



14929 - COS/FUV LP4 Focus Sweep - New G130M/1223 Cenwave

Cycle: 24, Proposal Category: CAL/COS

(Availability Mode: RESTRICTED)

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) V-KL-UMA NONE	COS COS/FUV COS/NUV	2	10-May-2017 21:05:37.0	yes
51	(1) V-KL-UMA NONE	COS COS/FUV COS/NUV	2	10-May-2017 21:05:46.0	yes

4 Total Orbits Used

ABSTRACT

This program will determine the optimal focus of the new COS/FUV/G130M/1223 setting at Lifetime Position 4 (LP4) using segment FUVB only. A focus sweep with G130M/1222/FUVB only was conducted at LP4 in program 14527, in the exploratory phase of the LP4 preparations, and the visit design here closely follows that earlier program. The program will scan around the expected best focus value of -350 to -200 from the G130M/1222/LP4 focus, as determined by a ray-trace model prediction.

OBSERVING DESCRIPTION

This program will perform a focus sweep at LP4 with G130M/1222 (FUVA only) and FP-POS=3. An ACQ/IMAGE with BOA/MIRRORA is used to acquire the target. At each position in the focus sweep, the LIFETIME_POS optional parameter is used to set the aperture position and voltages, and the FOCUS optional parameter is used to set the focus position.

The LP4 FSW 1222 focus value is -879. Raytraces suggest that the cenwave is best focused somewhere in the range from -350 to -200 from the 1222 setting, depending on what wavelength the resolving power is maximized. As a result, the pattern is offset from zero so that the focus sweep runs from -1150 to +850, with 100 or 200 focus steps between each exposure.

In absolute focus units, the pattern goes from $-879-1150 = -2029$ (> -2200 , the lower limit) and $-879+850 = -29$.

At the end of the focus sweep, exposures are taken at an additional FP-POS in order to determine if Lyman-alpha still falls in the gap at the estimated focus position.

Proposal 14929 - G130M 1223 LP4 focus (01) - COS/FUV LP4 Focus Sweep - New G130M/1223 Cenwave

Visit	<p>Proposal 14929, G130M_1223_LP4_focus (01), completed Thu May 11 01:05:48 GMT 2017</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: COS, COS/FUV, COS/NUV</p> <p>Special Requirements: SCHED 100%</p>																								
Diagnostics	<p>(G130M_1223_LP4_focus (01)) Warning (Form): For the best data quality, it is strongly recommended that all four FP-POS positions be used when observing at a given COS CENWAVE setting.</p>																								
Fixed Targets	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>V-KL-UMA</td> <td>RA: 11 47 14.4900 (176.8103750d)</td> <td>Proper Motion RA: 0.00333 sec of time/yr</td> <td>V=13.28</td> <td>Reference Frame: ICRS</td> </tr> <tr> <td></td> <td>Alt Name1: FEIGE48</td> <td>Dec: +61 15 31.80 (61.25883d)</td> <td>Proper Motion Dec: 0</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>Equinox: J2000</td> <td>Epoch of Position: 2000</td> <td></td> <td></td> </tr> </tbody> </table> <p><i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i></p> <p><i>Extended=NO</i></p>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	V-KL-UMA	RA: 11 47 14.4900 (176.8103750d)	Proper Motion RA: 0.00333 sec of time/yr	V=13.28	Reference Frame: ICRS		Alt Name1: FEIGE48	Dec: +61 15 31.80 (61.25883d)	Proper Motion Dec: 0					Equinox: J2000	Epoch of Position: 2000		
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Proposal 14929 - G130M 1223 LP4 focus (01) - COS/FUV LP4 Focus Sweep - New G130M/1223 Cenwave

