13322 - Time-resolved FUV Spectroscopy of a Unique White Dwarf in the Kepler Field

Cycle: 21, 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) KIC9535405	COS/FUV	4	19-Jun-2013 22:22:03.0	yes

4 Total Orbits Used

ABSTRACT

We propose to use 4 HST orbits to obtain time-resolved far-UV (FUV) spectra with COS of the rapidly spinning, metal-polluted white dwarf KIC 9535405, in order to explore the distribution of accreted metals over the white dwarf's surface (including the possibility that confinement by the white dwarf's magnetic field is preventing the rapid gravitational settling of heavy elements). This will enable us to explore details of the largely unknown process through which matter transitions from circumstellar space onto the WD itself. We will also obtain the chemical composition of the parent body of the accreted matter, thereby adding to the limited pool of information on direct measurements of the composition and structure of extrasolar planetary (terrestrial) bodies. The proposed HST observations will be complemented by existing, ongoing, and planned ground- and space-based (Kepler, Spitzer) observations obtained by us.

OBSERVING DESCRIPTION

The basic observing strategy for this program is relatively straightforward: 1 visit to 1 target lasting 4 orbits. A single COS/FUV configuration (G160M, center at 1309 A, TIME-TAG mode) is used for the entire duration of the visit. Each orbit is configured as a single exposure on the target with the maximum possible total integration time (target visibility minus overheads). Because we want to compare the spectra obtained during each orbit for time variable behavior of the target (not just examine a single spectrum obtained during the entire 4-orbit program), while also ensuring the best possible spectral extraction, we have used FS-POS=ALL for the science exposure in each orbit, to ensure the best results on an orbit-by-orbit basis. Thus, each orbit contains a single science exposure split into 4 sub-exposures. Orbit 1 starts with GS acquisition, followed by target acquisition (COS/FUV ACQ PEAKXD, then COS/FUV ACQ PEAKD). After accounting for the FP-POS overheads, the total remaining science time in Orbit 1 is 2222 s. The S/N achieved in the combined spectrum from Orbit 1 will be approx. 21 (using the online ETC, with the target represented by a 34,000 K blackbody normalized to V=17.15 mag). Orbits 2, 3, and 4 are identical to each other. Like Orbit 1, they start with guide star (re)acquisition, but do not require target (re)acqusition - hence, slightly more time is available for the science exposures. After acounting for FS-POS overheads, a total of 2649 s is available for science exposure in each orbit. Expected S/N for the total combined spectrum in each of Orbits 2, 3, and 4 is approx. 23.

Visit

Proposal 13322, Visit 01 Thu Jun 20 02:22:16 GMT 2013

Diagnostic Status: Warning

Scientific Instruments: COS/FUV

Special Requirements: (none)

Diagnostics

(Visit 01) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS

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(Visit 01) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS

Fixed Targets

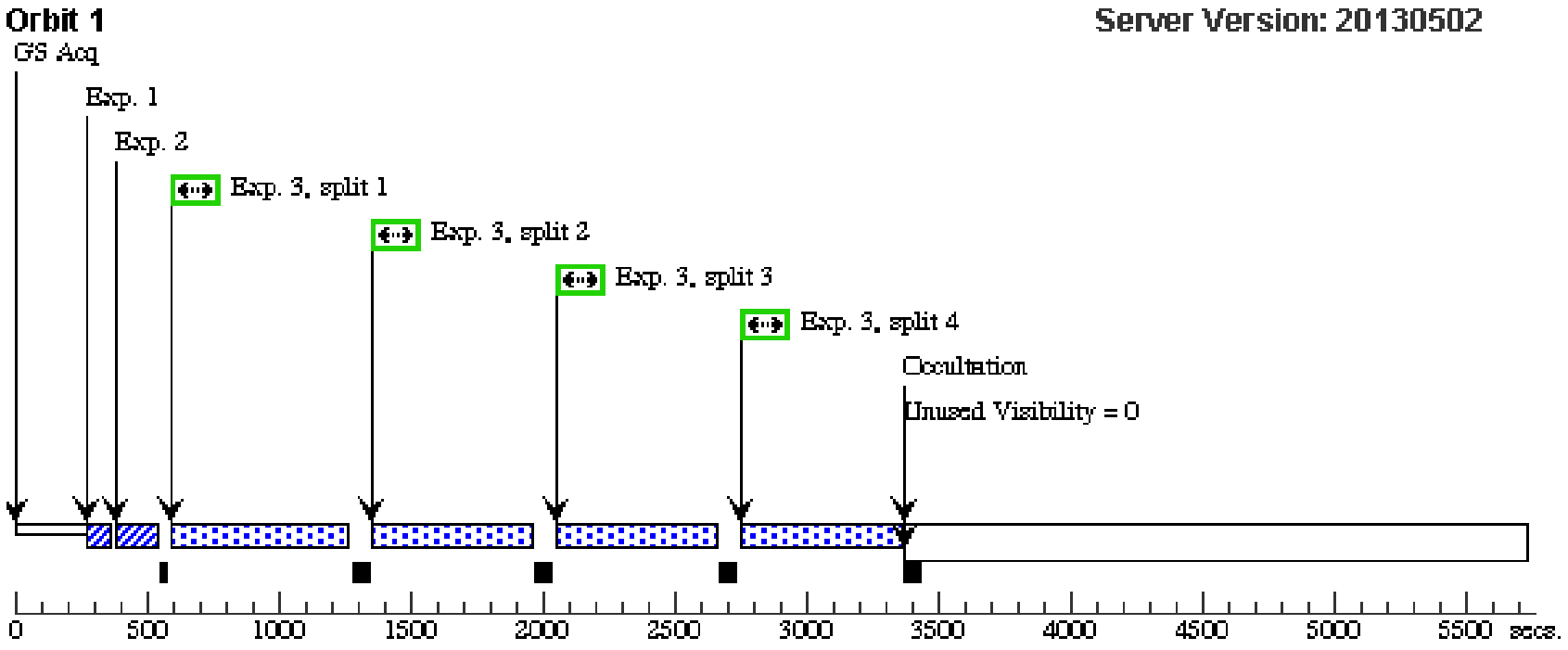
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	KIC9535405	RA: 19 41 31.3580 (295.3806583d) Dec: +46 06 11.37 (46.10316d) Equinox: J2000	Proper Motion RA: 0.020 arcsec/yr Proper Motion Dec: 0.040 arcsec/yr Epoch of Position: 2013.060	V=17.150+/-0.022 UVW2 (Swift UVOT) = 1.60(3) mJy	Reference Frame: ICRS

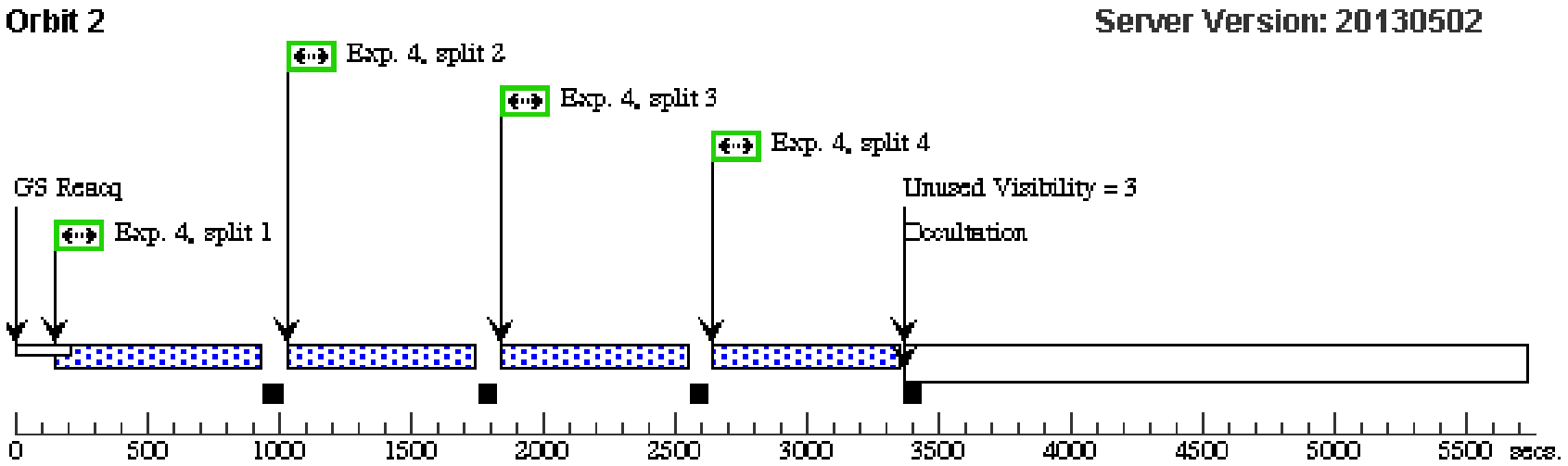
Comments: Target coordinates from Spitzer IRAC ch1 pbcd mosaic obtained in Jan 2013.

