

THE CFA SEYFERT SAMPLE AT 8.4 GHZ

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Increasingly, the evidence from optical and infra-red wavebands suggests that the difference between Seyfert 1 and Seyfert 2 nuclei is due largely to orientation effects rather than intrinsic differences between the two classes, but the evidence from radio observations has been less clear-cut. We have observed the Cfa Seyfert Sample at 8.4 GHz using the VLA in A- and C-configurations. At this frequency our A-array maps have a resolution of $0.25''$ – much higher than those achieved in previous surveys – whilst the $3''$ C-array beam is ideal for measuring the total radio flux of the active nucleus. The 1-sigma noise in both sets of observations was $70 \mu\text{Jy}$.

Space densities for the Cfa Seyferts have been derived by Huchra & Burg (1992) and Edelson (1987). The results of our work are consistent with these previous studies: the total space density of Seyferts with 8.4 GHz luminosities between $10^{20.6}$ and $10^{22.6} \text{ WHz}^{-1}$ is $3.5 \times 10^{-5} \text{ Mpc}^{-3}$. For Seyfert 1s the density is $1.0 \times 10^{-5} \text{ Mpc}^{-3}$ and the density of Seyfert 2s is approximately 2.5 times larger.

We find that the mean 8.4 GHz luminosities are $10^{21.3 \pm 0.2} \text{ WHz}^{-1}$ for Type 1 and $10^{21.4 \pm 0.2} \text{ WHz}^{-1}$ for Type 2, and a variety of statistical tests all show that there is no significant difference between the luminosity functions of the two types.

Although the mean radio luminosities of Seyfert 1s and 2s are the same, their radio structures are very different. In the high-resolution A-array maps 45% of the Type 2 objects are extended, with double, triple and linear structures. However, at the same resolution only 8% of the Seyfert 1s are resolved, and only one nearby object, NGC4151, contains multiple radio components. This difference could be explained by orientation effects: if type 1s are seen 'head on' (so that their radio axes lie close to the line of sight) and type 2s 'side on' then any extended radio structure in Seyfert 1s will be foreshortened. We find that the individual compact components in Seyfert 2 nuclei have, on average, only 75% of the luminosity of those in Seyfert 1s. This suggests that foreshortening in Seyfert 1s has resulted in multiple radio components being superimposed and appearing as a single compact source.

Our observations therefore support the idea that Seyfert 1s and 2s have the same intrinsic luminosities and radio structures, and that the apparent differences between them are due to their orientation relative to the line of sight.