The standard Friedmann-Lemaître-Robertson-Walker model of cosmology is based on the 'Cosmological Principle', namely that the Universe is isotropic and homogeneous on average. Analysis of observations of distant supernovae then leads to the inference that the Hubble expansion rate is accelerating, as if driven by Einstein's Cosmological Constant, which is interpreted as the energy density of the quantum vacuum. However the cosmic microwave background radiation is not isotropic as viewed by us – this is ascribed to our local non-Hubble motion due to inhomogeneities. If so, the sky distribution of distant quasars should have a corresponding dipole anisotropy. We find however that the quasar dipole does not match this expectation, i.e. the rest frames of matter and radiation do not coincide. This calls into question the Cosmological Principle, and thereby the existence of dark energy dominating the Universe.
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