The Entropy-Feedback Connection and Quantifying Cluster Virialization

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Understanding the entropy of intracluster gas is the key to understanding 1) the feedback mechanisms active within clusters and 2) the role of the cluster environment on galaxy formation. Our presented work focuses on examining feedback mechanisms together with the breaking of self-similar relations expected in cluster and galaxy formation models with star formation and AGN. In this poster, we present and describe radial profiles of the entropy distribution in cluster gas. We also examine a metric proposed to quantify the degree of cluster virialization which may in turn reduce scatter in scaling relations, thus increasing clusters utility in cosmological studies.

We have assembled a library of entropy profiles for a sample of 100 clusters in the *Chandra* Data Archive (CDA) covering broad mass and morphological ranges, together with the radio and optical properties of the central galaxy. We will discuss the interconnection of central entropy with radio luminosity and Hα emission. We will describe the distribution of central entropy levels in our sample and briefly discuss what can be learned about the range of central heating mechanisms and the timescale of feedback mechanisms from this distribution.

We will also present recently completed work for which we explore the band-dependence of the inferred X-ray temperature of the ICM for 179 clusters selected from the *Chandra* archive. We compare the X-ray temperatures inferred for single-temperature fits of global spectra (with the central R=70 kpc excluded and an outer radius of R_{2500}) when the energy range of the fit is 0.7-7.0 keV (full) and when the energy range is 2.0/(1+z)-7.0 keV (hard). We find, on average, the hard-band temperature is significantly higher than the full-band temperature. Upon further exploration, we find the ratio $T_{HFR} = T_{2.0-7.0}/T_{0.7-7.0}$ is enhanced preferentially for clusters which are known merger systems and for clusters which do not have detectable cool cores. Annular regions surrounding cool core clusters tend to have best-fit hard-band temperatures that are statistically consistent with their best-fit full-band temperatures.