Stellar and globular cluster metallicity gradients in early-type galaxy halos

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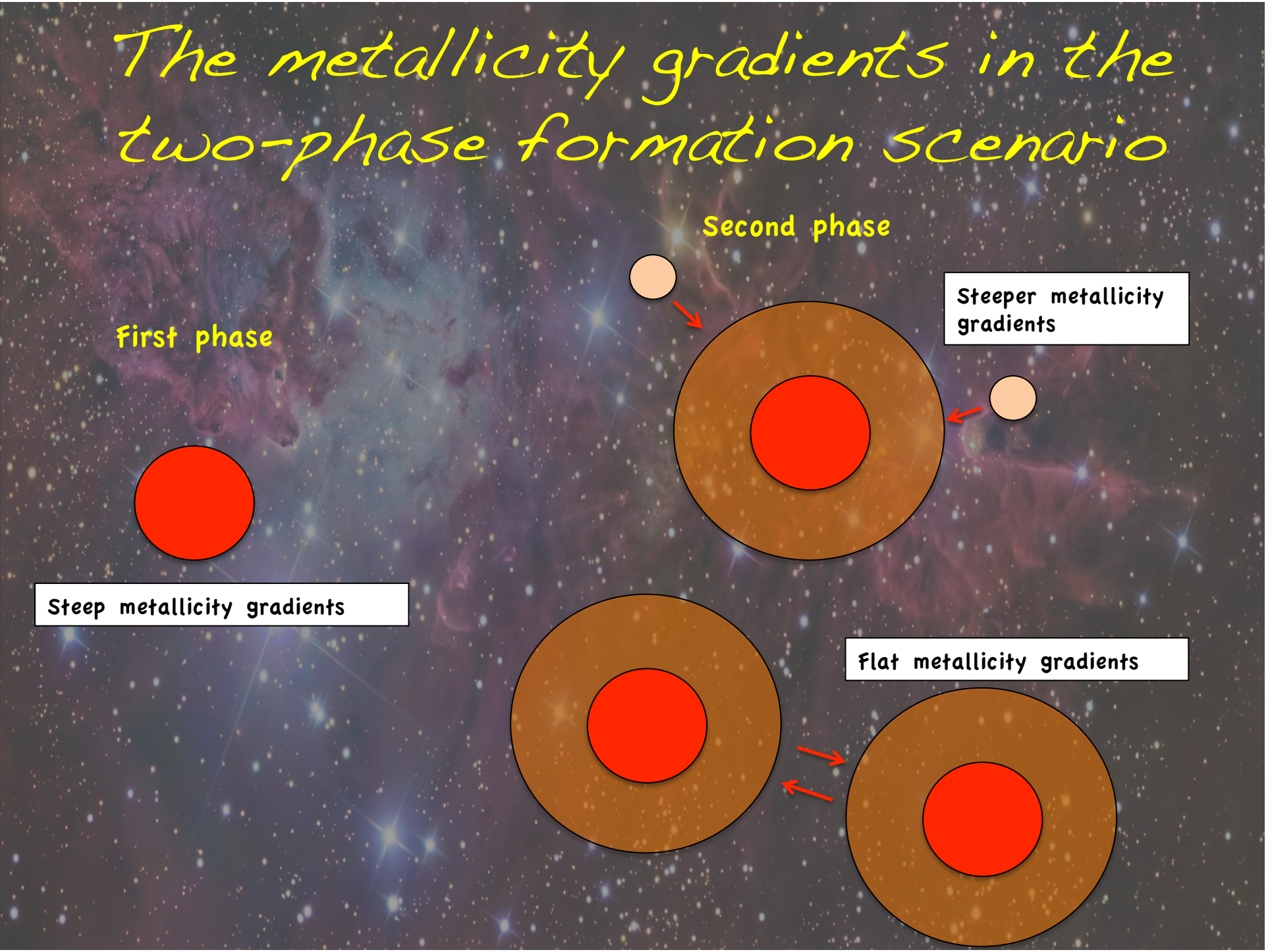
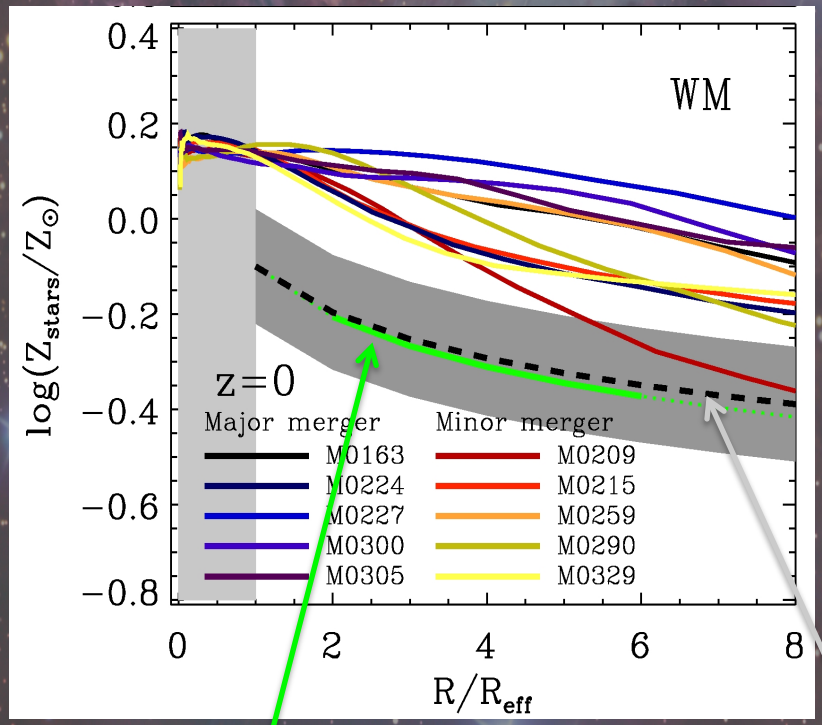
Garching, 25/02/15

