

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 (Ly- α) observations.

Primary author: CHOI, Ki-Young (Sungkyunkwan University)

Presenter: CHOI, Ki-Young (Sungkyunkwan University)

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