



Physical properties of extreme emission-line galaxies at z~4-9 from the JWST CEERS survey

Mario Llerena Postdoc INAF-OAR

arXiv: 2403.05362

June 28th 2024 Cosmic Dawn at High Latitudes

CEERS\_ zphot=

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80208	CEERS_39263	CEERS_97692	CEERS_11941	CEERS_67762	CEERS_50810	CEERS_61403	CEERS_87470
.16	zphot=4.56	zphot=7.27	zphot=4.08	zphot=5.10	zphot=5.83	zphot=4.02	zphot=5.19
0196	CEERS_20521	CEERS_80453	CEERS_2166	CEERS_80512	CEERS_64742	CEERS_86005	CEERS_79407
.16	zphot=5.22	zphot=5.89	zphot=5.16	zphot=6.04	zphot=5.16	zphot=3.81	zphot=6.40
92671	CEERS_80746	CEERS_38680	CEERS_81061	CEERS_64248	CEERS_1855	CEERS_78647	CEERS_6306
.80	zphot=4.68	zphot=6.07	zphot=8.68	zphot=4.65	zphot=5.10	zphot=7.36	zphot=5.16
72169	CEERS_67763	CEERS_20899	CEERS_12888	CEERS_24869	CEERS_83350	CEERS_79714	CEERS_22290
.36	zphot=5.10	zphot=4.11	zphot=4.53	zphot=6.43	zphot=4.38	zphot=3.90	zphot=7.39
02998	CEERS_5-324	CEERS_6265	CEERS_49117	CEERS_84034	CEERS_87173	CEERS_93846	CEERS_83332
.19	zphot=6.13	zphot=5.16	zphot=4.68	zphot=5.19	zphot=5.16	zphot=5.19	zphot=5.68
06682	CEERS_85039	CEERS_96778	CEERS_66855	CEERS_2149	CEERS_77134	CEERS_75857	CEERS_21324
	zphot=4.53	zphot=5.80	zphot=6.16	zphot=4.68	zphot=6.55	zphot=4.74	zphot=5.16
19590	CEERS_22442	CEERS_65781	CEERS_100832	CEERS_14830	CEERS_24868	CEERS_6886	CEERS_12855
.65	zphot=4.68	zphot=7.45	zphot=4.08	zphot=4.11	zphot=6.46	zphot=4.20	zphot=7.39
33597	CEERS_14035	CEERS_53557	CEERS_27278	CEERS_33140	CEERS_6647	CEERS_25074	CEERS_87469
.16	zphot=4.11	zphot=4.68	zphot=4.11	zphot=5.16	zphot=5.16	zphot=6.28	zphot=5.16
9490	CEERS_20040	CEERS_65564	CEERS_98160	CEERS_1028	CEERS_77960	CEERS_54272	CEERS_9321
.71	zphot=5.16	zphot=4.80	zphot=7.42	zphot=7.99	zphot=5.22	zphot=5.22	zphot=7.54
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# Extreme emission-line galaxies (EELGs)

Strong star formation events.

High equivalent widths (EWs) driven by elevated specific star formation rates (sSFRs) up to 10-100 Gyr-1

Galaxies with stellar masses  $\leq 10^{9}$ Msun, with subsolar metallicities and little dust (van der Wel+11, Maseda+14, Amorin+15, Forrest+17)





# Extreme emission-line galaxies (EELGs)

Many of the searches for EELGs select samples using either narrow- (e.g. Sobral+2013; Iglesias-Páramo+2022;Lumbreras-Calle+2022) broad- (e.g. van der Wel+2011;Onodera+2020; Kojima+2020; Chen+2023; Davis+2023) or medium-band photometry (e.g. Cohn+2018; Withers+2023; Simmonds+2023), and **slitless** spectroscopy (e.g. Maseda+2018; Kashino+2023).



Large samples to understand their physical properties

### Empirical templates

#### **Synthetic NIRCam observations**

Automated Spectroscopic K-means-based (ASK) classes presented in Sanchez-Almeida+2010.

~one-million SDSS-DR7 galaxies with an apparent magnitude brighter than 17.8 can be classified in only 28 ASK classes based exclusively on the features and shape of their rest-frame

#### 1% in 11 minor classes: metal-poor starbursts



~1900 EELGs presented in Pérez-Montero+21





### Synthetic NIRCam observations

#### 1% in minor classes: metal-poor starbursts

ASK class	EW(Hβ)	EW([OIII])	EW(Ha)
	Å	Å	Å
15	169.6	1097.9	918.3
17	144.9	874.3	782.3
20	92.3	496.2	484.9
21	85.9	460.1	457.5
25	63.9	298.1	334.4
26	45.1	172.8	232.0
27	57.4	234.1	302.4

1.2 1.0 0.4 0.2 0.0

#### Templates ASK 15, 17, 20, 21: with EW([OIII])>460A



# Color-Color diagrams<sup>3.8<z<9.0</sup>: photo-zs from photometric cata





# EELG candidates

3.78<z<5.3



CEERS photometric catalogs v0.51.2 (Finkelstein et al. in prep.)



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ADEC



634 galaxies (~15%)

# EELG candidates

5.6<z<9



CEERS photometric catalogs v0.51.2 (Finkelstein et al. in prep.)

S/N>3P(z>3)>50% (EAZY fit)



420 galaxies (~17%)

# Grandidates

By visual inspection, we clean the sample for saturated pixels, close to the edge galaxies. Our final sample is made of 736 EELG candidates. The control sample is made of ~1500 galaxies.







No bias compared with the parent samples

30 31

#### **R**: F410M

**G**: F356W

**B**: F277W



#### Compact, isolated

CEERS_80208	CEERS_39263	CEERS_97692	CEERS_11941	CEERS_67762	CEERS_50810	CEERS_61403	CEERS_87470	CEERS_14670	CEERS_65253
zphot=5.16	zphot=4.56	zphot=7.27	zphot=4.08	zphot=5.10	zphot=5.83	zphot=4.02	zphot=5.19	zphot=4.02	zphot=4.59
			•	-	•				
CEERS_50196	CEERS_20521	CEERS_80453	CEERS_2166	CEERS_80512	CEERS_64742	CEERS_86005	CEERS_79407	CEERS_90872	CEERS_81068
zphot=5.16	zphot=5.22	zphot=5.89	zphot=5.16	zphot=6.04	zphot=5.16	zphot=3.81	zphot=6.40	zphot=4.41	zphot=7.36
CEERS_92671	CEERS_80746	CEERS_38680	CEERS_81061	CEERS_64248	CEERS_1855	CEERS_78647	CEERS_6306	CEERS_87370	CEERS_34761
zphot=4.80	zphot=4.68	zphot=6.07	zphot=8.68	zphot=4.65	zphot=5.10	zphot=7.36	zphot=5.16	zphot=5.10	zphot=5.19
CEERS_72169	CEERS_67763	CEERS_20899	CEERS_12888	CEERS_24869	CEERS_83350	CEERS_79714	CEERS_22290	CEERS_82948	CEERS_54450
zphot=7.36	zphot=5.10	zphot=4.11	zphot=4.53	zphot=6.43	zphot=4.38	zphot=3.90	zphot=7.39	zphot=7.33	zphot=5.19
		5. <b>2</b> 2 4		1					
CEERS_62998	CEERS_5-324	CEERS_6265	CEERS_49117	CEERS_84034	CEERS_87173	CEERS_93846	CEERS_83332	CEERS_11578	CEERS_65207
zphot=5.19	zphot=6.13	zphot=5.16	zphot=4.68	zphot=5.19	zphot=5.16	zphot=5.19	zphot=5.68	zphot=5.19	zphot=7.00
CEERS_96682	CEERS_85039	CEERS_96778	CEERS_66855	CEERS_2149	CEERS_77134	CEERS_75857	CEERS_21324	CEERS_91251	CEERS_9233
zphot=5.16	zphot=4.53	zphot=5.80	zphot=6.16	zphot=4.68	zphot=6.55	zphot=4.74	zphot=5.16	zphot=6.04	zphot=7.33
CEERS_49590	CEERS_22442	CEERS_65781	CEERS_100832	CEERS_14830	CEERS_24868	CEERS_6886	CEERS_12855	CEERS_62230	CEERS_67706
zphot=4.65	zphot=4.68	zphot=7.45	zphot=4.08	zphot=4.11	zphot=6.46	zphot=4.20	zphot=7.39	zphot=5.19	zphot=5.19
					1				
CEERS_33597	CEERS_14035	CEERS_53557	CEERS_27278	CEERS_33140	CEERS_6647	CEERS_25074	CEERS_87469	CEERS_73028	CEERS_95217
zphot=5.16	zphot=4.11	zphot=4.68	zphot=4.11	zphot=5.16	zphot=5.16	zphot=6.28	zphot=5.16	zphot=5.07	zphot=6.01
CEERS_29490	CEERS_20040	CEERS_65564	CEERS_98160	CEERS_1028	CEERS_77960	CEERS_54272	CEERS_9321	CEERS_82643	CEERS_15833
zphot=4.71	zphot=5.16	zphot=4.80	zphot=7.42	zphot=7.99	zphot=5.22	zphot=5.22	zphot=7.54	zphot=4.53	zphot=4.56
CEERS_64644	CEERS_50197	CEERS_25418	CEERS_35021	CEERS_87910	CEERS_5955	CEERS_19193	CEERS_37905	CEERS_11618	CEERS_63460
zphot=7.09	zphot=5.19	zphot=4.26	zphot=7.45	zphot=4.83	zphot=4.26	zphot=7.39	zphot=3.81	zphot=6.55	zphot=3.81

