

Cosmology, Big and Small: Probing the Multi-scale Nature of Structure Formation with Artificial Universes

Monday, 8 July 2024 16:30 (20 minutes)

In our present paradigm of galaxy formation, the onset of structure is brought about via the gravitational collapse of dark matter, which subsequently acts as the scaffolding for the visible universe. Decades of numerical simulations have established several features of the dark matter model: the formation of haloes, and how their structure and abundance are influenced by the particle physics of the underlying model. In particular, the nature of the smallest objects in the universe—haloes or galaxies—may be key to unravelling several mysteries underpinning our cosmological model. In this talk, I will review some of the ways in which cosmological simulations can be used to test and predict the phenomenology of dark matter models and will show why the confluence of different probes is necessary to constrain the many ways in which models of dark matter impact structure formation. I will also present some exciting new avenues offered by early universe galaxy formation and gravitational wave astrophysics for testing the dark matter paradigm using future observatories.

Primary author: BOSE, Sownak (Durham University)

Presenter: BOSE, Sownak (Durham University)

Session Classification: Parallel 2

Track Classification: Parallel session: Cosmology Dark Matter