Modeling globular clusters in cosmological simulations of Virgo-like objects

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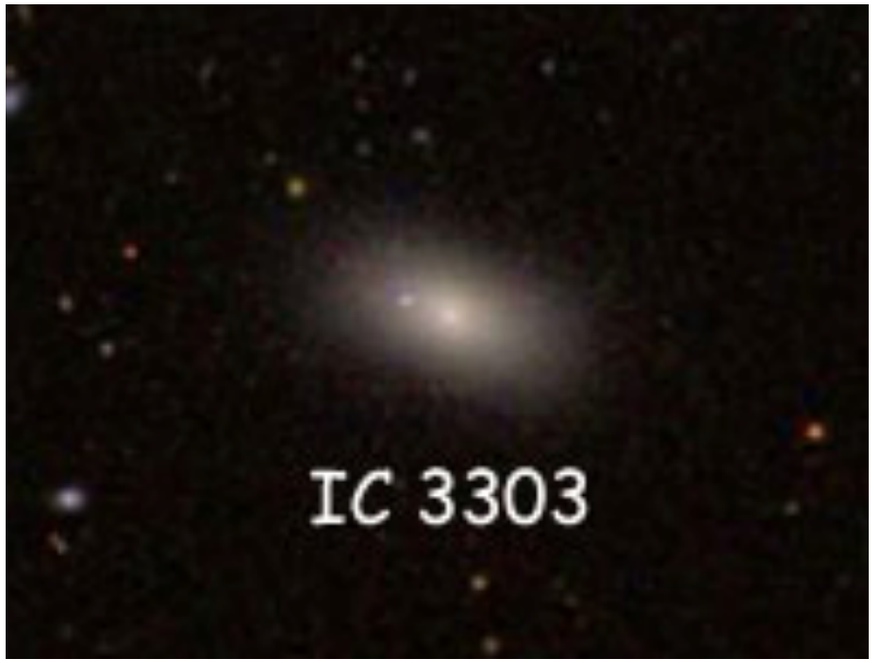
Dwarf Galaxies:

A rather heterogeneous class of objects

Clusters



dE

Field

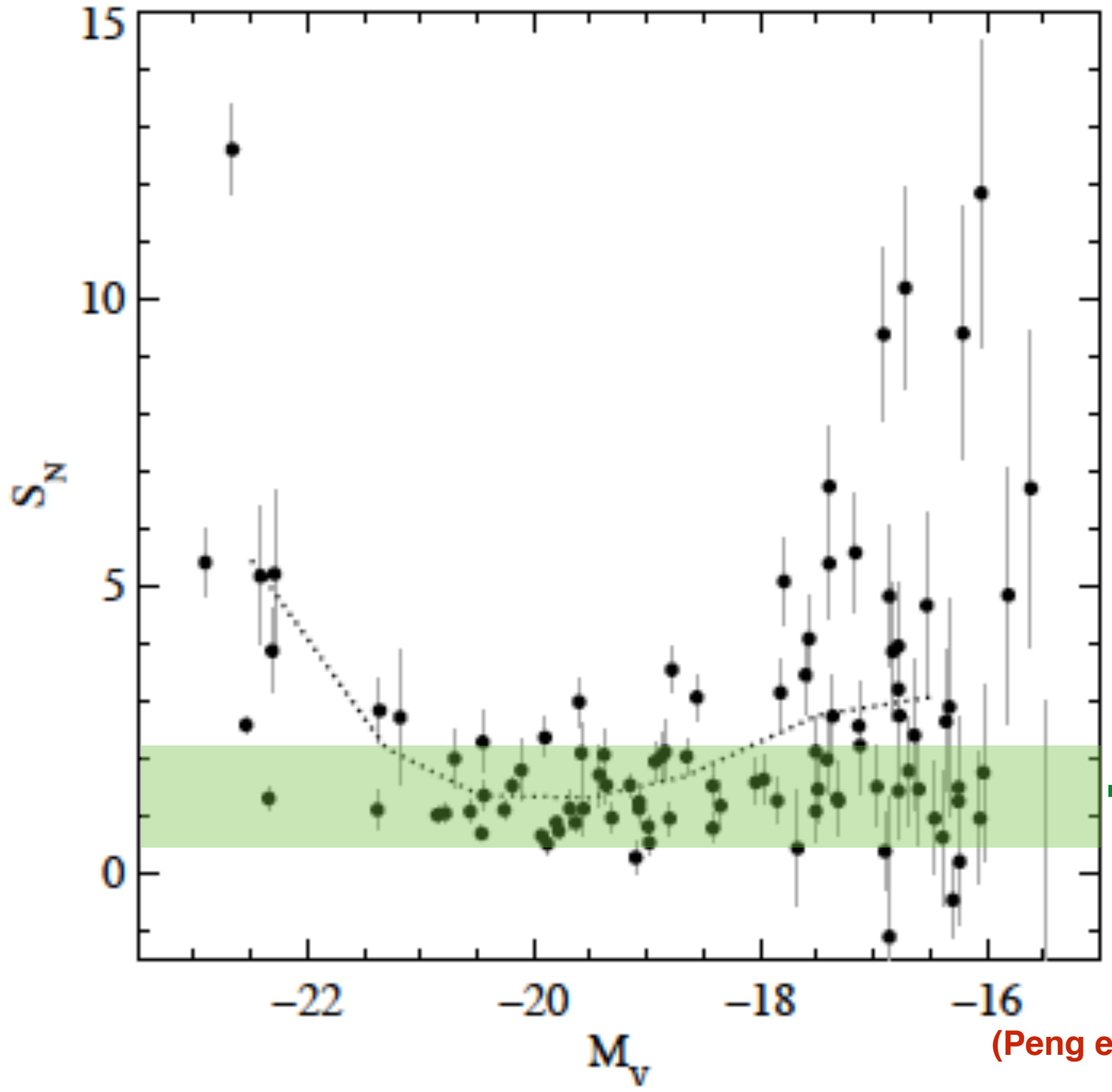
dIrr

progenitors?

But globular clusters (GC) numbers don't add up…

Number of GC per unit v-band galaxy luminosity

"specific frequency"

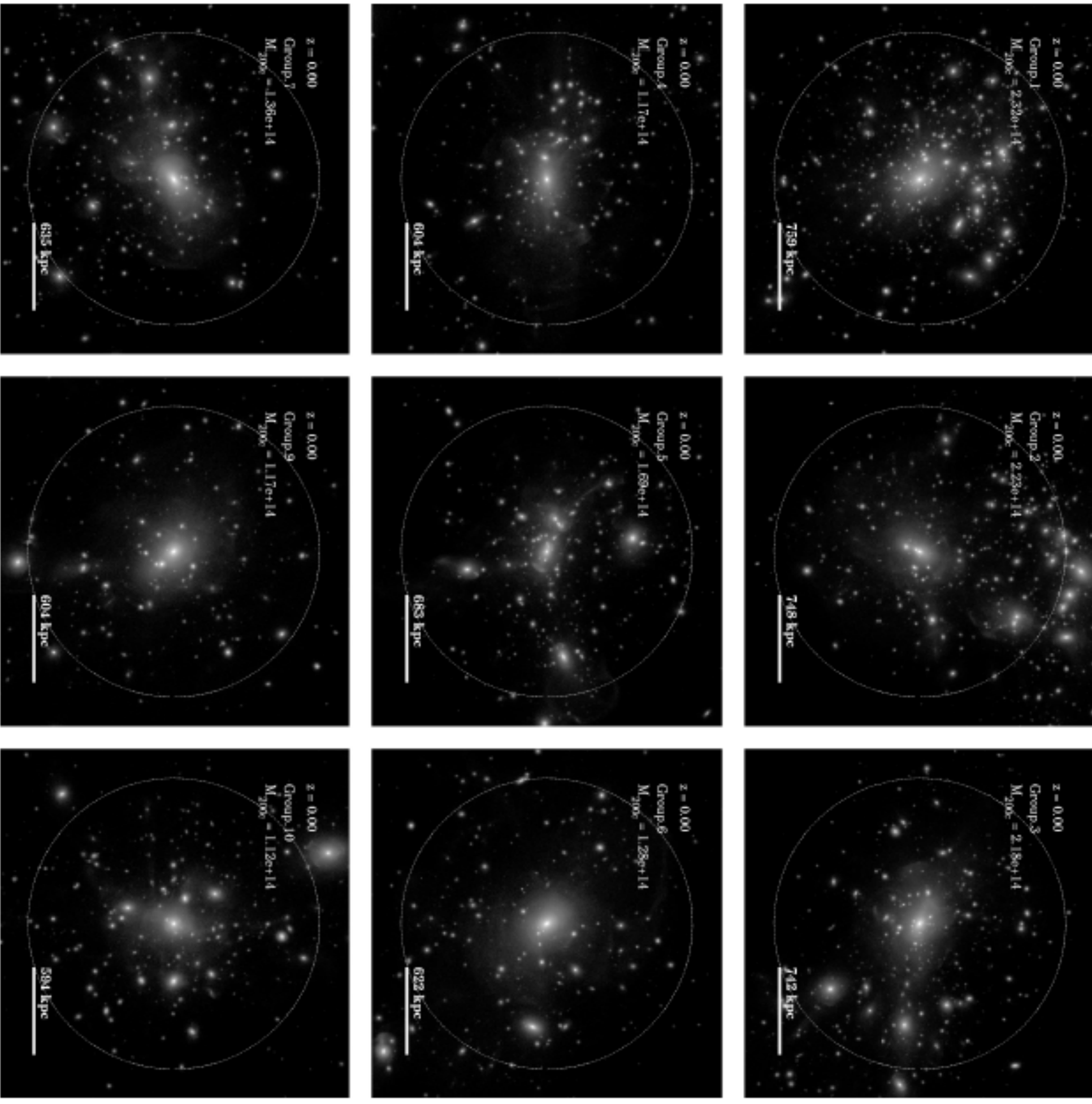


