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Photometric Properties of Low-Redshift Galaxy Clusters

W. A. Barkhouse and H. K. C. Yee
Department of Astronomy, University of Toronto, 60 Saint George Street, Toronto, ON, M5S 3H8, Canada

O. López-Cruz
INAOE-Tonantzintla, Tonantzintla Pue. México

1. Preliminary Results

A recent comprehensive photometric survey of 45 low-z X-ray selected Abell clusters (López-Cruz 1997) has measured significant variations in the faint end slope of the luminosity function (LF). This result indicates that dwarf galaxies (dGs) comprise a different fraction of the cluster population as a function cluster environment. Clusters having a central "cD-like" galaxy have a flatter faint end slope than non-cD clusters. Also, cD clusters were found to have a dwarf-to-giant ratio (D/G) which was smaller than non-cD clusters. López-Cruz et al. (1997) has suggested that the light contained in cD envelopes can be accounted for by assuming that it is produced from stars that originally formed dGs. In this simple model, the D/G would be expected to increase with radial distance from the cluster centre due to the decrease in the disruptive forces.

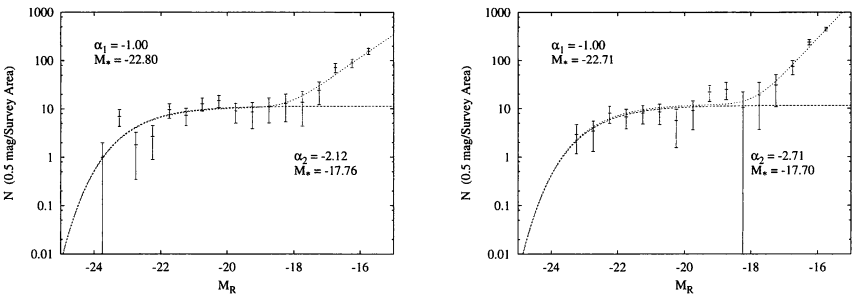

Figure 1. A2151 LF for the inner (0.0-0.75 Mpc) and outer (0.75-1.50 Mpc) radial bin. The LFs are modelled using two Schechter functions with a significantly flatter faint end slope for the inner cluster region (top left).

2. Preliminary Results

In order to test the dG disruption model, B and R band images of a sample of 27 low-z ($0.02 \leq z \leq 0.04$) Abell clusters have been obtained with the 8k CCD mosaic camera on the KPNO 0.9m telescope ($1^{\circ} \times 1^{\circ}$ field of view). These

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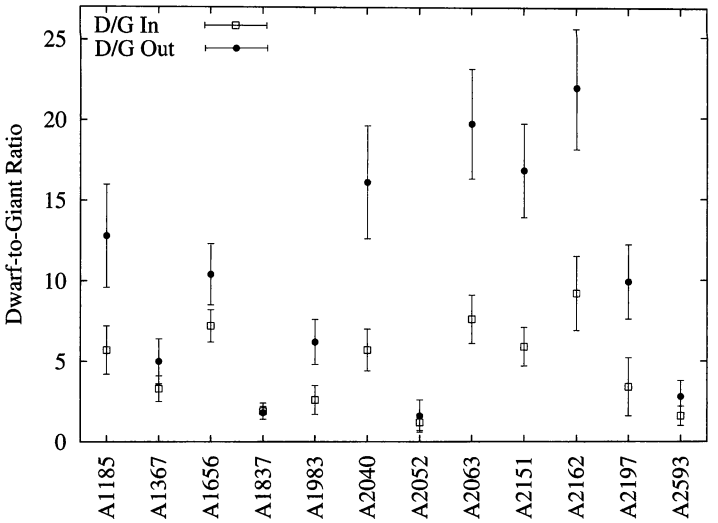

Figure 2. The dwarf-to-giant ratio is depicted for the inner and outer region of each cluster. The majority show a significant difference in the D/G between the two radial regions, in the sense that the D/G is larger in the outer region.

observations will allow us to probe several magnitudes deeper than the López-Cruz (1997) survey and provide a definitive measure of the dG LF. Preliminary LFs and D/G ratios have been calculated for twelve clusters. Nine of these clusters can be modelled using two Schechter functions: a fixed $\alpha = -1.0$ for the bright component, and $\alpha < -1.0$ for the faint component (see Figure 1). The majority of the clusters have a significantly flatter faint end slope in the inner region (0.0-0.75 Mpc) as compared to the outer radial annulus (0.75-1.5 Mpc). The D/G, defined as the number of galaxies with $-19.0 \leq M_R \leq -15.0$ to those with $M_R < -19.5$, is depicted in Figure 2 for the inner and outer radial regions of each cluster. The majority of these clusters show a significant difference in the D/G between the two radial regions, in the sense that the D/G is larger in the outer region. These observations are consistent with the dwarf disruption model (López-Cruz 1997).

References

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