16731 - Leveraging High Radial Velocities to Get to the Core of Planetary Lyman-alpha Transits

Cycle: 29, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. R. O. Parke Loyd (PI) (Contact)	**Eureka Scientific Inc.**	**astroparke@gmail.com**
Dr. Evgenya L. Shkolnik (CoI)	Arizona State University	shkolnik@asu.edu
Dr. James Edward Owen (CoI) (ESA Member)	Institute For Advanced Study	james.owen@imperial.ac.uk
Dr. Ruth A. Murray-Clay (CoI)	University of California - Santa Cruz	rmc@ucsc.edu
Dr. Samuel Quinn (CoI)	Smithsonian Institution Astrophysical Observatory	squinn@cfa.harvard.edu
Dr. Adam Schneider (CoI)	United States Naval Observatory Flagstaff Station	aschneid10@gmail.com
Dr. Courtney Dressing (CoI)	University of California - Berkeley	dressing@berkeley.edu
Steven Giacalone (CoI)	University of California - Berkeley	steven_giacalone@berkeley.edu
Dr. David R. Ardila (CoI)	Jet Propulsion Laboratory	david.r.ardila@jpl.nasa.gov
Dr. Travis Stuart Barman (CoI)	University of Arizona	barman@lpl.arizona.edu
Dr. Sarah Peacock (CoI)	NASA Goddard Space Flight Center	sarah.r.peacock@nasa.gov
Joseph Murphy (CoI)	University of California - Santa Cruz	joseph.murphy@ucsc.edu
Dr. Natalie Batalha (CoI)	University of California - Santa Cruz	natalie.batalha@ucsc.edu
Nicholas Scarsdale (CoI)	University of California - Santa Cruz	scarsdale@ucsc.edu
Dr. Ian Crossfield (CoI)	University of Kansas Center for Research, Inc.	ianc@ku.edu
Aarynn Carter (CoI)	University of California - Santa Cruz	aarynn.carter@ucsc.edu
Dr. James Jackman (CoI)	Arizona State University	jamesjackman@asu.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(5) BD-14-1137 WAVE	STIS/CCD STIS/FUV-MAMA	1	18-Apr-2022 11:00:43.0	yes
02	(1) HD-42813 WAVE	STIS/CCD STIS/FUV-MAMA	1	18-Apr-2022 11:00:44.0	yes
03	(2) HD-63935 WAVE	STIS/CCD STIS/FUV-MAMA	1	18-Apr-2022 11:00:44.0	yes
04	(3) HD-97507 WAVE	STIS/CCD STIS/FUV-MAMA	1	18-Apr-2022 11:00:45.0	yes
05	(4) HD-85426 WAVE	STIS/CCD STIS/FUV-MAMA	1	18-Apr-2022 11:00:46.0	yes
08	(4) HD-85426 WAVE	STIS/CCD STIS/FUV-MAMA	1	18-Apr-2022 11:00:47.0	yes
06	(6) -NU.02-LUP WAVE	STIS/CCD STIS/FUV-MAMA	2	18-Apr-2022 11:00:48.0	yes
07	(6) -NU.02-LUP WAVE	STIS/CCD STIS/FUV-MAMA	5	18-Apr-2022 11:00:51.0	yes

13 Total Orbits Used

ABSTRACT

Lyman-alpha transit observations of warm, gas-rich exoplanets enable the study of active atmospheric loss. However, obscuration of the inner +/-30 km/s of the Lyman-alpha core by the interstellar medium (ISM) severs a key link between the velocities at which planetary outflows are observed and the ~10 km/s velocity at which they initially depart the planet. Systems with high radial velocities (RVs) can circumvent this limitation by Doppler-shifting the Lyman-alpha core away from ISM absorption. We propose Lyman-alpha line core transit observations of HD 136352 c, a transiting warm sub-Neptune orbiting a nearby solar analog. HD 136352 c is presently uniquely suited to these observations. However, because of the diagnostic power of transit observations in the Lyman-alpha line core, we also include a Lyman-alpha survey of 5 additional high RV targets hosting warm, gas-rich planets to confirm Lyman-alpha core visibility in an expected 1-3 systems. These Lyman-alpha transit observations of HD 136352 c and, in future cycles, the 1-3 systems found to have exposed line cores will provide an observational link between material accelerated beyond the 30

km/s limit and its source at the planet. This will provide new constraints on the interactions between planetary outflows and their circumstellar environments, ultimately improving model-dependent mass loss estimates and providing insight into the impact of hydrodynamic atmospheric loss on the evolution of planetary populations.

OBSERVING DESCRIPTION

The observing plan is straightforward. All observations will utilize the G140M/1222 configuration.

Five targets will receive single-orbit Lyman-alpha reconnaissance. These observations have no time constraints.

For the remaining target, the Lya transit of planet c will be observed with 7 orbits. Two initial orbits scheduled a day ahead of the transit visit will provide a trustworthy out of transit baseline followed by a five orbit visit centered on the transit.

Visit

Proposal 16731, TOI-421 (01), completed Mon Apr 18 15:00:51 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: (none)

Fixed Targets

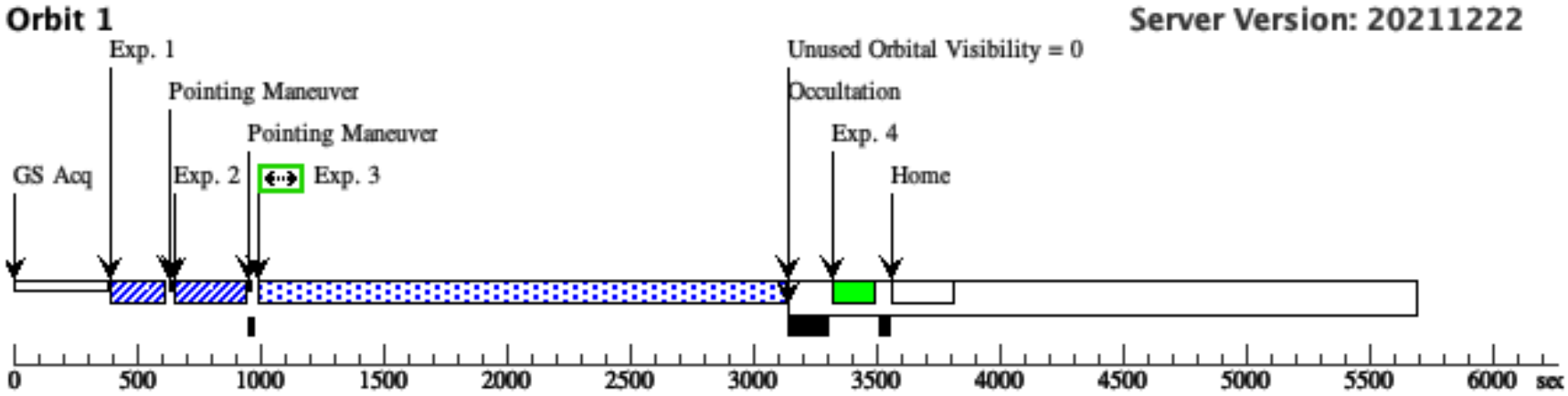
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	BD-14-1137 Alt Name1: TOI-421	RA: 05 27 24.7865 (81.8532771d) Dec: -14 16 36.24 (-14.27673d) Equinox: J2000	Proper Motion RA: -35.742672237284026 mas/yr Proper Motion Dec: 50.38733489295357 mas/yr Parallax: .013333711447035695" Epoch of Position: 2016.0	V=9.93	Reference Frame: ICRS

Comments:
Category=EXT-STAR
Description=[EXTRA-SOLAR PLANETARY SYSTEM, G V-IV]

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.1525273)	(5) BD-14-1137	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			0.1 Secs (0.1 Secs) *[==>]*	 ***[1]***
2	(STIS.ta.1525274)	(5) BD-14-1137	STIS/CCD, ACQ/PEAK, 52X0.05	MIRROR				0.1 Secs (0.1 Secs) *[==>]*	 ***[1]***
3	(STIS.sp.1525400)	(5) BD-14-1137	STIS/FUV-MAMA, TIME-TAG, 52X0.5	G140M 1222 A	BUFFER-TIME=4612; WAVECAL=NO			1500 Secs (1965 Secs) *[==>1965.0 Secs]*	 ***[1]***
4		WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A				*[==>]*	***[1]***

Orbit Structure



Visit

Proposal 16731, TOI-469 (02), completed Mon Apr 18 15:00:52 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: (none)

Fixed Targets

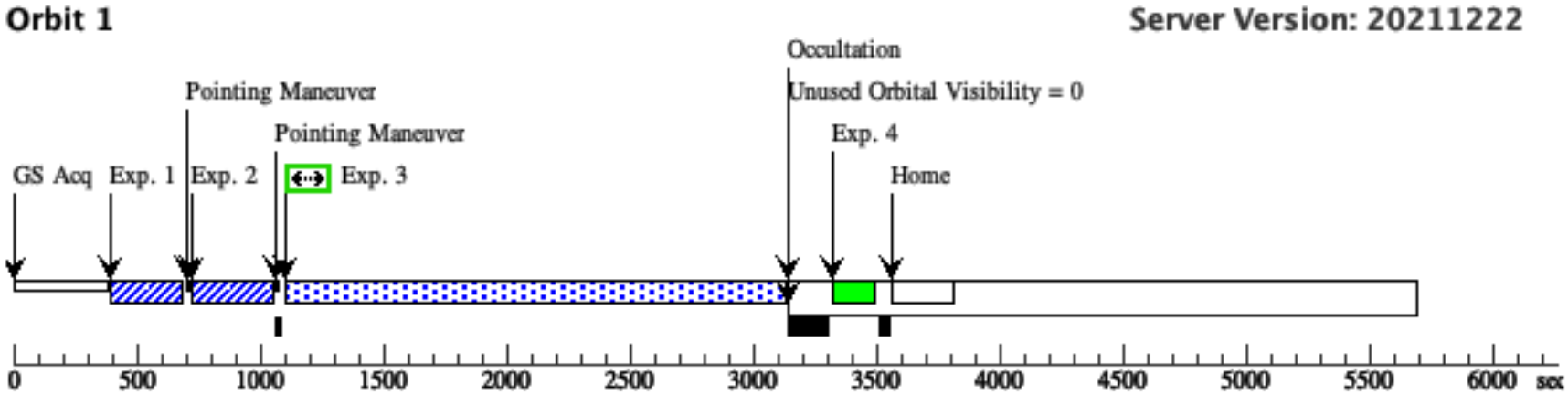
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-42813 Alt Name1: TOI-469	RA: 06 12 13.8800 (93.0578333d) Dec: -14 38 57.46 (-14.64929d) Equinox: J2000	Proper Motion RA: -79.1320013747779 mas/yr Proper Motion Dec: 162.69593831494234 mas/yr Parallax: .014706508337649488" Epoch of Position: 2016.0	V=9.47	Reference Frame: ICRS

Comments: SpT from http://simbad.u-strasbg.fr/simbad/sim-ref?bibcode=1993yCat.3135....0C
Category=EXT-STAR
Description=[EXTRA-SOLAR PLANETARY SYSTEM, G V-IV]

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.1525277)	(1) HD-42813	STIS/CCD, ACQ, F25ND3	MIRROR	ACQTYPE=POINT			1 Secs (1 Secs) *[==>]*	 ***[1]***
2		(1) HD-42813	STIS/CCD, ACQ/PEAK, 31X0.05NDC	MIRROR				0.2 Secs (0.2 Secs) *[==>]*	 ***[1]***
3	(STIS.sp.1525409)	(1) HD-42813	STIS/FUV-MAMA, TIME-TAG, 52X0.5	G140M 1222 A	BUFFER-TIME=4603; WAVECAL=NO			1500 Secs (1871 Secs) *[==>1871.0 Secs]*	 ***[1]***
4		WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A				*[==>]*	***[1]***

Orbit Structure



Visit

Proposal 16731, TOI-509 (03), completed Mon Apr 18 15:00:52 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: (none)

Fixed Targets

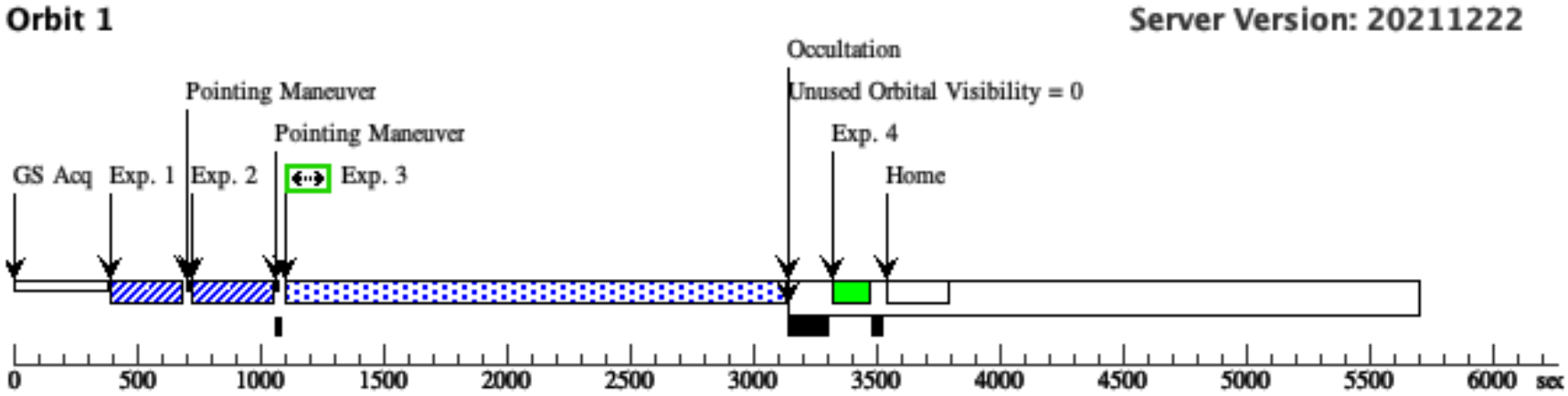
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HD-63935 Alt Name1: TOI-509	RA: 07 51 41.9113 (117.9246304d) Dec: +09 23 6.77 (9.38521d) Equinox: J2000	Proper Motion RA: -78.69583136449107 mas/yr Proper Motion Dec: -188.51239801270458 mas/yr Parallax: .02046996590146038" Epoch of Position: 2016.0	V=8.6 G = 8.3935	Reference Frame: ICRS

Comments: Vmag predicted from G mag and Teff using Mamajek tables
Category=EXT-STAR
Description=[EXTRA-SOLAR PLANETARY SYSTEM, G V-IV]

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.1525308)	(2) HD-63935	STIS/CCD, ACQ, F25ND3	MIRROR	ACQTYPE=POINT			1 Secs (1 Secs) *[==>]*	***[1]***
2	(STIS.ta.1525309)	(2) HD-63935	STIS/CCD, ACQ/PEAK, 31X0.05NDC	MIRROR				0.2 Secs (0.2 Secs) *[==>]*	***[1]***
3	(STIS.sp.1525416)	(2) HD-63935	STIS/FUV-MAMA, TIME-TAG, 52X0.2	G140M 1222 A	BUFFER-TIME=6850; WAVECAL=NO			1500 Secs (1828 Secs) *[==>1828.0 Secs]*	***[1]***
4		WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A				*[==>]*	***[1]***

Orbit Structure



Visit

Proposal 16731, TOI-1203 (04), scheduling Mon Apr 18 15:00:52 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: (none)

Fixed Targets

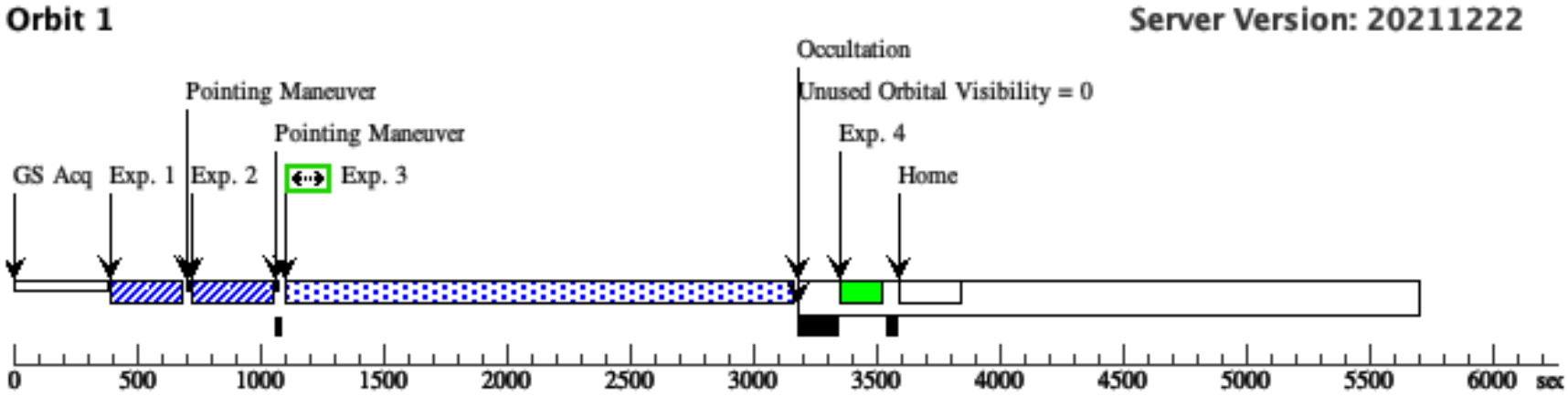
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	HD-97507 Alt Name1: TOI-1203	RA: 11 12 54.4284 (168.2267850d) Dec: -34 24 25.00 (-34.40694d) Equinox: J2000	Proper Motion RA: 292.9705495071484 mas/yr Proper Motion Dec: -44.53825560870125 mas/yr Parallax: .01539341679836094" Epoch of Position: 2016.0	V=8.59 G = 8.4220	Reference Frame: ICRS

