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Spectrum of dark matter axions from strings

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Understanding of the production of axions from global string decays in the early universe is indispensable for the precise estimation of the relic axion abundance and for a sharp prediction of the axion dark matter mass. In this contribution, we present the state-of-the-art results on the analysis of the spectrum of dark matter axions radiated by strings based on the large scale numerical simulations of the Peccei-Quinn field in the expanding background. We discuss several systematic effects that can bias the numerical results, and point out that some of them could be regarded as possible sources of discrepancy in the literature. It turns out that the spectrum is highly distorted at large string tension due to discretization effects, which highlights the need for further improvement in the dynamical range to resolve the discrepancy. By extrapolating the numerical results, we also quantify the predicted values of the axion dark matter mass and its uncertainty.

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