



17286 - Unveiling the origin and nature of the UV-brightest Lyman continuum emitting star-forming galaxy

Cycle: 30, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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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) J1316	WFC3/UVIS	2	03-Feb-2023 13:00:15.0	yes
03	(1) J1316	ACS/WFC	1	03-Feb-2023 13:00:15.0	yes
04	(1) J1316	WFC3/UVIS	1	03-Feb-2023 13:00:16.0	yes
05	(1) J1316	WFC3/IR	1	03-Feb-2023 13:00:16.0	yes

5 Total Orbits Used

ABSTRACT

J1316+2614 at $z=3.613$ was recently discovered as the UV-brightest star-forming galaxy and also the strongest Lyman continuum (LyC, with energies >13.6 eV) emitter ever detected. 1316+2614 also shows other outstanding properties, including possible "exotic" stellar populations and

massive inflowing gas, hinting at a new, very efficient mode of star formation. These unexpected results challenge our understanding of the LyC escape in UV-bright galaxies, and of the potential role these sources may play in cosmic reionization. Furthermore, unusually bright galaxies are now being discovered at very high-redshifts with the James Webb, stressing the need to urgently understand the nature of such sources.

The exceptional properties of J1316+2614 call for rapid follow-up observations. Here we request Hubble Space Telescope high-resolution imaging of J1316+2614 for the morphological characterization of the LyC emitting regions, ionizing source, inflowing gas, and the elusive old stellar population. The requested observations will uncover some of the most important, but still open questions raised by this exceptional source, including those related to its origin and nature.

OBSERVING DESCRIPTION

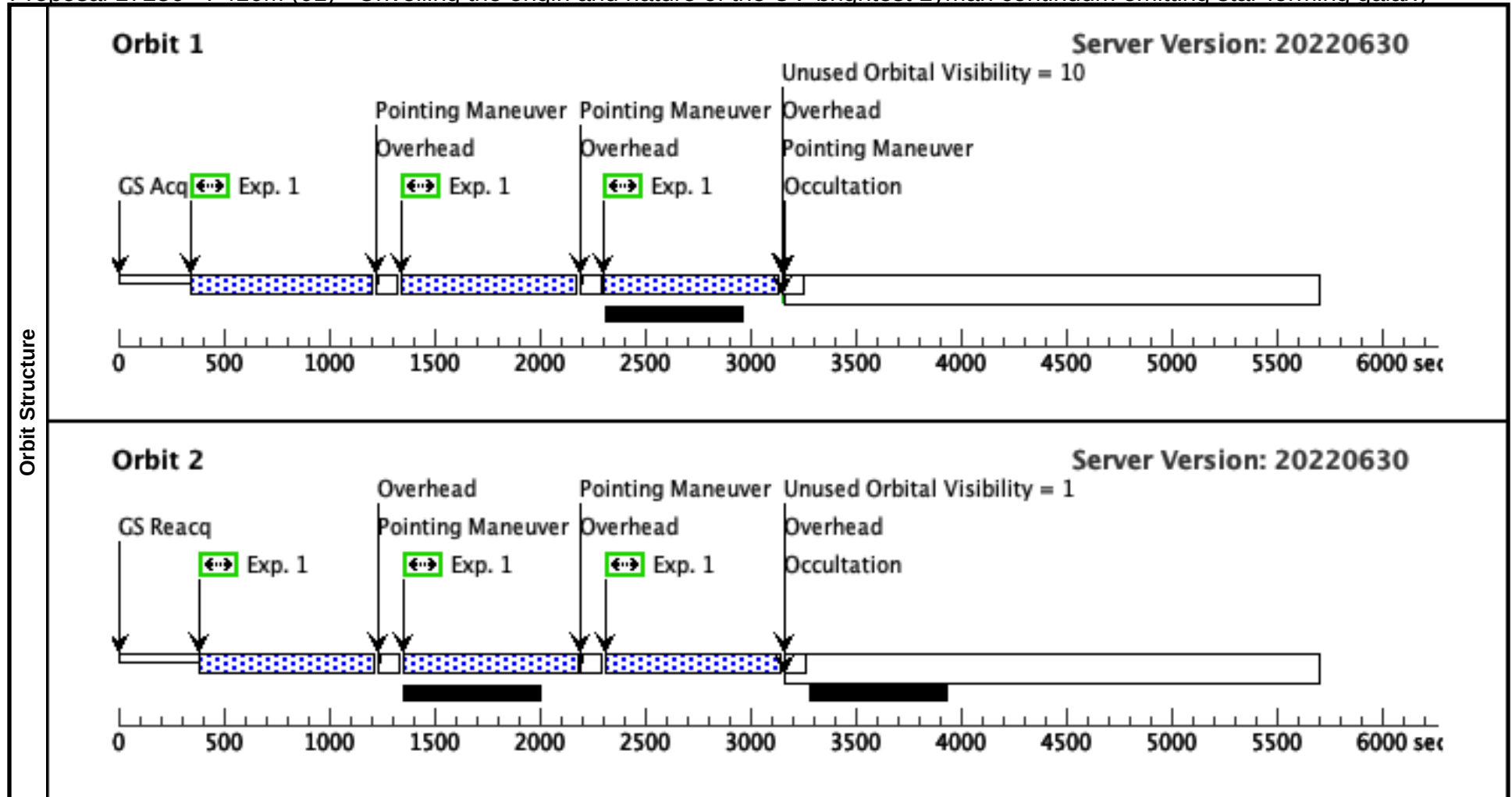
This program uses four different filters to obtain rest-frame UV emission (ionizing and non-ionizing emission with the WFC3/UVIS F410M and F775W filters, respectively), map the LyA emission (with the ACS/WFC ramp filter FR551N), and rest-optical emission (WFC3/IR F160W) of a bright Lyman continuum emitter at $z=3.613$.

F410M observations (2 orbits, 1 visit) use a dither-line pattern with 6 points for cosmic rays removal. A post-flash of 14e- is required to reach a sufficient background level. For F775W (1 orbit) we use the standard 4-point box pattern. F775W requires a post-flash of 6e- due to 4 exposures in the 1 orbit to obtain a very clean image. FR551N (1 orbit) uses a standard 4-point box pattern, but no post-flash is required in this case. The central wavelength of FR551N is set to 5604Å (LyA emission at $z=3.613$). F160W (1 orbit) uses also the standard 4-point box pattern.

For WFC3/UVIS F775W, the target is placed at Aperture='UVIS'. For WFC3/UVIS F410M the target is placed at Aperture='UVIS-C1K1C-CTE' with a specific orient range to avoid placing a bright star on the detector. For WFC3/IR F160W we use Aperture='IR' without any special requirement for orientation.

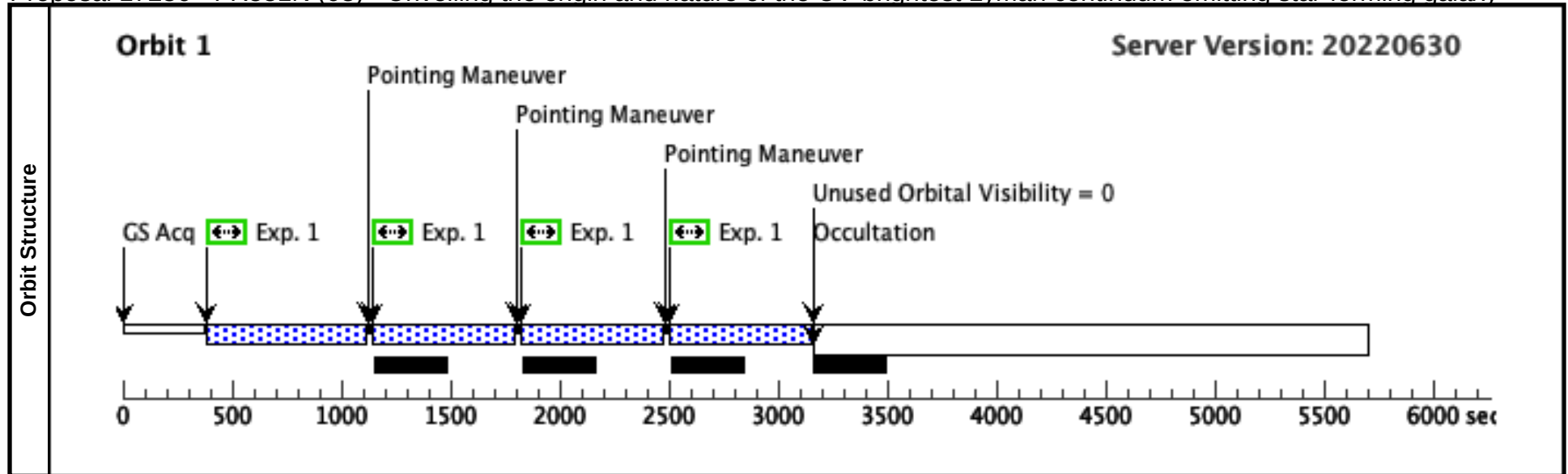
Proposal 17286 - F410M (01) - Unveiling the origin and nature of the UV-brightest Lyman continuum emitting star-forming galaxy

Visit	Proposal 17286, F410M (01), implementation										Fri Feb 03 18:00:17 GMT 2023	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: WFC3/UVIS											
	Special Requirements: ORIENT 31D TO 320 D											
Patterns	#	Primary Pattern					Secondary Pattern				Exposures	
	(1)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=6 Point Spacing=0.145 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)	J1316	RA: 13 16 29.6100 (199.1233750d) Dec: +26 14 7.05 (26.23529d) Equinox: J2000			Redshift: 3.613		V=21.2+/-0.10 R=21.2		Reference Frame: ICRS		
	Comments: Category=GALAXY Description=[HIGH REDSHIFT GALAXY]											
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1		(1) J1316	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F410M	FLASH=14		Pattern 1, Exps 1-1 in F410M (01) (1)	834 Secs (5004 Secs)			
									[==>(Pattern 1)]			
									[==>(Pattern 2)]		[1]	
									[==>(Pattern 3)]			
									[==>(Pattern 4)]			
								[==>(Pattern 5)]		[2]		
								[==>(Pattern 6)]				



Proposal 17286 - FR551N (03) - Unveiling the origin and nature of the UV-brightest Lyman continuum emitting star-forming galaxy

Visit	Proposal 17286, FR551N (03), implementation										Fri Feb 03 18:00:17 GMT 2023		
	Diagnostic Status: Warning												
	Scientific Instruments: ACS/WFC												
	Special Requirements: (none)												
Diagnostics	(Exposure 1 (Pattern 2, Exps 1-1 in FR551N (03))) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.												
Patterns	#	Primary Pattern					Secondary Pattern					Exposures	
	(2)	Pattern Type=ACS-WFC-DITHER-BOX Coordinate Frame=POS-TARG Pattern Orientation=20.7 Purpose=DITHER Angle Between Sides=69.02 Number Of Points=4 Center Pattern=false Point Spacing=0.2637 Line Spacing=0.1856										(1)	
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(1)	J1316		RA: 13 16 29.6100 (199.1233750d) Dec: +26 14 7.05 (26.23529d) Equinox: J2000		Redshift: 3.613		V=21.2+/-0.10 R=21.2		Reference Frame: ICRS			
	Comments:												
	Category=GALAXY												
Exposures	Description=[HIGH REDSHIFT GALAXY]												
	#	Label	Target	Config,Mode,Aperture		Spectral Els.		Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1		(1) J1316	ACS/WFC, ACCUM, WFC1-IRAMP		FR551N 5604 A				Pattern 2, Exps 1-1 in FR551N (03) (2)	522 Secs (2088 Secs)		
											[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]		[1]



Proposal 17286 - F775W (04) - Unveiling the origin and nature of the UV-brightest Lyman continuum emitting star-forming galaxy

Visit	Proposal 17286, F775W (04), implementation Fri Feb 03 18:00:17 GMT 2023				
	Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: (none)				
Patterns	#	Primary Pattern		Secondary Pattern	Exposures
	(4)	Pattern Type=WFC3-UVIS-DITHER-BOX Coordinate Frame=POS-TARG Pattern Orientation=23.884 Purpose=DITHER Angle Between Sides=81.785 Number Of Points=4 Center Pattern=false Point Spacing=1.5 Line Spacing=1.5			(1)
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes
	(1)	J1316	RA: 13 16 29.6100 (199.1233750d) Dec: +26 14 7.05 (26.23529d) Equinox: J2000	Redshift: 3.613	V=21.2+/-0.10 R=21.2
	Comments: Category=GALAXY Description=[HIGH REDSHIFT GALAXY]				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.
	1	(1) J1316		WFC3/UVIS, ACCUM, UVIS	F775W
				Opt. Params.	FLASH=6
				Special Reqs.	
				Groups	Pattern 4, Exps 1-1 in F775W (04) (4)
				Exp. Time (Total)/[Actual Dur.]	593 Secs (2372 Secs)
					[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]
				Orbit	[1]
Orbit Structure	Orbit 1 Server Version: 20220630				

Proposal 17286 - F160W (05) - Unveiling the origin and nature of the UV-brightest Lyman continuum emitting star-forming galaxy

Visit	Proposal 17286, F160W (05), implementation Fri Feb 03 18:00:17 GMT 2023				
	Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: (none)				
Patterns	#	Primary Pattern		Secondary Pattern	Exposures
	(3)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=1.75 Line Spacing=1.75		Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false	(1)
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes
	(1)	J1316	RA: 13 16 29.6100 (199.1233750d) Dec: +26 14 7.05 (26.23529d) Equinox: J2000	Redshift: 3.613	V=21.2+/-0.10 R=21.2
	Comments: Category=GALAXY Description=[HIGH REDSHIFT GALAXY]				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.
	1	(1) J1316		WFC3/IR, MULTIACCUM, IR	F160W
				Opt. Params.	Special Reqs.
				NSAMP=13; SAMP-SEQ=SPAR S50	
				Groups	Exp. Time (Total)/[Actual Dur.]
				Pattern 3, Exps 1-1 in F160W (05) (3)	602.937703 Secs (2411.751 Secs)
					[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]
					[1]
Orbit Structure	Orbit 1 Server Version: 20220630				