

X18a **The Environmental Dependence of Galaxy Properties at $z=2$**

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We report on the environmental dependence of galaxy properties at $z=2.15$. We construct multi-band photometric data sets in the (proto-)cluster field PKS1138 and in the GOODS field. We then fit spectral energy distributions of the galaxies with model templates generated with the latest stellar population synthesis code and derive physical properties of galaxies from the fits.

We find that the PKS1138 galaxies have similar ages, shorter star formation time scales, lower star formation rates, and weaker dust extinctions compared to the GOODS galaxies at the same redshift. This trend is similar to that observed locally, suggesting that the environmental dependence of galaxy properties is already partly in place as early as $z=2.15$.

We show that the PKS1138 galaxies assemble the bulk of their masses 1 Gyr earlier than field galaxies, i.e., the galaxy formation depends on environment. Galaxy mergers should frequently occur during the first collapse of clusters and they may play an important role in driving the observed environmental dependence of galaxy properties.