#### **R**: F410M

#### **G**: F356W

**B**: F277W

CEERS_80208	CEERS_39263	CEERS_97692	CEERS_11941	CEERS_67762	CEERS_50810	CEERS_61403	CEERS_87470	CEERS_14670	CEERS_65253
zphot=5.16	zphot=4.56	zphot=7.27	zphot=4.08	zphot=5.10	zphot=5.83	zphot=4.02	zphot=5.19	zphot=4.02	zphot=4.59
CEERS_50196	CEERS_20521	CEERS_80453	CEERS_2166	CEERS_80512	CEERS_64742	CEERS_86005	CEERS_79407	CEERS_90872	CEERS_81068
zphot=5.16	zphot=5.22	zphot=5.89	zphot=5.16	zphot=6.04	zphot=5.16	zphot=3.81	zphot=6.40	zphot=4.41	zphot=7.36
CEERS_92671	CEERS_80746	CEERS_38680	CEERS_81061	CEERS_64248	CEERS_1855	CEERS_78647	CEERS_6306	CEERS_87370	CEERS_34761
zphot=4.80	zphot=4.68	zphot=6.07	zphot=8.68	zphot=4.65	zphot=5.10	zphot=7.36	zphot=5.16	zphot=5.10	zphot=5.19
CEERS_72169	CEERS_67763	CEERS_20899	CEERS_12888	CEERS_24869	CEERS_83350	CEERS_79714	CEERS_22290	CEERS_82948	CEERS_54450
zphot=7.36	zphot=5.10	zphot=4.11	zphot=4.53	zphot=6.43	zphot=4.38	zphot=3.90	zphot=7.39	zphot=7.33	zphot=5.19
CEERS_62998	CEERS_54324	CEERS_6265	CEERS_49117	CEERS_84034	CEERS_87173	CEERS_93846	CEERS_83332	CEERS_11578	CEERS_65207
zphot=5.19	zphot=6.13	zphot=5.16	zphot=4.68	zphot=5.19	zphot=5.16	zphot=5.19	zphot=5.68	zphot=5.19	zphot=7.00
CEERS_96682	CEERS_85039	CEERS_96778	CEERS_66855	CEERS_2149	CEERS_77134	CEERS_75857	CEERS_21324	CEERS_91251	CEERS_9233
zphot=5.16	zphot=4.53	zphot=5.80	zphot=6.16	zphot=4.68	zphot=6.55	zphot=4.74	zphot=5.16	zphot=6.04	zphot=7.33
CEERS_49590	CEERS_22442	CEERS_65781	CEERS_100832	CEERS_14830	CEERS_24868	CEERS_6886	CEERS_12855	CEERS_62230	CEERS_67706
zphot=4.65	zphot=4.68	zphot=7.45	zphot=4.08	zphot=4.11	zphot=6.46	zphot=4.20	zphot=7.39	zphot=5.19	zphot=5.19
CEERS_33597	CEERS_14035	CEERS_53557	CEERS_27278	CEERS_33140	CEERS_6647	CEERS_25074	CEERS_87469	CEERS_73028	CEERS_95217
zphot=5.16	zphot=4.11	zphot=4.68	zphot=4.11	zphot=5.16	zphot=5.16	zphot=6.28	zphot=5.16	zphot=5.07	zphot=6.01
CEERS_29490	CEERS_20040	CEERS_65564	CEERS_98160	CEERS_1028	CEERS_77960	CEERS_54272	CEERS_9321	CEERS_82643	CEERS_15833
zphot=4.71	zphot=5.16	zphot=4.80	zphot=7.42	zphot=7.99	zphot=5.22	zphot=5.22	zphot=7.54	zphot=4.53	zphot=4.56
CEERS_64644	CEERS_50197	CEERS_25418	CEERS_35021	CEERS_87910	CEERS_5955	CEERS_19193	CEERS_37905	CEERS_11618	CEERS_63460
zphot=7.09	zphot=5.19	zphot=4.26	zphot=7.45	zphot=4.83	zphot=4.26	zphot=7.39	zphot=3.81	zphot=6.55	zphot=3.81

# CEERS\_14830 zphot=4.11

#### Interacting systems



#### **R**: F410M

#### **G**: F356W

#### **B**: F277W

CEERS_80208 zphot=5.16	CEERS_39263 zphot=4.56	CEERS_97692 zphot=7.27	CEERS_11941 zphot=4.08	CEERS_67762 zphot=5.10	CEERS_50810 zphot=5.83	CEERS_61403 zphot=4.02	CEERS_87470 zphot=5.19	CEERS_14670 zphot=4.02	CEERS_65253 zphot=4.59
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CEERS_50196 zphot=5.16	CEERS_20521 zphot=5.22	CEERS_80453 zphot=5.89	CEERS_2166 zphot=5.16	CEERS_80512 zphot=6.04	CEERS_64742 zphot=5.16	CEERS_86005 zphot=3.81	CEERS_79407 zphot=6.40	CEERS_90872 zphot=4.41	CEERS_81068 zphot=7.36
CEERS_92671 zphot=4.80	CEERS_80746 zphot=4.68	CEERS_38680 zphot=6.07	CEERS_81061 zphot=8.68	CEERS_64248 zphot=4.65	CEERS_1855 zphot=5.10	CEERS_78647 zphot=7.36	CEERS_6306 zphot=5.16	CEERS_87370 zphot=5.10	CEERS_34761 zphot=5.19
CEERS_72169 zphot=7.36	CEERS_67763 zphot=5.10	CEERS_20899 zphot=4.11	CEERS_12888 zphot=4.53	CEERS_24869 zphot=6.43	CEERS_83350 zphot=4.38	CEERS_79714 zphot=3.90	CEERS_22290 zphot=7.39	CEERS_82948 zphot=7.33	CEERS_54450 zphot=5.19
		6 A		1					
CEERS_62998 zphot=5.19	CEERS_54324 zphot=6.13	CEERS_6265 zphot=5.16	CEERS_49117 zphot=4.68	CEERS_84034 zphot=5.19	CEERS_87173 zphot=5.16	CEERS_93846 zphot=5.19	CEERS_83332 zphot=5.68	CEERS_11578 zphot=5.19	CEERS_65207 zphot=7.00
CEERS_96682 zphot=5.16	CEERS_85039 zphot=4.53	CEERS_96778 zphot=5.80	CEERS_66855 zphot=6.16	CEERS_2149 zphot=4.68	CEERS_77134 zphot=6.55	CEERS_75857 zphot=4.74	CEERS_21324 zphot=5.16	CEERS_91251 zphot=6.04	CEERS_9233 zphot=7.33
CEERS_49590 zphot=4.65	CEERS_22442 zphot=4.68	CEERS_65781 zphot=7.45	CEERS_100832 zphot=4.08	CEERS_14830 zphot=4.11	CEERS_24868 zphot=6.46	CEERS_6886 zphot=4.20	CEERS_12855 zphot=7.39	CEERS_62230 zphot=5.19	CEERS_67706 zphot=5.19
					-				
CEERS_33597 zphot=5.16	CEERS_14035 zphot=4.11	CEERS_53557 zphot=4.68	CEERS_27278 zphot=4.11	CEERS_33140 zphot=5.16	CEERS_6647 zphot=5.16	CEERS_25074 zphot=6.28	CEERS_87469 zphot=5.16	CEERS_73028 zphot=5.07	CEERS_95217 zphot=6.01
CEERS_29490 zphot=4.71	CEERS_20040 zphot=5.16	CEERS_65564 zphot=4.80	CEERS_98160 zphot=7.42	CEERS_1028 zphot=7.99	CEERS_77960 zphot=5.22	CEERS_54272 zphot=5.22	CEERS_9321 zphot=7.54	CEERS_82643 zphot=4.53	CEERS_15833 zphot=4.56
CEERS_64644 zphot=7.09	CEERS_50197 zphot=5.19	CEERS_25418 zphot=4.26	CEERS_35021 zphot=7.45	CEERS_87910 zphot=4.83	CEERS_5955 zphot=4.26	CEERS_19193 zphot=7.39	CEERS_37905 zphot=3.81	CEERS_11618 zphot=6.55	CEERS_63460 zphot=3.81
and should	Carrier and Carrier	NUMBER OF STREET	A PROPERTY OF A			Sector Street and	a start of the second	ELSE AT LOSS	ALCONTRACTOR

