



12515 - Probing the outer limits of a galactic halo - deep imaging of exceptionally remote globular clusters in M31

Cycle: 19, 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	(1) NGC224-000443+472142 ANY	ACS/WFC WFC3/UVIS	2	29-Jun-2011 21:43:09.0	yes
02	(2) NGC224-000612+414121 ANY	ACS/WFC WFC3/UVIS	2	29-Jun-2011 21:43:18.0	yes
03	(3) NGC224-001456+443716 ANY	ACS/WFC WFC3/UVIS	2	29-Jun-2011 21:43:27.0	yes

<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>
04	(4) NGC224-001740+431839 ANY	ACS/WFC WFC3/UVIS	2	29-Jun-2011 21:43:34.0	yes
05	(5) NGC224-005928+312911 ANY	ACS/WFC WFC3/UVIS	2	29-Jun-2011 21:43:41.0	yes
06	(6) NGC224-010151+481819 ANY	ACS/WFC WFC3/UVIS	2	29-Jun-2011 21:43:50.0	yes
07	(7) NGC224-011247+422525 ANY	ACS/WFC WFC3/UVIS	2	29-Jun-2011 21:43:56.0	yes
08	(8) NGC224-011758+391453 ANY	ACS/WFC WFC3/UVIS	2	29-Jun-2011 21:44:03.0	yes
09	(9) NGC224-012304+415511 ANY	ACS/WFC WFC3/UVIS	2	29-Jun-2011 21:44:10.0	yes
10	(10) NGC224-012747+404047 ANY	ACS/WFC WFC3/UVIS	2	29-Jun-2011 21:44:18.0	yes
11	(11) NGC224-012902+404709 ANY	ACS/WFC WFC3/UVIS	2	29-Jun-2011 21:44:25.0	yes
12	(12) NGC224-235712+433308 ANY	ACS/WFC WFC3/UVIS	2	29-Jun-2011 21:44:31.0	yes
13	(13) NGC224-235756+414649 ANY	ACS/WFC WFC3/UVIS	2	29-Jun-2011 21:44:38.0	yes

26 Total Orbits Used

ABSTRACT

Globular clusters (GCs) are fossil relics from which we can obtain critical insights into the formation and growth of galaxies. As part of the ongoing Pan-Andromeda Archaeological Survey (PAndAS) we have discovered a group of exceptionally remote GCs in the M31 halo, spanning a range in projected galactocentric distance of 85-145 kpc. Here we apply for deep ACS imaging of 13 such targets, which will allow us to study their constituent stellar populations, line-of-sight distances, and structural parameters. Our measurements will facilitate the use of these GCs as a unique set of probes of the exceptionally remote halo of a large disk galaxy, opening up a completely new area of parameter space to observational

constraint. Comparing the properties of our targets with more centrally-located objects will provide a much clearer picture of the M31 GC population than is presently available, while comparison with the outermost Milky Way GCs will further elucidate well-known disparities between the two systems and offer vital clues to differences in their assembly. In addition, our measurements will substantially augment a broad swathe of science that is presently underway - including probing the dark mass distribution in M31 at very large radii, and investigating the detailed chemical composition of M31 GCs via high-resolution integrated-light spectroscopy.

OBSERVING DESCRIPTION

The aim of this program is to conduct ACS/WFC resolved imaging of 13 globular clusters in the extreme outer reaches of the Andromeda galaxy (M31, NGC224). Using these observations we will construct a colour-magnitude diagram for each target cluster, allowing us to study their constituent stellar populations, structures, and line-of-sight distances.

ACS/WFC possesses a sufficiently wide field of view to fully cover each target cluster and sample the surrounding halo field, while providing a suitably high pixel scale to resolve even the most compact targets in our list into their constituent stars in regions outside their innermost cores. It also possesses considerably higher throughput than WFC3/UVIS in the mid-optical passbands we will use. Although charge-transfer inefficiency is now a non-negligible issue for ACS/WFC photometry, we do not expect our science to be negatively impacted. CTE effects are somewhat mitigated because (i) we will be conducting deep broadband imaging, where the background is comparatively high, and (ii) our target clusters cover a rather small region on the camera (typically with radius ~ 500 pixels). In addition, sophisticated tools (such as that developed by Anderson & Bedin at STScI) enable CTE effects to be corrected with a high degree of precision.

We will observe using the F606W and F814W filters. These offer maximum throughput and match the vast majority of extant ACS/WFC imaging of M31 and Galactic globular clusters.

In order to achieve our science goals we require the cluster colour-magnitude diagrams to reach at least 2 magnitudes below the level of the horizontal branch, and cover the possibility that the horizontal branch may extend significantly to blue colours. The horizontal branch level in clusters at the distance and typical foreground extinction of M31 ($D \sim 780$ kpc, $A_V \sim 0.1$ mag) is $V \sim 25$. The ACS/WFC exposure time calculator shows that suitable signal-to-noise can be achieved with three ~ 800 s exposures in both F606W and F814W. With these exposure durations the ETC suggests we will reach $S/N \sim 10$ for red giant branch stars with $V \sim 27.3$ -- that is, more than 2 magnitudes below the horizontal branch level. On the horizontal branch at $V \sim 25$, we expect $S/N \sim 60$, which is excellent for an accurate assessment of horizontal branch morphology even if

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this feature extends far to the blue. In no individual exposure will the brightest cluster red giants (at $V \sim 22$) be saturated, meaning the upper parts of the red giant branch will be fully sampled at high signal-to-noise (> 350).

For each target our observations are most efficiently arranged over a two orbit visit -- one orbit per filter. Even though our targets span a range of declinations and therefore have a range of orbital visibility periods, at minimum we will obtain 3x800s exposures in F606W and F814W. We have used the "auto-adjust" feature in APT to deliver maximum on-target exposure time per orbit. We place the F814W exposures, for which ACS/WFC has slightly lower throughput, on the second orbit of each visit as the available exposure time is slightly longer than on the first orbit.

Our overall allocation is $13 \times 2 = 26$ orbits.

We place each target at the WFC1 aperture. This will ensure full coverage of the majority of each cluster, while avoiding the ACS/WFC inter-chip gap. In order to minimise the effect of this gap on our imaging we will employ a 3-point dither in each filter using the ACS-WFC-DITHER-LINE pattern. This will enable cosmic ray and hot pixel rejection across the field of view.

All but one of our visits are unconstrained in orientation. The exception is visit 08, for target NGC224-011758+391453 which lies 2.1 arcmin from another exceptionally remote M31 globular cluster. We aim to image both these clusters in the one ACS/WFC field. To do so we will place the WFCENTER aperture at the mid-point of the line joining the two objects, and require some relatively broad orientation restrictions in order to keep the two clusters sufficiently far away from the edges of the field of view and from the inter-chip gap.

We will conduct coordinated parallel observations using WFC3/UVIS to sample the M31 halo near each target cluster. The aim is to construct colour-magnitude diagrams for field halo stars at large distances from the centre of M31. We will utilise the F606W and F814W filters, which offer maximum throughput. Exposure times are similar to those employed for our primary observations, but again maximised using the "auto-adjust" feature in APT. Since we are not imaging a specific target with any of these parallels, it does not matter whether the dither pattern we have selected for the primary imaging ends up covering the WFC3/UVIS inter-chip gap or not.

Each of our visits (even visit 08, which has fairly unrestrictive orientation requirements) is schedulable on numerous occasions throughout Cycle 19, including significant periods outside the proscribed interval 11 Nov 2011 - 01 Mar 2012.

