

# Capabilities of WFC3/G102 for Constraining Metallicity and Age for Massive Quiescent Galaxies in a Redshift Range of $1 < z < 1.8$



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Papovich, Momcheva, Brammer, and CLEAR and CANDELS teams

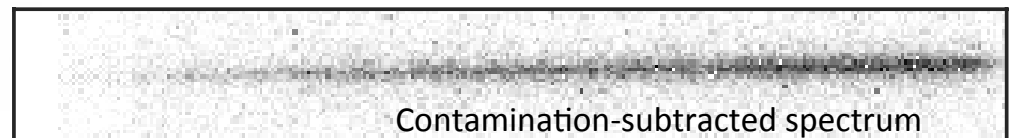
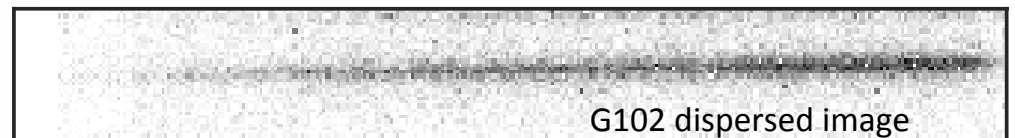
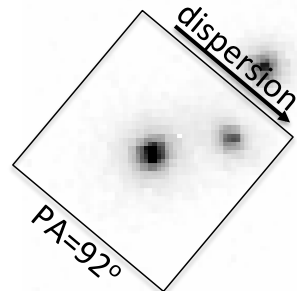
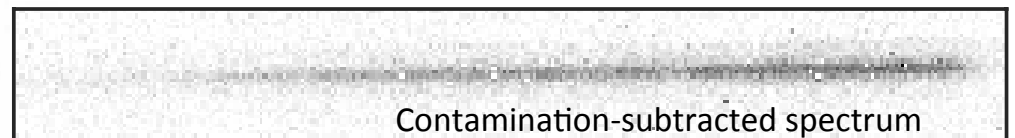
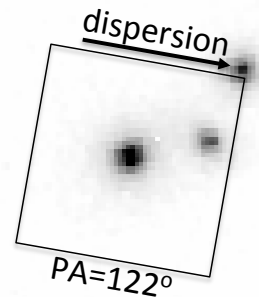
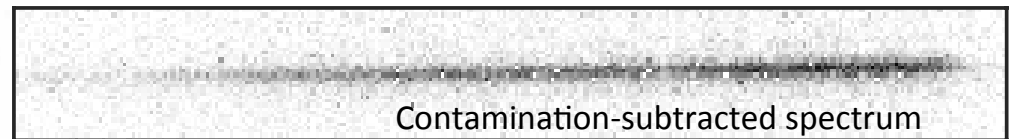
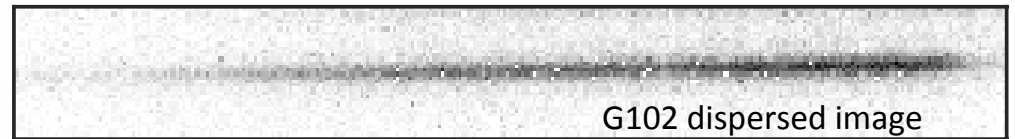
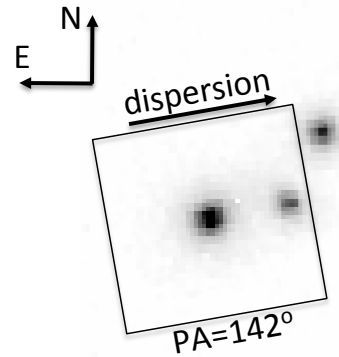
# Outline

- Determined the capabilities of HST/WFC3 G102 grism data on constraining parameters in our redshift range using a hierarchical Bayesian methodology
- Median age constraints indicate that our galaxies have formed 68% of their mass by a redshift of  $\sim 4$
- Metallicity constraints show that the median metallicity of quiescent galaxies in our redshift range is  $\sim 1 Z_{\odot}$

# CLEAR Data

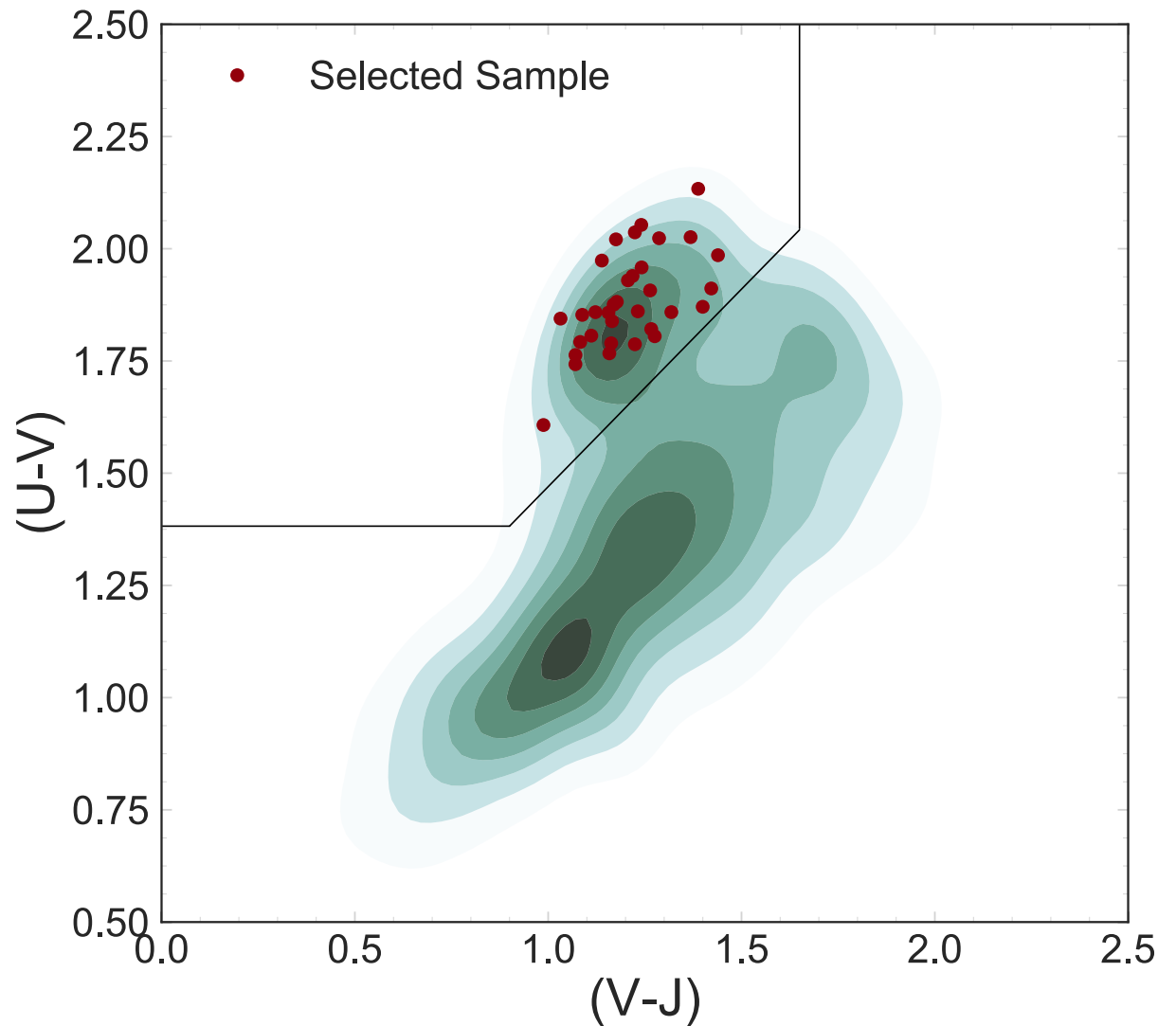
- HST/WFC3 deep (12 orbits) G102 grism spectroscopy from the CANDELS Lyman-alpha Emission at Reionization (CLEAR) survey

- CLEAR covers  $\lambda \sim 7,500\text{-}12,000 \text{ \AA}$ , at  $R \sim 200$  in the CANDELS/GOODS-N and GOODS-S fields

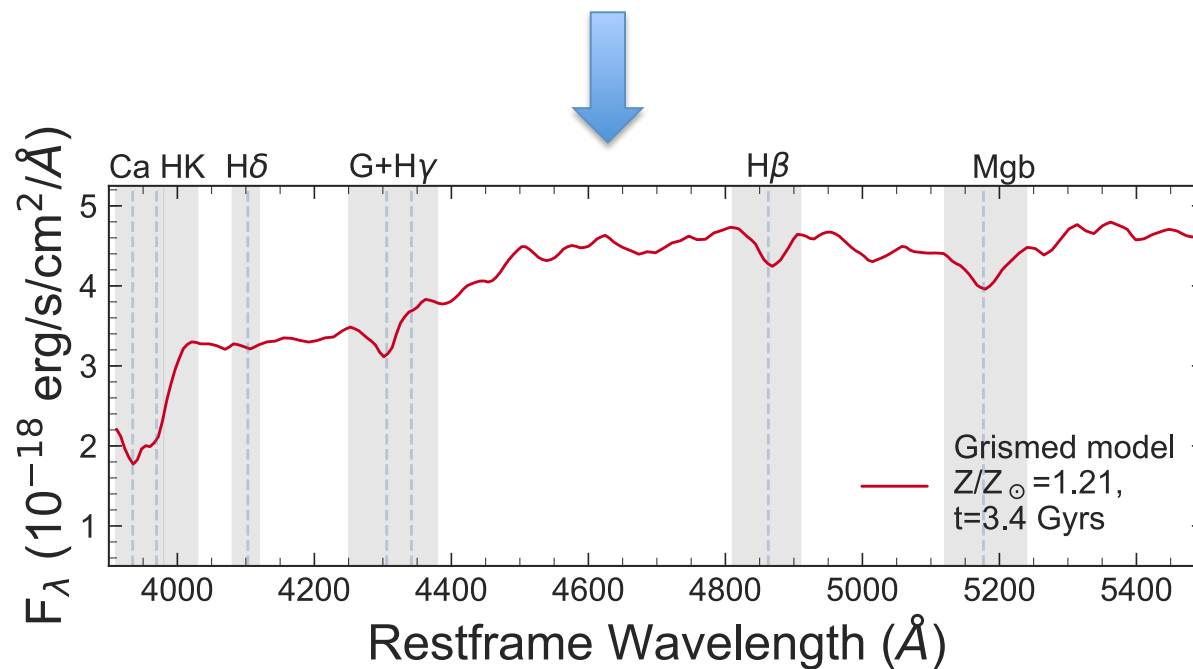
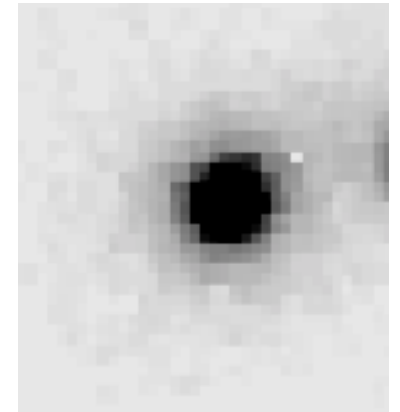
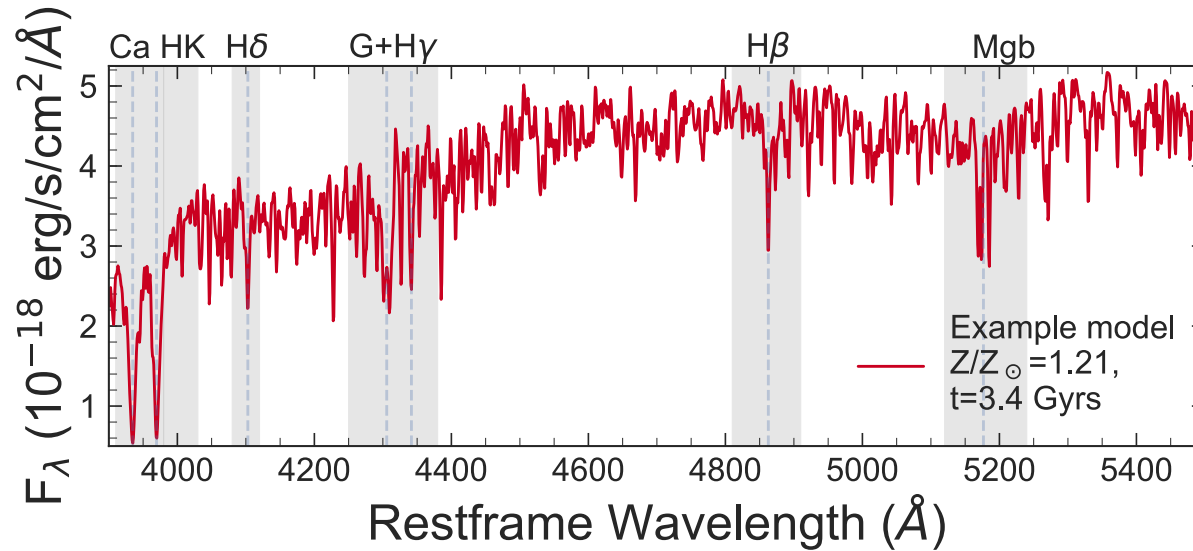


