



15185 - Extreme Wolf-Rayet Galaxies with HST/COS: Understanding CIII Emission in the Reionization Era

Cycle: 25, Proposal Category: GO

(UV Initiative)

(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) SDSSJ011533.82-005131.2	COS/FUV COS/NUV	2	06-Dec-2018 19:02:28.0	yes
02	(2) SDSSJ113235.35+141129.8	COS/FUV COS/NUV	2	06-Dec-2018 19:02:29.0	yes
03	(3) SDSSJ115002.73+150123.5	COS/FUV COS/NUV	2	06-Dec-2018 19:02:31.0	yes
04	(4) SDSSJ130432.27-033322.1	COS/FUV COS/NUV	2	06-Dec-2018 19:02:32.0	yes

<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>
05	(5) SDSSJ131447.37+345259.8	COS/FUV COS/NUV	2	06-Dec-2018 19:02:34.0	yes
06	(6) SDSSJ143248.36+095257.1	COS/FUV COS/NUV	2	06-Dec-2018 19:02:35.0	yes
07	(7) SDSSJ144805.38-011057.7	COS/FUV COS/NUV	2	06-Dec-2018 19:02:36.0	yes
09	(7) SDSSJ144805.38-011057.7	COS/FUV COS/NUV	2	06-Dec-2018 19:02:38.0	yes
08	(3) SDSSJ115002.73+150123.5	COS/FUV COS/NUV	1	06-Dec-2018 19:02:39.0	yes

17 Total Orbits Used

ABSTRACT

The first deep spectra of reionization-era galaxies have revealed strong UV nebular emission in high-ionization lines. This is in striking contrast to massive galaxies at lower redshifts, where emission from CIII], OIII], HeII, and CIV is rarely seen. These lines will likely be the only probe available for the most distant galaxies JWST will detect; but we are still unprepared to interpret them. Modeling predicts that intense UV nebular emission can only be produced below a tenth solar metallicity. However, recent HST/COS observations of local galaxies suggest that extreme populations of Wolf-Rayet (WR) stars, the hot exposed cores of massive O stars, may be capable of powering CIII] at metallicities as high as a half-solar. If these moderately metal-poor extreme WR galaxies are indeed a viable source of strong CIII] emission, our interpretation of CIII] detections in the reionization era will be dramatically altered; but we presently have sufficient UV coverage for only three examples. Here, we propose HST/COS G160M and G185M observations of an additional seven extreme WR galaxies spanning 0.5 dex in metallicity around half-solar. These observations will constrain the maximum CIII] equivalent width these galaxies can power as a function of metallicity. The moderate resolution gratings will robustly characterize the massive O and WR star populations, allowing us to link the nebular emission directly to the massive stars responsible. These data will provide a stringent test for the population synthesis codes which will be applied to JWST observations. Without this empirical baseline, our understanding of the most distant galaxies JWST finds will be severely limited.

