

Characterization of the properties of extended UV regions nearby galaxies with deep large optical survey

The new large deep optical survey (like Megacam at CFHT, DES, LSST, Euclid) bring the promise to better study Low Surface Brightness Galaxies (LSBs). A new telescope suitable for observing LSBs, CASTLE, is under construction at LAM in Marseille to test innovative concepts (curved detector, reduction in the number of optics, removal of supporting spiders and associated diffraction effects) .

One among several scientific cases proposed for this telescope (Lombardo et al. 2020) is the characterization of the optical part of the extended UV (XUV) galaxies discovered by GALEX and correctly established by Thilker (et al. 2007) as galaxies with an extended UV disk beyond their optical radius. Large and faint galaxies in the optical domain have been called “Giant LSBs” by Sprayberry et al, based on the diffuseness of the extended disk, based on the diffuseness of the extended disk. Through a systematic optical study of the XUV disks of those galaxies, we will be able to determine the tentative relationship between XUV and LSBs galaxies (similar aspect of a common phenomena? Evolution between these classes of objects? Completely different families?).

We selected several XUV galaxies for which deep optical data are already available from deep surveys (DES, Pan-STARRS, Subaru) and compared them with the UV data from GALEX and UVIT. We prepared these images by masking stars, background objects, sky estimation and error estimation to acquire the radial surface brightness profiles of XUV galaxies. We investigate the influence of the telescope, pipeline, and method on the uncertainty of the measured profiles by comparison with existing profiles from the literature. Although binning is important for accurately measuring external profiles, we found that the quality of the sky background is paramount. The position angle and ellipticity for each galaxy are determined by adjusting the outer galaxy ellipse near the sky uncertainty. Determining these parameters from different datasets yields coherent results. We also use UV-optical colors to study the stellar population in the UV extended region and attempt to establish relationships between XUV galaxies and different families of LSB galaxies.

I will present the initial results of this study of XUV galaxies and discuss the prospects for such studies using CASTLE and other upcoming large wide field optical survey.