

Cosmological Tensions and Inelastic Dark Matter Model

Thursday, 10 October 2024 10:00 (30 minutes)

I will talk about a novel and comprehensive particle physics framework that addresses multiple cosmological tensions observed in recent measurements of the Hubble parameter, $S8$, and Lyman- α forest data. Our model, termed ‘SIDR+zt’ (Self Interacting Dark Radiation with transition redshift), is based on an inelastic dark matter (IDM) scenario coupled with dark radiation, governed by a $U(1)_D$ gauge symmetry. This framework naturally incorporates cold dark matter (DM), strongly interacting dark radiation (SIDR), and the interactions between these components. The fluid-like behavior of the dark radiation component which originates from the self-quartic coupling of the $U(1)_D$ breaking scalar, effectively mitigates both the Hubble and $S8$ tensions by suppressing free-streaming effects. Simultaneously, the interacting DM-DR system attenuates the matter power spectrum at small scales, potentially reconciling discrepancies in Lyman- α ($L\gamma$ - α) observations.

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