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Simulations of ultralight axion dark matter halos

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Light scalar fields such as ultra-light axions (ULAs) are dark matter candidates which suppress the growth of perturbations on scales below their de Broglie wavelength and predict solitonic halo cores owing to their quantum pressure support. They therefore give rise to new phenomenology in large-scale structure formation and galaxy evolution, including a potential solution to the cusp-core and satellite problems. The nonlinear, non-relativistic dynamics of ULA halos can be described by the Schroedinger-Poisson equations or, equivalently, the fluid equations with an additional pressure term. Several approaches to simulate structure formation with ULA dark matter and some preliminary results will be presented.

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