16004 - Monitoring the Unprecendented Near-Infrared Variability of Sgr A*

Cycle: 26, Proposal Category: GO/DD

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Tuan Do (PI) (Contact)	**University of California - Los Angeles**	**tdo@astro.ucla.edu**
Dr. Eric E. Becklin (CoI)	University of California - Los Angeles	becklin@astro.ucla.edu
Dr. Mark R. Morris (CoI)	University of California - Los Angeles	morris@astro.ucla.edu
Dr. Gunther Witzel (CoI)	University of California - Los Angeles	witzel@astro.ucla.edu
Dr. Jessica Ryan Lu (CoI)	University of California - Berkeley	jlu.astro@berkeley.edu
Matthew Hosek Jr. (CoI)	University of Hawaii	mwhosek@gmail.com
Dr. Andrea M. Ghez (CoI)	University of California - Los Angeles	ghez@astro.ucla.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) SGR-A	WFC3/IR	4	21-Aug-2019 10:00:16.0	yes
02	(1) SGR-A	WFC3/IR	4	21-Aug-2019 10:00:20.0	yes
03	(1) SGR-A	WFC3/IR	4	21-Aug-2019 10:00:24.0	yes

12 Total Orbits Used

ABSTRACT

Sgr A*, the electromagnetic counterpart to the supermassive black hole at the Galactic center offers us a unique view into the physics black hole accretion and the growth of black holes. This summer, near-infrared observations of Sgr A* show unprecedented brightness and variability. This is increased activity is compared to over 20 years of historical near-infrared observations, which have until 2019 shown consistent variability characteristics. Unusual activity has also been reported by X-ray observatories with large outbursts. The current activity may be indicating a change

Sgr A*'s accretion state or a change in the accretion flow. However, a physical explanation is lacking because basic questions about this activity is unknown, including: is this elevated activity a brief change, or is it a precursor to even larger events? With ground-based near-infrared observations soon unable to observe Sgr A*, we propose a monitoring program to observe Sgr A* during the remaining observable HST period in 2019 for Sgr A* (Sept. & Oct.) with WFC3-IR. This will provide us critical data on the nature of the current Sgr A* activity and a unique opportunity to study supermassive black hole accretion.

OBSERVING DESCRIPTION

The main science goal of this proposal is to monitor the supermassive black hole, Sgr A*, at the Galactic center to assess whether it is increasing in activity and characterize its variability. The most important part of this program is cadence of the monitoring. We request monitoring of the source from early-September to late-October, when the HST observing window for the Galactic center closes.

To measure Sgr A* variability, we request observations using WFC3-IR and the F153M filter. We request observations using SAMP-SEQ=STEP50, NSAMP=12 for individual exposure times of 349.233 s. This exposure time is a balance between observing short time-scale variations in Sgr A* and minimizing the overhead from reading out the detector.

We request an ORIENT=90 deg to maximize the available number of dates for scheduling. This ORIENT will also match WCF3-IR Galactic center data from 2010,2011,and 2012. This will increase the legacy value of this data for astrometry and variability studies.

Visit

Proposal 16004, Visit 01 Wed Aug 21 14:00:26 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 90D TO 90 D; BETWEEN 01-SEP-2019:00:00:00 AND 07-SEP-2019:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=SPIRAL	Coordinate Frame=POS-TARG		(1)
	Purpose=DITHER	Pattern Orientation=11.0		
	Number Of Points=27	Angle Between Sides=		
	Point Spacing=0.42	Center Pattern=false		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SGR-A	RA: 17 45 40.0360 (266.4168167d)		V=14	Reference Frame: SIMBAD
		Dec: -29 00 28.17 (-29.00783d)			
		Equinox: J2000			

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STELLAR CLUSTER
Description=[NUCLEUS]
Extended=NO

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) SGR-A	WFC3/IR, MULTIACCUM, IR-FIX	F153M	SAMP-SEQ=STEP50; NSAMP=12		Pattern 2, Exps 1-1 in Visit 01 (2)	349.232932 Secs (9429.289 Secs)	
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								[==>(Pattern 2)]	
								[==>(Pattern 3)]	
								[==>(Pattern 4)]	
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								[==>(Pattern 6)]	
								[==>(Pattern 7)]	***[2]***
								[==>(Pattern 8)]	
								[==>(Pattern 9)]	
								[==>(Pattern 10)]	
								[==>(Pattern 11)]	
								[==>(Pattern 12)]	
								[==>(Pattern 13)]	
								[==>(Pattern 14)]	***[3]***
								[==>(Pattern 15)]	
								[==>(Pattern 16)]	
								[==>(Pattern 17)]	
								[==>(Pattern 18)]	
								[==>(Pattern 19)]	
								[==>(Pattern 20)]	
								[==>(Pattern 21)]	***[4]***
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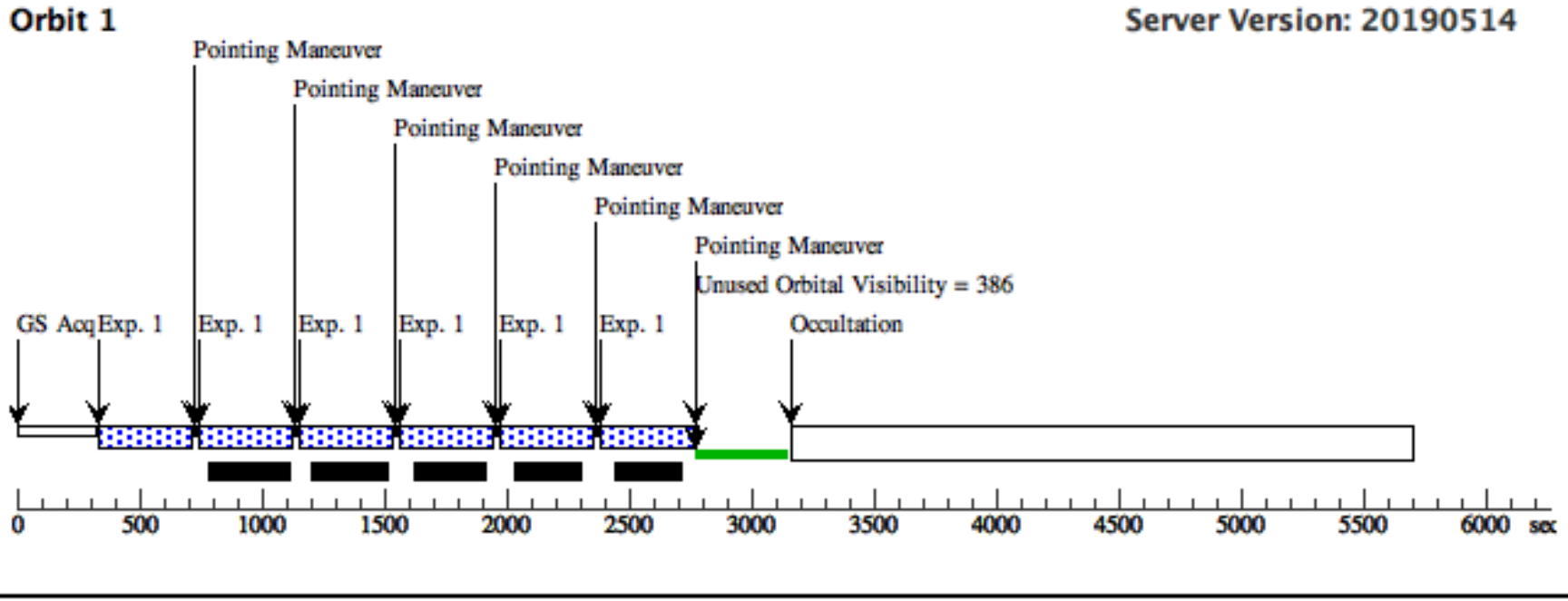
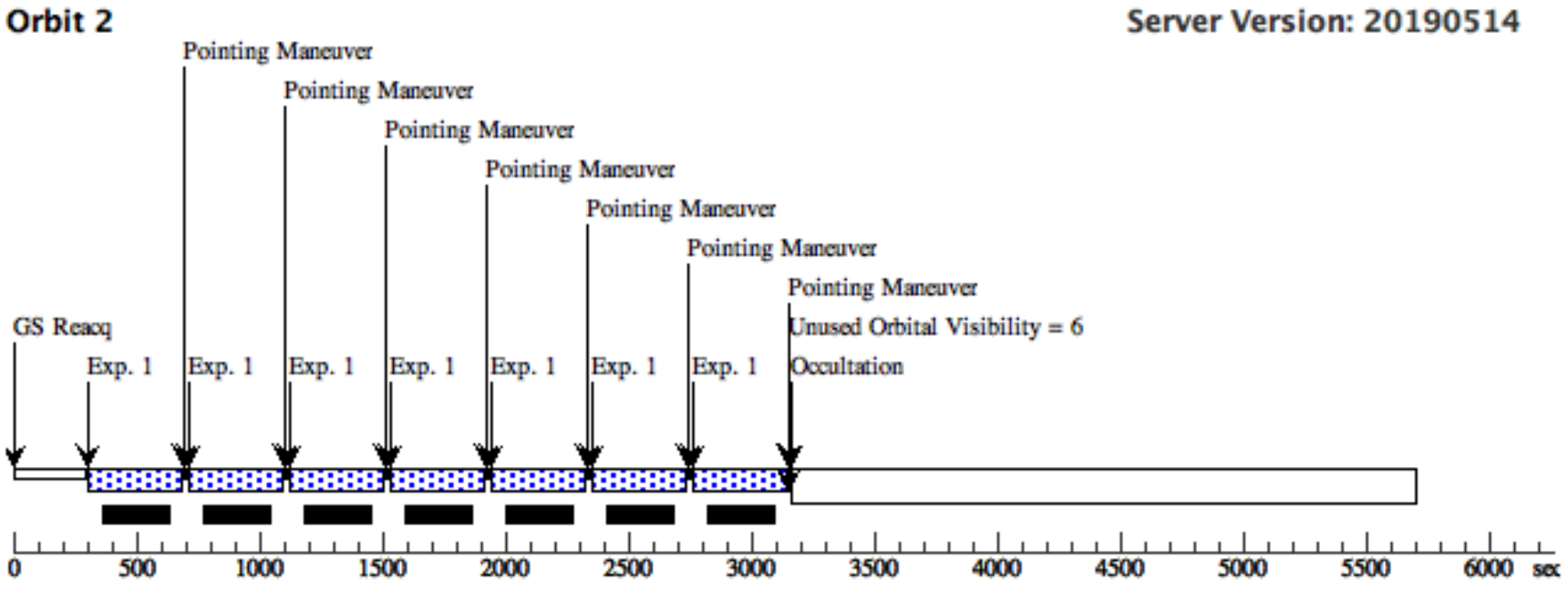
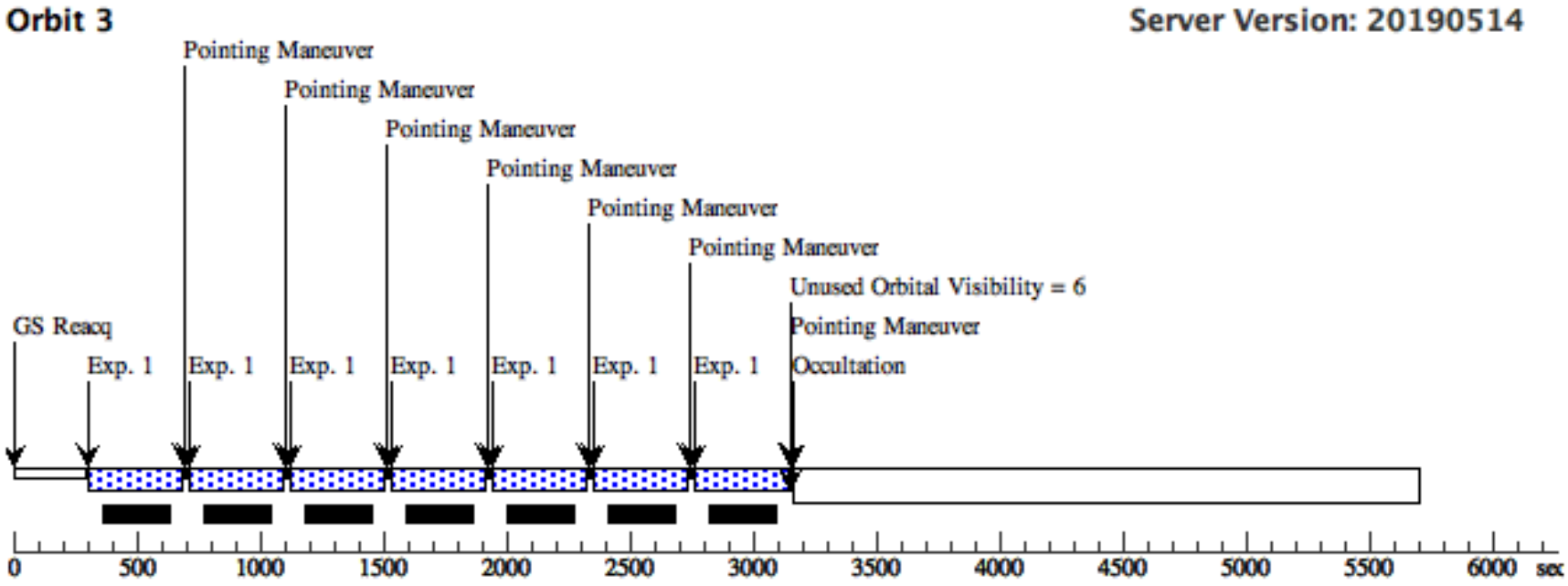
Orbit Structure



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Unused Orbital Visibility = 6
Pointing Maneuver
Occultation
GS Reacq
Exp. 1
Exp. 1
Exp. 1
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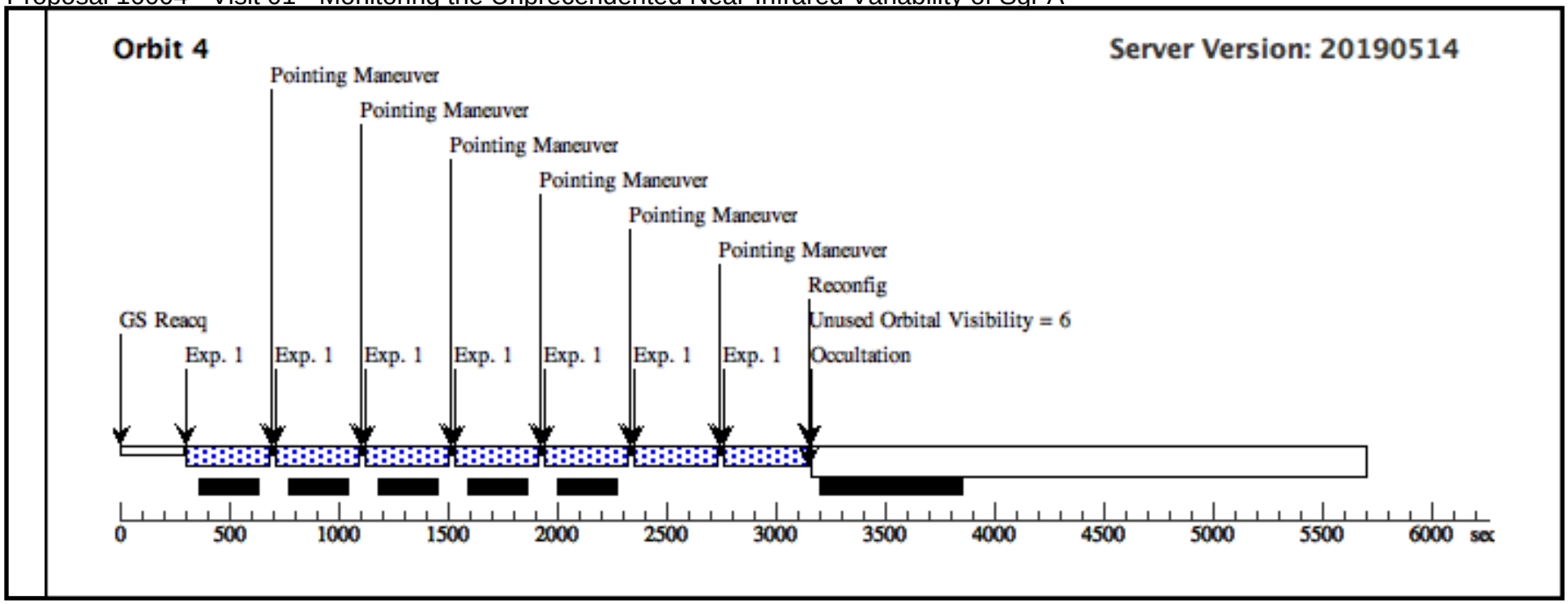
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Occultation
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sec

Visit

Proposal 16004, Visit 02 Wed Aug 21 14:00:26 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 90D TO 90 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=SPIRAL	Coordinate Frame=POS-TARG		(1)
	Purpose=DITHER	Pattern Orientation=11.0		
	Number Of Points=27	Angle Between Sides=		
	Point Spacing=0.42	Center Pattern=false		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SGR-A	RA: 17 45 40.0360 (266.4168167d)		V=14	Reference Frame: SIMBAD
		Dec: -29 00 28.17 (-29.00783d)			
		Equinox: J2000			

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STELLAR CLUSTER
Description=[NUCLEUS]
Extended=NO

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) SGR-A	WFC3/IR, MULTIACCUM, IR-FIX	F153M	SAMP-SEQ=STEP50; NSAMP=12		Pattern 2, Exps 1-1 in Visit 02 (2)	349.232932 Secs (9429.289 Secs)	
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								[==>(Pattern 6)]	
								[==>(Pattern 7)]	***[2]***
								[==>(Pattern 8)]	
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								[==>(Pattern 10)]	
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								[==>(Pattern 14)]	***[3]***
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								[==>(Pattern 17)]	
								[==>(Pattern 18)]	
								[==>(Pattern 19)]	
								[==>(Pattern 20)]	
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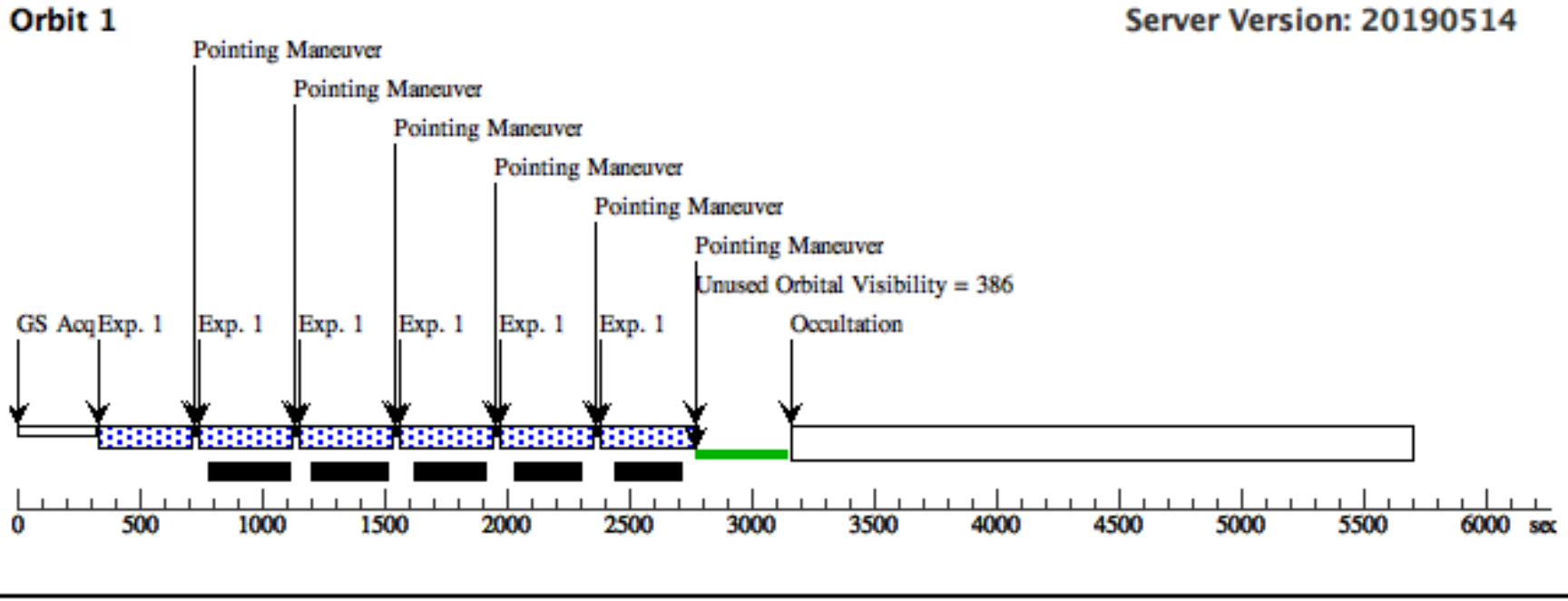
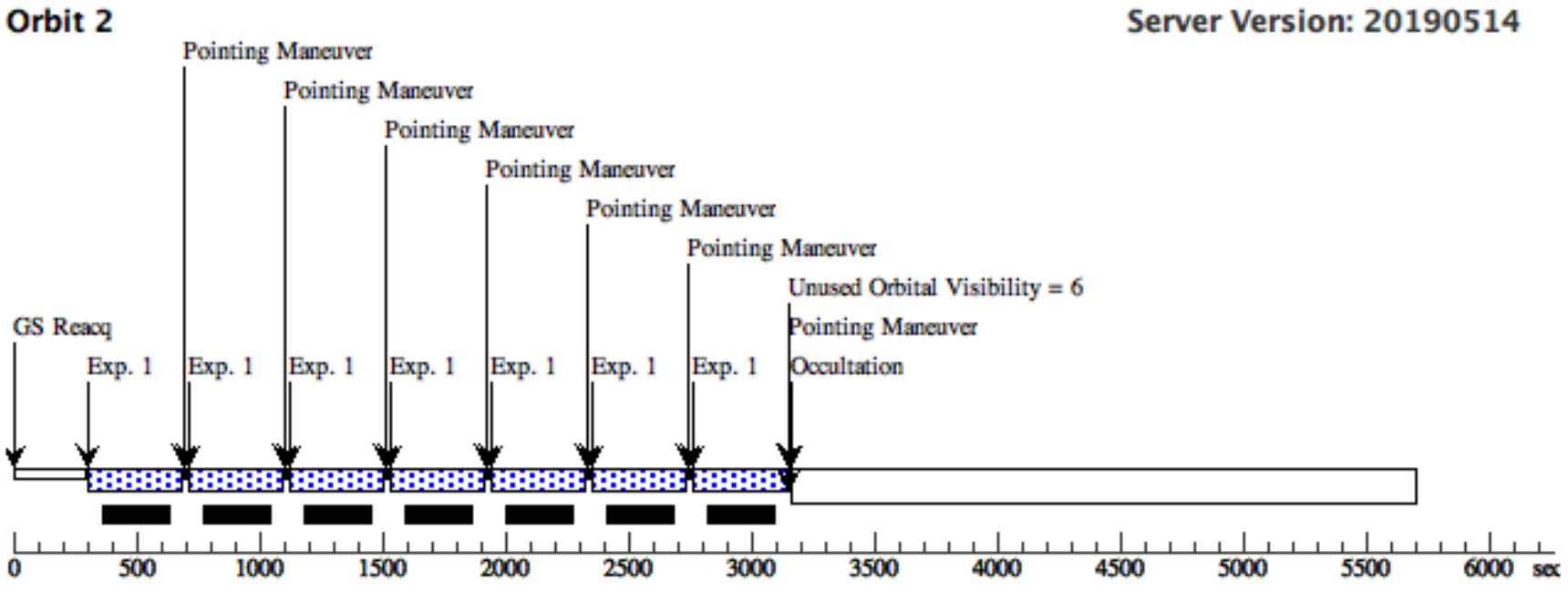
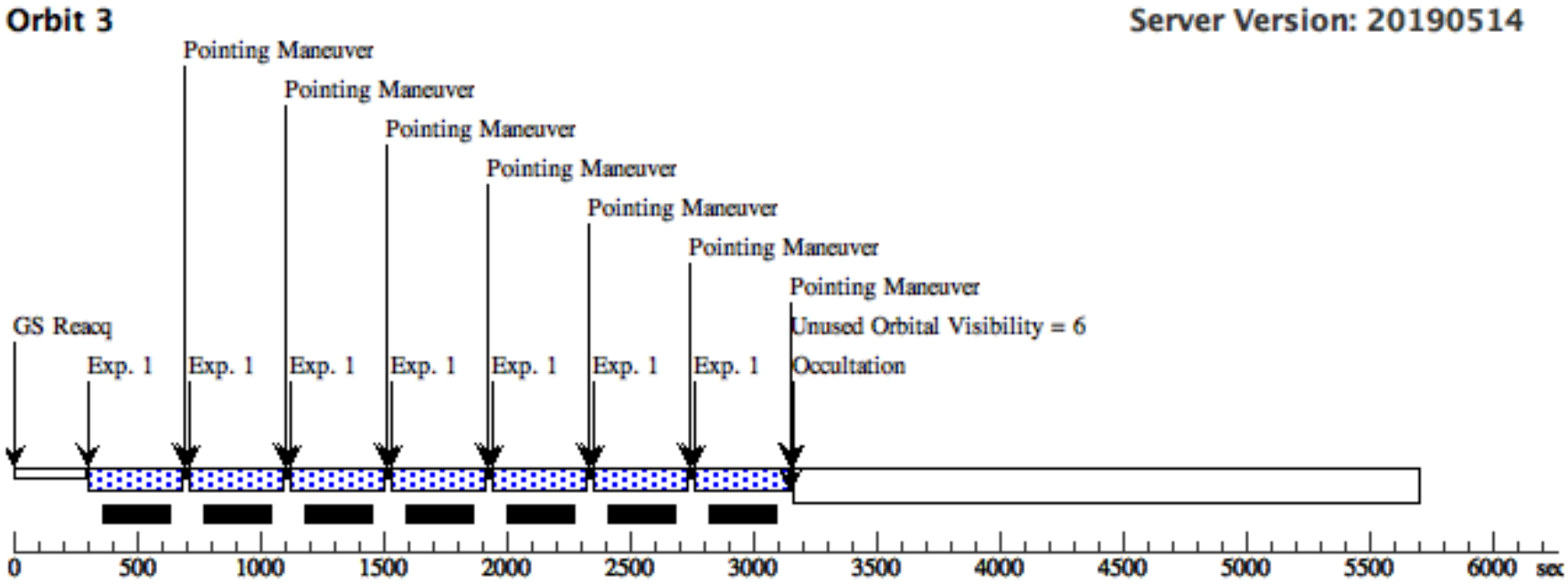
Orbit Structure



