

Enhancement of rapidly quenched galaxies in distant clusters at $0.5 < z < 1.0$

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Socolovsky et al. (submitted)

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- Does environment have an effect on how galaxies evolve? What is it?
- Which galaxies are being quenched? What are their masses?
- How does environmental quenching proceed? Timescales.

PSBs = Rapidly quenched galaxies

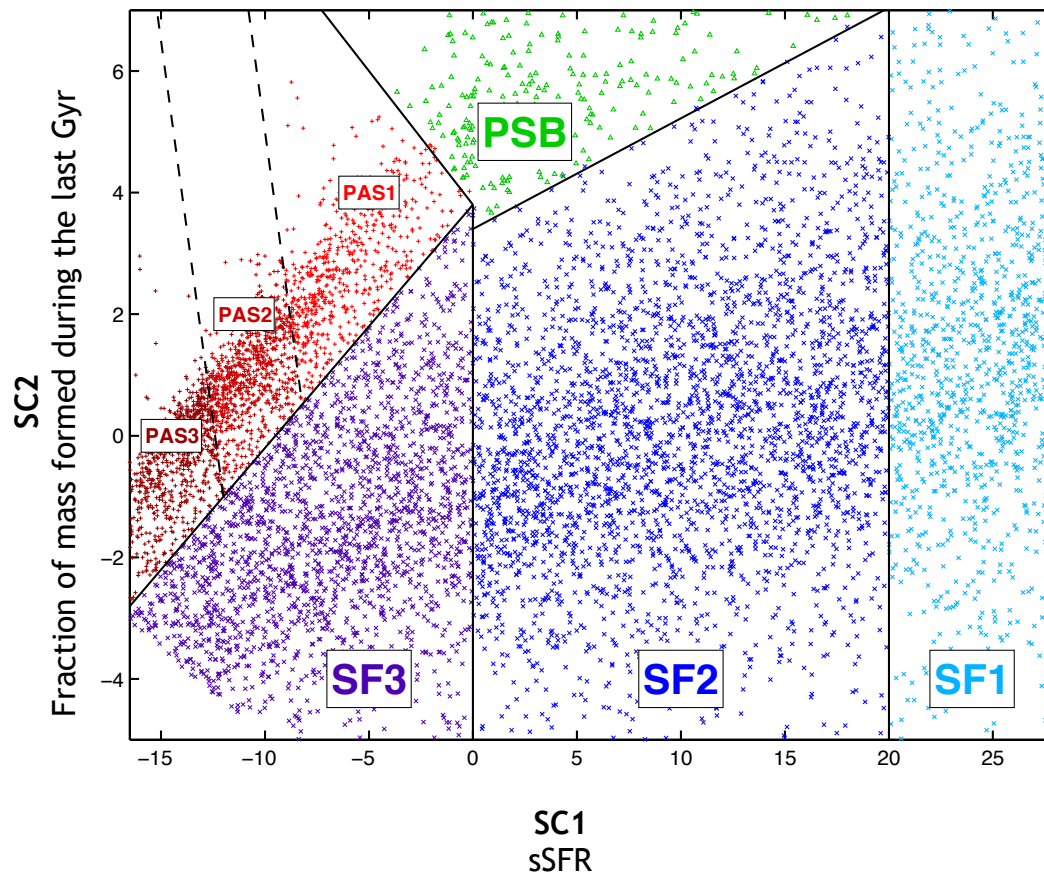
Population in transition.

Galaxies whose star formation activity was rapidly truncated after an extended period forming stars.

They may be the smoking gun to understand the quenching mechanisms.



