L'evoluzione delle galassie nell'universo locale:

(genetica e) ambiente

G. Gavazzi
Universita' di Milano Bicocca

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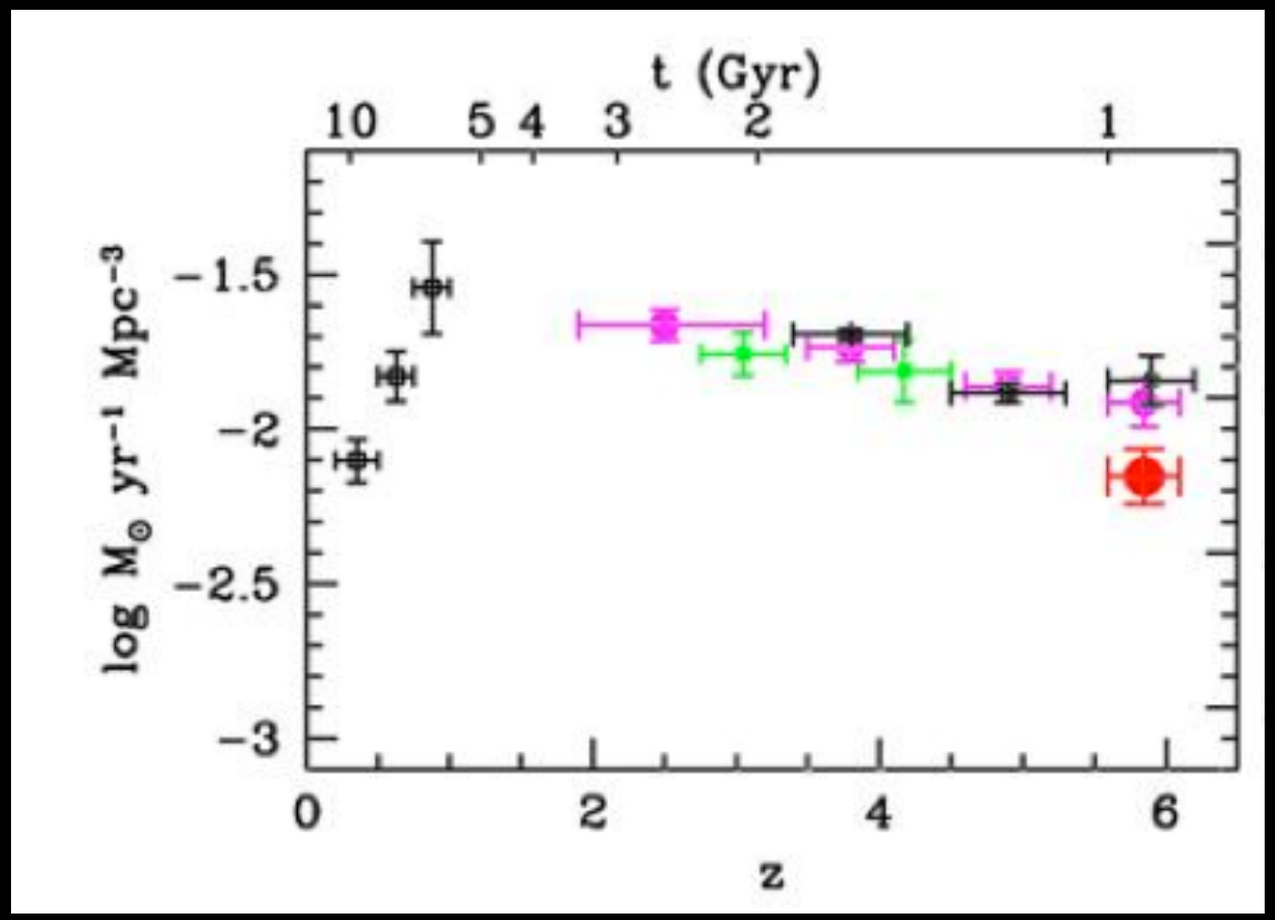
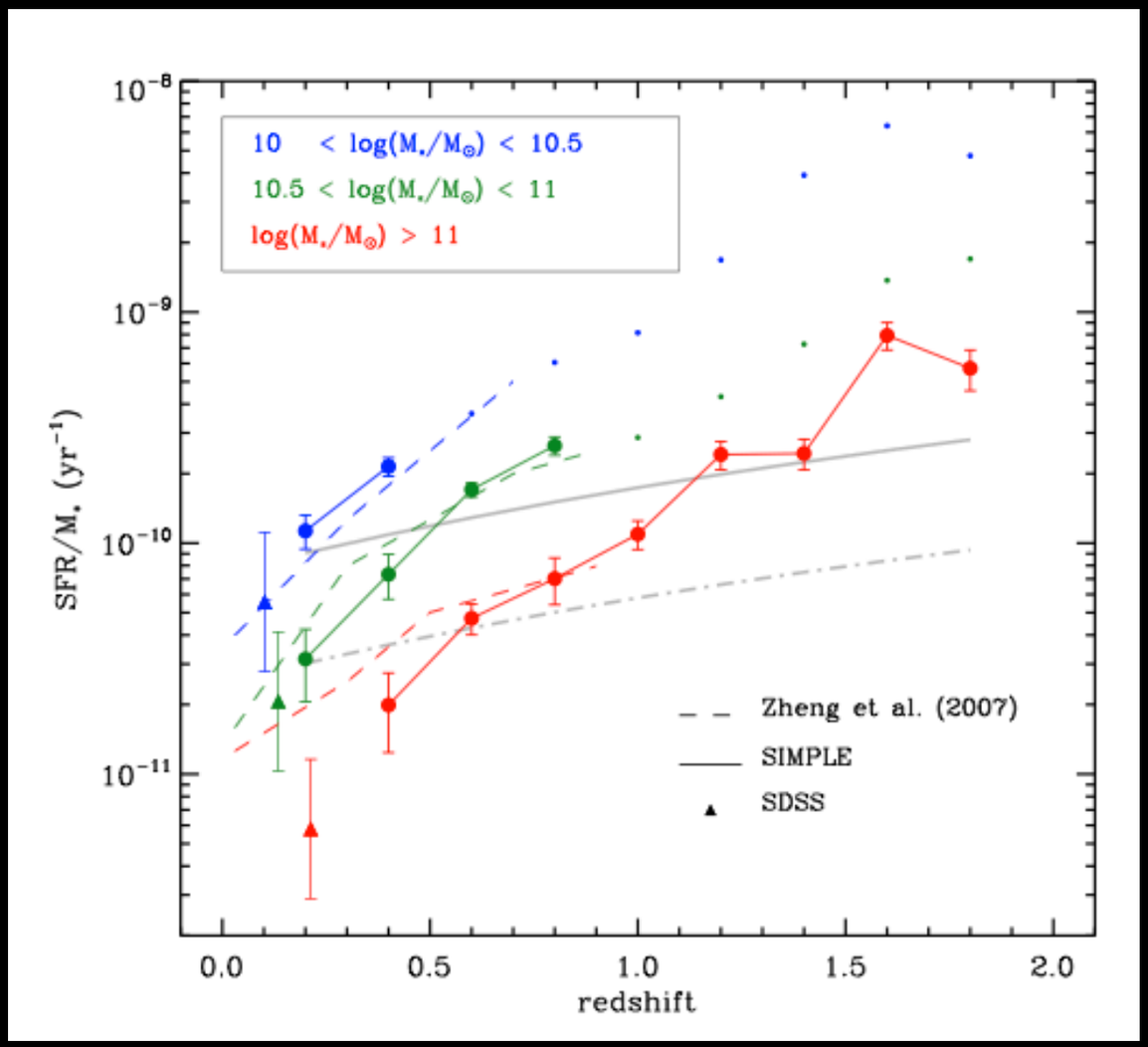
"Galaxy evolution":

-Build-up of dark matter haloes
-Transformation of baryons into stars
Quenching since z=1-2

SFR density



SSFR



..But galaxies form star at some rate even at the present epoch

M100

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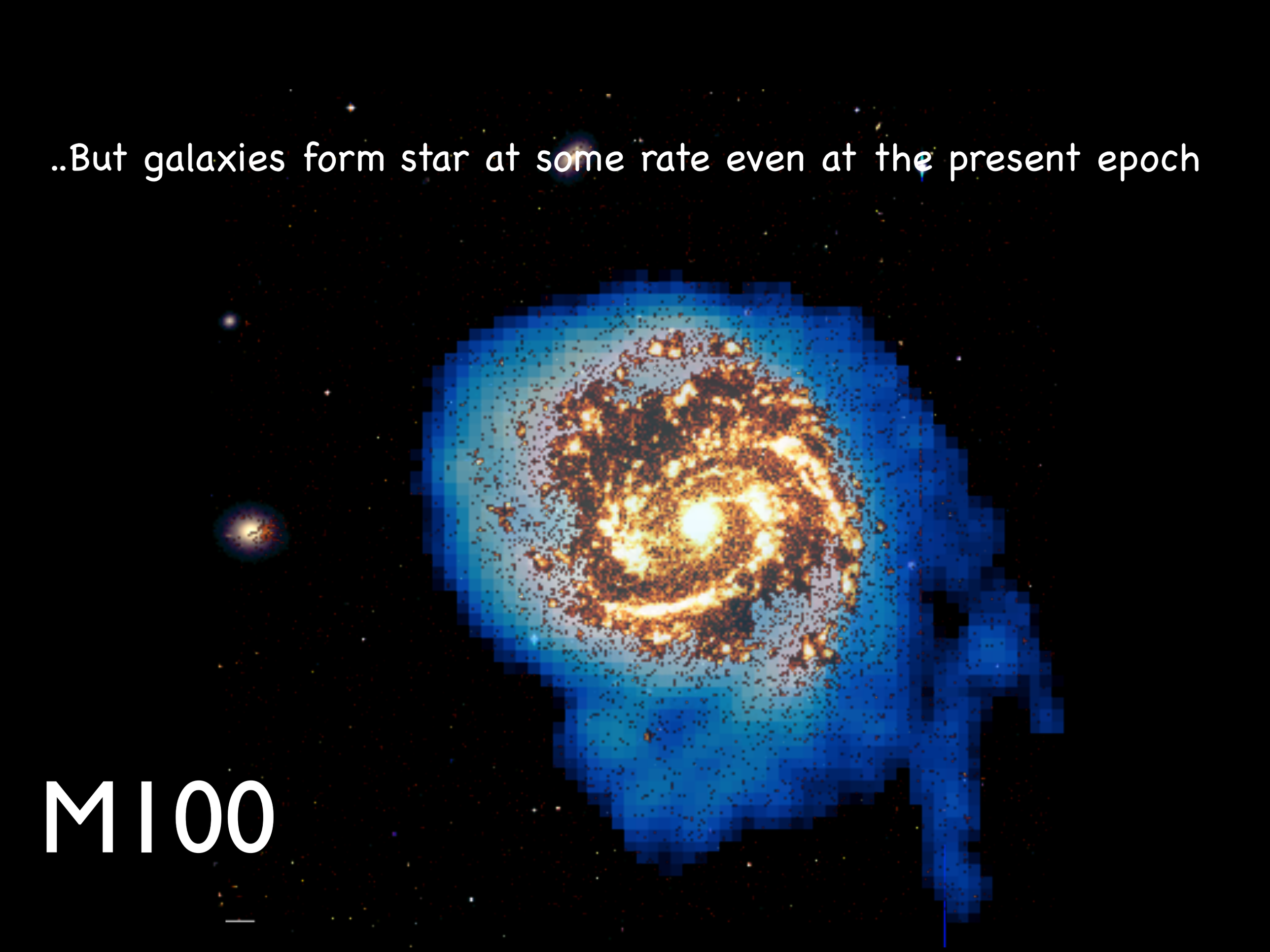
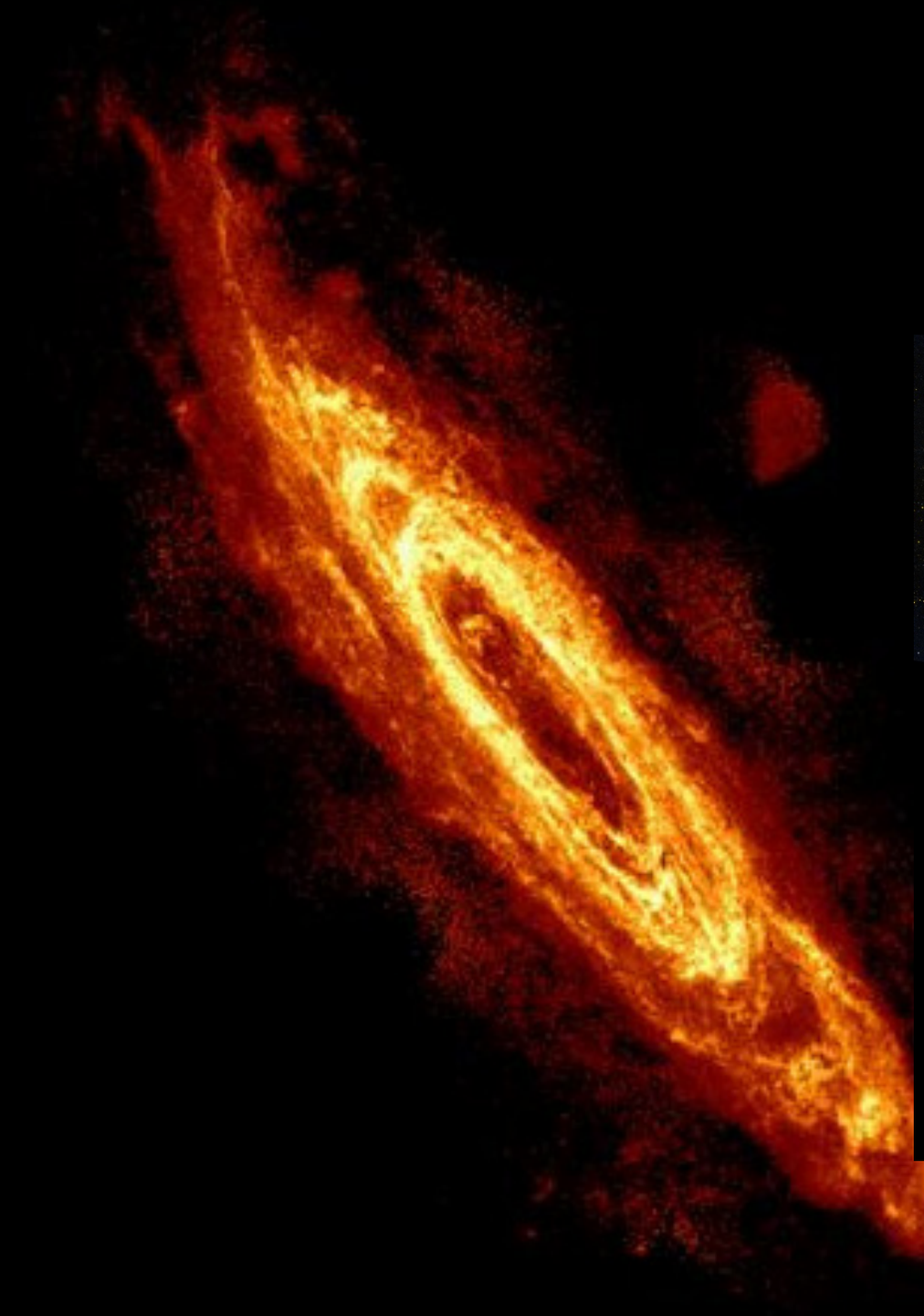
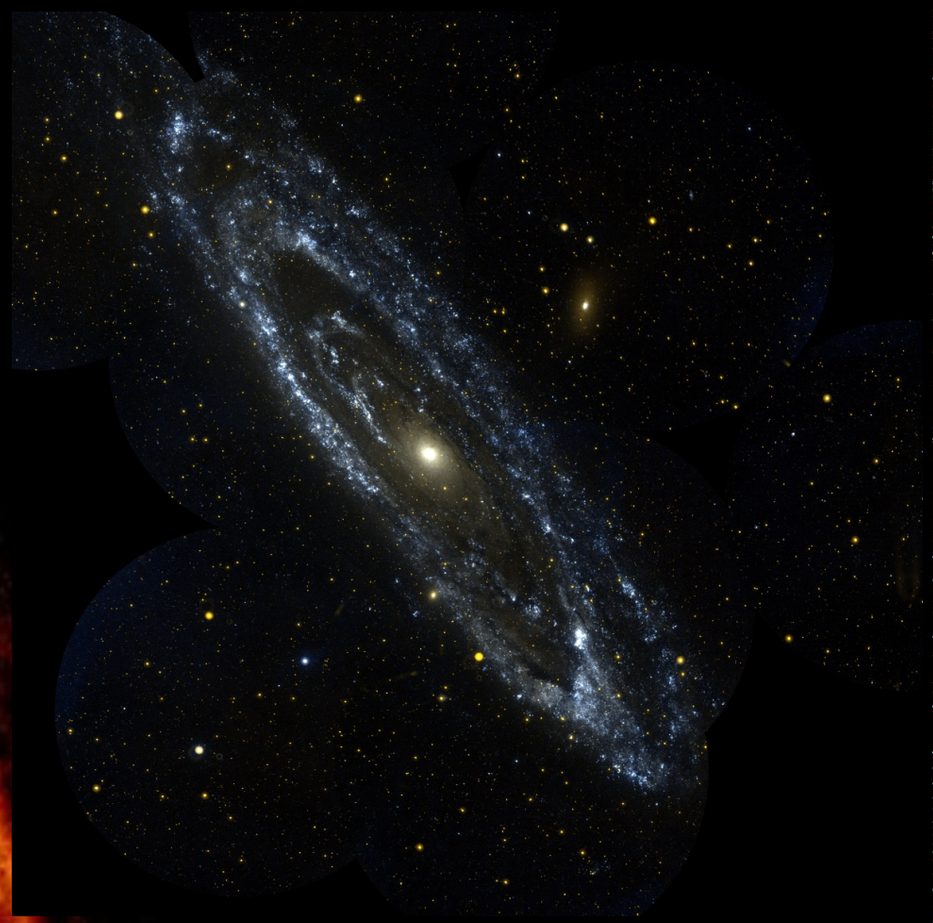


