15319 - The HST View of Was 49b: An Overmassive AGN in a Merging Dwarf Galaxy?

Cycle: 25, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) WAS49B	WFC3/IR WFC3/UVIS	1	24-Jun-2019 13:00:19.0	yes
02	(1) WAS49B	ACS/WFC	2	24-Jun-2019 13:00:21.0	yes
51	(1) WAS49B	WFC3/IR WFC3/UVIS	1	24-Jun-2019 13:00:23.0	yes

4 Total Orbits Used

ABSTRACT

Galaxy interactions are ubiquitous and play a fundamental role in the evolution of galaxies and their supermassive black holes (SMBHs). While major galaxy mergers (M1/M2~1) often trigger accretion onto both SMBHs and enhance AGN activity, the influence of minor mergers (M1/M2<1/3) on AGN fueling is poorly understood, although there is evidence that minor mergers predominantly trigger AGN activity in the primary galaxy. The dual AGN system Was 49, by contrast, is a unique system composed of a dwarf galaxy in a minor (M1/M2~1/10) merger with a disk galaxy in which the dwarf galaxy hosts a heavily obscured AGN with a luminosity of over 10^45 erg/s, while the AGN in the primary galaxy is over one thousand times less luminous. Furthermore, the black hole powering the AGN in the dwarf galaxy is much larger than black hole/galaxy scaling relations predict, with a mass of over 2% that of the stellar mass of its host. While the stellar host of this powerful AGN has been identified, the low spatial resolution of ground-based observations has limited our ability to determine the nature of this strange object. High-resolution continuum and narrow-band imaging of Was 49 is critical to understanding how such a powerful AGN could exist in a such a low mass host galaxy, as well as how this AGN is affecting its environment. Only Hubble has the resolving power and the filtering capability to determine the structure of this dwarf galaxy and the effect that the powerful AGN it hosts is having on it. This study will yield key insights into how large black holes grow in low mass galaxies, the role of minor mergers on SMBH fueling, and the effect of AGN 'feedback' before merger coalescence.

OBSERVING DESCRIPTION

The final TAC allocation was the same as our original proposal. Therefore, the observations will be split into three orbits. In one orbit, WFC3 will be used for observations with the F225W and F160W filters, 3 frames per filter, with a total of 30 minutes and 6 minutes, respectively. For another orbit, ACS will be used, with the FR551N filter x 3 frames, total = 25 minutes, and the FR647M filter x 3 frames, total = 6 minutes. For the third orbit, ACS will be used, with the FR716N filter x 3 frames, total = 25 minutes, and the FR914M filter x 3 frames, total = 6 minutes.

The ACS ramp filters will be centered as follows.

FR551N: 532.6 nm ([OIII]5007 at z = 0.06353)
FR647M: 585.0 nm
FR716N: 698.1 nm
FR914M: 860.0 nm (H-alpha at z = 0.06353)

Visit

Proposal 15319, Visit (01), failed Mon Jun 24 17:00:23 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: WFC3/IR, WFC3/UVIS

Special Requirements: (none)

Diagnostics

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

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false		(1)
(2)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false		(2)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WAS49B	RA: 12 14 17.8160 (183.5742333d) Dec: +29 31 43.17 (29.52866d) Equinox: J2000		V=16.87	Reference Frame: ICRS

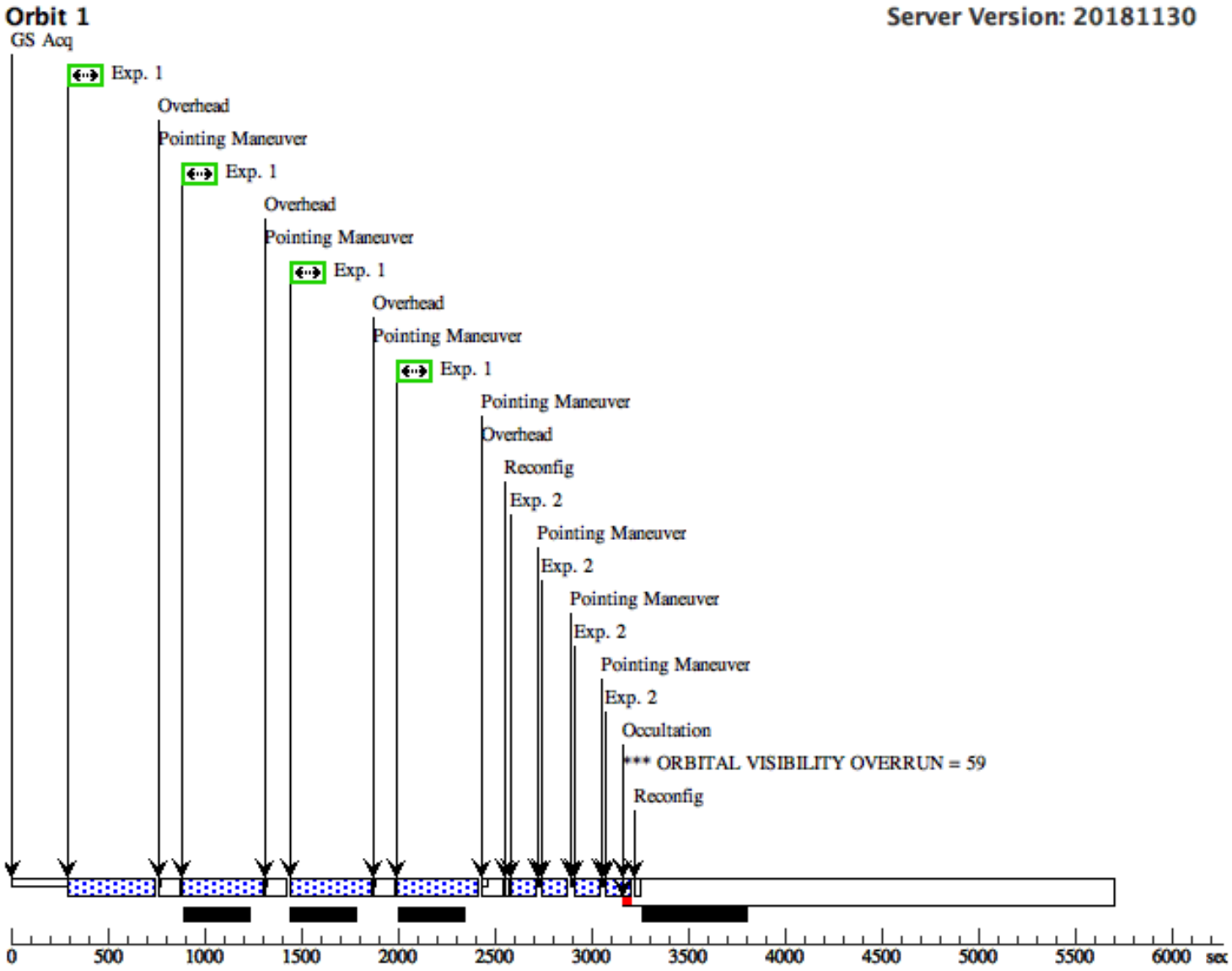
Comments:
Category=GALAXY
Description=[INTERACTING GALAXY, NLR, SEYFERT]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F225W	(1) WAS49B	WFC3/UVIS, ACCUM, UVIS2	F225W	FLASH=11		Pattern 1, Exps 1-1 in Visit (01) (1)	421 Secs (1684 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	
								[==>(Pattern 3)]	
								[==>(Pattern 4)]	
2	F160W	(1) WAS49B	WFC3/IR, MULTIACCUM, IRSUB512	F160W	NSAMP=9; SAMP-SEQ=STEP25		Pattern 2, Exps 2-2 in Visit (01) (2)	105.518395 Secs (422.074 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	
								[==>(Pattern 3)]	
								[==>(Pattern 4)]	

