

Evolution of bulgeless low surface brightness galaxies

X. Shao^{1,2}, F. Hammer², Y. B. Yang² and Y. C. Liang¹

¹Key Laboratory of Optical Astronomy, National Astronomical Observatories, Chinese Academy of Sciences, 20A Datun Road, Chaoyang District, Beijing, 100012, China

²Laboratoire GEPI, Observatoire de Paris, CNRS-UMR8111, Univ. Paris Diderot, Sorbonne Paris Cité, 5 place Jules Janssen, F-92195 Meudon, France

Abstract. Based on the Sloan Digital Sky Survey DR 7, we investigate the environment, morphology, and stellar population of bulgeless low surface-brightness (LSB) galaxies in a volume-limited sample with redshift ranging from 0.024 to 0.04 and $M_r \leq -18.8$. We find that, for bulgeless galaxies, the surface brightness does not depend on the environment. Irregular LSB galaxies have more young stars and are more metal-poor than regular LSB galaxies. These results suggest that the evolution of LSB galaxies may be driven by their dynamics, including mergers rather than by their large-scale environment.

Keywords. galaxies: evolution, galaxies: formation, galaxies: kinematics and dynamics

Based on the Sloan Digital Sky Survey DR 7 (Abazajian *et al.* 2009), we select 1235 bulgeless and low-inclination LSB galaxies ($frac{DeV_r=0$, $b/a > 0.5$, $\mu_0(B) > 22.5$ mag arcsec⁻²) in a volume-limited sample with $0.024 < z < 0.04$ and $M_r \leq -18.8$. Using local density parameter Σ_5 (Rosenbaum & Bomans 2004), we trace the environment of bulgeless galaxies, and find that their surface brightness does not depend on the environment. Table 1 shows the median value of different stellar populations for bulgeless LSB galaxies located in different environment and with different morphologies. We found that the stellar populations of bulgeless LSB galaxies in low-density regions are similar to those of bulgeless LSB galaxies in high-density regions, suggesting that the environment may play a less important role in the evolution of bulgeless LSB galaxies. Bulgeless LSB galaxies with different morphologies have significant differences in the stellar populations. Different dynamic situations make irregular LSB galaxies have more young stars in the center than regular LSB galaxies. These results suggest that the dynamics and mergers may play a dominant role in the evolution of LSB galaxies rather than environment.

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Table 1. Median value of different stellar populations

	Age			Metallicity
	Young (<1Gyr)	Intermediate (1-5Gyr)	Old (>=5Gyr)	Poor (0.2Zsun)
Isolated LSB galaxies ($\log(\Sigma_5) < -0.4$)	3.3%	55.5%	38.3%	74.9%
LSB galaxies in low density ($\log(\Sigma_5) < 0.5$)	3.2%	55.9%	37.5%	73.9%
LSB galaxies in high density ($\log(\Sigma_5) > 0.5$)	2.2%	53.6%	42.2%	68.2%
Irregular LSB galaxies	12.9%	60.1%	11.0%	88.6%
Regular LSB galaxies	2.7%	55.1%	40.5%	71.0%

References

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