学位申請論文公開講演会

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場所　：物理会議室 - 理学部C館422号室
題目　：Nature of X-ray sources in nearby poor cluster of galaxies
(近傍銀河団におけるX線源の起源)

Abstract

Since the question of how the cluster environment and activities in member galaxies affect each other remains as an unsolved, interesting question at the present and properties of active galactic nuclei (AGNs) in clusters are important diagnostics of cluster formation and galaxy evolution, we are undertaken a study of the population of X-Ray point like structures around selected two cluster of galaxies and quantify the content of clusters relative to the field.

Several studies state a higher X-ray point source population for cluster fields, however a quantitative comparative investigation is very few. Having this motivation, we have selected two nearby ($z \leq 0.02$), poor and X-ray faint cluster of galaxies of Abell 194 and Abell 1060 for our survey. We have detected about 90 low-luminous sources from cluster fields with $L_X \geq 3 \times 10^{39}$ ergs s^{-1}. The ICM diffuse emission of our cluster sample is not very luminous, individual sources well stands out particularly, which qualifies our cluster environments as good laboratories.

The integrated number of sources as a function of flux, $\log(N)$-$\log(S)$ normalized to our survey area between 2-10 keV is measured and found a significant excess of the source population relative to the non-cluster field. Based on the X-ray color classifications, we find the absorbed sources to be 46% of the unabsorbed sources for A194 cluster field. The ratio for A1060 is 63%. The fraction of type-II/type-I is found to be higher in the cluster environment than the noncluster field of Lockman Hole ($0.46-0.63 > 0.25$). The source volume number densities of cluster and field are compared. We found about 3-order number excess from clusters with respect to the fields within the luminosity range of $39.6 \leq log(L_X) \leq 40.8$ ergs s^{-1}. In order to test the part of this excess associated to galaxies in optical bands, galaxy luminosity functions (GLF) of clusters and that of the field are evaluated. GLF from clusters also showed a factor-175 excess at maximum. If the same amounth of point like X-ray emission complimented to this optical galaxy excess, there is still a minimum factor 6 excess of X-ray point like emission from the cluster regions. Given the limiting sensitivity and corresponding to the luminosity $L_X \sim 10^{39}$ ergs s^{-1} at the cluster distance, the intrinsic source emission is dominated by X-ray binaries. X-ray to optical luminosity ratio results also show that the sources from the cluster fields are about an order brighter than the expected L_X/L_B levels. If the point sources detected in these fields are indeed at the cluster redshift, the sources without optical identifications are likely to be LLAGNs. The detected point source population seems to be a blend of LMXBs and LLAGNs. Our survey results suggest that active galaxies are crowded in cluster fields.