15470 - SXDF308: challenging the Case-B assumption in Extreme Emission Line Galaxies

Cycle: 25, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) SXDF308	WFC3/UVIS	2	18-Dec-2018 10:00:46.0	yes
02	(1) SXDF308	COS/FUV COS/NUV	3	18-Dec-2018 10:00:48.0	yes

5 Total Orbits Used

ABSTRACT

We propose a comprehensive study of SXDF308, a compact, low-mass galaxy with extreme emission lines. The emission line spectrum of this objects shares many similarities with those of the most metal poor galaxies currently known (e.g., Skillman+2013) as well as with the Green Peas, the only galaxy population with confirmed substantial escape of Lyman Continuum ionizing radiation (Vanzella+2016, Izotov+2018, Jaskot+2018).

However, critically, the Balmer decrement (Halpha/Hbeta) measured from ground-based spectroscopy suggests that the common Case B assumption often invoked to interpret emission line spectra may not be valid in this object. A low Halpha/Hbeta ratio may in fact be a common feature of extreme emission line galaxies: 32 out of 41 Green Pea galaxies in the Yang+(2017) sample have Halpha/Hbeta ratio smaller than Case-B. If the Case B assumption does not apply to EELGs, then that most of the intrinsic physical properties determined for these galaxies are severely incorrect!

Here we request 3 orbits with COS-G140L and 2 orbits with WFC3-UVIS, with the goal of fully characterize: 1) the spatial distribution of the ionized gas and stars using the high resolution optical and UV WFCS/UVIS imaging, along with 2) the physical properties of the HII regions and the nature of the ionizing sources using COS FUV spectroscopy and thus, 3) confirm the validity and impact of the fundamental assumptions associated in the inference of physical properties of these galaxies.

OBSERVING DESCRIPTION

This project will obtain two orbits of WFC3+UVIS multiband imaging of SXDF308.
We will image the target in the F275W, F336W, F438W broad band filters and in the F547M, F621M, F689M and F763M medium band filters. To reduce overhead and minimize CTE effects we use the UVIS-C512C-SUB aperture for imaging. We add a POST-FLASH flux to each exposure, to ensure a minimum charge packet of 12 electrons (http://www.stsci.edu/hst/wfc3/ins_performance/CTE). The POST-FLASH was computed using the ETC.

We will also observe the target for three orbits, with COS-G140L. We have added a time constraint to the COS visit, to observe it after the WFC3-UVIS visit has been executed. Once the UVIS observations are conducted we
will immediately obtain the images from MAST, process them, and make the size and flux measurements in the F275W, to opitmize the exposure time of the COS acquisition image. We'll use ACQ/IMAGE for target acquisition, and then do four exposures of spectroscopy in the G140L grating with CENWAVE=1280. We'll use FP-POS = ALL to best remove fixed pattern noise.

Visit

Proposal 15470, Imaging (01), completed Tue Dec 18 15:00:48 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Diagnostics

(Imaging (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Imaging (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1-7)

