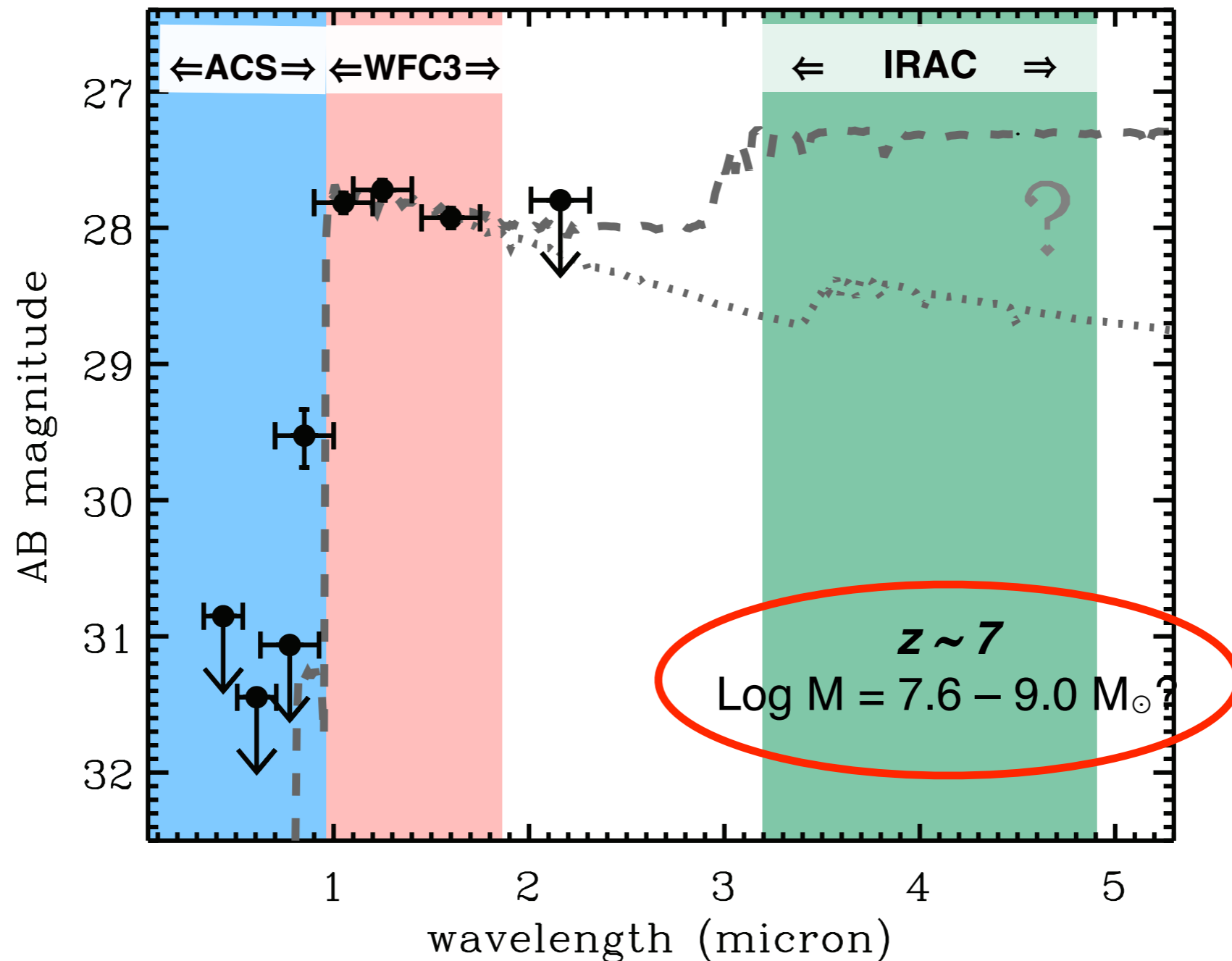
The background of the slide is a vibrant, reddish-orange nebula or galaxy. In the foreground, the Spitzer Space Telescope is shown in a detailed, cutaway-style rendering, revealing its internal instruments and structure. The telescope is positioned diagonally across the frame, pointing towards the upper right.

Stellar Population Modeling of High- z Galaxies and the sSFR Plateau at $z \sim 4 - 7$

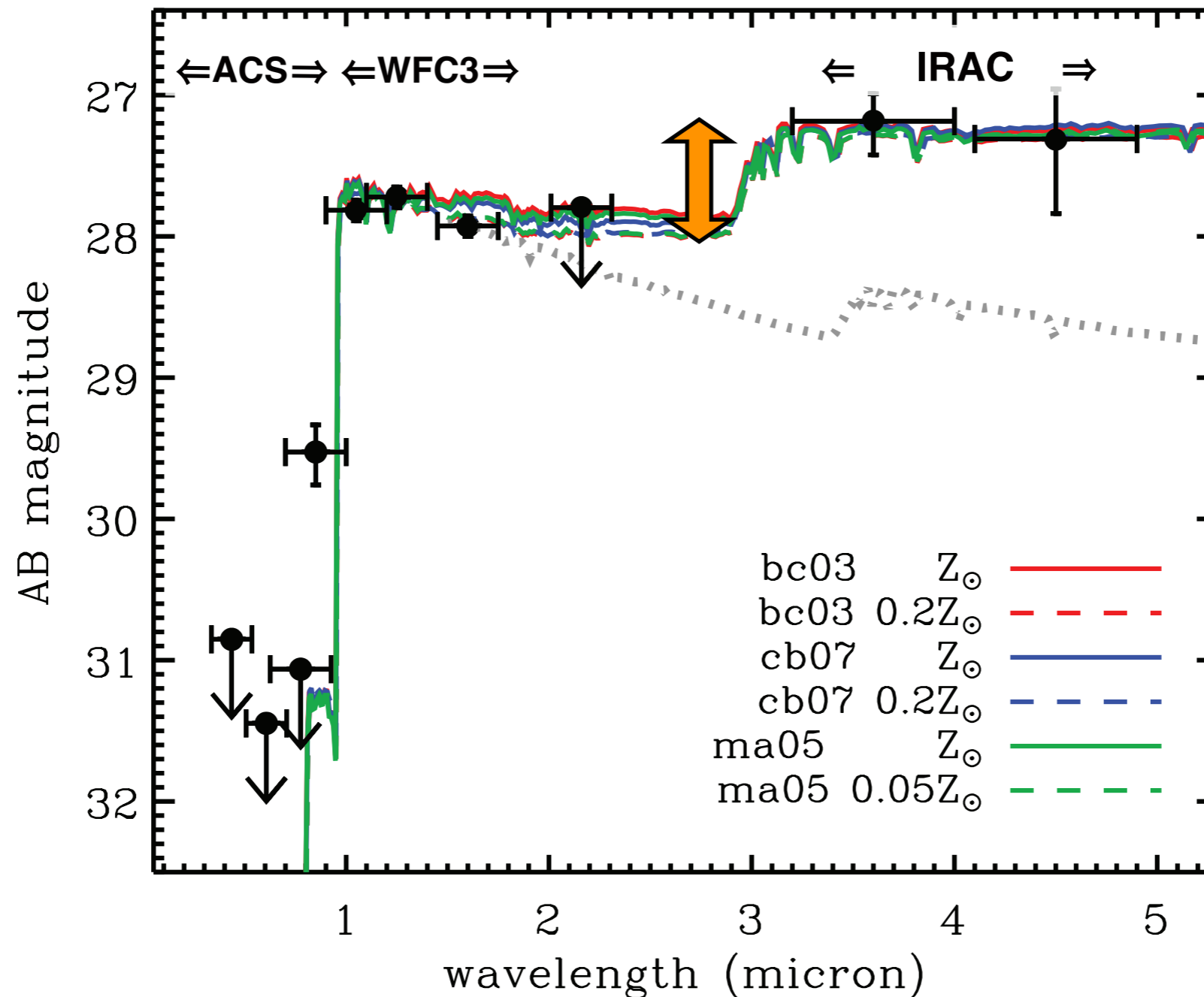
Valentino González

Garth Illingworth, Rychard Bouwens, Ivo Labbé, Pascal Oesch

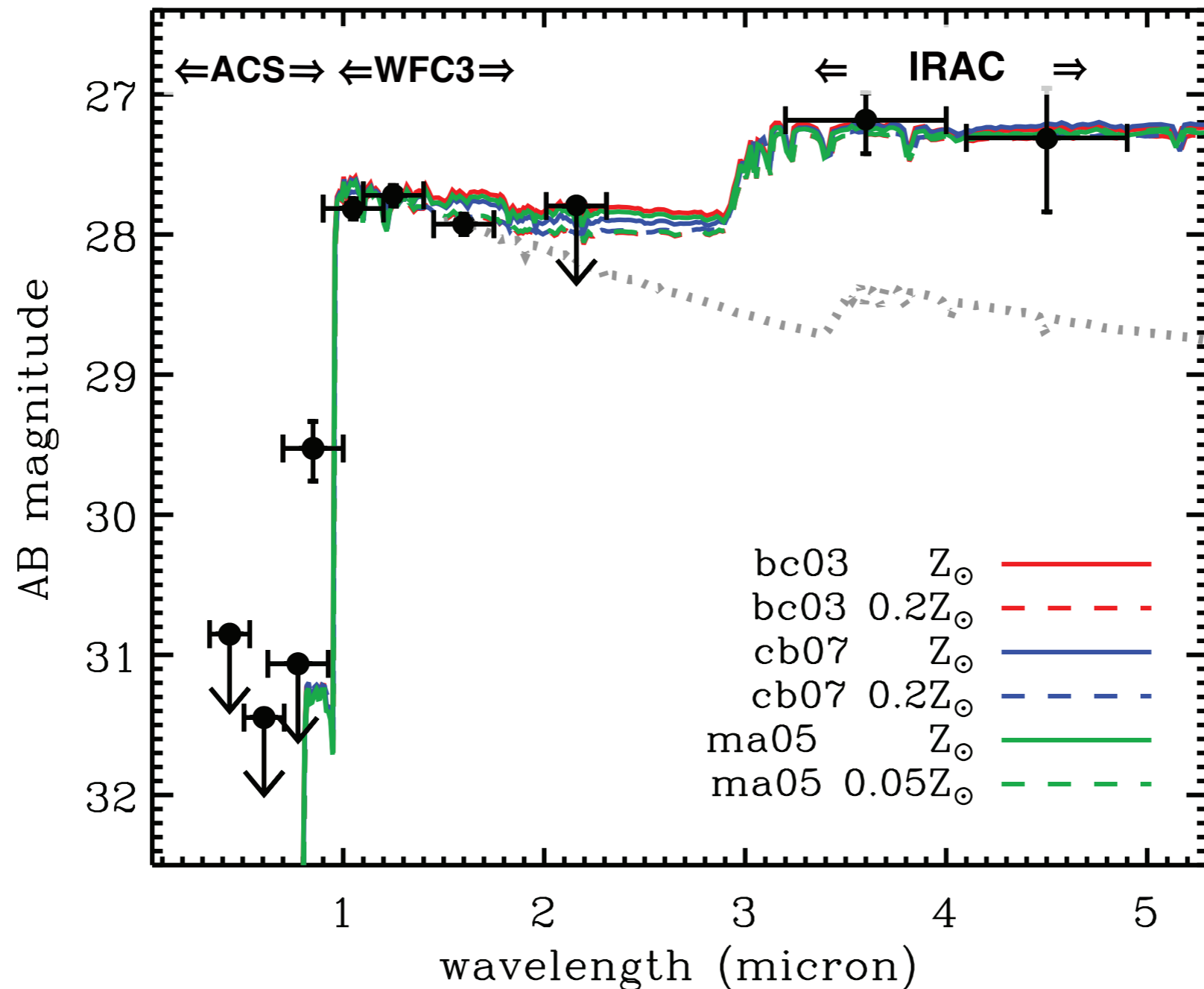
Spitzer/IRAC provides valuable constraints to estimate Age and Stellar Mass.



