**Study of Galaxy Clusters as Standard Bucket Using Chandra X-Ray Satellite Data**

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ABSTRACT

Clusters of galaxies are the most massive structure in the universe, confined together in gravitationally bound systems with typical mass in the range of 1013 M🞊 - 1015 M🞊. Clusters of galaxies may be considered as self-similar, meaning that the properties of low mass clusters can be scaled up from the properties of more massive clusters, or vice versa. Cluster of galaxies have been thought to have standard mass fraction of gas, independent of redshift or total mass, and therefore have been proposed to be used as “standard bucket”. The purpose of this work is to check the validity of gas mass fraction as standard bucket by studying larger sample than those analyzed by Mantz et al. (2014). The data set are employed here consists of Chandra observations of 47 such relaxed clusters at redshift 0.069 ≤ z ≤ 1.063. The results of this study show that compared to the differential gas fraction (fgas,diff), the cumulative gas mass fractions (fgas,2500) of the total sample of clusters are less dependent to the total mass M2500 and redshift. Relation between gas mass fraction and total mass M2500 suggests that massive clusters are more reliable to be used as standard bucket.

*Keywords: cluster of galaxies; standard bucket; gas mass fraction; and cosmological probe*