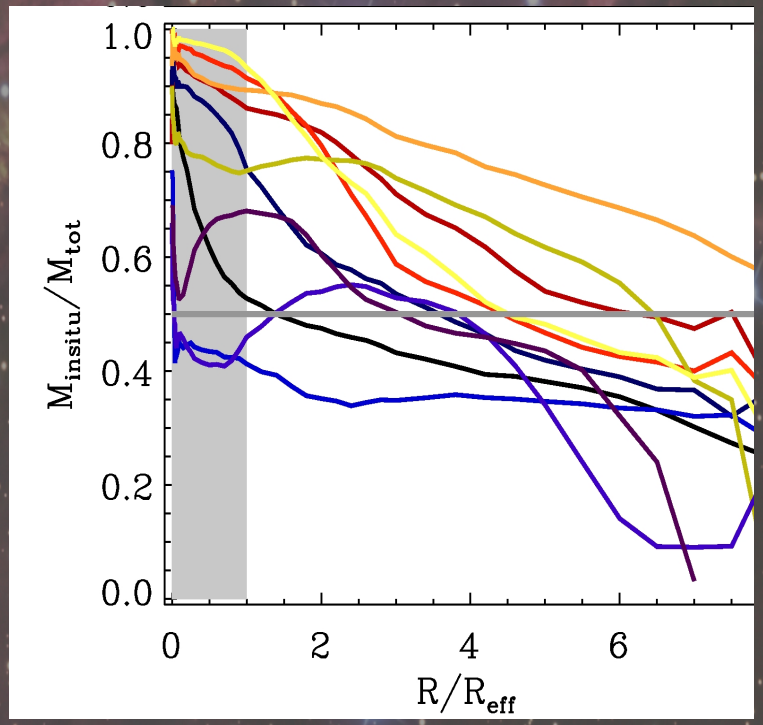

The metallicity gradients in the two-phase formation scenario
Second phase
Steeper metallicity gradients
First phase
Steep metallicity gradients
Flat metallicity gradients

The halo metallicity as proxy of galaxy formation history

Major mergers => shallow gradients and small/no transition radius

Minor mergers => steep gradients and large transition radius





Average metallicity profile (offset in Y)

Observed photometric metallicity (La Barbera et al. 2012)

Hirschmann et al. 2014

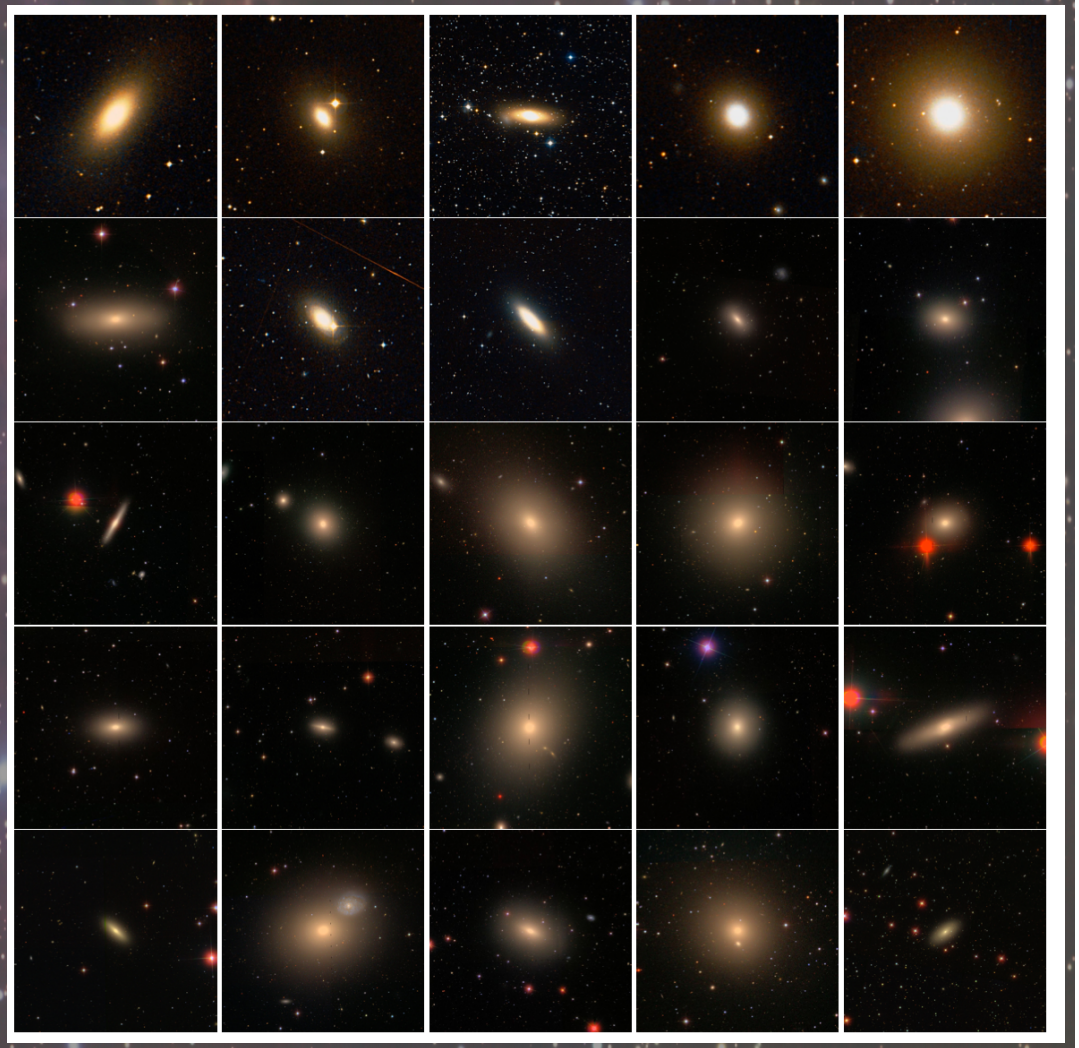
The SLUGGS survey

25 nearby ETGs (d<30 Mpc).

Spectroscopy (Keck/DEIMOS) and photometry (Subaru/Suprime-Cam) of stellar component (up to 3 R_{eff}) and GCs (up to 10 R_{eff}).

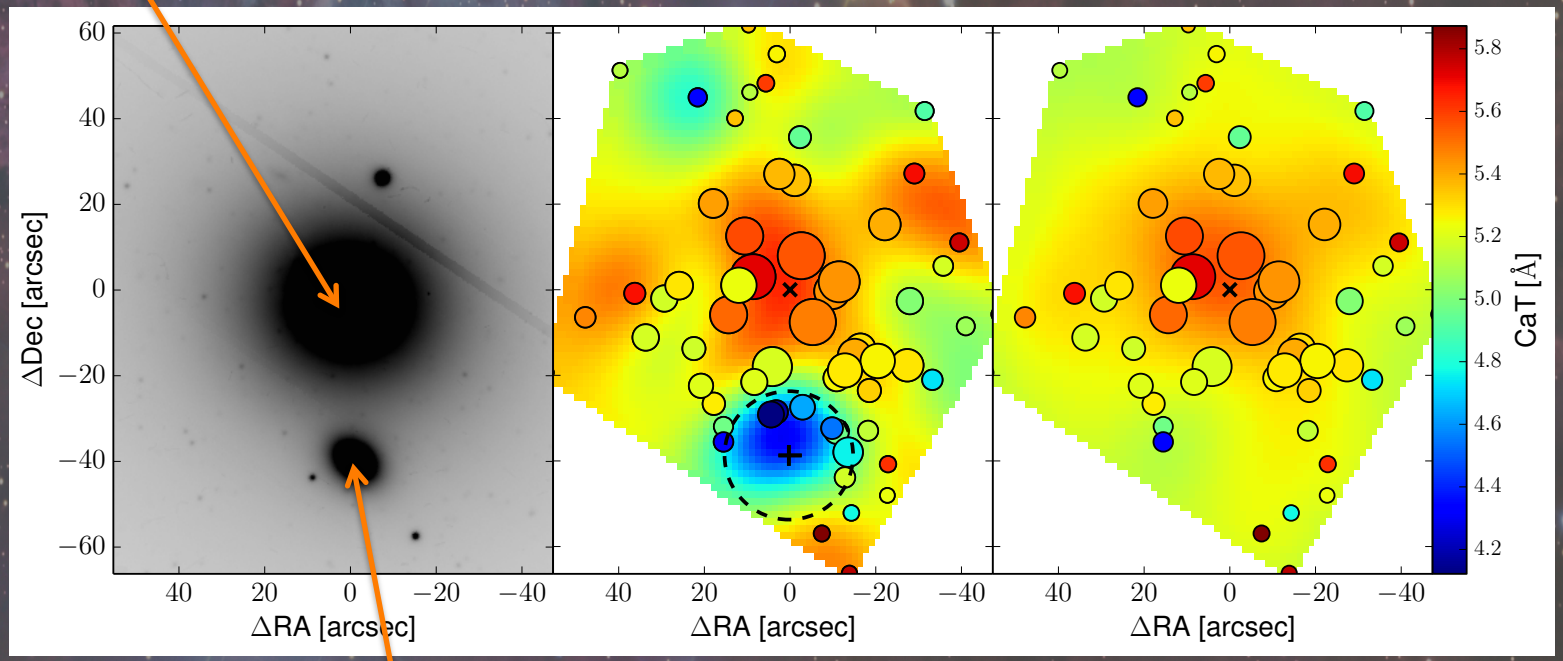
Completed during the first semester of 2015 (weather permitting…)

Both kinematics and metallicity.



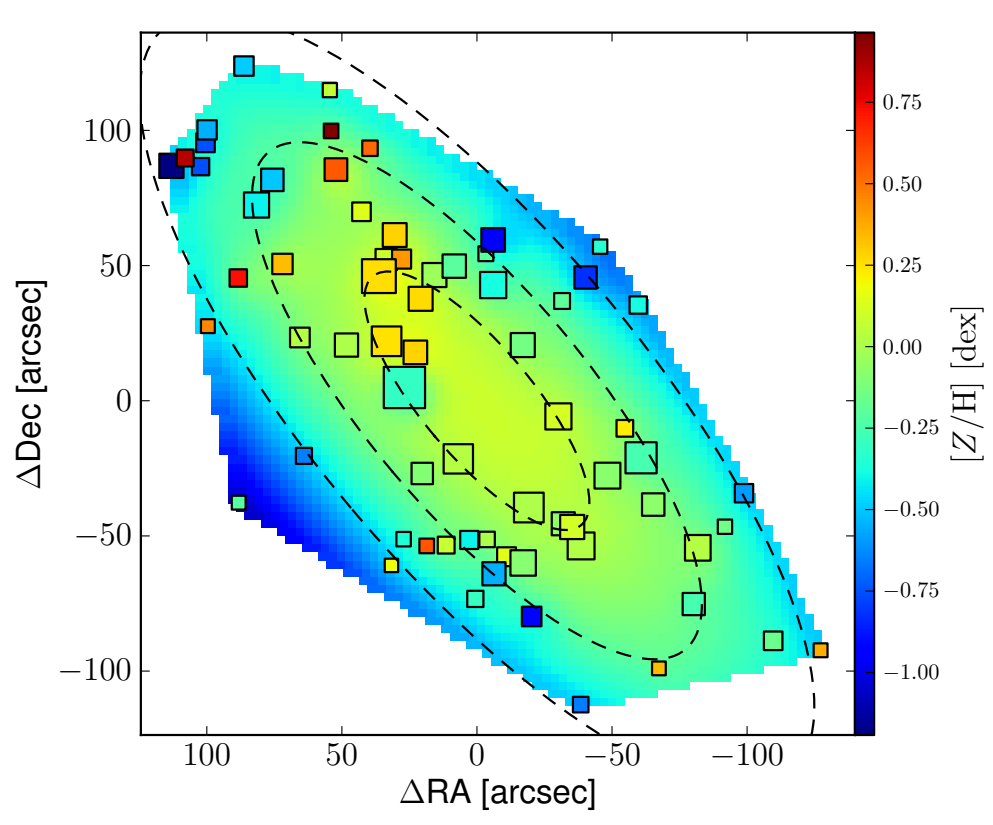
Brodie et al. 2014

2D CaT maps

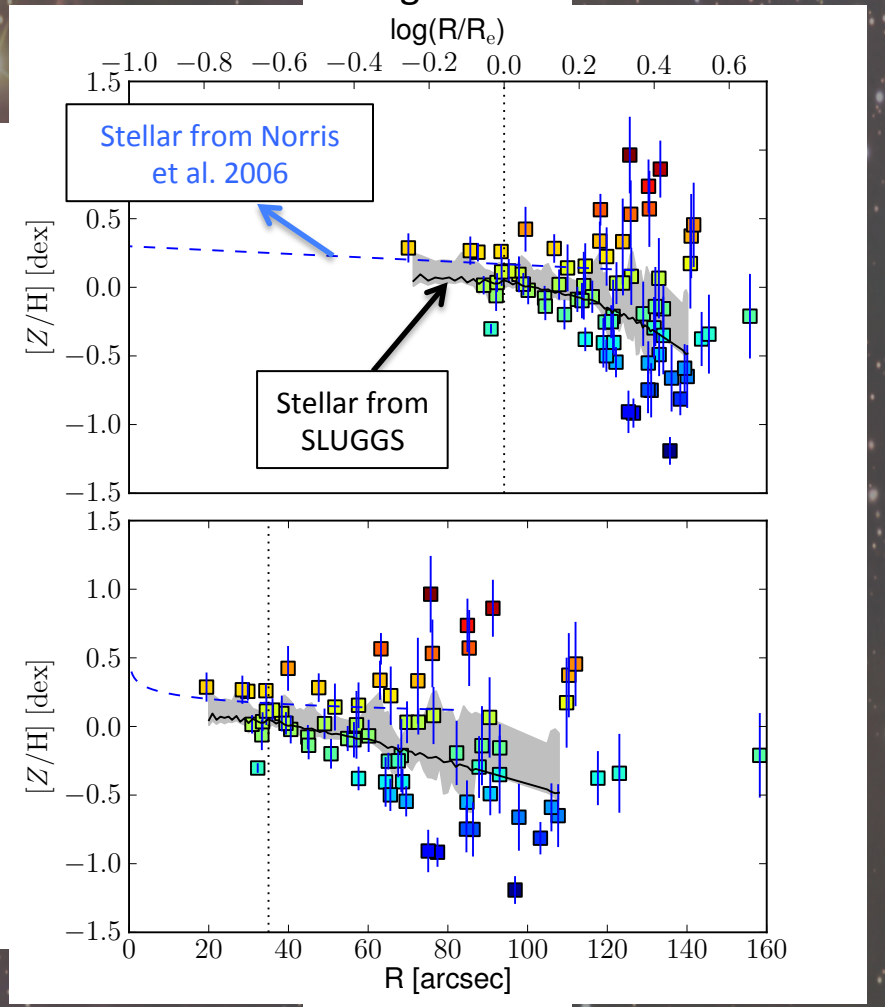


Pastorello et al. 2014

2D Metallicity maps and profiles



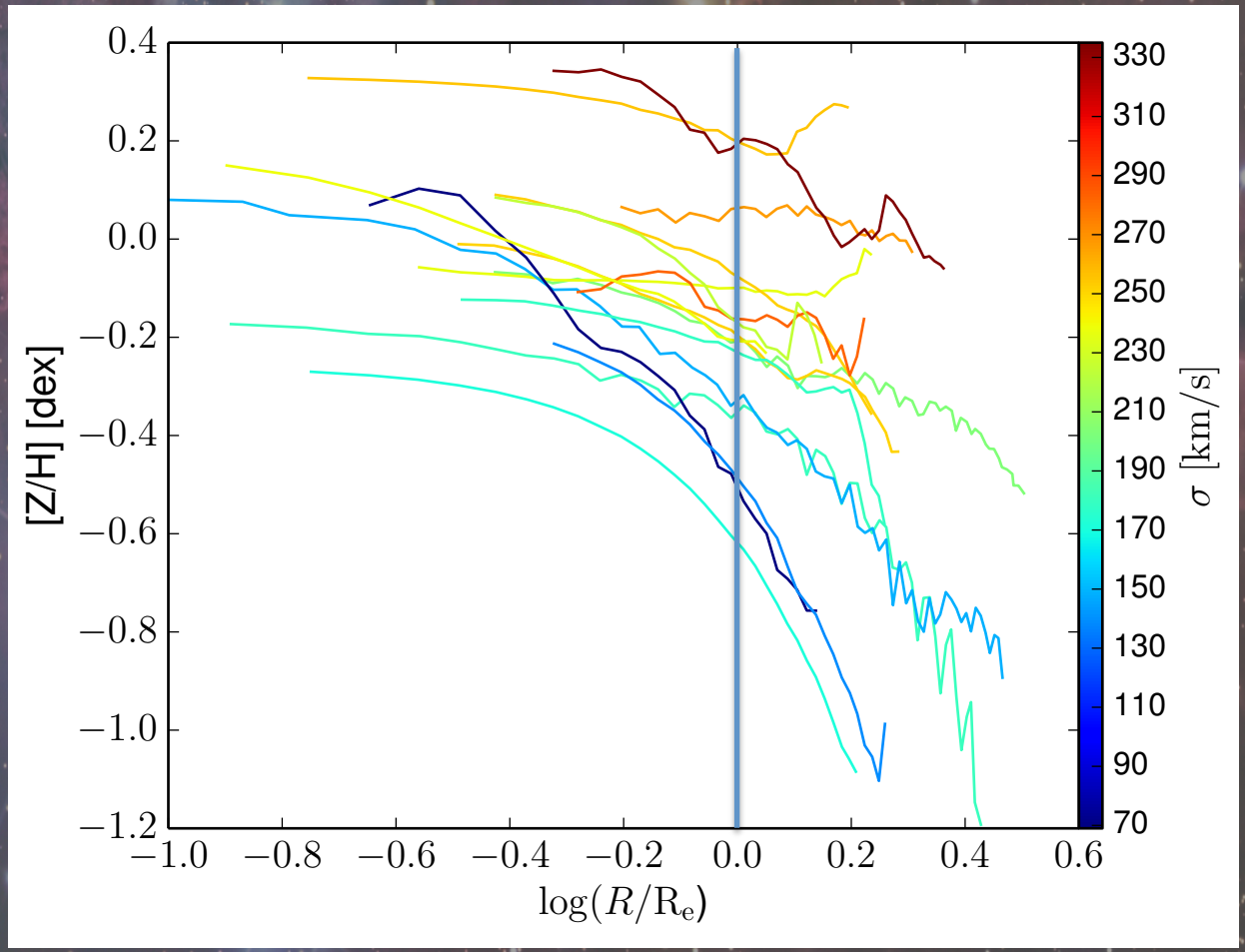
Log scale



Linear scale

Pastorello et al. 2014

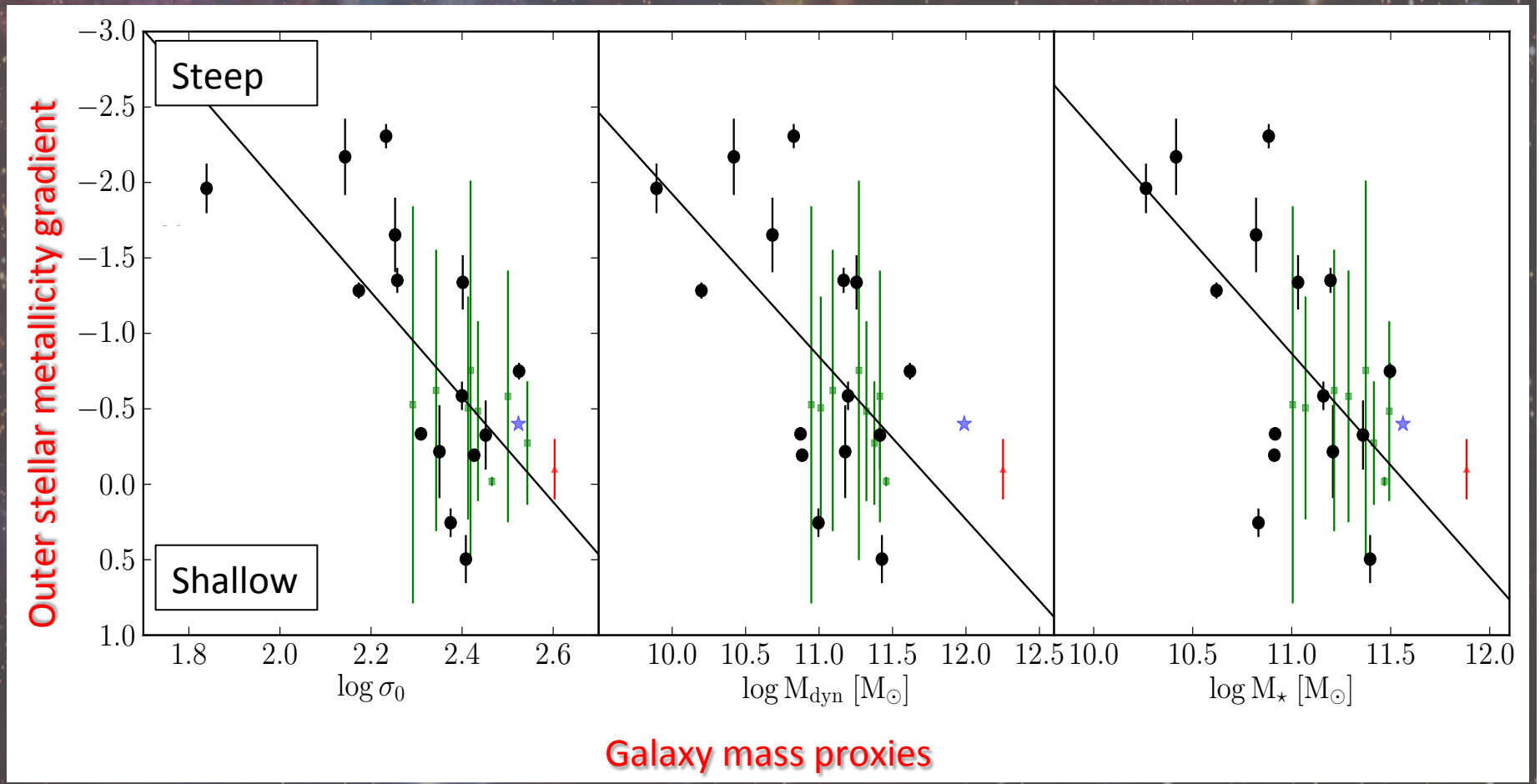
Stellar metallicity profiles



Galaxy mass

Pastorello et al. 2014

Outer metallicity gradients

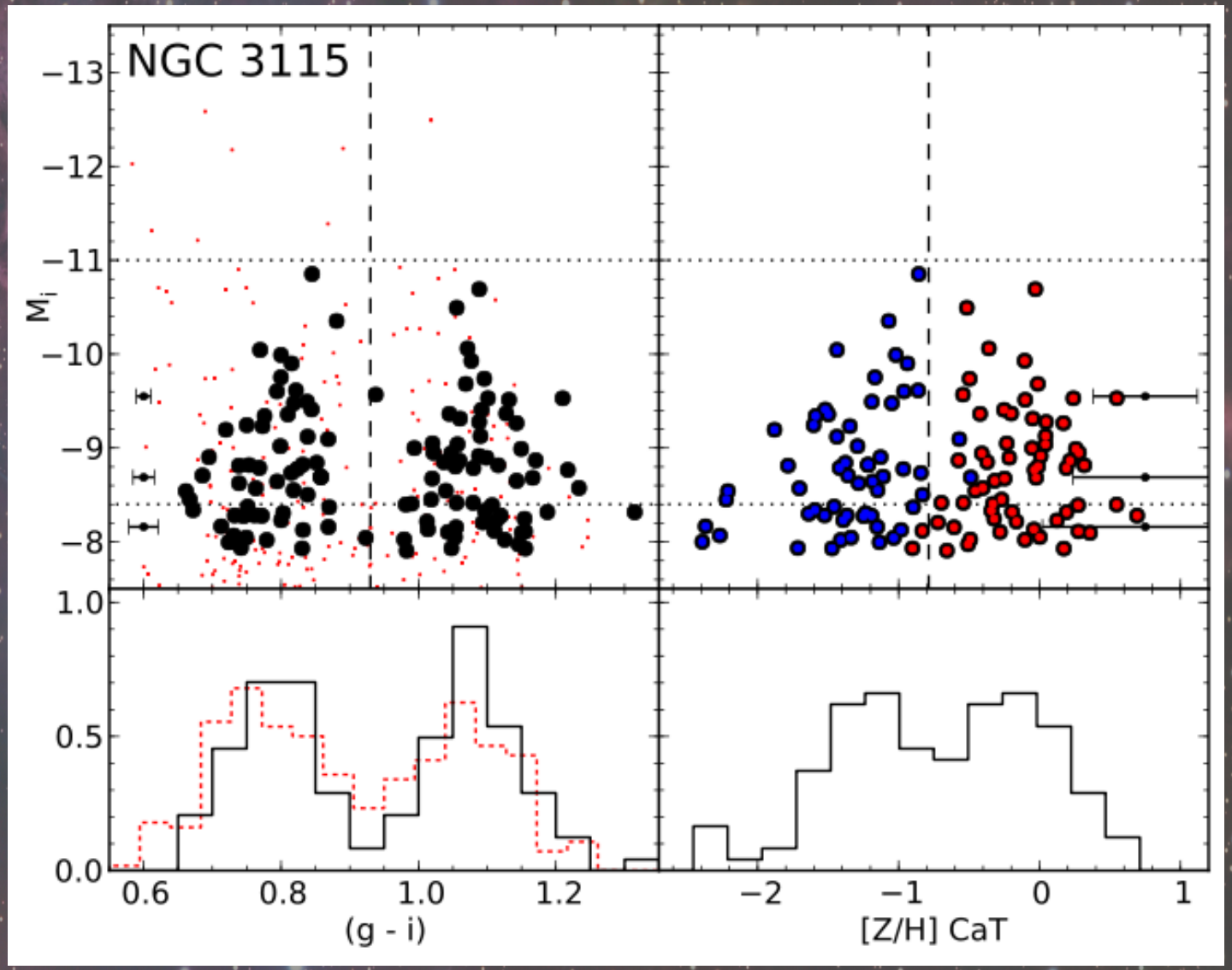


Minor vs Major mergers?

Pastorello et al. 2014

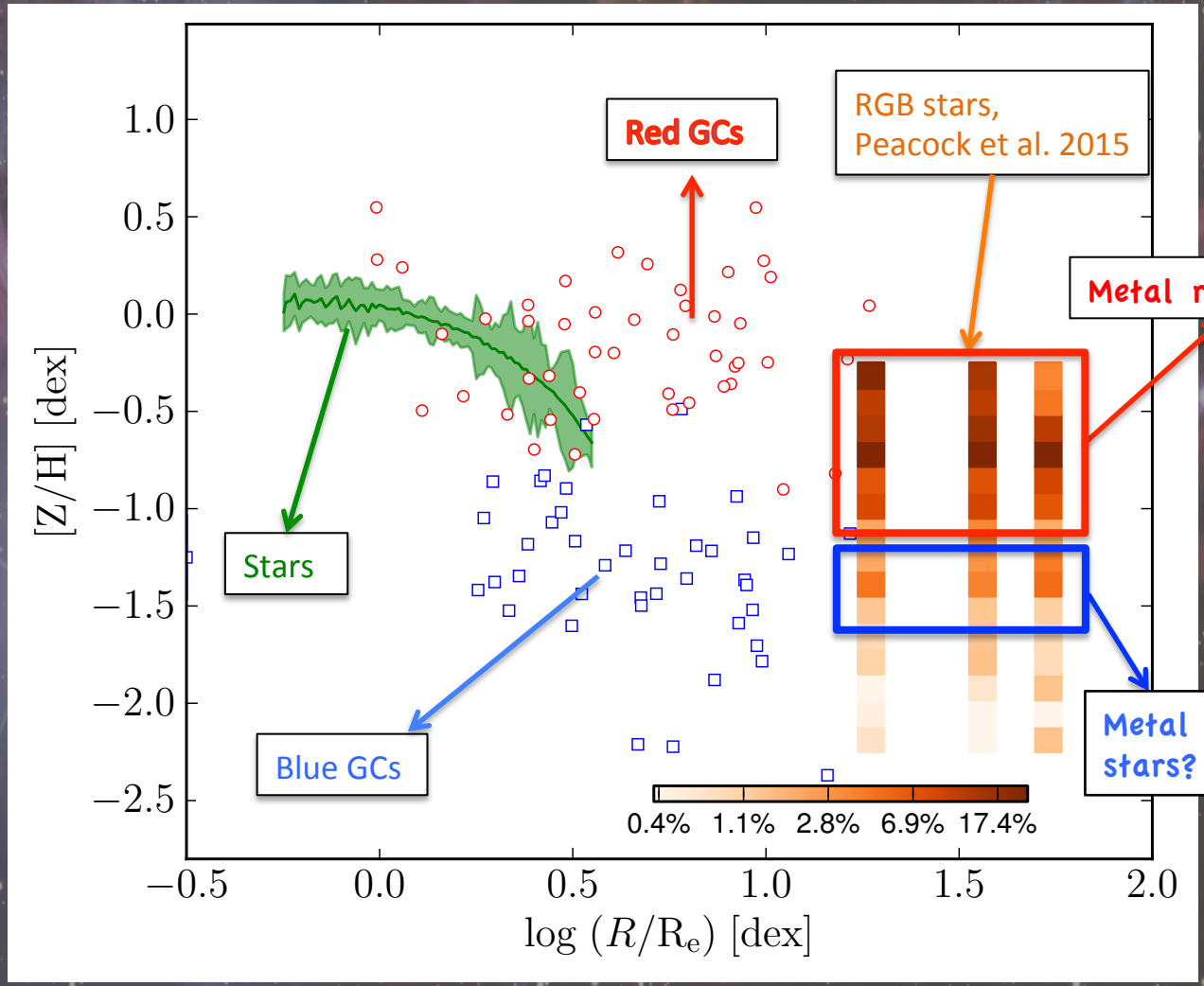

Going further out with
Globular Clusters

The GC metallicity bimodality



Usher et al. 2012

Metallicity radial profiles up to 10 effective radii

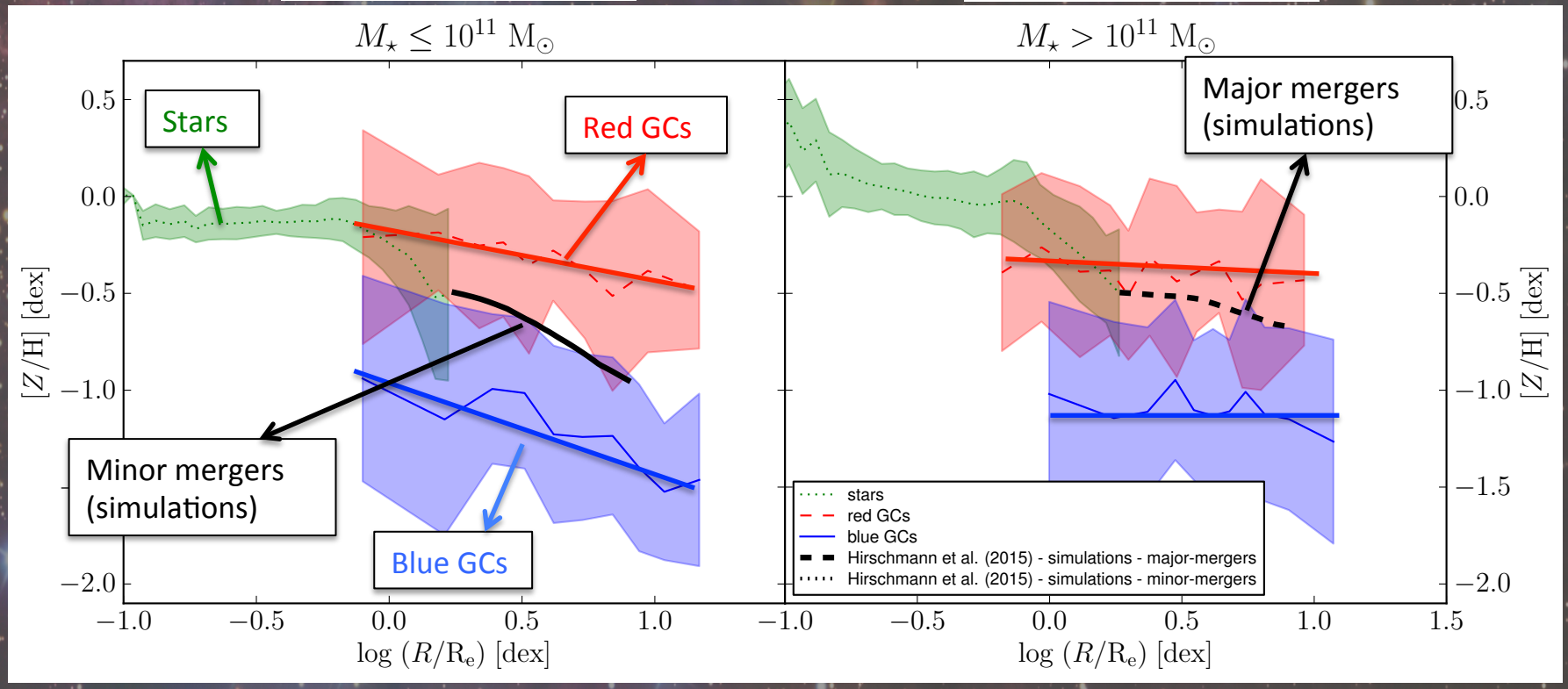


Pastorello et al., submitted

Metallicity gradients up to 10 effective radii

Low mass galaxies

High mass galaxies



Steep GC metallicity profiles

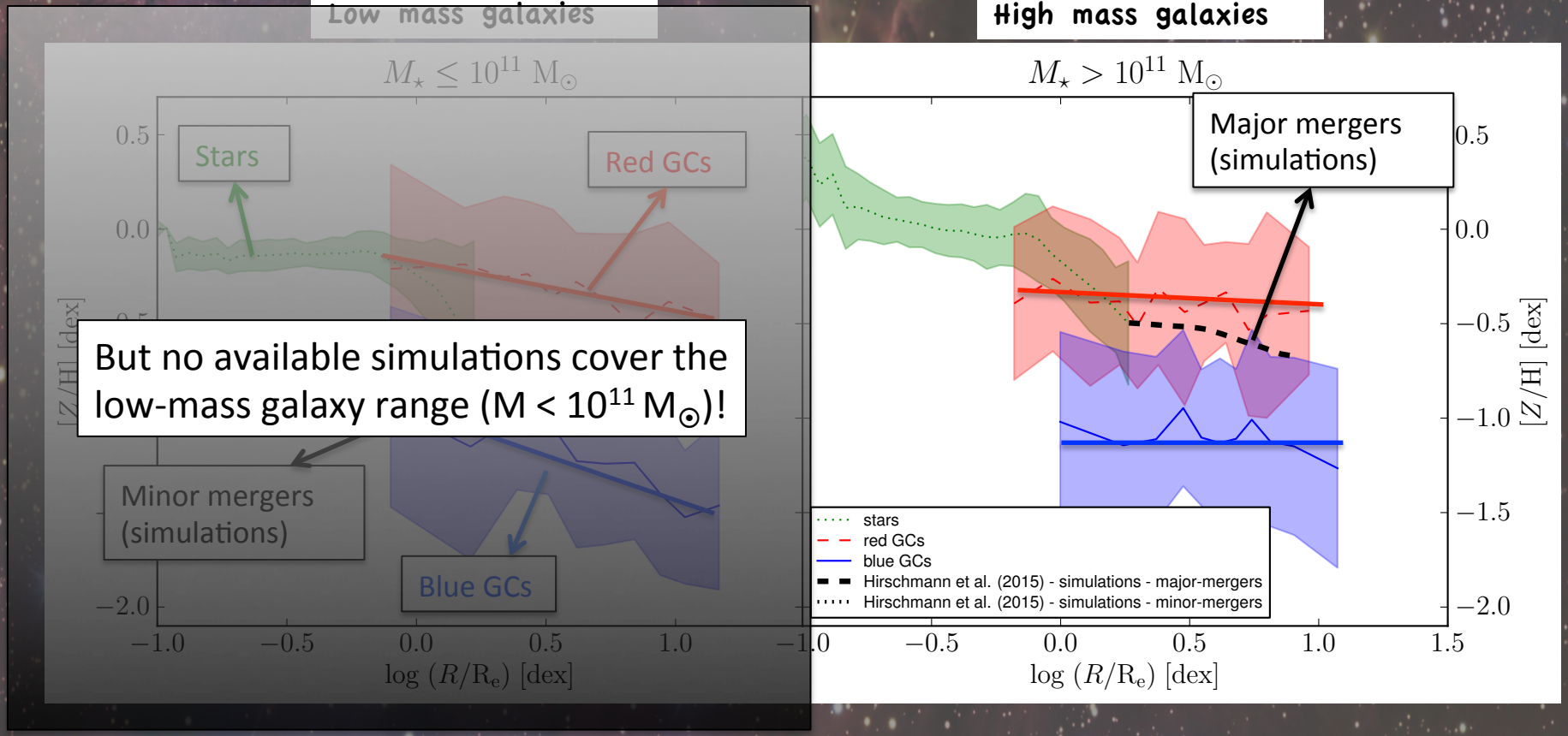
Flat GC metallicity profiles

Pastorello et al., submitted

Metallicity gradients up to 10 effective radii

Low mass galaxies

High mass galaxies



Steep GC metallicity profiles

Flat GC metallicity profiles

Pastorello et al., submitted

Summary

- Thanks to the data from the SLUGGS survey we have been able to probe the stellar metallicity in nearby ETGs out to 3 R_e and the GC metallicity out to more than 10 R_e.

- The stellar and GC metallicity gradients in the outer regions ($R>1\ R_e$) of high mass galaxies are consistent with a major-merger dominated evolution.

- In low mass galaxies, the steep stellar and GC outer metallicity gradients suggest that a significant number of minor-mergers occurred in their history.

- However, more simulations of low-mass galaxy formation are needed.