



# 15418 - Probing spatially variable Lyman-continuum escape from the brightest lensed galaxy in the universe

Cycle: 25, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

## INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
<b>Dr. Haakon Dahle (PI) (ESA Member) (Contact )</b>	<b>University of Oslo</b>	<b>hdahle@astro.uio.no</b>
Dr. Matthew Bayliss (CoI) (AdminUSPI)	Massachusetts Institute of Technology	mbbayliss@gmail.com
Dr. Jane R. Rigby (CoI)	NASA Goddard Space Flight Center	jane.rigby@nasa.gov
Prof. Michael D. Gladders (CoI)	University of Chicago	gladders@oddjob.uchicago.edu
Prof. Keren Sharon (CoI)	University of Michigan	kerens@umich.edu
Dr. T. Emil Rivera-Thorsen (CoI) (ESA Member)	University of Oslo	emil.rivera-thorsen@astro.uio.no
Ms. Traci Lin Johnson (CoI)	University of Michigan	tljohn@umich.edu
Max Gronke (CoI) (ESA Member)	University of Oslo	max.groenke@gmail.com

## VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) PSZ1G311.65-18.48	WFC3/UVIS	2	13-Dec-2017 13:00:13.0	yes
02	(1) PSZ1G311.65-18.48	WFC3/UVIS	1	13-Dec-2017 13:00:14.0	yes

3 Total Orbits Used

## **ABSTRACT**

Recent Magellan spectra of a strongly gravitationally lensed starburst galaxy at  $z=2.4$  show clear evidence of direct escape of Lyman-alpha photons through a riddled neutral medium. The observed Lyman-alpha line profile has been theoretically predicted, but never unambiguously seen so far, and it is considered to be a smoking gun for the escape of Lyman-continuum photons from star-forming galaxies.

The unique Lyman-alpha line profile, in addition to the unique brightness and apparent angular size of the strongly lensed galaxy, makes it an instantly compelling target for direct detection of LyC photons, utilizing the UV capabilities of HST while they are still available. We propose WFC3/UVIS F275W-band imaging to directly reveal the spatial distribution of the escape of ionizing photons. Coupled with scheduled Cycle 25 HST imaging and grism spectroscopy at longer wavelengths, this will reveal the physical conditions for Lyman continuum leakage, across  $\sim 4000$  resolution elements at  $<100$ pc resolution.

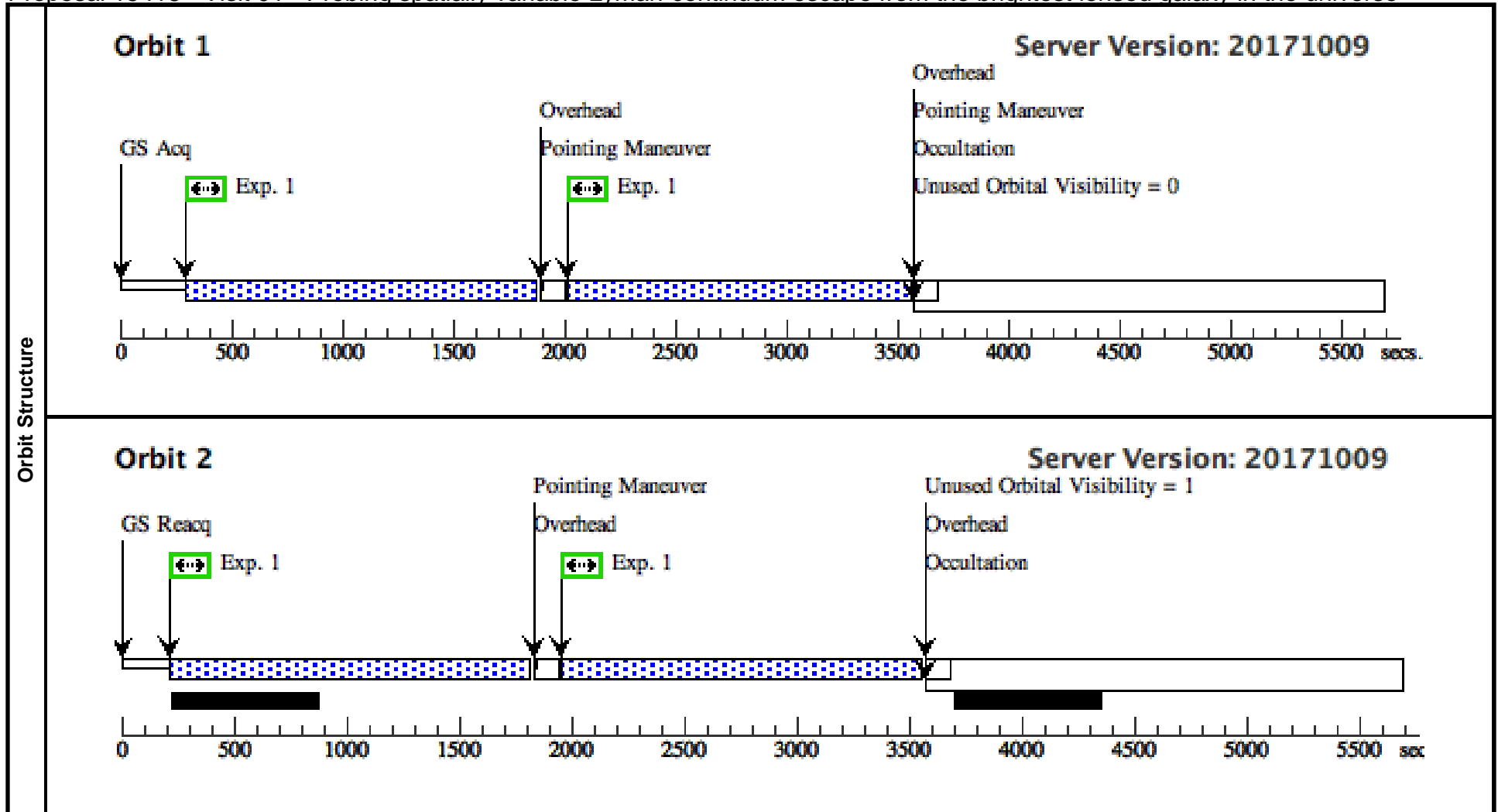
## **OBSERVING DESCRIPTION**

We have been allocated 3 orbits for WFC3/UVIS imaging in the F275W filter. We split the allocation into two visits, of two and one orbits, respectively, to improve schedulability. No a priori restriction is given on roll angle, but the roll angle should be the same for both visits. Two exposures are made during each orbit, with dither offsets to ensure that the gap between the chips in a given exposure is always covered by the five other exposures. Postflash of 8 electrons is applied to ensure a background level of 12 electrons to mitigate CTE losses.

Proposal 15418 - Visit 01 - Probing spatially variable Lyman-continuum escape from the brightest lensed galaxy in the universe

Wed Dec 13 18:00:14 GMT 2017

Visit	<b>Proposal 15418, Visit 01</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/UVIS Special Requirements: (none)										
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures		
		(1)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=4 Point Spacing=2.5 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false					(1)		
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(1)	PSZ1G311.65-18.48	RA: 15 50 7.0000 (237.5291667d) Dec: -78 11 32.00 (-78.19222d) Equinox: J2000			V=17.8+/-0.1 R=17.82, z=17.38, J=16.75, Ks=15.43 (Vega)	Reference Frame: ICRS				
	<i>Comments:</i> Category=GALAXY Description=[GRAVITATIONAL LENS, HIGH REDSHIFT GALAXY, STARBURST]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1		(1) PSZ1G311.65-18.48	WFC3/UVIS, ACCUM, UVIS-FIX	F275W	FLASH=8	POS TARG 0.0,0.0	Pattern 1, Exps 1-1 in Visit 01 (1)	1564 Secs (6318 Secs)		
								[=>1552.0 Secs (Pattern 1)]		[1]	
								[=>1552.0 Secs (Pattern 2)]			
								[=>1607.0 Secs (Pattern 3)]		[2]	
								[=>1607.0 Secs (Pattern 4)]			



Proposal 15418 - Visit 02 - Probing spatially variable Lyman-continuum escape from the brightest lensed galaxy in the universe

Wed Dec 13 18:00:15 GMT 2017

<b>Visit</b>	<b>Proposal 15418, Visit 02</b>		
	<b>Diagnostic Status: No Diagnostics</b>		
	Scientific Instruments: WFC3/UVIS		
	Special Requirements: SAME ORIENT AS 01		

<b>Patterns</b>	#	Primary Pattern	Secondary Pattern	Exposures
	(2)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=2.5 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1)

<b>Fixed Targets</b>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	PSZ1G311.65-18.48	RA: 15 50 7.0000 (237.5291667d) Dec: -78 11 32.00 (-78.19222d) Equinox: J2000		V=17.8+/-0.1 R=17.82, z=17.38, J=16.75, Ks=15.43 (Vega)	Reference Frame: ICRS
	<i>Comments:</i> Category=GALAXY Description=[GRAVITATIONAL LENS, HIGH REDSHIFT GALAXY, STARBURST]					

<b>Exposures</b>	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(1) PSZ1G311.65-18.48	WFC3/UVIS, ACCUM, UVIS-FIX	F275W	FLASH=8	POS TARG 0.4,8	Pattern 2, Exps 1-1 in Visit 02 (2)	1564 Secs (3104 Secs)	
									[==>1552.0 Secs (Pattern 1)]	
									[==>1552.0 Secs (Pattern 2)]	[1]

