Institute of Space Sciences

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Fantastic galaxy truncations and where to find them

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Ultradeep observations coming from HST and JWST are revealing abrupt drops in the external parts of galaxy mass profiles. These Low Surface Brightness features, dubbed as galaxy edges or truncations, deliver a physically-motivated size indicator. They represent the limit of the radial location of the gas density enabling efficient star formation, i.e. the outermost extension of the in-situ formed galaxy stellar component. We will present our results in Buitrago et al. (2024) for the identification of these edges in a sample of 1048 massive (M_stellar > 10^10 M_Sun) disc galaxies in the HST CANDELS fields. Our conclusion is that Milky Way-like galaxies decrease their size by a factor of 2 since z = 1, while at the same time their density at the truncation position increases by an order of magnitude, reflecting the progressively different star formation conditions. We will also show in Fernández-Iglesias et al. (2024) that we are able to obtain high-accuracy results by using Machine Learning U-Net networks. Comparing our outcomes with those from effective radii –that are biased by light concentration–, a more dramatic size evolution proportional to (1+z)^-1 is displayed, and we will outline our plans for extending such measurements for millions of objects utilizing Machine Learning Domain Adaptation techniques for Euclid.

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