



## 14653 - The most luminous galaxies: strongly lensed SMGs at $1 < z < 4$

Cycle: 24, Proposal Category: GO

(Availability Mode: SUPPORTED)

### INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
<b>Dr. James Lowenthal (PI) (Contact)</b>	<b>Smith College</b>	<b>jlowenth@smith.edu</b>
Prof. Min S. Yun (CoI)	University of Massachusetts - Amherst	myun@astro.umass.edu
Prof. Q. Daniel Wang (CoI)	University of Massachusetts - Amherst	wqd@umass.edu
Dr. Itziar Aretxaga (CoI)	Instituto Nacional de Astrofísica, Óptica y Electrónica	itziar@inaoep.mx
Dr. Roberto J. Terlevich (CoI) (ESA Member)	University of Cambridge	rjt@ast.cam.ac.uk
Dr. David Hughes (CoI)	Instituto Nacional de Astrofísica, Óptica y Electrónica	dhughes@inaoep.mx
Kevin Harrington (CoI)	University of Massachusetts - Amherst	kharring@umass.edu
Mr. Derek A Berman (CoI)	University of Massachusetts - Amherst	daberman@umass.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) J011646.77	WFC3/IR	1	09-Nov-2016 11:34:32.0	yes
02	(2) J014341.2	WFC3/IR	1	09-Nov-2016 11:34:33.0	yes
03	(3) J020941.3	WFC3/IR	1	09-Nov-2016 11:34:34.0	yes
04	(4) J022633.98	WFC3/IR	1	09-Nov-2016 11:34:35.0	yes
05	(5) J030510.62	WFC3/IR	1	09-Nov-2016 11:34:35.0	yes
06	(6) J074851.72	WFC3/IR	1	09-Nov-2016 11:34:36.0	yes
07	(7) J084648.55	WFC3/IR	1	09-Nov-2016 11:34:37.0	yes
08	(8) J112713.44	WFC3/IR	1	09-Nov-2016 11:34:38.0	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>
09	(9) J113805.53	WFC3/IR	1	09-Nov-2016 11:34:38.0	yes
10	(10) J113921.74	WFC3/IR	1	09-Nov-2016 11:34:39.0	yes
11	(11) J114038.50	WFC3/IR	1	09-Nov-2016 11:34:40.0	yes
12	(12) J114329.52	WFC3/IR	1	09-Nov-2016 11:34:41.0	yes
13	(13) J120207.90	WFC3/IR	1	09-Nov-2016 11:34:42.0	yes
14	(14) J132217.52	WFC3/IR	1	09-Nov-2016 11:34:42.0	yes
15	(15) J132630.25	WFC3/IR	1	09-Nov-2016 11:34:43.0	yes
16	(16) J133634.94	WFC3/IR	1	09-Nov-2016 11:34:44.0	yes
17	(17) J141230.51	WFC3/IR	1	09-Nov-2016 11:34:44.0	yes
18	(18) J142823.9	WFC3/IR	1	09-Nov-2016 11:34:45.0	yes
19	(19) J144653.20	WFC3/IR	1	09-Nov-2016 11:34:46.0	yes
20	(20) J144958.59	WFC3/IR	1	09-Nov-2016 11:34:47.0	yes
21	(21) J160722.77	WFC3/IR	1	09-Nov-2016 11:34:48.0	yes
22	(22) J231356.64	WFC3/IR	1	09-Nov-2016 11:34:49.0	yes

22 Total Orbits Used

## ABSTRACT

About half of all star formation at high redshift is thought to take place in dust-shrouded starburst galaxies not easily detected in rest-UV surveys. Studying their star formation and gas properties in detail is important but very difficult. We have assembled a new sample of some of the most FIR-luminous galaxies in the Universe and have imaged them in 1.1 mm dust emission and measured their redshifts  $1 < z < 4$  via CO emission lines using the LMT. Our sample of 31 submm galaxies (SMGs) in 28 fields, culled from the Planck and Herschel all-sky surveys, includes 14 of the 21 most luminous galaxies known, with  $L_{\text{FIR}} > 10^{14} L_{\text{sun}}$  and  $\text{SFR} > 10^4 M_{\text{sun}}/\text{yr}$ . These extreme inferred luminosities -- and multiple / extended 1.1 mm images -- imply that most or all are strongly gravitationally lensed, with typical magnification  $\sim 10x$ . About half of the intervening lenses are likely massive galaxy clusters at  $z \sim 1$ , with the other half presumably massive galaxies aligned by chance with the SMG. Here we seek deep WFC3/IR images of 22 fields lacking deep HST coverage. Our science goals are (1) to build accurate lensing models, which requires high-resolution images of lensing galaxies and clusters and lensed background galaxies, arcs, and Einstein rings; and (2) to apply the lensing models to any lensed images of

the background SMGs themselves to derive structural details of gas and star formation down to scales of 10 to 100 pc, which is needed to understand the fueling and triggering mechanisms of these extreme starbursts. This unique sample of lensed super-starbursts is unlike any previous sample of SMGs and promises new insight into the formation of massive galaxies at early epochs.

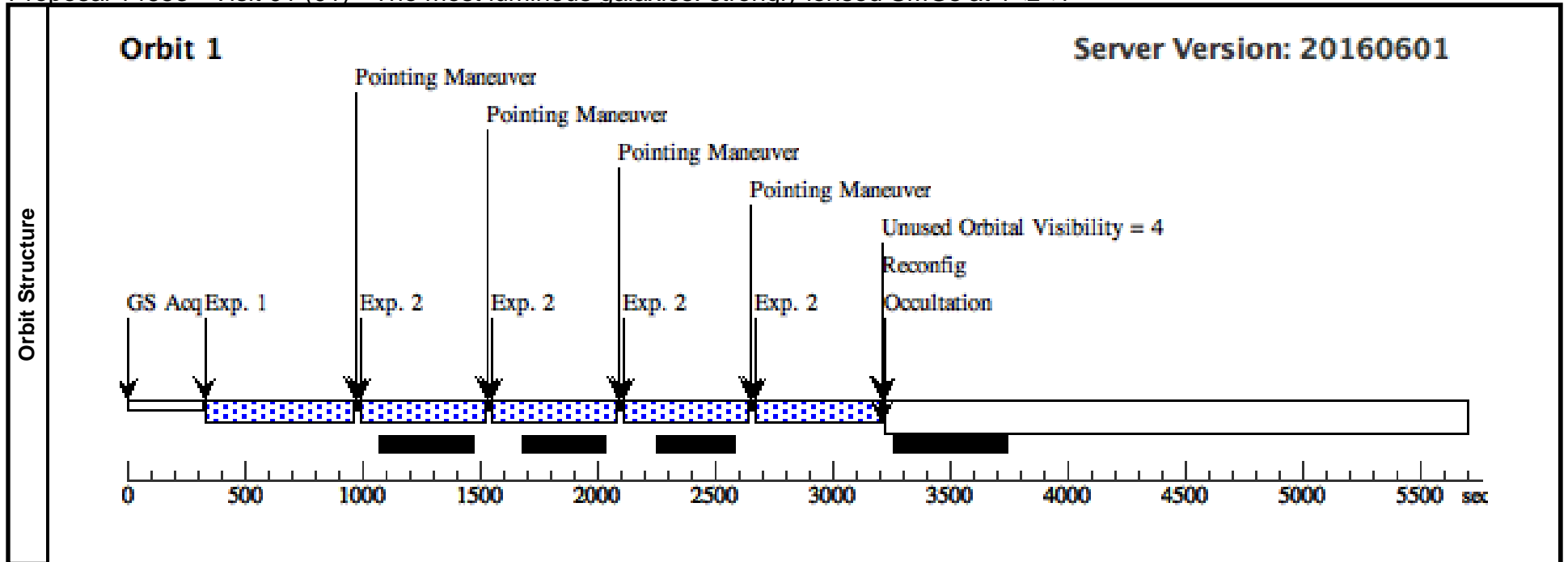
### **OBSERVING DESCRIPTION**

We will obtain one-orbit images with WFC3/IR F160W of each of our 22 high-redshift, gravitationally lensed sub-millimeter galaxy targets. The goal is to obtain the deepest images with the best resolution possible. We will take 5 dithered exposures of each target at 5 different pointings: 4 using the WFC3-IR-DITHER-BOX-MIN pattern and 1 simple exposure. For the pattern, we use the default small spacing of  $0.572 \times 0.365$  arcsec, centered on the target (i.e. 4 points distributed around the target). Each exposure uses SAMP-SEQ = STEP50 and NSAMP=15. This gives exposure times of 499 sec for each pointing. With 5 exposures per target, this leaves only ~100 sec unused in each orbit. This appears to be the best combination of SAMP-SEQ and NSAMP for packing the orbits with background-limited exposures.

Proposal 14653 - Visit 01 (01) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

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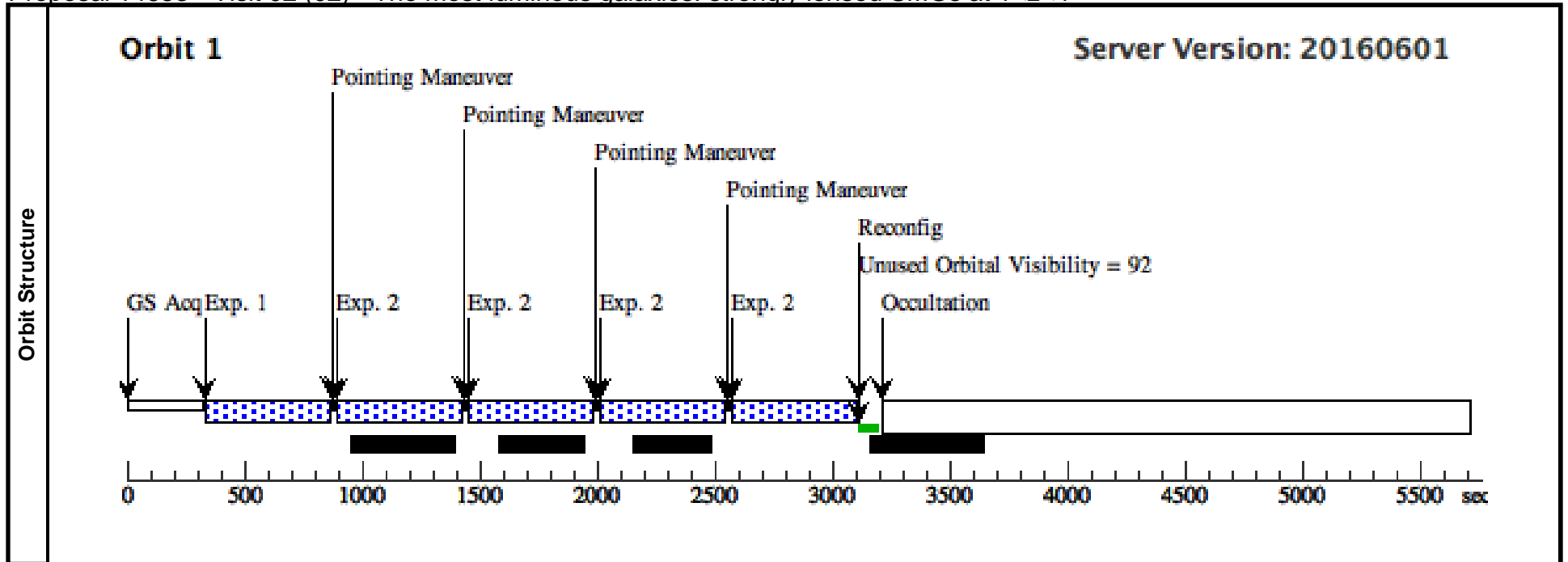
Visit	<b>Proposal 14653, Visit 01 (01), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	J011646.77	RA: 01 16 46.7700 (19.1948750d) Dec: -24 37 1.90 (-24.61719d) Equinox: J2000		V=25	Reference Frame: ICRS				
	<i>Comments: Extended=YES</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(1) J011646.77	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=STEP100			599.232292 Secs (599.232 Secs) [==>]	[1]
	2		(1) J011646.77	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50		Pattern 1, Exps 2-2 in Visit 01 (01) (1)	499.234285 Secs (1996.937 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 02 (02) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

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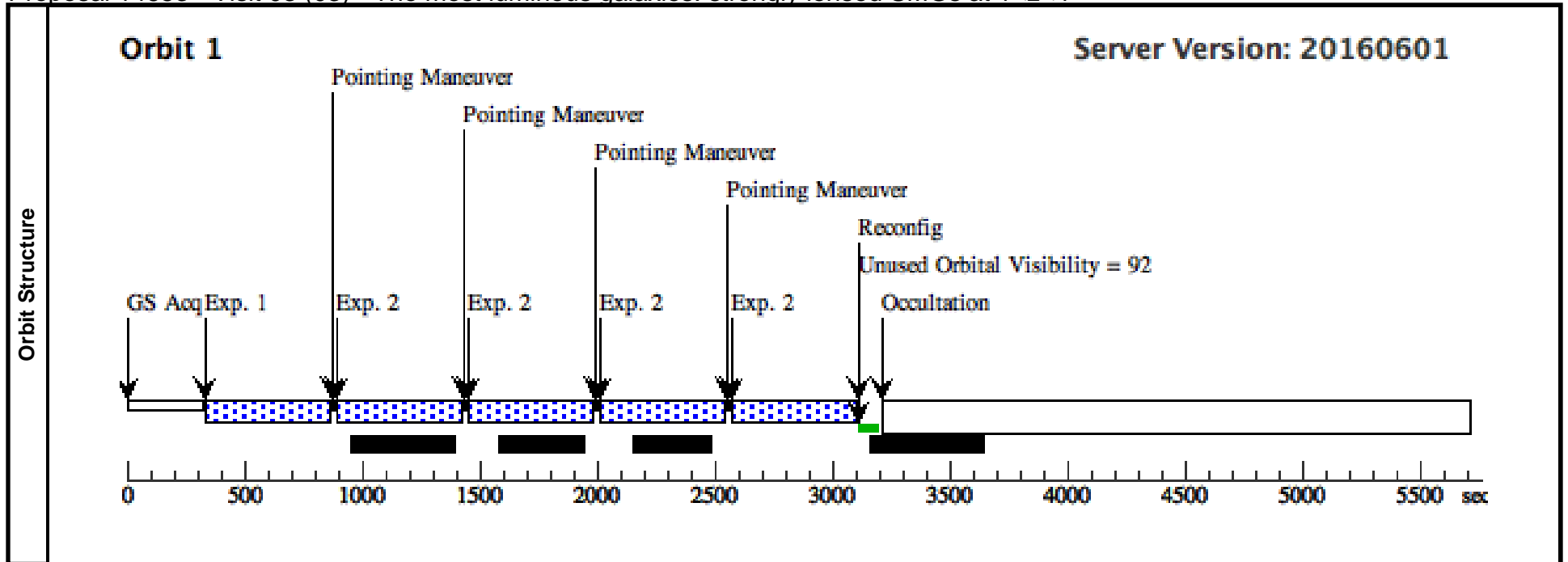
Visit		<b>Proposal 14653, Visit 02 (02), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)								
Patterns	#	Primary Pattern	Secondary Pattern	Exposures						
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(2)	J014341.2	RA: 01 43 41.2000 (25.9216667d) Dec: -01 47 26.00 (-1.79056d) Equinox: J2000		V=25	Reference Frame: ICRS				
<i>Comments: Extended=YES</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(2) J014341.2	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP5 0			499.234285 Secs (499.234 Secs)	
									[==>]	[1]
2		(2) J014341.2	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP5 0			Pattern 1, Exps 2-2 in Visit 02 (02) (1)	499.234285 Secs (1996.937 Secs)	
									[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 03 (03) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

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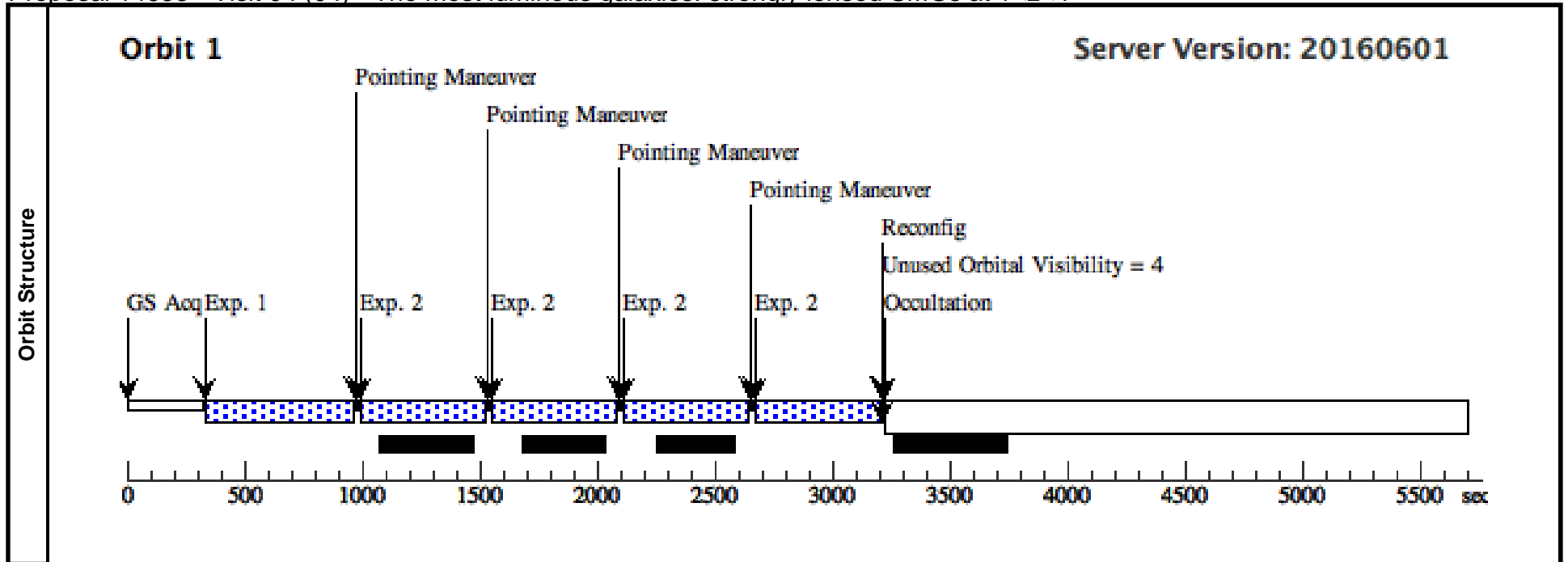
Visit	<b>Proposal 14653, Visit 03 (03), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(3)	J020941.3	RA: 02 09 41.3000 (32.4220833d) Dec: +00 15 59.00 (.26639d) Equinox: J2000		V=25	Reference Frame: ICRS				
	<i>Comments: Extended=YES</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(3) J020941.3	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP5 0			499.234285 Secs (499.234 Secs) [==>]	[1]
	2		(3) J020941.3	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP5 0		Pattern 1, Exps 2-2 in Visit 03 (03) (1)	499.234285 Secs (1996.937 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 04 (04) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

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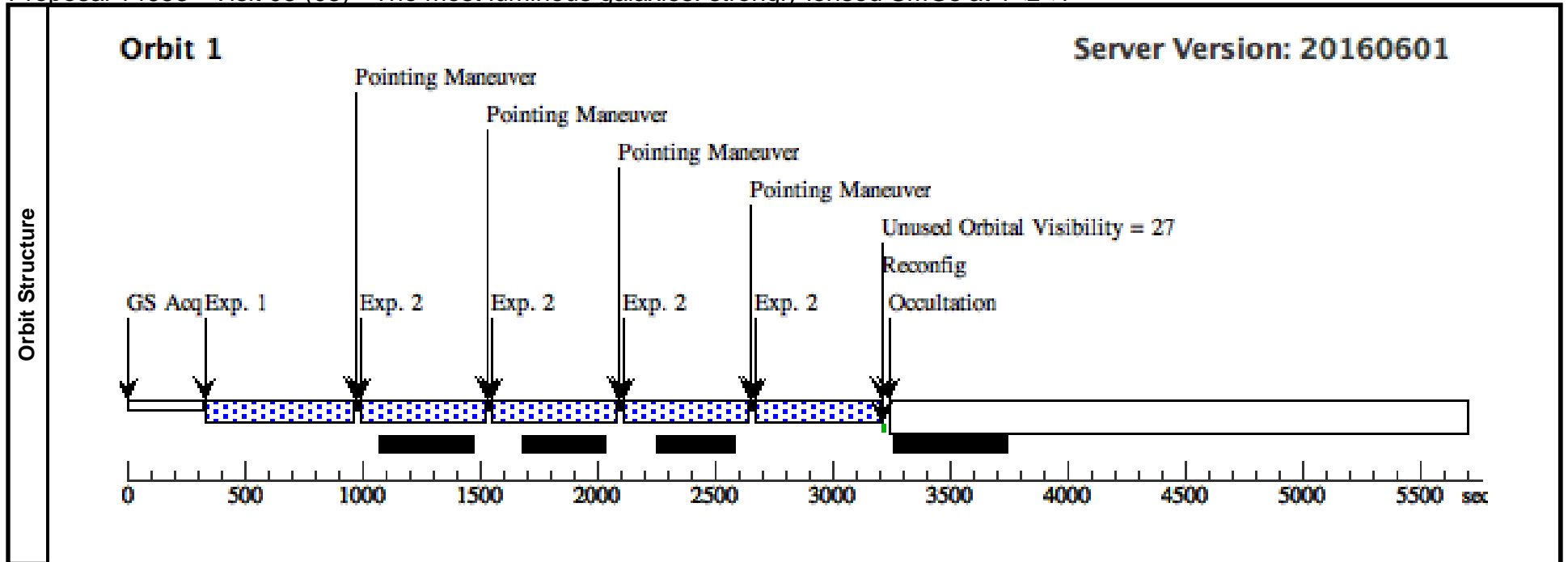
Visit	<b>Proposal 14653, Visit 04 (04), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(4)	J022633.98	RA: 02 26 33.9800 (36.6415833d) Dec: +23 45 28.30 (23.75786d) Equinox: J2000		V=25	Reference Frame: ICRS				
	<i>Comments: Extended=YES</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(4) J022633.98	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=STEP100			599.232292 Secs (599.232 Secs) [==>]	[1]
	2		(4) J022633.98	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50		Pattern 1, Exps 2-2 in Visit 04 (04) (1)	499.234285 Secs (1996.937 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 05 (05) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

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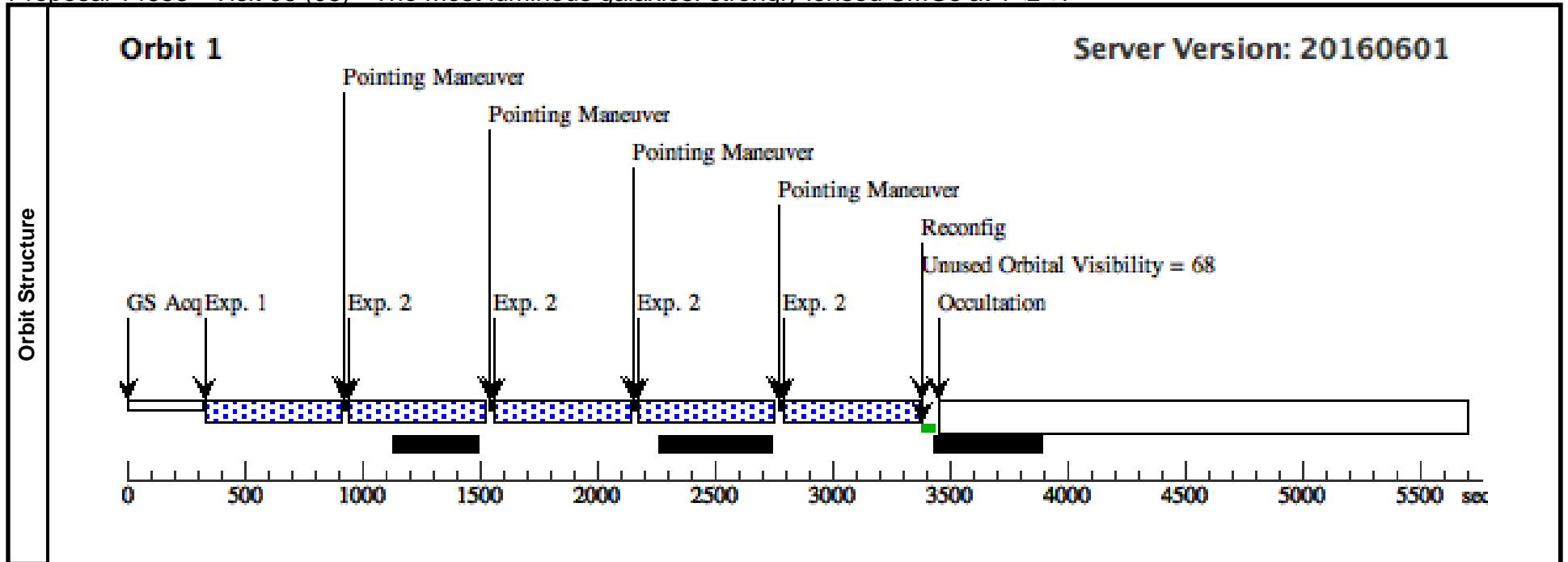
Visit	<b>Proposal 14653, Visit 05 (05), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
Patterns	#	Primary Pattern		Secondary Pattern		Exposures				
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true			(2)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(5)	J030510.62	RA: 03 05 10.6200 (46.2942500d) Dec: -30 36 30.30 (-30.60842d) Equinox: J2000		V=25	Reference Frame: ICRS				
	<i>Comments: Extended=YES</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(5) J030510.62	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=STEP100			599.232292 Secs (599.232 Secs) [==>]	[1]
	2		(5) J030510.62	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50		Pattern 1, Exps 2-2 in Visit 05 (05) (1)	499.234285 Secs (1996.937 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 06 (06) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

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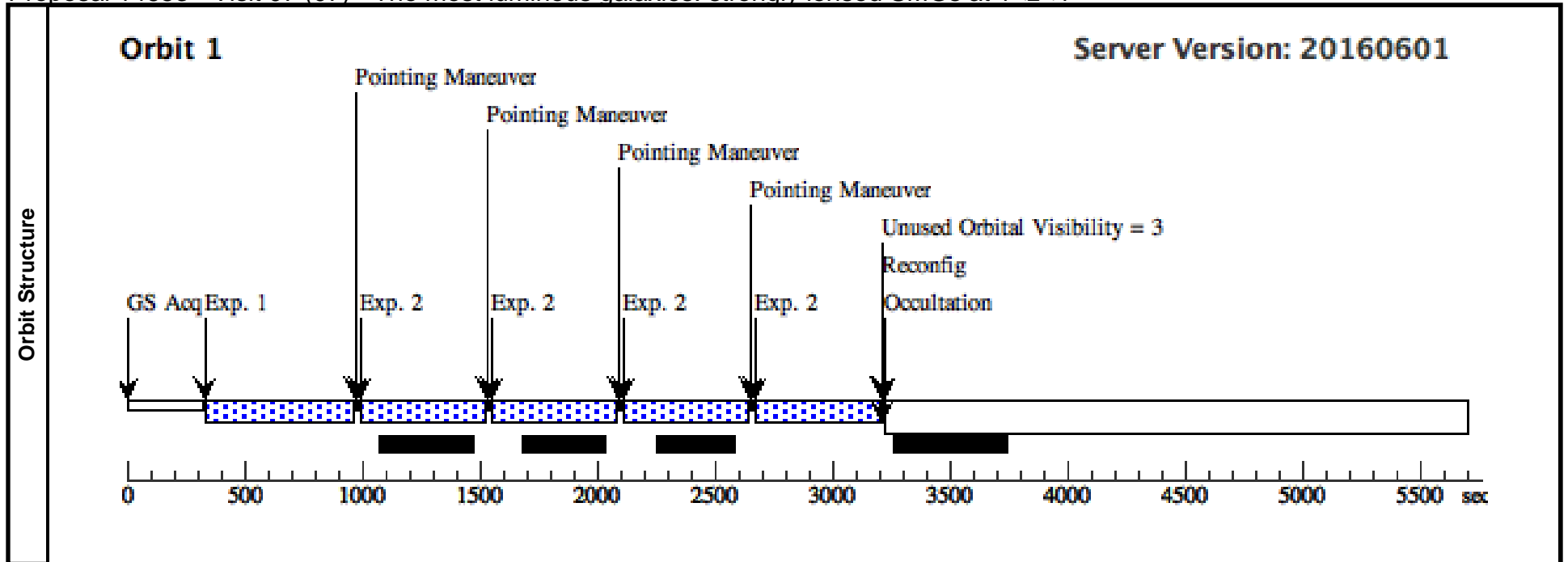
Visit	<b>Proposal 14653, Visit 06 (06), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(6)	J074851.72	RA: 07 48 52.1700 (117.2173750d) Dec: +59 42 1.40 (59.70039d) Equinox: J2000		V=25	Reference Frame: ICRS				
	<i>Comments: coord is mean posn between J074851.72 and J074852.61</i> Extended=YES									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(6) J074851.72	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPAR S50			552.937252 Secs (552.937 Secs) [==>]	[1]
	2		(6) J074851.72	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPAR S50		Pattern 1, Exps 2-2 in Visit 06 (06) (1)	552.937252 Secs (2211.749 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 07 (07) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

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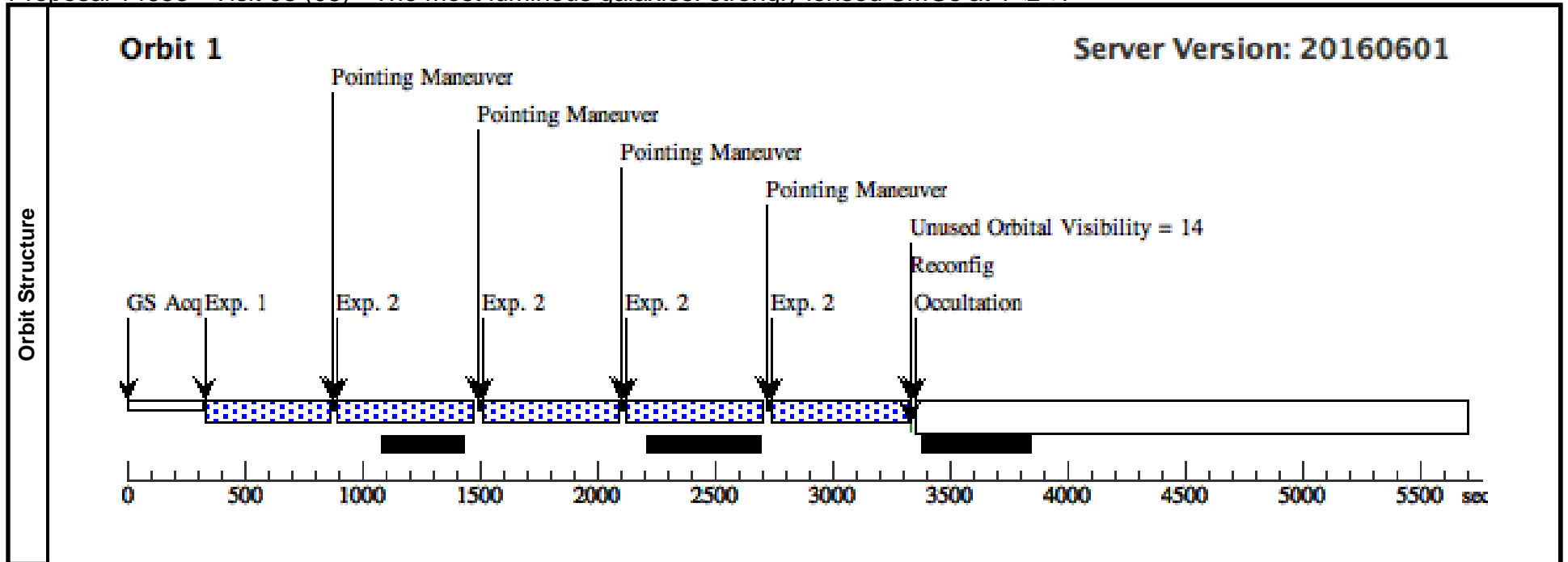
Visit	<b>Proposal 14653, Visit 07 (07), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(7)	J084648.55	RA: 08 46 49.3500 (131.7056250d) Dec: +15 05 52.10 (15.09781d) Equinox: J2000		V=25	Reference Frame: ICRS				
	<i>Comments: coord is mean posn between J084648.55 and J084650.16</i> Extended=YES									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(7) J084648.55	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=STEP100			599.232292 Secs (599.232 Secs) [==>]	[1]
	2		(7) J084648.55	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50		Pattern 1, Exps 2-2 in Visit 07 (07) (1)	499.234285 Secs (1996.937 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 08 (08) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

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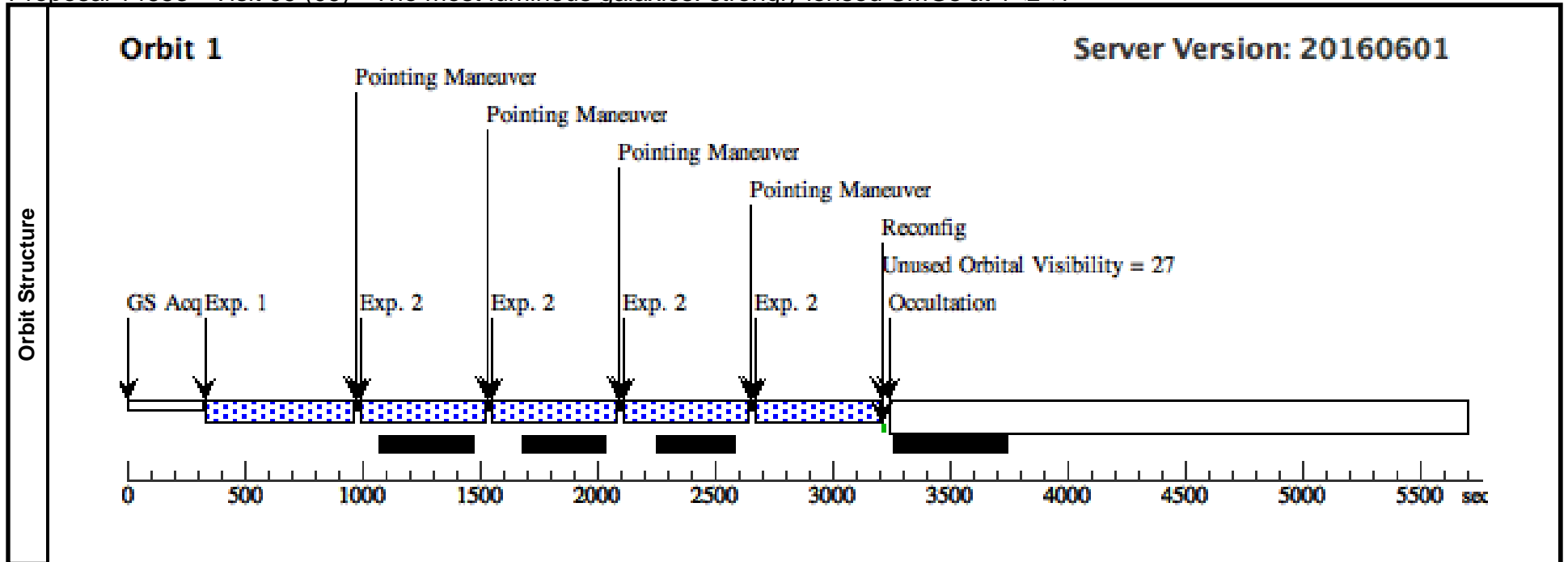
Visit	<b>Proposal 14653, Visit 08 (08), implementation</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 38.4D TO 108.4 D; ORIENT 128.4D TO 198.4 D; ORIENT 218.4D TO 288.4 D; ORIENT 308.4D TO 18.4 D									
	Patterns	#	Primary Pattern	Secondary 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=true		(2)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(8)	J112713.44	RA: 11 27 13.4400 (171.8060000d) Dec: +46 09 24.10 (46.15669d) Equinox: J2000  <i>Comments: Extended=YES</i>		V=25	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(8) J112713.44	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=11; SAMP-SEQ=SPAR S50			502.936801 Secs (502.937 Secs) [==>]	[1]
2		(8) J112713.44	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPAR S50			Pattern 1, Exps 2-2 i n Visit 08 (08) (1) 552.937252 Secs (2211.749 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]	



Proposal 14653 - Visit 09 (09) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

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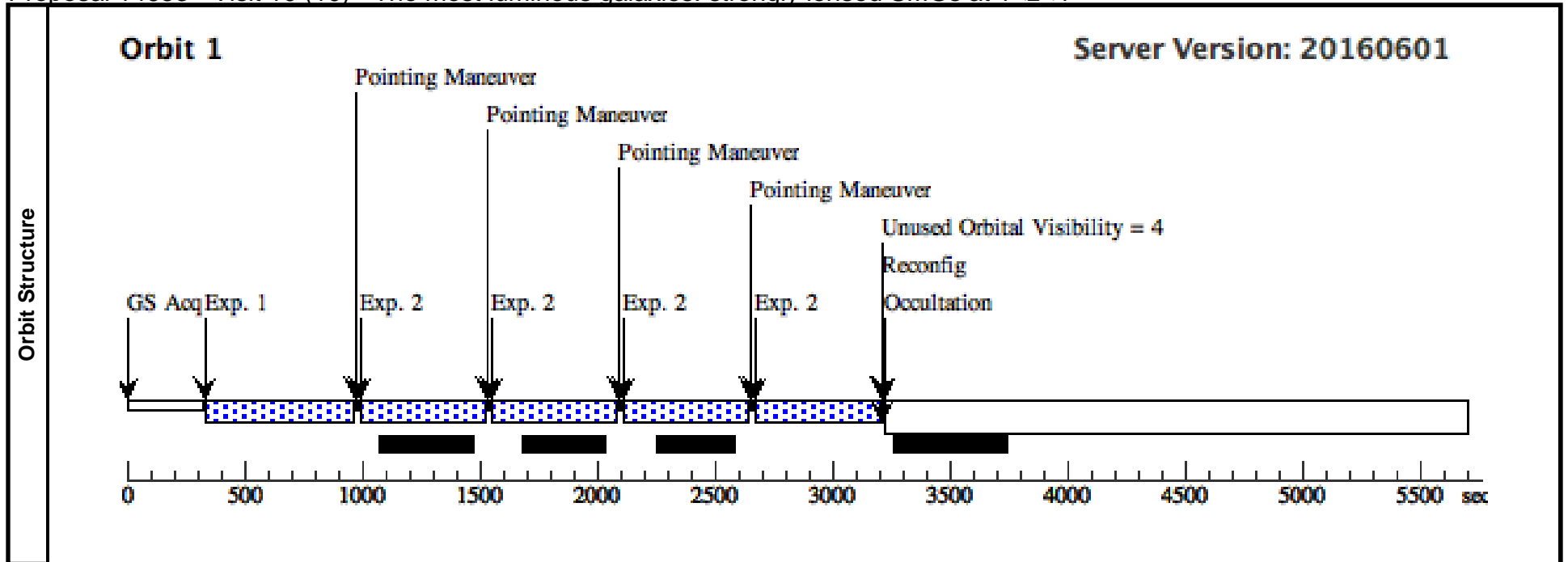
Visit	<b>Proposal 14653, Visit 09 (09), implementation</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 40.2D TO 110.2 D; ORIENT 130.2D TO 200.2 D; ORIENT 220.2D TO 290.2 D; ORIENT 310.0D TO 20.2 D									
	Patterns	#	Primary Pattern	Secondary 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=true		(2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(9)	J113805.53	RA: 11 38 5.5300 (174.5230417d) Dec: +32 57 56.90 (32.96581d) Equinox: J2000		V=25	Reference Frame: ICRS				
	<i>Comments: Extended=YES</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(9) J113805.53	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=STEP100			599.232292 Secs (599.232 Secs) [==>]	[1]
	2		(9) J113805.53	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50		Pattern 1, Exps 2-2 in Visit 09 (09) (1)	499.234285 Secs (1996.937 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 10 (10) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

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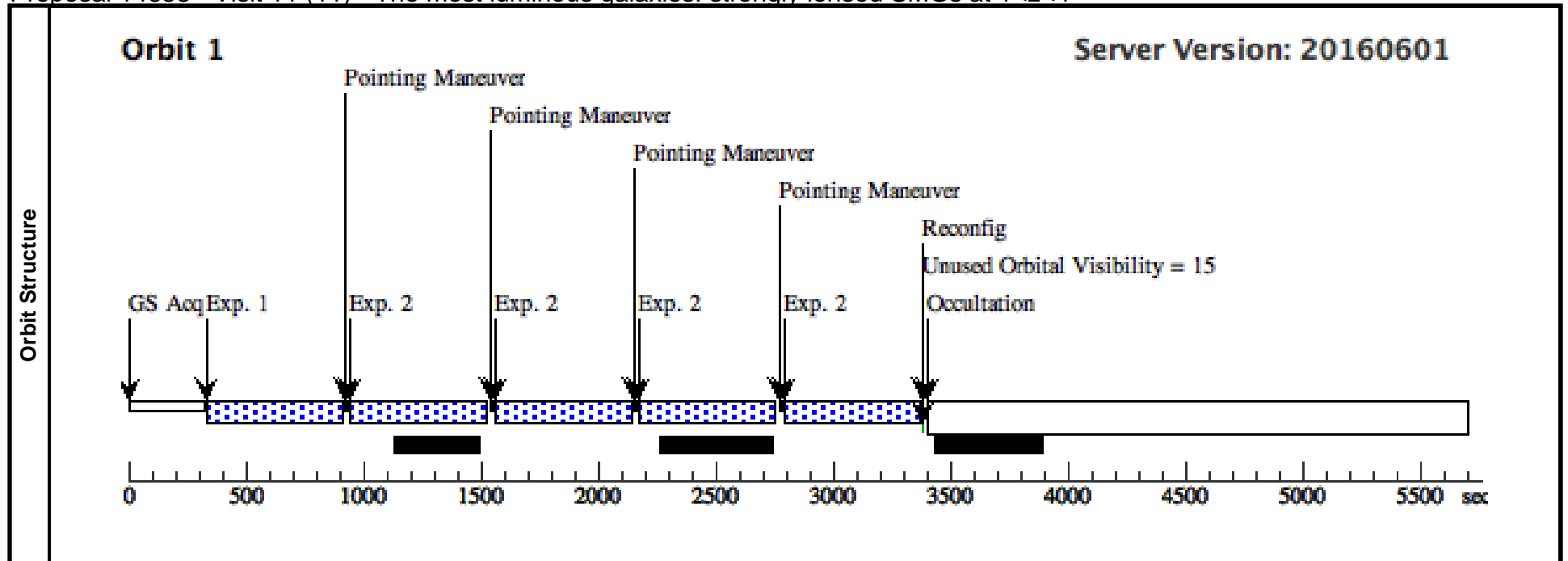
Visit	<b>Proposal 14653, Visit 10 (10), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(10)	J113921.74	RA: 11 39 21.7400 (174.8405833d) Dec: +20 24 50.90 (20.41414d) Equinox: J2000		V=25	Reference Frame: ICRS				
	<i>Comments: Extended=YES</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(10) J113921.74	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=STEP100			599.232292 Secs (599.232 Secs) [==>]	[1]
	2		(10) J113921.74	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50		Pattern 1, Exps 2-2 in Visit 10 (10) (1)	499.234285 Secs (1996.937 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 11 (11) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

Wed Nov 09 16:34:50 GMT 2016

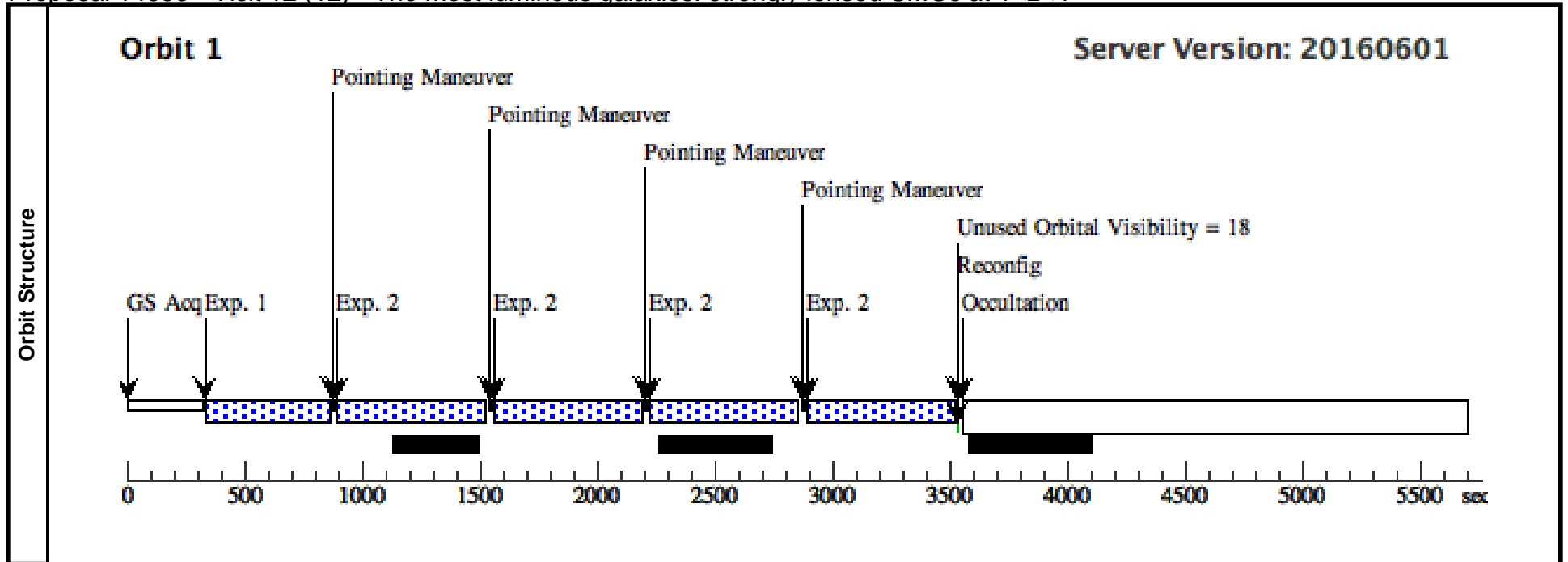
Visit	<b>Proposal 14653, Visit 11 (11), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(2)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(11)	J114038.50	RA: 11 40 38.5000 (175.1604167d) Dec: +53 21 56.80 (53.36578d) Equinox: J2000  <i>Comments: Extended=YES</i>		V=25	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(11) J114038.50	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPAR S50			552.937252 Secs (552.937 Secs) [==>]	[1]
2		(11) J114038.50	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPAR S50			Pattern 1, Exps 2-2 in Visit 11 (11) (1) 552.937252 Secs (2211.749 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]	



Proposal 14653 - Visit 12 (12) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

Wed Nov 09 16:34:51 GMT 2016

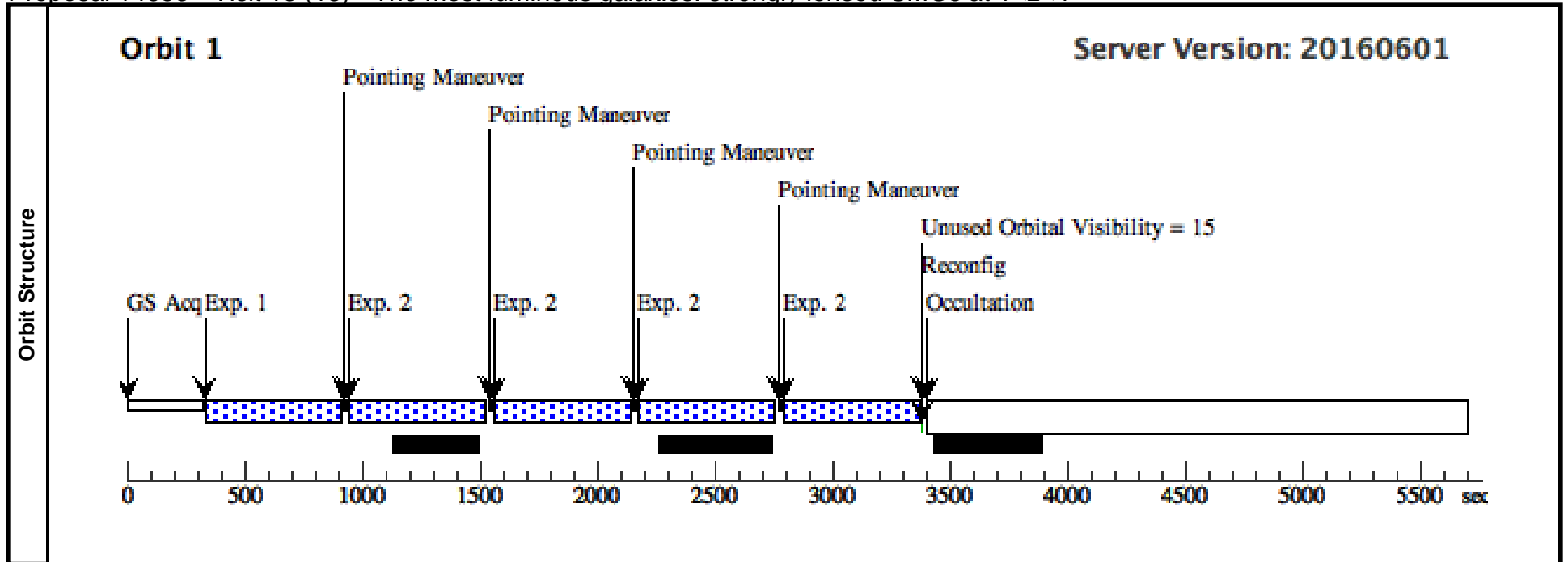
Visit	<b>Proposal 14653, Visit 12 (12), scheduled</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(12)	J114329.52	RA: 11 43 29.5200 (175.8730000d) Dec: +68 01 6.70 (68.01853d) Equinox: J2000  <i>Comments: Extended=YES</i>		V=25	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(12) J114329.52	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=11; SAMP-SEQ=SPAR S50			502.936801 Secs (502.937 Secs) [==>]	[1]
2		(12) J114329.52	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=SPAR S50			Pattern 1, Exps 2-2 in Visit 12 (12) (1) 602.937703 Secs (2411.751 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]	



