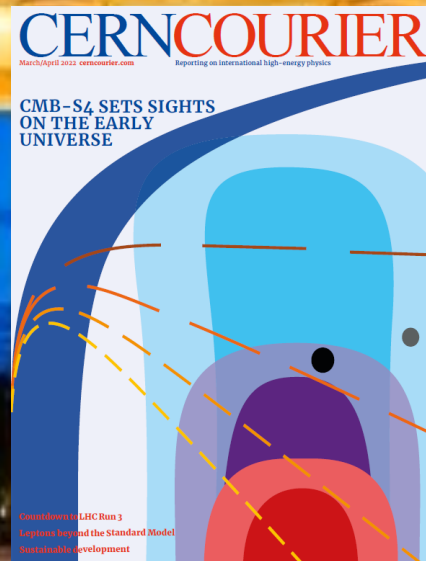


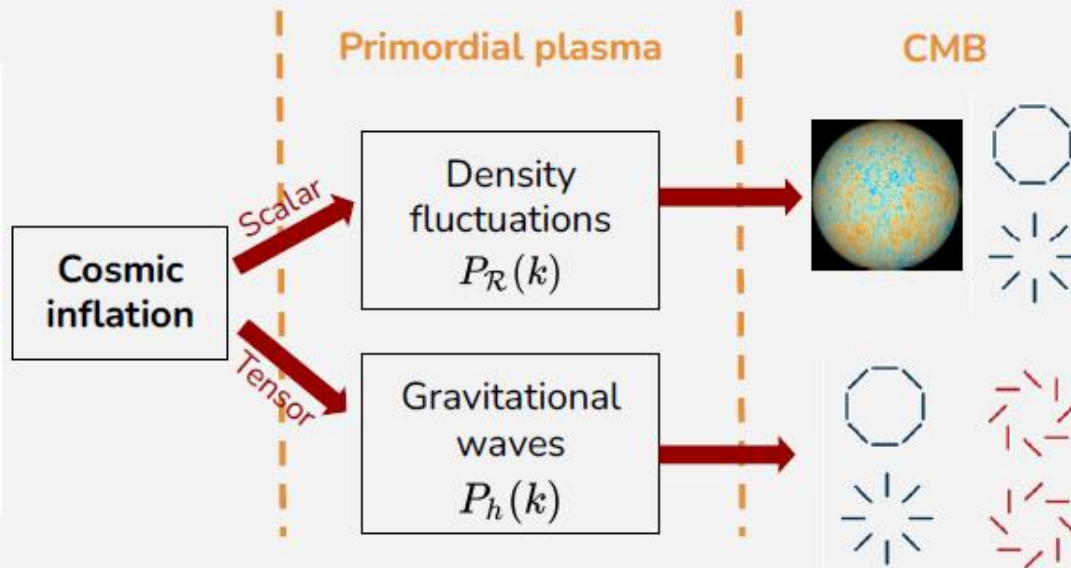
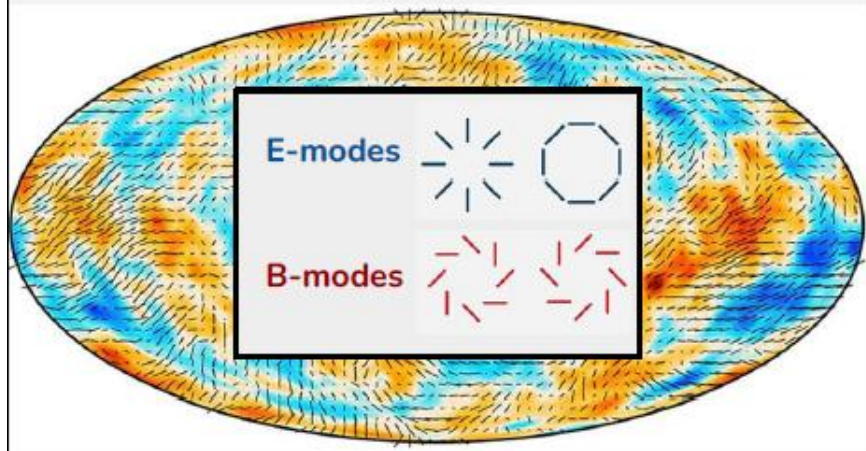
# CMB



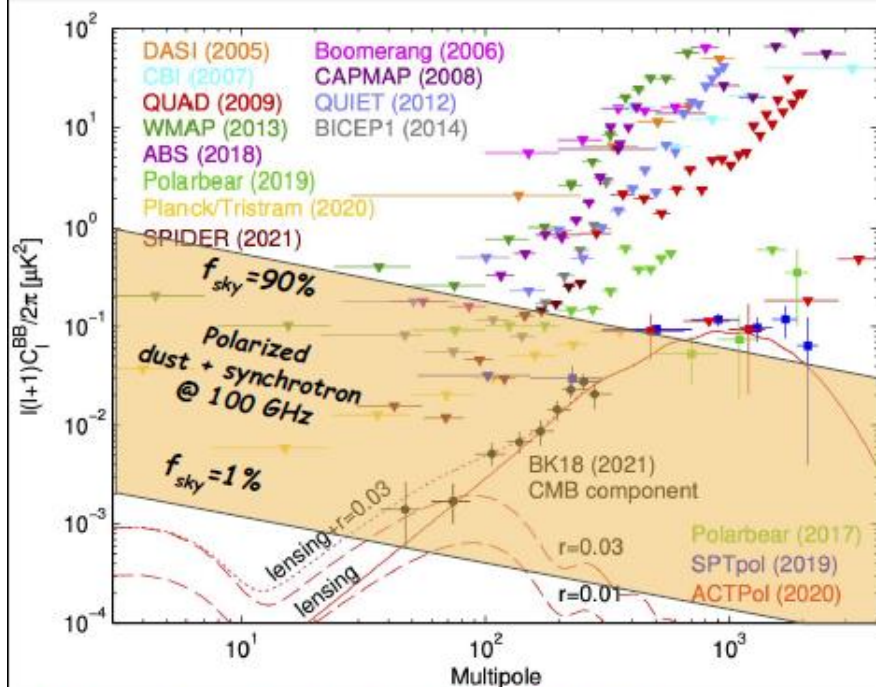
S. Loucatos  
and K. Ganga  
Irfu-CEA and APC

APPEC town meeting Berlin 2022

# CMB polarization: a signature of inflation



## A major goal in observational cosmology



**Tensor-to-scalar ratio:**

$$r \sim \frac{P_h}{P_{\mathcal{R}}}$$

$r_{0.05} < 0.036$  at 95% C.L.

L. Mousset

# Early questions:

What is next in CMB and how should Europe contribute, or take the lead?

Midterm report:

The largest CMB initiatives are being driven by teams in the United States and Japan, but there are funded, suborbital CMB experiments planned from Europe. QUIJOTE, Groundbird, QUBIC

Florence CMB Workshop series have helped incubate multiple European initiatives for contributing to SO, SPO, and S4, which have not yet come to fruition ...

- a proposal for a European Low-Frequency Survey
- contributions to the large angular-scale effort on the Simons Observatory;
- contributions to the small angular-scale effort for the South Pole Observatory

...APPEC support for developing the three axes will help Europe to remain a significant actor in future ground-based CMB science.

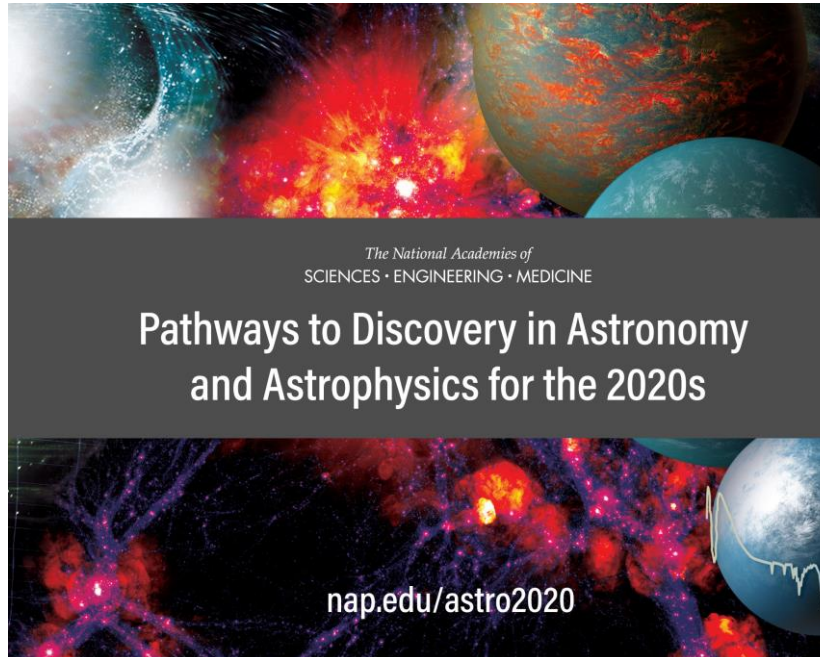
What is the context to ASTRONET?

ASTRONET considers LiteBird as a possible project.

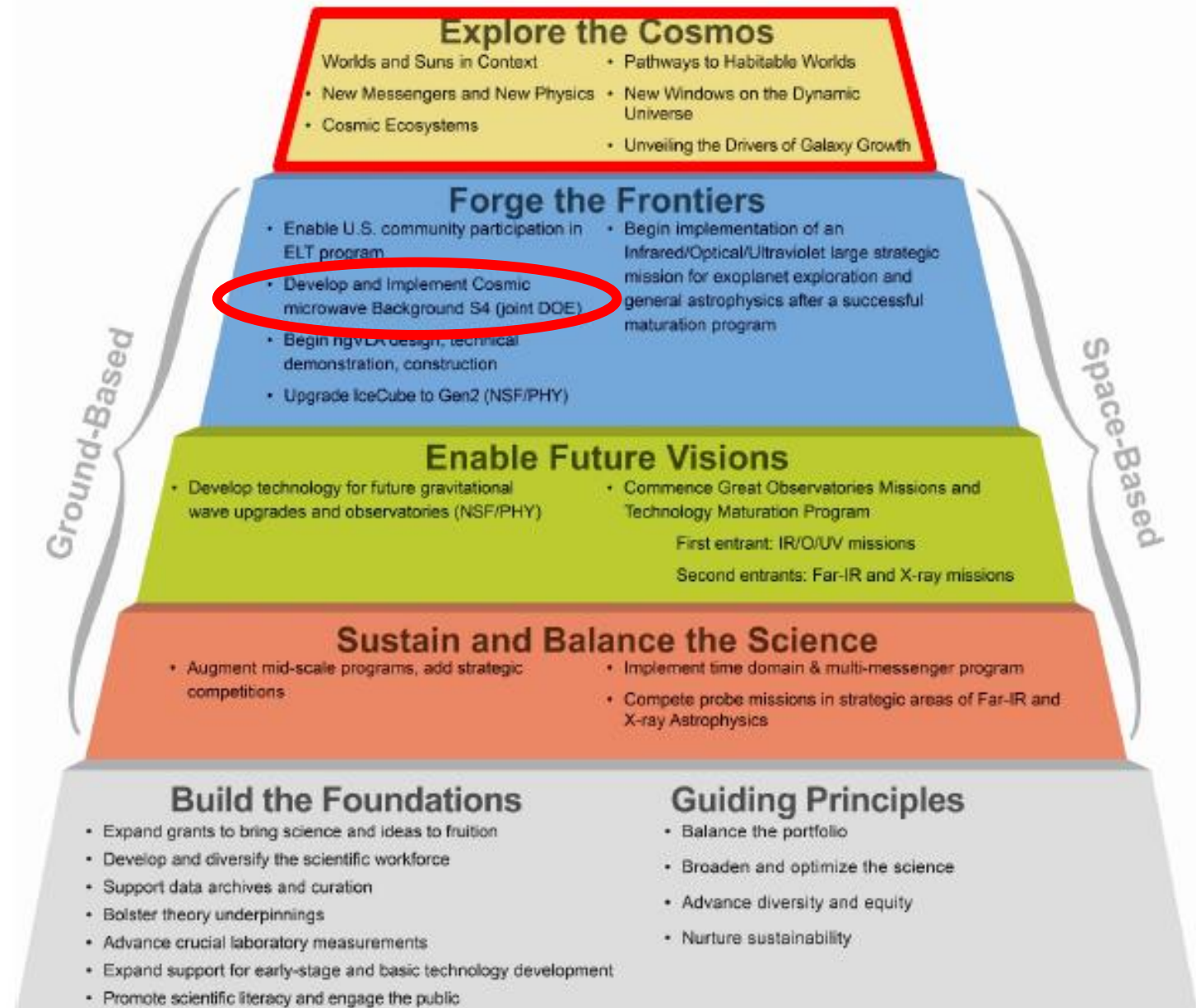
What is the context to the US Decadal Survey?



nap.edu/astro2020



# Realizing the Astro2020 Program: Pathways From Foundations to Frontiers



# The Cosmic Microwave Background Stage 4 Observatory



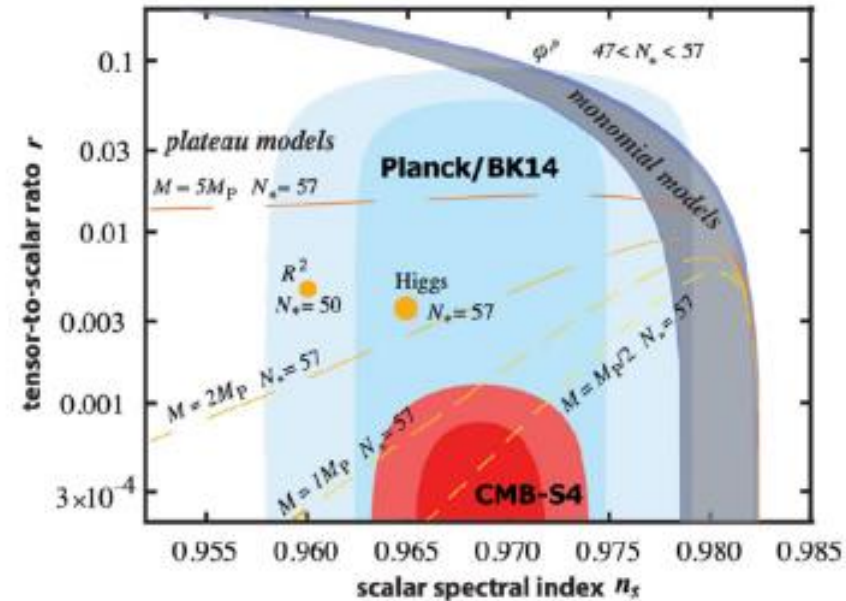
CMB-S4 builds on the foundation of decades of CMB measurements to take a major leap, pushing CMB science to the next level

## Scientific goals

B-mode CMB polarization signatures of primordial gravitational waves and inflation

Maps 50% sky, every other day from 0.1- 1 cm with unprecedented sensitivity

Broad science including systematic time domain science



(Plot flipped on CERN courier cover)

CMB-S4 consists of a systematically planned suite of facilities in Antarctica and Chile designed to sample a wide range of independent frequencies, and probe a combination of large and small angular scales

# Questions raised at the round table:

- Appec should support LiteBird (although already done, so what more?)
- Data policy in CMB. Next experiments probably 2 years of proprietary phase, like Planck. European labs need to be inside the new projects early, to have data access.
- Appec should act more to reinforce common work of cosmology e.g. with GW cosmological sirens, or dark matter, e.g. effects of hot DM, self-interacting DM...



- Appec should address more strongly the support of new technologies for CMB and elsewhere, to be present in the future experiments.
- Finally, Appec should become more attractive to cosmologists...