



13487 - A pilot study to characterize the Lyman alpha emission of active exoplanet host stars

Cycle: 21, Proposal Category: SNAP

(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-146389	STIS/CCD STIS/FUV-MAMA	1	12-Jul-2013 14:04:52.0	yes
02	(2) HD-147506	STIS/CCD STIS/FUV-MAMA	1	12-Jul-2013 14:04:57.0	yes
03	(3) STKM-1-649-1	STIS/CCD STIS/FUV-MAMA	1	12-Jul-2013 14:05:01.0	yes
04	(4) GSC-05490-00141	STIS/CCD STIS/FUV-MAMA	1	12-Jul-2013 14:05:05.0	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) CCDM-J02286-0704AB	STIS/CCD STIS/FUV-MAMA	1	12-Jul-2013 14:05:08.0	yes
06	(6) GSC-02752-00114	STIS/CCD STIS/FUV-MAMA	1	12-Jul-2013 14:05:12.0	yes
07	(7) CD-35-16019	STIS/CCD STIS/FUV-MAMA	1	12-Jul-2013 14:05:15.0	yes
08	(8) TYC-5165-481-1	STIS/CCD STIS/FUV-MAMA	1	12-Jul-2013 14:05:19.0	yes

8 Total Orbits Used

ABSTRACT

We propose to measure the strength of the stellar hydrogen Lyman alpha emission in a sample of seven planet host-stars with transiting hot Jupiters using HST-STIS snapshots. Strong UV irradiation is thought to heat the outer planetary atmosphere leading to atmospheric expansion that may result in substantial mass-loss. Expanded hydrogen atmospheres have been detected around the two hot Jupiters HD 209458 b and HD 189733 b by means of Ly alpha transit spectroscopy, which is only possible with the HST. Further observational studies of planetary atmospheres are crucial to constrain model calculations and improve our understanding of planetary mass-loss. We compiled a sample of planet host-stars with the strongest anticipated Ly alpha fluxes. The accuracy of these estimates is fundamentally limited by uncertainties in the intrinsic stellar emission and the interstellar absorption column density. The proposed program is needed to establish the true Ly alpha fluxes and identify suitable targets for follow-up transit campaigns aimed at detecting the planetary atmosphere.

OBSERVING DESCRIPTION

The main observational task is to measure the strength of the Ly alpha emission. The layout of the observations follows the successful HST STIS observations of HD209458 and HD189733. We will use STIS, because airglow cannot be removed from COS data with the required accuracy. To identify suitable targets for follow-up studies, we have to identify the portion of the Ly alpha line-profile unaffected by airglow since the wavelength regions affected by airglow have a significantly higher error in the reduced spectrum. Therefore, we will use the G140M grating (the G140L does not provide sufficient spectral resolution).

Proposal 13487 (STScI Edit Number: 0, Created: Friday, July 12, 2013 1:05:25 PM EST) - Overview

Based on the observations of HD209458, we conclude that an exposure time of 20 min is sufficient to identify targets amenable to follow-up studies. Since we are currently only interested in the strength of the Ly alpha emission, but not in the exact line profile, we will maximize the available exposure time by skipping the WAVECAL exposure. An approximate wavelength zero-point will be determined from the Ly alpha airglow line. If a strong Ly alpha emission feature is visible, we expect to detect also metal features of Si III and N V, which will allow a (relative) wavelength calibration. If no or weak Ly alpha emission is detected, the wavelength calibration is dispensable. With this procedure, we will be able to carry out a sufficiently accurate characterization of the Ly alpha emission to select the best targets for follow-up. We do not attempt to measure the actual transit so that no time for telescope settling is required.

DETECTOR SAFETY

All sources in the sample are of spectral type F8 or later; they are more than six magnitudes fainter than the brightness-limits for the proposed setup. We checked the SIMBAD database for sources violating the brightness limit within a radius of 2 arcmin but found none. Additionally, we inspected SDSS and USNO images of the surroundings of our target stars. The brightest sources within 30 arcsec of the targets have $V \sim 15$ mag, so that the long-slit observations do not pose any safety concern when using the 52 arcsec long slit.

