



13002 - Monsters at the Dawn of the Thermal Era: Probing the extremes of galactic mass at $z > 2.5$

Cycle: 20, 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) UDS3433	WFC3/IR	1	06-Aug-2012 22:00:32.0	yes
02	(2) UDS19400	WFC3/IR	1	06-Aug-2012 22:00:39.0	yes
03	(3) UDS35621	WFC3/IR	1	06-Aug-2012 22:00:45.0	yes
04	(4) UDS37091	WFC3/IR	1	06-Aug-2012 22:00:50.0	yes
05	(5) UDS46645	WFC3/IR	1	06-Aug-2012 22:00:55.0	yes
06	(6) UDS90845	WFC3/IR	1	06-Aug-2012 22:00:59.0	yes
07	(7) UDS97905	WFC3/IR	1	06-Aug-2012 22:01:04.0	yes
08	(8) UDS99096	WFC3/IR	1	06-Aug-2012 22:01:09.0	yes
09	(9) UDS104425	WFC3/IR	2	06-Aug-2012 22:01:14.0	yes
10	(10) UDS108509	WFC3/IR	1	06-Aug-2012 22:01:19.0	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>
11	(11) UDS118604	WFC3/IR	2	06-Aug-2012 22:01:23.0	yes
12	(12) UDS138948	WFC3/IR	1	06-Aug-2012 22:01:28.0	yes

14 Total Orbits Used

ABSTRACT

There can now be little doubt that a significant population of massive early-type galaxies exists at $z \sim 2$. Revealed by a combination of wide-field, deep near-IR photometric surveys and medium-resolution near-IR spectroscopy, they look like nothing in the local universe: despite having stellar masses comparable to nearby ellipticals, their average effective radii are 5 times smaller, implying enormous stellar densities. Their formation remains a mystery, as all their stellar mass must have been assembled within the first 1-2 Gyr after the Big Bang. Using new ultradeep, wide-field near-IR imaging, we have now uncovered a population of rare and extremely massive ($\log M/M_{\text{sun}} > 11.2$) quiescent galaxies at even higher redshifts ($2.5 < z < 3.5$). Interestingly, these galaxies do not seem to follow the same size evolution trends as less-extreme galaxies; however, since their sizes are estimated from ground-based imaging, details of their structure (clumps, extended envelopes, and/or multiplicity) cannot be ascertained. These "monster" galaxies are so rare that essentially none will be covered in the infrared by existing large HST surveys. Here we propose WFC3/IR imaging of the 12 most massive quiescent galaxies in our $z > 2.5$ sample to determine their sizes and structural parameters. By combining targeted near-IR imaging of these rare objects with robust sizes of less-massive galaxies from the complementary CANDELS MCT program, we will place the first strong constraints on the structural evolution of the extreme tail of the galaxy population at $z \sim 2.7$.

OBSERVING DESCRIPTION

The purpose of this program is to obtain imaging of twelve $z > 2.5$, massive, compact early-type galaxies (ten for one orbit each, two for two orbits each) in order to place precise limits on their sizes, structures, and morphologies. At these redshifts the most robust band to measure such quantities is the near-IR, which traces rest-frame optical light; we thus employ the F160W filter on WFC3/IR. A well-sampled PSF is critical to perform these measurements, so we will use the standard four-point WFC3-IR-DITHER-BOX pattern; since the targets are all small in extent (< 0.5 arcsec), there is no need to step over IR blobs or the death star.

Proposal 13002 - UDS3433 (01) - Monsters at the Dawn of the Thermal Era: Probing the extremes of galactic mass at $z > 2.5$

