



# 10474 - Shooting Stars: Looking for Direct Evidence of Massive Central Black Holes in Globular Clusters

Cycle: 14, Proposal Category: GO

(Availability Mode: SUPPORTED)

## INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
<b>Dr. Gordon A. Drukier (PI)</b>	<b>Yale University</b>	
Dr. Charles David Bailyn (CoI)	Yale University	
Dr. William F. van Altena (CoI)	Yale University	
Dr. Terrence M. Girard (CoI)	Yale University	

## VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) NGC6388	ACS/HRC	3	08-Mar-2007 21:01:17.0	yes
02	(1) NGC6388	ACS/HRC	3	08-Mar-2007 21:01:39.0	yes
03	(2) NGC6441	ACS/HRC	3	08-Mar-2007 21:01:54.0	yes
04	(2) NGC6441	ACS/HRC	3	08-Mar-2007 21:02:11.0	yes
53	(2) NGC6441	ACS/HRC	3	08-Mar-2007 21:02:24.0	yes
54	(2) NGC6441	ACS/HRC	3	08-Mar-2007 21:02:36.0	yes
06	(3) NGC6441-WFPC2	WFPC2	3	08-Mar-2007 21:02:52.0	yes
07	(3) NGC6441-WFPC2	WFPC2	3	08-Mar-2007 21:03:05.0	yes

24 Total Orbits Used

## **ABSTRACT**

We propose to make observations that directly test the proposition that globular clusters contain massive black holes. Our targets are the bulge globular clusters NGC 6388 and NGC 6441. These are probably among the most massive in the galaxy, but are understudied compared to more familiar objects such as M15. Our analysis suggests that these two clusters are the most likely to show unambiguous evidence for a central massive black hole if such things exist in globular clusters. The observations proposed will give us the first thorough kinematic and photometric studies of these two clusters. The combination of the two epochs will give us proper motions good to of order 6 km/s. In addition, they will provide us with the first good, deep, color-magnitude diagrams for these clusters. These diagrams will be used to investigate the make up of the stellar population in the clusters, to more firmly establish their distances, ages, and metallicities, and to search for a binary sequence.

## **OBSERVING DESCRIPTION**

These are second epoch observations coordinated with the first epoch observations under Program GO 9835, and our planned observing program is identical, to within the limits placed by 2-Gyro Mode.

We will observe the two clusters for 6 orbits each. On each orbit, the telescope will be pointed to two positions, making 12 in total. These are designed to facilitate the high-precision reconstruction of the ACS PSF necessary for astrometry. Our astrometric imaging will be in the F555W band, where the exposure times have been tailored for each cluster to prevent excessive saturation in the brightest giants closest to the cluster center. For the same reason, we will be using a gain setting of 4 e-/ADU, so that our saturation limit is set by the full well rather than the 16bit ADC. These frames should allow for accurate positions to about a magnitude below the main sequence turn-off.

At each position we will also take a long exposure in the F814W band for photometric purposes. The latter two orbits in each visit will also have a short exposure F814W band in order to recover the brighter stars in this band. The short exposures will reach below the horizontal branch, while the longer exposures will saturate between the HB and the main-sequence turn-off. The combined result is expected to reach  $I=24$ , somewhat deeper than the combined set of F555W frames.

The fluxes given in the Target section are for the brightest giants we want to have good F555W observations for. The photometry comes from the compilation of Piotto et al. (2002, A&Ap, 391, 945). The V-I color is based on photometry of our GO 9835 observations.

**ADDENDUM:** Visits 6 and 7 for NGC 6441 have been moved to WFPC2 after the demise of ACS/HRC we originally planned on using. Most of the

above comments still apply, except that the exposures have been shortened so as not to saturate the shallower pixels of WFPC2, and the short F814W exposures have been deleted to keep within the orbit. In general, the F814W observations will not be as deep as those from the first epoch. As these are secondary to our scientific objectives, we are prepared to live with this. The positioning has been chosen to put the PC1 onto the field of the first epoch observations. The orientation has been chosen to maximize the overlap between the two fields to within the constraints of 2-gyro mode.

#### **ADDITIONAL COMMENTS**

The window for these observations is very small, but our orientation constraint has only removed a couple of days from the possible window. The main limit seems to be the target visibility in 2-gyro mode.

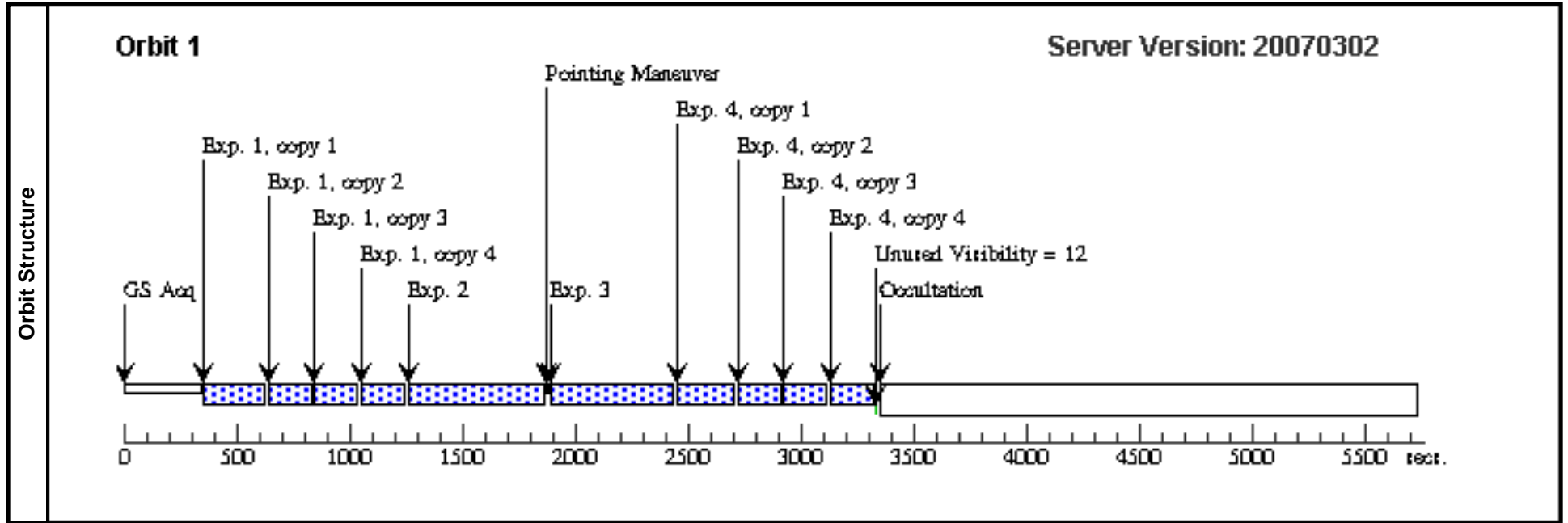
Proposal 10474 - Visit 01 - Shooting Stars: Looking for Direct Evidence of Massive Central Black Holes in Globular Clusters

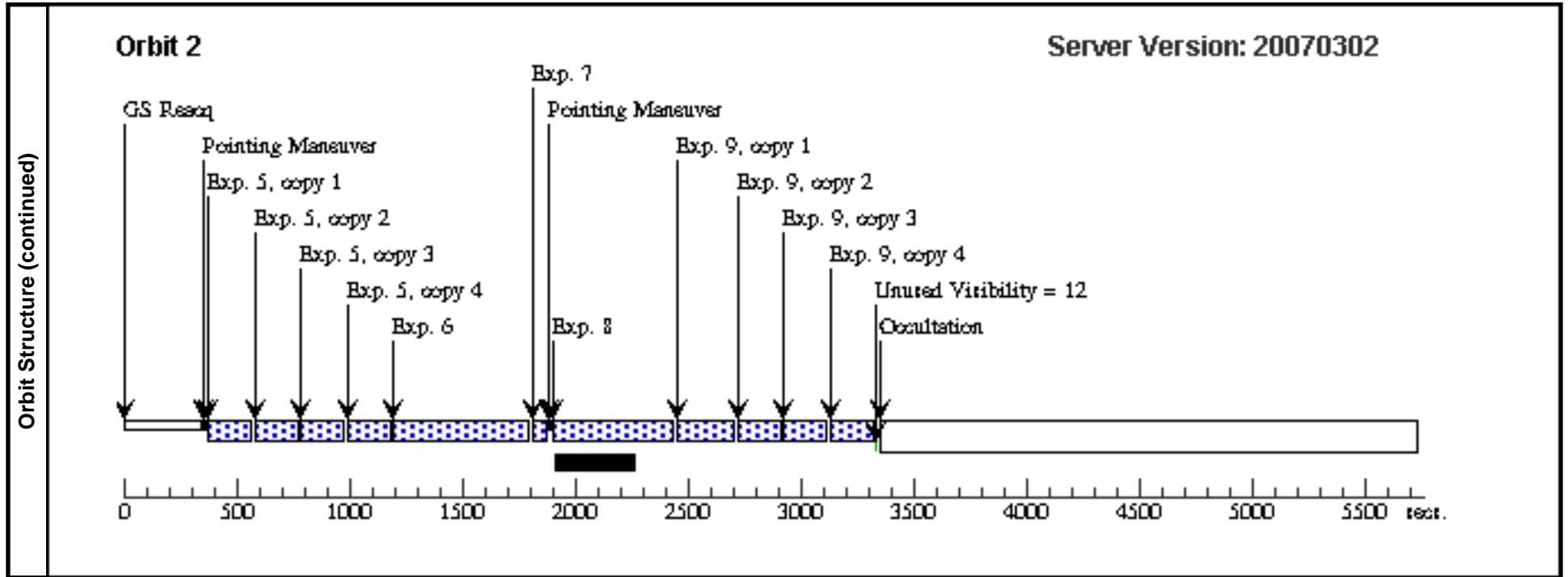
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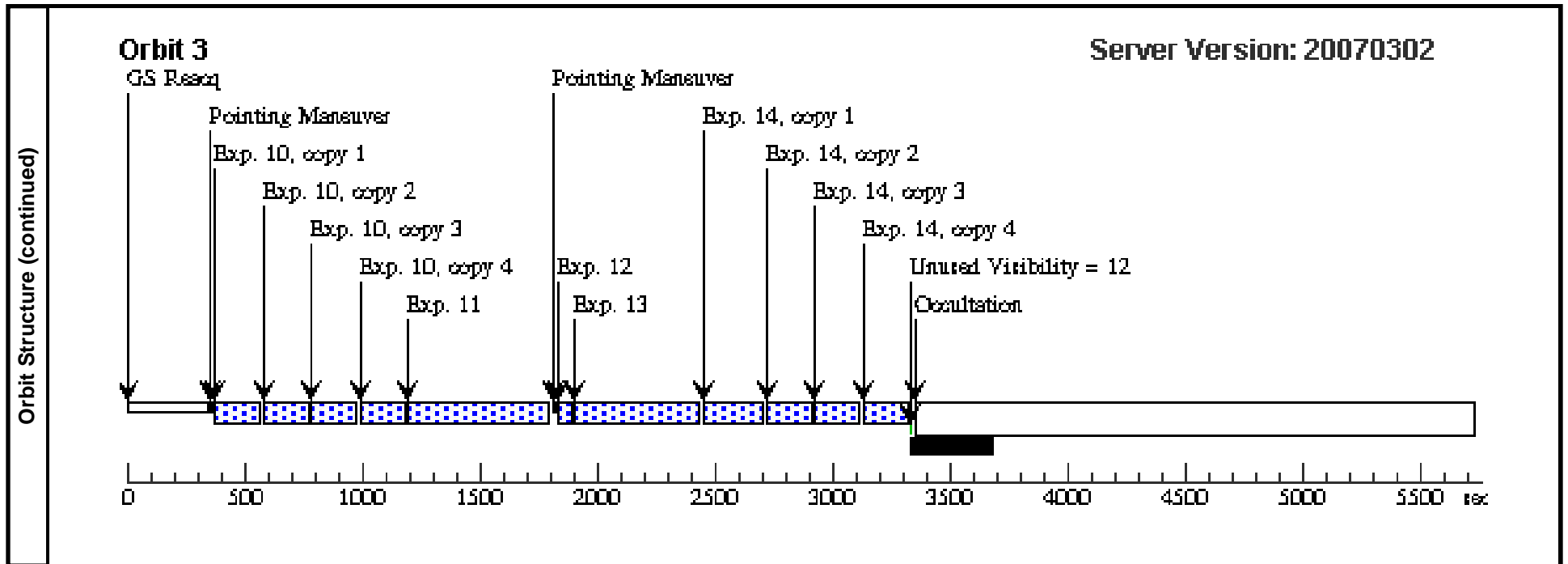
Visit	Proposal 10474, Visit 01									
	Diagnostic Status: No Diagnostics									
Scientific Instruments: ACS/HRC										
Special Requirements: PCS MODE FINE; ORIENT 280.0D TO 300.0 D; ORIENT 100.0D TO 120.0 D										
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
		(1)	NGC6388	RA: 17 36 17.1600 (264.0715000d) Dec: -44 44 8.20 (-44.73561d) Equinox: J2000 Plate Id: 06AQ		V=15.1 E(B-V) = 0.4	Coordinate Source: HST_IMAGE			
<i>Comments: V-I&lt;=2.5</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	Position 1 F 555	(1) NGC6388	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0,0	Sequence 1-4 Non-Int	155.0 Secs X 4 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)]	[1]
	2	Position 1 F 814	(1) NGC6388	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0,0	Sequence 1-4 Non-Int	508.0 Secs [==>]	[1]
	3	Position 2 F 814	(1) NGC6388	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.116,-0.071	Sequence 1-4 Non-Int	508.0 Secs [==>]	[1]
	4	Position 2 F 555	(1) NGC6388	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.116,-0.071	Sequence 1-4 Non-Int	155.0 Secs X 4 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)]	[1]
	5	Position 3 F 555	(1) NGC6388	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.061,-0.033	Sequence 5-9 Non-Int	155.0 Secs X 4 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)]	[2]
	6	Position 3 F 814	(1) NGC6388	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.061,-0.033	Sequence 5-9 Non-Int	501.0 Secs [==>]	[2]
	7	Position 3 F 814 short	(1) NGC6388	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.061,-0.033	Sequence 5-9 Non-Int	25.0 Secs [==>]	[2]
	8	Position 4 F 814	(1) NGC6388	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.064,0.01	Sequence 5-9 Non-Int	501.0 Secs [==>]	[2]

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#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
Exposures (continued)	9	Position 4 F 555	(1) NGC6388	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.064,0.01	Sequence 5-9 Non-Int	155.0 Secs X 4 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)]	[2]
	10	Position 5 F 555	(1) NGC6388	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.009,-0.078	Sequence 10-14 Non-Int	155.0 Secs X 4 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)]	[3]
	11	Position 5 F 814	(1) NGC6388	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.009,-0.078	Sequence 10-14 Non-Int	501.0 Secs [==>]	[3]
	12	Position 6 F 814 Short	(1) NGC6388	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.125,-0.031	Sequence 10-14 Non-Int	25.0 Secs [==>]	[3]
	13	Position 6 F 814	(1) NGC6388	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.125,-0.031	Sequence 10-14 Non-Int	501.0 Secs [==>]	[3]
	14	Position 6 F 555	(1) NGC6388	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.125,-0.031	Sequence 10-14 Non-Int	155.0 Secs X 4 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)]	[3]







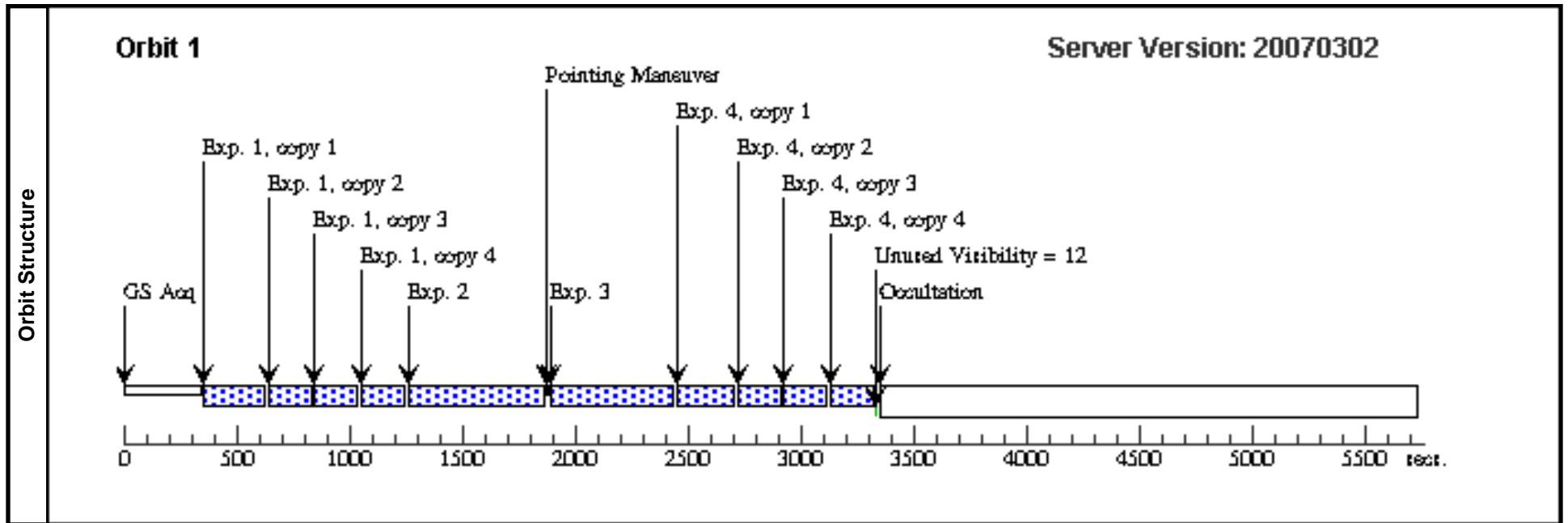
Proposal 10474 - Visit 02 - Shooting Stars: Looking for Direct Evidence of Massive Central Black Holes in Globular Clusters

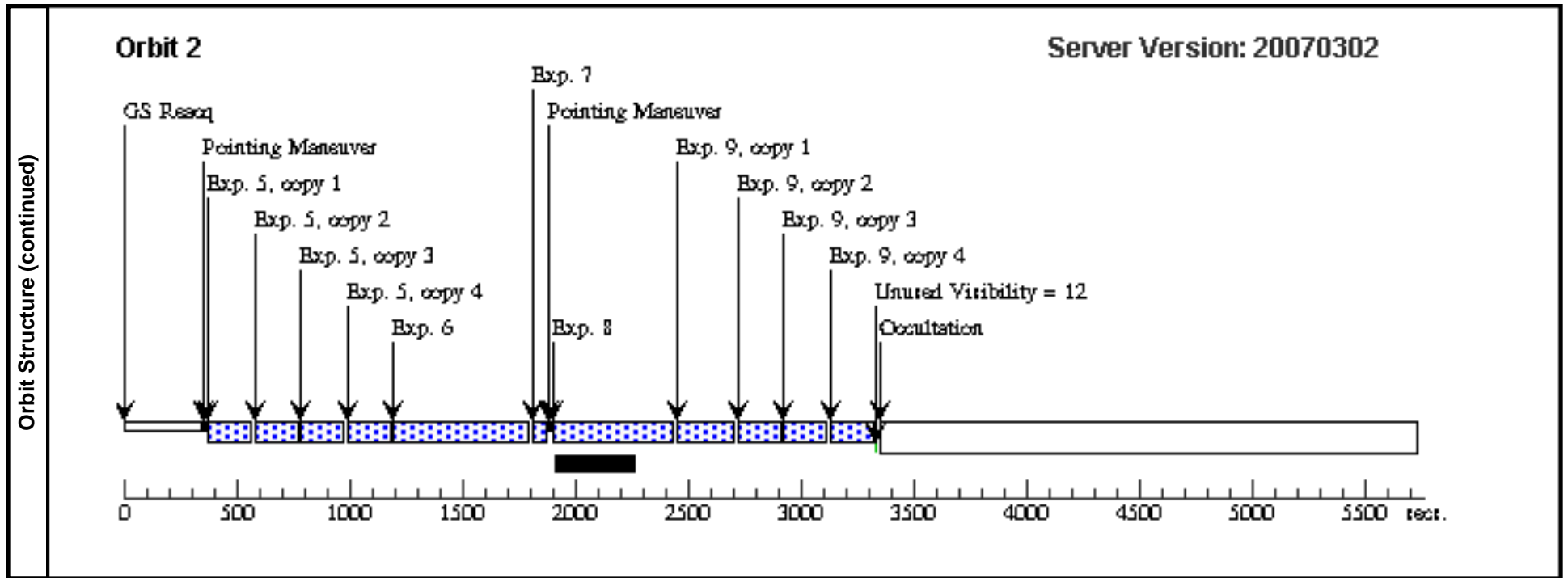
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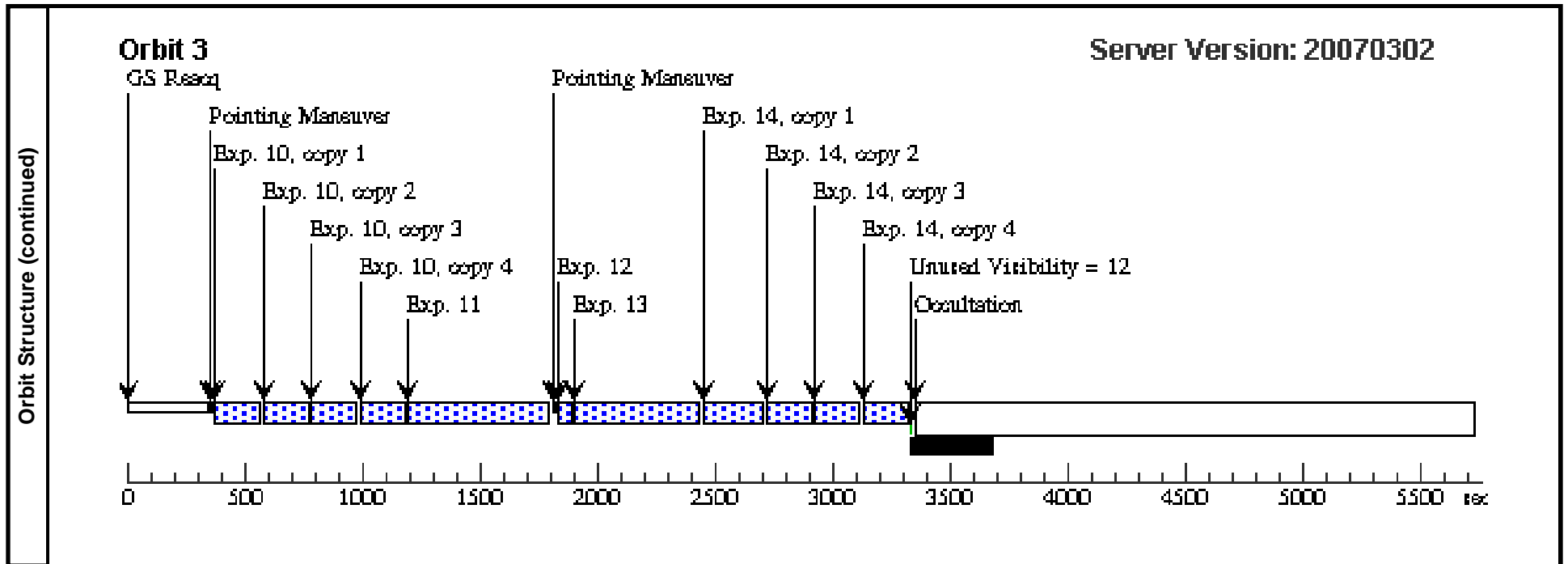
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Fixed Targets	Scientific Instruments: ACS/HRC									
	Special Requirements: ORIENT 280.0D TO 300.0 D; ORIENT 100.0D TO 120.0 D									
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous					
(1)	NGC6388	RA: 17 36 17.1600 (264.0715000d) Dec: -44 44 8.20 (-44.73561d) Equinox: J2000 Plate Id: 06AQ		V=15.1 E(B-V) = 0.4	Coordinate Source: HST_IMAGE					
<i>Comments: V-I&lt;=2.5</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	Position 7 F 555	(1) NGC6388	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.127,0.027	Sequence 1-4 Non-Int	155.0 Secs X 4 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)]	[1]
	2	Position 7 F 814	(1) NGC6388	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.127,0.027	Sequence 1-4 Non-Int	508.0 Secs [==>]	[1]
	3	Position 8 F 814	(1) NGC6388	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG -0.04,-0.045	Sequence 1-4 Non-Int	508.0 Secs [==>]	[1]
	4	Position 8 F 555	(1) NGC6388	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG -0.04,-0.045	Sequence 1-4 Non-Int	155.0 Secs X 4 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)]	[1]
	5	Position 9 F 555	(1) NGC6388	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.019,-0.025	Sequence 5-9 Non-Int	155.0 Secs X 4 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)]	[2]
	6	Position 9 F 814	(1) NGC6388	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.019,-0.025	Sequence 5-9 Non-Int	501.0 Secs [==>]	[2]
	7	Position 9 F 814 short	(1) NGC6388	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.019,-0.025	Sequence 5-9 Non-Int	25.0 Secs [==>]	[2]
8	Position 10 F814	(1) NGC6388	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG -0.035,-0.001	Sequence 5-9 Non-Int	501.0 Secs [==>]	[2]	

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#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
Exposures (continued)	9	Position 10 F555	(1) NGC6388	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG -0.035,- 0.001	Sequence 5-9 Non-Int	155.0 Secs X 4 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)]	[2]
	10	Position 11 F555	(1) NGC6388	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG -0.033,- 0.09	Sequence 10-14 Non-Int	155.0 Secs X 4 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)]	[3]
	11	Position 11 F814	(1) NGC6388	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG -0.033,- 0.09	Sequence 10-14 Non-Int	501.0 Secs [==>]	[3]
	12	Position 12 F814 Short	(1) NGC6388	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.083,- .072	Sequence 10-14 Non-Int	25.0 Secs [==>]	[3]
	13	Position 12 F814	(1) NGC6388	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.083,- .072	Sequence 10-14 Non-Int	501.0 Secs [==>]	[3]
	14	Position 12 F555	(1) NGC6388	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.083,- .072	Sequence 10-14 Non-Int	155.0 Secs X 4 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)]	[3]







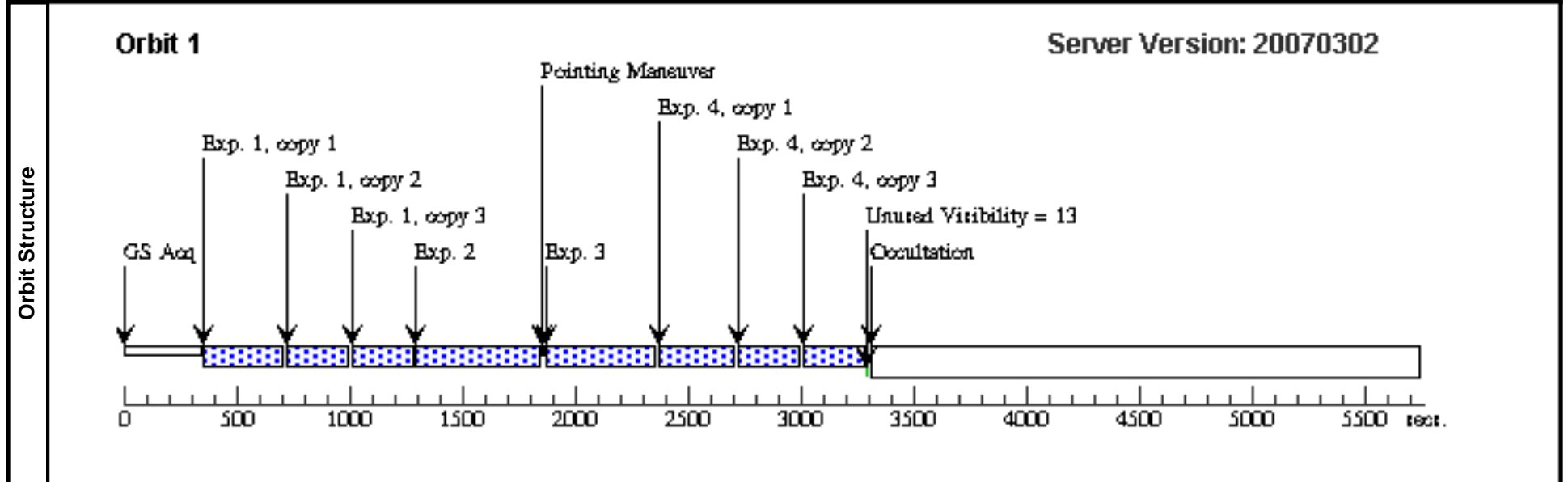
Proposal 10474 - Visit 03 - Shooting Stars: Looking for Direct Evidence of Massive Central Black Holes in Globular Clusters

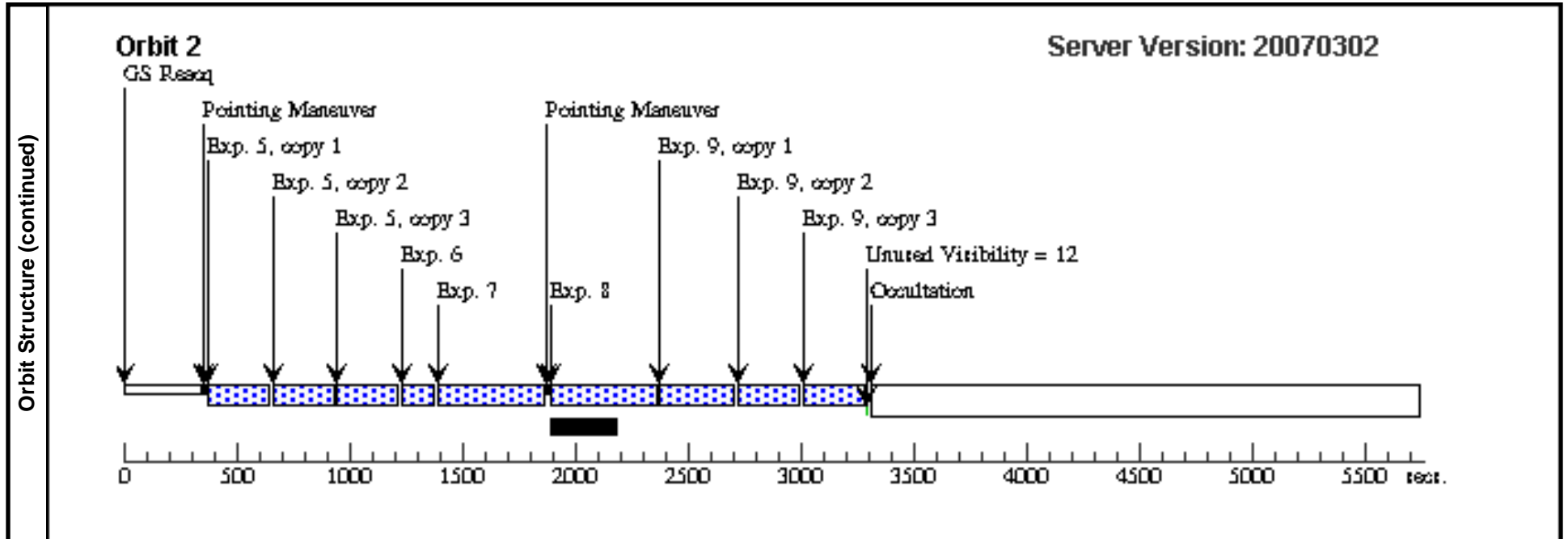
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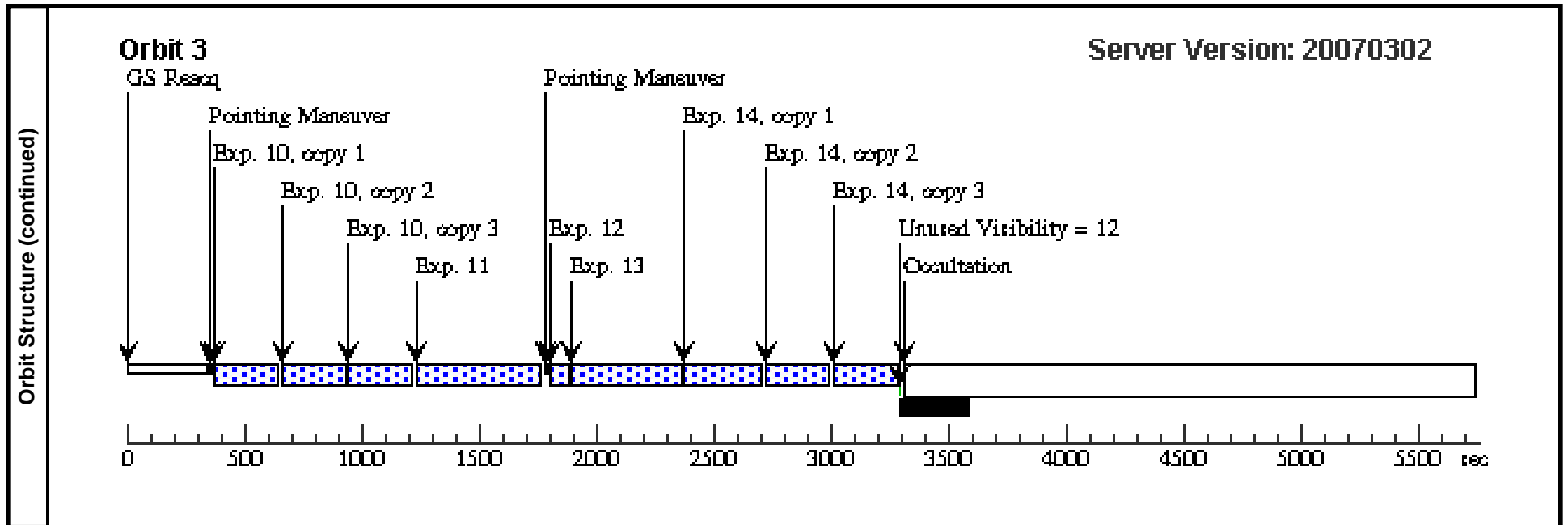
Visit	Proposal 10474, Visit 03									
	Diagnostic Status: No Diagnostics									
Fixed Targets	Scientific Instruments: ACS/HRC									
	Special Requirements: PCS MODE FINE; ORIENT 256.0D TO 276.0 D; ORIENT 76.0D TO 96.0 D									
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous					
(2)	NGC6441	RA: 17 50 13.0700 (267.5544583d) Dec: -37 03 6.90 (-37.05192d) Equinox: J2000 Plate Id: 06AS		V=16.1 E(B-V) = 0.5	Coordinate Source: HST_IMAGE					
<i>Comments: V-I&lt;=2.5</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	Position 1 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0,0	Sequence 1-4 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[1]
	2	Position 1 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0,0	Sequence 1-4 Non-Int	450.0 Secs [==>]	[1]
	3	Position 2 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.116,-0.071	Sequence 1-4 Non-Int	450.0 Secs [==>]	[1]
	4	Position 2 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.116,-0.071	Sequence 1-4 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[1]
	5	Position 3 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.061,-0.033	Sequence 5-9 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[2]
	6	Position 3 F 814 short	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.061,-0.033	Sequence 5-9 Non-Int	40.0 Secs [==>]	[2]
	7	Position 3 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.061,-0.033	Sequence 5-9 Non-Int	436.0 Secs [==>]	[2]
	8	Position 4 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.064,0.01	Sequence 5-9 Non-Int	436.0 Secs [==>]	[2]
	9	Position 4 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.064,0.01	Sequence 5-9 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[2]

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#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
Exposures (continued)	10	Position 5 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.009,-0 .078	Sequence 10-14 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[3]
	11	Position 5 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.009,-0 .078	Sequence 10-14 Non-Int	436.0 Secs [==>]	[3]
	12	Position 6 F 814 Short	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.125,-0 .031	Sequence 10-14 Non-Int	40.0 Secs [==>]	[3]
	13	Position 6 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.125,-0 .031	Sequence 10-14 Non-Int	436.0 Secs [==>]	[3]
	14	Position 6 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.125,-0 .031	Sequence 10-14 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[3]







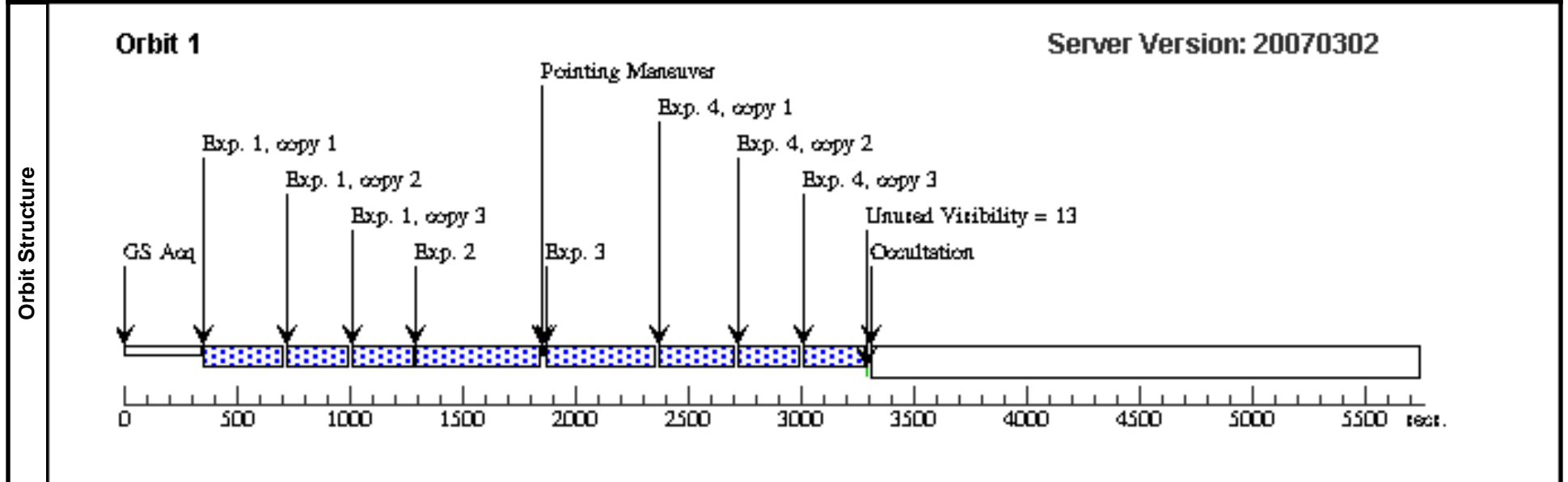
Proposal 10474 - Visit 04 - Shooting Stars: Looking for Direct Evidence of Massive Central Black Holes in Globular Clusters

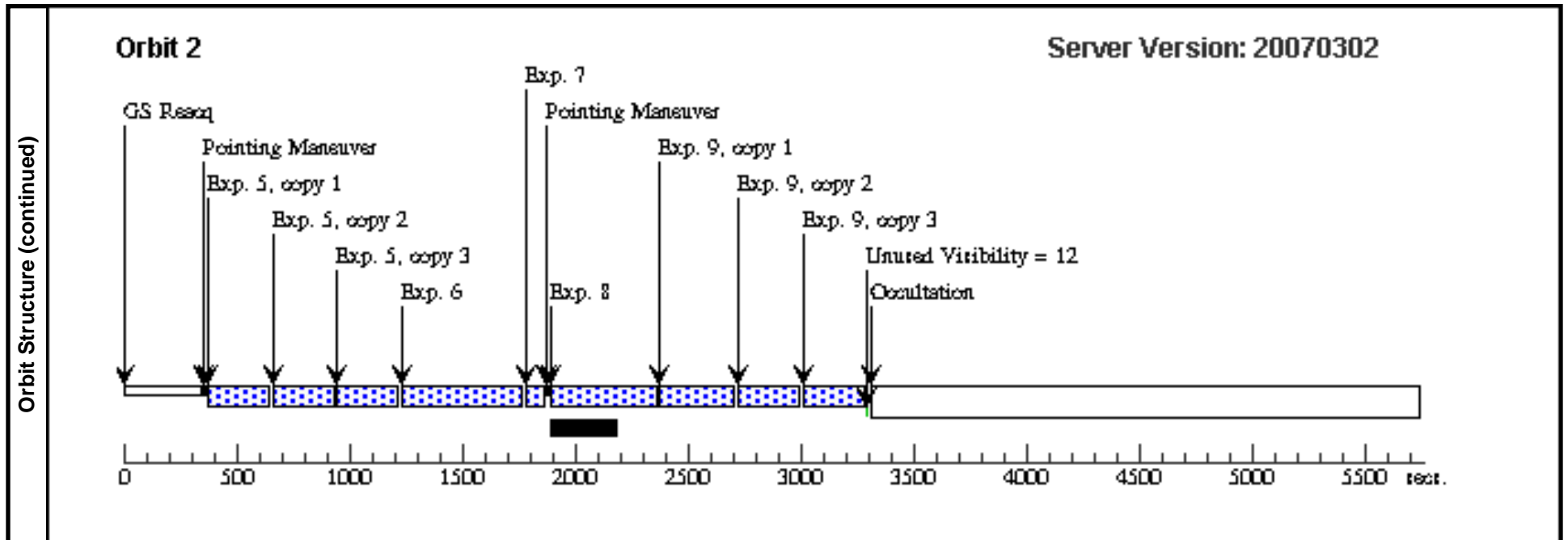
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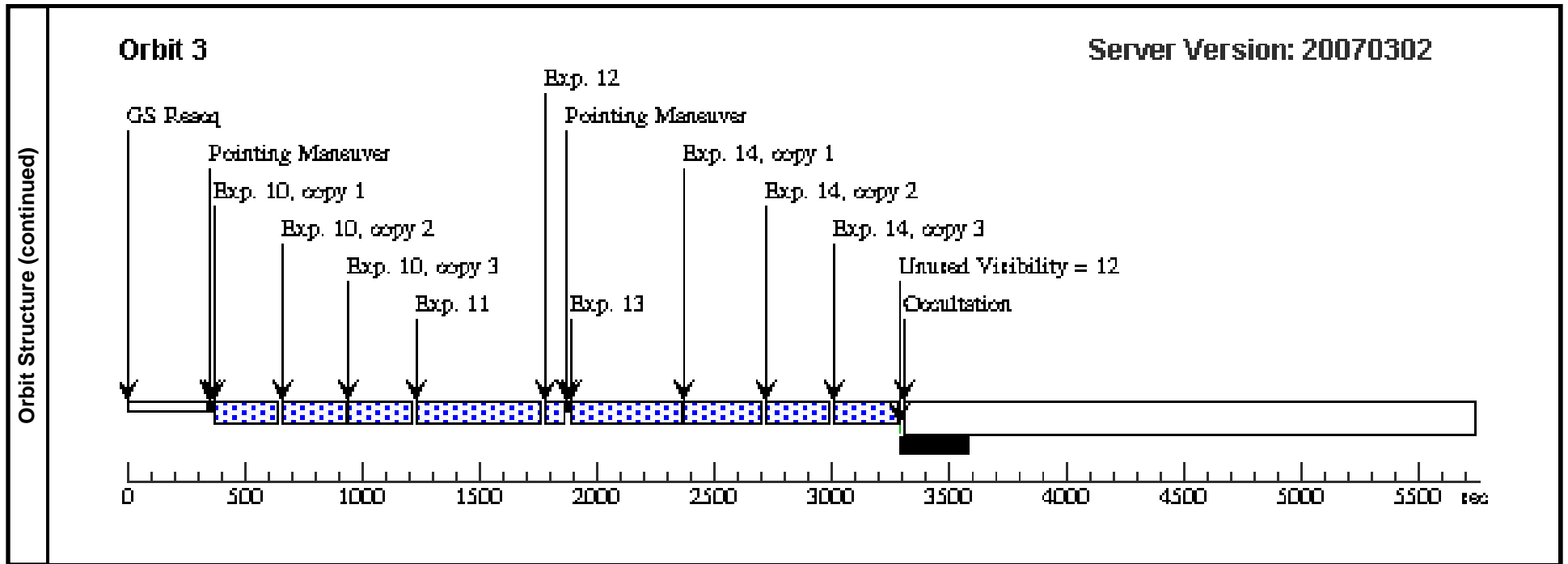
Visit	Proposal 10474, Visit 04									
	Diagnostic Status: No Diagnostics									
Scientific Instruments: ACS/HRC										
Special Requirements: ORIENT 256.0D TO 276.0 D; ORIENT 76.0D TO 96.0 D										
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
		(2)	NGC6441	RA: 17 50 13.0700 (267.5544583d) Dec: -37 03 6.90 (-37.05192d) Equinox: J2000 Plate Id: 06AS		V=16.1 E(B-V) = 0.5	Coordinate Source: HST_IMAGE			
<i>Comments: V-I&lt;=2.5</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	Position 9 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.019,-0.025	Sequence 1-4 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[1]
	2	Position 9 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.019,-0.025	Sequence 1-4 Non-Int	450.0 Secs [==>]	[1]
	3	Position 10 F814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG -0.035,-0.001	Sequence 1-4 Non-Int	450.0 Secs [==>]	[1]
	4	Position 10 F555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG -0.035,-0.001	Sequence 1-4 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[1]
	5	Position 11 F555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG -0.033,-0.09	Sequence 5-9 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[2]
	6	Position 11 F814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG -0.033,-0.09	Sequence 5-9 Non-Int	436.0 Secs [==>]	[2]
	7	Position 11 F814 Short	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	SAME POS AS 5	Sequence 5-9 Non-Int	40.0 Secs [==>]	[2]
	8	Position 12 F814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.083,-0.072	Sequence 5-9 Non-Int	436.0 Secs [==>]	[2]
	9	Position 12 F555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.083,-0.072	Sequence 5-9 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[2]

Proposal 10474 - Visit 04 - Shooting Stars: Looking for Direct Evidence of Massive Central Black Holes in Globular Clusters

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
Exposures (continued)	10	Position 7 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.127,0.027	Sequence 10-14 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[3]
	11	Position 7 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.127,0.027	Sequence 10-14 Non-Int	436.0 Secs [==>]	[3]
	12	Position 7 F 814 Short	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.127,0.027	Sequence 10-14 Non-Int	40.0 Secs [==>]	[3]
	13	Position 8 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG -0.04,-0.045	Sequence 10-14 Non-Int	436.0 Secs [==>]	[3]
	14	Position 8 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG -0.04,-0.045	Sequence 10-14 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[3]







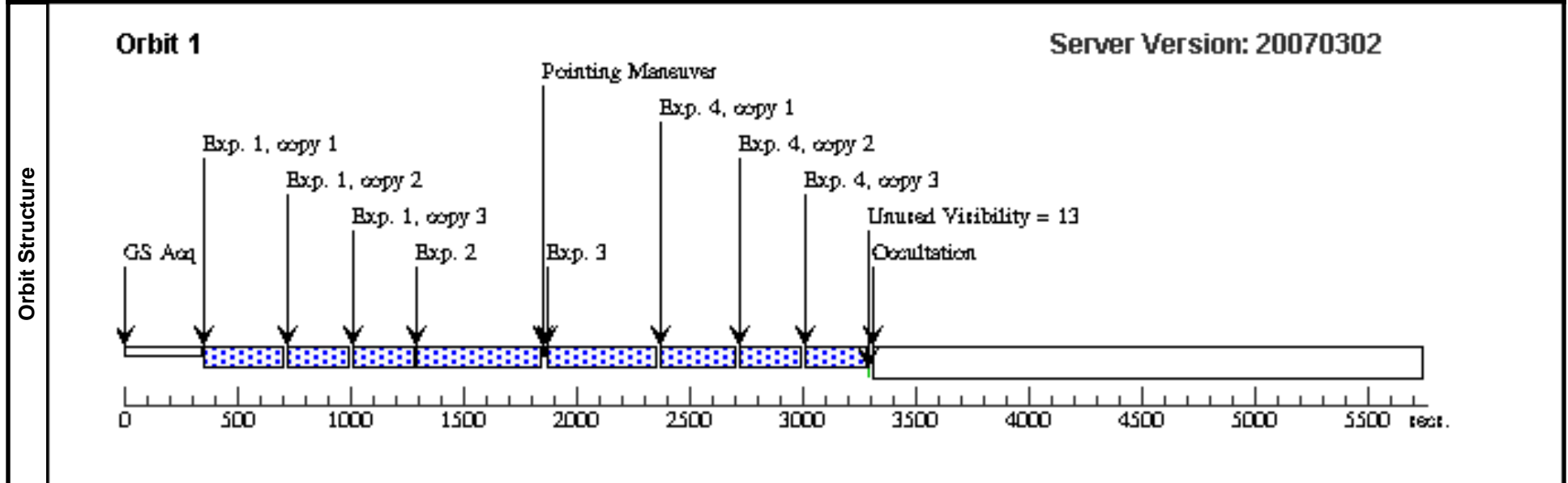
Proposal 10474 - Visit 53 - Shooting Stars: Looking for Direct Evidence of Massive Central Black Holes in Globular Clusters

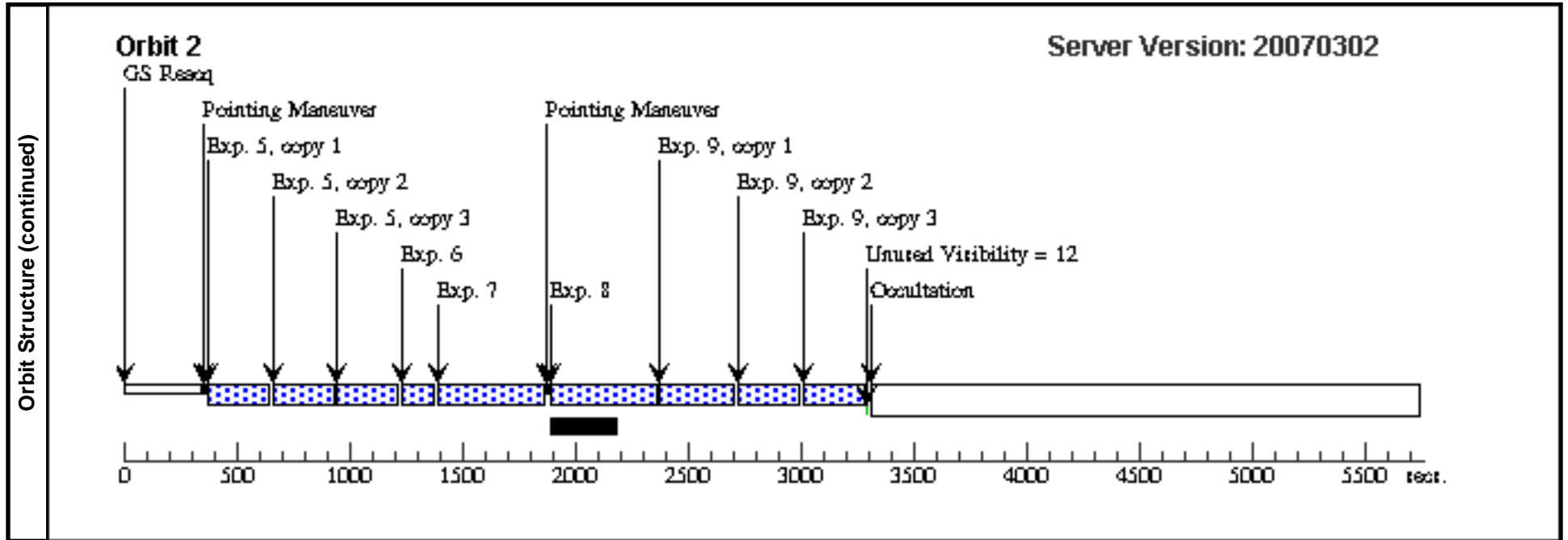
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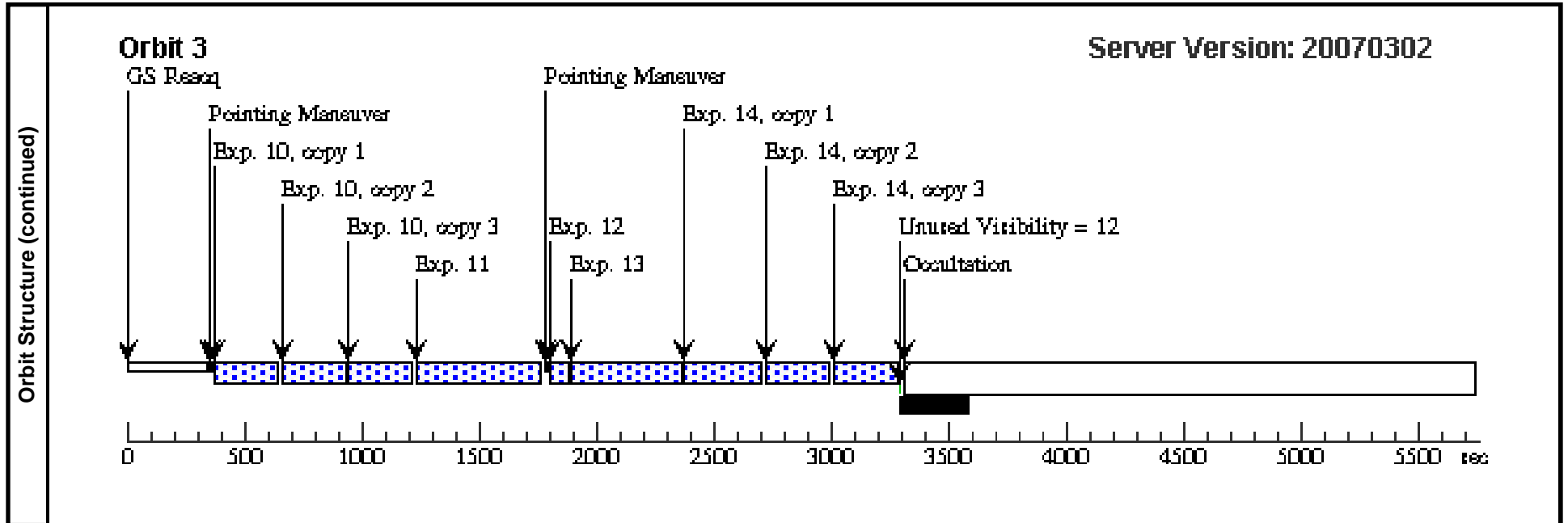
Visit	Proposal 10474, Visit 53									
	Diagnostic Status: No Diagnostics									
Fixed Targets	Scientific Instruments: ACS/HRC									
	Special Requirements: PCS MODE FINE; ORIENT 256.0D TO 276.0 D; ORIENT 76.0D TO 96.0 D									
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous					
(2)	NGC6441	RA: 17 50 13.0700 (267.5544583d) Dec: -37 03 6.90 (-37.05192d) Equinox: J2000 Plate Id: 06AS		V=16.1 E(B-V) = 0.5	Coordinate Source: HST_IMAGE					
<i>Comments: V-I&lt;=2.5</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	Position 1 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0,0	Sequence 1-4 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[1]
	2	Position 1 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0,0	Sequence 1-4 Non-Int	450.0 Secs [==>]	[1]
	3	Position 2 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.116,-0.071	Sequence 1-4 Non-Int	450.0 Secs [==>]	[1]
	4	Position 2 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.116,-0.071	Sequence 1-4 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[1]
	5	Position 3 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.061,-0.033	Sequence 5-9 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[2]
	6	Position 3 F 814 short	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.061,-0.033	Sequence 5-9 Non-Int	40.0 Secs [==>]	[2]
	7	Position 3 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.061,-0.033	Sequence 5-9 Non-Int	436.0 Secs [==>]	[2]
	8	Position 4 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.064,0.01	Sequence 5-9 Non-Int	436.0 Secs [==>]	[2]
	9	Position 4 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.064,0.01	Sequence 5-9 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[2]

Proposal 10474 - Visit 53 - Shooting Stars: Looking for Direct Evidence of Massive Central Black Holes in Globular Clusters

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
Exposures (continued)	10	Position 5 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.009,-0 .078	Sequence 10-14 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[3]
	11	Position 5 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.009,-0 .078	Sequence 10-14 Non-Int	436.0 Secs [==>]	[3]
	12	Position 6 F 814 Short	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.125,-0 .031	Sequence 10-14 Non-Int	40.0 Secs [==>]	[3]
	13	Position 6 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.125,-0 .031	Sequence 10-14 Non-Int	436.0 Secs [==>]	[3]
	14	Position 6 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.125,-0 .031	Sequence 10-14 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[3]







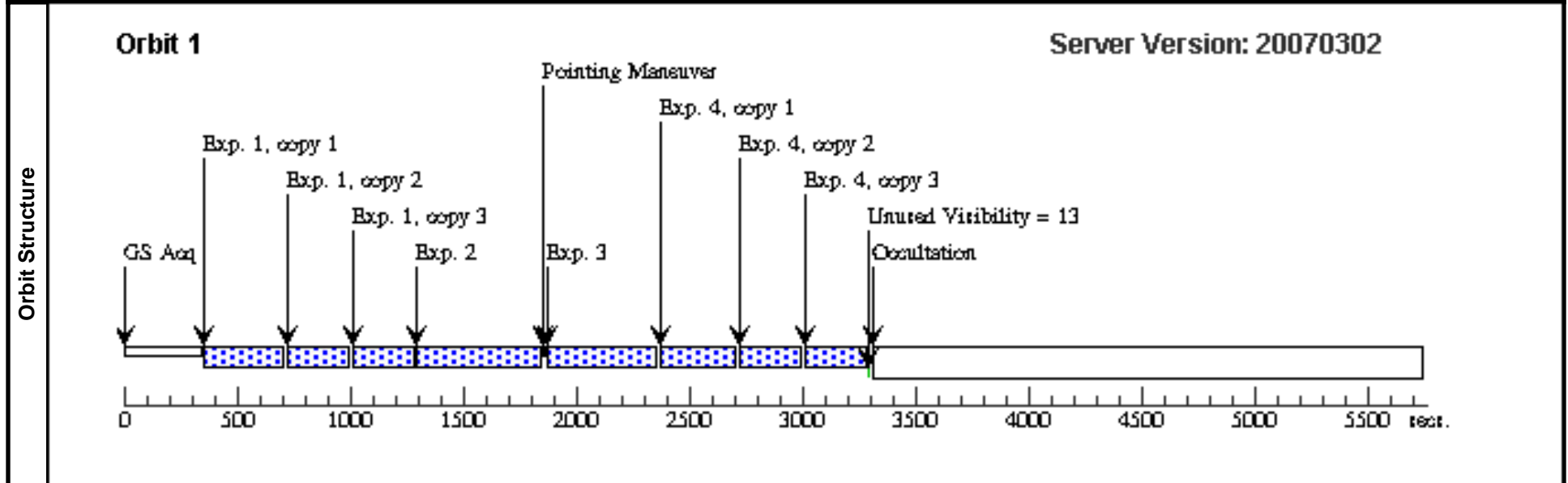
Proposal 10474 - Visit 54 - Shooting Stars: Looking for Direct Evidence of Massive Central Black Holes in Globular Clusters

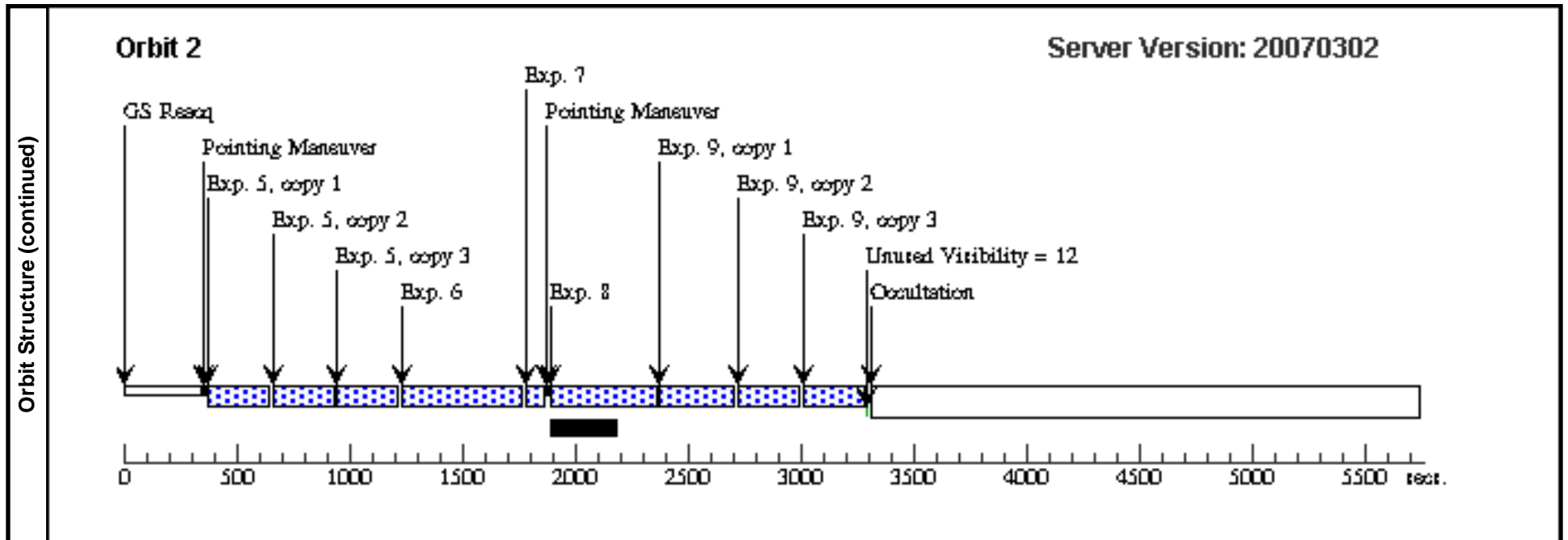
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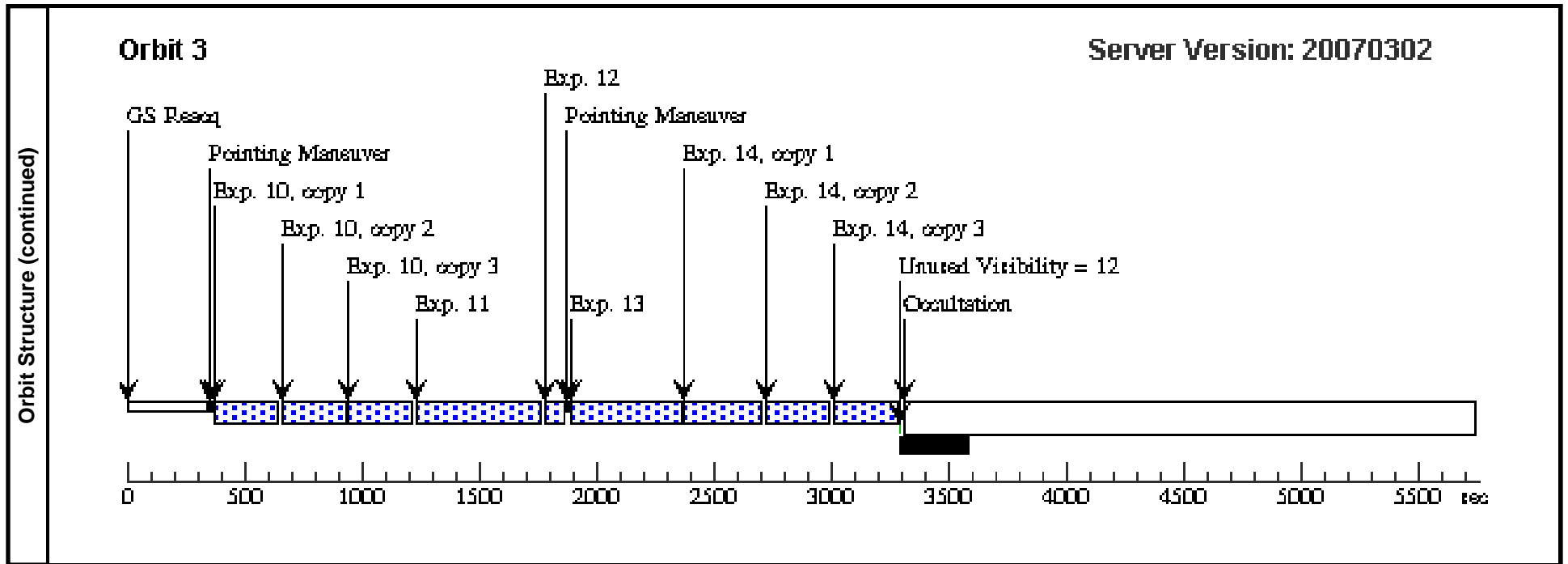
Visit	Proposal 10474, Visit 54									
	Diagnostic Status: No Diagnostics									
Scientific Instruments: ACS/HRC										
Special Requirements: ORIENT 256.0D TO 276.0 D; ORIENT 76.0D TO 96.0 D										
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
		(2)	NGC6441	RA: 17 50 13.0700 (267.5544583d) Dec: -37 03 6.90 (-37.05192d) Equinox: J2000 Plate Id: 06AS		V=16.1 E(B-V) = 0.5	Coordinate Source: HST_IMAGE			
<i>Comments: V-I&lt;=2.5</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	Position 9 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.019,-0.025	Sequence 1-4 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[1]
	2	Position 9 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.019,-0.025	Sequence 1-4 Non-Int	450.0 Secs [==>]	[1]
	3	Position 10 F814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG -0.035,-0.001	Sequence 1-4 Non-Int	450.0 Secs [==>]	[1]
	4	Position 10 F555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG -0.035,-0.001	Sequence 1-4 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[1]
	5	Position 11 F555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG -0.033,-0.09	Sequence 5-9 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[2]
	6	Position 11 F814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG -0.033,-0.09	Sequence 5-9 Non-Int	436.0 Secs [==>]	[2]
	7	Position 11 F814 Short	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	SAME POS AS 5	Sequence 5-9 Non-Int	40.0 Secs [==>]	[2]
	8	Position 12 F814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.083,-0.072	Sequence 5-9 Non-Int	436.0 Secs [==>]	[2]
	9	Position 12 F555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.083,-0.072	Sequence 5-9 Non-Int	240.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[2]

Proposal 10474 - Visit 54 - Shooting Stars: Looking for Direct Evidence of Massive Central Black Holes in Globular Clusters

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
Exposures (continued)	10	Position 7 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG 0.127,0.027	Sequence 10-14 Non-Int	240.0 Secs X 3 [=>(Copy 1)] [=>(Copy 2)] [=>(Copy 3)]	[3]
	11	Position 7 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.127,0.027	Sequence 10-14 Non-Int	436.0 Secs [=>]	[3]
	12	Position 7 F 814 Short	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG 0.127,0.027	Sequence 10-14 Non-Int	40.0 Secs [=>]	[3]
	13	Position 8 F 814	(2) NGC6441	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; GAIN=4	POS TARG -0.04,-0.045	Sequence 10-14 Non-Int	436.0 Secs [=>]	[3]
	14	Position 8 F 555	(2) NGC6441	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO; GAIN=4	POS TARG -0.04,-0.045	Sequence 10-14 Non-Int	240.0 Secs X 3 [=>(Copy 1)] [=>(Copy 2)] [=>(Copy 3)]	[3]







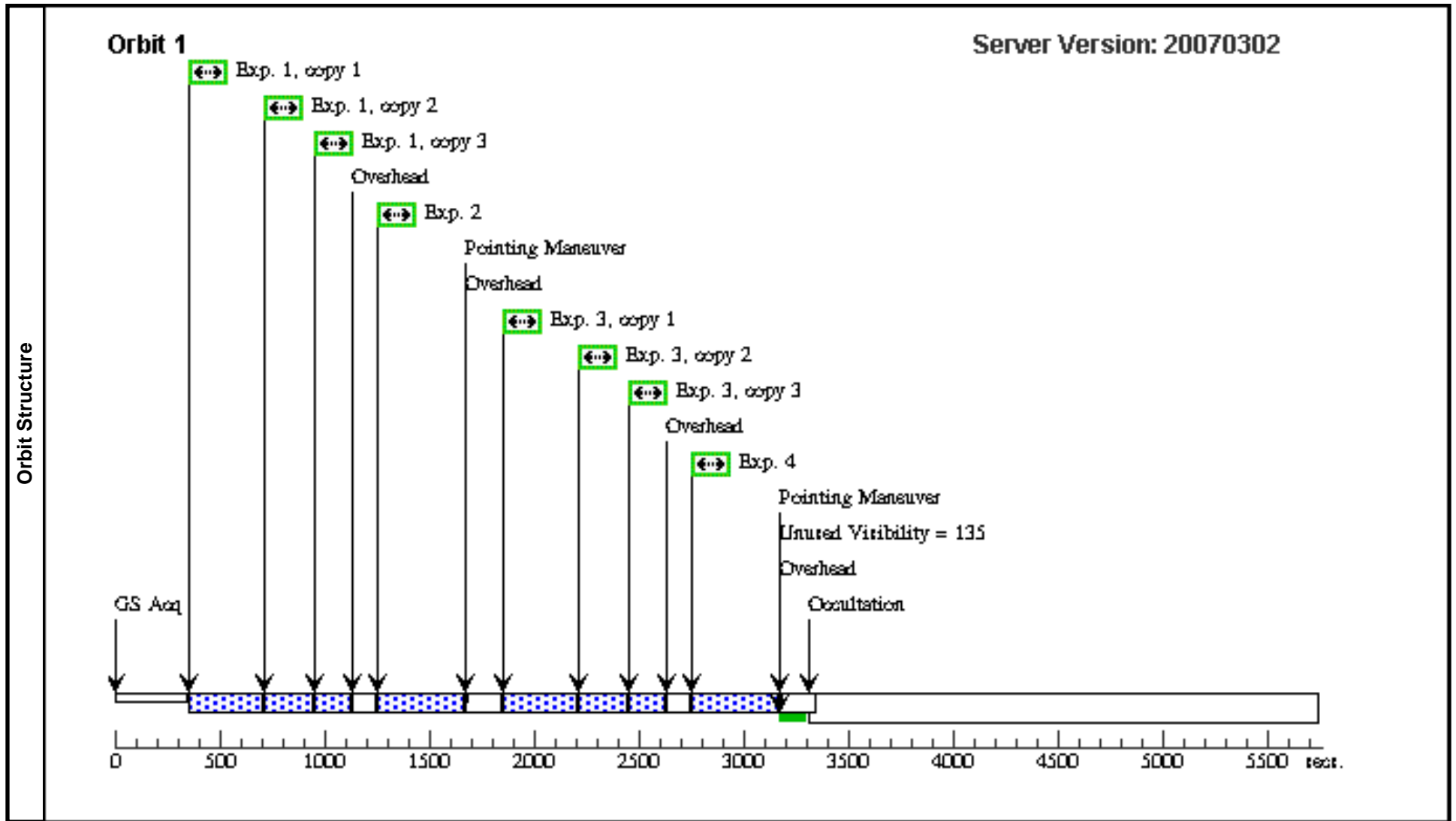
Proposal 10474 - Visit 06 - Shooting Stars: Looking for Direct Evidence of Massive Central Black Holes in Globular Clusters

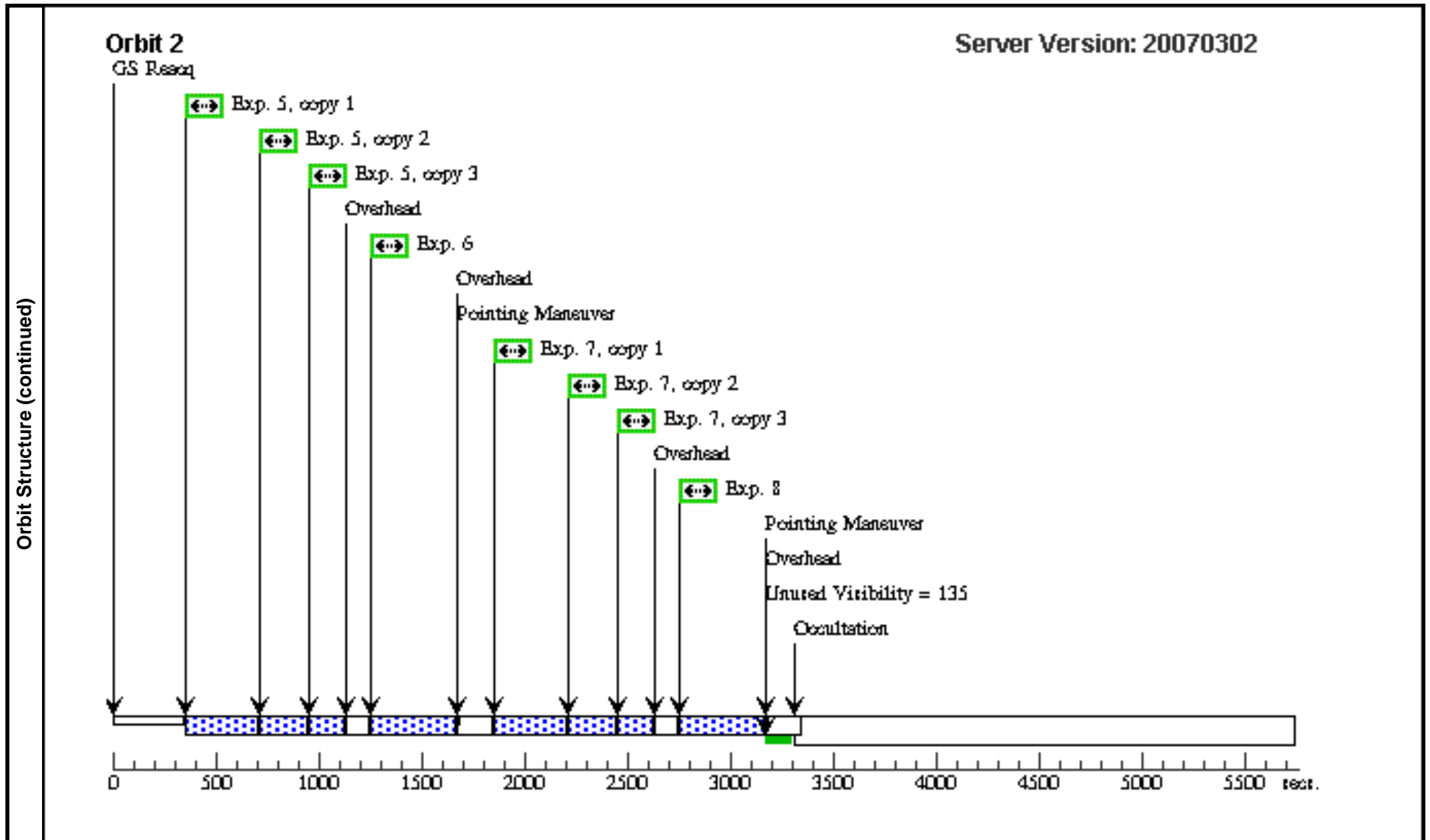
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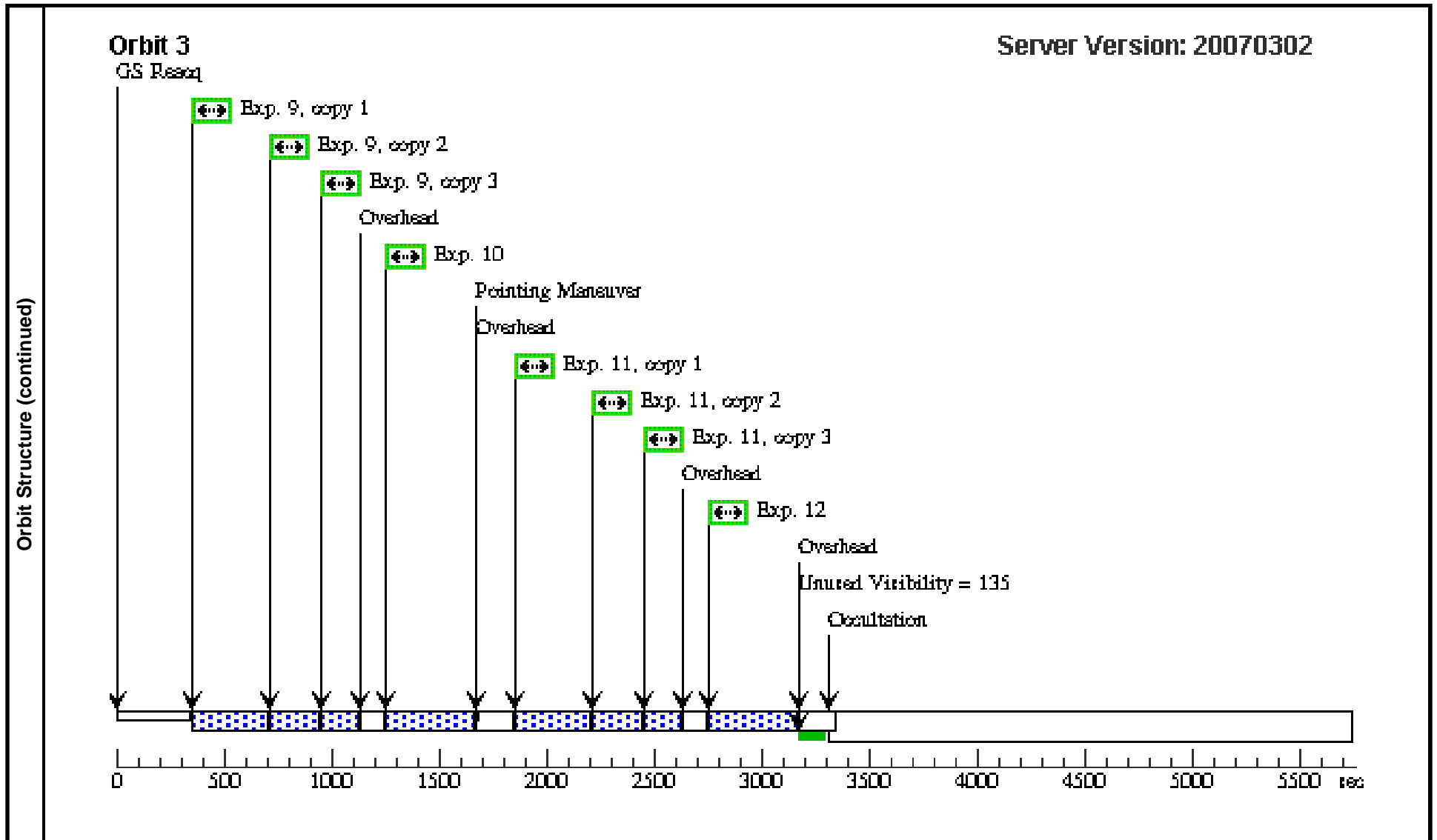
Visit	Proposal 10474, Visit 06					Fluxes	Miscellaneous			
	Diagnostic Status: No Diagnostics									
Fixed Targets	Scientific Instruments: WFPC2					V=16.1	Coordinate Source: HST_IMAGE			
	Special Requirements: PCS MODE FINE; ORIENT 297.0D TO 310.0 D									
#	Name	Target Coordinates	Targ. Coord. Corrections							
(3)	NGC6441-WFPC2	RA: 17 50 13.2600 (267.5552500d) Dec: -37 03 8.70 (-37.05242d) Equinox: J2000 Plate Id: 06AS				E(B-V) = 0.5				
<i>Comments: V-I&lt;=2.5</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	Position 1 F 555	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F555W		POS TARG 0.09,0	Sequence 1-4 Non-Int	160.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[1]
	2	Position 1 F 814	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F814W		POS TARG 0.09,0	Sequence 1-4 Non-Int	260.0 Secs [==>]	[1]
	3	Position 2 F 555	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.00375,0.03	Sequence 1-4 Non-Int	160.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[1]
	4	Position 2 F 814	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F814W		POS TARG 0.00375,0.03	Sequence 1-4 Non-Int	260.0 Secs [==>]	[1]
	5	Position 3 F 555	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.10125,-0.0825	Sequence 5-8 Non-Int	160.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[2]
	6	Position 3 F 814	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F814W	CR-SPLIT=NO	POS TARG 0.10125,-0.0825	Sequence 5-8 Non-Int	260.0 Secs [==>]	[2]
	7	Position 4 F 555	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.105,-0.1425	Sequence 5-8 Non-Int	160.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[2]
	8	Position 4 F 814	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F814W	CR-SPLIT=NO	POS TARG 0.105,-0.1425	Sequence 5-8 Non-Int	260.0 Secs [==>]	[2]
9	Position 5 F 555	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.02625,-0.075	Sequence 9-12 Non-Int	160.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[3]	

Proposal 10474 - Visit 06 - Shooting Stars: Looking for Direct Evidence of Massive Central Black Holes in Globular Clusters

Exposures (continued)	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	10	Position 5 F 814	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F814W	CR-SPLIT=NO	POS TARG 0.02625, -0.075	Sequence 9-12 Non-I nt	260.0 Secs [==>]	[3]
	11	Position 6 F 555	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.0375,- 0.1575	Sequence 9-12 Non-I nt	160.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[3]
	12	Position 6 F 814	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F814W	CR-SPLIT=NO	POS TARG 0.0375,- 0.1575	Sequence 9-12 Non-I nt	260.0 Secs [==>]	[3]







Proposal 10474 - Visit 07 - Shooting Stars: Looking for Direct Evidence of Massive Central Black Holes in Globular Clusters

Fri Mar 09 02:03:20 GMT 2007

Visit	Proposal 10474, Visit 07									
	Diagnostic Status: No Diagnostics Scientific Instruments: WFPC2 Special Requirements: PCS MODE FINE; ORIENT 297.0D TO 310.0 D									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
		(3)	NGC6441-WFPC2	RA: 17 50 13.2600 (267.5552500d) Dec: -37 03 8.70 (-37.05242d) Equinox: J2000 Plate Id: 06AS		V=16.1 E(B-V) = 0.5	Coordinate Source: HST_IMAGE			
	<i>Comments: V-I&lt;=2.5</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	Position 7 F 555	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F555W		POS TARG 0.2775,0 .10875	Sequence 1-4 Non-Int	160.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[1]
	2	Position 7 F 814	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F814W		POS TARG 0.2775,0 .10875	Sequence 1-4 Non-Int	260.0 Secs [==>]	[1]
	3	Position 8 F 555	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.37875,0 .10125	Sequence 1-4 Non-Int	160.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[1]
	4	Position 8 F 814	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F814W		POS TARG 0.37875,0 .10125	Sequence 1-4 Non-Int	260.0 Secs [==>]	[1]
	5	Position 9 F 555	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.3825,0 .20625	Sequence 5-8 Non-Int	160.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[2]
	6	Position 9 F 814	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F814W	CR-SPLIT=NO	POS TARG 0.3825,0 .20625	Sequence 5-8 Non-Int	260.0 Secs [==>]	[2]
	7	Position 10 F555	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.3,0.22 125	Sequence 5-8 Non-Int	160.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[2]
	8	Position 10 F814	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F814W	CR-SPLIT=NO	POS TARG 0.3,0.22 125	Sequence 5-8 Non-Int	260.0 Secs [==>]	[2]
	9	Position 11 F555	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.39375,0 .00375	Sequence 9-12 Non-Int	160.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[3]

Proposal 10474 - Visit 07 - Shooting Stars: Looking for Direct Evidence of Massive Central Black Holes in Globular Clusters

Exposures (continued)	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	10	Position 11 F814	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F814W	CR-SPLIT=NO	POS TARG 0.39375, 0.00375	Sequence 9-12 Non-I nt	260.0 Secs [==>]	[3]
	11	Position 12 F555	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.31125, 0.03375	Sequence 9-12 Non-I nt	160.0 Secs X 3 [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[3]
	12	Position 12 F814	(3) NGC6441-WFPC 2	WFPC2, IMAGE, PC1-FIX	F814W	CR-SPLIT=NO	POS TARG 0.31125, 0.003375	Sequence 9-12 Non-I nt	260.0 Secs [==>]	[3]

