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Tilted cosmology and tensions with the ΛCDM model using SNIa

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No real observers in the universe follow the smooth Hubble expansion but we all move relative to it. The Local Group of galaxies, for example, drifts at approximately 600km/s with respect to the Hubble flow. Such peculiar motions dominate the kinematics of the local universe. Recently, peculiar velocity surveys have reported the existence of bulk flows extending out to several hun- dreds of Mpc, in excess of those predicted by the standard cosmological model. This work looks into the implications of large-scale peculiar velocities from the viewpoint of a tilted cosmologi- cal model equipped with two families of observers. The first one follows the Hubble flow, while the second family consists of real observers residing in a typical galaxy (like our Milky Way) and moving relative to the universal expansion with non-relativistic peculiar velocities. We study a parametrization of the deceleration parameter in the tilted model using the Pantheon compilation of Type Ia supernovae. By means of a Markov Chain Monte Carlo (MCMC) method, we show that a tilted Einstein-de Sitter model, having one or two additional parameters that describe the assumed velocity flows, can reproduce the late-time cosmic acceleration without the need of a cosmologi- cal constant or dark energy. From our statistical analysis, we find that the tilted model performs similarly to the standard ÎŁCDM paradigm in the context of model selection criteria (Akaike infor- mation criterion and Bayesian information criterion).

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