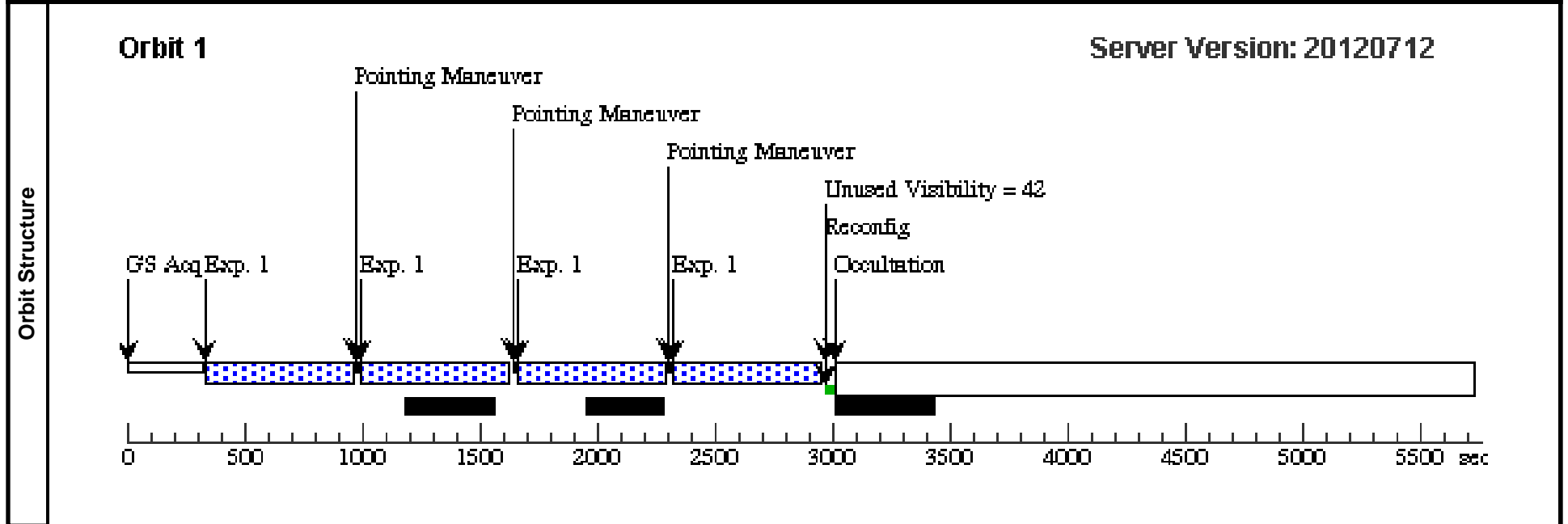
Tue Aug 07 02:01:35 GMT 2012

Visit	Proposal 13002, UDS3433 (01), implementation		
	Diagnostic Status: No Diagnostics		
	Scientific Instruments: WFC3/IR		
	Special Requirements: SCHED 100%		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false	

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	UDS3433	RA: 02 17 56.6933 (34.4862221d) Dec: -05 31 16.65 (-5.52129d) Equinox: J2000		V=26.1+/-0.1 H(AB)=22.9	Reference Frame: ICRS

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	uds3433A	(1) UDS3433	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=SPAR S50			Pattern 1, Exps 1-1 in UDS3433 (01) (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]



Proposal 13002 - UDS19400 (02) - Monsters at the Dawn of the Thermal Era: Probing the extremes of galactic mass at $z>2.5$

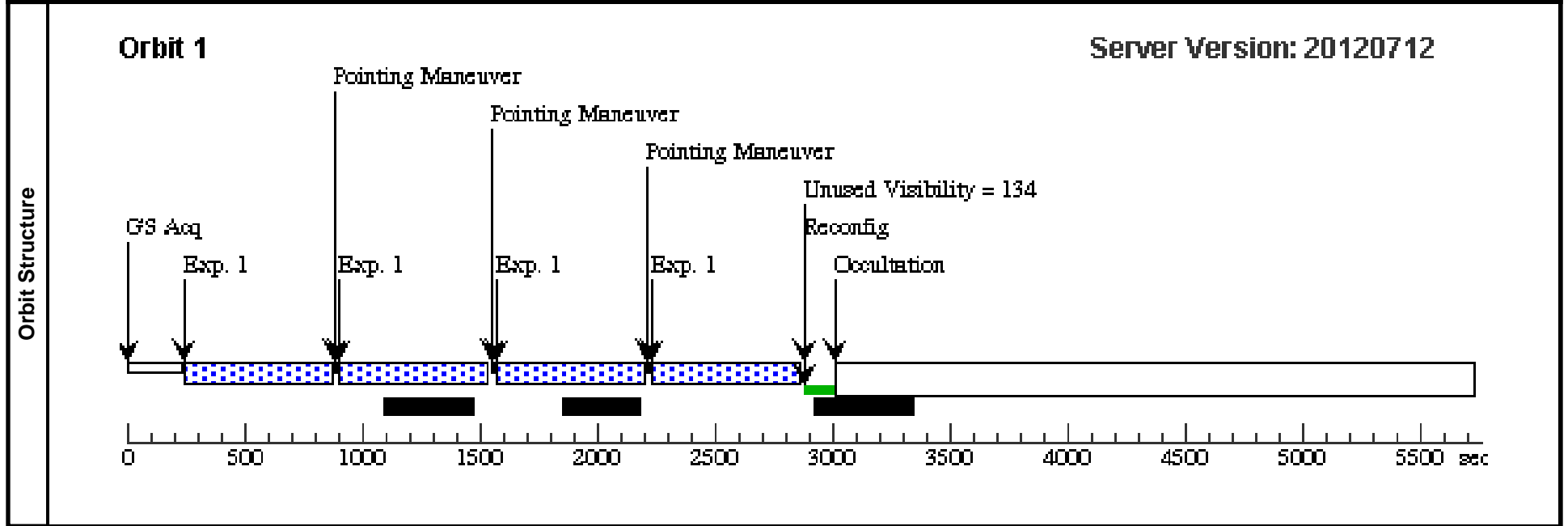
Tue Aug 07 02:01:37 GMT 2012

Visit	Proposal 13002, UDS19400 (02), implementation		
	Diagnostic Status: No Diagnostics		
	Scientific Instruments: WFC3/IR		
	Special Requirements: SCHED 100%		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false	

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(2)	UDS19400	RA: 02 19 11.9292 (34.7997050d) Dec: -05 26 24.62 (-5.44017d) Equinox: J2000		V=25.31+/-0.08 H(AB)=22.7	Reference Frame: ICRS

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	uds19400	(2) UDS19400	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=SPAR S50	GS ACQ SCENARI O ONEB1B	Pattern 1, Exps 1-1 i n UDS19400 (02) (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 13002 - UDS35621 (03) - Monsters at the Dawn of the Thermal Era: Probing the extremes of galactic mass at $z > 2.5$

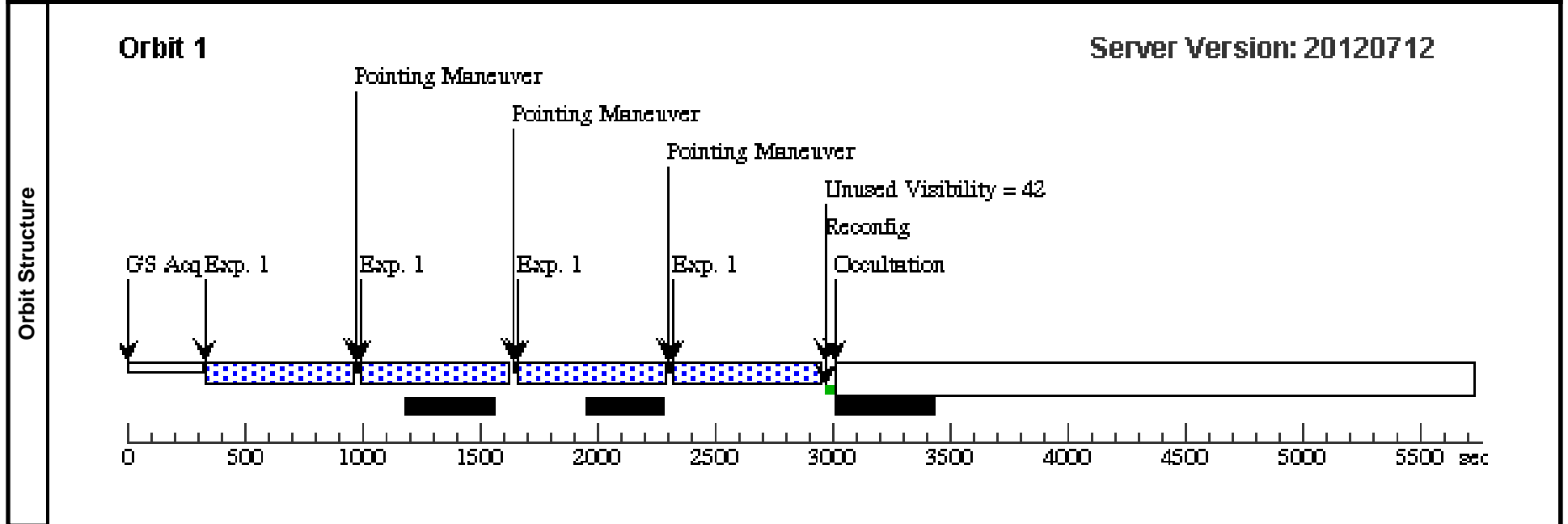
Tue Aug 07 02:01:38 GMT 2012

Visit	Proposal 13002, UDS35621 (03), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: SCHED 100%		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	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	Miscellaneous
	(3)	UDS35621	RA: 02 18 19.4040 (34.5808500d) Dec: -05 21 32.67 (-5.35908d) Equinox: J2000		V=27.12+/-0.21 H(AB)=22.7	Reference Frame: ICRS

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	uds35621	(3) UDS35621	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=SPAR S50		Pattern 1, Exps 1-1 in UDS35621 (03) (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 13002 - UDS37091 (04) - Monsters at the Dawn of the Thermal Era: Probing the extremes of galactic mass at $z>2.5$

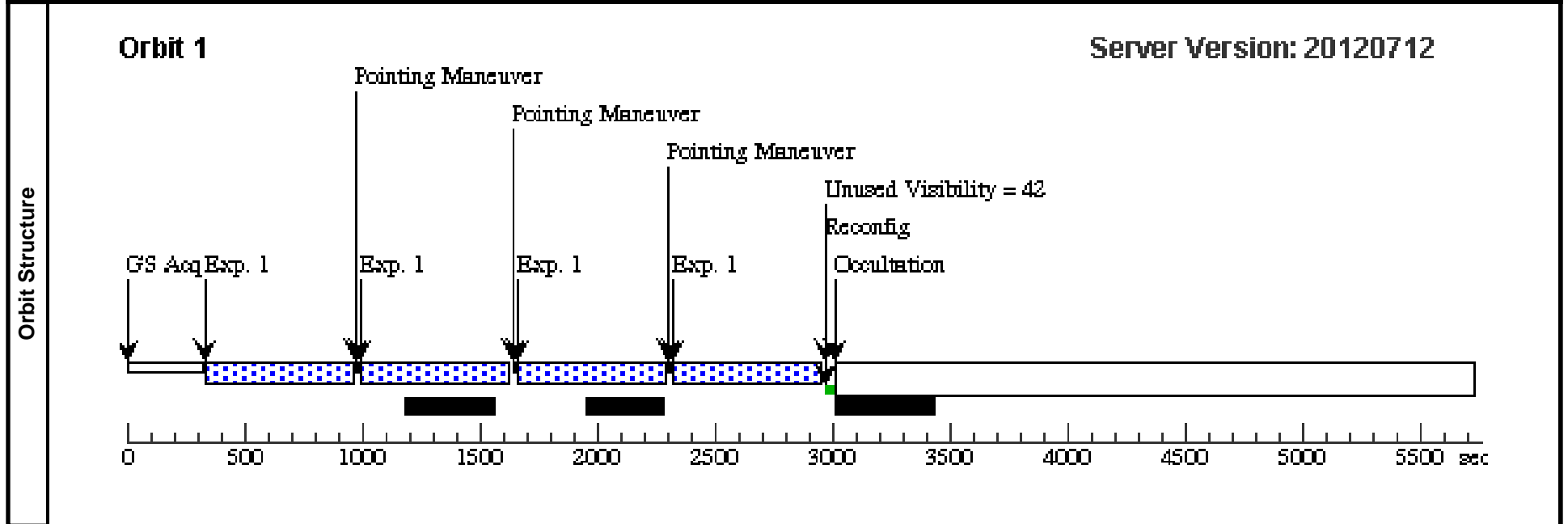
Tue Aug 07 02:01:39 GMT 2012

Visit	Proposal 13002, UDS37091 (04), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: SCHED 100%		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false	

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(4)	UDS37091	RA: 02 17 9.2971 (34.2887379d) Dec: -05 21 7.42 (-5.35206d) Equinox: J2000			V=26.70+/-0.17 H(AB)=21.6

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	uds37091	(4) UDS37091	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=SPAR S50			Pattern 1, Exps 1-1 in UDS37091 (04) (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]



Proposal 13002 - UDS46645 (05) - Monsters at the Dawn of the Thermal Era: Probing the extremes of galactic mass at $z>2.5$

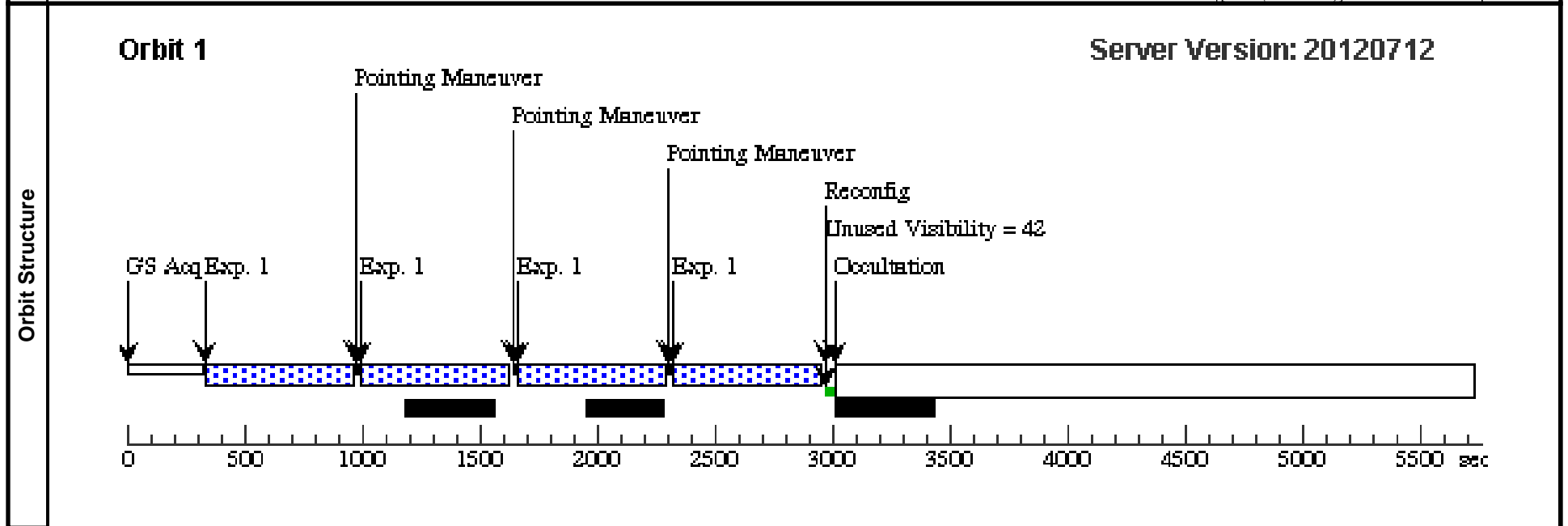
Tue Aug 07 02:01:40 GMT 2012

Visit	Proposal 13002, UDS46645 (05), implementation		
	Diagnostic Status: No Diagnostics		
	Scientific Instruments: WFC3/IR		
	Special Requirements: SCHED 100%		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false	

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(5)	UDS46645	RA: 02 16 59.0909 (34.2462121d) Dec: -05 18 7.07 (-5.30196d) Equinox: J2000		V=26.40+/-0.12 H(AB)=21.5	Reference Frame: ICRS

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	uds46645	(5) UDS46645	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=SPAR S50			Pattern 1, Exps 1-1 in UDS46645 (05) (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]



Proposal 13002 - UDS90845 (06) - Monsters at the Dawn of the Thermal Era: Probing the extremes of galactic mass at $z>2.5$

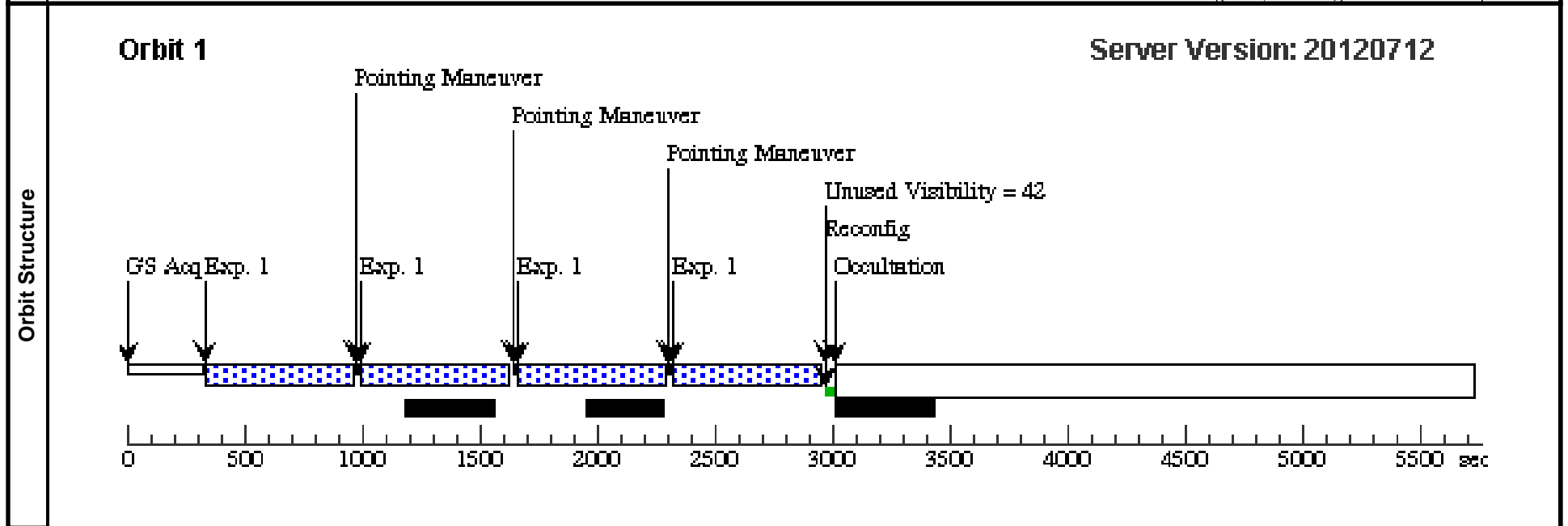
Tue Aug 07 02:01:42 GMT 2012

Visit	Proposal 13002, UDS90845 (06), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: SCHED 100%		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	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	Miscellaneous
	(6)	UDS90845	RA: 02 17 12.7858 (34.3032742d) Dec: -05 04 49.97 (-5.08055d) Equinox: J2000		V=25.99+/-0.08 H(AB)=21.5	Reference Frame: ICRS

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	uds90845	(6) UDS90845	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=SPAR S50		Pattern 1, Exps 1-1 in UDS90845 (06) (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 13002 - UDS97905 (07) - Monsters at the Dawn of the Thermal Era: Probing the extremes of galactic mass at $z>2.5$

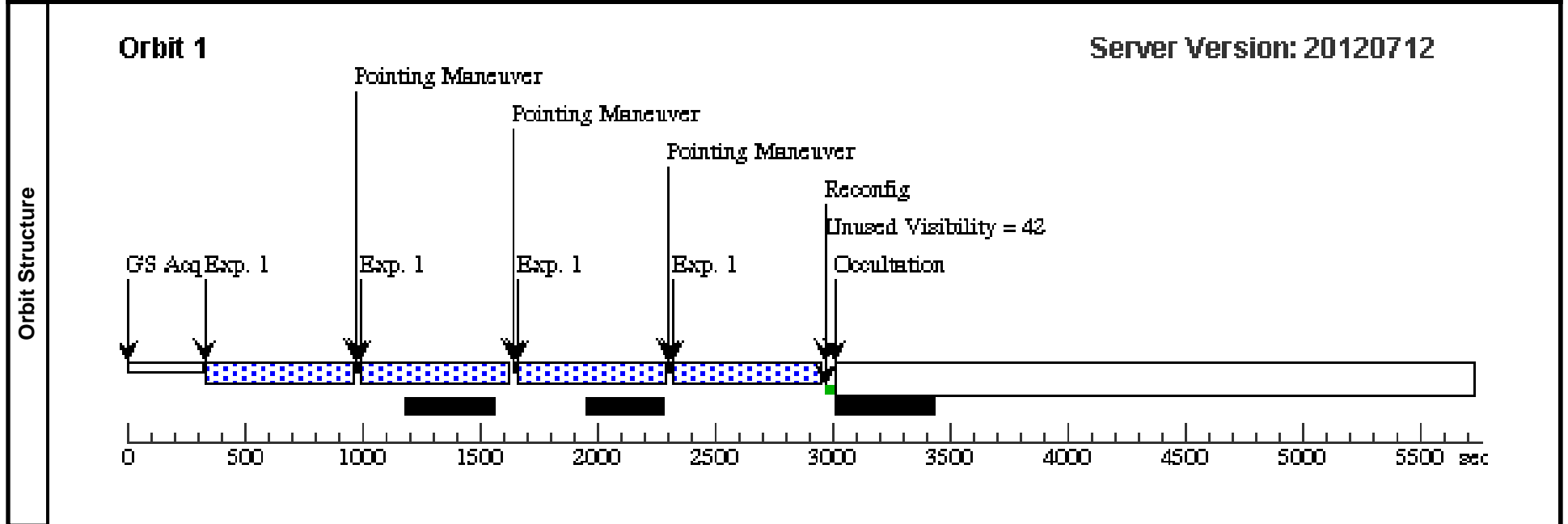
Tue Aug 07 02:01:43 GMT 2012

Visit	Proposal 13002, UDS97905 (07), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: SCHED 100%		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false	

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(7)	UDS97905	RA: 02 16 8.8932 (34.0370550d) Dec: -05 02 37.69 (-5.04380d) Equinox: J2000		V=25.34+/-0.04 H(AB)=22.0	Reference Frame: ICRS

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	uds97905	(7) UDS97905	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=SPAR S50			Pattern 1, Exps 1-1 in UDS97905 (07) (1)	[=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]



Proposal 13002 - UDS99096 (08) - Monsters at the Dawn of the Thermal Era: Probing the extremes of galactic mass at $z>2.5$

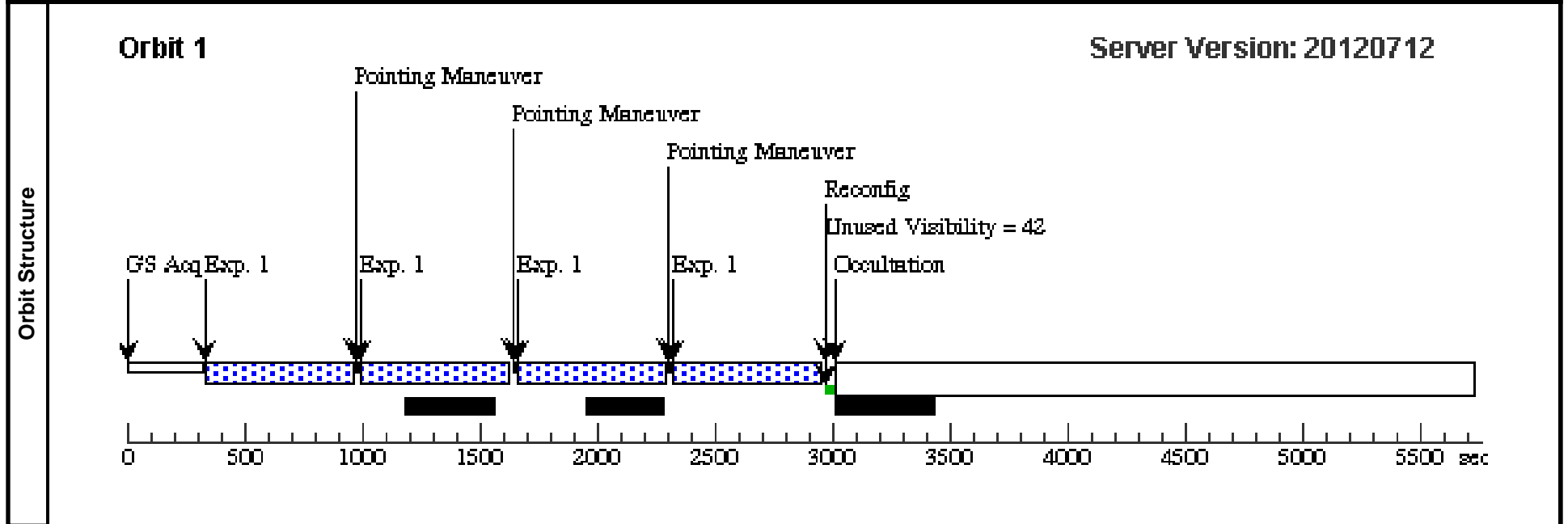
Tue Aug 07 02:01:44 GMT 2012

Visit	Proposal 13002, UDS99096 (08), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: SCHED 100%		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false	

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(8)	UDS99096	RA: 02 17 9.8614 (34.2910892d) Dec: -05 02 17.17 (-5.03810d) Equinox: J2000		V=26.68+/-0.15 H(AB)=22.4	Reference Frame: ICRS

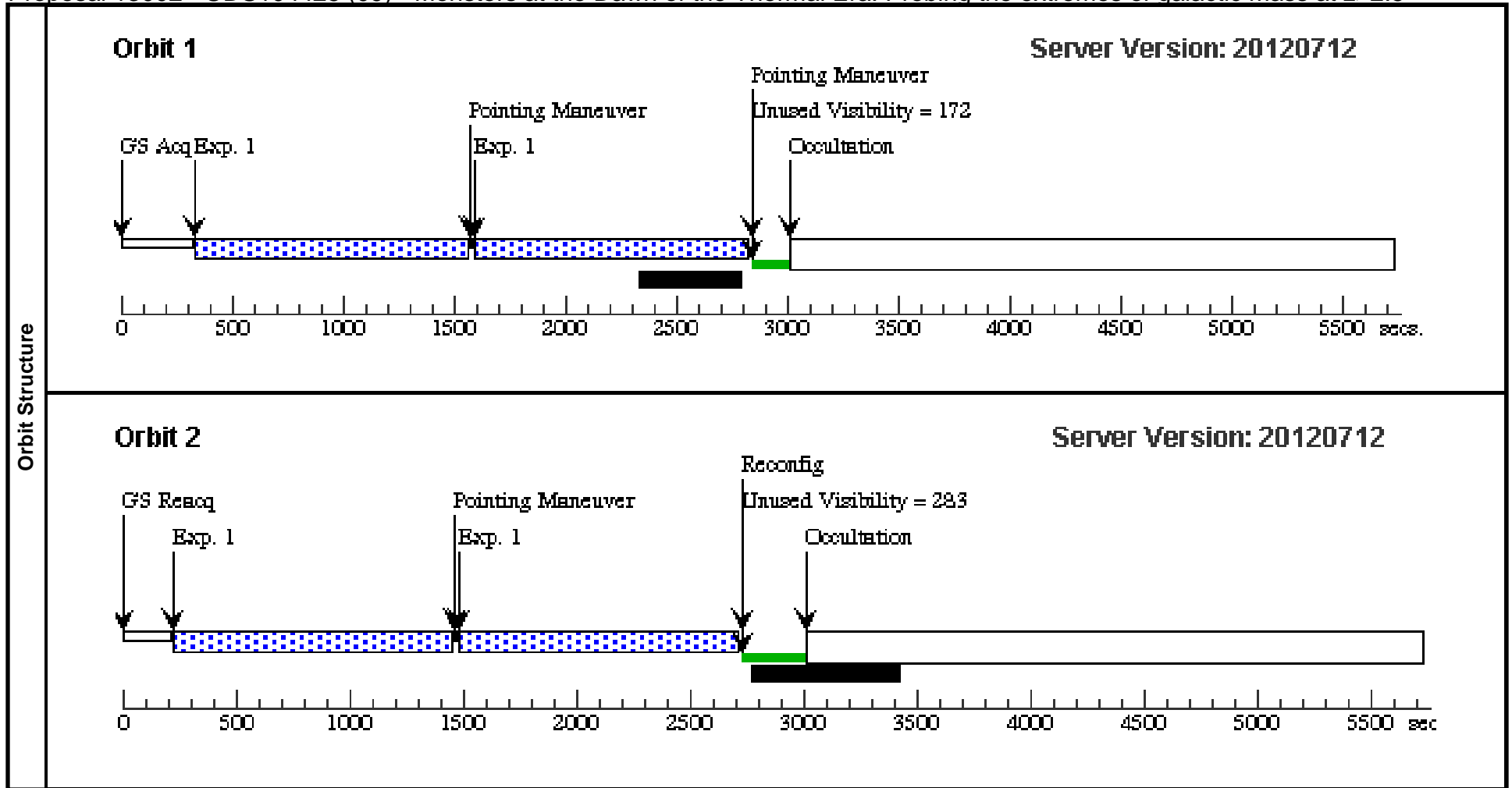
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	uds99096	(8) UDS99096	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=SPAR S50			Pattern 1, Exps 1-1 in UDS99096 (08) (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]



Proposal 13002 - UDS104425 (09) - Monsters at the Dawn of the Thermal Era: Probing the extremes of galactic mass at $z > 2.5$

Tue Aug 07 02:01:45 GMT 2012

Visit	Proposal 13002, UDS104425 (09), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: SCHED 100%										
	Patterns	#	Primary Pattern				Secondary Pattern			Exposures	
		(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	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		Miscellaneous		
	(9)	UDS104425	RA: 02 16 45.2647 (34.1886029d) Dec: -05 00 40.79 (-5.01133d) Equinox: J2000				V=26.67+/-0.19 H(AB)=23.8		Reference Frame: ICRS		
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]		Orbit
	1	uds104425	(9) UDS104425	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=SPAR S100			Pattern 1, Exps 1-1 in UDS104425 (09) (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1] [2]



Proposal 13002 - UDS108509 (10) - Monsters at the Dawn of the Thermal Era: Probing the extremes of galactic mass at $z > 2.5$

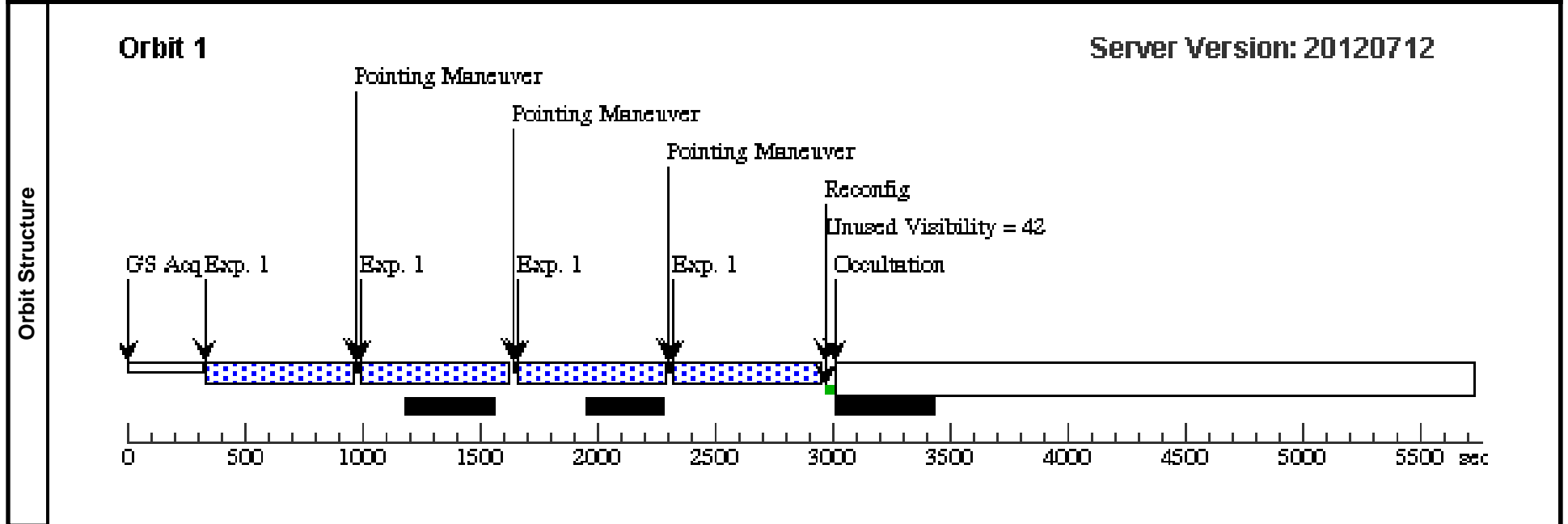
Tue Aug 07 02:01:46 GMT 2012

Visit	Proposal 13002, UDS108509 (10), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: SCHED 100%		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false	

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(10)	UDS108509	RA: 02 18 46.5031 (34.6937629d) Dec: -04 59 29.30 (-4.99147d) Equinox: J2000		V=26.64+/-0.14 H(AB)=22.0	Reference Frame: ICRS

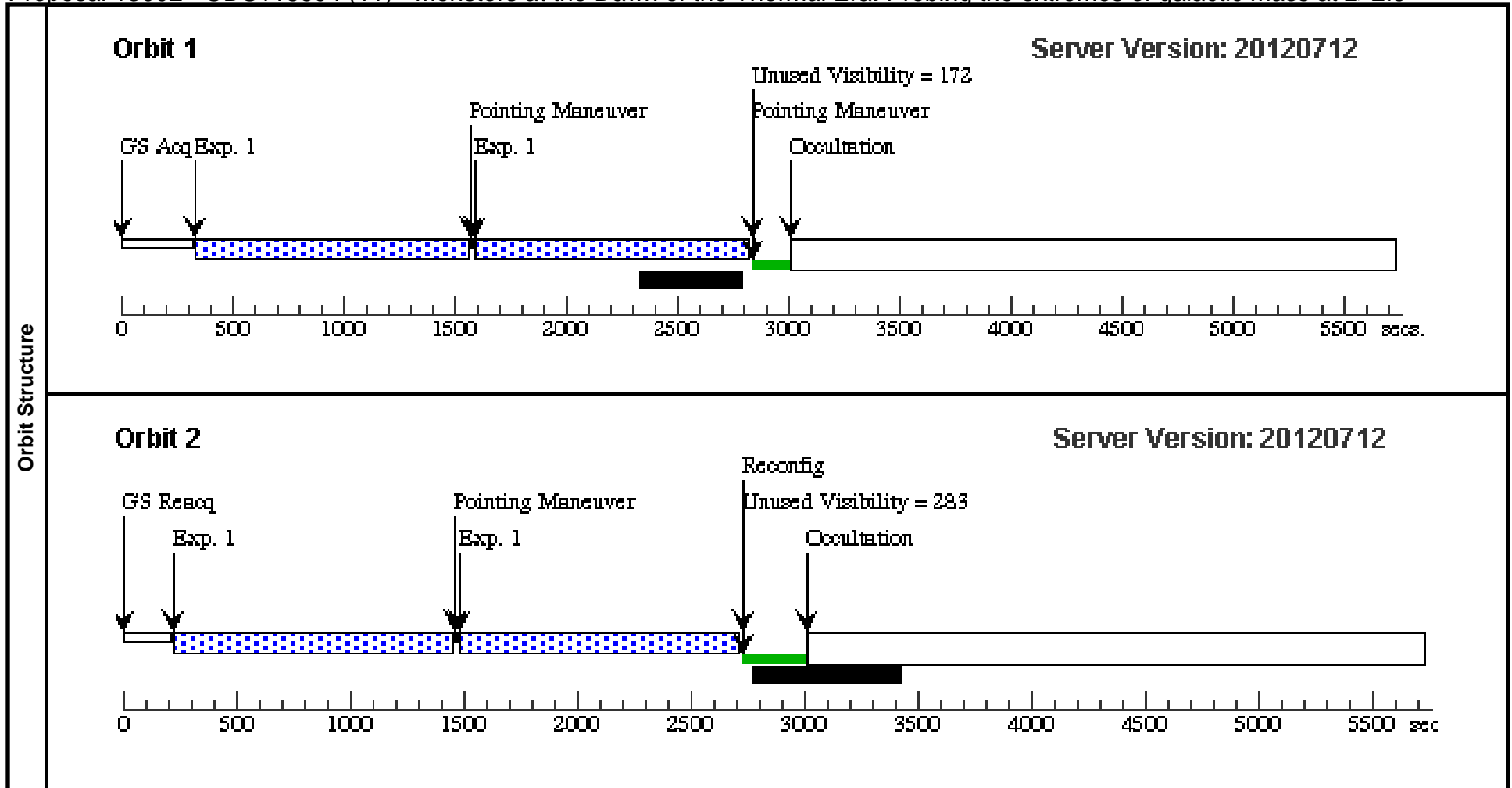
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	uds108509	(10) UDS108509	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=SPAR S50			Pattern 1, Exps 1-1 in UDS108509 (10) (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]



Proposal 13002 - UDS118604 (11) - Monsters at the Dawn of the Thermal Era: Probing the extremes of galactic mass at z>2.5

Tue Aug 07 02:01:47 GMT 2012

Visit	Proposal 13002, UDS118604 (11), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: SCHED 100%										
	Patterns	#	Primary Pattern				Secondary Pattern			Exposures	
		(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	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		Miscellaneous		
	(11)	UDS118604	RA: 02 18 32.2198 (34.6342492d) Dec: -04 56 55.70 (-4.94881d) Equinox: J2000				V=27.48+/-1.12 H(AB)=24.0		Reference Frame: ICRS		
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]		Orbit
	1	uds118604	(11) UDS118604	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=SPAR S100			Pattern 1, Exps 1-1 in UDS118604 (11) (1)	[=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[1] [2]



Proposal 13002 - UDS138948 (12) - Monsters at the Dawn of the Thermal Era: Probing the extremes of galactic mass at $z > 2.5$

Tue Aug 07 02:01:49 GMT 2012

Visit	Proposal 13002, UDS138948 (12), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: SCHED 100%		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false	

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(12)	UDS138948	RA: 02 17 34.6793 (34.3944971d) Dec: -04 50 9.92 (-4.83609d) Equinox: J2000		V=27.16+/-0.21 H(AB)=21.9	Reference Frame: ICRS

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	uds138948	(12) UDS138948	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=SPAR S50			Pattern 1, Exps 1-1 in UDS138948 (12) (1)	[=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]

