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Cosmology of self-gravitating media

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The low-energy dynamics of a generic self-gravitating media can be studied by using effective field theory in terms four derivatively coupled scalar fields. Imposing $SO(3)$ internal spatial invariance, the theory describes fluids, superfluids, solid and supersolids. Dynamical and thermodynamical properties of the medium are dictated by internal symmetries of the effective theory. From the analysis of cosmological perturbations it emerges that in the scalar sector, besides the gravitational potential, a non-adiabatic mode corresponding to the perturbations of entropy per particle σ . Perfect fluids and solids are adiabatic with constant in time σ while for superfluids and supersolids σ has non-trivial dynamics. Tensor perturbations are massive for solid and supersolid. Such an effective approach can be used to give a very general modelling of the dark sector based on symmetries.

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Experimental Collaboration

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