



16641 - HST/WFC3-IR Imaging of Exceptionally Luminous Himiko/CR7-Like Galaxies at $z > 6$

Cycle: 29, Proposal Category: GO

(JWST Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
Dr. Eiichi Egami (PI) (Contact)	University of Arizona	egami@arizona.edu
Dr. Yuichi Harikane (CoI) (ESA Member)	University College London	y.harikane@ucl.ac.uk
Prof. Linhua Jiang (CoI)	Peking University	jiangkiaa@pku.edu.cn
Dr. Yoshiaki Ono (CoI)	University of Tokyo, Institute of Cosmic Ray Research	ono@icrr.u-tokyo.ac.jp
Dr. Masami Ouchi (CoI)	University of Tokyo, Institute of Cosmic Ray Research	ouchims@icrr.u-tokyo.ac.jp
Mr. Fengwu Sun (CoI) (Contact)	University of Arizona	fengwusun@email.arizona.edu

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) HSCJ021839-050944	WFC3/IR	2	02-Nov-2021 09:00:16.0	yes
02	(2) HSCJ162833+431211	WFC3/IR	2	02-Nov-2021 09:00:18.0	yes
03	(3) HSCJ163026+431559	WFC3/IR	2	02-Nov-2021 09:00:19.0	yes
04	(4) HSCJ162126+545719	WFC3/IR	2	02-Nov-2021 09:00:20.0	yes
05	(5) HSCJ233125-005216	WFC3/IR	2	02-Nov-2021 09:00:21.0	yes
06	(6) HSCJ100334+024546	WFC3/IR	2	02-Nov-2021 09:00:22.0	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>
07	(7) HSCJ021843-050915	WFC3/IR	2	02-Nov-2021 09:00:24.0	yes

14 Total Orbits Used

ABSTRACT

Physical processes governing the formation/evolution of high-redshift galaxies in the epoch of reionization (EoR; $z > 6$) are still not well understood. In most cases, EoR galaxies are fuzzy faint blobs showing little internal structure, and fitting various theoretical models to spatially-integrated spectral energy distributions (SEDs) is often all that can be done. There are, however, a small number of luminous EoR galaxies, such as Himiko at $z=6.595$ and CR7 at $z=6.601$, whose exceptional brightnesses have allowed spatially-resolved studies and have revealed some fascinating details.

Although such luminous EoR galaxies are rare, the Subaru/Hyper Suprime-Cam (HSC) survey has recently discovered 7 comparably bright EoR galaxies with $y < 25$ mag (in comparison, $y=25.4$ and 24.5 mag with Himiko and CR7, respectively). Here, we propose to obtain HST/WFC3 near-infrared images for these exceptionally luminous $z > 6$ galaxies with the F105W, F125W, and F160W filters. Our goals are, (1) to identify the rest-frame UV continuum morphology, (2) to measure UV continuum spectral slopes, and (3) to compare the UV continuum morphology with those of Ly-alpha, [C II], and dust emission when possible. The obtained HST data will allow us to probe the internal structures and underlying physical processes in these remarkable high-redshift galaxies.

The targeted $z > 6$ EoR galaxies are so bright that they will also make excellent targets for NIRSpec IFU observations, enabling us to study the internal structure and kinematics of these high-redshift galaxies in greater detail. The obtained HST data will also be essential to make effective use of precious JWST time.

OBSERVING DESCRIPTION

We will observe 7 bright ($y < 25$ mag) Lyman alpha emitters (LAEs) and Lyman break galaxies (LBGs) at $z=6-6.5$ selected from the Subaru Hyper Suprime-Cam (HSC) surveys. We will observe each galaxy with WFC3-IR using three filters, F105W, F125W, and F160W, probing their UV continuum morphologies and spectral slopes.

Since the target galaxies are compact ($\sim 1''$), we will use the IR aperture to ensure that the obtained data are optimized for these individual sources. We will use SAMP-SEQ=SPARS50 and set NSAMP=7 for the F105W/F125W observations (a half-orbit each) and NSAMP=14 for the F160W

Proposal 16641 (STScI Edit Number: 1, Created: Tuesday, November 2, 2021 at 8:00:24 AM Eastern Standard Time) - Overview observations (one orbit). This ensures that there are enough number of reads to measure the count slope accurately even with the half-orbit observations. In the following cases, the orbit duration is slightly longer so that NSAMP can be increased:

HSCJ162833, HSCJ163026: NSAMP=15 for F160W

HSCJ162126 : NSAMP=15 for F160W, NSAMP=8 for F125W

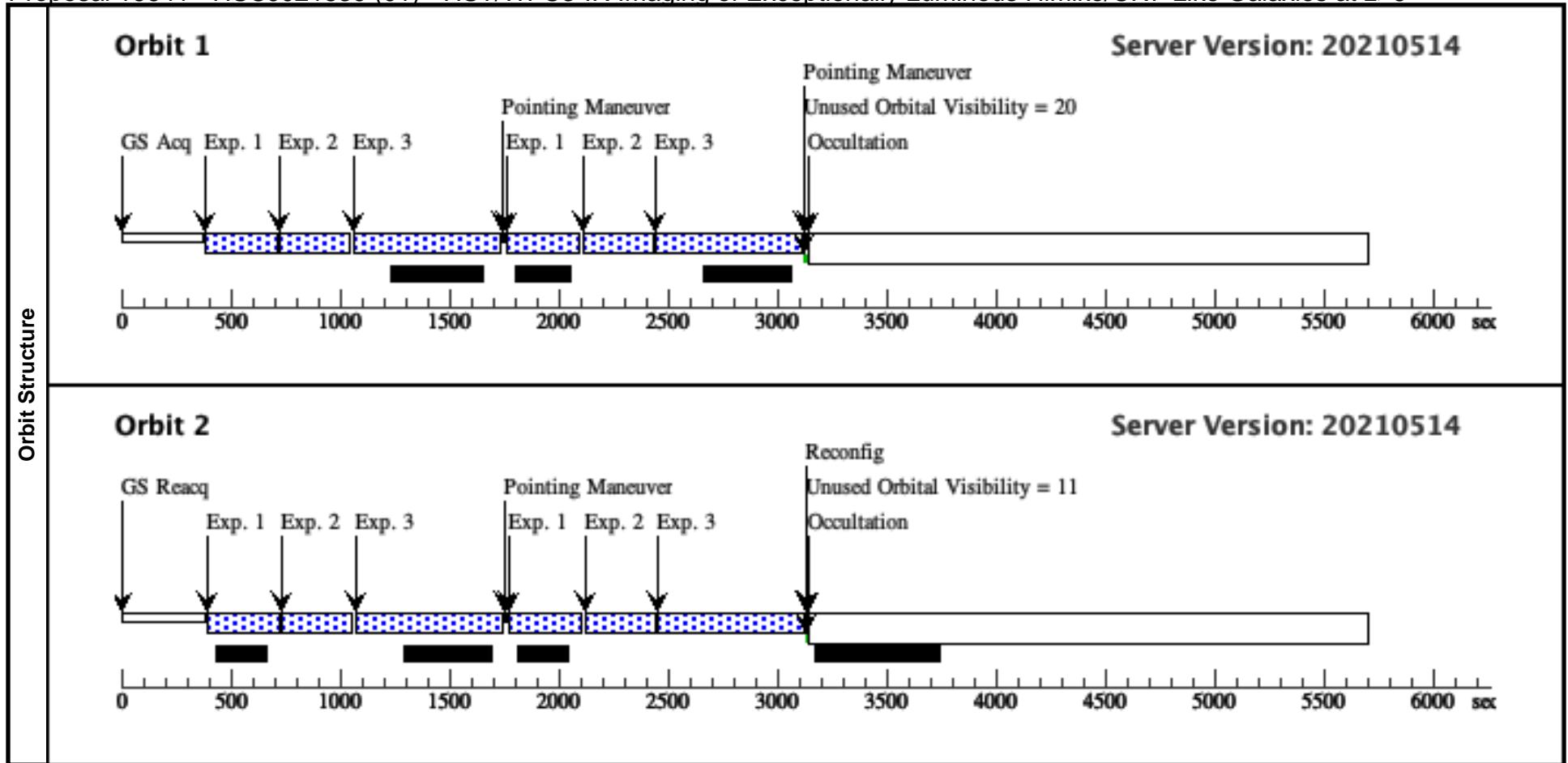
Since the UV continuum brightness of these galaxies drops toward longer wavelengths, NSAMP is increased for F160W first and then for F125W when possible. We generally set the low-sky constraint when it does not affect the number of exposures schedulable, but for these three sources, we removed it to increase NSAMP.

For each source, we use the WFC3-IR-DITHER-BOX-MIN pattern to obtain four exposures, one at each dither position. To maximize the observing efficiency (i.e., to minimize the number of pointing maneuvers during each orbit), we change the filter at each dither position rather than dithering the telescope while keeping the same filter.

Proposal 16641 - HSCJ021839 (01) - HST/WFC3-IR Imaging of Exceptionally Luminous Himiko/CR7-Like Galaxies at z>6

Tue Nov 02 13:00:24 GMT 2021

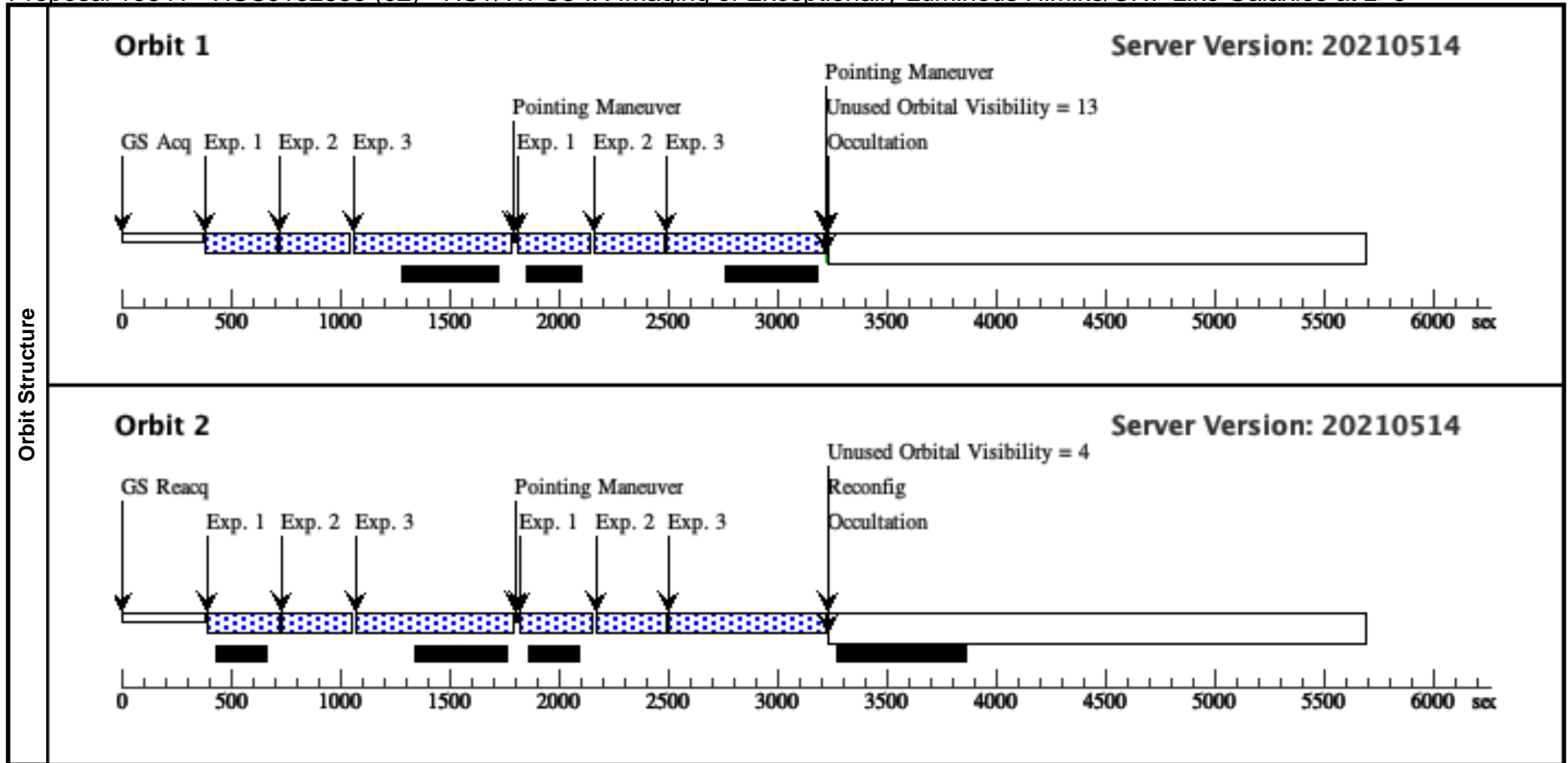
Visit	Proposal 16641, HSCJ021839 (01), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=2.86 Line Spacing=1.825	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false		(1-3)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	HSCJ021839-050944	RA: 02 18 38.9030 (34.6620958d) Dec: -05 09 43.94 (-5.16221d) Equinox: J2000		V=(?) y=24.51	Reference Frame: ICRS				
	<i>Comments:</i> 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	F105W	(1) HSCJ021839-050944	WFC3/IR, MULTIACCUM, IR	F105W	SAMP-SEQ=SPARS 50; NSAMP=7	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ021839 (01) (1)	302.934997 Secs (1211.74 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1] [2]
2	F125W	(1) HSCJ021839-050944	WFC3/IR, MULTIACCUM, IR	F125W	SAMP-SEQ=SPARS 50; NSAMP=7	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ021839 (01) (1)	302.934997 Secs (1211.74 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1] [2]	
3	F160W	(1) HSCJ021839-050944	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=SPARS 50; NSAMP=14	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ021839 (01) (1)	652.938154 Secs (2611.753 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1] [2]	



Proposal 16641 - HSCJ162833 (02) - HST/WFC3-IR Imaging of Exceptionally Luminous Himiko/CR7-Like Galaxies at z>6

Tue Nov 02 13:00:24 GMT 2021

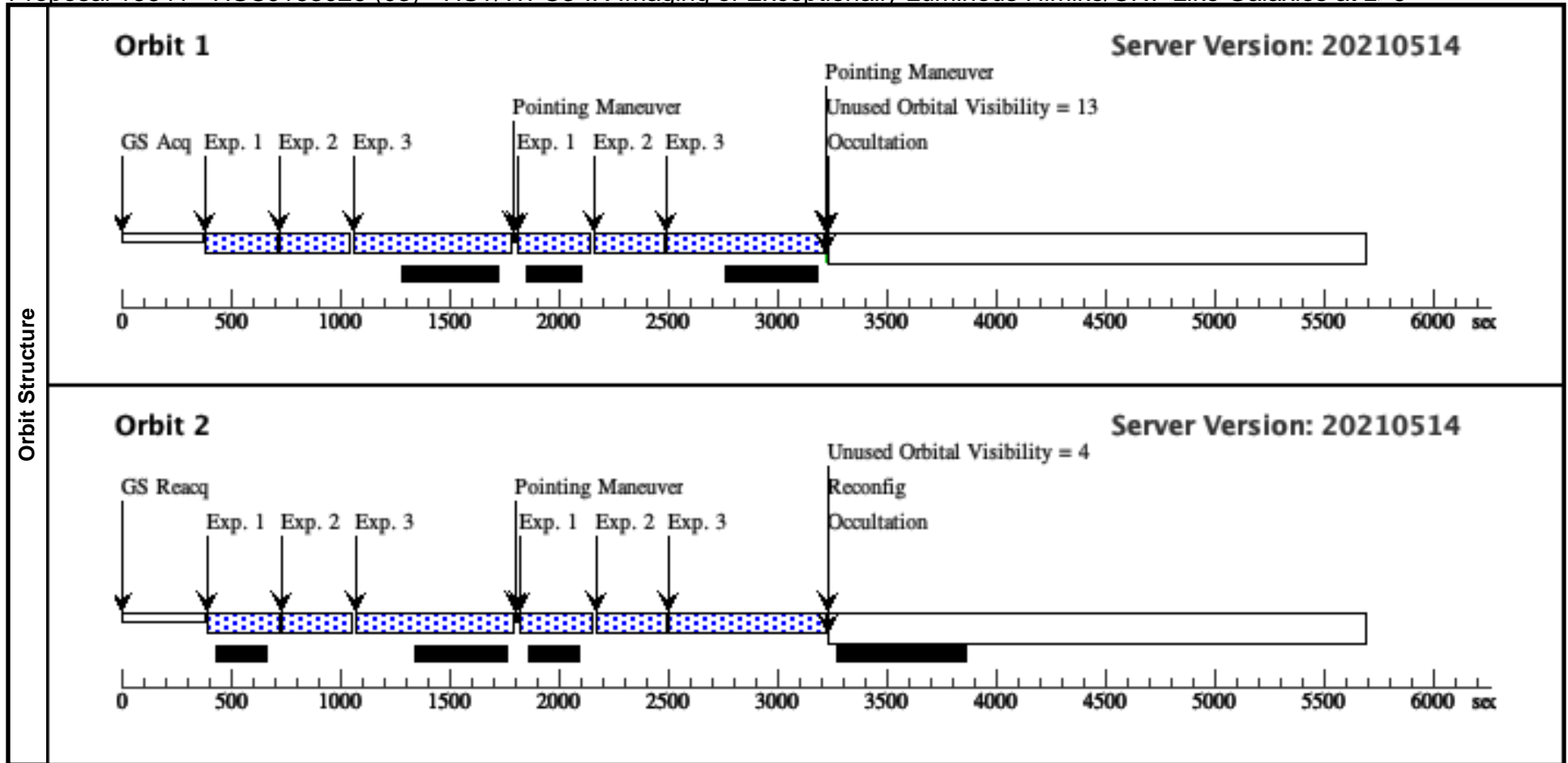
Visit	Proposal 16641, HSCJ162833 (02), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: (none)										
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures		
		(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=2.86 Line Spacing=1.825	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false					(1-3)		
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(2)	HSCJ162833+431211	RA: 16 28 33.0180 (247.1375750d)	Dec: +43 12 10.56 (43.20293d)			V=(?) y=23.88	Reference Frame: ICRS			
	<i>Comments:</i> 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	F105W	(2) HSCJ162833+431211	WFC3/IR, MULTIACCUM, IR	F105W	SAMP-SEQ=SPARS 50; NSAMP=7	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ162833 (02) (1)	302.934997 Secs (1211.74 Secs)		
									[==>(Pattern 1)]	[1]	
									[==>(Pattern 2)]	[2]	
									[==>(Pattern 3)]		
									[==>(Pattern 4)]		
2	F125W	(2) HSCJ162833+431211	WFC3/IR, MULTIACCUM, IR	F125W	SAMP-SEQ=SPARS 50; NSAMP=7	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ162833 (02) (1)	302.934997 Secs (1211.74 Secs)			
									[==>(Pattern 1)]	[1]	
									[==>(Pattern 2)]	[2]	
									[==>(Pattern 3)]		
									[==>(Pattern 4)]		
3	F160W	(2) HSCJ162833+431211	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=SPARS 50; NSAMP=15	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ162833 (02) (1)	702.938605 Secs (2811.754 Secs)			
									[==>(Pattern 1)]	[1]	
									[==>(Pattern 2)]	[2]	
									[==>(Pattern 3)]		
									[==>(Pattern 4)]		



Proposal 16641 - HSCJ163026 (03) - HST/WFC3-IR Imaging of Exceptionally Luminous Himiko/CR7-Like Galaxies at z>6

Tue Nov 02 13:00:24 GMT 2021

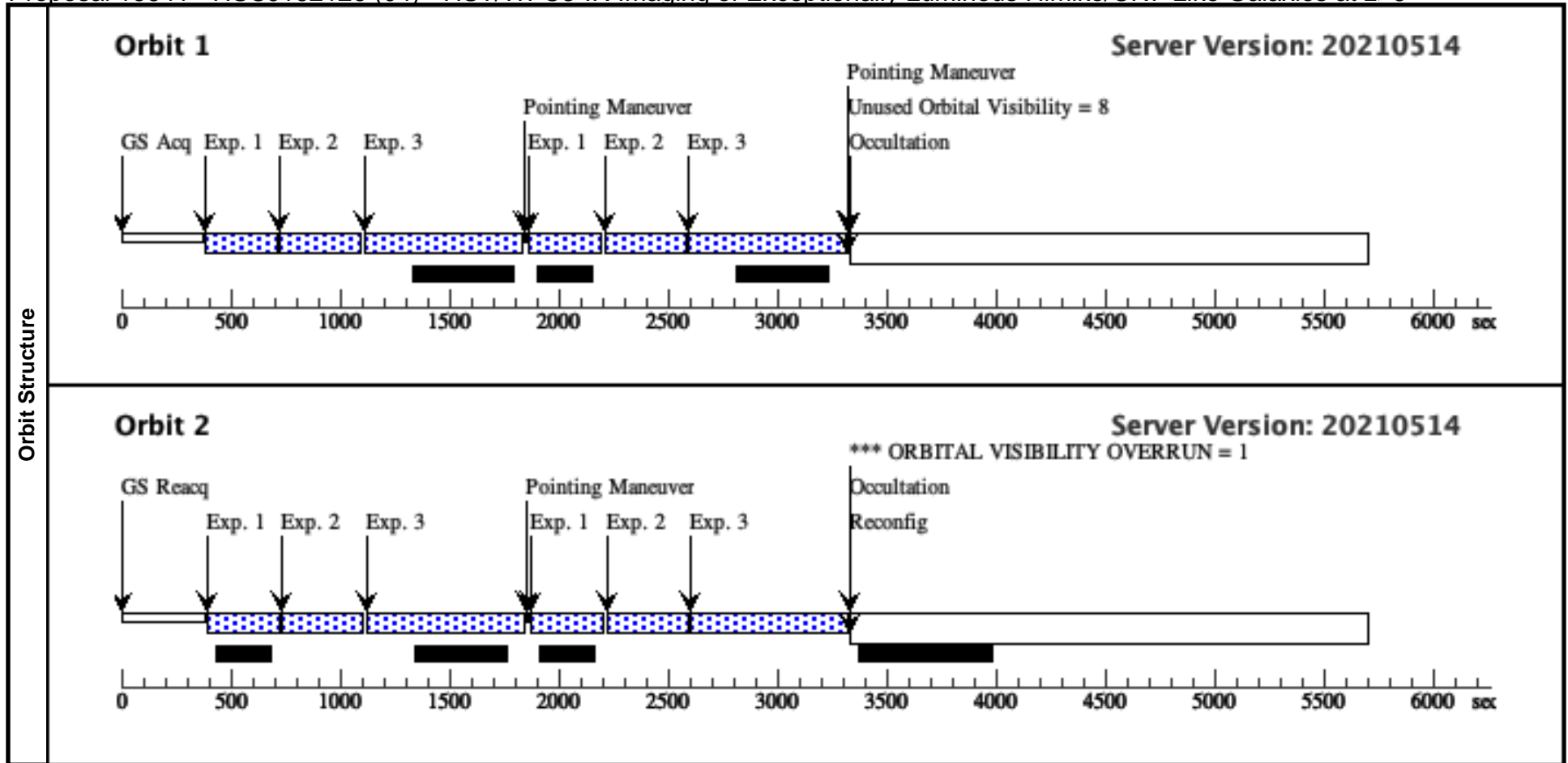
Visit	Proposal 16641, HSCJ163026 (03), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: (none)										
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures		
		(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=2.86 Line Spacing=1.825	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false					(1-3)		
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(3)	HSCJ163026+431559	RA: 16 30 26.3640 (247.6098500d) Dec: +43 15 58.60 (43.26628d) Equinox: J2000				V=(?) y=23.98		Reference Frame: ICRS		
	<i>Comments:</i> 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	F105W	(3) HSCJ163026+431559	WFC3/IR, MULTIACCUM, IR	F105W	SAMP-SEQ=SPARS 50; NSAMP=7	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ163026 (03) (1)	302.934997 Secs (1211.74 Secs)		
									[==>(Pattern 1)]	[1]	
									[==>(Pattern 2)]		
									[==>(Pattern 3)]	[2]	
									[==>(Pattern 4)]		
2	F125W	(3) HSCJ163026+431559	WFC3/IR, MULTIACCUM, IR	F125W	SAMP-SEQ=SPARS 50; NSAMP=7	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ163026 (03) (1)	302.934997 Secs (1211.74 Secs)			
									[==>(Pattern 1)]	[1]	
									[==>(Pattern 2)]		
									[==>(Pattern 3)]	[2]	
									[==>(Pattern 4)]		
3	F160W	(3) HSCJ163026+431559	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=SPARS 50; NSAMP=15	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ163026 (03) (1)	702.938605 Secs (2811.754 Secs)			
									[==>(Pattern 1)]	[1]	
									[==>(Pattern 2)]		
									[==>(Pattern 3)]	[2]	
									[==>(Pattern 4)]		



Proposal 16641 - HSCJ162126 (04) - HST/WFC3-IR Imaging of Exceptionally Luminous Himiko/CR7-Like Galaxies at z>6

Tue Nov 02 13:00:24 GMT 2021

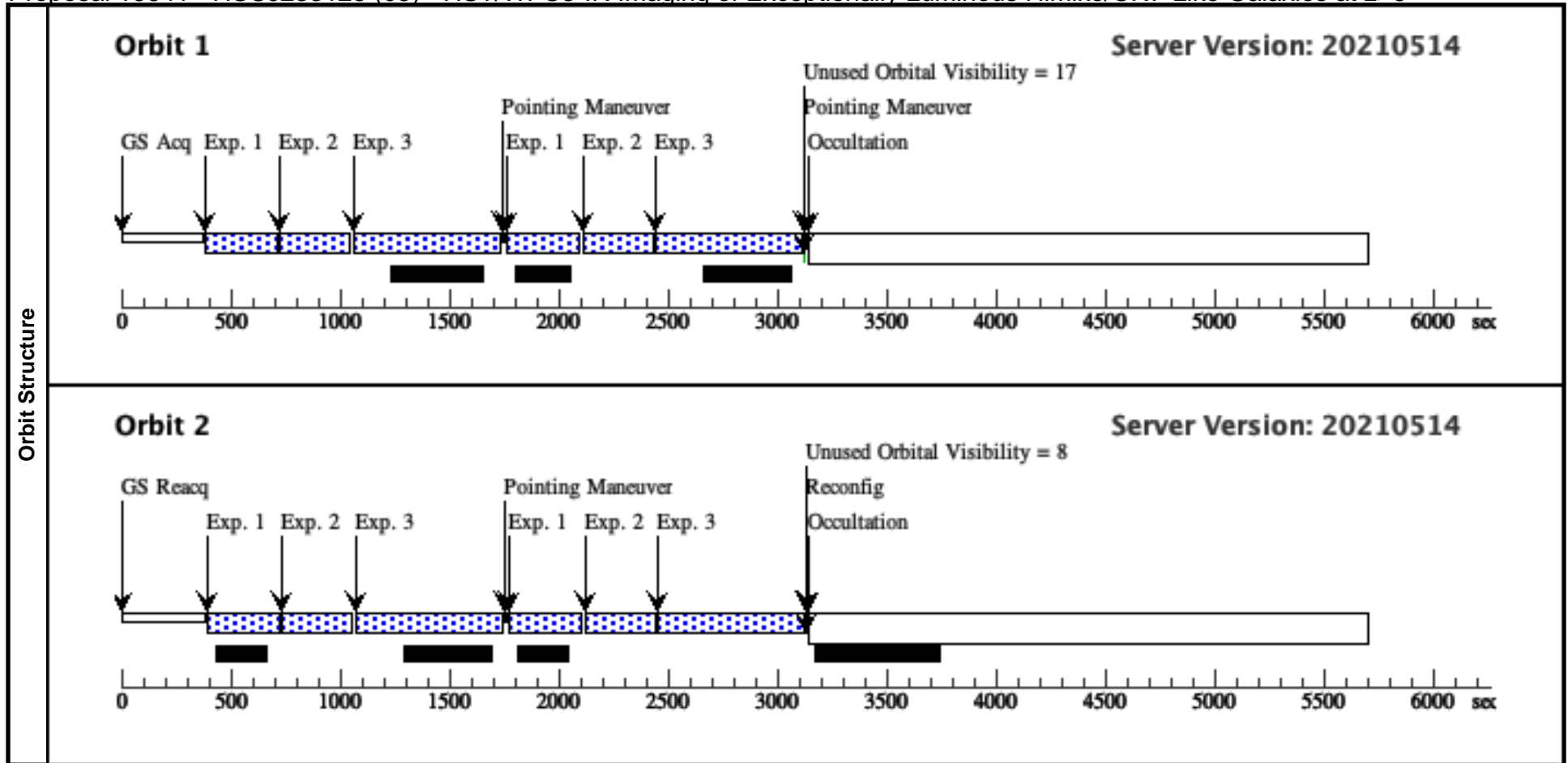
Visit	Proposal 16641, HSCJ162126 (04), implementation Diagnostic Status: Warning Scientific Instruments: WFC3/IR Special Requirements: (none)										
	(HSCJ162126 (04)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN										
Diagnosics											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures	
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=2.86 Line Spacing=1.825				Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false				(1-3)	
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(4)	HSCJ162126+545719	RA: 16 21 26.5100 (245.3604583d) Dec: +54 57 19.14 (54.95532d) Equinox: J2000				V=(?) y=22.92		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	F105W	(4) HSCJ162126+545719	WFC3/IR, MULTIACCUM, IR	F105W	SAMP-SEQ=SPARS 50; NSAMP=7	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ162126 (04) (1)	302.934997 Secs (1211.74 Secs)		
										[=>(Pattern 1)]	[1]
										[=>(Pattern 2)]	[2]
										[=>(Pattern 3)]	
										[=>(Pattern 4)]	
	2	F125W	(4) HSCJ162126+545719	WFC3/IR, MULTIACCUM, IR	F125W	SAMP-SEQ=SPARS 50; NSAMP=8	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ162126 (04) (1)	352.935448 Secs (1411.742 Secs)		
										[=>(Pattern 1)]	[1]
										[=>(Pattern 2)]	[2]
										[=>(Pattern 3)]	
									[=>(Pattern 4)]		
3	F160W	(4) HSCJ162126+545719	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=SPARS 50; NSAMP=15	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ162126 (04) (1)	702.938605 Secs (2811.754 Secs)			
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									[=>(Pattern 2)]	[2]	
									[=>(Pattern 3)]		
									[=>(Pattern 4)]		



Proposal 16641 - HSCJ233125 (05) - HST/WFC3-IR Imaging of Exceptionally Luminous Himiko/CR7-Like Galaxies at z>6

Tue Nov 02 13:00:25 GMT 2021

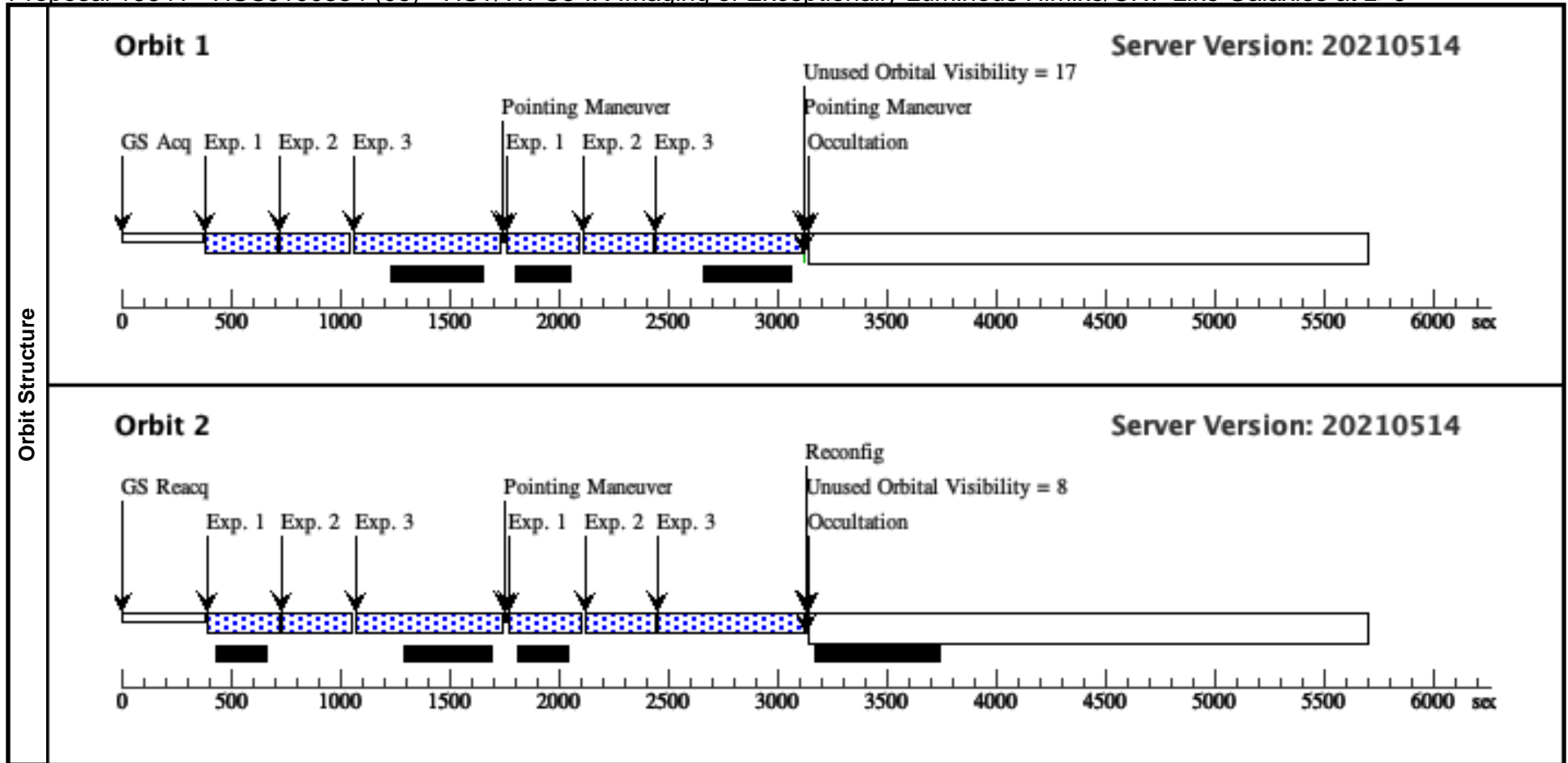
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(5)	HSCJ233125-005216	RA: 23 31 25.3600 (352.8556667d) Dec: -00 52 16.36 (-.87121d) Equinox: J2000		V=(?) y=24.96	Reference Frame: ICRS				
	<i>Comments:</i> 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	F105W	(5) HSCJ233125-005216	WFC3/IR, MULTIACCUM, IR	F105W	SAMP-SEQ=SPARS 50;	POS TARG 5.46,-1.95;	Pattern 1, Exps 1-3 in HSCJ233125 (05) (1)	302.934997 Secs (1211.74 Secs)	
						NSAMP=7	GS ACQ SCENARIO BASE1B3		[=>(Pattern 1)]	[1]
									[=>(Pattern 2)]	
									[=>(Pattern 3)]	[2]
									[=>(Pattern 4)]	
	2	F125W	(5) HSCJ233125-005216	WFC3/IR, MULTIACCUM, IR	F125W	SAMP-SEQ=SPARS 50;	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ233125 (05) (1)	302.934997 Secs (1211.74 Secs)	
						NSAMP=7			[=>(Pattern 1)]	[1]
									[=>(Pattern 2)]	
									[=>(Pattern 3)]	[2]
								[=>(Pattern 4)]		
3	F160W	(5) HSCJ233125-005216	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=SPARS 50;	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ233125 (05) (1)	652.938154 Secs (2611.753 Secs)		
					NSAMP=14			[=>(Pattern 1)]	[1]	
								[=>(Pattern 2)]		
								[=>(Pattern 3)]	[2]	
								[=>(Pattern 4)]		



Proposal 16641 - HSCJ100334 (06) - HST/WFC3-IR Imaging of Exceptionally Luminous Himiko/CR7-Like Galaxies at z>6

Tue Nov 02 13:00:25 GMT 2021

Visit	Proposal 16641, HSCJ100334 (06), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: (none)										
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures		
		(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=2.86 Line Spacing=1.825	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false					(1-3)		
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(6)	HSCJ100334+024546	RA: 10 03 34.6600 (150.8944167d) Dec: +02 45 46.56 (2.76293d) Equinox: J2000				V=(?) y=24.97		Reference Frame: ICRS		
	<i>Comments:</i> 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	F105W	(6) HSCJ100334+024546	WFC3/IR, MULTIACCUM, IR	F105W	SAMP-SEQ=SPARS 50; NSAMP=7	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ100334 (06) (1)	302.934997 Secs (1211.74 Secs)		
									[=>(Pattern 1)]	[1]	
									[=>(Pattern 2)]		
									[=>(Pattern 3)]	[2]	
									[=>(Pattern 4)]		
2	F125W	(6) HSCJ100334+024546	WFC3/IR, MULTIACCUM, IR	F125W	SAMP-SEQ=SPARS 50; NSAMP=7	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ100334 (06) (1)	302.934997 Secs (1211.74 Secs)			
									[=>(Pattern 1)]	[1]	
									[=>(Pattern 2)]		
									[=>(Pattern 3)]	[2]	
									[=>(Pattern 4)]		
3	F160W	(6) HSCJ100334+024546	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=SPARS 50; NSAMP=14	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ100334 (06) (1)	652.938154 Secs (2611.753 Secs)			
									[=>(Pattern 1)]	[1]	
									[=>(Pattern 2)]		
									[=>(Pattern 3)]	[2]	
									[=>(Pattern 4)]		



Proposal 16641 - HSCJ021843 (07) - HST/WFC3-IR Imaging of Exceptionally Luminous Himiko/CR7-Like Galaxies at z>6

Tue Nov 02 13:00:25 GMT 2021

Visit	Proposal 16641, HSCJ021843 (07), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures	
		(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=2.86 Line Spacing=1.825	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false					(1-3)	
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous	
	(7)	HSCJ021843-050915	RA: 02 18 43.6200 (34.6817500d)	Dec: -05 09 15.63 (-5.15434d)	Equinox: J2000		V=(?) y=24.87	Reference Frame: ICRS		
	<i>Comments:</i> 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	F105W	(7) HSCJ021843-050915	WFC3/IR, MULTIACCUM, IR	F105W	SAMP-SEQ=SPARS 50; NSAMP=7	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ021843 (07) (1)	302.934997 Secs (1211.74 Secs)	
								[==>(Pattern 1)]	[1]	
								[==>(Pattern 2)]	[2]	
								[==>(Pattern 3)]		
								[==>(Pattern 4)]		
2	F125W	(7) HSCJ021843-050915	WFC3/IR, MULTIACCUM, IR	F125W	SAMP-SEQ=SPARS 50; NSAMP=7	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ021843 (07) (1)	302.934997 Secs (1211.74 Secs)		
								[==>(Pattern 1)]	[1]	
								[==>(Pattern 2)]	[2]	
								[==>(Pattern 3)]		
								[==>(Pattern 4)]		
3	F160W	(7) HSCJ021843-050915	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=SPARS 50; NSAMP=14	POS TARG 5.46,-1.95	Pattern 1, Exps 1-3 in HSCJ021843 (07) (1)	652.938154 Secs (2611.753 Secs)		
								[==>(Pattern 1)]	[1]	
								[==>(Pattern 2)]	[2]	
								[==>(Pattern 3)]		
								[==>(Pattern 4)]		

