General Relativity and Quantum Cosmology

Cosmological Constraints on the Sign-Changeable Interactions

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Recently, Cai and Su [Phys.\ Rev.\ D {\bf 81}, 103514 (2010)] argued that the sign of interaction Q in the dark sector changed in the approximate redshift range of $0.45\,\lsim\, z\,\lsim\, 0.9$, by using a model-independent method to deal with the observational data. In fact, this result raises a remarkable problem, since most of the familiar interactions cannot change their signs in the whole cosmic history. Motivated by the work of Cai and Su, we have proposed a new type of interaction in a previous work [arXiv:1008.4968]. The key ingredient is the deceleration parameter q in the interaction Q. Therefore, the interaction Q can change its sign when our universe changes from deceleration ($q>0$) to acceleration ($q<0$). In the present work, we consider the cosmological constraints on this type of sign-changeable interactions, by using the latest observational data. We find that the constraints on the model parameters are fairly tight. In particular, the key parameter β can be constrained to a very narrow range.

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