Exploring new realms : small and giant ultra-diffuse galaxies

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Since about 10 years, astronomers re-discovered the low surface brightness (LSB) realm of galaxies. Van Dokkum et al. (2015) coined the term Ultra Diffuse Galaxies (UDGs) describing very LSB galaxies, larger than usual dwarfs and found in large number in clusters (Koda et al. 2015). Low surface brightness galaxies are also found with sizes much larger than usual galaxies, with « monster » galaxies such as Malin 1 (Galaz et al. 2015, Boissier et al. 2016 and references within), the Giant LSB galaxies (GLSBs).

Recent HI discoveries show that giant gas-rich galaxies exist without being seen (O'Neil et al 2024; Shu et al., 2026). The SKAO area will bring us many more GLSBs, but should also allow us to detect gaz in many UDGs, helping us to understand their nature and evolution, by confronting them to models of their evolution (e.g. predictions of the models of Junais et al. 2022 for Virgo diffuse and ultra-diffuse galaxies).

I will present some recent results concerning these two families of LSB galaxies, including the possible discovery of a star forming UDG in the Virgo Cluster, how candidate UDGs can turn out to be GLSBs once their redshif is determined, and models fitting the photo-metric properties of UDGs in Virgo, that do predict gas masses that will be tested with SKA observations.

Large ongoing sky surveys (e.g. Euclid, LSST) and future projects will clearly open a new observational window on galaxy evolution.