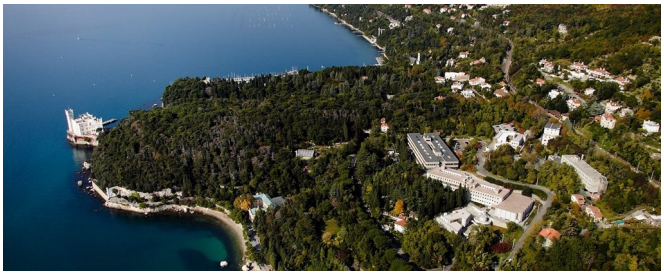

Contribution ID: **78** Type: **not specified**

A Lagrangian formulation of interacting dark sectors.

Friday 1 September 2023 21:35 (5 minutes)

In the age of precision cosmology, the LambdaCDM model precisely fits most cosmological observations; however, discrepancies have been reported in measuring a local Hubble parameter at low and high redshifts. One possible way to reduce Hubble tension is by allowing dark sectors to interact. Historically, this has been accomplished by incorporating the interaction term at the covariant derivative of the energy-momentum tensor and, thus, energy flows between the two sectors. However, such incorporation leads to instability at the perturbation level, and manual adjustment is required to rectify these instabilities. In this talk, we present a Lagrangian formulation for investigating the interaction between dark matter and dark energy. In the Lagrangian, the dark matter sector is characterized as a relativistic fluid, while a K-essence scalar field is a candidate for dark energy. The interaction function comprises the fluid number density, entropy density, particle flux number, and field variables. Such a parameter-dependent function provides a generalized structure for interaction that generates a complex equation of motion and modifies Friedmann equations. Such complexity can be consistently studied by utilizing the dynamical stability technique for a particular model. Introducing the interaction at the action level makes the theory covariant at the background and perturbation levels.

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Session Classification: Posters of friday (ignore time)