Mapping the spatial distribution of star formation in cluster galaxies at z ~0.5 with the Grism Lens-Amplified Survey from Space (GLASS)

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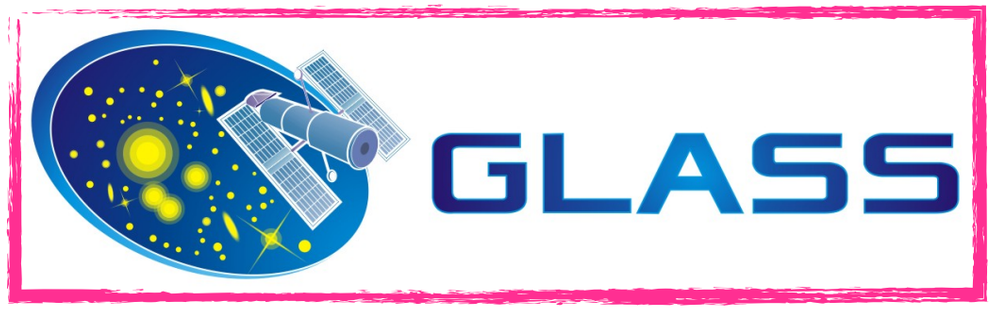
and the GLASS team

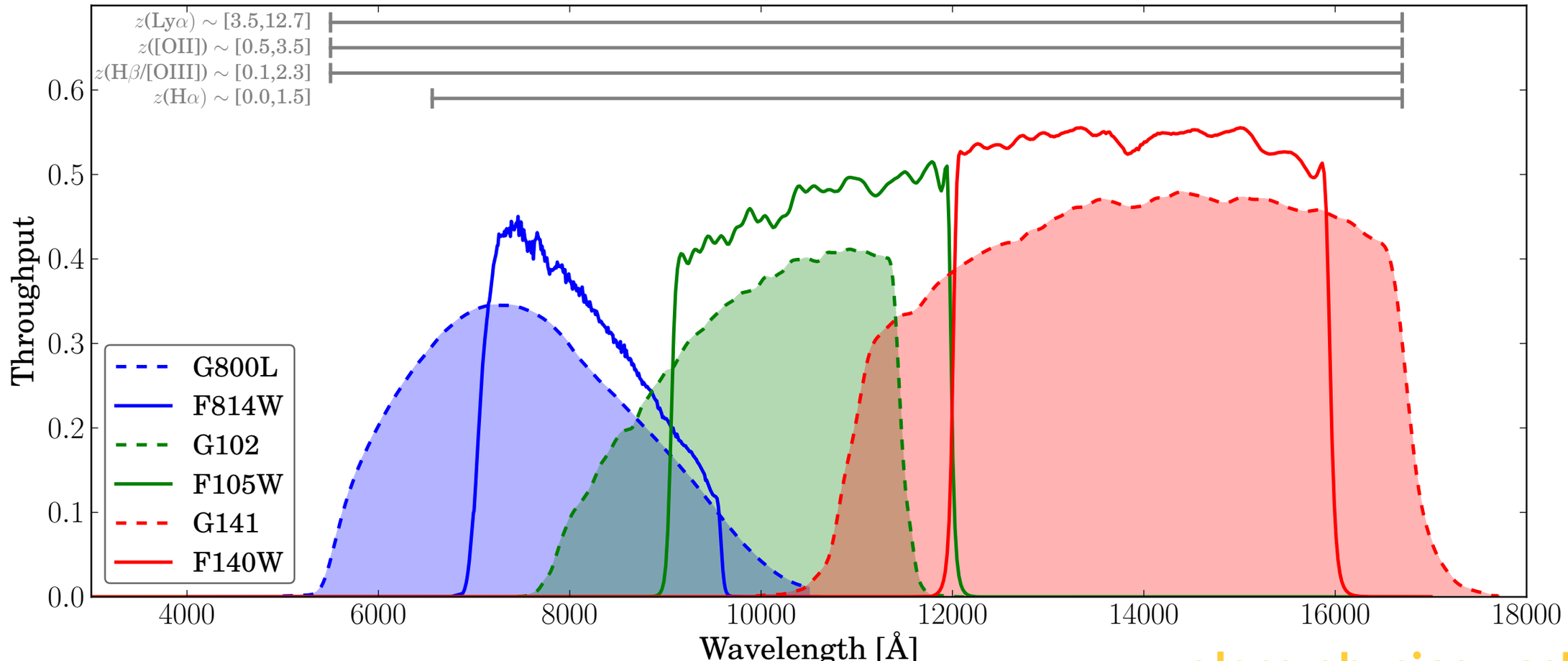
THE UNIVERSITY OF MELBOURNE



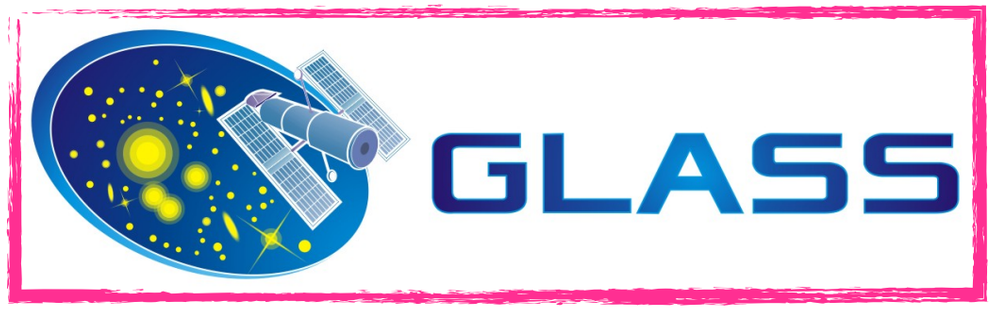
Schmidt et al. (2014)
Treu et al. (2015)

- The Grism Lens-Amplified Survey from Space (PI T.Treu, UCLA)
- 140 orbits HST grism spectroscopy of 10 massive clusters (Cycle 21) **COMPLETED**
- Clusters are selected from CLASH and Frontier Field (z=0.3-0.6)
- Spectra for ~20,000 objects (~10,000 down to m_{F140} ~24)