Super-Colour (SC) classification



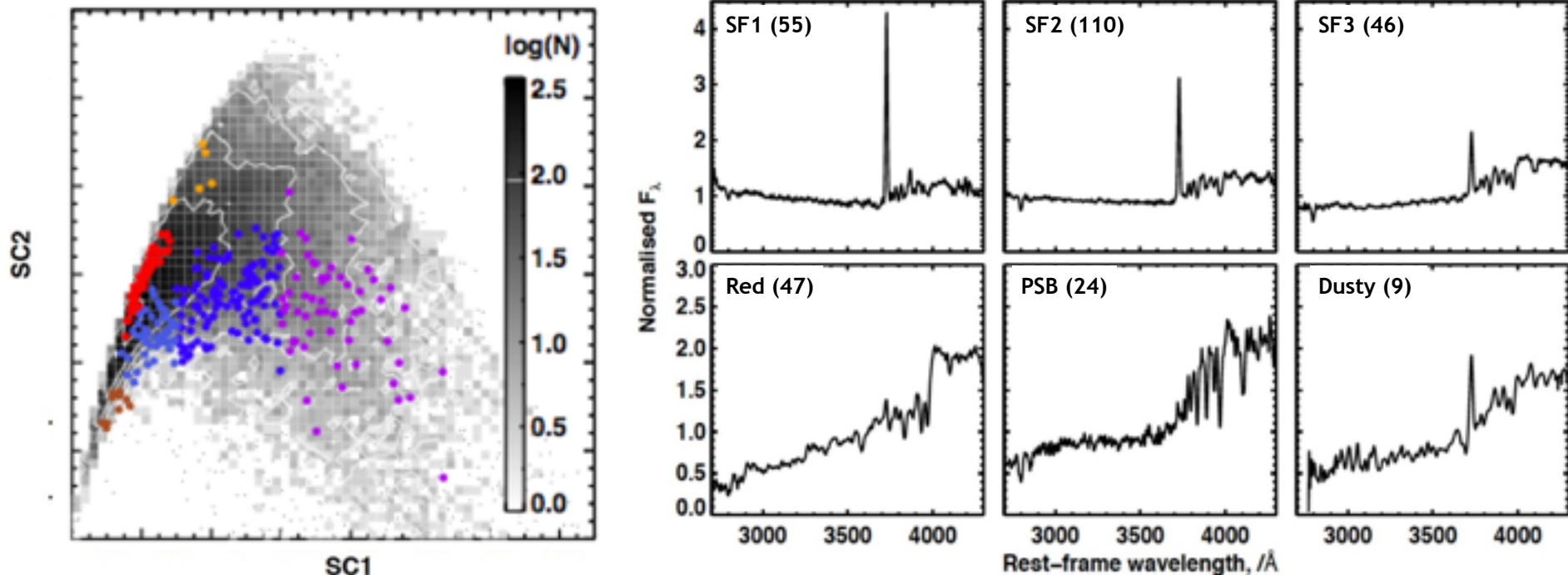
Principal Component Analysis (PCA). Wild et al. (2014).

It is able to characterise a broad range of SEDs.

Provides a clean separation between the known populations.

Points out three new populations.

