

Cosmological Constraints on Heavy QCD Axion Theories

The explicit breaking of the PQ symmetry by higher dimensional operators can spoil the dynamical relaxation of the strong CP angle to its minimum of zero. One solution to this PQ “quality problem” is to introduce heavy QCD axions. While still solving the strong CP problem, such heavy axions acquire a mass from physics occurring far above the QCD scale. In this talk, I will discuss the cosmological constraints on heavy QCD axions in the early Universe from their interactions with the Standard Model thermal bath. In addition, I will discuss how including a mirror photon - common in heavy axion theories involving mirror QCD sectors - modifies this picture and can lead to dangerous amounts of dark radiation.

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