Dust Obscuration of L* Galaxies at z~2: Implications for LAEs and the Missing Stellar Mass Problem

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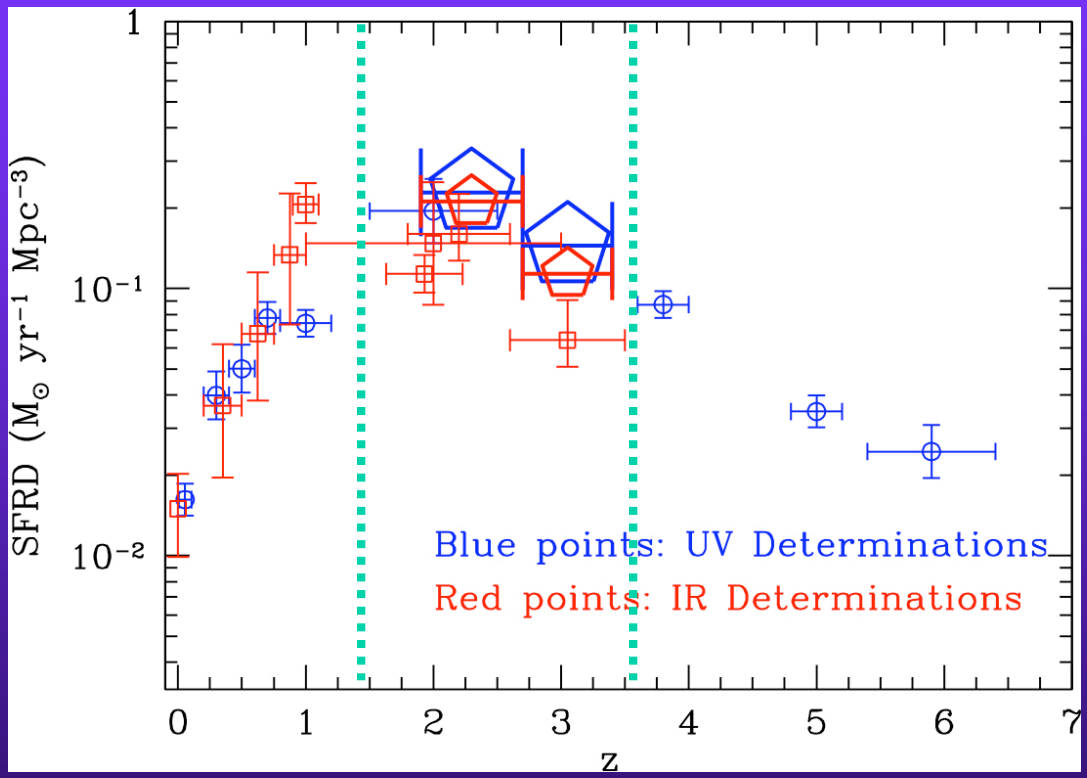
Why z~2-3 is Interesting



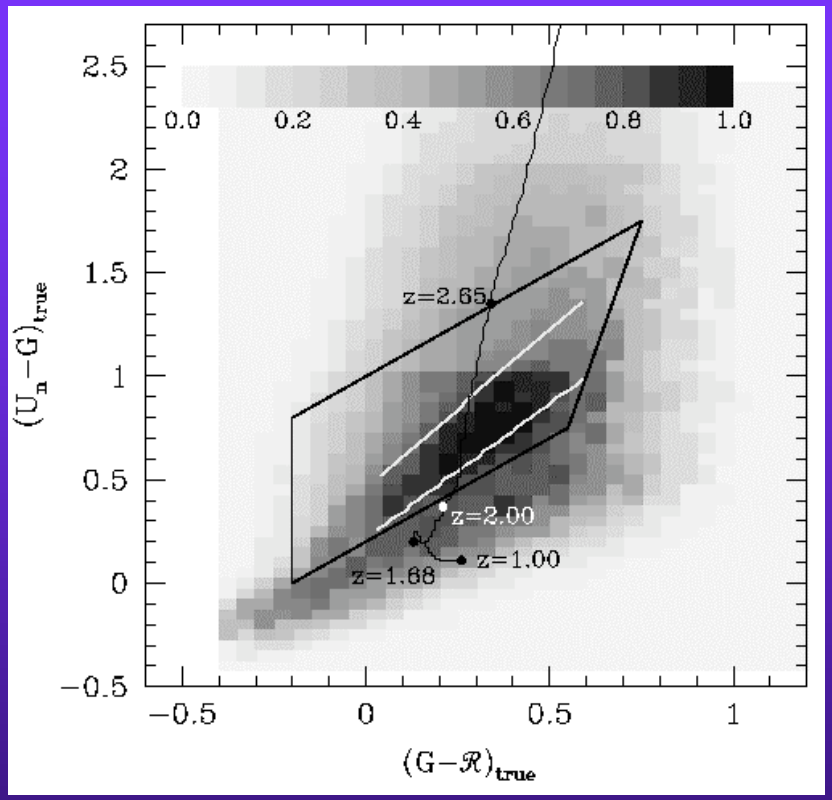
Reddy et al 2008a

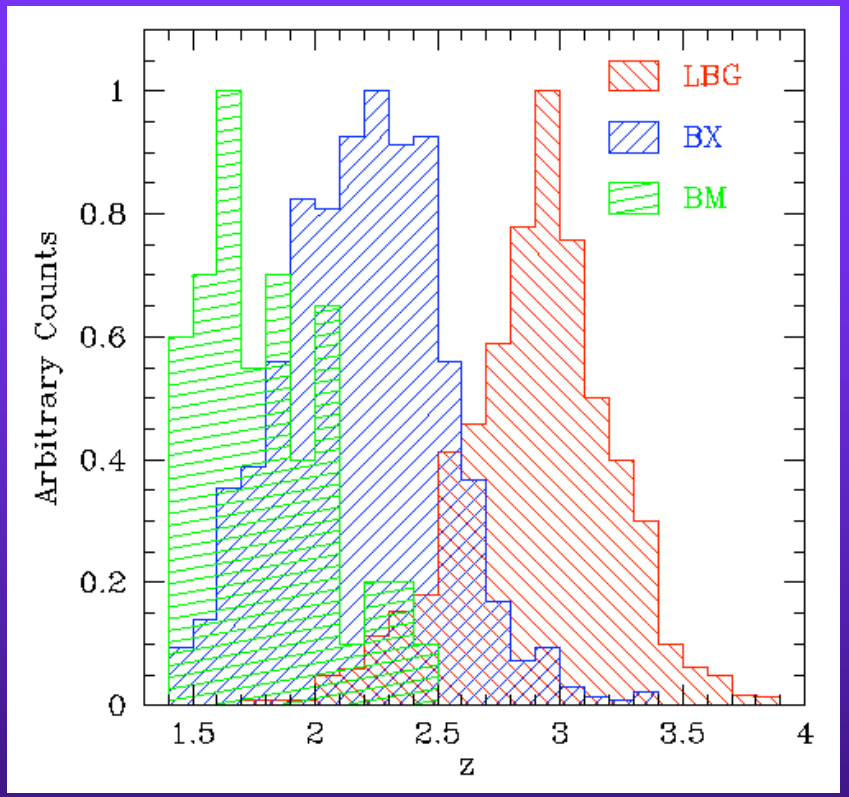
>50% of the stars in the present-day universe formed in the interval 3.5 > z > 1.5; peak of quasar activity

Can watch all of the effects that shaped the present-day universe while they were happening

Galaxies still bright enough for spectroscopic study on 8-10 m class telescopes

Rest-UV Selection at z~2-3

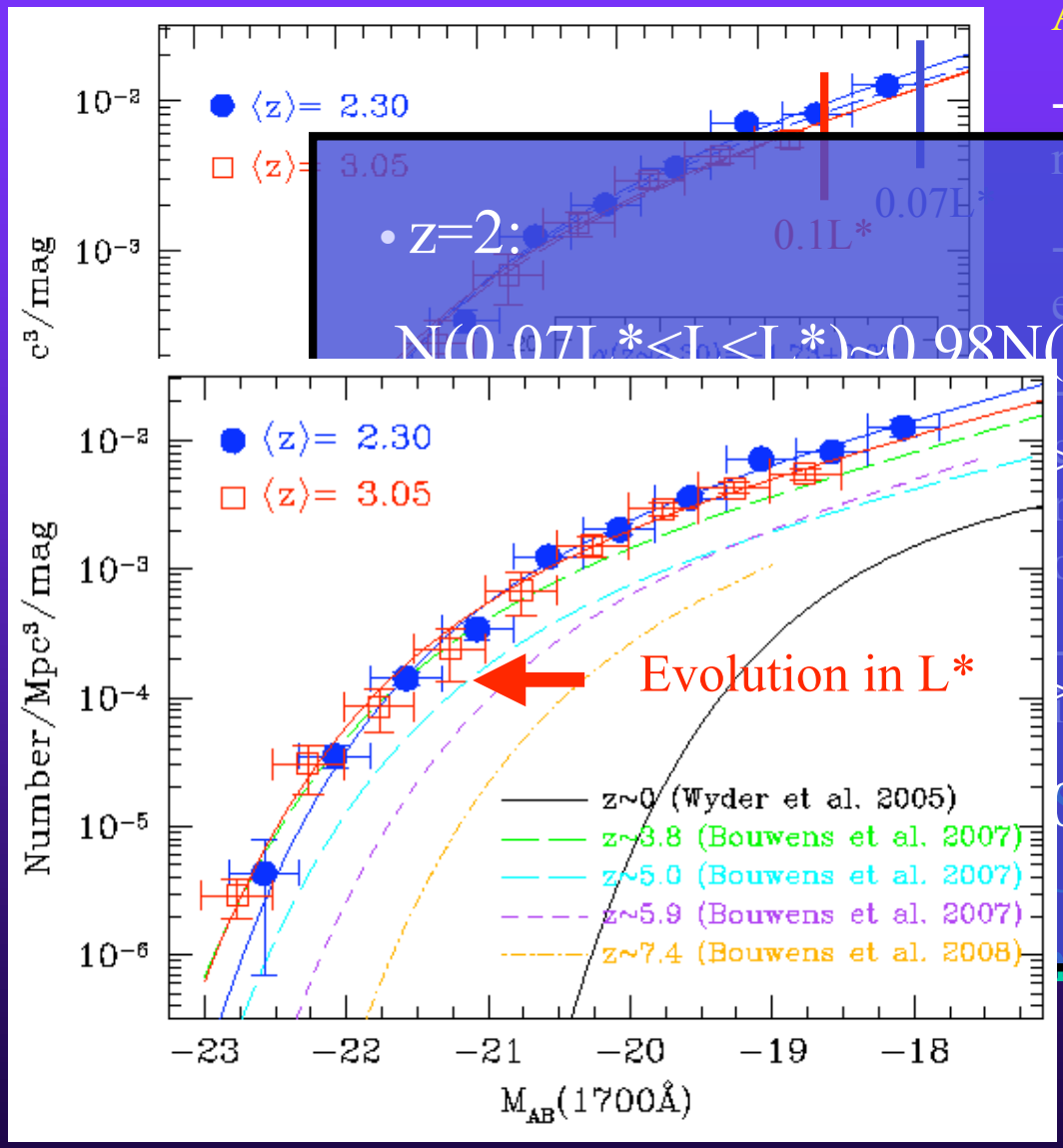




>2000 spec-z's (1.5<z<3.5) with Keck/LRIS

~31000 LBGs (31 fields) in total ~0.9 sq. deg

Results on the UV LF at z~2-3



- z=2:

N(0.07L*<L<L*)~0.98N(>0.07L*)

>0.07L*)

>0.1L*)

0.1L*)

Advantages of our analysis

- > 2000 spectroscopic redshifts at the bright-end

- modeling of systematic effects

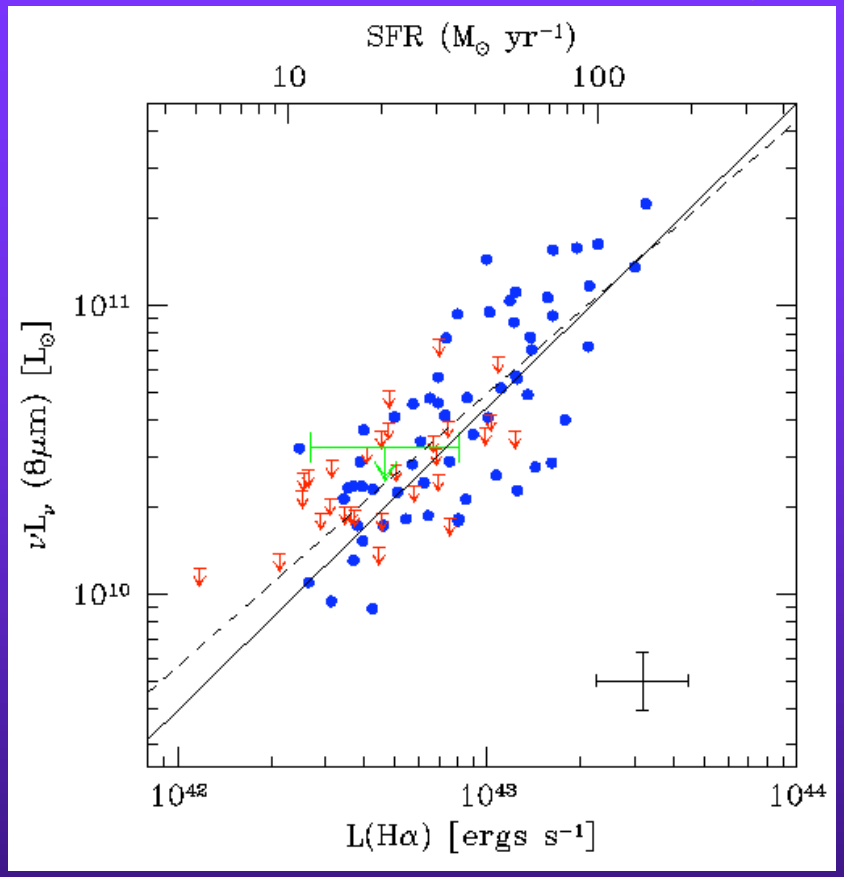
- maximum-likelihood

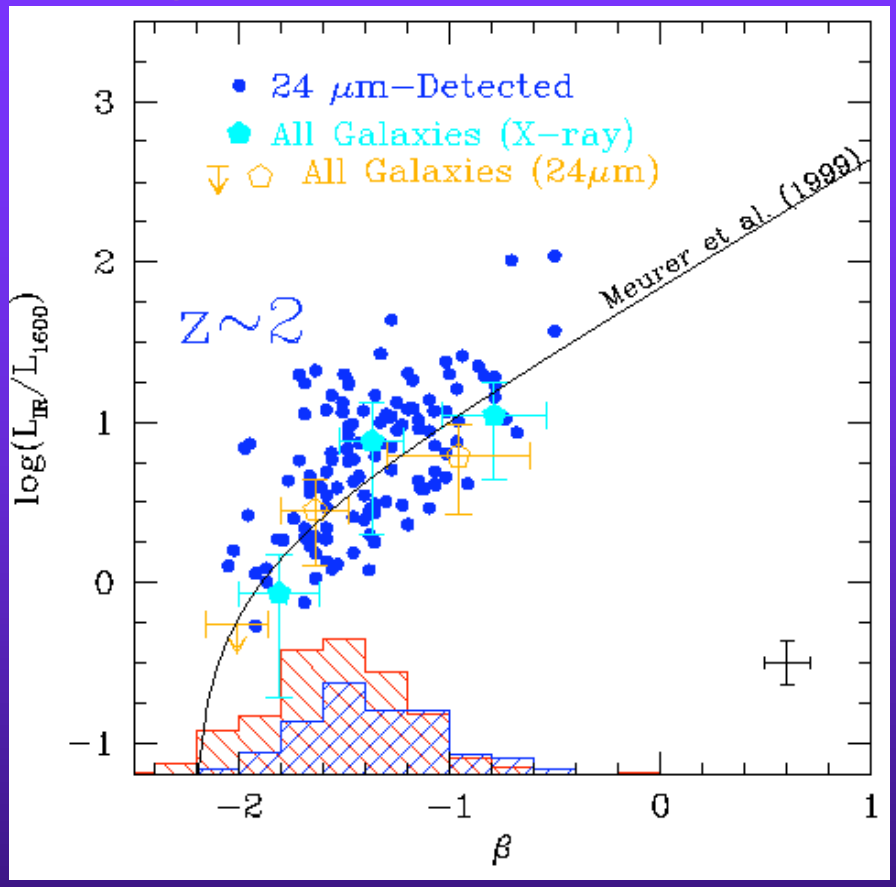
on LF that are robust to non-uniform sources of scatter

31000 LBGs in 31 independent fields

faint-end slope of α -1.73, similar to that measured at z~4-6

Dust Extinction in Typical High Redshift Galaxies

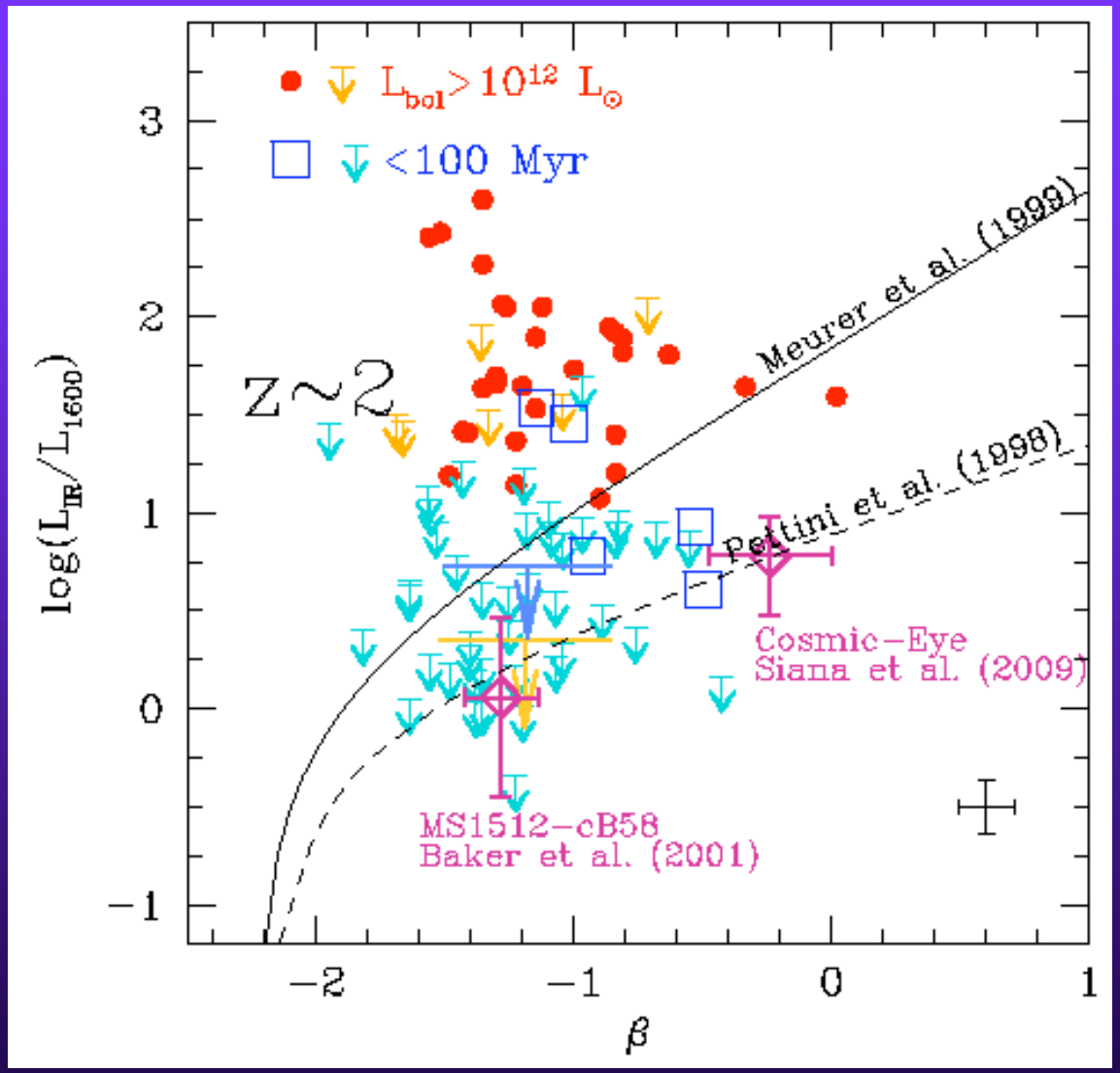




- Tight correlation between observed 24 micron (rest-frame 8 micron) dust luminosity and Hα luminosity
- Correlation between UV slope and dust attenuation in L* galaxies at z~2

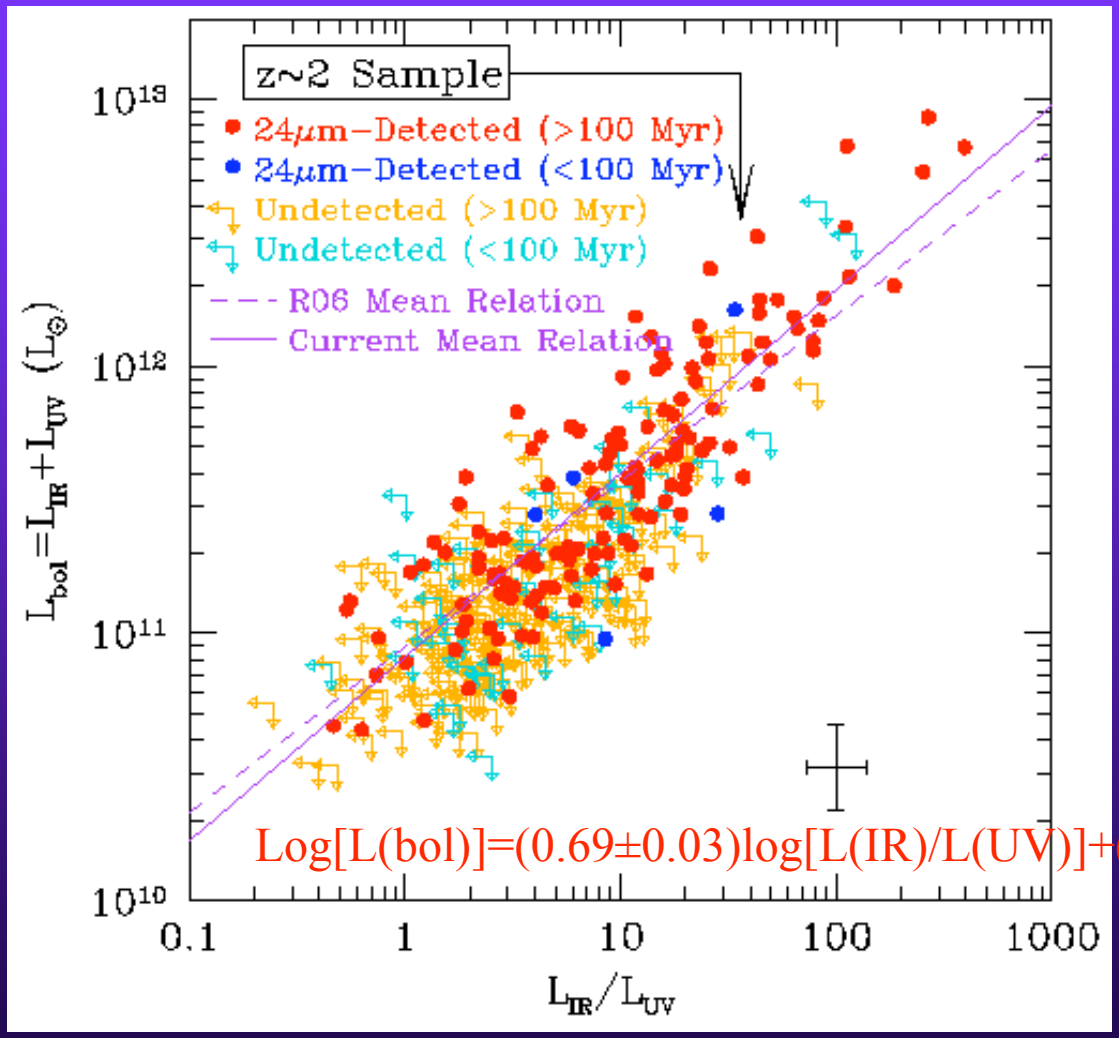
What about UV-faint galaxies?

Bolometrically Luminous / Young Galaxies at z~2



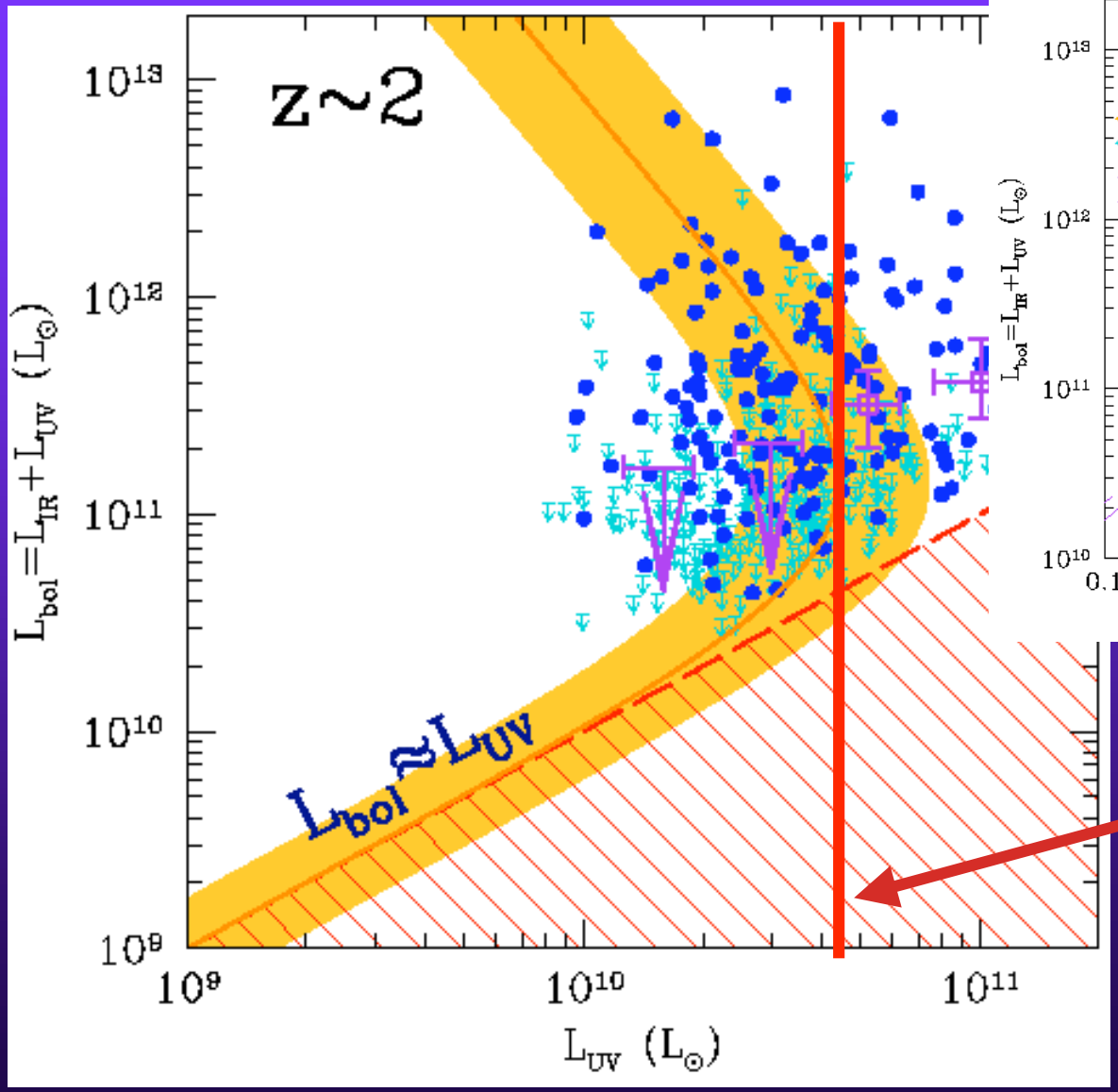
Lower Extinction at a given UV slope for galaxies <100 Myr

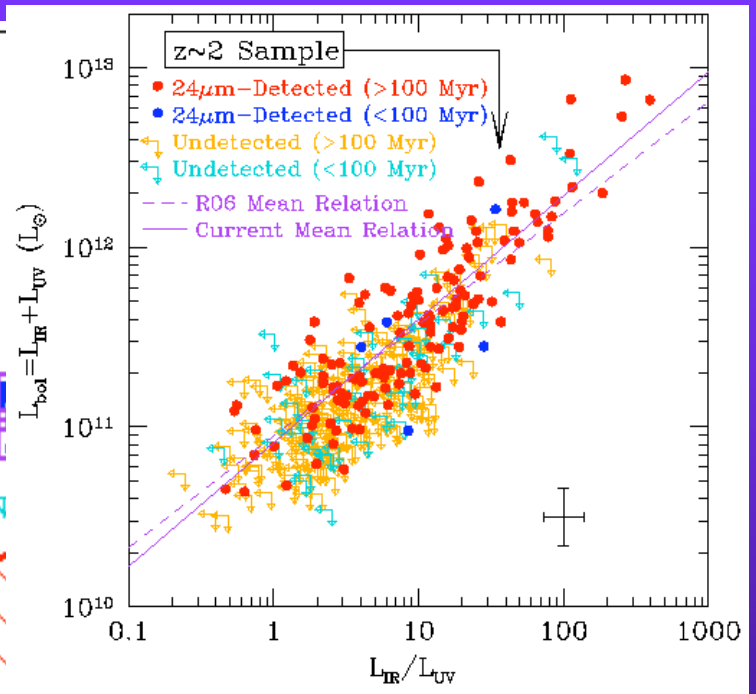
Correlation between Bolometric Luminosity and Dust Extinction at z~2



Log[L(bol)]=(0.69±0.03)log[L(IR)/L(UV)]+(10.91 ±0.04)

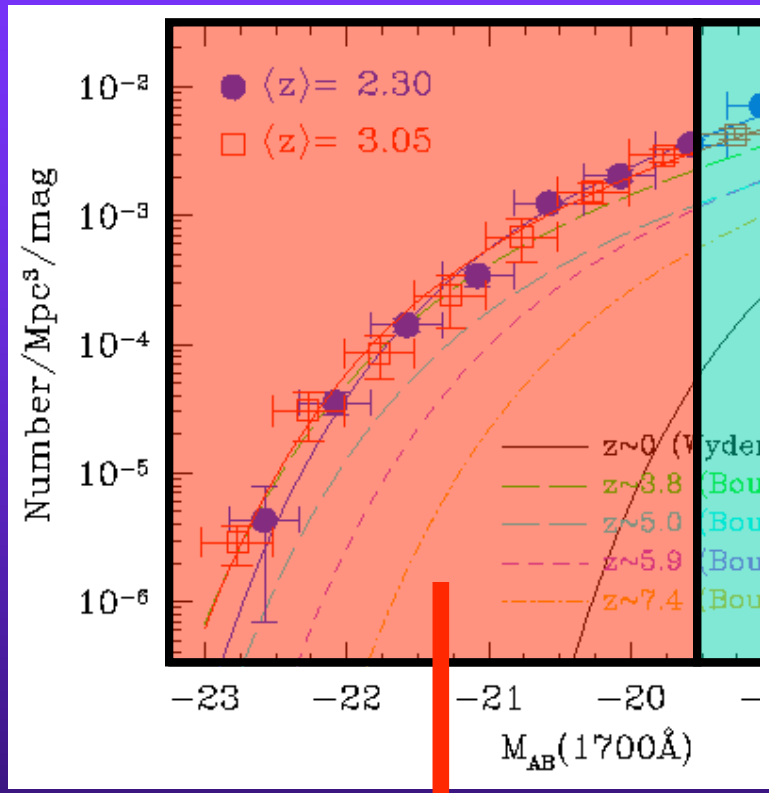
Bolometric and Observed UV Luminosities

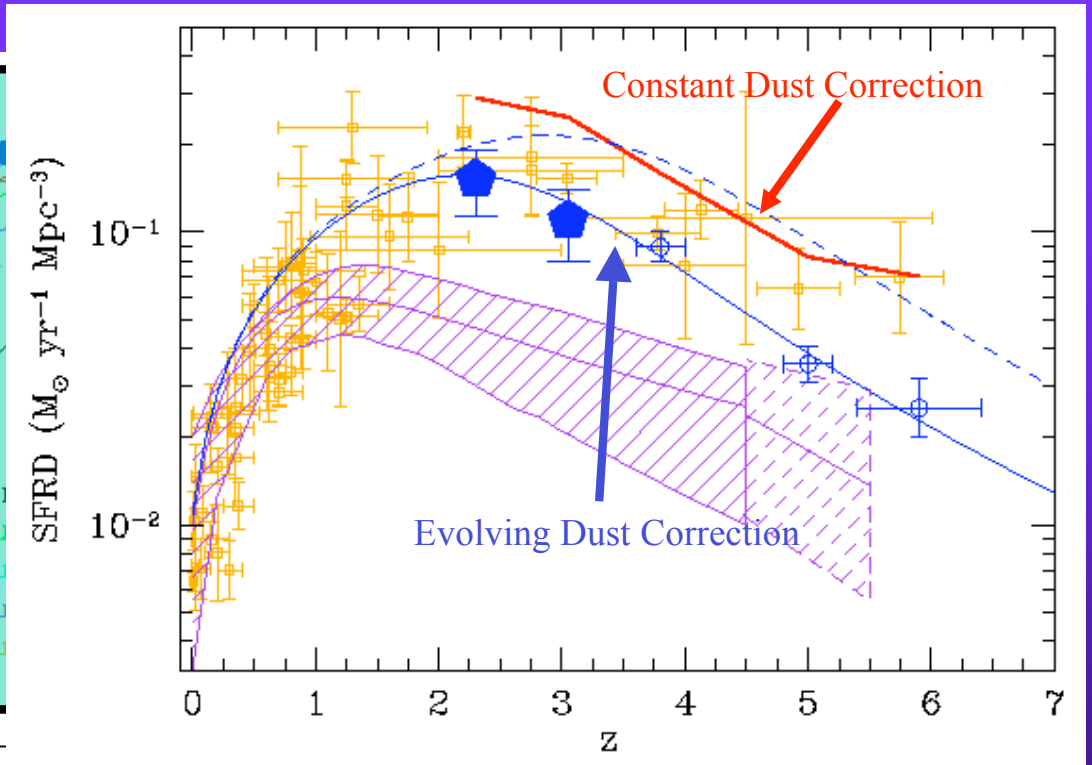




Saturation of UV luminosity around L*(UV)

Dust Corrections as a Function of UV Luminosity



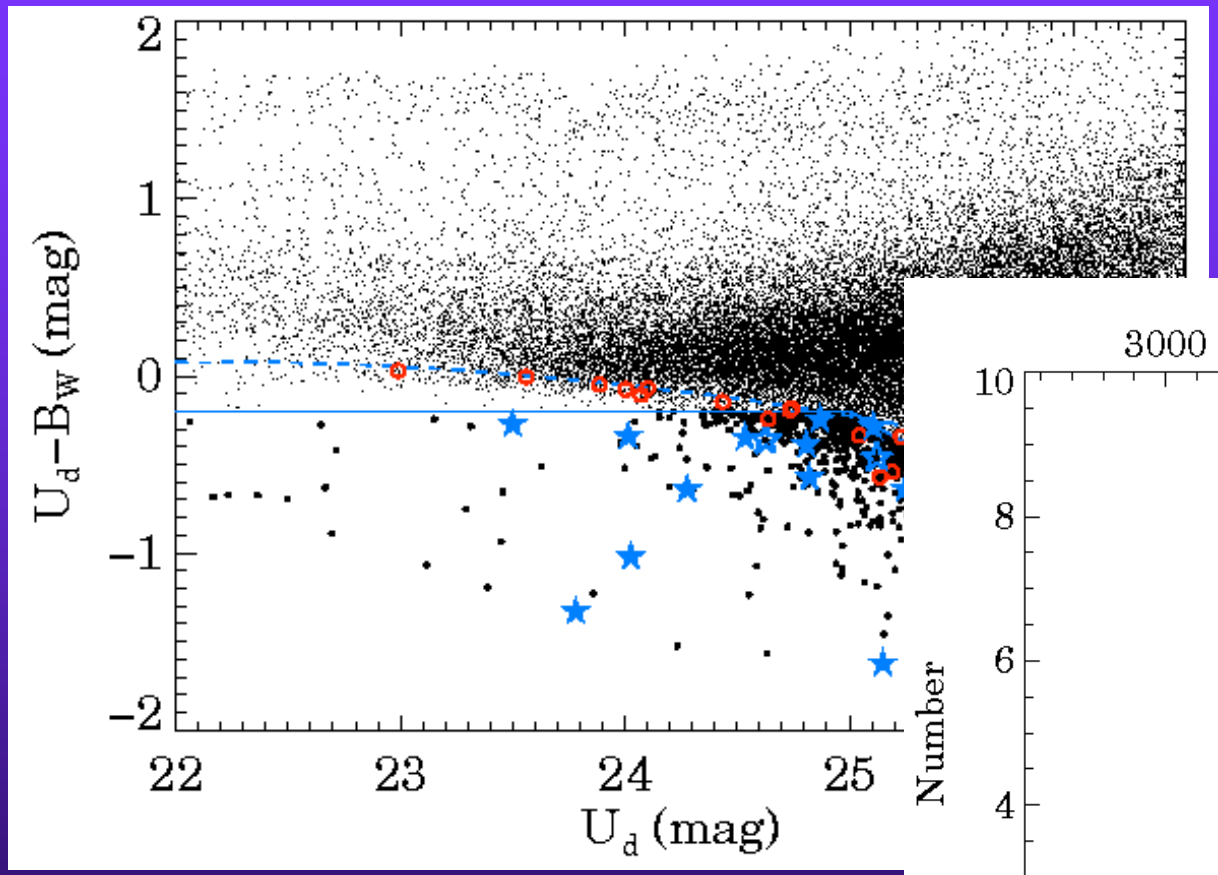


~4-5 dust correction

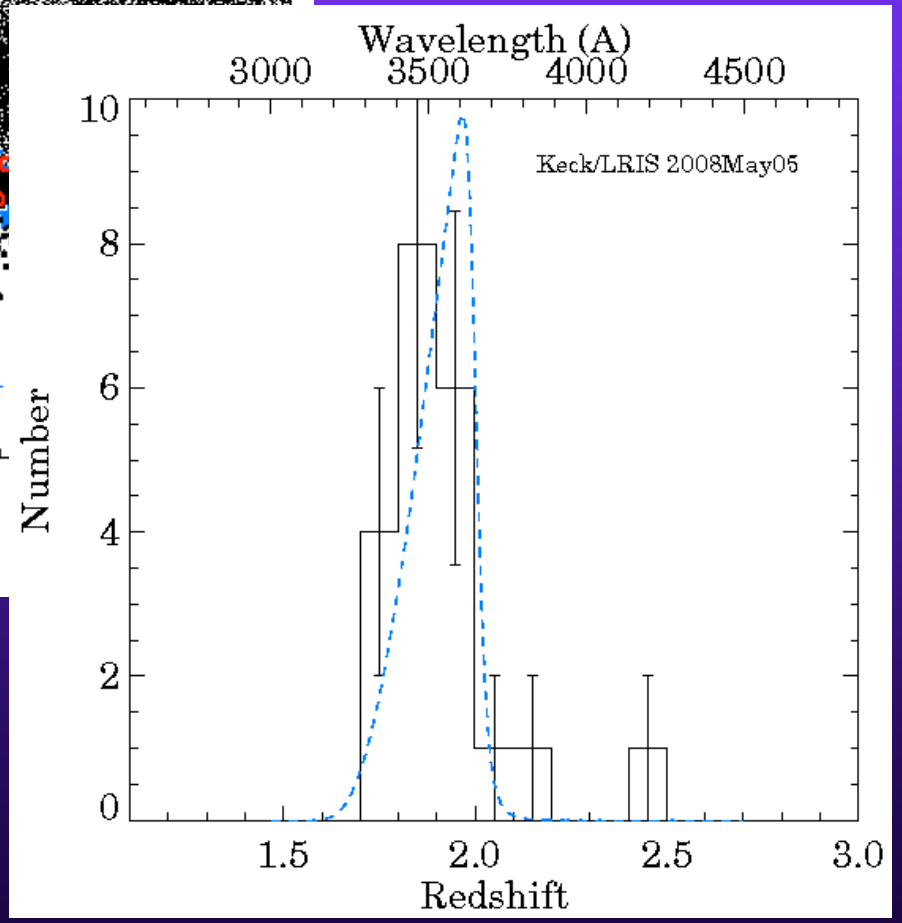
~2 dust correction

Mean Correction of ~2.5-3 for Total UV Luminosity Density

LAEs at Low Redshift (z~1.9)

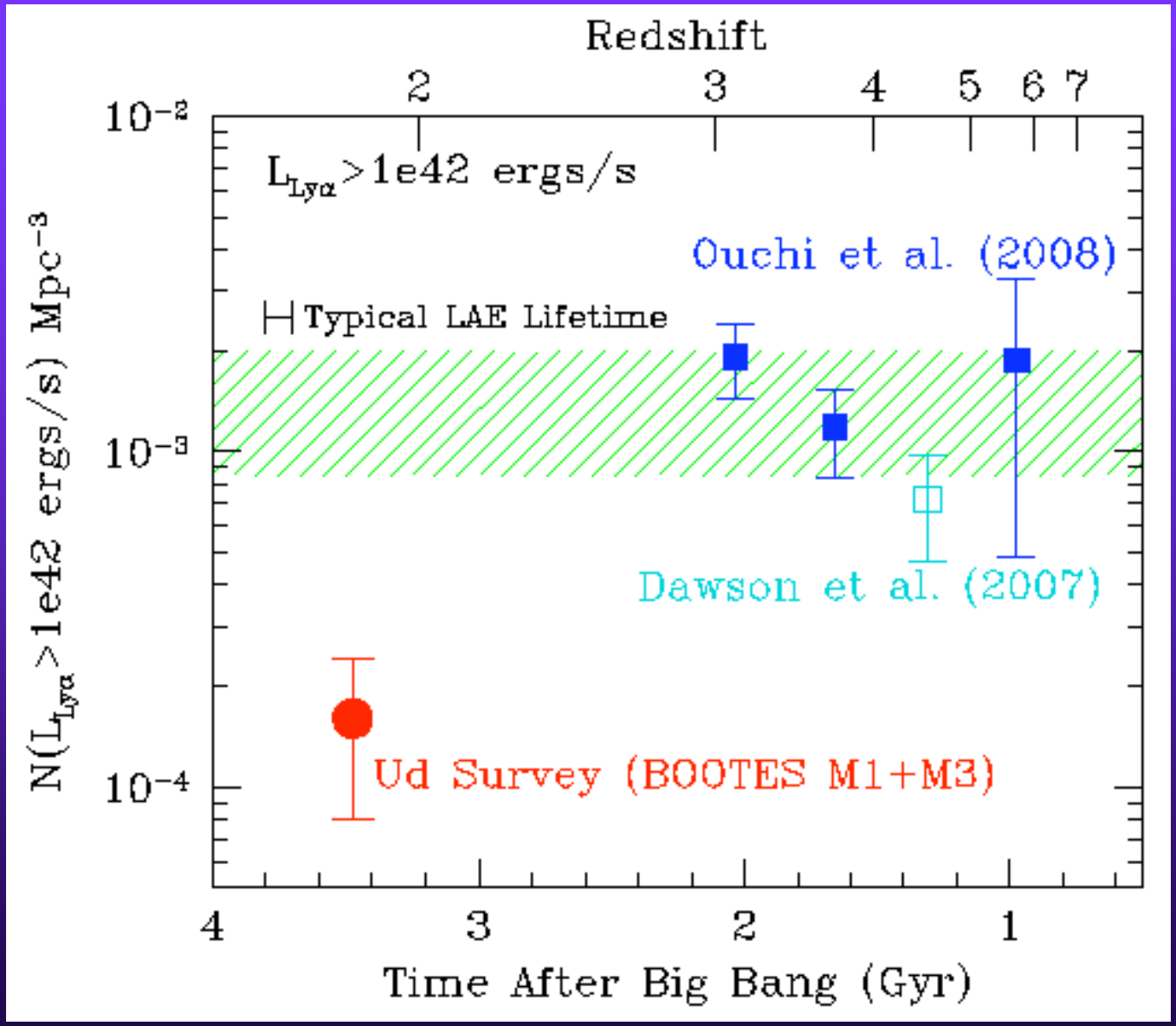


Followup Spectroscopy with Keck



No Contamination from OII Emitters

Evolution in the Number Density of LAEs



Conclusions

- UV LF evolves strongly between z~6 and z~2

- very steep faint-end slope of the UV LF of $\alpha \sim -1.73$ at z~2 and z~3, remarkably similar to those derived at higher redshifts (z~4-6)

- young galaxies less dusty at a given UV slope than older ones

-dust corrections depend on how far one integrates to obtain the UV LD

Stay tuned for more results on LAEs at z~1.9…