LOCAL DYNAMICS OF ULTRALIGHT BOSONIC DARK MATTER

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The ultralight BEC dark matter model assumes the dark matter particle is a spinless boson with mass of order between 10^{-23}-10^{-22}eV/c^2. Structure formation simulations show that this candidate behaves like CDM at big scales and the same time the density profile of local structures can be described with a core-tail distribution. The dynamics of this dark matter model is ruled by the the evolution of a self-gravitating Bose-Einstein condensate, described by the Gross-Pitaevskii-Poisson (GPP) set of equations. Based on the numerical solution of the GPP system at local scales, in this talk we present various aspects of the local dynamics of cores made of this type of dark matter. The first aspect is their stability against perturbations and the oscillation modes triggered by perturbations; it is shown how to use these modes to characterize a galaxy core. A second aspect is the gravitational cooling, which is the relaxation mechanism of cores, consisting on the emission of the excess of kinetic energy of a given initial fluctuation that evolves toward a late time attractor configuration. The third aspect is the head-on collision of two cores, both in the merger and the unbounded case; the impact on luminous matter during mergers is described. Finally, we present the merger of orbiting cores under a variety of initial conditions and in particular analyse the effects of interference during the process.