



11209 - Determining the Structural Parameters of the First Globular Cluster Found to Host an Black-Hole X-ray Binary

Cycle: 16, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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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) NGC4472-BHGC ANY	NIC3 WFPC2	2	05-May-2008 21:01:00.0	yes
02	(2) NGC4472-FIELD2 ANY	NIC3 WFPC2	2	05-May-2008 21:01:07.0	yes
03	(3) NGC4472-FIELD3 ANY	NIC3 WFPC2	2	05-May-2008 21:01:12.0	yes
04	(4) NGC4472-FIELD4 ANY	NIC3 WFPC2	2	05-May-2008 21:01:17.0	yes

<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>
05	(5) NGC4472-FIELD5 ANY	NIC3 WFPC2	2	05-May-2008 21:01:21.0	yes

10 Total Orbits Used

ABSTRACT

We recently published the discovery of the first black hole X-ray binary in a globular cluster. This object is located in a bright globular cluster around the Virgo elliptical NGC 4472. Here we propose to obtain HST PC images of this black-hole hosting globular cluster and a sample of other NGC 4472 globulars. We will use these data to determine the structural parameters of both the globular cluster known to have a black hole and a control sample of other NGC 4472 clusters. This will test recent theoretical predictions how black holes affect the structural parameters of globular clusters, and more generally will allow for the first time constraints on any relationship between the presence of a black hole and the surface brightness profiles of globular clusters. The deep WFPC2 images outside of the galaxy's central regions will also be invaluable for studying how the sizes and luminosity function of globular clusters depend on distance from the center of the galaxy, and thus address questions about the origin of the size differences between metal-rich and metal-poor clusters and the shape of the globular cluster luminosity function. In addition, parallel NIC3 images will allow the optical to near-infrared colors of NGC 4472 globular cluster to be determined over a wide range of galactocentric radii.

OBSERVING DESCRIPTION

We propose to obtain HST PC images in F555W of the globular cluster in NGC 4472 that has been recently discovered to host a black hole X-ray binary, and also four other PC fields with similarly bright globular clusters for comparison to the black-hole hosting cluster. We will use two orbits for each pointing which will be observed with a four point dither to maximize spatial resolution and cosmic ray removal. Two orbits with the PC in F555W will allow a reliable determination of the surface brightness profile over a broad enough radial range to distinguish between clusters of different concentrations.

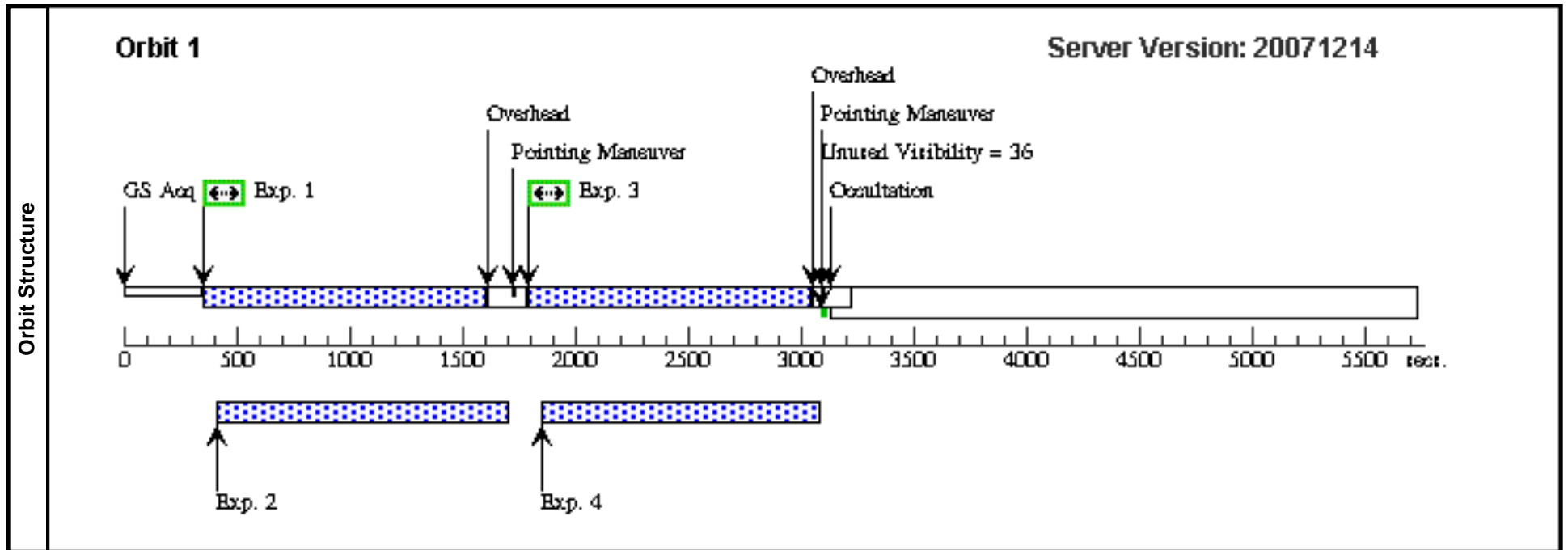
In addition to our principal targets on the PC, we will also use the WF data from WFPC2 in a number of ways described in the justification. These include determining the sizes for globular clusters over a wide range of galactocentric radii, as well as constraining any dependence of the the globular cluster luminosity function on distance from the galactic center.

