16727 - A Propeller Driven by Spin-Down Energy in the Intermediate Polar FO Aquarii

Cycle: 29, Proposal Category: GO

(UV Initiative)

(Availability Mode: AVAILABLE)

INVESTIGATORS

Name	*Institution*
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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) V-FO-AQR	COS/FUV COS/NUV	3	04-Aug-2023 13:00:17.0	yes
B1	(11) TARGET01-SAFE-TARGET	COS/FUV COS/NUV	3	04-Aug-2023 13:00:18.0	yes
S1	(1) V-FO-AQR	S/C	1	04-Aug-2023 13:00:19.0	yes
02	(1) V-FO-AQR	COS/FUV COS/NUV	2	04-Aug-2023 13:00:19.0	yes
B2	(12) TARGET01-SAFE-TARGET-V2	COS/FUV COS/NUV	2	04-Aug-2023 13:00:20.0	yes
S2	(12) TARGET01-SAFE-TARGET-V2	S/C	1	04-Aug-2023 13:00:20.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
51	(51) V-FO-AQR-REPEAT	COS/FUV COS/NUV	3	04-Aug-2023 13:00:21.0	yes
1B	(61) V-FO-AQR-SAFE-TARGET	COS/FUV COS/NUV	3	04-Aug-2023 13:00:22.0	yes
52	(51) V-FO-AQR-REPEAT	COS/FUV COS/NUV	2	04-Aug-2023 13:00:23.0	yes
2B	(62) V-FO-AQR-SAFE-TARGET-V2	COS/FUV COS/NUV	2	04-Aug-2023 13:00:24.0	yes
S3	(51) V-FO-AQR-REPEAT	S/C	1	04-Aug-2023 13:00:24.0	yes
S4	(51) V-FO-AQR-REPEAT	S/C	1	04-Aug-2023 13:00:25.0	yes

24 Total Orbits Used

ABSTRACT

White dwarfs (WD) in intermediate polars (IPs) rotate rapidly and have sufficiently high magnetic-field strengths to channel gas from an accretion disk onto their magnetic poles. The WD in FO Aquarii, the so-called ``King of the IPs,'' began spinning down in 2015 after spinning up for the preceding quarter-century. Almost immediately, it began to drop into a series of low-accretion states in the optical and X-rays, behavior that was never observed when the WD was spinning up. The power generated by the spin-down is nearly 0.5 Solar luminosities, which raises a very basic question: where is this energy deposited? We hypothesize that during FO Aqr's low states, the WD powers an outflow that removes angular momentum from the WD, causing the observed spin-down. This scenario is similar to X-ray binaries in which a magnetized neutron star, after being spun-up by accretion, develops a centrifugal barrier that drives outflows or even a jet. FO Aqr's spin-down power is sufficiently high to drive a substantial outflow, and although optical spectra of FO Aqr during its recent low state hint at the existence of this feature, ultraviolet spectra are vastly more sensitive to outflowing gas because of the presence of C IV and Si IV resonance lines. We propose HST/COS observation of FO Aqr to test for outflow/jet signatures such as P-Cygni line profiles that were not present in UV spectra taken in 1995 when the WD was spinning up.

OBSERVING DESCRIPTION

We will observe the intermediate polar FO Aquarii with COS in time-tag mode. We will used the G140L grating centered on 1105 angstroms. The first visit will be 3 consecutive HST orbits that will cover 80% of the 4.85-h binary orbit. The gaps in phase coverage caused by Earth occultations

will be filled by a second visit 30 orbits after visit 1. The brightness of FO Aqr has been near its all-time maximum of V=13.5 for decades. We have used FOS spectra taken in 1995 to estimate fluxes and count rates for the COS observations. We plan a NUV imaging acquisiton for both visits. The NUV flux based on XMM/OM and SWIFT/UVOT observations is 4e-14 erg/cm2/s/A, so we will use the BOA and MirrorA for the acqusitions. To get the S/N=30 image will take a 22sec exposure. The position and proper motion of FO Aqr is very well determined by Gaia EDR3.

Visit

Proposal 16727, visit01 (01), failed Fri Aug 04 17:00:25 GMT 2023

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: ORIENT 70D TO 105 D

Comments: This should be scheduled in evening local time. Flags need to be cleared during the work day. Weekends are to be avoided since the CS must clear the target within 24 hours of HST execution.
Expected execution is ~ 300:02:00

Diagnostics

(visit01 (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

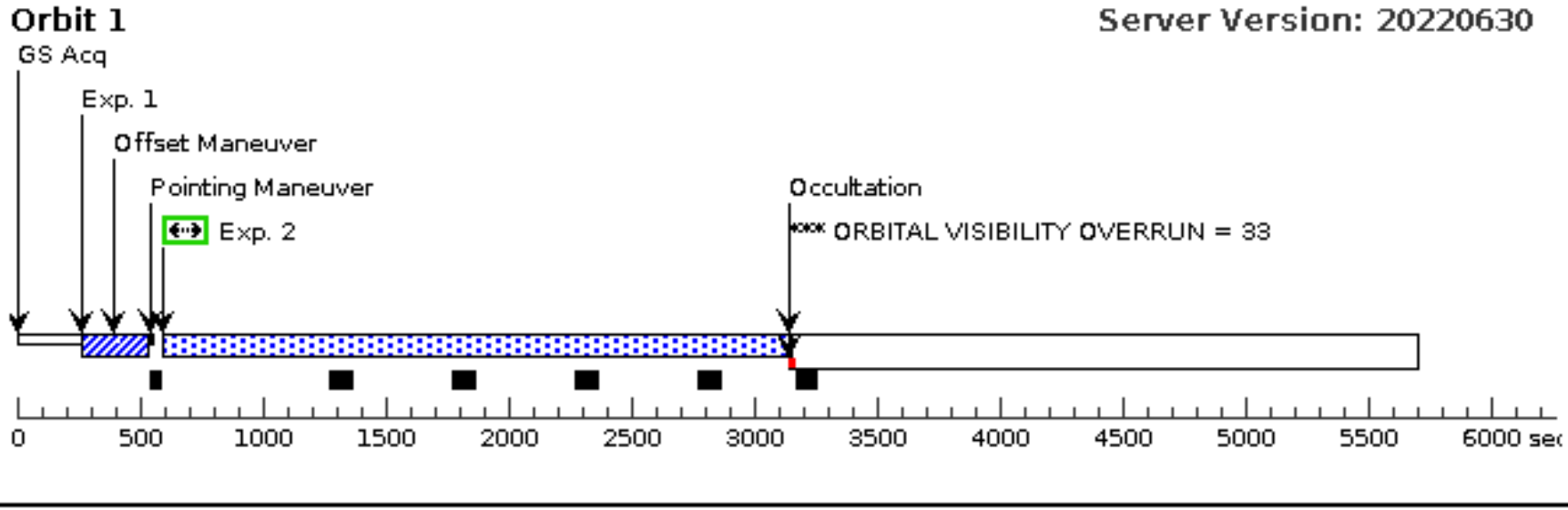
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	V-FO-AQR	RA: 22 17 55.3797 (334.4807488d)	Proper Motion RA: 2.276 mas/yr	V=14.0+/-1.0	Reference Frame: ICRS
		Dec: -08 21 3.76 (-8.35104d)	Proper Motion Dec: 4.512 mas/yr		
		Equinox: J2000	Parallax: 0.0018416"		
			Epoch of Position: 2000.0		

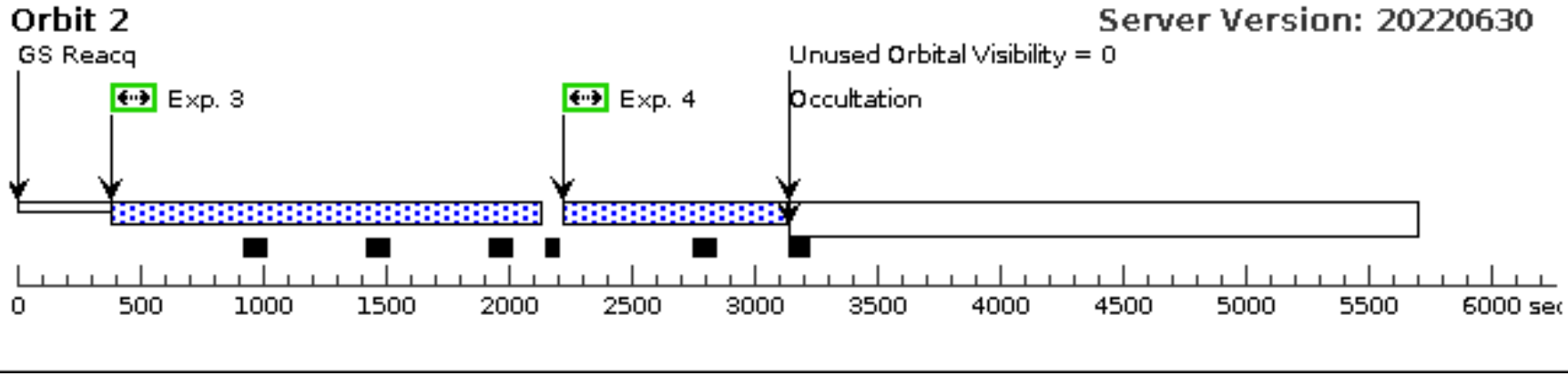
Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions.
Category=STAR
Description=[INTERMEDIATE POLAR]
Extended=NO

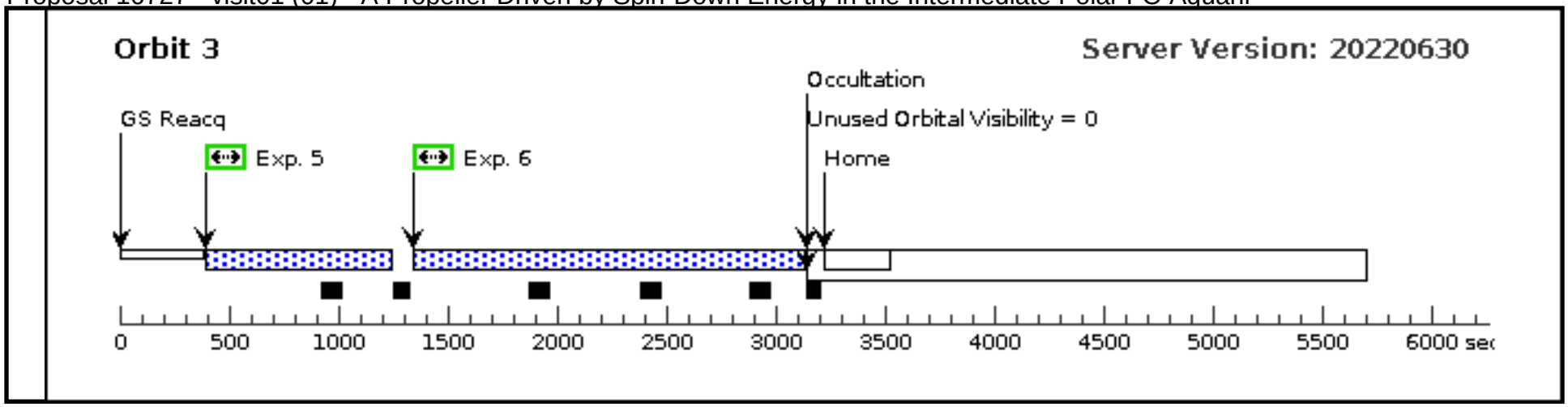
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	acq1 (COS.ta.1528085)	(1) V-FO-AQR	COS/NUV, ACQ/IMAGE, BOA	MIRRORA		USE OFFSET V01SAF		22 Secs (22 Secs) *[==>]*	***[1]***
Comments: XMM OM and Swift UVOT provide a flux of 4e-14 erg/cm2/s/A at 2220 Ang. This is too bright for PSA, so we will use BOA and MIRRORA. This gives a S/N ratio of 30 in 22 sec.									
2	sci1 (COS.sp.1528090)	(1) V-FO-AQR	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=1; LIFETIME-POS=LP3	USE OFFSET V01SAF		2375 Secs (2375 Secs) *[==>]*	***[1]***
3	sci2 (COS.sp.1528090)	(1) V-FO-AQR	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=2; LIFETIME-POS=LP3	USE OFFSET V01SAF		1700 Secs (1700 Secs) *[==>]*	***[2]***
4	sci3 (COS.sp.1528090)	(1) V-FO-AQR	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=3; LIFETIME-POS=LP3	USE OFFSET V01SAF		855 Secs (855 Secs) *[==>]*	***[2]***
5	sci4 (COS.sp.1528090)	(1) V-FO-AQR	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=3; LIFETIME-POS=LP3	USE OFFSET V01SAF		800 Secs (800 Secs) *[==>]*	***[3]***
6	sci5 (COS.sp.1528090)	(1) V-FO-AQR	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=4; LIFETIME-POS=LP3	USE OFFSET V01SAF		1739 Secs (1736 Secs) *[==>1736.0 Secs]*	***[3]***

Orbit Structure



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Exp. 6
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1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec

Visit

Proposal 16727, SCIENCETARGET-BOP-ONLY (B1), withdrawn Fri Aug 04 17:00:25 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: ORIENT 70D TO 105 D

Comments: This visit is for BOP checking the safe target only and should not execute onboard HST

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	V-FO-AQR	RA: 22 17 55.3797 (334.4807488d) Dec: -08 21 3.76 (-8.35104d) Equinox: J2000	Proper Motion RA: 2.276 mas/yr Proper Motion Dec: 4.512 mas/yr Parallax: 0.0018416" Epoch of Position: 2000.0	V=14.0+/-1.0	Reference Frame: ICRS

Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions.
Category=STAR
Description=[INTERMEDIATE POLAR]
Extended=NO

(11)	TARGET01-SAFE-TARGET	Offset from V-FO-AQR RA Offset: -0.47 Secs Dec Offset: -6.799 Arcsec		V=14.0+/-1.0	Offset Position (TARGET01-SAFE-TARGET)

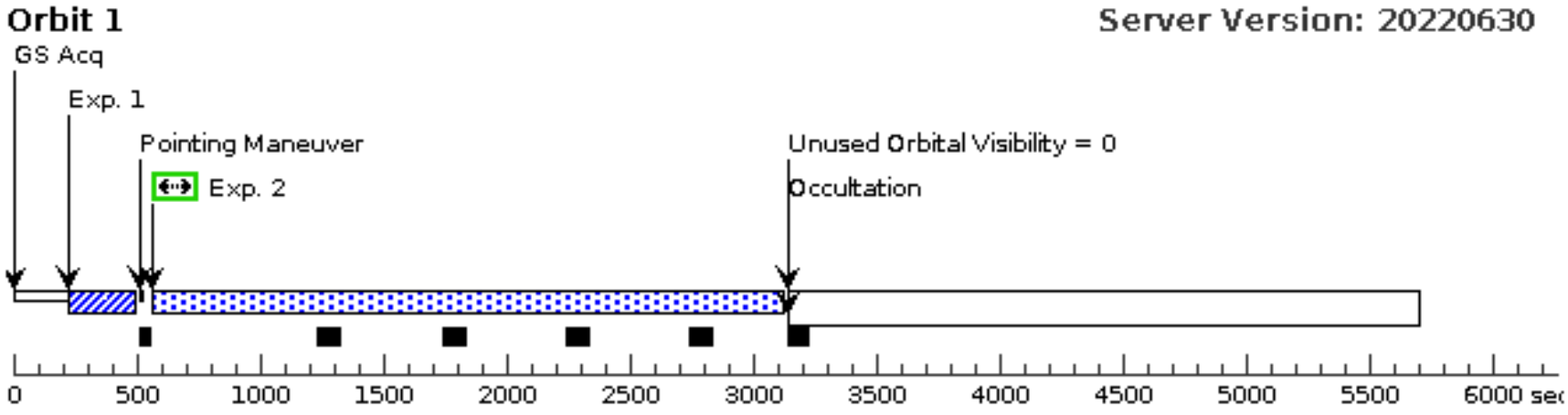
Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions.

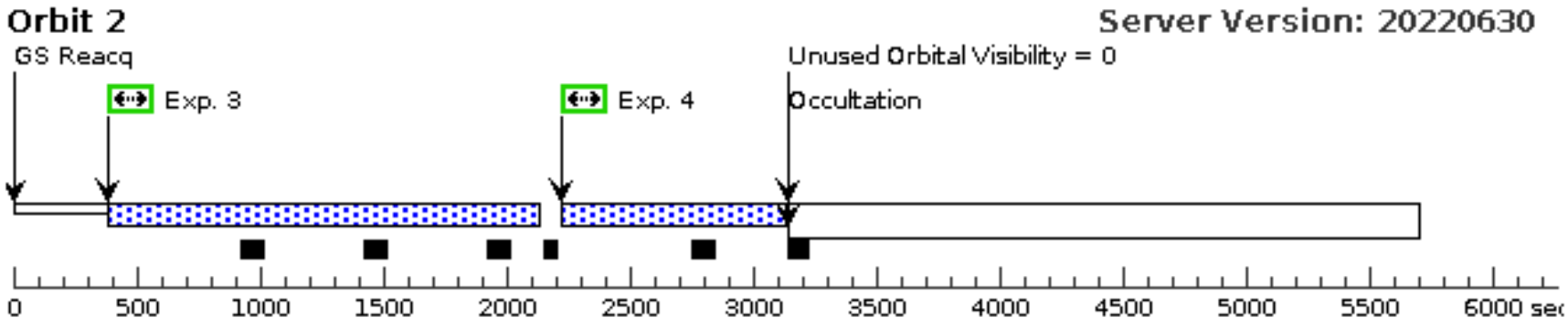
This target is a blank piece of sky which is the bright object safe pointing and is 9.804 arcseconds away at a PA of 226.1 from V-FO-AQR.
Category=UNIDENTIFIED
Description=[BLANK FIELD]
Extended=NO

