

COMPLETE SAMPLES OF FLAT SPECTRUM RADIO SOURCES
FROM THE PARKES 2.7 GHZ SURVEY.

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ABSTRACT

We are investigating complete samples of southern hemisphere flat spectrum extra-galactic radio sources drawn from the Parkes 2.7 GHz Survey (see Bolton et al. 1979 and references therein). These samples are being used for a variety of investigations, including a determination of the space distribution and luminosity function of radio QSOs, their radio size distribution, as well as the structures of the individual sources. Accurate positions are being determined, as well, in order to establish an extra-galactic position reference frame in the southern hemisphere.

THE COMPLETE SAMPLES

The main component of this programme is a complete sample of some 400 sources satisfying the following criteria;

- i) $S_{2.7} \geq 0.50$ Jy ii) $\text{Alpha}(2.7, 5.0) \geq 0.5$,
iii) $10^\circ \geq \text{dec} \geq -45^\circ$, and iv) $|b| \geq 10^\circ$

A second, strong source sample covers the southern sky outside of the Galactic Plane, and satisfies;

- a) $S_{2.7} \geq 1.8$ Jy b) $\text{Alpha}(2.7, 5.0)$ or $(.4, 2.7) \geq 0.50$,
c) $\text{Dec} \leq -20^\circ$, and d) $|b| \geq 10^\circ$.

Criterion c) was introduced to ensure that those compact peaked spectrum sources would also be included.

HIGH RESOLUTION RADIO OBSERVATIONS

Single epoch VLBI observations of more than half of the stronger sample have already been undertaken with the SHEVE array (see Preston et al. this conference), and accurate, 0.1 arcsecond rms, radio positions measured for 10 of the stronger sources south of -30° that have bright optical counterparts. Comparison of the radio positions and optical positions measured with respect to reference stars from the Perth 70 Catalogue (Hog and van der Heide 1976) shows that at the level of 0.2 arcsec rms there appears to be no significant displacement between the radio and optical frames.

In addition, about half of the sources in the 0.5 Jy sample have been observed at 2.3 GHz with the Parkes-Tidbinbilla interferometer, the PTI, (see Norris, this conference, and Norris et al. 1985) in order to identify those showing structure on this 275 Km baseline, as well as a search for potential radio position calibrators.

OPTICAL IDENTIFICATIONS

The SERC J survey where available has been used for the identifications and the Palomar Sky Survey for the remainder. SERC J plates are being sought for all fields and AAT CCD photography is underway for the faint identifications. Accurate radio positions and maps have been obtained with the VLA at 6 cm wavelength for sources north of declination -45° , in order to confirm identifications and to compare the optical and radio morphologies. Low resolution optical spectroscopy, mainly undertaken by us with the AAT, (see Jauncey et al. 1984, and references therein) has been completed for 70% of the identifications. The present redshift distribution shows a broad peak at about $z=1.5$, with a steady decrease in source numbers above this redshift. We see no evidence for a redshift cut-off above 3.0, and note that four sources have already been found in the 0.5 Jy sample with redshifts above 3.5.

SUMMARY

This is a major observational program parts of which have been underway for more than a decade. With limited VLBI facilities available in the southern hemisphere, high resolution observations of the flat spectrum radio sources from the Parkes 2.7 GHz radio survey are proceeding slowly. In contrast, however, to similar programmes from the north, the present investigation has been able to compile extensive optical identifications, spectroscopy, deep photography and redshift determinations. Observations presently in progress with the PTI are aimed at statistical angular size studies, while the development of the Long Baseline Array of the Australia Telescope in the coming years will eventually provide detailed milliarcsecond resolution maps.

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