



13769 - Trans-iron group elements in hot helium-rich white dwarfs

Cycle: 22, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
Prof. Klaus Werner (PI) (ESA Member) (Contact)	Eberhard Karls Universitat, Tubingen	werner@astro.uni-tuebingen.de
Dr. Thomas Rauch (CoI) (ESA Member)	Eberhard Karls Universitat, Tubingen	rauch@astro.uni-tuebingen.de
Dr. Jeffrey W. Kruk (CoI) (AdminUSPI)	NASA Goddard Space Flight Center	jeffrey.w.kruk@nasa.gov

VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) PG0109+111	COS/FUV	3	15-Jul-2014 21:07:14.0	yes
02	(2) WD0111+002	COS/FUV	3	15-Jul-2014 21:07:18.0	yes
03	(3) PG1707+427	COS/FUV	5	15-Jul-2014 21:07:21.0	yes

11 Total Orbits Used

ABSTRACT

Our recent detection of twelve trans-iron group elements ($Z=30-56$) in the hot helium-rich white dwarf (i.e. spectral type DO) RE0503-289 is a unique discovery. This phenomenon was never observed before in any white dwarf. Abundance analyses hitherto performed for five species (Zn, Ge, Kr, Xe, Ba) reveal values between 155 and 23000 times solar. There are reasons to believe that these extreme overabundances are connected to the evolutionary history of the DO white dwarfs. They are the outcome of a late helium-shell flash that consumes all hydrogen in the stellar envelope and at the same time dredges up helium-rich intershell matter that is enriched with s-process elements. These elements were synthesised in the preceding

AGB phase of the evolution. We argue that if RE0503-289 is a typical representative of the DO white dwarfs, then all DOs with similar effective temperature should also show these extraordinary chemical diversity and overabundances. In order to prove this hypothesis, we want to obtain FUV spectra of two other hot DO white dwarfs plus a representative of the PG1159 stars, which are thought to be immediate progenitors of DO white dwarfs. If all three targets show the same heavy-metal abundance pattern, then these objects hold the promise that their metal abundances can be used to constrain AGB star nucleosynthesis. If otherwise RE0503-289 remains a unique object, then an alternative evolutionary scenario (binary WD merger) is probably responsible for its extreme element abundances.

OBSERVING DESCRIPTION

FUV spectra of 3 targets (stars) shall be observed , 1 visit each. For each target we use COS/G130M with central wavelength 1222 A.

