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Title:

Phase-Curve Spectroscopy With Ariel Against Gain Drifts

Abstract:

Recent phase-curve observations with JWST highlighted the strong potential of spectroscopic phase curves to constrain the spatial and temporal variability of planet atmospheres. Ariel capabilities for phase-curves are consequently closely investigated to understand how well Ariel will perform such observations.

However, these observations are highly sensitive to long-term instrumental systematics, including gain variations and pointing drifts. As a result, degeneracies between the instrumental drift model and the planetary flux model are expected and may be difficult to disentangle. This work investigates the ability to detrend these long-term drifts while preserving the underlying astrophysical signal using the Ariel Simulator ExoSim2 (Mugnai et al, 2025).

We evaluate how accurately the science parameters can be recovered under different gain-drift scenarios through a complete end-to-end analysis, from the simulation to the fitted light-curve model for the full wavelength range of Ariel’s spectroscopic channels. This study provides new insights into the potential of Ariel for phase-curve science.