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Testing general relativity with EMU: Simulation and analysis pipeline

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The Evolutionary Map of the Universe (EMU) is currently conducting a radio-continuum survey with the Australian Square Kilometre Array Pathfinder (ASKAP) radio telescope. We can use the radio continuum galaxies from EMU to perform an observational test of General Relativity (GR) via cosmic magnification in the weak gravitational lensing regime; a key science goal of the cosmology project inside EMU. We will test GR via the cross-correlation of high-redshift radio galaxies ($z > 1.0$), which do not have counterparts, and low-redshift radio galaxies ($z \leq 1.0$) with optical/NIR counterparts. The simulation of galaxy clustering statistics is crucial for an accurate test. Accordingly, we have established the requisite simulation and analysis pipeline to generate theoretical predictions of the two-point angular correlation function,
, with and without a predicted lensing effect, in addition to generating the respective covariance matrices. In my talk, I will detail the finalised simulation and analysis pipeline, as well as outline the upcoming analysis of EMU galaxies in the south polar orbital zone, located between approx. -45 and -75 degrees in declination. By cross-correlating the two EMU radio galaxy populations, we can determine the statistical significance of the cosmic magnification effect, and look for potential deviations from the standard LCDM model.

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