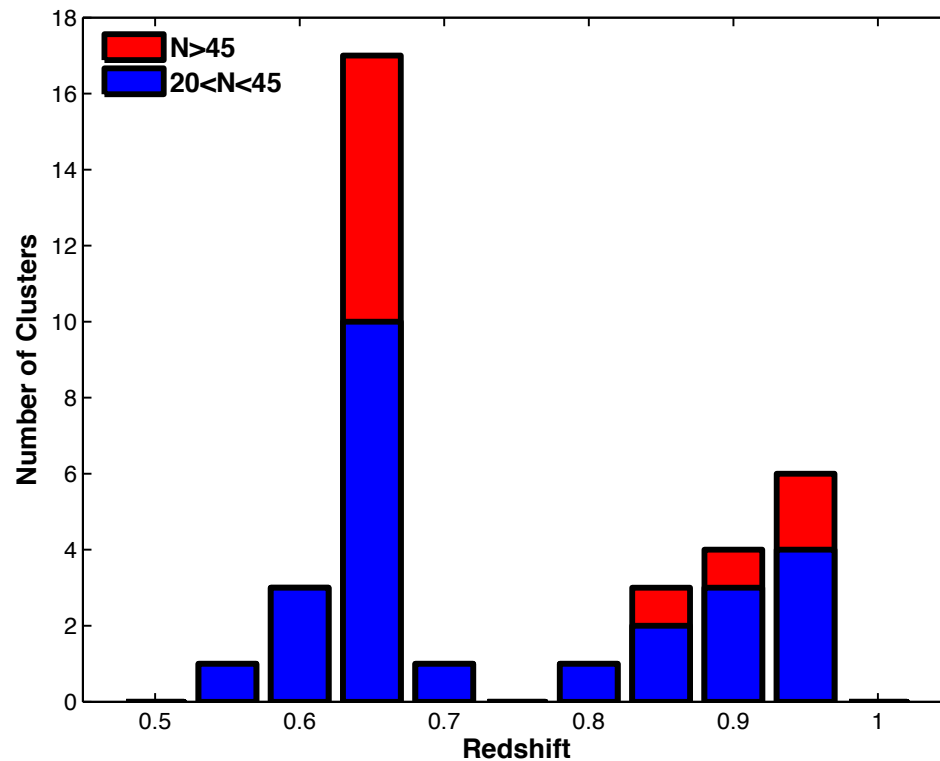
Super-Colour spectroscopic confirmation



- 60-80% of the PSB candidates show the characteristic spectral signature.
- 33 spectroscopically confirmed PSB galaxies.

See Wild et al. (2014) and Maltby et al. (2016)

