14646 - A White Dwarf with an Actively Disintegrating Asteroid

Cycle: 24, 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) WD-1145+017	COS/FUV COS/NUV	3	19-Jan-2017 21:01:10.0	yes
02	(1) WD-1145+017	COS/FUV COS/NUV	3	19-Jan-2017 21:01:11.0	yes
03	(1) WD-1145+017	COS/FUV COS/NUV	3	19-Jan-2017 21:01:13.0	yes
04	(1) WD-1145+017	COS/FUV COS/NUV	3	19-Jan-2017 21:01:14.0	yes

12 Total Orbits Used

ABSTRACT

We have recently discovered a white dwarf with an actively disintegrating asteroid. Using data from the Kepler extended mission, transits with periods less than 5 hours have been detected from at least 6 objects. Evidence for circumstellar dust was found by comparing UKIDSS and WISE data. High-resolution optical spectroscopic data from Keck show that the host star is heavily polluted with 11 heavy elements and also displays numerous absorption lines from circumstellar gas. This system has become much more active since its original discovery. We were granted mid-cycle observing time with Hubble and a few other telescopes to perform simultaneous observations. Our preliminary analysis already shows new emerging features. We propose to monitor this system two more times for the next year and study the real time disintegration of an asteroid around a white dwarf.

OBSERVING DESCRIPTION

Our goal is threefold: (i) use TIME-TAG data to monitor the potential changes of circumstellar lines; (ii) measure a transit light curve in the ultraviolet; (iii) to detect additional trace elements. To cover all the lines of interest, we will employ the G130M grating with a central wavelength of 1291 Angstrom and a wavelength coverage of 1137-1274 Angstrom and 1292-1432 Angstrom.

We used the COS spectra as an input template and with ETC v24.1, we find that an average S/N of 20 can be reached in most regions for a total exposure time of 17000 sec (6 orbits). For target acquisition, we will only employ ACQ/IMG because the position of our target is well known. Including overheads, a total of 6 orbits is required for each set of observation. In order to cover the full 4.5 period, we separate the 6 orbits into two set of observations, 3 orbits each and separtaed by 10 orbits in between.

We will repeat this set of observations and a total of 12 orbits are required. We prefer the two set of observations to be scheduled at least 30 days apart to understand the long term evolution of the system. We will also combine all the data together to produce a high quality ultraviolet spectrum of the target. The total S/N (including our mid-cycle data) would be over 30 and we will be able to detect or put good upper limit on a set of trace elements.

We prefer the observation to be scheduled during the time that simultaneous ground-based observation is possible.

Visit

Proposal 14646, WD1145_obs1 (01), implementation Fri Jan 20 02:01:15 GMT 2017

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: SCHED 40%

Fixed Targets

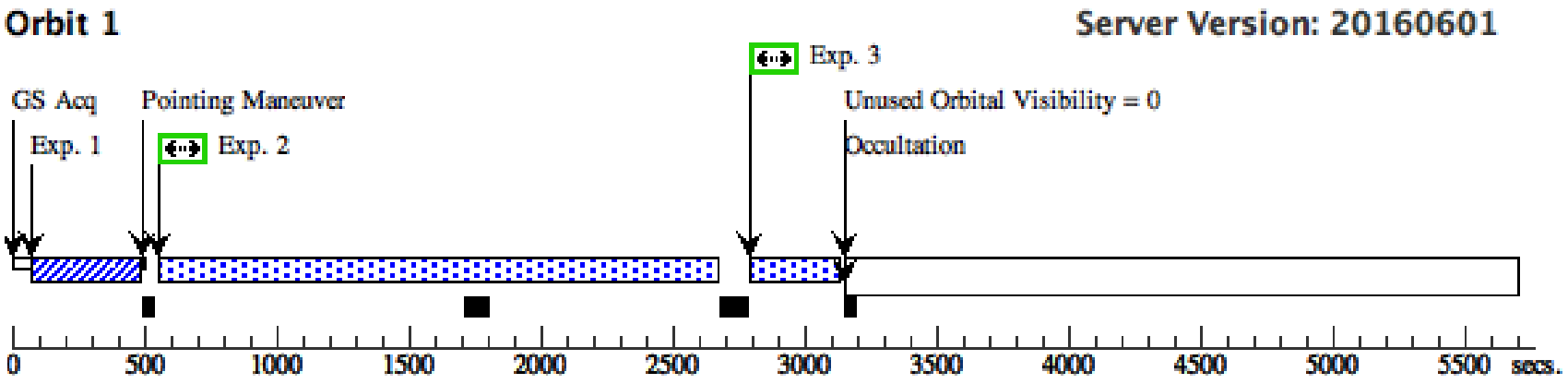
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WD-1145+017	RA: 11 48 33.6270 (177.1401125d) Dec: +01 28 59.45 (1.48318d) Equinox: J2000	Proper Motion RA: -43.3 mas/yr Proper Motion Dec: -7 mas/yr Epoch of Position: 2000	V=17.3	Reference Frame: ICRS

