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Dipole analyses of cosmic radio background with SKA

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The peculiar motion of the observer induces boosting effects in the anisotropy pattern of the background. The monopole frequency spectrum of the background is altered and transferred to higher multipoles, most prominently to the dipole, which retains the imprint of the isotropic background spectrum. Thanks to the high sensitivity and resolution of SKA, these patterns can be extracted even from limited sky regions, carefully selected to minimize foreground contamination. SKA will enable the study of various types of dipole signals, ranging from the integrated contribution of extragalactic sources to diffuse free-free emission, from the redshifted 21 cm line to low-frequency spectral distortions of the CMB. Comparing the dipole with the underlying monopole provides constraints on the observer's velocity and, when combined with CMB analyses, helps disentangle the kinematic and intrinsic components of the cosmic dipole. Finally, the capabilities of the SKA Low and Mid (AA* and AA4) configurations are discussed, considering both short and long baselines, which are crucial for significantly reducing confusion noise.

Topics

Cosmology

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