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Simulations of ultralight axion dark matter halos

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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 numerically modeled by solving the Schroedinger-Poisson equations or, equivalently, the fluid equations with an additional quantum pressure term. Several approaches to simulate structure formation with ULA dark matter, both directly and semi-analytically, and some preliminary results will be presented.

Primary author: Prof. NIEMEYER, Jens (Goettingen University)

Presenter: Prof. NIEMEYER, Jens (Goettingen University)