



13407 - COS Gas Flows: Challenging the Optical Perspective

Cycle: 21, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
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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) IRAS00262+4251	ACS/SBC WFC3/UVIS	1	21-Jan-2014 21:16:17.0	yes
02	(4) IRAS16487+5447	ACS/SBC WFC3/UVIS	1	21-Jan-2014 21:16:27.0	yes
03	(2) IRAS09583+4714-POSB	COS/FUV	1	21-Jan-2014 21:16:37.0	yes
04	(3) IRAS16474+3430 (5) IRAS16474+3430-OFFSET	COS/FUV COS/NUV	1	21-Jan-2014 21:16:45.0	yes
05	(6) IRAS00262+4251-OFFSET (8) IRAS00262+4251-TWEAK	COS/FUV COS/NUV	1	21-Jan-2014 21:16:52.0	yes
06	(7) IRAS16487+5447-OFFSET (9) IRAS16487+5447-TWEAK	COS/FUV COS/NUV	1	21-Jan-2014 21:16:59.0	yes

6 Total Orbits Used

ABSTRACT

Observations of the hydrogen Ly α profile in galaxy spectra uniquely distinguish outflowing and inflowing gas. Recent COS observations of ultraluminous starbursts show the telltale signature of infalling neutral hydrogen. A radiative transfer calculation that models the profiles of Lyman series lines predicts broad scattering wings on the hydrogen Balmer lines, but the origin of the scattered Balmer emission is only unique when the Ly β profile is also fit. We show a strong kinematic similarity between the broad wings of the Ly α and Ha line profiles in ULIRG spectra raising the suggestion that the sign of the gas flows producing the broad Ha wings may have been previously misinterpreted. We propose very blue G130M spectroscopy with COS to obtain the Ly β line profiles for four starburst galaxies with the aim of establishing the correct interpretation of the broad Balmer line wings in starburst spectra.

Radiative transfer modeling has focused primarily on reproducing the Ly α line shape. Calculating the Ly α and Ha line profiles simultaneously in principle eliminates degeneracies in model parameters. However, the addition of spectroscopy covering Ly β can significantly improve the constraints obtained from radiative transfer modeling; but because of the lack of data, no one has done this thus far. The Hubble Ultraviolet Initiative should ensure that these data exist.

OBSERVING DESCRIPTION

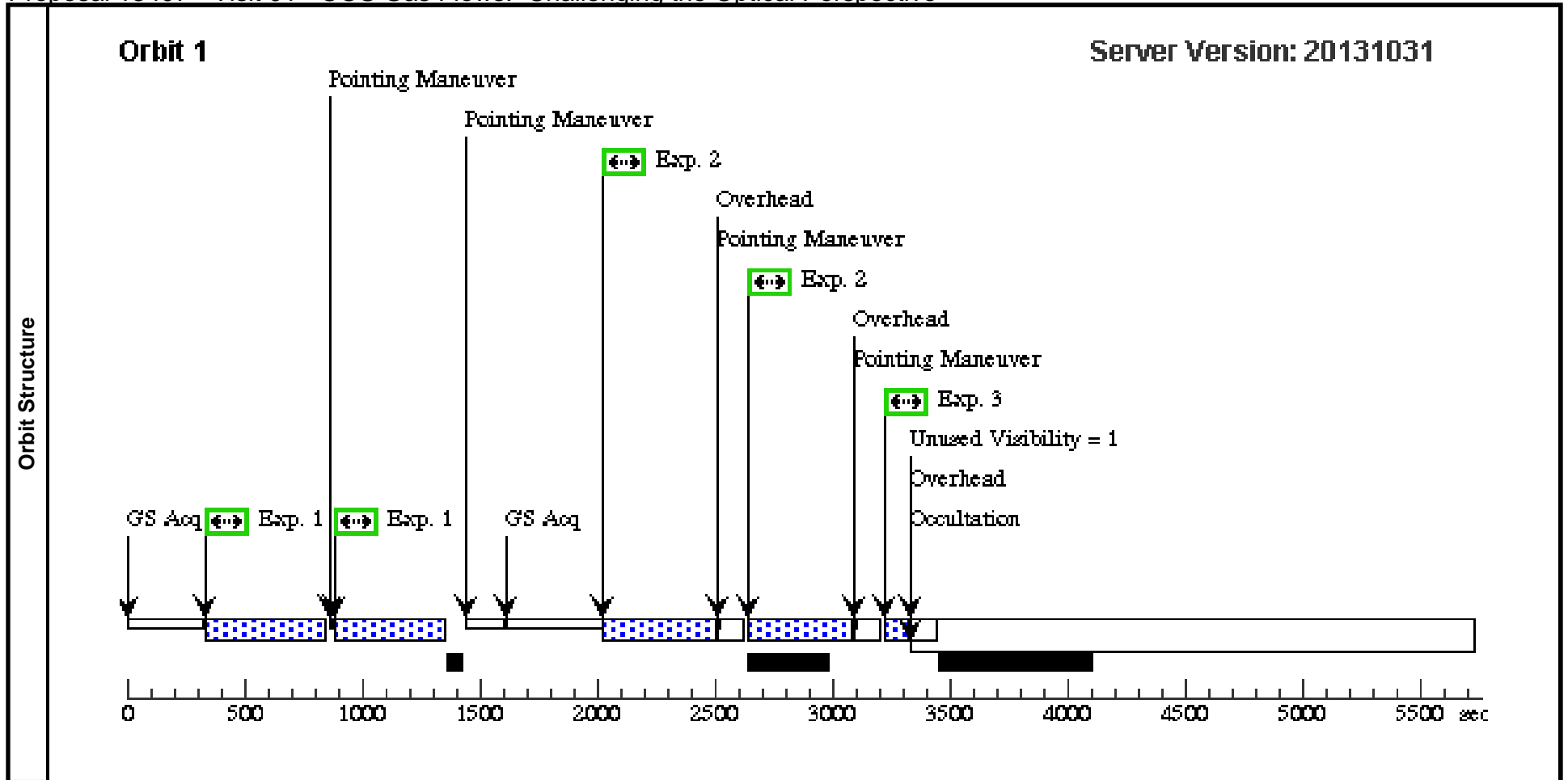
This program will obtain pre-imaging of 2 ULIRGs. Blind offsets between the UV brightest knot in the ULIRG and a nearby star will be calculated from these images and used to acquire the UV knot in the COS PSA. COS G130M spectra will be obtained for each ULIRG.

The other two ULIRGs have known offsets and can be acquired with existing information. The new COS spectra will provide bluer coverage than did previous observations.

Proposal 13407 - Visit 01 - COS Gas Flows: Challenging the Optical Perspective

Wed Jan 22 02:17:08 GMT 2014

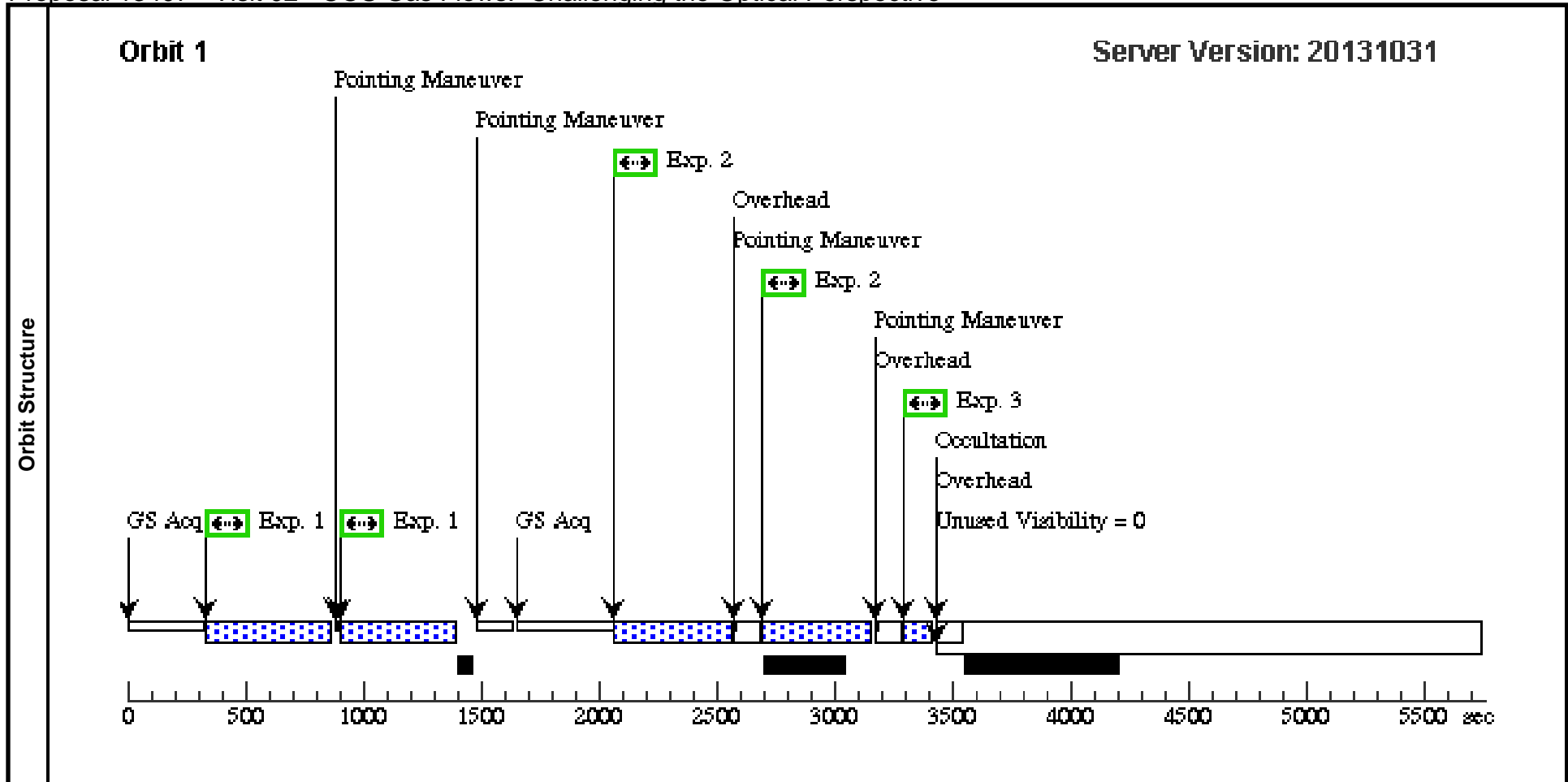
Visit	Proposal 13407, Visit 01, completed Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/SBC Special Requirements: (none)									
	#	Primary Pattern	Secondary Pattern	Exposures						
Patterns	(1)	Pattern Type=ACS-SBC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.472 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=44.4 Angle Between Sides= Center Pattern=false		(1)						
	(2)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(2)						
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	IRAS00262+4251	RA: 00 28 54.1526 (7.2256358d) Dec: +43 08 15.82 (43.13773d) Equinox: J2000	Redshift: 0.09724	V=14.2+/-0.4 R=16.0 mNUV = 18.729, mFUV=19.216	Reference Frame: ICRS				
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	IRAS00262+4251 F125 LP image (ACS.im.510770)	(1) IRAS00262+4251 1	ACS/SBC, ACCUM, SBC	F125LP			Sequence 1-3 Non-Int in Visit 01	450 Secs (892 Secs)	
								Pattern 1, Exps 1-1 in Sequence 1-3 Non-Int in Visit 01 (1)	[==>446.0 Secs (Pattern 1)] [==>446.0 Secs (Pattern 2)]	[1]
2	IRAS00262+4251 F225 W image	(1) IRAS00262+4251 1	WFC3/UVIS, ACCUM, UVIS	F225W	FLASH=11		Sequence 1-3 Non-Int in Visit 01	450 Secs (892 Secs)		
							Pattern 2, Exps 2-2 in Sequence 1-3 Non-Int in Visit 01 (2)	[==>446.0 Secs (Pattern 1)] [==>446.0 Secs (Pattern 2)]	[1]	
3	IRAS00262+4251 F625 W image	(1) IRAS00262+4251 1	WFC3/UVIS, ACCUM, UVIS	F625W	FLASH=9		Sequence 1-3 Non-Int in Visit 01	75 Secs (71 Secs)		
								[==>71.0 Secs]	[1]	



Proposal 13407 - Visit 02 - COS Gas Flows: Challenging the Optical Perspective

Wed Jan 22 02:17:11 GMT 2014

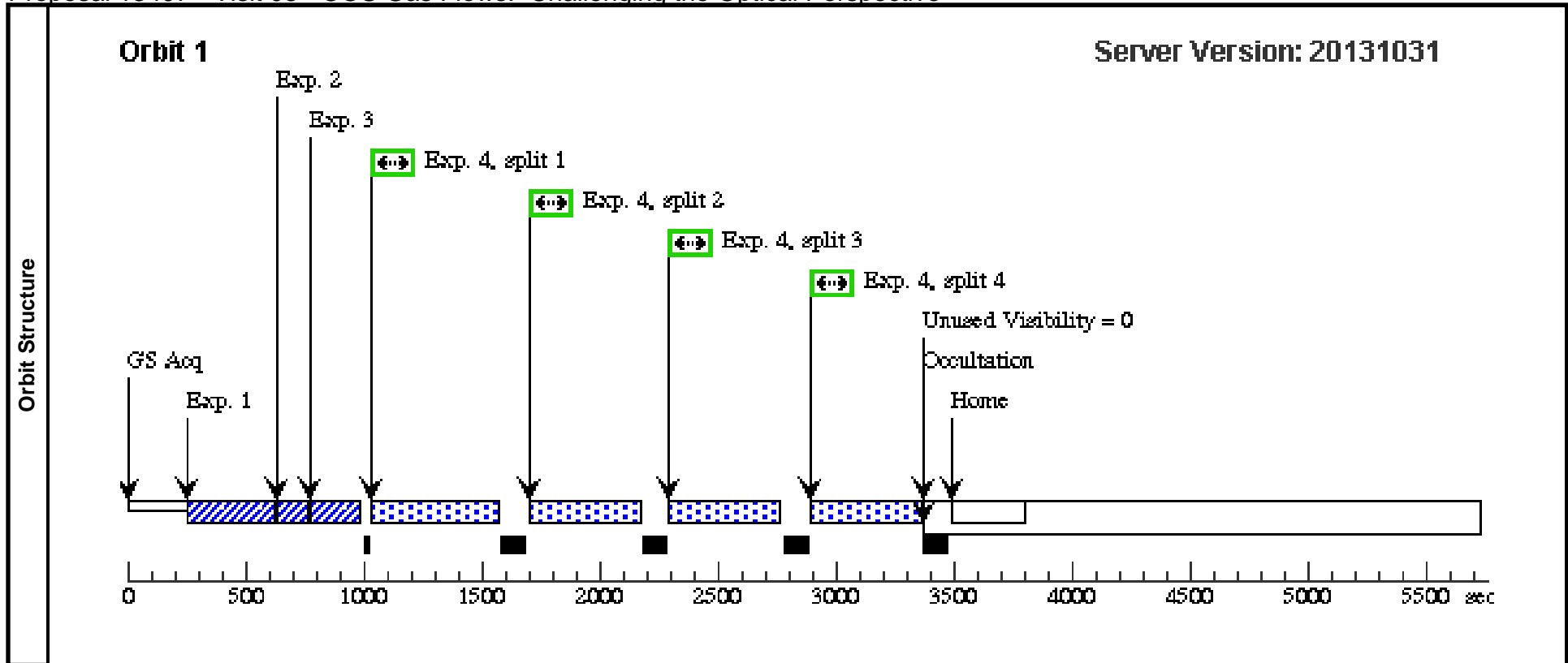
Visit	Proposal 13407, Visit 02, completed Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/SBC Special Requirements: (none)									
	#	Primary Pattern	Secondary Pattern	Exposures						
Patterns	(1)	Pattern Type=ACS-SBC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.472 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=44.4 Angle Between Sides= Center Pattern=false		(1)						
	(2)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(2)						
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(4)	IRAS16487+5447	RA: 16 49 47.0300 (252.4459583d) Dec: +54 42 35.41 (54.70984d) Equinox: J2000	Redshift: 0.10360	V=15.1+/-0.1 R=16.5 mNUV=18.158 mFUV=18.465	Reference Frame: ICRS				
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	IRAS16487+5447 F125 7 LP image (ACS.im.510772)	(4) IRAS16487+5447	ACS/SBC, ACCUM, SBC	F125LP			Sequence 1-3 Non-Int in Visit 02	450 Secs (932 Secs)	
								Pattern 1, Exps 1-1 in Sequence 1-3 Non-Int in Visit 02 (1)	[==>466.0 Secs (Pattern 1)] [==>466.0 Secs (Pattern 2)]	[1]
	2	IRAS16487+5447 F225 7 W image	(4) IRAS16487+5447	WFC3/UVIS, ACCUM, UVIS	F225W	FLASH=11		Sequence 1-3 Non-Int in Visit 02	450 Secs (932 Secs)	
							Pattern 2, Exps 2-2 in Sequence 1-3 Non-Int in Visit 02 (2)	[==>466.0 Secs (Pattern 1)] [==>466.0 Secs (Pattern 2)]	[1]	
3	IRAS16487+5447 F625 7 W image	(4) IRAS16487+5447	WFC3/UVIS, ACCUM, UVIS	F625W	FLASH=9		Sequence 1-3 Non-Int in Visit 02	75 Secs (91 Secs)		
								[==>91.0 Secs]	[1]	



