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Relativistic effects in galaxy clustering with DESI

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Understanding the accelerated expansion of the Universe remains as one of the key challenges in cosmology. The main candidates to explain this observation, which do not rely on a cosmological constant, are dark energy and modifications of General Relativity, but they require robust tests on cosmological scales. The Dark Energy Spectroscopic Instrument offers unprecedented precision in measuring galaxy clustering from spectroscopic data, allowing for the detection of relativistic features beyond the standard redshift-space distortions. In particular, relativistic effects generate a dipole in the cross-power spectrum of two galaxy populations. Using mock catalogues of synthetic galaxies which mimic the DESI Bright Galaxy Survey (BGS), we analyse ways to amplify the relativistic dipole by separating these galaxies into bright and faint populations, while conserving their redshift distribution. We also examine techniques to accurately estimate the magnification bias, a key parameter entering the amplitude of the dipole signal. Our results indicate an improved detectability of the relativistic dipole with fewer bright sources and that the measured distortions are well described by the predictions of linear theory.

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