Locating Clusters in Photometric Surveys to Understand Environmental Quenching Mechanisms at $0.5 < z < 2$

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Linking Galaxy Evolution with Environment

Dressler (1980)
The UKIDSS Ultra-Deep Survey

DR8 (this work):
\[ K = 24.6, \ H = 24.2, \ J = 24.9 \]

Final Release:
\[ K = 25.3, \ H = 24.8, \ J = 25.4 \]
(AB, 5σ, 2” apertures)

Deepest IR survey over this area.
UDS: Photometry in 12 bands

Hartley et al. 2013
\[ \frac{\delta z}{1+z} \approx 0.03 \]
Cluster Detection Method

- Based on the Friends of friends (FoF) algorithm:
  - Linking distance in projected space (\( d_{\text{link}} \)).
  - Linking distance in redshift space (\( z_{\text{link}} \)).

- If the number of objects detected reaches the threshold of 10 they are considered a group/cluster.
Radial Distribution of Galaxies

N < 18

18 < N < 45

N > 45

fraction

fraction in the field

r (kpc)
Conclusions

- We detect 250 groups and clusters in the UDS field in the redshift range $0.5 < z < 2$, which includes previously confirmed ones (Finoguenov et al. 2010).

- The passive galaxy population is confirmed to reside in the central region of clusters while the star forming fraction grows towards the outskirts.

- The crossover point between red and blue population scales with cluster richness.

- Post-starburst galaxies are found to reside in the inner parts of clusters, following a distribution rather similar to the red population.

- Future Work:

  Explore the detailed properties of the galaxy population as a function of richness, clustercentric radius and redshift.