

The onset of the red sequence

Szomoru, van de Sande, Bezanson,
Brammer, Kriek, van Dokkum, Williams,
Quadri, Labbe, Marchesini, Illingworth,
Lee, Muzzin, Rudnick, Wake, MF

- 2 case studies
- some statistics



Photometric studies:

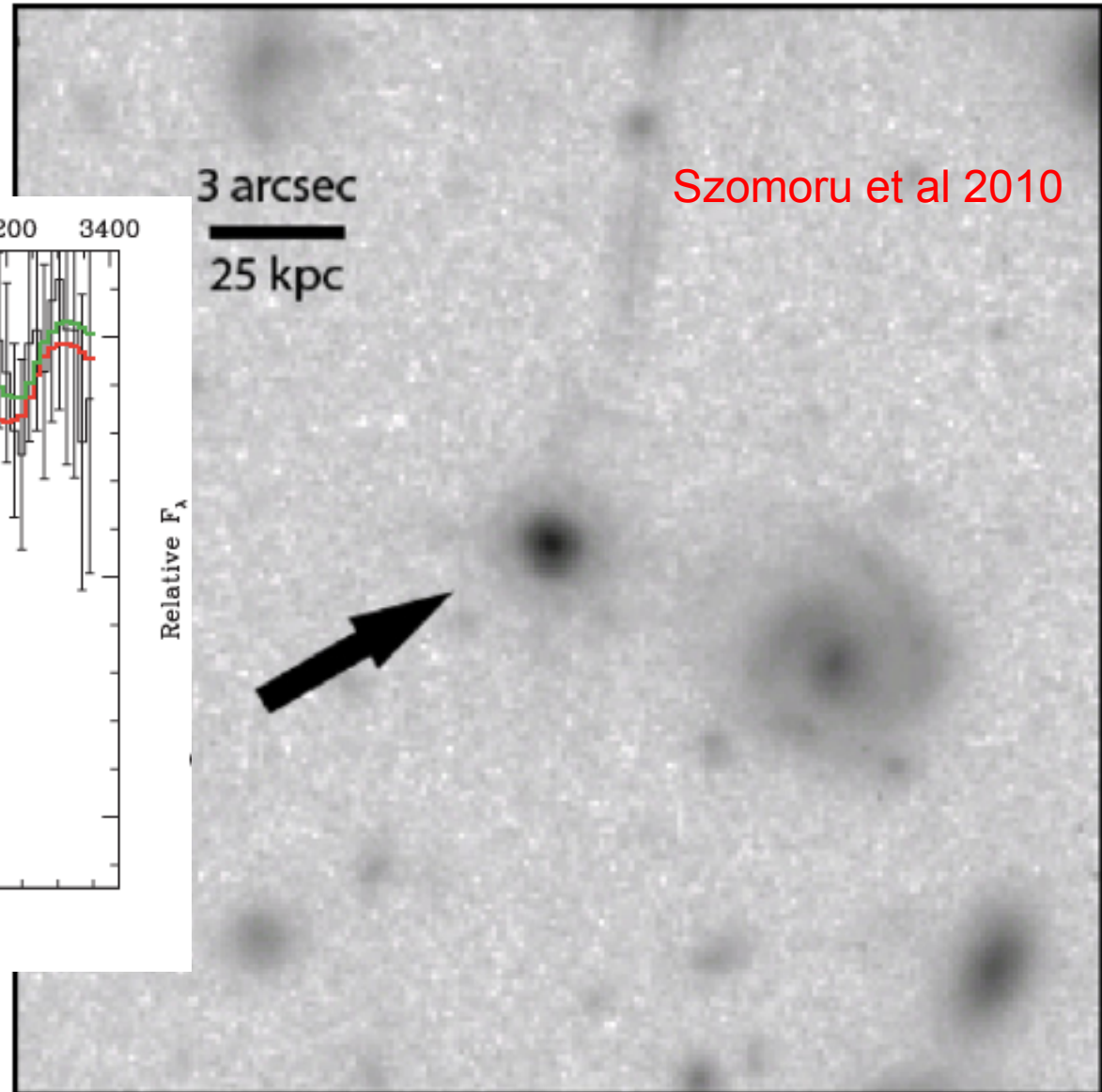
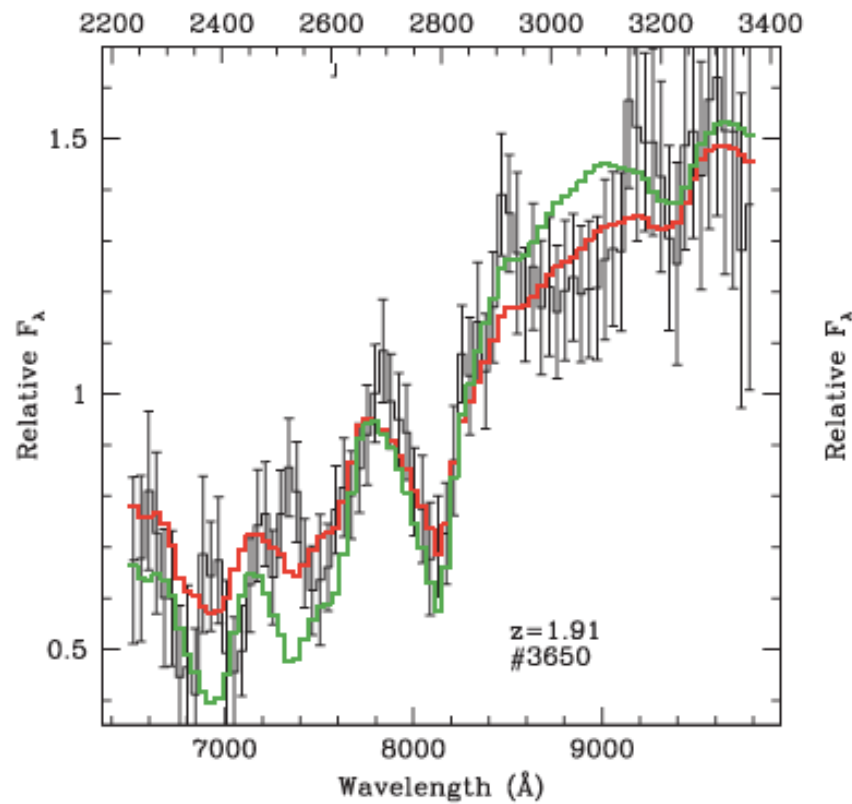
- Quiescent galaxies exist at $z=2$ but
 - 1) Much rarer
 - 2) Much smaller at fixed stellar mass
(roughly 1/3)
 - 3) Dispersions increase at fixed mass

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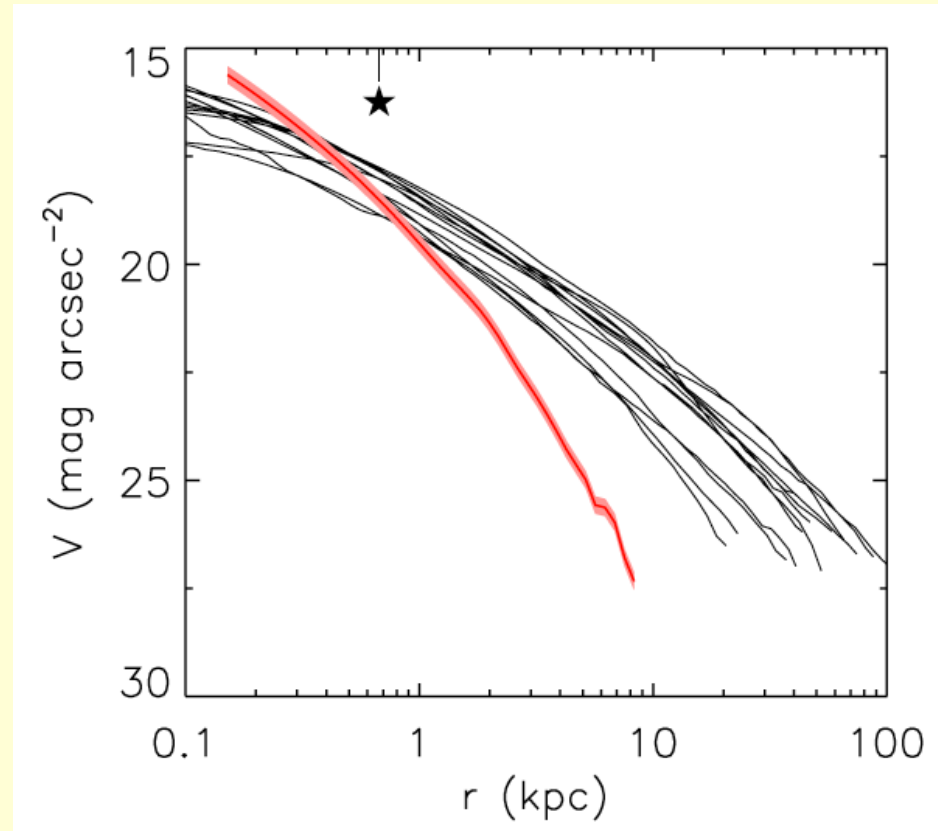
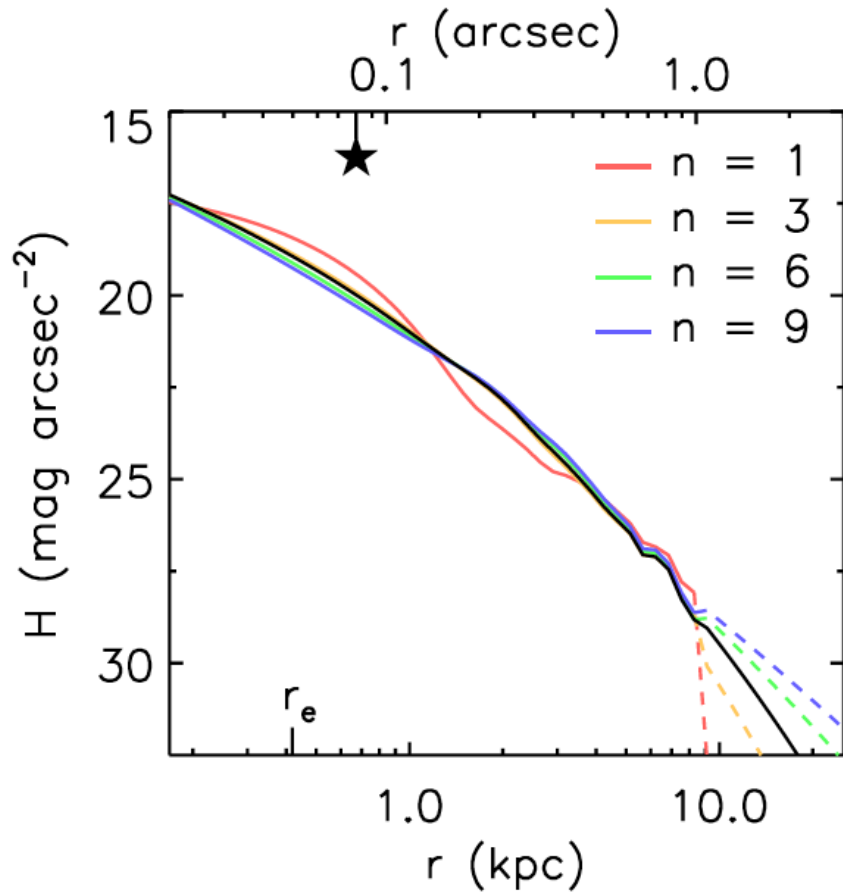
IS IT REALLY TRUE ?

Go to the UDF !

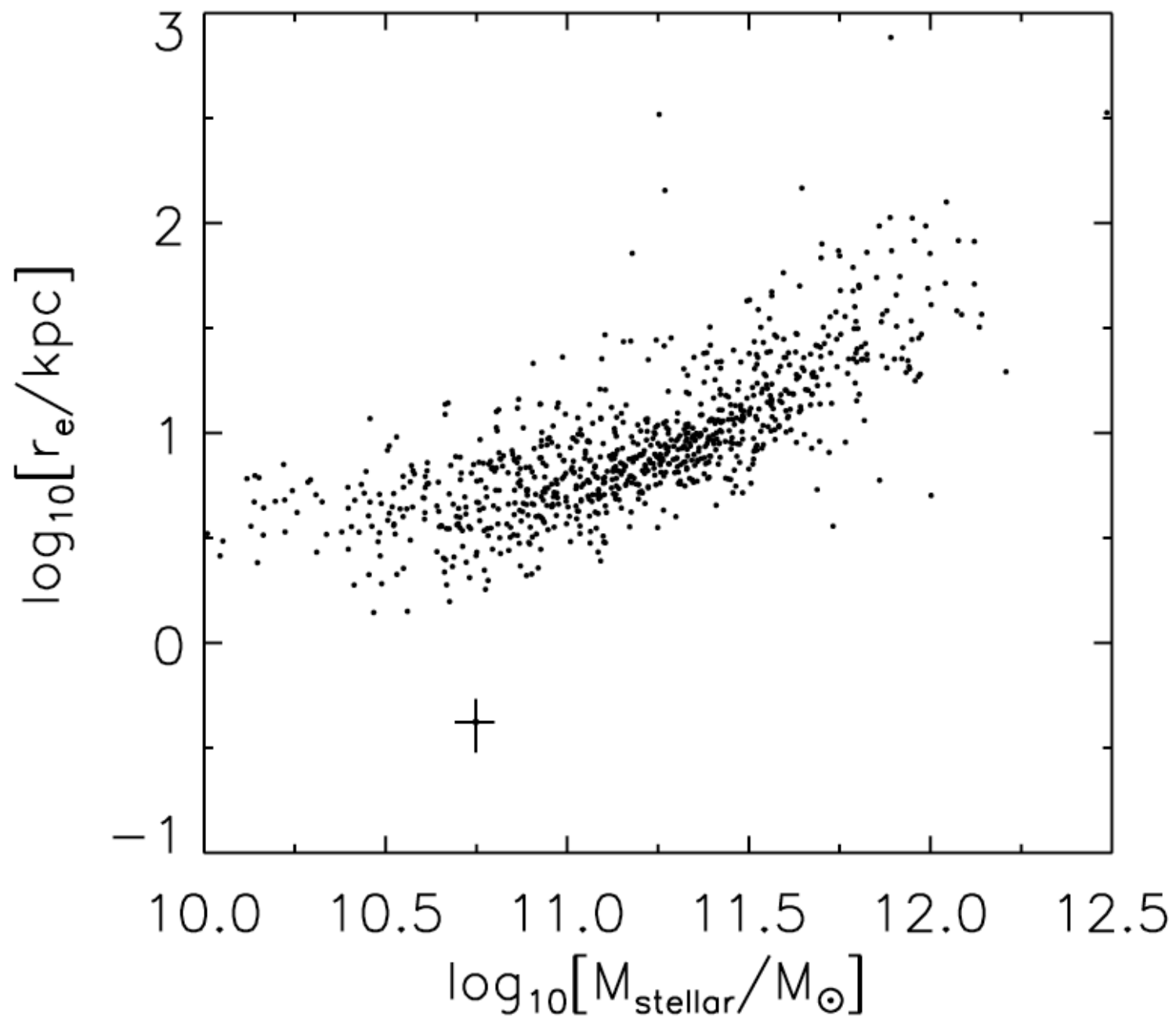


Daddi et al 2005

UDF – very deep imaging



Szomoru et al 2010

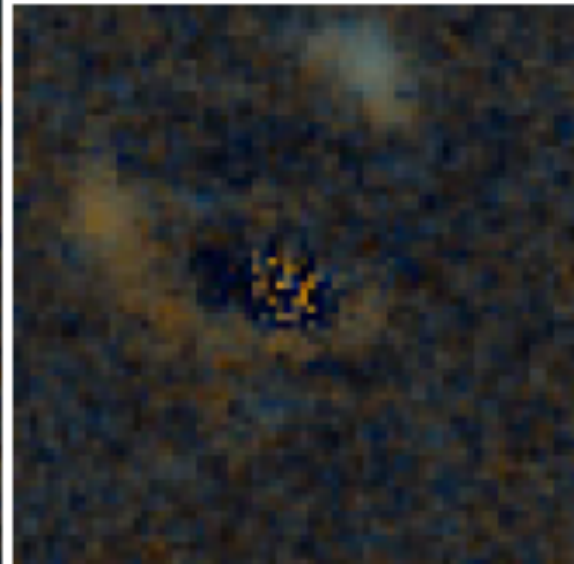
