15112 - The low-metallicity starburst NGC346: massive-star population and feedback

Cycle: 25, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Lida Oskinova (PI) (ESA Member) (Contact)	**Universitat Potsdam**	**lida@astro.physik.uni-potsdam.de**
Dr. Wolf-Rainer Hamann (CoI) (ESA Member)	Universitat Potsdam	wrh@astro.physik.uni-potsdam.de
Prof. John S. Gallagher III (CoI) (AdminUSPI)	University of Wisconsin - Madison	jsg@astro.wisc.edu
Dr. Rainer Hainich (CoI) (ESA Member)	Universitat Potsdam	rhainich@astro.physik.uni-potsdam.de
Dr. Helge Todt (CoI) (ESA Member)	Universitat Potsdam	htodt@astro.physik.uni-potsdam.de
Dr. Andreas Sander (CoI) (ESA Member)	Universitat Potsdam	ansander@astro.physik.uni-potsdam.de
Dr. Tomer Shenar (CoI) (ESA Member)	Universitat Potsdam	shtomer@astro.physik.uni-potsdam.de
Prof. You-Hua Chu (CoI)	Academia Sinica, Institute of Astronomy and Astrophysics	yhchu@asiaa.sinica.edu.tw
Dr. Martin Wendt (CoI) (ESA Member)	Universitat Potsdam	mwendt@astro.physik.uni-potsdam.de

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) NGC-346-W3-OFFSET (2) NGC346-A (3) NGC346-B (4) NGC346-C (7) NGC-346-W3	STIS/CCD STIS/FUV-MAMA	3	07-Aug-2018 13:00:19.0	yes
02	(1) NGC-346-W3-OFFSET (5) NGC346-C2 (6) NGC346-D	STIS/CCD STIS/FUV-MAMA	2	07-Aug-2018 13:00:21.0	yes

5 Total Orbits Used

ABSTRACT

The Small Magellanic Cloud (SMC) is ideal to study young, massive stars at low metallicity. The compact cluster NGC346 contains about half of all O-type stars in the entire SMC. The massive-star population of this cluster powers N66, the brightest and largest HII region in the SMC.

We propose to use HST-STIS to slice NGC346 with 20 long-slit exposures, in order to obtain the UV spectra of most of the massive early-type stars of this cluster. Archival data of 13 exposures that cover already a minor part of this cluster will be included in our analyses.

Our aim is to quantitatively analyze virtually the whole massive-star population of NGC346. We have already secured the optical spectra of all massive stars in the field with the integral-field spectrograph MUSE at the ESO-VLT. However, for the determination of the stellar-wind parameters, i.e. the mass-loss rates and the wind velocities, ultraviolet spectra are indispensable. Our advanced "Potsdam Wolf-Rayet (PoWR)" code will be used for modeling the stellar and wind spectra in the course of the analysis.

Finally, we will obtain:

(a) the fundamental stellar and wind parameters of all stars brighter than spectral type B2V in the field, which, e,g,, will constrain the initial mass function in this young low-metallicity starburst;

(b) mass-loss rates of many more OB-type stars at SMC metallicity than hitherto known, allowing to better constrain their metallicity dependence;

(c) the integrated feedback by ionizing radiation and stellar winds of the whole massive-star population of NGC346, which will be used as input to model the ecology of the giant HII region N66.

These HST UV data will be of high legacy value.

OBSERVING DESCRIPTION

The observations shall map major parts of the young stellar cluster NGC346 in the SMC. We want to take STIS long-slit UV spectra arranged in mosaic of adjacent slit positions. The slit is 52" x 2", and the positions should overlap by 0.2" in dispersion direction. The aim is to extract as many as possible stellar spectra of the blue cluster stars.

The fields are carefully chosen, taking into account that a minor part of the cluster has already been observed with a similar technique with STIS before (GO-8629, PI Bruhweiler), see Figure3 of the Phase I proposal.

For the visual brightness that is requested in the "target" forms we have always given the UV-brightes star in the whole mosaic field (Cl* NGC346 W3, V=12.8mag), although this star is only covered by one of the slit postions.

For the precise positioning of the slit exposures, we use first a reference star for target acquisition and peakup. Then, the slit is positiond with relative offsets using the "STIS PERP-TO-SLIT" pattern.

In addition to the coordinate offsets, we apply an offset ot 3" in slit direction in order to account for the spectral offset of the MAMA detector described in Sect. 7.6 of the "STIS Instrument Handbook for Cycle 25" (Version 16.0).

Our mosaic coverage requires a position angle of the slit of about 35deg. We specify here a tolerance of plus/minus 10deg in order to allow for larger windows of visibility. If this would still lead to scheduling problems, we could release this constraint further. In any case, we would ask to contact us when the orbits have been scheduled and the exact position angle of the slit is known, so that we could check and re-adjust the position offsets in order not to miss any interesting star.

Following the special note for Cycle 25, we have structured our 5 orbits into visits of 3 + 2 orbits. If it would finally happen that the orbits can be scheduled back-to-back, the target acquision and peakup at the beginning of orbit 4 would not be necessary and the time can be distributed for the science exposures.

In each orbit we have left 165s at the end unused, because we noticed that otherwise the visibility is strongly redued. Of course, finally all available time should be evenly distributed to extend the science exposures to the maximum possible.

Visit

Proposal 15112, Visit 01, implementation Tue Aug 07 17:00:22 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: ORIENT 70D TO 90 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=STIS-PERP-TO-SLIT	Coordinate Frame=POS-TARG		(3), (4)
	Purpose=MOSAIC	Pattern Orientation=0.0		
	Number Of Points=4	Angle Between Sides=		
	Point Spacing=1.8	Center Pattern=false		
	Line Spacing=			
(2)	Pattern Type=STIS-PERP-TO-SLIT	Coordinate Frame=POS-TARG		(5)
	Purpose=MOSAIC	Pattern Orientation=0.0		
	Number Of Points=3	Angle Between Sides=		
	Point Spacing=1.8	Center Pattern=false		
	Line Spacing=			

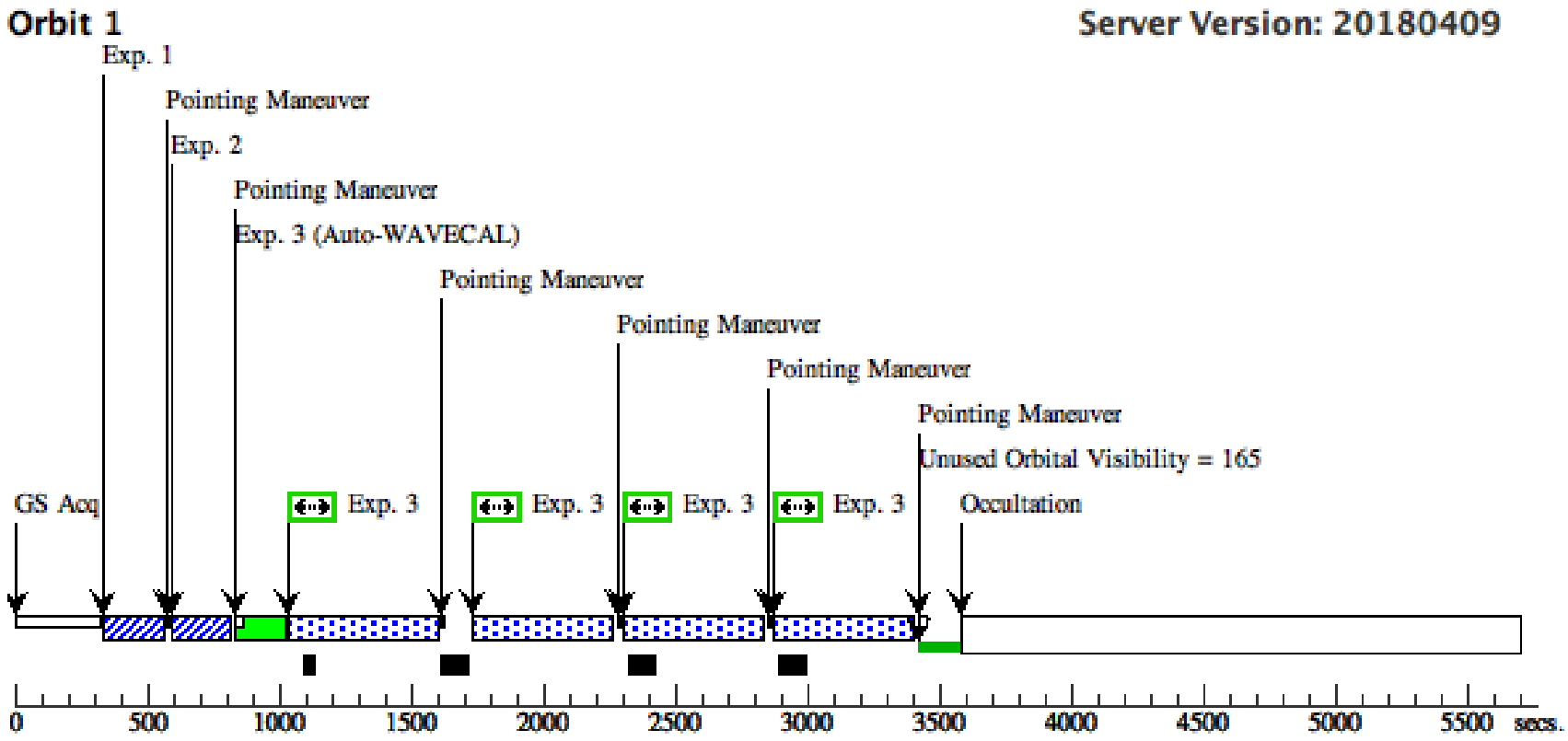
Fixed Targets

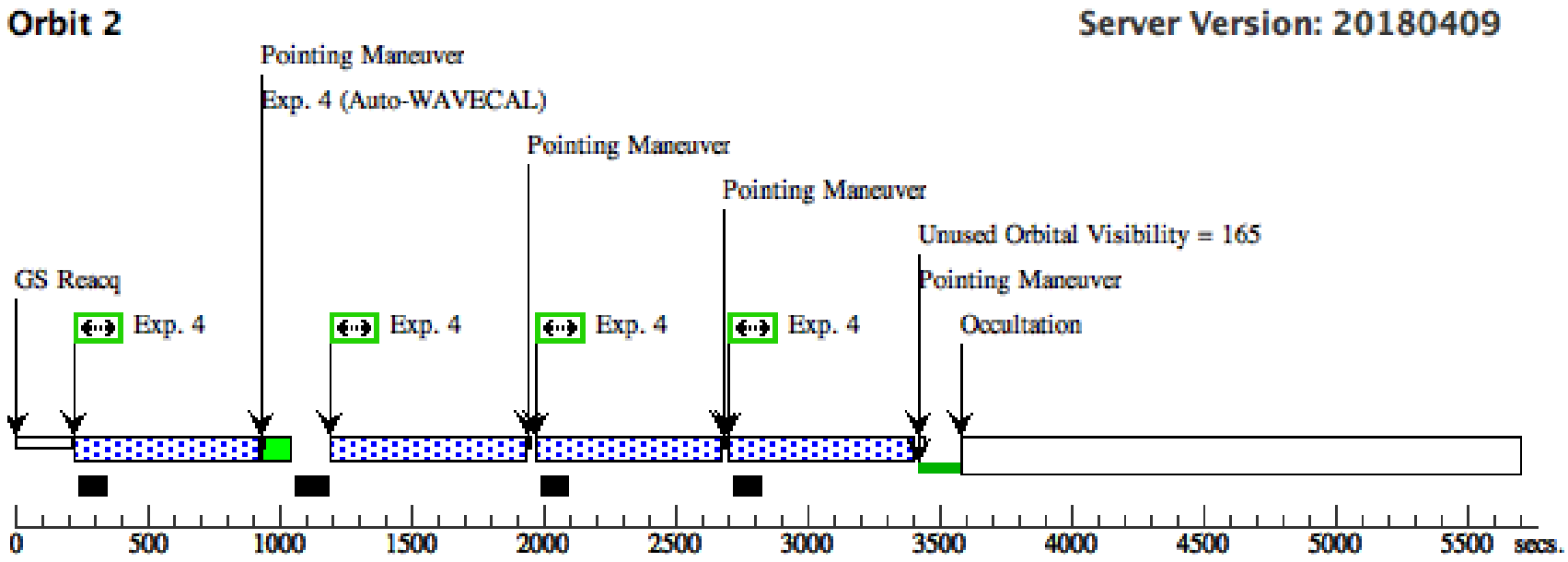
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-346-W3-OFFSET	RA: 00 59 0.7500 (14.7531250d) Dec: -72 10 28.20 (-72.17450d) Equinox: J2000		V=12.8	Reference Frame: ICRS
Comments: *Category=STAR* *Description=[OF]* *Extended=NO*					
(2)	NGC346-A	Offset from NGC-346-W3-OFFSET RA Offset: 0.359 Secs Dec Offset: -0.91 Arcsec		V=12.8+/-0.04 abmag=12.8 in filter WFC3/UVIS/F225W	Offset Position (NGC346-A)
Comments: *Category=STELLAR CLUSTER* *Description=[OPEN CLUSTER]*					
(3)	NGC346-B	Offset from NGC-346-W3-OFFSET RA Offset: 5.636 Secs Dec Offset: 5.12 Arcsec		V=12.8 abmag>13.06 in filter WFC3/UVIS/F225W	Offset Position (NGC346-B)
Comments: *Category=STELLAR CLUSTER* *Description=[OPEN CLUSTER]*					
(4)	NGC346-C	Offset from NGC-346-W3-OFFSET RA Offset: 3.236 Secs Dec Offset: -17.88 Arcsec		V=12.8 abmag>13.06 in filter WFC3/UVIS/F225W	Offset Position (NGC346-C)
Comments: *Category=STELLAR CLUSTER* *Description=[OPEN CLUSTER]*					
(7)	NGC-346-W3	RA: 00 59 0.7500 (14.7531250d) Dec: -72 10 28.20 (-72.17450d) Equinox: J2000		V=12.8	Reference Frame: ICRS
Comments: *Category=STAR* *Description=[OF]* *Extended=NO*					

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.1005884)	(1) NGC-346-W3-OFFSET	STIS/CCD, ACQ, F28X50LP	MIRROR				1.0 Secs (1 Secs) *[==>]*	***[1]***
2	(STIS.ta.1005893)	(1) NGC-346-W3-OFFSET	STIS/CCD, ACQ/PEAK, 52X0.1	MIRROR				0.5 Secs (0.5 Secs) *[==>]*	***[1]***
3	(STIS.sp.939708)	(3) NGC346-B	STIS/FUV-MAMA, ACCUM, 52X2	G140L 1425 A		POS TARG 0.,3.	Pattern 1, Exps 3-3 in Visit 01 (1)	520 Secs (2080 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
4	(STIS.sp.939708)	(4) NGC346-C	STIS/FUV-MAMA, ACCUM, 52X2	G140L 1425 A		POS TARG 0.,3.	Pattern 1, Exps 4-4 in Visit 01 (1)	686 Secs (2744 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[2]***
5	(STIS.sp.939708)	(2) NGC346-A	STIS/FUV-MAMA, ACCUM, 52X2	G140L 1425 A		POS TARG 0.,3.	Pattern 2, Exps 5-5 in Visit 01 (2)	625 Secs (1875 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[3]***
6	(STIS.ta.1005884)	(7) NGC-346-W3	STIS/CCD, ACQ, F28X50LP	MIRROR				1.0 Secs (1 Secs) *[==>]*	***[3]***
7	(STIS.sp.1177436)	(7) NGC-346-W3	STIS/FUV-MAMA, ACCUM, 52X0.2	G140L 1425 A				225 Secs (225 Secs) *[==>]*	***[3]***

Orbit Structure




Orbit 2
Server Version: 20180409
Pointing Maneuver
Exp. 4 (Auto-WAVECAL)
Pointing Maneuver
Pointing Maneuver
Unused Orbital Visibility = 165
Pointing Maneuver
GS Reacq
Exp. 4
Exp. 4
Exp. 4
Exp. 4
Occultation
0
500
1000
1500
2000
2500
3000
3500
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4500
5000
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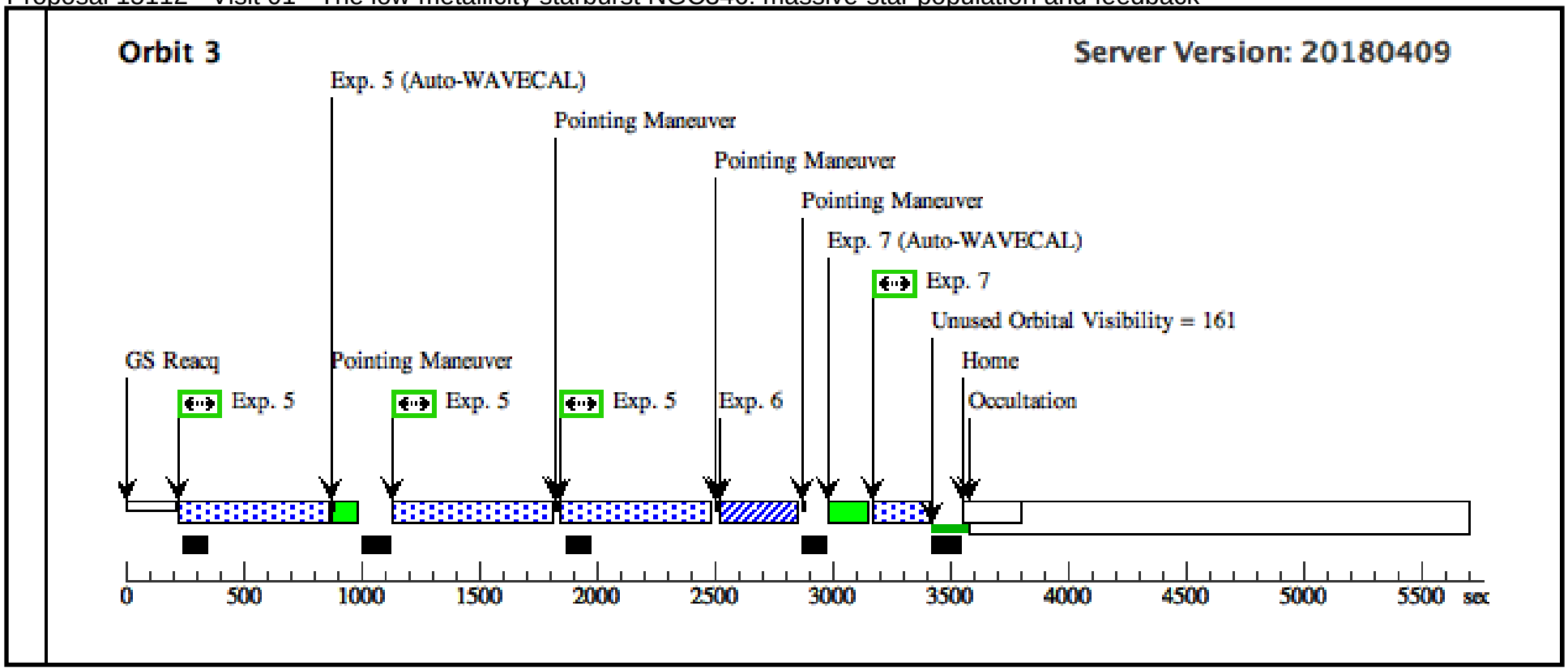
secs.


Orbit 3
Server Version: 20180409
Exp. 5 (Auto-WAVECAL)
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Exp. 7 (Auto-WAVECAL)
Exp. 7
Unused Orbital Visibility = 161
GS Reacq
Exp. 5
Pointing Maneuver
Exp. 5
Exp. 5
Exp. 6
Home
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15112, Visit 02, implementation Tue Aug 07 17:00:23 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: ORIENT 70D TO 90 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=STIS-PERP-TO-SLIT	Coordinate Frame=POS-TARG		(3), (4)
	Purpose=MOSAIC	Pattern Orientation=0.0		
	Number Of Points=4	Angle Between Sides=		
	Point Spacing=1.8	Center Pattern=false		
	Line Spacing=			

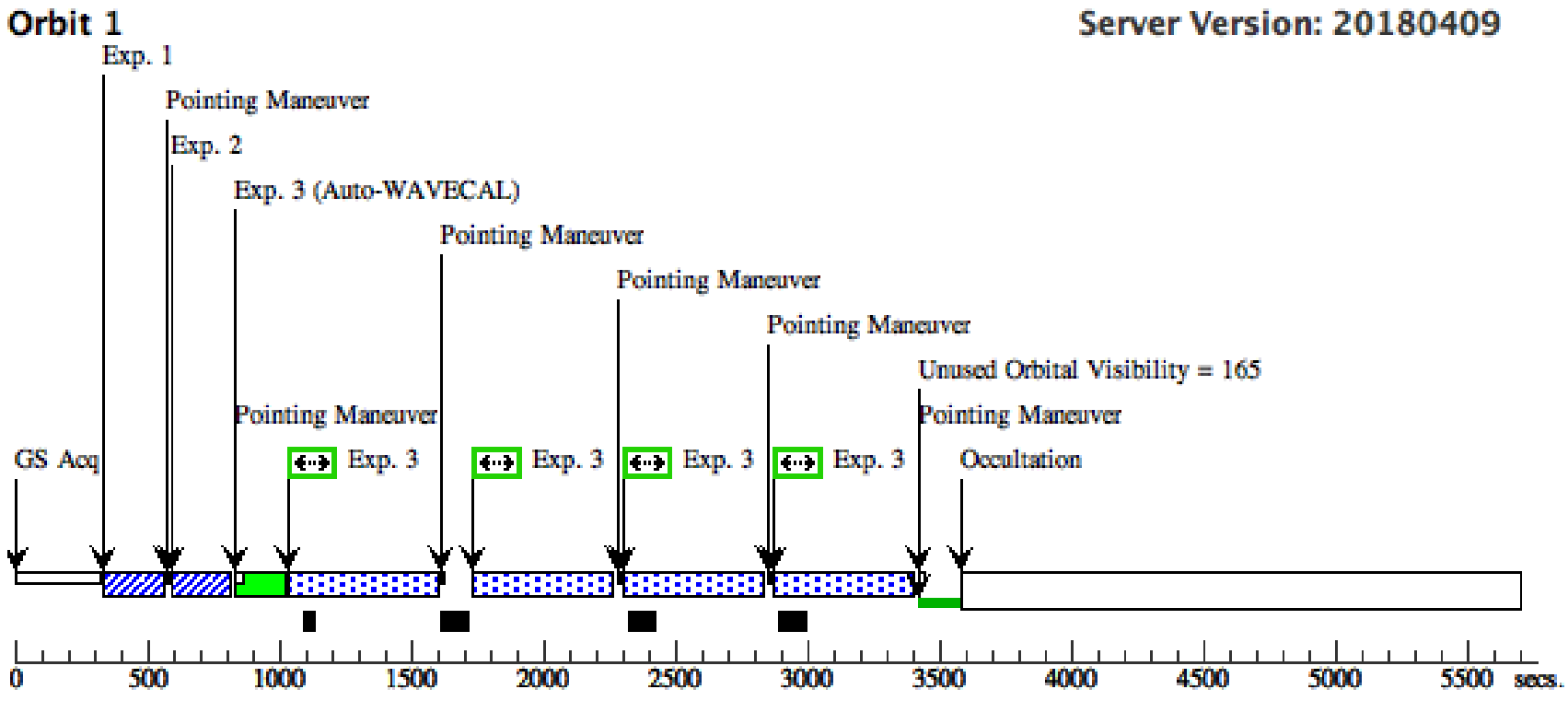
Fixed Targets

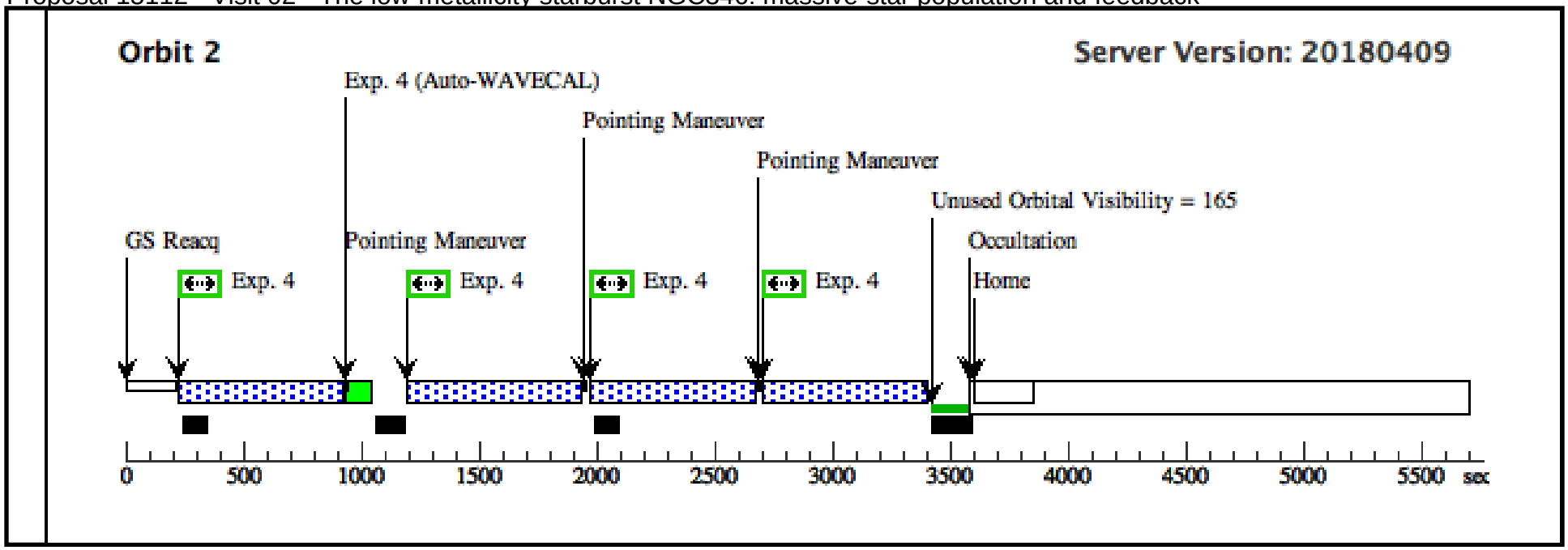
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-346-W3-OFFSET	RA: 00 59 0.7500 (14.7531250d) Dec: -72 10 28.20 (-72.17450d) Equinox: J2000		V=12.8	Reference Frame: ICRS
Comments: *Category=STAR* *Description=[OF]* *Extended=NO*					
(5)	NGC346-C2	Offset from NGC-346-W3-OFFSET RA Offset: 4.525 Secs Dec Offset: -21.98 Arcsec		V=12.8 abmag>13.06 in filter WFC3/UVIS/F225W	Offset Position (NGC346-C2)
Comments: *Category=STELLAR CLUSTER* *Description=[OPEN CLUSTER]*					
(6)	NGC346-D	Offset from NGC-346-W3-OFFSET RA Offset: 6.736 Secs Dec Offset: -19.88 Arcsec		V=12.8 abmag>13.06 in filter WFC3/UVIS/F225W	Offset Position (NGC346-D)
Comments: *Category=STELLAR CLUSTER* *Description=[OPEN CLUSTER]*					

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.1005884)	(1) NGC-346-W3-OFFSET	STIS/CCD, ACQ, F28X50LP	MIRROR				1.0 Secs (1 Secs)	
								[==>]	***[1]***
2	(STIS.ta.1005893)	(1) NGC-346-W3-OFFSET	STIS/CCD, ACQ/PEAK, 52X0.1	MIRROR				0.5 Secs (0.5 Secs)	
								[==>]	***[1]***
3	(STIS.sp.939708)	(5) NGC346-C2	STIS/FUV-MAMA, ACCUM, 52X2	G140L 1425 A		POS TARG 0.,3.	Pattern 1, Exps 3-3 in Visit 02 (1)	520 Secs (2080 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
4	(STIS.sp.939708)	(6) NGC346-D	STIS/FUV-MAMA, ACCUM, 52X2	G140L 1425 A		POS TARG 0.,3.	Pattern 1, Exps 4-4 in Visit 02 (1)	686 Secs (2744 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[2]***

Orbit Structure




Orbit 2
Server Version: 20180409
Exp. 4 (Auto-WAVECAL)
Pointing Maneuver
Pointing Maneuver
Unused Orbital Visibility = 165
GS Reacq
Pointing Maneuver
Occultation
Exp. 4
Exp. 4
Exp. 4
Exp. 4
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec