

Effects of Fuzzy Dark Matter Granule Perturbations on Orbital Motion

In Fuzzy Dark Matter, the quantum nature of the axion dark matter field induces granular density variations within halos, commonly referred to as “granules”. These granules exert stochastic perturbations on the orbits of subhalos, leading to their redistribution over time. Previous work has modeled these effects using a diffusion-based approach. In this study, we propose an alternative framework based on representing the perturbations as a Fourier series with random coefficients which is applicable to individual orbits, not just populations. We will demonstrate how this approach accounts for the timescale of variation of the perturbations, and use it to explore how these perturbations affect the distribution of subhalos in axion models.

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