15951 - Testing r-process nucleosynthesis models with two r-process enhanced stars

Cycle: 27, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) 2MASSJ00512646-1053170 WAVE	STIS/CCD STIS/NUV-MAMA	3	12-Dec-2019 16:00:14.0	yes
02	(1) 2MASSJ00512646-1053170 WAVE	STIS/CCD STIS/NUV-MAMA	3	12-Dec-2019 16:00:16.0	yes
03	(1) 2MASSJ00512646-1053170 WAVE	STIS/CCD STIS/NUV-MAMA	3	12-Dec-2019 16:00:18.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
04	(1) 2MASSJ00512646-1053170 WAVE	STIS/CCD STIS/NUV-MAMA	3	12-Dec-2019 16:00:20.0	yes
05	(2) 2MASSJ05383296-5904280 WAVE	STIS/CCD STIS/NUV-MAMA	2	12-Dec-2019 16:00:21.0	yes
06	(2) 2MASSJ05383296-5904280 WAVE	STIS/CCD STIS/NUV-MAMA	2	12-Dec-2019 16:00:23.0	yes
07	(2) 2MASSJ05383296-5904280 WAVE	STIS/CCD STIS/NUV-MAMA	1	12-Dec-2019 16:00:24.0	yes

17 Total Orbits Used

ABSTRACT

Recent years have seen extensive progress in our understanding of the rapid neutron capture ("r-") process, responsible for the production of the heaviest elements in the Universe, especially with the discovery that neutron star mergers can produce these elements in kilonovae. However, several key questions about the detailed composition of r-process nucleosynthesis remain unanswered. Two critical unknowns are whether the ratio of high-opacity lanthanides to other r-process elements varies or is universal; and why some stars have boosted abundances of the high-opacity and radioactive actinides ("actinide boost stars"). Both of these variations can drastically affect neutron star merger kilonova light curves, but cannot currently be directly measured in those kilonovae. Metal-poor star abundance patterns can be used to understand such variations. This proposal aims to observe two r-process enhanced stars from which abundances of 2nd and 3rd peak elements can be measured. Combining abundances derived with near-UV spectroscopy with those from optical spectroscopy will provide a full r-process abundance pattern for the two stars which can be used to test components of current r-process models like fission fragment distributions and fission cycling.

OBSERVING DESCRIPTION

The goal of this observing program is to collect E230M c2707 R~30000 spectra of two stars, J0051-1053 and J0538-5904.
Both targets are non-variable, metal-poor Pop II stars. Because the targets are non-variable, spectra can be collected at any time with no constraints.

Our S/N goals are 50/1 for J0051-1053 and 30/1 for J0538-5904 at 2385 Angstroms. This can be obtained in 12 orbits for J0051-1053 and 5 orbits for J0538-5904 including overheads.

Observations have been grouped into 2- or 3-orbit visits to minimize overhead and maximize scheduling flexibility.
For the 3-orbit visits, there should be five exposures. Orbit 1: ACQ, ACQ/PEAK, and SCIENCE. Orbit 2: SCIENCE. Orbit 3: SCIENCE.
For the 2-orbit visits, there should be four exposures. Orbit 1: ACQ, ACQ/PEAK, and SCIENCE. Orbit 2: SCIENCE.

Acquisition exposure times are computed with STIS target acquisition exposure time calculator targeting S/N=40 and employing the F25ND3 filter for bright targets for initial acquisition and the 0.2x0.05ND slit for maximum precision for acquisition peak.

Visit

Proposal 15951, Visit 01, implementation Thu Dec 12 21:00:25 GMT 2019

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Fixed Targets

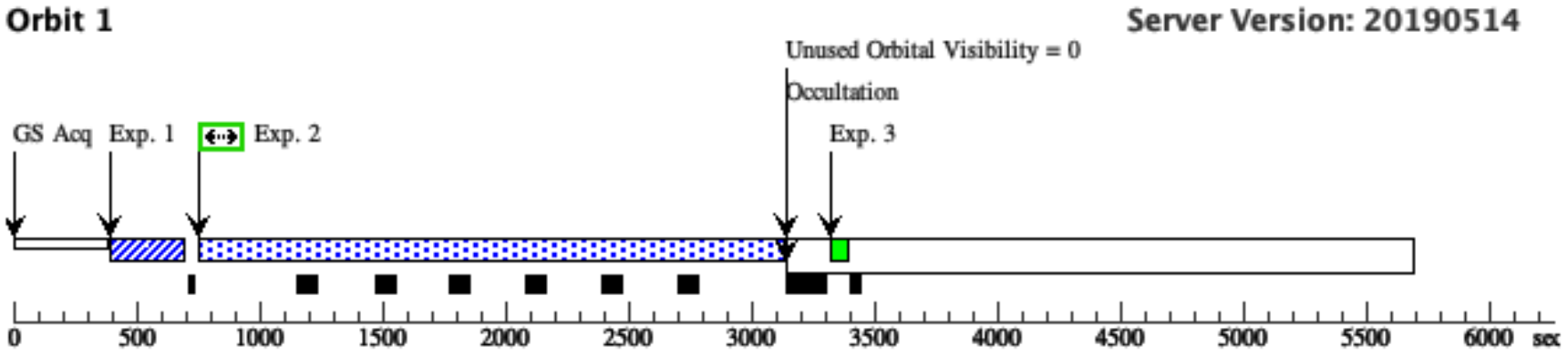
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	2MASSJ00512646-1053170	RA: 00 51 26.4242 (12.8601008d) Dec: -10 53 20.11 (-10.88892d) Equinox: J2000	Proper Motion RA: -0.002154253422766755 sec of time/yr Proper Motion Dec: -0.18137799997930415 arcsec/yr Epoch of Position: 2015.5 Radial Velocity: -31.73 km/sec	V=10.81	Reference Frame: ICRS

