

Astrophysical Constraints on Warm Dark Matter

Thursday 30 March 2023 15:00 (20 minutes)

In the regime of linear growth of structure, dark matter dominates structure formation at all scales. On small scales, the thermal and kinetic properties of dark matter will alter the growth of structure at a finite scale that depends on the nature of dark matter. I will review the methods for constraining matter clustering on small scales, highlighting those most robust to modeling and data uncertainties. I will also review the impact of these constraints on leading candidate warm dark matter models, including sterile neutrino and gravitino dark matter models, with our work providing more accurate descriptions of structure formation in the case of gravitino warm dark matter. Our other recent work combines strong lensing and galaxy counts to provide among the strongest constraints yet on warm dark matter, with a corresponding significant (greater than 50%) suppression of structure at $M < 8 \times 10^6 M_\odot$, well below dwarf galaxy scales, requiring thermal warm dark matter particle masses at approximately $m_{\text{th}} > 9$ keV.

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