

EVOLUTIONARY STATUS OF GALAXY POPULATION IN CLUSTERS AT INTERMEDIATE REDSHIFT ($z \sim 0.2$)

Emilio Molinari, Dolores Pedrana, Massimo Banzi,
Alberto Buzzoni and Guido Chincarini

Osservatorio Astronomico di Brera
Via Brera, 28 20121 Milano, Italy

In this contribution we present observations for a set of three clusters of galaxies at intermediate redshift ($z \sim 0.2$) selected from the revised Abell catalog (Abell *et al.* 1989, *Ap.J. Suppl.*, **70**, 1) and observed in the Gunn photometric system at the ESO 3.6m telescope in La Silla (Chile) during various runs between 1986 and 1990. This is part of a more extended project addressing the study of the distant clusters, as outlined in more detail in Molinari *et al.* (1990, *M.N.R.A.S.*, **246**, 576).

Member galaxies and *bona fide* galaxy types have been determined considering isophotal radii and their location in the color-magnitude and two-color diagrams. A marked concentration of red galaxies around $(g - r) \sim 0.8$ clearly appear in the cluster population. They can be easily located redshifting the present-day colors of ellipticals with a little amount of blueing ($\Delta(g - r) \sim 0.03$ mag) due to quiescent evolution, as estimated on the basis of the models for stellar population synthesis (Buzzoni 1989, *Ap.J. Suppl.*, **71**, 817).

The evidence emerging from our work is that also distant clusters appear to be dominated by quite normal, i.e. quiescent, galaxy populations. If ongoing star formation in some ellipticals cannot be firmly excluded (as indicated for instance by emission-line or E+A galaxies) this could probably not fully account for the excess of blue objects in the Butcher & Oemler (1984, *Ap.J.*, **285**, 426) effect. In spite of the three clusters statistics, we note that f_B correlates with the Bautz-Morgan type that could be regarded as a measure of the dynamical relaxation of a cluster (White 1976, *M.N.R.A.S.*, **177**, 717). Thus gas cooling flows and/or galactic tidal stripping (Fabian *et al.* 1982, *M.N.R.A.S.*, **180**, 479) would probably help in leaving fewer blue objects in older (low-redshift) relaxed environments.

Fig. 1 – Two-color diagrams for cluster galaxy populations. Top right panel displays the locus expected for different galactic morphological types with varying redshift from $z = 0$ to 1 (in the sense of increasing $g - i$). Boldface marks the location expected for galaxies in our relevant range ($z = 0.15 - 0.22$). Loci for late-type galaxies have been calculated from Pence (1976, *Ap.J.*, **203**, 39) and Coleman *et al.* (1980, *Ap.J. Suppl.*, **43**, 393) while ellipticals are tracked by evolutionary models of Buzzoni (1989).

