



10546 - The filaments of NGC1275

Cycle: 14, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

<i>Visit</i>	<i>Targets</i>	<i>Configurations</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) NGC1275-NW	ACS/WFC	6	27-Jul-2005 21:02:33.0	yes
02	(2) NGC1275-SW	ACS/WFC	6	27-Jul-2005 21:02:54.0	yes
03	(3) NGC1275-NE	ACS/WFC	6	27-Jul-2005 21:03:14.0	yes
04	(4) NGC1275-SE	ACS/WFC	6	27-Jul-2005 21:03:33.0	yes

24 Total Orbits Used

ABSTRACT

The spectacular H-0alpha filaments stretching over 100 kpc around the central galaxy in the nearby Perseus cluster of galaxies, NGC1275, resemble those found around distant radio galaxies and some protogalaxies. The origin and ionization of the filaments are poorly understood and relate to

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heating and cooling processes in galaxy formation and evolution.

We propose here to image the filaments in order to reveal their true small-scale structure and to search for clumps of young stars along them. The observations will produce the first deep high resolution images of the whole filament system and, with our 1 Ms Chandra image, constrain both particle and photon ionization models for its ionization and excitation.

OBSERVING DESCRIPTION

We propose to observe NGC1275 and its surroundings in 3 filters, F550M (mostly line free), F625W (includes α) and F435W (includes [OII] and provides blue photometry of star clusters), targetting 4 positions (the corners of a rectangle of width 1 arcmin and depth 1.33 arcmin) with substantial overlap. This way we observe the central 3 arcmin wide region deeply and also cover the outer arcmin in the search for weak filaments.

The brightest filaments have an α surface brightness of a few times 10^{-15} erg s^{-1} cm^{-2} $arcsec^{-2}$ (Conselice et al 2001). We intend to go to a fraction of this flux on subarcsec scales.

For an extended emission-line source with 3×10^{-16} erg s^{-1} cm^{-2} $arcsec^{-2}$ to reach $S/N = 5$ in a 2×2 pixel region (0.1x0.1 arcsec) takes ~ 24 ks for F625W.

A star cluster, comparable to the brighter ones detected, with $10^6 M_{\odot}$ has abs. $V = -12.25$ and -10.52 after 100 Myrs and a Gyr. To detect these will take 24 s -- 160 s in F625W and 42 s

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-- 300 s in F435W to a $S/N \sim 20$.

$10^4 M_{\odot}$ clusters will have

magnitudes 5 times fainter, which will require a minimum of ~ 2500 s.

$V = 27$ is reached with an A star spectrum and $S/N = 10$ in 4000s.

This gives an absolute magnitude limit of -7.4 , in which we could detect $10^4 M_{\odot}$ star clusters that are 100 Myrs old to 5 sigma. For ionization of the gas we require massive young stars, which may have a more patchy distribution than older A stars. We shall search for a statistical excess of sources along the filaments.

Therefore, the known filaments and possible large star clusters will be detected straightforwardly (see Figs. 1 and 2 and discussion in Duplication justification section for a demonstration from existing images). Fine-scale detail will be resolved in the filaments and we will be sensitive to smaller star clusters.

With the better efficiency of ACS and the multiple coverage of the inner regions (21.6 ks per filter where they overlap) our proposed signal should be 10 times better than the existing WFPC2 data (Figs 1 and 2).

We request 5400 s (2 orbits) for each of the 4 pointings in each of three filters, totalling 24 orbits. We have assumed here about 15 min per orbit for guide star, pointing and 'cosmic ray split' times, leaving about 2700 s per HST orbit.

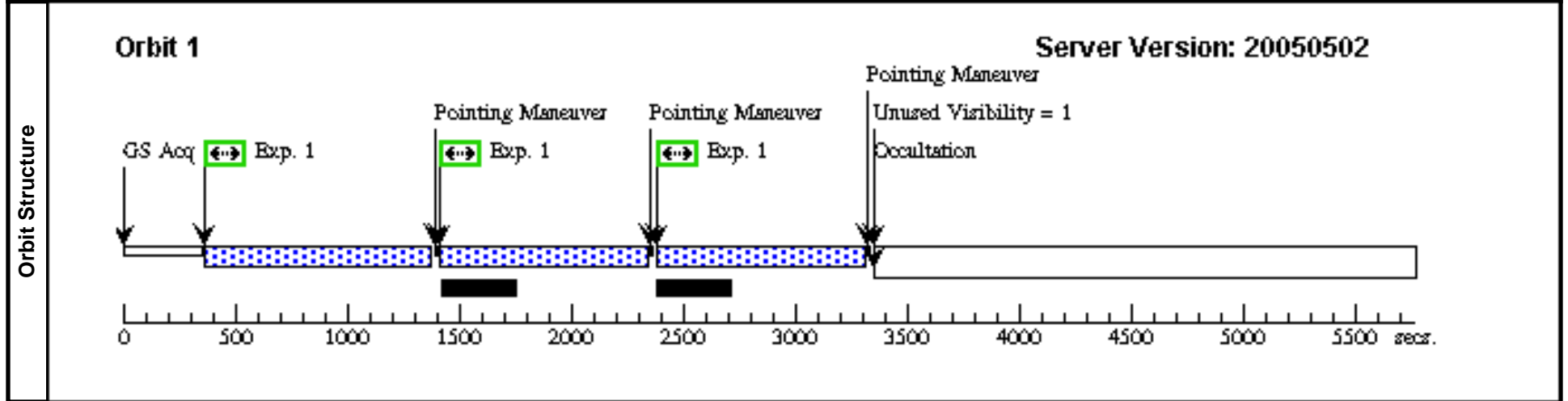
Proposal 10546 - Visit 01 - The filaments of NGC1275

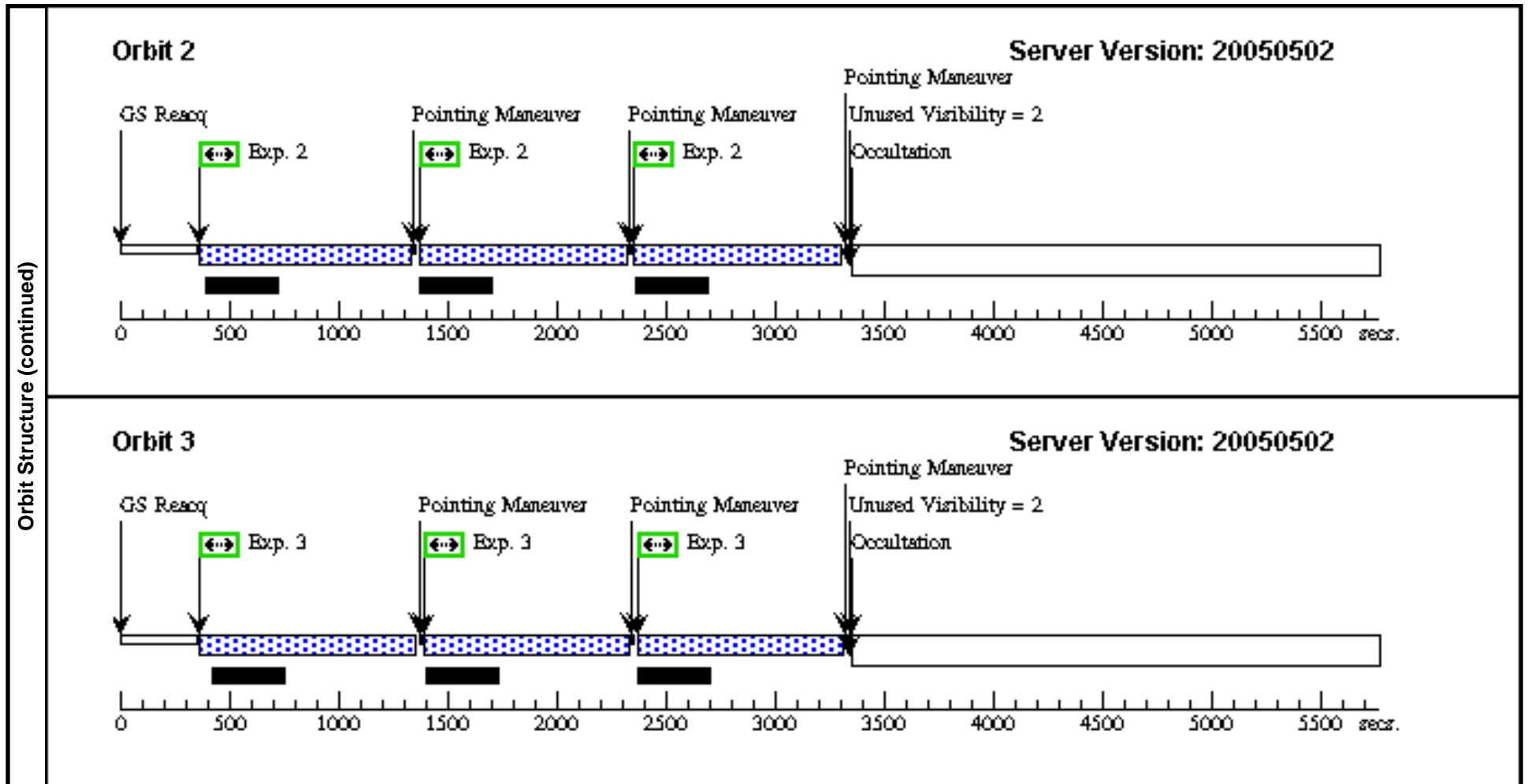
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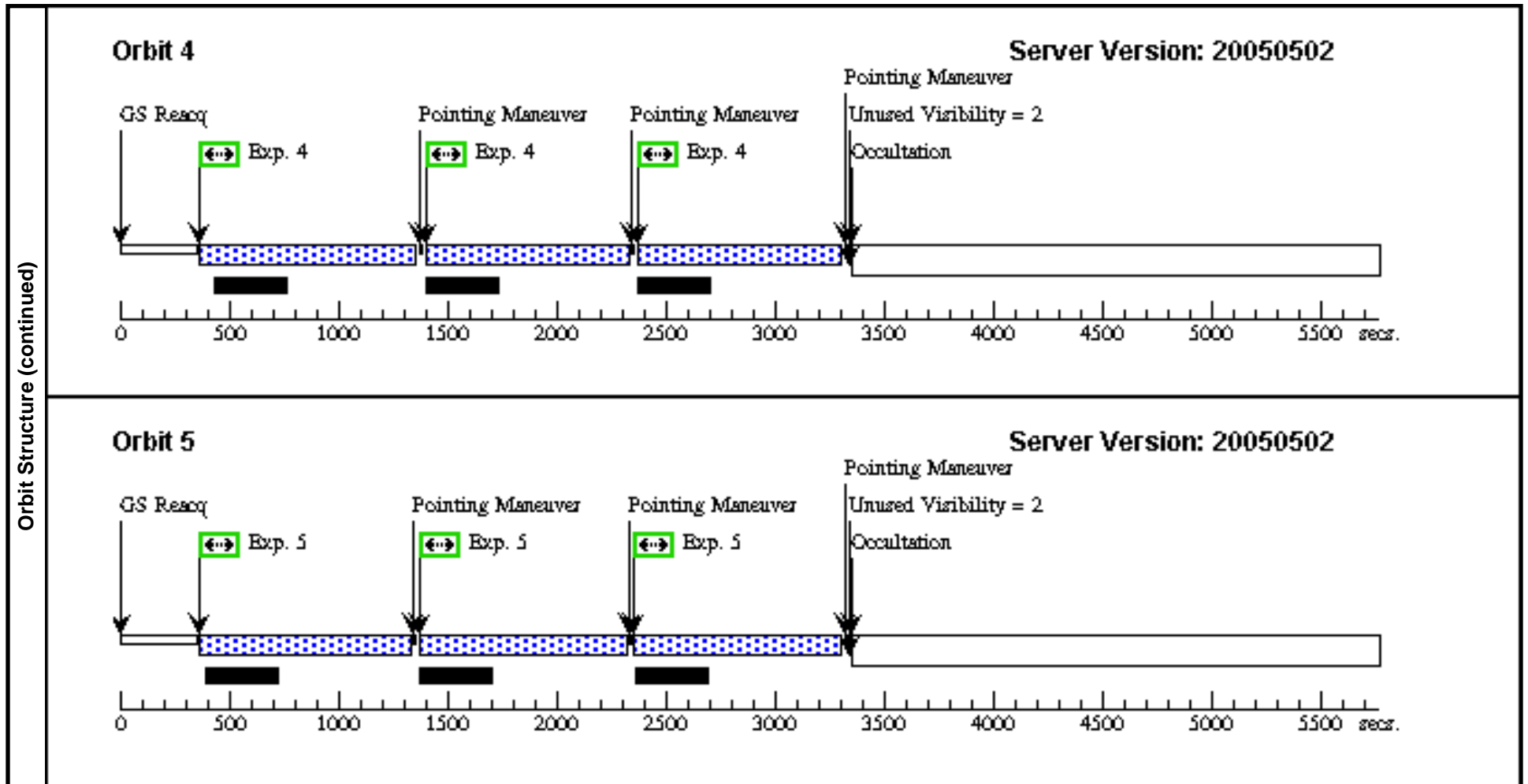
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	NGC1275-NW	RA: 03 19 45.3000 (49.9387500d) Dec: +41 32 0.00 (41.53333d) Equinox: J2000 Plate Id: (?)		V=11.0	Coordinate Source: GUIDE_STAR_CATALOG				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	NW f550m1	(1) NGC1275-NW	ACS/WFC, ACCUM, WFCENTER	F550M	CR-SPLIT=NO		Pattern 1-1 (1)	800.0 Secs	
									[==>806.0 Secs (Pattern 1)] [==>806.0 Secs (Pattern 2)] [==>806.0 Secs (Pattern 3)]	[1]
	2	NW f625w1	(1) NGC1275-NW	ACS/WFC, ACCUM, WFCENTER	F625W	CR-SPLIT=NO		Pattern 2-2 (1)	800.0 Secs	
									[==>827.0 Secs (Pattern 1)] [==>827.0 Secs (Pattern 2)] [==>827.0 Secs (Pattern 3)]	[2]
	3	NW f435w1	(1) NGC1275-NW	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO		Pattern 3-3 (1)	800.0 Secs	
								[==>815.0 Secs (Pattern 1)] [==>815.0 Secs (Pattern 2)] [==>815.0 Secs (Pattern 3)]	[3]	
	4	NW f550m2	(1) NGC1275-NW	ACS/WFC, ACCUM, WFCENTER	F550M	CR-SPLIT=NO		Pattern 4-4 (1)	800.0 Secs	
								[==>813.0 Secs (Pattern 1)] [==>813.0 Secs (Pattern 2)] [==>813.0 Secs (Pattern 3)]	[4]	
	5	NW f625w2	(1) NGC1275-NW	ACS/WFC, ACCUM, WFCENTER	F625W	CR-SPLIT=NO		Pattern 5-5 (1)	800.0 Secs	
								[==>827.0 Secs (Pattern 1)] [==>827.0 Secs (Pattern 2)] [==>827.0 Secs (Pattern 3)]	[5]	

