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Non-perturbative method for modeling the wide-angle effects in the power spectrum

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The three-dimensional galaxy power spectrum is a powerful probe of primordial non-Gaussianity and additional general relativistic effects, which become important on large scales. At the same time, wide-angle (WA) effects due to differing lines-of-sight (LOS) on the curved sky also become important with large angular separation. In this work, we accurately model WA and Doppler effects using the spherical Fourier-Bessel (SFB) formalism, before transforming the result into the commonly used power spectrum multipoles (PSM). This mapping from the SFB power spectrum to PSM represents a new way to non-perturbatively model WA and GR effects present in the PSM, which we validate with log-normal mocks. Moreover, for the first time, we can compute the analytical PSM Gaussian covariance on large scales, exactly including WA-induced mode-couplings, without resorting to any plane-parallel approximations.

Primary authors: HEINRICH, Chen (Caltech); WEN, Robin (Caltech); GEBHARDT, Henry (Caltech); DORE, Olivier (Caltech)

Presenter: HEINRICH, Chen (Caltech)

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