field spirals

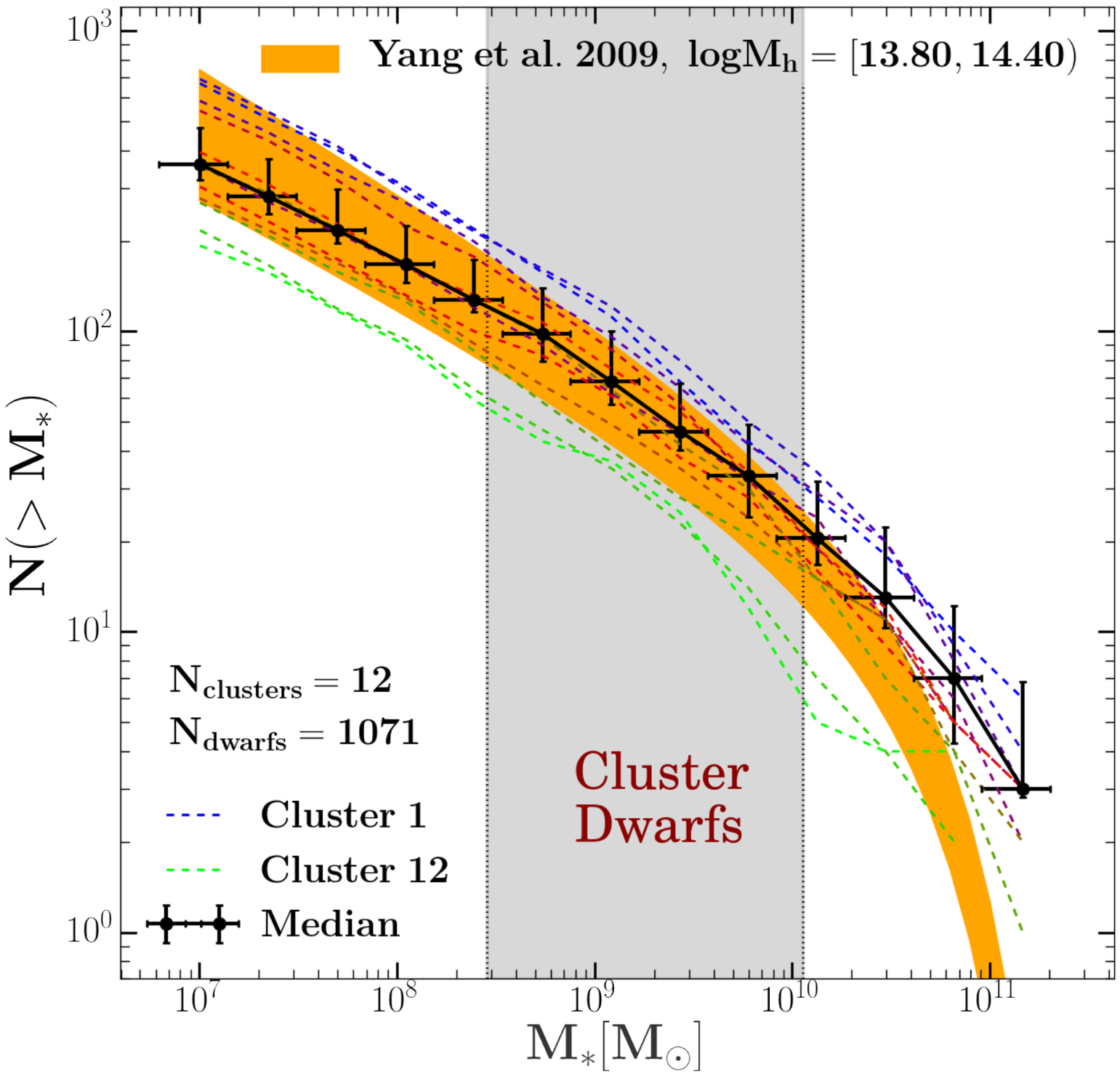
(Peng et al. 2008)

(see also e.g., Durrell 1998, Miller & Lotz 2007, others)

