14140 - Using UV-bright Milky Way Halo Stars to Probe Star-Formation Driven Winds as a Function of Disk Scale Height

Cycle: 23, 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) SDSS-J152750.06+402729.0	COS/FUV	1	21-Oct-2015 21:08:51.0	yes
02	(2) 2MASS-J15341124+5015564	COS/FUV	2	21-Oct-2015 21:08:53.0	yes
03	(3) 2MASS-J13440440+1842590	COS/FUV	3	21-Oct-2015 21:08:55.0	yes
04	(4) SDSS-J132554.40+223250.1	COS/FUV	4	21-Oct-2015 21:08:57.0	yes
05	(5) SDSS-J141557.13+371658.2	COS/FUV	4	21-Oct-2015 21:08:59.0	yes
06	(5) SDSS-J141557.13+371658.2	COS/FUV	2	21-Oct-2015 21:09:01.0	yes
07	(6) 2MASS-J13411984+2823586	COS/FUV	4	21-Oct-2015 21:09:02.0	yes
08	(6) 2MASS-J13411984+2823586	COS/FUV	2	21-Oct-2015 21:09:04.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
09	(7) SDSS-J145953.97+412851.1	COS/FUV	4	21-Oct-2015 21:09:06.0	yes
10	(7) SDSS-J145953.97+412851.1	COS/FUV	4	21-Oct-2015 21:09:08.0	yes

30 Total Orbits Used

ABSTRACT

Galactic-scale winds driven by star formation are a common feature of galaxy formation models, and are observed ubiquitously from the local Universe to z~6. However, empirical constraints on the radial density profile and total spatial extent of these winds have been very challenging to obtain. We have devised a simple experiment using blue horizontal branch (BHB) stars in the halo of the Milky Way that will directly map the extent and density of diffuse, ionized outflows from the Galactic disk to the halo. We propose to take COS FUV spectra of 7 BHB stars that evenly sample the range of scale heights from 3 - 13 kpc, lying perpendicular to the disk of the Milky Way, extending from the position of the sun. This study will allow us to unambiguously track inflowing and outflowing material from the Milky Way via absorption component blueshifts and redshifts, respectively. This program will yield the first direct observational determination of the scale height to which star-formation-driven winds propagate in the halo. We will additionally probe the change in the gas density as it extends into the halo, and approximate a mass of metals as they leave the disk and become integrated into the halo. Our proposed experiment will yield the most detailed constraints on the physical state and energetics of gas in a large-scale galactic wind to date. Such constraints are fundamental to understanding the impact of feedback processes on galaxies and in fueling the buildup of their gaseous environments.

OBSERVING DESCRIPTION

From Phase I:

We are targeting blue horizontal branch stars in the halo of the Milky Way along a straight line perpendicular to the disk extending from the sun out to 13 kpc into the halo. Our catalog of blue horizontal branch stars comes from Xue et al. (2011), who selected these stars from SDSS DR8 stars with fiber spectra. Halo blue horizontal branch stars are good COS targets for four primary reasons: (1) They are blue point sources and therefore have bright continua in the UV, (2) their UV spectra are characterized by a fairly featureless bright continuum with broad Lyman series lines (Brown et al. 2012) because they are quite metal poor, (3) many of them are moving with |vrad| > 100 km/s which allows us to cleanly distinguish any absorption features intrinsic to the star and its atmosphere, and (4) They are approximate standard candles since their distances can be estimated from multi-band photometry with an accuracy of 10% (Deason et al. 2011).

There are two primary requirements that define our seven-star sample: 1) The stars must have GALEX FUV magnitudes that are bright enough to achieve our required S/N in a reasonable number of orbits (see below; mFUV < 18.5); and 2) The stars must have heliocentric radial velocites < -100 km/s to minimize confusion of features redshifted with respect to the MW with stellar absorption lines (although the halo stars are metal poor, and unlikely to exhibit significant contaminating atmospheric lines). Criterion 1 limits us to ~800 stars and criterion 2 winnows the group to ~200 potential stellar targets. Finally, we choose stars that lie along a continuous line of sight roughly perpendicular to the disk extending to the most distant star (z = 13 kpc) that remains after the aforementioned cuts. We sample the distance perpendicular to the plane in 1- 2 kpc increments, with a narrow range of x, y values (coordinates in the 2D plane of the disk) such that we are probing lines of sight within 500 pc of each other to minimize variations due to differing locations above the disk. These final criteria are crucial for a direct measure of how the properties of gas outside the disk depend on scale height, and leave us with 7 stars that satisfy our experimental design.

To achieve our primary goal of detecting the weak FUV absorption features redshifted (or perhaps blueshifted) with respect to strong Galactic absorption features, we require a S/N of 15 - 20 over our wavelength range, and the highest spectral resolution of COS (G160M) with a central wavelength of 1577 A. These requirements are to ensure an accurate measurement of this weak component and to avoid blending with the disk of the Milky Way. We expect to detect 15 mA features of CIV 1548 at 3sigma, consistent with previous detections of this transition in the halo of the Milky Way (Lehner & Howk 2011). For reference, a CIV 1548 line with an EW of 15 mA has a column density of 3 x10^12 cm^2, and a physically interesting limit based on detections in the halos of normal, star-forming galaxies (Bordoloi et al. 2014). To assess the signatures of gas inflow and outflow may require an analysis of the absorption line profiles by constructing two-component models which include the ISM component of the Galaxy (Rubin+2012), which is another reason we require S/N of at least 15 across our spectral range.

The key transitions we will probe will be SiII (1526), FeII (1608, 1611), AlII (1670),SiIV (1393, 1402), and CIV (1548, 1550). From this range of transitions, especially via comparisons of SiII and SiIV, we will be able to probe the ionization state of the gas as a function of distance from the galactic plane. Our stars range in GALEX FUV magnitudes from 16.3 - 18.5 . The Cycle 23 COS ETC tells us that we will require between 1 and 8 orbits for each BHB star (modeled as an AOIII star) to reach a S/N of 15 - 20 over the full spectral range (see: COS.sp.697859,697885, 697894, 697898, 697902, 697909). The most stringent requirement setting the exposure time is that we cover the CiIV doublet (1548, 1550) at the minimum S/N of 15. This calculation includes 14 minutes of overhead for the first orbit, and 6 minutes of overhead for each additional orbit. All exposure time calculations assume 2800 seconds of useful exposure averaged in each orbit (i.e., acquisition takes longer on the first orbit). Standard COS guide star and target acquisition, minimal readouts, and other overheads are factored in. None of these stars will pose a bright limit threat to COS and we have no timing or orientation constraints.

Phase II Observing Strategy:

We are taking COS/FUV spectra of blue horizontal branch stars with G160M centered at 1577 Angstroms. We require only one CENWAVE setting for this experiment since we are targeting specific absorption lines that will not fall near the gap between segments. Because we have coordinates that are accurate to within 0.1", we skip the ACQ/SEARCH step, and acquire the targets with a PEAKXD exposure followed by a PEAKD exposure. The Exposure times for these acquisitions are set by requiring a S/N in FUV-A segment only of 25, and a S/N of 40 for both segments, respectively.

For each of our four brightest targets that require four or fewer orbits to reach our desired S/N, we pack the exposures into a single visit. For the brightest star in our sample, we use a single orbit, and only three FP-POS settings to reduce overheads from buffer dumps. In general, the buffer times are quite long, and we thus set the buffer time in the exposure manually to be 100 seconds shorter than the target's exposure time. We proceed by attempting to maximize exposure times while keeping to a minimum of four FP-POS settings per visit (Except for visit 1, noted above, which is only one orbit). In four-orbit visits, we are able to use all four FP-POS settings with no loss from buffer dumps.

In our final set-up we achieve S/N of between 13 - 22 across our full wavelength range for all of our targets, which is generally in line with the requirements we outlined in the science case of Phase 1.

Visit

Proposal 14140, BHB1 (01), implementation Thu Oct 22 01:09:09 GMT 2015

Diagnostic Status: Warning

Scientific Instruments: COS/FUV

Special Requirements: (none)

Diagnostics

(BHB1 (01)) Warning (Form): For the best data quality, it is strongly recommended that all four FP-POS positions be used when observing at a given COS CENWAVE setting.

Fixed Targets

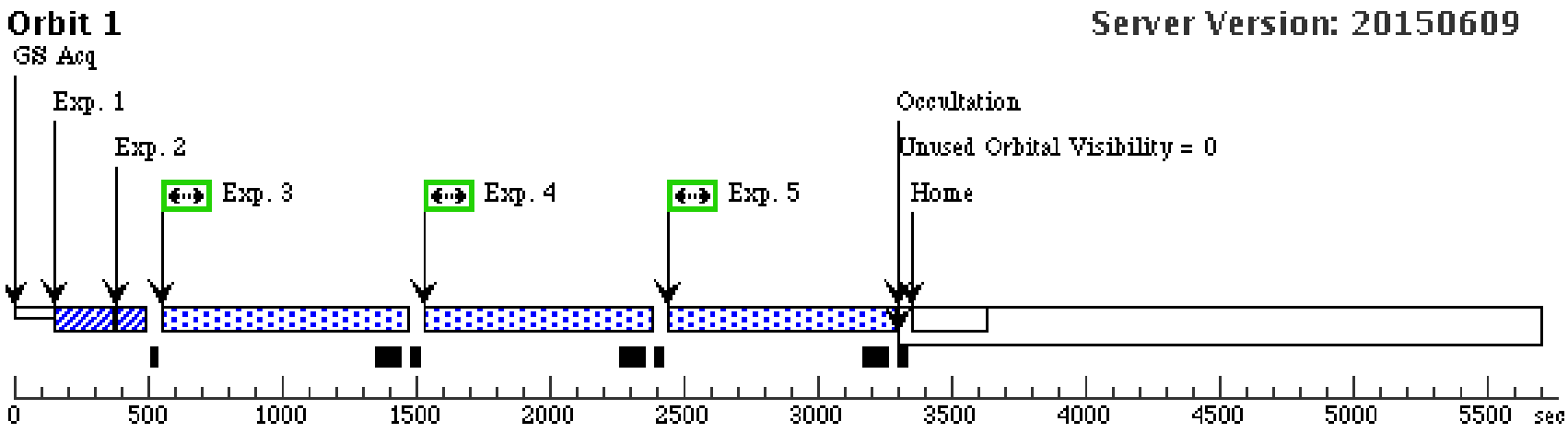
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SDSS-J152750.06+402729.0	RA: 15 27 50.0600 (231.9585833d) Dec: +40 27 29.06 (40.45807d) Equinox: J2000	Proper Motion RA: 0.0 mas/yr Proper Motion Dec: 0.0 mas/yr Epoch of Position: 2000 Radial Velocity: -105.58 km/sec	V=14.1+/-0.1 GALEX FUV = 16.3	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. z = 3.4
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sa.71936)	(1) SDSS-J152750.06+402729.0	COS/FUV, ACQ/PEAKXD, PSA	G160M 1577 A				9 Secs (9 Secs) *[==>]*	*[1]*
2	(COS.sa.717865)	(1) SDSS-J152750.06+402729.0	COS/FUV, ACQ/PEAKD, PSA	G160M 1577 A	STEP-SIZE=1.3; CENTER=FLUX-WT; NUM-POS=3			5.5 Secs (5.5 Secs) *[==>]*	*[1]*
3	(COS.sp.719138)	(1) SDSS-J152750.06+402729.0	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=698; FP-POS=1			798 Secs (798 Secs) *[==>]*	*[1]*
4	(COS.sp.719138)	(1) SDSS-J152750.06+402729.0	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=698; FP-POS=2			798 Secs (798 Secs) *[==>]*	*[1]*
5	(COS.sp.719138)	(1) SDSS-J152750.06+402729.0	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=697; FP-POS=4			797 Secs (797 Secs) *[==>]*	*[1]*

Orbit Structure



Visit

Proposal 14140, BHB2 (02), implementation Thu Oct 22 01:09:10 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: (none)

Fixed Targets

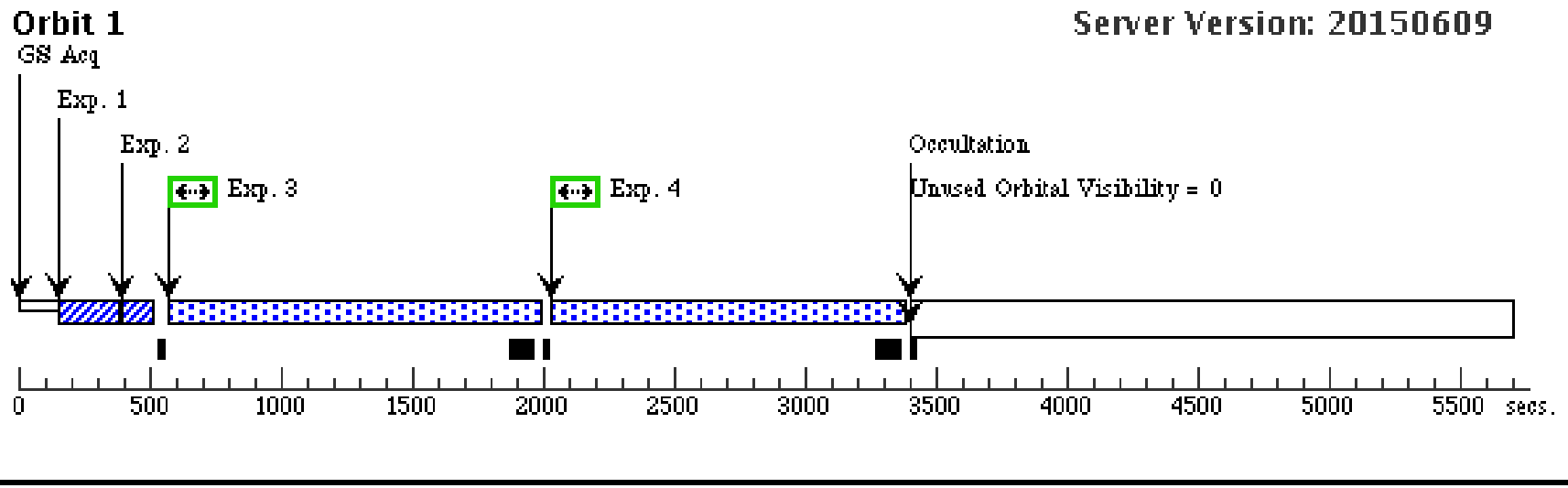
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	2MASS-J15341124+5015564	RA: 15 34 11.2500 (233.5468750d) Dec: +50 15 56.40 (50.26567d) Equinox: J2000	Proper Motion RA: 0.0 mas/yr Proper Motion Dec: 0.0 mas/yr Epoch of Position: 2000 Radial Velocity: -129.4 km/sec	V=14.5+/-0.01 GALEX FUV = 16.9	Reference Frame: ICRS

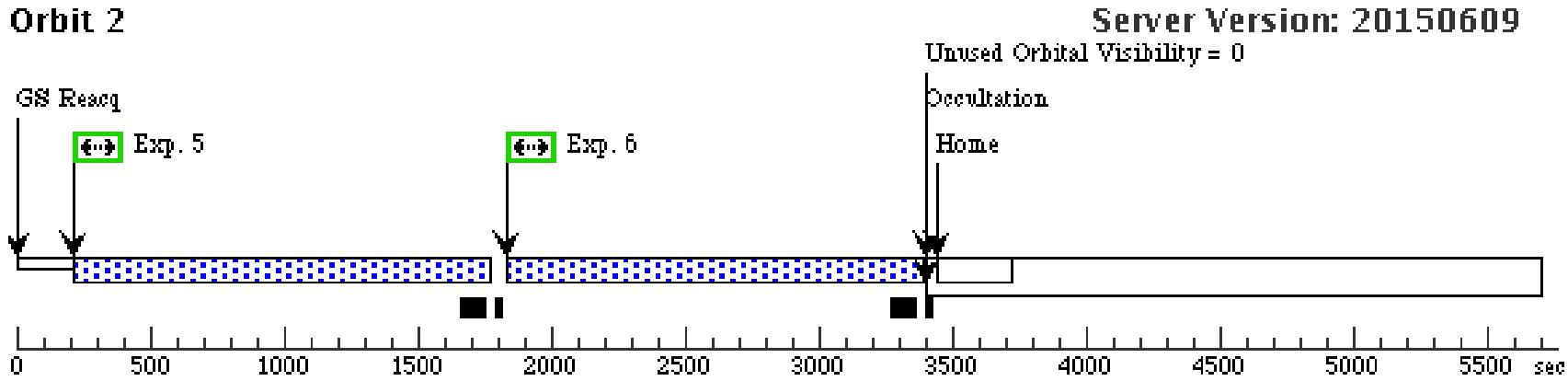
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. z = 4.1
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sa.719145)	(2) 2MASS-J15341124+5015564	COS/FUV, ACQ/PEAKXD, PSA	G160M 1577 A				16.7 Secs (16.7 Secs) *[==>]*	 ***[1]***
2	(COS.sa.719148)	(2) 2MASS-J15341124+5015564	COS/FUV, ACQ/PEAKD, PSA	G160M 1577 A	STEP-SIZE=1.3; CENTER=FLUX-WT; NUM-POS=3			10 Secs (10 Secs) *[==>]*	 ***[1]***
3	(COS.sp.719167)	(2) 2MASS-J15341124+5015564	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=1196; FP-POS=1			1296 Secs (1296 Secs) *[==>]*	 ***[1]***
4	(COS.sp.719167)	(2) 2MASS-J15341124+5015564	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=1197; FP-POS=2			1297 Secs (1297 Secs) *[==>]*	 ***[1]***
5	(COS.sp.719166)	(2) 2MASS-J15341124+5015564	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=1406; FP-POS=3			1506 Secs (1506 Secs) *[==>]*	 ***[2]***
6	(COS.sp.719166)	(2) 2MASS-J15341124+5015564	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=1406; FP-POS=4			1506 Secs (1506 Secs) *[==>]*	 ***[2]***

Orbit Structure





Visit

Proposal 14140, BHB3 (03), implementation Thu Oct 22 01:09:10 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: (none)

Fixed Targets

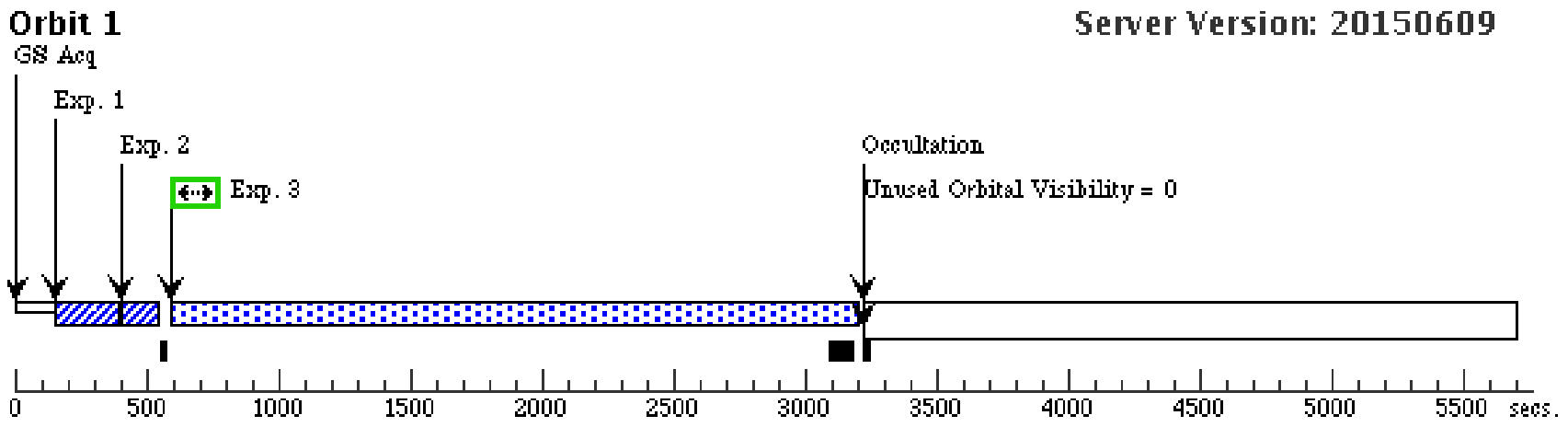
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	2MASS-J13440440+1842590 Alt Name1: SDSS-J134404.40+184259.1	RA: 13 44 4.4000 (206.0183333d) Dec: +18 42 59.00 (18.71639d) Equinox: J2000	Proper Motion RA: 0.0 mas/yr Proper Motion Dec: 0.0 mas/yr Epoch of Position: 2000 Radial Velocity: -74.7 km/sec	V=14.75+/-0.01 GALEX FUV = 17.3	Reference Frame: ICRS

