STUDIES OF A COMPLETE SAMPLE OF ABELL CLUSTERS AT 1400 MHz

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We present here analyses of a radio survey of Abell clusters at 1400 MHz using the NRAO 91-m telescope. Details will appear in a paper to be submitted to the Astronomical Journal where we present two lists. The first contains sources within 0.5 of an Abell radius (hereafter R_a, 3 Mpc if H=50) of the center of an Abell cluster. The second contains those clusters for which there were no sources within that limit. The flux limit is 100 mJy, the beam size $\sim$10 1/2 arcmin, and the declination limit $-19^{o}30'$. For consistency we use Corwin's (1974) m_{10} - z calibration throughout. The errors in m_{10} and therefore z and R_a, combined with a beam large compared to galaxy and cluster size (preventing identifications) preclude all but the simplest analyses which we present here.

We observed 1476 clusters and detected sources within 0.5 R_a in $\sim$ 1/3 of them. The log N - log S relation of Fomalont et.al.(1974) indicates $\sim$60% of the detections are expected to be random. In the remaining discussion we consider only sources within 0.3 R_a; all numbers are corrected for expected random detections. We define two statistical subsamples, both north of -19^{o}. The first includes all clusters with $m_{10} \leq 16.9$ (in distance group 5). The second includes all clusters richness 3 or greater, and is 100% complete. Because of the large beam size and large average distance of these clusters, we will not discuss them further here. The first sample contains 538 clusters, 530 (98.5%) observed and 103$\pm$8 (19%$\pm$2%) detected. We present in the figures below correlations for various characteristics of this sample. Errors are 1 sigma.

In Fig. 1 we see the richer clusters are more likely to contain a radio source, possibly because they simply contain more galaxies. The data are consistent with the probability of a galaxy being a radio source being independent of cluster richness, but may show some Bautz-Morgan (BM) effect. In Fig. 2 equal normalized probabilities would mean that the radio galaxy distribution follows a King model. There <u>may</u> be an indication

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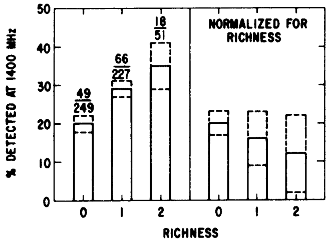

Fig. 1. Detection Rate vs. Richness

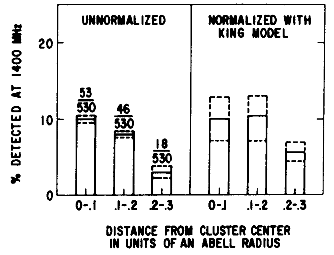

Fig. 2. Detection Rate vs. Radius

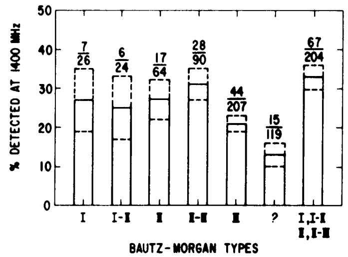

Fig. 3. Detection Rate vs. BM Type

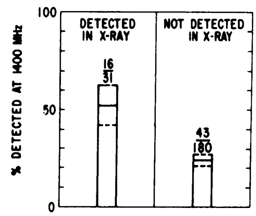

Fig. 4. Correlation with HEAO A-2 Results of McKee et.al.(1980).

of a BM effect. In Fig. 3, comparing rates for BM III with BM I to II-III clusters, there is some evidence that clusters which contain a central galaxy with some degree of dominance are more likely to contain a radio source. This may be simply because brighter galaxies are intrinsically more likely to be radio sources; but the degree of dominance does not seem to matter. The central location may also play a role. In Fig. 4 the correlation of detection rates is most likely due to higher radio detection rates in rich clusters, which are also preferentially detected by McKee et.al.(1981). The BM effect may enter in the same way.

We are pursuing the appropriate VLA, optical, and X-ray studies to investigate further the effects of cluster environment on radio sources, particularly those associated with dominant central galaxies.

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