Galaxy clusters in Illustris

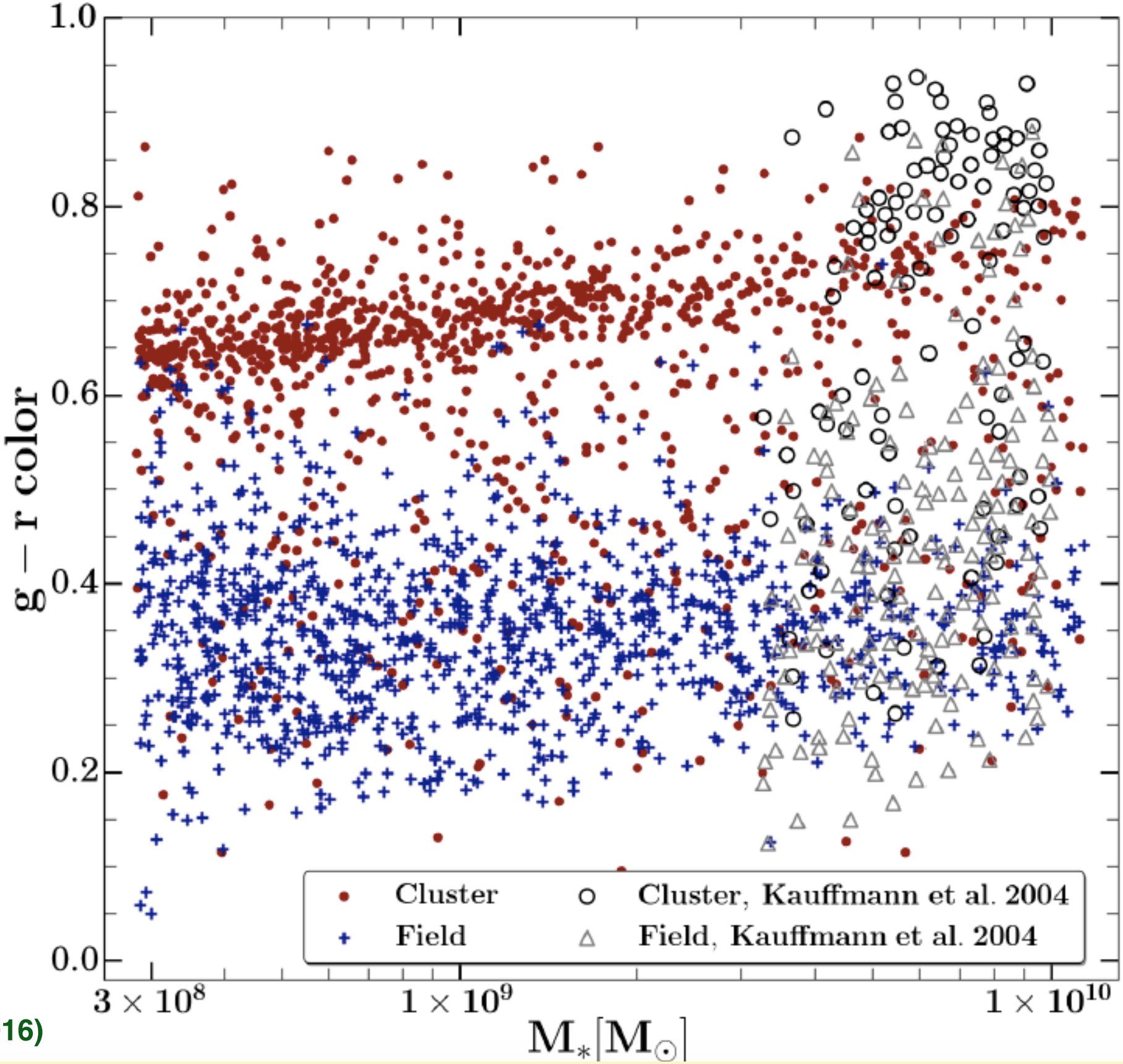


The cluster dwarfs in our sample



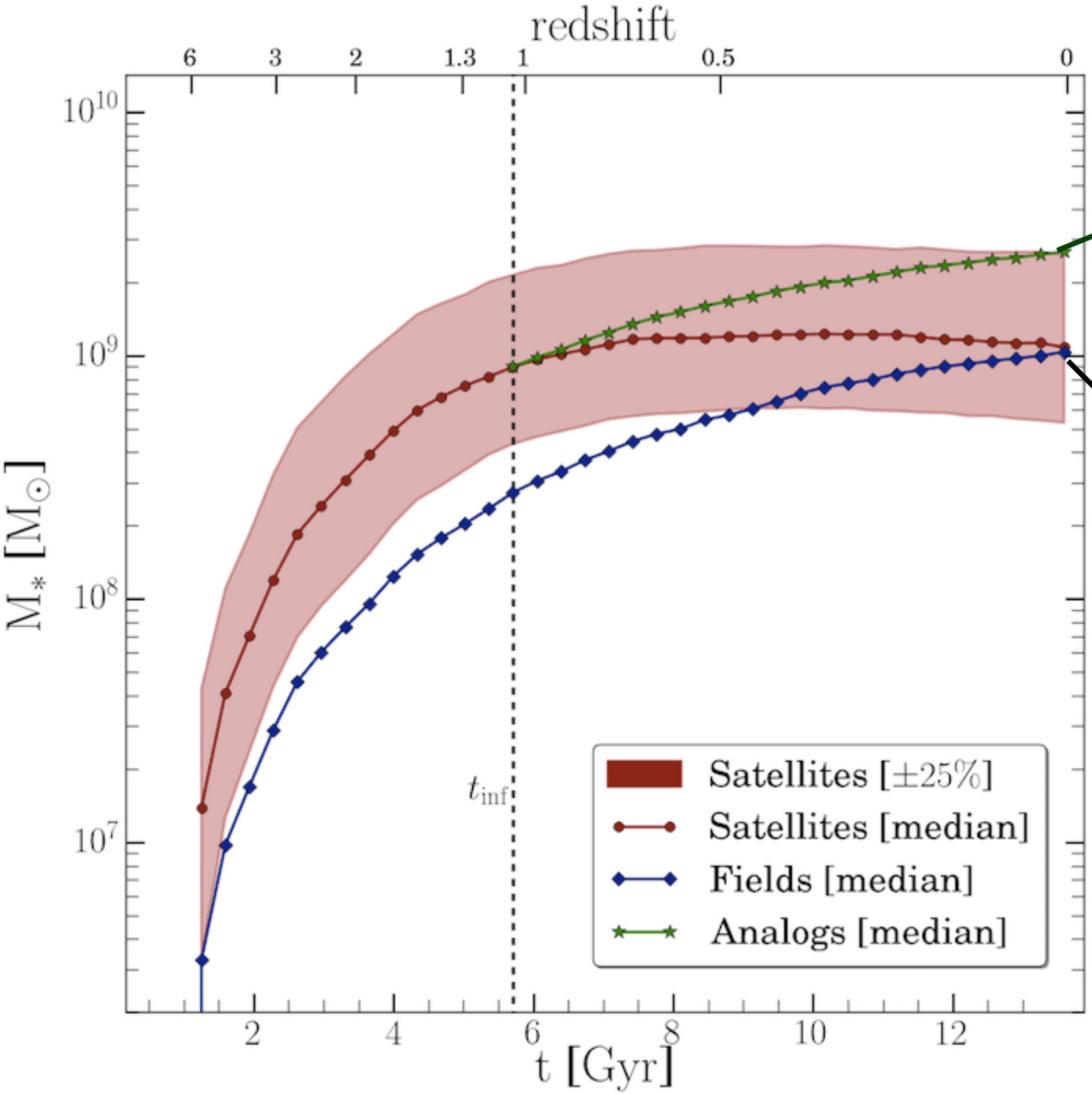
(Mistani et al. 2016)

The cluster dwarfs in our sample



(Mistani et al. 2016)

1) The mass assembly of cluster and field dwarfs



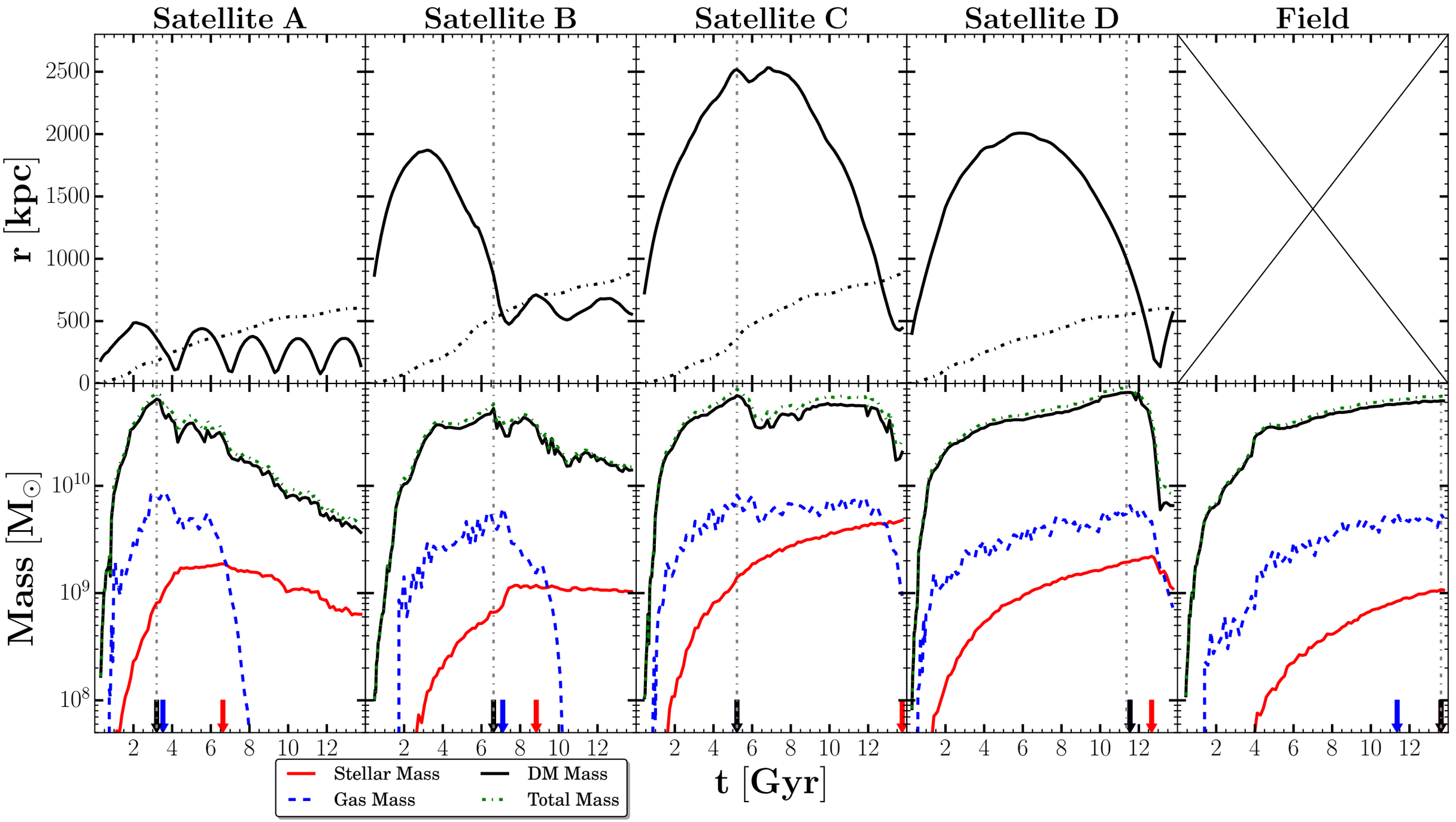
"Analogs" of cluster dwarfs at time of infall, are today, in the field, about ~3 times more massive

Dwarfs in clusters were more massive than field dwarfs at all times

Higher SFR

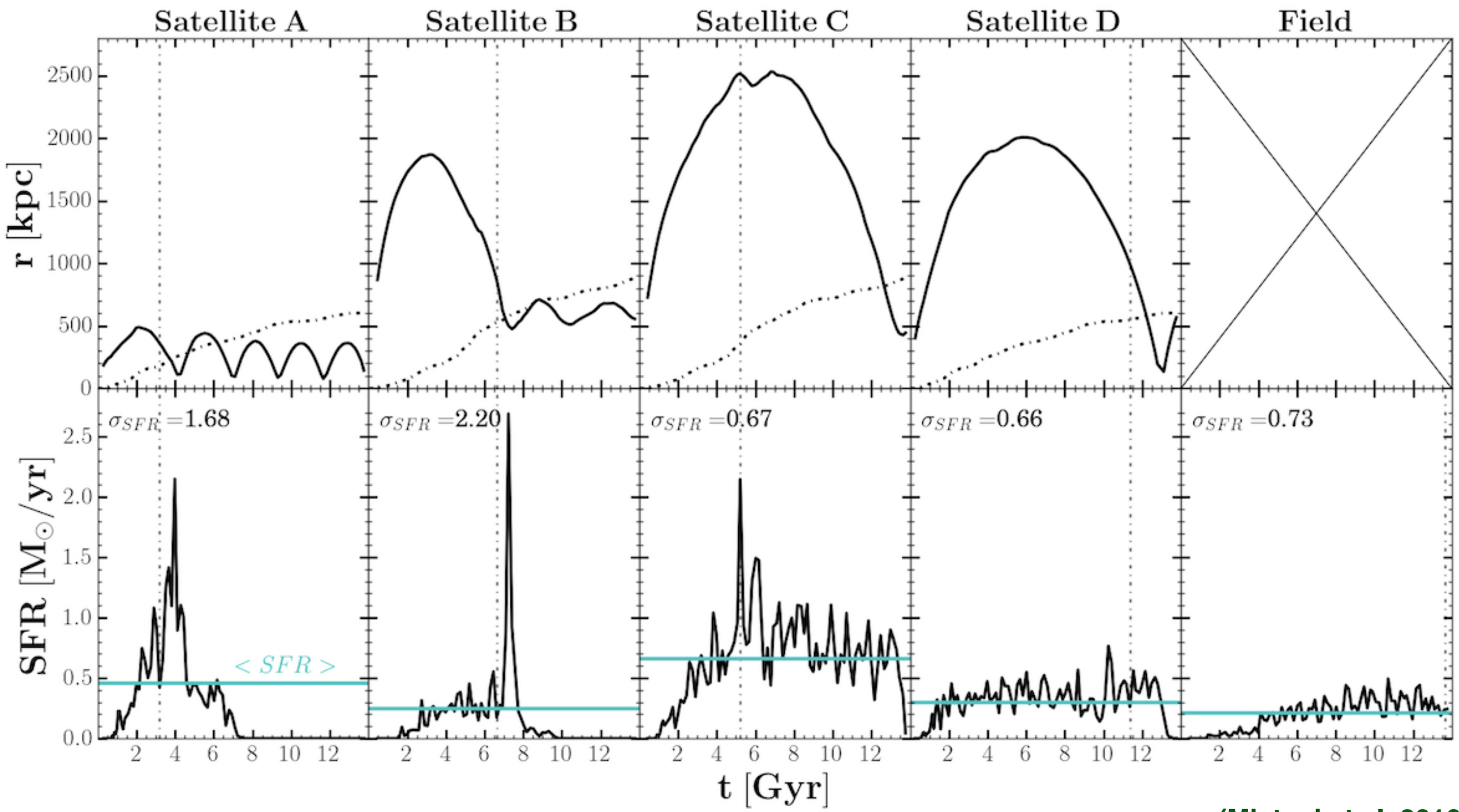
(Mistani et al. 2016)

