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MEASURING GALAXY MORPHOLOGIES IN THE CFHT STRIPE 82 SURVEY

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We present the determination of galaxy structural parameters in the CFHT Stripe 82 Survey (CS82) stacked images. The CS82 survey covered an area of ~ 170 square degrees with the CFHT $3.6m$ telescope in a field determined by $-40 < RA < 45$ and $-1 < DEC < 1$ (within the SDSS stripe-82 region) in i-band to a depth of $mag_{AB} \sim 24$. Its excellent image quality (mean seeing of ~ 0.6) and uniformity makes CS82 specially suitable for applications involving gravitational lensing and galaxy morphology. The determination of galaxy structural parameters has applications to galaxy evolution studies, weak lensing, and the improvement of the photometry in other surveys (e.g. SDSS), through the "forced photometry" method. The morphological analysis of galaxies is performed through a profile-fitting method implemented with a combination of SExtractor v2.14.7 (which has model-fitting features) and PSFEx. First, we use SExtractor to perform the detection and obtain basic measurements of objects, then we use PSFEx to model the PSF across the field, and finally, we run SExtractor again to perform the model-fitting of objects. In particular we use 4 models implemented in SExtractor: Sérsic, de Vaucouleurs, exponential and 2-component de Vaucouleurs+exponential. In this work we outline the procedure described above and focus on a quality assessment of the determination of the ellipticities, through a comparison with the CS82 weak lensing catalogue obtained with the state-of-the-art code lensfit (Miller et al. 2007).

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IDENTIFICATION AND EXTRACTION OF PHOTOMETRIC REDSHIFTS OF QUASARS WITH NARROW-BAND FILTERS

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Although quasars are valuable targets for many cosmological applications, imaging surveys employing optical broad-band filter systems are unable to obtain accurate photometric redshifts for these objects. Broad-band imaging surveys also have some difficulty in distinguishing quasars from stars and HII regions of galaxies. However, the construction of a high-purity catalog of quasars, with accurate photometric redshifts, can be much more efficient with medium or narrow-band surveys, such as the upcoming J-PAS. In this work we discuss how to overcome the degeneracies in the color-color and color-magnitude diagrams that hamper the efficient detection of quasars, and how to obtain very good (near spectroscopic) photometric redshifts for these objects. In particular, we discuss how to include quasars in some of the most popular redshift codes, and the parallel need for the inclusion of spectral libraries for stars. We also discuss the importance of a good modeling of the distribution of point-sources in the sky, and the need for reliable luminosity functions that can inform the Bayesian estimation of types and photometric redshifts.

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GRAVITATIONAL WAVES FORMULATION FOR THE BRANE UNIVERSE AND POSSIBLE INDUCED CORRECTIONS ON AN OBSERVATIONAL LEVEL

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The observation of gravitational waves and their effect on different physical systems constitute one of most searched for proofs of the theory of general relativity. In this work, a brief summation on their construction based on general relativity and its observational consequences is presented with the intention of later extending the analysis to obtain the wave equation from the field equations that describe the brane universe. With the obtained results, a discussion is opened around the possibility of distinguishing observationally between general relativity and the brane universe theory. Since brane theory considers that gravity can spread to the extra dimensions (thus appearing weaker than the rest of interactions), it is possible to argue that the expected amplitude of gravitational waves according to the theory differs from the one expected in relativity.

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In the same way, it is to expect that the effect of energy dissipation that involves gravitational waves emission, as occurs in binary systems, needs to be corrected.

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ANISOTROPIC HALO MODEL

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We present an extended version of the classic halo model for the large-scale matter distribution which includes a triaxial model for the halo density profiles, a probabilistic distribution of the halo shape and a probabilistic law describing the alignment of the surrounding structure. In particular, we derive general expressions for the halo-matter cross-correlation function. Using a Monte Carlo integration method we obtain instances of the cross-correlation function depending on the directions given by halo shape axes. These functions are called anisotropic cross-correlations. We have found that our model is able to reproduce the numerical measurements of those functions over a wide range of scales, particularly in the 2-halo regime. The parameters of the model obtained by fitting numerical results recover the well known mass dependence of halo shapes and the alignment of dark matter halos with the surrounding structure. In this sense, most massive halos tend to have a less spherical shape and more prolate mass profile. In addition, we have found that taking the triaxial nature of dark matter halos into account improves at least %15 the predictions of the standard halo model (as noted by others authors before).
Finally, we are working on the development of a similar model in order to compare theoretical predictions with anisotropic correlation functions measured on galaxy group catalogues. These results will appear in a forthcoming paper.

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THE TYPE IA SUPERNOVA PIPELINE FOR THE JAVALAMBRE PHYSICS OF THE ACCELERATING UNIVERSE ASTROPHYSICAL SURVEY (J-PAS)

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The Javalambre Physics of the Accelerating Universe Astrophysical Survey (J-PAS) is an astronomical facility being built in Sierra de Javalambre, Spain. The main goal is to study the expansion of the Universe through different cosmological observables such as baryonic acoustic oscillations, type Ia supernovae and galaxy clusters. The main instrument will be a 2.5 m telescope equipped with a system of 56 narrow band filters in the optical. Here we present a sketch of the pipeline we are developing to detect type Ia supernovae with J-PAS. First we describe each individual step of the pipeline, such as image subtraction and source selection. Then we show some results we obtained when applying our pipeline to images from the Sloan Digital Sky Survey and the ALHAMBRA survey, which had a set of narrow band filters similar to the ones that will be used by J-PAS.

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THE RED SEQUENCE OF AXU CLUSTERS

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We present an analysis of the colour-magnitude relation for a sample of 54 Abell X-ray underluminous (AXU) clusters aiming at unveiling properties that may elucidate the evolutionary stages of the galaxy populations which compose such systems. We compared the parameters of their colour-magnitude relations with the ones found for another sample of 50 Abell X-ray "normal" (AXN) emitting clusters. The g and r magnitudes from the SDSS-DR7 were used for constructing the colour-magnitude relations.

We found that both samples show the same trend: the red sequence slopes change with redshift, but the slopes for AXU clusters are always flatter than AXN clusters, by a difference of about 42% along the surveyed redshift range of $0.05 \leq z < 0.20$. Also, the intrinsic scatter of the colour-magnitude relation was found to grow with redshift for both samples, but for the AXU clusters, this is systematically