14727 - Probing Super Star Cluster formation in the most favorable environments: the metal-enriched, gas-rich and turbulent collisional ring of NGC 5291

Cycle: 24, 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) NGC5291-N	WFC3/IR WFC3/UVIS	3	07-Sep-2016 18:17:37.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
02	(2) NGC5291-S	WFC3/IR WFC3/UVIS	3	07-Sep-2016 18:17:39.0	yes
03	(3) NGC5291-CN	WFC3/UVIS	1	07-Sep-2016 18:17:40.0	yes
04	(4) NGC5291-CS	WFC3/UVIS	1	07-Sep-2016 18:17:41.0	yes

8 Total Orbits Used

ABSTRACT

The formation of massive super star clusters (SSCs), and possibly Globular Clusters, is predicted to be enhanced in a medium characterized by a high gas density, turbulence and moderate metallicity. These are precisely the conditions observed at high redshift in the distant star-forming galaxies, and locally by our proposed target: the huge collisional gaseous ring surrounding the early type galaxy NGC 5291. This massive HI structure expanded into the intergalactic medium after a high speed collision. It formed a series of gravitationally bound dwarf galaxies, where numerous massive SSCs are expected to be found.

We will (i) identify SSCs based on multi-band WFC3 images, (ii) derive their mass function, and (iii) compare their properties with environments that should be less favourable for the formation of massive SSCs, such as the metal-poor Blue Compact Dwarf Galaxies and the central tidally-affected regions of major mergers.

The ring around NGC 5291, and the condensations therein, for which a tremendous dataset is already available, are arguably the best local analogues of distant galaxies, since both have a very high gas fraction of 50%, a high turbulence of a few tens of km/s, a clumpy morphology, and a metallicity of half solar. The proposed observations will thus provide strong constraints on the ability of distant galaxies to form massive SSCs which might be the progenitors of today's globular clusters.

OBSERVING DESCRIPTION

We aim at mapping the whole eastern region of the star-forming ring of NGC 5291.

This may be achieved with 4 partly overlapping individual pointings. Because of the shape of the pattern structure, individual independent pointings were prefered, rather than a mosaic which would force us to give strong constrains on the orientation.

Centering is done with the UVIS-CENTER and IR-UVIS-CENTER, recommended for mosaicing (to be checked).

All pontings are observed with WFC3-UVIS with the F475W, F606W, F814W filters, while the northern most (NGC5291N) and southern most

(NGC5291S) fields will also be observed with WFC3-UVIS / F336W and WFC3-IR / F160W.
The two last fields contain prominent HII regions associated to tidal dwarf galaxies.

A dithering pattern has been implemented for all exposures.

For UVIS, GAP-LINE is used to cover the CCD gap with 2 pointings. This is needed as, depending on the orientation, the gap may correspond to interesting regions. For the UVIS / F336W filter, the DITHER-BOX pattern is used with 4 points to help with the rejection of cosmic rays and hot pixels. This could not be implemented for the other UVIS filters that require lower exposure times. Indeed the splitting in 4 exposures would result in two large overheads and inefficient observations: the buffer dumps can no longer be executed during the exposures.
Thus for the F475W, F606W, F814W filters, exposures times are 2x368 s = 736 s (slightly higher than in phase 1 to fill the orbits).
For F336W, exposure times are 4x378=1512 s (as announced in phase1). Pre-flash has been implemented.

For WFC3-IR, the dithering pattern DITHER-IR-DITHER-BOX-MIN offering a uniform S/N over the full map was chosen (though it does not allow to fully map the UVIS field). SPARS100 with 10 NSAMP is chosen, resulting in individual exposure times of 903 s. Thus total integration time per field is 3612 s, higer than in phase 1 (2800 s) to fill the orbits.

All observations were grouped in 4 visits each corresponding to a separate pointing.
The first 2 visits on the main targets (with 5 bands each) have three orbits, the remaining 2 one each

With no constrain on the orientation, all visits are schedulable during half of the time.