1) The mass assembly of cluster and field dwarfs



(Mistani et al. 2016)

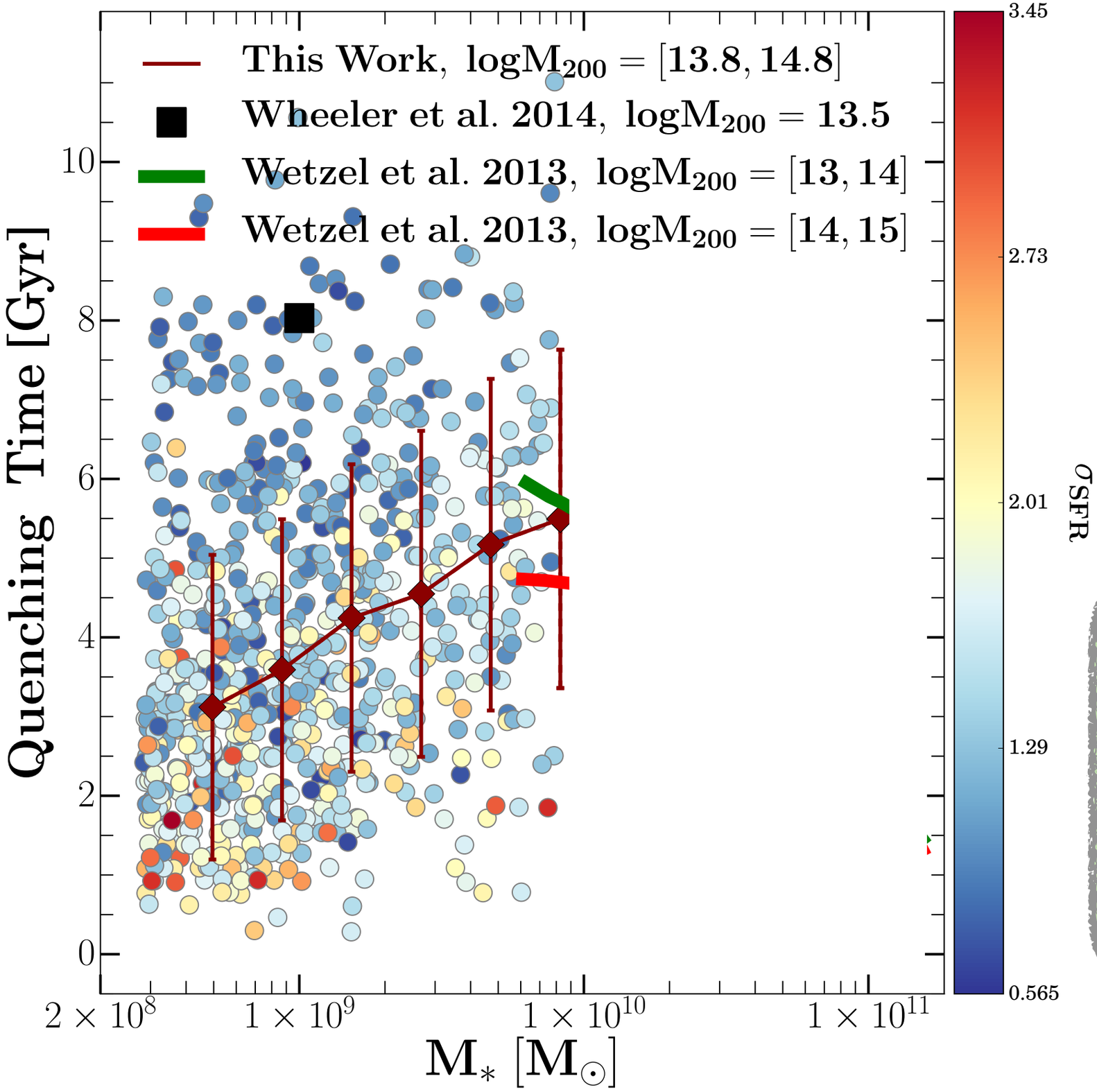
2.) The star formation history of cluster dwarfs



(Mistani et al. 2016)

2.) The star formation history of cluster galaxies

The star-formation shut-off time



But also,
<u>where</u> it happens?

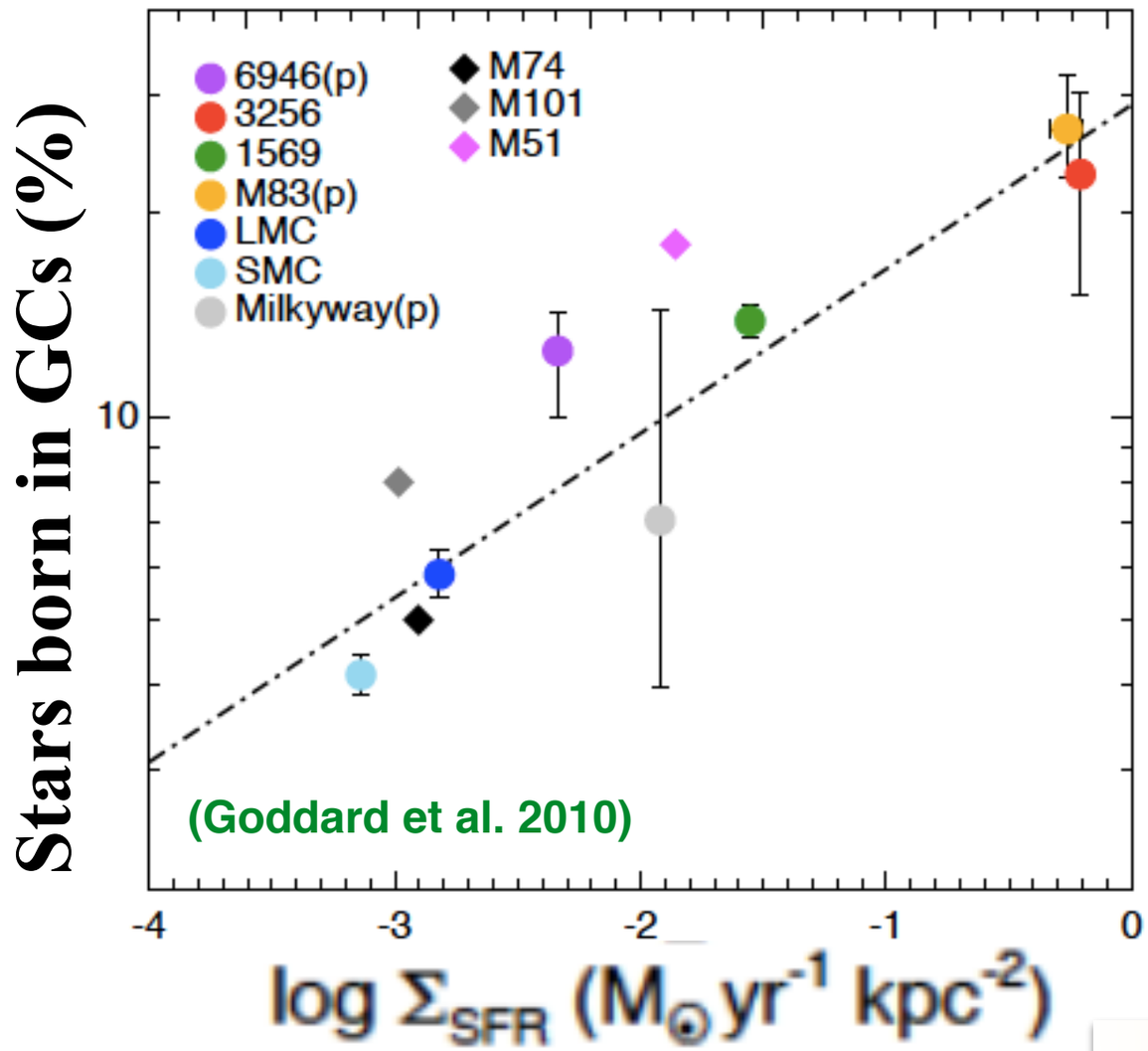
About 50% of dwarfs were part of a larger system when they joined their their host clusters

(Mistani et al. 2016)

What can we say about the specific GC frequency?

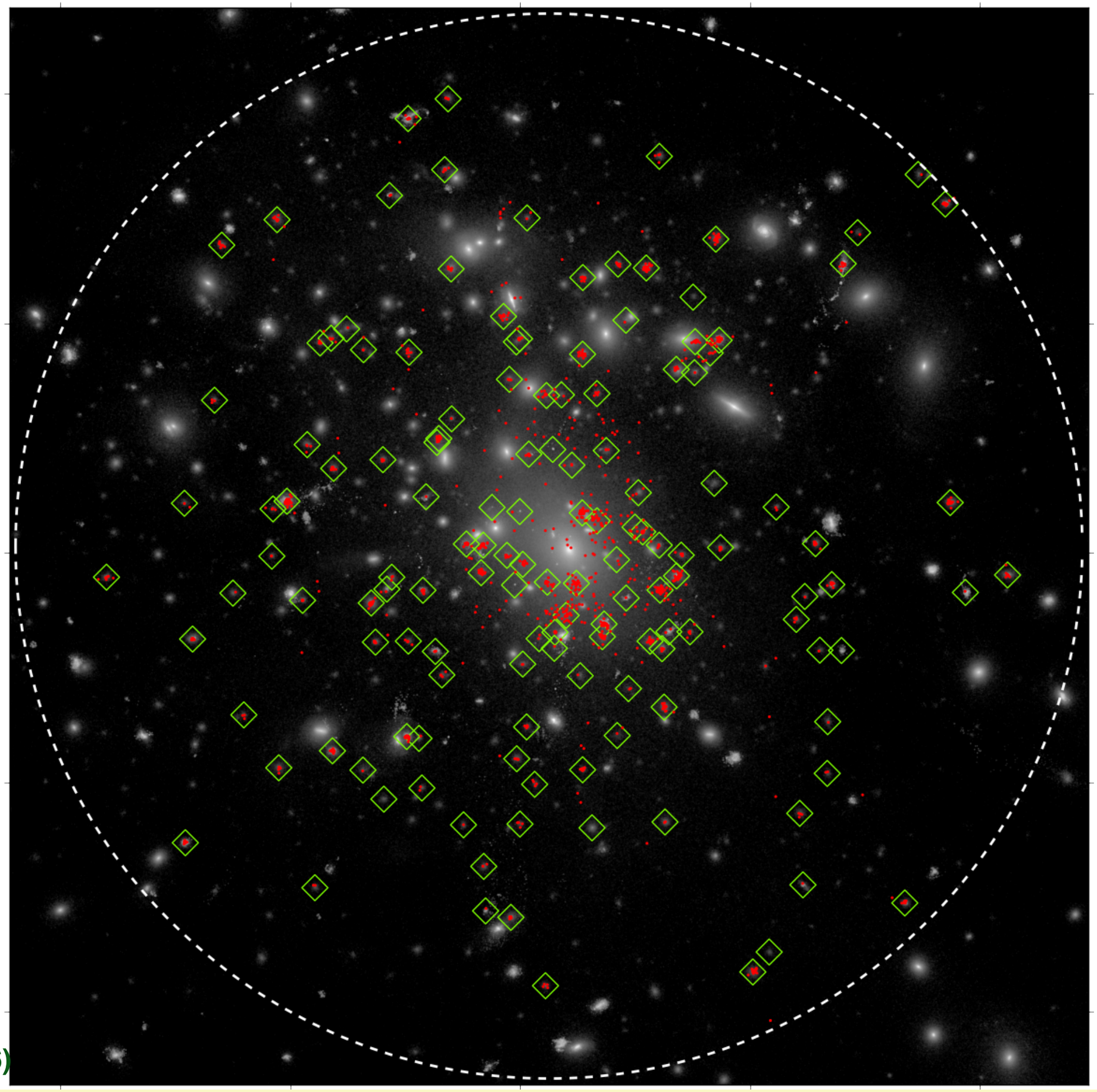
Post-processing model for GC formation & tidal evolution:

1) Compute the mass in GCs
2) M_{GC} —> Number
3) Tagging of DM particles to evaluate stripping



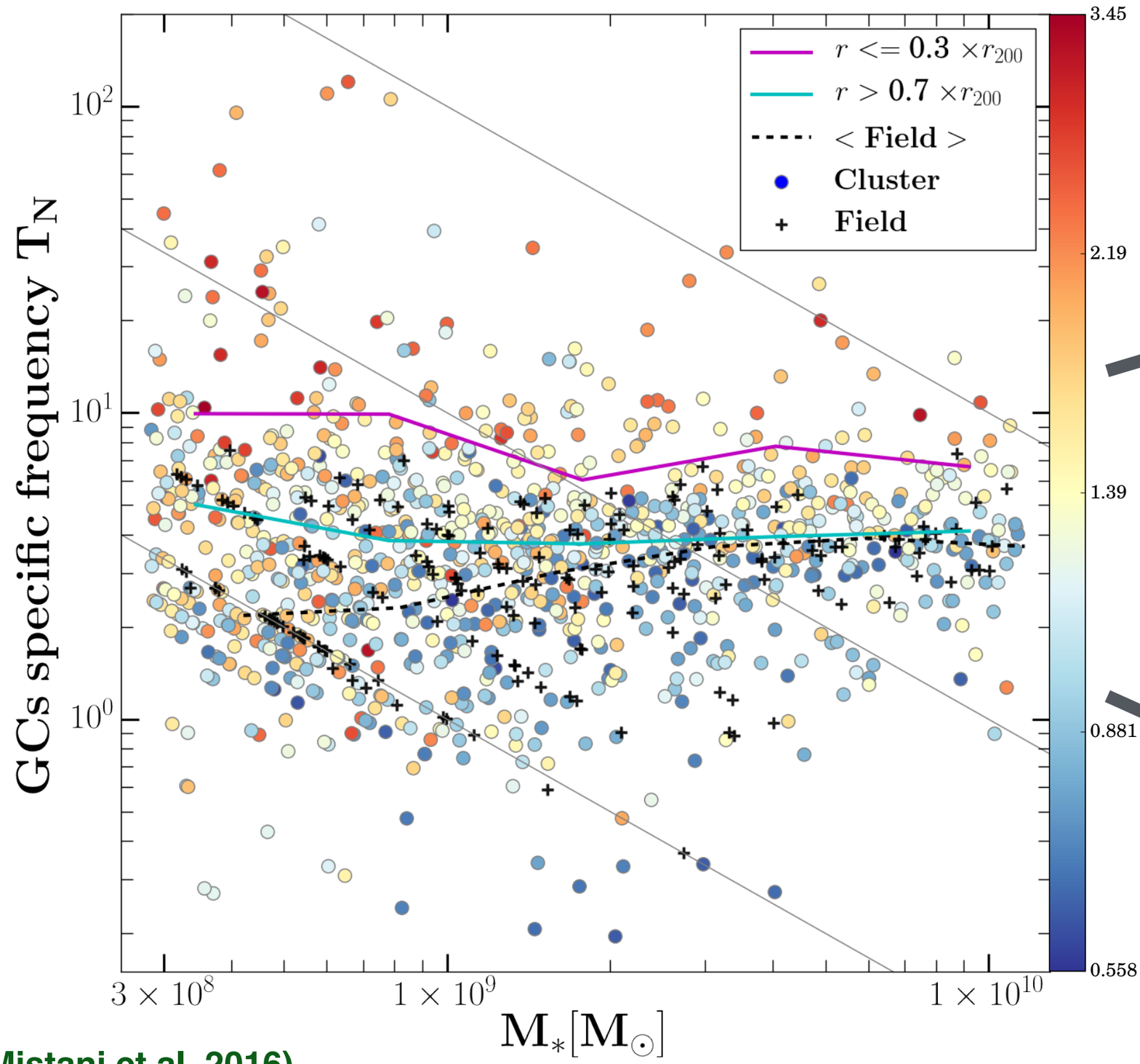
Observationally…

High SFR density ==> more efficient GC formation



(Mistani et al. 2016)

GCs content in cluster and field dwarfs



(Mistani et al. 2016)

Cluster dwarfs have an excess of GCs in agreement with observations

Excess is largest for inner and more starbursty dwarfs

Conclusions

* Simulated dwarfs in Illustris show a strong color bi-modality according to environment, in agreement with observations

* dE assemble their total and stellar mass earlier than field dwarfs

* dE build up their stellar mass at higher SFRs and starburst events seem common

* dE stop forming stars after becoming satellites in a wide range of timescales, t~0.5 - 9 Gyr

* Higher specific frequency of GCs in dE can arise due to their higher SFRs

dEs can form from dIrrs, but reproducing the early progenitors of today's dE requires to look at field dIrr with about ~3 times more stars at present time (to account for the truncation of star formation in cluster dwarfs)