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
Exposures	1	ACQ/IMAG E (COS.ta.913 463)	(1) V-KL-UMA	COS/NUV, ACQ/IMAGE, BOA	MIRRORA			16 Secs (16 Secs) [==>]	[1]	
	<p><i>Comments: S/N=60. ACQ/IMAGE. This target has been observed with this configuration in 14527 with the following counts and slew % TEST_LTAIMAGE: Msrd slew was [AD,XD] = [-0.326,0.769]" % TEST_LTAIMAGE: Final BOA Final Pointing ERROR was = [-2.126,1.599] p % TEST_LTAIMAGE: Final BOA Final Pointing ERROR was = [-0.050,0.038] " % TEST_LTAIMAGE: Estimated background over image = 3998 % TEST_LTAIMAGE: Estimated background over the trimmed image = 410 % TEST_LTAIMAGE: Bck subtracted counts in first image = 2324 ; S/N = 48.20 % TEST_LTAIMAGE: Bck subtracted counts in second image = 3597 ; S/N = 59.97</i></p>									
	2	Initialization Exposure (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4; FLASH=NO; WAVECAL=NO			0.1 Secs (0.1 Secs) [==>]	[1]
	<p><i>Comments: Initialization exposure to set the zero point of the focus sweep to the G130M/1222/LP4 value (absolute position of -879)</i></p>									
	3	Move to 0-3 50	NONE	COS, ALIGN/OSM		FOCUS=-350			0 Secs (0 Secs) [==>]	[1]
	<p><i>Comments: Set focus to -350 from the G130M/1222 focus position</i></p>									
	4	1222_A_f-0 -FPPOS3 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4			100 Secs (100 Secs) [==>]	[1]
<p><i>Comments: 100 seconds gives S/N = 29 @ 1310A. Count rate segment A: 19436 cts/sec. Therefore buffer fills in 2.35e6/19436 = 121 sec. 2/3x121=80s, and for 80 < B/T_2/3 < 110, use 111s for buffer time (from COS IHB)</i></p> <p><i>This exposure is a standard LP4 C1222 exposure at the LP4 focus value of -879-350, taken as a baseline, but it can be used in the focus sweep.</i></p>										
5	Move to -80 0-350	NONE	COS, ALIGN/OSM		FOCUS=-1150			0 Secs (0 Secs) [==>]	[1]	
<p><i>Comments: Focus position is -350 - 800 = -1150 relative to the G130M/1222/LP4 focus</i></p>										
6	1222_A_f-8 00 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4			100 Secs (100 Secs) [==>]	[1]	
7	Move to -60 0-350	NONE	COS, ALIGN/OSM		FOCUS=-950			0 Secs (0 Secs) [==>]	[1]	
<p><i>Comments: Focus position is -350 - 600 = -950 relative to the G130M/1222/LP4 focus</i></p>										

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8	1222_A_f-6 00 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[1]
9	Move to -40 0-350	NONE	COS, ALIGN/OSM		FOCUS=-750	0 Secs (0 Secs) [==>]	[1]
<i>Comments: Focus position is -350 - 400 = -750 relative to the G130M/1222/LP4 focus</i>							
10	1222_A_f-4 00 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[1]
11	Move to -20 0-350	NONE	COS, ALIGN/OSM		FOCUS=-550	0 Secs (0 Secs) [==>]	[1]
<i>Comments: Focus position is -350 - 200 = -550 relative to the G130M/1222/LP4 focus</i>							
12	1222_A_f-2 00 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[1]
13	Move to -10 0-350	NONE	COS, ALIGN/OSM		FOCUS=-450	0 Secs (0 Secs) [==>]	[1]
<i>Comments: Focus position is -350 - 100 = -450 relative to the G130M/1222/LP4 focus</i>							
14	1222_A_f-1 00 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[1]
15	Move to 0-3 50	NONE	COS, ALIGN/OSM		FOCUS=-350	0 Secs (0 Secs) [==>]	[1]
<i>Comments: Focus position is -350 - 0 = -350 relative to the G130M/1222/LP4 focus</i>							
16	1222_A_f-0 -FPPOS3 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[1]
17	Move to +10 0-350	NONE	COS, ALIGN/OSM		FOCUS=-250	0 Secs (0 Secs) [==>]	[1]
<i>Comments: Focus position is -350 + 100 = -250 relative to the G130M/1222/LP4 focus</i>							

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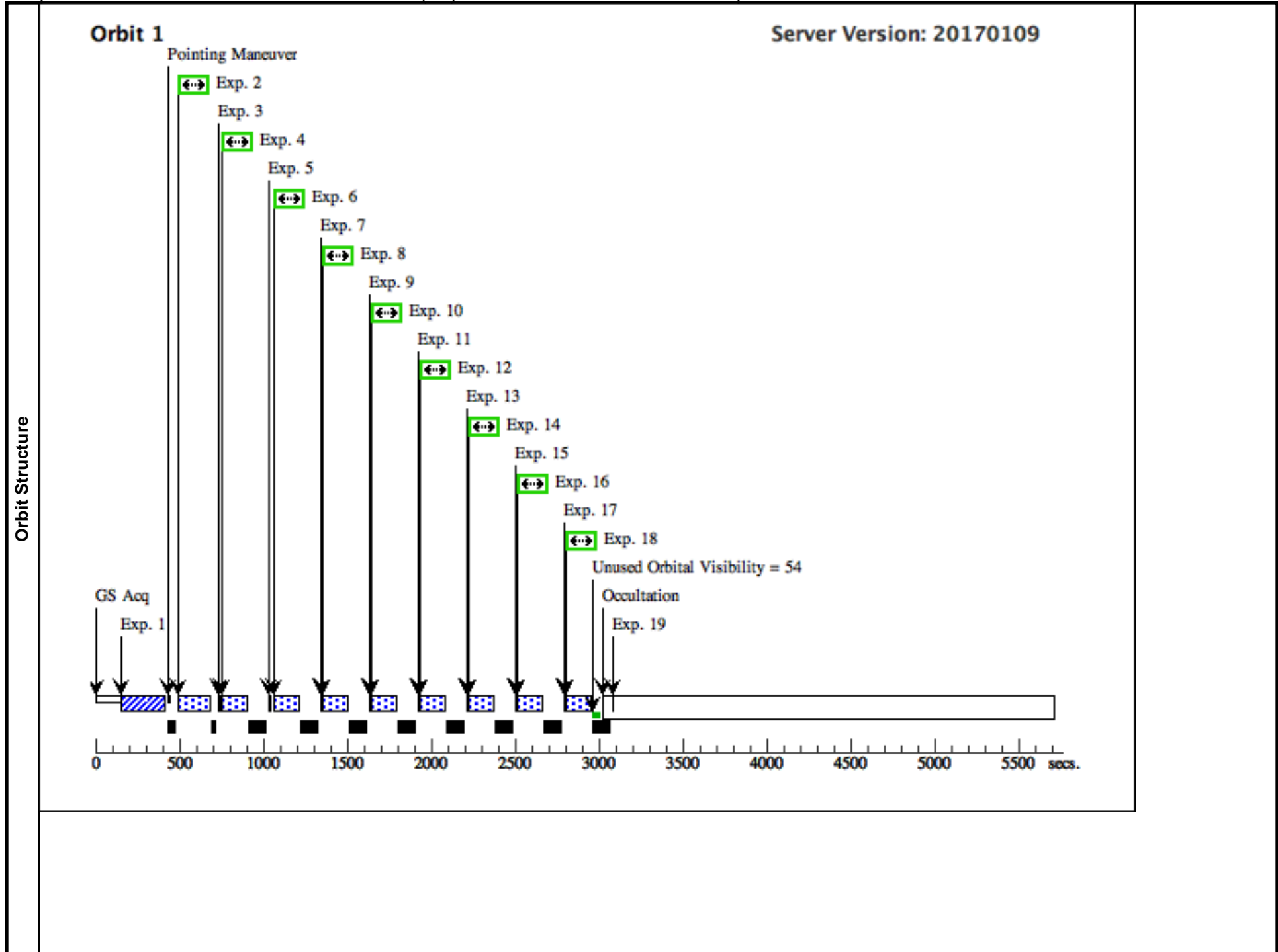
18	1222_A_f+1 00 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[1]
19	Move to +20 0-350	NONE	COS, ALIGN/OSM		FOCUS=-150	0 Secs (0 Secs) [==>]	[1]
<i>Comments: Focus position is -350 + 200 = -150 relative to the G130M/1222/LP4 focus</i>							
20	1222_A_f+2 00 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
21	Move to +30 0-350	NONE	COS, ALIGN/OSM		FOCUS=-50	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Focus position is -350 + 300 = -50 relative to the G130M/1222/LP4 focus</i>							
22	1222_A_f+3 00 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
23	Move to +40 0-350	NONE	COS, ALIGN/OSM		FOCUS=+50	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Focus position is -350 + 400 = +50 relative to the G130M/1222/LP4 focus</i>							
24	1222_A_f+4 00 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
25	Move to +50 0-350	NONE	COS, ALIGN/OSM		FOCUS=+150	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Focus position is -350 + 500 = +150 relative to the G130M/1222/LP4 focus</i>							
26	1222_A_f+5 00 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
27	Move to +60 0-350	NONE	COS, ALIGN/OSM		FOCUS=+250	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Focus position is -350 + 600 = +250 relative to the G130M/1222/LP4 focus</i>							