REAL TIME JUSTIFICATION

N/A

CALIBRATION JUSTIFICATION

N/A

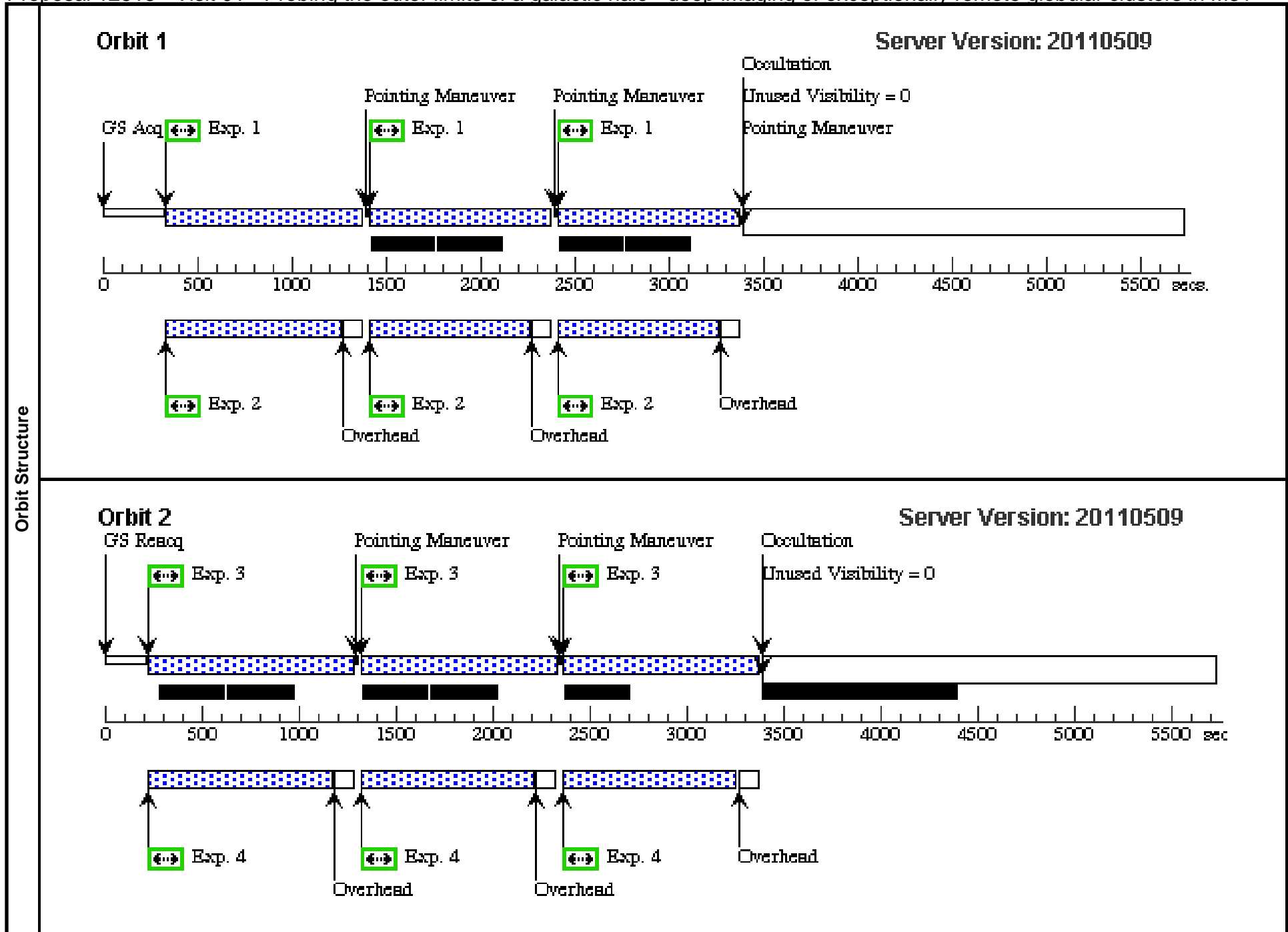
ADDITIONAL COMMENTS

We have exchanged one target specified in the Phase I proposal (NGC224-011800+391659) with a new target (NGC224-001740+431839) by application to the TTRB. This is because the original target lies just 2.1 arcmin from another target (NGC224-011758+391453) and will therefore fall within the field of view when that object is imaged.

Proposal 12515 - Visit 01 - Probing the outer limits of a galactic halo - deep imaging of exceptionally remote globular clusters in M31

Thu Jun 30 01:44:45 GMT 2011

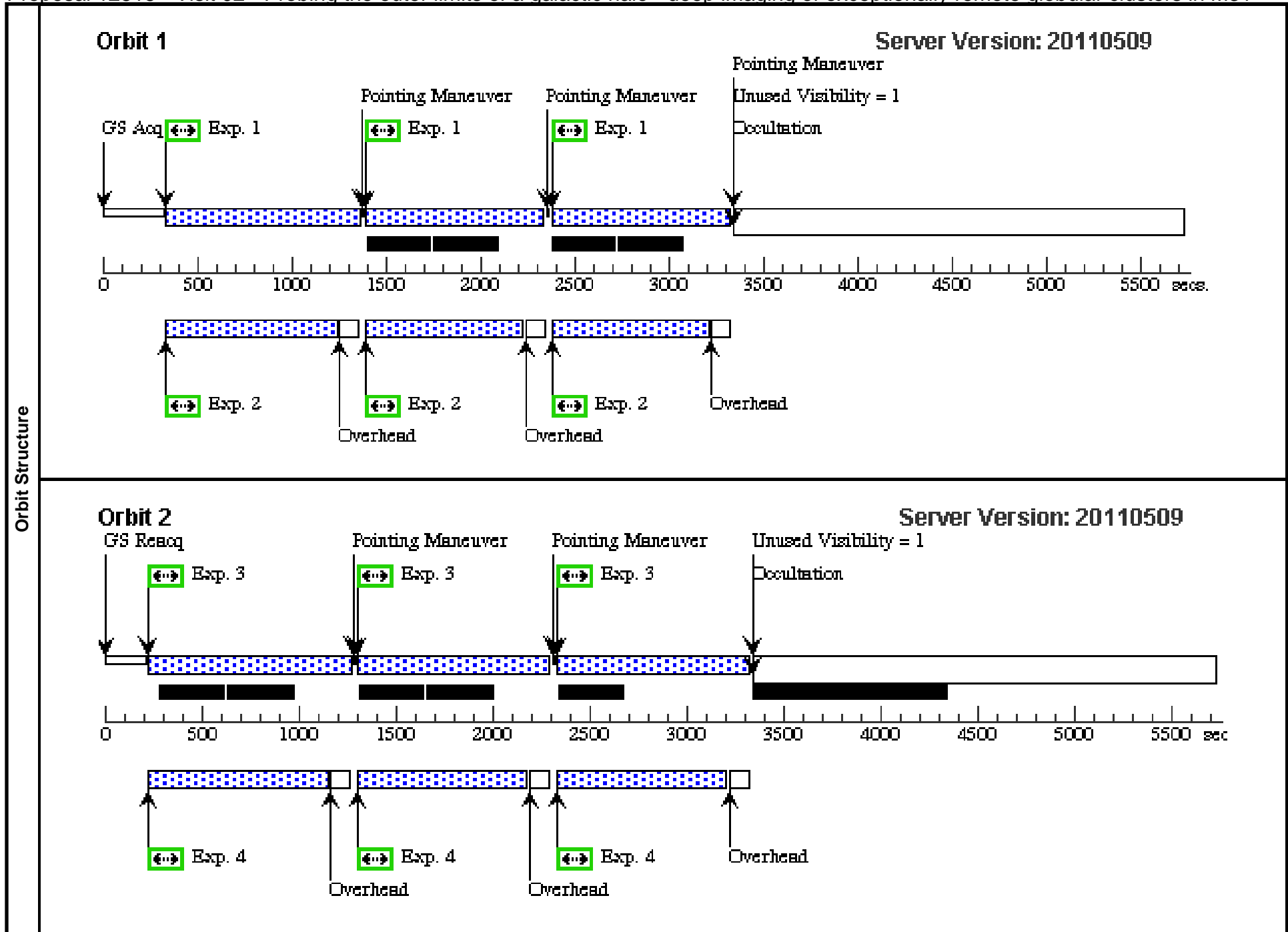
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	NGC224-000443+472142	RA: 00 04 42.9200 (1.1788333d) Dec: +47 21 42.47 (47.36180d) Equinox: J2000		V=17.8+/-0.1 SURF(V) = 19.0 +/- 0.1, V-I = 0.9 +/- 0.1, E(B-V) = 0.13 +/- 0.01	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) NGC224-000443+472142	ACS/WFC, ACCUM, WFC1	F606W			Pattern 1, Exps 1-2 in Visit 01 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 01	780 Secs [==>838.0 Secs (Pattern 1)] [==>838.0 Secs (Pattern 2)] [==>838.0 Secs (Pattern 3)]	[1]
	2		ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in Visit 01 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 01	780 Secs [==>898.0 Secs (Pattern 1)] [==>848.0 Secs (Pattern 2)] [==>848.0 Secs (Pattern 3)]	[1]
	3		(1) NGC224-000443+472142	ACS/WFC, ACCUM, WFC1	F814W			Pattern 1, Exps 3-4 in Visit 01 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 01	820 Secs [==>884.0 Secs (Pattern 1)] [==>884.0 Secs (Pattern 2)] [==>884.0 Secs (Pattern 3)]	[2]
	4		ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 3-4 in Visit 01 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 01	820 Secs [==>926.0 Secs (Pattern 1)] [==>894.0 Secs (Pattern 2)] [==>894.0 Secs (Pattern 3)]	[2]



Proposal 12515 - Visit 02 - Probing the outer limits of a galactic halo - deep imaging of exceptionally remote globular clusters in M31

