Title:	Bayesian Approaches to the Cosmic Dipole
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Abstract:	The Cosmological Principle asserts that the universe is isotropic and homogeneous on large scales and attributes the Cosmic Microwave Background (CMB) thermal dipole to our departure from the local Hubble flow. If this attribution is correct, then surveys of cosmological sources should show a similar dipole in their sky distribution. However, recent studies have found a disagreement between the kinematic expectations and the observed clustering dipole, with claims reaching well over 5σ ! This thesis aims to study this tension between the kinematic dipole and the matter dipoles. The first part of this thesis is devoted to Bayesian analysis of the Quaia sample of quasars as a test of the cosmological principle. We test various hypotheses for the quasar distribution in Quaia, and find that selection effects contaminate the sample near the Galactic center. After masking these regions, we find that the Quaia matter dipole is relatively consistent with the CMB kinematic dipole. These results support the Cos- mological Principle and the kinematic interpretation of the matter dipole. The second part of this thesis intends to study the matter dipole in the NRAO VLA Sky Survey (NVSS) and the Rapid ASKAP Continuum Survey (RACS) radio galaxy catalogues. We find that local radio sources in both NVSS and RACS give a non- negligible contribution to the matter dipole signal. By proper consideration of these sources, the tension between CMB kinematic dipole and radio galaxy matter dipole is relaxed, and their consistency is favoured. Therefore, our joint analysis of both cata- logues support the Cosmological Principle. However, the ‘clustering dipole’ in local sources appears to align with the kinematic dipole, which warrants further inquiry.
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