Visit

Proposal 14727, NGC5291-N (01), implementation Wed Sep 07 22:17:42 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-GAP-LINE Purpose=MOSAIC Number Of Points=2 Point Spacing=2.414 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.759 Angle Between Sides= Center Pattern=true		(1), (2), (3)
(4)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=1.642 Line Spacing=0.753	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=true		(4)
(5)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(5)

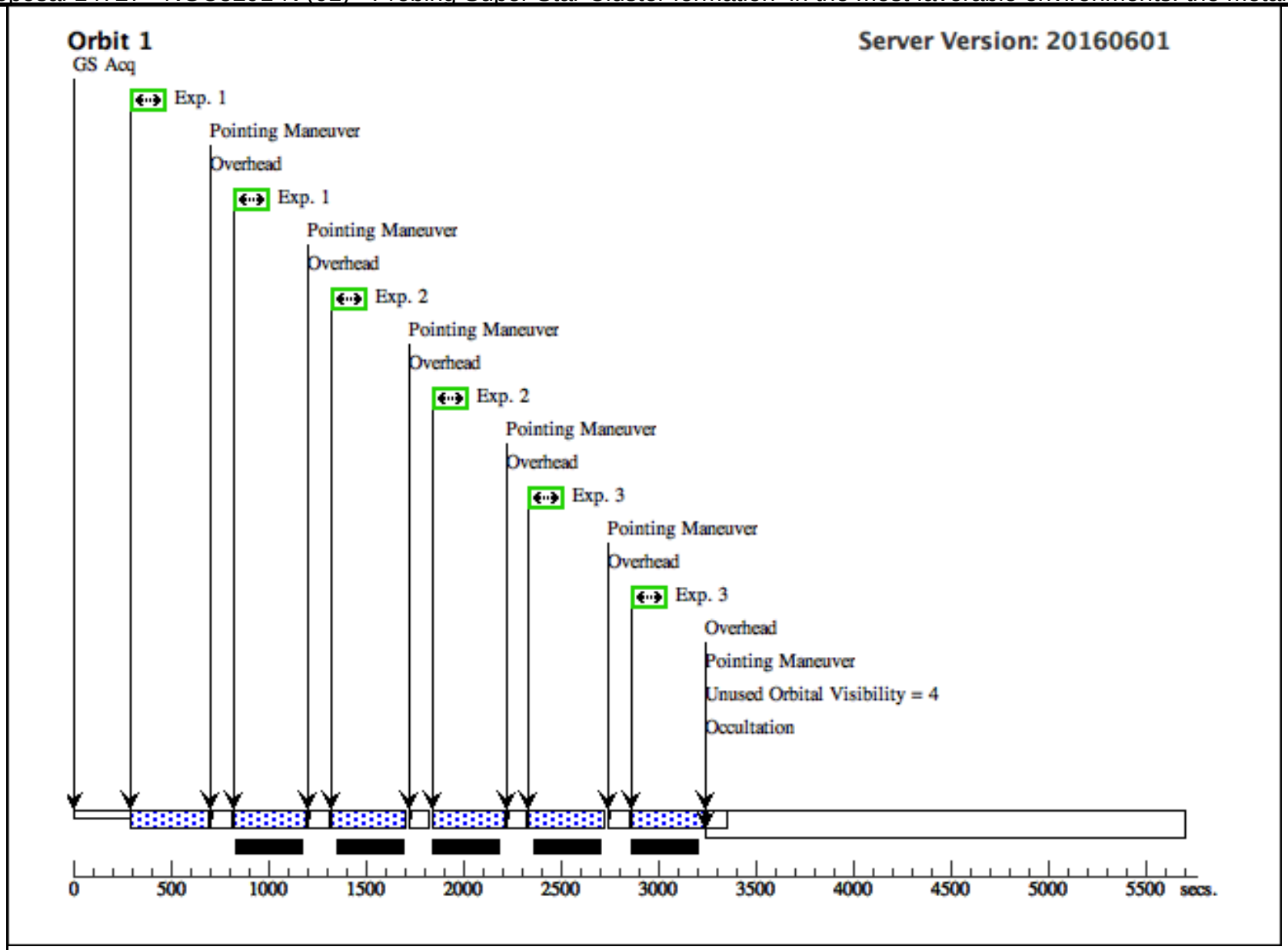
Fixed Targets

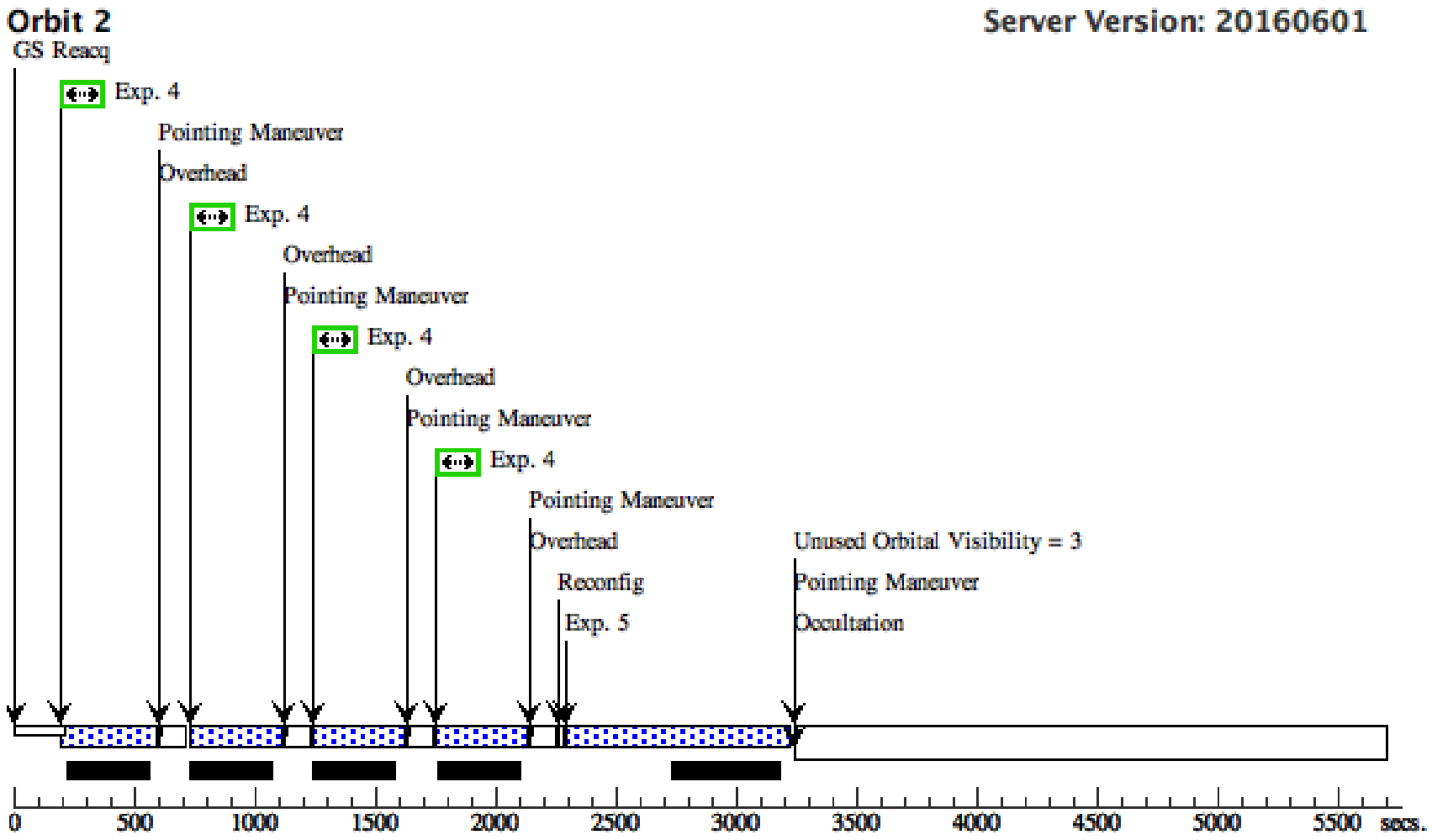
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC5291-N	RA: 13 47 18.6279 (206.8276162d) Dec: -30 20 28.51 (-30.34125d) Equinox: J2000		V=20	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	NGC5291-N-F475W	(1) NGC5291-N	WFC3/UVIS, ACCUM, UVIS-CENTER	F475W	FLASH=5		Pattern 1, Exps 1-1 in NGC5291-N (01) (1)	350 Secs (736 Secs) *[==>368.0 Secs (Pattern 1)]* *[==>368.0 Secs (Pattern 2)]*	***[1]***
