CLUSTERS OF GALAXIES AT INTERMEDIATE REDSHIFTS: A SAMPLE SELECTED AT RADIO WAVELENGHTS

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In order to gather a sample of intermediate redshifts ($z \sim 0.1 \div 0.2$) clusters avoiding evolutionary effects or biases induced by limited sensitivity of instruments and optical plates that affect samples selected through inspection of optical plates, color diagrams or X-ray emission properties, we plan to use radio galaxies as suitable tracers of dense environments (e.g. Allington-Smith *et al.*, 1993). This would allow us to effectively test different environments and population properties, and would also give valuable information on the effect of environment on the radioemission phenomena. Moreover, it would not impact on the X–ray or optical properties of clusters, since there is no significant correlation between the radio properties of galaxies within a cluster with its L_X (Feigelson, Maccacaro and Zamorani, 1982), or with richness of the cluster (Zhao, Burns, and Owen, 1989).

1. The Radio Sources Catalogue and Optical Identifications

From the new 1.4 GHz NRAO VLA Sky Survey (NVSS) (Condon *et al.*, 1994) maps we extracted a catalogue of 11922 pointlike radio sources and 3371 double radio sources down to a flux limit 2.5 mJy, on an area of ~ 550 square degrees in the region of the South Galactic Pole. The reliability of source positions in the catalogue was found to be consistent within the errors predicted by Condon *et al.* (1994), which vary from $5''$ for sources at the flux limit, to $< 0.5''$ for sources brighter than 20 mJy.

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Optical identifications were made with galaxies in the Edimburgh-Durham Southern Galaxy Catalogue (EDSGC) (Heydon-Dumbleton, Collins and MacGillivray, 1988), up to a limiting magnitude $b_J = 20.0$, above which the EDSGC is no more complete and the stellar confusion exceeds 10%. Restricting our search to a radio-optical distance $\leq 7.0''$, which corresponds to a contamination from chance coincidence $< 5\%$ and to an identification rate $\sim 5\%$ at each flux, we found a preliminary sample of 609 optically identified pointlike radio sources.

2. The Cluster Sample

The selection of cluster candidates was performed through the search of excesses in galaxy density near the position of the radio galaxies. For each ESO plate in the region covered by our catalogue we calculated a gaussian smoothed matrix of counts of optical data in the EDSGC, with bin size $30''$ and smoothing length $2'$. We looked for excess densities inside a circular region of radius $3'$ centered at the position of each identified radio galaxy, having defined the *"excess density"* on each plate as $\rho_{crit} \geq 3\sigma + \rho_m$, where ρ_m and σ are the mean value and sigma of galaxy density fluctuations calculated on the whole plate.

Neglecting all those radio galaxies which fall inside the Abell radius of an already known ACO or Edimburgh-Durham Clusters Catalogue cluster, and those identified with galaxies brighter than $b_J = 17.5$, we found a list of 59 cluster candidates. Spectroscopy will be taken for each radio galaxy and $\sim 10-15$ nearby companions in order to have positive cluster identifications and to improve the results of Allington-Smith *et al.* (1993), who took only photometry of fields centered on radio galaxies at intermediate redshifts.

Assuming for the candidates a redshift range $0.1 \div 0.2$, the power range covered by our sample would be $2.4 \times 10^{22} < P_{1.4GHz} < 2.5 \times 10^{24}$ ($H_0 = 100$km/sec Mpc, $q_0 = 1$), thus well representing FR I population of extragalactic radio sources.

References

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