

# EVOLUTION OF THE COLOUR-MAGNITUDE RELATION OF ELLIPTICAL GALAXIES

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This paper presents the quantitative analyses of evolution of the colour-magnitude (C-M) relation of early type galaxies in 9 distant clusters (AC 103 [ $z=0.31$ ], AC 114 [0.31], AC 118 [0.31], Cl 0024+16 [0.39], Cl 0412-65 [0.51], Cl 0016+16 [0.546], Cl 0054-27 [0.563], GH0 1603+43 [0.895], and 3C 324 [1.206]) at  $0.3 < z < 1.2$  based on the evolutionary model of elliptical galaxies (Kodama & Arimoto 1997, *A&A*, 320, 41). The model is calibrated to reproduce the C-M relation of Coma ellipticals at  $z = 0$  (Bower, Lucey, Ellis 1992, *MNRAS*, 254, 589) and gives the evolution of slope and zero-point of the C-M relation as a function of redshift. The slopes of C-M relation can be reproduced by a single model sequence in which mean stellar metallicities of ellipticals are varied as a function of galaxy luminosity and ages are assumed to be equally old. The zero-points of C-M relation of the two most distant clusters (GH0 1603+43, 3C 324) put constraint on the epoch of major star formation in early type galaxies that should be  $z > 2 - 4$ . The cluster early type galaxies are suggested to be uniformly old and to have universal metallicity sequence as a function of galaxy mass. We find no significant difference of C-M relation among the different clusters. This will put strong constraint on the formation of clusters of galaxies as well, since they must have shared a common formation mechanism to produce the homogeneous C-M relation.