

Solutions to axion electromagnetodynamics and new search strategies

The Witten effect implies the electromagnetic interactions between axions and magnetic monopoles. Based on the quantum electromagnetodynamics, a generic low-energy axion-photon effective field theory was built by introducing two four-potentials (A^μ and B^μ) to describe a photon. More anomalous axion-photon interactions and couplings (g_{aAA} , g_{aBB} and g_{aAB}) arise in contrary to the ordinary axion coupling $g_{a\gamma\gamma}aF^{\mu\nu}\tilde{F}_{\mu\nu}$. As a consequence, the conventional axion Maxwell equations are further modified. We properly solve the new axion-modified Maxwell equations and obtain the axion-induced electromagnetic fields given a static electric or magnetic field. I will also mention our proposals of new search strategies to measure the new couplings for sub- μeV axion in haloscope experiments.

Primary authors: DAI, Chang-jie; ZHANG, Rui-jia (Nankai University); Dr LI, Tong (Nankai University)

Presenter: ZHANG, Rui-jia (Nankai University)