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Anticorrelating void and peak galaxies with marked CF to pin down modified gravity

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Modified gravity (MG) as an alternative model to the cosmological constant is very appealing in resolving issues in the ΛCDM paradigm. To comply with general relativity (GR) in high density regions many MG theories exhibit a screening mechanism suppressing the fifth force to recover GR thereby imprinting an environmental dependency into the theory on a fundamental level.

Recent developments have shown that marked correlation functions are a promising statistic to distinguish between screened modified gravity and GR where the unweighted correlation function fails to do so. This is made possible by using, among others, the density field as a mark to upweigh galaxies residing in low density regions where MG effects are expected to be pronounced leading to an increase in their statistical contribution.

We undertook an extended investigation of marks utilising environmental information from the T-Web classification as well as the density field in particular creating anti-correlation by allowing the mark to switch signs. The latter is found to produce significant differences measured in simulations of $f(R)$ gravity up to intermediate above 40Mpc/h both in real space and in the monopole in redshift space. This might enable more efficient modelling in the future hence rendering marked correlation functions are viable tool to detect modified gravity in observations.

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