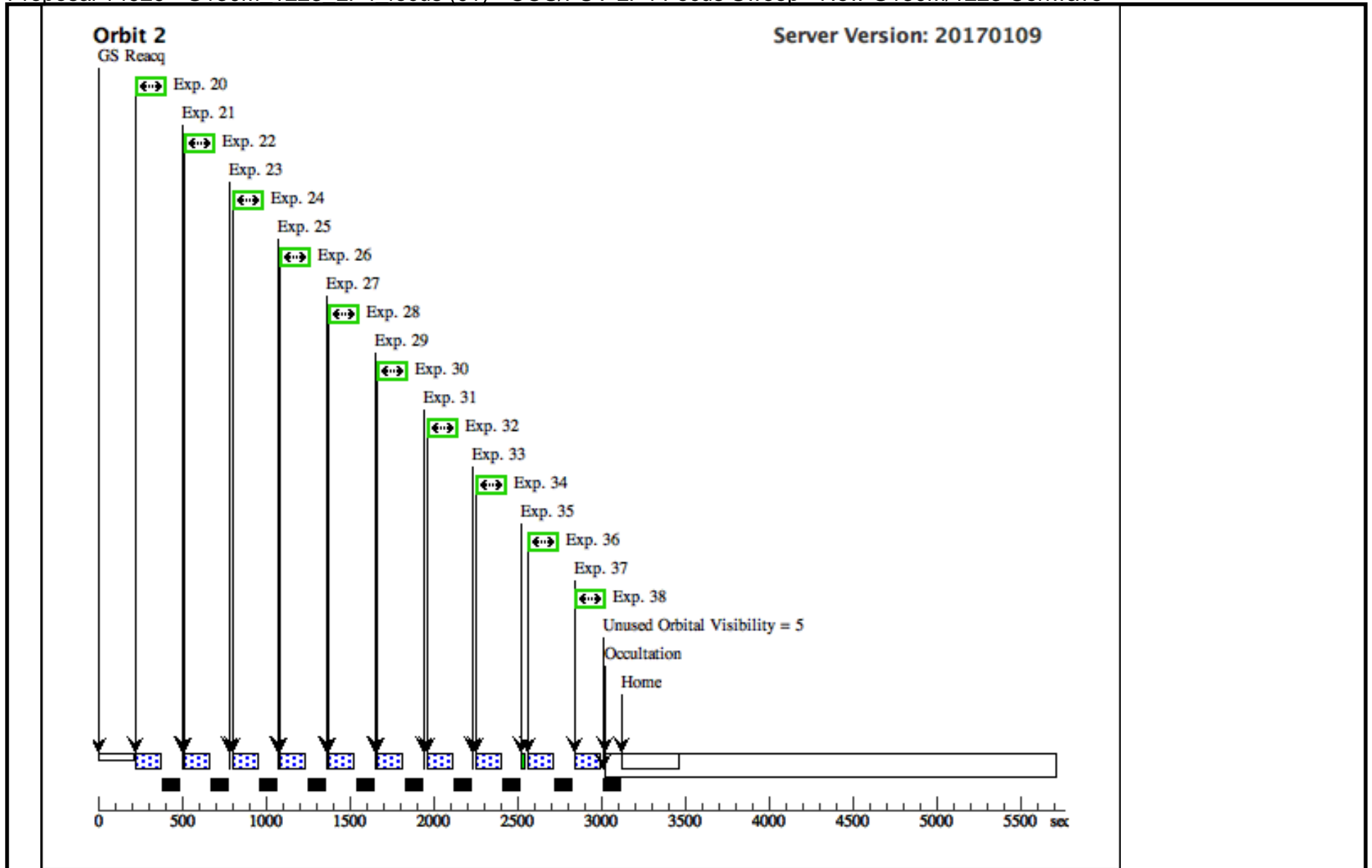
Proposal 14929 - G130M 1223 LP4 focus (01) - COS/FUV LP4 Focus Sweep - New G130M/1223 Cenwave

