17422 - Bulk abundances of the planetary material in a nearby bright gaseous disk around a white

Cycle: 31, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*
Prof. Boris T. Gaensicke (PI) (ESA Member) (Contact)	**The University of Warwick**
Dr. Odette Fabiola Toloza Castillo (CoI)	Universidad Tecnica Federico Santa Maria
Prof. Matthias R. Schreiber (CoI)	Universidad Tecnica Federico Santa Maria
Dr. Keith Inight (CoI) (ESA Member)	The University of Warwick
Dr. JJ Hermes (CoI) (AdminUSPI)	Boston University
Dr. Warren R. Brown (CoI)	Smithsonian Institution Astrophysical Observatory
Dr. Gagik Tovmasian (CoI)	Universidad Nacional Autonoma de Mexico (UNAM)

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) WDJ062500.08+413410.73	COS/FUV COS/NUV	5	20-Jun-2024 12:00:17.0	yes
02	(1) WDJ062500.08+413410.73	COS/FUV COS/NUV	5	20-Jun-2024 12:00:18.0	yes

10 Total Orbits Used

ABSTRACT

The remnants of planetary systems that survived the metamorphosis of their host stars into white dwarfs are identified in the form of compact debris disks, formed from the tidal disruption of planetesimals. These disks are detectable as IR flux excess, and, in rare occasions, as metallic emission lines from a gaseous disk component in optical spectra. These gaseous disks are thought to host embedded solid fragments, maybe the core, of the disrupted planetesimal, and represent ideal targets for joint ultraviolet, optical and infrared observations that provide unrivalled insight into the formation of these disks, the nature of the disrupting planetesimal, the elemental abundances of the planetary debris, and its mineralogical make-up. Here, we propose COS far-ultraviolet spectroscopy of a new, bright, and nearby gaseous disk system to measure the elemental abundances of the planetary material. The far-ultraviolet wavelength range is critically important to access transitions of core (Cr, Fe, Ni), mantle (Si, Mg, O), and crust (Ca, Al), as well as volatiles (C, S, P) species that have no transitions at optical wavelengths, or are contaminated by the disk emission lines. This system is also a prime target for JWST MIRI spectroscopy of the circumstellar dust, and these COS observations will ensure that the composition of the debris is known well in time for the next JWST proposal round.

OBSERVING DESCRIPTION

The goal of these COS observations is to obtain COS/G130M FUV spectroscopy of the hydrogen-atmosphere DA white dwarf WDJ062500.08+413410.73, which has an effective temperature of ~17500K.

The observations are split across two G130M central wavelength settings, 1291A and 1222A, which are obtained over two 5-orbit visits.

Visit 1 will obtain the 1291A data, which can only make use of the FP-POS=3 & 4 setups (as per COS 2025 policy), the exposure time is split equally across these two settings.

Visit 2 (1222A) uses FP-POS=1,2,3,4, again, the time is split equally across the four settings. A warning regarding inefficient FP-POS changes can be ignored, as the change from FP-POS=4 back to 1 occurs during Earth occlutation between orbit 4 and 5.

Apart from impacting the schedulability of this program, we do not foresee any negative effect should HST drop to a 2-gyro mode.

The ETC similations were carried out with a DA model for Teff=17500K, log g=7.7, as per https://ui.adsabs.harvard.edu/abs/2021MNRAS.508.3877G

Update 2023-10-25: deleted a spurious "Visit Orientation Requirement" in Visit 01.

Visit

Proposal 17422, COS spectroscopy, G130M @ 1291A (01), implementation Thu Jun 20 16:00:19 GMT 2024

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Comments: Only two FP-POS settings allowed for the 1291A central wavelength.

