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A new window to Axion-Like Particles from the upcoming CMB experiments

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Summary

Cosmic Microwave Background (CMB) is a powerful probe to the Universe which carries signatures of cosmic secrets over a vast range of redshifts. Along with spatial fluctuations, spectral distortions of CMB blackbody are also a rich source of cosmological information. In my talk, I will introduce a new kind of spectral distortion of CMB which can arise due to the conversion of CMB photons into Axion-Like Particles (ALPs) in the presence of an external magnetic field. This effect leads to both polarized and unpolarized spatially varying spectral distortion signals with a unique spectral shape when CMB photons undergo resonant and non-resonant conversion into ALPs in the presence of the magnetic field of the Milky Way, galaxy clusters, and voids. I will discuss the spatial structure of this distortion which can arise from Milky Way and galaxy clusters and will show its uniqueness from other known cosmological and astrophysical signals using which we can probe unexplored parameter space of photon ALPs coupling.

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