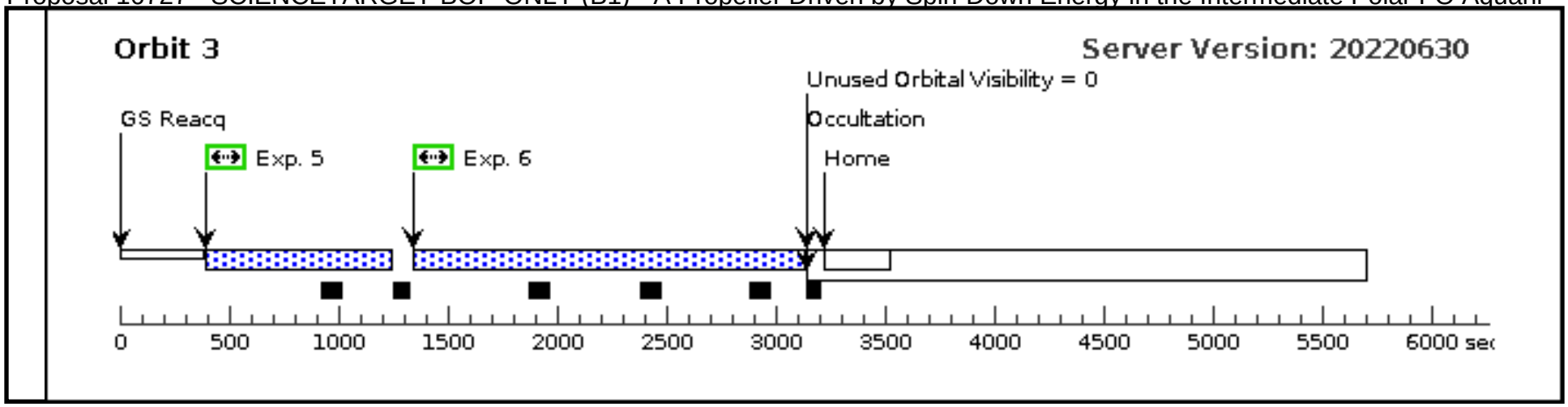
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	acq1 (COS.ta.1528085)	(11) TARGET01-SAFE-TARGET	COS/NUV, ACQ/IMAGE, BOA	MIRRORA				22 Secs (22 Secs) *[==>]*	***[1]***
Comments: XMM OM and Swift UVOT provide a flux of 4e-14 erg/cm2/s/A at 2220 Ang. This is too bright for PSA, so we will use BOA and MIRRORA. This gives a S/N ratio of 30 in 22 sec.									
2	sci1 (COS.sp.1528090)	(11) TARGET01-SAFE-TARGET	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=500; FP-POS=1; LIFETIME-POS=LP3			2375 Secs (2375 Secs) *[==>]*	***[1]***
3	sci2 (COS.sp.1528090)	(11) TARGET01-SAFE-TARGET	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=500; FP-POS=2; LIFETIME-POS=LP3			1700 Secs (1700 Secs) *[==>]*	***[2]***
4	sci3 (COS.sp.1528090)	(11) TARGET01-SAFE-TARGET	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=500; FP-POS=3; LIFETIME-POS=LP3			855 Secs (855 Secs) *[==>]*	***[2]***
5	sci4 (COS.sp.1528090)	(11) TARGET01-SAFE-TARGET	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=500; FP-POS=3; LIFETIME-POS=LP3			800 Secs (800 Secs) *[==>]*	***[3]***
6	sci5 (COS.sp.1528090)	(11) TARGET01-SAFE-TARGET	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=500; FP-POS=4; LIFETIME-POS=LP3			1739 Secs (1736 Secs) *[==>1736.0 Secs]*	***[3]***

Orbit Structure



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Unused Orbital Visibility = 0
GS Reacq
Occultation
Exp. 5
Exp. 6
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
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5500
6000 sec

Visit

Proposal 16727, S/C visit for 01 (S1), completed Fri Aug 04 17:00:25 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: S/C

Special Requirements: ORIENT 70D TO 105 D

Comments: This visit allocates and sets up the safe position offset slot for visit 01 which will use that slot. This S/C visit should go earlier in the week while visit 01 will be about 3 days later. The S/C visit will contain only one exposure.

Fixed Targets

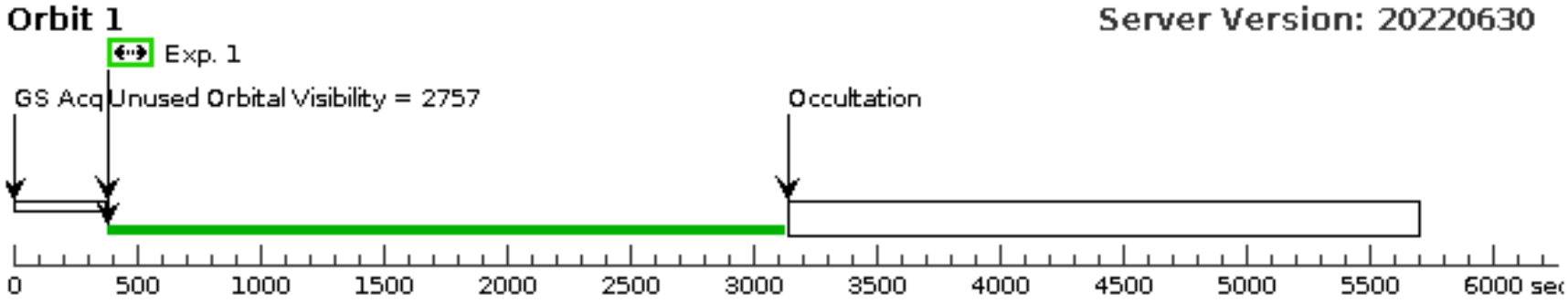
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	V-FO-AQR	RA: 22 17 55.3797 (334.4807488d) Dec: -08 21 3.76 (-8.35104d) Equinox: J2000	Proper Motion RA: 2.276 mas/yr Proper Motion Dec: 4.512 mas/yr Parallax: 0.0018416" Epoch of Position: 2000.0	V=14.0+/-1.0	Reference Frame: ICRS

Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions.
Category=STAR
Description=[INTERMEDIATE POLAR]
Extended=NO

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) V-FO-AQR	S/C, DATA, V1			POS TARG 232.723, -237.515; SAVE OFFSET V01 SAF; SPEC COM INSTR ECSLOTSET; QESIPARM ANGLE 226.1; QESIPARM DIST 9.804		5 Secs (5 Secs) *[==>]*	*[1]*

Orbit Structure



Visit

Proposal 16727, visit02 (02), failed Fri Aug 04 17:00:25 GMT 2023

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: ORIENT 70D TO 105 D; AFTER 01 BY 28 Orbits TO 32 Orbits

Comments: Visit 02 is timed to be 30 orbits after vist 01 so that a full binary orbit is covered.

This should be scheduled in evening local time. Flags need to be cleared during the work day. Weekends are to be avoided since the CS must clear the target within 24 hours of HST execution.

Diagnostics

(visit02 (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

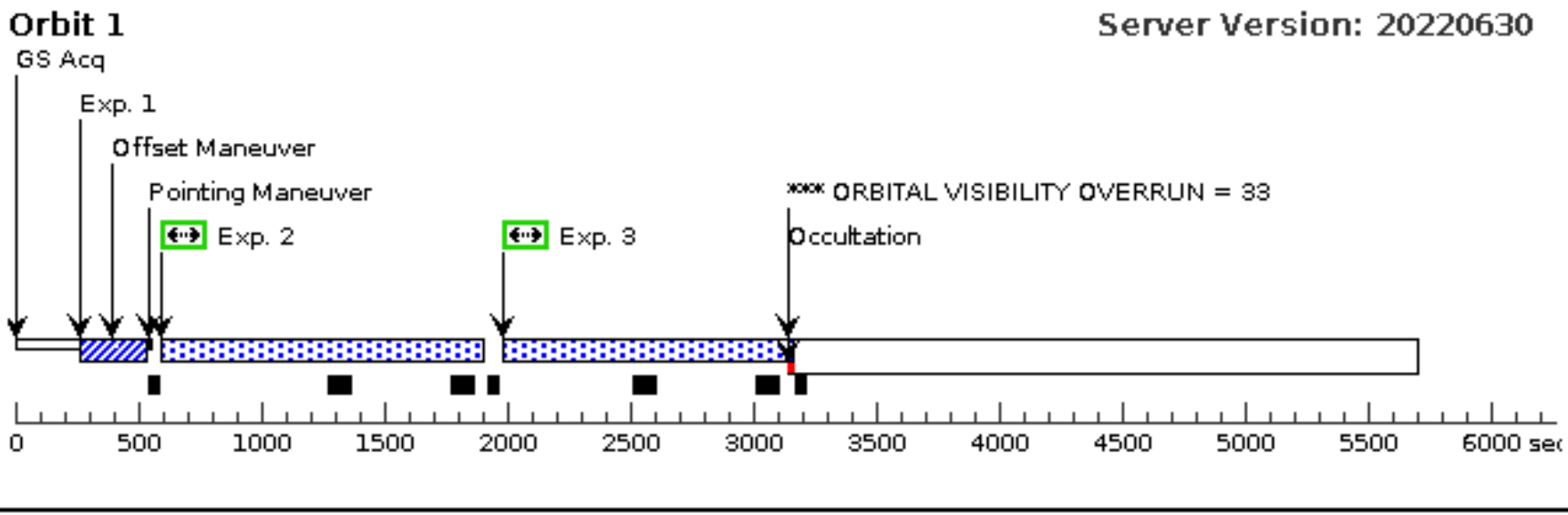
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	V-FO-AQR	RA: 22 17 55.3797 (334.4807488d) Dec: -08 21 3.76 (-8.35104d) Equinox: J2000	Proper Motion RA: 2.276 mas/yr Proper Motion Dec: 4.512 mas/yr Parallax: 0.0018416" Epoch of Position: 2000.0	V=14.0+/-1.0	Reference Frame: ICRS

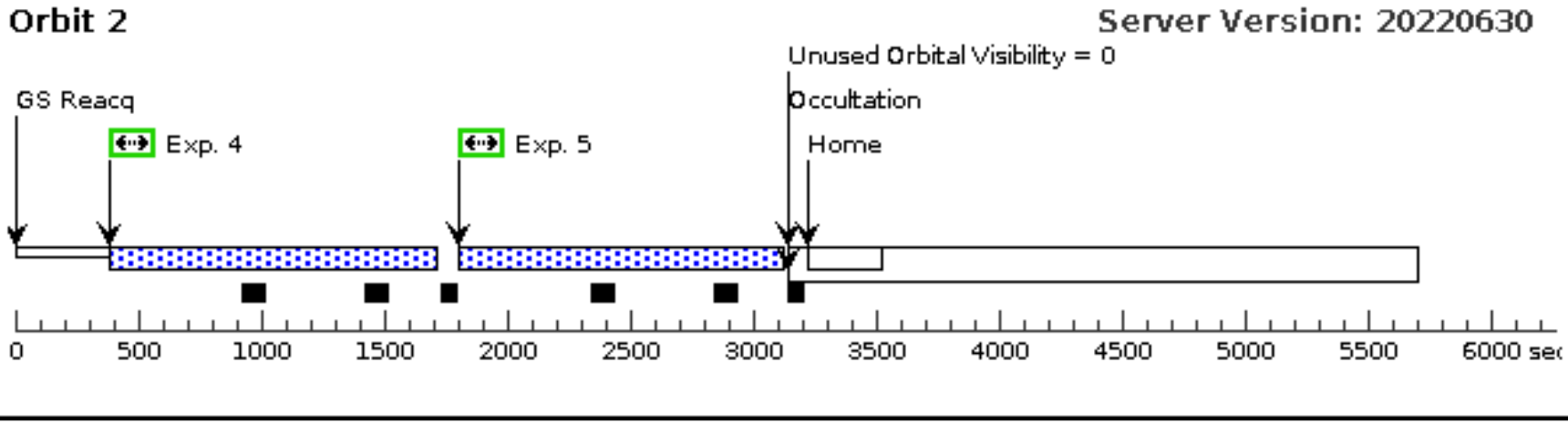
Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions.
Category=STAR
Description=[INTERMEDIATE POLAR]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	acq1 (COS.ta.1528085)	(1) V-FO-AQR	COS/NUV, ACQ/IMAGE, BOA	MIRRORA		USE OFFSET V02SAF		22 Secs (22 Secs) *[==>]*	*[1]*
	Comments: XMM OM and Swift UVOT provide a flux of 4e-14 erg/cm2/s/A at 2220 Ang. This is too bright for PSA, so we will use BOA and MIRRORA. This gives a S/N ratio of 30 in 22 sec.								
2	sci1 (COS.sp.1528090)	(1) V-FO-AQR	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=1; LIFETIME-POS=LP3	USE OFFSET V02SAF		1200 Secs (1121 Secs) *[==>1121.0 Secs]*	*[1]*
3	sci2 (COS.sp.1528090)	(1) V-FO-AQR	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=2; LIFETIME-POS=LP3	USE OFFSET V02SAF		1700 Secs (1130 Secs) *[==>1130.0 Secs]*	*[1]*
4	sci3 (COS.sp.1528090)	(1) V-FO-AQR	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=3; LIFETIME-POS=LP3	USE OFFSET V02SAF		855 Secs (1275 Secs) *[==>1275.0 Secs]*	*[2]*
5	sci4 (COS.sp.1528090)	(1) V-FO-AQR	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=4; LIFETIME-POS=LP3	USE OFFSET V02SAF		800 Secs (1271 Secs) *[==>1271.0 Secs]*	*[2]*

Orbit Structure





Visit

Proposal 16727, SCIENCETARGET-BOP-ONLY (B2), withdrawn Fri Aug 04 17:00:25 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: ORIENT 70D TO 105 D

Comments: Visit 02 is timed to be 30 orbits after vist 01 so that a full binary orbit is covered.

This visit is for BOP checkng the safe target only and should not execute onboard HST

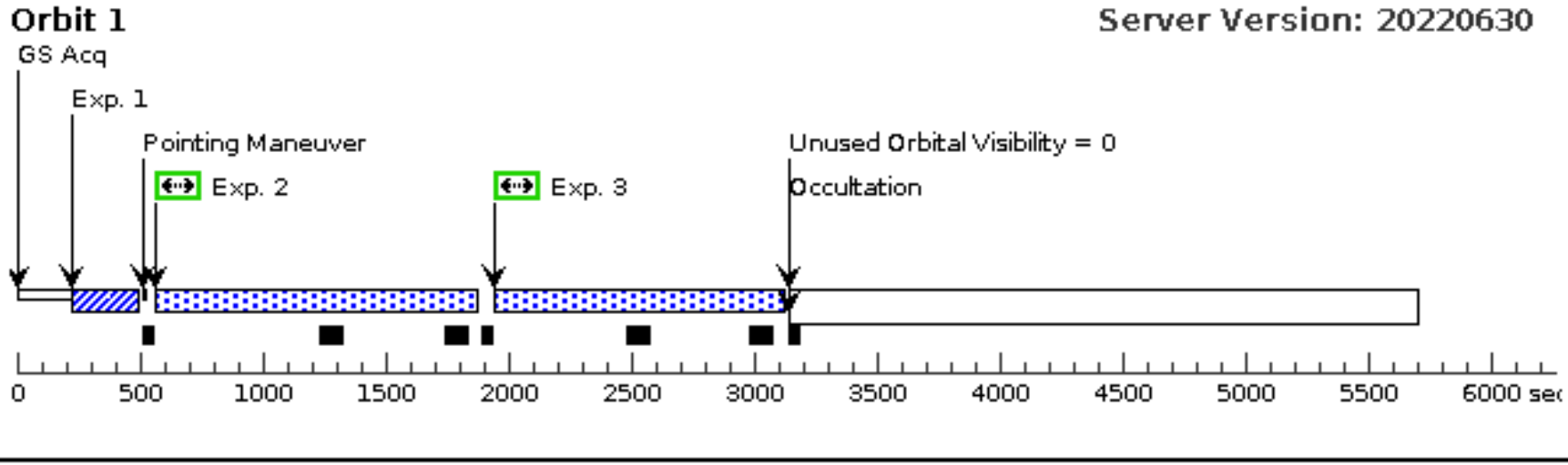
Fixed Targets

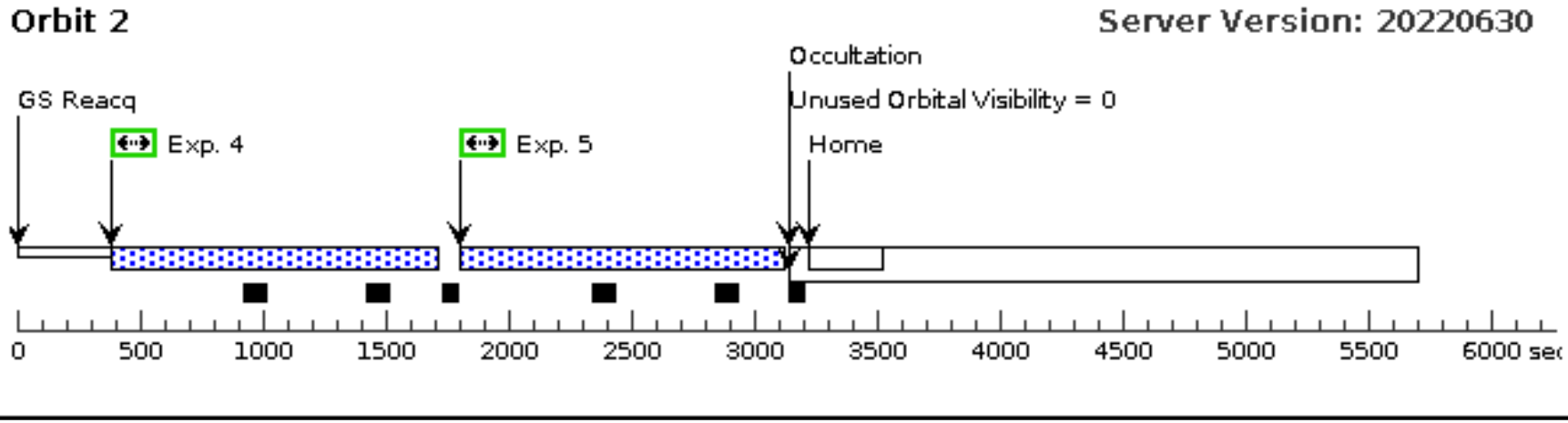
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	V-FO-AQR	RA: 22 17 55.3797 (334.4807488d) Dec: -08 21 3.76 (-8.35104d) Equinox: J2000	Proper Motion RA: 2.276 mas/yr Proper Motion Dec: 4.512 mas/yr Parallax: 0.0018416" Epoch of Position: 2000.0	V=14.0+/-1.0	Reference Frame: ICRS
Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions. *Category=STAR* *Description=[INTERMEDIATE POLAR]* *Extended=NO*					
(12)	TARGET01-SAFE-TARGET-V2	Offset from V-FO-AQR RA Offset: -0.47 Secs Dec Offset: -6.799 Arcsec		V=14.0+/-1.0	Offset Position (TARGET01-SAFE-TARGET-V2)
Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions. ***This target is a blank piece of sky which is the bright object safe pointing and is 9.804 arcseconds away at a PA 226.1 degrees from V-FO-AQR* *Category=UNIDENTIFIED* *Description=[BLANK FIELD]* *Extended=NO*					

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	acq1 (COS.ta.1528085)	(12) TARGET01-SAFE-TARGET-V2	COS/NUV, ACQ/IMAGE, BOA	MIRRORA				22 Secs (22 Secs) *[==>]*	 ***[1]***
Comments: XMM OM and Swift UVOT provide a flux of 4e-14 erg/cm2/s/A at 2220 Ang. This is too bright for PSA, so we will use BOA and MIRRORA. This gives a S/N ratio of 30 in 22 sec.									
2	sci1 (COS.sp.1528090)	(12) TARGET01-SAFE-TARGET-V2	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=1; LIFETIME-POS=LP3			1200 Secs (1121 Secs) *[==>1121.0 Secs]*	 ***[1]***
3	sci2 (COS.sp.1528090)	(12) TARGET01-SAFE-TARGET-V2	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=2; LIFETIME-POS=LP3			1700 Secs (1130 Secs) *[==>1130.0 Secs]*	 ***[1]***
4	sci3 (COS.sp.1528090)	(12) TARGET01-SAFE-TARGET-V2	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=3; LIFETIME-POS=LP3			855 Secs (1275 Secs) *[==>1275.0 Secs]*	 ***[2]***
5	sci4 (COS.sp.1528090)	(12) TARGET01-SAFE-TARGET-V2	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=4; LIFETIME-POS=LP3			800 Secs (1271 Secs) *[==>1271.0 Secs]*	 ***[2]***

Orbit Structure





Visit

Proposal 16727, S/C visit for 02 (S2), completed Fri Aug 04 17:00:25 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: S/C

Special Requirements: ORIENT 70D TO 105 D

Comments: This visit allocates and sets up the safe position offset slot for visit 02 which will use that slot. This S/C visit should go earlier in the week while visit 02 will be at least 3 days later. The S/C visit will contain only one exposure.

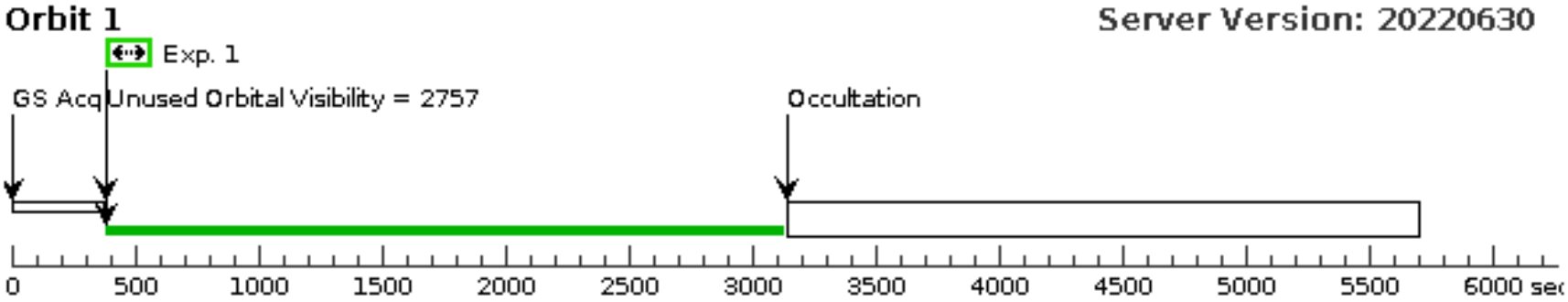
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	V-FO-AQR	RA: 22 17 55.3797 (334.4807488d) Dec: -08 21 3.76 (-8.35104d) Equinox: J2000	Proper Motion RA: 2.276 mas/yr Proper Motion Dec: 4.512 mas/yr Parallax: 0.0018416" Epoch of Position: 2000.0	V=14.0+/-1.0	Reference Frame: ICRS
		Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions. *Category=STAR* *Description=[INTERMEDIATE POLAR]* *Extended=NO*			
(12)	TARGET01-SAFE-TARGET-V2	Offset from V-FO-AQR RA Offset: -0.47 Secs Dec Offset: -6.799 Arcsec		V=14.0+/-1.0	Offset Position (TARGET01-SAFE-TARGET-V2)
		Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions. ***This target is a blank piece of sky which is the bright object safe pointing and is 9.804 arcseconds away at a PA 226.1 degrees from V-FO-AQR* *Category=UNIDENTIFIED* *Description=[BLANK FIELD]* *Extended=NO*			

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(12) TARGET01-SAFE-TARGET-V2	S/C, DATA, V1			POS TARG 232.723, -237.515; SAVE OFFSET V02 SAF; SPEC COM INSTR ECSLOTSET; QESIPARM ANGLE 226.1; QESIPARM DIST 9.804		5 Secs (5 Secs) *[==>]*	*[1]*

Orbit Structure



Visit

Proposal 16727, visit01 repeat (51), implementation Fri Aug 04 17:00:25 GMT 2023

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: ORIENT 69D TO 93 D

Comments: This should be scheduled in evening local time. Flags need to be cleared during the work day. Weekends are to be avoided since the CS must clear the target within 24 hours of HST execution.

Diagnostics

(visit01 repeat (51)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

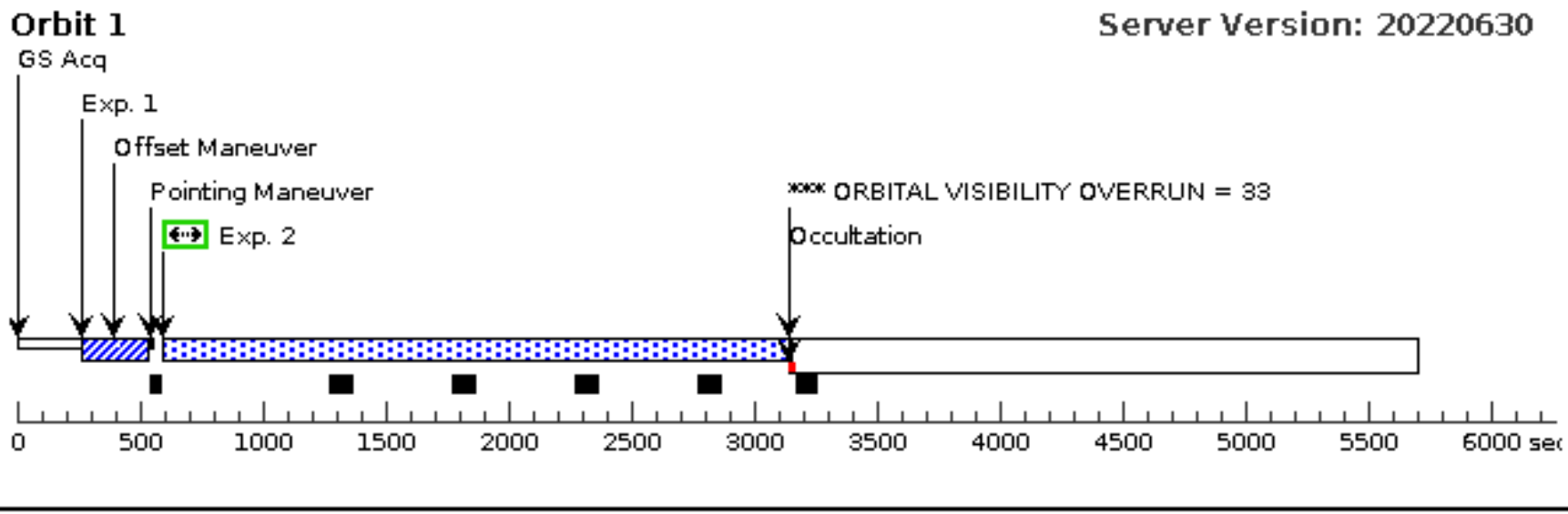
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(51)	V-FO-AQR-REPEAT	RA: 22 17 55.3797 (334.4807488d) Dec: -08 21 3.76 (-8.35104d) Equinox: J2000	Proper Motion RA: 2.276 mas/yr Proper Motion Dec: 4.512 mas/yr Parallax: 0.0018416" Epoch of Position: 2000.0	V=14.0+/-1.0	Reference Frame: ICRS

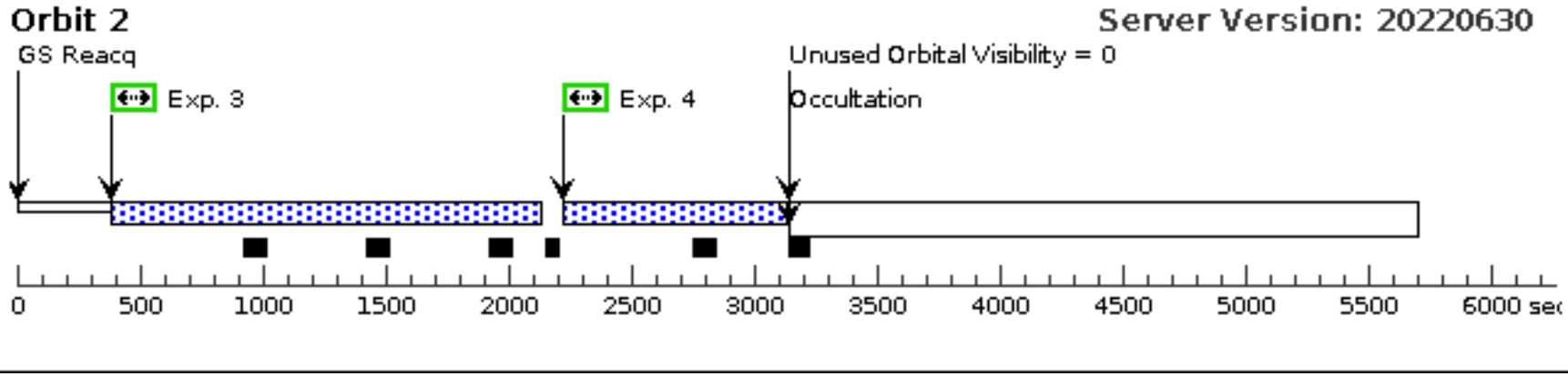
Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions.
Category=STAR
Description=[INTERMEDIATE POLAR]
Extended=NO

