Faint extended structures near galaxies: preliminary results from the Wise Observatory

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Abstract. We present the first results from a survey of deep imaging of edge-on galaxies, with the goal of testing the growth-by-accretion of galaxies proposed by ΛCDM. The data were obtained with a new telescope at the Wise Observatory. Our images show previously unreported extensions of the disk, tidal distortions, and streams at the level of 27-28 mag arcsec\textsuperscript{-2}.

Keywords. Galaxies, halos, interactions

In ΛCDM galaxies form by accreting dwarf-galaxy sized units of dark and baryonic matter. It is important to confront this prediction with observations; among the most powerful approach is the observation of the accretion history of galaxies. We have initiated a program of deep imaging for a sample of 180 edge-on disk galaxies (EODGs) selected from the Revised Catalog of Edge-on Galaxies (Karachentsev \textit{et al.} 2003) with angular size $>2$ arcmin and visibility ($\delta>-30^\circ$). We use a new 0.7-m prime-focus telescope at the Wise Observatory (The Jay Baum Rich telescope; JBRT, Brosch \textit{et al.} 2015), as well as an identical facility near Frazier Park, CA (see Rich \textit{et al.} these proceedings). The JBRT camera is at prime focus behind a 2-element Ross corrector, imaging a $\sim 1\text{^o}^2$ field at f/3.2 onto a PL-16801 (FLI) 4096\textsuperscript{2} CCD with 9\textmu m pixels, at 0.84 arcsec pixel\textsuperscript{-1}. To reach the required LSB levels we co-add 20 -- 100+ dithered images, each exposed for 300 sec through a luminance (wide R) filter [250 nm bandpass, center at 560 nm, flat transmission profile at 95% over the entire bandpass].

The images are debiased, dark-subtracted, flat-fielded with twilight sky flats, astrometrically registered, sky-subtracted and co-added, while rejecting outlier pixels, using \textit{THELI} (Schirmer 2013). Further processing is done using \textit{DECA} (Mosenkov 2014). This includes masking of unrelated objects (stars, field galaxies, artifacts), re-estimation of the sky background in the region of interest, and photometric calibration using unsaturated stars with R-band magnitudes. The galaxy image is then cropped and aligned with the major axis horizontal, and a model fit to the galaxy’s surface brightness profile. Our preliminary very deep images of EODGs reach $\mu \geq 28$ mag arcsec\textsuperscript{-2}. Imaging the entire EODG sample will be used to test ΛCDM.

References

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