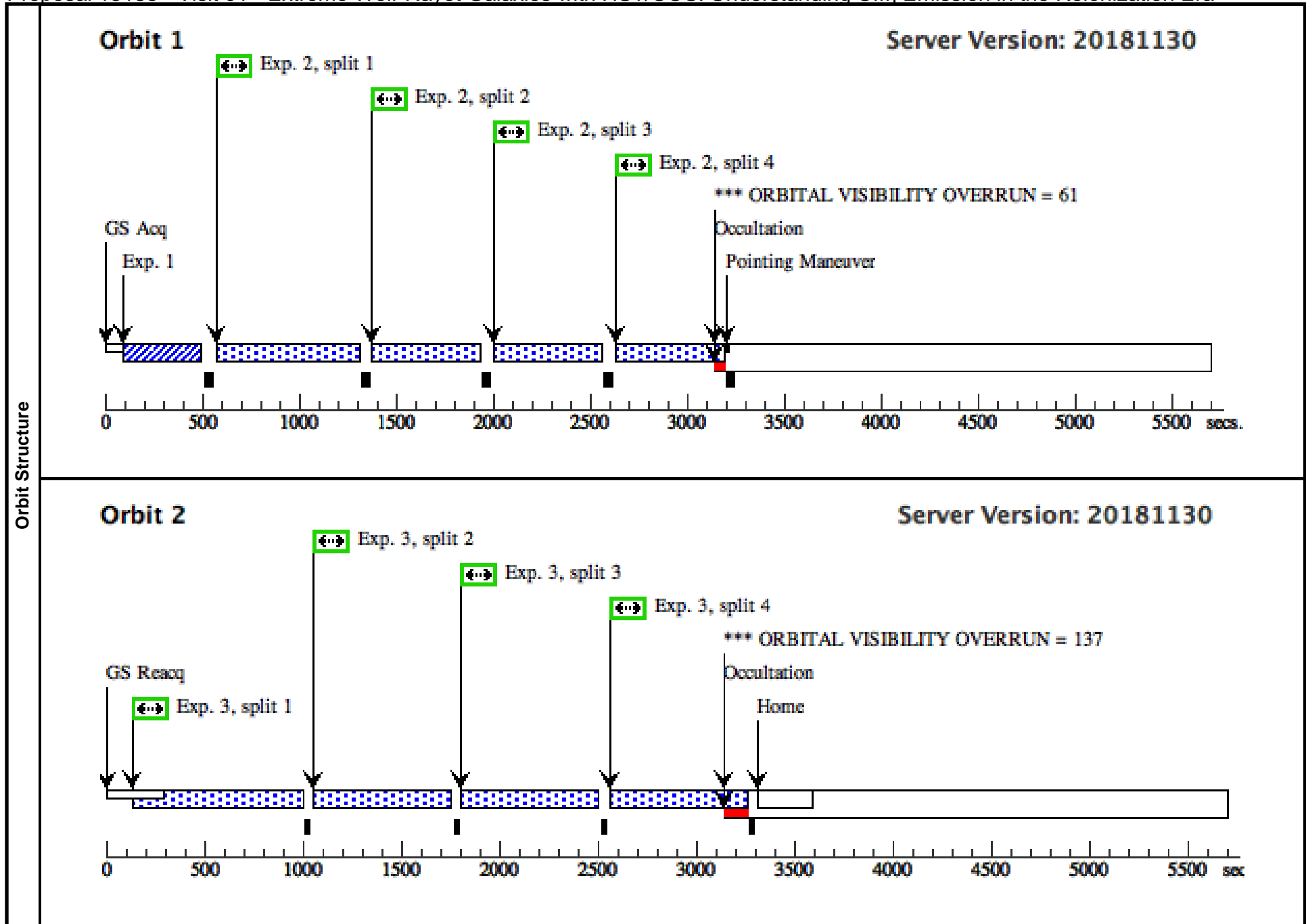
OBSERVING DESCRIPTION

We will obtain medium-resolution FUV+NUV COS spectroscopy for seven metal poor star-forming regions in nearby galaxies with prominent optical signatures of Wolf-Rayet stars and nebular HeII emission. The targets were additionally selected to have a compact morphology and SDSS u-band magnitudes brighter than 18.5 AB. ICRS coordinates and u-band magnitudes were derived from SDSS imaging. The galaxies will be acquired using COS/NUV ACQ/IMAGE mode. Motivated by our results from previous COS observations of similar sources, exposure times were computed using the SDSS 3 arcsecond u-band aperture magnitudes assuming an approximately point-like distribution at COS resolution and a flat continuum in F_{ν} out to the UV. Target acquisition exposures are computed with target signal to noise ratio of 40; in cases where the ETC indicated that a perfectly point-like flux distribution with this magnitude would yield per-pixel count rates over the bright limit, we utilize Mirror B. After acquisition, each source will be observed with the G160M and G185M gratings. The central wavelength of both gratings has been chosen to place the target emission lines and stellar features into the observable bandpass given the known redshift of each target from SDSS. Exposures will be taken in the TIME-TAG mode with four focal plane positions per setting. Based upon the ETC calculations and our previous COS observations, we expect the total integration time in each grating to deliver $S/N > 4$ per bin of 3 resolution elements, sufficient to measure the equivalent widths of the target nebular and stellar features.

Proposal 15185 - Visit 01 - Extreme Wolf-Rayet Galaxies with HST/COS: Understanding CIII] Emission in the Reionization Era

Fri Dec 07 00:02:40 GMT 2018

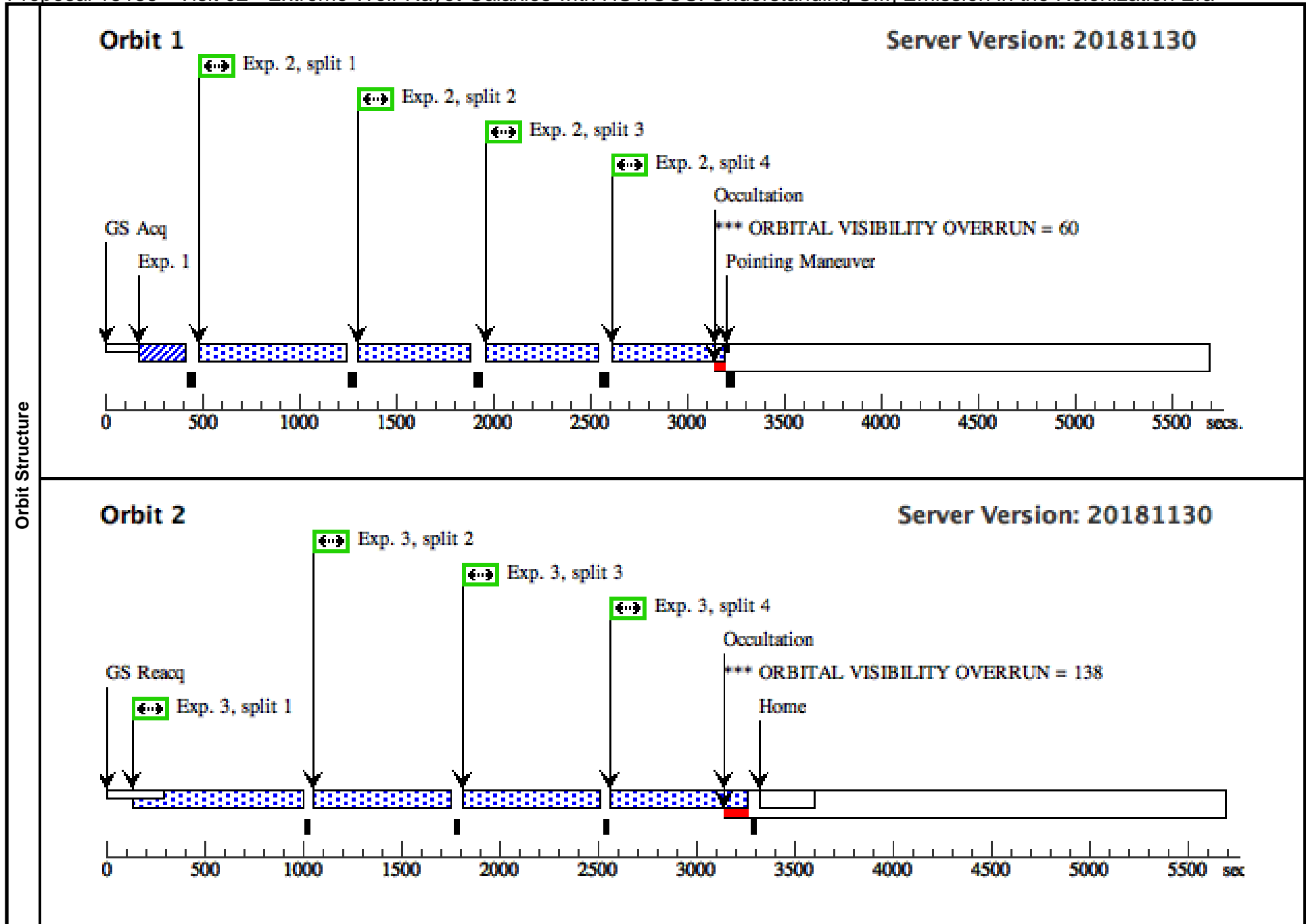
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Diagnosics										
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	SDSSJ011533.82-005131.2	RA: 01 15 33.8200 (18.8909167d) Dec: -00 51 31.17 (-.85866d) Equinox: J2000	Redshift: 0.00556	V=17.3+/-0.2	Reference Frame: ICRS				
Comments: Category=GALAXY Description=[STAR FORMING 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	(COS.ta.100 7613)	(1) SDSSJ011533.82-005131.2	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				55 Secs (55 Secs)	
									[==>]	[1]
	2	(COS.sp.100 7617)	(1) SDSSJ011533.82-005131.2	COS/NUV, TIME-TAG, PSA	G185M 1921 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=17 79			540 Secs (2160 Secs)	
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3	(COS.sp.100 7625)	(1) SDSSJ011533.82-005131.2	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=10 513			649 Secs (2596 Secs)		
								[==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[2]	



Proposal 15185 - Visit 02 - Extreme Wolf-Rayet Galaxies with HST/COS: Understanding CIII] Emission in the Reionization Era

Fri Dec 07 00:02:40 GMT 2018

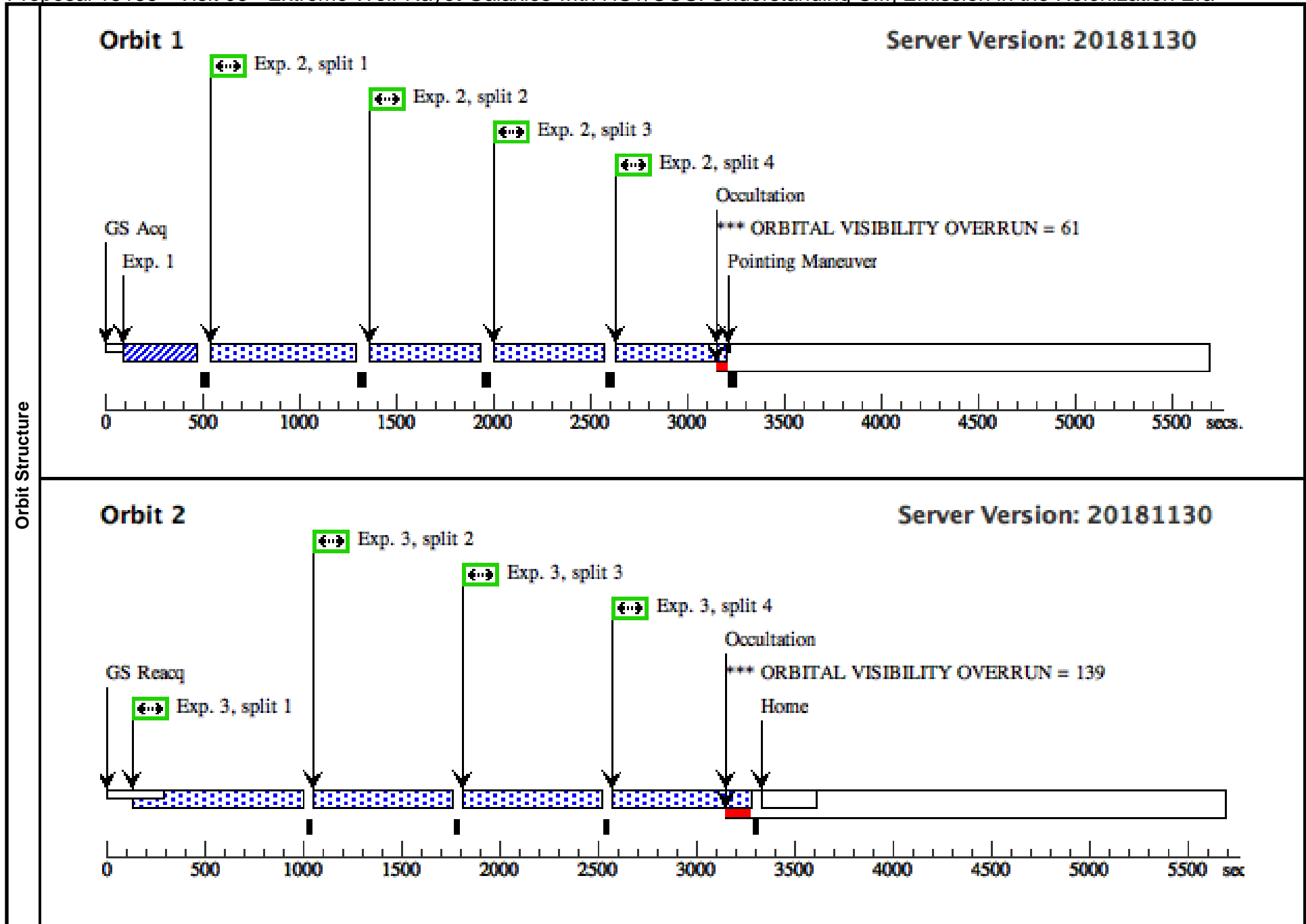
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Diagnosics										
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(2)	SDSSJ113235.35+141129.8	RA: 11 32 35.3500 (173.1472917d) Dec: +14 11 29.83 (14.19162d) Equinox: J2000	Redshift: 0.01764	V=18.4+/-0.2	Reference Frame: ICRS				
Comments: Category=GALAXY Description=[STAR FORMING 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	(COS.ta.100 7630)	(2) SDSSJ113235.35 +141129.8	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				9 Secs (9 Secs)	
									[==>]	[1]
	2	(COS.sp.100 7642)	(2) SDSSJ113235.35 +141129.8	COS/NUV, TIME-TAG, PSA	G185M 1941 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=1806			566 Secs (2264 Secs)	
								[==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[1]	
3	(COS.sp.100 7646)	(2) SDSSJ113235.35 +141129.8	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=17227			651 Secs (2604 Secs)		
								[==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[2]	



