15078 - Initial conditions of multiple populations in the dynamically most pristine globular cluster, NGC 2419

Cycle: 25, 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) NGC-2419	WFC3/UVIS	3	19-Jul-2017 14:01:15.0	yes
02	(1) NGC-2419	WFC3/UVIS	3	19-Jul-2017 14:01:16.0	yes
03	(1) NGC-2419	WFC3/UVIS	3	19-Jul-2017 14:01:17.0	yes

9 Total Orbits Used

ABSTRACT

The remote globular cluster (GC) NGC 2419 is unique in the Milky Way by having a half-mass relaxation time that exceeds the age of the Universe. This makes it an ideal target for studying the initial spatial distributions of sub-populations within the cluster. Most scenarios for the origin of multiple populations in GCs predict that enriched ("2nd-generation") stars should have a more centrally concentrated radial distribution than the

pristine stars. This has indeed been found by a number of studies for the outer regions of GCs, although these (mostly ground-based) studies generally did not probe the center. We have recently found the opposite trend from HST observations of the central regions of the GC M15, where the enriched stars are the least centrally concentrated. This suggests a more complex situation than implied by most formation scenarios. Here we propose to determine the radial distributions of subpopulations in the central regions of NGC 2419 and determine whether it formed with a more centrally concentrated pristine population. This unique, dynamically pristine environment is free of the dynamical effects (such as orbital mixing and mass segregation) that may have modified the spatial distributions in other clusters, and will thus directly reflect the initial conditions. We will use F336W and F343N data to unambiguously separate pristine and enriched stars, based on their N abundances (that are enhanced by about 2 dex in enriched stars). By combining these data with archival observations at longer wavelengths, we will also determine the He abundances of the different populations.

OBSERVING DESCRIPTION

Images of NGC 2419 will be obtained with WFC3-UVIS in F343N (6 orbits) and F336W (3 orbits). The exposures will be grouped into visits of three orbits each, with two such visits for F343N and one visit for F336W. In each visit, the exposures will be dithered according to the 3x2 "C6" dither pattern in ISR WFC3-2010-09, i.e., a 3 point line dither (one dither point per orbit) with 2 point sub-dithers.

Visit

Proposal 15078, NGC2419-F343N (01) Wed Jul 19 18:01:18 GMT 2017

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=WFC3-UVIS-MOS-DITH-LINE 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=true	Pattern Type=WFC3-UVIS-MOS-DITH-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.109 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=25.07 Angle Between Sides= Center Pattern=false	(1)

Fixed Targets

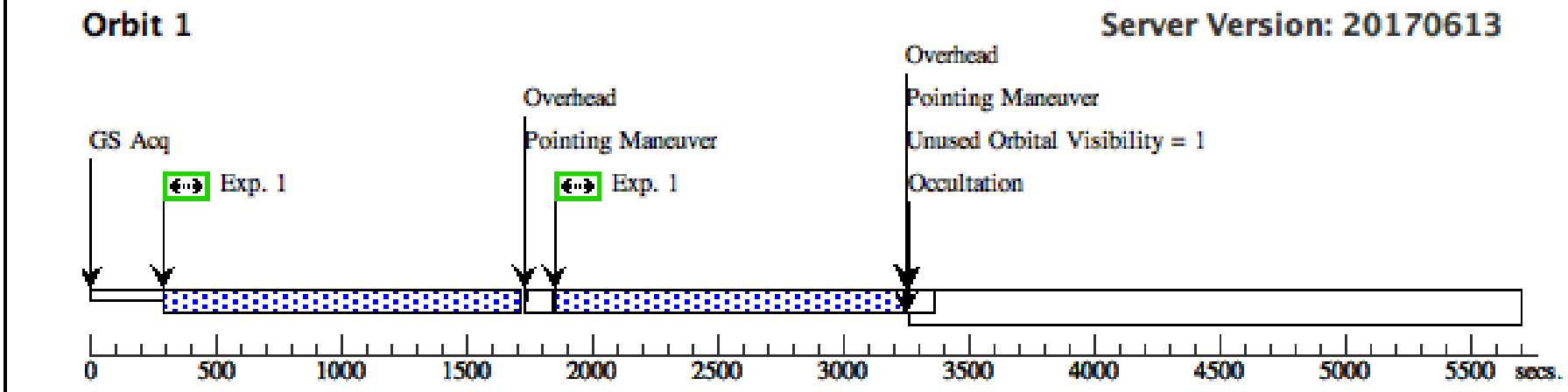
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-2419	RA: 07 38 8.5100 (114.5354583d) Dec: +38 52 54.90 (38.88192d) Equinox: J2000		V=10.05	Reference Frame: SIMBAD

