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Cross-correlation between CMB polarization and mu-distortion anisotropies as a path towards the detection of small-scale primordial non-Gaussianity

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The dissipation of primordial perturbation modes with wavenumbers $50\,\mathrm{Mpc}^{-1} < k < 10^4\,\mathrm{Mpc}^{-1}$ in the early Universe cause μ-type spectral distortions to the average CMB blackbody radiation. Besides, some inflation scenarios (multi-field or single-field inflation with modified initial state) predict large primordial non-Gaussianity at these scales, so that non-Gaussian couplings between short and long-wavelength modes can modulate the damping of small-scale perturbations across different directions in the sky, and thus induce *anisotropic* μ-distortions which are furthermore correlated with CMB temperature and polarization anisotropies.

Through signal enhancement by cross-correlation with CMB anisotropies, the μ-distortion anisotropies could potentially be detected by future CMB imagers like the *LiteBIRD* satellite, and would allow to constrain f_{NL} at the very small scales $50\,\mathrm{Mpc}^{-1} < k < 10^4\,\mathrm{Mpc}^{-1}$ which are inaccessible to both CMB anisotropies and LSS surveys.

In this talk we will present our forecasts on the recovery of the cross-power spectra $C_\ell^{\mu T}$ and $C_\ell^{\mu E}$ between μ-distortion anisotropies and CMB temperature and E-mode polarization anisotropies in the presence of astrophysical foregrounds for a LiteBIRD-type experiment. In particular, we will show how μ-E correlations (i.e. $C_\ell^{\mu E}$) actually provide more constraining power on f_{NL} than μ-T correlations in the presence of foregrounds, and how the sensitivity to f_{NL} at small scales can be further increased by the joint analysis of μ-T and μ-E correlations.

Author: REMAZEILLES, Mathieu

Co-authors: RAVENNI, Andrea (Jodrell Bank Centre for Astrophysics, University of Manchester); CHLUBA, Jens (JBCA)

Presenter: REMAZEILLES, Mathieu

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