



11147 - The Origin of Diffuse UV Light from Spiral Disks

Cycle: 16, Proposal Category: GO

(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	(3) M101-UV-POS1-NEW ANY	ACS/SBC NIC3	4	20-May-2008 21:01:02.0	yes
02	(4) M101-UV-POS2-NEW	ACS/SBC	4	20-May-2008 21:01:18.0	yes
51	(3) M101-UV-POS1-NEW ANY	ACS/SBC NIC3	2	20-May-2008 21:01:26.0	yes

10 Total Orbits Used

ABSTRACT

The ultraviolet light from galaxies has been used as a beacon for tracing the cosmic star formation history of the Universe, yet we have an incomplete understanding of many characteristics of this light. Most of the UV emission from nearby, normal star-forming galaxies is unresolved and "diffuse", and GALEX has shown that in spiral disks it permeates the inter-arm regions. The nature of this diffuse inter-arm component is under debate. Recent results suggest that it may arise from non-ionizing UV photons which originate in star forming regions in the spiral arms, travel in the plane of the galaxy, and then scatter off of diffusely distributed cold dust grains. Alternatively, an in-situ, unresolved stellar population could produce the observed inter-arm UV emission. This project seeks to establish which of the two competing scenarios is responsible for the bulk of this diffuse emission. We propose to use HST's UV imaging capability (ACS/SBC) to obtain deep observations of selected fields in the nearby spiral galaxy M101, for which available (low angular resolution) data favor the 'scattered light' scenario. Our observations are designed to detect any faint, UV-luminous stellar population down to main sequence B5 stars. With these data, we will establish the nature of the bulk of the diffuse UV light in this spiral galaxy by: (i) quantifying the contribution from dust-scattered light; (ii) measuring the contribution to the ubiquitous diffuse ionized medium from in-situ ionizing stars; and (iii) providing constraints on the observed stellar mass function in the field. Only HST has the UV sensitivity and angular resolution to discriminate in-situ stellar populations from scattered light. The ultimate goal of this project is to re-'calibrate' the UV emission as a star formation rate indicator, which will need to account for any scattered component.

OBSERVING DESCRIPTION

We request ACS/SBC F150LP primary imaging of 2 inter-arm fields in M101, with NICMOS/NIC3 H band parallel imaging. The fields have been chosen such that at the specified Galactocentric radii the disk is not too optically thick (which will hinder the observation of the individual stars) but not too optically thin (since there will then be not sufficient dust to give rise to the putative scattered light component).

(2) We choose the two fields just "upstream" and "downstream" of major spiral arms with prominent star-formation complexes, such that the SBC fields extend from the edge of the arms outwards (for a 29 x 26 arcsec aperture) and contain apparently diffuse

UV emission on the GALEX images.

