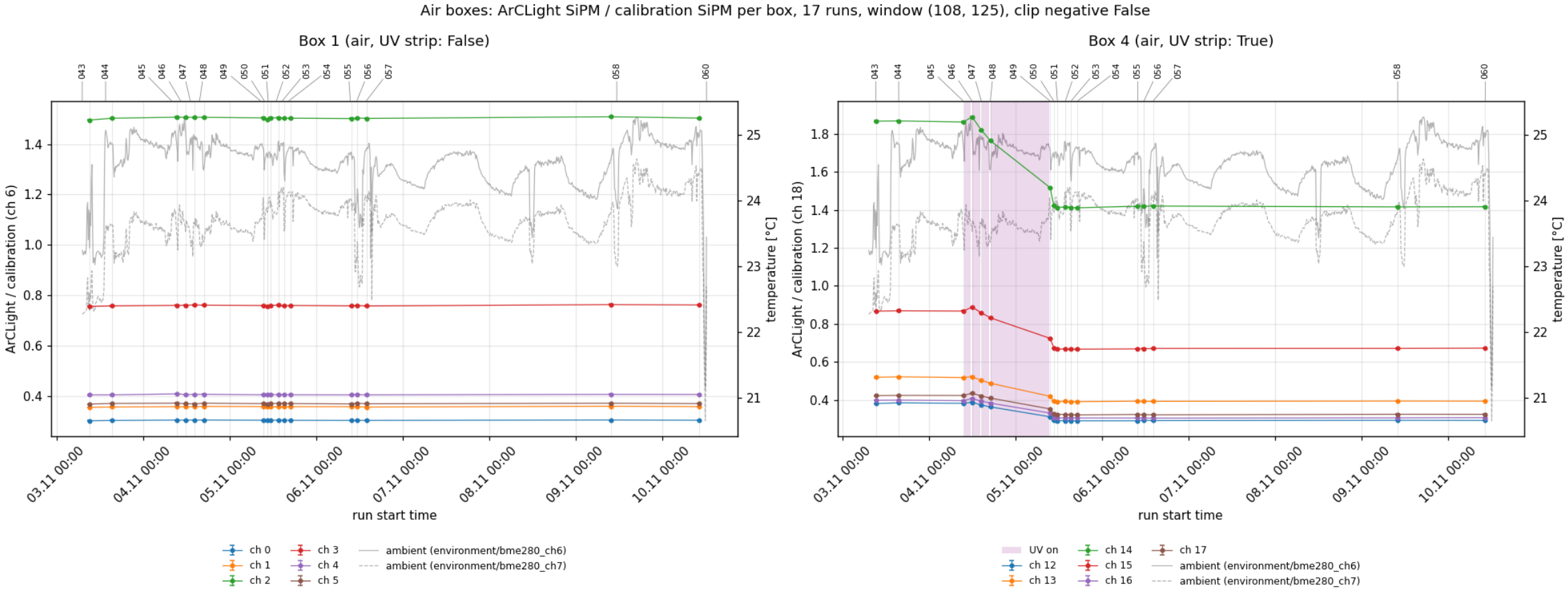
TPB Degradation Study Status

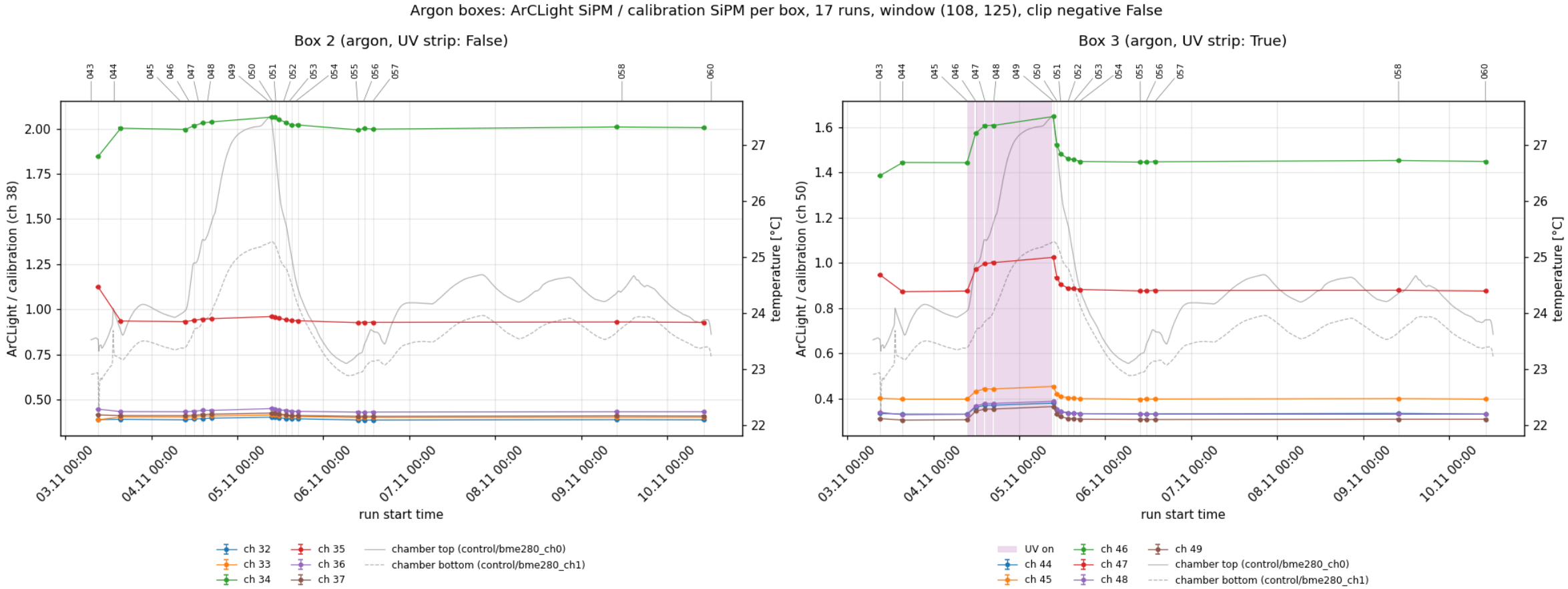
Martin Weber

10.11.2026

ADC integral ratios (Air)



ADC integral ratios (Argon)

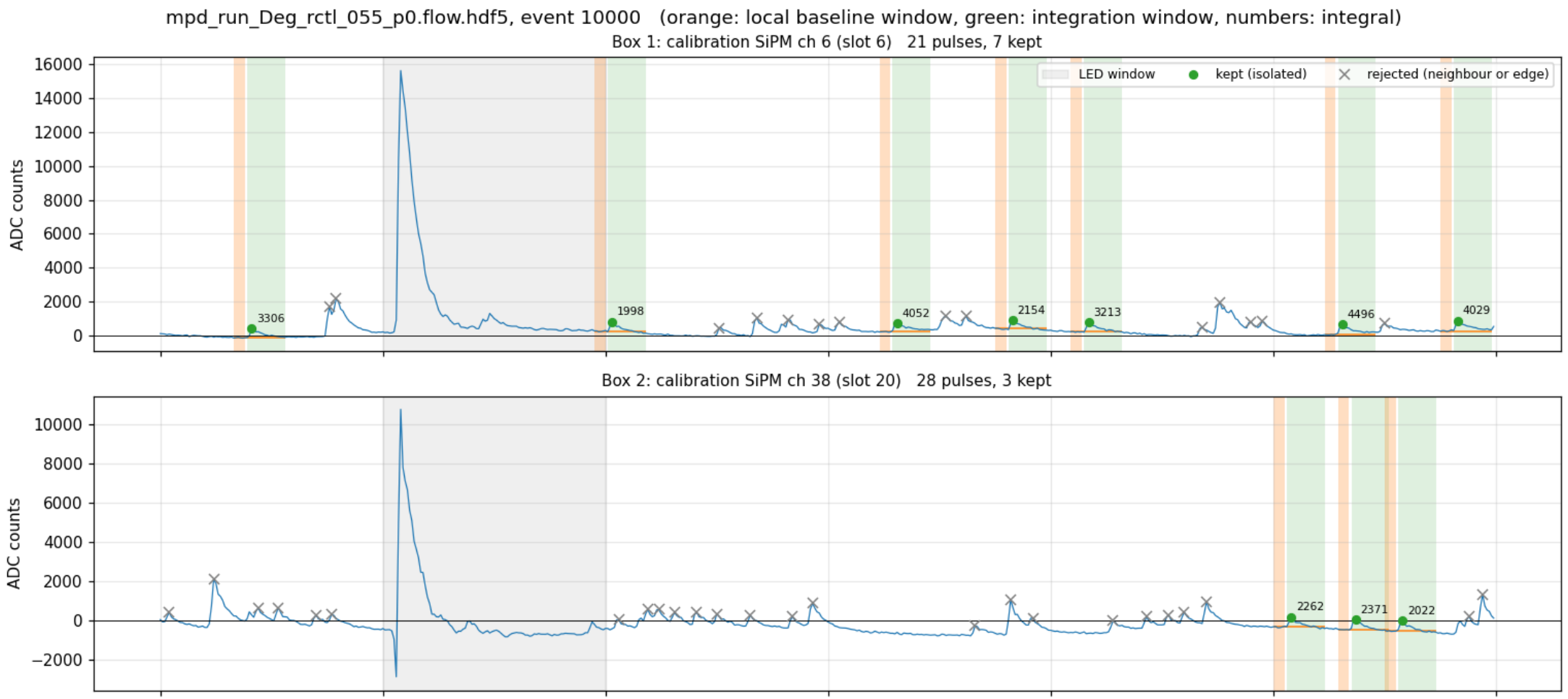


SiPM calibration

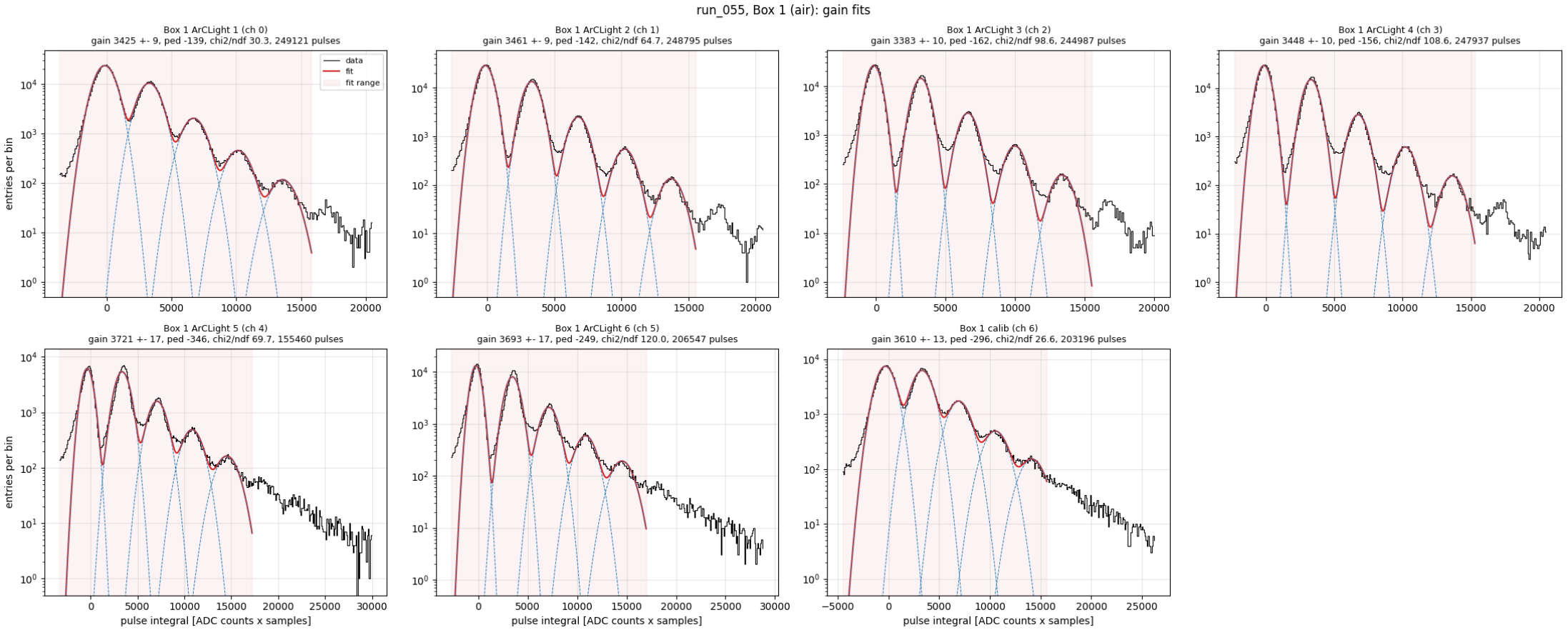
SiPM calibration to remove the temperature dependent change

