



14757 - Hydrogen Escape from a Rocky Earth-Size Exoplanet

Cycle: 24, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
Dr. Zach K. Berta-Thompson (PI) (Contact)	University of Colorado at Boulder	zachory.bertathompson@colorado.edu
Prof. David Charbonneau (CoI) (AdminUSPI)	Harvard University	dcharbonneau@cfa.harvard.edu
Dr. Jonathan Irwin (CoI)	Smithsonian Institution Astrophysical Observatory	jirwin@cfa.harvard.edu
Ms. Elisabeth R. Newton (CoI)	Harvard University	enewton@cfa.harvard.edu
Mr. Jason A. Dittmann (CoI)	Harvard University	jdittmann@cfa.harvard.edu
Dr. Vincent Bourrier (CoI) (ESA Member)	Observatoire de Geneve	bourrier@iap.fr
Dr. David Ehrenreich (CoI) (ESA Member)	Observatoire de Geneve	david.ehrenreich@unige.ch
Dr. Eliza M.-R. Kempton (CoI)	Grinnell College	kemptone@grinnell.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) LHS-281 WAVE	STIS/CCD STIS/FUV-MAMA	5	09-Nov-2016 11:55:08.0	yes
02	(1) LHS-281 WAVE	STIS/CCD STIS/FUV-MAMA	2	09-Nov-2016 11:55:10.0	yes
03	(1) LHS-281 WAVE	STIS/CCD STIS/FUV-MAMA	5	09-Nov-2016 11:55:14.0	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>
04	(1) LHS-281 WAVE	STIS/CCD STIS/FUV-MAMA	2	09-Nov-2016 11:55:16.0	yes

14 Total Orbits Used

ABSTRACT

Planets transiting M dwarfs offer our best opportunities to observe the atmospheres of potentially habitable planets outside the Solar System. Models predict that M dwarfs can significantly erode their planets' atmospheres, but no observations yet exist to investigate this atmospheric escape. GJ1132b is a warm, rocky, Earth-size planet transiting a star that is both very nearby (12pc) and very small (0.21 solar radii). Here, we propose to use GJ1132b as a laboratory to examine the process of hydrogen escape from terrestrial planets, a topic that is important for understanding the evolution of habitable worlds. We will use STIS to observe two transits of GJ1132b at Lyman-alpha wavelengths, to measure the size of the neutral hydrogen cloud escaping from the planet. Such a cloud might be fed by the dissociation of trace amounts of water or hydrogen halides in the planet's upper atmosphere. In a Cycle 23 pilot study, we proved the star is bright enough at Ly-alpha to serve as a backlight for these observations, and we tentatively detected a 40% flux decrement when the planet was in front the star. GJ1132b is subject to less radiation pressure than the comet-tailed exoplanet G1436b; this allows neutral hydrogen to develop into an inflated coma and leading arm, with substantial absorption before and during the time of optical transits. These observations would provide the first constraints on atmospheric escape from an Earth-size planet around an M dwarf, and they make use of Hubble's precious UV capabilities to inform future JWST atmospheric observations of GJ1132b and other rocky planets.

OBSERVING DESCRIPTION

With this program, we will observe two transits of the rocky exoplanet GJ 1132b with STIS/G140M at Lyman-alpha wavelengths. We want to measure the depth, shape, and wavelength-dependence of these transits, to determine the properties of a possible neutral hydrogen gas cloud surrounding the planet.

In a mid-cycle pilot study (GO-14462), we measured the Lyman-alpha spectrum of the star itself. The blue wing of the stellar line is mostly obscured by the ISM. The observed red wing peaks at a flux (observed at HST) of about 3×10^{14} ergs/s/cm²/angstrom, enabling a relative brightness measurement of about 8% per HST orbit, integrated over the unobscured portion of the red wing.

We will conduct two independent transit observations. Each transit observation will consist of one "At-Transit" and one "Far-From-Transit" visit.

Proposal 14757 (STScI Edit Number: 0, Created: Wednesday, November 9, 2016 11:55:17 AM EST) - Overview

The "At-Transit" visit, of five contiguous orbits, will be used to measure the flux decrement from the planet passing in front of its star. The optical transit lasts 46 minutes, but the ultraviolet exosphere transit could last many times longer, potentially a significant fraction of the planet's orbital period. The "Far-From-Transit" visit, of two contiguous orbits scheduled when the planet is behind the star, will be used to probe the completely unobscured flux from the star and assess its intrinsic variability.

The instrument settings are nearly identical to those in GO-14462 (our pilot study), as well as those in GO-14222 and GO-12965. We use the 52x0.05 slit to minimize the flux through the slit from Lyman-alpha sky glow. We opt for the nominal 52X0.05 aperture instead of the low-dark-current 52X0.05D1 aperture, because we are more concerned about geocoronal sky subtraction than we are about dark current.

Modifications to GO-14757 Phase II:

(1) We had previously requested that AUTO-WAVECALs be skipped in favor of GO-WAVECALs, out of a desire for more integration time on target during the orbital visibility window. However, in retrospect, the 10% gain in on-target exposure is less crucial than optimal wavelength/position calibration. Therefore, we leave the AUTO-WAVECALs in place. We still request the supplemental GO-WAVECAL exposures be taken after each orbit, but only if these do not substantially limit scheduling opportunities.

(2) In the initial Phase II, we provided a period and epoch that came from the discovery paper for this planet. We update them here, to reflect analyses of the most recently collected observations. The previously specified values were

$$P = 1.628930$$

$$T_0 = 2457184.55786$$

and the updated values are

$$P = 1.6289246$$

$$T_0 = 2457184.55804$$

This modification has the effect of shifting the predicted times of transit through June 2017 by up to 3.2 minutes. We also relax the PHASE constraints slightly, so they now amount to 30 minutes of allowed start times per period.

Proposal 14757 - First At-Transit (01) - Hydrogen Escape from a Rocky Earth-Size Exoplanet

Wed Nov 09 16:55:17 GMT 2016

Visit	Proposal 14757, First At-Transit (01), implementation Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD, STIS/FUV-MAMA Special Requirements: Period 1.6289246 D AND ZERO-PHASE HJD2457184.55804 <i>Comments: This five-orbit visit must be obtained at a time of GJ1132b's transit. If the red-shifted absorption we saw in GO-14462 is due to infalling material streaming from the planet, we would expect the strongest absorption before and during the optical transit of the planet. PHASE constraints are included so the visibility window of the fourth orbit overlaps by at least 23 minutes with the 46 minute optical transit. We implement an ACO/PEAK at the start of each orbit, to ensure consistent centering on the slit.</i>																																																																
	Fixed Targets	<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>(1)</td> <td>LHS-281</td> <td>RA: 10 14 51.7700 (153.7157083d)</td> <td>Proper Motion RA: -1046 mas/yr</td> <td>V=13.49+/-0.03</td> <td>Reference Frame: ICRS</td> </tr> <tr> <td></td> <td>Alt Name1: GJ1132</td> <td>Dec: -47 09 24.10 (-47.15669d)</td> <td>Proper Motion Dec: +416 mas/yr</td> <td>U=16.51,</td> <td></td> </tr> <tr> <td></td> <td></td> <td>Equinox: J2000</td> <td>Parallax: 0.08307"</td> <td>B=15.17,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>Epoch of Position: 2000.0</td> <td>V=13.49,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>Radial Velocity: +35 km/sec</td> <td>Rc=12.26,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>Ic=10.69,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>J=9.245,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>H=8.666,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>Ks=8.322</td> <td></td> </tr> </tbody> </table> <p><i>Comments: RA, Dec, proper motions, parallax were drawn from RECONS astrometry originally published in Jao et al. (2005; 2005AJ....129.1954J) and restated in Berta-Thompson et al. (2015; 2015Natur.527..204B). We adopt uncertainties on the RA and Dec as those for 2MASS for this object, through which these positions are tied to the ICRS. The RECONS astrometry is more accurate than the positions and proper motions listed in SIMBAD. We confirmed that the quoted position and proper motions match both the epoch 1992.2 position of the star in the APT Target Confirmation Chart and the epoch 2015.8 position of the star in recent MEarth imaging. These coordinates were successfully used for target acquisition with STIS in GO-14462.</i></p> <p>Extended=NO</p>					#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	LHS-281	RA: 10 14 51.7700 (153.7157083d)	Proper Motion RA: -1046 mas/yr	V=13.49+/-0.03	Reference Frame: ICRS		Alt Name1: GJ1132	Dec: -47 09 24.10 (-47.15669d)	Proper Motion Dec: +416 mas/yr	U=16.51,				Equinox: J2000	Parallax: 0.08307"	B=15.17,					Epoch of Position: 2000.0	V=13.49,					Radial Velocity: +35 km/sec	Rc=12.26,						Ic=10.69,						J=9.245,						H=8.666,						Ks=8.322
#		Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous																																																											
(1)	LHS-281	RA: 10 14 51.7700 (153.7157083d)	Proper Motion RA: -1046 mas/yr	V=13.49+/-0.03	Reference Frame: ICRS																																																												
	Alt Name1: GJ1132	Dec: -47 09 24.10 (-47.15669d)	Proper Motion Dec: +416 mas/yr	U=16.51,																																																													
		Equinox: J2000	Parallax: 0.08307"	B=15.17,																																																													
			Epoch of Position: 2000.0	V=13.49,																																																													
			Radial Velocity: +35 km/sec	Rc=12.26,																																																													
				Ic=10.69,																																																													
				J=9.245,																																																													
				H=8.666,																																																													
				Ks=8.322																																																													