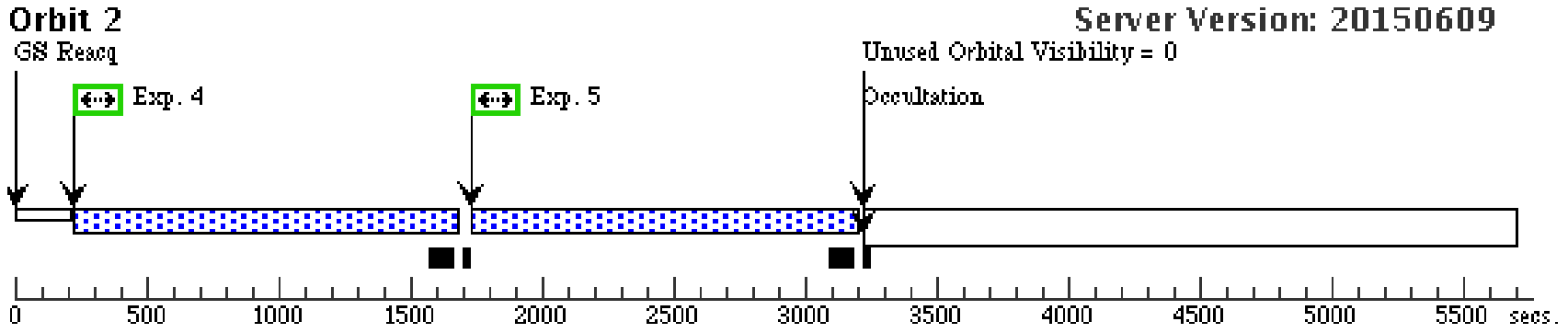
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. z = 5.7
Extended=NO

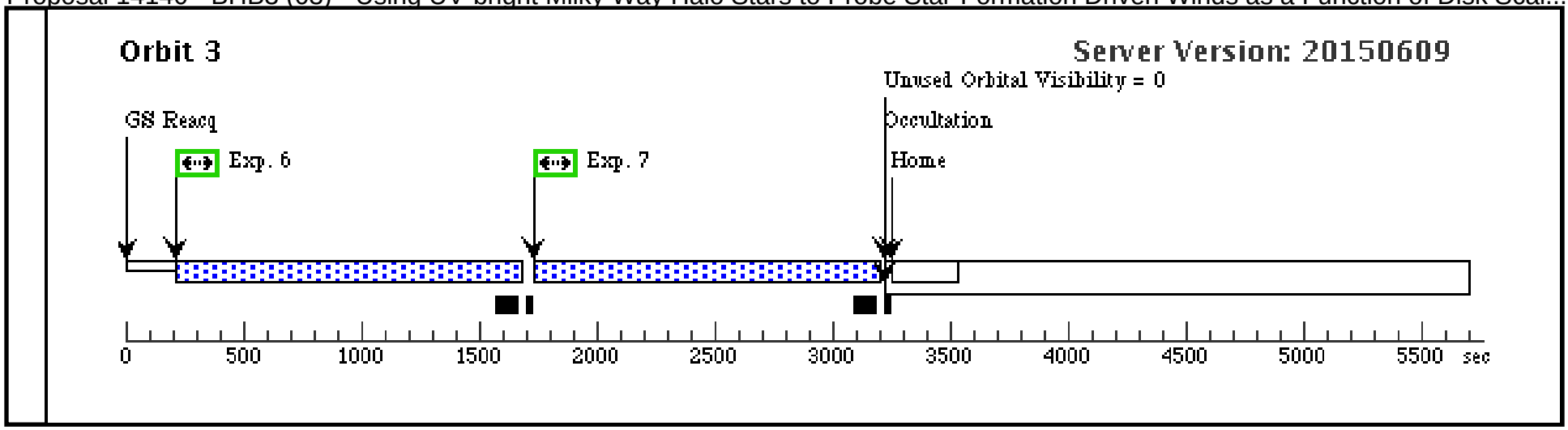
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sa.719169)	(3) 2MASS-J13440440+1842590	COS/FUV, ACQ/PEAKXD, PSA	G160M 1577 A				25.9 Secs (25.9 Secs) *[==>]*	 ***[1]***
2	(COS.sa.719170)	(3) 2MASS-J13440440+1842590	COS/FUV, ACQ/PEAKD, PSA	G160M 1577 A	STEP-SIZE=1.3; CENTER=FLUX-WT; NUM-POS=3			14.8 Secs (14.8 Secs) *[==>]*	 ***[1]***
3	(COS.sp.719196)	(3) 2MASS-J13440440+1842590	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2392; FP-POS=1			2492 Secs (2492 Secs) *[==>]*	 ***[1]***
4	(COS.sp.719821)	(3) 2MASS-J13440440+1842590	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=1315; FP-POS=1			1415 Secs (1415 Secs) *[==>]*	 ***[2]***
5	(COS.sp.719821)	(3) 2MASS-J13440440+1842590	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=1315; FP-POS=2			1415 Secs (1415 Secs) *[==>]*	 ***[2]***
6	(COS.sp.719821)	(3) 2MASS-J13440440+1842590	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=1315; FP-POS=3			1415 Secs (1415 Secs) *[==>]*	 ***[3]***
7	(COS.sp.719821)	(3) 2MASS-J13440440+1842590	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=1315; FP-POS=4			1415 Secs (1415 Secs) *[==>]*	 ***[3]***

Orbit Structure



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GS Reacq
Occultation
Exp. 6
Exp. 7
Home
0
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1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14140, BHB4 (04), implementation Thu Oct 22 01:09:10 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: (none)

Fixed Targets

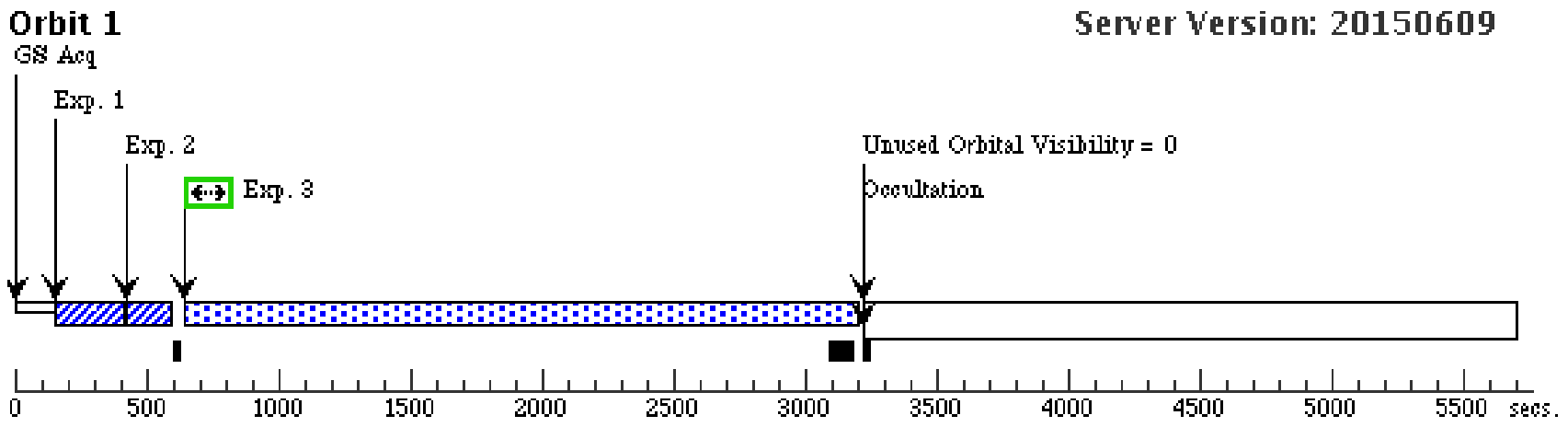
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	SDSS-J132554.40+223250.1 Alt Name1: 2MASS-J13255441+2232499	RA: 13 25 54.4180 (201.4767417d) Dec: +22 32 49.97 (22.54721d) Equinox: J2000	Proper Motion RA: 0.0 mas/yr Proper Motion Dec: 0.0 mas/yr Epoch of Position: 2000 Radial Velocity: -100.3 km/sec	V=15.2+/-0.01 GALEX FUV = 17.8	Reference Frame: ICRS

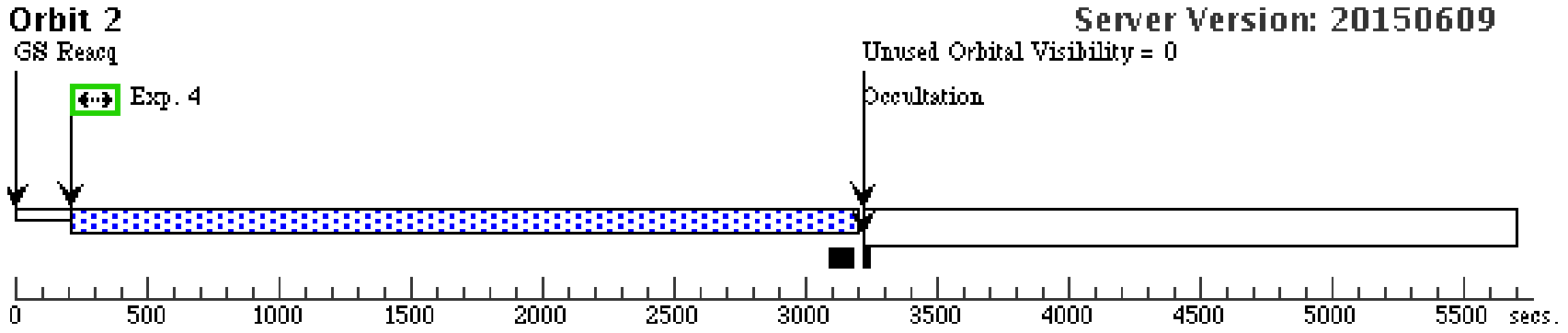
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. z = 7.3
Extended=NO

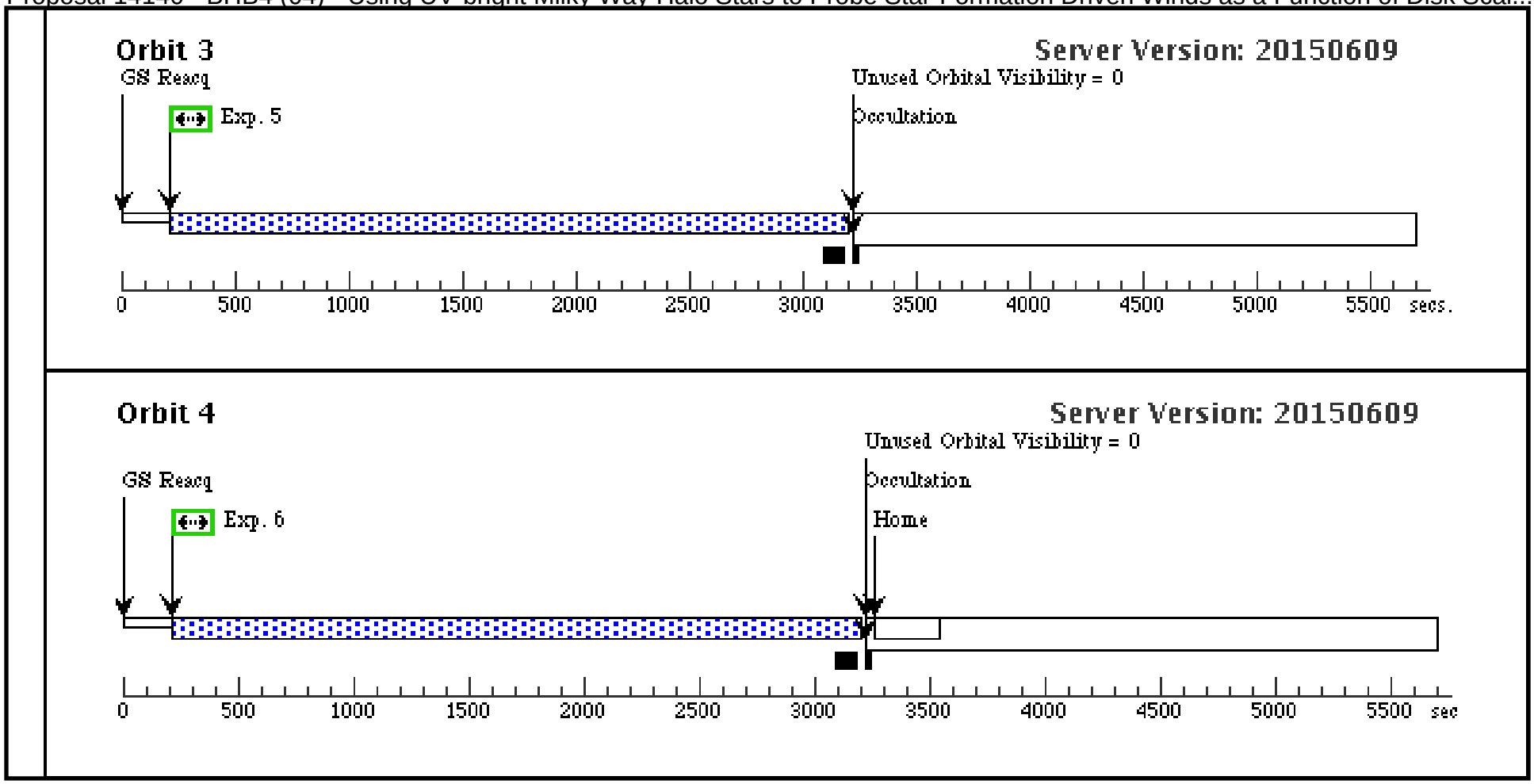
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sa.719172)	(4) SDSS-J132554.40+223250.1	COS/FUV, ACQ/PEAKXD, PSA	G160M 1577 A				45.2 Secs (45.2 Secs) *[==>]*	 ***[1]***
2	(COS.sa.719194)	(4) SDSS-J132554.40+223250.1	COS/FUV, ACQ/PEAKD, PSA	G160M 1577 A	STEP-SIZE=1.3; CENTER=FLUX-WT; NUM-POS=3			24.8 Secs (24.8 Secs) *[==>]*	 ***[1]***
3	(COS.sp.719197)	(4) SDSS-J132554.40+223250.1	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2343; FP-POS=1			2443 Secs (2443 Secs) *[==>]*	 ***[1]***
4	(COS.sp.719198)	(4) SDSS-J132554.40+223250.1	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2836; FP-POS=2			2936 Secs (2936 Secs) *[==>]*	 ***[2]***
5	(COS.sp.719198)	(4) SDSS-J132554.40+223250.1	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2836; FP-POS=3			2936 Secs (2936 Secs) *[==>]*	 ***[3]***
6	(COS.sp.719198)	(4) SDSS-J132554.40+223250.1	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2836; FP-POS=4			2936 Secs (2936 Secs) *[==>]*	 ***[4]***

Orbit Structure



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Occultation
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secs.
Orbit 4
Server Version: 20150609
Unused Orbital Visibility = 0
GS Reacq
Occultation
Exp. 6
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1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14140, BHB5 (05), implementation Thu Oct 22 01:09:10 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: (none)

Comments: Splitting Target 5 into 2 visits. This is the first visit of four orbits, using one unique FP-POS per orbit.
The other visit will be two orbits, with two exposures per orbit, each with a different FP-POS.

Fixed Targets

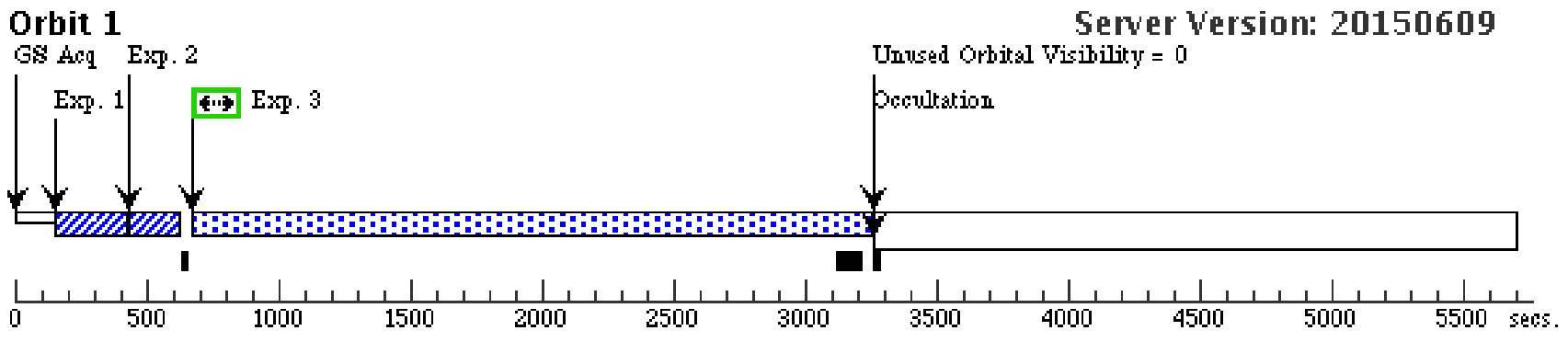
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	SDSS-J141557.13+371658.2 Alt Name1: 2MASS-J14155712+3716582	RA: 14 15 57.1250 (213.9880208d) Dec: +37 16 58.28 (37.28286d) Equinox: J2000	Proper Motion RA: 0.0 mas/yr Proper Motion Dec: 0.0 mas/yr Epoch of Position: 2000 Radial Velocity: -134.0 km/sec	V=15.81+/-0.01 GALEX FUV = 18.0	Reference Frame: ICRS

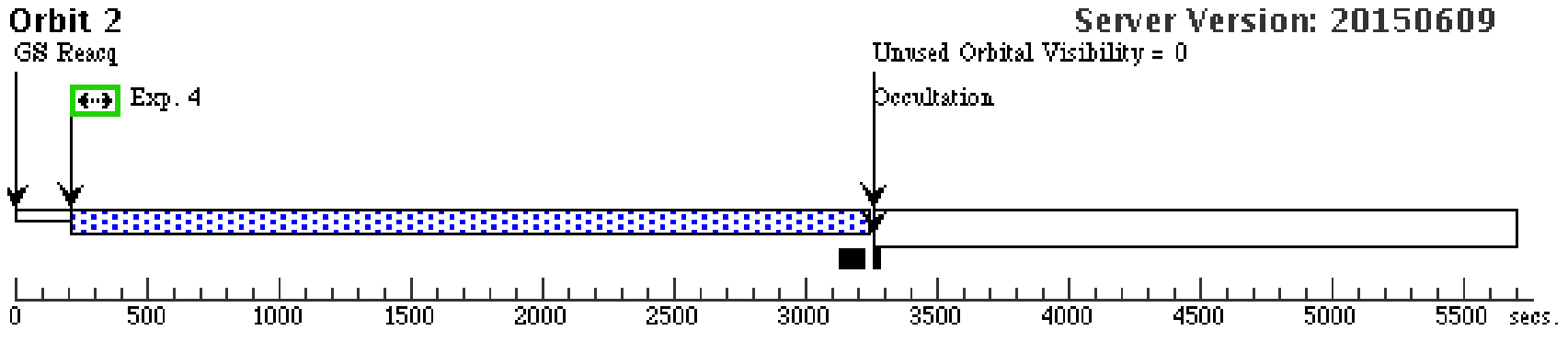
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. z = 9.2
Extended=NO

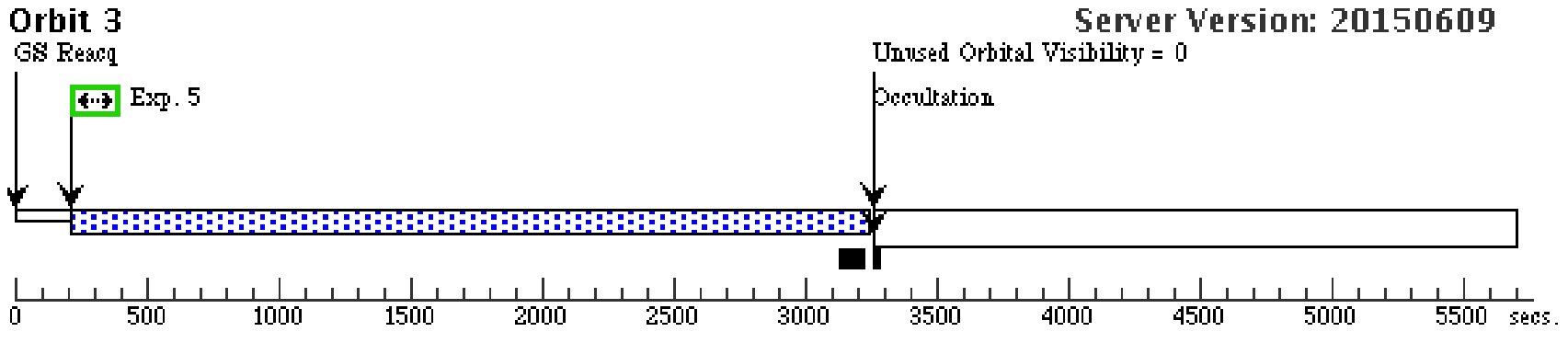
Exposures

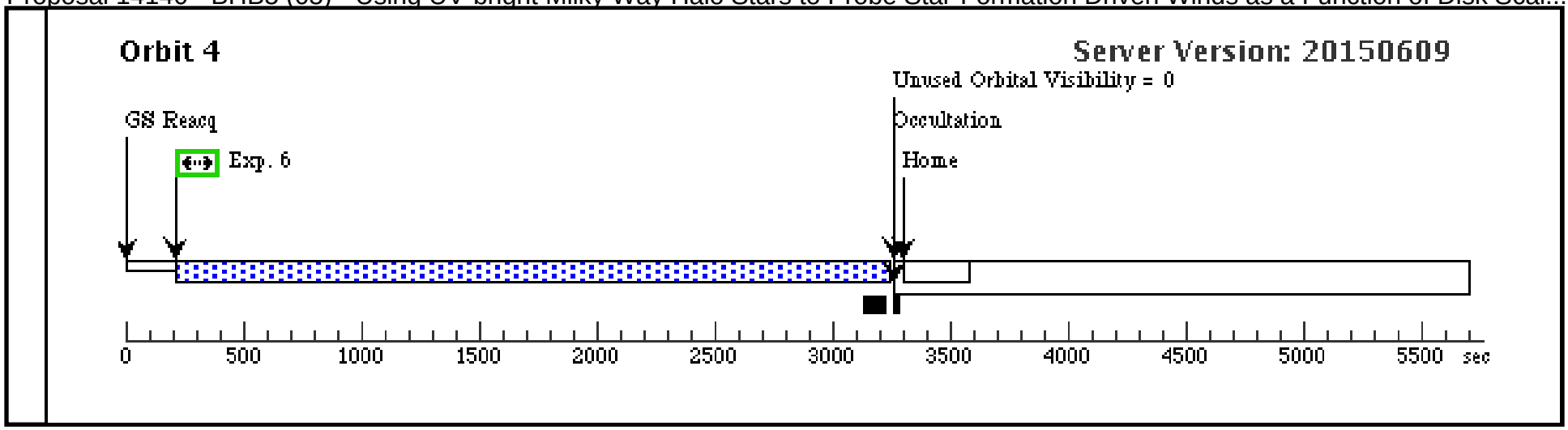
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sa.719203)	(5) SDSS-J141557.13+371658.2	COS/FUV, ACQ/PEAKXD, PSA	G160M 1577 A				56.9 Secs (56.9 Secs) *[==>]*	*[1]*
2	(COS.sa.719202)	(5) SDSS-J141557.13+371658.2	COS/FUV, ACQ/PEAKD, PSA	G160M 1577 A	STEP-SIZE=1.3; CENTER=FLUX-WT; NUM-POS=3			30.8 Secs (30.8 Secs) *[==>]*	*[1]*
3	(COS.sp.719204)	(5) SDSS-J141557.13+371658.2	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2349; FP-POS=1			2459 Secs (2459 Secs) *[==>]*	*[1]*
4	(COS.sp.719205)	(5) SDSS-J141557.13+371658.2	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2881; FP-POS=2			2981 Secs (2981 Secs) *[==>]*	*[2]*
5	(COS.sp.719205)	(5) SDSS-J141557.13+371658.2	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2881; FP-POS=3			2981 Secs (2981 Secs) *[==>]*	*[3]*
6	(COS.sp.719205)	(5) SDSS-J141557.13+371658.2	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2881; FP-POS=4			2981 Secs (2981 Secs) *[==>]*	*[4]*

Orbit Structure








Orbit 4
Server Version: 20150609
Unused Orbital Visibility = 0
GS Reacq
Exp. 6
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14140, BHB5 (06), implementation Thu Oct 22 01:09:10 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: (none)

Comments: Splitting Target 5 into 2 visits. This is the second visit of two orbits, using all four FP-POS.

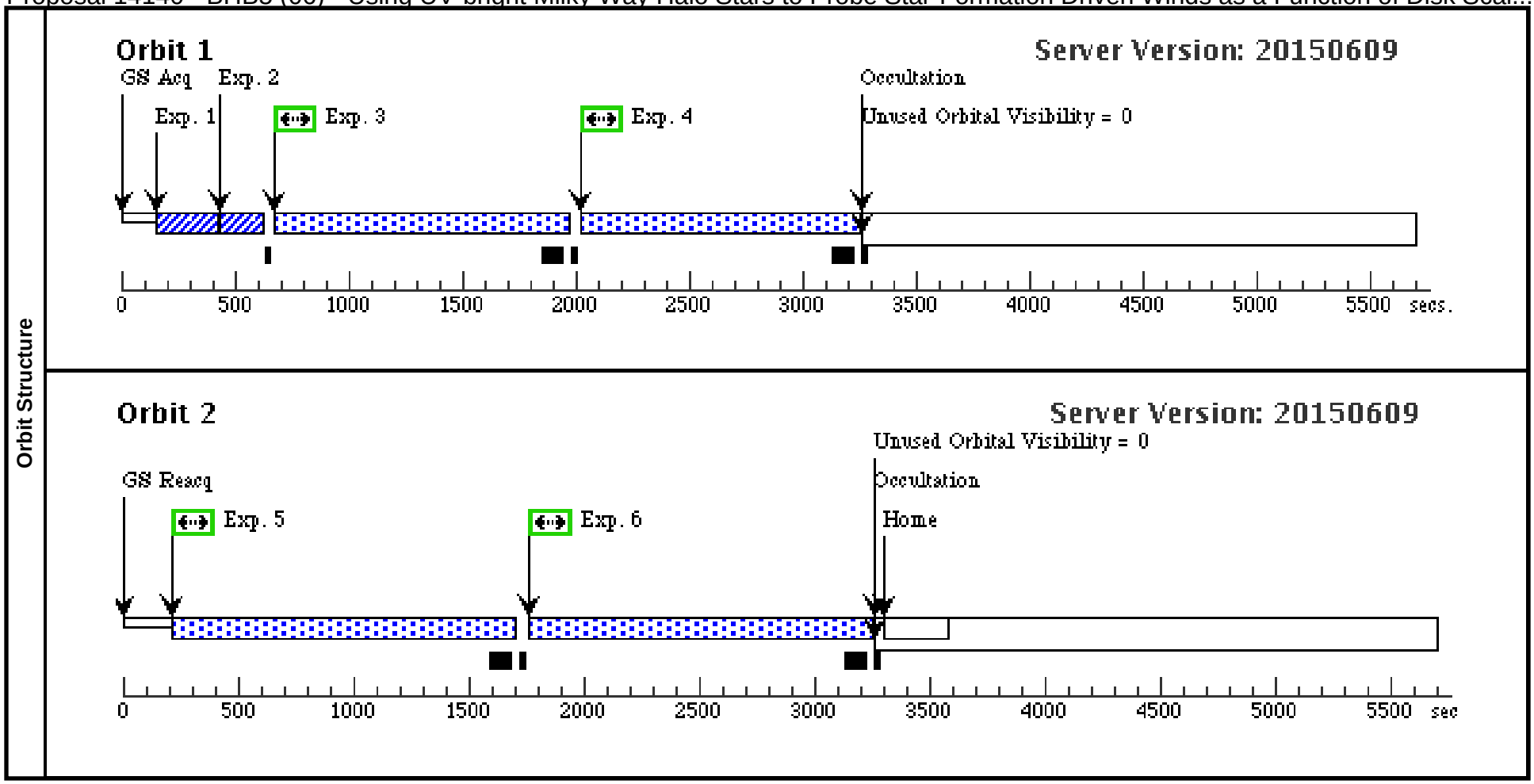
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	SDSS-J141557.13+371658.2 Alt Name1: 2MASS-J14155712+3716582	RA: 14 15 57.1250 (213.9880208d) Dec: +37 16 58.28 (37.28286d) Equinox: J2000	Proper Motion RA: 0.0 mas/yr Proper Motion Dec: 0.0 mas/yr Epoch of Position: 2000 Radial Velocity: -134.0 km/sec	V=15.81+/-0.01 GALEX FUV = 18.0	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. z = 9.2
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sa.719203)	(5) SDSS-J141557.13+371658.2	COS/FUV, ACQ/PEAKXD, PSA	G160M 1577 A				56.9 Secs (56.9 Secs) *[==>]*	 ***[1]***
2	(COS.sa.719202)	(5) SDSS-J141557.13+371658.2	COS/FUV, ACQ/PEAKD, PSA	G160M 1577 A	STEP-SIZE=1.3; CENTER=FLUX-WT; NUM-POS=3			30.8 Secs (30.8 Secs) *[==>]*	 ***[1]***
3	(COS.sp.719837)	(5) SDSS-J141557.13+371658.2	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=1077; FP-POS=1			1177 Secs (1177 Secs) *[==>]*	 ***[1]***
4	(COS.sp.719837)	(5) SDSS-J141557.13+371658.2	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=1077; FP-POS=2			1177 Secs (1177 Secs) *[==>]*	 ***[1]***
5	(COS.sp.719839)	(5) SDSS-J141557.13+371658.2	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=1338; FP-POS=3			1438 Secs (1438 Secs) *[==>]*	 ***[2]***
6	(COS.sp.719839)	(5) SDSS-J141557.13+371658.2	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=1338; FP-POS=4			1438 Secs (1438 Secs) *[==>]*	 ***[2]***


Orbit Structure
Orbit 1
Server Version: 20150609
GS Acq
Exp. 2
Occultation
Exp. 1
Exp. 3
Exp. 4
Unused Orbital Visibility = 0
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.
Orbit 2
Server Version: 20150609
Unused Orbital Visibility = 0
GS Reacq
Occultation
Exp. 5
Exp. 6
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14140, BHB6 (07), implementation Thu Oct 22 01:09:11 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: (none)

Comments: Splitting Target 6 into 2 visits. This is the first visit of four orbits, with one exposure per-orbit, each using a different FP-POS. The other visit will be two orbits.

Fixed Targets

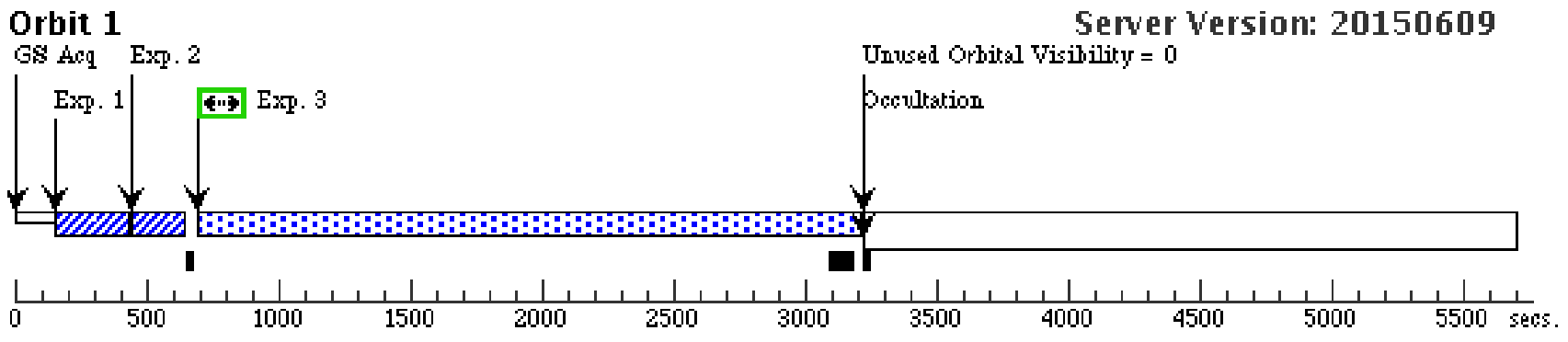
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	2MASS-J13411984+2823586 Alt Name1: SDSS-J134119.85+282358.6	RA: 13 41 19.8500 (205.3327083d) Dec: +28 23 58.60 (28.39961d) Equinox: J2000	Proper Motion RA: 0.0 mas/yr Proper Motion Dec: 0.0 mas/yr Epoch of Position: 2000 Radial Velocity: -124.8 km/sec	V=16.4+/-0.01 GALEX FUV = 18.1	Reference Frame: ICRS

