



14713 - Binarity and Accretion Activity in AGB Stars with Variable UV and X-Ray Emission

Cycle: 24, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) Y-GEM	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	2	09-Nov-2016 11:51:38.0	yes
02	(1) Y-GEM	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	2	09-Nov-2016 11:51:42.0	yes

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
03	(2) EY-HYA	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	2	09-Nov-2016 11:51:45.0	yes
04	(2) EY-HYA	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	2	09-Nov-2016 11:51:47.0	yes

8 Total Orbits Used

ABSTRACT

The dramatic changes in the geometry and dynamics of the mass-ejection during the AGB-to-PN transformation are widely believed to be due to binarity and associated accretion processes, but observational probes are lacking. We propose to obtain multi-epoch UV spectra of two late-spectral-type AGB stars, Y Gem and EY Hya, that belong to a newly-discovered class of AGB stars showing strong and variable FUV fluxes ("fuvAGB" stars) and hard X-ray emission -- suggestive of variable accretion of matter onto an accretion disk in a binary system. The companions are either low-mass main-sequence stars or cold white dwarfs. The proposed study will provide robust confirmation of, and constraints on, our accretion-activity model for these objects.

Y Gem and EY Hya represent the two main observational paths taken during post-AGB (pAGB) evolution: one leading to preplanetary nebulae (PPN) and the other to disk-prominent pAGB objects (dpAGB). Both dpAGBs and PPNe possess dusty circumstellar disks/torii, but, unlike dpAGBs, PPNe also show prominent extended nebulosities. We will fit the continuum to derive the temperature and size of the accretion hot-spot, and using CLOUDY modelling, fit the emission lines to provide constraints on the physical parameters of the accreting flow. The line profiles, if resolved, will reveal the nature of the companion stars. Our study will probe the early formation phase of bound disks in binary AGB stars, and provide valuable insights into the binary-induced accretion processes that make such disks, which have long been theorized to drive collimated outflows that produce aspherical morphologies in post-AGB objects.