M31



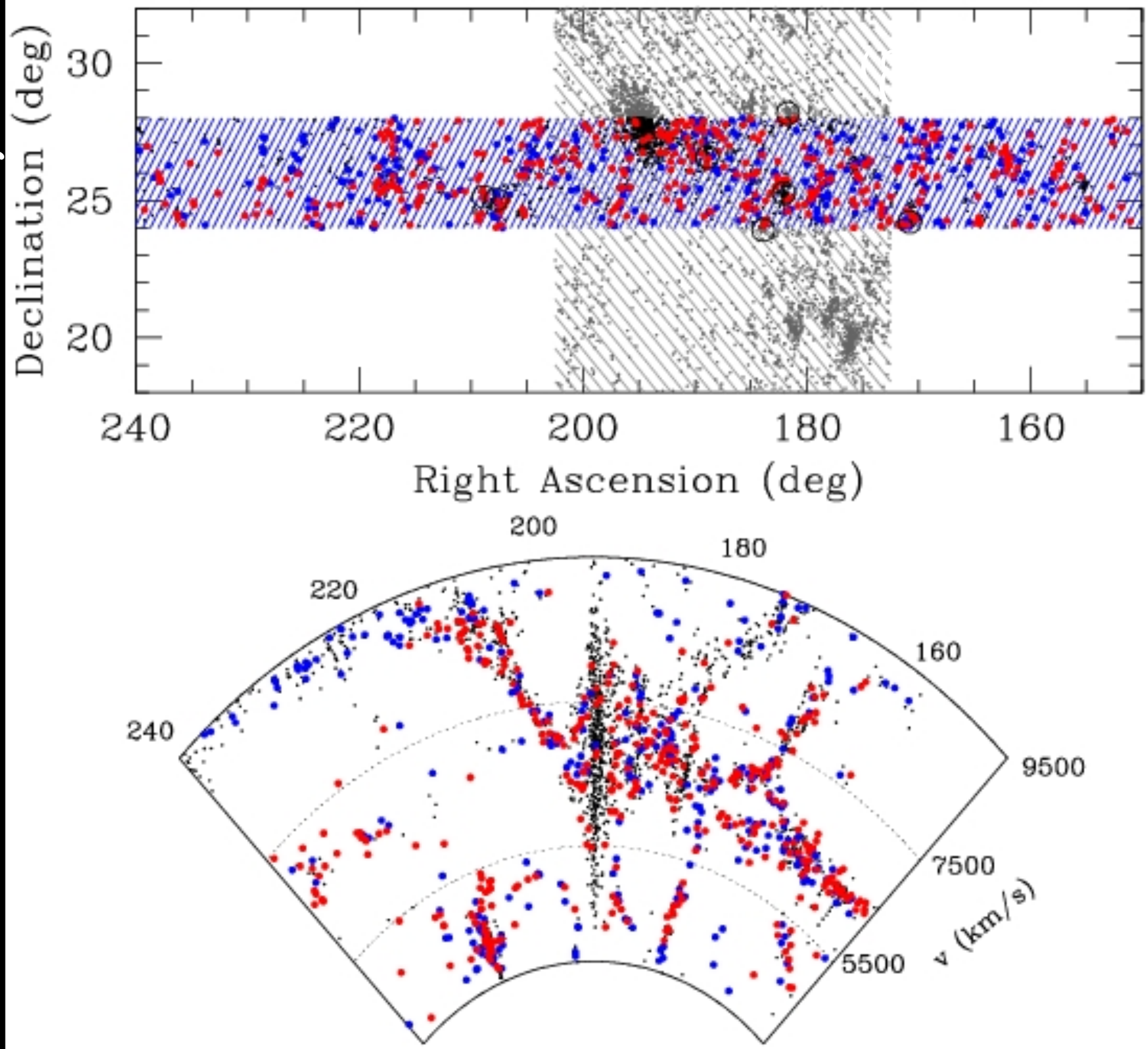
Gas



Young stars

Old stars

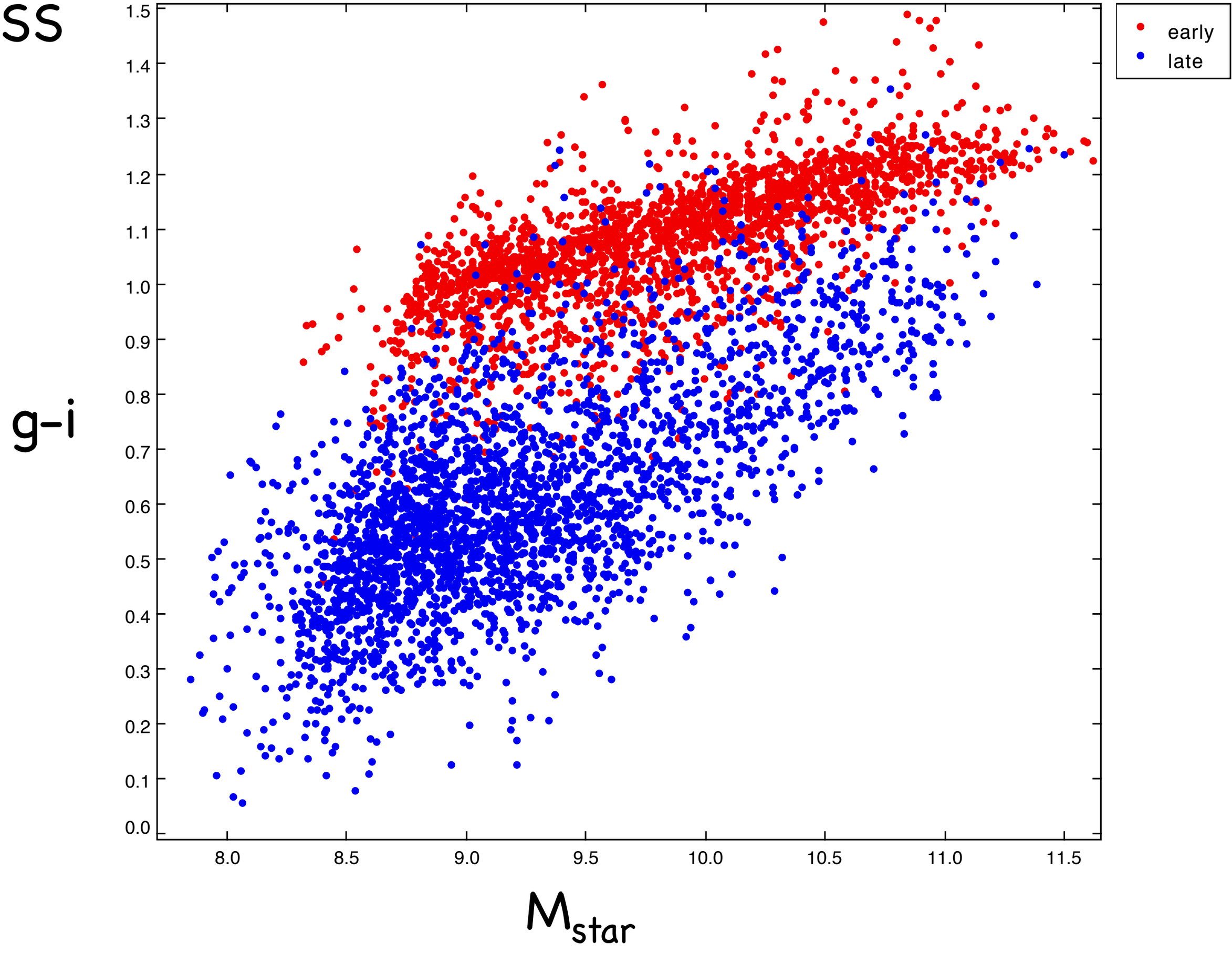
Coma supercluster ~ 5000 gal



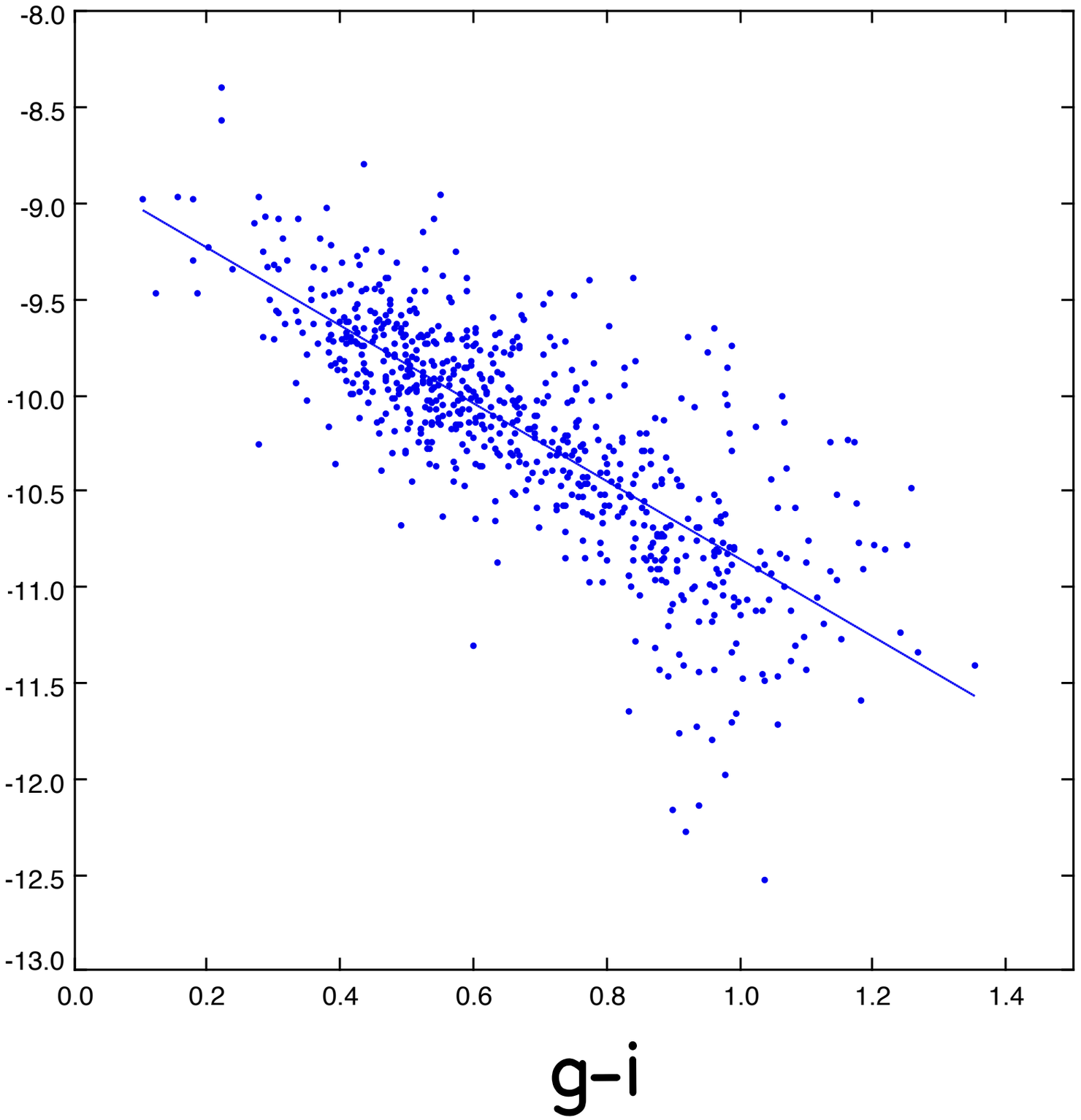
(Gav+10)