Proposal 13407 - Visit 03 - COS Gas Flows: Challenging the Optical Perspective

Wed Jan 22 02:17:12 GMT 2014

Visit		Proposal 13407, Visit 03, completed Diagnostic Status: No Diagnostics Scientific Instruments: COS/FUV Special Requirements: (none)								
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
		(2)	IRAS09583+4714-POSB	RA: 10 01 30.4490 (150.3768708d) Dec: +46 59 51.74 (46.99771d) Equinox: J2000	Redshift: 0.08588	V=15.9 R=15.9 mNUV=18.46 mFUV = 19.09	Reference Frame: ICRS			
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	IRAS09583+4714-POSB ACQ/SEAR B ACQ/SEA RCH (cos.sa.510761)	(2) IRAS09583+4714-POSB	COS/FUV, ACQ/SEARCH, PSA	G130M 1291 A	STEP-SIZE=1.0; CENTER=FLUX-W T; SCAN-SIZE=2; SEGMENT=BOTH		Sequence 1-4 Non-Int in Visit 03	38 Secs (38 Secs) [==>]	[1]
	2	IRAS09583+4714-POSB ACQ/PEAK XD (cos.sa.510761)	(2) IRAS09583+4714-POSB	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A	SEGMENT=BOTH		Sequence 1-4 Non-Int in Visit 03	38 Secs (38 Secs) [==>]	[1]
	3	IRAS09583+4714-POSB ACQ/PEA B ACQ/PEA KD (cos.510761)	(2) IRAS09583+4714-POSB	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	SEGMENT=BOTH; NUM-POS=3; STEP-SIZE=1.118; CENTER=FLUX-W T		Sequence 1-4 Non-Int in Visit 03	38 Secs (38 Secs) [==>]	[1]
	4	IRAS09583+4714-POSB ACQ/PEA B ACQ/PEA KD (cos.sp.510789)	(2) IRAS09583+4714-POSB	COS/FUV, TIME-TAG, PSA	G130M 1055 A	BUFFER-TIME=457; EXTENDED=YES; SEGMENT=BOTH; FP-POS=ALL		Sequence 1-4 Non-Int in Visit 03	100 Secs (1660 Secs) [==>415.0 Secs (Split 1)] [==>415.0 Secs (Split 2)] [==>415.0 Secs (Split 3)] [==>415.0 Secs (Split 4)]	[1]



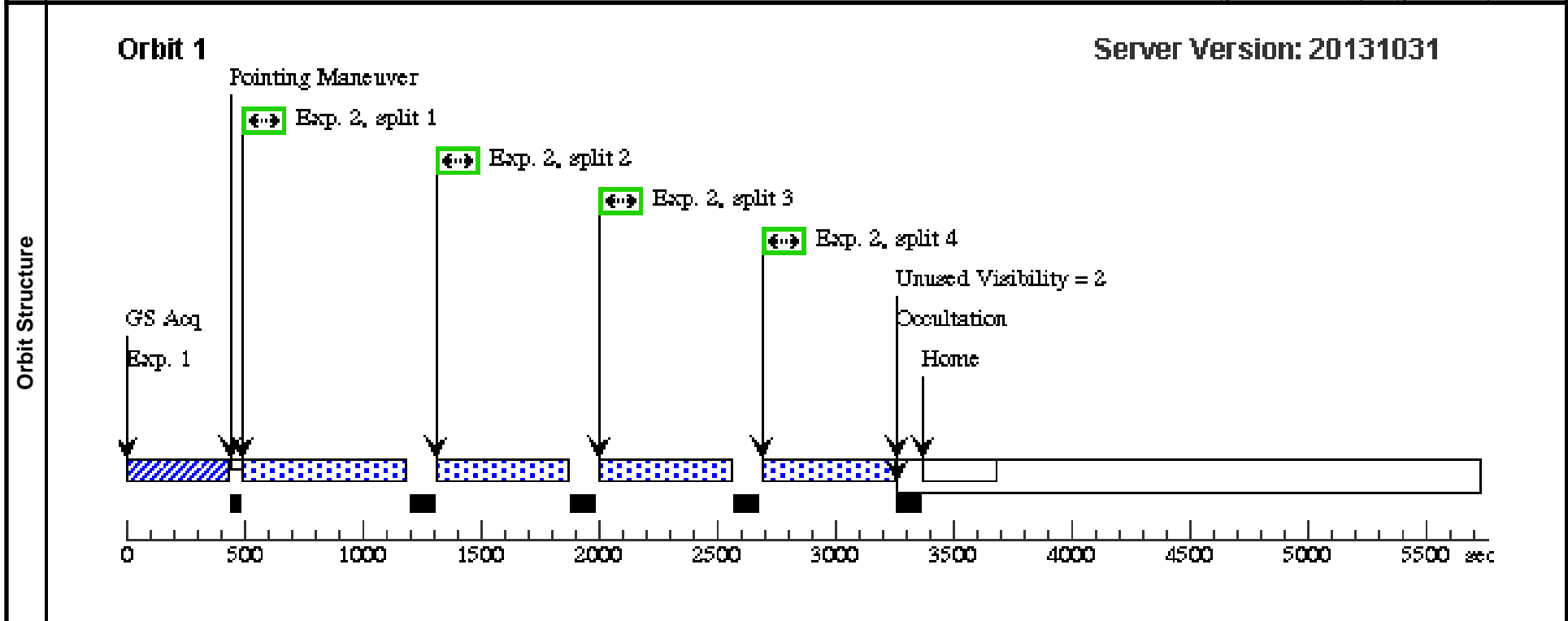
Proposal 13407 - Visit 04 - COS Gas Flows: Challenging the Optical Perspective

Wed Jan 22 02:17:13 GMT 2014

Visit	Proposal 13407, Visit 04, scheduling				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: COS/NUV, COS/FUV				
	Special Requirements: (none)				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(3)	IRAS16474+3430	RA: 16 49 14.2380 (252.3093250d) Dec: +34 25 8.68 (34.41908d) Equinox: J2000	Redshift: 0.11147	V=14+/-0.3 R=16.5 mNUV = 18.391, mFUV = 18.929	Reference Frame: ICRS
	(5)	IRAS16474+3430-OFFSET	RA: 16 49 14.2060 (252.3091917d) Dec: +34 23 27.77 (34.39105d) Equinox: J2000		V=14 m_NUV=18.56	Reference Frame: ICRS

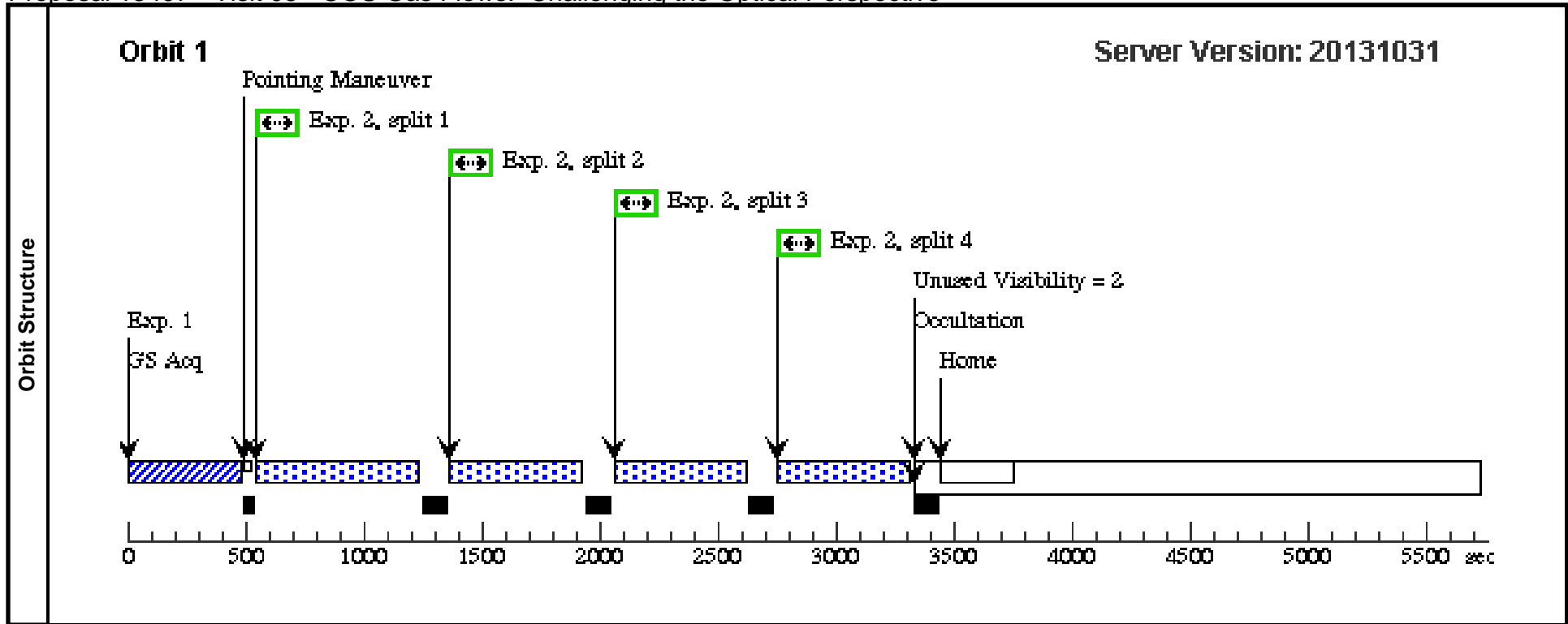
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	ACQ/NUV STAR (COS.ta.448880)	(5) IRAS16474+3430-OFFSET	COS/NUV, ACQ/IMAGE, PSA	MIRRORA			Sequence 1-2 Non-Int in Visit 04	12 Secs (12 Secs) [==>]	[1]
	2	science CEN 1055 IRAS1 6474+3430 (cos.sp.510791)	(3) IRAS16474+3430	COS/FUV, TIME-TAG, PSA	G130M 1055 A	BUFFER-TIME=55 1; EXTENDED=YES; FP-POS=ALL; SEGMENT=BOTH		Sequence 1-2 Non-Int in Visit 04	551 Secs (2028 Secs) [==>507.0 Secs (Split 1)] [==>507.0 Secs (Split 2)] [==>507.0 Secs (Split 3)] [==>507.0 Secs (Split 4)]	[1]



Proposal 13407 - Visit 05 - COS Gas Flows: Challenging the Optical Perspective

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Visit	Proposal 13407, Visit 05, implementation Diagnostic Status: No Diagnostics Scientific Instruments: COS/NUV, COS/FUV Special Requirements: AFTER 01 BY 60.0 D TO 365.0 D; ON HOLD ; ON HOLD FOR 01 <i>On Hold Comments: We will use the images of this field (Visit 1) to select an offset star and enter its coordinates as Target 6. We will also identify the brightest UV knot and tweak the coordinates of Target 1 for Visit 5.</i>									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
		(6)	IRAS00262+4251-OFFSET	RA: 00 28 53.1030 (7.2212625d) Dec: +43 08 56.49 (43.14902d) Equinox: J2000		V=14 m(NUV) = 19.52	Reference Frame: ICRS			
	(8)	IRAS00262+4251-TWEAK	RA: 00 28 54.1580 (7.2256583d) Dec: +43 08 14.75 (43.13743d) Equinox: J2000		V=14	Reference Frame: ICRS				
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	ACQ/NUV STAR (cos.ta.5533 92)	(6) IRAS00262+4251-OFFSET	COS/NUV, ACQ/IMAGE, PSA	MIRRORA			Sequence 1-2 Non-Int in Visit 05	37 Secs (37 Secs) [==>]	[1]
<i>Comments: Magnitude of offset star measured from from visit 1 F225W image.</i>										
2	science CEN 1055 IRAS0 0262+4251 (cos.sp.5107 94)	(8) IRAS00262+4251-TWEAK	COS/FUV, TIME-TAG, PSA	G130M 1055 A		BUFFER-TIME=55 1; EXTENDED=YES; FP-POS=ALL; SEGMENT=BOTH		Sequence 1-2 Non-Int in Visit 05	551 Secs (2044 Secs) [==>511.0 Secs (Split 1)] [==>511.0 Secs (Split 2)] [==>511.0 Secs (Split 3)] [==>511.0 Secs (Split 4)]	[1]



Proposal 13407 - Visit 06 - COS Gas Flows: Challenging the Optical Perspective

Wed Jan 22 02:17:14 GMT 2014

Visit	Proposal 13407, Visit 06, implementation				
	Diagnostic Status: No Diagnostics Scientific Instruments: COS/NUV, COS/FUV Special Requirements: AFTER 04 BY 60.0 D TO 365.0 D; ON HOLD ; ON HOLD FOR 04 <i>On Hold Comments: We will use the images of this field (Visit 2) to select an offset star and enter its coordinates as Target 7. We will also identify the brightest UV knot and tweak the coordinates of Target 4 for Visit 6.</i>				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(7)	IRAS16487+5447-OFFSET	RA: 16 49 41.2290 (252.4217875d) Dec: +54 42 13.26 (54.70368d) Equinox: J2000		V=14 TBD	Reference Frame: ICRS
	(9)	IRAS16487+5447-TWEAK	RA: 16 49 46.9680 (252.4457000d) Dec: +54 42 35.51 (54.70986d) Equinox: J2000		V=14	Reference Frame: ICRS

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	ACQ/NUV STAR (COS.ta.554413)	(7) IRAS16487+5447-OFFSET	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				Sequence 1-2 Non-Int in Visit 06	13 Secs (13 Secs) [==>]
<i>Comments: Magnitude of offset star is not known until Visit 2 is analyzed.</i>										
2	science CEN 1055 IRAS16487+5447 (cos.sp.510796)	(9) IRAS16487+5447-TWEAK	COS/FUV, TIME-TAG, PSA	G130M 1055 A	BUFFER-TIME=55 EXTENDED=YES; FP-POS=ALL; SEGMENT=BOTH			Sequence 1-2 Non-Int in Visit 06	551 Secs (2188 Secs) [==>547.0 Secs (Split 1)] [==>547.0 Secs (Split 2)] [==>547.0 Secs (Split 3)] [==>547.0 Secs (Split 4)]	[1]

