Statistical properties of central cool component in galaxy clusters

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Abstract

We performed systematic analysis of ASCA data of 85 brightest clusters and studied statistical properties of the sample clusters, in particular, X-ray characteristics of the central cool components. ASCA spectra were analyzed with a two temperature model, in which a hot isothermal component is distributing in entire cluster region while in the central region a cool component is allowed to coexist with the hot component making two-phase plasma. We found that X-ray luminosity vs temperature relation of the cool components, $L_{\rm c} - T_{\rm c}$ relation, is almost identical to that of the hot components, $L_{\rm h} - T_{\rm h}$ relation. This strongly suggests that the cool components are related to another gravitational bound object, which inset into the host cluster. Another important finding is that the cool component temperature is always very close to half of the hot component temperature, e.g. $T_{\rm c} = T_{\rm h}/2$. Our detailed analysis of XMM data of ABELL1795 shows that stellar velocity dispersion in the central region agrees with the temperature of the cool component. We can then conclude that the central cool component shows no indication of cooling with respect to the central gravitational potential depth. X-ray radiative cooling has to be compensated by unknown heat source.

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