WEAVE and 4MOST: the lessons we (can) learn

Marcella Longhetti

INAF – Osservatorio Astronomico di Brera - Milano

Fabio Ditrani (Università Bicocca Milano - INAF – OA Brera)
Angela Iovino (INAF – OA Brera)
Amata Mercurio (Università Salerno – INAF OAC)
& **StePS team**

WST

Telescope aperture (M1)	12 m seeing limited		
Telescope FoV	3.1 deg^2		
Telescope Spec. range	0.35-1.6 µm		
Operations	MOS and IFS simultaneous operations ToO implemented at telescope and fibre level		
Modes	MOS-LR	MOS-HR	IFS
FoV	3.1 deg^2	3.1 deg^2	3x3 arcmin^2 (mosaic on 9x9 arcmin^2)
Spectral range (simultaneous)	0.37-0.97 µm	0.37-0.97 µm 3-4 windows	0.37-0.97 µm
Spectral resolution	4000	40000	3500
Multiplexing	20000	2000	
Fiber on sky aperture	**1.2 arcsec**		

WEAVE & 4MOST

	WEAVE @ WHT	4MOST @ VISTA
Telescope size	4m class	4m class
FoV	3 sq degs	4 sq degs
R @ Low resolution mode	5000	6000
Lambda range	3600 – 9900 Å	3700 – 9500 Å
Multiplexing	1000	1600
Fibers on sky aperture	1".3	1".45

- Large field of view
- Wide wavelength range
- High resolution

StePS : Stellar Populations Survey

WEAVE-StePS

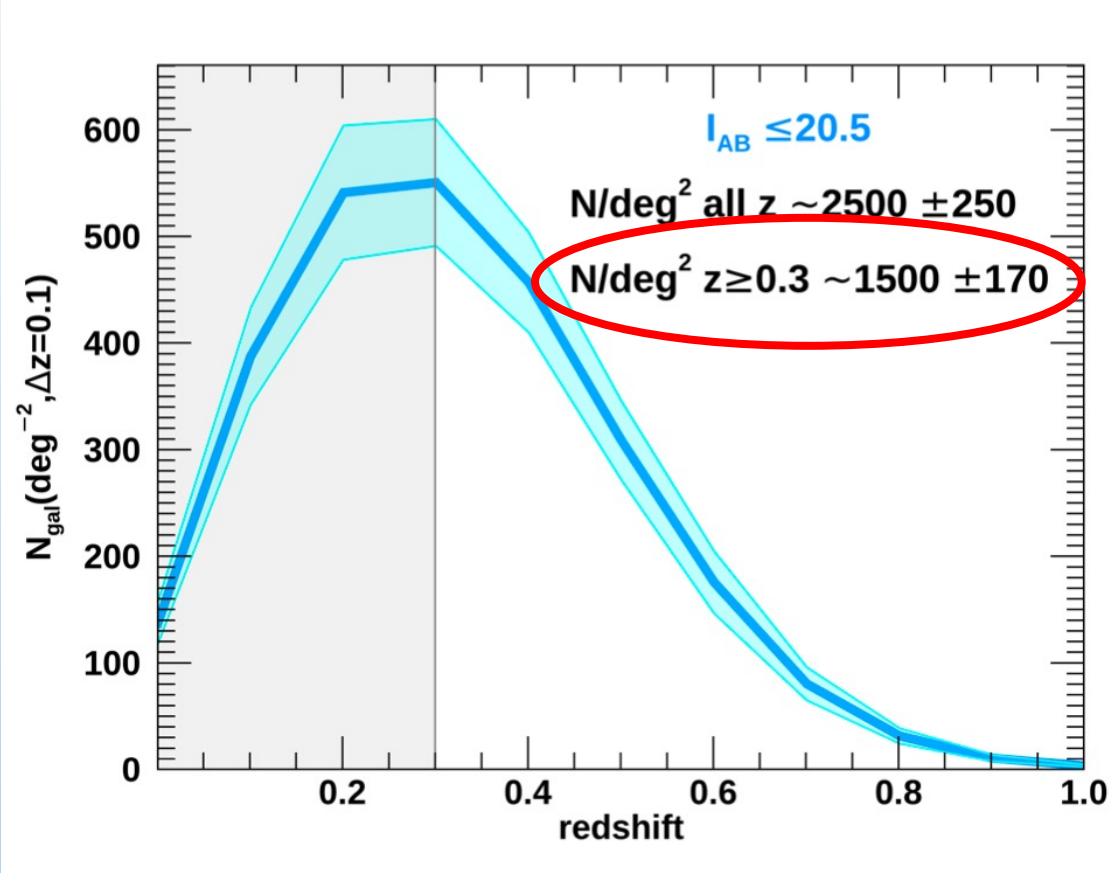
- Spectra of ~ 25 k galaxies
- z > 0.3
- I_{AB} < 20.5
- 7 h exp

