

Matter power spectrum for the generalized Chaplygin gas model: The relativistic case

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The generalized Chaplygin gas (GCG) model is the prototype of a unified model of dark energy (DE) and dark matter (DM). It is characterized by equation-of-state (EoS) parameters w and α . We use a statistical analysis of the 2dFGRS data to constrain these parameters. In particular, we find that very small (close to zero) and very large values ($w \gg 1$) of the equation-of-state parameter w are preferred. To test the validity of this type of unification of the dark sector we admit the existence of a separate DM component in addition to the Chaplygin gas and calculate the probability distribution for the fractional contributions of both components to the total energy density. This analysis favors a model for which the Universe is nearly entirely made up of the separate DM component with an almost negligible Chaplygin gas part. This confirms the results of a previous Newtonian analysis.

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