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The IAC stripe82 legacy project

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Abstract. We present new deep co-adds of data taken within Stripe 82 of the Sloan Digital Sky Survey (SDSS), especially stacked to reach the faintest surface brightness limits of this data set. Our reduction puts special emphasis on preserving the characteristics of the background (sky + diffuse light) in the input images using a non-aggressive sky subtraction strategy, resulting in an exquisite quality on extremely faint structures. The IAC Stripe 82 co-adds offer a rather unique possibility to study the low surface brightness Universe like stellar haloes and disc truncations, low surface brightness, tidal galactic interactions, extremely faint dwarf galaxies, intra-cluster light or diffuse light from galactic dust. The imaging data is publicly available at http://www.iac.es/proyecto/stripe82/.

Keywords. surveys - stars - galaxies: general - galaxies: interactions

1. The dataset and its implications

The IAC Stripe 82 Fliri & Trujillo (2016) covers 275 deg^2 within -50<RA<+60° and -1.25<Dec.<+1.25°. Our reduction reaches a limit of $\mu_r \approx 28.5$ mag arcsec^{-2} (3σ, 10×10 arcsec^2). The effective surface brightness limit (50% completeness for exponential light distribution) lies at $<\mu_e(r)> \approx 25.5$ mag arcsec^{-2}. For point sources, we reach 50% completeness limits (3σ level) of (24.2, 25.2, 24.7, 24.3, 23.0) mag in *(u,g,r,i,z)*. The release includes deep co-adds, representations of the PSF for each field and object catalogues with stars and galaxies confidently separated until g≈23 mag. Additionally, we provide the residual-rectified images due to the coadding process. There is a huge amount of astrophysical phenomena that remain still barely studied due to the lack of large (several hundred of squeare degrees), multiwavelength and deep (μ_v >28 mag arcsec^{-2}) optical surveys. Little is known about the connection of the so-called "optical cirrus" or diffuse light of our galaxy and the dust filamentary structure observed in the far-infrared full-sky surveys. Also, only a relative small number of nearby galaxies have been probed with enough depth to explore cosmological predictions about the formation of the faint stellar haloes, tidal streams and ultra-faint satellites surrounding these objects. Similarly, only a handful of nearby galaxy clusters have been observed with enough depth to understanding the intracluster light expected from the hierarchical assembly of these cosmic structures. Our dataset is allowing us to explore all the phenomena with an unprecedent level of detail. The first publication showing an aplication of this data, Roman & Trujillo (2016), explore the large scale spatial distribution of the ultra diffuse galaxies.

References

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