

The VIMOS Public Extragalactic Redshift Survey Calibration of SFR Indicators at $z \sim 0.7$

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Context & Aim

The formation and evolution of galaxies are constrained by the build-up of stellar mass which can be quantified by the SFR. Therefore, having several SFR indicators at our disposal is crucial to study galaxies over cosmic time. We use VIPERS, the largest spectroscopic survey at $z \sim 0.7$ (90 000 galaxies) to calibrate SFR indicators from UV to IR.

The goal is to provide SFR relations at $z \sim 0.7$ when a calibration based on $H\alpha$ is not possible

Data & Method

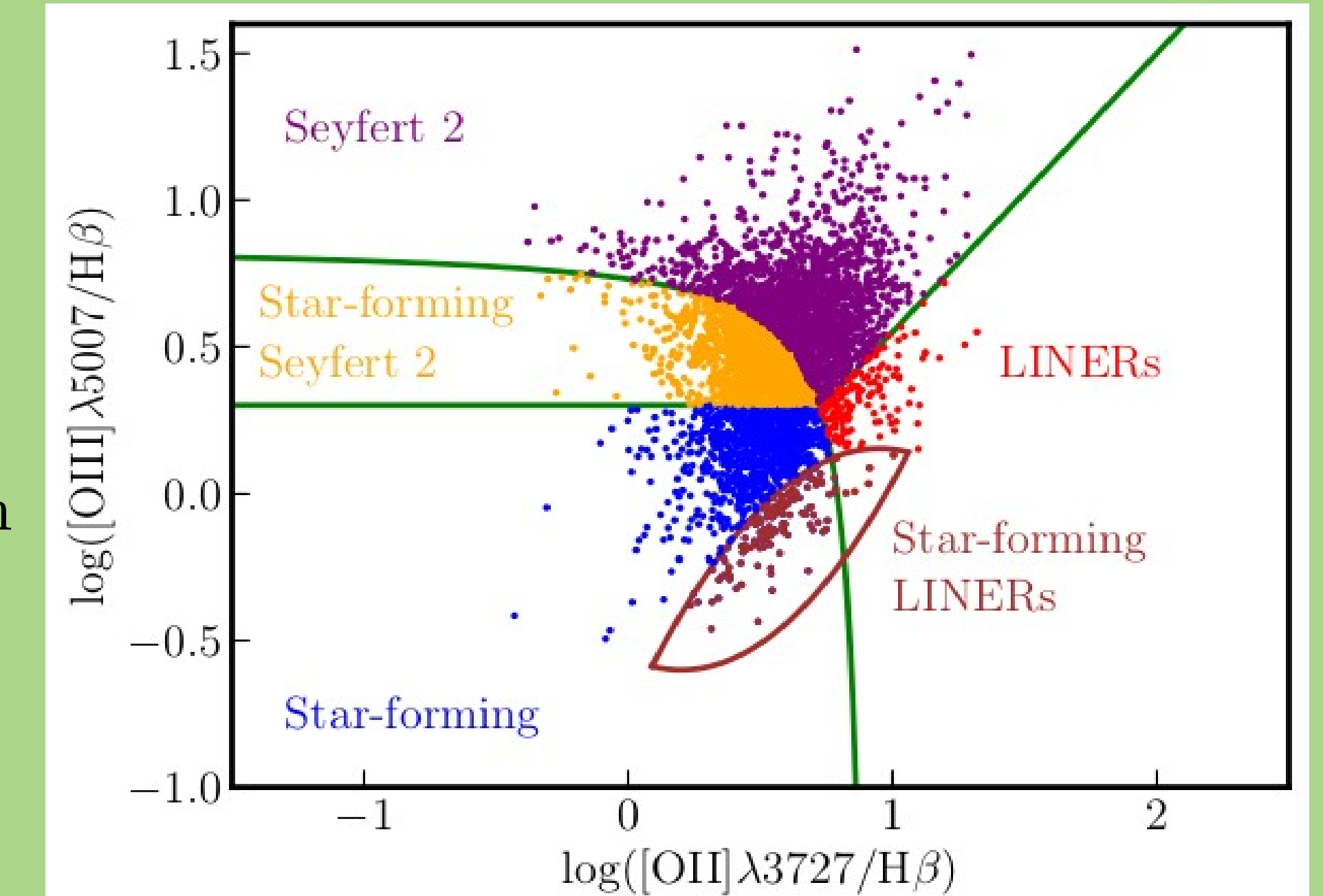
VIPERS ($0.5 < z < 0.9$)

2538 star-forming galaxies

GALEX-SDSS-WISE Legacy Catalog ($z < 0.3$)

98 165 star-forming galaxies

1. Reconstruction of the Spectral Energy Distribution from UV to IR using the **CIGALE** code.
2. Calibration of SFR indicators from UV to IR and spectral lines based on CIGALE SFR estimation
3. Selection of the best SFR tracers

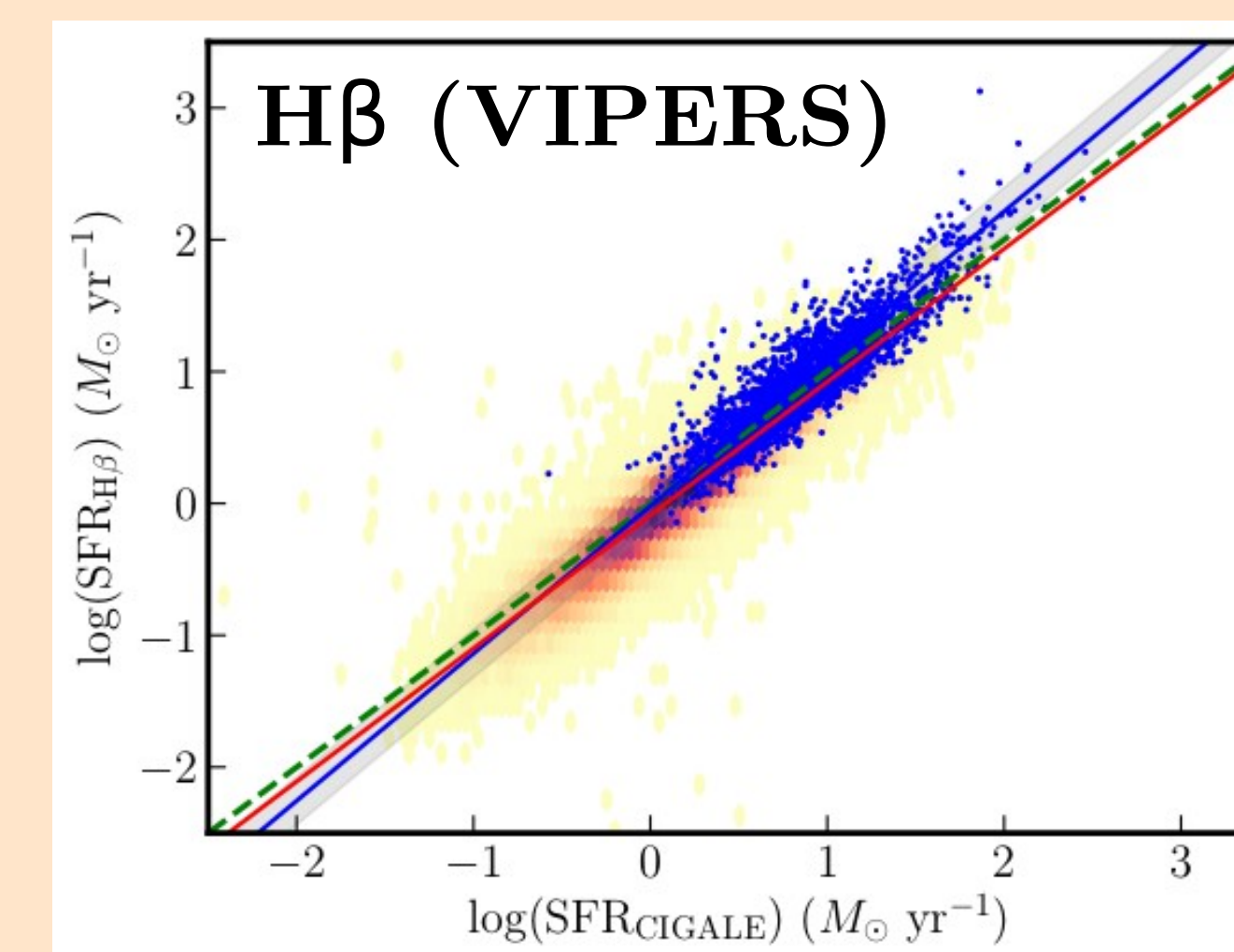
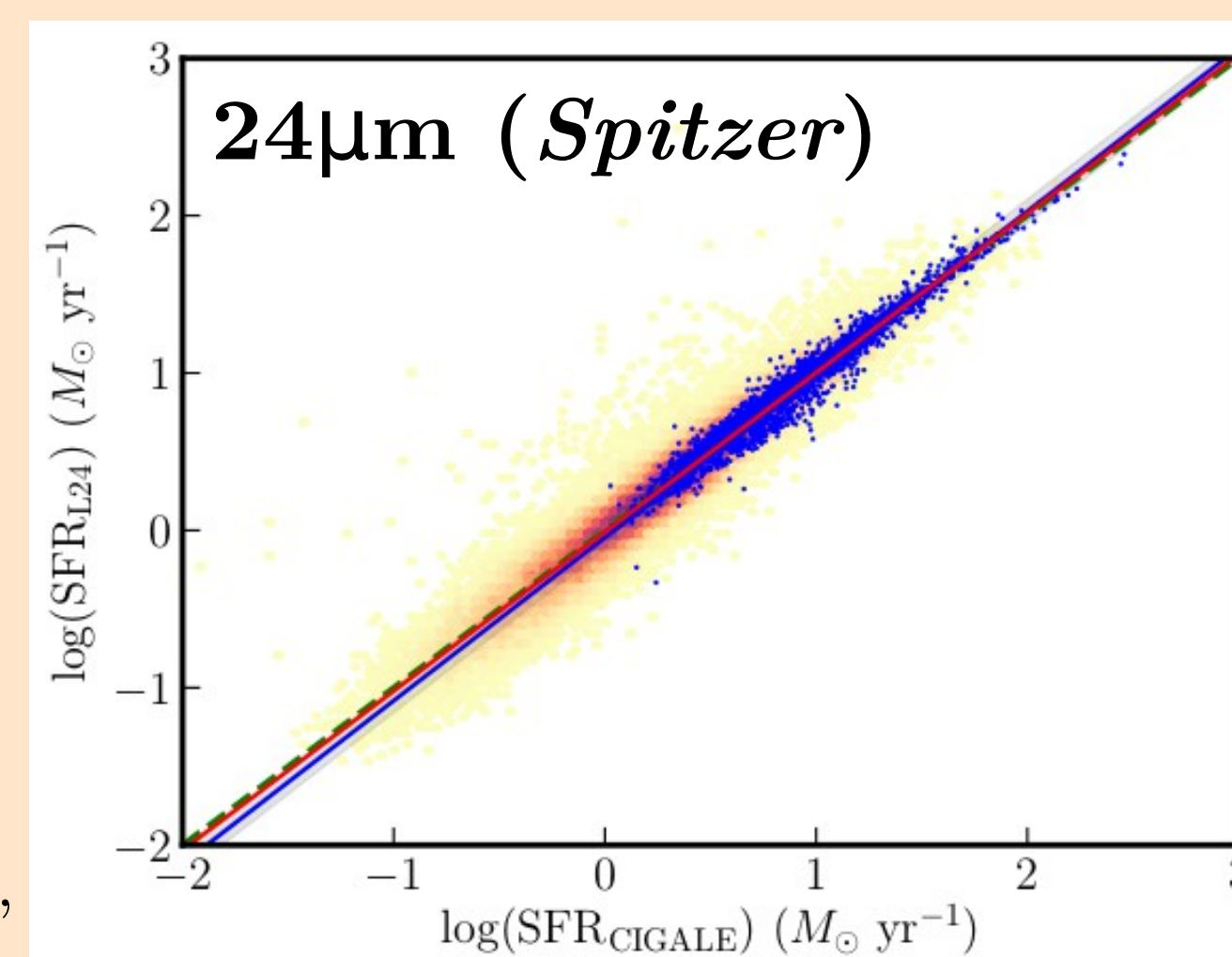
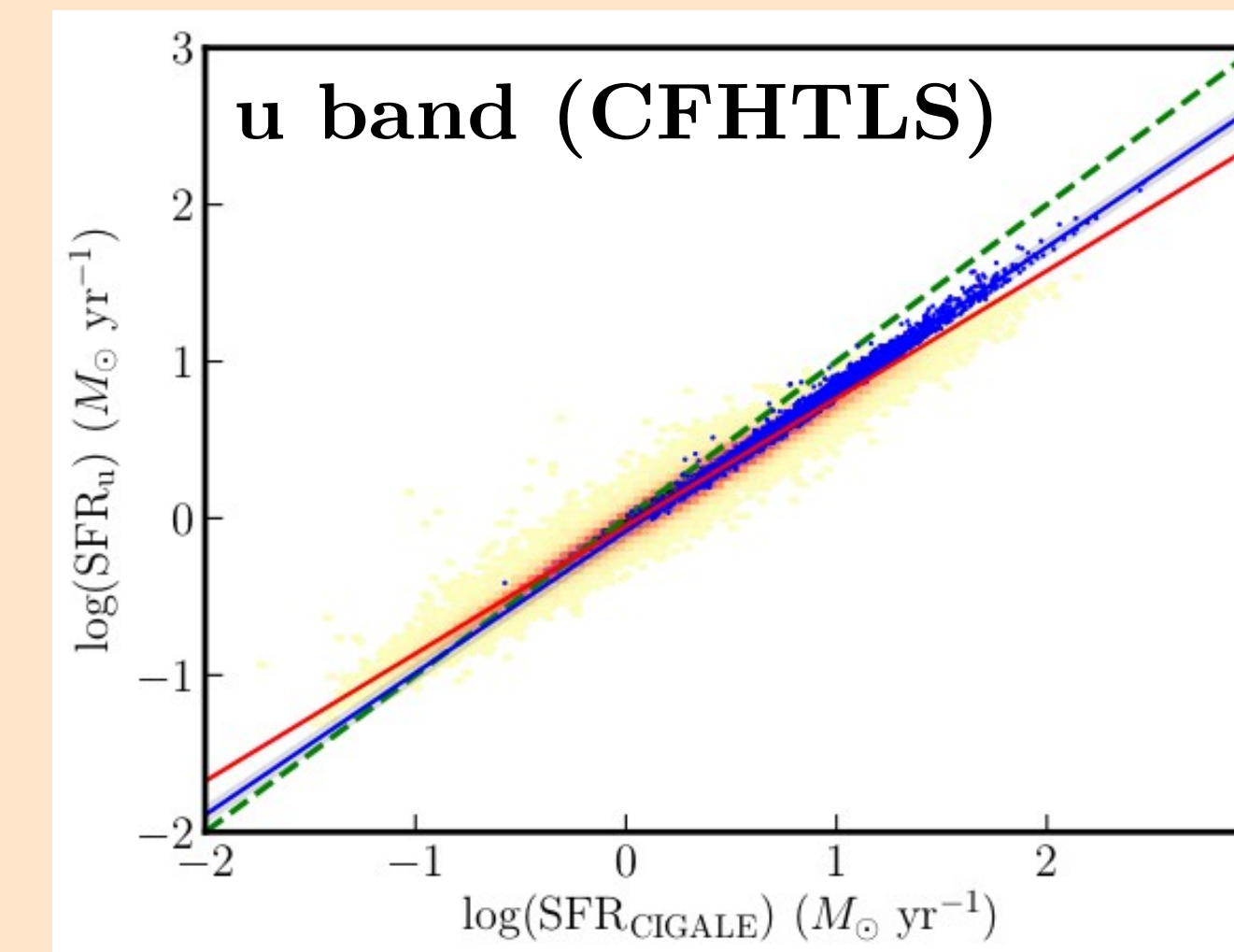
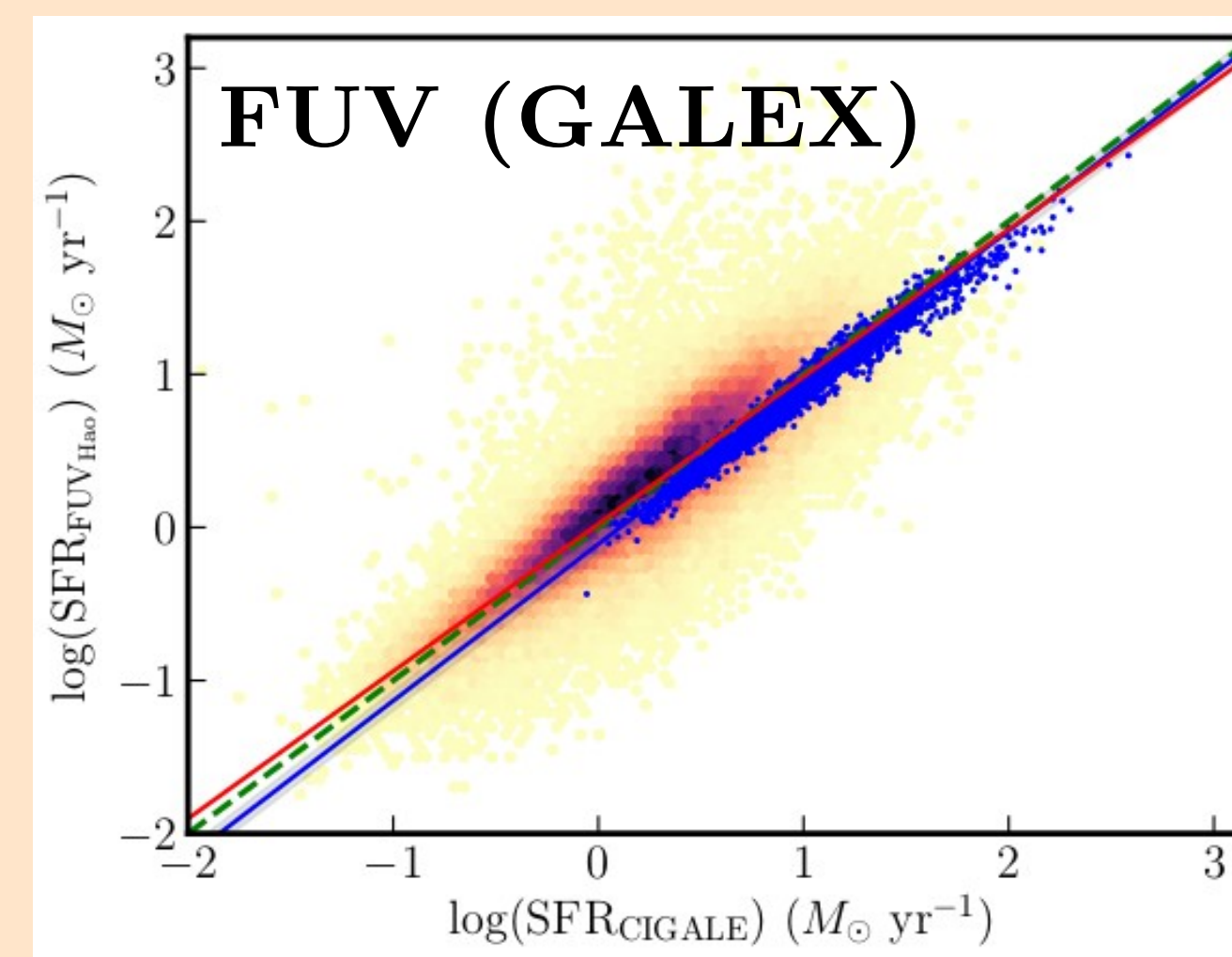


Analysis & Results

16 SFR relations are tested in this work

- FUV and NUV bands with different attenuation methods
- U band with correction for old stellar population
- Spitzer bands at 8 and 24 μ m
- Total infrared luminosity from Chary & Elbaz (2001) templates
- $H\beta$, [OII] and [OIII]
- Composite SFR tracers (UV+IR)
- Metallicity estimated using the R_{23} diagnostic
[OII] and [OIII] corrected for metallicity

SFR from different bands versus CIGALE SFR.
VIPERS (blue) GSWLC (density hexapixel and red),
1:1 relation (green)



Rest-frame bands	Pearson coefficient	Scatter
u band	0.99	0.05
FUV	0.99	0.06
24 μ m	0.98	0.08
$H\beta$	0.89	0.18

- Calibration of several bands
 - Good agreement between VIPERS and GSWLC
 - Scatter ranges from 0.05 to 0.34 dex
 - FUV, u band, 24 μ m, $H\beta$ are very good SFR indicators
 - Composite SFR can be good but need two bands
- Metallicity of the VIPERS sample of galaxies
 - Galaxies are highly metallic ($\log(O/H)+12 \sim 8.7$)
 - Metallicity does not significantly increase the accuracy of SFR from [OII]

Conclusions

- SFR calibrations available for FUV/NUV, u, IRAC4, MIPS1, L_{TIR} as well as $H\beta$, [OII] and [OIII]
- Best SFR indicators at $z \sim 0.7$: u band, FUV (Hao attenuation law) and 24 μ m
- No significant modifications are found for SFR estimations between VIPERS and the local Universe

References

VIPERS: Scodreggio, M. et al., 2018, A&A, 609, A84 / Guzzo, L. et al., 2014, A&A, 566, A108 – GSWLC: Salim, S. et al., 2018, ApJ, 859, 11 / Salim, S. et al., 2016, ApJ SS, 227, 2 – SFR recipes: Alonso-Herrero, A. et al., 2006, ApJ, 650, 835 / Arnouts, S. et al., 2013, A&A, 558, A67 / Brown, M. J. I., et al., 2017, ApJ, 847, 136 / Davies, L. J. M. et al, 2016, MNRAS, 461, 458 / Kennicutt, R. C. Jr., 1998, ARAA, 36, 189 / Kewley, L. J., et al., 2004, AJ, 127, 2002 / Figueira, M., et al, in prep

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