



# 15268 - A First Investigation of the UV Extinction Properties of Interstellar Dust in M33

Cycle: 25, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

## INVESTIGATORS

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Kathryn Forbes Neugent (CoI)	Lowell Observatory	kneugent@lowell.edu

## 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) J013416.10+303344.9 (10) OFFSET-STAR-1	STIS/CCD STIS/NUV-MAMA	2	14-Oct-2019 14:00:47.0	yes
02	(2) J013250.80+303507 (11) OFFSET-STAR-2	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	2	14-Oct-2019 14:00:49.0	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	(3) J013341.93+304728	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	2	14-Oct-2019 14:00:50.0	yes
04	(4) J013344.59+304436	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	2	14-Oct-2019 14:00:51.0	yes
05	(5) J013406.63+304147	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	2	14-Oct-2019 14:00:52.0	yes
06	(6) J013339.52+304540	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	2	14-Oct-2019 14:00:52.0	yes
07	(7) J013410.59+304616 (13) OFFSET-STAR-7	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	2	14-Oct-2019 14:00:53.0	yes
08	(8) J013334.26+303327	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	2	14-Oct-2019 14:00:54.0	yes

16 Total Orbits Used

## **ABSTRACT**

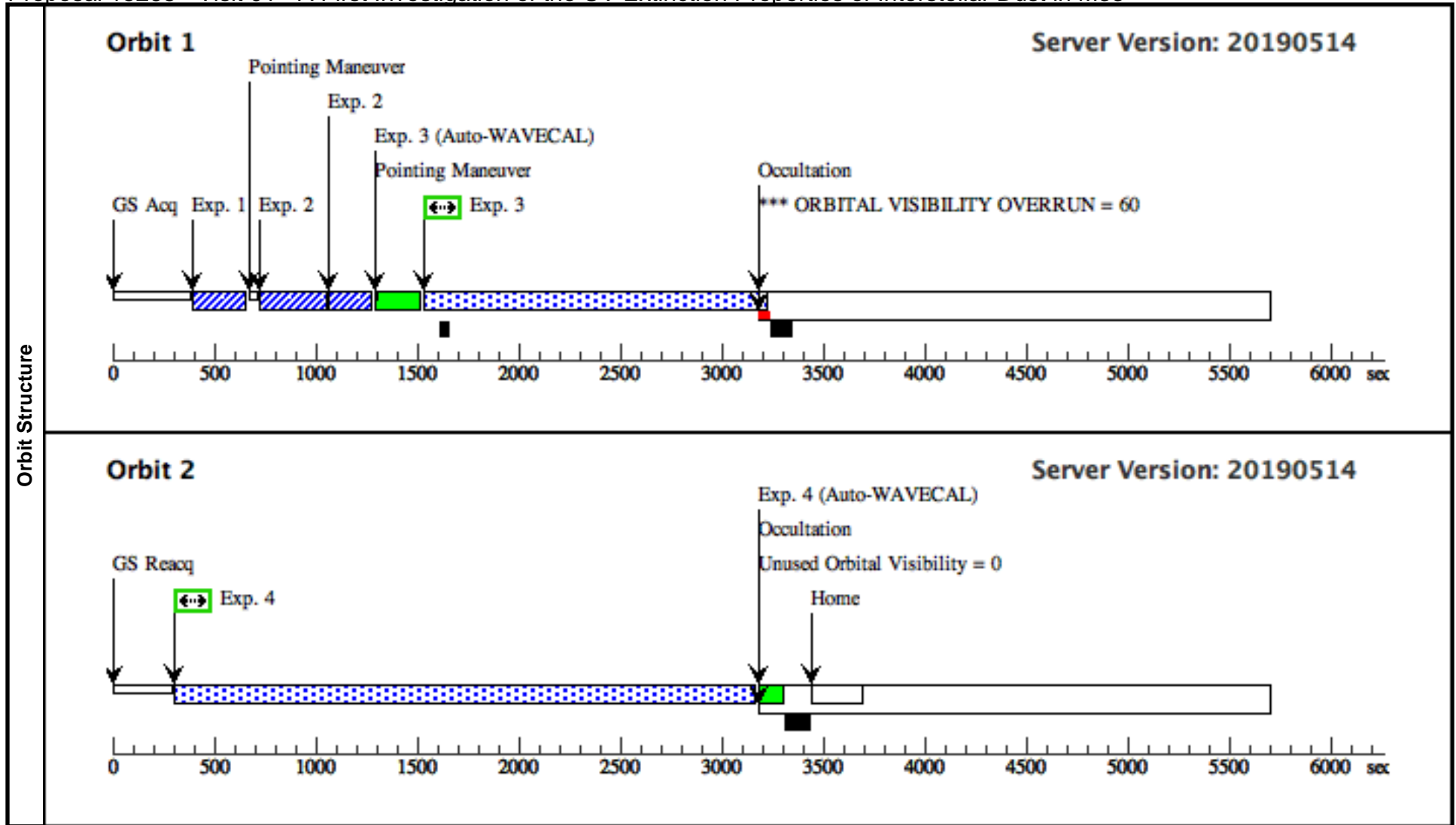
It is well known that the standard Milky Way UV extinction curve does not hold even in the most nearby galaxies, the LMC and the SMC. But, it is not even known whether the standard curve holds throughout our own galaxy because our position in the disk of the Milky Way, where extinction is high, prevents us from seeing most of our galaxy at UV wavelengths. We have a unique opportunity, while we still have the capability to obtain UV spectra, to investigate the UV extinction properties across another spiral galaxy in the Local Group, M33. The small aperture and high sensitivity of HST/STIS are ideal for obtaining UV spectra of stars in the crowded fields of M33. We propose to observe 8 stars in M33 which will provide good spatial coverage. We are choosing sightlines that lie in the footprint of the M33 Legacy Survey which extends the Panchromatic Hubble Andromeda Treasury (PHAT) survey. Focusing our study on the detailed properties of M33 dust grains via UV spectroscopy with HST/STIS will mean that we can directly connect the variations seen in the UV extinction curves with their environments. By selecting our sightlines in the M33 PHAT survey

region, we will be able to probe a variety of potential correlations between dust grains and their environment. This proposal is part of a long-term program to investigate the extinction properties of interstellar dust across a sample of Local Group galaxies, also including M31, with different global characteristics such as metallicity and star formation activity. There is a metallicity gradient across M33 from solar to sub-solar that will be sampled with our proposed sightlines.

### **OBSERVING DESCRIPTION**

We plan to observe a total of 8 stars, listed in Table 1 and in the Target Summary. The stars require 2 orbits each for a total of 16 orbits. The visibility for M33 (Dec  $\sim +40$  deg) is approximately 54 minutes per orbit. Using the Phase II Orbit Planner, including the Guide Star and STIS acquisition overheads, we find that we will get about 2800 s per orbit on M33 targets with the G230L and G140L gratings. Since we are using the 0.2 x 0.2 slit, no peakup is required. Each target has a single 2-orbit visit with no repeat visits, one orbit for each grating.

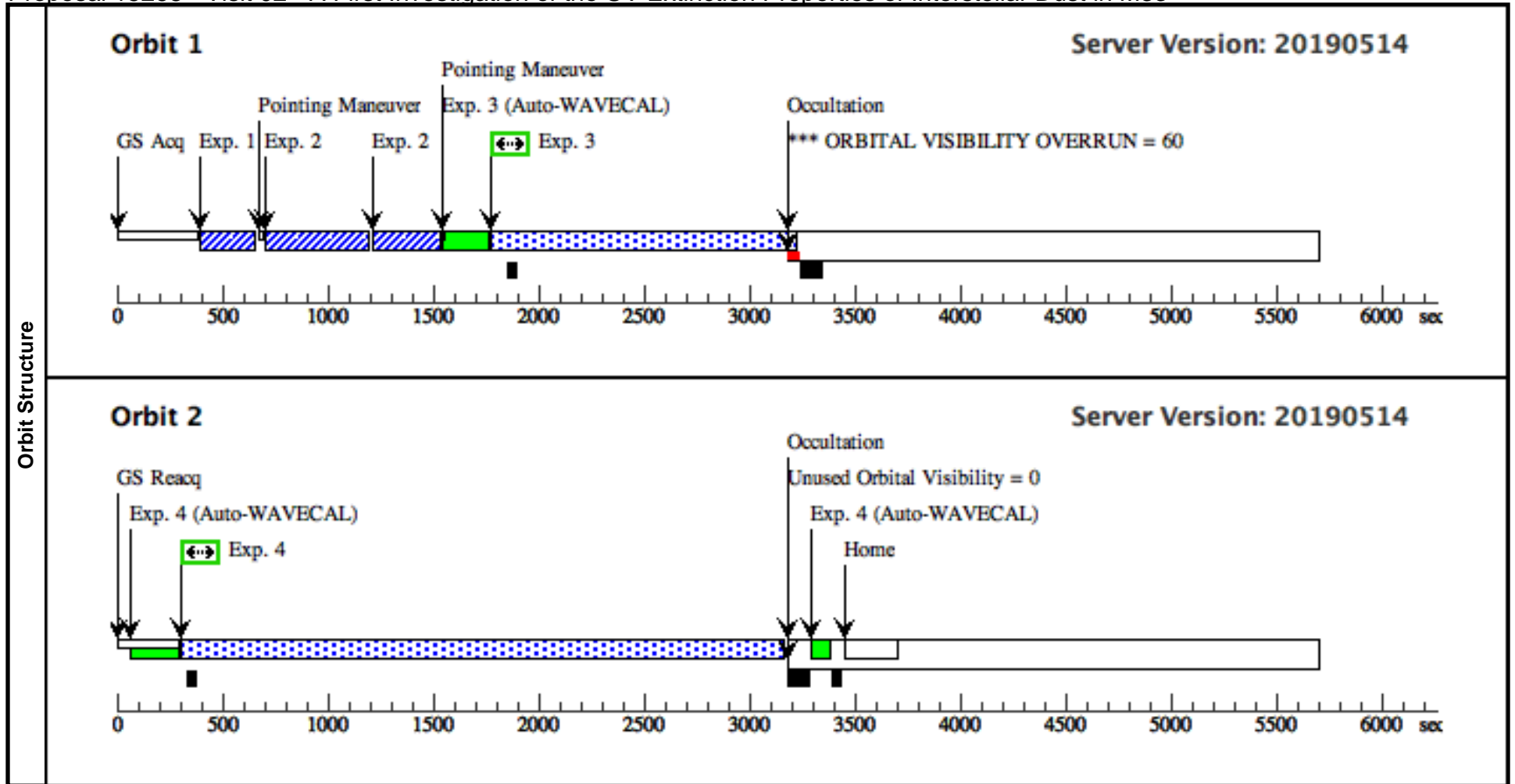




Proposal 15268 - Visit 02 - A First Investigation of the UV Extinction Properties of Interstellar Dust in M33

Mon Oct 14 18:00:55 GMT 2019

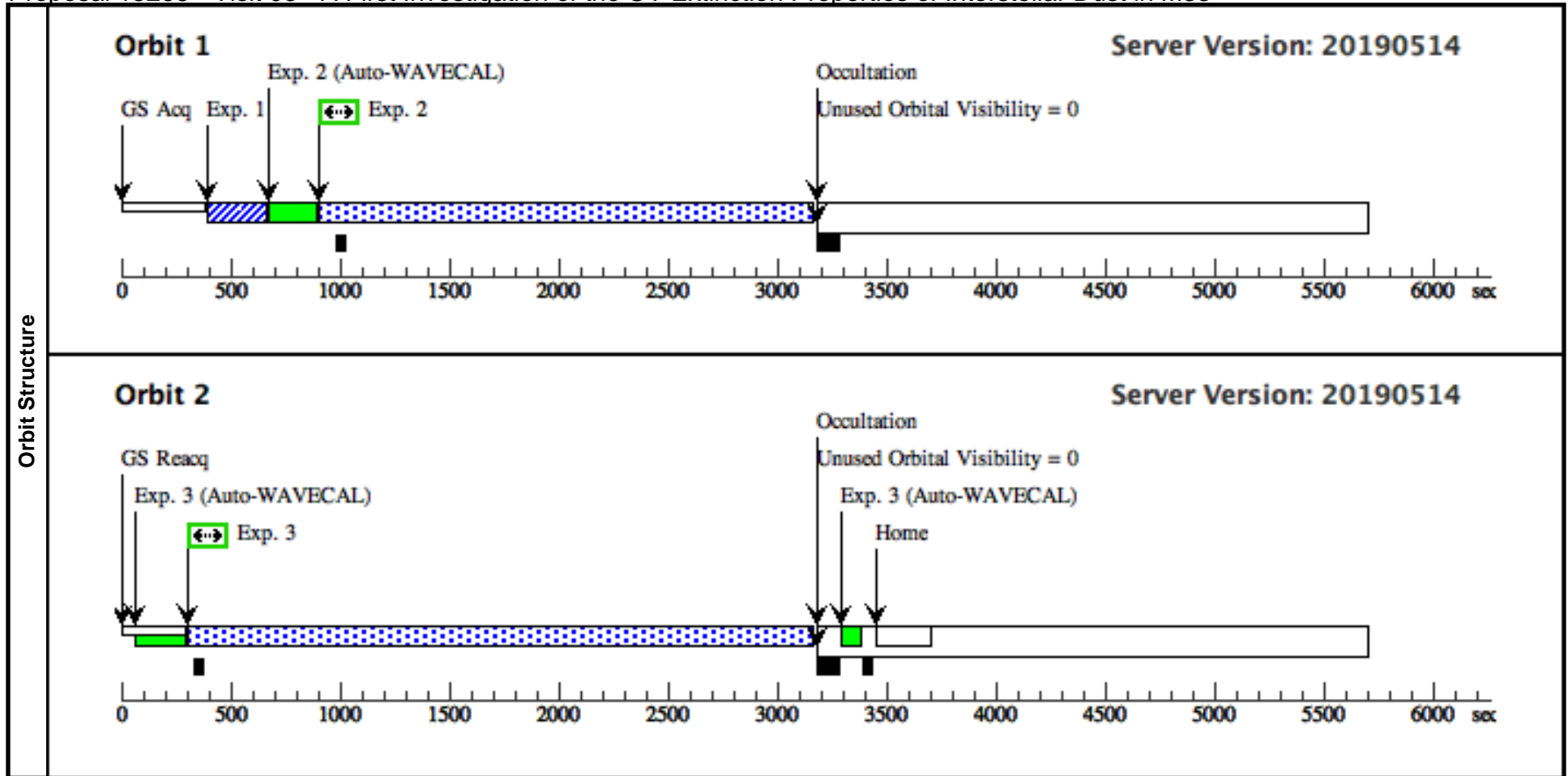
<b>Visit</b>	<b>Proposal 15268, Visit 02, completed</b> <b>Diagnostic Status: Warning</b> Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, STIS/FUV-MAMA Special Requirements: (none)																																																							
	(Visit 02) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN																																																							
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Proposal 15268 - Visit 03 - A First Investigation of the UV Extinction Properties of Interstellar Dust in M33

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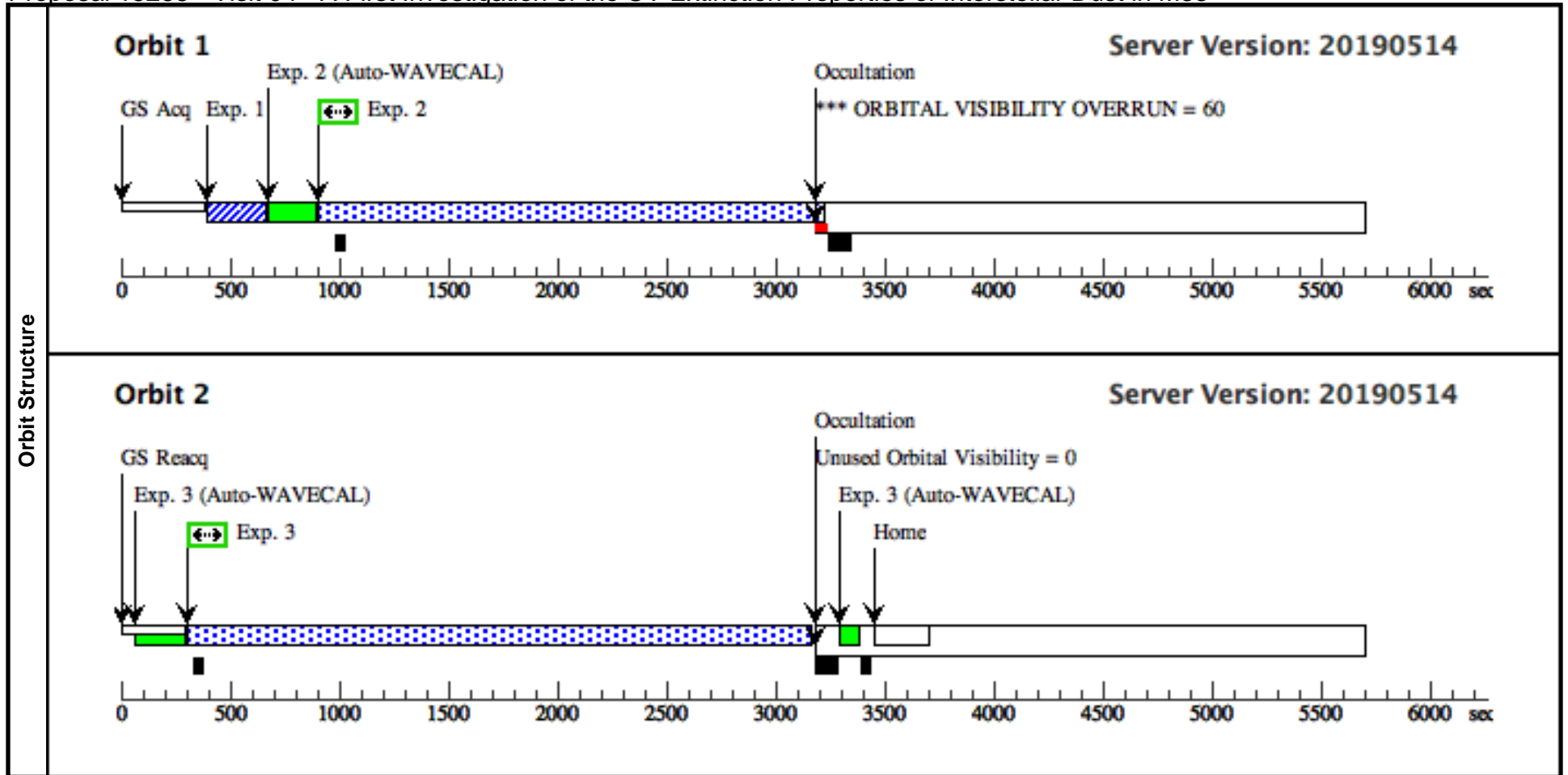
Visit	<b>Proposal 15268, Visit 03, implementation</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, STIS/FUV-MAMA Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
		(3)	J013341.93+304728	RA: 01 33 41.8838 (23.4245158d) Dec: +30 47 28.32 (30.79120d) Equinox: J2000		V=18.4+/-0.1 B-V=0.2	Reference Frame: ICRS			
	<i>Comments:</i> Category=STAR Description=[B0-B2 III-I] Extended=NO									
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(STIS.ta.136 2315)	(3) J013341.93+304 728	STIS/CCD, ACQ, F28X50LP	MIRROR				10 Secs (10 Secs)	
									[==>]	[1]
	2	(STIS.sp.18 1107)	(3) J013341.93+304 728	STIS/NUV-MAMA, ACCUM, 0.2X0.2	G230L 2376 A				2375 Secs (2187 Secs)	
								[==>2187.0 Secs ]	[1]	
3	(STIS.sp.18 1120)	(3) J013341.93+304 728	STIS/FUV-MAMA, ACCUM, 0.2X0.2	G140L 1425 A				3025 Secs (2836 Secs)		
								[==>2836.0 Secs ]	[2]	



