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Revisiting the Dark Matter Relic Abundance Calculation: The Case of Early Kinetic Decoupling

Wednesday 25 July 2018 17:00 (20 minutes)

Today's standard way to calculate the thermal relic abundance of dark matter via chemical decoupling relies on the assumption that particles remain in kinetic equilibrium throughout the freeze-out process. However, is this assumption always justified?

The talk aims to address this question and discuss the consequences of more accurate treatments. Two methods are presented: One that combines higher momentum moments of the underlying Boltzmann equation and another that numerically solves the evolution of the full phase-space distribution of the dark matter particles. The implications are illustrated for the Scalar Singlet model, often referred to as the simplest benchmark model for WIMP dark matter. It is here explicitly shown that even in this simple model the predictions of the dark matter abundance can be affected by up to an order of magnitude.

Parallel Session

Dark Matter, Astroparticle Physics

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