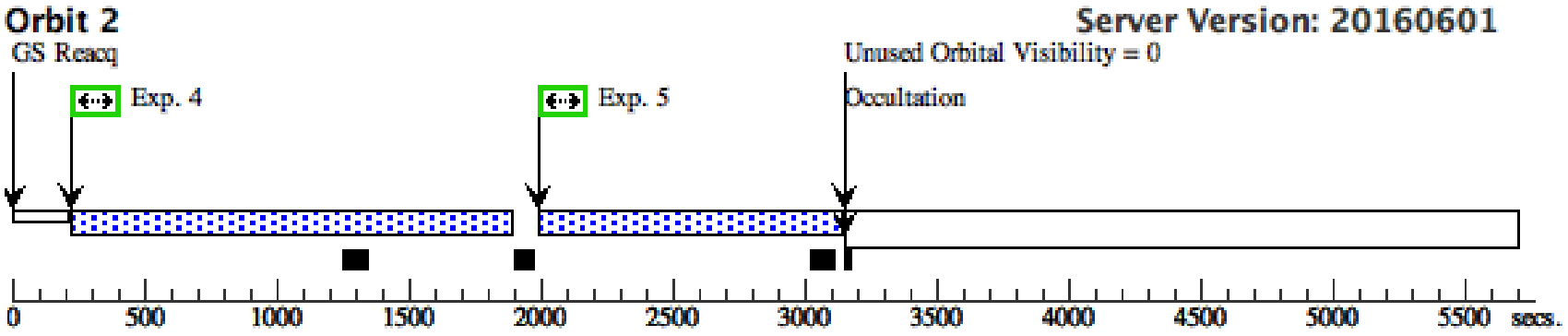
Comments: Extended=NO

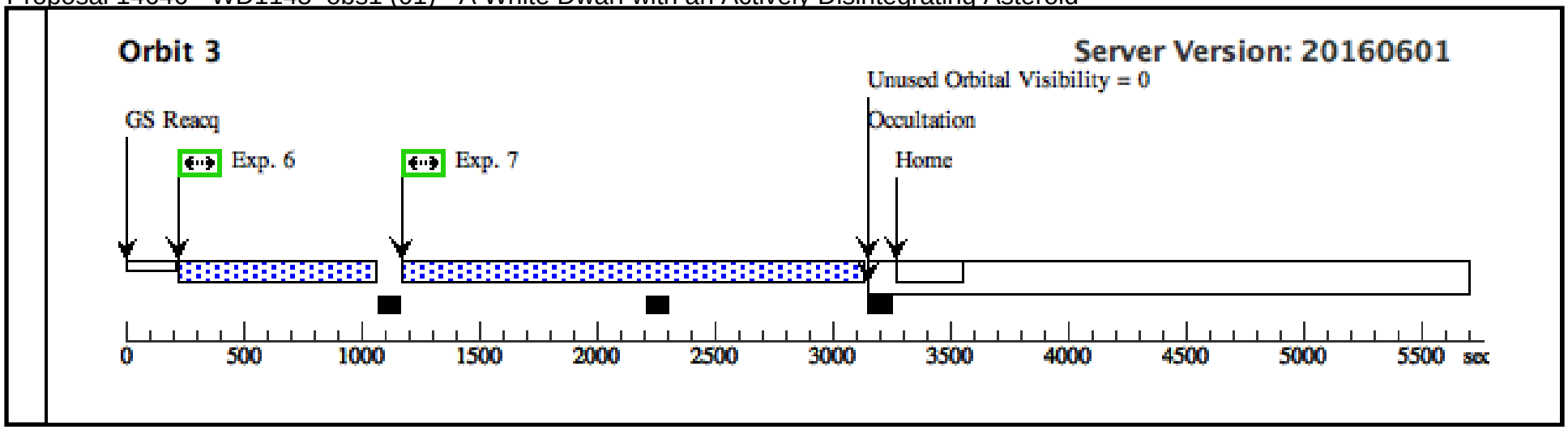
Exposures

#	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.825411)	(1) WD-1145+017	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				45 Secs (45 Secs) *[==>]*	*[1]*
2	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=1; SEGMENT=BOTH			1972 Secs (1938 Secs) *[==>1938.0 Secs]*	*[1]*
3	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=2; SEGMENT=BOTH			325 Secs (291 Secs) *[==>291.0 Secs]*	*[1]*
4	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=2; SEGMENT=BOTH			1647 Secs (1620 Secs) *[==>1620.0 Secs]*	*[2]*
5	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=3; SEGMENT=BOTH			1124 Secs (1097 Secs) *[==>1097.0 Secs]*	*[2]*
6	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=3; SEGMENT=BOTH			848 Secs (787 Secs) *[==>787.0 Secs]*	*[3]*
