

CMB-S4 Project Submission

Submission Date and Revision

Apr 19, 2023 - version 2

Project Title/Topic

CMB-S4: Framework for instrumental systematics forecasting for SATs

Project Leader(s)

(Responsible for reporting progress to Science team, Publication Board, and Collaboration. Note any thesis students.)

Clara Vergès, Colin Bischoff, Kirit Karkare

Project team and member roles

Colin Bischoff - likelihood framework development

Kirit Karkare - likelihood analysis, systematic templates

John Kovac - general advice

Akito Kusaka - general advice

Clem Pryke - general advice

John Ruhl - general advice

Clara Vergès - likelihood analysis, systematic templates

Kimmy Wu - likelihood framework development

Michael Zito - likelihood analysis

Proposed Project Category

Forecast/Technical Report

Upstream data products required

Nominal bands, N_{hits} maps and NETs for SATs

Instrument specifications

Fiducial sky models

Systematics templates from S3 experiments

Estimated Completion Date

October 2023

Expected Final Products

Likelihood code, calibration requirements

Project Description

Constraining primordial gravitational waves using degree-scale B-mode polarisation requires exquisite control of instrumental systematics which could bias constraints on cosmological parameters. We extend the CMB-S4 fiducial r forecasting framework to account for the impact of instrumental systematic effects. Our generic, power spectrum-based likelihood framework includes additive and multiplicative systematics, as well as uncertainties on their estimates. We explore different avenues to mitigate the impact of systematics, tied to instrumental calibration precision. We demonstrate the framework on additive beam systematics and multiplicative bandpass mismatch using estimates from Stage 3 experiments.

External Collaborators or Collaborations (if any)

None.