Parallel fields **Cluster cores** **Cluster cores**

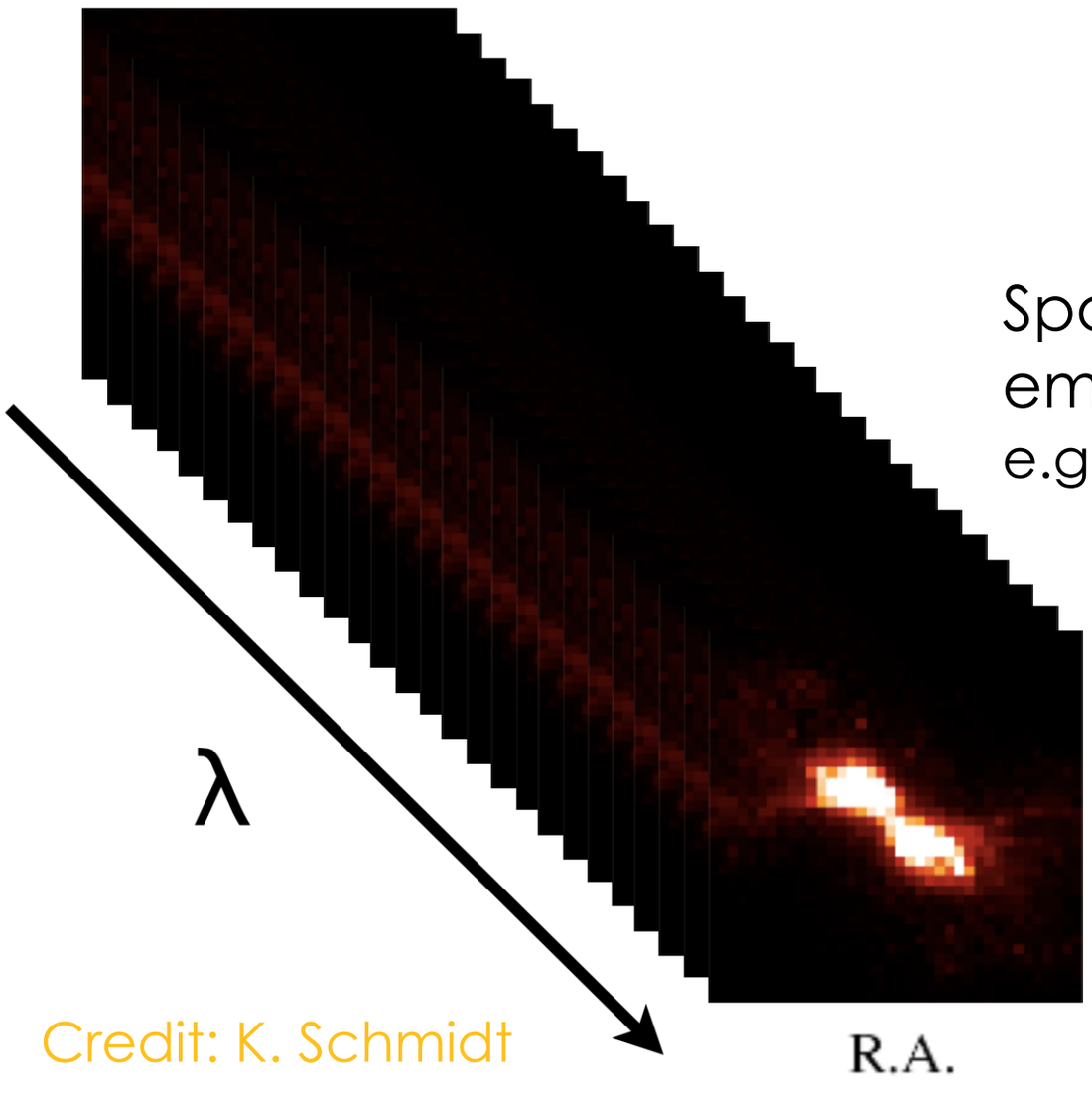


glass.physics.ucsb.edu



Schmidt et al. (2014)
Treu, Schmidt, Brammer, BV et al. (2015)

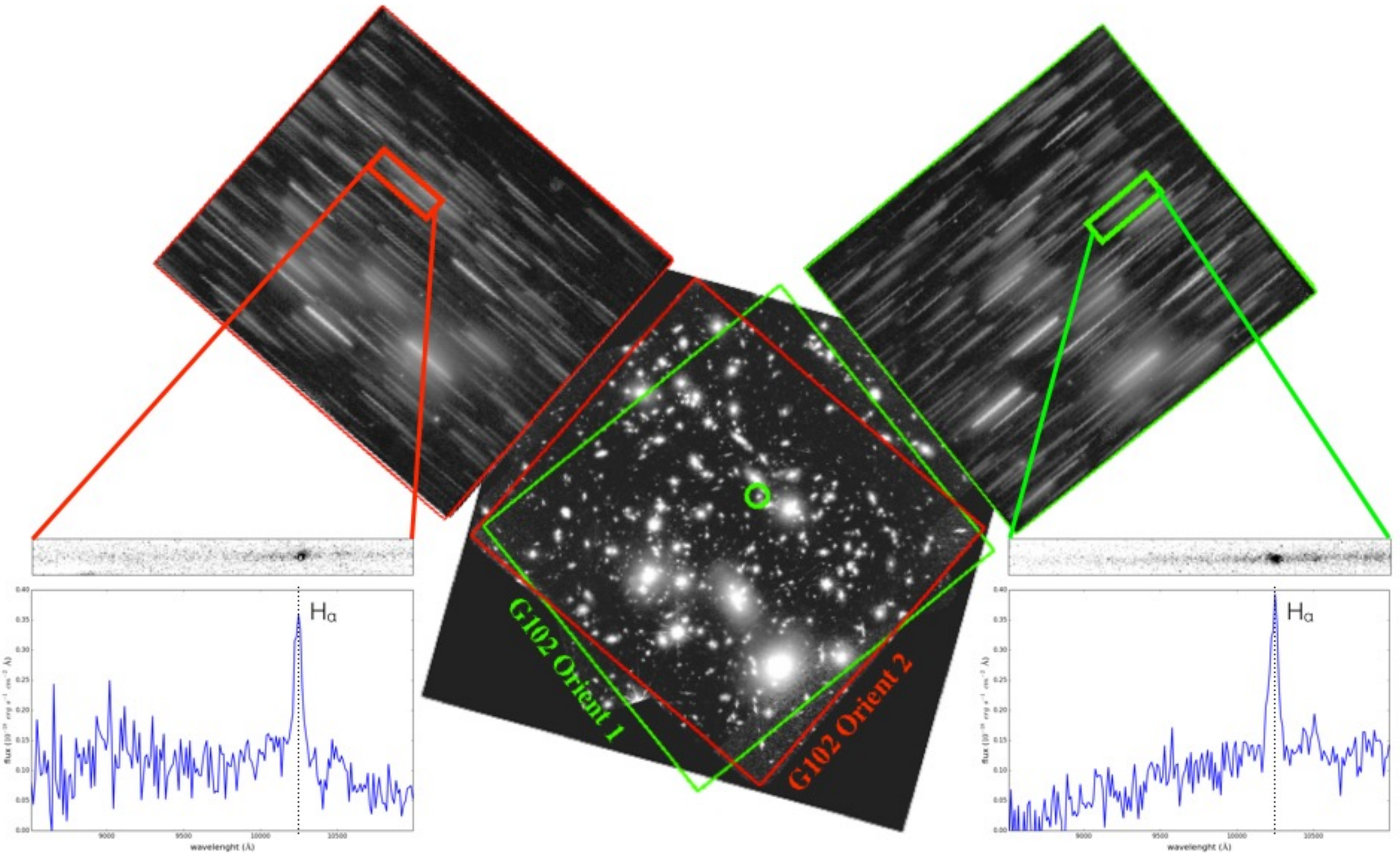
- 3D grism spectroscopy



Credit: K. Schmidt

Spatial information to create maps of emission lines
e.g. Schmidt+2013, Nelson+2012,2013