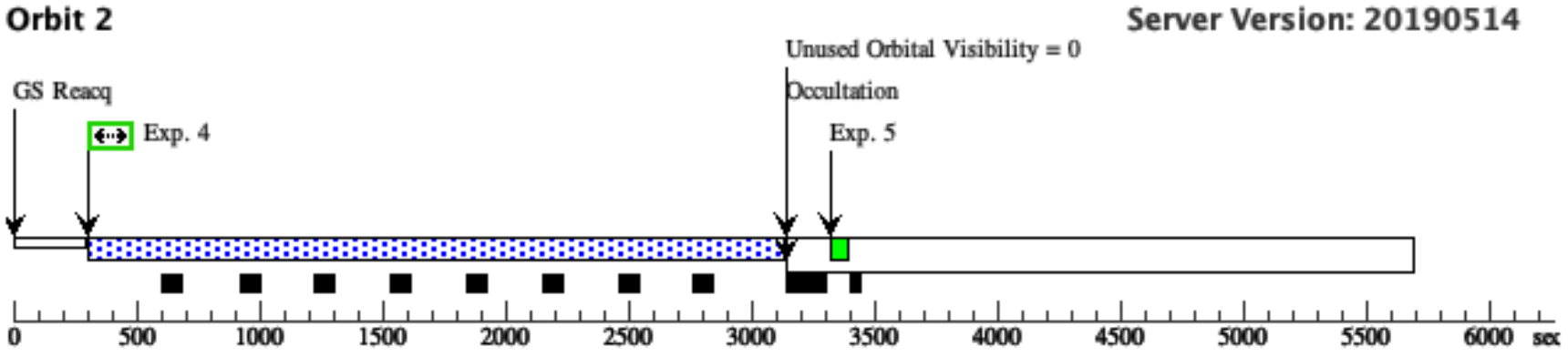
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[HALO, POPULATION II]
Extended=NO

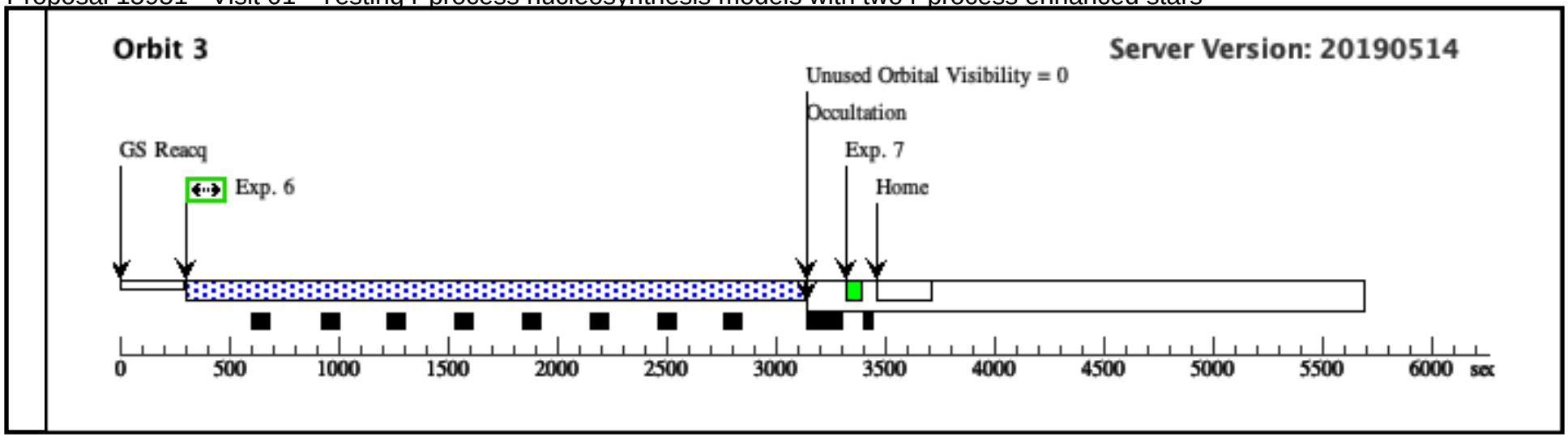
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (STIS.ta.1368416)	(1) 2MASSJ00512646-1053170	STIS/CCD, ACQ, F25ND3	MIRROR				3 Secs (3 Secs) *[==>]*	 ***[1]***
2	SCIENCE 1 (STIS.sp.1396291)	(1) 2MASSJ00512646-1053170	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=308			2267 Secs (2267 Secs) *[==>]*	 ***[1]***
3	GO WAVE CAL 1	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	***[1]***
4	SCIENCE 2 (STIS.sp.1396291)	(1) 2MASSJ00512646-1053170	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=308			2817 Secs (2817 Secs) *[==>]*	 ***[2]***
5	GO WAVE CAL 2	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	***[2]***
6	SCIENCE 3 (STIS.sp.1396291)	(1) 2MASSJ00512646-1053170	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=308			2817 Secs (2817 Secs) *[==>]*	 ***[3]***
7	GO WAVE CAL 3	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	***[3]***

Orbit Structure



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Occultation
GS Reacq
Exp. 6
Exp. 7
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3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 15951, Visit 02, implementation Thu Dec 12 21:00:25 GMT 2019

