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Investigation of the mass neutrinos effects on bulk flow direction and other cosmic parameters

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Abstract

One of the most fascinating features of cosmology is the study of large structures that can reveal the properties of particles with the smallest known cross sections (neutrinos). In fact, in the early universe, after photons, neutrinos play an important role in the formation of structures. The large number of neutrinos, combined with their non-zero mass, leads to today's energy density at least 25 times larger than CMB photons. This high density of free-flowing particles leads to changes in the large-scale structure (LSS) that can be recorded in large galaxy studies or dark current measurements. The purpose of this paper is to determine the direction of bulk flow and other cosmic parameters using the quintessence model. In this paper, we also estimate the mass of neutrinos using neutrino coupling and the scalar field of quintessence. The data where used in this article is the Pantheon Catalog, a total of 1048 Type Ia supernovae. The direction of the bulk flow is slightly different on scales smaller than 0.1, and the higher the scale of the local world, the greater the difference in the direction of the bulk current.

Keywords: anisotropy, mass neutrinos, dark energy

For full article, refer to the Persian section