Proposal 15185 - Visit 03 - Extreme Wolf-Rayet Galaxies with HST/COS: Understanding CIII] Emission in the Reionization Era

Fri Dec 07 00:02:40 GMT 2018

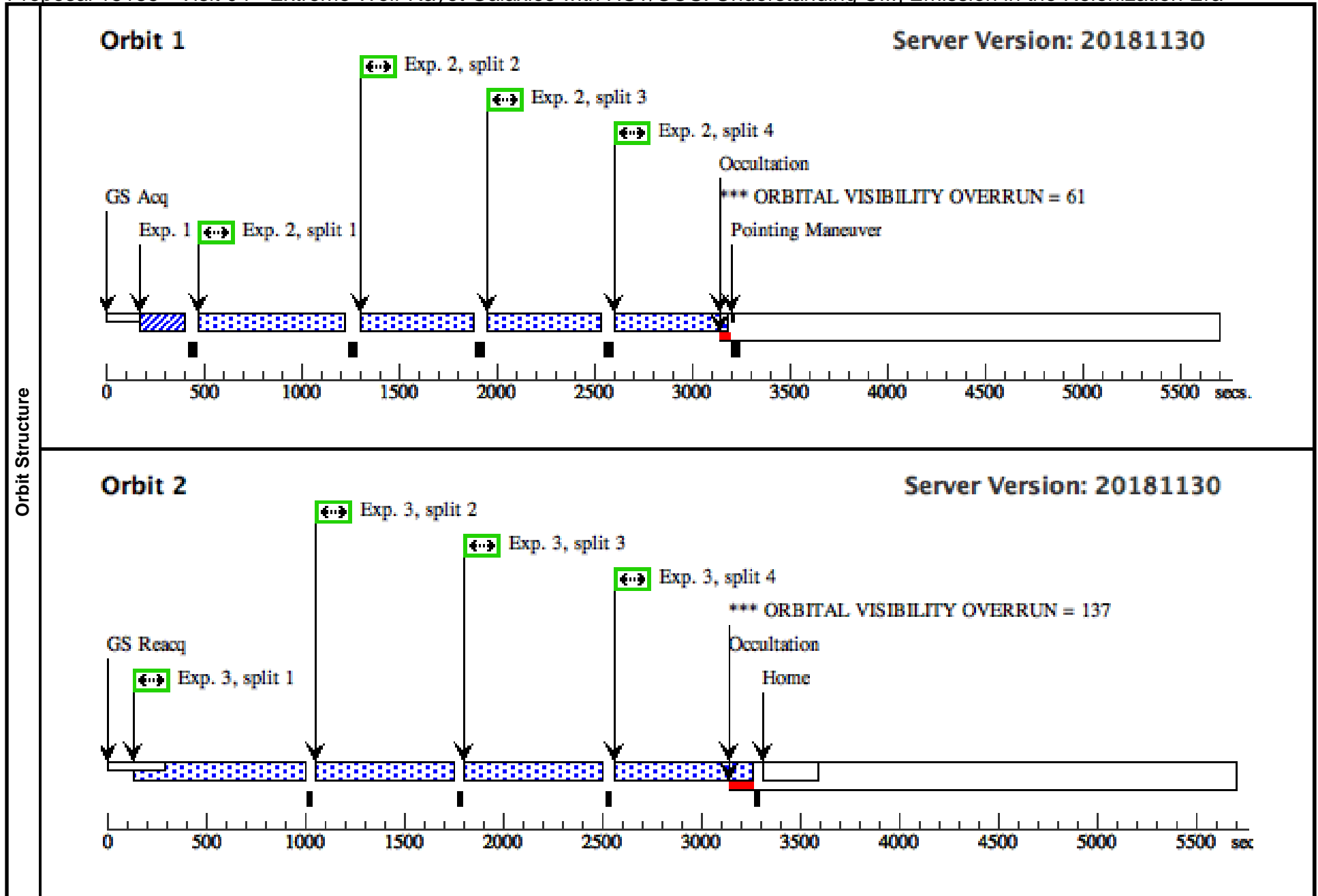
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Diagnosics										
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(3)	SDSSJ115002.73+150123.5	RA: 11 50 2.7300 (177.5113750d) Dec: +15 01 23.48 (15.02319d) Equinox: J2000	Redshift: 0.00245	V=17.0+/-0.2	Reference Frame: ICRS				
Comments: Category=GALAXY Description=[STAR FORMING 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	(COS.ta.100 7648)	(3) SDSSJ115002.73 +150123.5	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				42 Secs (42 Secs) [==>]	[1]
	2	(COS.sp.100 7654)	(3) SDSSJ115002.73 +150123.5	COS/NUV, TIME-TAG, PSA	G185M 1913 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=17 65			550 Secs (2200 Secs) [==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[1]
	3	(COS.sp.100 7657)	(3) SDSSJ115002.73 +150123.5	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=87 99			653 Secs (2612 Secs) [==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[2]



Proposal 15185 - Visit 04 - Extreme Wolf-Rayet Galaxies with HST/COS: Understanding CIII] Emission in the Reionization Era

Fri Dec 07 00:02:40 GMT 2018

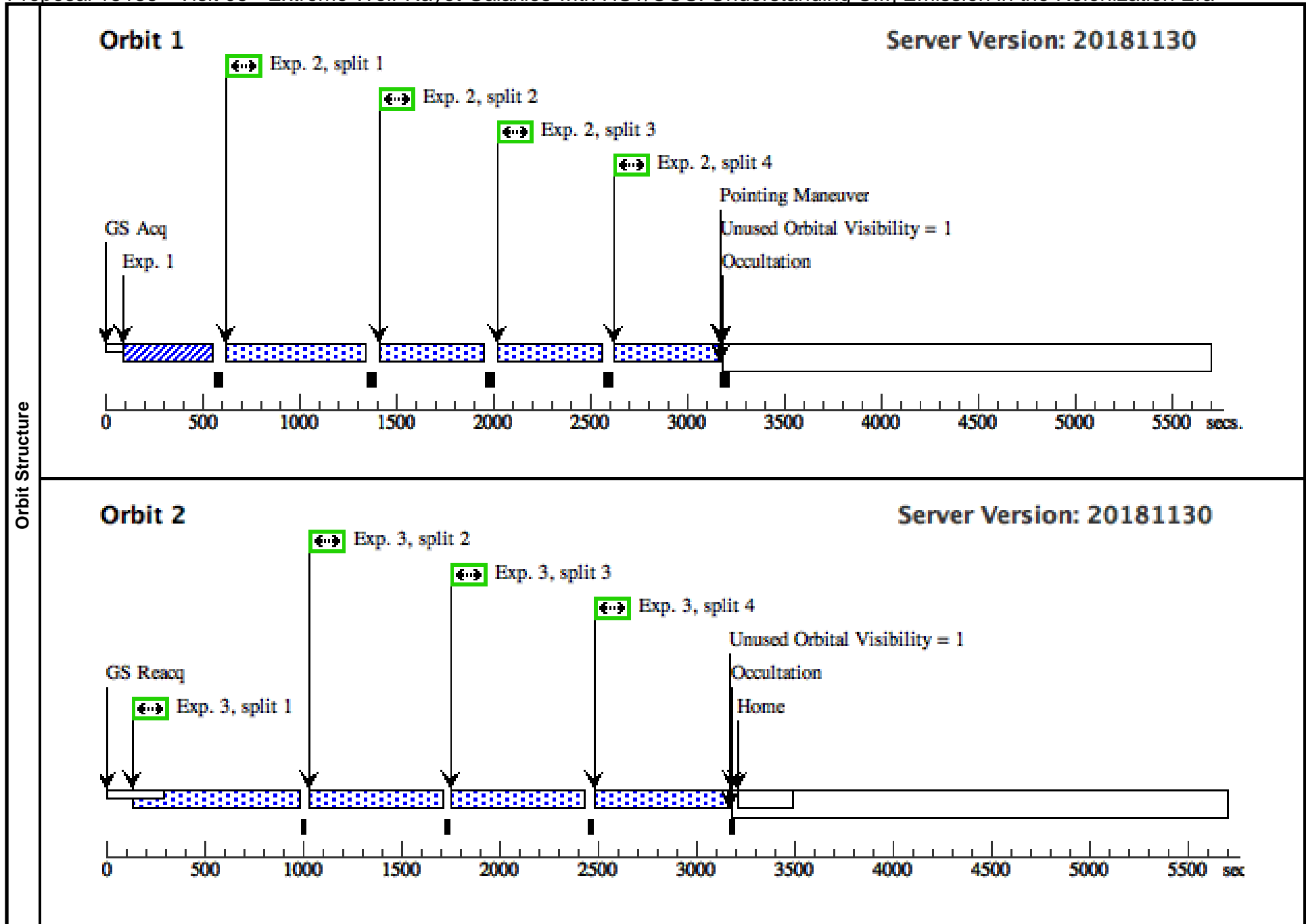
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Diagnosics										
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(4)	SDSSJ130432.27-033322.1	RA: 13 04 32.2700 (196.1344583d) Dec: -03 33 22.12 (-3.55614d) Equinox: J2000	Redshift: 0.0045	V=18.2+/-0.2	Reference Frame: ICRS				
Comments: Category=GALAXY Description=[STAR FORMING 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	(COS.ta.100 7670)	(4) SDSSJ130432.27 -033322.1	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				8 Secs (8 Secs)	
									[==>]	[1]
	2	(COS.sp.100 7674)	(4) SDSSJ130432.27 -033322.1	COS/NUV, TIME-TAG, PSA	G185M 1921 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=1803			565 Secs (2260 Secs)	
								[==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[1]	
3	(COS.sp.100 7675)	(4) SDSSJ130432.27 -033322.1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=16045			649 Secs (2596 Secs)		
								[==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[2]	



Proposal 15185 - Visit 05 - Extreme Wolf-Rayet Galaxies with HST/COS: Understanding CIII] Emission in the Reionization Era

