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HALO-BASED RECONSTRUCTION OF THE COSMIC MASS DENSITY FIELD

J. C. Muñoz-Cuartas[1], V. Müller[2], and J. E. Forero-Romero[3]

We present the implementation of a halo-based method for the reconstruction of the cosmic mass density field. The method employs the mass density distribution of dark matter haloes and its environments computed from cosmological N-body simulations and convolves it with a halo catalogue to reconstruct the dark matter density field determined by the distribution of haloes. We applied the method to the group catalogue of Yang et al. built from the Sloan Digital Sky Survey (SDSS) Data Release 7. As a result we obtain reconstructions of the cosmic mass density field that are independent of any explicit assumption of bias. We describe in detail the implementation of the method, present a detailed characterization of the reconstructed density field (mean mass density distribution, correlation function and counts in cells) and the results of the classification of large-scale environments (filaments, voids, peaks and sheets) in our reconstruction. Applications of the method include morphological studies of the galaxy population on large scales and the realization of constrained simulations.

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OBSERVATIONAL CONSTRAINTS ON A COUPLED QUINTESSENCE MODEL WITH A GENERALIZED DE EOS

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In this work we put constraints on a quintessence dark energy model that interacts with the dark matter fluid. By assuming a DE model described by the parameterization $w(a) = w_0 + w_1 \ln_\beta(a)$ and that the dark fluids follows the relation $\rho_m/\rho_x = a^{-\xi}$ we use the most recent data of SN Ia, BAO, CMB and H(z) to put constraints on the EoS parameters w_0, w_1 and $\Omega_{m,0}$ for selected values of β and ξ parameters. Although the standard ΛCDM model is in good agreement with our results, we show that scenarios with interaction in the dark sector can not be ruled out by currently available data.

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GRAVITATIONAL WAVES AND STABILITY OF COSMOLOGICAL SOLUTIONS IN THE MODIFIED STAROBINSKY INFLATION

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We consider the dynamics of metric perturbations in the gravity theory with anomaly-induced quantum corrections. Our first purpose is to derive the equation for gravitational wave in this theory on the most general homogeneous and isotropic background, and then explore the stability of such background with respect to metric perturbations. Our first purpose is to explore the stability of the classical cosmological solutions in the theory with quantum effects taken into account. There is an interesting literature about stability of Minkowski and de Sitter spaces and here we extend the consideration also to the radiation and matter dominated cosmologies. The consideration was based on explicit derivation of gravitational wave equations in the theory with anomaly-induced quantum corrections and on the use of both analytical and numerical methods to perform the detailed analysis of these equations. The main conclusion of our work is that the stability conditions are essentially related to the sign of the Weyl-squared term in the *classical* action of vacuum and do not manifest any essential dependence on the quantum contributions. Furthermore, we analyze the behavior of metric perturbations during inflationary period, in the stable phase of the Modified Starobinsky inflation.

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