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Optimizing the interplay of systematic effects and observing strategy in CMB space missions

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CMB space missions are uniquely capable of probing the very largest angular scales for the primordial B-mode reionization bump which is the signal least susceptible to contamination from lensing.

A critical piece of this framework will necessarily be the ability of generating synthetic mission datasets of sufficient realism, both in their complexity and their size, to be truly representative of the dataset that would be gathered by a given mission conguration.

In this talk, we aim at outlining the studies that will be performed under the support of an APRA grant.

We firstly focus on showing preliminary results of simulations encoding systematic effects injected with the Time-Ordered Astrophysics Scalable Tools (TOAST) package, such as frequency bandpass mismatch, calibration errors, gain fluctuations, optical beam and Half-Wave plate imperfections.

On a second stage, we will focus on developing efficient mitigation algorithms by constructing, fitting and subtracting appropriate time-domain templates.

Finally, while the degree of any systematic effect will primarily depend on the instrument properties, the effectiveness of the mitigation strategies will mostly depend on the observing strategy. We, thus, aim at optimizing the survey with respect to these mitigations before attempting to quantify the systematics residuals and place requirements on instrument performance.

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