



# 16032 - A dusty outburst at WD0145+234: real-time disintegration of a massive rocky body?

Cycle: 27, Proposal Category: GO/DD

(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>
01	(1) WD-0145+234	COS/FUV COS/NUV	3	07-Nov-2019 17:01:39.0	yes
02	(1) WD-0145+234	COS/FUV COS/NUV	3	07-Nov-2019 17:01:40.0	yes

6 Total Orbits Used

## **ABSTRACT**

WD0145+234 was recently reported in the literature to have undergone an outburst in the mid-infrared. It previously was host to atmospheric pollution and infrared excess emission indicating that the white dwarf star was consuming a rocky body from its remnant planetary system. The infrared excess emission is now brighter by over a magnitude, likely due to a fresh disintegration event off of a massive rocky body. Such an event has never been observed before and it promises to revolutionize our understanding of the white dwarf pollution process if we can capitalize on it. While we have detected a few elements in optical spectroscopy, it is critical to obtain as soon as possible a complete inventory of the current atmospheric pollution such that we may chart its evolution as the infrared outburst progresses. It is our expectation that atmospheric line strengths will start to increase (due to a higher accretion rate from the recent infusion of fresh dust) and that we could possibly see a change in the overall composition of the accreted material. HST is the only facility in existence that can provide a baseline characterization of the rocky body composition and the total accretion rate before these changes begin to occur.

## **OBSERVING DESCRIPTION**

Our primary goal is to determine (or place tight upper limits on) the abundances in the atmosphere of WD0145+234 for a number of elements that are key to determine the nature of the disrupting parent body. In particular, we will probe for the presence of volatiles (C, O), crust elements (Al, Ti), mantle elements (Mg, Si), and core-elements (Cr, Mn, Fe, Ni). Modeling of absorption lines shows that the desired elements can be measured or sufficiently strongly constrained with observations in the 1130-1700 Angstrom range. We will perform medium spectral resolution ultraviolet spectroscopy with COS and the G130M+G160M gratings to cover the 1130-1700 Angstrom range. In accordance with the COS2025 policies, we will only use two FP-POS positions (3 and 4) for G130M observations.

For the GALEX-measured UV flux level of WD0145+234 (given in the target information area) it should be possible to obtain average S/N~35 in the 1130- 1700 Angstrom wavelength range with total on-source exposure time of approximately 7,500 seconds. These estimates are made using the COS ETC assuming standard background parameters and with a white dwarf spectral energy distribution matched to the parameters and flux level of our target. An average signal-to-noise ratio of ~35 for the 1130-1700 Angstrom wavelength range will enable detection or tight limits on the abundances of elements listed above. Our requested time estimates for COS are increased assuming 20 minutes of instrument overhead (including all acquisition and exposure overheads as suggested in the COS manual) per visit and 6 minutes of observatory overhead per orbit (spacecraft acquisition). In sum, we request 3 orbits for each instrument setup (G130M and G160M) and a total of 6 orbits for this project.

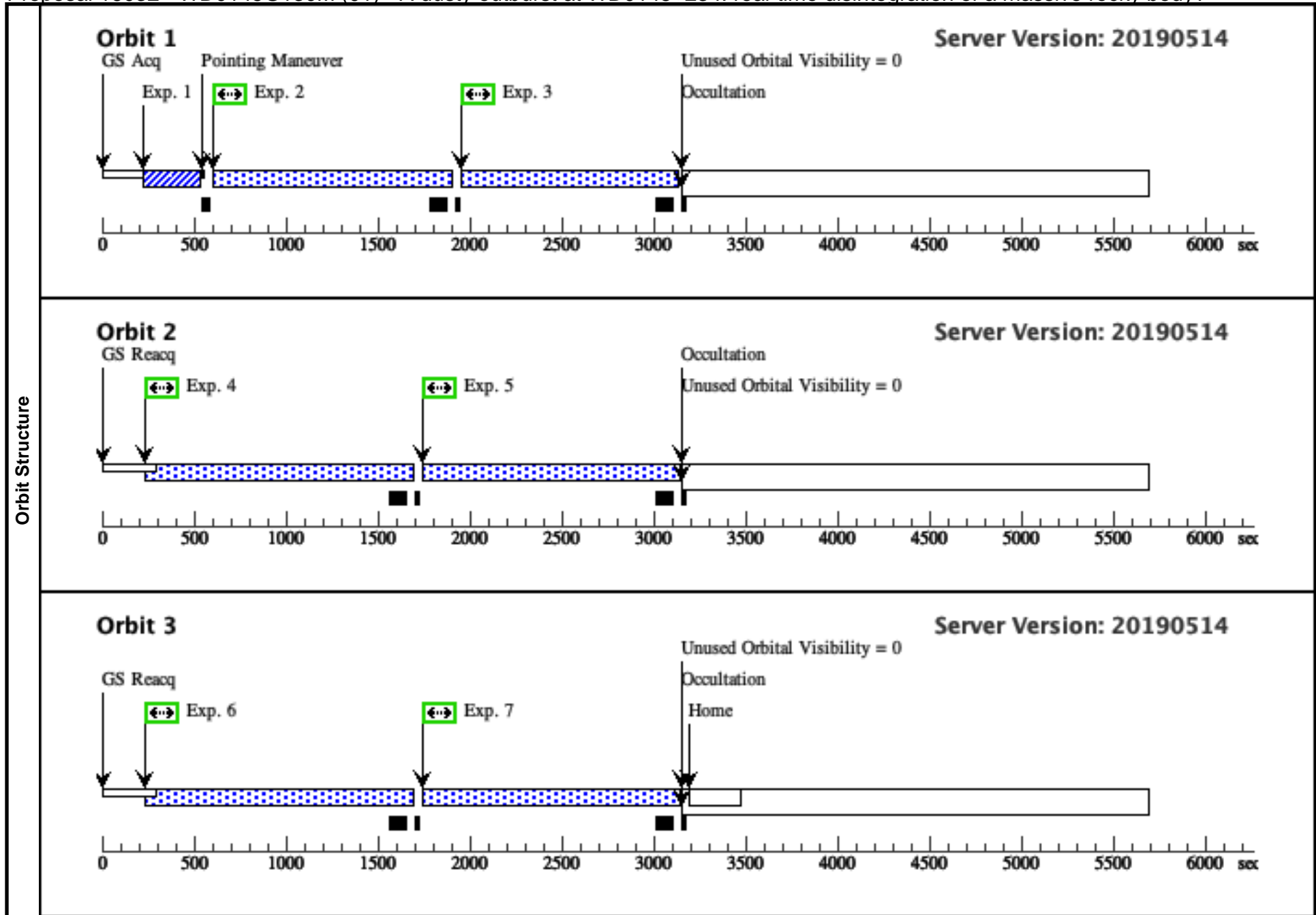
Observations will be done in the TIME-TAG mode using TAG-FLASH wavelength calibration.

The target white dwarf is an ICRS object (Gaia DR2 position with less than 0.4" positional uncertainty), has a measured UV flux, and is safe for the COS detectors in our desired setups.

Proposal 16032 - WD0145G130M (01) - A dusty outburst at WD0145+234: real-time disintegration of a massive rocky body?

Thu Nov 07 22:01:41 GMT 2019

<b>Visit</b>	<b>Proposal 16032, WD0145G130M (01)</b> <b>Diagnostic Status: Warning</b> Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none) <i>Comments: G130M COS/FUV observation of WD0145+234.</i>																																																																																								
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Proposal 16032 - WD0145G160M (02) - A dusty outburst at WD0145+234: real-time disintegration of a massive rocky body?

Thu Nov 07 22:01:41 GMT 2019

Visit	<b>Proposal 16032, WD0145G160M (02)</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none) <i>Comments: G160M COS/FUV observation of WD0145+234.</i>									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
		(1)	WD-0145+234	RA: 01 47 54.8118 (26.9783825d) Dec: +23 39 42.09 (23.66169d) Equinox: J2000	Proper Motion RA: -5.209 mas/yr Proper Motion Dec: -97.589 mas/yr Parallax: 0.0339471" Epoch of Position: 2015.5	V=14.19+/-0.02 mFUV=14.66	Reference Frame: ICRS			
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Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Imaging AC Q (COS.ta.139 1576)	(1) WD-0145+234	COS/NUV, ACQ/IMAGE, BOA	MIRRORA				40 Secs (40 Secs) [==>]	[1]
	2	G160M@16 00 FP-POS=1 (COS.sp.139 1526)	(1) WD-0145+234	COS/FUV, TIME-TAG, PSA	G160M 1600 A	BUFFER-TIME=99 7; FP-POS=1; FLASH=YES			1107 Secs (1107 Secs) [==>]	[1]
	3	G160M@16 00 FP-POS=2 (COS.sp.139 1526)	(1) WD-0145+234	COS/FUV, TIME-TAG, PSA	G160M 1600 A	BUFFER-TIME=99 7; FP-POS=2; FLASH=YES			1107 Secs (1107 Secs) [==>]	[1]
	4	G160M@16 11 FP-POS=1 (COS.sp.139 1527)	(1) WD-0145+234	COS/FUV, TIME-TAG, PSA	G160M 1611 A	BUFFER-TIME=12 33; FP-POS=1; FLASH=YES			1343 Secs (1343 Secs) [==>]	[2]
	5	G160M@16 11 FP-POS=2 (COS.sp.139 1527)	(1) WD-0145+234	COS/FUV, TIME-TAG, PSA	G160M 1611 A	BUFFER-TIME=12 33; FP-POS=2; FLASH=YES			1343 Secs (1343 Secs) [==>]	[2]
	6	G160M@16 23 FP-POS=1 (COS.sp.139 1528)	(1) WD-0145+234	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=12 33; FP-POS=1; FLASH=YES			1343 Secs (1343 Secs) [==>]	[3]
	7	G160M@16 23 FP-POS=2 (COS.sp.139 1528)	(1) WD-0145+234	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=12 33; FP-POS=2; FLASH=YES			1343 Secs (1343 Secs) [==>]	[3]

