

SUBSTRUCTURE IN RICH CLUSTERS

Rachel Webster

Department of Astronomy, University of Toronto.

Michael Fitchett

CITA, University of Toronto.

Paul Hewett

Institute of Astronomy, Cambridge.

Matthew Colless

Department of Physics, Durham University.

We have developed a new statistical method based on maximum likelihood to test for the existence of two subclumps in data of arbitrary dimensionality (Fitchett 1987). The statistic, which is called the Lee function, can be calibrated using Monte Carlo simulations under various null hypotheses.

We have used this method to test for the existence of substructure in the central region of Coma (Fitchett and Webster 1987). We have analysed the 3-D data of Kent and Gunn (1982), and the 2-D data of Godwin and Peach (1977). The 2-D data is shown to have two subgroups at a statistically significant level. Two-body models with radial and circular orbits are calculated using virial determinations of the mass. Although the analysis has assumed that only two subclumps are present, the real distribution is probably more complex. If this analysis withstands the acquisition of new data, the central region of Coma is not relaxed.

The statistic has also been applied to the Cambridge sample of rich clusters (Colless and Hewett 1987). We have ~ 40 radial velocities for 14 rich southern clusters. About 35% of the clusters show substructure in the 2-D plots which is due to field galaxies. Five of the 14 clusters have significantly more field galaxies in the central region than would be predicted from the galaxy field counts. Application of the Lee statistic to the cluster galaxies suggests that ~ 5 of the clusters show evidence for substructure in the central regions. Dynamical models of the clusters have also been calculated.

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