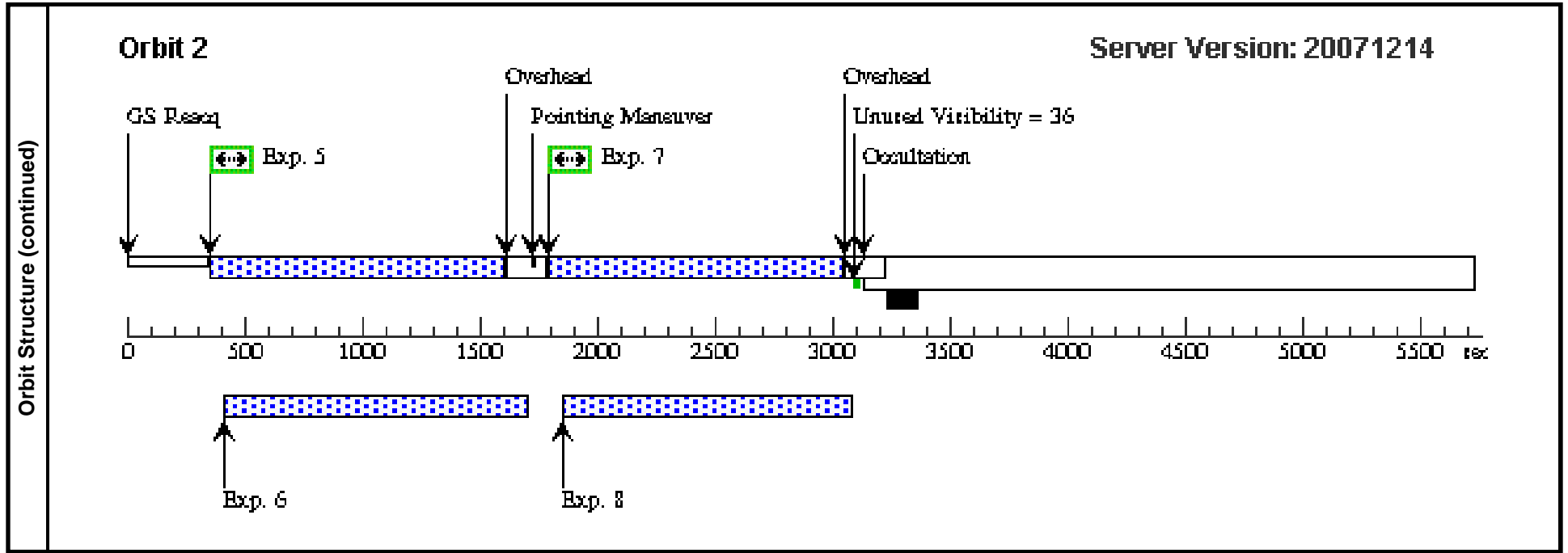
We will also obtain parallel NIC3 exposures in order to constrain the optical to near-infrared colors of NGC 4472 globular clusters over a range of galactocentric distances. The optical to near-ir colors provide important constraints on the metallicities and ages of the globular clusters, and the parallel NICMOS data will extend these over a greater range of radii than previously observed

Proposal 11209 - Visit 01 - Determining the Structural Parameters of the First Globular Cluster Found to Host an Blac...

