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Cosmological simulations: the role of scalar fields

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Abstract content

We present numerical N-body simulation studies of large-scale structure formation. The main purpose of these studies is to analyze the several models of dark matter and the role they played in the process of large-scale structure formation. We analyze the standard and more successful case, i.e., the cold dark matter with cosmological constant (LCDM). We compare the results of this model with the corresponding results of other alternative models, in particular, the models that can be built from the Newtonian limit of alternative theories of gravity like scalar-tensor theories. A specific model is the one that considers that the scalar field is non-minimally coupled to the Ricci scalar in the Einstein-Hilbert Lagrangian. Comparisons of the models are done showing results of rotation curves, density profiles, and velocity dispersions for halos formed at $z=0$. We also show how the parameters of the models can be obtained from fittings to observed rotation curves of spiral galaxies.

Summary

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