

# Study of barred galaxies in IllustrisTNG100: the case of low surface brightness galaxies.

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## Abstract

Stellar bars are non-axisymmetric components located in the inner part of their host galaxies. These structures play a significant role in the secular evolution of galaxies. In this work, we compare the presence of stellar bars in low and high surface brightness (LSB and HSB, respectively) galaxies using the TNG100 simulation of the IllustrisTNG project. The sample consists of 4244 disc galaxies at  $z = 0$  with a stellar mass of  $M_{\star} \geq 10^{10} M_{\odot}$ . We find that the bar fraction in LSBs is  $24 \pm 1.73\%$ , marginally lower than the  $28 \pm 0.74\%$  found in HSBs, consistent with observations. For a given stellar mass range, HSBs consistently exhibit a higher bar fraction compared to LSBs except for galaxies with  $M_{\star} > 10^{11} M_{\odot}$ , where the difference vanishes. To understand the influence of stellar mass, spin, gas mass fraction, and bulge-to-total mass ratio on the bar fraction disparities between LSBs and HSBs, we create several control samples. For low stellar masses ( $M_{\star} < 10^{11} M_{\odot}$ ), the difference in bar fraction may be attributed to a higher spin parameter and gas mass fraction in LSBs, which are some of the parameters known to inhibit the bar formation/growth. At the high mass end, the parameter that seems to be responsible for the difference in the bar fraction is the bulge-to-total mass fraction. Additionally, we investigate the impact of the local environment through the tidal parameter, finding that in contrast to HSBs, where the bar fraction appears to be unaffected by the tidal parameter, interactions may benefit the bar presence in LSBs, although exerting a lower impact than internal parameters.

My poster in zenodo.org can be found here