Thu Jun 30 01:44:46 GMT 2011

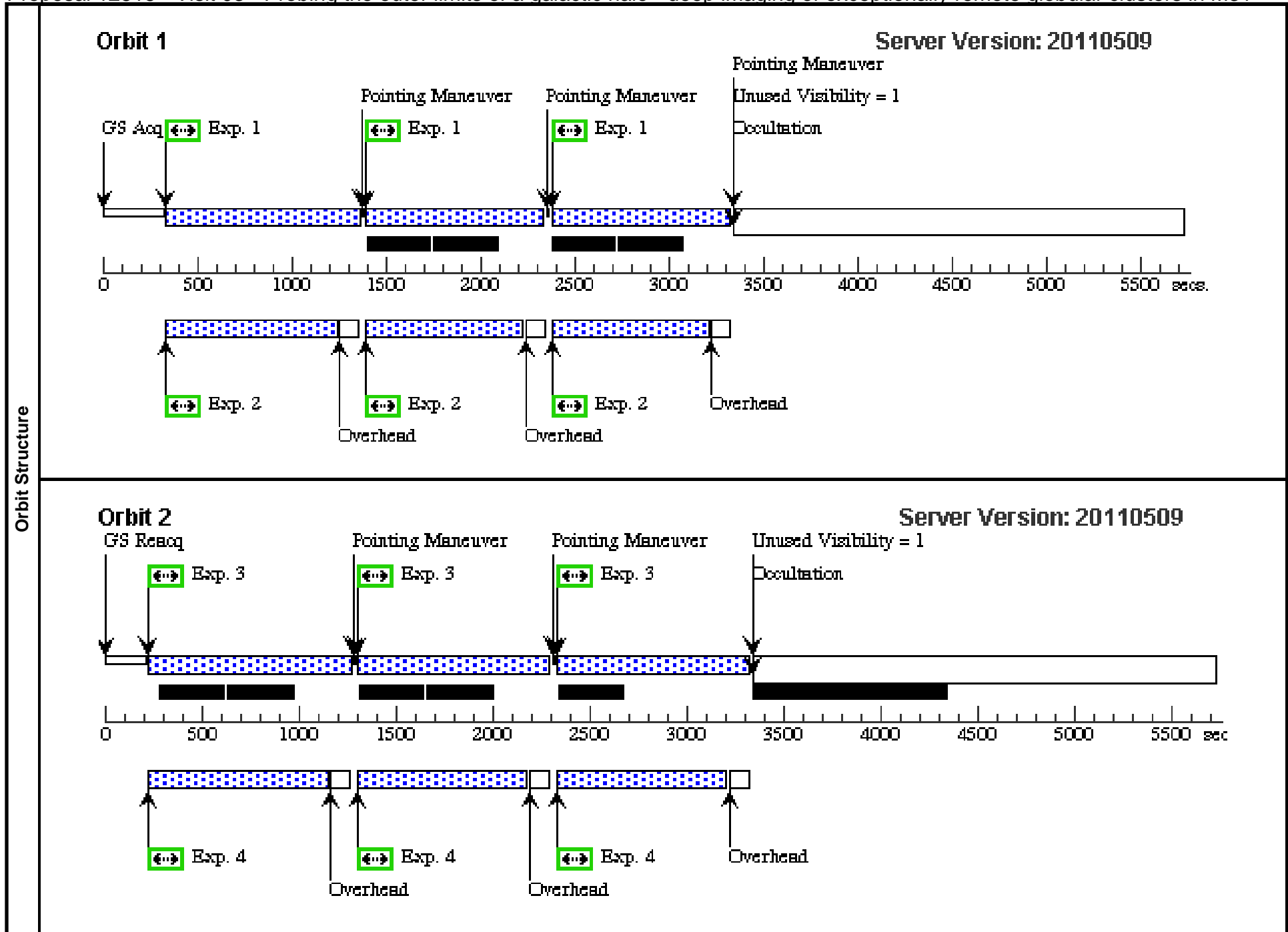
Visit	Proposal 12515, Visit 02 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: (none)									
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		(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false		(1-2), (3-4)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(2)	NGC224-000612+414121	RA: 00 06 11.9450 (1.5497708d) Dec: +41 41 20.90 (41.68914d) Equinox: J2000		V=16.7+/-0.1 SURF(V) = 17.8 +/- 0.1, V-I = 0.9 +/- 0.1, E(B-V) = 0.07 +/- 0.01	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(2) NGC224-000612+414121	ACS/WFC, ACCUM, WFC1	F606W			Pattern 1, Exps 1-2 in Visit 02 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 02	780 Secs [==>821.0 Secs (Pattern 1)] [==>821.0 Secs (Pattern 2)] [==>821.0 Secs (Pattern 3)]	[1]
	2		ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in Visit 02 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 02	780 Secs [==>881.0 Secs (Pattern 1)] [==>831.0 Secs (Pattern 2)] [==>831.0 Secs (Pattern 3)]	[1]
	3		(2) NGC224-000612+414121	ACS/WFC, ACCUM, WFC1	F814W			Pattern 1, Exps 3-4 in Visit 02 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 02	820 Secs [==>867.0 Secs (Pattern 1)] [==>867.0 Secs (Pattern 2)] [==>867.0 Secs (Pattern 3)]	[2]
	4		ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 3-4 in Visit 02 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 02	820 Secs [==>909.0 Secs (Pattern 1)] [==>877.0 Secs (Pattern 2)] [==>877.0 Secs (Pattern 3)]	[2]



Proposal 12515 - Visit 03 - Probing the outer limits of a galactic halo - deep imaging of exceptionally remote globular clusters in M31

Thu Jun 30 01:44:47 GMT 2011

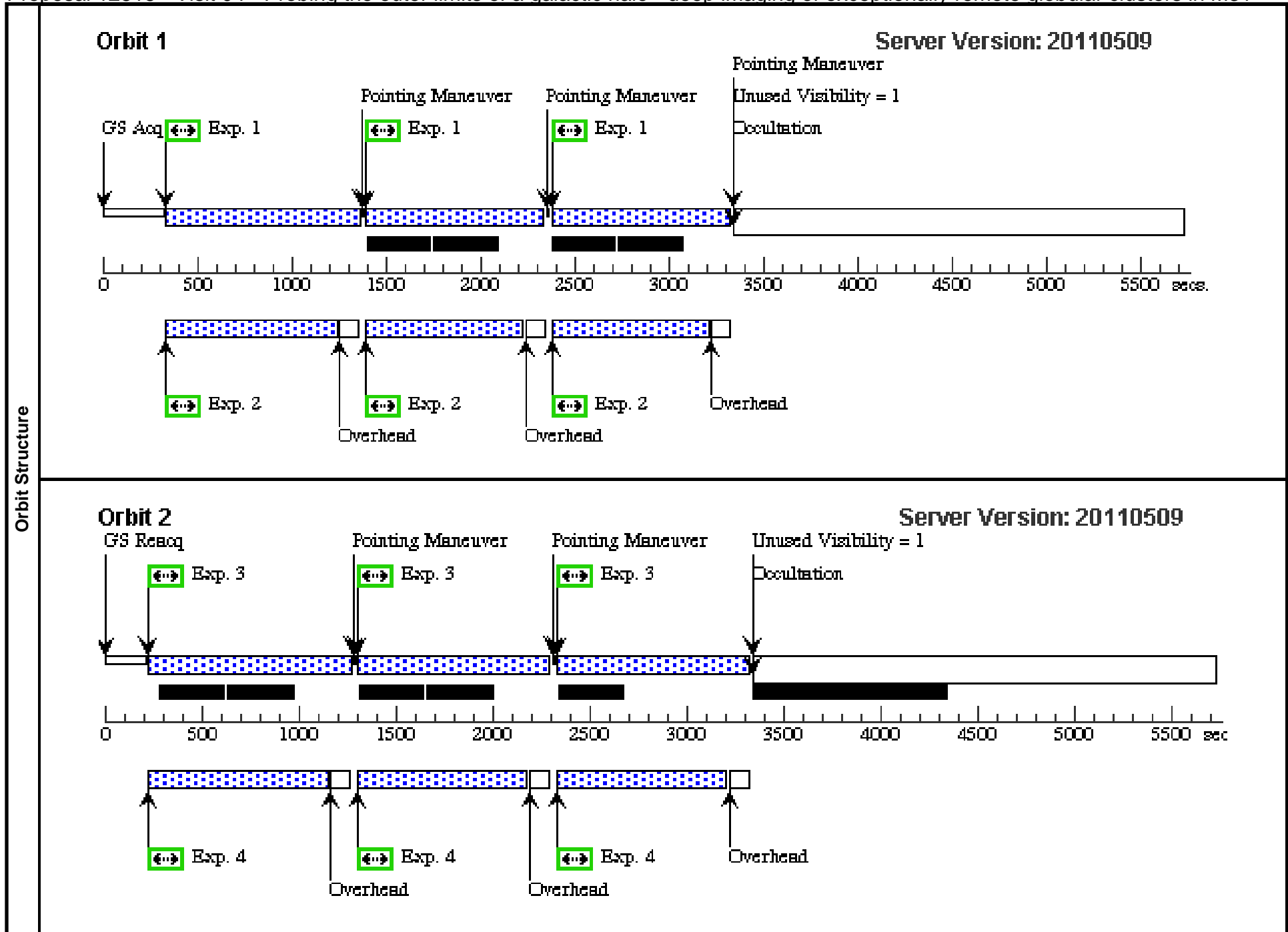
Visit	Proposal 12515, Visit 03 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(3)	NGC224-001456+443716	RA: 00 14 55.6000 (3.7316667d) Dec: +44 37 16.49 (44.62125d) Equinox: J2000		V=18.0+/-0.1 SURF(V) = 20.7 +/- 0.1, V-I = 0.9 +/- 0.1, E(B-V) = 0.09 +/- 0.01	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(3) NGC224-001456+443716	ACS/WFC, ACCUM, WFC1	F606W			Pattern 1, Exps 1-2 in Visit 03 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 03	780 Secs [==>821.0 Secs (Pattern 1)] [==>821.0 Secs (Pattern 2)] [==>821.0 Secs (Pattern 3)]	[1]
	2		ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in Visit 03 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 03	780 Secs [==>881.0 Secs (Pattern 1)] [==>831.0 Secs (Pattern 2)] [==>831.0 Secs (Pattern 3)]	[1]
	3		(3) NGC224-001456+443716	ACS/WFC, ACCUM, WFC1	F814W			Pattern 1, Exps 3-4 in Visit 03 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 03	820 Secs [==>867.0 Secs (Pattern 1)] [==>867.0 Secs (Pattern 2)] [==>867.0 Secs (Pattern 3)]	[2]
	4		ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 3-4 in Visit 03 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 03	820 Secs [==>909.0 Secs (Pattern 1)] [==>877.0 Secs (Pattern 2)] [==>877.0 Secs (Pattern 3)]	[2]



Proposal 12515 - Visit 04 - Probing the outer limits of a galactic halo - deep imaging of exceptionally remote globular clusters in M31