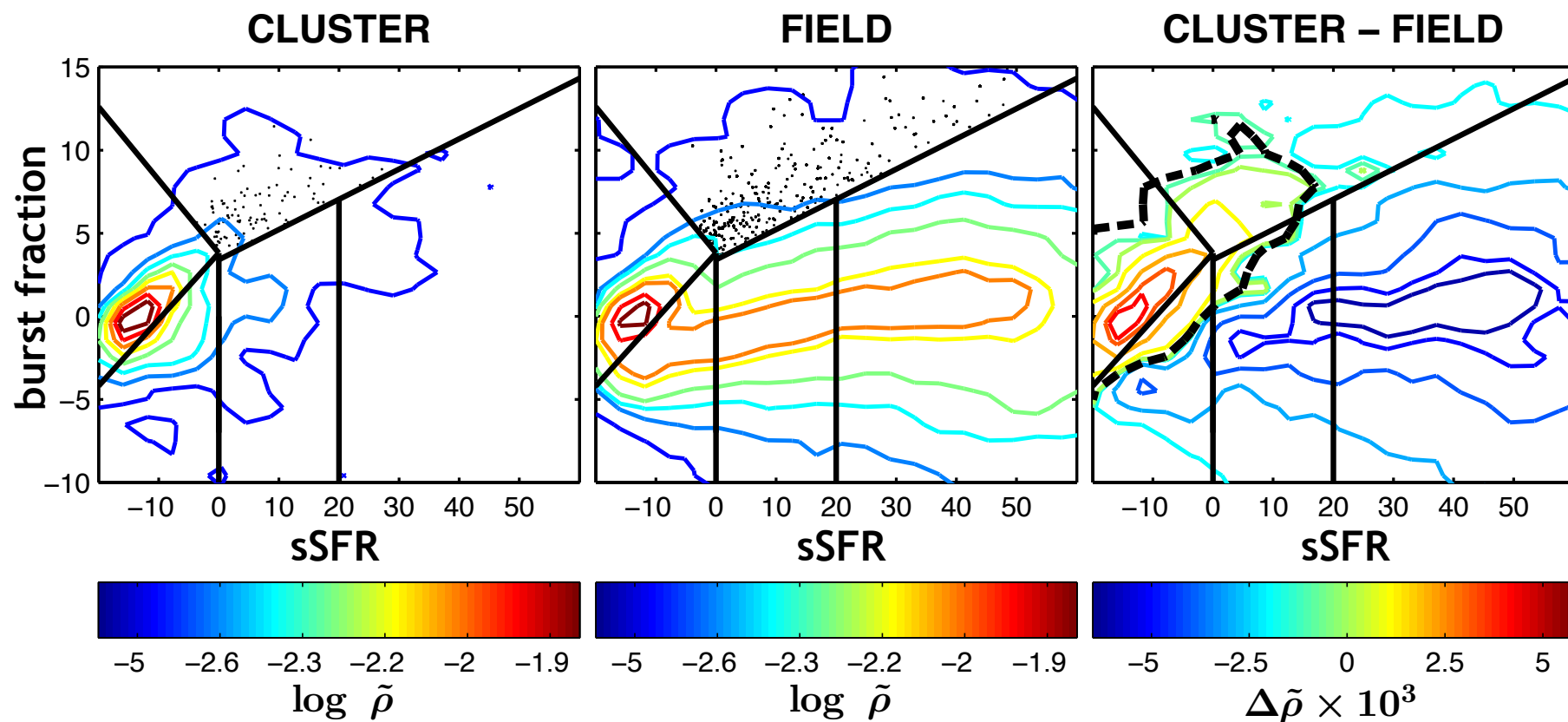
Galaxy and Cluster sample



- 8th data release of the UKIDSS Ultra Deep Survey.
- Detected using a FoF based algorithm.
- 37 galaxy clusters candidates.
- 11 of them spectroscopically confirmed
- In good agreement with previous studies studying galaxy clusters in the same field.

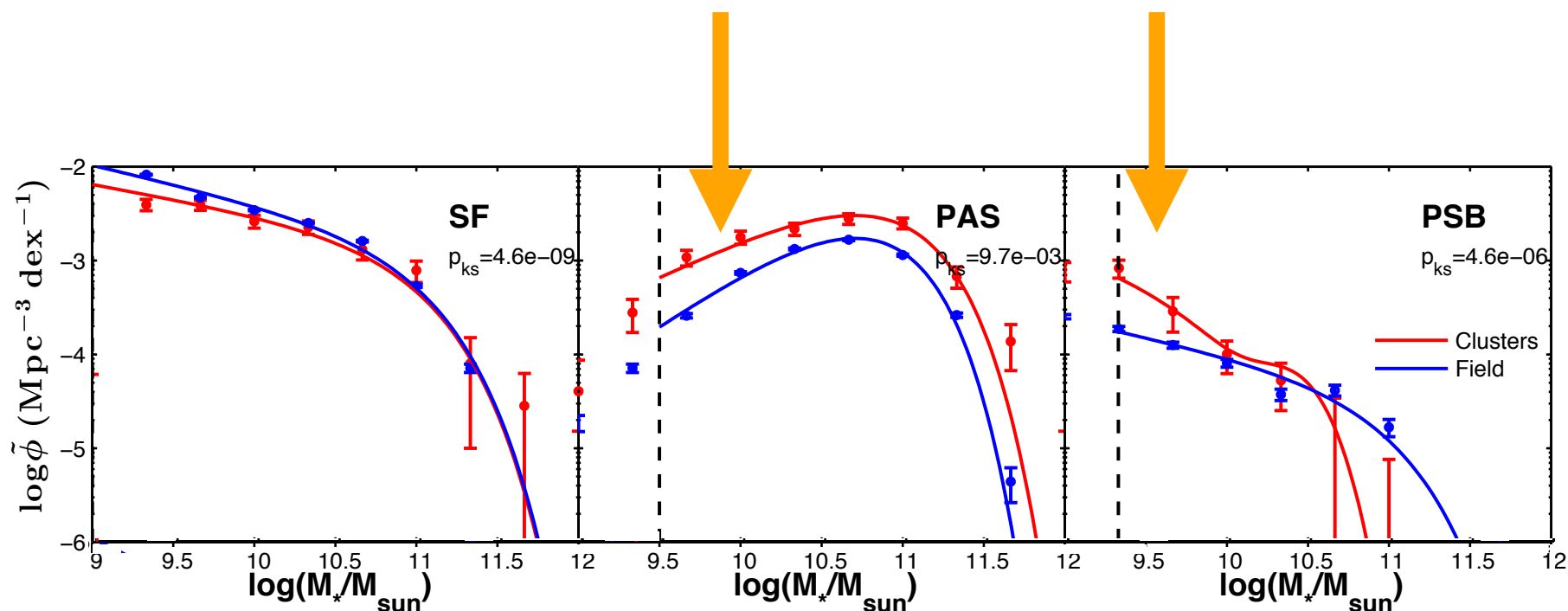
Environmental quenching in clusters

In clusters the overall galaxy population is shifted towards the passive evolving regime.

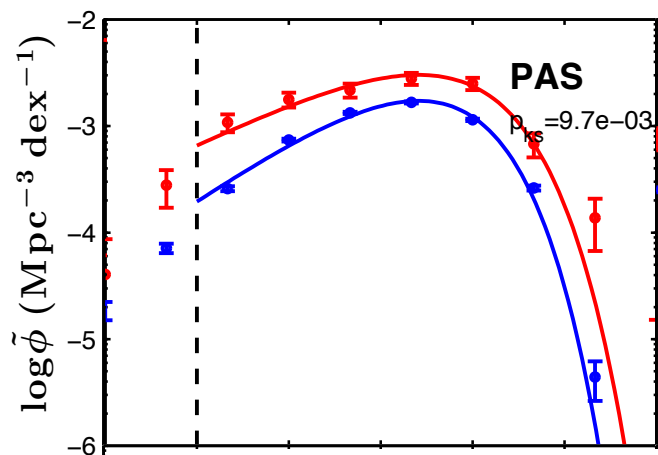


Environment quenches low-mass galaxies

Environment preferentially quenches low-mass galaxies!



The low-mass excess is due to young galaxies

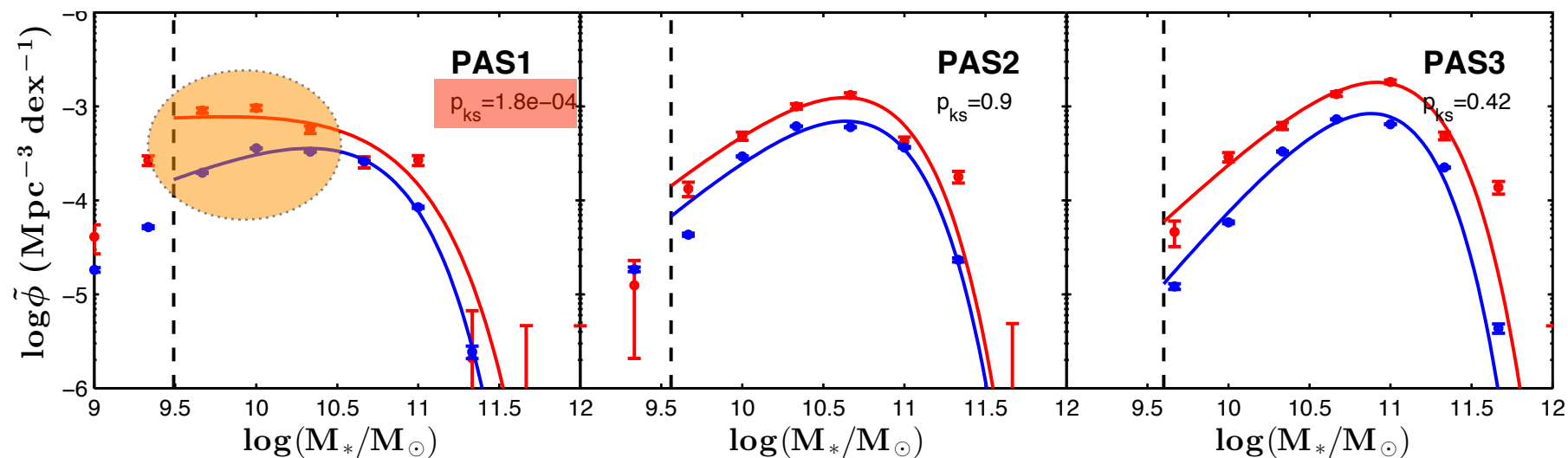


- The excess of low-mass passives is exclusively produced by recently quenched galaxies.