7	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=4; SEGMENT=BOTH			1972 Secs (1911 Secs) *[==>1911.0 Secs]*	*[3]*

Orbit Structure



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GS Reacq
Exp. 6
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Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
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5500
sec

Visit

Proposal 14646, WD1145_obs2 (02), implementation Fri Jan 20 02:01:15 GMT 2017

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: SCHED 40%; AFTER 01 BY 9.8 Orbits TO 10.2 Orbits

Fixed Targets

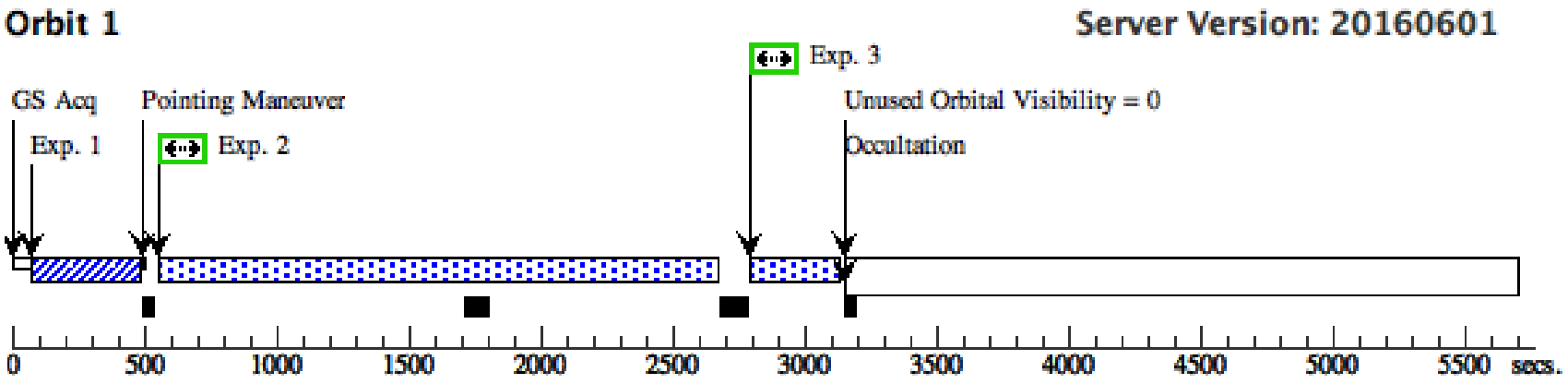
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WD-1145+017	RA: 11 48 33.6270 (177.1401125d) Dec: +01 28 59.45 (1.48318d) Equinox: J2000	Proper Motion RA: -43.3 mas/yr Proper Motion Dec: -7 mas/yr Epoch of Position: 2000	V=17.3	Reference Frame: ICRS

