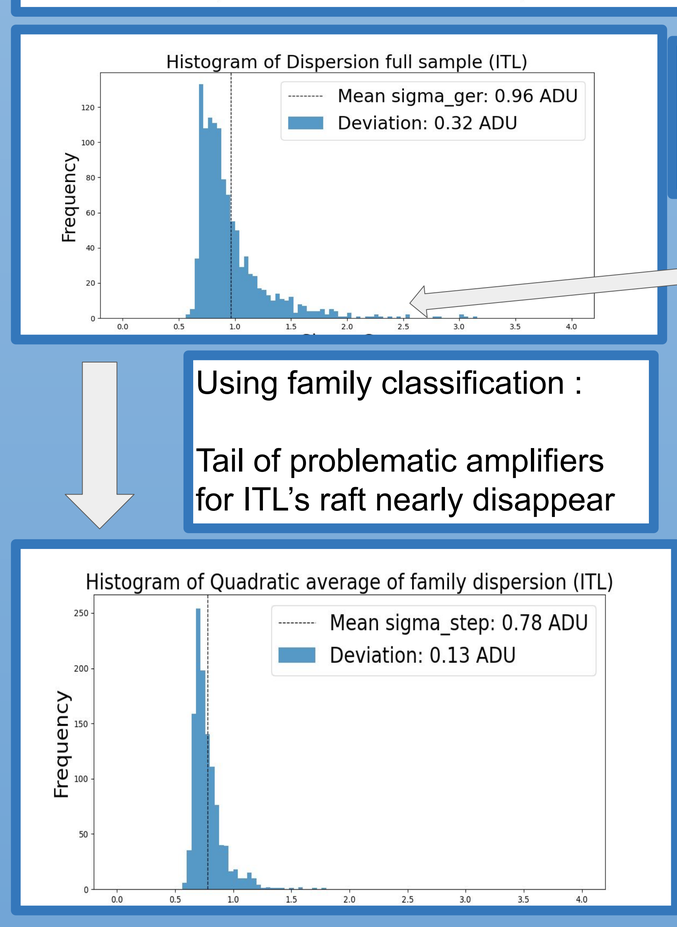


Too much noise with photodiode correction.

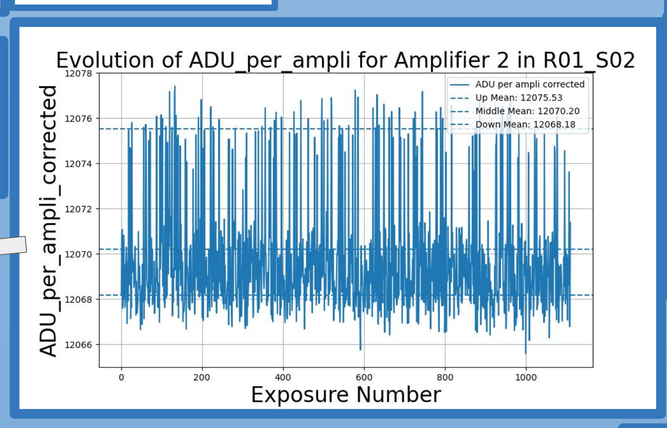
We have to use a different kind of correction

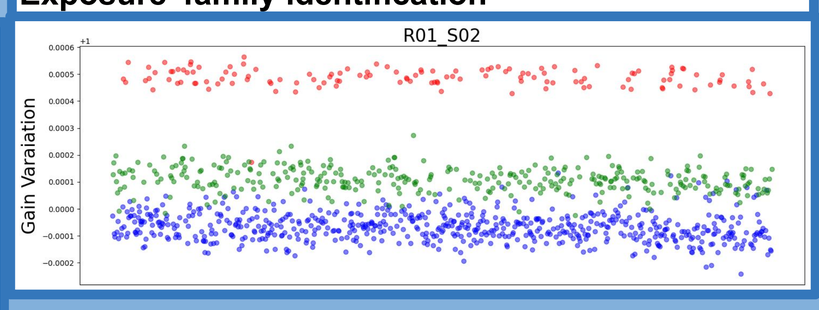


Correction using an entire raft to remove common variation across the focal plane. This technique allows us to detect effects on the order of 10−4 ADU



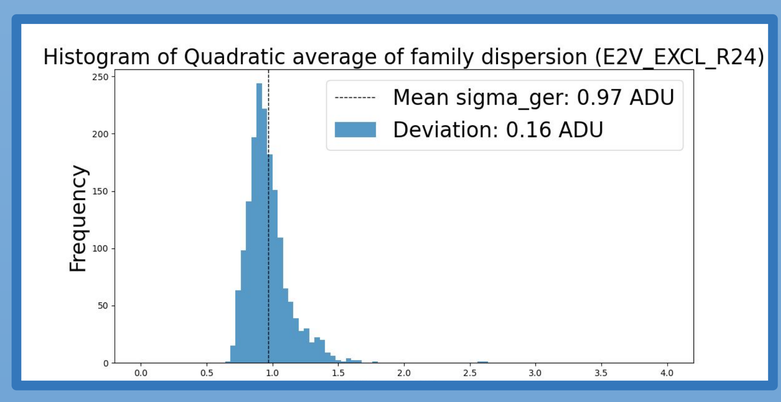
Problematic ITL amplifier example.





Using family classification :

Tail of problematic amplifiers for ITL’s raft nearly disappear



Deviation reduction :

On the left plot, we can see the flickering of the ITL amplifiers. On the right, by separating the exposures into families, the flickering almost entirely disappears.