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Finding the limits of galaxies up to $z = 1$.

F. Buitrago[1,2], and I. Trujillo[3,4]

[1] Departamento de Física Teórica, Atómica y Óptica, Universidad de Valladolid, 47011 Valladolid, Spain
[2] Instituto de Astrofísica e Ciências do Espaço, Universidade de Lisboa, OAL, Tapada da Ajuda, PT1349-018 Lisbon, Portugal
[3] Instituto de Astrofísica de Canarias, Vía Láctea $s\backslash n$, 38200 La Laguna, Tenerife, Spain [4] Departamento de Astrofísica, Universidad de La Laguna, E-38205, La Laguna, Tenerife, Spain

Abstract

The superb depth of present ultradeep observations and next generation synoptic surveys allow us to reach sudden decrements of the galaxy surface brightness in their outer parts. These truncations are intimately linked with the expected location of the cold gas density threshold for star formation. The unexpected existence of these limits in the galaxy light has led some authors to propose these truncations as the long-sought physically-motivated proxy for galaxy sizes, as opposed to traditional effective radii. We have analysed all the HST CANDELS fields (best trade-off between depth and spatial resolution) to follow the evolution of these galaxy borders in massive disk galaxies up to $z = 1$. By determining galaxy colors and mass profiles, we show that Milky Way analogs (galaxies with stellar mass$\sim 5\times10^{10}$ $M_\odot$) grow in size by a factor of 2 in the last 8 Gyr, while at the same time decreasing their stellar density at these limit positions by an order of magnitude. We plan to apply our techniques to the forthcoming data from the Euclid satellite, that will cover one third of the sky down to 29.5 mag/arcsec^2 (3 magnitudes deeper than SDSS and with HST spatial resolution!). Therefore we have developed Machine Learning techniques that will derive the most accurate galaxy size-mass relation for millions of galaxies in the future, and going one step beyond, as these computational methods also help the astronomer to determine the existence of any galaxy stellar haloes and galaxy tidal tails.

My poster is available at https://zenodo.org/record/7037734#.Y71pLtLMJhE