12219 - Multiple stellar generations in the Large Magellanic Cloud Star Cluster NGC 1846

Cycle: 18, 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	(2) NGC1846-OUT	ACS/WFC WFC3/IR WFC3/UVIS	4	10-Jul-2010 00:51:04.0	yes

4 Total Orbits Used

ABSTRACT

The recent discovery of multiple stellar populations in massive Galactic globular clusters poses a serious challenge for models of star cluster formation and evolution. The finding of multiple main sequences in the massive clusters NGC 2808 and omega Centauri, and multiple sub-giant-branch in NGC 1851 and many other globulars have demonstrated that star clusters are not as simple as we have imagined for decades. Surprisingly the only way to explain the main sequence splitting appears to be Helium enrichment, up to an astonishingly high Y~0.40.An unique angle on this problem can be provided by intermediate-age clusters in the Magellanic Clouds with peculiar main-sequence turn-off morphologies. Recent

discoveries, based on ACS data of unparalleled photometric accuracy, have demonstrated that the CMDs of a large fraction of these clusters (~70 %) are not consistent with the simple, single stellar population hypothesis.

Explanations for what conditions could give rise to multiple populations in Galactic Globular Clusters remain controversial; this is even more the case for LMC clusters

To properly constraint the multipopulation phenomenon in Magellanic Cloud star clusters, we propose deep UV/IR imaging of NGC 1846, a star cluster where multiple populations have already been identified. The proposed observation will allow us to accurately measure the age difference between the stellar populations providing fundamental clues on the formation mechanism. Our simulations of WFC3 performance suggest that we will be able to detect even the main sequence splitting caused by small He differences (Delta Y ~0.02).

OBSERVING DESCRIPTION

UVIS and NIR WFC3, and ACS WFC observations of the Large Magellanic Cloud stellar cluster NGC1846

Visit

Proposal 12219, Visit 01 Sat Jul 10 04:51:13 GMT 2010

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, ACS/WFC, WFC3/UVIS

Special Requirements: ORIENT 124D TO 130 D

Fixed Targets

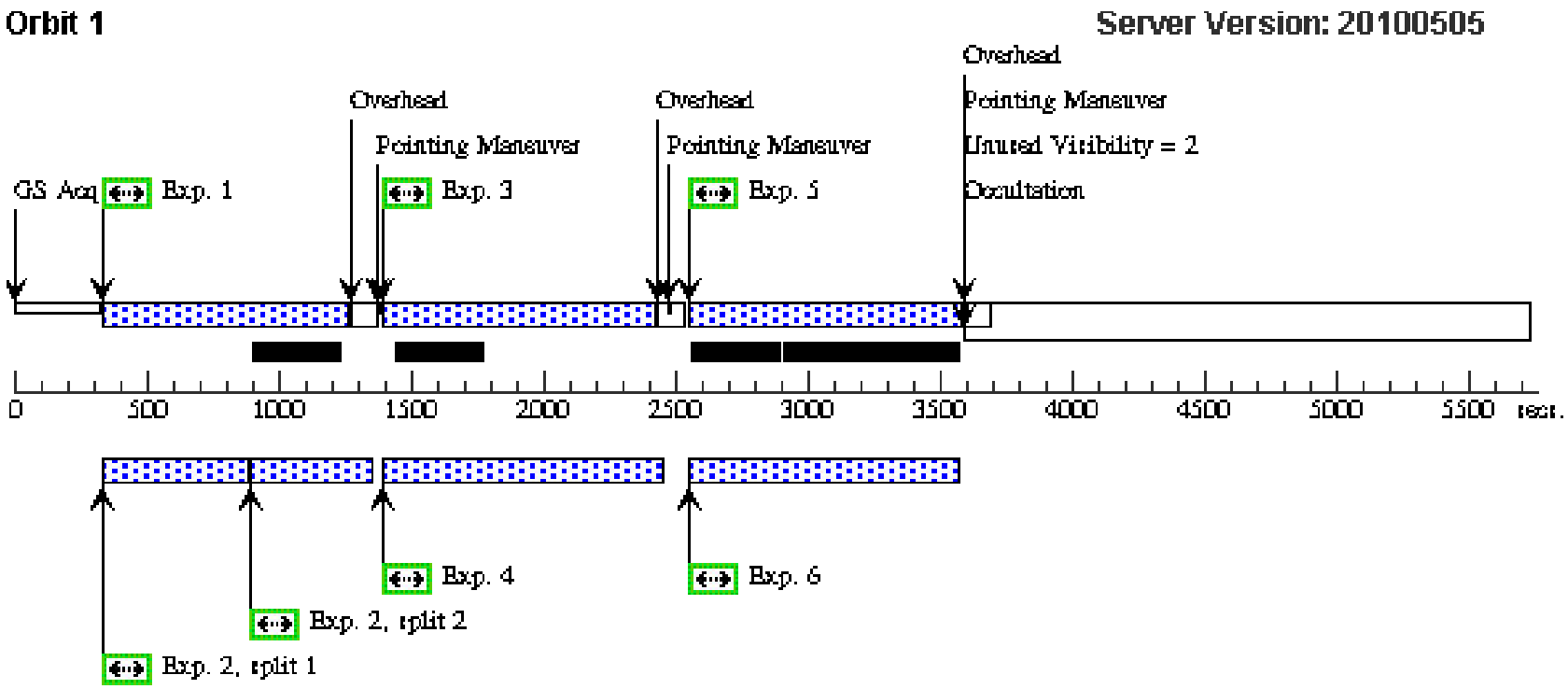
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	NGC1846-OUT	RA: 05 07 40.8000 (76.9200000d) Dec: -67 26 56.70 (-67.44908d) Equinox: J2000		V=11.31	Reference Frame: ICRS

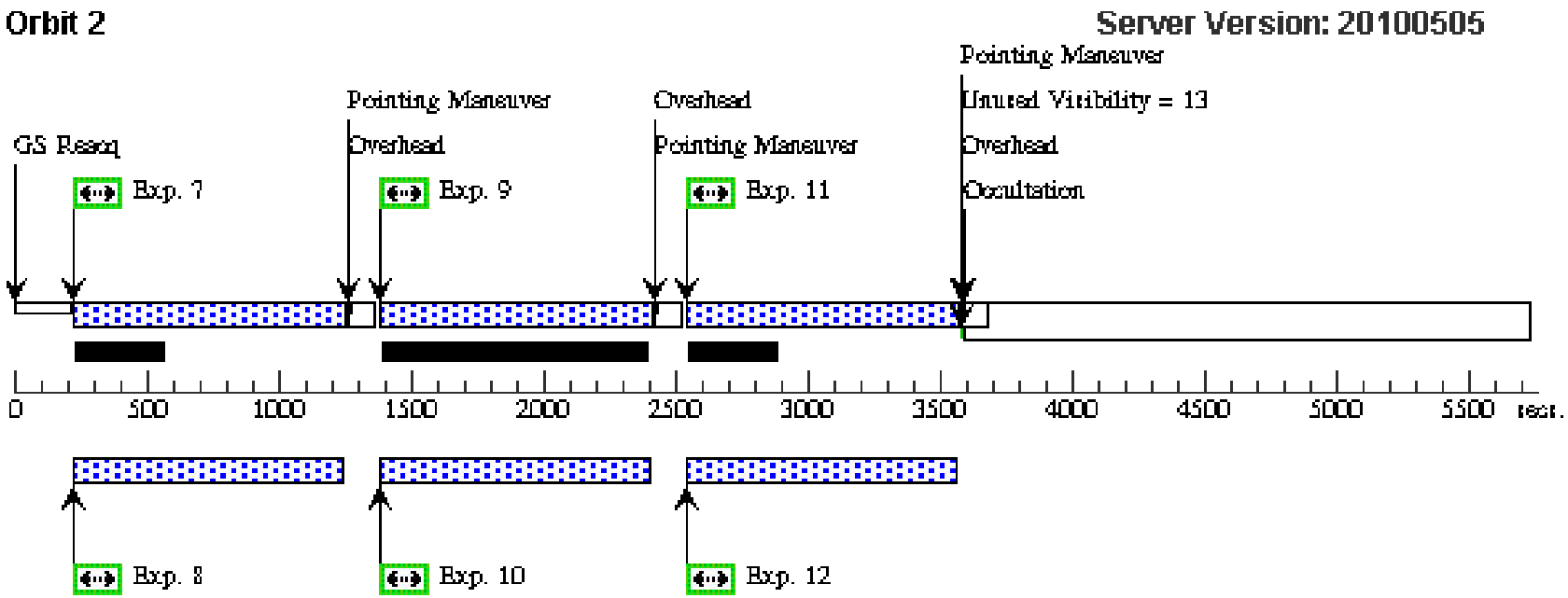
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(2) NGC1846-OUT	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W	CR-SPLIT=NO	POS TARG -5.6,-4.2	Prime + Parallel Group 1-2	900 Secs *[==>]*	*[1]*
2		(2) NGC1846-OUT	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=2		Prime + Parallel Group 1-2	680 Secs *[==>(Split 1)]* *[==>(Split 2)]*	*[1]*
3		(2) NGC1846-OUT	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W	CR-SPLIT=NO	POS TARG -4.2,-2.8	Prime + Parallel Group 3-4	1032 Secs *[==>]*	*[1]*
4		(2) NGC1846-OUT	ACS/WFC, ACCUM, WFCENTER	F475W	CR-SPLIT=NO		Prime + Parallel Group 3-4	900 Secs *[==>]*	*[1]*
5		(2) NGC1846-OUT	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W	CR-SPLIT=NO	POS TARG -2.8,-1.4	Prime + Parallel Group 5-6	1032 Secs *[==>]*	*[1]*
6		(2) NGC1846-OUT	ACS/WFC, ACCUM, WFCENTER	F475W	CR-SPLIT=NO		Prime + Parallel Group 5-6	900 Secs *[==>]*	*[1]*
7		(2) NGC1846-OUT	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W	CR-SPLIT=NO	POS TARG -1.4,0.0	Prime + Parallel Group 7-8	1032 Secs *[==>]*	*[2]*
8		(2) NGC1846-OUT	ACS/WFC, ACCUM, WFCENTER	F475W	CR-SPLIT=NO		Prime + Parallel Group 7-8	900 Secs *[==>]*	*[2]*
9		(2) NGC1846-OUT	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W	CR-SPLIT=NO	POS TARG 0.0,1.4	Prime + Parallel Group 9-10	1032 Secs *[==>]*	*[2]*
10		(2) NGC1846-OUT	ACS/WFC, ACCUM, WFCENTER	F475W	CR-SPLIT=NO		Prime + Parallel Group 9-10	900 Secs *[==>]*	*[2]*
11		(2) NGC1846-OUT	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W	CR-SPLIT=NO	POS TARG 1.4,2.8	Prime + Parallel Group 11-12	1032 Secs *[==>]*	*[2]*
12		(2) NGC1846-OUT	ACS/WFC, ACCUM, WFCENTER	F475W	CR-SPLIT=NO		Prime + Parallel Group 11-12	900 Secs *[==>]*	*[2]*
13		(2) NGC1846-OUT	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W	CR-SPLIT=NO	POS TARG 2.8,4.2	Prime + Parallel Group 13-14	1032 Secs *[==>]*	*[3]*
14		(2) NGC1846-OUT	ACS/WFC, ACCUM, WFCENTER	F475W	CR-SPLIT=NO		Prime + Parallel Group 13-14	900 Secs *[==>]*	*[3]*
15		(2) NGC1846-OUT	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W	CR-SPLIT=NO	POS TARG 4.2,5.6	Prime + Parallel Group 15-16	1032 Secs *[==>]*	*[3]*
16		(2) NGC1846-OUT	ACS/WFC, ACCUM, WFCENTER	F475W	CR-SPLIT=NO		Prime + Parallel Group 15-16	900 Secs *[==>]*	*[3]*
17		(2) NGC1846-OUT	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W	CR-SPLIT=NO	POS TARG 5.6,7	Prime + Parallel Group 17-18	1032 Secs *[==>]*	*[3]*
18		(2) NGC1846-OUT	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=2		Prime + Parallel Group 17-18	680 Secs *[==>(Split 1)]* *[==>(Split 2)]*	*[3]*
19		(2) NGC1846-OUT	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=12; SAMP-SEQ=STEP50	POS TARG -5.6,-4.2		*[==>]*	*[4]*
20		(2) NGC1846-OUT	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=12; SAMP-SEQ=STEP50	POS TARG -4.2,-2.8		*[==>]*	*[4]*

	21	(2) NGC1846-OUT	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=12; SAMP-SEQ=STEP50	POS TARG -2.8,-1.4		*[==>]*	***[4]***
	22	(2) NGC1846-OUT	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=12; SAMP-SEQ=STEP50	POS TARG -1.4,0		*[==>]*	***[4]***
	23	(2) NGC1846-OUT	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=12; SAMP-SEQ=STEP50	POS TARG 0,1.4		*[==>]*	***[4]***
	24	(2) NGC1846-OUT	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=12; SAMP-SEQ=STEP50	POS TARG 1.4,2.8		*[==>]*	***[4]***
	25	(2) NGC1846-OUT	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=12; SAMP-SEQ=STEP50	POS TARG 2.8,4.2		*[==>]*	***[4]***
	26	(2) NGC1846-OUT	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=13; SAMP-SEQ=STEP50	POS TARG 4.2,5.6	Prime + Parallel Group 26-27	*[==>]*	***[4]***
	27	(2) NGC1846-OUT	ACS/WFC, ACCUM, WFC	F814W			Prime + Parallel Group 26-27	326 Secs *[==>]*	 ***[4]***

Orbit Structure

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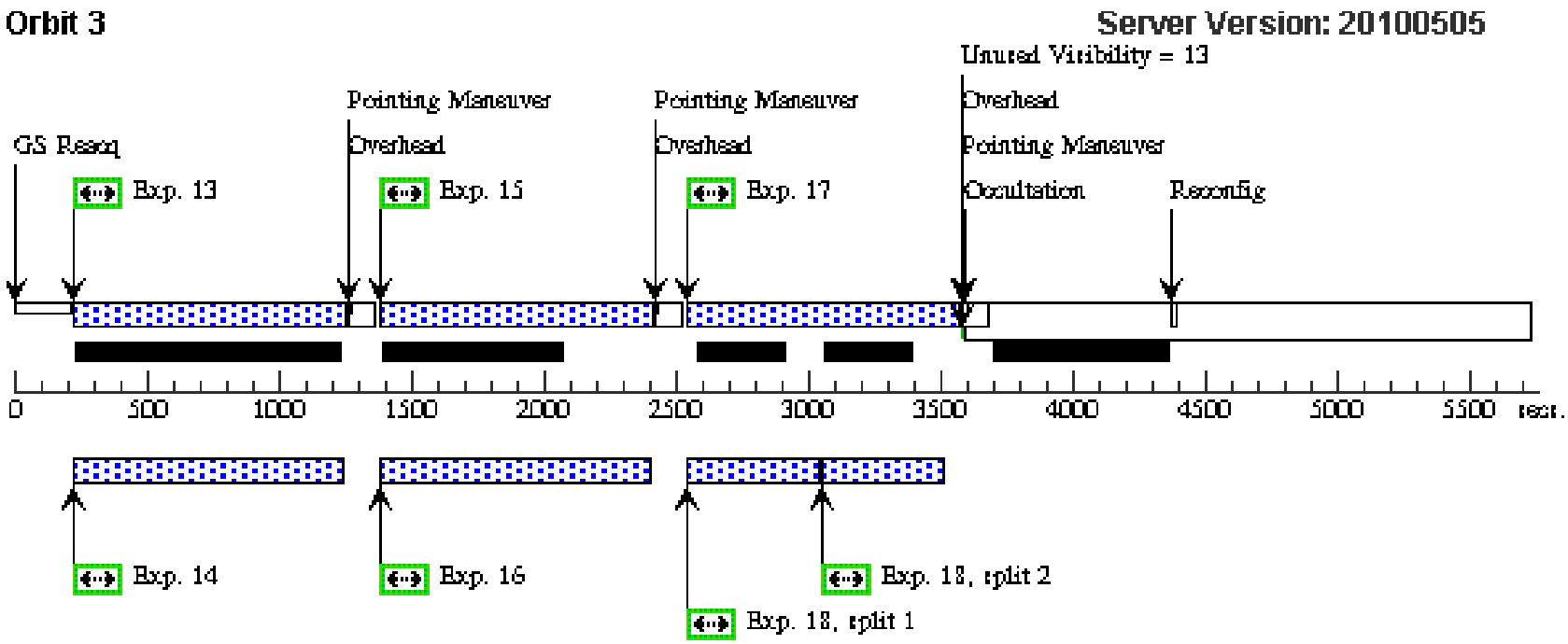
Server Version: 20100505
GS Reacq
Exp. 7
Pointing Maneuver
Overhead
Exp. 9
Overhead
Pointing Maneuver
Exp. 11
Pointing Maneuver
Unused Visibility = 13
Overhead
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec.
Exp. 8
Exp. 10
Exp. 12


Orbit 3
Server Version: 20100505
Unused Visibility = 13
GS Reacq
Pointing Maneuver
Overhead
Pointing Maneuver
Overhead
Overhead
Pointing Maneuver
Occultation
Reconfig
Exp. 13
Exp. 15
Exp. 17
0
500
1000
1500
2000
2500
3000
3500
4000
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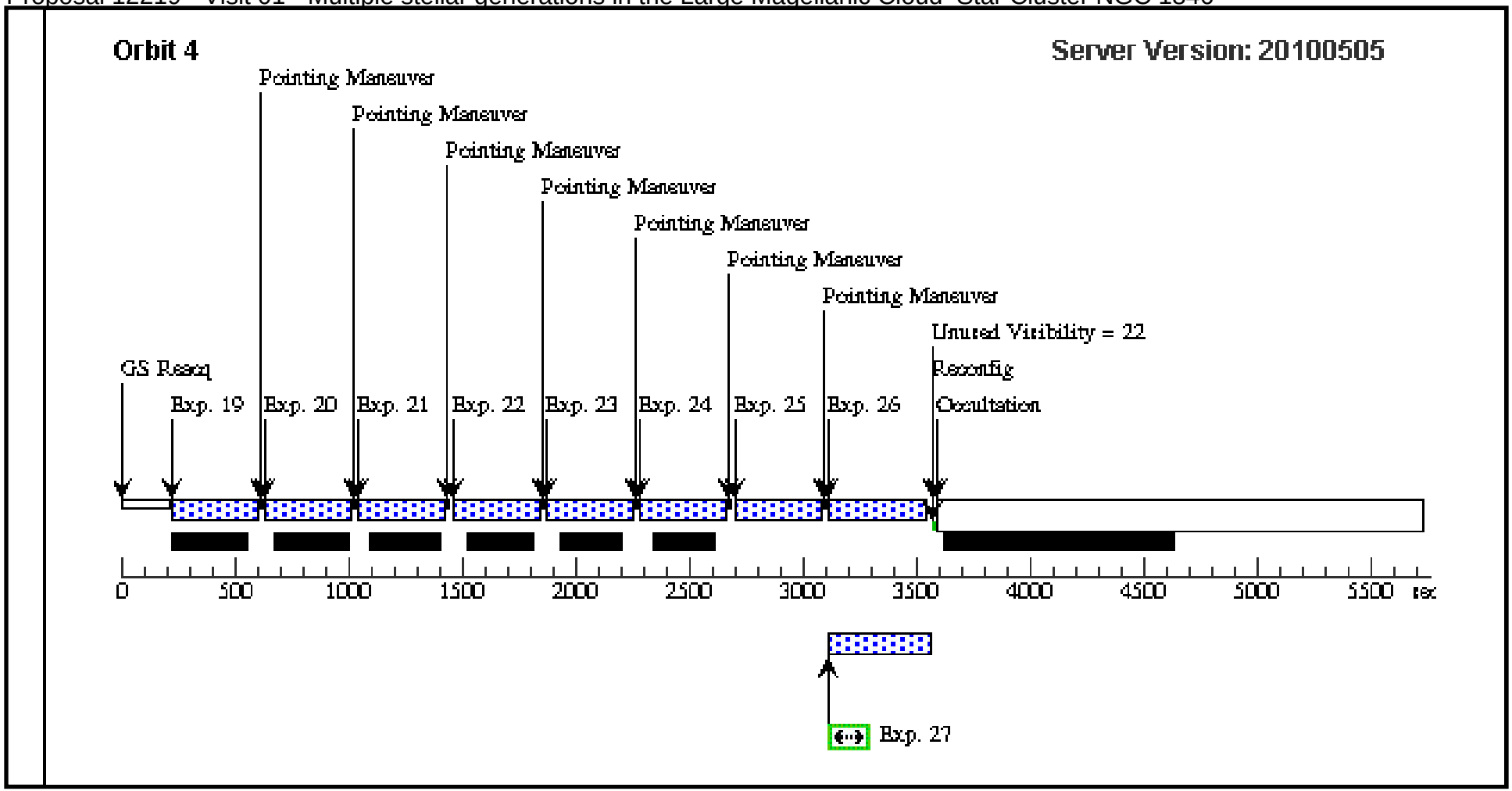
sec.
Exp. 14
Exp. 16
Exp. 18, split 2
Exp. 18, split 1


Orbit 4
Server Version: 20100505
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Unused Visibility = 22
GS Reacq
Reconfig
Exp. 19
Exp. 20
Exp. 21
Exp. 22
Exp. 23
Exp. 24
Exp. 25
Exp. 26
Occultation
0
500
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2000
2500
3000
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sec
Exp. 27