
YZiCS: Preprocessing of dark halos in the hydrodynamic zoom-in simulation of clusters

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Abstract

To understand the assembly of the galaxy population in clusters today, it is important to first understand the impact of previous environments prior to cluster infall, namely preprocessing. We use YZiCS, a hydrodynamic zoom-in simulation of clusters, to determine the significance of preprocessing focusing primarily on the tidal mass loss of dark matter halos. We find $\sim 48\%$ of the cluster member halos were once satellites of another host. The preprocessed fraction is not a clear function of cluster mass. Instead, we find it is related to each individual cluster's recent mass growth history. We find that the total mass loss is a clear function of time spent in a host. However, two factors can considerably increase the mass loss rate. First, if the satellite mass is approaching the mass of its host. Second, when the halo suffers tidal mass loss at a higher redshift. The preprocessing provides an opportunity for halos to experience tidal mass loss for a more extended period of time than would be possible if they simply fell directly into the cluster. From a sample of heavily tidally stripped members in clusters today, nearly three quarters were previously in a host. Thus, visibly disturbed cluster members are more likely to have experienced preprocessing.

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