Rapid quenching in the Outskirts of XLSSC122 [1]

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Introduction

Galaxy clusters accelerate the evolution of member galaxies, offering ideal laboratories for investigating galaxy evolution through time. XLSSC122 [2,3], an early progenitor to local universe massive galaxy clusters We expand previous work on the cluster core to the outer regions, exploring the behaviour of infalling galaxies and create a catalogue of cluster members. We investigate the dominant effect halting star formation in galaxies converting active blue into passive red galaxies.

Methods

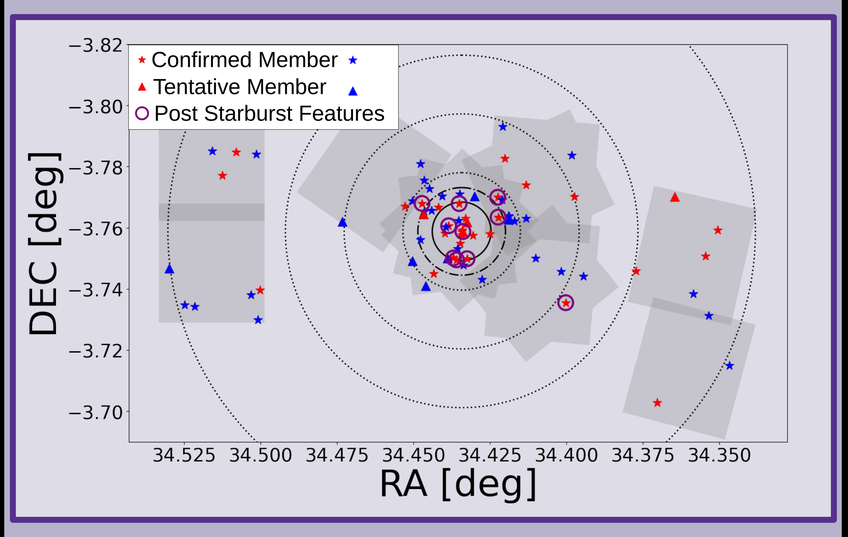
- Ram pressure stripping [4]

$$\rho_{ICM}(r_{BCG}) \cdot v_{infall}^2 > \frac{\pi}{2} \frac{GM_{gal}(R_{gal})\rho_{gas}(R_{gal})}{R_{gal}}$$

- Cluster membership classification with redshift from galaxy templates.

The Updated Catalogue

- Redshifts, Post Starburst (PS) features using equivalent width cuts from G141 grizm.



- Magnitudes, colours using Hubble Space Telescope. (F140W, F105W, F814W).

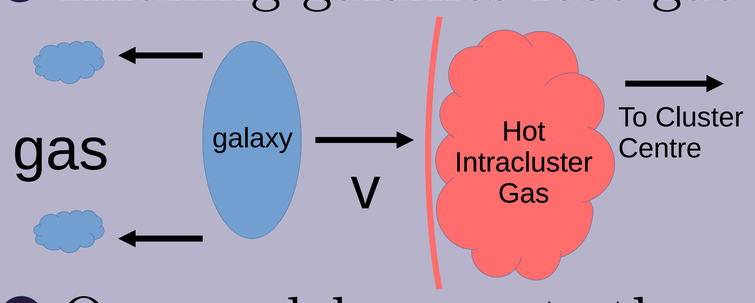
Want to learn more?

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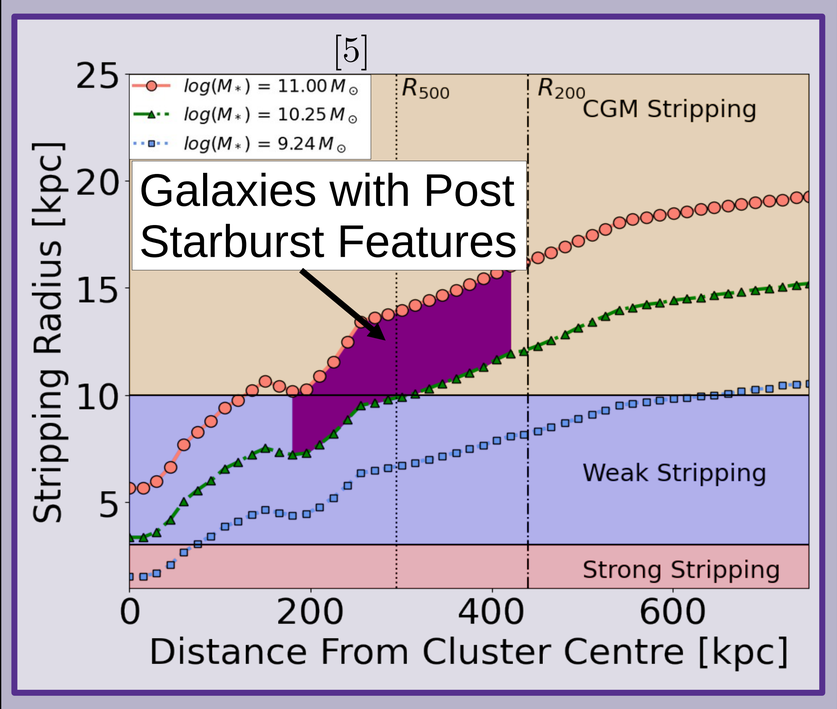
Github: https://github.com/blonsbrough/Initial-Investigations-of-the-Outskirts-of-XLSSC-122

Ram Pressure Stripping

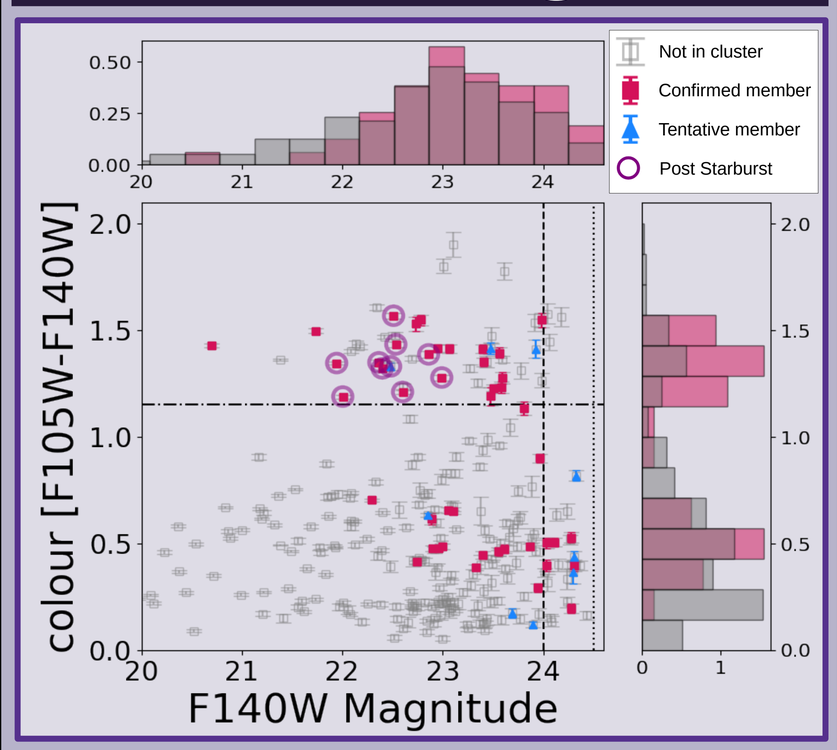
- Infalling galaxies lose gas



- Our model suggests the PS galaxies in our sample experience a weak stripping.



Colours and Magnitudes



Conclusions

- 74 Spectroscopically confirmed cluster members
- A clear colour bimodality indicating rapid quenching 300-400 kpc from the cluster centre.
- We find post starburst features in galaxies expected to be undergoing weak ram pressure stripping.
- No conclusive evidence of infalling groups or filaments.
- We find a nearby cluster at $z = 1.93$, and designate it CL J021741.7-034546.

References

[1] Todd E. B., et al., 2026, Monthly Notices of the Royal Astronomical Society 546, 140
[2] Willis J. P., et al., 2013, Monthly Notices of the Royal Astronomical Society, 430, 134
[3] Willis J. P., et al., 2020, Nature, 577, 39
[4] McCarthy I. G., et al., 2008, Monthly Notices of the Royal Astronomical Society, 383, 593
[5] Trudeau A., et al., 2022, Monthly Notices of the Royal Astronomical Society, 515, 2529

See Also:

Morphological analysis of XLSSC122 cluster members
Leste O. K., et al., 2024, Monthly Notices of the Royal Astronomical Society, 533, 2927

Intracluster medium mapping for XLSSC122
Mantz A. B., et al., 2018, Astronomy & Astrophysics, 620, A2