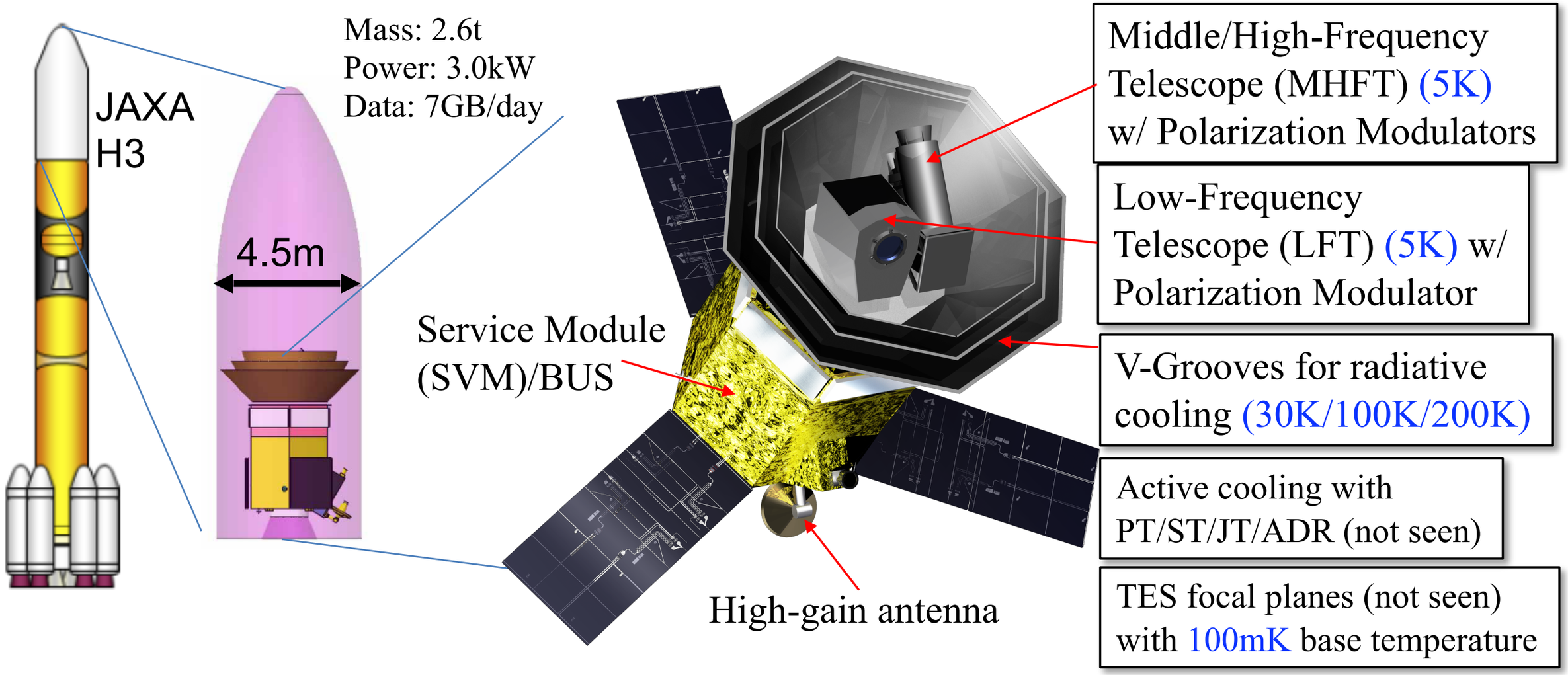
LiteBIRD Overview

- Light satellite for B-modes from Inflation CMB Radiation Observation
- Just selected (May 2019) as the next JAXA's L-class mission
- Expected launch in 2028 with JAXA H3 rocket
  - LiteBIRD is the only CMB space mission that can be realized in 2020s
- Observations for 3 years (baseline) around Sun-Earth Lagrangian point L2
- Millimeter-wave all sky surveys (34–448 GHz, 15 bands) at 70–20 arcmin
- Mission δr (total uncertainty) < 0.001 (for r=0) with CMB B-mode observation



LiteBIRD mission instrument

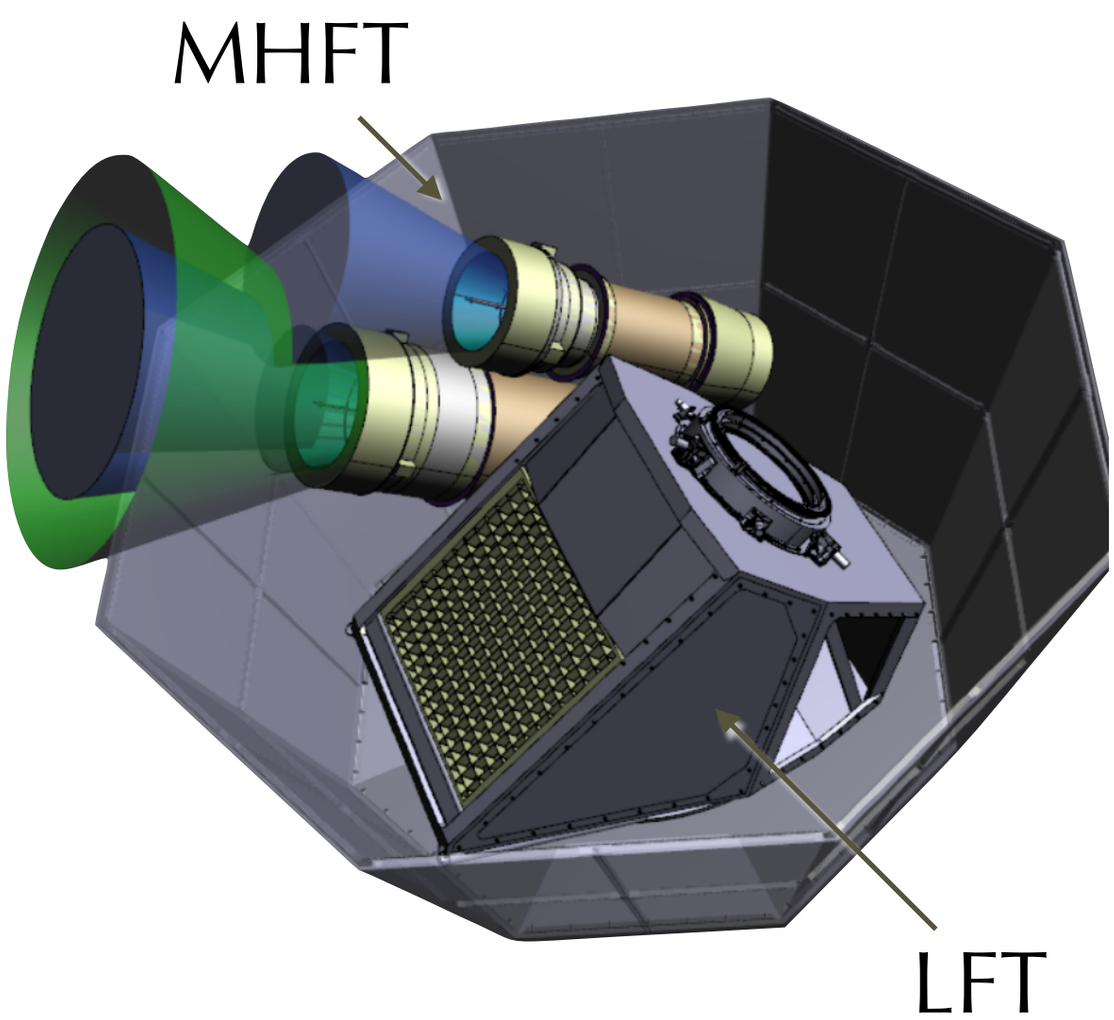
- Three features
  - Three telescopes w/ TES arrays (4732 detectors)
  - Polarization modulator for 1/f noise reduction
  - Cryogenic system for 0.1K base temperature

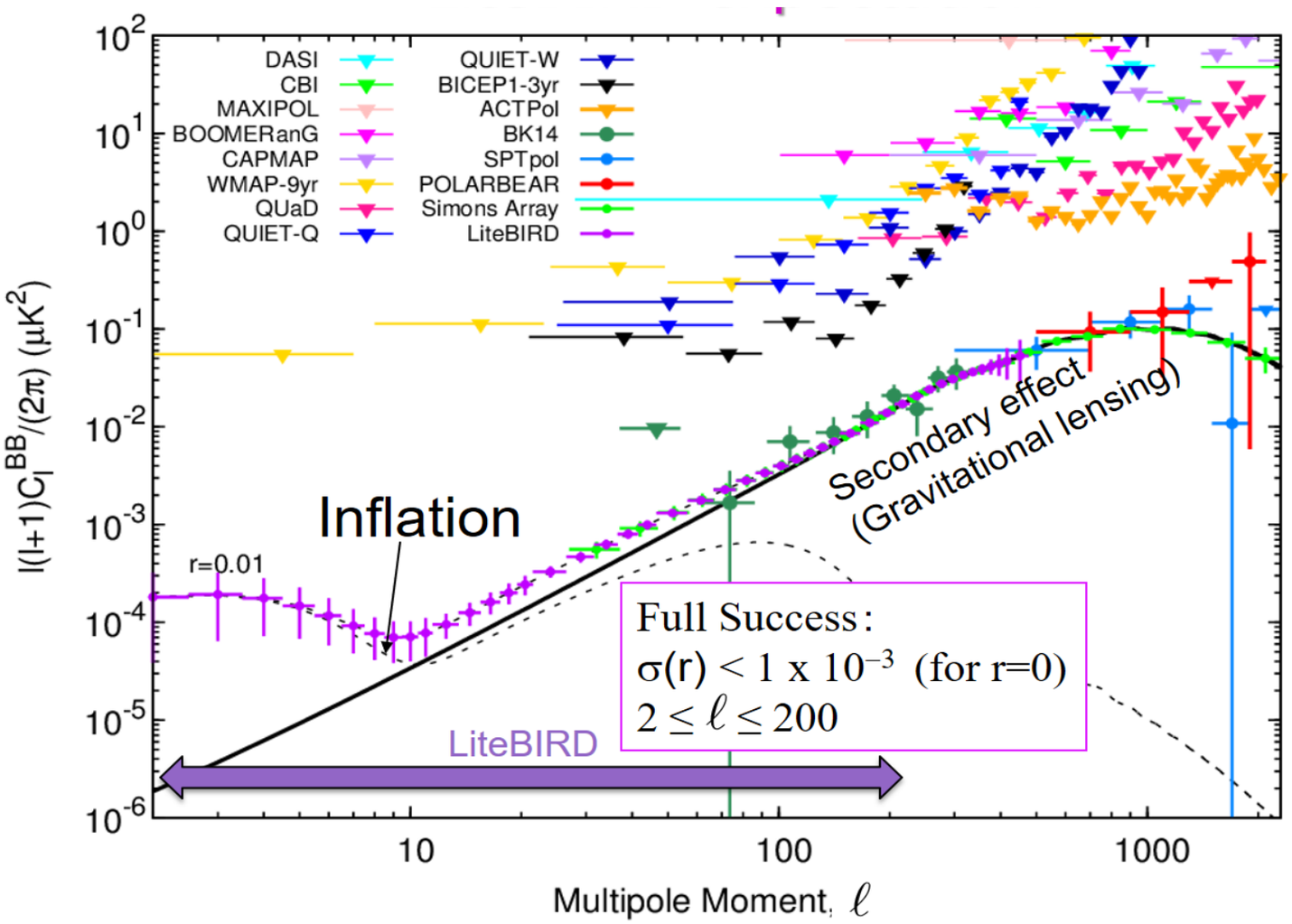
Full Success:

$\delta r < 1 \times 10^{-3}$ (for r=0)

ℓ

x70 sensitivity
w.r.t. present lir





Activity in Ferrara (2021/2022)

Development of the LiteBIRD Simulation Framework (largely developed in Ferrara)

- Python modules to simulate the instruments onboard the LiteBIRD spacecraft

Provides:

- Interface with the instrument model
- Scanning strategy
- Signal ingestion (CMB, foregrounds, dipole, etc..)
- Systematic effects generation
- Mapmaking
- Interface with existing codes

https://github.com/litebird/litebird_sim

LiteBIRD Simulation Framework

Main repository of the LiteBIRD Simulation Framework, a set of Python modules to simulate the instruments onboard the LiteBIRD spacecraft.

Explore the docs »

Activity in Ferrara (2021/2022)

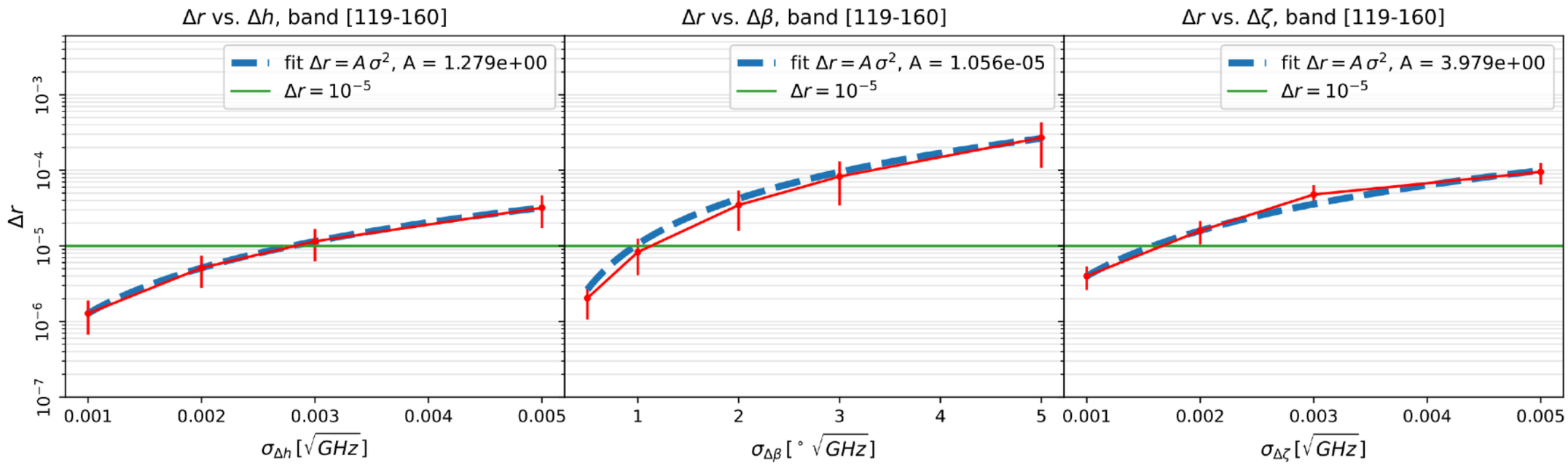
Study of the impact on the tensor-to-scalar ratio of the HWP non-idealities

S. Giardiello et. al.: Detailed study of HWP non-idealities and their impact on future measurements of CMB polarization anisotropies from space

Paper published on A&A in January

It provides:

- A pipeline for propagating the non-idealities of the HWP in the timelines and in the CMB maps.
- A data reduction pipeline for reducing the systematic effects
- Requirements for the construction of the HWPs



Activity in Ferrara (2022/2023)

1. First e2e LiteBIRD simulations
   a. Pipeline ready to go, still waiting for IMO definition
   b. Production of timelines and maps
   c. Purpose: support for instrument definition, testing of data analysis codes (e.g. calibration), and support for the project papers

2. Further development of the simulation framework:
   a. Beam convolution
   b. Electronic related systematics
   c. Bandpass mismatch and interplay with the HWP non idealities

3. Activity within the project papers:
   a. Reionization and neutrino masses
   b. Cosmic Birefringence
   c. Cross-correlation Science

Anagrafica e Richieste (2023)

- Paolo Natoli: **0.6**
- Martina Gerbino **0.5**
- Mario Ballardini: **0.5**
- Marco Bortolami: **1.0**
- Angelo Cotta Ramusino: **0.1**
- Roberto Malaguti**: 0.1**

Variazione:

- Ballardini in, Gerbino in, Giardiello out

Totale FTE: **2.6** (**+0.2** OE)

Richieste (da confermare con RN):

- Missioni nazionali e internazionali (+ integrazione elettronica): **8 K€**
- Licenze SW: **TBD**