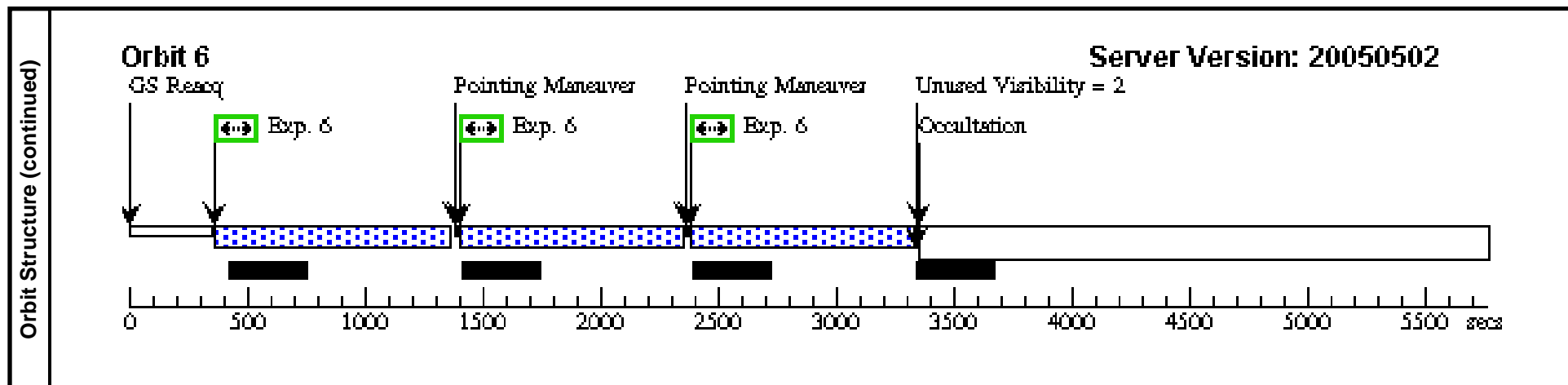
Proposal 10546 - Visit 01 - The filaments of NGC1275

Exposures (continued)	#	Label	Target	Config, Mode, Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	6	NW f435w2	(1) NGC1275-NW	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO		Pattern 6-6 (1)	800.0 Secs [==>824.0 Secs (Pattern 1)] [==>824.0 Secs (Pattern 2)] [==>824.0 Secs (Pattern 3)]	[6]









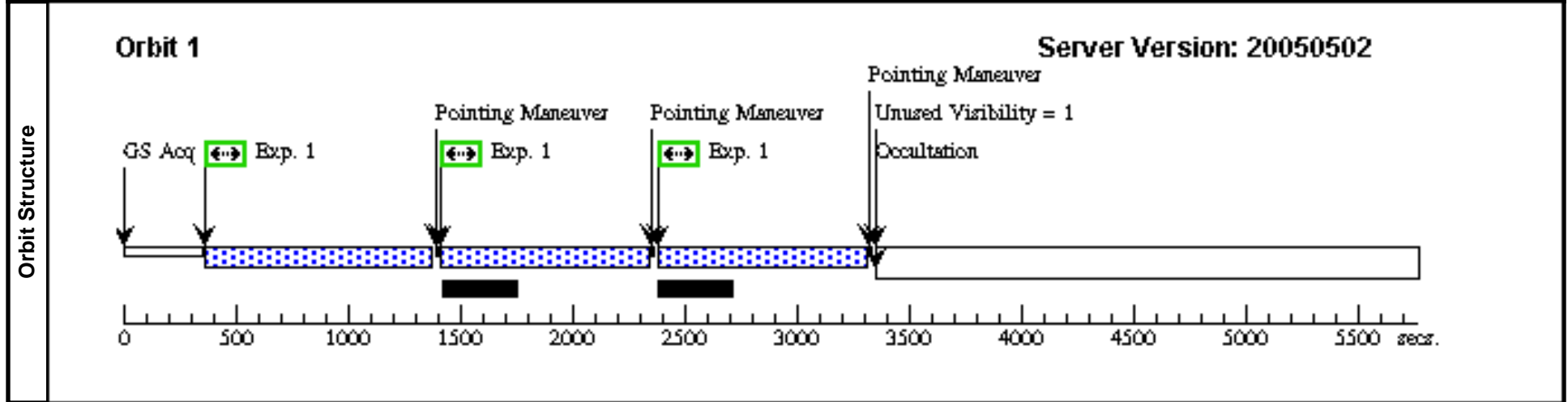
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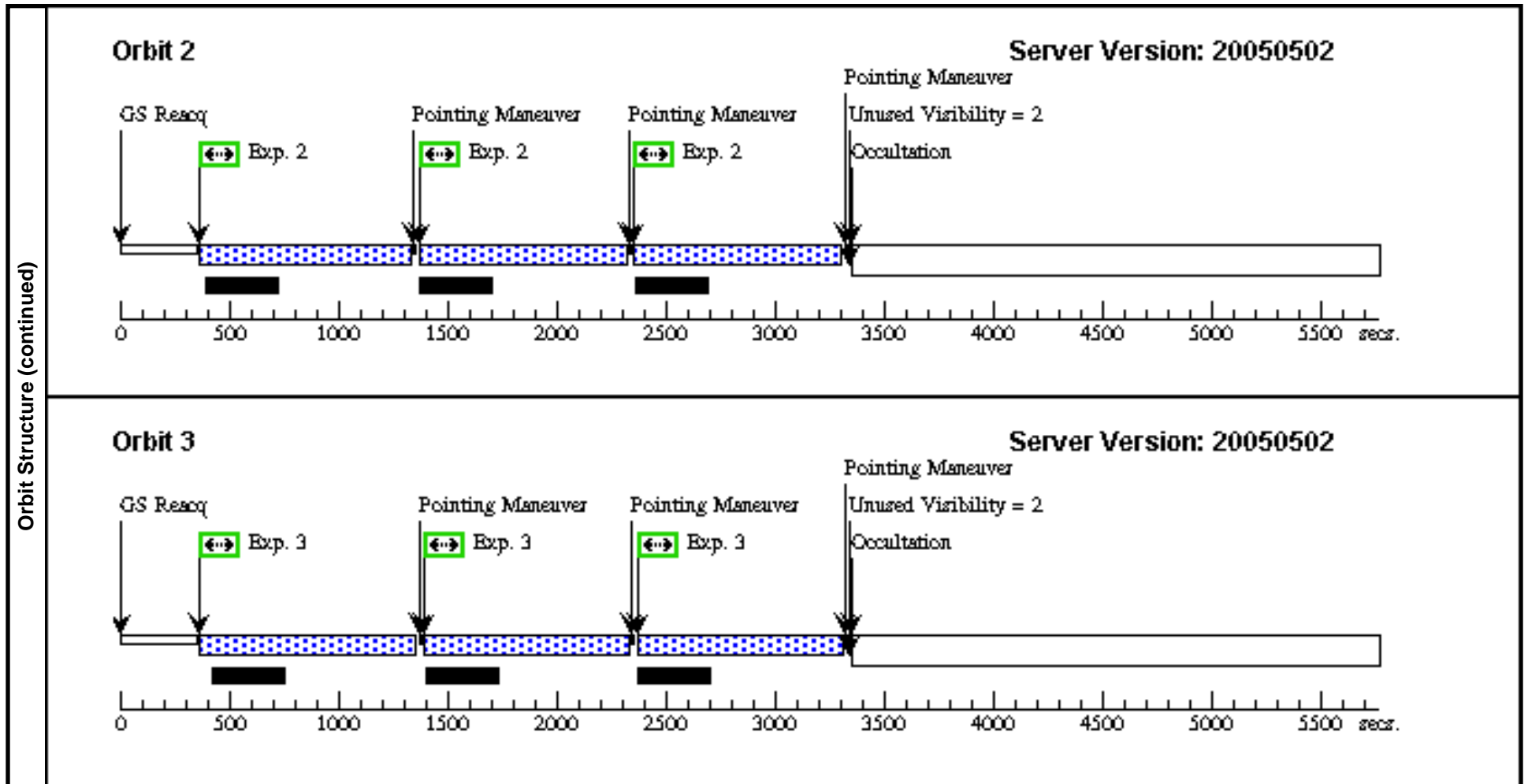
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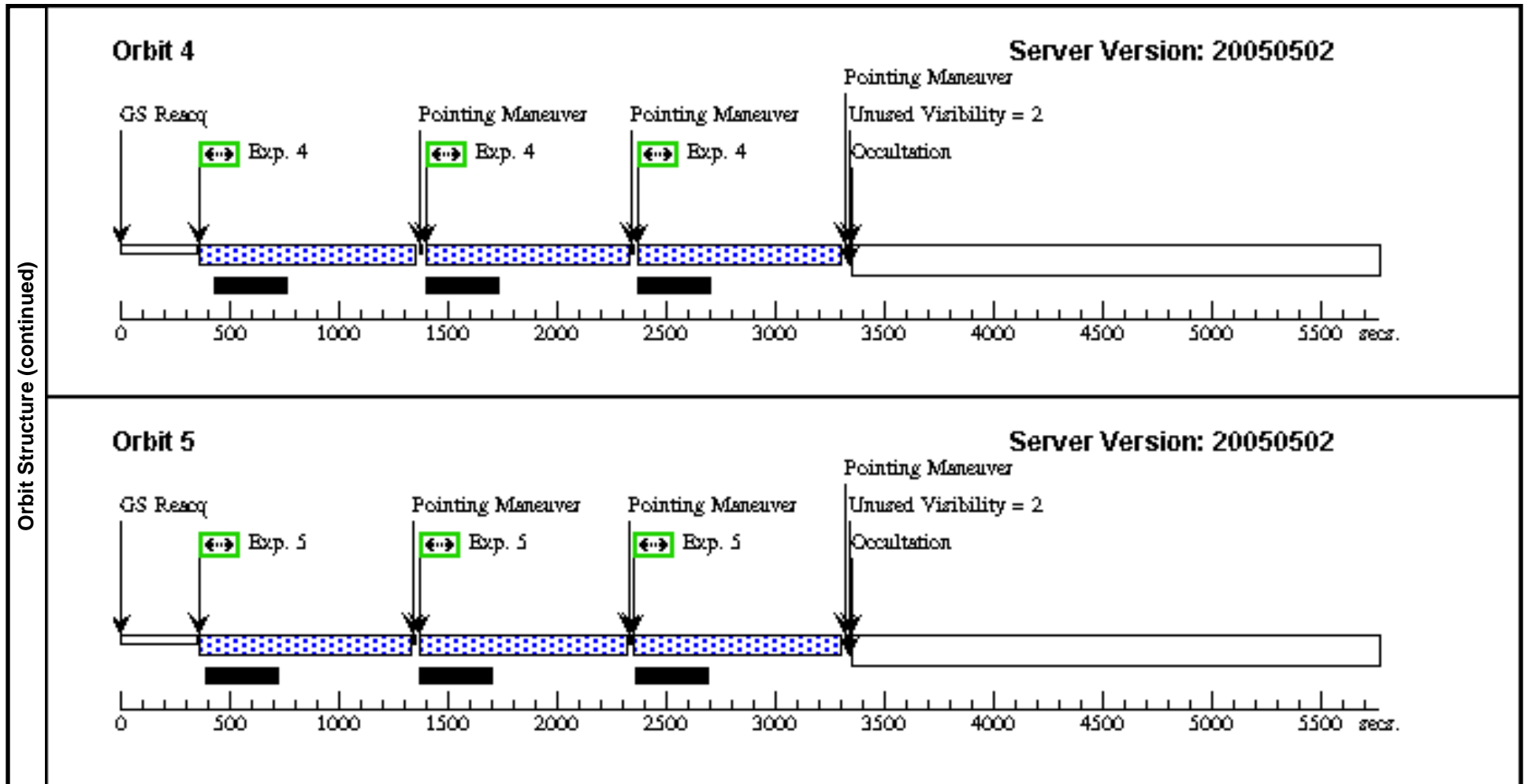
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(2)	NGC1275-SW	RA: 03 19 45.3000 (49.9387500d) Dec: +41 30 40.00 (41.51111d) Equinox: J2000 Plate Id: (?)		V=11.0	Coordinate Source: GUIDE_STAR_CATALOG				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	SW f550m1	(2) NGC1275-SW	ACS/WFC, ACCUM, WFCENTER	F550M	CR-SPLIT=NO		Pattern 1-1 (1)	800.0 Secs [==>806.0 Secs (Pattern 1)] [==>806.0 Secs (Pattern 2)] [==>806.0 Secs (Pattern 3)]	[1]
	2	SW f625w1	(2) NGC1275-SW	ACS/WFC, ACCUM, WFCENTER	F625W	CR-SPLIT=NO		Pattern 2-2 (1)	800.0 Secs [==>827.0 Secs (Pattern 1)] [==>827.0 Secs (Pattern 2)] [==>827.0 Secs (Pattern 3)]	[2]
	3	SW f435w1	(2) NGC1275-SW	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO		Pattern 3-3 (1)	800.0 Secs [==>815.0 Secs (Pattern 1)] [==>815.0 Secs (Pattern 2)] [==>815.0 Secs (Pattern 3)]	[3]
	4	SW f550m2	(2) NGC1275-SW	ACS/WFC, ACCUM, WFCENTER	F550M	CR-SPLIT=NO		Pattern 4-4 (1)	800.0 Secs [==>813.0 Secs (Pattern 1)] [==>813.0 Secs (Pattern 2)] [==>813.0 Secs (Pattern 3)]	[4]
	5	SW f625w2	(2) NGC1275-SW	ACS/WFC, ACCUM, WFCENTER	F625W	CR-SPLIT=NO		Pattern 5-5 (1)	800.0 Secs [==>827.0 Secs (Pattern 1)] [==>827.0 Secs (Pattern 2)] [==>827.0 Secs (Pattern 3)]	[5]

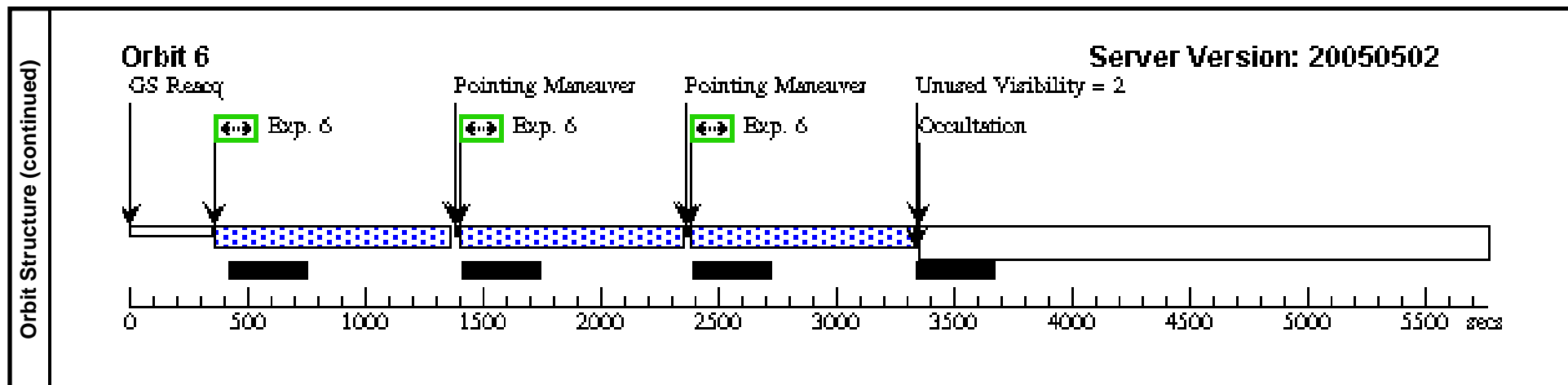
Proposal 10546 - Visit 02 - The filaments of NGC1275

Exposures (continued)	#	Label	Target	Config, Mode, Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	6	SW f435w2	(2) NGC1275-SW	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO		Pattern 6-6 (1)	800.0 Secs [==>824.0 Secs (Pattern 1)] [==>824.0 Secs (Pattern 2)] [==>824.0 Secs (Pattern 3)]	[6]









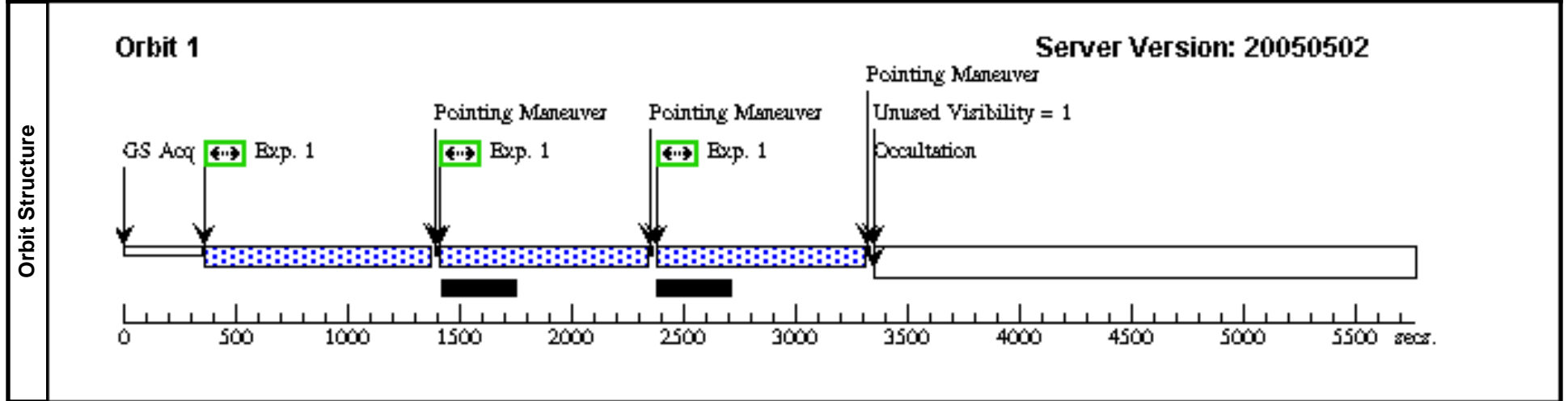
Proposal 10546 - Visit 03 - The filaments of NGC1275

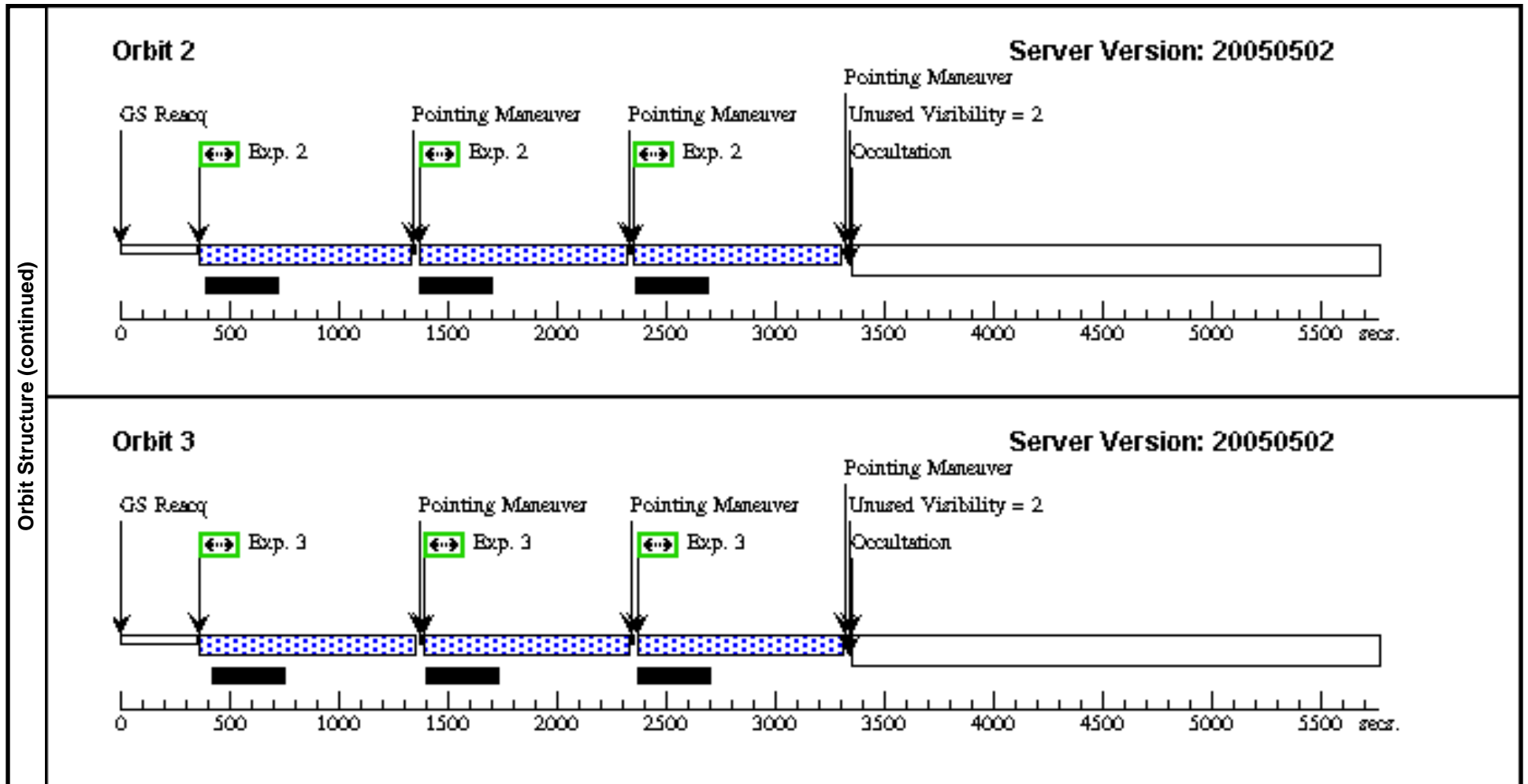
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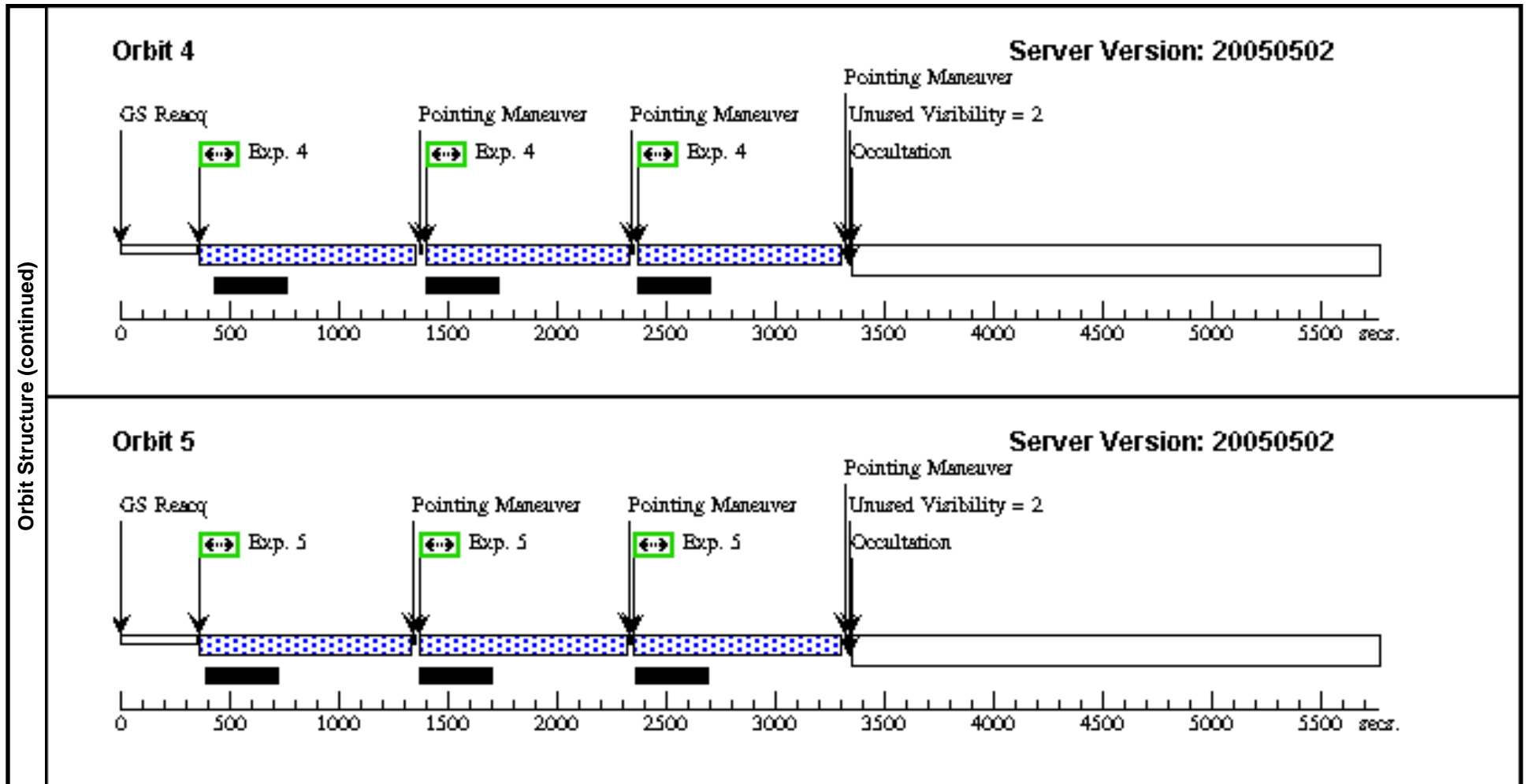
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(3)	NGC1275-NE	RA: 03 19 50.5000 (49.9604167d) Dec: +41 32 0.00 (41.53333d) Equinox: J2000 Plate Id: (?)		V=11.0	Coordinate Source: GUIDE_STAR_CATALOG				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	NE f550m1	(3) NGC1275-NE	ACS/WFC, ACCUM, WFCENTER	F550M	CR-SPLIT=NO		Pattern 1-1 (1)	800.0 Secs [==>806.0 Secs (Pattern 1)] [==>806.0 Secs (Pattern 2)] [==>806.0 Secs (Pattern 3)]	[1]
	2	NE f625w1	(3) NGC1275-NE	ACS/WFC, ACCUM, WFCENTER	F625W	CR-SPLIT=NO		Pattern 2-2 (1)	800.0 Secs [==>827.0 Secs (Pattern 1)] [==>827.0 Secs (Pattern 2)] [==>827.0 Secs (Pattern 3)]	[2]
	3	NE f435w1	(3) NGC1275-NE	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO		Pattern 3-3 (1)	800.0 Secs [==>815.0 Secs (Pattern 1)] [==>815.0 Secs (Pattern 2)] [==>815.0 Secs (Pattern 3)]	[3]
	4	NE f550m2	(3) NGC1275-NE	ACS/WFC, ACCUM, WFCENTER	F550M	CR-SPLIT=NO		Pattern 4-4 (1)	800.0 Secs [==>813.0 Secs (Pattern 1)] [==>813.0 Secs (Pattern 2)] [==>813.0 Secs (Pattern 3)]	[4]
	5	NE f625w2	(3) NGC1275-NE	ACS/WFC, ACCUM, WFCENTER	F625W	CR-SPLIT=NO		Pattern 5-5 (1)	800.0 Secs [==>827.0 Secs (Pattern 1)] [==>827.0 Secs (Pattern 2)] [==>827.0 Secs (Pattern 3)]	[5]

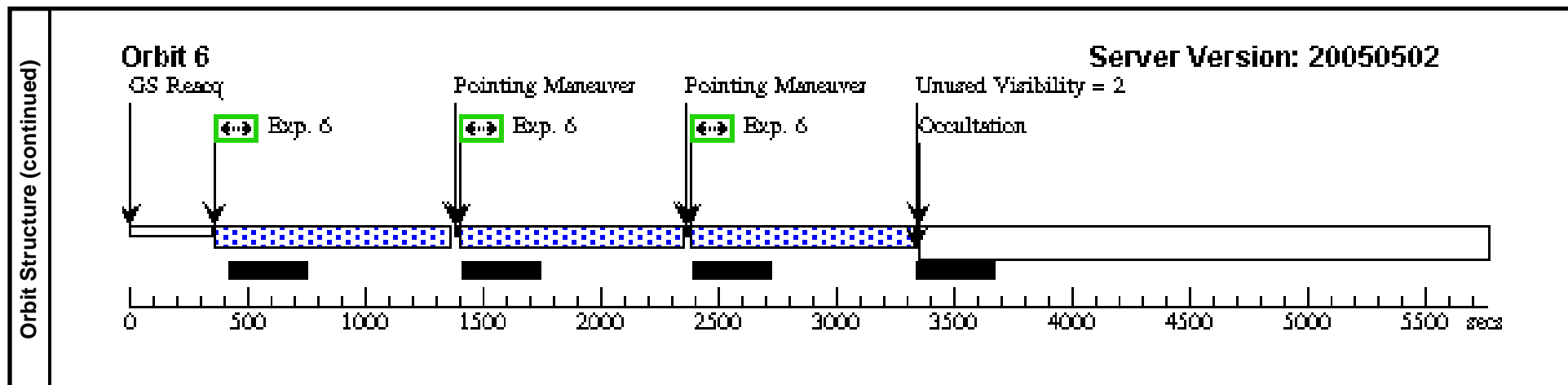
Proposal 10546 - Visit 03 - The filaments of NGC1275

Exposures (continued)	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	6	NE f435w2	(3) NGC1275-NE	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO		Pattern 6-6 (1)	800.0 Secs [==>824.0 Secs (Pattern 1)] [==>824.0 Secs (Pattern 2)] [==>824.0 Secs (Pattern 3)]	[6]









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Thu Jul 28 01:03:43 GMT 2005

Visit	Proposal 10546, Visit 04 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: (none)									
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(4)	NGC1275-SE	RA: 03 19 50.5000 (49.9604167d) Dec: +41 30 40.00 (41.51111d) Equinox: J2000 Plate Id: (?)		V=11.0	Coordinate Source: GUIDE_STAR_CATALOG				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	SE f550m1	(4) NGC1275-SE	ACS/WFC, ACCUM, WFCENTER	F550M	CR-SPLIT=NO		Pattern 1-1 (1)	800.0 Secs [==>806.0 Secs (Pattern 1)] [==>806.0 Secs (Pattern 2)] [==>806.0 Secs (Pattern 3)]	[1]
	2	SE f625w1	(4) NGC1275-SE	ACS/WFC, ACCUM, WFCENTER	F625W	CR-SPLIT=NO		Pattern 2-2 (1)	800.0 Secs [==>827.0 Secs (Pattern 1)] [==>827.0 Secs (Pattern 2)] [==>827.0 Secs (Pattern 3)]	[2]
	3	SE f435w1	(4) NGC1275-SE	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO		Pattern 3-3 (1)	800.0 Secs [==>815.0 Secs (Pattern 1)] [==>815.0 Secs (Pattern 2)] [==>815.0 Secs (Pattern 3)]	[3]
	4	SE f550m2	(4) NGC1275-SE	ACS/WFC, ACCUM, WFCENTER	F550M	CR-SPLIT=NO		Pattern 4-4 (1)	800.0 Secs [==>813.0 Secs (Pattern 1)] [==>813.0 Secs (Pattern 2)] [==>813.0 Secs (Pattern 3)]	[4]
	5	SE f625w2	(4) NGC1275-SE	ACS/WFC, ACCUM, WFCENTER	F625W	CR-SPLIT=NO		Pattern 5-5 (1)	800.0 Secs [==>827.0 Secs (Pattern 1)] [==>827.0 Secs (Pattern 2)] [==>827.0 Secs (Pattern 3)]	[5]

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Exposures (continued)	#	Label	Target	Config, Mode, Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	6	SE f435w2	(4) NGC1275-SE	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO		Pattern 6-6 (1)	800.0 Secs [==>824.0 Secs (Pattern 1)] [==>824.0 Secs (Pattern 2)] [==>824.0 Secs (Pattern 3)]	[6]