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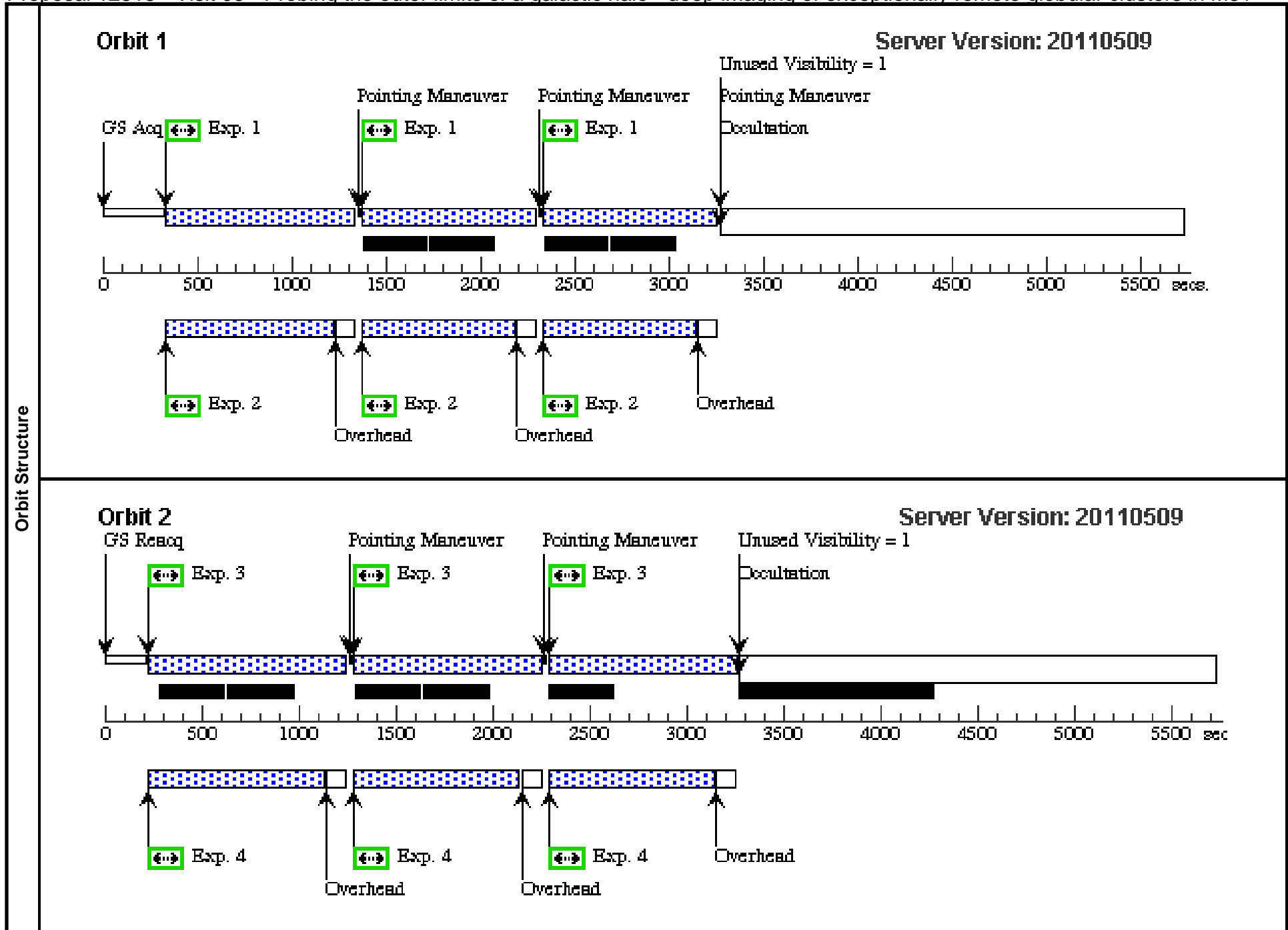
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(4)	NGC224-001740+431839	RA: 00 17 40.1100 (4.4171250d) Dec: +43 18 39.40 (43.31094d) Equinox: J2000		V=19.2+/-0.1 SURF(V) = 22.7 +/- 0.1, V-I = 0.9 +/- 0.1, E(B-V) = 0.06 +/- 0.01	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(4) NGC224-001740+431839	ACS/WFC, ACCUM, WFC1	F606W			Pattern 1, Exps 1-2 in Visit 04 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 04	780 Secs [==>821.0 Secs (Pattern 1)] [==>821.0 Secs (Pattern 2)] [==>821.0 Secs (Pattern 3)]	[1]
	2		ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in Visit 04 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 04	780 Secs [==>881.0 Secs (Pattern 1)] [==>831.0 Secs (Pattern 2)] [==>831.0 Secs (Pattern 3)]	[1]
	3		(4) NGC224-001740+431839	ACS/WFC, ACCUM, WFC1	F814W			Pattern 1, Exps 3-4 in Visit 04 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 04	820 Secs [==>867.0 Secs (Pattern 1)] [==>867.0 Secs (Pattern 2)] [==>867.0 Secs (Pattern 3)]	[2]
	4		ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 3-4 in Visit 04 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 04	820 Secs [==>909.0 Secs (Pattern 1)] [==>877.0 Secs (Pattern 2)] [==>877.0 Secs (Pattern 3)]	[2]



Proposal 12515 - Visit 05 - Probing the outer limits of a galactic halo - deep imaging of exceptionally remote globular clusters in M31

Thu Jun 30 01:44:48 GMT 2011

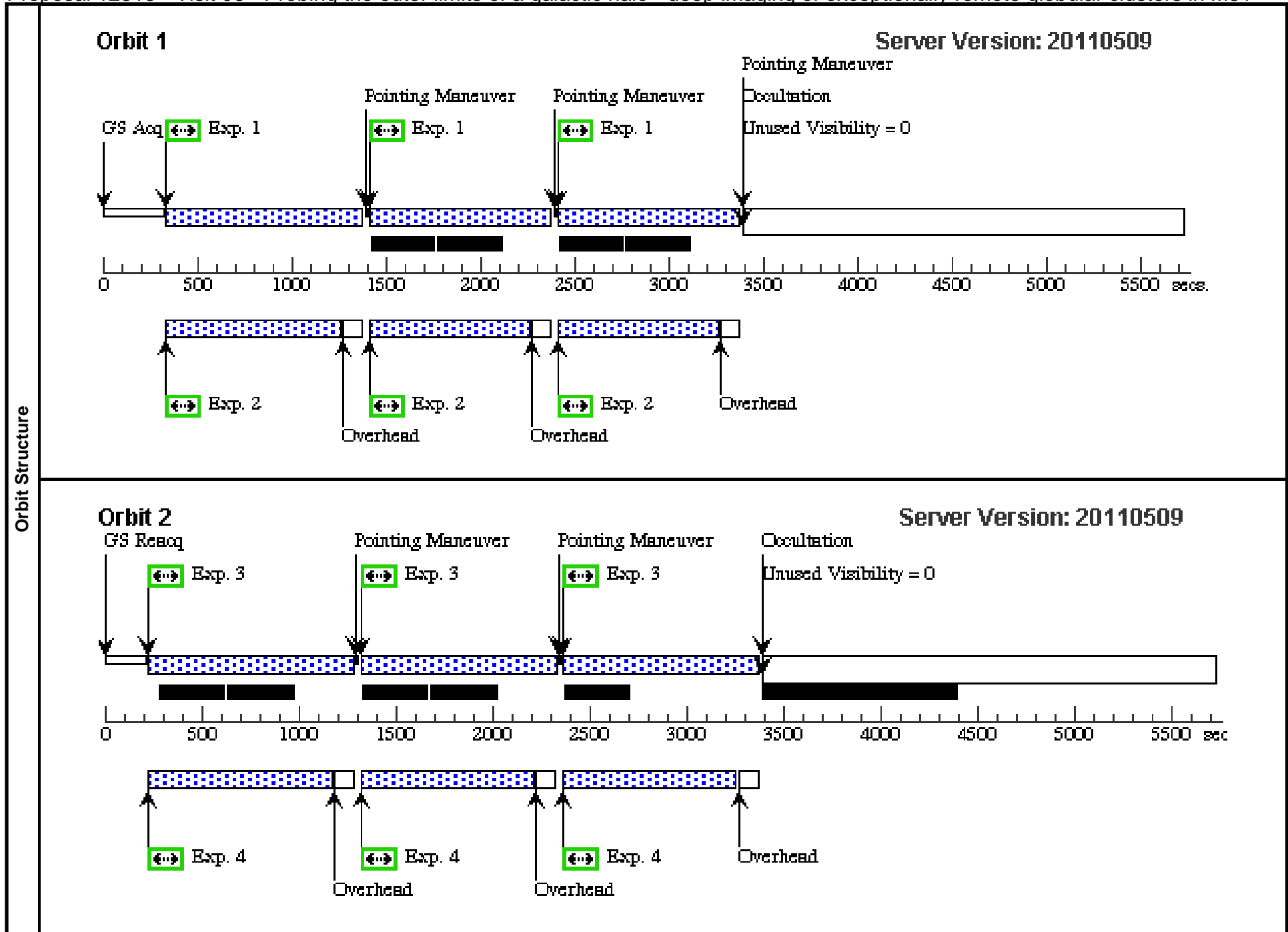
Visit	Proposal 12515, Visit 05 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: (none)									
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(5)	NGC224-005928+312911	RA: 00 59 28.2450 (14.8676875d) Dec: +31 29 10.50 (31.48625d) Equinox: J2000		V=20.8+/-0.5 SURF(V) = 25.0 +/- 0.5, V-I = 0.5 +/- 0.5, E(B-V) = 0.07 +/- 0.01	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(5) NGC224-005928+312911	ACS/WFC, ACCUM, WFC1	F606W			Pattern 1, Exps 1-2 in Visit 05 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 05	780 Secs [==>799.0 Secs (Pattern 1)] [==>799.0 Secs (Pattern 2)] [==>799.0 Secs (Pattern 3)]	[1]
	2		ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in Visit 05 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 05	780 Secs [==>859.0 Secs (Pattern 1)] [==>809.0 Secs (Pattern 2)] [==>809.0 Secs (Pattern 3)]	[1]
	3		(5) NGC224-005928+312911	ACS/WFC, ACCUM, WFC1	F814W			Pattern 1, Exps 3-4 in Visit 05 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 05	820 Secs [==>845.0 Secs (Pattern 1)] [==>845.0 Secs (Pattern 2)] [==>845.0 Secs (Pattern 3)]	[2]
	4		ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 3-4 in Visit 05 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 05	820 Secs [==>887.0 Secs (Pattern 1)] [==>855.0 Secs (Pattern 2)] [==>855.0 Secs (Pattern 3)]	[2]



Proposal 12515 - Visit 06 - Probing the outer limits of a galactic halo - deep imaging of exceptionally remote globular clusters in M31

Thu Jun 30 01:44:48 GMT 2011

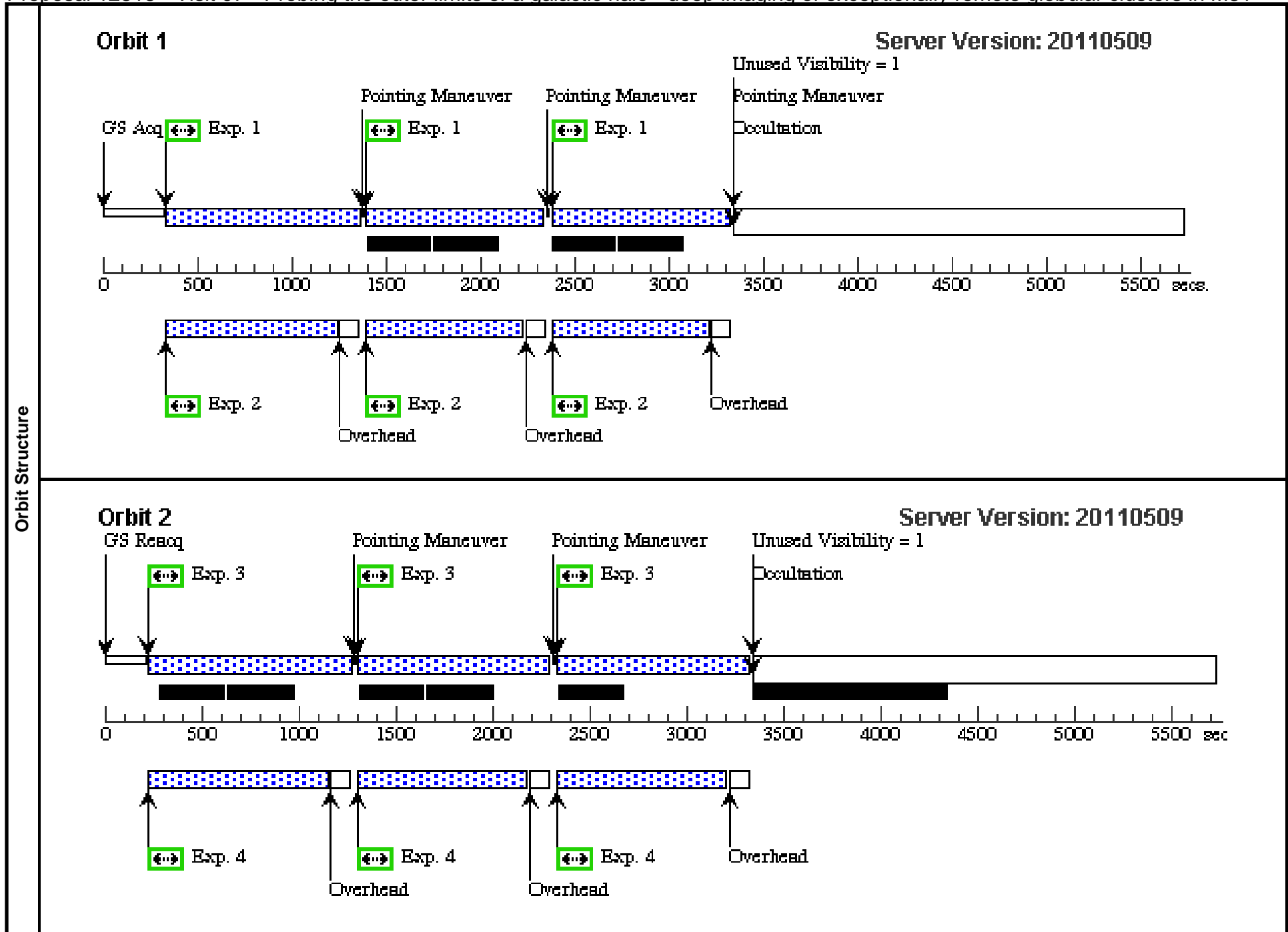
Visit	Proposal 12515, Visit 06 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: (none)									
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(6)	NGC224-010151+481819	RA: 01 01 50.6600 (15.4610833d) Dec: +48 18 19.30 (48.30536d) Equinox: J2000		V=18.5+/-0.1 SURF(V) = 22.8 +/- 0.1, V-I = 1.1 +/- 0.1, E(B-V) = 0.16 +/- 0.01	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(6) NGC224-010151+481819	ACS/WFC, ACCUM, WFC1	F606W			Pattern 1, Exps 1-2 in Visit 06 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 06	780 Secs [==>838.0 Secs (Pattern 1)] [==>838.0 Secs (Pattern 2)] [==>838.0 Secs (Pattern 3)]	[1]
	2		ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in Visit 06 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 06	780 Secs [==>898.0 Secs (Pattern 1)] [==>848.0 Secs (Pattern 2)] [==>848.0 Secs (Pattern 3)]	[1]
	3		(6) NGC224-010151+481819	ACS/WFC, ACCUM, WFC1	F814W			Pattern 1, Exps 3-4 in Visit 06 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 06	820 Secs [==>884.0 Secs (Pattern 1)] [==>884.0 Secs (Pattern 2)] [==>884.0 Secs (Pattern 3)]	[2]
	4		ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 3-4 in Visit 06 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 06	820 Secs [==>926.0 Secs (Pattern 1)] [==>894.0 Secs (Pattern 2)] [==>894.0 Secs (Pattern 3)]	[2]



Proposal 12515 - Visit 07 - Probing the outer limits of a galactic halo - deep imaging of exceptionally remote globular clusters in M31