Iovino et al. 2023 – A&A 672

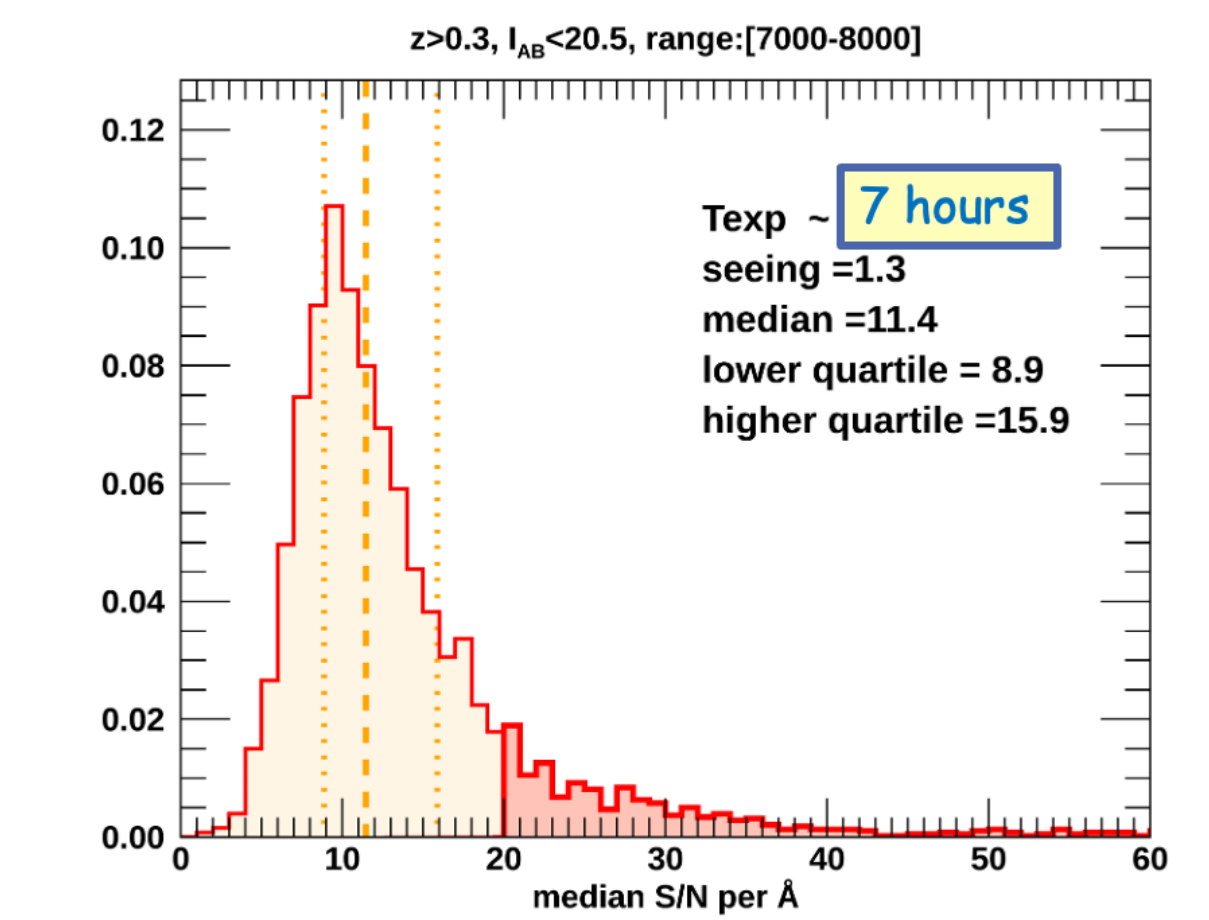
4MOST-StePS

- Spectra of ~ 3 k galaxies
- 0.3 < z < 0.7
- I_{AB} < 20.5
- 30 h exp

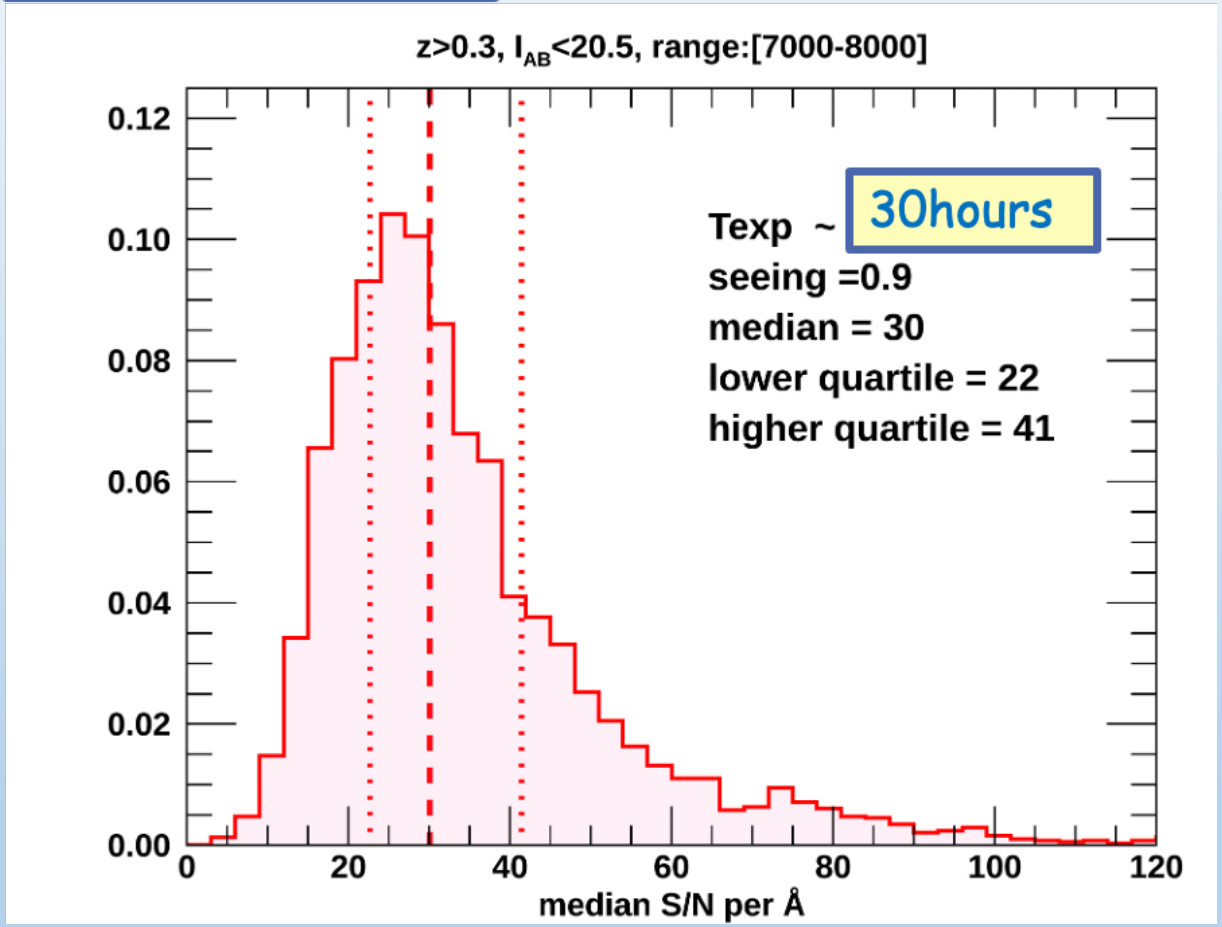
Iovino et al. 2023 – ESO Messenger 190



SN WEAVE StePS



SN 4MOST StePS

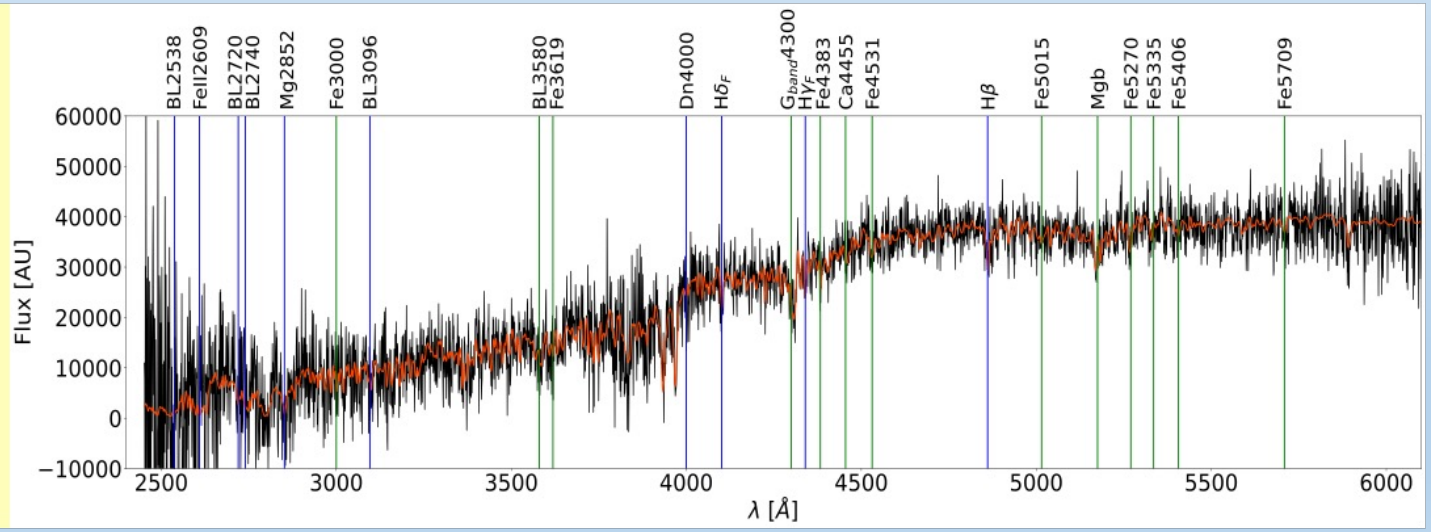


StePS - goals

SPECTRA
high quality - high resolution - wide wavelength coverage

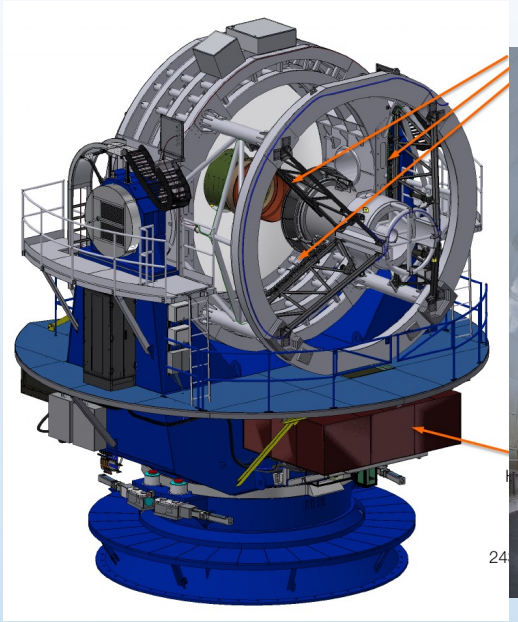
STUDY THE GALAXY PROPERTIES WHEN THE UNIVERSE WAS AT HALF OF ITS EVOLUTIONARY PATH

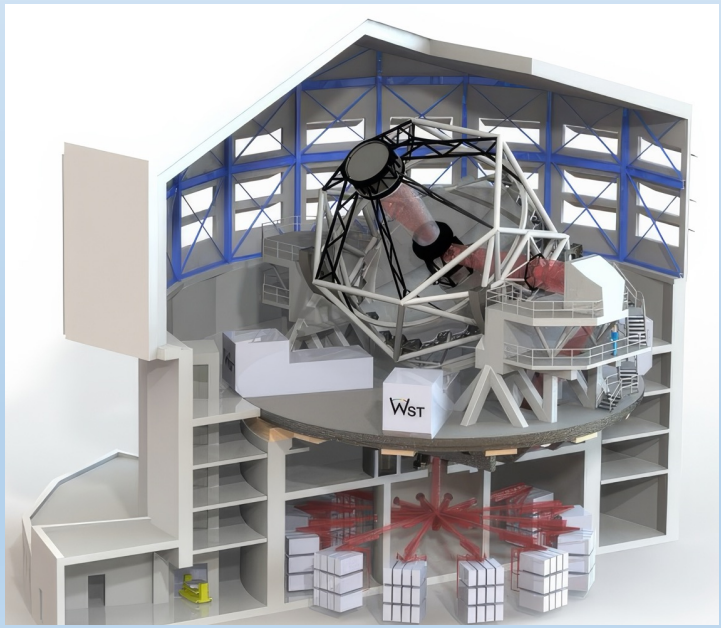
- age of the stellar component
- star-formation activity time-scale
- metal abundances in stars and gas
- presence/absence of AGN activity
- galaxy stellar and dynamical mass
- presence of gas inflows and outflows



4MOST@VISTA & WEAVE@WHT
StePS - Stellar Populations Survey

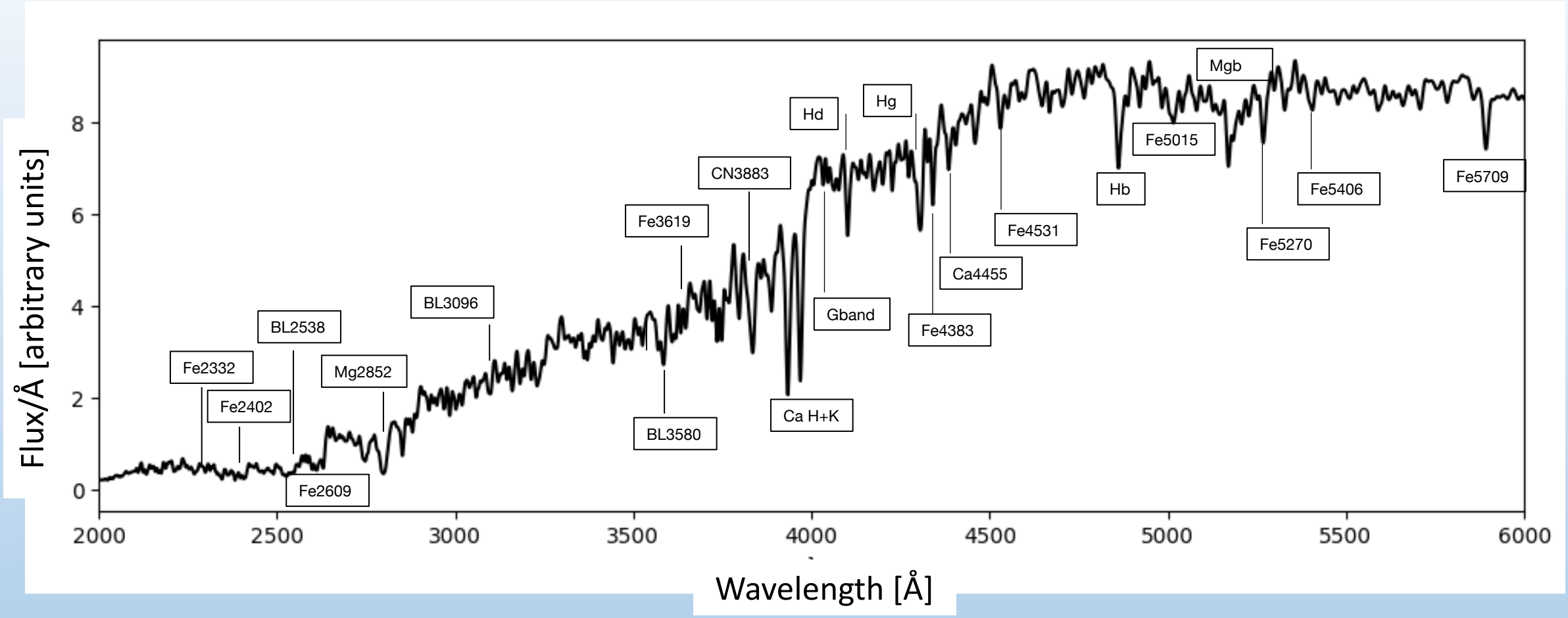
Massive galaxies at z < 0.7-0.8
restframe 2200 Å – 5600 Å
Age_Universe > 7 Gyr



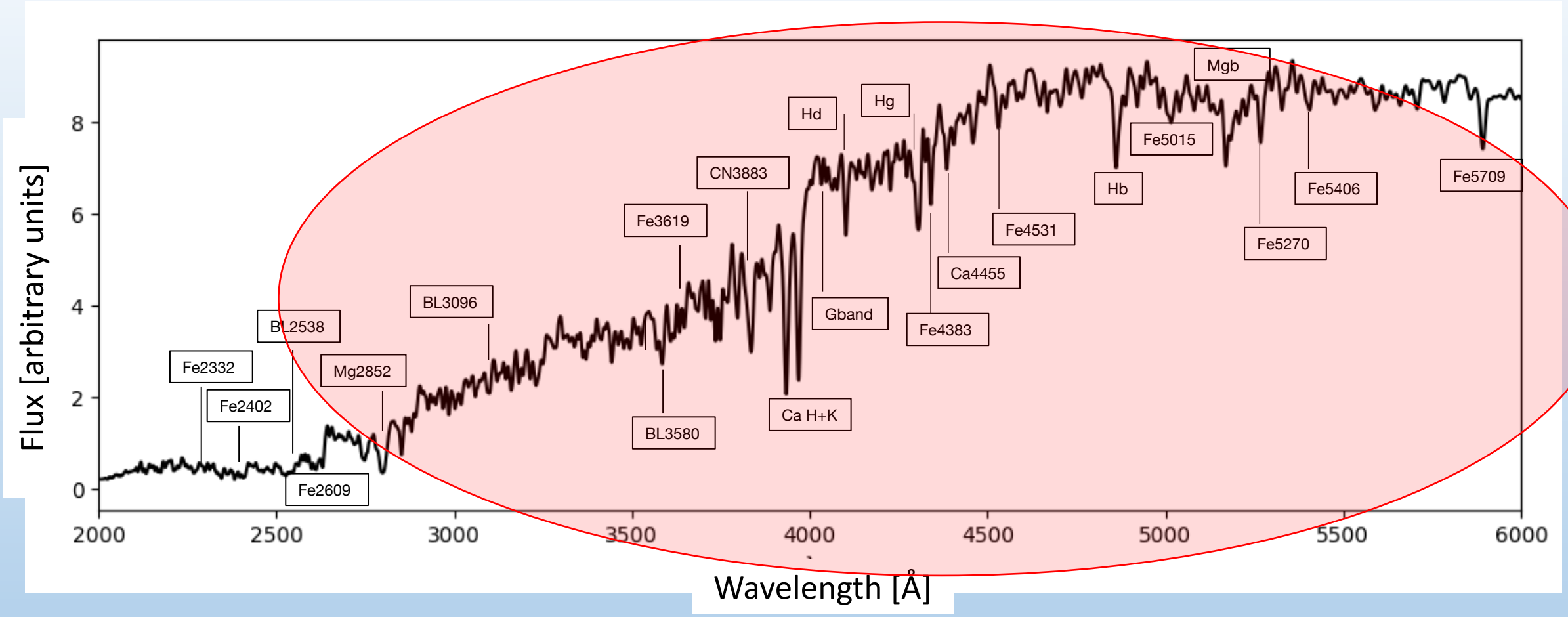


WST
Stellar Populations Survey ?

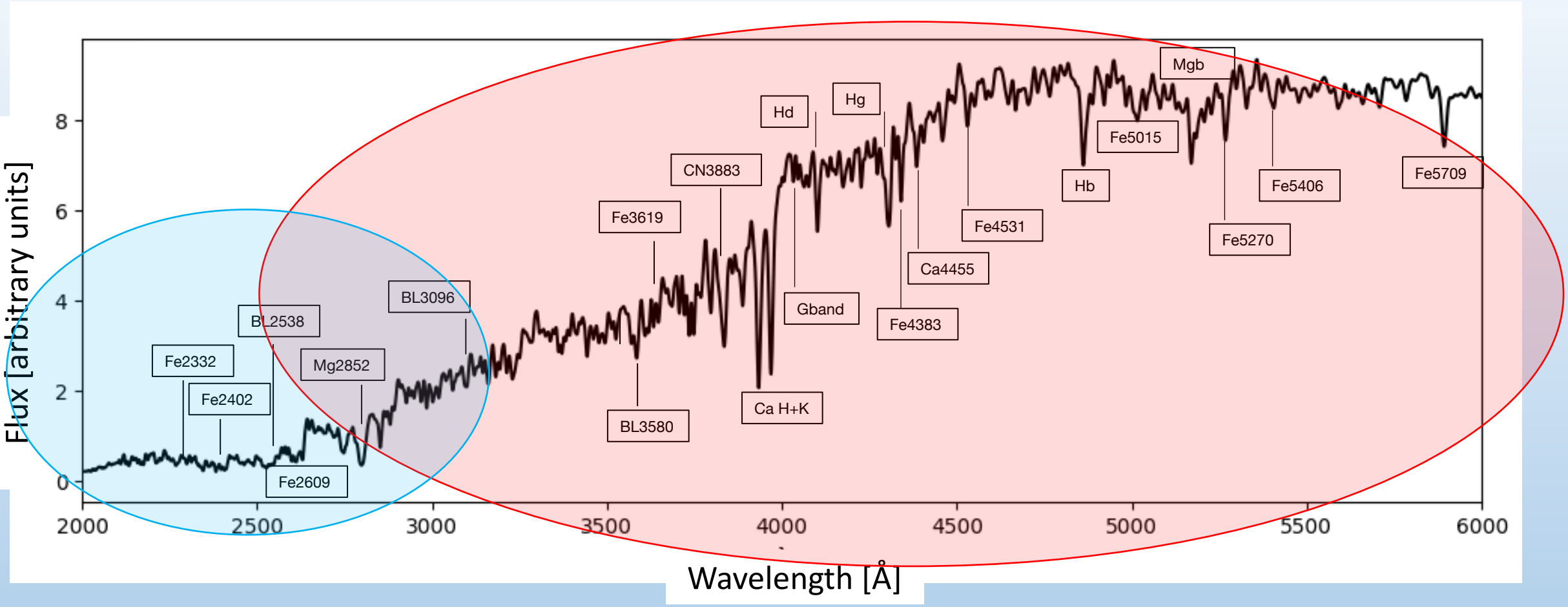
Massive galaxies at z > 1.2 up to z=3
restframe 1200 Å – 4300 Å
Age_Universe < 5 Gyr



SSP 2 Gyr solar metallicity eMILES models


Flux [arbitrary units]
Wavelength [Å]
Fe2332
Fe2402
BL2538
Fe2609
Mg2852
BL3096
Fe3619
BL3580
CN3883
Ca H+K
Hd
Gband
Hg
Fe4383
Ca4455
Fe4531
Hb
Fe5015
Mgb
Fe5270
Fe5406
Fe5709

z = 0.5


Flux [arbitrary units]
Wavelength [Å]
0
2
4
6
8
2000
2500
3000
3500
4000
4500
5000
5500
6000
Fe2332
Fe2402
BL2538
Mg2852
BL3096
Fe2609
Fe3619
CN3883
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Mgb
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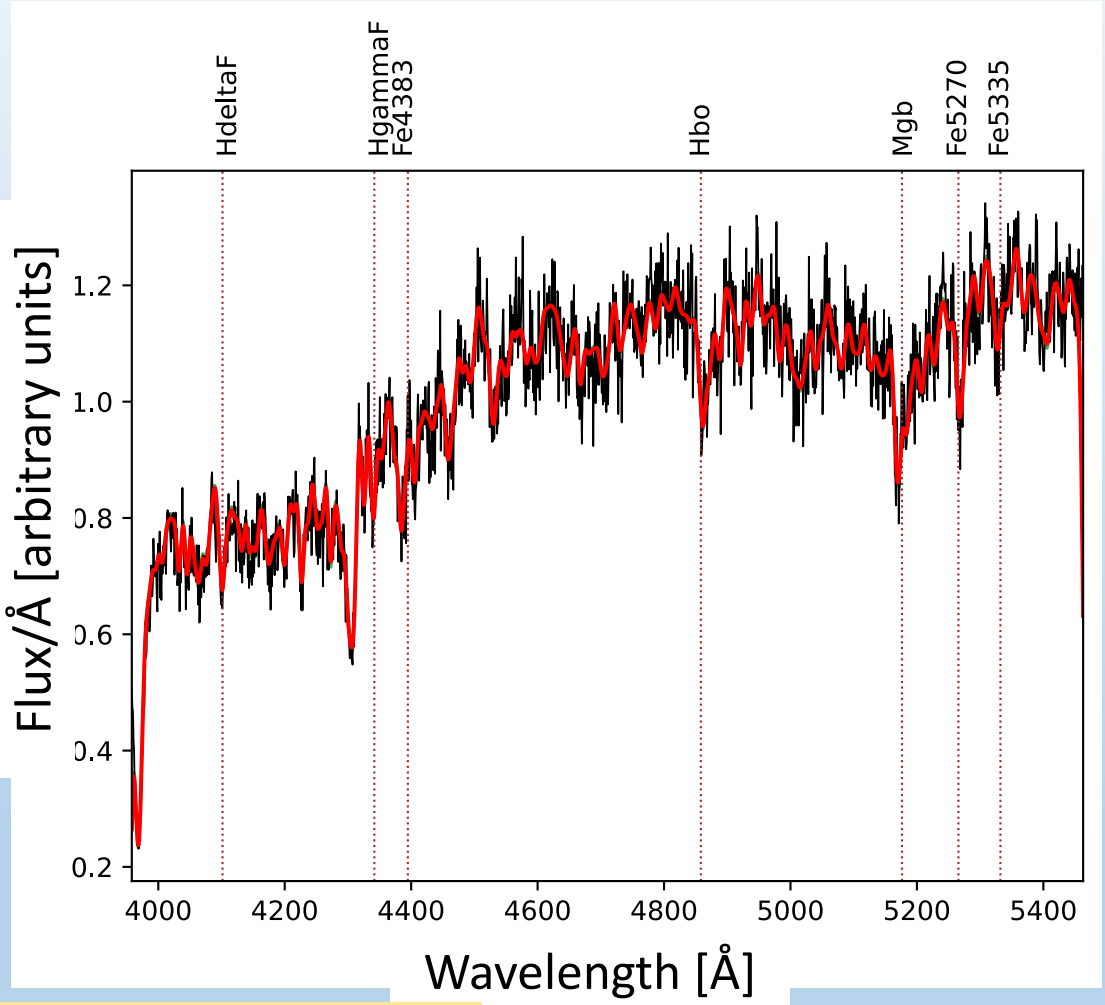
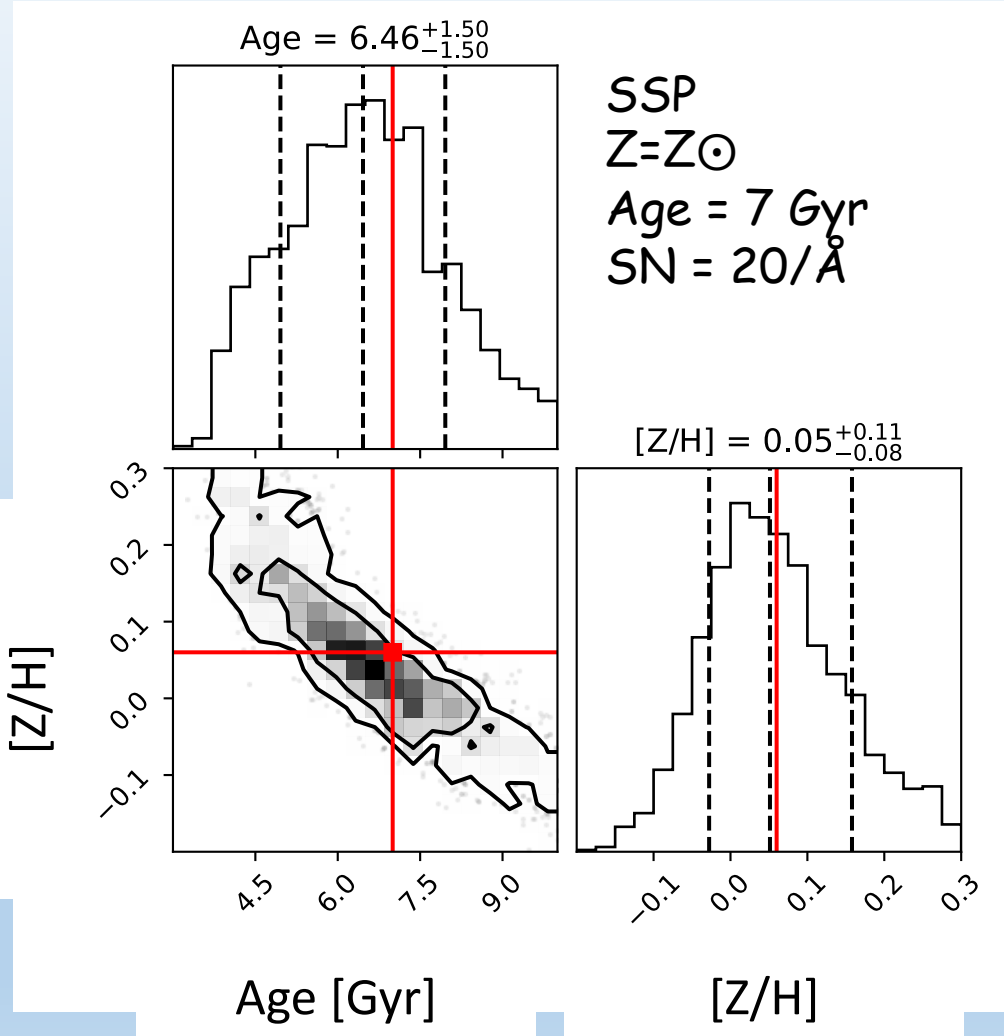
Fe5406
Fe5709

z = 2

z = 0.5

SIMPLE TEST:
1) SSP 7 Gyr solar metallicity





OPTICAL RANGE

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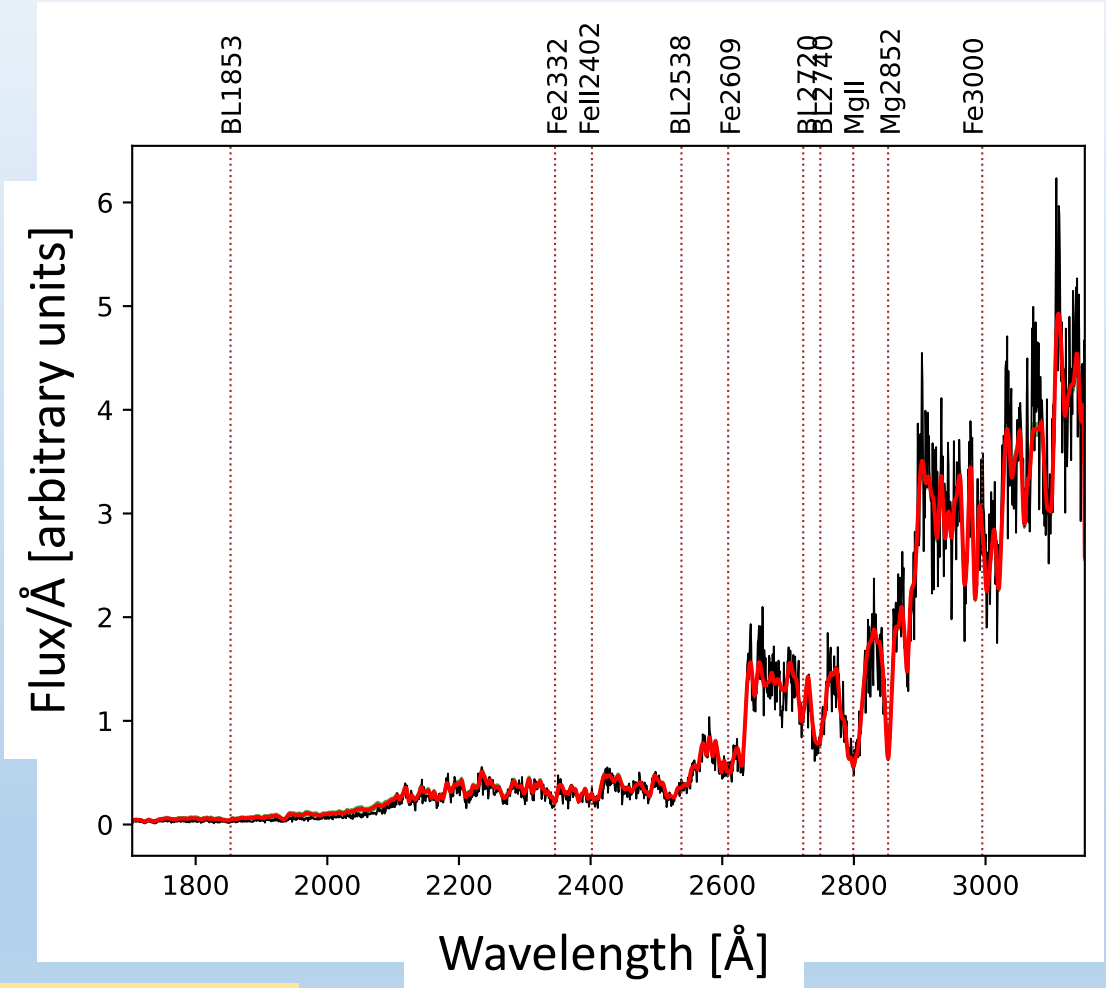
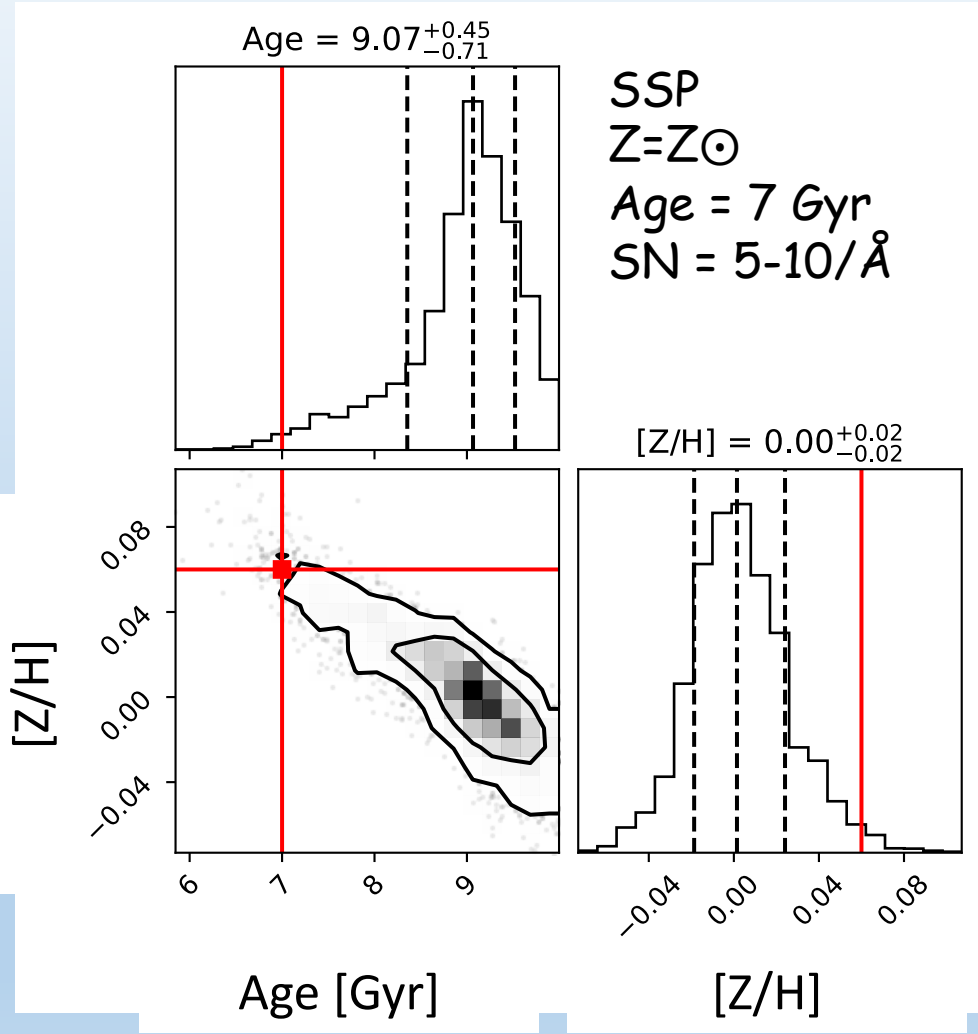
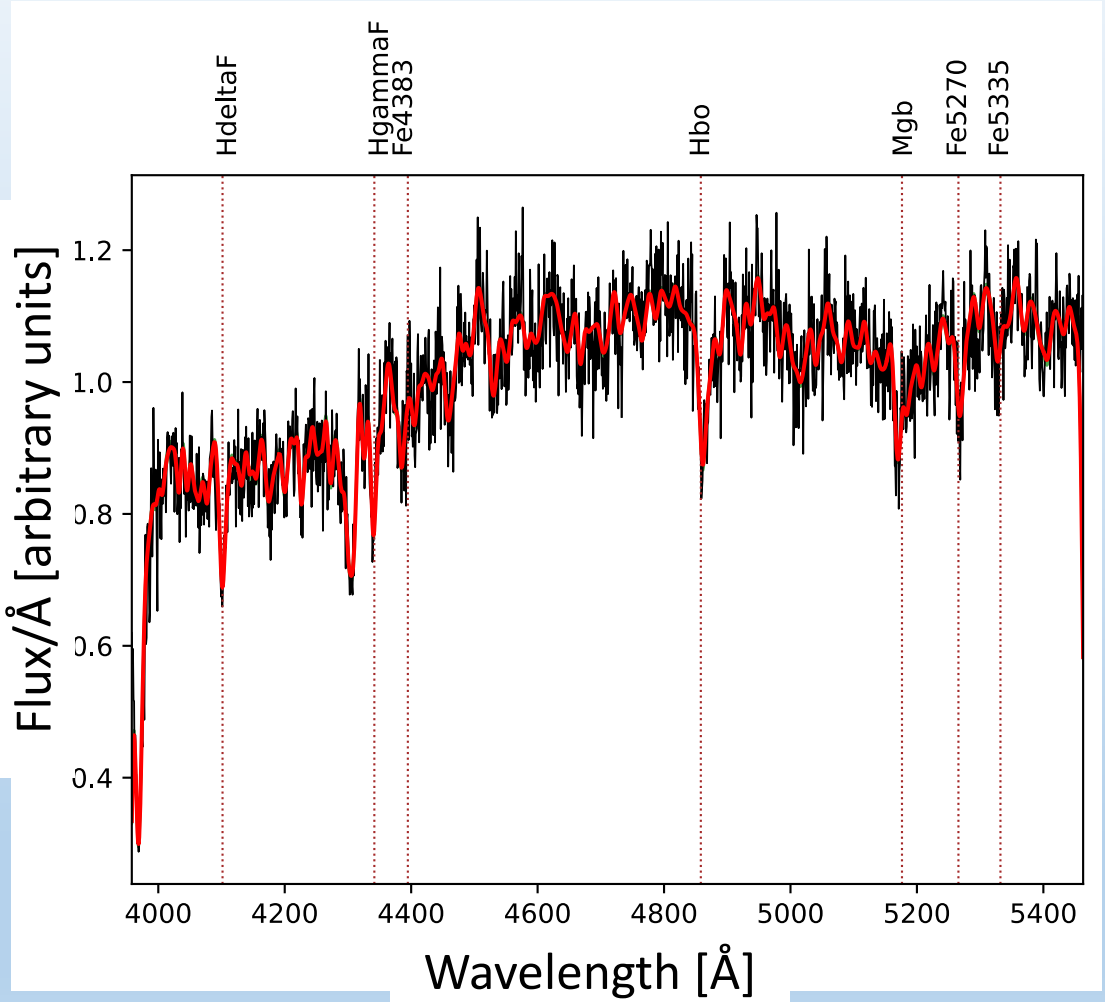
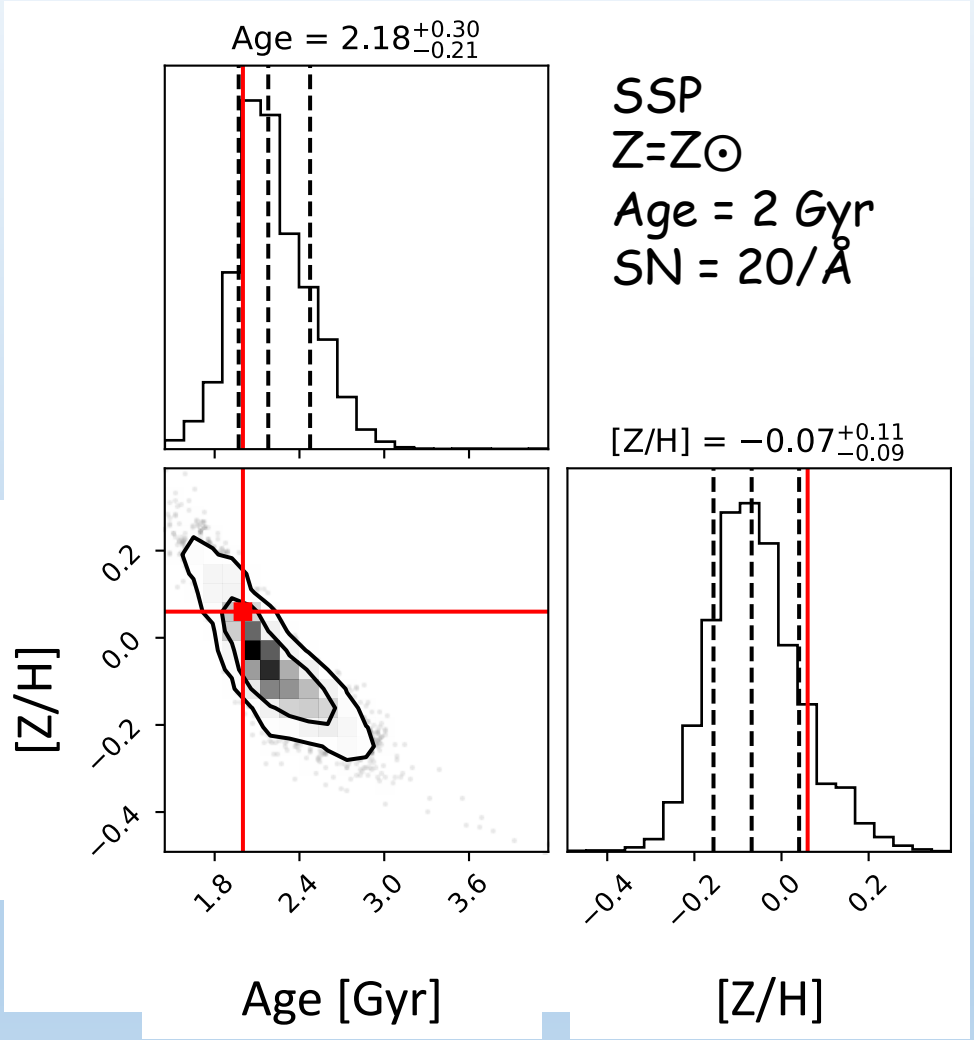