# Sample selection

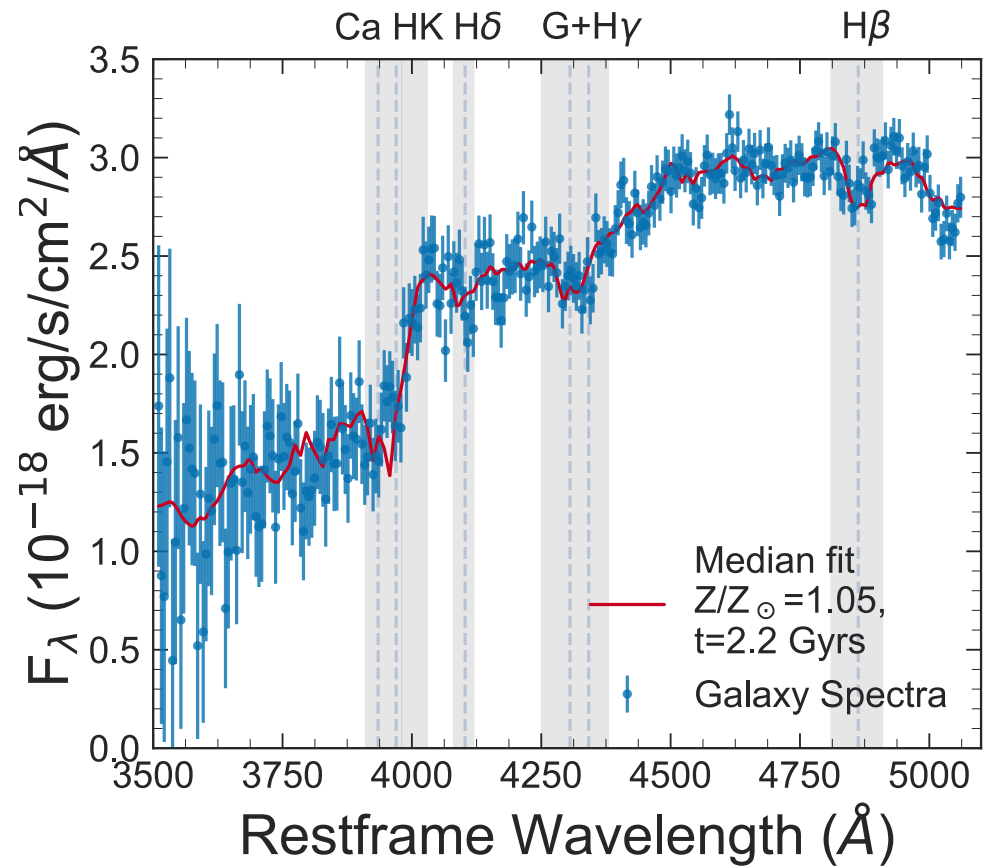
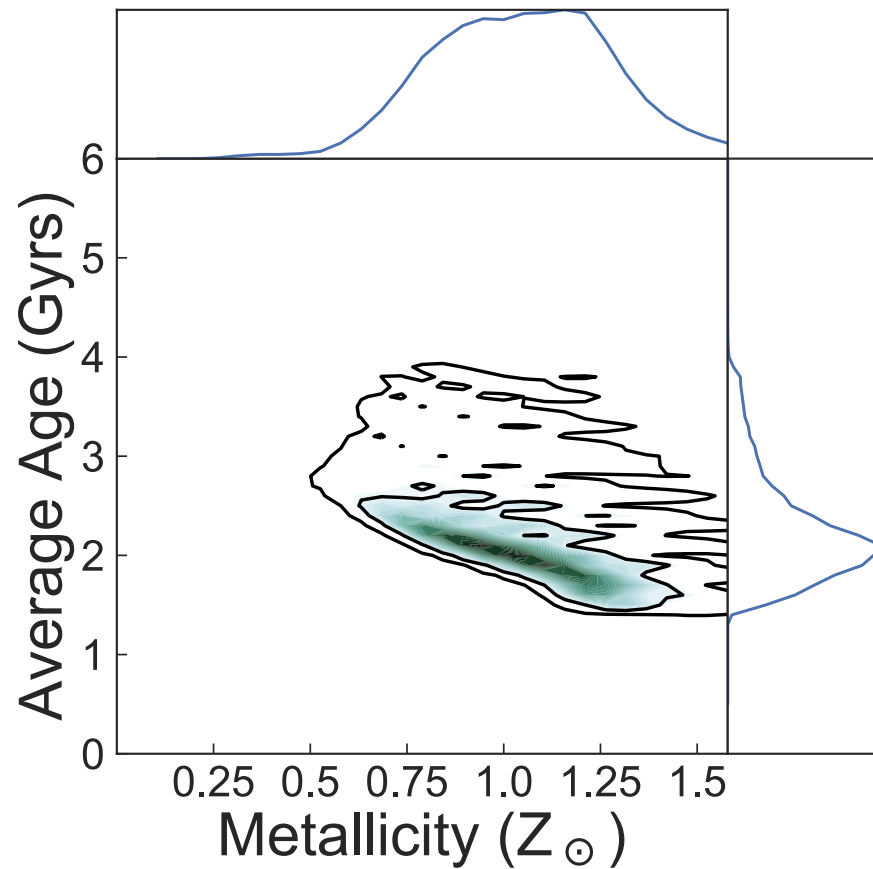
- Mass limit of  $\text{Log}(M_*/M_\odot) > 10$
- Redshift range of  $1 < z < 1.8$  chosen so we cover age/metallicity sensitive features
- Quiescence determined by UVJ rest-frame colors
- Each pointing was examined for residual contamination
- From an initial sample of 100 galaxies 33 were selected