Targets 1 and 2: 3 orbits each. One different FP-POS per orbit

Target 3: 5 orbits. FP-POS=1 in orbits 1 and 2. FP-POS=2,3,4 in orbits 3,4,5

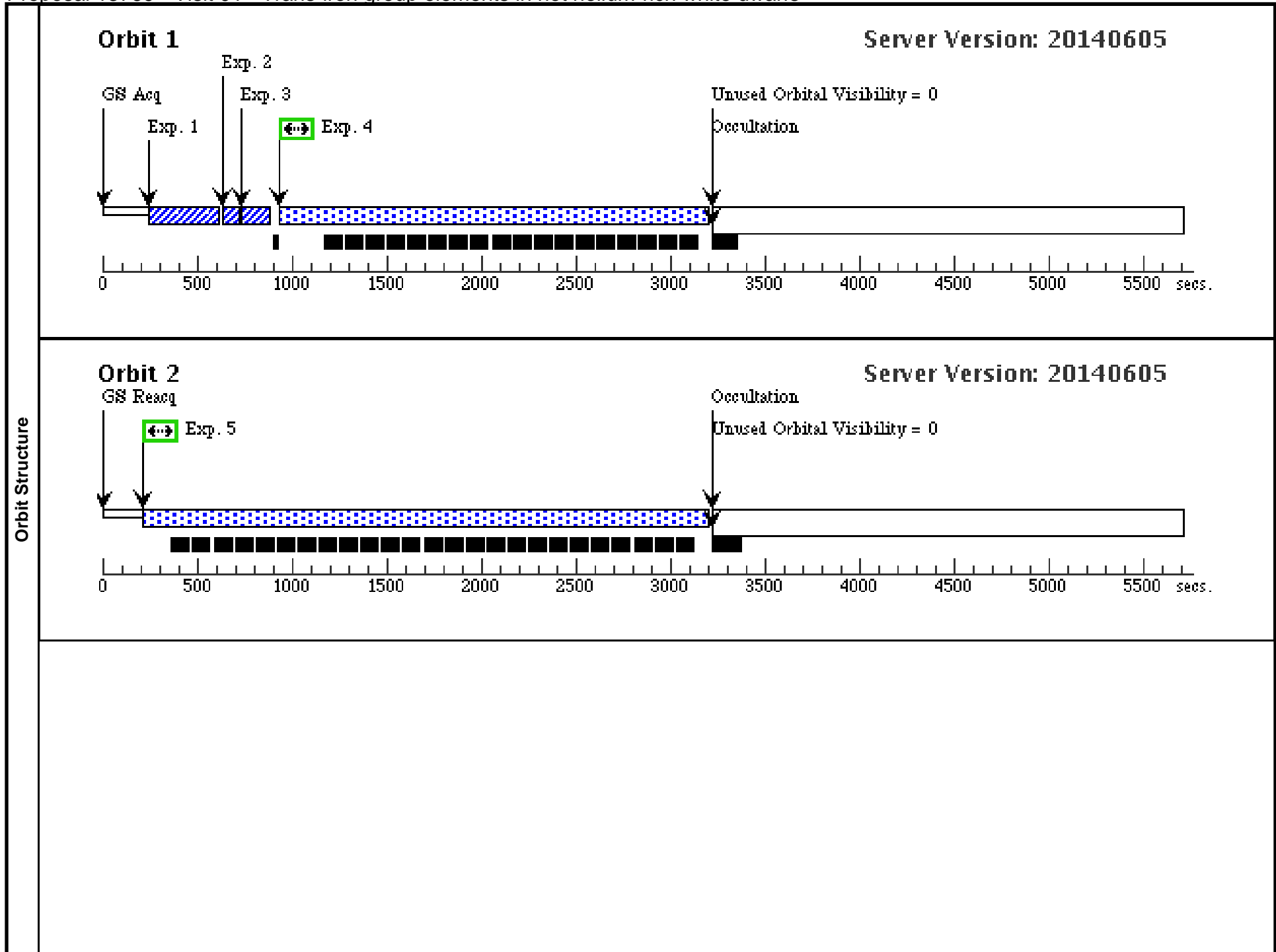
Proposal 13769 - Visit 01 - Trans-iron group elements in hot helium-rich white dwarfs

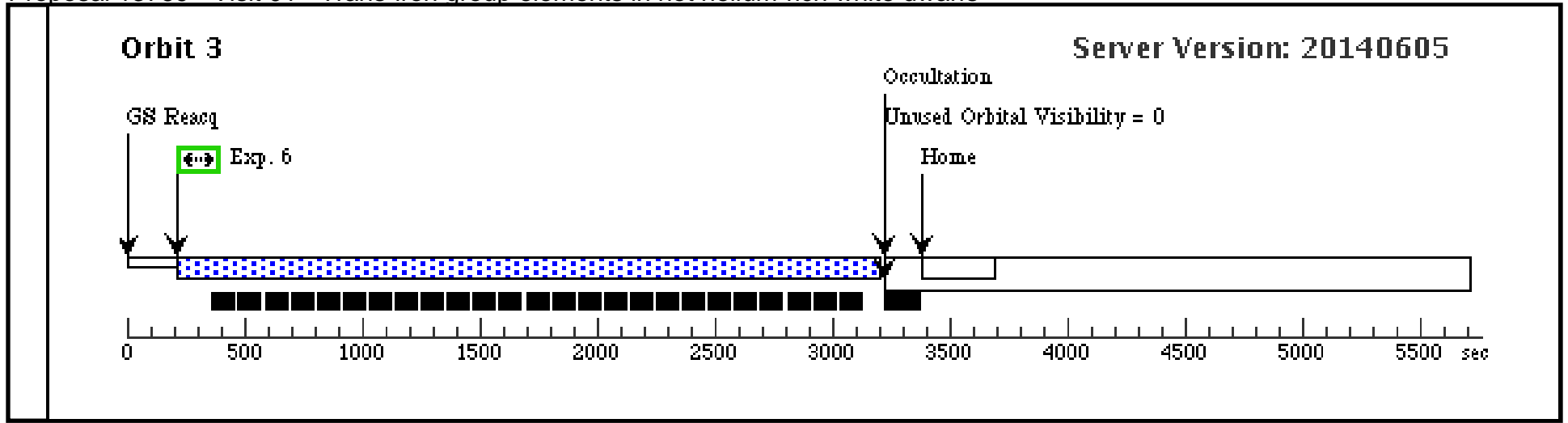
Wed Jul 16 01:07:23 GMT 2014

Visit	<p>Proposal 13769, Visit 01</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: COS/FUV</p> <p>Special Requirements: (none)</p>					
Diagnostics	<p>(Visit 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.</p>					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	PG0109+111	<p>RA: 01 12 23.0800 (18.0961667d)</p> <p>Dec: +11 23 36.10 (11.39336d)</p> <p>Equinox: J2000</p>		<p>V=14.6+/-0.2</p> <p>Flambda = 6.0E-13 at 1150 A (FUSE)</p>	Reference Frame: ICRS
	<p><i>Comments: SDSS coordinates</i></p>					

Proposal 13769 - Visit 01 - Trans-iron group elements in hot helium-rich white dwarfs

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
Exposures	1	(COS.sa.619 (1) PG0109+111 916)	COS/FUV, ACQ/SEARCH, PSA	G130M 1291 A	CENTER=FLUX-W T-FLR; SCAN-SIZE=3; STEP-SIZE=1.767; SEGMENT=BOTH			0.2 Secs (0.2 Secs) [==>]	[1]
	2	(COS.sa.619 (1) PG0109+111 916)	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A	SEGMENT=BOTH			0.2 Secs (0.2 Secs) [==>]	[1]
	3	(COS.sa.619 (1) PG0109+111 916)	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	CENTER=FLUX-W T-FLR; NUM-POS=5; SEGMENT=BOTH; STEP-SIZE=0.9			0.2 Secs (0.2 Secs) [==>]	[1]
	4	(COS.sp.619 (1) PG0109+111 923)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=11 1; EXTENDED=NO; FLASH=YES; FP-POS=1; SEGMENT=BOTH			2136 Secs (2136 Secs) [==>]	[1]
	<i>Comments: BUFFER-TIME: ETC recommends 151 *2/3 = 100. According to instrument handbook section 5.4.3, we set 111.</i>								
	5	(COS.sp.619 (1) PG0109+111 923)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=11 1; EXTENDED=NO; FLASH=YES; FP-POS=2; SEGMENT=BOTH			2940 Secs (2940 Secs) [==>]	[2]
6	(COS.sp.619 (1) PG0109+111 923)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=11 1; EXTENDED=NO; FLASH=YES; FP-POS=3; SEGMENT=BOTH			2940 Secs (2940 Secs) [==>]	[3]	





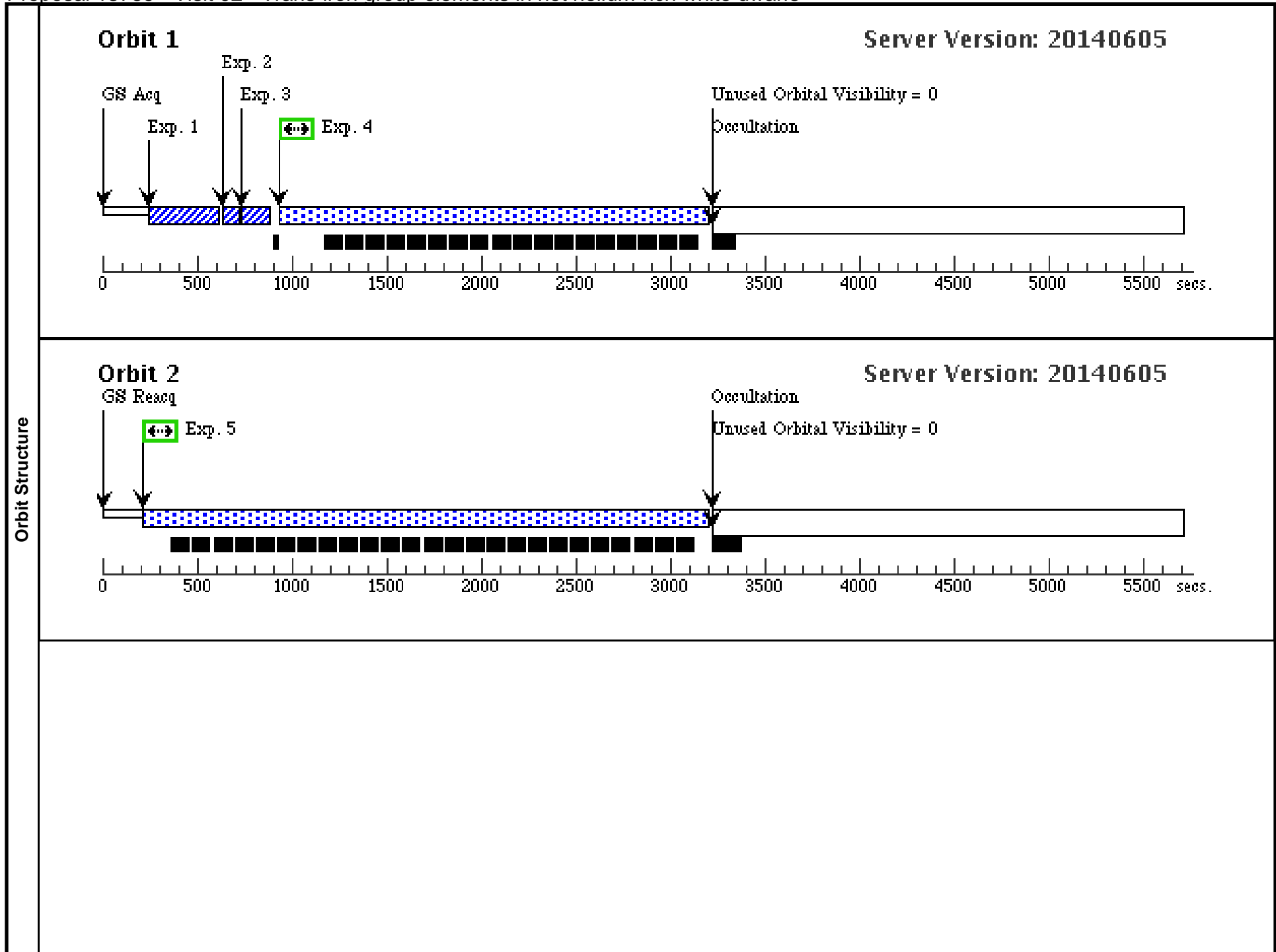
Proposal 13769 - Visit 02 - Trans-iron group elements in hot helium-rich white dwarfs

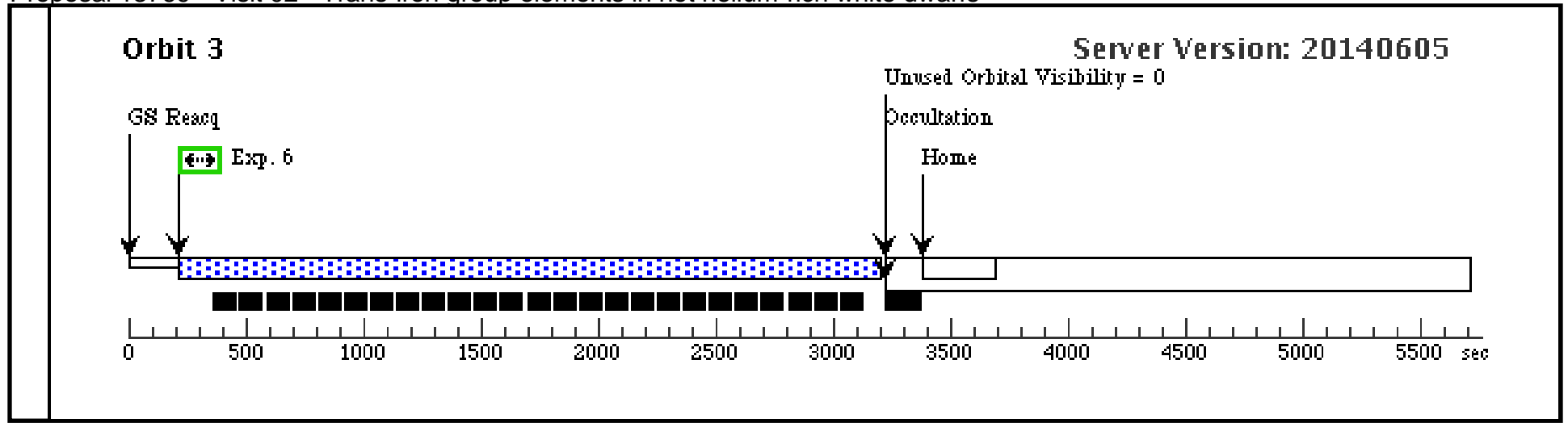
Wed Jul 16 01:07:23 GMT 2014

Visit	<p>Proposal 13769, Visit 02</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: COS/FUV</p> <p>Special Requirements: (none)</p>					
Diagnostics	<p>(Visit 02) 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.</p>					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(2)	WD0111+002	RA: 01 13 46.7700 (18.4448750d) Dec: +00 28 28.70 (.47464d) Equinox: J2000		V=14.9+/-0.2 Flambda = 6.5E-13 at 1150 A (F USE)	Reference Frame: ICRS
	<p><i>Comments: SDSS coordinates</i></p>					

Proposal 13769 - Visit 02 - Trans-iron group elements in hot helium-rich white dwarfs

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
Exposures	1	(COS.sa.619 (2) WD0111+002 917)	COS/FUV, ACQ/SEARCH, PSA	G130M 1291 A	CENTER=FLUX-W T-FLR; SCAN-SIZE=3; SEGMENT=BOTH; STEP-SIZE=1.767			0.2 Secs (0.2 Secs) [==>]	[1]
	2	(COS.sa.619 (2) WD0111+002 917)	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A	SEGMENT=BOTH			0.2 Secs (0.2 Secs) [==>]	[1]
	3	(COS.sa.619 (2) WD0111+002 917)	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	CENTER=FLUX-W T-FLR; NUM-POS=5; SEGMENT=BOTH; STEP-SIZE=0.9			0.2 Secs (0.2 Secs) [==>]	[1]
	4	(COS.sp.619 (2) WD0111+002 924)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=11 1; EXTENDED=NO; FLASH=YES; FP-POS=1; SEGMENT=BOTH			2132 Secs (2132 Secs) [==>]	[1]
	<i>Comments: BUFFER-TIME: ETC recommends 139 *2/3 = 92. According to instrument handbook sect. 5.4.3 we set 111</i>								
	5	(COS.sp.619 (2) WD0111+002 924)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=11 1; EXTENDED=NO; FLASH=YES; FP-POS=2; SEGMENT=BOTH			2936 Secs (2936 Secs) [==>]	[2]
6	(COS.sp.619 (2) WD0111+002 924)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=11 1; EXTENDED=NO; FLASH=YES; FP-POS=3; SEGMENT=BOTH			2936 Secs (2936 Secs) [==>]	[3]	