Comments:
Category=EXT-STAR
Description=[EXTRA-SOLAR PLANETARY SYSTEM, G V-IV]

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.1525313)	(3) HD-97507	STIS/CCD, ACQ, F25ND3	MIRROR	ACQTYPE=POINT			1 Secs (1 Secs) *[==>]*	*[1]*
2	(STIS.ta.1525314)	(3) HD-97507	STIS/CCD, ACQ/PEAK, 31X0.05NDC	MIRROR				0.2 Secs (0.2 Secs) *[==>]*	*[1]*
3	(STIS.sp.1525421)	(3) HD-97507	STIS/FUV-MAMA, TIME-TAG, 52X0.5	G140M 1222 A	BUFFER-TIME=4605; WAVECAL=NO			1500 Secs (1902 Secs) *[==>1902.0 Secs]*	*[1]*
4		WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A				*[==>]*	*[1]*

Orbit Structure



Visit

Proposal 16731, TOI-1774 (05), failed Mon Apr 18 15:00:52 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: (none)

Fixed Targets

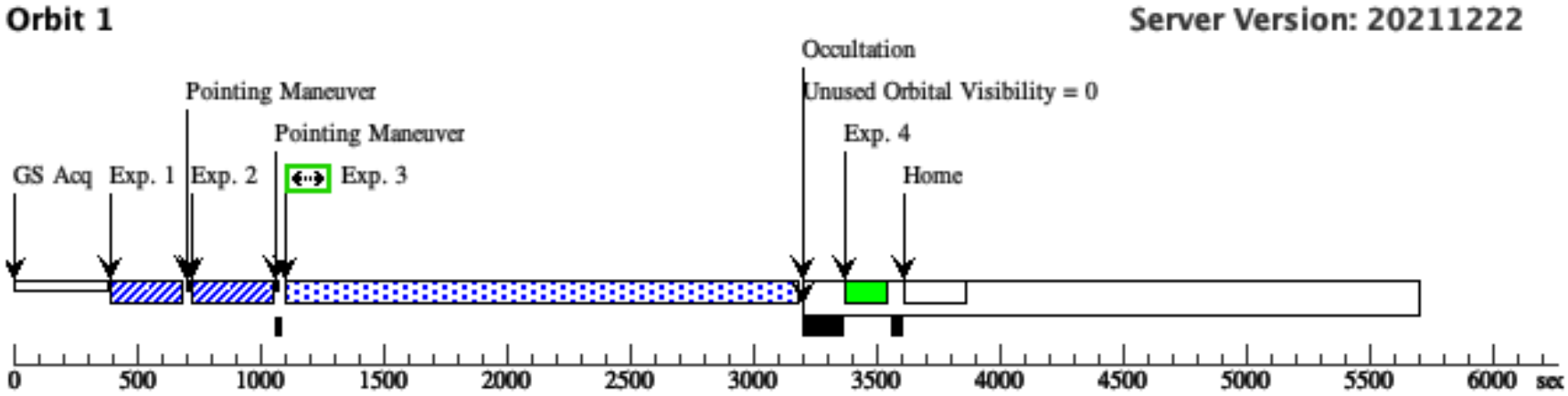
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	HD-85426 Alt Name1: TOI-1774	RA: 09 52 38.8741 (148.1619754d) Dec: +35 06 39.55 (35.11099d) Equinox: J2000	Proper Motion RA: 264.73730760869984 mas/yr Proper Motion Dec: -150.09529986141462 mas/yr Parallax: .01857222471636576 " Epoch of Position: 2016.0	V=8.2 G = 8.0823	Reference Frame: ICRS

Comments: Vmag predicted from G mag and Teff using Mamajek tables
Category=EXT-STAR
Description=[EXTRA-SOLAR PLANETARY SYSTEM, G V-IV]

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.1525317)	(4) HD-85426	STIS/CCD, ACQ, F25ND3	MIRROR	ACQTYPE=POINT			1 Secs (1 Secs) *[==>]*	 ***[1]***
2	(STIS.ta.1525319)	(4) HD-85426	STIS/CCD, ACQ/PEAK, 31X0.05NDC	MIRROR				0.3 Secs (0.3 Secs) *[==>]*	 ***[1]***
3	(STIS.sp.1525425)	(4) HD-85426	STIS/FUV-MAMA, TIME-TAG, 52X0.5	G140M 1222 A	BUFFER-TIME=4601; WAVECAL=NO			1500 Secs (1920 Secs) *[==>1920.0 Secs]*	 ***[1]***
4		WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A				*[==>]*	***[1]***

Orbit Structure



Visit

Proposal 16731, TOI-1774 (08) Mon Apr 18 15:00:52 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: (none)

Fixed Targets

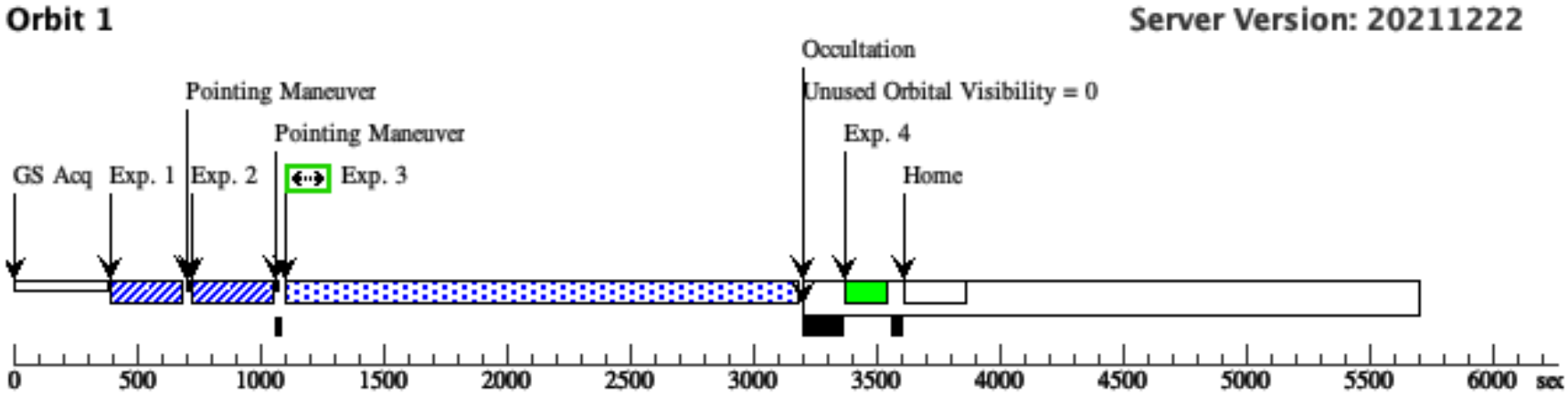
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	HD-85426 Alt Name1: TOI-1774	RA: 09 52 38.8741 (148.1619754d) Dec: +35 06 39.55 (35.11099d) Equinox: J2000	Proper Motion RA: 264.73730760869984 mas/yr Proper Motion Dec: -150.09529986141462 mas/yr Parallax: .01857222471636576 " Epoch of Position: 2016.0	V=8.2 G = 8.0823	Reference Frame: ICRS

Comments: Vmag predicted from G mag and Teff using Mamajek tables
Category=EXT-STAR
Description=[EXTRA-SOLAR PLANETARY SYSTEM, G V-IV]

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.1525317)	(4) HD-85426	STIS/CCD, ACQ, F25ND3	MIRROR	ACQTYPE=POINT			1 Secs (1 Secs) *[==>]*	 ***[1]***
2	(STIS.ta.1525319)	(4) HD-85426	STIS/CCD, ACQ/PEAK, 31X0.05NDC	MIRROR				0.3 Secs (0.3 Secs) *[==>]*	 ***[1]***
3	(STIS.sp.1525425)	(4) HD-85426	STIS/FUV-MAMA, TIME-TAG, 52X0.5	G140M 1222 A	BUFFER-TIME=4601; WAVECAL=NO			1500 Secs (1920 Secs) *[==>1920.0 Secs]*	 ***[1]***
4		WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A				*[==>]*	***[1]***

Orbit Structure



Visit

Proposal 16731, HD 136352 (06), implementation Mon Apr 18 15:00:52 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: SCHED 100%

Fixed Targets

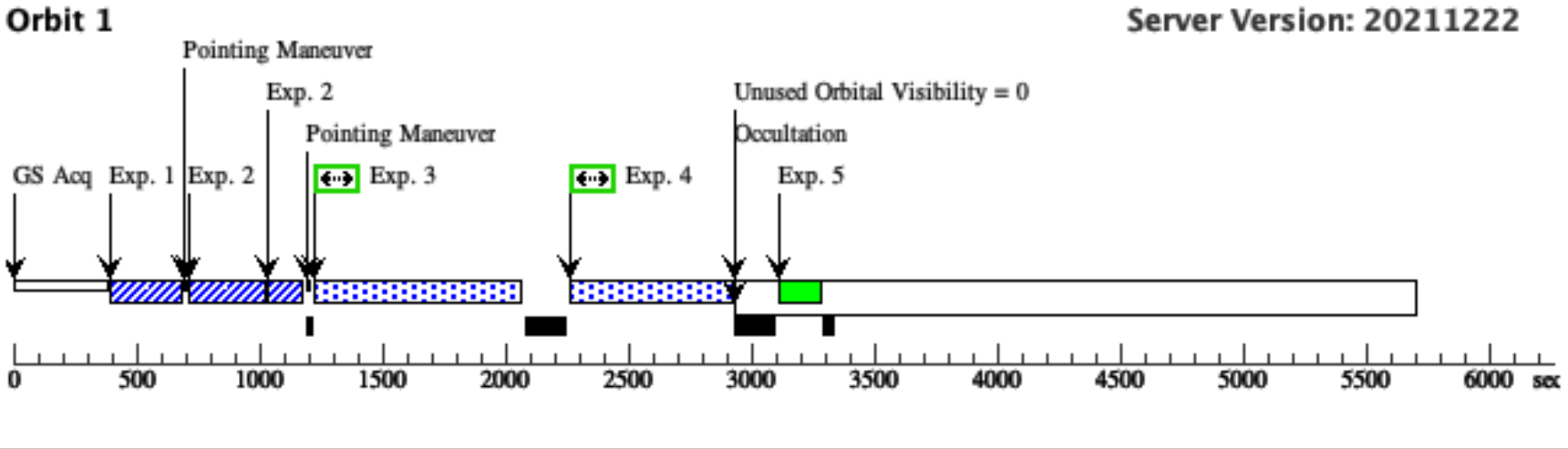
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	-NU.02-LUP Alt Name1: HD-136352	RA: 15 21 45.5462 (230.4397758d) Dec: -48 19 7.88 (-48.31886d) Equinox: J2000	Proper Motion RA: -1623.2748018634263 mas/yr Proper Motion Dec: -275.5476122093827 mas/yr Parallax: .06784669435693799" Epoch of Position: 2016.0	V=5.65	Reference Frame: ICRS

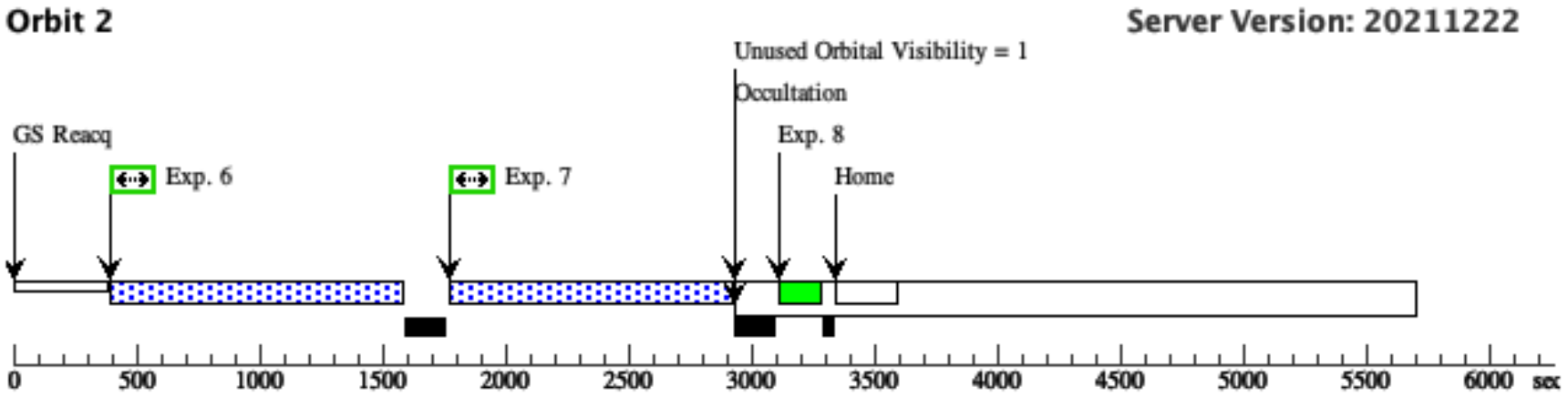
Comments:
Category=EXT-STAR
Description=[EXTRA-SOLAR PLANET, EXTRA-SOLAR PLANETARY SYSTEM, G V-IV]

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.1525376)	(6) -NU.02-LUP	STIS/CCD, ACQ, F25ND3	MIRROR	ACQTYPE=POINT			0.1 Secs (0.1 Secs) *[==>]*	***[1]***
2	(STIS.ta.1525378)	(6) -NU.02-LUP	STIS/CCD, ACQ/PEAK, 0.3X0.05ND	MIRROR				0.5 Secs (0.5 Secs) *[==>]*	***[1]***
3	(STIS.sp.1525431)	(6) -NU.02-LUP	STIS/FUV-MAMA, TIME-TAG, 52X2	G140M 1222 A	BUFFER-TIME=1661; WAVECAL=NO			500 Secs (642 Secs) *[==>642.0 Secs]*	***[1]***
4	(STIS.sp.1525431)	(6) -NU.02-LUP	STIS/FUV-MAMA, TIME-TAG, 52X2	G140M 1222 A	BUFFER-TIME=1661; WAVECAL=NO			500 Secs (642 Secs) *[==>642.0 Secs]*	***[1]***
5		WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A				*[==>]*	***[1]***
6	(STIS.sp.1525431)	(6) -NU.02-LUP	STIS/FUV-MAMA, TIME-TAG, 52X2	G140M 1222 A	BUFFER-TIME=1661; WAVECAL=NO			1000 Secs (1131 Secs) *[==>1131.0 Secs]*	***[2]***
7	(STIS.sp.1525431)	(6) -NU.02-LUP	STIS/FUV-MAMA, TIME-TAG, 52X2	G140M 1222 A	BUFFER-TIME=1661; WAVECAL=NO			1000 Secs (1131 Secs) *[==>1131.0 Secs]*	***[2]***
8		WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A				*[==>]*	***[2]***

Orbit Structure





Visit

Proposal 16731, HD 136352 (07), implementation Mon Apr 18 15:00:52 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: SCHED 100%; Period 27.59221 D AND ZERO-PHASE HJD2458954.40990; SEQ 06,07 WITHIN 1.5 D

Fixed Targets

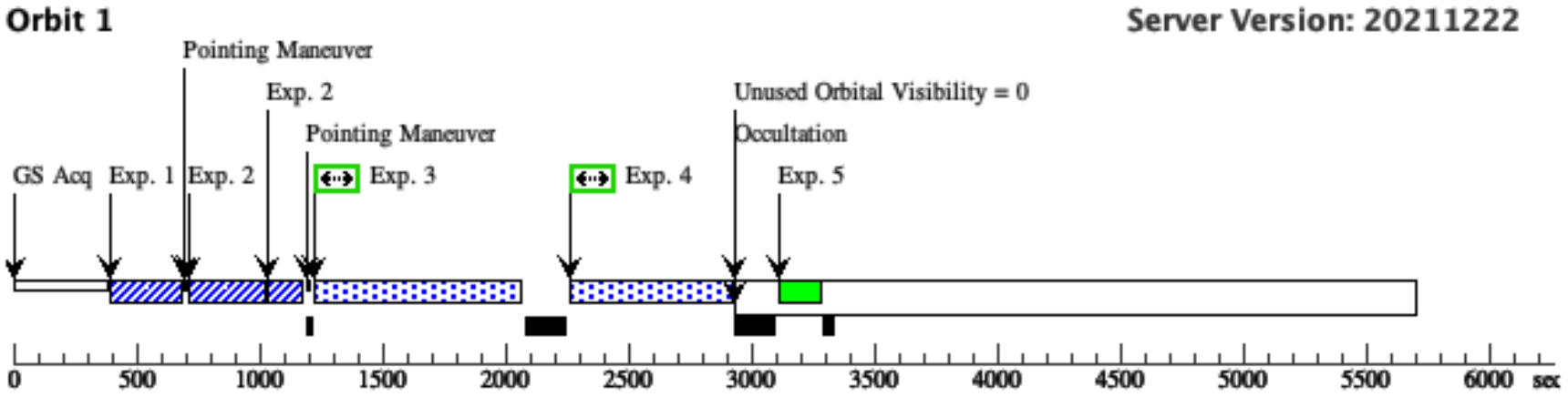
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	-NU.02-LUP Alt Name1: HD-136352	RA: 15 21 45.5462 (230.4397758d) Dec: -48 19 7.88 (-48.31886d) Equinox: J2000	Proper Motion RA: -1623.2748018634263 mas/yr Proper Motion Dec: -275.5476122093827 mas/yr Parallax: .06784669435693799" Epoch of Position: 2016.0	V=5.65	Reference Frame: ICRS

