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Connecting Dark Matter Signals from Lepton Colliders to Reheating Temperature

Dark matter (DM) genesis via Ultraviolet (UV) freeze-in embeds the seed of reheating temperature and dynamics in its relic density. This talk presents a novel framework for deducing the Universe's reheat temperature from collider signals associated with DM production. Lepton colliders excel in DM searches due to their well-defined center-of-mass energy and low hadronic contamination, facilitating precise missing energy measurements essential for detecting DM candidates. The mono-photon signal from MeV-scale feebly interacting massive particles (FIMPs) at electron-positron colliders enables the inference of a low-scale reheating temperature, particularly under the assumption of instantaneous inflaton decay. A similar connection can be drawn when the inflaton decays with a finite width, extending the applicability of this framework to non-instantaneous decay scenarios.

Field of contribution

Phenomenology

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