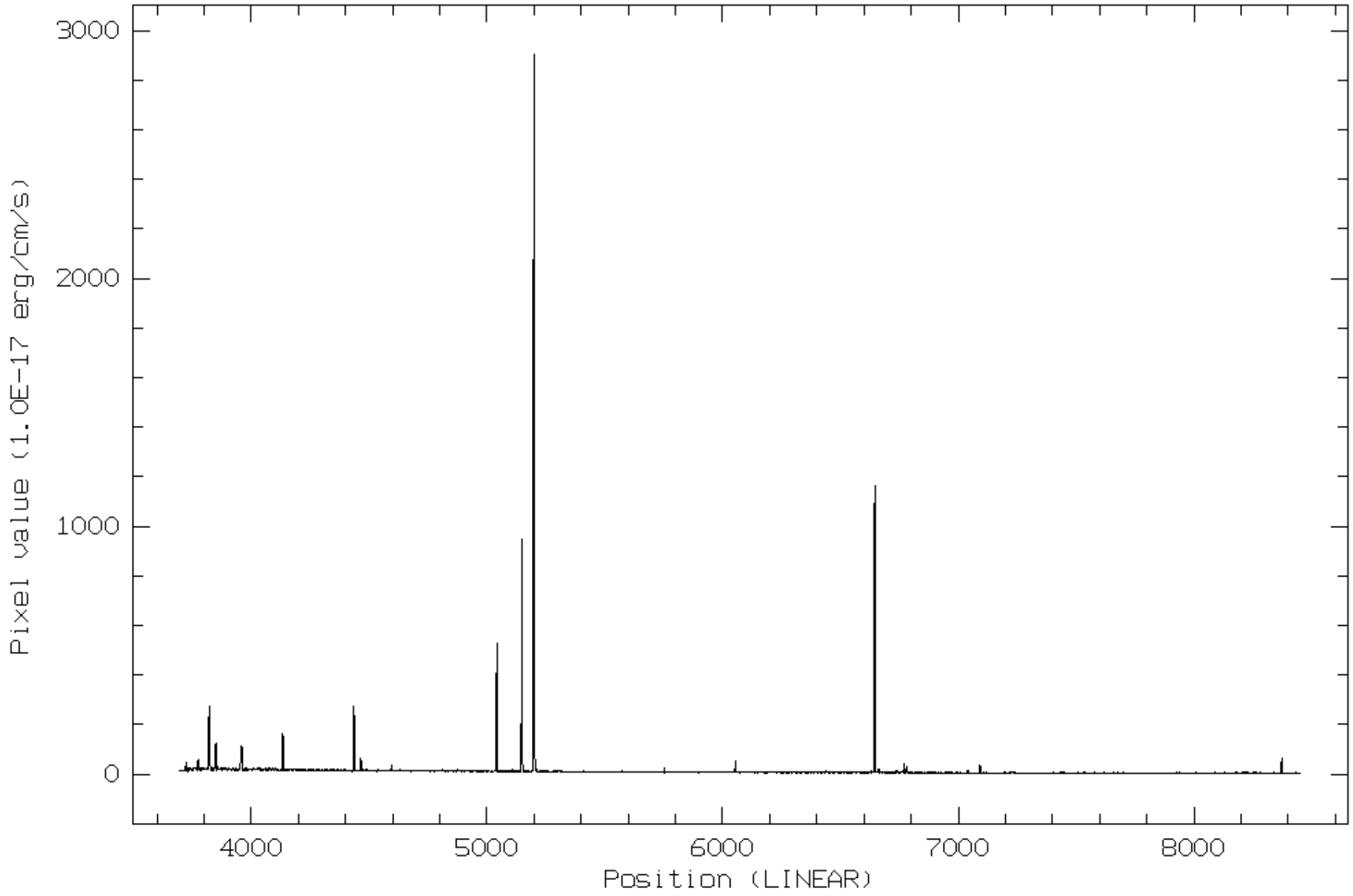
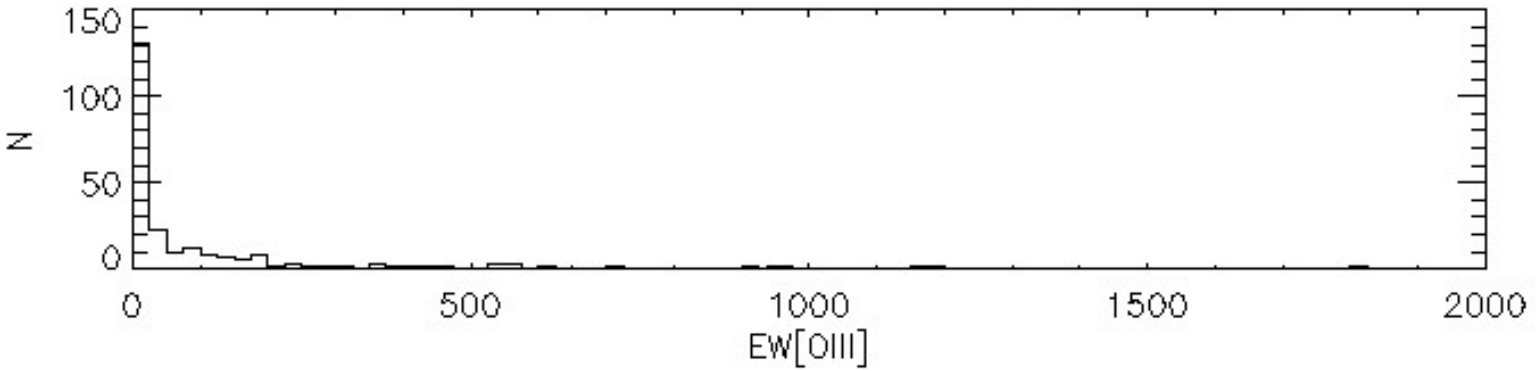
Coloured galaxies

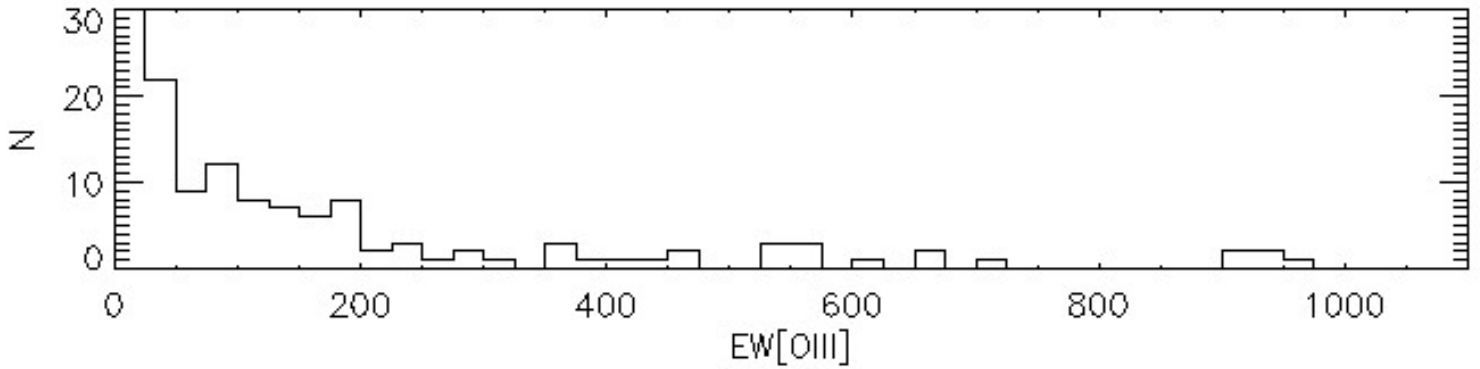
A.M. Hidalgo-Gámez, B. Miranda-Pérez & V. Hernández-Rosas
(ESFM-IPN, Mexico)

“Small galaxies, cosmic questions” Durham, 2019


3000
2000
1000
0
Pixel value (1.0E-17 erg/cm/s)
4000
5000
6000
7000
8000
Position (LINEAR)

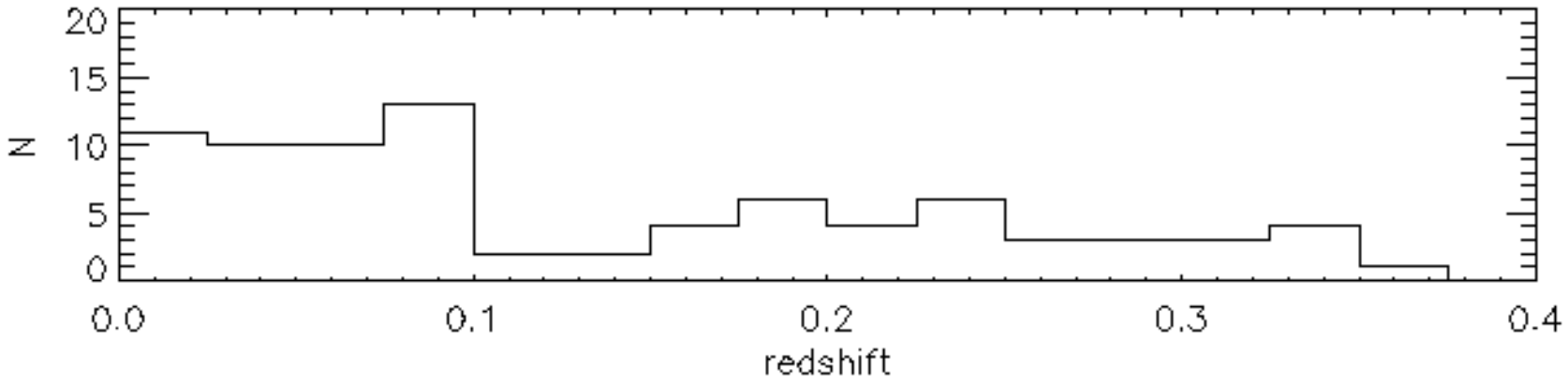
There are only 7 SHARDS galaxies with EW([OIII]) between 200 Å and 280 Å (Lumbreras-Calle, private communication).

