12932 - COSMIC-LAB: Hunting for optical companions to binary MSPs in Globular Clusters

Cycle: 20, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Prof. Francesco R. Ferraro (PI) (ESA Member) (Contact)	**Universita di Bologna**	**francesco.ferraro3@unibo.it**
Dr. Barbara Lanzoni (CoI) (ESA Member)	Universita di Bologna	barbara.lanzoni3@unibo.it
Dr. Cristina Pallanca (CoI) (ESA Member)	Universita di Bologna	cristina.pallanca3@unibo.it
Dr. Emanuele Dalessandro (CoI) (ESA Member)	Universita di Bologna	emanuele.dalessandr2@unibo.it
Dr. Alessio Mucciarelli (CoI) (ESA Member)	Universita di Bologna	alessio.mucciarelli@studio.unibo.it
Dr. Andrea Possenti (CoI) (ESA Member)	INAF, Osservatorio Astronomico di Cagliari	possenti@ca.astro.it
Dr. Scott M. Ransom (CoI) (AdminUSPI)	Associated Universities, Inc.	sransom@nrao.edu
Dr. Paulo C. C. Freire (CoI) (ESA Member)	Max-Planck-Institut fur Radioastronomie	pfreire@mpifr-bonn.mpg.de
Dr. Ingrid Stairs (CoI)	University of British Columbia	stairs@astro.ubc.ca
Dr. Livia Origlia (CoI) (ESA Member)	INAF, Osservatorio Astronomico di Bologna	livia.origlia@oabo.inaf.it

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(2) NGC6838	ACS/WFC	4	16-Jul-2012 21:52:48.0	yes
02	(1) NGC6544	WFC3/UVIS	1	16-Jul-2012 21:53:04.0	yes
03	(1) NGC6544	WFC3/UVIS	1	16-Jul-2012 21:53:11.0	yes
04	(1) NGC6544	WFC3/UVIS	1	16-Jul-2012 21:53:17.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
05	(1) NGC6544	WFC3/UVIS	1	16-Jul-2012 21:53:22.0	yes
06	(1) NGC6544	WFC3/UVIS	1	16-Jul-2012 21:53:27.0	yes
07	(1) NGC6544	WFC3/UVIS	1	16-Jul-2012 21:53:31.0	yes
08	(4) M28H-OFFSET (5) M28H-TARGET CCDFLAT	STIS/CCD	8	16-Jul-2012 21:54:04.0	yes

18 Total Orbits Used

ABSTRACT

As part of the project "Cosmic-Lab" aimed at using globular clusters (GCs) as natural laboratories to study dynamics and stellar evolution, here we present a proposal focussed on binary Millisecond Pulsars (MSPs). While the link between these objects and GC dynamics is firmly established, much needs to be still understood in terms of both the details of such a connection and the MSP evolutionary paths. This is mainly because only 7 optical counterparts to binary MSP companions are known to date in GCs. Noteworthy, 4 out of these 7 objects have been discovered by our group, thanks to our large experience in high-precision stellar photometry, spectroscopy and astrometry in crowded stellar fields, and our very efficient collaboration with the major groups leading extensive MSP search in the radio bands.

Here we propose to further pursue this prolific route by exploiting the ACS and WFC3 imaging capabilities in order to search for 3 new companions to binary MSPs in two GCs (namely NGC6838 and NGC6544). The selected targets present the double advantage of already showing promising candidate counterparts in archive ACS images and sampling three different stages of the MSP evolution. We also propose phase resolved spectroscopy with STIS to measure the radial velocity curve of COM-M28H, recently discovered by our group. This will allow the full characterization of the system, yielding the direct determination of the pulsar mass (that in MSPs is expected to be significantly larger than the canonical 1.4 Msun, due to heavy mass accretion during the recycling process).

OBSERVING DESCRIPTION

Observations are organized in 8 visits (1 for NGC6838, 6 for NGC6544 and 1 for M28H).

VISIT 1. Target: the optical companion to a MSP in NGC6838 - 4 orbits - instrument: ACS/WFC.

A total of 19 long exposures in the selected optical filters (F606W,F814W) are planned in a proper way to sample the orbital period of the target.

Dithering is performed by applying small offsets (via POS TARG keyword) to each exposure using a path already successfully tested in the past. The target is positioned at the aperture WFC1; with this configuration we are also able to sample almost the entire cluster core.
Using visit orientation requirements we excluded orientations for which a contamination from spikes of close bright stars is possible. Two short exposures are also planned in order to sample the bright population of the globular cluster.

VISIT 2-7. Target: the optical companion to a MSP in NGC6544 - 6 orbits - Instrument: WFC3/UVIS
A total of 24 long exposures in the selected optical filters (F390W,F606W) are planned. Exposures are organized in six visits (one orbit each) with appropriate TIMING REQUIREMENT are planned in order to sample the entire orbital period (P~ 10 days) of the main target. Dithering is performed by applying small offsets (via POS TARG keyword) to each exposure using a path already tested in the past. The main target is positioned at the aperture UVIS1 thus allowing to sample also the region where another binary MSP is located. Using visit orientation requirements we excluded orientations for which contamination from close bright star spikes is possible. Two short exposures are also planned in order to sample the bright population of the globular cluster.

VISIT 8: Target: the optical companion to the MSP M28H - 8 orbits - Instrument: STIS
Since the target is located in a crowded region we plan the acquisition using an offset star (at ~ 1".8 from the target). A total of 23 exposures with the spectral element G750L, the 52X0.2 aperture, BINAXIS2=2 and CR-SPLIT=NO are planned in a single visit. At the end of the visit we also planned the Fringe Flat Fields. Dithering is performed using the path SLIT-ALONG-SLIT of 2 points for the first orbit and 3 points for the other orbits by setting POINT_SETTING=0".15 in both cases. Using visit orientation requirements we excluded orientations for which contamination from close bright stars is possible.

Visit

Proposal 12932, 6838 (01) Tue Jul 17 01:54:23 GMT 2012

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 65.9D TO 92.6 D; ORIENT 144.8D TO 205.9 D; ORIENT 245.9D TO 272.6 D; ORIENT 324.8D TO 25.9 D

