13701 - Stellar Populations in the Outer Disk of M101

Cycle: 22, Proposal Category: GO

(Availability Mode: SUPPORTED)

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	(1) M101-NE-PLUME	ACS/WFC WFC3/UVIS	2	17-Jul-2014 21:04:35.0	yes
02	(1) M101-NE-PLUME	ACS/WFC WFC3/UVIS	2	17-Jul-2014 21:04:36.0	yes
03	(1) M101-NE-PLUME	ACS/WFC WFC3/UVIS	2	17-Jul-2014 21:04:38.0	yes
04	(1) M101-NE-PLUME	ACS/WFC WFC3/UVIS	2	17-Jul-2014 21:04:39.0	yes
05	(1) M101-NE-PLUME	ACS/WFC WFC3/UVIS	2	17-Jul-2014 21:04:40.0	yes
06	(1) M101-NE-PLUME	ACS/WFC WFC3/UVIS	2	17-Jul-2014 21:04:41.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
07	(1) M101-NE-PLUME	ACS/WFC WFC3/UVIS	2	17-Jul-2014 21:04:42.0	yes
08	(1) M101-NE-PLUME	ACS/WFC WFC3/UVIS	2	17-Jul-2014 21:04:43.0	yes
09	(1) M101-NE-PLUME	ACS/WFC WFC3/UVIS	2	17-Jul-2014 21:04:44.0	yes
10	(1) M101-NE-PLUME	ACS/WFC WFC3/UVIS	2	17-Jul-2014 21:04:46.0	yes
11	(1) M101-NE-PLUME	ACS/WFC WFC3/UVIS	2	17-Jul-2014 21:04:47.0	yes
12	(1) M101-NE-PLUME	ACS/WFC WFC3/UVIS	2	17-Jul-2014 21:04:48.0	yes
13	(1) M101-NE-PLUME	ACS/WFC WFC3/UVIS	2	17-Jul-2014 21:04:49.0	yes

26 Total Orbits Used

ABSTRACT

The outskirts of disk galaxies hold a remarkable range of information on processes driving galaxy evolution. Correlations between outer disk structure and galaxy Hubble type argue for the interaction-driven growth of galaxy disks, but the specific mechanism by which this occurs remains unclear. Characterizing the age and metallicity of stars in the outskirts of disk galaxies can differentiate between models of disk building via induced star formation versus those involving stripping or migration of older stars outwards from the inner disk.

The nearby giant spiral M101 (NGC 5457) provides an ideal opportunity to study the outer disk populations of a giant Sc galaxy in great detail. Our deep ground-based imaging has mapped M101's stellar disk out to nearly 50 kpc (10 scale lengths), where we see signatures of diverse stellar populations tracing recent disk building. However, the constraints provided by integrated colors are limited; direct imaging of the stellar populations with HST will provide much stronger constraints on the evolutionary history of the outer disk.

We propose deep ACS imaging of the outskirts of M101's disk, to construct resolved stellar CMDs for the outer disk and use the relative distribution

of stars in different evolutionary phases to constrain the ages and metallicities of the stellar populations. Our deep (I=28.7, V=29.9) imaging will extend far enough down the stellar luminosity function to probe a variety of stellar evolutionary tracers for both young and old stars. A parallel WFC3 pointing will image a nearby blank field, to allow for detection and separation of any M101 halo populations from those in the outer disk field.

OBSERVING DESCRIPTION

Our program seeks to obtain deep photometry of the various stellar populations found in the outskirts of M101. We plan a primary ACS/WFC pointings in the NE Plume along with a nearby co-ordinated parallel WFC3/UVIS 'halo' field. Our plan is to obtain deep point source photometry of stellar sources in M101. To do this we have received 26 orbits -- 14 orbits in F606W and 12 orbits with the F814W filter.

Field location: The chosen field is far enough in the outer disk of M101 to effectively sample the stellar populations, AND to sample the stellar halo with the parallel WFC3 field. The field location is set; the current location places it in a 'hole' surrounded by 14th and 15th magnitude stars, and we would like to avoid those in our science field if at all possible.

Exposure Times: Our observing plan is to take a series of dithered 1/2 orbit exposures to allow us to perform the deep photometry. The 1/2 orbit exposures (>1300s) should be enough to mitigate the CTE problems for faint objects in ACS data -- this is crucial for our project as we are trying to get data as deep as F814W~29 and F606W~30. We have also chosen 1/2 orbit exposures to lessen the effect of cosmic rays in our data compared to that of full orbit exposures. NOTE: We have reduced the exposure times slightly in order to allow for easier scheduling; at the moment we have trimmed ~60sec from full visibility in an orbit.

Dithering strategy: We want to dither our exposures to avoid as many issues with CRs, hot pixels, and to fill out the PSF in the ACS data via sub-pixel dithers. We have adopted the ACS-DITHER-BOX 4-point pattern to do this. By using this pattern with 1/2 orbit exposures, we have split up our program into 2-orbit visits to maximize scheduleability. Two visits will be placed +- 20 pixels in the X direction from the original visit/filter to further avoid hit pixels and any other artifacts. In order to fill the ACS gap, 3 more visits/filter will be shifted 60 pixels=3.0" in the Y-direction, and 0.25" in X (much like the ACS/WFC DITHER-LINE pattern). Finally, an extra visit (2 orbits more in F606W than in F814W) is placed between the two line patterns.

Orientations/Roll Angles: Due to having only 1 pointing available to do our science, we have a (somewhat) resticted range (roughly 23 degrees) of

roll angles to allow us to (a) place the ACS primary on the outer disk (the 'NE Plume' of M101, and (b) to place the WFC3 co-ordinated parallel field to the E of that field and sample the M101 halo (and not the disk). This field placement is necessary for our science goals; the WFC3 data will be used to remove any halo star (and background galaxy) contamination from the ACS primary data. Our primary ACS field was chosen to maximize the possible roll angles we can effectively use to still target a 'pure' halo/background WFC3 field. All other roll angles will place the WFC3 field on other parts of M101's outer disk (affecting its use as a background field) or n the companion galaxy NGC 5477. We cannot use roll angles < 12 degrees due to the presence of a bright (V~14) star in the WFC3 parallel field. We have placed our science field in such a location that we can use the smallest roll angles (12+ degrees) possible to allow the program to be schedulable in the earlier part of Cycle 22.

We recognize the constraints on the roll angle will affect the schedulability of the program; for this reason we have (a) divided our program into a series of 2-orbit visits and (b) reduced our exposure times in each orbit/visit by ~60 seconds short of full visibility.

Visit

Proposal 13701, M101 - F606W - location 1 (01), implementation Fri Jul 18 01:04:50 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: ORIENT 12D TO 35 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1-2)

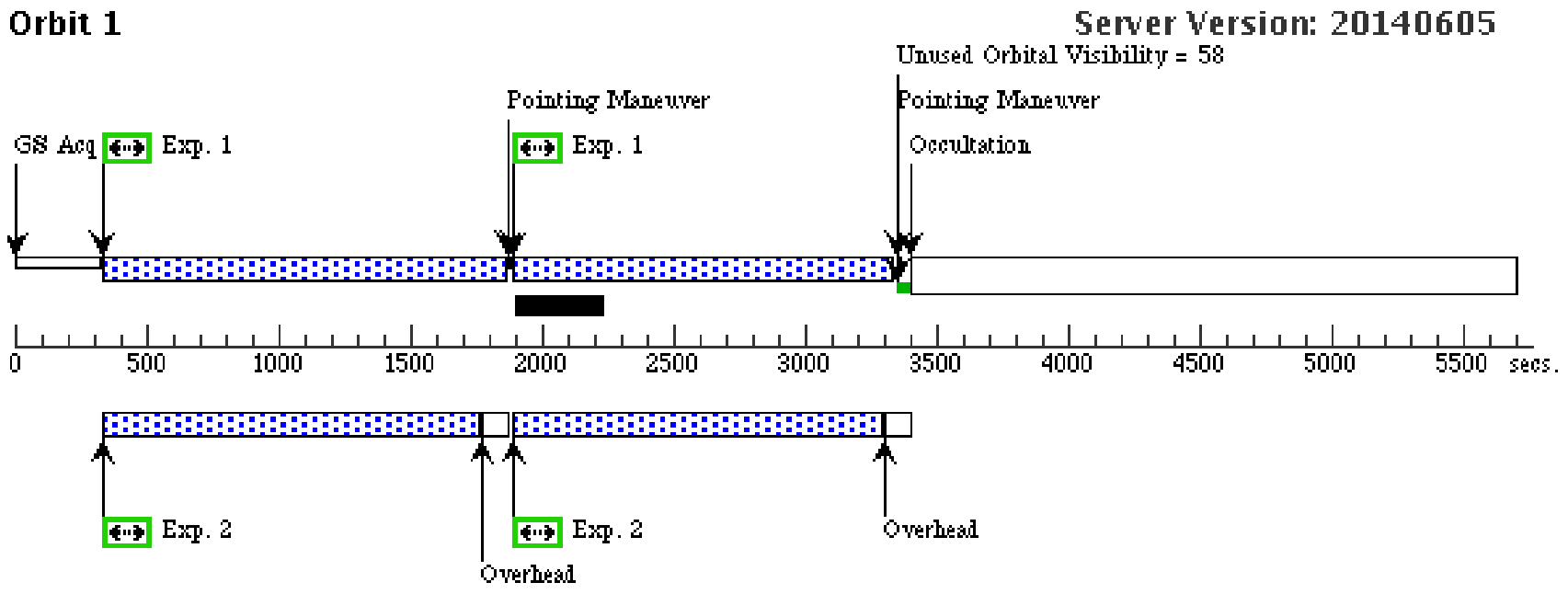
Fixed Targets

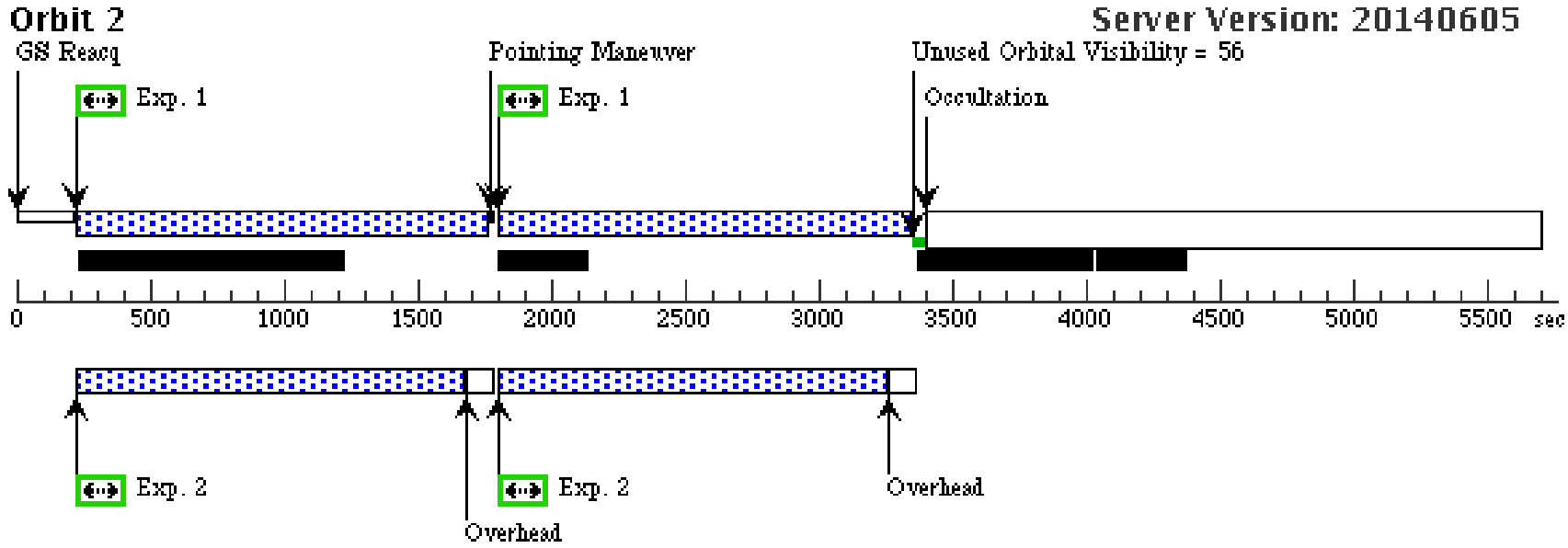
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M101-NE-PLUME	RA: 14 04 50.6202 (211.2109175d) Dec: +54 31 19.13 (54.52198d) Equinox: J2000		V=29.9	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACS disk	(1) M101-NE-PLUME	ACS/WFC, ACCUM, WFCENTER	F606W		POS TARG 0,0; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-2 in M101 - F606W - location 1 (01) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F606W - location 1 (01)	1400 Secs (5470 Secs) *[==>1320.0 Secs (Pattern 1)]* *[==>1320.0 Secs (Pattern 2)]* *[==>1415.0 Secs (Pattern 3)]* *[==>1415.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***
2	WFC3 halo	(1) M101-NE-PLUME	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in M101 - F606W - location 1 (01) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F606W - location 1 (01)	1400 Secs (5700 Secs) *[==>1400.0 Secs (Pattern 1)]* *[==>1400.0 Secs (Pattern 2)]* *[==>1450.0 Secs (Pattern 3)]* *[==>1450.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***

Orbit Structure





Visit

Proposal 13701, M101 - F606W - location 2 (02), implementation Fri Jul 18 01:04:51 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: ORIENT 12D TO 35 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1-2)

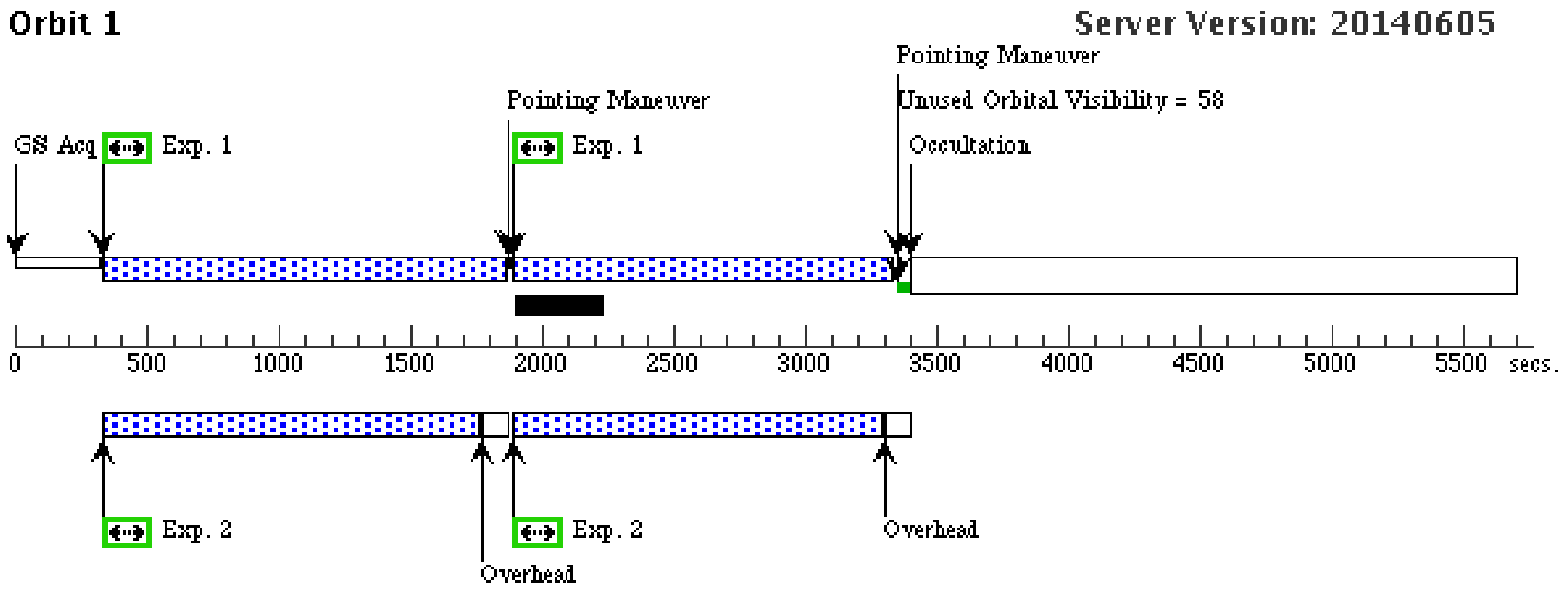
Fixed Targets

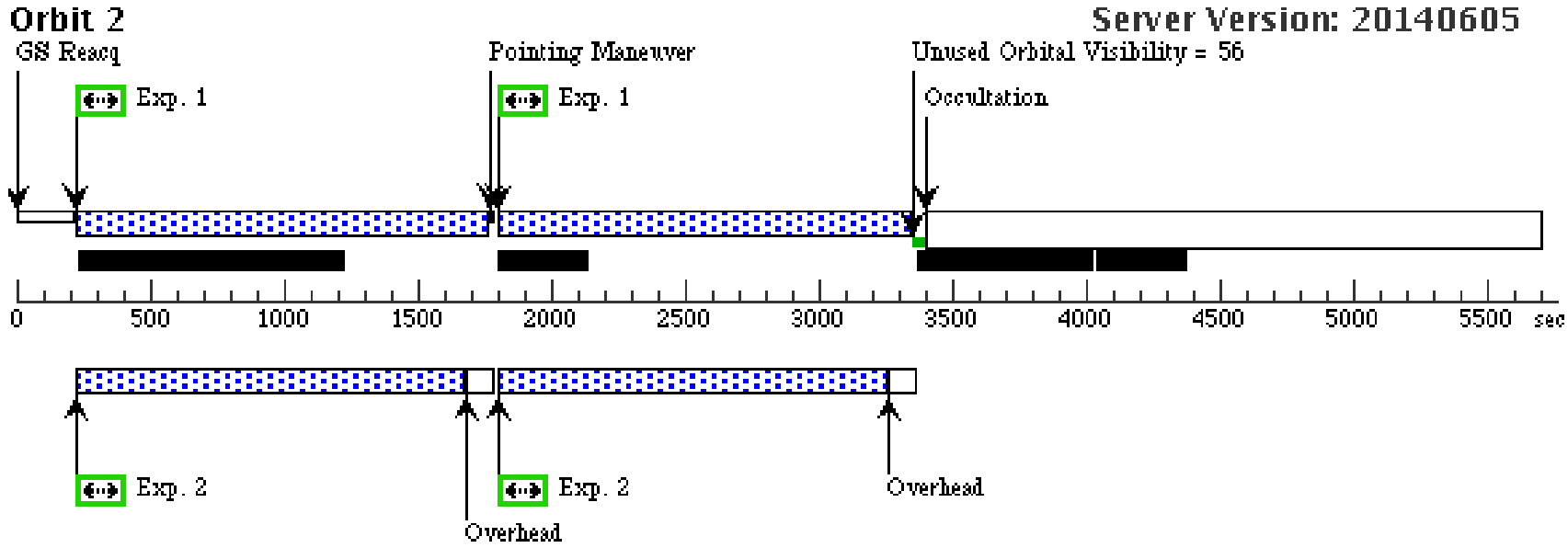
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M101-NE-PLUME	RA: 14 04 50.6202 (211.2109175d) Dec: +54 31 19.13 (54.52198d) Equinox: J2000		V=29.9	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACS disk	(1) M101-NE-PLUME	ACS/WFC, ACCUM, WFCENTER	F606W		POS TARG -1.0,0; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-2 in M101 - F606W - location 2 (02) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F606W - location 2 (02)	1400 Secs (5470 Secs) *[==>1320.0 Secs (Pattern 1)]* *[==>1320.0 Secs (Pattern 2)]* *[==>1415.0 Secs (Pattern 3)]* *[==>1415.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***
2	WFC3 halo	(1) M101-NE-PLUME	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in M101 - F606W - location 2 (02) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F606W - location 2 (02)	1400 Secs (5700 Secs) *[==>1400.0 Secs (Pattern 1)]* *[==>1400.0 Secs (Pattern 2)]* *[==>1450.0 Secs (Pattern 3)]* *[==>1450.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***

Orbit Structure





Visit

Proposal 13701, M101 - F606W - location 3 (03), implementation Fri Jul 18 01:04:51 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: ORIENT 12D TO 35 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1-2)

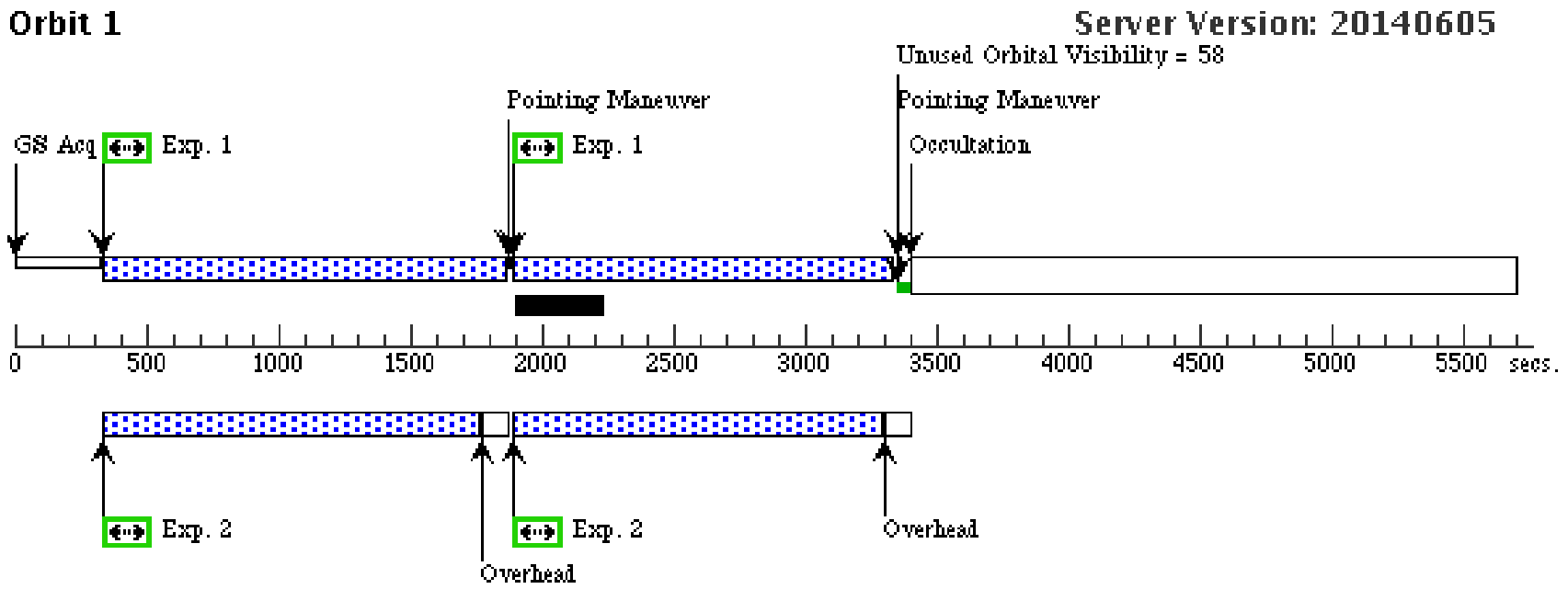
Fixed Targets

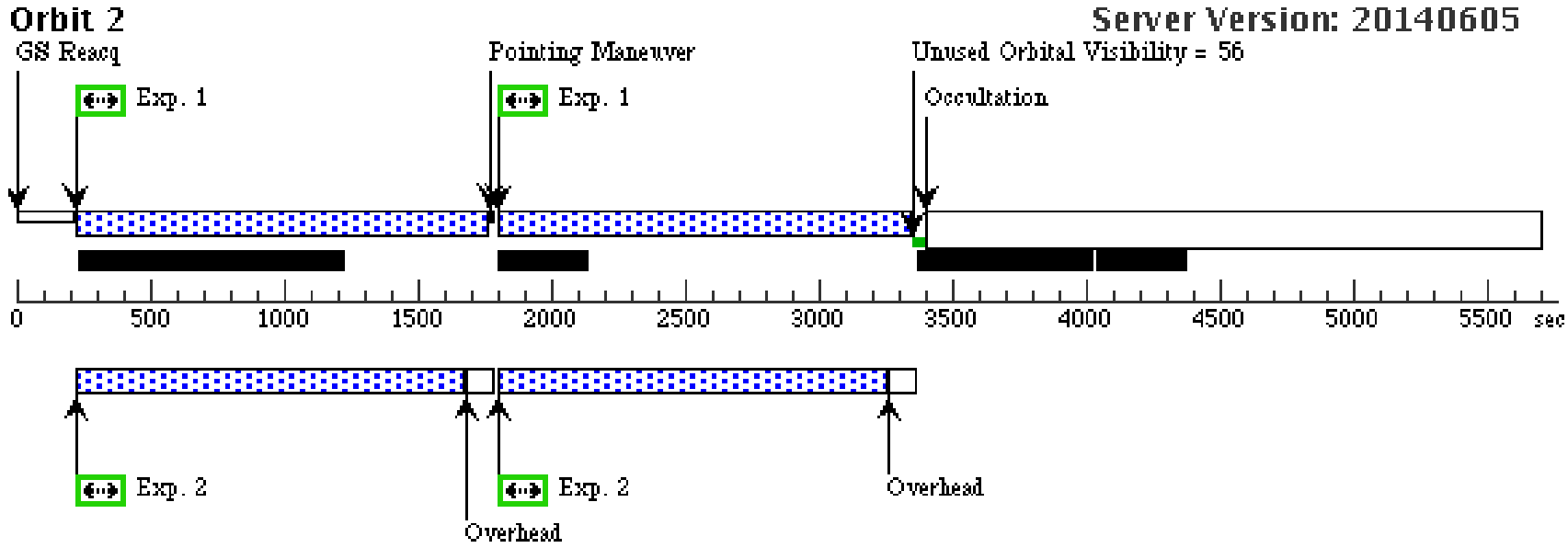
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M101-NE-PLUME	RA: 14 04 50.6202 (211.2109175d) Dec: +54 31 19.13 (54.52198d) Equinox: J2000		V=29.9	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACS disk	(1) M101-NE-PLUME	ACS/WFC, ACCUM, WFCENTER	F606W		POS TARG +1.0 ,0.00; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-2 in M101 - F606W - location 3 (03) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F606W - location 3 (03)	1400 Secs (5470 Secs) *[==>1320.0 Secs (Pattern 1)]* *[==>1320.0 Secs (Pattern 2)]* *[==>1415.0 Secs (Pattern 3)]* *[==>1415.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***
2	WFC3 halo	(1) M101-NE-PLUME	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in M101 - F606W - location 3 (03) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F606W - location 3 (03)	1400 Secs (5700 Secs) *[==>1400.0 Secs (Pattern 1)]* *[==>1400.0 Secs (Pattern 2)]* *[==>1450.0 Secs (Pattern 3)]* *[==>1450.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***

Orbit Structure





Visit

Proposal 13701, M101 - F606W - location 4 (04), implementation Fri Jul 18 01:04:51 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: ORIENT 12D TO 35 D

Comments: Locations 4 same as Locations 1, but shifted by 5,60 pixels to cover ACS gap

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1-2)

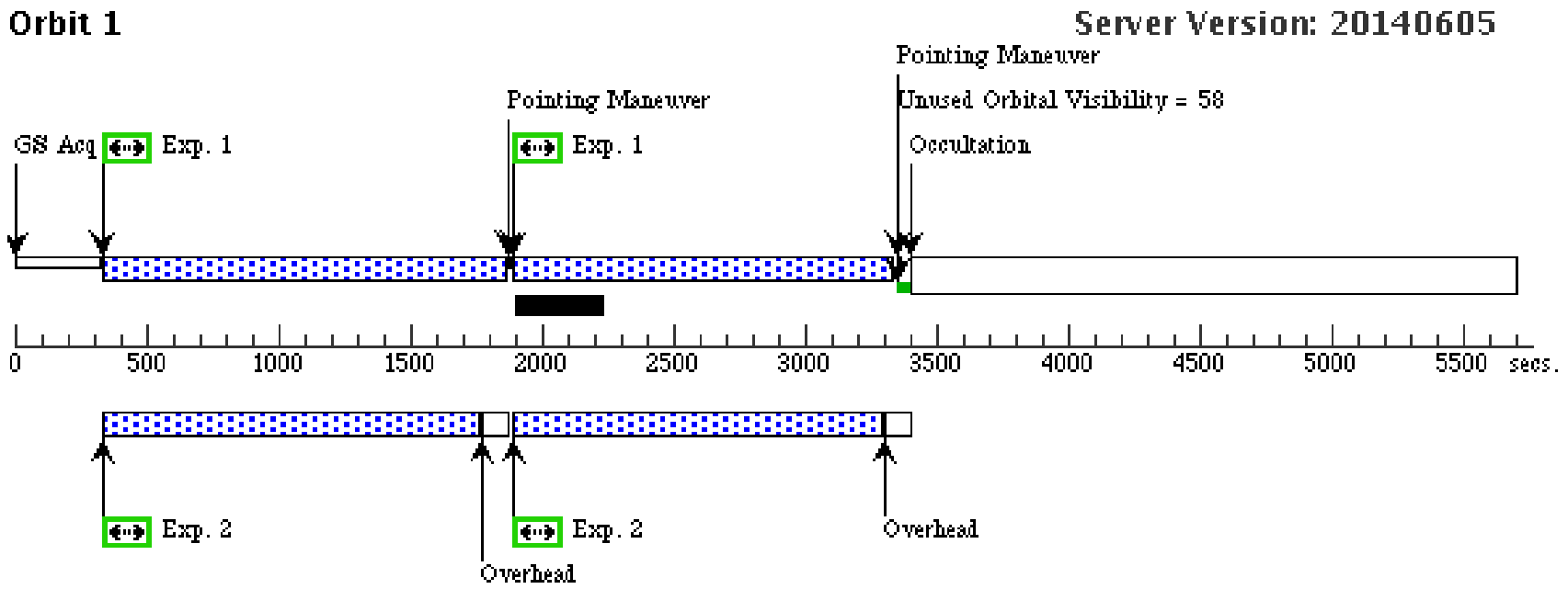
Fixed Targets

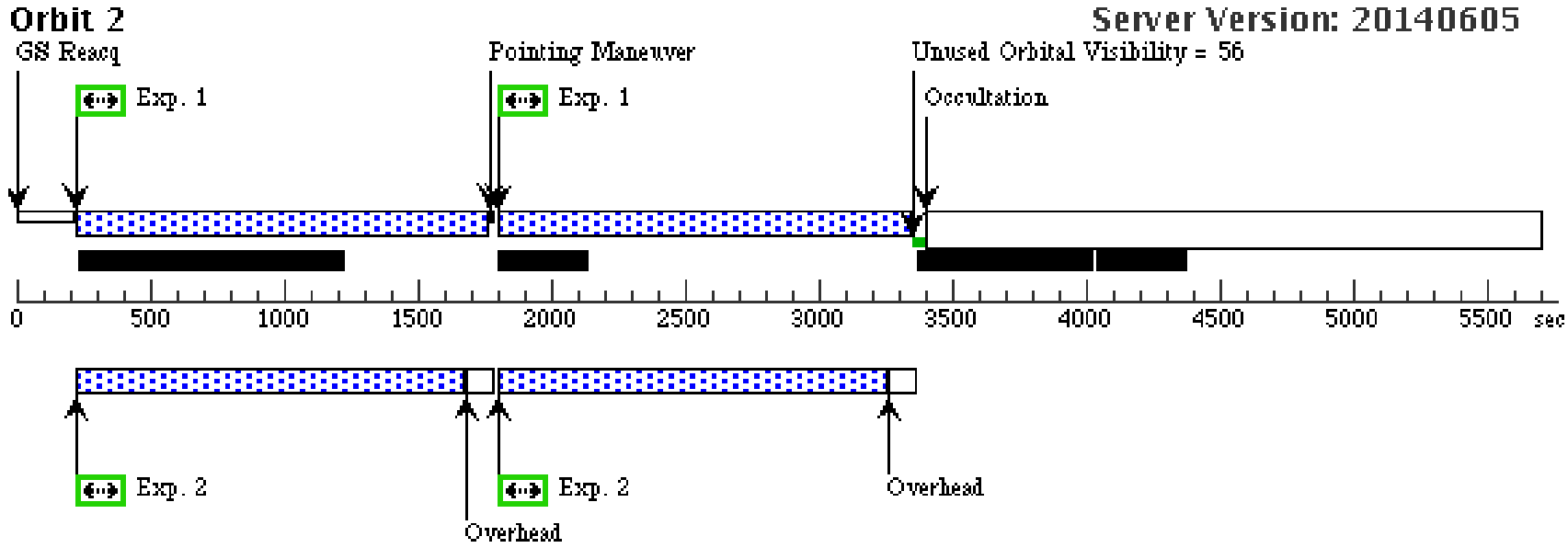
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M101-NE-PLUME	RA: 14 04 50.6202 (211.2109175d) Dec: +54 31 19.13 (54.52198d) Equinox: J2000		V=29.9	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACS disk	(1) M101-NE-PLUME	ACS/WFC, ACCUM, WFCENTER	F606W		POS TARG 0.25,3.00; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-2 in M101 - F606W - location 4 (04) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F606W - location 4 (04)	1400 Secs (5470 Secs) *[==>1320.0 Secs (Pattern 1)]* *[==>1320.0 Secs (Pattern 2)]* *[==>1415.0 Secs (Pattern 3)]* *[==>1415.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***
2	WFC3 halo	(1) M101-NE-PLUME	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in M101 - F606W - location 4 (04) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F606W - location 4 (04)	1400 Secs (5700 Secs) *[==>1400.0 Secs (Pattern 1)]* *[==>1400.0 Secs (Pattern 2)]* *[==>1450.0 Secs (Pattern 3)]* *[==>1450.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***

Orbit Structure





Visit

Proposal 13701, M101 - F606W - location 5 (05), implementation Fri Jul 18 01:04:51 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: ORIENT 12D TO 35 D

Comments: Location 5 same as Location 2, but shifted by 5,60 pixels to cover ACS gap

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1-2)

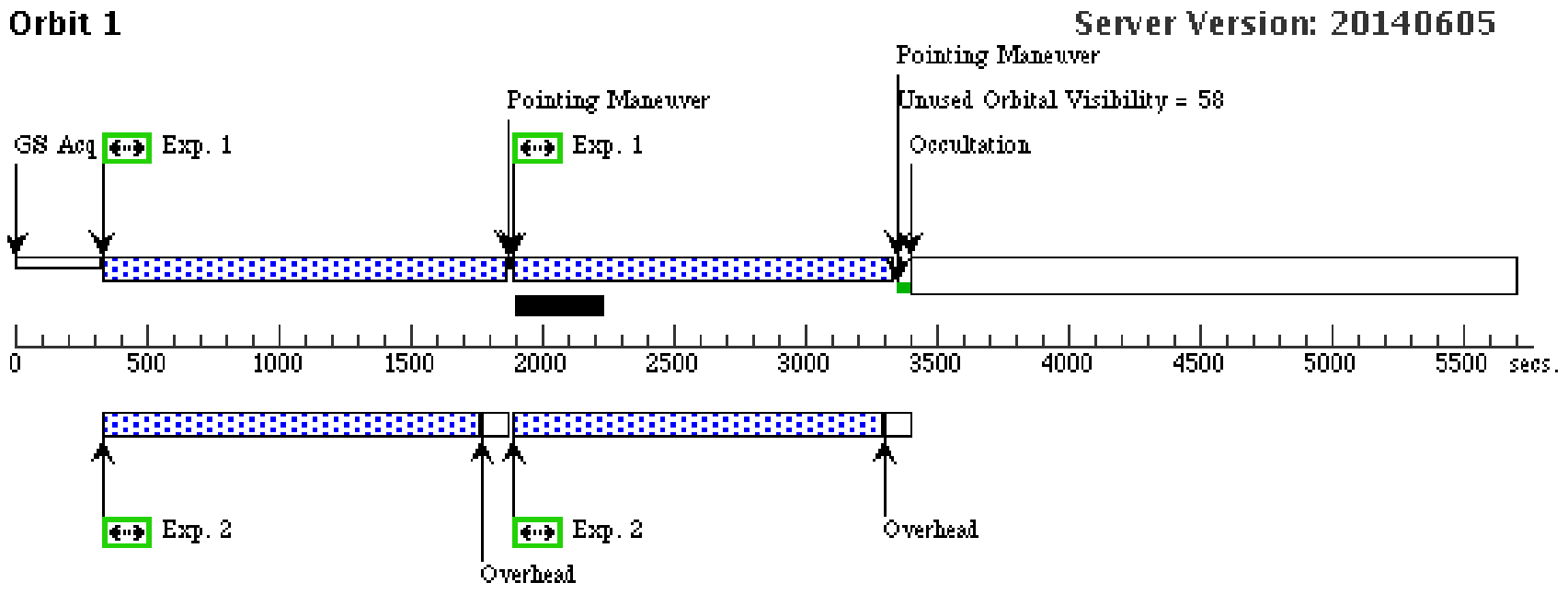
Fixed Targets

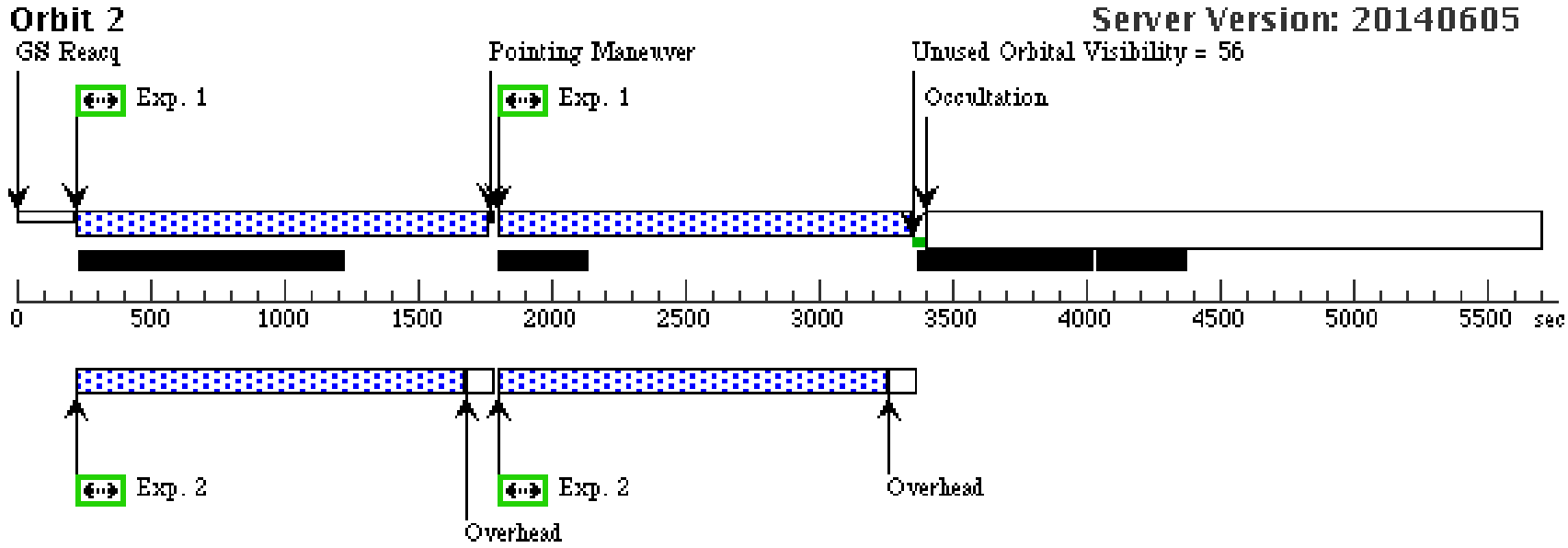
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M101-NE-PLUME	RA: 14 04 50.6202 (211.2109175d) Dec: +54 31 19.13 (54.52198d) Equinox: J2000		V=29.9	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACS disk	(1) M101-NE-PLUME	ACS/WFC, ACCUM, WFCENTER	F606W		POS TARG -0.75,3.00; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-2 in M101 - F606W - location 5 (05) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F606W - location 5 (05)	1400 Secs (5470 Secs) *[==>1320.0 Secs (Pattern 1)]* *[==>1320.0 Secs (Pattern 2)]* *[==>1415.0 Secs (Pattern 3)]* *[==>1415.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***
2	WFC3 halo	(1) M101-NE-PLUME	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in M101 - F606W - location 5 (05) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F606W - location 5 (05)	1400 Secs (5700 Secs) *[==>1400.0 Secs (Pattern 1)]* *[==>1400.0 Secs (Pattern 2)]* *[==>1450.0 Secs (Pattern 3)]* *[==>1450.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***

Orbit Structure





Visit

Proposal 13701, M101 - F606W - location 6 (06), implementation Fri Jul 18 01:04:51 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: ORIENT 12D TO 35 D

Comments: Location 6 same as Location 3, but shofted 5,60 pixels to cover ACS gap

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1-2)

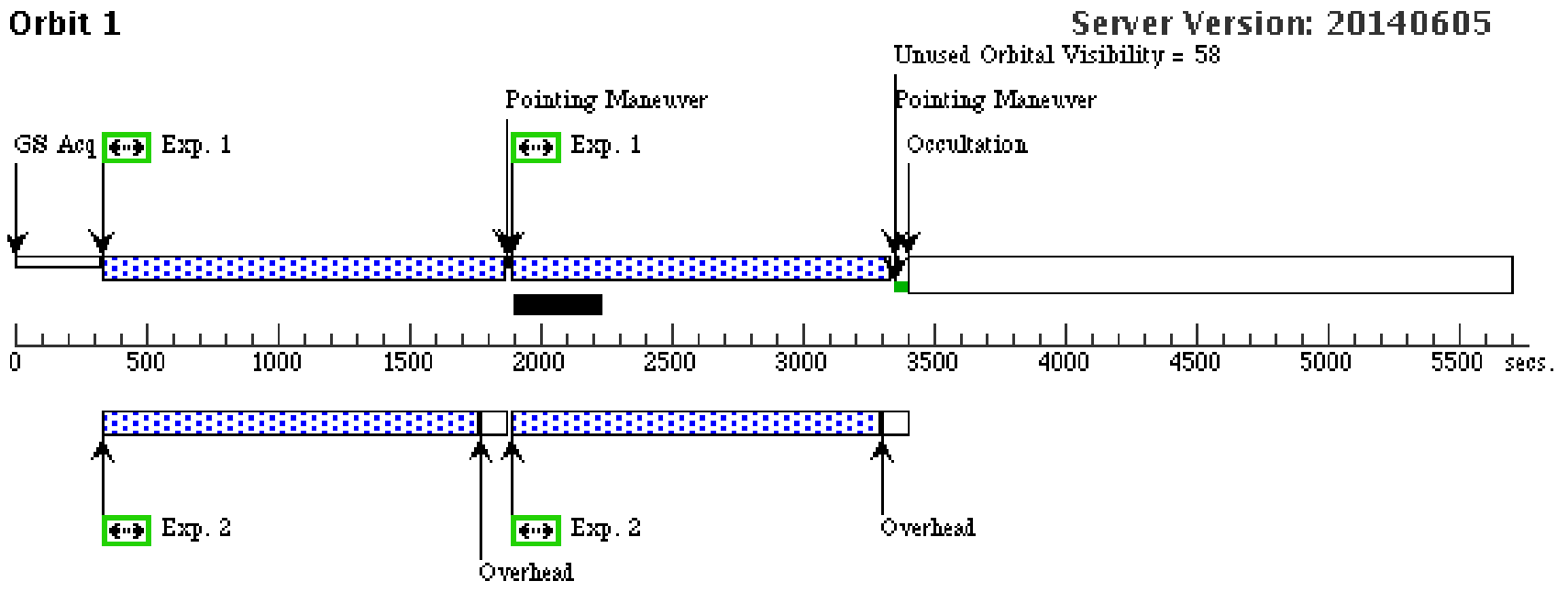
Fixed Targets

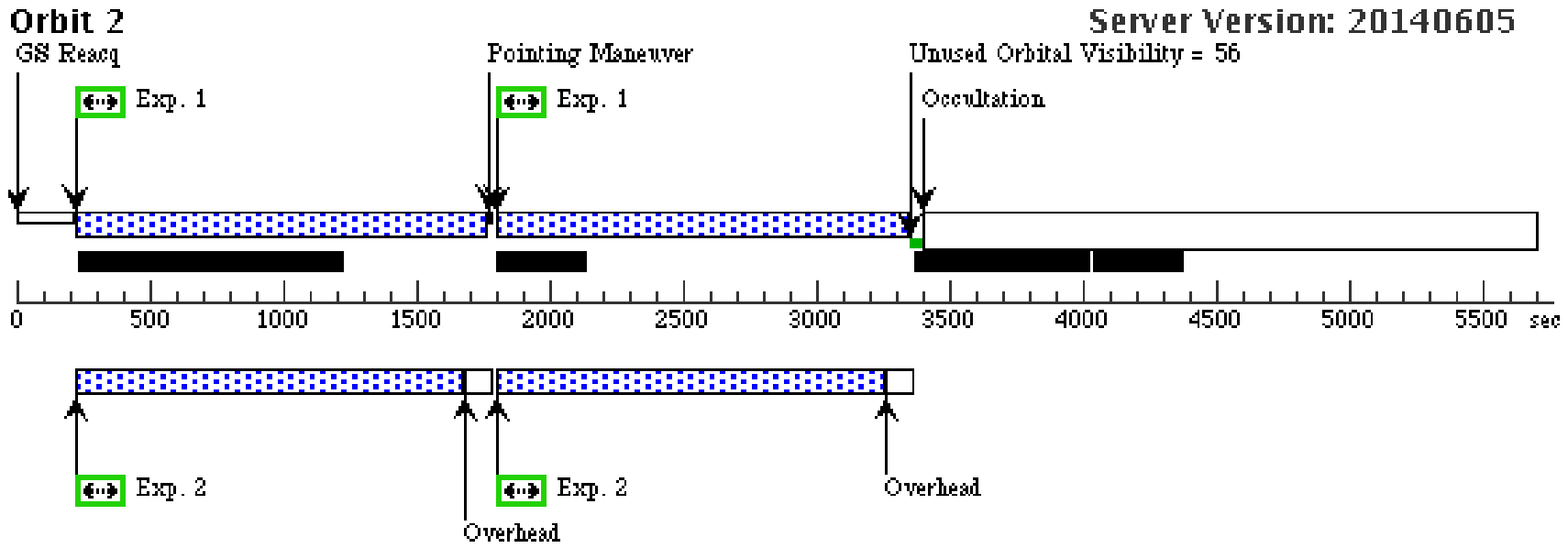
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M101-NE-PLUME	RA: 14 04 50.6202 (211.2109175d) Dec: +54 31 19.13 (54.52198d) Equinox: J2000		V=29.9	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACS disk	(1) M101-NE-PLUME	ACS/WFC, ACCUM, WFCENTER	F606W		POS TARG +1.25,3.00; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-2 in M101 - F606W - location 6 (06) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F606W - location 6 (06)	1400 Secs (5470 Secs) *[==>1320.0 Secs (Pattern 1)]* *[==>1320.0 Secs (Pattern 2)]* *[==>1415.0 Secs (Pattern 3)]* *[==>1415.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***
2	WFC3 halo	(1) M101-NE-PLUME	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in M101 - F606W - location 6 (06) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F606W - location 6 (06)	1400 Secs (5700 Secs) *[==>1400.0 Secs (Pattern 1)]* *[==>1400.0 Secs (Pattern 2)]* *[==>1450.0 Secs (Pattern 3)]* *[==>1450.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***

Orbit Structure





Visit

Proposal 13701, M101 - F606W - location 7 (07), implementation Fri Jul 18 01:04:51 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: ORIENT 12D TO 35 D

Comments: Location 7 (only used for F606W in ACS, F814W in WFC3 parallel) is placed between Locations 1 and 3

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1-2)

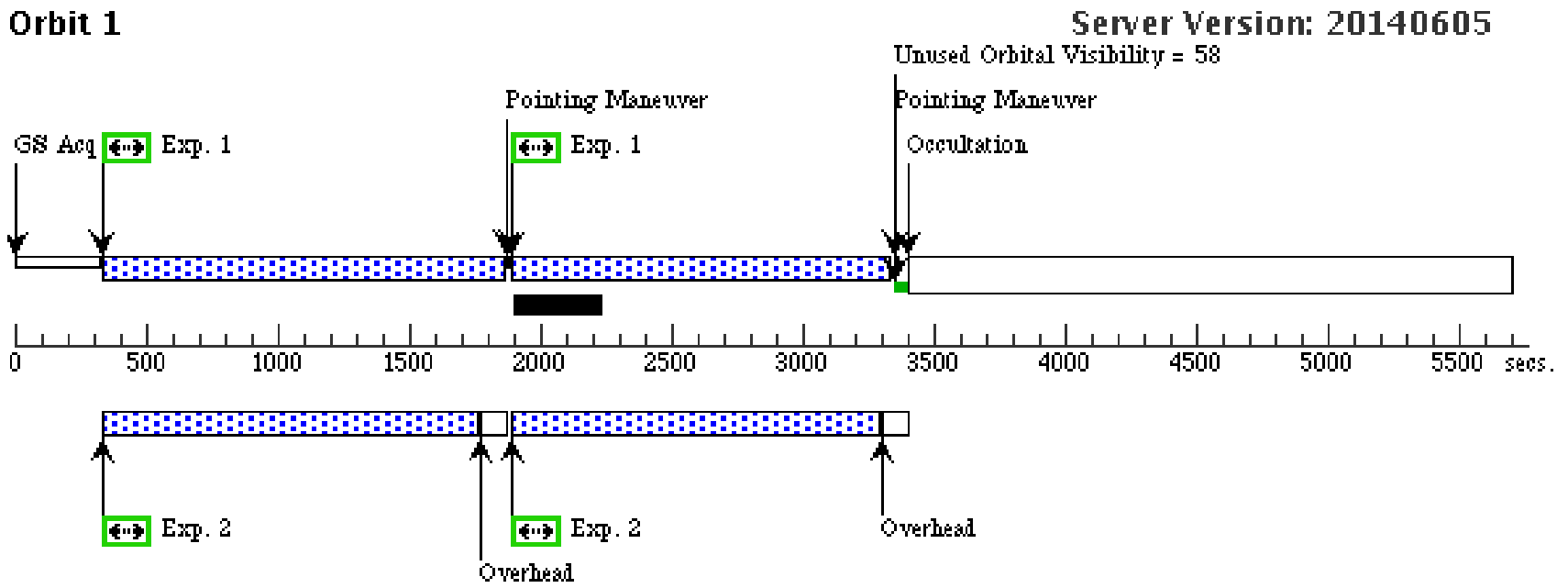
Fixed Targets

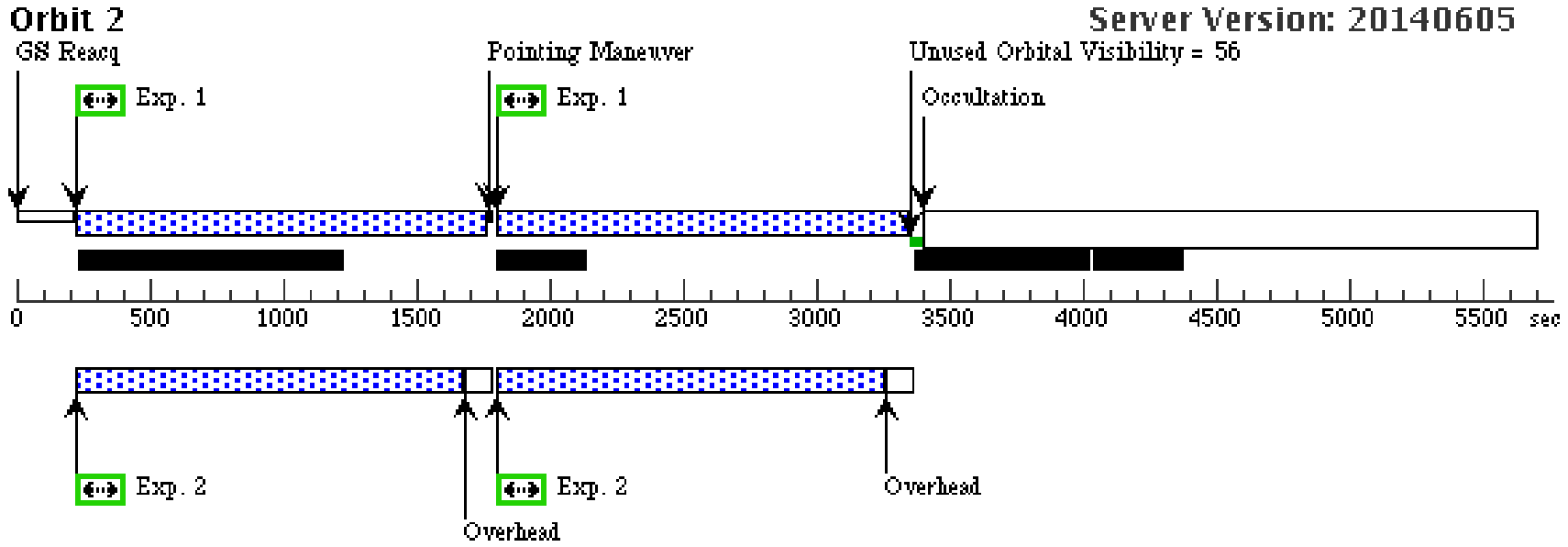
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M101-NE-PLUME	RA: 14 04 50.6202 (211.2109175d) Dec: +54 31 19.13 (54.52198d) Equinox: J2000		V=29.9	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACS disk	(1) M101-NE-PLUME	ACS/WFC, ACCUM, WFCENTER	F606W		POS TARG 0.125,1.5; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-2 in M101 - F606W - location 7 (07) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F606W - location 7 (07)	1400 Secs (5470 Secs)	
								[==>1320.0 Secs (Pattern 1)] *[==>1320.0 Secs (Pattern 2)]*	***[1]***
								[==>1415.0 Secs (Pattern 3)] *[==>1415.0 Secs (Pattern 4)]*	***[2]***
2	WFC3 halo	(1) M101-NE-PLUME	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 1-2 in M101 - F606W - location 7 (07) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F606W - location 7 (07)	1400 Secs (5700 Secs)	
								[==>1400.0 Secs (Pattern 1)] *[==>1400.0 Secs (Pattern 2)]*	***[1]***
								[==>1450.0 Secs (Pattern 3)] *[==>1450.0 Secs (Pattern 4)]*	***[2]***

Orbit Structure





Visit

Proposal 13701, M101 - F814W - location 1 (08), implementation Fri Jul 18 01:04:51 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: ORIENT 12D TO 35 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1-2)

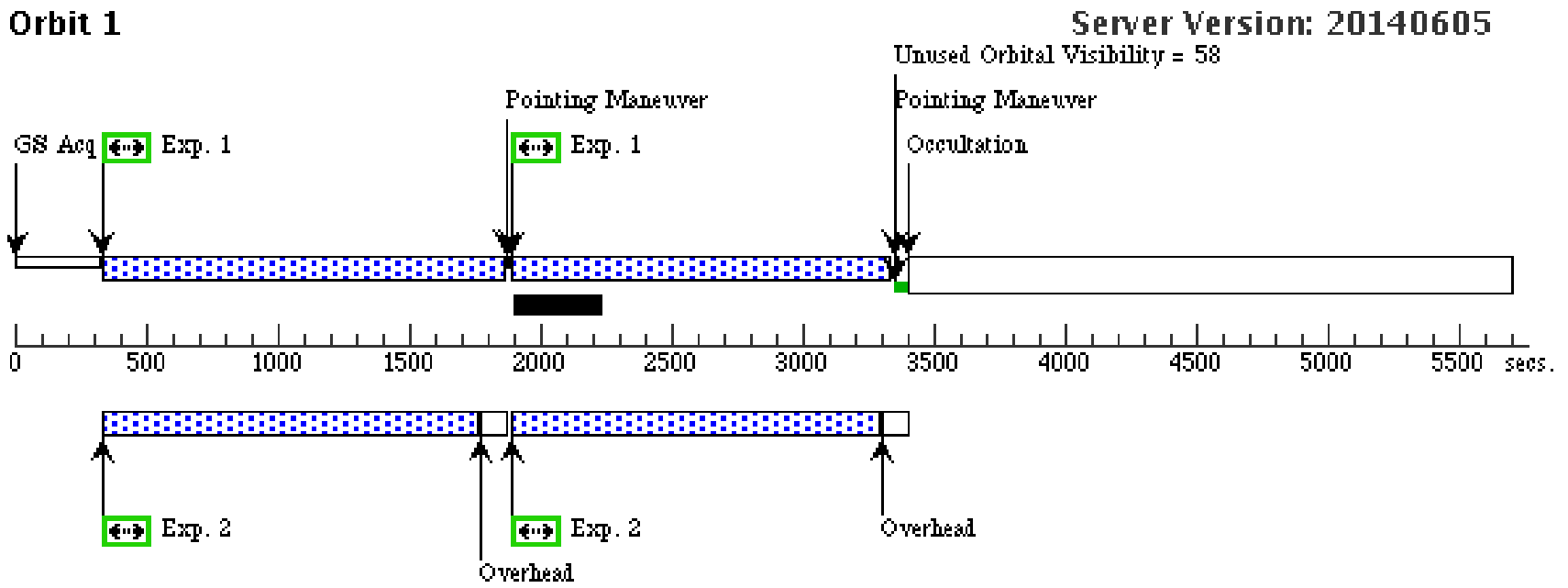
Fixed Targets

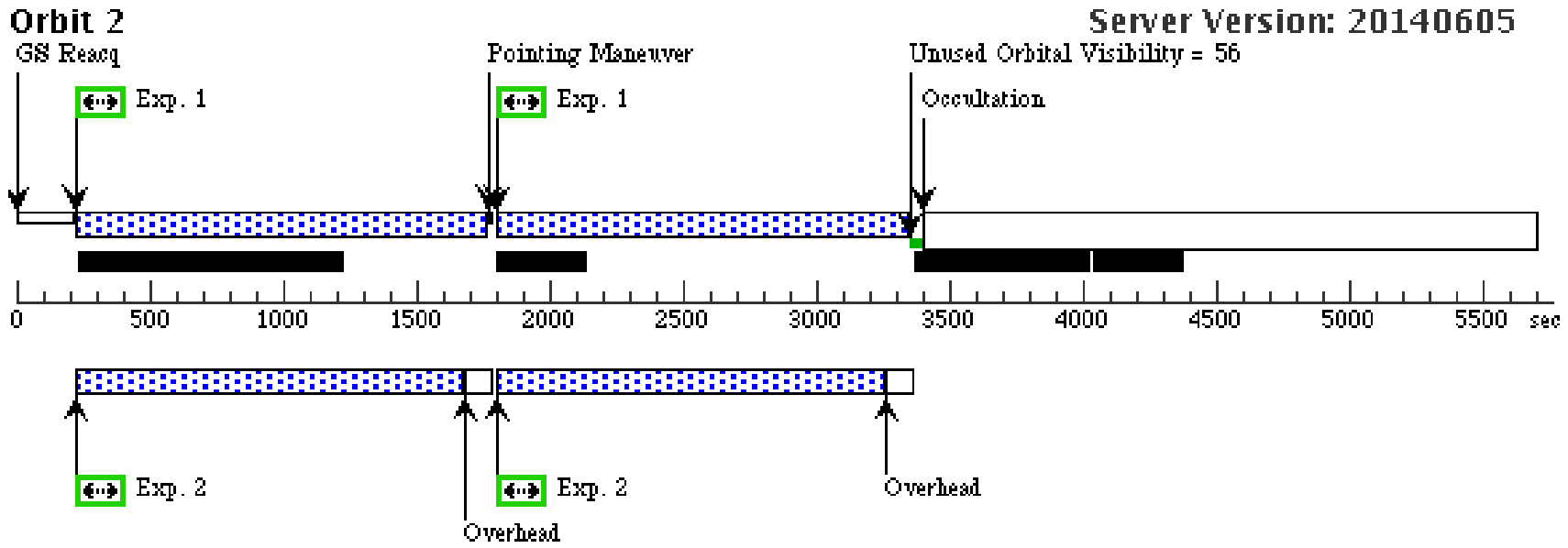
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M101-NE-PLUME	RA: 14 04 50.6202 (211.2109175d) Dec: +54 31 19.13 (54.52198d) Equinox: J2000		V=29.9	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACS disk	(1) M101-NE-PLUME	ACS/WFC, ACCUM, WFCENTER	F814W		POS TARG 0,0; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-2 in M101 - F814W - location 1 (08) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F814W - location 1 (08)	1400 Secs (5470 Secs) *[==>1320.0 Secs (Pattern 1)]* *[==>1320.0 Secs (Pattern 2)]* *[==>1415.0 Secs (Pattern 3)]* *[==>1415.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***
2	WFC3 halo	(1) M101-NE-PLUME	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 1-2 in M101 - F814W - location 1 (08) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F814W - location 1 (08)	1400 Secs (5700 Secs) *[==>1400.0 Secs (Pattern 1)]* *[==>1400.0 Secs (Pattern 2)]* *[==>1450.0 Secs (Pattern 3)]* *[==>1450.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***

Orbit Structure





Visit

Proposal 13701, M101 - F814W - location 2 (09), implementation Fri Jul 18 01:04:51 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: ORIENT 12D TO 35 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1-2)

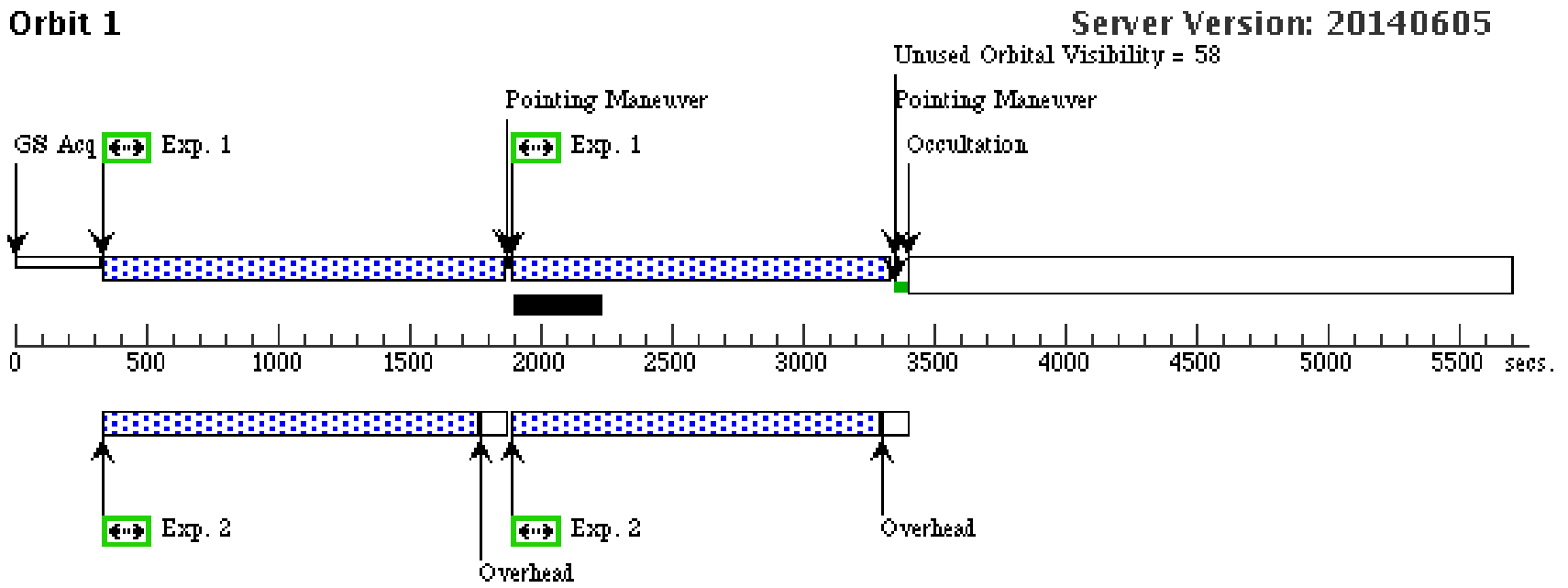
Fixed Targets

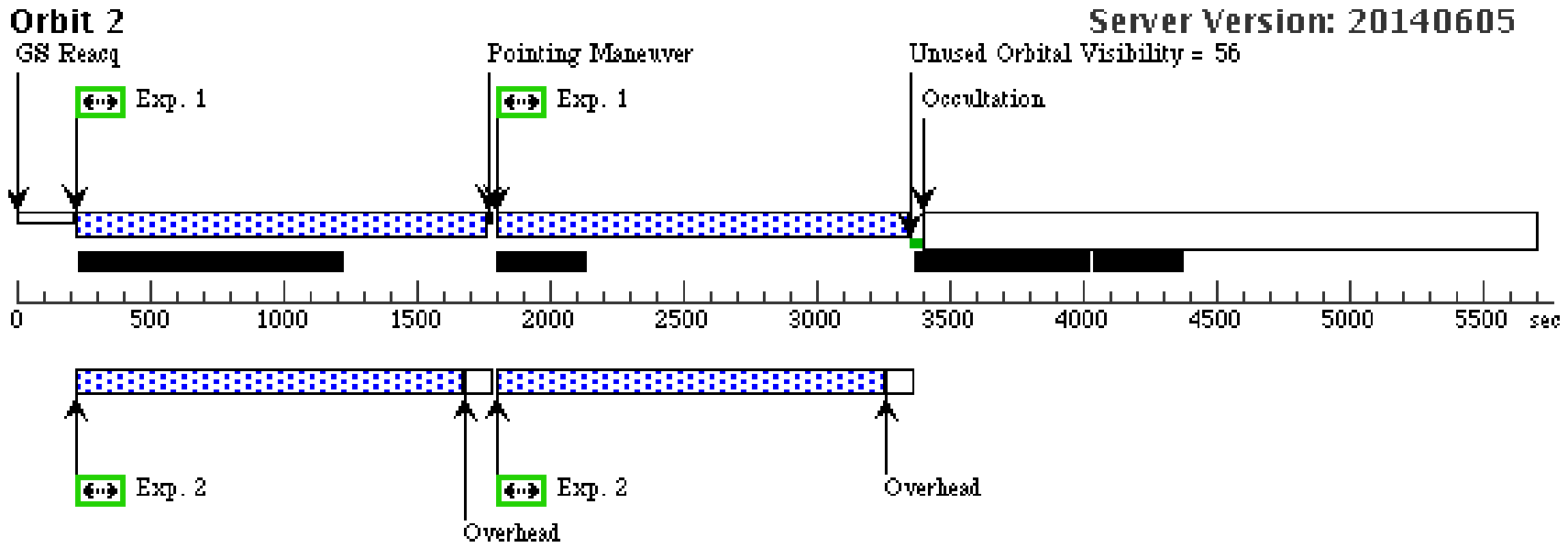
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M101-NE-PLUME	RA: 14 04 50.6202 (211.2109175d) Dec: +54 31 19.13 (54.52198d) Equinox: J2000		V=29.9	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACS disk	(1) M101-NE-PLUME	ACS/WFC, ACCUM, WFCENTER	F814W		POS TARG -1.0,0; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-2 in M101 - F814W - location 2 (09) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F814W - location 2 (09)	1400 Secs (5470 Secs) *[==>1320.0 Secs (Pattern 1)]* *[==>1320.0 Secs (Pattern 2)]* *[==>1415.0 Secs (Pattern 3)]* *[==>1415.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***
2	WFC3 halo	(1) M101-NE-PLUME	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 1-2 in M101 - F814W - location 2 (09) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F814W - location 2 (09)	1400 Secs (5700 Secs) *[==>1400.0 Secs (Pattern 1)]* *[==>1400.0 Secs (Pattern 2)]* *[==>1450.0 Secs (Pattern 3)]* *[==>1450.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***

Orbit Structure





Visit

Proposal 13701, M101 - F814W - location 3 (10), implementation Fri Jul 18 01:04:51 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: ORIENT 12D TO 35 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1-2)

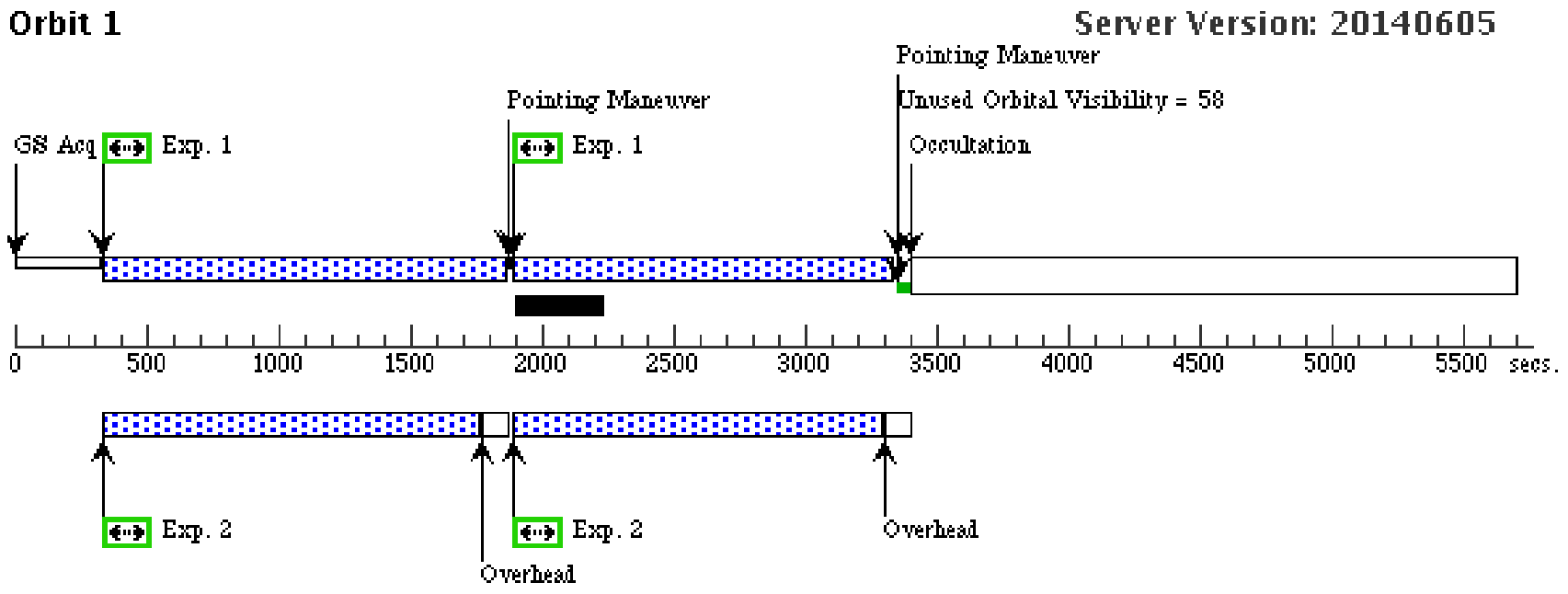
Fixed Targets

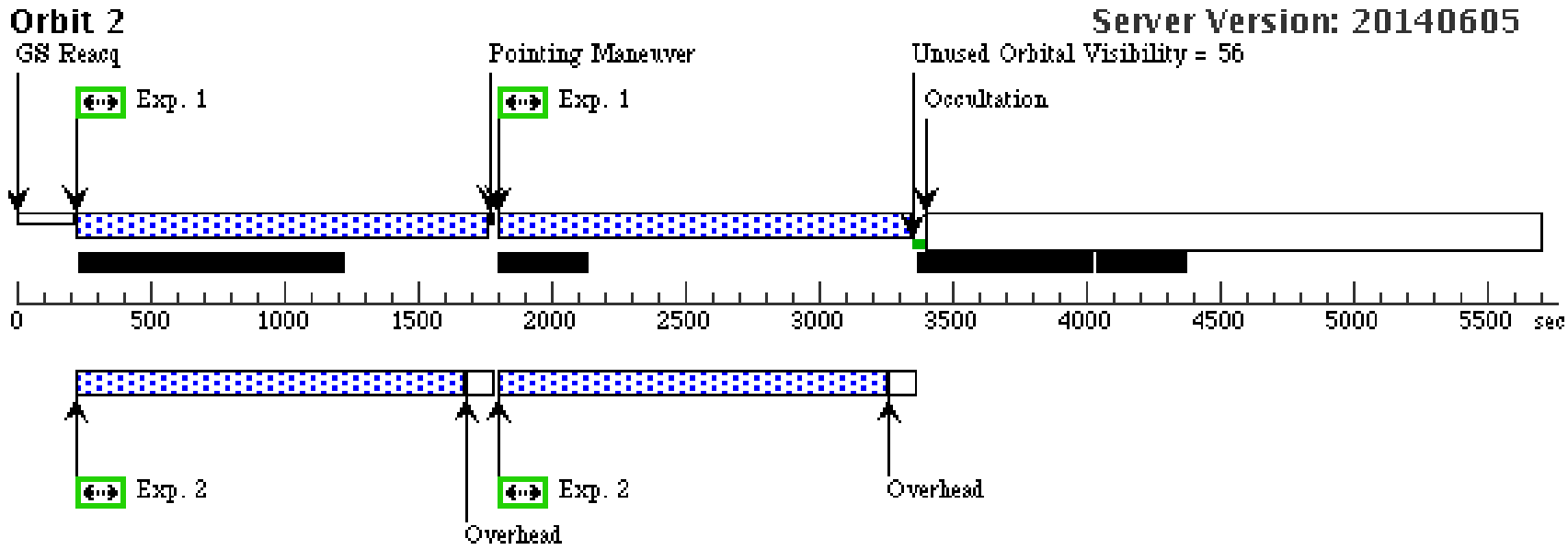
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M101-NE-PLUME	RA: 14 04 50.6202 (211.2109175d) Dec: +54 31 19.13 (54.52198d) Equinox: J2000		V=29.9	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACS disk	(1) M101-NE-PLUME	ACS/WFC, ACCUM, WFCENTER	F814W		POS TARG +1.0 ,0.00; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-2 in M101 - F814W - location 3 (10) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F814W - location 3 (10)	1400 Secs (5470 Secs) *[==>1320.0 Secs (Pattern 1)]* *[==>1320.0 Secs (Pattern 2)]* *[==>1415.0 Secs (Pattern 3)]* *[==>1415.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***
2	WFC3 halo	(1) M101-NE-PLUME	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 1-2 in M101 - F814W - location 3 (10) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F814W - location 3 (10)	1400 Secs (5700 Secs) *[==>1400.0 Secs (Pattern 1)]* *[==>1400.0 Secs (Pattern 2)]* *[==>1450.0 Secs (Pattern 3)]* *[==>1450.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***

Orbit Structure





Visit

Proposal 13701, M101 - F814W - location 4 (11), implementation Fri Jul 18 01:04:52 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: ORIENT 12D TO 35 D

Comments: Locations 4 same as Locations 1, but shifted by 5,60 pixels to cover ACS gap

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1-2)

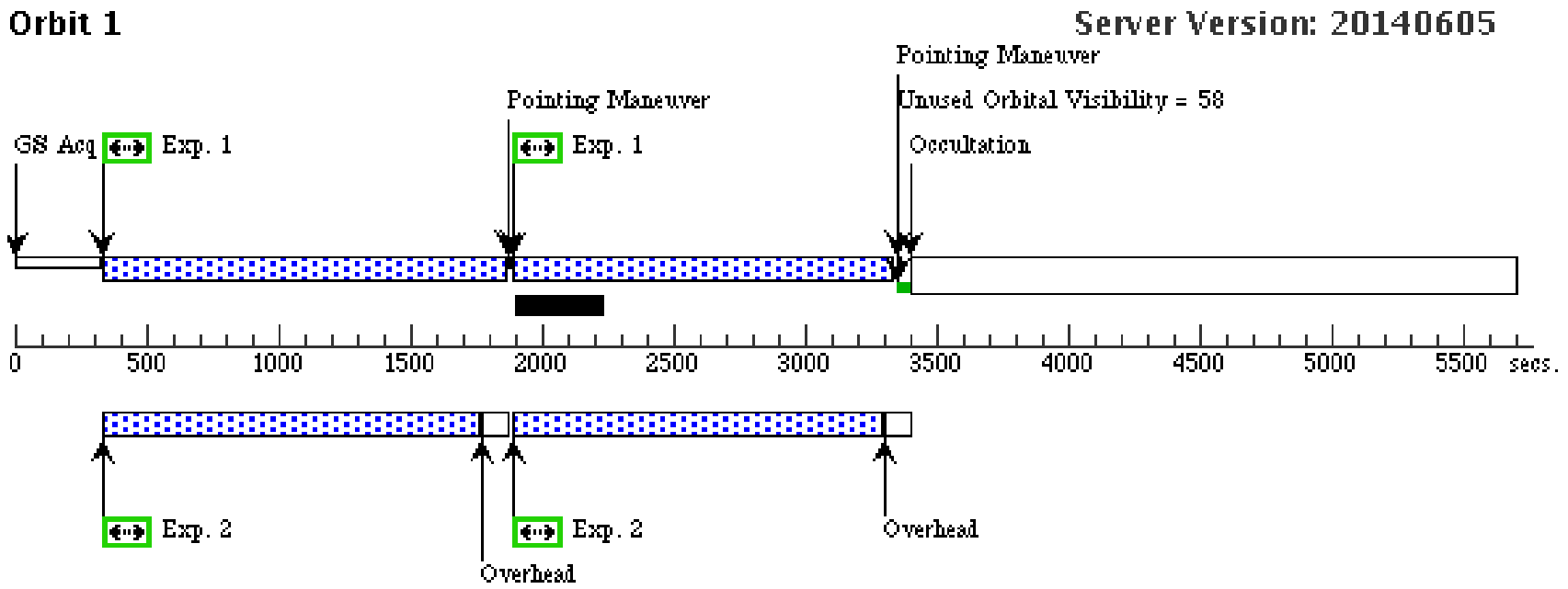
Fixed Targets

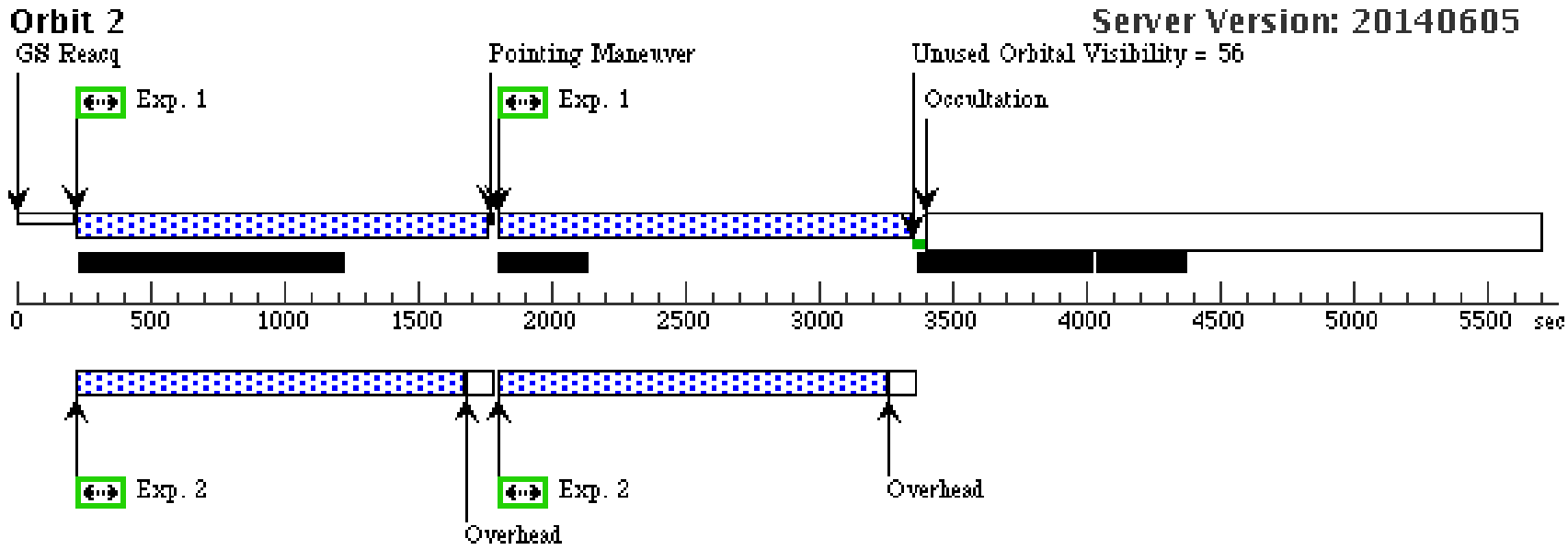
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M101-NE-PLUME	RA: 14 04 50.6202 (211.2109175d) Dec: +54 31 19.13 (54.52198d) Equinox: J2000		V=29.9	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACS disk	(1) M101-NE-PLUME	ACS/WFC, ACCUM, WFCENTER	F814W		POS TARG 0.25,3.00; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-2 in M101 - F814W - location 4 (11) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F814W - location 4 (11)	1400 Secs (5470 Secs) *[==>1320.0 Secs (Pattern 1)]* *[==>1320.0 Secs (Pattern 2)]* *[==>1415.0 Secs (Pattern 3)]* *[==>1415.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***
2	WFC3 halo	(1) M101-NE-PLUME	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 1-2 in M101 - F814W - location 4 (11) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F814W - location 4 (11)	1400 Secs (5700 Secs) *[==>1400.0 Secs (Pattern 1)]* *[==>1400.0 Secs (Pattern 2)]* *[==>1450.0 Secs (Pattern 3)]* *[==>1450.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***

Orbit Structure





Visit

Proposal 13701, M101 - F814W - location 5 (12), implementation Fri Jul 18 01:04:52 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: ORIENT 12D TO 35 D

Comments: Location 5 same as Location 2, but shifted by 5,60 pixels to cover ACS gap

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1-2)

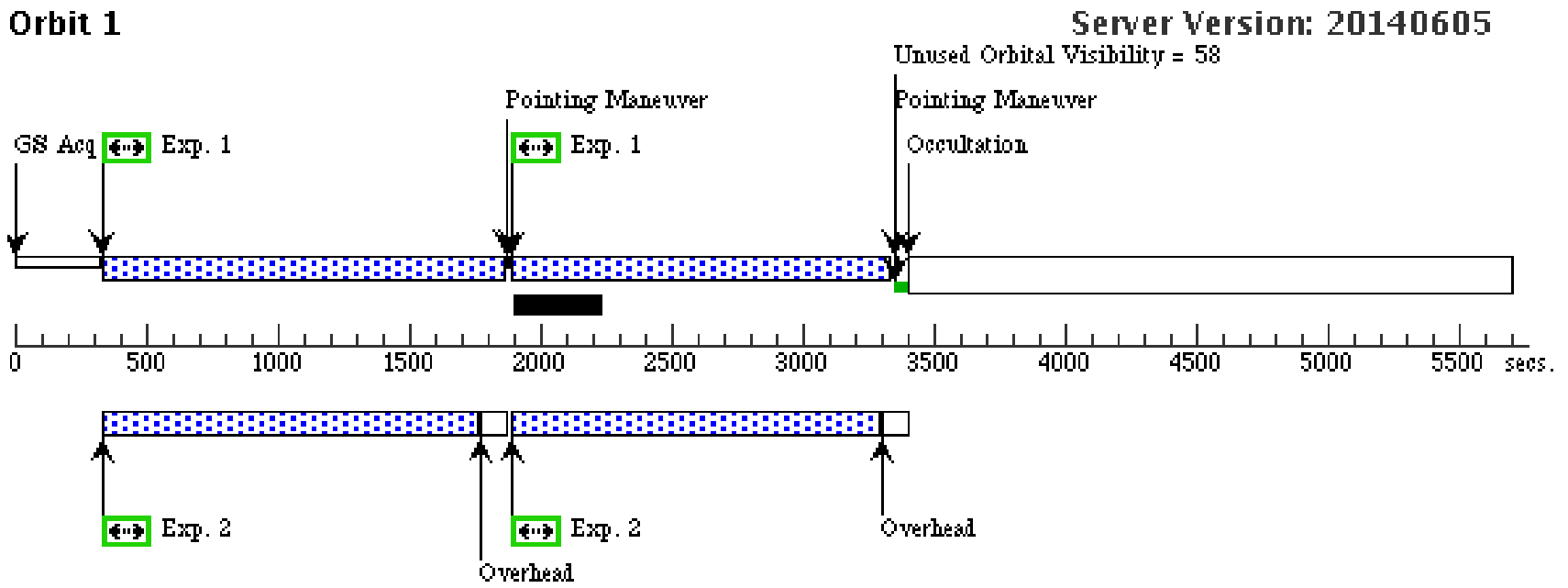
Fixed Targets

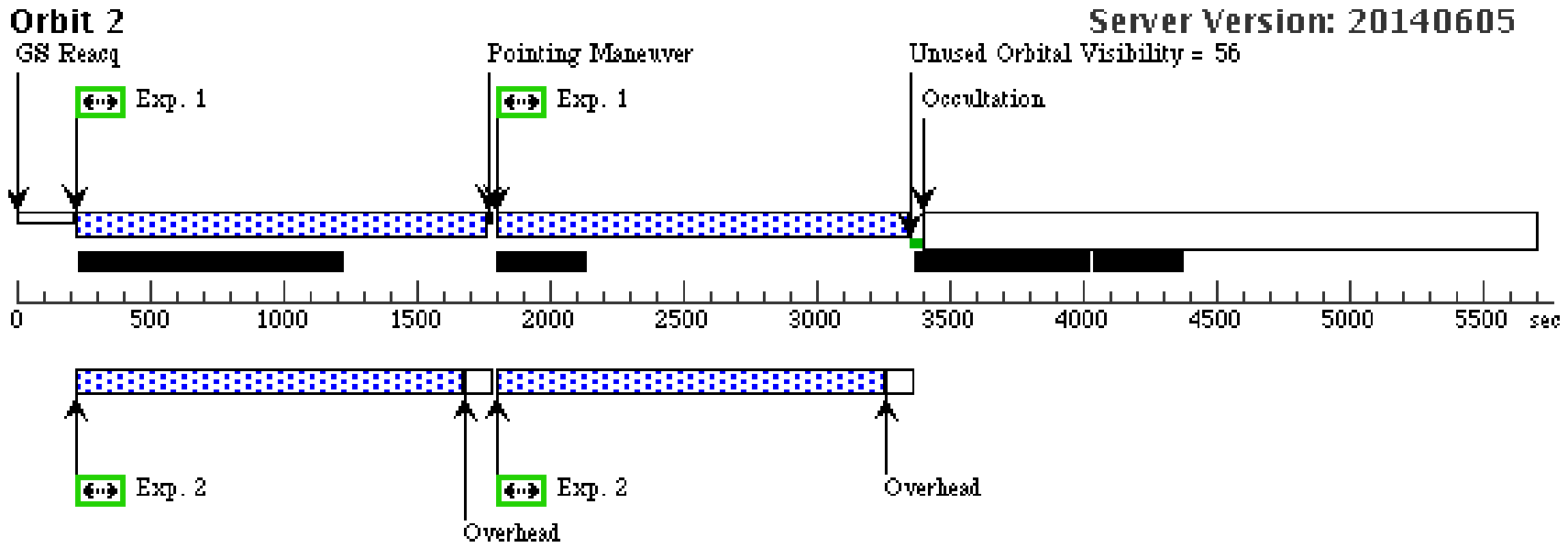
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M101-NE-PLUME	RA: 14 04 50.6202 (211.2109175d) Dec: +54 31 19.13 (54.52198d) Equinox: J2000		V=29.9	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACS disk	(1) M101-NE-PLUME	ACS/WFC, ACCUM, WFCENTER	F814W		POS TARG -0.75,3.00; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-2 in M101 - F814W - location 5 (12) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F814W - location 5 (12)	1400 Secs (5470 Secs) *[==>1320.0 Secs (Pattern 1)]* *[==>1320.0 Secs (Pattern 2)]* *[==>1415.0 Secs (Pattern 3)]* *[==>1415.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***
2	WFC3 halo	(1) M101-NE-PLUME	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 1-2 in M101 - F814W - location 5 (12) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F814W - location 5 (12)	1400 Secs (5700 Secs) *[==>1400.0 Secs (Pattern 1)]* *[==>1400.0 Secs (Pattern 2)]* *[==>1450.0 Secs (Pattern 3)]* *[==>1450.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***

Orbit Structure





Visit

Proposal 13701, M101 - F814W - location 6 (13), implementation Fri Jul 18 01:04:52 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: ORIENT 12D TO 35 D

Comments: Location 6 same as Location 3, but shofted 5,60 pixels to cover ACS gap

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1-2)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M101-NE-PLUME	RA: 14 04 50.6202 (211.2109175d) Dec: +54 31 19.13 (54.52198d) Equinox: J2000		V=29.9	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACS disk	(1) M101-NE-PLUME	ACS/WFC, ACCUM, WFCENTER	F814W		POS TARG +1.25,3.00; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-2 in M101 - F814W - location 6 (13) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F814W - location 6 (13)	1400 Secs (5470 Secs) *[==>1320.0 Secs (Pattern 1)]* *[==>1320.0 Secs (Pattern 2)]* *[==>1415.0 Secs (Pattern 3)]* *[==>1415.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***
2	WFC3 halo	(1) M101-NE-PLUME	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 1-2 in M101 - F814W - location 6 (13) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in M101 - F814W - location 6 (13)	1400 Secs (5700 Secs) *[==>1400.0 Secs (Pattern 1)]* *[==>1400.0 Secs (Pattern 2)]* *[==>1450.0 Secs (Pattern 3)]* *[==>1450.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***

Orbit Structure