

The environment of Low Surface Brightness Galaxies

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The formation and evolution scenarios that led to the existence of Low Surface Brightness (LSB) galaxies are not well understood yet. Although LSBs have HI components with low surface densities (systematically below the Kennicutt criterion) they can be regarded as gas-rich in general. Hence, the key in understanding LSBs lies in the answer to the question what prevented them from sufficient star formation. Using the public data releases of the Sloan Digital Sky Survey (SDSS), we investigated the galaxy density around LSBs in comparison to High Surface Brightness (HSB) galaxies. We performed a number counting analysis in three dimensions within spheres of several radii on a sample of HSBs and LSBs with well measured SDSS redshifts. On scales between 2 and 5 Mpc our results show significantly lower galaxy densities in the vicinity of LSBs compared to HSBs. At larger scales than 5 Mpc, LSBs and HSBs share the same clustering properties but on scales below 2 Mpc the galaxy density in the neighbourhood of LSBs lies systematically (but only with a slight significance) below that of HSBs. In the pie slice diagrams LSBs favour the outer rims of the filaments of the Large Scale Structure and some LSBs are even found in voids. These results give strong evidence to a formation and evolution scenario where LSBs were formed in low density environments. Hence, the lack of tidal interactions with companions must have caused the absence of an effective trigger for sufficient star formation.

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