13734 - Probing the extreme wind confinement of the most magnetic O star with COS spectroscopy

Cycle: 22, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
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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) NGC1624-2	COS/FUV COS/NUV	2	24-Oct-2014 21:02:11.0	yes
02	(1) NGC1624-2	COS/FUV COS/NUV	2	24-Oct-2014 21:02:15.0	yes

4 Total Orbits Used

ABSTRACT

We propose to obtain phase-resolved UV spectroscopy of the recently discovered magnetic O star NGC 1624-2, which has the strongest magnetic field ever detected in a O-star, by an order of magnitude. We will use the strength and variability of the UV resonance line profiles to diagnose the density, velocity, and ionization structure of NGC 1624-2's enormous magnetosphere that results from entrapment of its stellar wind by its strong, nearly dipolar magnetic field. With this gigantic magnetosphere, NGC 1624-2 represents a new regime of extreme wind confinement that will constrain models of magnetized winds and their surface mass flux properties. A detailed understanding of such winds is necessary to study the rotational braking history of magnetic O-stars, which can shed new light on the fundamental origin of magnetism in massive, hot stars.

OBSERVING DESCRIPTION

Our program requires time-critical observations of NGC 1624-2 at two rotational phases, as described below.

For each of these observations, we aim to investigate important photospheric, wind, and magnetospheric features such as N V 1239,1243 A, Si IV 1393,1403 A, C IV 1548,1550 AA, N IV 1718 A.
NGC 1624-2, with V=11.8, E(B-V)=0.9, will therefore be optimally observed at the COS medium resolution with the G130M (settings 1291, 1327 A) and G160M (1577, 1623 A) gratings for the maximum available, uninterrupted wavelength coverage of 1134 - 1798 A. Two orbits in each of the two visits at high and low states will be required.

The coordinates of the target are precise enough to use the ACQ-image. The BOA aperture is used for the acquisition. An exposure of 86 seconds is enough to reach the recommanded SNR of 60.

The ephemeris for NGC 1624-2 is JD = 245 5967.0 (+-10) + 157.99 (+-0.94) x E (Wade et al. 2012). A tolerance of +-0.05 cycles around the desired phases leads to periodic observational windows of 2 weeks that are consistent with these constraints.

Visit

Proposal 13734, high-state (01), implementation Sat Oct 25 01:02:17 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: Period 157.99 D AND ZERO-PHASE HJD2455967.0

Fixed Targets

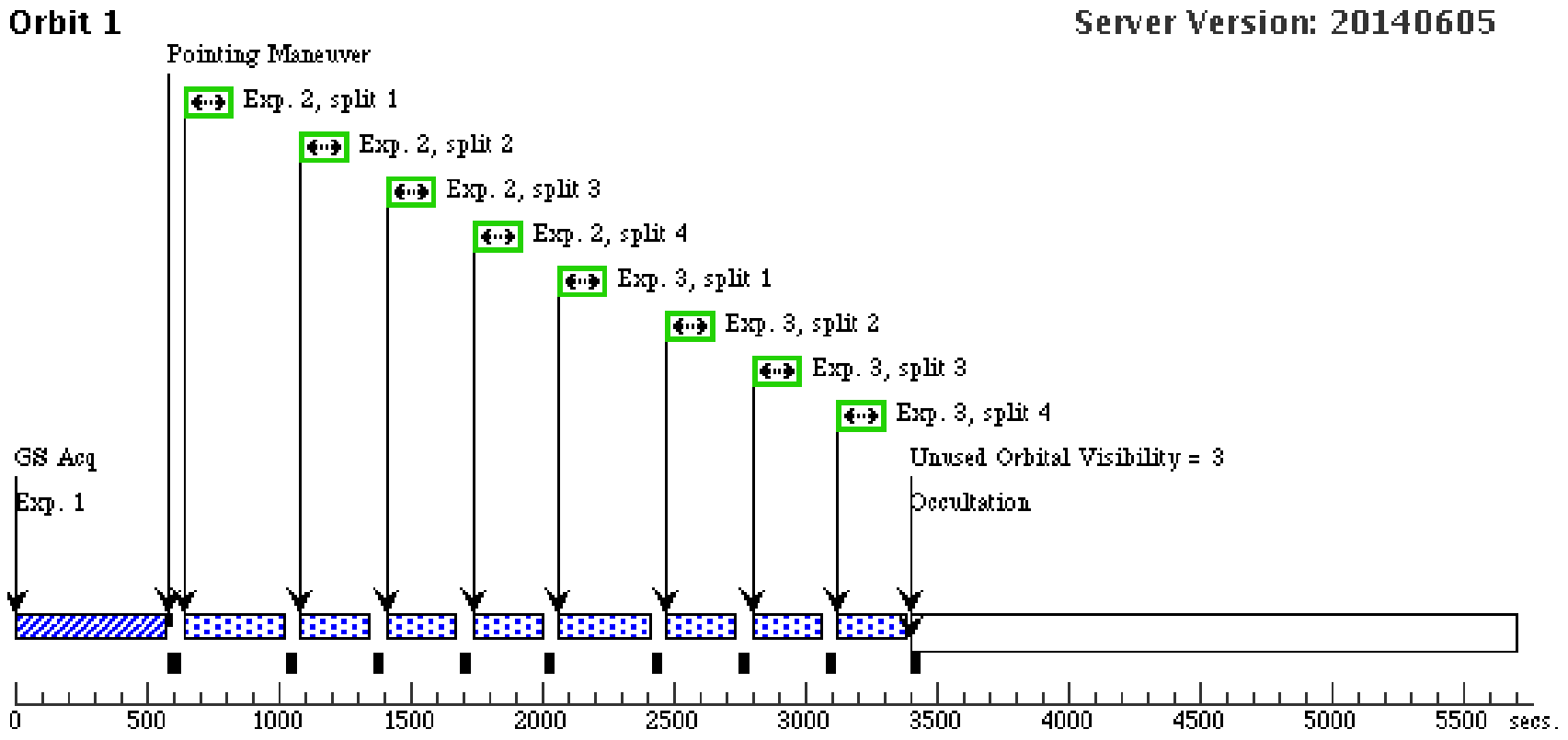
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC1624-2 Alt Name1: J04403728+5027410	RA: 04 40 37.2660 (70.1552750d) Dec: +50 27 40.96 (50.46138d) Equinox: J2000		V=11.77	Reference Frame: ICRS