UV RANGE

SIMPLE TEST:
2) SSP 2 Gyr solar metallicity





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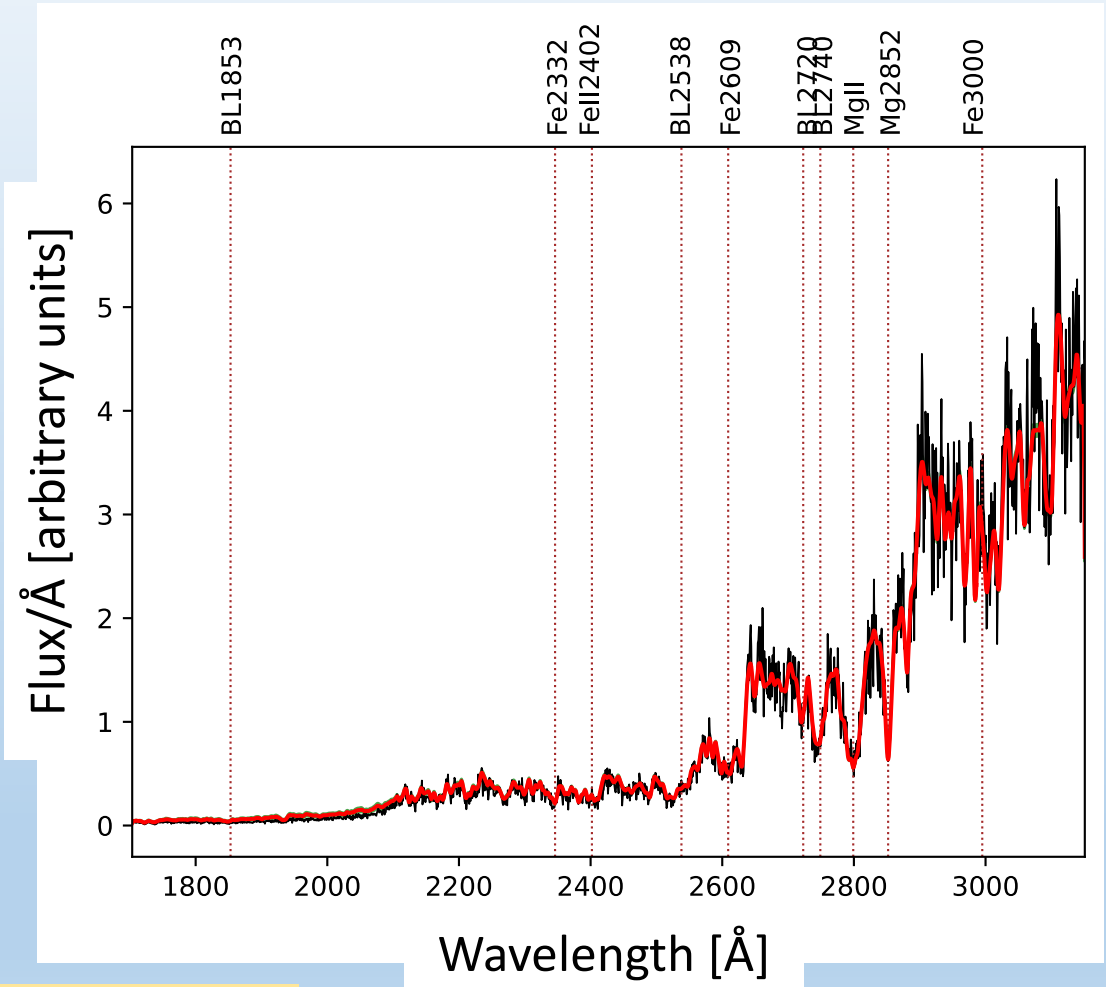
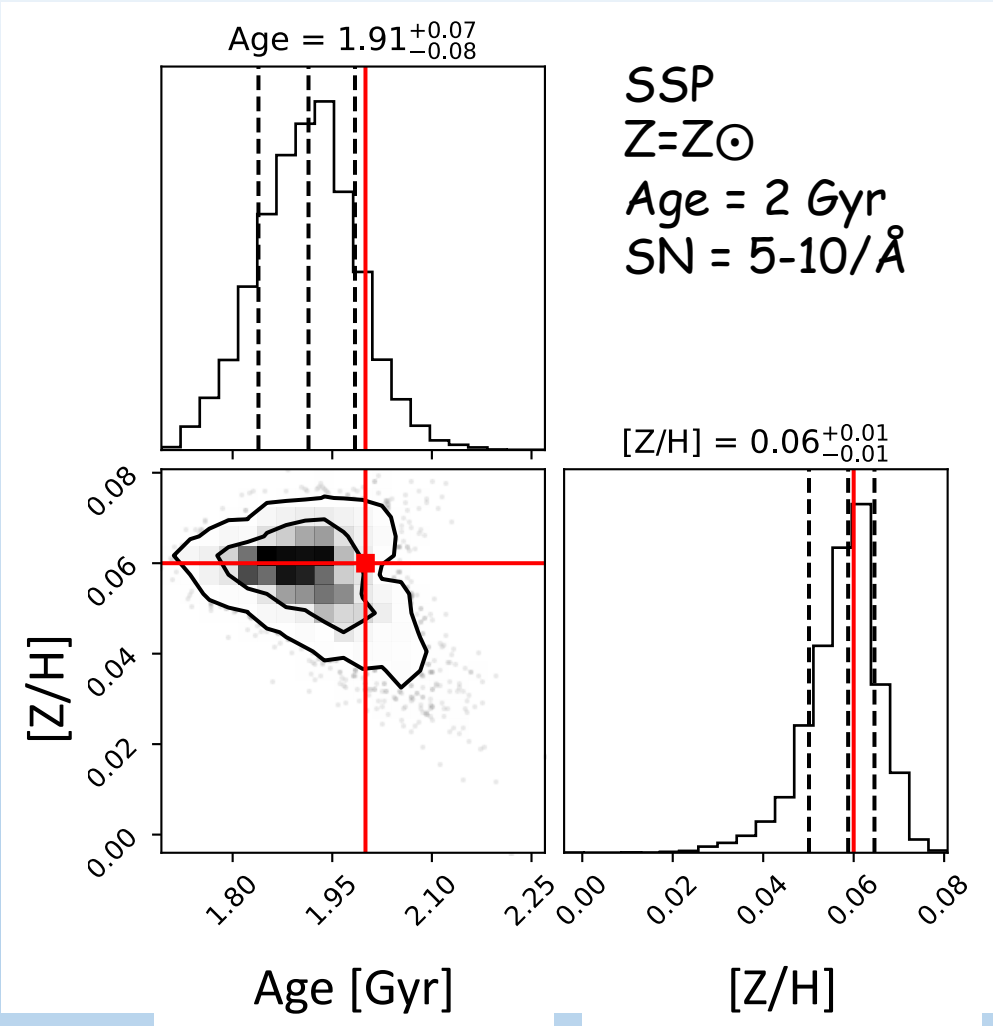
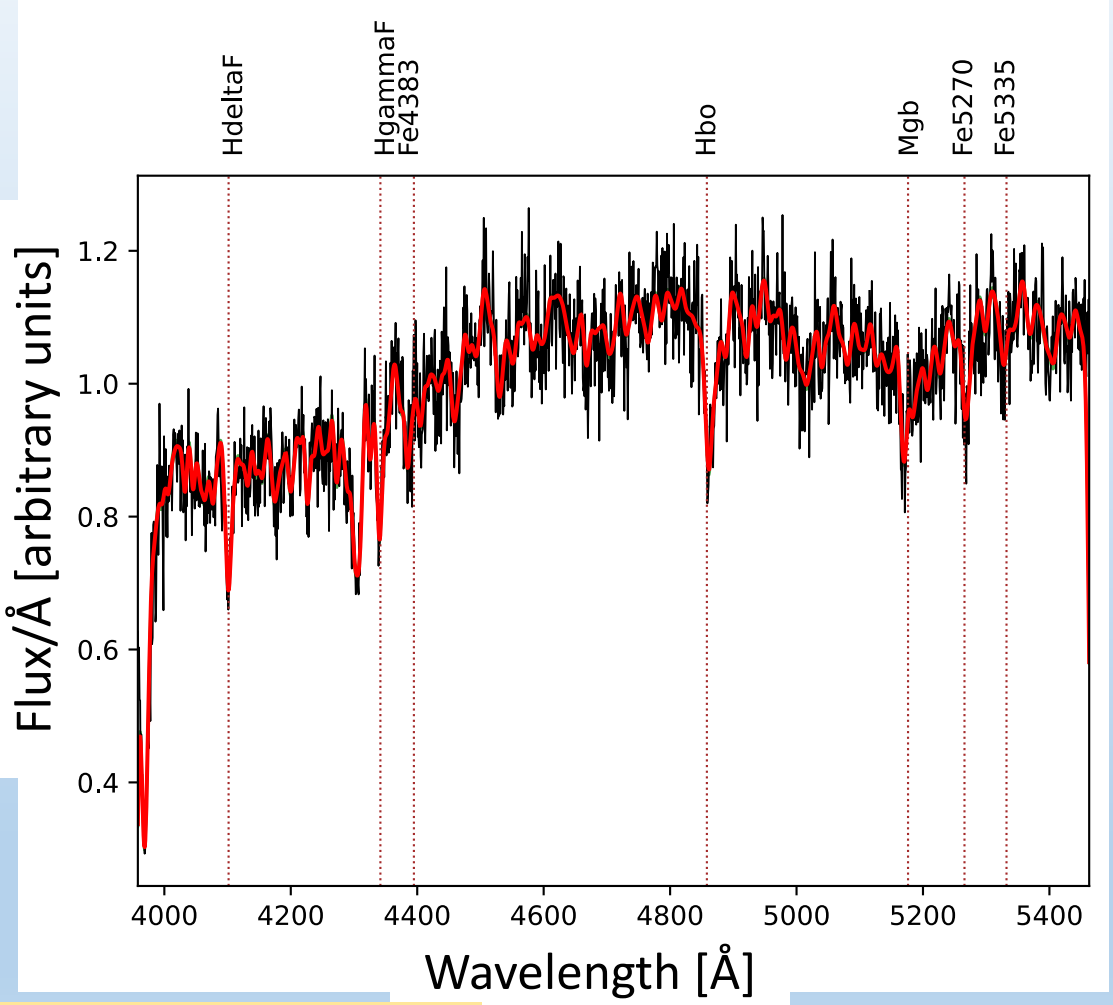
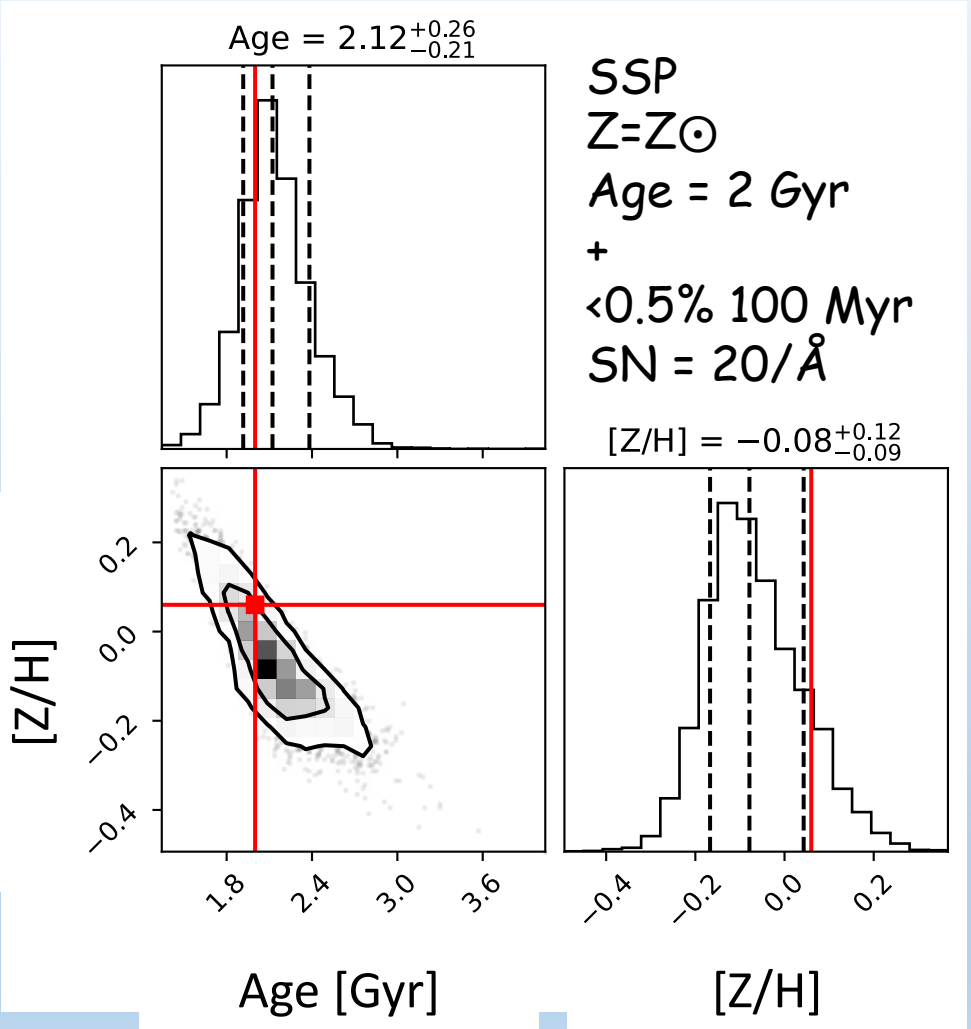




