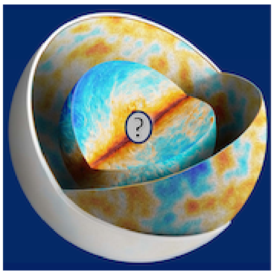

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Moment expansion and the challenge of polarized dust SED complexity for B mode detections.

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Characterising accurately the polarised dust emission from our Galaxy will be decisive for the quest for the Cosmic Microwave Background (CMB) primordial B-modes. The incomplete modelling of its potentially complex spectral properties could lead to biases in the CMB polarisation analyses and to a spurious detection of the tensor-to-scalar ratio r. It is particularly crucial for future surveys like the LiteBIRD satellite, which aims at constraining the faint primordial signal leftover by Inflation with an accuracy on the tensor-to-scalar ratio r of the order 10^{-3}. Variations of the dust properties along and between lines of sight lead to unavoidable distortions of the spectral energy distribution (SED) that can not be easily anticipated by standard component separation methods. This issue can be tackled using a moment expansion of the dust SED, an innovative parametrisation method imposing minimal assumptions on the sky complexity.

In a first study, we applied this formalism to the B-mode cross-angular power spectra computed from simulated LiteBIRD polarisation data at frequencies between 100 and 402\,GHz, containing CMB, dust and instrumental noise. The spatial variation of the dust spectral parameters (spectral index β and temperature T) in our simulations, lead to significant biases on r ($\sim$21\,σ_r) if not properly taken into account. Performing the moment expansion in β, as in previous studies, reduces the bias but do not lead to reliable enough estimates of r. We introduce for the first time the expansion of the cross-angular power spectra SED in both β and T, showing that, at the LiteBIRD sensitivity, it is required to take into account the SED complexity due to temperature variations to prevent analysis biases on r. Thanks to this expansion and despite the existing correlations between some of the dust moments and the CMB signal, responsible for a rise of the error on r, we can measure an unbiased value of the tensor-to-scalar ratio with an uncertainty as low as $\sigma_r = 8.8 \times 10^{-4}$.

Recent results including the treatment of the synchrotron component will be discussed as well as ongoing and future work exploiting this new tool for component separation.

Auteur principal: VACHER, Léo (Institut de recherche en astrophysique et planétologie (IRAP))

Co-auteurs: M. MONTIER, Ludovic; AUMONT, Jonathan; BOULANGER, Francois (ENS); REMAZEILLES, Mathieu (University of Manchester); AZZONI, Susanna

Orateur: VACHER, Léo (Institut de recherche en astrophysique et planétologie (IRAP))

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