Proposal 15268 - Visit 04 - A First Investigation of the UV Extinction Properties of Interstellar Dust in M33

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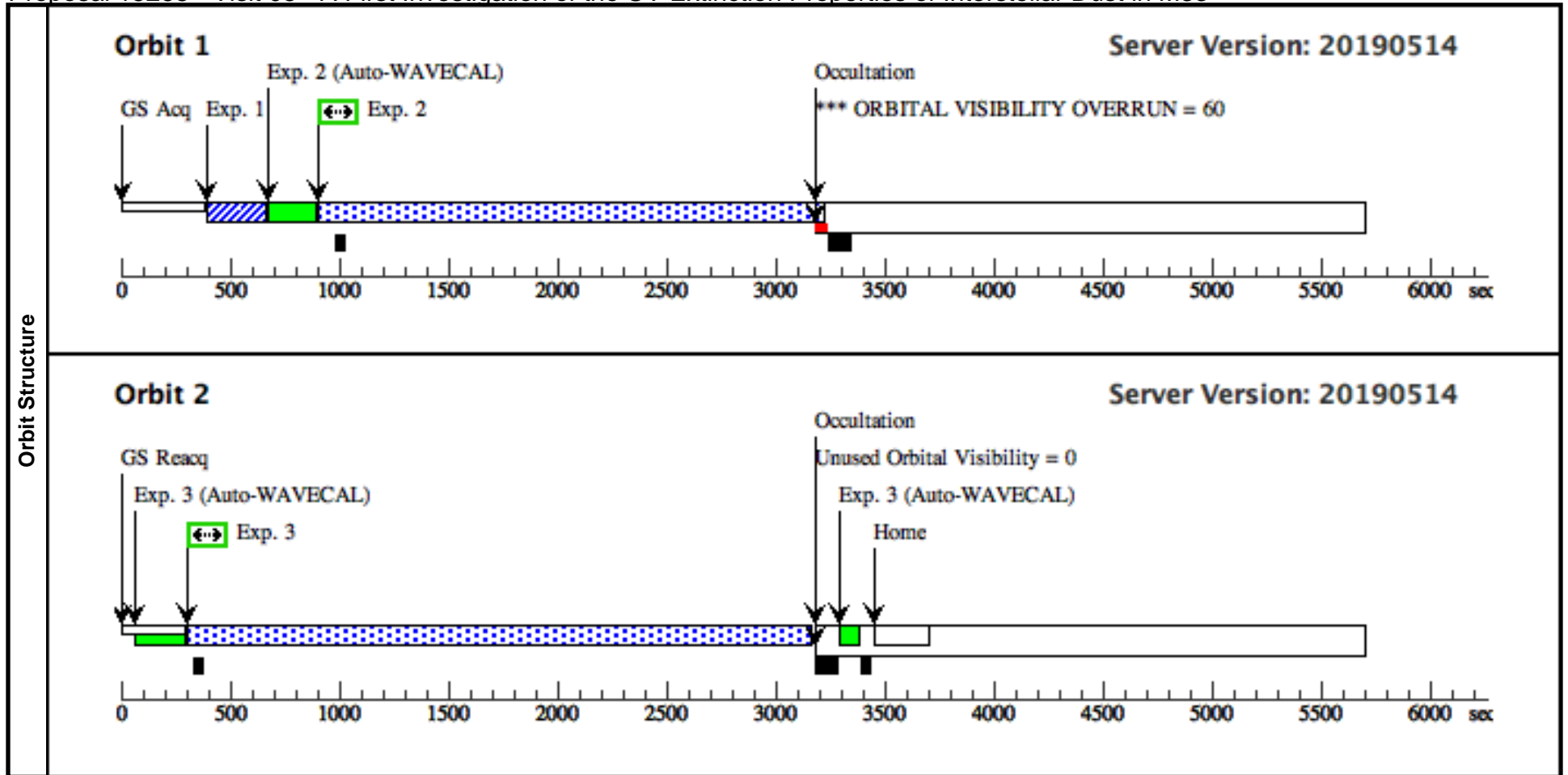
<b>Visit</b>	<b>Proposal 15268, Visit 04, completed</b> <b>Diagnostic Status: Warning</b> Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, STIS/FUV-MAMA Special Requirements: (none)																																													
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Proposal 15268 - Visit 05 - A First Investigation of the UV Extinction Properties of Interstellar Dust in M33

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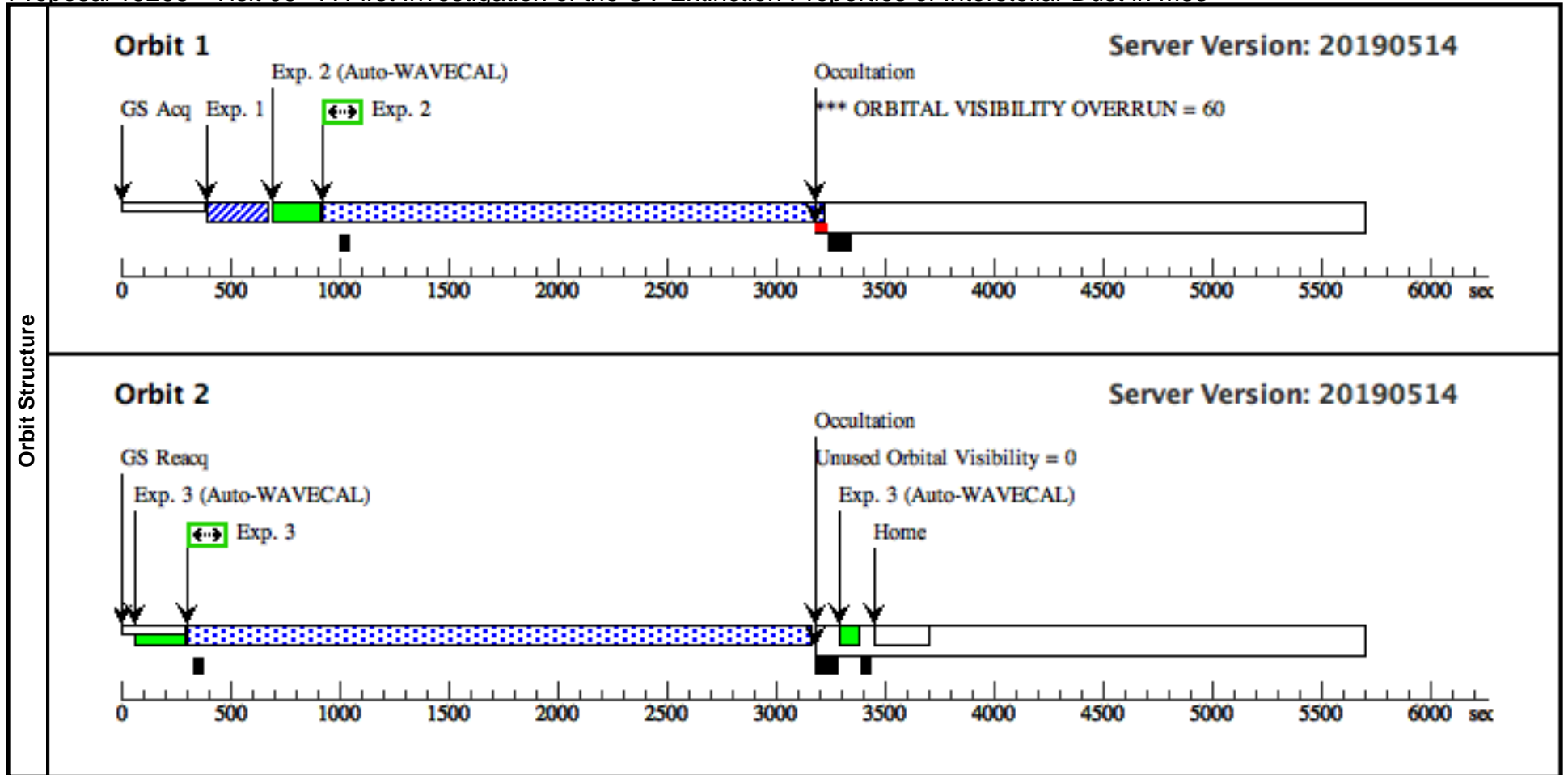
<b>Visit</b>	<b>Proposal 15268, Visit 05, completed</b> <b>Diagnostic Status: Warning</b> Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, STIS/FUV-MAMA Special Requirements: (none)																																													
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	1	(STIS.ta.136 2318)	(5) J013406.63+304 147	STIS/CCD, ACQ, F28X50LP	MIRROR				10 Secs (10 Secs) [==>]	[1]																																				
	2	(STIS.sp.18 1107)	(5) J013406.63+304 147	STIS/NUV-MAMA, ACCUM, 0.2X0.2	G230L 2376 A				2375 Secs (2247 Secs) [==>2247.0 Secs ]	[1]																																				
3	(STIS.sp.18 1120)	(5) J013406.63+304 147	STIS/FUV-MAMA, ACCUM, 0.2X0.2	G140L 1425 A				3025 Secs (2836 Secs) [==>2836.0 Secs ]	[2]																																					



Proposal 15268 - Visit 06 - A First Investigation of the UV Extinction Properties of Interstellar Dust in M33

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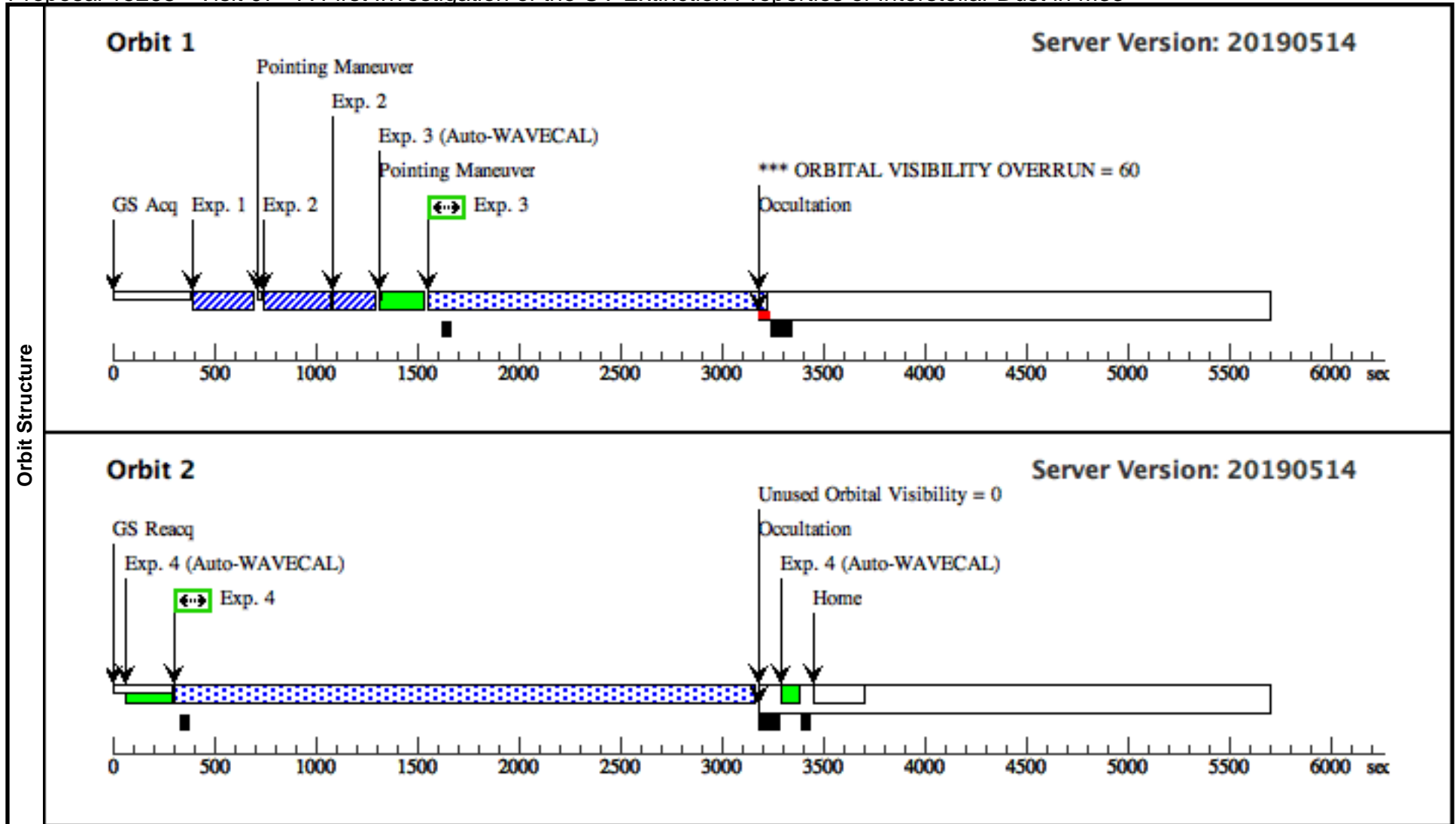
<b>Visit</b>	Proposal 15268, Visit 06, completed <b>Diagnostic Status: Warning</b> Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, STIS/FUV-MAMA Special Requirements: (none)										
	(Visit 06) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN										
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>		<b>Targ. Coord. Corrections</b>		<b>Fluxes</b>	<b>Miscellaneous</b>			
	(6)	J013339.52+304540	RA: 01 33 39.4900 (23.4145417d) Dec: +30 45 40.40 (30.76122d) Equinox: J2000				V=17.50+/-0.01	Reference Frame: ICRS			
Comments: Category=STAR Description=[B0-B2 III-I]											
<b>Exposures</b>	<b>#</b>	<b>Label (ETC Run)</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time (Total)/[Actual Dur.]</b>		<b>Orbit</b>
	1		(6) J013339.52+304540	STIS/CCD, ACQ, 50CCD	MIRROR				10 Secs (10 Secs)		
									[=>]		[1]
	2	(STIS.sp.18 1107)	(6) J013339.52+304540	STIS/NUV-MAMA, ACCUM, 0.2X0.2	G230L				2230 Secs (2230 Secs)		
						2376 A			[=>]		[1]
3	(STIS.sp.18 1120)	(6) J013339.52+304540	STIS/FUV-MAMA, ACCUM, 0.2X0.2	G140L				2836 Secs (2836 Secs)			
					1425 A			[=>]		[2]	



Proposal 15268 - Visit 07 - A First Investigation of the UV Extinction Properties of Interstellar Dust in M33

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<b>Visit</b>	<b>Proposal 15268, Visit 07, completed</b> <b>Diagnostic Status: Warning</b> Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, STIS/FUV-MAMA Special Requirements: (none)									
	(Visit 07) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN									
<b>Diagnostics</b>										
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>	<b>Fluxes</b>	<b>Miscellaneous</b>				
	(7)	J013410.59+304616	Offset from OFFSET-STAR-7 RA Offset: -0.672 Secs Dec Offset: -1.44 Arcsec		V=18.7+/-0.1 B-V =0.29	Offset Position (J013410.59+304616)				
	<i>Comments:</i> Category=STAR Description=[B0-B2 III-I] Extended=NO									
	(13)	OFFSET-STAR-7	RA: 01 34 11.2770 (23.5469875d) Dec: +30 46 17.94 (30.77165d) Equinox: J2000		V=21.3+/-0.1 I = 18.7	Reference Frame: ICRS				
<i>Comments:</i> Category=STAR Description=[K III-I]										
<b>Exposures</b>	<b>#</b>	<b>Label (ETC Run)</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time (Total)/[Actual Dur.]</b>	<b>Orbit</b>
	1	(STIS.ta.136 2319)	(13) OFFSET-STAR-7	STIS/CCD, ACQ, F28X50LP	MIRROR				20 Secs (20 Secs) [=>]	[1]
	2	(STIS.ta.136 2307)	(7) J013410.59+304616	STIS/CCD, ACQ/PEAK, 0.2X0.09	MIRROR				10 Secs (10 Secs) [=>]	[1]
	3	(STIS.sp.18 1107)	(7) J013410.59+304616	STIS/NUV-MAMA, ACCUM, 0.2X0.2	G230L 2376 A				2375 Secs (1605 Secs) [=>1605.0 Secs ]	[1]
	4	(STIS.sp.18 1120)	(7) J013410.59+304616	STIS/FUV-MAMA, ACCUM, 0.2X0.2	G140L 1425 A				3025 Secs (2836 Secs) [=>2836.0 Secs ]	[2]



Proposal 15268 - Visit 08 - A First Investigation of the UV Extinction Properties of Interstellar Dust in M33

Mon Oct 14 18:00:56 GMT 2019

<b>Visit</b>	<b>Proposal 15268, Visit 08, completed</b> <b>Diagnostic Status: Warning</b> Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, STIS/FUV-MAMA Special Requirements: (none)																																													
	(Visit 08) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN																																													
<b>Diagnosics</b>																																														
<b>Fixed Targets</b>	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(8)</td> <td>J013334.26+303327</td> <td>RA: 01 33 34.2300 (23.3926250d) Dec: +30 33 27.50 (30.55764d) Equinox: J2000</td> <td></td> <td>V=18.55+/-0.01</td> <td>Reference Frame: ICRS</td> </tr> </tbody> </table>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(8)	J013334.26+303327	RA: 01 33 34.2300 (23.3926250d) Dec: +30 33 27.50 (30.55764d) Equinox: J2000		V=18.55+/-0.01	Reference Frame: ICRS	Comments: Category=STAR Description=[B0-B2 III-I] Extended=NO																																
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