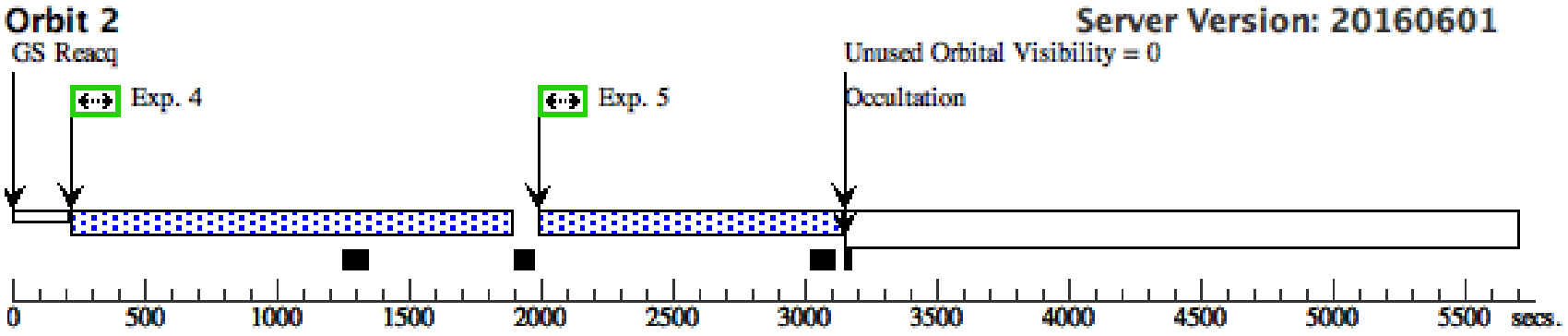
Comments: Extended=NO

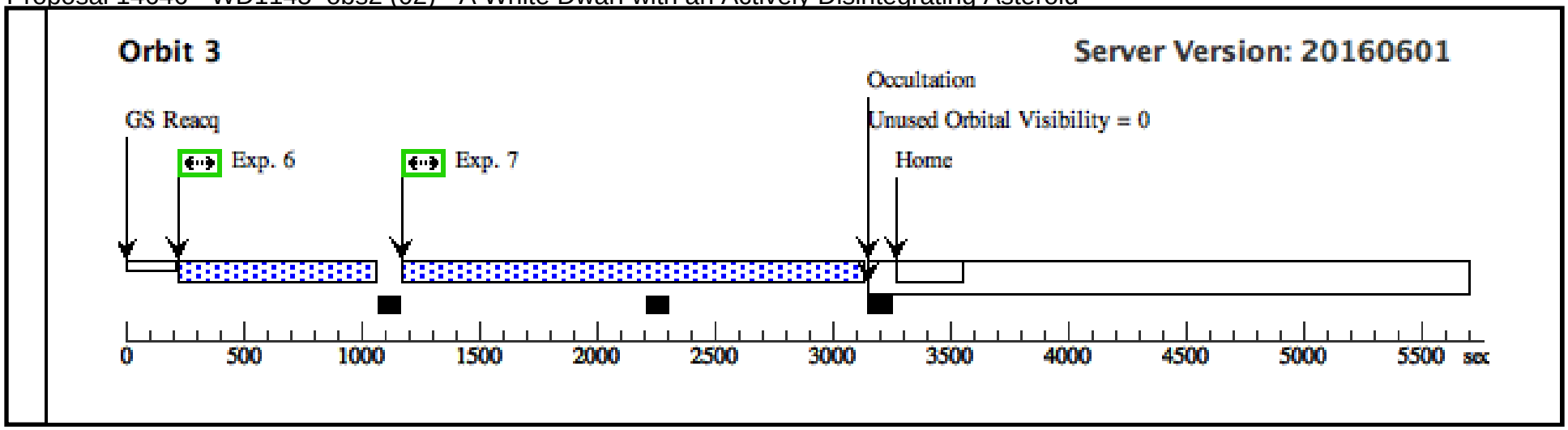
Exposures

#	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.825411)	(1) WD-1145+017	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				45 Secs (45 Secs) *[==>]*	***[1]***
2	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=1; SEGMENT=BOTH			1972 Secs (1938 Secs) *[==>1938.0 Secs]*	***[1]***
3	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=2; SEGMENT=BOTH			325 Secs (291 Secs) *[==>291.0 Secs]*	***[1]***
4	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=2; SEGMENT=BOTH			1647 Secs (1620 Secs) *[==>1620.0 Secs]*	***[2]***
5	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=3; SEGMENT=BOTH			1124 Secs (1097 Secs) *[==>1097.0 Secs]*	***[2]***
6	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=3; SEGMENT=BOTH			848 Secs (787 Secs) *[==>787.0 Secs]*	***[3]***
