

Axions: A Survey From Neutrinos to Cosmology

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Abstract: The existence of neutral pseudo-scalar bosons, that is the axions, has been proposed long ago by Peccei and Quinn to explain the suppression of the electric dipole moment of the neutron. The associated $U(1)$ symmetry breaks at very high energy, and it guarantees that the interaction of other particles with axions is very weak. We shall review the axion properties in connection with apparently very different contexts, like neutrino physics, dark matter and cosmology. We shall explore the case of neutrinos by allowing interactions with axions as a mass mechanism, then proceed to discuss our results for neutrino-dark matter interactions and finally discuss some cosmological scenarios related to axions