Co-Evolution of Central Black Holes and Galaxies
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The Australia Telescope 20 GHz (AT20G) Survey

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The recently completed AT20G survey provides the largest and most complete sample of high-frequency selected radio sources yet obtained, and offers new insights into the nature of the high-frequency active galaxy population. Here we focus on the optical properties of this survey which highlights the difference of the AT20G source population compared to other radio-selected AGN samples.

The AT20G survey is a blind survey of the southern sky at 20 GHz and consists of 5890 sources above a flux limit of 40 mJy (Murphy *et al.* 2009). At high radio frequencies, the AGN core is the dominant source of emission and hence a survey at 20 GHz provides a clean signature of the most recent activity of the central black hole and is an efficient way of selecting the most active radio-loud AGN. Sixty percent of AT20G sources have optical identifications in the SuperCOSMOS database† (Hambly *et al.* 2001), a much higher fraction than seen in lower-frequency radio surveys (typically of order 25–30%). The optical ID rate increases with flux density due to the increasing fraction of QSOs/blazars at higher flux densities (see Figure 1). At lower 20 GHz flux densities, we begin to see lower-luminosity AGNs residing in optically fainter galaxies. The full AT20G catalogue is available online at http://www.atnf.csiro.au/research/AT20G/.

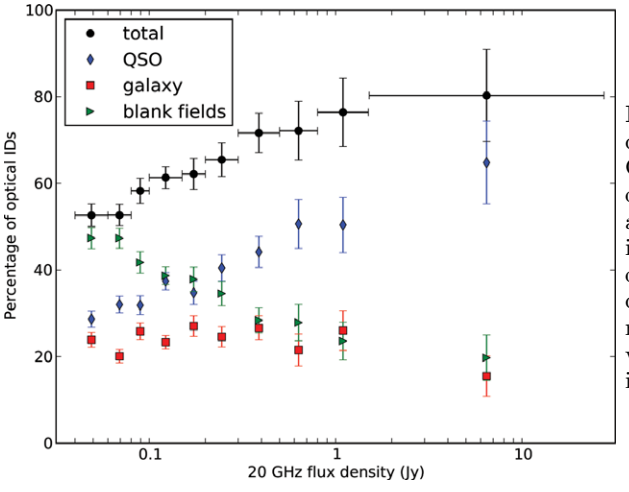

Figure 1. The optical identification rate as a function of 20 GHz flux density. The separation of point-like (generally QSOs) and extended sources (galaxies) is based on the optical morphology using SuperCOSMOS classifications. The horizontal error bars represent the bin size while the vertical errors are the $\sqrt{n}$ counting errors.

References

Hambly, N. C., *et al.* 2001, *MNRAS*, 326, 1279
Murphy, T., *et al.* 2009, *MNRAS*, in press [arXiv:0911.0002]

† excluding the Galactic plane $|b| < 10°$