Proposal 14653 - Visit 13 (13) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

Wed Nov 09 16:34:51 GMT 2016

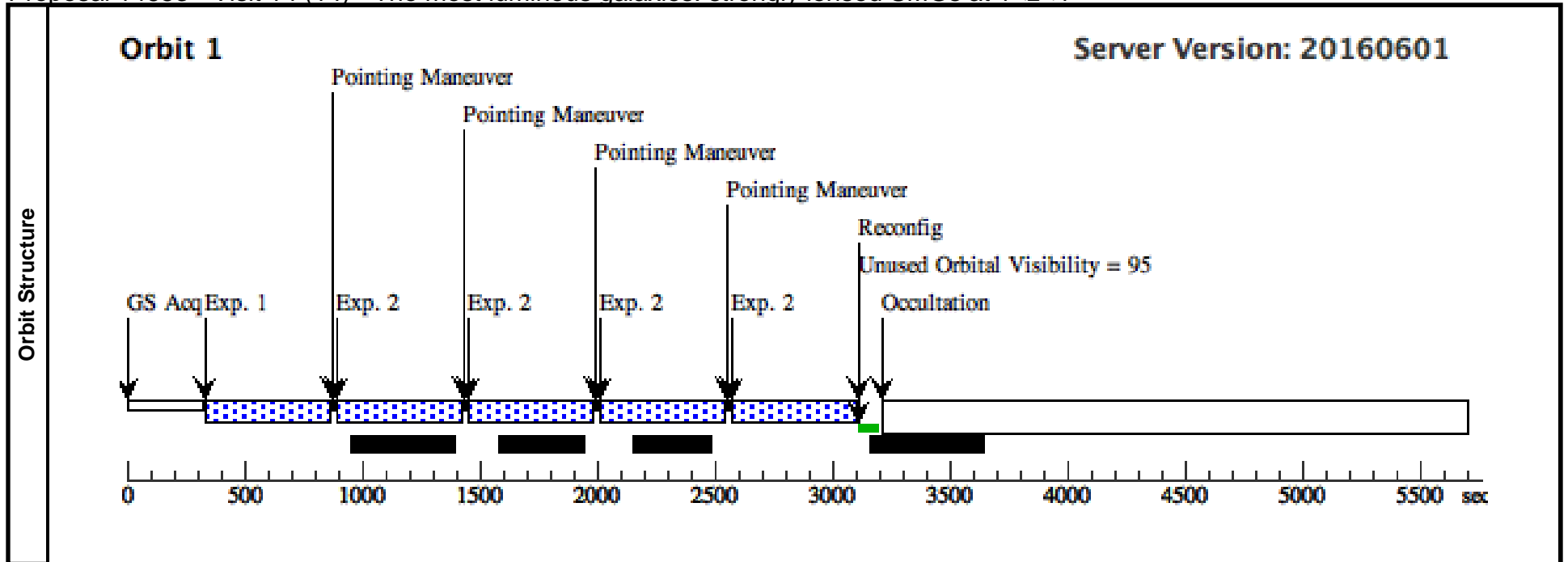
Visit	<b>Proposal 14653, Visit 13 (13), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
Patterns	#	Primary Pattern	Secondary Pattern	Exposures						
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(13)	J120207.90	RA: 12 02 7.9000 (180.5329167d) Dec: +53 34 39.00 (53.57750d) Equinox: J2000		V=25	Reference Frame: ICRS				
	<i>Comments: Extended=YES</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(13) J120207.90	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPAR S50			552.937252 Secs (552.937 Secs) [==>]	[1]
	2		(13) J120207.90	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPAR S50		Pattern 1, Exps 2-2 in Visit 13 (13) (1)	552.937252 Secs (2211.749 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 14 (14) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

Wed Nov 09 16:34:51 GMT 2016

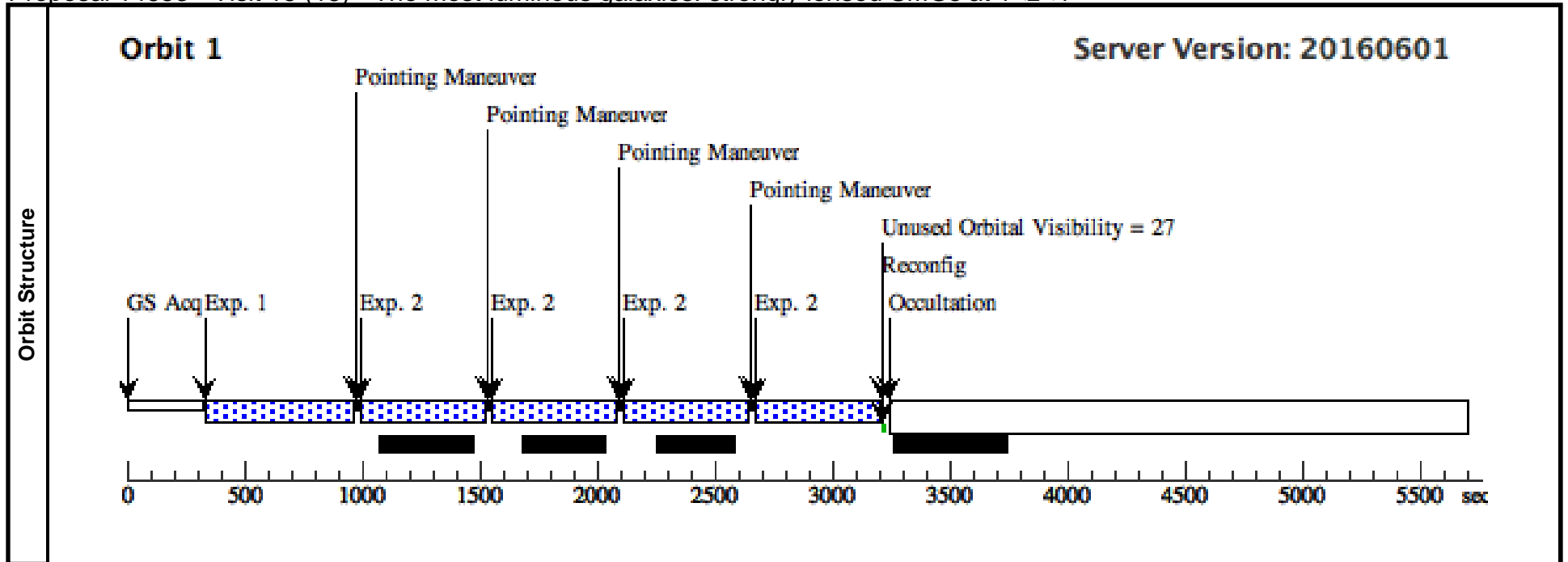
Visit	<b>Proposal 14653, Visit 14 (14), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(14)	J132217.52	RA: 13 22 17.5200 (200.5730000d) Dec: +09 23 26.40 (9.39067d) Equinox: J2000		V=25	Reference Frame: ICRS				
	<i>Comments: Extended=YES</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(14) J132217.52	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP5 0			499.234285 Secs (499.234 Secs) [==>]	[1]
	2		(14) J132217.52	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP5 0		Pattern 1, Exps 2-2 in Visit 14 (14) (1)	499.234285 Secs (1996.937 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 15 (15) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

Wed Nov 09 16:34:51 GMT 2016

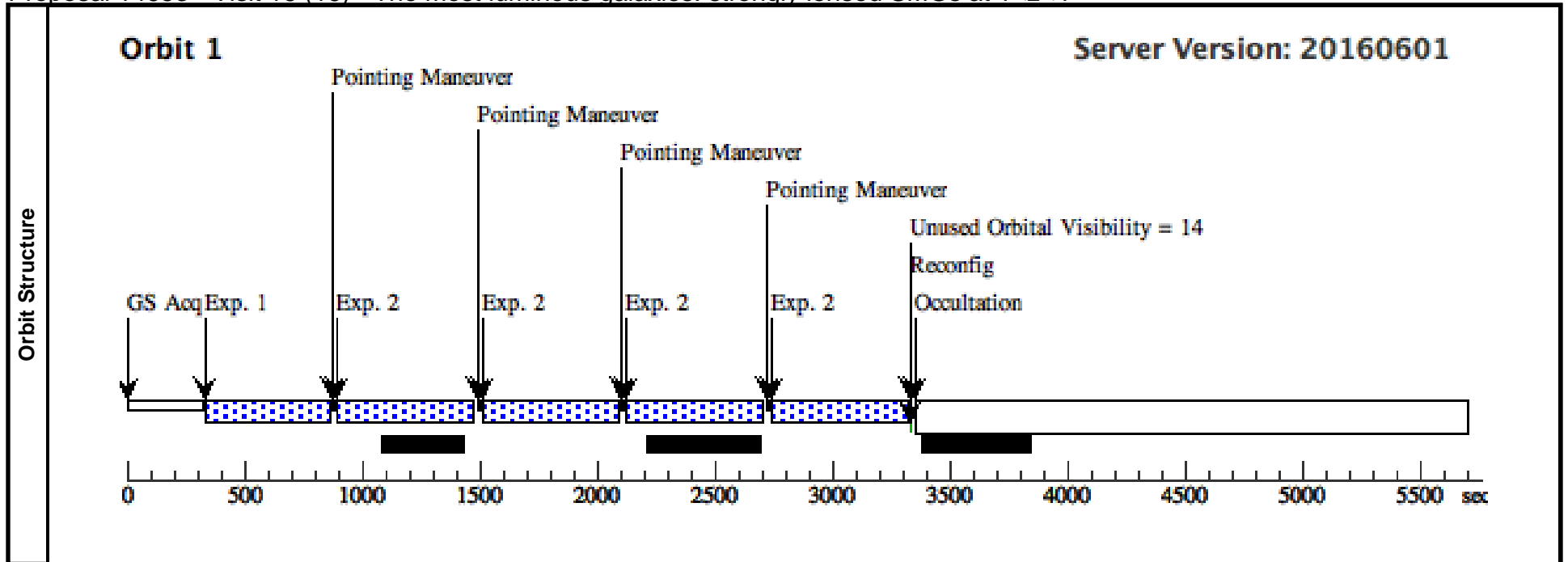
Visit	<b>Proposal 14653, Visit 15 (15), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(15)	J132630.25	RA: 13 26 30.2500 (201.6260417d) Dec: +33 44 7.40 (33.73539d) Equinox: J2000		V=25	Reference Frame: ICRS				
	<i>Comments: Extended=YES</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(15) J132630.25	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=STEP100			599.232292 Secs (599.232 Secs) [==>]	[1]
	2		(15) J132630.25	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50		Pattern 1, Exps 2-2 in Visit 15 (15) (1)	499.234285 Secs (1996.937 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 16 (16) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

Wed Nov 09 16:34:51 GMT 2016

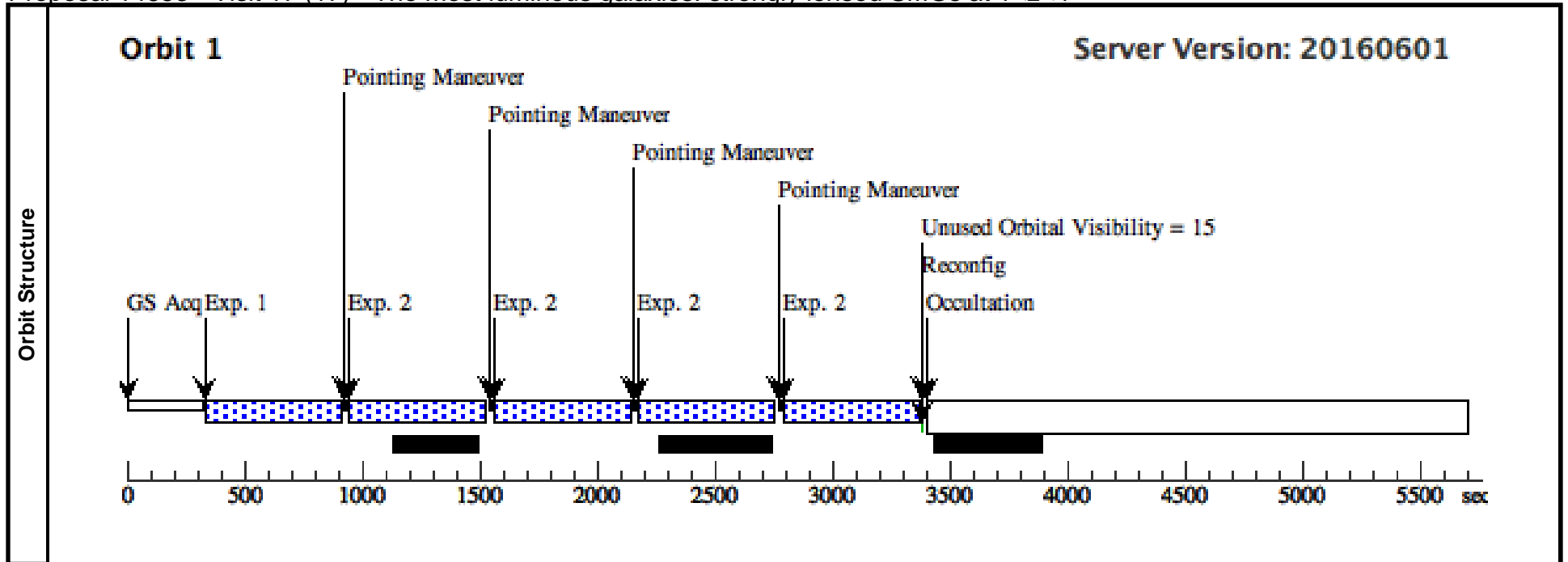
Visit	<b>Proposal 14653, Visit 16 (16), implementation</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 3D TO 72.3 D; ORIENT 92.3D TO 162.3 D; ORIENT 182.3D TO 252.3 D; ORIENT 272.3D TO 342.3 D									
	Patterns	#	Primary Pattern	Secondary Pattern	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=true		(2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(16)	J133634.94	RA: 13 36 34.9400 (204.1455833d) Dec: +49 13 13.60 (49.22044d) Equinox: J2000		V=25	Reference Frame: ICRS				
	<i>Comments: Extended=YES</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(16) J133634.94	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=11; SAMP-SEQ=SPAR S50			502.936801 Secs (502.937 Secs) [==>]	[1]
	2		(16) J133634.94	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPAR S50		Pattern 1, Exps 2-2 in Visit 16 (16) (1)	552.937252 Secs (2211.749 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 17 (17) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

Wed Nov 09 16:34:51 GMT 2016

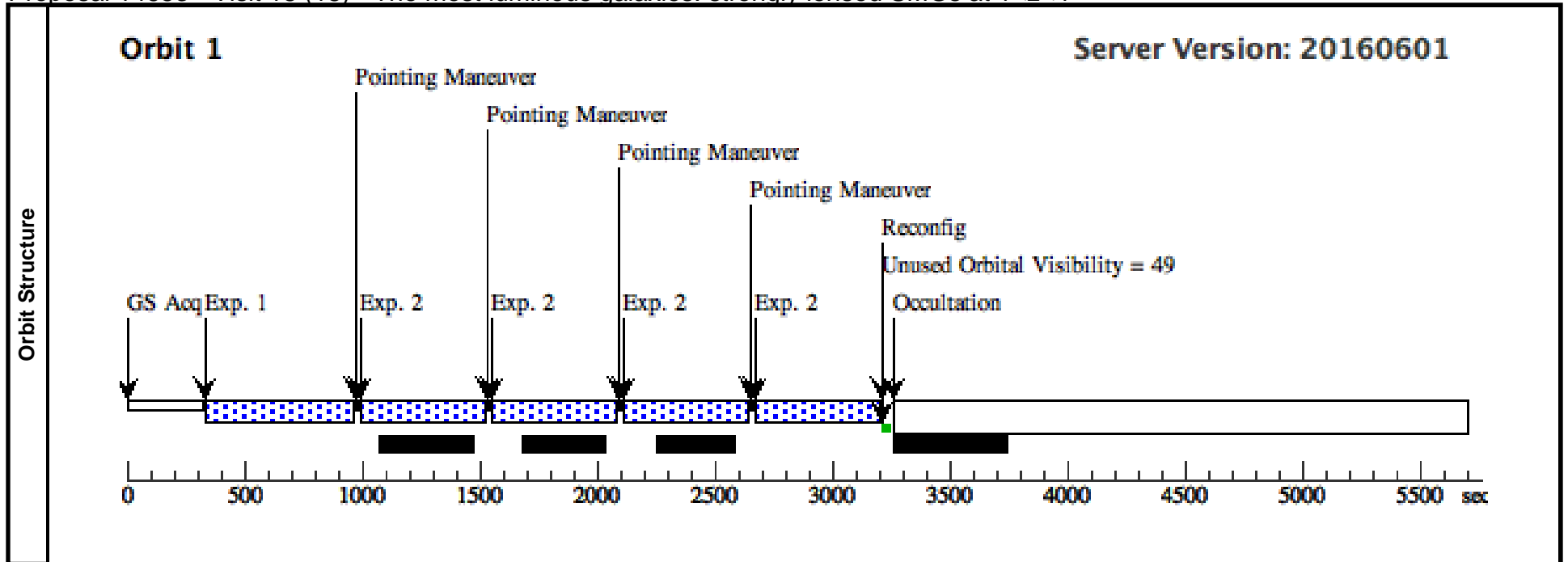
Visit	<b>Proposal 14653, Visit 17 (17), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(17)	J141230.51	RA: 14 12 30.5100 (213.1271250d) Dec: +50 34 55.10 (50.58197d) Equinox: J2000		V=25	Reference Frame: ICRS				
	<i>Comments: Extended=YES</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(17) J141230.51	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPAR S50			552.937252 Secs (552.937 Secs) [==>]	[1]
	2		(17) J141230.51	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPAR S50		Pattern 1, Exps 2-2 in Visit 17 (17) (1)	552.937252 Secs (2211.749 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 18 (18) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

Wed Nov 09 16:34:51 GMT 2016

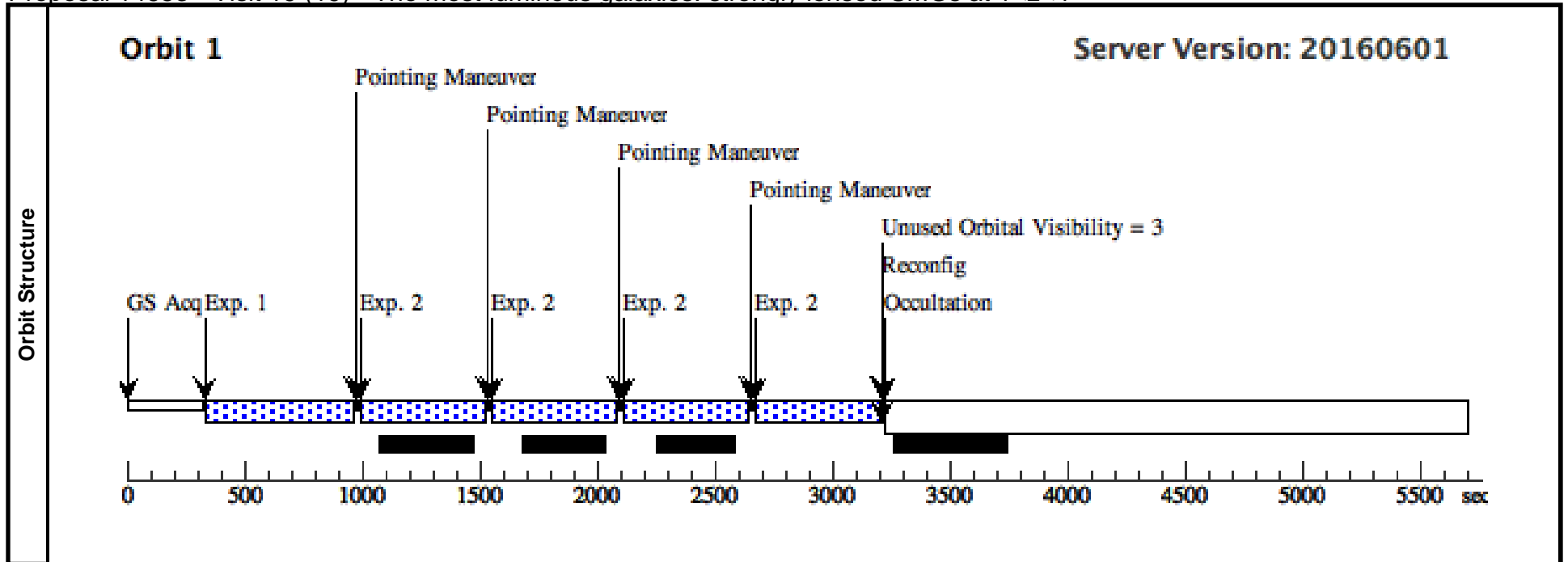
Visit	<b>Proposal 14653, Visit 18 (18), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(18)	J142823.9	RA: 14 28 23.9000 (217.0995833d) Dec: +35 26 20.00 (35.43889d) Equinox: J2000		V=25	Reference Frame: ICRS				
	<i>Comments: Extended=YES</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(18) J142823.9	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=STEP100			599.232292 Secs (599.232 Secs) [==>]	[1]
	2		(18) J142823.9	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50		Pattern 1, Exps 2-2 in Visit 18 (18) (1)	499.234285 Secs (1996.937 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 19 (19) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

Wed Nov 09 16:34:51 GMT 2016

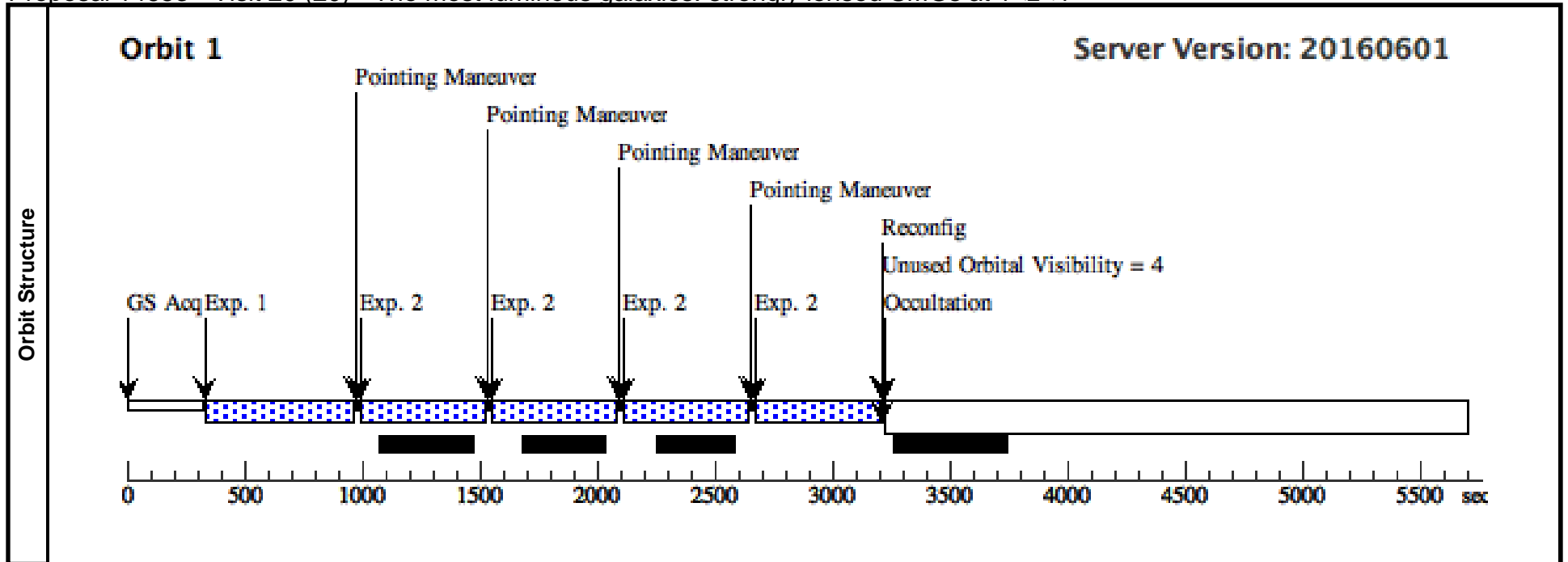
Visit	<b>Proposal 14653, Visit 19 (19), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(19)	J144653.20	RA: 14 46 53.2000 (221.7216667d) Dec: +17 52 33.30 (17.87592d) Equinox: J2000		V=25	Reference Frame: ICRS				
	<i>Comments: Extended=YES</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(19) J144653.20	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=STEP100			599.232292 Secs (599.232 Secs) [==>]	[1]
	2		(19) J144653.20	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50		Pattern 1, Exps 2-2 in Visit 19 (19) (1)	499.234285 Secs (1996.937 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 20 (20) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

Wed Nov 09 16:34:51 GMT 2016

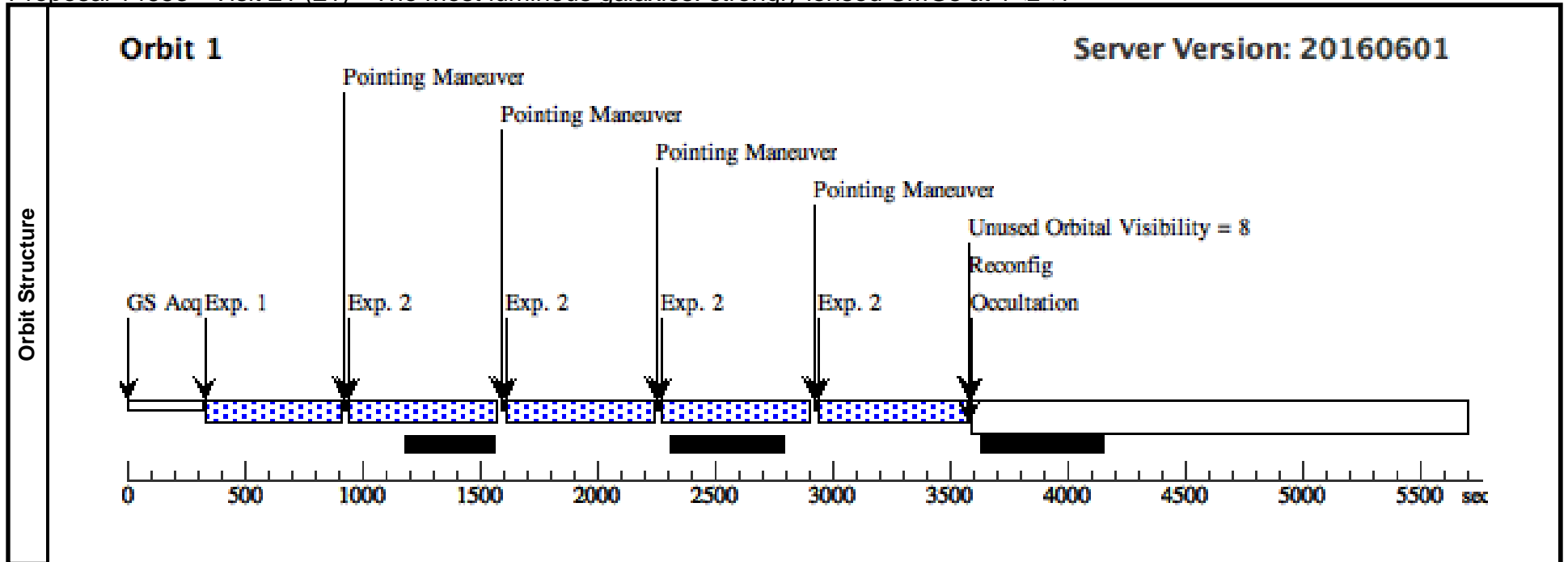
Visit	<b>Proposal 14653, Visit 20 (20), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(20)	J144958.59	RA: 14 49 58.5900 (222.4941250d) Dec: +22 38 36.80 (22.64356d) Equinox: J2000		V=25	Reference Frame: ICRS				
	<i>Comments: Extended=YES</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(20) J144958.59	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=STEP100			599.232292 Secs (599.232 Secs) [==>]	[1]
	2		(20) J144958.59	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50		Pattern 1, Exps 2-2 in Visit 20 (20) (1)	499.234285 Secs (1996.937 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 14653 - Visit 21 (21) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

Wed Nov 09 16:34:51 GMT 2016

Visit	<b>Proposal 14653, Visit 21 (21), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 55D TO 95 D; ORIENT 136D TO 180 D; ORIENT 238D TO 255 D									
	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=true		(2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(21)	J160722.77	RA: 16 07 22.7700 (241.8448750d) Dec: +73 47 2.20 (73.78394d) Equinox: J2000  <i>Comments: Extended=YES</i>		V=25	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(21) J160722.77	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPAR S50			552.937252 Secs (552.937 Secs) [==>]	[1]
2		(21) J160722.77	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=SPAR S50			Pattern 1, Exps 2-2 i n Visit 21 (21) (1) 602.937703 Secs (2411.751 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]	



Proposal 14653 - Visit 22 (22) - The most luminous galaxies: strongly lensed SMGs at  $1 < z < 4$

Wed Nov 09 16:34:51 GMT 2016

Visit	<b>Proposal 14653, Visit 22 (22), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> 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=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(22)	J231356.64	RA: 23 13 56.6400 (348.4860000d) Dec: +01 09 17.70 (1.15492d) Equinox: J2000  <i>Comments: Extended=YES</i>		V=25	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(22) J231356.64	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP5 0			499.234285 Secs (499.234 Secs) [==>]	[1]
2		(22) J231356.64	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP5 0			Pattern 1, Exps 2-2 in Visit 22 (22) (1) 499.234285 Secs (1996.937 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]	