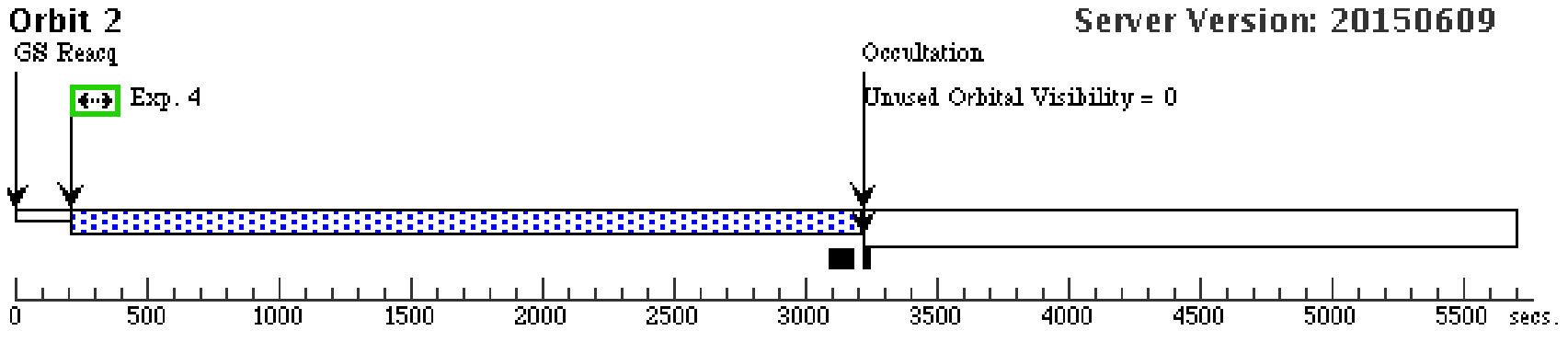
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Extended=NO

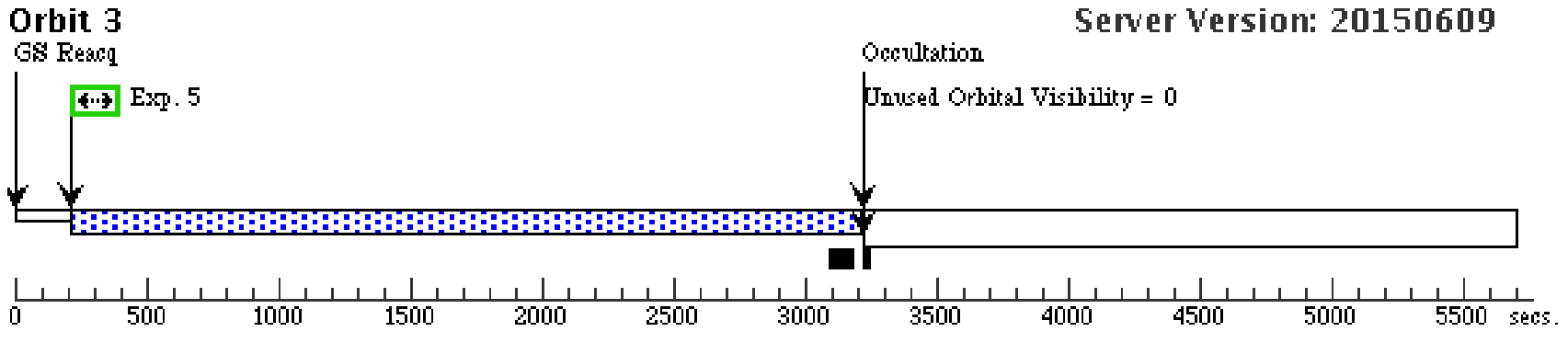
Exposures

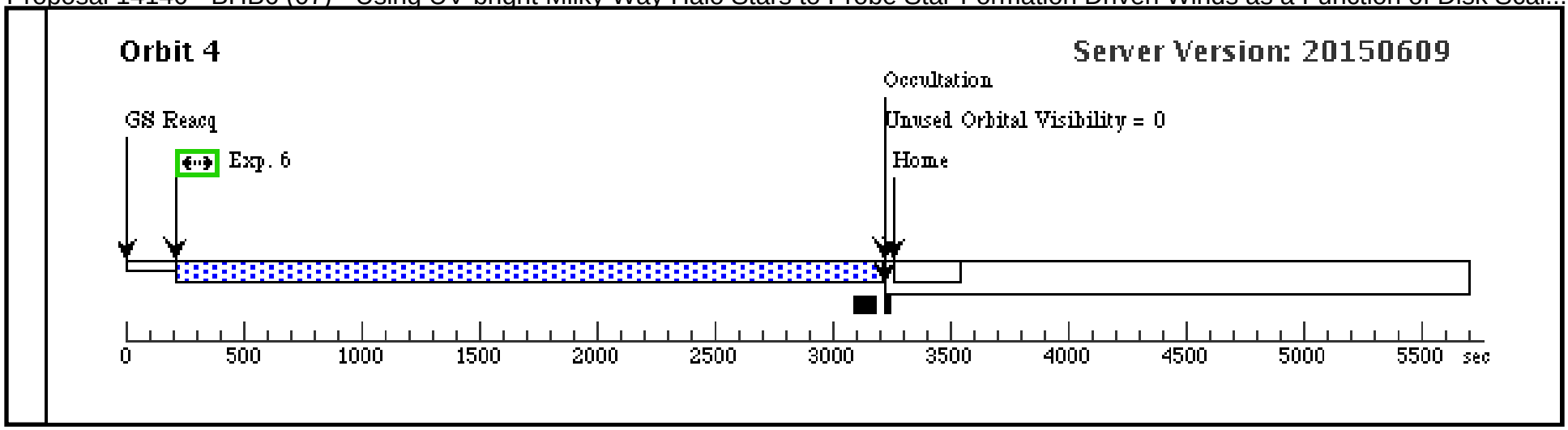
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sa.719206)	(6) 2MASS-J13411984+2823586	COS/FUV, ACQ/PEAKXD, PSA	G160M 1577 A				64.2 Secs (64.2 Secs) *[==>]*	*[1]*
2	(COS.sa.719207)	(6) 2MASS-J13411984+2823586	COS/FUV, ACQ/PEAKD, PSA	G160M 1577 A	STEP-SIZE=1.3; CENTER=FLUX-WT; NUM-POS=3			34.3 Secs (34.3 Secs) *[==>]*	*[1]*
3	(COS.sp.719208)	(6) 2MASS-J13411984+2823586	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2303; FP-POS=1			2403 Secs (2403 Secs) *[==>]*	*[1]*
4	(COS.sp.719209)	(6) 2MASS-J13411984+2823586	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2843; FP-POS=2			2943 Secs (2943 Secs) *[==>]*	*[2]*
5	(COS.sp.719209)	(6) 2MASS-J13411984+2823586	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2843; FP-POS=3			2943 Secs (2943 Secs) *[==>]*	*[3]*
6	(COS.sp.719209)	(6) 2MASS-J13411984+2823586	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2843; FP-POS=4			2943 Secs (2943 Secs) *[==>]*	*[4]*

Orbit Structure








Orbit 4
Server Version: 20150609
Occultation
GS Reacq
Unused Orbital Visibility = 0
Exp. 6
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14140, BHB6 (08), implementation Thu Oct 22 01:09:11 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: (none)

Comments: Splitting Target 6 into 2 visits. This is the second visit of now of two orbits, with two exposures per orbit, each exposure having a unique FP-POS.

Fixed Targets

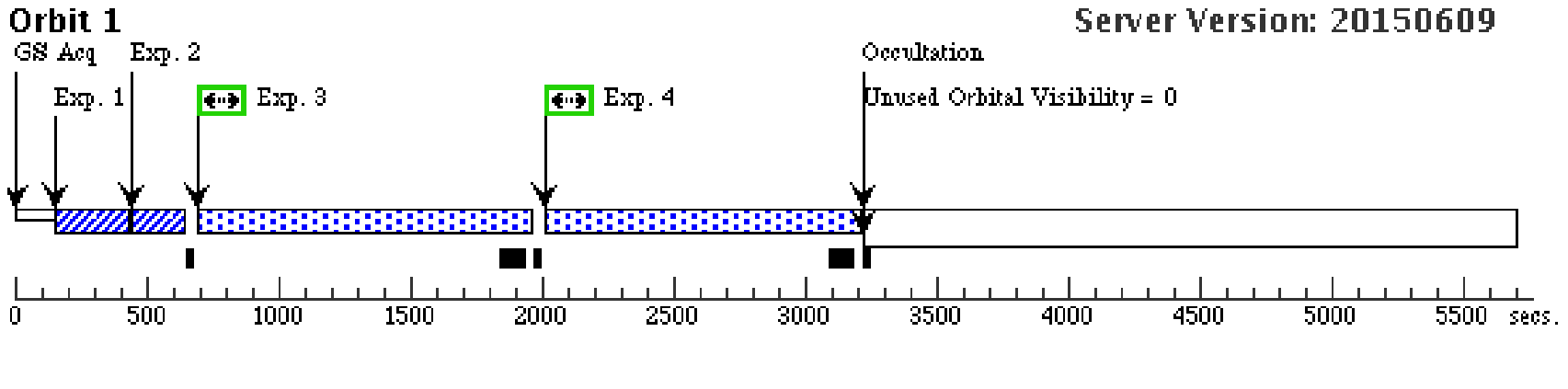
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	2MASS-J13411984+2823586 Alt Name1: SDSS-J134119.85+282358.6	RA: 13 41 19.8500 (205.3327083d) Dec: +28 23 58.60 (28.39961d) Equinox: J2000	Proper Motion RA: 0.0 mas/yr Proper Motion Dec: 0.0 mas/yr Epoch of Position: 2000 Radial Velocity: -124.8 km/sec	V=16.4+/-0.01 GALEX FUV = 18.1	Reference Frame: ICRS

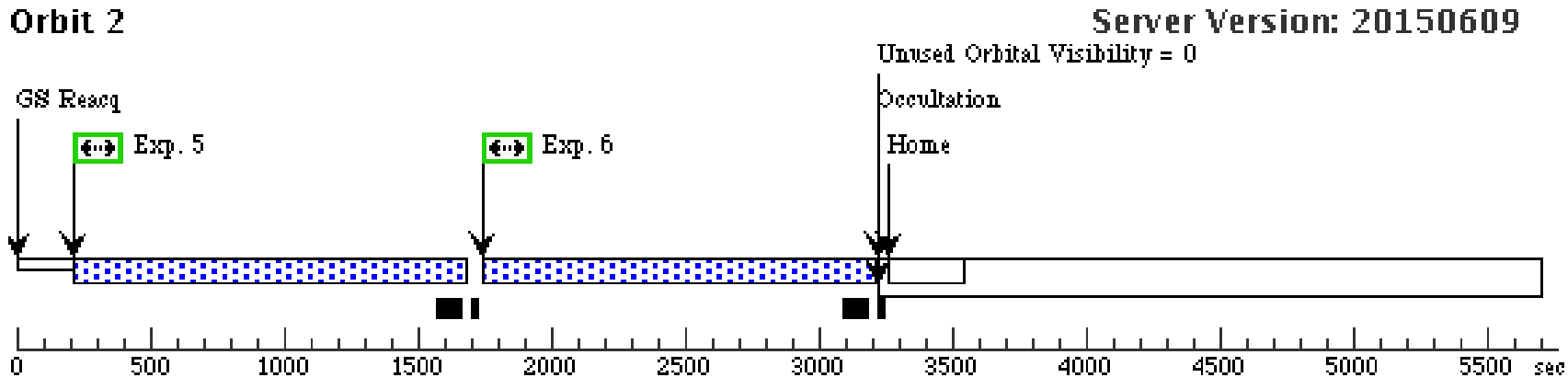
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sa.719206)	(6) 2MASS-J13411984+2823586	COS/FUV, ACQ/PEAKXD, PSA	G160M 1577 A				64.2 Secs (64.2 Secs) *[==>]*	***[1]***
2	(COS.sa.719207)	(6) 2MASS-J13411984+2823586	COS/FUV, ACQ/PEAKD, PSA	G160M 1577 A	STEP-SIZE=1.3; CENTER=FLUX-WT; NUM-POS=3			34.3 Secs (34.3 Secs) *[==>]*	***[1]***
3	(COS.sp.719840)	(6) 2MASS-J13411984+2823586	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=1049; FP-POS=1			1149 Secs (1149 Secs) *[==>]*	***[1]***
4	(COS.sp.719840)	(6) 2MASS-J13411984+2823586	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=1049; FP-POS=2			1149 Secs (1149 Secs) *[==>]*	***[1]***
5	(COS.sp.719841)	(6) 2MASS-J13411984+2823586	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=1319; FP-POS=3			1419 Secs (1419 Secs) *[==>]*	***[2]***
6	(COS.sp.719841)	(6) 2MASS-J13411984+2823586	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=1319; FP-POS=4			1419 Secs (1419 Secs) *[==>]*	***[2]***

Orbit Structure





Visit

Proposal 14140, BHB7 (09), implementation Thu Oct 22 01:09:11 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: (none)

Comments: The 7th target gets 8 orbits split over two visits of four orbits each.
With this set-up, we can get all four FP-POS per visit easily...

Fixed Targets

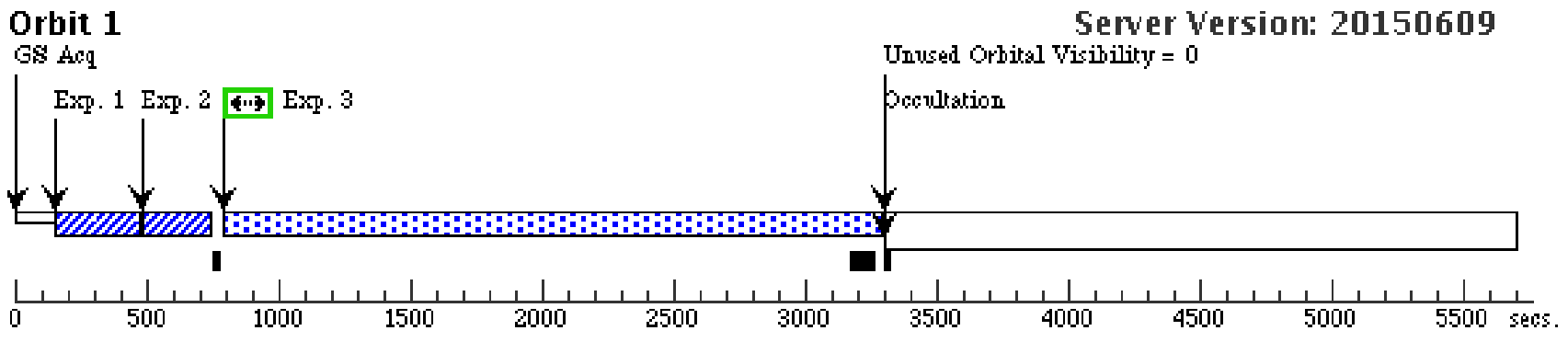
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(7)	SDSS-J145953.97+412851.1	RA: 14 59 53.9770 (224.9749042d) Dec: +41 28 51.19 (41.48089d) Equinox: J2000	Proper Motion RA: 0.0 mas/yr Proper Motion Dec: 0.0 mas/yr Epoch of Position: 2000 Radial Velocity: -182.8 km/sec	V=17.1+/-0.1 GALEX FUV = 18.5	Reference Frame: ICRS

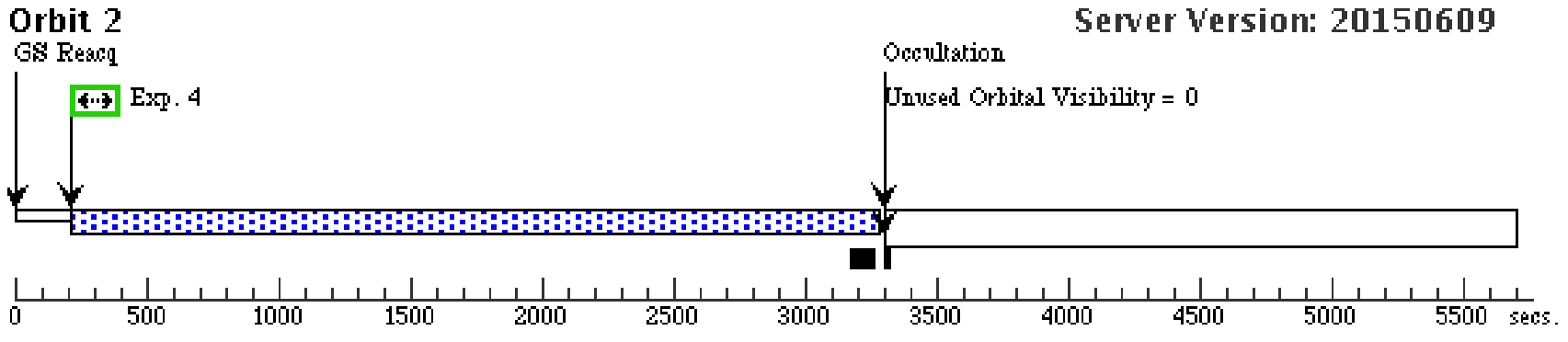
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Extended=NO

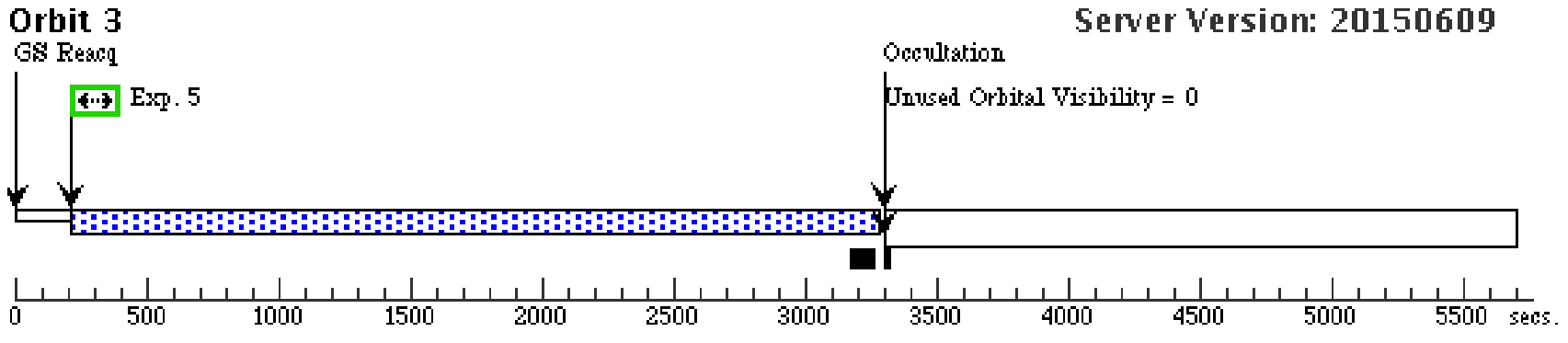
Exposures

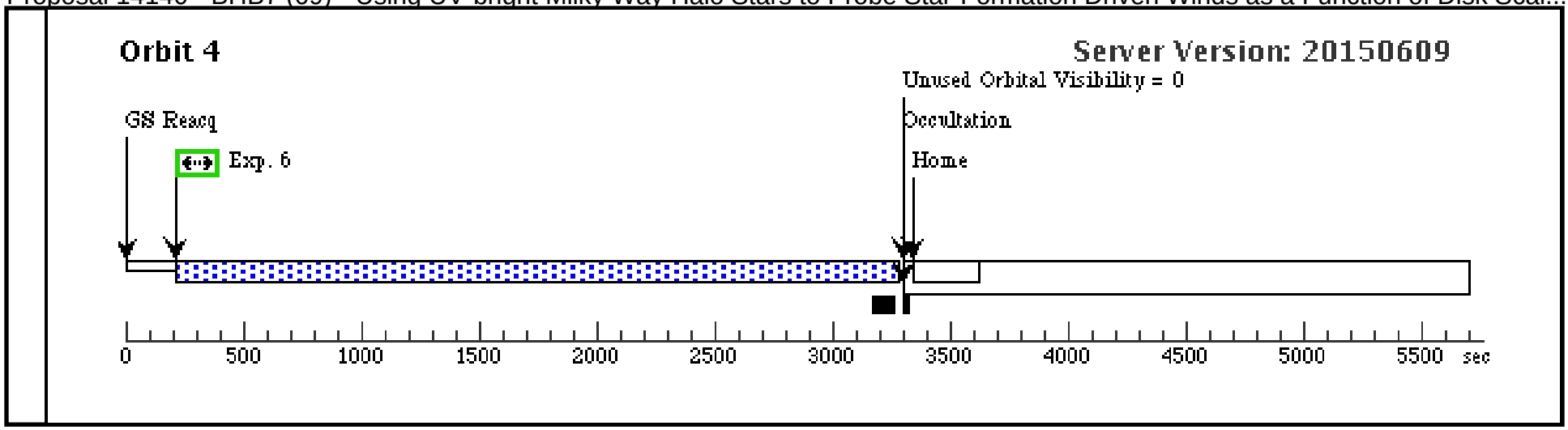
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sa.719211)	(7) SDSS-J145953.97+412851.1	COS/FUV, ACQ/PEAKXD, PSA	G160M 1577 A				105.8 Secs (105.8 Secs) *[==>]*	*[1]*
2	(COS.sa.719210)	(7) SDSS-J145953.97+412851.1	COS/FUV, ACQ/PEAKD, PSA	G160M 1577 A	STEP-SIZE=1.3; CENTER=FLUX-WT; NUM-POS=3			53.8 Secs (53.8 Secs) *[==>]*	*[1]*
3	(COS.sp.719212)	(7) SDSS-J145953.97+412851.1	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2281; FP-POS=1			2381 Secs (2381 Secs) *[==>]*	*[1]*
4	(COS.sp.719213)	(7) SDSS-J145953.97+412851.1	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2921; FP-POS=2			3021 Secs (3021 Secs) *[==>]*	*[2]*
5	(COS.sp.719213)	(7) SDSS-J145953.97+412851.1	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2921; FP-POS=3			3021 Secs (3021 Secs) *[==>]*	*[3]*
6	(COS.sp.719213)	(7) SDSS-J145953.97+412851.1	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2921; FP-POS=4			3021 Secs (3021 Secs) *[==>]*	*[4]*

Orbit Structure








Orbit 4
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Unused Orbital Visibility = 0
GS Reacq
Exp. 6
Occultation
Home
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500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14140, BHB7 (10), implementation Thu Oct 22 01:09:11 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: (none)

Comments: The 7th target gets 8 orbits split over two visits of four orbits each.
With this set-up, we can get all four FP-POS per visit easily...
visits 9 and 10 are identical.

Fixed Targets

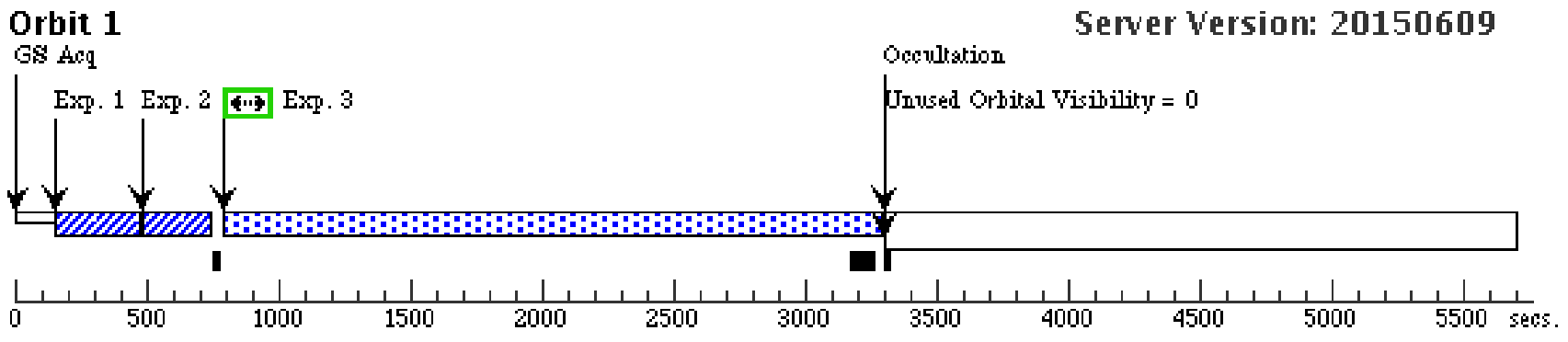
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(7)	SDSS-J145953.97+412851.1	RA: 14 59 53.9770 (224.9749042d) Dec: +41 28 51.19 (41.48089d) Equinox: J2000	Proper Motion RA: 0.0 mas/yr Proper Motion Dec: 0.0 mas/yr Epoch of Position: 2000 Radial Velocity: -182.8 km/sec	V=17.1+/-0.1 GALEX FUV = 18.5	Reference Frame: ICRS

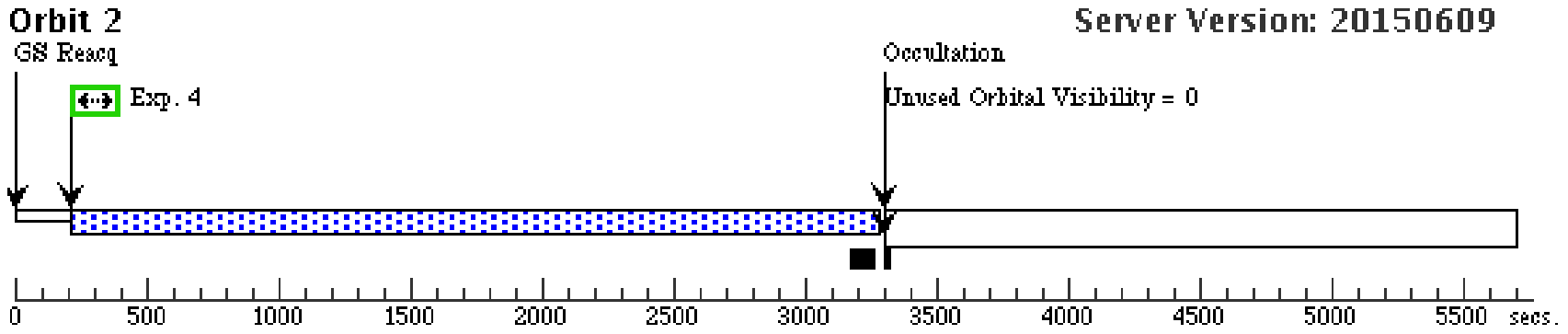
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Extended=NO

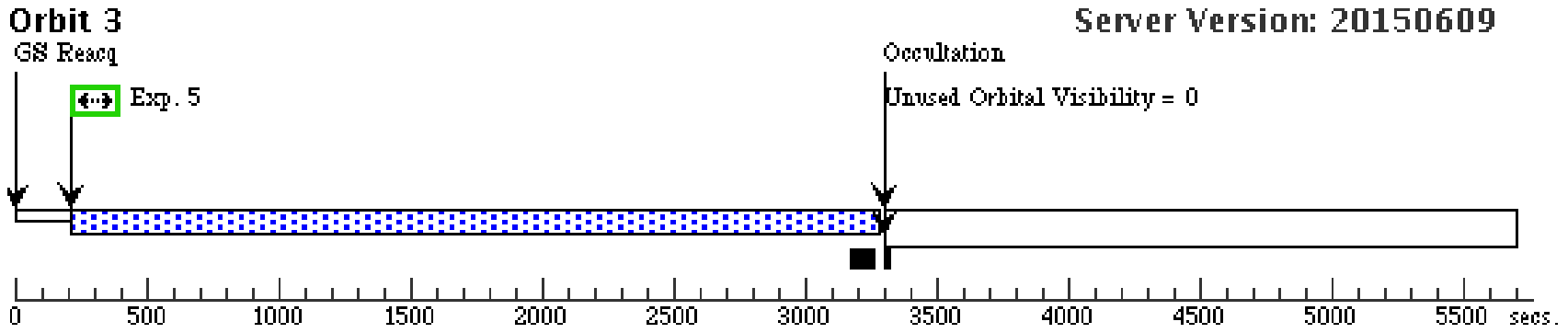
Exposures

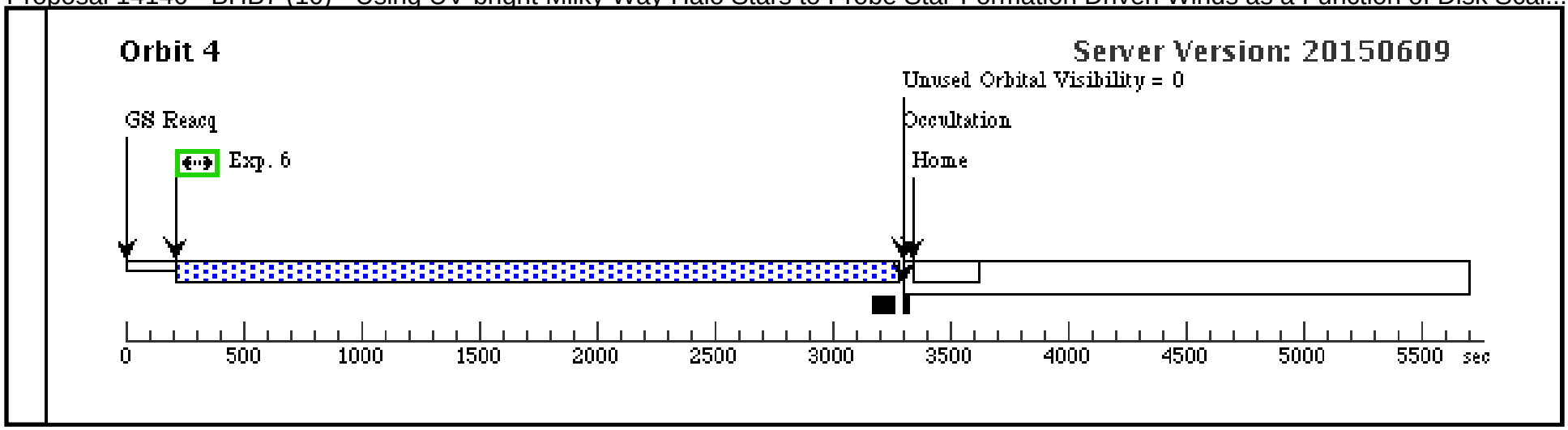
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sa.719211)	(7) SDSS-J145953.97+412851.1	COS/FUV, ACQ/PEAKXD, PSA	G160M 1577 A				105.8 Secs (105.8 Secs) *[==>]*	*[1]*
2	(COS.sa.719210)	(7) SDSS-J145953.97+412851.1	COS/FUV, ACQ/PEAKD, PSA	G160M 1577 A	STEP-SIZE=1.3; CENTER=FLUX-WT; NUM-POS=3			53.8 Secs (53.8 Secs) *[==>]*	*[1]*
3	(COS.sp.719212)	(7) SDSS-J145953.97+412851.1	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2281; FP-POS=1			2381 Secs (2381 Secs) *[==>]*	*[1]*
4	(COS.sp.719213)	(7) SDSS-J145953.97+412851.1	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2921; FP-POS=2			3021 Secs (3021 Secs) *[==>]*	*[2]*
5	(COS.sp.719213)	(7) SDSS-J145953.97+412851.1	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2921; FP-POS=3			3021 Secs (3021 Secs) *[==>]*	*[3]*
6	(COS.sp.719213)	(7) SDSS-J145953.97+412851.1	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=2921; FP-POS=4			3021 Secs (3021 Secs) *[==>]*	*[4]*

Orbit Structure








Orbit 4
Server Version: 20150609
Unused Orbital Visibility = 0
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sec