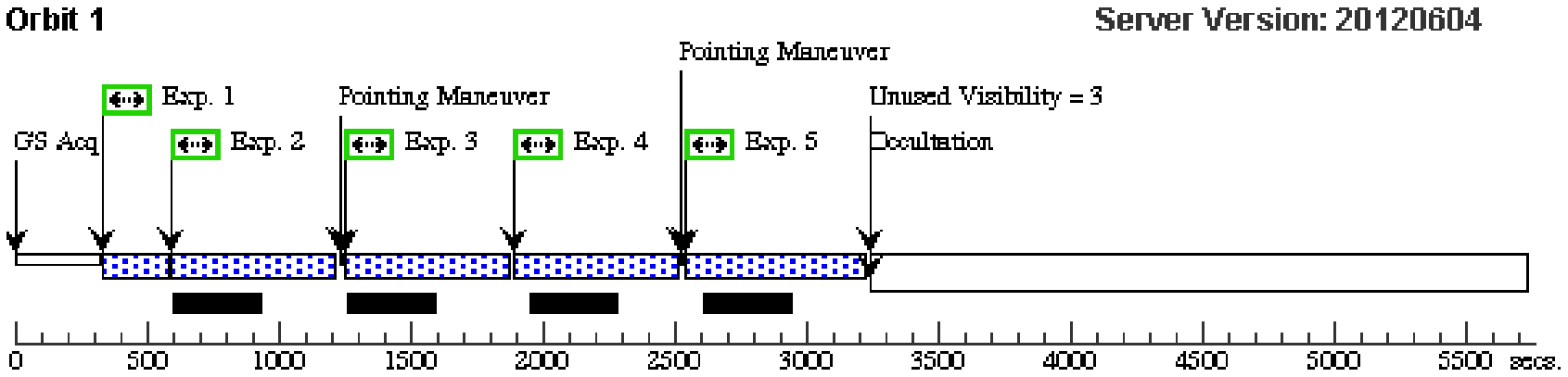
Fixed Targets

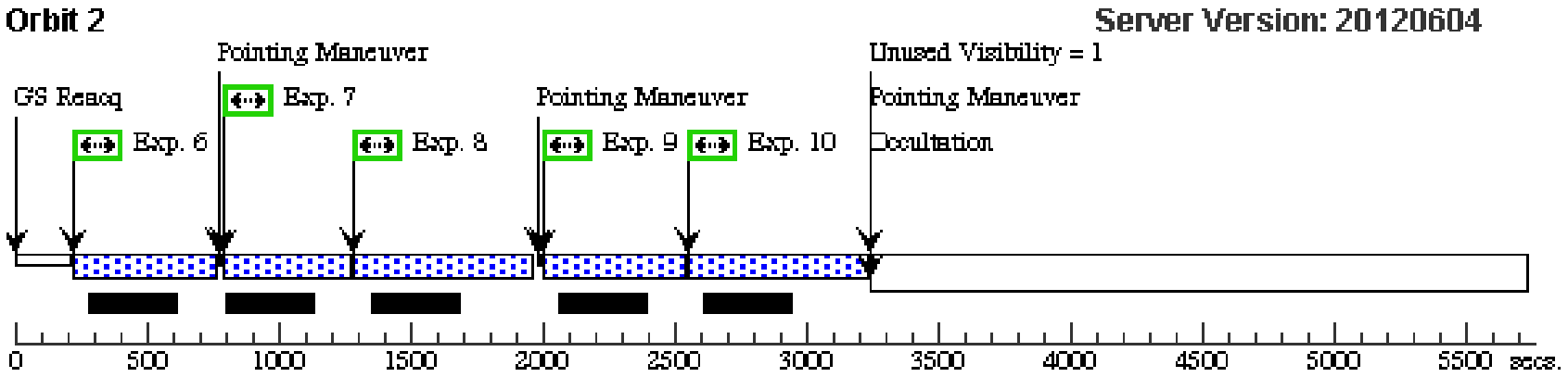
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	NGC6838	RA: 19 53 46.4000 (298.4433333d) Dec: +18 47 4.90 (18.78469d) Equinox: J2000		V=8.19+/-0.1	Reference Frame: ICRS

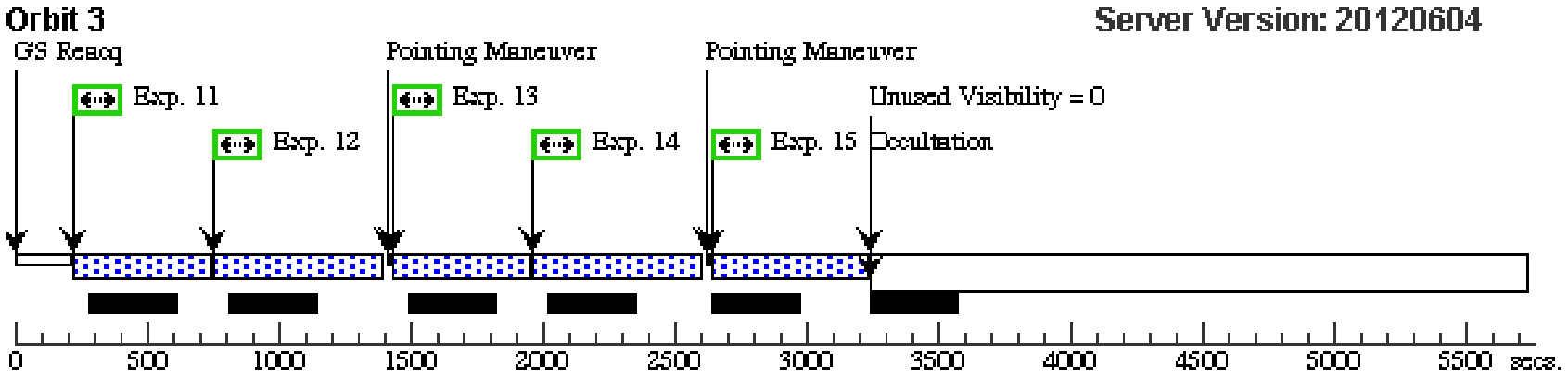
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	6838_VS	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F606W				0.5 Secs	
								[==>]	***[1]***
2	6838_V0	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F606W				500 Secs	
								[==>]	***[1]***
3	6838_V1	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F606W		POS TARG -0.099,-0.165		500 Secs	
								[==>]	***[1]***
4	6838_I1	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F814W		SAME POS AS 3		440 Secs	
								[==>]	***[1]***
5	6838_V2	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.059,-0.095		500 Secs	
								[==>]	***[1]***
6	6838_I2	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F814W		SAME POS AS 5		357 Secs	
								[==>]	***[2]***
7	6838_I3	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F814W		POS TARG 0.218,-0.024		357 Secs	
								[==>]	***[2]***
8	6838_V3	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F606W		SAME POS AS 7		500 Secs	
								[==>]	***[2]***
9	6838_I4	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F814W		POS TARG 0.158,0.07		357 Secs	
								[==>]	***[2]***
10	6838_V4	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F606W		SAME POS AS 9		500 Secs	
								[==>]	***[2]***
11	6838_I5	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F814W		POS TARG 0.099,0.165		337 Secs	
								[==>]	***[3]***
12	6838_V5	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F606W		SAME POS AS 11		466 Secs	
								[==>]	***[3]***
13	6838_I6	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F814W		POS TARG -0.059,0.095		337 Secs	
								[==>]	***[3]***
14	6838_V6	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F606W		SAME POS AS 13		466 Secs	
								[==>]	***[3]***
15	6838_I7	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F606W		POS TARG -0.218,0.024		466 Secs	
								[==>]	***[3]***
16	6838_IS	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F814W		SAME POS AS 15		0.5 Secs	
								[==>]	***[4]***
17	6838_V7	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F814W		SAME POS AS 15		337 Secs	
								[==>]	***[4]***
18	6838_I8	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F814W		POS TARG -0.158,-0.07		337 Secs	
								[==>]	***[4]***
19	6838_V8	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F606W		SAME POS AS 18		459 Secs	
								[==>]	***[4]***
20	6838_I9	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F814W		POS TARG -0.158,-0.110		337 Secs	
								[==>]	***[4]***
21	6838_V9	(2) NGC6838	ACS/WFC, ACCUM, WFC1	F606W		SAME POS AS 20		459 Secs	
								[==>]	***[4]***

Orbit Structure



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GS Reacq
Pointing Maneuver
Pointing Maneuver
Exp. 11
Exp. 13
Unused Visibility = 0
Exp. 12
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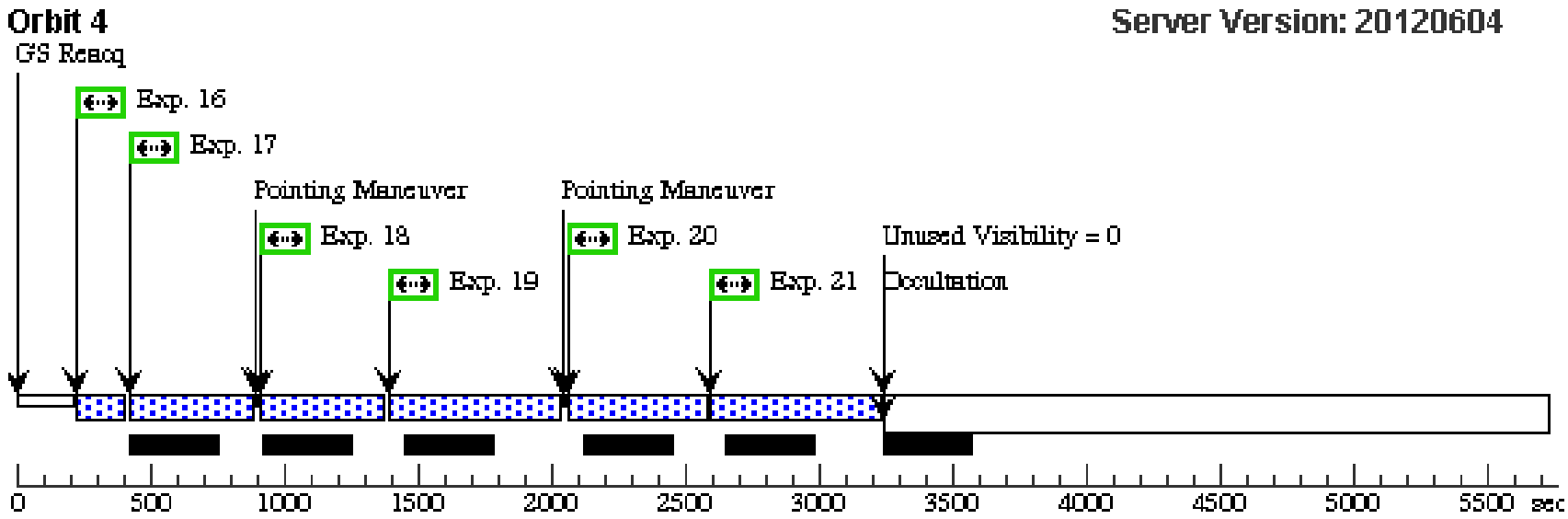
5500
secs.