The bright object tool (BOT) of the APT has been used to further check for any limiting sources. The GALEX screening does not show any Health/Safety objects. We used the Simbad tool to overplot the GALEX images and the aperture and checked that there is full GALEX coverage of all sources but WASP-80. The GSC II screening reveals one Health Safety object, which is our target HAT-P-2. The BOT assumes a 0.5V star, however the star is of spectral type F8V. The target has been cleared with the ETC (Kurucz model - F8V + Lyman alpha estimate from the phase I proposal) and is more than four orders of magnitude below the safety limits.

The GSC II screening also reveals one unknown object. It is on the axis between the target HAT-P-20 and the known faint red companion of the star. Since full GALEX coverage is available for the region, the unknown object may be ignored.

Both objects have been cleared with the CS.

Therefore, it is safe to observe our target sample with STIS MAMA using the 52x0.2 arcsec slit with an arbitrary orientation angle.

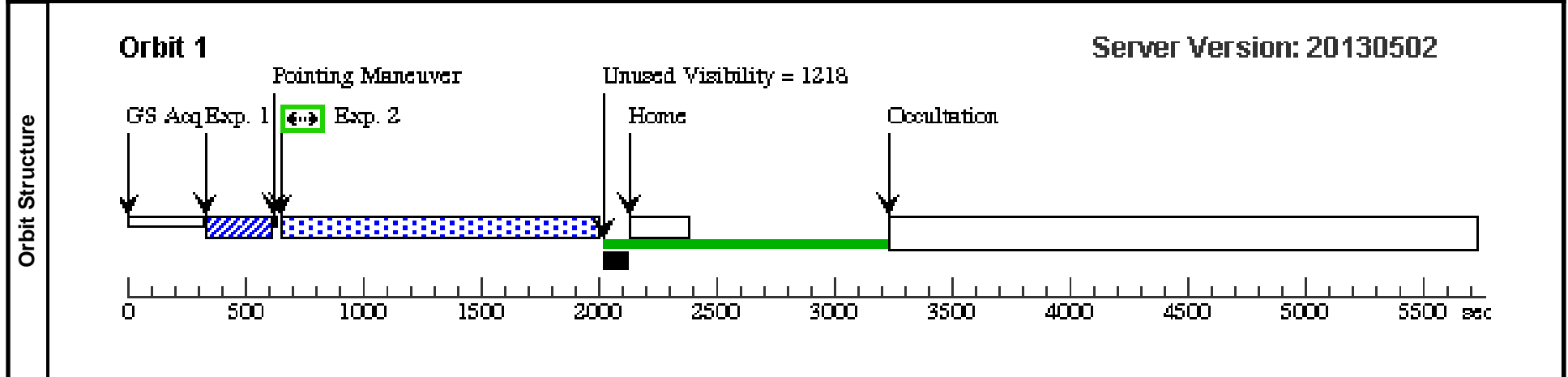
Proposal 13487 - Wasp-38 (01) - A pilot study to characterize the Lyman alpha emission of active exoplanet host stars

Fri Jul 12 18:05:25 GMT 2013

Visit	Proposal 13487, Wasp-38 (01)				
	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-146389	RA: 16 15 50.3340 (243.9597250d)		V=9.39	Reference Frame: ICRS
		Alt Name1: WASP-38	Dec: +10 01 56.86 (10.03246d)			
			Equinox: J2000			
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	target acq. (516282)	(1) HD-146389	STIS/CCD, ACQ, F28X500II	MIRROR	ACQTYPE=POINT			5 Secs (5 Secs)	
									[==>]	[1]
	2	science exp. (515132)	(1) HD-146389	STIS/FUV-MAMA, ACCUM, 52X0.2D1	G140M 1222 A	WAVECAL=NO			1200 Secs (1200 Secs)	
									[==>]	[1]



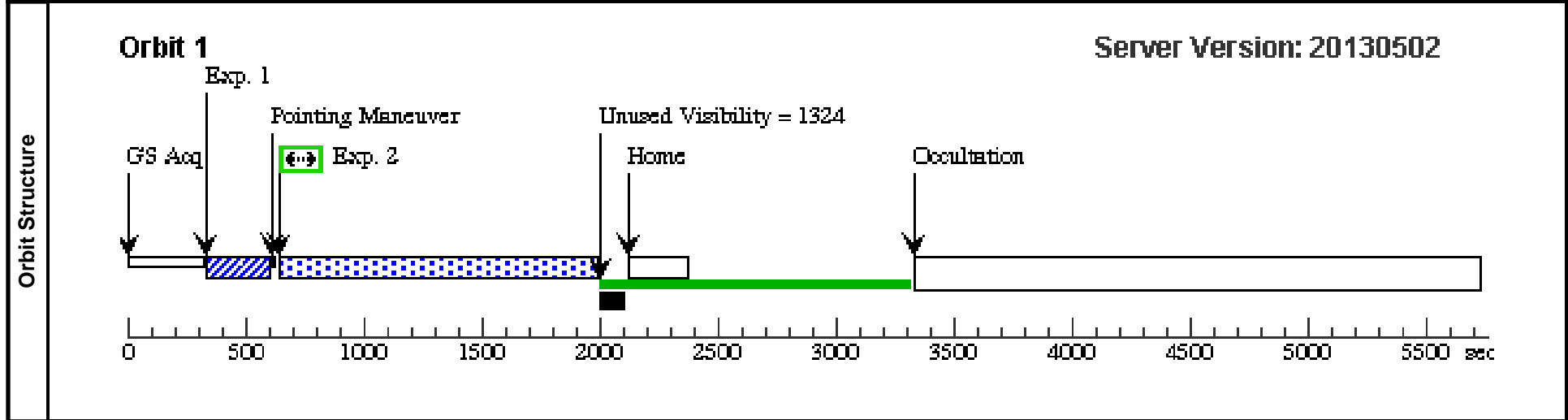
Proposal 13487 - HAT-P-2 (02) - A pilot study to characterize the Lyman alpha emission of active exoplanet host stars

Fri Jul 12 18:05:27 GMT 2013

Visit	Proposal 13487, HAT-P-2 (02)				
	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)	HD-147506	RA: 16 20 36.3454 (245.1514392d) Dec: +41 02 52.72 (41.04798d) Equinox: J2000		V=8.69	Reference Frame: ICRS
		Alt Name1: HAT-P-2				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	target acq. (514331)	(2) HD-147506	STIS/CCD, ACQ, F28X500II	MIRROR	ACQTYPE=POINT			2.0 Secs (2 Secs)	
									[==>]	[1]
	2	science exp. (515133)	(2) HD-147506	STIS/FUV-MAMA, ACCUM, 52X0.2D1	G140M 1222 A	WAVECAL=NO			1200 Secs (1200 Secs)	
									[==>]	[1]



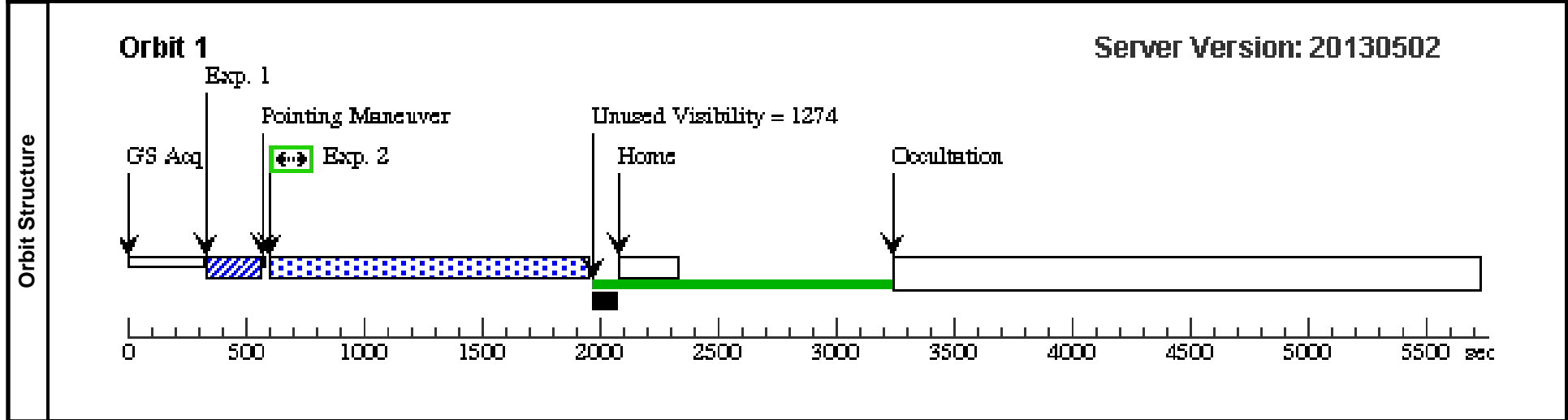
Proposal 13487 - HAT-P-20 (03) - A pilot study to characterize the Lyman alpha emission of active exoplanet host stars

Fri Jul 12 18:05:28 GMT 2013

Visit	Proposal 13487, HAT-P-20 (03)				
	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)	STKM-1-649-1	RA: 07 27 39.9490 (111.9164542d)		V=11.339	Reference Frame: ICRS
		Alt Name1: HAT-P-20	Dec: +24 20 11.37 (24.33649d)			
			Equinox: J2000			
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	target acq. (514345)	(3) STKM-1-649-1	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			0.1 Secs (0.1 Secs)	
									[==>]	[1]
	2	science exp. (515134)	(3) STKM-1-649-1	STIS/FUV-MAMA, ACCUM, 52X0.2D1	G140M 1222 A	WAVECAL=NO			1200 Secs (1200 Secs)	
									[==>]	[1]



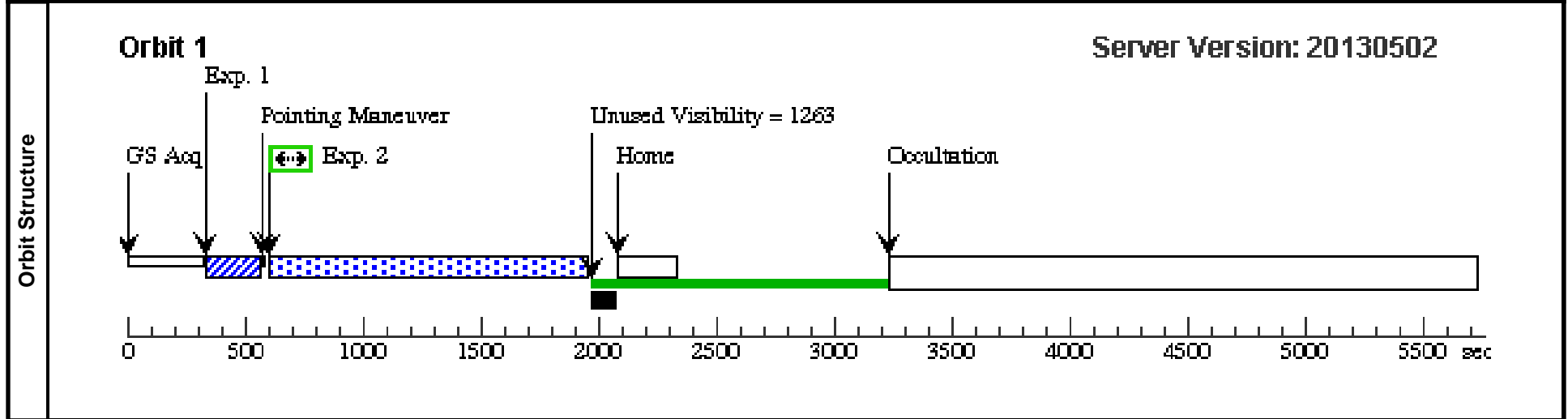
Proposal 13487 - WASP-43 (04) - A pilot study to characterize the Lyman alpha emission of active exoplanet host stars

Fri Jul 12 18:05:28 GMT 2013

Visit	Proposal 13487, WASP-43 (04)				
	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)	GSC-05490-00141	RA: 10 19 38.0080 (154.9083667d)	Proper Motion RA: -43.2 mas/yr	V=12.4	Reference Frame: ICRS
		Alt Name1: WASP-43	Dec: -09 48 22.59 (-9.80628d)	Proper Motion Dec: -43.2 mas/yr		
			Equinox: J2000	Epoch of Position: 2000.0		
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	target acq. (514351)	(4) GSC-05490-0014 1	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			0.3 Secs (0.3 Secs)	
									[==>]	[1]
	2	science exp. (515135)	(4) GSC-05490-0014 1	STIS/FUV-MAMA, ACCUM, 52X0.2D1	G140M 1222 A	WAVECAL=NO			1200 Secs (1200 Secs)	
									[==>]	[1]



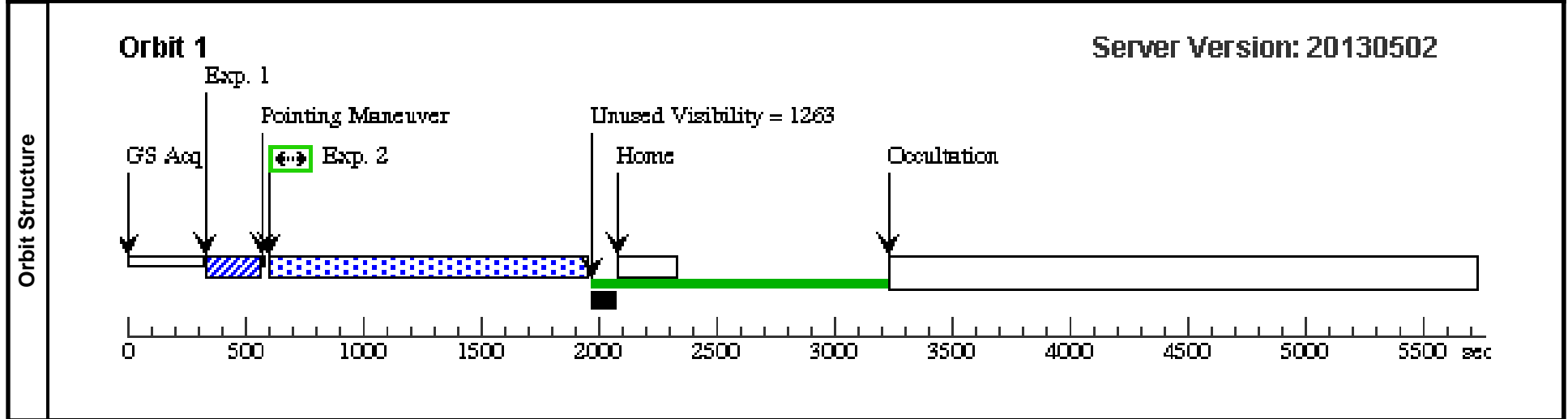
Proposal 13487 - WASP-77A (05) - A pilot study to characterize the Lyman alpha emission of active exoplanet host stars

Fri Jul 12 18:05:29 GMT 2013

Visit	Proposal 13487, WASP-77A (05)				
	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)	CCDM-J02286-0704AB	RA: 02 28 37.2291 (37.1551213d)	Proper Motion RA: 95.9 mas/yr	V=9.3	Reference Frame: ICRS
		Alt Name1: WASP-77A	Dec: -07 03 38.45 (-7.06068d)	Proper Motion Dec: -3.0 mas/yr		
			Equinox: J2000	Epoch of Position: 2000.0		
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	target acq. (514354)	(5) CCDM-J02286-0704AB	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			0.1 Secs (0.1 Secs)	
									[=>]	[1]
	2	science exp. (515136)	(5) CCDM-J02286-0704AB	STIS/FUV-MAMA, ACCUM, 52X0.2D1	G140M 1222 A	WAVECAL=NO			1200 Secs (1200 Secs)	
									[=>]	[1]



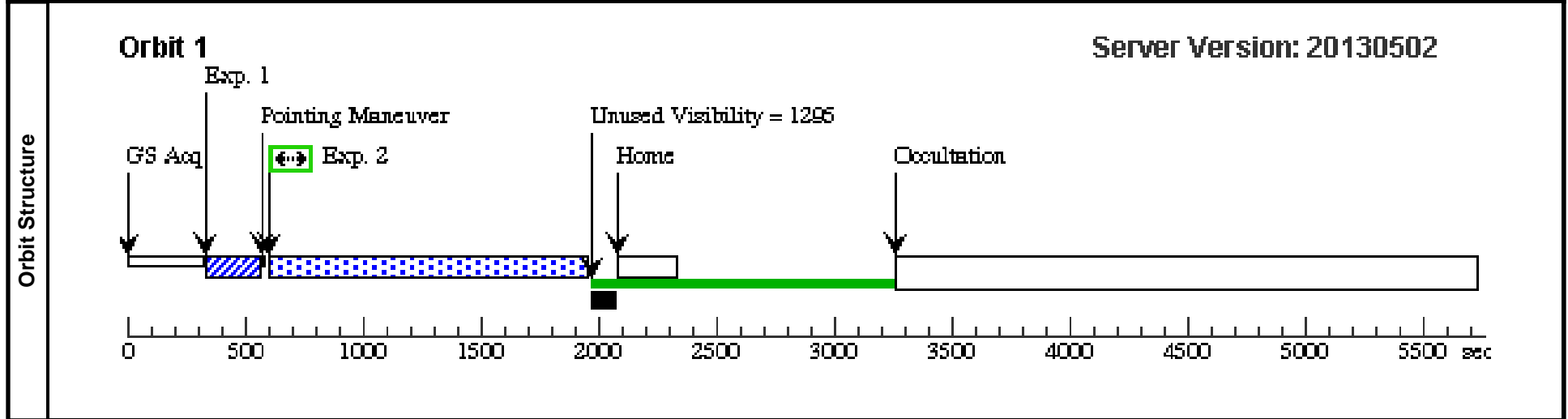
Proposal 13487 - WASP-10 (06) - A pilot study to characterize the Lyman alpha emission of active exoplanet host stars

Fri Jul 12 18:05:30 GMT 2013

Visit	Proposal 13487, WASP-10 (06)				
	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)	GSC-02752-00114 Alt Name1: WASP-10	RA: 23 15 58.3220 (348.9930083d) Dec: +31 27 45.88 (31.46274d) Equinox: J2000		V=12.7	Reference Frame: ICRS
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	target acq. (514357)	(6) GSC-02752-0011 4	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			0.5 Secs (0.5 Secs)	
									[=>]	[1]
	2	science exp. (515137)	(6) GSC-02752-0011 4	STIS/FUV-MAMA, ACCUM, 52X0.2D1	G140M 1222 A	WAVECAL=NO			1200 Secs (1200 Secs)	
									[=>]	[1]