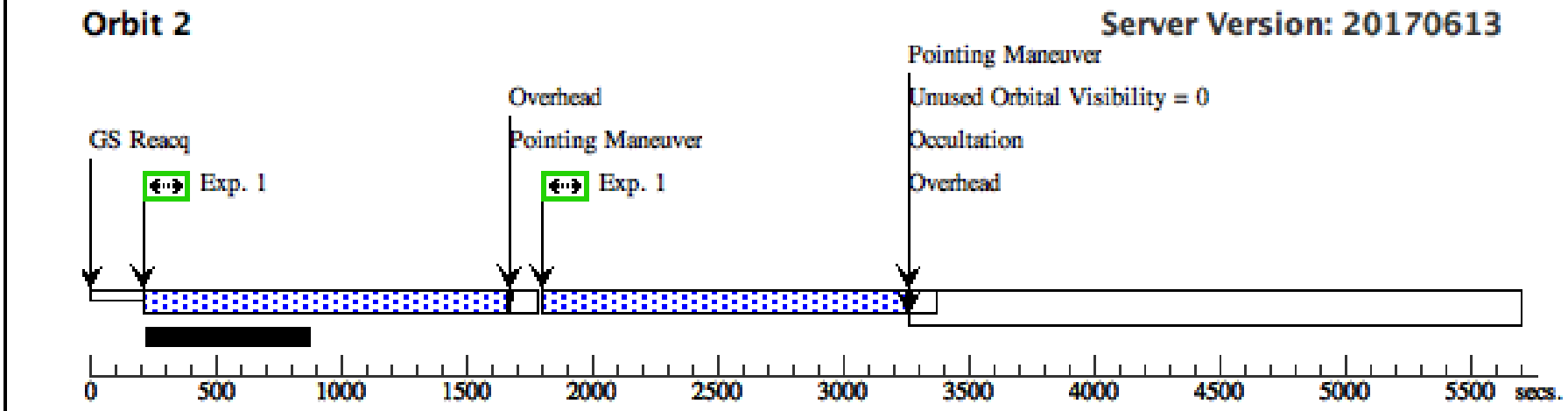
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

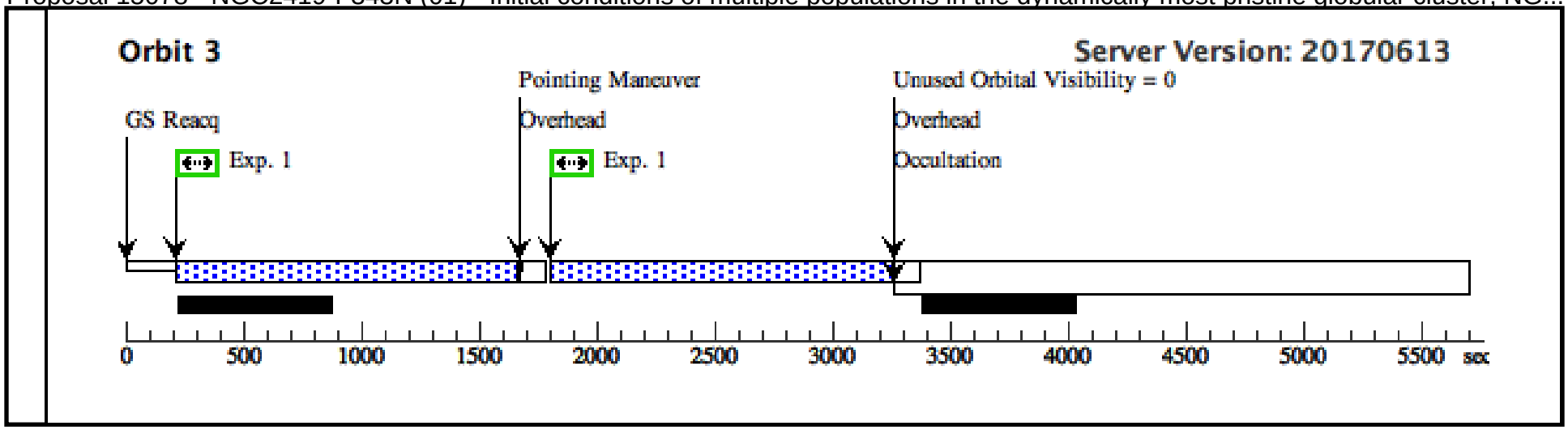
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F343N	(1) NGC-2419	WFC3/UVIS, ACCUM, UVIS	F343N	FLASH=10		Pattern 1, Exps 1-1 in NGC2419-F343N (01) (1)	1400 Secs (8576 Secs)	
								[==>1392.0 Secs (Pattern 1,1)] *[==>1392.0 Secs (Pattern 1,2)]*	***[1]***
								[==>1448.0 Secs (Pattern 2,1)] *[==>1448.0 Secs (Pattern 2,2)]*	***[2]***
								[==>1448.0 Secs (Pattern 3,1)] *[==>1448.0 Secs (Pattern 3,2)]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20170613
Pointing Maneuver
Unused Orbital Visibility = 0
GS Reacq
Overhead
Overhead
Exp. 1
Exp. 1
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15078, NGC2419-F343N (02) Wed Jul 19 18:01:19 GMT 2017

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: SAME ORIENT AS 01

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=WFC3-UVIS-MOS-DITH-LINE 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=true	Pattern Type=WFC3-UVIS-MOS-DITH-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.109 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=25.07 Angle Between Sides= Center Pattern=false	(1)

Fixed Targets

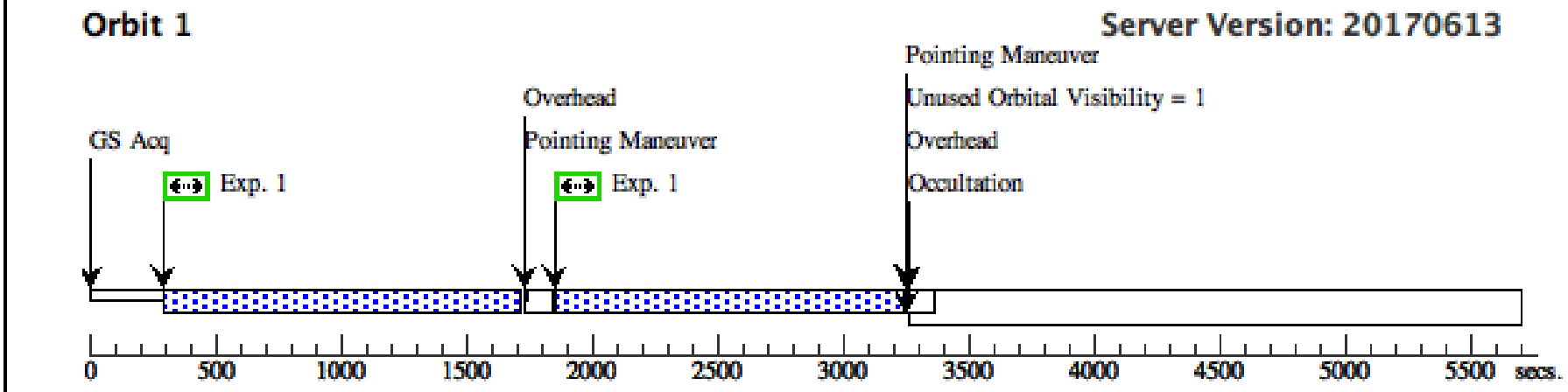
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-2419	RA: 07 38 8.5100 (114.5354583d) Dec: +38 52 54.90 (38.88192d) Equinox: J2000		V=10.05	Reference Frame: SIMBAD

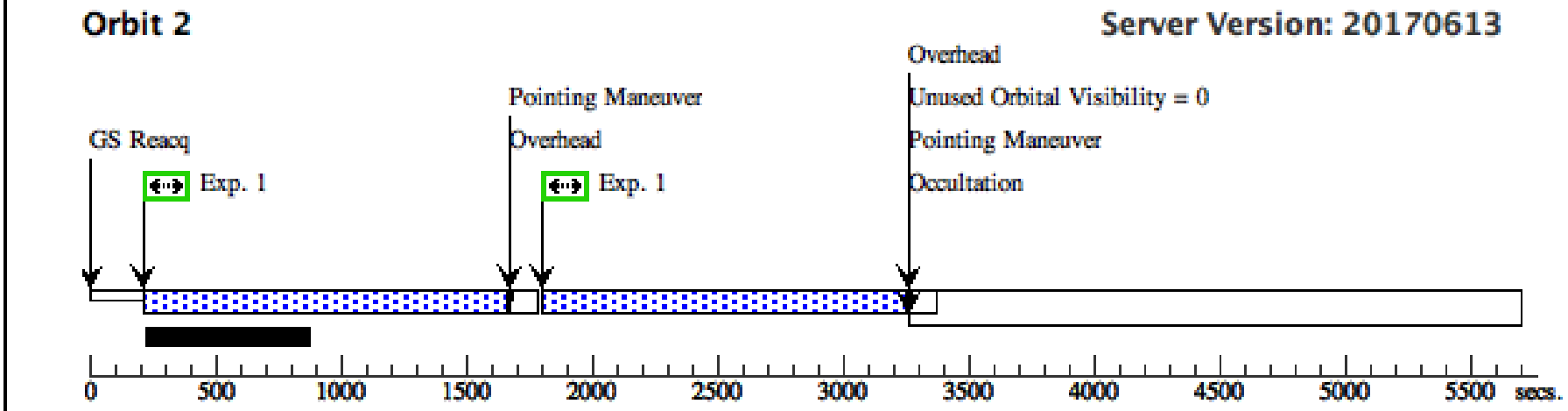
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

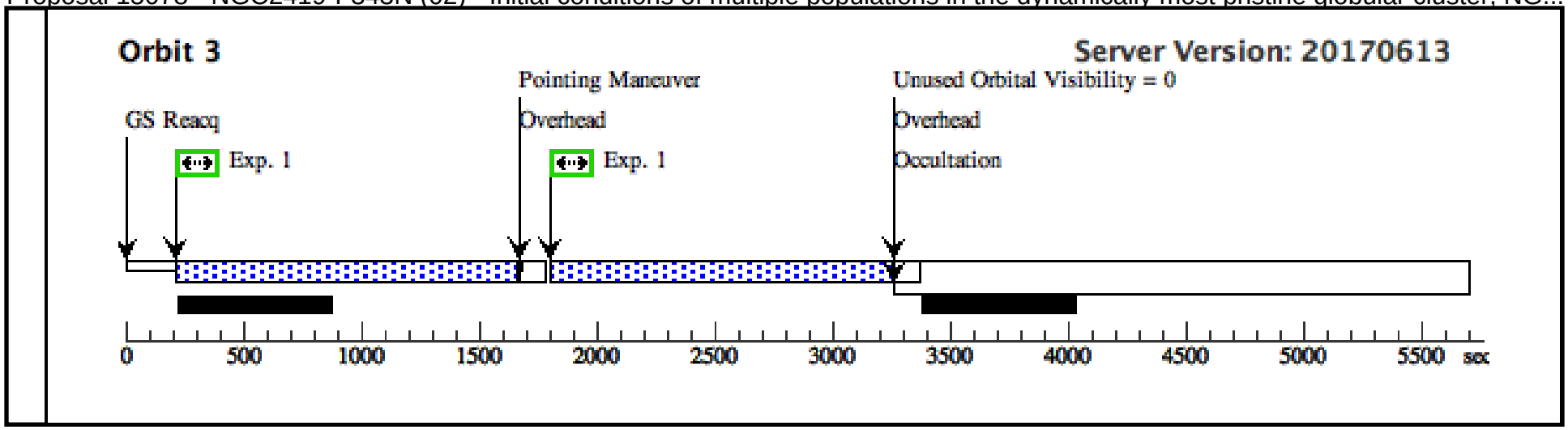
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F343N	(1) NGC-2419	WFC3/UVIS, ACCUM, UVIS	F343N	FLASH=10		Pattern 1, Exps 1-1 in NGC2419-F343N (02) (1)	1400 Secs (8576 Secs)	
								[==>1392.0 Secs (Pattern 1,1)] *[==>1392.0 Secs (Pattern 1,2)]*	***[1]***
								[==>1448.0 Secs (Pattern 2,1)] *[==>1448.0 Secs (Pattern 2,2)]*	***[2]***
								[==>1448.0 Secs (Pattern 3,1)] *[==>1448.0 Secs (Pattern 3,2)]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20170613
GS Reacq
Exp. 1
Pointing Maneuver
Overhead
Exp. 1
Unused Orbital Visibility = 0
Overhead
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15078, NGC2419-F336W (03) Wed Jul 19 18:01:19 GMT 2017

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: SAME ORIENT AS 01

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=WFC3-UVIS-MOS-DITH-LINE 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=true	Pattern Type=WFC3-UVIS-MOS-DITH-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.109 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=25.07 Angle Between Sides= Center Pattern=false	(1)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
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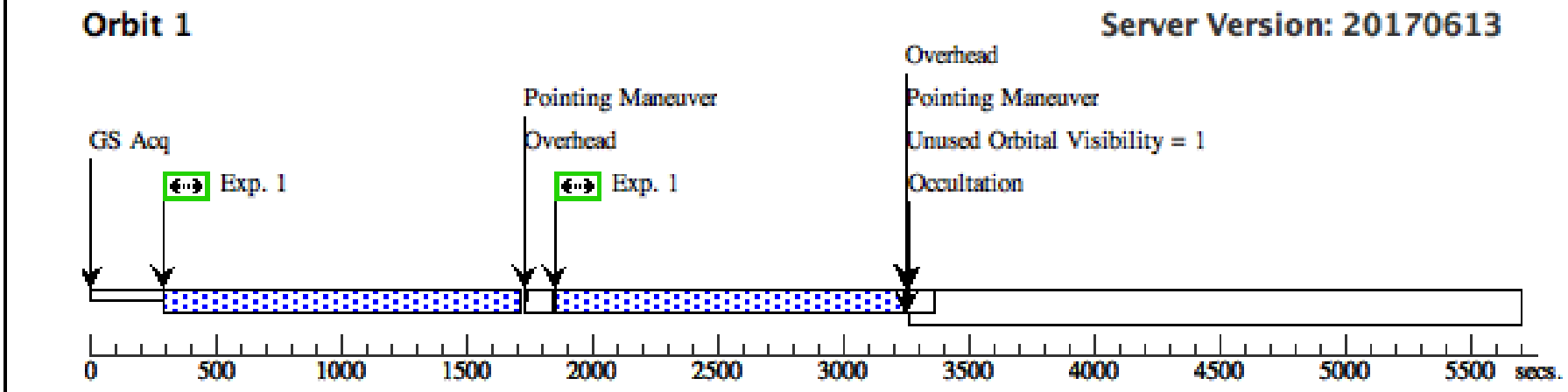
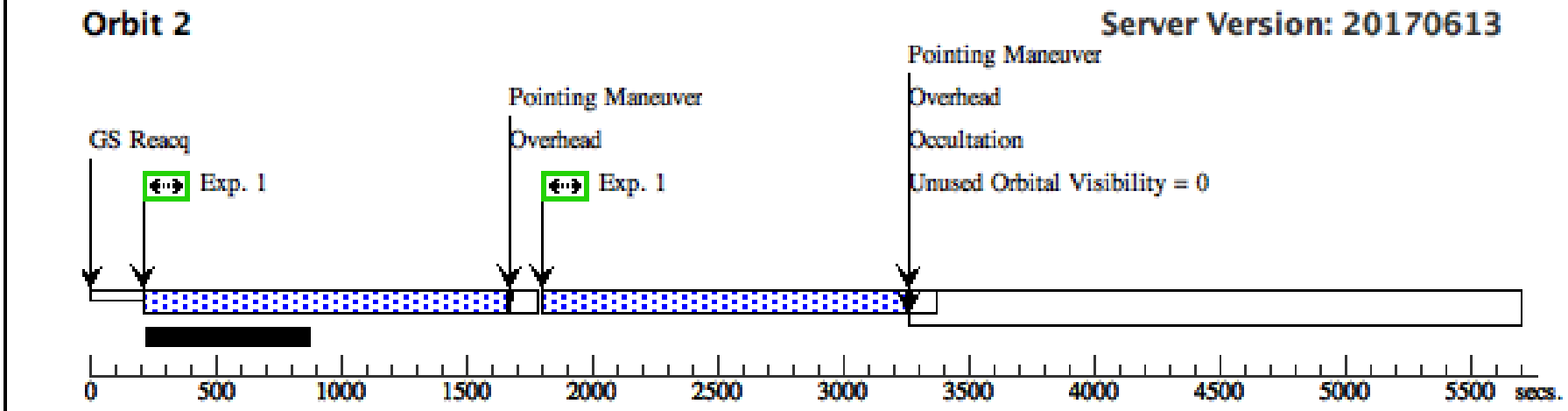
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

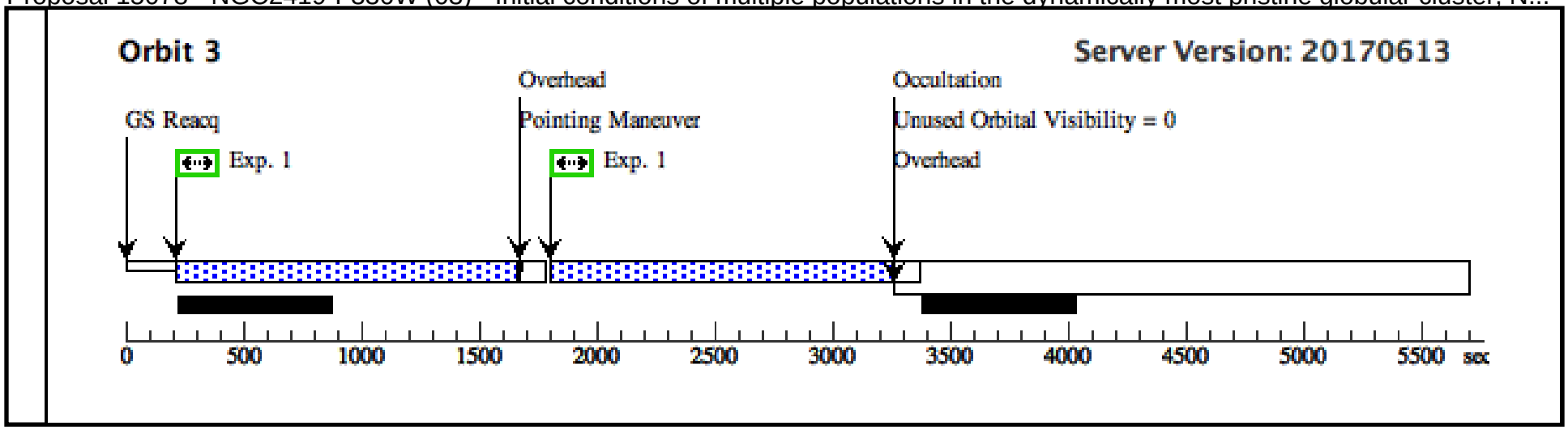
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F336W	(1) NGC-2419	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=10		Pattern 1, Exps 1-1 in NGC2419-F336W (03) (1)	1400 Secs (8576 Secs)	
								[==>1392.0 Secs (Pattern 1,1)] *[==>1392.0 Secs (Pattern 1,2)]*	***[1]***
								[==>1448.0 Secs (Pattern 2,1)] *[==>1448.0 Secs (Pattern 2,2)]*	***[2]***
								[==>1448.0 Secs (Pattern 3,1)] *[==>1448.0 Secs (Pattern 3,2)]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20170613
GS Reacq
Exp. 1
Overhead
Pointing Maneuver
Exp. 1
Occultation
Unused Orbital Visibility = 0
Overhead
0
500
1000
1500
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