



## 14654 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Cycle: 24, Proposal Category: GO

(Availability Mode: SUPPORTED)

### INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
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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) IC-2597	WFC3/IR	1	17-Jan-2017 21:02:44.0	yes
02	(2) NGC-524	WFC3/IR	1	17-Jan-2017 21:02:45.0	yes
03	(3) NGC-4036	WFC3/IR	1	17-Jan-2017 21:02:46.0	yes
04	(4) NGC-2765	WFC3/IR	1	17-Jan-2017 21:02:47.0	yes
05	(5) NGC-3392	WFC3/IR	1	17-Jan-2017 21:02:48.0	yes
06	(6) NGC-910	WFC3/IR	2	17-Jan-2017 21:02:49.0	yes
07	(7) NGC-6702	WFC3/IR	1	17-Jan-2017 21:02:50.0	yes
08	(8) NGC-1200	WFC3/IR	1	17-Jan-2017 21:02:51.0	yes
09	(9) NGC-1201	WFC3/IR	1	17-Jan-2017 21:02:52.0	yes
21	(9) NGC-1201	WFC3/IR	1	17-Jan-2017 21:02:53.0	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>
10	(10) NGC-809	WFC3/IR	1	17-Jan-2017 21:02:54.0	yes
11	(11) NGC-2962	WFC3/IR	1	17-Jan-2017 21:02:55.0	yes
12	(12) NGC-6964	WFC3/IR	1	17-Jan-2017 21:02:55.0	yes
13	(13) NGC-495	WFC3/IR	1	17-Jan-2017 21:02:56.0	yes
14	(14) NGC-1259	WFC3/IR	2	17-Jan-2017 21:02:57.0	yes
15	(15) NGC-4386	WFC3/IR	1	17-Jan-2017 21:02:58.0	yes
16	(16) NGC-5839	WFC3/IR	1	17-Jan-2017 21:02:59.0	yes
17	(17) NGC-5490	WFC3/IR	1	17-Jan-2017 21:03:00.0	yes
18	(18) NGC-1278	WFC3/IR	1	17-Jan-2017 21:03:01.0	yes
19	(19) KK-1524	WFC3/IR	1	17-Jan-2017 21:03:02.0	yes
20	(20) ESO-125-6	WFC3/IR	2	17-Jan-2017 21:03:03.0	yes

24 Total Orbits Used

## ABSTRACT

We propose obtaining Surface Brightness Fluctuation (SBF) distances to the hosts galaxies of 20 nearby type Ia supernovae (SNe Ia), resulting in a sample of 29 SNe Ia in 27 galaxies when combined with HST-SBF distances from the literature. This sample can then be compared with the existing 18 SN Ia distances from Cepheids. Through these comparisons, we will determine if there are any discrepancies between the SBF distance scale, which is extended into the Hubble flow using early-type galaxies, and the SNIa distance scale, for which local calibrators are scarce and host galaxy types and SN environments are heterogenous. Since recent measurements of UV-optical colors suggest that SN Ia properties do depend on galaxy type and environment, it is essential that SNe Ia in all galaxy types are included when extending SN Ia distances to the distant Hubble flow. Since the conclusion that universal expansion is accelerating was originally based on SNe Ia distances, and because recent measurements of UV-optical colors suggest that SN Ia properties do depend on galaxy type and environment, it is essential to measure the same types of SNe in the same types of galaxies. To meet this goal, we propose to measure high-precision SBF distances to all early-type galaxies that have hosted SNIa within 80 Mpc. We will therefore be able to distinguish between systematic offsets in the derived Hubble constant between galaxies and/or SNe of different types and correct for them. SBF is the only distance measurement technique with statistical uncertainties comparable to SN Ia that can be applied to the early-type of galaxies in which the majority of the high-redshift SNIa occur.

## **OBSERVING DESCRIPTION**

We are targeting 20 early-type host galaxies of Type Ia supernova in the F110W bandpass of WFC3/IR (all prime; no parallels).

Most of the galaxies are imaged for one orbit, but 3 are more distant and require 2 orbits each, for 23 orbits total.

For each of the (seventeen) single-orbit galaxies, we do either a 5-point or 6-point dither line, with each sub-exposure using the "STEP-50" non-destructive read sequence with NSAMP=15 or NSAMP=14 (i.e., at or near the maximum number of reads per exposure).

In the case of the 5-point single orbit galaxies, each sub-exposure is therefore 499.23s, giving a total exposure of 2496s.

In the case of the 6-point single orbit galaxies, each sub-exposure is therefore 449.23s, giving a total exposure of 2695s.

The dither line has an offset of  $\sim 0.7''$  between exposures (5.4 pix), at an angle of 41.8deg; this should translate to about 4 pix in each of X and Y.

For all of these single-orbit targets, we use the "center pattern" option so the dither offsets are symmetric about zero.

For two of the 2-orbit galaxies (Visits 6 and 14), we do a 5-point dither pattern followed by a 4-point dither pattern, with the patterns at right angles to each other; again with "center pattern" (since one is even and the other odd, they don't overlap at any position).

For the final 2-orbit galaxy (Visit 20), we have a longer visibility, so we do a 6-point orbit followed by a 4-point orbit. The second pattern is not centered, so again there is no overlap of positions.

Finally, we have imposed ORIENT constraints in order to mitigate the danger of discontinuous changes in the F110W background caused by the varying helium airglow line at 1.083 microns. The advice from our Contact Scientist Gabe Brammer on a previous (similar) program was:

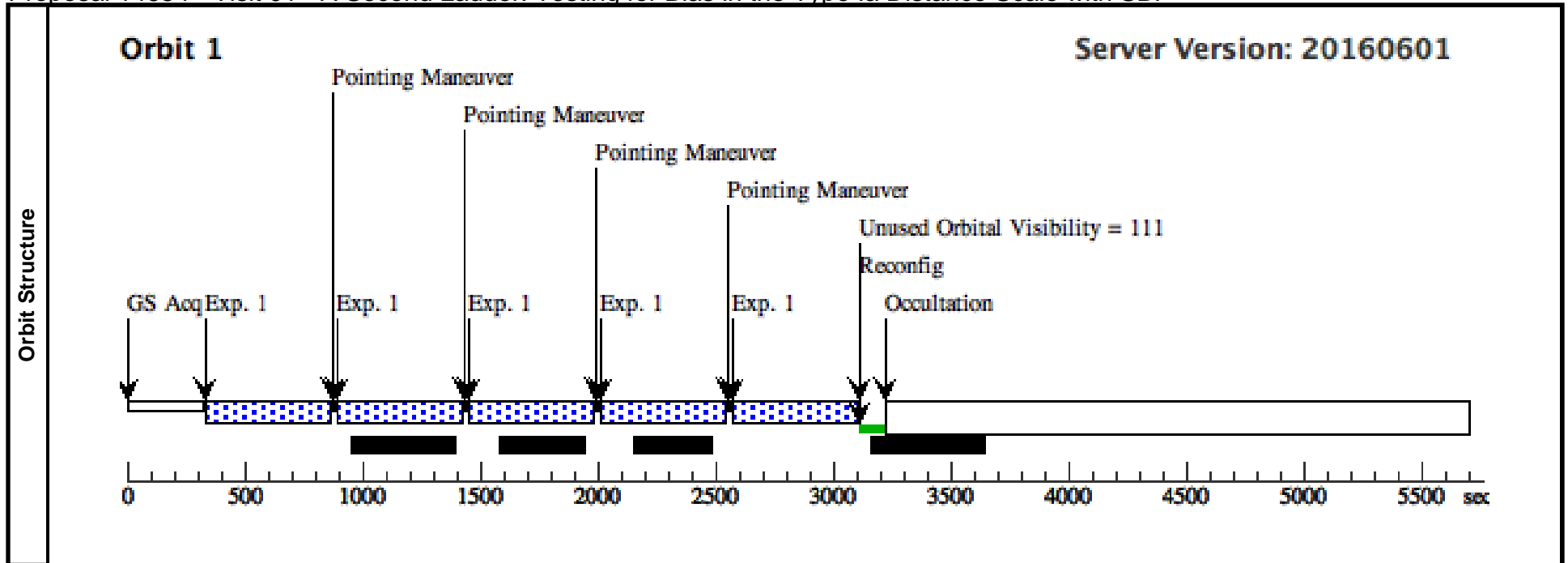
"The worst timing for the He backgrounds seems to be in the month or two following the target reappearance after the sun avoidance, which you can see in the APT Visit Planner. At that time the orbital target visibility is mostly in sunlight and the zodi can also be high at this time when the sun-to-target angle is at a minimum. For example, I see that NGC 0057 isn't schedulable between 11-Feb to 20-May for the sun proximity. To add some padding, you could then apply an ORIENT constraint allowing only ORIENTS visible between, say 20-July and 1-Jan, which would be 48-240.... It's similar to the "LOW SKY" APT flag in that it reduces the zodi backgrounds, but it's not restrictive on the limb angle, which I think is less of a concern and not using it might give you a bit longer orbit lengths and improve schedulability."

We have followed this advice in selecting ORIENT constraints that should increase the minimum possible SUN\_ANGLE for all of these F110W observations.

Proposal 14654 - Visit 01 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:05 GMT 2017

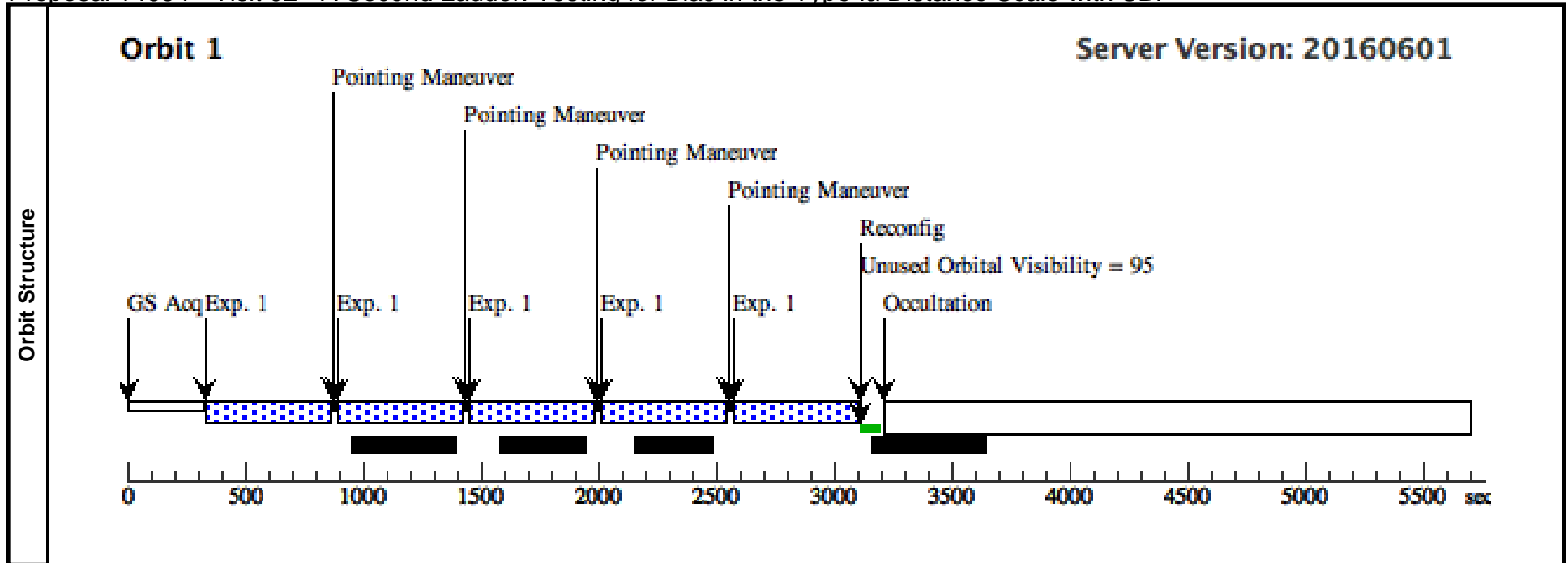
Visit	<b>Proposal 14654, Visit 01, scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 300D TO 110 D										
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures		
		(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=5 Point Spacing=0.724 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=true							(1)
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections		Fluxes	Miscellaneous				
	(1)	IC-2597	RA: 10 37 47.3440 (159.4472667d) Dec: -27 04 52.46 (-27.08124d) Equinox: J2000			V=15.0+/-2.5	Reference Frame: SIMBAD				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1		(1) IC-2597	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP5 0; NSAMP=15		Pattern 1, Exps 1-1 in Visit 01 (1)	499.234285 Secs (2496.171 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)]	[1]	



Proposal 14654 - Visit 02 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:05 GMT 2017

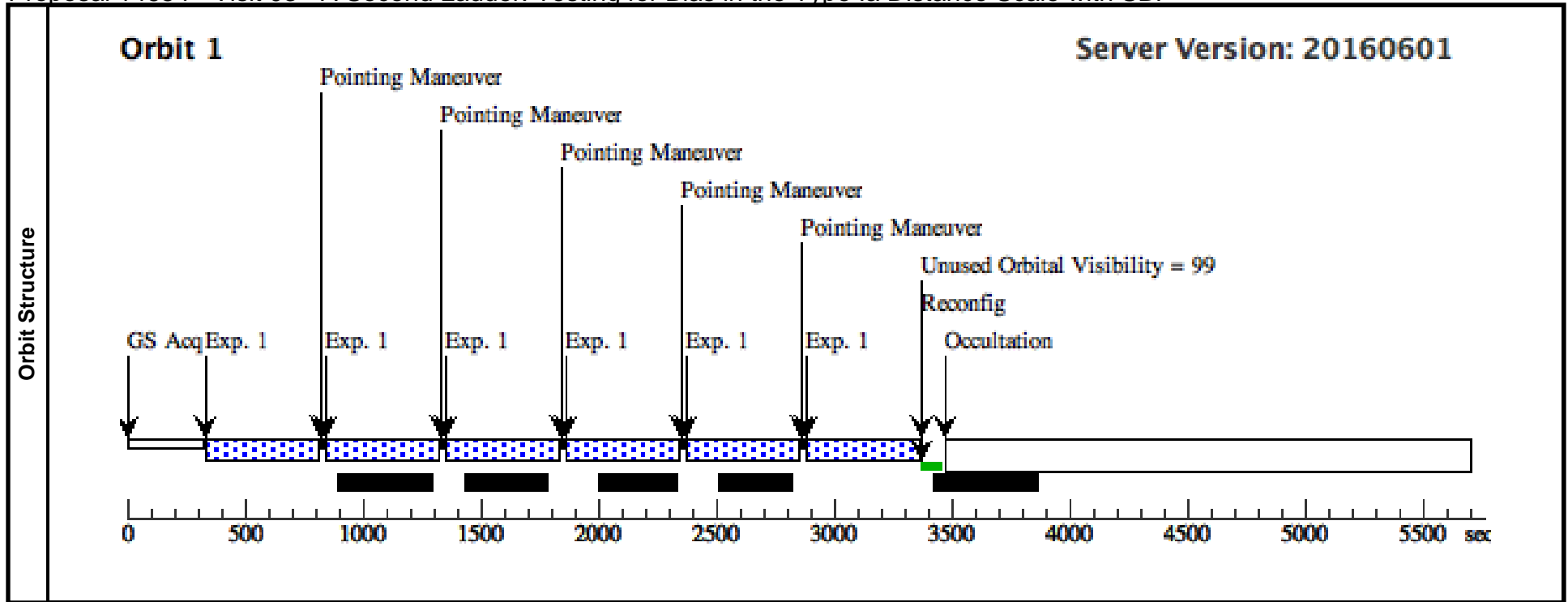
Visit	Proposal 14654, Visit 02, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: ORIENT 85D TO 240 D									
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures	
		(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=5 Point Spacing=0.724 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=true						
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(2)	NGC-524	RA: 01 24 47.7070 (21.1987792d) Dec: +09 32 19.65 (9.53879d) Equinox: J2000		V=15.0+/-2.5	Reference Frame: SIMBAD				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(2) NGC-524	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP5 0; NSAMP=15		Pattern 1, Exps 1-1 in Visit 02 (1)	499.234285 Secs (2496.171 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)]	[1]



Proposal 14654 - Visit 03 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:05 GMT 2017

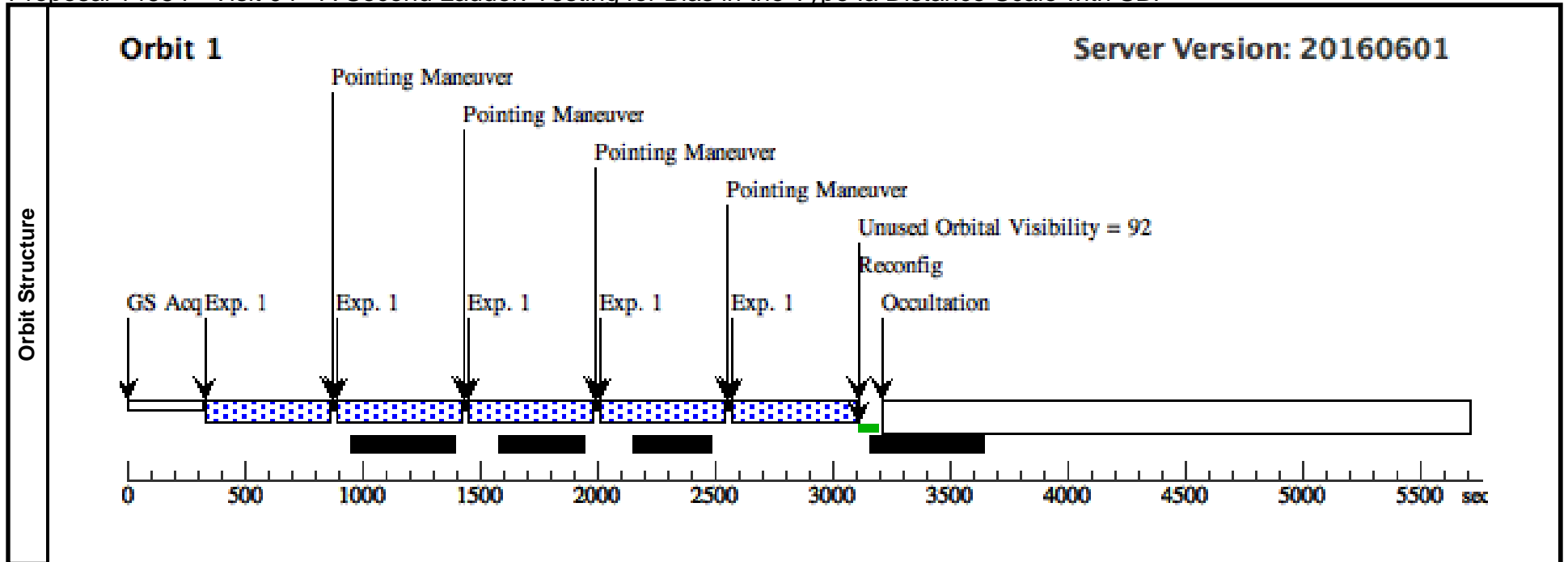
Visit	<b>Proposal 14654, Visit 03, scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(3)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=6 Point Spacing=0.724 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=131.788 Angle Between Sides= Center Pattern=true		(1)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(3)	NGC-4036	RA: 12 01 26.8910 (180.3620458d) Dec: +61 53 44.52 (61.89570d) Equinox: J2000		V=11.2+/-2.5	Reference Frame: SIMBAD				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(3) NGC-4036	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP50; NSAMP=14			Pattern 3, Exps 1-1 i n Visit 03 (3)	449.233834 Secs (2695.403 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)] [=>(Pattern 6)]



Proposal 14654 - Visit 04 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:05 GMT 2017

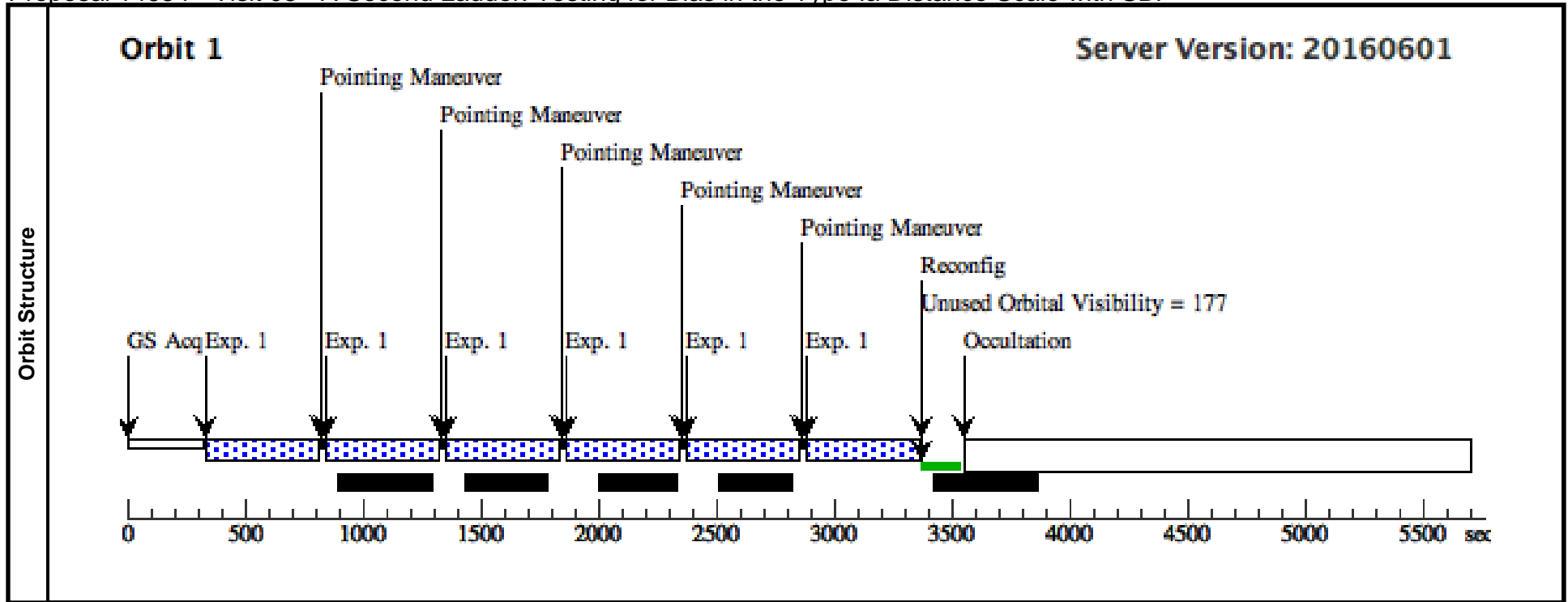
<b>Visit</b>	<b>Proposal 14654, Visit 04, completed</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 294D TO 101 D									
<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>	<b>Secondary Pattern</b>	<b>Exposures</b>						
	(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=5 Point Spacing=0.724 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=true		(1)					
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>	<b>Fluxes</b>	<b>Miscellaneous</b>				
	(4)	NGC-2765	RA: 09 07 36.6610 (136.9027542d) Dec: +03 23 34.79 (3.39300d) Equinox: J2000		V=15.0+/-2.5	Reference Frame: SIMBAD				
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES										
<b>Exposures</b>	<b>#</b>	<b>Label</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time (Total)/[Actual Dur.]</b>	<b>Orbit</b>
	1		(4) NGC-2765	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP50; NSAMP=15		Pattern 1, Exps 1-1 in Visit 04 (1)	499.234285 Secs (2496.171 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)]	[1]



Proposal 14654 - Visit 05 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:05 GMT 2017

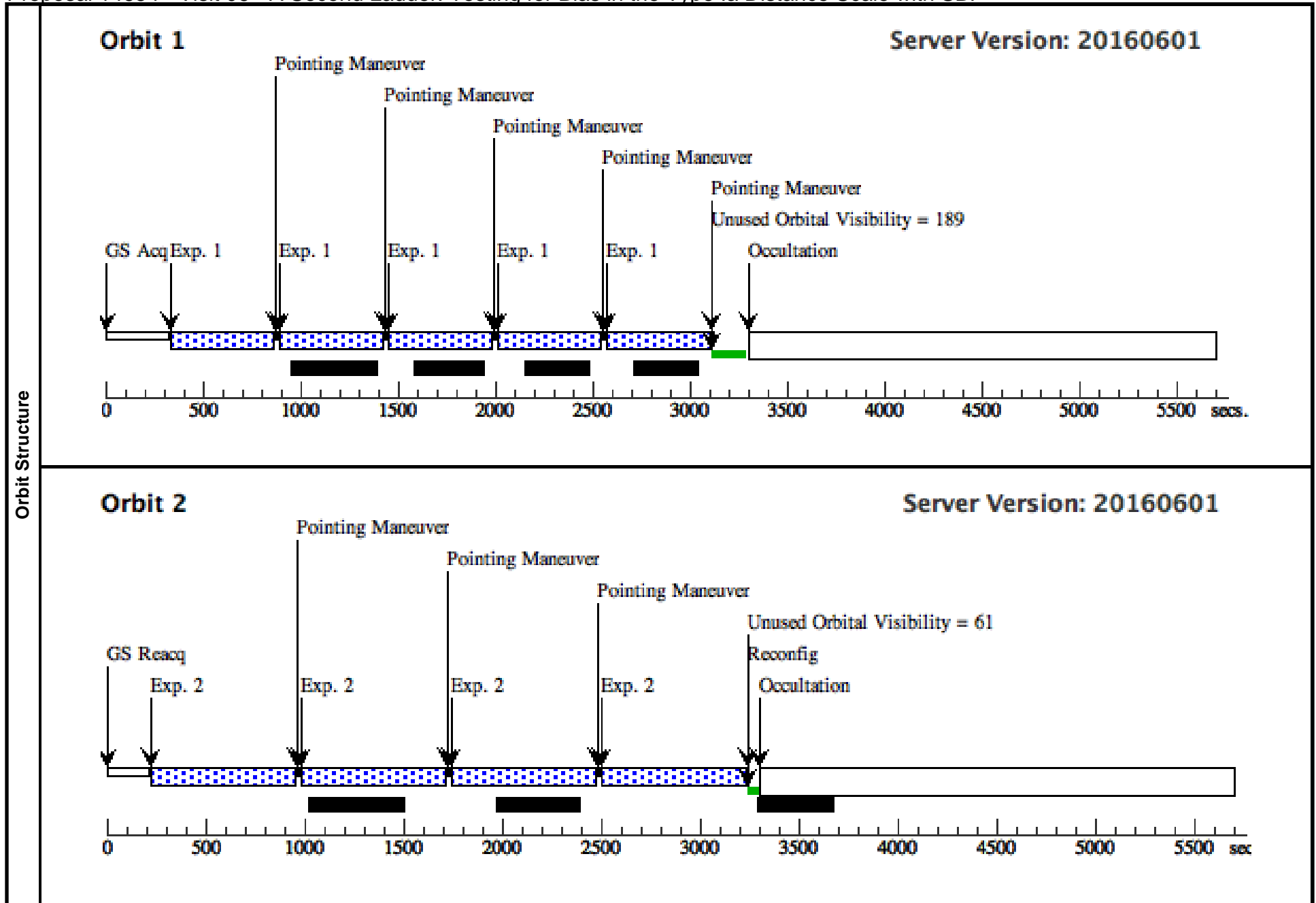
<b>Visit</b>	<b>Proposal 14654, Visit 05, completed</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 131D TO 302 D									
	<b>Patterns</b>	# (3)	<b>Primary Pattern</b> Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=6 Point Spacing=0.724 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=131.788 Angle Between Sides= Center Pattern=true	<b>Secondary Pattern</b>	<b>Exposures</b> (1)				
<b>Fixed Targets</b>	# (5)	<b>Name</b> NGC-3392	<b>Target Coordinates</b> RA: 10 51 3.0720 (162.7628000d) Dec: +65 46 53.49 (65.78153d) Equinox: J2000	<b>Targ. Coord. Corrections</b>	<b>Fluxes</b> V=16.11+/-2.5	<b>Miscellaneous</b> Reference Frame: SIMBAD  <i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES				
<b>Exposures</b>	# 1	<b>Label</b> (5) NGC-3392	<b>Target</b>	<b>Config,Mode,Aperture</b> WFC3/IR, MULTIACCUM, IR	<b>Spectral Els.</b> F110W	<b>Opt. Params.</b> SAMP-SEQ=STEP5 0; NSAMP=14	<b>Special Reqs.</b>	<b>Groups</b> Pattern 3, Exps 1-1 i n Visit 05 (3)	<b>Exp. Time (Total)/[Actual Dur.]</b> 449.233834 Secs (2695.403 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)] [=>(Pattern 6)]	<b>Orbit</b> [1]



Proposal 14654 - Visit 06 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:05 GMT 2017

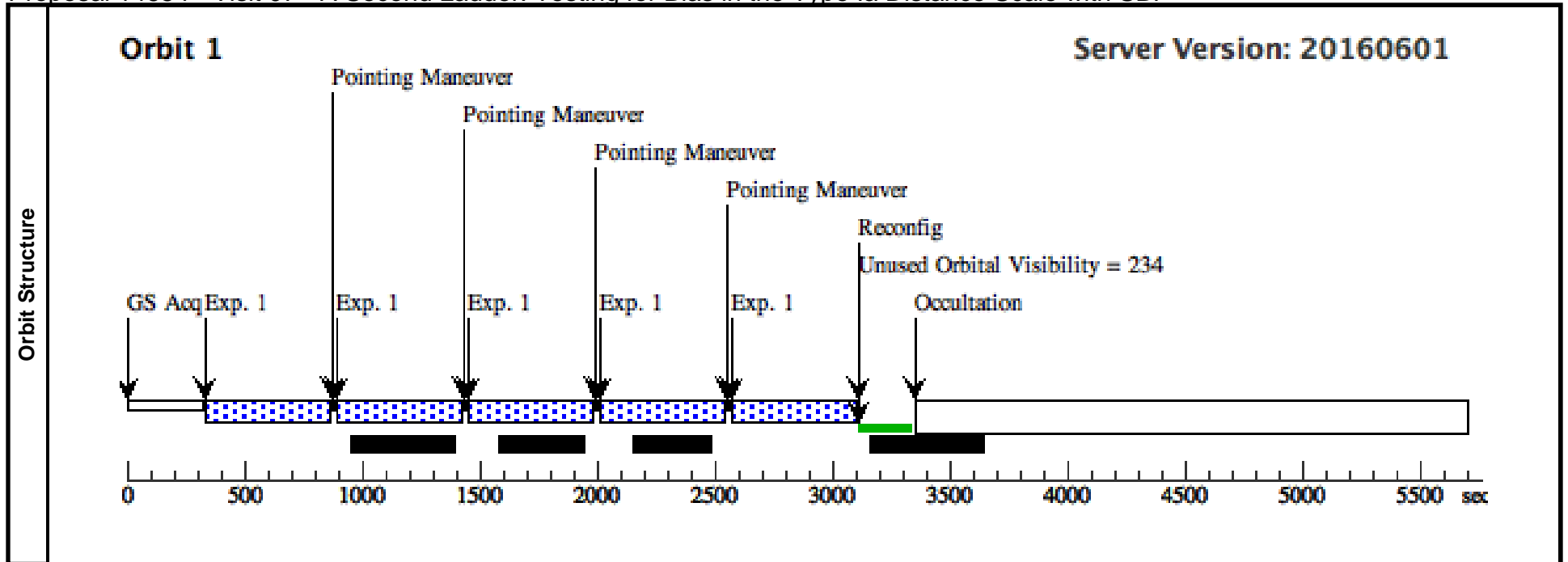
Visit	<b>Proposal 14654, Visit 06, scheduled</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 75D TO 242 D									
	#	Primary Pattern	Secondary Pattern	Exposures						
Patterns	(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=5 Point Spacing=0.724 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=true		(1)						
	(6)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=4 Point Spacing=0.73 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=131.788 Angle Between Sides= Center Pattern=true		(2)						
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(6)	NGC-910	RA: 02 25 26.7720 (36.3615500d) Dec: +41 49 27.50 (41.82431d) Equinox: J2000		V=15.0+/-2.5	Reference Frame: SIMBAD				
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(6) NGC-910	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP50; NSAMP=15			Pattern 1, Exps 1-1 in Visit 06 (1) 499.234285 Secs (2496.171 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)]	[1]
2		(6) NGC-910	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP100; NSAMP=13			Pattern 6, Exps 2-2 in Visit 06 (6) 699.232615 Secs (2796.93 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[2]	



Proposal 14654 - Visit 07 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:05 GMT 2017

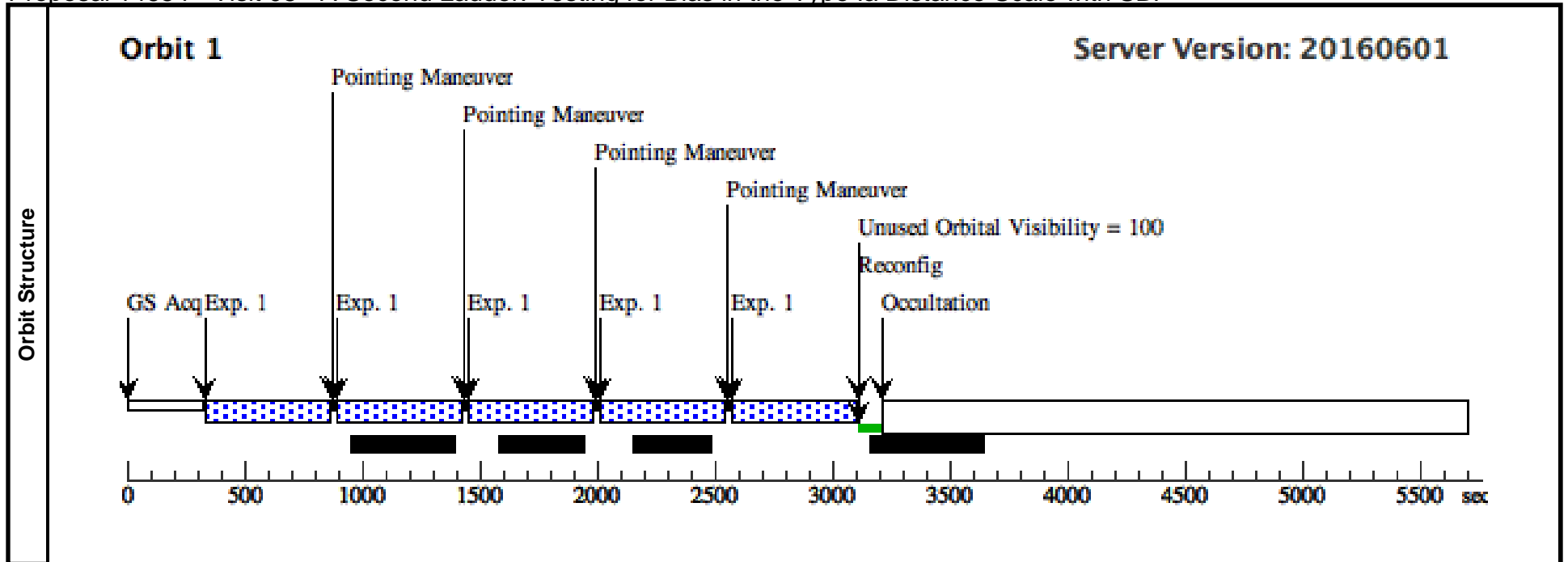
Visit	<b>Proposal 14654, Visit 07, scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 83D TO 253 D									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=5 Point Spacing=0.724 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=true		(1)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(7)	NGC-6702	RA: 18 46 57.5760 (281.7399000d) Dec: +45 42 20.56 (45.70571d) Equinox: J2000		V=13.05+/-2.5	Reference Frame: SIMBAD				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(7) NGC-6702	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP50; NSAMP=15		Pattern 1, Exps 1-1 in Visit 07 (1)	499.234285 Secs (2496.171 Secs)	[1]
									[=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)]	



Proposal 14654 - Visit 08 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:05 GMT 2017

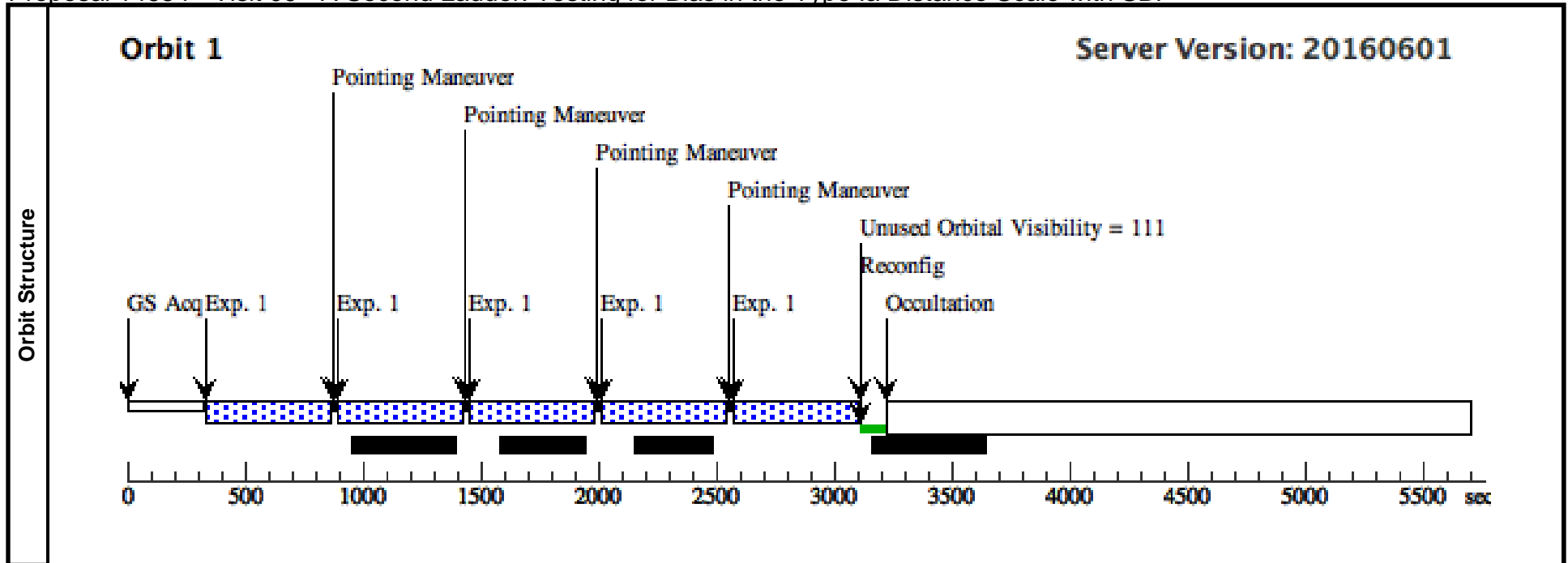
Visit	<b>Proposal 14654, Visit 08, completed</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 258D TO 67 D									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=5 Point Spacing=0.724 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=true		(1)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(8)	NGC-1200	RA: 03 03 54.4810 (45.9770042d) Dec: -11 59 30.67 (-11.99185d) Equinox: J2000		V=15.0+/-2.5	Reference Frame: SIMBAD				
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(8) NGC-1200	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP50; NSAMP=15			Pattern 1, Exps 1-1 in Visit 08 (1)	499.234285 Secs (2496.171 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)]



Proposal 14654 - Visit 09 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:05 GMT 2017

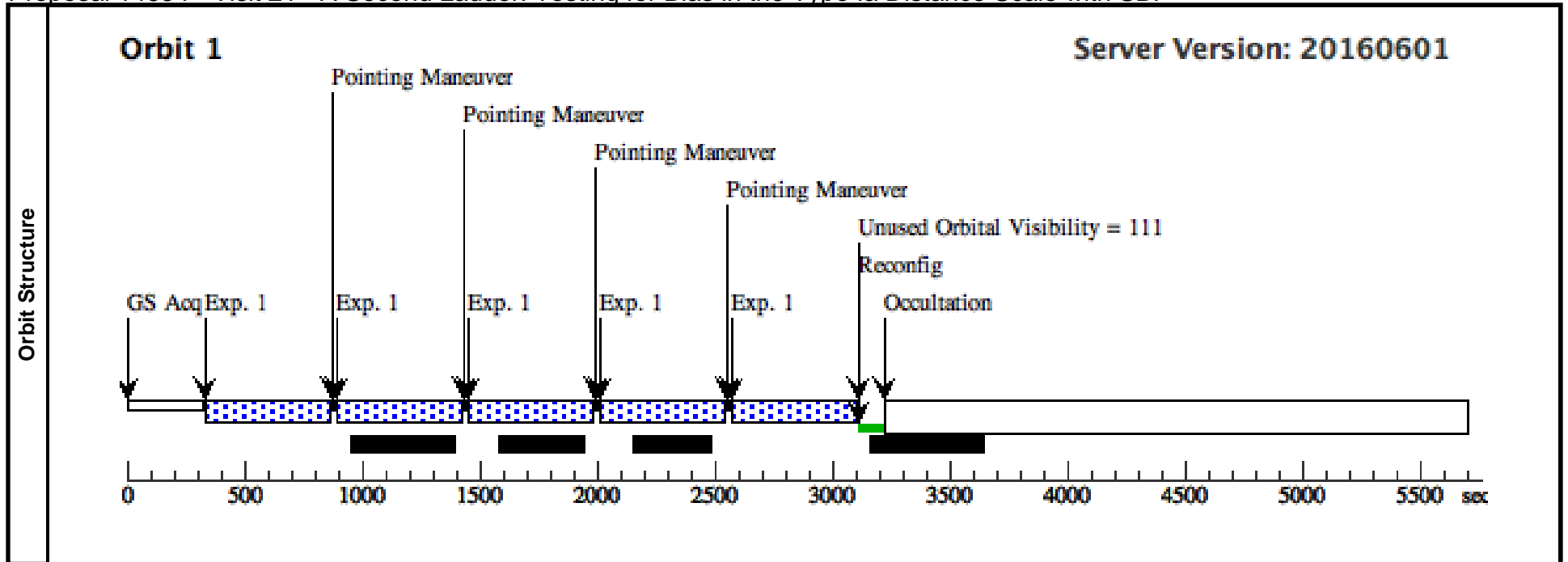
Visit	<b>Proposal 14654, Visit 09, completed</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 255D TO 63 D									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=5 Point Spacing=0.724 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=true		(1)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(9)	NGC-1201	RA: 03 04 7.9690 (46.0332042d) Dec: -26 04 10.53 (-26.06959d) Equinox: J2000		V=10.64+/-2.5	Reference Frame: SIMBAD				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(9) NGC-1201	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP5 0; NSAMP=15		Pattern 1, Exps 1-1 i n Visit 09 (1)	499.234285 Secs (2496.171 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)]	[1]



Proposal 14654 - Visit 21 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:05 GMT 2017

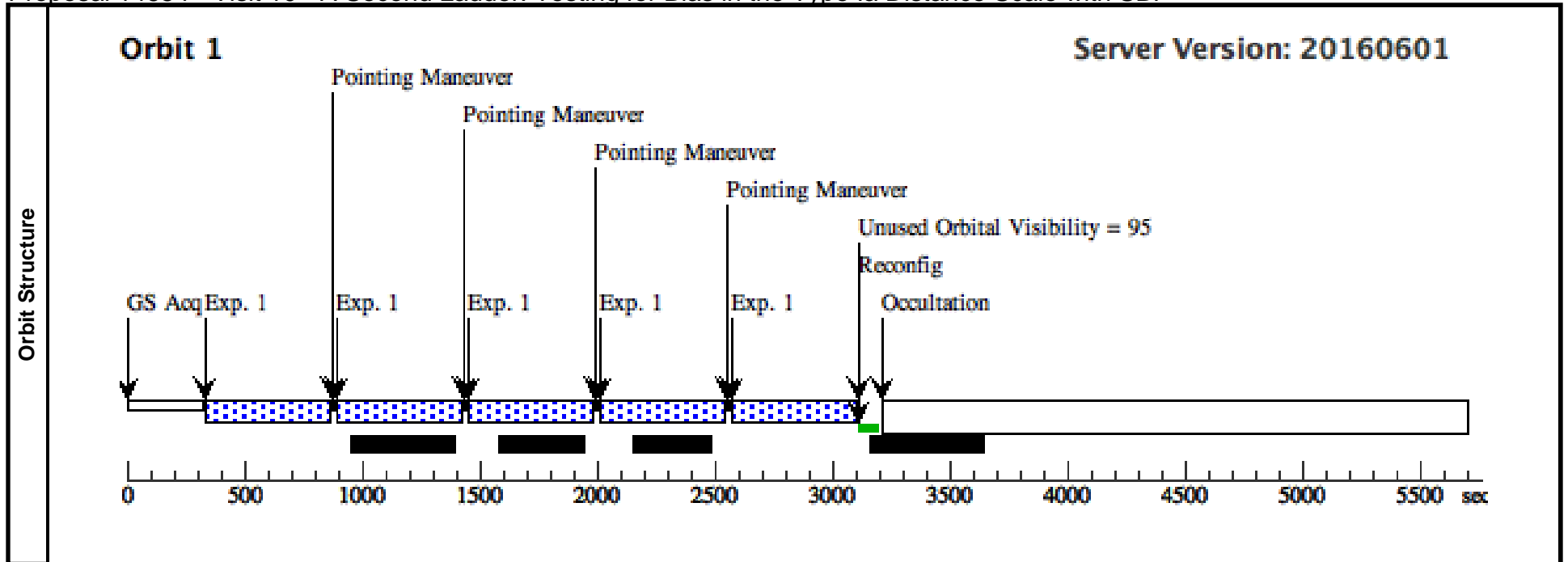
Visit	<b>Proposal 14654, Visit 21</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 255D TO 63 D									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=5 Point Spacing=0.724 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=true		(1)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(9)	NGC-1201	RA: 03 04 7.9690 (46.0332042d) Dec: -26 04 10.53 (-26.06959d) Equinox: J2000		V=10.64+/-2.5	Reference Frame: SIMBAD				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(9) NGC-1201	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP50; NSAMP=15			Pattern 1, Exps 1-1 in Visit 21 (1)	499.234285 Secs (2496.171 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)]



Proposal 14654 - Visit 10 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:05 GMT 2017

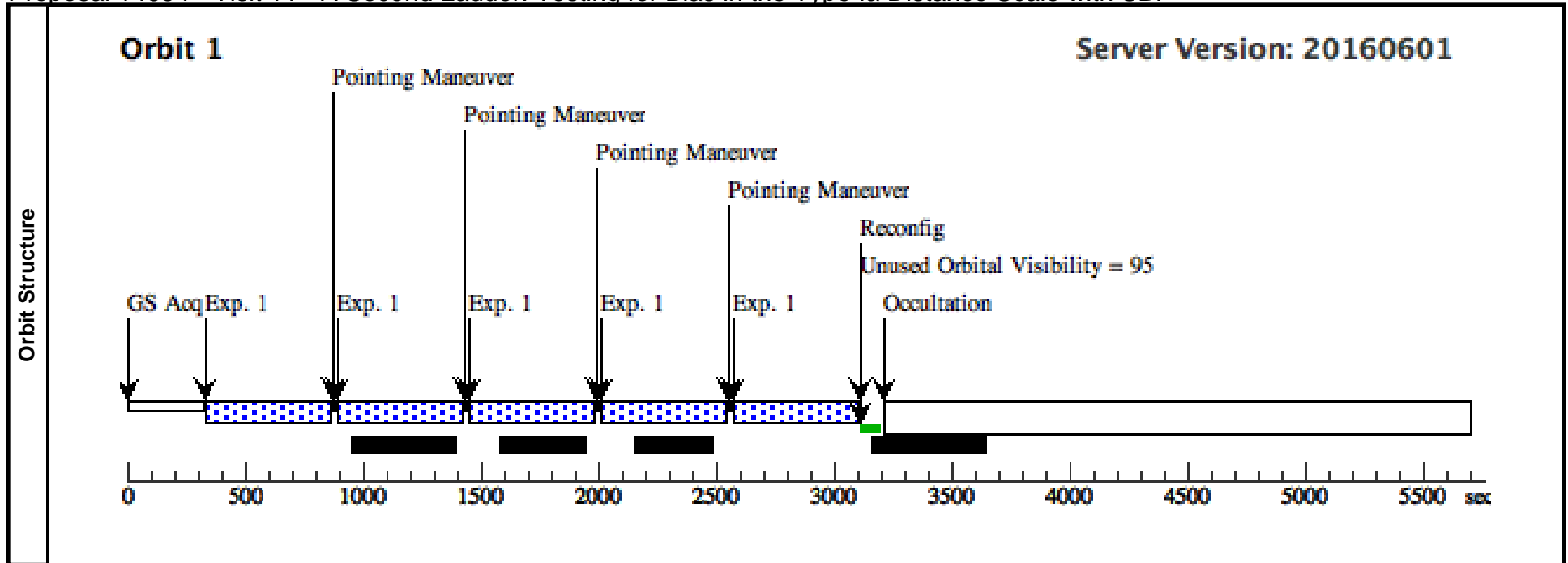
Visit	<b>Proposal 14654, Visit 10, scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 255D TO 63 D									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=5 Point Spacing=0.724 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=true		(1)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(10)	NGC-809	RA: 02 04 19.0020 (31.0791750d) Dec: -08 44 7.24 (-8.73534d) Equinox: J2000		V=15.0+/-2.5	Reference Frame: SIMBAD				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(10) NGC-809	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP5 0; NSAMP=15		Pattern 1, Exps 1-1 i n Visit 10 (1)	499.234285 Secs (2496.171 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)]	[1]



Proposal 14654 - Visit 11 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:05 GMT 2017

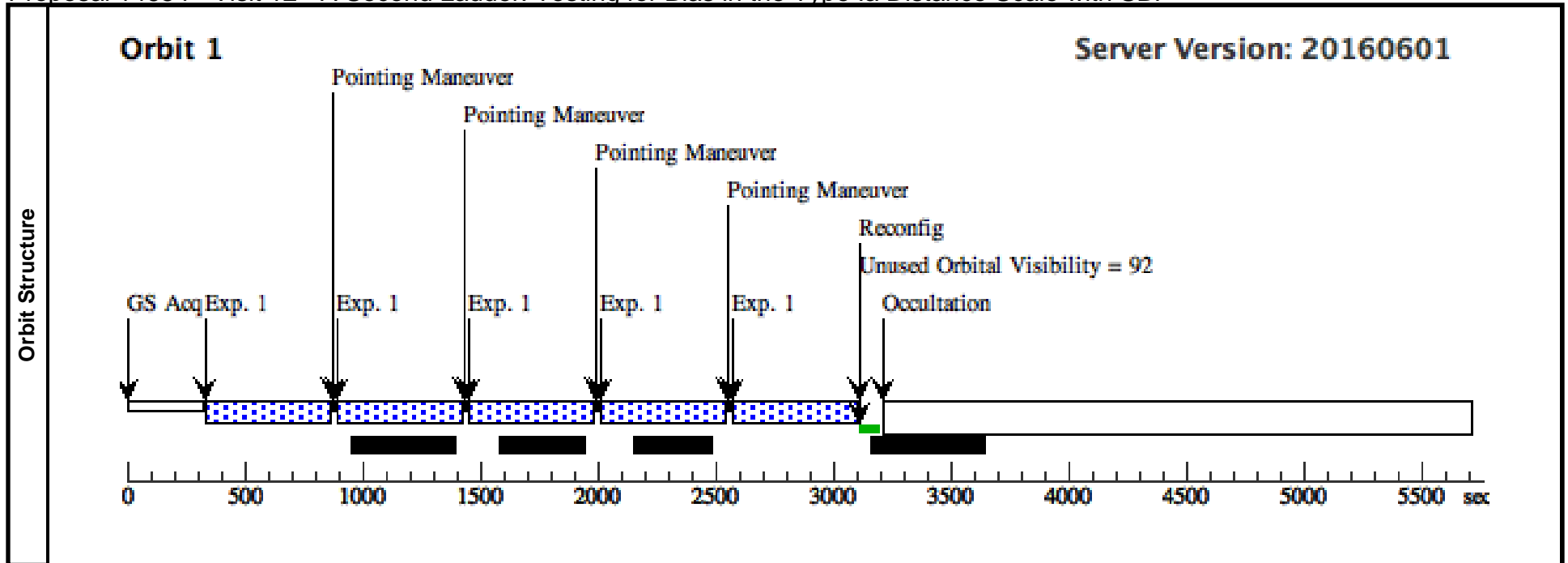
Visit	<b>Proposal 14654, Visit 11, scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 295D TO 103 D									
Patterns	#	Primary Pattern	Secondary Pattern	Exposures						
	(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=5 Point Spacing=0.724 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=true		(1)						
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(11)	NGC-2962	RA: 09 40 53.9060 (145.2246083d) Dec: +05 09 56.95 (5.16582d) Equinox: J2000		V=15.0+/-2.5	Reference Frame: SIMBAD				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(11) NGC-2962	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP50; NSAMP=15		Pattern 1, Exps 1-1 in Visit 11 (1)	499.234285 Secs (2496.171 Secs)	
									[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)] [==>(Pattern 5)]	[1]



Proposal 14654 - Visit 12 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:05 GMT 2017

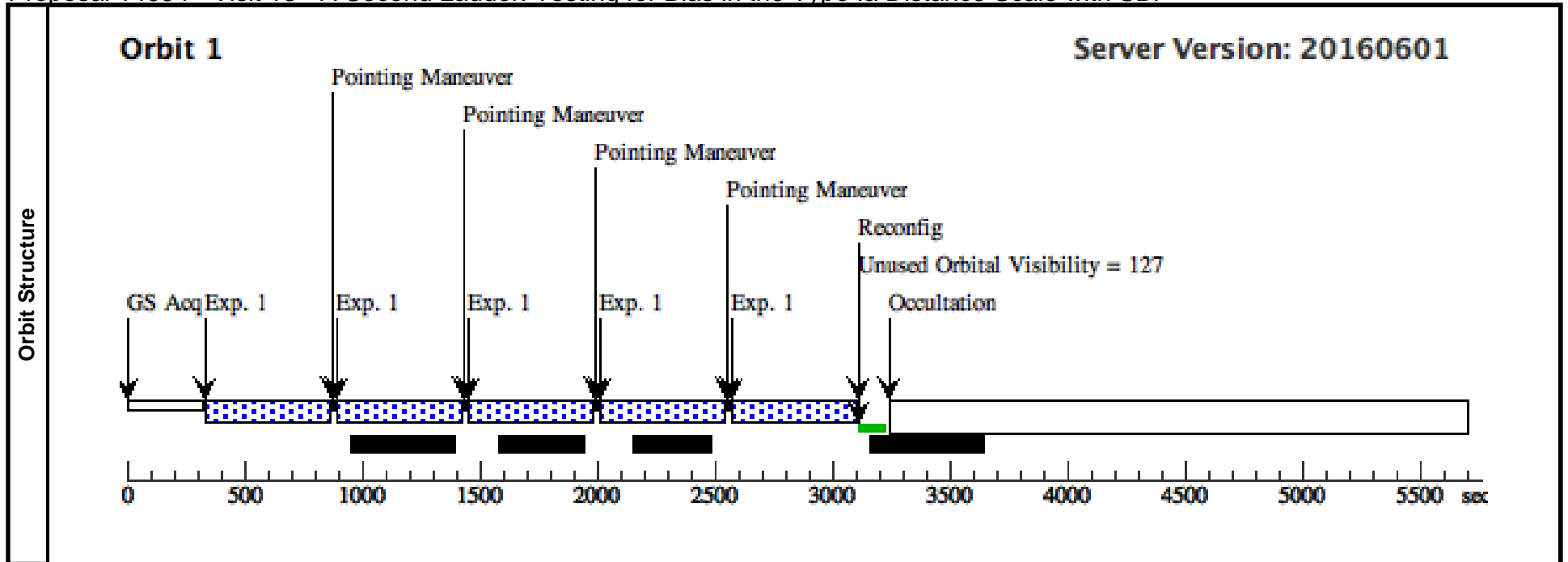
Visit	<b>Proposal 14654, Visit 12, scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 80D TO 247 D									
Patterns	#	Primary Pattern				Secondary Pattern				Exposures
	(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=5 Point Spacing=0.724 Line Spacing=		Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=true						(1)
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(12)	NGC-6964	RA: 20 47 24.2870 (311.8511958d) Dec: +00 18 3.01 (.30084d) Equinox: J2000		V=12.99+/-2.5	Reference Frame: SIMBAD				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(12) NGC-6964	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP5 0; NSAMP=15		Pattern 1, Exps 1-1 i n Visit 12 (1)	499.234285 Secs (2496.171 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)]	[1]



Proposal 14654 - Visit 13 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:05 GMT 2017

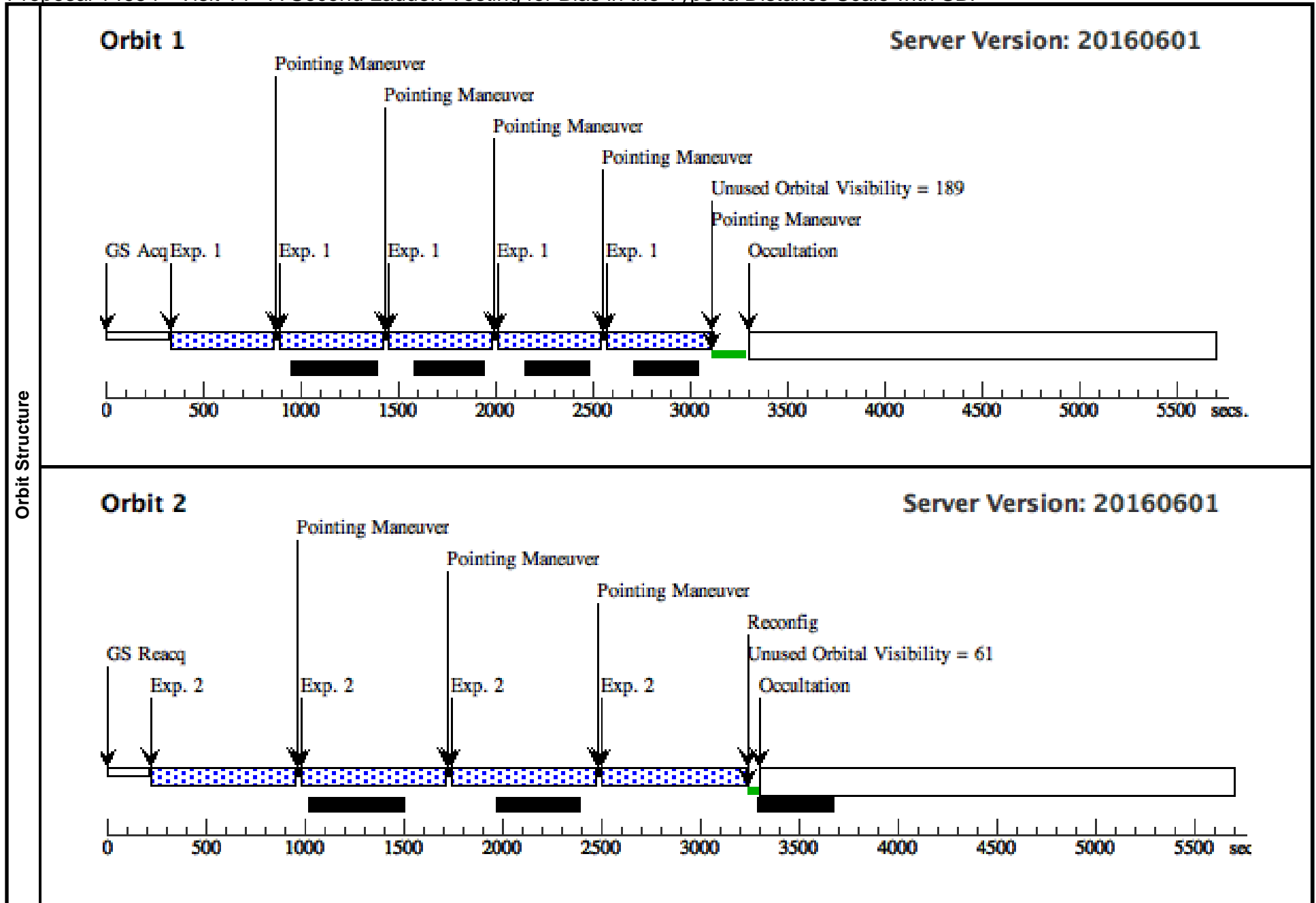
Visit	<b>Proposal 14654, Visit 13, scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 73D TO 240 D									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=5 Point Spacing=0.724 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=true		(1)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(13)	NGC-495	RA: 01 22 55.9560 (20.7331500d) Dec: +33 28 17.14 (33.47143d) Equinox: J2000		V=15.0+/-2.5	Reference Frame: SIMBAD				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(13) NGC-495	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP50; NSAMP=15		Pattern 1, Exps 1-1 in Visit 13 (1)	499.234285 Secs (2496.171 Secs)	[1]
									[=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)]	



Proposal 14654 - Visit 14 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:05 GMT 2017

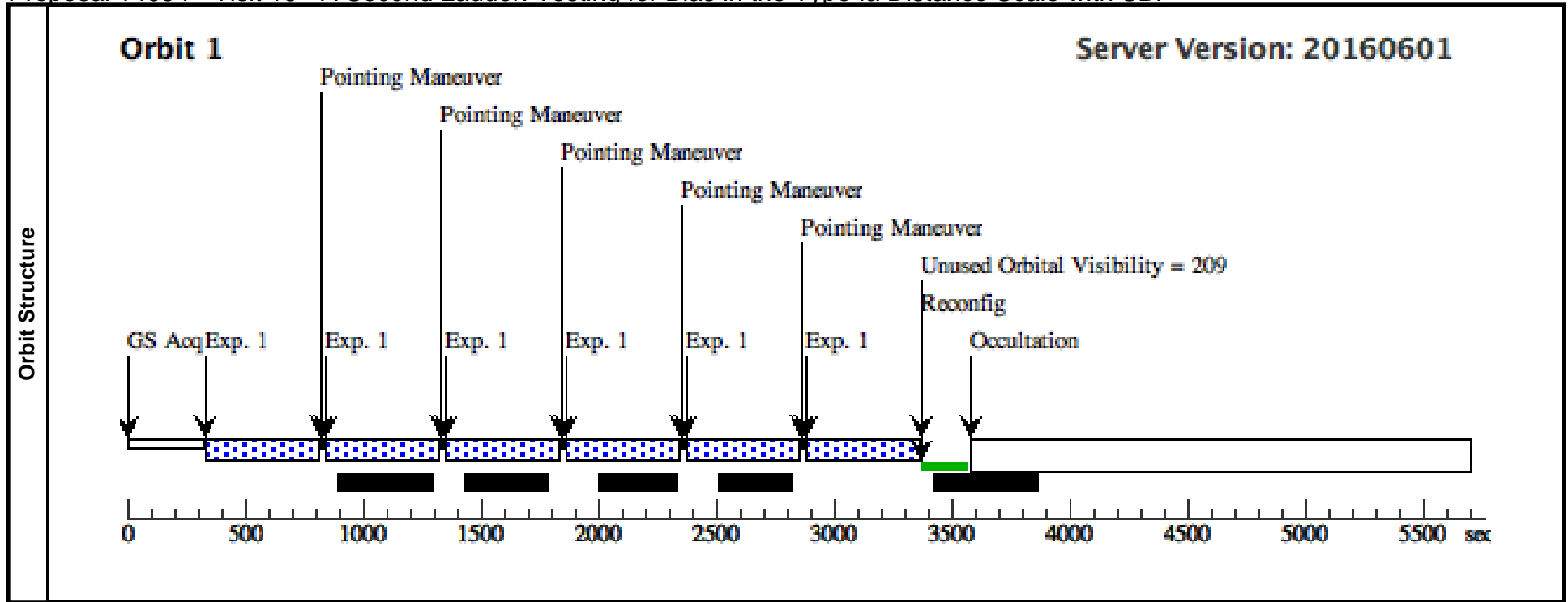
Visit	<b>Proposal 14654, Visit 14, scheduled</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 80D TO 248 D									
	#	Primary Pattern	Secondary Pattern	Exposures						
Patterns	(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=5 Point Spacing=0.724 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=true		(1)						
	(6)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=4 Point Spacing=0.73 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=131.788 Angle Between Sides= Center Pattern=true		(2)						
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(14)	NGC-1259	RA: 03 17 17.3050 (49.3221042d) Dec: +41 23 7.22 (41.38534d) Equinox: J2000		V=15.0+/-2.5	Reference Frame: SIMBAD				
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(14) NGC-1259	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP50; NSAMP=15		Pattern 1, Exps 1-1 in Visit 14 (1)	499.234285 Secs (2496.171 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)]	[1]
2		(14) NGC-1259	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP100; NSAMP=13		Pattern 6, Exps 2-2 in Visit 14 (6)	699.232615 Secs (2796.93 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[2]	



Proposal 14654 - Visit 15 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:06 GMT 2017

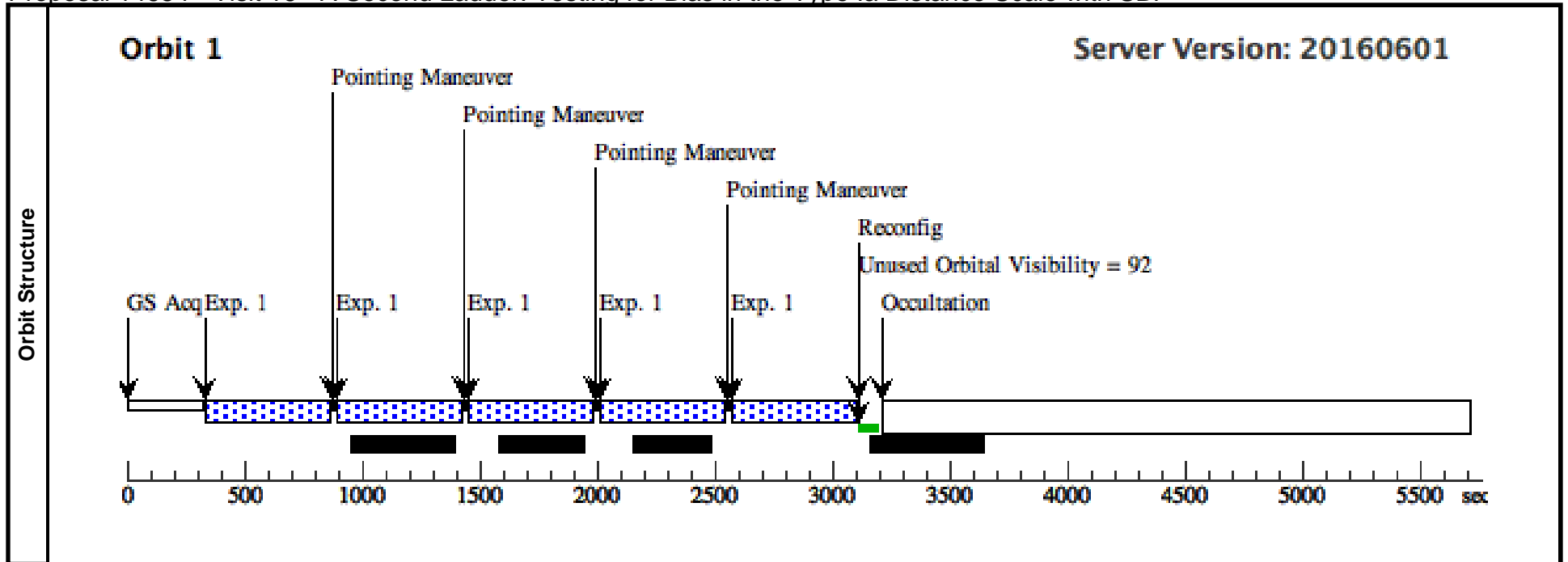
<b>Visit</b>	<b>Proposal 14654, Visit 15, completed</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 160D TO 328 D									
	<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>	<b>Secondary Pattern</b>	<b>Exposures</b>					
	(3)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=6 Point Spacing=0.724 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=131.788 Angle Between Sides= Center Pattern=true		(1)					
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>	<b>Fluxes</b>	<b>Miscellaneous</b>				
	(15)	NGC-4386	RA: 12 24 28.3190 (186.1179958d) Dec: +75 31 44.01 (75.52889d) Equinox: J2000		V=15.0+/-2.5	Reference Frame: SIMBAD				
	Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Extended=YES									
<b>Exposures</b>	<b>#</b>	<b>Label</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time (Total)/[Actual Dur.]</b>	<b>Orbit</b>
	1	(15) NGC-4386		WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP50; NSAMP=14		Pattern 3, Exps 1-1 in Visit 15 (3)	449.233834 Secs (2695.403 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)] [=>(Pattern 6)]	[1]



Proposal 14654 - Visit 16 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:06 GMT 2017

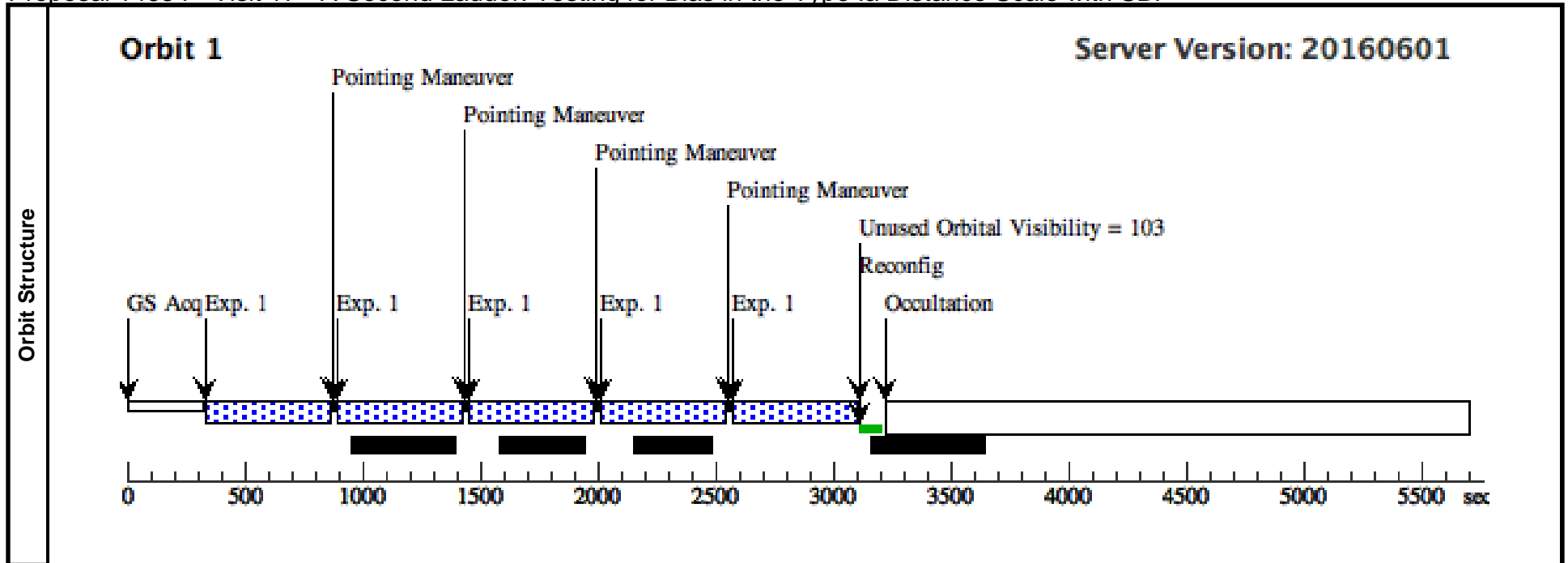
<b>Visit</b>	<b>Proposal 14654, Visit 16, scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 113D TO 281 D										
	<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>				<b>Secondary Pattern</b>			<b>Exposures</b>	
(1)		Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=5 Point Spacing=0.724 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=true						(1)		
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>		<b>Fluxes</b>	<b>Miscellaneous</b>				
	(16)	NGC-5839	RA: 15 05 27.4730 (226.3644708d) Dec: +01 38 4.68 (1.63463d) Equinox: J2000			V=12.19+/-2.5	Reference Frame: SIMBAD				
	Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Extended=YES										
<b>Exposures</b>	<b>#</b>	<b>Label</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time (Total)/[Actual Dur.]</b>		<b>Orbit</b>
	1		(16) NGC-5839	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP5 0; NSAMP=15		Pattern 1, Exps 1-1 in Visit 16 (1)	499.234285 Secs (2496.171 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)]		[1]



Proposal 14654 - Visit 17 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:06 GMT 2017

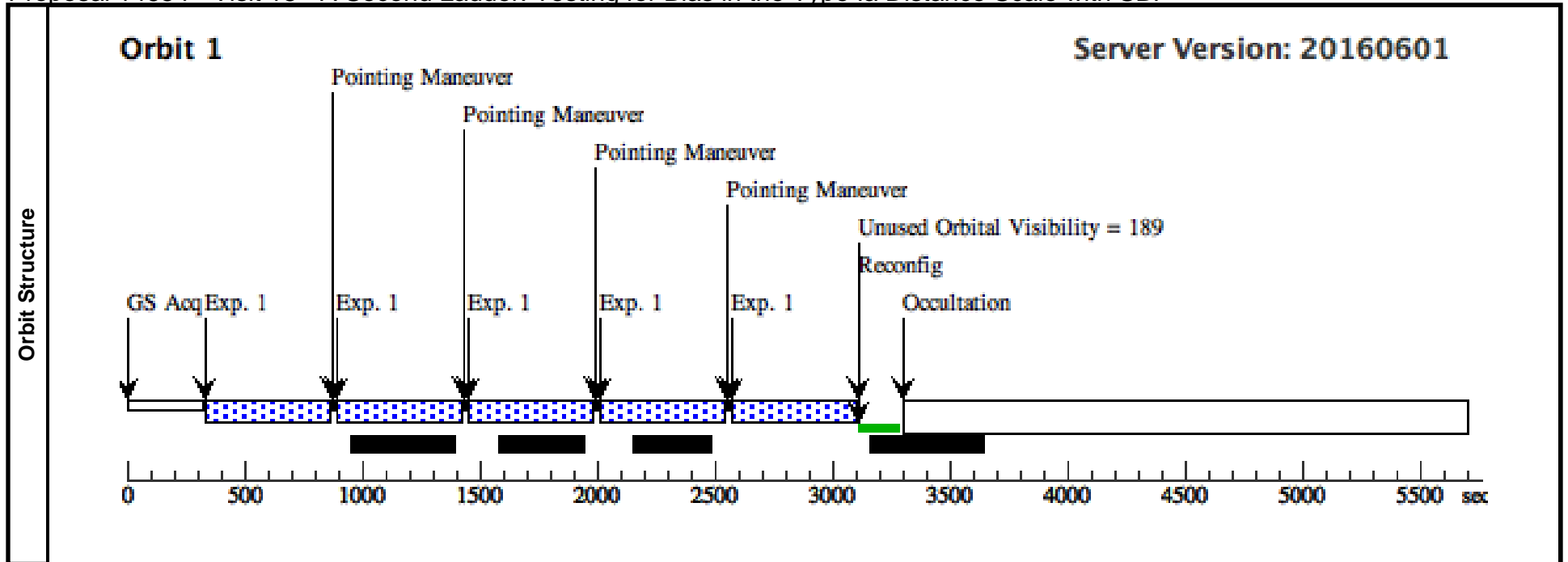
Visit	<b>Proposal 14654, Visit 17, scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 119D TO 286 D									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=5 Point Spacing=0.724 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=true		(1)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(17)	NGC-5490	RA: 14 09 57.3300 (212.4888750d) Dec: +17 32 43.53 (17.54543d) Equinox: J2000		V=15.5+/-2.5	Reference Frame: SIMBAD				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(17) NGC-5490	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP50; NSAMP=15		Pattern 1, Exps 1-1 in Visit 17 (1)	499.234285 Secs (2496.171 Secs)	[1]
									[=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)]	



Proposal 14654 - Visit 18 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:06 GMT 2017

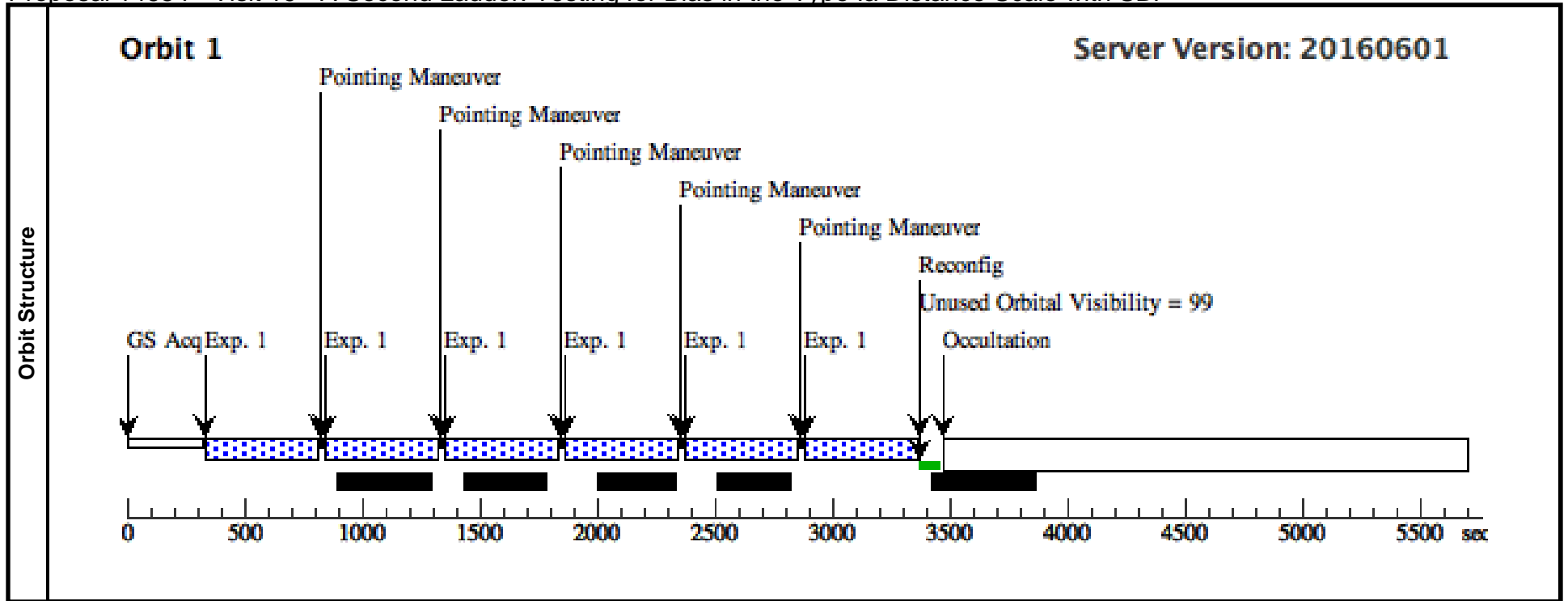
Visit	<b>Proposal 14654, Visit 18, completed</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 80D TO 248 D									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=5 Point Spacing=0.724 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=true		(1)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(18)	NGC-1278	RA: 03 19 54.1630 (49.9756792d) Dec: +41 33 48.27 (41.56341d) Equinox: J2000		V=14.14+/-2.5	Reference Frame: SIMBAD				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=YES									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(18) NGC-1278	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP50; NSAMP=15		Pattern 1, Exps 1-1 in Visit 18 (1)	499.234285 Secs (2496.171 Secs)	[1]
									[=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)]	



Proposal 14654 - Visit 19 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:06 GMT 2017

Visit	<b>Proposal 14654, Visit 19, scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 335D TO 134 D									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(3)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=6 Point Spacing=0.724 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=131.788 Angle Between Sides= Center Pattern=true		(1)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(19)	KK-1524	RA: 09 38 34.1088 (144.6421200d) Dec: -63 58 22.58 (-63.97294d) Equinox: J2000		V=15.0+/-2.5	Reference Frame: NED				
	<i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i> Extended=YES									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(19) KK-1524	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP50; NSAMP=14		Pattern 3, Exps 1-1 in Visit 19 (3)	449.233834 Secs (2695.403 Secs)	[1]
									[=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)] [=>(Pattern 6)]	



Proposal 14654 - Visit 20 - A Second Ladder: Testing for Bias in the Type Ia Distance Scale with SBF

Wed Jan 18 02:03:06 GMT 2017

Visit	<b>Proposal 14654, Visit 20, completed</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ORIENT 332D TO 140 D									
	#	Primary Pattern	Secondary Pattern	Exposures						
Patterns	(3)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=6 Point Spacing=0.724 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=131.788 Angle Between Sides= Center Pattern=true		(1)						
	(7)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=4 Point Spacing=0.73 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false		(2)						
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(20)	ESO-125-6	RA: 08 50 35.8500 (132.6493750d) Dec: -61 16 40.50 (-61.27792d) Equinox: J2000		V=15.0+/-2.5	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) ESO-125-6	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP50; NSAMP=14			Pattern 3, Exps 1-1 i n Visit 20 (3)	449.233834 Secs (2695.403 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)] [=>(Pattern 5)] [=>(Pattern 6)]
2		(20) ESO-125-6	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP100; NSAMP=13			Pattern 7, Exps 2-2 i n Visit 20 (7)	699.232615 Secs (2796.93 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[2]