UV RANGE

SIMPLE TEST:
3) SSP 2 Gyr solar metallicity + < 0.5% SSP 100Myr





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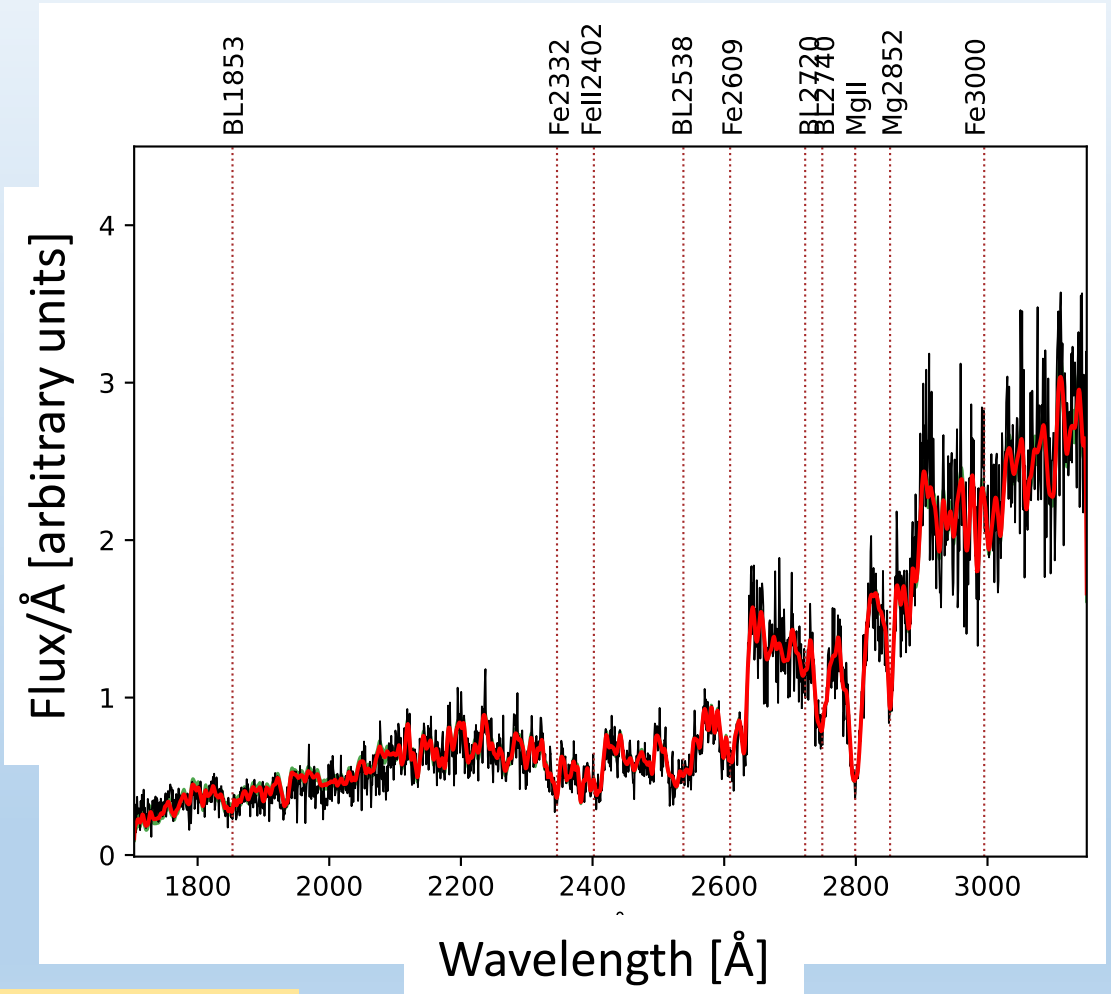
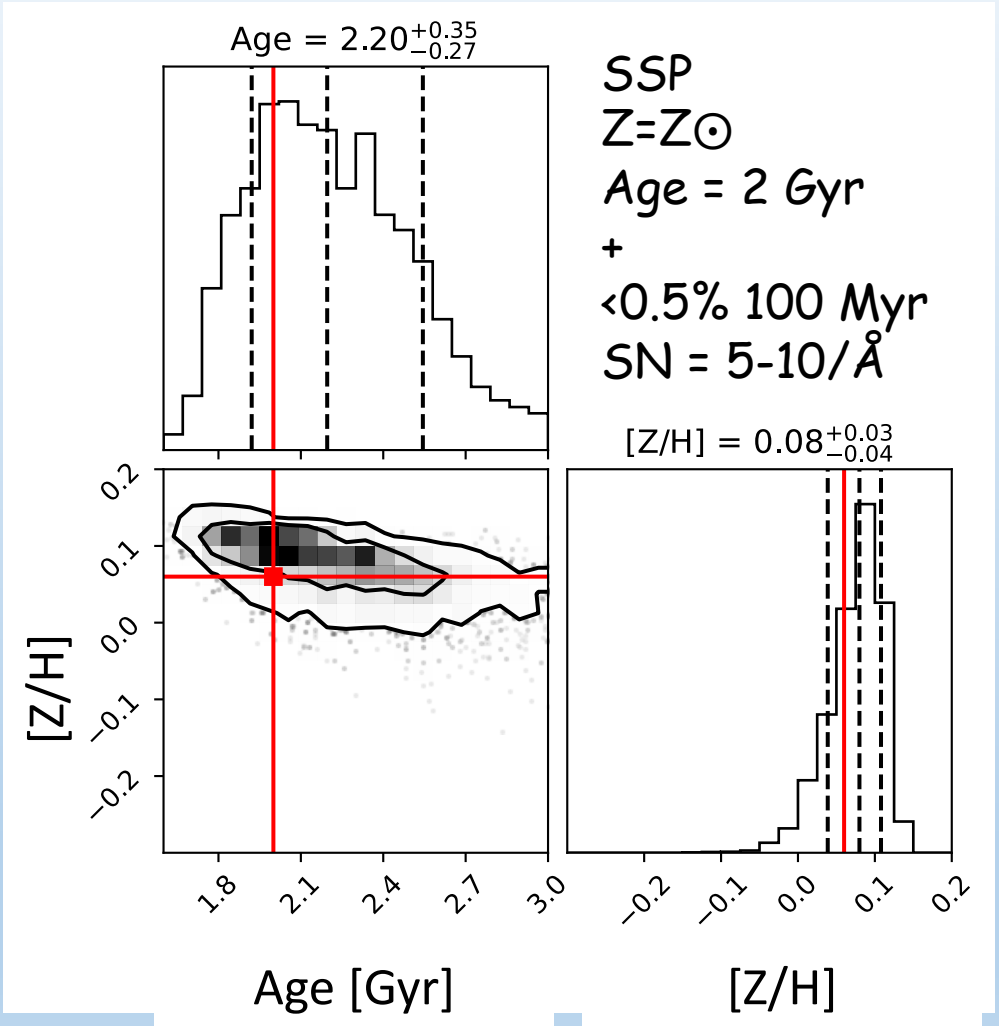




UV RANGE

SUMMARY

- UV spectral range can provide information on the stellar population properties of galaxies at high redshift thanks to the young age of their bulk component

