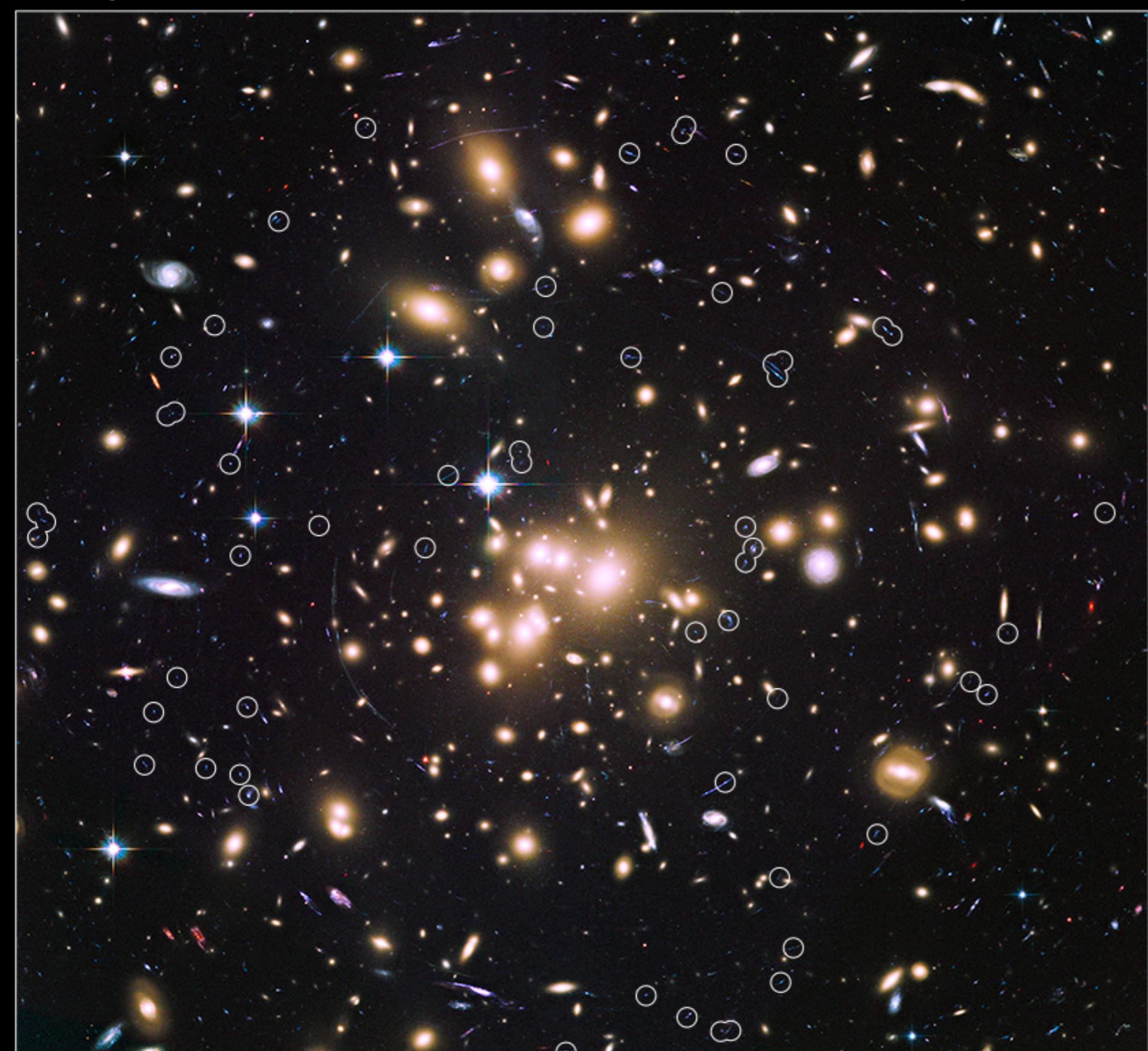


REST-OPTICAL SPECTROSCOPY OF LENSED DWARF GALAXIES AT $1.5 < z < 3.7$

BRIAN SIANA

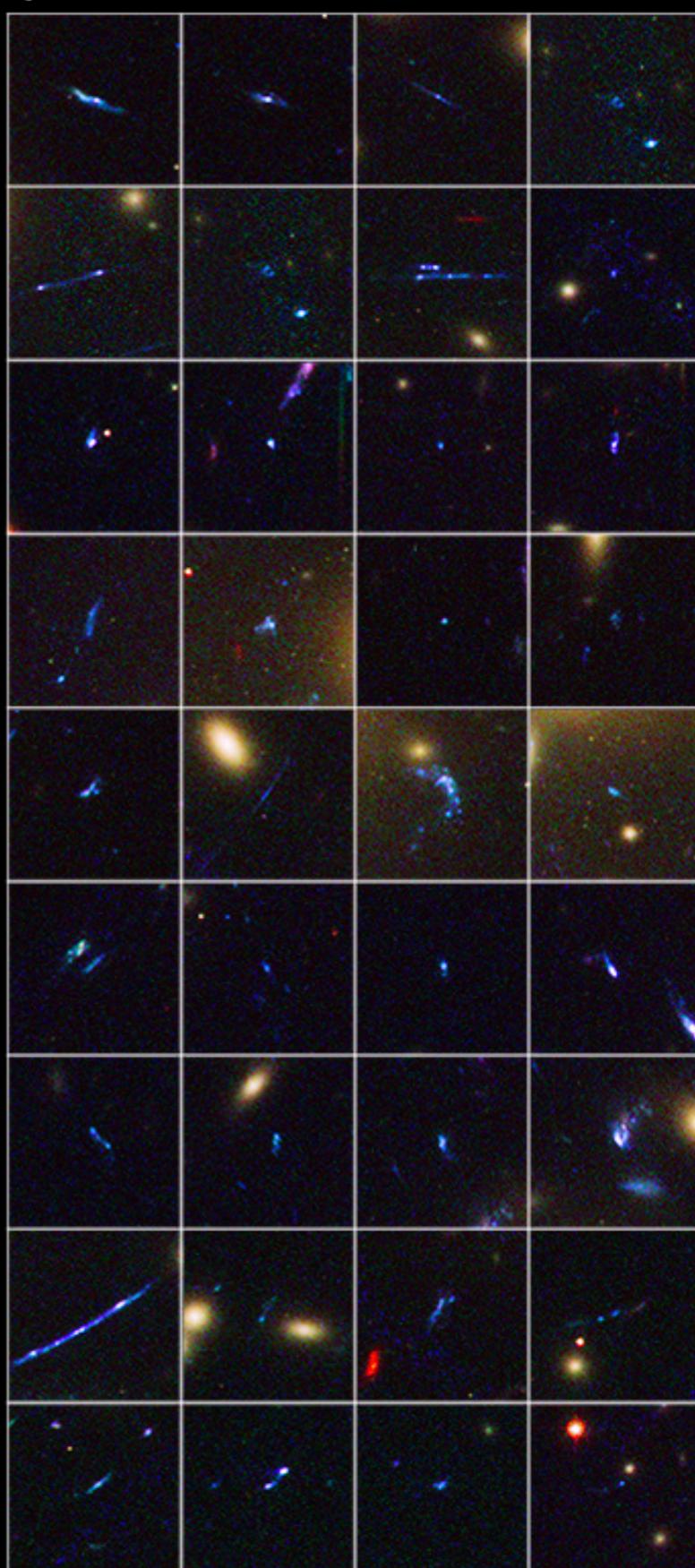


ANAHITA ALAVI, TIMOTHY GBUREK, NAJMEH EMAMI
JOHAN RICHARD, DAN STARK, MARC RAFELSKI, WILLIAM FREEMAN, CLAUDIA
SCARLATA, BRANT ROBERTSON, HARRY TEPLITZ



NASA and ESA

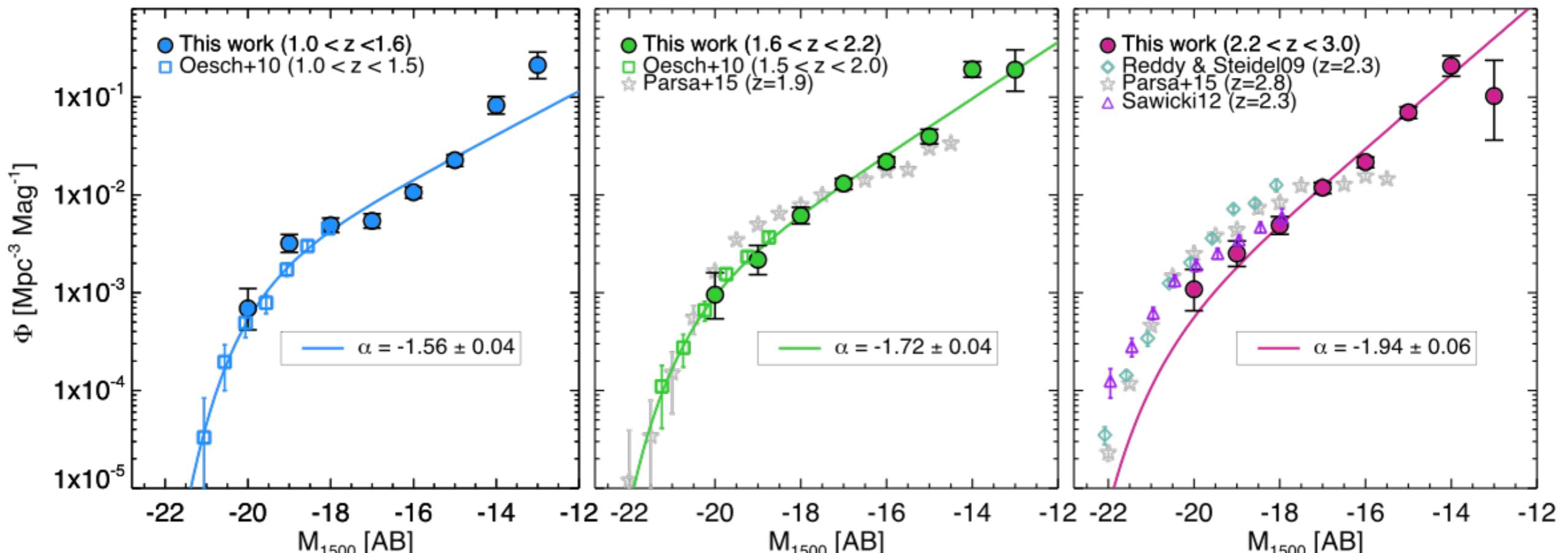
Alavi et al. (2014)



STScI-PRC14-07a

Sample

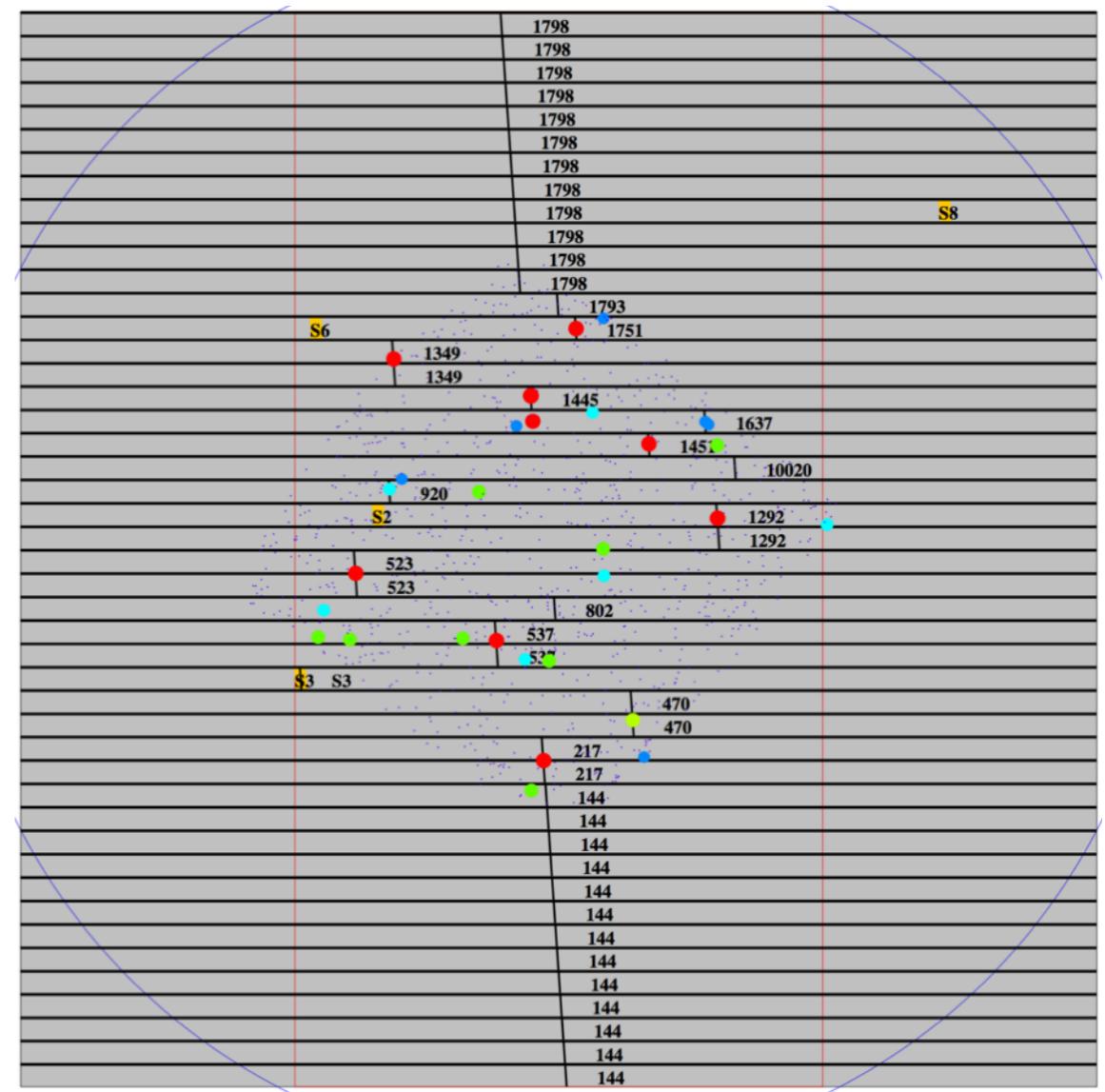
- ~2000 galaxies at $1 < z < 3$ in 7 lensing clusters.
- $10^6 < M < 10^9 M_{\text{sun}}$ at $z \sim 2$
- Doubles the UV luminosity density.



Alavi et al. (2016)

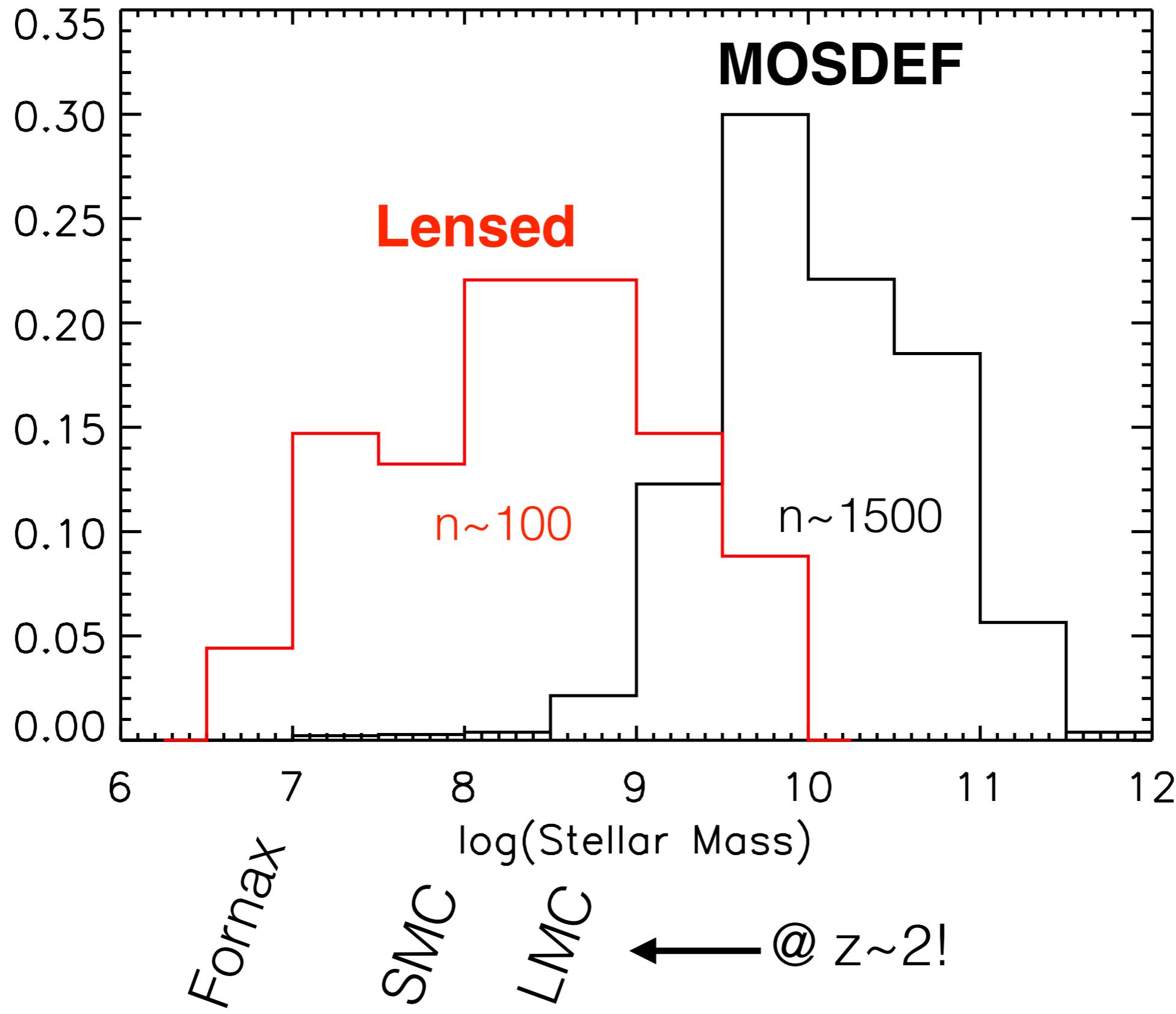
Survey Description

- $1.4 < z < 3.7$
 - magnifications $\sim 5\text{-}20$
 - 3 Lensing Clusters - **Abell 1689**, MACS J0717, MACS J1149
 - LRIS: 4.5 nights, $\sim 1.5\text{-}4.5$ hours
 - MOSFIRE: 7 nights, 1.5-2 hours/filter



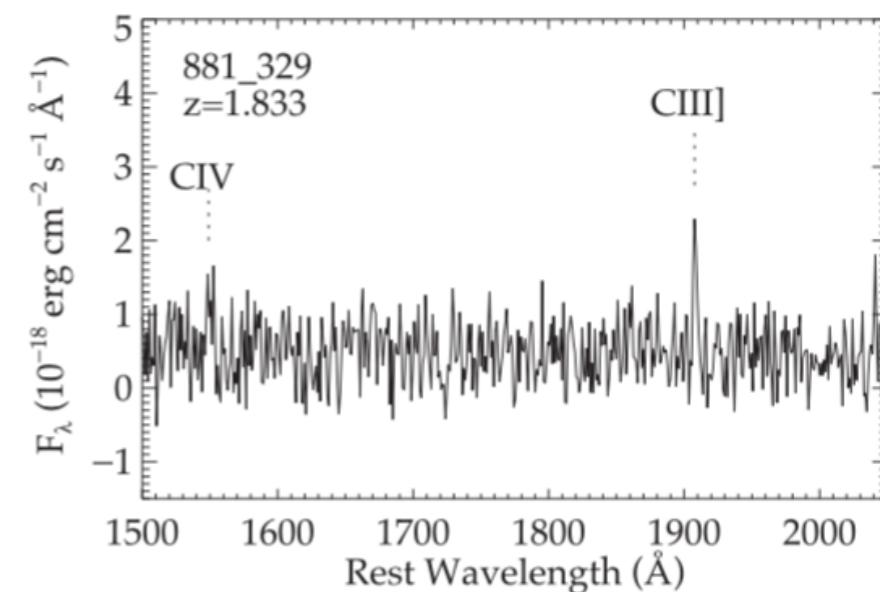
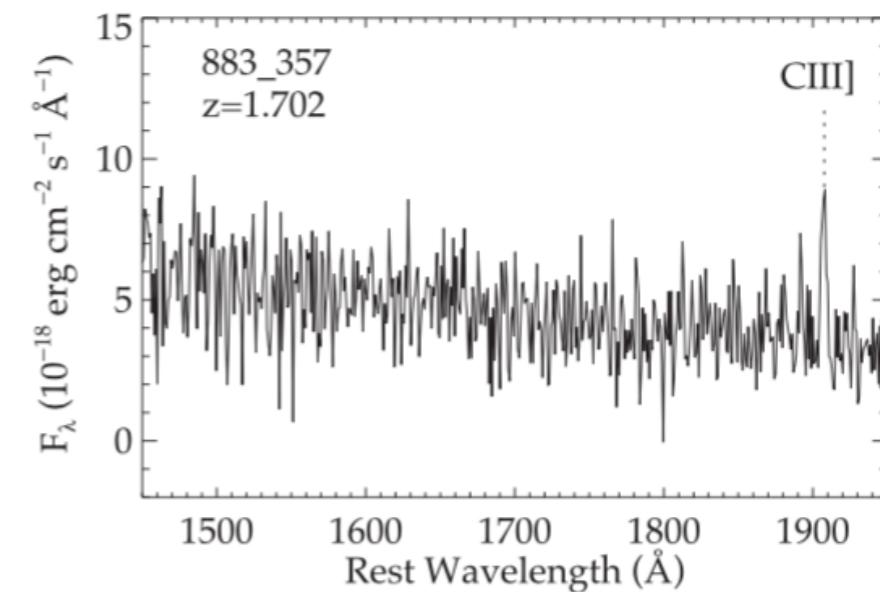
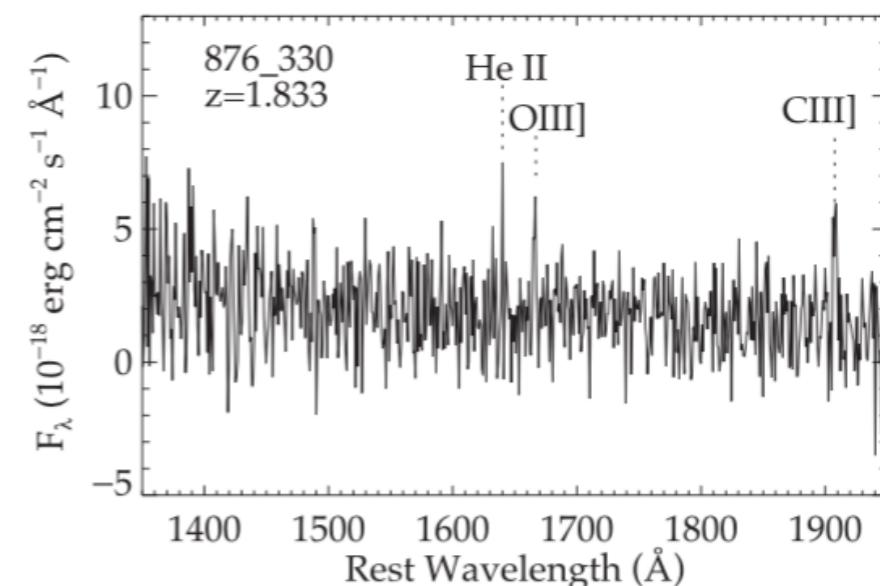
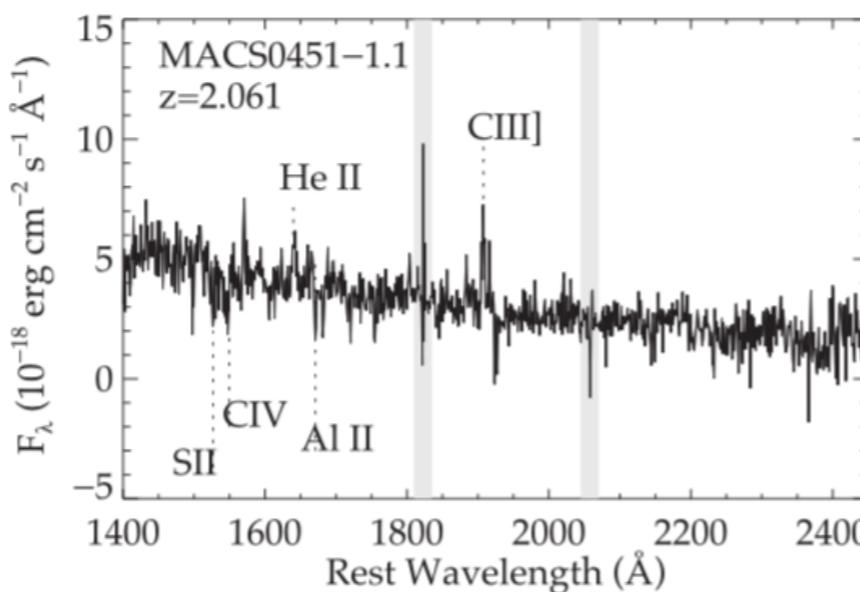
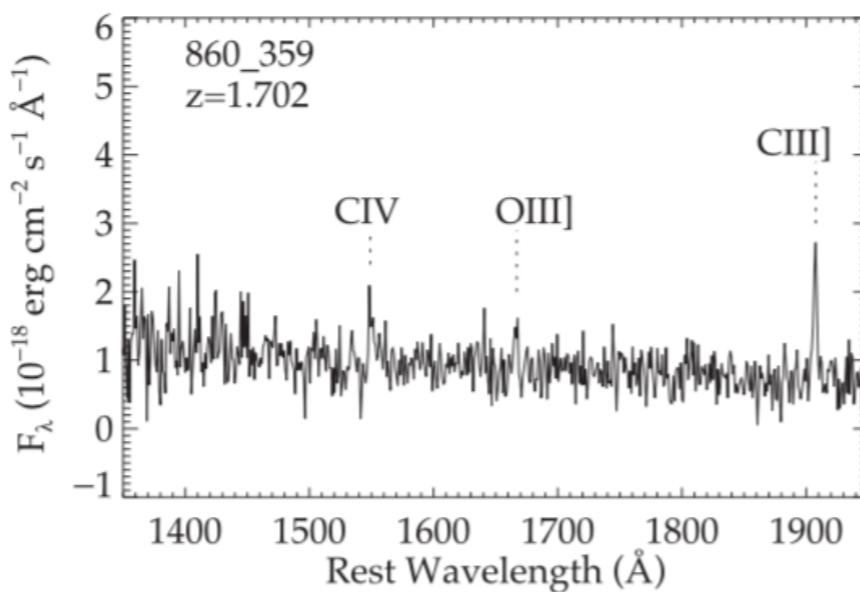
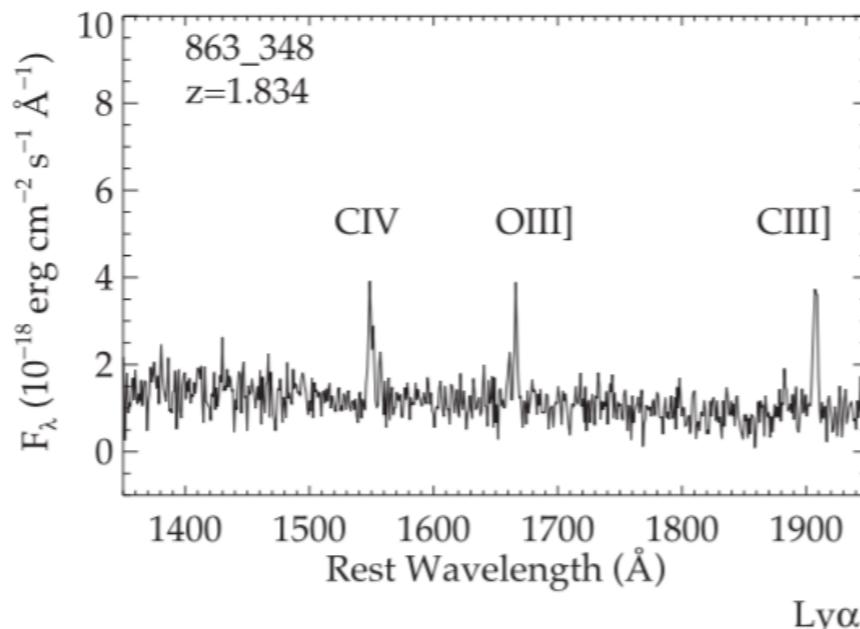
Motivation

- Redshifts
 - z_{spec} for multiple images —> constrain mass/magnification maps
- Study other half of star formation at peak epoch.
 - Different extinction curves (maybe)
 - High mass loading factors (maybe)
 - “Bursty” SF (maybe)
 - High escape fractions (maybe)
- Rest-UV spectra of dwarf galaxies.

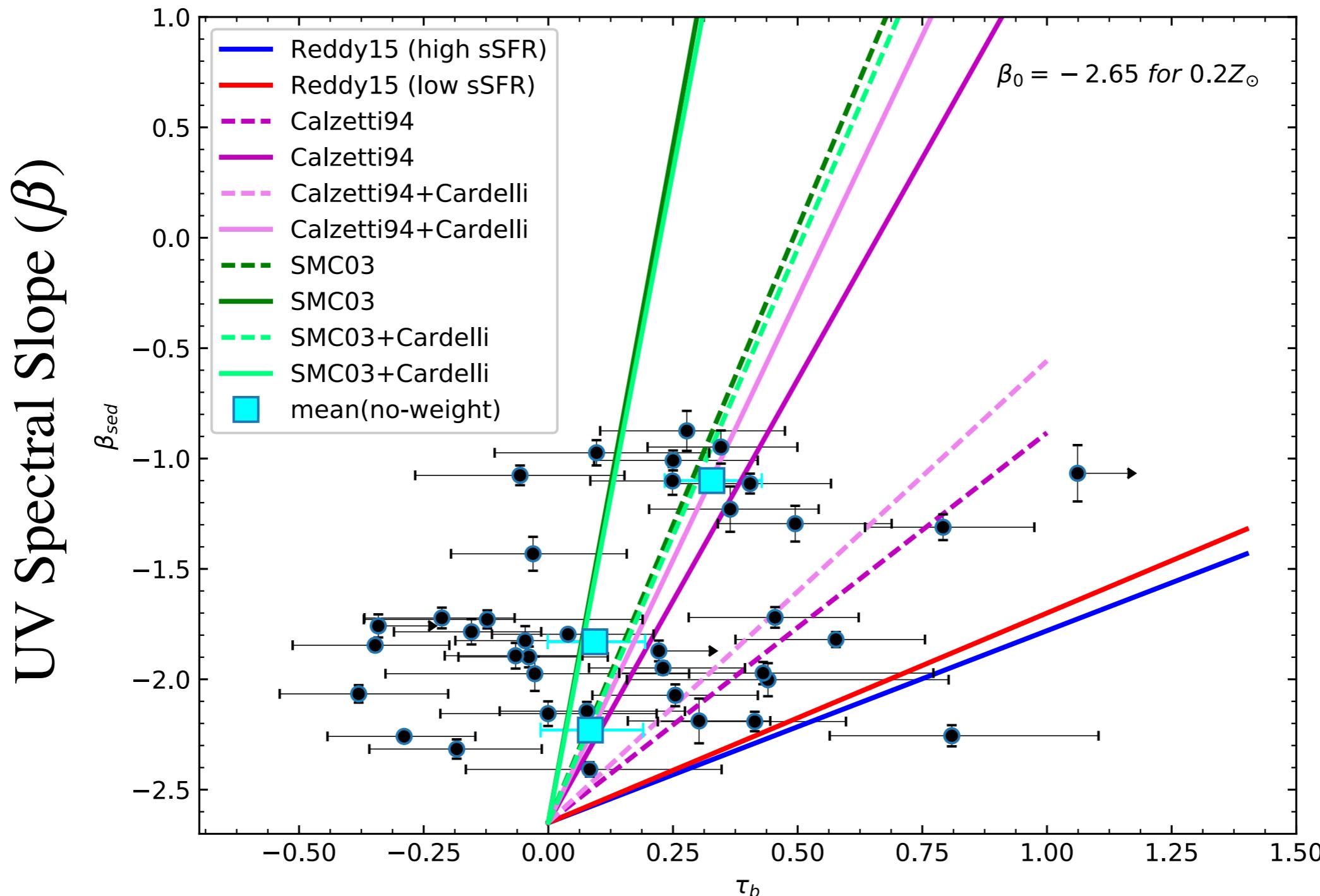


Rest-UV Spectra

Stark et al. 2014



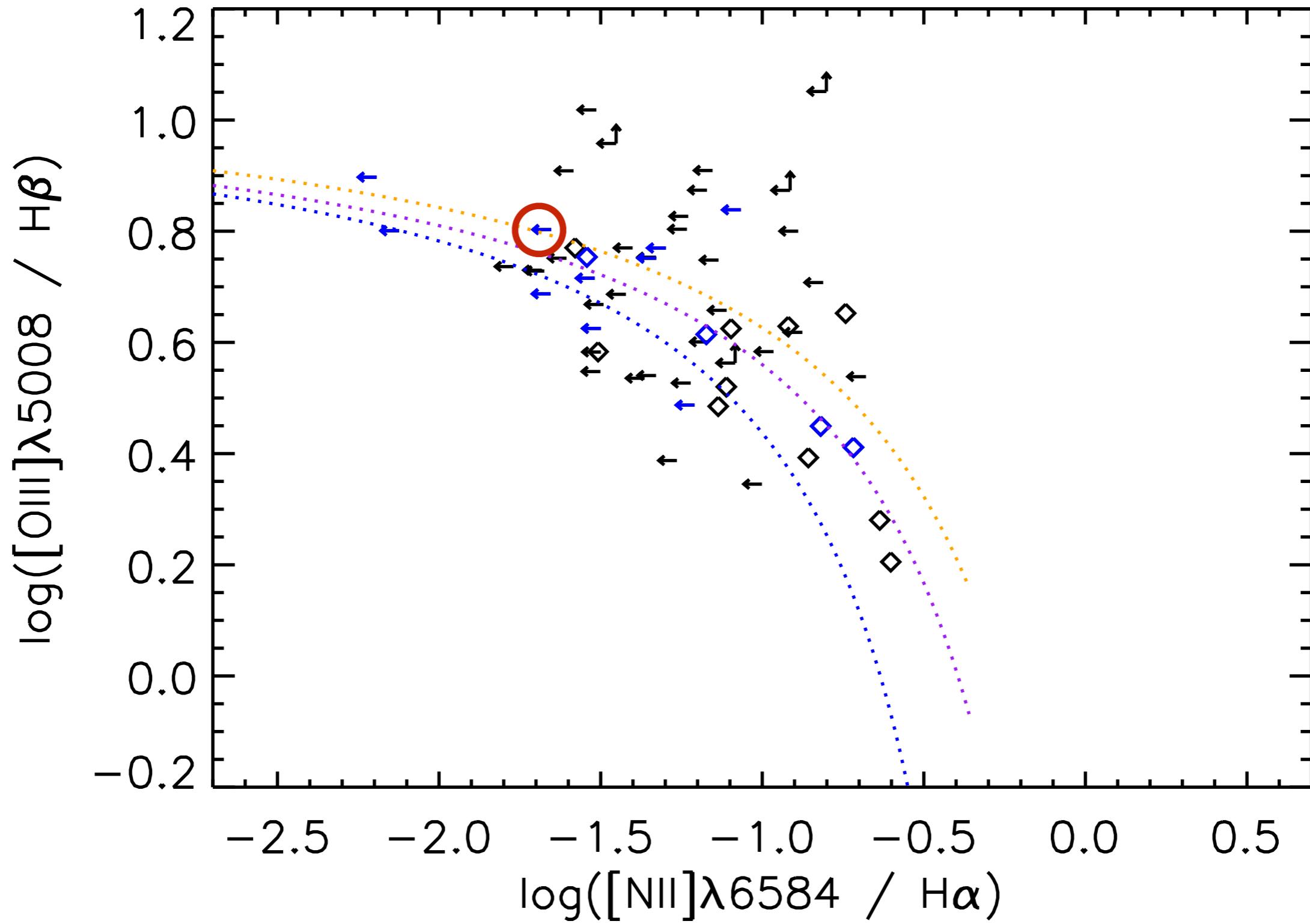
Dust Extinction



$$\tau_b = \ln\left(\frac{\text{H}\alpha/\text{H}\beta}{2.86}\right)$$

Alavi et al. (in prep.)

BPT Diagram

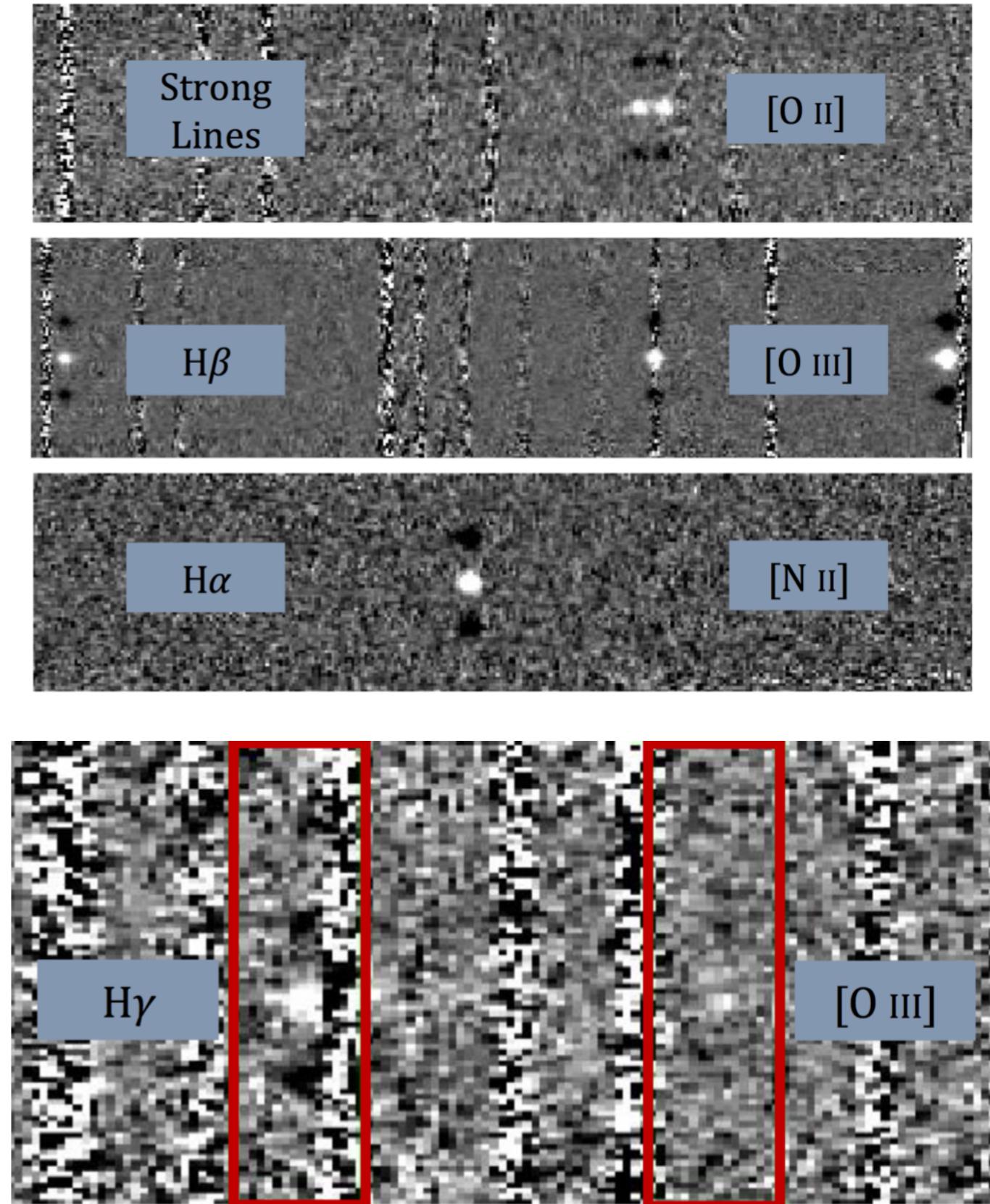


M-Z

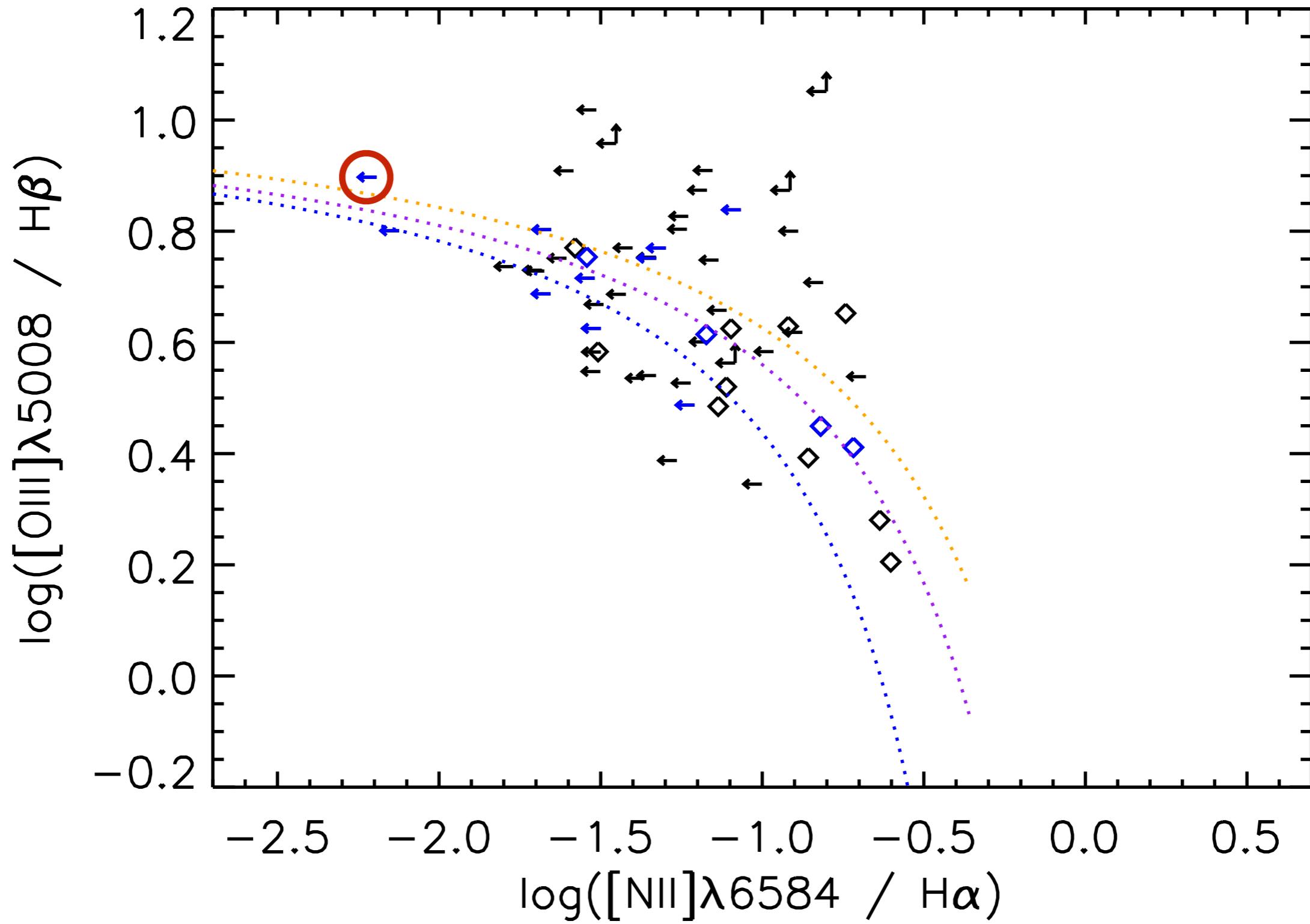
Gburek et al. (in prep.)



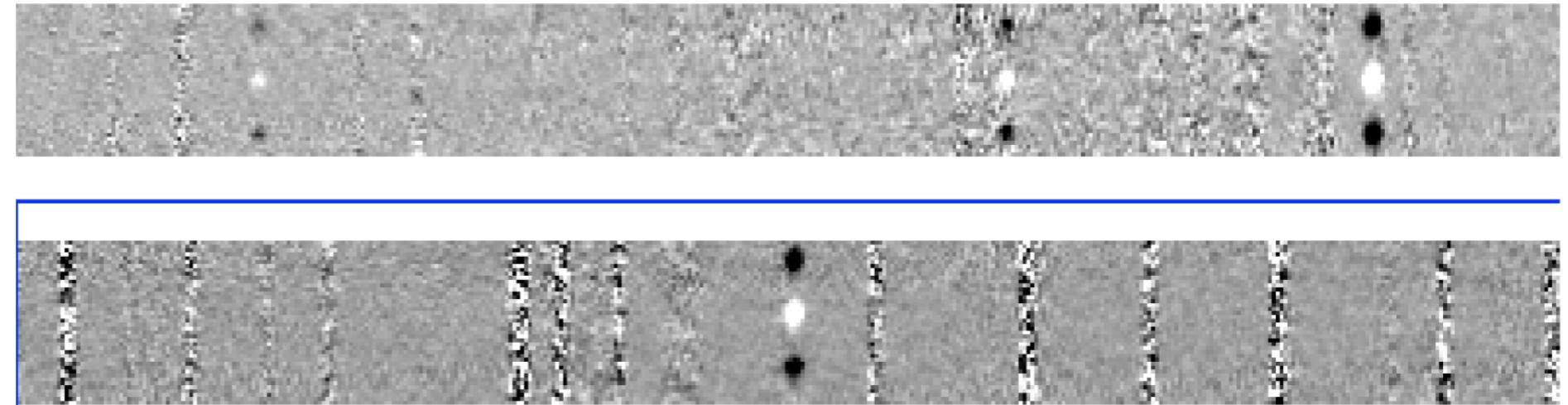
Zspec	2.59
Magnification	20
log(M_{stel})	7.8
M_{uv}	-17.5



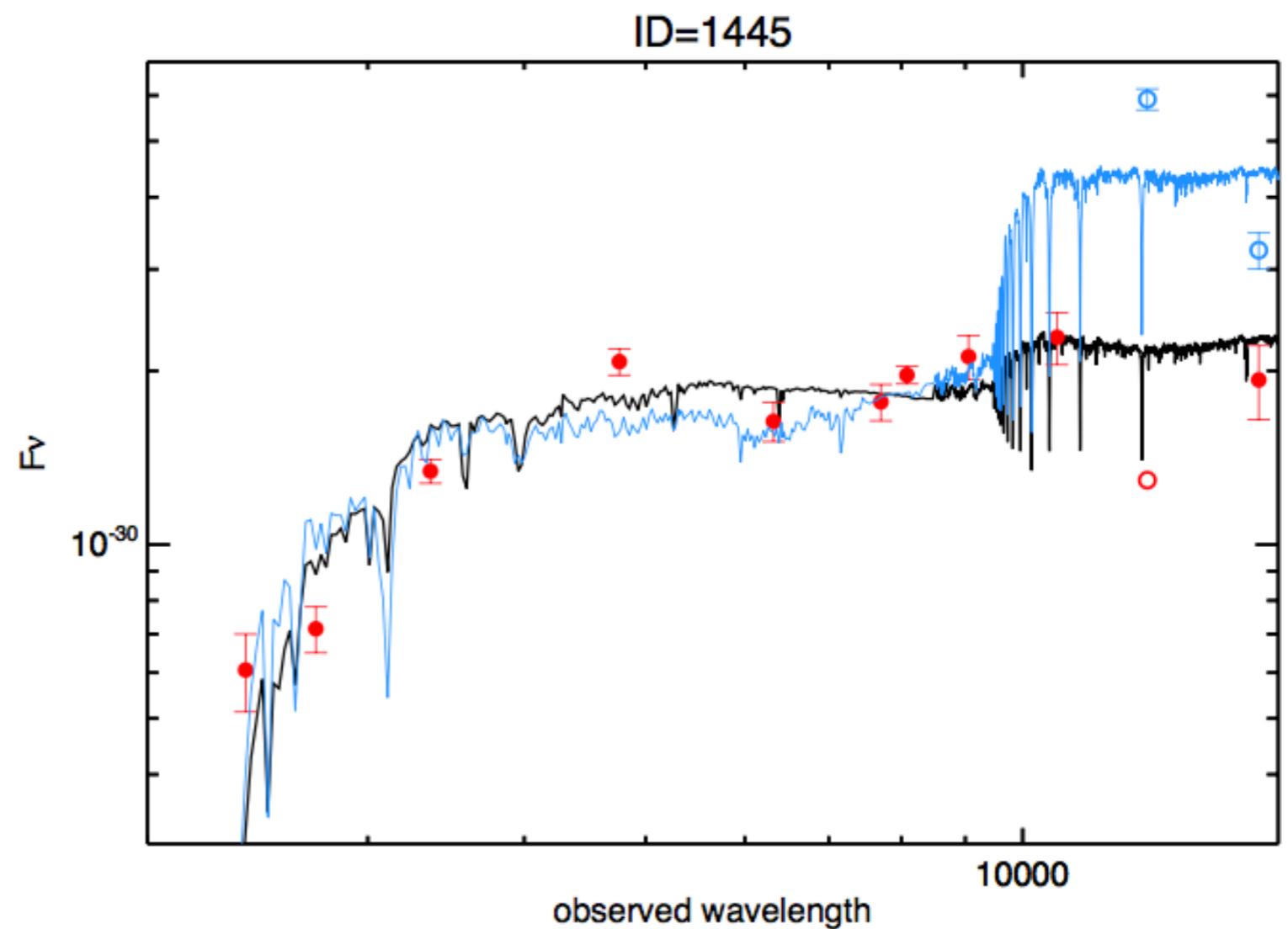
BPT Diagram



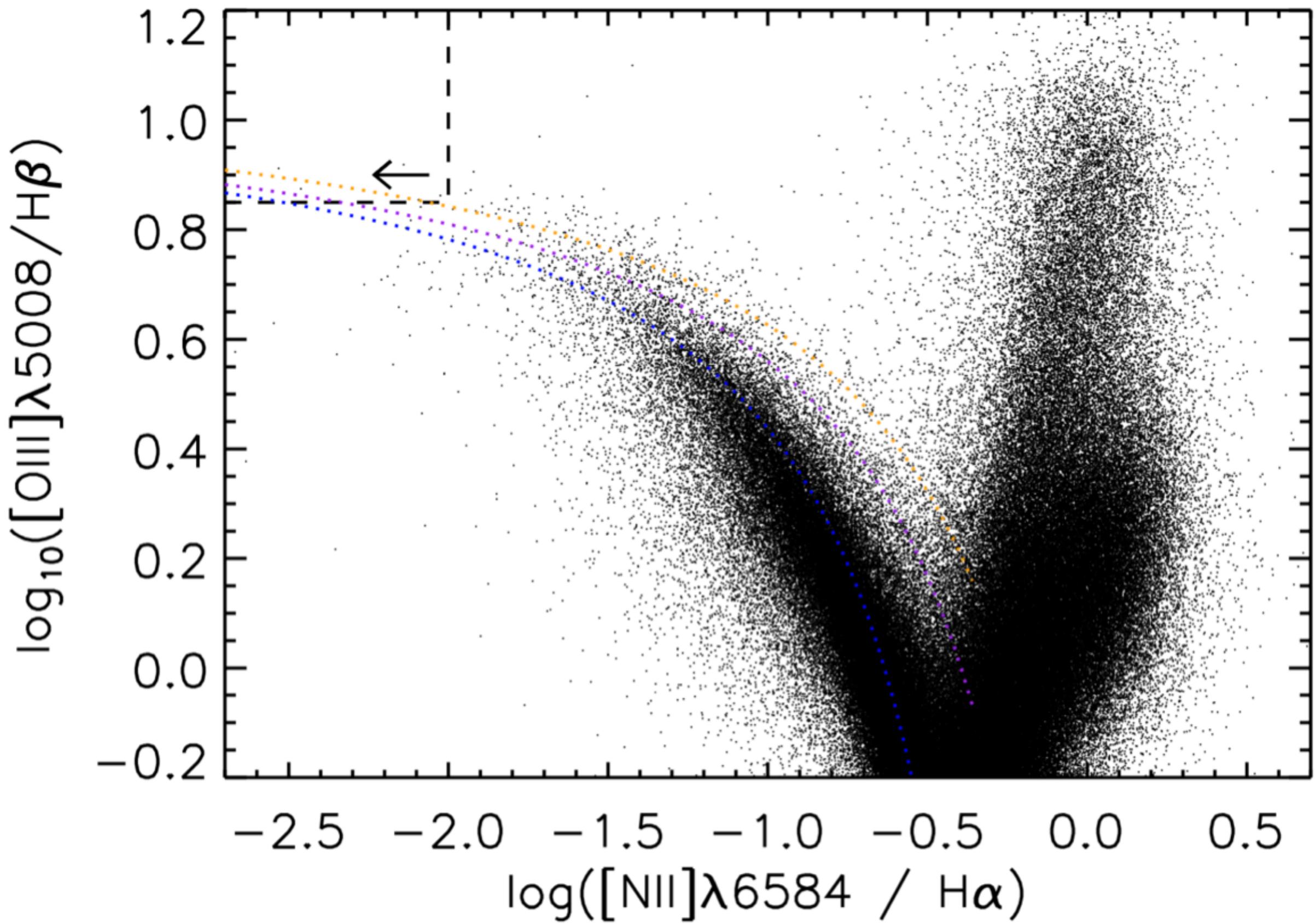
High sSFR



Zspec	1.56
Magnification	~78
log(M_{stel})	~6.0-6.3
EW([OIII]5007)	4300
EW([OIII]+Hβ)	6000
EW(Hα)	1400
M_{UV}	-13.5

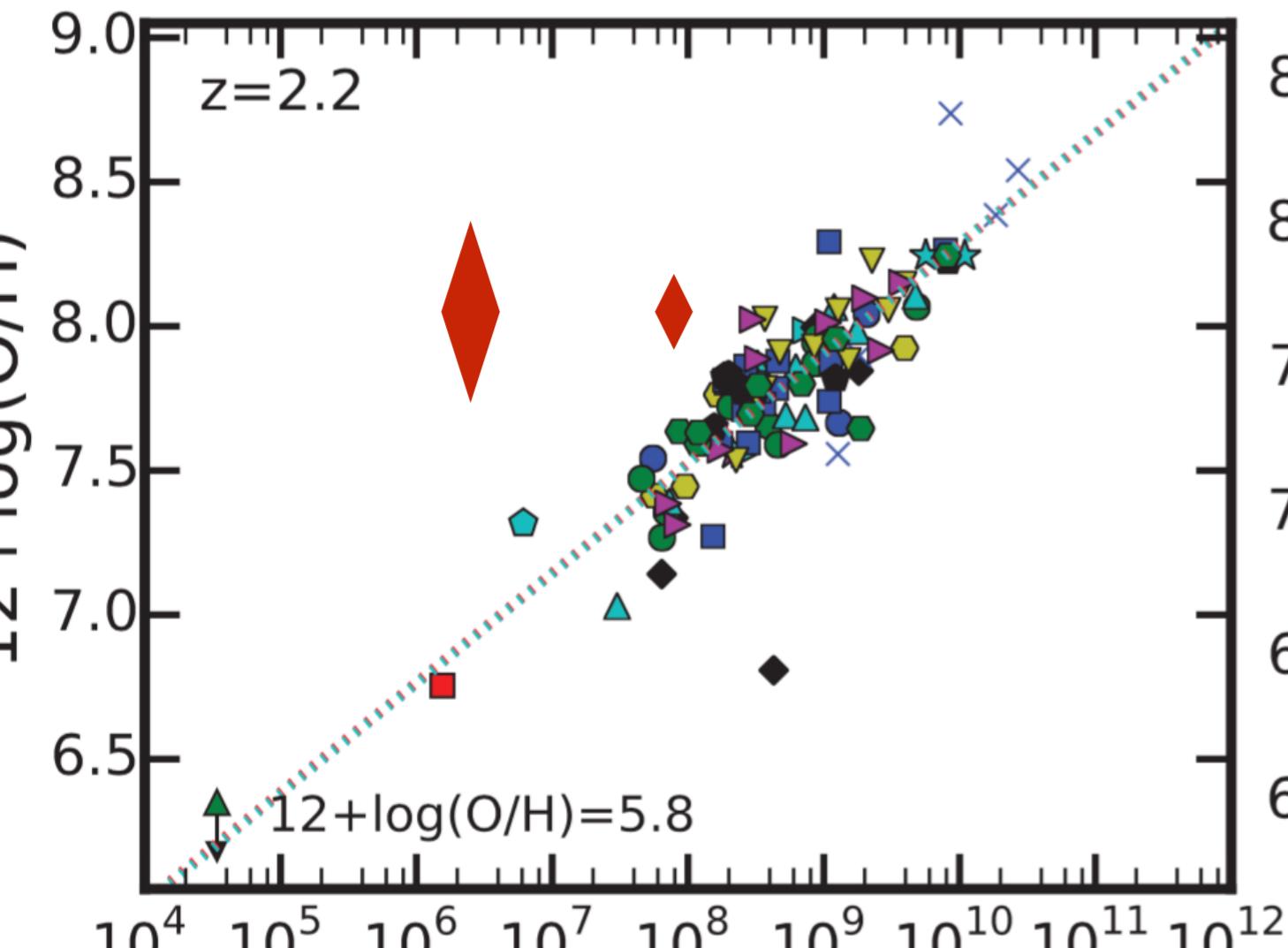


xBPT

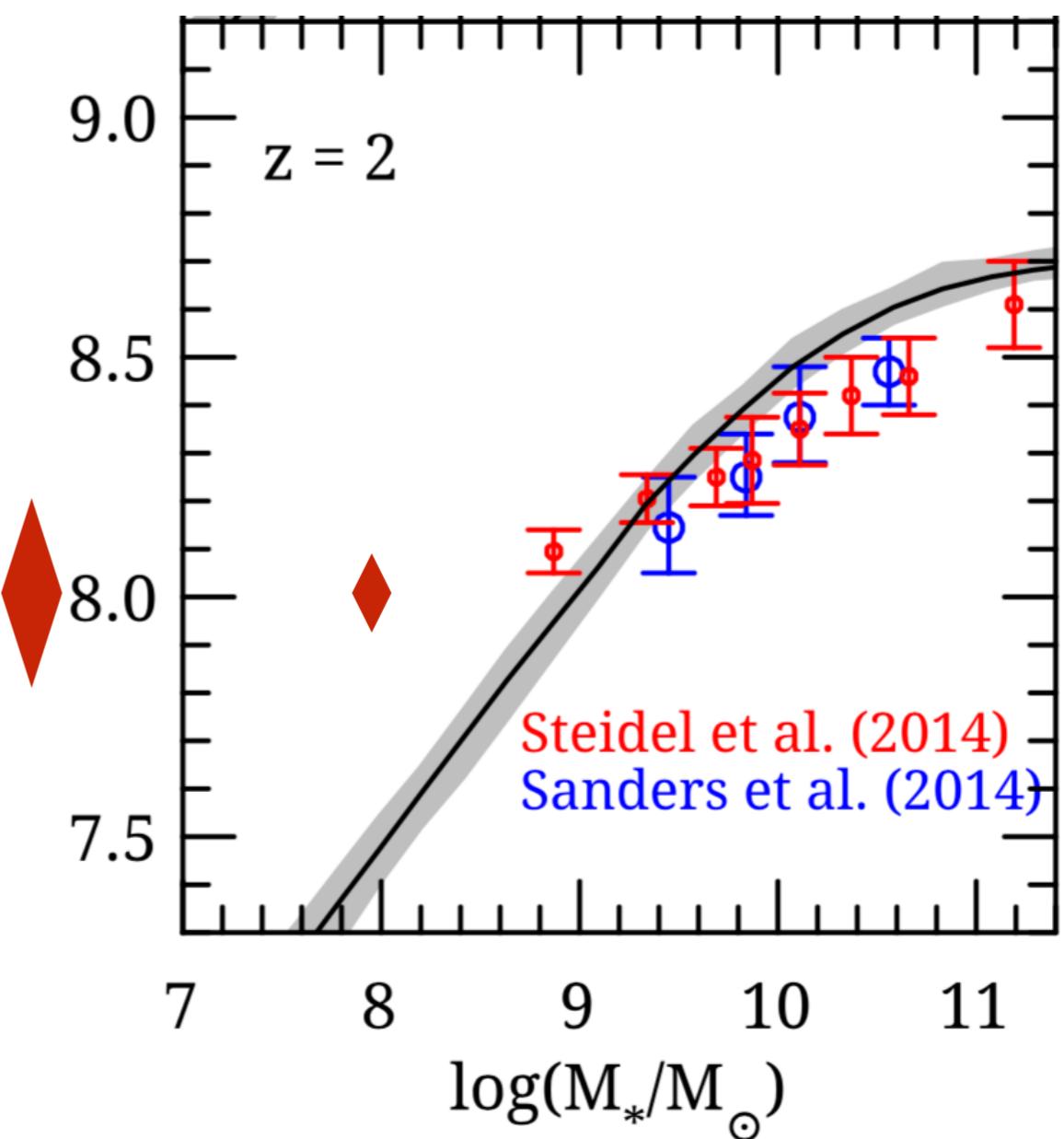


M-Z Predictions

FIRE: Ma et al. 2016



Mitra et al. 2015



Conclusions

- Added many more z_{spec} for multiply imaged galaxies.
- Extinction curve steep in UV (SMC-like) and/or no difference in nebular and stellar extinction.
- A few (3) [OIII] 4363 detections ($\sim 5\sigma$), with 3 more at $\sim 3\sigma$. 10 [Ne III] 3869 detections.
- Extreme sSFR and EWs, bursty/young galaxies.
- To do: Analyze metallacity of entire sample (when confident about strong line calibrations).