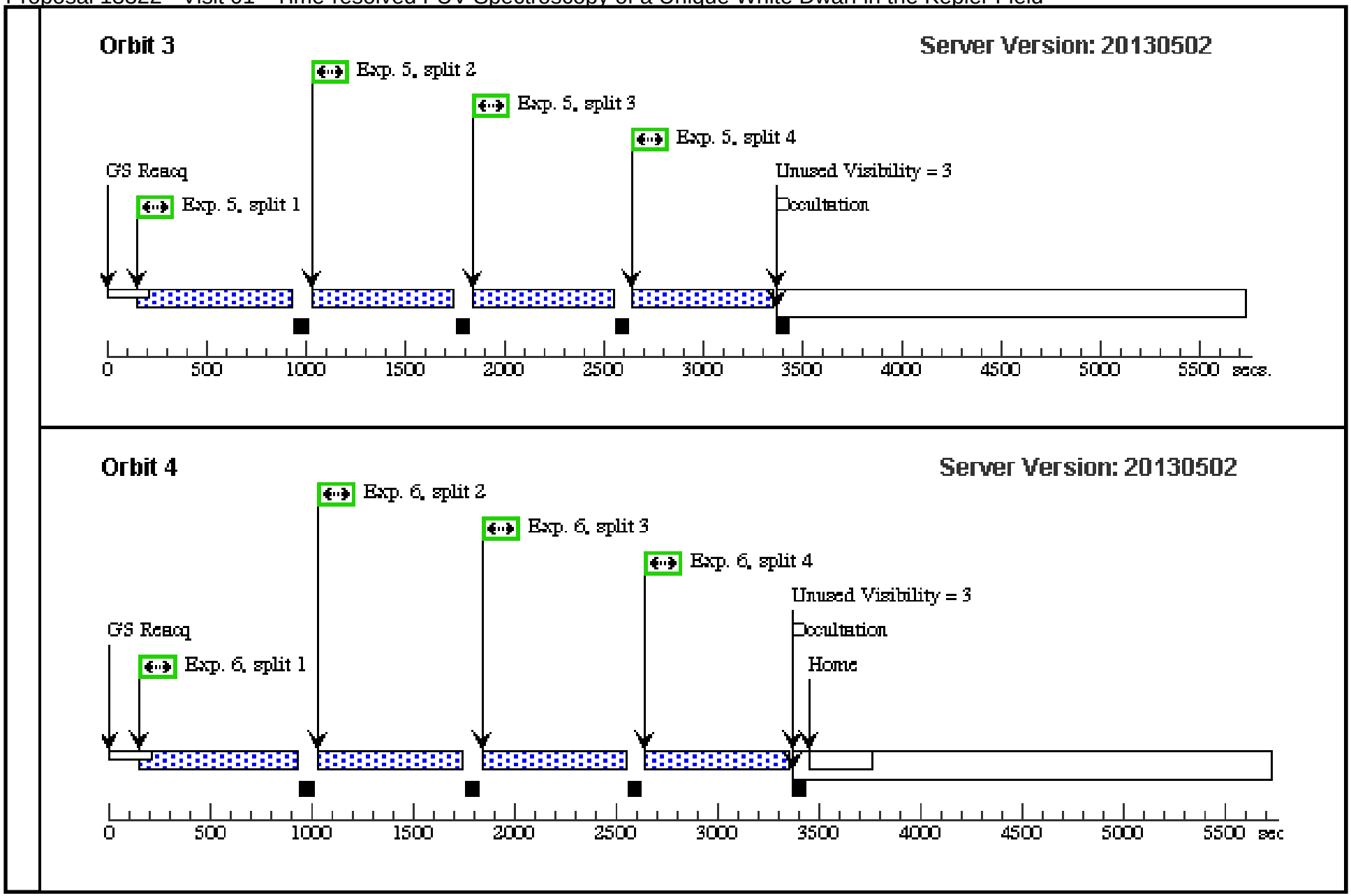
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/PEAKXD (COS.sa.513397)	(1) KIC9535405	COS/FUV, ACQ/PEAKXD, PSA	G130M 1309 A	SEGMENT=BOTH			1.8 Secs (1.8 Secs) *[==>]*	***[1]***
	Comments: ETC calculation uses 34000 K BB model normalized to V=17.15, gives ACQ exp time = 1.7849 sec. Double-check: the Swift measurement of the target at 0.2 microns (1.6 mJy) corresponds to 3e-14 erg/s/cm^2/A at 0.13 microns, assuming 34000 K BB spectrum. Figure 8.4 in COS IHB gives ACQ exp time of ~1.5 sec.								
2	ACQ/PEAKD (COS.sa.513397)	(1) KIC9535405	COS/FUV, ACQ/PEAKD, PSA	G130M 1309 A	NUM-POS=5; STEP-SIZE=0.9; CENTER=FLUX-WT-FLR; SEGMENT=BOTH			1.8 Secs (1.8 Secs) *[==>]*	***[1]***
	Comments: optional parameters are recommended values from COS IHB, Sec 8.6.								
3	orbit 1 science (COS.sp.513605)	(1) KIC9535405	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=1193; SEGMENT=BOTH; EXTENDED=NO; FLASH=YES; FP-POS=ALL			556 Secs (2222 Secs) *[==>555.0 Secs (Split 1)]* *[==>555.0 Secs (Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[1]***
	Comments: S/N = 10.4 per resolution element in each FP-POS split spectrum								