2	NGC5291-N-F606W	(1) NGC5291-N	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 2-2 in NGC5291-N (01) (1)	350 Secs (736 Secs) *[==>368.0 Secs (Pattern 1)]* *[==>368.0 Secs (Pattern 2)]*	***[1]***
3	NGC5291-N-F814W	(1) NGC5291-N	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W	FLASH=4		Pattern 1, Exps 3-3 in NGC5291-N (01) (1)	350 Secs (736 Secs) *[==>368.0 Secs (Pattern 1)]* *[==>368.0 Secs (Pattern 2)]*	***[1]***
4	NGC5291-N-F336W	(1) NGC5291-N	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W	FLASH=10		Pattern 4, Exps 4-4 in NGC5291-N (01) (4)	375 Secs (1512 Secs) *[==>378.0 Secs (Pattern 1)]* *[==>378.0 Secs (Pattern 2)]* *[==>378.0 Secs (Pattern 3)]* *[==>378.0 Secs (Pattern 4)]*	***[2]***
5	NGC5291-N-F160W	(1) NGC5291-N	WFC3/IR, MULTIACCUM, IR-UVIS-CENTER	F160W	SAMP-SEQ=SPARS100; NSAMP=10		Pattern 5, Exps 5-5 in NGC5291-N (01) (5)	902.935198 Secs (3611.741 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[2]*** ***[3]***

Orbit Structure

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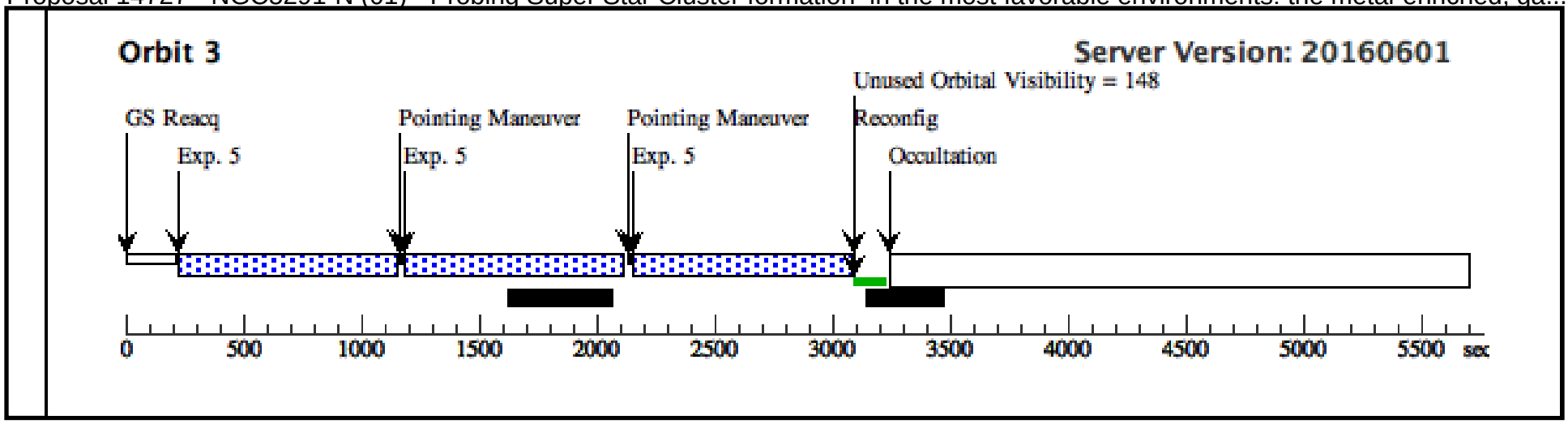
GS Reacq
Exp. 4
Pointing Maneuver
Overhead
Exp. 4
Overhead
Pointing Maneuver
Exp. 4
Overhead
Pointing Maneuver
Exp. 4
Pointing Maneuver
Overhead
Reconfig
Exp. 5
Unused Orbital Visibility = 3
Pointing Maneuver
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 3
Server Version: 20160601
Unused Orbital Visibility = 148
GS Reacq
Exp. 5
Pointing Maneuver
Exp. 5
Pointing Maneuver
Exp. 5
Reconfig
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14727, NGC5291-S (02), implementation Wed Sep 07 22:17:42 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-GAP-LINE Purpose=MOSAIC Number Of Points=2 Point Spacing=2.414 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.759 Angle Between Sides= Center Pattern=true		(1), (2), (3)
(4)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=1.642 Line Spacing=0.753	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=true		(4)
(5)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(5)

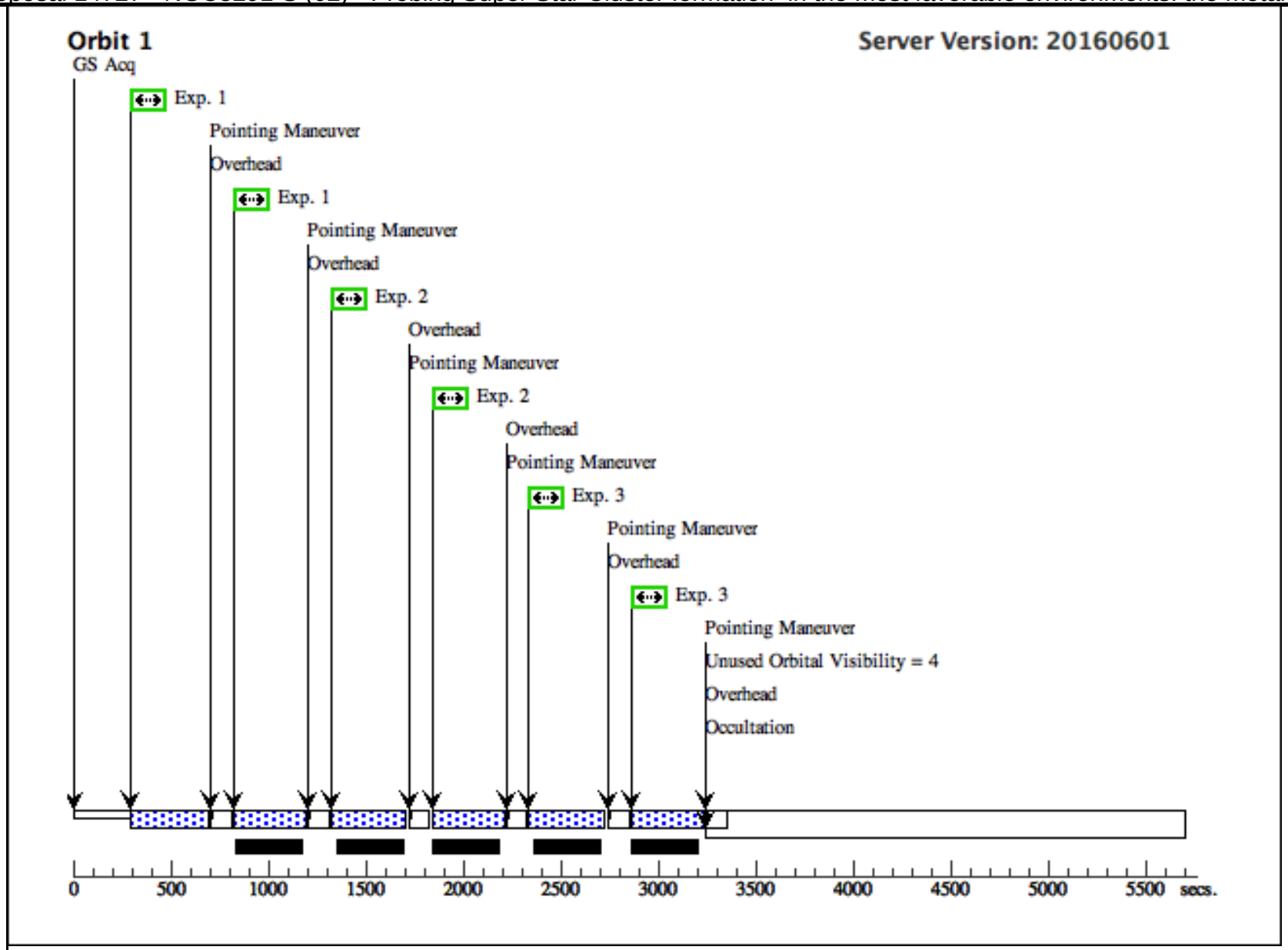
Fixed Targets

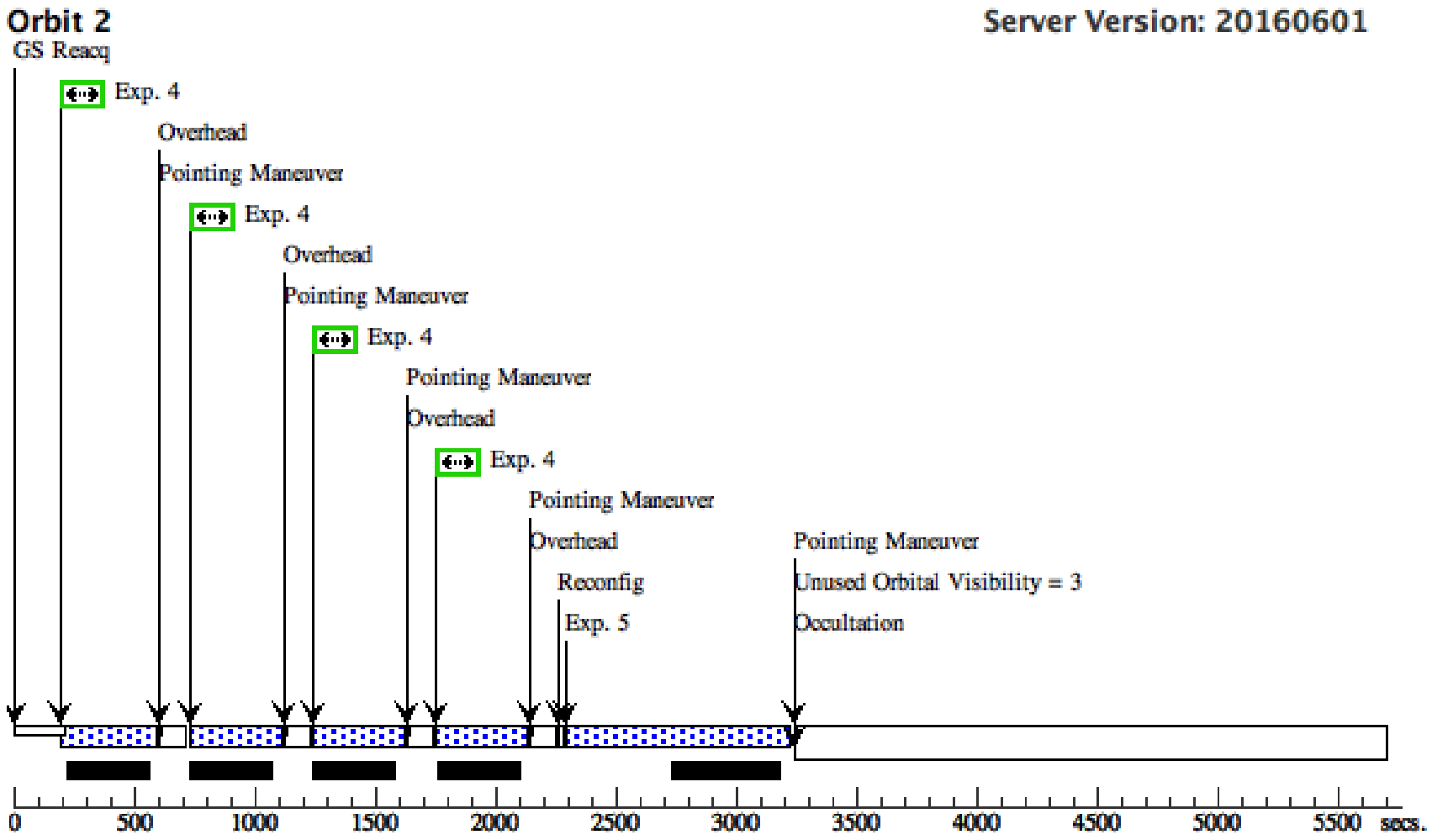
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	NGC5291-S	RA: 13 47 20.4055 (206.8350229d) Dec: -30 27 53.33 (-30.46481d) Equinox: J2000		V=20	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	NGC5291-S-F475W	(2) NGC5291-S	WFC3/UVIS, ACCUM, UVIS-CENTER	F475W	FLASH=5		Pattern 1, Exps 1-1 in NGC5291-S (02) (1)	350 Secs (736 Secs) *[==>368.0 Secs (Pattern 1)]* *[==>368.0 Secs (Pattern 2)]*	***[1]***
2	NGC5291-S-F606W	(2) NGC5291-S	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 2-2 in NGC5291-S (02) (1)	350 Secs (736 Secs) *[==>368.0 Secs (Pattern 1)]* *[==>368.0 Secs (Pattern 2)]*	***[1]***
3	NGC5291-S-F814W	(2) NGC5291-S	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W	FLASH=4		Pattern 1, Exps 3-3 in NGC5291-S (02) (1)	350 Secs (736 Secs) *[==>368.0 Secs (Pattern 1)]* *[==>368.0 Secs (Pattern 2)]*	***[1]***
4	NGC5291-S-F336W	(2) NGC5291-S	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W	FLASH=10		Pattern 4, Exps 4-4 in NGC5291-S (02) (4)	375 Secs (1512 Secs) *[==>378.0 Secs (Pattern 1)]* *[==>378.0 Secs (Pattern 2)]* *[==>378.0 Secs (Pattern 3)]* *[==>378.0 Secs (Pattern 4)]*	***[2]***
5	NGC5291-S-F160W	(2) NGC5291-S	WFC3/IR, MULTIACCUM, IR-UVIS-CENTER	F160W	SAMP-SEQ=SPARS100; NSAMP=10		Pattern 5, Exps 5-5 in NGC5291-S (02) (5)	902.935198 Secs (3611.741 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[2]*** ***[3]***