Comments: AGN F160W magnitude = 17.9 (Vega; SED fit prediction)

Orbit Structure



Visit

Proposal 15319, Visit 02, completed Mon Jun 24 17:00:23 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Diagnostics

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

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

(FR551N (02.001)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

(FR647M (02.002)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

(FR716N (02.003)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

(FR914M (02.004)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.262 Line Spacing=0.192	Coordinate Frame=POS-TARG Pattern Orientation=18.39 Angle Between Sides=68.14 Center Pattern=false		(1), (2), (3), (4)

Fixed Targets

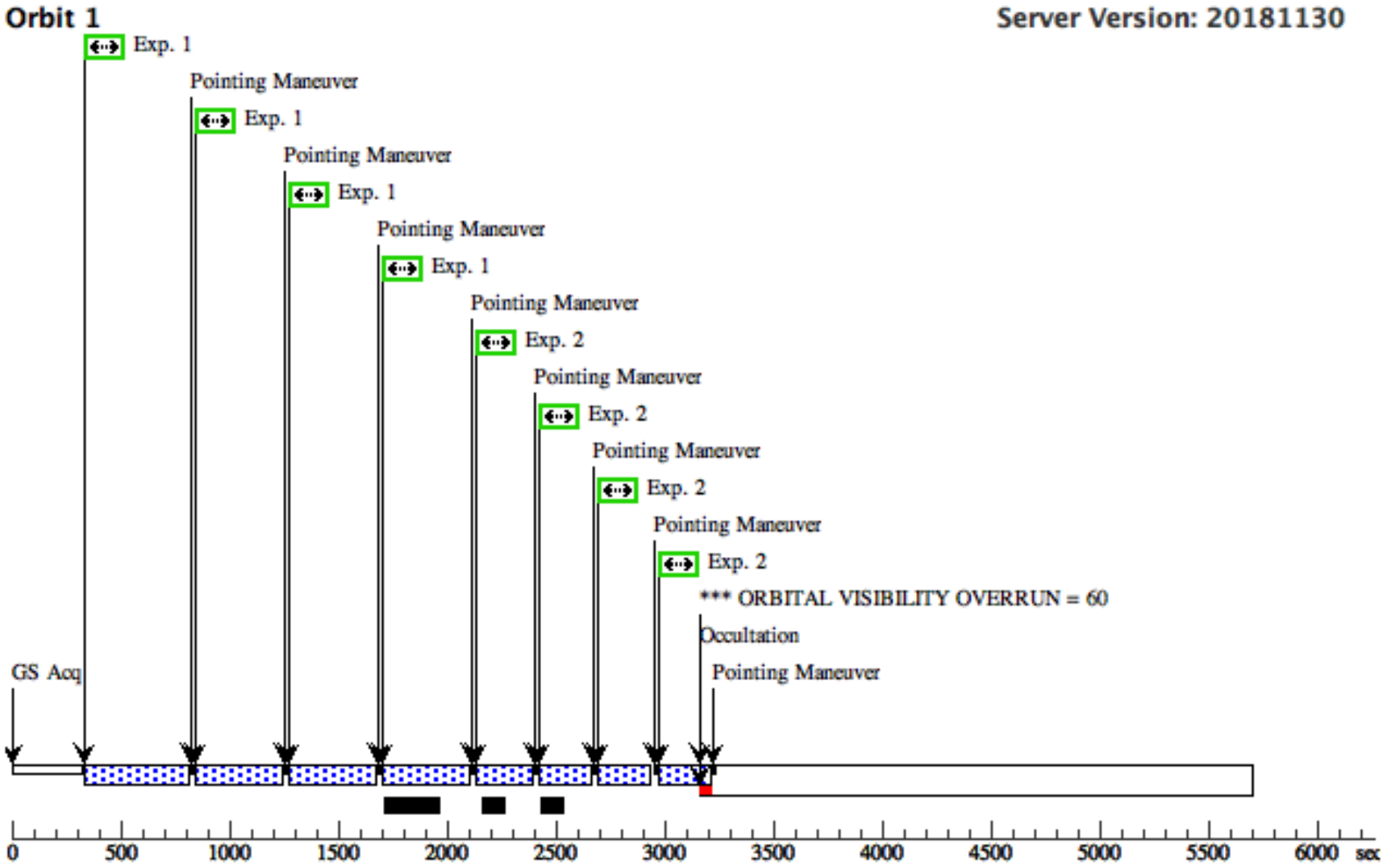
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WAS49B	RA: 12 14 17.8160 (183.5742333d) Dec: +29 31 43.17 (29.52866d) Equinox: J2000		V=16.87	Reference Frame: ICRS

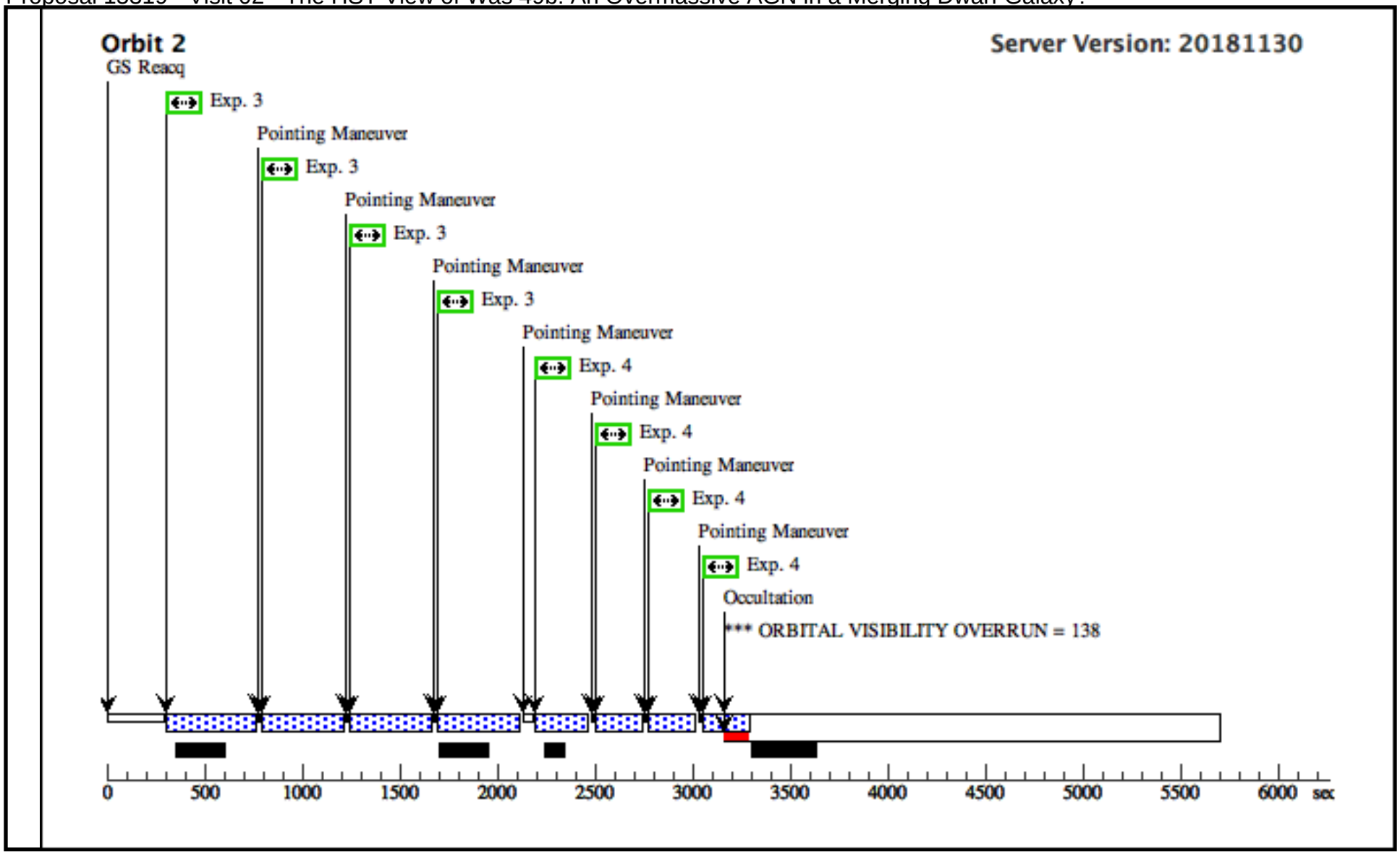
Comments:
Category=GALAXY
Description=[INTERACTING GALAXY, NLR, SEYFERT]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	FR551N	(1) WAS49B	ACS/WFC, ACCUM, WFC1-IRAMPQ	FR551N 5326 A			Pattern 3, Exps 1-1 in Visit 02 (3)	271 Secs (1084 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
Comments: The dither pattern is the standard 4 point box dither to optimize PSF sampling. The dither should not be an issue for the limtied FOV of the ramp filters.									
2	FR647M	(1) WAS49B	ACS/WFC, ACCUM, WFC1-IRAMPQ	FR647M 5850 A			Pattern 3, Exps 2-2 in Visit 02 (3)	110 Secs (440 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
Comments: The dither pattern is the standard 4 point box dither to optimize PSF sampling. The dither should not be an issue for the limtied FOV of the ramp filters.									
3	FR716N	(1) WAS49B	ACS/WFC, ACCUM, WFC1-IRAMPQ	FR716N 6981 A			Pattern 3, Exps 3-3 in Visit 02 (3)	293 Secs (1172 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[2]***
Comments: The dither pattern is the standard 4 point box dither to optimize PSF sampling. The dither should not be an issue for the limtied FOV of the ramp filters.									
4	FR914M	(1) WAS49B	ACS/WFC, ACCUM, WFC1-MRAMPQ	FR914M 8600 A			Pattern 3, Exps 4-4 in Visit 02 (3)	110 Secs (440 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[2]***
Comments: The dither pattern is the standard 4 point box dither to optimize PSF sampling. The dither should not be an issue for the limtied FOV of the ramp filters.									

Orbit Structure




Orbit 2
Server Version: 20181130
GS Reacq
Exp. 3
Pointing Maneuver
Exp. 3
Pointing Maneuver
Exp. 3
Pointing Maneuver
Exp. 3
Pointing Maneuver
Exp. 4
Pointing Maneuver
Exp. 4
Pointing Maneuver
Exp. 4
Pointing Maneuver
Exp. 4
Occultation
*** ORBITAL VISIBILITY OVERRUN = 138
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 15319, Visit (51), completed Mon Jun 24 17:00:24 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: WFC3/IR, WFC3/UVIS

Special Requirements: (none)

Comments: Repeat of failed visit 01.

Diagnostics

(Visit (51)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false		(1)
(2)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false		(2)

Fixed Targets

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Comments:
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Description=[INTERACTING GALAXY, NLR, SEYFERT]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F225W	(1) WAS49B	WFC3/UVIS, ACCUM, UVIS2	F225W	FLASH=11		Pattern 1, Exps 1-1 in Visit (51) (1)	421 Secs (1684 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2	F160W	(1) WAS49B	WFC3/IR, MULTIACCUM, IRSUB512	F160W	NSAMP=9; SAMP-SEQ=STEP25		Pattern 2, Exps 2-2 in Visit (51) (2)	105.518395 Secs (422.074 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Comments: AGN F160W magnitude = 17.9 (Vega; SED fit prediction)

Orbit Structure