14598 - The Incredibly Long-Lived SN 2005ip

Cycle: 24, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) SN-2005IP	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	5	29-Jul-2016 13:50:13.0	yes

5 Total Orbits Used

ABSTRACT

Type IIn supernovae (SNe IIn) are defined by their relatively narrow spectral line features associated with a dense circumstellar medium (CSM) formed by the progenitor star. The nature of the progenitor and mass loss remains relatively unknown. Shock interaction with the dense CSM can

often result in significant UV emission for several years post-explosion, thereby probing the CSM characteristics, progenitor mass loss history and, ultimately, the progenitor itself. The Type IIn SN 2005ip proves to be one of the most interesting and well-studied targets within this subclass. Compared to all other supernovae, SN 2005ip is the most luminous for its age. Now more than 11 years post-explosion, the SN has released >10^51 erg throughout its lifetime as the forward shock continues to collide with a dense CSM. Here we propose HST/STIS-MAMA UV observations of SN 2005ip to investigate the massive CSM. When accounting for the shock travel time, these observations will probe material lost from the progenitor more than 1000 years prior to the explosion. We already have a single HST/STIS spectrum of SN 2005ip from 2014, which was obtained while the shock was still within a higher mass regime. With just 5 orbits, a second spectrum will allow us to directly trace the evolution of the CSM and produce new constraints on the pre-SN mass-loss history. Coinciding with Cycle 24's UV Initiative, this program offers new insight regarding both the progenitor and explosion characteristics of the SN IIn subclass.

OBSERVING DESCRIPTION

We propose to obtain a single STIS-MAMA spectrum of SN 2005ip in both the G140 and G230L bandpasses. The goal is to detect UV signatures of CSM interaction to (1) constrain the CSM characteristics, including the geometry and composition, and (2) confirm emission from CSM interaction as the heating source in the warm-dust model presented by Fox et al. (2011). We choose STIS over COS because, while COS is optimized for isolated faint point-sources, STIS offers spatially resolved spectra that exploit the intrinsically high resolution of HST over a large spectral range (accommodating both the C III] 1909 and Mg II 2800 lines). The long slit length will allow us to subtract contamination from zodiacal light, earthshine, the host galaxy, and H II regions.

Visit

Proposal 14598, STIS-SN2005ip (01), implementation Fri Jul 29 17:50:15 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, STIS/FUV-MAMA

Special Requirements: (none)

Comments: Normal ACQ.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(2), (3), (4), (5), (6)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=4	Angle Between Sides=		
	Point Spacing=1	Center Pattern=true		
	Line Spacing=			

Fixed Targets

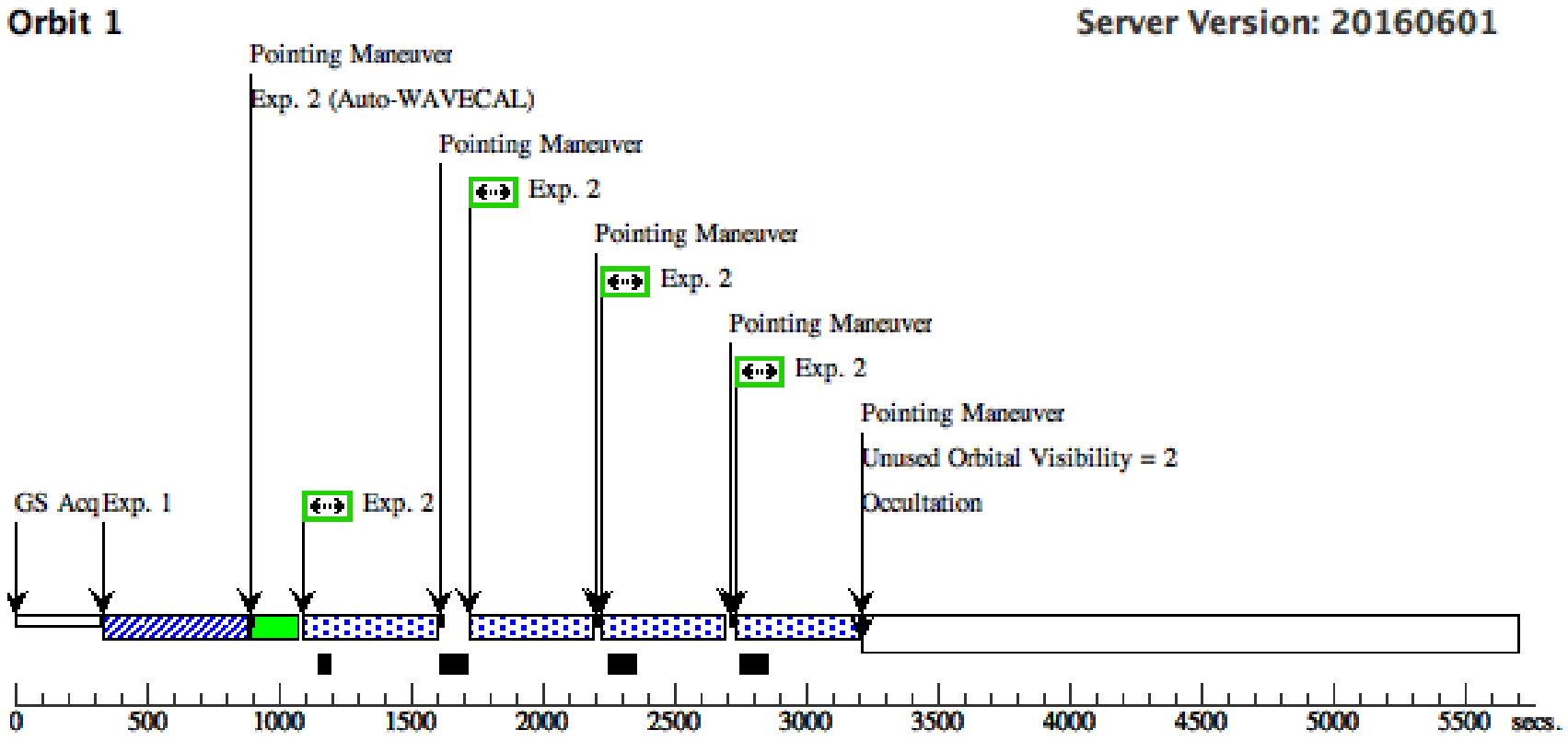
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN-2005IP	RA: 09 32 6.4200 (143.0267500d)		V=20.5	Reference Frame: ICRS
		Dec: +08 26 44.40 (8.44567d)			
		Equinox: J2000			

