

LoCuSS: exploring the connection between local environment, star formation and dust mass in Abell 1758

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Environmental processes

Hydrodynamical

**Reduction/halt
of cosmic accretion**
(Behroozi+ 14, Joshi+19)

Ram-pressure stripping
(Gunn&Gott 72, Steinhauser +16,
Poggianti+16)

**AGN feedback,
stellar winds**
(Churazov+ 01, Sijacki +06)

Shock heating
(Rees & Ostriker 77)

...

Gravitational

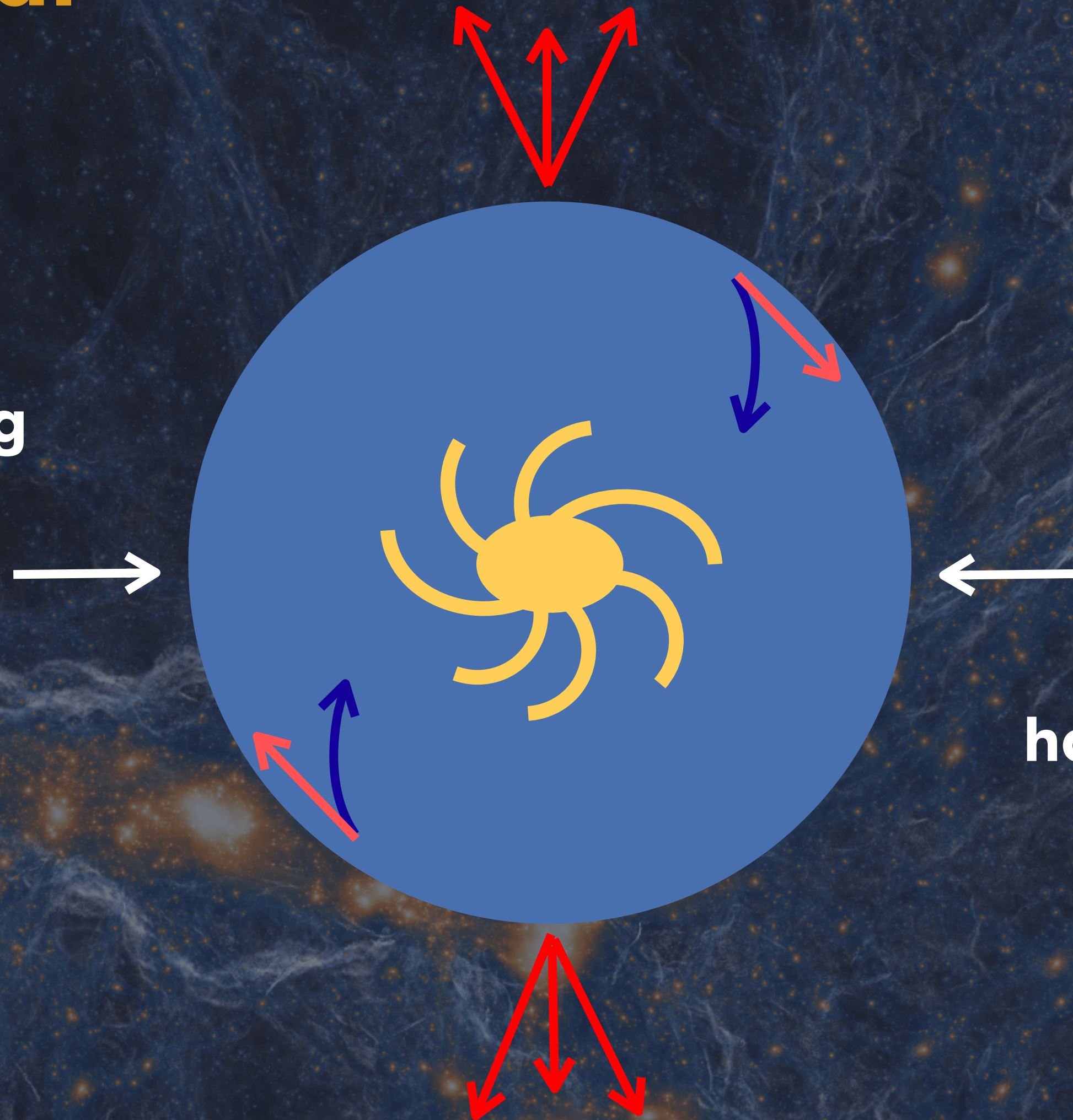
Tidal pull & stripping
(Merritt+ 83, Gao+04)

Mergers
(Negroponte +82,
Hernquist +94)

**“Soft” encounters
harassment/cannibalism**
(Richstone 76, Moore +98, Ostriker 75)

Torque transfer
(Renzini 18)

...



A visualization of the cosmic web, showing a complex network of dark matter filaments and galaxy clusters. The filaments are depicted as thin, blue, fibrous structures against a dark blue background, with numerous bright orange and yellow points representing galaxies and galaxy clusters.

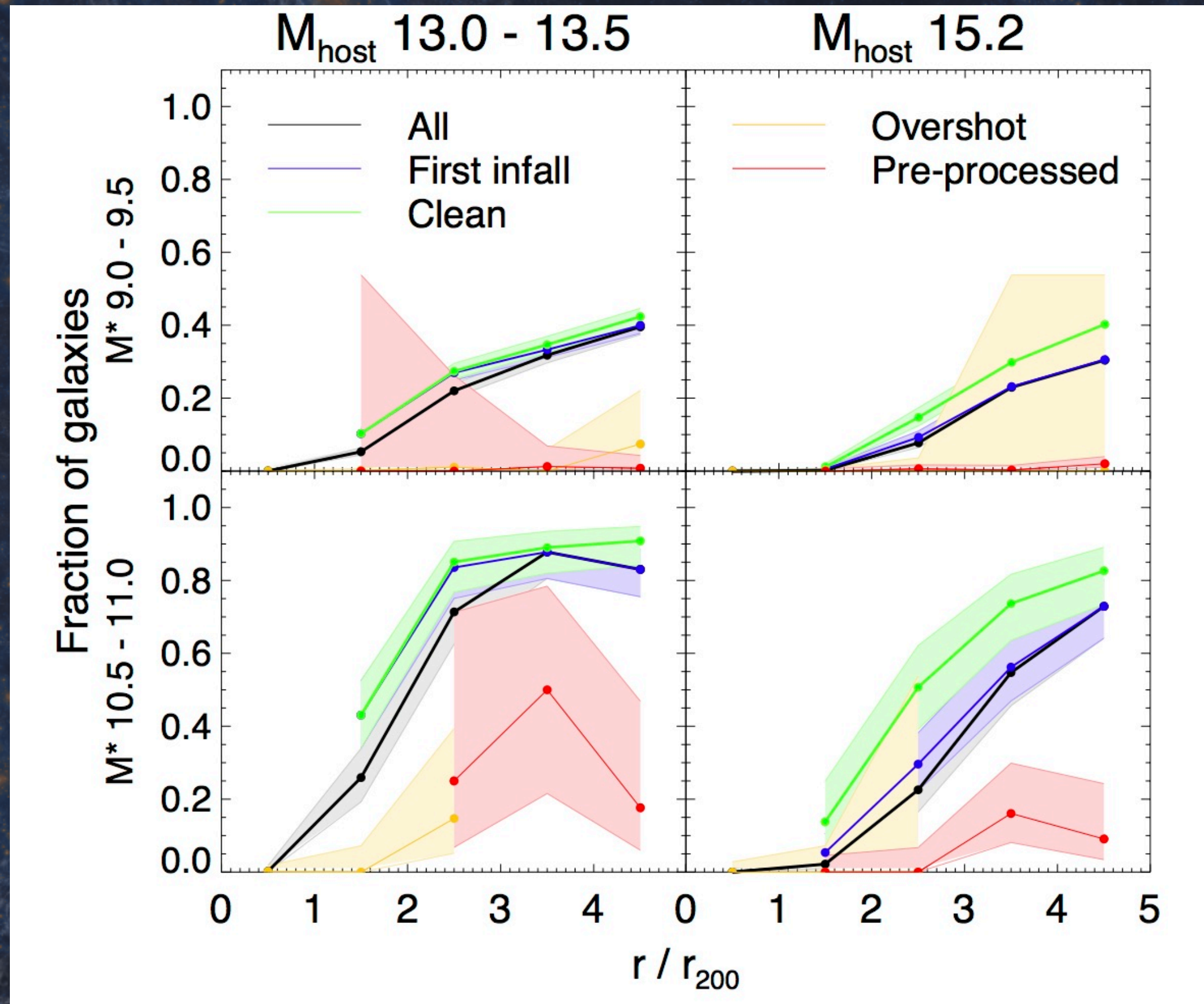
How does accretion shape clusters and galaxies?

How long does quenching take?

Does quenching depend on the accretion path?

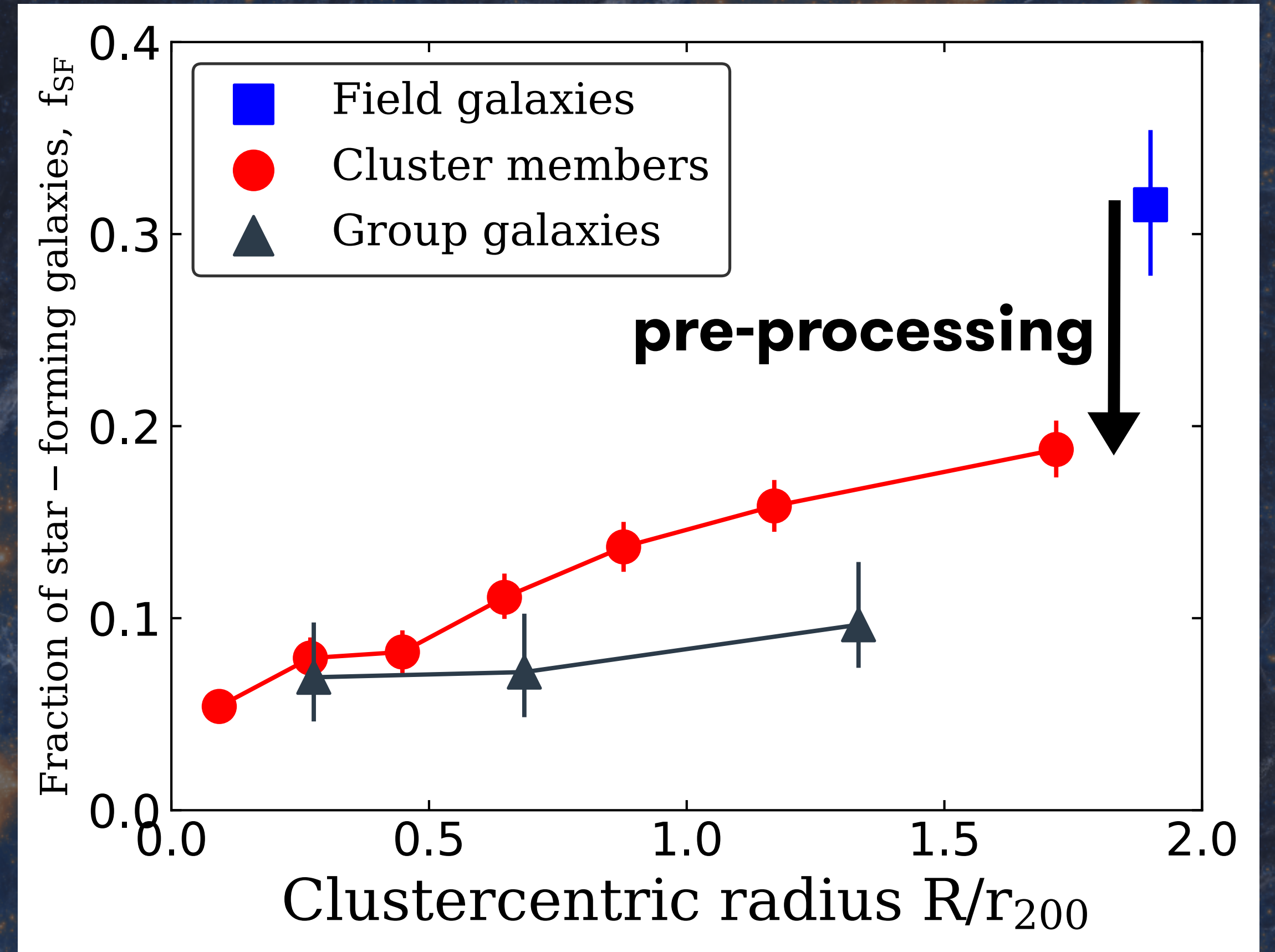
Pre-processing

Simulations



De Lucia+ 12, Bahè+ 13/19

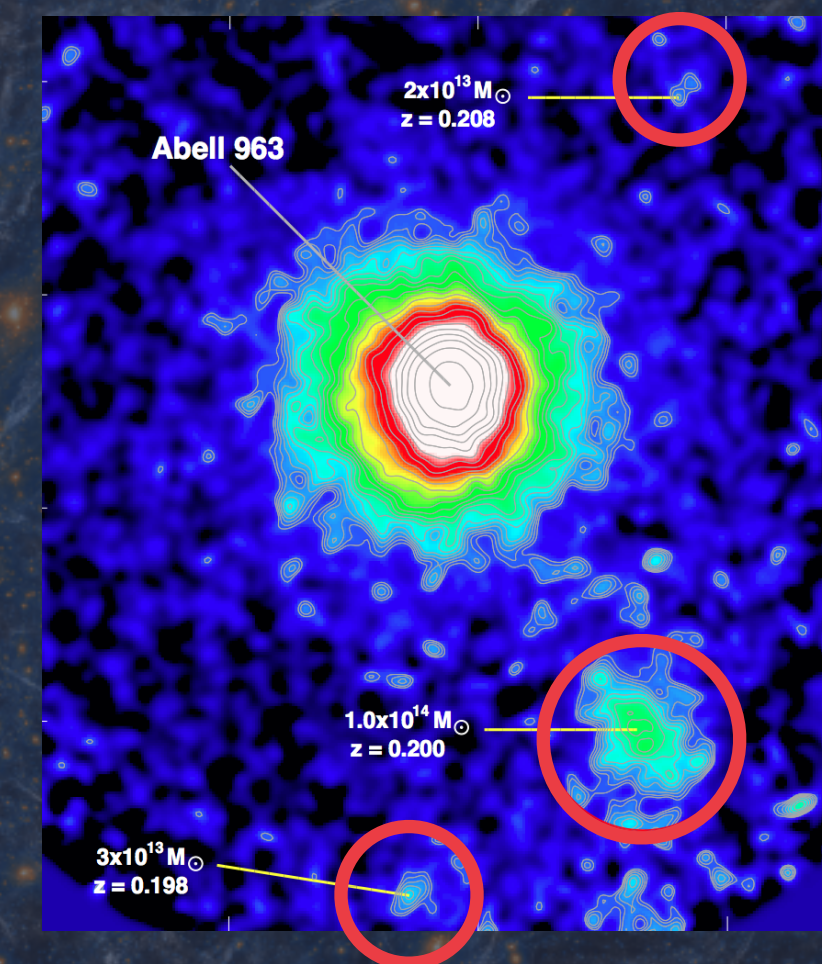
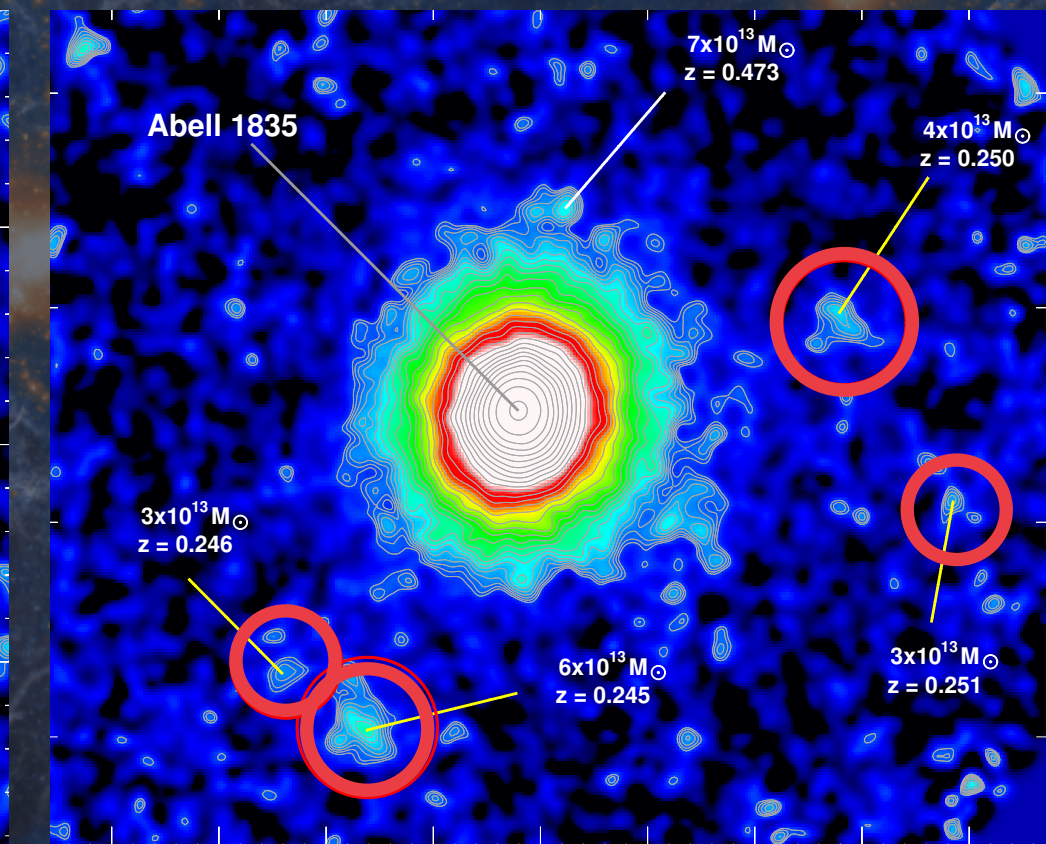
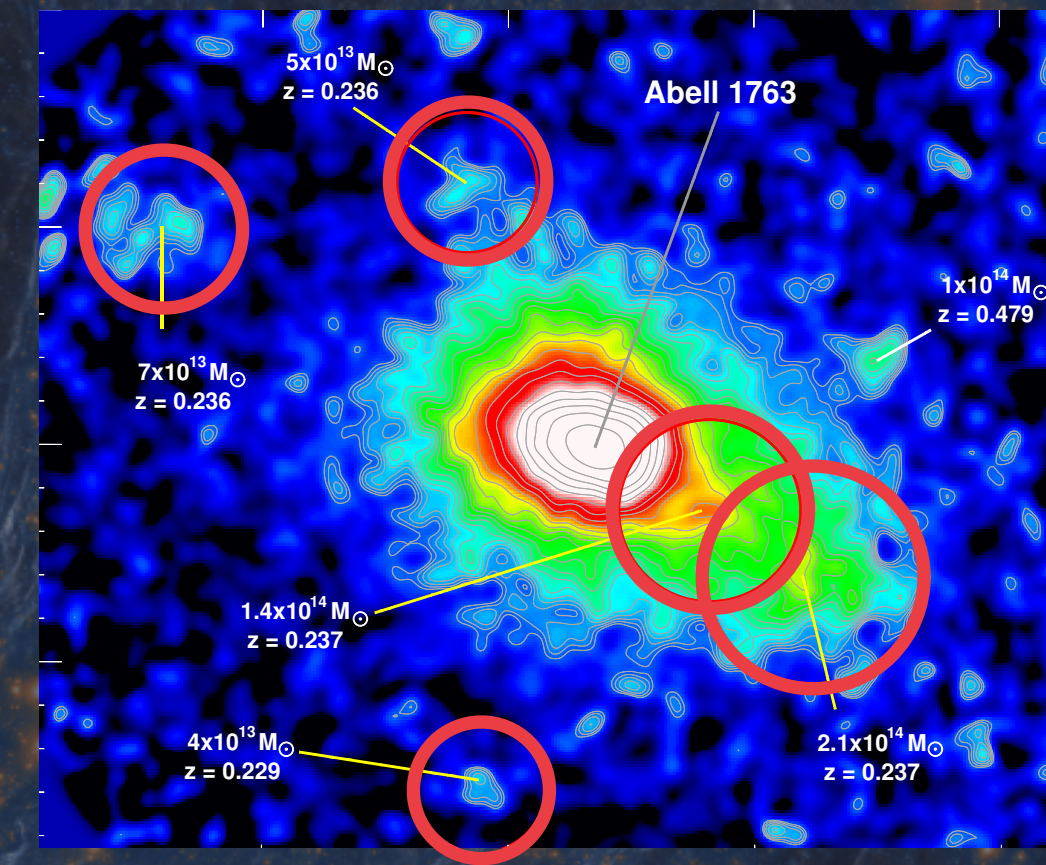
Observations



