16255 - Pinpointing the Onset of Multiple Populations in Globular Clusters

Cycle: 28, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Emanuele Dalessandro (PI) (ESA Member) (Contact)	**INAF, Osservatorio di Astrofisica e Scienza dello S pazio**	**emanuele.dalessandro@inaf.it**
Dr. Nate Bastian (CoI) (ESA Member)	Liverpool John Moores University	n.j.bastian@ljmu.ac.uk
Dr. Maurizio Salaris (CoI) (ESA Member)	Liverpool John Moores University	ms@astro.livjm.ac.uk
Dr. Ivan Cabrera-Ziri (CoI) (AdminUSPI)	Harvard University	ivandiver2@gmail.com
Ms. Silvia Martocchia (CoI) (ESA Member)	Liverpool John Moores University	s.martocchia@2016.ljmu.ac.uk

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
03	(1) NGC-1783	WFC3/UVIS	3	08-Oct-2020 16:00:12.0	yes
04	(1) NGC-1783	WFC3/UVIS	3	08-Oct-2020 16:00:13.0	yes
05	(1) NGC-1783	WFC3/UVIS	2	08-Oct-2020 16:00:14.0	yes
06	(1) NGC-1783	WFC3/UVIS	2	08-Oct-2020 16:00:14.0	yes

10 Total Orbits Used

ABSTRACT

Studies of massive stellar clusters in the Large and Small Magellanic Clouds, spanning a wide range of ages from 100 Myr to 11 Gyr, have potentially pinpointed the onset of the multiple populations (MPs) phenomenon. Focusing on clusters with similar mass (~10^5 Msun), all systems with ages above 2 Gyr were found to host MPs while clusters below this limit do not. Such a relation with age is not expected in any scenario for the

origin of MPs, and constitutes one of the most important findings in the field in recent years.
One potential explanation for the observations is that MPs do exist within the young clusters, but only below a certain stellar mass limit. We propose to obtain deeper imaging of NGC 1783, a 1.7 Gyr cluster that does not show MPs on its RGB (~1.6 Msun), in order to search for splitting along main sequence stars (~1 Msun and below) caused by the chemical anomalies. Based on stellar isochrones with MPs abundance variations, we expect to observe main sequence splitting with an additional 10 orbits of exposure using our unique optical-UV filter combination. Determining if a stellar mass limit exists for MPs would consistute a major step forward in the search for the origin of the multiple populations phenomenon.

OBSERVING DESCRIPTION

Deep WFC3/UVIS observations to identify multiple populations along the Main Sequence of the intermediate-age stellar cluster NGC1783 in the Large Magellanic Cloud and to study their properties.
8 orbits will be dedicated to observations with the F343N filter (1 image per orbit), and two orbits to obtain 6 images with F438W.
Observations are split in 4 Visits. Visit 03 and Visit 04 include 3 orbits to get F343N images. Visit 05 and Visit 06 inlcude 2 orbits: one to get an F343N image and 1 for 3 F438W images.
A pre-defined UVIS DITHER 3PT is adopted both for the F343N and F438W images.
Small offsets among visits are applied.

The requested images will be combined with archival ACS/WFC images (GO-10595). To maximize the overlap with these observations without the need to put stringent constraints on the ORIENT angles, which might be strongly dependent on the gyros performances, the UVIS-CENTER aperture is adopted.

Visit

Proposal 16255, Visit 03, implementation Thu Oct 08 20:00:15 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Diagnostics

(Exposure 1 (Pattern 1, Exps 1-1 in Visit 03)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1)

Fixed Targets

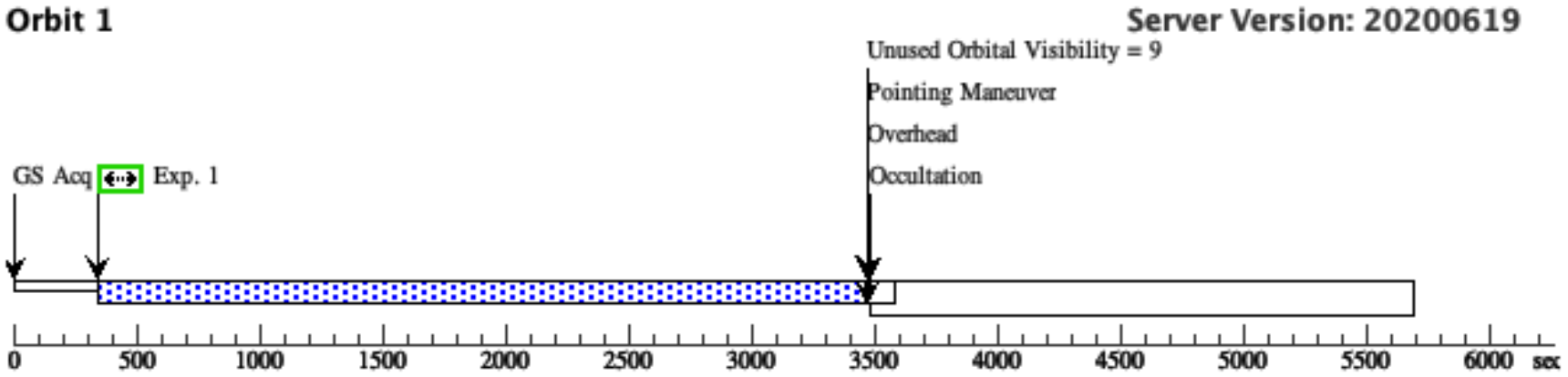
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-1783	RA: 04 59 8.5900 (74.7857917d) Dec: -65 59 15.84 (-65.98773d) Equinox: J2000	Epoch of Position: 2015.5	V=10.93	Reference Frame: SIMBAD

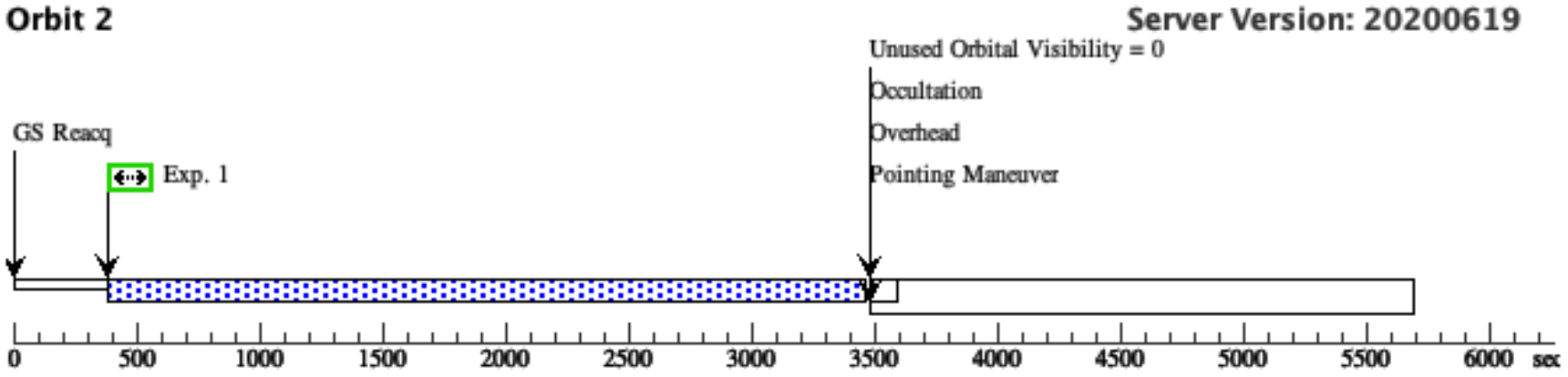
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STELLAR CLUSTER
Description=[GLOBULAR CLUSTER]

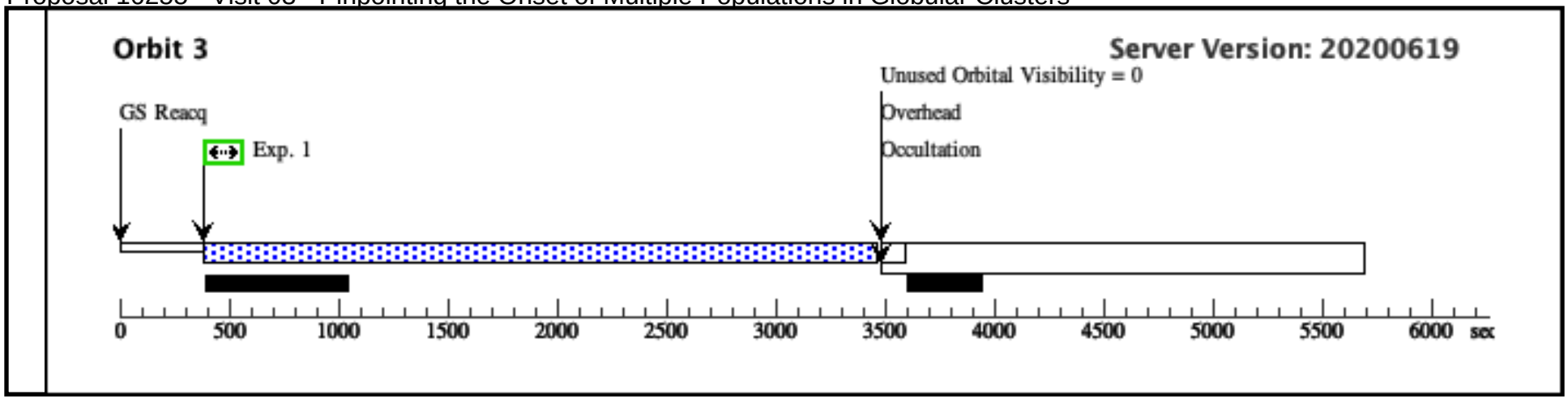
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) NGC-1783	WFC3/UVIS, ACCUM, UVIS-CENTER	F343N	FLASH=12		Pattern 1, Exps 1-1 in Visit 03 (1)	3086 Secs (9258 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	***[2]***
								[==>(Pattern 3)]	***[3]***

Orbit Structure






Orbit 3
Server Version: 20200619
Unused Orbital Visibility = 0
GS Reacq
Exp. 1
Overhead
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 16255, Visit 04, implementation Thu Oct 08 20:00:15 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: SAME ORIENT AS 03

Diagnostics

(Exposure 1 (Pattern 1, Exps 1-1 in Visit 04)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1)

Fixed Targets

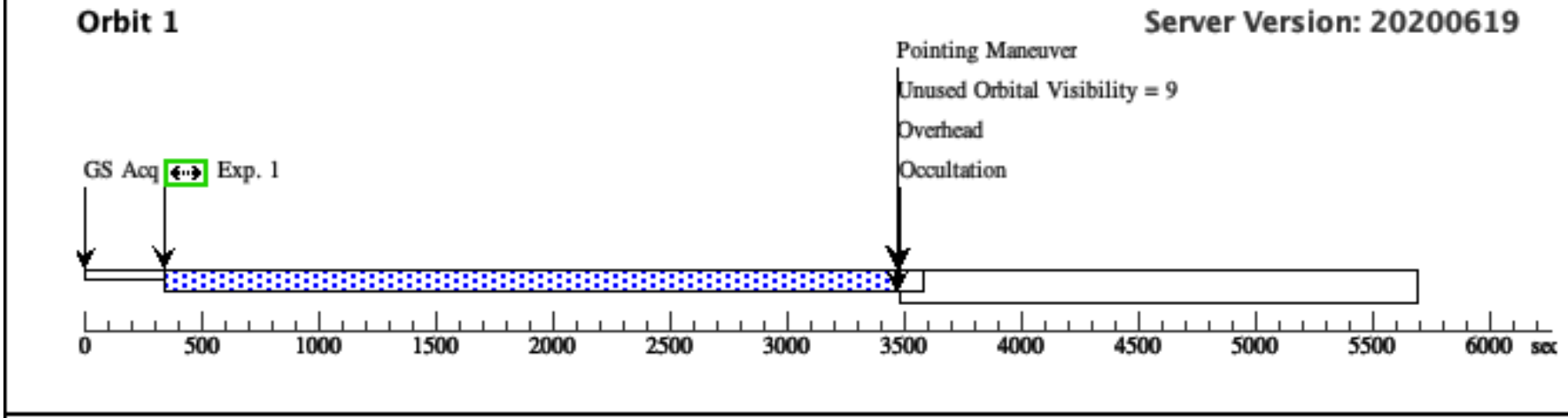
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-1783	RA: 04 59 8.5900 (74.7857917d) Dec: -65 59 15.84 (-65.98773d) Equinox: J2000	Epoch of Position: 2015.5	V=10.93	Reference Frame: SIMBAD

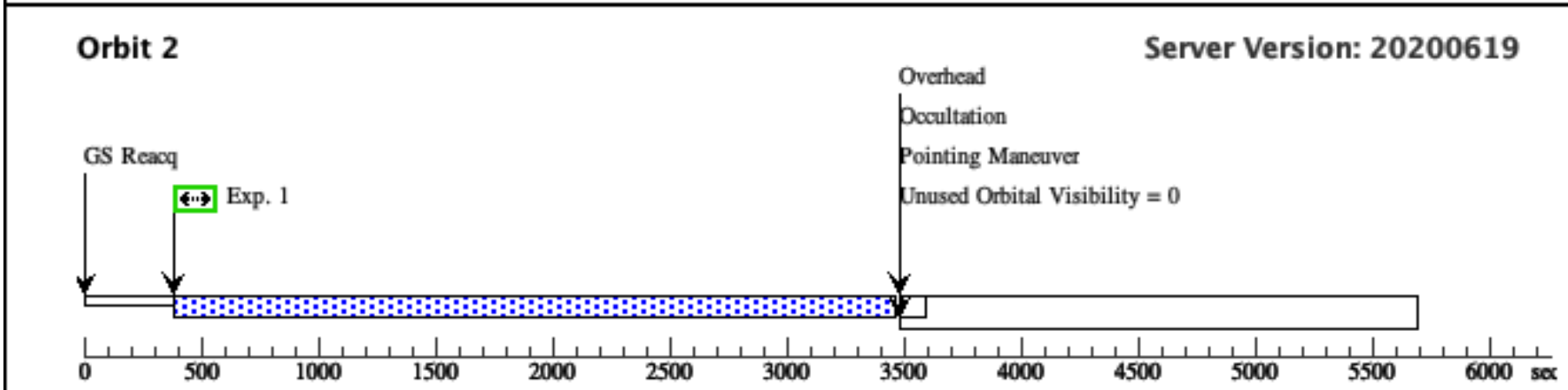
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STELLAR CLUSTER
Description=[GLOBULAR CLUSTER]

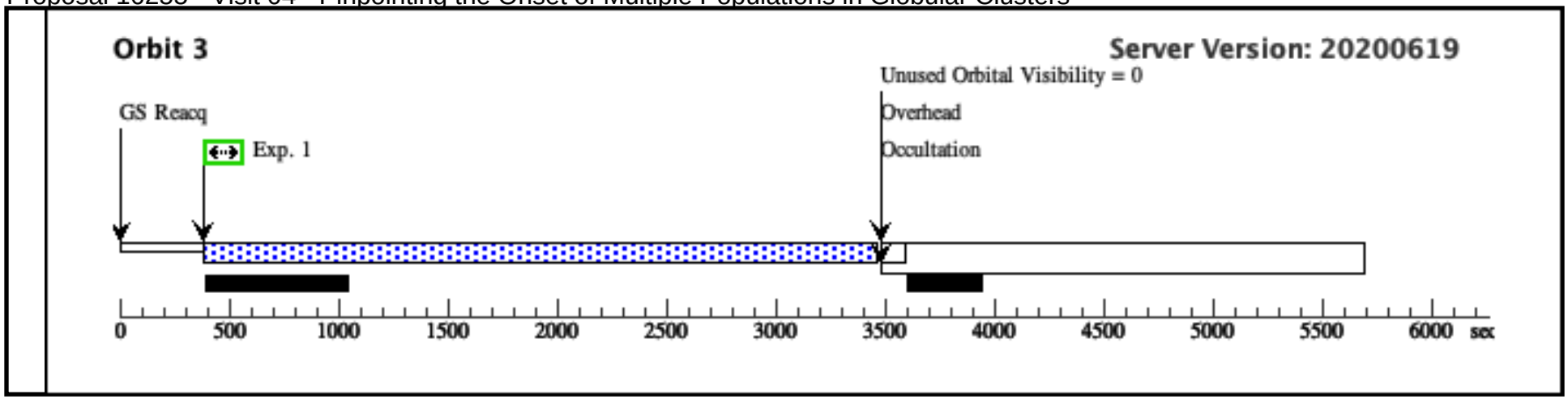
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) NGC-1783	WFC3/UVIS, ACCUM, UVIS-CENTER	F343N	FLASH=12	POS TARG 0.125,0.125	Pattern 1, Exps 1-1 in Visit 04 (1)	3086 Secs (9258 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	***[2]***
								[==>(Pattern 3)]	***[3]***

Orbit Structure






Orbit 3
Server Version: 20200619
Unused Orbital Visibility = 0
GS Reacq
Exp. 1
Overhead
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 16255, Visit 05, implementation Thu Oct 08 20:00:15 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: SAME ORIENT AS 03

Diagnostics

(Exposure 1 (Visit 05)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

(Exposure 2 (Pattern 1, Exps 2-2 in Visit 05)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(2)

Fixed Targets

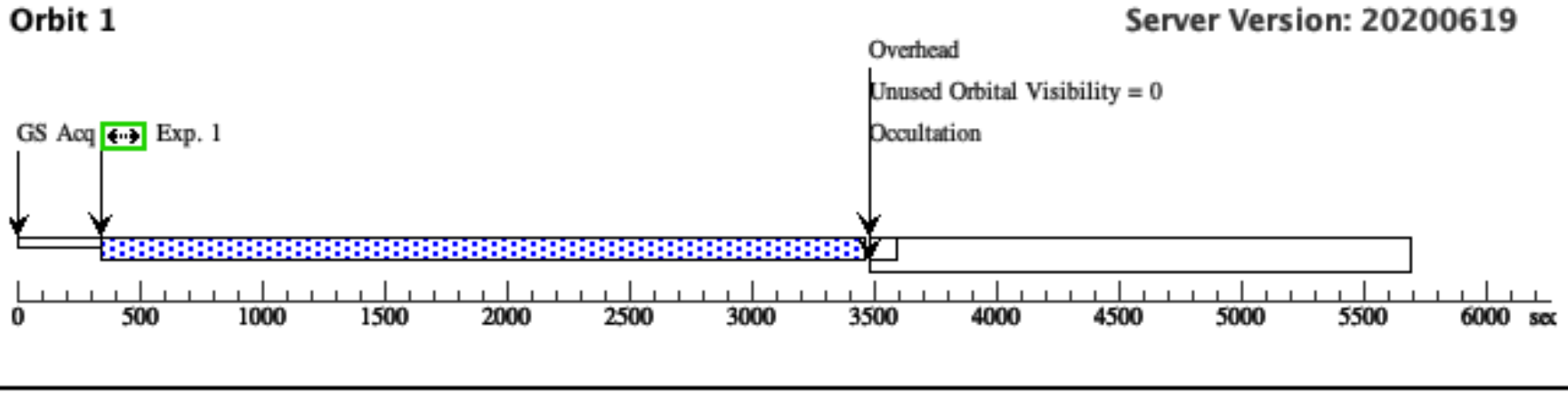
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-1783	RA: 04 59 8.5900 (74.7857917d) Dec: -65 59 15.84 (-65.98773d) Equinox: J2000	Epoch of Position: 2015.5	V=10.93	Reference Frame: SIMBAD

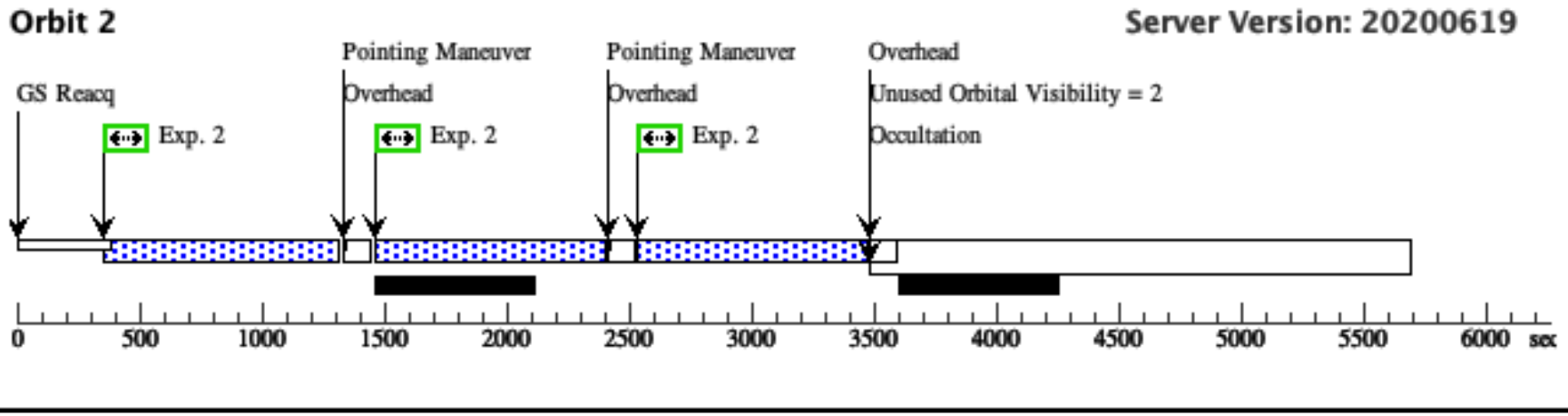
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STELLAR CLUSTER
Description=[GLOBULAR CLUSTER]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) NGC-1783	WFC3/UVIS, ACCUM, UVIS-CENTER	F343N	FLASH=12	POS TARG 0.25,0.25		3095 Secs (3095 Secs) *[==>]*	 ***[1]***
2		(1) NGC-1783	WFC3/UVIS, ACCUM, UVIS-CENTER	F438W	FLASH=12	POS TARG 0.25,0.25	Pattern 1, Exps 2-2 in Visit 05 (1)	938 Secs (2814 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	 ***[2]***

Orbit Structure





Visit

Proposal 16255, Visit 06, implementation Thu Oct 08 20:00:15 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: SAME ORIENT AS 03

Diagnostics

(Exposure 1 (Visit 06)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

(Exposure 2 (Pattern 1, Exps 2-2 in Visit 06)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(2)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-1783	RA: 04 59 8.5900 (74.7857917d) Dec: -65 59 15.84 (-65.98773d) Equinox: J2000	Epoch of Position: 2015.5	V=10.93	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STELLAR CLUSTER
Description=[GLOBULAR CLUSTER]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) NGC-1783	WFC3/UVIS, ACCUM, UVIS-CENTER	F343N	FLASH=12	POS TARG 0.375,0.375		3095 Secs (3095 Secs)	
								[==>]	***[1]***
2		(1) NGC-1783	WFC3/UVIS, ACCUM, UVIS-CENTER	F438W	FLASH=12	POS TARG 0.375,0.375	Pattern 1, Exps 2-2 in Visit 06 (1)	938 Secs (2814 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[2]***

Orbit Structure