



10184 - A New Class of Bright Ultraviolet Variable Sources in the Globular Cluster NGC 1851

Cycle: 13, Proposal Category: GO
(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
Dr. David R. Zurek (PI)	American Museum of Natural History	dzurek@amnh.org
Dr. Christian Knigge (CoI) (ESA Member)	University of Southampton	christian@astro.soton.ac.uk
Dr. Michael Shara (CoI)	American Museum of Natural History	mshara@amnh.org

VISITS

<i>Visit</i>	<i>Targets</i>	<i>Configurations</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
02	(1) NGC1851	ACS/SBC	4	20-Jan-2006 21:01:34.0	yes
03	(1) NGC1851	ACS/SBC	4	20-Jan-2006 21:02:26.0	yes
04	(1) NGC1851	ACS/SBC	4	20-Jan-2006 21:03:24.0	yes

12 Total Orbits Used

ABSTRACT

Our reductions of archival STIS/FUV-MAMA data (AR9225) have discovered 13 completely unexpected and unexplained Ultraviolet bright variables. Eleven of the variables have been identified with evolved stars (Horizontal Branch or Asymptotic Giant Branch). The total number and nature of these systems is completely unknown. If these variables are binaries the implication is that the binary fraction (up to 25%) in NGC 1851 is the highest in all Galactic globular clusters. The radial distributions of the variables and the blue horizontal branch stars imply a common origin and

Proposal 10184 - Overview

perhaps an explanation of the bi-modal morphology of the horizontal branch in the color magnitude diagrams of globular clusters. These variables may be the tip of the iceberg and a critical clue concerning the infamous "second parameter". We propose to observe NGC 1851 on three occasions with the same setup as the archival data to determine the total number and periods of the ultraviolet variables.

OBSERVING DESCRIPTION

We are duplicating the observations taken in proposal number 7363. The phase 2 is designed to be as close to identical as possible to the observations of NGC 1851 in proposal 7363. The allowed orientations, exposure times, apertures, buffer time are all the same. The observations are taken in Time tag mode to allow for studies of the variables discovered from the archival data on many different timescales.

ADDITIONAL COMMENTS

We have set up the visits to have the same orientation and an orientation that overlaps with the archival observations. This allows for maximum use of the archival observations in the new observations. The observations of proposal 7363 occurred over 4 orbits. APT does not want to place the observations in 4 orbits though that should be possible. If adjustments need to be made the PI would be happy to discuss what needs to be done.

Proposal 10184 - Visit 02 - A New Class of Bright Ultraviolet Variable Sources in the Globular Cluster NGC 1851

Sat Jan 21 02:03:34 GMT 2006

Visit	Proposal 10184, Visit 02 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/SBC Special Requirements: PCS MODE FINE <i>Comments: This visit was set up as a copy of the observations taken of NGC 1851 in proposal 7363, however, due to the difficulties with STIS the proposal was adjusted to use ACS/SBC. Visits 3 and 4 are intended to have the same orientation and occur 1 to 2 days later for visit 3 and 7 to 11 days later for visit 4.</i>									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
(1)		NGC1851	RA: 05 14 5.7200 (78.5238333d) Dec: -40 02 34.54 (-40.04293d) Equinox: J2000 Plate Id: (?)		V=16.0+/-0.1	Coordinate Source: HST_IMAGE				
<i>Comments: The position of the target is measured on the WFPC2/F218W images U2VO0306T & U2VO0307T.</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				90.0 Secs X 22 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)] [==>(Copy 8)] [==>(Copy 9)] [==>(Copy 10)] [==>(Copy 11)] [==>(Copy 12)] [==>(Copy 13)] [==>(Copy 14)] [==>(Copy 15)] [==>(Copy 16)] [==>(Copy 17)] [==>(Copy 18)] [==>(Copy 19)] [==>(Copy 20)] [==>(Copy 21)] [==>(Copy 22)]	[1]

Proposal 10184 - Visit 02 - A New Class of Bright Ultraviolet Variable Sources in the Globular Cluster NGC 1851

