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QCD axion-mediated dark matter

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A QCD axion with a decay constant below 10^{11} GeV is a strongly-motivated extension to the Standard Model, though its relic abundance from the misalignment mechanism or decay of cosmic defects is insufficient to explain the origin of dark matter. Nevertheless, such an axion may still play an important role in setting the dark matter density if it mediates a force between the SM and the dark sector. In this work, we explore QCD axion-mediated freeze-out and freeze-in scenarios, finding that the axion can play a critical role for setting the dark matter density. Assuming the axion solves the strong CP problem makes this framework highly predictive, and we comment on experimental targets.

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