

Active and Sterile Neutrino-Axion Competition in Cosmic Birefringence Angle Measurement

mardi 7 novembre 2023 14:50 (20 minutes)

Cosmic birefringence (CB) angle refers to the rotation of the linear polarization plane of Cosmic Microwave Background (CMB) radiations when parity-violating theories are considered. We analyze the Quantum Boltzmann equation for an ensemble of CMB photons interacting with axion and neutrinos (active and sterile) in the presence of a scalar metric perturbation. After calculating the C_l^{EB} to drive CB, we plot these contributions by considering CB measurement and discuss on parametric mass-coupling space of axion and neutrino. We show that for some of the axion mass-coupling parameters, the dominant contribution (consistency with) is for neutrino and axion contribution suppresses neutrino one and vice versa. In another plot, we compare our results on the axion-neutrino parametric space with other experiments measuring the mass-coupling of axion.

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Classification de Session: Review and contribution talks