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Dark Matter Axions in the Early Universe with a Period of Increasing Temperature

Tuesday 6 September 2022 15:50 (20 minutes)

We consider the production of axion dark matter through the misalignment mechanism in the context of a nonstandard cosmological history involving early matter domination by a scalar field with a time-dependent decay rate. In cases where the temperature of the Universe experiences a temporary period of increase, Hubble friction can be restored in the evolution of the axion field, resulting in the possibility of up to three "crossings" of the axion mass and the Hubble expansion rate. This has the effect of dynamically resetting the misalignment mechanism to a new initial state for a second distinct phase of oscillation. The resultant axion mass required for the present dark matter relic density is never bigger than the standard-history window and can be smaller by more than three orders of magnitude, which can be probed by upcoming experiments such as ABRACADABRA, KLASH, ADMX, MADMAX, and ORGAN, targeting the axion-photon coupling. This highlights the possibility of exploring the cosmological history prior to Big Bang Nucleosynthesis through searches for axion dark matter beyond the standard window.

Is this abstract from experiment?

No

Name of experiment and experimental site

N/A

Is the speaker for that presentation defined?

Yes

Details

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Internet talk

Maybe

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