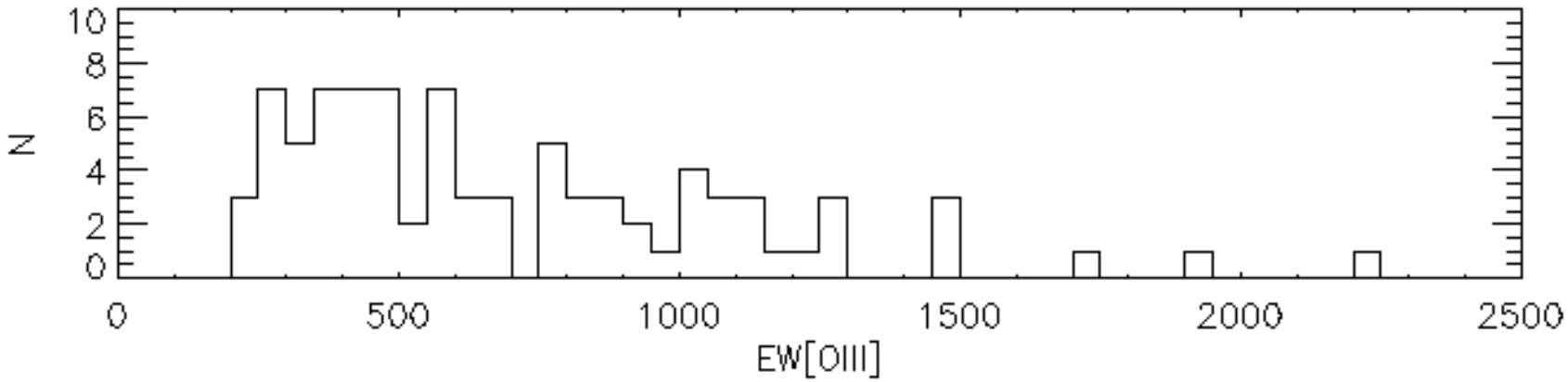




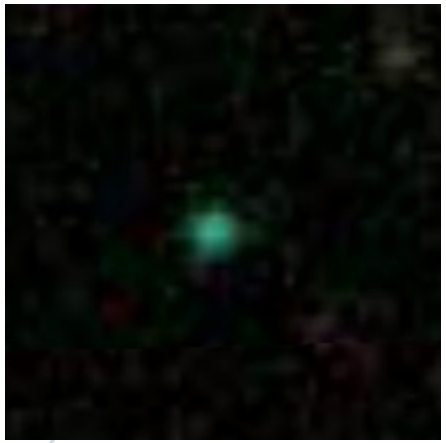
A sample of 34 regions in WR galaxies (López-Sánchez & Esteban 2010), 66 Im, 51 starburst, 72 BCD's and
30 hot spots in galaxies (Kniazev et al. 2004)

-Equivalent width of the oxygen line [OIII]λ5007 larger than 200Å
-Compact size, smaller than 4” for nearby and 2” for distant galaxies
-not very far galaxies
→ Unsual composite *gri* colour: Green, purple or brigth blue
Sample: 87 galaxies