4	orbit 2 science (COS.sp.513608)	(1) KIC9535405	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=1193; SEGMENT=BOTH; EXTENDED=NO; FLASH=YES; FP-POS=ALL			662 Secs (2649 Secs) *[==>663.0 Secs (Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[2]***
	Comments: S/N = 11.3 per resolution element in each FP-POS split spectrum								
5	orbit 3 science (COS.sp.513608)	(1) KIC9535405	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=1193; SEGMENT=BOTH; EXTENDED=NO; FLASH=YES; FP-POS=ALL			662 Secs (2649 Secs) *[==>663.0 Secs (Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[3]***
	Comments: S/N = 11.3 per resolution element in each FP-POS split spectrum								
6	orbit 4 science (COS.sp.513608)	(1) KIC9535405	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=1193; SEGMENT=BOTH; EXTENDED=NO; FLASH=YES; FP-POS=ALL			662 Secs (2649 Secs) *[==>663.0 Secs (Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[4]***
	Comments: S/N = 11.3 per resolution element in each FP-POS split spectrum								

Orbit Structure






Orbit 3
Server Version: 20130502
Exp. 5, split 2
Exp. 5, split 3
Exp. 5, split 4
GS Reacq
Unused Visibility = 3
Exp. 5, split 1
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.
Orbit 4
Server Version: 20130502
Exp. 6, split 2
Exp. 6, split 3
Exp. 6, split 4
Unused Visibility = 3
GS Reacq
Occultation
Exp. 6, split 1
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec