



## 17819 - WD0106-038: the first variable metal polluted white dwarf?

Cycle: 32, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

### INVESTIGATORS

<i>Name</i>	<i>Institution</i>
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Dr. Siyi Xu (CoI) (AdminUSPI)	NOIRLab - Gemini North (HI)
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Dr. Michael Shara (CoI)	American Museum of Natural History
Dr. Simon Hodgkin (CoI) (ESA Member)	University of Cambridge
Ms. Mariona Badenas Agusti (CoI)	Massachusetts Institute of Technology
Dr. Patrick Dufour (CoI) (CSA Member)	Universite de Montreal

### 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) TON-S-193	COS/FUV COS/NUV	2	12-Sep-2025 17:00:14.0	yes
03	(1) TON-S-193	COS/FUV COS/NUV	2	12-Sep-2025 17:00:15.0	yes
02	(1) TON-S-193	COS/FUV COS/NUV	2	12-Sep-2025 17:00:15.0	yes

6 Total Orbits Used

## **ABSTRACT**

This proposal aims to re-observe a white dwarf polluted with planetary material to confirm whether the amount of planetary material in the atmosphere has changed over time. This would be the first confirmed variable metal polluted white dwarf. Ground based observations revealed an increase of 35% in the equivalent width of the Mg II doublet over a timescale of 10 years. However, this is based off of one spectral line. A previous UV spectrum of WD0106-038 has been obtained which revealed a plethora of absorption lines; by obtaining a follow up UV spectrum we will confirm whether this is the first variable metal polluted white dwarf. Due to the short sinking timescales of approximately days-weeks depending on the element, we propose 2 observations to assess both the long-term (yearly) and short-term (monthly) variability of the absorption lines. This would be the first evidence for sporadic accretion and will have a significant impact on how we use metal polluted white dwarfs to measure bulk planetary compositions.

## **OBSERVING DESCRIPTION**

Technical Set-up: We propose to use the G130M grating in the FUV module with a central wavelength of 1291 Å. In accordance with the COS2025 policies, we will only use two FP-POS positions (3 and 4).

COS safety: Our target is sufficiently faint that COS safety is not a problem.

Reduced gyro observations: our observations are not time critical, we just require the 2 visits to be separated by more than 60 days, so reducing the possible observing windows will not affect this proposal. Using the visit planner tool, there are plenty of schedulable opportunities across the cycle for the target. Target acquisition is required in order to successfully complete the proposed observations.

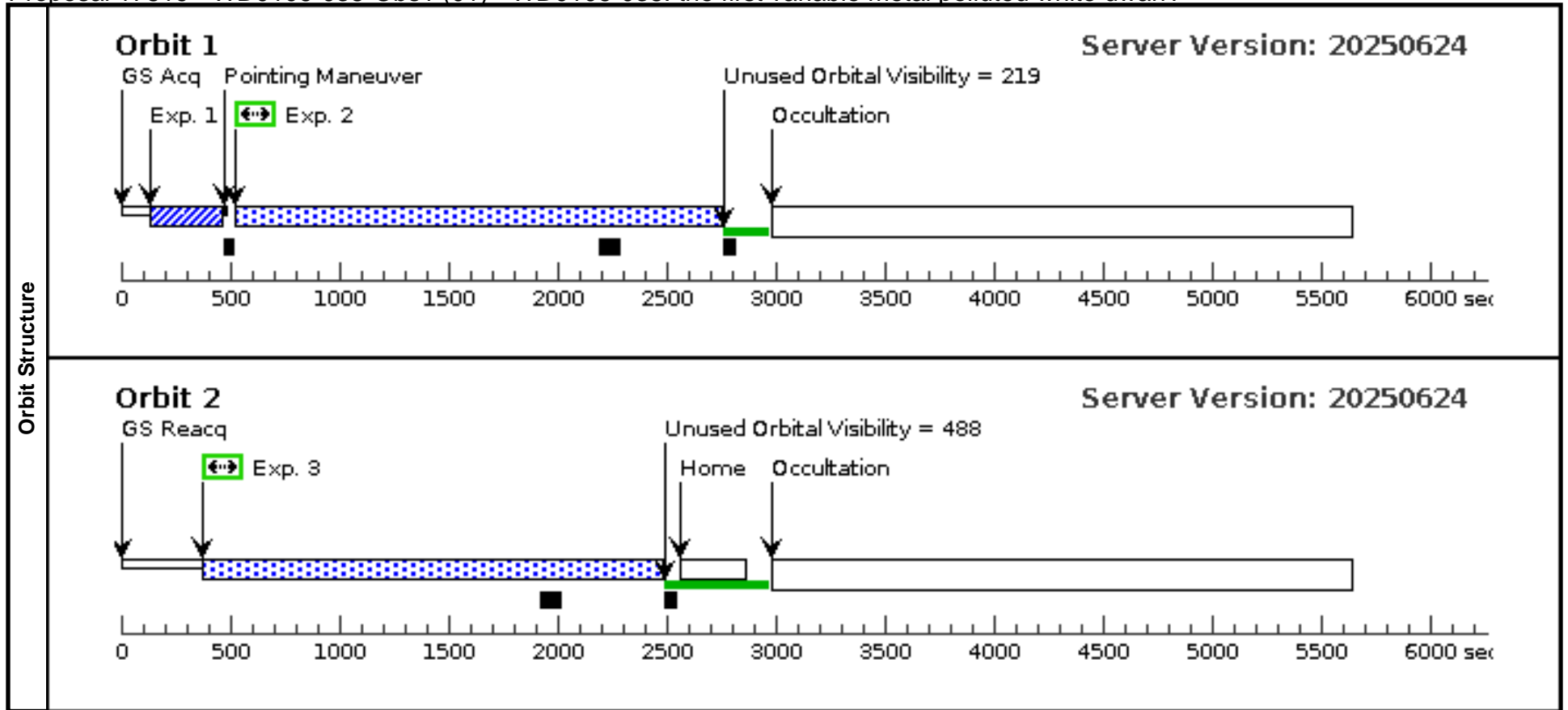
Scheduling: This proposal observes the same object to search for variability, therefore the gap between observations needs to be at least 2 months.

SNR: We require a SNR of at least 30 around 1320Å, close to important lines of carbon.

Proposal 17819 - WD0106-038-Obs1 (01) - WD0106-038: the first variable metal polluted white dwarf?

Fri Sep 12 21:00:15 GMT 2025

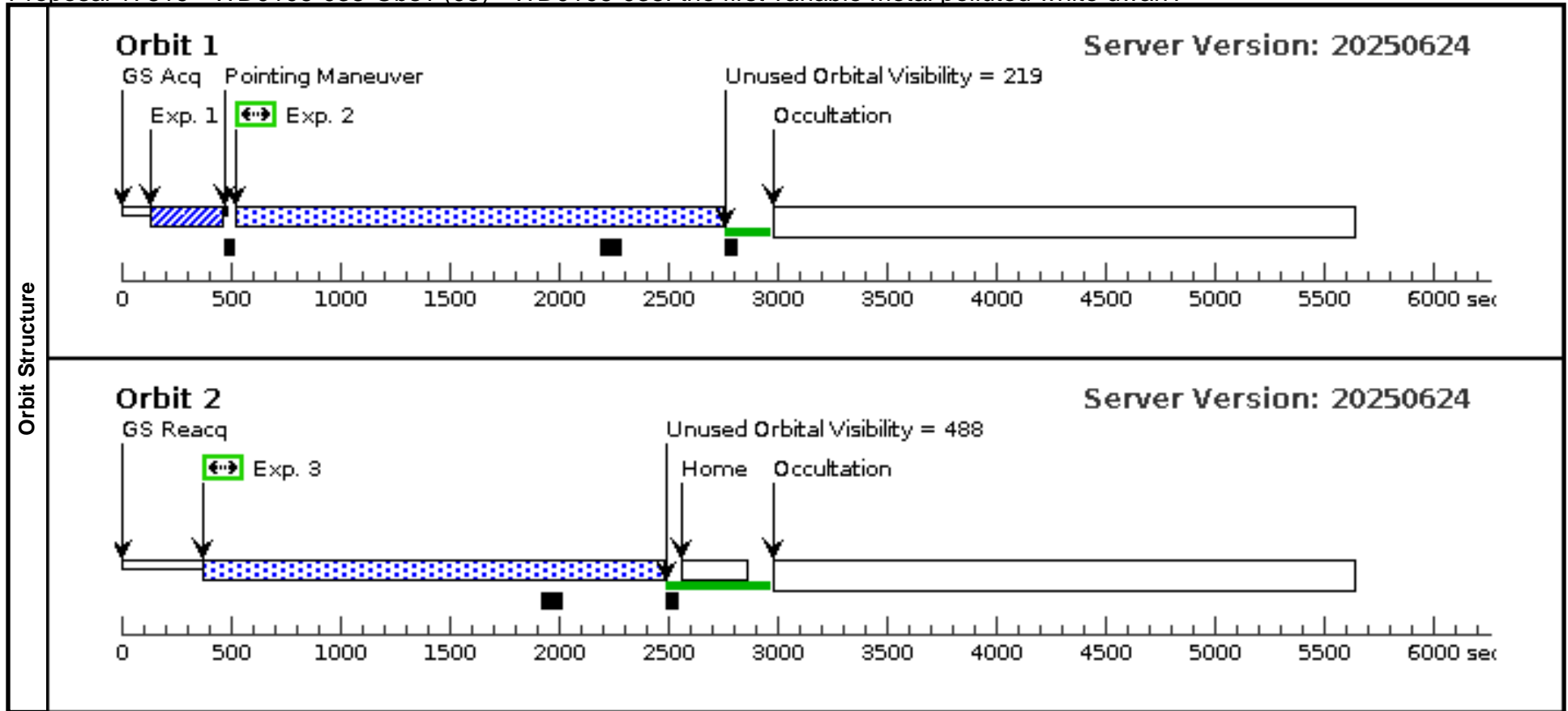
Visit	<b>Proposal 17819, WD0106-038-Obs1 (01), completed</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none) <i>Comments: First visit for WD0106-038</i>									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
		(1)	TON-S-193 Alt Name1: WD0106-328 Alt Name2: GAIA-DR3-5026963661794939520	RA: 01 08 36.0346 (17.1501442d) Dec: -32 37 43.38 (-32.62872d) Equinox: J2000	Proper Motion RA: 26.561 mas/yr Proper Motion Dec: -21.664 mas/yr Epoch of Position: 2000	V=15.26 FUV=15.22	Reference Frame: ICRS			
	<i>Comments:</i> Category=STAR Description=[DA, DZ] 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 (COS.ta.193 1884)	(1) TON-S-193	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				10 Secs (10 Secs) [==>]	[1]
	2	SCIENCE O RBIT 1 (COS.sp.193 0366)	(1) TON-S-193	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 11; FP-POS=3			2056 Secs (2056 Secs) [==>]	[1]
	3	SCIENCE O RBIT 2 (COS.sp.193 0366)	(1) TON-S-193	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 11; FP-POS=4			2055 Secs (2055 Secs) [==>]	[2]



