17778 - Revealing the closest hidden white dwarfs in post-common envelope binaries

Cycle: 32, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*
Dr. Mairi O'Brien (PI) (ESA Member) (Contact)	**University of Warwick**
Dr. David John Wilson (CoI) (AdminUSPI)	University of Colorado at Boulder
Prof. Boris T. Gaensicke (CoI) (ESA Member)	University of Warwick
Prof. Pier-Emmanuel Tremblay (CoI) (ESA Member)	University of Warwick
Dr. Felipe Esteban Lagos-Vilches (CoI) (ESA Member)	University of Warwick

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) G-203-47	STIS/CCD STIS/NUV-MAMA	2	03-Dec-2025 14:00:15.0	yes
02	(2) GJ-207.1	STIS/CCD	2	03-Dec-2025 14:00:16.0	yes
03	(3) LHS-1817	STIS/CCD	1	03-Dec-2025 14:00:17.0	yes

5 Total Orbits Used

ABSTRACT

When a white dwarf is in a close binary with an M dwarf, they will have undergone a common envelope phase, making the system a post-common envelope binary. The common envelope phase of binary evolution is poorly understood, and the numbers of post-common envelope binaries in the local volume need to be constrained to improve predictions of the space density of binary stars. Despite the high spectroscopic completeness of local

samples of single white dwarfs, white dwarfs in post-common envelope binaries are notoriously difficult to detect, as the M dwarf dominates the system's optical spectrum and colours.

We request to observe the three closest candidate post-common envelope binaries to the Sun, all of which are M dwarfs with close unconfirmed white dwarf companions that were detected via radial velocity measurements. STIS is the only instrument that can confirm the white dwarf companions as they are brighter than the M dwarf in the near-UV. The mass and effective temperature of the white dwarfs will be constrained by fitting the UV spectra with white dwarf models. Confirming three of these systems that are within 17 parsec of the Sun will place vital constraints on the space density of close binary systems.

OBSERVING DESCRIPTION

We are observing three M dwarfs with hidden white dwarf binary companions. We will detect the excesses in the SEDs of these systems caused by the white dwarfs using the G230L and G230LB gratings in the near-UV.

For G 203-47, we will use the 52x2 aperture for NUV-MAMA G230L as it is the most spectrophotometric, and therefore enables confirmation and characterisation of the white dwarf excess. We will observe G 203-47 in TIME-TAG mode for G230L to reduce the impact of this flaring on our observations. A rare flare event at LHS 1817 and GJ 207.1 would saturate a G230L observation, so the CCD G230LB grating is used for these targets.

G203-47: From the ETC, we achieve a S/N of 8.9 at 2250 Angstrom for the shortest observation of the 2 orbits (1902s). The S/N reaches 35 at 3000 Angstrom.
GJ207.1: From the ETC, we achieve a S/N of 7.95 at 2375 Angstrom for the shortest observation of the 2 orbits (1997s). The S/N reaches 51 at 3000 Angstrom.
LHS 1817: From the ETC, we achieve a S/N of 17.9 at 2375 Angstrom for the single orbit observation (1734s). The S/N reaches 59 at 3000 Angstrom.

We will observe each target in the G430L grating as well, in order to calibrate the NUV data to optical/IR models. For the G430L observations we use the 52x2E1 grating to mitigate for CTE loss (as in STIS handbook 7.3.8).

We will not perform the ACQ/PEAK exposures as this is not required for slits greater in width than 0.1 arcsecond (as in STIS handbook 8.3).

Visit

Proposal 17778, G-203-47 (01), implementation Wed Dec 03 19:00:17 GMT 2025

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Fixed Targets

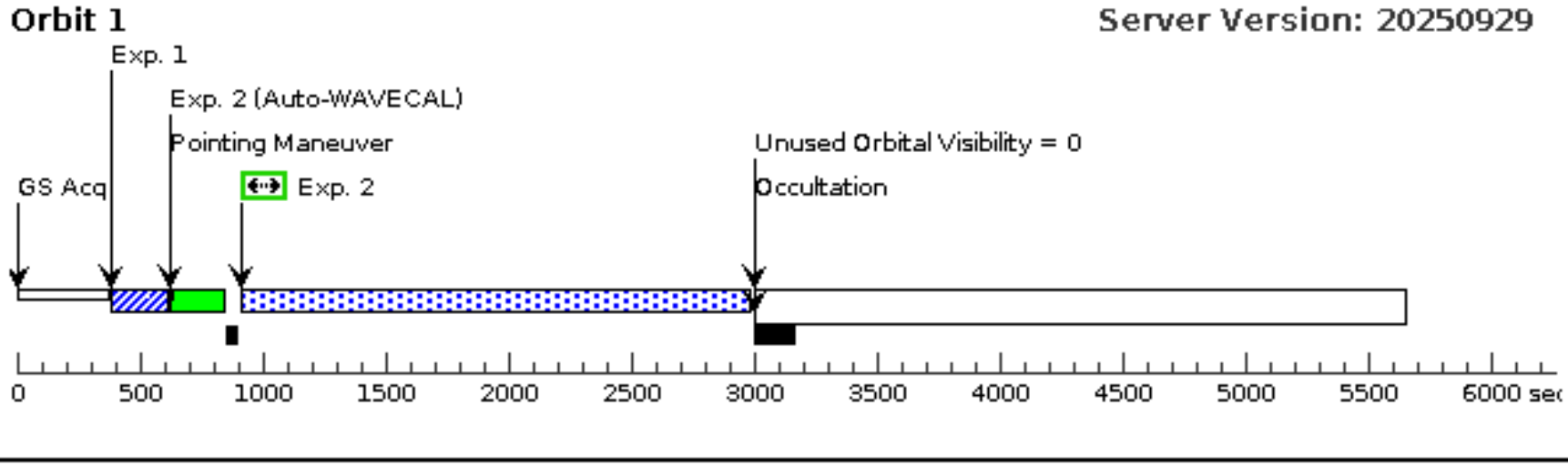
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	G-203-47	RA: 17 09 32.0333 (257.3834721d) Dec: +43 40 48.38 (43.68011d) Equinox: J2000	Proper Motion RA: 332.03214754852814 mas/yr Proper Motion Dec: -274.50099472651857 mas/yr Epoch of Position: 2016.0	V=13.671	Reference Frame: ICRS

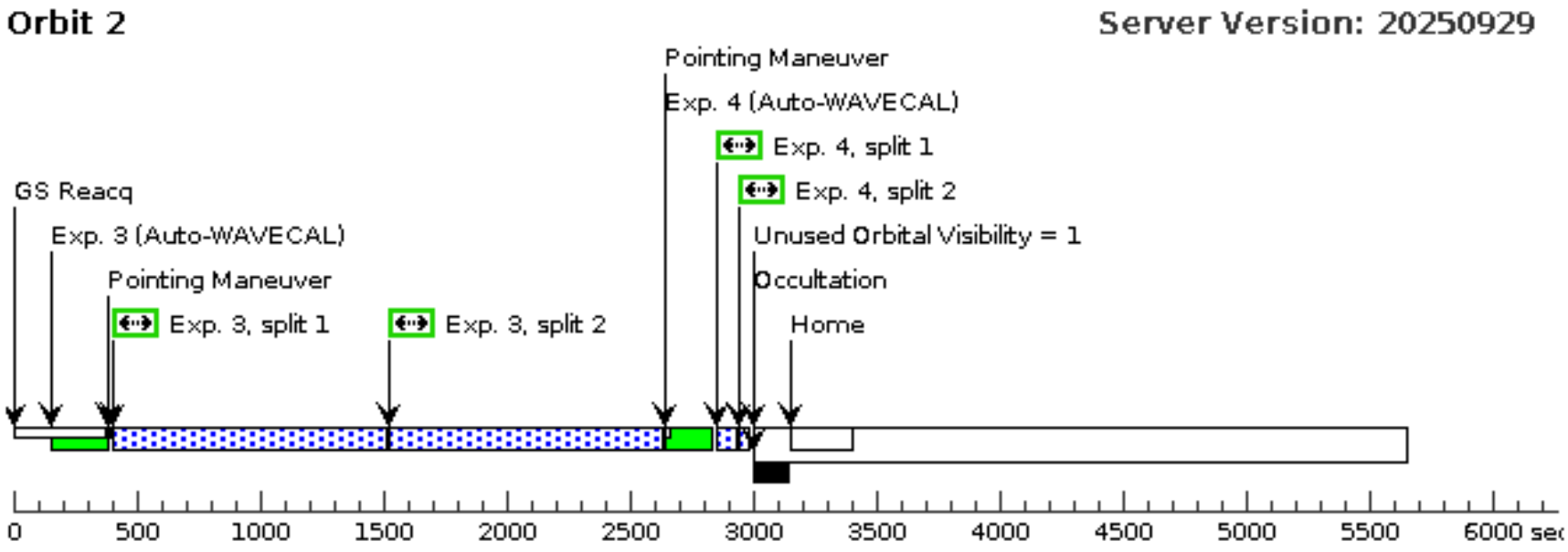
Comments: Coordinates, proper motions, and parallaxes are from Gaia Data Release 3.
Category=STAR
Description=[M III-I]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	G-203-47 Acq (STIS.ta.1930776)	(1) G-203-47	STIS/CCD, ACQ, F28X50LP	MIRROR				0.1 Secs (0.1 Secs) *[==>]*	***[1]***
2	G-203-47 G230L (STIS.sp.1930865)	(1) G-203-47	STIS/NUV-MAMA, TIME-TAG, 52X2	G230L 2376 A	BUFFER-TIME=1051			2800 Secs (2034 Secs) *[==>2034.0 Secs]*	***[1]***
3	G-203-47 G230LB (STIS.sp.2249642)	(1) G-203-47	STIS/CCD, ACCUM, 52X0.2	G230LB 2375 A				2500 Secs (2148 Secs) *[==>1074.0 Secs (Split 1)]* *[==>1074.0 Secs (Split 2)]*	***[2]***
4	G-203-47 G430L (STIS.sp.1930786)	(1) G-203-47	STIS/CCD, ACCUM, 52X2E1	G430L 4300 A				100 Secs (0.2 Secs) *[==>0.1 Secs (Split 1)]* *[==>0.1 Secs (Split 2)]*	***[2]***

Orbit Structure





Visit

Proposal 17778, GJ-207.1 (02), completed

Wed Dec 03 19:00:17 GMT 2025

Diagnostic Status: Warning

Scientific Instruments: STIS/CCD

Special Requirements: (none)

Diagnostics

(GJ-207.1 (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(GJ-207.1 (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

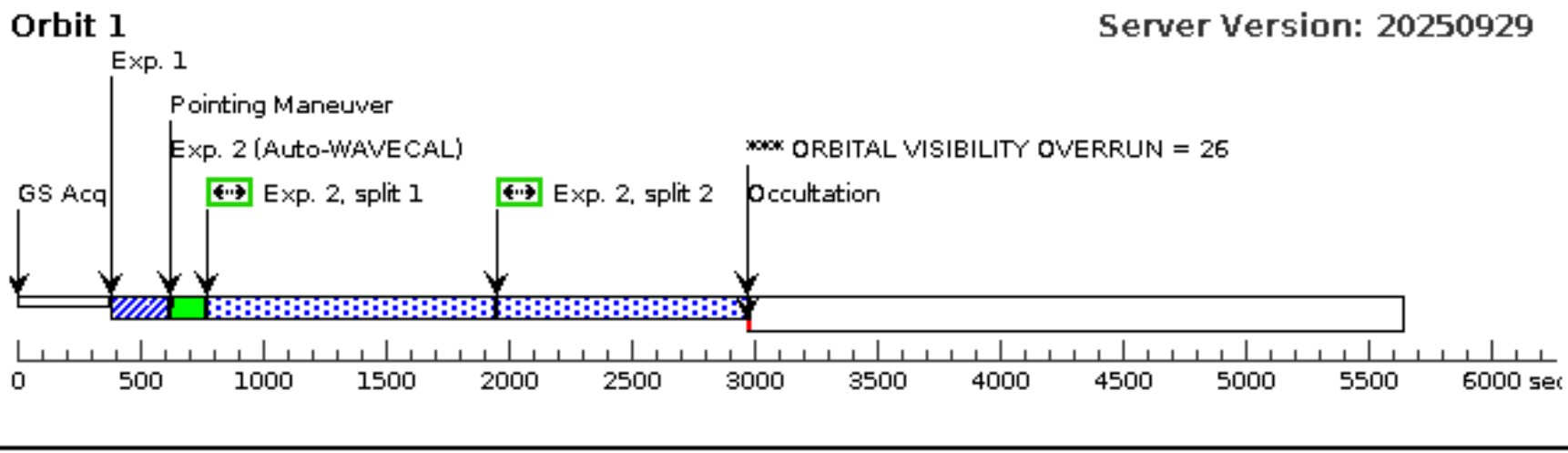
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	GJ-207.1	RA: 05 33 44.5529 (83.4356371d) Dec: +01 56 40.99 (1.94472d) Equinox: J2000	Proper Motion RA: -231.5393115276151 mas/yr Proper Motion Dec: -153.98875225290712 mas/yr Epoch of Position: 2016.0	V=11.499	Reference Frame: ICRS

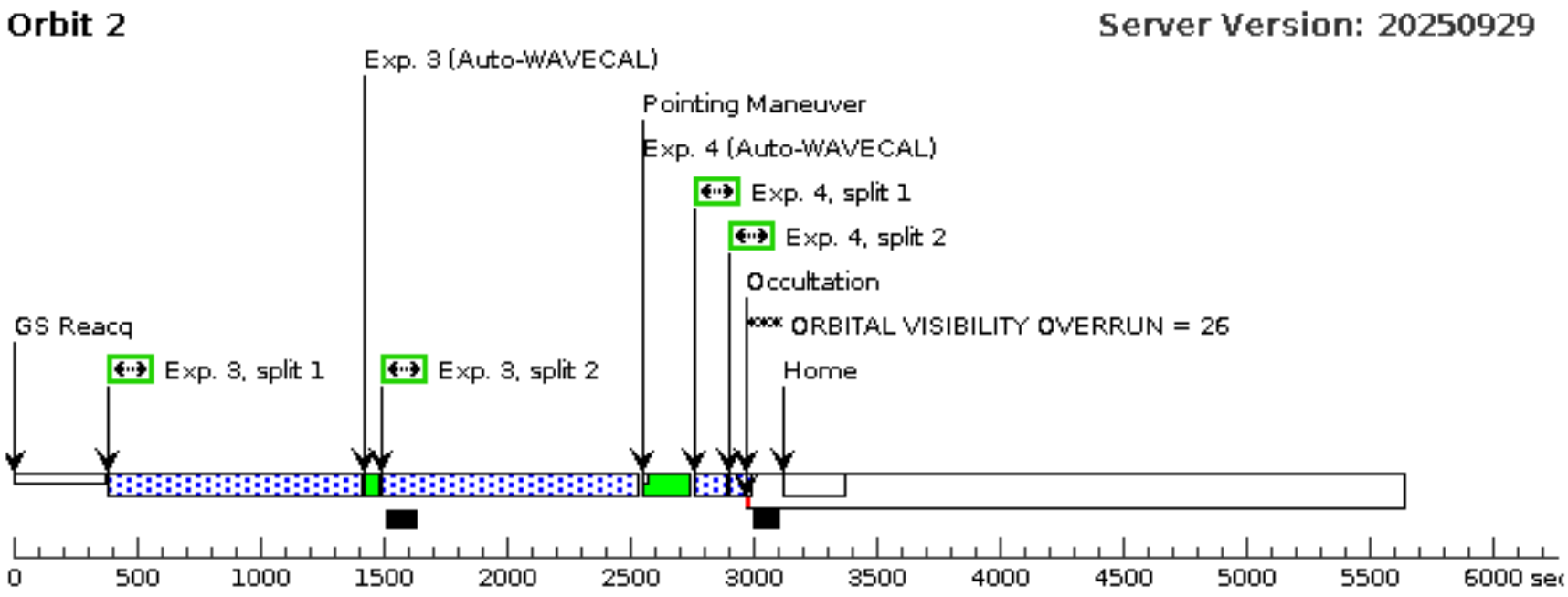
Comments: Coordinates, proper motions, and parallaxes are from Gaia Data Release 3.
Category=STAR
Description=[M III-I]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	GJ-207.1 Acq (STIS.ta.1930781)	(2) GJ-207.1	STIS/CCD, ACQ, F28X50LP	MIRROR				0.1 Secs (0.1 Secs) *[==>]*	***[1]***
2	GJ-207.1 G230LB 1 (STIS.sp.2021230)	(2) GJ-207.1	STIS/CCD, ACCUM, 52X0.2	G230LB 2375 A				1000 Secs (2137 Secs) *[==>1137.0 Secs (Split 1)]* *[==>1000.0 Secs (Split 2)]*	***[1]***
3	GJ-207.1 G230LB 2 (STIS.sp.2021231)	(2) GJ-207.1	STIS/CCD, ACCUM, 52X0.2	G230LB 2375 A				1000 Secs (1997 Secs) *[==>997.0 Secs (Split 1)]* *[==>1000.0 Secs (Split 2)]*	***[2]***
4	GJ-207.1 G430L (STIS.sp.1930787)	(2) GJ-207.1	STIS/CCD, ACCUM, 52X2E1	G430L 4300 A				50 Secs (100 Secs) *[==>50.0 Secs (Split 1)]* *[==>50.0 Secs (Split 2)]*	***[2]***

Orbit Structure





Visit

Proposal 17778, LHS-1817 (03), completed Wed Dec 03 19:00:17 GMT 2025

Diagnostic Status: Warning

Scientific Instruments: STIS/CCD

Special Requirements: (none)

Diagnostics

(LHS-1817 (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

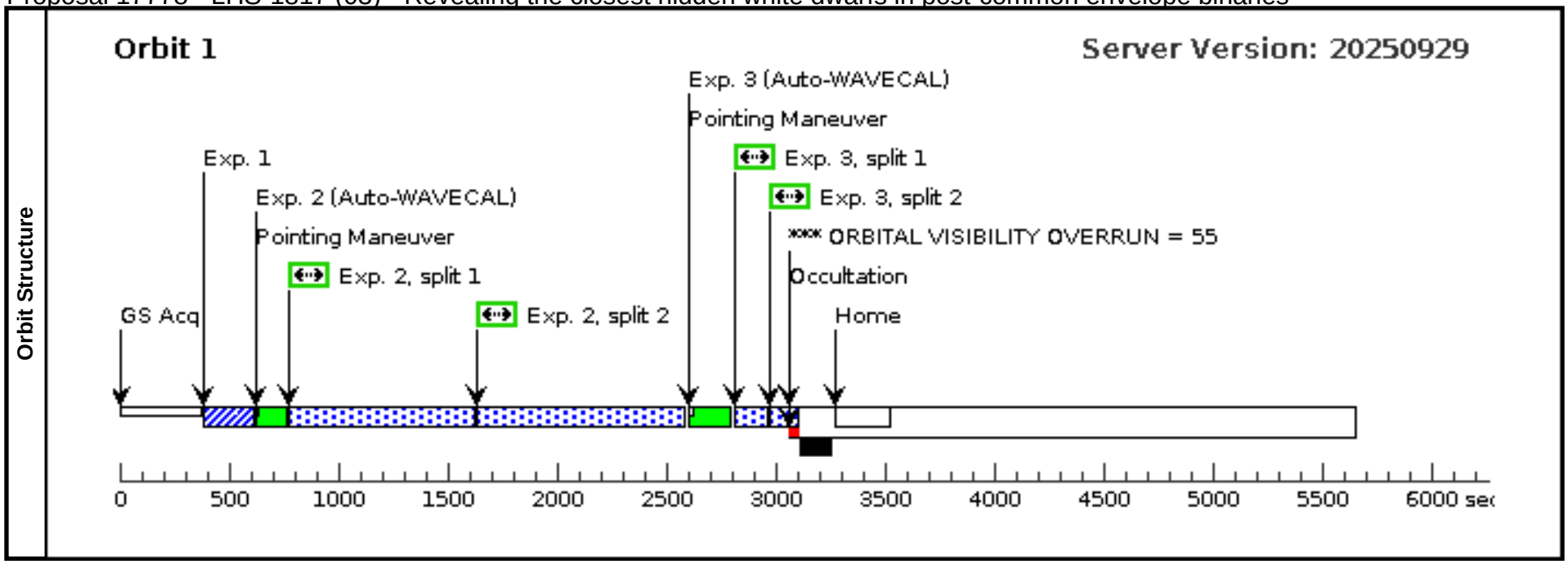
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	LHS-1817	RA: 06 05 30.0366 (91.3751525d) Dec: +60 49 9.84 (60.81940d) Equinox: J2000	Proper Motion RA: 290.1890575197944 mas/yr Proper Motion Dec: -788.781768640439 mas/yr Epoch of Position: 2016.0	V=13.69	Reference Frame: ICRS

Comments: Coordinates, proper motions, and parallaxes are from Gaia Data Release 3.
Category=STAR
Description=[M V-IV]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	LHS-1817 Acq (STIS.ta.1930784)	(3) LHS-1817	STIS/CCD, ACQ, F28X50LP	MIRROR				0.1 Secs (0.1 Secs) *[==>]*	***[1]***
2	LHS-1817 G230LB (STIS.sp.1952954)	(3) LHS-1817	STIS/CCD, ACCUM, 52X0.2	G230LB 2375 A				5600 Secs (1734 Secs) *[==>817.0 Secs (Split 1)]* *[==>917.0 Secs (Split 2)]*	***[1]***
3	LHS-1817 G430L (STIS.sp.1930788)	(3) LHS-1817	STIS/CCD, ACCUM, 52X2E1	G430L 4300 A				100 Secs (161 Secs) *[==>67.0 Secs (Split 1)]* *[==>94.0 Secs (Split 2)]*	***[1]***


Orbit Structure
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Server Version: 20250929
Exp. 3 (Auto-WAVECAL)
Pointing Maneuver
Exp. 1
Exp. 3, split 1
Exp. 2 (Auto-WAVECAL)
Exp. 3, split 2
Pointing Maneuver
**** ORBITAL VISIBILITY OVERRUN = 55
Exp. 2, split 1
Occultation
GS Acq
Exp. 2, split 2
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec