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Title: The (Really) Small Scale Structure of Dark Matter

Thursday 12 June 2025 13:30 (30 minutes)

The statistical properties of dark matter (DM) on the largest scales in the universe are well described by the standard cosmological model. In contrast, comparatively little is known about the DM distribution within galaxies. I will discuss how early universe cosmological evolution and DM microphysics can result in enhanced structure, i.e. clumpiness, on sub-galactic scales. Using the examples of vector DM produced during inflation and a universe with a period of pre-nucleosynthesis matter domination, I will show how we can relate the microphysical parameters in these models (such as particle masses and lifetimes) to the late-time properties of gravitationally-bound DM clumps called microhalos. I will then describe a promising technique for detecting microhalos using observations of highly-magnified extragalactic stars. Such observations can give us insight into the pre-nucleosynthesis universe, and the particle nature and origin of DM.

Keyword-1

dark matter

Keyword-2

cosmology

Keyword-3

particle physics

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