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Simulations of Fuzzy Dark Matter

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As an alternative theory to cold dark matter (CDM), fuzzy dark matter (FDM) has recently attracted widespread attention. FDM consists of ultra-light bosons with masses around 10^{-22} eV. At typical galactic velocities, their de Broglie wavelength can reach kiloparsec (kpc) scales, thereby exhibiting unique wave-like behavior on galactic scales. This leads to complex evolutionary dynamics and observational effects, which may help address several small-scale challenges the CDM paradigm faces. Unlike other dark matter models, FDM is described by a wavefunction that follows the Schrödinger equation. In this presentation, I will introduce some of our recent work on FDM simulations, including: the construction of wavefunction initial conditions, the removal of initial velocity in FDM halo wavefunctions, self-consistent simulations of FDM and stellar systems, and tidal simulations of FDM subhalos.

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