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Fixed Targets

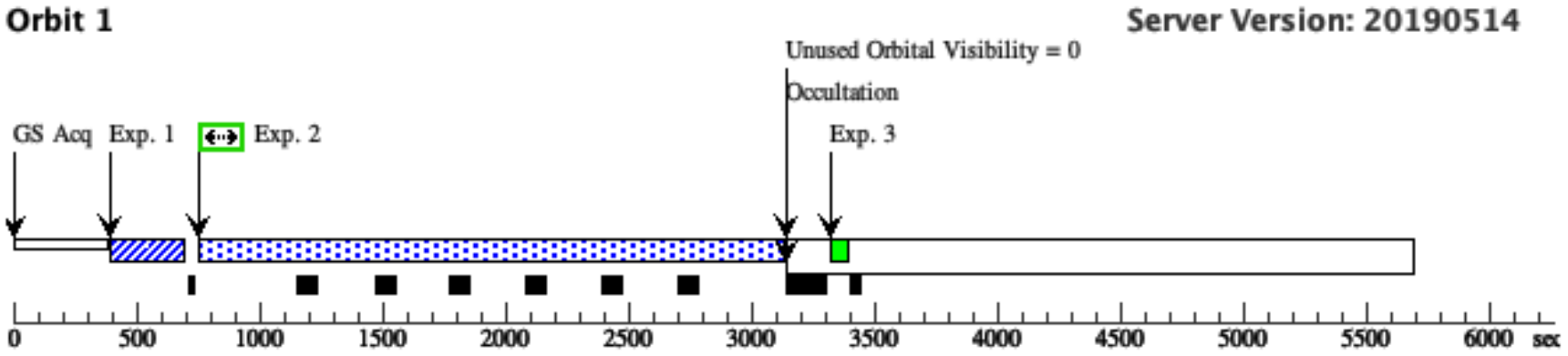
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	2MASSJ00512646-1053170	RA: 00 51 26.4242 (12.8601008d) Dec: -10 53 20.11 (-10.88892d) Equinox: J2000	Proper Motion RA: -0.002154253422766755 sec of time/yr Proper Motion Dec: -0.18137799997930415 arcsec/yr Epoch of Position: 2015.5 Radial Velocity: -31.73 km/sec	V=10.81	Reference Frame: ICRS

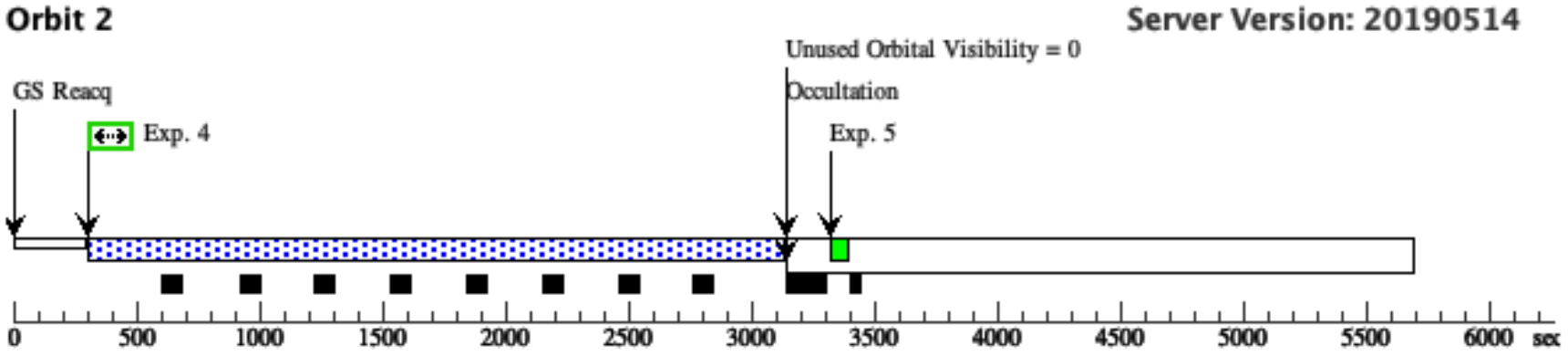
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[HALO, POPULATION II]
Extended=NO

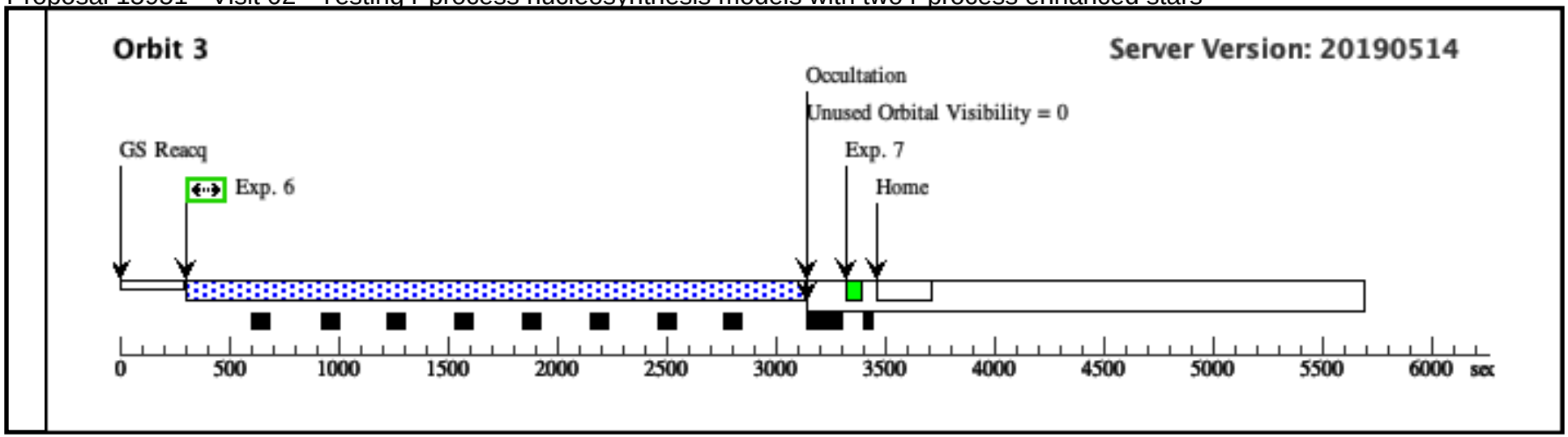
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (STIS.ta.1368416)	(1) 2MASSJ00512646-1053170	STIS/CCD, ACQ, F25ND3	MIRROR				3 Secs (3 Secs) *[==>]*	 ***[1]***
2	SCIENCE 1 (STIS.sp.1396291)	(1) 2MASSJ00512646-1053170	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=308			2267 Secs (2267 Secs) *[==>]*	 ***[1]***
3	GO WAVE CAL 1	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	***[1]***
4	SCIENCE 2 (STIS.sp.1396291)	(1) 2MASSJ00512646-1053170	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=308			2817 Secs (2817 Secs) *[==>]*	 ***[2]***
5	GO WAVE CAL 2	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	***[2]***
6	SCIENCE 3 (STIS.sp.1396291)	(1) 2MASSJ00512646-1053170	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=308			2817 Secs (2817 Secs) *[==>]*	 ***[3]***
7	GO WAVE CAL 3	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	***[3]***

Orbit Structure



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4500
5000
5500
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sec

Visit

Proposal 15951, Visit 03, implementation Thu Dec 12 21:00:25 GMT 2019

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Fixed Targets

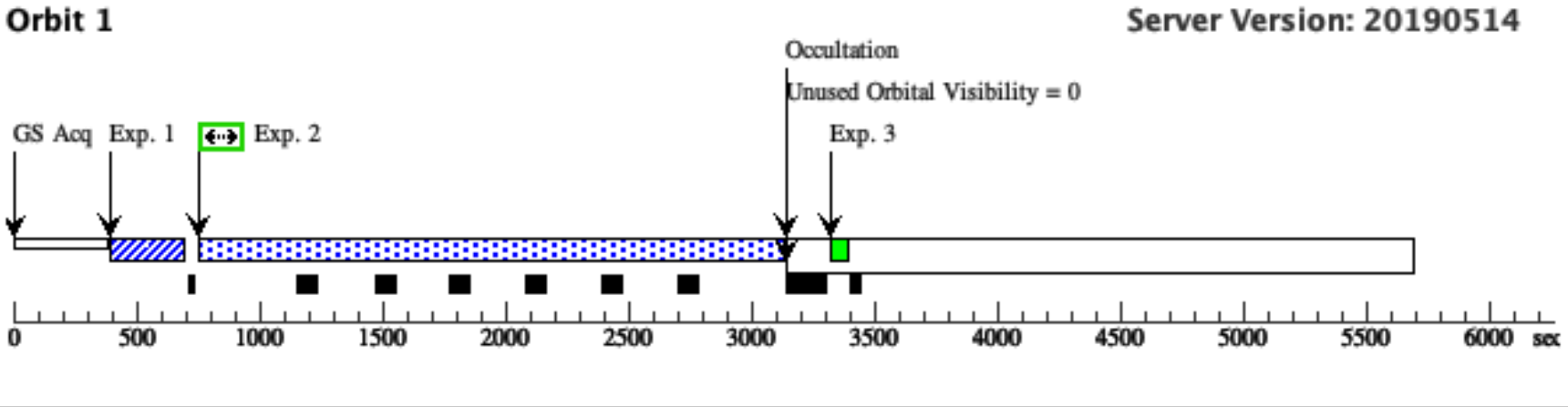
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	2MASSJ00512646-1053170	RA: 00 51 26.4242 (12.8601008d) Dec: -10 53 20.11 (-10.88892d) Equinox: J2000	Proper Motion RA: -0.002154253422766755 sec of time/yr Proper Motion Dec: -0.18137799997930415 arcsec/yr Epoch of Position: 2015.5 Radial Velocity: -31.73 km/sec	V=10.81	Reference Frame: ICRS

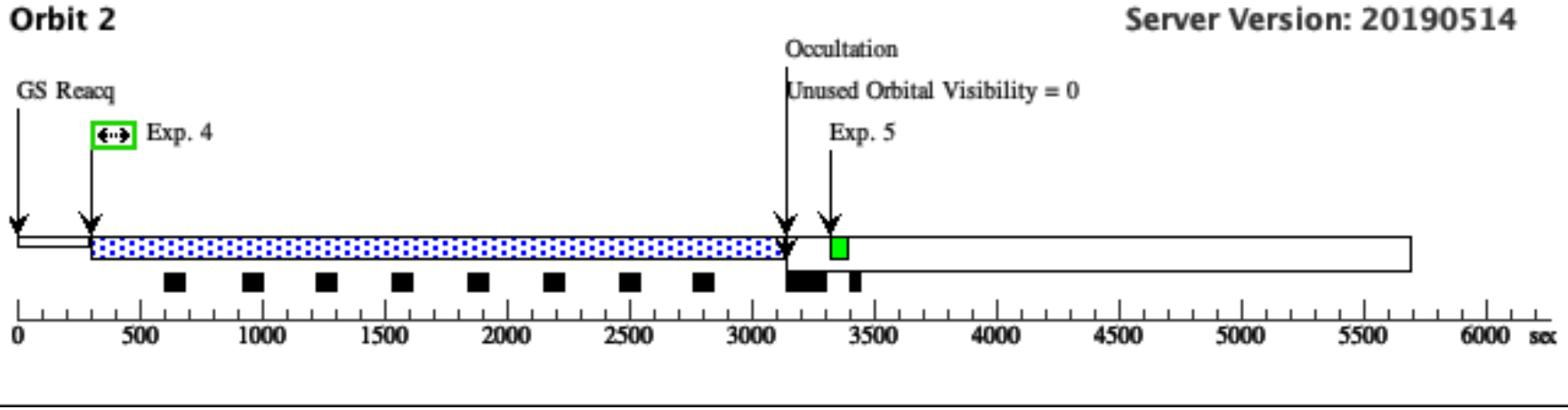
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[HALO, POPULATION II]
Extended=NO