7	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=4; SEGMENT=BOTH			1972 Secs (1911 Secs) *[==>1911.0 Secs]*	***[3]***

Orbit Structure



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Server Version: 20160601
Occultation
GS Reacq
Unused Orbital Visibility = 0
Exp. 6
Exp. 7
Home
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2000
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3500
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4500
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sec

Visit

Proposal 14646, WD1145_obs3 (03), implementation Fri Jan 20 02:01:15 GMT 2017

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: AFTER_02 BY 30 D TO 180 D

Fixed Targets

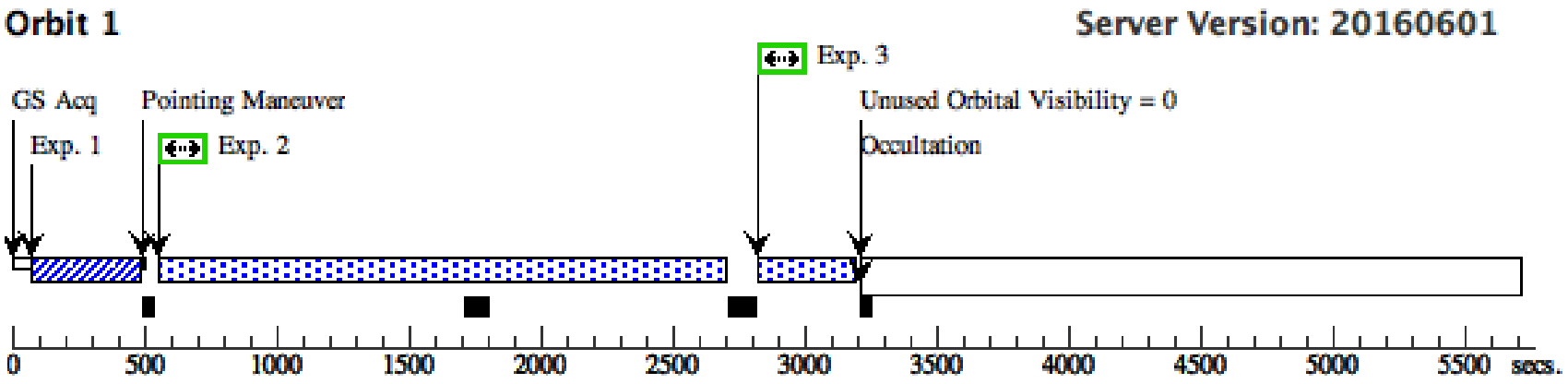
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WD-1145+017	RA: 11 48 33.6270 (177.1401125d) Dec: +01 28 59.45 (1.48318d) Equinox: J2000	Proper Motion RA: -43.3 mas/yr Proper Motion Dec: -7 mas/yr Epoch of Position: 2000	V=17.3	Reference Frame: ICRS

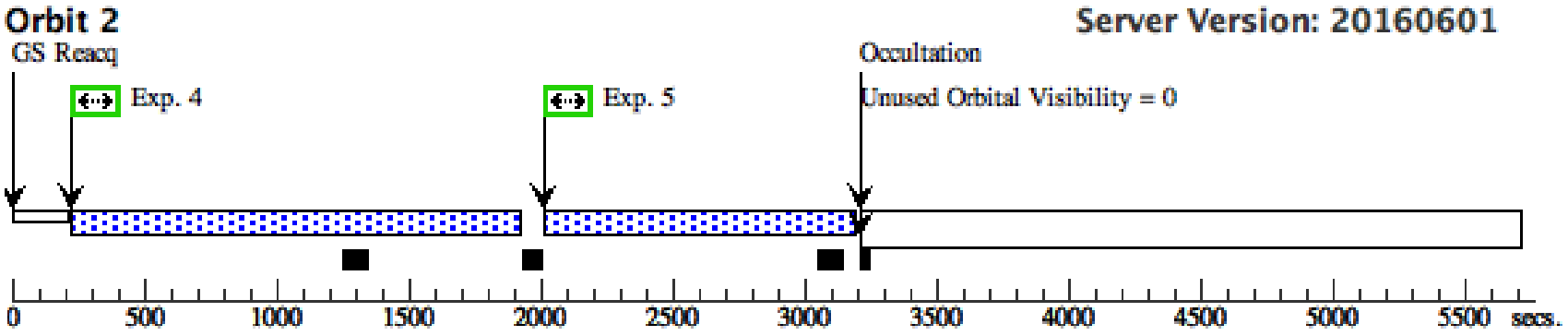
Comments: Extended=NO

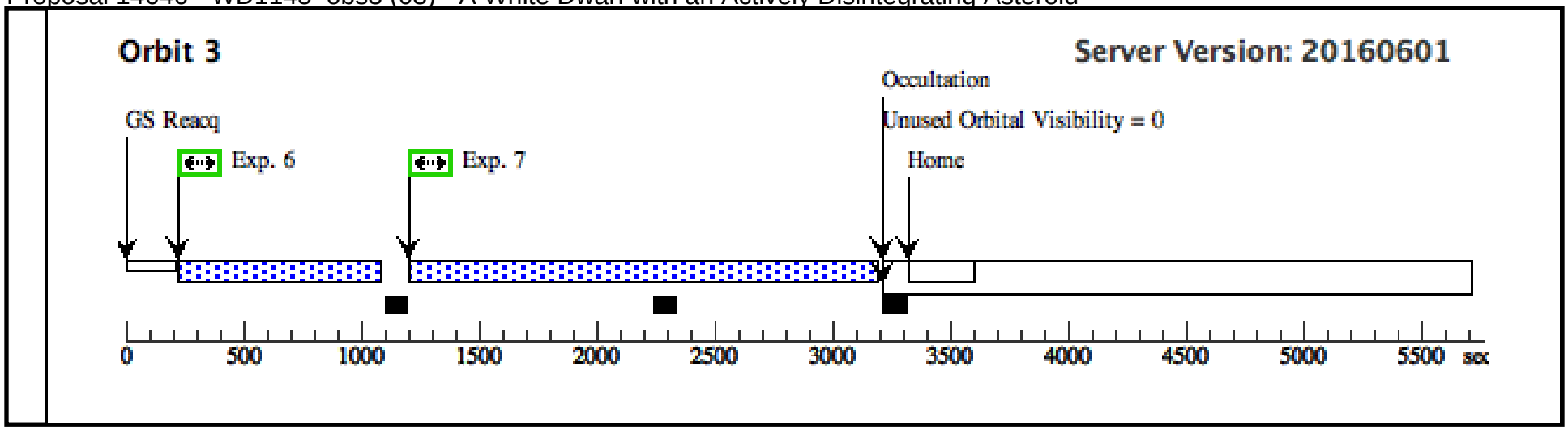
Exposures

#	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.825411)	(1) WD-1145+017	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				45 Secs (45 Secs) *[==>]*	***[1]***
2	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=1; SEGMENT=BOTH			1972 Secs (1965 Secs) *[==>1965.0 Secs]*	***[1]***
3	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=2; SEGMENT=BOTH			325 Secs (318 Secs) *[==>318.0 Secs]*	***[1]***
4	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=2; SEGMENT=BOTH			1647 Secs (1647 Secs) *[==>]*	***[2]***
5	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=3; SEGMENT=BOTH			1124 Secs (1124 Secs) *[==>]*	***[2]***
6	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=3; SEGMENT=BOTH			848 Secs (814 Secs) *[==>814.0 Secs]*	***[3]***
7	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=4; SEGMENT=BOTH			1972 Secs (1938 Secs) *[==>1938.0 Secs]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20160601
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GS Reacq
Unused Orbital Visibility = 0
Exp. 6
Exp. 7
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Visit

Proposal 14646, WD1145_obs4 (04), implementation Fri Jan 20 02:01:16 GMT 2017

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: AFTER_03 BY 9.8_Orbits TO 10.2_Orbits

Fixed Targets

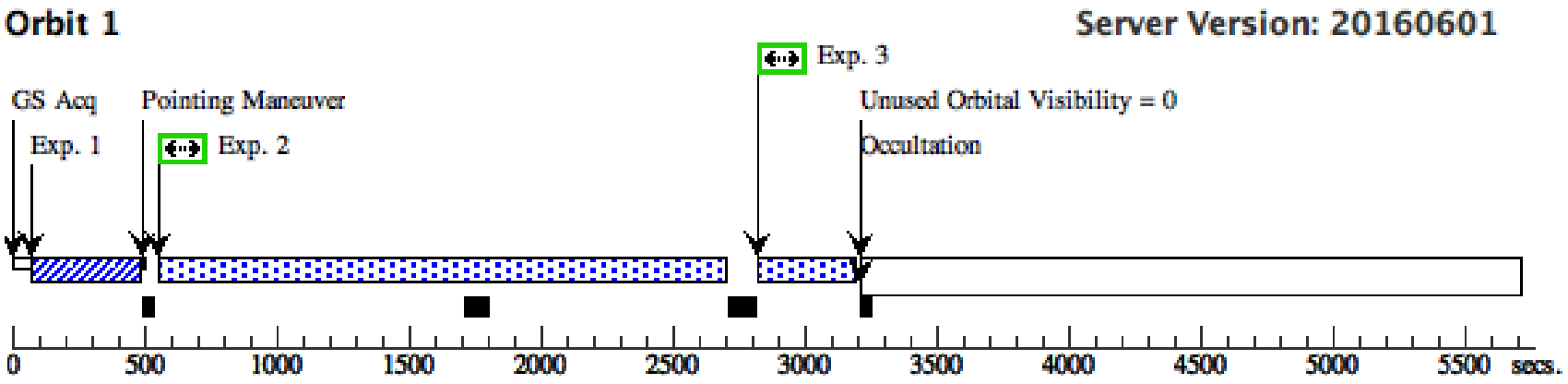
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WD-1145+017	RA: 11 48 33.6270 (177.1401125d) Dec: +01 28 59.45 (1.48318d) Equinox: J2000	Proper Motion RA: -43.3 mas/yr Proper Motion Dec: -7 mas/yr Epoch of Position: 2000	V=17.3	Reference Frame: ICRS

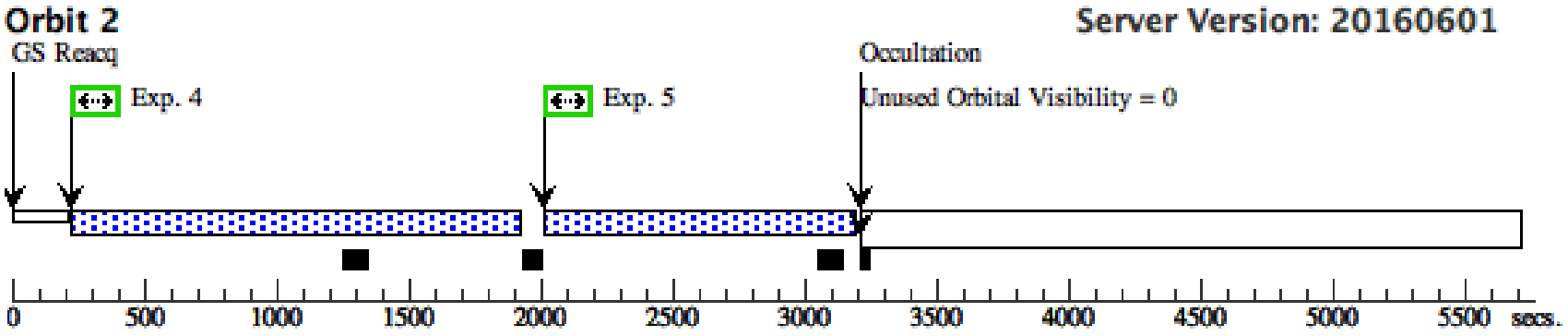
Comments: Extended=NO

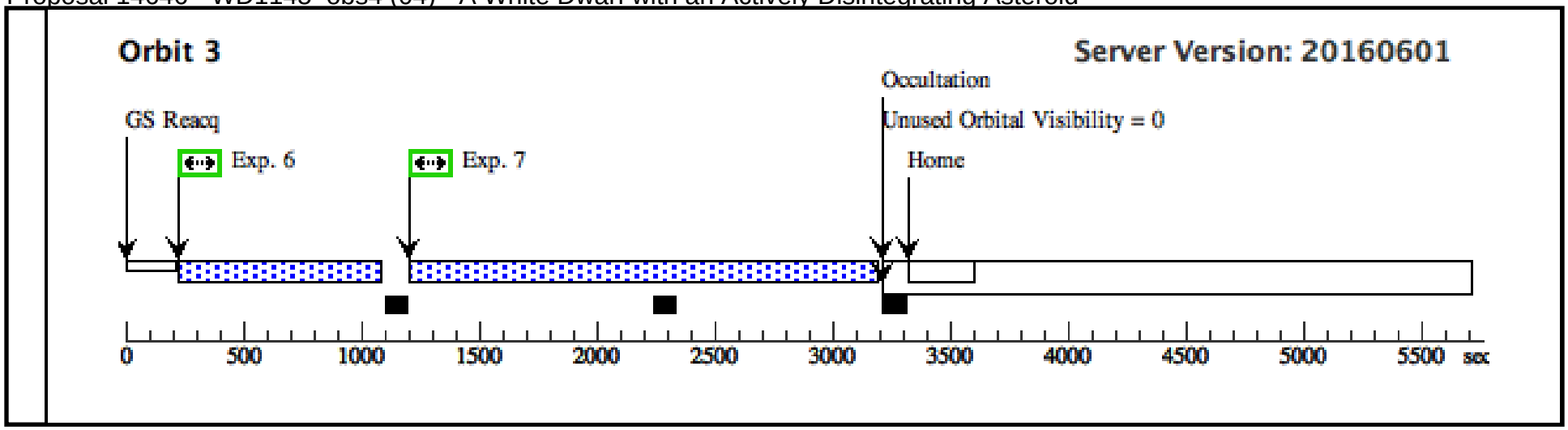
Exposures

#	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.825411)	(1) WD-1145+017	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				45 Secs (45 Secs) *[==>]*	***[1]***
2	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=1; SEGMENT=BOTH			1972 Secs (1965 Secs) *[==>1965.0 Secs]*	***[1]***
3	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=2; SEGMENT=BOTH			325 Secs (318 Secs) *[==>318.0 Secs]*	***[1]***
4	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=2; SEGMENT=BOTH			1647 Secs (1647 Secs) *[==>]*	***[2]***
5	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=3; SEGMENT=BOTH			1124 Secs (1124 Secs) *[==>]*	***[2]***
6	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=3; SEGMENT=BOTH			848 Secs (814 Secs) *[==>814.0 Secs]*	***[3]***
7	WD1145+017 (COS.sp.825414)	(1) WD-1145+017	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1000; FLASH=YES; FP-POS=4; SEGMENT=BOTH			1972 Secs (1938 Secs) *[==>1938.0 Secs]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20160601
Occultation
GS Reacq
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sec