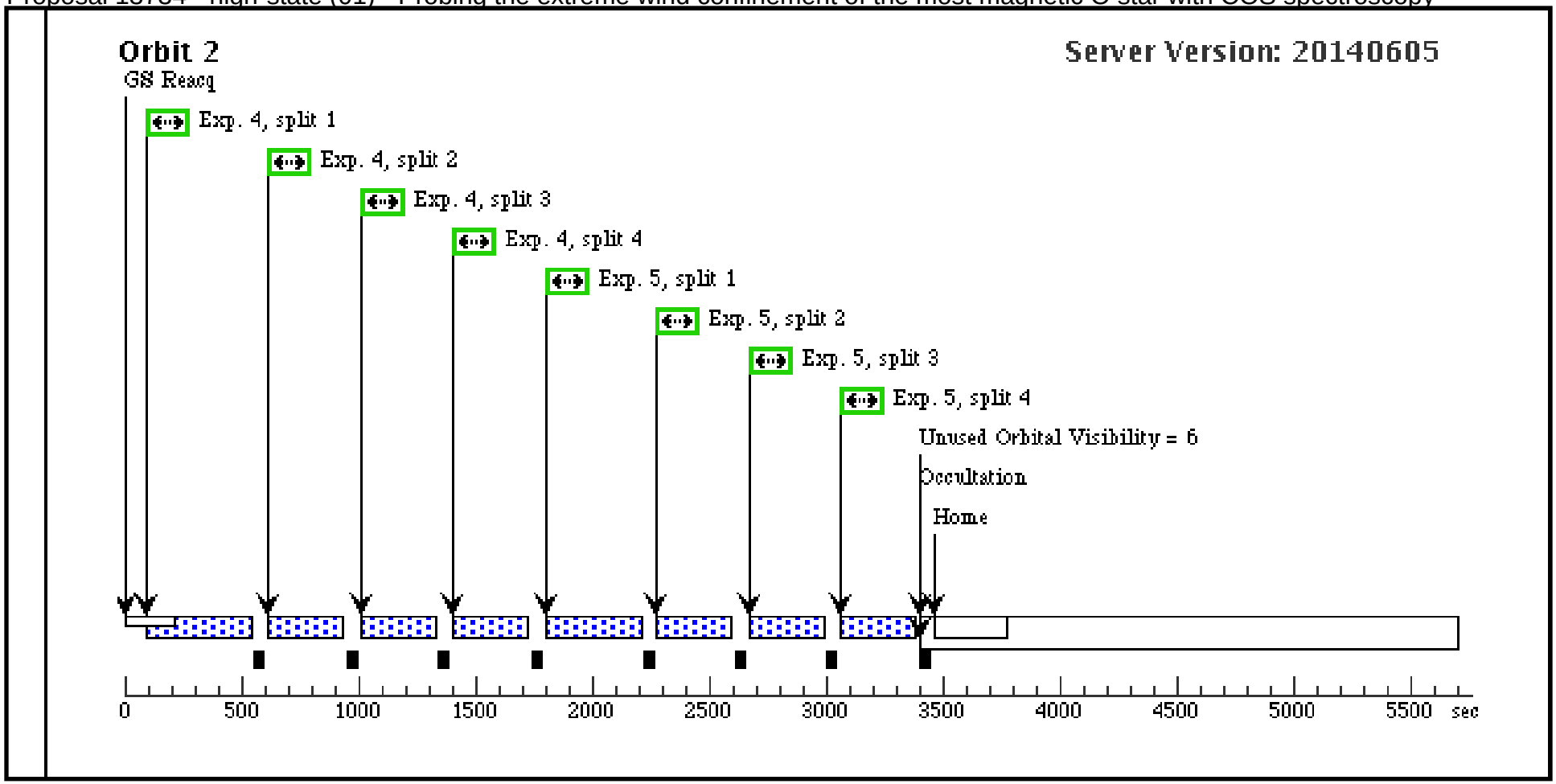
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	High-state-ACQ (COS.ta.622864)	(1) NGC1624-2	COS/NUV, ACQ/IMAGE, BOA	MIRRORA		PHASE 0.95 TO 0.05		86 Secs (86 Secs) *[==>]*	***[1]***
2	High-state-G130M-1291 (COS.sp.622865)	(1) NGC1624-2	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1124; FP-POS=ALL			200 Secs (848 Secs) *[==>212.0 Secs (Split 1)]* *[==>212.0 Secs (Split 2)]* *[==>212.0 Secs (Split 3)]* *[==>212.0 Secs (Split 4)]*	***[1]***
3	High-state-G130M-1327 (COS.sp.622866)	(1) NGC1624-2	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=992; FP-POS=ALL			200 Secs (844 Secs) *[==>211.0 Secs (Split 1)]* *[==>211.0 Secs (Split 2)]* *[==>211.0 Secs (Split 3)]* *[==>211.0 Secs (Split 4)]*	***[1]***
4	High-state-G160M-1577 (COS.sp.622867)	(1) NGC1624-2	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=922; FP-POS=ALL			200 Secs (1084 Secs) *[==>271.0 Secs (Split 1)]* *[==>271.0 Secs (Split 2)]* *[==>271.0 Secs (Split 3)]* *[==>271.0 Secs (Split 4)]*	***[2]***
5	High-state-G160M-1623 (COS.sp.622868)	(1) NGC1624-2	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FP-POS=ALL; BUFFER-TIME=1012			200 Secs (1080 Secs) *[==>270.0 Secs (Split 1)]* *[==>270.0 Secs (Split 2)]* *[==>270.0 Secs (Split 3)]* *[==>270.0 Secs (Split 4)]*	***[2]***

Orbit Structure




Orbit 2
Server Version: 20140605
GS Reacq
Exp. 4, split 1
Exp. 4, split 2
Exp. 4, split 3
Exp. 4, split 4
Exp. 5, split 1
Exp. 5, split 2
Exp. 5, split 3
Exp. 5, split 4
Unused Orbital Visibility = 6
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 13734, Low-state (02), implementation Sat Oct 25 01:02:18 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: Period 157.99 D AND ZERO-PHASE HJD2455967.0

Fixed Targets

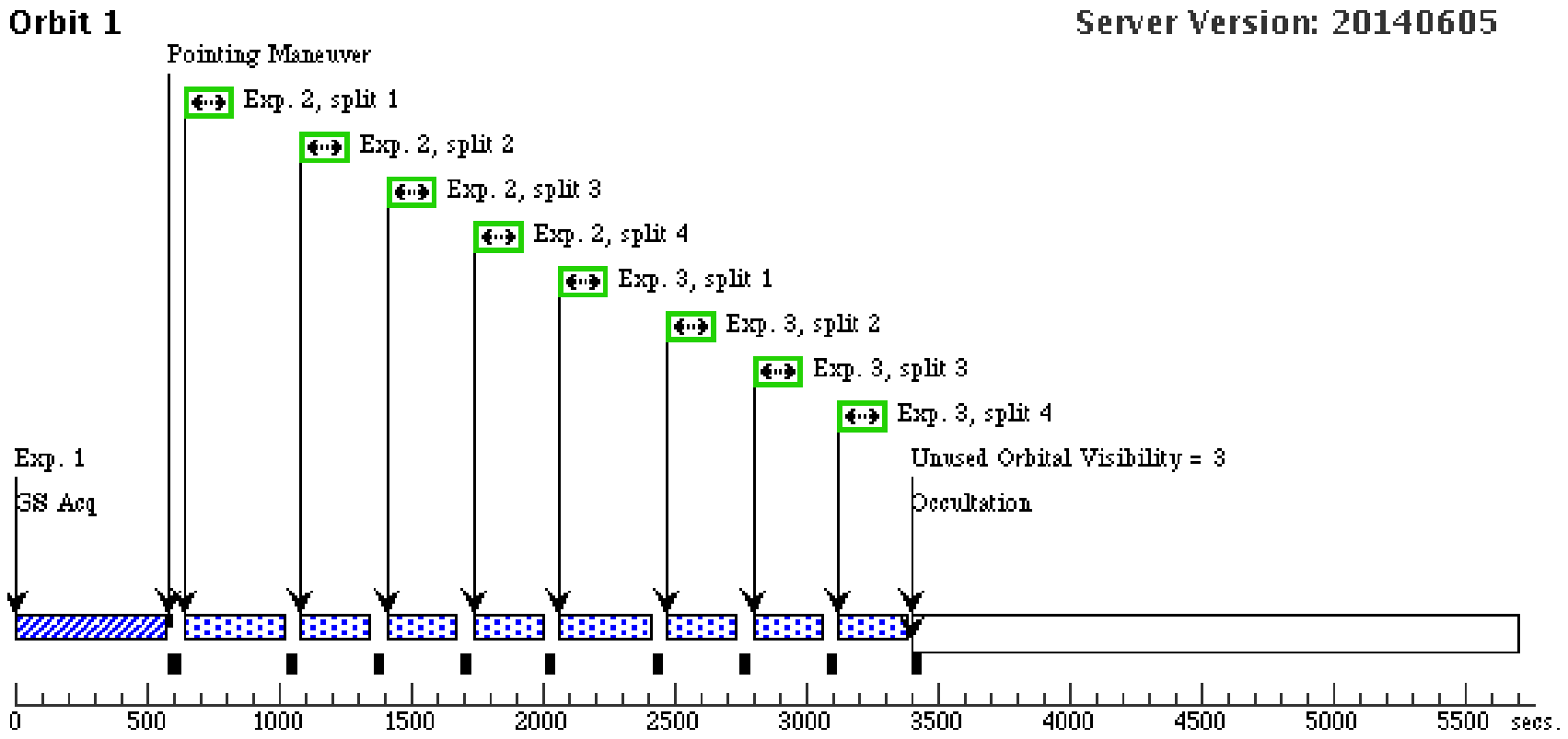
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC1624-2 Alt Name1: J04403728+5027410	RA: 04 40 37.2660 (70.1552750d) Dec: +50 27 40.96 (50.46138d) Equinox: J2000		V=11.77	Reference Frame: ICRS

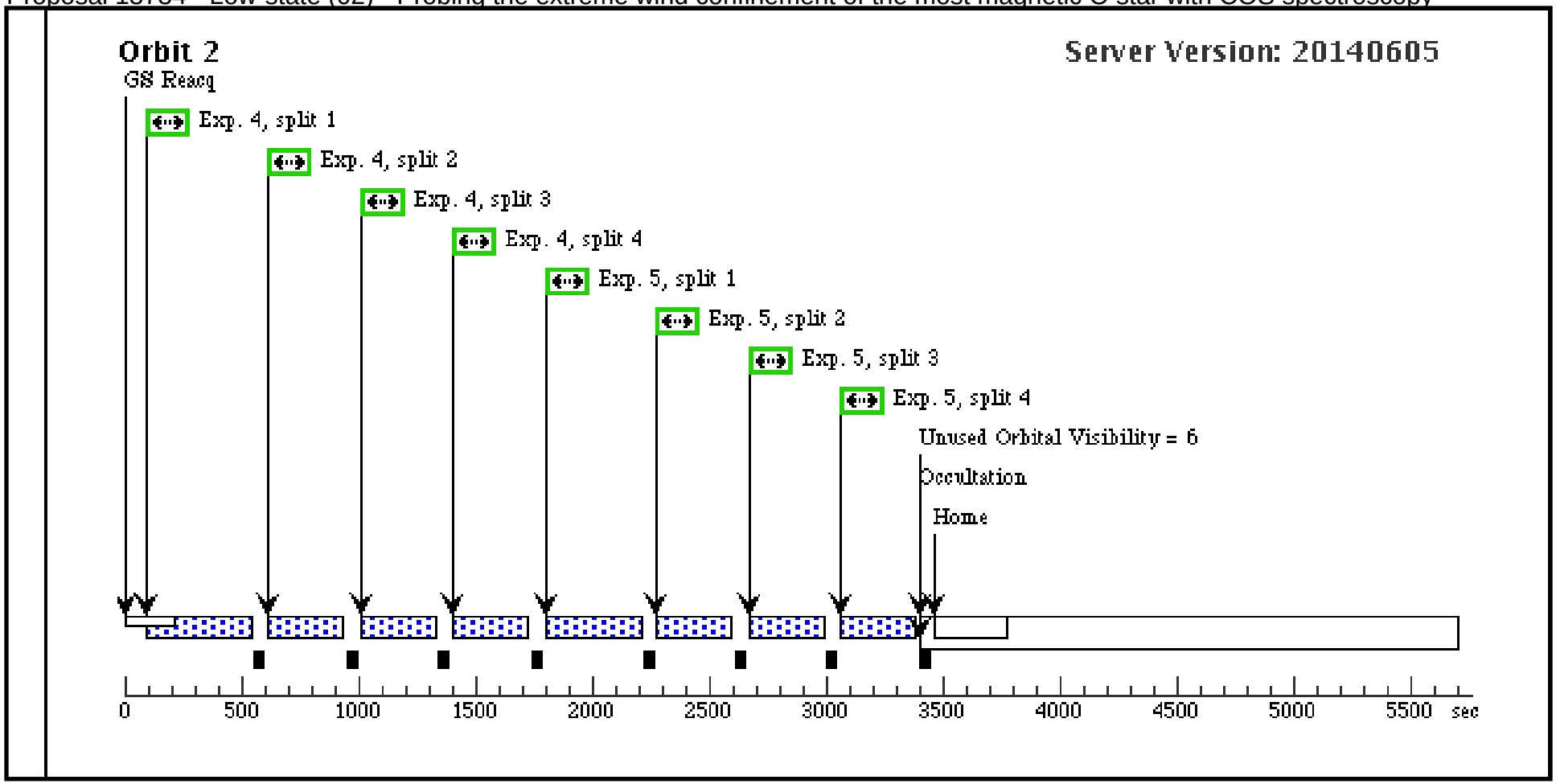
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Low-state-ACQ (COS.ta.622864)	(1) NGC1624-2	COS/NUV, ACQ/IMAGE, BOA	MIRRORA		PHASE 0.45 TO 0.55		86 Secs (86 Secs) *[==>]*	***[1]***
2	Low-state-G130M-1291 (COS.sp.622865)	(1) NGC1624-2	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1124; FP-POS=ALL			120 Secs (848 Secs) *[==>212.0 Secs (Split 1)]* *[==>212.0 Secs (Split 2)]* *[==>212.0 Secs (Split 3)]* *[==>212.0 Secs (Split 4)]*	***[1]***
3	Low-state-G130M-1327 (COS.sp.622866)	(1) NGC1624-2	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=992; FP-POS=ALL			120 Secs (844 Secs) *[==>211.0 Secs (Split 1)]* *[==>211.0 Secs (Split 2)]* *[==>211.0 Secs (Split 3)]* *[==>211.0 Secs (Split 4)]*	***[1]***
4	Low-state-G160M-1577 (COS.sp.622867)	(1) NGC1624-2	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=922; FP-POS=ALL			225 Secs (1084 Secs) *[==>271.0 Secs (Split 1)]* *[==>271.0 Secs (Split 2)]* *[==>271.0 Secs (Split 3)]* *[==>271.0 Secs (Split 4)]*	***[2]***
5	Low-state-G160M-1623 (COS.sp.622868)	(1) NGC1624-2	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FP-POS=ALL; BUFFER-TIME=1012			225 Secs (1080 Secs) *[==>270.0 Secs (Split 1)]* *[==>270.0 Secs (Split 2)]* *[==>270.0 Secs (Split 3)]* *[==>270.0 Secs (Split 4)]*	***[2]***

Orbit Structure




Orbit 2
Server Version: 20140605
GS Reacq
Exp. 4, split 1
Exp. 4, split 2
Exp. 4, split 3
Exp. 4, split 4
Exp. 5, split 1
Exp. 5, split 2
Exp. 5, split 3
Exp. 5, split 4
Unused Orbital Visibility = 6
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec