

GOGREEN

# Transition Galaxies

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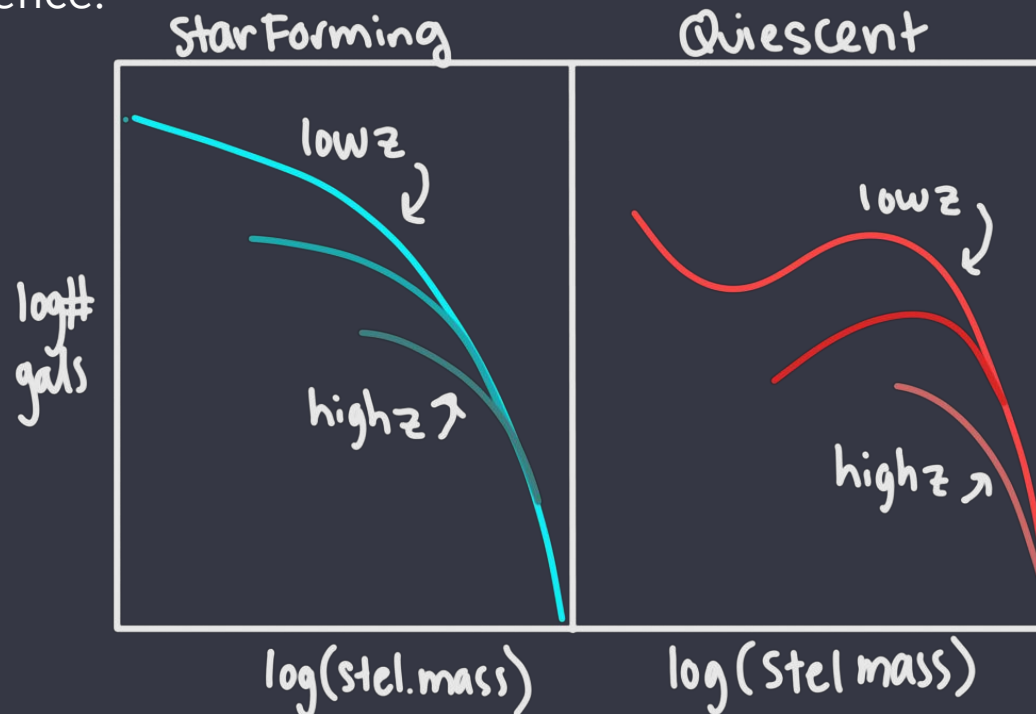
Michael Balogh

Anyia Forestell

GOGREEN Meeting- August 2020

# Galaxies in GOGREEN

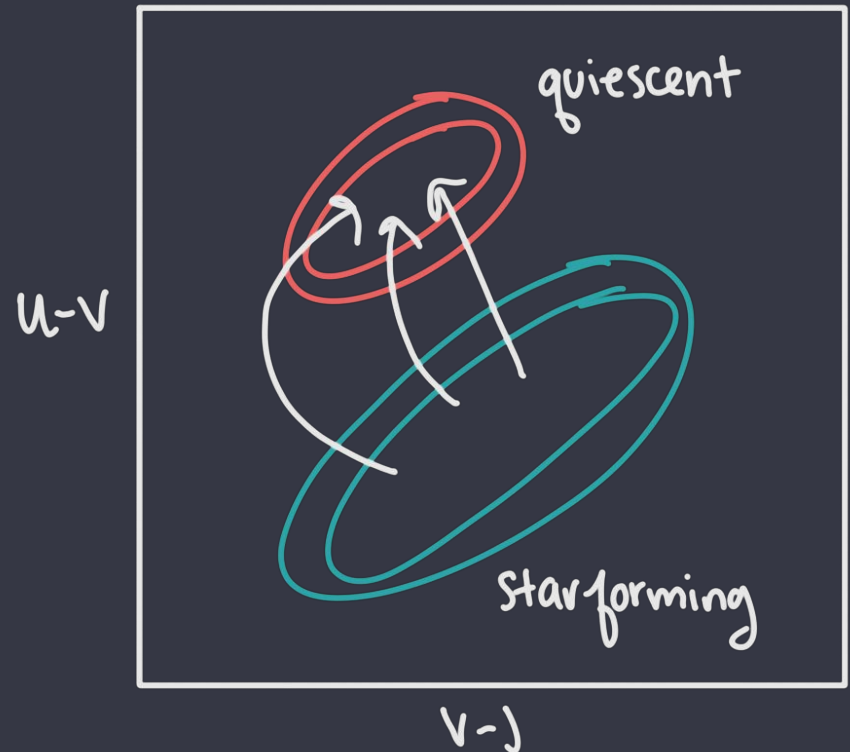
- Galaxy evolution is driven primarily by their **star formation**
- We know that the stellar mass function of star forming galaxies doesn't change drastically over time, but there is a **build up** of quiescent galaxies that no longer form stars.
  - This implies a motion of galaxies going from star formation to quiescence.



