

# The Stellar Mass Fractions of Clusters of Galaxies

*Saturday, 21 January 2023 16:30 (1h 30m)*

We determine the total stellar mass fraction (stellar mass/total mass) in clusters of galaxies using data from the Dark Energy Survey for  $\sim 300$  clusters in the redshift range 0.2-0.3 (Zhang et al. 2019). We use the total observed luminosity of the clusters, including their Brightest Cluster Galaxy (BCG), satellite galaxies, and Intracluster Light (ICL). Previous studies claimed that clusters are inefficient in star formation when investigating the stellar light in the BCG relative to the total cluster mass; the stellar mass of the BCG relative to the total cluster mass drops sharply with increasing cluster mass. Here we find that when the total stellar mass in clusters is included, as obtained from the total cluster luminosity, clusters are not inefficient in star formation. In fact, we find that clusters are as efficient in star formation as expected from the sum of their individual cluster members. We find the total stellar mass fraction in rich clusters to be  $\sim 1.5\% \pm 0.6\%$ , exactly as expected from the sum of the luminosity function of cluster members, which have stellar mass fractions that range from  $\sim 3\%$  for bright  $L^*$  galaxies to very low stellar mass fractions for fainter galaxies. The BCGs simply do not grow their stellar light as fast as clusters grow their mass. This is indeed expected since merging clusters grow their mass continuously, while BCGs merge and grow only occasionally. Finally, we find that the total stellar mass traces the total mass of clusters well. This can potentially offer a new tracer of total cluster mass.

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**Session Classification:** Poster Session + Grad/Career Fair