GLASS

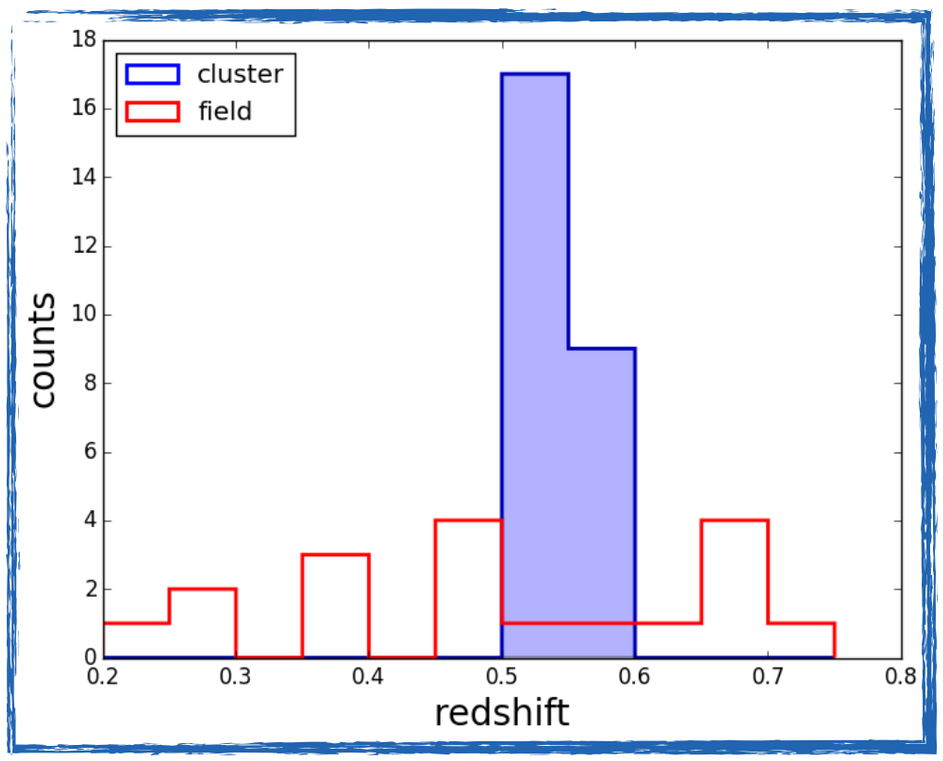


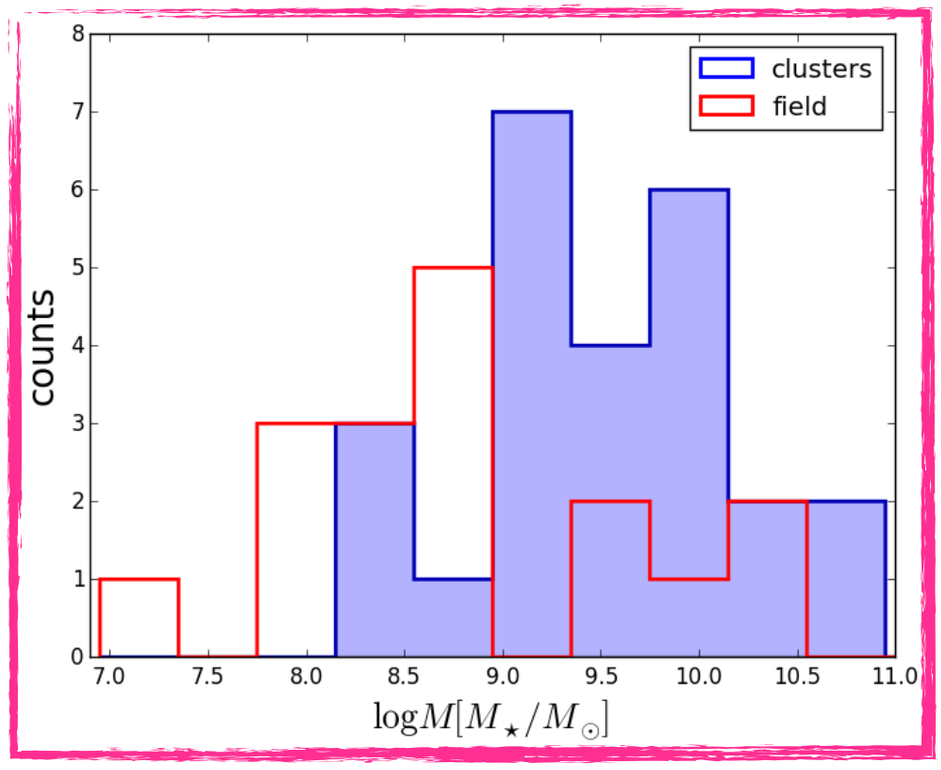
Credit: K. Schmidt

Our sample

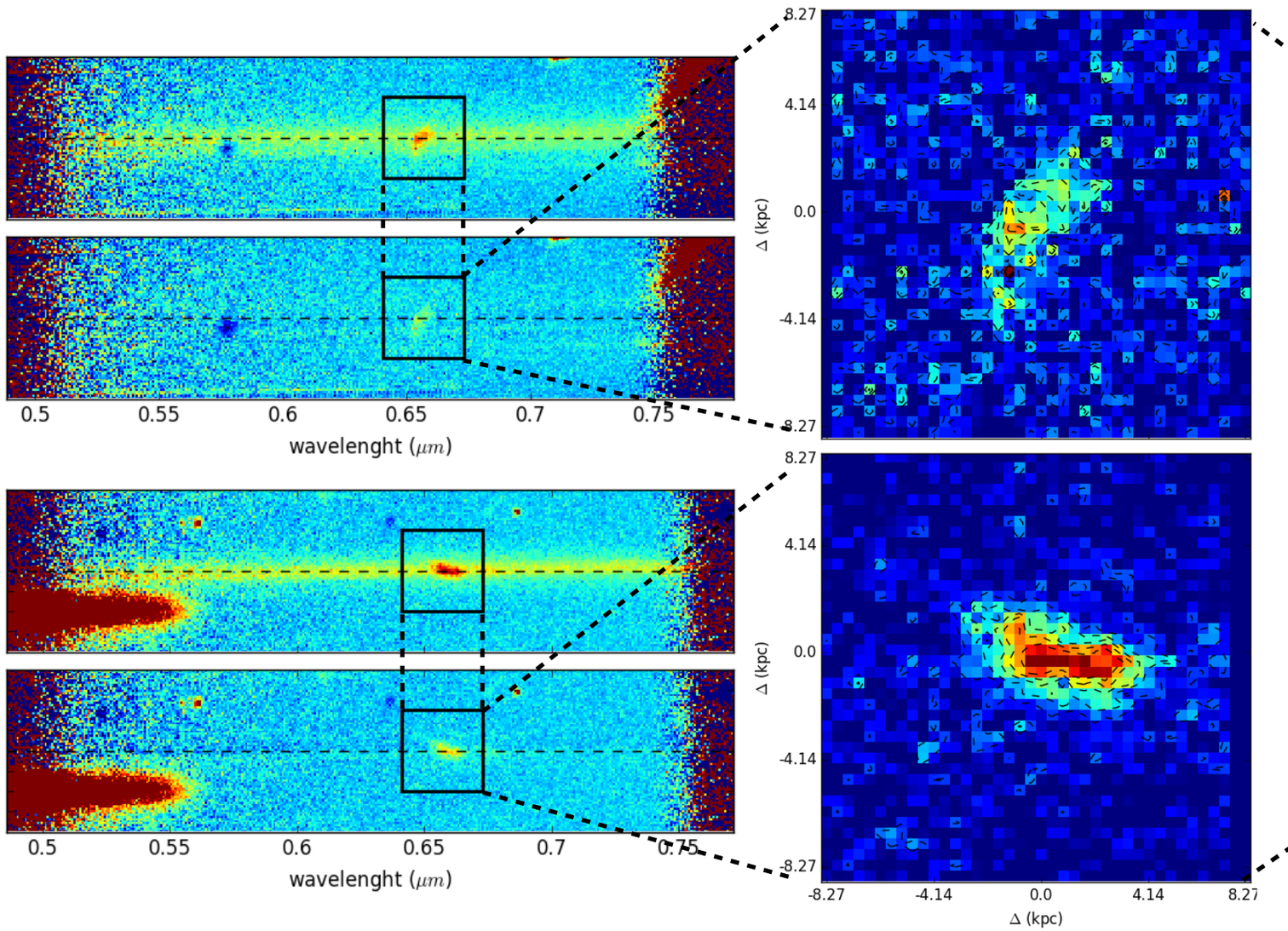
Vulcani et al. (2015)

