14736 - Connecting Variability and Metals in White Dwarfs

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) J1529+2928	COS/NUV	4	29-Jul-2016 15:08:55.0	yes

4 Total Orbits Used

ABSTRACT

The Kepler and K2 missions have revealed that about half of the observed white dwarfs with sufficient signal-to-noise ratio light curves have low-level photometric variations at hour to day timescales. Potential explanations for the observed variability include the relativistic beaming effect, ellipsodial variations, eclipses, and reflection off of giant planets in close orbits. However, these are all rare events. Roughly 10% of white dwarfs are magnetic, and magnetic fields can explain part of this puzzle. However, the high incidence (50%) of variability is currently unexplained. HST COS spectroscopy of nearby white dwarfs show that about half of them have metals on their surface. Hence, we propose that the observed variability is due to the rotation of the star coupled with an inhomogeneous surface distribution of accreted metals. We have recently discovered an ideal system to test this hypothesis. J1529 is an apparently non-magnetic white dwarf that shows 5.9% photometric dips in the optical every 38 min. We propose to

obtain COS TIME-TAG spectroscopy of J1529 over 4 orbits to search for surface abundance differences throughout the orbit and look for the flux redistribution effect in the optical. These observations will confirm or rule out the idea that inhomogeneous metal accretion on white dwarfs can explain the high incidence of variability. We predict that the LSST will identify ~100,000 variable white dwarfs. Hence, understanding the source of variability in white dwarfs has implications for the current and future transient surveys.

OBSERVING DESCRIPTION

We will use COS/TIME-TAG mode to obtain G230L spectra (with the nominal wavelength setting of 2635 Angstrom) of a white dwarf that shows photometric dips every 38 minutes. We think that the source of these dips is surface inhomogeneities of accreted metals. Our goals is to get a S/N=20 spectrum to search for metal lines within and outside of the photometric dips. We divide each orbit into 2 sub-exposures using FP-POS 1,2,3, and 4 for the orbits 1,2,3, and 4, respectively.

We will obtain simultaneous ground-based, optical photometry from McDonald and APO telescopes. Hence, we will need to know the HST scheduled dates as soon as possible so that we can plan for the ground-based observations.

Visit

Proposal 14736, J1529 (01) Fri Jul 29 19:08:56 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/NUV

Special Requirements: (none)

Fixed Targets

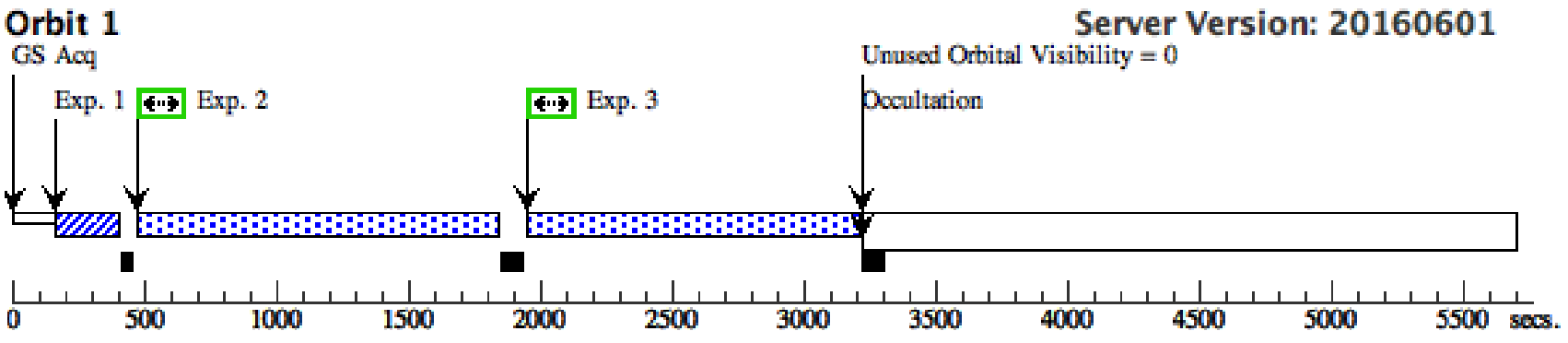
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	J1529+2928	RA: 15 29 34.9809 (232.3957537d) Dec: +29 28 1.87 (29.46719d) Equinox: J2000	Proper Motion RA: -75.36797 mas/yr Proper Motion Dec: -6.913108 mas/yr Epoch of Position: 2003.47	V=17.47 u=17.77 AB mag	Reference Frame: ICRS