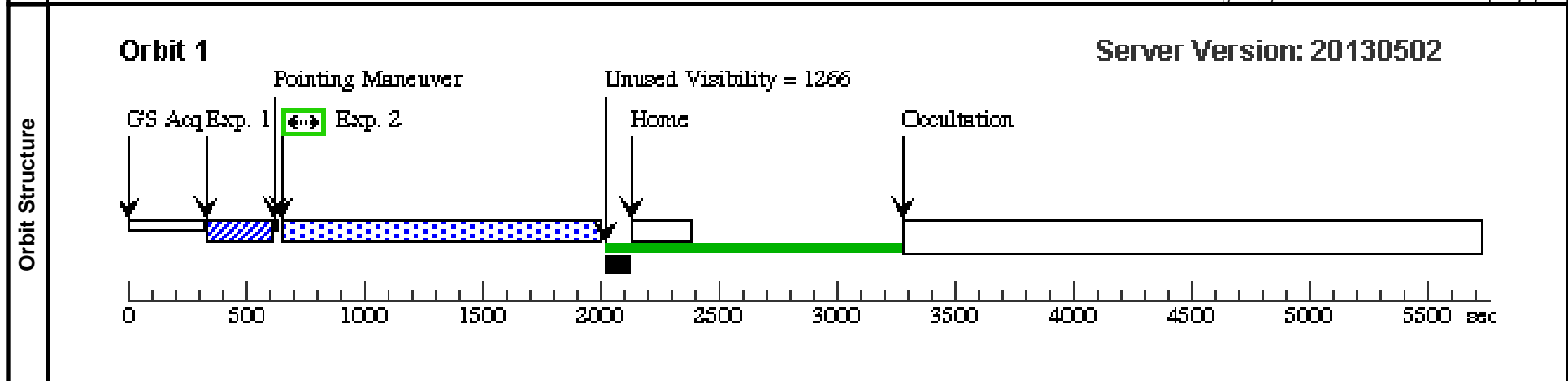
Proposal 13487 - WASP-8 (07) - A pilot study to characterize the Lyman alpha emission of active exoplanet host stars

Fri Jul 12 18:05:30 GMT 2013

Visit	Proposal 13487, WASP-8 (07)				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: STIS/CCD, STIS/FUV-MAMA				
	Special Requirements: (none)				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(7)	CD-35-16019	RA: 23 59 36.0682 (359.9002842d)	Proper Motion RA: 110.2 mas/yr	V=9.79	Reference Frame: ICRS
		Alt Name1: WASP-8	Dec: -35 01 52.86 (-35.03135d)	Proper Motion Dec: 7.7 mas/yr		
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	target acq. (516285)	(7) CD-35-16019	STIS/CCD, ACQ, F28X500II	MIRROR	ACQTYPE=POINT			5 Secs (5 Secs)	
									[==>]	[1]
	2	science exp. (515138)	(7) CD-35-16019	STIS/FUV-MAMA, ACCUM, 52X0.2D1	G140M 1222 A	WAVECAL=NO			1200 Secs (1200 Secs)	
									[==>]	[1]



Proposal 13487 - WASP-80 (08) - A pilot study to characterize the Lyman alpha emission of active exoplanet host stars

Fri Jul 12 18:05:31 GMT 2013

Visit	Proposal 13487, WASP-80 (08)				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: STIS/CCD, STIS/FUV-MAMA				
	Special Requirements: (none)				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(8)	TYC-5165-481-1	RA: 20 12 40.1780 (303.1674083d)	Proper Motion RA: -100.0 mas/yr	V=11.87	Reference Frame: ICRS
		Alt Name1: WASP-80	Dec: -02 08 39.15 (-2.14421d)	Proper Motion Dec: -60.0 mas/yr		
			Equinox: J2000	Epoch of Position: 2000.0		
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	target acq. (514362)	(8) TYC-5165-481-1	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			0.2 Secs (0.2 Secs)	
									[==>]	[1]
	2	science exp. (515139)	(8) TYC-5165-481-1	STIS/FUV-MAMA, ACCUM, 52X0.2D1	G140M 1222 A	WAVECAL=NO			1200 Secs (1200 Secs)	
									[==>]	[1]

