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Tracing the environments of low-surface-brightness galaxies

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Low-surface-brightness galaxies (LSBGs) provide important insights into galaxy formation and evolution, yet the role of the environment in shaping their properties remains poorly understood. Using a sample of ~ 20,000 LSBGs from the Kilo-Degree Survey (KiDS), we investigate how their spatial distribution depends on colour and morphology. We quantify their clustering with the angular two-point correlation function and use Limber inversion with the redshift distribution to infer spatial correlation lengths. We find that red LSBGs cluster substantially more strongly than blue LSBGs. Moreover, featureless galaxies exhibit the strongest clustering, spirals the weakest, and ellipticals intermediate clustering amplitudes. Additionally, for all LSBGs samples at small angular separations, we observe a significant flattening of the correlation function with respect to both high surface brightness galaxy measurements and power-law models. This suggests that LSBGs distribution in clusters differs from that of high surface brightness galaxies, and that there may exist environmental processes that prevent LSBGs from forming in cluster centres.

Our results provide new constraints on the relationship between LSBG properties and their environments. Future surveys, particularly the Vera C. Rubin Observatory's Legacy Survey of Space and Time (LSST), will help us study these relationships with substantially larger samples and greater statistical precision.

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