

Axion dark matter from topological defects

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Abstract: The axion arises as a pseudo Nambu-Goldstone boson from the spontaneous breaking of a hypothetical global Peccei-Quinn symmetry introduced to provide a solution to the strong CP problem of quantum chromodynamics. Due to the weakness of the coupling with ordinary matters, the axion is regarded as a viable candidate of dark matter of the universe. However, there is a theoretical uncertainty on the determination of the relic abundance of dark matter axions, which comes from a poor understanding of their production mechanism. In particular, the recent analysis of the spectrum of axions radiated from networks of topological defects revealed that axions produced by the defects give significant contributions to the relic cold dark matter abundance if the Peccei-Quinn symmetry is broken after inflation. In this talk, I will report the recent theoretical estimation of the axion dark matter abundance based on the results of field-theoretic lattice simulations of topological defects and discuss its implications for future experimental tests.

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