Thu Jun 30 01:44:49 GMT 2011

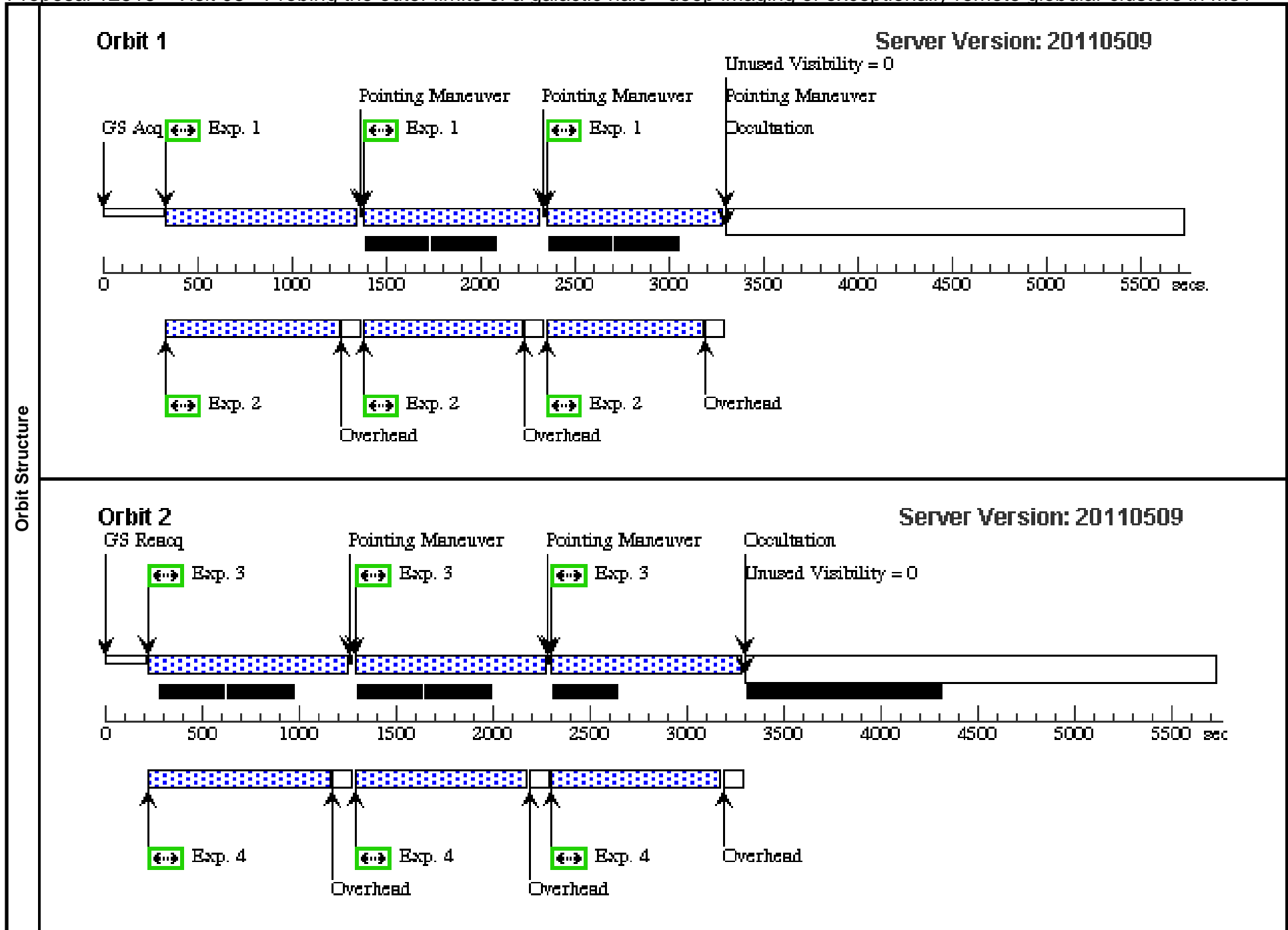
Visit	Proposal 12515, Visit 07 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false		(1-2), (3-4)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(7)	NGC224-011247+422525	RA: 01 12 47.0100 (18.1958750d) Dec: +42 25 24.95 (42.42360d) Equinox: J2000		V=17.1+/-0.1 SURF(V) = 19.0 +/- 0.1, V-I = 0.9 +/- 0.1, E(B-V) = 0.06 +/- 0.01	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(7) NGC224-011247+422525	ACS/WFC, ACCUM, WFC1	F606W			Pattern 1, Exps 1-2 in Visit 07 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 07	780 Secs [==>821.0 Secs (Pattern 1)] [==>821.0 Secs (Pattern 2)] [==>821.0 Secs (Pattern 3)]	[1]
	2	ANY		WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in Visit 07 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 07	780 Secs [==>881.0 Secs (Pattern 1)] [==>831.0 Secs (Pattern 2)] [==>831.0 Secs (Pattern 3)]	[1]
	3		(7) NGC224-011247+422525	ACS/WFC, ACCUM, WFC1	F814W			Pattern 1, Exps 3-4 in Visit 07 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 07	820 Secs [==>867.0 Secs (Pattern 1)] [==>867.0 Secs (Pattern 2)] [==>867.0 Secs (Pattern 3)]	[2]
4	ANY		WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 3-4 in Visit 07 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 07	820 Secs [==>909.0 Secs (Pattern 1)] [==>877.0 Secs (Pattern 2)] [==>877.0 Secs (Pattern 3)]	[2]	



Proposal 12515 - Visit 08 - Probing the outer limits of a galactic halo - deep imaging of exceptionally remote globular clusters in M31

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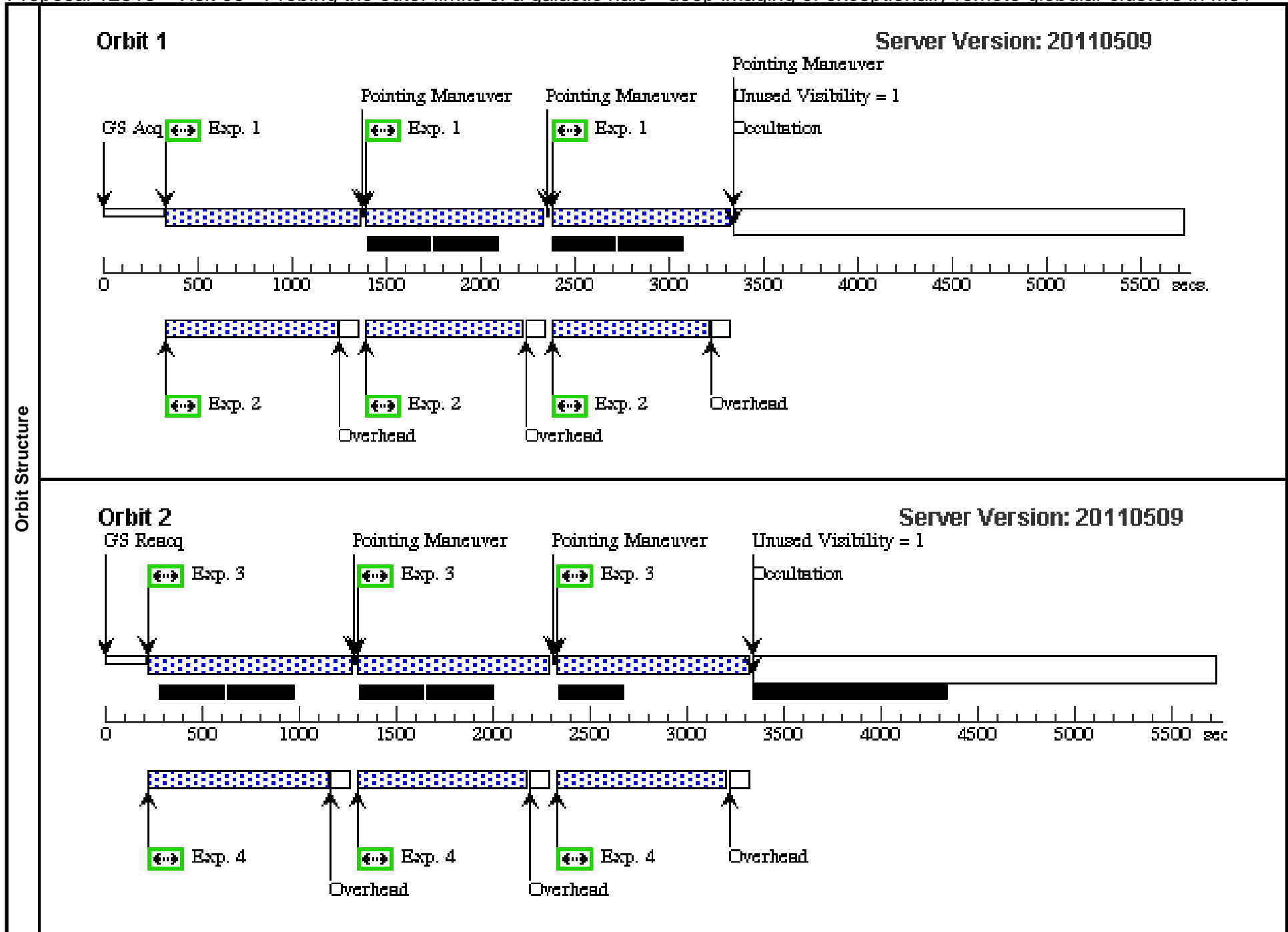
Visit	Proposal 12515, Visit 08 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: ORIENT 310D TO 65 D; ORIENT 130D TO 240 D									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false		(1-2), (3-4)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(8)	NGC224-011758+391453	RA: 01 17 59.2500 (19.4968750d) Dec: +39 15 56.00 (39.26556d) Equinox: J2000		V=15.5+/-0.1 SURF(V) =16.4 +/- 0.1, V-I = 0.8 +/- 0.1, E(B-V) = 0.05 +/- 0.01	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(8) NGC224-011758+391453	ACS/WFC, ACCUM, WFCENTER	F606W			Pattern 1, Exps 1-2 in Visit 08 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 08	780 Secs [==>808.0 Secs (Pattern 1)] [==>808.0 Secs (Pattern 2)] [==>808.0 Secs (Pattern 3)]	[1]
	2	ANY		WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in Visit 08 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 08	780 Secs [==>891.0 Secs (Pattern 1)] [==>841.0 Secs (Pattern 2)] [==>831.0 Secs (Pattern 3)]	[1]
	3		(8) NGC224-011758+391453	ACS/WFC, ACCUM, WFCENTER	F814W			Pattern 1, Exps 3-4 in Visit 08 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 08	820 Secs [==>854.0 Secs (Pattern 1)] [==>854.0 Secs (Pattern 2)] [==>854.0 Secs (Pattern 3)]	[2]
	4	ANY		WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 3-4 in Visit 08 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 08	820 Secs [==>919.0 Secs (Pattern 1)] [==>887.0 Secs (Pattern 2)] [==>877.0 Secs (Pattern 3)]	[2]



Proposal 12515 - Visit 09 - Probing the outer limits of a galactic halo - deep imaging of exceptionally remote globular clusters in M31

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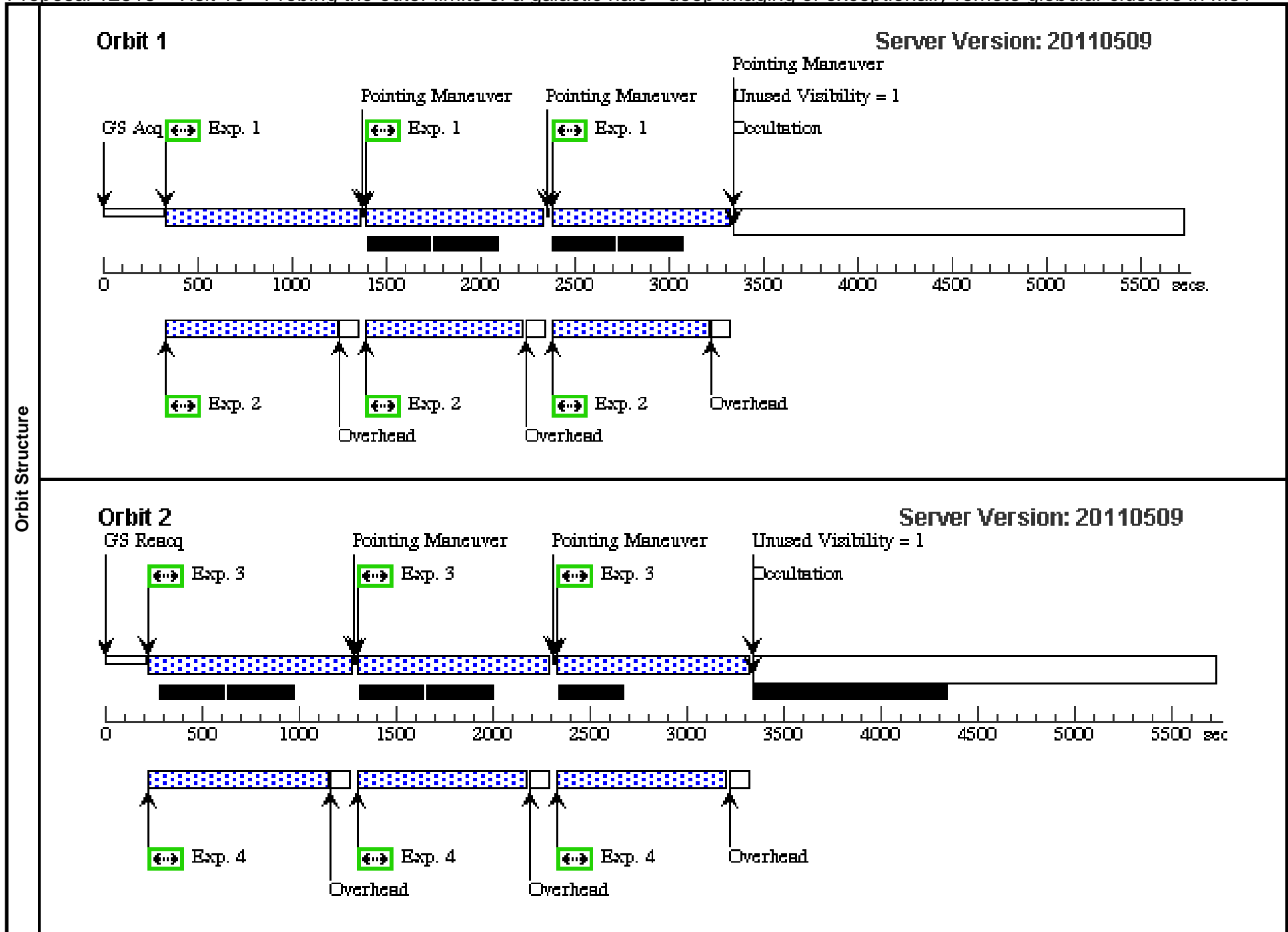
Visit	Proposal 12515, Visit 09 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false		(1-2), (3-4)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(9)	NGC224-012304+415511	RA: 01 23 3.5150 (20.7646458d) Dec: +41 55 11.02 (41.91973d) Equinox: J2000		V=17.0+/-0.1 SURF(V) = 18.1 +/- 0.1, V-I = 0.9 +/- 0.1, E(B-V) = 0.05 +/- 0.01	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(9) NGC224-012304+415511	ACS/WFC, ACCUM, WFC1	F606W			Pattern 1, Exps 1-2 in Visit 09 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 09	780 Secs [==>821.0 Secs (Pattern 1)] [==>821.0 Secs (Pattern 2)] [==>821.0 Secs (Pattern 3)]	[1]
	2		ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in Visit 09 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 09	780 Secs [==>881.0 Secs (Pattern 1)] [==>831.0 Secs (Pattern 2)] [==>831.0 Secs (Pattern 3)]	[1]
	3		(9) NGC224-012304+415511	ACS/WFC, ACCUM, WFC1	F814W			Pattern 1, Exps 3-4 in Visit 09 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 09	820 Secs [==>867.0 Secs (Pattern 1)] [==>867.0 Secs (Pattern 2)] [==>867.0 Secs (Pattern 3)]	[2]
	4		ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 3-4 in Visit 09 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 09	820 Secs [==>909.0 Secs (Pattern 1)] [==>877.0 Secs (Pattern 2)] [==>877.0 Secs (Pattern 3)]	[2]



Proposal 12515 - Visit 10 - Probing the outer limits of a galactic halo - deep imaging of exceptionally remote globular clusters in M31

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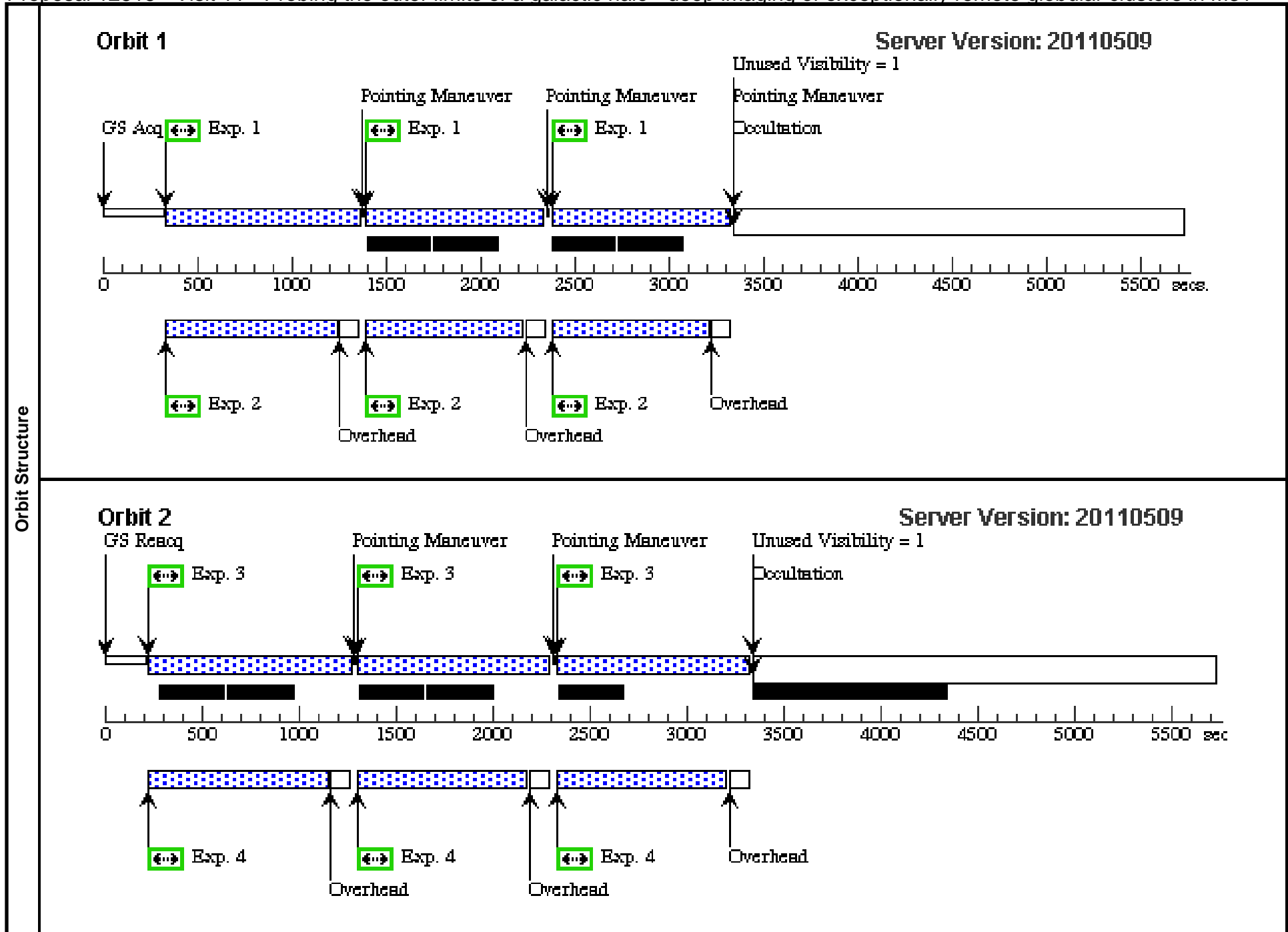
Visit	Proposal 12515, Visit 10 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false		(1-2), (3-4)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(10)	NGC224-012747+404047	RA: 01 27 47.4850 (21.9478542d) Dec: +40 40 46.87 (40.67969d) Equinox: J2000		V=18.9+/-0.1 SURF(V) = 22.1 +/- 0.1, V-I = 0.8 +/- 0.1, E(B-V) = 0.07 +/- 0.01	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(10) NGC224-012747+404047	ACS/WFC, ACCUM, WFC1	F606W			Pattern 1, Exps 1-2 in Visit 10 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 10	780 Secs [==>821.0 Secs (Pattern 1)] [==>821.0 Secs (Pattern 2)] [==>821.0 Secs (Pattern 3)]	[1]
	2		ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in Visit 10 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 10	780 Secs [==>881.0 Secs (Pattern 1)] [==>831.0 Secs (Pattern 2)] [==>831.0 Secs (Pattern 3)]	[1]
	3		(10) NGC224-012747+404047	ACS/WFC, ACCUM, WFC1	F814W			Pattern 1, Exps 3-4 in Visit 10 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 10	820 Secs [==>867.0 Secs (Pattern 1)] [==>867.0 Secs (Pattern 2)] [==>867.0 Secs (Pattern 3)]	[2]
	4		ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 3-4 in Visit 10 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 10	820 Secs [==>909.0 Secs (Pattern 1)] [==>877.0 Secs (Pattern 2)] [==>877.0 Secs (Pattern 3)]	[2]



Proposal 12515 - Visit 11 - Probing the outer limits of a galactic halo - deep imaging of exceptionally remote globular clusters in M31

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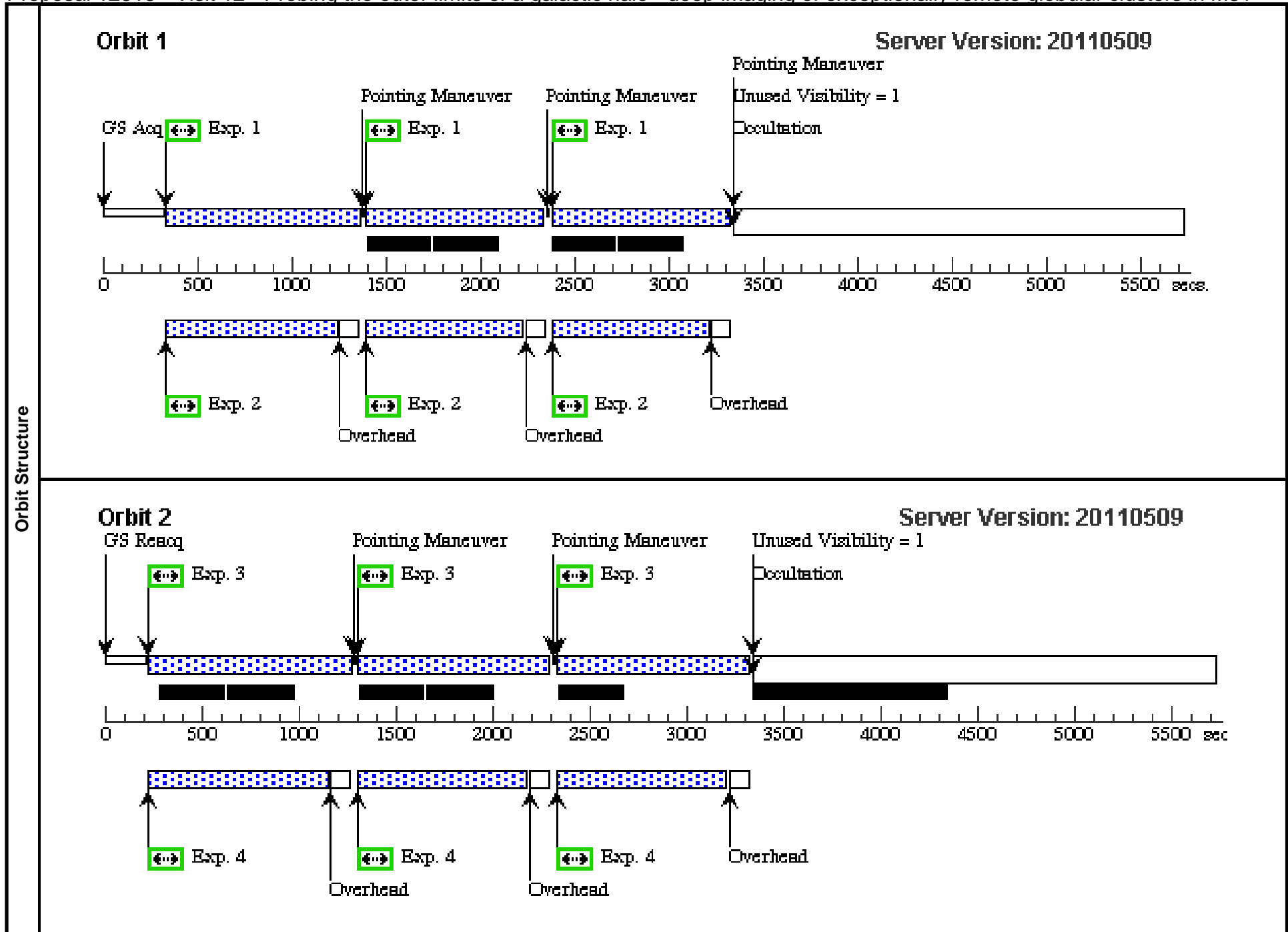
Visit	Proposal 12515, Visit 11 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false		(1-2), (3-4)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(11)	NGC224-012902+404709	RA: 01 29 2.1665 (22.2590271d) Dec: +40 47 8.51 (40.78570d) Equinox: J2000		V=18.5+/-0.1 SURF(V) = 21.1 +/- 0.1, V-I = 1.0 +/- 0.1, E(B-V) = 0.06 +/- 0.01	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(11) NGC224-012902+404709	ACS/WFC, ACCUM, WFC1	F606W			Pattern 1, Exps 1-2 in Visit 11 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 11	780 Secs [==>821.0 Secs (Pattern 1)] [==>821.0 Secs (Pattern 2)] [==>821.0 Secs (Pattern 3)]	[1]
	2	ANY		WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in Visit 11 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 11	780 Secs [==>881.0 Secs (Pattern 1)] [==>831.0 Secs (Pattern 2)] [==>831.0 Secs (Pattern 3)]	[1]
	3		(11) NGC224-012902+404709	ACS/WFC, ACCUM, WFC1	F814W			Pattern 1, Exps 3-4 in Visit 11 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 11	820 Secs [==>867.0 Secs (Pattern 1)] [==>867.0 Secs (Pattern 2)] [==>867.0 Secs (Pattern 3)]	[2]
	4	ANY		WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 3-4 in Visit 11 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 11	820 Secs [==>909.0 Secs (Pattern 1)] [==>877.0 Secs (Pattern 2)] [==>877.0 Secs (Pattern 3)]	[2]



Proposal 12515 - Visit 12 - Probing the outer limits of a galactic halo - deep imaging of exceptionally remote globular clusters in M31

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Visit	Proposal 12515, Visit 12 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false		(1-2), (3-4)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(12)	NGC224-235712+433308	RA: 23 57 12.0370 (359.3001542d) Dec: +43 33 8.20 (43.55228d) Equinox: J2000		V=17.2+/-0.1 SURF(V) = 19.0 +/- 0.1, V-I = 0.9 +/- 0.1, E(B-V) = 0.10 +/- 0.01	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(12) NGC224-235712+433308	ACS/WFC, ACCUM, WFC1	F606W			Pattern 1, Exps 1-2 in Visit 12 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 12	780 Secs [==>821.0 Secs (Pattern 1)] [==>821.0 Secs (Pattern 2)] [==>821.0 Secs (Pattern 3)]	[1]
	2	ANY		WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in Visit 12 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 12	780 Secs [==>881.0 Secs (Pattern 1)] [==>831.0 Secs (Pattern 2)] [==>831.0 Secs (Pattern 3)]	[1]
	3		(12) NGC224-235712+433308	ACS/WFC, ACCUM, WFC1	F814W			Pattern 1, Exps 3-4 in Visit 12 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 12	820 Secs [==>867.0 Secs (Pattern 1)] [==>867.0 Secs (Pattern 2)] [==>867.0 Secs (Pattern 3)]	[2]
	4	ANY		WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 3-4 in Visit 12 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 12	820 Secs [==>909.0 Secs (Pattern 1)] [==>877.0 Secs (Pattern 2)] [==>877.0 Secs (Pattern 3)]	[2]



Proposal 12515 - Visit 13 - Probing the outer limits of a galactic halo - deep imaging of exceptionally remote globular clusters in M31

Thu Jun 30 01:44:51 GMT 2011

Visit	Proposal 12515, Visit 13 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false		(1-2), (3-4)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(13)	NGC224-235756+414649	RA: 23 57 55.7015 (359.4820896d) Dec: +41 46 49.44 (41.78040d) Equinox: J2000		V=17.6+/-0.1 SURF(V) = 22.5 +/- 0.1, V-I = 1.0 +/- 0.1, E(B-V) = 0.11 +/- 0.01	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(13) NGC224-235756+414649	ACS/WFC, ACCUM, WFC1	F606W			Pattern 1, Exps 1-2 in Visit 13 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 13	780 Secs [==>821.0 Secs (Pattern 1)] [==>821.0 Secs (Pattern 2)] [==>821.0 Secs (Pattern 3)]	[1]
	2	ANY		WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 1-2 in Visit 13 (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in Visit 13	780 Secs [==>881.0 Secs (Pattern 1)] [==>831.0 Secs (Pattern 2)] [==>831.0 Secs (Pattern 3)]	[1]
	3		(13) NGC224-235756+414649	ACS/WFC, ACCUM, WFC1	F814W			Pattern 1, Exps 3-4 in Visit 13 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 13	820 Secs [==>867.0 Secs (Pattern 1)] [==>867.0 Secs (Pattern 2)] [==>867.0 Secs (Pattern 3)]	[2]
	4	ANY		WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 3-4 in Visit 13 (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in Visit 13	820 Secs [==>909.0 Secs (Pattern 1)] [==>877.0 Secs (Pattern 2)] [==>877.0 Secs (Pattern 3)]	[2]

