

Neutron Electric Dipole Moment: from theory to experiment

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The Peccei-Quinn axion and QCD topology

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The Peccei-Quinn axion provides a simple solution to the strong-CP problem and is also a possible source of Dark Matter, being thus one of the most well-motivated extension of the Standard Model.

The simple relation between the axion mass and the QCD topological susceptibility allows, once the behavior of the latter quantity as a function of the temperature is known, to put useful bounds on the axion scale through the misalignment mechanism, which in principle could also be probed by forthcoming experiments such as IAXO.

The numerical non-perturbative computation of the temperature-behavior of the QCD topological susceptibility from lattice simulations is however an highly non-trivial task, being it plagued by serious computational problems, and many different strategies to overcome them have been proposed in the recent literature to this end.

In this talk, after reviewing the main physical aspects of axion physics and of QCD topology, I will give an overview about the current status of lattice determinations of the QCD topological susceptibility at high temperatures and I will discuss possible future research directions.

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