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Fuzzy Dark Matter

Monday, 5 July 2021 16:53 (23 minutes)

Fuzzy dark matter (FDM) is a general term for the lightest possible dark matter particle. FDM is distinct from CDM in manifesting wavelike effects on cosmic scales, which lead to a vast array of methods to probe this model. Across more than 20 orders of magnitude, only two windows remain where FDM can constitute the entirety of the dark matter. I will discuss how these windows are arrived at using astrophysical and cosmological observables, including galaxy weak lensing, the dynamics of star clusters, and the properties of black holes. I will further derive precision bounds from the CMB and galaxy clustering that probe sub-dominant FDM populations at the 1% level. Improving these bounds with intensity mapping could test the possible connection between FDM and the grand unified scale. Finally, I will discuss how black hole superradiance caused by FDM can be used to test the topological invariants of string theory compactifications.

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