

[구GC-10] The Relationship Between Bright Galaxies and Their Faint Companions in Abell 2744, an Ongoing Cluster-Cluster Merger

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It is widely accepted that the evolution of galaxies is accelerated in dense environments. According to recent studies, however, the evolution by direct interactions between galaxies is known to be most active in a galaxy group rather than in a galaxy cluster. In particular, the central galaxy in a group is closely related to its satellites in the properties such as morphology, color and star formation rate, because those galaxies evolve together in a small-scale environment. Currently, however, it is not yet studied well whether such conformity between bright galaxies and their faint companions remains after a galaxy group falls into a galaxy cluster. Recently, Lee et al. (2014) have found that the colors of bright galaxies show a measurable correlation with the mean colors of faint companions around them in WHL J085910.0+294957, a galaxy cluster at $z = 0.3$, which may be the vestige of infallen groups in the cluster. As a follow-up study, we study Abell 2744, an ongoing cluster-cluster merger at $z = 0.308$, using the HST Frontier Fields Survey data. The cluster members are selected based on the distributions of color, size and concentration along magnitude. The correlation in color between bright galaxies and their companions is not found in the full area of Abell 2744. However, when the area is limited to the southeastern part of the Abell 2744 image, the mean color of faint companions shows marginal dependence ($> 2\sigma$ to Bootstrap uncertainties) on the color of their adjacent bright galaxy. We discuss the implication of these results, focusing on their dependence on local environments.