Haines+ 13/15, MB+ 18

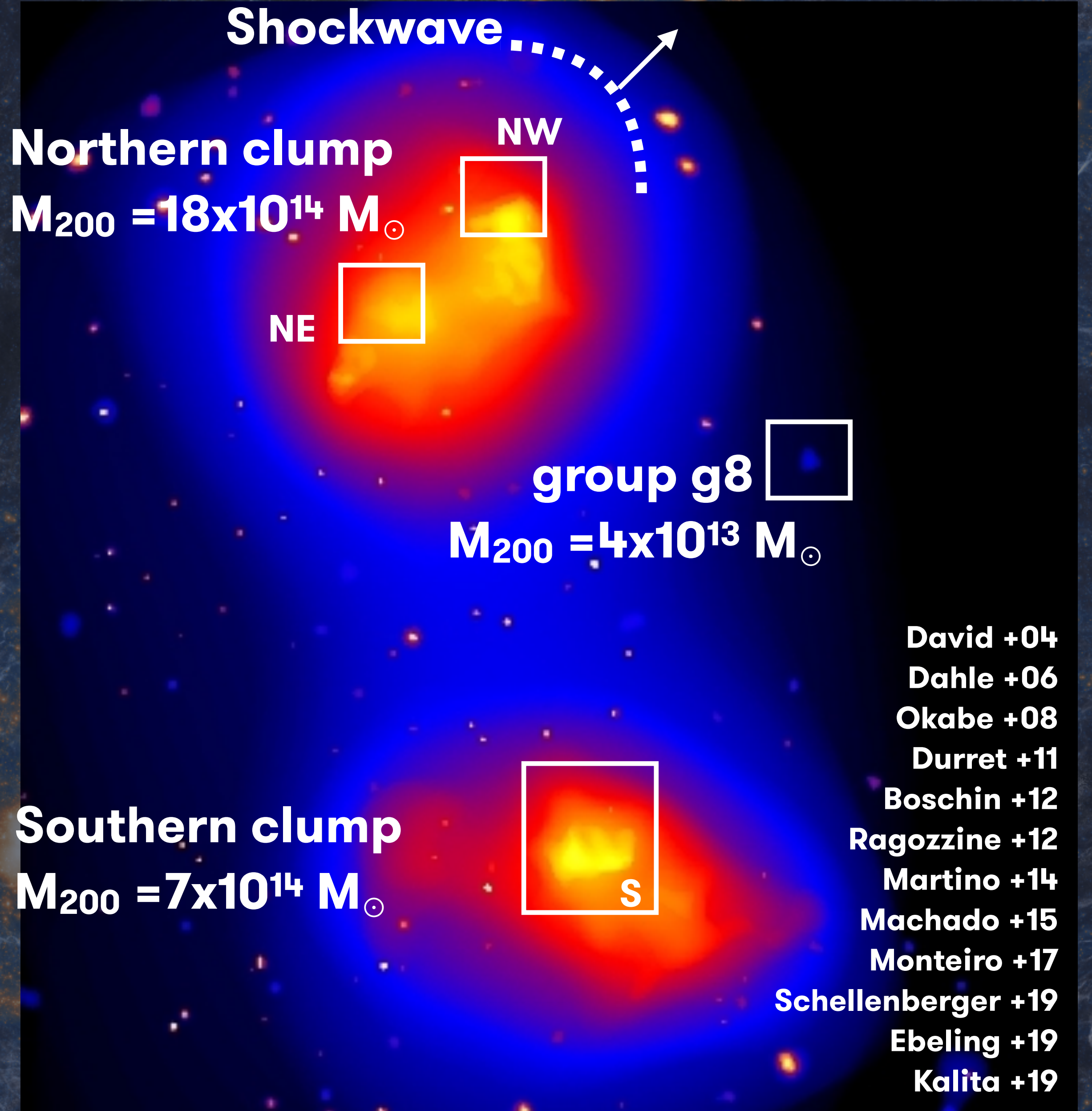
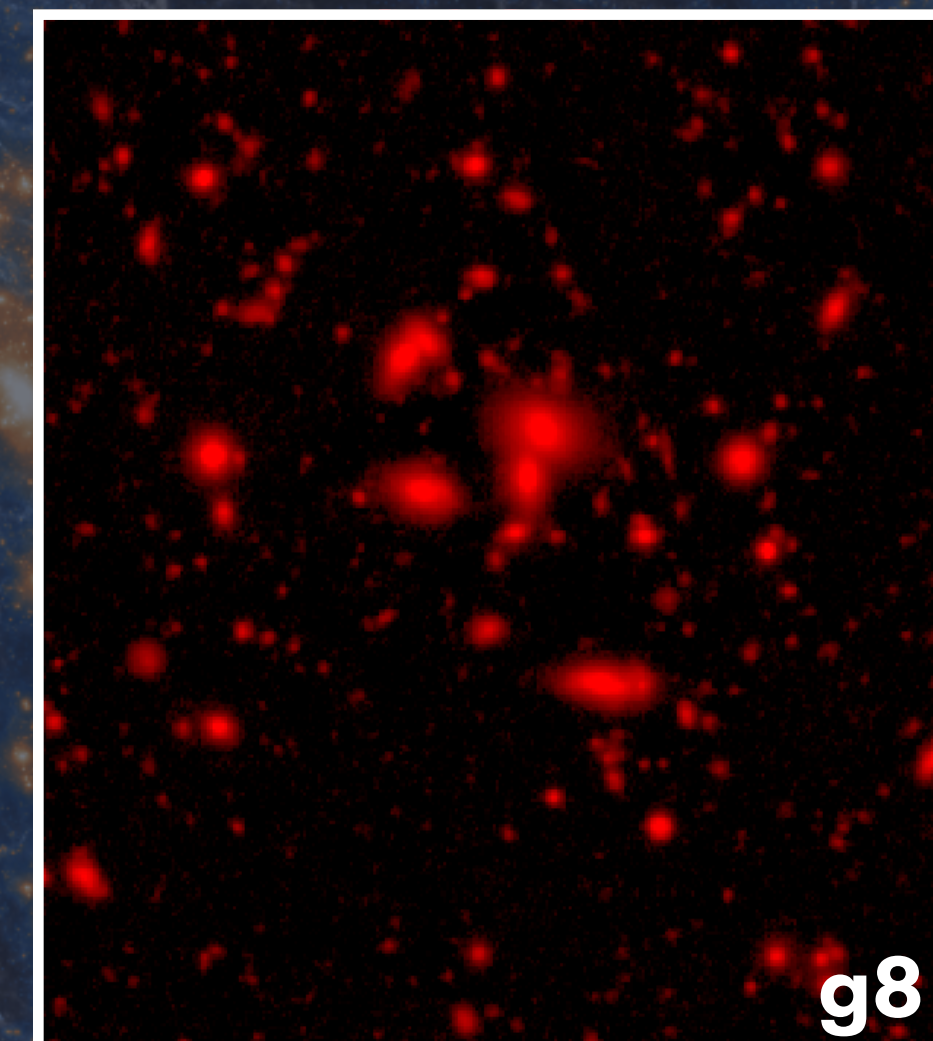
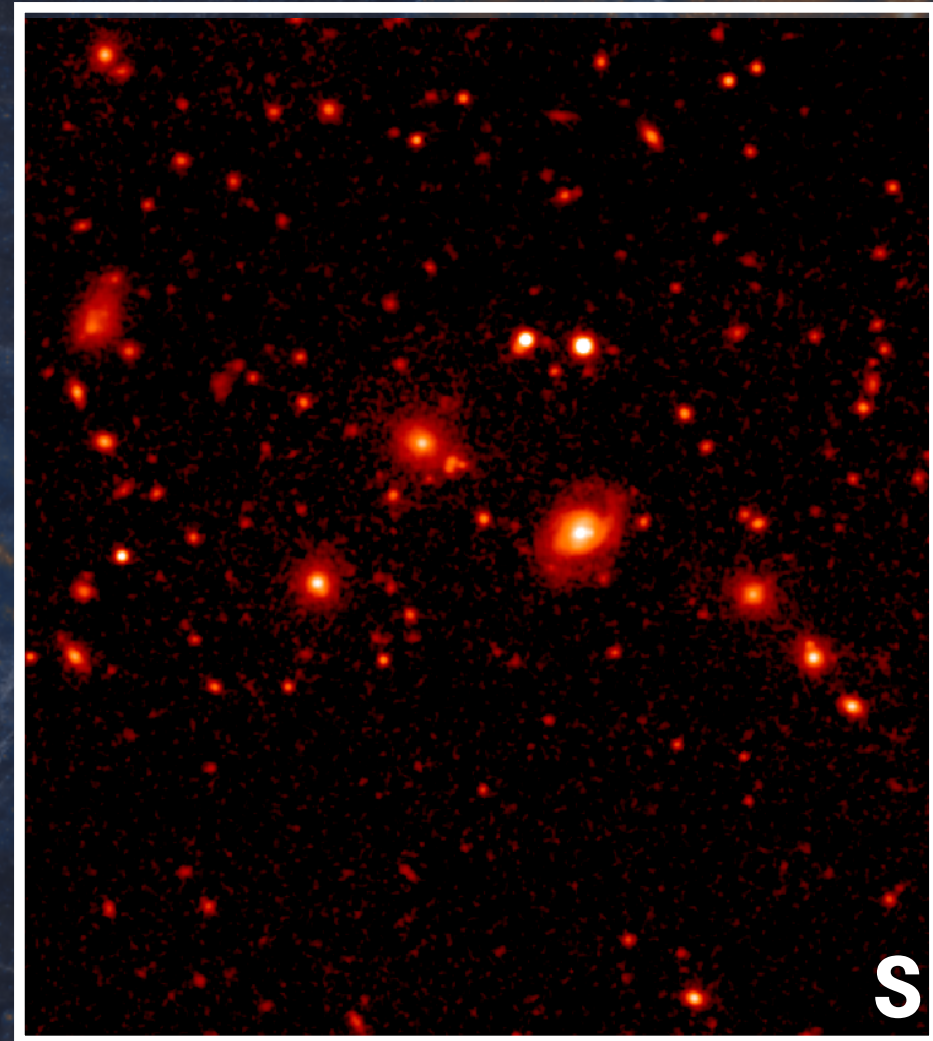
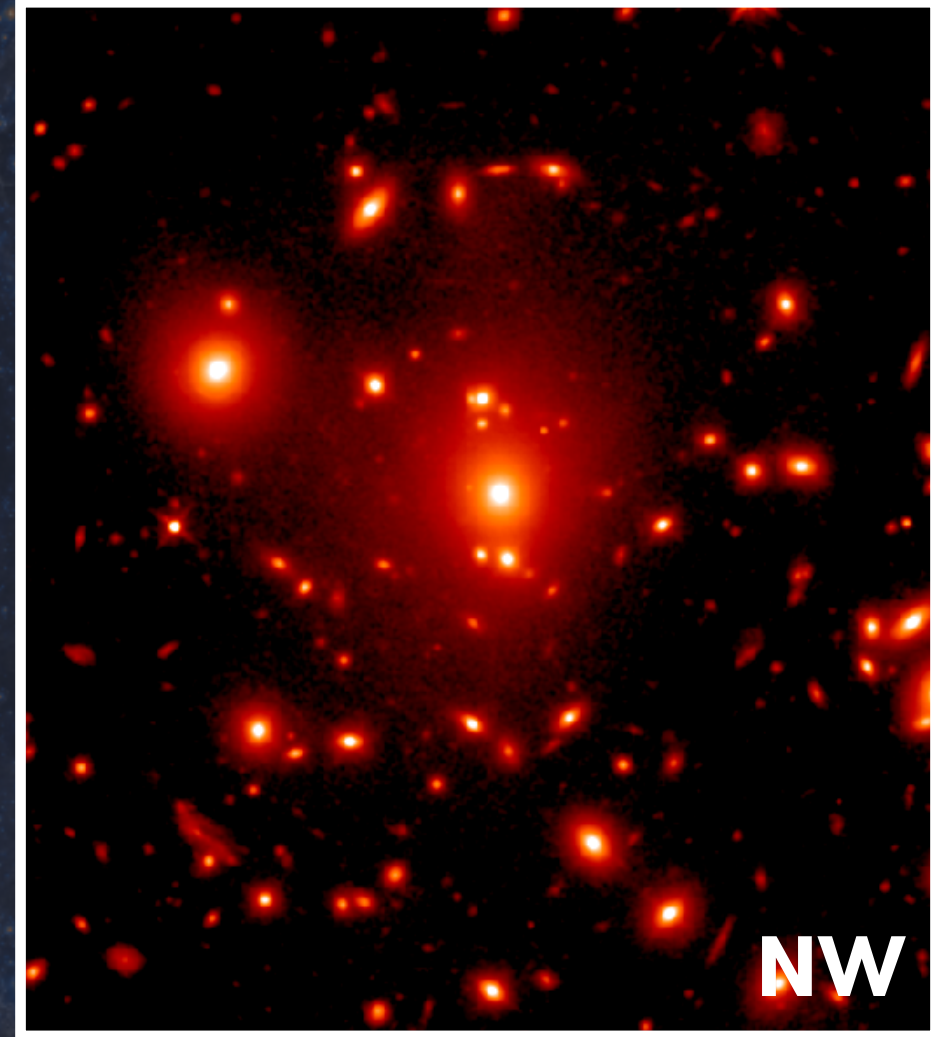
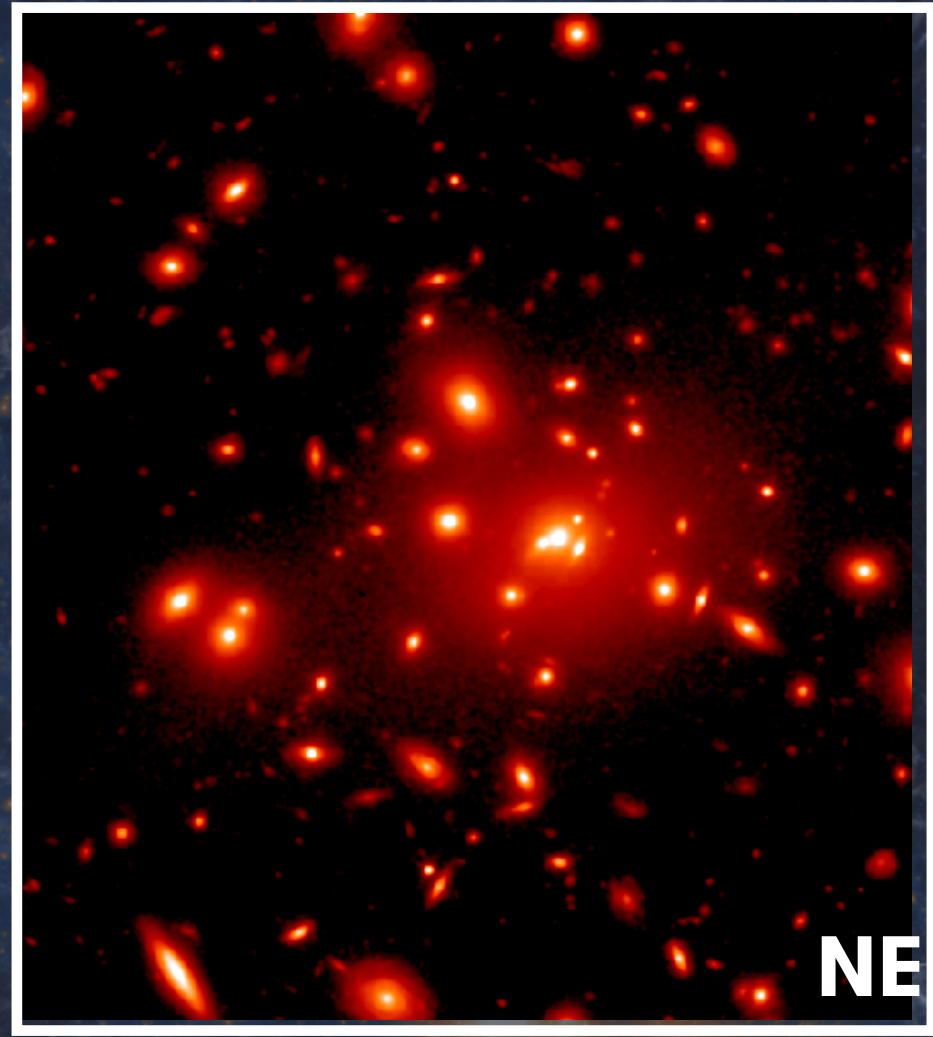
LoCuSS survey

- Multi-wavelength survey of X-ray luminous clusters at $0.15 < z < 0.30$
- 10^4 spectr. confirmed cluster members up to $\sim 2r_{200}$ and down to $M_* \approx 2 \times 10^{10} M_\odot$ (80 % completeness)
 - weak dependence on SFR and SFH
 - no morphological bias, weak dependence on SFR and SFH
- 96% spect. completeness for MIPS 24 μm sources
- 90% phot. completeness at $400 \mu\text{Jy}$



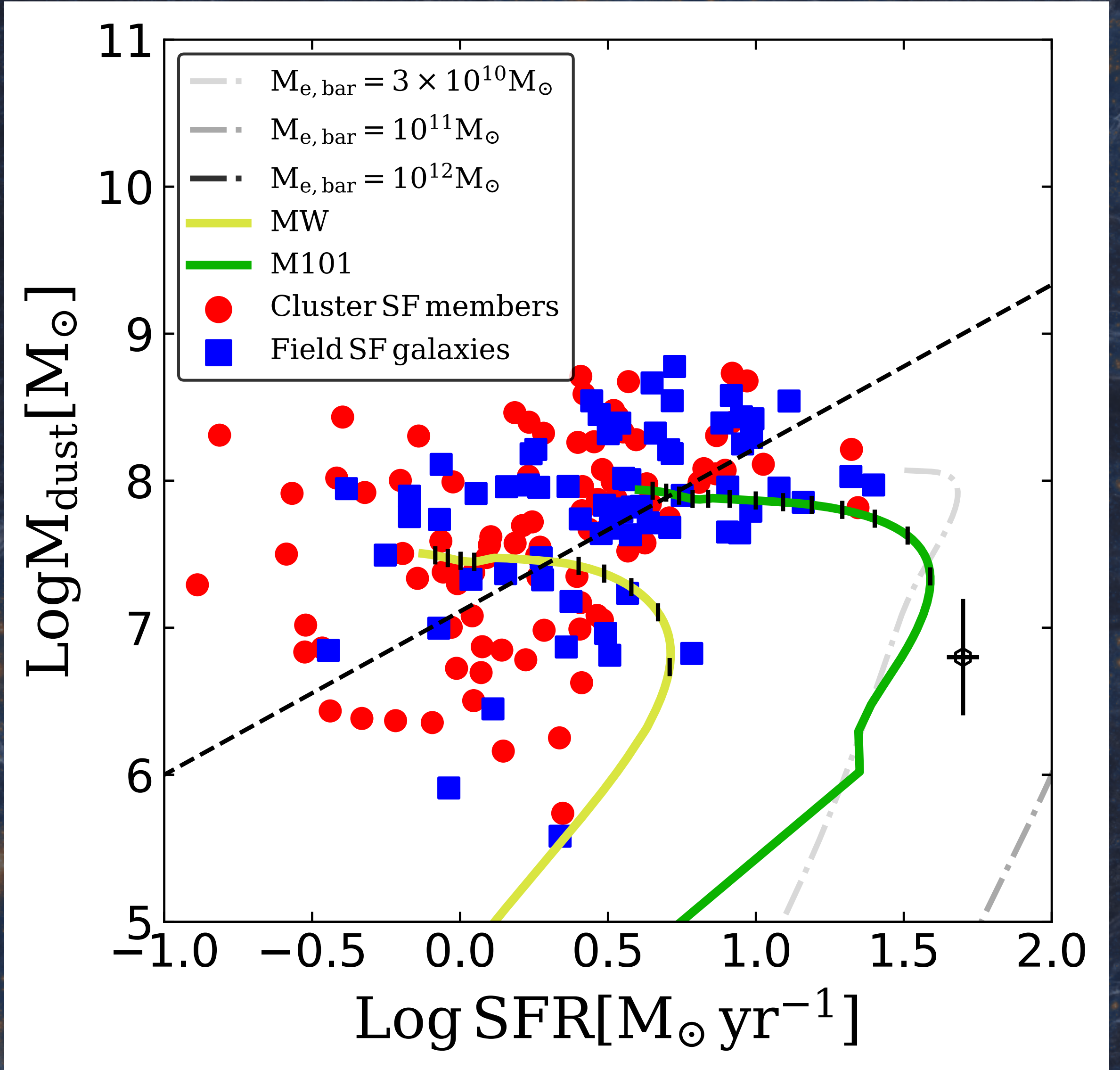
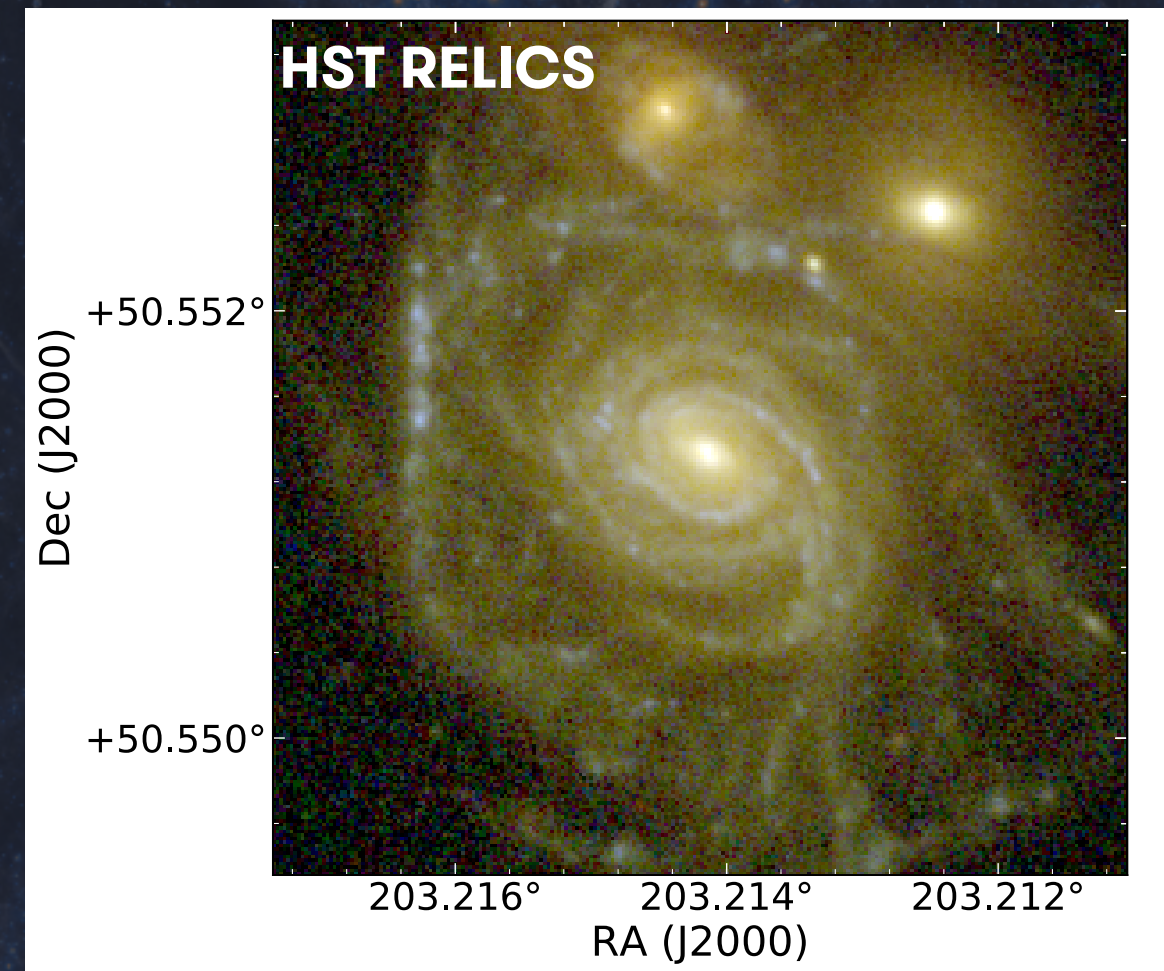
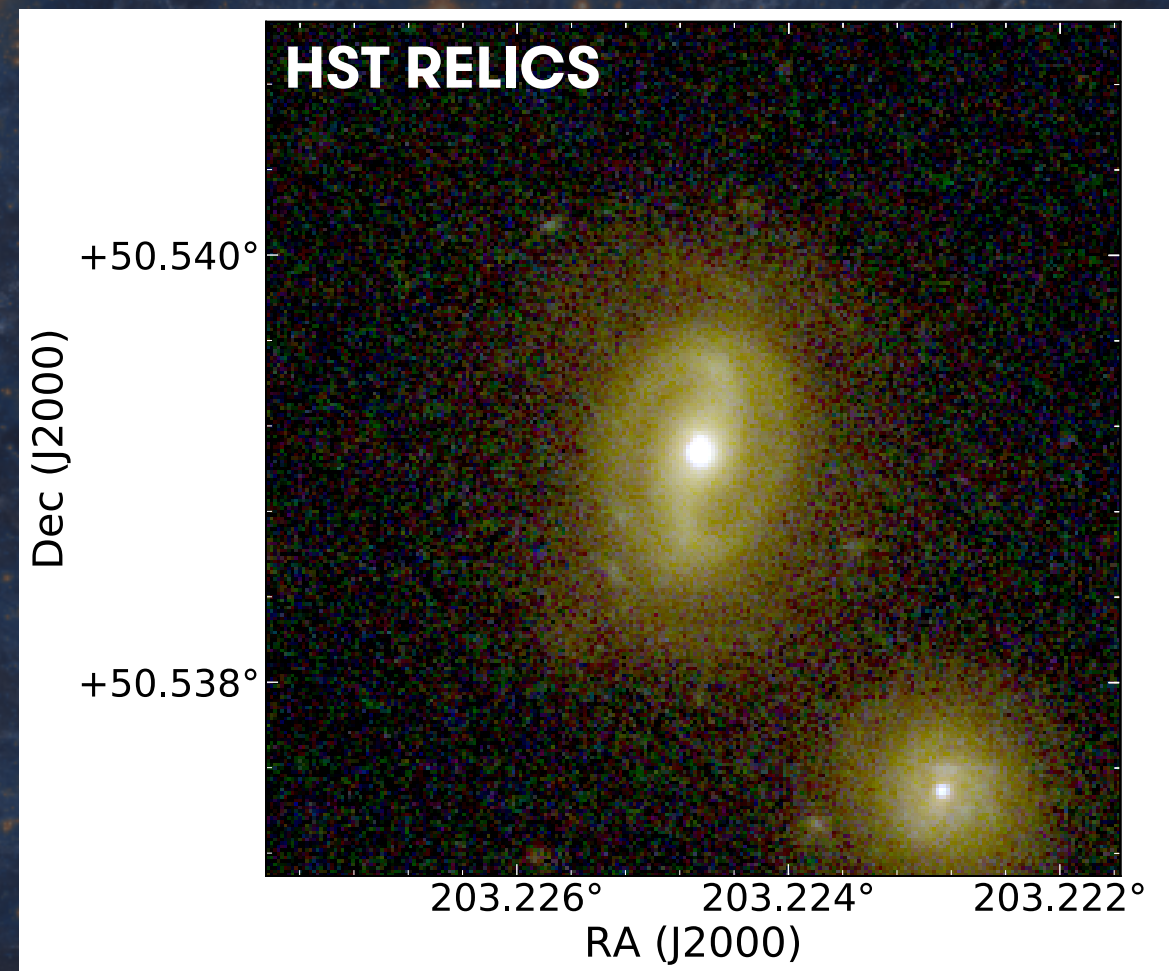
Infalling
X-ray groups
surrounding
clusters

Abell 1758



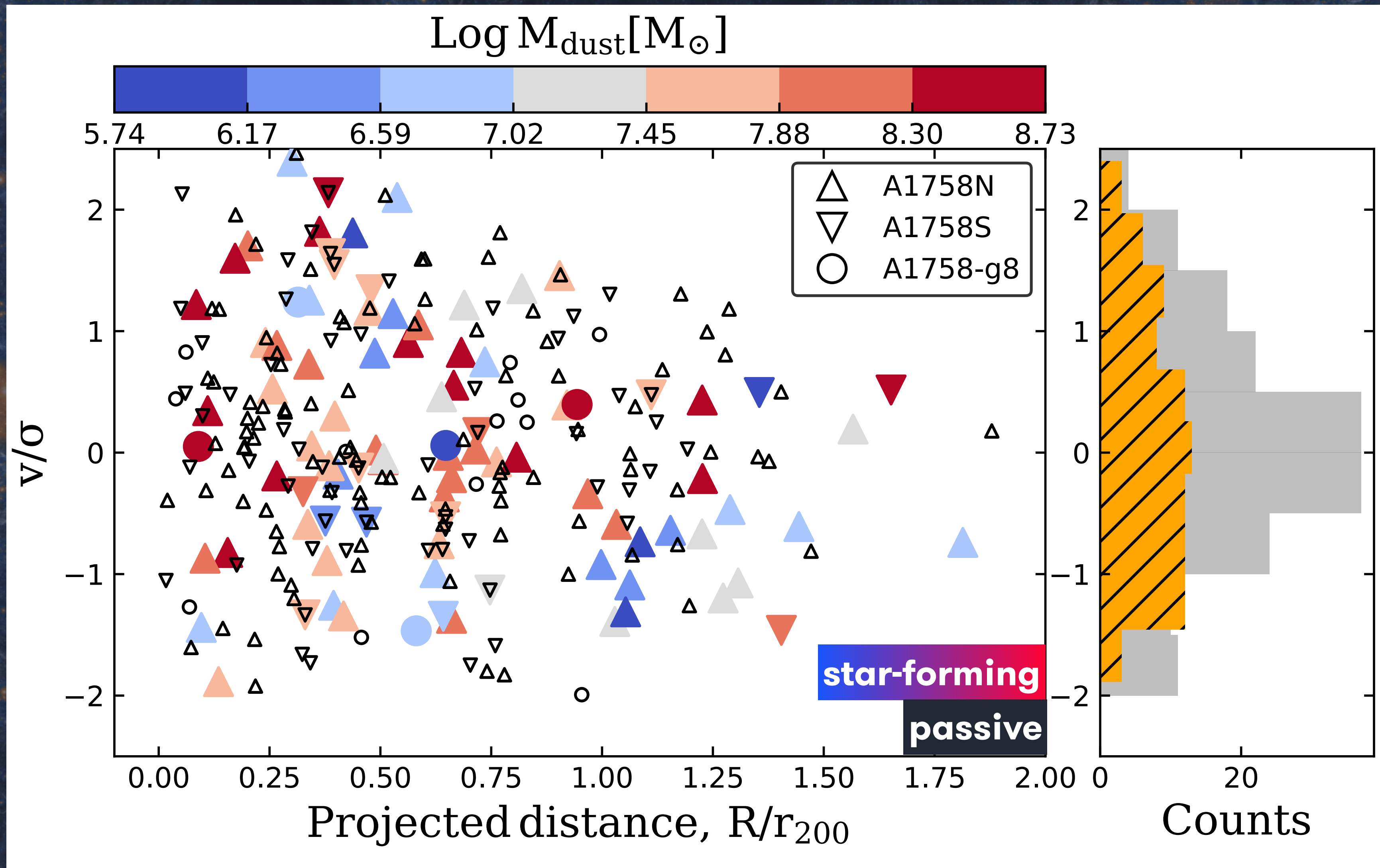
HST and Subaru optical insets + Chandra X-ray map

