17911 - Building the Last Bridge Between the PHAT & PHATTER Surveys and Carbon Star Cosmology

Cycle: 32, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*
Siyang Li (PI) (Contact)	**The Johns Hopkins University**
Dr. Adam Riess (CoI)	The Johns Hopkins University
Dr. Stefano Casertano (CoI)	Space Telescope Science Institute
Dr. Gagandeep Singh Anand (CoI)	Space Telescope Science Institute
Dr. Caroline Huang (CoI)	Smithsonian Institution Astrophysical Observatory
Dr. Wenlong Yuan (CoI)	The Johns Hopkins University

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) M-106	WFC3/IR	2	11-Mar-2025 14:00:11.0	yes
02	(1) M-106	WFC3/IR	2	11-Mar-2025 14:00:12.0	yes
03	(1) M-106	WFC3/IR	2	11-Mar-2025 14:00:13.0	yes
04	(1) M-106	WFC3/IR	2	11-Mar-2025 14:00:14.0	yes

8 Total Orbits Used

ABSTRACT

The Hubble Tension refers to a >5 sigma difference between local and cosmological measurements of the present expansion rate of our universe, the Hubble constant (H0). This tension hints at the possibility of undiscovered physics undermining the canonical standard model of our universe.

Probing the Hubble Tension necessitates intense scrutiny of the Cepheid-based distance ladder, which currently provides the strongest constraints on direct H0 measurements. Possibly the most powerful approach to test systematics in the Cepheid-based steps of the distance ladder is to develop and use independent standard candles to measure distances to galaxies. To date, agreement with another candle, the tip of the red giant branch (TRGB), has been elusive. The J-region Asymptotic Giant Branch (JAGB) is a new standard candle that can provide independent relative distances between nearby systems, as well as crosscheck Cepheid systematics at > 30 Mpc. The Panchromatic Hubble Andromeda Treasury (PHAT) and PHAT Triangulum Extended Region (PHATTER) were HST multi-cycle programs that mapped a third of the star forming disk in M31 and central ~0.1 deg2 region of M33 and are unequivocally the best testing grounds for characterizing and standardizing the JAGB via cross calibration with other standard candles. However, there currently exists no F110W observations of the outer disk in NGC 4258 that can be used to measure JAGB distances with PHAT & PHATTER. We propose to fill in this gap and observe the outer disk of NGC 4258 in the HST WFC3/IR F110W filter. This cycle is the last that will enable tying the PHAT & PHATTER legacies to Carbon star cosmology.

OBSERVING DESCRIPTION

This program will observe multipel fields in NGC 4258 in the WFC3 F110W filter to observe JAGB stars. These fields will overlap with one of the existing NGC 4258 fields, which will provide the F814W observations needed to differentiate these JAGB stars via color cuts.

Visit

Proposal 17911, Tile Visit 01, implementation Tue Mar 11 18:00:14 GMT 2025

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(2)	Pattern Type=LINE Purpose=DITHER Number Of Points=3 Point Spacing=1.908 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=1.716 Line Spacing=1.095	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false	(1)

