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On the kinematic cosmic dipole tension

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Our motion through the Universe generates a dipole in the temperature anisotropies of the Cosmic Microwave Background (CMB) and also in the angular distribution of sources. If the cosmological principle is valid, these two dipoles are directly linked, such that the amplitude of one determines that of the other. However, it is a longstanding problem that number counts of radio sources and of quasars at low and intermediate redshifts exhibit a dipole that is well aligned with that of the CMB but with about twice the expected amplitude, leading to a tension reaching up to 4.9σ . In this talk, I revisit the theoretical derivation of the dipole in the sources number counts, explicitly accounting for the redshift evolution of the population of sources. I will argue that if the spectral index and magnification bias of the sources vary with redshift, the standard theoretical description of the dipole may be inaccurate. I will provide an alternative expression which does not depend on the spectral index, but instead on the time evolution of the population of sources. I then determine the values that this evolution rate should have in order to remove the tension with the CMB dipole.

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