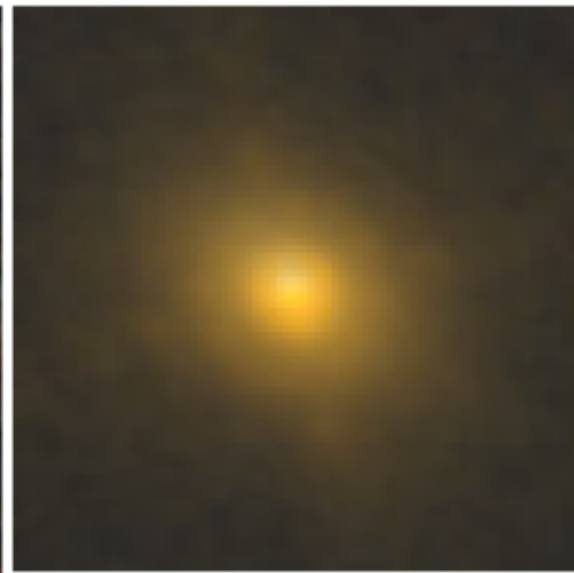
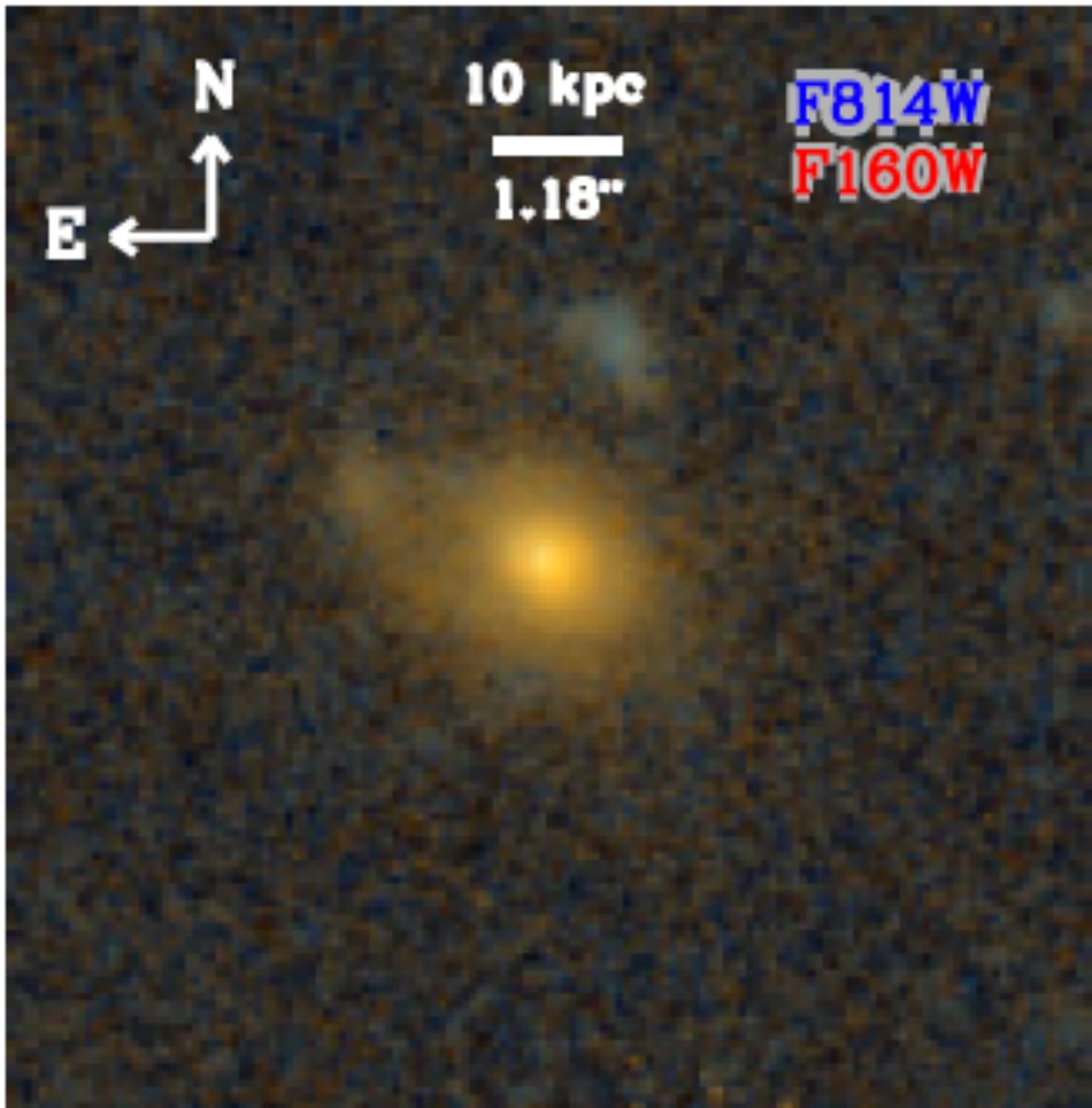


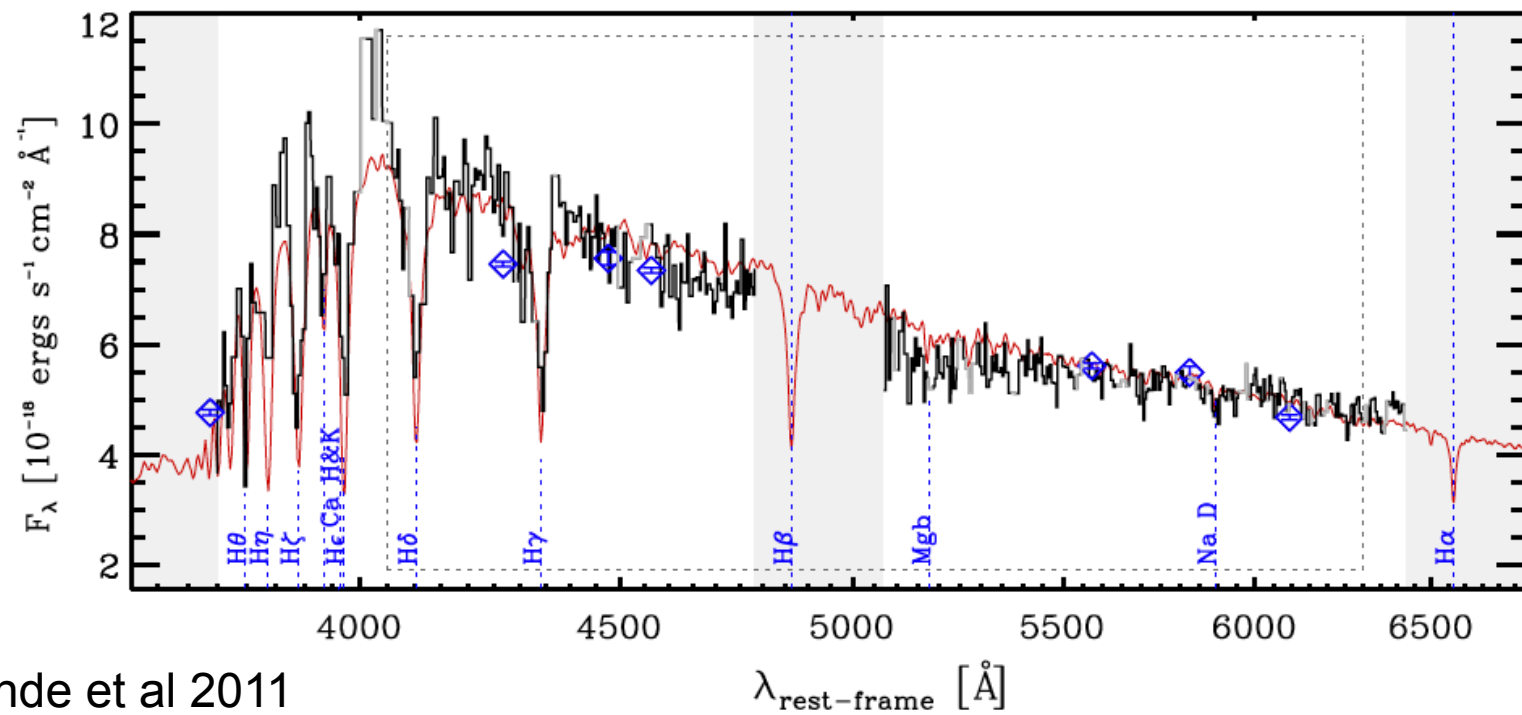
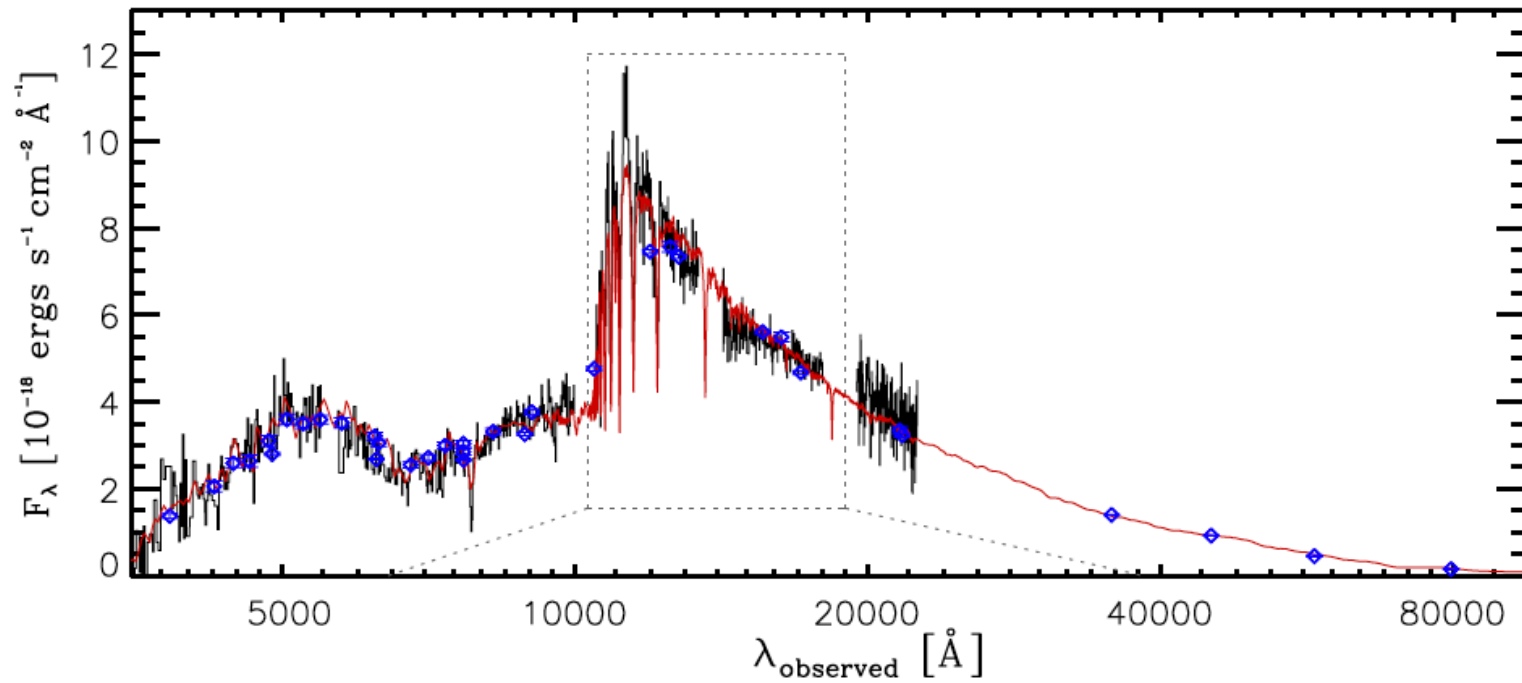
Why should we believe those masses ?

