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Dark Matter at Finite Temperature: Oscillations, Resonances and Scattering

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The microphysical properties of Dark Matter (DM), such as its mass and coupling strength, are typically assumed to retain their vacuum values for any given model when considering DM behaviour at a range of scales. However, DM interactions in different astrophysical and cosmological environments is impacted by the properties of the background which in turn can substantially affect both DM production and the detection prospects for any given model. This is particularly true for models where a mixing between DM and another field gives rise to oscillations, such as in the case of sterile neutrinos, dark photons and axions.

In this talk, I will provide an overview of some of these effects, especially in the context of DM production. I will detail a general framework for calculating DM abundance when DM is produced through the oscillation of a beyond-the-Standard Model state, in the presence and absence of a resonance. I will discuss the viable parameter space for such a production mechanism and the associated phenomenology.

Keyword-1

Dark Matter

Keyword-2

Sterile neutrinos

Keyword-3

finite temperature

Authors: Dr DUNSKY, David (NYU); Dr RUDERMAN, Josh (NYU); Dr HEEBA, Saniya (McGill University)

Presenter: Dr HEEBA, Saniya (McGill University)

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