Orbit Structure




Orbit 2
Server Version: 20160601
GS Reacq
Exp. 4
Overhead
Pointing Maneuver
Exp. 4
Overhead
Pointing Maneuver
Exp. 4
Pointing Maneuver
Overhead
Exp. 4
Pointing Maneuver
Overhead
Reconfig
Exp. 5
Pointing Maneuver
Unused Orbital Visibility = 3
Occultation
0
500
1000
1500
2000
2500
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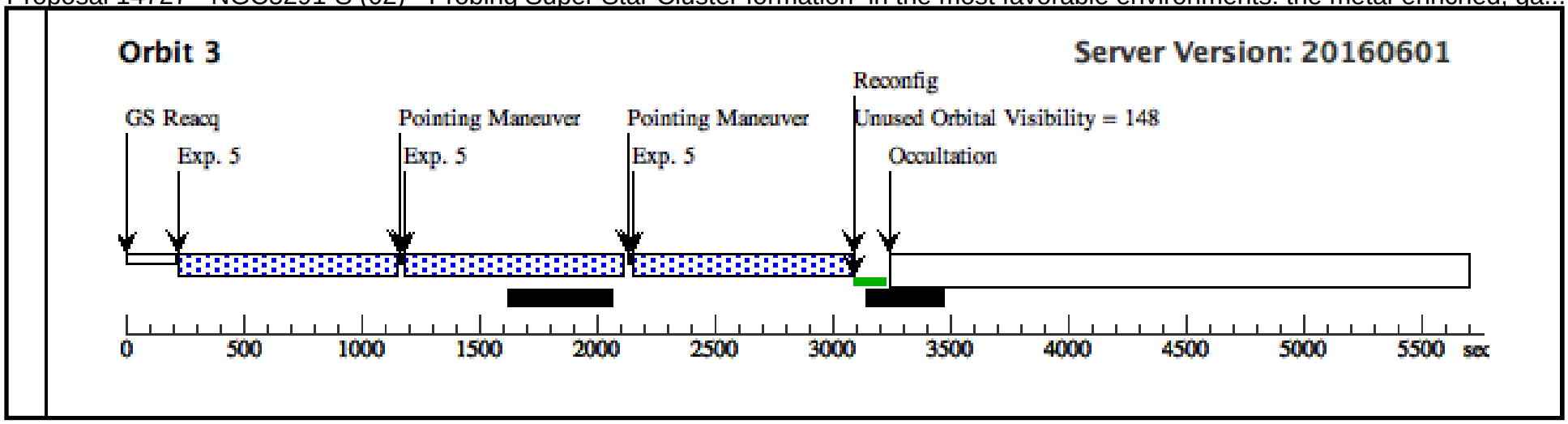
3500
4000
4500
5000
5500
secs.


Orbit 3
Server Version: 20160601
GS Reacq
Exp. 5
Pointing Maneuver
Exp. 5
Pointing Maneuver
Exp. 5
Reconfig
Unused Orbital Visibility = 148
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14727, NGC5291-CN (03), implementation Wed Sep 07 22:17:42 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-GAP-LINE	Coordinate Frame=POS-TARG		(1), (2), (3)
	Purpose=MOSAIC	Pattern Orientation=85.759		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=2.414	Center Pattern=true		
	Line Spacing=			

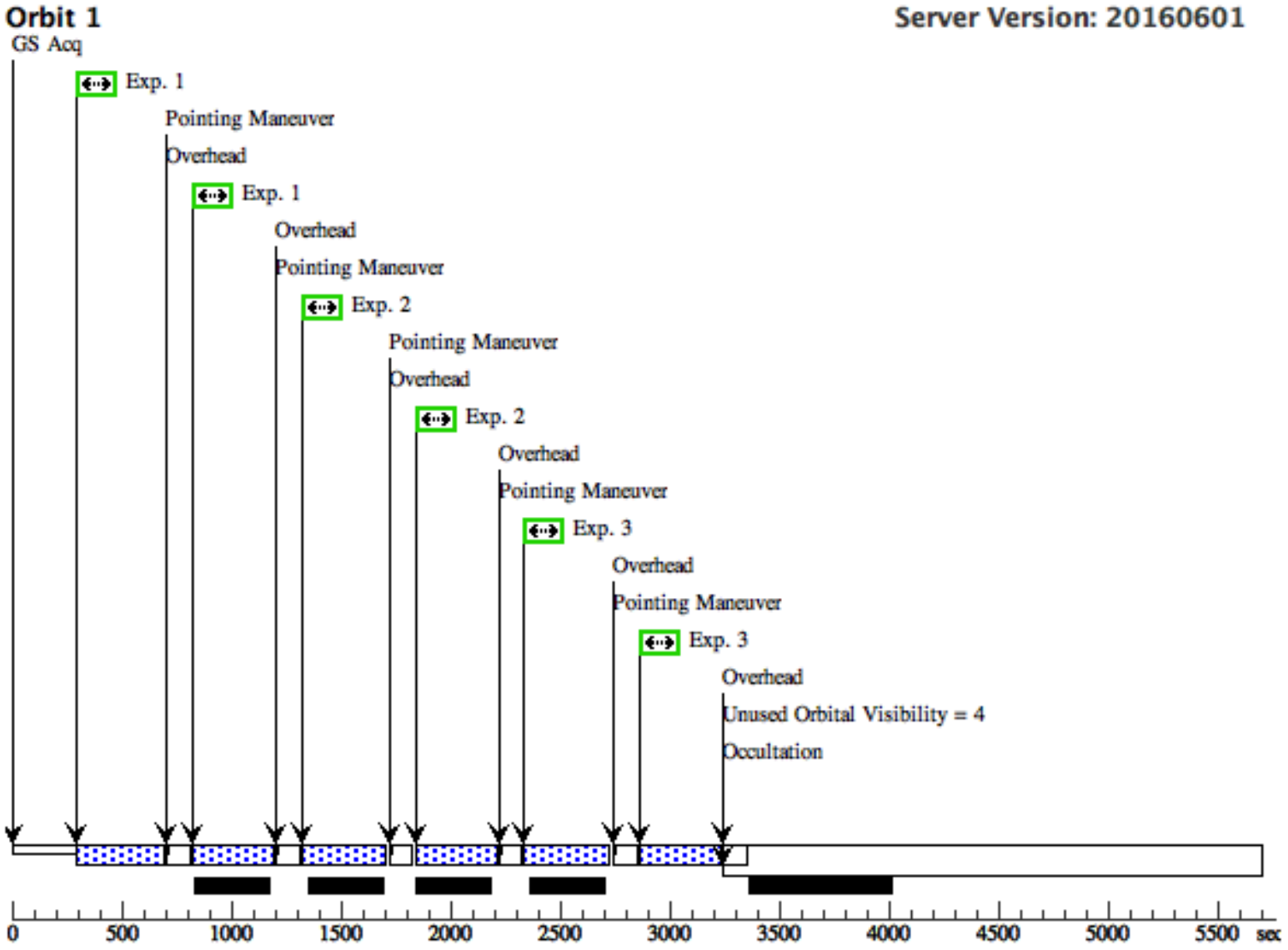
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	NGC5291-CN	RA: 13 47 22.9438 (206.8455992d) Dec: -30 22 57.62 (-30.38267d) Equinox: J2000		V=20	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	NGC5291-CN-F475W	(3) NGC5291-CN	WFC3/UVIS, ACCUM, UVIS-CENTER	F475W	FLASH=5		Pattern 1, Exps 1-1 in NGC5291-CN (03) (1)	350 Secs (736 Secs) *[==>368.0 Secs (Pattern 1)]* *[==>368.0 Secs (Pattern 2)]*	***[1]***
2	NGC5291-CN-F606W	(3) NGC5291-CN	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 2-2 in NGC5291-CN (03) (1)	350 Secs (736 Secs) *[==>368.0 Secs (Pattern 1)]* *[==>368.0 Secs (Pattern 2)]*	***[1]***
3	NGC5291-CN-F814W	(3) NGC5291-CN	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W	FLASH=4		Pattern 1, Exps 3-3 in NGC5291-CN (03) (1)	350 Secs (736 Secs) *[==>368.0 Secs (Pattern 1)]* *[==>368.0 Secs (Pattern 2)]*	***[1]***

Orbit Structure



Visit

Proposal 14727, NGC5291-CS (04), implementation Wed Sep 07 22:17:43 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-GAP-LINE	Coordinate Frame=POS-TARG		(1), (2), (3)
	Purpose=MOSAIC	Pattern Orientation=85.759		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=2.414	Center Pattern=true		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	NGC5291-CS	RA: 13 47 23.9973 (206.8499887d) Dec: -30 25 34.15 (-30.42615d) Equinox: J2000		V=20	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	NGC5291-CS-F475W	(4) NGC5291-CS	WFC3/UVIS, ACCUM, UVIS-CENTER	F475W	FLASH=5		Pattern 1, Exps 1-1 in NGC5291-CS (04) (1)	350 Secs (736 Secs) *[==>368.0 Secs (Pattern 1)]* *[==>368.0 Secs (Pattern 2)]*	***[1]***
2	NGC5291-CS-F606W	(4) NGC5291-CS	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 1, Exps 2-2 in NGC5291-CS (04) (1)	350 Secs (736 Secs) *[==>368.0 Secs (Pattern 1)]* *[==>368.0 Secs (Pattern 2)]*	***[1]***
3	NGC5291-CS-F814W	(4) NGC5291-CS	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W	FLASH=4		Pattern 1, Exps 3-3 in NGC5291-CS (04) (1)	350 Secs (736 Secs) *[==>368.0 Secs (Pattern 1)]* *[==>368.0 Secs (Pattern 2)]*	***[1]***

Orbit Structure