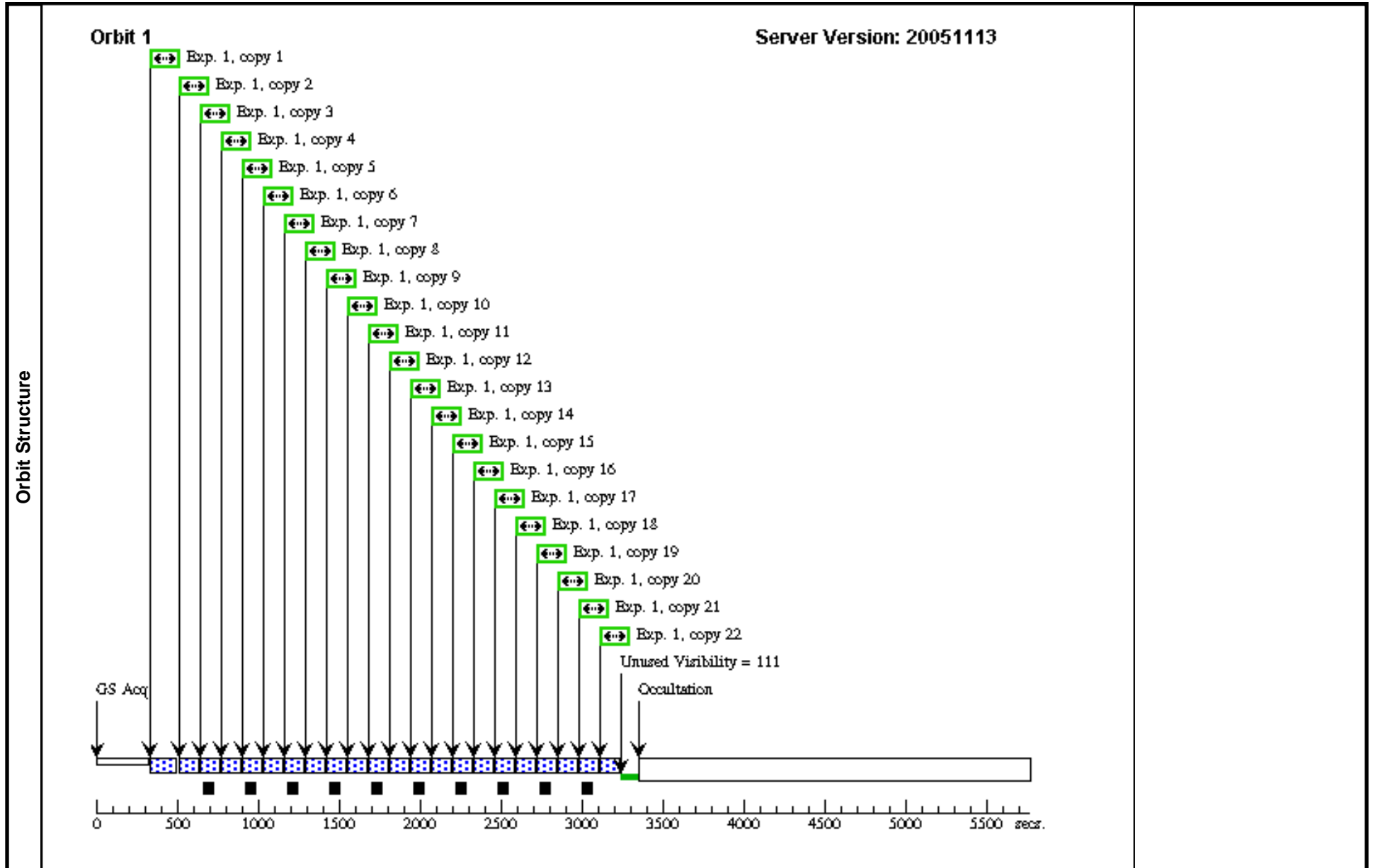
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
Exposures (continued)	2	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				90.0 Secs X 22 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)] [==>(Copy 8)] [==>(Copy 9)] [==>(Copy 10)] [==>(Copy 11)] [==>(Copy 12)] [==>(Copy 13)] [==>(Copy 14)] [==>(Copy 15)] [==>(Copy 16)] [==>(Copy 17)] [==>(Copy 18)] [==>(Copy 19)] [==>(Copy 20)] [==>(Copy 21)] [==>(Copy 22)]	[2]
	3	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				70.0 Secs [==>]	[2]

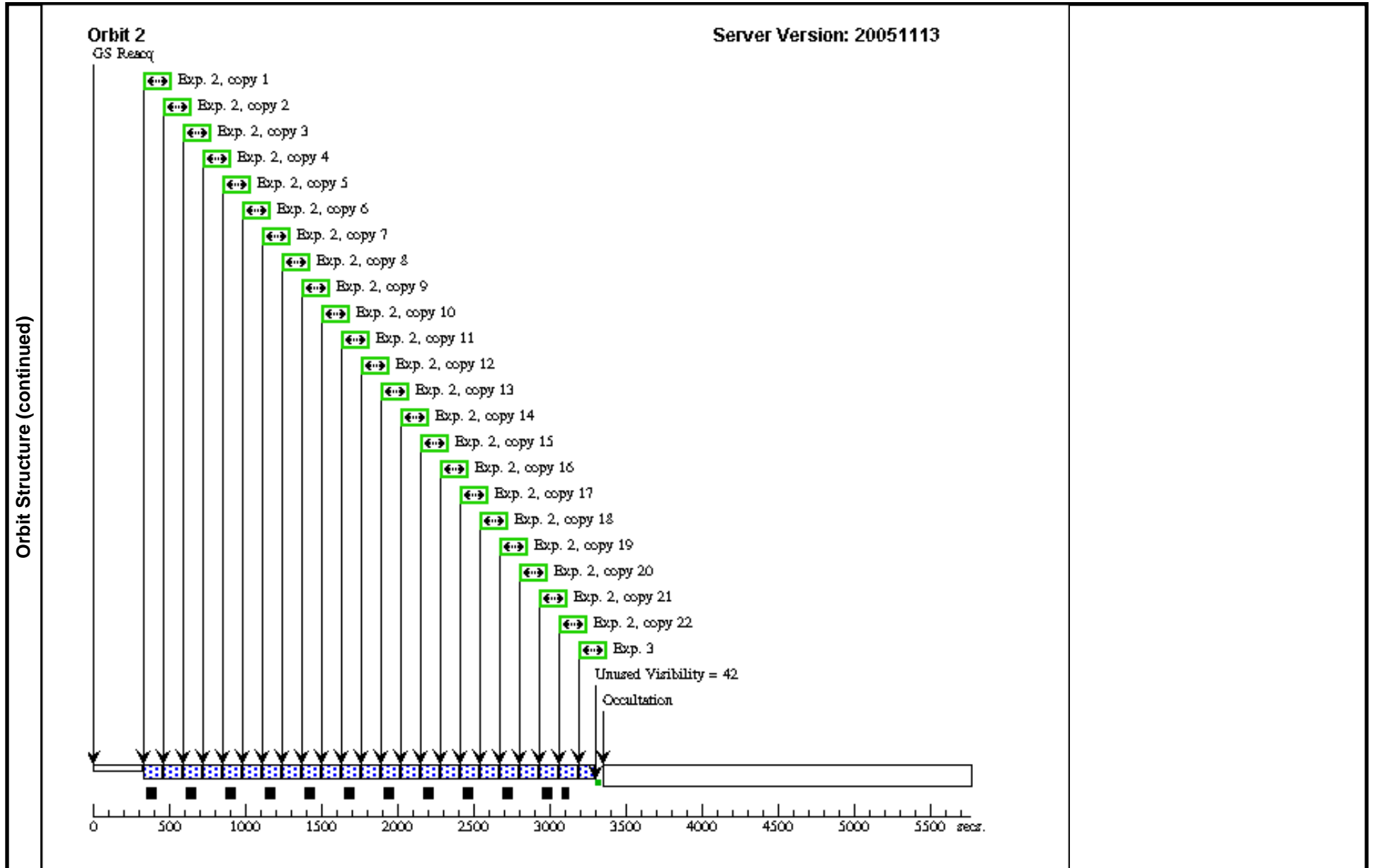
Proposal 10184 - Visit 02 - A New Class of Bright Ultraviolet Variable Sources in the Globular Cluster NGC 1851

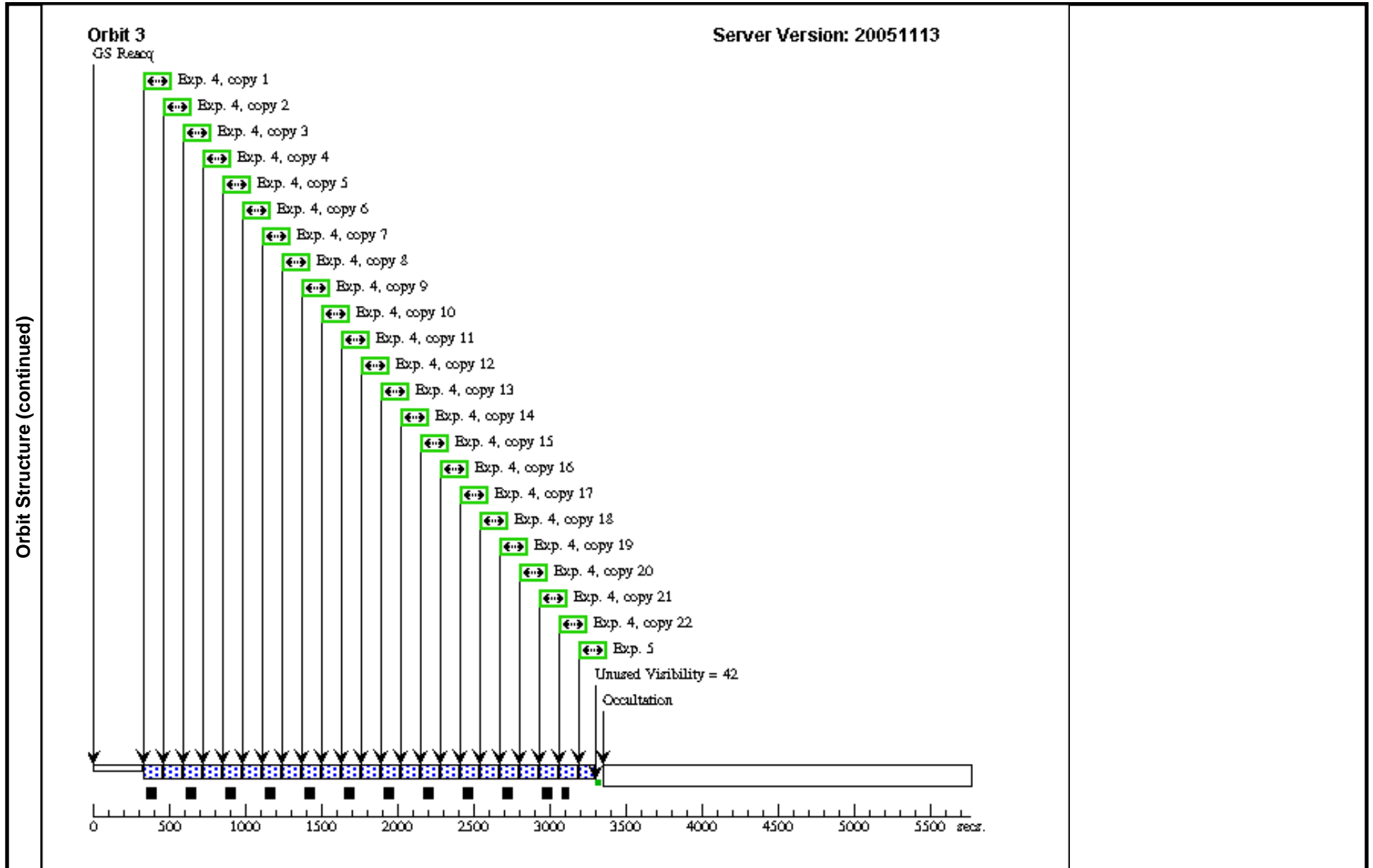
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
Exposures (continued)	4	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				90.0 Secs X 22 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)] [==>(Copy 8)] [==>(Copy 9)] [==>(Copy 10)] [==>(Copy 11)] [==>(Copy 12)] [==>(Copy 13)] [==>(Copy 14)] [==>(Copy 15)] [==>(Copy 16)] [==>(Copy 17)] [==>(Copy 18)] [==>(Copy 19)] [==>(Copy 20)] [==>(Copy 21)] [==>(Copy 22)]	[3]
	5	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				70.0 Secs [==>]	[3]

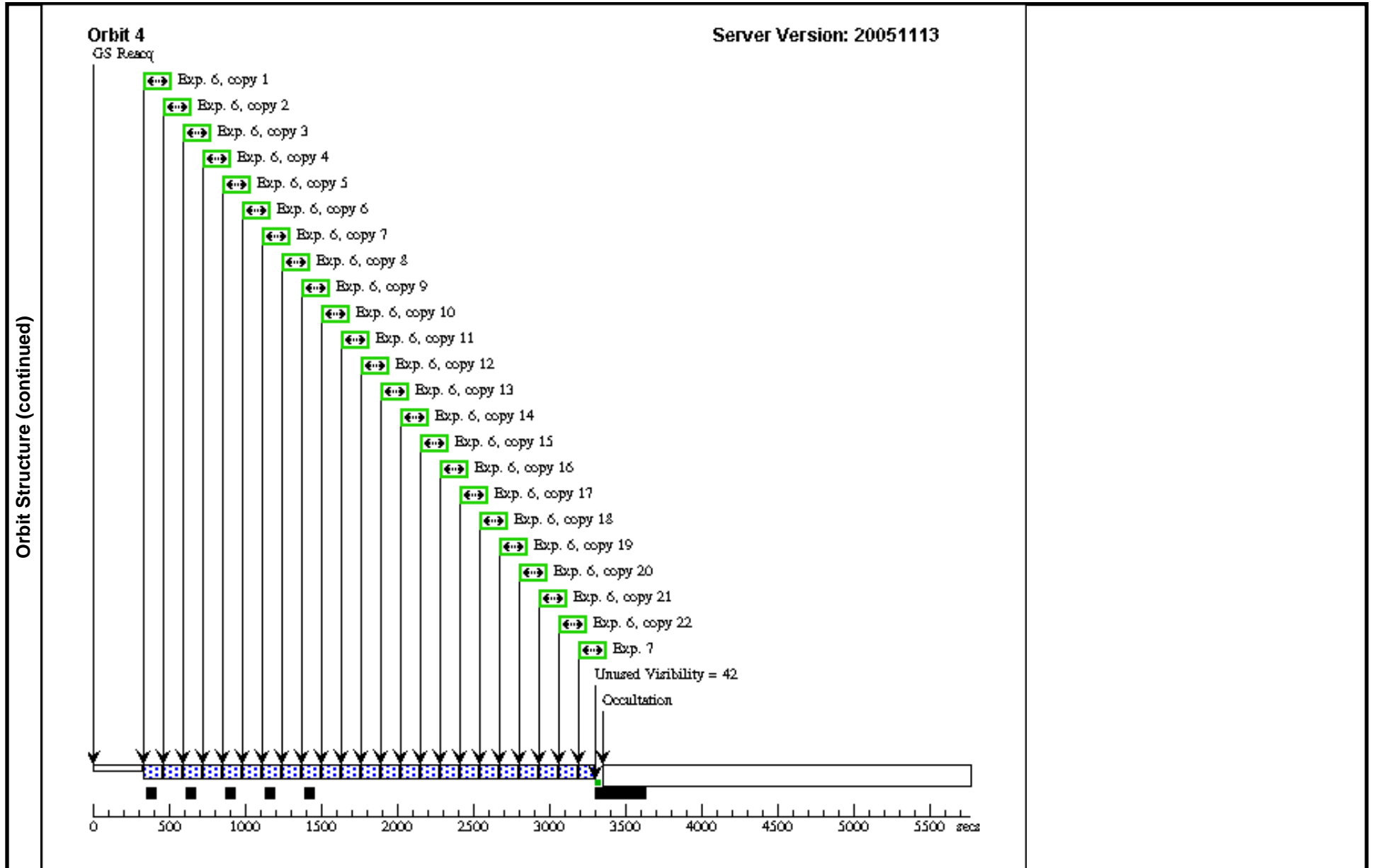
Proposal 10184 - Visit 02 - A New Class of Bright Ultraviolet Variable Sources in the Globular Cluster NGC 1851

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
Exposures (continued)	6	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				90.0 Secs X 22 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)] [==>(Copy 8)] [==>(Copy 9)] [==>(Copy 10)] [==>(Copy 11)] [==>(Copy 12)] [==>(Copy 13)] [==>(Copy 14)] [==>(Copy 15)] [==>(Copy 16)] [==>(Copy 17)] [==>(Copy 18)] [==>(Copy 19)] [==>(Copy 20)] [==>(Copy 21)] [==>(Copy 22)]	[4]
	7	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				70.0 Secs [==>]	[4]









Proposal 10184 - Visit 03 - A New Class of Bright Ultraviolet Variable Sources in the Globular Cluster NGC 1851

Sat Jan 21 02:03:38 GMT 2006

Visit	Proposal 10184, Visit 03 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/SBC Special Requirements: PCS MODE FINE; SAME ORIENT AS 02; AFTER 02 BY 1 D TO 2 D <i>Comments: This visit is intended to have the same orientation as visit 02 and occur 1 to 2 days later.</i> <i>This visit was also set up as a copy of the observations of NGC 1851 in proposal 7363, however, has been adjusted to use ACS/SBC.</i>									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(1)	NGC1851	RA: 05 14 5.7200 (78.5238333d) Dec: -40 02 34.54 (-40.04293d) Equinox: J2000 Plate Id: (?)		V=16.0+/-0.1	Coordinate Source: HST_IMAGE				
	<i>Comments: The position of the target is measured on the WFPC2/F218W images U2VO0306T & U2VO0307T.</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				90.0 Secs X 22 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)] [==>(Copy 8)] [==>(Copy 9)] [==>(Copy 10)] [==>(Copy 11)] [==>(Copy 12)] [==>(Copy 13)] [==>(Copy 14)] [==>(Copy 15)] [==>(Copy 16)] [==>(Copy 17)] [==>(Copy 18)] [==>(Copy 19)] [==>(Copy 20)] [==>(Copy 21)] [==>(Copy 22)]	[1]

Proposal 10184 - Visit 03 - A New Class of Bright Ultraviolet Variable Sources in the Globular Cluster NGC 1851

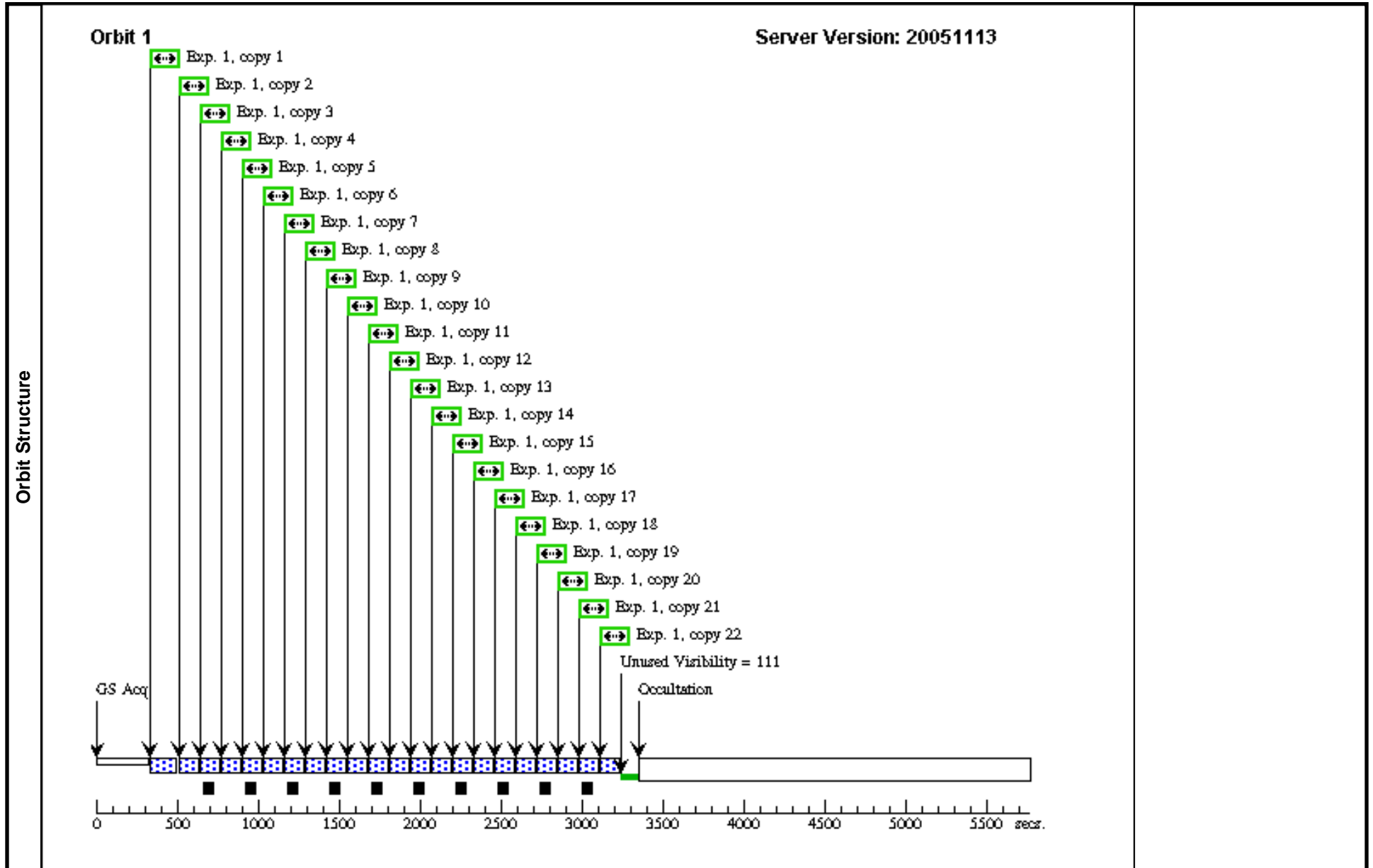
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
Exposures (continued)	2	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				90.0 Secs X 22 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)] [==>(Copy 8)] [==>(Copy 9)] [==>(Copy 10)] [==>(Copy 11)] [==>(Copy 12)] [==>(Copy 13)] [==>(Copy 14)] [==>(Copy 15)] [==>(Copy 16)] [==>(Copy 17)] [==>(Copy 18)] [==>(Copy 19)] [==>(Copy 20)] [==>(Copy 21)] [==>(Copy 22)]	[2]
	3	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				70.0 Secs [==>]	[2]

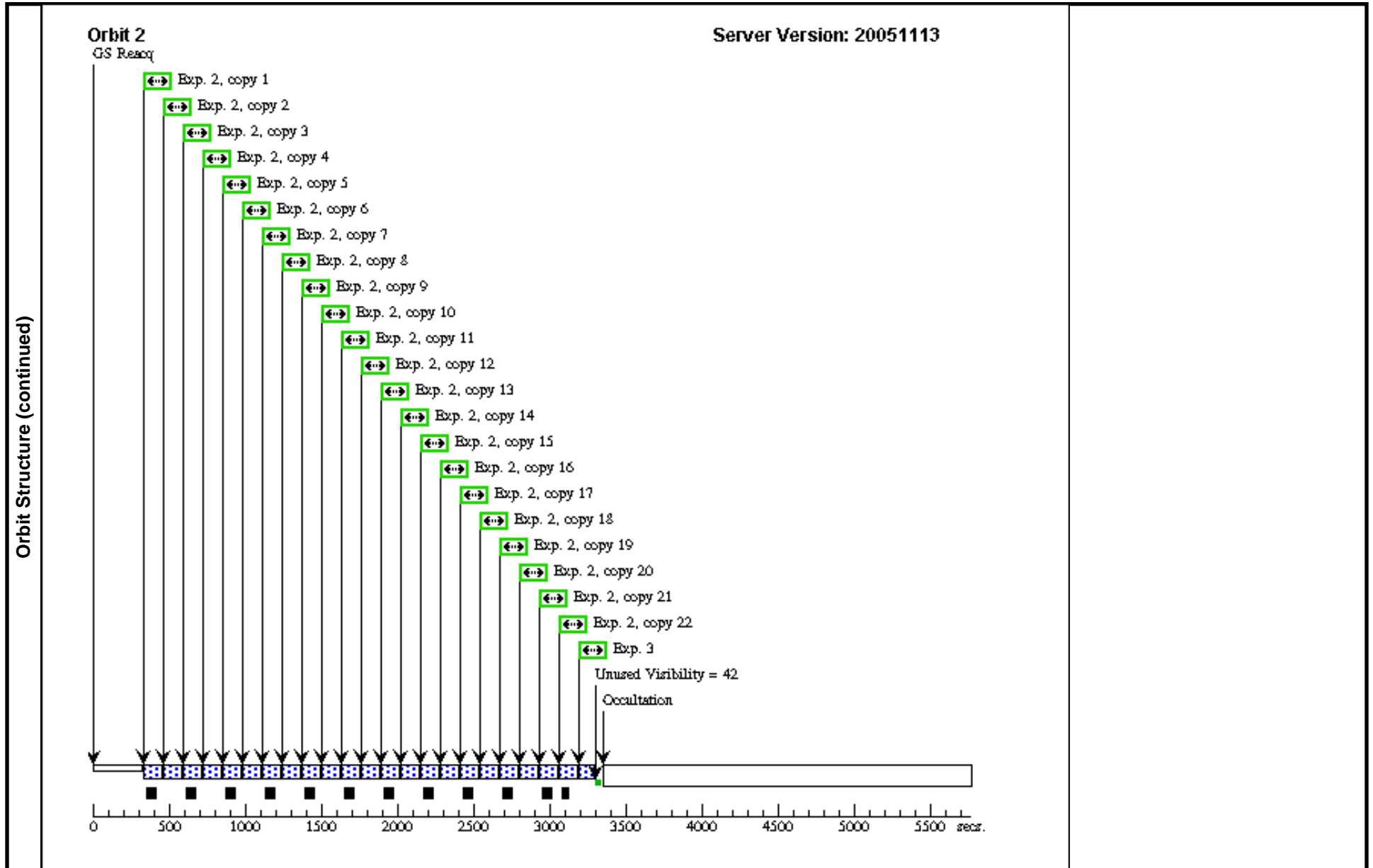
Proposal 10184 - Visit 03 - A New Class of Bright Ultraviolet Variable Sources in the Globular Cluster NGC 1851

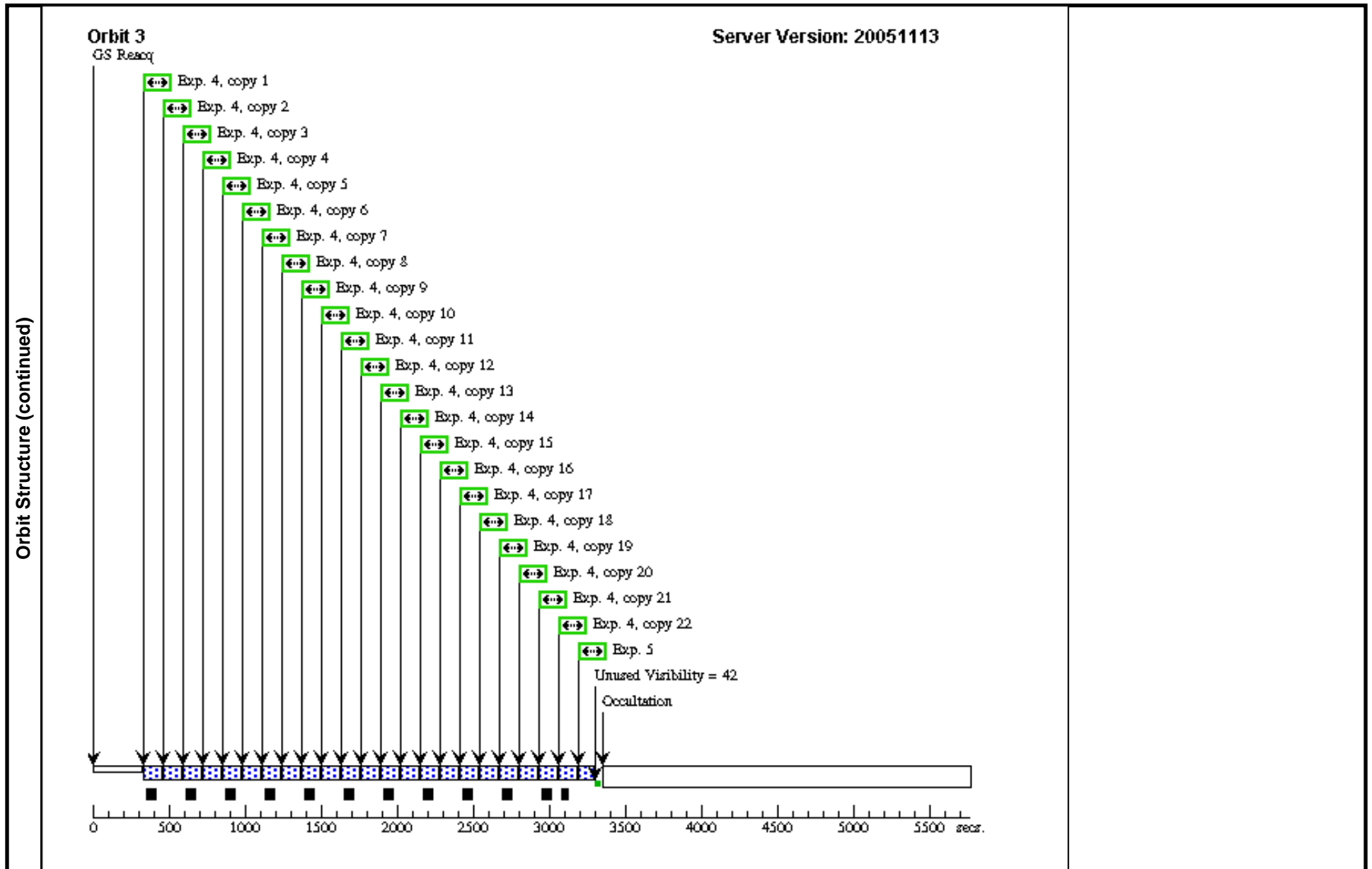
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
Exposures (continued)	4	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				90.0 Secs X 22	
								[==>(Copy 1)]	
								[==>(Copy 2)]	
								[==>(Copy 3)]	
								[==>(Copy 4)]	
								[==>(Copy 5)]	
								[==>(Copy 6)]	
								[==>(Copy 7)]	
								[==>(Copy 8)]	
								[==>(Copy 9)]	
								[==>(Copy 10)]	
								[==>(Copy 11)]	
								[==>(Copy 12)]	[3]
								[==>(Copy 13)]	
								[==>(Copy 14)]	
								[==>(Copy 15)]	
								[==>(Copy 16)]	
								[==>(Copy 17)]	
								[==>(Copy 18)]	
								[==>(Copy 19)]	
								[==>(Copy 20)]	
								[==>(Copy 21)]	
							[==>(Copy 22)]		
5	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP					70.0 Secs	
								[==>]	[3]

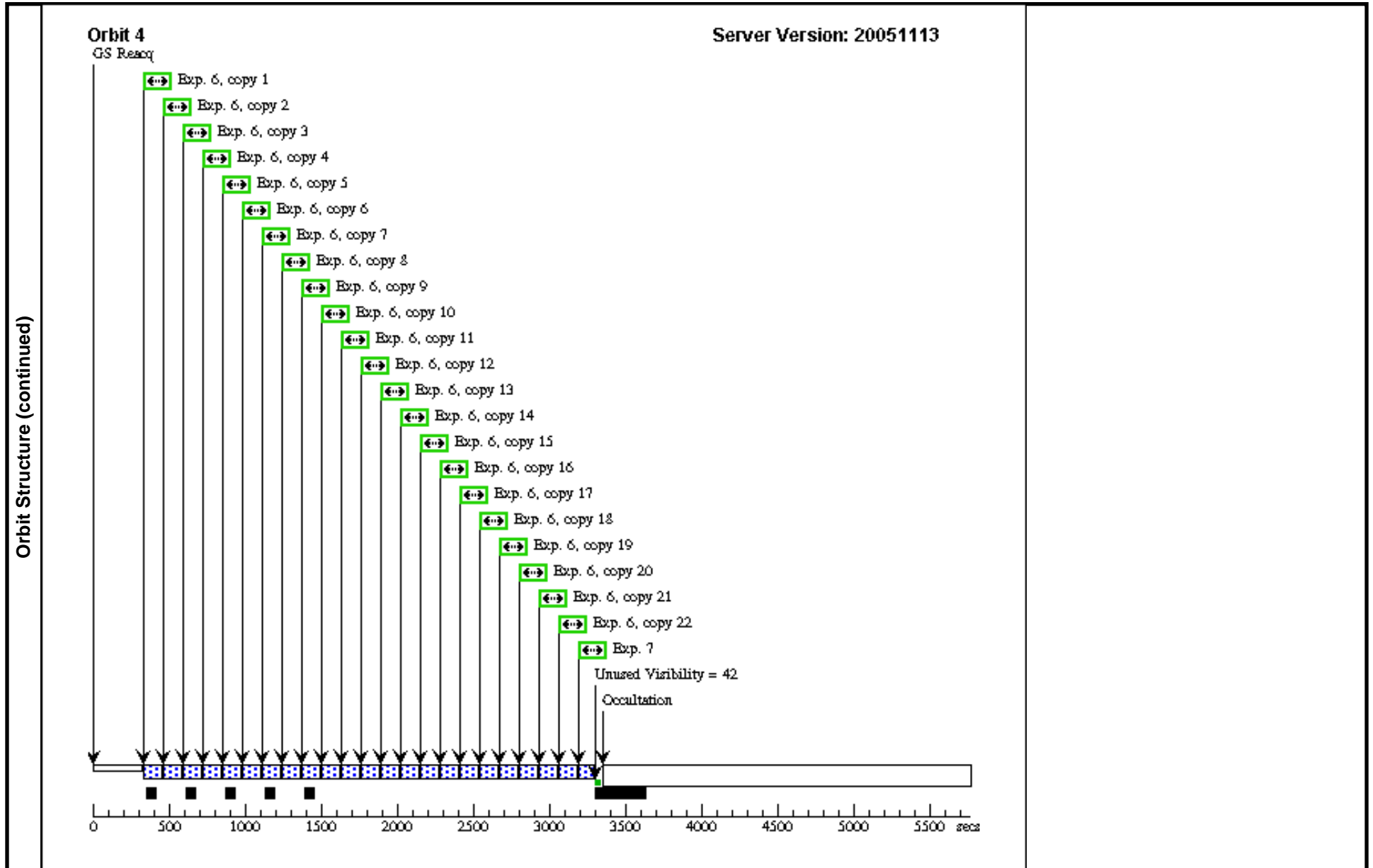
Proposal 10184 - Visit 03 - A New Class of Bright Ultraviolet Variable Sources in the Globular Cluster NGC 1851

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
Exposures (continued)	6	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				90.0 Secs X 22 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)] [==>(Copy 8)] [==>(Copy 9)] [==>(Copy 10)] [==>(Copy 11)] [==>(Copy 12)] [==>(Copy 13)] [==>(Copy 14)] [==>(Copy 15)] [==>(Copy 16)] [==>(Copy 17)] [==>(Copy 18)] [==>(Copy 19)] [==>(Copy 20)] [==>(Copy 21)] [==>(Copy 22)]	[4]
	7	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				70.0 Secs [==>]	[4]









Proposal 10184 - Visit 04 - A New Class of Bright Ultraviolet Variable Sources in the Globular Cluster NGC 1851

Sat Jan 21 02:03:42 GMT 2006

Visit	Proposal 10184, Visit 04 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/SBC Special Requirements: PCS MODE FINE; SAME ORIENT AS 02; AFTER 02 BY 7 D TO 12 D <i>Comments: This visit is intended to have the same orientation as visit 02 and occur 7 to 12 days later.</i> <i>This visit was also set up as a copy of the observations of NGC 1851 in proposal 7363, however, has been adjusted to use ACS/SBC.</i>									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(1)	NGC1851	RA: 05 14 5.7200 (78.5238333d) Dec: -40 02 34.54 (-40.04293d) Equinox: J2000 Plate Id: (?)		V=16.0+/-0.1	Coordinate Source: HST_IMAGE				
	<i>Comments: The position of the target is measured on the WFPC2/F218W images U2VO0306T & U2VO0307T.</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				90.0 Secs X 22 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)] [==>(Copy 8)] [==>(Copy 9)] [==>(Copy 10)] [==>(Copy 11)] [==>(Copy 12)] [==>(Copy 13)] [==>(Copy 14)] [==>(Copy 15)] [==>(Copy 16)] [==>(Copy 17)] [==>(Copy 18)] [==>(Copy 19)] [==>(Copy 20)] [==>(Copy 21)] [==>(Copy 22)]	[1]

Proposal 10184 - Visit 04 - A New Class of Bright Ultraviolet Variable Sources in the Globular Cluster NGC 1851

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
Exposures (continued)	2	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				90.0 Secs X 22 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)] [==>(Copy 8)] [==>(Copy 9)] [==>(Copy 10)] [==>(Copy 11)] [==>(Copy 12)] [==>(Copy 13)] [==>(Copy 14)] [==>(Copy 15)] [==>(Copy 16)] [==>(Copy 17)] [==>(Copy 18)] [==>(Copy 19)] [==>(Copy 20)] [==>(Copy 21)] [==>(Copy 22)]	[2]
	3	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				70.0 Secs [==>]	[2]

Proposal 10184 - Visit 04 - A New Class of Bright Ultraviolet Variable Sources in the Globular Cluster NGC 1851

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
Exposures (continued)	4	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				90.0 Secs X 22	
								[==>(Copy 1)]	
								[==>(Copy 2)]	
								[==>(Copy 3)]	
								[==>(Copy 4)]	
								[==>(Copy 5)]	
								[==>(Copy 6)]	
								[==>(Copy 7)]	
								[==>(Copy 8)]	
								[==>(Copy 9)]	
								[==>(Copy 10)]	
								[==>(Copy 11)]	
								[==>(Copy 12)]	[3]
								[==>(Copy 13)]	
								[==>(Copy 14)]	
								[==>(Copy 15)]	
								[==>(Copy 16)]	
								[==>(Copy 17)]	
								[==>(Copy 18)]	
								[==>(Copy 19)]	
								[==>(Copy 20)]	
								[==>(Copy 21)]	
								[==>(Copy 22)]	
	5	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				70.0 Secs	
								[==>]	[3]

Proposal 10184 - Visit 04 - A New Class of Bright Ultraviolet Variable Sources in the Globular Cluster NGC 1851

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
Exposures (continued)	6	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				90.0 Secs X 22 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)] [==>(Copy 8)] [==>(Copy 9)] [==>(Copy 10)] [==>(Copy 11)] [==>(Copy 12)] [==>(Copy 13)] [==>(Copy 14)] [==>(Copy 15)] [==>(Copy 16)] [==>(Copy 17)] [==>(Copy 18)] [==>(Copy 19)] [==>(Copy 20)] [==>(Copy 21)] [==>(Copy 22)]	[4]
	7	(1) NGC1851	ACS/SBC, ACCUM, SBC-FIX	F140LP				70.0 Secs [==>]	[4]

