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The LIGER method: light-cone using GR

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We introduce a method to create mock galaxy catalogs in redshift space including all gen- eral relativistic effects to linear order in the cosmological perturbations. We dub our method LIGER, a short for 'light cones with general relativity'. LIGER takes a (N-body or hydrody- namic) Newtonian simulation as an input and outputs the distribution of galaxies in comoving redshift space. This result is achieved making use of a coordinate transformation and simulta- neously accounting for lensing magnification. The calculation includes both local corrections and terms that have been integrated along the line of sight. Our fast implementation allows the production of many realizations that can be used to forecast the performance of forthcom- ing wide-angle surveys and to estimate the covariance matrix of the observables. To facilitate this use, we also present a variant of LIGER designed for large-volume simulations with low mass resolution. In this case, the galaxy distribution on large scales is obtained biasing the matter-density field. Finally, we present two sample applications of LIGER. First, we dis- cuss the impact of magnification bias onto the angular clustering of galaxies in a Euclid-like survey. Second, we show that Doppler redshift-space distortions beyond the standard Kaiser effect can be detected with high statistical significance using the completed Square Kilometre Array.

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