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THE AQUARIUS SUPERCLUSTERS

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Measurements of about a thousand galaxy redshifts in the direction of 72 cluster candidates in Aquarius region, reveal two superclusters of galaxies, at $z \sim 0.086$ and at $z \sim 0.112$, respectively with 5 and 14 clusters.

The Aquarius region, enclosed by the coordinates $22^h57.0^m < \alpha_{2000} < 23^h38.6^m$ and $-25°54' < \delta_{2000} < -19°29'$, contains 63 clusters from the catalogs ACO (Abell et al. 1989, ApJSS, 70, 1), EDCC and APMCC. By applying a matched-filter technique and a counts-in-cells analysis to b_J and R photographic data for the region (Caretta et al. 2002, AJ, in press), we have detected other 39 cluster candidates. We have also carried out a redshift survey for galaxies selected from $10'\times10'$ boxes centered at the surface density peaks of 72 candidates, using 2m class telescopes at La Silla (ESO, Chile), Observatório do Pico dos Dias (LNA, Brazil) and CASLEO (Argentina). As a result, we measured redshifts for 993 galaxies which, together with data from the literature, amount to 1594 galaxy redshifts for this study. From the 72 cluster candidates with mean redshifts, 51% revealed a single significant peak in redshift space, while 45% showed more than one and 4% did not show any. Moreover, 56 of them were found to be probable real clusters, while 7 may result from chance alignment of only small groups. The distribution of the 3D clusters and groups found in Aquarius are shown in Figure 1. By applying a percolation analysis to the cluster data, we have found 2 rich superclusters in Aquarius region, at $z \sim 0.086$ and $z \sim 0.112$, respectively with 5 and 14 clusters, at a spatial number density contrast of about 10 ($R_{perc} = 10h^{-1}$ Mpc). For both of them, a number of smaller galaxy systems (at least 10 for each), probably poor clusters or groups, were also found to be part of the superclusters at the same percolation radius. The $z \sim 0.11$ supercluster is possibly connected to a $40h^{-1}$ Mpc filament of at least 7 clusters from 0.11 and 0.14. If we consider the mean velocity dispersion we obtained for rich clusters, a mean mass for groups (e.g. Maia et al. 1998, AJ, 115, 59), and a fraction of about one third for the dispersed component (Small et al. 1998, ApJ, 492, 45), we can estimate for the $z \sim 0.086$ and 0.112 superclusters the masses of at least $8 \times 10^{15}h^{-1}\mathcal{M}_\odot$ and $2 \times 10^{16}h^{-1}\mathcal{M}_\odot$, respectively. We also find possible cluster concentrations at 0.15, 0.17, 0.20 and 0.21, that need deeper photometry and spectroscopy to be confirmed. We have also found significant signals of alignment (above 4σ) between galaxies themselves and between them and the large scale structures in Aquarius.

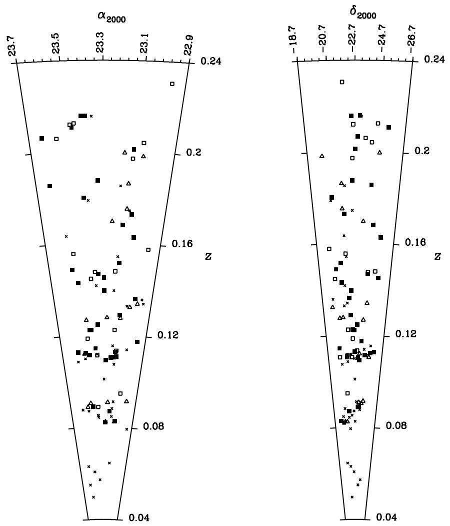

Fig. 1. Distribution of the 56 probable rich clusters: 37 single peak (solid squares) and 19 subject to small groups superposition (open squares); and 53 possible poor clusters or groups: 18 from double significant peaks (open triangles) and 35 small groups (crosses), in right ascension and declination projections. Angular coordinates are expanded to the ratio 1.5:1 over radial coordinate for clarity.

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