Proposal 17819 - WD0106-038-Obs1 (03) - WD0106-038: the first variable metal polluted white dwarf?

Fri Sep 12 21:00:15 GMT 2025

Visit	<b>Proposal 17819, WD0106-038-Obs1 (03)</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none) <i>Comments: First visit for WD0106-038</i>									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
		(1)	TON-S-193 Alt Name1: WD0106-328 Alt Name2: GAIA-DR3-5026963661794939520	RA: 01 08 36.0346 (17.1501442d) Dec: -32 37 43.38 (-32.62872d) Equinox: J2000	Proper Motion RA: 26.561 mas/yr Proper Motion Dec: -21.664 mas/yr Epoch of Position: 2000	V=15.26 FUV=15.22	Reference Frame: ICRS			
	<i>Comments:</i> Category=STAR Description=[DA, DZ] 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 (COS.ta.193 1884)	(1) TON-S-193	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				10 Secs (10 Secs)	
									[==>]	[1]
	2	SCIENCE O RBIT 1 (COS.sp.193 0366)	(1) TON-S-193	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 11; FP-POS=3			2056 Secs (2056 Secs)	
								[==>]	[1]	
3	SCIENCE O RBIT 2 (COS.sp.193 0366)	(1) TON-S-193	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 11; FP-POS=4			2055 Secs (2055 Secs)		
								[==>]	[2]	



Proposal 17819 - WD0106-038-Obs2 (02) - WD0106-038: the first variable metal polluted white dwarf?

Fri Sep 12 21:00:16 GMT 2025

Visit	<b>Proposal 17819, WD0106-038-Obs2 (02), scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: COS/FUV, COS/NUV Special Requirements: AFTER 03 BY 60 D TO 1000 D Comments: Second visit for WD0106-038, needs to be > 60 days after the first visit.									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
		(1)	TON-S-193 Alt Name1: WD0106-328 Alt Name2: GAIA-DR3-5026963661794939520	RA: 01 08 36.0346 (17.1501442d) Dec: -32 37 43.38 (-32.62872d) Equinox: J2000	Proper Motion RA: 26.561 mas/yr Proper Motion Dec: -21.664 mas/yr Epoch of Position: 2000	V=15.26 FUV=15.22	Reference Frame: ICRS			
	Comments: Category=STAR Description=[DA, DZ] 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 (COS.ta.193 1884)	(1) TON-S-193	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				10 Secs (10 Secs)	
									[==>]	[1]
	2	SCIENCE O RBIT 1 (COS.sp.193 0366)	(1) TON-S-193	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 11; FP-POS=3			2056 Secs (2056 Secs)	
								[==>]	[1]	
3	SCIENCE O RBIT 2 (COS.sp.193 0366)	(1) TON-S-193	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 11; FP-POS=4			2055 Secs (2055 Secs)		
								[==>]	[2]	