Youngest

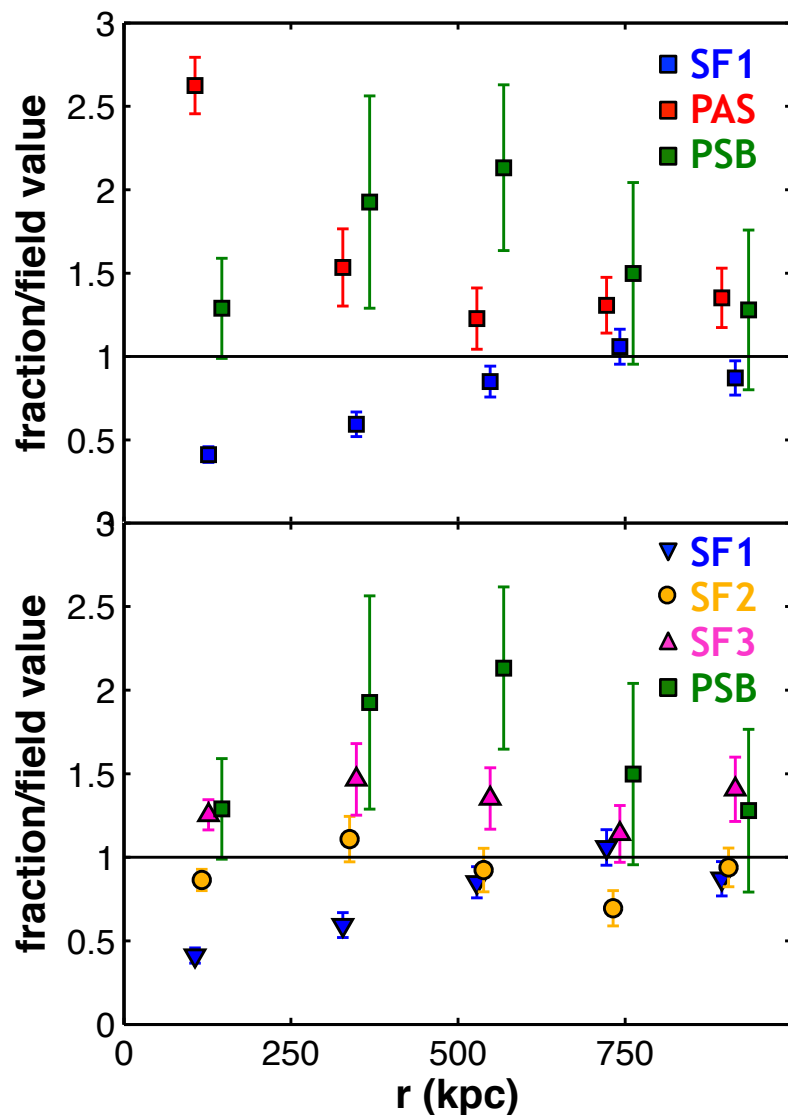
Intermediate

Oldest



Result 1: Excess of **low-mass** passive galaxies in
clusters
Excess primarily ***recently quenched***

Passive and PSB galaxies prefer cluster cores



Young star-forming galaxies (SF1) avoid the central region of clusters. Fast quenching.

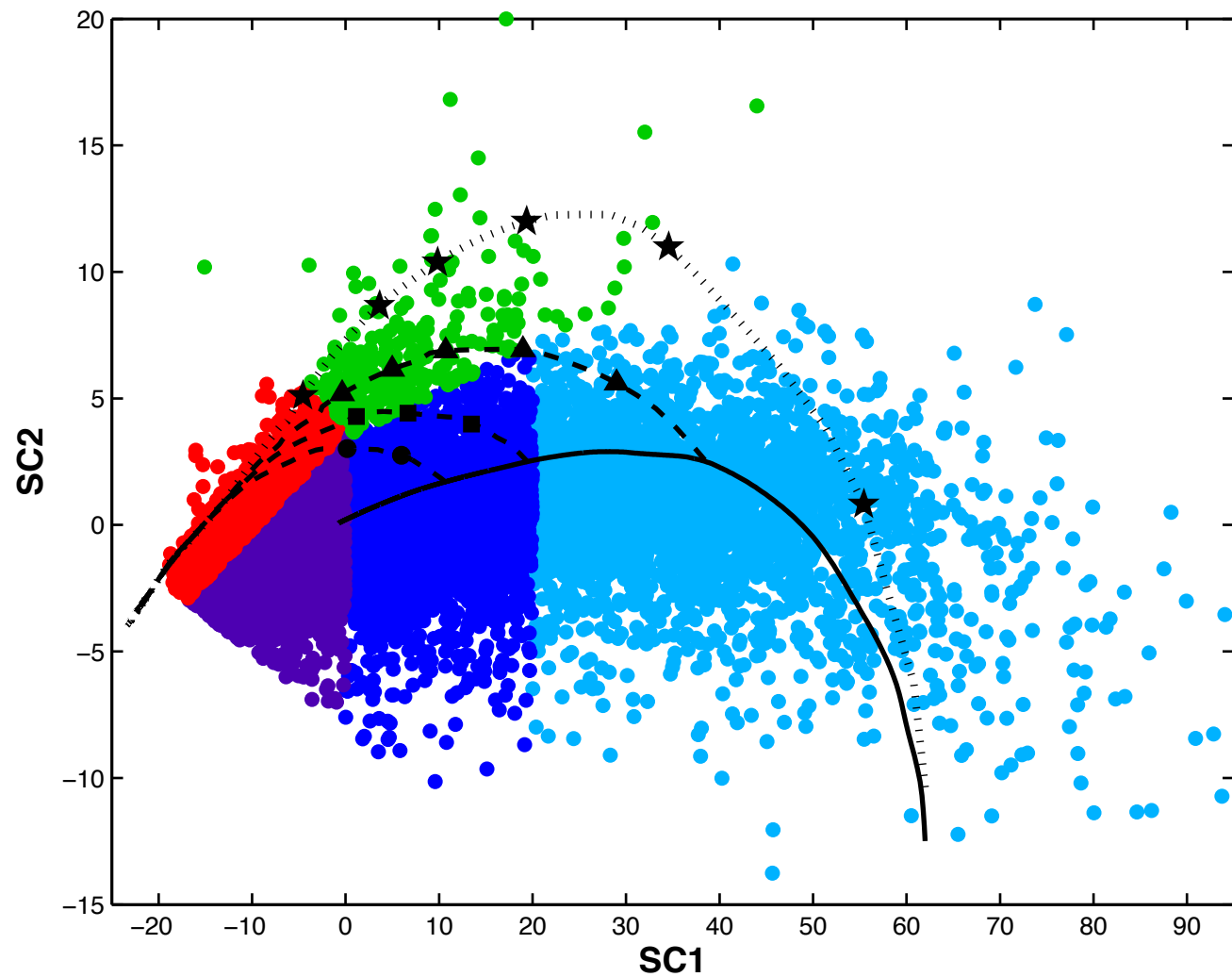
Moderate star-forming galaxies (SF2) show a flat radial profile. Slow quenching.

PSB galaxies found throughout the inner Mpc. They last ~ 1 Gyr.

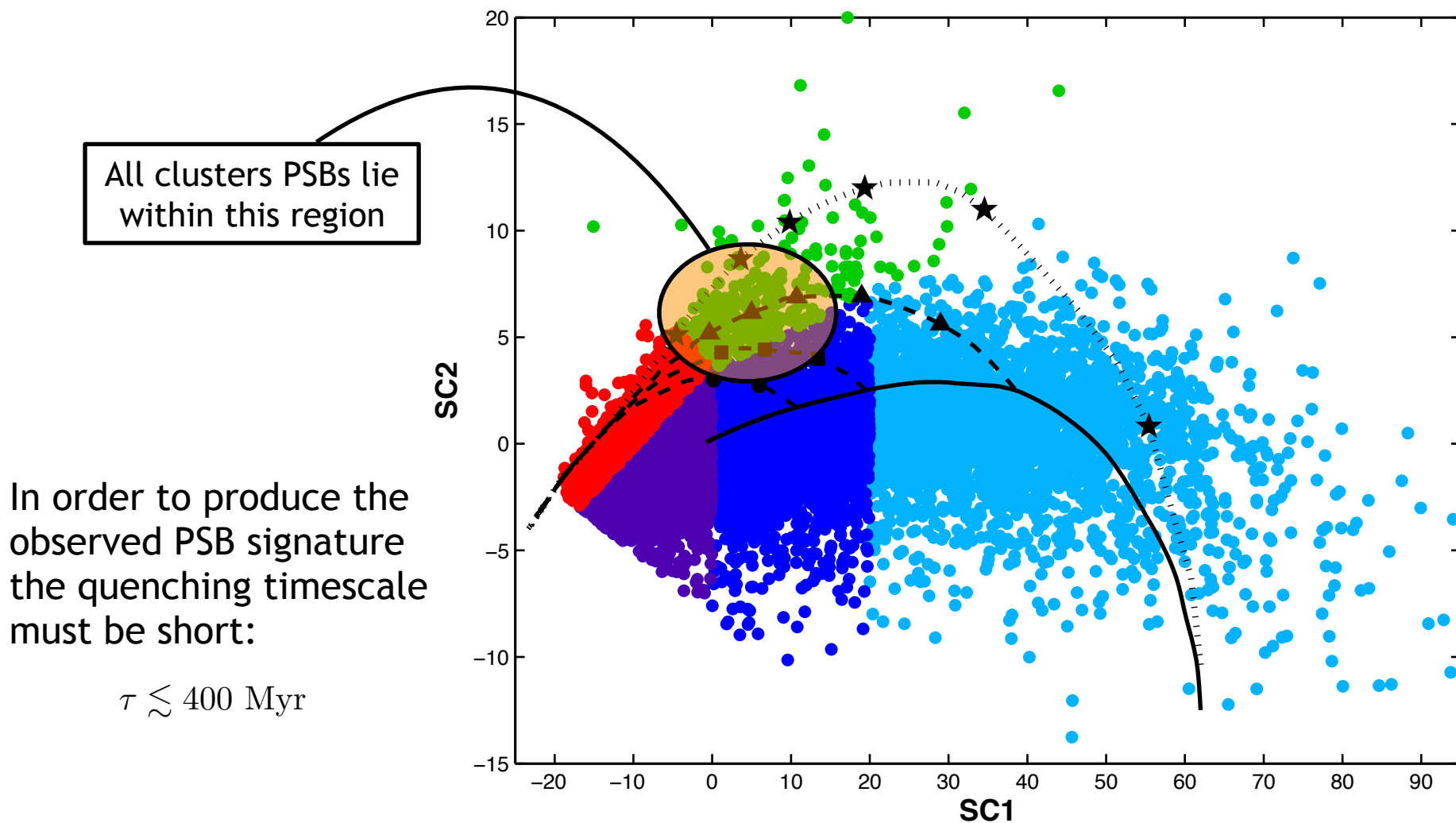
Result 2: Very *young* galaxies undergo *rapid* quenching while *moderate* galaxies experience *slow quenching*.

Evolution across the SC-diagram

Models from
Wild et al (2016)



No starburst in cluster post-starbursts



Result 3: PSBs in clusters are likely to be rapidly quenched galaxies which have undergone *no strong starburst*.

Conclusions

1. Excess of **low-mass** passive galaxies in clusters
Excess primarily *recently quenched*
2. Very *young* galaxies undergo *rapid* quenching
while *moderate* galaxies experience *slow* quenching.
3. PSBs in clusters are likely to be rapidly quenched galaxies which had undergone *no strong starburst*.