

Passive Disc Galaxies at $1 < z < 3$



Hugo Messias¹, Fernando Buitrago², Antonio Cava³,
José M. Afonso¹, Frédéric Bournaud⁴,
Pablo G. Pérez-González⁵, Helena Domínguez-Sánchez⁵

¹—Instituto de Astrofísica e Ciências do Espaço, Lisboa, Portugal; ²—SUPA, Univ. of Edinburgh, Edinburgh, UK; ³—Observatoire de Genève, Univ. de Genève, Switzerland; ⁴—Laboratoire AIM Paris-Saclay, Univ. Paris, France; ⁵—Departamento de Astrofísica, Univ. Complutense de Madrid,

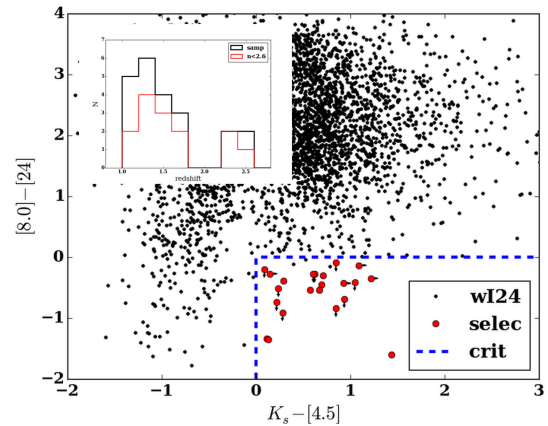


MOTIVE

How a galaxy becomes passive, but still showing a disc-dominated light profile (aka, Passive Disc Galaxy, PDG), can be explained by different mechanisms, each with strong or weak points (e.g., Bundy et al. 2010). By going to early cosmic times, one limits the mechanisms inducing the PDG phase to those which act faster, thus reducing the scenario degeneracy.

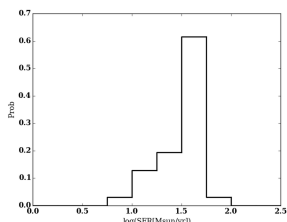
COLOUR+MORPH SELECT

This work exploits an easy colour selection based on infra-red bands (K_s , 4.5 μ m, 8.0 μ m, 24 μ m), which selects $z > 1$ galaxies with reduced or no dust emission, candidates for passive or dust-free galaxies. Making use of galfit (Peng et al. 2010) on HST-WFC3 F160W imaging, one can then select disc-dominated sources among the colour-selected sample. The sample is selected from the MUSIC catalogue (Santini et al. 2009).

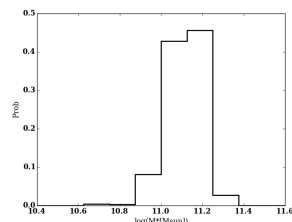


PHYSICAL PROPERTIES

Multi-wavelength photometry (0.35 μ m to 24 μ m, including medium and broadband filters) is gathered from the MUSIC (Santini et al. 2009), CANDELS (Guo et al. 2013), and 3D-HST (Skelton et al. 2014) catalogues. In order to estimate continuum-based physical properties, we have used Magphys (da Cunha et al. 2008) to fit the spectral energy distributions of each colour-selected disc-dominated ($n < 2.6$) galaxy.



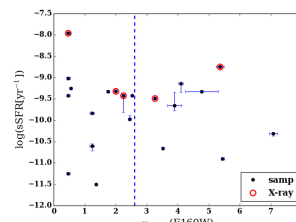
Probability distribution function for the star-formation rate of the $n < 2.6$ colour-selected sample (aka, PDGs).



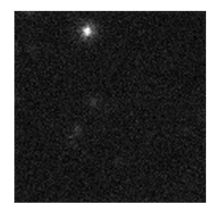
Probability distribution function for the stellar-mass of the $n < 2.6$ colour-selected sample (aka, PDGs).

X-RAY PROPERTIES

The deep Chandra 4Ms data-set (Xue et al. 2011) is also looked into to check for active galactic nuclei (AGN). Three sources among the PDG sample (23%) is found to have an X-ray counterpart closer than 2". The remainder X-ray-undetected PDG sample (10 sources) went through a preliminary stacking analysis that shows no detection.



Specific Star-Formation Rate (sSFR) versus Sérsic index (as measured in the F160W band). PDGs are found on the left-hand side of the plot.



X-rays average stack of ten undetected PDGs.

References

Bundy et al. (2010, ApJ, 719, 1969); da Cunha, Charlot & Elbaz (2008, MNRAS, 388, 1595); Y. Guo et al. (2013, ApJS, 207, 24); L.-T. Hsu et al. (2014, ApJ, 796, 60); Santini et al. (2009, A&A, 504, 751); Skelton et al. (2014, ApJS, 214, 24); Y. Q. Xue et al. (2011, ApJS, 195, 10); Peng et al. (2010, AJ, 139, 2097).

Acknowledgements

The authors wish to thank the teams involved in making public the multi-wavelength catalogues and images which make the base of this work.