ALHAMBRA survey: morphological classification


1Instituto de Astrofísica de Andalucía (IAA-CSIC), Granada, Spain
email: mpovic@iaa.es
2GEPI, Paris Observatory, Paris, France
3Instituto de Astrofísica de Canarias (IAC), La Laguna, Tenerife, Spain
4Centro 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 Å), plus JHK near-infrared (NIR) bands, which enable measurements of photometric redshifts with good accuracy. ALHAMBRA covers > 4 deg² in eight discontinuous regions (~0.5 deg² per region), of th these seven 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) ~ 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 δz/z ≤ 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, M20 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 ~ 20,000 sources in 8 ALHAMBRA fields. For early-type galaxies we expect to recover ~ 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 ~ 70%, 60 - 70%, and ~ 30% of sources up to magnitudes 22.0, 22.5, and 23.0, respectively, having the contamination of early-types of ≤ 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