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Enhancing Dark Energy Constraints from Redshift-Space Galaxy Clustering

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Galaxy clustering from ongoing and forthcoming large galaxy surveys plays an important role in understanding the acclerated cosmic expansion, through the measurements of baryon acoustic oscillations (BAO) and the redhshift-space distortions (RSD). The latter can be used to infer the linear structure growth rate in the universe, which can constrain the equation of state of dark energy and test theories of gravity. Current constraints on the growth rate mainly comes from large-scale RSD, while the intermediate- and small-scale RSD with high statistical power is not used because of model challenges. I will present a method based on high-resolution N-body simulations to accurately model redshift-space galaxy clustering and efficiently explore the parameter space. I will then discuss how systematic effects in relating galaxies to dark matter field could affect our ability to constrain the structure growth rate. I will convey the encouraging message that the intermediate- and small-scale RSD will substantially tighten the constraints on the growth rate and help better constrain dark energy or test theories of gravity.

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