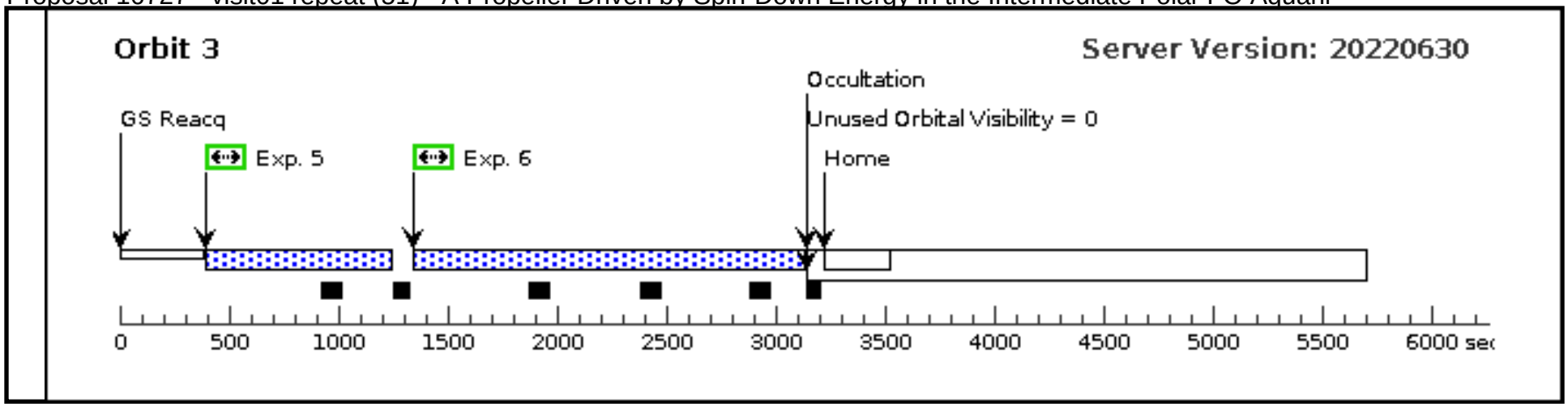
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	acq1 (COS.ta.1528085)	(51) V-FO-AQR-REPEAT	COS/NUV, ACQ/IMAGE, BOA	MIRRORA		USE OFFSET V51SAF		22 Secs (22 Secs) *[==>]*	***[1]***
Comments: XMM OM and Swift UVOT provide a flux of 4e-14 erg/cm2/s/A at 2220 Ang. This is too bright for PSA, so we will use BOA and MIRRORA. This gives a S/N ratio of 30 in 22 sec.									
2	sci1 (COS.sp.1528090)	(51) V-FO-AQR-REPEAT	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=500; FP-POS=1; LIFETIME-POS=LP3	USE OFFSET V51SAF		2375 Secs (2375 Secs) *[==>]*	***[1]***
3	sci2 (COS.sp.1528090)	(51) V-FO-AQR-REPEAT	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=500; FP-POS=2; LIFETIME-POS=LP3	USE OFFSET V51SAF		1700 Secs (1700 Secs) *[==>]*	***[2]***
4	sci3 (COS.sp.1528090)	(51) V-FO-AQR-REPEAT	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=500; FP-POS=3; LIFETIME-POS=LP3	USE OFFSET V51SAF		855 Secs (855 Secs) *[==>]*	***[2]***
5	sci4 (COS.sp.1528090)	(51) V-FO-AQR-REPEAT	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=500; FP-POS=3; LIFETIME-POS=LP3	USE OFFSET V51SAF		800 Secs (800 Secs) *[==>]*	***[3]***
6	sci5 (COS.sp.1528090)	(51) V-FO-AQR-REPEAT	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=500; FP-POS=4; LIFETIME-POS=LP3	USE OFFSET V51SAF		1739 Secs (1736 Secs) *[==>1736.0 Secs]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20220630
Occultation
GS Reacq
Unused Orbital Visibility = 0
Exp. 5
Exp. 6
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec

Visit

Proposal 16727, SCIENCETARGET-BOP-ONLY-V51 (1B) Fri Aug 04 17:00:26 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: ORIENT 69D TO 93 D

Comments: This visit is for BOP checking the safe target only and should not execute onboard HST.

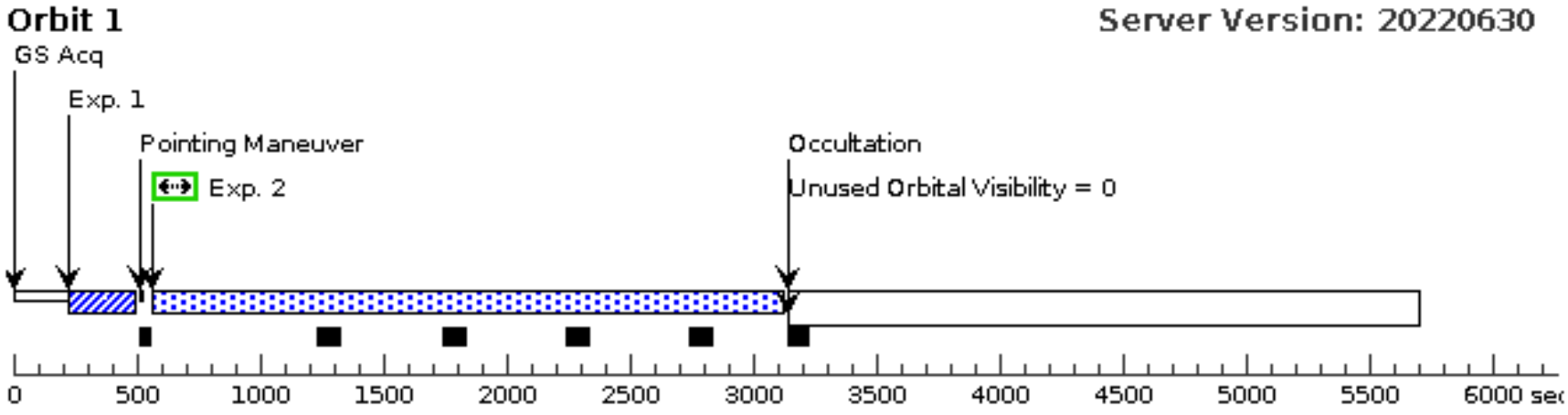
Fixed Targets

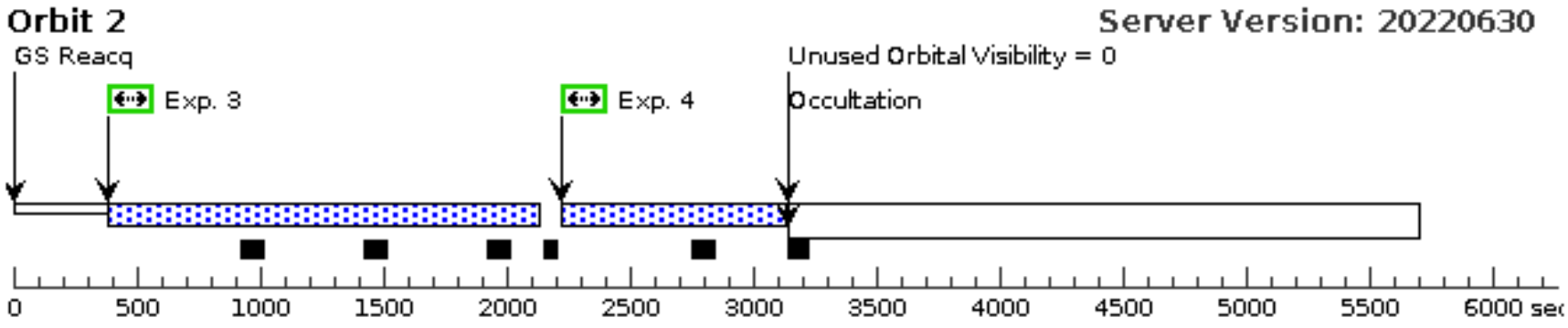
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(51)	V-FO-AQR-REPEAT	RA: 22 17 55.3797 (334.4807488d) Dec: -08 21 3.76 (-8.35104d) Equinox: J2000	Proper Motion RA: 2.276 mas/yr Proper Motion Dec: 4.512 mas/yr Parallax: 0.0018416" Epoch of Position: 2000.0	V=14.0+/-1.0	Reference Frame: ICRS
Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions. *Category=STAR* *Description=[INTERMEDIATE POLAR]* *Extended=NO*					
(61)	V-FO-AQR-SAFE-TARGET	Offset from V-FO-AQR-REPEAT RA Offset: -0.4 Secs Dec Offset: -7.555 Arcsec		V=14.0+/-1.0	Offset Position (V-FO-AQR-SAFE-TARGET)
Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions. *Category=UNIDENTIFIED* *Description=[BLANK FIELD]* *Extended=NO*					

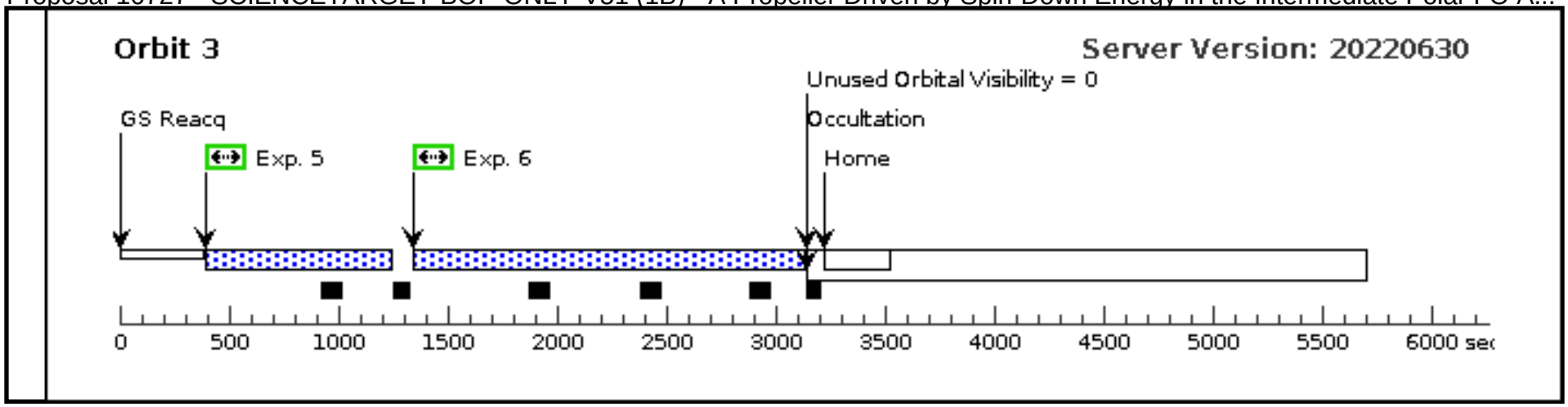
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	acq1 (COS.ta.1528085)	(61) V-FO-AQR-SA FE-TARGET	COS/NUV, ACQ/IMAGE, BOA	MIRRORA				22 Secs (22 Secs) *[==>]*	***[1]***
Comments: XMM OM and Swift UVOT provide a flux of 4e-14 erg/cm2/s/A at 2220 Ang. This is too bright for PSA, so we will use BOA and MIRRORA. This gives a S/N ratio of 30 in 22 sec.									
2	sci1 (COS.sp.1528090)	(61) V-FO-AQR-SA FE-TARGET	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=1; LIFETIME-POS=LP3			2375 Secs (2375 Secs) *[==>]*	***[1]***
3	sci2 (COS.sp.1528090)	(61) V-FO-AQR-SA FE-TARGET	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=2; LIFETIME-POS=LP3			1700 Secs (1700 Secs) *[==>]*	***[2]***
4	sci3 (COS.sp.1528090)	(61) V-FO-AQR-SA FE-TARGET	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=3; LIFETIME-POS=LP3			855 Secs (855 Secs) *[==>]*	***[2]***
5	sci4 (COS.sp.1528090)	(61) V-FO-AQR-SA FE-TARGET	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=3; LIFETIME-POS=LP3			800 Secs (800 Secs) *[==>]*	***[3]***
6	sci5 (COS.sp.1528090)	(61) V-FO-AQR-SA FE-TARGET	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=4; LIFETIME-POS=LP3			1739 Secs (1736 Secs) *[==>1736.0 Secs]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20220630
Unused Orbital Visibility = 0
GS Reacq
Occultation
Exp. 5
Exp. 6
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec

Visit

Proposal 16727, visit02 repeat (52), implementation Fri Aug 04 17:00:26 GMT 2023

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: ORIENT 69D TO 93 D; AFTER 51 BY 28 Orbits TO 32 Orbits

Comments: Visit 52 is timed to be 30 orbits after vist 51 so that a full binary orbit is covered.

