

NEW RESULTS FROM COMPLETE SAMPLES OF FAINT RADIO GALAXIES AND QUASARS

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1. Improved coverage of the luminosity–redshift plane

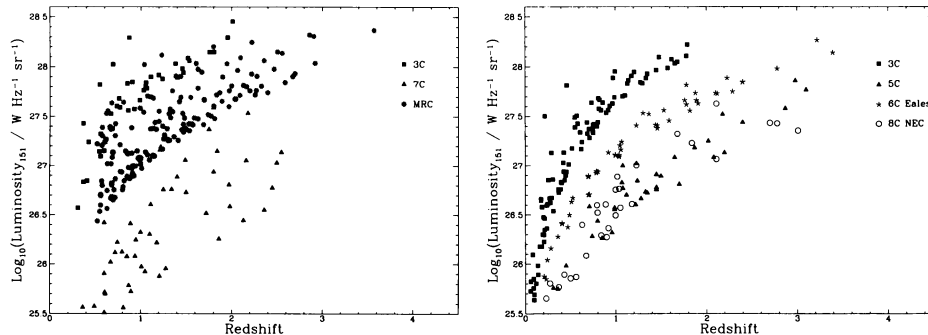


Figure 1. Coverage of the P – z plane with the new flux-limited quasar (left) and RG (right) samples overlaid on the coverage from 3C.

In any flux-limited sample a tight correlation of luminosity (P) and redshift (z) is inevitable. It is therefore necessary to obtain complete samples at lower and lower flux-limits in order to have adequate coverage of the P – z plane, essential if we are to decouple the trends in epoch from trends in luminosity. This we have done for a number of flux-limits — giving coverage of the P – z plane seen in Fig. 1. Our redshift information is *spectroscopic*; the results of Eales et al (*in prep.*), namely the increased scatter in the

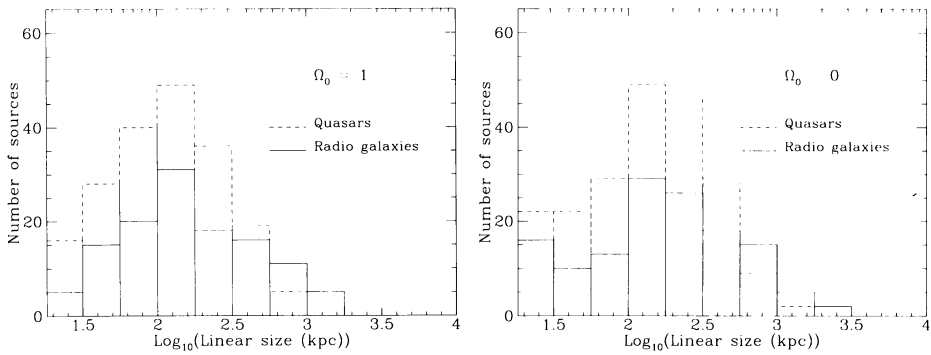


Figure 2. Histograms of the linear sizes of RGs and quasars calculated for two values of Ω .

K-z plot for samples lower in luminosity than 3C, strongly warn us against using redshifts estimated from *K*-magnitudes.

2. Linear size evolution of radio sources

We calculated the three-way partial rank correlation coefficients (Macklin 1982) for the linear sizes (D) of sources, with their redshifts and luminosities. For a universe with $\Omega = 1$, we obtain for both radio galaxies and quasars in our complete samples, $r_{Dz|P} = -0.43$ with significance 7.6σ and $r_{DP|z} = -0.0067$ with significance 0.11σ . (The notation $r_{Dz|P}$ means the partial rank correlation coefficient between D and z at constant P). We thus find a strong anti-correlation between D and z , but not between D and P .

3. Comparison of the linear sizes of radio galaxies and quasars

Barthel (1989) found the median linear size of RGs in 3C to be ~ 2.2 times that of the quasars in 3C, lending strong support to the unification-by-orientation model of RGs and quasars. For our higher redshift and lower luminosity samples, we find that the ratios of the median lengths in kpc of RGs over quasars for $0 < z < 1$ is 259/157, for $1 < z < 2$ is 119/86, for $z > 1.5$ is 84/77 and for $z > 2$ is actually 56/77. The similarity of the linear size distributions of radio galaxies and quasars can be seen in Fig. 2. We thus conclude that unification without evolution is untenable.

References

- Barthel P.D. (1989) *ApJ*, **336**, 606.
 Macklin J.T. (1982) *MNRAS*, **199**, 1119.