Fixed Targets

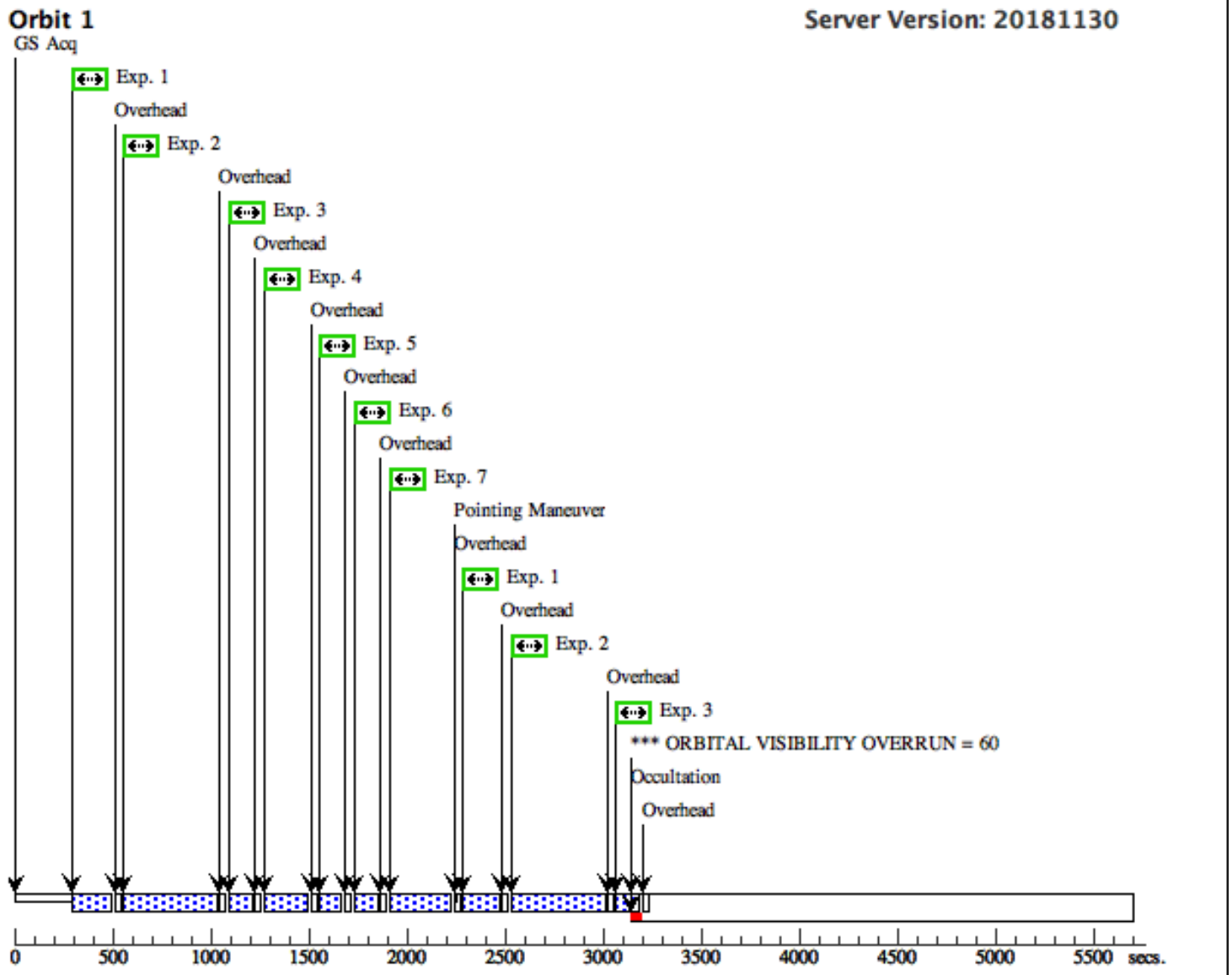
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SXDF308	RA: 02 19 12.8590 (34.8035792d) Dec: -04 30 17.65 (-4.50490d) Equinox: J2000		V=20.05+/-0.01	Reference Frame: ICRS

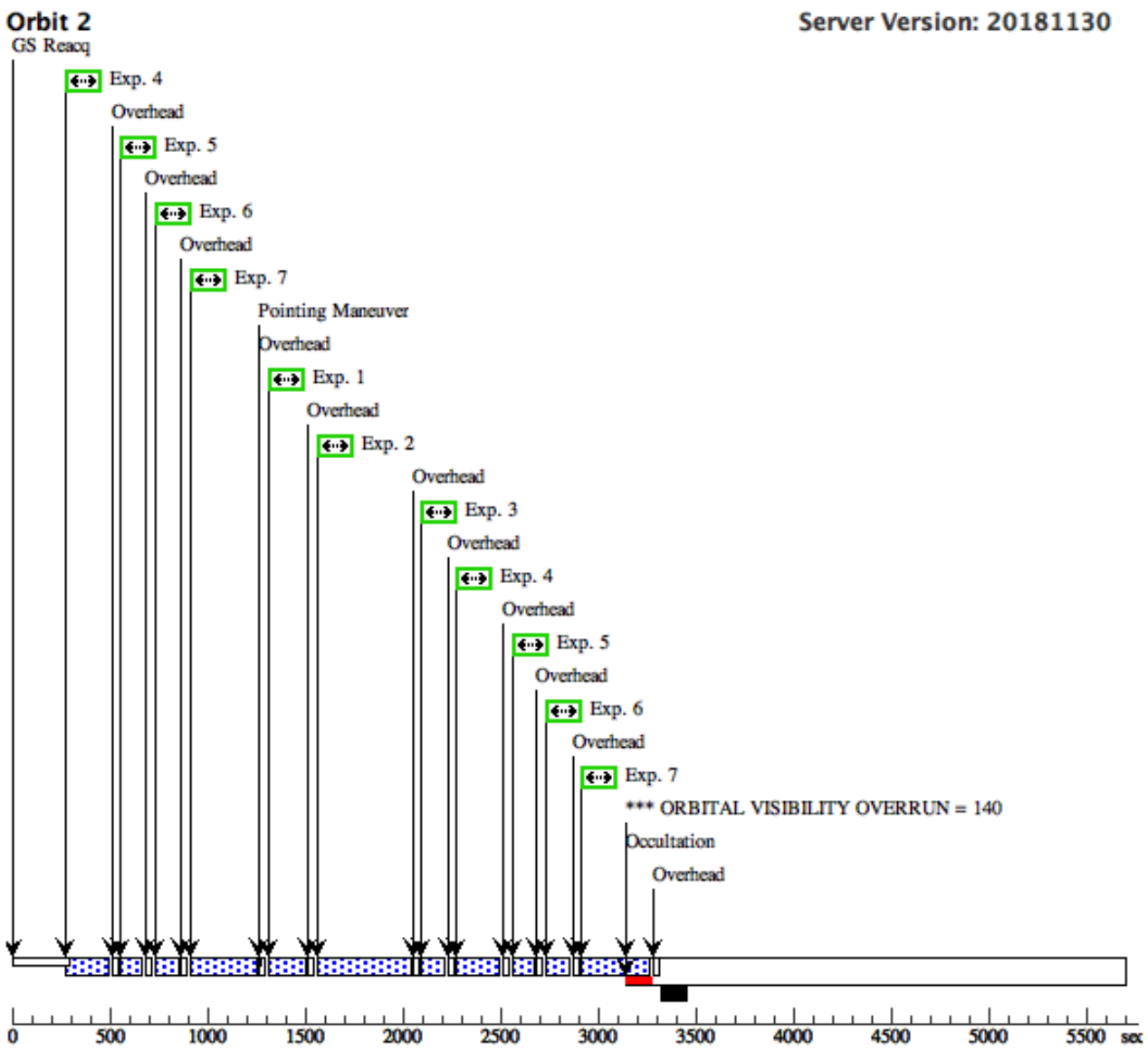
Comments:
Category=ISM
Description=[HII REGION]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F621M (WFC3UVIS.im.1166013)	(1) SXDF308	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F621M	FLASH=9		Pattern 1, Exps 1-7 in Imaging (01) (1)	170 Secs (510 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	
								[==>(Pattern 3)]	***[2]***
Comments: The ETC link shows how we determined the POST-FLASH value: we assumed a source with a magnitude of 40, to ensure only background flux was present.									
2	F275W (WFC3UVIS.im.1166024)	(1) SXDF308	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F275W	FLASH=11		Pattern 1, Exps 1-7 in Imaging (01) (1)	450 Secs (1350 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>450.0 Secs (Pattern 2)]	
								[==>(Pattern 3)]	***[2]***
Comments: The ETC link shows how we determined the POST-FLASH value: we assumed a source with a magnitude of 40, to ensure only background flux was present.									
3	F547M (WFC3UVIS.im.1166027)	(1) SXDF308	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F547M	FLASH=11		Pattern 1, Exps 1-7 in Imaging (01) (1)	100 Secs (300 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	
								[==>(Pattern 3)]	***[2]***
Comments: The ETC link shows how we determined the POST-FLASH value: we assumed a source with a magnitude of 40, to ensure only background flux was present.									
4	F438W (WFC3UVIS.im.1166084)	(1) SXDF308	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F438W	FLASH=11		Pattern 1, Exps 1-7 in Imaging (01) (1)	200 Secs (600 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	***[2]***
								[==>(Pattern 3)]	
5	F763M (WFC3UVIS.im.1166087)	(1) SXDF308	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F763M	FLASH=11		Pattern 1, Exps 1-7 in Imaging (01) (1)	100 Secs (300 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	***[2]***
								[==>(Pattern 3)]	
6	F689M (WFC3UVIS.im.1166088)	(1) SXDF308	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F689M	FLASH=11		Pattern 1, Exps 1-7 in Imaging (01) (1)	100 Secs (300 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	***[2]***
								[==>(Pattern 3)]	
7	F336W (WFC3UVIS.im.1166092)	(1) SXDF308	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F336W	FLASH=11		Pattern 1, Exps 1-7 in Imaging (01) (1)	260 Secs (909 Secs)	
								[==>280.0 Secs (Pattern 1)]	***[1]***
								[==>310.0 Secs (Pattern 2)]	***[2]***
								[==>319.0 Secs (Pattern 3)]	

Orbit Structure

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Server Version: 20181130
GS Reacq
Exp. 4
Overhead
Exp. 5
Overhead
Exp. 6
Overhead
Exp. 7
Pointing Maneuver
Overhead
Exp. 1
Overhead
Exp. 2
Overhead
Exp. 3
Overhead
Exp. 4
Overhead
Exp. 5
Overhead
Exp. 6
Overhead
Exp. 7
*** ORBITAL VISIBILITY OVERRUN = 140
Occultation
Overhead
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15470, Spectroscopy (02), implementation Tue Dec 18 15:00:49 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SXDF308	RA: 02 19 12.8590 (34.8035792d) Dec: -04 30 17.65 (-4.50490d) Equinox: J2000		V=20.05+/-0.01	Reference Frame: ICRS

Comments:
Category=ISM
Description=[HII REGION]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (COS.ta.1166100)	(1) SXDF308	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				100 Secs (100 Secs) *[==>]*	***[1]***
2	SCI (COS.sp.1164818)	(1) SXDF308	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FP-POS=ALL; BUFFER-TIME=22000; FLASH=YES; SEGMENT=BOTH			1395 Secs (7736 Secs) *[==>2290.0 Secs (Split 1)]* *[==>1335.0 Secs (Split 2)]* *[==>1335.0 Secs (Split 3)]* *[==>2776.0 Secs (Split 4)]*	 ***[1]*** ***[2]*** ***[3]***

Orbit Structure