

Newsletter

28 February 2025

Atmospheric characterization with the QUBIC prototype at the observation site

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From the data collected with the QUBIC prototype at the laboratory in the city of Salta in 2022 and later at the Alto Chorrillos observatory in 2023, we measured the atmospheric temperature over several days and compared it with simulations. The results for Salta are shown in Fig. 1 for the best detectors on the QUBIC focal plane. The data show good agreement with the simulation. The significant spread of the data could be explained by the presence of trees in the instrumental field of view during the Salta test campaign for some of the detectors. The thermal emission from the trees could have potentially contaminated the signal with an additional, unaccounted-for load.

The results for the Alto Chorrillos observatory are shown in Fig. 2 for the two best detectors on the QUBIC focal plane. Both detectors exhibit modulation over time as expected. However, there is a constant discrepancy with the simulation. This can be attributed to an issue during the data acquisition that caused thermal saturation of the focal plane, which will be addressed in the next observation campaign.

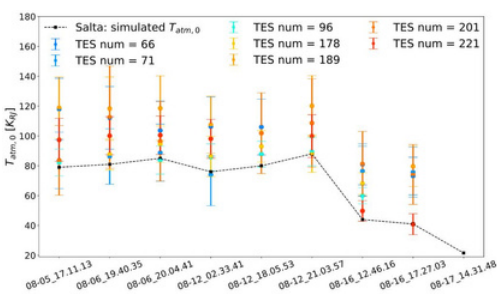


Figure 1 - Atmospheric temperature measured at the lab in Salta from data collected with the QUBIC prototype over different days and times of the day (reported along the x-axis). The measurements correspond to the best detectors (TES), each shown in a different colour, and are compared to the simulation (shown in black squares).

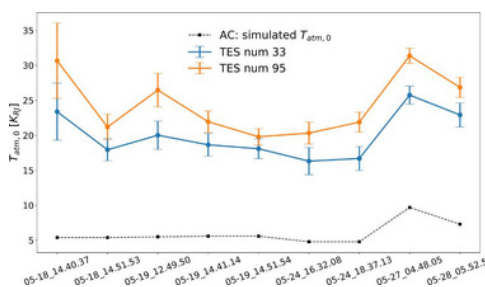


Figure 2 - Atmospheric temperature measured at the Alto Chorrillos site from data collected with the QUBIC prototype over different days and times of the day (reported along the x-axis). The measurements correspond to the two best detectors (TES numbers 33 and 95) and are compared to the simulation (shown in black squares).

One can also appreciate the lower atmospheric temperature at the observatory, located at an altitude of 5000 meters, compared to the city of Salta. This ensures a lower noise contribution from the atmosphere.

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