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BCGs evolution in the last 6 Gyr: feedback processes versus merger events

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Abstract

We present results on the evolution in the last 6 Gyr of the structural parameters of two samples of brightest cluster galaxies (BCGs). The nearby sample of BCGs consist on 69 galaxies from the WINGS survey spanning a redshift range of $0.04 < z < 0.07$. The intermediate redshift ($0.3 < z < 0.6$) sample is formed by 20 BCGs extracted from the Hubble Space Telescope archive. Both samples have similar spatial resolution and their host clusters have similar X-ray luminosities. We report an increase of a factor of 2 in the size of the BCGs from intermediate to local redshift. However, we do not detect any variation in the Sérsic shape parameter in both samples. These results are proved to be robust since the observed tendencies are model independent. We also obtain significant correlations between some of the BCGs parameters and the main properties of the host clusters. More luminous, larger and centrally located BCGs are located in more massive and dominant galaxy clusters. These facts indicate that the host galaxy cluster has played an important role in the formation of their BCGs. We discuss the possible mechanisms that can explain the observed evolution of the structural parameters of the BCGs. We conclude that the main mechanisms that can explain the increase in size and the non-evolution in the Sérsic shape parameter of the BCGs in the last 6 Gyr are feedback processes. This result disagrees with semi-analytical simulation results supporting that merging processes are the main responsible for the evolution of the BCGs until the present epoch.