Test by measuring dynamical masses

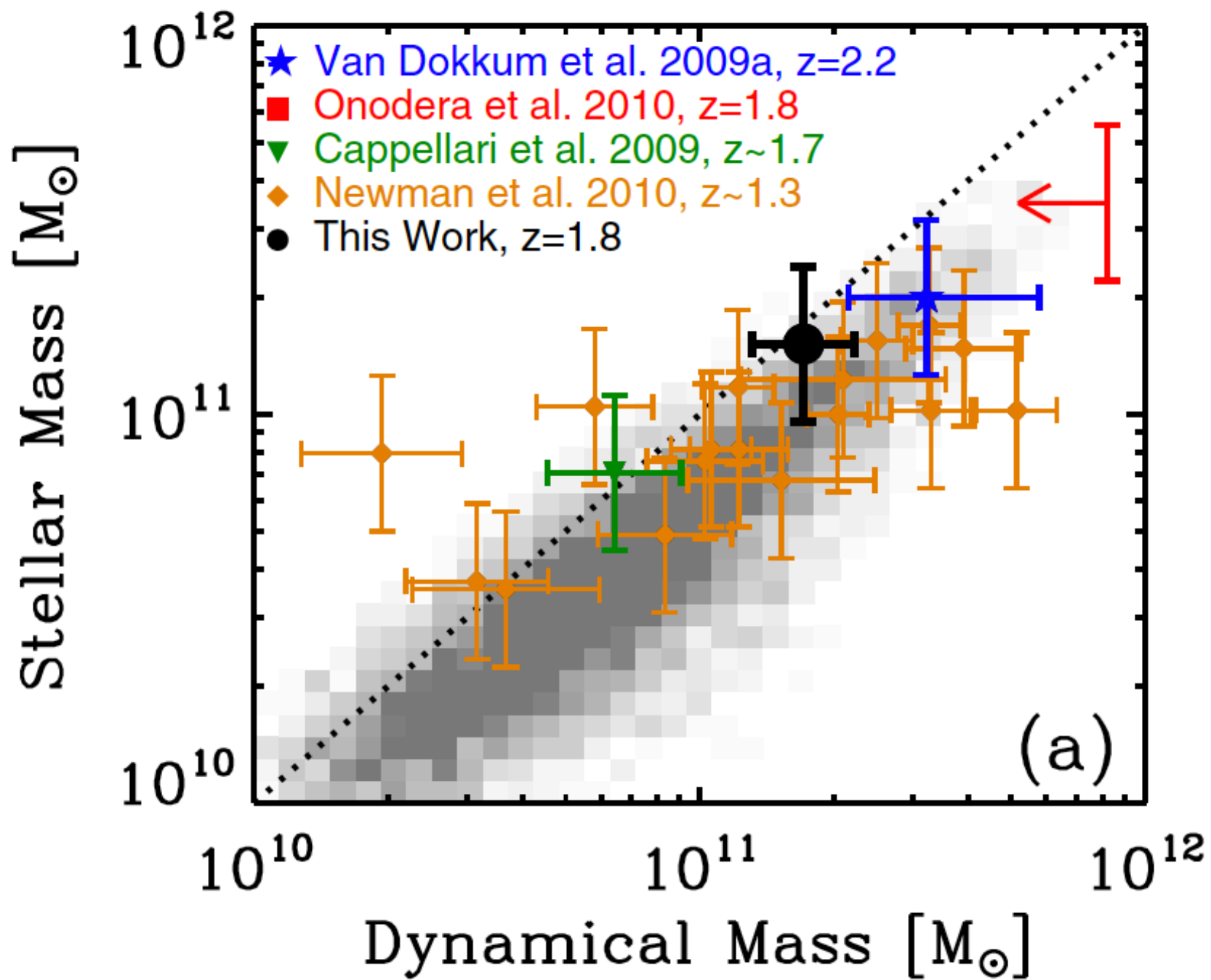
$$M_{\text{dyn}} = c R_e v^2 / G$$

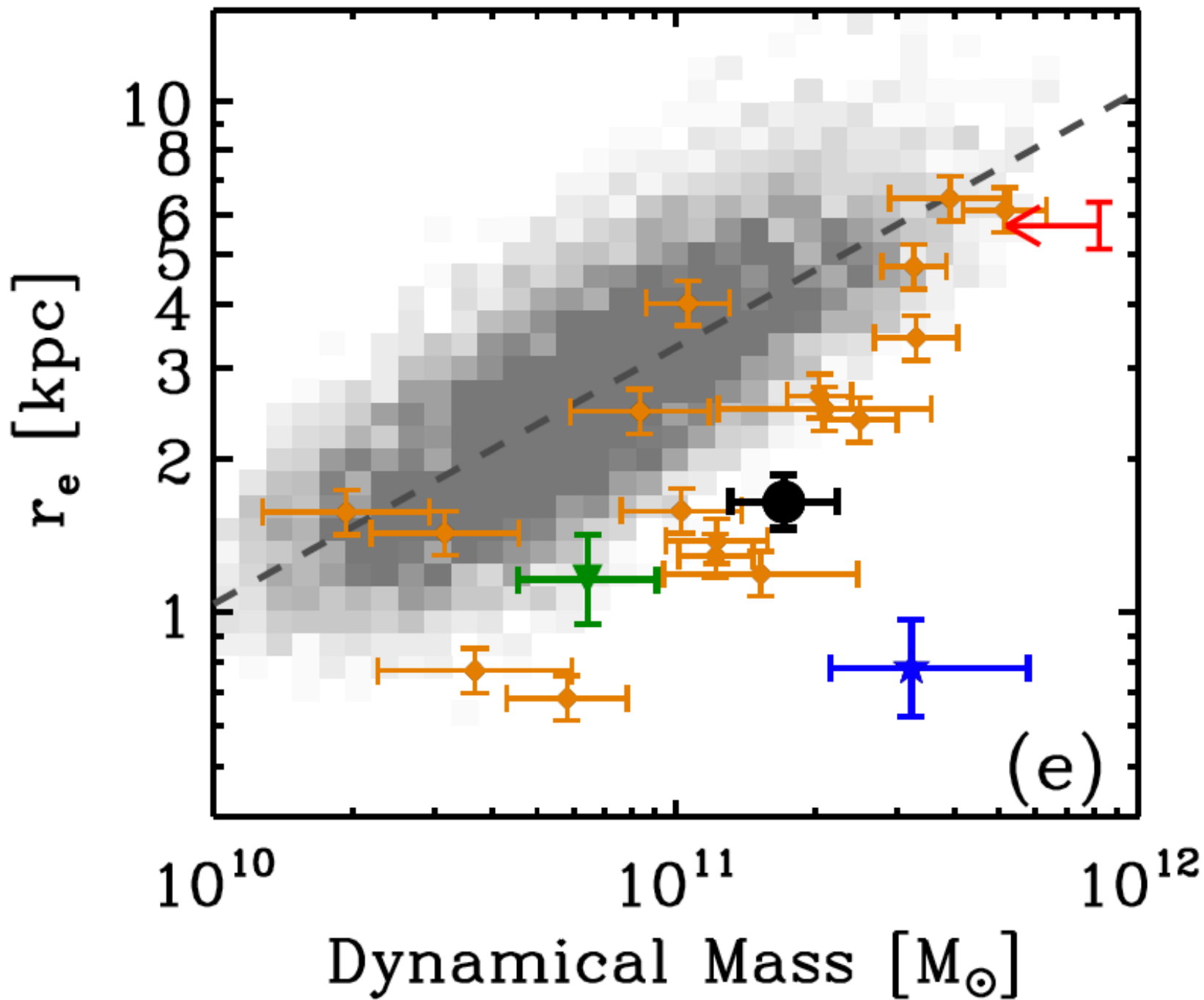
Test evolution by using M_{dyn} and by showing R_e sigma relation

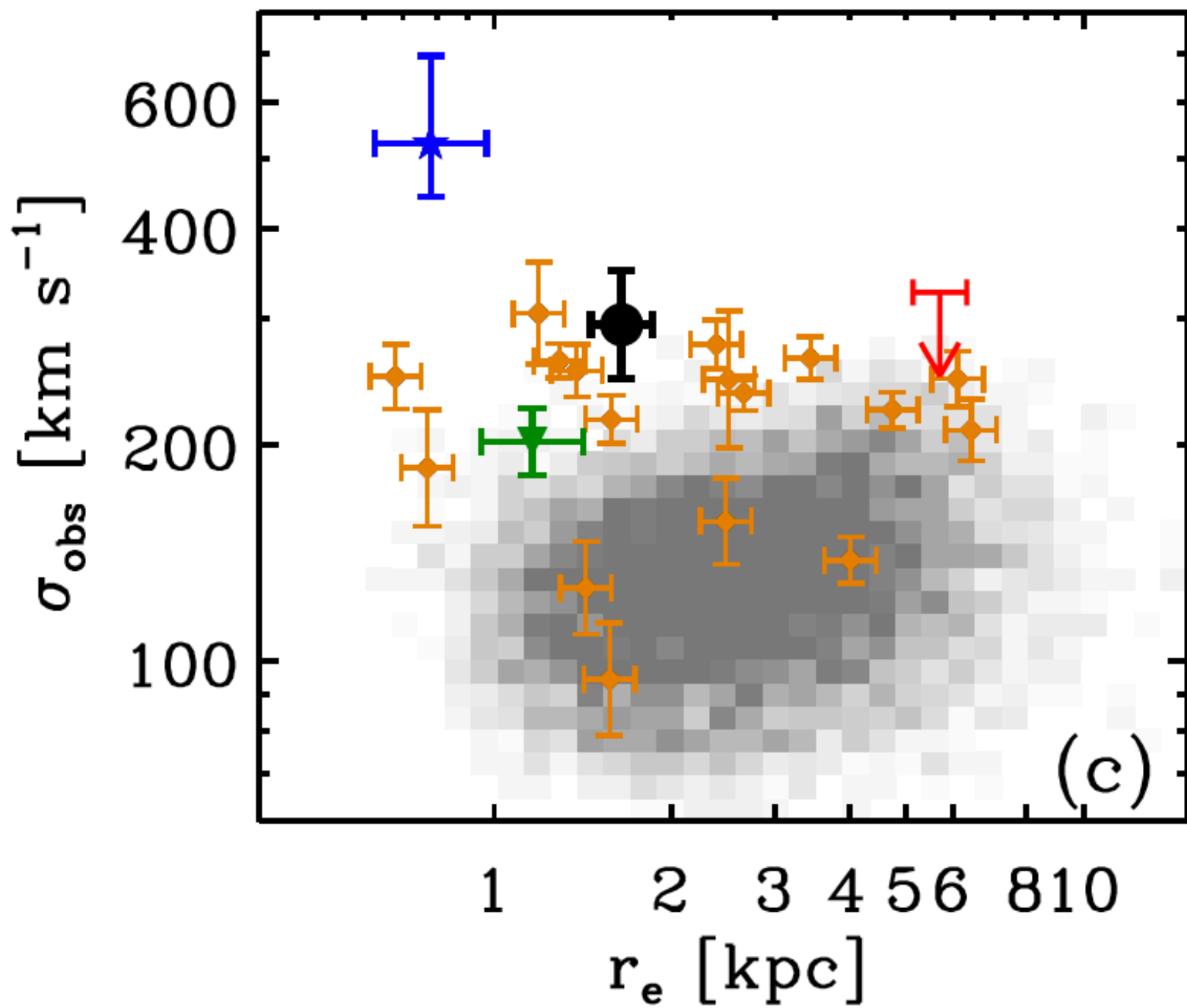




Van de Sande et al 2011

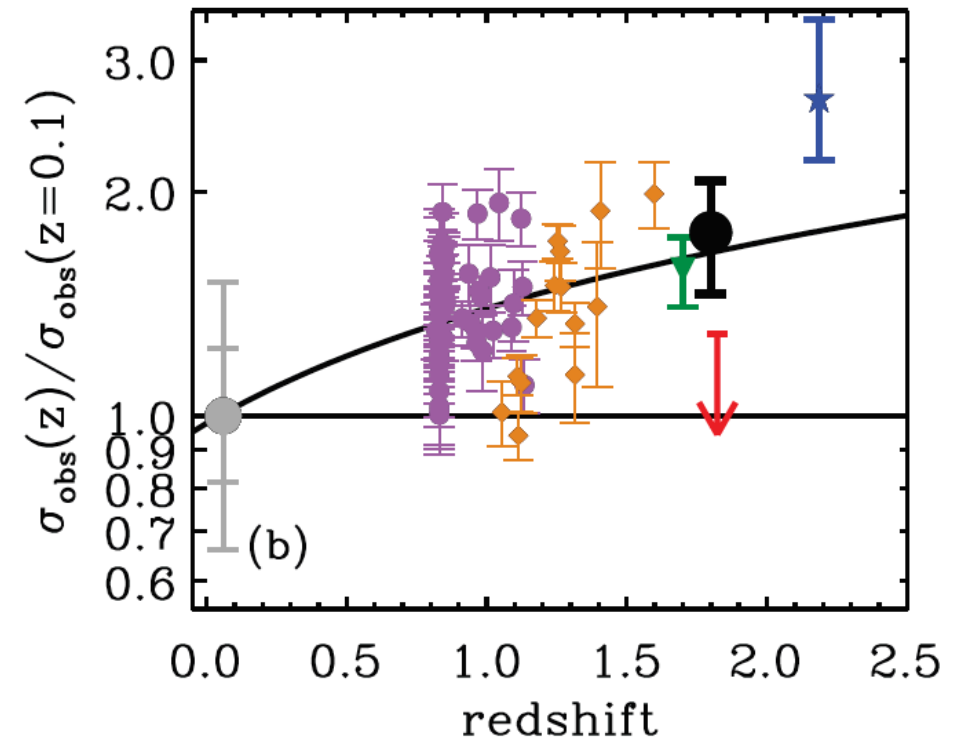
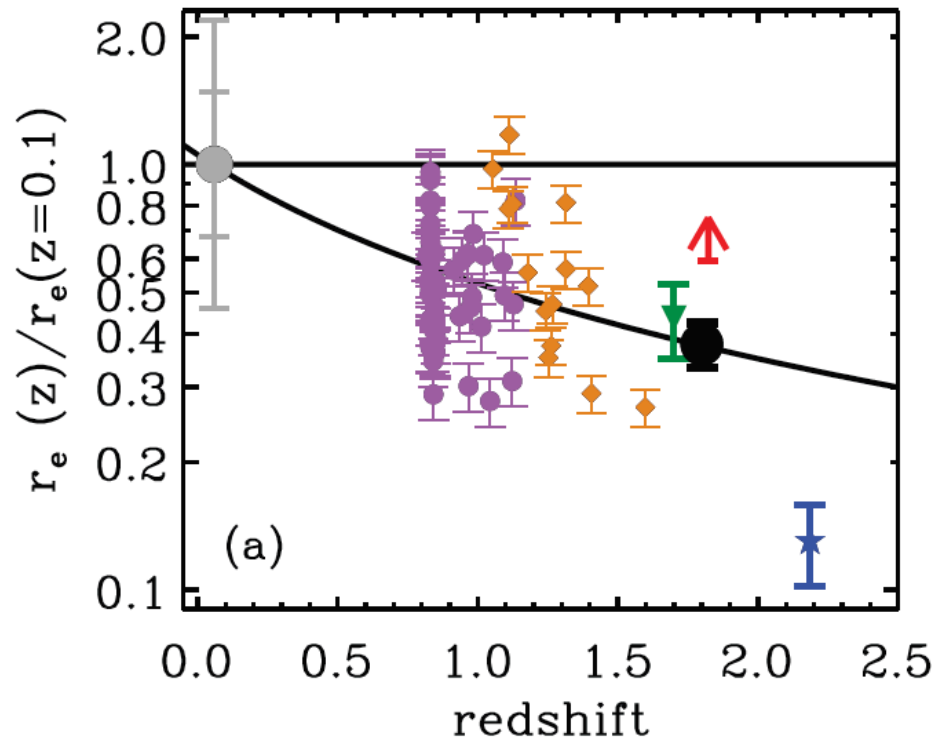


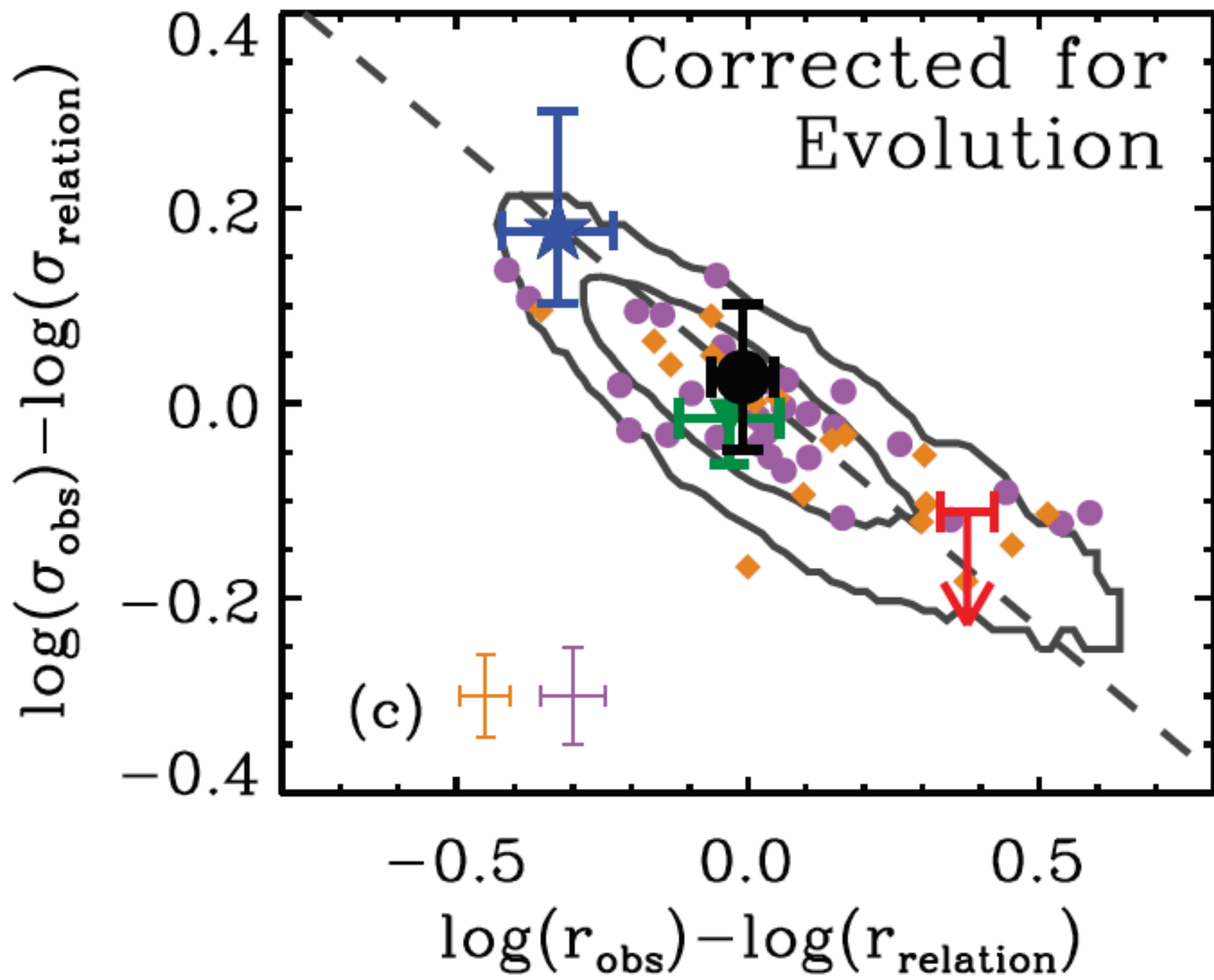




$$r=1/(1+z)$$

$$\text{sigma}=\text{sqrt}(1+z)$$





Conclusions

- Sizes go down at fixed mass
 $(1+z)^{-1}$
- Dispersions increase at fixed mass
 $(1+z)^{0.5}$
- Virial theorem works at $z=2$

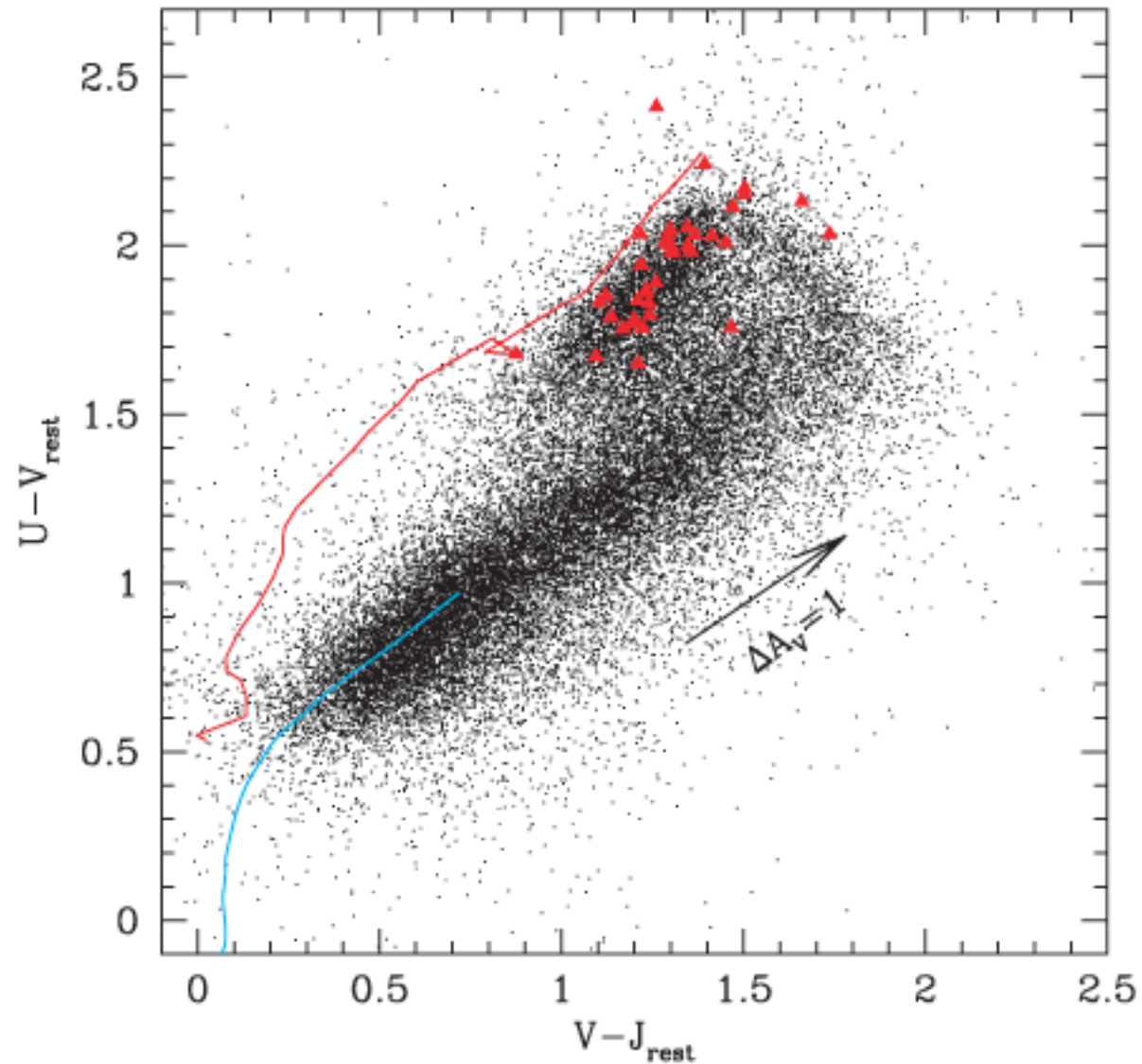
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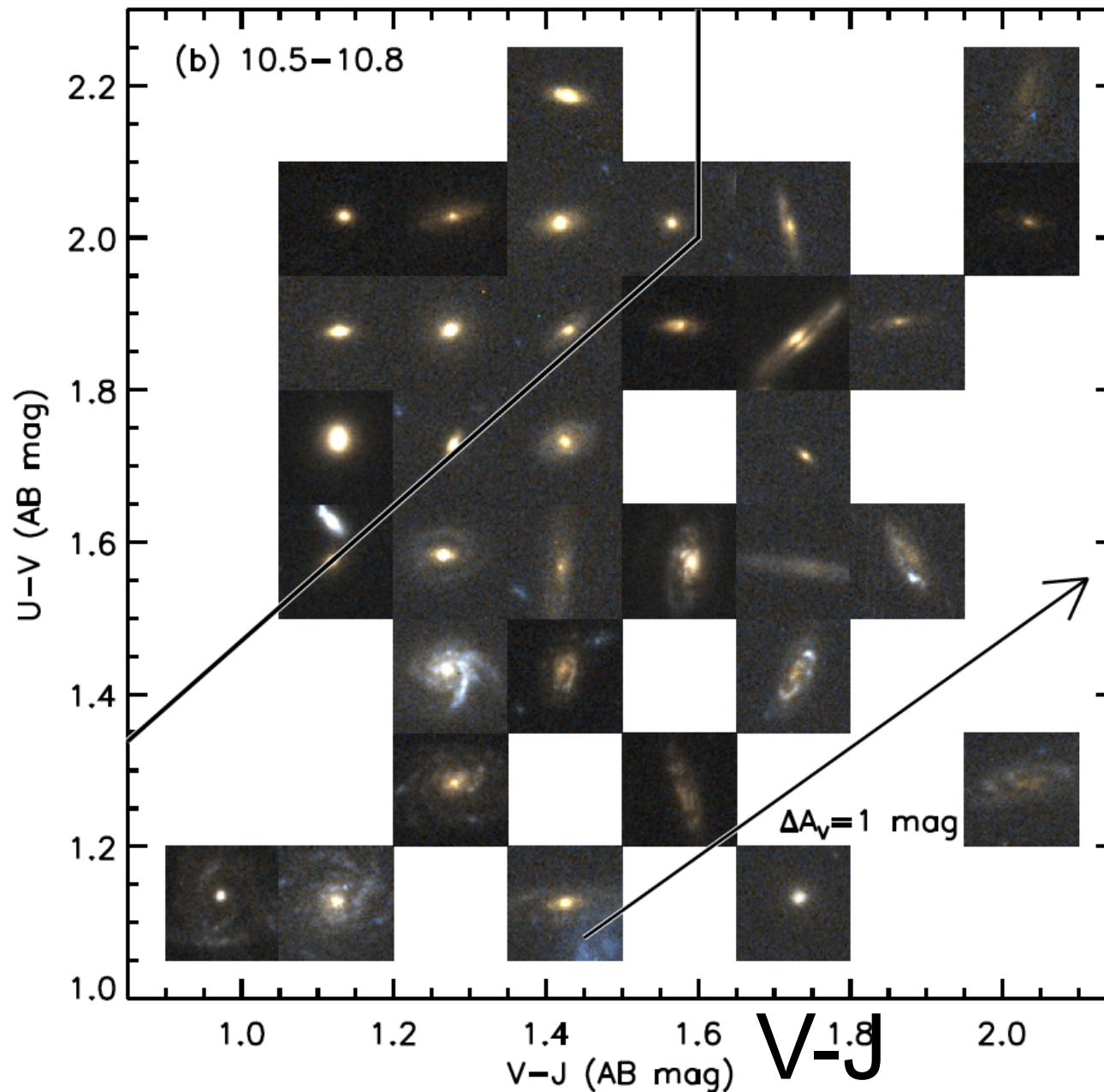
HOW MANY ARE THERE ?

Extend to $z=2$ and beyond



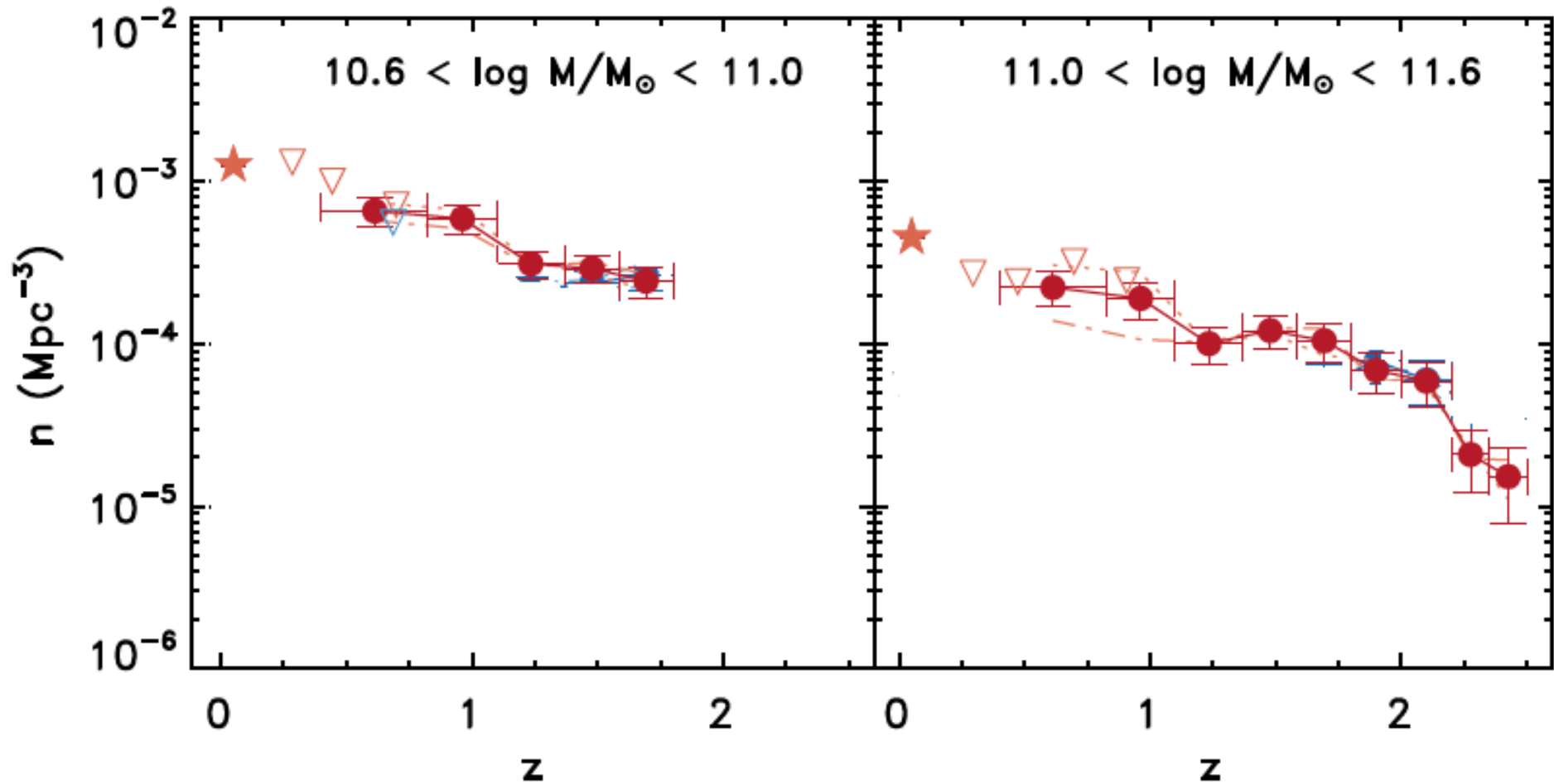
Extend to $z=2$ and beyond

U-V



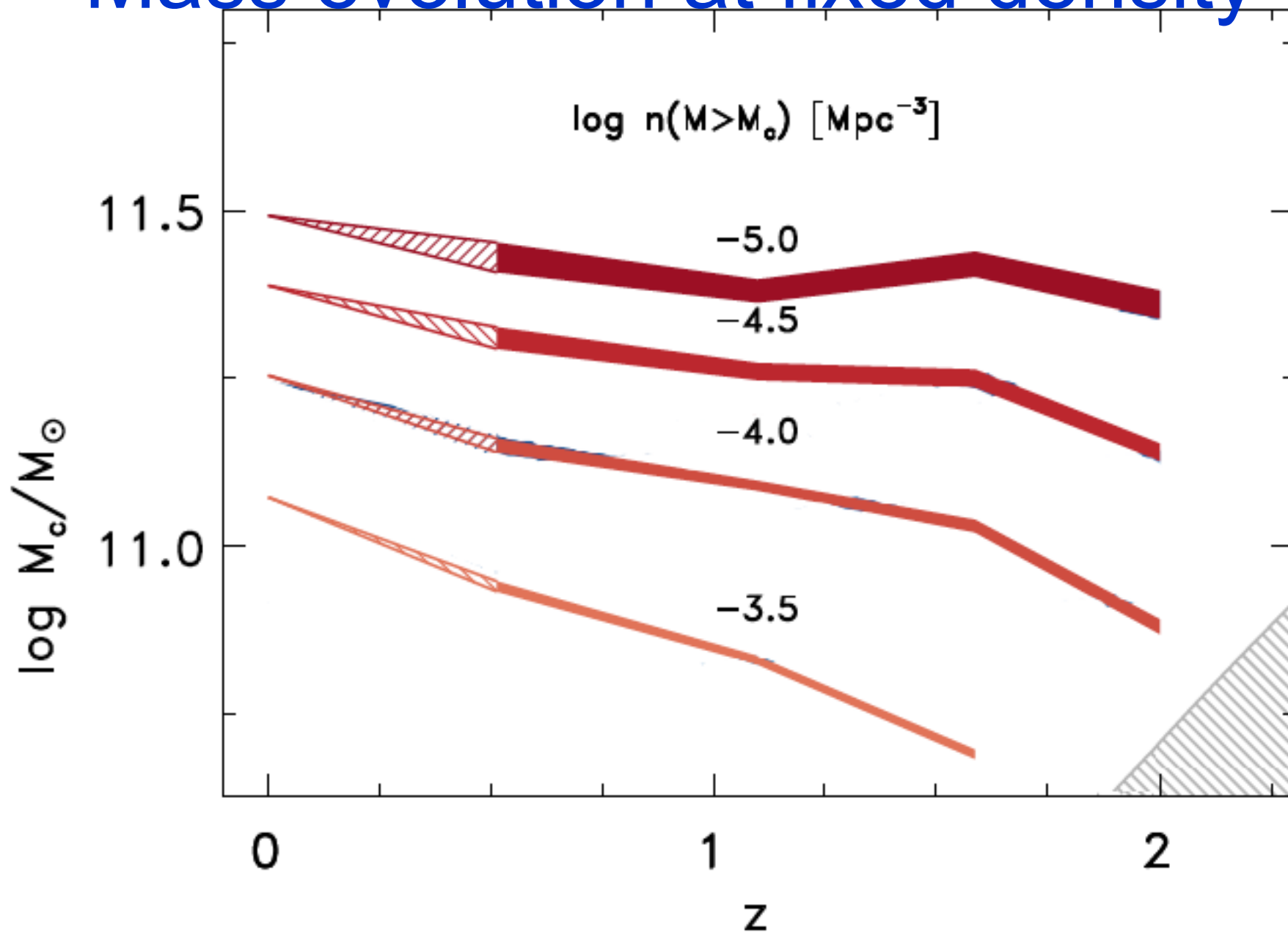
Patel et
Al 2011

Density evolution



Brammer et al 2011

Mass evolution at fixed density



Conclusions

- Density goes down $(1+z)^{-2}$
- Mass at constant density $(1+z)^{-0.8}$
- Sizes go down at fixed mass
 $(1+z)^{-1}$
- Dispersions increase at fixed mass
 $(1+z)^{0.5}$

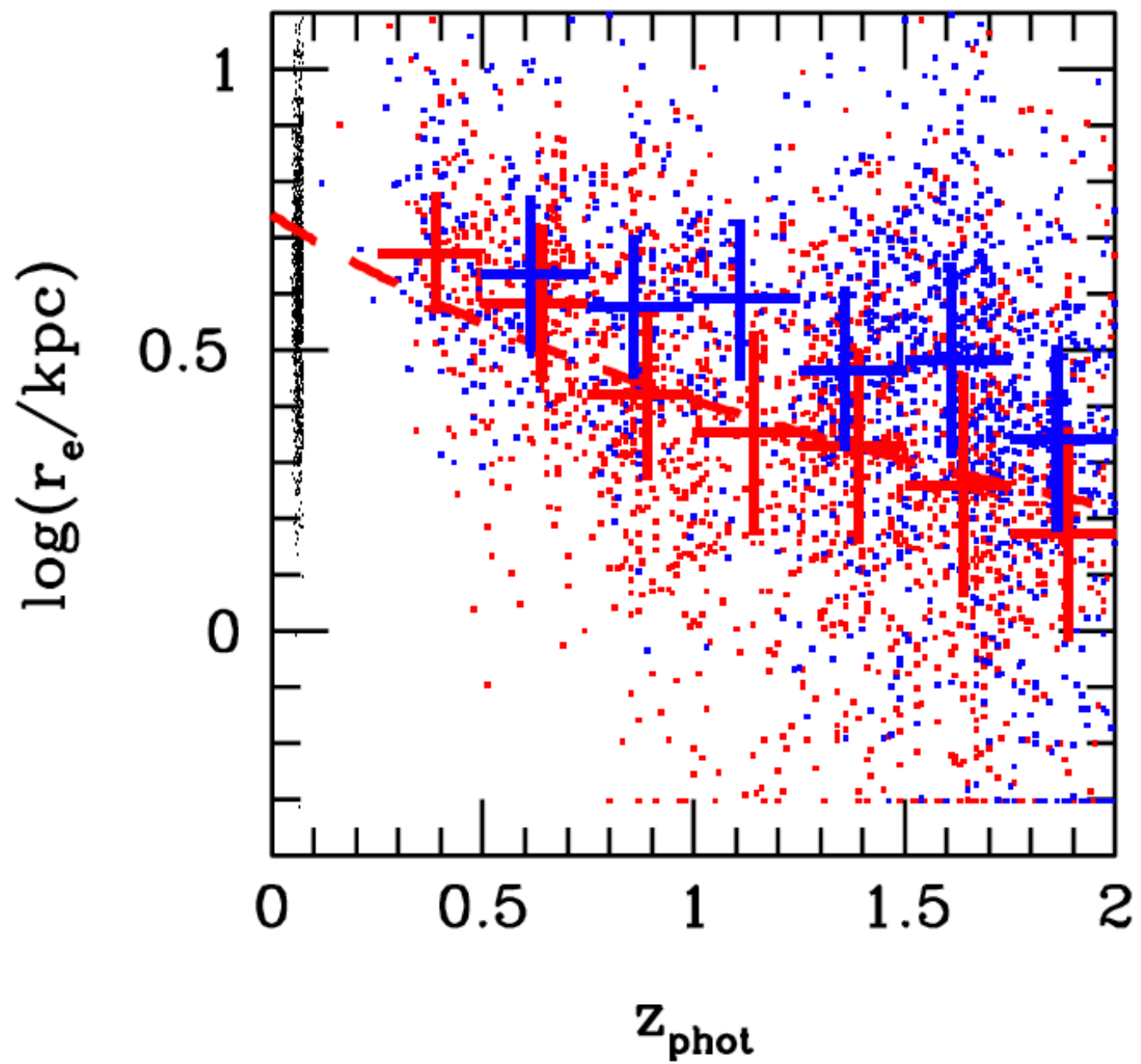
What's happening ?

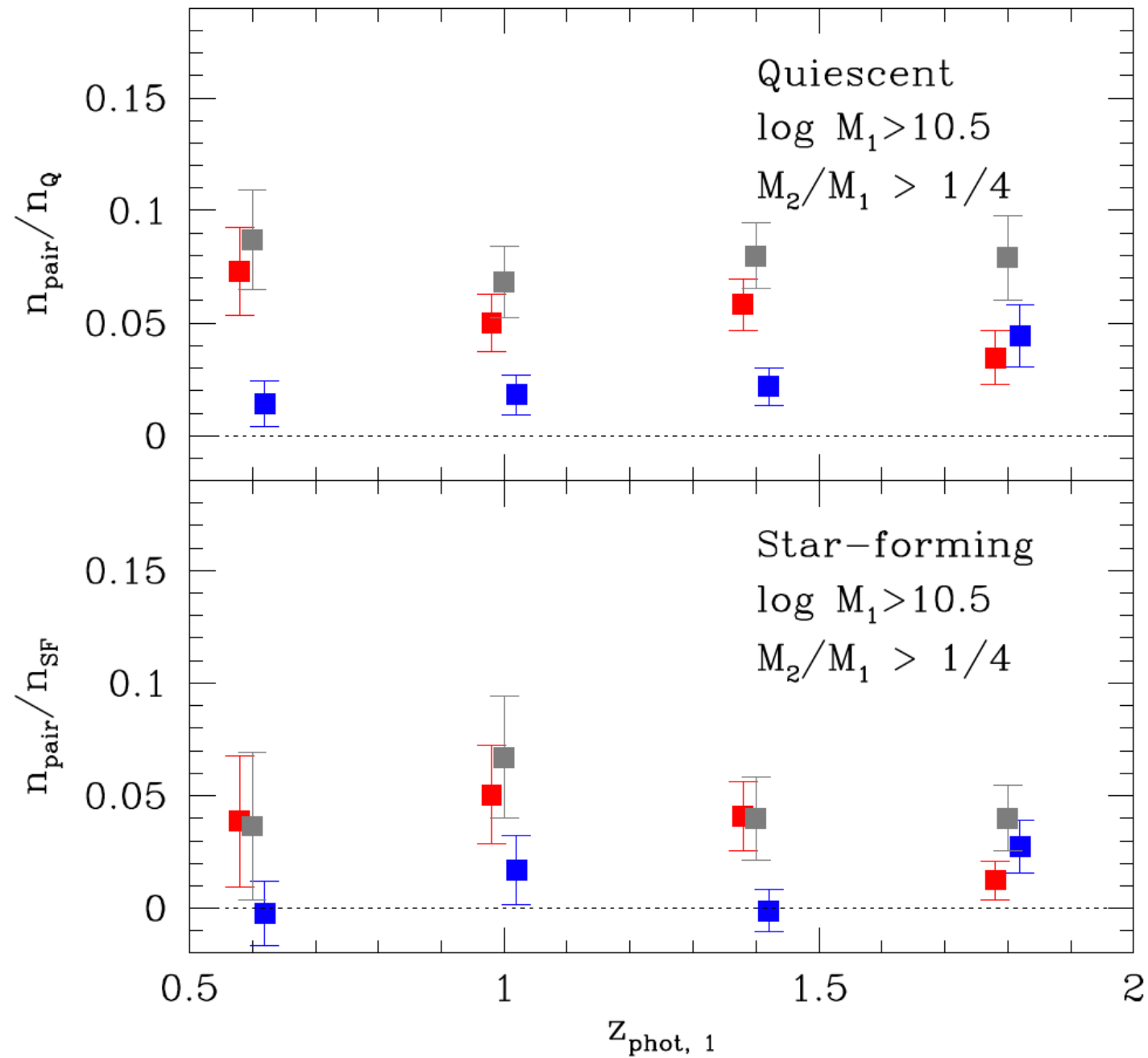
- Quiescent galaxies are growing, presumable through merging
- Star forming galaxies are quenched

What is causing galaxies to stop forming stars ?

- Can we measure merging rate ?

Williams et al. 2010





The end