# Transition Between Populations

- There are different ways galaxies can move from the star forming population to quiescence
- To get an idea of how environment impacts galaxy evolution, we want to look at this transition population in the cluster vs. the field

We define a set of transition populations including: Post-Starbursts, Blue Quiescent Galaxies and the Green Valley

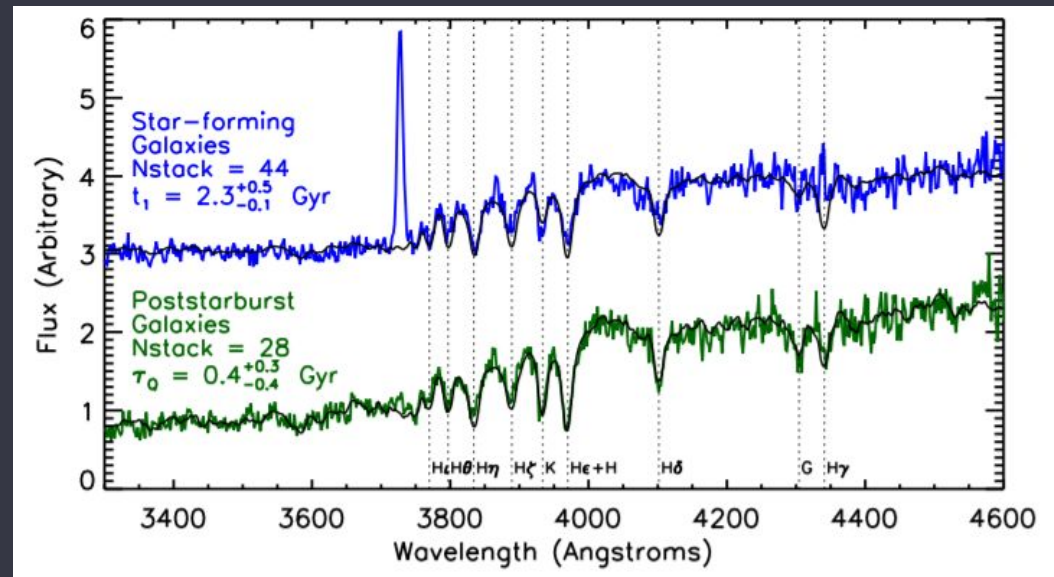
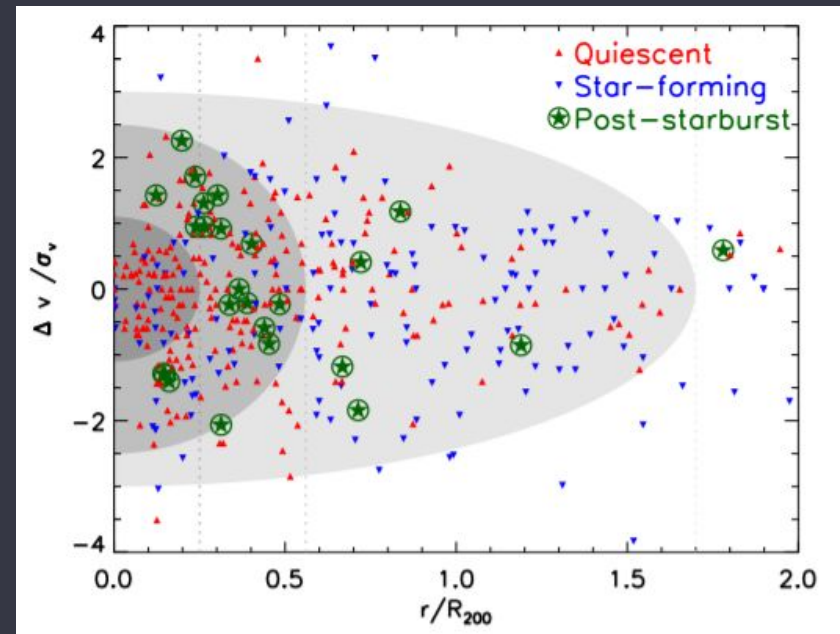


# Post-Starbursts

We define **post-starbursts** (Dressler & Gunn 1992) spectroscopically using their  $\Delta BIC$  criteria and their **D4000 break** as in Muzzin et. al. 2018.

These are meant to represent the population that is no longer star-forming, but was in the recent past.

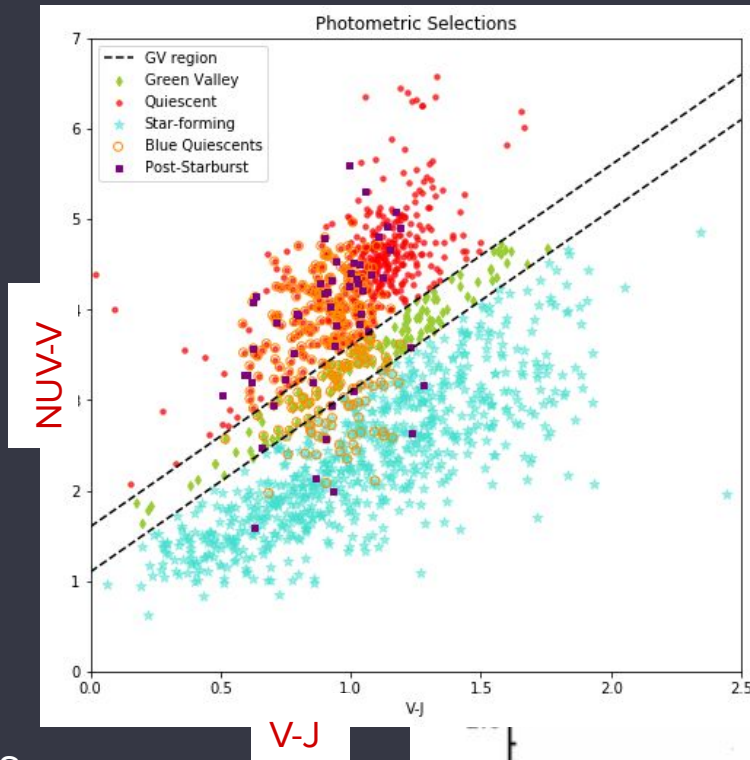
Their spectral signature shows evidence that they are linked to an infalling population



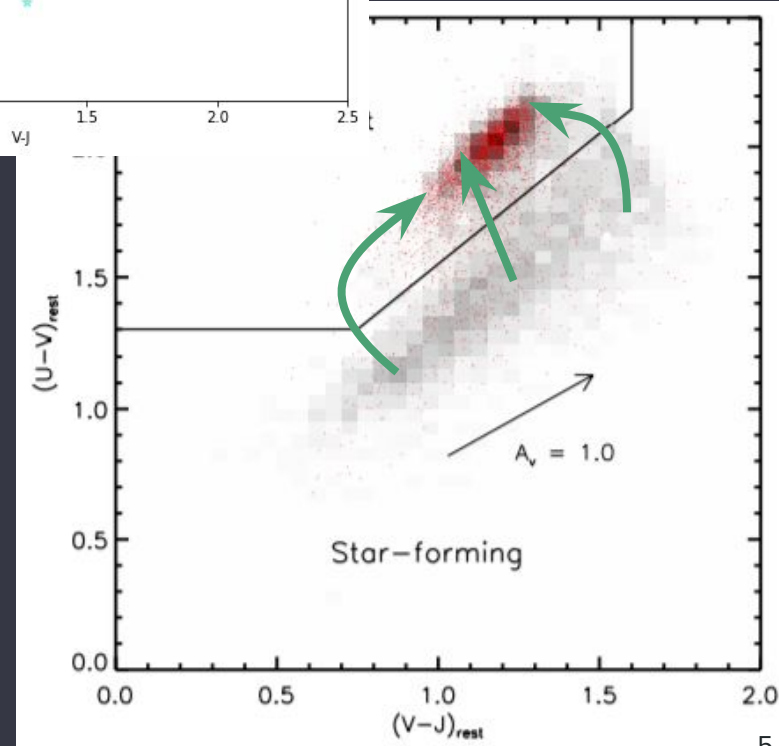
# Green Valley

When moving from the star forming sequence to the red cloud, **all galaxies** must **pass through** the region we have defined as the **Green Valley**.

We have selected this region in NUV-V-J space since it gives us better vertical definition between the two overdensities in colour-colour space, allowing us to better define the gap in between.



Van der Burg et. al. 2018

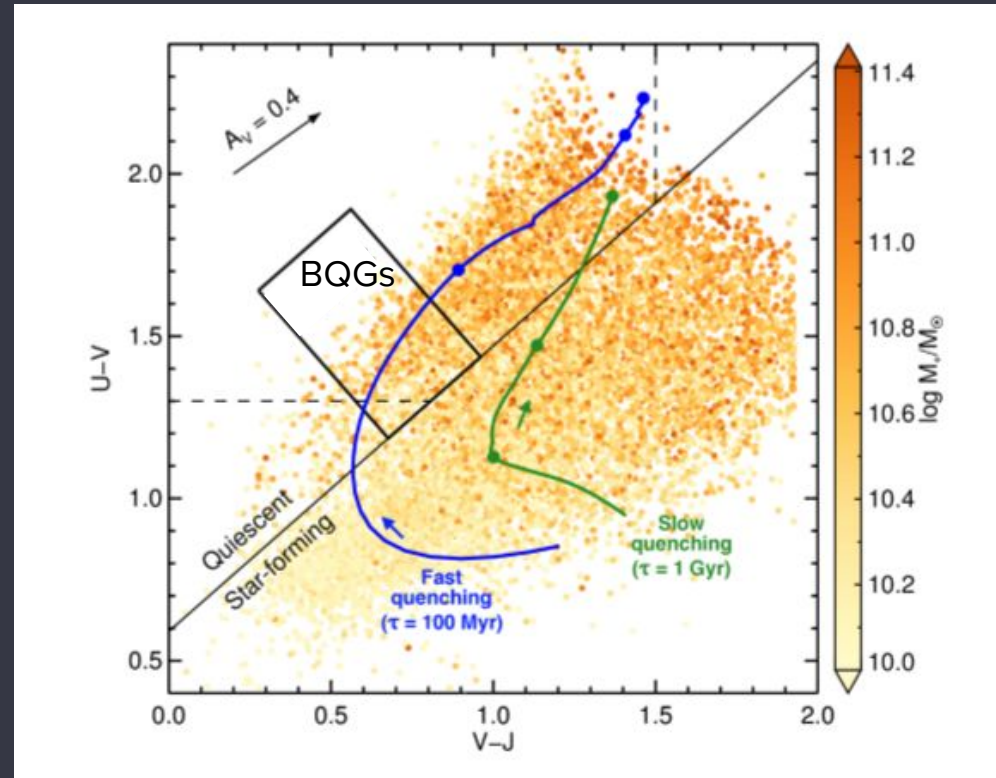


# Blue Quiescent Galaxies

Belli et. al. 2018

Quiescent galaxies can come about through fast or slow quenching processes. Those undergoing fast quenching populate the blue end of the red sequence.

We call this population the **Blue-Quiescent Galaxies** (BQGs)



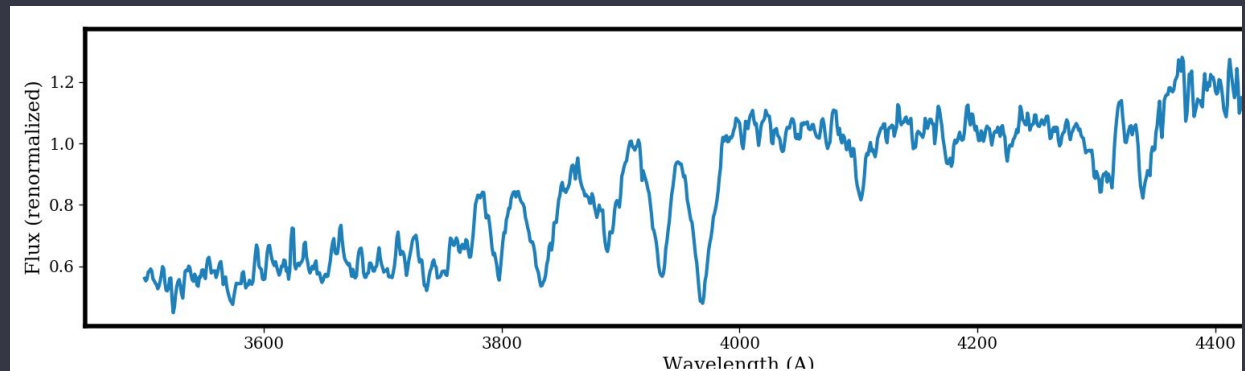
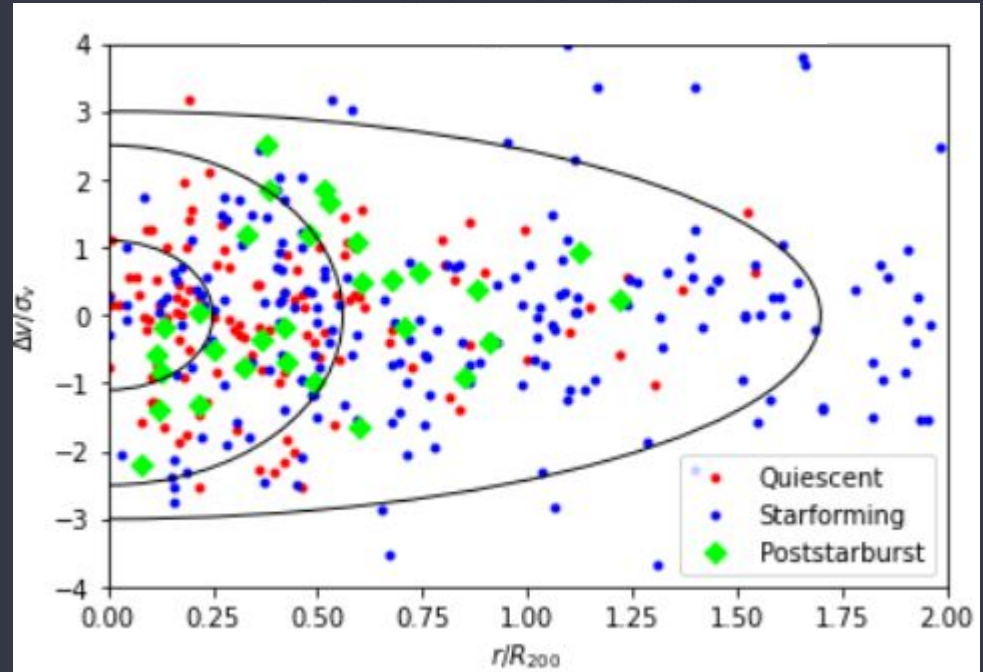
Here the quiescent population is shown as anything above the back diagonal line, the BQGs in the black box

# GOGREEN Post-Starbursts

Used  
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Making selections based on the OII features and the D4000 break do a pretty good job at picking out PSB like things

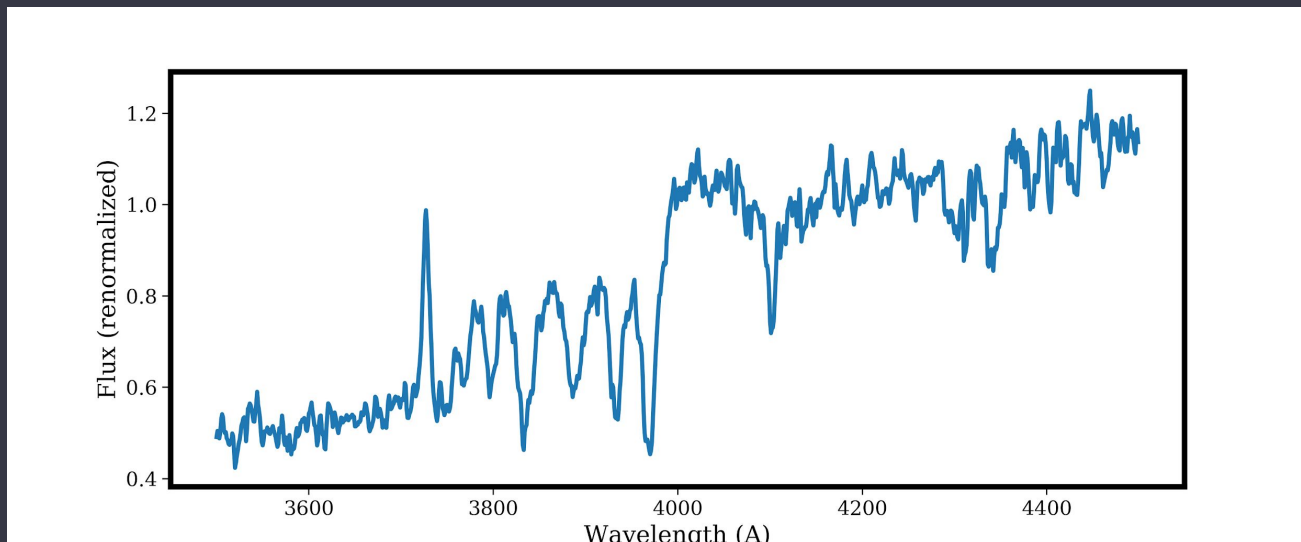
Balmer lines are pretty apparent with fairly strong H $\delta$



# GOGREEN Green Valley

The stack of the Green Valley spectra shows pretty strong H $\delta$ , with clearly visible OII emission. Based on the colour selection this is not unexpected.

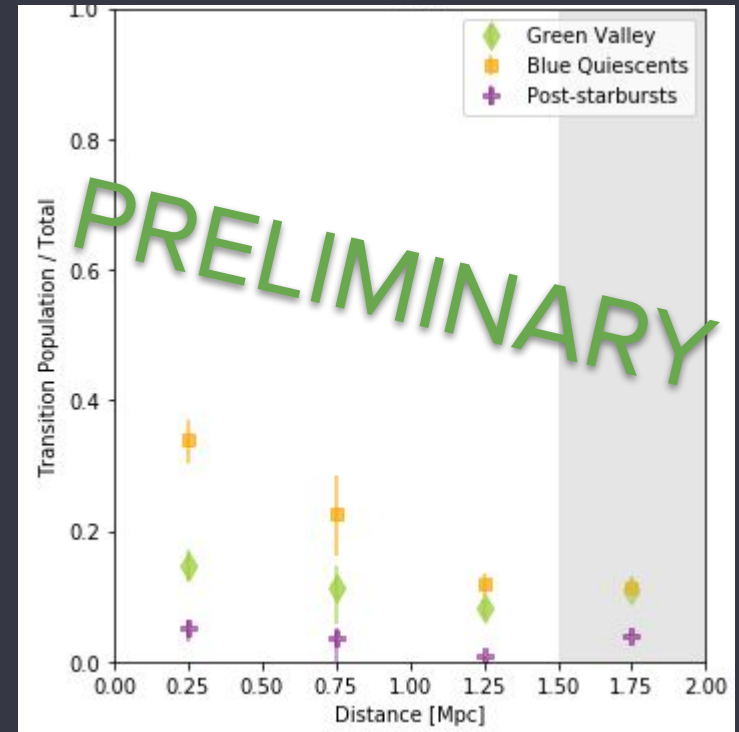
In individual spectra, some have low OII emission, but most have it





# Fraction of Transition Galaxies

In order to see the effect of environment, we compare the fractions of each transition population in both the cluster and the field.



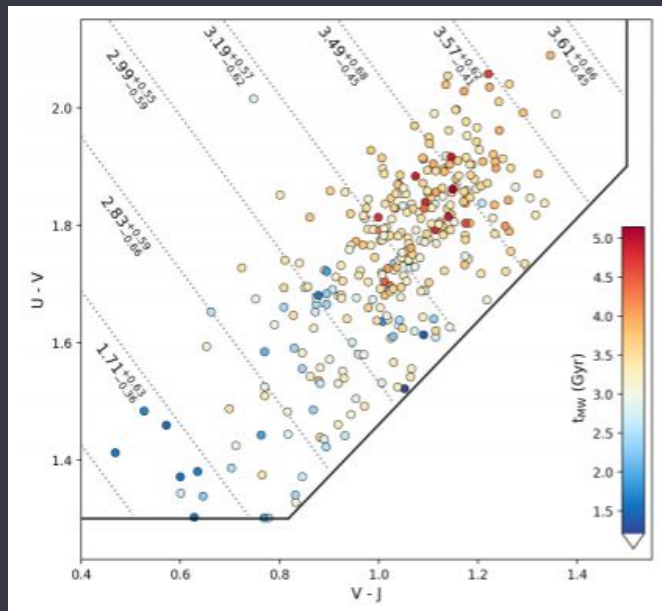
PRELIMINARY

	Inner Cluster	Mid-Cluster	Outer Cluster	Field
<b>Green Valley</b>	$0.146 \pm 0.02$	$0.113 \pm 0.05$	$0.081 \pm 0.01$	$0.109 \pm 0.003$
<b>Blue Quiescent Galaxies</b>	$0.338 \pm 0.03$	$0.227 \pm 0.06$	$0.120 \pm 0.01$	$0.112 \pm 0.003$
<b>Post-Starbursts</b>	$0.051 \pm 0.01$	$0.035 \pm 0.03$	$0.007 \pm 0.004$	$0.039 \pm 0.001$

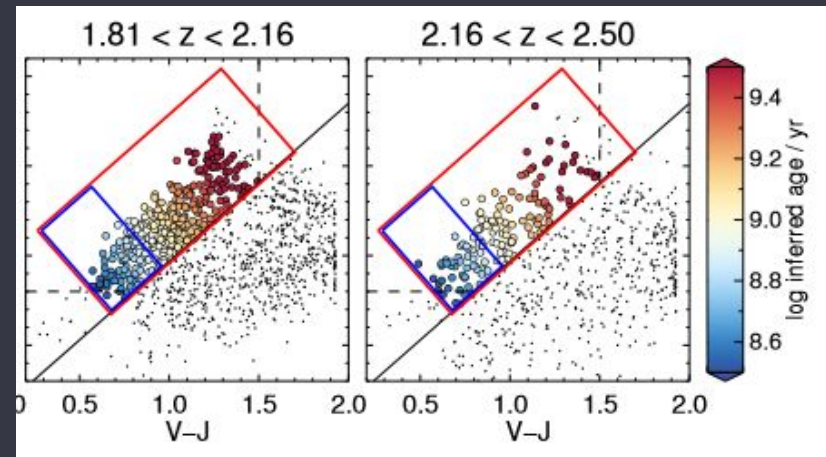
# More on Blue Quiescent Galaxies

Belli et. al. made use of deep, rest-frame optical spectroscopy ( $1.5 < z < 2.5$ ) using MOSFIRE, focusing on the **post-starburst** population; those galaxies that underwent **fast quenching**

- We have selected based on **UVJ colour** and spectroscopically derived **ages**



Belli et. al. 2018



Webb et. al. in prep