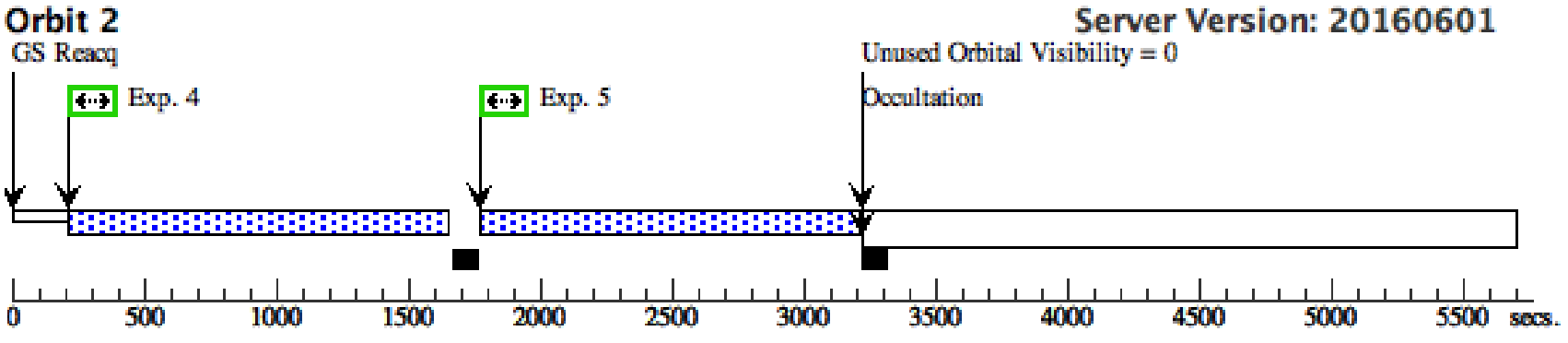
Comments: Extended=NO

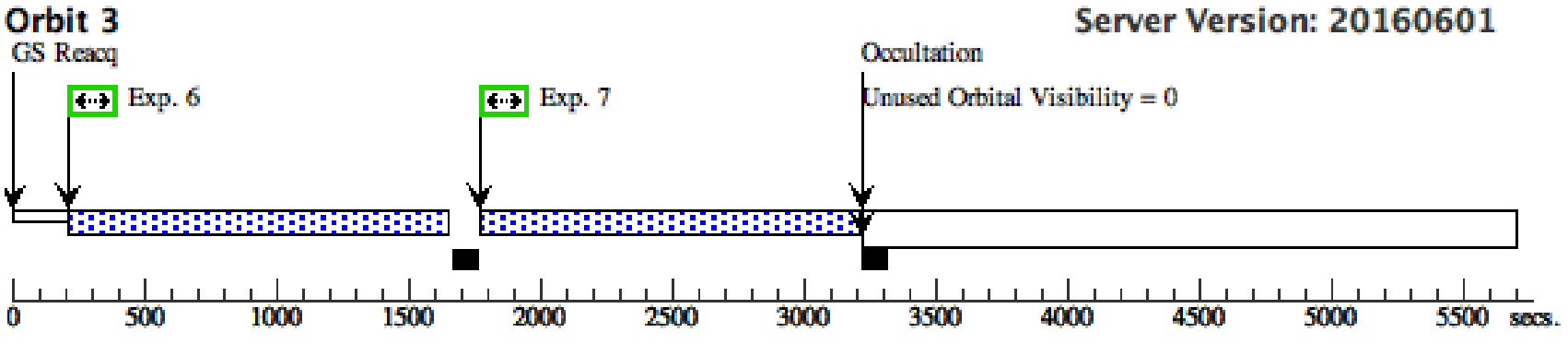
Exposures

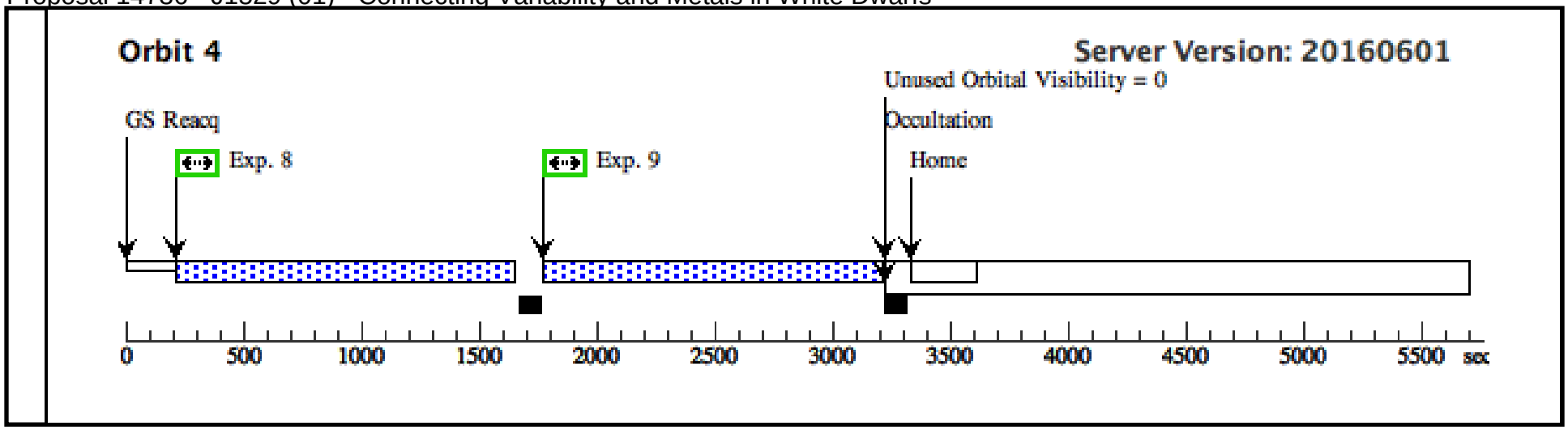
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Target Acquisition (795448)	(1) J1529+2928	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				7 Secs (7 Secs) *[==>]*	*[1]*
2	G230L POS 1 (795448)	(1) J1529+2928	COS/NUV, TIME-TAG, PSA	G230L 2635 A	BUFFER-TIME=1625; FP-POS=1; FLASH=YES			1240 Secs (1251 Secs) *[==>1251.0 Secs]*	*[1]*
3	G230L POS 1 (795448)	(1) J1529+2928	COS/NUV, TIME-TAG, PSA	G230L 2635 A	BUFFER-TIME=1625; FP-POS=1; FLASH=YES			1240 Secs (1252 Secs) *[==>1252.0 Secs]*	*[1]*
4	G230L POS 2 (795448)	(1) J1529+2928	COS/NUV, TIME-TAG, PSA	G230L 2635 A	BUFFER-TIME=1625; FP-POS=2; FLASH=YES			1420 Secs (1424 Secs) *[==>1424.0 Secs]*	*[2]*
5	G230L POS 2 (795448)	(1) J1529+2928	COS/NUV, TIME-TAG, PSA	G230L 2635 A	BUFFER-TIME=1625; FP-POS=2; FLASH=YES			1420 Secs (1424 Secs) *[==>1424.0 Secs]*	*[2]*
6	G230L POS 3 (795448)	(1) J1529+2928	COS/NUV, TIME-TAG, PSA	G230L 2635 A	BUFFER-TIME=1625; FP-POS=3; FLASH=YES			1420 Secs (1424 Secs) *[==>1424.0 Secs]*	*[3]*
7	G230L POS 3 (795448)	(1) J1529+2928	COS/NUV, TIME-TAG, PSA	G230L 2635 A	BUFFER-TIME=1625; FP-POS=3; FLASH=YES			1420 Secs (1424 Secs) *[==>1424.0 Secs]*	*[3]*
8	G230L POS 4 (795448)	(1) J1529+2928	COS/NUV, TIME-TAG, PSA	G230L 2635 A	BUFFER-TIME=1625; FP-POS=4; FLASH=YES			1420 Secs (1424 Secs) *[==>1424.0 Secs]*	*[4]*
9	G230L POS 4 (795448)	(1) J1529+2928	COS/NUV, TIME-TAG, PSA	G230L 2635 A	BUFFER-TIME=1625; FP-POS=4; FLASH=YES			1420 Secs (1424 Secs) *[==>1424.0 Secs]*	*[4]*

Orbit Structure





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