- Isolate dark count peaks per event per Sipm
- Intagrate peaks and create fingerplot
- Fit gaussian to find gain
- Plot gain corrected ratio
- Plot gain vs temperatur

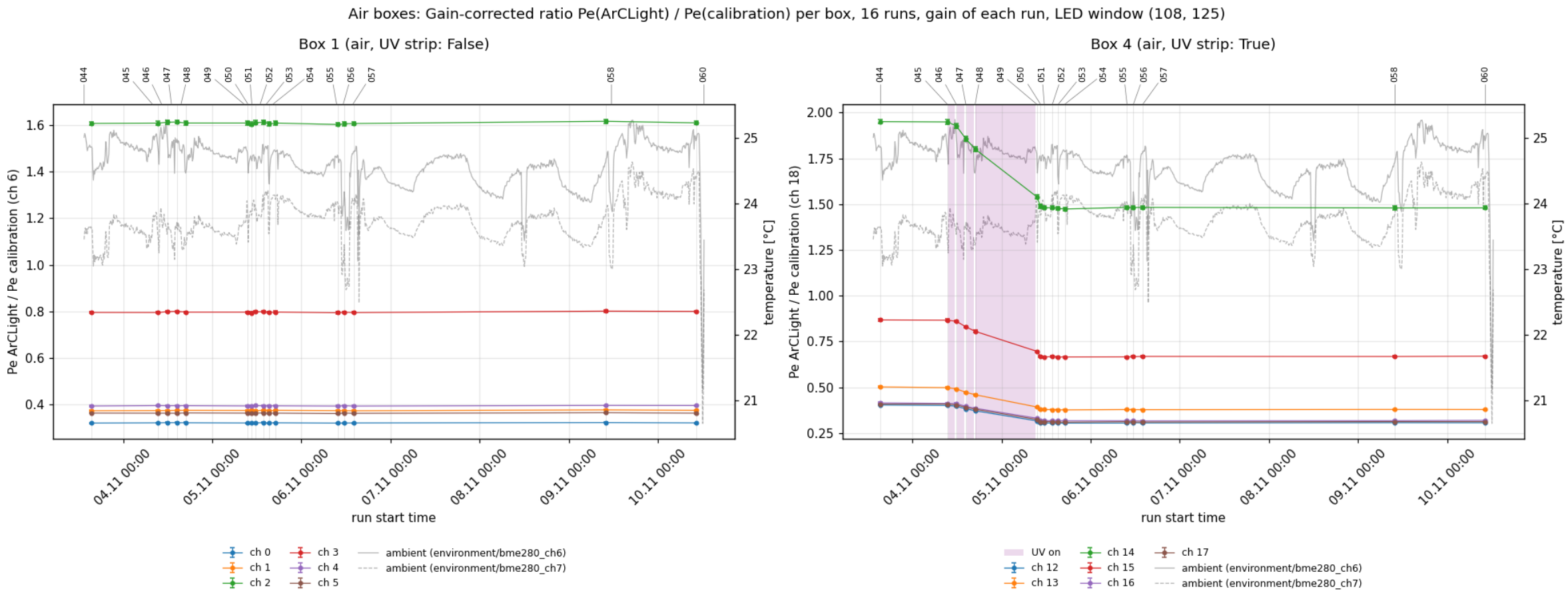
Isolation of dark count peaks



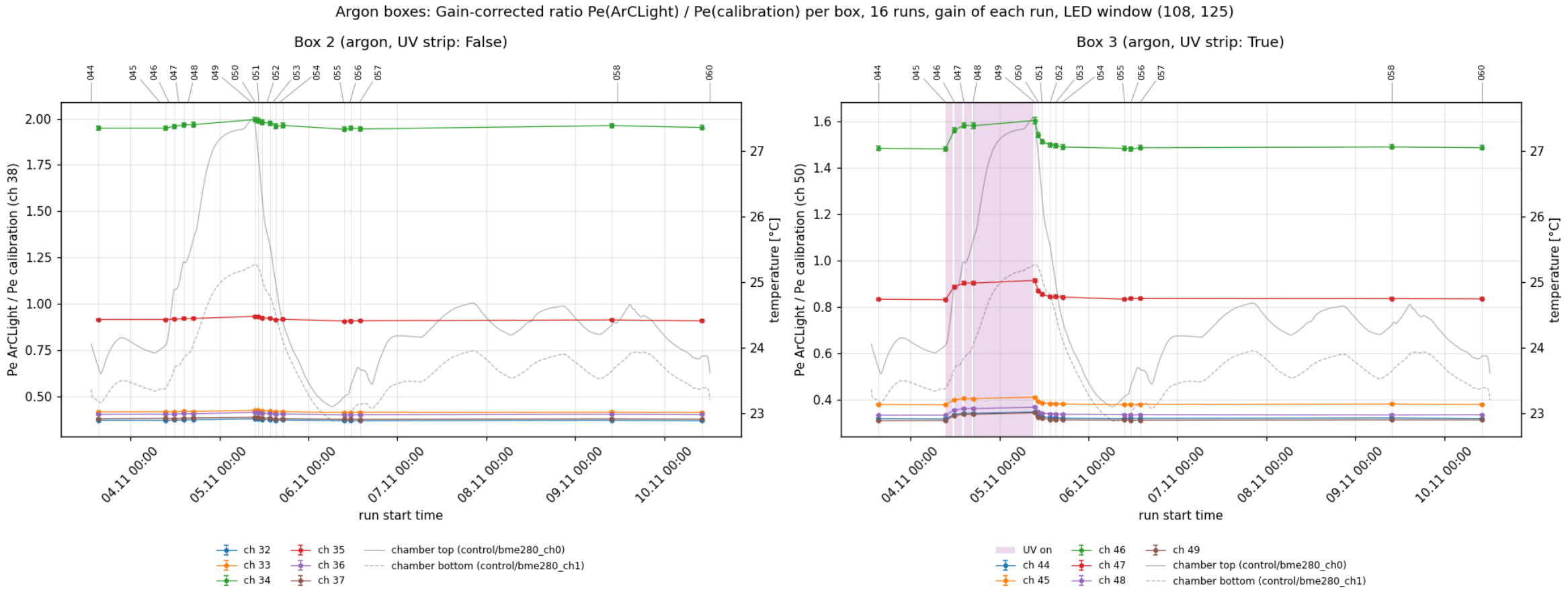
Fingerplots and gaussian fitting



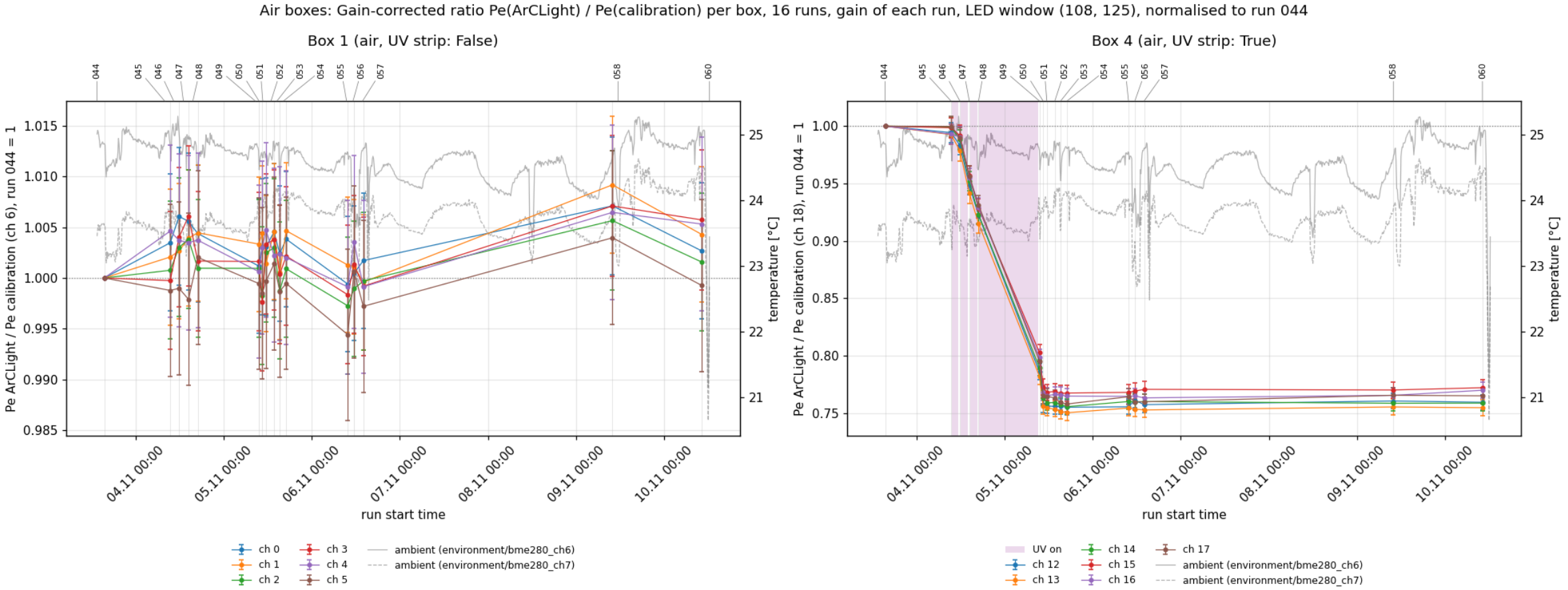
Gain corrected ratio (Air)



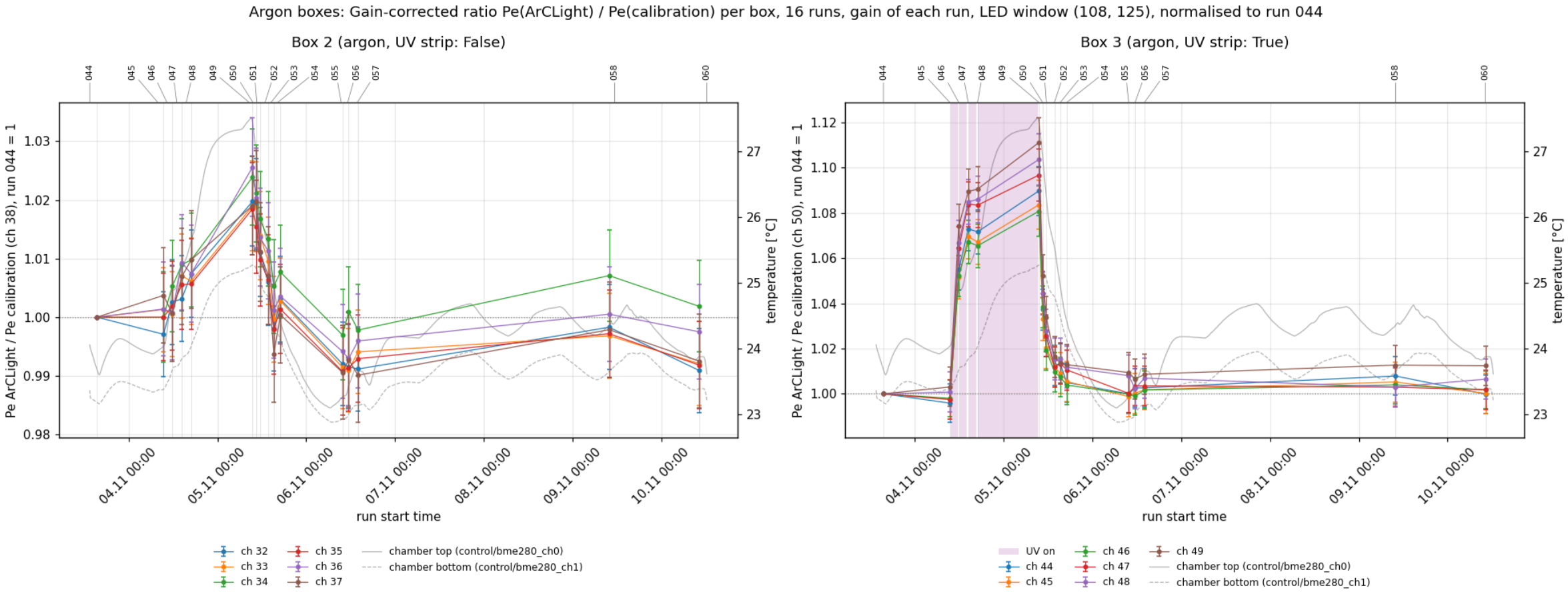
Gain corrected ratio (Argon)



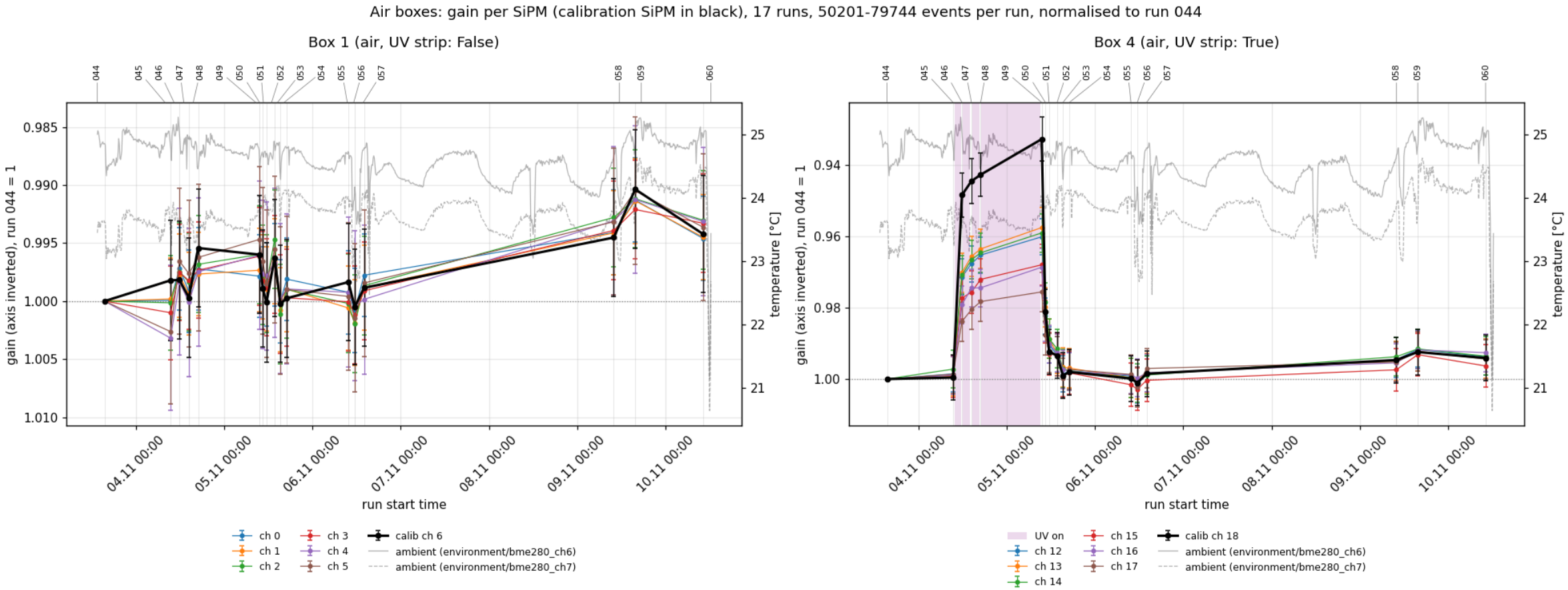
Gain corrected ratio (Air normalised)



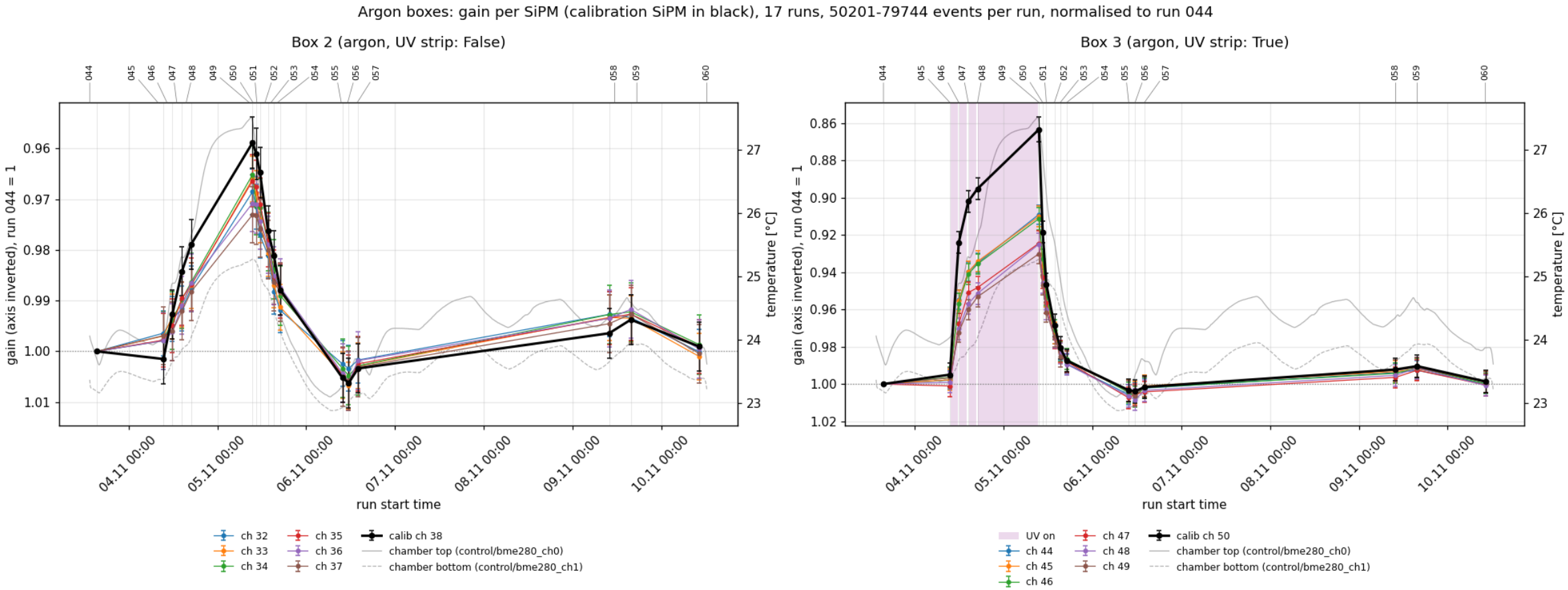
Gain corrected ratio (Argon normalised)



Gain vs temperature (Air normalised to run 44)



Gain vs temperature (Argon normalised to run 44)



Still persistent temperature dependencies

Possible causes (needs further investigating):

- PDE (photon detection efficiency)
  - Since fixed Bias (57 V) → Falls with temperature, but differently for different Wavelengths
  - ArcLight SiPMs vs Calibration SiPMs → change in ratio
- Pulser LED spectrum shift → absorbs slightly differently
- TPB changes
  - Some studies for cryogenics vs room T → For our T change probably insignificant.

Further measurement plan

- Covering / improving covering of boxes to further increase lighttightness
- Doing another measurments series with UV (similar to run 45-57)
- If possible in Week 16th to 20th 2D scan of the (at least the UV blasted) ArcLights to see gradient.

Rought Thesis outline

- Introduction
- DUNE detector and ArcLights
- SiPMs and SiPM calibration (theory)
  - How do they work
  - Gain / fingerplots
- Setup and measurement process
  - Setup
  - Vacuum test / sensor data
  - measurement process
- Results
- Discussion
- Conclusion