# Grizli simulated grism models



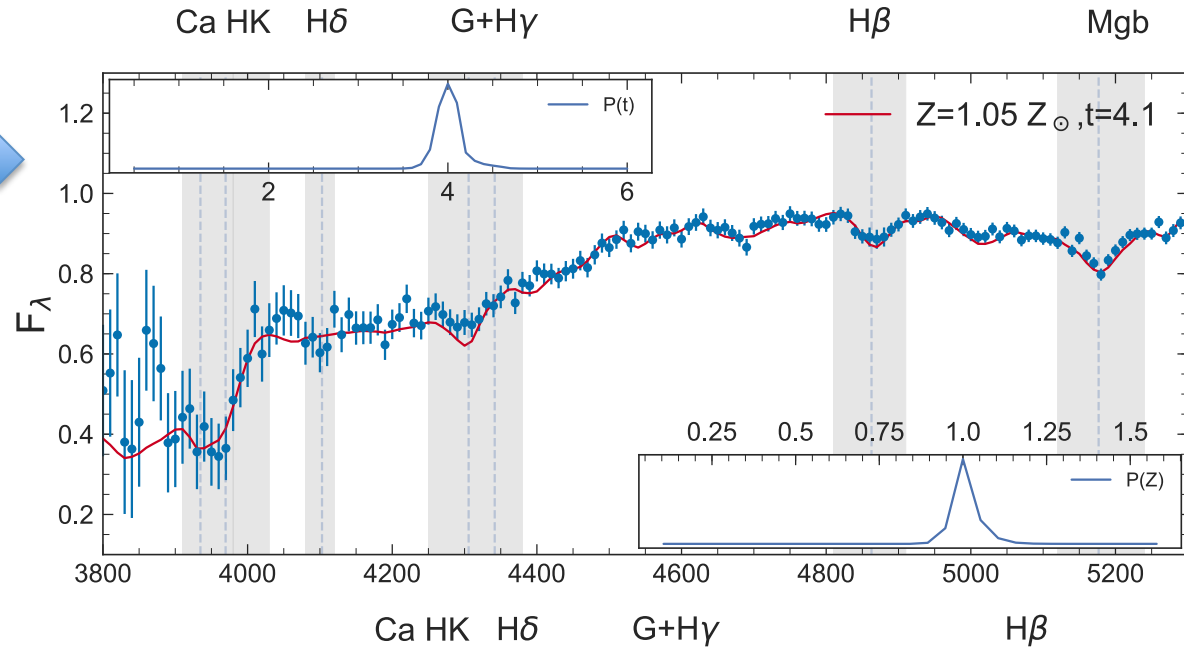
# Model Fitting CLEAR Data



# Group Parameter Posteriors

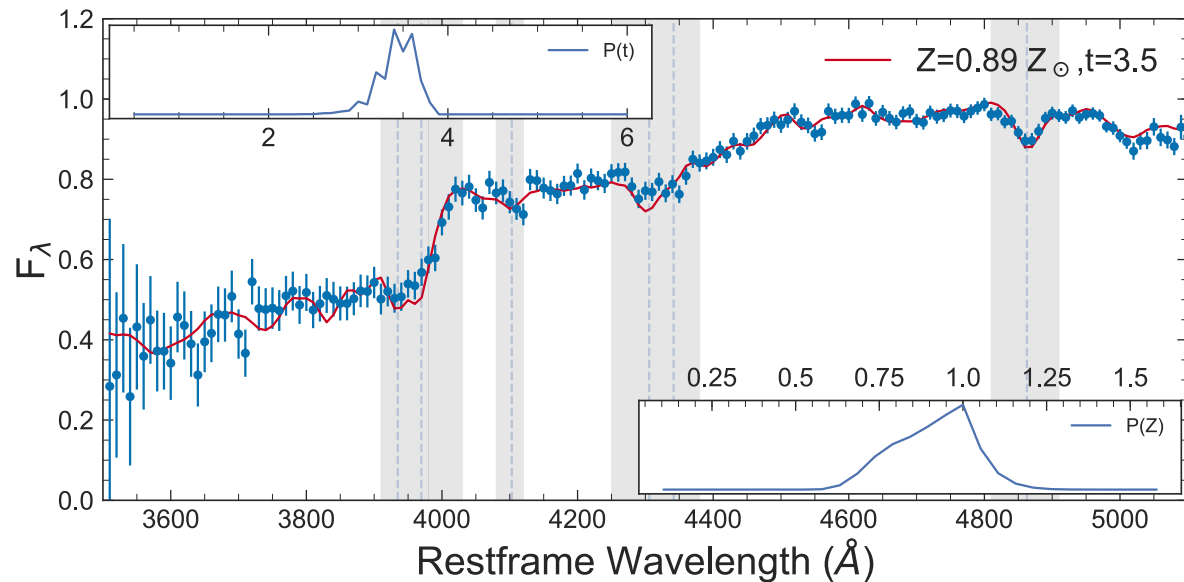
$z \sim 1.1$

$P(t)$



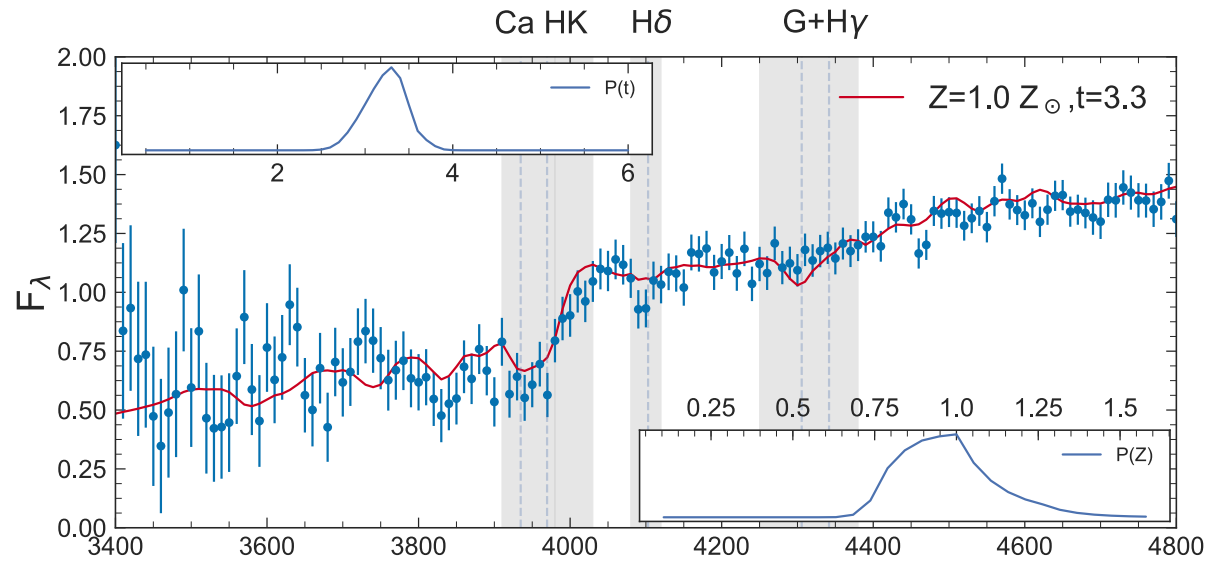
$P(Z)$

$z \sim 1.2$

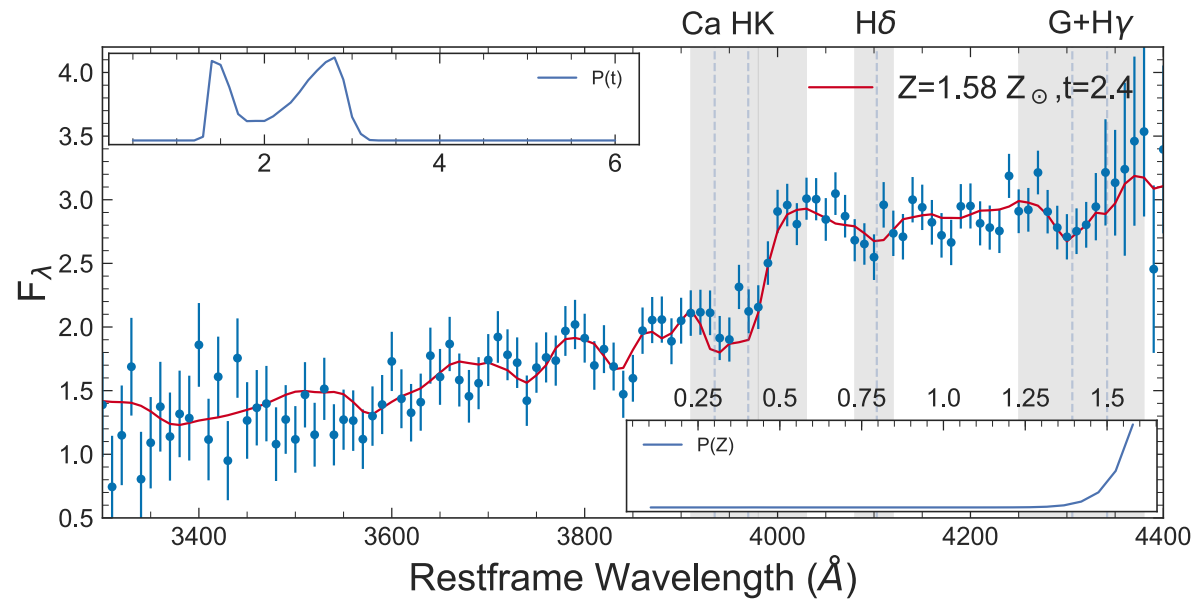


# Group Parameter Posteriors cont.

$z \sim 1.3$

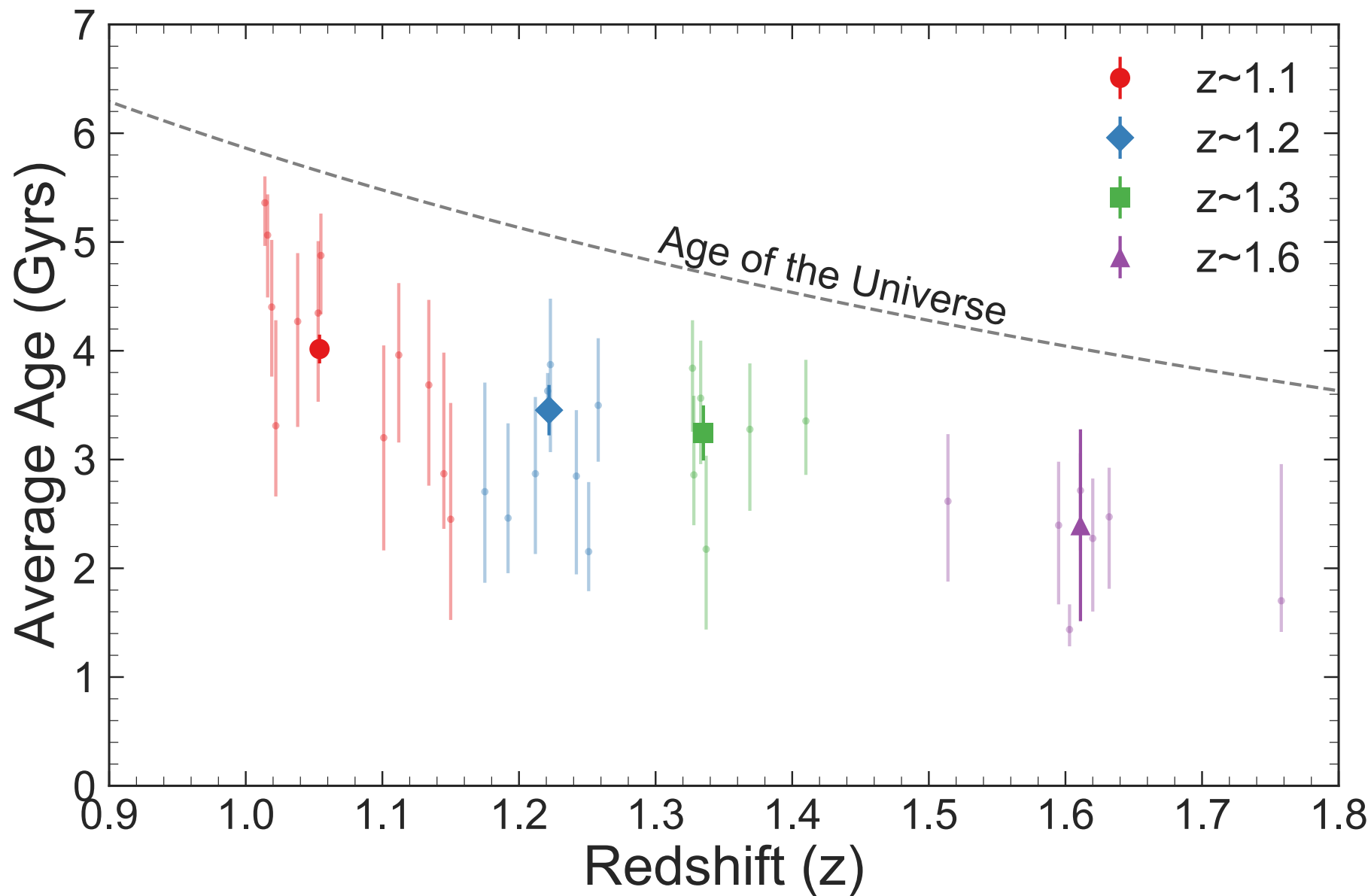


$z \sim 1.6$



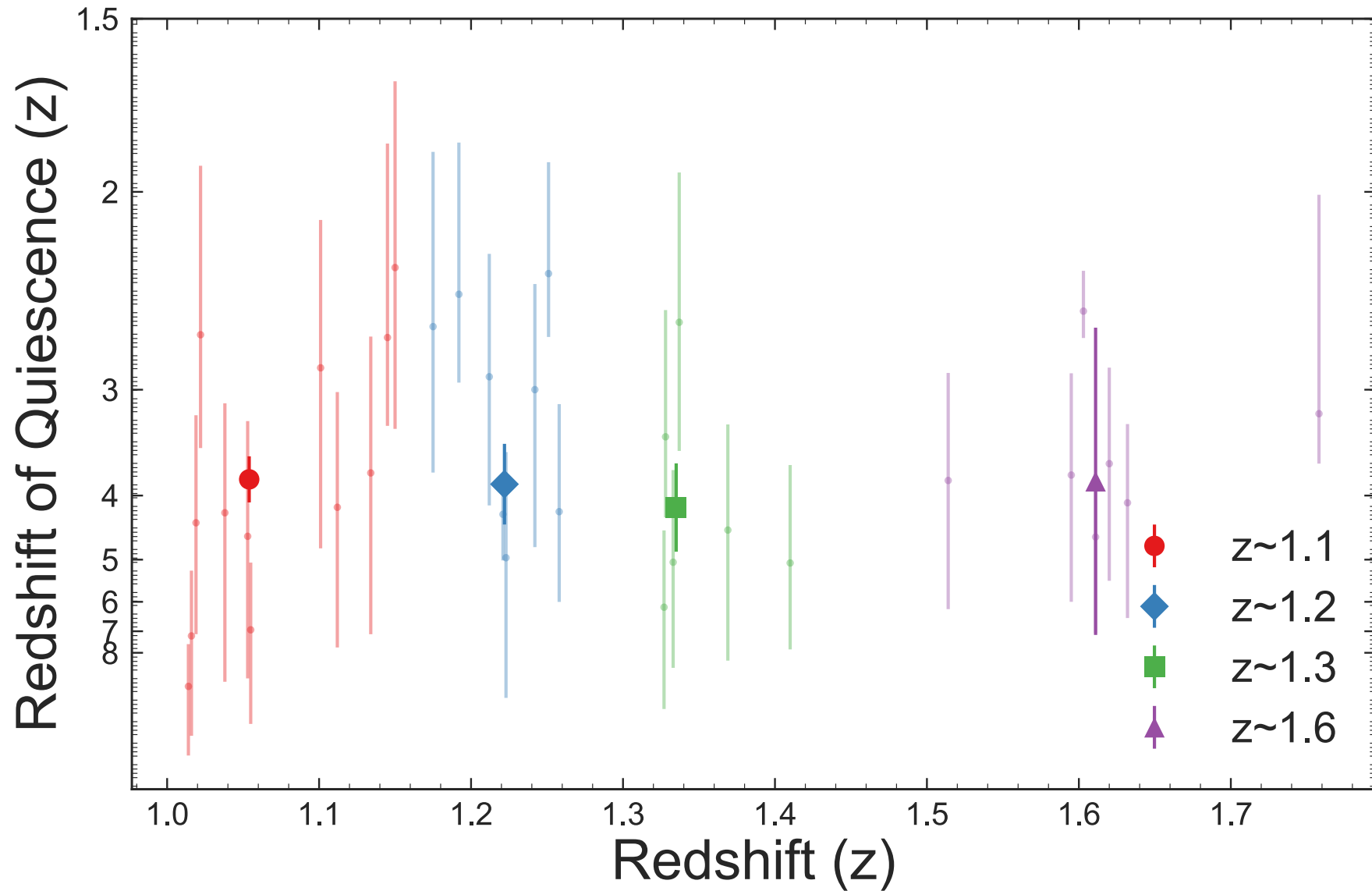


# Age Constraints



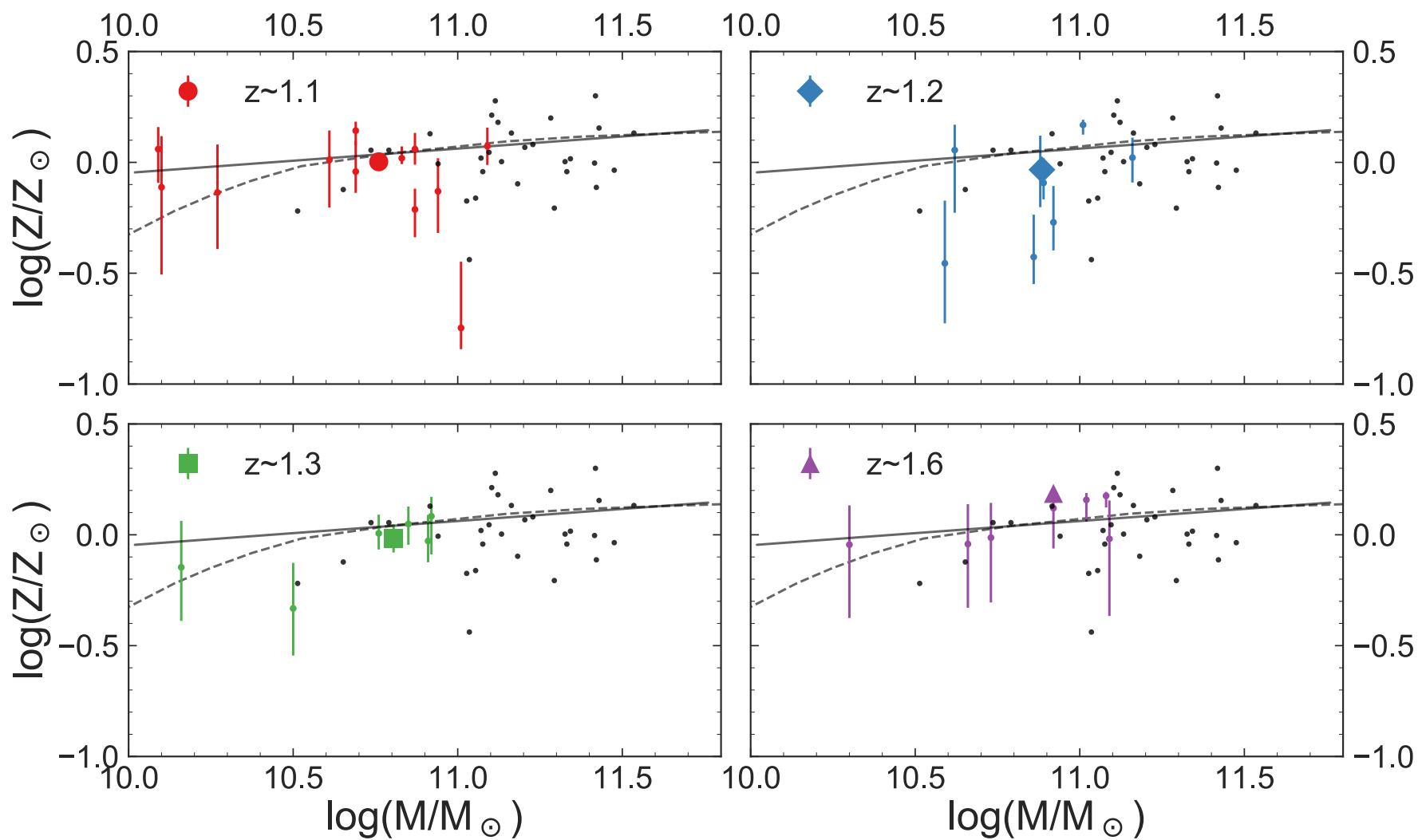
# Age Constraints cont.

Redshift of Quiescence: When galaxy has formed  $\sim 63\%$  of its mass



# Metallicity Constraints

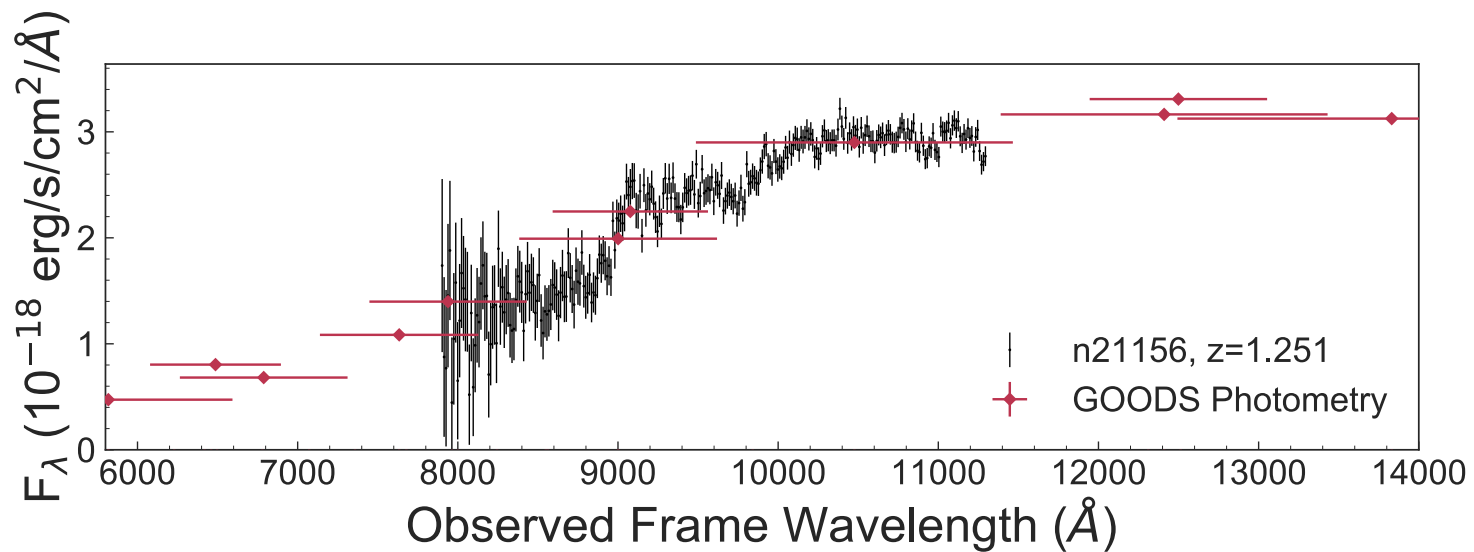
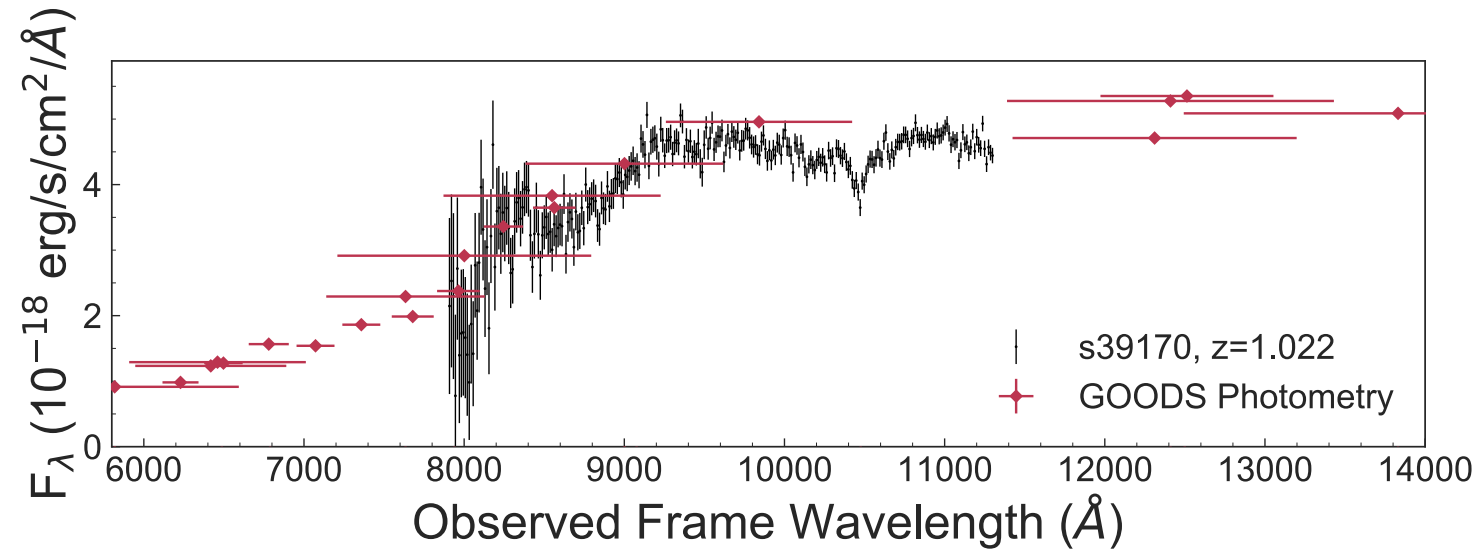
\*plotted with results from Gallazzi 14



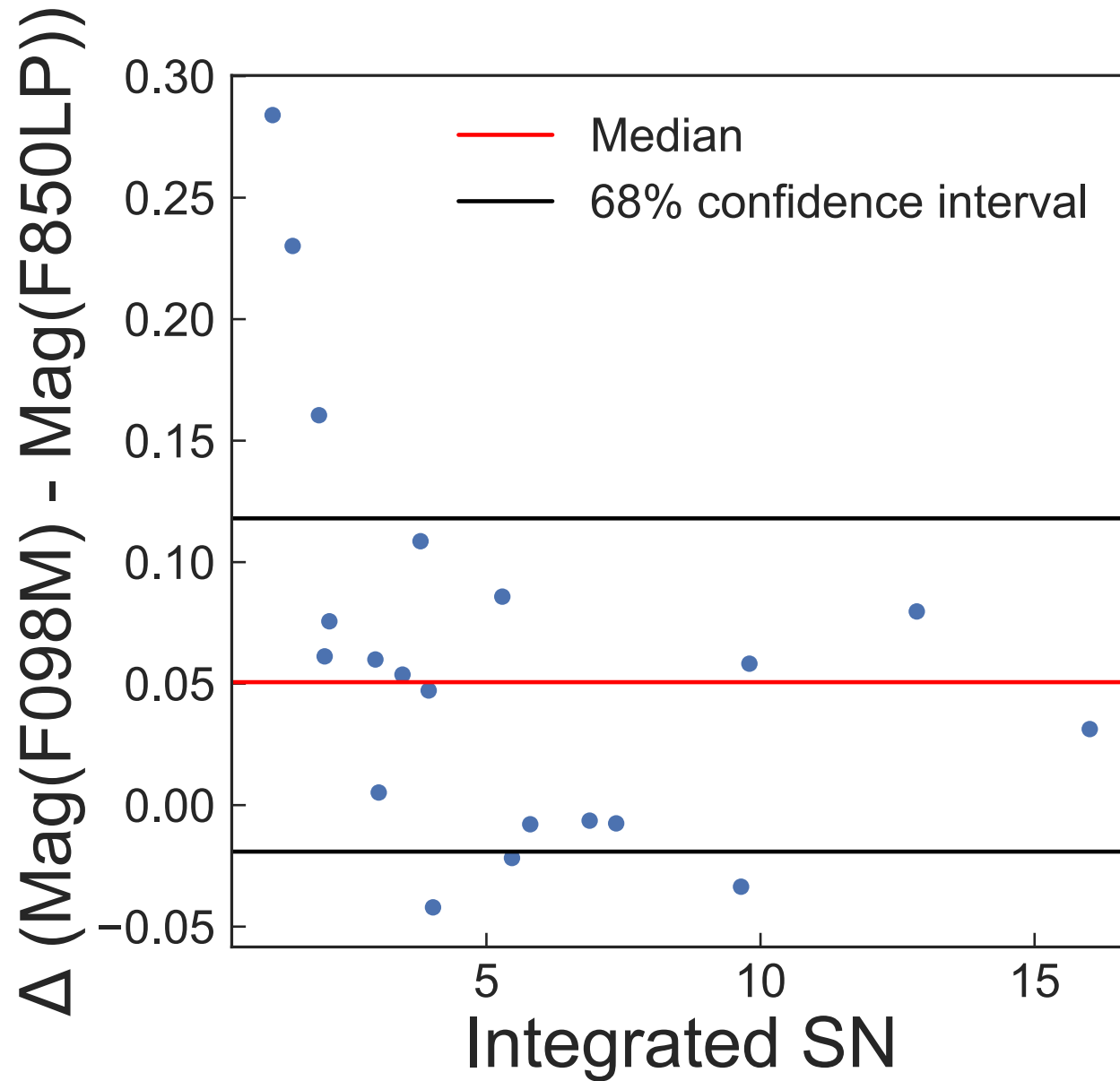
# Summary

- Used CLEAR to constrain the metallicity and age of massive,  $\text{Log}(M/M_{\odot}) > 10$ , quiescent galaxies in a redshift range of  $1 < z < 1.8$
- Fit HST/WFC3 G102 grism spectra with simulated grism models derived using Grizli and FSPS models
- Future work includes forward modeling of 2D spectra, and using 2 component morphologies to simulate the effects of bright compact cores

# Spectra and Photometry



# Spectra and Photometry cont.



# Model Fitting Simulated Data

