14197 - NGC 6273: Towards Understanding a New Class of Galactic Globular Clusters

Cycle: 23, Proposal Category: GO

(Availability Mode: AVAILABLE)

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) M-19	WFC3/UVIS	4	02-Oct-2015 21:44:36.0	yes

4 Total Orbits Used

ABSTRACT

Recent work combining HST photometry and ground-based spectroscopy has led to a renaissance in our understanding of Galactic globular clusters. The peculiar large light element abundance variations, discovered nearly 40 years ago by spectroscopy, hid in plain sight what HST finally revealed as a globular cluster's signature of formation: the existence, within a single globular cluster, of multiple populations with unique chemistry that trace out discrete photometric sequences.

HST photometry and ground-based spectroscopy have revealed the existence of a new globular cluster class. These "anomalous" clusters are differentiated from normal globular clusters by exhibiting large (>0.1 dex) intrinsic metallicity dispersions, complex sub-giant branches, and

correlated [Fe/H] and s-process abundances. Omega Centauri is the most famous and extreme example of this new class.

Our new high-resolution ground-based spectroscopy demonstrates that NGC 6273, a largely unexplored but massive globular cluster, also exhibits the chemical characteristics of an anomalous cluster. Similar to Omega Cen, NGC 6273 possesses at least 2-3 stellar populations with very different [Fe/H] and s-process abundances; however, further analyses of this cluster are hindered by bulge field star contamination and strong differential reddening. Therefore, we are proposing to combine new WFC3 and archival WFPC2 data to photometrically trace the cluster's populations and isolate cluster members with proper motion cleaning. The HST photometry provides information about population ratios, radial distributions, and formation scenarios that are not possible to obtain by any other means.

OBSERVING DESCRIPTION

The observations for this project consist of multiple exposures with multiple filters centered on the Galactic globular cluster NGC 6273 (M19). We are using the WFC3 instrument and the F336W, F438W, F555W, and F814W filters. The observations cover 4 orbits, and we have setup each orbit to have a different small dither position (for PSF sampling; i.e., 1 orbit per dither position).

The beginning and end of each orbit consist of a "short" exposure in either the F438W, F555W, or F814W filters. There should be one F555W short exposure per orbit and one F438W or F814W short exposure every other orbit (i.e., F555W short is observed 4 times and F438W/F814W are observed a total of two times each).

Every orbit also contains "long" exposures for each of the F336W, F438W, F555W, and F814W filters. There is also a "medium" exposure for F336W that immediately follows each long F336W exposure. These are taken in each orbit so that every long/medium exposure is taken at all four dither point positions. The goal of the short/long pattern is to get good photometry for stars ranging from ~V=13.5-23.

We will be matching these new observations to archival observations taken with WFPC2 (GO-7470 and GO-8718). Since the WFC3 field-of-view is larger than WFPC2, the roll angle is not too critical. However, if possible we would prefer to match as closely as possible with the GO-7470 and GO-8718 orientation. Based on the Aladin previewer, the best orientations seem to be roll angles between 0-120 degrees, 170-195 degrees, 277-290 degrees, and 350-360 degrees. If this is too restrictive, any roll angle will still permit us to complete a majority of the science goals.

Visit

Proposal 14197, N6273Obs (01), implementation Sat Oct 03 01:44:40 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 350D TO 120 D; ORIENT 170D TO 195 D; ORIENT 277D TO 290 D

Fixed Targets

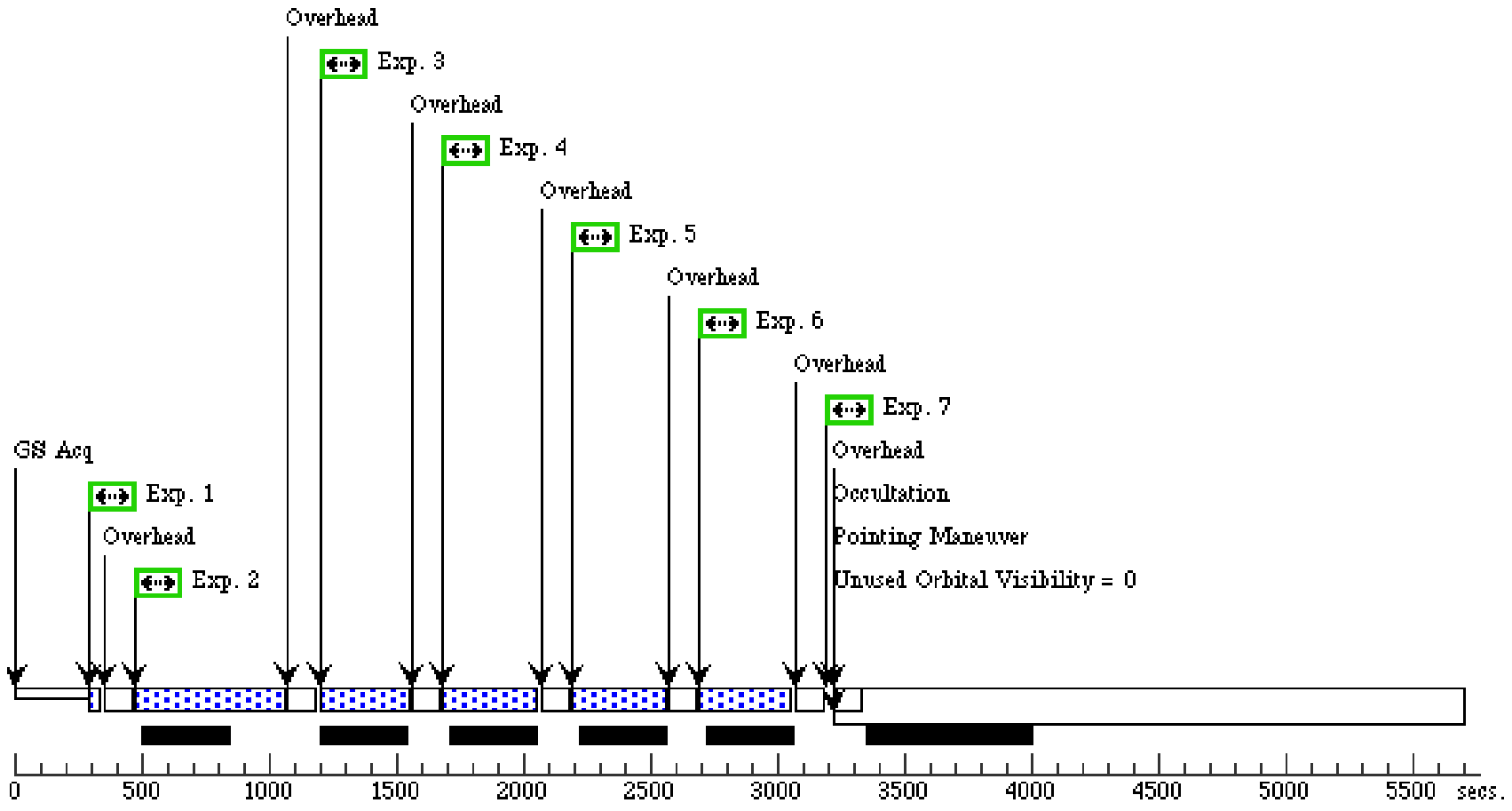
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M-19	RA: 17 02 38.7773 (255.6615721d)		V=18+/-5	Reference Frame: ICRS
	Alt Name1: NGC6273	Dec: -26 16 11.60 (-26.26989d)			
		Equinox: J2000			

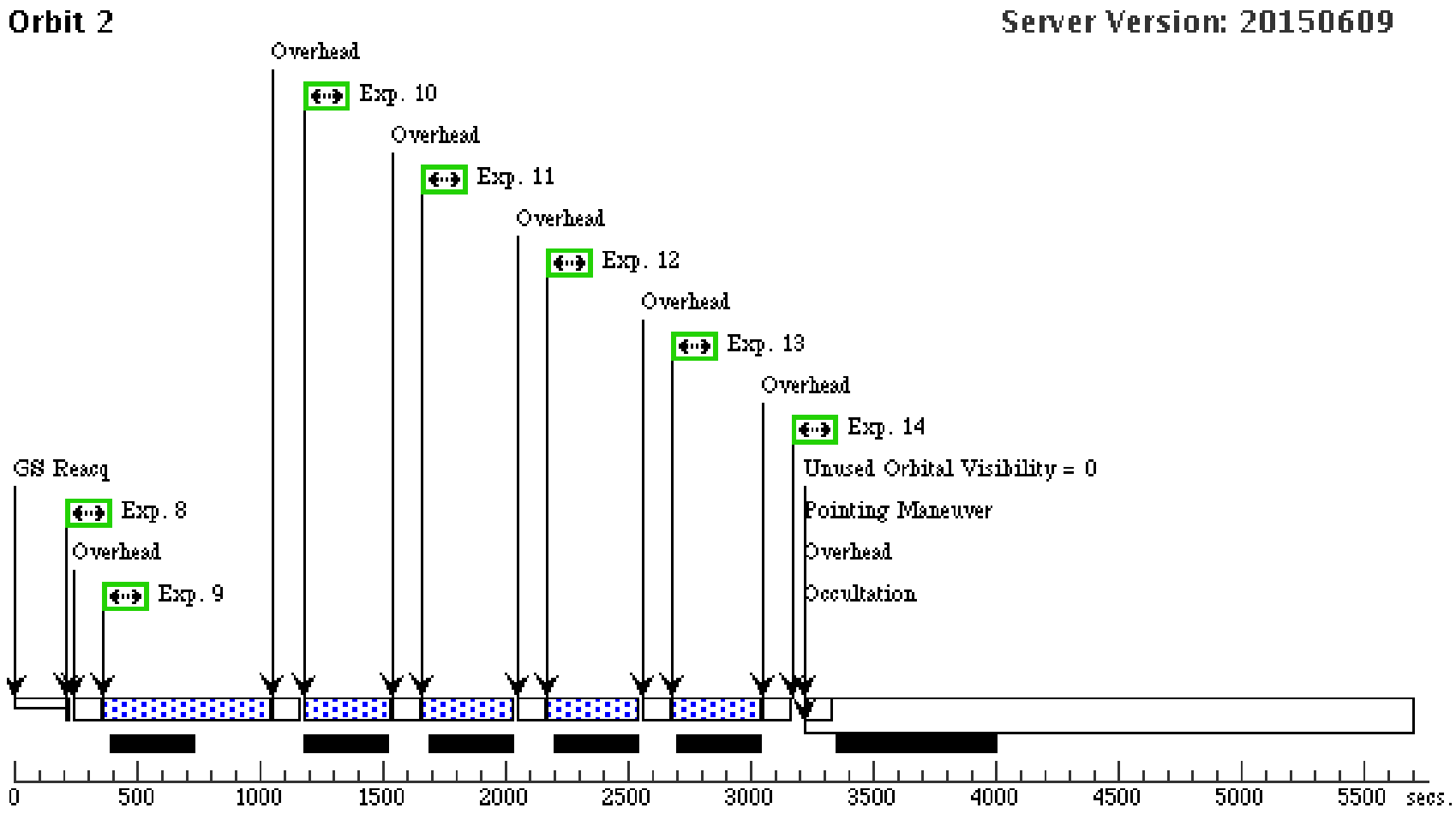
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F438W-Short1	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F438W	FLASH=12; BLADE=A	POS TARG 0,0		10 Secs (10 Secs) *[==>]*	*[1]*
Comments: Set "BLADE=A" with STScI approval.									
2	F336W-Long1	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12	POS TARG 0,0		700 Secs (566 Secs) *[==>566.0 Secs]*	*[1]*
3	F336W-Medium1	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12	POS TARG 0,0		350 Secs (350 Secs) *[==>]*	*[1]*
4	F438W-Long1	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F438W	FLASH=12	POS TARG 0,0		350 Secs (350 Secs) *[==>]*	*[1]*
5	F555W-Long1	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F555W	FLASH=5	POS TARG 0,0		350 Secs (350 Secs) *[==>]*	*[1]*
6	F814W-Long1	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F814W	FLASH=5	POS TARG 0,0		350 Secs (348 Secs) *[==>348.0 Secs]*	*[1]*
7	F555W-Short1	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F555W	FLASH=12; BLADE=A	POS TARG 0,0		10 Secs (10 Secs) *[==>]*	*[1]*
Comments: Set "BLADE=A" with STScI approval.									
8	F555W-Short2	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F555W	FLASH=12; BLADE=A	POS TARG 0.158,0.07		10 Secs (10 Secs) *[==>]*	*[2]*
Comments: Set "BLADE=A" with STScI approval.									
9	F336W-Long2	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12	POS TARG 0.158,0.07		660 Secs (659 Secs) *[==>659.0 Secs]*	*[2]*
10	F336W-Medium2	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12	POS TARG 0.158,0.07		350 Secs (350 Secs) *[==>]*	*[2]*
11	F438W-Long2	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F438W	FLASH=12	POS TARG 0.158,0.07		350 Secs (350 Secs) *[==>]*	*[2]*
12	F555W-Long2	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F555W	FLASH=5	POS TARG 0.158,0.07		350 Secs (350 Secs) *[==>]*	*[2]*
13	F814W-Long2	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F814W	FLASH=5	POS TARG 0.158,0.07		350 Secs (348 Secs) *[==>348.0 Secs]*	*[2]*
14	F438W-Short2	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F438W	FLASH=12; BLADE=A	POS TARG 0.158,0.07		10 Secs (10 Secs) *[==>]*	*[2]*
Comments: Set "BLADE=A" with STScI approval.									
15	F814W-Short3	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F814W	FLASH=12; BLADE=A	POS TARG 0.099,0.165		10 Secs (10 Secs) *[==>]*	*[3]*
Comments: Set "BLADE=A" with STScI approval.									
16	F336W-Long3	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12	POS TARG 0.099,0.165		700 Secs (674 Secs) *[==>674.0 Secs]*	*[3]*
17	F336W-Medium3	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12	POS TARG 0.099,0.165		350 Secs (350 Secs) *[==>]*	*[3]*
18	F438W-Long3	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F438W	FLASH=12	POS TARG 0.099,0.165		350 Secs (350 Secs) *[==>]*	*[3]*
19	F555W-Long3	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F555W	FLASH=5	POS TARG 0.099,0.165		350 Secs (350 Secs) *[==>]*	*[3]*

	20	F814W-Long3	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F814W	FLASH=5	POS TARG 0.099,0.165	350 Secs (348 Secs) *[==>348.0 Secs]*	 ***[3]***
	21	F555W-Short3	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F555W	FLASH=12; BLADE=A	POS TARG 0.099,0.165	10 Secs (10 Secs) *[==>]*	 ***[3]***
	Comments: Set "BLADE=A" with STScI approval.								
	22	F555W-Short4	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F555W	FLASH=12; BLADE=A	POS TARG -0.060,0.095	10 Secs (10 Secs) *[==>]*	 ***[4]***
	23	F336W-Long4	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12	POS TARG -0.060,0.095	700 Secs (685 Secs) *[==>685.0 Secs]*	 ***[4]***
	24	F336W-Medium4	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12	POS TARG -0.060,0.095	350 Secs (350 Secs) *[==>]*	 ***[4]***
	25	F438W-Long4	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F438W	FLASH=12	POS TARG -0.060,0.095	350 Secs (350 Secs) *[==>]*	 ***[4]***
	26	F555W-Long4	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F555W	FLASH=5	POS TARG -0.060,0.095	350 Secs (350 Secs) *[==>]*	 ***[4]***
	27	F814W-Long4	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F814W	FLASH=5	POS TARG -0.060,0.095	350 Secs (348 Secs) *[==>348.0 Secs]*	 ***[4]***
	28	F814W-Short4	(1) M-19	WFC3/UVIS, ACCUM, UVIS	F814W	FLASH=12; BLADE=A	POS TARG -0.060,0.095	10 Secs (10 Secs) *[==>]*	 ***[4]***
	Comments: Set "BLADE=A" with STScI approval.								

Orbit Structure

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GS Reacq
Exp. 8
Overhead
Exp. 9
Overhead
Exp. 10
Overhead
Exp. 11
Overhead
Exp. 12
Overhead
Exp. 13
Overhead
Exp. 14
Unused Orbital Visibility = 0
Pointing Maneuver
Overhead
Occultation
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1000
1500
2000
2500
3000
3500
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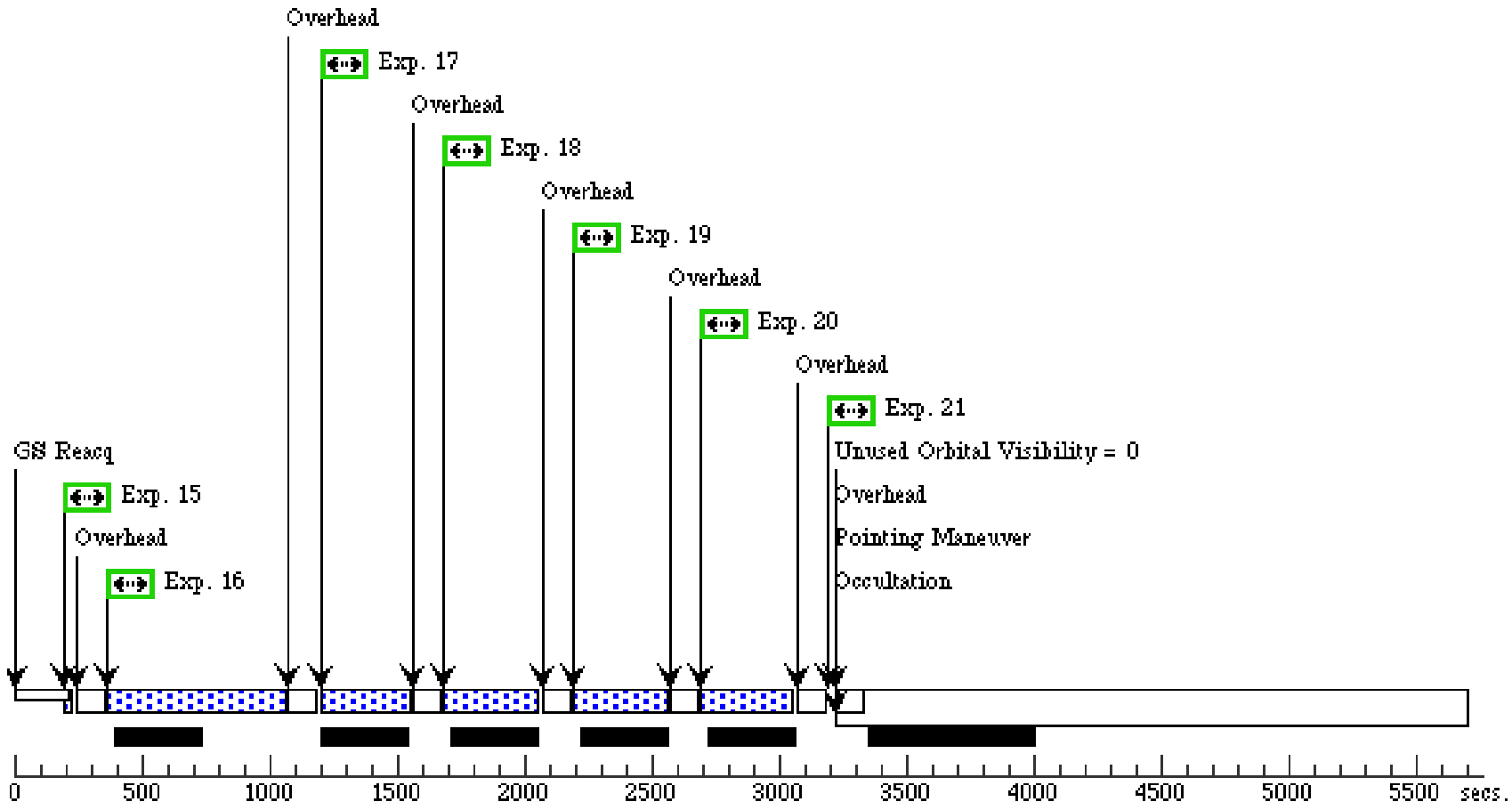
5500
secs.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Server Version: 20150609
Overhead
Exp. 17
Overhead
Exp. 18
Overhead
Exp. 19
Overhead
Exp. 20
Overhead
Exp. 21
Unused Orbital Visibility = 0
Overhead
Pointing Maneuver
Occultation
GS Reacq
Exp. 15
Overhead
Exp. 16
0
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1000
1500
2000
2500
3000
3500
4000
4500
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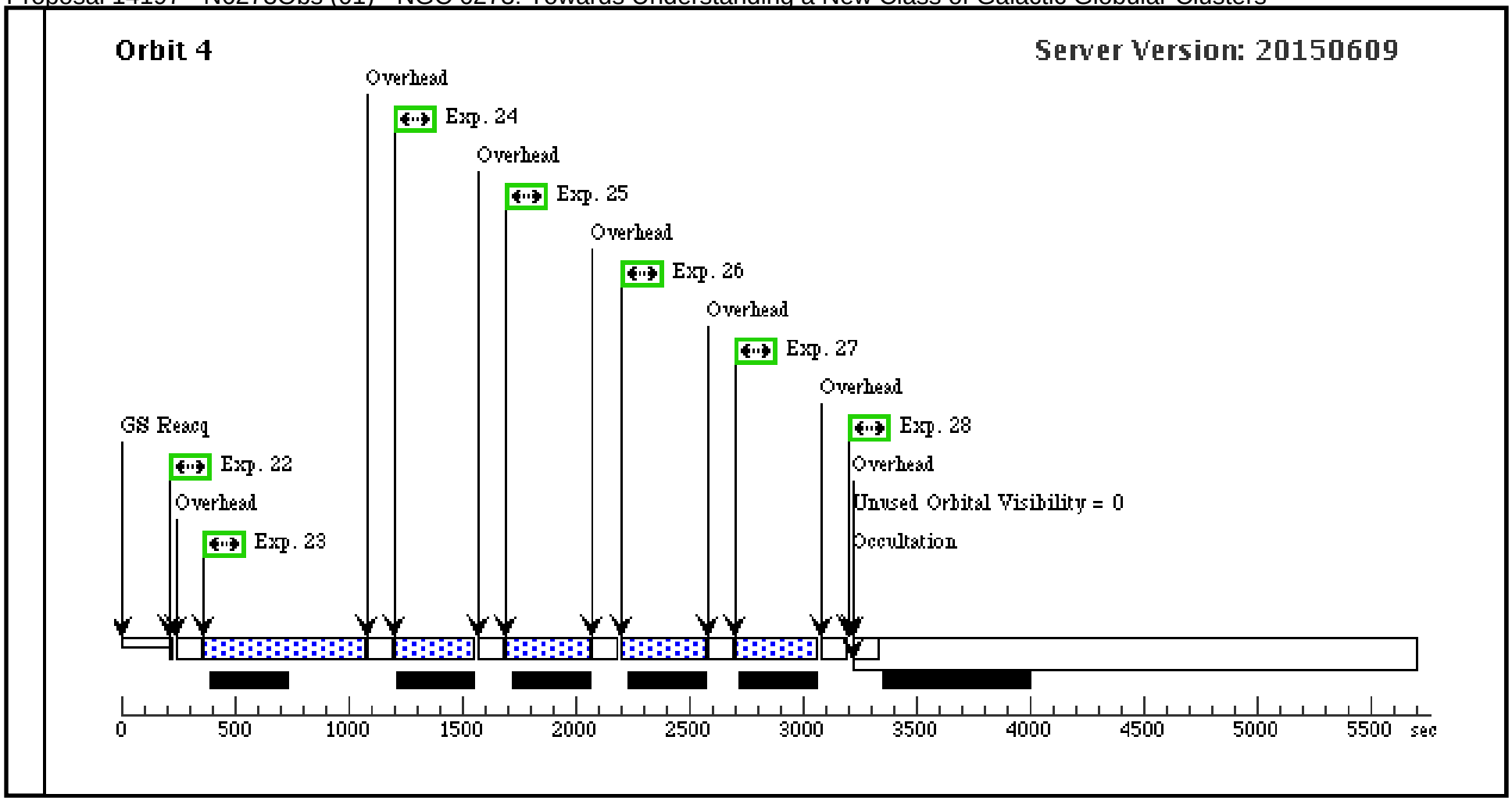
5500
secs.


Orbit 4
Server Version: 20150609
GS Reacq
Exp. 22
Overhead
Exp. 23
Overhead
Exp. 24
Overhead
Exp. 25
Overhead
Exp. 26
Overhead
Exp. 27
Overhead
Exp. 28
Overhead
Unused Orbital Visibility = 0
Occultation
0
500
1000
1500
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2500
3000
3500
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sec