ker7@st-andrews.ac.uk

University of St Andrews

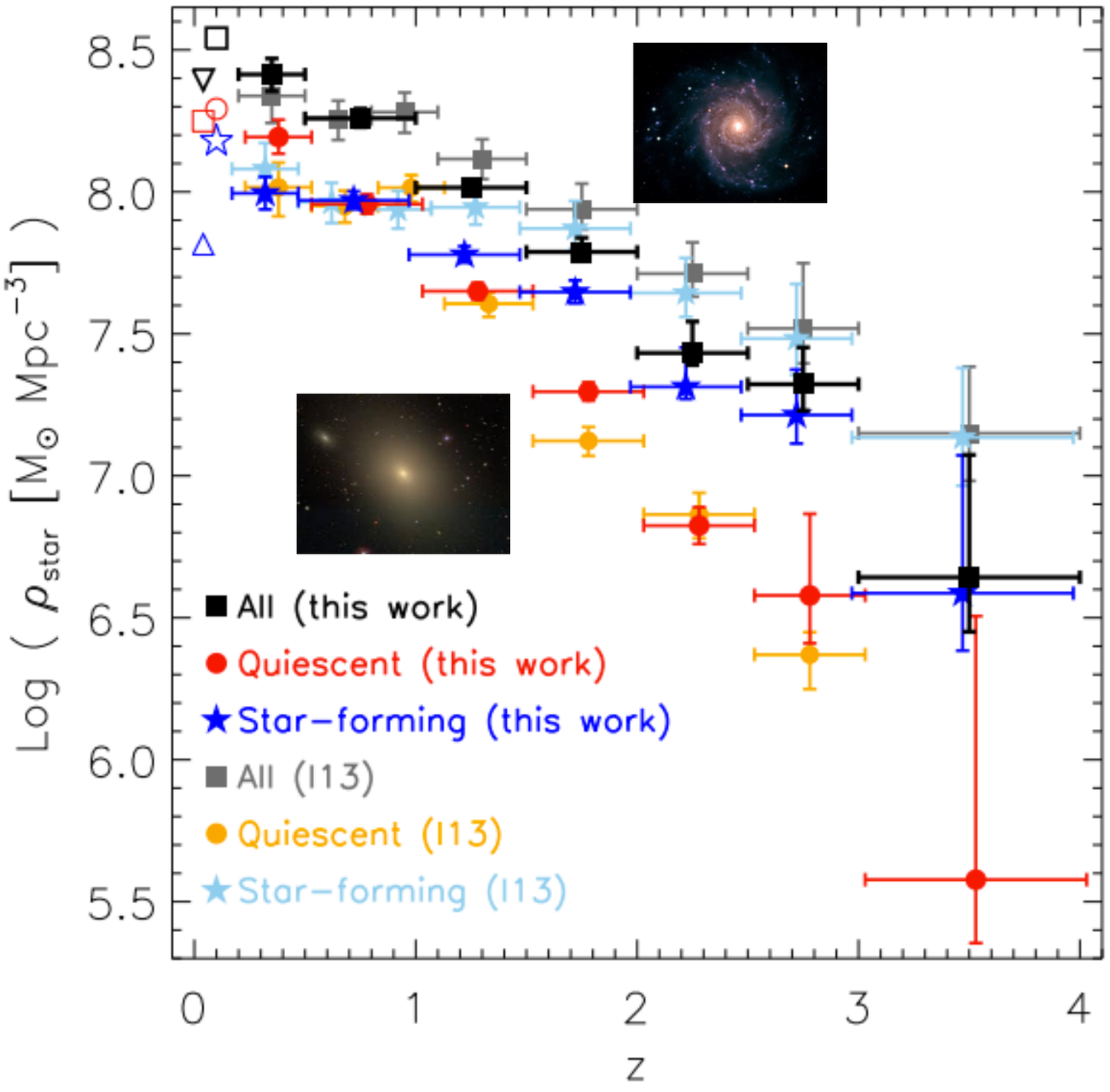
The mechanisms for quiescent galaxy formation at z<1

Kate Rowlands

Vivienne Wild & the GAMA team

Building the quiescent galaxy population

Stellar mass density

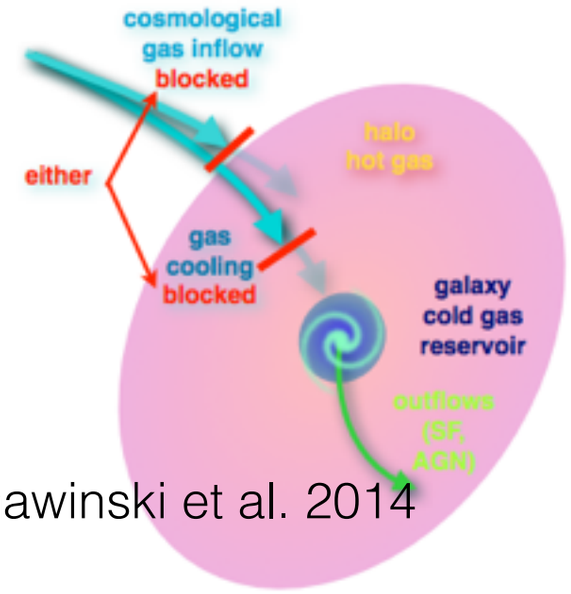


Muzzin et al. (2013), Ilbert et al. (2013)

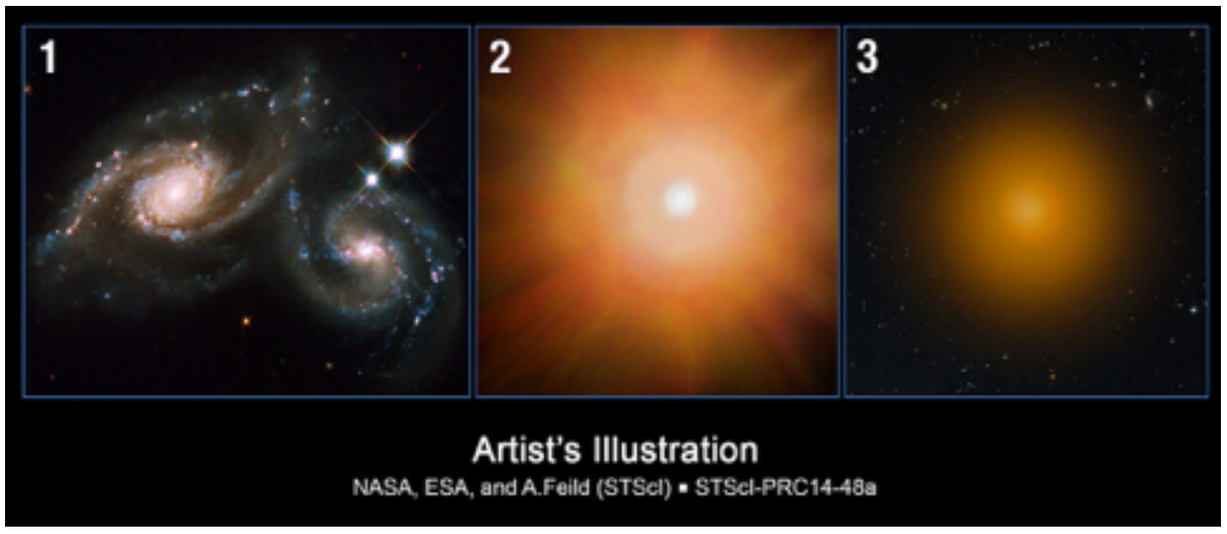
How to stop star formation? How fast?

- Stop gas getting to galaxy - halo/mass quenching
- Starvation, strangulation
- Exhaustion - secular evolution

- Expel/heat gas
  - Starburst-driven winds
  - Active galactic nuclei (AGN)
- Exhaust gas - starburst



Schawinski et al. 2014



Schawinski et al. 2007, Cortese & Hughes 2009; Salim et al. 2012; Fang et al. 2012, 2013; Yesuf et al. 2014, Schawinski et al. 2014, Smethurst et al. 2015, Peng, Maiolino & Cochrane 2015, Trayford et al. 2015

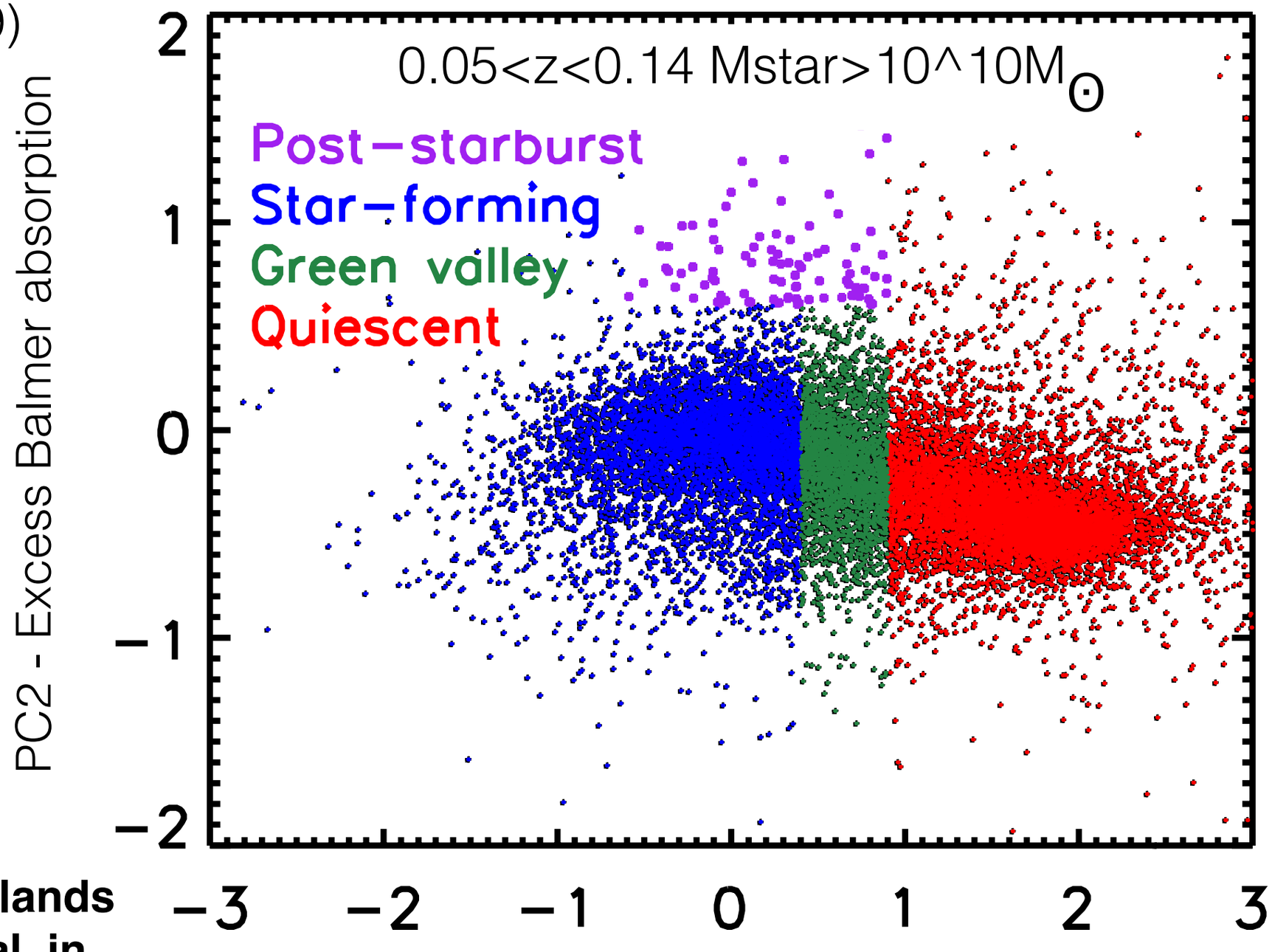
Selecting quenching galaxies spectroscopically

64671
galaxies
0.05<z<0.35

22011
galaxies
0.5<z<0.7
with
$M_*>10^{10.5}M_\odot$
and SNR>6.5

Selecting quenching galaxies spectroscopically

Wild et al. (2009)



Rowlands et al. in prep

64671 galaxies 0.05<z<0.35

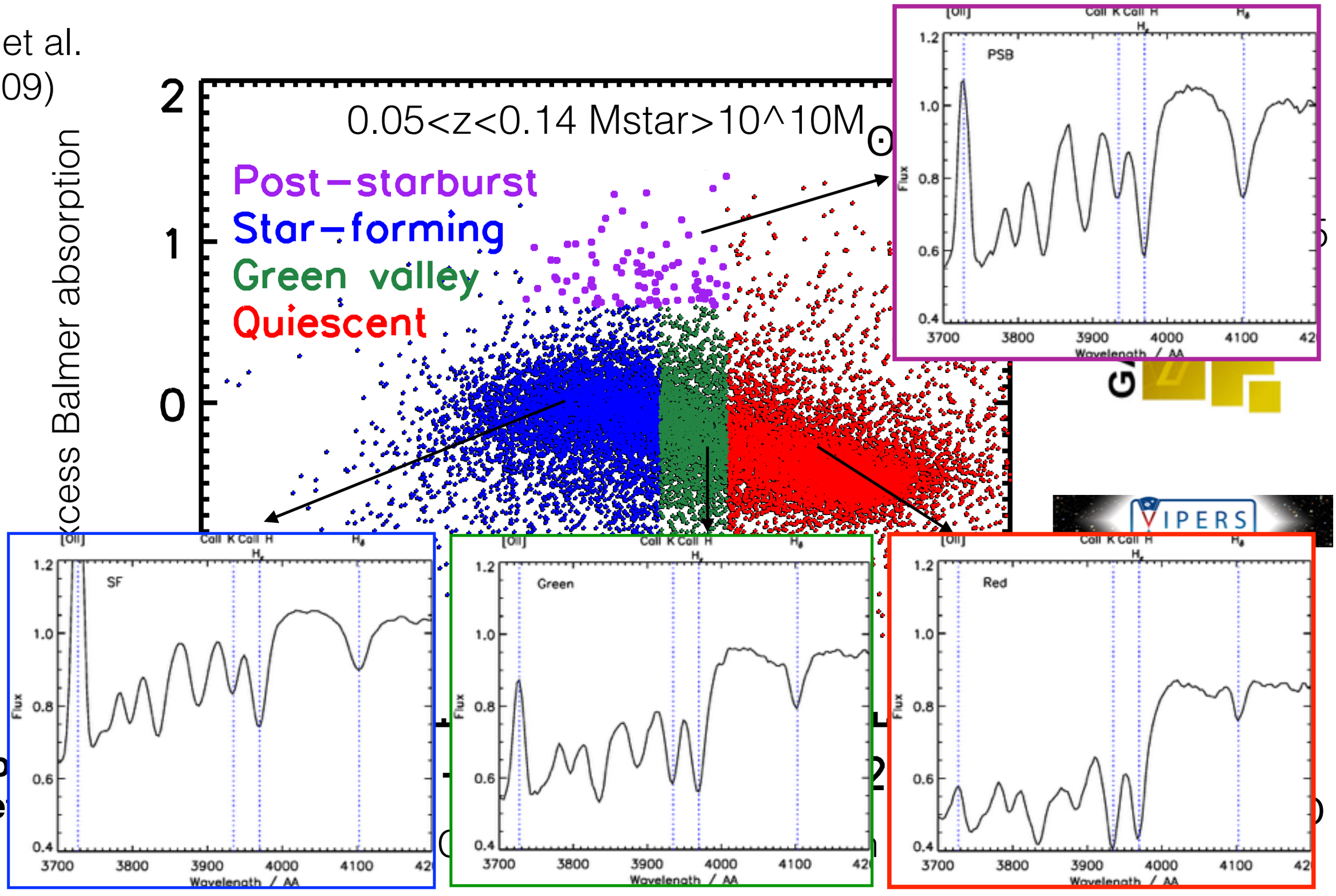
GAMA

VIPERS

22011 galaxies 0.5<z<0.7 with $M_* > 10^{10.5} M_\odot$ and SNR>6.5

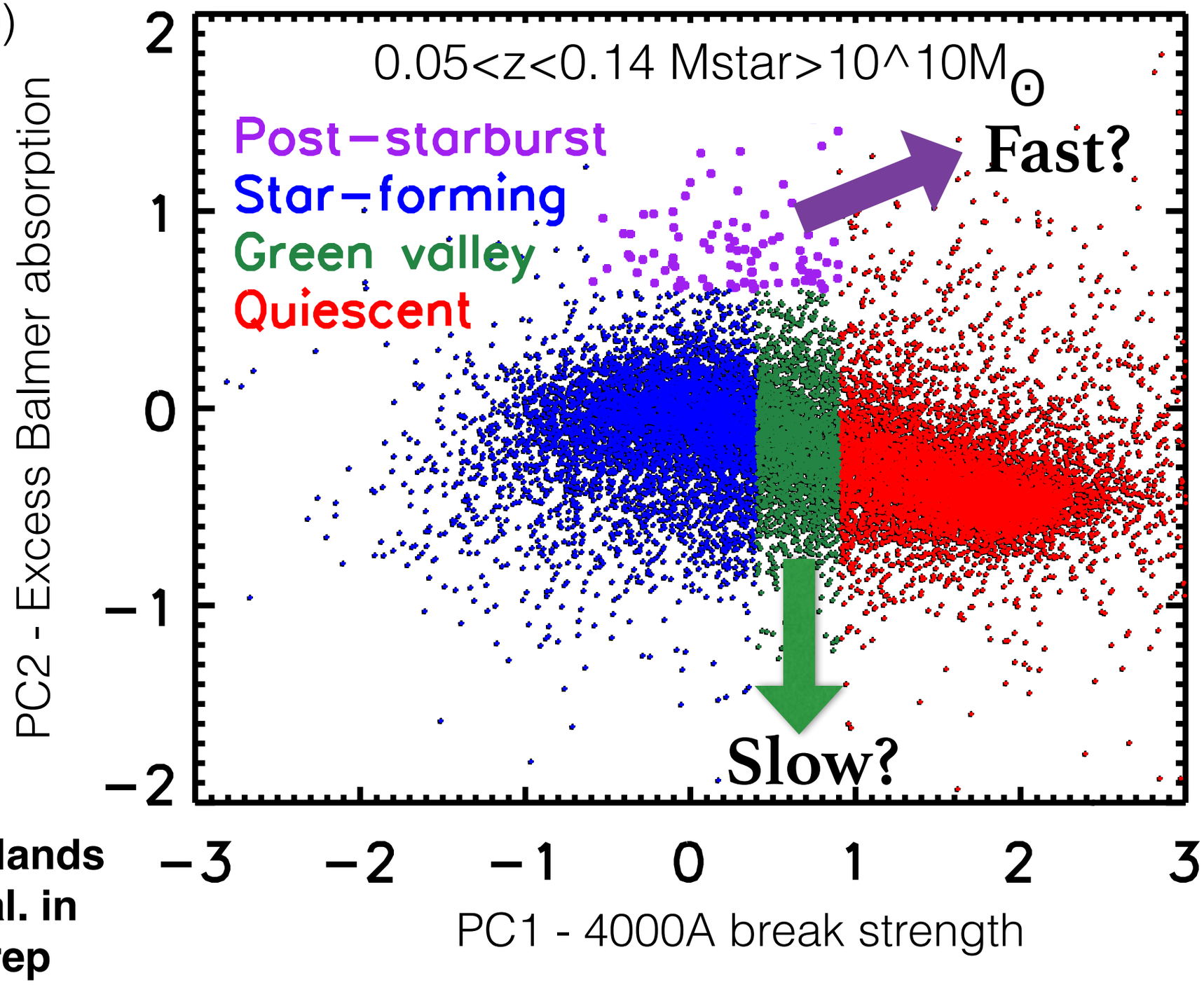
Selecting quenching galaxies spectroscopically

Wild et al. (2009)



Selecting quenching galaxies spectroscopically

Wild et al. (2009)



Rowlands et al. in prep

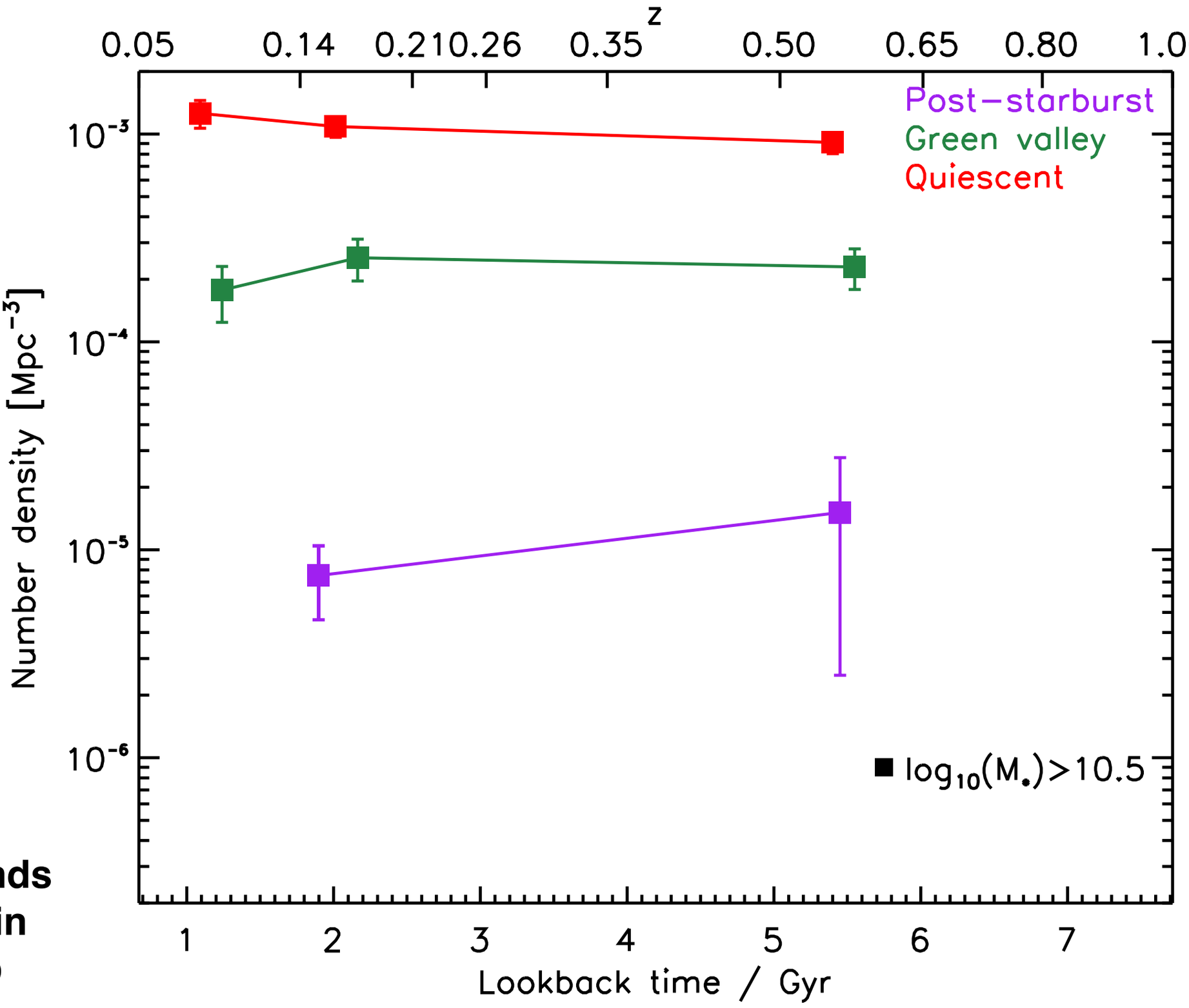
64671 galaxies 0.05<z<0.35

GAMA

VIPERS

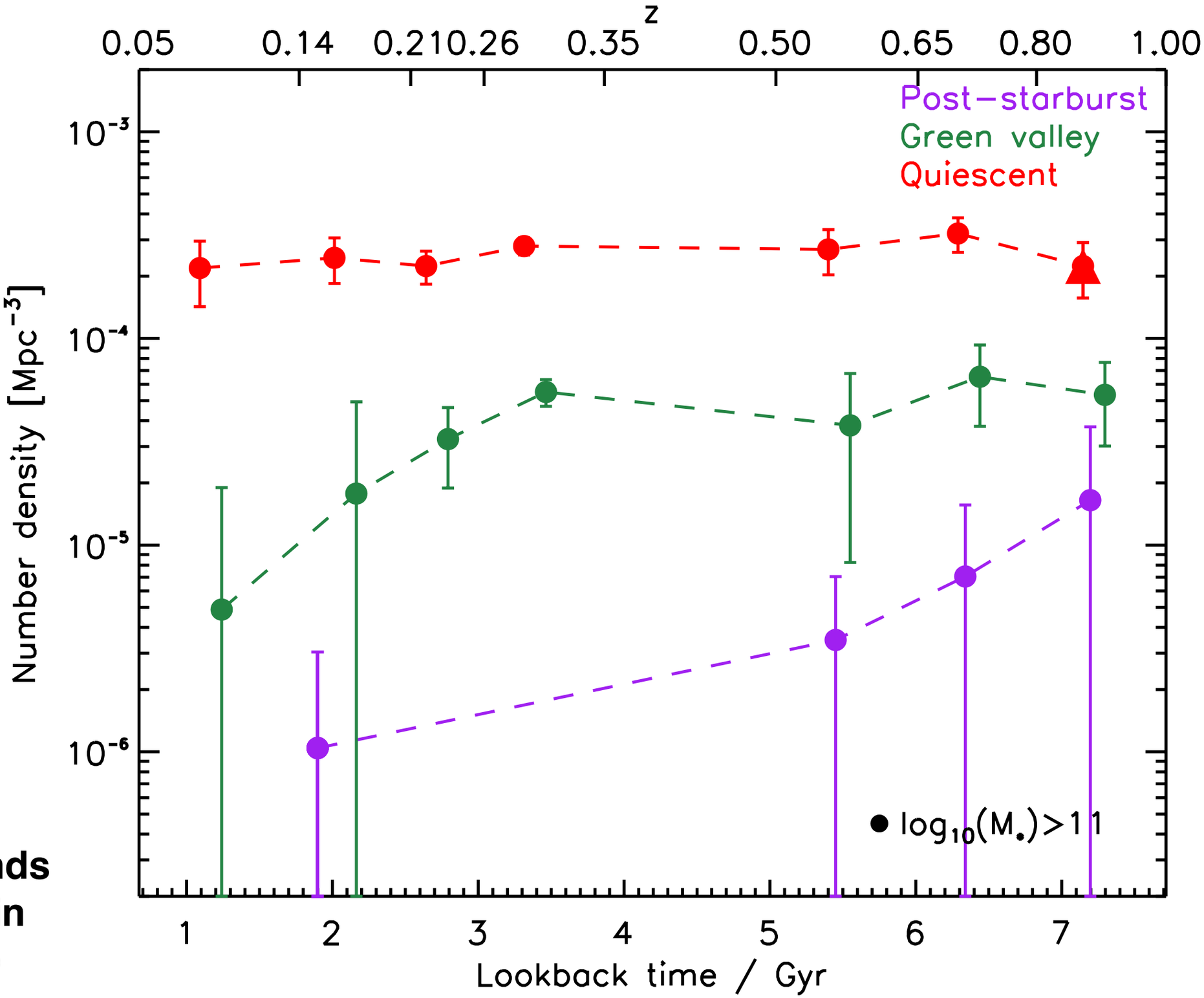
22011 galaxies 0.5<z<1.3 with $M_* > 10^{10.5} M_\odot$ and SNR>6.5

Is the red sequence building at low redshift?



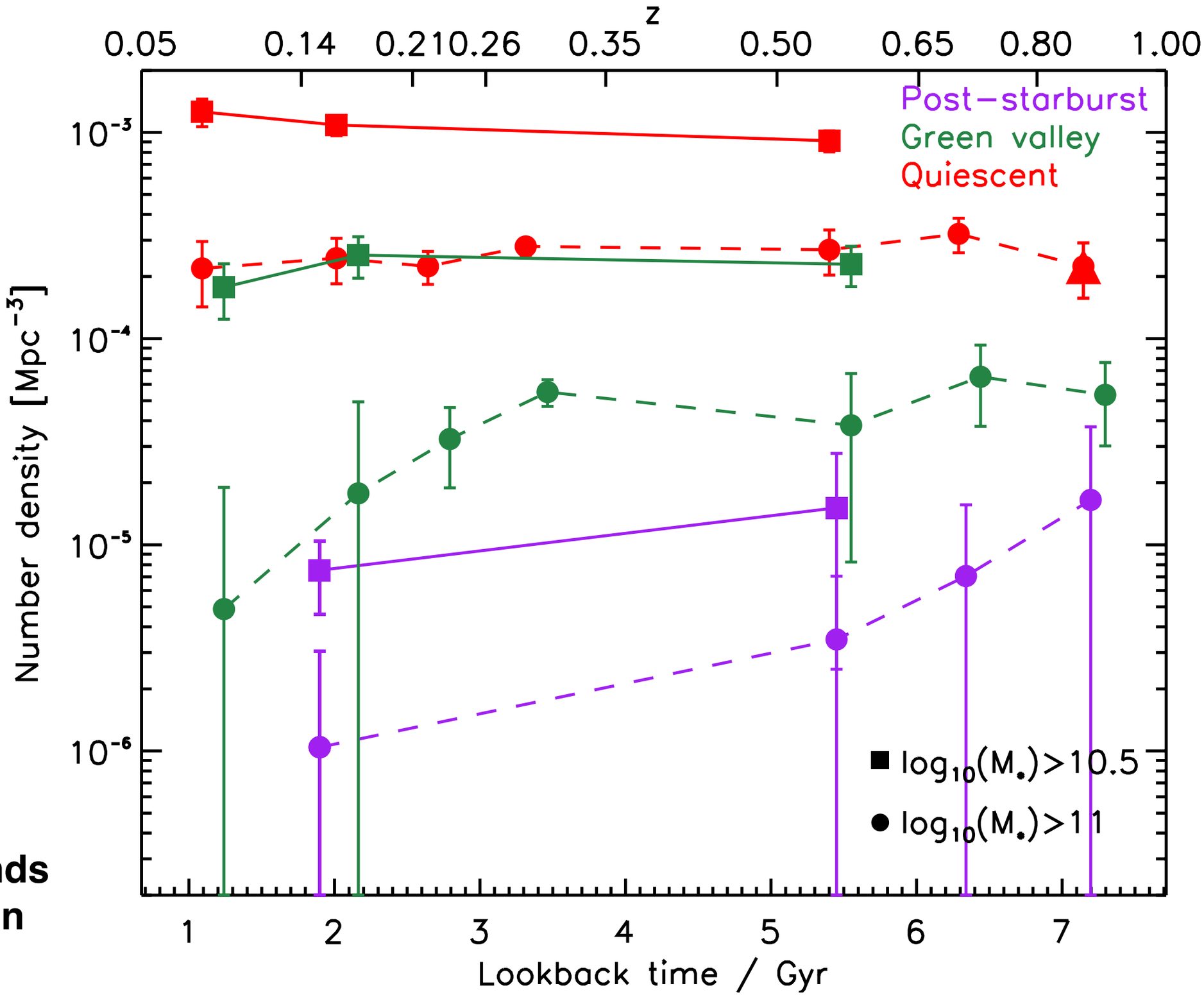
Rowlands et al. in prep

Is the red sequence building at low redshift?



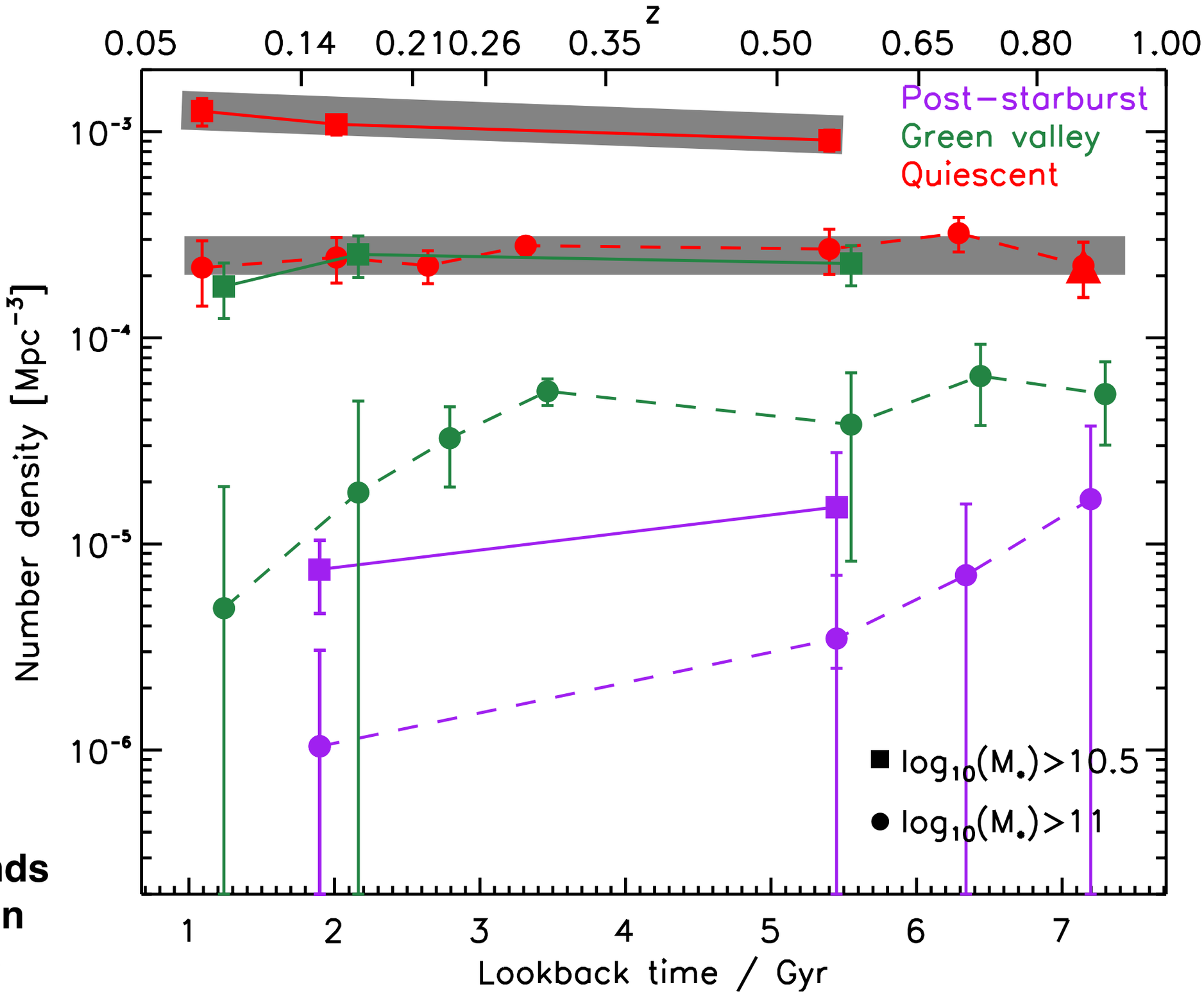
Rowlands et al. in prep

Is the red sequence building at low redshift?



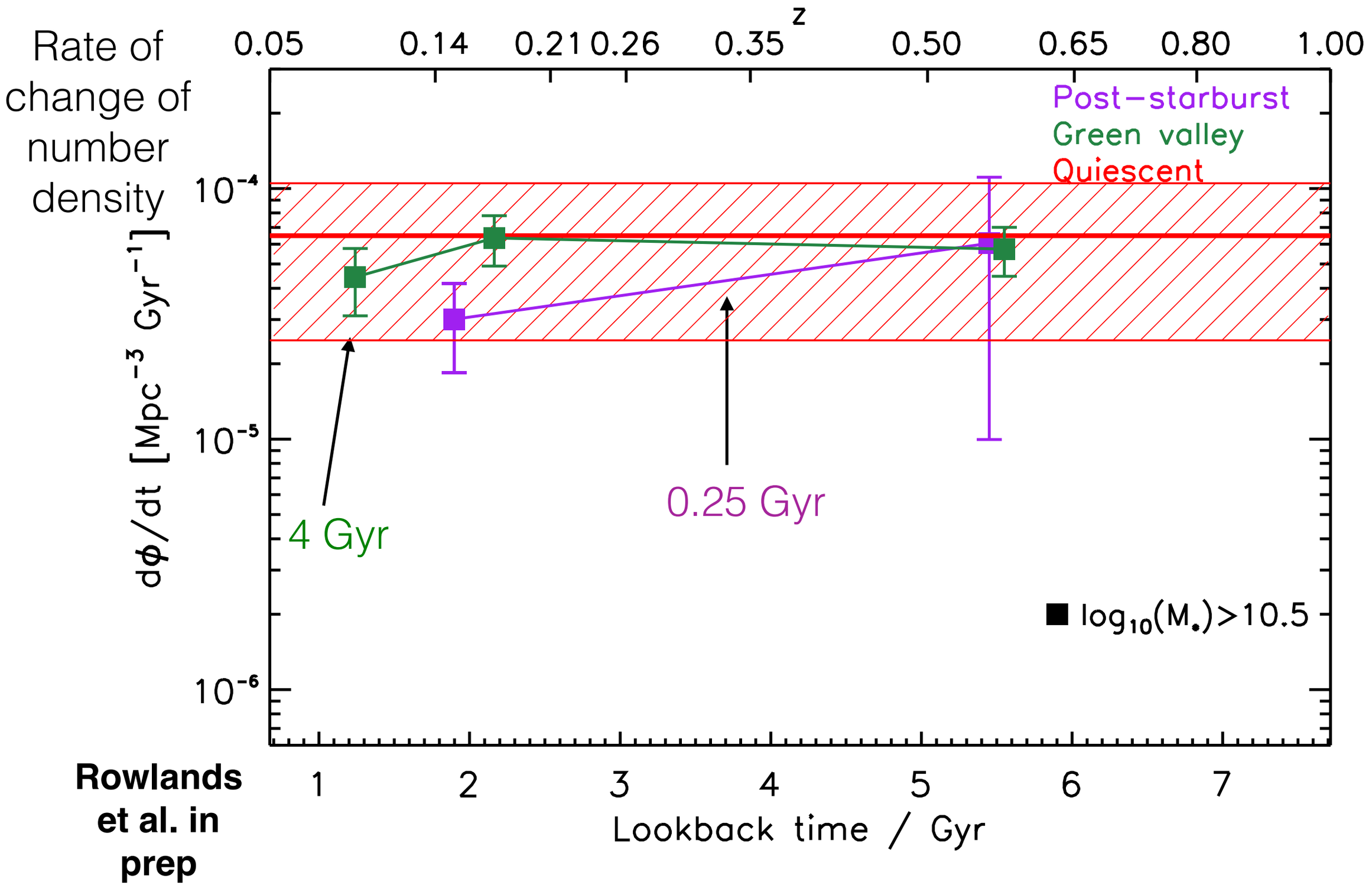
Rowlands et al. in prep

Is the red sequence building at low redshift?



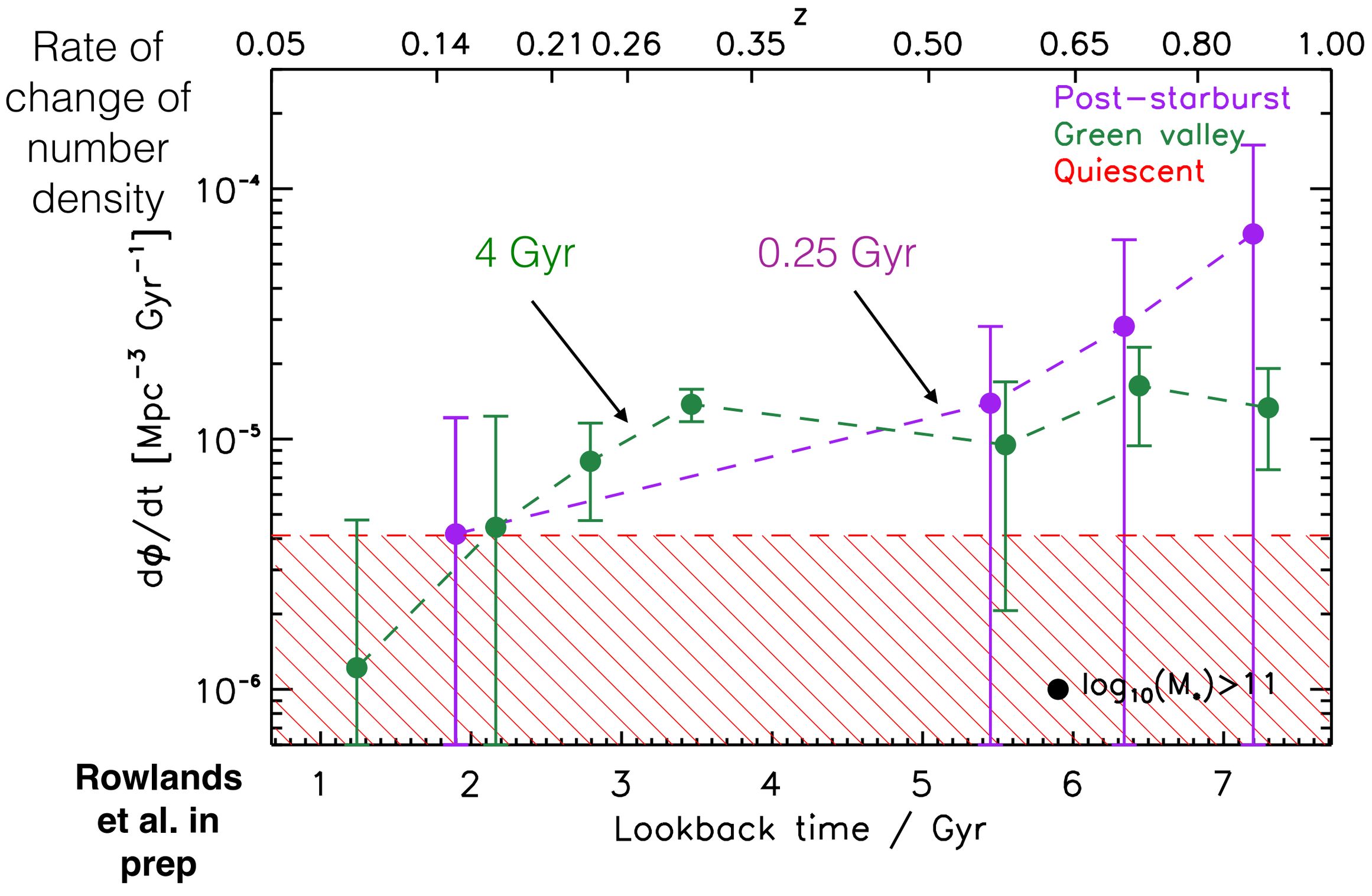
Rowlands et al. in prep

How quickly do galaxies stop forming stars?



Rowlands et al. in prep

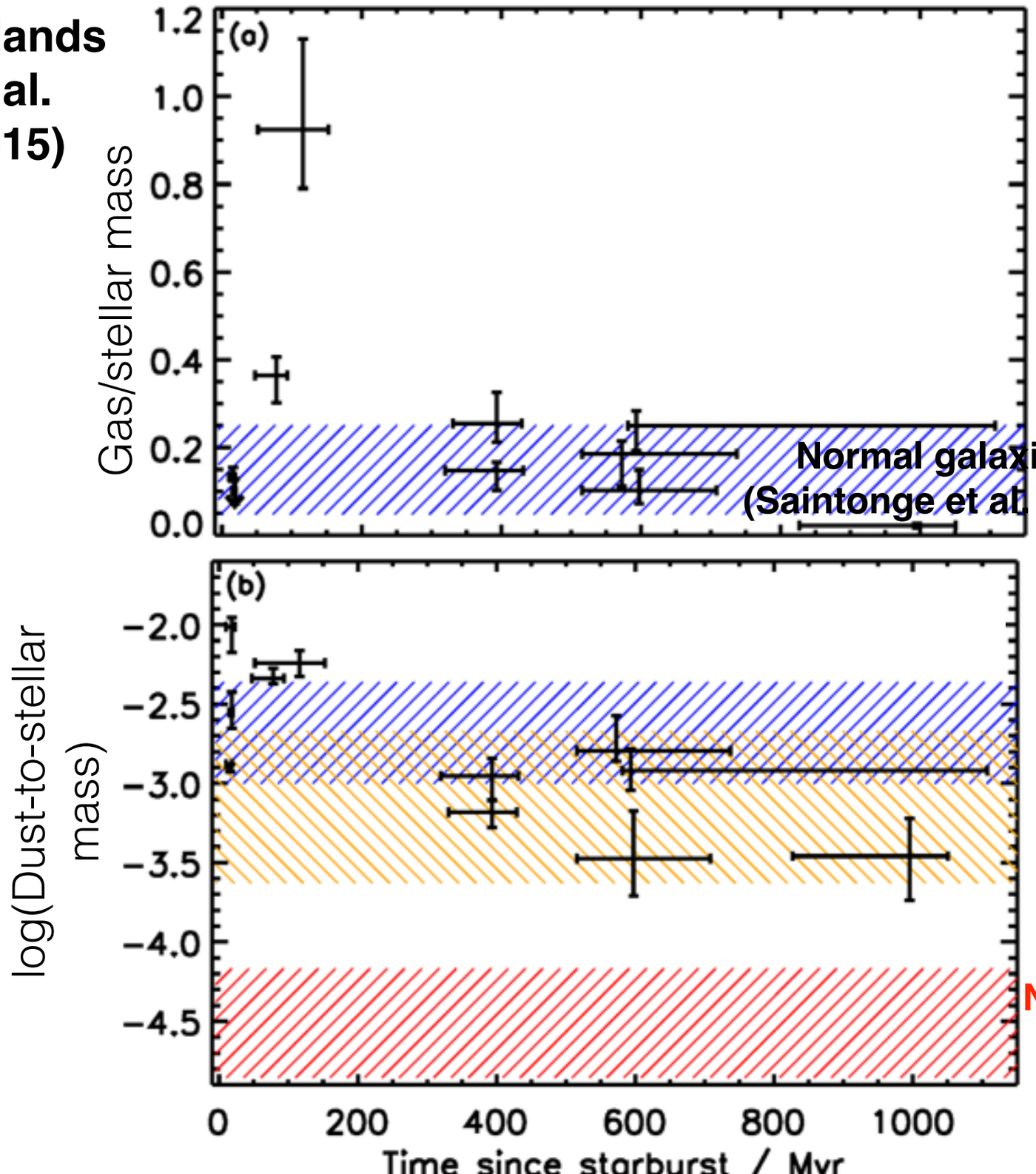
How quickly do galaxies stop forming stars?



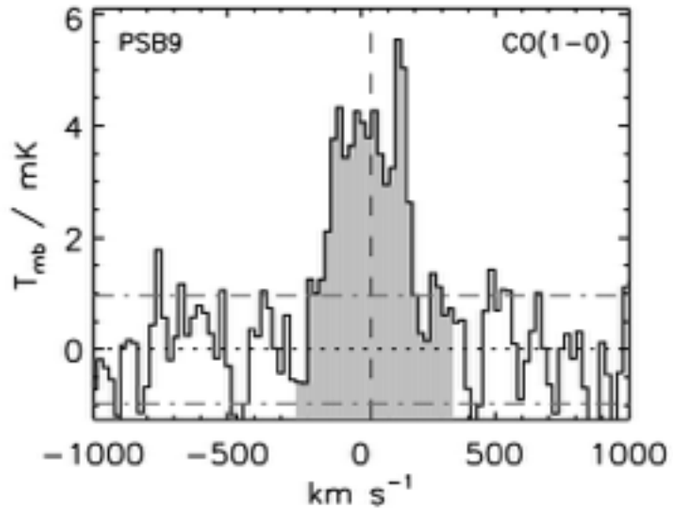
Rowlands et al. in prep

Post-starbursts at low-z are not dead?

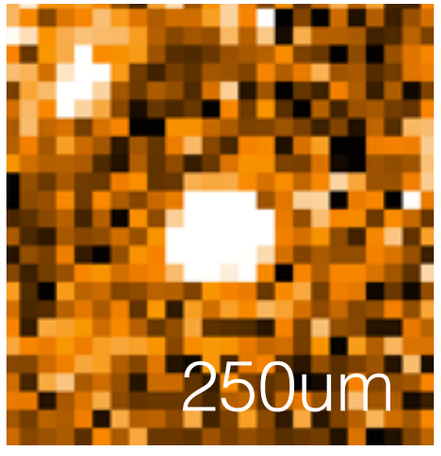
Rowlands et al. (2015)



Molecular gas



Cold dust



Normal galaxies

Dusty early-type galaxies

Non-dusty early-type galaxies

See also Zwann +13, French+15, Alatalo+16

Conclusions

- Quiescent population grows slowly from 0<z<1 for $M_*>10^{10.5}M_\odot$.
- Consistent with green valley galaxies quenching over ~4 Gyrs and post-starbursts aren't quenching.

  Or

- Low number density of post-starbursts consistent with slow growth in quiescent population if green valley galaxies aren't quenching.
- Presence of quenching galaxies inconsistent with flat red sequence at $M_*>10^{11}M_\odot$. Rejuvenation?
- Post-starbursts are rare at z<1 — fast quenching route much less common at z~0 than at high redshift.

ker7@st-andrews.ac.uk

Rowlands et al. (2015), Rowlands et al. in prep, Pawlik et al. (2016), Wild et al. (2016) - arXiv:1608.00588