

Contribution ID: 603

Type: Parallel

Phenomenology of extended axion models

Monday 7 July 2025 14:00 (17 minutes)

Efforts for axion's search have been reinforced in the past decades, motivated by its rich phenomenology allowing for various ways to probe its parameter. Axions provide a solution to the Strong CP puzzle while being a dark matter candidate. In a spirit of minimality, we attempt to have it solve additional puzzles. We are particularly interested in coupling the axion to the sector of Baryogenesis and a scalar sector from conformal symmetry.

First, axion is the Goldstone of an internal U(1) which easily mixes with other flavor symmetries such as Baryon and Lepton numbers. Scenarii of dark matter carrying a baryon number of two open up a new BSM sector that we could probe in neutron-antineutron oscillations. In particular, for light dark matter with mass in the micro-eV range, such coupling induces Rabi resonances in the oscillations. Although the tuning of the magnetic field required to reach the resonance makes the resonant regime unrealistic, this could significantly enhance the signal. For true QCD axions, the resonances are generated by a derivative coupling, and hence strongly attenuated. However, this remains a relevant sector to investigate for ALP's and scalar dark matter [1].

Second, being the Goldstone boson of the conformal group, the dilaton couples anomalously to the kinetic gauge operator. The similarities with the axion coupling to gauge bosons motivate our analysis of axion-dilaton models. The phenomenology of the dilaton has specific features as it emerges from a space-time symmetry. Yet, a correct understanding of axion-dilaton phenomenology can be enlightening both for the experimental search and for model building of such particles [2].

[1] Théo Brugeat and Christopher Smith, JHEP 01 (2025), 132, [arXiv:2412.06434 [hep-ph]]

[2] Théo Brugeat and Christopher Smith, in preparation.

Secondary track

T07 - Flavour Physics and CP Violation

Author: BRUGEAT, Théo (cnr)

Presenter: BRUGEAT, Théo (cnr)

Session Classification: T02

Track Classification: T02 - Dark Matter