28	1222_A_f+6 (1) V-KL-UMA 00 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
29	Move to +80 NONE 0-350	COS, ALIGN/OSM		FOCUS=+450	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Focus position is -350 + 800 = +450 relative to the G130M/1222/LP4 focus</i>						
30	1222_A_f+8 (1) V-KL-UMA 00 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
31	Move to +10 NONE 00-350	COS, ALIGN/OSM		FOCUS=+650	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Focus position is -350 + 1000 = +650 relative to the G130M/1222/LP4 focus</i>						
32	1222_A_f+1 (1) V-KL-UMA 000 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
33	Move to +12 NONE 00-350	COS, ALIGN/OSM		FOCUS=+850	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Focus position is -350 + 1200 = +850 relative to the G130M/1222/LP4 focus</i>						
34	1222_A_f+1 (1) V-KL-UMA 200 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
35	Move to 0-3 NONE 50	COS, ALIGN/OSM		FOCUS=-350	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Set focus back to -350 from the G130M/1222 focus position</i>						
36	1222_A_f-0 (1) V-KL-UMA -FPPOS3 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
<i>Comments: Repeat of the initial reference exposure</i>						
37	Move to 0-3 NONE 50	COS, ALIGN/OSM		FOCUS=-350	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Set focus to -350 from the G130M/1222 focus position</i>						

Proposal 14929 - G130M 1223 LP4 focus (01) - COS/FUV LP4 Focus Sweep - New G130M/1223 Cenwave

38	1222_A_f-0 (1) V-KL-UMA -FPPOS4 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=4; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
<i>Comments: Exposure at FP-POS=4 to verify that Lyman-alpha will be in the gap for G130M/1223</i>						





Proposal 14929 - G130M 1223 LP4 focus (51) - COS/FUV LP4 Focus Sweep - New G130M/1223 Cenwave

Visit	Proposal 14929, G130M_1223_LP4_focus (51), implementation Thu May 11 01:05:48 GMT 2017 Diagnostic Status: Warning Scientific Instruments: COS, COS/FUV, COS/NUV Special Requirements: SCHED 100%																													
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#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/IMAG E (COS.ta.913 463)	(1) V-KL-UMA	COS/NUV, ACQ/IMAGE, BOA	MIRRORA		GS ACQ SCENARI O BASE1B3		16 Secs (16 Secs) [==>]	[1]
<p><i>Comments: S/N=60. ACQ/IMAGE. This target has been observed with this configuration in 14527 with the following counts and slew % TEST_LTAIMAGE: Msrd slew was [AD,XD] = [-0.326,0.769]" % TEST_LTAIMAGE: Final BOA Final Pointing ERROR was = [-2.126,1.599] p % TEST_LTAIMAGE: Final BOA Final Pointing ERROR was = [-0.050,0.038] " % TEST_LTAIMAGE: Estimated background over image = 3998 % TEST_LTAIMAGE: Estimated background over the trimmed image = 410 % TEST_LTAIMAGE: Bck subtracted counts in first image = 2324 ; S/N = 48.20 % TEST_LTAIMAGE: Bck subtracted counts in second image = 3597 ; S/N = 59.97</i></p>									
2	Initialization Exposure (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4; FLASH=NO; WAVECAL=NO			0.1 Secs (0.1 Secs) [==>]	[1]
<p><i>Comments: Initialization exposure to set the zero point of the focus sweep to the G130M/1222/LP4 value (absolute position of -879)</i></p>									
3	Move to 0-3 50	NONE	COS, ALIGN/OSM		FOCUS=-350			0 Secs (0 Secs) [==>]	[1]
<p><i>Comments: Set focus to -350 from the G130M/1222 focus position</i></p>									
4	1222_A_f-0 -FPPOS3 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4			100 Secs (100 Secs) [==>]	[1]
<p><i>Comments: 100 seconds gives S/N = 29 @ 1310A. Count rate segment A: 19436 cts/sec. Therefore buffer fills in 2.35e6/19436 = 121 sec. 2/3x121=80s, and for 80 < B/T_2/3 < 110, use 111s for buffer time (from COS IHB)</i></p> <p><i>This exposure is a standard LP4 C1222 exposure at the LP4 focus value of -879-350, taken as a baseline, but it can be used in the focus sweep.</i></p>									
5	Move to -80 0-350	NONE	COS, ALIGN/OSM		FOCUS=-1150			0 Secs (0 Secs) [==>]	[1]
<p><i>Comments: Focus position is -350 - 800 = -1150 relative to the G130M/1222/LP4 focus</i></p>									
6	1222_A_f-8 00 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4			100 Secs (100 Secs) [==>]	[1]
7	Move to -60 0-350	NONE	COS, ALIGN/OSM		FOCUS=-950			0 Secs (0 Secs) [==>]	[1]
<p><i>Comments: Focus position is -350 - 600 = -950 relative to the G130M/1222/LP4 focus</i></p>									

Proposal 14929 - G130M 1223 LP4 focus (51) - COS/FUV LP4 Focus Sweep - New G130M/1223 Cenwave

8	1222_A_f-6 00 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[1]
9	Move to -40 0-350	NONE	COS, ALIGN/OSM		FOCUS=-750	0 Secs (0 Secs) [==>]	[1]
<i>Comments: Focus position is -350 - 400 = -750 relative to the G130M/1222/LP4 focus</i>							
10	1222_A_f-4 00 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[1]
11	Move to -20 0-350	NONE	COS, ALIGN/OSM		FOCUS=-550	0 Secs (0 Secs) [==>]	[1]
<i>Comments: Focus position is -350 - 200 = -550 relative to the G130M/1222/LP4 focus</i>							
12	1222_A_f-2 00 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[1]
13	Move to -10 0-350	NONE	COS, ALIGN/OSM		FOCUS=-450	0 Secs (0 Secs) [==>]	[1]
<i>Comments: Focus position is -350 - 100 = -450 relative to the G130M/1222/LP4 focus</i>							
14	1222_A_f-1 00 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[1]
15	Move to 0-3 50	NONE	COS, ALIGN/OSM		FOCUS=-350	0 Secs (0 Secs) [==>]	[1]
<i>Comments: Focus position is -350 - 0 = -350 relative to the G130M/1222/LP4 focus</i>							
16	1222_A_f-0 -FPPOS3 (COS.sp.913 465)	(1) V-KL-UMA	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[1]
17	Move to +10 0-350	NONE	COS, ALIGN/OSM		FOCUS=-250	0 Secs (0 Secs) [==>]	[1]
<i>Comments: Focus position is -350 + 100 = -250 relative to the G130M/1222/LP4 focus</i>							

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18	1222_A_f+1 (1) V-KL-UMA 00 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[1]
19	Move to +20 NONE 0-350	COS, ALIGN/OSM		FOCUS=-150	0 Secs (0 Secs) [==>]	[1]
<i>Comments: Focus position is -350 + 200 = -150 relative to the G130M/1222/LP4 focus</i>						
20	1222_A_f+2 (1) V-KL-UMA 00 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
21	Move to +30 NONE 0-350	COS, ALIGN/OSM		FOCUS=-50	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Focus position is -350 + 300 = -50 relative to the G130M/1222/LP4 focus</i>						
22	1222_A_f+3 (1) V-KL-UMA 00 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
23	Move to +40 NONE 0-350	COS, ALIGN/OSM		FOCUS=+50	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Focus position is -350 + 400 = +50 relative to the G130M/1222/LP4 focus</i>						
24	1222_A_f+4 (1) V-KL-UMA 00 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
25	Move to +50 NONE 0-350	COS, ALIGN/OSM		FOCUS=+150	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Focus position is -350 + 500 = +150 relative to the G130M/1222/LP4 focus</i>						
26	1222_A_f+5 (1) V-KL-UMA 00 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
27	Move to +60 NONE 0-350	COS, ALIGN/OSM		FOCUS=+250	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Focus position is -350 + 600 = +250 relative to the G130M/1222/LP4 focus</i>						

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28	1222_A_f+6 (1) V-KL-UMA 00 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
29	Move to +80 NONE 0-350	COS, ALIGN/OSM		FOCUS=+450	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Focus position is -350 + 800 = +450 relative to the G130M/1222/LP4 focus</i>						
30	1222_A_f+8 (1) V-KL-UMA 00 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
31	Move to +10 NONE 00-350	COS, ALIGN/OSM		FOCUS=+650	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Focus position is -350 + 1000 = +650 relative to the G130M/1222/LP4 focus</i>						
32	1222_A_f+1 (1) V-KL-UMA 000 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
33	Move to +12 NONE 00-350	COS, ALIGN/OSM		FOCUS=+850	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Focus position is -350 + 1200 = +850 relative to the G130M/1222/LP4 focus</i>						
34	1222_A_f+1 (1) V-KL-UMA 200 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
35	Move to 0-3 NONE 50	COS, ALIGN/OSM		FOCUS=-350	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Set focus back to -350 from the G130M/1222 focus position</i>						
36	1222_A_f-0 (1) V-KL-UMA -FPPOS3 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
<i>Comments: Repeat of the initial reference exposure</i>						
37	Move to 0-3 NONE 50	COS, ALIGN/OSM		FOCUS=-350	0 Secs (0 Secs) [==>]	[2]
<i>Comments: Set focus to -350 from the G130M/1222 focus position</i>						

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38	1222_A_f-0 (1) V-KL-UMA -FPPOS4 (COS.sp.913 465)	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=4; SEGMENT=A; BUFFER-TIME=11 1; LIFETIME-POS=L P4	100 Secs (100 Secs) [==>]	[2]
<i>Comments: Exposure at FP-POS=4 to verify that Lyman-alpha will be in the gap for G130M/1223</i>						

