Contribution ID : **27** Type : **In person**

Model of the quintessence axion

Monday, 28 July 2025 09:00 (30)

We construct a model of the quintessence axion based on a gauged chiral U(1) symmetry and an additional flat fifth dimension. The required high qualities are guaranteed by the brane separation. The observed cosmological constant (i.e., the potential energy of the quintessence axion) is determined by the size of the extra dimension and the axion decay constant F_a is fixed almost at F_a ⊠ 10^17 GeV, which is sufficiently large for the stability of the axion field near the hilltop of its potential. Furthermore, the movement of the axion can also easily explain the recently reported isotropic cosmic birefringence of the cosmic microwave background photon.

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Session Classification : Morning Session