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Birefringence in CMB anisotropies due to cosmological pseudoscalar fields

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We study the imprints of a cosmological redshift-dependent pseudoscalar field on the rotation of cosmic microwave background.

We show how either phenomenological or theoretically motivated redshift dependence of the pseudoscalar field, such as those in models of Early Dark Energy, Quintessence or axion-like dark matter, lead to CMB polarization and temperature-polarization power spectra which exhibit a multipole dependence which goes beyond the widely adopted approximation in which the redshift dependence of the linear polarization angle is neglected.

By taking this multipole dependence into account, we calculate the parameters of these phenomenological and theoretical redshift dependence of the pseudoscalar field which can be detected by future CMB polarization experiments on the basis of a χ^2 analysis for a Wishart likelihood.

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