Orbit 4
Server Version: 20120604
GS Reacq
Exp. 16
Exp. 17
Pointing Maneuver
Pointing Maneuver
Exp. 18
Exp. 20
Unused Visibility = 0
Exp. 19
Exp. 21
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 12932, 6544_1 (02) Tue Jul 17 01:54:28 GMT 2012

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 31D TO 43.4 D; ORIENT 83.4D TO 101.6 D; ORIENT 141.7D TO 171 D; ORIENT 211D TO 223.4 D; ORIENT 263.4D TO 281.6 D; ORIENT 321.7D TO 356 D

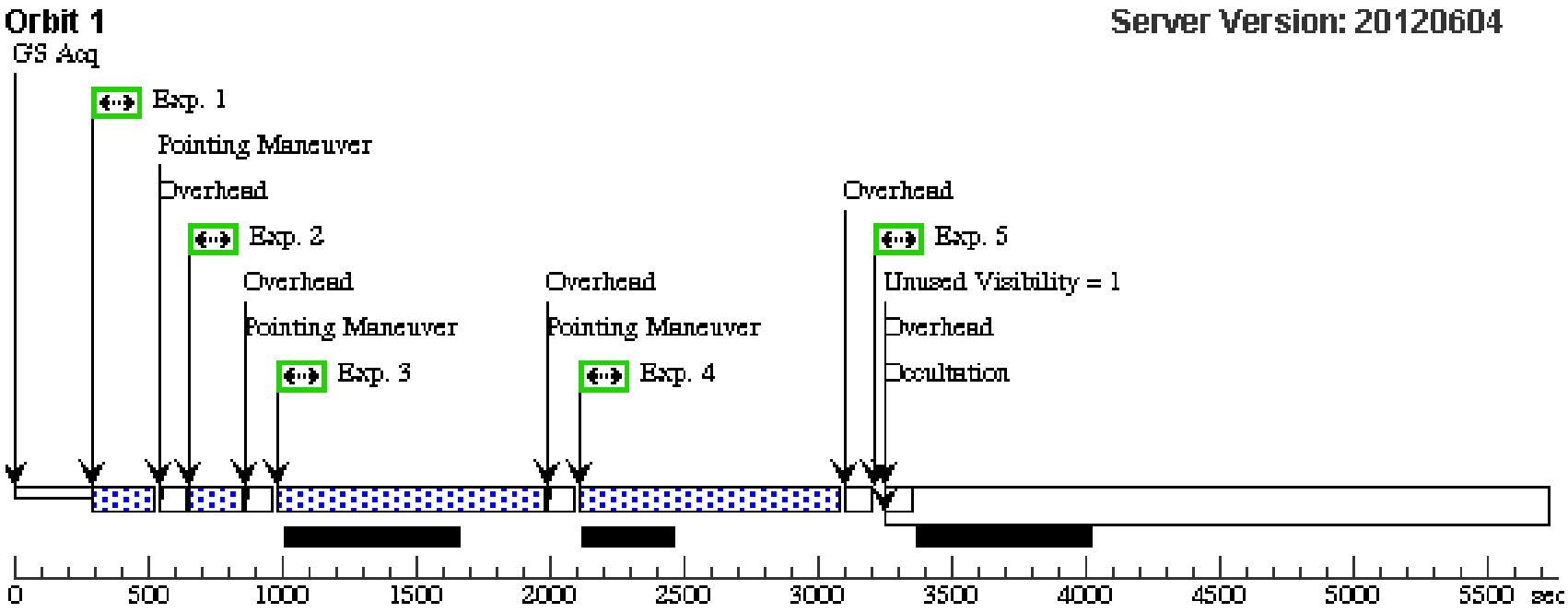
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC6544	RA: 18 07 20.8700 (271.8369583d) Dec: -25 00 1.90 (-25.00053d) Equinox: J2000		V=7.77+/-0.1	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	6544_V1	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F606W				200 Secs	
								[==>]	***[1]***
2	6544_V2	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F606W		POS TARG -0.099,-0.165		200 Secs	
								[==>]	***[1]***
3	6544_U1	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F390W		SAME POS AS 1		975 Secs	
								[==>]	***[1]***
4	6544_U2	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F390W		SAME POS AS 2		975 Secs	
								[==>]	***[1]***
5	6544_VS	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F606W		SAME POS AS 2		0.5 Secs	
								[==>]	***[1]***

Orbit Structure



Visit

Proposal 12932, 6544_2 (03) Tue Jul 17 01:54:29 GMT 2012

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

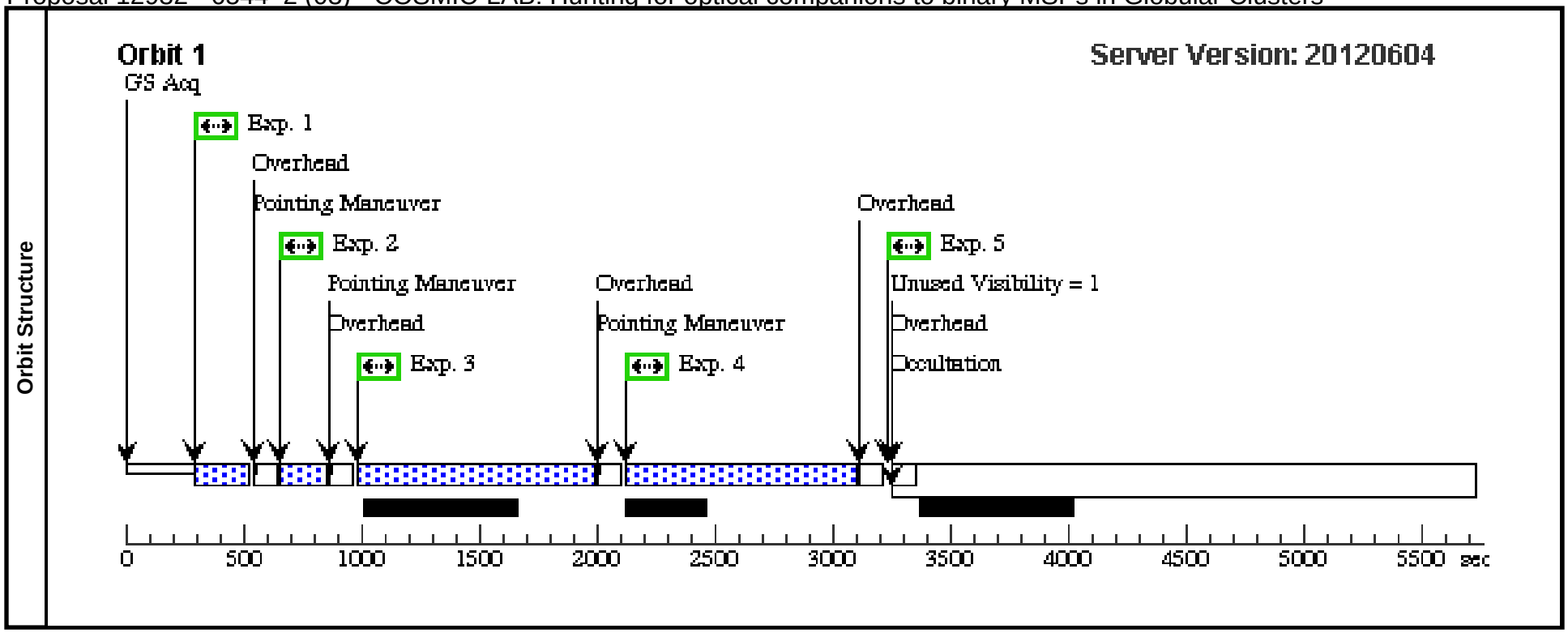
Special Requirements: ORIENT 31D TO 43.4 D; ORIENT 83.4D TO 101.6 D; ORIENT 141.7D TO 171 D; ORIENT 211D TO 223.4 D; ORIENT 263.4D TO 281.6 D; ORIENT 321.7D TO 356 D; AFTER 02 BY 1.26 D TO 2.06 D

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC6544	RA: 18 07 20.8700 (271.8369583d) Dec: -25 00 1.90 (-25.00053d) Equinox: J2000		V=7.77+/-0.1	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	6544_V3	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F606W		POS TARG 0.059,-0.095		200 Secs	
								[==>]	***[1]***
2	6544_V4	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F606W		POS TARG 0.218,-0.024		200 Secs	
								[==>]	***[1]***
3	6544_U3	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F390W		SAME POS AS 1		983 Secs	
								[==>]	***[1]***
4	6544_U4	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F390W		SAME POS AS 2		983 Secs	
								[==>]	***[1]***
5	6544_US	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F390W		SAME POS AS 2		5 Secs	
								[==>]	***[1]***


Orbit Structure
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Overhead
Pointing Maneuver
Exp. 2
Pointing Maneuver
Overhead
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Overhead
Pointing Maneuver
Exp. 4
Overhead
Exp. 5
Unused Visibility = 1
Overhead
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 12932, 6544_3 (04) Tue Jul 17 01:54:30 GMT 2012

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 31D TO 43.4 D; ORIENT 83.4D TO 101.6 D; ORIENT 141.7D TO 171 D; ORIENT 211D TO 223.4 D; ORIENT 263.4D TO 281.6 D; ORIENT 321.7D TO 356 D; AFTER 02 BY 2.92 D TO 3.72 D

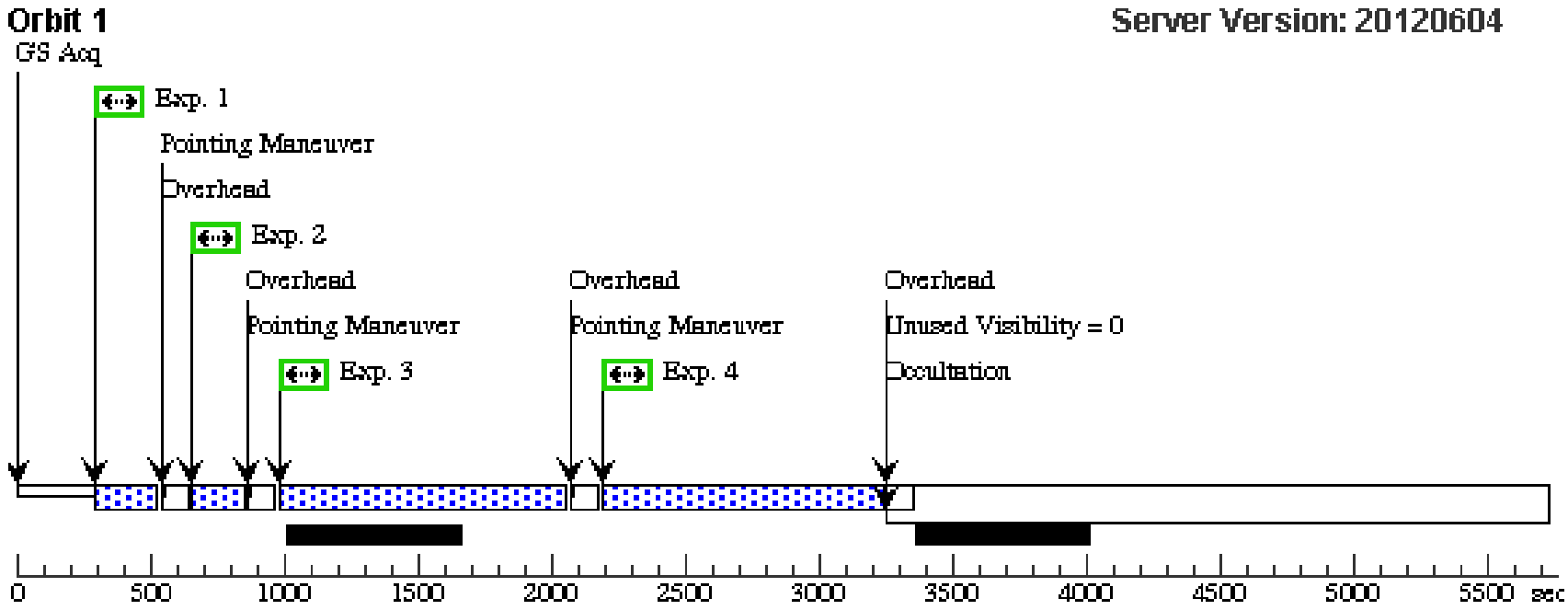
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC6544	RA: 18 07 20.8700 (271.8369583d) Dec: -25 00 1.90 (-25.00053d) Equinox: J2000		V=7.77+/-0.1	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	6544_V5	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F606W		POS TARG 0.158,0.070		200 Secs	
								[==>]	***[1]***
2	6544_V6	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F606W		POS TARG 0.099,0.165		200 Secs	
								[==>]	***[1]***
3	6544_U5	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F390W		SAME POS AS 1		1051 Secs	
								[==>]	***[1]***
4	6544_U6	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F390W		SAME POS AS 2		1051 Secs	
								[==>]	***[1]***

Orbit Structure



Visit

Proposal 12932, 6544_4 (05) Tue Jul 17 01:54:31 GMT 2012

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 31D TO 43.4 D; ORIENT 83.4D TO 101.6 D; ORIENT 141.7D TO 171 D; ORIENT 211D TO 223.4 D; ORIENT 263.4D TO 281.6 D; ORIENT 321.7D TO 356 D; AFTER 02 BY 4.58 D TO 5.38 D

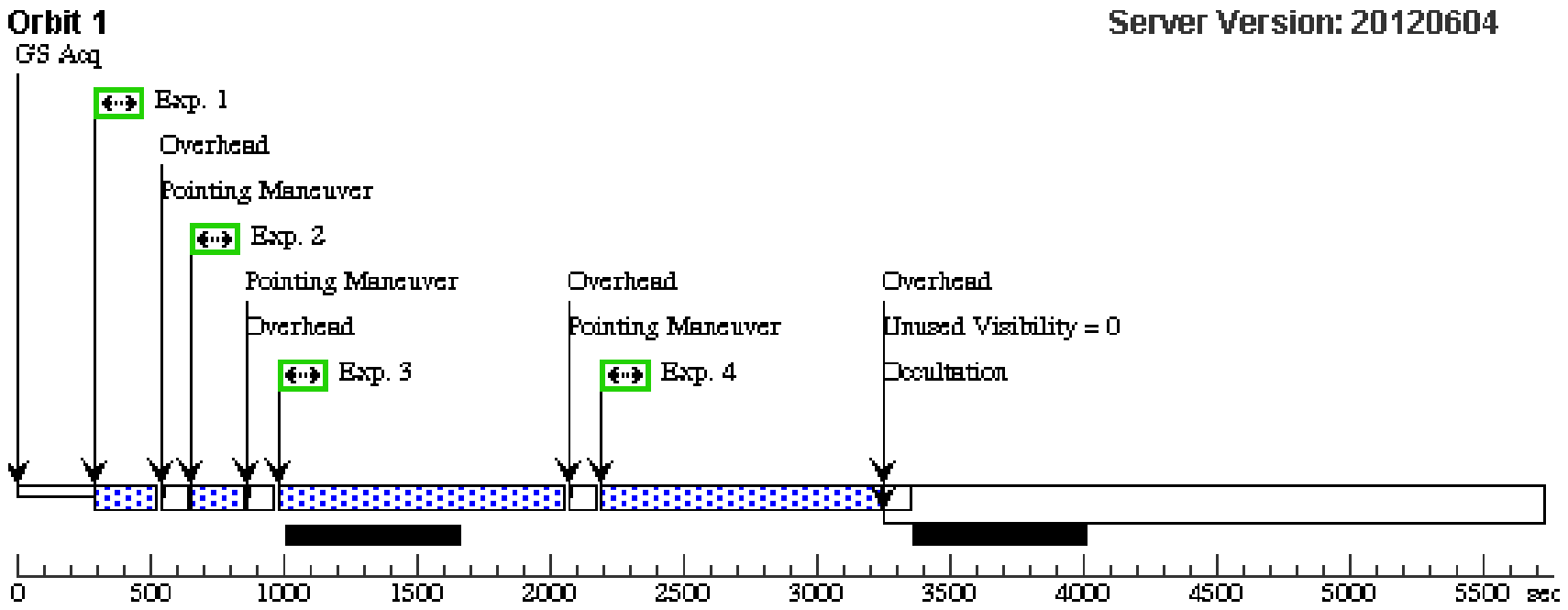
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC6544	RA: 18 07 20.8700 (271.8369583d) Dec: -25 00 1.90 (-25.00053d) Equinox: J2000		V=7.77+/-0.1	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	6544_V7	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F606W		POS TARG -0.059,0 .095		200 Secs	
								[==>]	***[1]***
2	6544_V8	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F606W		POS TARG -0.218,0 .024		200 Secs	
								[==>]	***[1]***
3	6544_U7	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F390W		SAME POS AS 1		1051 Secs	
								[==>]	***[1]***
4	6544_U8	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F390W		SAME POS AS 2		1051 Secs	
								[==>]	***[1]***

Orbit Structure



Visit

Proposal 12932, 6544_5 (06) Tue Jul 17 01:54:32 GMT 2012

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 31D TO 43.4 D; ORIENT 83.4D TO 101.6 D; ORIENT 141.7D TO 171 D; ORIENT 211D TO 223.4 D; ORIENT 263.4D TO 281.6 D; ORIENT 321.7D TO 356 D; AFTER 02 BY 6.24 D TO 7.04 D

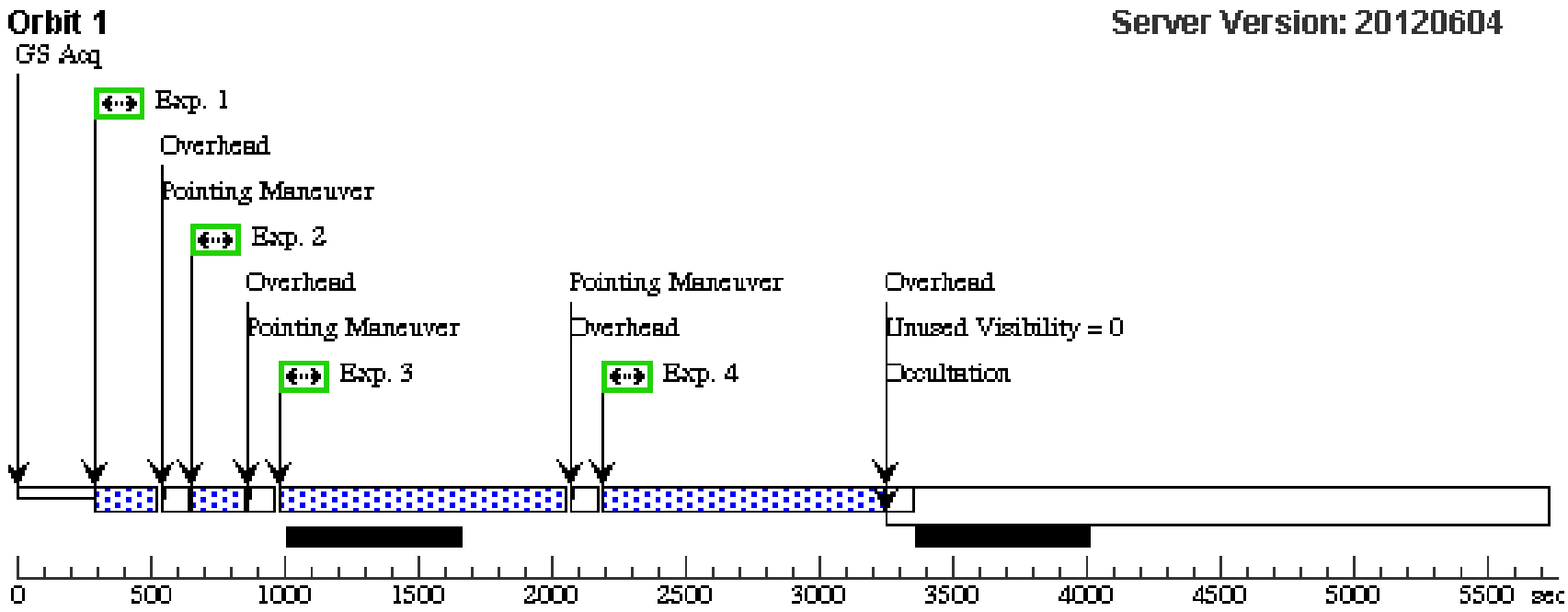
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC6544	RA: 18 07 20.8700 (271.8369583d) Dec: -25 00 1.90 (-25.00053d) Equinox: J2000		V=7.77+/-0.1	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	6544_V9	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F606W		POS TARG -0.158,-0.070		200 Secs	
								[==>]	***[1]***
2	6544_V10	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F606W		POS TARG -0.158,-0.110		200 Secs	
								[==>]	***[1]***
3	6544_U9	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F390W		SAME POS AS 1		1051 Secs	
								[==>]	***[1]***
4	6544_U10	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F390W		SAME POS AS 2		1051 Secs	
								[==>]	***[1]***

Orbit Structure



Visit

Proposal 12932, 6544_6 (07) Tue Jul 17 01:54:32 GMT 2012

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 31D TO 43.4 D; ORIENT 83.4D TO 101.6 D; ORIENT 141.7D TO 171 D; ORIENT 211D TO 223.4 D; ORIENT 263.4D TO 281.6 D; ORIENT 321.7D TO 356 D; AFTER 02 BY 7.90 D TO 8.70 D

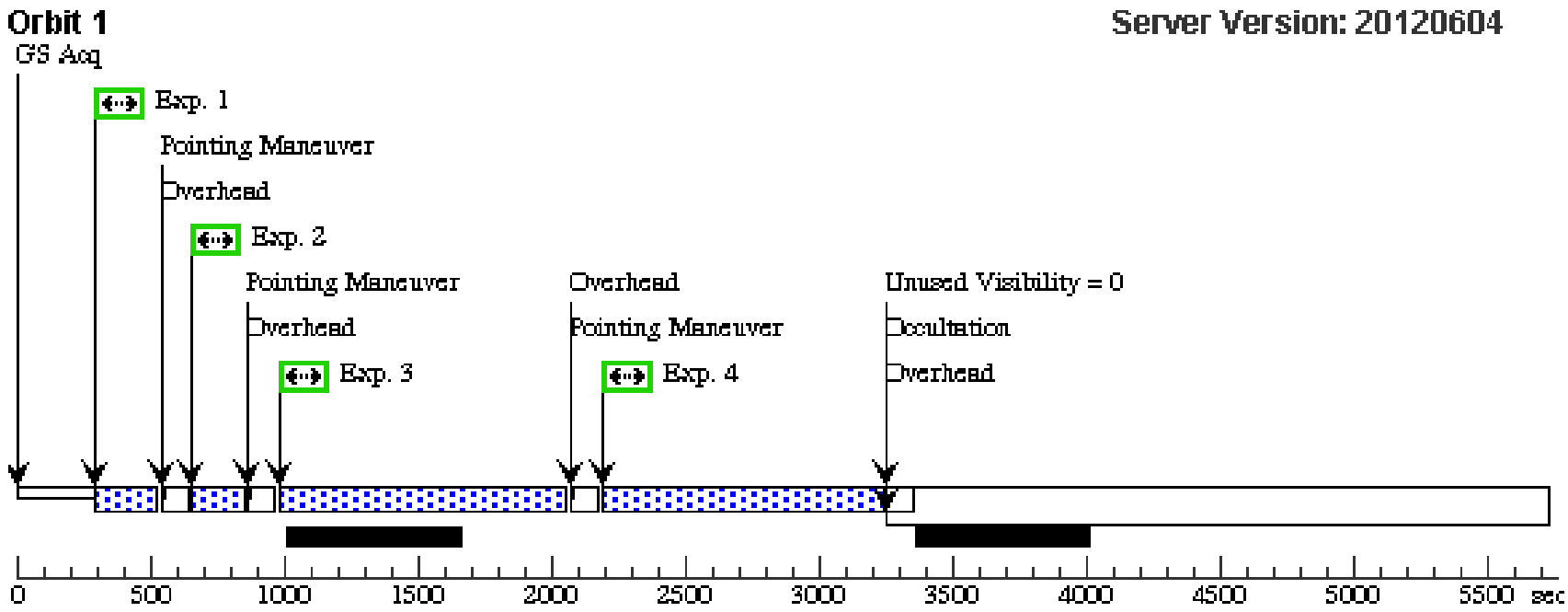
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC6544	RA: 18 07 20.8700 (271.8369583d) Dec: -25 00 1.90 (-25.00053d) Equinox: J2000		V=7.77+/-0.1	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	6544_V11	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F606W		POS TARG -0.099,0.052		200 Secs	
								[==>]	***[1]***
2	6544_V12	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F606W		POS TARG -0.04,0.214		200 Secs	
								[==>]	***[1]***
3	6544_U11	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F390W		SAME POS AS 1		1051 Secs	
								[==>]	***[1]***
4	6544_U12	(1) NGC6544	WFC3/UVIS, ACCUM, UVIS1	F390W		SAME POS AS 2		1051 Secs	
								[==>]	***[1]***

Orbit Structure



Visit

Proposal 12932, M28H (08) Tue Jul 17 01:54:33 GMT 2012

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: ORIENT 15.7D TO 63.8 D; ORIENT 83.8D TO 115.8 D; ORIENT 154.4D TO 175.7 D; ORIENT 195.7D TO 243.8 D; ORIENT 263.8D TO 295.8 D; ORIENT 334.4D TO 355.7 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=STIS-ALONG-SLIT Purpose=DITHER Number Of Points=2 Point Spacing=0.15 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=90.0 Angle Between Sides= Center Pattern=false		(2)
(4)	Pattern Type=STIS-ALONG-SLIT Purpose=DITHER Number Of Points=3 Point Spacing=0.15 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=90.0 Angle Between Sides= Center Pattern=false		(3), (4), (5), (6), (7), (8), (9)

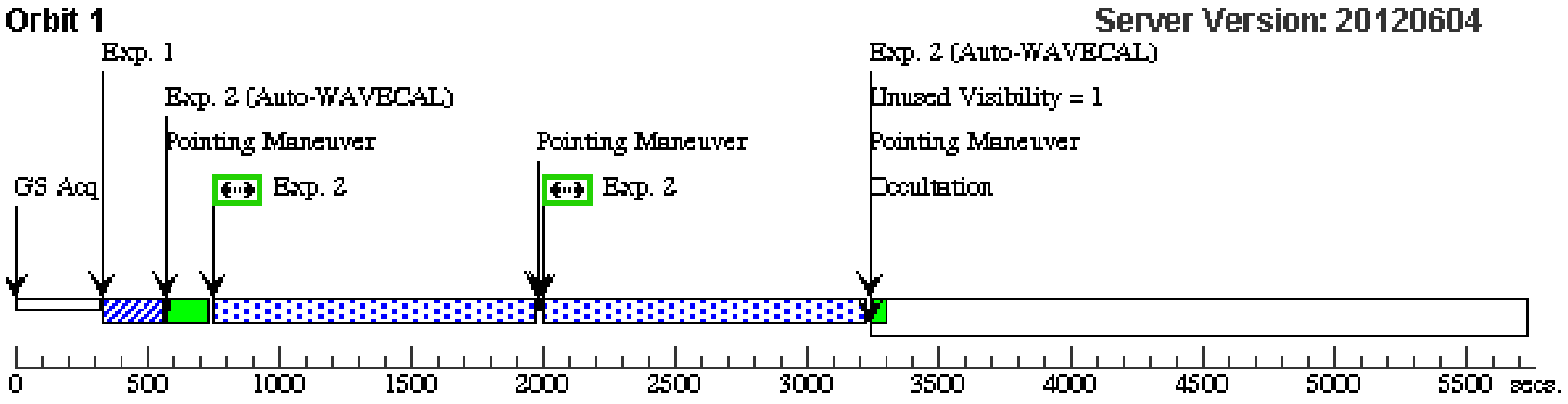
Fixed Targets

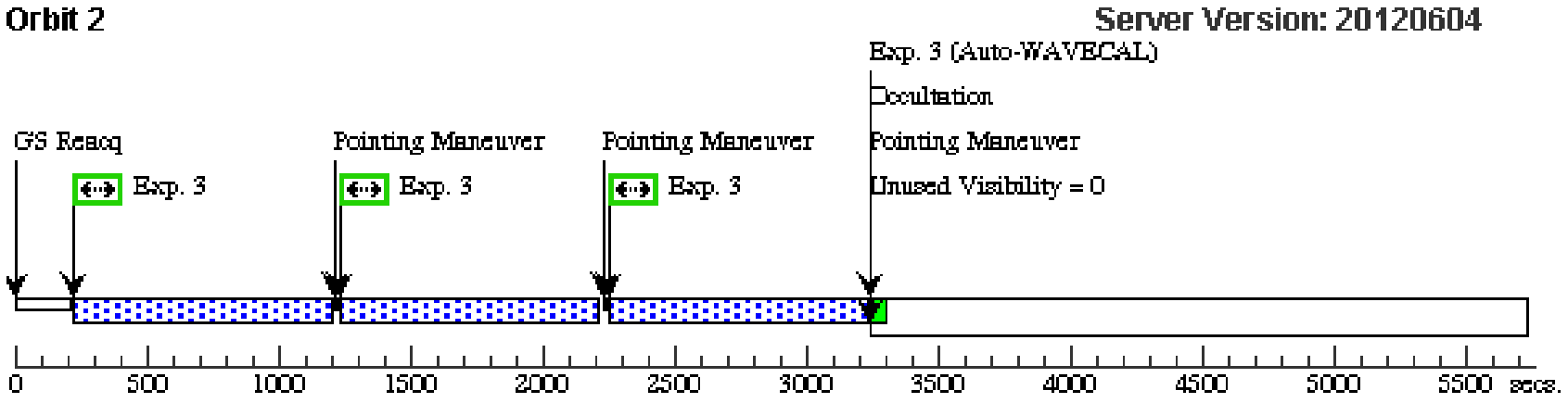
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	M28H-OFFSET	RA: 18 24 31.4661 (276.1311088d) Dec: -24 52 17.51 (-24.87153d) Equinox: J2000		V=(?) B=15.1+/-0.1	Reference Frame: ICRS
(5)	M28H-TARGET	RA: 18 24 31.5977 (276.1316571d) Dec: -24 52 17.21 (-24.87145d) Equinox: J2000		V=(?) I=20.07+/-0.1	Reference Frame: ICRS

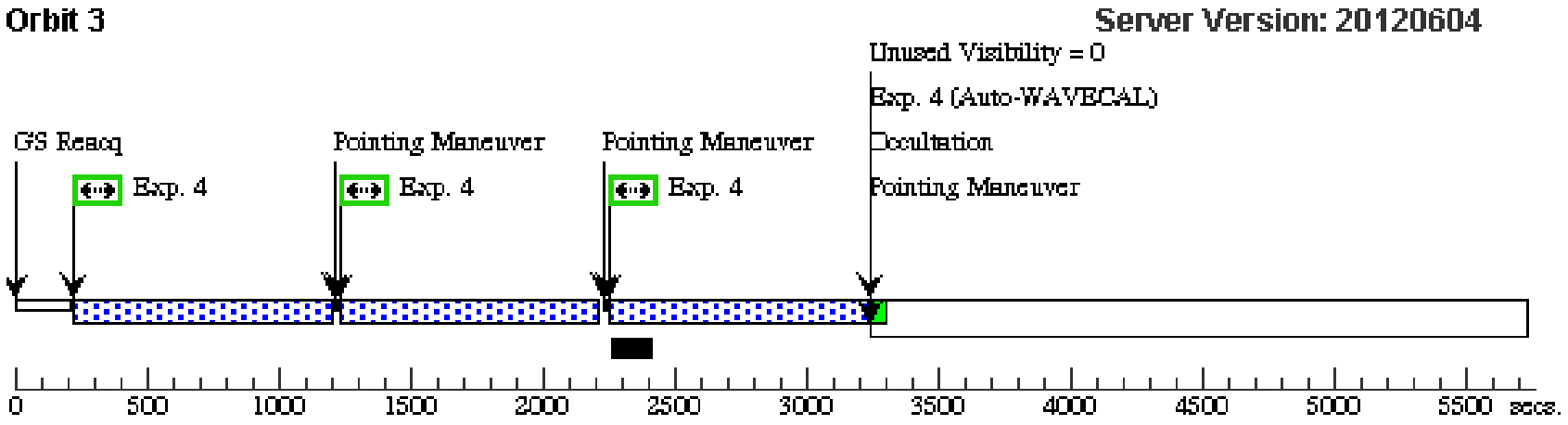
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	OFFSET STAR	(4) M28H-OFFSET	STIS/CCD, ACQ, F28X50LP	MIRROR				1 Secs *[==>]*	***[1]***
2	M28H_1	(5) M28H-TARGET	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A	CR-SPLIT=NO; BINAXIS2=2		Pattern 3, Exps 2-2 in M28H (08) (3)	1199 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
3	M28H_2	(5) M28H-TARGET	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A	CR-SPLIT=NO; BINAXIS2=2		Pattern 4, Exps 3-3 in M28H (08) (4)	957 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[2]***
4	M28H_3	(5) M28H-TARGET	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A	CR-SPLIT=NO; BINAXIS2=2		Pattern 4, Exps 4-4 in M28H (08) (4)	957 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[3]***
5	M28H_4	(5) M28H-TARGET	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A	CR-SPLIT=NO; BINAXIS2=2		Pattern 4, Exps 5-5 in M28H (08) (4)	957 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[4]***
6	M28H_5	(5) M28H-TARGET	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A	CR-SPLIT=NO; BINAXIS2=2		Pattern 4, Exps 6-6 in M28H (08) (4)	957 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[5]***
7	M28H_6	(5) M28H-TARGET	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A	CR-SPLIT=NO; BINAXIS2=2		Pattern 4, Exps 7-7 in M28H (08) (4)	957 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[6]***
8	M28H_7	(5) M28H-TARGET	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A	CR-SPLIT=NO; BINAXIS2=2		Pattern 4, Exps 8-8 in M28H (08) (4)	957 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[7]***
9	M28H_8	(5) M28H-TARGET	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A	CR-SPLIT=NO; BINAXIS2=2		Pattern 4, Exps 9-9 in M28H (08) (4)	957 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[8]***
10	FFF	CCDFLAT	STIS/CCD, ACCUM, 0.3X0.09	G750L 7751 A	BINAXIS2=2			*[==>(Copy 1)]* *[==>(Copy 2)]*	***[8]***

Orbit Structure



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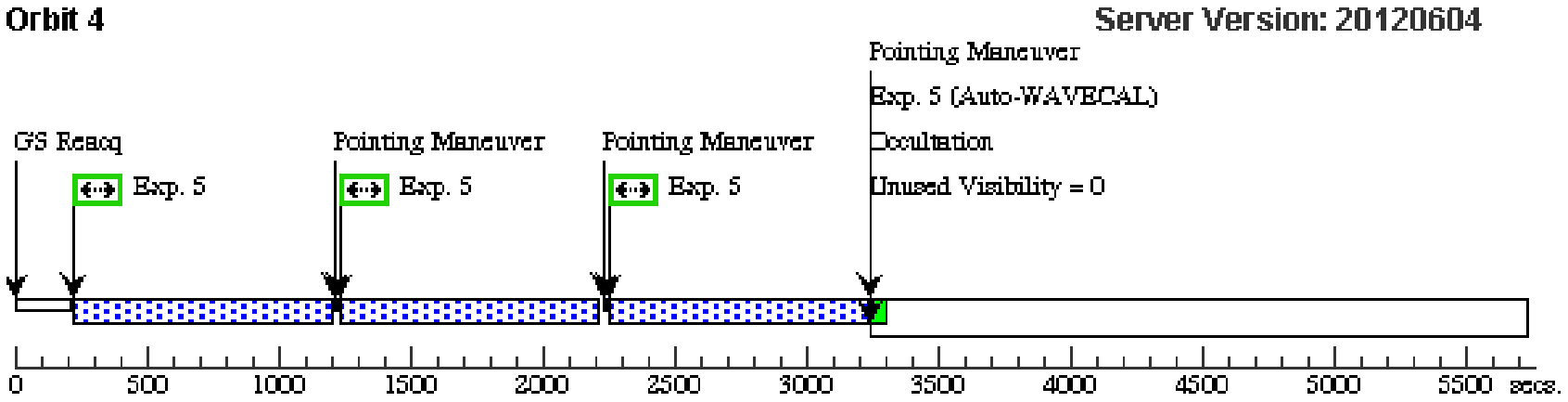
GS Reacq
Exp. 4
Pointing Maneuver
Exp. 4
Pointing Maneuver
Exp. 4
Occultation
Pointing Maneuver
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 4
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Pointing Maneuver
Exp. 5 (Auto-WAVECAL)
GS Reacq
Exp. 5
Pointing Maneuver
Exp. 5
Pointing Maneuver
Exp. 5
Occultation
Unused Visibility = 0
0
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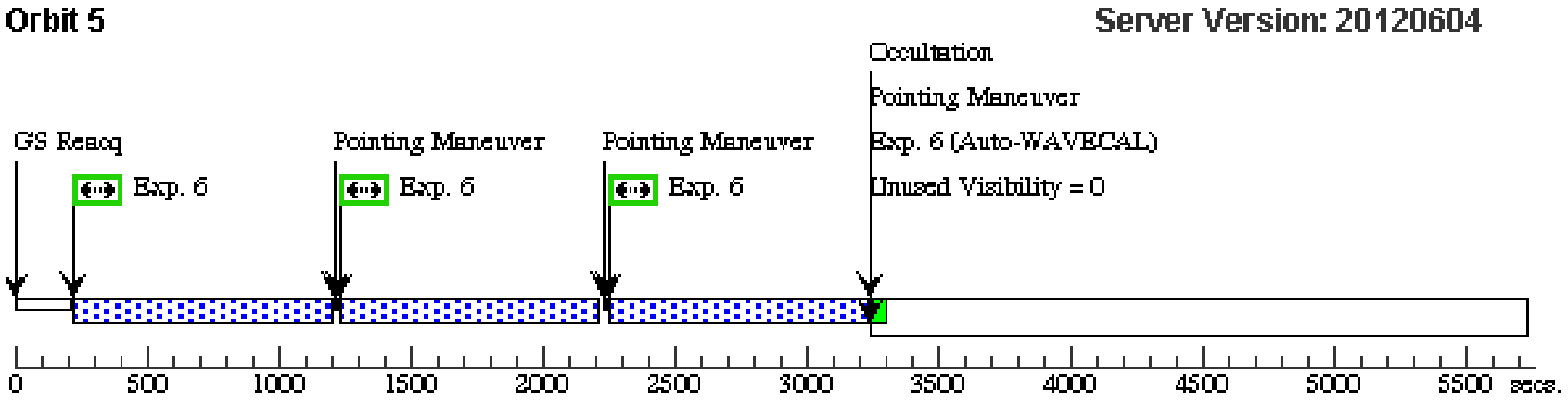
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 5
Server Version: 20120604
Occultation
Pointing Maneuver
Exp. 6 (Auto-WAVECAL)
Unused Visibility = 0
GS Reacq
Exp. 6
Pointing Maneuver
Exp. 6
Pointing Maneuver
Exp. 6
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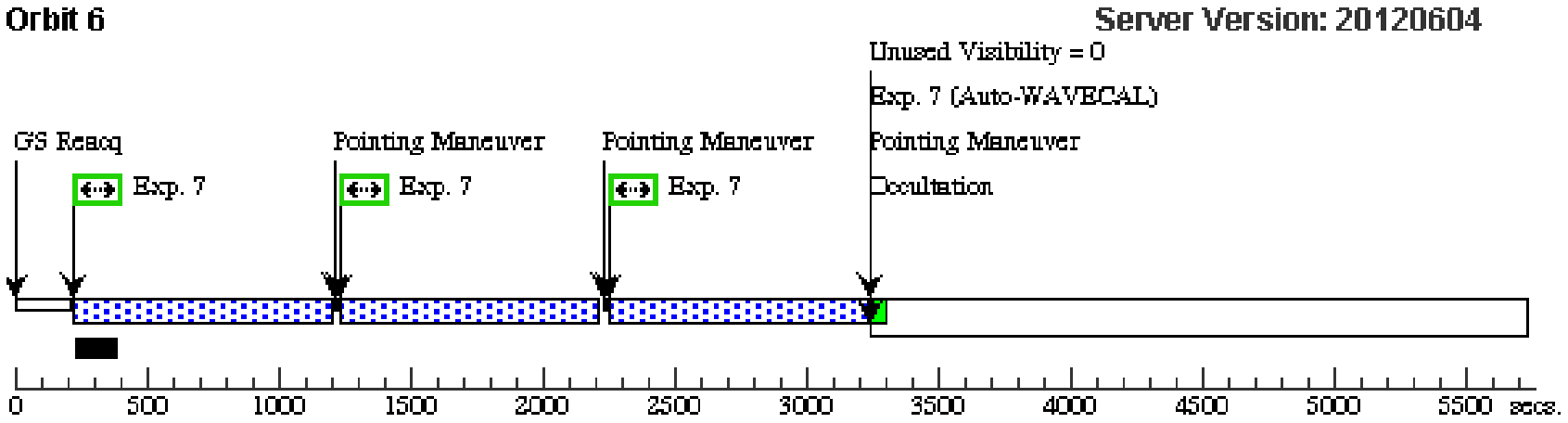
3000
3500
4000
4500
5000
5500
secs.


Orbit 6
Server Version: 20120604
Unused Visibility = 0
Exp. 7 (Auto-WAVECAL)
Pointing Maneuver
Occultation
GS Reacq
Exp. 7
Pointing Maneuver
Exp. 7
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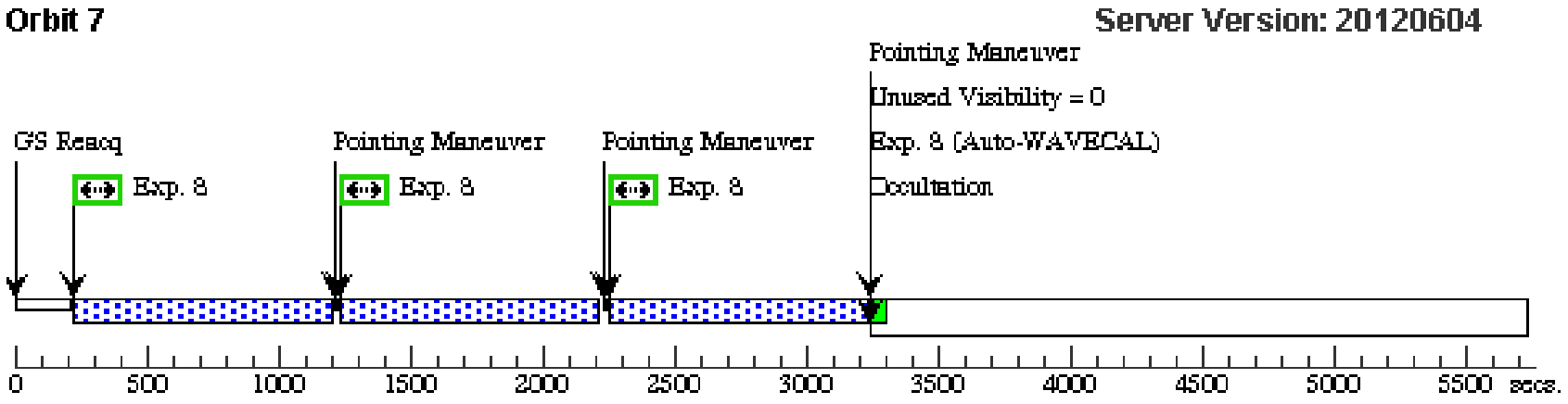
4500
5000
5500
secs.


Orbit 7
Server Version: 20120604
Pointing Maneuver
Unused Visibility = 0
Exp. 8 (Auto-WAVECAL)
Occultation
GS Reacq
Exp. 8
Pointing Maneuver
Exp. 8
Pointing Maneuver
Exp. 8
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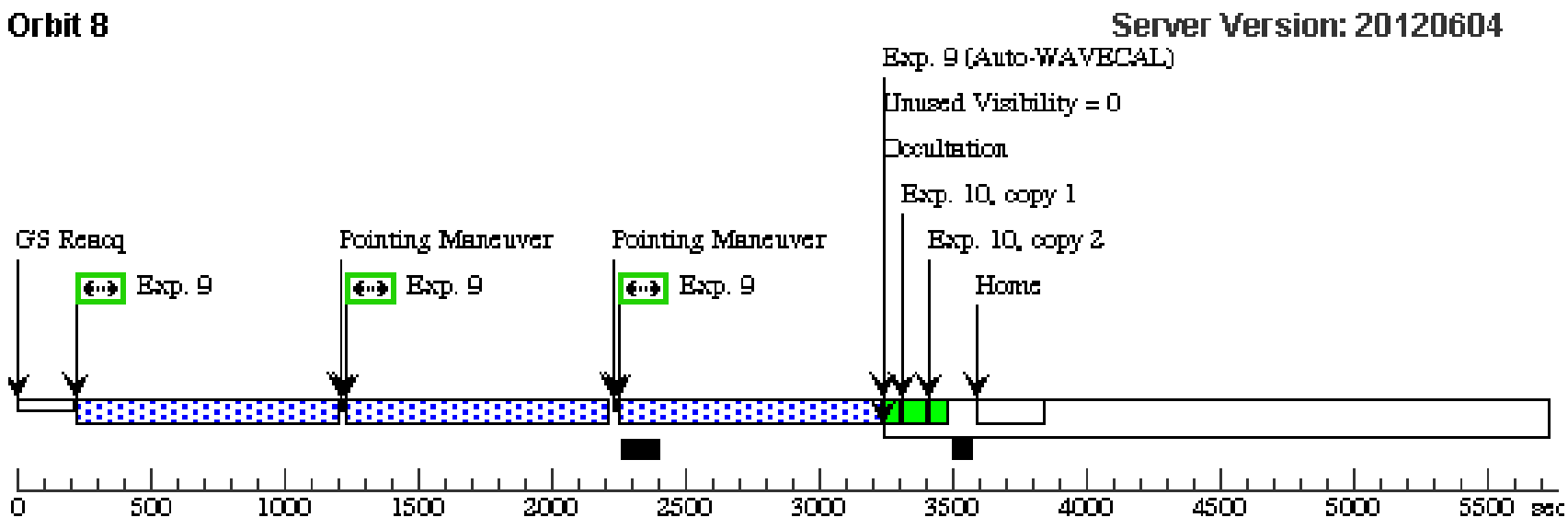
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 8
Server Version: 20120604
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Unused Visibility = 0
Occultation
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Exp. 10, copy 2
Home
GS Reacq
Exp. 9
Pointing Maneuver
Exp. 9
Pointing Maneuver
Exp. 9
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2500
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4000
4500
5000
5500
sec