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Gauged Global Strings

Abstract

I will present the string solutions and cosmological implications of the gauge $U(1)Z \times$ global $U(1)PQ$ model. With two hierarchical symmetry-breaking scales, the model exhibits three distinct string solutions: a conventional global string, a global string with a heavy core, and a gauge string as a bound state of the two global strings. This model reveals rich phenomenological implications in cosmology. When incorporating this model with the QCD axion framework, the heavy-core global strings emit more axion particles due to their large tension. This radiation significantly enhances the QCD axion dark matter abundance, thereby opening up the QCD axion mass window. Furthermore, in contrast to conventional gauge strings, the gauge strings in this model exhibit a distinctive behavior, radiating axions.