

# Galaxy Star Formation Histories from Deep IR Surveys -

## The Blessings, and the Blind Spot

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# The All-Wavelength Extended Groth Strip International Survey

- DEEP2/3: Keck /DEIMOS spectra: ~20,000 precision redshifts, galaxy kinematics
- HST imaging
- Very deep:
  - Spitzer (IRAC, MIPS)
  - GALEX (NUV, FUV)
  - Chandra, XMM
  - VLA 6/20cm
  - Herschel FIR
  - (sub)-mm
- Ground-based deep U- to K-imaging

[HTTP://AEGIS.UCOLICK.ORG](http://AEGIS.UCOLICK.ORG)

**-DATA RELEASED-**

C. Willmer

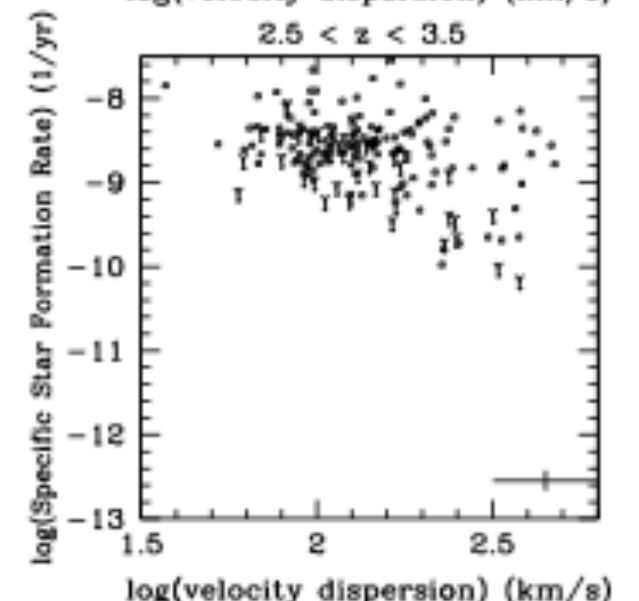
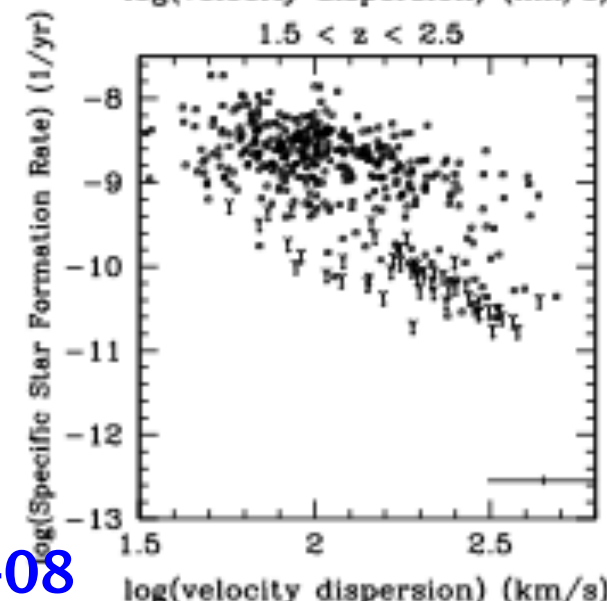
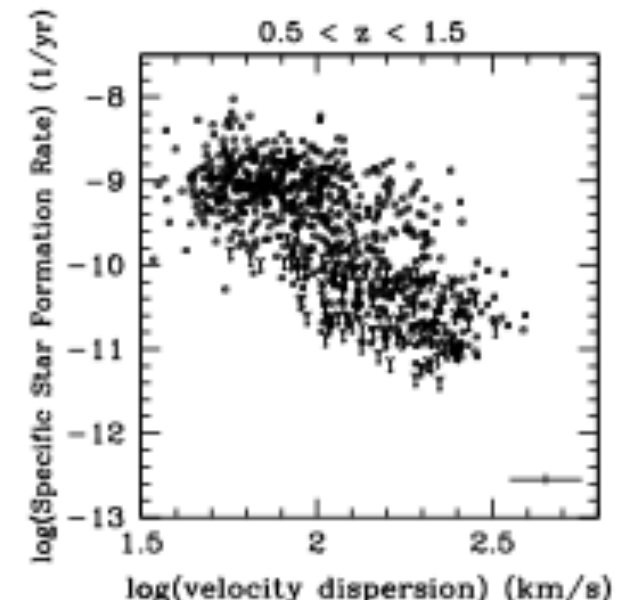
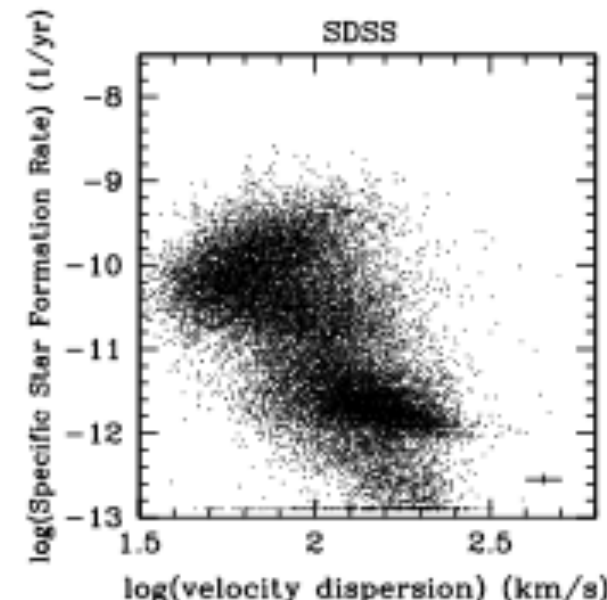
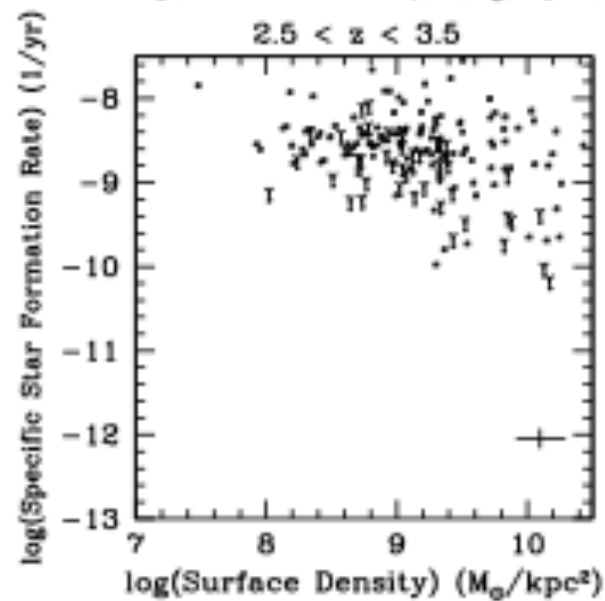
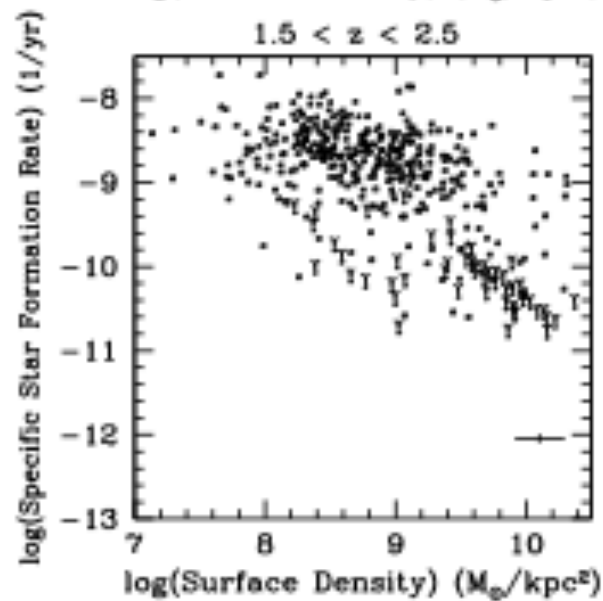
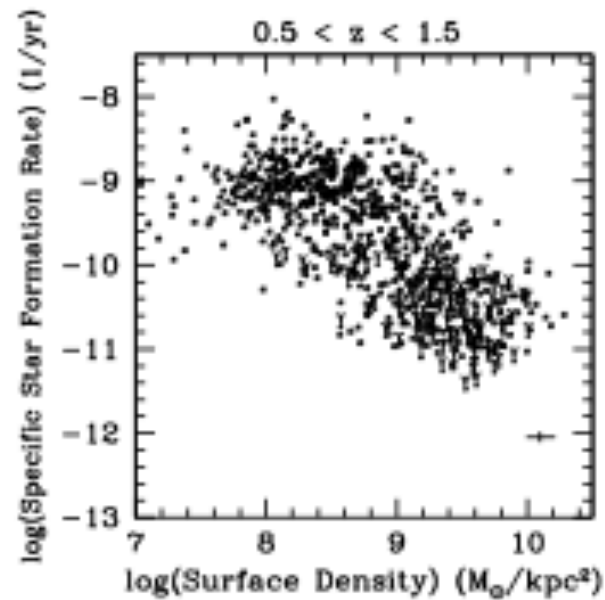
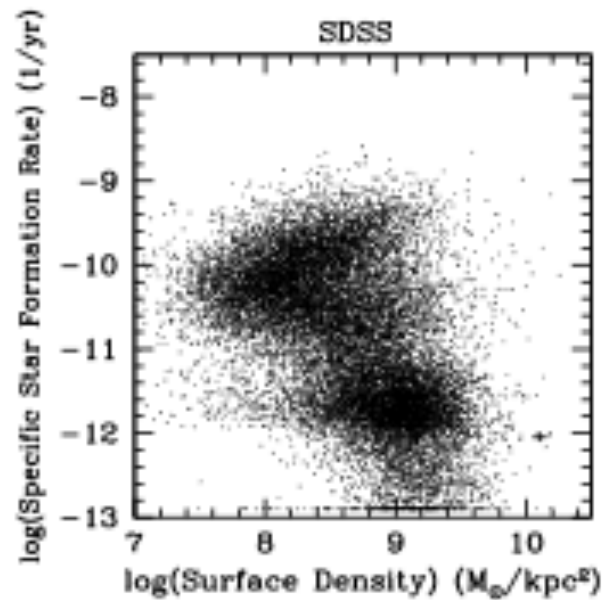


# Recent discoveries from the deep Multi-wavelength surveys: Star Formation Scaling Relations

Fundamental to the understanding of star formation processes, similar to TF

# SFR - surface density

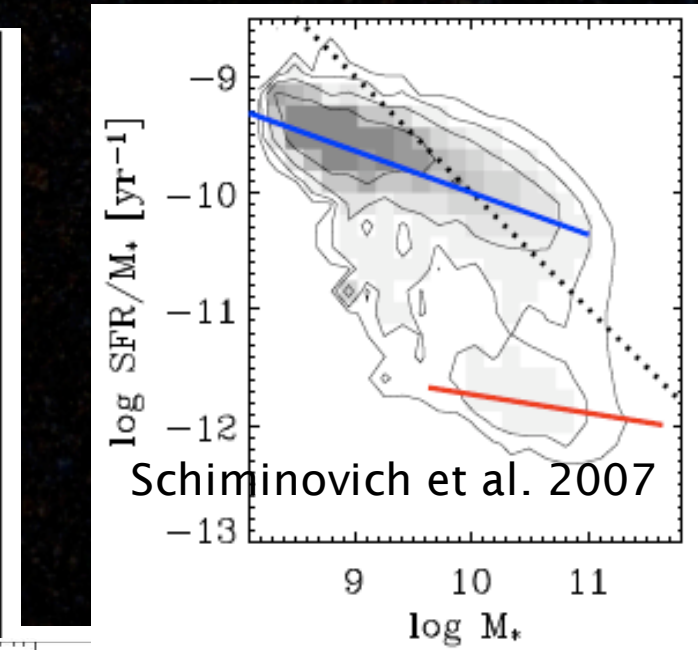
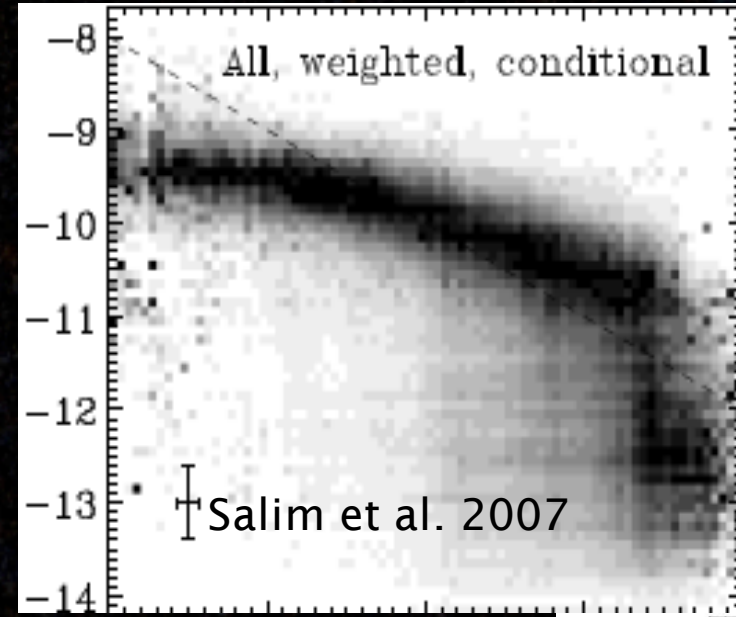
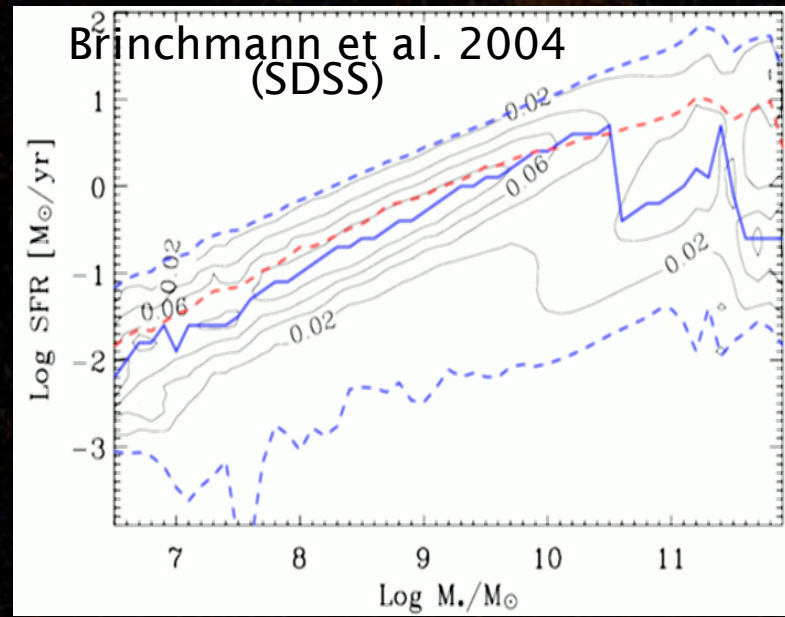
# SFR - velocity dispersion



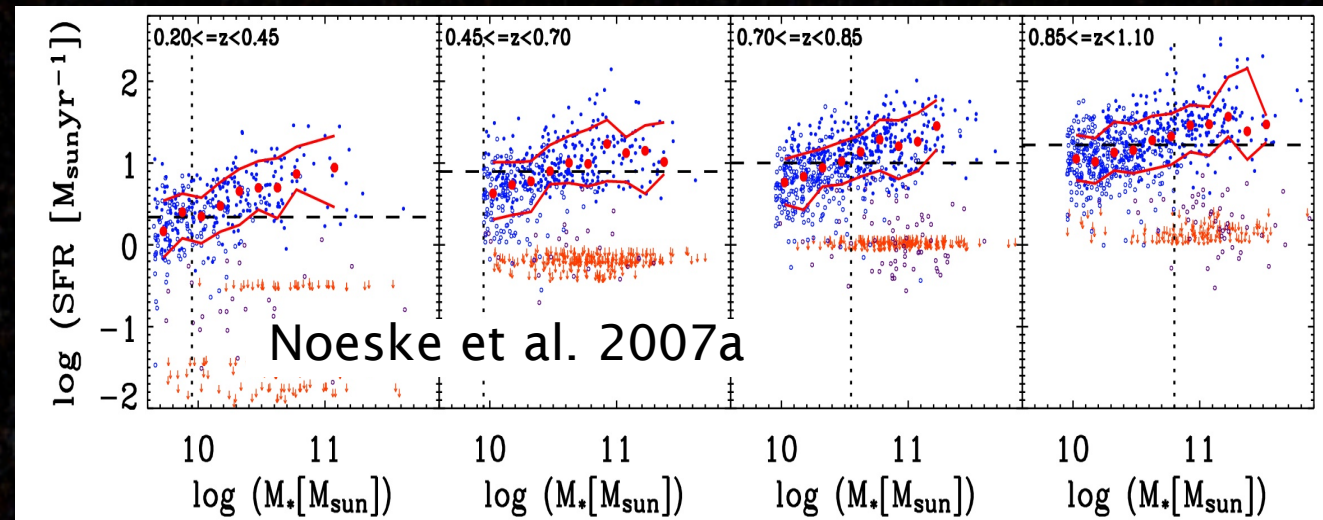
Franx+08

# The Star Formation Rate-Stellar Mass Relation ("Main Sequence")

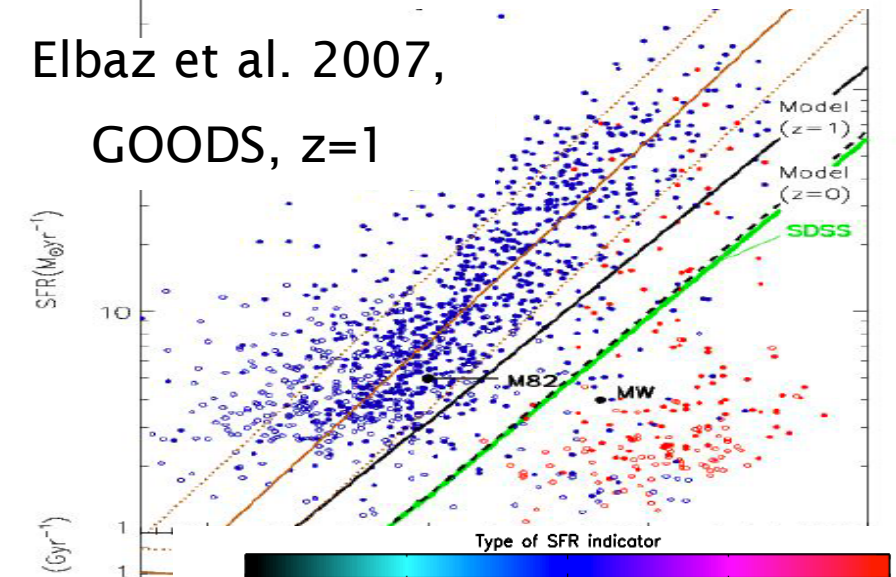
$z \sim 0.1$   
("now")



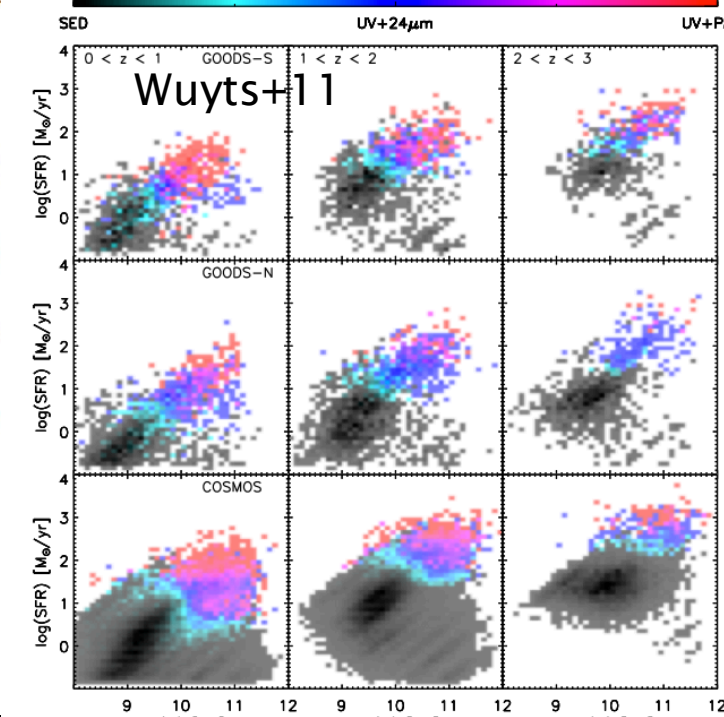
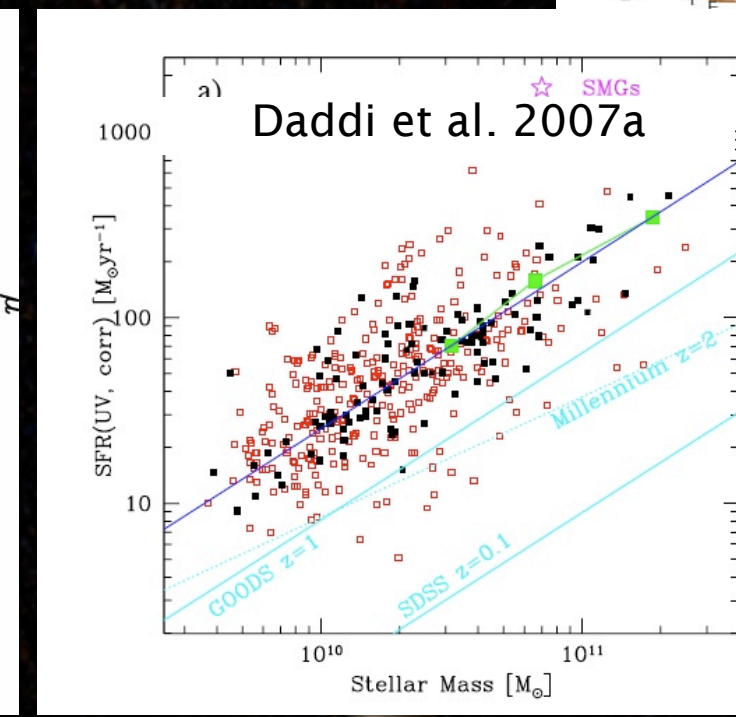
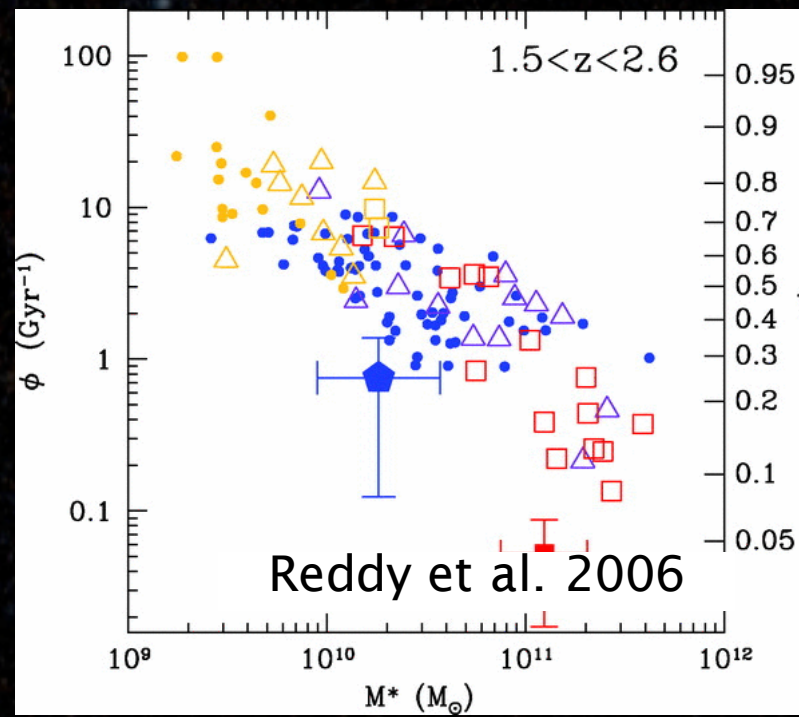
$z < \sim 1$



Elbaz et al. 2007,  
GOODS,  $z=1$



Existence  
to  $z > \sim 3$

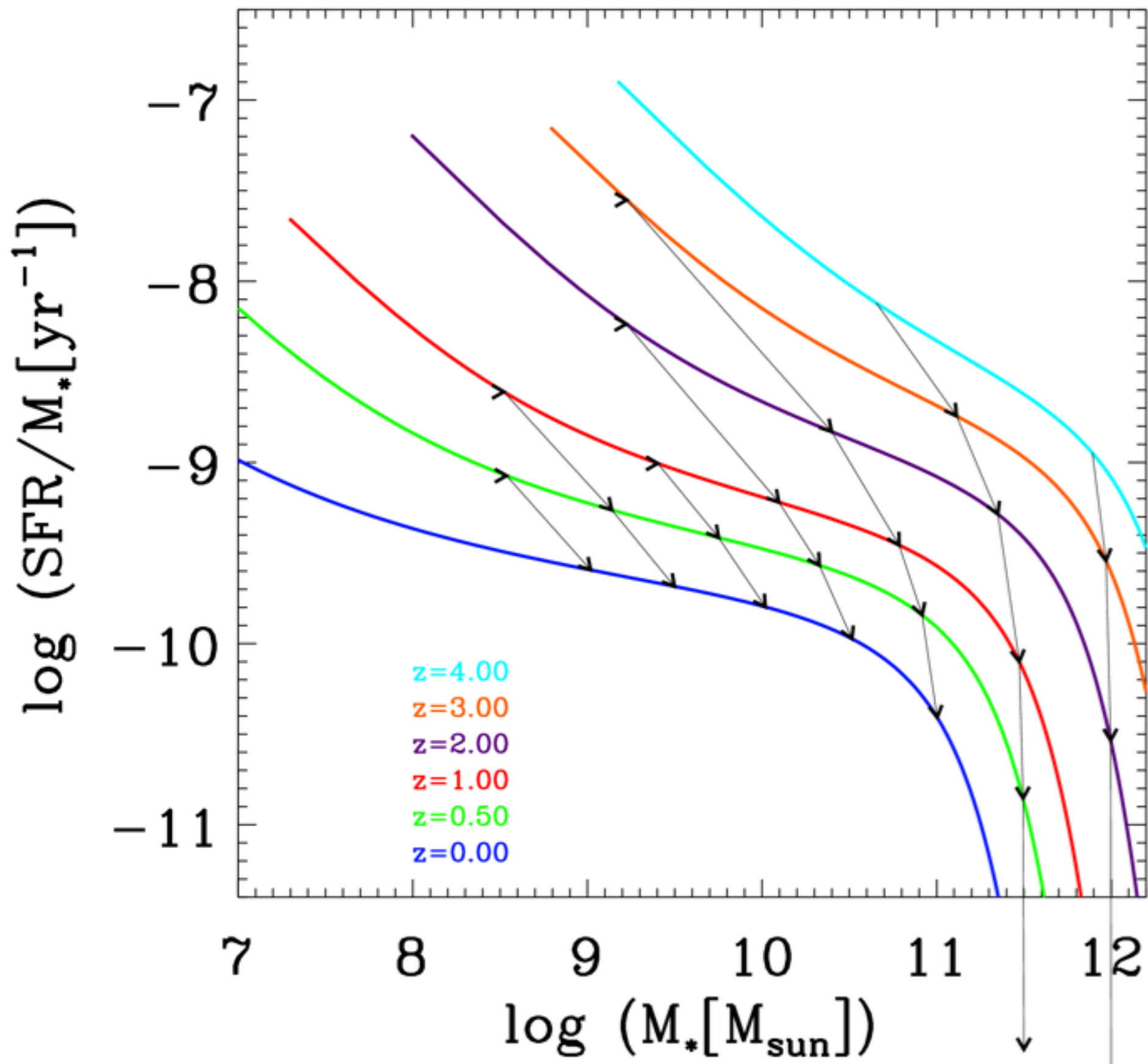


# The Star-Forming Galaxy Main Sequence:

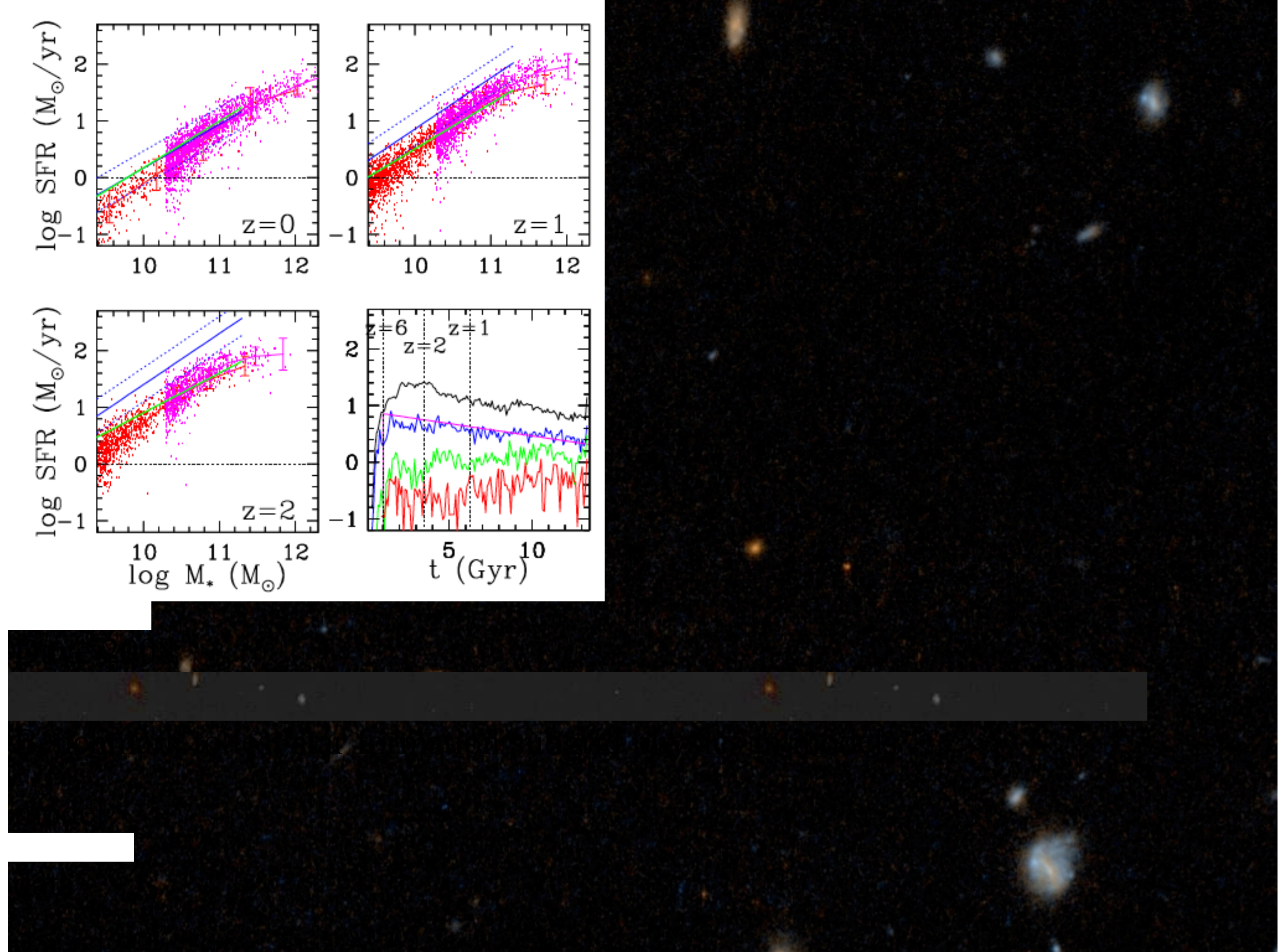
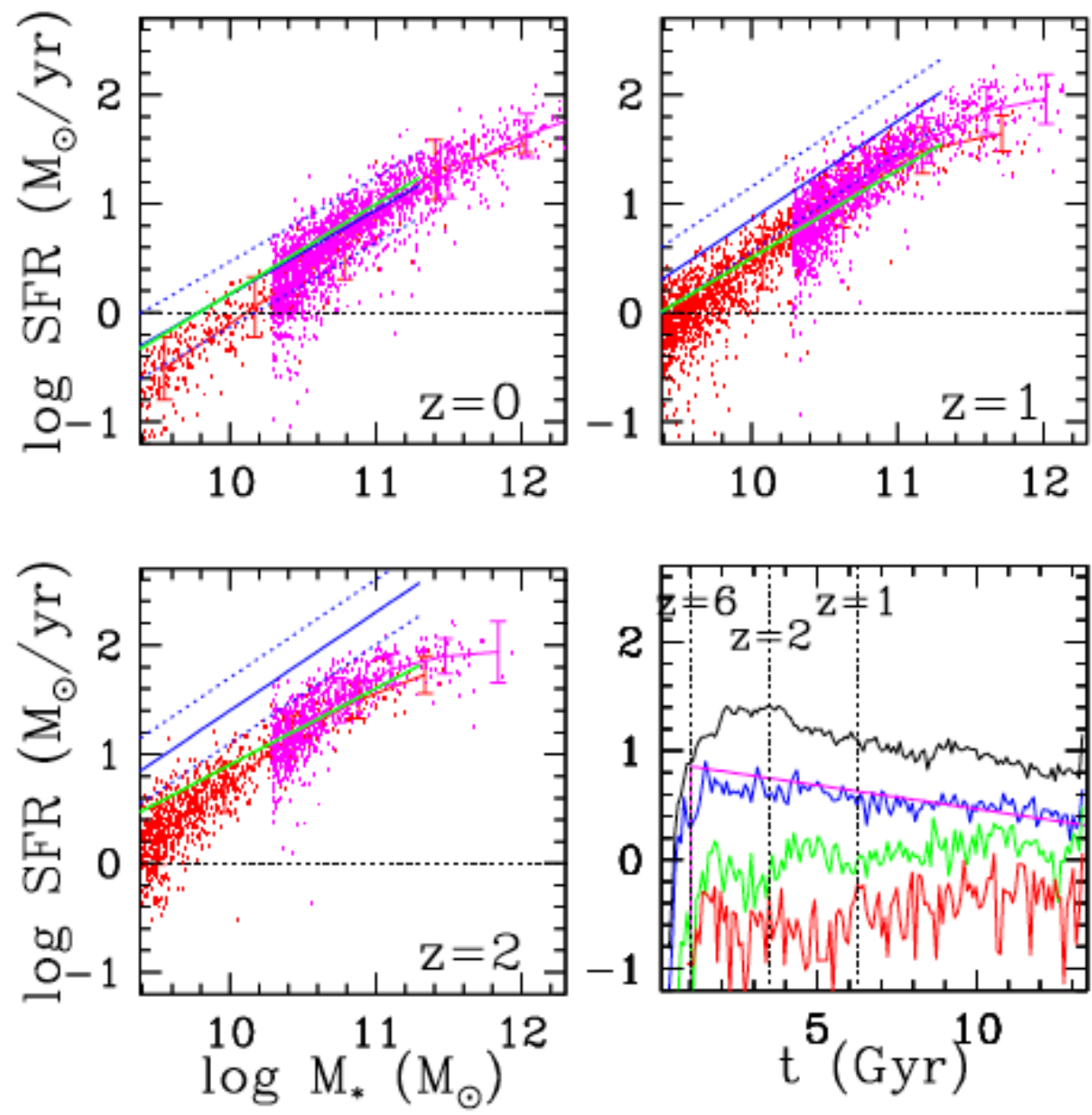
(1) “HRD of galaxies”,  
encodes mass-dependent SF histories

(2) Key relation to test galaxy models, subgrid  
physics of galaxy-wide star formation









### III SF / $M_*$

IV

- STILL ARGUE ABOUT K-S

-  $X_{CO}$ , RESOLUTION?

-  $H_I - H_2$  BALANCE

- SPS MODELS: DIFFER,  
PROBLEMS: \*LIBRARIES  
SF HISTORIES

- IMF = SCAPEGOAT

Robust measurements of Star Formation Scaling Relations (1)

Require a combination of matched-together SFR tracers:



