14231 - The First Detections of Phosphorus, Sulphur, and Zinc in a Bona-Fide Second-Generation Star

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) BD+44-493	COS/NUV	3	10-Oct-2015 21:41:00.0	yes
02	(1) BD+44-493	COS/NUV	3	10-Oct-2015 21:41:02.0	yes
03	(1) BD+44-493	COS/NUV	3	10-Oct-2015 21:41:04.0	yes
04	(1) BD+44-493	COS/NUV	3	10-Oct-2015 21:41:06.0	yes
05	(1) BD+44-493	COS/NUV	3	10-Oct-2015 21:41:08.0	yes
06	(1) BD+44-493	COS/NUV	3	10-Oct-2015 21:41:10.0	yes

18 Total Orbits Used

ABSTRACT

We propose to obtain new NUV COS spectra of the bright carbon-enhanced metal-poor star BD+44 493. This extremely low-metallicity ([Fe/H] = -3.8) star exhibits the chemical signature expected for a second-generation star that formed from the metals produced by a single zero-metallicity Population III star. Our group has previously studied the detailed abundance pattern of this star from NUV and optical spectra (2300-9350 Angstroms). Now we propose to obtain new high-resolution spectra of this star extending to 1800 Angstroms. These observations would allow us to detect three elements that have not been studied previously in BD+44 493, or any other CEMP star with [Fe/H] < -4: phosphorus, sulphur, and zinc. Our proposed observations will constrain the abundances of these elements, and test the predictions of models for at least one of the likely zero-metallicity supernova progenitors that may have existed in the early Universe.

OBSERVING DESCRIPTION

The goal of this program is to obtain high-resolution COS spectra of the late-G-type star BD+44 493. Three grating positions will be used:

G185M, center=1913A: target S/N ~ 20/1 at 1821 Angstroms after all co-adds (12 orbits)
G185M, center=1971A: target S/N ~ 40/1 at 2065 Angstroms after all co-adds (3 orbits)
G225M, center=2233A: target S/N ~ 40/1 at 2130 Angstroms after all co-adds (3 orbits).

I have verified the target confirmation chart for this star.

-- IUR, 06 July 2015

Visit

Proposal 14231, Visit 1: PI (G225M, 2233A) (01), implementation Sun Oct 11 01:41:11 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/NUV

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	BD+44-493	RA: 02 26 49.7394 (36.7072475d)	Proper Motion RA: 118.5 mas/yr	V=9.11+/-0.02	Reference Frame: ICRS
		Dec: +44 57 46.52 (44.96292d)	Proper Motion Dec: -32.8 mas/yr	E(B-V) = 0.042 (low!)	
		Equinox: J2000	Parallax: 0.00488"		
			Epoch of Position: 2000.0		

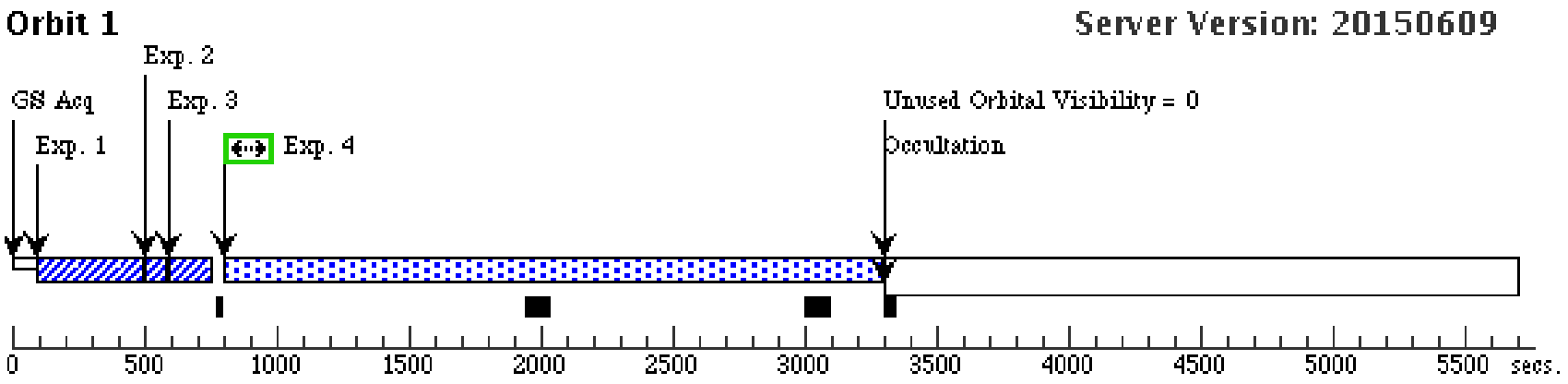
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

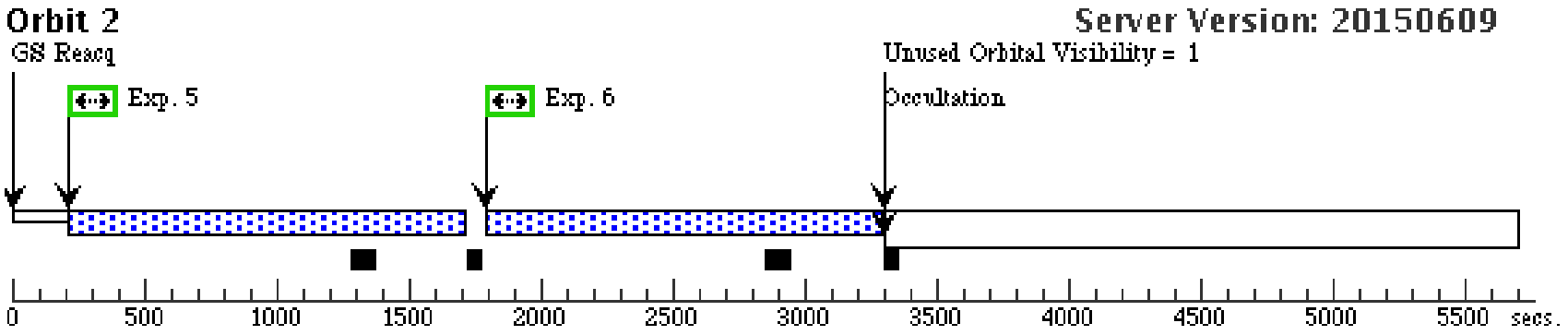
Coords from UCAC4 (via Vizier). PM from UCAC4 (via Vizier). Parallax from Hipparcos re-reduction (via Vizier). Extended=NO

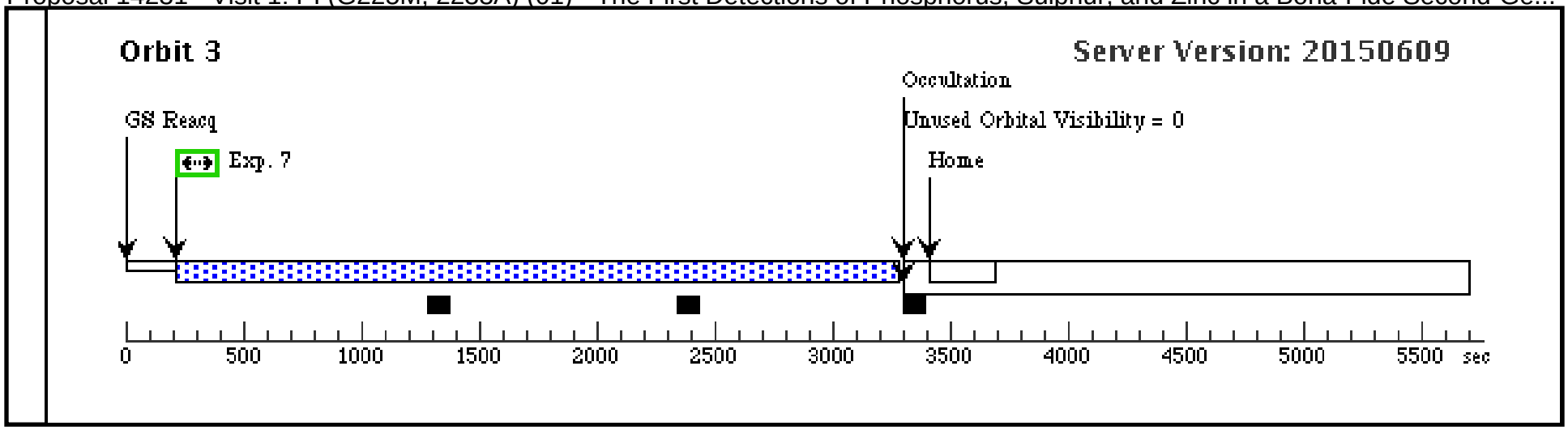
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/SEARCH (COS.sa.746429)	(1) BD+44-493	COS/NUV, ACQ/SEARCH, PSA	G225M 2357 A	SCAN-SIZE=2			3 Secs (3 Secs) *[==>]*	*[1]*
	Comments: Using the acquisition sequence #3 given in Table 8.1. (BD+44 493 is too bright for either Mirror.) *Exposure time is ETC value (COS.sa.746429), rounded up.* *Using Scan-size=2 since coordinates are good.* *Revised 2015oct09 by IUR according to recommendations given by P. Sonnentrucker.*								
2	ACQ/PEAKXD (COS.sa.746431)	(1) BD+44-493	COS/NUV, ACQ/PEAKXD, PSA	G225M 2357 A				6 Secs (6 Secs) *[==>]*	*[1]*
	Comments: Exposure time is ETC value for stripe B, rounded up. *Revised 2015oct09 by IUR using recommendations provided by P. Sonnentrucker.*								
3	ACQ/PEAKD (COS.sa.746429)	(1) BD+44-493	COS/NUV, ACQ/PEAKD, PSA	G225M 2357 A	STEP-SIZE=0.9; NUM-POS=5; CENTER=FLUX-WT-FLR			3 Secs (3 Secs) *[==>]*	*[1]*
	Comments: Exposure time is ETC, rounded up. *Optional parameters set by recommended defaults in Section 8.6.* *Updated grating wavelength on 2015oct09 by IUR using recommendations provided by P. Sonnentrucker.*								
4	SCIENCE 1 (COS.sp.685186)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G225M 2233 A	BUFFER-TIME=1060; FP-POS=1			2400 Secs (2398 Secs) *[==>2398.0 Secs]*	*[1]*
	Comments: Buffer time is 2/3 of ETC value (which is computed based on the full time required to reach S/N goal). *FP-POS is 1 on first orbit of visit, 2 and 3 on second orbit of visit, and 4 on third orbit of visit. (There are a total of three orbits given to this particular grating/wavelength setup of this star.) See Section 5.8.2.*								
5	SCIENCE 2 (COS.sp.685186)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G225M 2233 A	BUFFER-TIME=1060; FP-POS=2			1500 Secs (1480 Secs) *[==>1480.0 Secs]*	*[2]*
6	SCIENCE 3 (COS.sp.685186)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G225M 2233 A	BUFFER-TIME=1060; FP-POS=3			1500 Secs (1480 Secs) *[==>1480.0 Secs]*	*[2]*
7	SCIENCE 4 (COS.sp.685186)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G225M 2233 A	BUFFER-TIME=1060; FP-POS=4			3100 Secs (3058 Secs) *[==>3058.0 Secs]*	*[3]*

Orbit Structure



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Visit

Proposal 14231, Visit 2: ZnII (G185M, 1971A) (02), implementation Sun Oct 11 01:41:11 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/NUV

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	BD+44-493	RA: 02 26 49.7394 (36.7072475d) Dec: +44 57 46.52 (44.96292d) Equinox: J2000	Proper Motion RA: 118.5 mas/yr Proper Motion Dec: -32.8 mas/yr Parallax: 0.00488" Epoch of Position: 2000.0	V=9.11+/-0.02 E(B-V) = 0.042 (low!)	Reference Frame: ICRS

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

Coords from UCAC4 (via Vizier). PM from UCAC4 (via Vizier). Parallax from Hipparcos re-reduction (via Vizier).
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/SEARCH (COS.sa.746428)	(1) BD+44-493	COS/NUV, ACQ/SEARCH, PSA	G225M 2306 A	SCAN-SIZE=2			3 Secs (3 Secs) *[==>]*	*[1]*

Comments: Exposure time is ETC, rounded up.

Grating, central wavelength, and exposure time (COS.sa.746428) updated 2015oct09 by IUR using recommendations from P. Sonnentrucken.

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
2	ACQ/PEAKXD (COS.sa.746432)	(1) BD+44-493	COS/NUV, ACQ/PEAKXD, PSA	G225M 2306 A				8 Secs (8 Secs) *[==>]*	*[1]*

Comments: Exposure time is ETC value, rounded up.

Updated grating, central wavelength, and exposure time (COS.sa.746432) on 2015oct09 by IUR using recommendations from P. Sonnentrucken.

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
3	ACQ/PEAKD (COS.sa.746428)	(1) BD+44-493	COS/NUV, ACQ/PEAKD, PSA	G225M 2306 A	STEP-SIZE=0.9; NUM-POS=5; CENTER=FLUX-WT-FLR			3 Secs (3 Secs) *[==>]*	*[1]*

Comments: Exposure time is ETC value, rounded up.

Optional parameters set by recommended defaults in Section 8.6.

Updated grating, central wavelength, and exposure time (COS.sa.746428) on 2015oct09 by IUR using recommendations from P. Sonnentrucken.

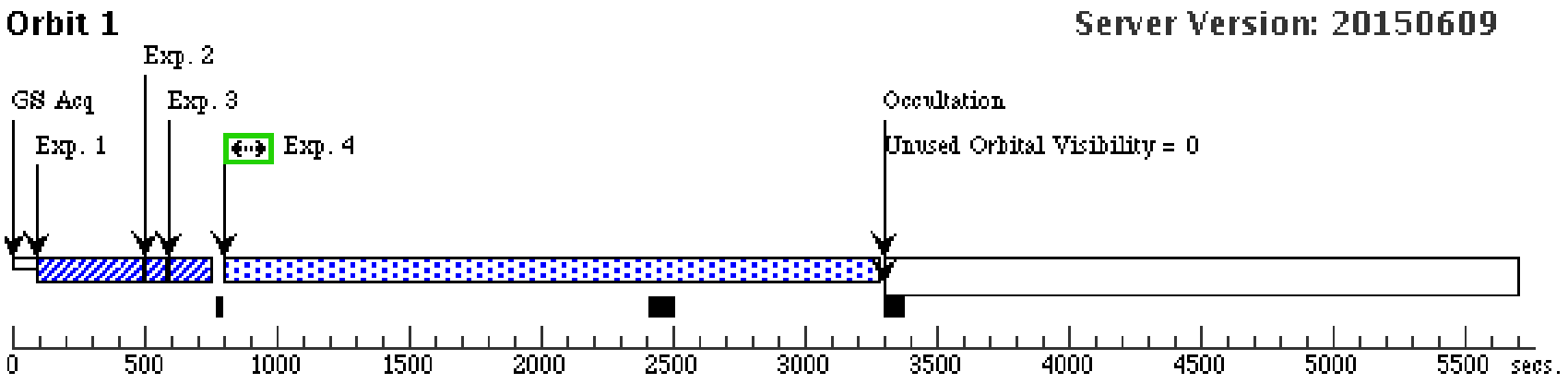
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
4	SCIENCE 1 (COS.sp.685175)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1971 A	BUFFER-TIME=1465; FP-POS=1			2200 Secs (2328 Secs) *[==>2328.0 Secs]*	*[1]*

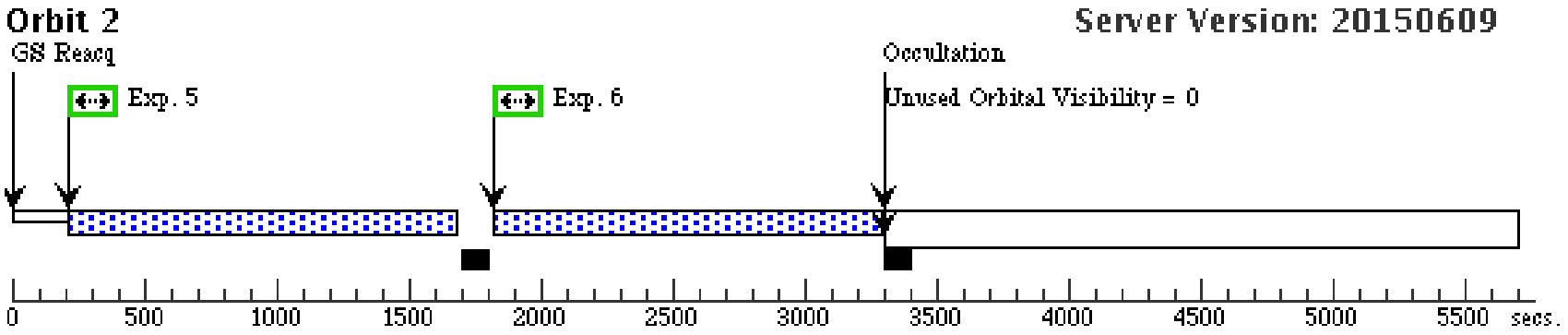
Comments: Buffer time is 2/3 of ETC value (which is computed based on the full time required to reach S/N goal).

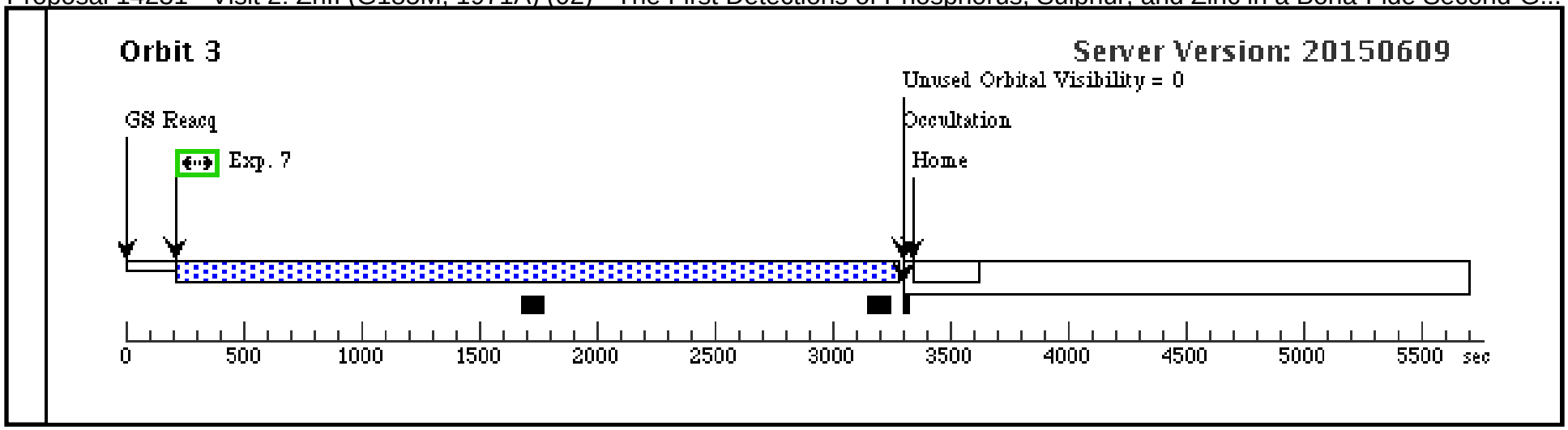
FP-POS is 1 on first orbit of visit, 2 and 3 on second orbit of visit, and 4 on third orbit of visit. (There are a total of three orbits given to this particular grating/wavelength setup of this star.) See Section 5.8.2.

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
5	SCIENCE 2 (COS.sp.685175)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1971 A	BUFFER-TIME=1465; FP-POS=2			1460 Secs (1457 Secs) *[==>1457.0 Secs]*	*[2]*
6	SCIENCE 3 (COS.sp.685175)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1971 A	BUFFER-TIME=1465; FP-POS=3			1460 Secs (1457 Secs) *[==>1457.0 Secs]*	*[2]*
7	SCIENCE 4 (COS.sp.685175)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1971 A	BUFFER-TIME=1465; FP-POS=4			3100 Secs (3058 Secs) *[==>3058.0 Secs]*	*[3]*

Orbit Structure



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Visit

Proposal 14231, Visit 3: SI (G185M, 1913A) (03), implementation Sun Oct 11 01:41:12 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/NUV

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	BD+44-493	RA: 02 26 49.7394 (36.7072475d) Dec: +44 57 46.52 (44.96292d) Equinox: J2000	Proper Motion RA: 118.5 mas/yr Proper Motion Dec: -32.8 mas/yr Parallax: 0.00488" Epoch of Position: 2000.0	V=9.11+/-0.02 E(B-V) = 0.042 (low!)	Reference Frame: ICRS

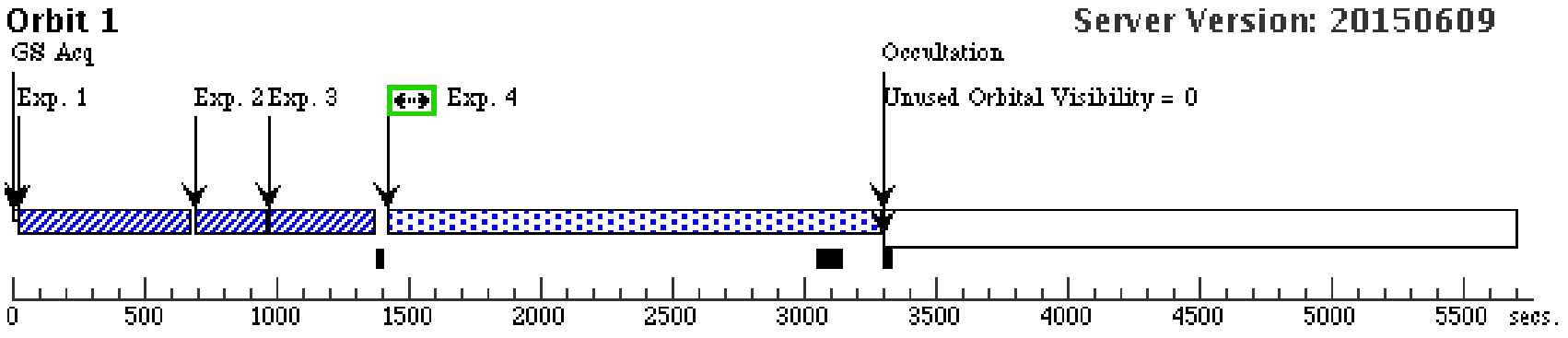
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

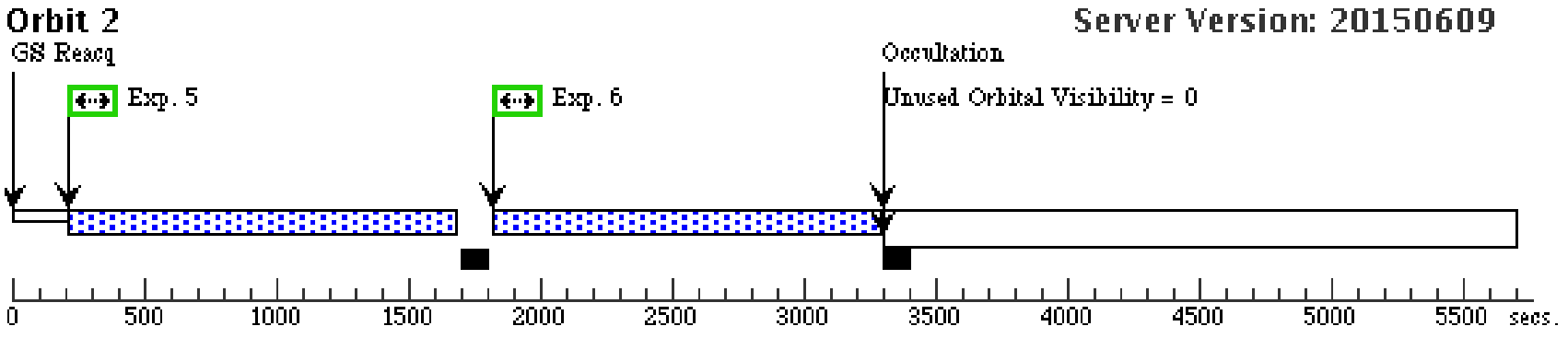
Coords from UCAC4 (via Vizier). PM from UCAC4 (via Vizier). Parallax from Hipparcos re-reduction (via Vizier).
Extended=NO

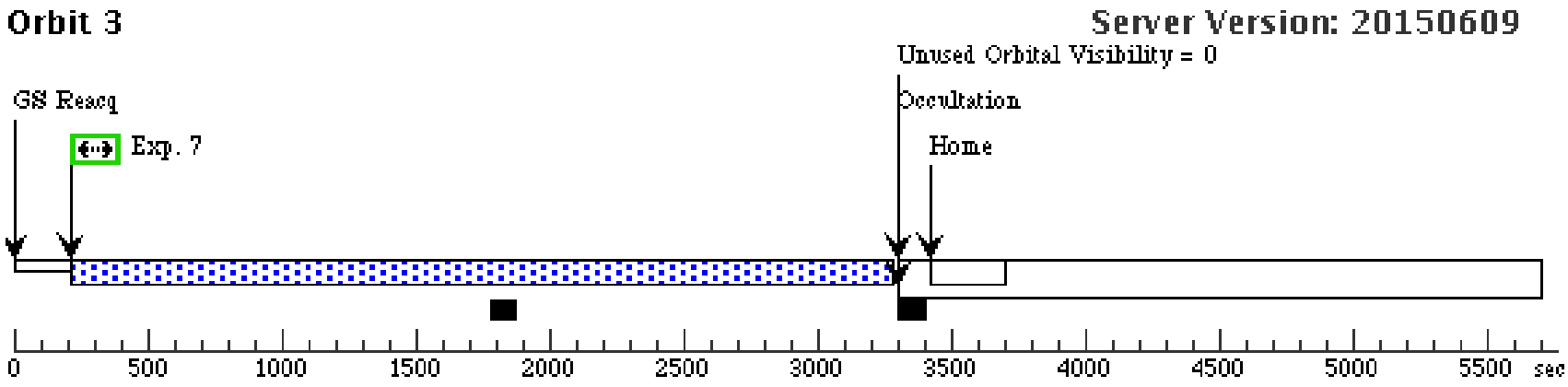
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/SEARCH (COS.sa.715056)	(1) BD+44-493	COS/NUV, ACQ/SEARCH, PSA	G185M 1913 A	SCAN-SIZE=2			50 Secs (50 Secs) *[==>]*	*[1]*
Comments: Exposure time is ETC value, rounded up.									
2	ACQ/PEAKXD (COS.sa.715059)	(1) BD+44-493	COS/NUV, ACQ/PEAKXD, PSA	G185M 1913 A				200 Secs (200 Secs) *[==>]*	*[1]*
Comments: Exposure time is ETC value, rounded up.									
3	ACQ/PEAKD (COS.sa.715056)	(1) BD+44-493	COS/NUV, ACQ/PEAKD, PSA	G185M 1913 A	STEP-SIZE=0.9; NUM-POS=5; CENTER=FLUX-WT-FLR			50 Secs (50 Secs) *[==>]*	*[1]*
Comments: Exposure time is ETC value, rounded up. *Optional parameters set by recommended defaults in Section 8.6.*									
4	SCIENCE 1 (COS.sp.685167)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=1560; FP-POS=1			1800 Secs (1786 Secs) *[==>1786.0 Secs]*	*[1]*
Comments: Buffer time is 2/3 of ETC value (which is computed based on the full time required to reach S/N goal). *FP-POS is 1 on first orbit of visit, 2 and 3 on second orbit of visit, and 4 on third orbit of visit. See Section 5.8.2.*									
5	SCIENCE 2 (COS.sp.685167)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=1560; FP-POS=2			1460 Secs (1457 Secs) *[==>1457.0 Secs]*	*[2]*
6	SCIENCE 3 (COS.sp.685167)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=1560; FP-POS=3			1460 Secs (1457 Secs) *[==>1457.0 Secs]*	*[2]*
7	SCIENCE 4 (COS.sp.685167)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=1560; FP-POS=4			3100 Secs (3058 Secs) *[==>3058.0 Secs]*	*[3]*

Orbit Structure







Visit

Proposal 14231, Visit 4: SI (G185M, 1913A) (04), implementation Sun Oct 11 01:41:12 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/NUV

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	BD+44-493	RA: 02 26 49.7394 (36.7072475d) Dec: +44 57 46.52 (44.96292d) Equinox: J2000	Proper Motion RA: 118.5 mas/yr Proper Motion Dec: -32.8 mas/yr Parallax: 0.00488" Epoch of Position: 2000.0	V=9.11+/-0.02 E(B-V) = 0.042 (low!)	Reference Frame: ICRS

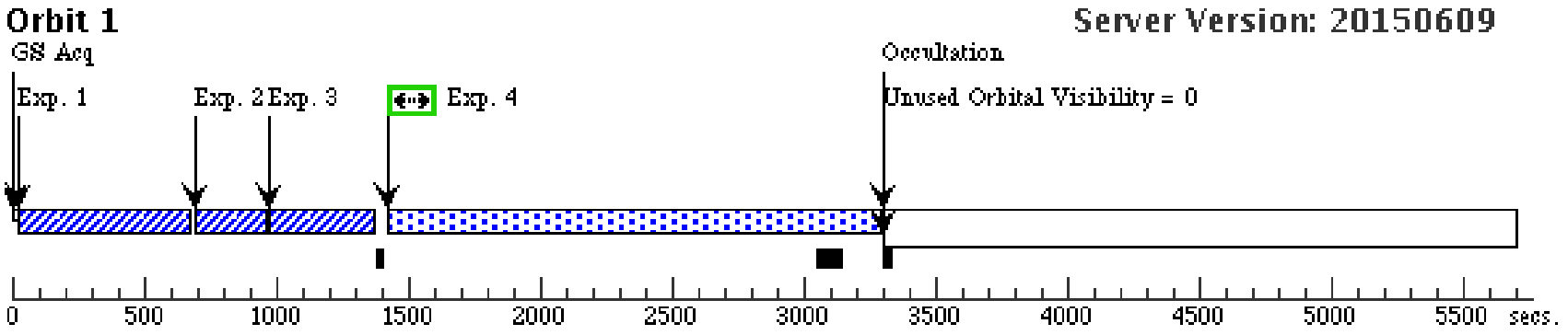
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

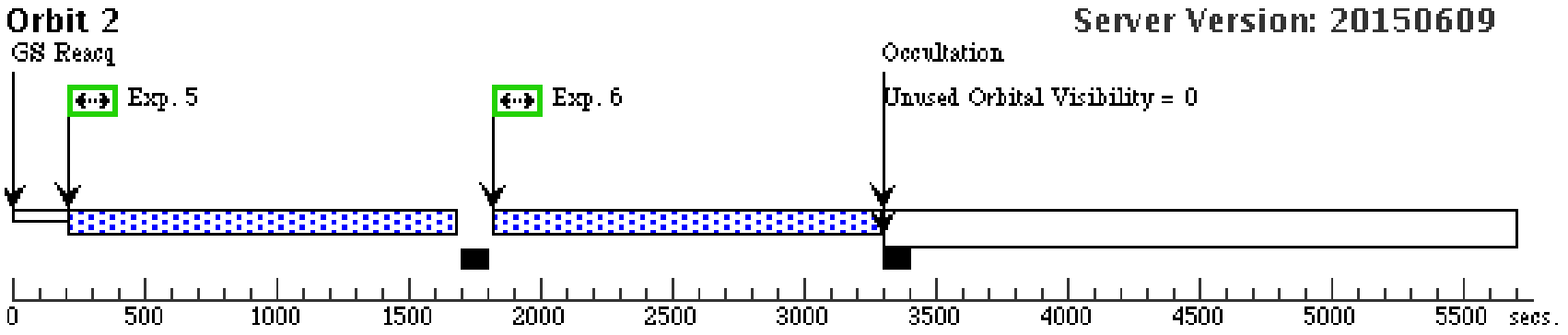
Coords from UCAC4 (via Vizier). PM from UCAC4 (via Vizier). Parallax from Hipparcos re-reduction (via Vizier). Extended=NO

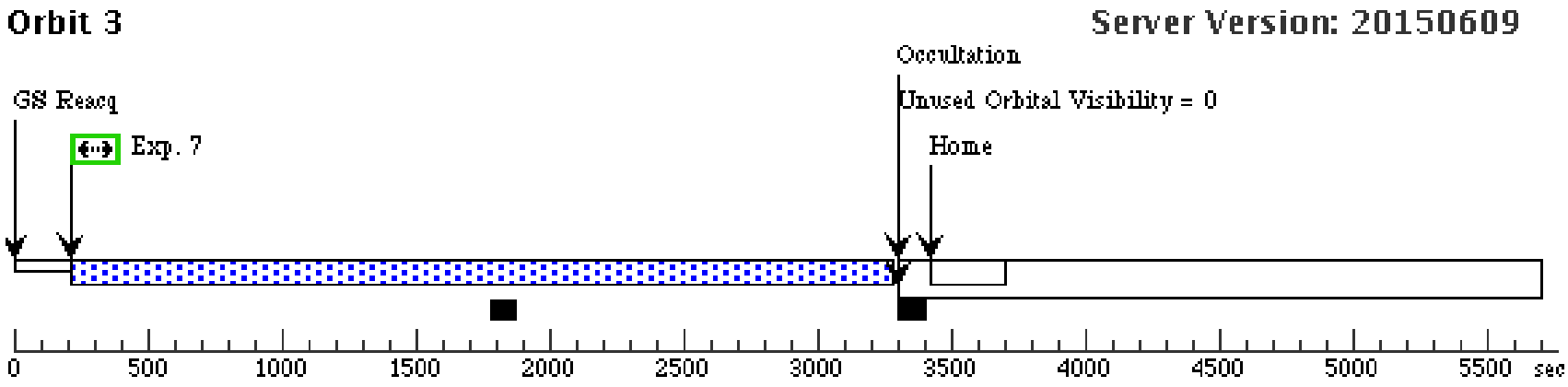
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/SEARCH (COS.sa.715056)	(1) BD+44-493	COS/NUV, ACQ/SEARCH, PSA	G185M 1913 A	SCAN-SIZE=2			50 Secs (50 Secs) *[==>]*	*[1]*
Comments: Exposure time is ETC value, rounded up.									
2	ACQ/PEAKXD (COS.sa.715059)	(1) BD+44-493	COS/NUV, ACQ/PEAKXD, PSA	G185M 1913 A				200 Secs (200 Secs) *[==>]*	*[1]*
Comments: Exposure time is ETC value, rounded up.									
3	ACQ/PEAKD (COS.sa.715056)	(1) BD+44-493	COS/NUV, ACQ/PEAKD, PSA	G185M 1913 A	STEP-SIZE=0.9; NUM-POS=5; CENTER=FLUX-WT-FLR			50 Secs (50 Secs) *[==>]*	*[1]*
Comments: Exposure time is ETC value, rounded up. *Optional parameters set by recommended defaults in Section 8.6.*									
4	SCIENCE 1 (COS.sp.685167)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=1560; FP-POS=1			1800 Secs (1786 Secs) *[==>1786.0 Secs]*	*[1]*
Comments: Buffer time is 2/3 of ETC value (which is computed based on the full time required to reach S/N goal). *FP-POS is 1 on first orbit of visit, 2 and 3 on second orbit of visit, and 4 on third orbit of visit. See Section 5.8.2.*									
5	SCIENCE 2 (COS.sp.685167)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=1560; FP-POS=2			1460 Secs (1457 Secs) *[==>1457.0 Secs]*	*[2]*
6	SCIENCE 3 (COS.sp.685167)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=1560; FP-POS=3			1460 Secs (1457 Secs) *[==>1457.0 Secs]*	*[2]*
7	SCIENCE 4 (COS.sp.685167)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=1560; FP-POS=4			3100 Secs (3058 Secs) *[==>3058.0 Secs]*	*[3]*

Orbit Structure







Visit

Proposal 14231, Visit 5: SI (G185M, 1913A) (05), implementation Sun Oct 11 01:41:12 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/NUV

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	BD+44-493	RA: 02 26 49.7394 (36.7072475d) Dec: +44 57 46.52 (44.96292d) Equinox: J2000	Proper Motion RA: 118.5 mas/yr Proper Motion Dec: -32.8 mas/yr Parallax: 0.00488" Epoch of Position: 2000.0	V=9.11+/-0.02 E(B-V) = 0.042 (low!)	Reference Frame: ICRS

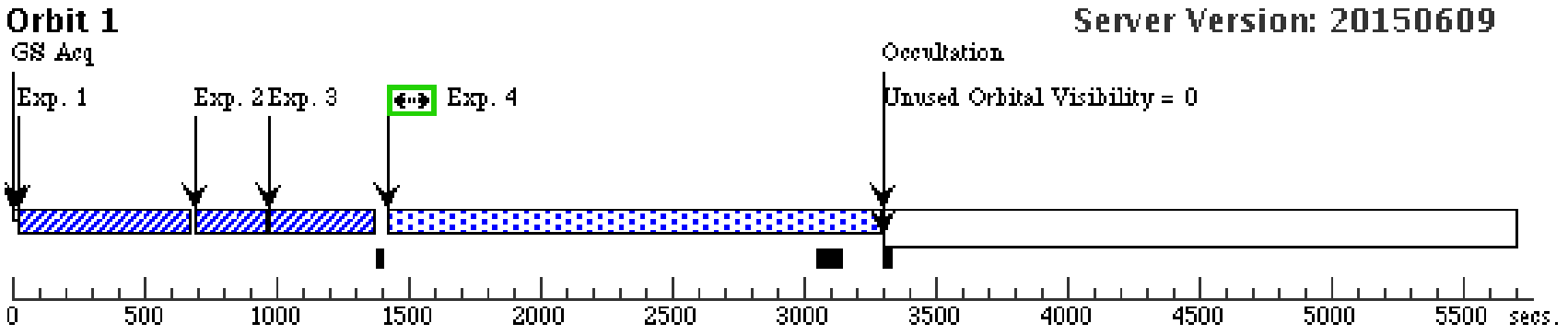
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

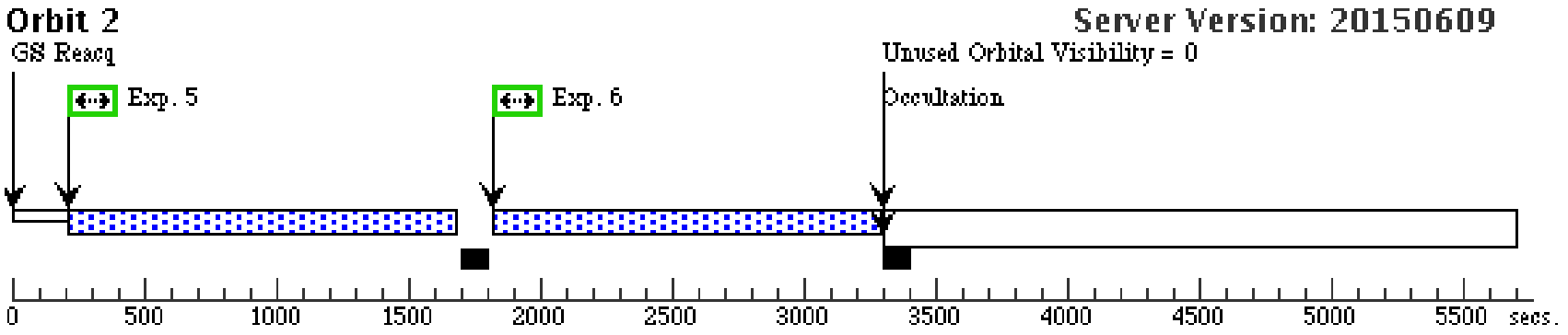
Coords from UCAC4 (via Vizier). PM from UCAC4 (via Vizier). Parallax from Hipparcos re-reduction (via Vizier).
Extended=NO

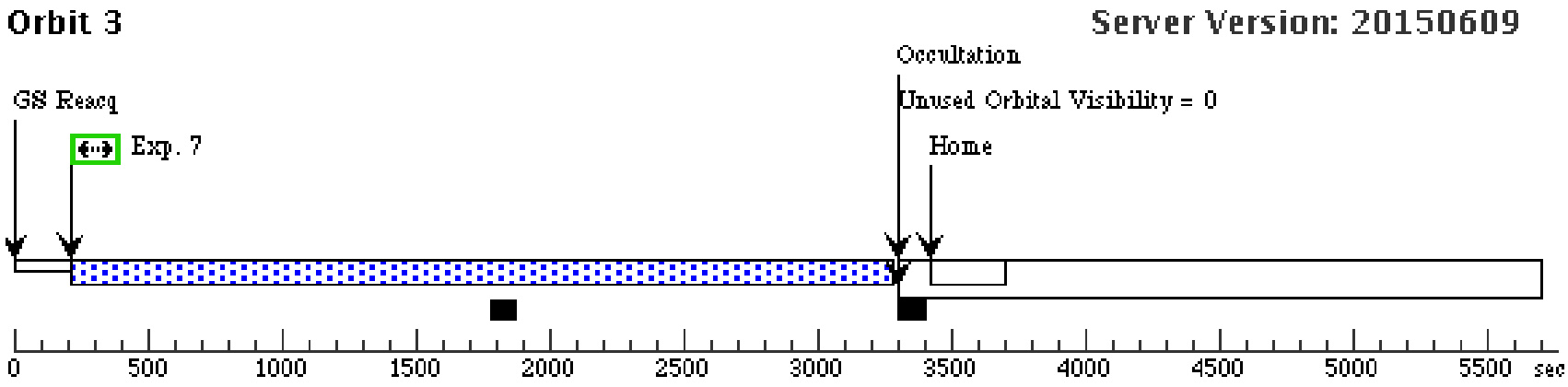
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/SEARCH (COS.sa.715056)	(1) BD+44-493	COS/NUV, ACQ/SEARCH, PSA	G185M 1913 A	SCAN-SIZE=2			50 Secs (50 Secs) *[==>]*	*[1]*
Comments: Exposure time is ETC value, rounded up.									
2	ACQ/PEAKXD (COS.sa.715059)	(1) BD+44-493	COS/NUV, ACQ/PEAKXD, PSA	G185M 1913 A				200 Secs (200 Secs) *[==>]*	*[1]*
Comments: Exposure time is ETC value, rounded up.									
3	ACQ/PEAKD (COS.sa.715056)	(1) BD+44-493	COS/NUV, ACQ/PEAKD, PSA	G185M 1913 A	STEP-SIZE=0.9; NUM-POS=5; CENTER=FLUX-WT-FLR			50 Secs (50 Secs) *[==>]*	*[1]*
Comments: Exposure time is ETC value, rounded up. *Optional parameters set by recommended defaults in Section 8.6.*									
4	SCIENCE 1 (COS.sp.685167)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=1560; FP-POS=1			1800 Secs (1786 Secs) *[==>1786.0 Secs]*	*[1]*
Comments: Buffer time is 2/3 of ETC value (which is computed based on the full time required to reach S/N goal). *FP-POS is 1 on first orbit of visit, 2 and 3 on second orbit of visit, and 4 on third orbit of visit. See Section 5.8.2.*									
5	SCIENCE 2 (COS.sp.685167)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=1560; FP-POS=2			1460 Secs (1457 Secs) *[==>1457.0 Secs]*	*[2]*
6	SCIENCE 3 (COS.sp.685167)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=1560; FP-POS=3			1460 Secs (1457 Secs) *[==>1457.0 Secs]*	*[2]*
7	SCIENCE 4 (COS.sp.685167)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=1560; FP-POS=4			3100 Secs (3058 Secs) *[==>3058.0 Secs]*	*[3]*

Orbit Structure







Visit

Proposal 14231, Visit 6: SI (G185M, 1913A) (06), implementation Sun Oct 11 01:41:12 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/NUV

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	BD+44-493	RA: 02 26 49.7394 (36.7072475d) Dec: +44 57 46.52 (44.96292d) Equinox: J2000	Proper Motion RA: 118.5 mas/yr Proper Motion Dec: -32.8 mas/yr Parallax: 0.00488" Epoch of Position: 2000.0	V=9.11+/-0.02 E(B-V) = 0.042 (low!)	Reference Frame: ICRS

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

Coords from UCAC4 (via Vizier). PM from UCAC4 (via Vizier). Parallax from Hipparcos re-reduction (via Vizier).
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/SEARCH (COS.sa.715056)	(1) BD+44-493	COS/NUV, ACQ/SEARCH, PSA	G185M 1913 A	SCAN-SIZE=2			50 Secs (50 Secs) *[==>]*	*[1]*
Comments: Exposure time is ETC value, rounded up.									
2	ACQ/PEAKXD (COS.sa.715059)	(1) BD+44-493	COS/NUV, ACQ/PEAKXD, PSA	G185M 1913 A				200 Secs (200 Secs) *[==>]*	*[1]*
Comments: Exposure time is ETC value, rounded up.									
3	ACQ/PEAKD (COS.sa.715056)	(1) BD+44-493	COS/NUV, ACQ/PEAKD, PSA	G185M 1913 A	STEP-SIZE=0.9; NUM-POS=5; CENTER=FLUX-WT-FLR			50 Secs (50 Secs) *[==>]*	*[1]*
Comments: Exposure time is ETC value, rounded up. *Optional parameters set by recommended defaults in Section 8.6.*									
4	SCIENCE 1 (COS.sp.685167)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=1560; FP-POS=1			1800 Secs (1786 Secs) *[==>1786.0 Secs]*	*[1]*
Comments: Buffer time is 2/3 of ETC value (which is computed based on the full time required to reach S/N goal). *FP-POS is 1 on first orbit of visit, 2 and 3 on second orbit of visit, and 4 on third orbit of visit. See Section 5.8.2.*									
5	SCIENCE 2 (COS.sp.685167)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=1560; FP-POS=2			1460 Secs (1457 Secs) *[==>1457.0 Secs]*	*[2]*
6	SCIENCE 3 (COS.sp.685167)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=1560; FP-POS=3			1460 Secs (1457 Secs) *[==>1457.0 Secs]*	*[2]*
7	SCIENCE 4 (COS.sp.685167)	(1) BD+44-493	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=1560; FP-POS=4			3100 Secs (3058 Secs) *[==>3058.0 Secs]*	*[3]*

Orbit Structure