



13703 - The donor star winds in High-Mass X-ray Binaries

Cycle: 22, Proposal Category: GO

(UV Initiative)

(Availability Mode: AVAILABLE)

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) HD-306414	STIS/CCD STIS/FUV-MAMA	3	09-Dec-2014 21:01:50.0	yes
02	(2) BD+532790	STIS/CCD STIS/FUV-MAMA	1	09-Dec-2014 21:01:52.0	yes
03	(3) BD+6073	STIS/CCD STIS/FUV-MAMA	2	09-Dec-2014 21:01:53.0	yes
04	(4) V-V884-SCO	STIS/CCD STIS/FUV-MAMA	1	09-Dec-2014 21:01:54.0	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>
05	(5) HD-100199	STIS/CCD STIS/FUV-MAMA	1	09-Dec-2014 21:01:55.0	yes
06	(6) V-LM-VEL	STIS/CCD STIS/FUV-MAMA	1	09-Dec-2014 21:01:56.0	yes

9 Total Orbits Used

ABSTRACT

High-mass X-ray binaries (HMXBs) are essential astrophysical laboratories. These objects represent an advanced stage in the evolution of massive binary systems, after the initially more massive star has already collapsed in a supernova explosion, but its remnant, a neutron star or black hole, remains gravitationally bound. The stellar wind from the OB-type donor is partially accreted onto its compact companion powering its relatively high X-ray luminosity. Since HMXBs accrete from the stellar wind, parameters such as the donor's mass-loss rate, the velocity of the wind, and its clumpiness are of fundamental importance.

This proposal takes advantage of the unique capabilities of HST/STIS for UV spectroscopy. We focus on the most populous in the Galaxy class of those HMXBs where the stellar wind of the OB donor is directly accreted onto a neutron star. Recently, a new sub-class of HMXBs - "supergiant fast X-ray transients" - was discovered. It has been proposed that these enigmatic objects can be explained by the specific properties of their donor-star winds. The only way to validate or disprove this hypothesis is by studying the wind diagnostics lines in the UV spectra of donor stars. The observations proposed here will, for the first time, provide the UV spectra of this important new type of accreting binaries. Our state-of-the-art non-LTE expanding stellar atmospheres and 3-D stellar wind simulations allow thorough exploitation of the STIS spectra. As a result we will obtain the wind parameters for a representative sample of six Galactic HMXBs, thus heightening our knowledge thereof considerably.

OBSERVING DESCRIPTION

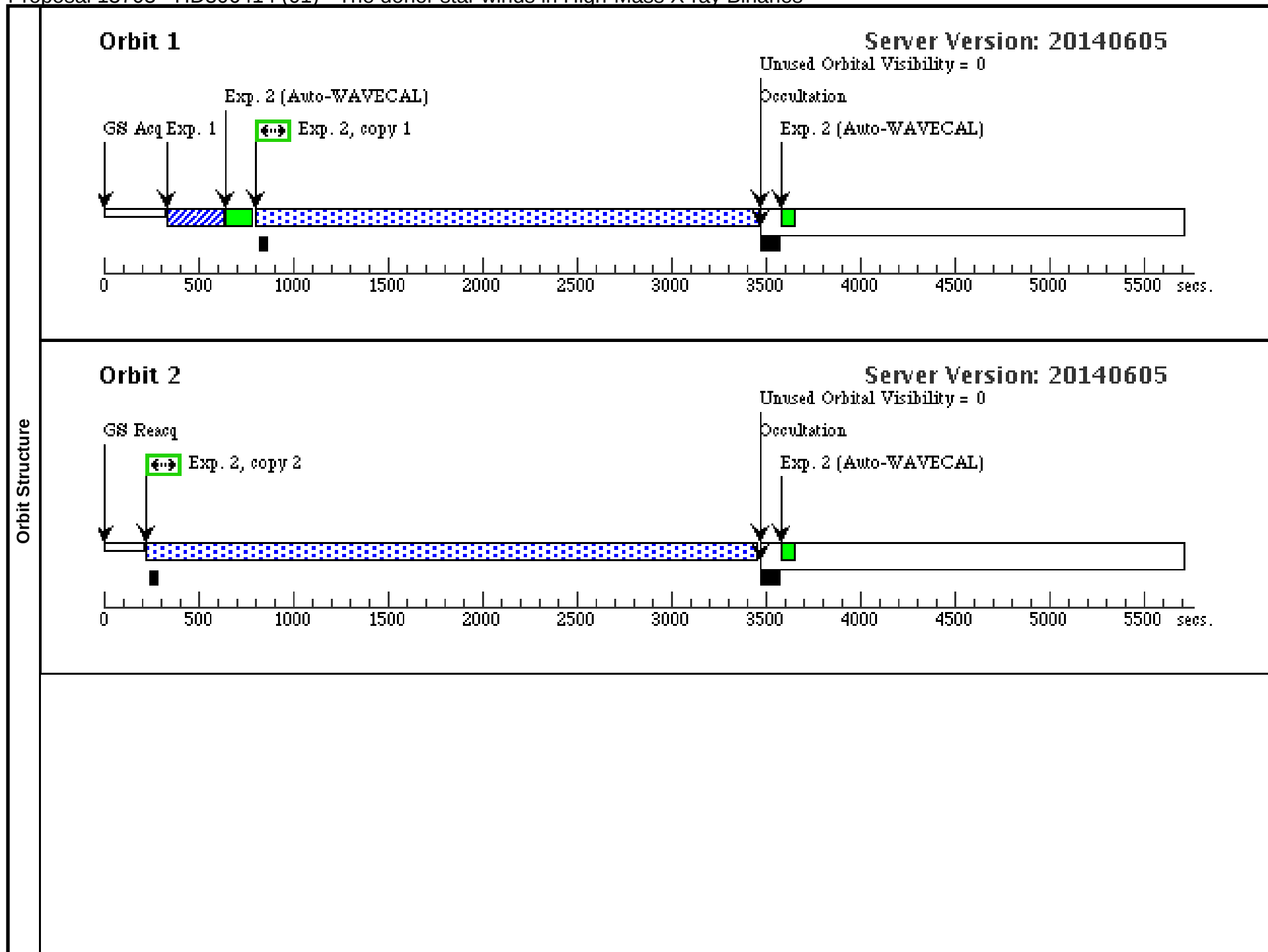
An UV survey of a clean sample consisting of six wind-fed HMXBs, including persistent X-ray sources as well as supergiant fast X-ray transients. The program consists of a total of 9 HST orbits.