(Gav+13)

SDSS

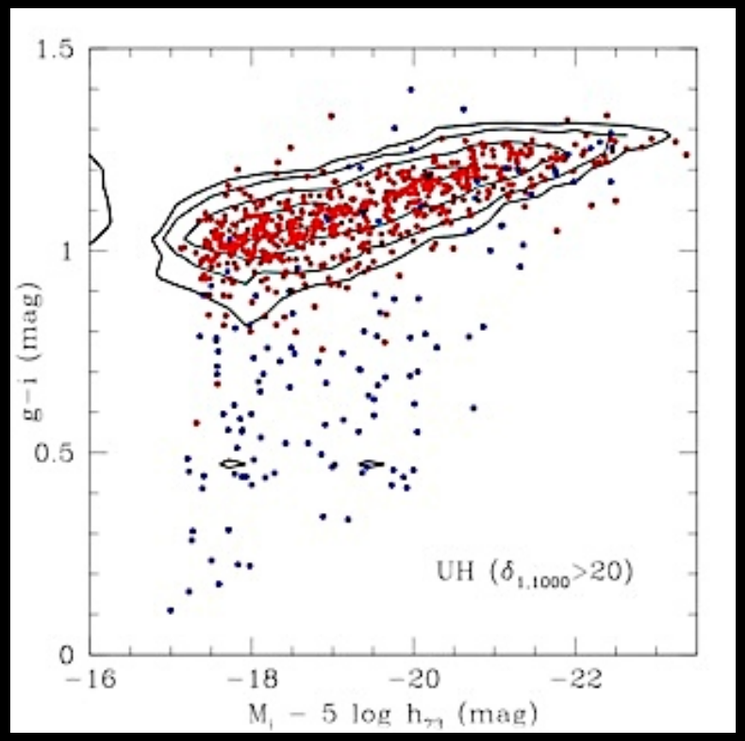

early
late
g–i
M_{star}
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
8.0
8.5
9.0
9.5
10.0
10.5
11.0
11.5

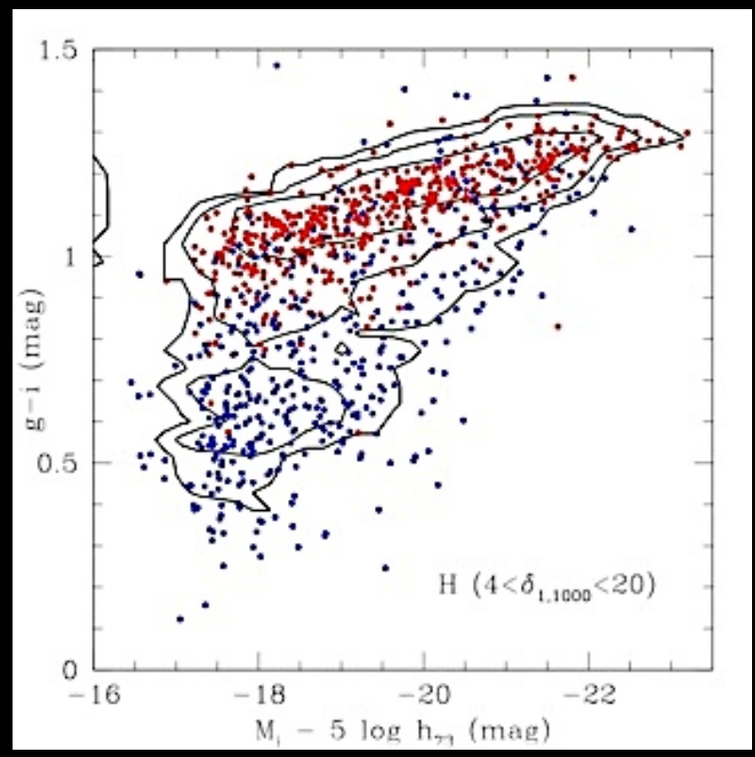
SSFR



Environment (Gav+10)

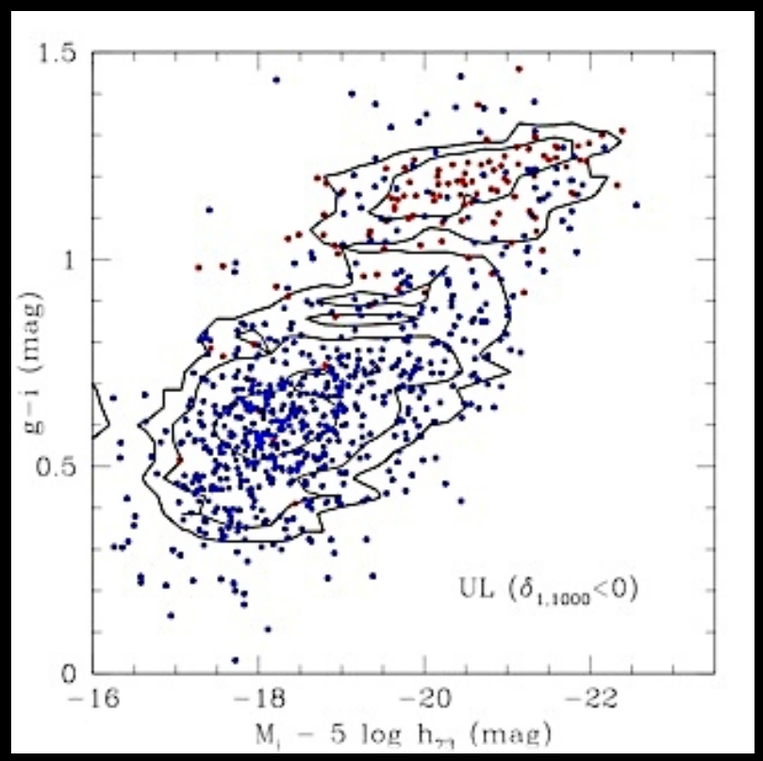
Cluster Cores

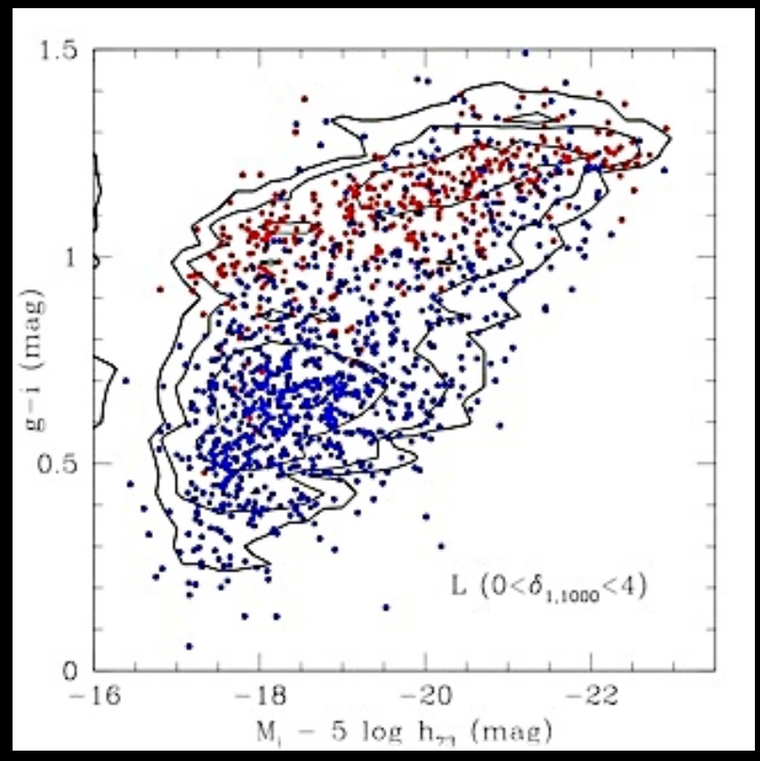




Groups / Cluster Oustkirts

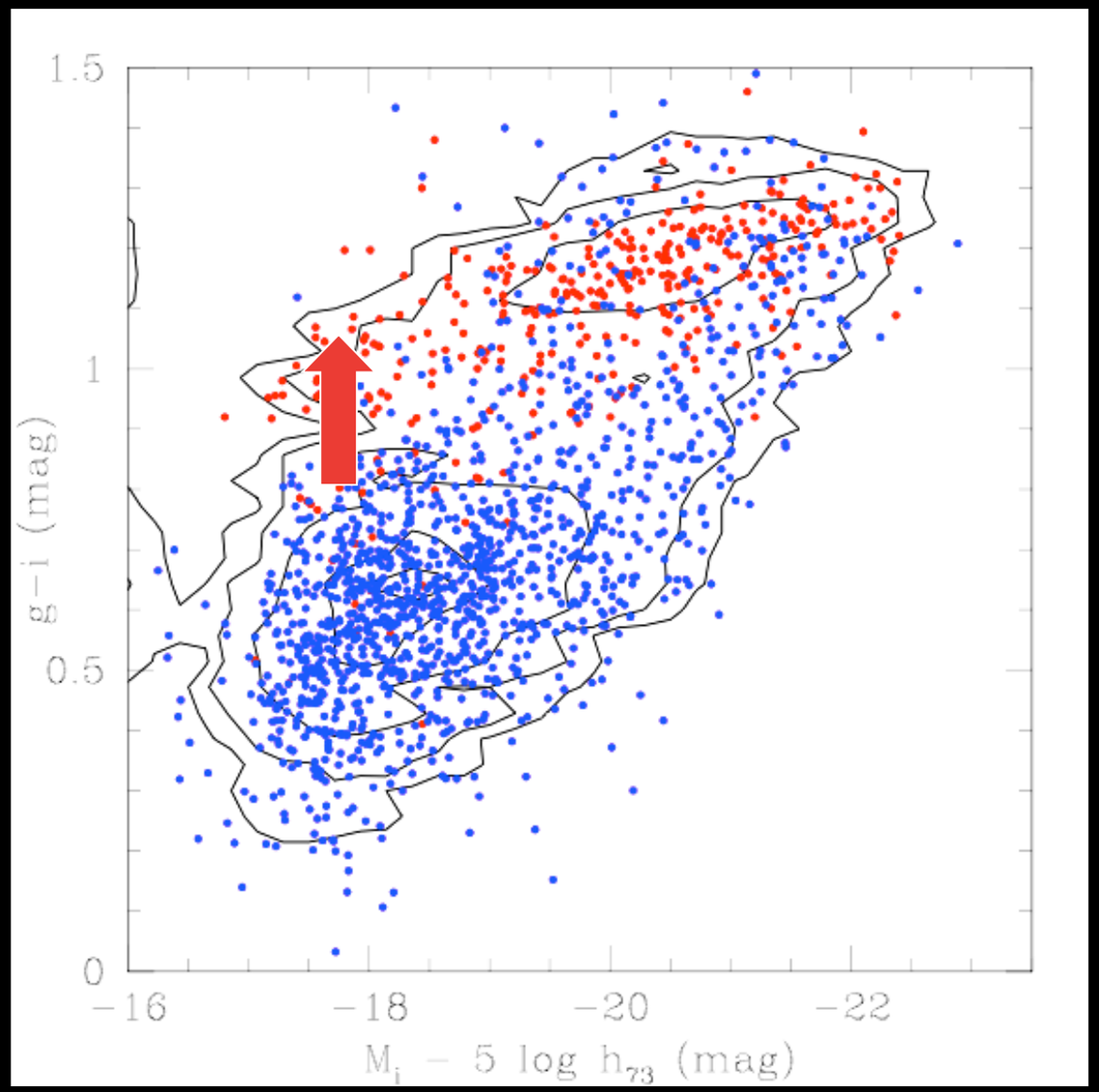
Isolated



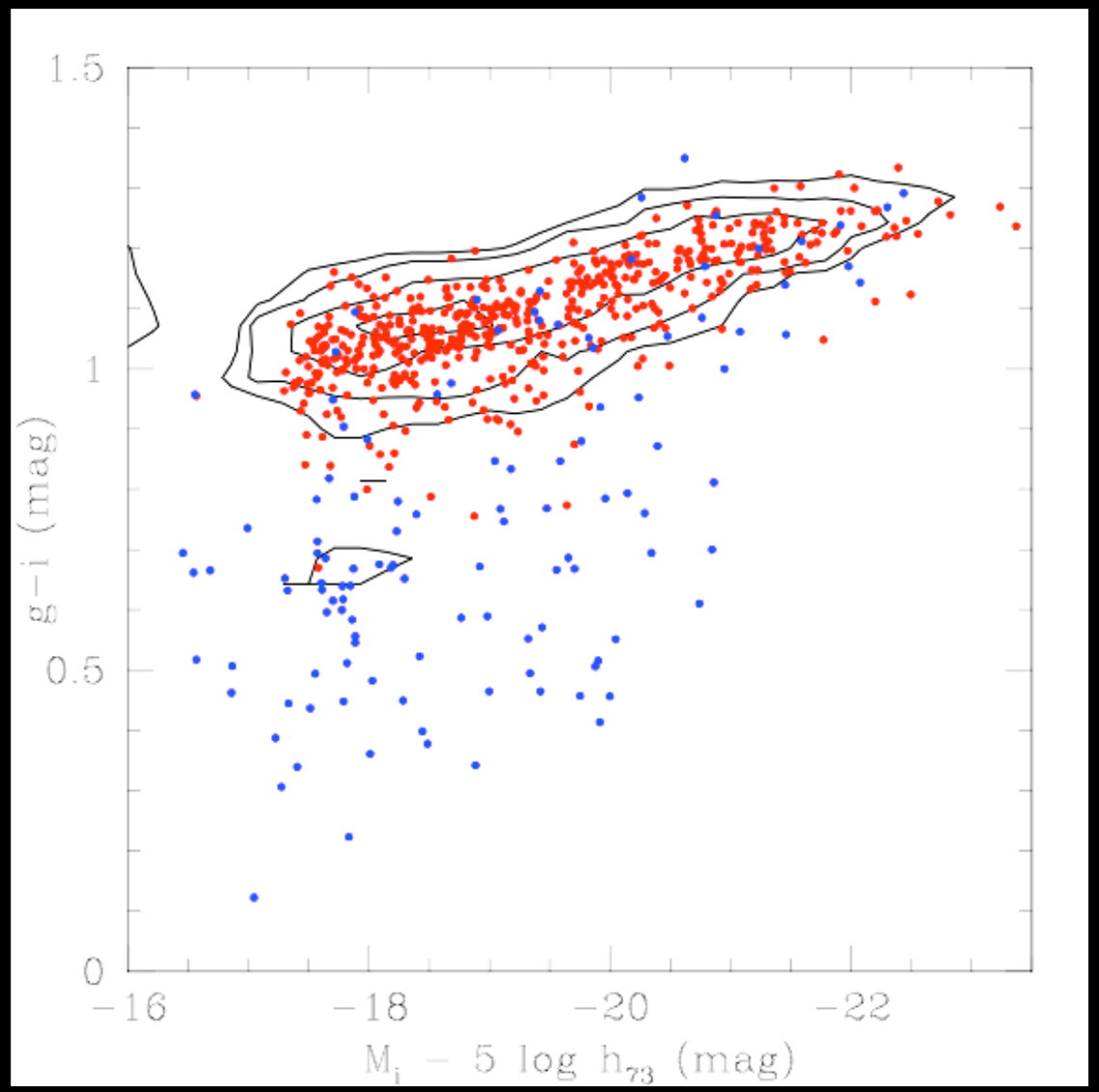


Loose Groups

field



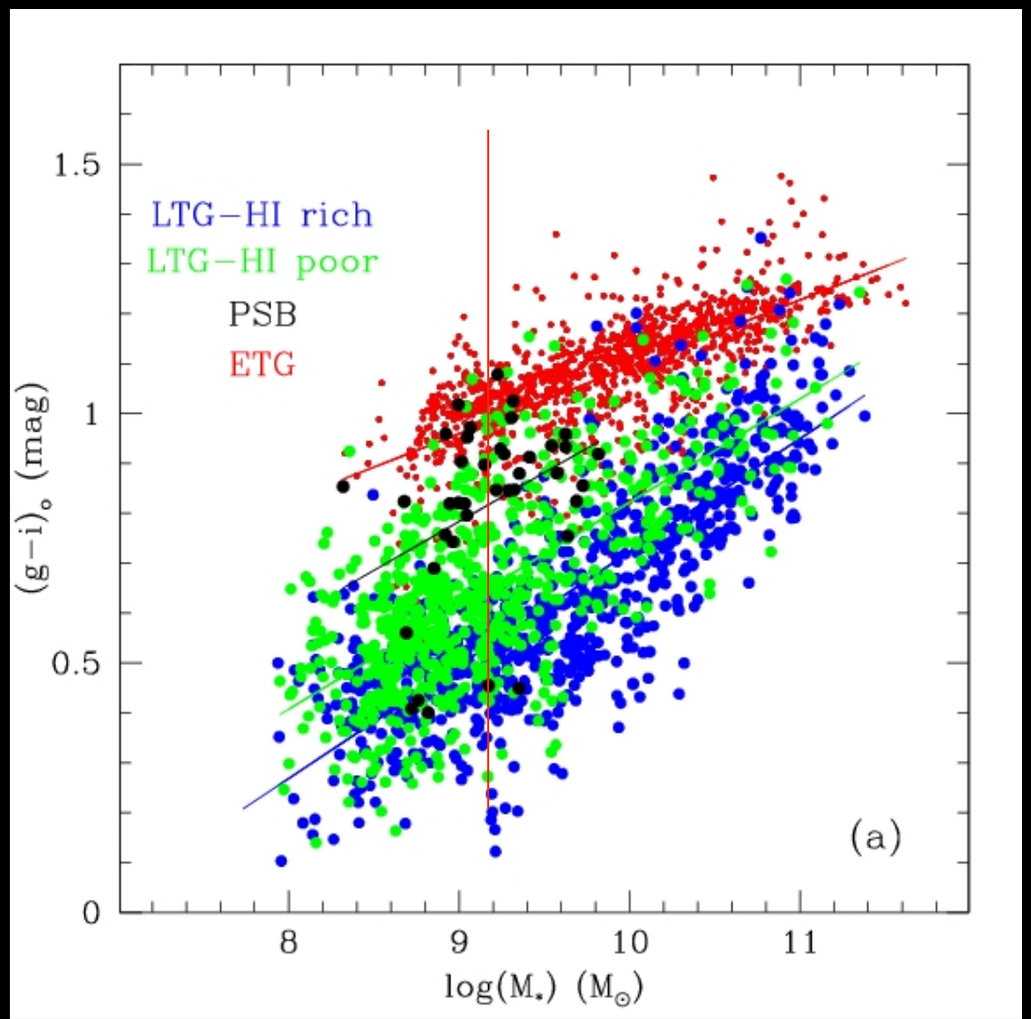
clusters

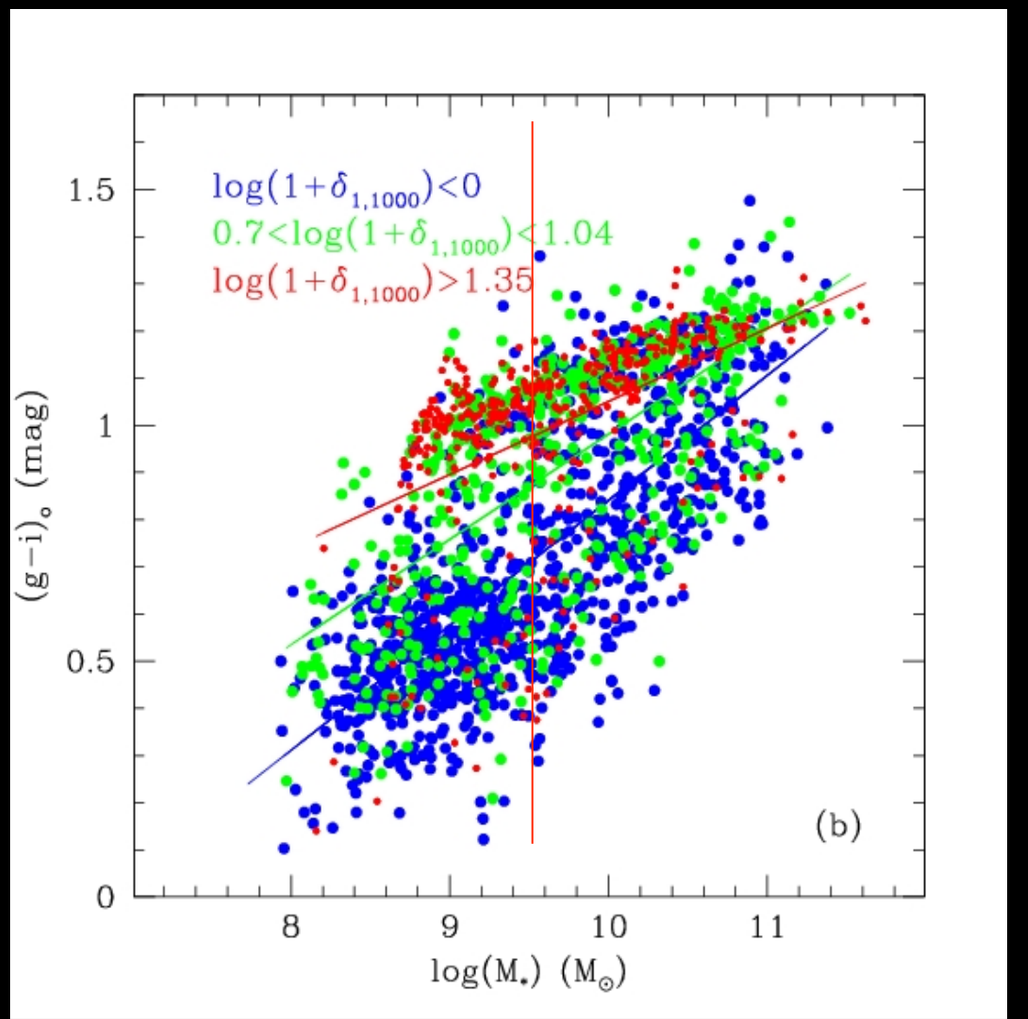


- Infall of galaxies from the cosmic web into clusters (and groups) produces quenching of star formation, thus their transformation from late (blue) to early (red) sequence.
- At z=0 the process affects mainly low-mass systems
- In clusters the quenching of star formation takes place in a short timescale

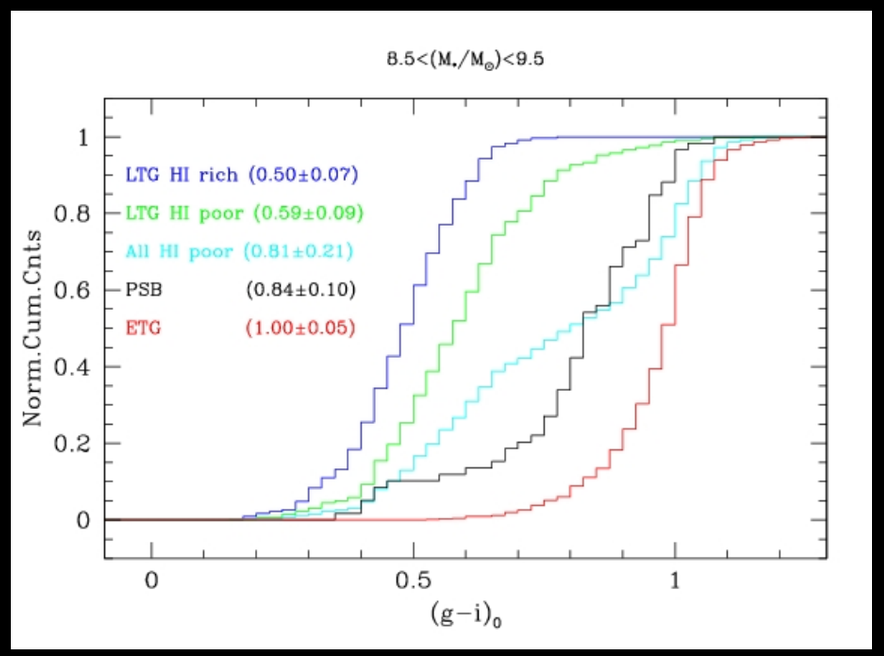
(Gav+10)

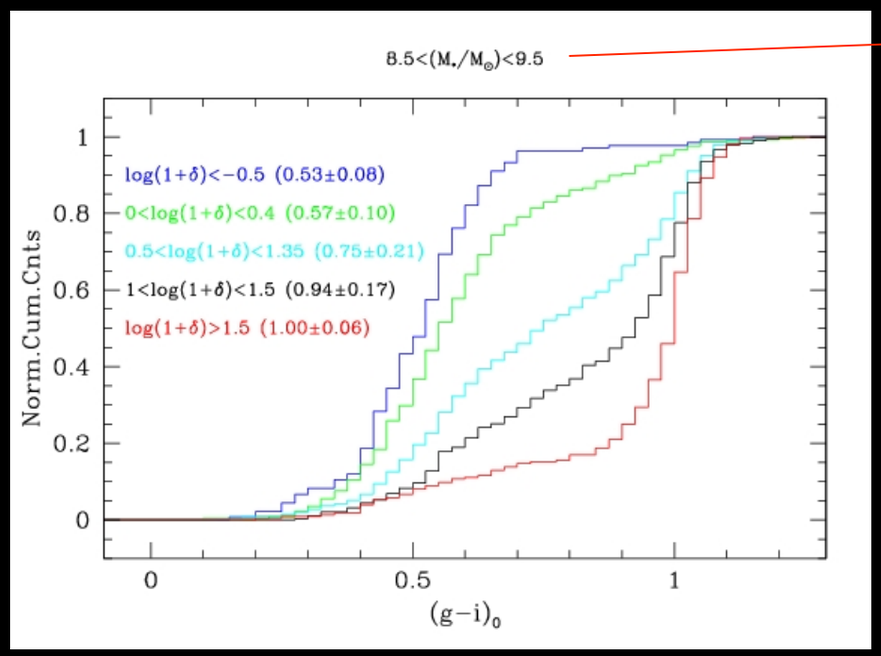
Gas content & gal density





(Gav+13)



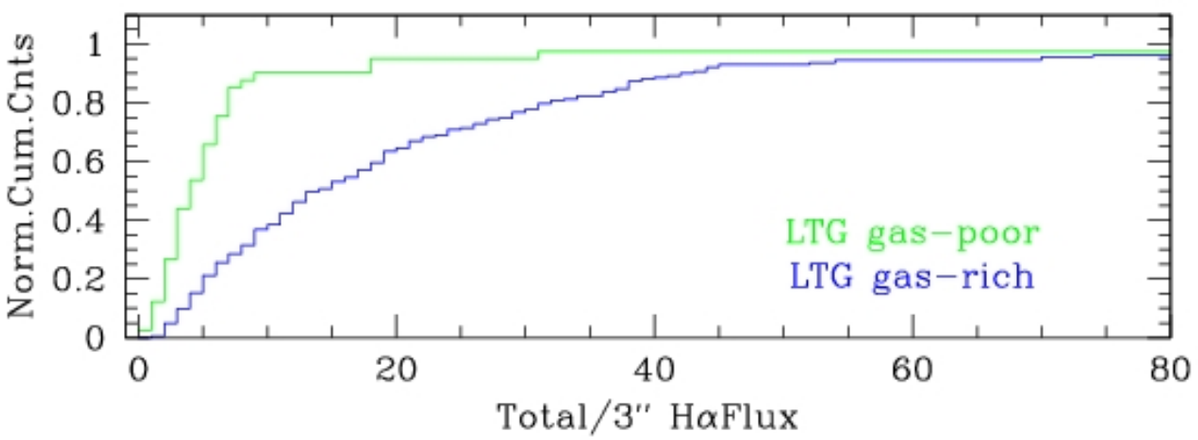


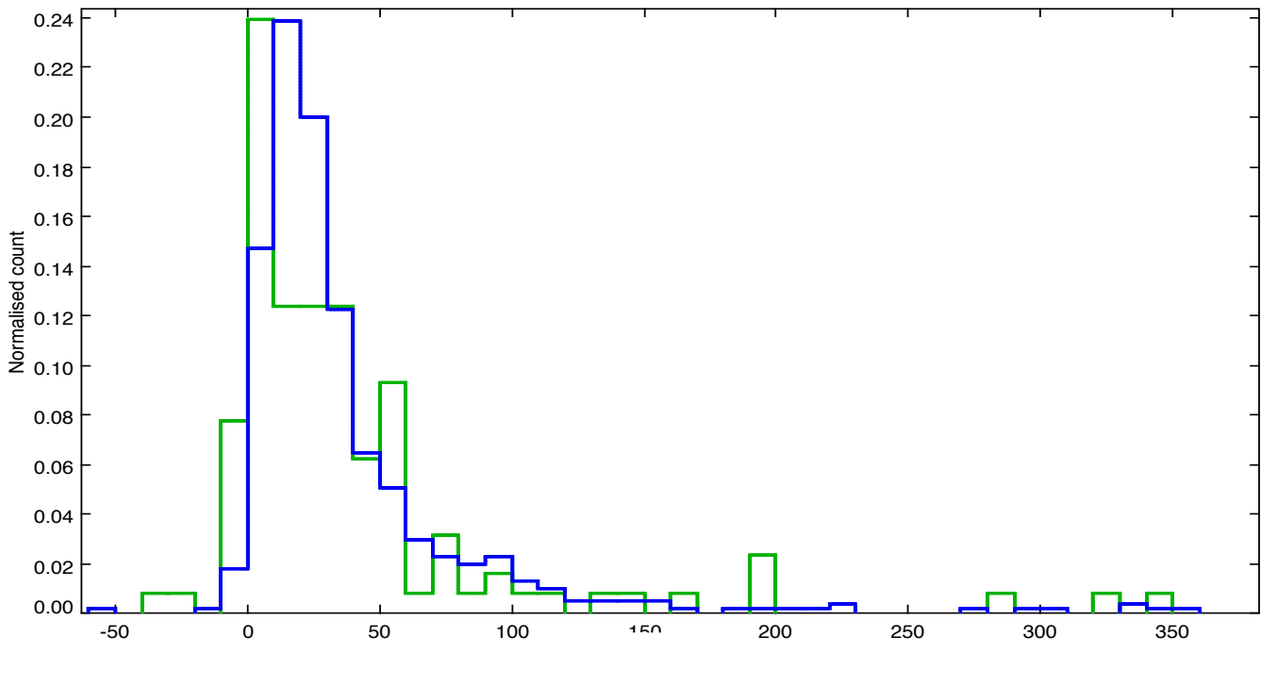
remark !!!

$M_* \leq 10^{9.5}$

For massive galaxies this pattern dosen't hold !!!!

Nuclear Star formation





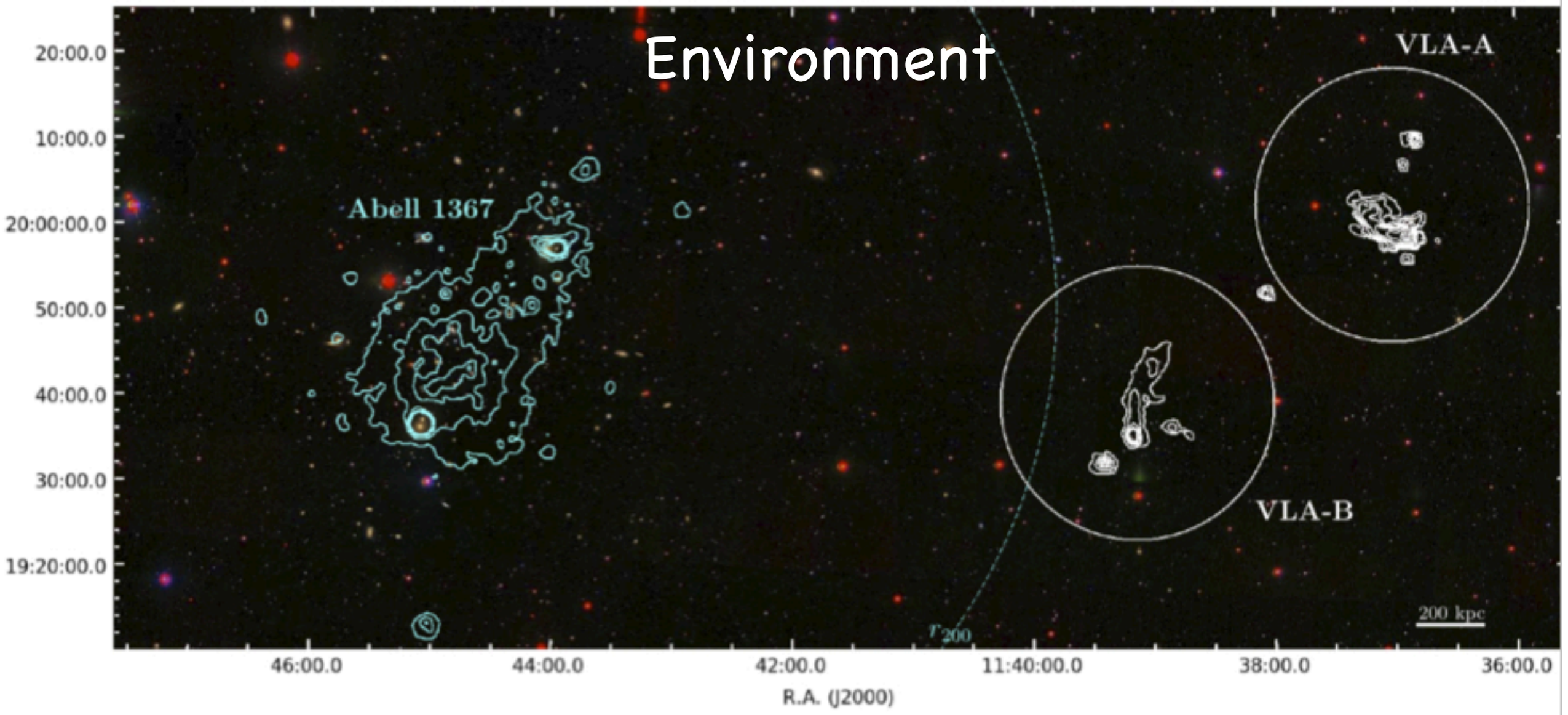
Ha sources are significantly smaller in HI poor LTGs (nuclear)

....But nuclear SF is as high in HI rich & poor LTGs

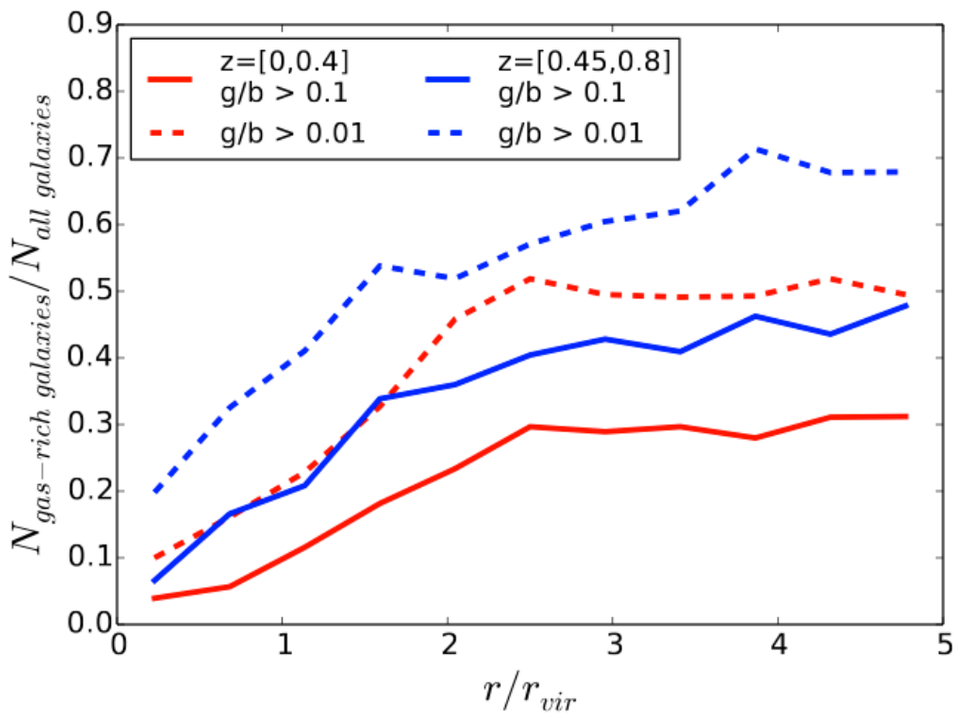
Even strongly gas deficient LTGs retain some nuclear star formation:
The gas truncation proceeds outside-in

(Gav+13)

Environment



Scott+2012

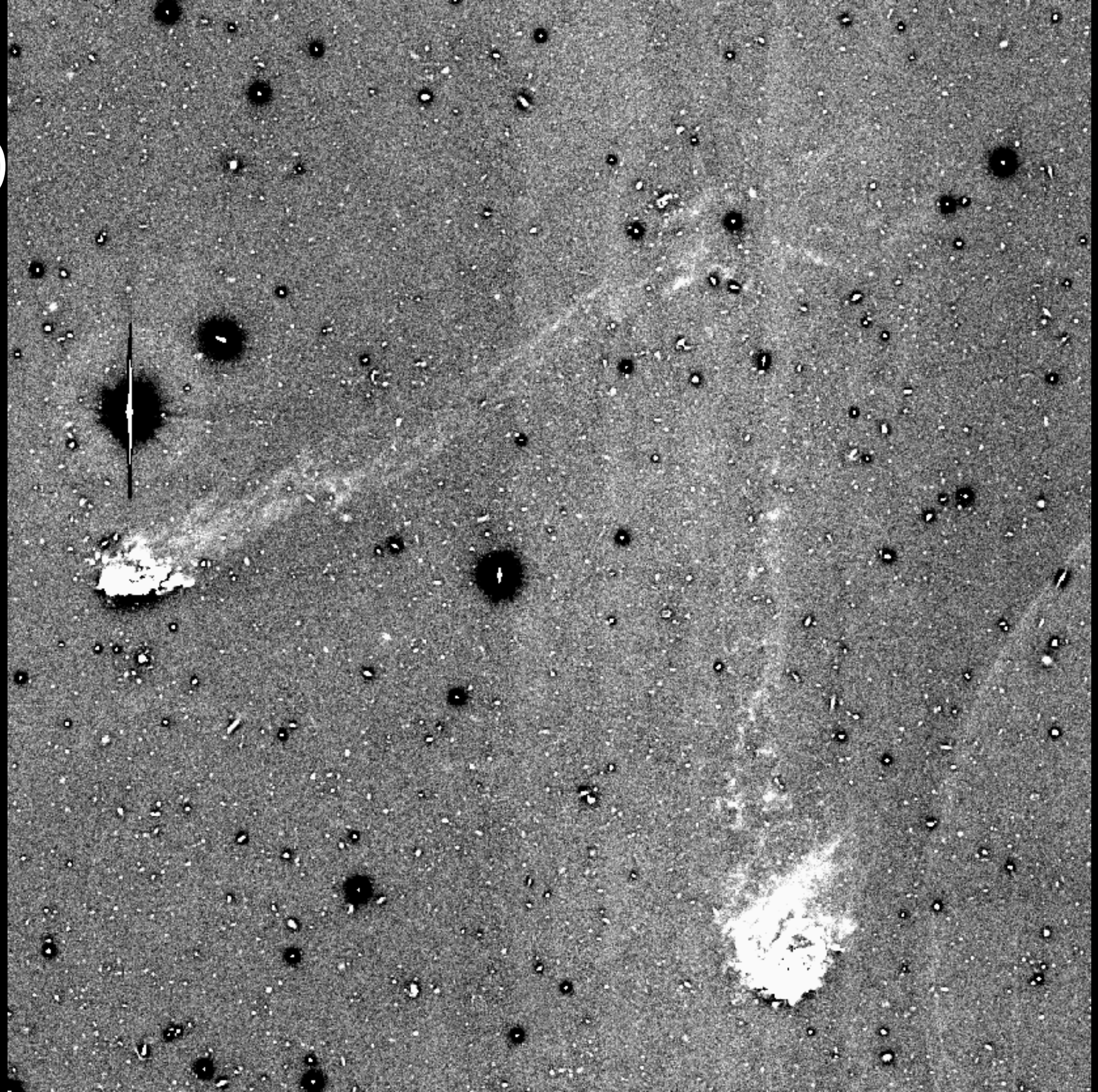


Cen, Pop, Bahcall (6/5/2014)

A1367

SDSS

Subaru (8.2)
3h
29/4/14

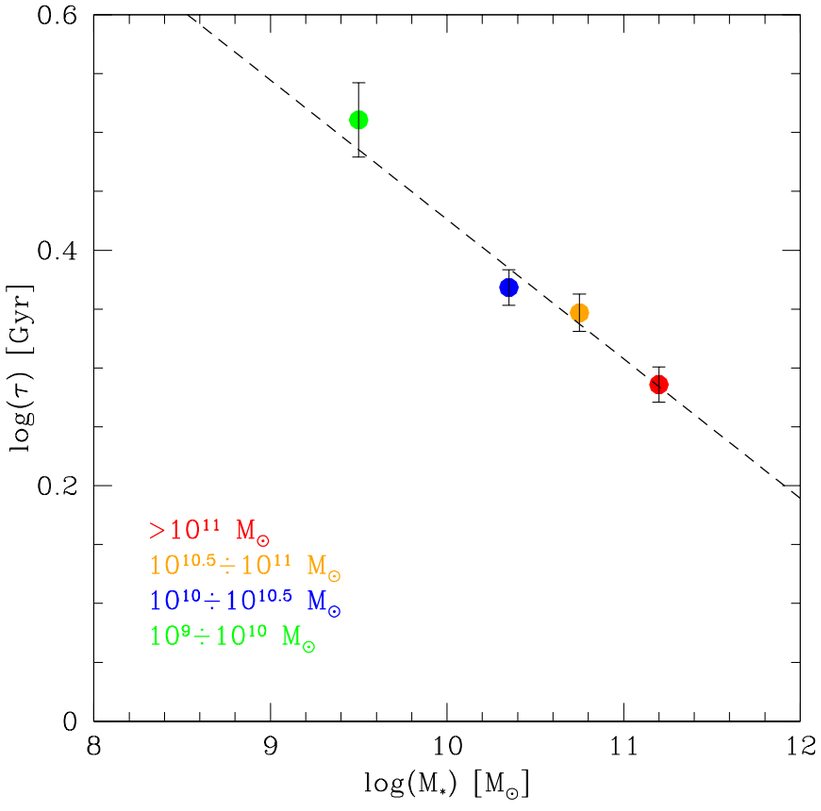


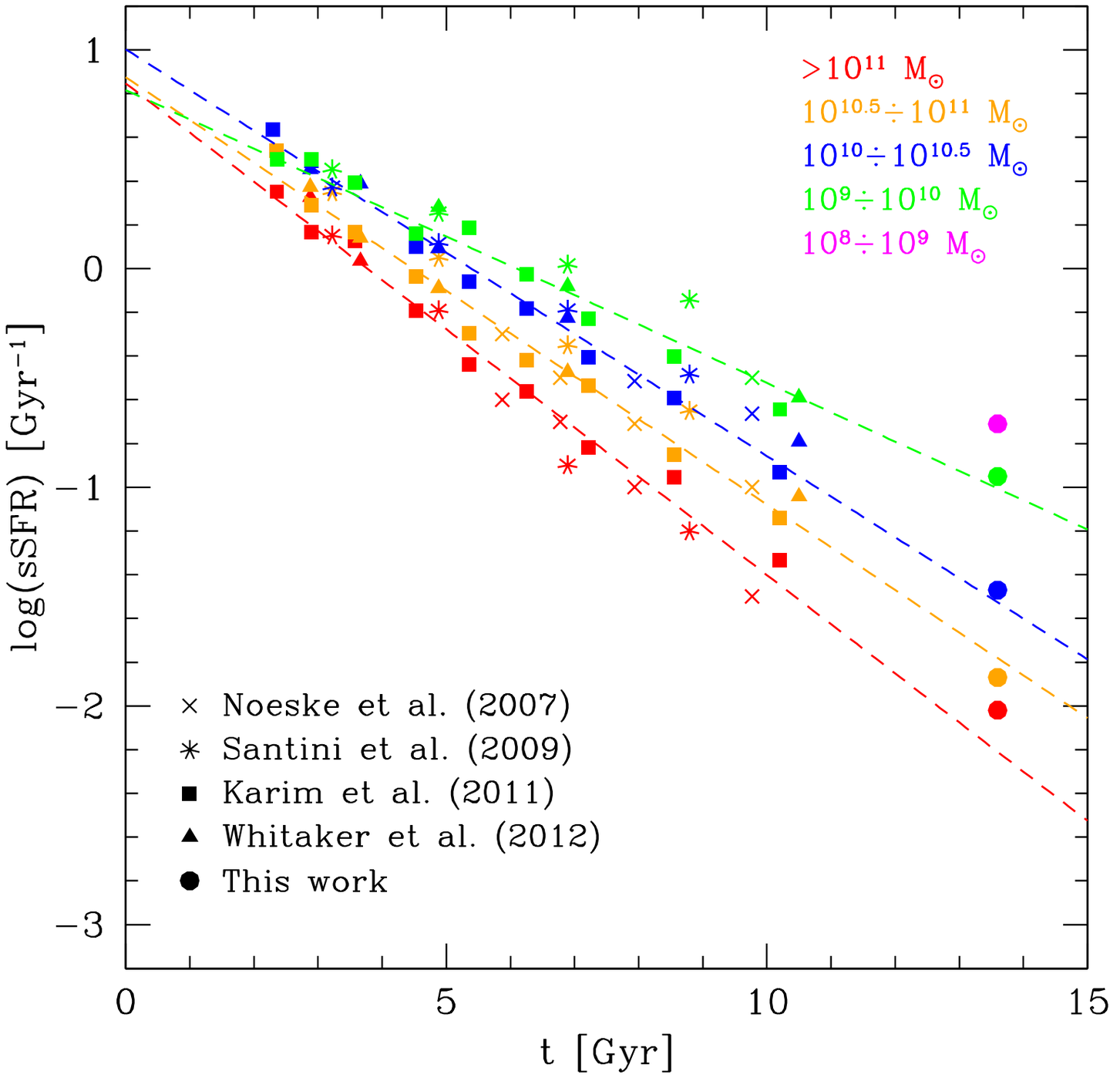
Take home ....

For dwarfish galaxies ($M_* \leq 10^{9.5}$)

The environment plays a significant role in today's evolution of galaxies by quenching their star formation.

The physical mechanism capable of driving this transformation is gas ablation via ram-pressure occurring in and around clusters (up to $3xr_{200}$)


0.6
0.4
0.2
0
8
9
10
11
12
log(τ) [Gyr]
log(M⋆) [M⊙]
>10^11 M⊙
10^10.5÷10^11 M⊙
10^10÷10^10.5 M⊙
10^9÷10^10 M⊙


1
0
−1
−2
−3
0
5
10
15
log(sSFR) [Gyr^−1]
t [Gyr]
>10^11 M⊙
10^10.5÷10^11 M⊙
10^10÷10^10.5 M⊙
10^9÷10^10 M⊙
10^8÷10^9 M⊙
× Noeske et al. (2007)
✳ Santini et al. (2009)
■ Karim et al. (2011)
▲ Whitaker et al. (2012)
● This work