#### Clumpy/Chains of clumps

CEERS\_65253 zphot=4.59





**R**: F410M

#### **G**: F356W

#### **B**: F277W

#### Major mergers



CEERS_80208 zphot=5.16	CEERS_39263 zphot=4.56	CEERS_97692 zphot=7.27	CEERS_11941 zphot=4.08	CEERS_67762 zphot=5.10	CEERS_50810 zphot=5.83	CEERS_61403 zphot=4.02	CEERS_87470 zphot=5.19	CEERS_14670 zphot=4.02	CEERS_65253 zphot=4.59
	•								
CEERS_50196 zphot=5.16	CEERS_20521 zphot=5.22	CEERS_80453 zphot=5.89	CEERS_2166 zphot=5.16	CEERS_80512 zphot=6.04	CEERS_64742 zphot=5.16	CEERS_86005 zphot=3.81	CEERS_79407 zphot=6.40	CEERS_90872 zphot=4.41	CEERS_81068 zphot=7.36
CEERS_92671 zphot=4.80	CEERS_80746 zphot=4.68	CEERS_38680 zphot=6.07	CEERS_81061 zphot=8.68	CEERS_64248 zphot=4.65	CEERS_1855 zphot=5.10	CEERS_78647 zphot=7.36	CEERS_6306 zphot=5.16	CEERS_87370 zphot=5.10	CEERS_34761 zphot=5.19
CEERS_72169 zphot=7.36	CEERS_67763 zphot=5.10	CEERS_20899 zphot=4.11	CEERS_12888 zphot=4.53	CEERS_24869 zphot=6.43	CEERS_83350 zphot=4.38	CEERS_79714 zphot=3.90	CEERS_22290 zphot=7.39	CEERS_82948 zphot=7.33	CEERS_54450 zphot=5.19
		61 2 2 4							
CEERS_62998 zphot=5.19	CEERS_54324 zphot=6.13	CEERS_6265 zphot=5.16	CEERS_49117 zphot=4.68	CEERS_84034 zphot=5.19	CEERS_87173 zphot=5.16	CEERS_93846 zphot=5.19	CEERS_83332 zphot=5.68	CEERS_11578 zphot=5.19	CEERS_65207 zphot=7.00
CEERS_96682 zphot=5.16	CEERS_85039 zphot=4.53	CEERS_96778 zphot=5.80	CEERS_66855 zphot=6.16	CEERS_2149 zphot=4.68	CEERS_77134 zphot=6.55	CEERS_75857 zphot=4.74	CEERS_21324 zphot=5.16	CEERS_91251 zphot=6.04	CEERS_9233 zphot=7.33
CEERS_49590 zphot=4.65	CEERS_22442 zphot=4.68	CEERS_65781 zphot=7.45	CEERS_100832 zphot=4.08	CEERS_14830 zphot=4.11	CEERS_24868 zphot=6.46	CEERS_6886 zphot=4.20	CEERS_12855 zphot=7.39	CEERS_62230 zphot=5.19	CEERS_67706 zphot=5.19
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CEERS_33597 zphot=5.16	CEERS_14035 zphot=4.11	CEERS_53557 zphot=4.68	CEERS_27278 zphot=4.11	CEERS_33140 zphot=5.16	CEERS_6647 zphot=5.16	CEERS_25074 zphot=6.28	CEERS_87469 zphot=5.16	CEERS_73028 zphot=5.07	CEERS_95217 zphot=6.01
CEERS_29490 zphot=4.71	CEERS_20040 zphot=5.16	CEERS_65564 zphot=4.80	CEERS_98160 zphot=7.42	CEERS_1028 zphot=7.99	CEERS_77960 zphot=5.22	CEERS_54272 zphot=5.22	CEERS_9321 zphot=7.54	CEERS_82643 zphot=4.53	CEERS_15833 zphot=4.56
CEERS_64644 zphot=7.09	CEERS_50197 zphot=5.19	CEERS_25418 zphot=4.26	CEERS_35021 zphot=7.45	CEERS_87910 zphot=4.83	CEERS_5955 zphot=4.26	CEERS_19193 zphot=7.39	CEERS_37905 zphot=3.81	CEERS_11618 zphot=6.55	CEERS_63460 zphot=3.81
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# Validation of the selection

#### 47 galaxies with NIRSpec observation -Prism or GM-Arrabal Haro et al. (in prep)



LiMe (Fernández+23) https://ceers-data.streamlit.app/



# lation of the select



**Differences due to**: Overestimation of photometric fluxes, slit loss, flux calibration

# Properties of EELG candidates (SED fitting)



**BAGPIPES**: JWST photometry assuming delayed  $\tau$ -model for the SFH

Similar underlying stellar population but younger starburst



### Ionization source

#### **Spectroscopically** observed sample



[OIII]/Hb~7

We can not rule out non-thermal sources for the entire sample



## <u>ing starbursts</u>



Above the main-sequence



## Escape of ionizing p

#### Mean EW([OIII]+Hb)~1000A

![](_page_18_Figure_2.jpeg)

Chevallard+18, Tang+19 Half of EELGs shows higher values than range of canonical

![](_page_18_Figure_4.jpeg)

Higher EWs and concentrated SFR have the conditions that should facilitate the escape of LyC photons

action	
5	

## Escape of ionizing photons

![](_page_19_Figure_1.jpeg)

# Summary

We use the broad-band filters F277W, F356W, and F444W and the medium-band filter F410M to select EELGs at z~4-9. We selected a sample of 736 candidates. 47 of them have already NIRSpec spectra. We define a control sample to compare the properties with the sample of EELGs. We use BAGPIPES to estimate their physical properties. We also use the F277W filter to estimate the physical size of the young stellar populations.

- Low mass, with high sSFRs and a mean age of 50Myr
- The larger differences are in the sSFR, ages and ionization parameter compared with control sample. This suggests they may have similar underlying stellar populations.
- the dominant source of ionization in these galaxies.
- Indirect LyC indicators (O32, SFR surface density) indicate they may have the conditions to facilitate the escape of ionizing photons.

### arXiv: 2403.05362

• Metal-poor starburst with high log([OIII]/Hbeta)~0.4-1 which indicates that star-formation may be

![](_page_20_Picture_11.jpeg)

![](_page_20_Picture_12.jpeg)

![](_page_20_Picture_13.jpeg)

![](_page_20_Picture_14.jpeg)

![](_page_20_Picture_15.jpeg)

![](_page_21_Picture_0.jpeg)

### RGB images

**R**: F410M

**G**: F356W

**B**: F277W

Blueish galaxies are at z~3.78-4.82 where [OIII] falls in F277W and Ha in F356W.

CEERS_80208 zphot=5.16	CEERS_39263 zphot=4.56	CEERS_97692 zphot=7.27	CEERS_11941 zphot=4.08	CEERS_67762 zphot=5.10	CEERS_50810 zphot=5.83	CEERS_61403 zphot=4.02	CEERS_87470 zphot=5.19	CEERS_14670 zphot=4.02	CEERS_65253 zphot=4.59
	•			-					
CEERS_50196 zphot=5.16	CEERS_20521 zphot=5.22	CEERS_80453 zphot=5.89	CEERS_2166 zphot=5.16	CEERS_80512 zphot=6.04	CEERS_64742 zphot=5.16	CEERS_86005 zphot=3.81	CEERS_79407 zphot=6.40	CEERS_90872 zphot=4.41	CEERS_81068 zphot=7.36
CEERS_92671 zphot=4.80	CEERS_80746 zphot=4.68	CEERS_38680 zphot=6.07	CEERS_81061 zphot=8.68	CEERS_64248 zphot=4.65	CEERS_1855 zphot=5.10	CEERS_78647 zphot=7.36	CEERS_6306 zphot=5.16	CEERS_87370 zphot=5.10	CEERS_34761 zphot=5.19
CEERS_72169 zphot=7.36	CEERS_67763 zphot=5.10	CEERS_20899 zphot=4.11	CEERS_12888 zphot=4.53	CEERS_24869 zphot=6.43	CEERS_83350 zphot=4.38	CEERS_79714 zphot=3.90	CEERS_22290 zphot=7.39	CEERS_82948 zphot=7.33	CEERS_54450 zphot=5.19
				1					
CEERS_62998 zphot=5.19	CEERS_54324 zphot=6.13	CEERS_6265 zphot=5.16	CEERS_49117 zphot=4.68	CEERS_84034 zphot=5.19	CEERS_87173 zphot=5.16	CEERS_93846 zphot=5.19	CEERS_83332 zphot=5.68	CEERS_11578 zphot=5.19	CEERS_65207 hot=7.00
CEERS_96682 zphot=5.16	CEERS_85039 zphot=4.53	CEERS_96778 zphot=5.80	CEERS_66855 zphot=6.16	CEERS_2149 zphot=4.68	CEERS_77134 zphot=6.55	CEERS_75857 zphot=4.74	CEERS_21324 zphot=5.16	CEERS_91251 zphot=6.04	CEERS_9233 zphot=7.33
CEERS_49590 zphot=4.65	CEERS_22442 zphot=4.68	CEERS_65781 zphot=7.45	CEERS_100832 zphot=4.08	CEERS_14830 zphot=4.11	CEERS_24868 zphot=6.46	CEERS_6886 zphot=4.20	CEERS_12855 zphot=7.39	CEERS_62230 zphot=5.19	CEERS_67706 zphot=5.19
					1				
CEERS_33597 zphot=5.16	CEERS_14035 zphot=4.11	CEERS_53557 zphot=4.68	CEERS_27278 zphot=4.11	CEERS_33140 zphot=5.16	CEERS_6647 zphot=5.16	CEERS_25074 zphot=6.28	CEERS_87469 zphot=5.16	CEERS_73028 zphot=5.07	CEERS_95217 zphot=6.01
CEERS_29490 zphot=4.71	CEERS_20040 zphot=5.16	CEERS_65564 zphot=4.80	CEERS_98160 zphot=7.42	CEERS_1028 zphot=7.99	CEERS_77960 zphot=5.22	CEERS_54272 zphot=5.22	CEERS_9321 zphot=7.54	CEERS_82643 zphot=4.53	CEERS_15833 zphot=4.56
CEERS_64644 zphot=7.09	CEERS_50197 zphot=5.19	CEERS_25418 zphot=4.26	CEERS_35021 zphot=7.45	CEERS_87910 zphot=4.83	CEERS_5955 zphot=4.26	CEERS_19193 zphot=7.39	CEERS_37905 zphot=3.81	CEERS_11618 zphot=6.55	CEERS_63460 zphot=3.81
	States and second second	Statistics of the second second	A CONTRACTOR OF A CONTRACT OF	and the second second second second second	A REAL PROPERTY AND A REAL	Long to the second second second		the second second second second	

The colors in RGB images are associated with redshift ranges where bright emission lines fall within filters.

Redish galaxies are at *z*~ 6.63-7.68 where [OIII] falls in F410M.

![](_page_22_Figure_8.jpeg)

![](_page_23_Picture_0.jpeg)

We selected ~1500 galaxies that do not satisfy the color selection criteria with similar S/N. We clean the sample imposing than Kron radius >1.6 pix

#### **Higher fraction of high EWs in the sample of EELGs**

![](_page_23_Figure_3.jpeg)

![](_page_23_Figure_4.jpeg)

![](_page_23_Figure_5.jpeg)

## <u>Gas-phase metallicity</u>

![](_page_24_Figure_1.jpeg)

![](_page_24_Picture_2.jpeg)

We find sub-solar gasphase metallicities for the sample of EELGs based on the O32 calibration with a mean value of 26% solar.

They follow the MZR at z~3.3 which suggests they do not show different gas-phase metallicities than the general population of galaxies.

#### <u>fEELGs candidates (G</u> ties o

From v0.52 galfit catalog (McGrath et al. in prep.)

We only consider 488 sources with good fit quality (so-called Flag=0).

F200W: <4680A (rest-frame)

![](_page_25_Figure_4.jpeg)

![](_page_25_Picture_6.jpeg)