Fixed Targets

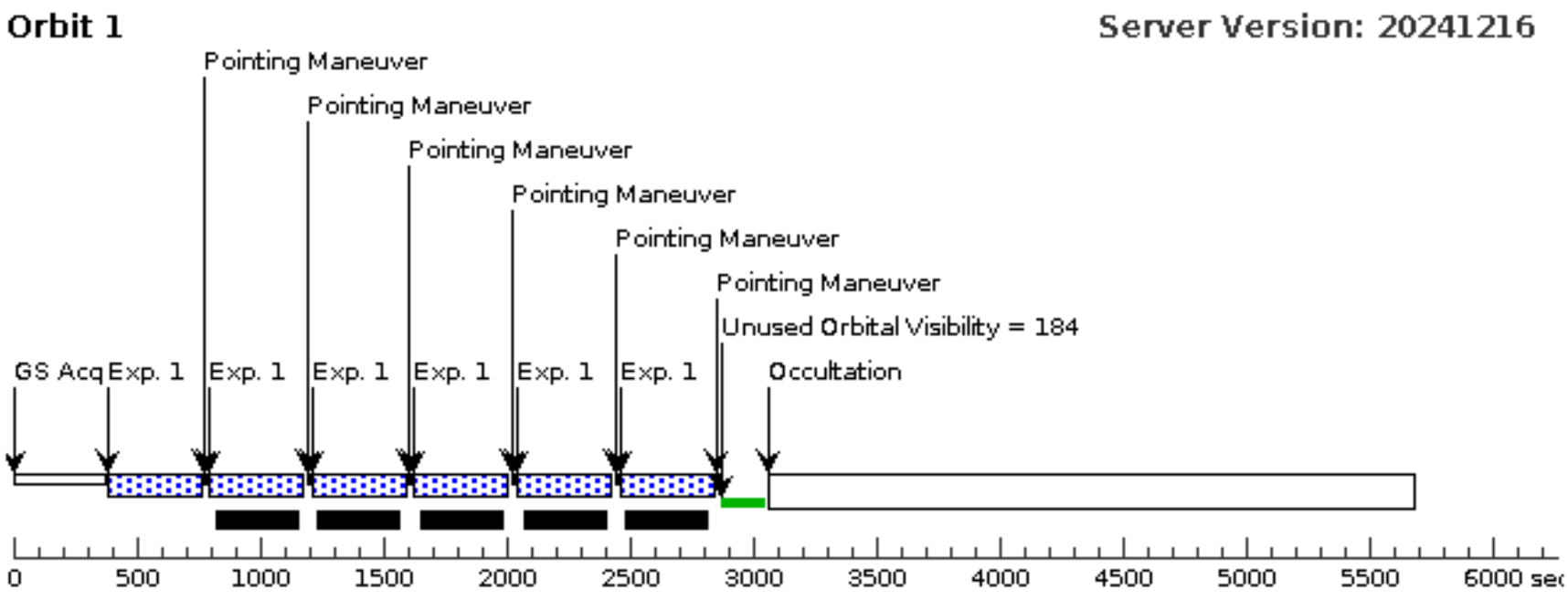
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M-106	RA: 12 18 34.0068 (184.6416950d) Dec: +47 14 55.68 (47.24880d) Equinox: J2000	Epoch of Position: 2000	V=8.41	Reference Frame: ICRS

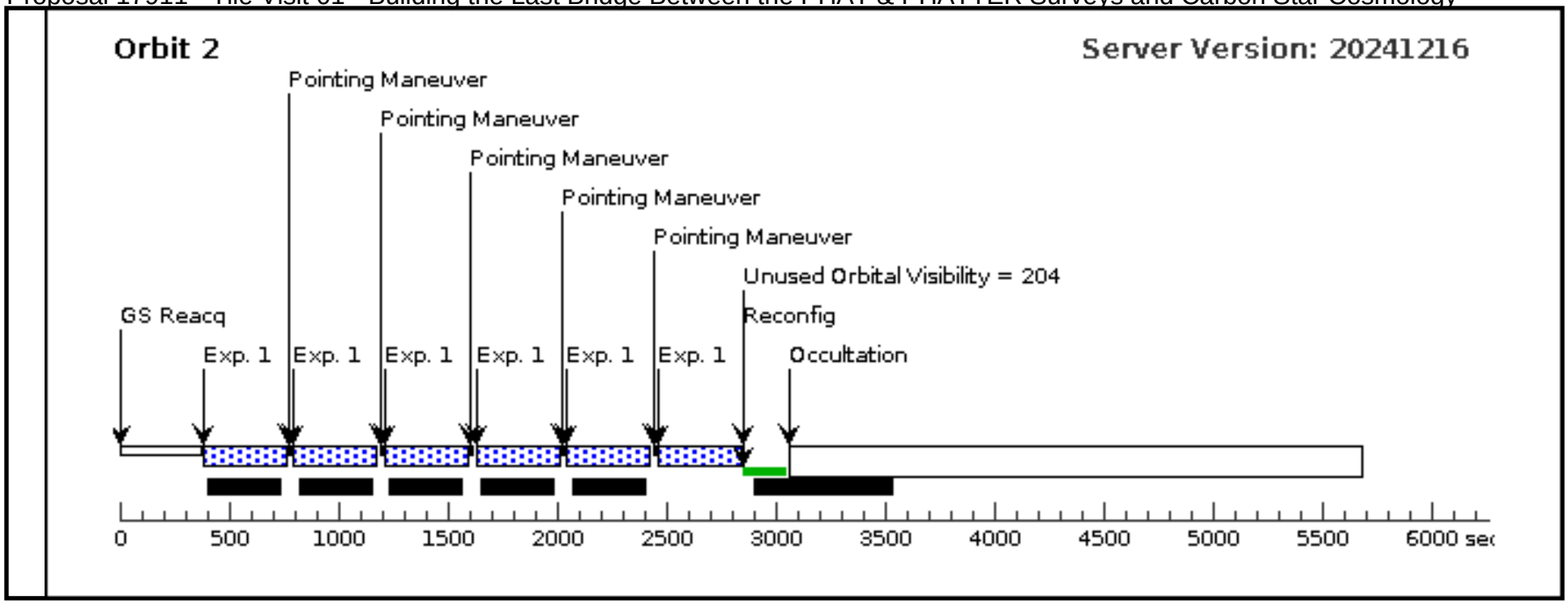
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[SPIRAL]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) M-106	WFC3/IR, MULTIACCUM, IR-FIX	F110W	SAMP-SEQ=SPARS25; NSAMP=15	POS TARG -62.56638000000001,-55.37128500000001; GS ACQ SCENARIO BASE1O3	Pattern 2, Exps 1-1 in Tile Visit 01 (2)	352.939501 Secs (4235.274 Secs)	
								[==>(Pattern 1,1)] *[==>(Pattern 1,2)]* *[==>(Pattern 1,3)]* *[==>(Pattern 1,4)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***
								[==>(Pattern 2,3)] *[==>(Pattern 2,4)]* *[==>(Pattern 3,1)]* *[==>(Pattern 3,2)]* *[==>(Pattern 3,3)]* *[==>(Pattern 3,4)]*	***[2]***

Orbit Structure




Orbit 2
Server Version: 20241216
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Unused Orbital Visibility = 204
GS Reacq
Reconfig
Exp. 1
Exp. 1
Exp. 1
Exp. 1
Exp. 1
Exp. 1
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec

Visit

Proposal 17911, Tile Visit 02, implementation Tue Mar 11 18:00:14 GMT 2025

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: SAME ORIENT AS 01

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(2)	Pattern Type=LINE Purpose=DITHER Number Of Points=3 Point Spacing=1.908 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=1.716 Line Spacing=1.095	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false	(1)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
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Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[SPIRAL]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) M-106	WFC3/IR, MULTIACCUM, IR-FIX	F110W	SAMP-SEQ=SPARS25; NSAMP=15	POS TARG 62.56638000000001,-55.37128500000001; GS ACQ SCENARIO BASE1O3	Pattern 2, Exps 1-1 in Tile Visit 02 (2)	352.939501 Secs (4235.274 Secs)	
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								[==>(Pattern 1,3)]	
								[==>(Pattern 1,4)]	
								[==>(Pattern 2,1)]	
								[==>(Pattern 2,2)]	
								[==>(Pattern 2,3)]	***[2]***
								[==>(Pattern 2,4)]	
								[==>(Pattern 3,1)]	
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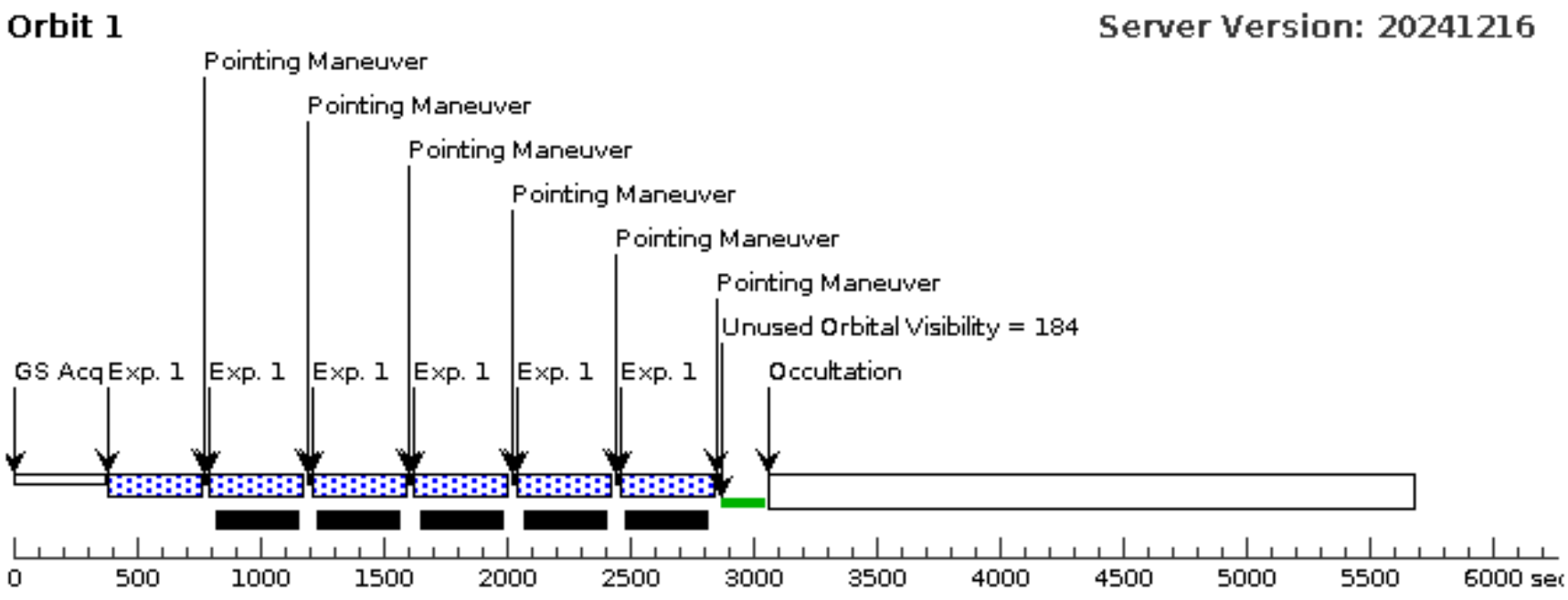
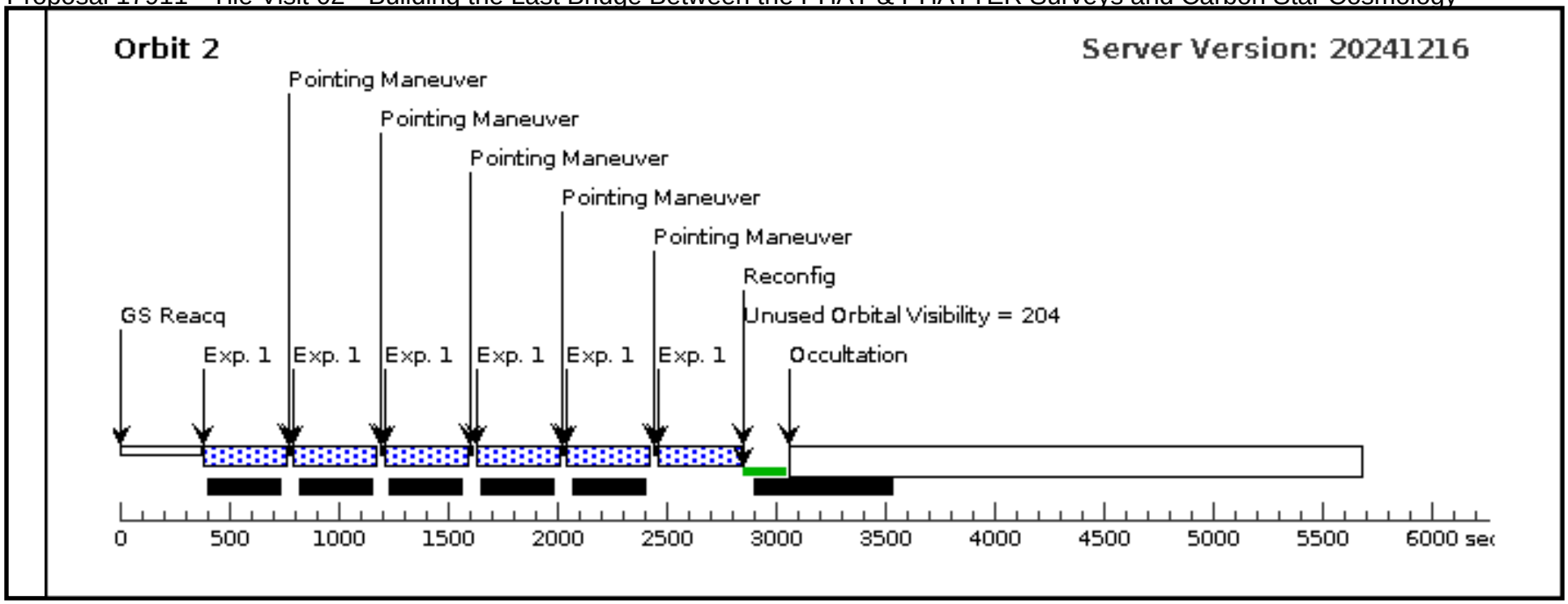
Orbit Structure




Orbit 2
Server Version: 20241216
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Reconfig
GS Reacq
Unused Orbital Visibility = 204
Exp. 1
Exp. 1
Exp. 1
Exp. 1
Exp. 1
Exp. 1
Occultation
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500
1000
1500
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6000 sec

Visit

Proposal 17911, Tile Visit 03, implementation Tue Mar 11 18:00:14 GMT 2025

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: SAME ORIENT AS 01

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(2)	Pattern Type=LINE Purpose=DITHER Number Of Points=3 Point Spacing=1.908 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=1.716 Line Spacing=1.095	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false	(1)

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#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
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Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[SPIRAL]

Exposures

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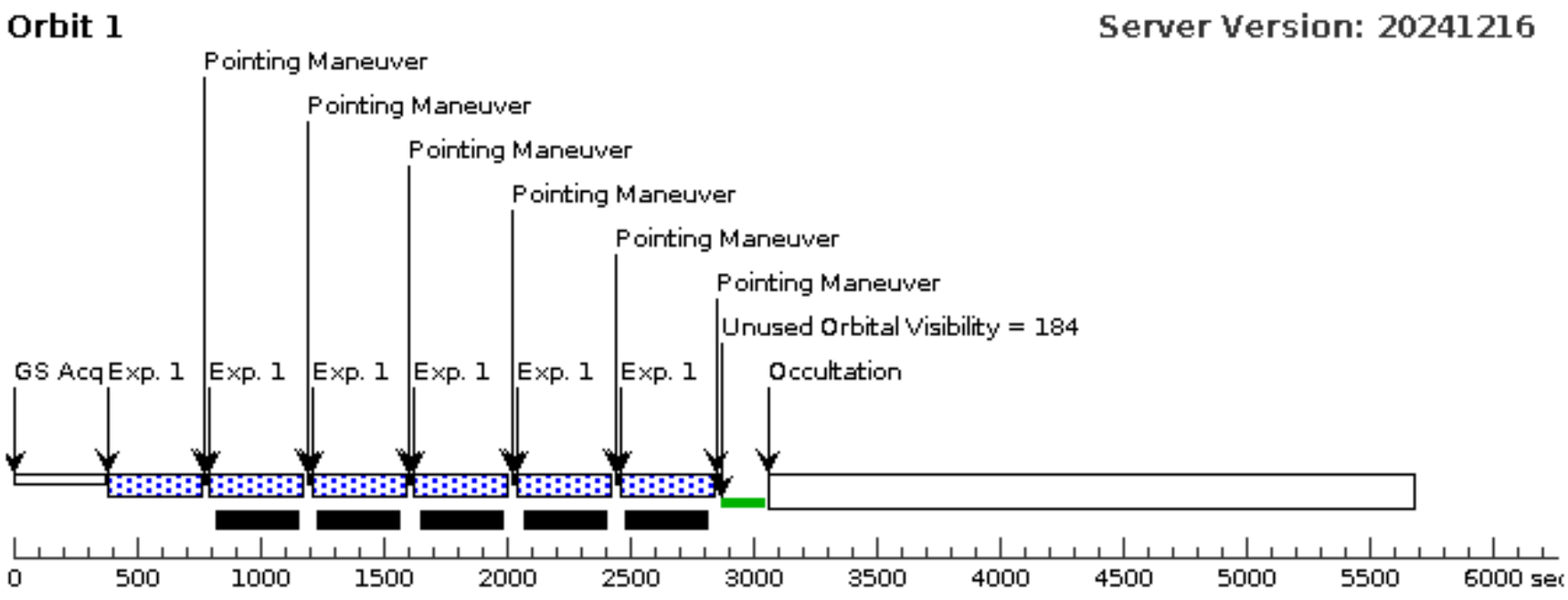
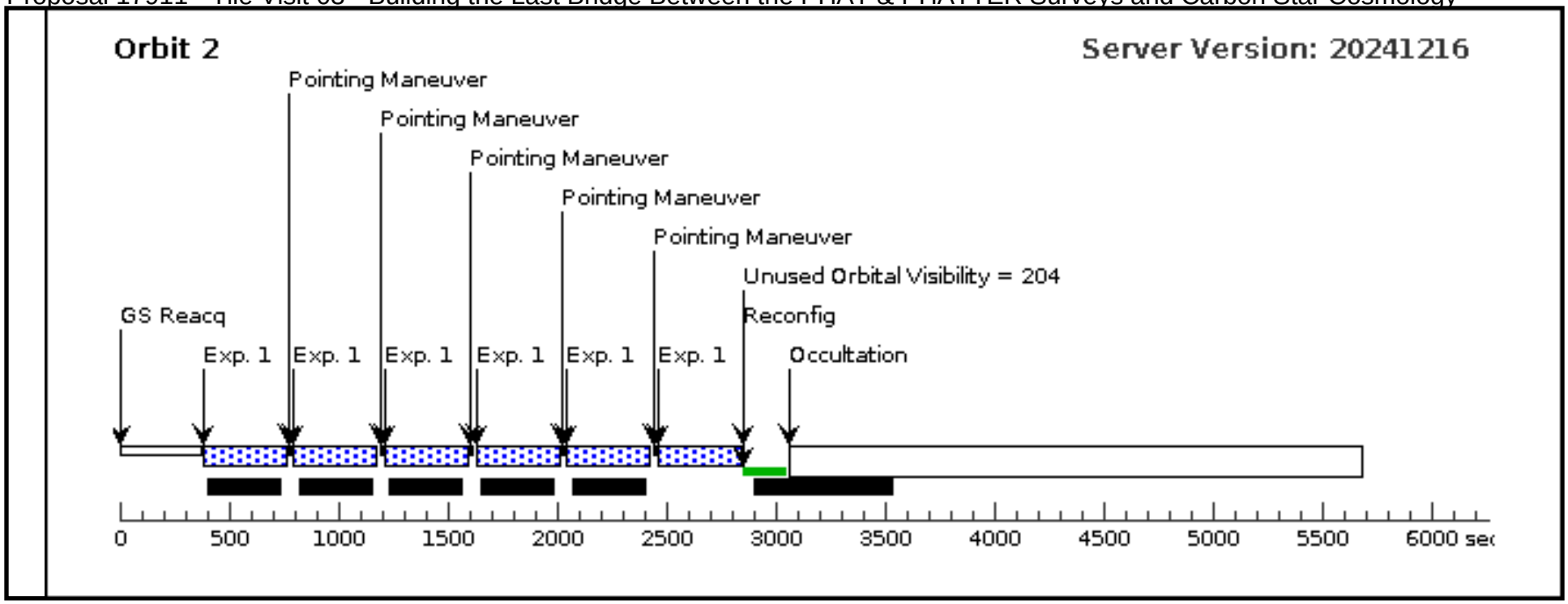
1		(1) M-106	WFC3/IR, MULTIACCUM, IR-FIX	F110W	SAMP-SEQ=SPARS25; NSAMP=15	POS TARG -62.56638000000001,55.37128499999999; GS ACQ SCENARIO BASE1O3	Pattern 2, Exps 1-1 in Tile Visit 03 (2)	352.939501 Secs (4235.274 Secs)	
								[==>(Pattern 1,1)] *[==>(Pattern 1,2)]* *[==>(Pattern 1,3)]* *[==>(Pattern 1,4)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***
								[==>(Pattern 2,3)] *[==>(Pattern 2,4)]* *[==>(Pattern 3,1)]* *[==>(Pattern 3,2)]* *[==>(Pattern 3,3)]* *[==>(Pattern 3,4)]*	***[2]***

Orbit Structure




Orbit 2
Server Version: 20241216
Pointing Maneuver
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Pointing Maneuver
Unused Orbital Visibility = 204
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Reconfig
Exp. 1
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Exp. 1
Exp. 1
Exp. 1
Occultation
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500
1000
1500
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5500
6000 sec

Visit

Proposal 17911, Tile Visit 04, implementation Tue Mar 11 18:00:14 GMT 2025

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: SAME ORIENT AS 01

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(2)	Pattern Type=LINE Purpose=DITHER Number Of Points=3 Point Spacing=1.908 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=1.716 Line Spacing=1.095	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false	(1)

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Exposures

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								[==>(Pattern 1,4)]	
								[==>(Pattern 2,1)]	
								[==>(Pattern 2,2)]	
								[==>(Pattern 2,3)]	***[2]***
								[==>(Pattern 2,4)]	
								[==>(Pattern 3,1)]	
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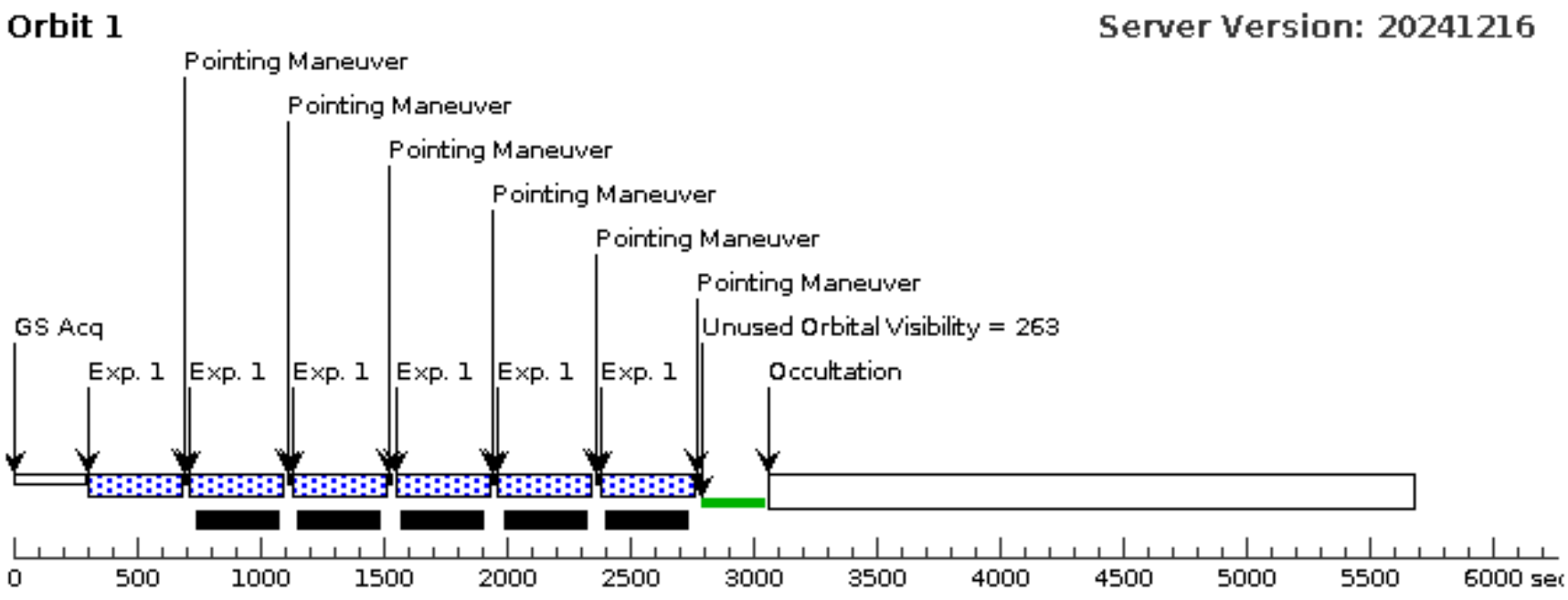
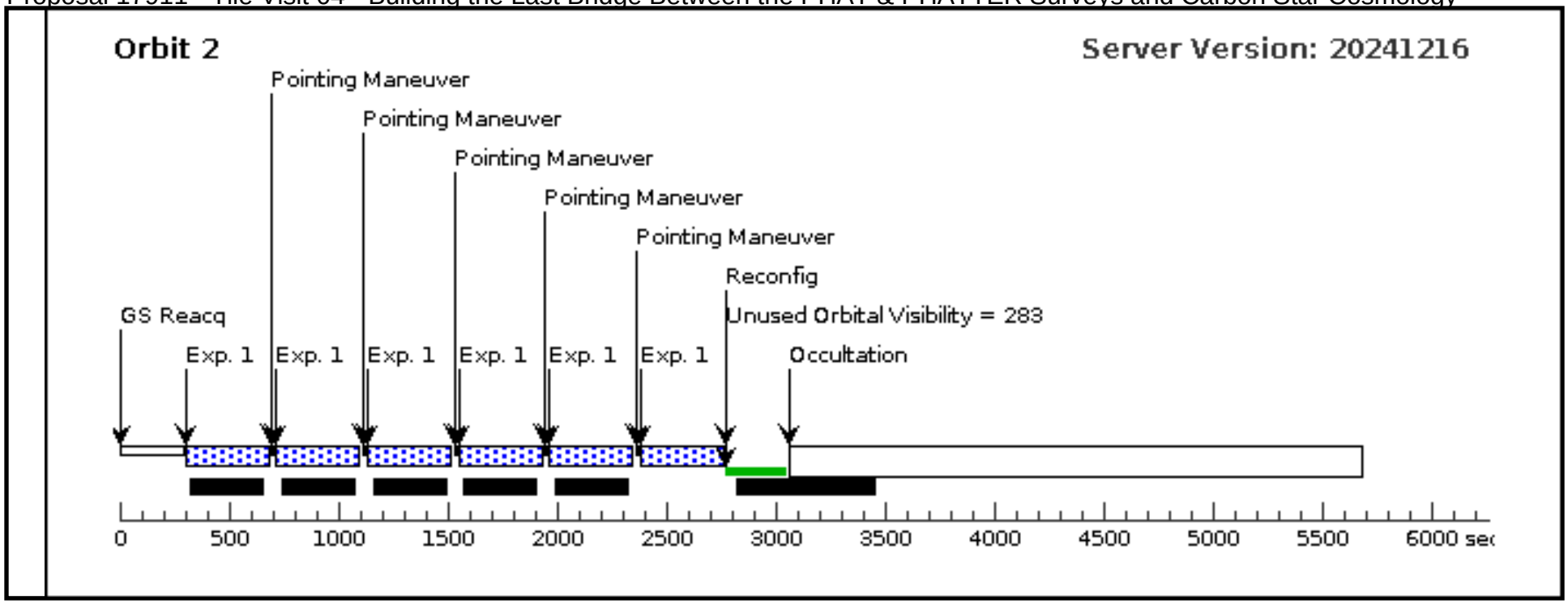
								[==>(Pattern 3,3)]	
								[==>(Pattern 3,4)]	

Orbit Structure




Orbit 2
Server Version: 20241216
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Reconfig
GS Reacq
Unused Orbital Visibility = 283
Exp. 1
Exp. 1
Exp. 1
Exp. 1
Exp. 1
Exp. 1
Occultation
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3500
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4500
5000
5500
6000 sec