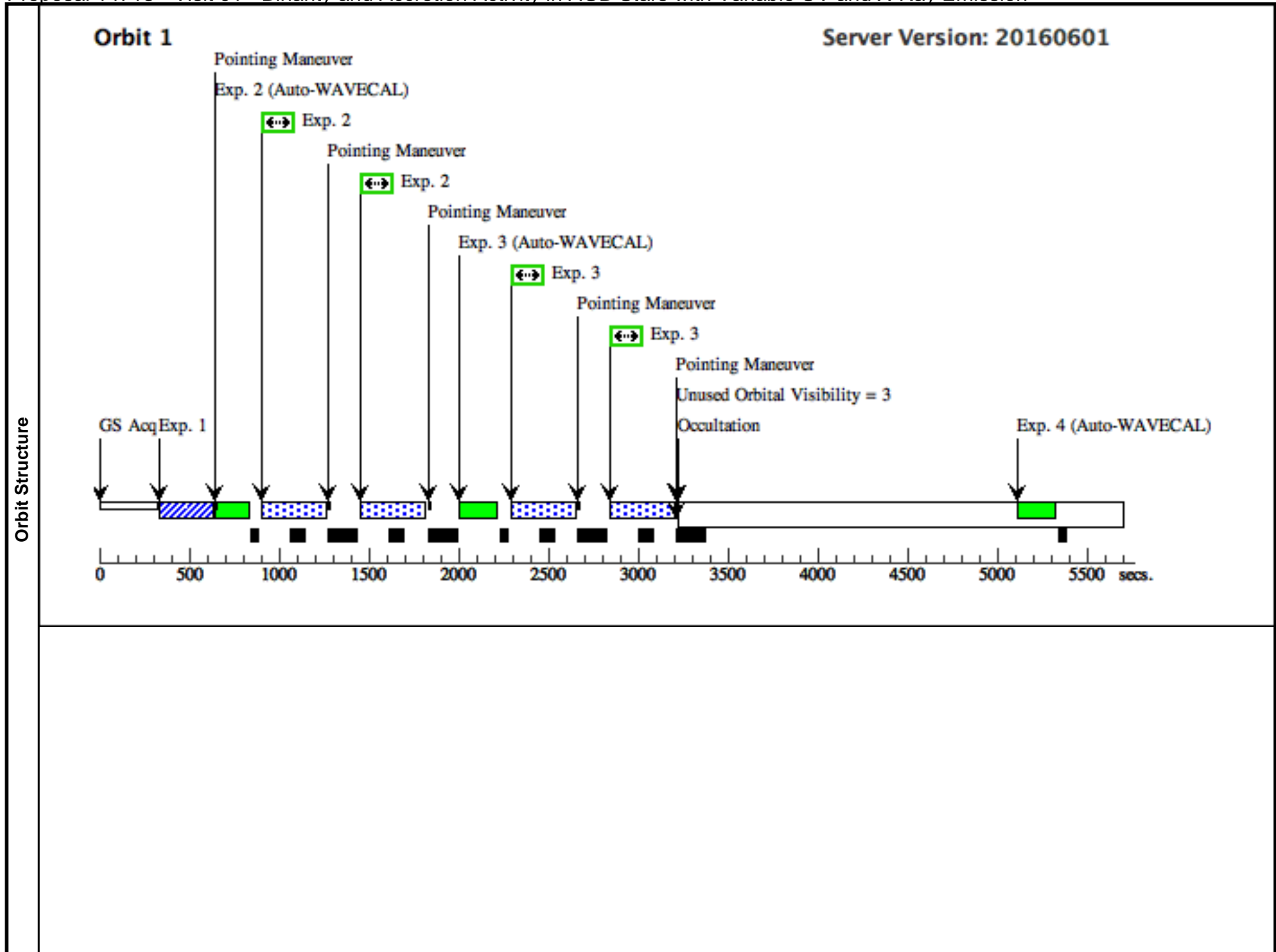
OBSERVING DESCRIPTION

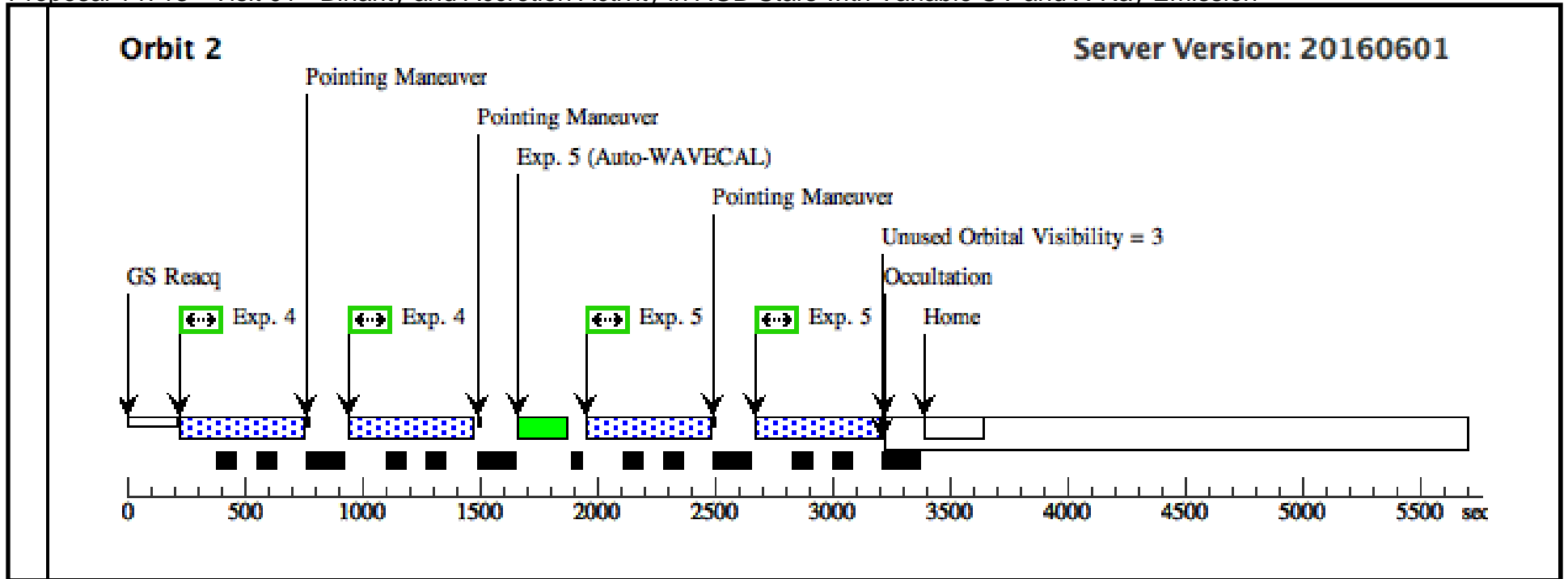
imaging survey of protoplanetary nebulae

Proposal 14713 - Visit 01 - Binarity and Accretion Activity in AGB Stars with Variable UV and X-Ray Emission

Wed Nov 09 16:51:48 GMT 2016

Visit	Proposal 14713, Visit 01, implementation Diagnostic Status: No Diagnostics Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, STIS/FUV-MAMA Special Requirements: (none)									
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures	
		(1)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG						
		Purpose=DITHER	Pattern Orientation=90.0							
		Number Of Points=2	Angle Between Sides=							
		Point Spacing=0.0861	Center Pattern=false							
		Line Spacing=								
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections		Fluxes	Miscellaneous			
	(1)	Y-GEM	RA: 07 41 8.5227 (115.2855113d) Dec: +20 25 44.34 (20.42898d) Equinox: J2000	Proper Motion RA: -4.59 mas/yr Proper Motion Dec: -8.3 mas/yr Parallax: 0" Epoch of Position: 2000.0		V=9.09+/-0.5 B=10.23, GALEX AB (FUV=14-16, NUV=14-15.9)	Reference Frame: ICRS			
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(STIS.ta.824 309)	(1) Y-GEM	STIS/CCD, ACQ, F25ND3	MIRROR				1 Secs (1 Secs)	
									[==>]	[1]
	2	(STIS.sp.82 4320)	(1) Y-GEM	STIS/FUV-MAMA, TIME-TAG, 52X0.2	G140L 1425 A	BUFFER-TIME=16 6		Pattern 1, Exps 2-2 in Visit 01 (1)	300 Secs (694 Secs)	
									[==>347.0 Secs (Pattern 1)]	[1]
									[==>347.0 Secs (Pattern 2)]	
	3	(STIS.sp.82 4322)	(1) Y-GEM	STIS/NUV-MAMA, TIME-TAG, 52X0.2	G230L 2376 A	BUFFER-TIME=16 6		Pattern 1, Exps 3-3 in Visit 01 (1)	300 Secs (694 Secs)	
								[==>347.0 Secs (Pattern 1)]	[1]	
								[==>347.0 Secs (Pattern 2)]		
4	(STIS.sp.82 4320)	(1) Y-GEM	STIS/FUV-MAMA, TIME-TAG, 52X0.2	G140L 1425 A	BUFFER-TIME=16 6		Pattern 1, Exps 4-4 in Visit 01 (1)	300 Secs (1034 Secs)		
								[==>517.0 Secs (Pattern 1)]	[2]	
								[==>517.0 Secs (Pattern 2)]		
5	(STIS.sp.82 4322)	(1) Y-GEM	STIS/NUV-MAMA, TIME-TAG, 52X0.2	G230L 2376 A	BUFFER-TIME=16 6		Pattern 1, Exps 5-5 in Visit 01 (1)	300 Secs (1034 Secs)		
								[==>517.0 Secs (Pattern 1)]	[2]	
								[==>517.0 Secs (Pattern 2)]		

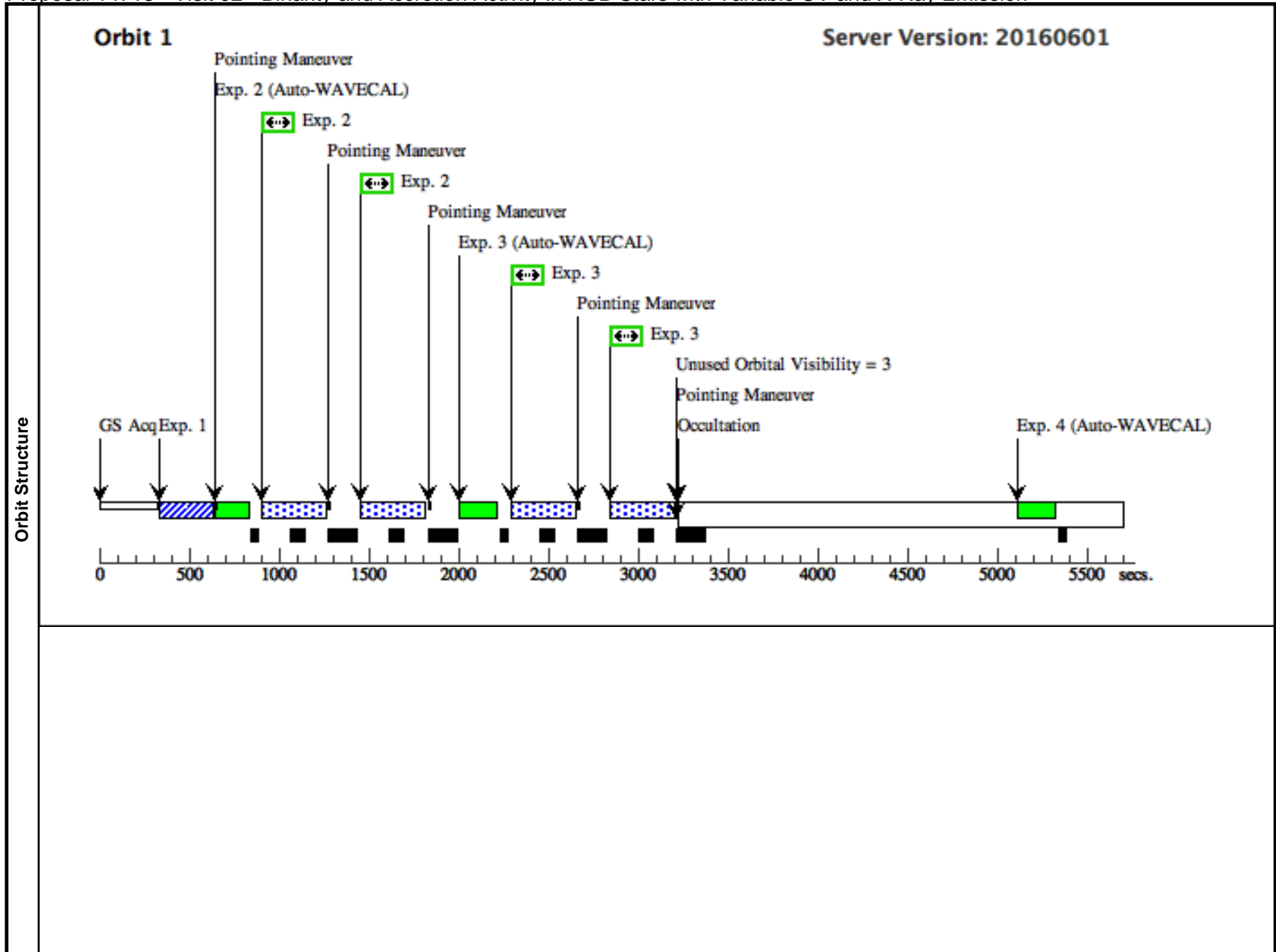




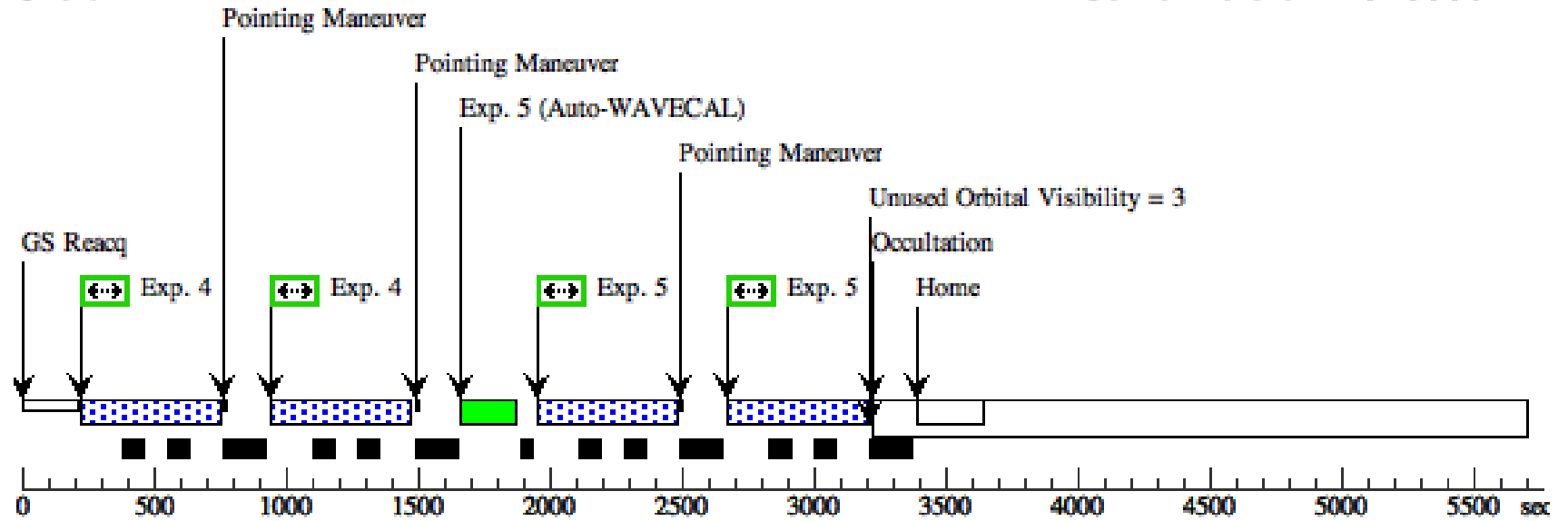
Proposal 14713 - Visit 02 - Binariness and Accretion Activity in AGB Stars with Variable UV and X-Ray Emission

Wed Nov 09 16:51:49 GMT 2016

Visit	Proposal 14713, Visit 02, implementation Diagnostic Status: No Diagnostics Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, STIS/FUV-MAMA Special Requirements: AFTER 01 BY 160 D TO 200 D									
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures	
		(1)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG						
		Purpose=DITHER	Pattern Orientation=90.0							
		Number Of Points=2	Angle Between Sides=							
		Point Spacing=0.0861	Center Pattern=false							
		Line Spacing=								
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections		Fluxes	Miscellaneous			
	(1)	Y-GEM	RA: 07 41 8.5227 (115.2855113d) Dec: +20 25 44.34 (20.42898d) Equinox: J2000	Proper Motion RA: -4.59 mas/yr Proper Motion Dec: -8.3 mas/yr Parallax: 0" Epoch of Position: 2000.0		V=9.09+/-0.5 B=10.23, GALEX AB (FUV=14-16, NUV=14-15.9)	Reference Frame: ICRS			
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(STIS.ta.824 309)	(1) Y-GEM	STIS/CCD, ACQ, F25ND3	MIRROR				1 Secs (1 Secs)	
									[==>]	[1]
	2	(STIS.sp.82 4320)	(1) Y-GEM	STIS/FUV-MAMA, TIME-TAG, 52X0.2	G140L 1425 A	BUFFER-TIME=16 6		Pattern 1, Exps 2-2 in Visit 02 (1)	300 Secs (694 Secs)	
									[==>347.0 Secs (Pattern 1)]	[1]
									[==>347.0 Secs (Pattern 2)]	
	3	(STIS.sp.82 4322)	(1) Y-GEM	STIS/NUV-MAMA, TIME-TAG, 52X0.2	G230L 2376 A	BUFFER-TIME=16 6		Pattern 1, Exps 3-3 in Visit 02 (1)	300 Secs (694 Secs)	
								[==>347.0 Secs (Pattern 1)]	[1]	
								[==>347.0 Secs (Pattern 2)]		
4	(STIS.sp.82 4320)	(1) Y-GEM	STIS/FUV-MAMA, TIME-TAG, 52X0.2	G140L 1425 A	BUFFER-TIME=16 6		Pattern 1, Exps 4-4 in Visit 02 (1)	300 Secs (1034 Secs)		
								[==>517.0 Secs (Pattern 1)]	[2]	
								[==>517.0 Secs (Pattern 2)]		
5	(STIS.sp.82 4322)	(1) Y-GEM	STIS/NUV-MAMA, TIME-TAG, 52X0.2	G230L 2376 A	BUFFER-TIME=16 6		Pattern 1, Exps 5-5 in Visit 02 (1)	300 Secs (1034 Secs)		
								[==>517.0 Secs (Pattern 1)]	[2]	
								[==>517.0 Secs (Pattern 2)]		



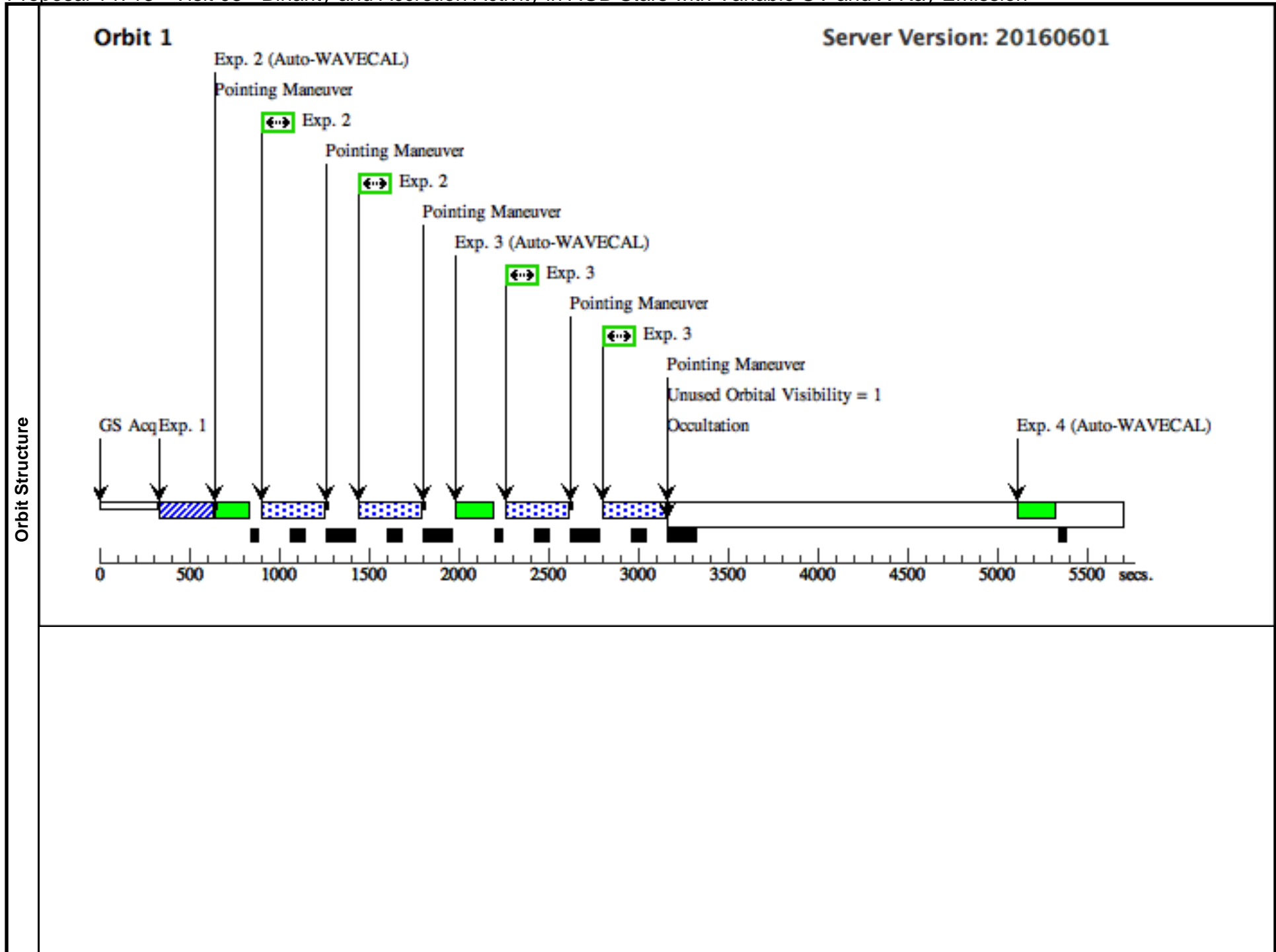
Orbit 2

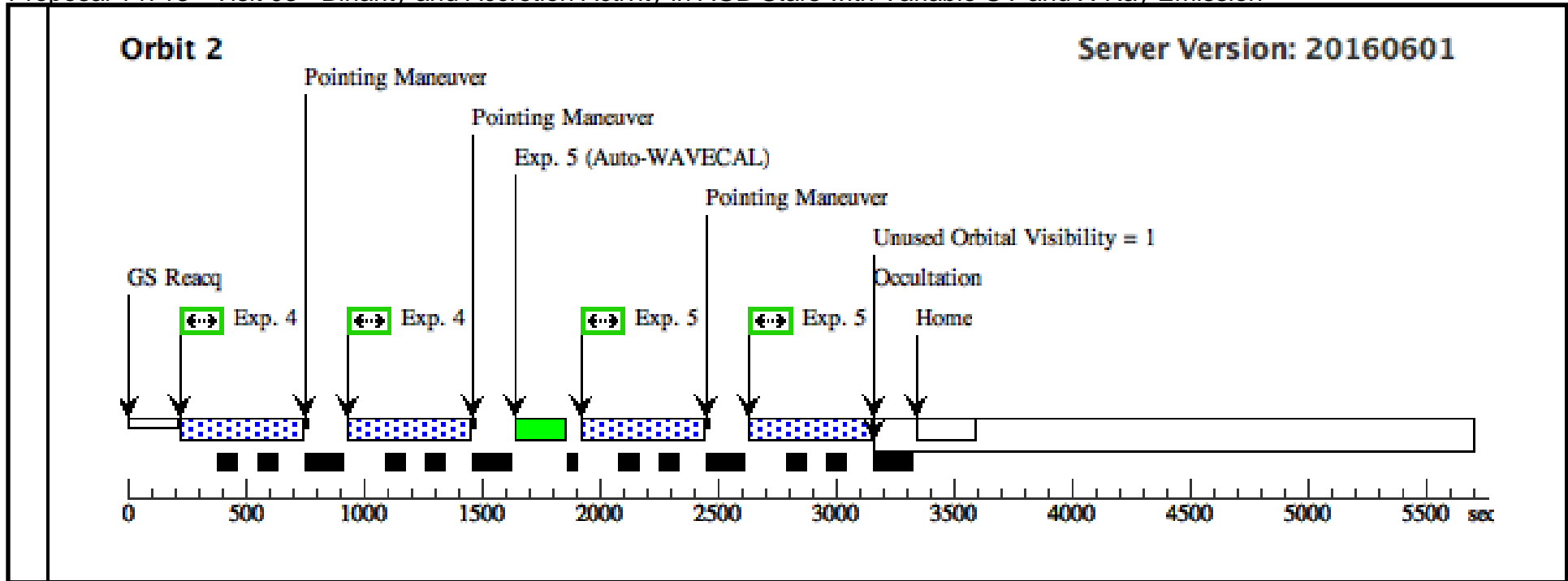


Proposal 14713 - Visit 03 - Binariness and Accretion Activity in AGB Stars with Variable UV and X-Ray Emission

Wed Nov 09 16:51:49 GMT 2016

Visit	Proposal 14713, Visit 03, implementation Diagnostic Status: No Diagnostics Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, STIS/FUV-MAMA Special Requirements: VISIBILITY INTERVAL 52.8 M										
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures		
		(1)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG							(2), (3), (4), (5)
		Purpose=DITHER	Pattern Orientation=90.0								
		Number Of Points=2	Angle Between Sides=								
		Point Spacing=0.0861	Center Pattern=false								
		Line Spacing=									
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(2)	EY-HYA	RA: 08 46 21.2085 (131.5883688d)	Dec: +01 37 56.03 (1.63223d)	Equinox: J2000	Proper Motion RA: -6.95 mas/yr	Proper Motion Dec: -6.21 mas/yr	Parallax: 0"	Epoch of Position: 2000.0	V=9.37+/-0.5	B=10.73, GALEX AB (FUV=19.0, NUV=18.6)
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	(STIS.ta.824 309)	(2) EY-HYA	STIS/CCD, ACQ, F25ND3	MIRROR				1 Secs (1 Secs)		
									[==>]		[1]
	2	(STIS.sp.82 4320)	(2) EY-HYA	STIS/FUV-MAMA, TIME-TAG, 52X0.2	G140L 1425 A	BUFFER-TIME=16 6		Pattern 1, Exps 2-2 in Visit 03 (1)	300 Secs (668 Secs)		
									[==>334.0 Secs (Pattern 1)]		[1]
									[==>334.0 Secs (Pattern 2)]		
	3	(STIS.sp.82 4322)	(2) EY-HYA	STIS/NUV-MAMA, TIME-TAG, 52X0.2	G230L 2376 A	BUFFER-TIME=16 6		Pattern 1, Exps 3-3 in Visit 03 (1)	300 Secs (668 Secs)		
								[==>334.0 Secs (Pattern 1)]		[1]	
								[==>334.0 Secs (Pattern 2)]			
4	(STIS.sp.82 4320)	(2) EY-HYA	STIS/FUV-MAMA, TIME-TAG, 52X0.2	G140L 1425 A	BUFFER-TIME=16 6		Pattern 1, Exps 4-4 in Visit 03 (1)	300 Secs (1008 Secs)			
								[==>504.0 Secs (Pattern 1)]		[2]	
								[==>504.0 Secs (Pattern 2)]			
5	(STIS.sp.82 4322)	(2) EY-HYA	STIS/NUV-MAMA, TIME-TAG, 52X0.2	G230L 2376 A	BUFFER-TIME=16 6		Pattern 1, Exps 5-5 in Visit 03 (1)	300 Secs (1008 Secs)			
								[==>504.0 Secs (Pattern 1)]		[2]	
								[==>504.0 Secs (Pattern 2)]			

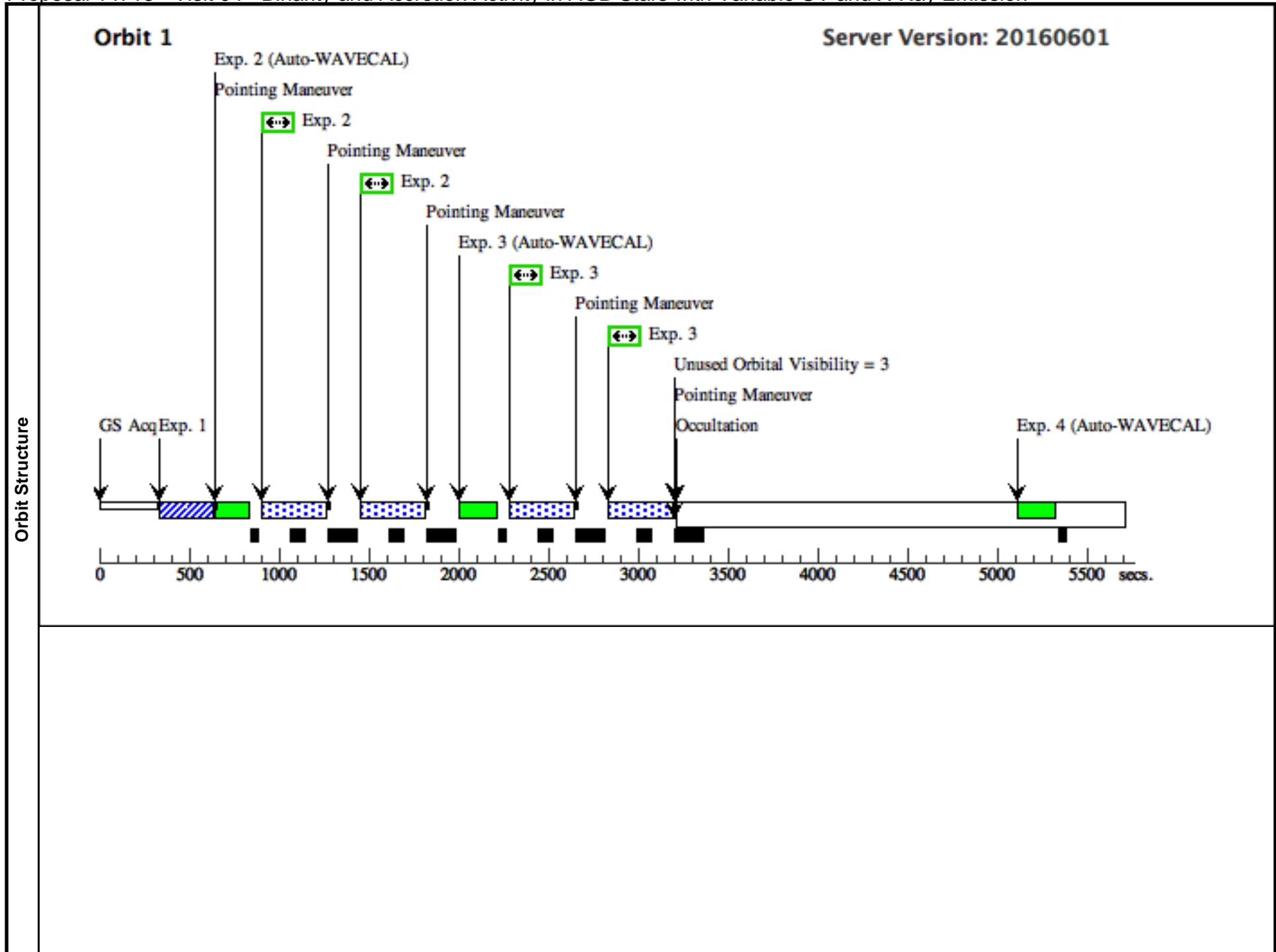




Proposal 14713 - Visit 04 - Binarity and Accretion Activity in AGB Stars with Variable UV and X-Ray Emission

Wed Nov 09 16:51:49 GMT 2016

Visit	Proposal 14713, Visit 04, implementation Diagnostic Status: No Diagnostics Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, STIS/FUV-MAMA Special Requirements: AFTER 03 BY 240 D TO 270 D									
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures	
		(1)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG						(2), (3), (4), (5)
		Purpose=DITHER	Pattern Orientation=90.0							
		Number Of Points=2	Angle Between Sides=							
		Point Spacing=0.0861	Center Pattern=false							
		Line Spacing=								
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections		Fluxes	Miscellaneous			
	(2)	EY-HYA	RA: 08 46 21.2085 (131.5883688d) Dec: +01 37 56.03 (1.63223d) Equinox: J2000	Proper Motion RA: -6.95 mas/yr Proper Motion Dec: -6.21 mas/yr Parallax: 0" Epoch of Position: 2000.0		V=9.37+/-0.5 B=10.73, GALEX AB (FUV=19.0, NUV=18.6)	Reference Frame: ICRS			
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(STIS.ta.824 309)	(2) EY-HYA	STIS/CCD, ACQ, F25ND3	MIRROR				1 Secs (1 Secs)	
									[==>]	[1]
	2	(STIS.sp.82 4320)	(2) EY-HYA	STIS/FUV-MAMA, TIME-TAG, 52X0.2	G140L 1425 A	BUFFER-TIME=16 6		Pattern 1, Exps 2-2 in Visit 04 (1)	300 Secs (688 Secs)	
									[==>344.0 Secs (Pattern 1)]	[1]
									[==>344.0 Secs (Pattern 2)]	
	3	(STIS.sp.82 4322)	(2) EY-HYA	STIS/NUV-MAMA, TIME-TAG, 52X0.2	G230L 2376 A	BUFFER-TIME=16 6		Pattern 1, Exps 3-3 in Visit 04 (1)	300 Secs (688 Secs)	
								[==>344.0 Secs (Pattern 1)]	[1]	
								[==>344.0 Secs (Pattern 2)]		
4	(STIS.sp.82 4320)	(2) EY-HYA	STIS/FUV-MAMA, TIME-TAG, 52X0.2	G140L 1425 A	BUFFER-TIME=16 6		Pattern 1, Exps 4-4 in Visit 04 (1)	300 Secs (1028 Secs)		
								[==>514.0 Secs (Pattern 1)]	[2]	
								[==>514.0 Secs (Pattern 2)]		
5	(STIS.sp.82 4322)	(2) EY-HYA	STIS/NUV-MAMA, TIME-TAG, 52X0.2	G230L 2376 A	BUFFER-TIME=16 6		Pattern 1, Exps 5-5 in Visit 04 (1)	300 Secs (1028 Secs)		
								[==>514.0 Secs (Pattern 1)]	[2]	
								[==>514.0 Secs (Pattern 2)]		



Orbit 2

