The stellar structure of early-type galaxies: a wide-field Mitchell Spectrograph view

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Much progress has been made in recent years towards understanding how early-type galaxies (ETGs) form and evolve. SAURON (Bacon et al. 2001) integral-field spectroscopy from the ATLAS3D survey (Cappellari et al. 2011) has suggested that less massive ETGs are linked directly to spirals, whereas the most massive objects appear to form from a series of merging and accretion events (Cappellari et al. 2013). However, the ATLAS3D data typically only extends to about one half-light radius (or effective radius, Re), making it unclear if this picture is truly complete.

We observed twelve nearby ETGs using the Mitchell Spectrograph (Hill et al. 2008). We extracted stellar kinematics out to the fourth Gauss-Hermite moment, reaching 3Re in most cases. We found no abrupt transitions in the ETG’s λR (Emsellem et al. 2007) profiles beyond 1Re, consistent with our ETGs having mostly passive recent histories.

We used triaxial (van den Bosch et al. 2008) Schwarzchild (1979) modelling to investigate one galaxy - NGC 3998 - in more detail (Boardman et al. 2016). We find NGC 3998 to be near-oblate, with an axis ratio q < 0.49 at 1 Re. We obtain an I-band M/L of 4.7±0.32−0.45 in good agreement with independent stellar population modelling results (Cappellari et al. 2013). Our models prefer low dark matter fractions, with a fraction of (7.1±5.8)% within 1Re. Our best-fit model contains few non-rotating orbits beyond 1Re, from which we infer that late-time accretion was not significant for this galaxy.

References
Hill, G. J., MacQueen, P. J., Smith, M. P., et al. 2008, Ground-based and Airborne Instrumentation for Astronomy II, article id. 701470

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