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Exploring radio galaxies with the MIGHTEE survey

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1 Extended Abstract

MeerKAT International GHz Tiered Extragalactic Exploration (MIGHTEE) Survey is a galaxy evolution survey currently underway with the MeerKAT radio telescope (Jarvis et al., 2016). Once complete, the survey will cover 20 square degrees in four fields to a depth of $\sim$1 μJy rms/beam at 1.28 GHz, providing a unique combination of depth and breath. Crucially, the MIGHTEE fields have excellent multi-wavelength coverage, enabling a full census of galaxy properties. The MIGHTEE survey is a precursor for the deep, large area radio-continuum surveys planned with the Square Kilometre Array, allowing us to develop the techniques necessary to maximise their science output.

The MIGHTEE-continuum early science data, covering 5.1 square degrees in two fields, were released last year (Heywood et al., 2021). I will provide an overview of recent results from these data, highlighting the nature of the faint radio source population. In particular, I will describe a study of 6000 radio sources detected in the early science data in the COSMOS field. Using extensive multi-wavelength data available in the field (optical, near and far-infrared and X-ray), these sources have been classified as active galactic nuclei (AGN) (33 per cent) and star-forming galaxies (54 per cent). By selecting a sample of radio-loud AGN with redshifts out to $z \sim 6$ and radio luminosities $10^{20} < \mathrm{L\,/\,W\,Hz^{-1}} < 10^{27}$, we are able to use these data to provide new insights into the nature of radio galaxies at both lower powers and higher redshifts than previous studies. I will discuss whether or not there is evidence for a dichotomy in the accretion rates of high-excitation and low-excitation radio galaxies, and the implications this has for the role radio galaxies play in galaxy evolution.

References

[1] Heywood I., Jarvis M. J., Hale C. L., Whittam I. H., Bester H. L., Hugo B., Kenyon J. S., et al., 2021, MNRAS.tmp. doi:10.1093/mnras/stab3021

[2] Jarvis M., Taylor R., Agudo I., Allison J. R., Deane R. P., Frank B., Gupta N., et al., 2016, mks..conf, 6