On the importance of using appropriate spectral models to derive physical properties of galaxies

Camilla Pacifici (Yonsei), Elisabete da Cunha (MPIA),
Hans-Walter Rix (MPIA), Stephane Charlot (IAP), Sukyoung Yi (Yonsei)

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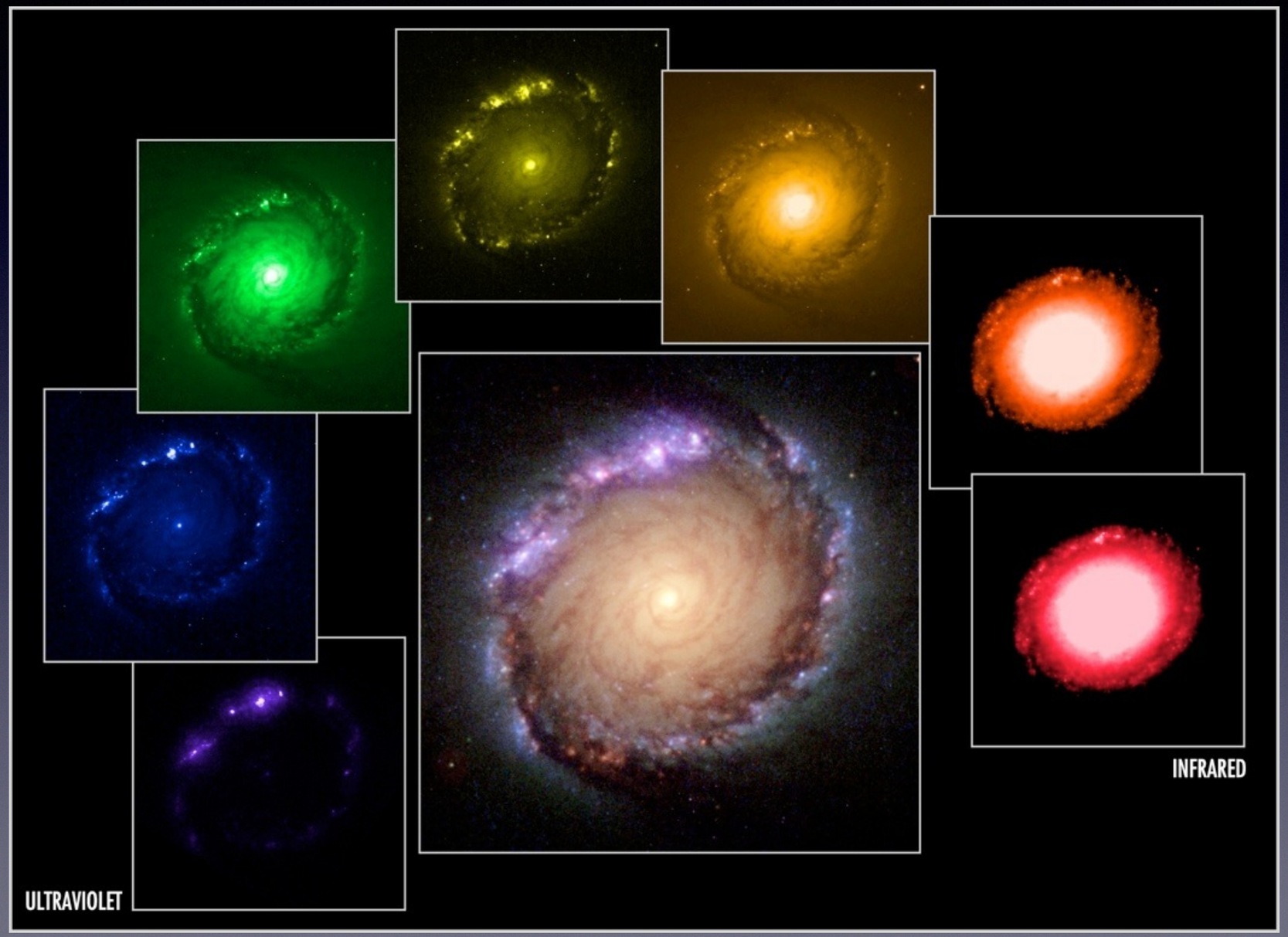
Outline

- Spectral-energy-distribution (SED) fitting
- Observed sample
- Modeling approach - the behaviour of different spectral libraries
- Extracting the physical parameters
- Conclusions

SED fitting



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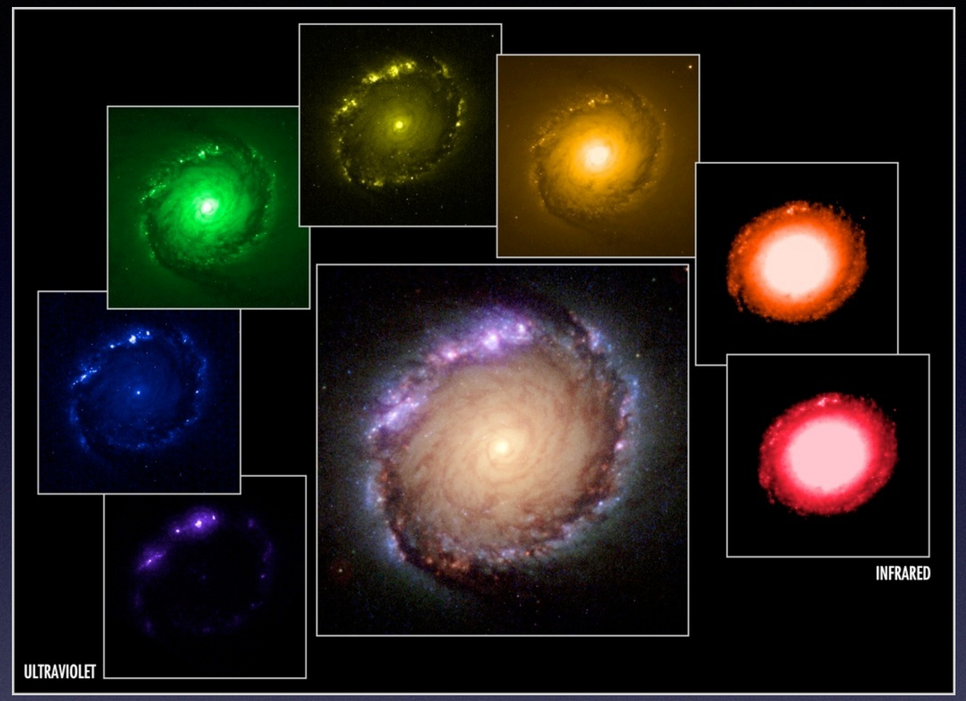
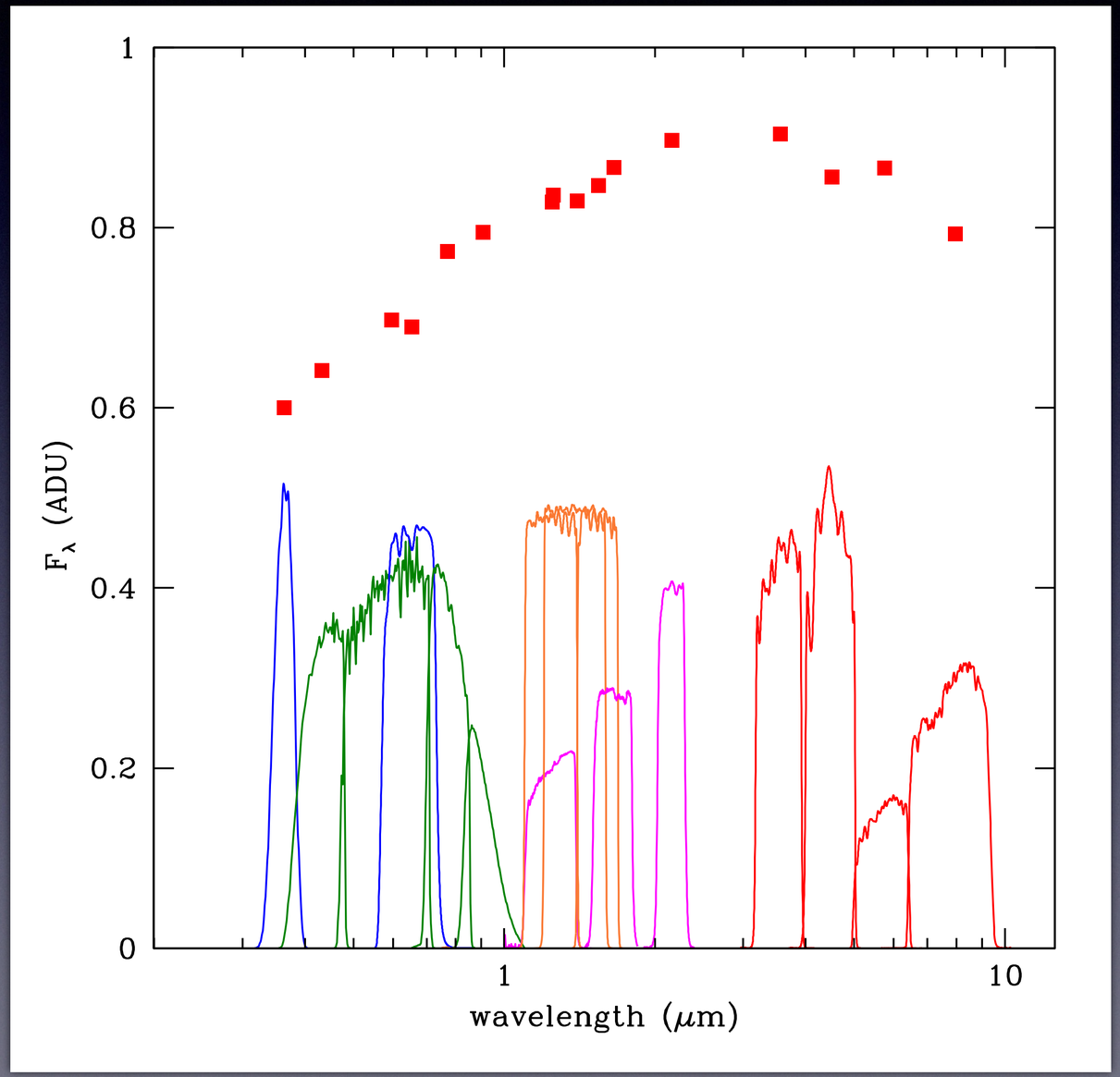

INFRARED
ULTRAVIOLET

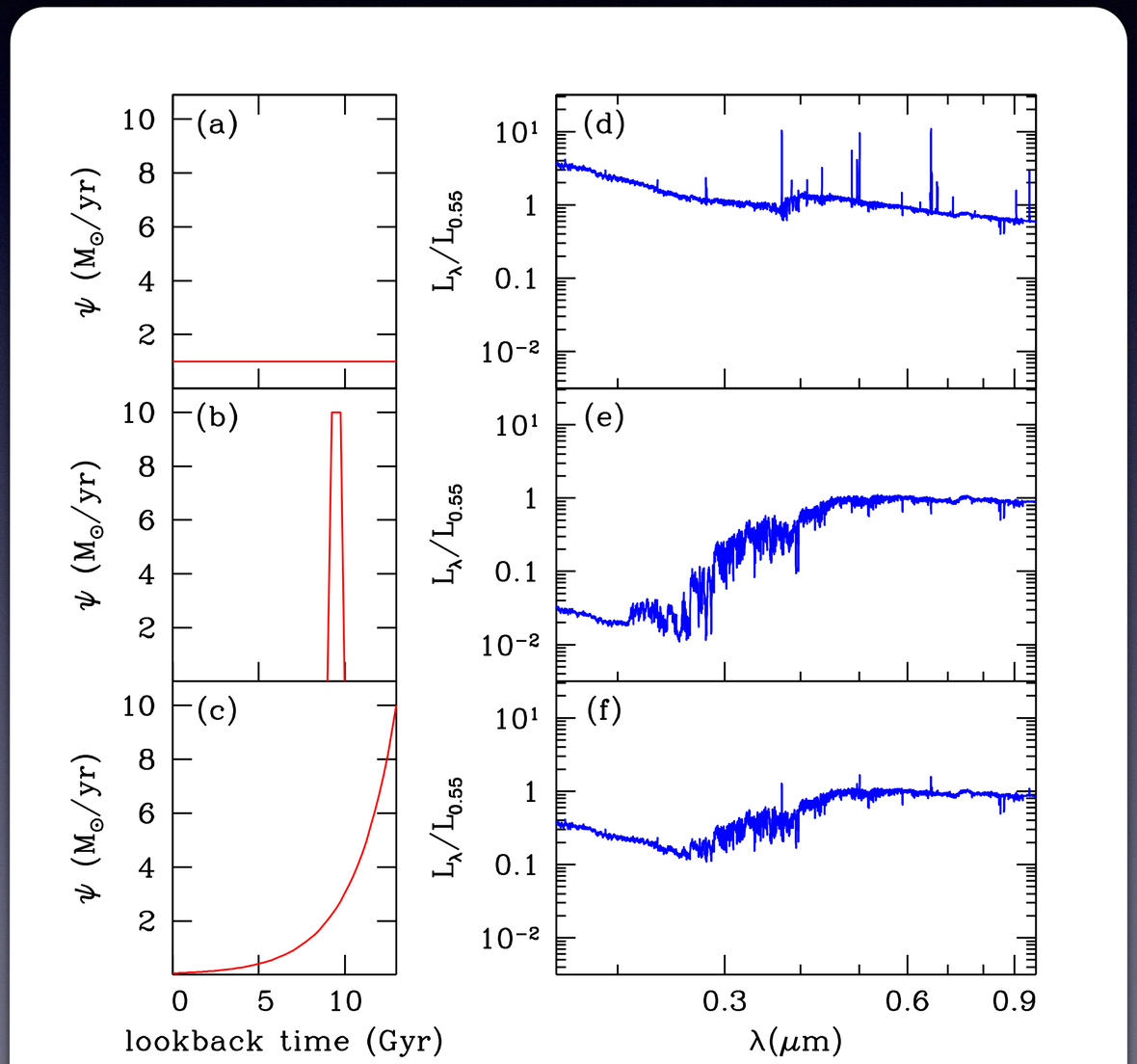

1
0.8
0.6
0.4
0.2
0
F_λ (ADU)
1
10
wavelength (μm)

SED fitting

SED fitting relies on assumptions

- star formation and metal enrichment histories
- stellar population models
- gas models
- dust models

Statistical treatment of the result



SED fitting

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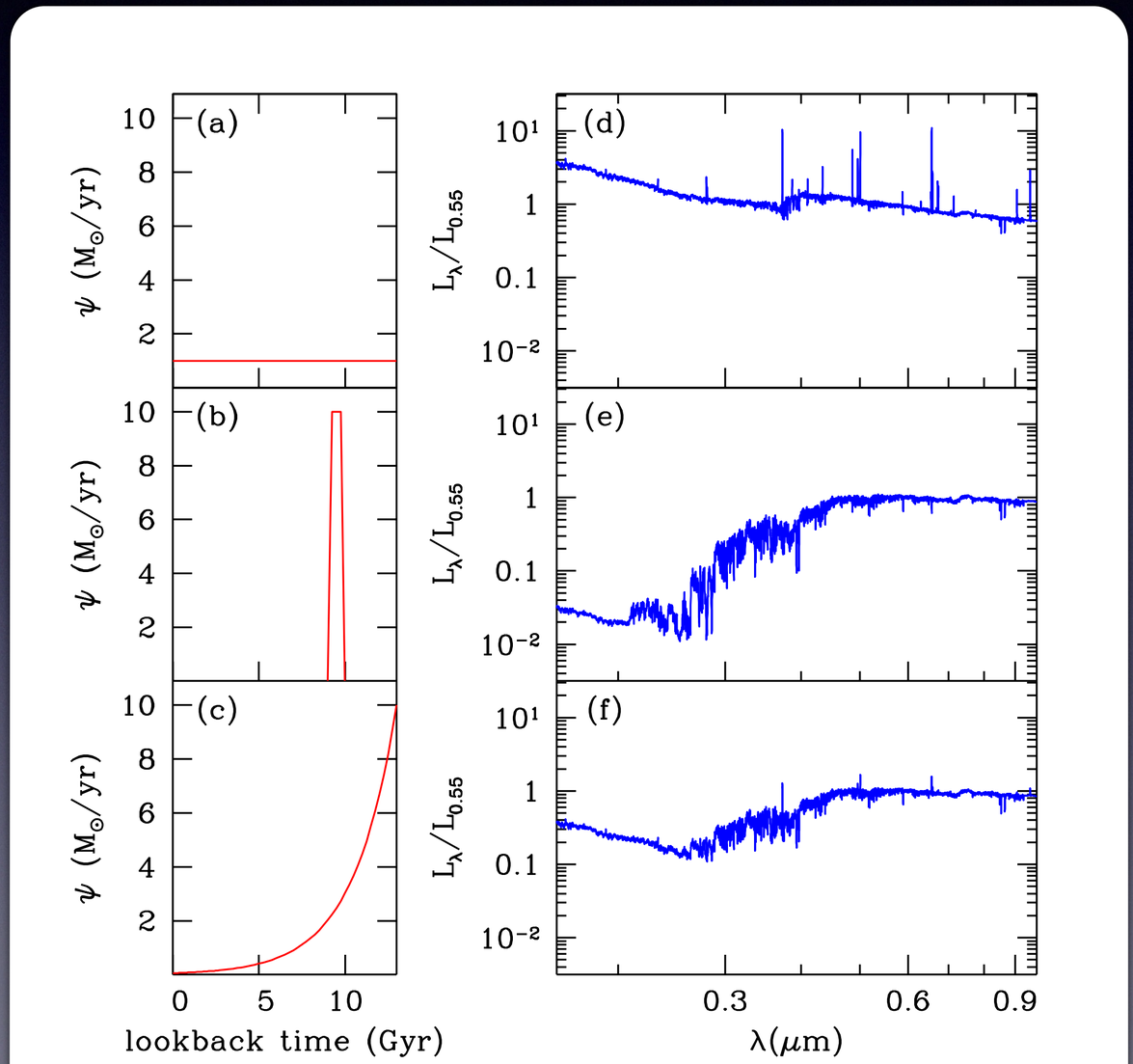
Statistical treatment of the result

build large library of "as realistic as possible" SEDs to estimate physical parameters from multi-wavelength observations



Observed sample

3D-HST photometry and grism spectroscopy

We select galaxies in the
GOODS-South Field with
accurate grism redshifts (*H*<*23*)

Pacifici et al. (2015)

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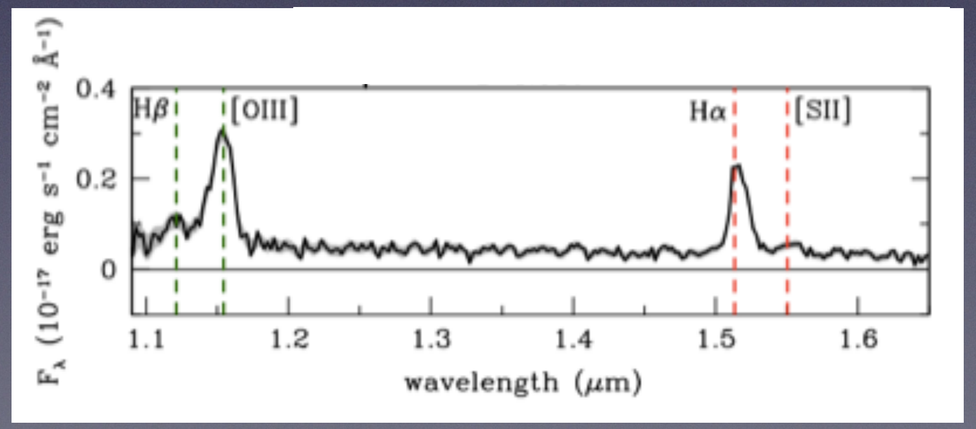

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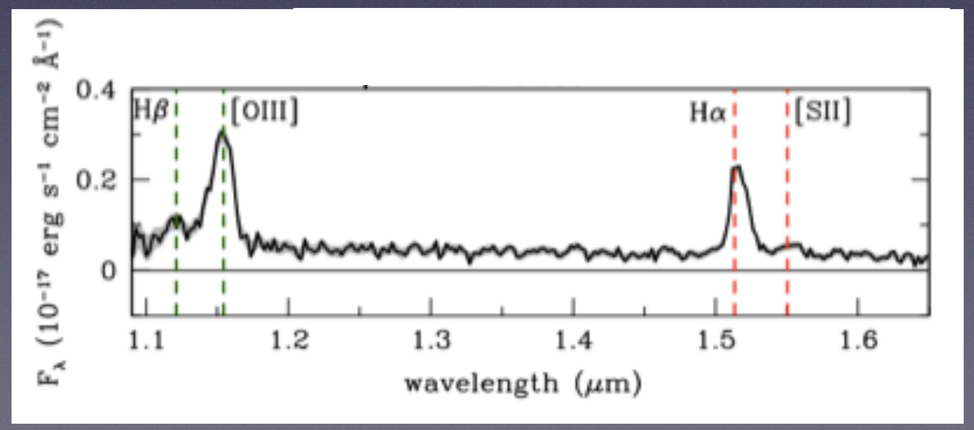

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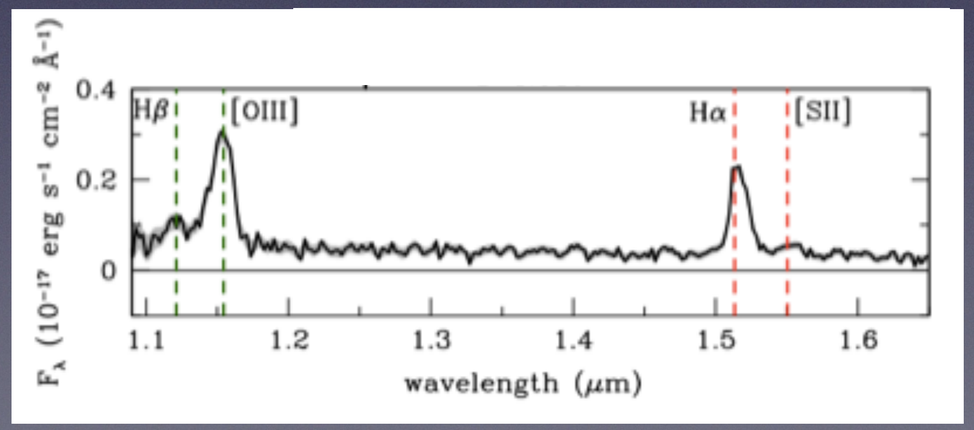

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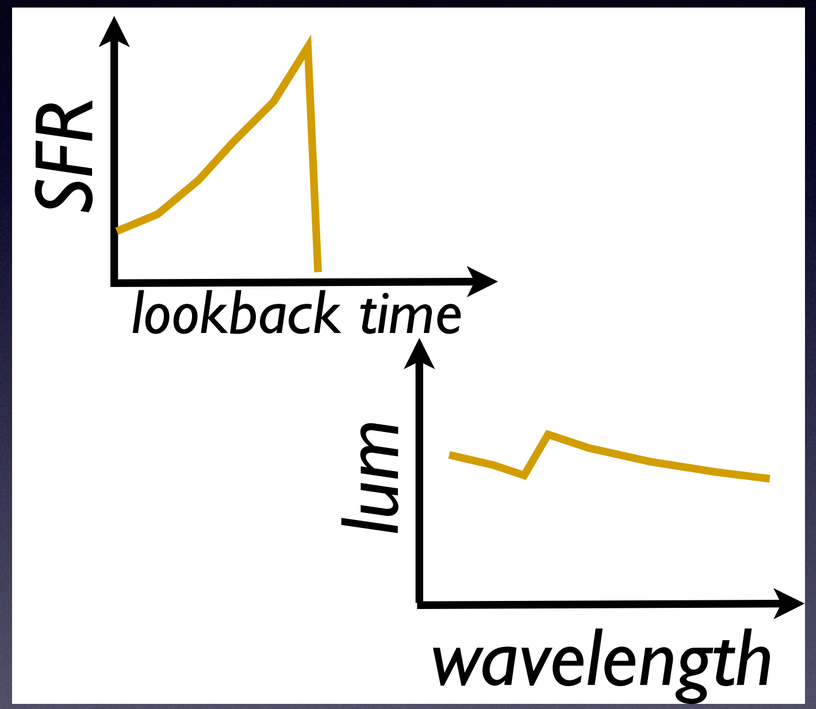
Modeling approach

3 different spectral libraries - same statistical approach

CLASSICAL

- exponentially declining SFHs, fixed metallicity
- stellar emission from the latest version of BC03
- simple dust attenuation



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P12 without emission lines

- physically motivated SF and ME histories
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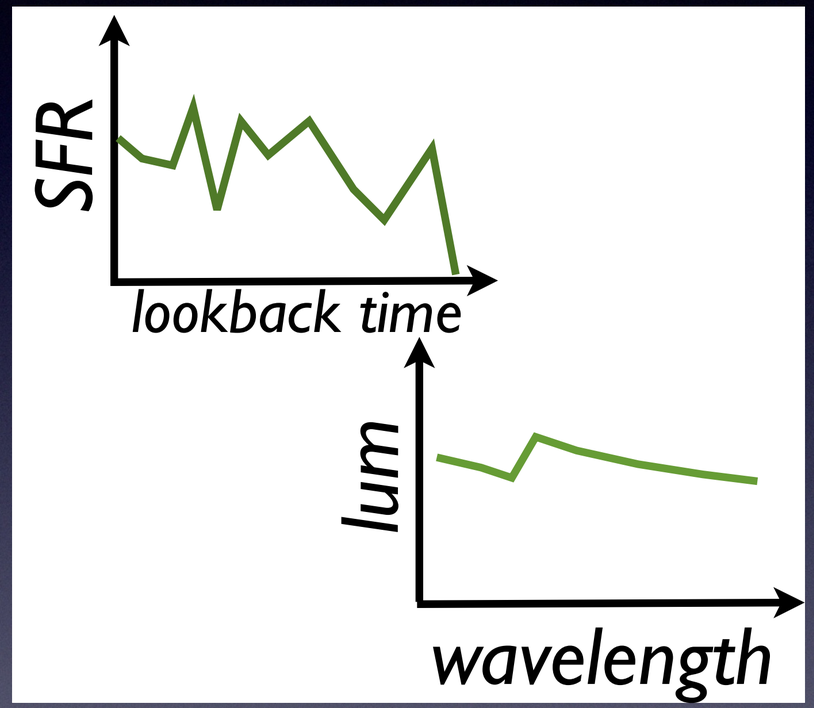

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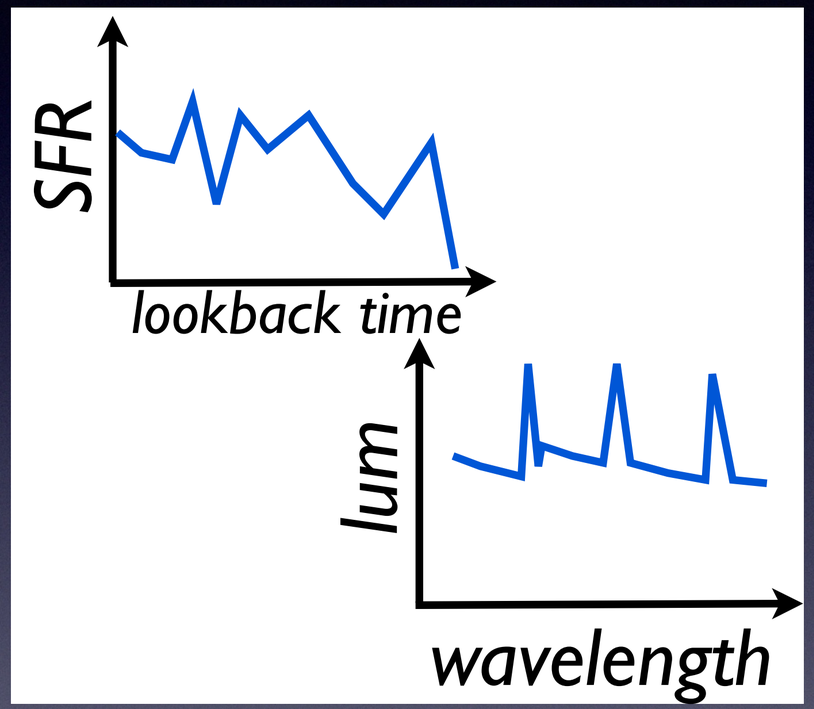

P12 without emission lines

- physically motivated SF and ME histories
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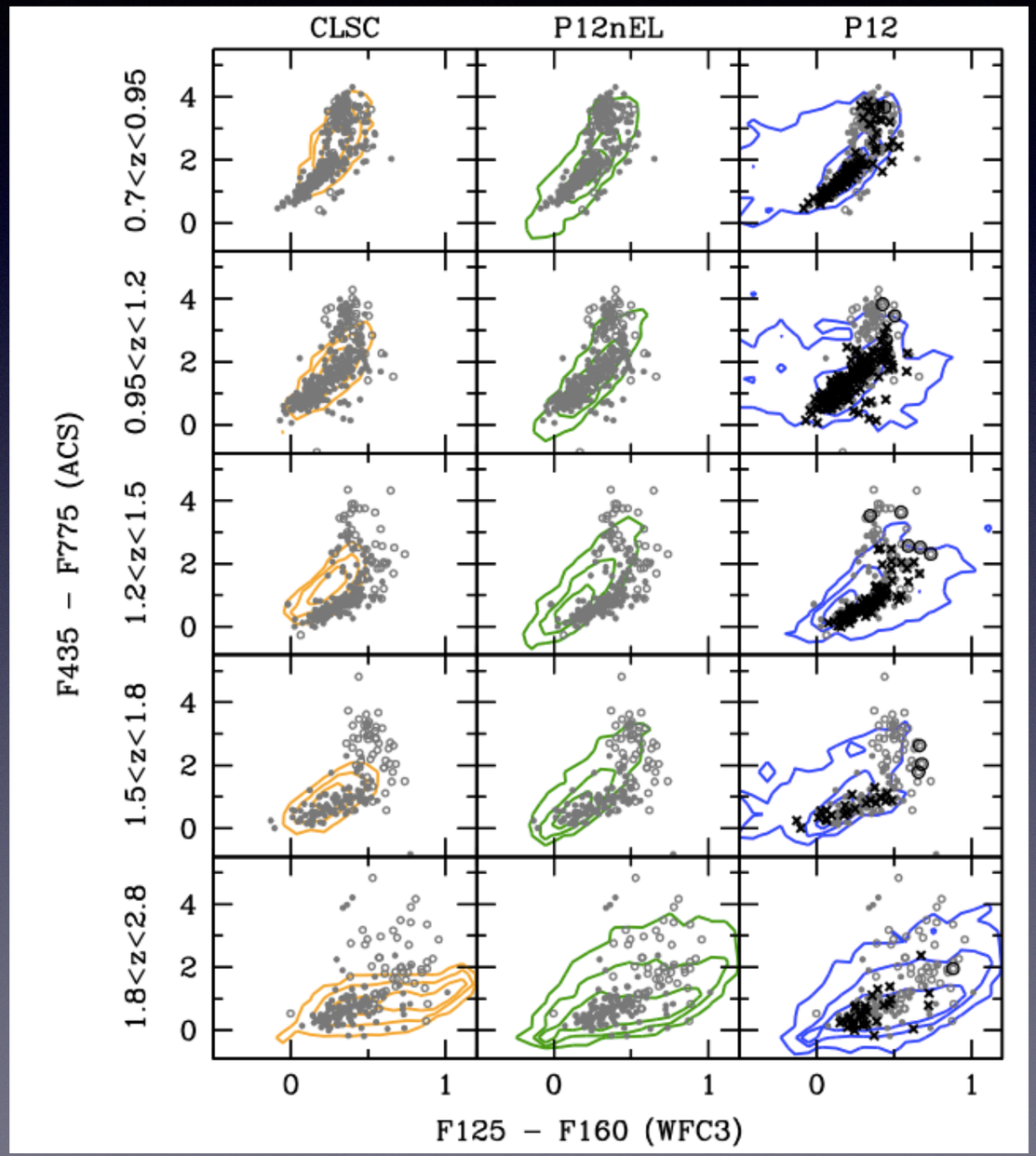
P12

- physically motivated SF and ME histories
- stellar emission from the latest version of BC03
- nebular emission lines included
- sophisticated dust attenuation

Pacifici et al. (2015)

Modeling approach

Convolve SEDs with the broad band filters and compare with observations



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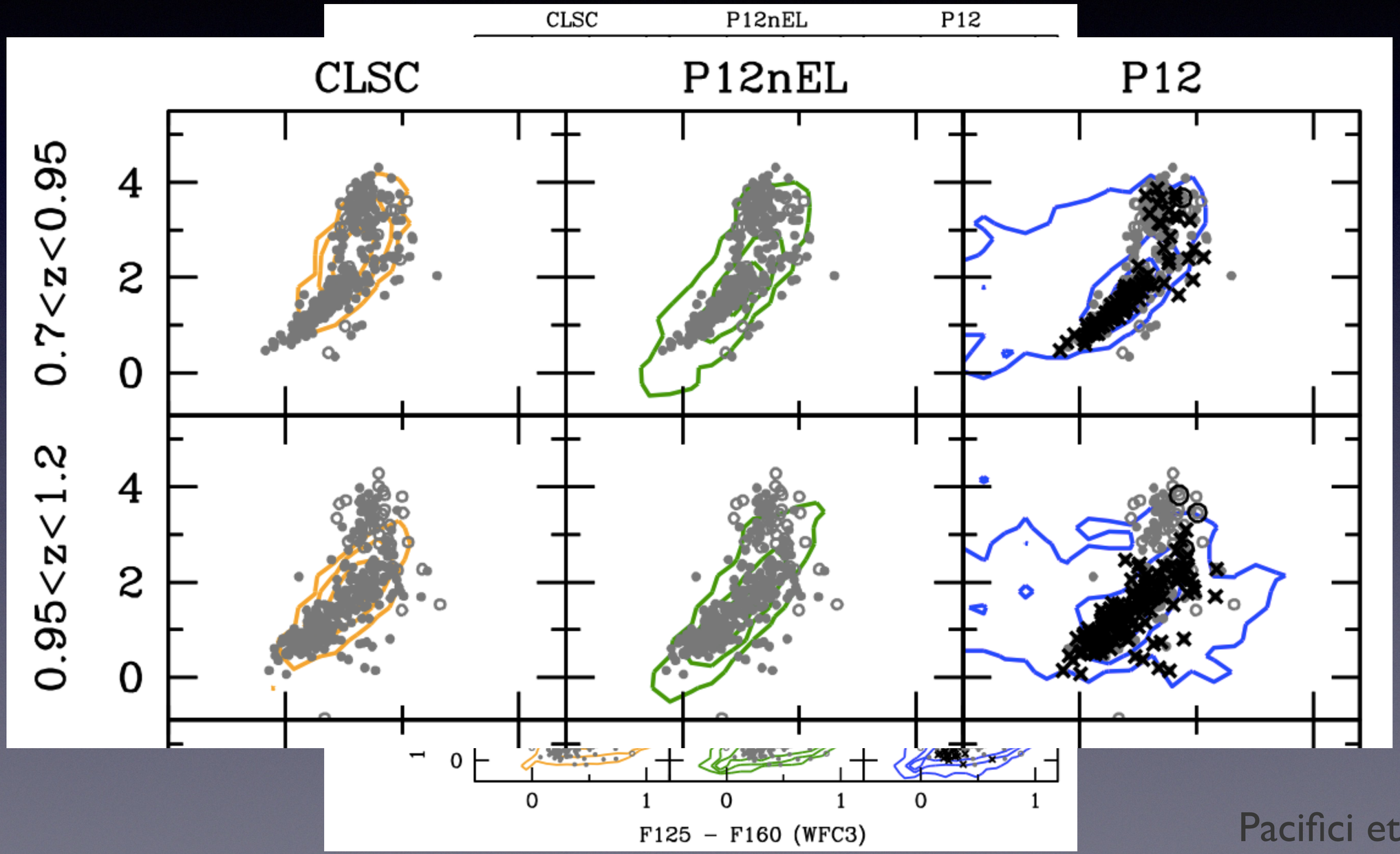

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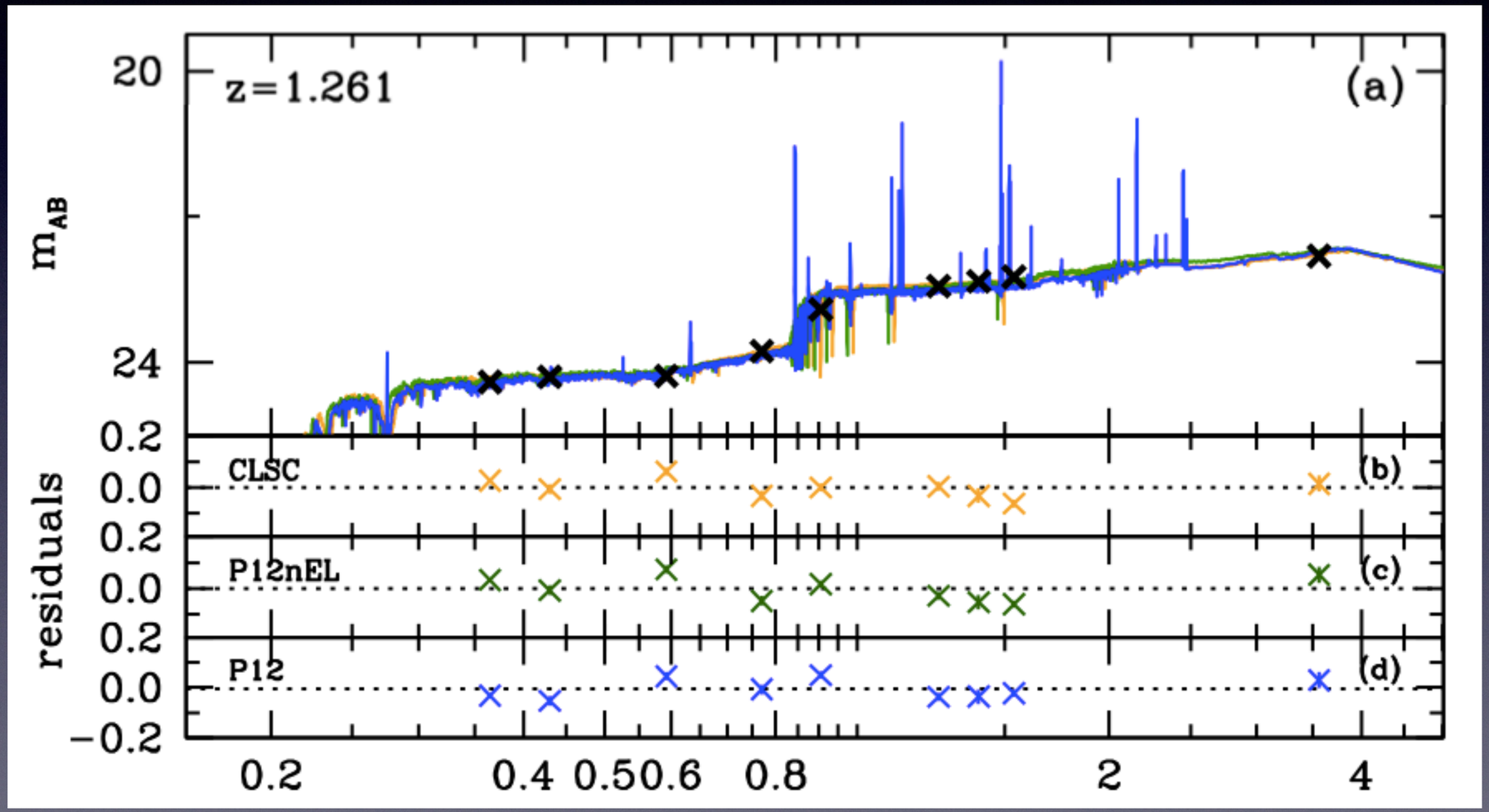
Fitting procedure

Photometric fit to 9 broad bands



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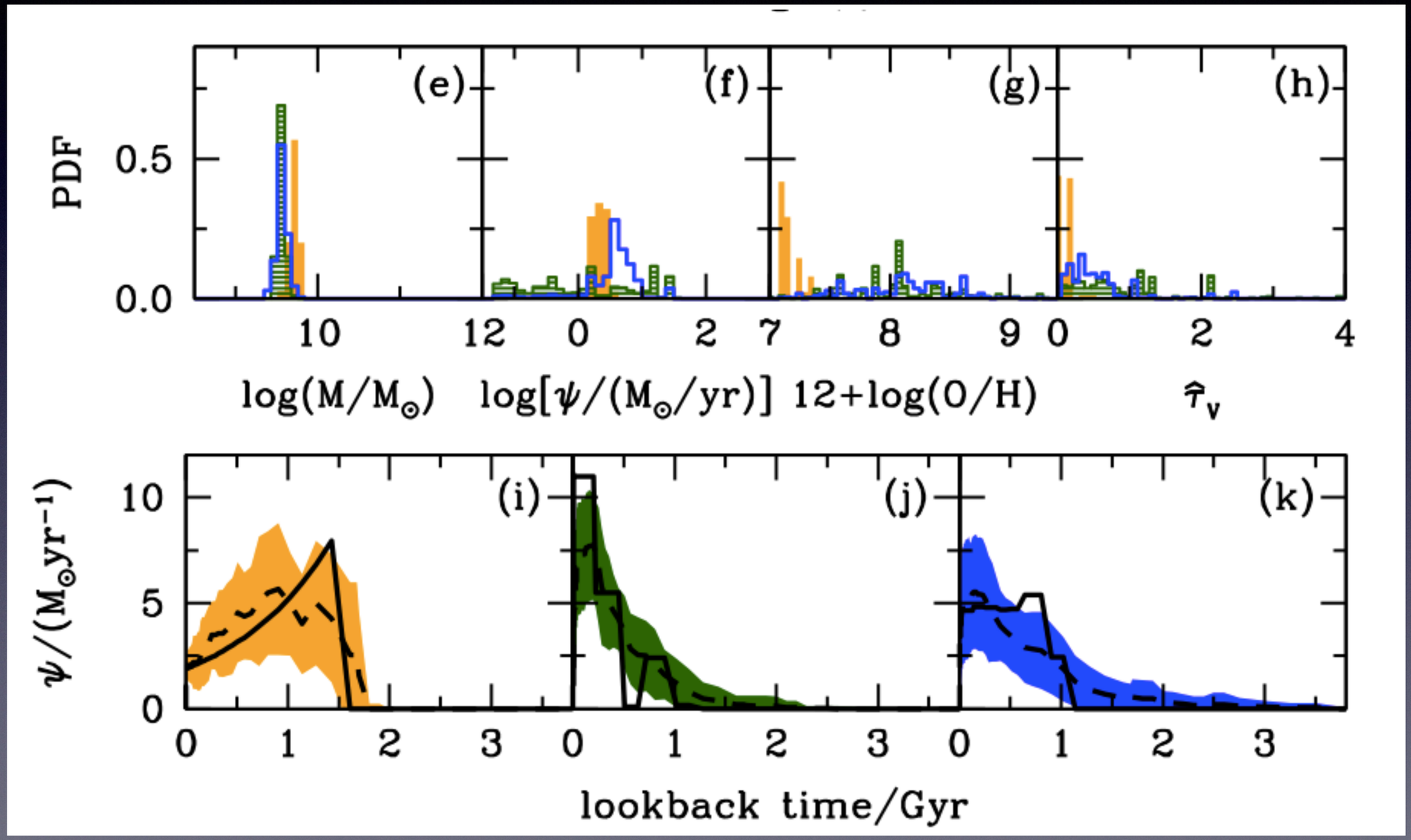

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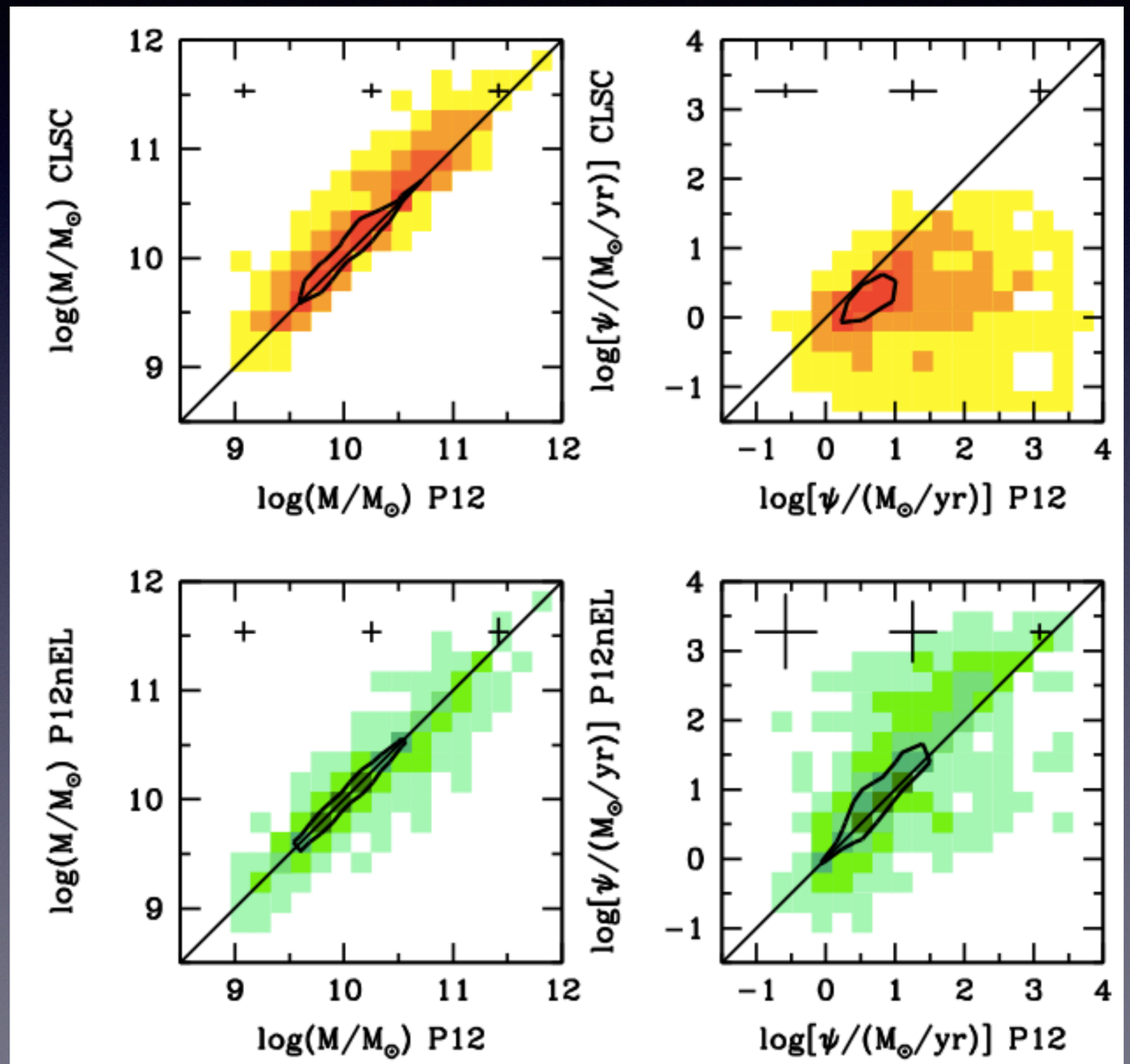
Extracting the physical parameters

The impact of the different libraries on the fits



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Take home messages

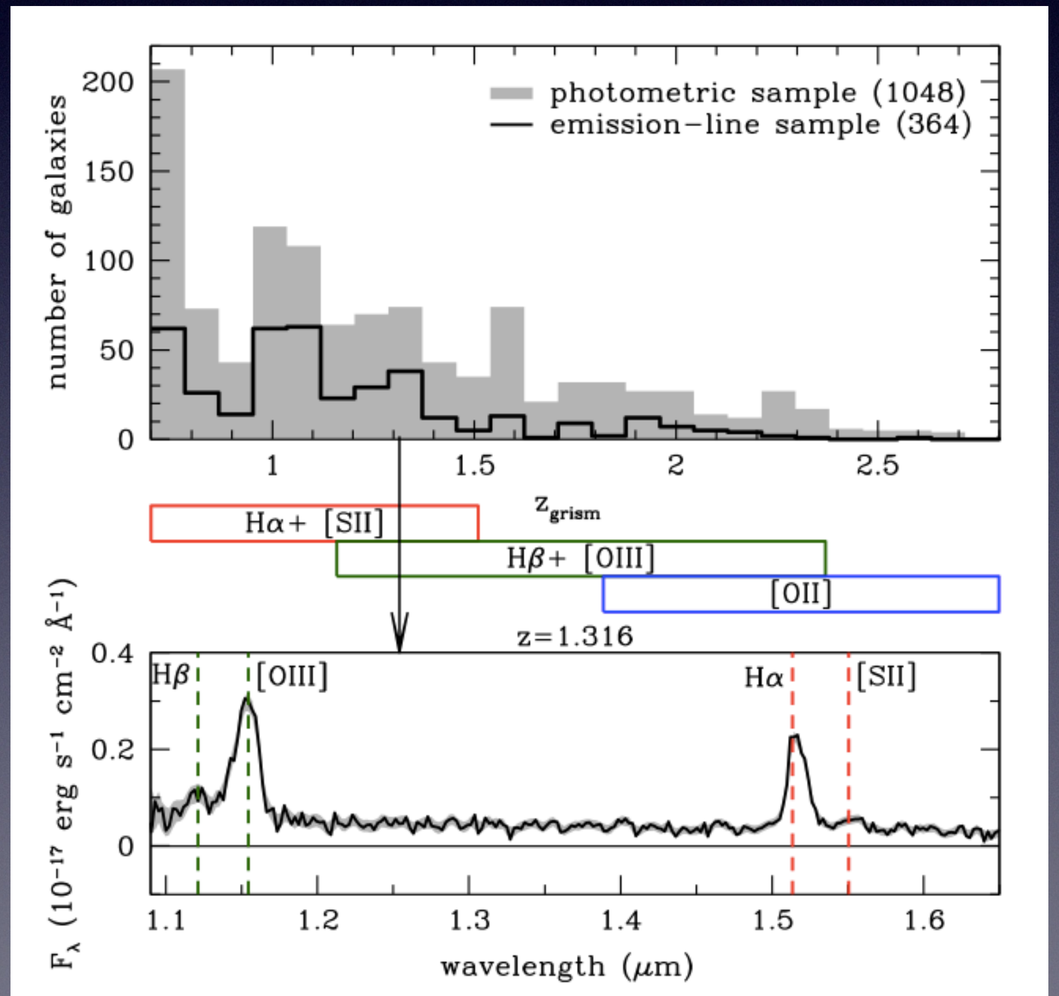
- SED fitting is a very powerful tool when the assumptions are under control
- It is important to make sure that the spectral models can reproduce the observations
- Uncertainties are useful if they are reliable
- Emission lines should not be forgotten

Observed sample

3D-HST photometry and grism spectroscopy

We select galaxies in the GOODS-South Field with accurate grism redshifts (*H*<*23*)

Required detection of at least one emission line with S/N>5



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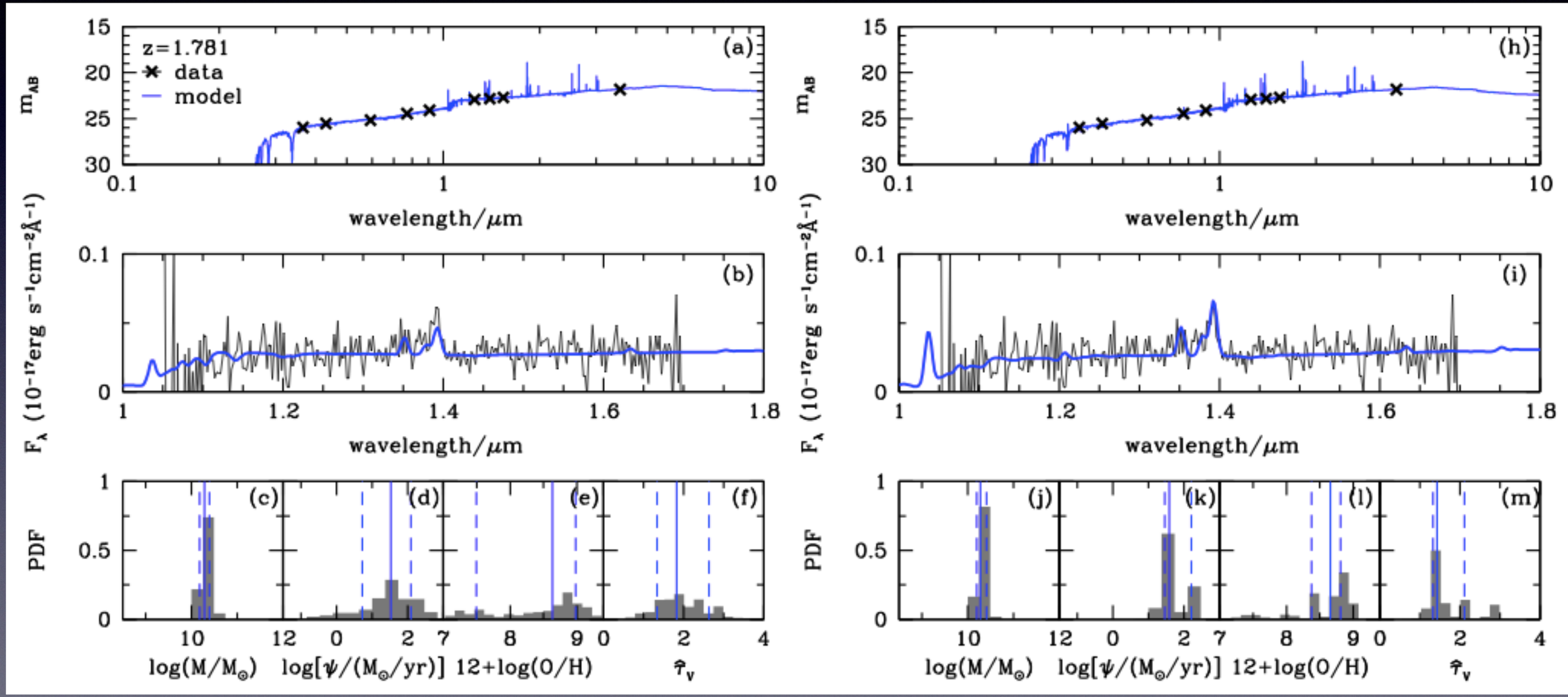
Extracting the physical parameters

Photometry + Spectroscopy



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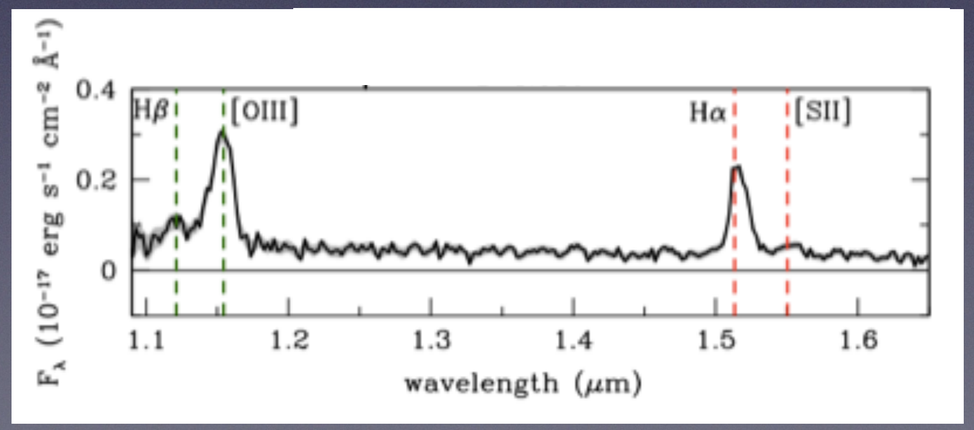

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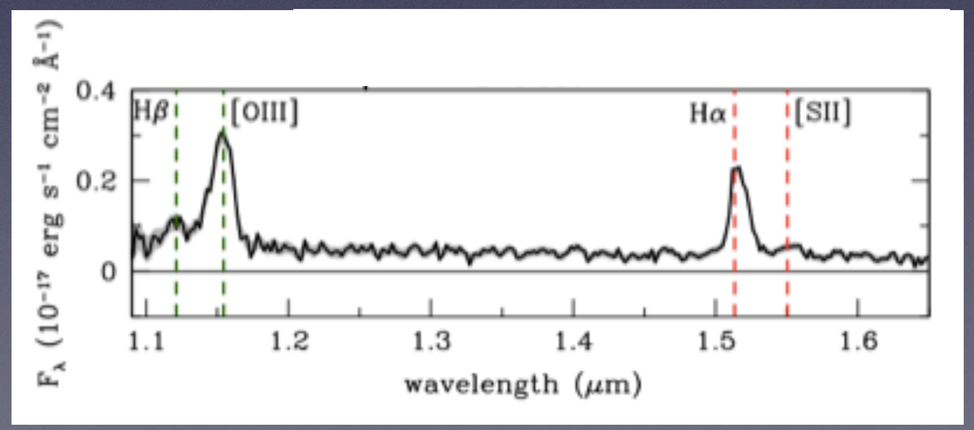
to study the improvements given by adding spectroscopic information to photometry



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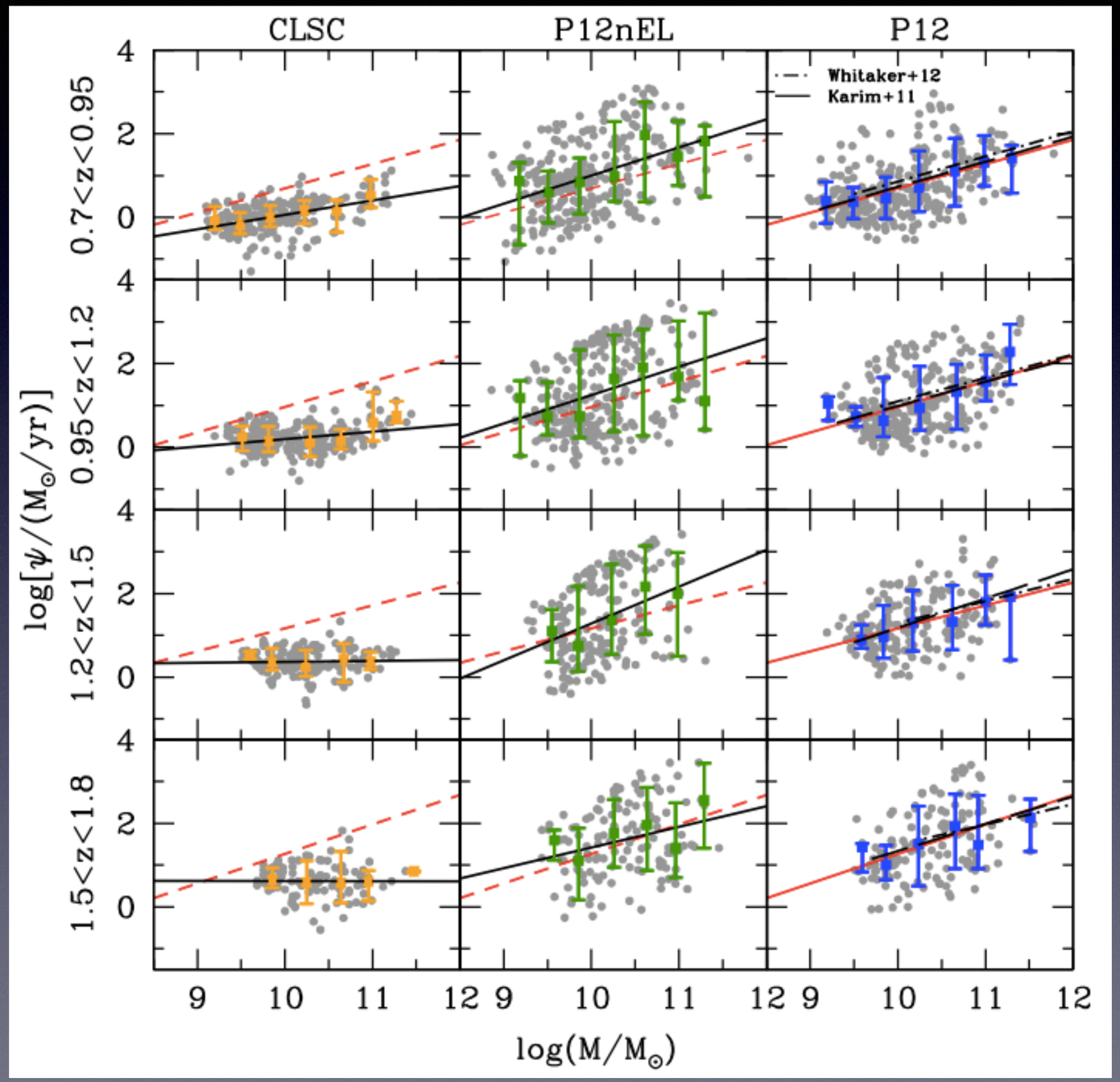
The star-formation main sequence