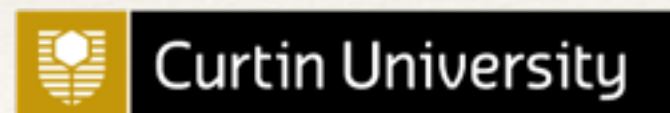*Prajwal R. Kafle*, *Aaron S. G. Robotham, Claudia d. Lagos and Simon P. Driver*

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Stellar Mass Segregation in Galaxy Groups

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Introduction

❖ Mass segregation means concentration of the most massive galaxies towards the center of the group.

❖ The study of mass segregation in groups can be used to understand physical processes such as dynamical friction, galaxy mergers, and tidal stripping.

❖ Presence or absence of stellar mass segregation in galaxy group has remained contentious issue (van den Bosch et al. 2008, Balogh et al. 2014, Roberts et al. 2015 vs Wetzel et al. 2012, Ziparo et al. 2013 etc).

Galaxy groups data

Observed:

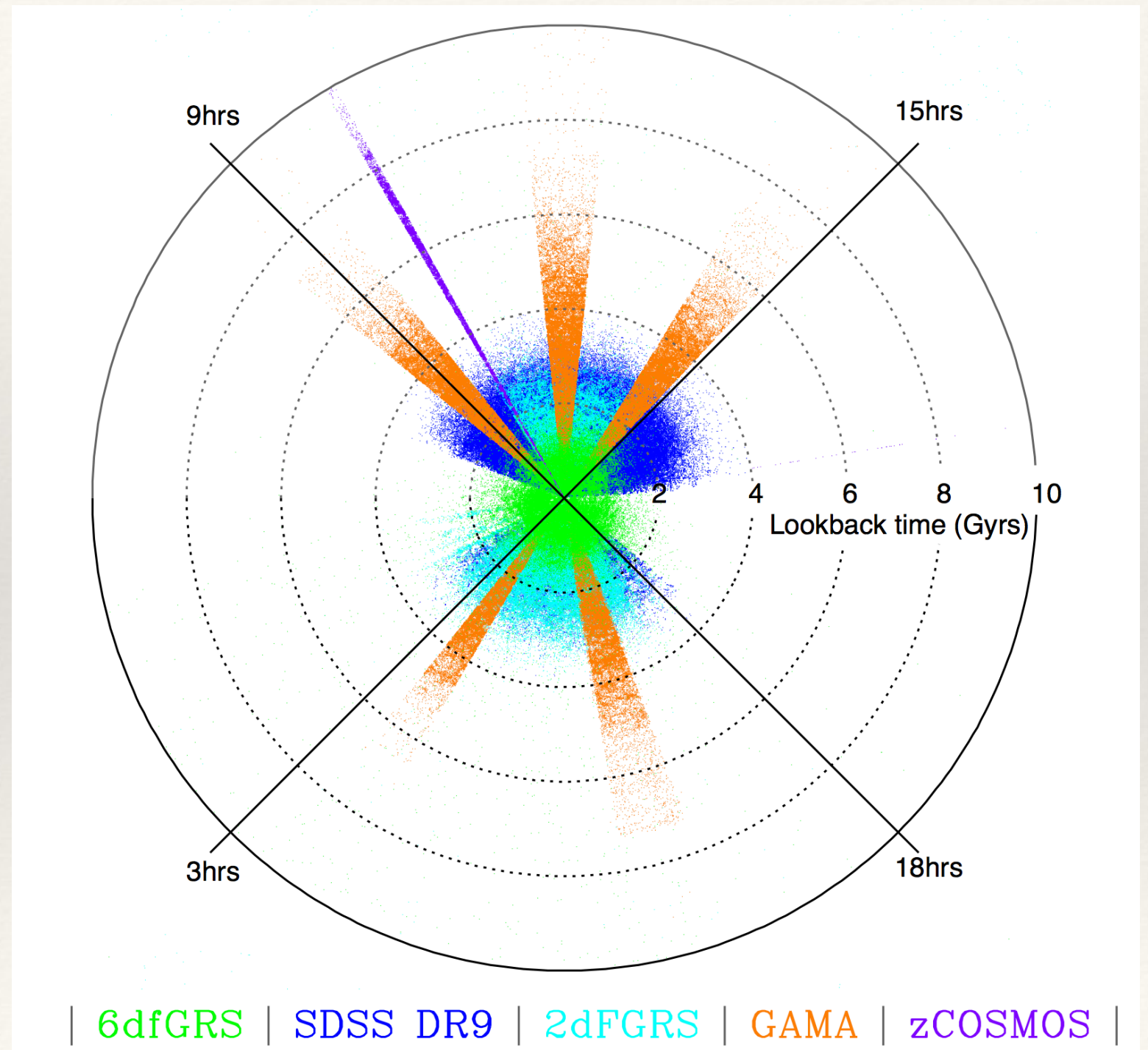Galaxy And Mass Assembly (GAMA) spectroscopic survey

- 300K galaxies (Driver'11, Liske'15)
- group catalog (Robotham'11)
- 12X5 deg^2 centered at 9, 12, 14.5 hrs
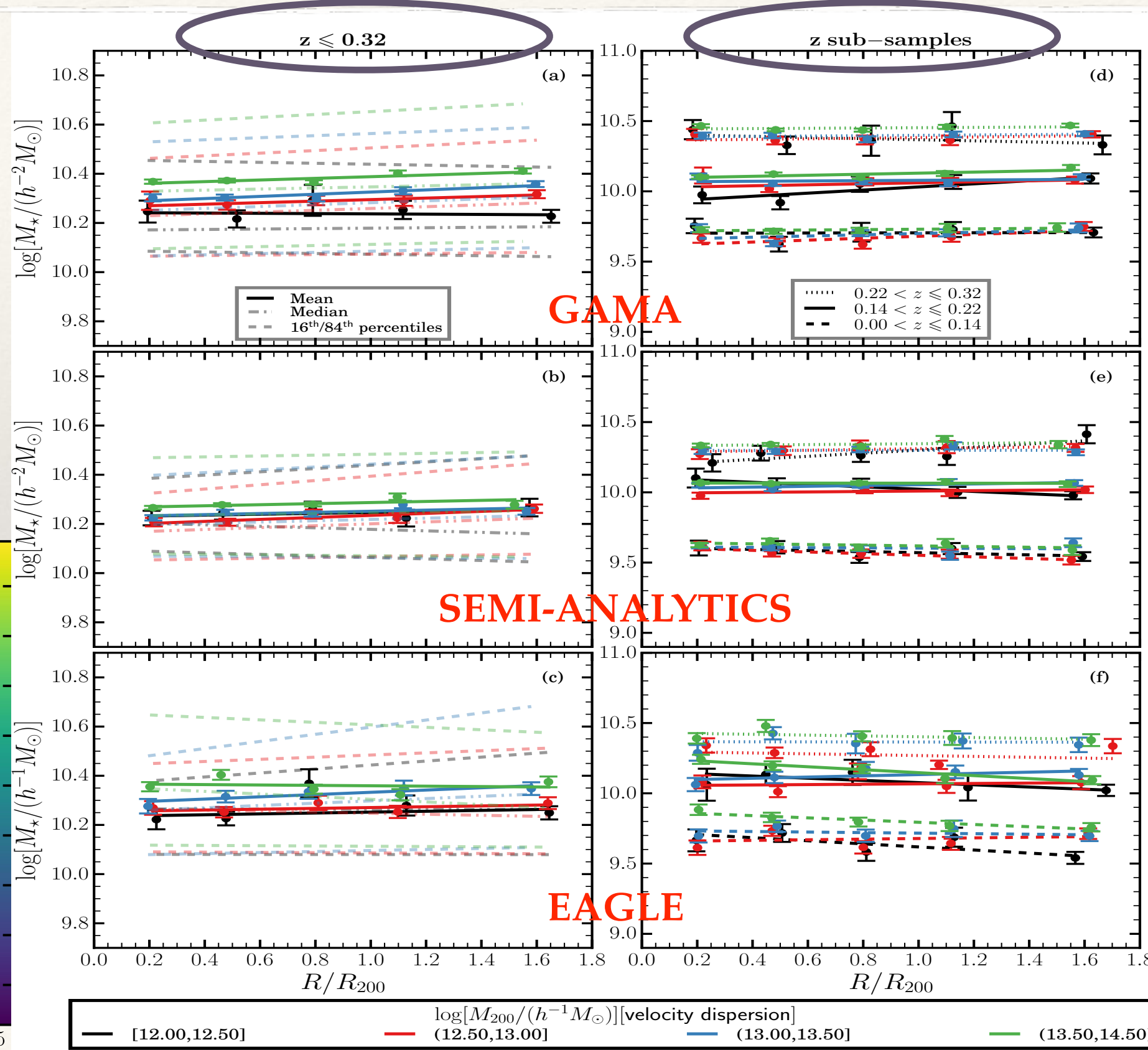
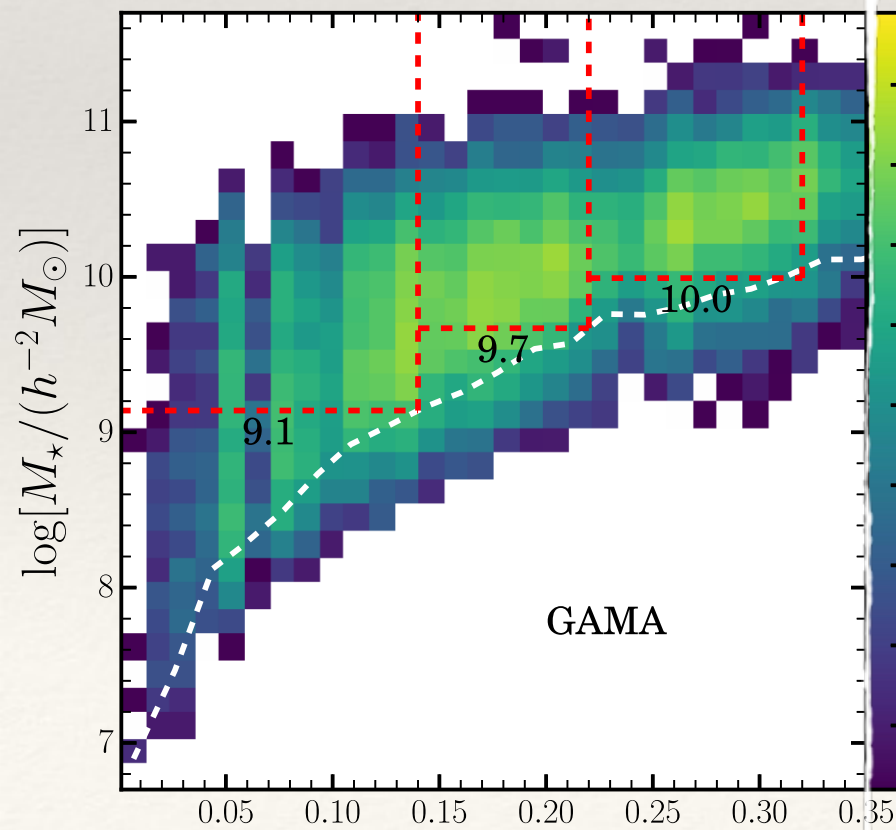**Simulated:**

GALFORM semi-analytics (Gonzalez-Perez'14)

- GAMA light cones (Merson'13)

EAGLE hydro-simulations (Schaye'15, McAlpine'16)
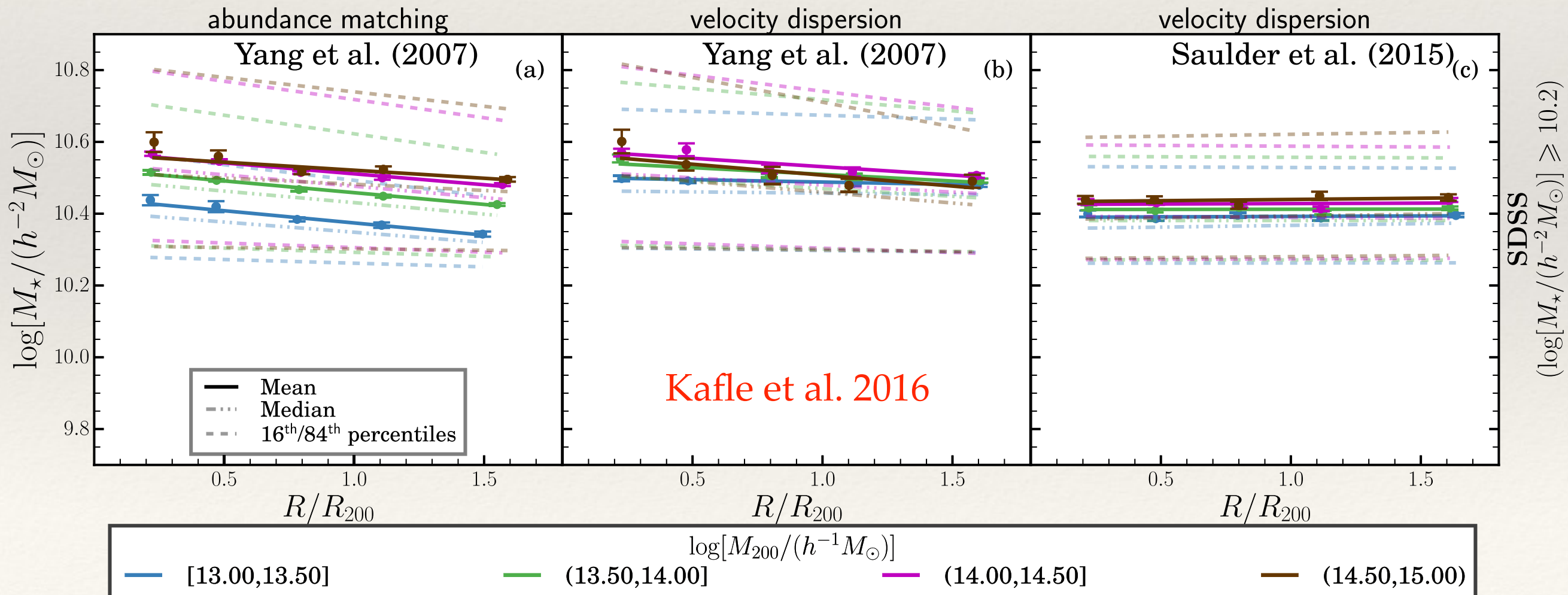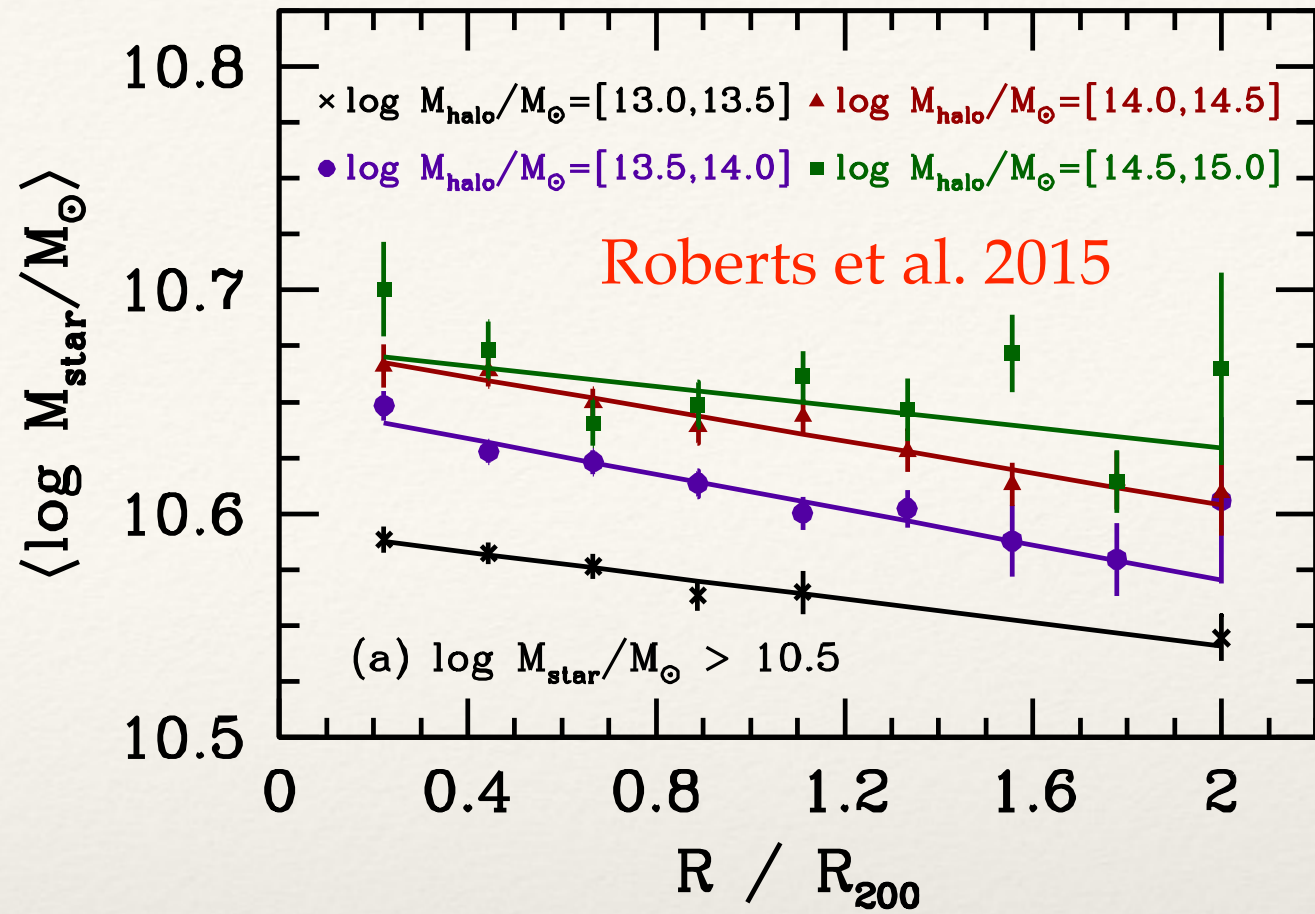

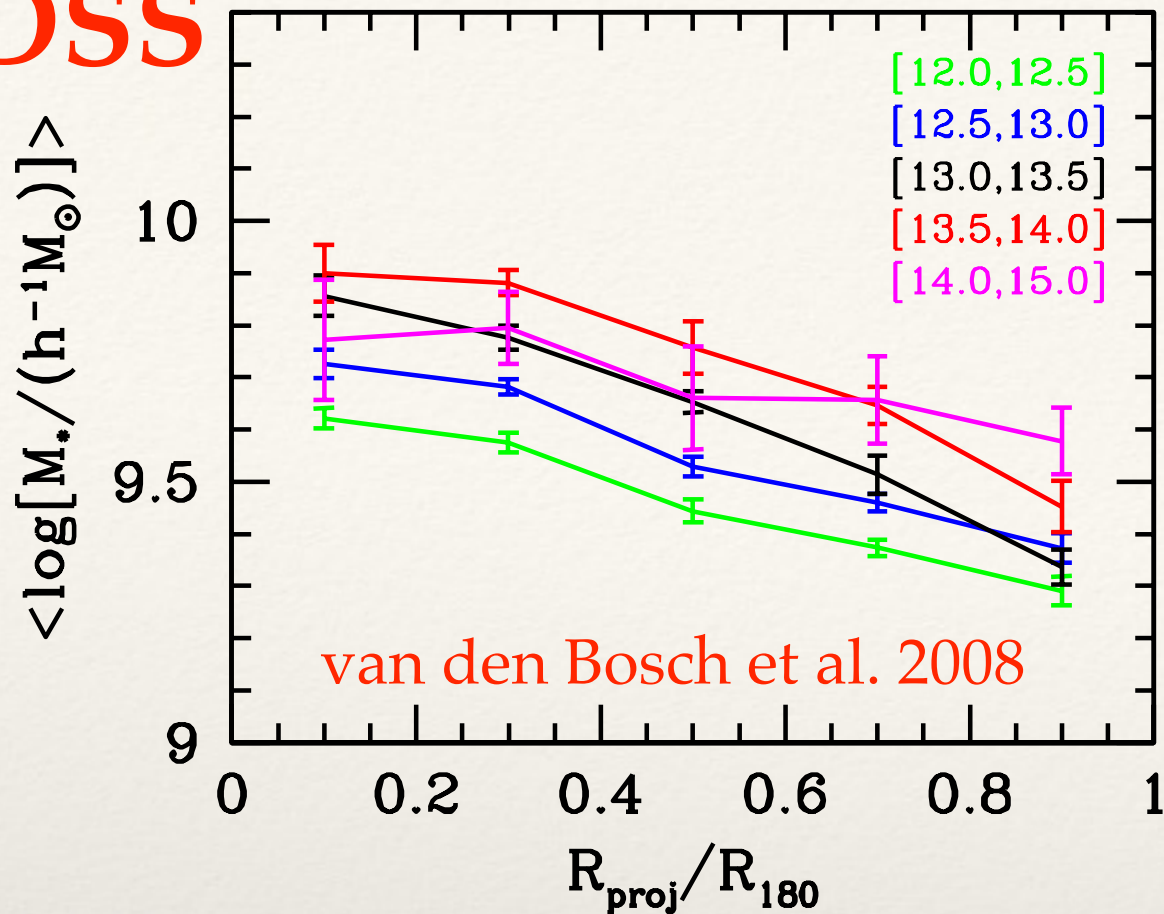| 6dfGRS | SDSS DR9 | 2dFGRS | GAMA | zCOSMOS |

No segregation, No redshift evolution

- Magnitude limited **r<19.8**
- Redshift range **z<0.32**
- Halo Mass range **log[M200/(h^-1 Msun)] = [12-14.50)**
- Halo mass: group velocity dispersion, stellar mass: g-i colour and z (Taylor'11).

SDSS

van den Bosch et al. 2008

[12.0,12.5]
[12.5,13.0]
[13.0,13.5]
[13.5,14.0]
[14.0,15.0]

Roberts et al. 2015

× log $M_{halo}/M_\odot$=[13.0,13.5]   ▲ log $M_{halo}/M_\odot$=[14.0,14.5]
● log $M_{halo}/M_\odot$=[13.5,14.0]   ■ log $M_{halo}/M_\odot$=[14.5,15.0]

(a) log $M_{star}/M_\odot$ > 10.5

abundance matching
Yang et al. (2007)   (a)

velocity dispersion
Yang et al. (2007)   (b)

velocity dispersion
Saulder et al. (2015)   (c)

Kafle et al. 2016

Mean
Median
16th/84th percentiles

$\log[M_\star/(h^{-2}M_\odot)]$

R/R_{200}

R/R_{200}

R/R_{200}

SDSS
($\log[M_\star/(h^{-2}M_\odot)] \geq 10.2$)

$\log[M_{200}/(h^{-1}M_\odot)]$

[13.00,13.50]   (13.50,14.00]   (14.00,14.50]   (14.50,15.00)

Results: EAGLE data– intrinsic galaxy stellar mass and group halo properties
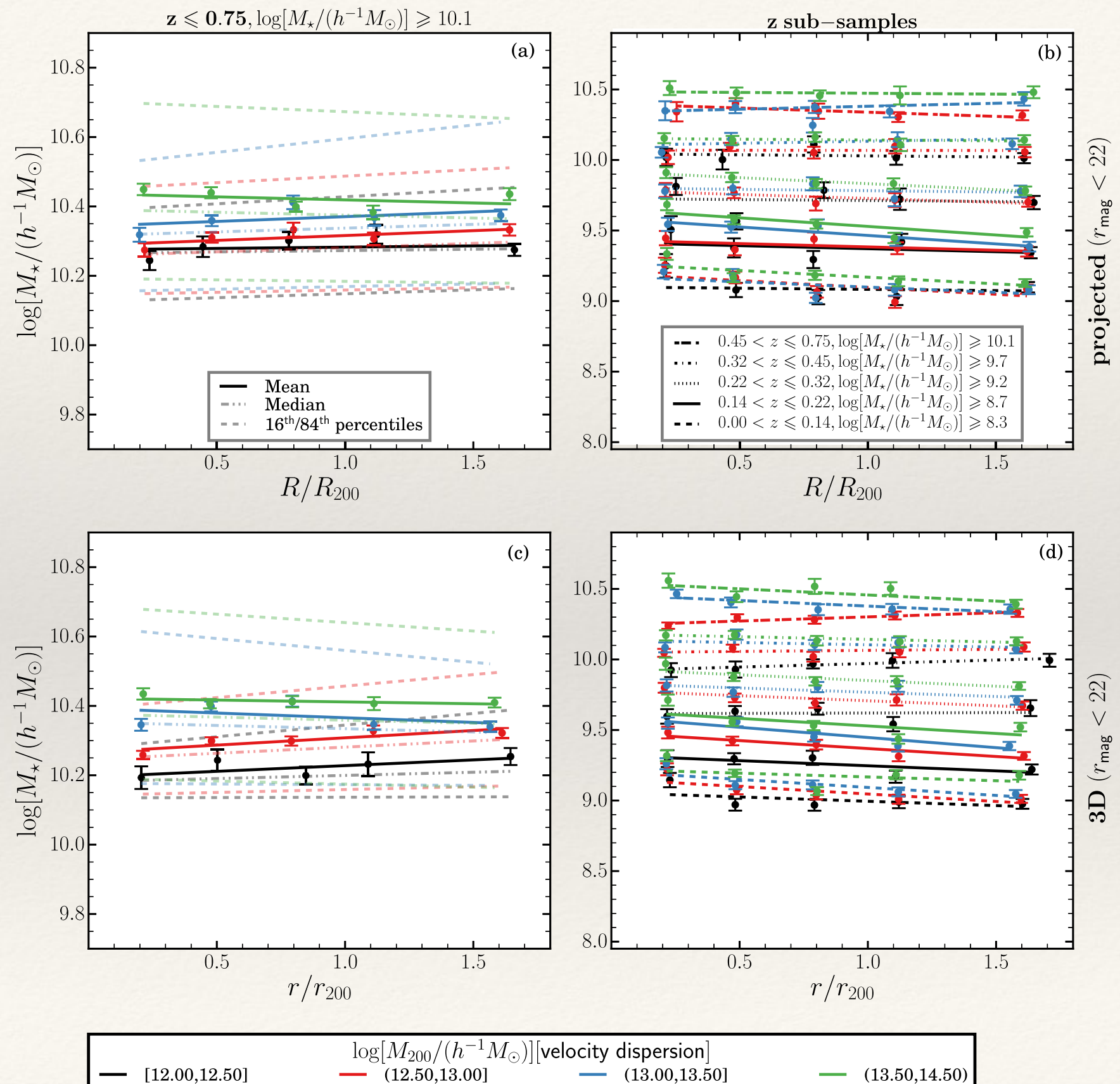
Conclusion

❖ Negligible stellar mass segregation (gradient <0.08 dex) in GAMA galaxy groups out to z<0.32 and halo mass range log (M200/Msun) = 12-14.5,

❖ Consistent predictions from galaxy groups in EAGLE and GALFORM models,

❖ GAMA results are **robust to definitions of halo mass** (velocity dispersion/weak-lensing relation/luminosity based) and **halo center** (BGG vs Luminosity weighted),

❖ The subtle differences between the group-finding algorithms could be the root cause of trends observed in SDSS,

❖ The apparent lack of mass segregation in groups suggest that whatever processes might enhance the effect is sub-dominant compared to competing and masking processes,

❖ For more details: Kafle et al. 2016, MNRAS, 463, 4194

❖ Please visit **the poster**.

—— Thanks ——