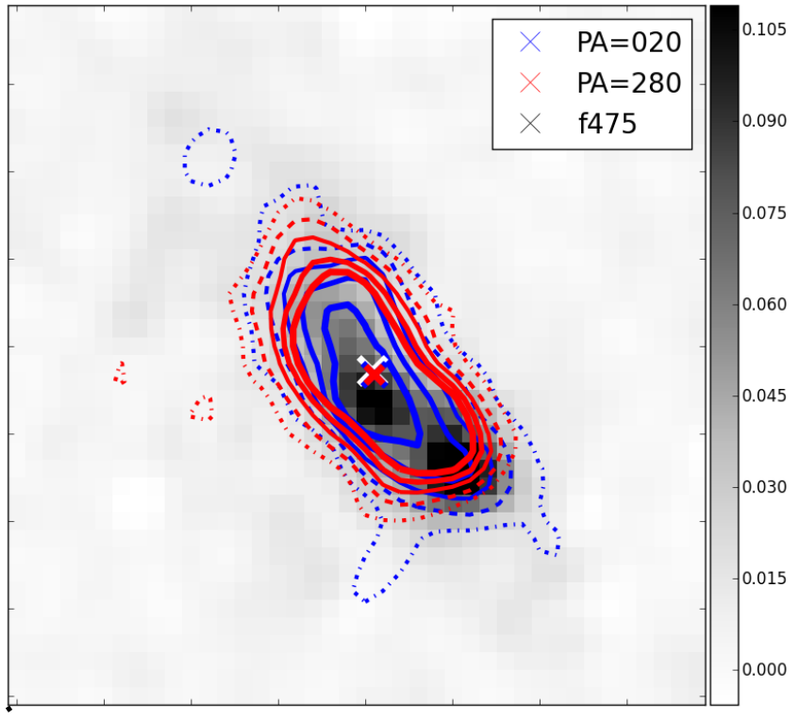
- 2 clusters: MACS0717.5+3745 z=0.548
  MACS1423.8+2404 z=0.545
- All galaxies with reliable redshift estimation and detected Hα in emission (in G102)
- 25 galaxies with z within ± 0.03 the cluster redshift: CLUSTER MEMBER sample
- 17 galaxies with z outside ± 0.03 the cluster redshift: FIELD sample
- Stellar masses from CLASH photometry using a set of templates, computed with standard spectral synthesis models (Bruzual & Charlot 2003, Fontana *et al.* 2003, 2004)
- sizes from the second order moment of the light distribution





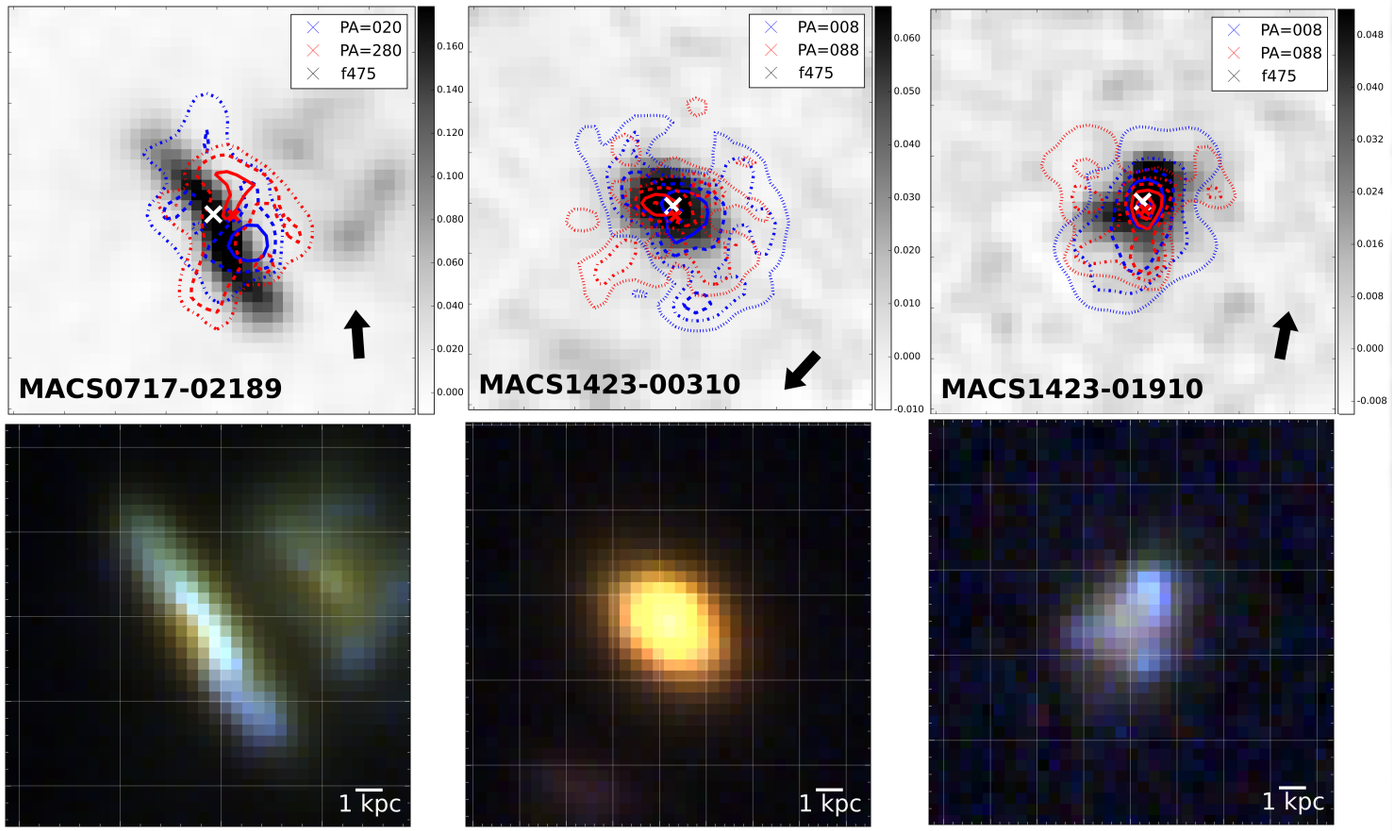
Maps of Hα


0.5
0.55
0.6
0.65
0.7
0.75
wavelenght (μm)
8.27
4.14
0.0
-4.14
-8.27
Δ (kpc)