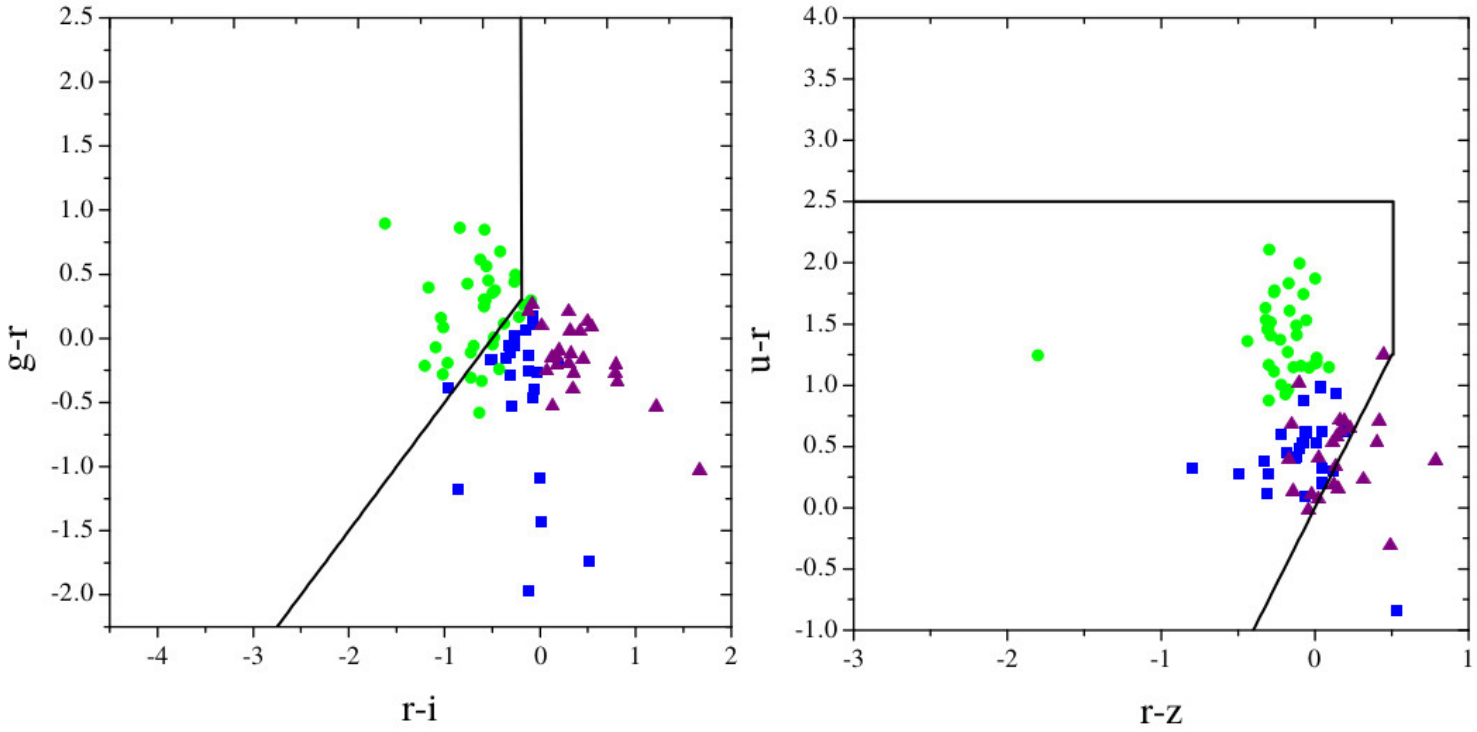


Besides, these galaxies have EW([OIII])/EW(Hα) larger than 1

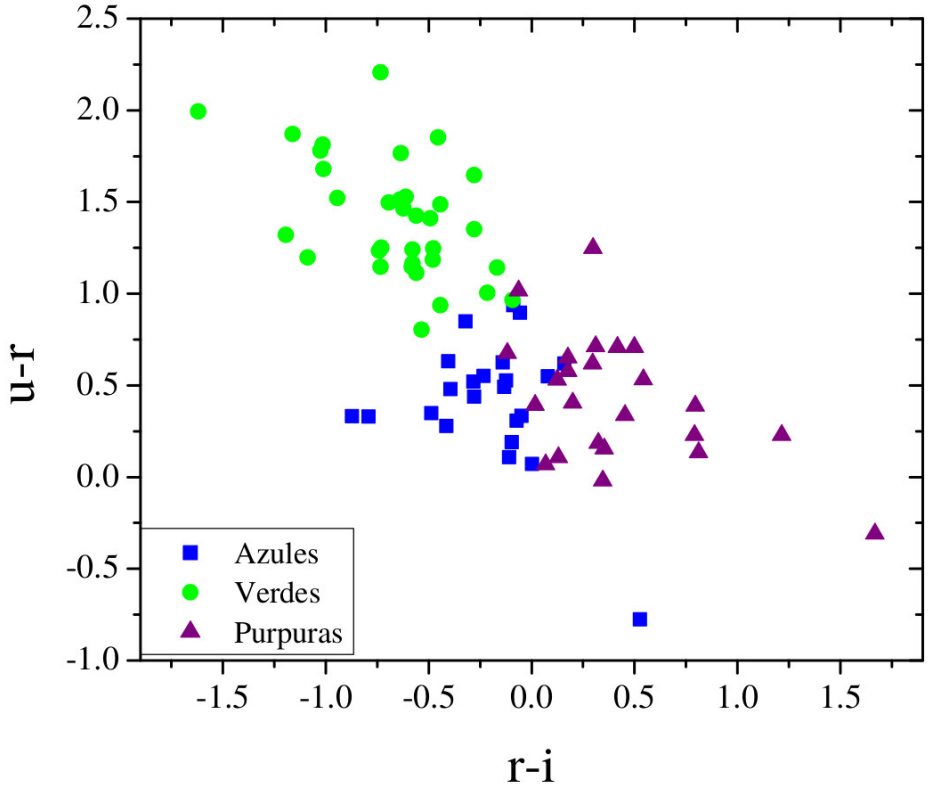


	z	EW([OIII])	r (kpc)	Mu	Mg	Mr	Mi	Mz
Green	0.25	813	11.9	-19.4	-20.6	-20.8	-20.13	-20.5
Purple	0.09	609	6.0	-18.9	-19.5	-19.3	-19.7	-19.5
blue	0.027	689	1.6	-17.3	-18.1	-17.7	-17.5	-17.6

Miranda-Pérez, 2017, Master thesis

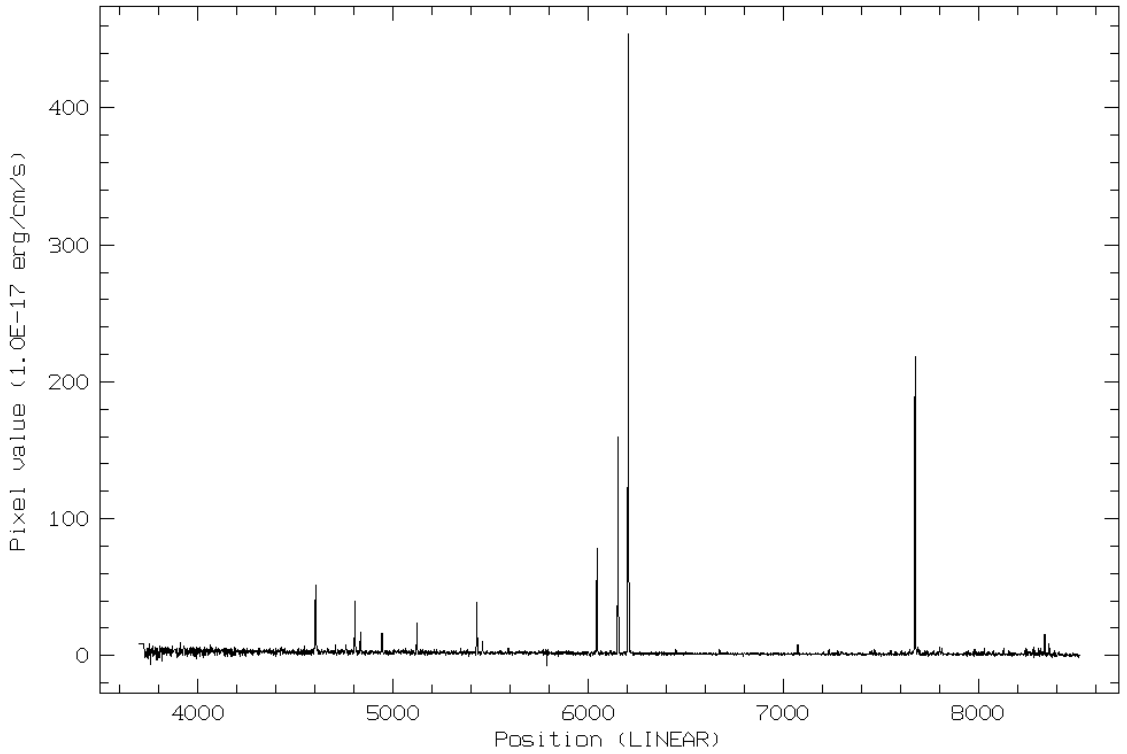


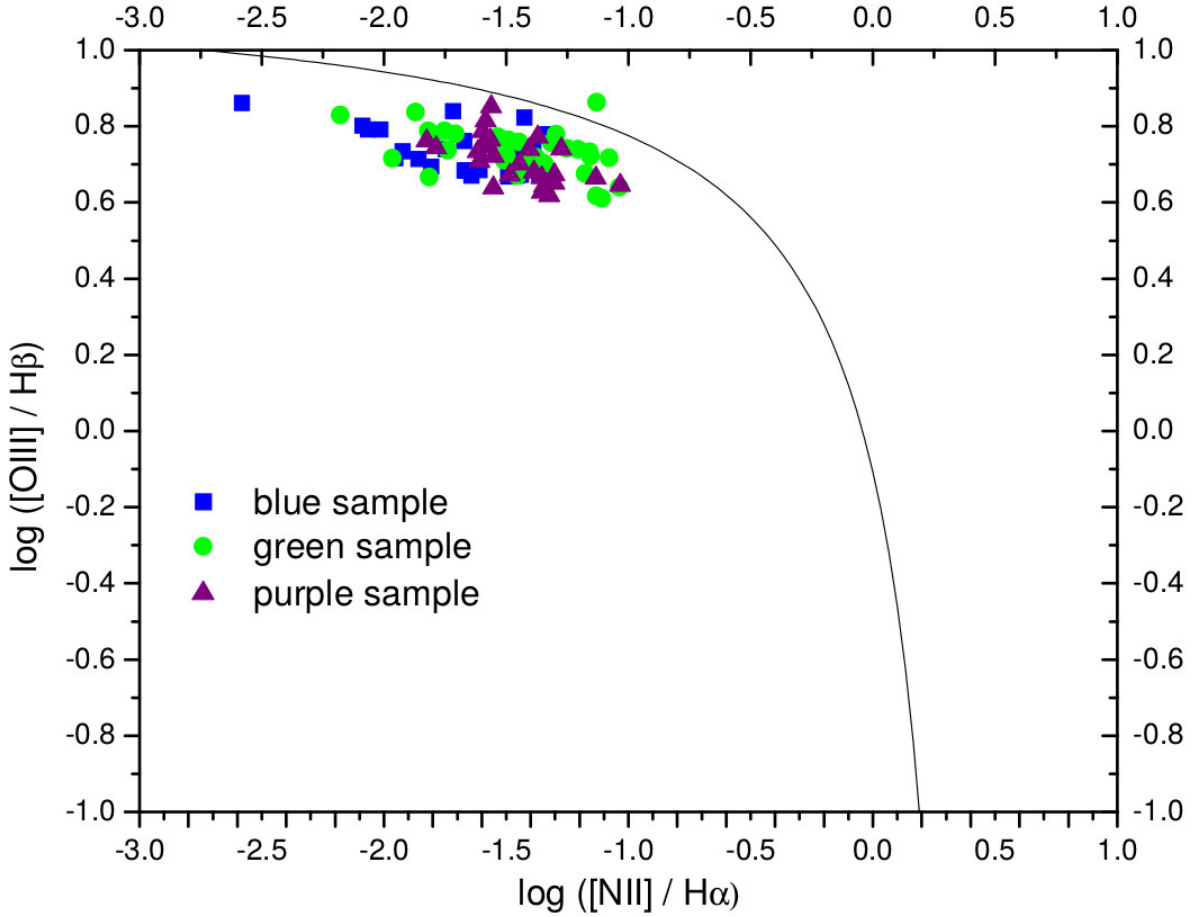
Actually, only about of 1/4 of our sample have been classified as green peas (Cardamone et al. 2009) or blueberry galaxies (Yang et al. 2017).



Why the EW([OIII]) is so large?

