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CMB pathway to constraining UV freeze-in dark matter

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Prediction of spectral index from the temperature fluctuation of Cosmic Microwave Background (CMB) can play a pivotal role in predicting the reheating dynamics in the early Universe. In this work, we consider α-attractor model of inflation and investigate the reheating phenomena in conjunction with the production of dark matter from the thermal bath via a dimension five operator. The dimensionality of the interaction naturally makes the DM feebly coupled with the SM bath as the interaction is inversely proportional to a cut-off scale Λ and the production strongly depends on the reheating temperature. The dependence of the DM relic on the reheating temperature enables us to put constraints on the DM parameter space from the CMB spectral index.

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