Title: CATARSIS: high-z observations and synergies

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Abstract: CATARSIS is the survey project for the 3.5m telescope at the Calar Alto Observatory behind its proposed new wide-field Integral Field Spectrograph, TARSIS (Tetra ARmed Super-Ifu Spectrograph; Gil de Paz et al., in this symposium) which has been selected by the board of the Calar Alto Observatory on July 3rd 2020 to move ahead to the Conceptual Design phase. With a field of view of ~3'x3', TARSIS will cover a wavelength range of 320-760 nm with R=1000-2000. The survey will carry out a magnitude limited (m_{AB}<22.0) spectroscopic survey over an area of 1 deg^2. CATARSIS aims at understanding the formation and evolution of galaxies in the cosmic web, studying both, the growth of large-scale structure and the galaxies in it (Sanchez-Blazquez et al. in this symposium).

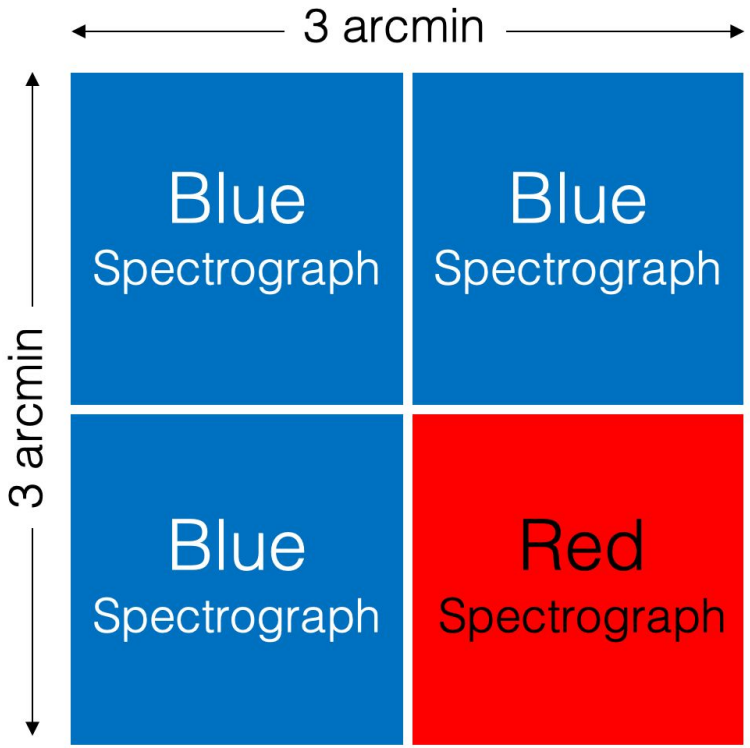
In this presentation I will describe the high redshift, z>1.5, opportunities that CATARSIS will provide thanks to the deep exposures and wavelength range to be explored such as the observation of Lyalpha at redshifts between 1.6<z<3.2. CATARSIS will allow us to study the nature of DLA, HeII and Lyα emitters and the intergalactic medium at the peak of cosmic star formation. Although these projects are normally carried out in large aperture telescopes, the reduce cosmic dimming at these redshifts and the efficiency of TARSIS make this project highly competitive.

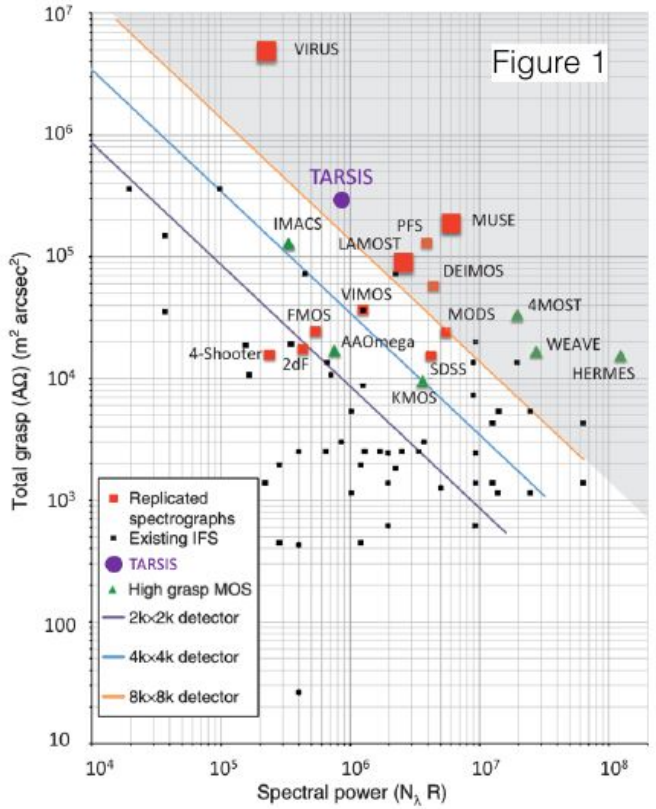
CATARSIS: high-z observations and synergies

- Blue: 320-520 nm & Red: 510-760 nm; FoV ≥ 8 arcmin^2; R>1000
- ~20 deep fields: ~8 hours in blue + ~2.5 hours in red

See Gil de Paz et al. in this symposium for more details about the spectrograph TARSIS

See Sanchez-Blazquez et al. in this symposium for more details on the z < 1 science goals of the survey





DESIGNED FOR LONG TRIPS WITH UNKNOWN DESTINIES...

CATARSIS: high-z observations and synergies

- Blue: 320-520 nm & Red: 510-760 nm; FoV ≥ 8 arcmin^2; R>1000
- ~20 deep fields: ~8 hours in blue + ~2.5 hours in red

→ Interesting unique high-z opportunities at z~1-3!

1) Young galaxies and the LF faint end from z~1-3

Lyman Alpha Emitters

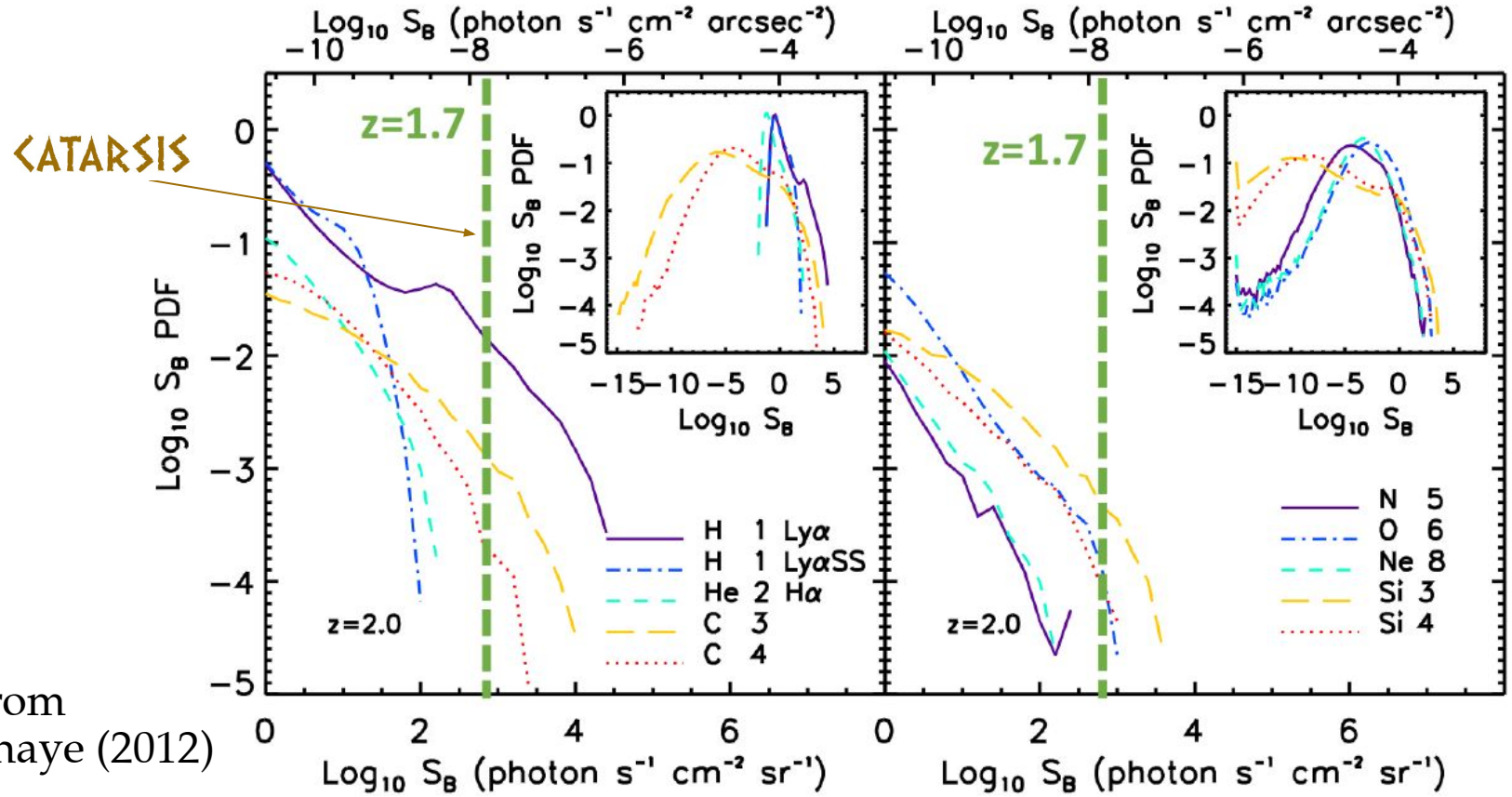
2) The Intergalactic and Circumgalactic Medium in emission

Lyman Alpha Blobs

Cold accretion and diffuse warm-hot gas

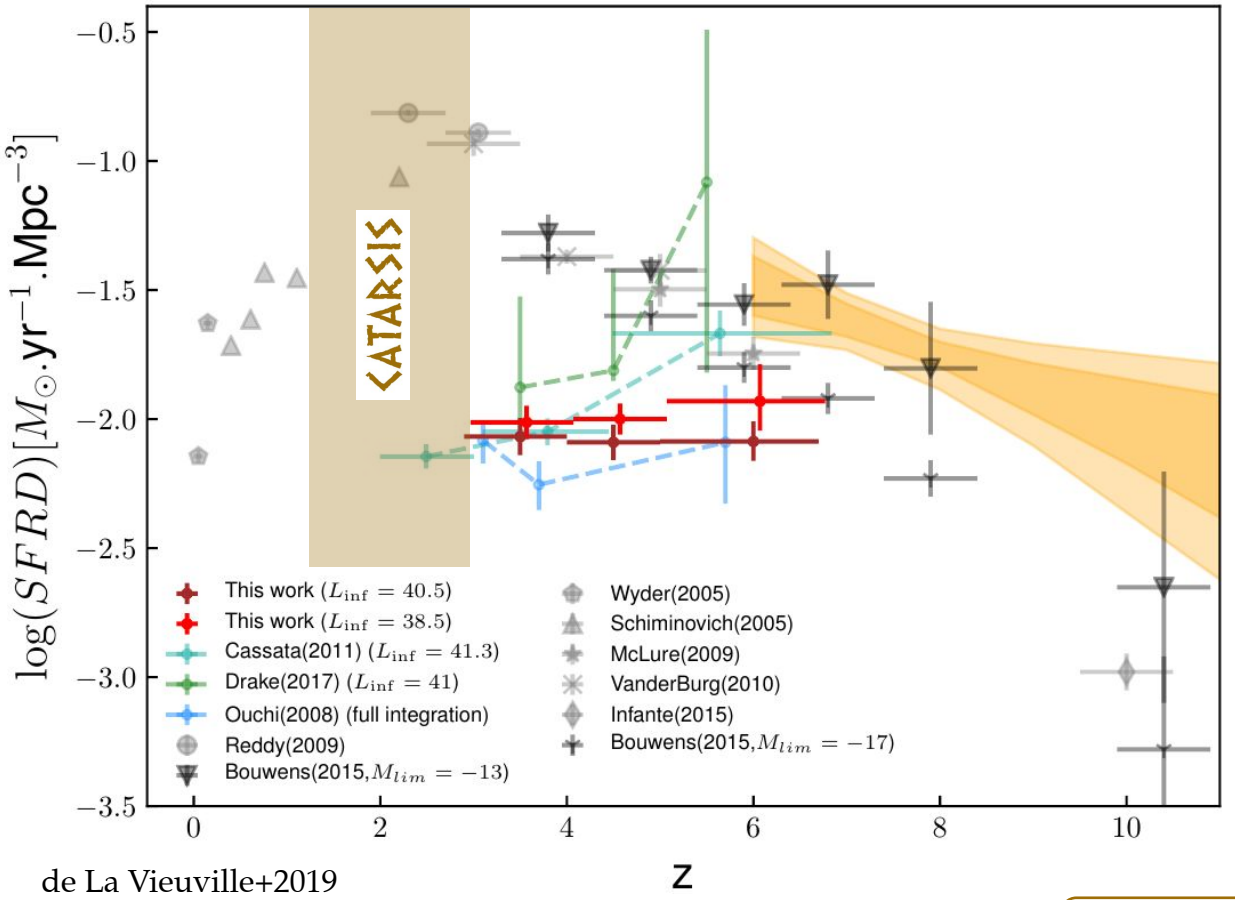
Counterparts of Damped Lyman-alpha Systems

The IGM/CGM in emission at z~1.7: Lyα, CIII, CIV, SiIII, SiIV, OVI



Predictions from Bertone & Schaye (2012)

Lyman Alpha Emitters: Expected over 200 counts per pointing (based on Garel+2016 model)



de La Vieuville+2019

Study at z~1.6-3

- Luminosity Function faint end
- Star Formation Rate Density
- Intersection LAE - LBG

Impact & prospects

LAE + the IGM/CGM in emission and absorption at 1.6<z<3

Line	λ (A)	BLUE		RED	
		z_{min}	z_{max}	z_{min}	z_{max}
OVI	1032	2.10	4.04	3.94	6.36
Lyα	1215	1.63	3.28	3.20	5.25
SiIII	1206	1.65	3.31	3.23	5.30
SiIV	1394,1403	1.30	2.70	2.66	4.42
CIV	1548,1551	1.07	2.35	2.29	3.90
MgII	2796,2803	0.14	0.86	0.83	1.72

+ DLA counterparts in emission, gas accretion in galaxies, galactic winds, absorption features from background sources, ...