Fri Dec 07 00:02:40 GMT 2018

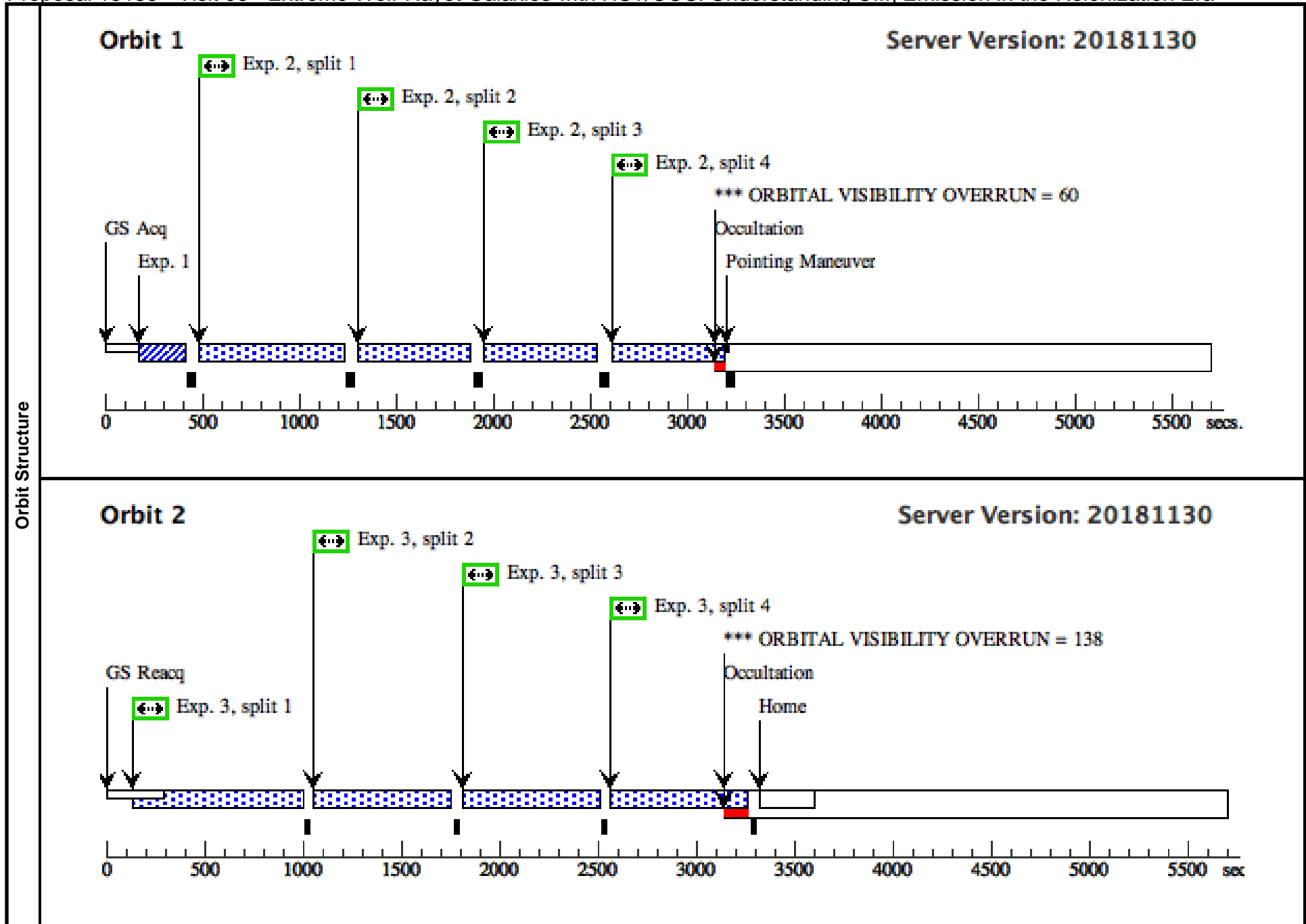
Visit	Proposal 15185, Visit 05, implementation Diagnostic Status: No Diagnostics Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
		(5)	SDSSJ131447.37+345259.8	RA: 13 14 47.3700 (198.6973750d) Dec: +34 52 59.81 (34.88328d) Equinox: J2000	Redshift: 0.00288	V=17.7+/-0.2	Reference Frame: ICRS			
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Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(COS.ta.100 7684)	(5) SDSSJ131447.37 +345259.8	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				81 Secs (81 Secs) [==>]	[1]
	2	(COS.sp.100 7693)	(5) SDSSJ131447.37 +345259.8	COS/NUV, TIME-TAG, PSA	G185M 1913 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=17 91			537 Secs (2084 Secs) [==>521.0 Secs (Split 1)] [==>521.0 Secs (Split 2)] [==>521.0 Secs (Split 3)] [==>521.0 Secs (Split 4)]	[1]
	3	(COS.sp.100 7696)	(5) SDSSJ131447.37 +345259.8	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=12 956			659 Secs (2496 Secs) [==>624.0 Secs (Split 1)] [==>624.0 Secs (Split 2)] [==>624.0 Secs (Split 3)] [==>624.0 Secs (Split 4)]	[2]



Proposal 15185 - Visit 06 - Extreme Wolf-Rayet Galaxies with HST/COS: Understanding CIII] Emission in the Reionization Era

Fri Dec 07 00:02:40 GMT 2018

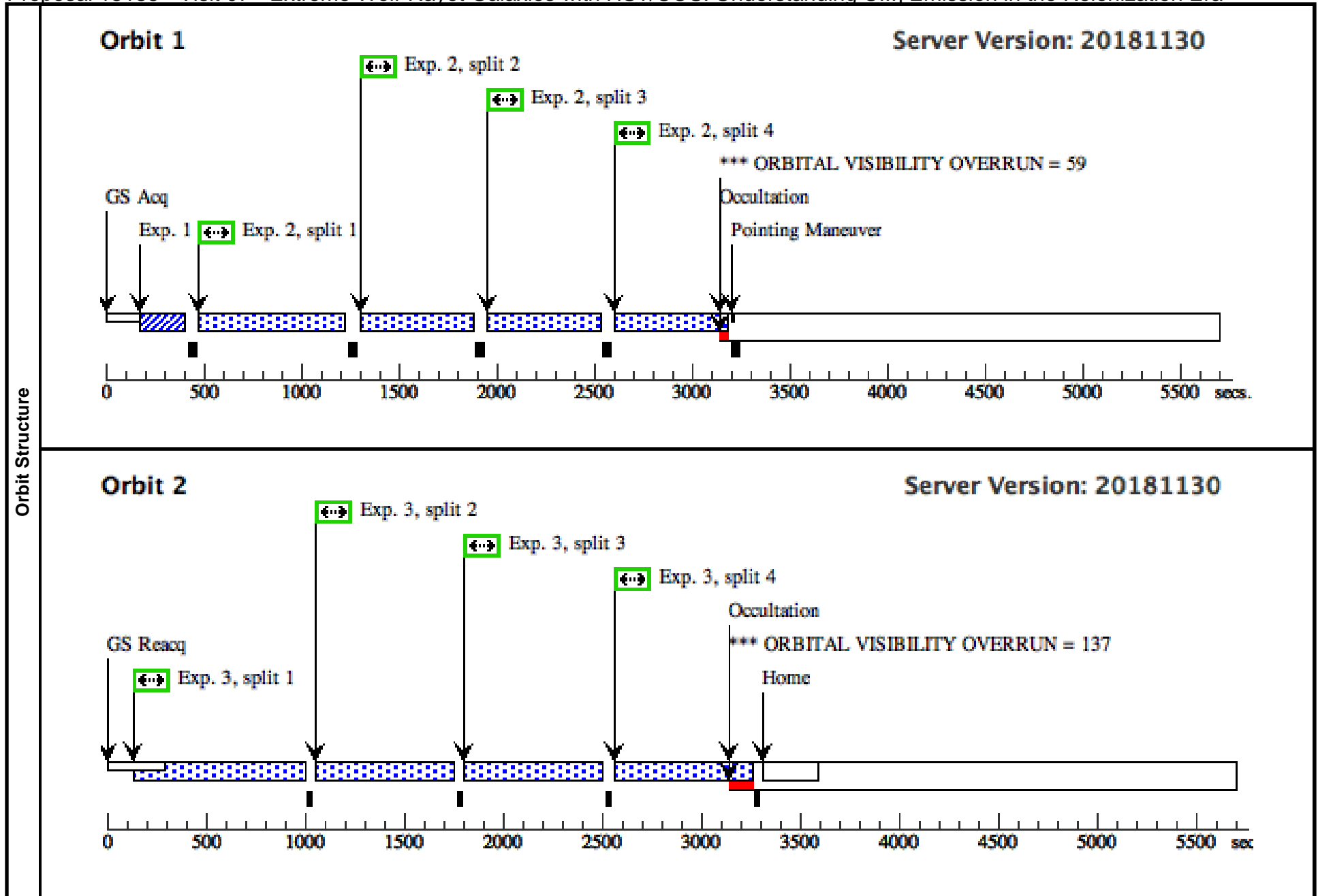
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Diagnosics										
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(6)	SDSSJ143248.36+095257.1	RA: 14 32 48.3600 (218.2015000d) Dec: +09 52 57.15 (9.88254d) Equinox: J2000	Redshift: 0.00466	V=18.4+/-0.2	Reference Frame: ICRS				
Comments: Category=GALAXY Description=[STAR FORMING 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	(COS.ta.100 7698)	(6) SDSSJ143248.36 +095257.1	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				9 Secs (9 Secs)	
									[==>]	[1]
	2	(COS.sp.100 7701)	(6) SDSSJ143248.36 +095257.1	COS/NUV, TIME-TAG, PSA	G185M 1921 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=1806			565 Secs (2260 Secs)	
								[==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[1]	
3	(COS.sp.100 7702)	(6) SDSSJ143248.36 +095257.1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=17227			650 Secs (2600 Secs)		
								[==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[2]	



Proposal 15185 - Visit 07 - Extreme Wolf-Rayet Galaxies with HST/COS: Understanding CIII] Emission in the Reionization Era

Fri Dec 07 00:02:40 GMT 2018

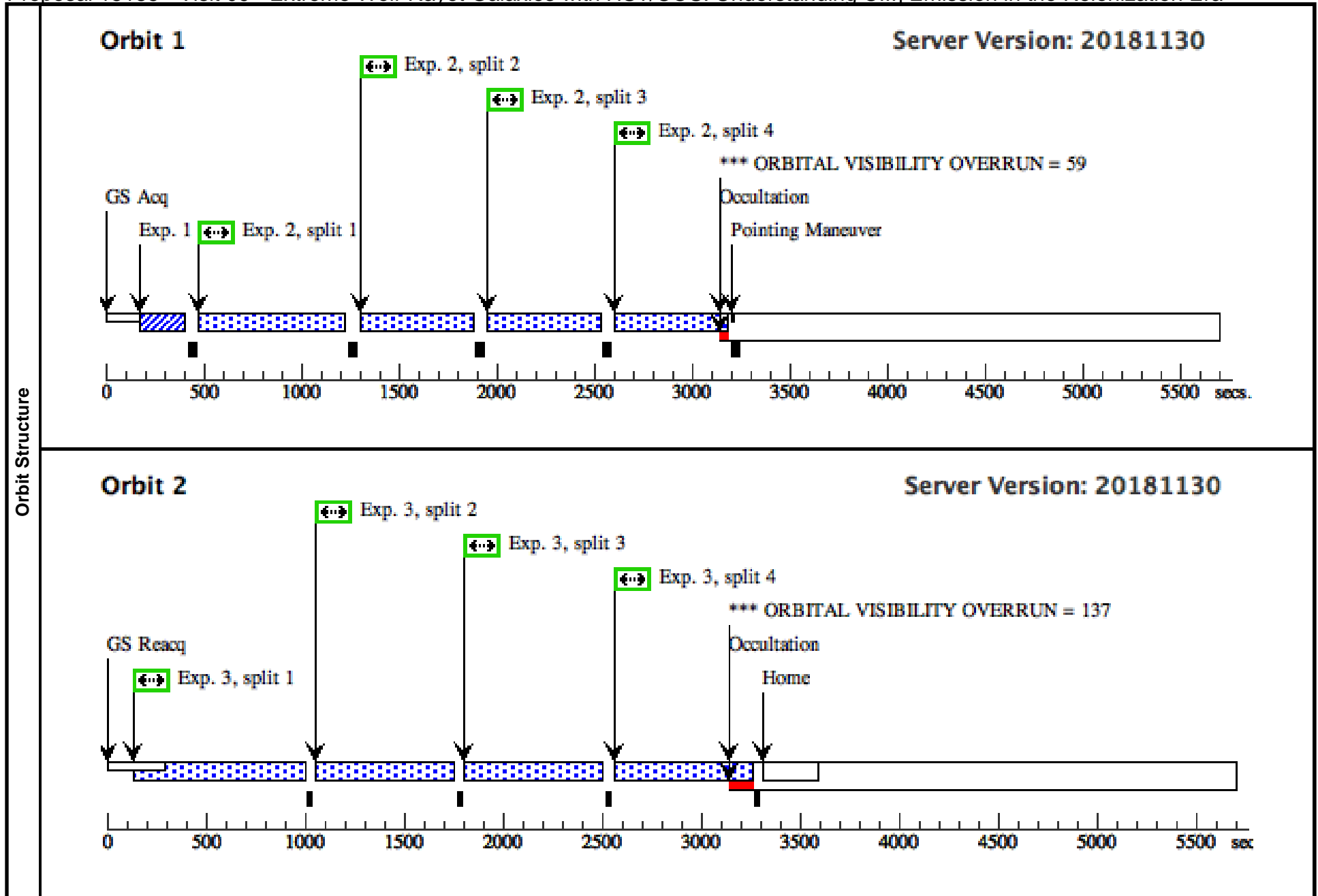
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Diagnosics										
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(7)	SDSSJ144805.38-011057.7	RA: 14 48 5.3800 (222.0224167d) Dec: -01 10 57.72 (-1.18270d) Equinox: J2000	Redshift: 0.0274	V=18.0+/-0.2	Reference Frame: ICRS				
Comments: Category=GALAXY Description=[STAR FORMING 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	(COS.ta.100 7703)	(7) SDSSJ144805.38 -011057.7	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				7 Secs (7 Secs)	
									[==>]	[1]
	2	(COS.sp.100 7724)	(7) SDSSJ144805.38 -011057.7	COS/NUV, TIME-TAG, PSA	G185M 1953 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=17 99			565 Secs (2260 Secs)	
								[==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[1]	
3	(COS.sp.100 7725)	(7) SDSSJ144805.38 -011057.7	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=14 823			649 Secs (2596 Secs)		
								[==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[2]	



Proposal 15185 - Visit 09 - Extreme Wolf-Rayet Galaxies with HST/COS: Understanding CIII] Emission in the Reionization Era

Fri Dec 07 00:02:41 GMT 2018

Visit	Proposal 15185, Visit 09, completed Diagnostic Status: Warning Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none) <i>Comments: Repeat of Visit 07</i>									
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Diagnosics										
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(7)	SDSSJ144805.38-011057.7	RA: 14 48 5.3800 (222.0224167d) Dec: -01 10 57.72 (-1.18270d) Equinox: J2000	Redshift: 0.0274	V=18.0+/-0.2	Reference Frame: ICRS				
<i>Comments:</i> Category=GALAXY Description=[STAR FORMING 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	(COS.ta.100 7703)	(7) SDSSJ144805.38 -011057.7	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				7 Secs (7 Secs)	
									[==>]	[1]
	2	(COS.sp.100 7724)	(7) SDSSJ144805.38 -011057.7	COS/NUV, TIME-TAG, PSA	G185M 1953 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=17 99			565 Secs (2260 Secs)	
								[==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[1]	
3	(COS.sp.100 7725)	(7) SDSSJ144805.38 -011057.7	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=14 823			649 Secs (2596 Secs)		
								[==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[2]	



Proposal 15185 - Visit 08 - Extreme Wolf-Rayet Galaxies with HST/COS: Understanding CIII] Emission in the Reionization Era

Fri Dec 07 00:02:41 GMT 2018

Visit	Proposal 15185, Visit 08, completed Diagnostic Status: Warning Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none)									
	(Visit 08) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(3)	SDSSJ115002.73+150123.5	RA: 11 50 2.7300 (177.5113750d) Dec: +15 01 23.48 (15.02319d) Equinox: J2000	Redshift: 0.00245	V=17.0+/-0.2	Reference Frame: ICRS				
Comments: Category=GALAXY Description=[STAR FORMING 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	(COS.ta.100 7648)	(3) SDSSJ115002.73 +150123.5	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				42 Secs (42 Secs)	
									[==>]	[1]
2	(COS.sp.100 7657)	(3) SDSSJ115002.73 +150123.5	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FLASH=YES; FP-POS=ALL; BUFFER-TIME=87 99				530 Secs (2120 Secs)	
									[==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[1]