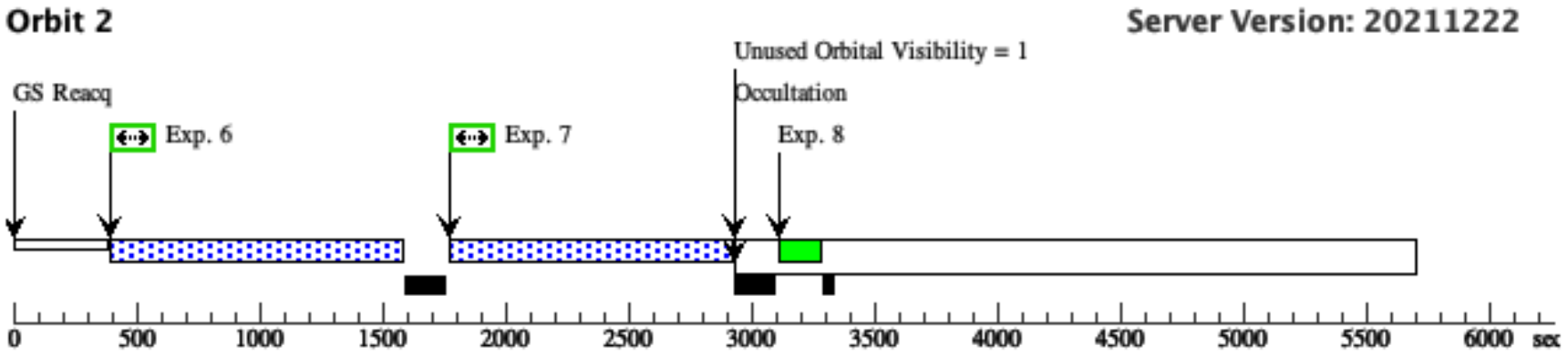
Comments:
Category=EXT-STAR
Description=[EXTRA-SOLAR PLANET, EXTRA-SOLAR PLANETARY SYSTEM, G V-IV]

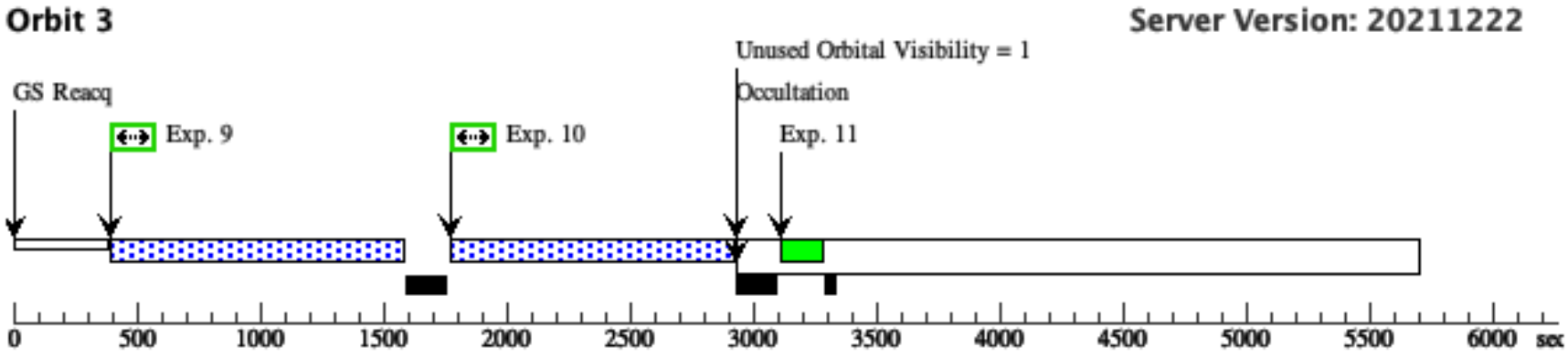
Exposures

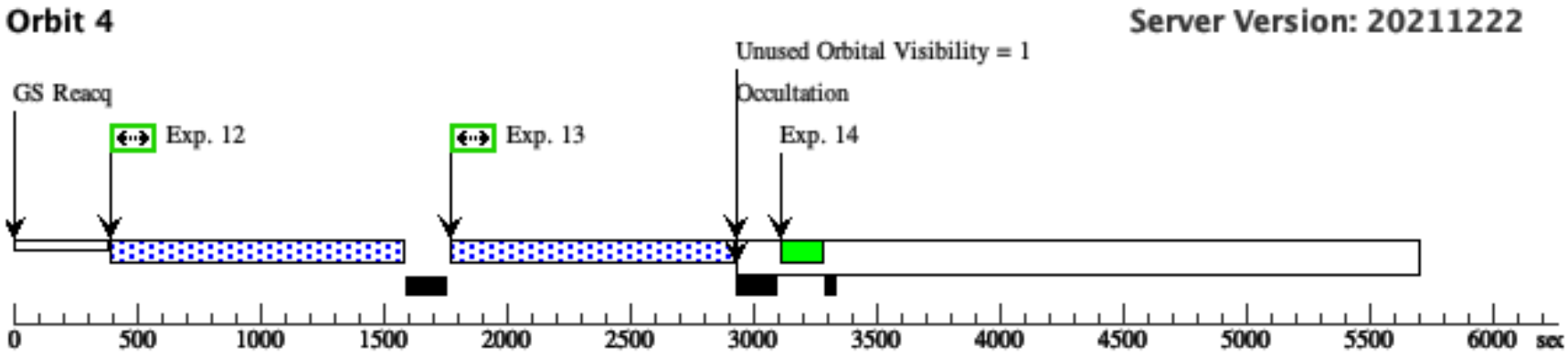
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.1525376)	(6) -NU.02-LUP	STIS/CCD, ACQ, F25ND3	MIRROR	ACQTYPE=POINT	PHASE 0.99282708 TO 0.99509221		0.1 Secs (0.1 Secs)	
								[==>]	***[1]***
2	(STIS.ta.1525378)	(6) -NU.02-LUP	STIS/CCD, ACQ/PEAK, 0.3X0.05ND	MIRROR				0.5 Secs (0.5 Secs)	
								[==>]	***[1]***
3	(STIS.sp.1525431)	(6) -NU.02-LUP	STIS/FUV-MAMA, TIME-TAG, 52X2	G140M 1222 A	BUFFER-TIME=1661; WAVECAL=NO			500 Secs (642 Secs)	
								[==>642.0 Secs]	***[1]***
4	(STIS.sp.1525431)	(6) -NU.02-LUP	STIS/FUV-MAMA, TIME-TAG, 52X2	G140M 1222 A	BUFFER-TIME=1661; WAVECAL=NO			500 Secs (642 Secs)	
								[==>642.0 Secs]	***[1]***
5		WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A				*[==>]*	***[1]***
6	(STIS.sp.1525431)	(6) -NU.02-LUP	STIS/FUV-MAMA, TIME-TAG, 52X2	G140M 1222 A	BUFFER-TIME=1661; WAVECAL=NO			1000 Secs (1131 Secs)	
								[==>1131.0 Secs]	***[2]***
7	(STIS.sp.1525431)	(6) -NU.02-LUP	STIS/FUV-MAMA, TIME-TAG, 52X2	G140M 1222 A	BUFFER-TIME=1661; WAVECAL=NO			1000 Secs (1131 Secs)	
								[==>1131.0 Secs]	***[2]***
8		WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A				*[==>]*	***[2]***
9	(STIS.sp.1525431)	(6) -NU.02-LUP	STIS/FUV-MAMA, TIME-TAG, 52X2	G140M 1222 A	BUFFER-TIME=1661; WAVECAL=NO			1000 Secs (1131 Secs)	
								[==>1131.0 Secs]	***[3]***
10	(STIS.sp.1525431)	(6) -NU.02-LUP	STIS/FUV-MAMA, TIME-TAG, 52X2	G140M 1222 A	BUFFER-TIME=1661; WAVECAL=NO			1000 Secs (1131 Secs)	
								[==>1131.0 Secs]	***[3]***
11		WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A				*[==>]*	***[3]***
12	(STIS.sp.1525431)	(6) -NU.02-LUP	STIS/FUV-MAMA, TIME-TAG, 52X2	G140M 1222 A	BUFFER-TIME=1661; WAVECAL=NO			1000 Secs (1131 Secs)	
								[==>1131.0 Secs]	***[4]***
13	(STIS.sp.1525431)	(6) -NU.02-LUP	STIS/FUV-MAMA, TIME-TAG, 52X2	G140M 1222 A	BUFFER-TIME=1661; WAVECAL=NO			1000 Secs (1131 Secs)	
								[==>1131.0 Secs]	***[4]***
14		WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A				*[==>]*	***[4]***
15	(STIS.sp.1525431)	(6) -NU.02-LUP	STIS/FUV-MAMA, TIME-TAG, 52X2	G140M 1222 A	BUFFER-TIME=1661; WAVECAL=NO			1000 Secs (1131 Secs)	
								[==>1131.0 Secs]	***[5]***
16	(STIS.sp.1525431)	(6) -NU.02-LUP	STIS/FUV-MAMA, TIME-TAG, 52X2	G140M 1222 A	BUFFER-TIME=1661; WAVECAL=NO			1000 Secs (1131 Secs)	
								[==>1131.0 Secs]	***[5]***
17		WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A				*[==>]*	***[5]***

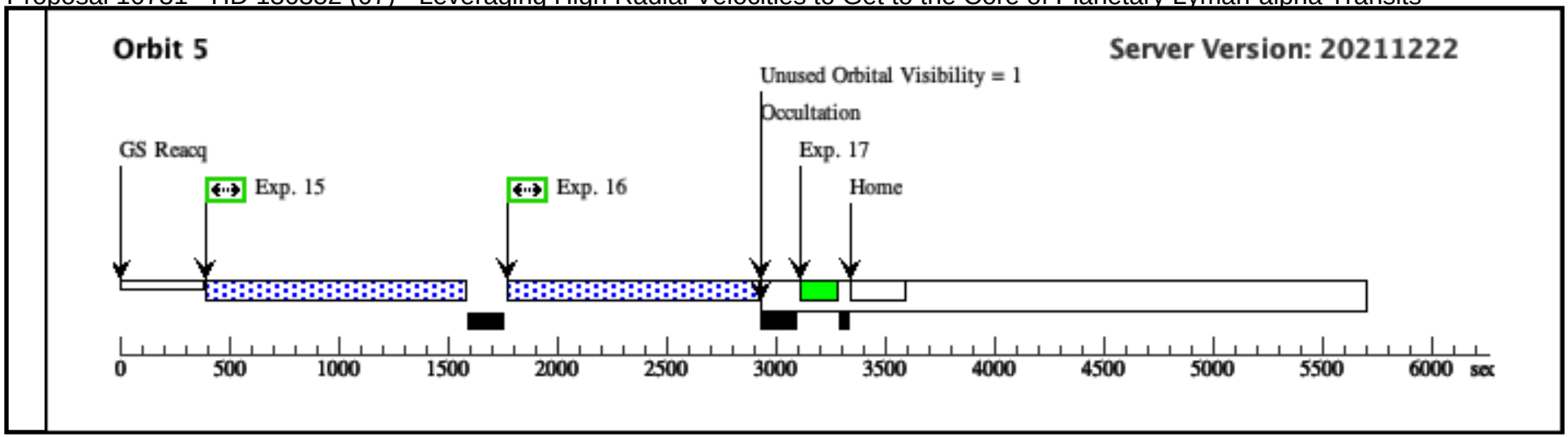
Orbit Structure






Orbit 3
Server Version: 20211222
Unused Orbital Visibility = 1
GS Reacq
Occultation
Exp. 9
Exp. 10
Exp. 11
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec


Orbit 4
Server Version: 20211222
Unused Orbital Visibility = 1
GS Reacq
Occultation
Exp. 12
Exp. 13
Exp. 14
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec


Orbit 5
Server Version: 20211222
Unused Orbital Visibility = 1
Occultation
GS Reacq
Exp. 15
Exp. 16
Exp. 17
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec