14841 - Optimization of COS/FUV spectrum placement at lifetime position 4

Cycle: 23, Proposal Category: CAL/COS

(Availability Mode: RESTRICTED)

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	(2) WD0308-565 DARK NONE	COS COS/FUV COS/NUV S/C	3	07-Sep-2016 19:13:08.0	yes

3 Total Orbits Used

ABSTRACT

Predictions for the gain sag at the third lifetime position of COS require a move to the fourth lifetime position by July 2017. This program aims at obtaining deep (S/N = 60 per resel) exposures of WD0308-565 with G130M/1291 and G130M/1222 to optimize the location of LP4. We selected the 1222 and 1291 cenwaves because they have the widest footprint on the detector. To determine the position at which there is no overlap between the LP3 gain sagged areas and the LP4 profiles, we will will derive preliminary spectral profiles and compare their footprints to the underlying gain maps

obtained at the beginning of July (PID=14525).

OBSERVING DESCRIPTION

We are obtaining WD0308-565 spectra positioned at -2.52" (cross-dispersion) and +0" (dispersion) from LP3 to determine optimal placement of the spectra at LP4. Observations are taken with the G130M/1222 and G130M/1291 cenwaves, which have the widest footprints on the detector. Under the assumption of typical pointing uncertainties of 0.3", we seek to determine the position at which the G130M/1291 and G130M/1222 cenwaves can successfully be extracted against the LP3 gain sagged regions. These data will also provide preliminary cross-dispersion profiles and aperture traces.

The observations consists of one visit with three orbits. The G130M/1291 cenwave is observed at HV (FUVA/B)=163,163, and focus=+40 (with respect to LP3 focus), while the G130M/1222 cenwave is observed at HV (FUVA/B)=163,167, and focus=+142 (wrt LP3). Optimal values of HV and focus have been obtained from the analysis of the LP4 exploratory programs gain map program (PID: 14525) and mini focus sweep program (PID: 14527) ran at the beginning of July.

We assume a plate scale of -1"/21 motor steps in the XAPER (cross-dispersion) direction and 1"/19 motor steps in the YAPER (dispersion) direction, following Table 1 of TIR 2013-03, and we set the home position to LP3 so XAPER and YAPER are relative to that position.

Our target is a total S/N of ~60 across all FP-POS at 1210 Angstroms for G130M/1291, and at 1130 Angstroms for G130M/1222 to ensure adequate spectral extraction near sagged regions of the FUVB segment.

=================== Note ==========================
We request the data to be fast tracked once the execution is complete.

Visit	**Proposal 14841, G130M/1291-G130M//1222 (01), implementation**	Wed Sep 07 23:13:09 GMT 2016

Diagnostic Status: Warning

Scientific Instruments: S/C, COS, COS/FUV, COS/NUV

Special Requirements: SCHED 100% ; BEFORE 06-SEP-2016:00:00:00

Comments: Use HV levels=163/163 for G130M/1291, and HV levels=163/167 for G130M/1222 and take external exposures of WD 0308-565 at aperture position = -2.52" away from LP3.

First exposure is an ACQ/IMAGE, which should provide very good acquisition and positioning of the spectrum. This is followed by a short science exposure to define the reference point for subsequent ALIGN/APER exposures. The first ALIGN/APER moves the AM by -2.52", assuming -21 motor steps/".

Buffer times are equivalent to the ETC returned values multiplied by 0.9 as a safety margin. Based on the FUV monitoring programs, we do not use the 2/3 safety margin based on the fact that the target has been observed before and its SED is well characterized.

Diagnostics

(G130M/1291-G130M//1222 (01)) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE

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(G130M/1291-G130M//1222 (01)) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE NO ORIENT

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(G130M/1291-G130M//1222 (01)) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	WD0308-565	RA: 03 09 47.9200 (47.4496667d)	Proper Motion RA: 150.6 mas/yr	V=14.07+/-0.02	Reference Frame: ICRS
	Alt Name1: GSC08495-00951	Dec: -56 23 49.41 (-56.39706d)	Proper Motion Dec: 64.3 mas/yr		
		Equinox: J2000	Epoch of Position: 2000		
	Alt Name2: 3UC068-006526		Radial Velocity: -68 km/sec		

Comments: Position and proper motions from the Third U.S. Naval Observatory CCD Astrograph Catalog (UCAC3) Zacharias et al. 2009
Extended=NO

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	HVA 163; H VB 163	DARK	S/C, DATA, NONE			SAA CONTOUR 31; SPEC COM INSTR ELHLTHVF; QASISTATES COS FUV HVLOW HVN OM; QESIPARM ENDC TSB 163; QESIPARM ENDC TSA 163; QESIPARM SEGM ENT AB		244 Secs (244 Secs) [==>]	[1]

Comments: SQL required for qexposure to specify the si_used = "COS"

The overhead on this exposure can actually be hidden under the guide star exposure and the previous occultation, but this is not reflected by APT and so the visits do not appear to fit within the allocated orbits..

Overhead on the ramp-up is calculated per Alan Welty's stated formula for the timing:

exptime=55+SECPERCT x (MAX(ENDCTSA,ENDCTSB)-100)

SECPERCT=3 s
MAX(ENDCTSA,ENDCTSB)= 163

exptime=244

Notes: 1. Special observation requirement SAA = 31 needed whenever executing special commands (SAA = 31 is implicitly assumed for all standard COS commands). 2. Once HV is set through S/C only another S/C command or end of OBSET can override it (no need to reset HV after OSM move).

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
2	ACQ/IM (826629)	(2) WD0308-565	COS/NUV, ACQ/IMAGE, BOA	MIRRORA				42 Secs (42 Secs) [==>]	[1]
3	G130M/1291 Setup (COS.sp.826631)	(2) WD0308-565	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=290			12 Secs (12 Secs) [==>]	[1]
4	move -2.52 arcsec (XD) +0 arcsec(D) from LP3 (0)	NONE	COS, ALIGN/APER		XAPER=53; YAPER=0			0.0 Secs (0 Secs) [==>]	[1]

Comments: Assume - 21 motor steps/" for XAPER (X-Dispersion)
Assume - 19 motor steps/" for YAPER (Dispersion)

Note: once the APM is moved it will not be reset as long as the config (COS/FUV) and aperture & LP (PSA, LP3) don't change (from Alan Welty's email).

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
5	FOCUS adjust 1291	NONE	COS, ALIGN/OSM		FOCUS=40			0 Secs (0 Secs) [==>]	[1]
6	G130M/1291 (COS.sp.826631)	(2) WD0308-565	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=290; FLASH=S0060D030	POS TARG null,-2.52		468 Secs (468 Secs) [==>]	[1]
7	G130M/1291 (COS.sp.826631)	(2) WD0308-565	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=2; BUFFER-TIME=290; FLASH=S0060D030	POS TARG null,-2.52		468 Secs (468 Secs) [==>]	[1]

Exposures

8	G130M/1291 (COS.sp.826631)	(2) WD0308-565	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=290; FLASH=S0060D030	POS TARG null,-2.5 2	468 Secs (468 Secs) [==>]	[1]
9	G130M/1291 (COS.sp.826631)	(2) WD0308-565	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=290; FLASH=S0060D030	POS TARG null,-2.5 2	468 Secs (468 Secs) [==>]	[2]
10	HVA 163; HVB 167	H DARK	S/C, DATA, NONE			SAA CONTOUR 31; SPEC COM INSTR ELHVADJPROP; QESIPARM ENDC TSB 167	44 Secs (44 Secs) [==>]	[2]

Comments: Set HV to 163/167.

Exposure time has been calculated following the rule by Alan Welty:

If neither segment is being set higher: Exp time = 39 s

*Else: Exp time = 39 + ceiling (max_upward_count_delta * 1.1)*

*HV change (167-163) = 4 for Segment B. Therefore, exposure time is 39 seconds + ceiling(4*1.1) = 44 seconds*

Notes: Special observation requirement SAA = 31 needed whenever executing special commands (SAA = 31 is implicetly assumed for all standard COS commands).

11	Initialize G130M/1222 focus (COS.sp.826632)	(2) WD0308-565	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=1; BUFFER-TIME=354; FLASH=NO; WAVECAL=NO	POS TARG null,-2.5 2	0.1 Secs (0.1 Secs) [==>]	[2]

Comments: Note: OSM move does not trigger HV or aperture change

12	FOCUS adjust 1222	NONE	COS, ALIGN/OSM		FOCUS=142		0 Secs (0 Secs) [==>]	[2]
13	G130M/1222 (COS.sp.826632)	(2) WD0308-565	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=1; BUFFER-TIME=354; FLASH=S0250D100	POS TARG null,-2.5 2	865 Secs (865 Secs) [==>]	[2]
14	G130M/1222 (COS.sp.826632)	(2) WD0308-565	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=2; BUFFER-TIME=354; FLASH=S0250D100	POS TARG null,-2.5 2	865 Secs (865 Secs) [==>]	[2]
15	G130M/1222 (COS.sp.826632)	(2) WD0308-565	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; BUFFER-TIME=354; FLASH=S0250D100	POS TARG null,-2.5 2	1000 Secs (1000 Secs) [==>]	[3]

| 16 | G130M/122 2 (COS.sp.826 632) | (2) WD0308-565 | COS/FUV, TIME-TAG, PSA | G130M 1222 A | FP-POS=4; BUFFER-TIME=35 4; FLASH=S0250D10 0 | POS TARG null,-2.5 2 | 1000 Secs (1000 Secs) [==>] | [3] |
| 17 | Return to no minal HV va lues: HVA 1 67; HVB 16 9 | DARK | S/C, DATA, NONE | | | SAA CONTOUR 31; SPEC COM INSTR ELHVADJPROP; QESIPARM ENDC TSB 169; QESIPARM ENDC TSA 167 | 44 Secs (44 Secs) [==>] | [3] |

Comments: Return to nominal HV 167/169 (from 163/167).

Exposure time has been calculated following the rule by Alan Welty:

If neither segment is being set higher: Exp time = 39 s

*Else: Exp time = 39 + ceiling (max_upward_count_delta * 1.1)*

*HV change (167-163) = 4 for Segment A, HV change (169-167) = 2 for Segment B. Therefore, exposure time is 39 seconds + ceiling(4*1.1) = 44 seconds*

Notes: Special observation requirement SAA = 31 needed whenever executing special commands (SAA = 31 is implicetly assumed for all standard COS commands).

Orbit Structure