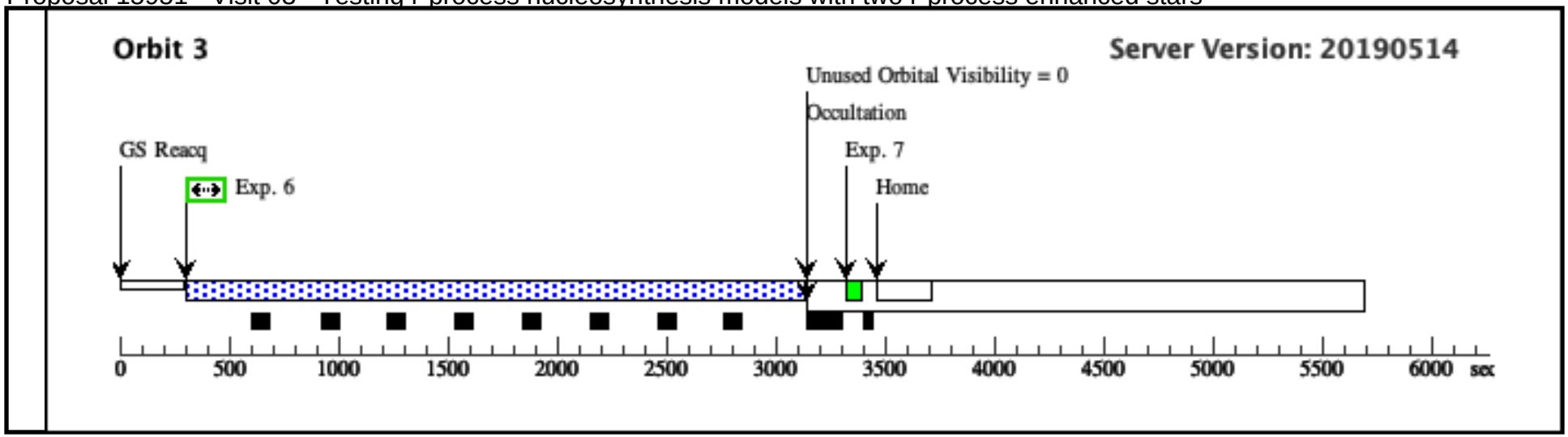
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (STIS.ta.1368416)	(1) 2MASSJ00512646-1053170	STIS/CCD, ACQ, F25ND3	MIRROR				3 Secs (3 Secs) *[==>]*	 ***[1]***
2	SCIENCE 1 (STIS.sp.1396291)	(1) 2MASSJ00512646-1053170	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=308			2267 Secs (2267 Secs) *[==>]*	 ***[1]***
3	GO WAVE CAL 1	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	***[1]***
4	SCIENCE 2 (STIS.sp.1396291)	(1) 2MASSJ00512646-1053170	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=308			2817 Secs (2817 Secs) *[==>]*	 ***[2]***
5	GO WAVE CAL 2	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	***[2]***
6	SCIENCE 3 (STIS.sp.1396291)	(1) 2MASSJ00512646-1053170	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=308			2817 Secs (2817 Secs) *[==>]*	 ***[3]***
7	GO WAVE CAL 3	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	***[3]***

Orbit Structure



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sec

Visit

Proposal 15951, Visit 04, implementation Thu Dec 12 21:00:25 GMT 2019

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Fixed Targets

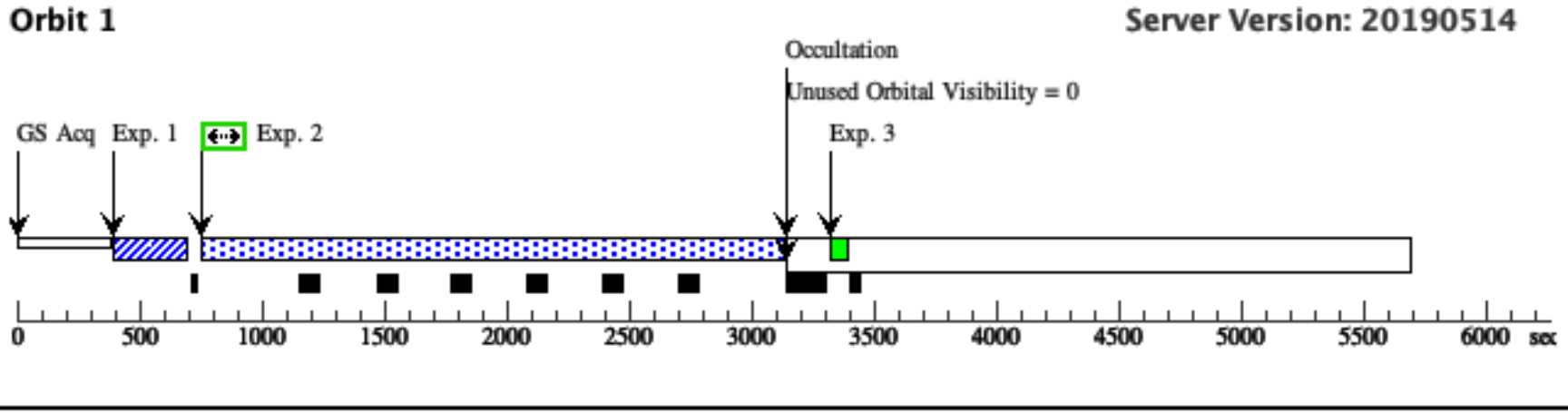
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	2MASSJ00512646-1053170	RA: 00 51 26.4242 (12.8601008d) Dec: -10 53 20.11 (-10.88892d) Equinox: J2000	Proper Motion RA: -0.002154253422766755 sec of time/yr Proper Motion Dec: -0.18137799997930415 arcsec/yr Epoch of Position: 2015.5 Radial Velocity: -31.73 km/sec	V=10.81	Reference Frame: ICRS

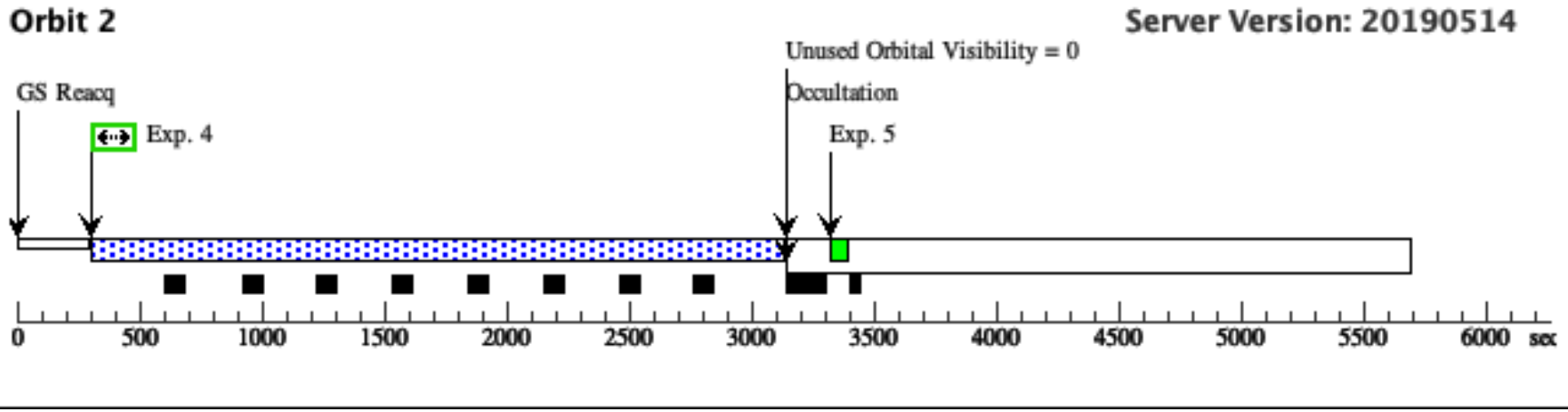
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[HALO, POPULATION II]
Extended=NO

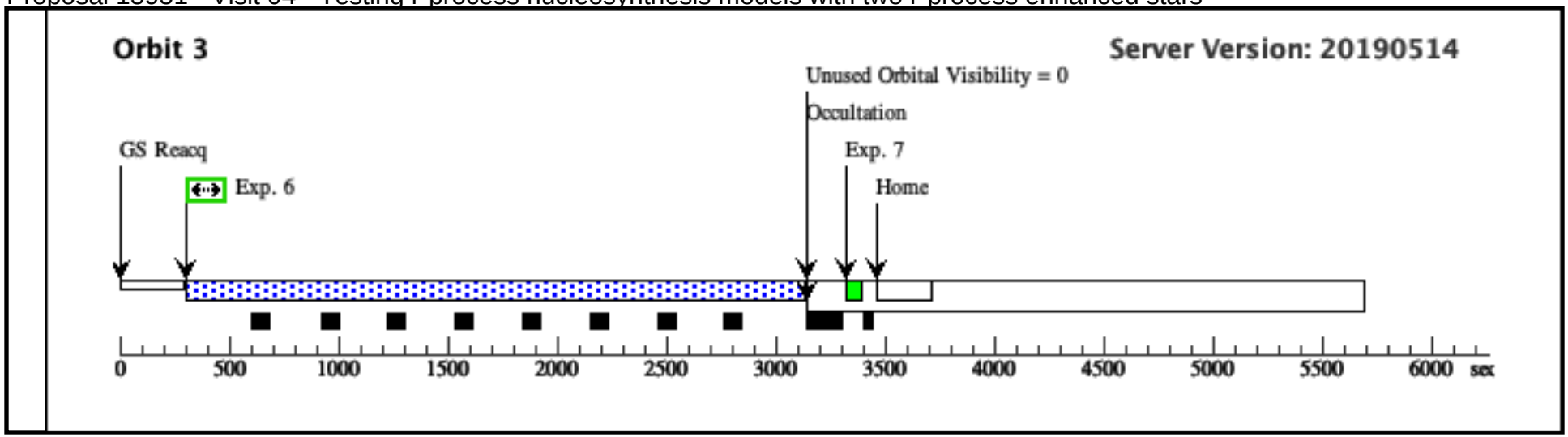
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (STIS.ta.1368416)	(1) 2MASSJ00512646-1053170	STIS/CCD, ACQ, F25ND3	MIRROR				3 Secs (3 Secs) *[==>]*	 ***[1]***
2	SCIENCE 1 (STIS.sp.1396291)	(1) 2MASSJ00512646-1053170	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=308			2267 Secs (2267 Secs) *[==>]*	 ***[1]***
3	GO WAVE CAL 1	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	***[1]***
4	SCIENCE 2 (STIS.sp.1396291)	(1) 2MASSJ00512646-1053170	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=308			2817 Secs (2817 Secs) *[==>]*	 ***[2]***
5	GO WAVE CAL 2	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	***[2]***
6	SCIENCE 3 (STIS.sp.1396291)	(1) 2MASSJ00512646-1053170	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=308			2817 Secs (2817 Secs) *[==>]*	 ***[3]***
7	GO WAVE CAL 3	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	***[3]***

Orbit Structure






Orbit 3
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Unused Orbital Visibility = 0
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GS Reacq
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Exp. 7
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sec

Visit

Proposal 15951, Visit 05, implementation Thu Dec 12 21:00:26 GMT 2019

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Fixed Targets

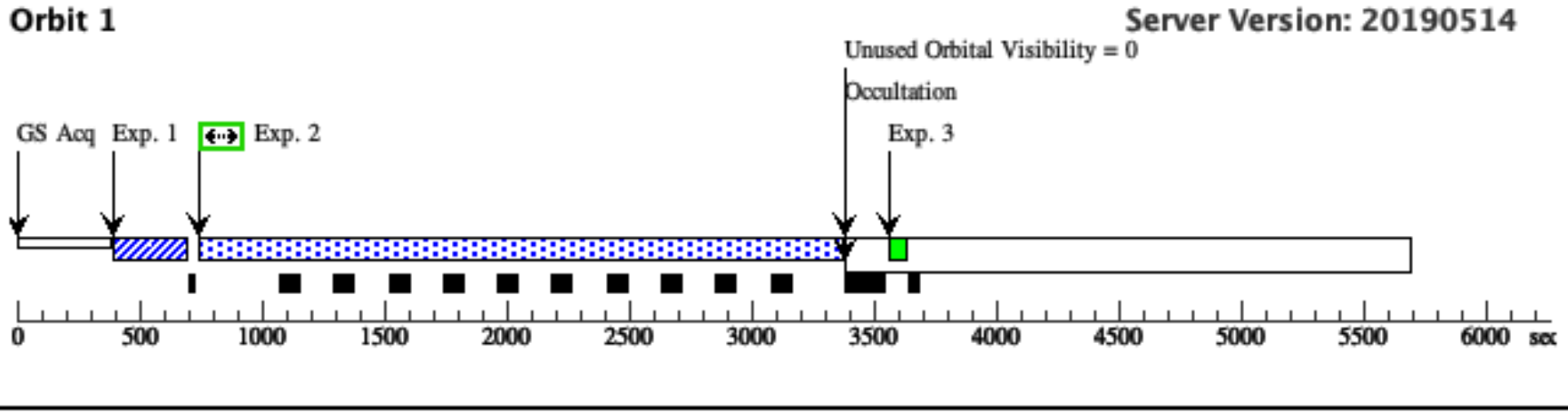
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	2MASSJ05383296-5904280	RA: 05 38 32.9460 (84.6372750d) Dec: -59 04 27.87 (-59.07441d) Equinox: J2000	Proper Motion RA: -7.043836947449679E-4 sec of time/yr Proper Motion Dec: 0.015125999999999999 arcsec/yr Epoch of Position: 2015.5 Radial Velocity: 197.35 km/sec	V=9.887	Reference Frame: ICRS

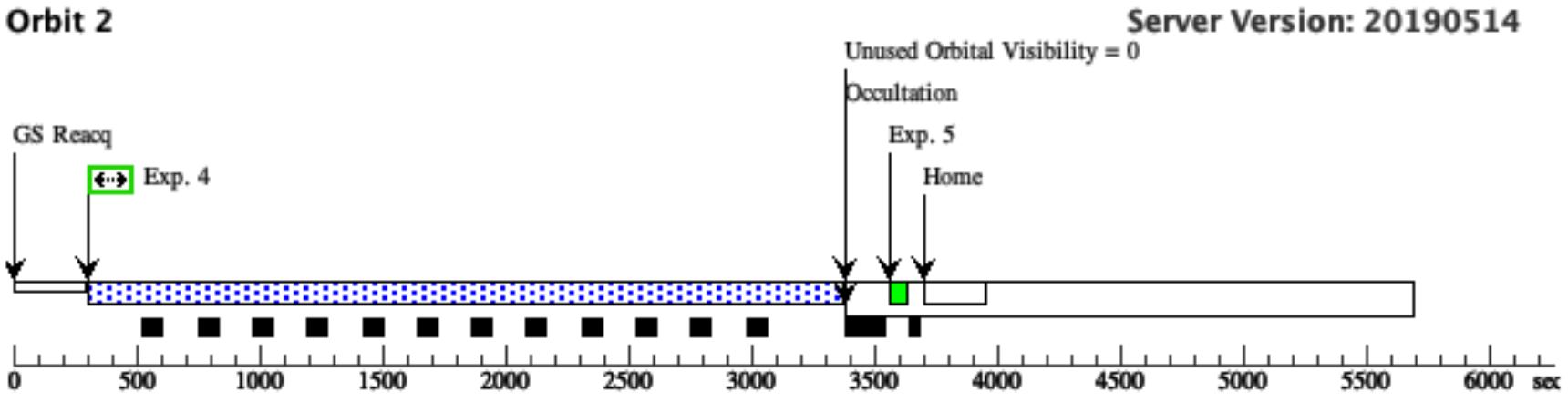
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[HALO, POPULATION II]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (STIS.ta.1368418)	(2) 2MASSJ05383296-5904280	STIS/CCD, ACQ, F25ND3	MIRROR				2 Secs (2 Secs) *[==>]*	 ***[1]***
2	SCIENCE 1 (STIS.sp.1396294)	(2) 2MASSJ05383296-5904280	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=223			2511 Secs (2511 Secs) *[==>]*	 ***[1]***
3	GO WAVE CAL 1	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	***[1]***
4	SCIENCE 2 (STIS.sp.1396294)	(2) 2MASSJ05383296-5904280	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=223			3057 Secs (3057 Secs) *[==>]*	 ***[2]***
5	GO WAVE CAL 2	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	***[2]***

Orbit Structure





Visit

Proposal 15951, Visit 06, implementation Thu Dec 12 21:00:26 GMT 2019

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Fixed Targets

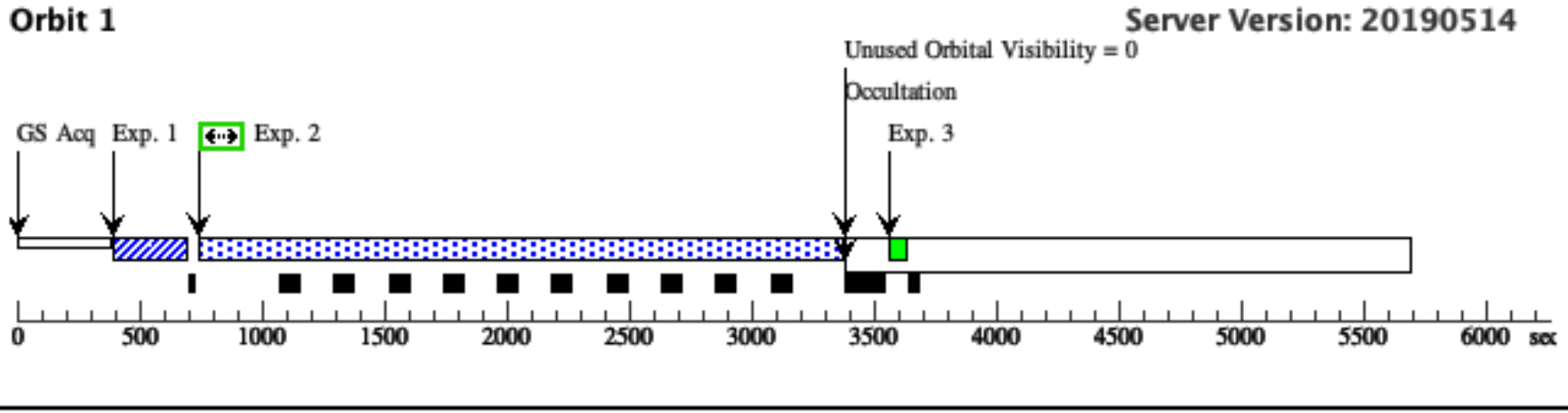
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	2MASSJ05383296-5904280	RA: 05 38 32.9460 (84.6372750d) Dec: -59 04 27.87 (-59.07441d) Equinox: J2000	Proper Motion RA: -7.043836947449679E-4 sec of time/yr Proper Motion Dec: 0.015125999999999999 arcsec/yr Epoch of Position: 2015.5 Radial Velocity: 197.35 km/sec	V=9.887	Reference Frame: ICRS

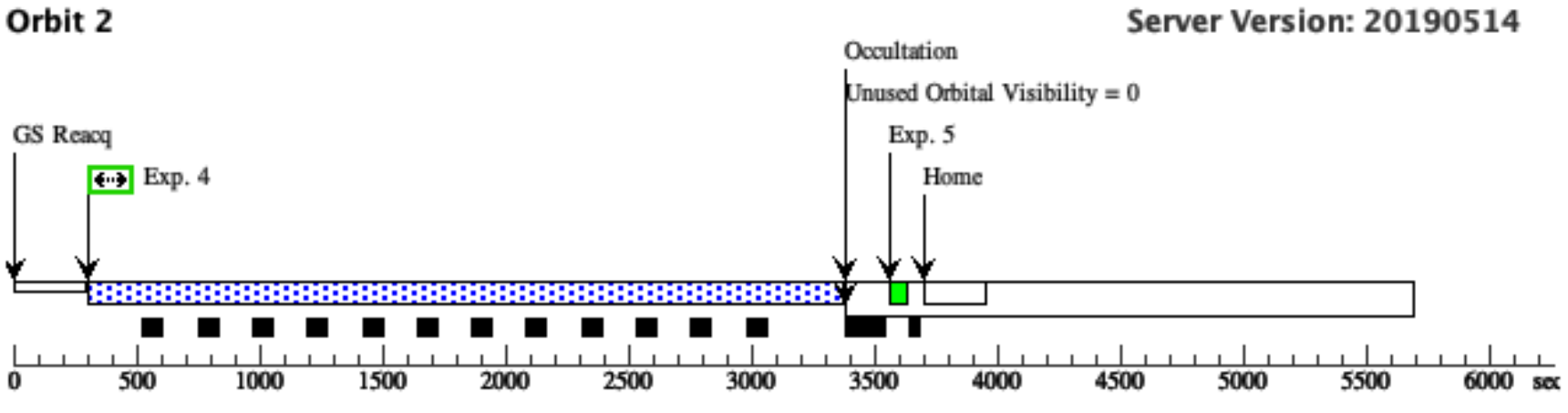
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[HALO, POPULATION II]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (STIS.ta.1368418)	(2) 2MASSJ05383296-5904280	STIS/CCD, ACQ, F25ND3	MIRROR				2 Secs (2 Secs) *[==>]*	 ***[1]***
2	SCIENCE 1 (STIS.sp.1396294)	(2) 2MASSJ05383296-5904280	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=223			2511 Secs (2511 Secs) *[==>]*	 ***[1]***
3	GO WAVE CAL 1	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	***[1]***
4	SCIENCE 2 (STIS.sp.1396294)	(2) 2MASSJ05383296-5904280	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=223			3057 Secs (3057 Secs) *[==>]*	 ***[2]***
5	GO WAVE CAL 2	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	***[2]***

Orbit Structure





Visit

Proposal 15951, Visit 07 Thu Dec 12 21:00:26 GMT 2019

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	2MASSJ05383296-5904280	RA: 05 38 32.9460 (84.6372750d) Dec: -59 04 27.87 (-59.07441d) Equinox: J2000	Proper Motion RA: -7.043836947449679E-4 sec of time/yr Proper Motion Dec: 0.015125999999999999 arcsec/yr Epoch of Position: 2015.5 Radial Velocity: 197.35 km/sec	V=9.887	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[HALO, POPULATION II]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (STIS.ta.1368418)	(2) 2MASSJ05383296-5904280	STIS/CCD, ACQ, F25ND3	MIRROR				2 Secs (2 Secs) *[==>]*	*[1]*
2	SCIENCE 1 (STIS.sp.1396294)	(2) 2MASSJ05383296-5904280	STIS/NUV-MAMA, TIME-TAG, 0.2X0.2	E230M 2707 A	WAVECAL=NO; BUFFER-TIME=223			2511 Secs (2511 Secs) *[==>]*	*[1]*
3	GO WAVE CAL 1	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				*[==>]*	*[1]*

Orbit Structure