Contribution ID : **21** Type : **not specified**

Suhani Gupta (CFT), Bending the web: exploring the impact of modified gravity on the density field and halo properties within the cosmic web

Thursday, 24 October 2024 15:00 (15)

Dependence of the properties of galaxies and dark matter halos on the hosting environment is one of the central issues in cosmology. Also, owing to the large-scale cosmological data from present and future surveys, it is of paramount importance to model non-linear measures associated with both underlying dark matter density fields, and halos which can help forecast various large-scale structure properties. In this work, we study the relative importance of different cosmic web (CW) environments in influencing the dark matter density and halo properties in two modified gravity (MG) models: namely Hu-Sawicki f(R) gravity model, and normal branch of Dvali-Gabadadze-Porrati (nDGP) gravity model. Both these models exhibit an enhanced structure formation scenario w.r.t. standard CDM case, at different cosmic scales and epochs. This is a result of an additional fifth force in these models, which acts on top of the Newtonian gravitational force on the cosmological scales. The effect of the fifth-force is reflected in large-scale cosmic density fields, and in the halo properties. We study the hierarchical clustering properties of dark matter in different CW environments in these MG models. The clustering statistics in each environment exhibit a different trend from the overall density. Similarly, each environment in MG models has a distinct departure from CDM, and MG signatures persist over a range of length scales and epochs. The difference of higher-order dark matter clustering statistics in these MG models w.r.t. CDM, and its dependence on the environment shows that the reduced cumulants can be used as cosmological probes of these beyond-GR models. We also focus on the halo properties, such as the halo mass function, halo spin and alignment, and how the change in MG results is influenced in each CW environment. The formation and evolution of DM halos, which are sites of galaxy formation, is also influenced by the underlying theory of gravity, and we show that the change in halo properties w.r.t. standard CDM is impacted by the hosting CW environment. Such environmental dependence in the change of dark matter and halo properties in MG scenarios will play an important role in future cosmological and galaxy formation studies, and for disentangling MG effects from the environmental impact in these large-scale structure properties.

Session Classification : Cosmology