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Self-interacting dark matter from simulation and astrophysics

In an era characterized by a wide range of astrophysical and cosmological observations, the synergy of data with sophisticated simulations has enabled us to probe interesting phenomenological paradigms of particulate dark matter (DM). Self-scattering of particulate DM within the dark sector can contribute to the thermalization of the central region of a galactic halo. The self-interaction strength of DM has a significant impact on the position and velocities of DM within these thermalised regions. We conduct rigorous DM only N-body simulations of spherical isolated haloes of (10ˆ10-10ˆ15) M⊠ and study their matter and velocity distributions. We also report conservative bounds on the self-interaction cross-section.

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