Fixed Targets

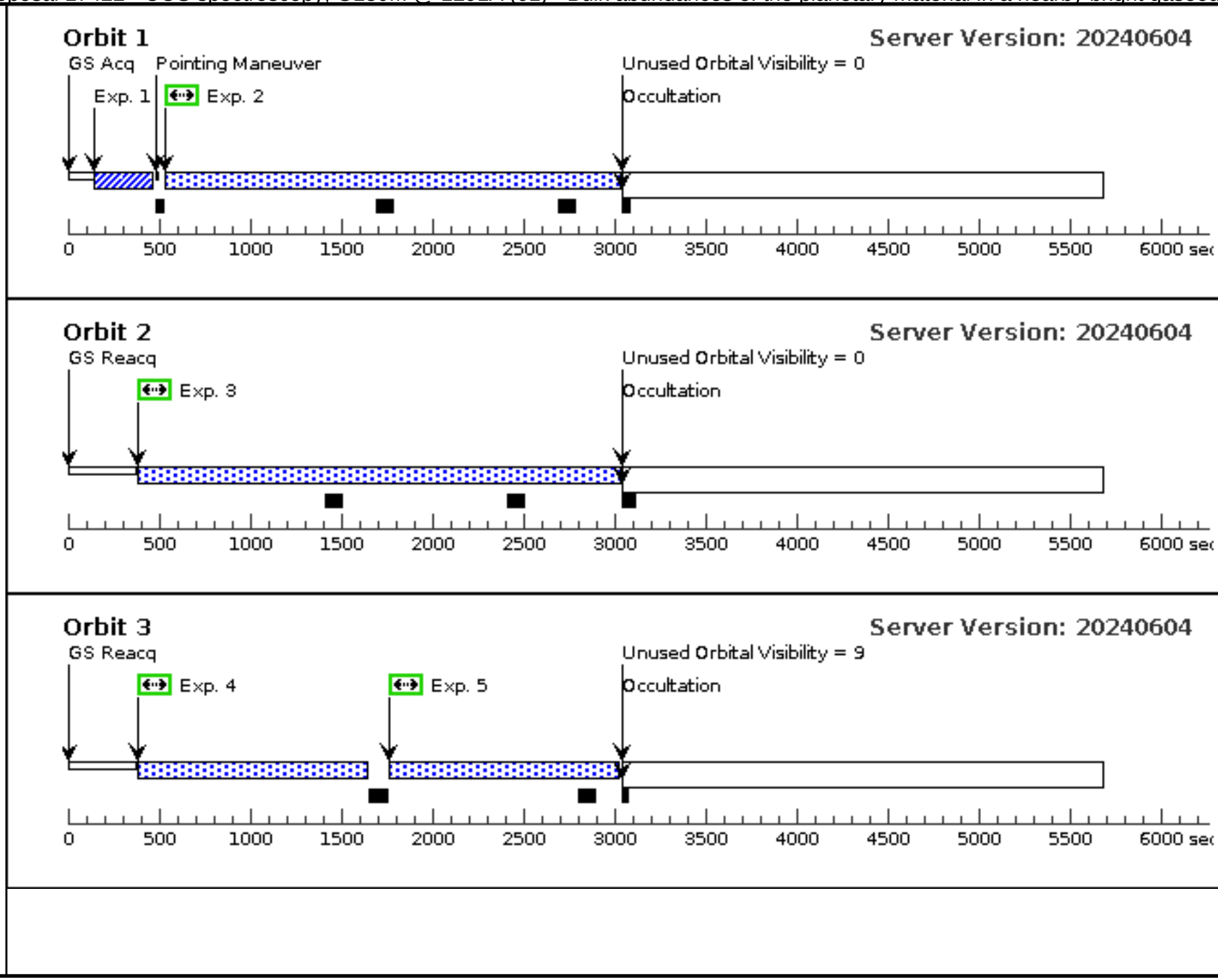
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WDJ062500.08+413410.73	RA: 06 25 0.0798 (96.2503325d) Dec: +41 34 10.73 (41.56965d) Equinox: J2000	Proper Motion RA: -33.124 mas/yr Proper Motion Dec: -25.784 mas/yr Epoch of Position: 2000	V=17.8+/-0.1 GALEX FUV=17.3	Reference Frame: ICRS

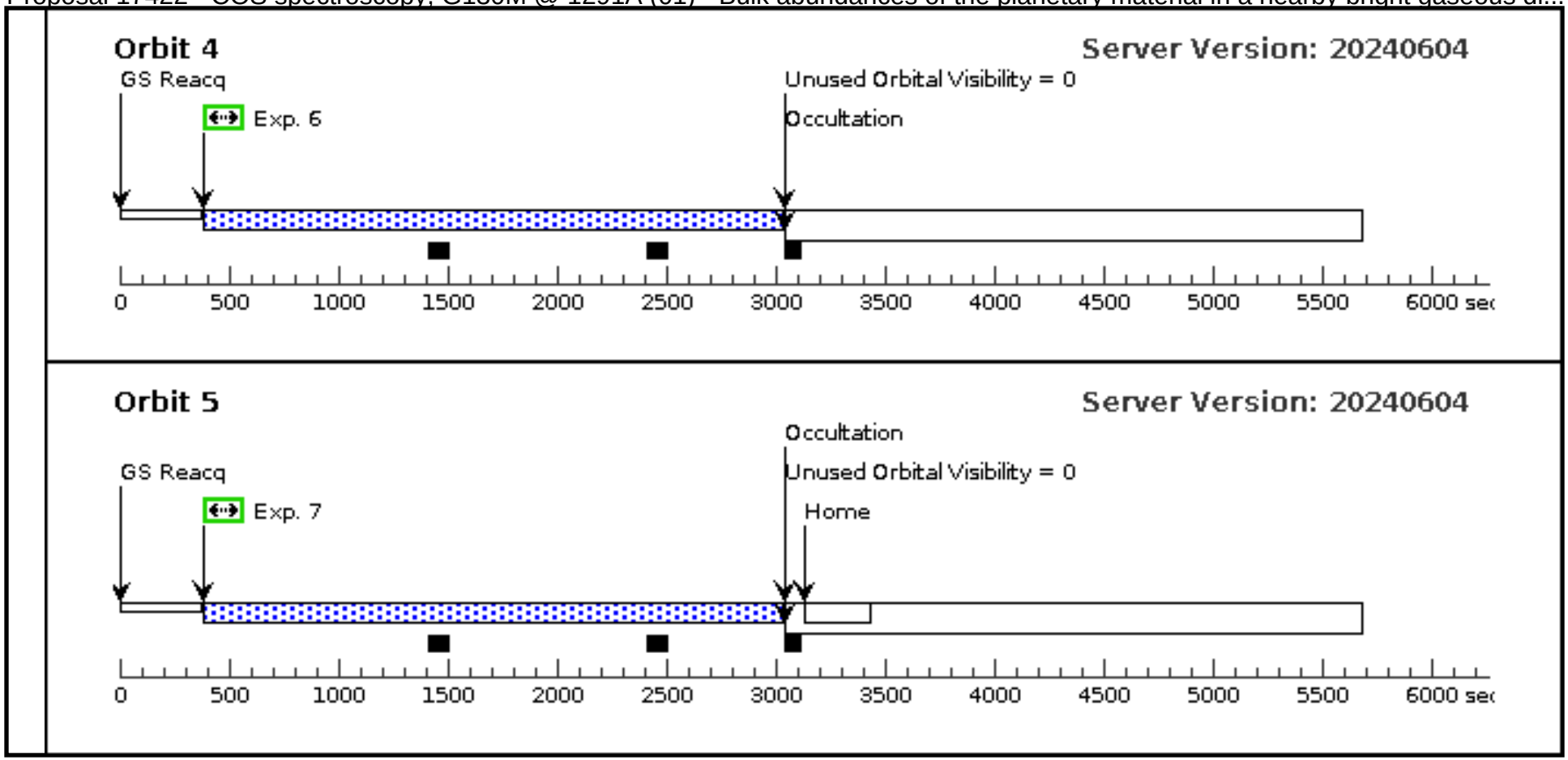
Comments: Teff~17500K
Category=STAR
Description=[DA]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/IMAGE (COS.ta.1888312)	(1) WDJ062500.08+413410.73	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				15 Secs (15 Secs) *[==>]*	*[1]*
Comments: For an alternative ETC simulation using a model spectrum, see https://etc.stsci.edu/etc/results/COS.ta.1888313/									
2	G130M @ 1291A, FP-POS=3 (COS.sp.1888315)	(1) WDJ062500.08+413410.73	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1000; FP-POS=3			2430 Secs (2326 Secs) *[==>2326.0 Secs]*	*[1]*
3	G130M @ 1291A, FP-POS=3 (COS.sp.1888315)	(1) WDJ062500.08+413410.73	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1000; FP-POS=3			2760 Secs (2605 Secs) *[==>2605.0 Secs]*	*[2]*
4	G130M @ 1291A, FP-POS=3 (COS.sp.1888315)	(1) WDJ062500.08+413410.73	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1223; FP-POS=3			1330 Secs (1210 Secs) *[==>1210.0 Secs]*	*[3]*
5	G130M @ 1291A, FP-POS=4 (COS.sp.1888315)	(1) WDJ062500.08+413410.73	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1000; FP-POS=4			1325 Secs (1205 Secs) *[==>1205.0 Secs]*	*[3]*
6	G130M @ 1291A, FP-POS=4 (COS.sp.1888315)	(1) WDJ062500.08+413410.73	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1000; FP-POS=4			2760 Secs (2605 Secs) *[==>2605.0 Secs]*	*[4]*
7	G130M @ 1291A, FP-POS=4 (COS.sp.1888315)	(1) WDJ062500.08+413410.73	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1000; FP-POS=4			2760 Secs (2605 Secs) *[==>2605.0 Secs]*	*[5]*

Orbit Structure

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GS Reacq
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Exp. 7
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4000
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5500
6000 sec

Visit

Proposal 17422, COS spectroscopy, G130M @ 1222A (02), implementation Thu Jun 20 16:00:19 GMT 2024

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(COS spectroscopy, G130M @ 1222A (02)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS

Fixed Targets

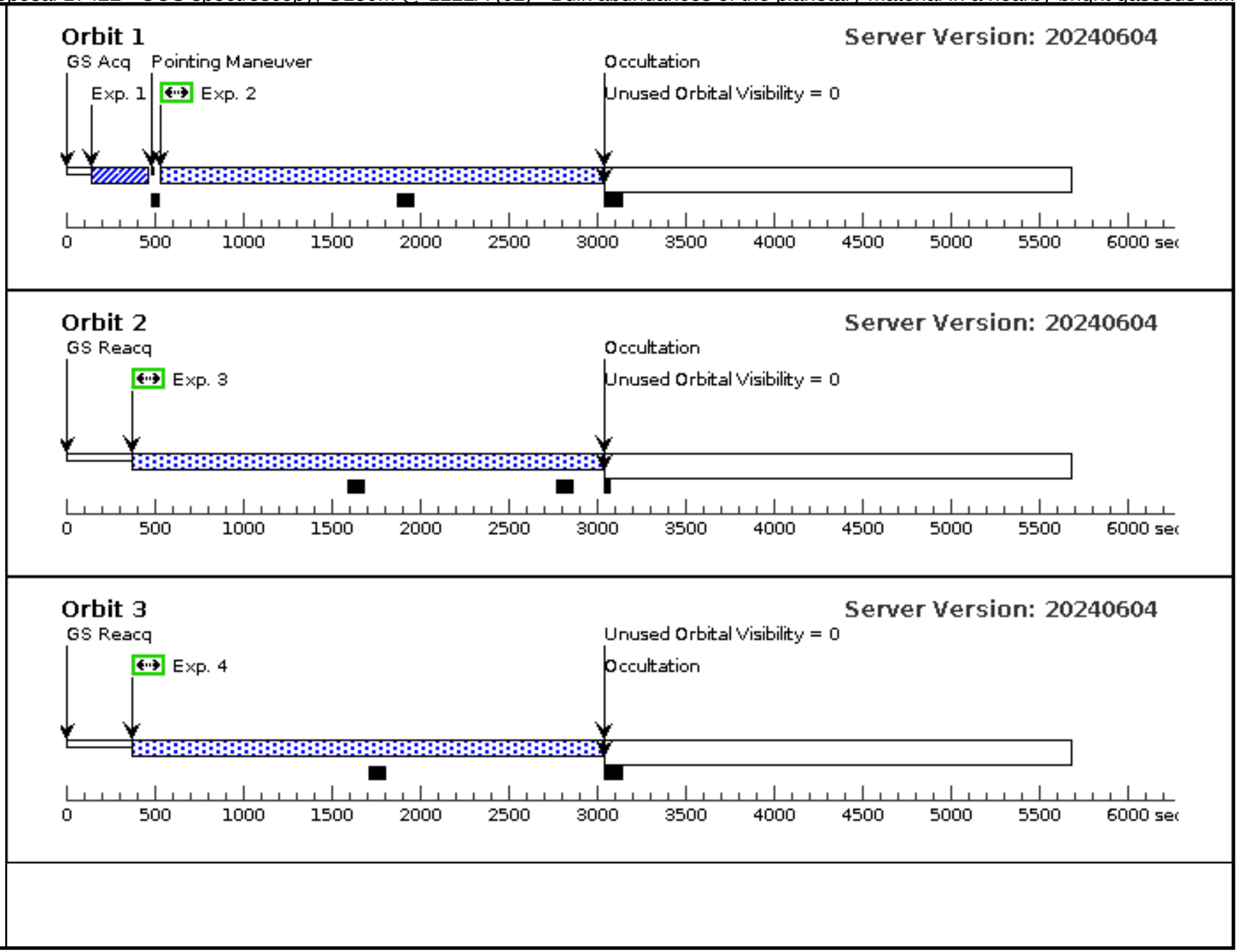
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WDJ062500.08+413410.73	RA: 06 25 0.0798 (96.2503325d) Dec: +41 34 10.73 (41.56965d) Equinox: J2000	Proper Motion RA: -33.124 mas/yr Proper Motion Dec: -25.784 mas/yr Epoch of Position: 2000	V=17.8+/-0.1 GALEX FUV=17.3	Reference Frame: ICRS

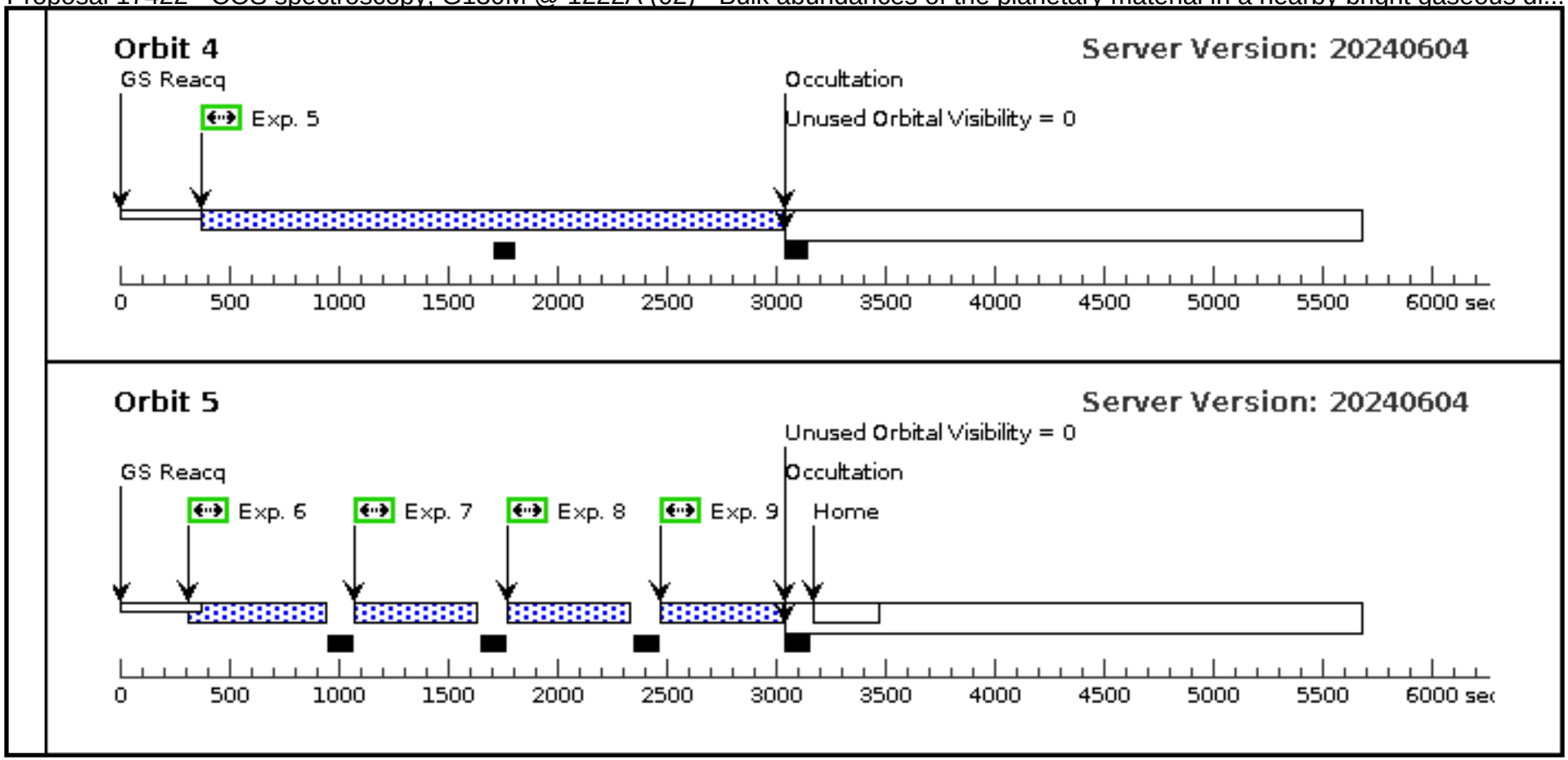
Comments: Teff~17500K
Category=STAR
Description=[DA]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/IMAGE (COS.ta.1888312)	(1) WDJ062500.08+413410.73	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				15 Secs (15 Secs) *[==>]*	*[1]*
Comments: For an alternative ETC simulation using a model spectrum, see https://etc.stsci.edu/etc/results/COS.ta.1888313/									
2	G130M @ 1222A, FP-POS=1 (COS.sp.1888316)	(1) WDJ062500.08+413410.73	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1169; FP-POS=1			2416 Secs (2312 Secs) *[==>2312.0 Secs]*	*[1]*
3	G130M @ 1222A, FP-POS=2 (COS.sp.1888316)	(1) WDJ062500.08+413410.73	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1180; FP-POS=2			2760 Secs (2605 Secs) *[==>2605.0 Secs]*	*[2]*
4	G130M @ 1222A, FP-POS=3 (COS.sp.1888316)	(1) WDJ062500.08+413410.73	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1304; FP-POS=3			2760 Secs (2605 Secs) *[==>2605.0 Secs]*	*[3]*
5	G130M @ 1222A, FP-POS=4 (COS.sp.1888316)	(1) WDJ062500.08+413410.73	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1304; FP-POS=4			2760 Secs (2605 Secs) *[==>2605.0 Secs]*	*[4]*
6	G130M @ 1222A, FP-POS=1 (COS.sp.1888316)	(1) WDJ062500.08+413410.73	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=485; FP-POS=1			597 Secs (508 Secs) *[==>508.0 Secs]*	*[5]*
7	G130M @ 1222A, FP-POS=2 (COS.sp.1888316)	(1) WDJ062500.08+413410.73	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=485; FP-POS=2			597 Secs (508 Secs) *[==>508.0 Secs]*	*[5]*
8	G130M @ 1222A, FP-POS=3 (COS.sp.1888316)	(1) WDJ062500.08+413410.73	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=485; FP-POS=3			597 Secs (508 Secs) *[==>508.0 Secs]*	*[5]*
9	G130M @ 1222A, FP-POS=4 (COS.sp.1888316)	(1) WDJ062500.08+413410.73	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=485; FP-POS=4			597 Secs (508 Secs) *[==>508.0 Secs]*	*[5]*

Orbit Structure

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Orbit 5
Server Version: 20240604
Unused Orbital Visibility = 0
GS Reacq
Occultation
Exp. 6
Exp. 7
Exp. 8
Exp. 9
Home
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4500
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6000 sec