EVOLUTION OF THE COLOUR-MAGNITUDE RELATION OF ELLIPTICAL GALAXIES

TADAYUKI KODAMA[1,2], NOBUO ARIMOTO[2], AMY BARGER[1,3]
AND
ALFONSO ARAGÓN-SALAMANCA[1]
[1] Institute of Astronomy, University of Cambridge, Madingley Road, Cambridge, CB3 0HA, UK
[2] Institute of Astronomy, University of Tokyo, Mitaka, Tokyo 181, Japan
[3] Institute for Astronomy, University of Hawaii, 2680 Woodlawn Drive, Honolulu, Hawaii 96822, USA
e-mail: kodama@ast.cam.ac.uk

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], GHO 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 relaiton 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 (GHO 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.

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