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GS Reacq
Exp. 1
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Unused Orbital Visibility = 6
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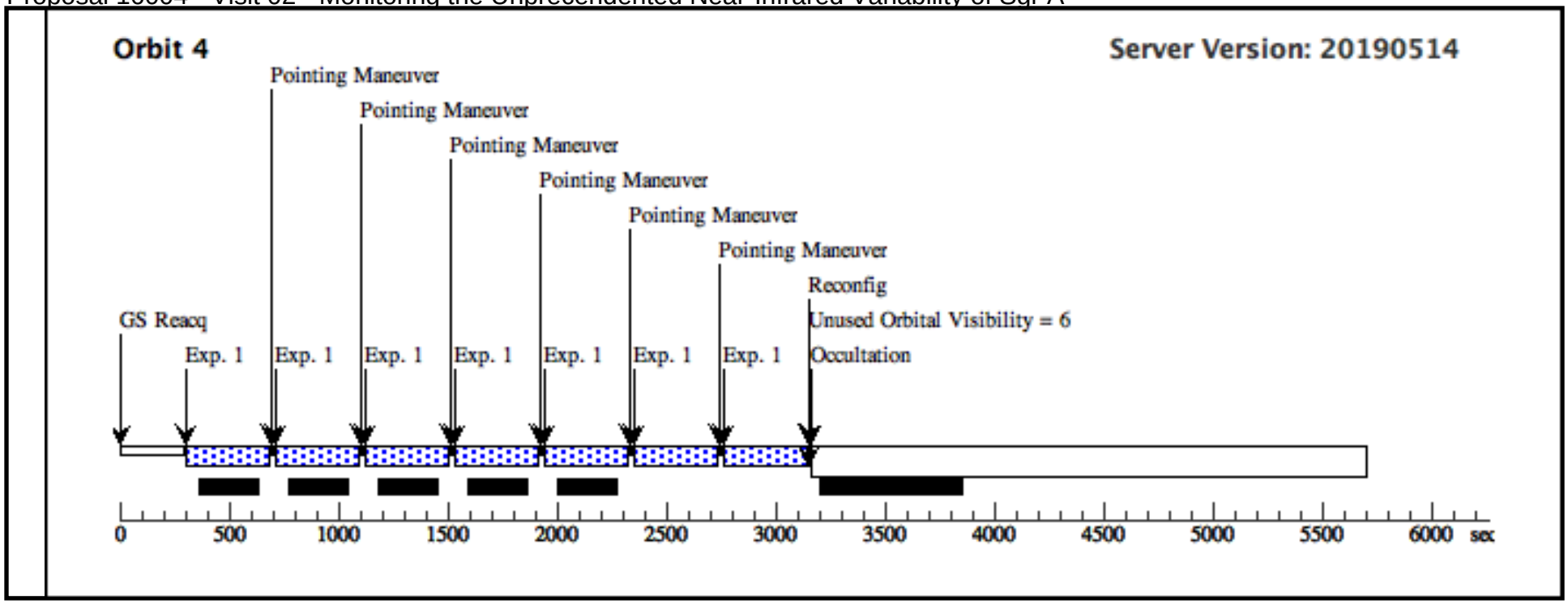
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Occultation
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sec

Visit

Proposal 16004, Visit 03 Wed Aug 21 14:00:26 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 90D TO 90 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=SPIRAL	Coordinate Frame=POS-TARG		(1)
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1		(1) SGR-A	WFC3/IR, MULTIACCUM, IR-FIX	F153M	SAMP-SEQ=STEP50; NSAMP=12		Pattern 2, Exps 1-1 in Visit 03 (2)	349.232932 Secs (9429.289 Secs)	
								[==>(Pattern 1)]	***[1]***
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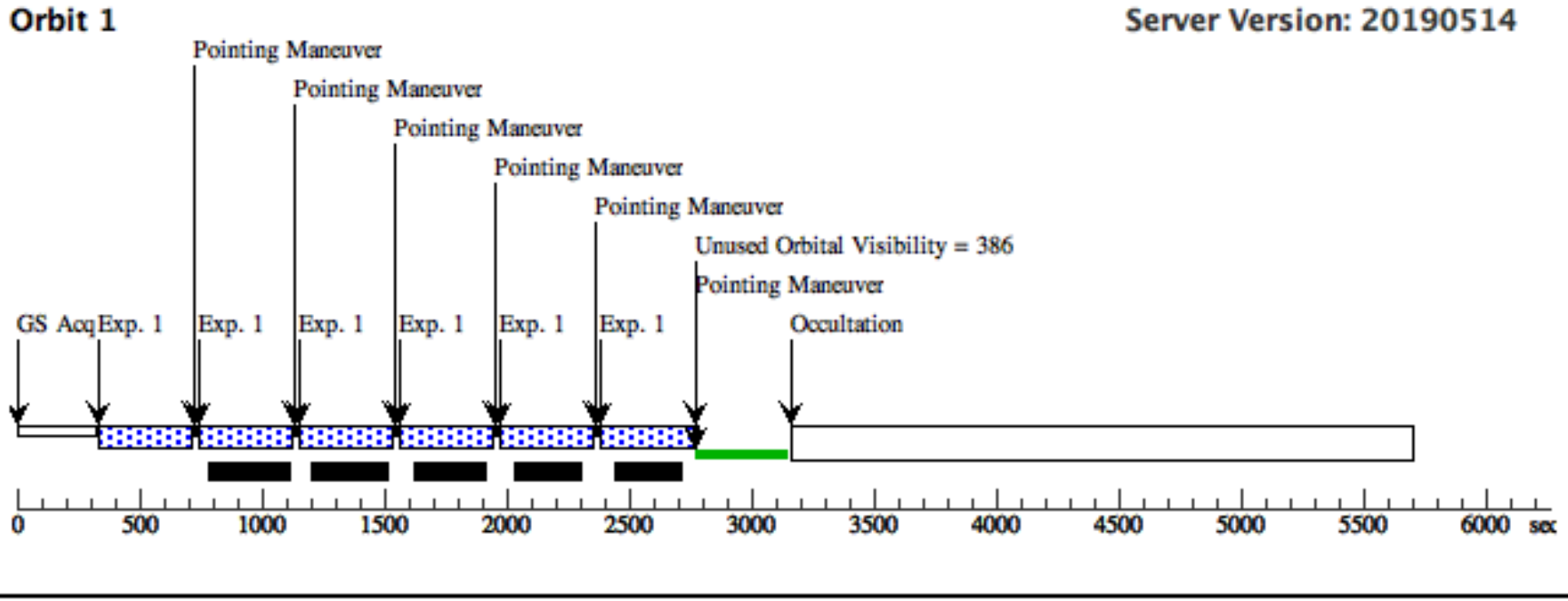
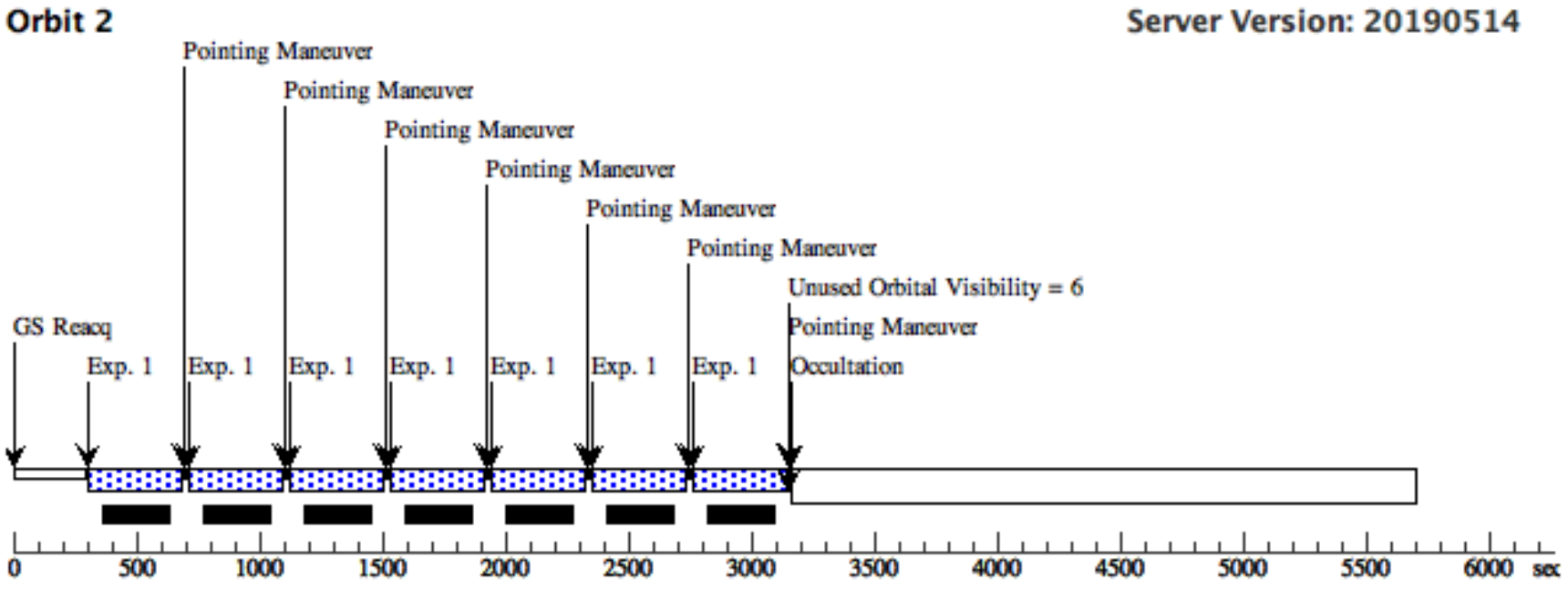
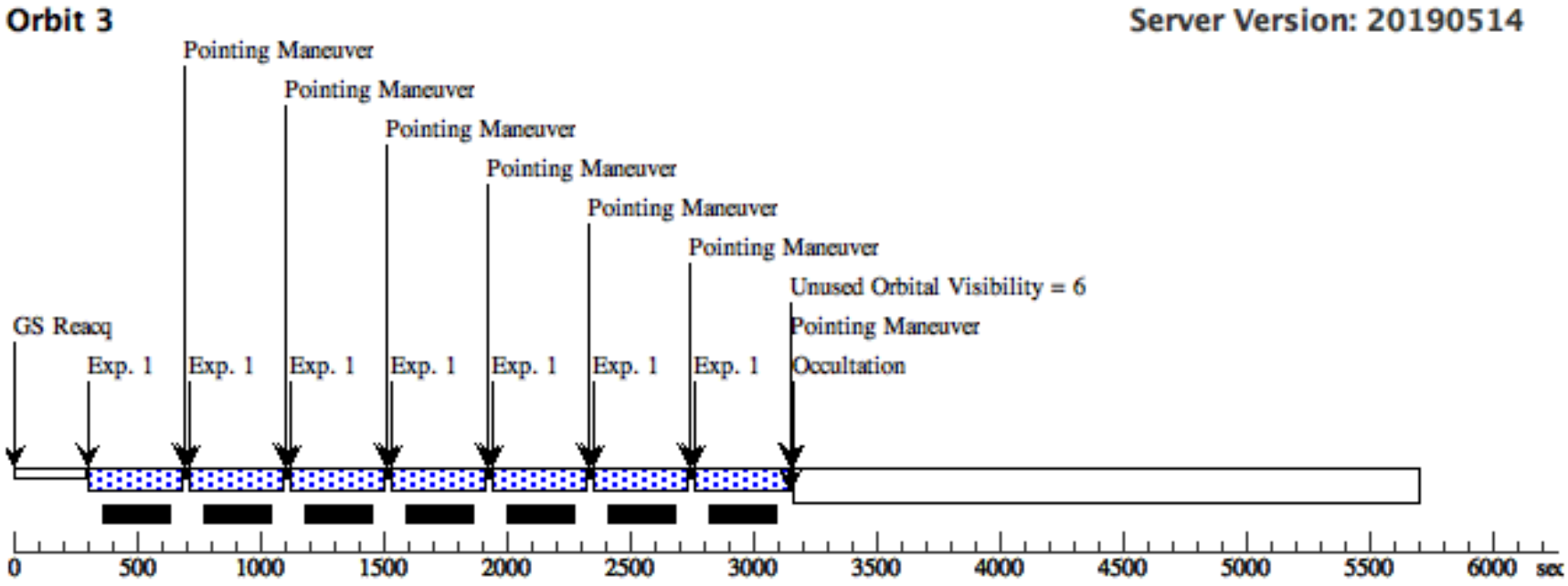
Orbit Structure



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GS Reacq
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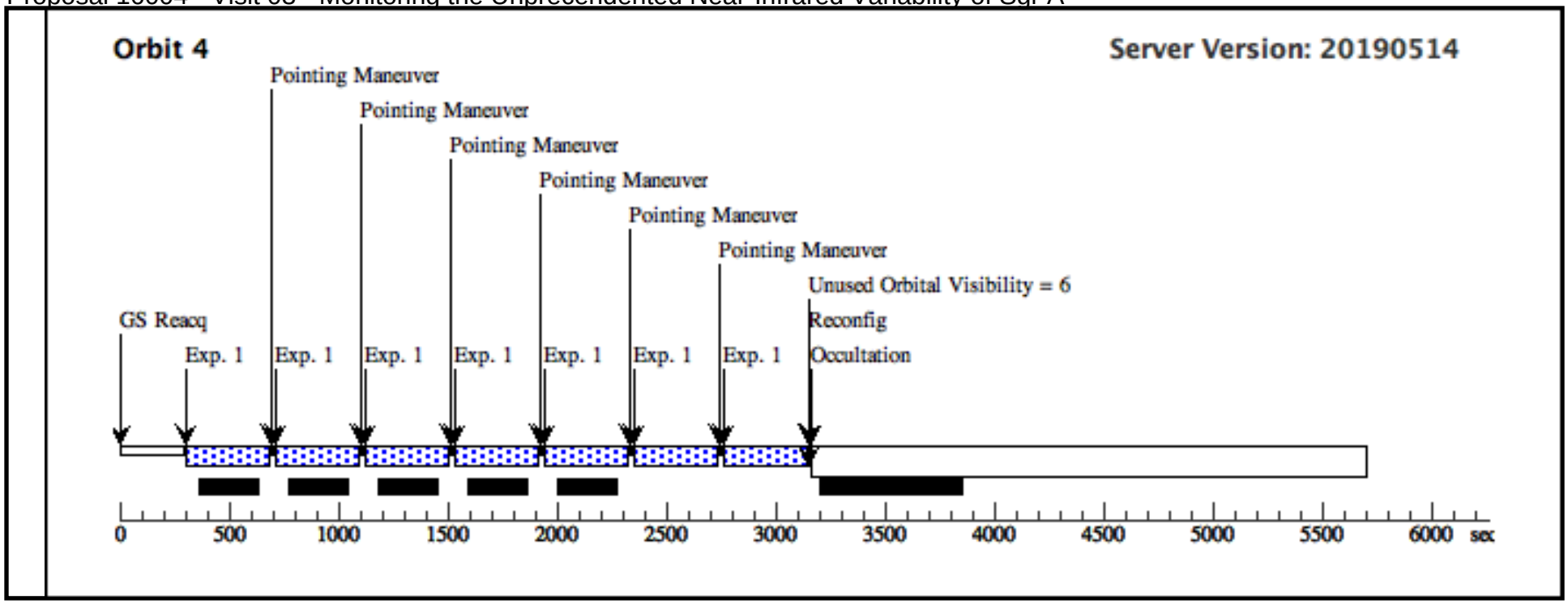
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GS Reacq
Reconfig
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Occultation
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