PA=020
PA=280
f475
0.105
0.090
0.075
0.060
0.045
0.030
0.015
0.000

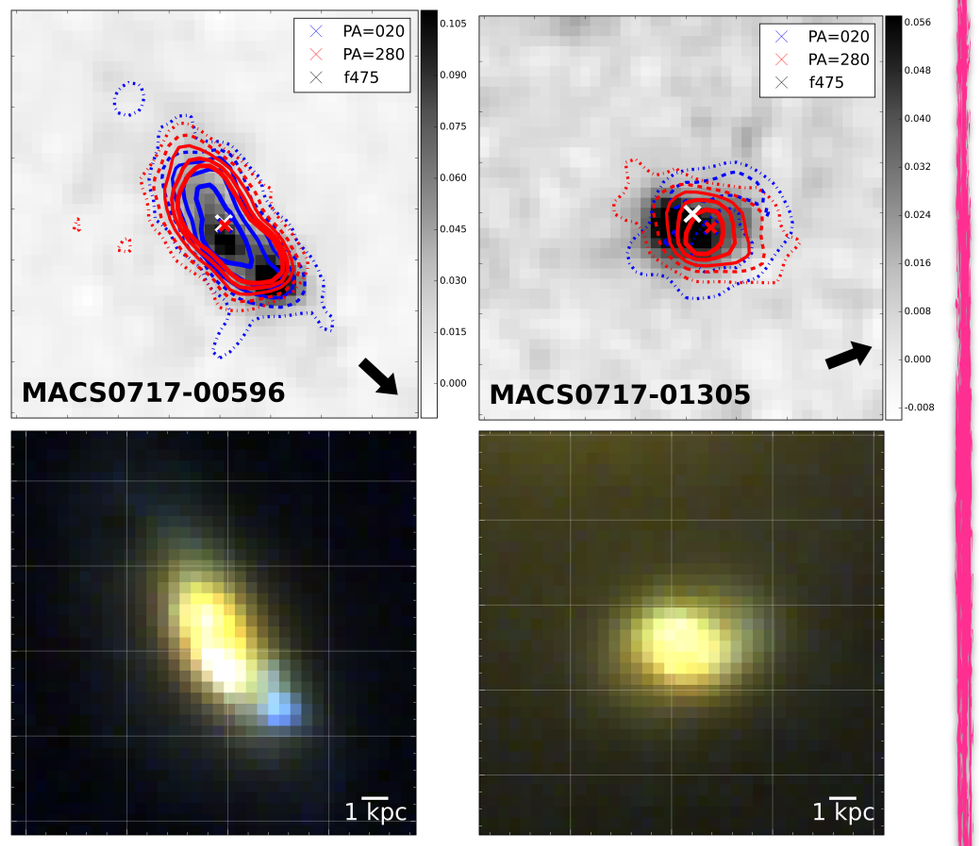
Maps of Hα and continuum emission

- r(Hα)>r(cont)



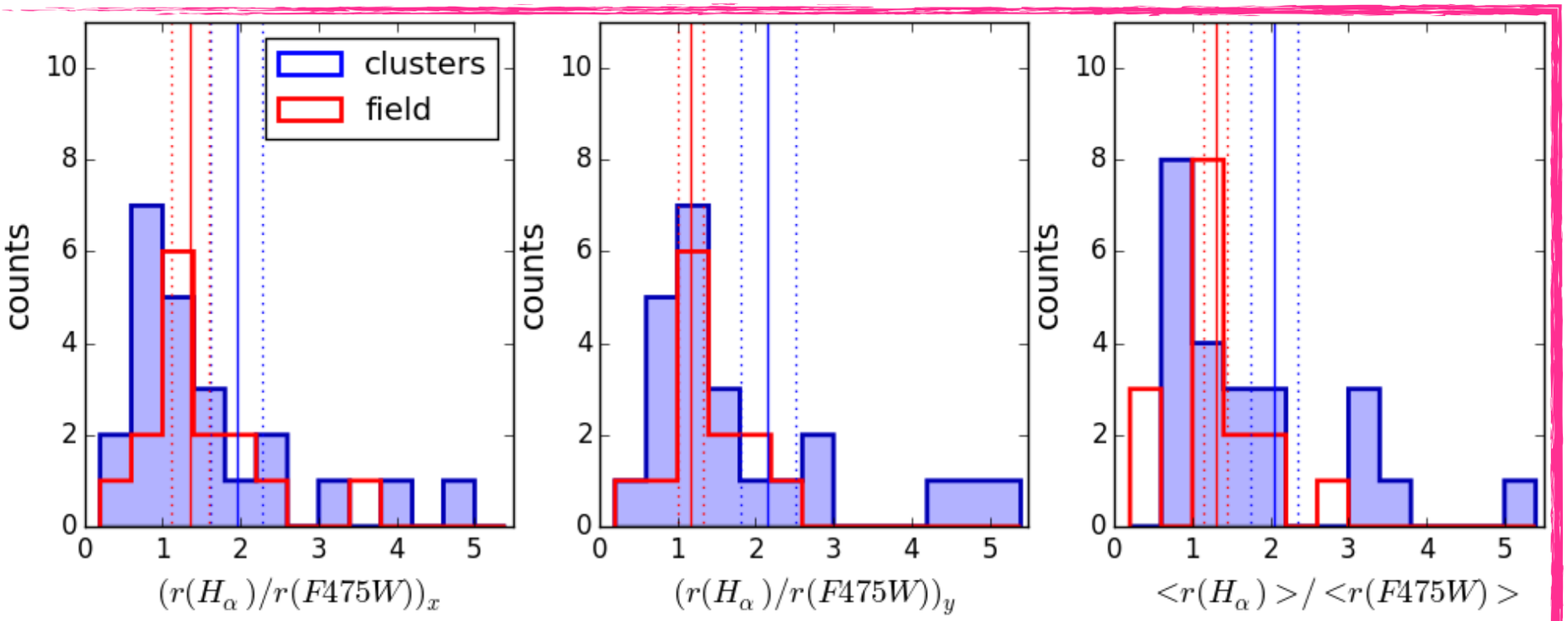
~60% both in clusters and field

- r(Hα)=r(cont)

