

10.2.22 WP 7-6X2: LiteBIRD Fase A – Systematics

PROJECT: Studi di Cosmologia		WP REF.: 7-6X2
WP TITLE: LiteBIRD Fase A - Foregrounds SUB-CONTRACTOR: Dipartimento di Fisica – Università di Ferrara START EVENT: KO+18 END EVENT: RA4 WP MANAGER: Paolo Natoli		Sheet: 1 of 1 Issue Ref: 1 Issue Date: 30/03/2018

OBJECTIVES

Systematic effects are the main source of uncertainty for contemporary CMB experiments. Due to their tight requirements of accuracy, satellite missions are especially vulnerable to systematics. Mission design needs to be carefully optimized proven robust towards this contribution. The phase A study is the proper context to carry out such activities. The LiteBIRD team has recognized this fact by creating a specific Joint Study Group devoted to the study of systematic effects as part of their phase A1 activity plan.

The objective of this WP is to support the activities of the LiteBIRD Joint Study Group for systematic effect.

INPUTS

- LiteBIRD mission description and requirement documents
- Work plan & schedule
- Output of previous studies in the public domain

TASKS

- Development of custom versions of the LiteBIRD simulation and analysis tools. The mission generic simulator as developed within the Joint Study Group will likely be a useful starting point, but it will be essential to develop additional modules to carry out the activities outlined below.
- Assess the correlated and cross-correlated noise impact on science outcome. This task will require to develop a prototypical calibration module
- Explore the feasibility of the LiteBIRD calibration with the help of realistic simulations, in close collaboration with the Milano group.
- Perform end-to-end simulations in presence of major expected contaminants to guarantee the mission can meet its accuracy goal even in the presence of systematic residuals. This activity will be carried out teaming up with the Trieste group for sky modeling and the component separation modules.
- Study of the HWP specific systematics, in conjunction with Roma 1. This in principle will be carried out both for the low and high frequency LiteBIRD telescope. Being however the HFT a foreseeable contribution from Italy, we expect a finer grained study for this instrument, possibly teaming up with industrial partners
- Simulation of the LiteBIRD 4Pi beam patterns across the detector band and propagation of their impact to the science goals. This activity will be carried out in close collaboration with the Milano group which will be involved in design optimization of the optical chain.

OUTPUTS

Contribution to deliverable documents regarding:

- Detailed technical reports for the activities outlined above, to cover the following points:
 - Validation of the feasibility of the mission scanning strategy towards delivery of clean frequency maps

- Careful assessment of the science LiteBIRD performance assuming a realistic model of the data reduction pipeline
- Optimization of the HFT design, in view of its science goal
- Optimization of the LiteBIRD calibration scheme
- Optimization of the 4Pi beam response
- Scientific publications, whose distribution will be subject to the collaboration NDA.

SCHEDULE

Activity completed at RA3