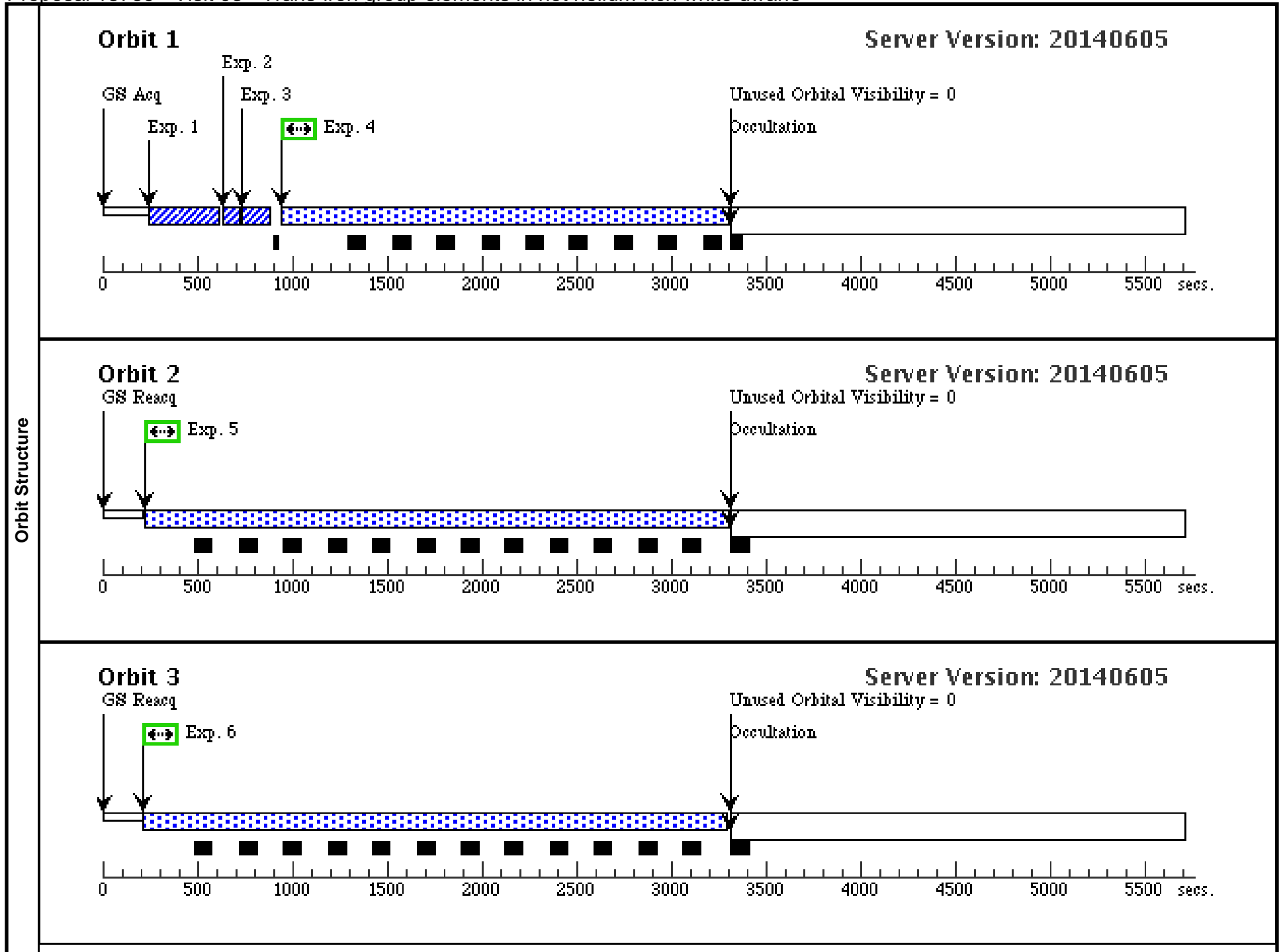


Proposal 13769 - Visit 03 - Trans-iron group elements in hot helium-rich white dwarfs