Abell 1758: star-forming galaxies



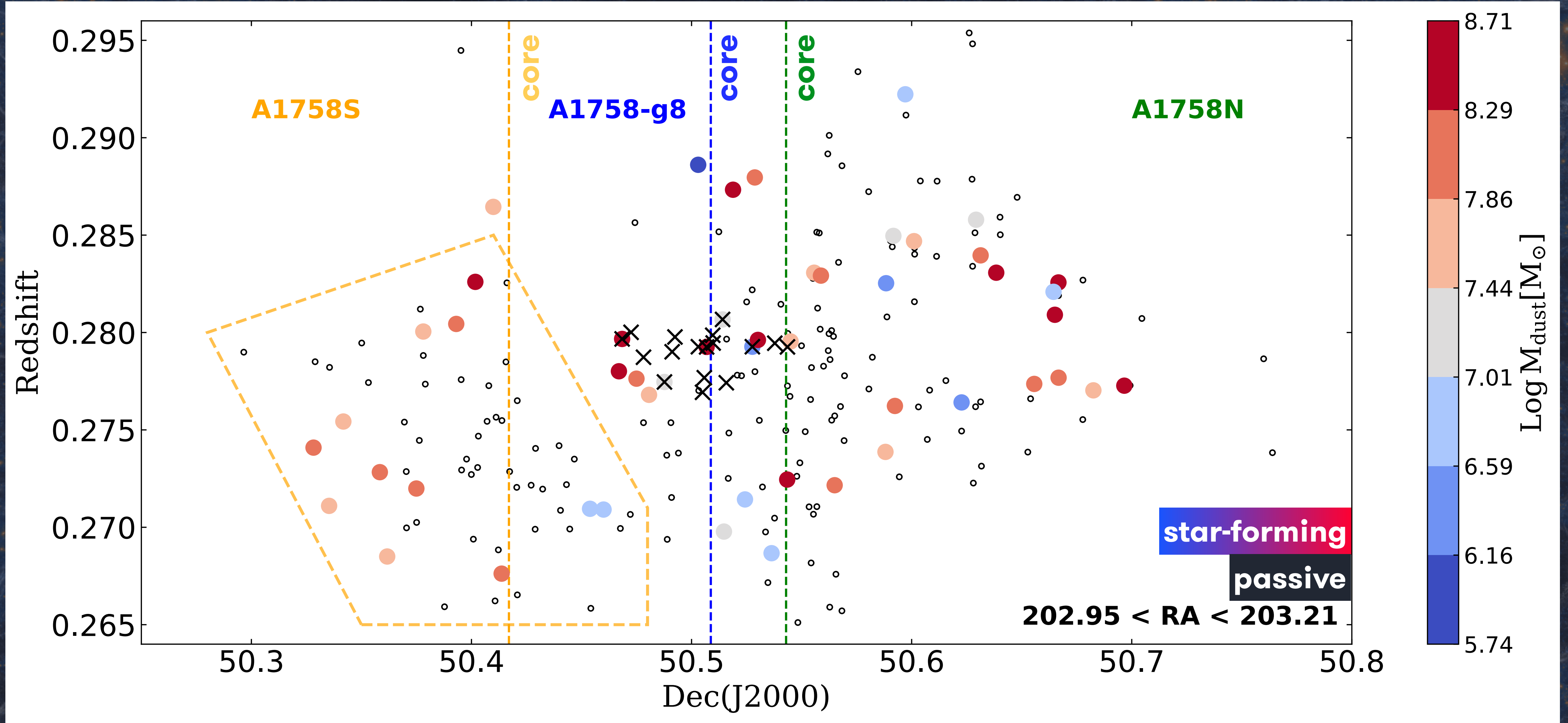
- Mass cut $M_{\text{star}} > 10^9 M_{\odot}$, $L_{\text{IR}} > 10^{9.8} L_{\odot}$
- Theoretical models from Calura +16 confirm “normal” star formation modes, no starburst
- SFR and dust masses in cluster tail at lower values compared to field galaxies

Abell 1758: star-forming galaxies



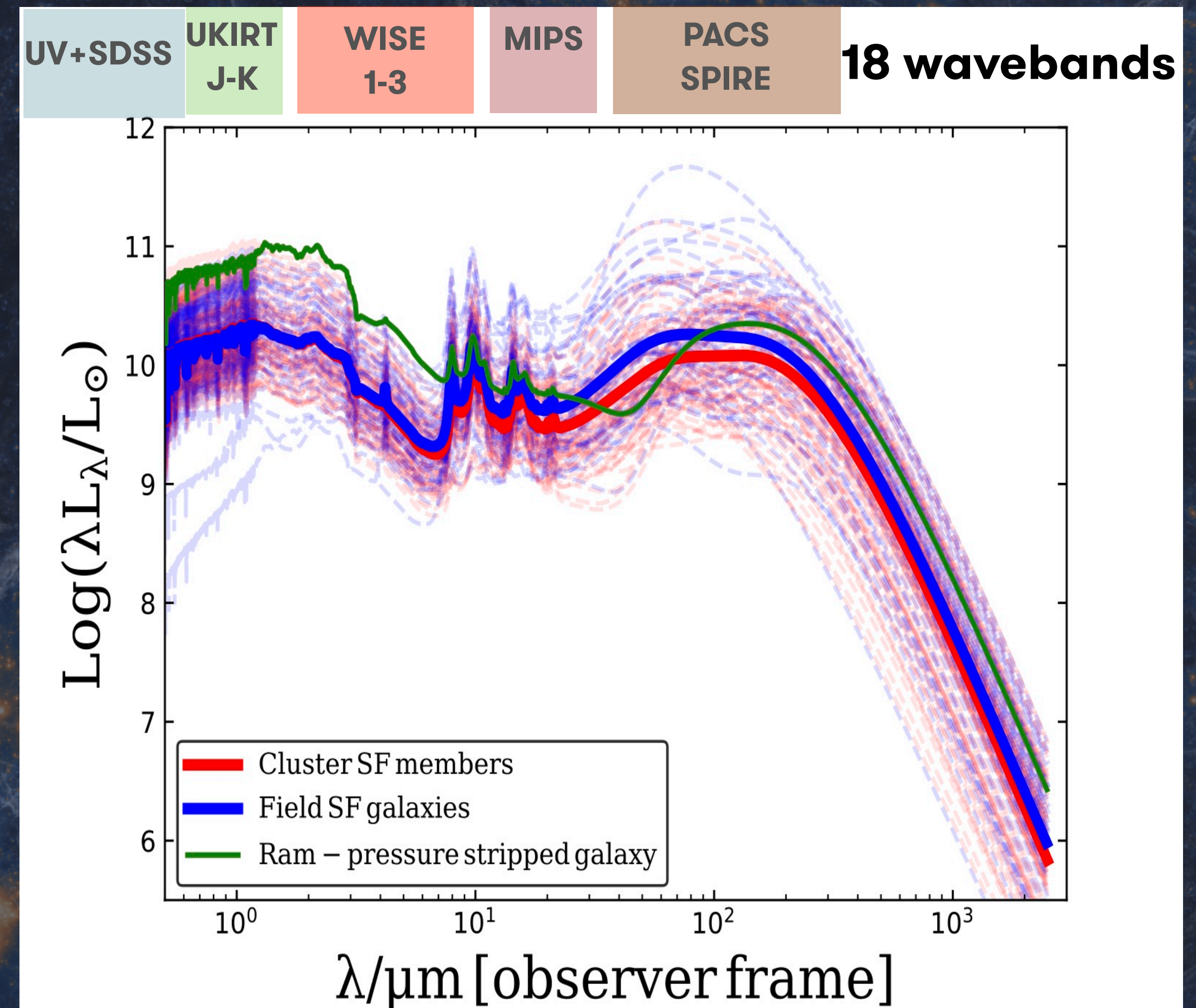
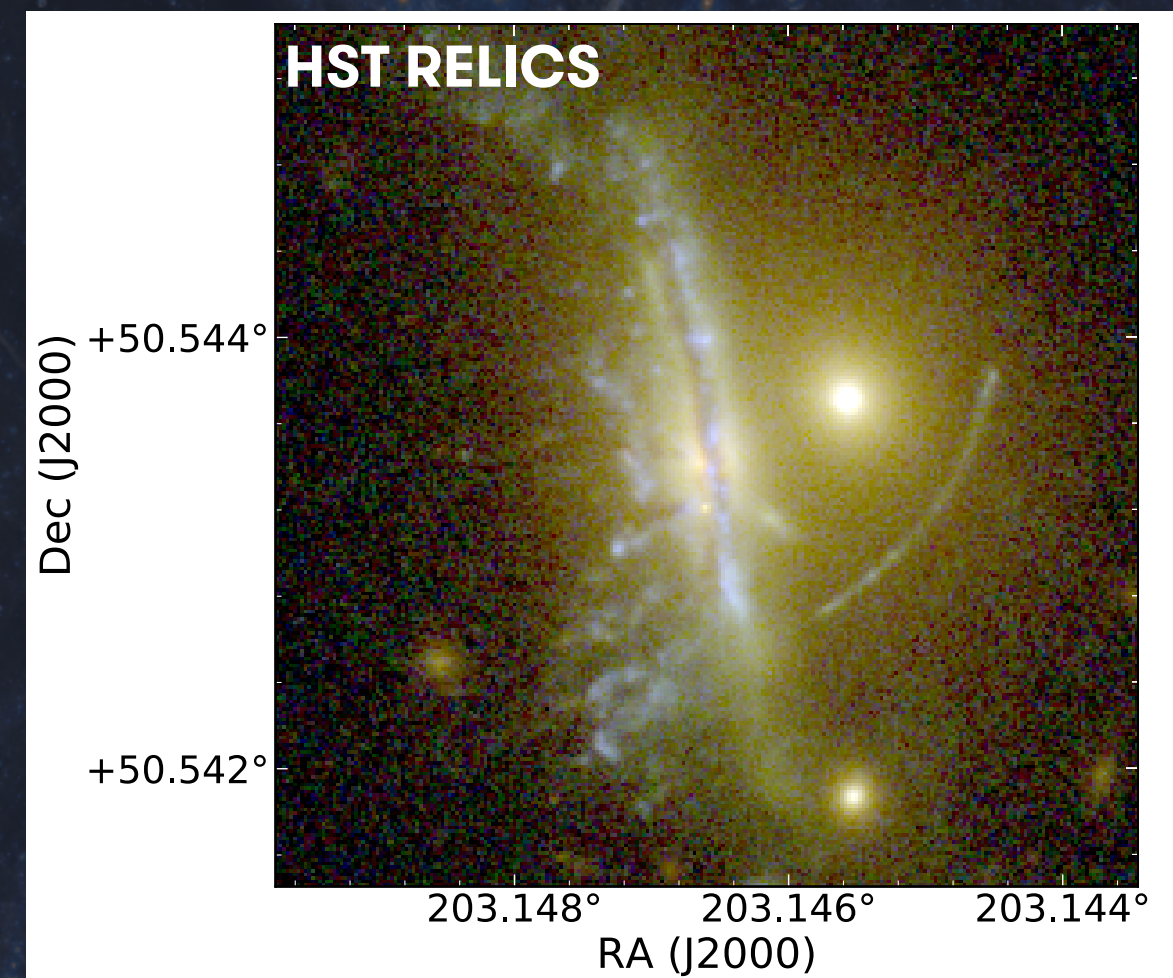
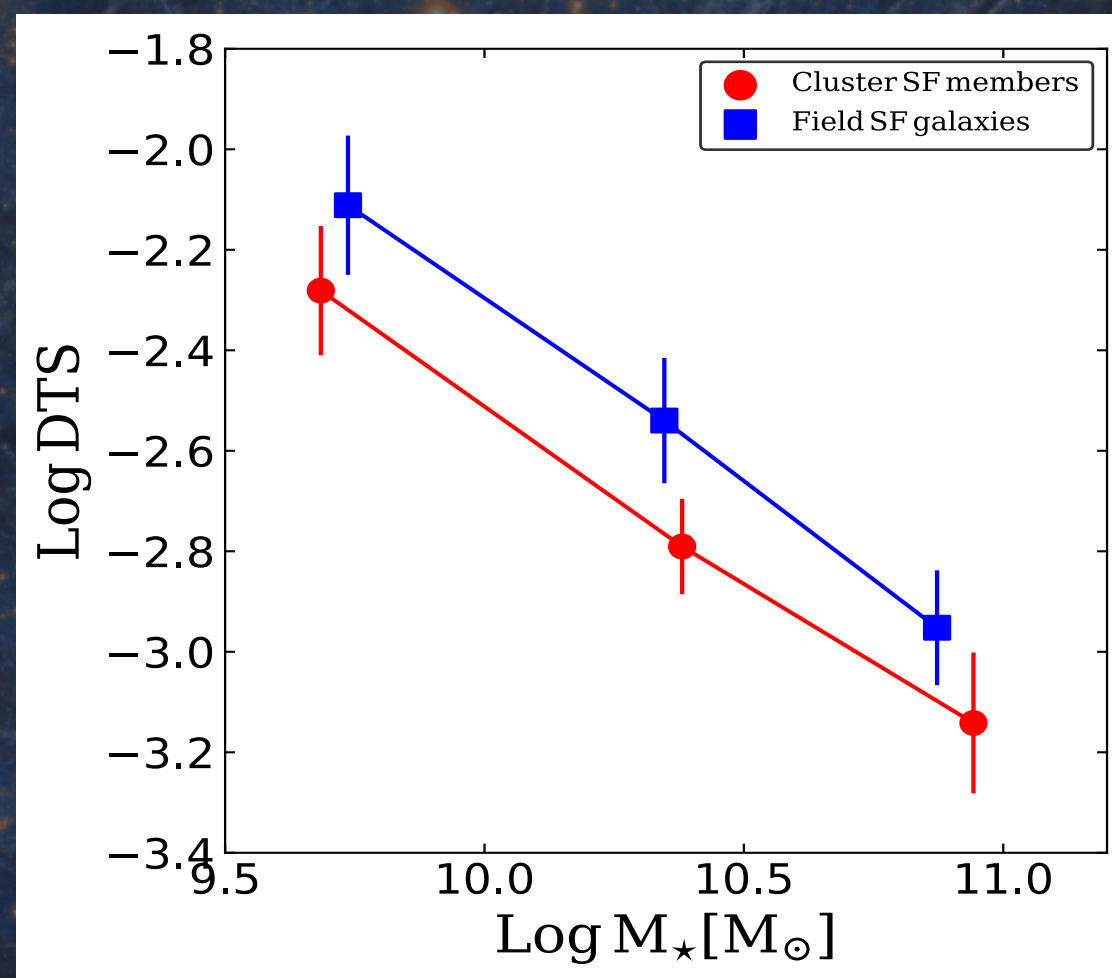
MB+ 20

Abell 1758: star-forming galaxies



MB+ 20

Abell 1758: dust properties



- Cluster SF members showing reduced mid-IR luminosity
- Enhance reduction in ram-pressure stripped galaxy: dust destruction/removal?
- Timescales of 0.7-2.0 Gyr

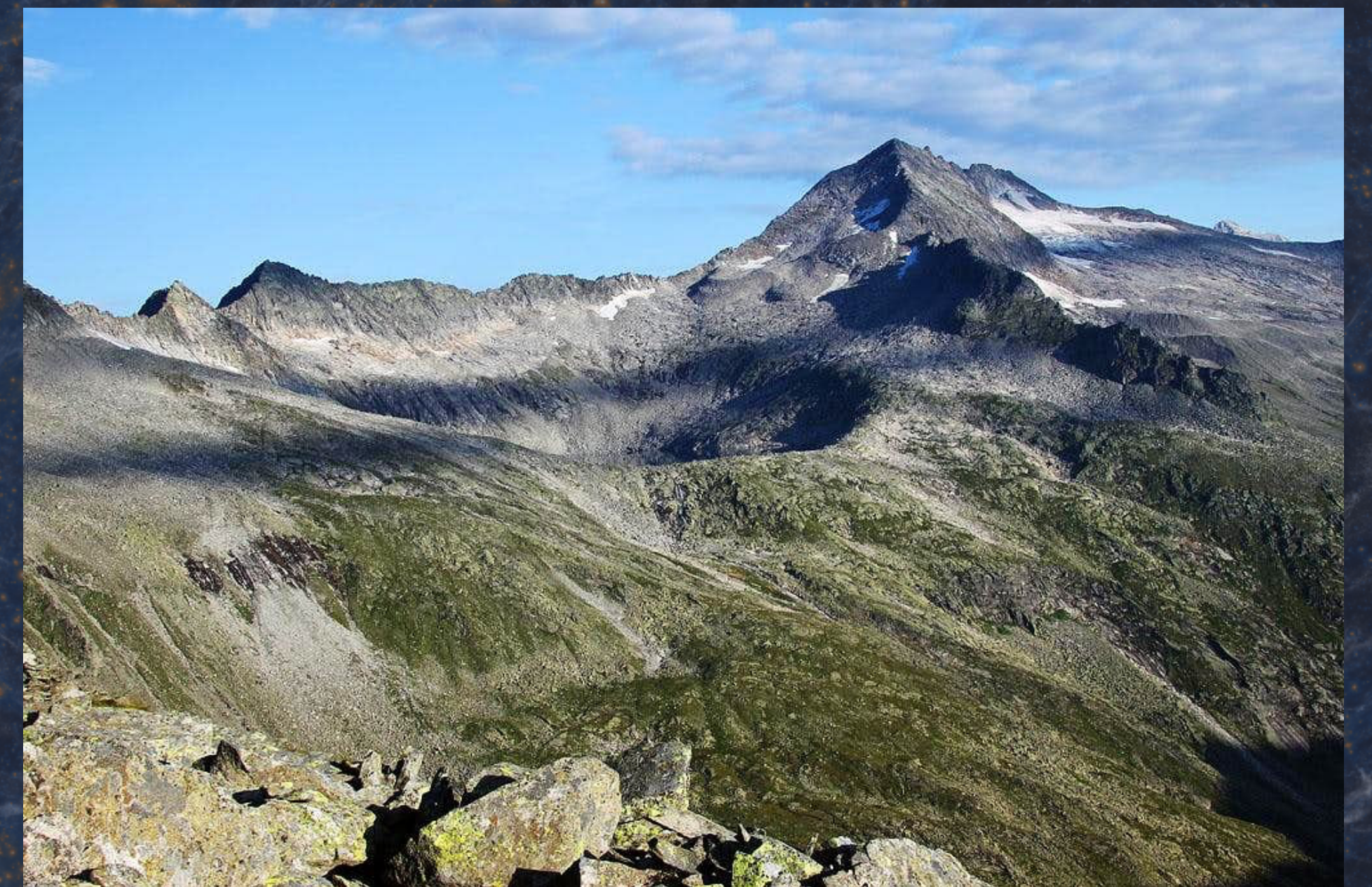
MB+ 20

Conclusions

- **Systematic panchromatic study of star-forming cluster members at $z > 0.25$, with measurement of dust masses**
- **Direct confirmation of pre-merger state of Abell 1758**
- **Direct evidence of dust consumption/destruction in recently infalling galaxies. SF galaxy mostly infalling in isolation**
- **Heating from the intracluster medium radiation, ram-pressure stripping and merger shocks. Timescales ~ 1.35 Gyrs**

Alpine **Cosmology** Conference 2020

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A visualization of the cosmic web, showing a complex network of blue filaments and nodes. The nodes are represented by bright, glowing orange and yellow clusters of galaxies, while the filaments are thin, wispy structures of blue light. The background is a dark, deep blue, suggesting the vastness of space.

Thank you