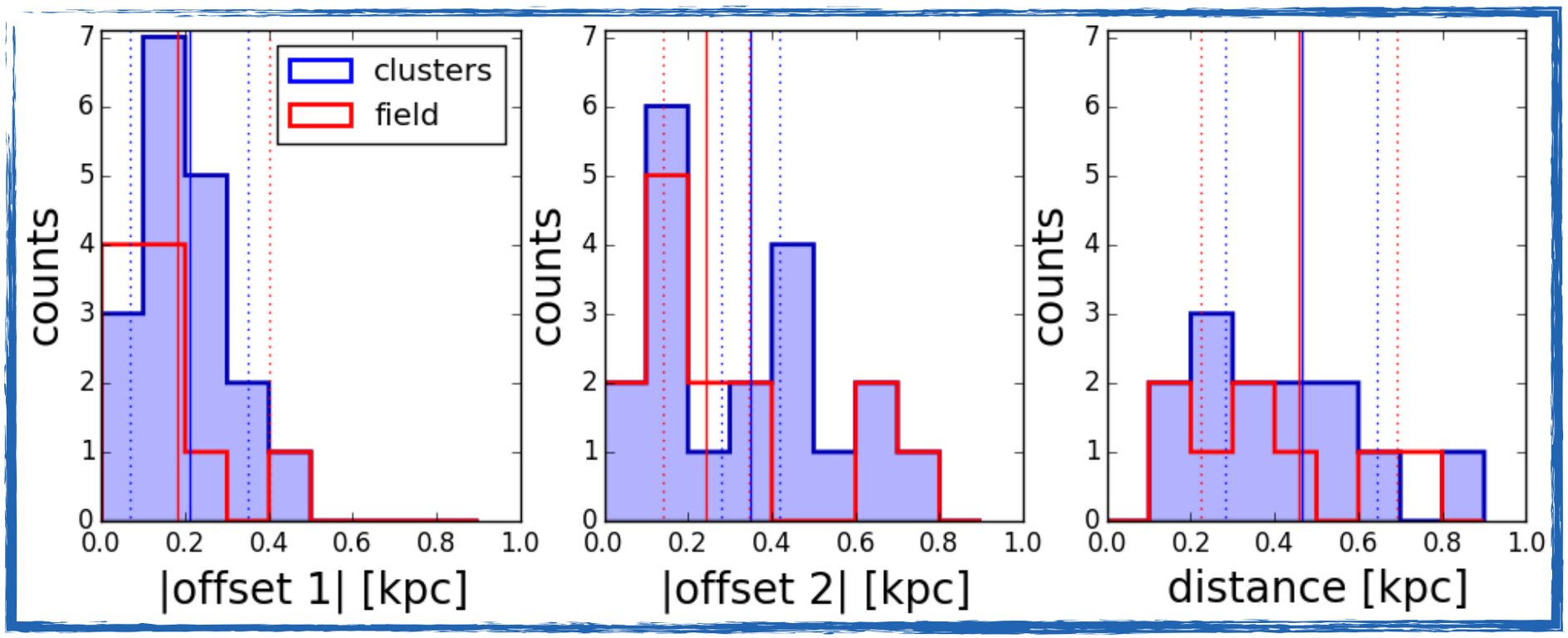


~30% in clusters
~20% in the field

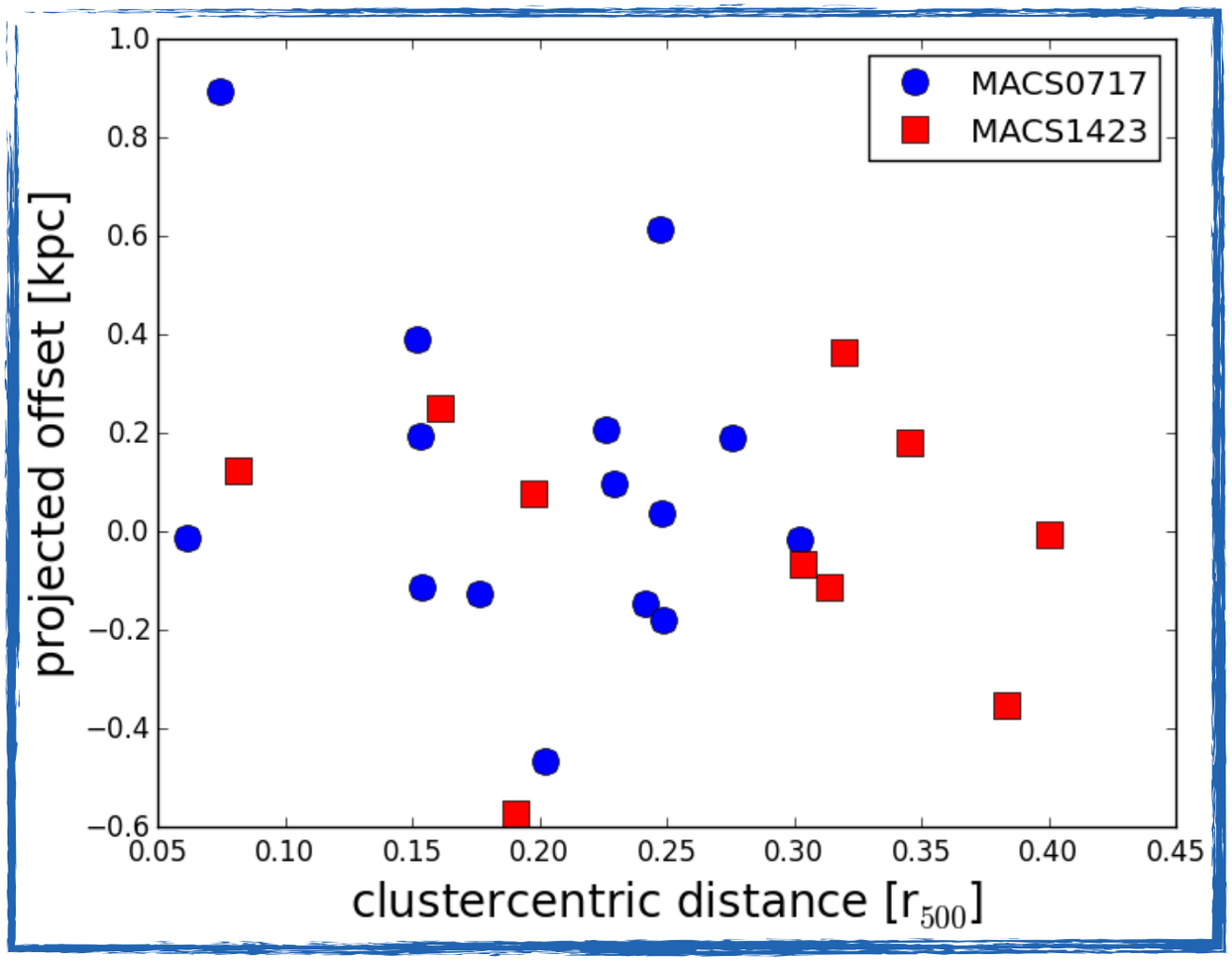
- SIZE RATIO



- OFFSET BETWEEN THE EMISSION IN THE CONTINUUM AND THE Hα EMISSION



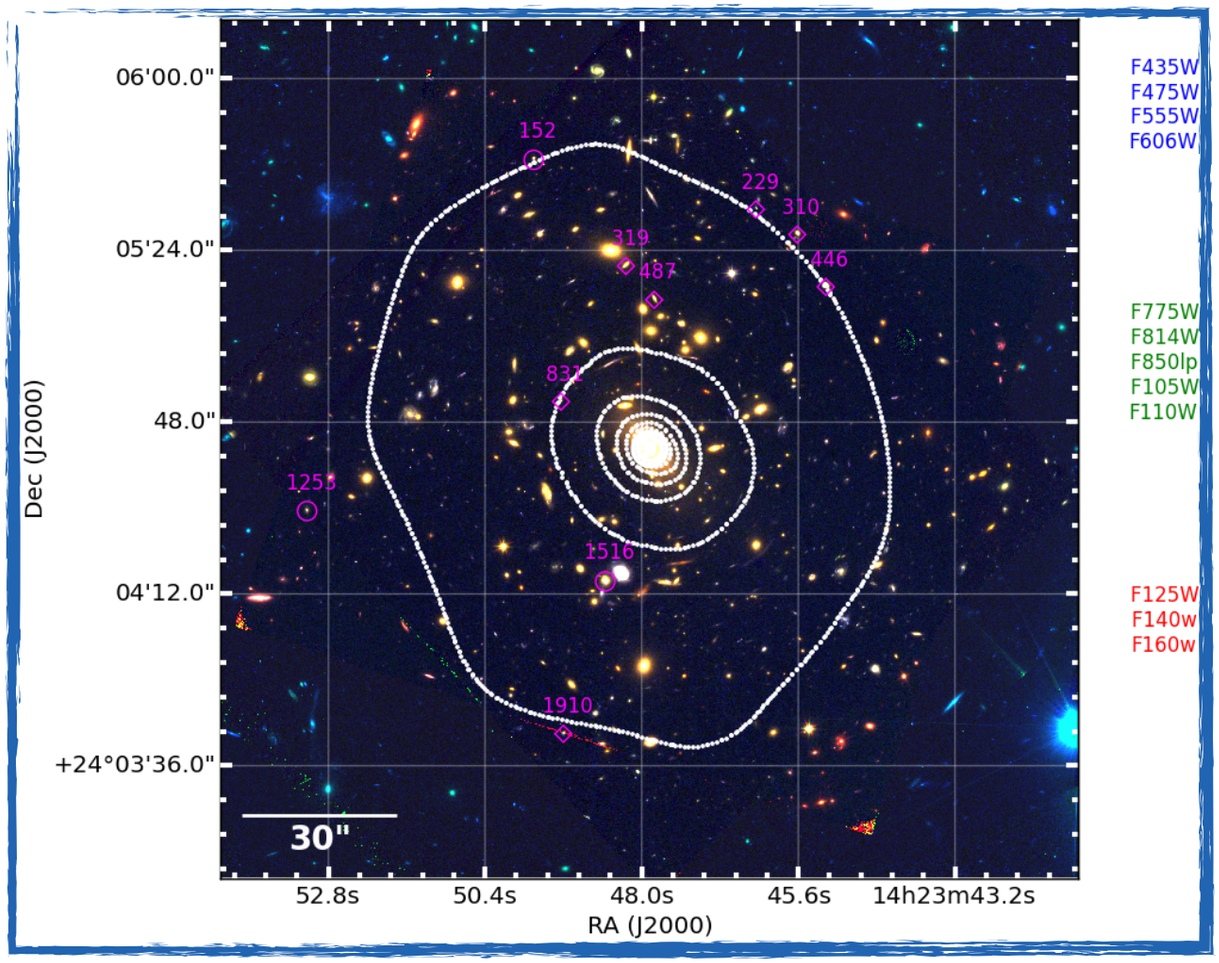
Peak of Hα emission and position within the clusters



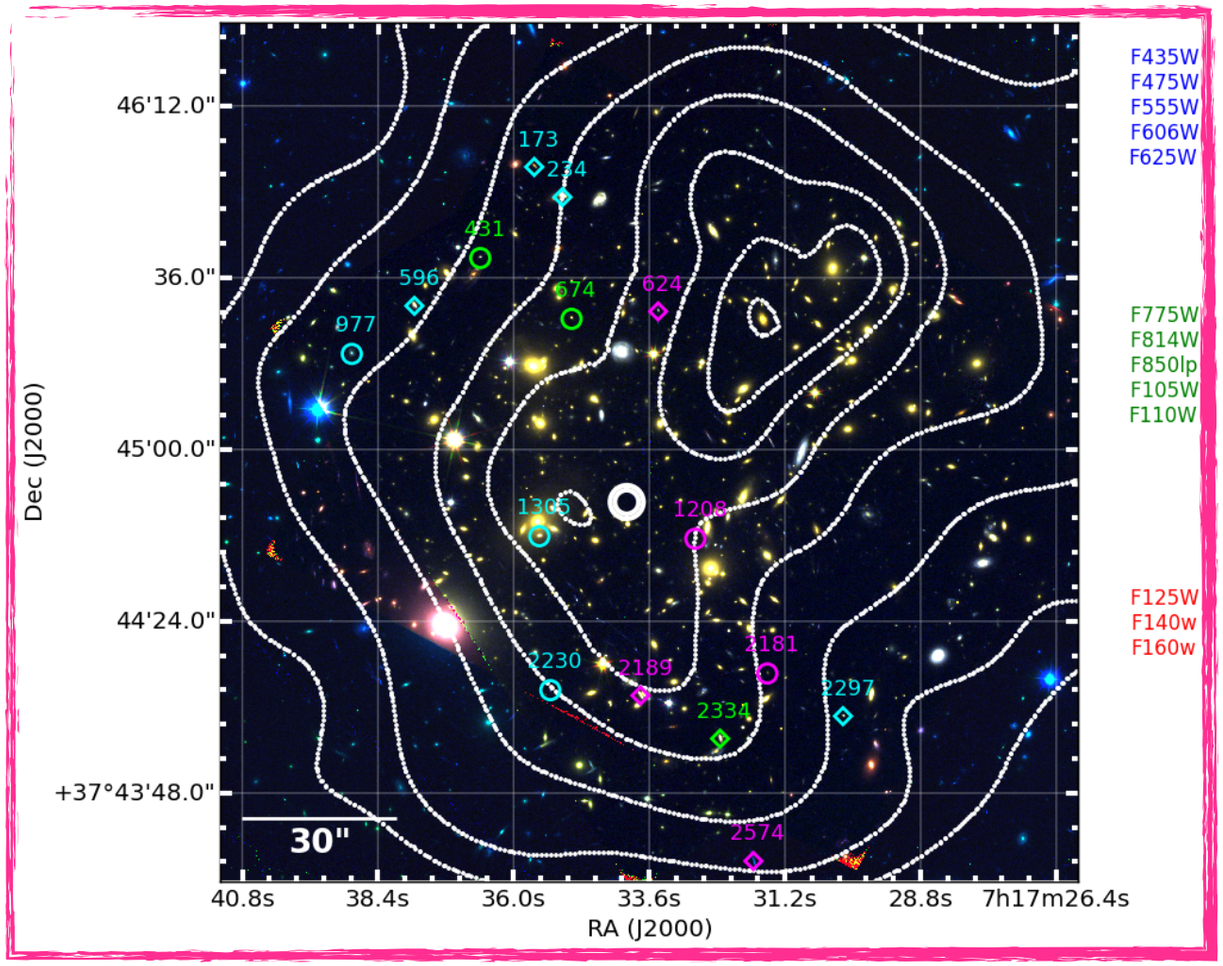
Maps of Hα and position within the clusters

- LOCAL GAS DENSITY (X ray emission)

MACS1423



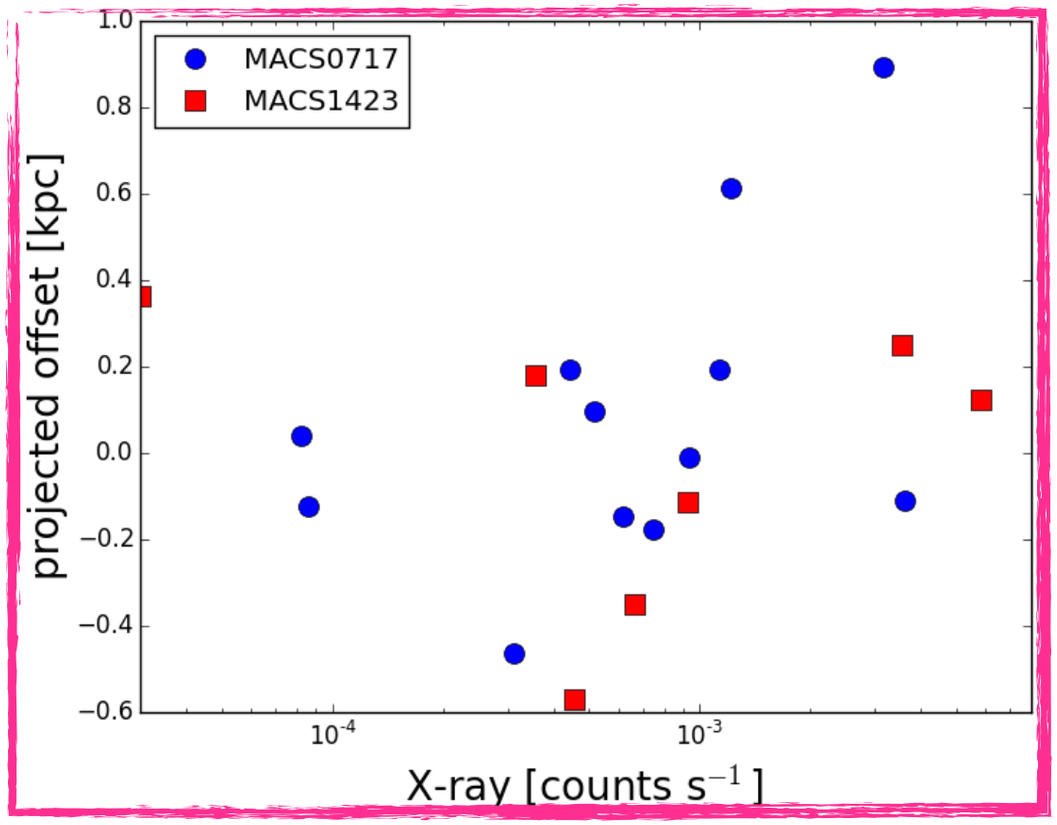
MACS0717

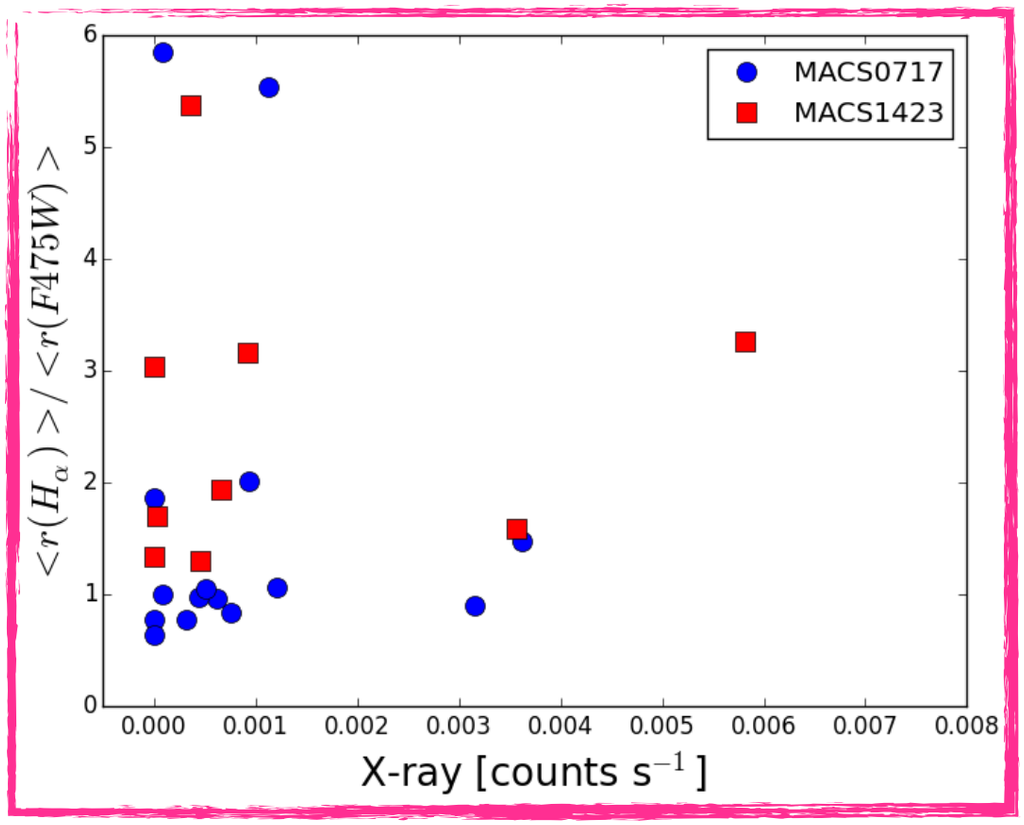


r(Hα)>r(cont)
r(Hα)=r(cont)
r(Hα)<r(cont)

similar results obtained with the surface mass density

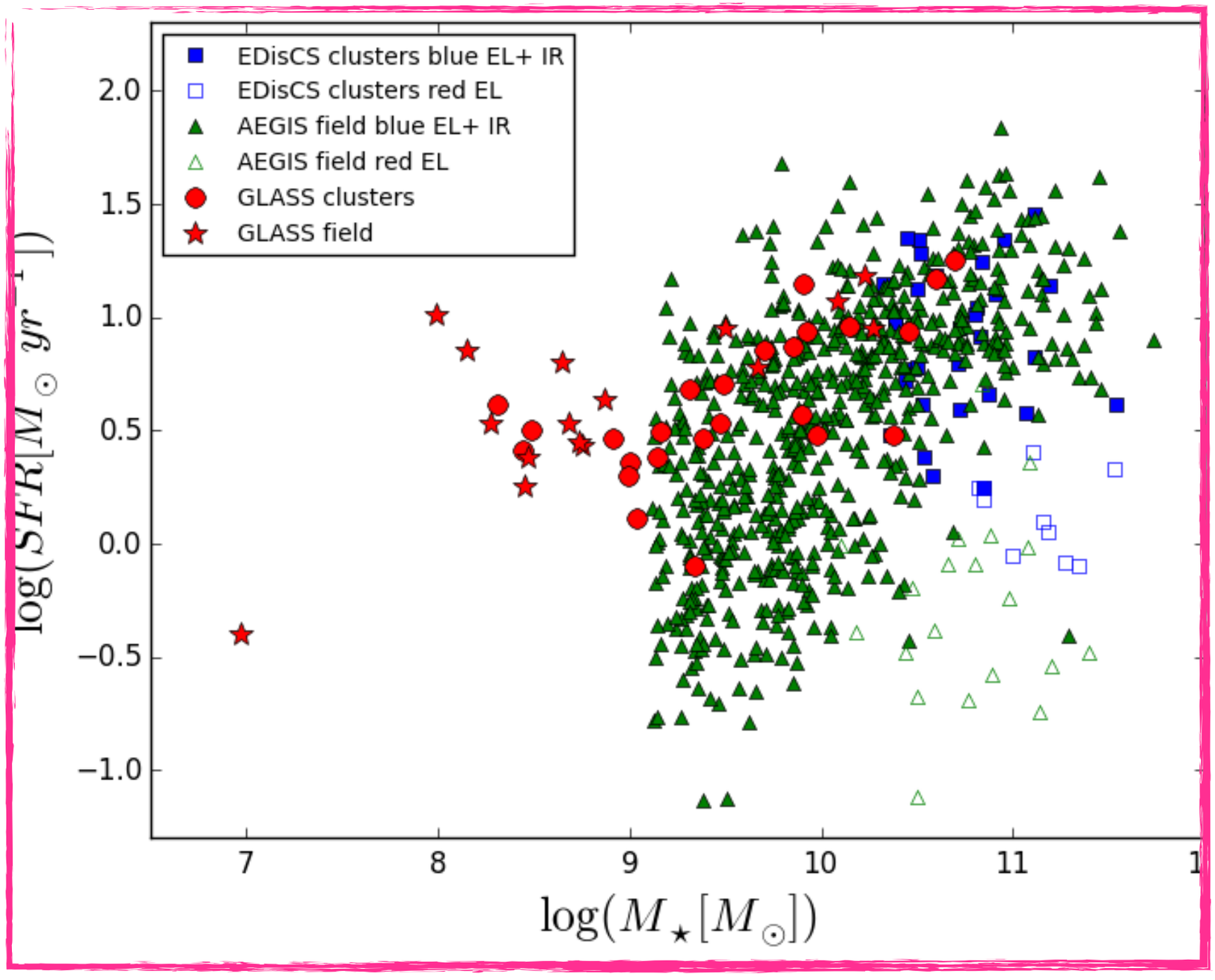
Peak of Hα emission and position within the clusters





similar results obtained with the surface mass density

SFR-Mass relation



Summary

Environmental processes are expected to act on cluster galaxies, leaving a recognisable signature

- Both in clusters and field 60% of the galaxies have r(Hα) larger than r(continuum) —> SF occurring in galaxy outskirts
- In clusters some examples of r(Hα) >> r(continuum) —> sign of ongoing stripping?
- Both in clusters and field there the Hα emission is offset with respect of the continuum emission —> bulk of SF not occurring in galaxy cores
- In clusters offset correlate with X-ray emission —>sign of ongoing stripping?
- MACS1423 is more relaxed than MACS0717 and all galaxies have Hα disk larger than continuum

Thanks for your attention!

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