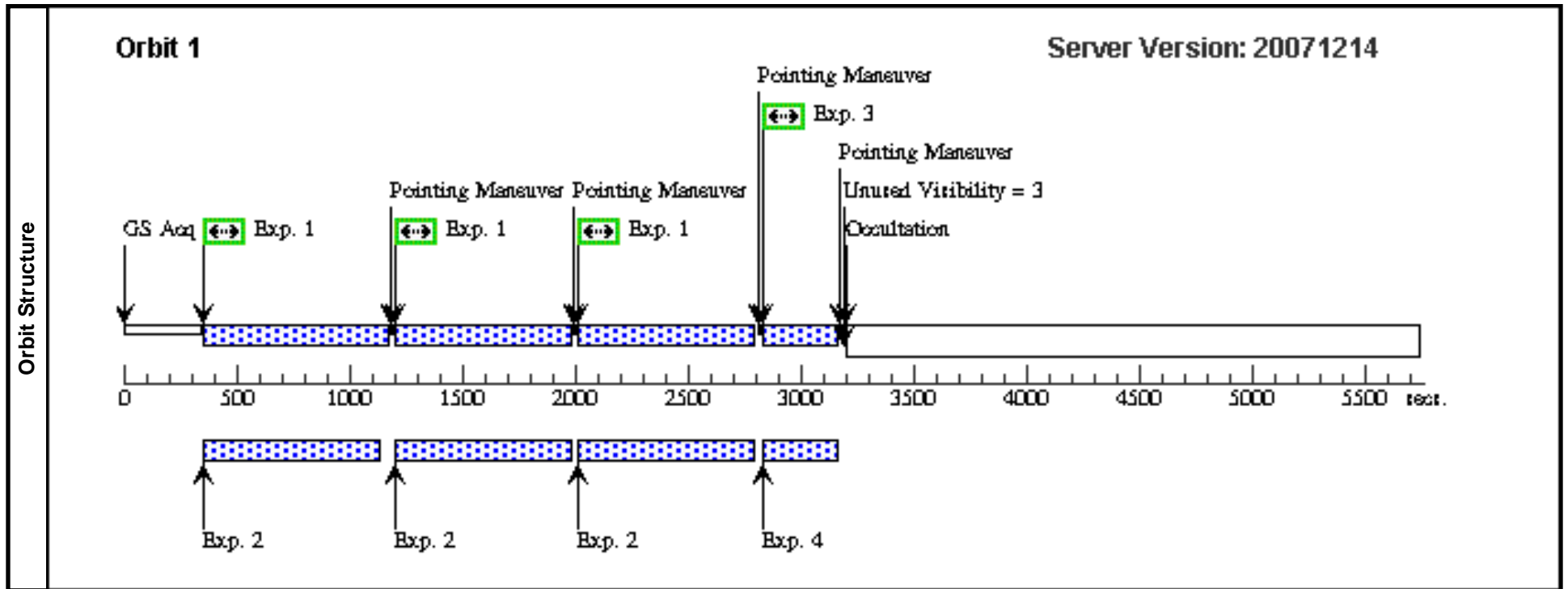
Proposal 11147 - Visit 01 - The Origin of Diffuse UV Light from Spiral Disks

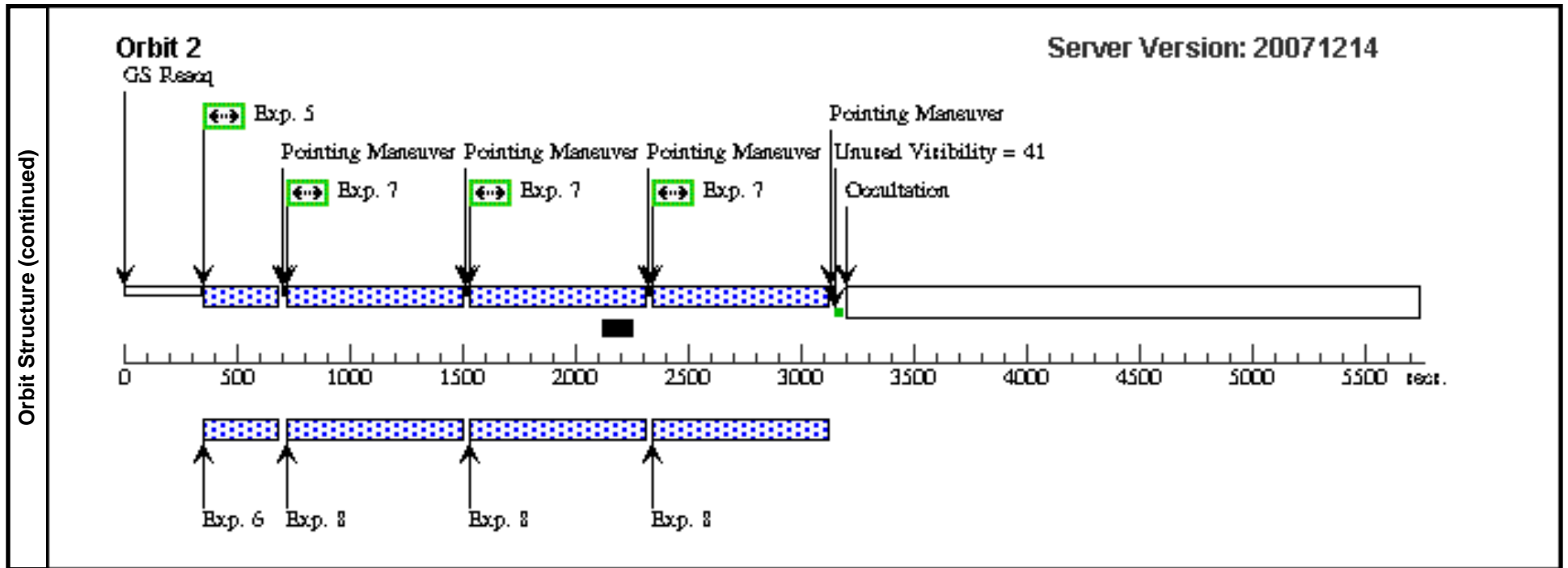
Wed May 21 01:01:30 GMT 2008

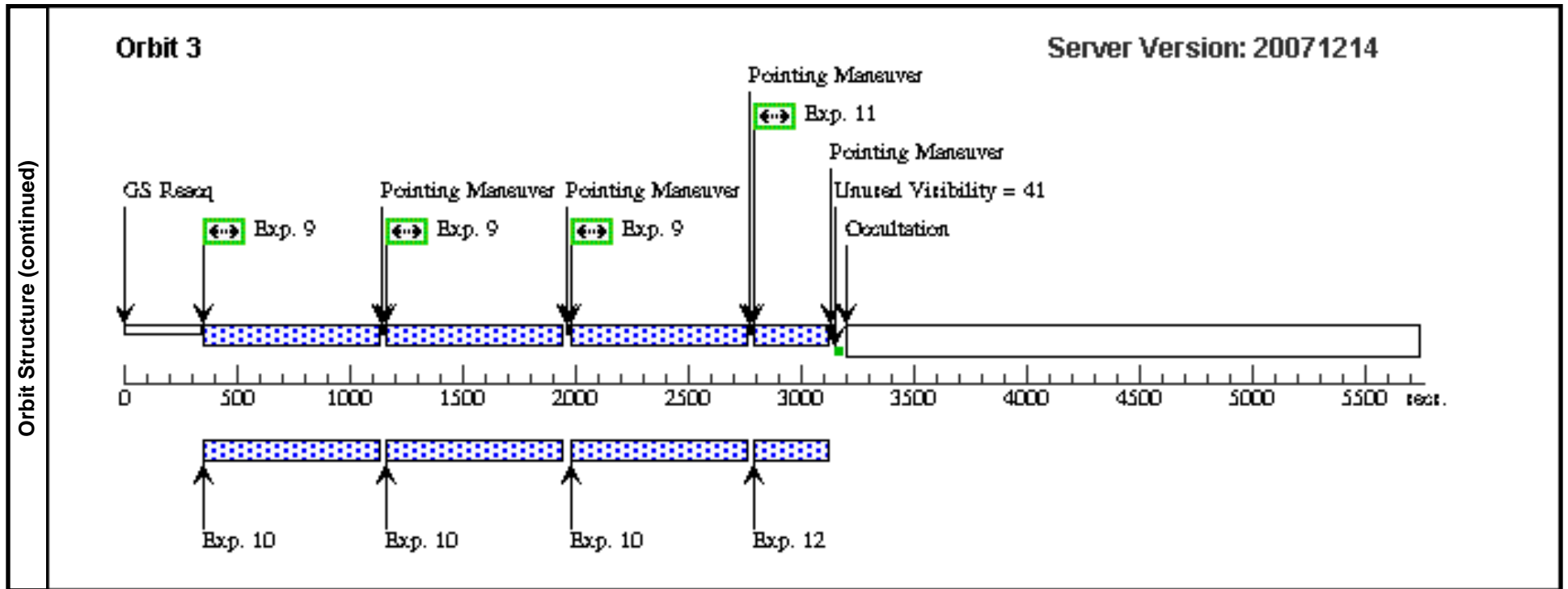
Visit	Proposal 11147, Visit 01, completed Diagnostic Status: No Diagnostics Scientific Instruments: ACS/SBC, NIC3 Special Requirements: (none)									
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures	
		(2)	Pattern Type=ACS-SBC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=0.472 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=44.4 Angle Between Sides= Center Pattern=false					(1-2), (7-8), (9-10), (13-14)	
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections		Fluxes	Miscellaneous			
	(3)	M101-UV-POS1-NEW	RA: 14 02 37.8700 (210.6577917d) Dec: +54 17 14.80 (54.28744d) Equinox: J2000			V=23	Reference Frame: ICRS			
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	M101-pos1-primary	(3) M101-UV-POS1-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP			Pattern 1-2 (2) Prime + Parallel Group 1-2	750.0 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[1]
	2	M101-pos1-parallel	ANY	NIC3, MULTIACCUM, NIC3	F160W	NSAMP=14; SAMP-SEQ=SPAR S64		Pattern 1-2 (2) Prime + Parallel Group 1-2	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[1]
	3		(3) M101-UV-POS1-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP			Prime + Parallel Group 3-4	300.0 Secs [==>]	[1]
	4		ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	SAMP-SEQ=SPARS 64; NSAMP=7		Prime + Parallel Group 3-4	[==>]	[1]
	5		(3) M101-UV-POS1-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP		POS TARG -0.078,-0.078	Prime + Parallel Group 5-6	300.0 Secs [==>]	[2]
	6		ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	SAMP-SEQ=SPARS 64; NSAMP=7		Prime + Parallel Group 5-6	[==>]	[2]
	7	M101-pos1-primary	(3) M101-UV-POS1-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP		POS TARG -0.078,0.078	Pattern 7-8 (2) Prime + Parallel Group 7-8	750.0 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[2]

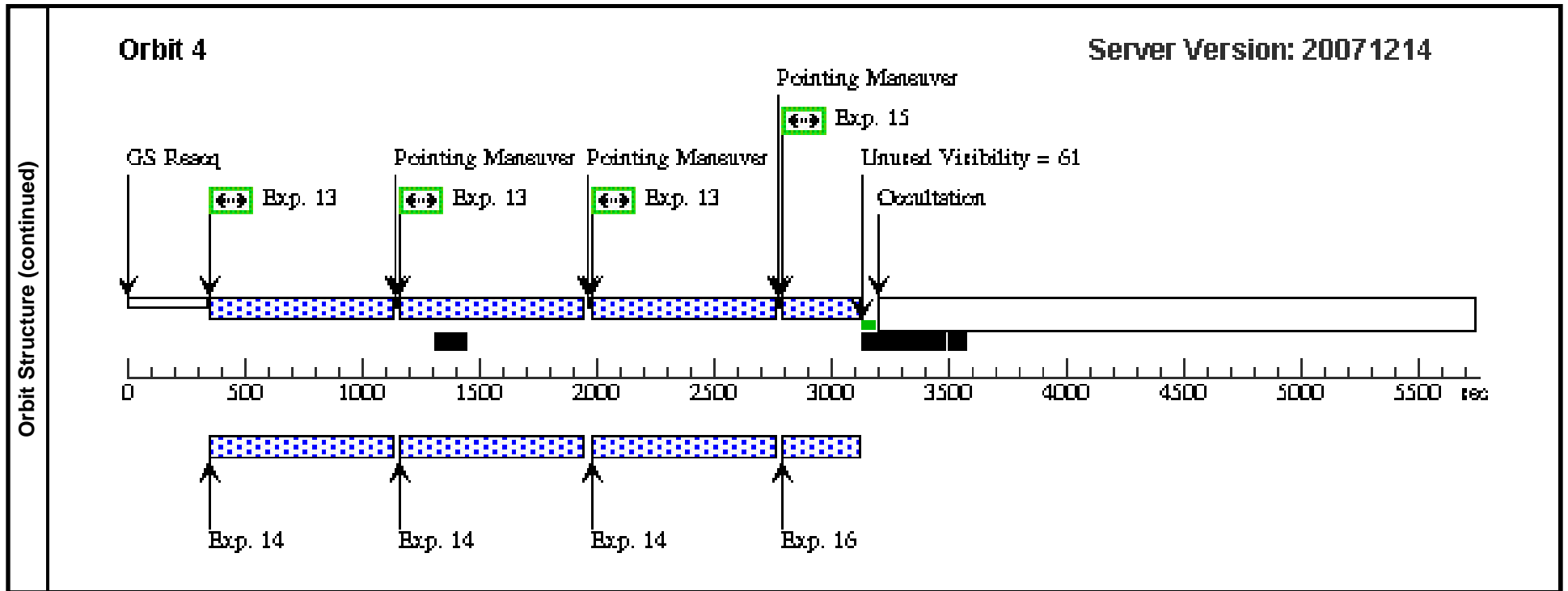
Proposal 11147 - Visit 01 - The Origin of Diffuse UV Light from Spiral Disks

Exposures (continued)	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	8	M101-pos1-parallel	ANY	NIC3, MULTIACCUM, NIC3	F160W	NSAMP=14; SAMP-SEQ=SPAR S64		Pattern 7-8 (2) Prime + Parallel Group 7-8	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[2]
	9	M101-pos1-primary	(3) M101-UV-POS1-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP		POS TARG -0.078,-0.078	Pattern 9-10 (2) Prime + Parallel Group 9-10	750.0 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[3]
	10	M101-pos1-parallel	ANY	NIC3, MULTIACCUM, NIC3	F160W	NSAMP=14; SAMP-SEQ=SPAR S64		Pattern 9-10 (2) Prime + Parallel Group 9-10	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[3]
	11		(3) M101-UV-POS1-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP		POS TARG -0.078,-0.078	Prime + Parallel Group 11-12	300.0 Secs [==>]	[3]
	12		ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	SAMP-SEQ=SPARS 64; NSAMP=7		Prime + Parallel Group 11-12	[==>]	[3]
	13	M101-pos1-primary	(3) M101-UV-POS1-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP		POS TARG -0.157,0.0	Pattern 13-14 (2) Prime + Parallel Group 13-14	750.0 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[4]
	14	M101-pos1-parallel	ANY	NIC3, MULTIACCUM, NIC3	F160W	NSAMP=14; SAMP-SEQ=SPAR S64		Pattern 13-14 (2) Prime + Parallel Group 13-14	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[4]
	15		(3) M101-UV-POS1-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP		POS TARG -0.157,0.0	Prime + Parallel Group 15-16	300.0 Secs [==>]	[4]
	16		ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	SAMP-SEQ=SPARS 64; NSAMP=7		Prime + Parallel Group 15-16	[==>]	[4]









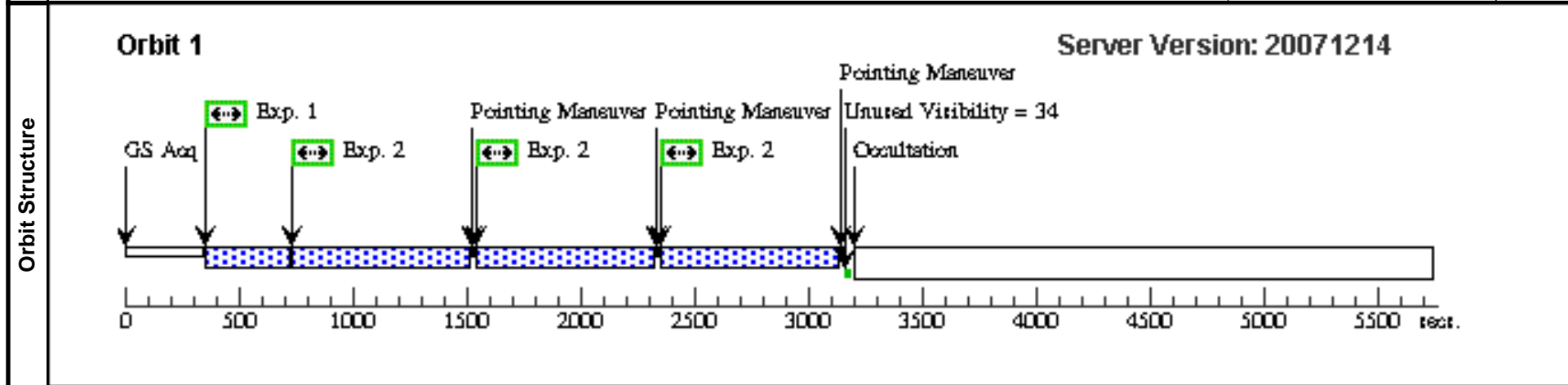
Proposal 11147 - Visit 02 - The Origin of Diffuse UV Light from Spiral Disks

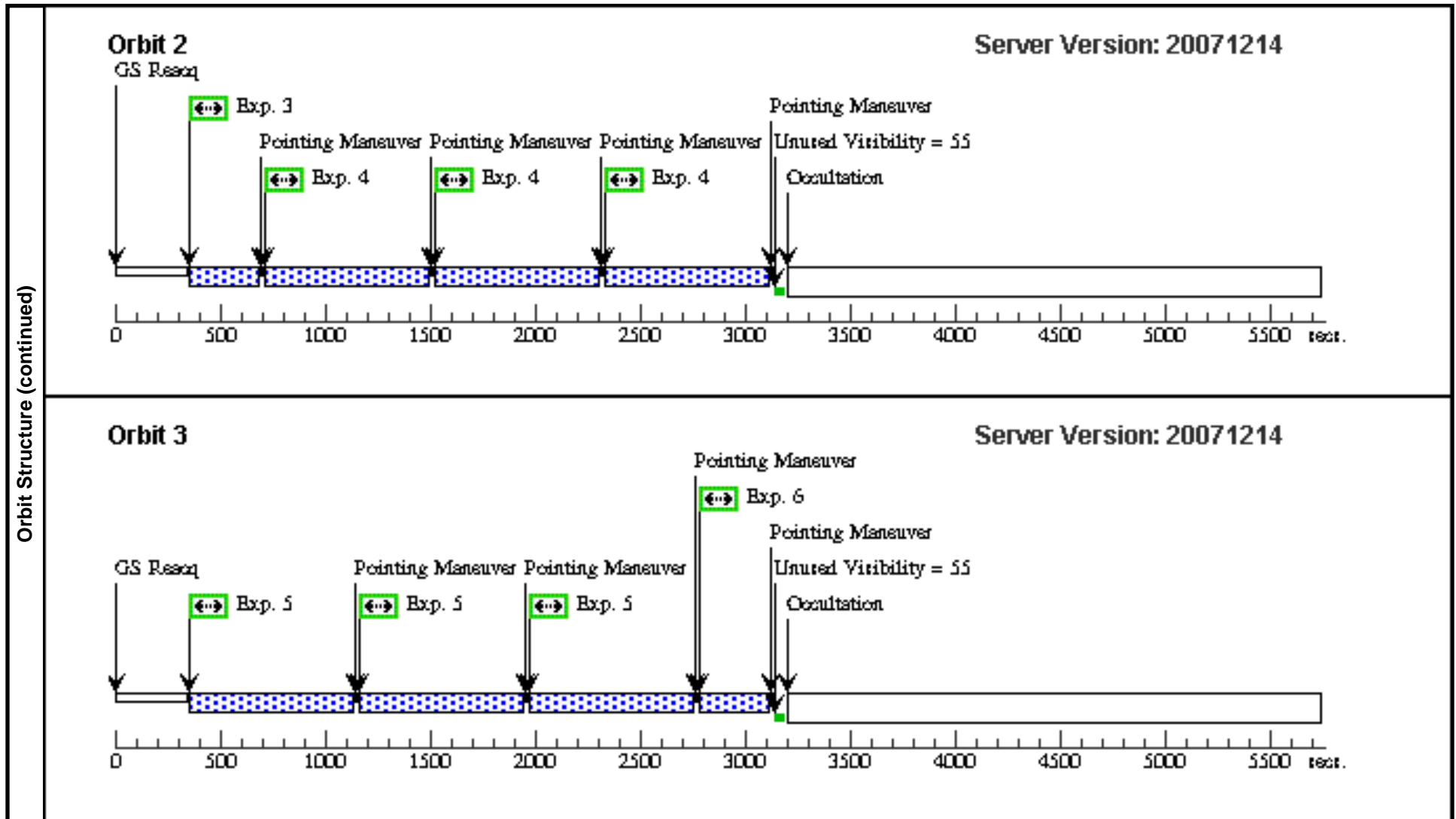
Wed May 21 01:01:32 GMT 2008

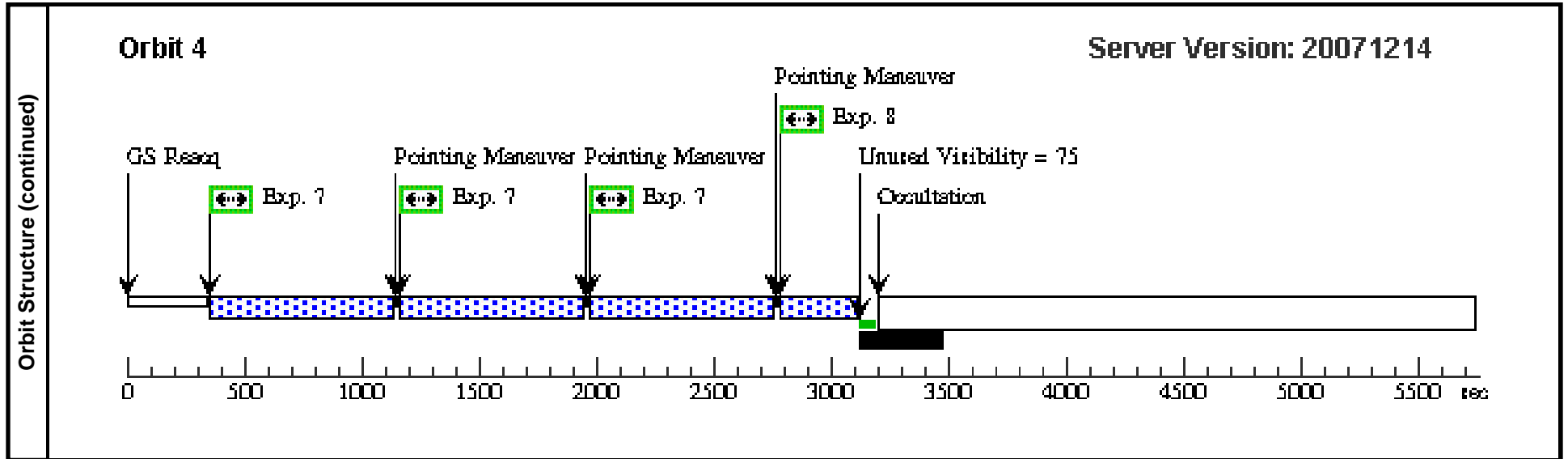
Visit	Proposal 11147, Visit 02, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: ACS/SBC Special Requirements: ORIENT 358.0D TO 2.0 D; ORIENT 88.0D TO 92.0 D; ORIENT 178.0D TO 182.0 D; ORIENT 268.0D TO 272.0 D									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(2)	Pattern Type=ACS-SBC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=0.472 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=44.4 Angle Between Sides= Center Pattern=false		(2), (4), (5), (7)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(4)	M101-UV-POS2-NEW	RA: 14 03 36.0255 (210.9001062d) Dec: +54 17 17.73 (54.28826d) Equinox: J2000		V=23	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(4) M101-UV-POS2-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP				300.0 Secs [==>]	[1]
	2	M101-pos1-primary	(4) M101-UV-POS2-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP			Pattern 2-2 (2)	750.0 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[1]
	3		(4) M101-UV-POS2-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP			POS TARG -0.078,-0.078	300.0 Secs [==>]	[2]
	4	M101-pos1-primary	(4) M101-UV-POS2-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP			POS TARG -0.078,0.078	Pattern 4-4 (2) 750.0 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[2]
	5	M101-pos1-primary	(4) M101-UV-POS2-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP			POS TARG -0.078,-0.078	Pattern 5-5 (2) 750.0 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[3]
	6		(4) M101-UV-POS2-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP			POS TARG -0.078,-0.078	300.0 Secs [==>]	[3]

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Exposures (continued)	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	7	M101-pos1-primary	(4) M101-UV-POS2-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP		POS TARG -0.157,0	Pattern 7-7 (2)	750.0 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[4]
8		(4) M101-UV-POS2-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP		POS TARG -0.157,0		300.0 Secs [==>]	[4]	







Proposal 11147 - Visit 51 - The Origin of Diffuse UV Light from Spiral Disks

Wed May 21 01:01:33 GMT 2008

Visit	Proposal 11147, Visit 51 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/SBC, NIC3 Special Requirements: (none) Comments: <i>This is a repeat of visit 01.</i>									
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures	
		(2)	Pattern Type=ACS-SBC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=0.472 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=44.4 Angle Between Sides= Center Pattern=false						
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(3)	M101-UV-POS1-NEW	RA: 14 02 37.8700 (210.6577917d) Dec: +54 17 14.80 (54.28744d) Equinox: J2000		V=23	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	M101-pos1-primary	(3) M101-UV-POS1-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP			Pattern 1-2 (2) Prime + Parallel Group 1-2	750.0 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[1]
	2	M101-pos1-parallel	ANY	NIC3, MULTIACCUM, NIC3	F160W	NSAMP=14; SAMP-SEQ=SPAR S64		Pattern 1-2 (2) Prime + Parallel Group 1-2	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[1]
	3		(3) M101-UV-POS1-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP			Prime + Parallel Group 3-4	300.0 Secs [==>]	[1]
	4		ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	SAMP-SEQ=SPARS 64; NSAMP=7		Prime + Parallel Group 3-4	[==>]	[1]
	5		(3) M101-UV-POS1-NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP		POS TARG -0.078,-0.078	Prime + Parallel Group 5-6	300.0 Secs [==>]	[2]
	6		ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	SAMP-SEQ=SPARS 64; NSAMP=7		Prime + Parallel Group 5-6	[==>]	[2]

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Exposures (continued)	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	7	M101-pos1- primary	(3) M101-UV-POS1- NEW	ACS/SBC, ACCUM, SBC-FIX	F150LP		POS TARG -0.078,0 .078	Pattern 7-8 (2) Prime + Parallel Gro up 7-8	750.0 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[2]
	8	M101-pos1- parallel	ANY	NIC3, MULTIACCUM, NIC3	F160W	NSAMP=14; SAMP-SEQ=SPAR S64		Pattern 7-8 (2) Prime + Parallel Gro up 7-8	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[2]

