

# COSMOLOGICAL STUDIES FROM THE MRC/1JY RADIO GALAXY SAMPLE: THE SPECTRAL INDEX – REDSHIFT CORRELATION

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The MRC/1Jy sample of 559 radio sources with  $S_{408 \text{ MHz}} \geq 0.95 \text{ Jy}$  (McCarthy et al. 1996; Kapahi et al. in preparation) is a factor of 5 to 6 times deeper than the 3CRR sample; it is therefore, well suited for disentangling the redshift ( $z$ ) and luminosity ( $P$ ) dependence of several properties of extragalactic radio sources. Here we present results on the spectral index – redshift correlation for radio galaxies, based on a comparison of the well documented radio spectra (in the rest frame frequency range of about 1 to 16 GHz) of the following two matched-luminosity samples. (a) 14 high redshift radio galaxies (HRRG) from MRC with  $2.0 < z < 3.2$  and linear size  $l > 10 \text{ kpc}$ , and (b) 21 intermediate  $z$  radio galaxies (IRRG) from 3CRR with  $0.85 < z < 1.7$  and  $l > 10 \text{ kpc}$ . Both samples have  $P_{1.4\text{GHz}}$  in the range  $10^{28}$  and  $10^{28.8} \text{ WHz}^{-1}$ .

We find that the median spectral indices ( $\alpha_{med}$ ), estimated at different rest frame frequencies are consistently steeper for the HRRG sample compared to the IRRG sample. Since the two samples are matched in  $P$  we conclude that  $\alpha$  depends primarily on  $z$  in the range of  $P$  considered here. The best fit  $\alpha - z$  correlation is found to be of the form  $\alpha_{1.4\text{GHz}} = 0.82 + 0.40 \log(1 + z)$ .

We also find that there is no statistically significant difference in the distributions of spectral curvature for the two samples. This suggests that the steeper values of  $\alpha$  at higher  $z$  may be related to a steeper energy distribution of electrons at injection, unlike other explanations based on a more rapid steepening of the radio spectra (Athreya & Kapahi 1997).

## References

- Athreya, R.M. & Kapahi, V.K. (1997), *submitted to JAA*  
McCarthy, P.J. et al. (1996), *ApJS*, **107**, 19