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A study on Thermal Conditions at the Central Regions of non-cD Clusters of Galaxies

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Observations with past satellites revealed marked differences between cD and non-cD clusters of galaxies in the properties of their intra-cluster medium (ICM) at their central regions. Around the cD galaxy of a cD cluster, the ICM temperature decreases towards the center, and the X-ray surface brightness shows a strong excess emission(e.g., Jones and Forman1984). Previously, these effects were believed to be a result of radiative ICM cooling (i.e., cooling flow hypothesis). However, observations with ASCA and later missions (e.g., Makishima et.al 2001) ruled out this interpretation and showed the necessity for some mechanisms which suppress the predicted cooling flows. While the phenomena around cD galaxies are thus of great interest, the present study focuses on non-cD clusters, which are much simpler than cD clusters. In fact, the ICM of non-cD clusters are known to be nearly isothermal even at their centers, without evidence of the cool component. Furthermore, a closer look at Abell 1060 with Chandra (Hayakawa et al. 2004) and Suzaku (Sato et al. 2007) reveals that the ICM of this a prototypical non-cD cluster is even hotter inside a central 200 kpc radius region. This suggests the presence of some ICM heating mechanisms in central regions of non-cD clusters. The primary goal of this study is to clarify thermal conditions of the ICM at the central regions of non-cD clusters, and quantify their differences from cD clusters. We will present radial temperature profiles from the analysis of XMM-Newton and Suzaku data of several non-cD clusters that are regular and are of medium richness.