

# (Rapid) Buildup of **Dust** from Deep Within the **Epoch of Reionization** to **Cosmic Noon**

**Danial Langeroodi**

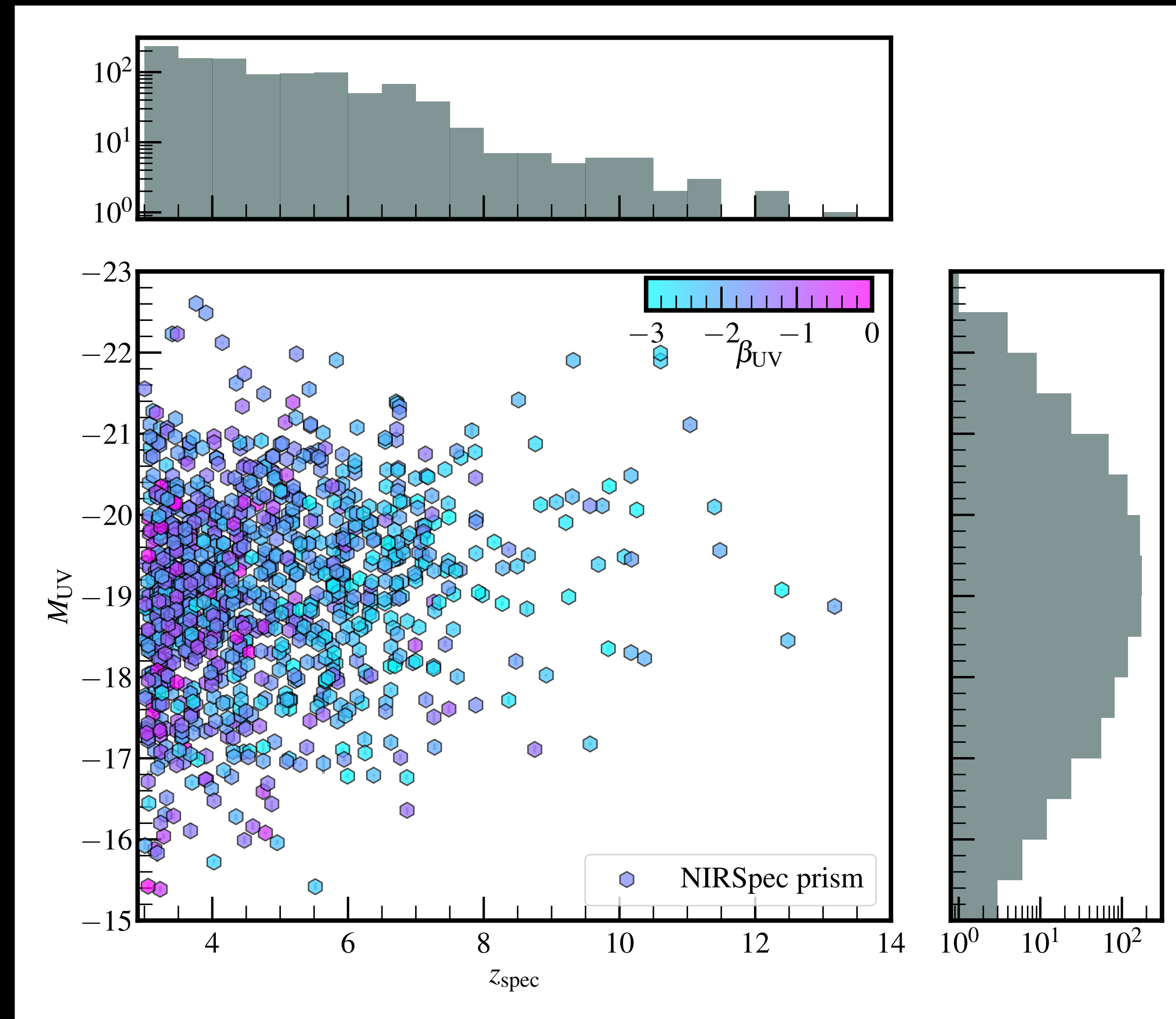
UNIVERSITY OF  
COPENHAGEN



**DARK**

# Uniformly Reduced Sample of NIRSpec MSA prism spectra

## > 2000 galaxies at $3 < z < 14$

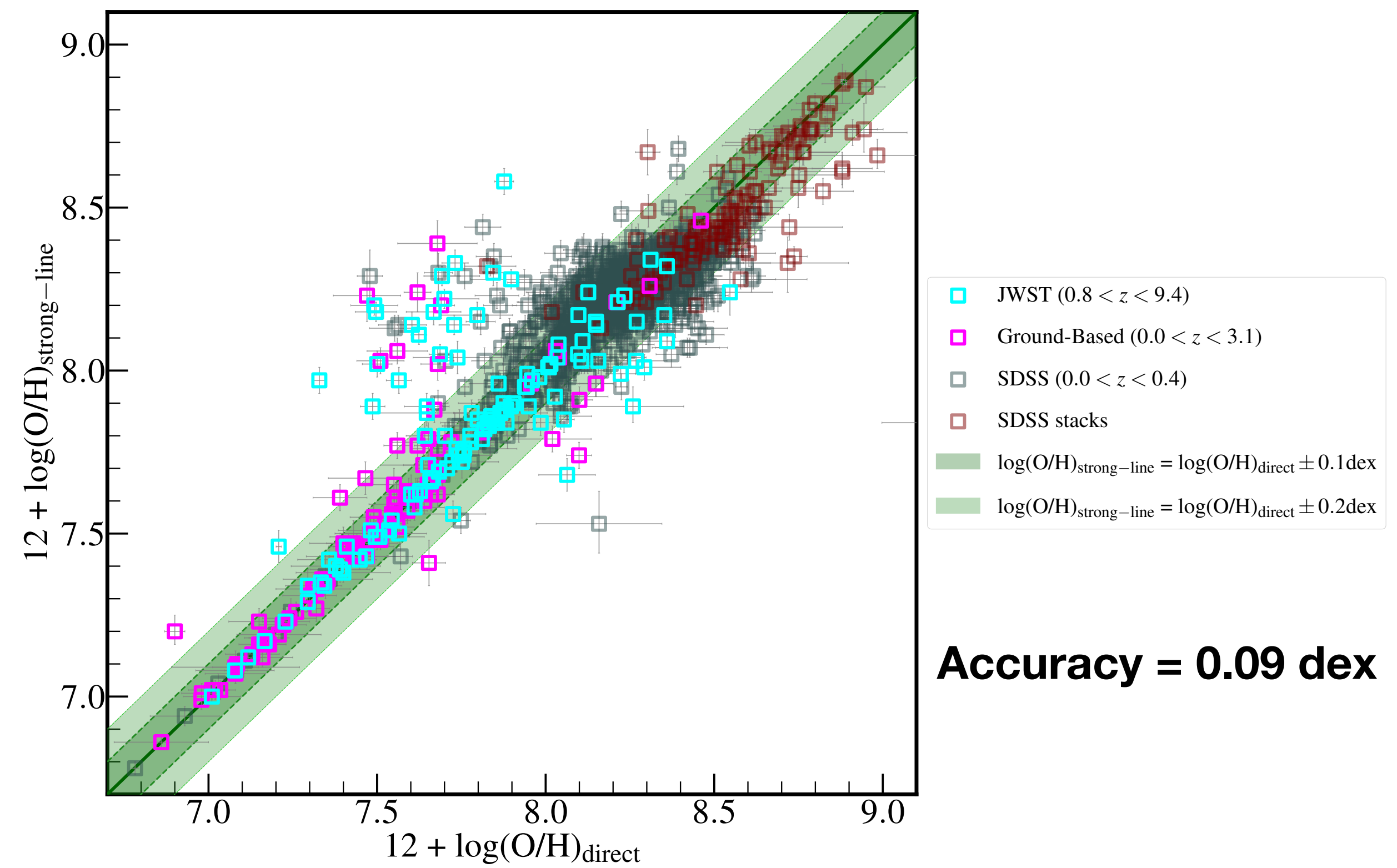
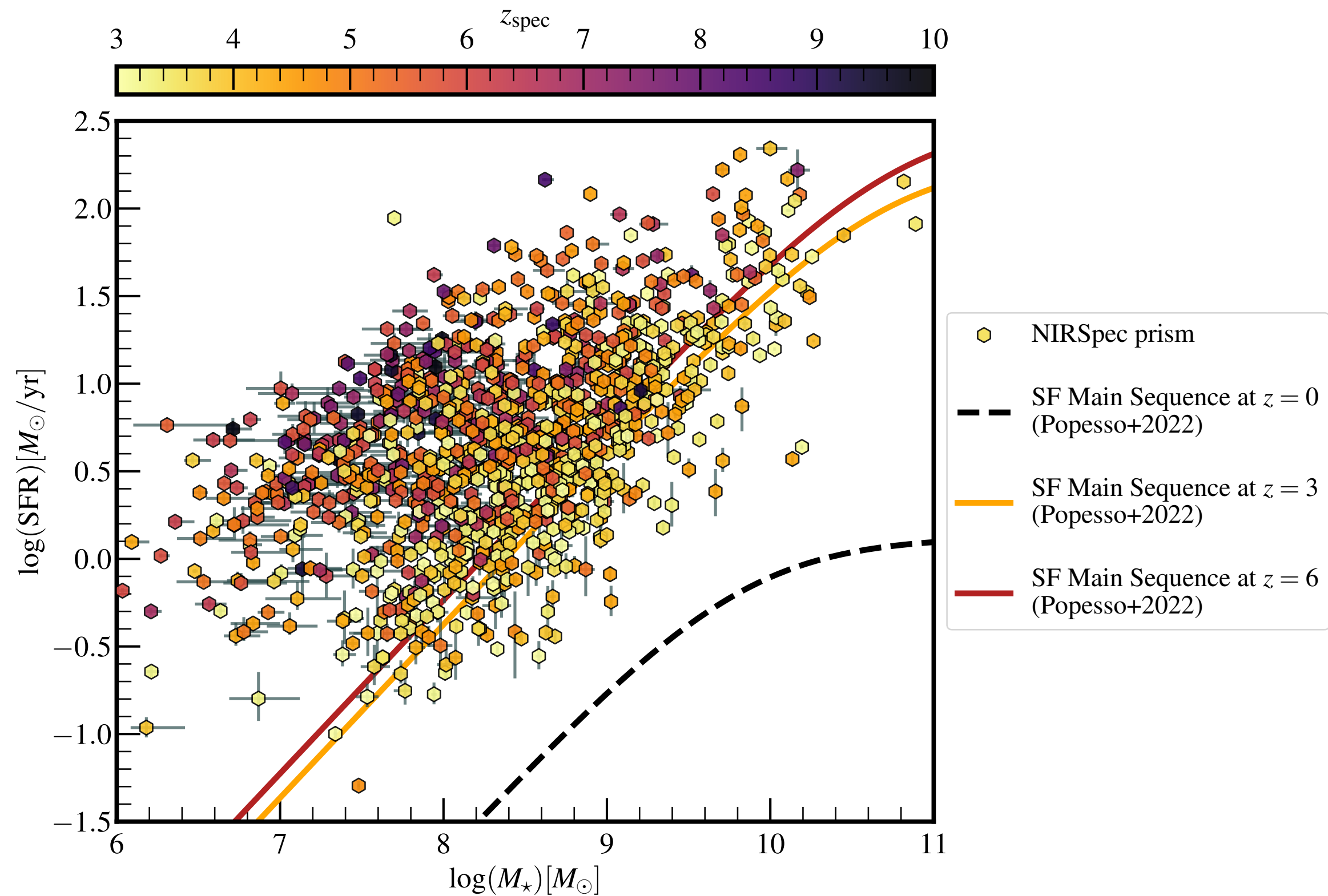


Langeroodi & Hjorth (2023)

Langeroodi & Hjorth (2024a)

Langeroodi & Hjorth (in prep.)

# Genesis. Spectral Energy Distribution (SED) Fitting

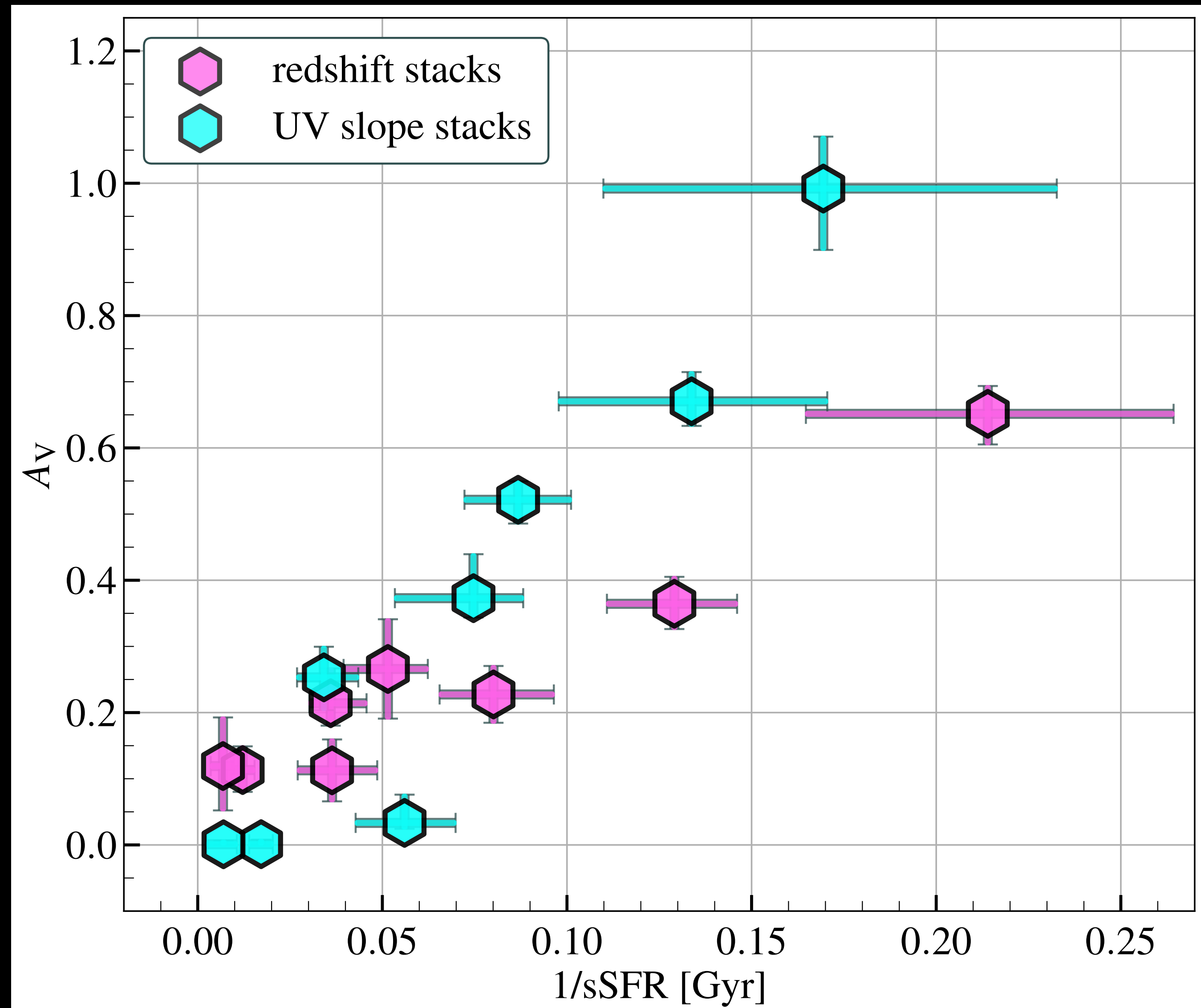


**Accuracy = 0.09 dex**



**The origin of interstellar dust and its formation timescale remain debated**

# Rapid Dust Buildup in the Early Universe

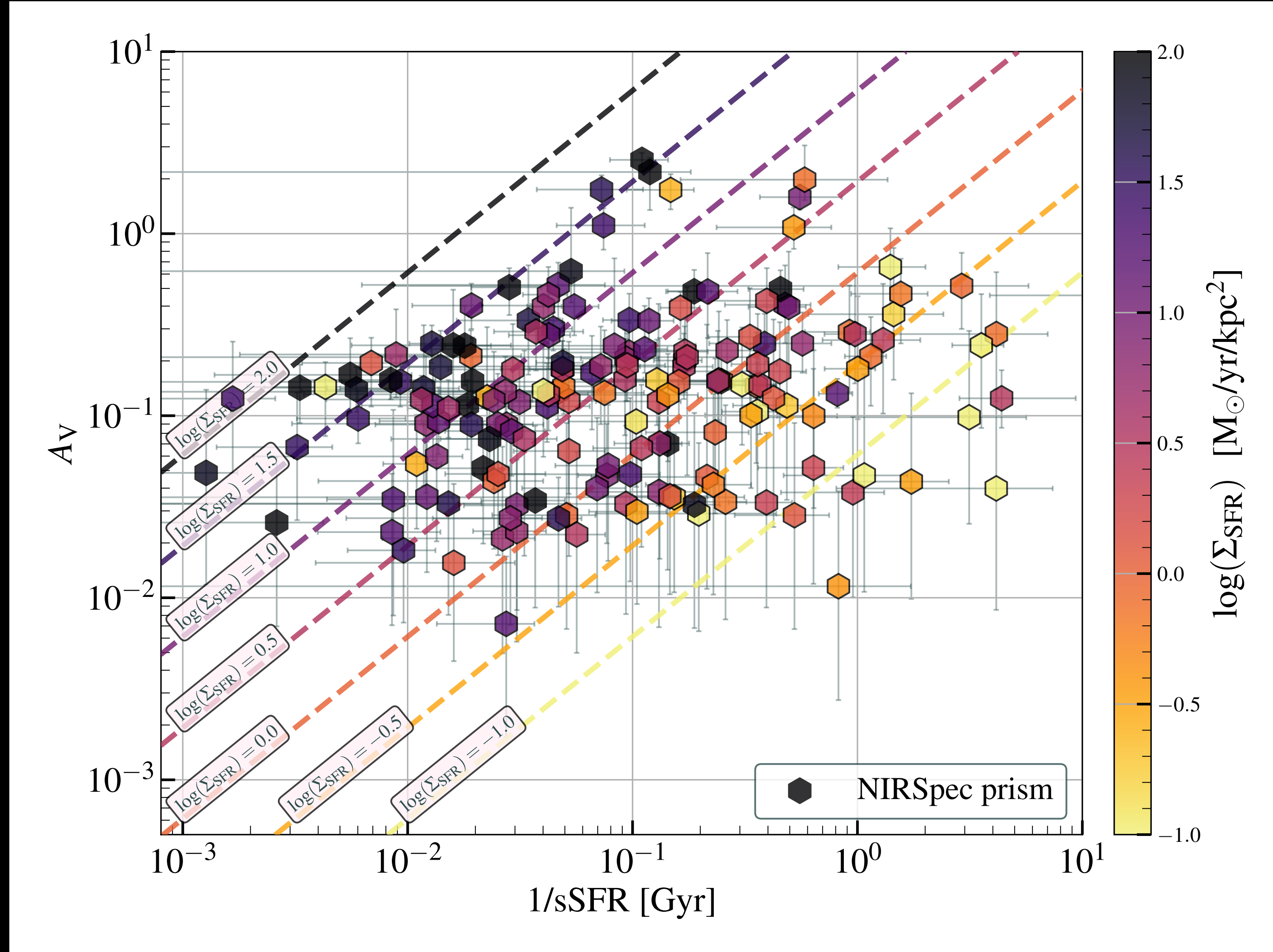


$$M_{\text{dust}} \propto M_{\star}$$

$$A_V = \Upsilon \Sigma_{\text{SFR}}/\text{sSFR}$$

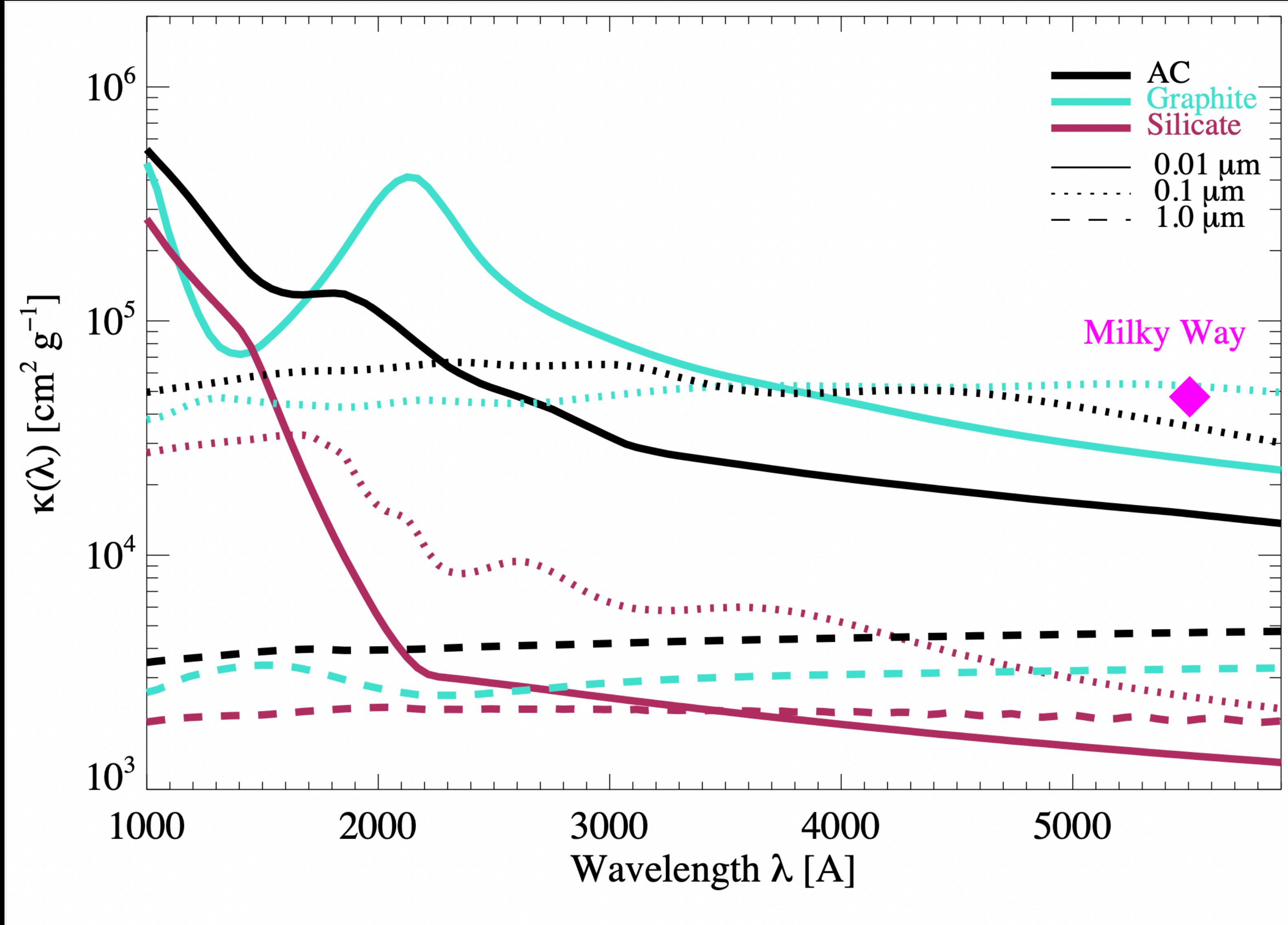


# Early-universe galaxies appear much less attenuated than expected

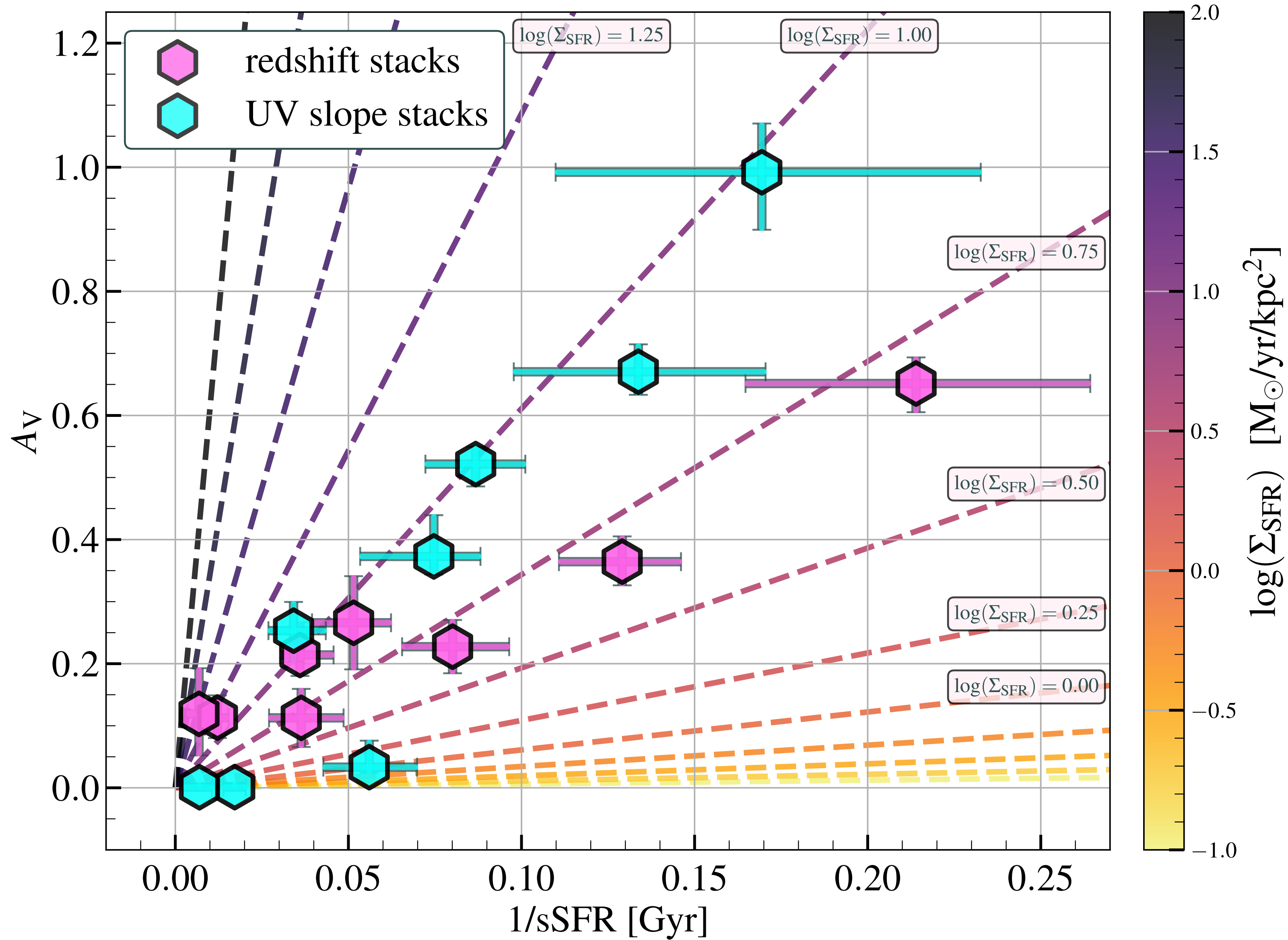


Langeroodi, Hjorth, Ferrara, and Gall 2024

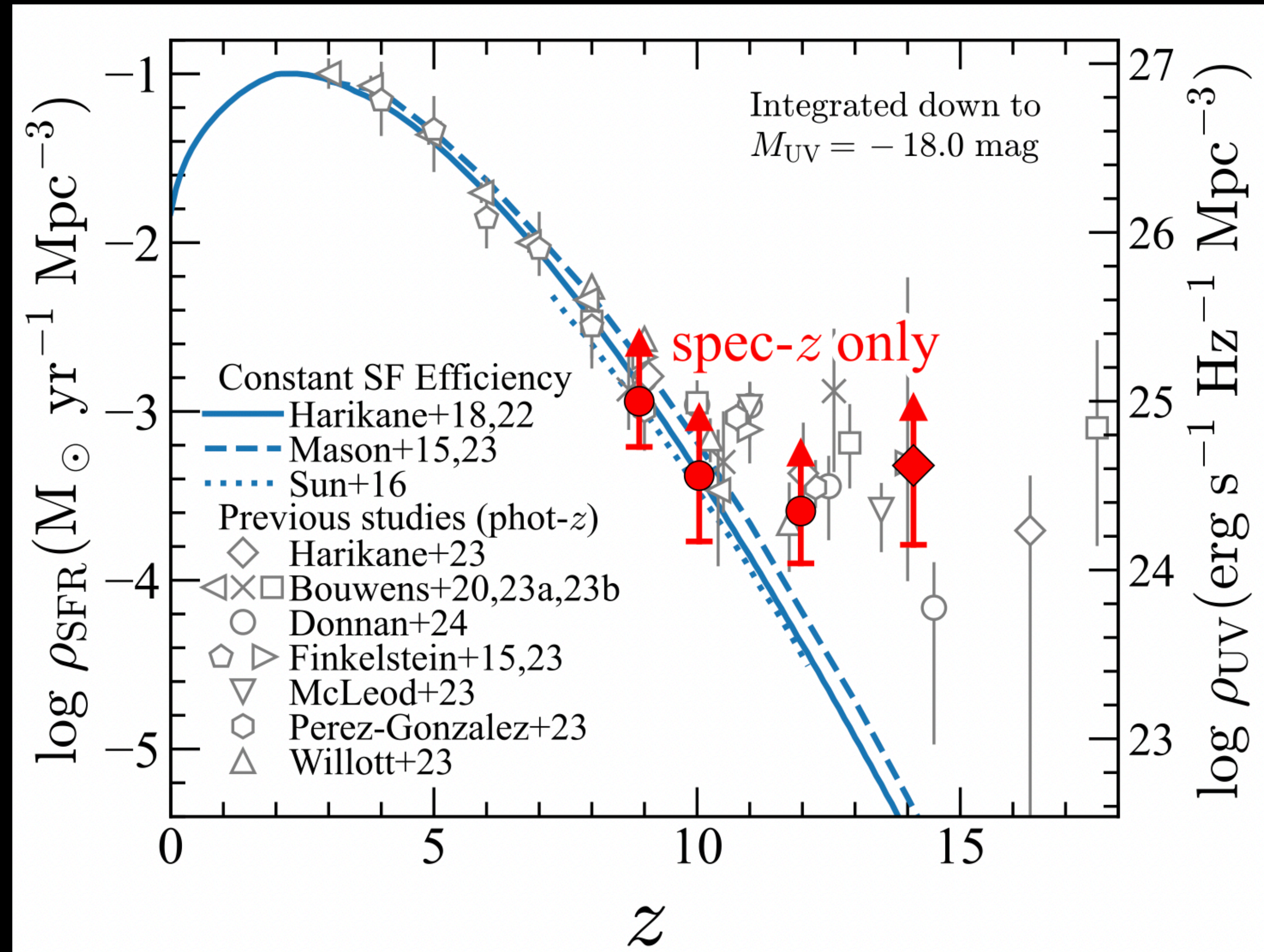
# Modifying the Dust Grains Properties





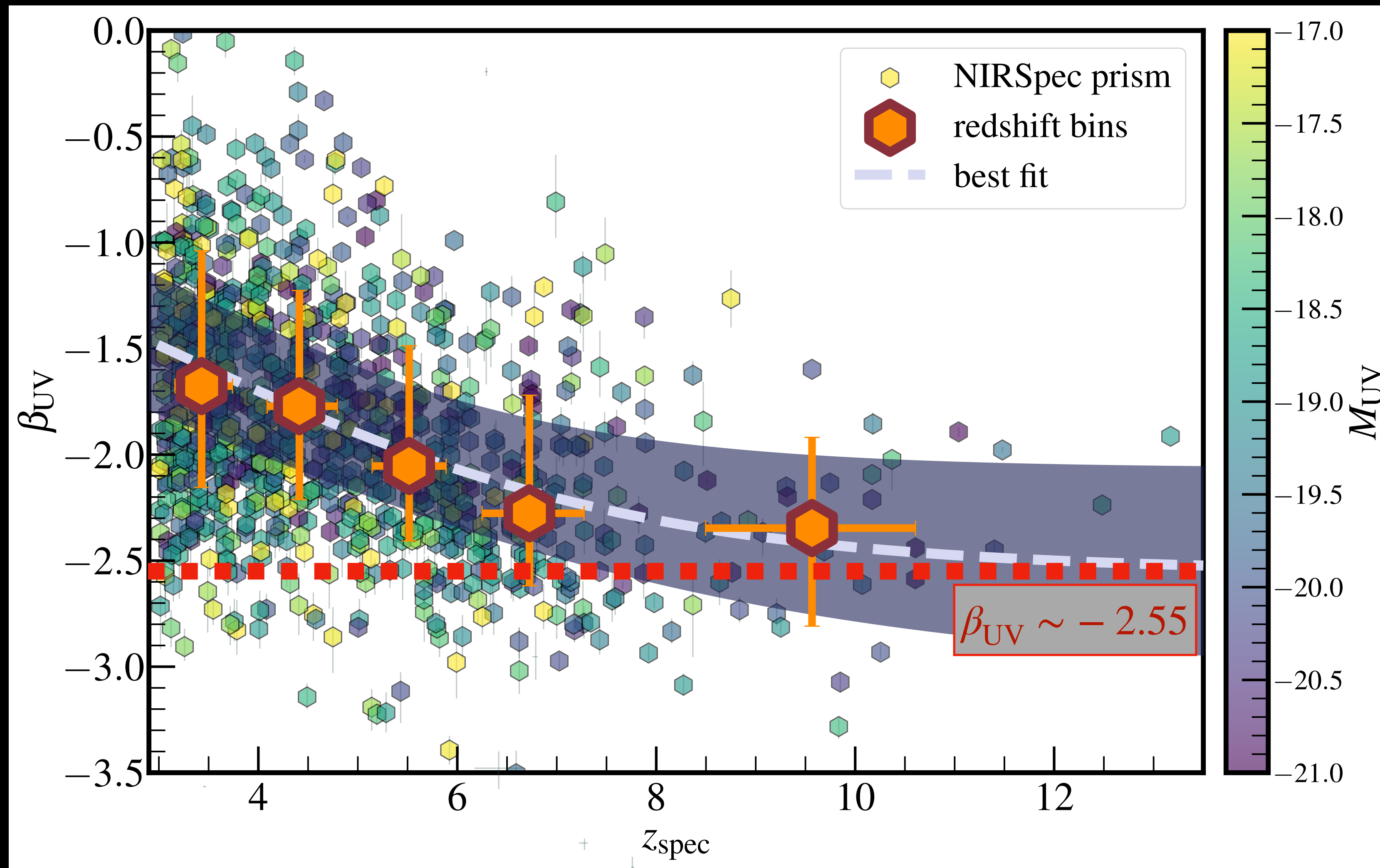


# High-redshift **Overabundance of Bright Galaxies**

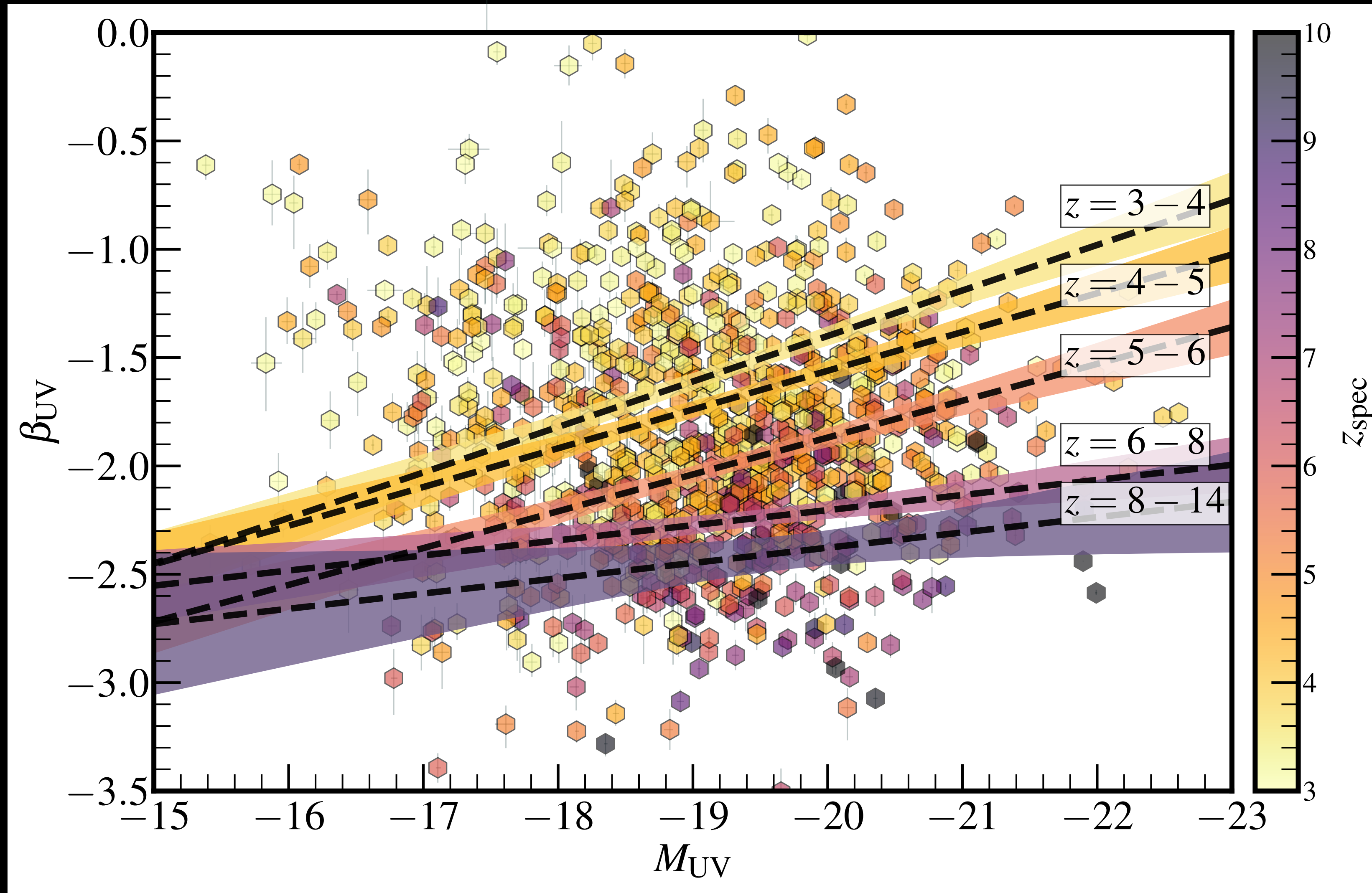




# Emergence of **Dust-Free** Stellar Populations at $z > 10$

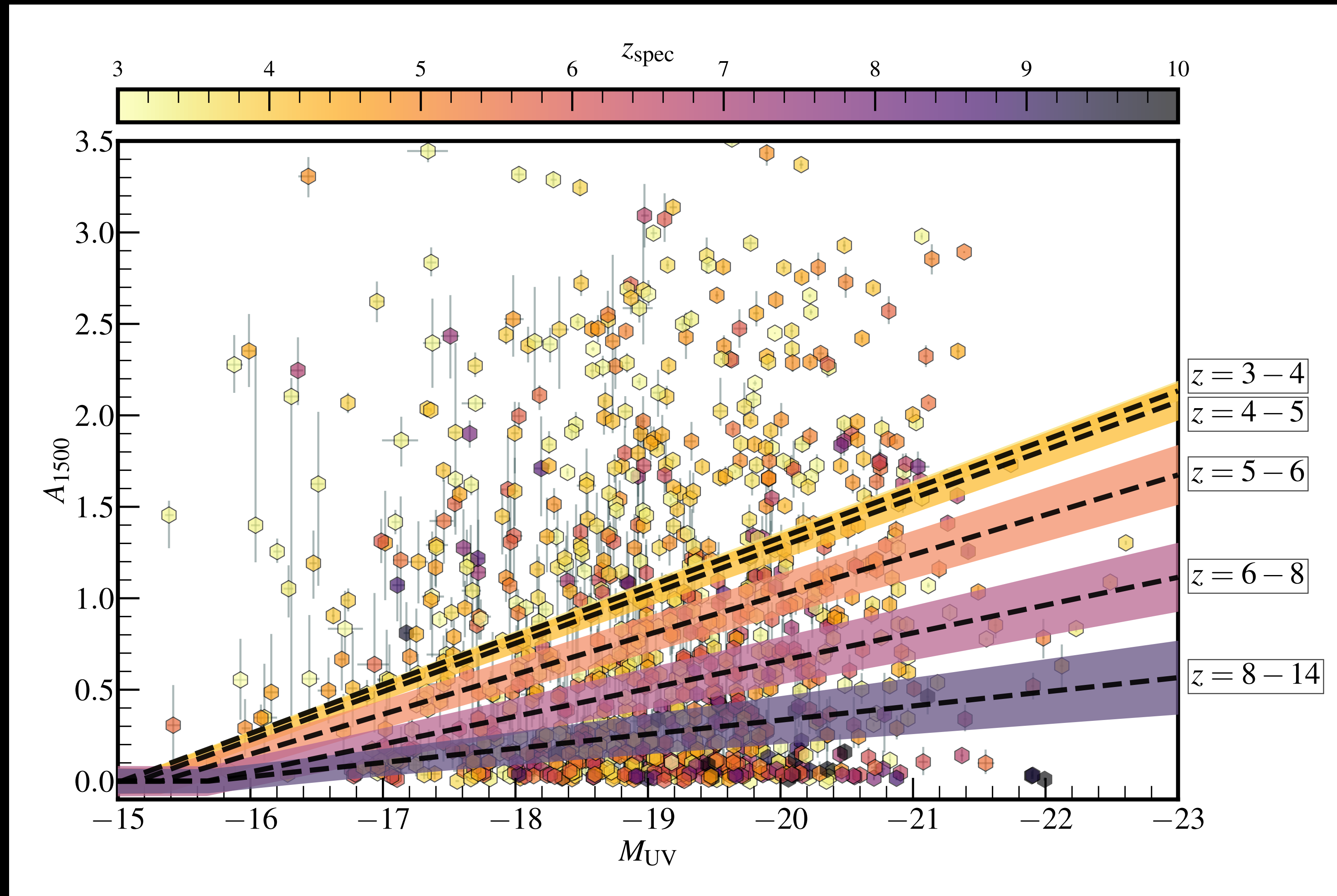


# $\beta_{\text{UV}}$ vs. $M_{\text{UV}}$ Anti-correlation is **Flattened** at High Redshifts





# $A_{1500}$ vs. $M_{UV}$ Anti-correlation is **Flattened** at High Redshifts



Langeroodi & Hjorth (in prep.)

# Generalization of the Meurer Relation

