

# Galaxy Star Formation in Groups/Clusters

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# Galaxy Catalog

SDSS Data Release 7

NYU value-added spectroscopic catalog

Spectroscopically derived stellar masses  
& star formation rates from MPA-JHU

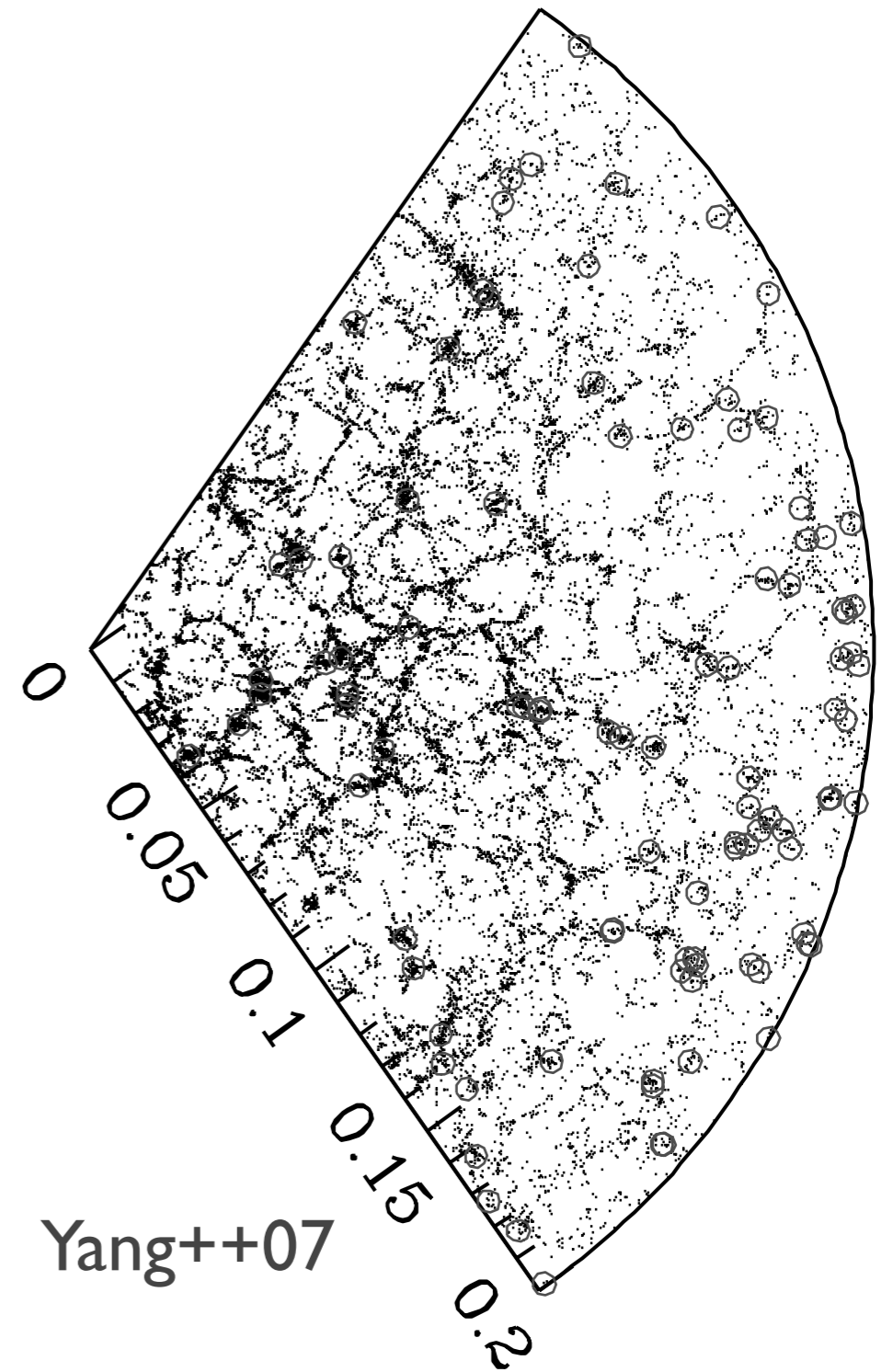
Kauffmann++03, Brinchmann++04, Salim++07

# Galaxy Group Catalog

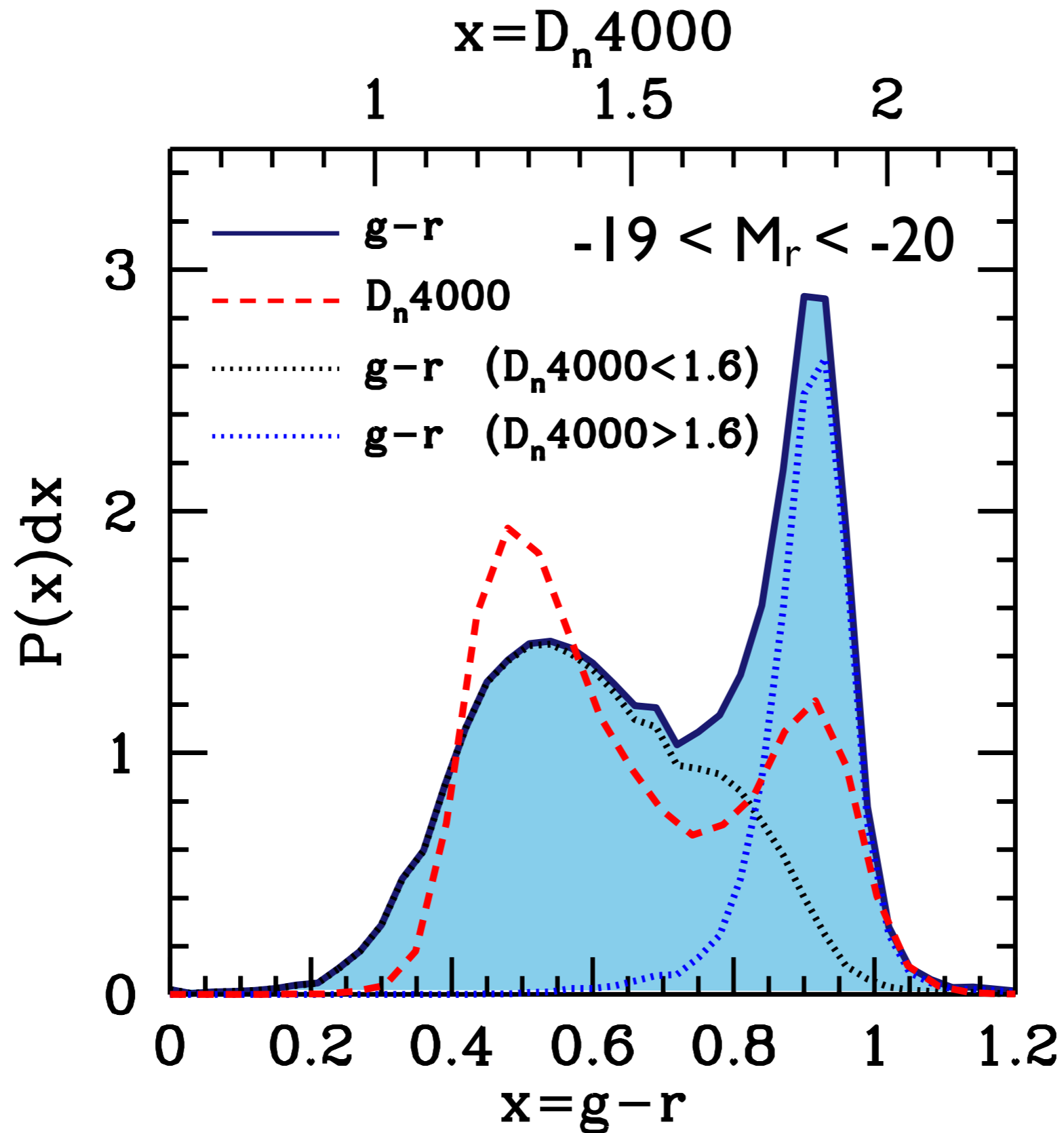
All galaxies in a 'group'

Each group has one 'central' (most massive) & possibly several  
'satellite' galaxies

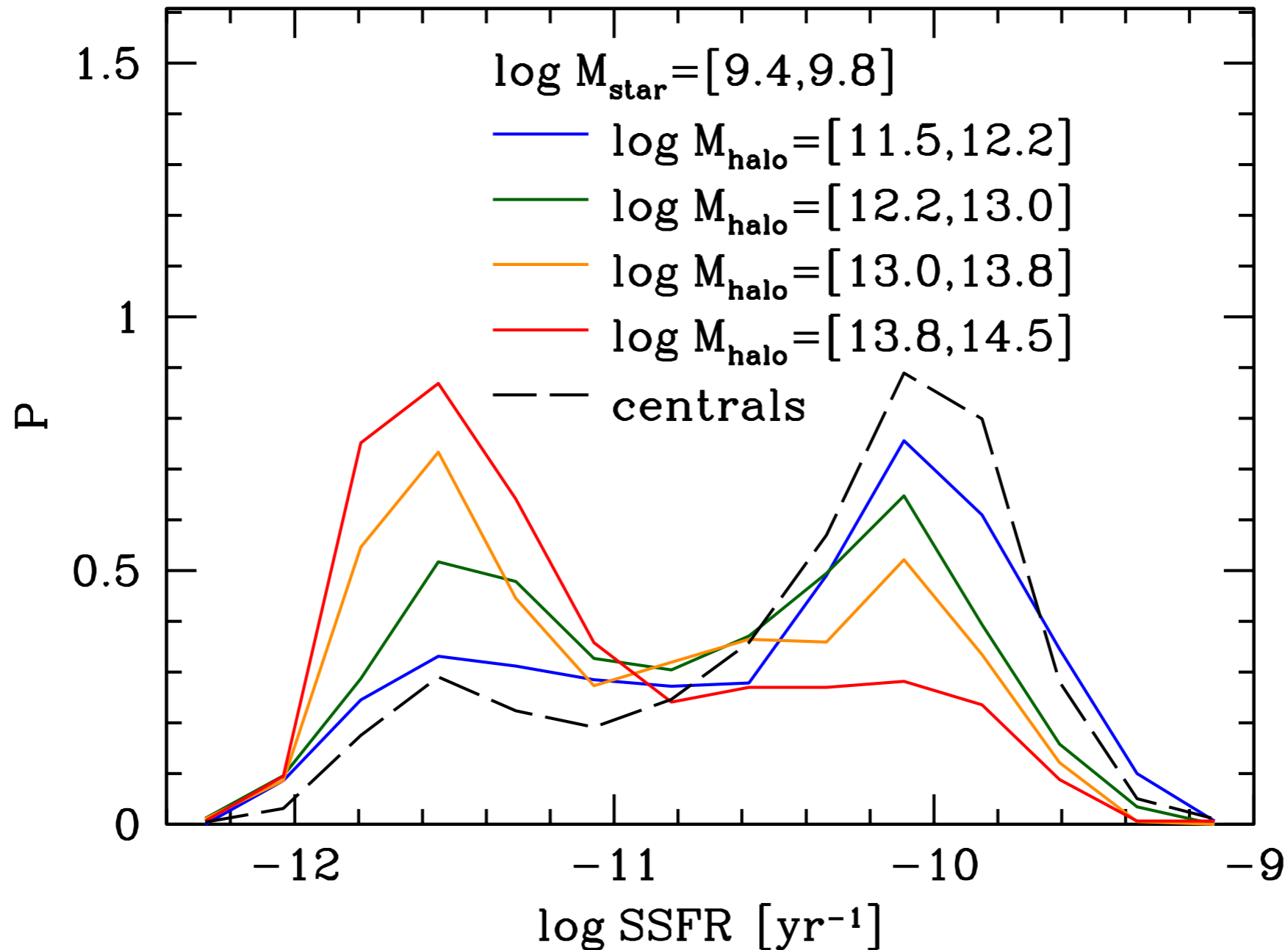
High purity & low contamination ( $\sim 15\%$ ) as calibrated against  
mock catalogs



# Danger of using galaxy color



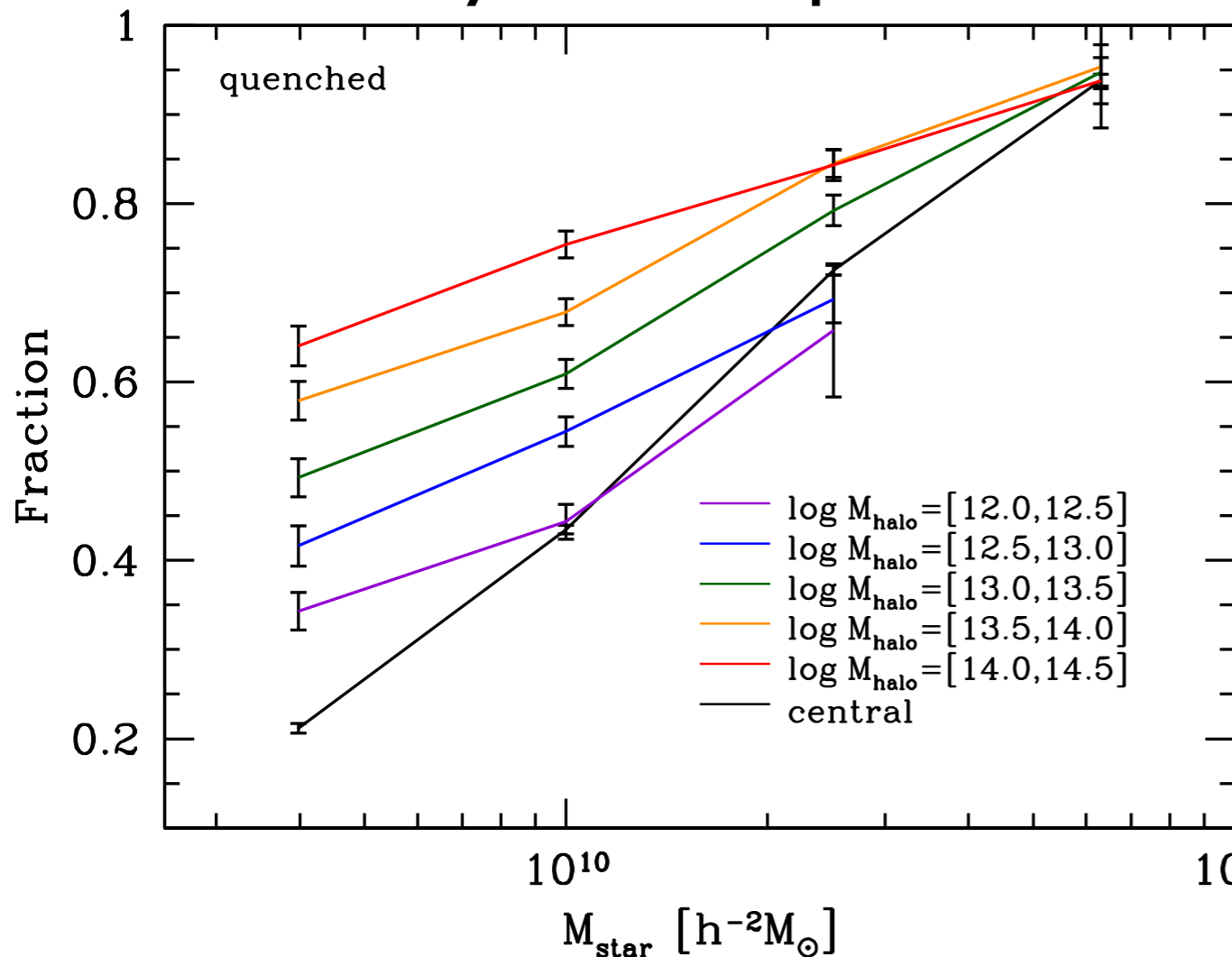
# Strong halo mass dependence to satellite star formation rate



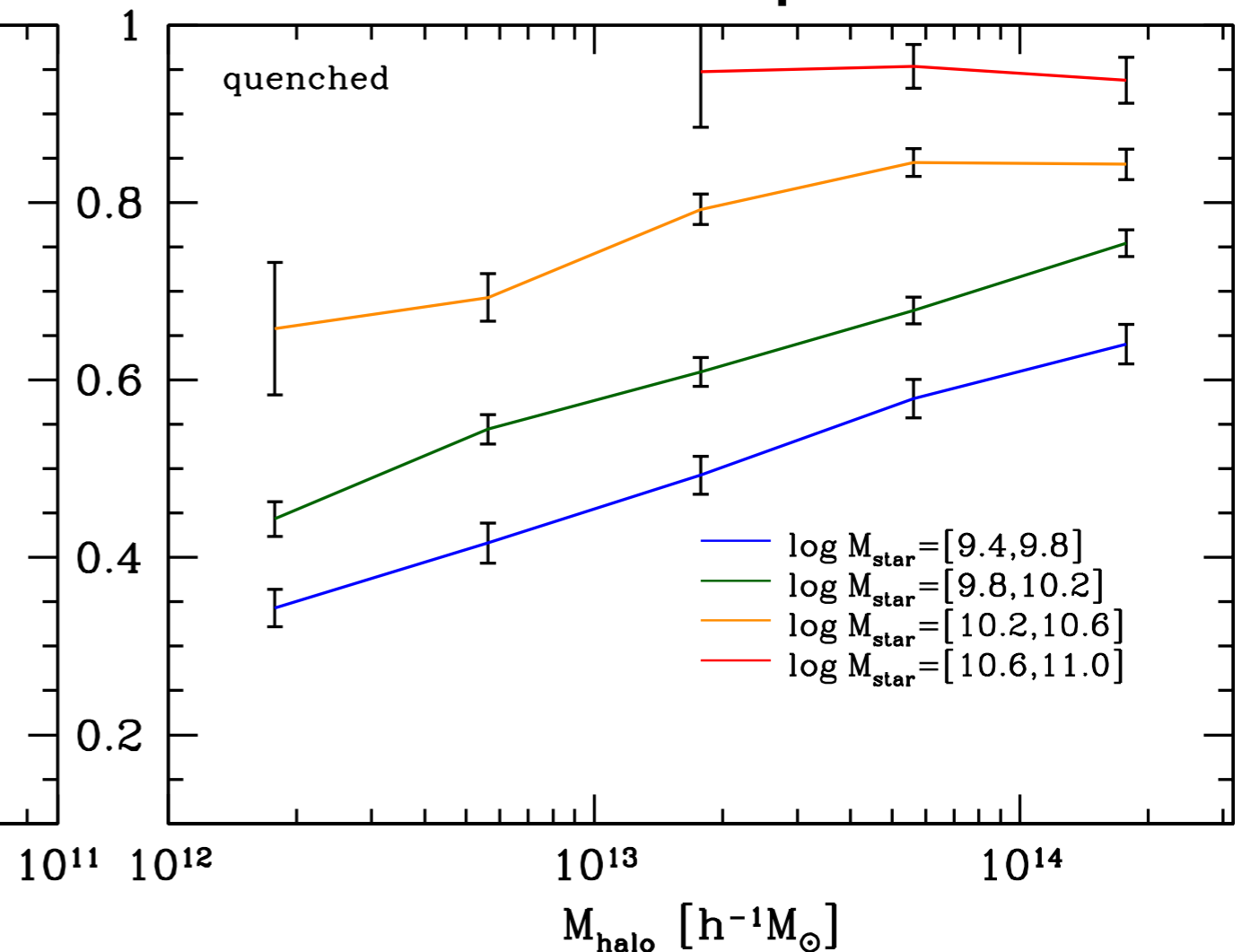
Bimodality persists at all halo masses

# Quenched fraction depends on both galaxy mass & halo mass (environment)

## Galaxy mass dependence



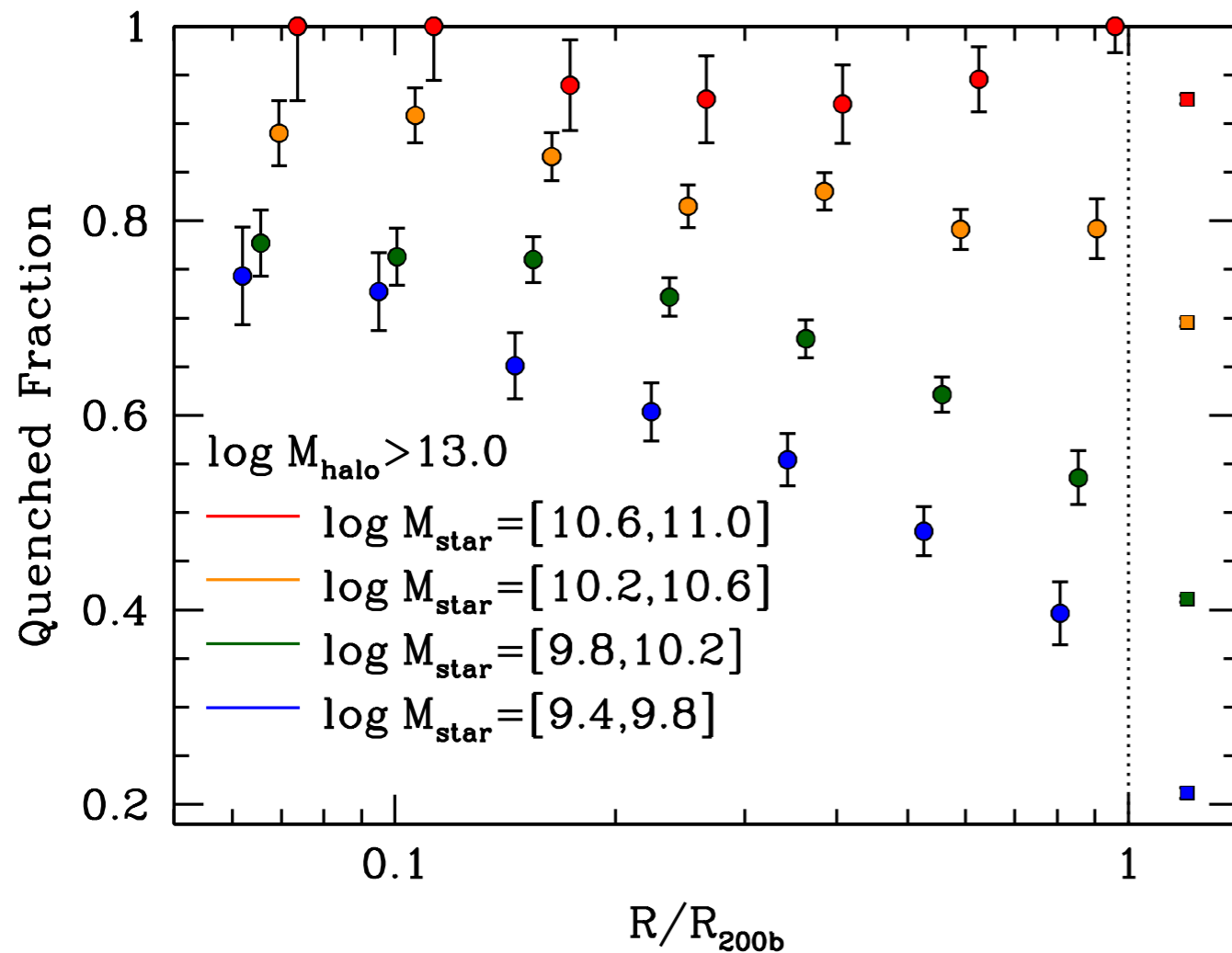
## Halo mass dependence



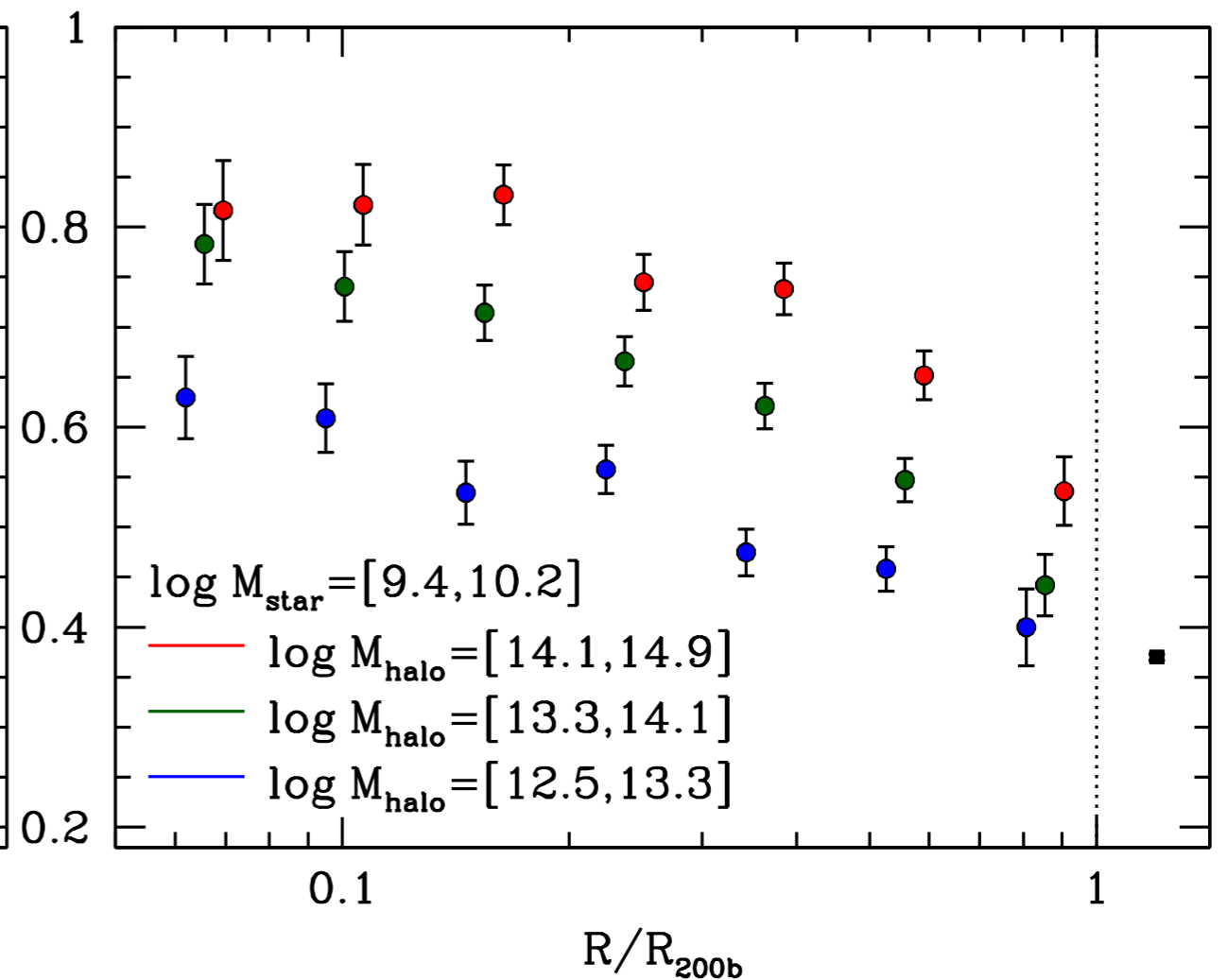
Only lower mass galaxies care about environment

# Satellite quenched fraction depends on radius in halo

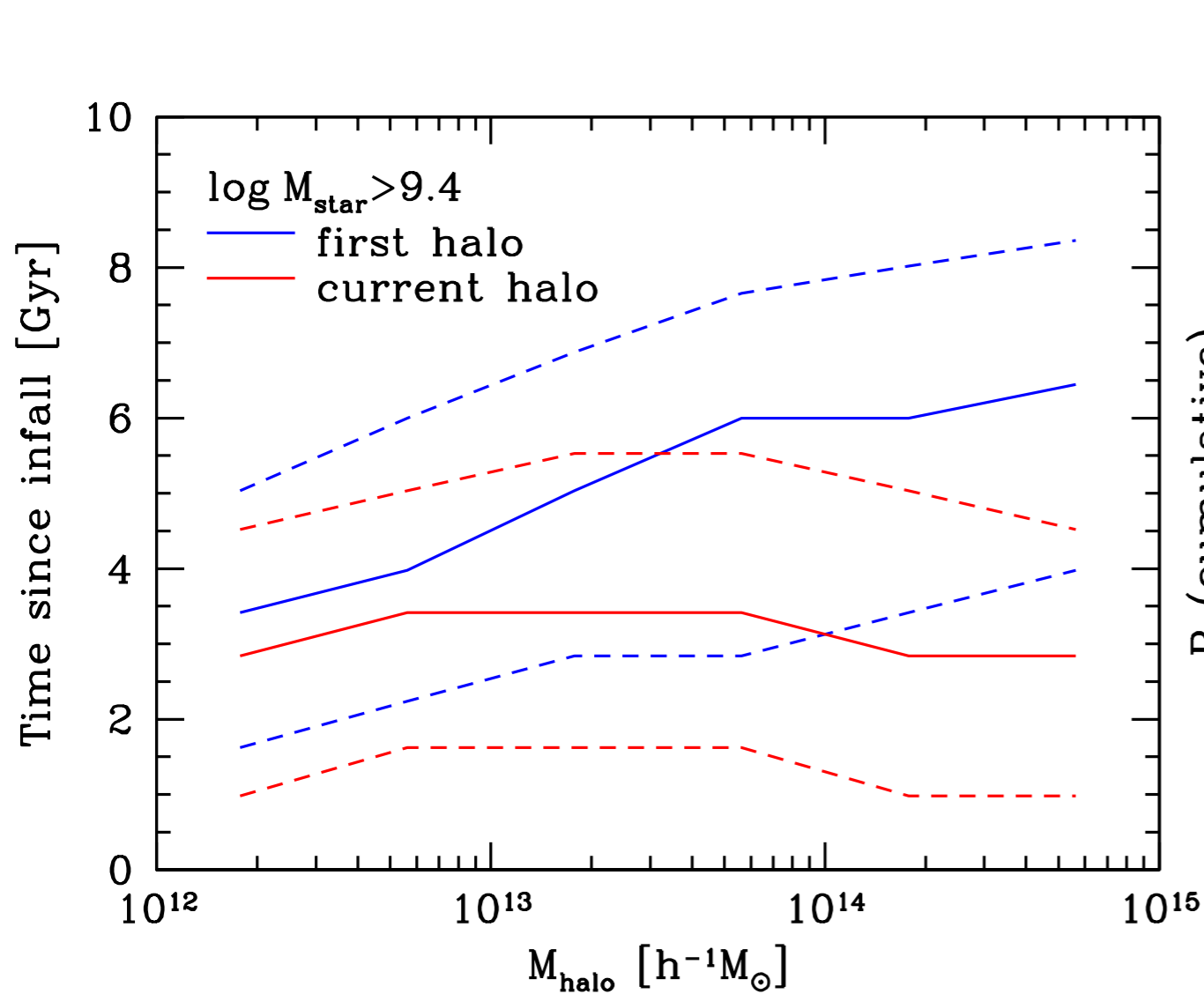
## Galaxy mass dependence



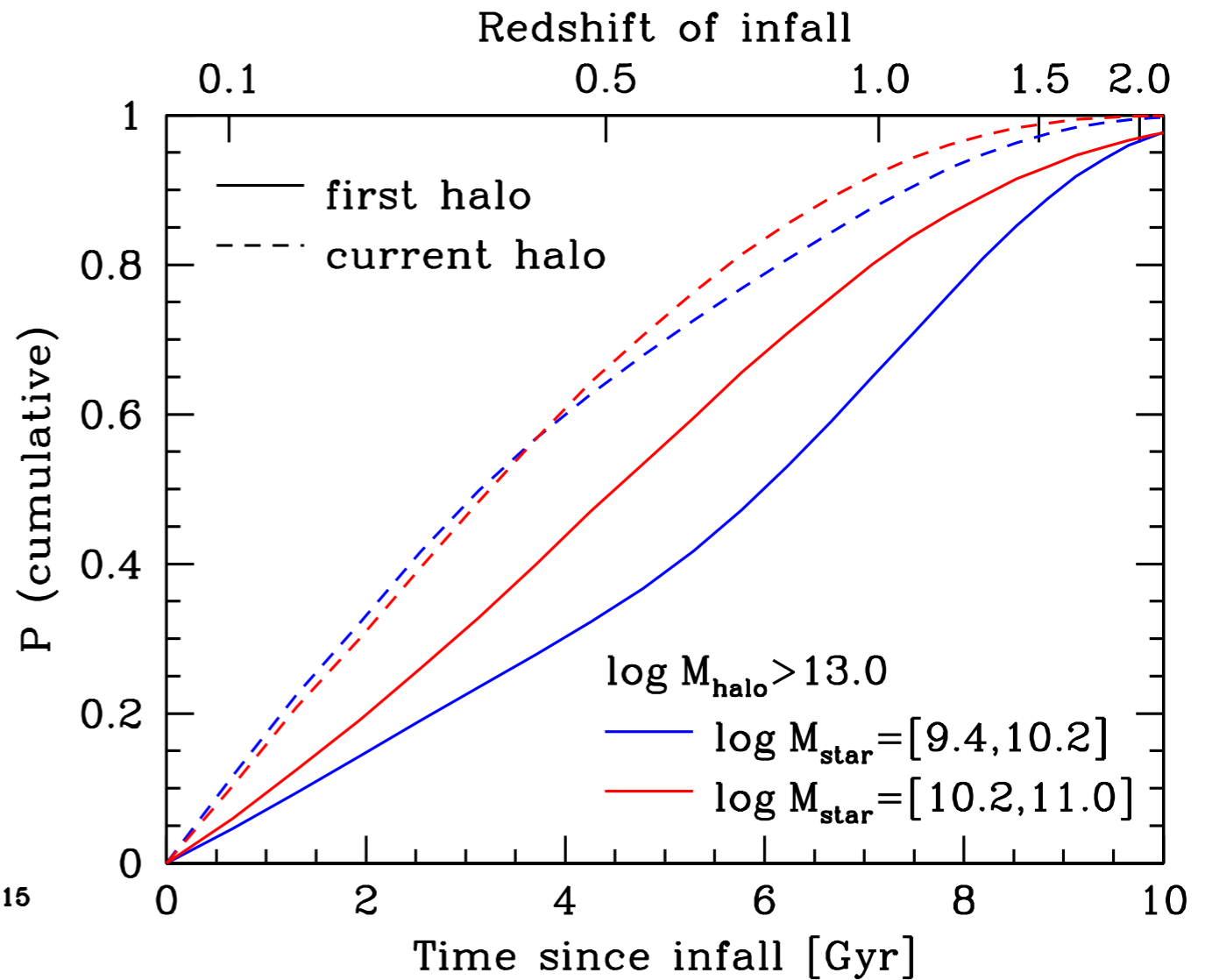
## Halo mass dependence



# Satellite Infall Time Distributions

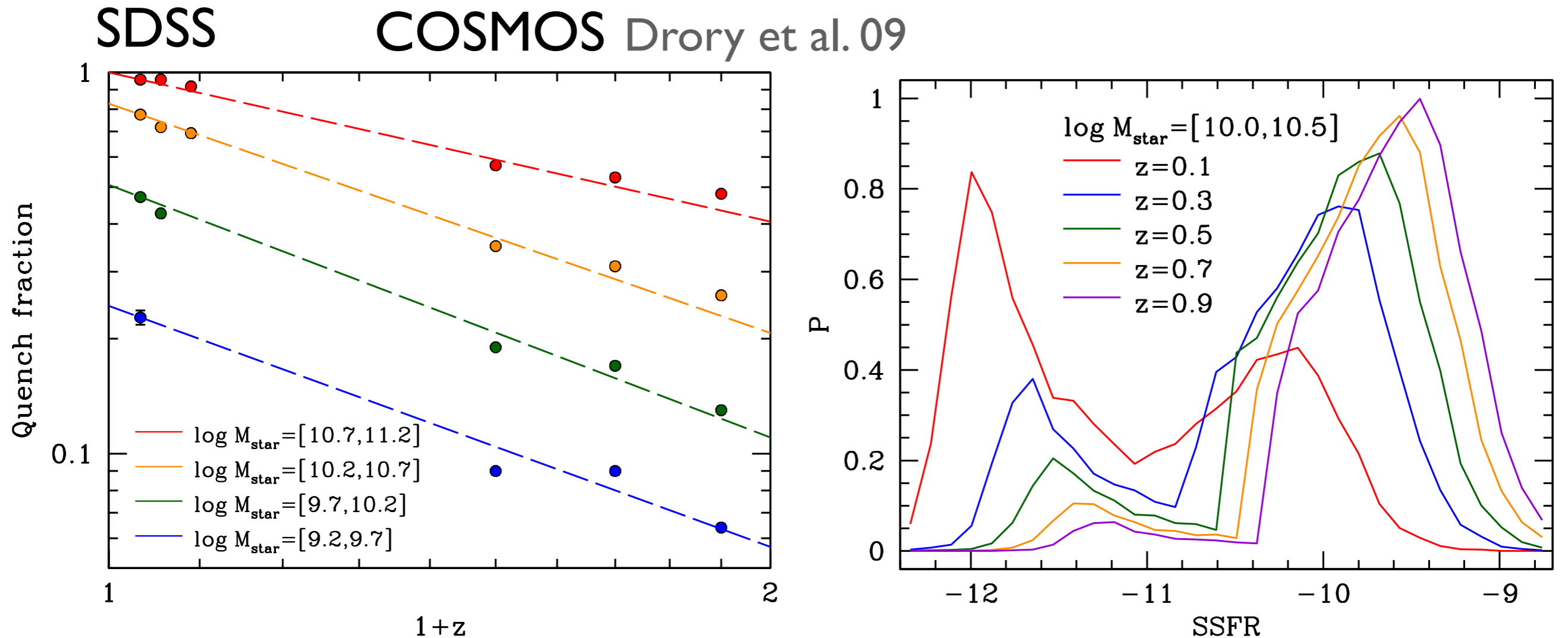


Importance of group  
pre-processing



Median infall redshift is  $z \sim 0.5$

# Evolution of central SFR distribution



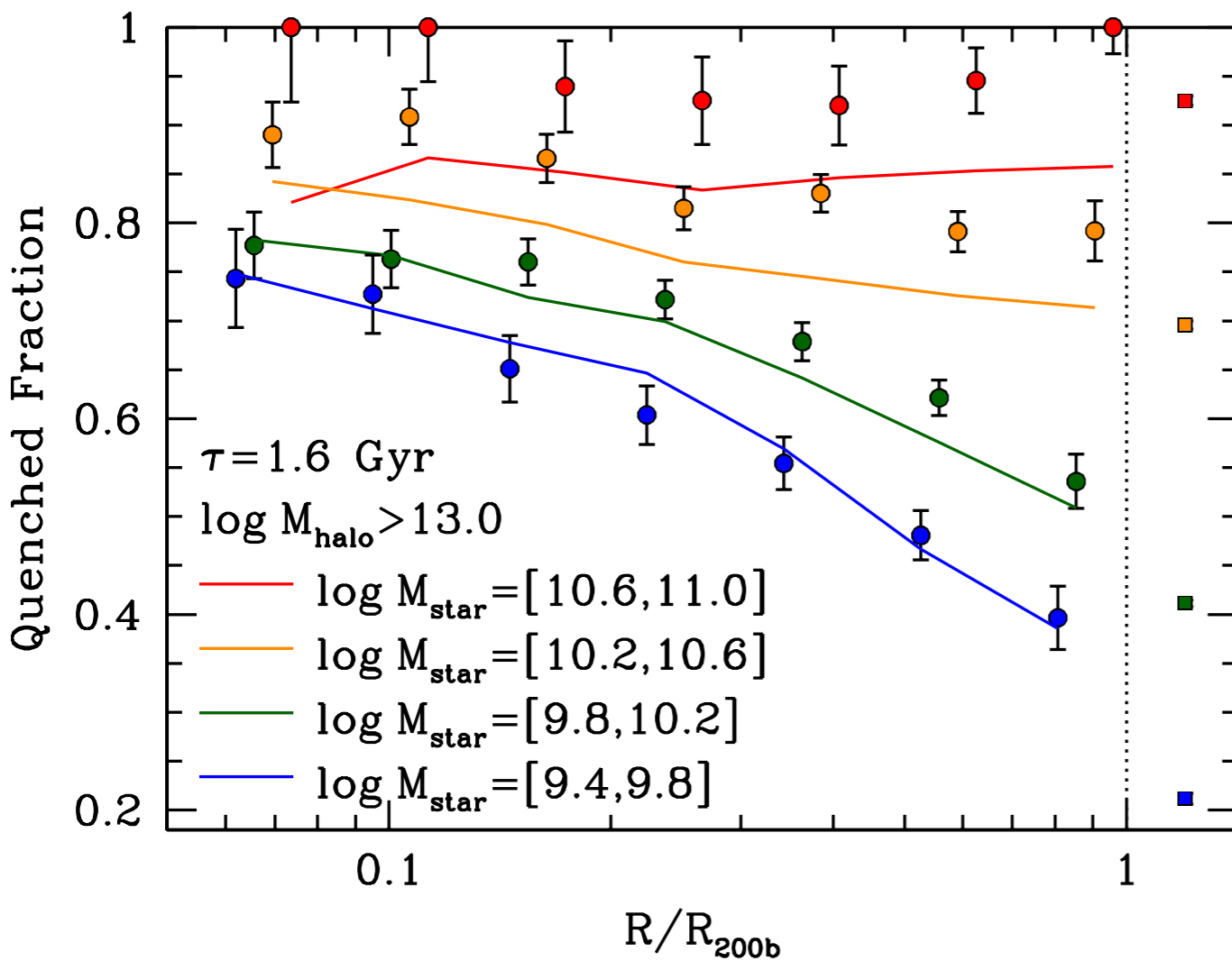
SSFR distribution width remain unchanged  
Median SSFR shifted via SPS evolution model  
(in agreement with DEEP2 - Noeske et al. 07)



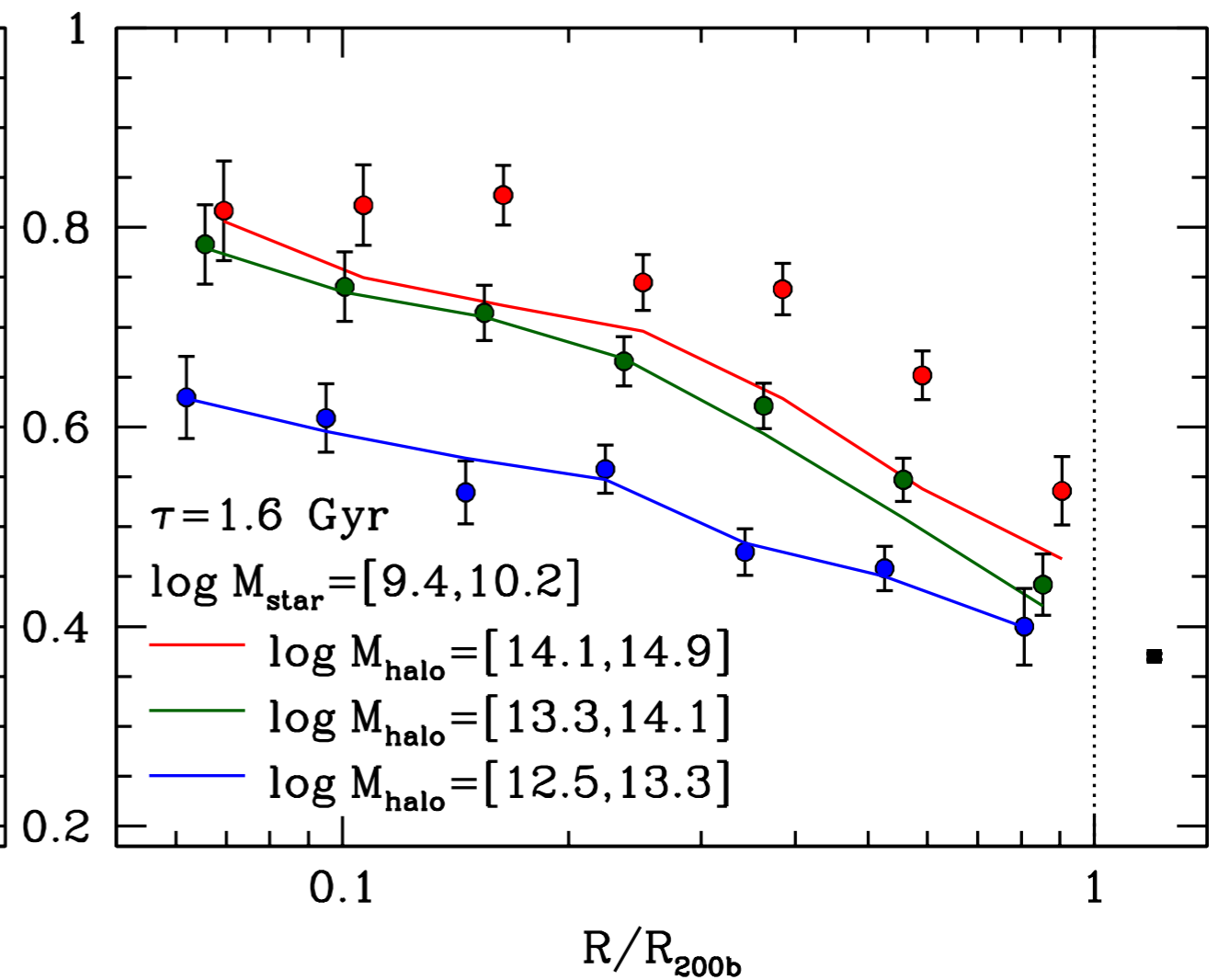
# Slow-fade Model (strangulation)

$$\text{SFR}(t) = \text{SFR}_{\text{inf}} \exp[-(t-t_{\text{inf}})/\tau]$$

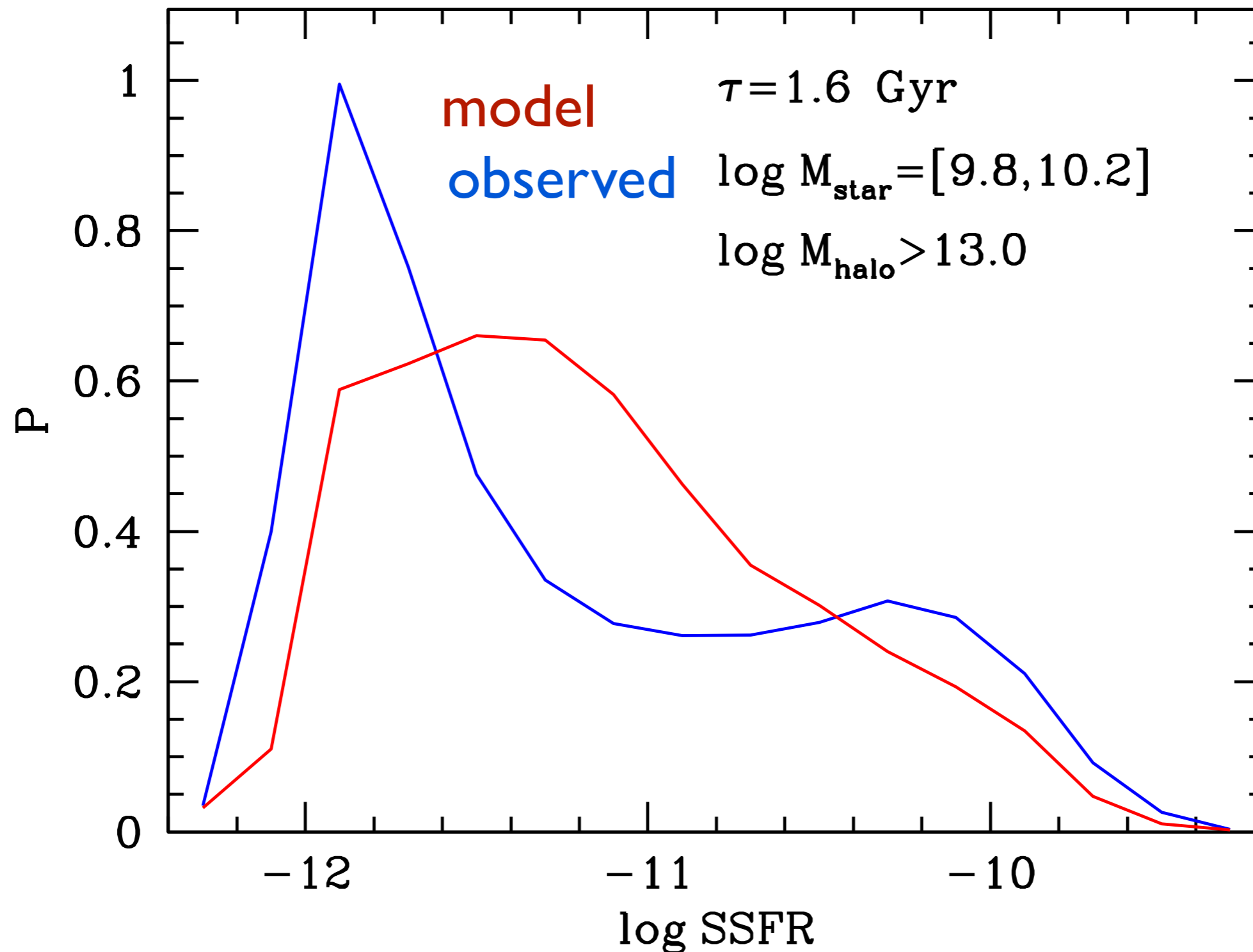
## Galaxy mass dependence



## Halo mass dependence



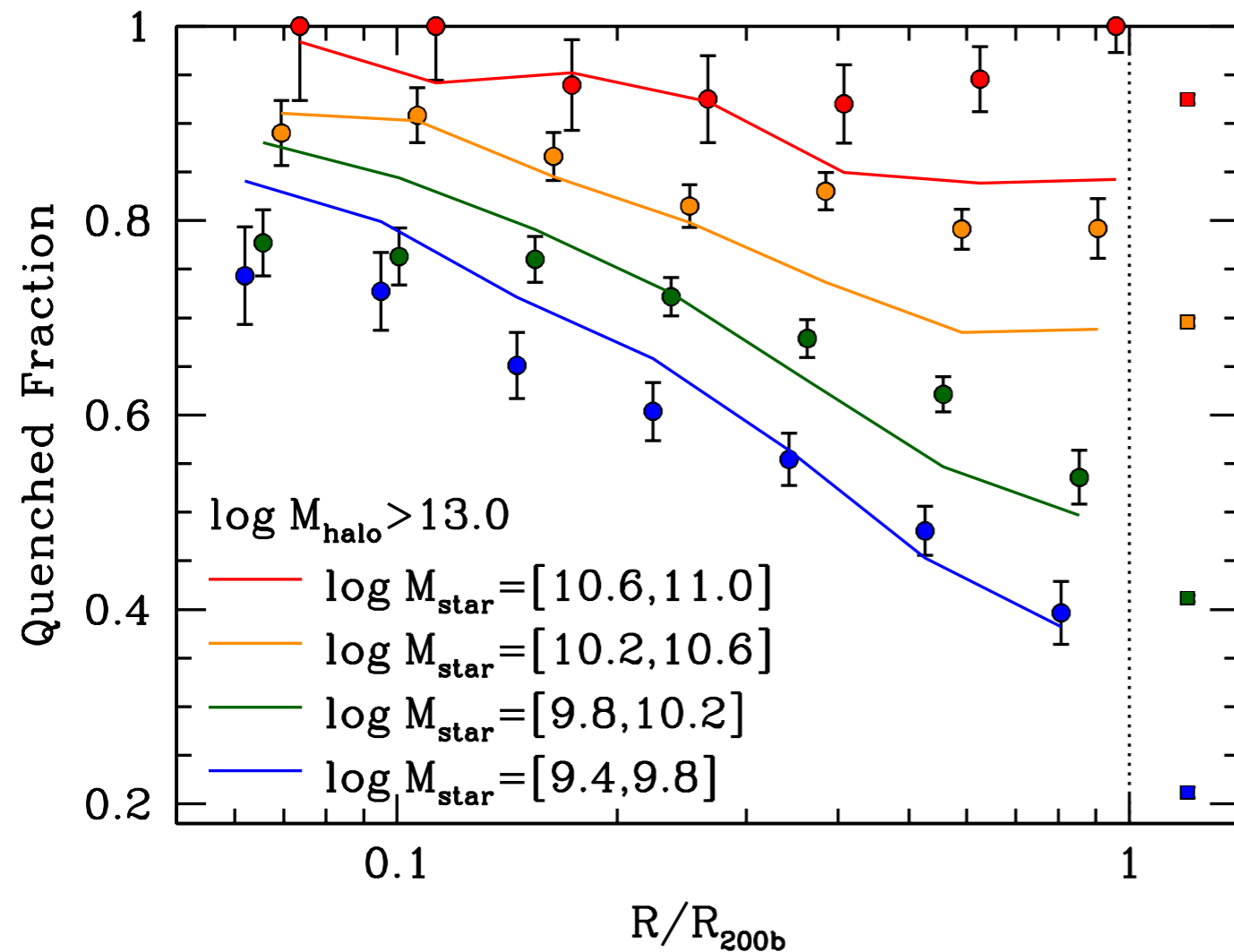
# Slow-fade model cannot reproduce satellite SFR bimodality



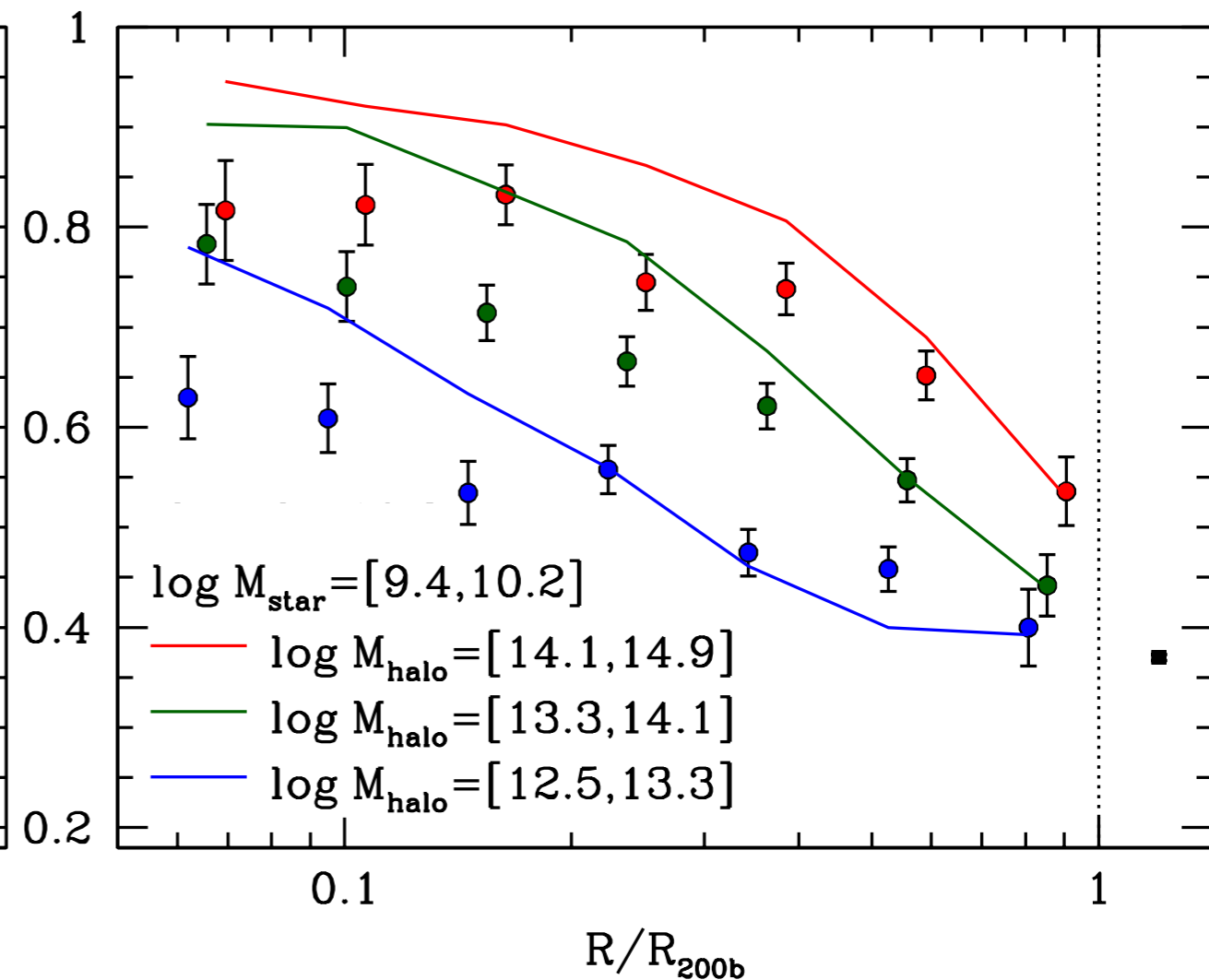
# Ram-pressure model

'instantaneous' quenching if  $\rho_{\text{halo}} v^2 > C$

## Galaxy mass dependence



## Halo mass dependence



Can ram-pressure be efficient in low-mass groups?

# Slow-fade ( $\tau=2.3$ Gyr) + ram-pressure stripping