Indication of evolved Stellar Population even at the highest redshifts probed (or not?)



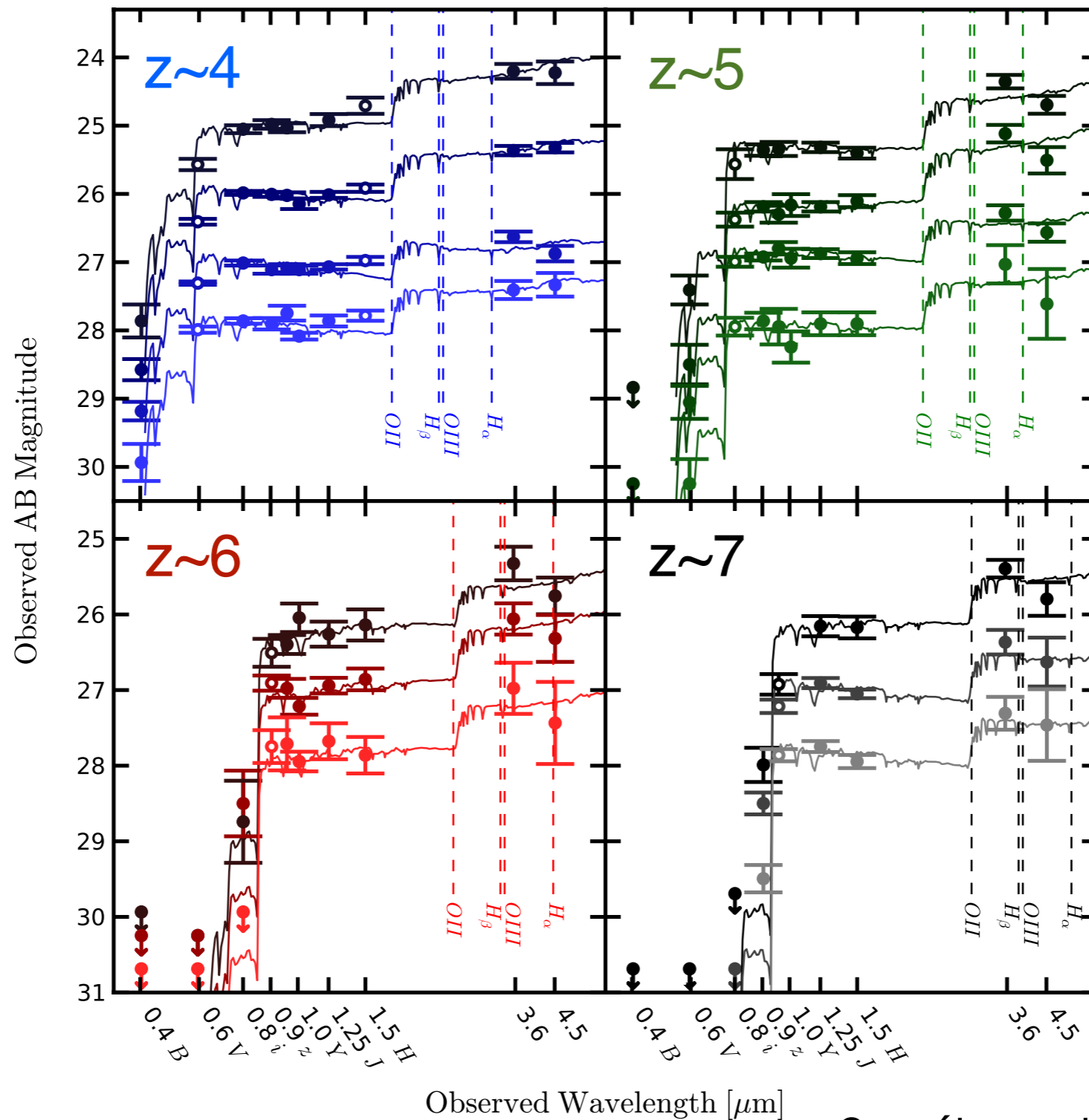
Stellar Mass is “fairly” robust but still dependent on assumptions used in SPS model fitting.

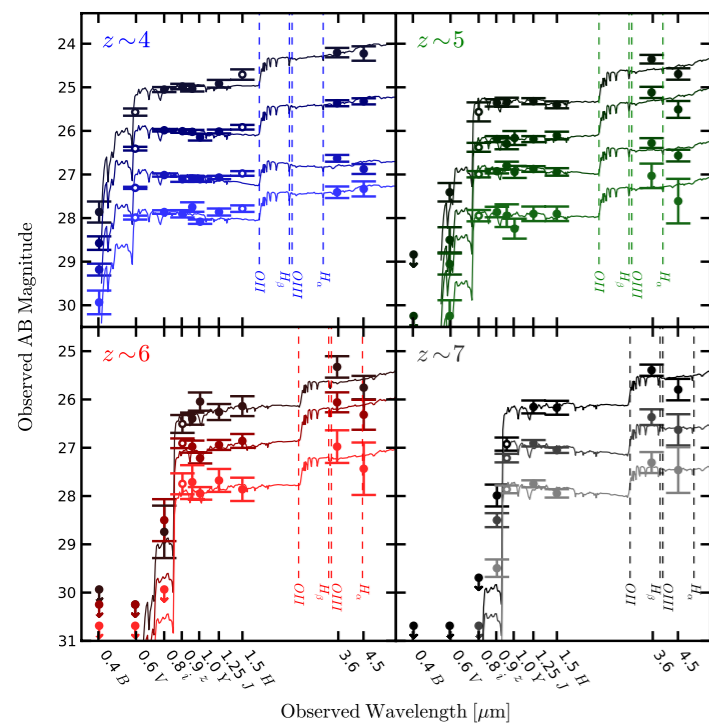


Caveats to have in mind:

IMF alone can be a factor x2.
 Dust-Age degeneracy.
 SFH?

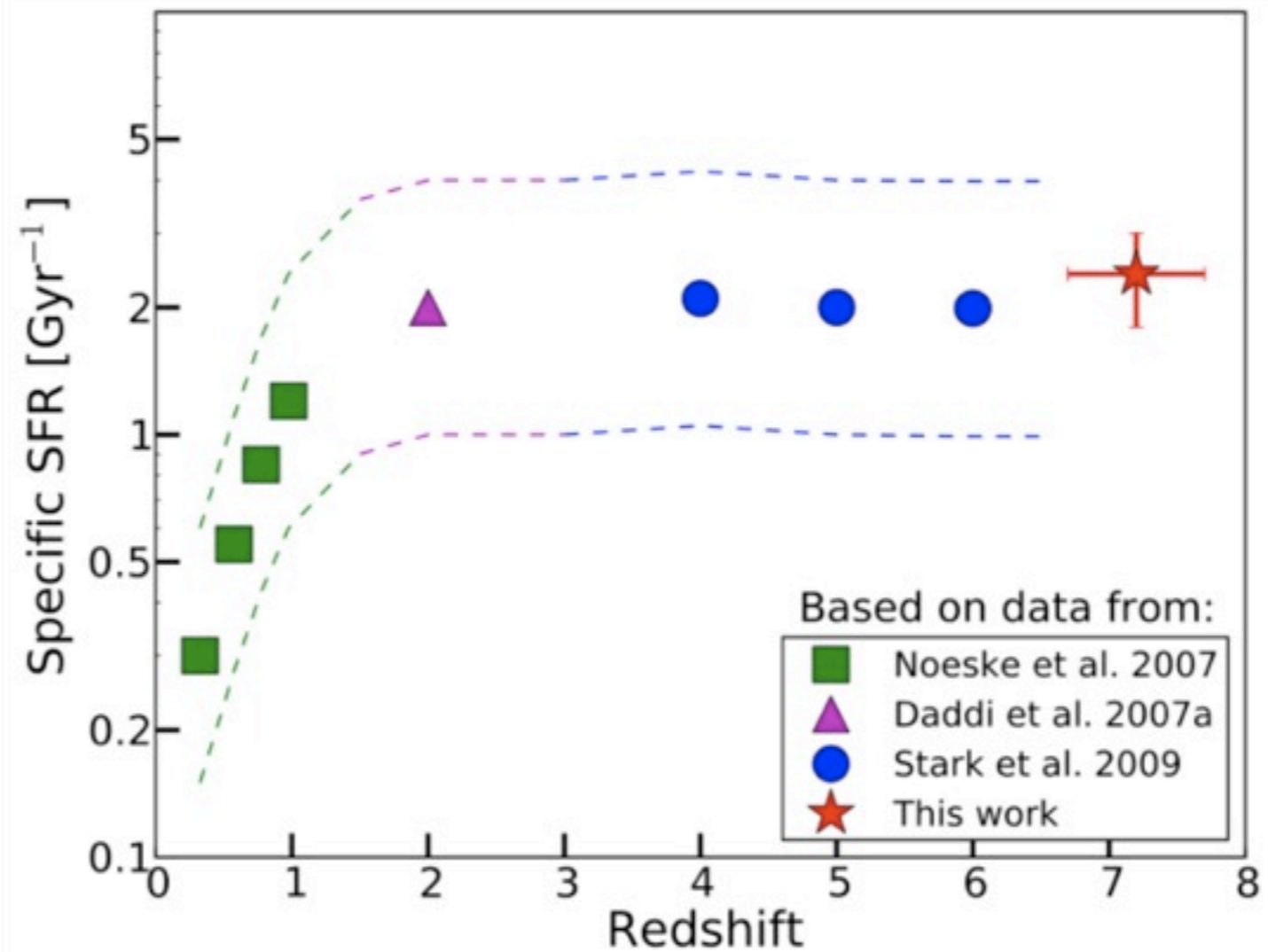
The median-stacked SEDs are remarkably similar in the range $z\sim 4-7$



