17272 - A transient outflow in the short-period binary UW CrB

Cycle: 30, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*
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Montserrat Armas Padilla (CoI) (ESA Member)	Universiteit van Amsterdam
Dr. Teo Munoz Darias (CoI) (ESA Member)	Instituto de Astrofisica de Canarias
Dr. Daniel Mata Sanchez (CoI) (ESA Member)	University of Manchester

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) V-UW-CRB	COS/FUV COS/NUV	2	20-Nov-2023 09:01:14.0	yes
02	(1) V-UW-CRB	COS/FUV COS/NUV	2	20-Nov-2023 09:01:15.0	yes
04	(1) V-UW-CRB	COS/FUV COS/NUV	2	20-Nov-2023 09:01:16.0	yes
03	(1) V-UW-CRB	COS/FUV COS/NUV	2	20-Nov-2023 09:01:17.0	yes

8 Total Orbits Used

ABSTRACT

Studying outflows of X-ray binaries is important for understanding the physics of accretion, the evolution of compact binaries, and dynamics of the local interstellar medium. UW CrB is a high-inclination low-mass X-ray binary with an orbital period of 111 min, for which we have recently identified a transient UV outflow and which shows hints of outflows at X-ray and optical wavelengths. We propose a comprehensive XMM-Newton (120 ks), HST (6 orbits) and VLT (6 hr) campaign to investigate the transient and multi-wavelength character of the outflow in UW CrB, aiming to determine the nature and physical properties of the outflow. Our proposed study will greatly enhance our general understanding of outflows in low-mass X-ray binaries.

OBSERVING DESCRIPTION

This programme consists of 6 HST orbits, spread over 3 visits that consist of 2 orbits each. Each first orbit will consist of an ACQ/IMAGE taken with COS/NUV and complemented with the spectroscopic exposures taken with the COS/FUV G140L.

The source position is accurately known (to within 0.2 arcsec; Gaia EDR3), so target acquisition can be performed using ACQ/IMAGE (a S/N of 50 is obtained for a 10-s exposure; ECT ID COS.ta.1836992). We will use the 1105 A setting that provides continuous coverage between 1118-2251 A in segment A, while segment B is switched off. With this setup, a 1150-s exposure for COS yields a S/N~5 (ETC ID: COS.sp.1837003). We will be using different FP-POS positions to reduce fixed-pattern noise and to minimise long-term gain sag.

Comment on reduced gyro operations

Since our program concerns simple orbit-long integrations with a single instrument/setup, the impact of reduced gyro operations on our HST science exposures is very minor. If needed we can increase the target acquisition time. We gladly accept advice on this.

Our program does reply on obtaining (partly) simultaneous observations with VLT and XMM-Newton (as detailed below), hence our HST observations are time critical. This may be impacted by the reduced field of regard and hence requires careful consideration.

Notes with regards to scheduling:

This programme is part of a simultaneous multi-wavelength campaign with the HST, XMM-Newton and VLT/XShooter observatories. The preferred

window to coordinate with XMM-Newton and VLT/XShooter is between 17 and 22 July 2023.

As mentioned before, the programme consists of 6 HST orbits, spread over 3 visits that consist of 2 orbits each. We aim to plan these visits in order to efficiently cover the entire orbital phase of our source (P~111 min) at least two times. We also aim to coordinate two of the HST visits with VLT, where the VLT observations consist of 6 hours spread equally over two consecutive days, and all of them within the XMM-Newton exposure of 120ks, to achieve our science goal of obtaining a time-resolved full SED of the system. We gladly accept advice on the optimal scheduling of our observations to achieve (partly) simulteneity with our VLT and XMM-Newton observations and to maximize the binary orbital coverage of our target. Given the orbital period of our system, this requires some careful consideration.

Visit

Proposal 17272, First visit (+VLT+XMM) (01), completed Mon Nov 20 14:01:17 GMT 2023

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Comments: This is the first visit, it will be performed simultaneously with VLT/X-Shooter and XMM-Newton. The tighter constrains comes from the visibility of the former.

Diagnostics

(First visit (+VLT+XMM) (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(First visit (+VLT+XMM) (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(First visit (+VLT+XMM) (01)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(First visit (+VLT+XMM) (01)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(First visit (+VLT+XMM) (01)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(First visit (+VLT+XMM) (01)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(First visit (+VLT+XMM) (01)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

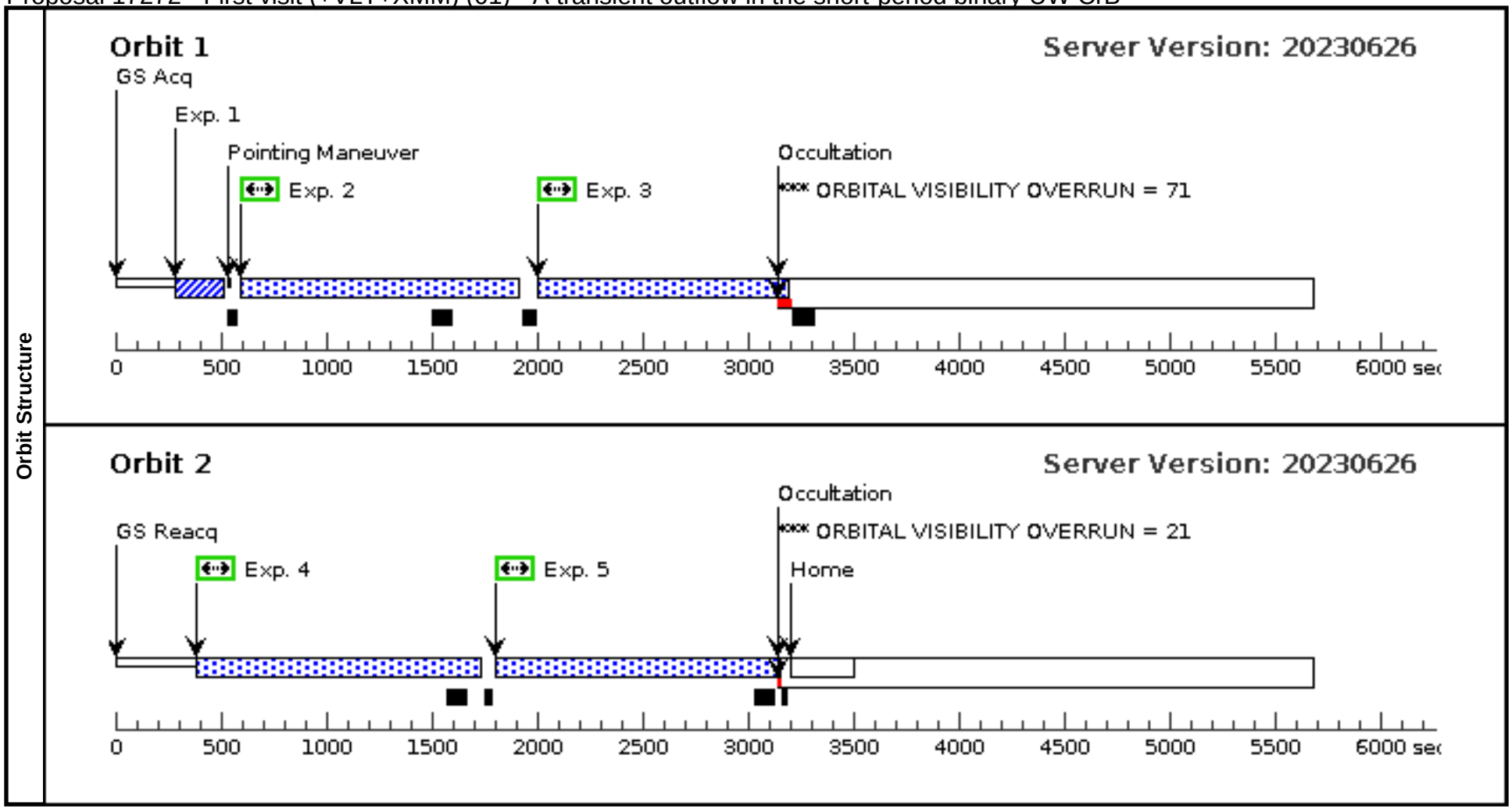
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	V-UW-CRB	RA: 16 05 45.8795 (241.4411646d) Dec: +25 51 45.14 (25.86254d) Equinox: J2000	Proper Motion RA: 3.127952476647745E-4 sec of time/yr Proper Motion Dec: -0.006624999991799996 arcsec/yr Epoch of Position: 2015.5	V=19.7+/-0.2	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[LMXB, NEUTRON STAR, X-RAY BURSTER]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	TA (COS.ta.1836992)	(1) V-UW-CRB	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				10 Secs (10 Secs) *[==>]*	*[1]*
2	SCI FP1 (COS.sp.1837003)	(1) V-UW-CRB	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=1; BUFFER-TIME=750			1141 Secs (1141 Secs) *[==>]*	*[1]*
3	SCI FP2 (COS.sp.1837003)	(1) V-UW-CRB	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=2; BUFFER-TIME=1200			1141 Secs (1141 Secs) *[==>]*	*[1]*
4	SCI FP3 (COS.sp.1837003)	(1) V-UW-CRB	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=3; BUFFER-TIME=1150			1297 Secs (1297 Secs) *[==>]*	*[2]*
5	SCI FP4 (COS.sp.1837003)	(1) V-UW-CRB	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=4; BUFFER-TIME=1200			1297 Secs (1297 Secs) *[==>]*	*[2]*


Orbit Structure
Orbit 1
Server Version: 20230626
GS Acq
Exp. 1
Pointing Maneuver
Exp. 2
Exp. 3
Occultation
*** ORBITAL VISIBILITY OVERRUN = 71
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec
Orbit 2
Server Version: 20230626
Occultation
*** ORBITAL VISIBILITY OVERRUN = 21
GS Reacq
Exp. 4
Exp. 5
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec

Visit

Proposal 17272, Second visit (+XMM) (02), failed Mon Nov 20 14:01:17 GMT 2023

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Comments: This is the second visit, which will be simultaneous with XMM-Newton but not with VLT (due to visibility).

Diagnostics

(Second visit (+XMM) (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Second visit (+XMM) (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Second visit (+XMM) (02)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(Second visit (+XMM) (02)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(Second visit (+XMM) (02)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(Second visit (+XMM) (02)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(Second visit (+XMM) (02)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

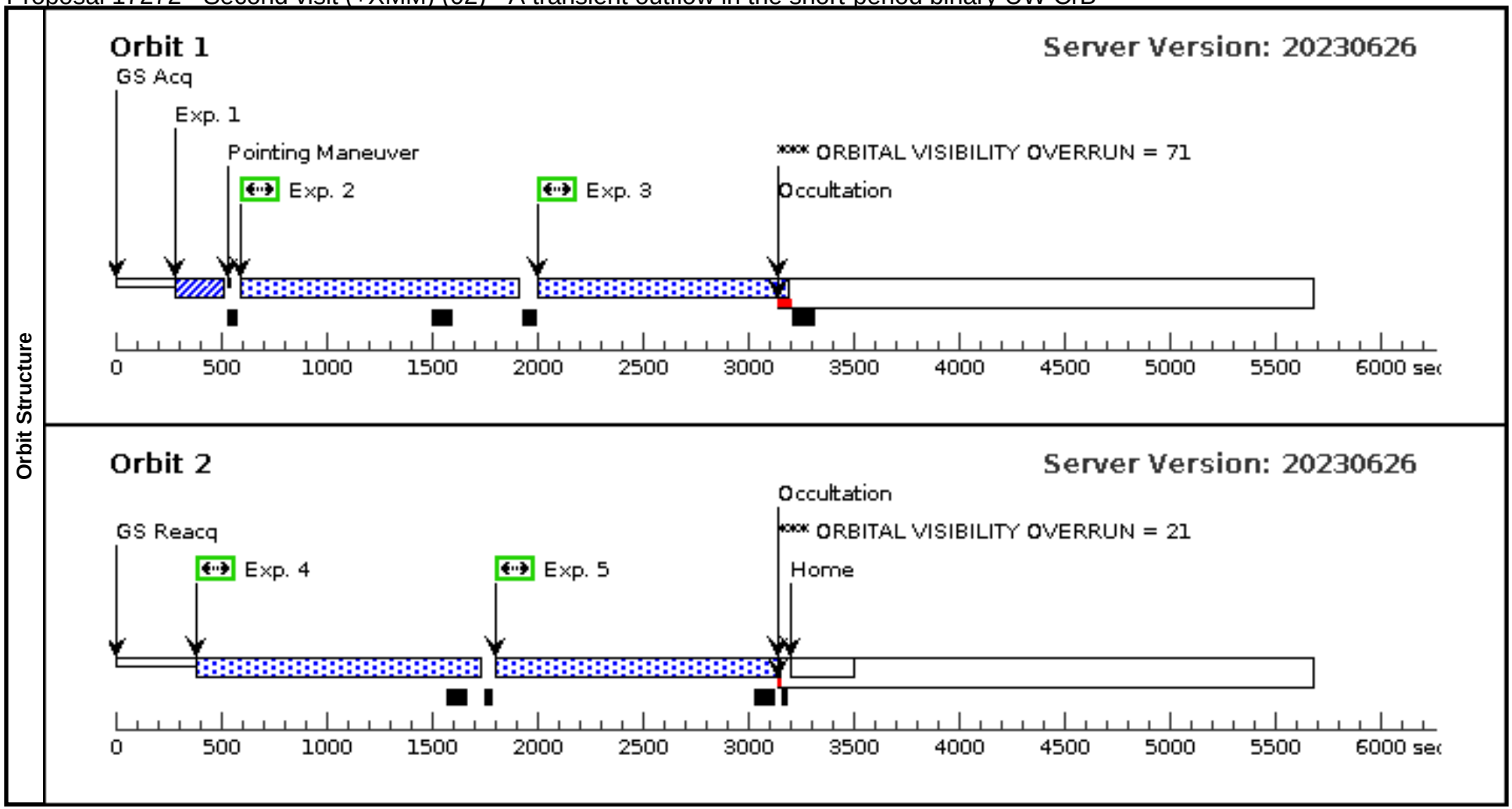
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	V-UW-CRB	RA: 16 05 45.8795 (241.4411646d) Dec: +25 51 45.14 (25.86254d) Equinox: J2000	Proper Motion RA: 3.127952476647745E-4 sec of time/yr Proper Motion Dec: -0.006624999991799996 arcsec/yr Epoch of Position: 2015.5	V=19.7+/-0.2	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[LMXB, NEUTRON STAR, X-RAY BURSTER]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	TA (COS.ta.1836992)	(1) V-UW-CRB	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				10 Secs (10 Secs) *[==>]*	*[1]*
2	SCI FP1 (COS.sp.1837003)	(1) V-UW-CRB	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=1; BUFFER-TIME=750			1141 Secs (1141 Secs) *[==>]*	*[1]*
3	SCI FP2 (COS.sp.1837003)	(1) V-UW-CRB	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=2; BUFFER-TIME=1200			1141 Secs (1141 Secs) *[==>]*	*[1]*
4	SCI FP3 (COS.sp.1837003)	(1) V-UW-CRB	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=3; BUFFER-TIME=1150			1297 Secs (1297 Secs) *[==>]*	*[2]*
5	SCI FP4 (COS.sp.1837003)	(1) V-UW-CRB	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=4; BUFFER-TIME=1200			1297 Secs (1297 Secs) *[==>]*	*[2]*


Orbit Structure
Orbit 1
Server Version: 20230626
GS Acq
Exp. 1
Pointing Maneuver
Exp. 2
Exp. 3
*** ORBITAL VISIBILITY OVERRUN = 71
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec
Orbit 2
Server Version: 20230626
Occultation
GS Reacq
*** ORBITAL VISIBILITY OVERRUN = 21
Exp. 4
Exp. 5
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec

Visit

Proposal 17272, Second visit (+XMM) (04) Mon Nov 20 14:01:17 GMT 2023

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Comments: This is the second visit, which will be simultaneous with XMM-Newton but not with VLT (due to visibility).

Diagnostics

(Second visit (+XMM) (04)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(Second visit (+XMM) (04)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(Second visit (+XMM) (04)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(Second visit (+XMM) (04)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(Second visit (+XMM) (04)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

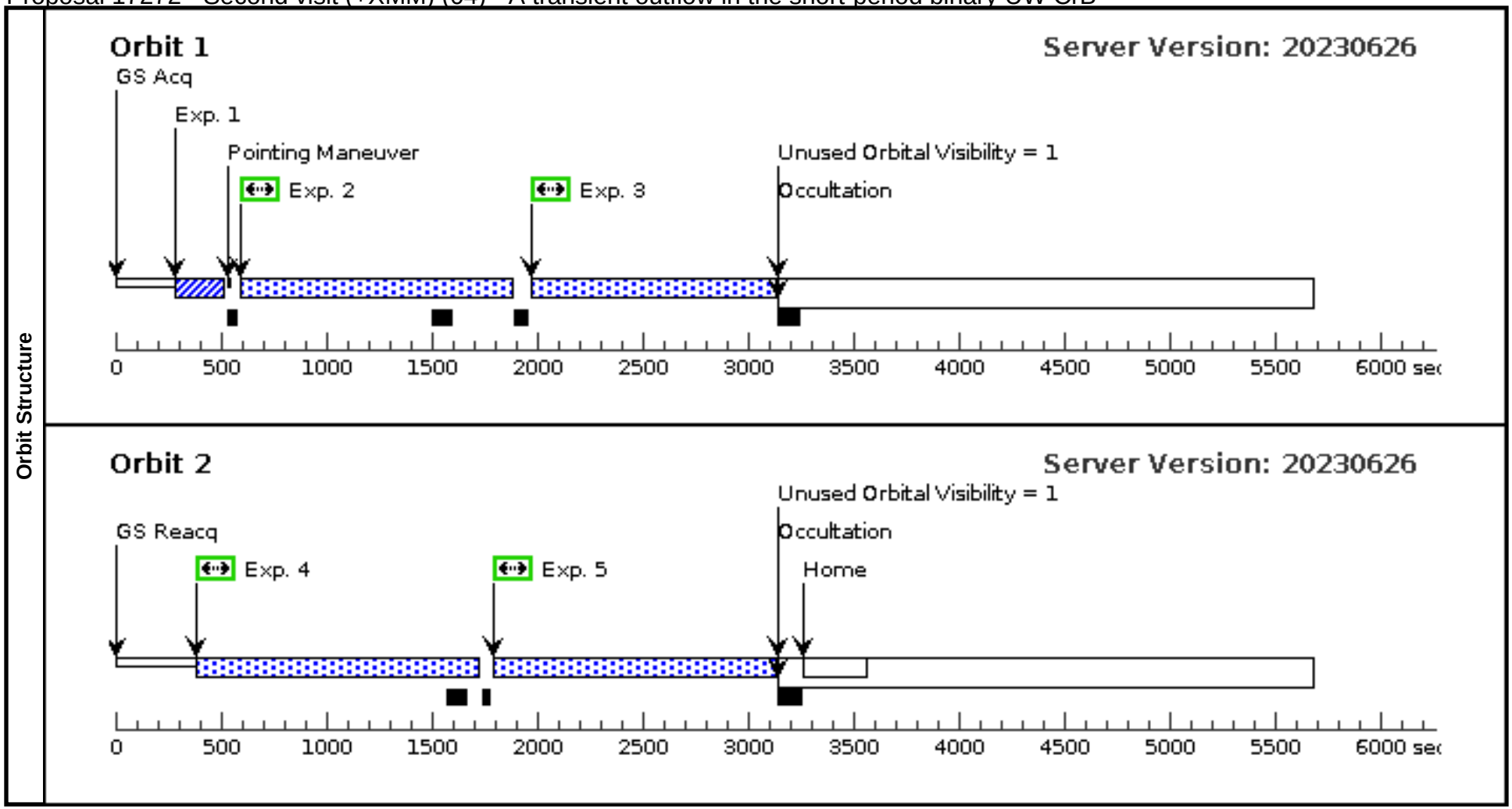
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	V-UW-CRB	RA: 16 05 45.8795 (241.4411646d) Dec: +25 51 45.14 (25.86254d) Equinox: J2000	Proper Motion RA: 3.127952476647745E-4 sec of time/yr Proper Motion Dec: -0.006624999991799996 arcsec/yr Epoch of Position: 2015.5	V=19.7+/-0.2	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[LMXB, NEUTRON STAR, X-RAY BURSTER]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	TA (COS.ta.1836992)	(1) V-UW-CRB	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				10 Secs (10 Secs) *[==>]*	*[1]*
2	SCI FP1 (COS.sp.1837003)	(1) V-UW-CRB	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=1; BUFFER-TIME=750			1141 Secs (1105 Secs) *[==>1105.0 Secs]*	*[1]*
3	SCI FP2 (COS.sp.1837003)	(1) V-UW-CRB	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=2; BUFFER-TIME=1200			1141 Secs (1105 Secs) *[==>1105.0 Secs]*	*[1]*
4	SCI FP3 (COS.sp.1837003)	(1) V-UW-CRB	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=3; BUFFER-TIME=1150			1297 Secs (1286 Secs) *[==>1286.0 Secs]*	*[2]*
5	SCI FP4 (COS.sp.1837003)	(1) V-UW-CRB	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=4; BUFFER-TIME=1200			1297 Secs (1286 Secs) *[==>1286.0 Secs]*	*[2]*


Orbit Structure
Orbit 1
Server Version: 20230626
GS Acq
Exp. 1
Pointing Maneuver
Exp. 2
Exp. 3
Unused Orbital Visibility = 1
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec
Orbit 2
Server Version: 20230626
Unused Orbital Visibility = 1
GS Reacq
Occultation
Exp. 4
Exp. 5
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec

Visit

Proposal 17272, Third visit (+VLT+XMM) (03), completed Mon Nov 20 14:01:17 GMT 2023

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Comments: This is the third visit, it will be performed simultaneously with VLT/X-Shooter and XMM-Newton. The tighter constrains comes from the visibility of the former.

Diagnostics

(Third visit (+VLT+XMM) (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Third visit (+VLT+XMM) (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Third visit (+VLT+XMM) (03)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(Third visit (+VLT+XMM) (03)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(Third visit (+VLT+XMM) (03)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(Third visit (+VLT+XMM) (03)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(Third visit (+VLT+XMM) (03)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

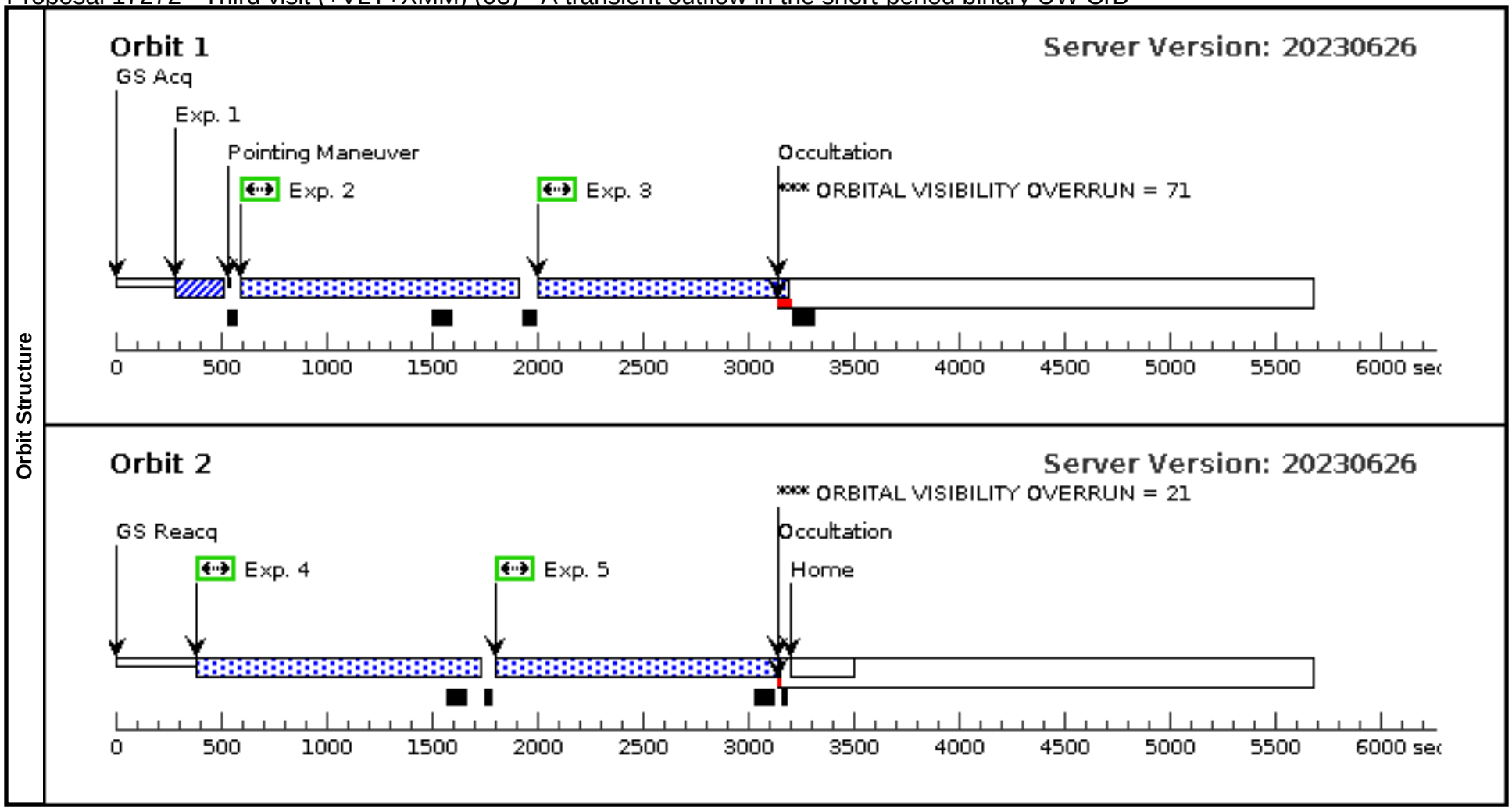
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	V-UW-CRB	RA: 16 05 45.8795 (241.4411646d) Dec: +25 51 45.14 (25.86254d) Equinox: J2000	Proper Motion RA: 3.127952476647745E-4 sec of time/yr Proper Motion Dec: -0.006624999991799996 arcsec/yr Epoch of Position: 2015.5	V=19.7+/-0.2	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[LMXB, NEUTRON STAR, X-RAY BURSTER]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	TA (COS.ta.1836992)	(1) V-UW-CRB	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				10 Secs (10 Secs) *[==>]*	*[1]*
2	SCI FP1 (COS.sp.1837003)	(1) V-UW-CRB	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=1; BUFFER-TIME=750			1141 Secs (1141 Secs) *[==>]*	*[1]*
3	SCI FP2 (COS.sp.1837003)	(1) V-UW-CRB	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=2; BUFFER-TIME=1200			1141 Secs (1141 Secs) *[==>]*	*[1]*
4	SCI FP3 (COS.sp.1837003)	(1) V-UW-CRB	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=3; BUFFER-TIME=1150			1297 Secs (1297 Secs) *[==>]*	*[2]*
5	SCI FP4 (COS.sp.1837003)	(1) V-UW-CRB	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=4; BUFFER-TIME=1200			1297 Secs (1297 Secs) *[==>]*	*[2]*


Orbit Structure
Orbit 1
Server Version: 20230626
GS Acq
Exp. 1
Pointing Maneuver
Exp. 2
Exp. 3
Occultation
*** ORBITAL VISIBILITY OVERRUN = 71
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec
Orbit 2
Server Version: 20230626
*** ORBITAL VISIBILITY OVERRUN = 21
GS Reacq
Exp. 4
Exp. 5
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec