Highlights of Astronomy, Volume 16
XXVIIIth IAU General Assembly, August 2012
T. Montmerle, ed.

doi:10.1017/S1743921314011508

ALHAMBRA survey: morphological classification

M. Pović[1], M. Huertas-Company[2], I. Márquez[1], J. Masegosa[1], J. A. López Aguerri[3], C. Husillos[1], A. Molino[1], D. Cristóbal-Hornillos[4] and ALHAMBRA team

[1]Instituto de Astrofísica de Andalucía (IAA-CSIC), Granada, Spain
email: mpovic@iaa.es

[2]GEPI, Paris Observatory, Paris, France
[3]Instituto de Astrofísica de Canarias (IAC), La Laguna, Tenerife, Spain
[4]Centro de Estudios de Física del Cosmos de Aragón (CEFCA), Teruel, Spain

Abstract. The Advanced Large Homogeneous Area Medium Band Redshift Astronomical (ALHAMBRA) survey is a photometric survey designed to study systematically cosmic evolution and cosmic variance (Moles *et al.* 2008). It employs 20 continuous medium-band filters (3500 - 9700 $\mathring{A}$), plus JHK near-infrared (NIR) bands, which enable measurements of photometric redshifts with good accuracy. ALHAMBRA covers $> 4\,\mathrm{deg}^2$ in eight discontinuous regions ($\sim 0.5\,\mathrm{deg}^2$ per region), of theseseven fields overlap with other extragalactic, multiwavelength surveys (DEEP2, SDSS, COSMOS, HDF-N, Groth, ELAIS-N1). We detect $>$600.000 sources, reaching the depth of R(AB) $\sim$ 25.0, and photometric accuracy of 2 - 4% (Husillos *et al.*, in prep.). Photometric redshifts are measured using the Bayesian Photometric Redshift (BPZ) code (Benítez *et al.* 2000), reaching one of the best accuracies up to date of $\delta z/z \leqslant 1.2\%$ (Molino *et al.*, in prep.).

To deal with the morphological classification of galaxies in the ALHAMBRA survey (Pović *et al.*, in prep.), we used the galaxy Support Vector Machine code (galSVM; Huertas-Company 2008, 2009), one of the new non-parametric methods for morphological classification, specially useful when dealing with low resolution and high-redshift data. To test the accuracy of our morphological classification we used a sample of 3000 local, visually classified galaxies (Nair & Abraham 2010), moving them to conditions typical of our ALHAMBRA data (taking into account the background, redshift and magnitude distributions, etc.), and measuring their morphology using galSVM. Finally, we measured the morphology of ALHAMBRA galaxies, obtaining for each source seven morphological parameters (two concentration indexes, asymmetry, Gini, M_{20} moment of light, smoothness, and elongation), probability if the source belongs to early- or late-type, and its error. Comparing ALHAMBRA morph COSMOS/ACS morphology (obtained with the same method) we expect to have qualitative separation in two main morphological types for $\sim$20.000 sources in 8 ALHAMBRA fields. For early-type galaxies we expect to recover $\sim$70% and 30-40% up to magnitudes 20.0 and 21.5, respectively, having the contamination of late-types of $<$7%. For late-type galaxies, we expect to recover $\sim$70%, 60 - 70%, and $\sim$30% of sources up to magnitudes 22.0, 22.5, and 23.0, respectively, having the contamination of early-types of $\leqslant$10%. These data will be used to study the evolution of active and non-active galaxies respect to morphology and morphological properties of galaxies in groups and clusters.

Keywords. surveys, catalog, galaxies: fundamental parameters (morphological classification)

References

Benítez, N., *et al.* 2000, *ApJ*, 536, 571
Huertas-Company, M., *et al.* 2008, *A&A*, 478, 971
Moles, M., *et al.* 2008, *AJ*, 136, 1325
Nair, P. & Abraham, R., 2010, *ApJS*, 186, 427