Tue May 06 01:01:24 GMT 2008

Visit	Proposal 11209, Visit 01, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: WFPC2, NIC3 Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(1)	NGC4472-BHGC	RA: 12 29 39.7200 (187.4155000d) Dec: +07 53 33.40 (7.89261d) Equinox: J2000		V=21	Reference Frame: OWN PHOTOMETRY				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) NGC4472-BHG C	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO		Prime + Parallel Group 1-2	1100.0 Secs [==>]	[1]
	2		ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=22; SAMP-SEQ=SPAR S64		Prime + Parallel Group 1-2	[==>]	[1]
	3		(1) NGC4472-BHG C	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.5,0.25	Prime + Parallel Group 3-4	1100.0 Secs [==>]	[1]
	4		ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=21; SAMP-SEQ=SPAR S64		Prime + Parallel Group 3-4	[==>]	[1]
	5		(1) NGC4472-BHG C	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.75,0.7 5	Prime + Parallel Group 5-6	1100.0 Secs [==>]	[2]
	6		ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=22; SAMP-SEQ=SPAR S64		Prime + Parallel Group 5-6	[==>]	[2]
	7		(1) NGC4472-BHG C	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.25,0.5	Prime + Parallel Group 7-8	1100.0 Secs [==>]	[2]
	8		ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=21; SAMP-SEQ=SPAR S64		Prime + Parallel Group 7-8	[==>]	[2]

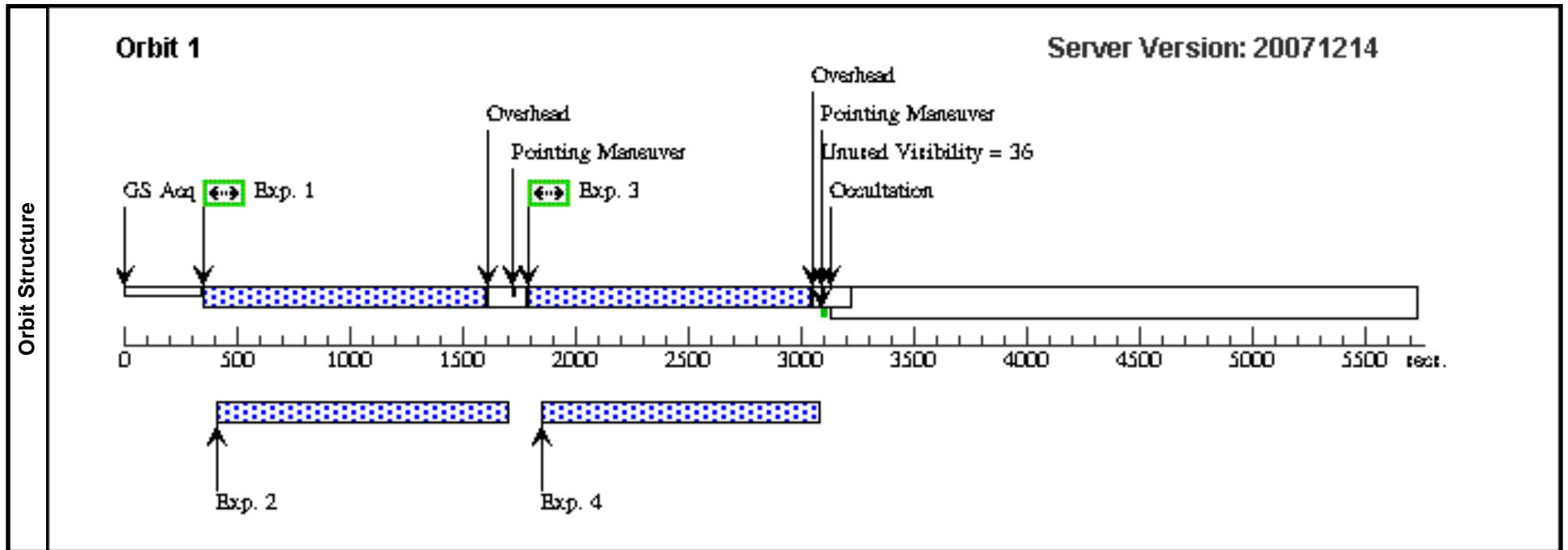


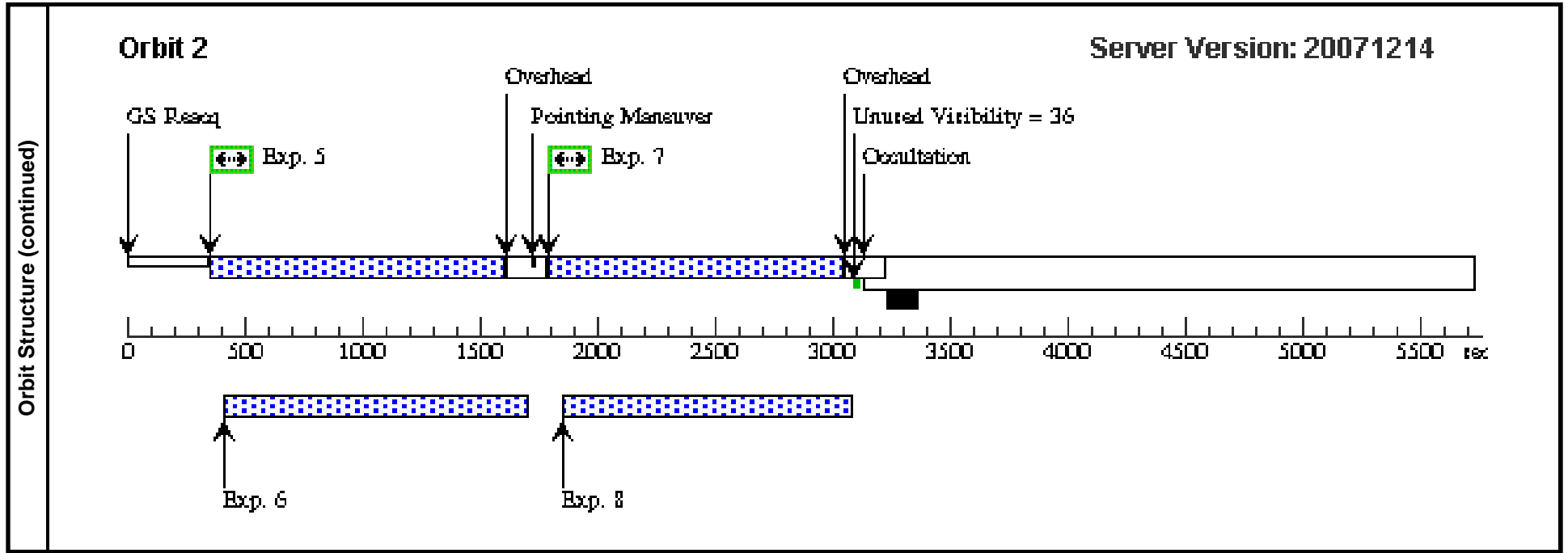


Proposal 11209 - Visit 02 - Determining the Structural Parameters of the First Globular Cluster Found to Host an Blac...

Tue May 06 01:01:25 GMT 2008

Visit	Proposal 11209, Visit 02, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: WFPC2, NIC3 Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(2)	NGC4472-FIELD2	RA: 12 29 34.0800 (187.3920000d) Dec: +08 05 53.30 (8.09814d) Equinox: J2000			V=21	Reference Frame: OWN PHOTOMETRY			
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(2) NGC4472-FIELD2	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO		Prime + Parallel Group 1-2	1100.0 Secs [==>]	[1]
	2		ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=22; SAMP-SEQ=SPAR S64		Prime + Parallel Group 1-2	[==>]	[1]
	3		(2) NGC4472-FIELD2	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.5,0.25	Prime + Parallel Group 3-4	1100.0 Secs [==>]	[1]
	4		ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=21; SAMP-SEQ=SPAR S64		Prime + Parallel Group 3-4	[==>]	[1]
	5		(2) NGC4472-FIELD2	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.75,0.75	Prime + Parallel Group 5-6	1100.0 Secs [==>]	[2]
	6		ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=22; SAMP-SEQ=SPAR S64		Prime + Parallel Group 5-6	[==>]	[2]
	7		(2) NGC4472-FIELD2	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.25,0.5	Prime + Parallel Group 7-8	1100.0 Secs [==>]	[2]
	8		ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=21; SAMP-SEQ=SPAR S64		Prime + Parallel Group 7-8	[==>]	[2]

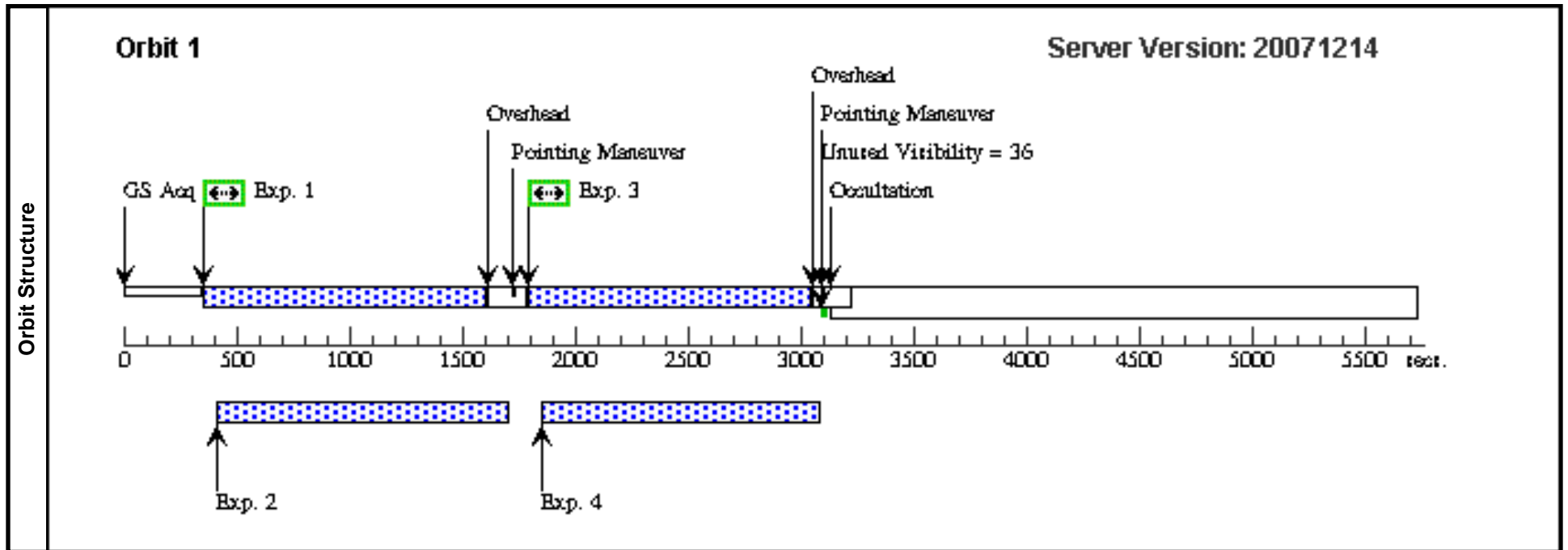


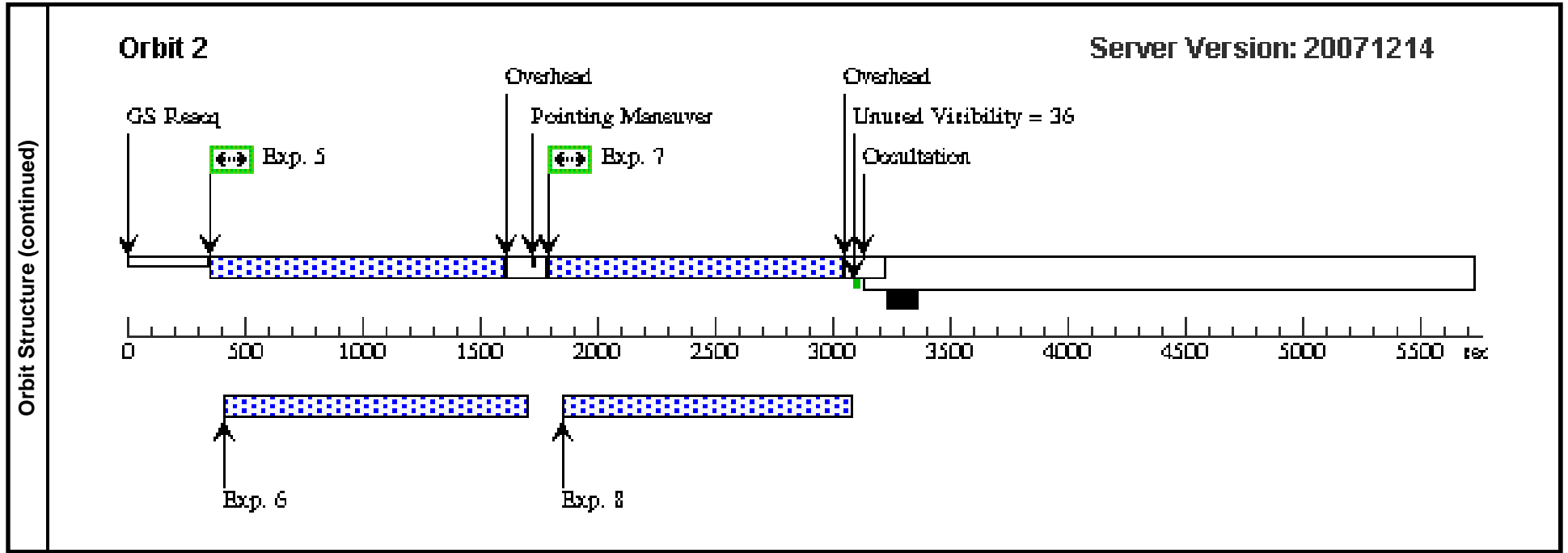


Proposal 11209 - Visit 03 - Determining the Structural Parameters of the First Globular Cluster Found to Host an Blac...

Tue May 06 01:01:26 GMT 2008

Visit	Proposal 11209, Visit 03, completed Diagnostic Status: No Diagnostics Scientific Instruments: WFPC2, NIC3 Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(3)	NGC4472-FIELD3	RA: 12 29 25.1600 (187.3548333d) Dec: +08 03 39.00 (8.06083d) Equinox: J2000		V=21	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(3) NGC4472-FIELD3	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO		Prime + Parallel Group 1-2	1100.0 Secs [==>]	[1]	
	2	ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=22; SAMP-SEQ=SPAR S64		Prime + Parallel Group 1-2	[==>]	[1]	
	3	(3) NGC4472-FIELD3	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.5,0.25	Prime + Parallel Group 3-4	1100.0 Secs [==>]	[1]	
	4	ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=21; SAMP-SEQ=SPAR S64		Prime + Parallel Group 3-4	[==>]	[1]	
	5	(3) NGC4472-FIELD3	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.75,0.75	Prime + Parallel Group 5-6	1100.0 Secs [==>]	[2]	
	6	ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=22; SAMP-SEQ=SPAR S64		Prime + Parallel Group 5-6	[==>]	[2]	
	7	(3) NGC4472-FIELD3	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.25,0.5	Prime + Parallel Group 7-8	1100.0 Secs [==>]	[2]	
	8	ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=21; SAMP-SEQ=SPAR S64		Prime + Parallel Group 7-8	[==>]	[2]	

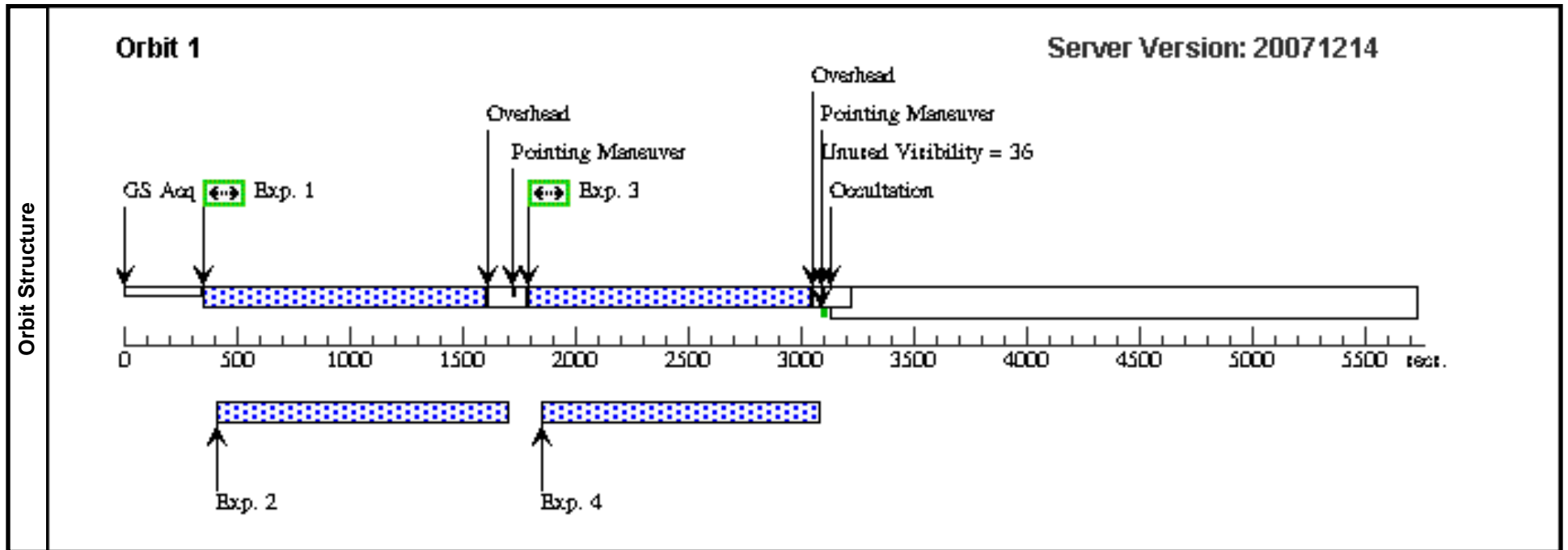


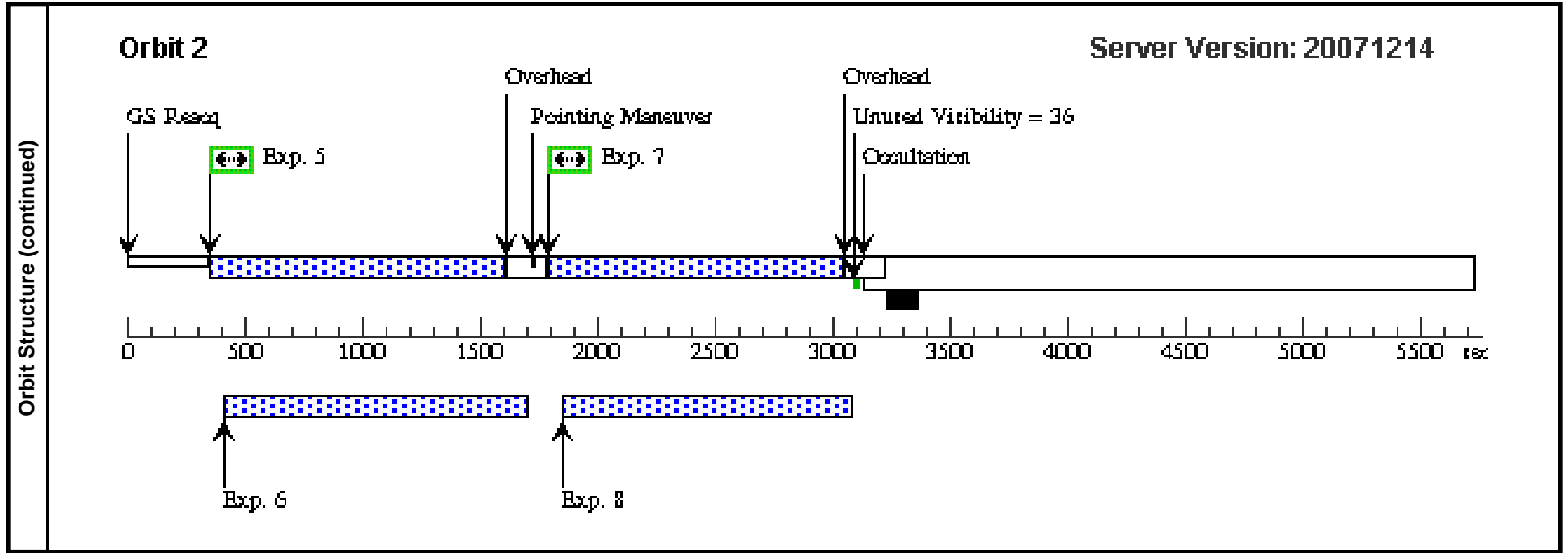


Proposal 11209 - Visit 04 - Determining the Structural Parameters of the First Globular Cluster Found to Host an Blac...

Tue May 06 01:01:27 GMT 2008

Visit	Proposal 11209, Visit 04, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: WFPC2, NIC3 Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(4)	NGC4472-FIELD4	RA: 12 30 6.5800 (187.5274167d) Dec: +07 59 37.40 (7.99372d) Equinox: J2000		V=21	Reference Frame: OWN PHOTOMETRY				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(4) NGC4472-FIELD4	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO		Prime + Parallel Group 1-2	1100.0 Secs [==>]	[1]	
	2	ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=22; SAMP-SEQ=SPAR S64		Prime + Parallel Group 1-2	[==>]	[1]	
	3	(4) NGC4472-FIELD4	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.5,0.25	Prime + Parallel Group 3-4	1100.0 Secs [==>]	[1]	
	4	ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=21; SAMP-SEQ=SPAR S64		Prime + Parallel Group 3-4	[==>]	[1]	
	5	(4) NGC4472-FIELD4	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.75,0.75	Prime + Parallel Group 5-6	1100.0 Secs [==>]	[2]	
	6	ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=22; SAMP-SEQ=SPAR S64		Prime + Parallel Group 5-6	[==>]	[2]	
	7	(4) NGC4472-FIELD4	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.25,0.5	Prime + Parallel Group 7-8	1100.0 Secs [==>]	[2]	
	8	ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=21; SAMP-SEQ=SPAR S64		Prime + Parallel Group 7-8	[==>]	[2]	





Proposal 11209 - Visit 05 - Determining the Structural Parameters of the First Globular Cluster Found to Host an Blac...

Tue May 06 01:01:27 GMT 2008

Visit	Proposal 11209, Visit 05, implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFPC2, NIC3 Special Requirements: (none)										
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(5)	NGC4472-FIELD5	RA: 12 29 47.5000 (187.4479167d) Dec: +07 59 20.00 (7.98889d) Equinox: J2000			V=21	Reference Frame: OWN PHOTOMETRY				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
	1	(5) NGC4472-FIELD5	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	GS ACQ SCENARIO SINGLE	Prime + Parallel Group 1-2	1100.0 Secs	[1]		
	2	ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=22; SAMP-SEQ=SPAR S64		Prime + Parallel Group 1-2	[==>]	[1]		
	3	(5) NGC4472-FIELD5	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.5,0.25	Prime + Parallel Group 3-4	1100.0 Secs	[1]		
	4	ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=21; SAMP-SEQ=SPAR S64		Prime + Parallel Group 3-4	[==>]	[1]		
	5	(5) NGC4472-FIELD5	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.75,0.75	Prime + Parallel Group 5-6	1100.0 Secs	[2]		
	6	ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=22; SAMP-SEQ=SPAR S64		Prime + Parallel Group 5-6	[==>]	[2]		
	7	(5) NGC4472-FIELD5	WFPC2, IMAGE, PC1-FIX	F555W	CR-SPLIT=NO	POS TARG 0.25,0.5	Prime + Parallel Group 7-8	1100.0 Secs	[2]		
	8	ANY	NIC3, MULTIACCUM, NIC3-FIX	F160W	NSAMP=21; SAMP-SEQ=SPAR S64		Prime + Parallel Group 7-8	[==>]	[2]		