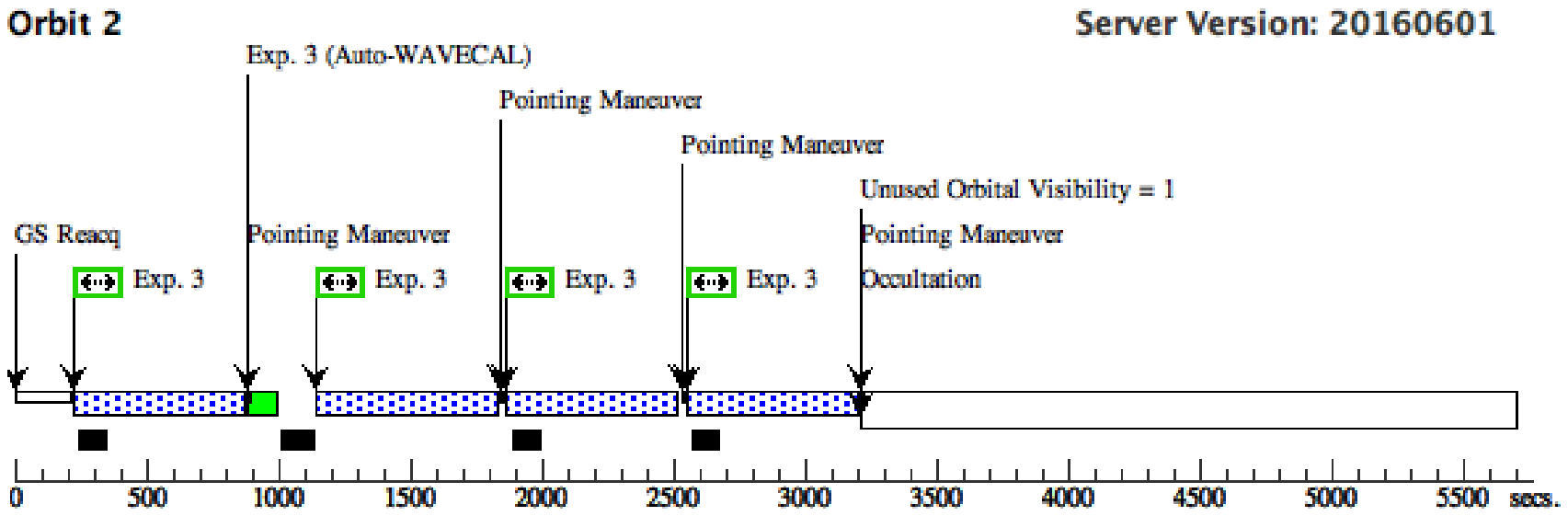
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (STIS.ta.828022)	(1) SN-2005IP	STIS/CCD, ACQ, F28X50LP	MIRROR				80 Secs (80 Secs) *[==>]*	***[1]***
Comments: Exposure time set for 20121115 spectrum of 05ip scaled to V mag = 20.5. Plus an extra 20 seconds to account for potential fading.									
2	STIS/FUV Exp1 (STIS.sp.508430)	(1) SN-2005IP	STIS/FUV-MAMA, ACCUM, 52X0.5	G140L 1425 A			Pattern 1, Exps 2-2 in STIS-SN2005ip (01) (1)	500 Secs (1812 Secs) *[==>453.0 Secs (Pattern 1)]* *[==>453.0 Secs (Pattern 2)]* *[==>453.0 Secs (Pattern 3)]* *[==>453.0 Secs (Pattern 4)]*	***[1]***
3	STIS/FUV Exp2 (STIS.sp.508430)	(1) SN-2005IP	STIS/FUV-MAMA, ACCUM, 52X0.5	G140L 1425 A			Pattern 1, Exps 3-3 in STIS-SN2005ip (01) (1)	530 Secs (2536 Secs) *[==>634.0 Secs (Pattern 1)]* *[==>634.0 Secs (Pattern 2)]* *[==>634.0 Secs (Pattern 3)]* *[==>634.0 Secs (Pattern 4)]*	***[2]***
4	STIS/FUV Exp3 (STIS.sp.508430)	(1) SN-2005IP	STIS/FUV-MAMA, ACCUM, 52X0.5	G140L 1425 A			Pattern 1, Exps 4-4 in STIS-SN2005ip (01) (1)	530 Secs (2536 Secs) *[==>634.0 Secs (Pattern 1)]* *[==>634.0 Secs (Pattern 2)]* *[==>634.0 Secs (Pattern 3)]* *[==>634.0 Secs (Pattern 4)]*	***[3]***
5	STIS/NUV Exp1 (STIS.sp.517595)	(1) SN-2005IP	STIS/NUV-MAMA, ACCUM, 52X0.5	G230L 2376 A			Pattern 1, Exps 5-5 in STIS-SN2005ip (01) (1)	650 Secs (2700 Secs) *[==>675.0 Secs (Pattern 1)]* *[==>675.0 Secs (Pattern 2)]* *[==>675.0 Secs (Pattern 3)]* *[==>675.0 Secs (Pattern 4)]*	***[4]***
6	STIS/NUV Exp2 (STIS.sp.517595)	(1) SN-2005IP	STIS/NUV-MAMA, ACCUM, 52X0.5	G230L 2376 A			Pattern 1, Exps 6-6 in STIS-SN2005ip (01) (1)	650 Secs (2796 Secs) *[==>699.0 Secs (Pattern 1)]* *[==>699.0 Secs (Pattern 2)]* *[==>699.0 Secs (Pattern 3)]* *[==>699.0 Secs (Pattern 4)]*	***[5]***

Orbit Structure




Orbit 2
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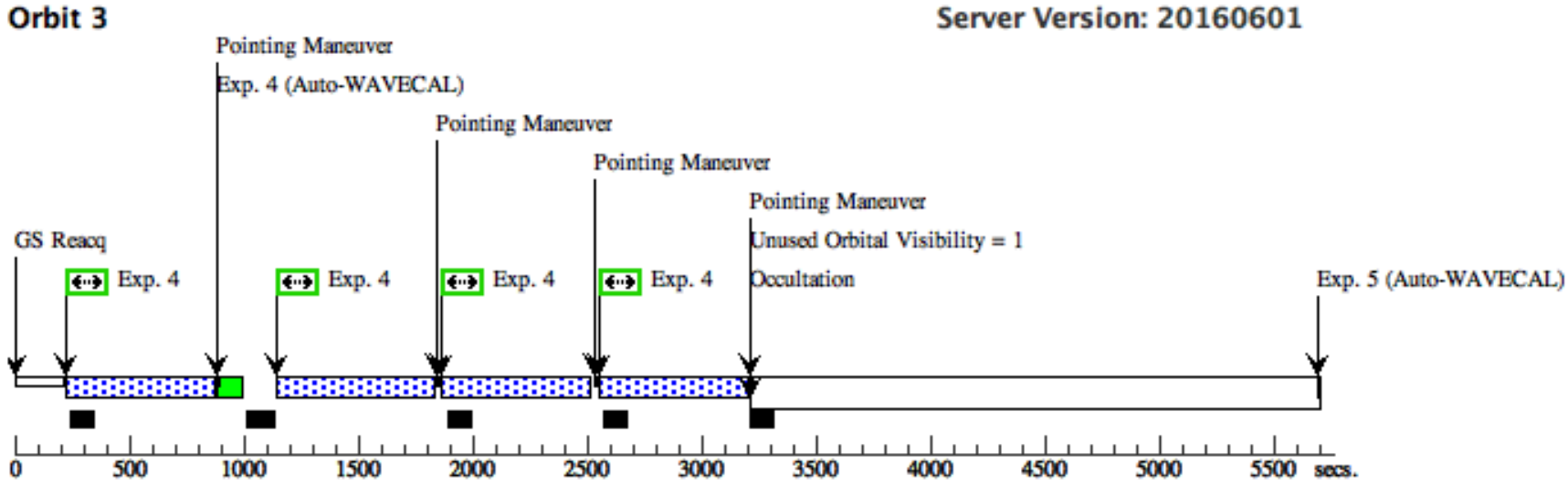
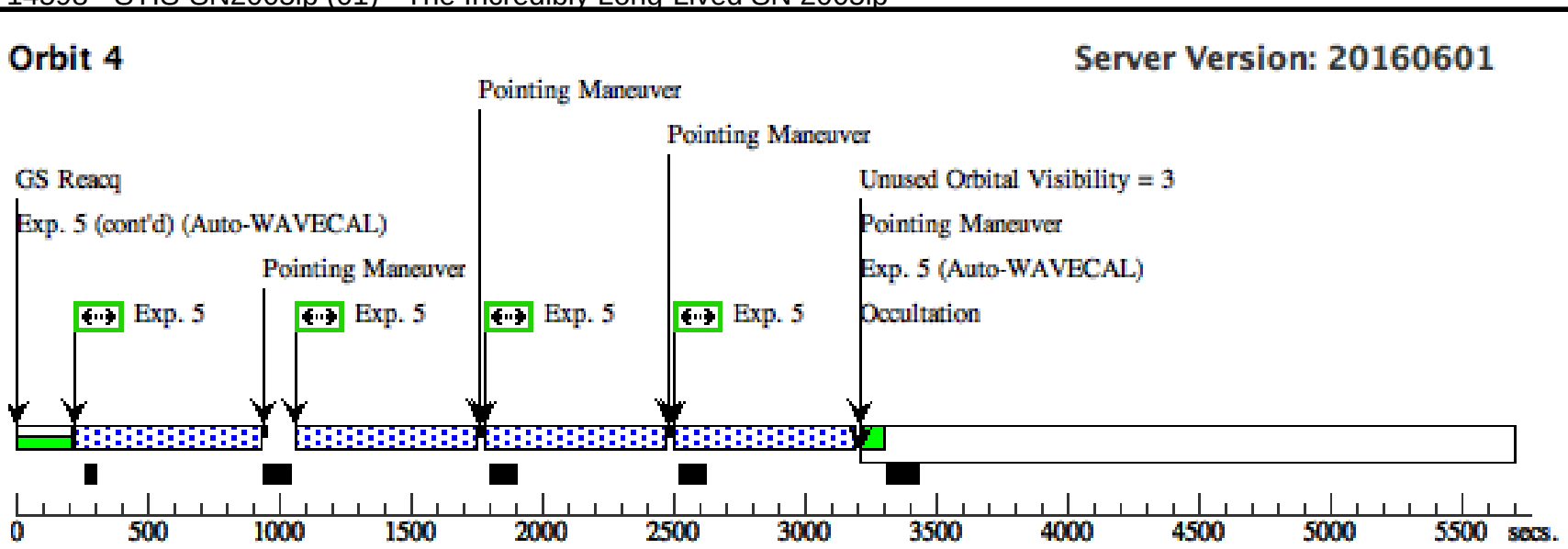
Exp. 3 (Auto-WAVECAL)
Pointing Maneuver
Pointing Maneuver
Unused Orbital Visibility = 1
GS Reacq
Pointing Maneuver
Pointing Maneuver
Occultation
Exp. 3
Exp. 3
Exp. 3
Exp. 3
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 3
Server Version: 20160601
Pointing Maneuver
Exp. 4 (Auto-WAVECAL)
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Unused Orbital Visibility = 1
GS Reacq
Occultation
Exp. 5 (Auto-WAVECAL)
Exp. 4
Exp. 4
Exp. 4
Exp. 4
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 4
Server Version: 20160601
Pointing Maneuver
Pointing Maneuver
GS Reacq
Exp. 5 (cont'd) (Auto-WAVECAL)
Unused Orbital Visibility = 3
Pointing Maneuver
Exp. 5 (Auto-WAVECAL)
Occultation
Pointing Maneuver
Exp. 5
Exp. 5
Exp. 5
Exp. 5
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1000
1500
2000
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3000
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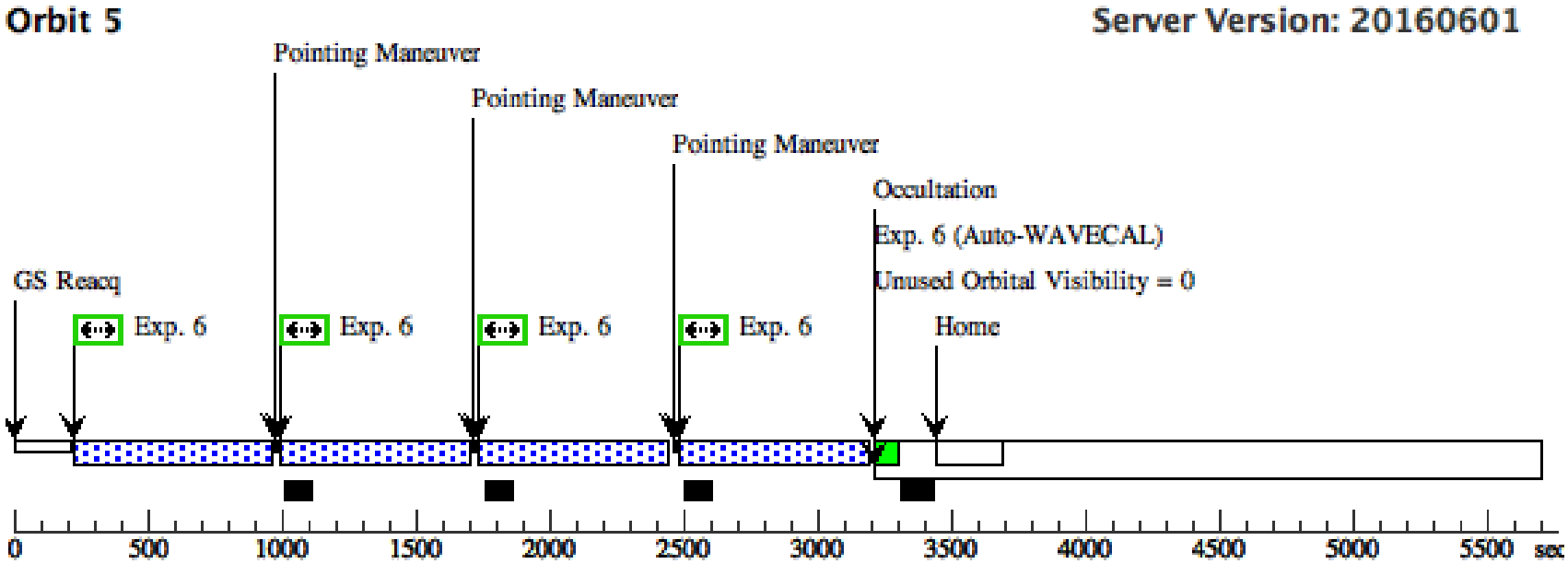
4500
5000
5500
secs.


Orbit 5
Server Version: 20160601
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Occultation
Exp. 6 (Auto-WAVECAL)
Unused Orbital Visibility = 0
GS Reacq
Exp. 6
Exp. 6
Exp. 6
Exp. 6
Home
0
500
1000
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2000
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3000
3500
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sec