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POPULATION OF FAINT GALAXIES IN CLUSTERS

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We investigate the possibility that cD halos could be formed by the disruption of galaxies in rich relaxed clusters that show a flat faint end galaxy luminosity function (López-Cruz et al., ApJ. 475, 97, 1997). We have analized the galaxy luminosity function (GLF) of nearby clusters taken from the Abell et al. (ApJ, 407,L49,1989) catalog and the X-ray Sample of Bright Clusters (hereafter BCS, De Grandi et al., ApJ,514,1488,1999).

Determining the GLF down to faint magnitudes in rich clusters has been subject of many studies in last years. Valotto et al. (Apj,546,157,2001) have analized several sources of systematics effects present in the observational deteminations of the GLF in clusters. The X-ray emission of the hot intracluster gas provides a confirmation of the presence of a bound galaxy cluster. Therefore, in order to measure the true GLF in clusters it is wise to restrict the cluster sample to those in an X-ray-selected sample. We use the standard background subtraction procedure to obtain the GLF. The results for the different samples are shown in Figure 1. We find that galaxy clusters selected by means of their X-ray emission show a flat luminosity function (faint end slope $\alpha \simeq -1.1$) consistent with that derived for the field and groups. By contrast, the sample of Abell clusters that do not have an X-ray counterpart shows a galaxy luminosity function with a steep faint end ($\alpha \simeq -1.6$), Fig 1(a) and 1(b).

We find that for the subsample of clusters with dominant central galaxies (Bautz-Morgan type I and I-II) the shape of the faint end galaxy LF depends on the detection of the X-ray emission of the intracluster gas. In fact, we derive a steep galaxy LF for the subsample of clusters with central dominant galaxies with no detected X-ray intracluster emission, Fig 1(c). This fact argues against the hypothesis that the disruption of faint galaxies would provide the material out of which cD halos form causing a flattening of the faint end slope. Our results provide support to the presence of biases on the galaxy LF determination in clusters due to projection effects. Clusters identified from the projected galaxy distribution result in many spurious clumps with no physically bound system along the line of sight. Furthermore, the fact that no significant correlation between X-ray luminosity and the galaxy LF faint end slope is found argues against processes associated to the gaseous environment causing the differences in the galaxy LF faint end slope, Fig 1(d).

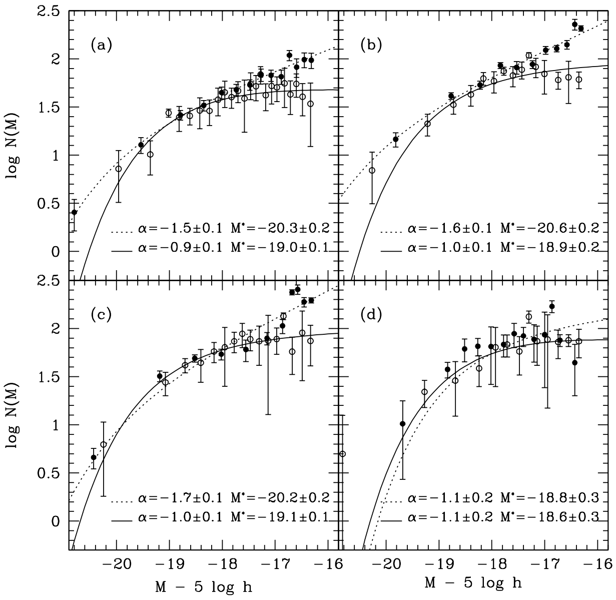

Fig. 1. (a) GLF from BCS clusters (15 objects), open circles, and Abell clusters (35 objects), solid circles. (b) GLF from BCS clusters that are also within the Abell catalog (9 objects), open circles, and Abell clusters with no X-ray counterpart (20 objects), filled circles. (c) GLF for clusters with Bautz-Morgan types I and I-II of the BCS with Abell identification (6 objects), open circles, and Abell clusters with no X-ray counterpart (10 objects), filled circles. (d) GLF for BCS clusters with low X-ray luminosity (4 objects), open circles, and high luminosity (5 objects), filled circles. Schechter function fits with the corresponding parameters are shown.

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