Visit	Proposal 13769, Visit 03 Wed Jul 16 01:07:24 GMT 2014 Diagnostic Status: No Diagnostics Scientific Instruments: COS/FUV Special Requirements: (none)					
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes
(3)		PG1707+427	RA: 17 08 47.7200 (257.1988333d) Dec: +42 41 0.30 (42.68342d) Equinox: J2000		V=16.4+/-0.2 Flambda = 2.5E-13 at 1150 A (F USE)	Reference Frame: ICRS
	<i>Comments: SDSS coordinates</i>					

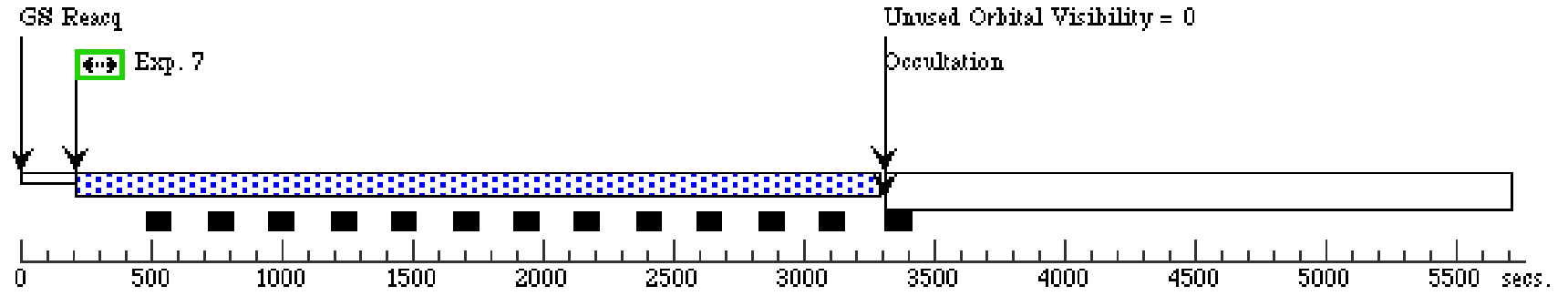
Proposal 13769 - Visit 03 - Trans-iron group elements in hot helium-rich white dwarfs

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(COS.sa.619 918)	(3) PG1707+427	COS/FUV, ACQ/SEARCH, PSA	G130M 1291 A	CENTER=FLUX-W T-FLR; SCAN-SIZE=3; SEGMENT=BOTH; STEP-SIZE=1.767			0.4 Secs (0.4 Secs) [==>]	[1]
	2	(COS.sa.619 918)	(3) PG1707+427	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A	SEGMENT=BOTH			0.4 Secs (0.4 Secs) [==>]	[1]
	3	(COS.sa.619 918)	(3) PG1707+427	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	CENTER=FLUX-W T-FLR; NUM-POS=5; SEGMENT=BOTH; STEP-SIZE=0.9			0.4 Secs (0.4 Secs) [==>]	[1]
	4	(COS.sp.619 925)	(3) PG1707+427	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=23 4; EXTENDED=NO; FLASH=YES; FP-POS=1; SEGMENT=BOTH			2223 Secs (2223 Secs) [==>]	[1]
	5	(COS.sp.619 925)	(3) PG1707+427	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=23 4; EXTENDED=NO; FLASH=YES; FP-POS=1; SEGMENT=BOTH			3030 Secs (3030 Secs) [==>]	[2]
	6	(COS.sp.619 925)	(3) PG1707+427	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=23 4; EXTENDED=NO; FLASH=YES; FP-POS=2; SEGMENT=BOTH			3030 Secs (3030 Secs) [==>]	[3]
	7	(COS.sp.619 925)	(3) PG1707+427	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=23 4; EXTENDED=NO; FLASH=YES; FP-POS=3; SEGMENT=BOTH			3030 Secs (3030 Secs) [==>]	[4]
	8	(COS.sp.619 925)	(3) PG1707+427	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=23 4; EXTENDED=NO; FLASH=YES; FP-POS=4; SEGMENT=BOTH			3030 Secs (3030 Secs) [==>]	[5]



Orbit 4

Server Version: 20140605



Orbit 5

Server Version: 20140605