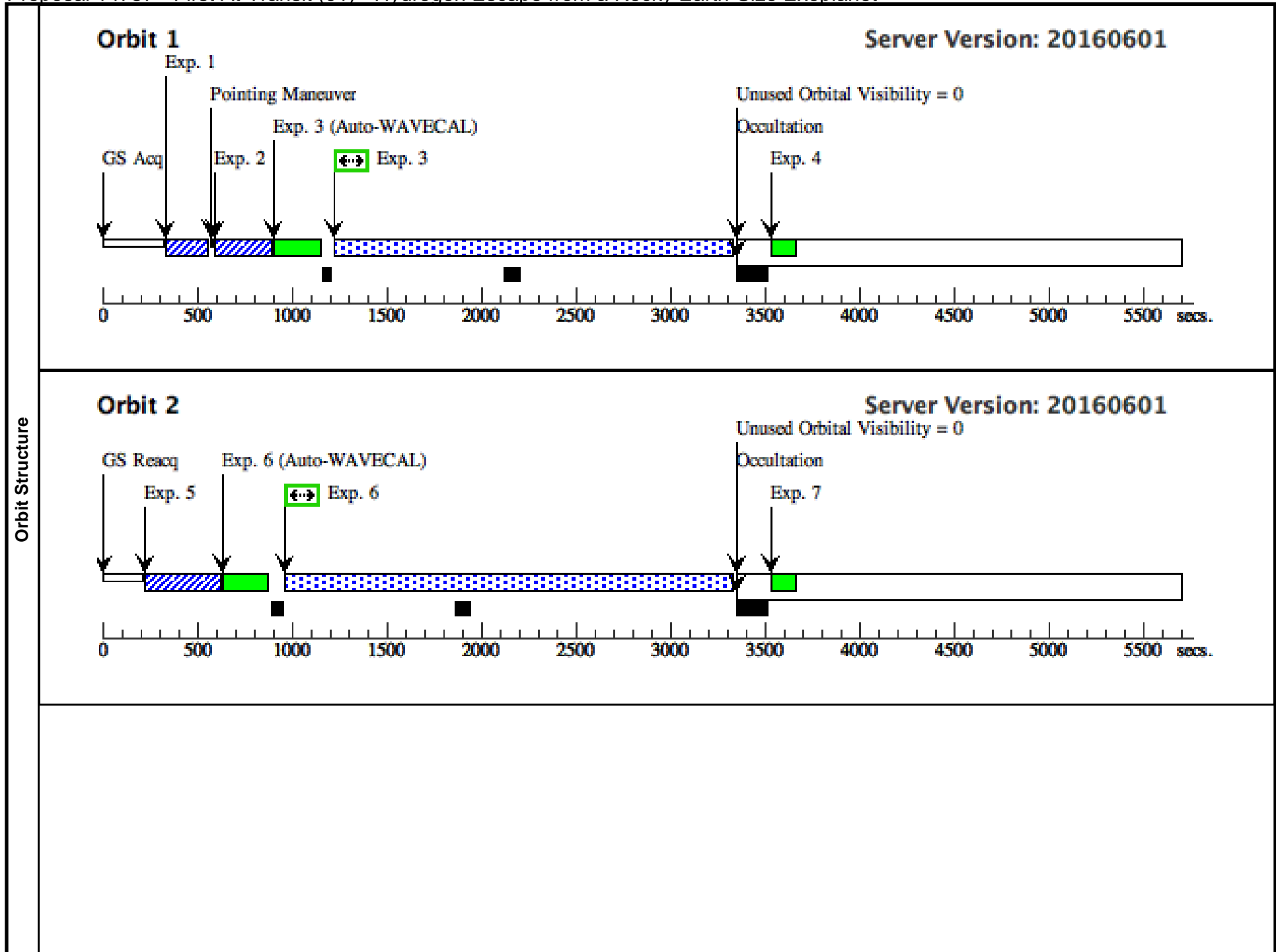
Proposal 14757 - First At-Transit (01) - Hydrogen Escape from a Rocky Earth-Size Exoplanet

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (STIS.ta.756 590)	(1) LHS-281	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	PHASE 0.85684745 TO 0.86964023	Sequence 1-4 Non-Int in First At-Transit (01)	0.2 Secs (0.2 Secs) [==>]	[1]
<p><i>Comments: The Timing Requirement is set on this first exposure so that the visibility window of the fourth orbit of this visit will overlap at least 25 minutes with the optical transit of the planet.</i></p> <p><i>We use the F28X50LP filter for this ACQ image, to ensure the brightness is weighted most strongly toward red wavelengths, where the target star is brightest. Due to its proper motion, the target is approaching a near by star (about 1" away and 4.7 magnitudes fainter in R-band). While we don't know the spectrum of this faint star, we can guarantee that in the long-pass filter, GJ1132 will be much brighter than this star. The ETC quotes a time to saturation of 2.83s for the F28X50LP filter, and a time of 0.0152s to reach S/N=40. Our 0.2s exposure time for the ACQ should reach 7% of saturation. This setting worked for successful acquisition of GJ1132 in GO-14462.</i></p>									
2	ACQ/PEAK (STIS.ta.757 054)	(1) LHS-281	STIS/CCD, ACQ/PEAK, 52X0.05	MIRROR			Sequence 1-4 Non-Int in First At-Transit (01)	1.0 Secs (1 Secs) [==>]	[1]
<p><i>Comments: The ETC lists a time to saturation through the 52X0.05 slit of 6.30s and a count rate of 100965e/s. With our 1.0s exposure, we should reach 100,000 source electrons, above the 80,000 required for peak-up but still well below saturation. This setting worked for successful acquisition of GJ1132 in GO-14462.</i></p>									
3	SCIENCE (STIS.sp.75 6606)	(1) LHS-281	STIS/FUV-MAMA, TIME-TAG, 52X0.05	G140M 1222 A		BUFFER-TIME=90 0	Sequence 1-4 Non-Int in First At-Transit (01)	2095 Secs (2095 Secs) [==>]	[1]
<p><i>Comments: We use the same buffer time as GO12965; GJ1132 is fainter than Gl436 at these wavelengths.</i></p>									
4	GO-WAVE CAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A			Sequence 1-4 Non-Int in First At-Transit (01)	82 Secs (82 Secs) [==>]	[1]
<p><i>Comments: We request an additional GO-WAVECAL be taken after the completion of the orbit, during Earth occultation. We will use this together with the AUTO-WAVECAL to check for drifts in the wavelength calibration over our orbit. We set the exposure time to be the same as for the AUTO-WAVECAL.</i></p>									
5	ACQ/PEAK (STIS.ta.757 054)	(1) LHS-281	STIS/CCD, ACQ/PEAK, 52X0.05	MIRROR			Sequence 5-7 Non-Int in First At-Transit (01)	1.0 Secs (1 Secs) [==>]	[2]
<p><i>Comments: The ETC lists a time to saturation through the 52X0.05 slit of 6.30s and a count rate of 100965e/s. With our 1.0s exposure, we should reach 100,000 source electrons, above the 80,000 required for peak-up but still well below saturation. This setting worked for successful acquisition of GJ1132 in GO-14462.</i></p>									
6	SCIENCE (STIS.sp.75 6606)	(1) LHS-281	STIS/FUV-MAMA, TIME-TAG, 52X0.05	G140M 1222 A		BUFFER-TIME=90 0	Sequence 5-7 Non-Int in First At-Transit (01)	2095 Secs (2356 Secs) [==>2356.0 Secs]	[2]
<p><i>Comments: We use the same buffer time as GO12965; GJ1132 is fainter than Gl436 at these wavelengths. Ideally, we would like to forego AUTO-WAVECALs on the last four orbits of the visit, instead requesting that GO-WAVECALs be taken during the Earth-occultations following each orbit. This is done to maximize exposure time and phase coverage for science observations.</i></p>									
7	GO-WAVE CAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A			Sequence 5-7 Non-Int in First At-Transit (01)	82 Secs (82 Secs) [==>]	[2]
<p><i>Comments: We request an additional GO-WAVECAL be taken after the completion of the orbit, during Earth occultation. We will use this together with the AUTO-WAVECAL to check for drifts in the wavelength calibration over our orbit. We set the exposure time to be the same as for the AUTO-WAVECAL.</i></p>									
8	ACQ/PEAK (STIS.ta.757 054)	(1) LHS-281	STIS/CCD, ACQ/PEAK, 52X0.05	MIRROR			Sequence 8-10 Non-Int in First At-Transit (01)	1.0 Secs (1 Secs) [==>]	[3]
<p><i>Comments: The ETC lists a time to saturation through the 52X0.05 slit of 6.30s and a count rate of 100965e/s. With our 1.0s exposure, we should reach 100,000 source electrons, above the 80,000 required for peak-up but still well below saturation. This setting worked for successful acquisition of GJ1132 in GO-14462.</i></p>									
9	SCIENCE (STIS.sp.75 6606)	(1) LHS-281	STIS/FUV-MAMA, TIME-TAG, 52X0.05	G140M 1222 A		BUFFER-TIME=90 0	Sequence 8-10 Non-Int in First At-Transit (01)	2095 Secs (2356 Secs) [==>2356.0 Secs]	[3]
<p><i>Comments: We use the same buffer time as GO12965; GJ1132 is fainter than Gl436 at these wavelengths. Ideally, we would like to forego AUTO-WAVECALs on the last four orbits of the visit, instead requesting that GO-WAVECALs be taken during the Earth-occultations following each orbit. This is done to maximize exposure time and phase coverage for science observations.</i></p>									
10	GO-WAVE CAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A			Sequence 8-10 Non-Int in First At-Transit (01)	82 Secs (82 Secs) [==>]	[3]
<p><i>Comments: We request an additional GO-WAVECAL be taken after the completion of the orbit, during Earth occultation. We will use this together with the AUTO-WAVECAL to check for drifts in the wavelength calibration over our orbit. We set the exposure time to be the same as for the AUTO-WAVECAL.</i></p>									

Exposures

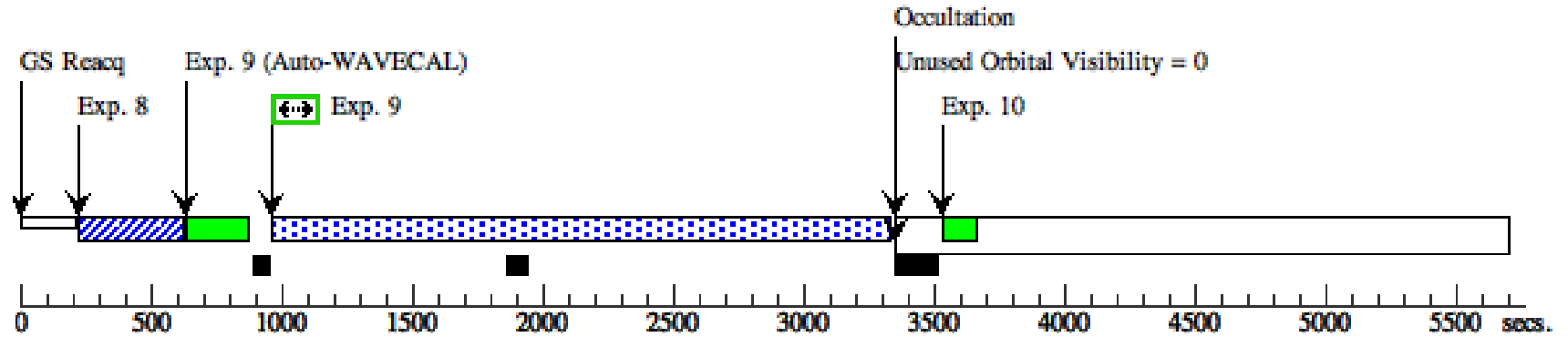
Proposal 14757 - First At-Transit (01) - Hydrogen Escape from a Rocky Earth-Size Exoplanet

11	ACQ/PEAK (STIS.ta.757 054)	(1) LHS-281	STIS/CCD, ACQ/PEAK, 52X0.05	MIRROR		Sequence 11-13 Non-Int in First At-Transit (01)	1.0 Secs (1 Secs) [==>]	[4]
<p><i>Comments: The ETC lists a time to saturation through the 52X0.05 slit of 6.30s and a count rate of 100965e/s. With our 1.0s exposure, we should reach 100,000 source electrons, above the 80,000 required for peak-up but still well below saturation. This setting worked for successful acquisition of GJ1132 in GO-14462.</i></p>								
12	SCIENCE (STIS.sp.75 6606)	(1) LHS-281	STIS/FUV-MAMA, TIME-TAG, 52X0.05	G140M 1222 A	BUFFER-TIME=90 0	Sequence 11-13 Non-Int in First At-Transit (01)	2095 Secs (2356 Secs) [==>2356.0 Secs]	[4]
<p><i>Comments: We use the same buffer time as GO12965; GJ1132 is fainter than Gl436 at these wavelengths. Ideally, we would like to forego AUTO-WAVECALs on the last four orbits of the visit, instead requesting that GO-WAVECALs be taken during the Earth-occultations following each orbit. This is done to maximize exposure time and phase coverage for science observations.</i></p>								
13	GO-WAVE CAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A		Sequence 11-13 Non-Int in First At-Transit (01)	82 Secs (82 Secs) [==>]	[4]
<p><i>Comments: We request an additional GO-WAVECAL be taken after the completion of the orbit, during Earth occultation. We will use this together with the AUTO-WAVECAL to check for drifts in the wavelength calibration over our orbit. We set the exposure time to be the same as for the AUTO-WAVECAL.</i></p>								
14	ACQ/PEAK (STIS.ta.757 054)	(1) LHS-281	STIS/CCD, ACQ/PEAK, 52X0.05	MIRROR		Sequence 14-16 Non-Int in First At-Transit (01)	1.0 Secs (1 Secs) [==>]	[5]
<p><i>Comments: The ETC lists a time to saturation through the 52X0.05 slit of 6.30s and a count rate of 100965e/s. With our 1.0s exposure, we should reach 100,000 source electrons, above the 80,000 required for peak-up but still well below saturation. This setting worked for successful acquisition of GJ1132 in GO-14462.</i></p>								
15	SCIENCE (STIS.sp.75 6606)	(1) LHS-281	STIS/FUV-MAMA, TIME-TAG, 52X0.05	G140M 1222 A	BUFFER-TIME=90 0	Sequence 14-16 Non-Int in First At-Transit (01)	2095 Secs (2356 Secs) [==>2356.0 Secs]	[5]
<p><i>Comments: We use the same buffer time as GO12965; GJ1132 is fainter than Gl436 at these wavelengths. Ideally, we would like to forego AUTO-WAVECALs on the last four orbits of the visit, instead requesting that GO-WAVECALs be taken during the Earth-occultations following each orbit. This is done to maximize exposure time and phase coverage for science observations.</i></p>								
16	GO-WAVE CAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A		Sequence 14-16 Non-Int in First At-Transit (01)	82 Secs (82 Secs) [==>]	[5]
<p><i>Comments: We request an additional GO-WAVECAL be taken after the completion of the orbit, during Earth occultation. We will use this together with the AUTO-WAVECAL to check for drifts in the wavelength calibration over our orbit. We set the exposure time to be the same as for the AUTO-WAVECAL.</i></p>								



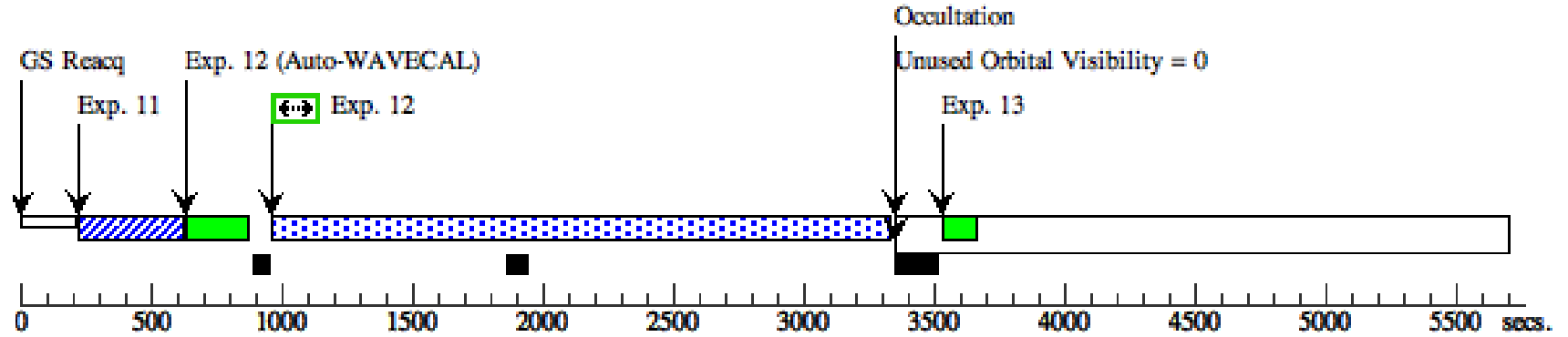
Orbit 3

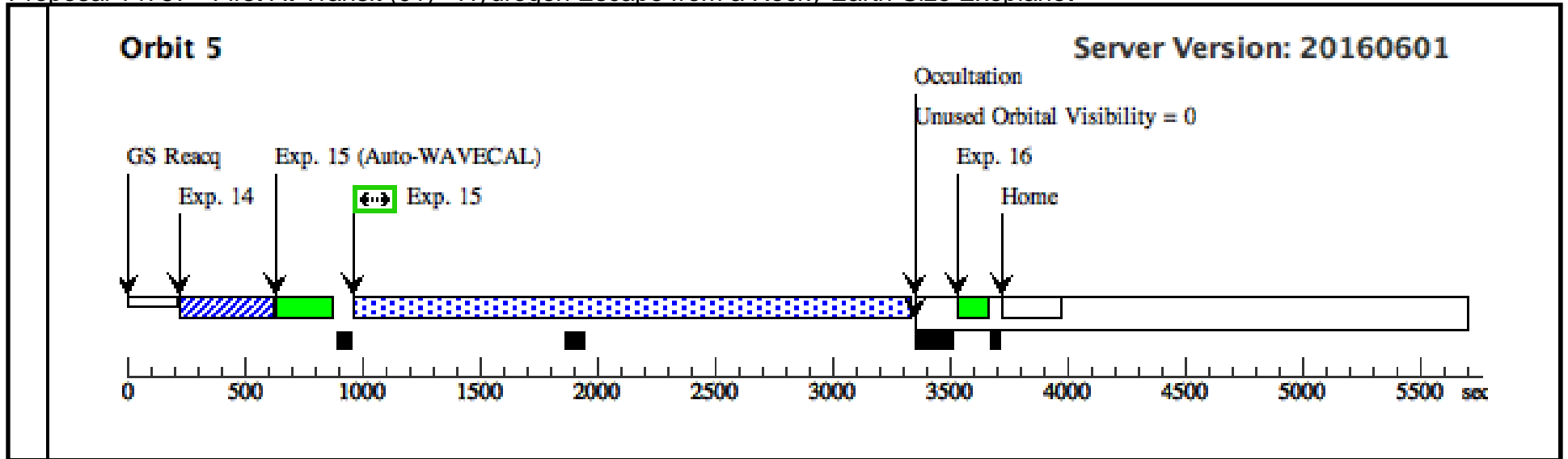
Server Version: 20160601



Orbit 4

Server Version: 20160601





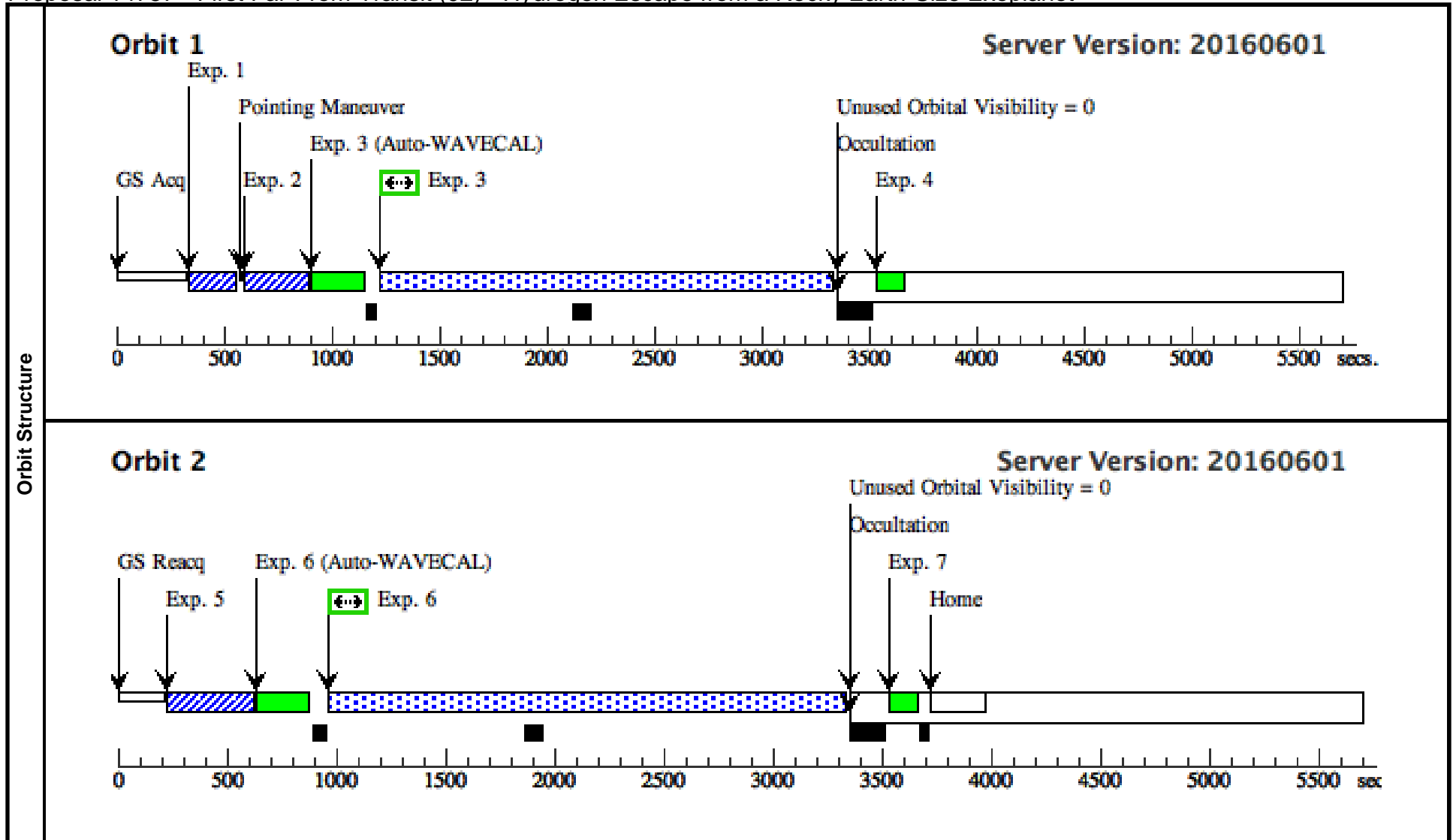
Proposal 14757 - First Far-From-Transit (02) - Hydrogen Escape from a Rocky Earth-Size Exoplanet

Wed Nov 09 16:55:17 GMT 2016

Visit	Proposal 14757, First Far-From-Transit (02), implementation Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD, STIS/FUV-MAMA Special Requirements: Period 1.6289246 D AND ZERO-PHASE HJD2457184.55804; GROUP 02,01 WITHIN 3.26D <i>Comments: This visit must be obtained far from a time of transit, to provide a clean estimate of the baseline UV flux from the star, and its potential variability. We specify PHASE constraints that limit this "far-from-transit" visit so that spectra are obtained between phases 0.50 and 0.75, and a GROUP-BY to ensure this observations happens within 3 days (two orbital periods) of the transit. We implement an ACQ/PEAK at the start of each orbit, to ensure consistent centering on the slit.</i>																																																																
	Fixed Targets	<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>(1)</td> <td>LHS-281</td> <td>RA: 10 14 51.7700 (153.7157083d)</td> <td>Proper Motion RA: -1046 mas/yr</td> <td>V=13.49+/-0.03</td> <td>Reference Frame: ICRS</td> </tr> <tr> <td></td> <td>Alt Name1: GJ1132</td> <td>Dec: -47 09 24.10 (-47.15669d)</td> <td>Proper Motion Dec: +416 mas/yr</td> <td>U=16.51,</td> <td></td> </tr> <tr> <td></td> <td></td> <td>Equinox: J2000</td> <td>Parallax: 0.08307"</td> <td>B=15.17,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>Epoch of Position: 2000.0</td> <td>V=13.49,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>Radial Velocity: +35 km/sec</td> <td>Rc=12.26,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>Ic=10.69,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>J=9.245,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>H=8.666,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>Ks=8.322</td> <td></td> </tr> </tbody> </table> <p><i>Comments: RA, Dec, proper motions, parallax were drawn from RECONS astrometry originally published in Jao et al. (2005; 2005AJ....129.1954J) and restated in Berta-Thompson et al. (2015; 2015Natur.527..204B). We adopt uncertainties on the RA and Dec as those for 2MASS for this object, through which these positions are tied to the ICRS. The RECONS astrometry is more accurate than the positions and proper motions listed in SIMBAD. We confirmed that the quoted position and proper motions match both the epoch 1992.2 position of the star in the APT Target Confirmation Chart and the epoch 2015.8 position of the star in recent MEarth imaging. These coordinates were successfully used for target acquisition with STIS in GO-14462.</i></p> <p>Extended=NO</p>					#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	LHS-281	RA: 10 14 51.7700 (153.7157083d)	Proper Motion RA: -1046 mas/yr	V=13.49+/-0.03	Reference Frame: ICRS		Alt Name1: GJ1132	Dec: -47 09 24.10 (-47.15669d)	Proper Motion Dec: +416 mas/yr	U=16.51,				Equinox: J2000	Parallax: 0.08307"	B=15.17,					Epoch of Position: 2000.0	V=13.49,					Radial Velocity: +35 km/sec	Rc=12.26,						Ic=10.69,						J=9.245,						H=8.666,						Ks=8.322
#		Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous																																																											
(1)	LHS-281	RA: 10 14 51.7700 (153.7157083d)	Proper Motion RA: -1046 mas/yr	V=13.49+/-0.03	Reference Frame: ICRS																																																												
	Alt Name1: GJ1132	Dec: -47 09 24.10 (-47.15669d)	Proper Motion Dec: +416 mas/yr	U=16.51,																																																													
		Equinox: J2000	Parallax: 0.08307"	B=15.17,																																																													
			Epoch of Position: 2000.0	V=13.49,																																																													
			Radial Velocity: +35 km/sec	Rc=12.26,																																																													
				Ic=10.69,																																																													
				J=9.245,																																																													
				H=8.666,																																																													
				Ks=8.322																																																													

Proposal 14757 - First Far-From-Transit (02) - Hydrogen Escape from a Rocky Earth-Size Exoplanet

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
Exposures	1	ACQ (STIS.ta.756 590)	(1) LHS-281 STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	PHASE 0.49 TO 0.68	Sequence 1-4 Non-Int in First Far-From-Transit (02)	0.2 Secs (0.2 Secs) [==>]	[1]	
	<i>Comments: The Timing Requirements are set on this far-from-transit visit so that all spectra would be gathered between planetary orbital phases of 0.5 and 0.75, at times far from transit, when the star is (theoretically) least obscured.</i>									
	<i>We use the F28X50LP filter for this ACQ image, to ensure the brightness is weighted most strongly toward red wavelengths, where the target star is brightest. Due to its proper motion, the target is approaching a near by star (about 1" away and 4.7 magnitudes fainter in R-band). While we don't know the spectrum of this faint star, we can guarantee that in the long-pass filter, GJ1132 will be much brighter than this star. The ETC quotes a time to saturation of 2.83s for the F28X50LP filter, and a time of 0.0152s to reach S/N=40. Our 0.2s exposure time for the ACQ should reach 7% of saturation.</i>									
	2	ACQ/PEAK (STIS.ta.757 054)	(1) LHS-281 STIS/CCD, ACQ/PEAK, 52X0.05	MIRROR				Sequence 1-4 Non-Int in First Far-From-Transit (02)	1.0 Secs (1 Secs) [==>]	[1]
	<i>Comments: The ETC lists a time to saturation through the 52X0.05 slit of 6.30s and a count rate of 100965e/s. With our 1.0s exposure, we should reach 100,000 source electrons, above the 80,000 required for peak-up but still well below saturation.</i>									
	3	SCIENCE (STIS.sp.75 6606)	(1) LHS-281 STIS/FUV-MAMA, TIME-TAG, 52X0.05	G140M 1222 A	BUFFER-TIME=90 0			Sequence 1-4 Non-Int in First Far-From-Transit (02)	2095 Secs (2095 Secs) [==>]	[1]
	<i>Comments: We use the same buffer time as GO12965, because we expect GJ1132 will be fainter than G1436 at these wavelengths.</i>									
4	GO-WAVE CAL	WAVE STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A				Sequence 1-4 Non-Int in First Far-From-Transit (02)	82 Secs (82 Secs) [==>]	[1]	
<i>Comments: We request an additional GO-WAVECAL be taken after the completion of the orbit, during Earth occultation. We will use this together with the AUTO-WAVECAL to check for drifts in the wavelength calibration over our orbit. We set the exposure time to be the same as for the AUTO-WAVECAL.</i>										
5	ACQ/PEAK (STIS.ta.757 054)	(1) LHS-281 STIS/CCD, ACQ/PEAK, 52X0.05	MIRROR				Sequence 5-7 Non-Int in First Far-From-Transit (02)	1.0 Secs (1 Secs) [==>]	[2]	
<i>Comments: The ETC lists a time to saturation through the 52X0.05 slit of 6.30s and a count rate of 100965e/s. With our 1.0s exposure, we should reach 100,000 source electrons, above the 80,000 required for peak-up but still well below saturation.</i>										
6	SCIENCE (STIS.sp.75 6606)	(1) LHS-281 STIS/FUV-MAMA, TIME-TAG, 52X0.05	G140M 1222 A	BUFFER-TIME=90 0			Sequence 5-7 Non-Int in First Far-From-Transit (02)	2095 Secs (2356 Secs) [==>2356.0 Secs]	[2]	
<i>Comments: We use the same buffer time as GO12965, because we expect GJ1132 will be fainter than G1436 at these wavelengths.</i>										
7	GO-WAVE CAL	WAVE STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A				Sequence 5-7 Non-Int in First Far-From-Transit (02)	82 Secs (82 Secs) [==>]	[2]	
<i>Comments: We request an additional GO-WAVECAL be taken after the completion of the orbit, during Earth occultation. We will use this together with the AUTO-WAVECAL to check for drifts in the wavelength calibration over our orbit. We set the exposure time to be the same as for the AUTO-WAVECAL.</i>										



Proposal 14757 - Second At-Transit (03) - Hydrogen Escape from a Rocky Earth-Size Exoplanet

Wed Nov 09 16:55:17 GMT 2016

Visit	Proposal 14757, Second At-Transit (03), implementation Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD, STIS/FUV-MAMA Special Requirements: AFTER 01 BY 45 D TO 1000 D; Period 1.6289246 D AND ZERO-PHASE HJD2457184.55804 <i>Comments: This five-orbit visit must be obtained at a time of GJ1132b's transit. If the red-shifted absorption we saw in GO-14462 is due to infalling material streaming from the planet, we would expect the strongest absorption before and during the optical transit of the planet. PHASE constraints are included so the visibility window of the fourth orbit overlaps by at least 23 minutes with the 46 minute optical transit. We implement an ACO/PEAK at the start of each orbit, to ensure consistent centering on the slit.</i>																																																																
	Fixed Targets	<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>(1)</td> <td>LHS-281</td> <td>RA: 10 14 51.7700 (153.7157083d)</td> <td>Proper Motion RA: -1046 mas/yr</td> <td>V=13.49+/-0.03</td> <td>Reference Frame: ICRS</td> </tr> <tr> <td></td> <td>Alt Name1: GJ1132</td> <td>Dec: -47 09 24.10 (-47.15669d)</td> <td>Proper Motion Dec: +416 mas/yr</td> <td>U=16.51,</td> <td></td> </tr> <tr> <td></td> <td></td> <td>Equinox: J2000</td> <td>Parallax: 0.08307"</td> <td>B=15.17,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>Epoch of Position: 2000.0</td> <td>V=13.49,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>Radial Velocity: +35 km/sec</td> <td>Rc=12.26,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>Ic=10.69,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>J=9.245,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>H=8.666,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>Ks=8.322</td> <td></td> </tr> </tbody> </table> <p><i>Comments: RA, Dec, proper motions, parallax were drawn from RECONS astrometry originally published in Jao et al. (2005; 2005AJ....129.1954J) and restated in Berta-Thompson et al. (2015; 2015Natur.527..204B). We adopt uncertainties on the RA and Dec as those for 2MASS for this object, through which these positions are tied to the ICRS. The RECONS astrometry is more accurate than the positions and proper motions listed in SIMBAD. We confirmed that the quoted position and proper motions match both the epoch 1992.2 position of the star in the APT Target Confirmation Chart and the epoch 2015.8 position of the star in recent MEarth imaging. These coordinates were successfully used for target acquisition with STIS in GO-14462.</i></p> <p>Extended=NO</p>					#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	LHS-281	RA: 10 14 51.7700 (153.7157083d)	Proper Motion RA: -1046 mas/yr	V=13.49+/-0.03	Reference Frame: ICRS		Alt Name1: GJ1132	Dec: -47 09 24.10 (-47.15669d)	Proper Motion Dec: +416 mas/yr	U=16.51,				Equinox: J2000	Parallax: 0.08307"	B=15.17,					Epoch of Position: 2000.0	V=13.49,					Radial Velocity: +35 km/sec	Rc=12.26,						Ic=10.69,						J=9.245,						H=8.666,						Ks=8.322
#		Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous																																																											
(1)	LHS-281	RA: 10 14 51.7700 (153.7157083d)	Proper Motion RA: -1046 mas/yr	V=13.49+/-0.03	Reference Frame: ICRS																																																												
	Alt Name1: GJ1132	Dec: -47 09 24.10 (-47.15669d)	Proper Motion Dec: +416 mas/yr	U=16.51,																																																													
		Equinox: J2000	Parallax: 0.08307"	B=15.17,																																																													
			Epoch of Position: 2000.0	V=13.49,																																																													
			Radial Velocity: +35 km/sec	Rc=12.26,																																																													
				Ic=10.69,																																																													
				J=9.245,																																																													
				H=8.666,																																																													
				Ks=8.322																																																													

