ABSTRACT Journées SF2A 2026

Impact of Galactic EB correlation on the calibration of CMB B-modes for future space missions

The search for primordial gravitational waves imprinted in the polarization of the Cosmic Microwave Background (CMB) is a primary goal for next-generation CMB experiments. As we aim for the high sensitivity required to detect CMB primordial B modes, our ability to distinguish between cosmological signal, astrophysical foregrounds and instrumental systematics becomes crucial. Currently, in-flight polarization angle calibration for space-borne experiments often relies on the EB nulling requirement, assuming that the intrinsic cross-correlation between E and B modes is zero. Under this assumption, any observed EB signal is attributed to instrumental polarization angle miscalibration. In this contribution, I discuss how the physical complexity of Galactic dust can produce a non-zero intrinsic EB signal, which creates a direct degeneracy with the instrumental miscalibration angle if not properly modeled. We present an extension of the current state-of-the-art calibration framework for space-borne observations that incorporates a complex dust model with intrinsic EB correlations. This allows us to study the impact of such astrophysical complexity on both the estimation of the miscalibration angle and the resulting accuracy of the tensor-to-scalar ratio, r. Our goal is to determine the level of modeling required to ensure that these systematic biases remain well below the statistical uncertainties of next-generation surveys.