This should be scheduled in evening local time. Flags need to be cleared during the work day. Weekends are to be avoided since the CS must clear the target within 24 hours of HST execution.

Diagnostics

(visit02 repeat (52)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

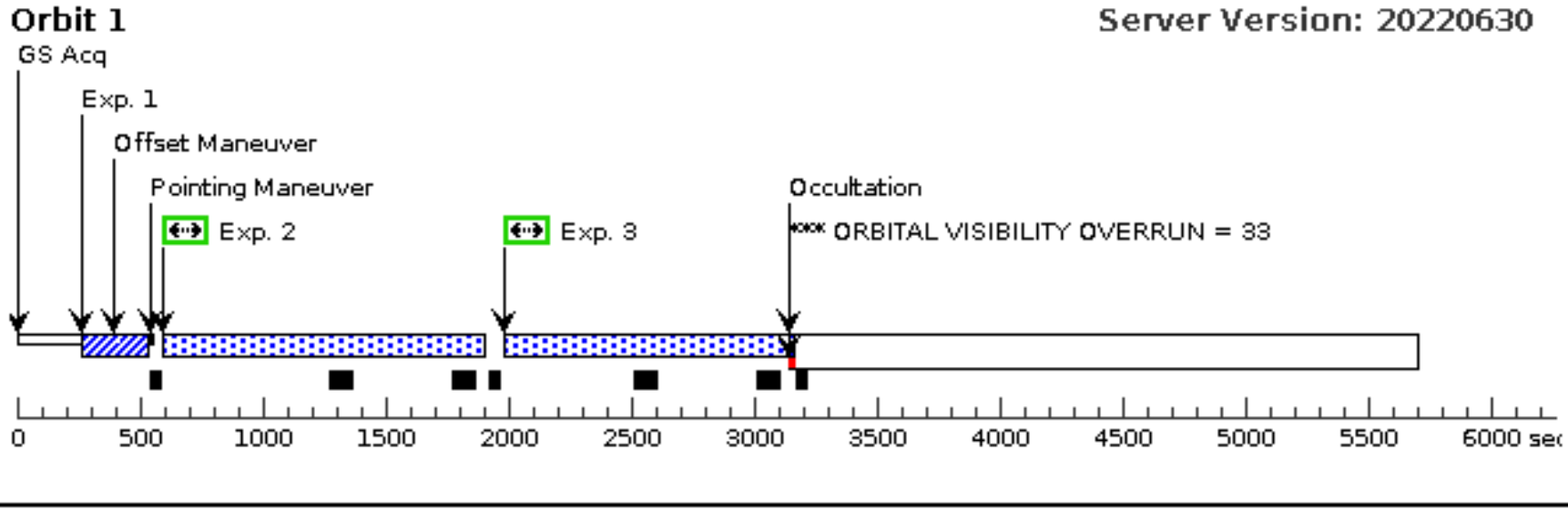
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(51)	V-FO-AQR-REPEAT	RA: 22 17 55.3797 (334.4807488d) Dec: -08 21 3.76 (-8.35104d) Equinox: J2000	Proper Motion RA: 2.276 mas/yr Proper Motion Dec: 4.512 mas/yr Parallax: 0.0018416" Epoch of Position: 2000.0	V=14.0+/-1.0	Reference Frame: ICRS

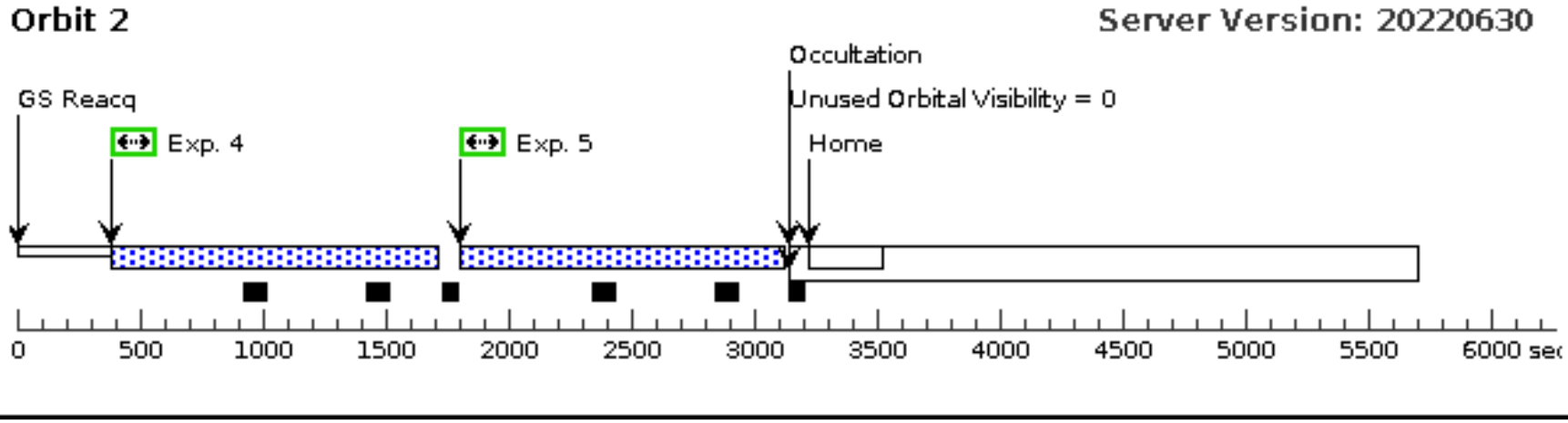
Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions.
Category=STAR
Description=[INTERMEDIATE POLAR]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	acq1 (COS.ta.1528085)	(51) V-FO-AQR-REPEAT	COS/NUV, ACQ/IMAGE, BOA	MIRRORA		USE OFFSET V52SAF		22 Secs (22 Secs) *[==>]*	*[1]*
Comments: XMM OM and Swift UVOT provide a flux of 4e-14 erg/cm2/s/A at 2220 Ang. This is too bright for PSA, so we will use BOA and MIRRORA. This gives a S/N ratio of 30 in 22 sec.									
2	sci1 (COS.sp.1528090)	(51) V-FO-AQR-REPEAT	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=1; LIFETIME-POS=LP3	USE OFFSET V52SAF		1200 Secs (1121 Secs) *[==>1121.0 Secs]*	*[1]*
3	sci2 (COS.sp.1528090)	(51) V-FO-AQR-REPEAT	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=2; LIFETIME-POS=LP3	USE OFFSET V52SAF		1700 Secs (1130 Secs) *[==>1130.0 Secs]*	*[1]*
4	sci3 (COS.sp.1528090)	(51) V-FO-AQR-REPEAT	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=3; LIFETIME-POS=LP3	USE OFFSET V52SAF		855 Secs (1275 Secs) *[==>1275.0 Secs]*	*[2]*
5	sci4 (COS.sp.1528090)	(51) V-FO-AQR-REPEAT	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=4; LIFETIME-POS=LP3	USE OFFSET V52SAF		800 Secs (1271 Secs) *[==>1271.0 Secs]*	*[2]*

Orbit Structure





Visit

Proposal 16727, SCIENCETARGET-BOP-ONLY-V52 (2B) Fri Aug 04 17:00:26 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: ORIENT 69D TO 93 D

Comments: Visit 52 is timed to be 30 orbits after vist 51 so that a full binary orbit is covered.

This visit is for BOP checking the safe target only and should not execute onboard HST.

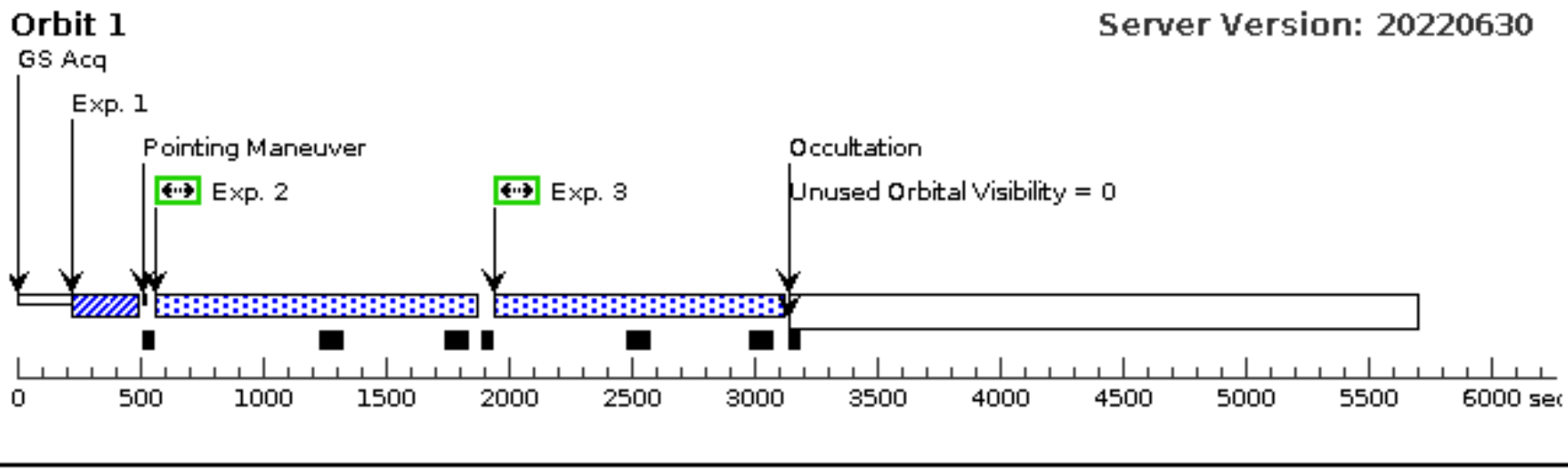
Fixed Targets

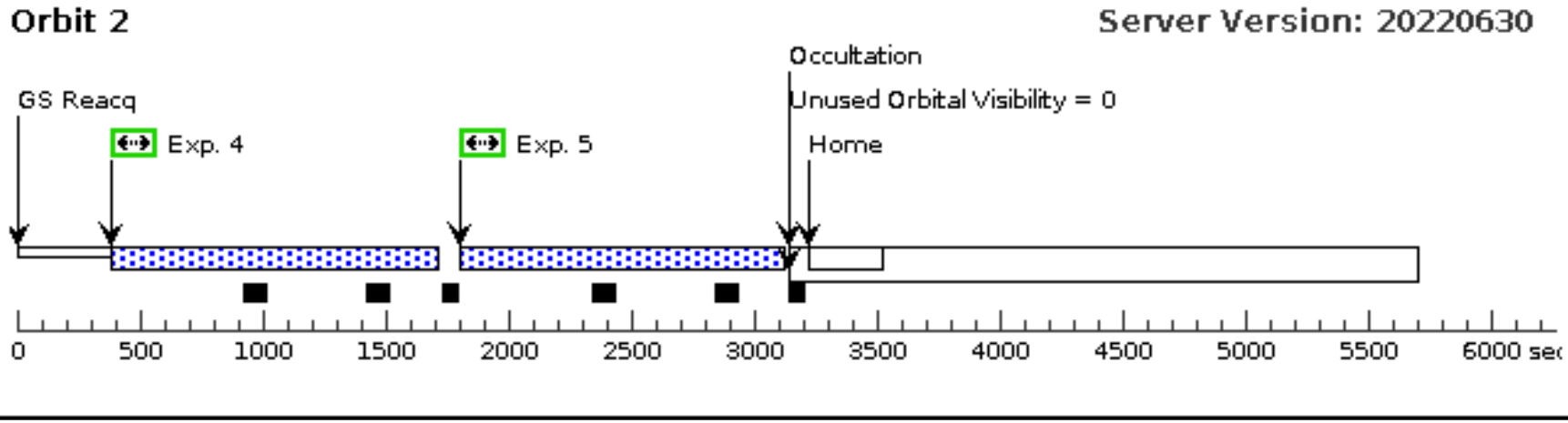
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(51)	V-FO-AQR-REPEAT	RA: 22 17 55.3797 (334.4807488d) Dec: -08 21 3.76 (-8.35104d) Equinox: J2000	Proper Motion RA: 2.276 mas/yr Proper Motion Dec: 4.512 mas/yr Parallax: 0.0018416" Epoch of Position: 2000.0	V=14.0+/-1.0	Reference Frame: ICRS
Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions. *Category=STAR* *Description=[INTERMEDIATE POLAR]* *Extended=NO*					
(62)	V-FO-AQR-SAFE-TARGET-V2	Offset from V-FO-AQR-REPEAT RA Offset: -0.4 Secs Dec Offset: -7.555 Arcsec		V=14.0+/-1.0	Offset Position (V-FO-AQR-SAFE-TARGET-V2)
Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions. *Category=UNIDENTIFIED* *Description=[BLANK FIELD]* *Extended=NO*					

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	acq1 (COS.ta.1528085)	(62) V-FO-AQR-SAFE-TARGET-V2	COS/NUV, ACQ/IMAGE, BOA	MIRRORA				22 Secs (22 Secs) *[==>]*	*[1]*
Comments: XMM OM and Swift UVOT provide a flux of 4e-14 erg/cm2/s/A at 2220 Ang. This is too bright for PSA, so we will use BOA and MIRRORA. This gives a S/N ratio of 30 in 22 sec.									
2	sci1 (COS.sp.1528090)	(62) V-FO-AQR-SAFE-TARGET-V2	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=1; LIFETIME-POS=LP3			1200 Secs (1121 Secs) *[==>1121.0 Secs]*	*[1]*
3	sci2 (COS.sp.1528090)	(62) V-FO-AQR-SAFE-TARGET-V2	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=2; LIFETIME-POS=LP3			1700 Secs (1130 Secs) *[==>1130.0 Secs]*	*[1]*
4	sci3 (COS.sp.1528090)	(62) V-FO-AQR-SAFE-TARGET-V2	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=3; LIFETIME-POS=LP3			855 Secs (1275 Secs) *[==>1275.0 Secs]*	*[2]*
5	sci4 (COS.sp.1528090)	(62) V-FO-AQR-SAFE-TARGET-V2	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5000; FP-POS=4; LIFETIME-POS=LP3			800 Secs (1271 Secs) *[==>1271.0 Secs]*	*[2]*

Orbit Structure





Visit

Proposal 16727, S/C visit for visit 51 (S3) Fri Aug 04 17:00:26 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: S/C

Special Requirements: ORIENT 69D TO 93 D

Comments: This visit allocates and sets up the safe position offset slot for visit 51 which will use that slot. This S/C visit should go 3-5 days before 51. The S/C visit will contain only 1 exposure.

Fixed Targets

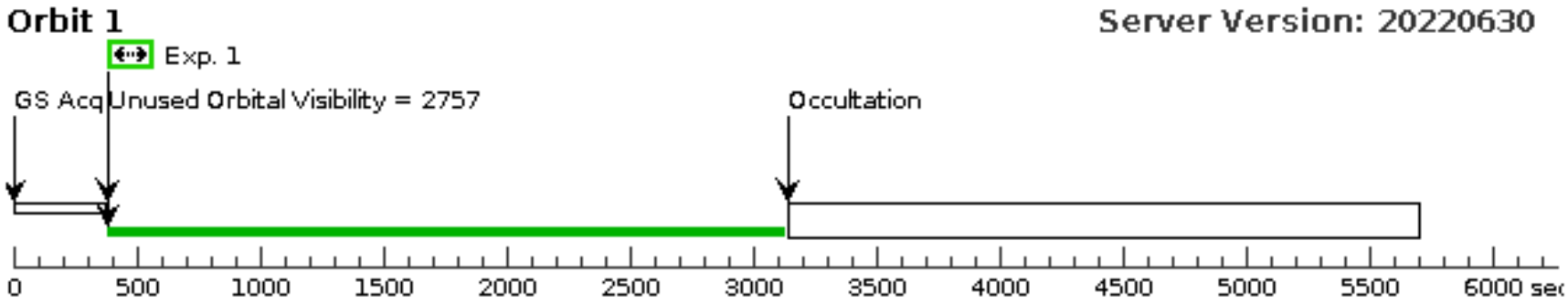
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(51)	V-FO-AQR-REPEAT	RA: 22 17 55.3797 (334.4807488d) Dec: -08 21 3.76 (-8.35104d) Equinox: J2000	Proper Motion RA: 2.276 mas/yr Proper Motion Dec: 4.512 mas/yr Parallax: 0.0018416" Epoch of Position: 2000.0	V=14.0+/-1.0	Reference Frame: ICRS

Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions.
Category=STAR
Description=[INTERMEDIATE POLAR]
Extended=NO

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(51) V-FO-AQR-REPEAT	S/C, DATA, V1			POS TARG 232.723, -237.515; SAVE OFFSET V51 SAF; SPEC COM INSTR ECSLOTSET; QESIPARM ANGLE 218.7; QESIPARM DIST 9.681		5 Secs (5 Secs) *[==>]*	***[1]***

Orbit Structure



Visit

Proposal 16727, S/C visit for visit 52 (S4) Fri Aug 04 17:00:26 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: S/C

Special Requirements: ORIENT 69D TO 93 D

Comments: This visit allocates and sets up the safe position offset slot for visit 52 which will use that slot. This S/C visit should go 3-5 days before 52. The S/C visit will contain only 1 exposure.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(51)	V-FO-AQR-REPEAT	RA: 22 17 55.3797 (334.4807488d) Dec: -08 21 3.76 (-8.35104d) Equinox: J2000	Proper Motion RA: 2.276 mas/yr Proper Motion Dec: 4.512 mas/yr Parallax: 0.0018416" Epoch of Position: 2000.0	V=14.0+/-1.0	Reference Frame: ICRS

Comments: Coordinates and PM are from Gaia EDR3. The position has been corrected to epoch 2000 based on the measured proper motions.
Category=STAR
Description=[INTERMEDIATE POLAR]
Extended=NO

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(51) V-FO-AQR-REPEAT	S/C, DATA, V1			POS TARG 232.723, -237.515; SAVE OFFSET V52 SAF; SPEC COM INSTR ECSLOTSET; QESIPARM ANGLE 218.7; QESIPARM DIST 9.681		5 Secs (5 Secs) *[==>]*	***[1]***

Orbit Structure