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Virial Masses from the Hectospec Cluster Survey (HeCS) and the Sunyaev-Zeldovich Effect

Kenneth Rines, Margaret J. Geller, Antonaldo Diaferio

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We present the first comparison of a large sample of virial masses of galaxy clusters with their Sunyaev-Zel'dovich (SZE) signals. We study 15 clusters from the Hectospec Cluster Survey (HeCS) with MMT/Hectospec spectroscopy and published SZE signals. We measure virial masses of these clusters from an average of 90 member redshifts inside the radius r_{100}. The virial masses of the clusters are strongly correlated with their SZE signals (at the 99% confidence level using a Spearman rank-sum test). This correlation suggests that Y_{SZ} can be used as a measure of virial mass. Simulations predict a powerlaw scaling of $Y_{SZ}\propto M_{200}^\alpha$ with $\alpha\approx$1.6. Observationally, we find α=1.11$\pm$0.16, significantly shallower than the theoretical prediction. More detailed studies of scaling relations may be needed to understand the relation between cluster mass and SZ signal.

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