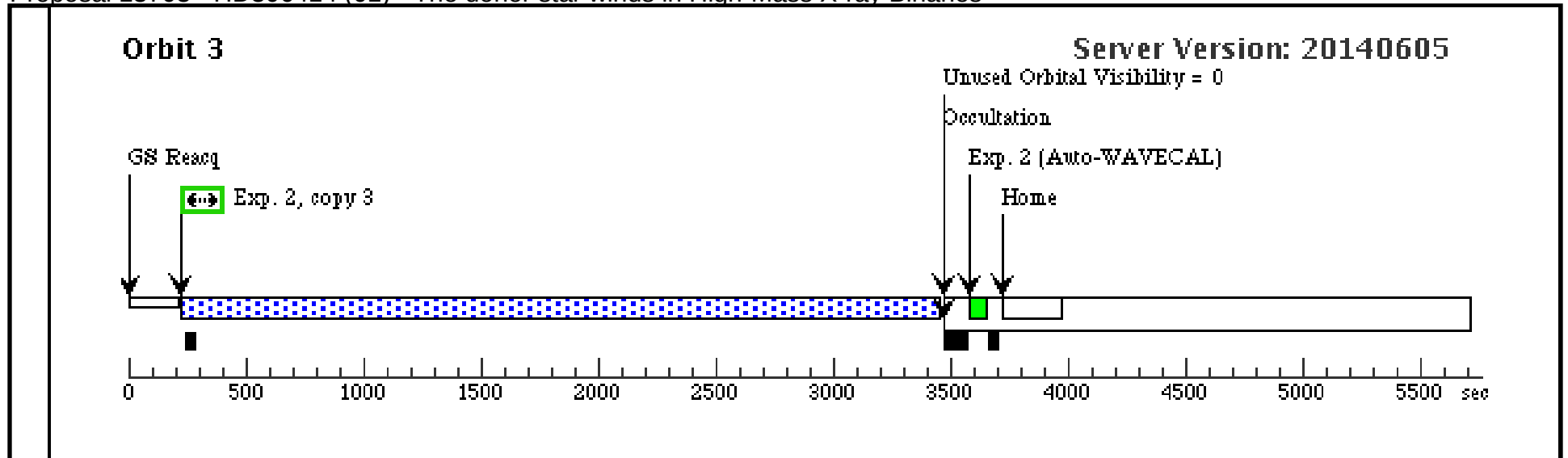
The observations will be performed with the E140M echelle grating centered at 1425 Å, and recorded by the FUV MAMA detector.

For the UV-brightest targets we must choose the small $0.1 \text{ arcsec} \times 0.03 \text{ arcsec}$ aperture in order to avoid the MAMA bright limit of the total count rate per image.

Proposal 13703 - HD306414 (01) - The donor star winds in High-Mass X-ray Binaries

Visit	Proposal 13703, HD306414 (01), scheduling										Wed Dec 10 02:01:57 GMT 2014	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: STIS/CCD, STIS/FUV-MAMA											
	Special Requirements: (none)											
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Fluxes		Miscellaneous	
	(1)	HD-306414	RA: 11 21 46.8150 (170.4450625d)			Proper Motion RA: -10.60 mas/yr			V=10.16+/-0.04		Reference Frame: ICRS	
		Alt Name1: IGR-J11215-5952	Dec: -59 51 47.96 (-59.86332d)			Proper Motion Dec: 4.70 mas/yr						
			Equinox: J2000			Epoch of Position: 2000						
	Comments: SFXT											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	HD306414A CQ (STIS.ta.622 302)	(1) HD-306414	STIS/CCD, ACQ, F25ND3		MIRROR				2 Secs (2 Secs)		
										[==>]		[1]
	2	HD306414S CI (STIS.sp.62 1854)	(1) HD-306414	STIS/FUV-MAMA, ACCUM, 0.2X0.2		E140M 1425 A				2340 Secs X 3 (9076 Secs)		
										[==>2640.0 Secs (Copy 1)]		[1]
										[==>3218.0 Secs (Copy 2)]		[2]
										[==>3218.0 Secs (Copy 3)]		[3]



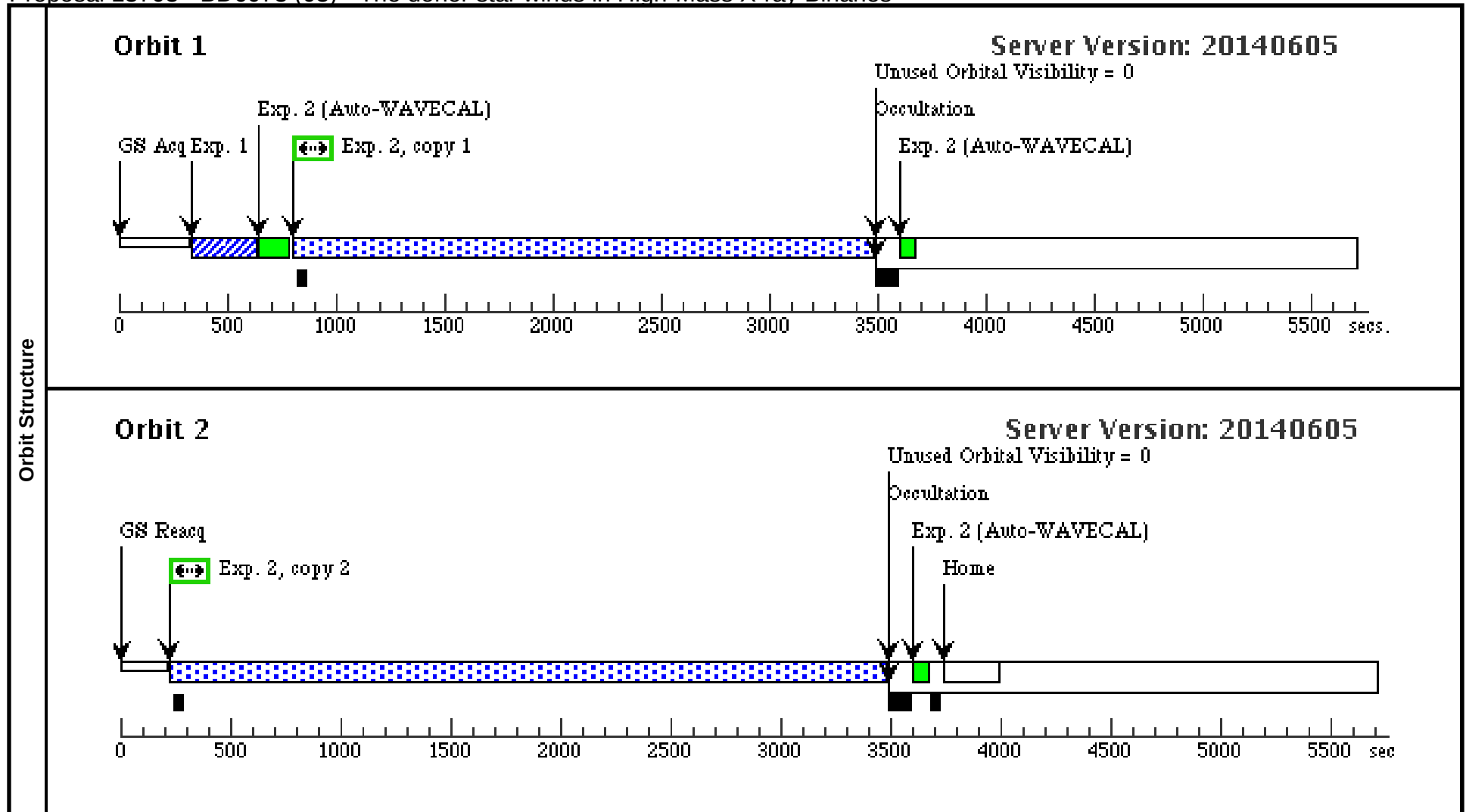


Proposal 13703 - BD532790 (02) - The donor star winds in High-Mass X-ray Binaries

Visit	Proposal 13703, BD532790 (02), scheduling										Wed Dec 10 02:01:58 GMT 2014
	Diagnostic Status: No Diagnostics										
	Scientific Instruments: STIS/CCD, STIS/FUV-MAMA										
	Special Requirements: (none)										
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(2)	BD+532790	RA: 22 07 56.2380 (331.9843250d)		Proper Motion RA: -4.3 mas/yr		V=9.90+/-0.03		Reference Frame: ICRS		
		Alt Name1: 4U-2206+543	Dec: +54 31 6.41 (54.51845d)		Proper Motion Dec: -3.1 mas/yr						
	Equinox: J2000										
	Epoch of Position: 2000										
	Comments: HMXB										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	BD532790-ACQ (STIS.ta.622 301)	(2) BD+532790	STIS/CCD, ACQ, F25ND3	MIRROR				3 Secs (3 Secs)		
									[==>]	[1]	
	2	BD532790-SCI (STIS.sp.62 2306)	(2) BD+532790	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				2575 Secs (2575 Secs)		
									[==>]	[1]	
Orbit Structure	Orbit 1										
	Server Version: 20140605										
	Occultation Unused Orbital Visibility = 0 Exp. 2 (Auto-WAVECAL) Home Exp. 2 (Auto-WAVECAL) GS Acq Exp. 1 Exp. 2										

Proposal 13703 - BD6073 (03) - The donor star winds in High-Mass X-ray Binaries

Visit	Proposal 13703, BD6073 (03), scheduling								Wed Dec 10 02:01:58 GMT 2014	
	Diagnostic Status: No Diagnostics									
	Scientific Instruments: STIS/CCD, STIS/FUV-MAMA									
	Special Requirements: (none)									
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous	
	(3)	BD+6073	RA: 00 37 9.6390 (9.2901625d)		Proper Motion RA: -1.66 mas/yr		V=9.68+/-0.02		Reference Frame: ICRS	
		Alt Name1: IGR-J00370+6122	Dec: +61 21 36.53 (61.36015d)		Proper Motion Dec: 0.51 mas/yr					
			Equinox: J2000		Epoch of Position: 2000					
	Comments: SFXT									
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	BD6073AC Q (STIS.ta.622 317)	(3) BD+6073	STIS/CCD, ACQ, F25ND3	MIRROR				2 Secs (2 Secs)	
									[==>]	[1]
	2	BD6073SCI (STIS.sp.62 2320)	(3) BD+6073	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				2664 Secs X 2 (5906 Secs)	
									[==>(Copy 1)]	[1]
[==>3242.0 Secs (Copy 2)]									[2]	



Proposal 13703 - V884Sco (04) - The donor star winds in High-Mass X-ray Binaries

Visit	Proposal 13703, V884Sco (04), implementation										Wed Dec 10 02:01:58 GMT 2014
	Diagnostic Status: No Diagnostics										
	Scientific Instruments: STIS/CCD, STIS/FUV-MAMA										
	Special Requirements: (none)										
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(4)	V-V884-SCO	RA: 17 03 56.7720 (255.9865500d)		Proper Motion RA: 2.80 mas/yr		V=6.53+/-0.01		Reference Frame: ICRS		
		Alt Name1: 4U-1700-37	Dec: -37 50 38.91 (-37.84414d)		Proper Motion Dec: 4.71 mas/yr						
			Equinox: J2000		Epoch of Position: 2000						
	Comments: HMXB										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	V884Sco A CQ (STIS.ta.650 026)	(4) V-V884-SCO	STIS/CCD, ACQ, F25ND3	MIRROR					0.5 Secs (0.5 Secs)	
										[==>]	[1]
	2	V884SCO-ACQ-PEAK (0.2x0.05N D) (STIS.ta.650 030)	(4) V-V884-SCO	STIS/CCD, ACQ/PEAK, 31X0.05NDB	MIRROR					0.1 Secs (0.1 Secs)	
										[==>]	[1]
3	V884ScoSC I (STIS.sp.62 4010)	(4) V-V884-SCO	STIS/FUV-MAMA, ACCUM, 31X0.05NDB	E140M 1425 A					2500 Secs (1993 Secs)		
									[==>1993.0 Secs]	[1]	
	Comments: An IUE spectrum of the source was used as an inut spectrum for the ETC calculations										
Orbit Structure	Orbit 1 Server Version: 20140605 Pointing Maneuver Pointing Maneuver Exp. 3 (Auto-WAVECAL) Occultation Unused Orbital Visibility = 0 Home GS Acq Exp. 1 Exp. 2 Exp. 3										

Proposal 13703 - HD100199 (05) - The donor star winds in High-Mass X-ray Binaries

Visit	Proposal 13703, HD100199 (05), implementation										Wed Dec 10 02:01:58 GMT 2014
	Diagnostic Status: No Diagnostics										
	Scientific Instruments: STIS/CCD, STIS/FUV-MAMA										
	Special Requirements: (none)										
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(5)	HD-100199	RA: 11 31 6.9130 (172.7788042d)		Proper Motion RA: -5.81 mas/yr		V=8.17+/-0.01		Reference Frame: ICRS		
		Alt Name1: IGR-J11305-6256	Dec: -62 56 48.93 (-62.94692d)		Proper Motion Dec: 0.23 mas/yr						
			Equinox: J2000		Epoch of Position: 2000						
	Comments: HMXB										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	HD100199A CQ (STIS.ta.649 996)	(5) HD-100199	STIS/CCD, ACQ, F25ND3		MIRROR				1 Secs (1 Secs)	
										[==>]	[1]
	2	HD100199-ACQ-PEAK (STIS.ta.650 022)	(5) HD-100199	STIS/CCD, ACQ/PEAK, 31X0.05NDA		MIRROR				0.1 Secs (0.1 Secs)	
										[==>]	[1]
3	HD100199S CI (STIS.sp.65 0001)	(5) HD-100199	STIS/FUV-MAMA, ACCUM, 31X0.05NDA		E140M 1425 A				2500 Secs (2213 Secs)		
									[==>2213.0 Secs]	[1]	
Orbit Structure	Orbit 1 Server Version: 20140605 Pointing Maneuver Pointing Maneuver Exp. 3 (Auto-WAVECAL) Unused Orbital Visibility = 0 Occultation Home GS Acq Exp. 1 Exp. 2 Exp. 3 </										

Proposal 13703 - LM-Vel (06) - The donor star winds in High-Mass X-ray Binaries

Visit	Proposal 13703, LM-Vel (06), implementation					Wed Dec 10 02:01:58 GMT 2014				
	Diagnostic Status: No Diagnostics									
	Scientific Instruments: STIS/CCD, STIS/FUV-MAMA									
	Special Requirements: (none)									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(6)	V-LM-VEL	RA: 08 40 47.7919 (130.1991329d)	Proper Motion RA: -7.21 mas/yr	V=7.58+/-0.01	Reference Frame: ICRS				
		Alt Name1: IGR-J08408-4503	Dec: -45 03 30.21 (-45.05839d)	Proper Motion Dec: 5.66 mas/yr						
			Equinox: J2000	Epoch of Position: 2000						
Comments: SFXT										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	LMVEL-AC Q (STIS.ta.650005)	(6) V-LM-VEL	STIS/CCD, ACQ, F25ND3	MIRROR				1 Secs (1 Secs)	
									[==>]	[1]
	2	LMVEL-SC i (STIS.sp.650038)	(6) V-LM-VEL	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				2537 Secs (2532 Secs)	
									[==>2532.0 Secs]	[1]
Orbit Structure	Orbit 1 Server Version: 20140605 Occultation Unused Orbital Visibility = 0 Exp. 2 (Auto-WAVECAL) Home Exp. 2 (Auto-WAVECAL) GS Acq Exp. 1 Exp. 2									