-AGN embeded
-Starburst

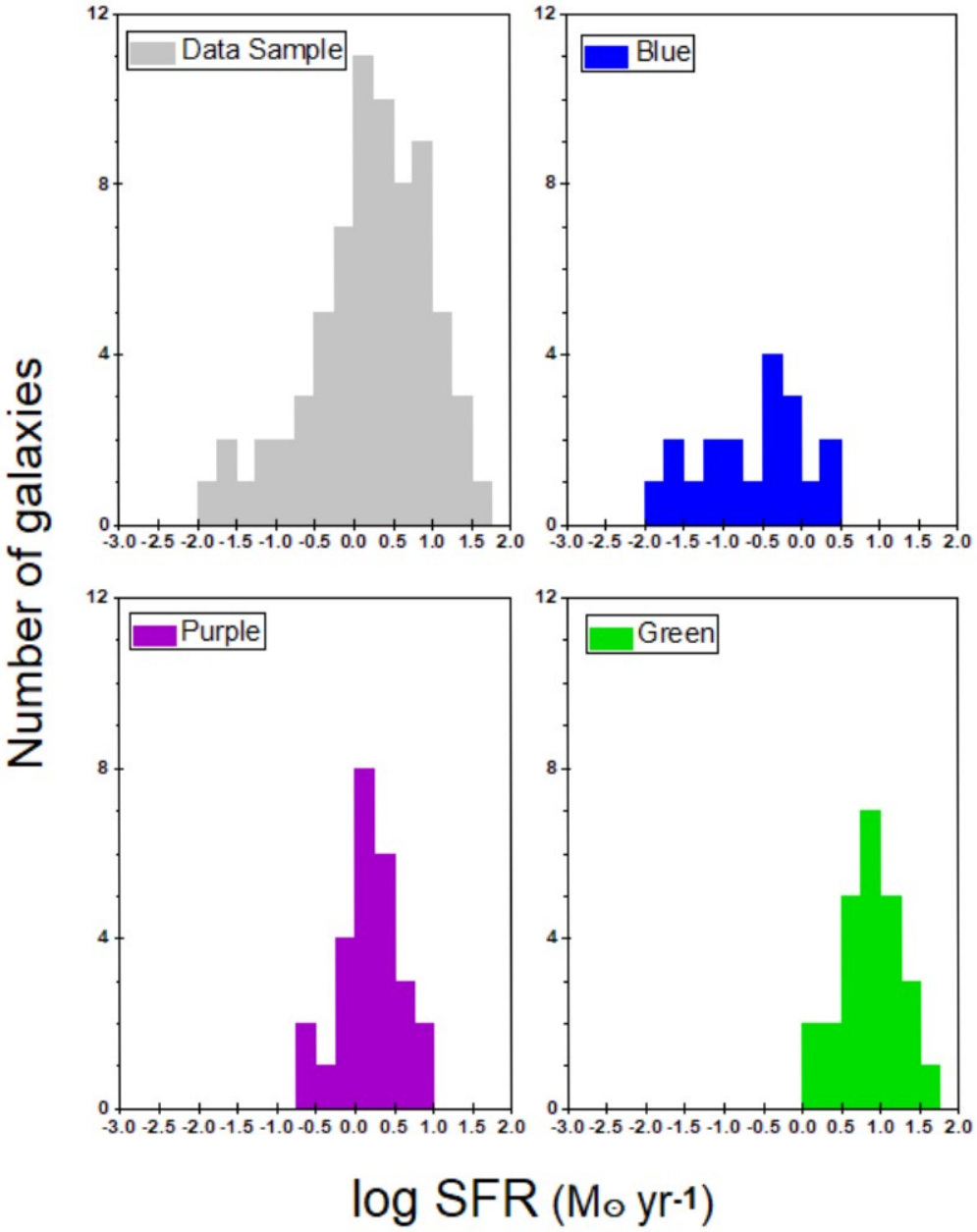




- All the galaxies are in the Star-forming region, although at the very high excitation end.

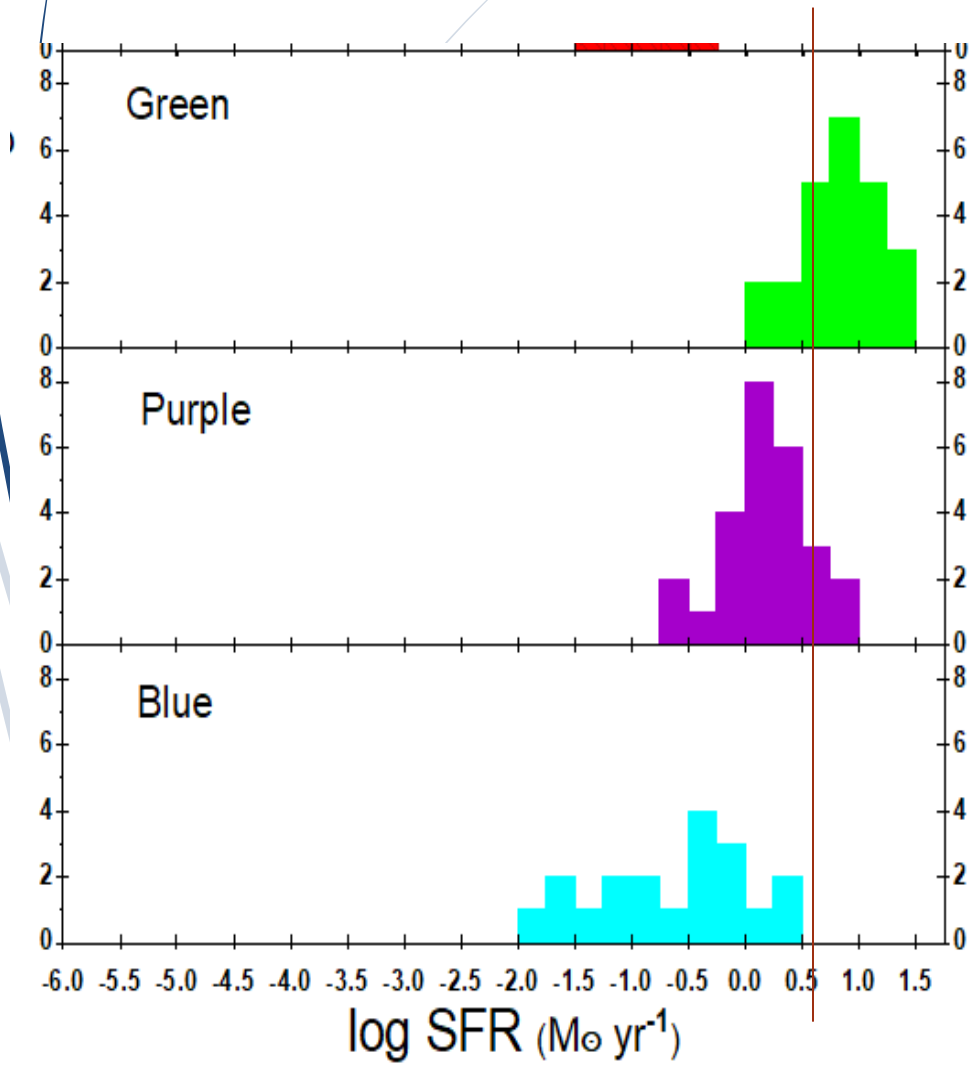
Are the coloured galaxies starbursts?

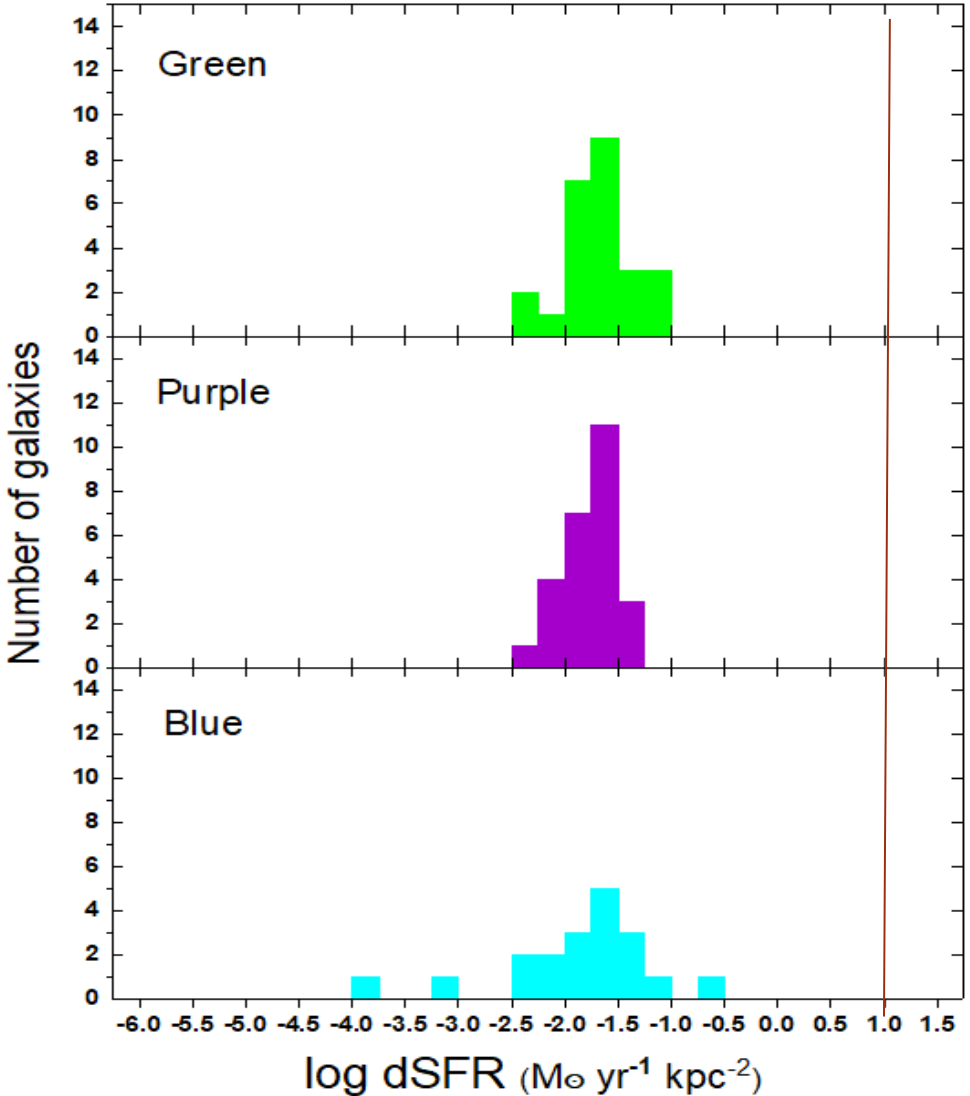
We determined the SFR from the UV luminosity using images from GALEX. The sky brackground subtraction as well as the flux measurements were obtained by us. The fluxes were extinction (galactic and internal) corrected and Kennicutt's equation were used to determined the SFR (Hernández-Rosas, Master thesis, 2019).

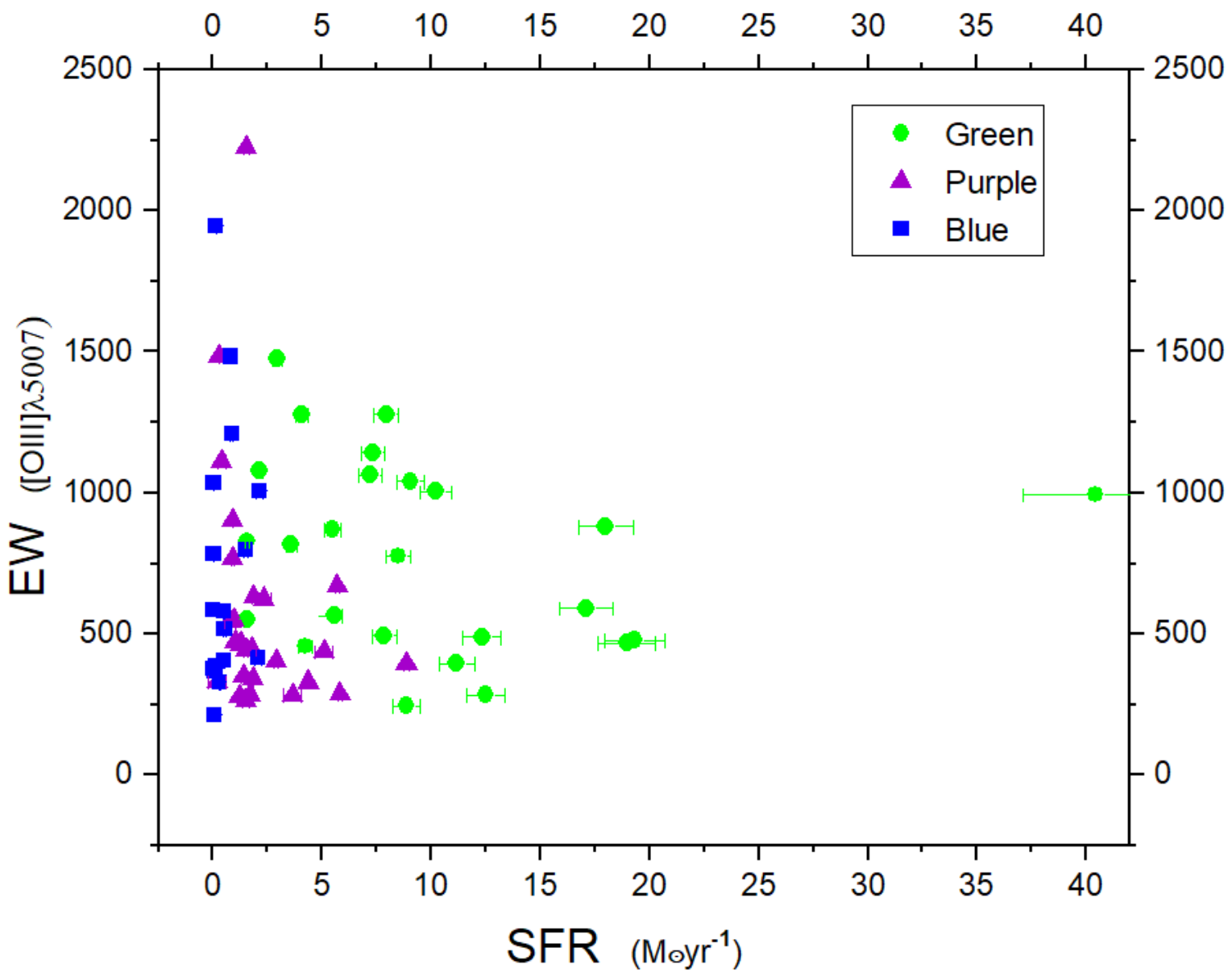


According to Melbourne et al. (2005) the SFR is larger than 2 M◦/yr.

According to Heckman (2005) the density of SFR should be larger than 10 M◦/ yr kpc2.

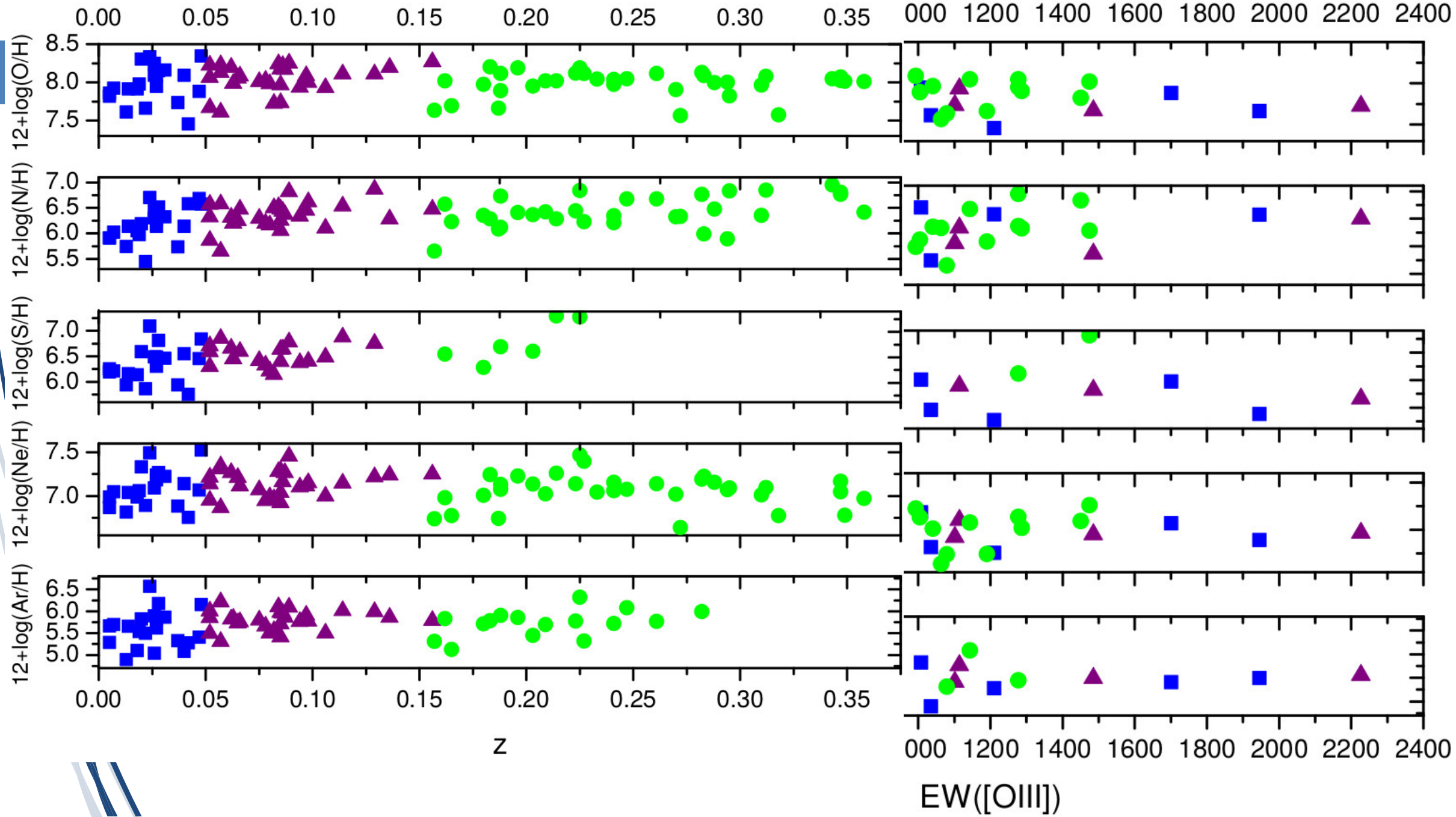




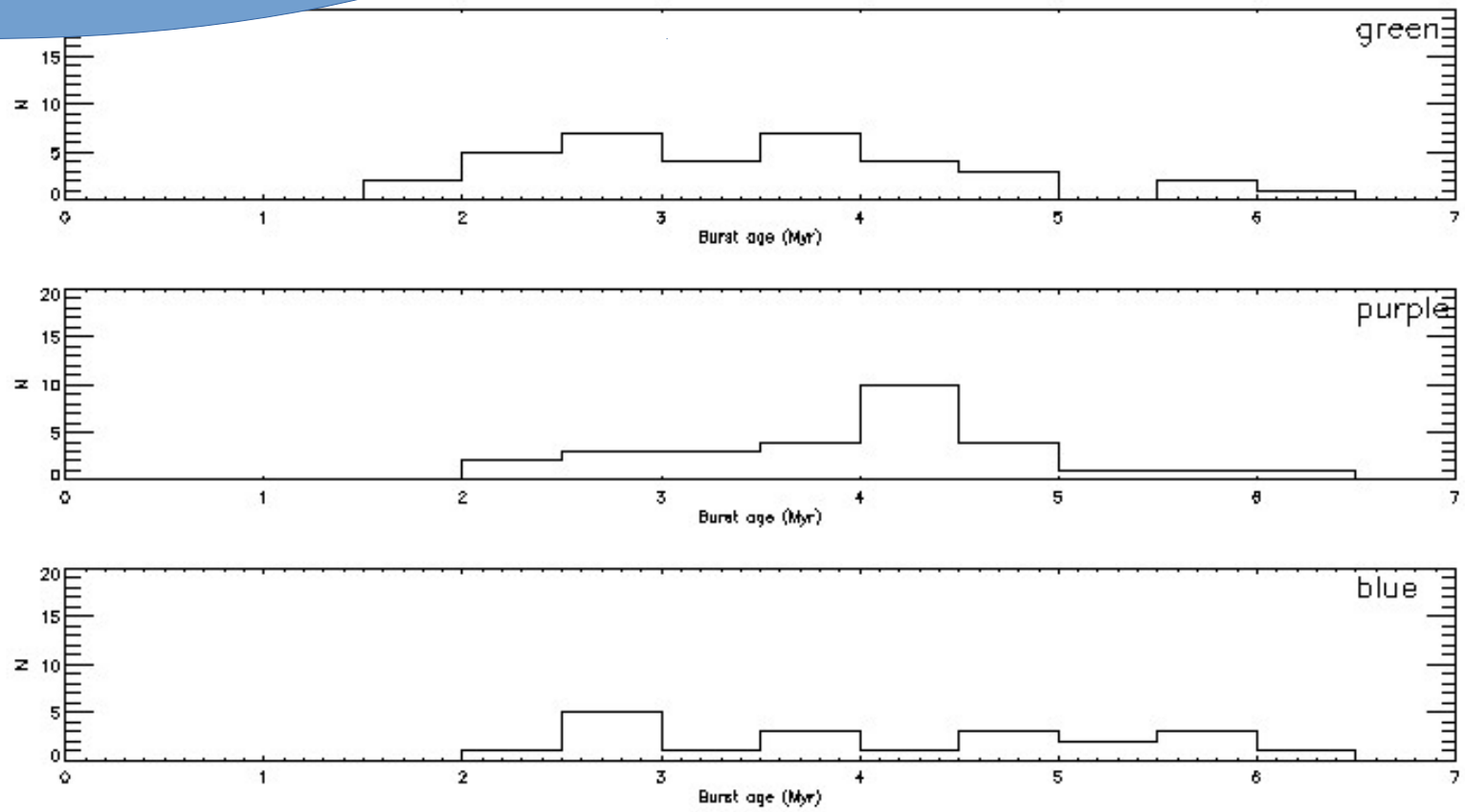

Green
Purple
Blue
EW ([OIII]λ5007)
SFR (M⊙yr-1)
0
5
10
15
20
25
30
35
40
0
500
1000
1500
2000
2500

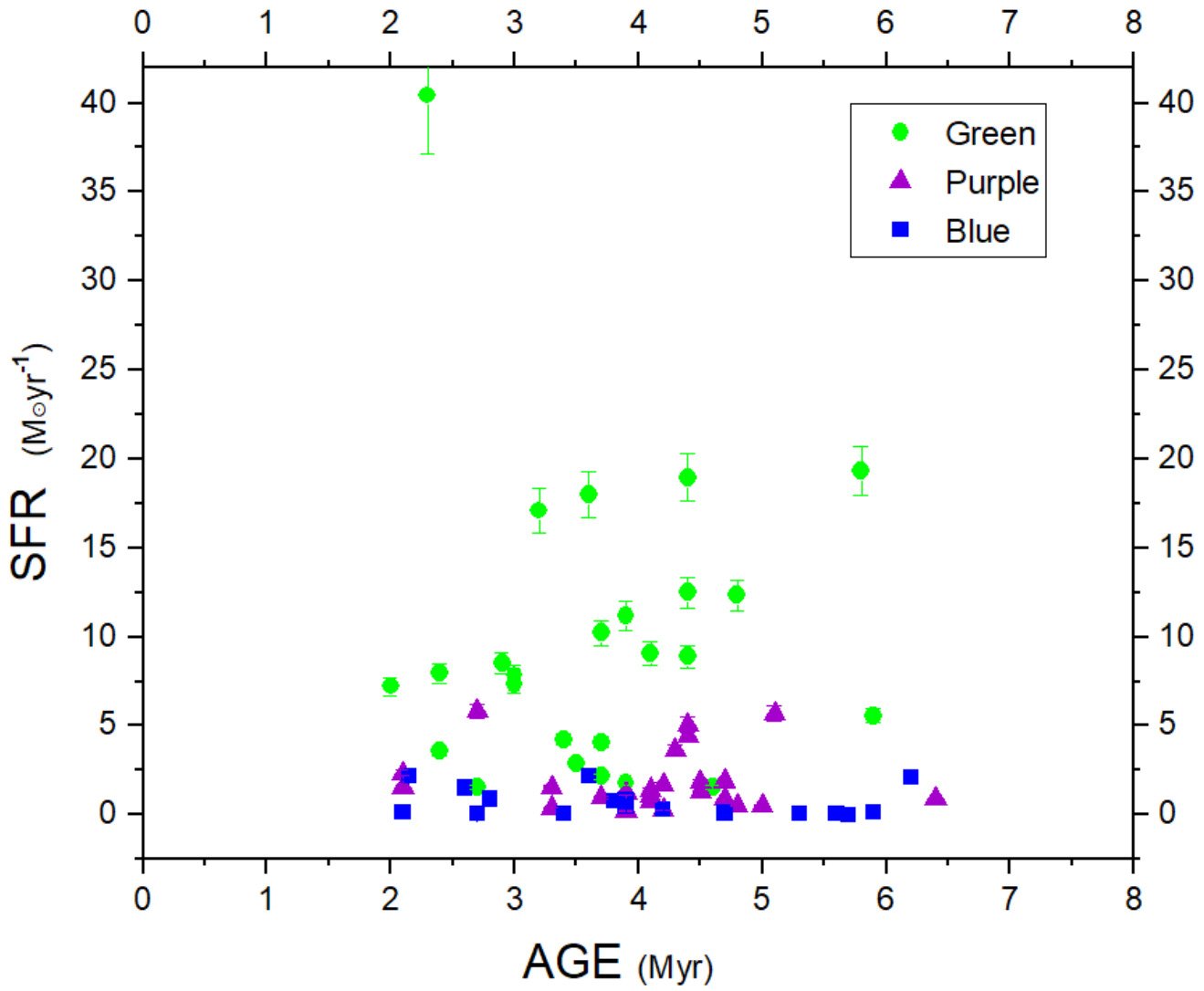
We determined the chemical abundance of the galaxies in the sample from the SDSS spectra (standard method), measuring the intensity of the lines with ALICE-MIDAS, correcting from absorption and extinction (Hidalgo-Gàmez & Miranda-Pèrez 2018; Miranda-Pérez & Hidalgo-Gámez, in preparation).

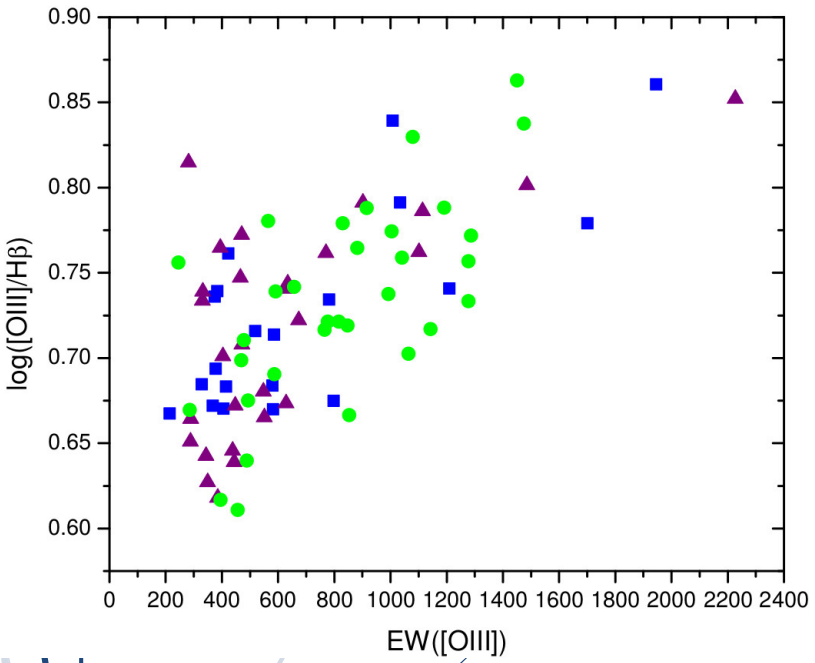
	Green	Purple	Blue	GP (Hawley 2012)
12+log(O/H)	8.00	8.1	8.0	8.11
12+log(N/H)	6.44	6.36	6.18	6.86
log(N/O)	-1.55	-1.69	-1.79	-1.25
12+log(Ne/H)	7.05	7.16	7.07	7.43
log(Ne/O)	-0.95	-0.95	-0.93	-0.68
12+log(S/H)	6.82	6.53	6.38	6.83
log(S/O)	-1.40	-1.54	-1.67	-1.25
12+log(Ar/H)	5.7	5.8	5.64	-
log(Ar/H)	-2.38	-2.3	-2.37	-

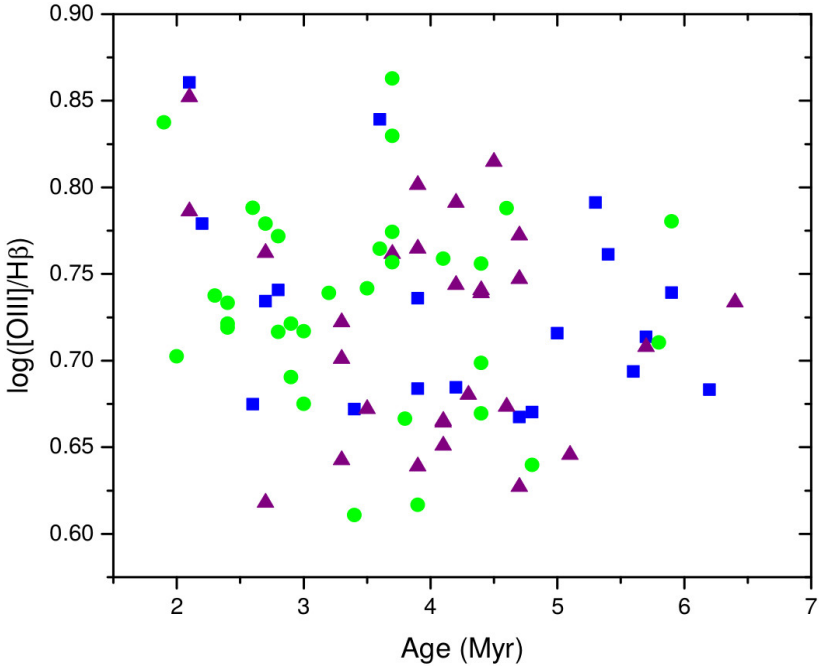

0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
000
1200
1400
1600
1800
2000
2200
2400
12+log(O/H)
8.5
8.0
7.5
12+log(N/H)
7.0
6.5
6.0
5.5
12+log(S/H)
7.0
6.5
6.0
12+log(Ne/H)
7.5
7.0
12+log(Ar/H)
6.5
6.0
5.5
5.0
z
EW([OIII])

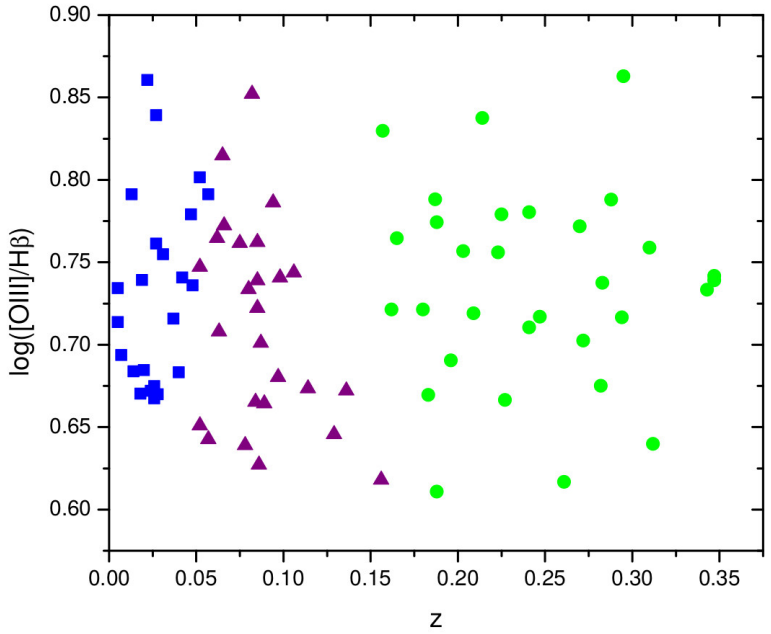
This is not in agreement with the age of the bursts, determined from the EW(Hβ), the oxygen abundance and the EW([OIII]), using the classical models by Coppetti et al. (1986).

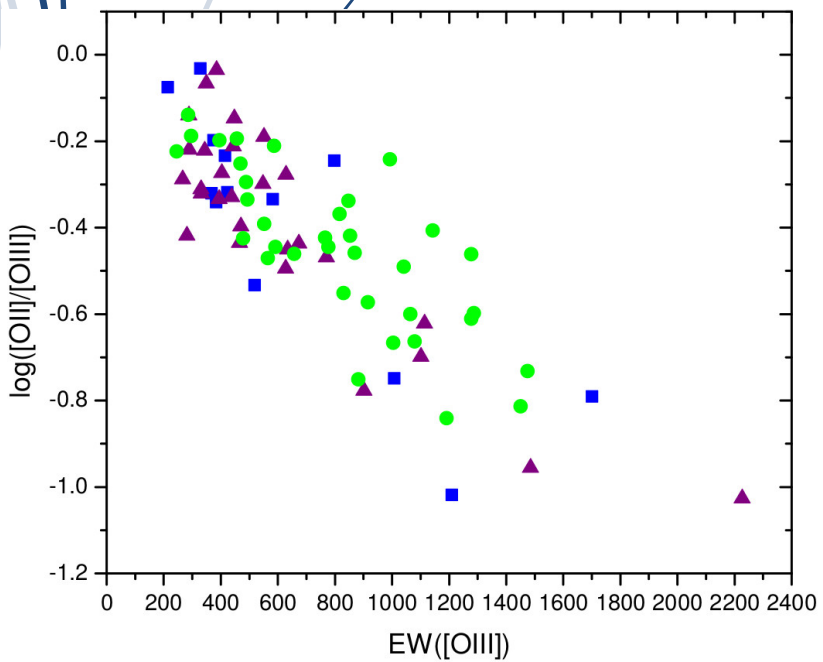


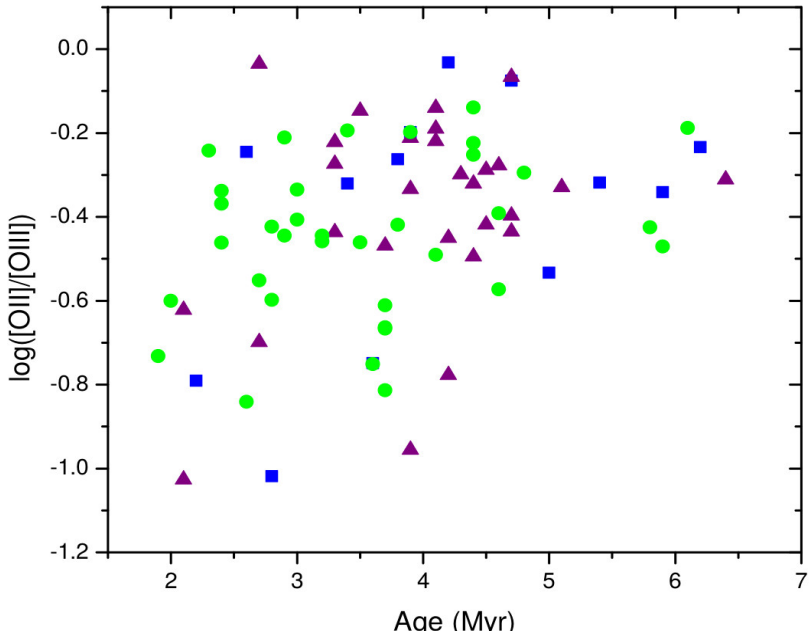

Green
Purple
Blue
SFR (M⊙yr-1)
AGE (Myr)
0
1
2
3
4
5
6
7
8
0
5
10
15
20
25
30
35
40

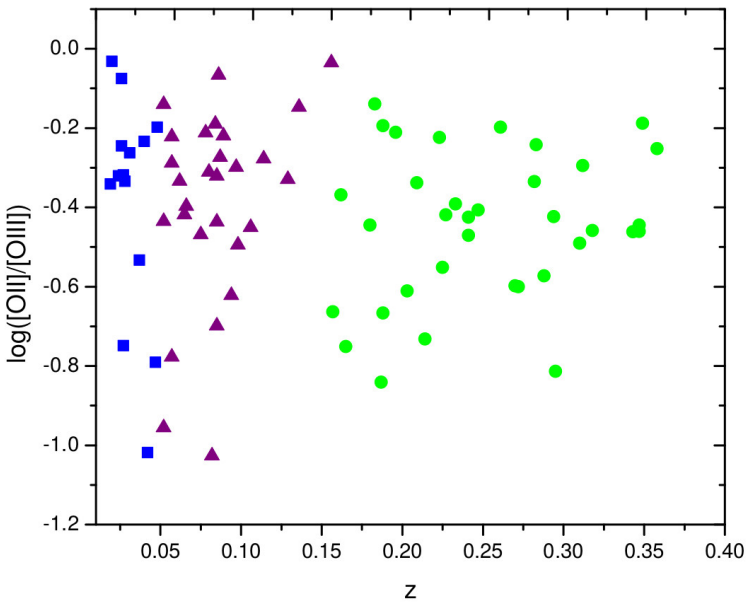

log([OIII]/Hβ)
EW([OIII])


log([OIII]/Hβ)
Age (Myr)


log([OIII]/Hβ)
z


log([OII]/[OIII])
EW([OIII])


log([OII]/[OIII])
Age (Myr)


log([OII]/[OIII])
z

Conclusions
We still don’t know why EW([OIII]) is so large!

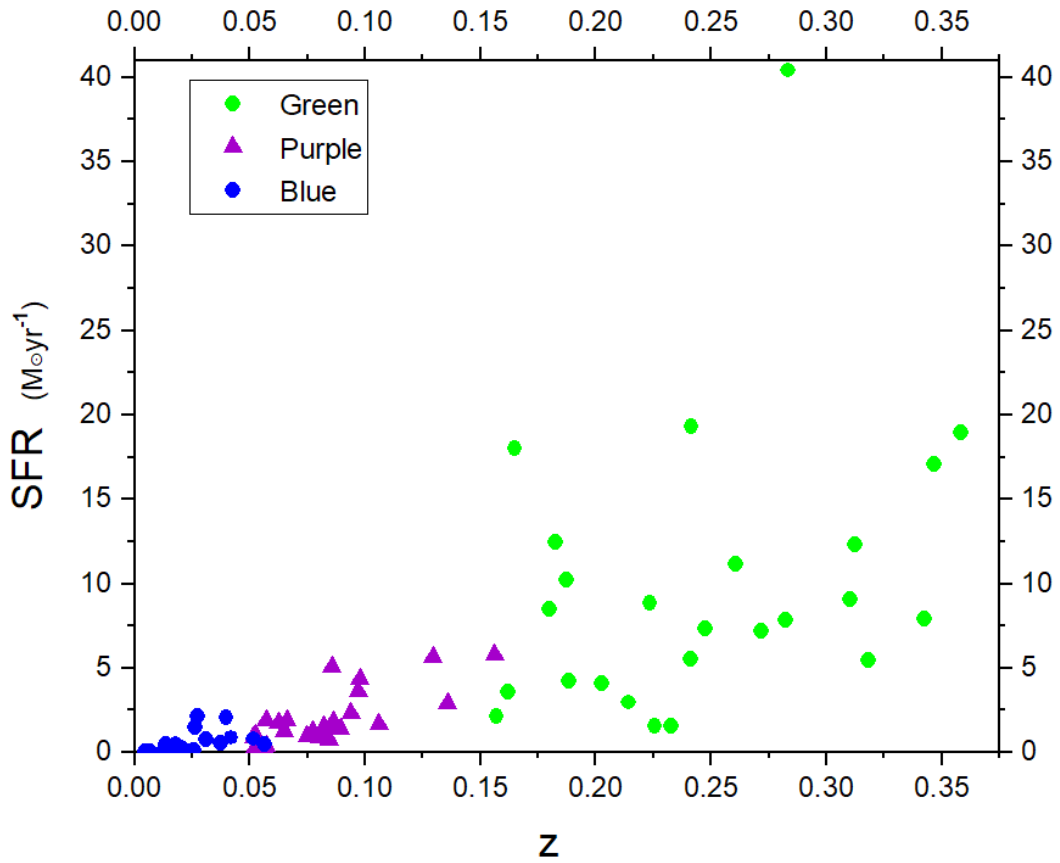
These coloured galaxies resemble “green peas” but most of them are not classified as them. They also resemble BCD.

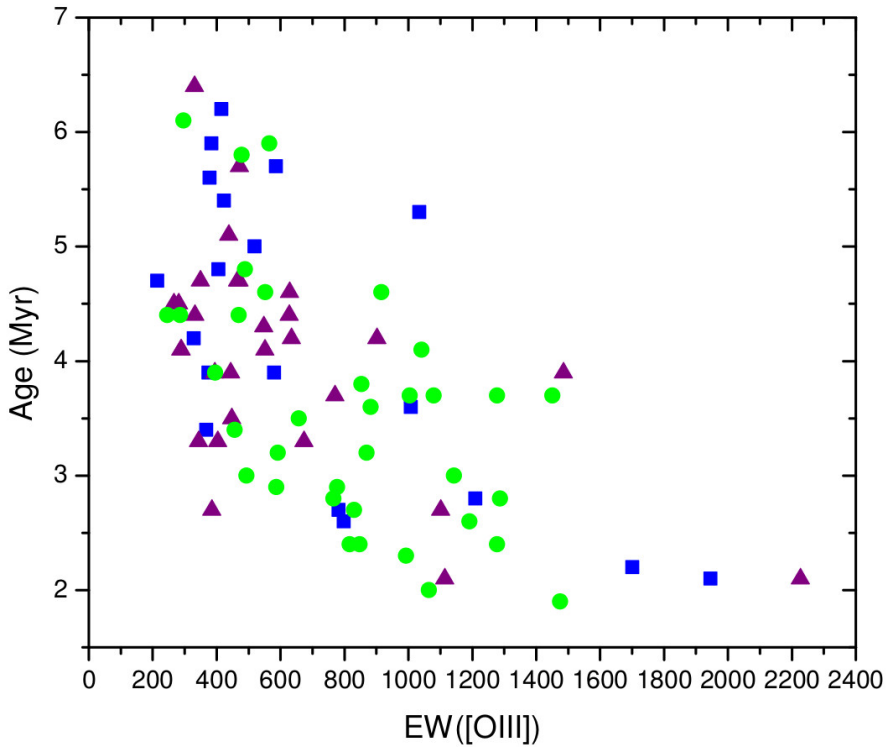
The SFR varies from 23.8 to 0.02 M/yr, being the green galaxies those with the large values and the blue ones those with the smallest.

Only 1/3 (at best!) of the sample might been suffering a big event of star formation. However, the spectral characteristics are very similar between them.

There is not differences in the chemical abundances between the galaxies despite the different redshift.

There is no real evolution on any of the spectral parameters.


Green
Purple
Blue
SFR (M⊙yr-1)
z
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0
5
10
15
20
25
30
35
40


Age (Myr)
EW([OIII])
2
3
4
5
6
7
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400