



18420 - Exploring the composition of the most aluminium-rich object accreting onto a white dwarf

Cycle: 34, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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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>
02	(1) WDJ063541.34-052430.64	COS/FUV	1	29-Jul-2026 13:00:55.0	yes

1 Total Orbits Used

ABSTRACT

The interior of low density rocky planets currently remains a mystery. Although there are theories that their interiors are dominated by carbon species or they are devoid of iron cores, there is no method to accurately probe their interior chemical compositions. However, white dwarfs accreting planetary material can be used to measure the chemical abundances of the accreted material. Their atmospheres are purely hydrogen or helium, hence measurements of any metal abundances can be used to determine the nature of planets in other systems.

We have identified a white dwarf which is accreting a planet(esimal) with an enormous aluminium enhancement, much greater than that of mantle or crustal material. This could indicate it is a fragment or a building block of a low density rocky planet dominated by aluminium oxide which formed under an extremely high temperature, where iron was lost resulting in a planet with no core. With our exploratory spectrum, we are unable to detect or place strict upper limits on oxygen and iron. Oxygen is vital to confirm it can form oxides which dominate the interior. A stricter upper limit on iron is necessary to confirm it contains little or no iron core. Additional species such as chromium or nickel will further constrain the core mass fraction. At the high temperature of this white dwarf, oxygen and iron only have strong transitions in the far-ultraviolet, so we require one orbit of COS spectroscopy to search for these absorption features.

OBSERVING DESCRIPTION

We aim to detect oxygen and iron in the atmosphere of a white dwarf with a very large aluminium abundance. We will use the COS G130M grating with a central wavelength of 1222Å which is sensitive to both oxygen and iron lines. We aim for a S/N ~ 30 at the lines of interest. All four FP-POS are used to minimise fixed pattern noise.

Proposal 18420 - WDJ063541.34-052430.64 (02) - Exploring the composition of the most aluminium-rich object accreting onto a white...

Visit	Proposal 18420, WDJ063541.34-052430.64 (02)								Wed Jul 29 17:00:55 GMT 2026	
	Diagnostic Status: No Diagnostics									
	Scientific Instruments: COS/FUV									
	Special Requirements: (none)									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(1)	WDJ063541.34-052430.64	RA: 06 35 41.3371 (98.9222379d) Dec: -05 24 30.63 (-5.40851d) Equinox: J2000	Proper Motion RA: -18.672 mas/yr Proper Motion Dec: 155.548 mas/yr Parallax: 0.0181656" Epoch of Position: 2000		V=14.3		Reference Frame: ICRS		
	Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.									
	SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.									
	Category=STAR Description=[DA] 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/PEAK XD (COS.sa.236 0521)	(1) WDJ063541.34-0 52430.64	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A	LIFETIME-POS=LP 7			2 Secs (2 Secs)	
									[==>]	[1]
	2	ACQ/PEAK D (COS.sa.236 0521)	(1) WDJ063541.34-0 52430.64	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	LIFETIME-POS=LP 7; STEP-SIZE=0.9; CENTER=DEF; NUM-POS=5			2 Secs (2 Secs)	
									[==>]	[1]
	3	G130M/122 2 (COS.sp.236 0524)	(1) WDJ063541.34-0 52430.64	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=ALL; LIFETIME-POS=L P7; BUFFER-TIME=21 8			250 Secs (805 Secs)	
									[==>200.0 Secs (Split 1)] [==>200.0 Secs (Split 2)] [==>200.0 Secs (Split 3)] [==>205.0 Secs (Split 4)]	[1]

