

Remontée des sujets CSC 2018-2019

Ecole Doctorale / Doctoral School

STEP UP

Titre du sujet / Subject title

Data analysis for future CMB polarization observations

Encadrant(s) / advisor(s)

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Etablissement / Institute

USPC

Pôle / Research axis

Description of the subject

The next challenge in Cosmic Microwave Background (CMB) observations after the Planck space mission is the detection and precise characterization of CMB polarization. One of the main science goals is the detection of primordial polarization modes called B-modes. Such primordial B-modes are expected to be generated by primordial gravitational waves generated in a scenario for the origin of perturbations in our universe during a phase of rapid expansion known as cosmic inflation. Their detection would be direct evidence for quantum gravitational effects in the very universe, and thus probe the physics at work in the Universe at energies 10 billion times higher than those achievable with the largest particle accelerator on Earth. Two major difficulties arise for the observation of primordial B-modes. The first one is the contamination of observed polarization B-modes by astrophysical emission of various origin. Foreground emission is emitted by the Galactic interstellar medium (synchrotron radiation, thermal dust emission). The second one is the imperfections of the observing instruments, which generate systematic effects in the data stream from the confusion of temperature anisotropies with the polarization signals of interest. Both unwanted signals can outshine the polarization signals of interest by orders of magnitude. The thesis project consists in the development of data analysis methods to jointly correct for both effects in the context of both the Chinese Ali-CPT ground-based observatory in Chinese Tibet, and as part of the feasibility study of a future CMB space mission.

Type de financement

M2 + 36mo.

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48 mo.

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Funding type

(cocher la case correspondante) Le cas échéant, titre du master NPAC