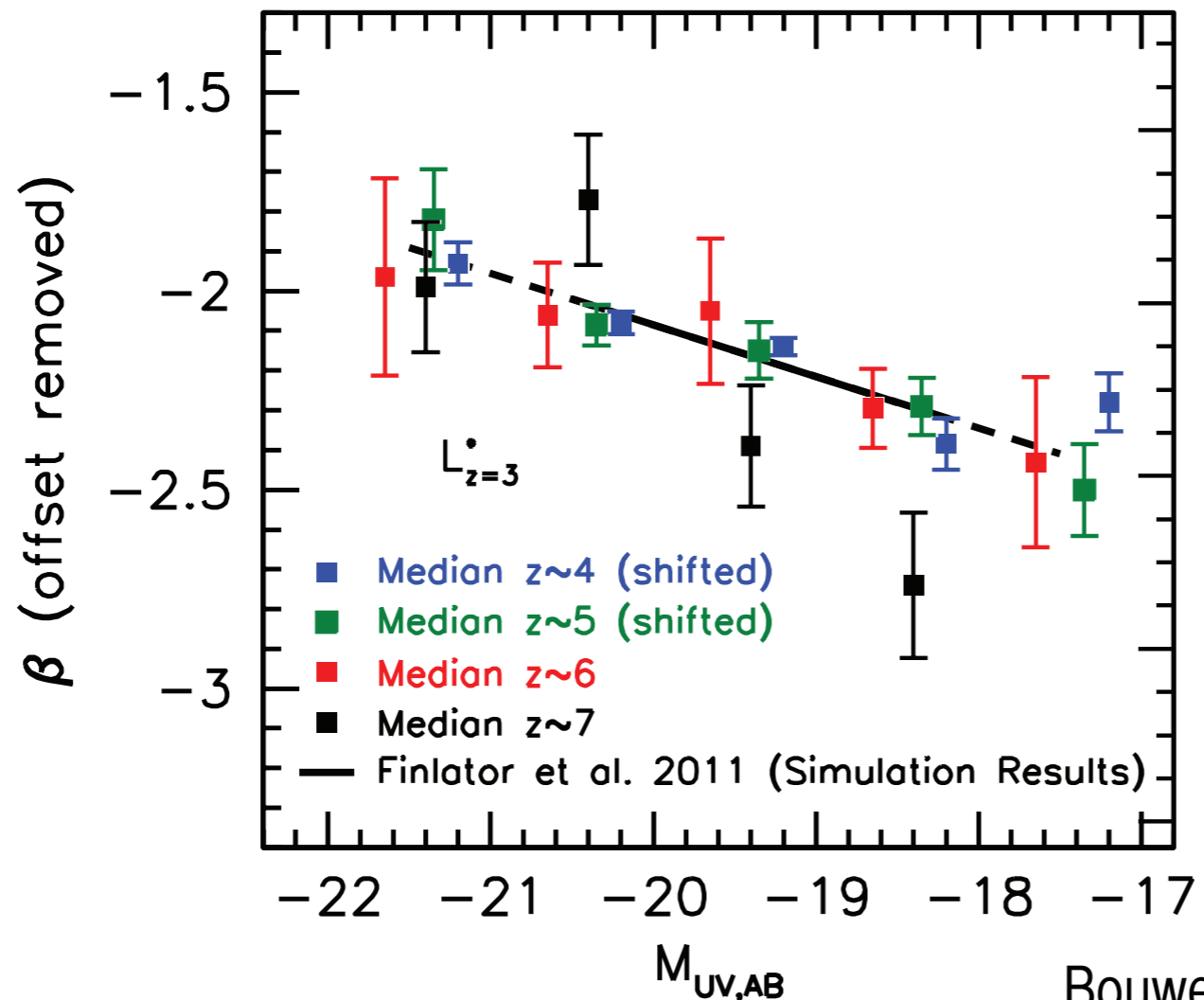
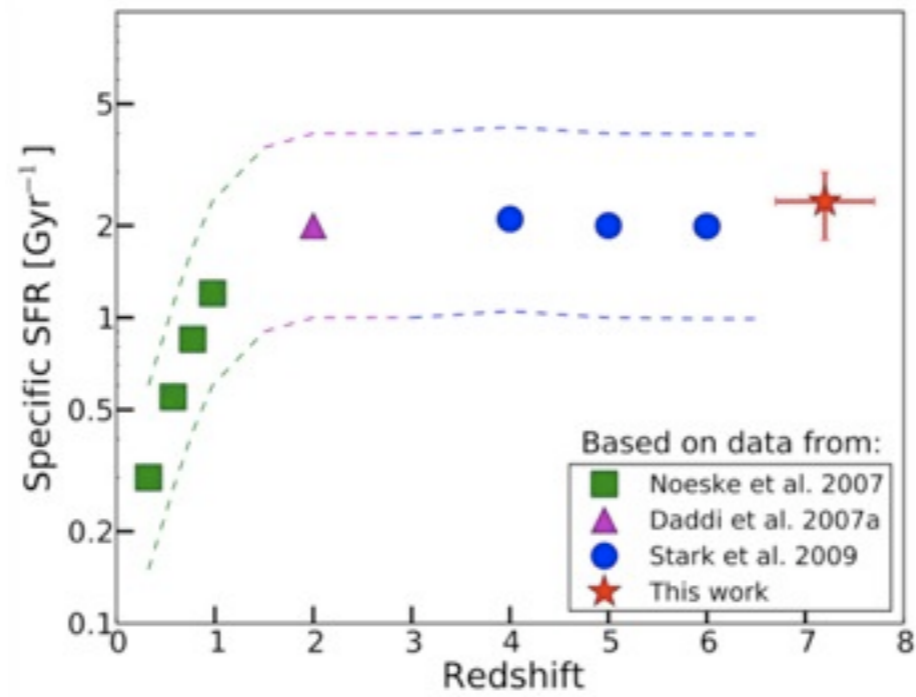
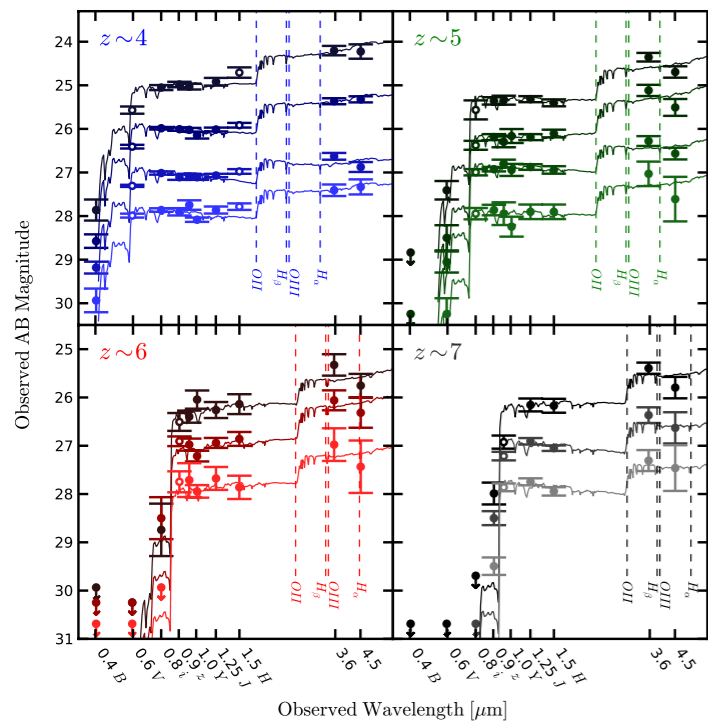


At a given UV luminosity, the M/L ratio is roughly constant.

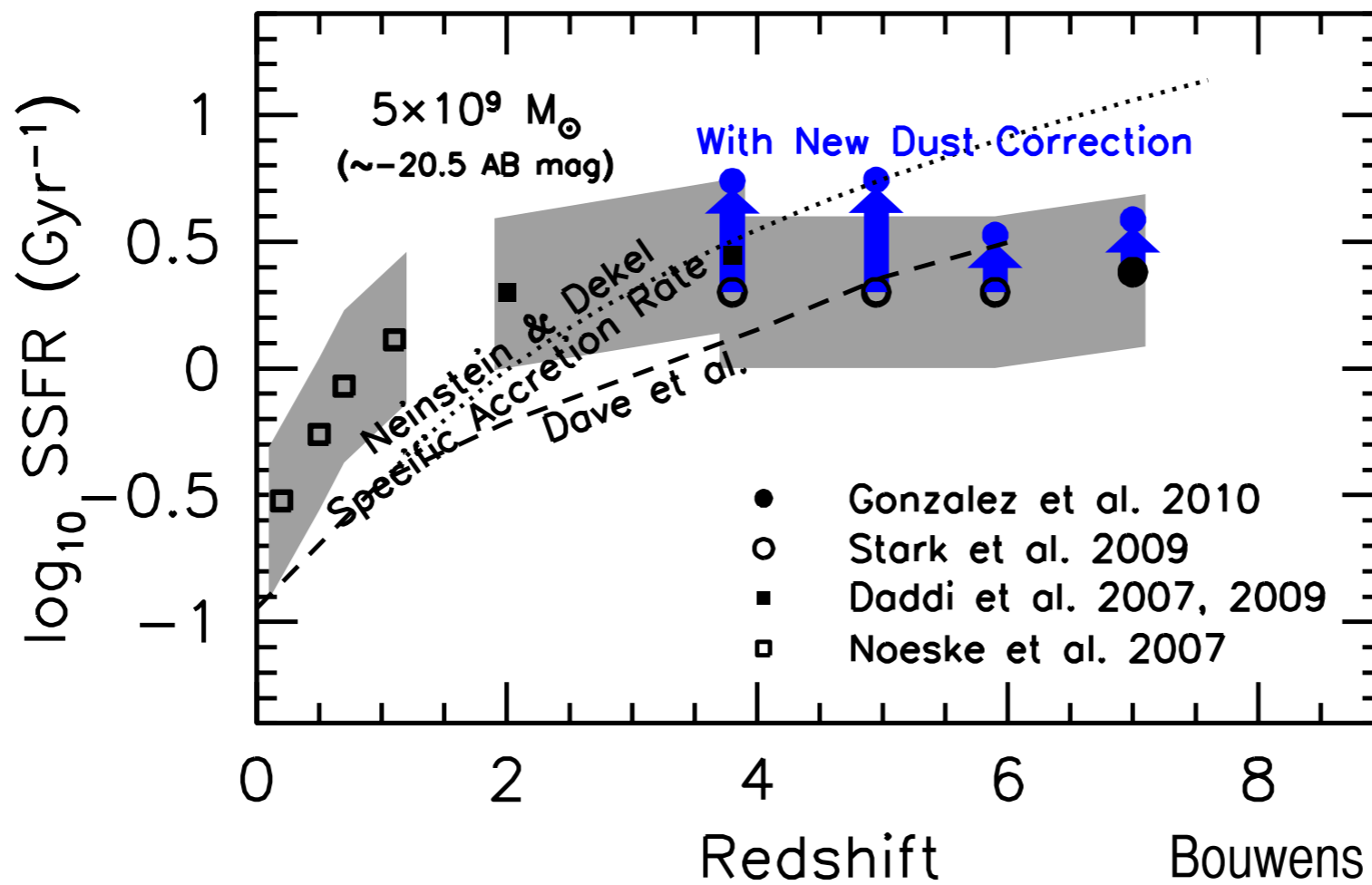
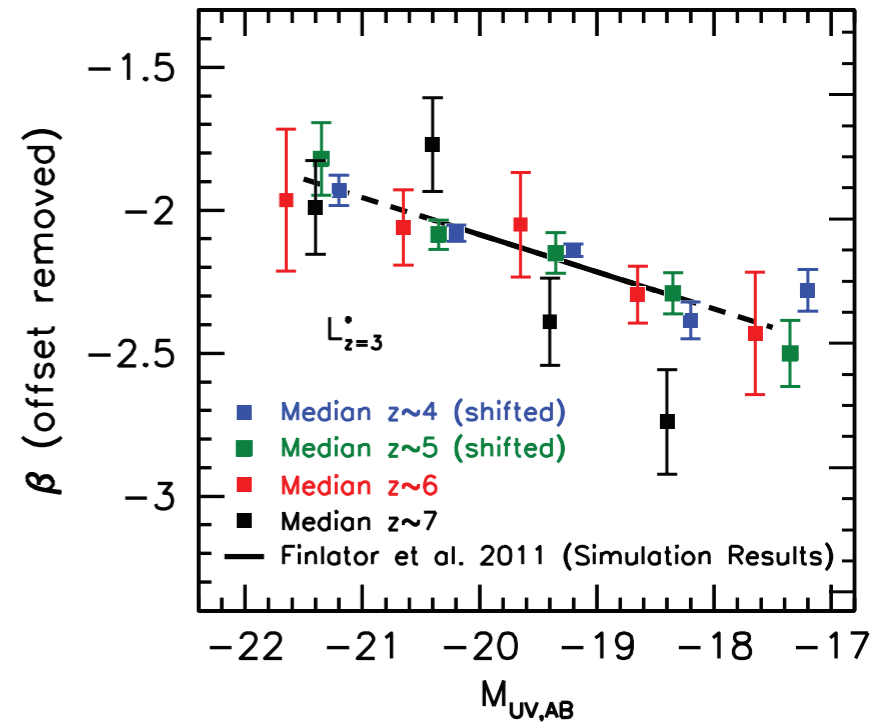
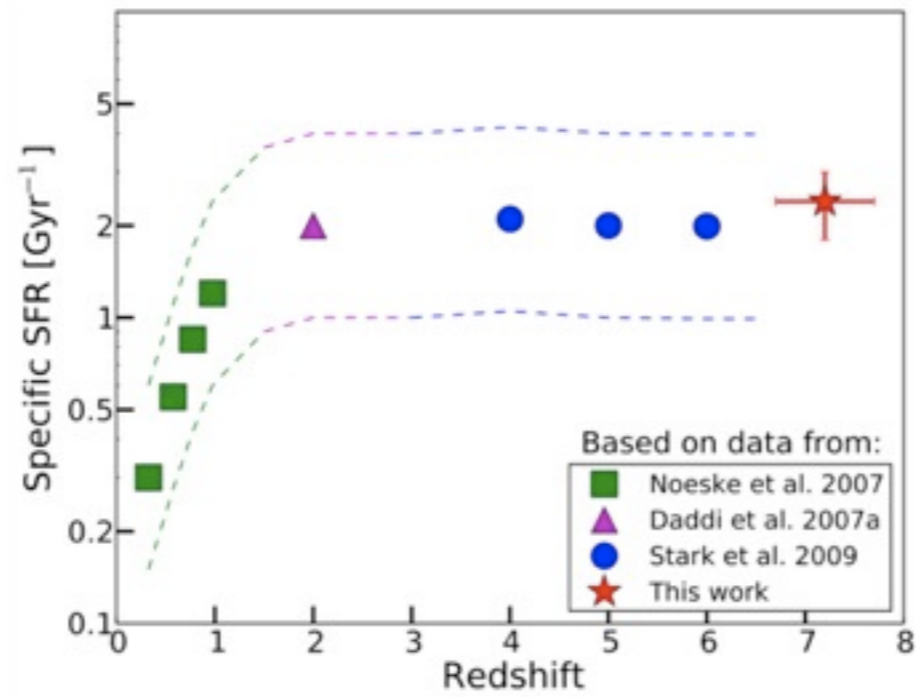
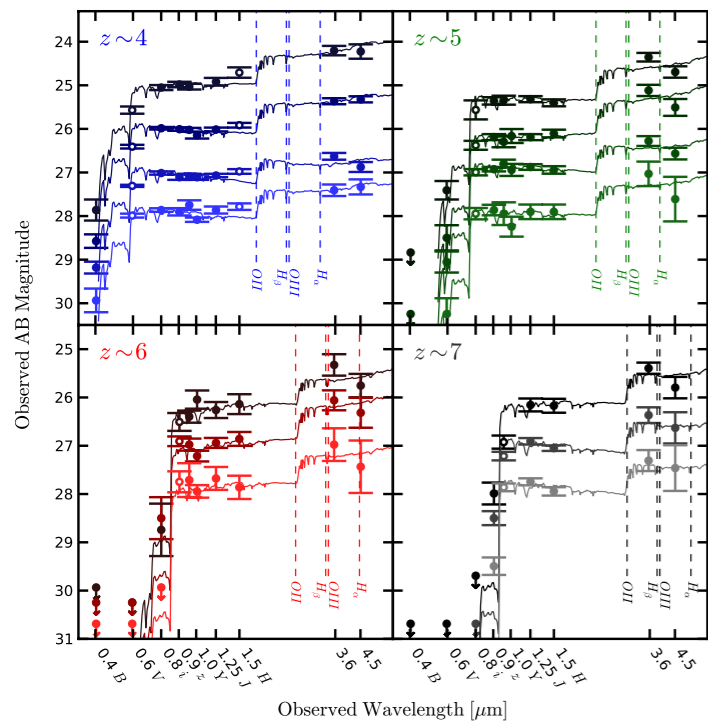
Requires adequate dust corrections.



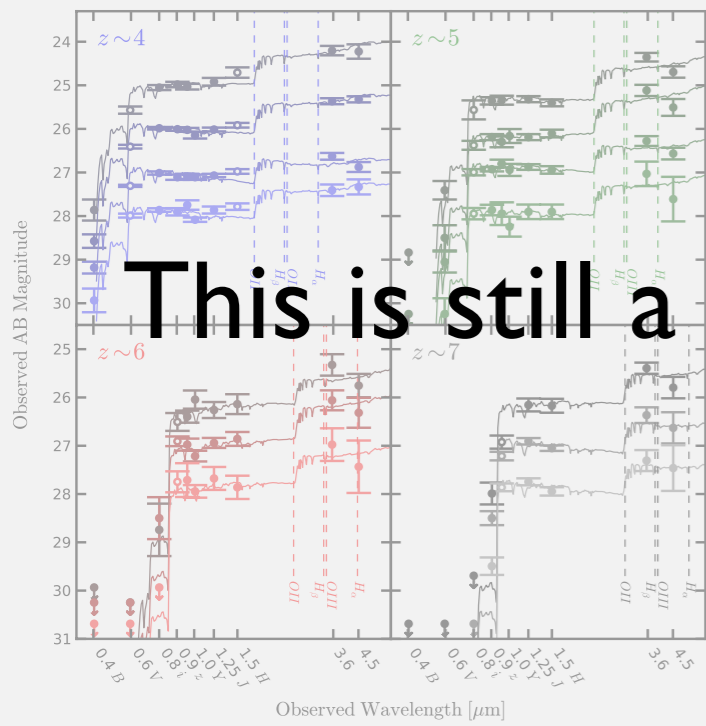
González et al. (2010)



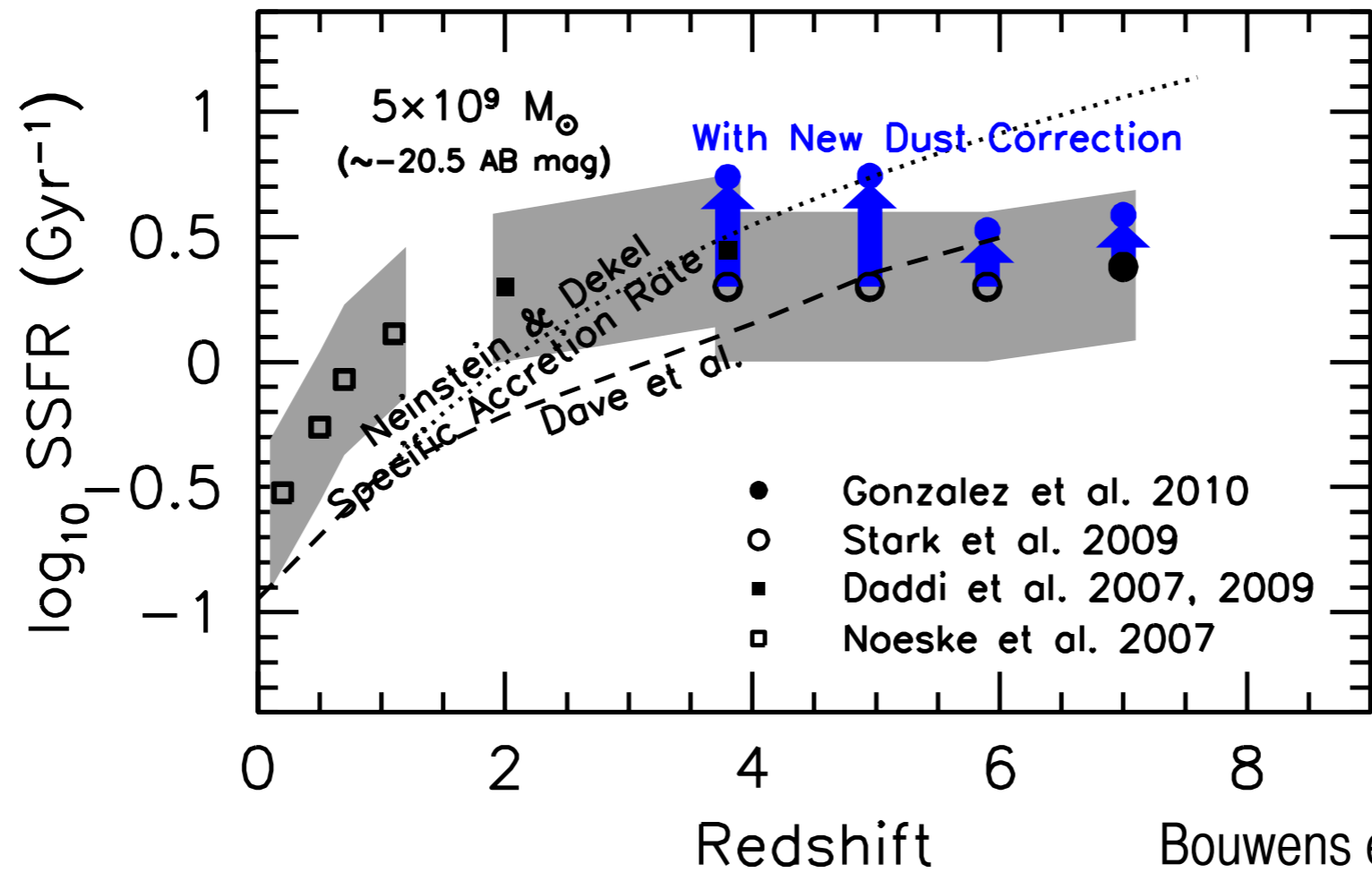
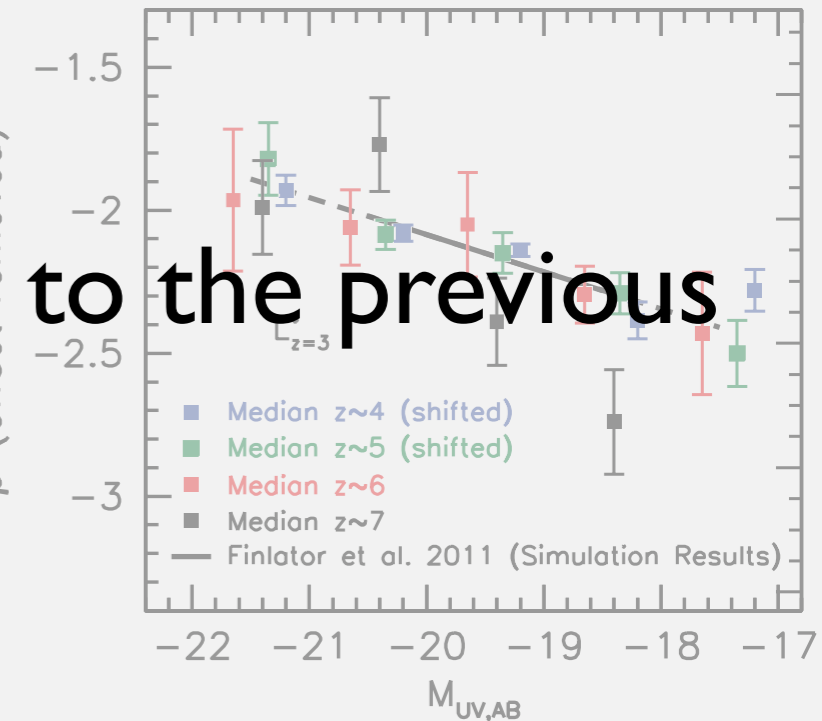
Latest measurements of β to estimate $E(B-V)$ (using, e.g., Meurer et al. '99 relation)



Bouwens et al. in prep.