- New upcoming spectroscopic surveys → spectra of thousands of galaxies

  → High resolution – wide spectral coverage (also UV!) – high SN

WEAVE-StePS

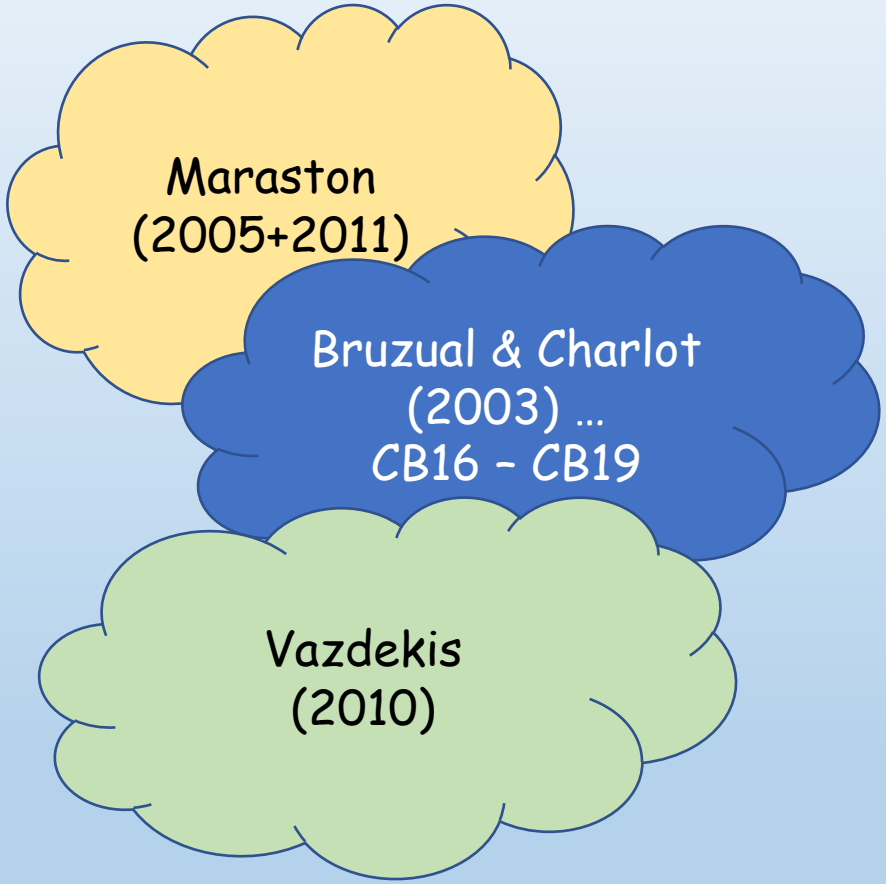
4MOST-StePS

- Comparison of results from UV with those from optical range

  → 'calibration' of UV in terms of stellar population properties

UV models

Stellar spectral library



OBSERVED: 218 stars - FWHM= 6 Å
(Fanelli et al. 1992)

OBSERVED: New Generation Stellar Library (NGSL)
374 stars – FWHM = 3 Å
(Koleva & Vazdekis 2012)

THEORETICAL: (λ > 3000Å)
1654 stars - FWHM = 1 Å
(Martins et al. 2005)

THEORETICAL: Kurucz high resolution
1800 stars – FWHM = 0.1 Å
(Rodríguez-Merino et al. 2005)

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  → time to address and resolve them

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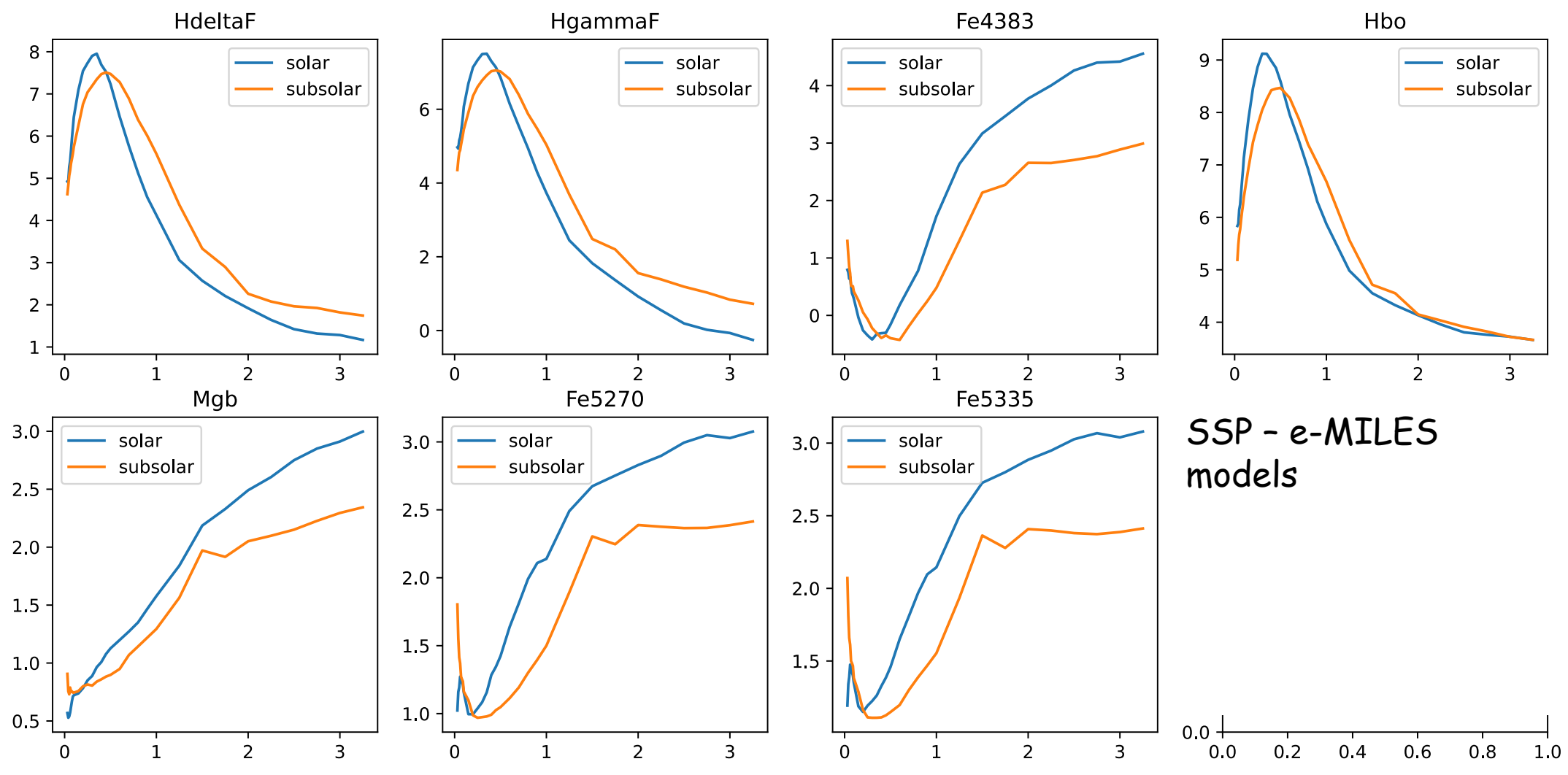
THANK YOU



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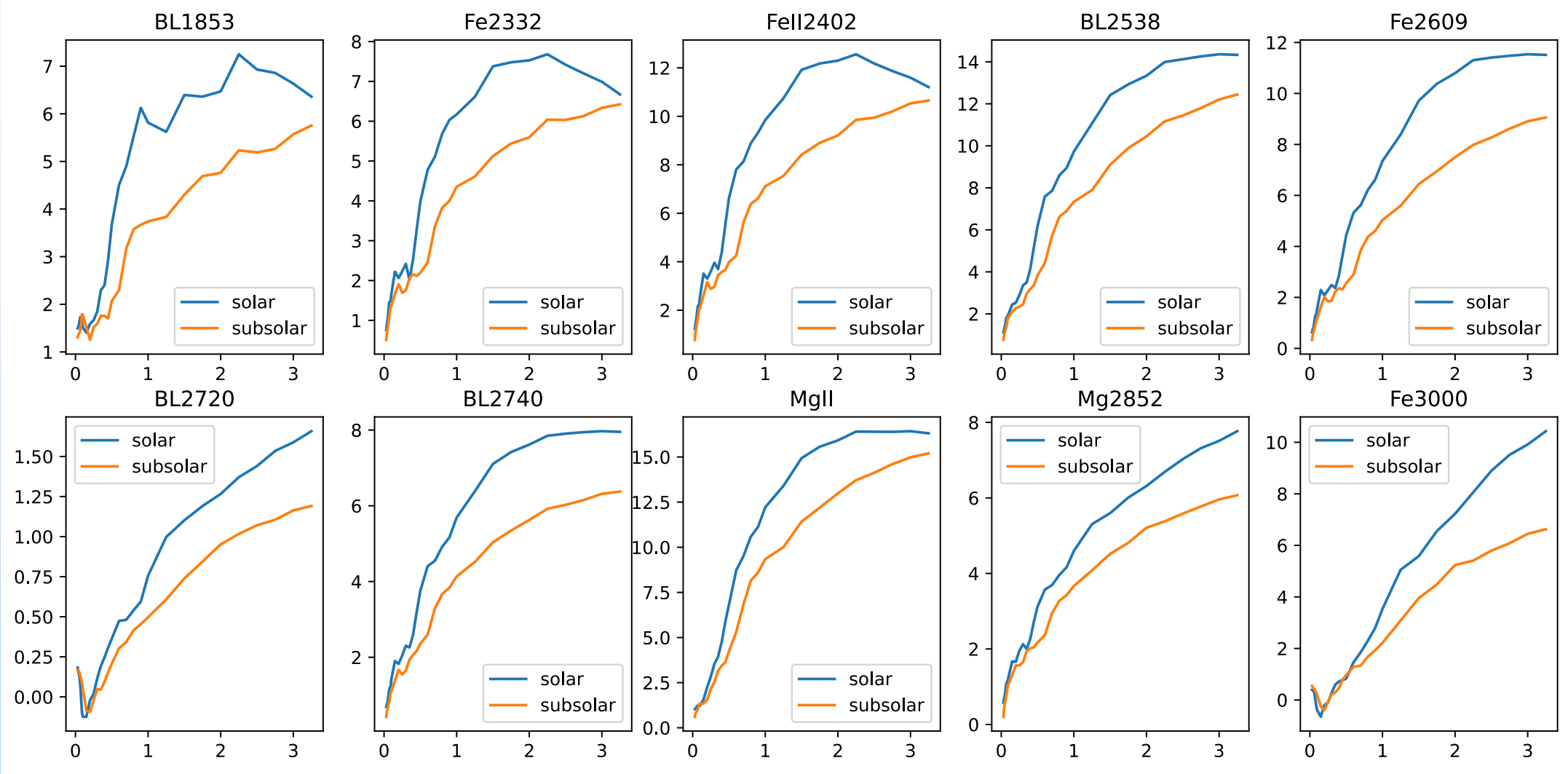

UV RANGE

Age [Gyr]