17210 - A Multi-Bandpass ACS Survey of Cassiopeia A: Keeping Up with its Rapidly Evolving Structure

Cycle: 30, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*
Dr. Robert A. Fesen (PI) (Contact)	**Dartmouth College**
Dr. Dan Milisavljevic (CoI)	Purdue University
Dr. Daniel J. Patnaude (CoI)	Smithsonian Institution Astrophysical Observatory
Dr. Roger A. Chevalier (CoI)	The University of Virginia
Dr. John Charles Raymond (CoI)	Smithsonian Institution Astrophysical Observatory
Dr. Tea Temim (CoI)	Princeton University
Dr. Kathryn E. Weil (CoI)	Purdue University
Dr. William P. Blair (CoI)	The Johns Hopkins University
Prof. Bon-Chul Koo (CoI)	Seoul National University
Dr. Patrick Slane (CoI)	Smithsonian Institution Astrophysical Observatory

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
19	(2) CAS-A-NE	ACS/WFC	3	11-May-2023 11:00:51.0	yes
11	(2) CAS-A-NE	ACS/WFC	3	11-May-2023 11:00:53.0	yes
12	(5) CAS-A-SE	ACS/WFC	3	11-May-2023 11:00:55.0	yes
20	(1) CAS-A-N-CENTER	ACS/WFC	1	11-May-2023 11:00:56.0	yes
13	(1) CAS-A-N-CENTER	ACS/WFC	3	11-May-2023 11:00:57.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
14	(4) CAS-A-S-CENTER	ACS/WFC	3	11-May-2023 11:00:58.0	yes
15	(3) CAS-A-NW	ACS/WFC	3	11-May-2023 11:01:01.0	yes
16	(6) CAS-A-SW	ACS/WFC	3	11-May-2023 11:01:02.0	yes
21	(6) CAS-A-SW	ACS/WFC	2	11-May-2023 11:01:03.0	yes
17	(2) CAS-A-NE (4) CAS-A-S-CENTER (5) CAS-A-SE	ACS/WFC	3	11-May-2023 11:01:05.0	yes
18	(1) CAS-A-N-CENTER (3) CAS-A-NW (6) CAS-A-SW	ACS/WFC	3	11-May-2023 11:01:06.0	yes

30 Total Orbits Used

ABSTRACT

The supernova remnant Cassiopeia A (Cas A) provides the clearest look at the properties and explosion dynamics of a core-collapse supernova (CCSN). With an explosion date around 1670, Cas A is the youngest Galactic core-collapse SNR known and, at an estimated distance of 3.4 kpc, it is also among the closest and brightest. However, Cas A exhibits significant changes in its emission structure on timescales as short as 1-2 years, and large-scale changes in one or two decades, meaning that upcoming multi-wavelength investigations require nearly contemporaneous, high-resolution optical observations.

This proposal describes a multi-bandpass ACS imaging program with the goals of: 1) a high-resolution optical survey that can discriminate O-Ne rich ejecta from S-Ar-Ca rich ejecta, thereby assisting new multi-wavelength studies of Cas A's ejecta and its dust content, including JWST approved Cycle 1 Near and Mid-IR observations, deep new 50 to 100 ksec Chandra high spatial resolution X-ray observations, and high spectral resolution X-ray data from the upcoming XRISM mission, 2) resolve the remnant's newly emerging and freshly reverse shocked O-Ne rich and S-Ar-Ca rich ejecta along the southern limb and north-central region, 3) add new constraints on reverse shock velocity estimates across multiple regions, and 4) measure the proper motions of the remnant's highest-velocity (8000 to 14,500 km/s) outer ejecta providing improved age and explosion center estimates plus deceleration measurements probing the density and arrangement of the local circumstellar medium as well as ejecta knot lifetimes.

OBSERVING DESCRIPTION

The goal is to obtain a set of ACS/WFC images nearly identical to those obtained in March and December 2004. These will yield excellent discrimination between O-Ne rich from S-Ar-Ca rich ejecta through the use of the ACS F450W and F775W filters sensitive to O-Ne rich SN ejecta via oxygen line emissions of [O III] 4959,5007 and [O II] 7319,7330. Likewise, detection of S-Ca rich ejecta through the use of ACS filters F625W and F850LP sensitive to sulfur-rich ejecta through [S II] 6716,6731 [S III] 9069,9531 and [S II] 10350 lines.

There are six (6) target regions be imaged with virtually the same ORIENT angle of around 90 degrees to fully cover Cas A wide E-W dimension. To do this, we have constructed an observing program of eight (8) visits. Each of the first six visits target one remnant region in three ACS filters (F625W, F775W, and F850LP) using roughly 2 x 590 sec exposures plus 2 x 590 sec exposures dithered by a two point the ACS-WFC-DITHER-LINE, plus a smaller, secondary two point ACS-WFC-DITHER-LINE to help with hot pixels and cosmic rays. Thus 1 orbit is needed for each filter. A single visit will comprise three orbits for three filters for each region The 7th and 8th visits each target three of the six remnant regions using just the F475W filter, with expoures again of roughly 2 x 590 sec dithered by the two ACS-WFC-DITHER-LINE dithers.

Thus, we will have ~ 4 x 590 sec exposures for each of the four filters (F450W, F625W, F775W, and F850LP) for six target regions in Cas A. Note: We have revised the coordinates of the six targets, increasing the RA and Dec by 10-20 arcseconds to permit detections of high-speed ejecta knots (mu = 0.55"/yr) located north and east of the remnant's main shell and first detected in 2004 ACS/WFC images.

We have also revised the six target coordinates to avoid having bright stars just off the ACS/WFC and away from potential "Dragon Breath" light scatterings from bright stars located just off the FOV.

All eight visits can be done in the 14 day window between 28 Nov 2022 and 12 Dec 2022. We have included a timing request for this time frame to match JWST Cycle 1 observations of Cas A, as noted in our Phase I submission. First set of JWST data are MIRI images have now been obtained between Jul 28, 2022 - Aug 8, 2022. The remaining observations are NIRCam images and are scheduled for Nov 4-14, 2022.
Thus having the HST data taken in late Nov/early Dec 2022 is ideal.

Visit

Proposal 17210, Visit 19, scheduling Thu May 11 15:01:07 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 269.0D TO 271.2 D

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.364 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.23 Angle Between Sides= Center Pattern=false	(1), (2), (3)

Fixed Targets

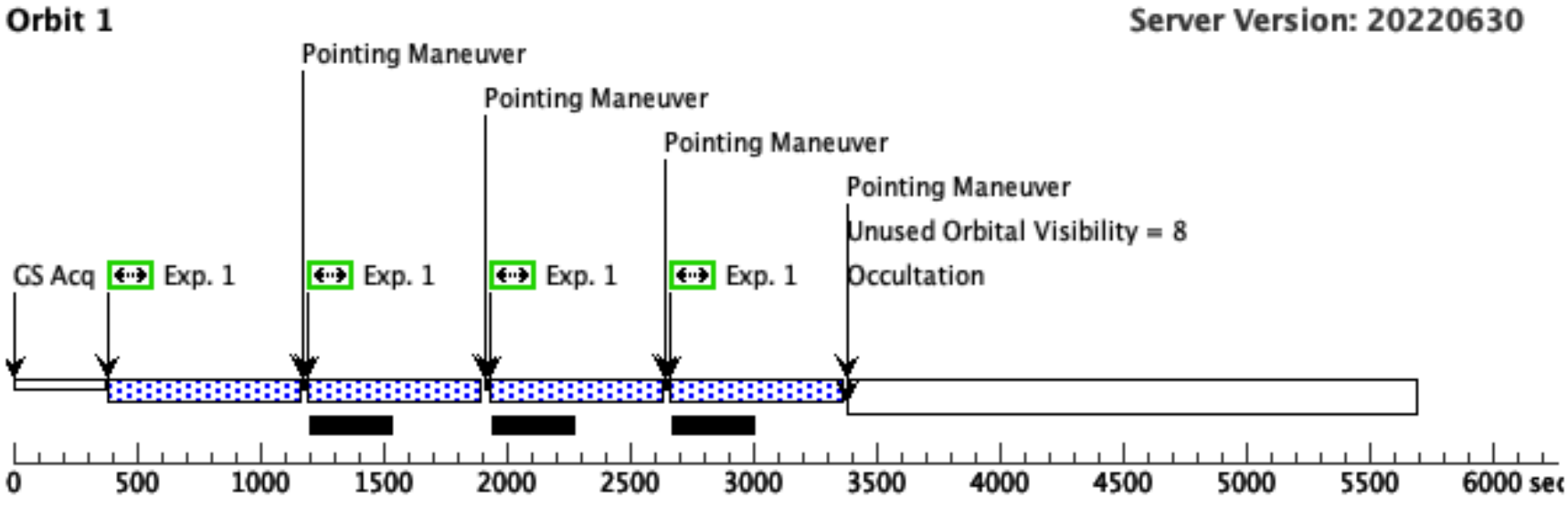
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	CAS-A-NE	RA: 23 23 52.7000 (350.9695833d) Dec: +58 50 55.00 (58.84861d) Equinox: J2000		V=20+/-1	Reference Frame: ICRS

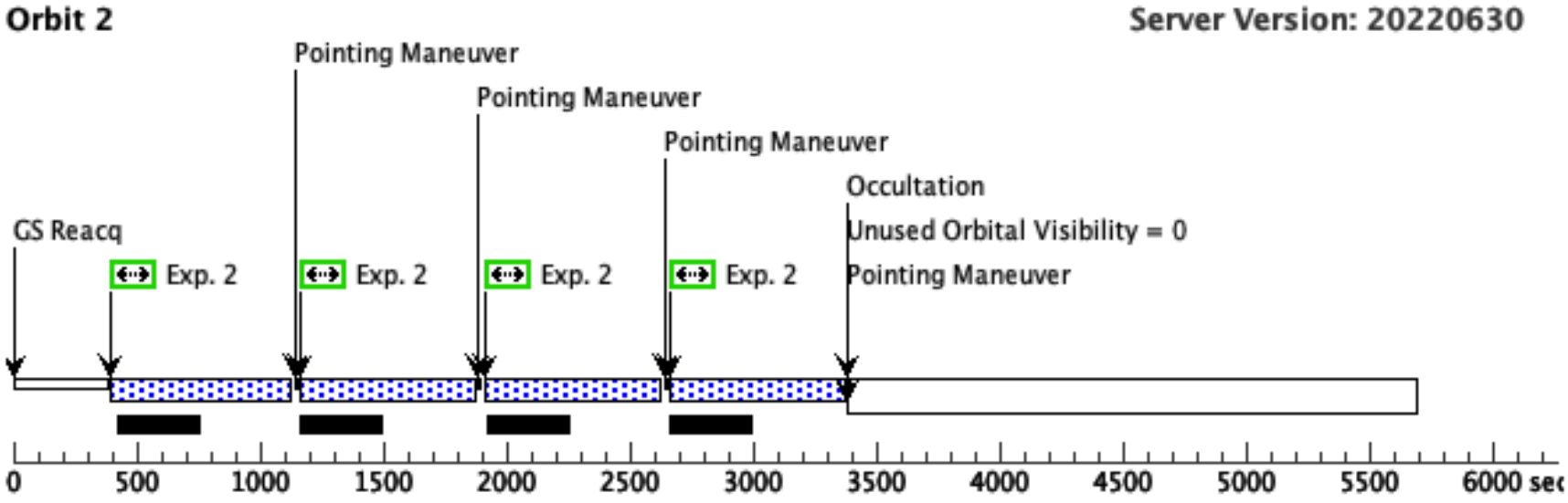
Comments:
Category=ISM
Description=[EJECTA, EMISSION LINE NEBULA, SNR]

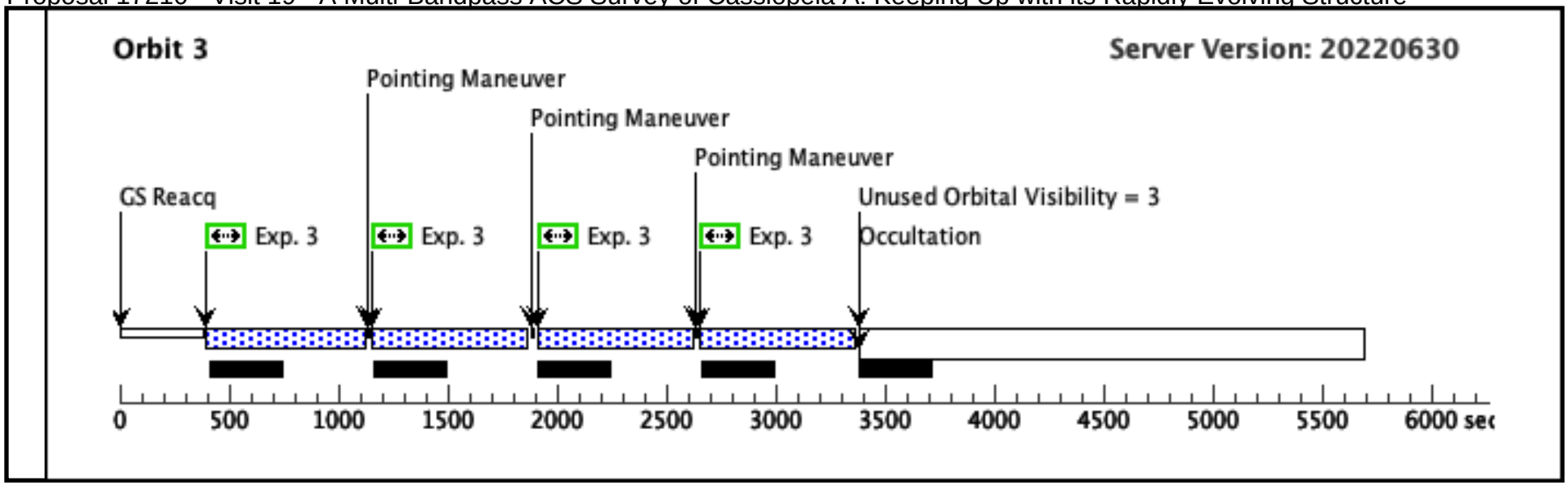
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	NE-F850LP	(2) CAS-A-NE	ACS/WFC, ACCUM, WFCENTER	F850LP			Pattern 1, Exps 1-1 in Visit 19 (1)	575 Secs (2300 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***
2	NE-F625W	(2) CAS-A-NE	ACS/WFC, ACCUM, WFCENTER	F625W			Pattern 1, Exps 2-2 in Visit 19 (1)	590 Secs (2360 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[2]***
3	NE-F775W	(2) CAS-A-NE	ACS/WFC, ACCUM, WFCENTER	F775W			Pattern 1, Exps 3-3 in Visit 19 (1)	590 Secs (2360 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[3]***

Orbit Structure






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

Visit

Proposal 17210, Visit 11, failed Thu May 11 15:01:07 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 84.9D TO 90.1 D; BEFORE 31-DEC-2022:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.364 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.23 Angle Between Sides= Center Pattern=false	(1), (2), (3)

Fixed Targets

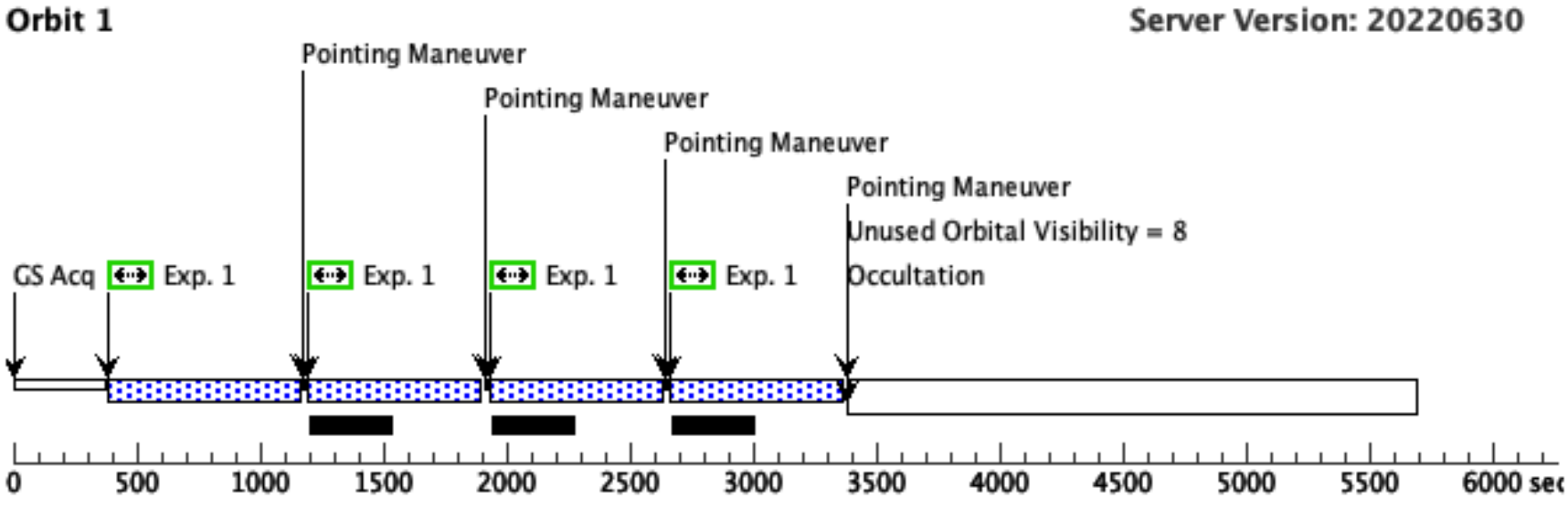
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	CAS-A-NE	RA: 23 23 52.7000 (350.9695833d) Dec: +58 50 55.00 (58.84861d) Equinox: J2000		V=20+/-1	Reference Frame: ICRS

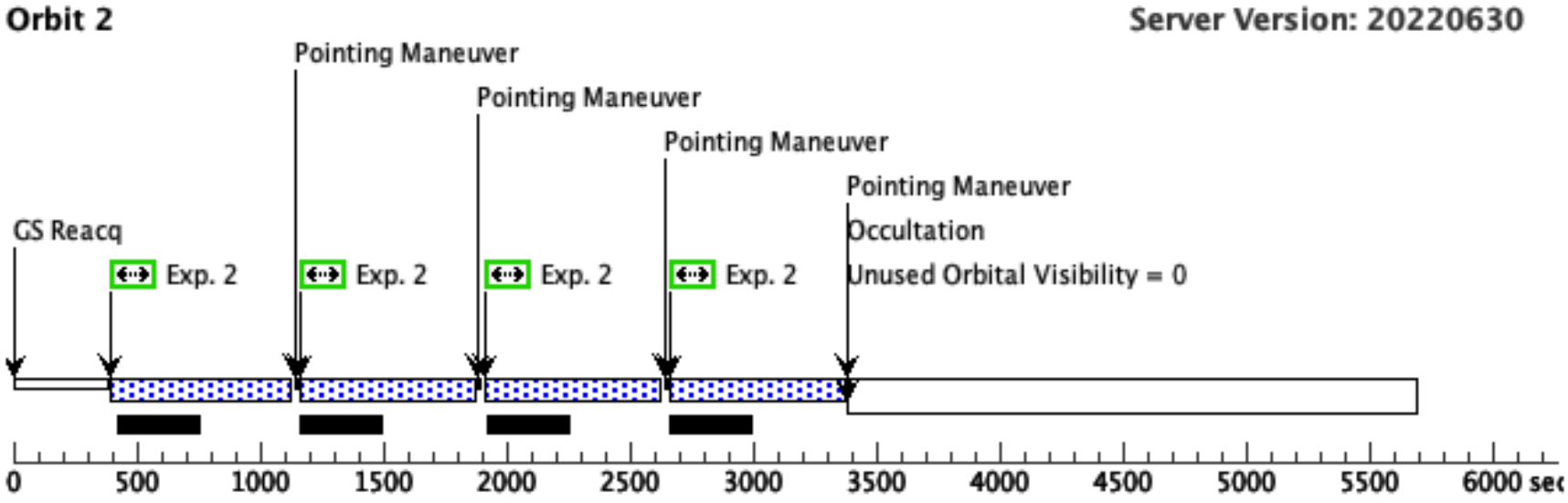
Comments:
Category=ISM
Description=[EJECTA, EMISSION LINE NEBULA, SNR]

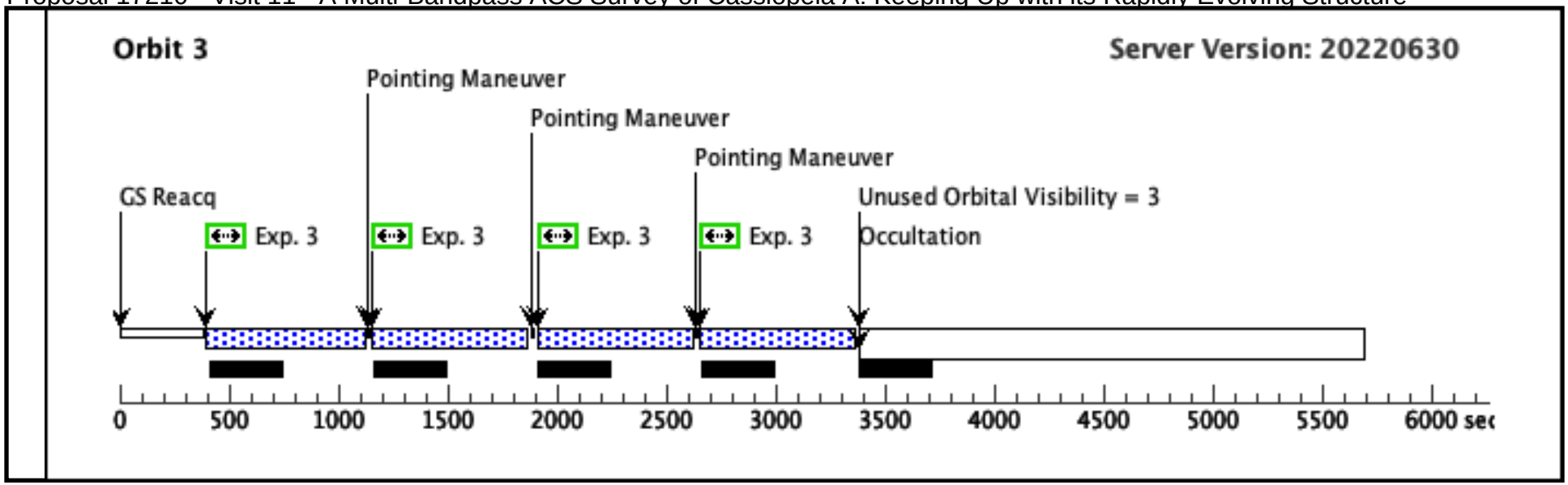
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	NE-F850LP	(2) CAS-A-NE	ACS/WFC, ACCUM, WFCENTER	F850LP			Pattern 1, Exps 1-1 in Visit 11 (1)	575 Secs (2300 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***
2	NE-F625W	(2) CAS-A-NE	ACS/WFC, ACCUM, WFCENTER	F625W			Pattern 1, Exps 2-2 in Visit 11 (1)	590 Secs (2360 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[2]***
3	NE-F775W	(2) CAS-A-NE	ACS/WFC, ACCUM, WFCENTER	F775W			Pattern 1, Exps 3-3 in Visit 11 (1)	590 Secs (2360 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[3]***

Orbit Structure






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

Visit

Proposal 17210, Visit 12, completed Thu May 11 15:01:07 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 84.9D TO 90.1 D; BEFORE 31-DEC-2022:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.364 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.23 Angle Between Sides= Center Pattern=false	(1), (2), (3)

Fixed Targets

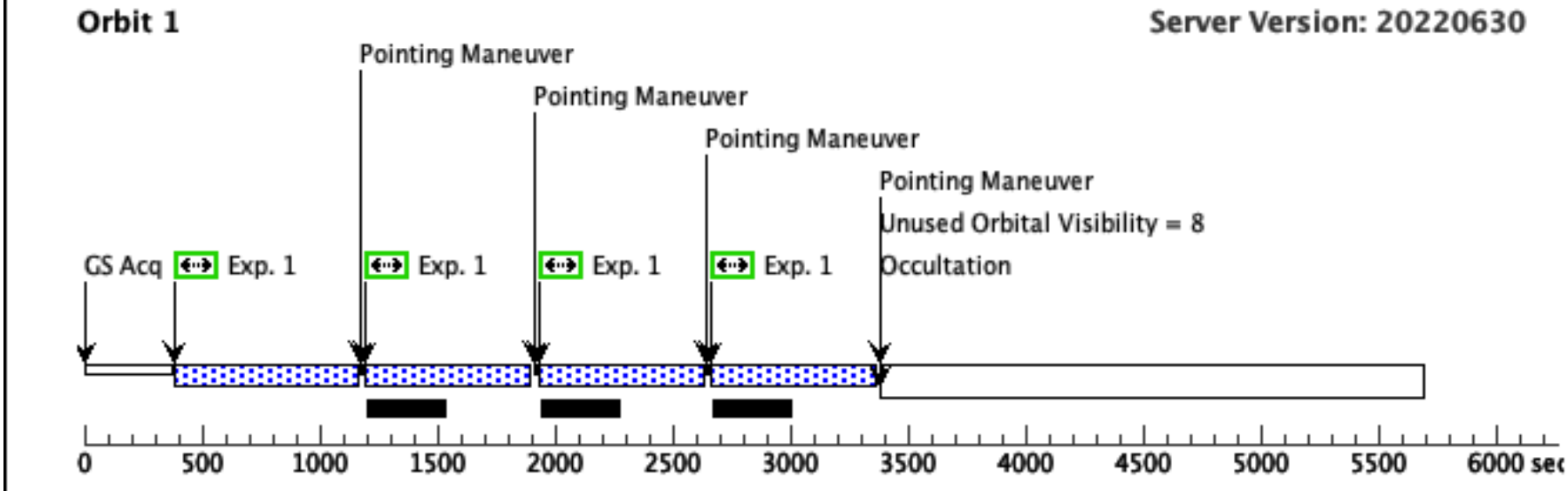
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	CAS-A-SE	RA: 23 23 51.5000 (350.9645833d) Dec: +58 47 45.00 (58.79583d) Equinox: J2000		V=20+/-1	Reference Frame: ICRS

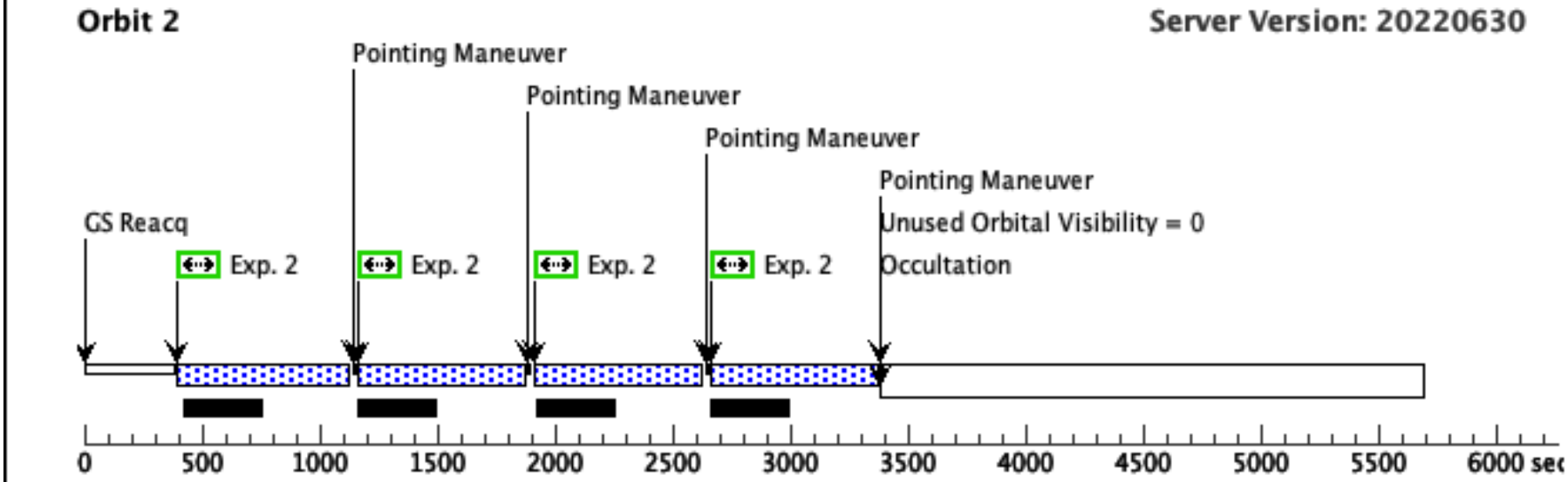
Comments:
Category=ISM
Description=[EJECTA, EMISSION LINE NEBULA, SNR]

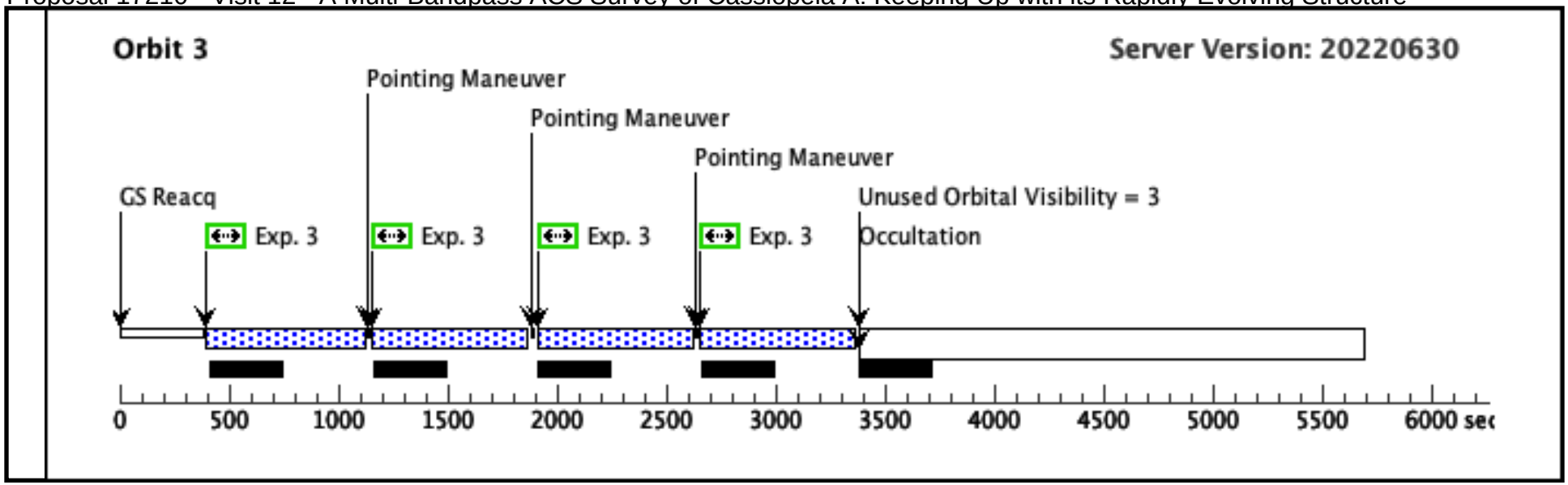
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	SE-F850LP	(5) CAS-A-SE	ACS/WFC, ACCUM, WFCENTER	F850LP			Pattern 1, Exps 1-1 in Visit 12 (1)	575 Secs (2300 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***
2	SE-F625W	(5) CAS-A-SE	ACS/WFC, ACCUM, WFCENTER	F625W			Pattern 1, Exps 2-2 in Visit 12 (1)	590 Secs (2360 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[2]***
3	SE-F775W	(5) CAS-A-SE	ACS/WFC, ACCUM, WFCENTER	F775W			Pattern 1, Exps 3-3 in Visit 12 (1)	590 Secs (2360 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[3]***

Orbit Structure






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

Visit

Proposal 17210, Visit 20, scheduling Thu May 11 15:01:07 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 269.0D TO 271.2 D

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.364 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.23 Angle Between Sides= Center Pattern=false	(1)

Fixed Targets

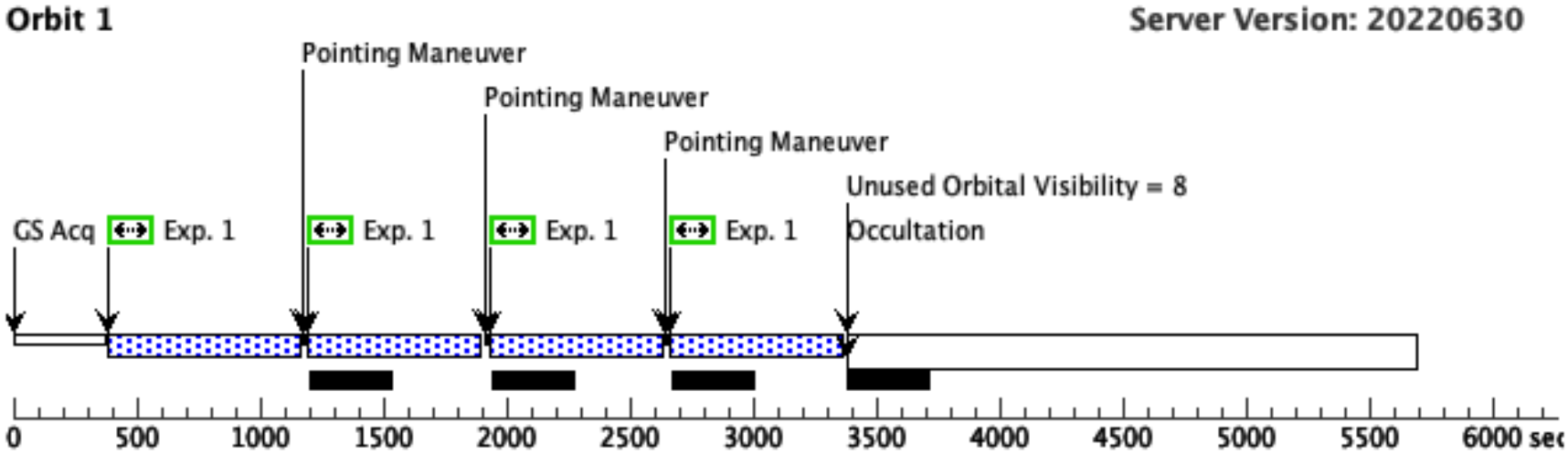
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	CAS-A-N-CENTER	RA: 23 23 30.9000 (350.8787500d) Dec: +58 50 45.00 (58.84583d) Equinox: J2000		V=20+/-1	Reference Frame: ICRS

Comments:
Category=ISM
Description=[EJECTA, EMISSION LINE NEBULA, SNR]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	NCENTER-F625W	(1) CAS-A-N-CENTER	ACS/WFC, ACCUM, WFCENTER	F625W			Pattern 1, Exps 1-1 in Visit 20 (1)	575 Secs (2300 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***

Orbit Structure



Visit

Proposal 17210, Visit 13, completed Thu May 11 15:01:07 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 84.9D TO 90.1 D; BEFORE 31-DEC-2022:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.364 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.23 Angle Between Sides= Center Pattern=false	(1), (2), (3)

Fixed Targets

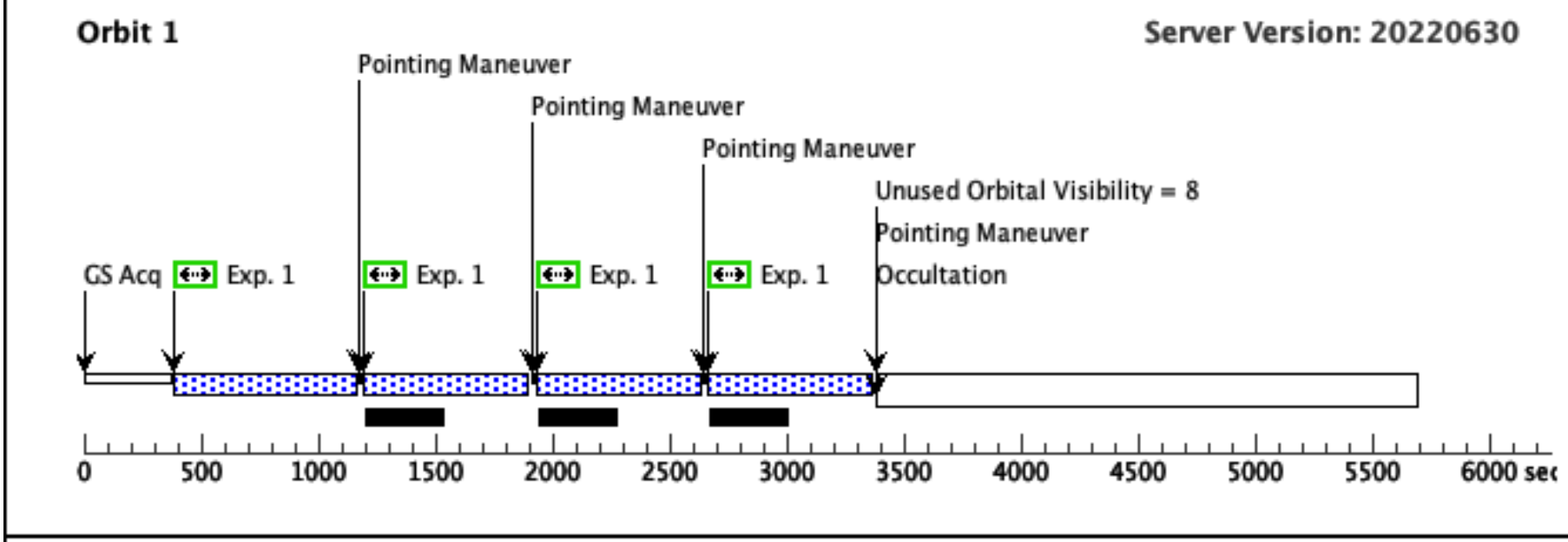
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	CAS-A-N-CENTER	RA: 23 23 30.9000 (350.8787500d) Dec: +58 50 45.00 (58.84583d) Equinox: J2000		V=20+/-1	Reference Frame: ICRS

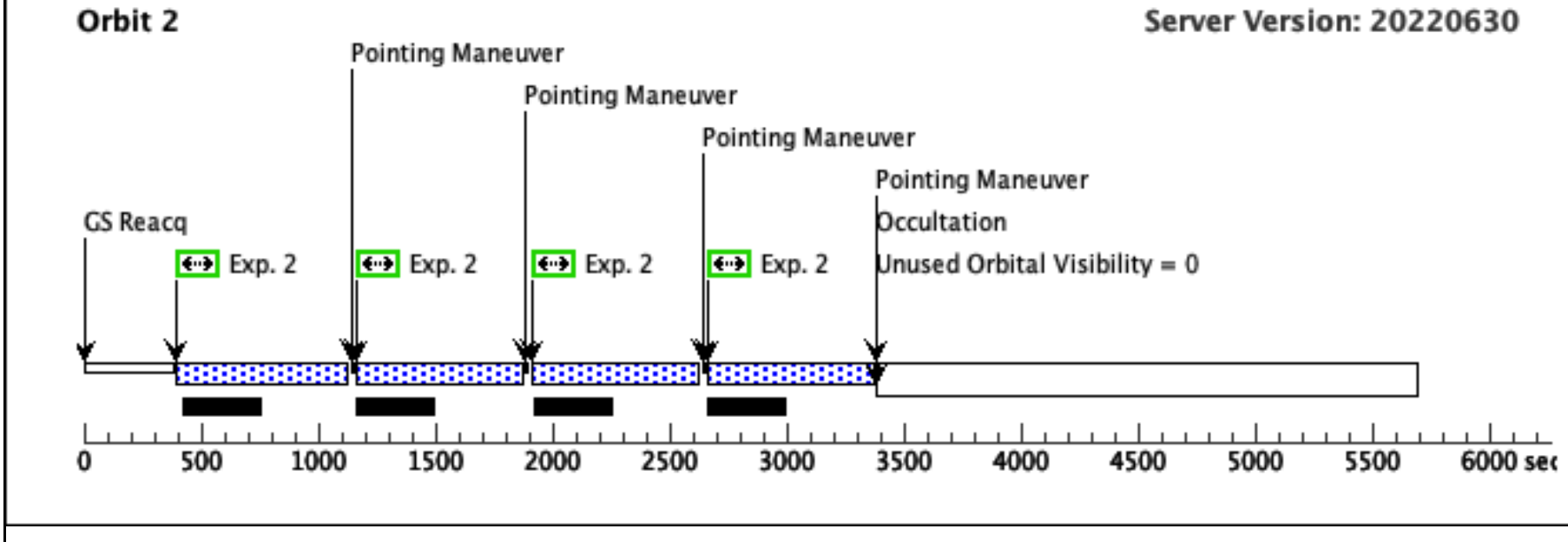
Comments:
Category=ISM
Description=[EJECTA, EMISSION LINE NEBULA, SNR]

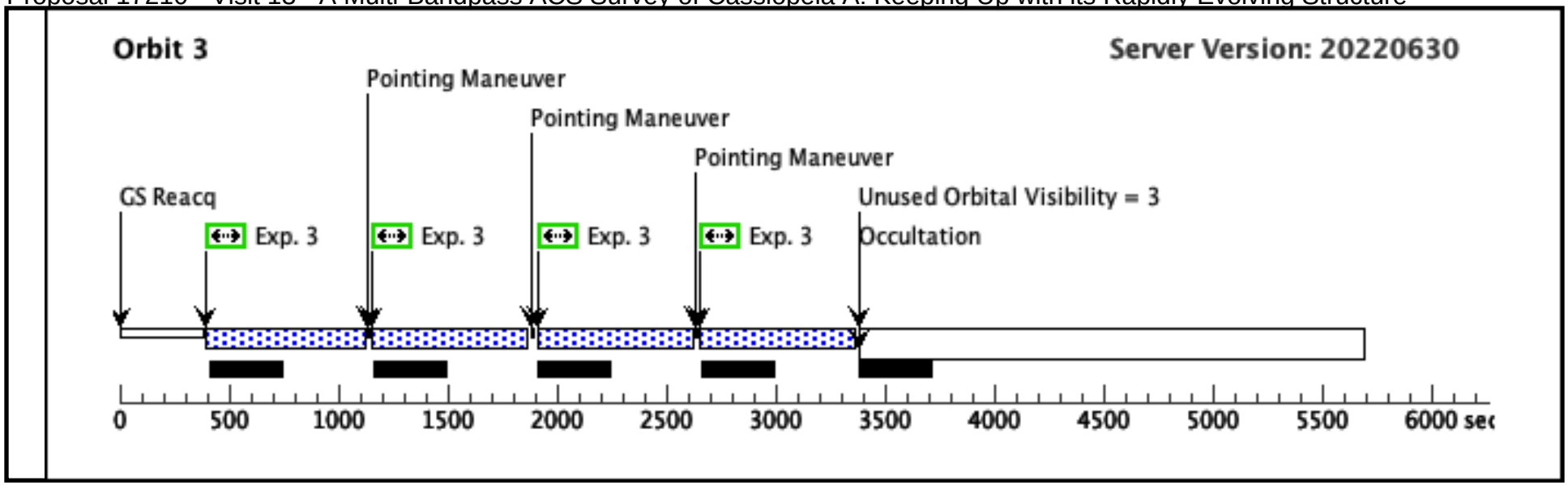
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	NCENTER-F850LP	(1) CAS-A-N-CENTER	ACS/WFC, ACCUM, WFCENTER	F850LP			Pattern 1, Exps 1-1 in Visit 13 (1)	575 Secs (2300 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***
2	NCENTER-F625W	(1) CAS-A-N-CENTER	ACS/WFC, ACCUM, WFCENTER	F625W			Pattern 1, Exps 2-2 in Visit 13 (1)	590 Secs (2360 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[2]***
3	NCENTER-F775W	(1) CAS-A-N-CENTER	ACS/WFC, ACCUM, WFCENTER	F775W			Pattern 1, Exps 3-3 in Visit 13 (1)	590 Secs (2360 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[3]***

Orbit Structure






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

Visit

Proposal 17210, Visit 14, completed Thu May 11 15:01:08 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 84.9D TO 90.1 D; BEFORE 31-DEC-2022:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.364 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.23 Angle Between Sides= Center Pattern=false	(1), (2), (3)

Fixed Targets

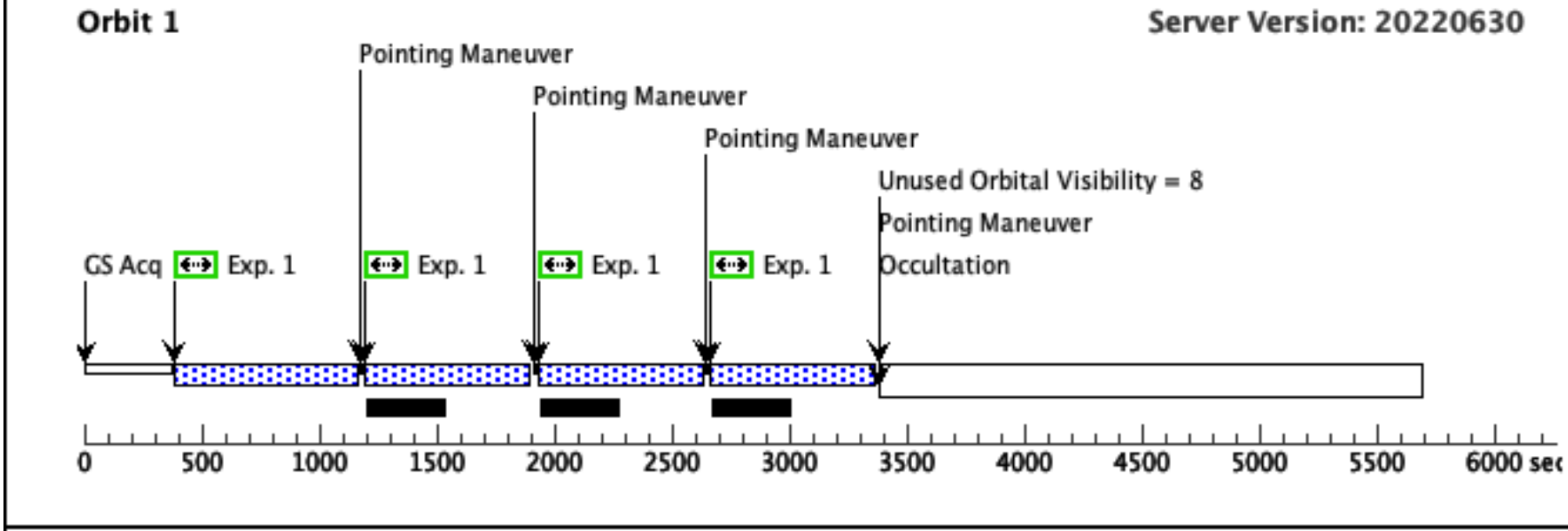
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	CAS-A-S-CENTER	RA: 23 23 28.3000 (350.8679167d) Dec: +58 47 30.00 (58.79167d) Equinox: J2000		V=20+/-1	Reference Frame: ICRS

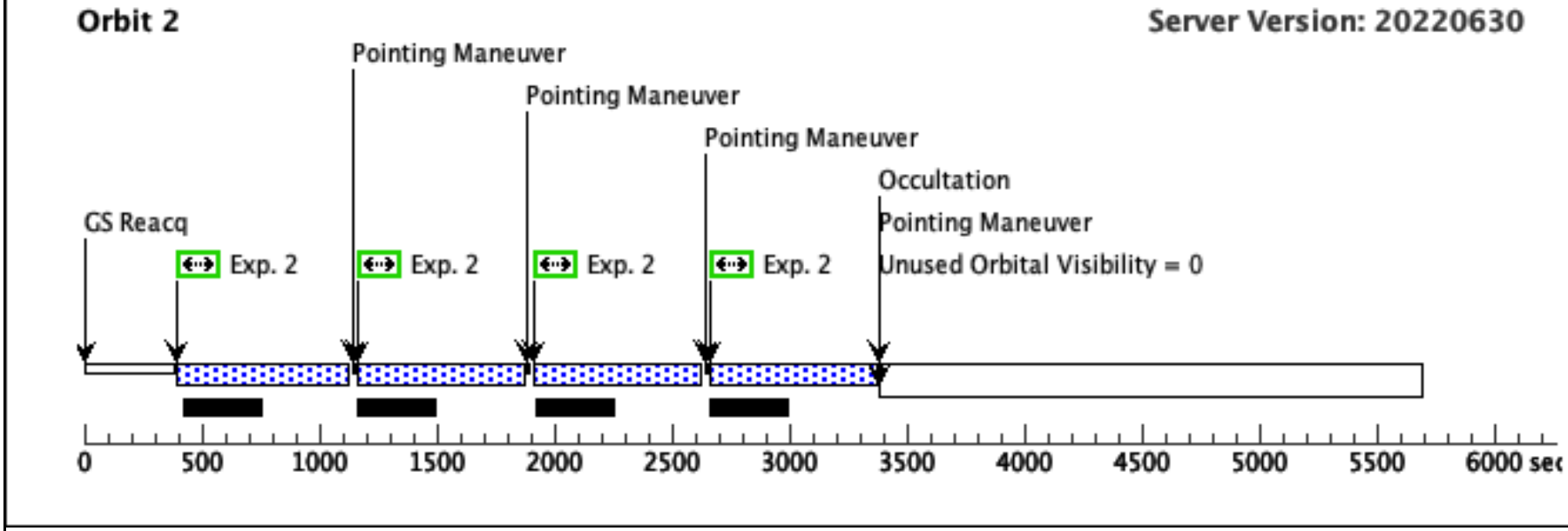
Comments:
Category=ISM
Description=[EJECTA, EMISSION LINE NEBULA, SNR]

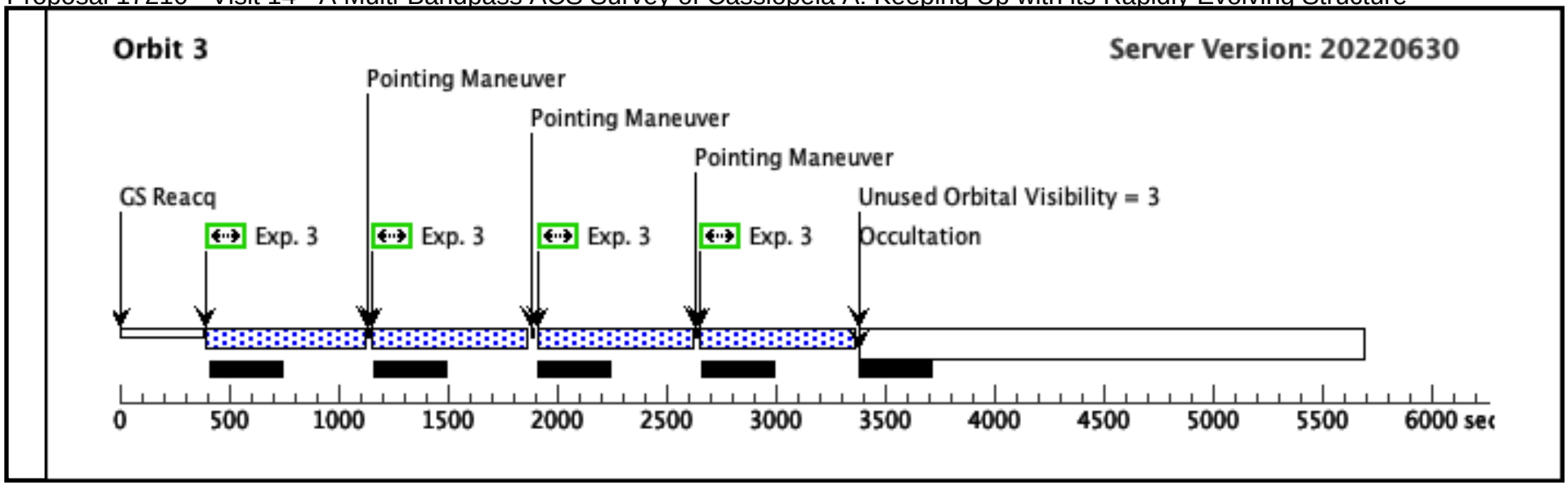
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	SCENTER-F850LP	(4) CAS-A-S-CENTER	ACS/WFC, ACCUM, WFCENTER	F850LP			Pattern 1, Exps 1-1 in Visit 14 (1)	575 Secs (2300 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***
2	SCENTER-F625W	(4) CAS-A-S-CENTER	ACS/WFC, ACCUM, WFCENTER	F625W			Pattern 1, Exps 2-2 in Visit 14 (1)	590 Secs (2360 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[2]***
3	SCENTER-F775W	(4) CAS-A-S-CENTER	ACS/WFC, ACCUM, WFCENTER	F775W			Pattern 1, Exps 3-3 in Visit 14 (1)	590 Secs (2360 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[3]***

Orbit Structure






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

Visit

Proposal 17210, Visit 15, completed Thu May 11 15:01:08 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 84.9D TO 90.1 D; BEFORE 31-DEC-2022:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.364 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.23 Angle Between Sides= Center Pattern=false	(1), (2), (3)

Fixed Targets

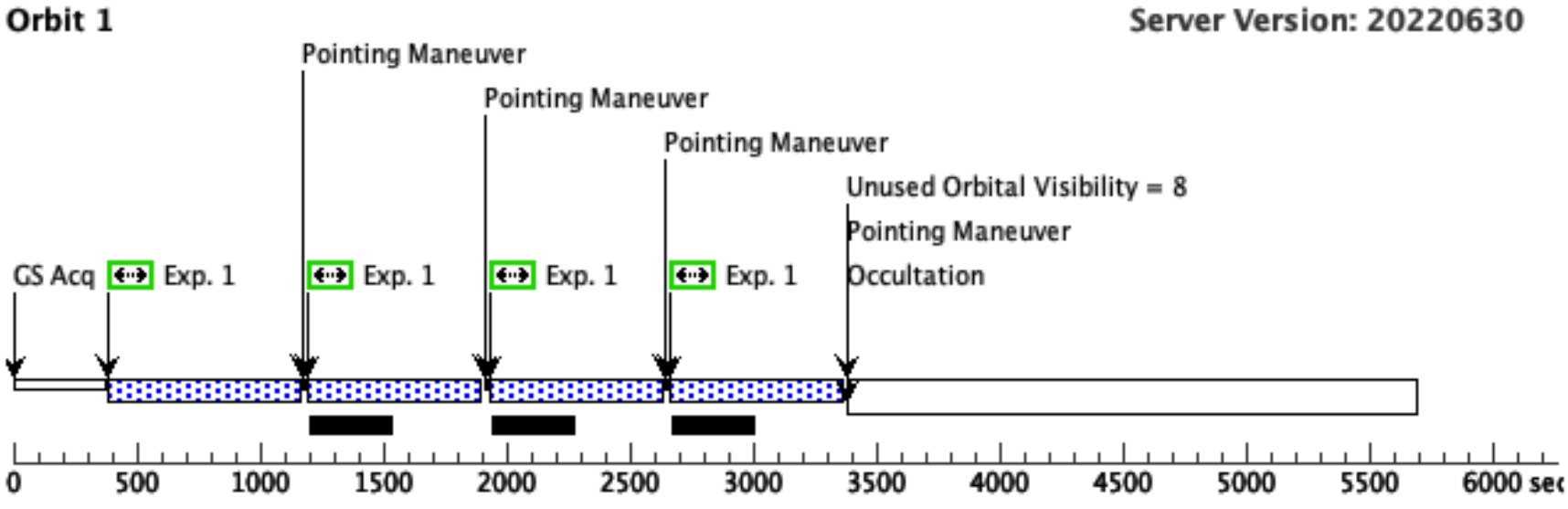
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	CAS-A-NW	RA: 23 23 7.5000 (350.7812500d) Dec: +58 50 22.00 (58.83944d) Equinox: J2000		V=20+/-1	Reference Frame: ICRS

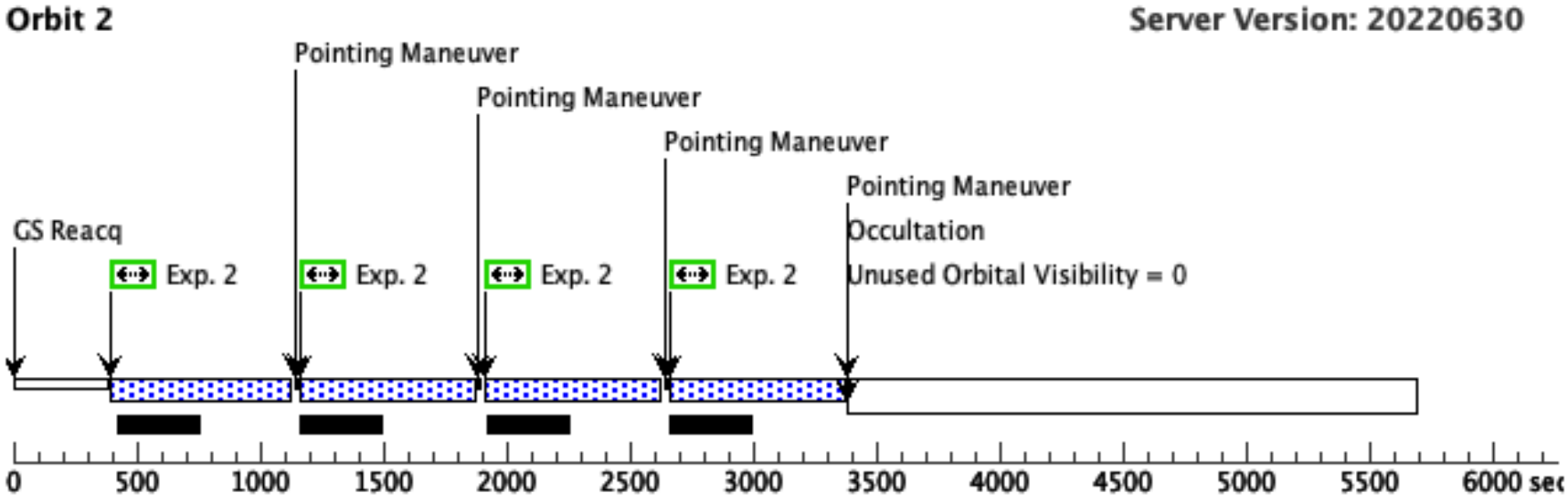
Comments:
Category=ISM
Description=[EJECTA, EMISSION LINE NEBULA, SNR]

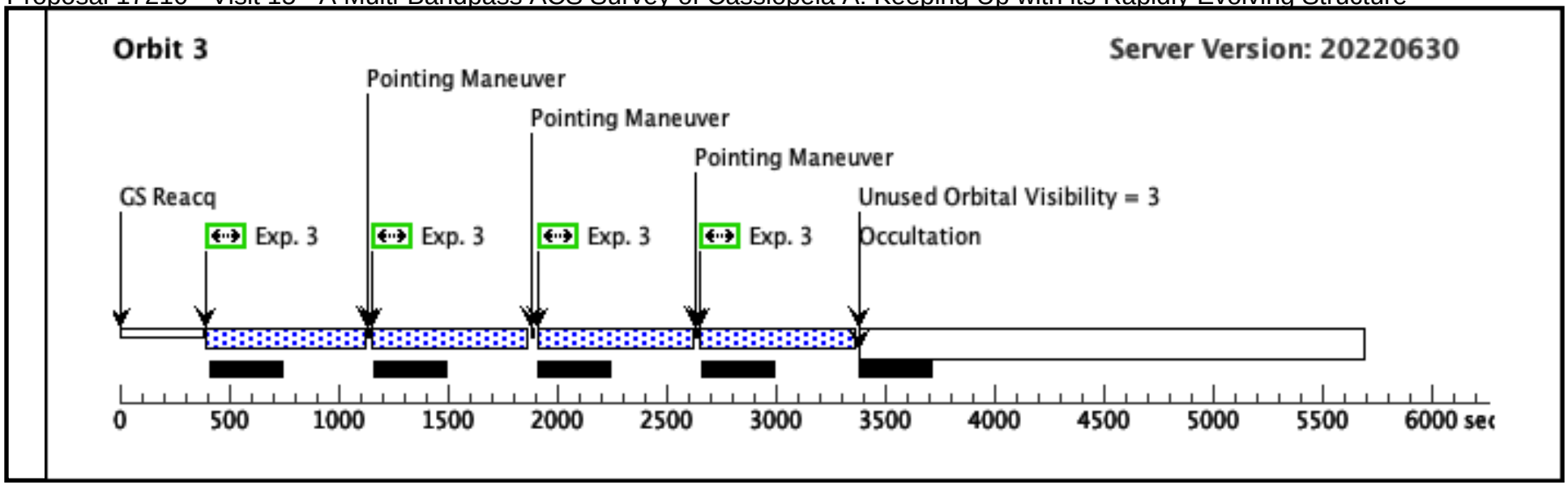
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	NW-F850LP	(3) CAS-A-NW	ACS/WFC, ACCUM, WFCENTER	F850LP			Pattern 1, Exps 1-1 in Visit 15 (1)	575 Secs (2300 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***
2	NW-F625W	(3) CAS-A-NW	ACS/WFC, ACCUM, WFCENTER	F625W			Pattern 1, Exps 2-2 in Visit 15 (1)	590 Secs (2360 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[2]***
3	NW-F775W	(3) CAS-A-NW	ACS/WFC, ACCUM, WFCENTER	F775W			Pattern 1, Exps 3-3 in Visit 15 (1)	590 Secs (2360 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[3]***

Orbit Structure






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

Visit

Proposal 17210, Visit 16, failed Thu May 11 15:01:08 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 84.9D TO 90.1 D; BEFORE 31-DEC-2022:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.364 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.23 Angle Between Sides= Center Pattern=false	(1), (2), (3)

Fixed Targets

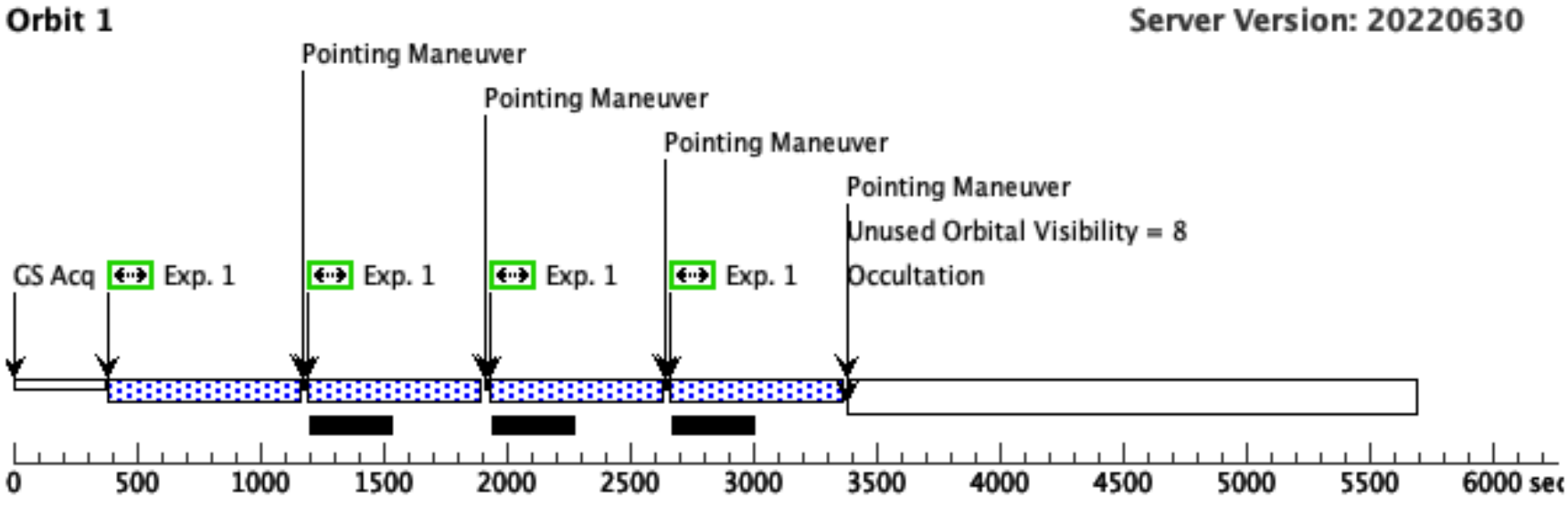
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	CAS-A-SW	RA: 23 23 6.0000 (350.7750000d) Dec: +58 47 20.00 (58.78889d) Equinox: J2000		V=20+/-1	Reference Frame: ICRS

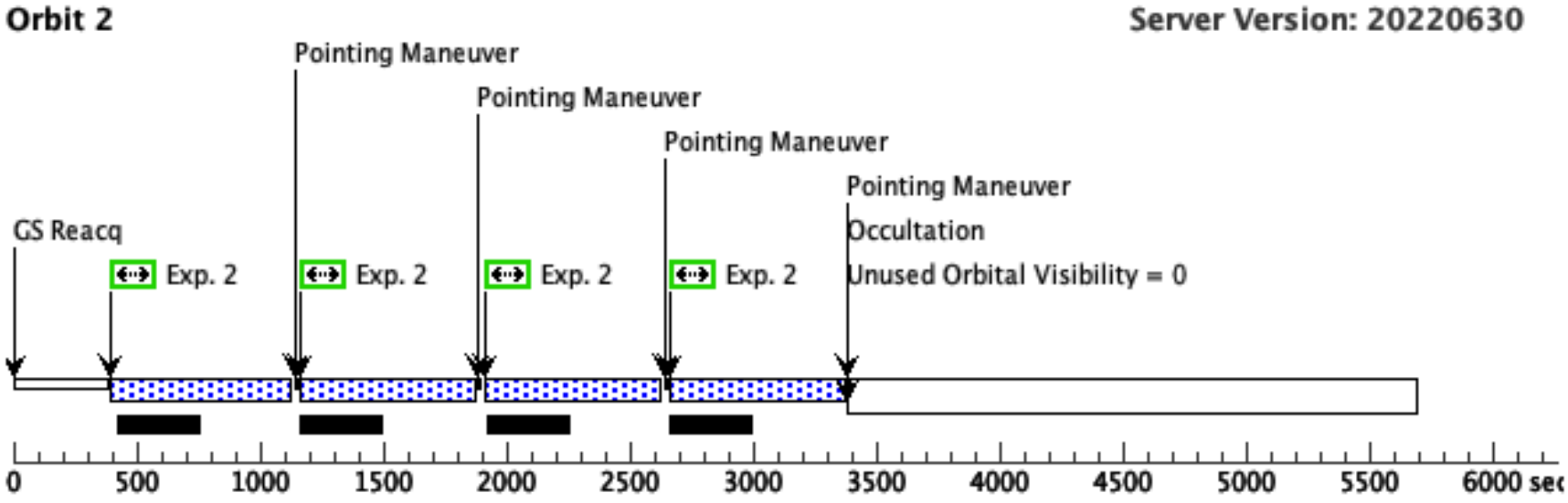
Comments:
Category=ISM
Description=[EJECTA, EMISSION LINE NEBULA, SNR]

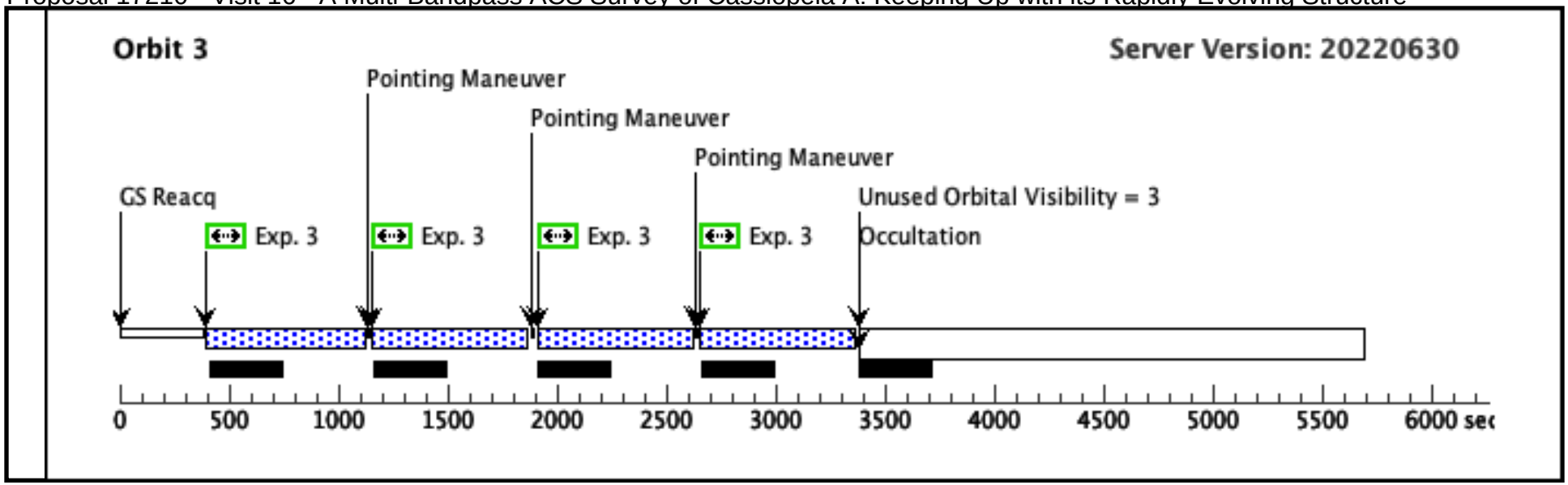
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	SW-F850LP	(6) CAS-A-SW	ACS/WFC, ACCUM, WFCENTER	F850LP			Pattern 1, Exps 1-1 in Visit 16 (1)	575 Secs (2300 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***
2	SW-F625W	(6) CAS-A-SW	ACS/WFC, ACCUM, WFCENTER	F625W			Pattern 1, Exps 2-2 in Visit 16 (1)	590 Secs (2360 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[2]***
3	SW-F775W	(6) CAS-A-SW	ACS/WFC, ACCUM, WFCENTER	F775W			Pattern 1, Exps 3-3 in Visit 16 (1)	590 Secs (2360 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[3]***

Orbit Structure






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

Visit

Proposal 17210, Visit 21, scheduling Thu May 11 15:01:08 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 269.0D TO 271.2 D

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.364 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.23 Angle Between Sides= Center Pattern=false	(1), (2)

Fixed Targets

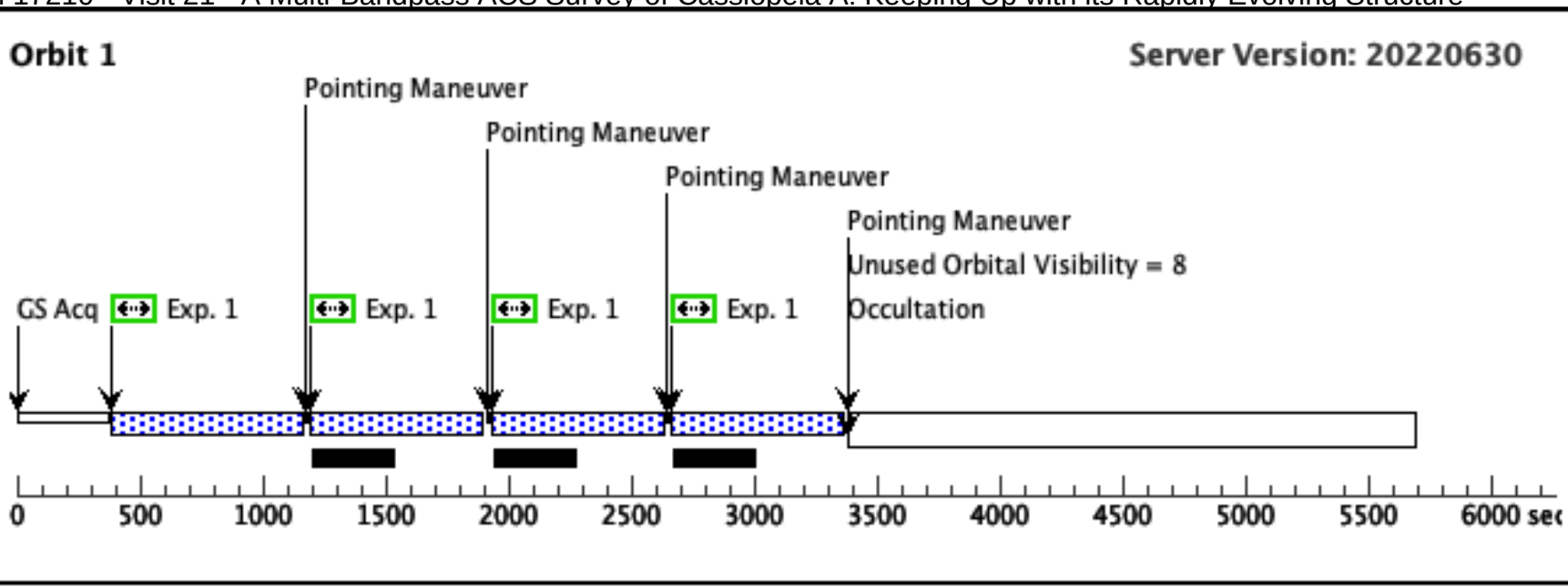
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	CAS-A-SW	RA: 23 23 6.0000 (350.7750000d) Dec: +58 47 20.00 (58.78889d) Equinox: J2000		V=20+/-1	Reference Frame: ICRS

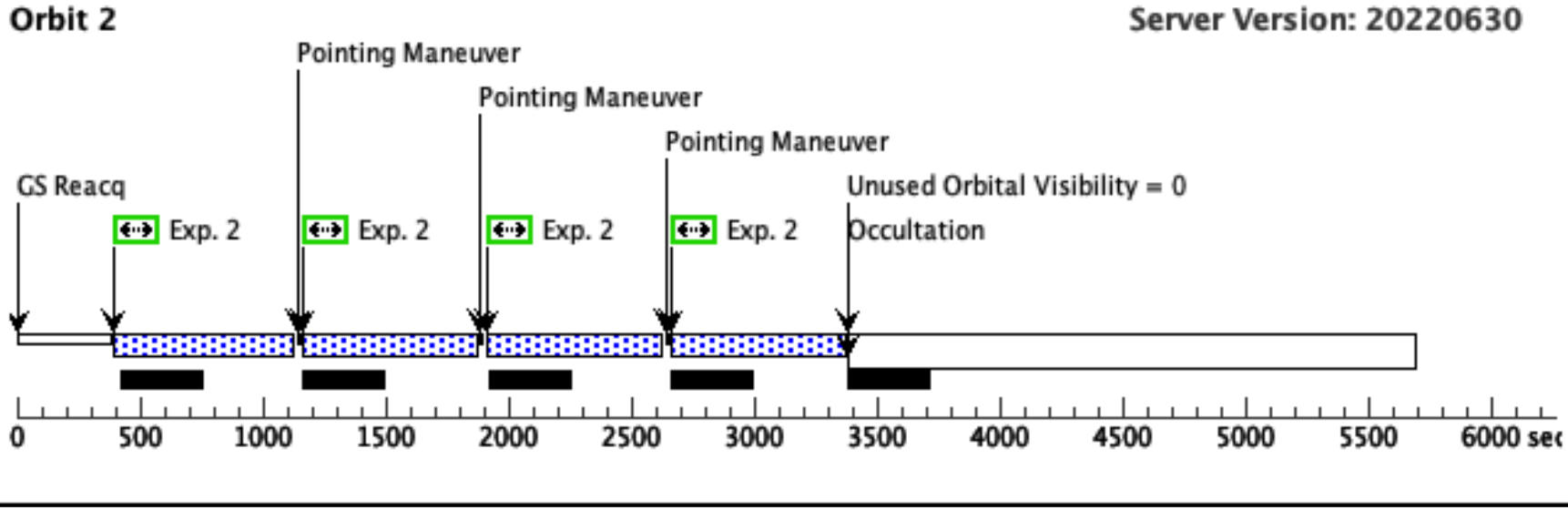
Comments:
Category=ISM
Description=[EJECTA, EMISSION LINE NEBULA, SNR]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	SW-F850LP	(6) CAS-A-SW	ACS/WFC, ACCUM, WFCENTER	F850LP			Pattern 1, Exps 1-1 in Visit 21 (1)	575 Secs (2300 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***
2	SW-F625W	(6) CAS-A-SW	ACS/WFC, ACCUM, WFCENTER	F625W			Pattern 1, Exps 2-2 in Visit 21 (1)	590 Secs (2360 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[2]***

Orbit Structure





Visit

Proposal 17210, Visit 17, failed

Thu May 11 15:01:08 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 84.9D TO 90.1 D; BEFORE 31-DEC-2022:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.364 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.23 Angle Between Sides= Center Pattern=false	(1), (2), (3)

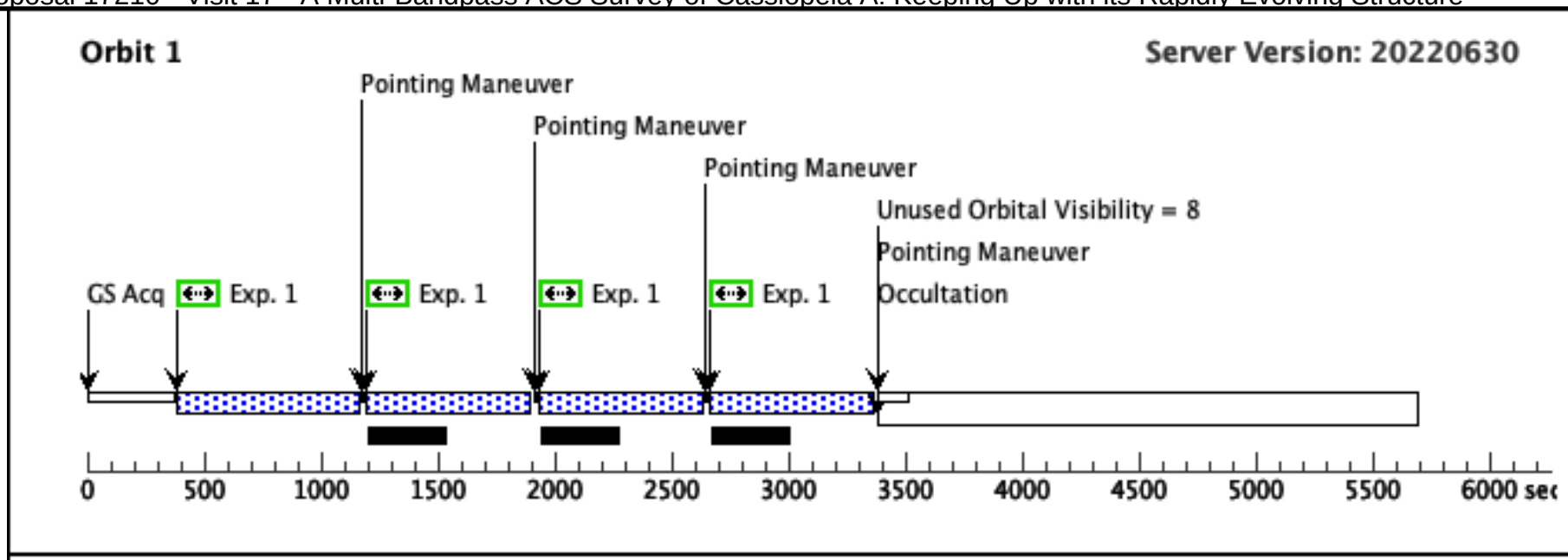
Fixed Targets

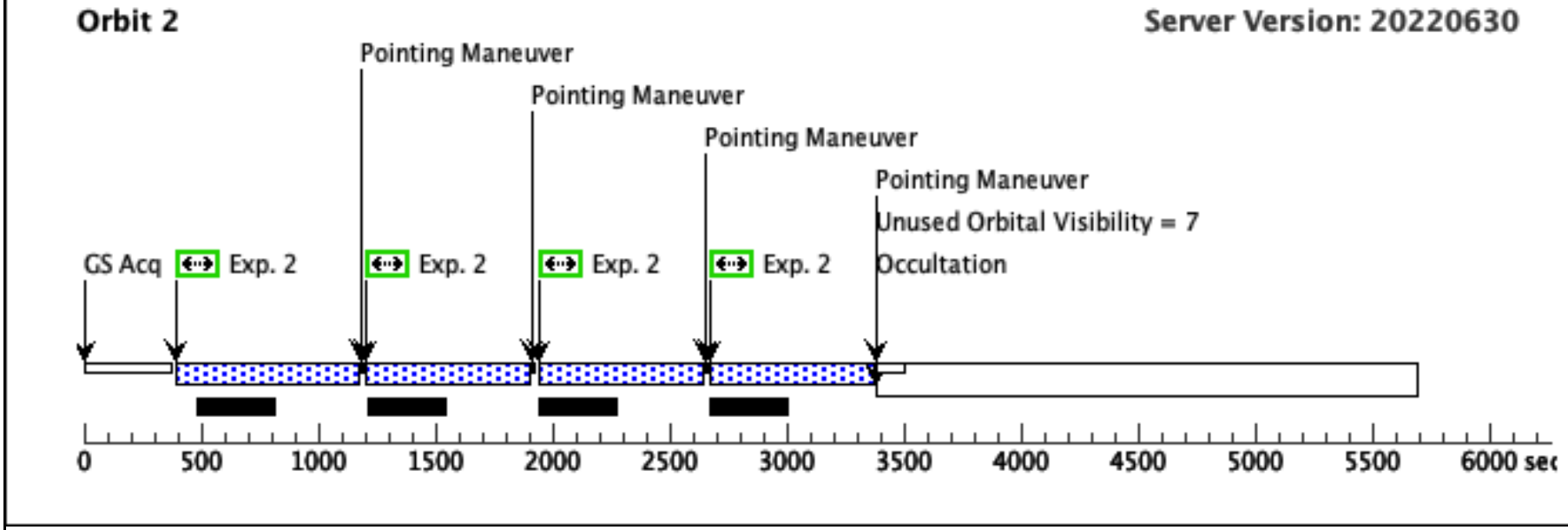
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	CAS-A-NE	RA: 23 23 52.7000 (350.9695833d) Dec: +58 50 55.00 (58.84861d) Equinox: J2000		V=20+/-1	Reference Frame: ICRS
Comments: *Category=ISM* *Description=[EJECTA, EMISSION LINE NEBULA, SNR]*					
(4)	CAS-A-S-CENTER	RA: 23 23 28.3000 (350.8679167d) Dec: +58 47 30.00 (58.79167d) Equinox: J2000		V=20+/-1	Reference Frame: ICRS
Comments: *Category=ISM* *Description=[EJECTA, EMISSION LINE NEBULA, SNR]*					
(5)	CAS-A-SE	RA: 23 23 51.5000 (350.9645833d) Dec: +58 47 45.00 (58.79583d) Equinox: J2000		V=20+/-1	Reference Frame: ICRS
Comments: *Category=ISM* *Description=[EJECTA, EMISSION LINE NEBULA, SNR]*					

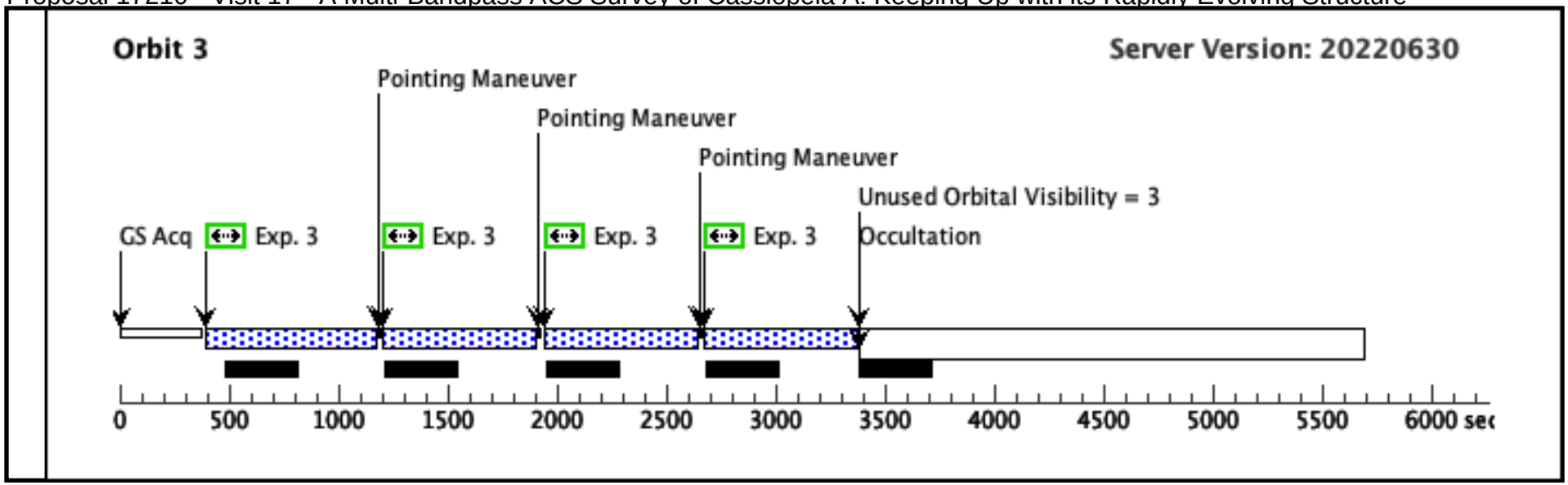
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	NE-F475W	(2) CAS-A-NE	ACS/WFC, ACCUM, WFCENTER	F475W			Pattern 1, Exps 1-1 in Visit 17 (1)	575 Secs (2300 Secs)	
								[==>(Pattern 1,1)] *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***
2	SE-F475W	(5) CAS-A-SE	ACS/WFC, ACCUM, WFCENTER	F475W			Pattern 1, Exps 2-2 in Visit 17 (1)	573 Secs (2292 Secs)	
								[==>(Pattern 1,1)] *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[2]***
3	SCENTER-F475W	(4) CAS-A-S-CENTER	ACS/WFC, ACCUM, WFCENTER	F475W			Pattern 1, Exps 3-3 in Visit 17 (1)	574 Secs (2296 Secs)	
								[==>(Pattern 1,1)] *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[3]***

Orbit Structure






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

Visit

Proposal 17210, Visit 18, completed Thu May 11 15:01:08 GMT 2023

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 84.9D TO 90.1 D; BEFORE 31-DEC-2022:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.364 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.23 Angle Between Sides= Center Pattern=false	(1), (2), (3)

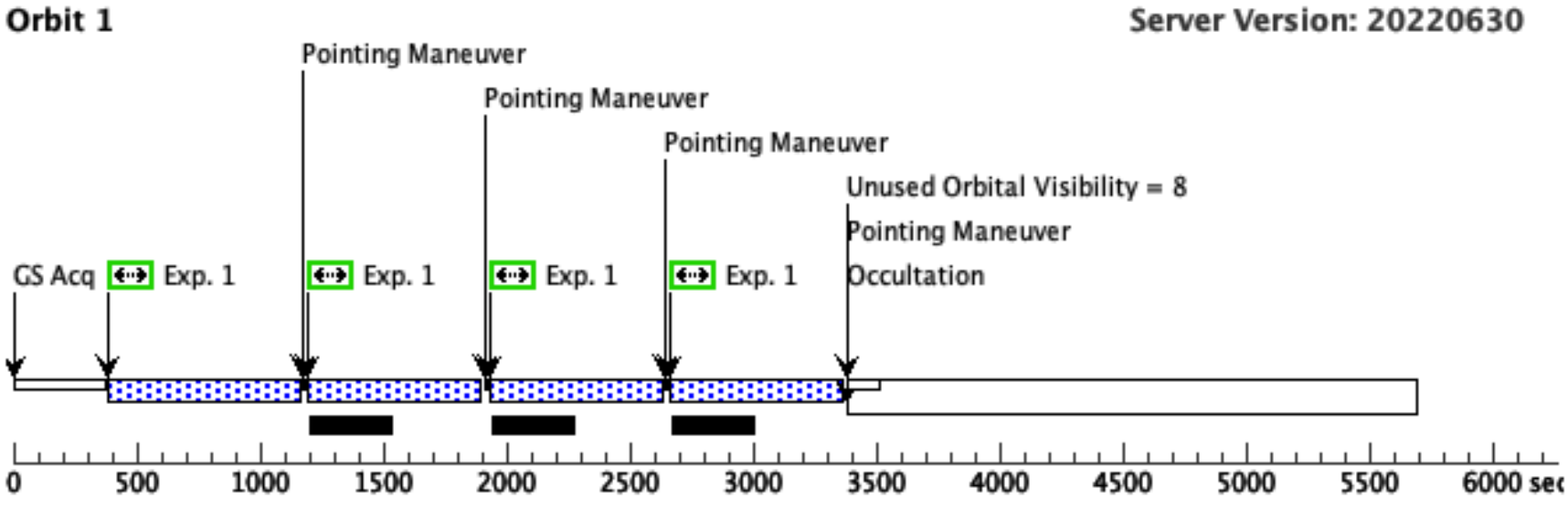
Fixed Targets

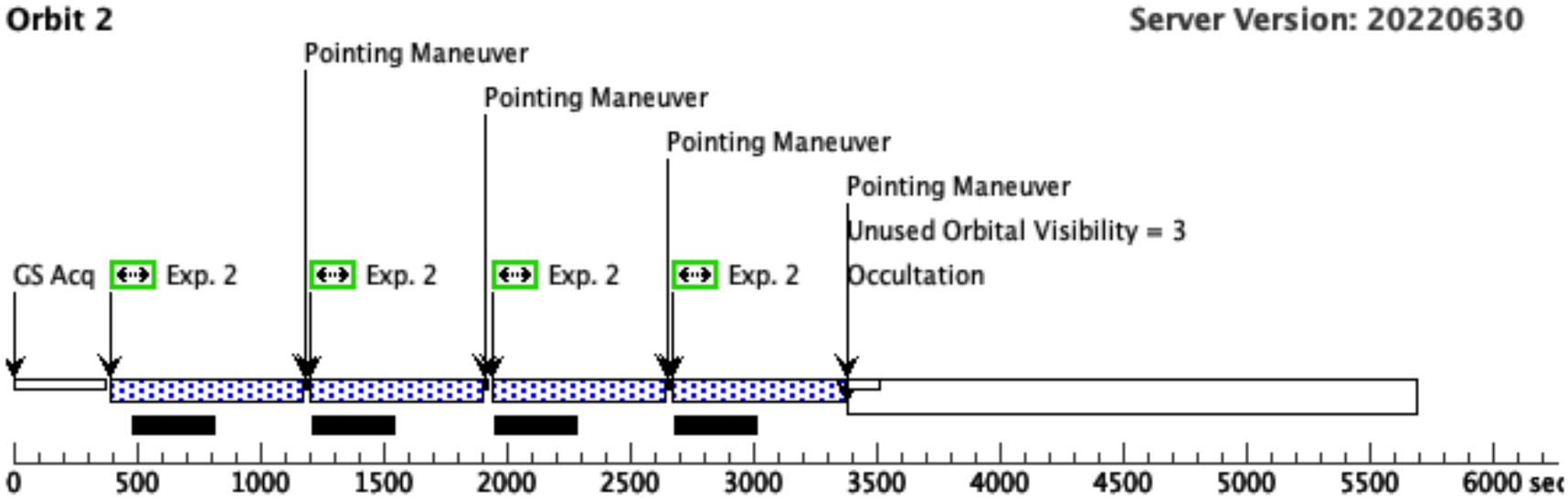
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	CAS-A-N-CENTER	RA: 23 23 30.9000 (350.8787500d) Dec: +58 50 45.00 (58.84583d) Equinox: J2000		V=20+/-1	Reference Frame: ICRS
Comments: *Category=ISM* *Description=[EJECTA, EMISSION LINE NEBULA, SNR]*					
(3)	CAS-A-NW	RA: 23 23 7.5000 (350.7812500d) Dec: +58 50 22.00 (58.83944d) Equinox: J2000		V=20+/-1	Reference Frame: ICRS
Comments: *Category=ISM* *Description=[EJECTA, EMISSION LINE NEBULA, SNR]*					
(6)	CAS-A-SW	RA: 23 23 6.0000 (350.7750000d) Dec: +58 47 20.00 (58.78889d) Equinox: J2000		V=20+/-1	Reference Frame: ICRS
Comments: *Category=ISM* *Description=[EJECTA, EMISSION LINE NEBULA, SNR]*					

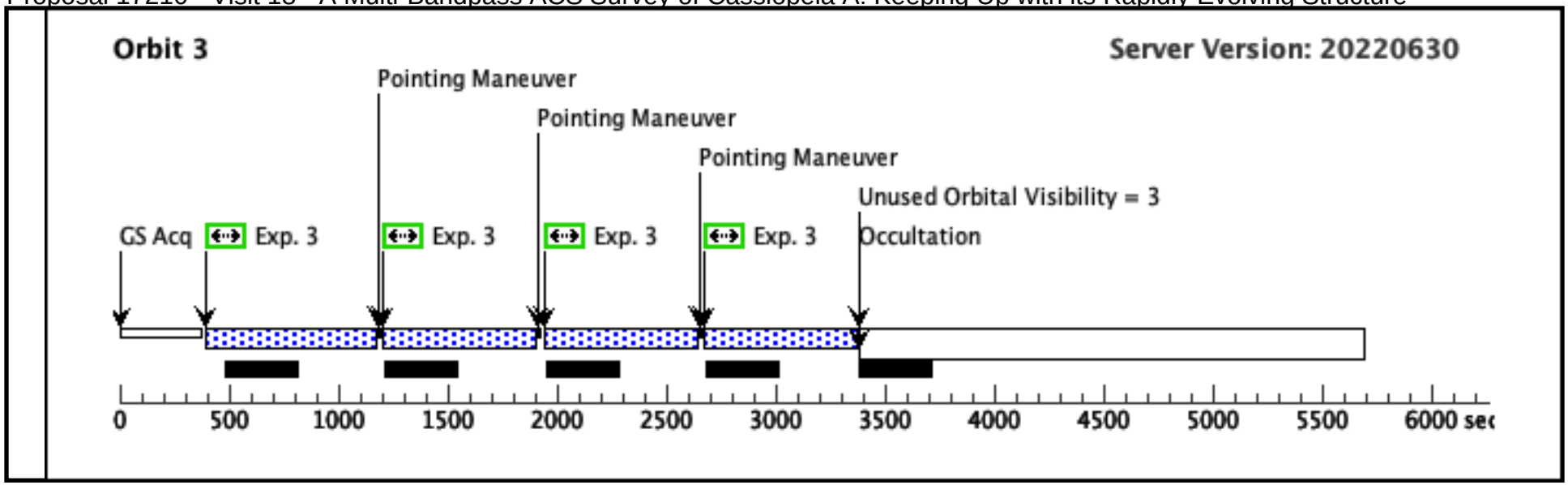
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	NCENTER-F475W	(1) CAS-A-N-CENTER	ACS/WFC, ACCUM, WFCENTER	F475W			Pattern 1, Exps 1-1 in Visit 18 (1)	575 Secs (2300 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***
2	NW-F475W	(3) CAS-A-NW	ACS/WFC, ACCUM, WFCENTER	F475W			Pattern 1, Exps 2-2 in Visit 18 (1)	574 Secs (2296 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[2]***
3	SW-F475W	(6) CAS-A-SW	ACS/WFC, ACCUM, WFCENTER	F475W			Pattern 1, Exps 3-3 in Visit 18 (1)	574 Secs (2296 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[3]***

Orbit Structure






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