This is still a rather simple correction to the previous results.

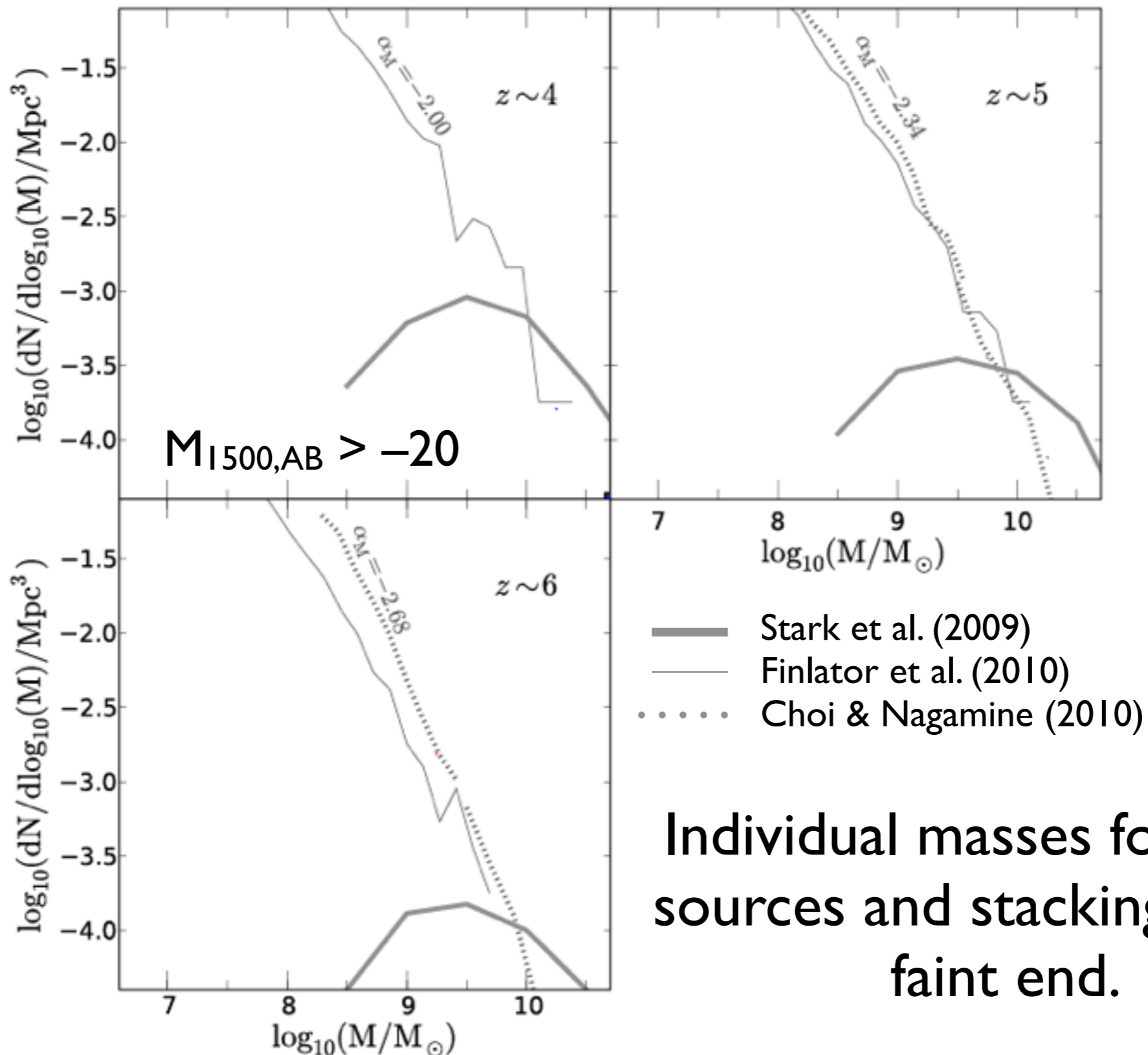


Bouwens et al. in prep.

The Stellar Mass Functions

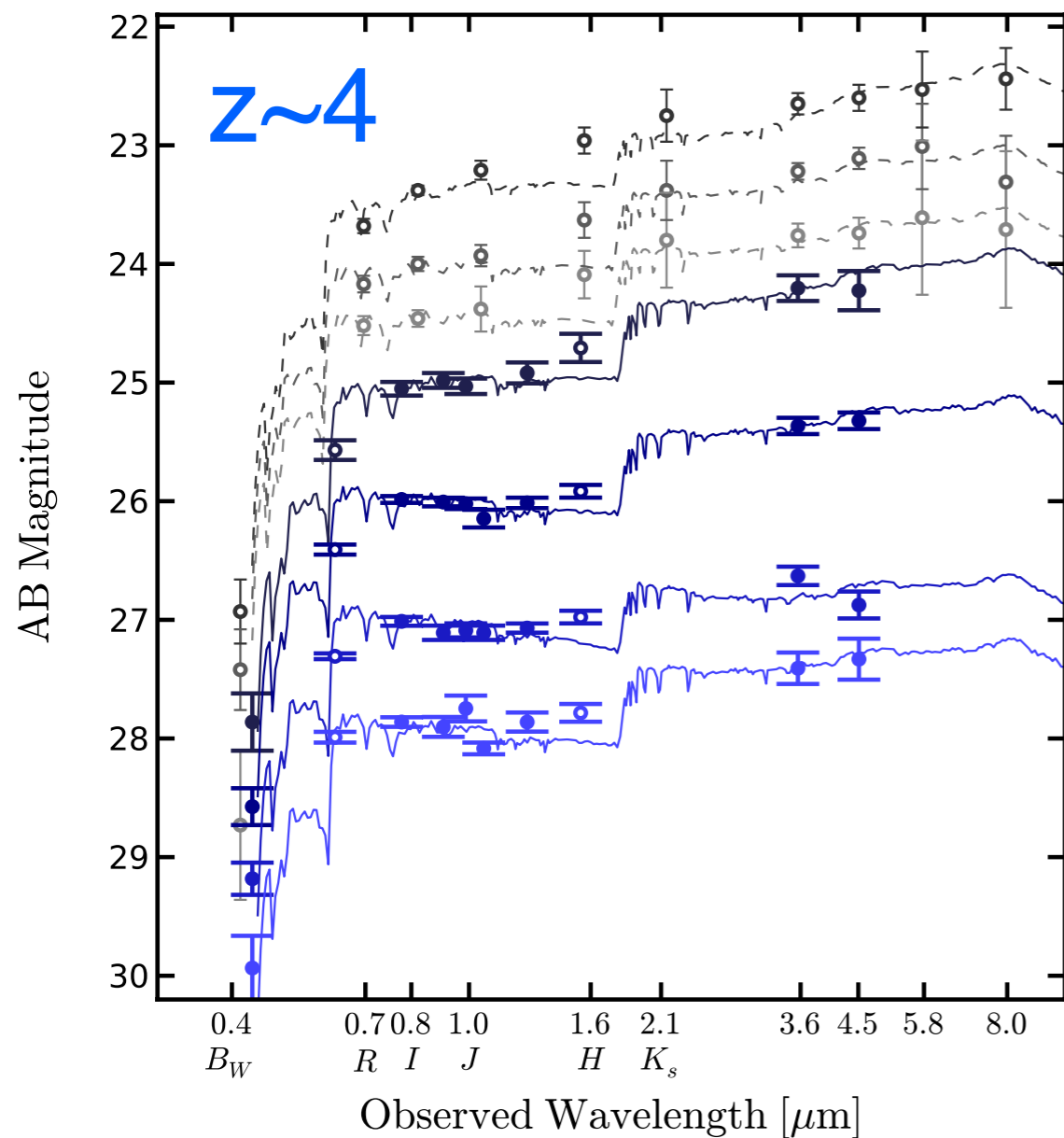
The Stellar Mass Functions as of 2009.

Data on individual sources not deep enough.

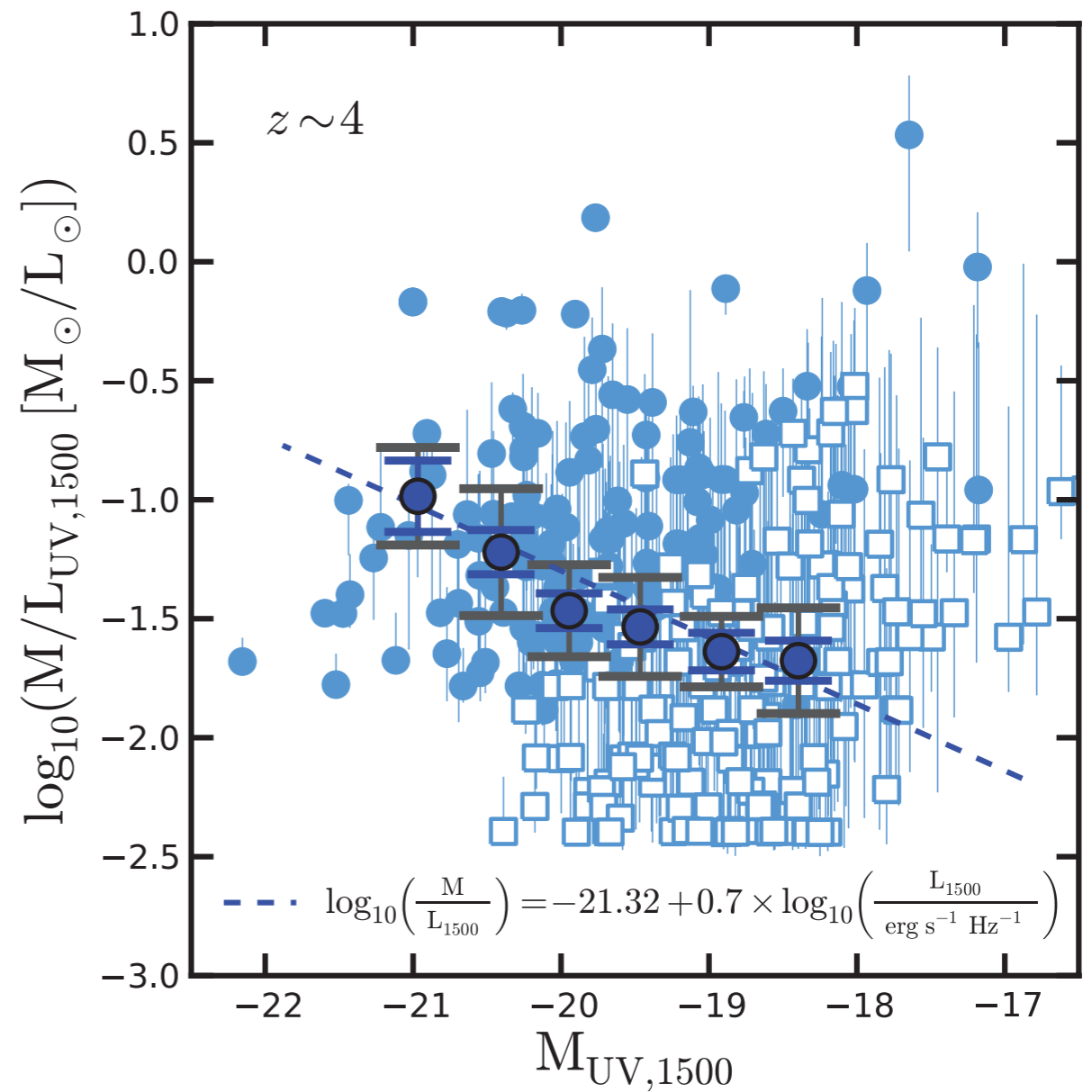


Individual masses for bright sources and stacking for the faint end.

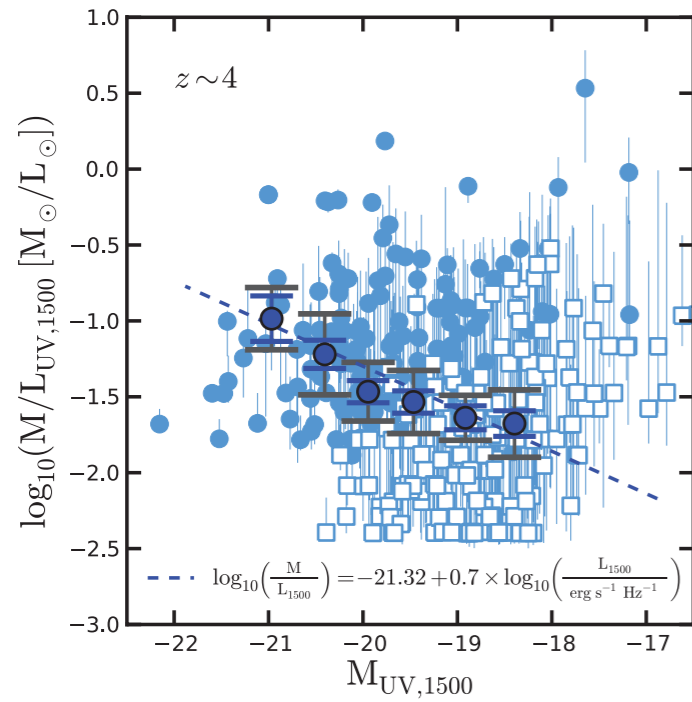
At a given redshift, the SED varies with luminosity.
 Reflected in the the M/L ratio vs UV luminosity.



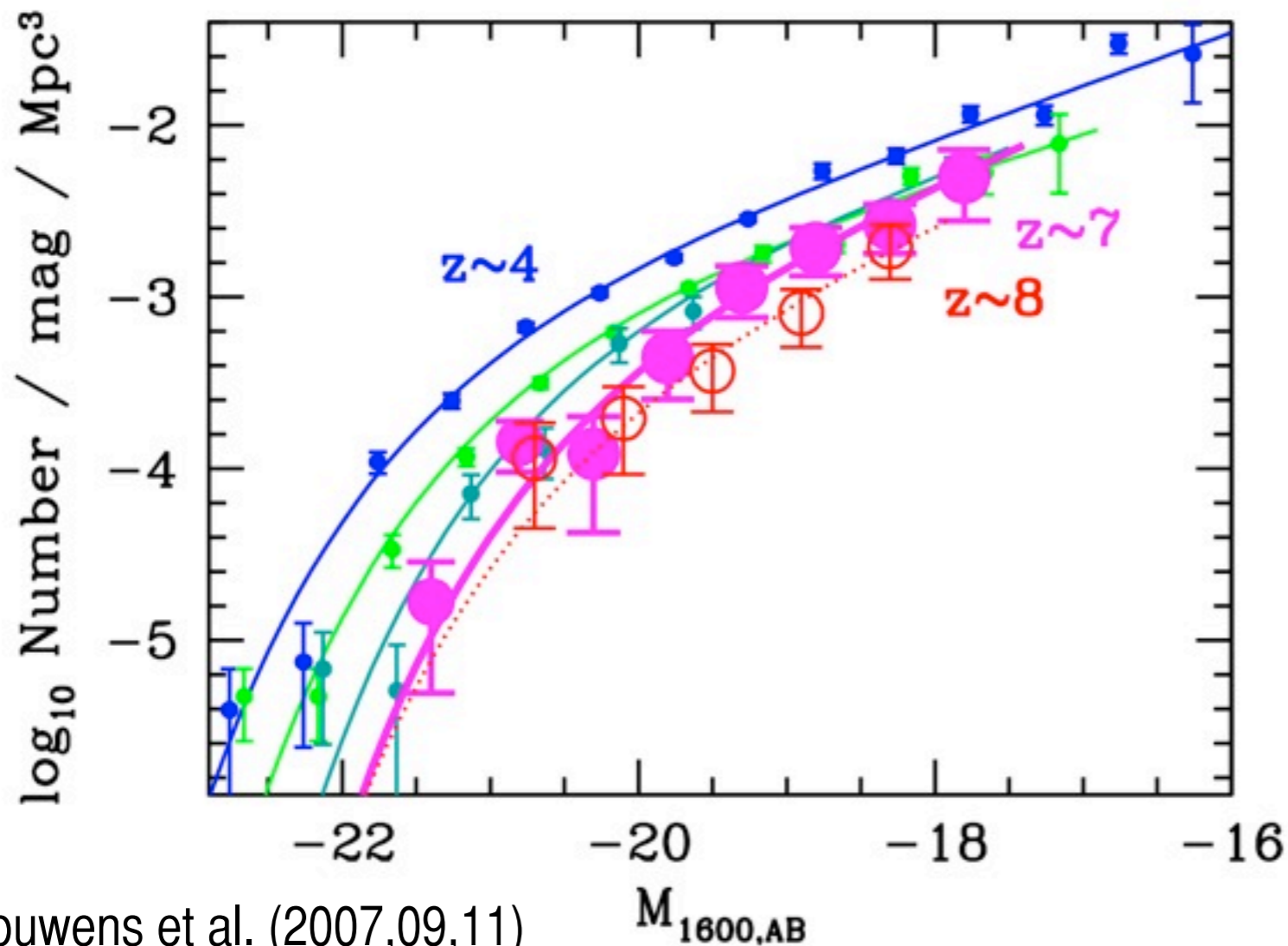
Lee et al. (2011) and
 González et al. in prep.



González et al. (2011)



Combine with the UV-LF to derive Stellar Mass Functions

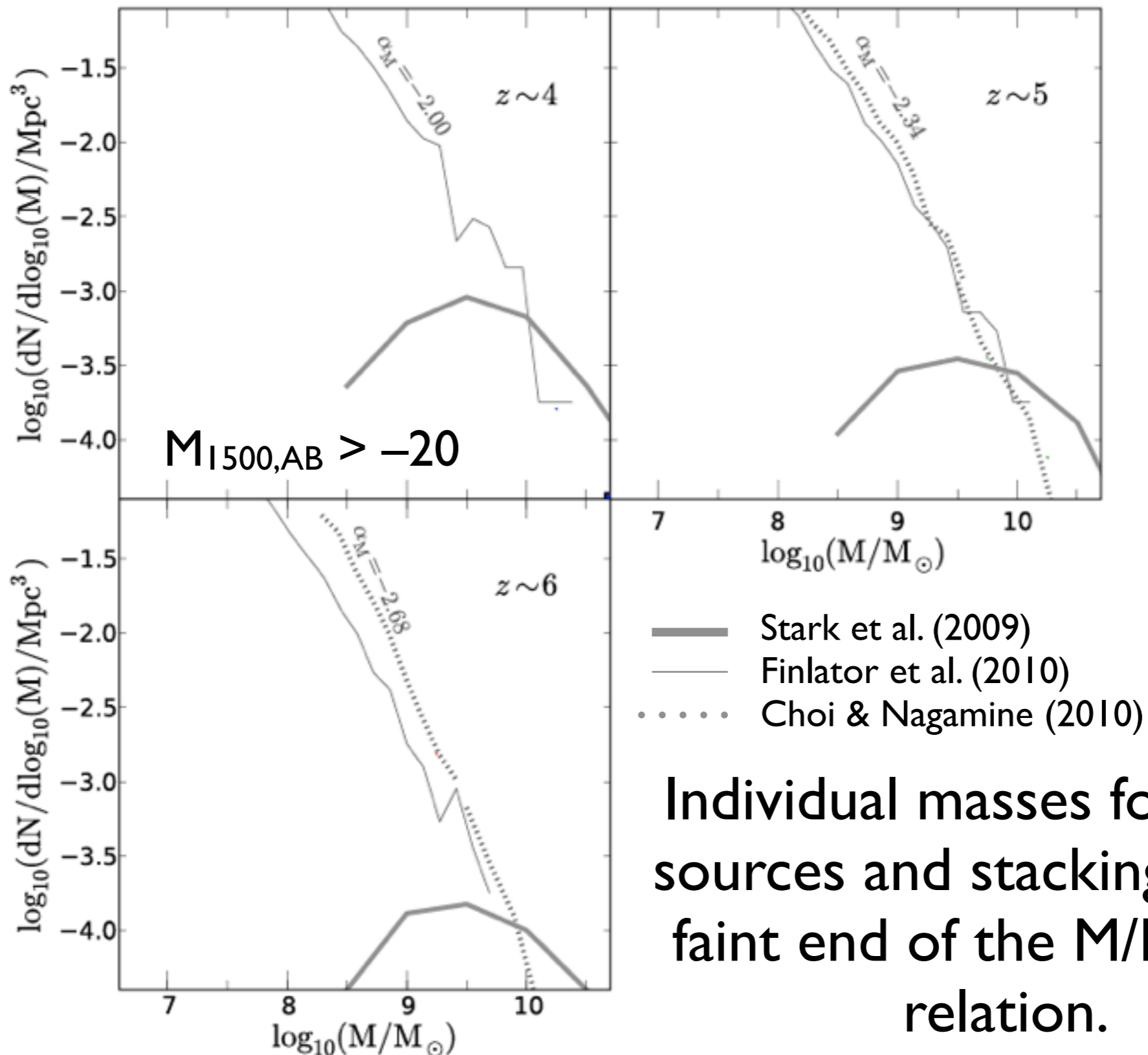


- UV-LF are deep.
- Contamination corrections.
- Completeness corrections.

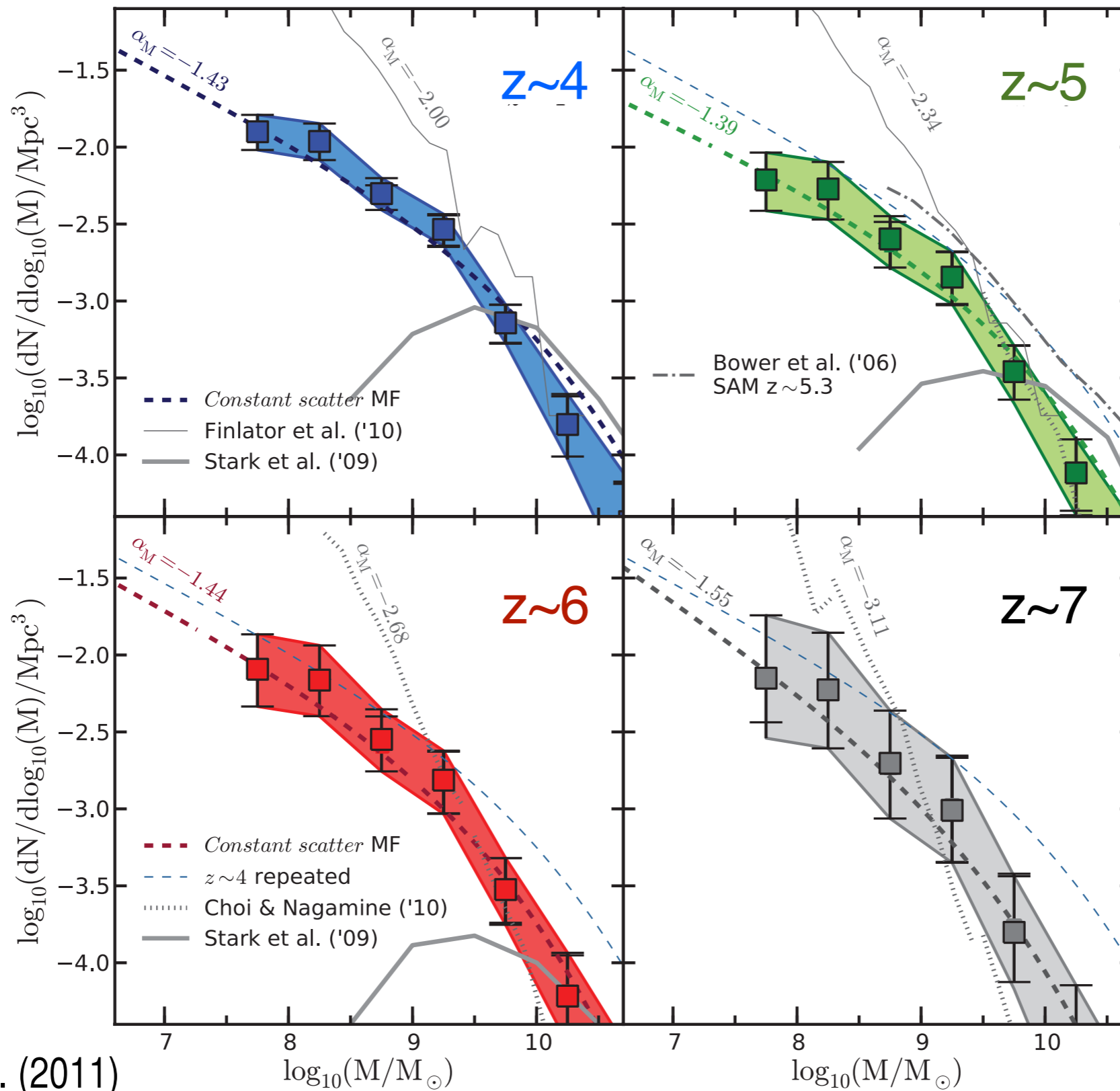
This is very hard to replicate for a Mass selected sample.

The Stellar Mass Functions as of 2009.

Data on individual sources not deep enough.

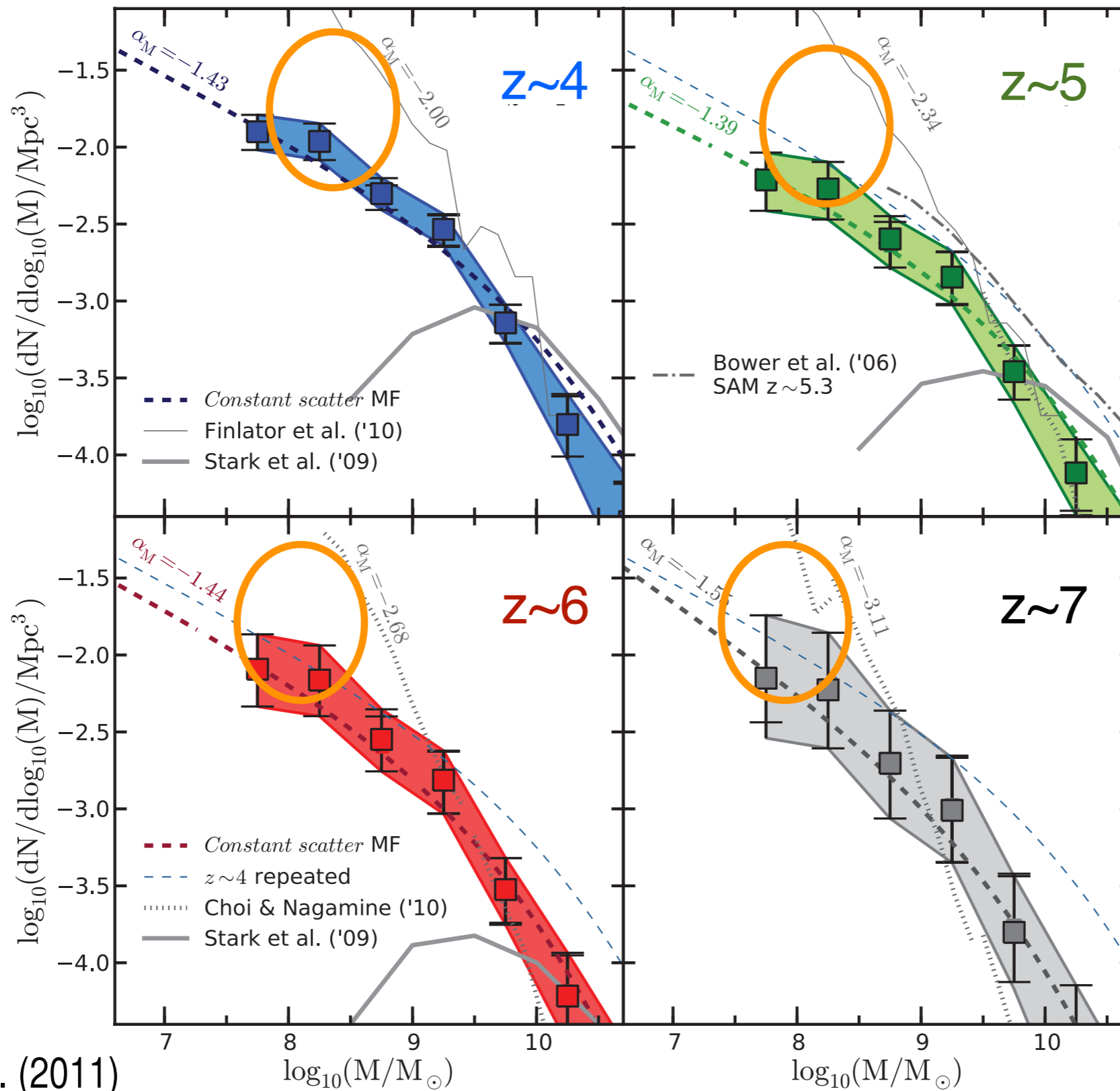


The Stellar Mass Functions



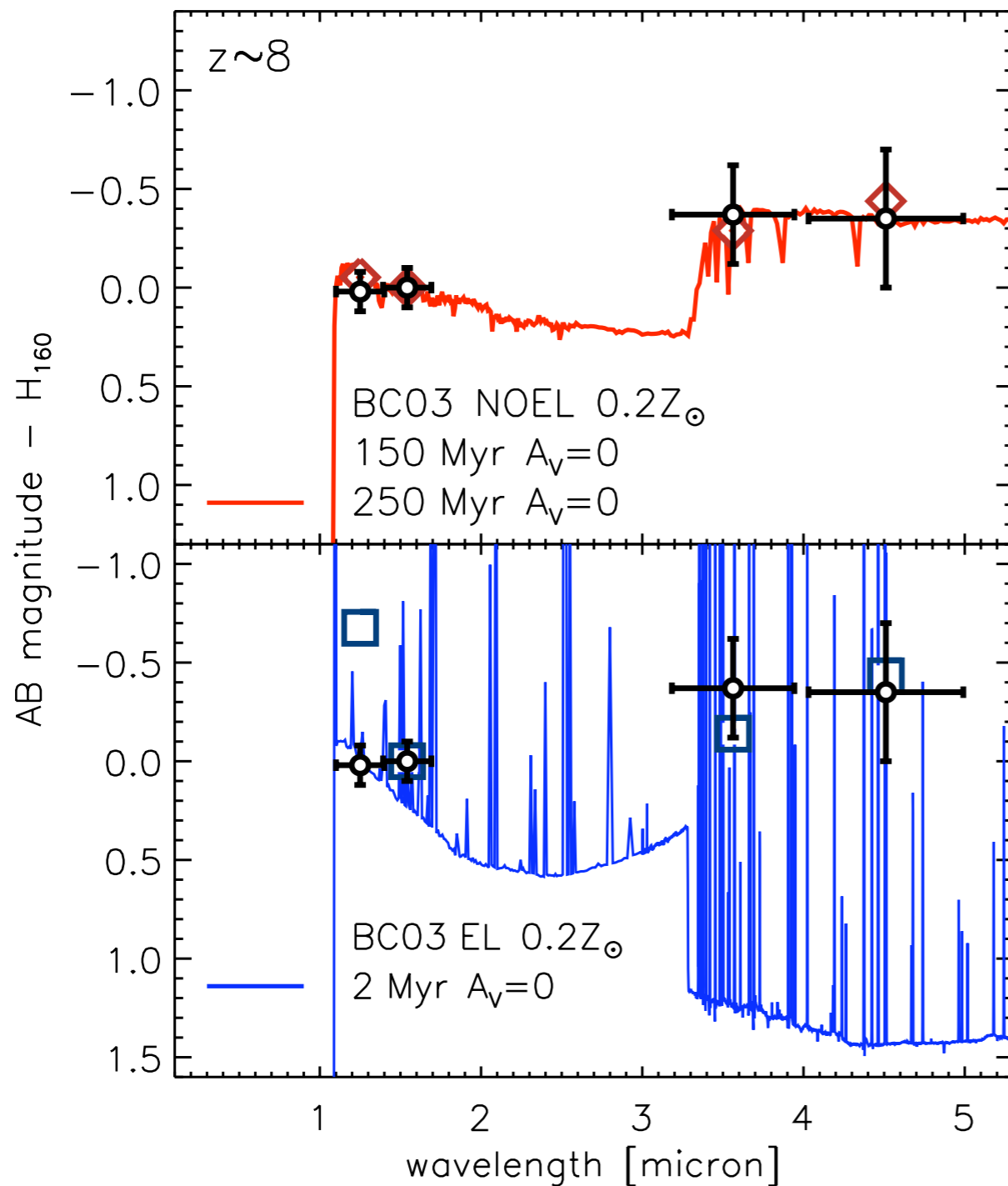
González et al. (2011)

The Stellar Mass Functions



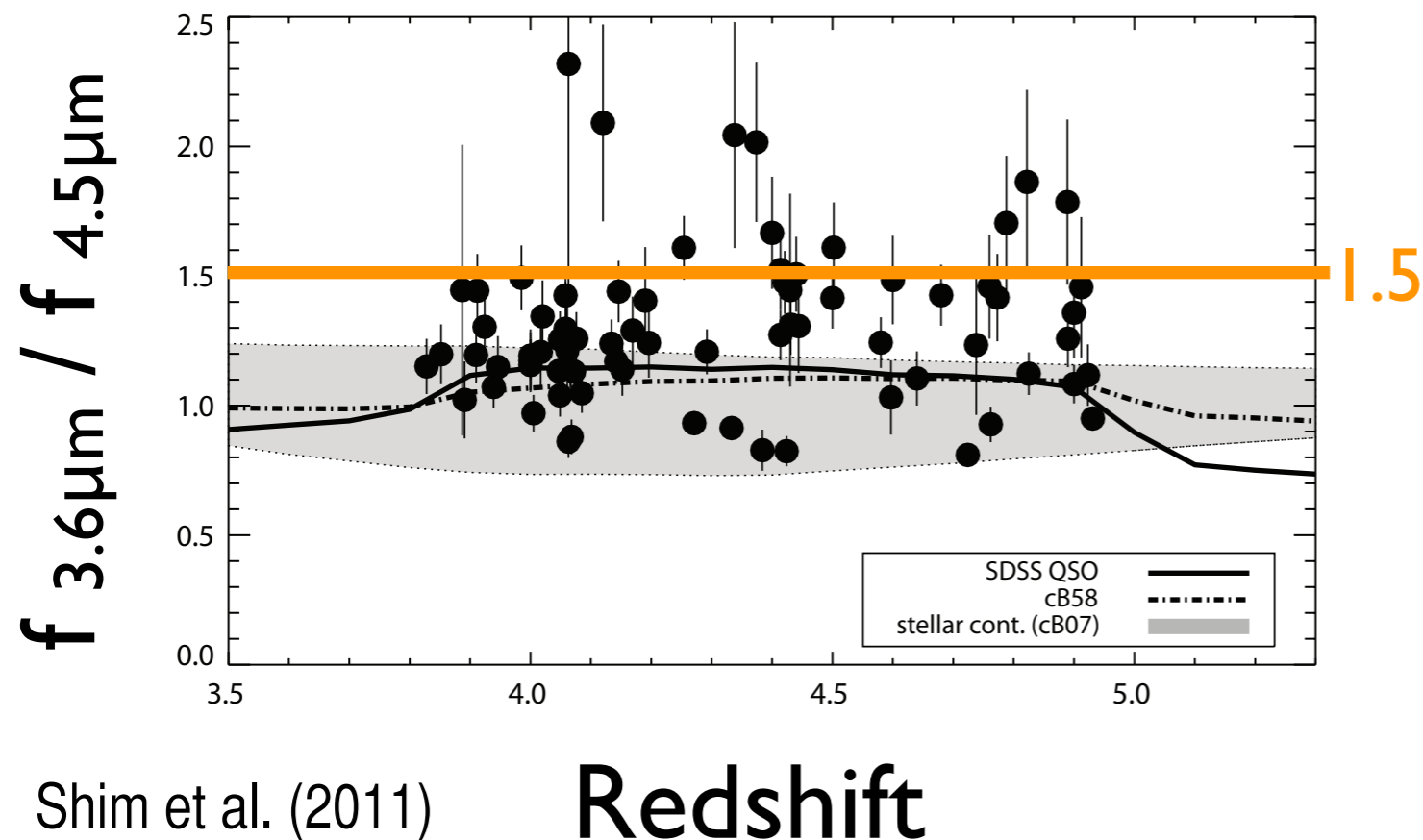
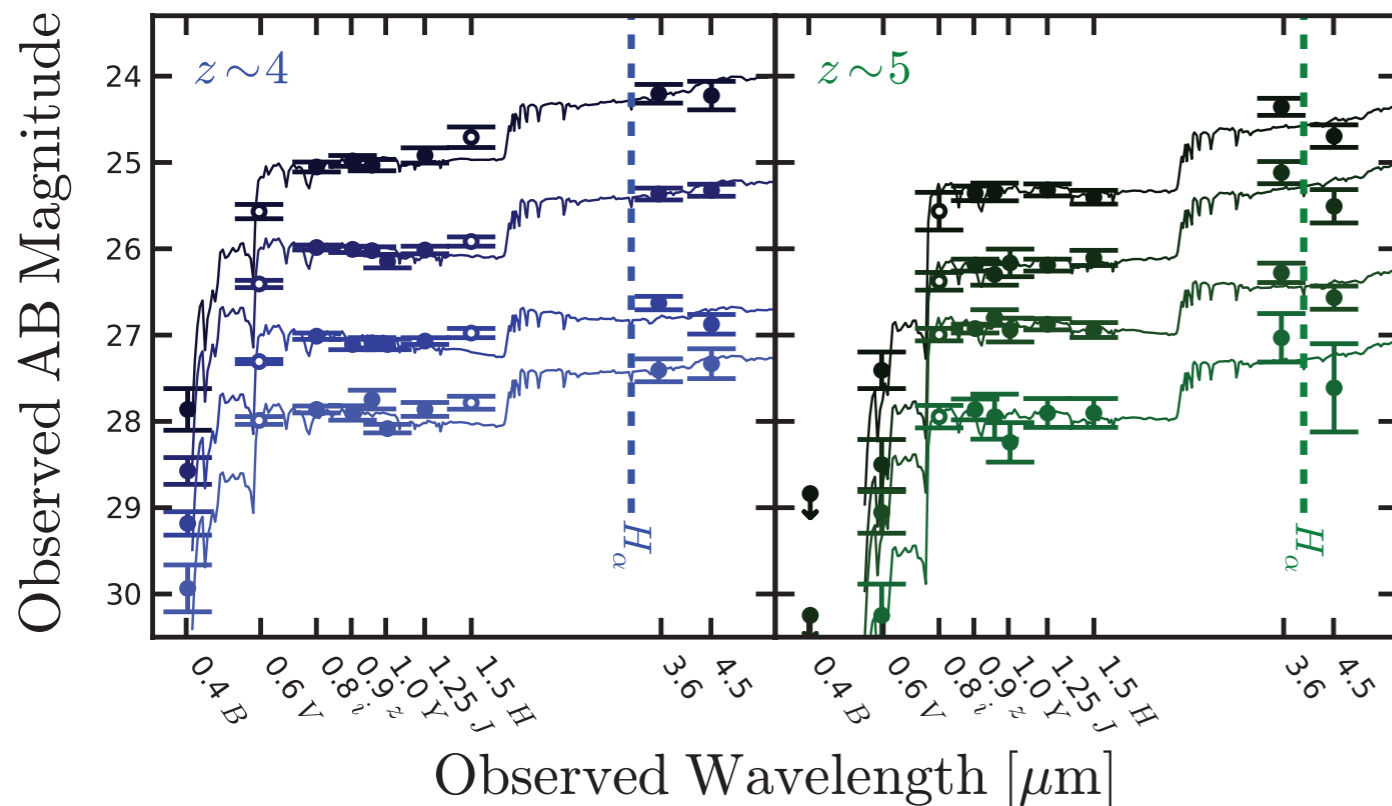
González et al. (2011)

Are we really seen Balmer Breaks?



Emission lines are expected, especially for rising SFHs.

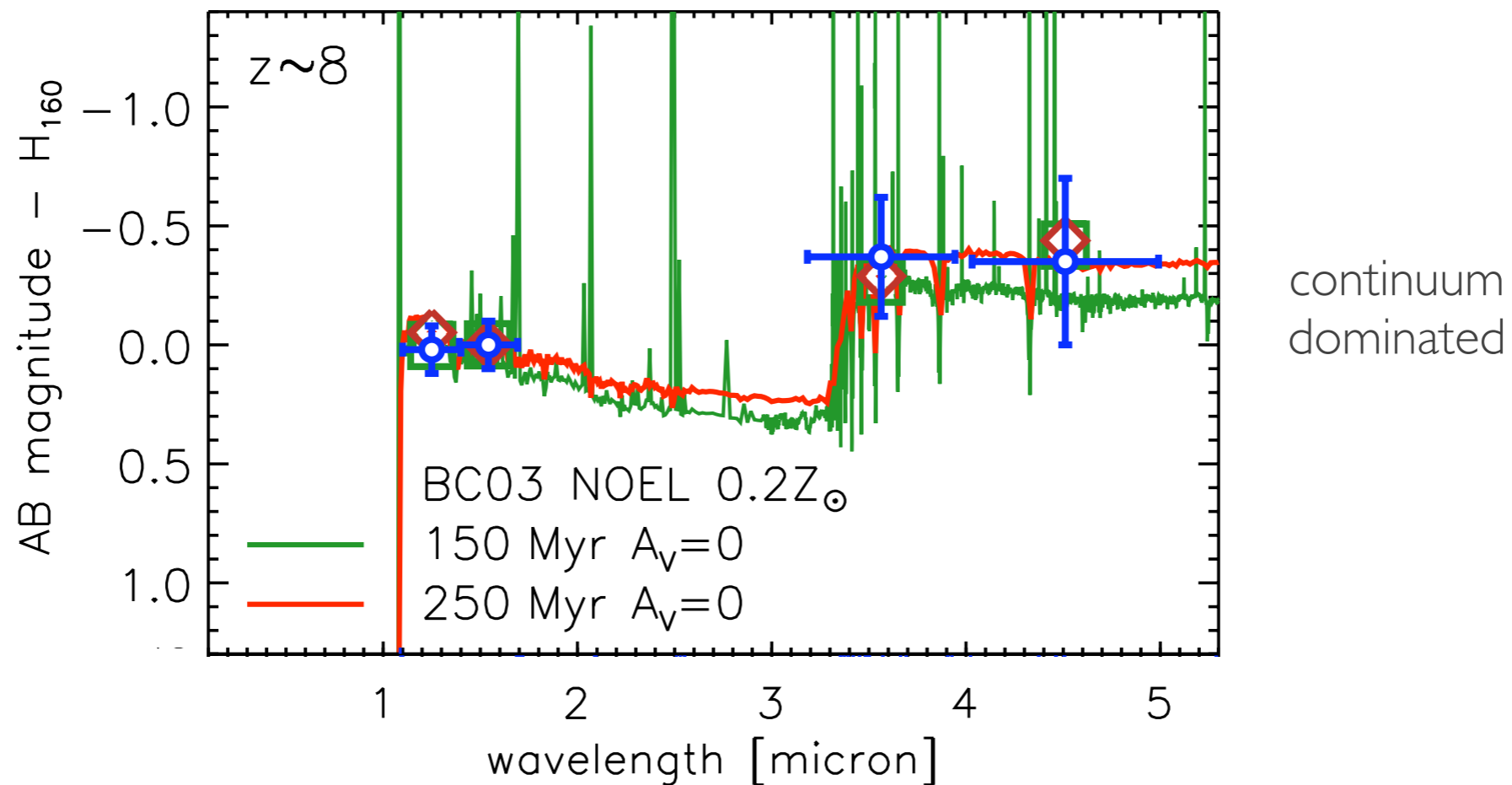
Is the rest-frame optical dominated by these emission lines?
(Schaerer and de Barros 2009, 2010)



Shim et al. (2011)

- At $z \sim 3.8 - 5.0$ H_{α} contaminates the [3.6] channel of IRAC while [4.5] remains fairly clean.
- Requires spectroscopic redshifts.
- Shim et al. (2011) finds continuum at [4.5]
- Also look for [3.6] excess over [4.5]. Some sources show signs of very strong H_{α} emission.

If continuum dominated plus emission lines,
the picture largely holds.



But notice that Ages, Stellar Masses, sSFR will require adjustments (possibly factors $\times 1.5-2$).

Other uncertainties remain: Dust, SFH, Metallicity.

Summary

- Spitzer/IRAC provides valuable constraints to estimate Stellar Masses and M/L_{UV} ratios.
- The median SEDs (rest-frame UV to Optical) of $z \sim 4-7$ star forming galaxies are remarkably similar.
- Latest dust estimates provide update to sSFR plateau especially at $z \sim 4-5$ (considerable uncertainties in the modeling remain).
- Variable M/L_{UV} ratio + UV Luminosity Functions \Rightarrow Steep Mass Functions (slopes ~ -1.45).
- Models: good agreement at massive end but models over-produce number of low mass sources
- Emission lines are probably present and corrections will be required (extreme emission line dominated models?).
- Several other uncertainties remain: SFH, metallicity, dust, IMF.