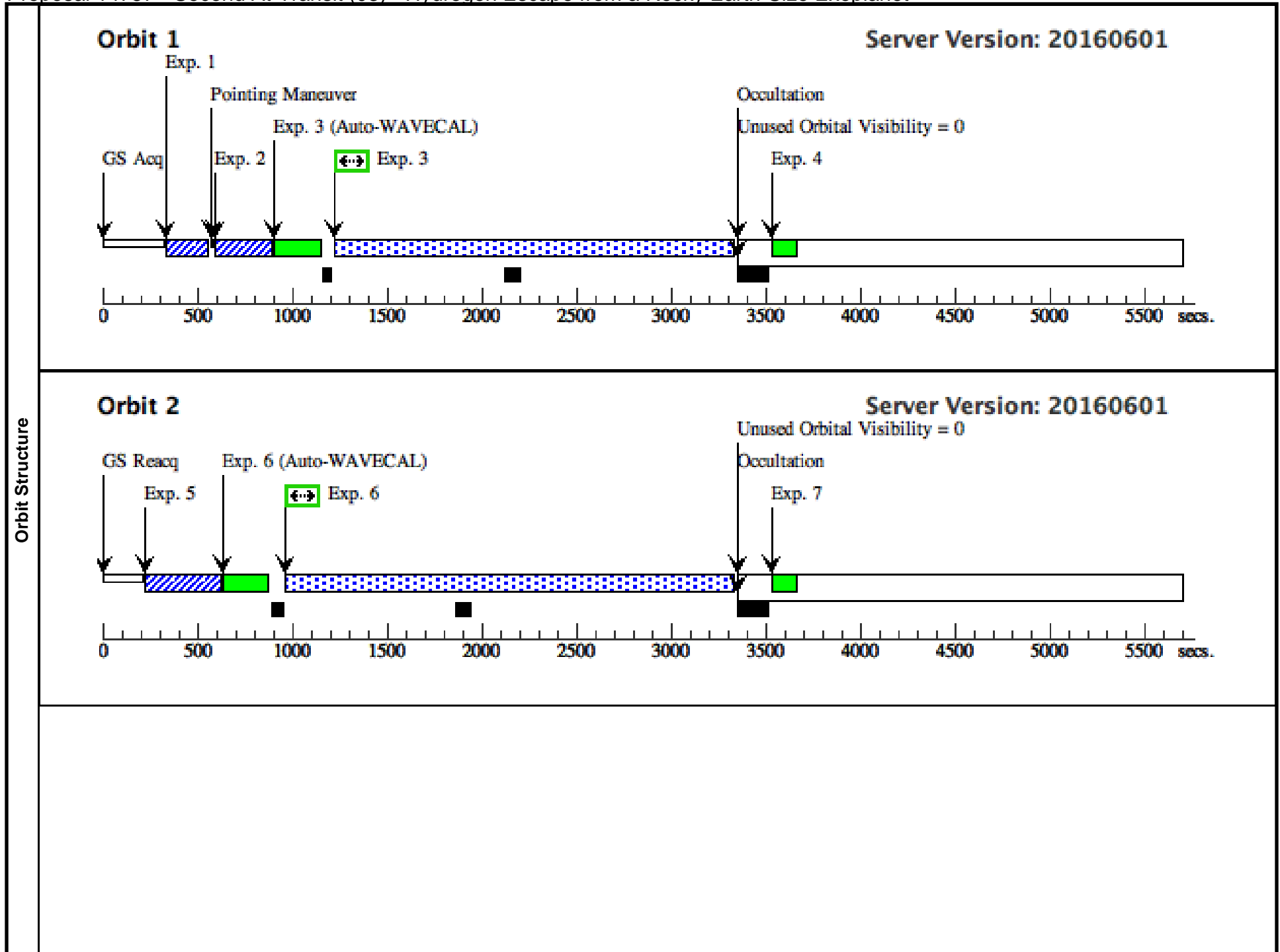
Proposal 14757 - Second At-Transit (03) - Hydrogen Escape from a Rocky Earth-Size Exoplanet

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (STIS.ta.756 590)	(1) LHS-281	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	PHASE 0.85684745 TO 0.86964023	Sequence 1-4 Non-Int in Second At-Transit (03)	0.2 Secs (0.2 Secs) [==>]	[1]
<p><i>Comments: The Timing Requirement is set on this first exposure so that the visibility window of the fourth orbit of this visit will overlap at least 25 minutes with the optical transit of the planet.</i></p> <p><i>We use the F28X50LP filter for this ACQ image, to ensure the brightness is weighted most strongly toward red wavelengths, where the target star is brightest. Due to its proper motion, the target is approaching a near by star (about 1" away and 4.7 magnitudes fainter in R-band). While we don't know the spectrum of this faint star, we can guarantee that in the long-pass filter, GJ1132 will be much brighter than this star. The ETC quotes a time to saturation of 2.83s for the F28X50LP filter, and a time of 0.0152s to reach S/N=40. Our 0.2s exposure time for the ACQ should reach 7% of saturation. This setting worked for successful acquisition of GJ1132 in GO-14462.</i></p>									
2	ACQ/PEAK (STIS.ta.757 054)	(1) LHS-281	STIS/CCD, ACQ/PEAK, 52X0.05	MIRROR			Sequence 1-4 Non-Int in Second At-Transit (03)	1.0 Secs (1 Secs) [==>]	[1]
<p><i>Comments: The ETC lists a time to saturation through the 52X0.05 slit of 6.30s and a count rate of 100965e/s. With our 1.0s exposure, we should reach 100,000 source electrons, above the 80,000 required for peak-up but still well below saturation. This setting worked for successful acquisition of GJ1132 in GO-14462.</i></p>									
3	SCIENCE (STIS.sp.75 6606)	(1) LHS-281	STIS/FUV-MAMA, TIME-TAG, 52X0.05	G140M 1222 A		BUFFER-TIME=90 0	Sequence 1-4 Non-Int in Second At-Transit (03)	2095 Secs (2095 Secs) [==>]	[1]
<p><i>Comments: We use the same buffer time as GO12965; GJ1132 is fainter than Gl436 at these wavelengths.</i></p>									
4	GO-WAVE CAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A			Sequence 1-4 Non-Int in Second At-Transit (03)	82 Secs (82 Secs) [==>]	[1]
<p><i>Comments: We request an additional GO-WAVECAL be taken after the completion of the orbit, during Earth occultation. We will use this together with the AUTO-WAVECAL to check for drifts in the wavelength calibration over our orbit. We set the exposure time to be the same as for the AUTO-WAVECAL.</i></p>									
5	ACQ/PEAK (STIS.ta.757 054)	(1) LHS-281	STIS/CCD, ACQ/PEAK, 52X0.05	MIRROR			Sequence 5-7 Non-Int in Second At-Transit (03)	1.0 Secs (1 Secs) [==>]	[2]
<p><i>Comments: The ETC lists a time to saturation through the 52X0.05 slit of 6.30s and a count rate of 100965e/s. With our 1.0s exposure, we should reach 100,000 source electrons, above the 80,000 required for peak-up but still well below saturation. This setting worked for successful acquisition of GJ1132 in GO-14462.</i></p>									
6	SCIENCE (STIS.sp.75 6606)	(1) LHS-281	STIS/FUV-MAMA, TIME-TAG, 52X0.05	G140M 1222 A		BUFFER-TIME=90 0	Sequence 5-7 Non-Int in Second At-Transit (03)	2095 Secs (2356 Secs) [==>2356.0 Secs]	[2]
<p><i>Comments: We use the same buffer time as GO12965; GJ1132 is fainter than Gl436 at these wavelengths. Ideally, we would like to forego AUTO-WAVECALs on the last four orbits of the visit, instead requesting that GO-WAVECALs be taken during the Earth-occultations following each orbit. This is done to maximize exposure time and phase coverage for science observations.</i></p>									
7	GO-WAVE CAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A			Sequence 5-7 Non-Int in Second At-Transit (03)	82 Secs (82 Secs) [==>]	[2]
<p><i>Comments: We request an additional GO-WAVECAL be taken after the completion of the orbit, during Earth occultation. We will use this together with the AUTO-WAVECAL to check for drifts in the wavelength calibration over our orbit. We set the exposure time to be the same as for the AUTO-WAVECAL.</i></p>									
8	ACQ/PEAK (STIS.ta.757 054)	(1) LHS-281	STIS/CCD, ACQ/PEAK, 52X0.05	MIRROR			Sequence 8-10 Non-Int in Second At-Transit (03)	1.0 Secs (1 Secs) [==>]	[3]
<p><i>Comments: The ETC lists a time to saturation through the 52X0.05 slit of 6.30s and a count rate of 100965e/s. With our 1.0s exposure, we should reach 100,000 source electrons, above the 80,000 required for peak-up but still well below saturation. This setting worked for successful acquisition of GJ1132 in GO-14462.</i></p>									
9	SCIENCE (STIS.sp.75 6606)	(1) LHS-281	STIS/FUV-MAMA, TIME-TAG, 52X0.05	G140M 1222 A		BUFFER-TIME=90 0	Sequence 8-10 Non-Int in Second At-Transit (03)	2095 Secs (2356 Secs) [==>2356.0 Secs]	[3]
<p><i>Comments: We use the same buffer time as GO12965; GJ1132 is fainter than Gl436 at these wavelengths. Ideally, we would like to forego AUTO-WAVECALs on the last four orbits of the visit, instead requesting that GO-WAVECALs be taken during the Earth-occultations following each orbit. This is done to maximize exposure time and phase coverage for science observations.</i></p>									
10	GO-WAVE CAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A			Sequence 8-10 Non-Int in Second At-Transit (03)	82 Secs (82 Secs) [==>]	[3]
<p><i>Comments: We request an additional GO-WAVECAL be taken after the completion of the orbit, during Earth occultation. We will use this together with the AUTO-WAVECAL to check for drifts in the wavelength calibration over our orbit. We set the exposure time to be the same as for the AUTO-WAVECAL.</i></p>									

Exposures

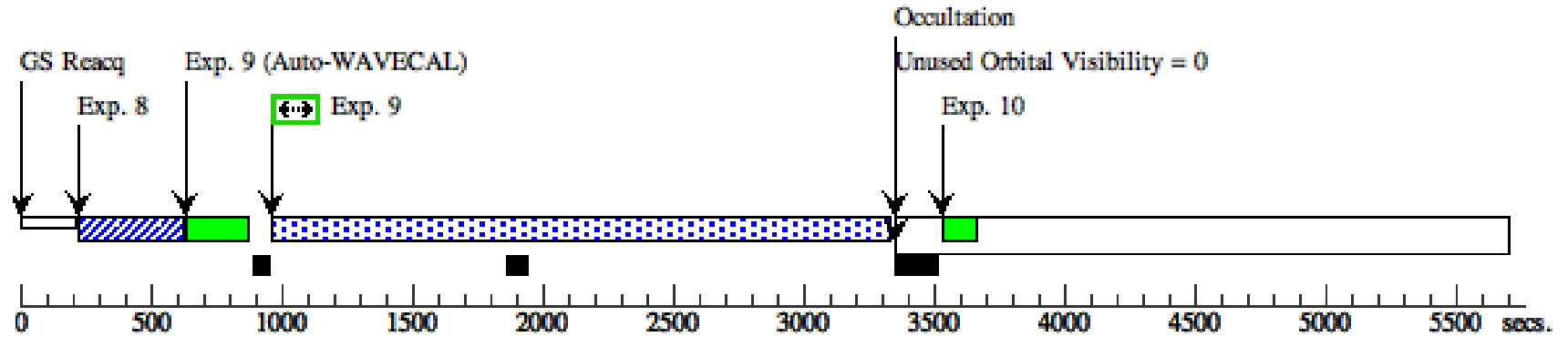
Proposal 14757 - Second At-Transit (03) - Hydrogen Escape from a Rocky Earth-Size Exoplanet

11	ACQ/PEAK (STIS.ta.757 054)	(1) LHS-281	STIS/CCD, ACQ/PEAK, 52X0.05	MIRROR		Sequence 11-13 Non-Int in Second At-Transit (03)	1.0 Secs (1 Secs) [==>]	[4]
<p><i>Comments: The ETC lists a time to saturation through the 52X0.05 slit of 6.30s and a count rate of 100965e/s. With our 1.0s exposure, we should reach 100,000 source electrons, above the 80,000 required for peak-up but still well below saturation. This setting worked for successful acquisition of GJ1132 in GO-14462.</i></p>								
12	SCIENCE (STIS.sp.75 6606)	(1) LHS-281	STIS/FUV-MAMA, TIME-TAG, 52X0.05	G140M 1222 A	BUFFER-TIME=90 0	Sequence 11-13 Non-Int in Second At-Transit (03)	2095 Secs (2356 Secs) [==>2356.0 Secs]	[4]
<p><i>Comments: We use the same buffer time as GO12965; GJ1132 is fainter than Gl436 at these wavelengths. Ideally, we would like to forego AUTO-WAVECALs on the last four orbits of the visit, instead requesting that GO-WAVECALs be taken during the Earth-occultations following each orbit. This is done to maximize exposure time and phase coverage for science observations.</i></p>								
13	GO-WAVE CAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A		Sequence 11-13 Non-Int in Second At-Transit (03)	82 Secs (82 Secs) [==>]	[4]
<p><i>Comments: We request an additional GO-WAVECAL be taken after the completion of the orbit, during Earth occultation. We will use this together with the AUTO-WAVECAL to check for drifts in the wavelength calibration over our orbit. We set the exposure time to be the same as for the AUTO-WAVECAL.</i></p>								
14	ACQ/PEAK (STIS.ta.757 054)	(1) LHS-281	STIS/CCD, ACQ/PEAK, 52X0.05	MIRROR		Sequence 14-16 Non-Int in Second At-Transit (03)	1.0 Secs (1 Secs) [==>]	[5]
<p><i>Comments: The ETC lists a time to saturation through the 52X0.05 slit of 6.30s and a count rate of 100965e/s. With our 1.0s exposure, we should reach 100,000 source electrons, above the 80,000 required for peak-up but still well below saturation. This setting worked for successful acquisition of GJ1132 in GO-14462.</i></p>								
15	SCIENCE (STIS.sp.75 6606)	(1) LHS-281	STIS/FUV-MAMA, TIME-TAG, 52X0.05	G140M 1222 A	BUFFER-TIME=90 0	Sequence 14-16 Non-Int in Second At-Transit (03)	2095 Secs (2356 Secs) [==>2356.0 Secs]	[5]
<p><i>Comments: We use the same buffer time as GO12965; GJ1132 is fainter than Gl436 at these wavelengths. Ideally, we would like to forego AUTO-WAVECALs on the last four orbits of the visit, instead requesting that GO-WAVECALs be taken during the Earth-occultations following each orbit. This is done to maximize exposure time and phase coverage for science observations.</i></p>								
16	GO-WAVE CAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A		Sequence 14-16 Non-Int in Second At-Transit (03)	82 Secs (82 Secs) [==>]	[5]
<p><i>Comments: We request an additional GO-WAVECAL be taken after the completion of the orbit, during Earth occultation. We will use this together with the AUTO-WAVECAL to check for drifts in the wavelength calibration over our orbit. We set the exposure time to be the same as for the AUTO-WAVECAL.</i></p>								



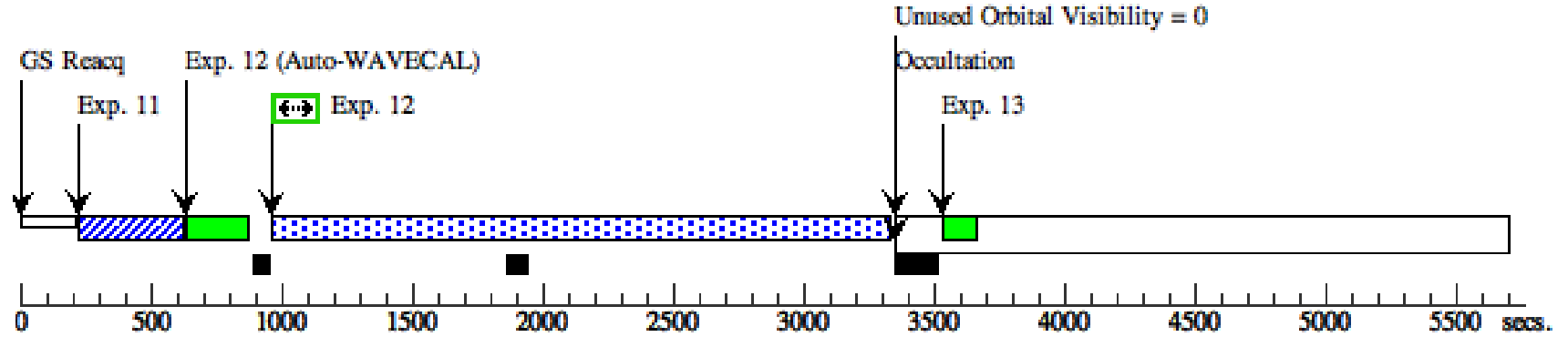
Orbit 3

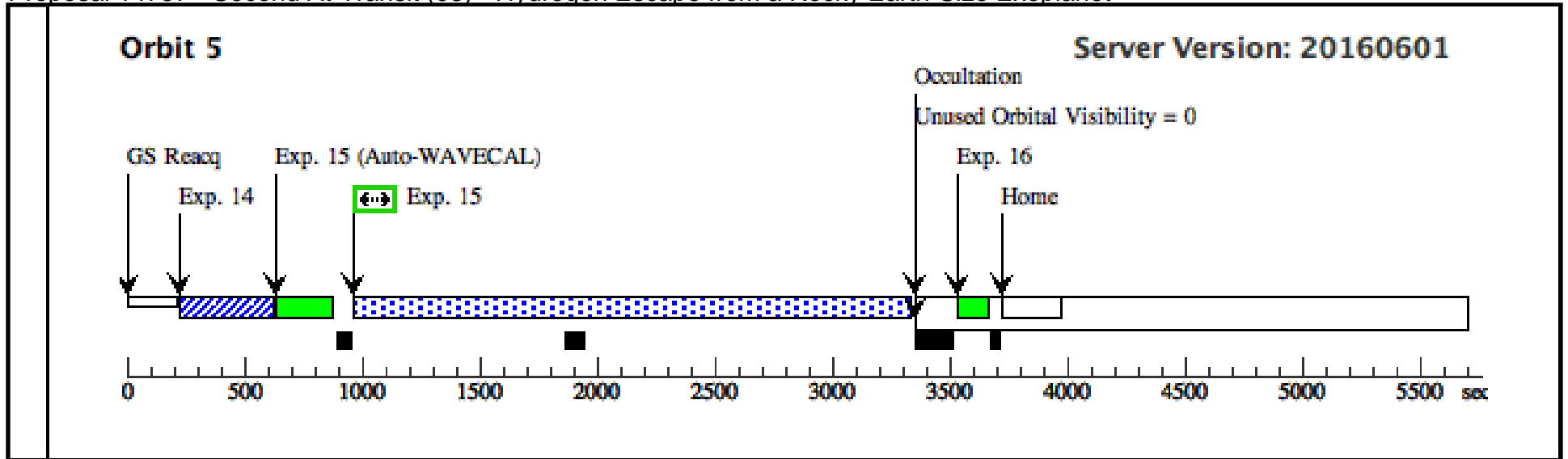
Server Version: 20160601



Orbit 4

Server Version: 20160601





Proposal 14757 - Second Far-From-Transit (04) - Hydrogen Escape from a Rocky Earth-Size Exoplanet

Wed Nov 09 16:55:17 GMT 2016

Visit	Proposal 14757, Second Far-From-Transit (04), implementation Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD, STIS/FUV-MAMA Special Requirements: Period 1.6289246 D AND ZERO-PHASE HJD2457184.55804; GROUP 04,03 WITHIN 3.26D <i>Comments: This visit must be obtained far from a time of transit, to provide a clean estimate of the baseline UV flux from the star, and its potential variability. We specify PHASE constraints that limit this "far-from-transit" visit so that spectra are obtained between phases 0.50 and 0.75, and a GROUP-BY to ensure this observations happens within 3 days (two orbital periods) of the transit. We implement an ACQ/PEAK at the start of each orbit, to ensure consistent centering on the slit.</i>																																																																
	Fixed Targets	<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>(1)</td> <td>LHS-281</td> <td>RA: 10 14 51.7700 (153.7157083d)</td> <td>Proper Motion RA: -1046 mas/yr</td> <td>V=13.49+/-0.03</td> <td>Reference Frame: ICRS</td> </tr> <tr> <td></td> <td>Alt Name1: GJ1132</td> <td>Dec: -47 09 24.10 (-47.15669d)</td> <td>Proper Motion Dec: +416 mas/yr</td> <td>U=16.51,</td> <td></td> </tr> <tr> <td></td> <td></td> <td>Equinox: J2000</td> <td>Parallax: 0.08307"</td> <td>B=15.17,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>Epoch of Position: 2000.0</td> <td>V=13.49,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>Radial Velocity: +35 km/sec</td> <td>Rc=12.26,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>Ic=10.69,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>J=9.245,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>H=8.666,</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>Ks=8.322</td> <td></td> </tr> </tbody> </table> <p><i>Comments: RA, Dec, proper motions, parallax were drawn from RECONS astrometry originally published in Jao et al. (2005; 2005AJ....129.1954J) and restated in Berta-Thompson et al. (2015; 2015Natur.527..204B). We adopt uncertainties on the RA and Dec as those for 2MASS for this object, through which these positions are tied to the ICRS. The RECONS astrometry is more accurate than the positions and proper motions listed in SIMBAD. We confirmed that the quoted position and proper motions match both the epoch 1992.2 position of the star in the APT Target Confirmation Chart and the epoch 2015.8 position of the star in recent MEarth imaging. These coordinates were successfully used for target acquisition with STIS in GO-14462.</i></p> <p>Extended=NO</p>					#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	LHS-281	RA: 10 14 51.7700 (153.7157083d)	Proper Motion RA: -1046 mas/yr	V=13.49+/-0.03	Reference Frame: ICRS		Alt Name1: GJ1132	Dec: -47 09 24.10 (-47.15669d)	Proper Motion Dec: +416 mas/yr	U=16.51,				Equinox: J2000	Parallax: 0.08307"	B=15.17,					Epoch of Position: 2000.0	V=13.49,					Radial Velocity: +35 km/sec	Rc=12.26,						Ic=10.69,						J=9.245,						H=8.666,						Ks=8.322
#		Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous																																																											
(1)	LHS-281	RA: 10 14 51.7700 (153.7157083d)	Proper Motion RA: -1046 mas/yr	V=13.49+/-0.03	Reference Frame: ICRS																																																												
	Alt Name1: GJ1132	Dec: -47 09 24.10 (-47.15669d)	Proper Motion Dec: +416 mas/yr	U=16.51,																																																													
		Equinox: J2000	Parallax: 0.08307"	B=15.17,																																																													
			Epoch of Position: 2000.0	V=13.49,																																																													
			Radial Velocity: +35 km/sec	Rc=12.26,																																																													
				Ic=10.69,																																																													
				J=9.245,																																																													
				H=8.666,																																																													
				Ks=8.322																																																													

Proposal 14757 - Second Far-From-Transit (04) - Hydrogen Escape from a Rocky Earth-Size Exoplanet

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
Exposures	1	ACQ (STIS.ta.756 590)	(1) LHS-281 STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	PHASE 0.49 TO 0.68	Sequence 1-4 Non-Int in Second Far-From-Transit (04)	0.2 Secs (0.2 Secs) [==>]	[1]	
	<i>Comments: The Timing Requirements are set on this far-from-transit visit so that all spectra would be gathered between planetary orbital phases of 0.5 and 0.75, at times far from transit, when the star is (theoretically) least obscured.</i>									
	<i>We use the F28X50LP filter for this ACQ image, to ensure the brightness is weighted most strongly toward red wavelengths, where the target star is brightest. Due to its proper motion, the target is approaching a near by star (about 1" away and 4.7 magnitudes fainter in R-band). While we don't know the spectrum of this faint star, we can guarantee that in the long-pass filter, GJ1132 will be much brighter than this star. The ETC quotes a time to saturation of 2.83s for the F28X50LP filter, and a time of 0.0152s to reach S/N=40. Our 0.2s exposure time for the ACQ should reach 7% of saturation.</i>									
	2	ACQ/PEAK (STIS.ta.757 054)	(1) LHS-281	STIS/CCD, ACQ/PEAK, 52X0.05	MIRROR			Sequence 1-4 Non-Int in Second Far-From-Transit (04)	1.0 Secs (1 Secs) [==>]	[1]
	<i>Comments: The ETC lists a time to saturation through the 52X0.05 slit of 6.30s and a count rate of 100965e/s. With our 1.0s exposure, we should reach 100,000 source electrons, above the 80,000 required for peak-up but still well below saturation.</i>									
	3	SCIENCE (STIS.sp.75 6606)	(1) LHS-281	STIS/FUV-MAMA, TIME-TAG, 52X0.05	G140M 1222 A	BUFFER-TIME=90 0		Sequence 1-4 Non-Int in Second Far-From-Transit (04)	2095 Secs (2095 Secs) [==>]	[1]
	<i>Comments: We use the same buffer time as GO12965, because we expect GJ1132 will be fainter than G1436 at these wavelengths.</i>									
4	GO-WAVE CAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A			Sequence 1-4 Non-Int in Second Far-From-Transit (04)	82 Secs (82 Secs) [==>]	[1]	
<i>Comments: We request an additional GO-WAVECAL be taken after the completion of the orbit, during Earth occultation. We will use this together with the AUTO-WAVECAL to check for drifts in the wavelength calibration over our orbit. We set the exposure time to be the same as for the AUTO-WAVECAL.</i>										
5	ACQ/PEAK (STIS.ta.757 054)	(1) LHS-281	STIS/CCD, ACQ/PEAK, 52X0.05	MIRROR			Sequence 5-7 Non-Int in Second Far-From-Transit (04)	1.0 Secs (1 Secs) [==>]	[2]	
<i>Comments: The ETC lists a time to saturation through the 52X0.05 slit of 6.30s and a count rate of 100965e/s. With our 1.0s exposure, we should reach 100,000 source electrons, above the 80,000 required for peak-up but still well below saturation.</i>										
6	SCIENCE (STIS.sp.75 6606)	(1) LHS-281	STIS/FUV-MAMA, TIME-TAG, 52X0.05	G140M 1222 A	BUFFER-TIME=90 0		Sequence 5-7 Non-Int in Second Far-From-Transit (04)	2095 Secs (2356 Secs) [==>2356.0 Secs]	[2]	
<i>Comments: We use the same buffer time as GO12965, because we expect GJ1132 will be fainter than G1436 at these wavelengths.</i>										
7	GO-WAVE CAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A			Sequence 5-7 Non-Int in Second Far-From-Transit (04)	82 Secs (82 Secs) [==>]	[2]	
<i>Comments: We request an additional GO-WAVECAL be taken after the completion of the orbit, during Earth occultation. We will use this together with the AUTO-WAVECAL to check for drifts in the wavelength calibration over our orbit. We set the exposure time to be the same as for the AUTO-WAVECAL.</i>										

