



11703 - The Nature of the Black Hole in a NGC 4472 Globular Cluster and the Origin of Its Broad [OIII] Emission

Cycle: 17, 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) NGC4472BH-GC	STIS/CCD	4	27-Jul-2009 21:46:09.0	yes
02	(1) NGC4472BH-GC	STIS/CCD	4	27-Jul-2009 21:46:17.0	yes
03	(1) NGC4472BH-GC	STIS/CCD	4	27-Jul-2009 21:46:26.0	yes
04	(1) NGC4472BH-GC	STIS/CCD	4	27-Jul-2009 21:46:32.0	yes

16 Total Orbits Used

ABSTRACT

We propose to use STIS to obtain optical spectroscopy at high spatial resolution of the black hole-hosting globular cluster RZ2109 in the Virgo elliptical NGC 4472. This is motivated by our very recent discovery broad [OIII] 4959, 5007 emission with a width of several thousand km/s in this globular cluster. The STIS spectroscopy will enable us to determine if the very broad [OIII] emission is due to material driven at high velocity from the central accreting black hole across the globular cluster, or if the velocity widths are due to gravitational motions very close to the central black hole. In the former case, the [OIII] emission should extend over a few-tenths of an arcsecond and be spatially resolved by HST and STIS, while in the latter case, the emission lines will be unresolved. Distinguishing between these two possibilities will allow us to - 1) determine whether the black hole is of intermediate mass or a stellar mass, and thereby whether the black hole mass - sigma relation extends to globular cluster masses, 2) test models of black hole formation and evolution in dense stellar systems, and 3) address the nature of accretion in the high luminosity black-hole X-ray source, and constrain the feedback processes from luminous black holes into their surrounding medium in dense stellar systems.

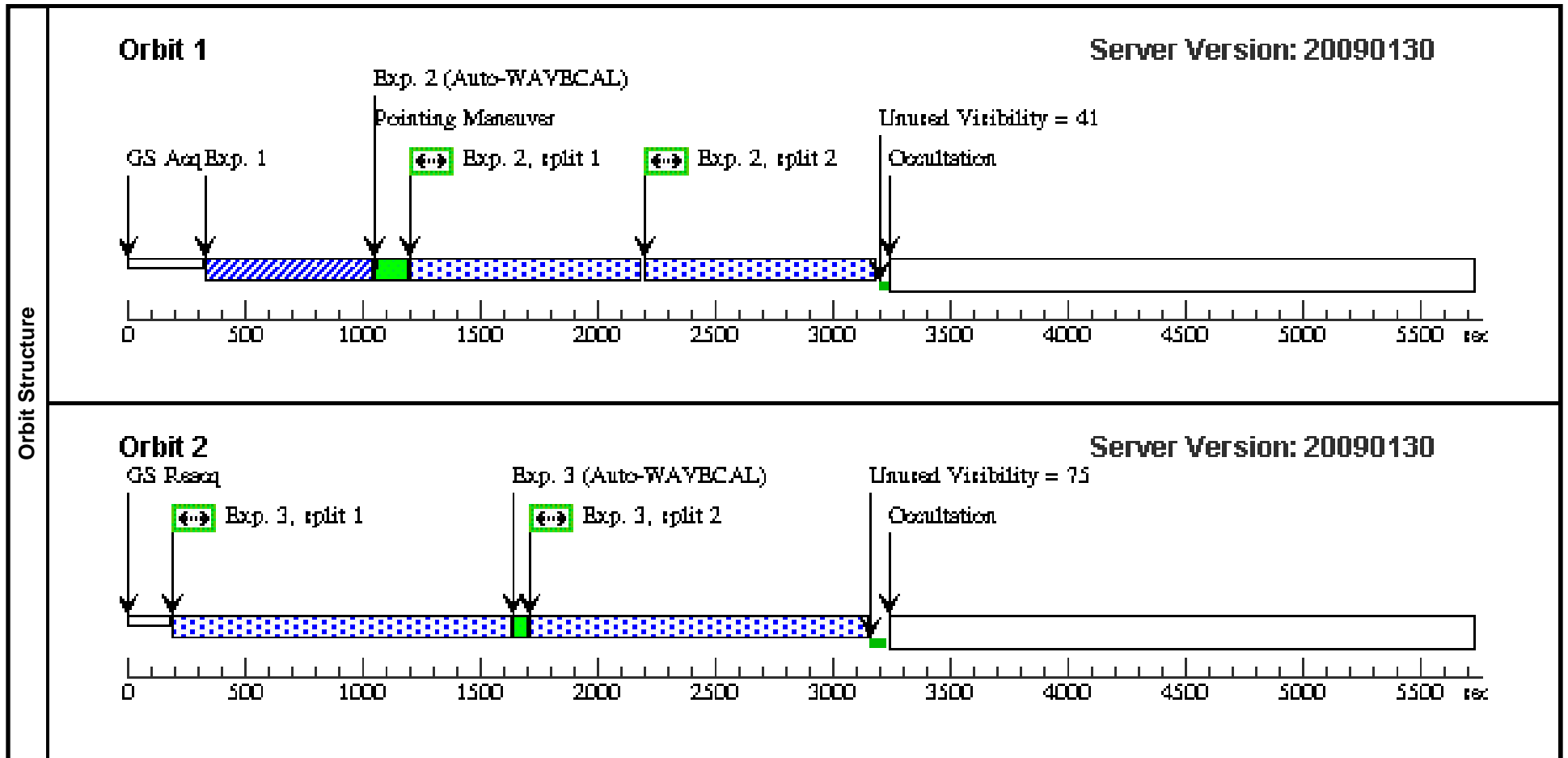
OBSERVING DESCRIPTION

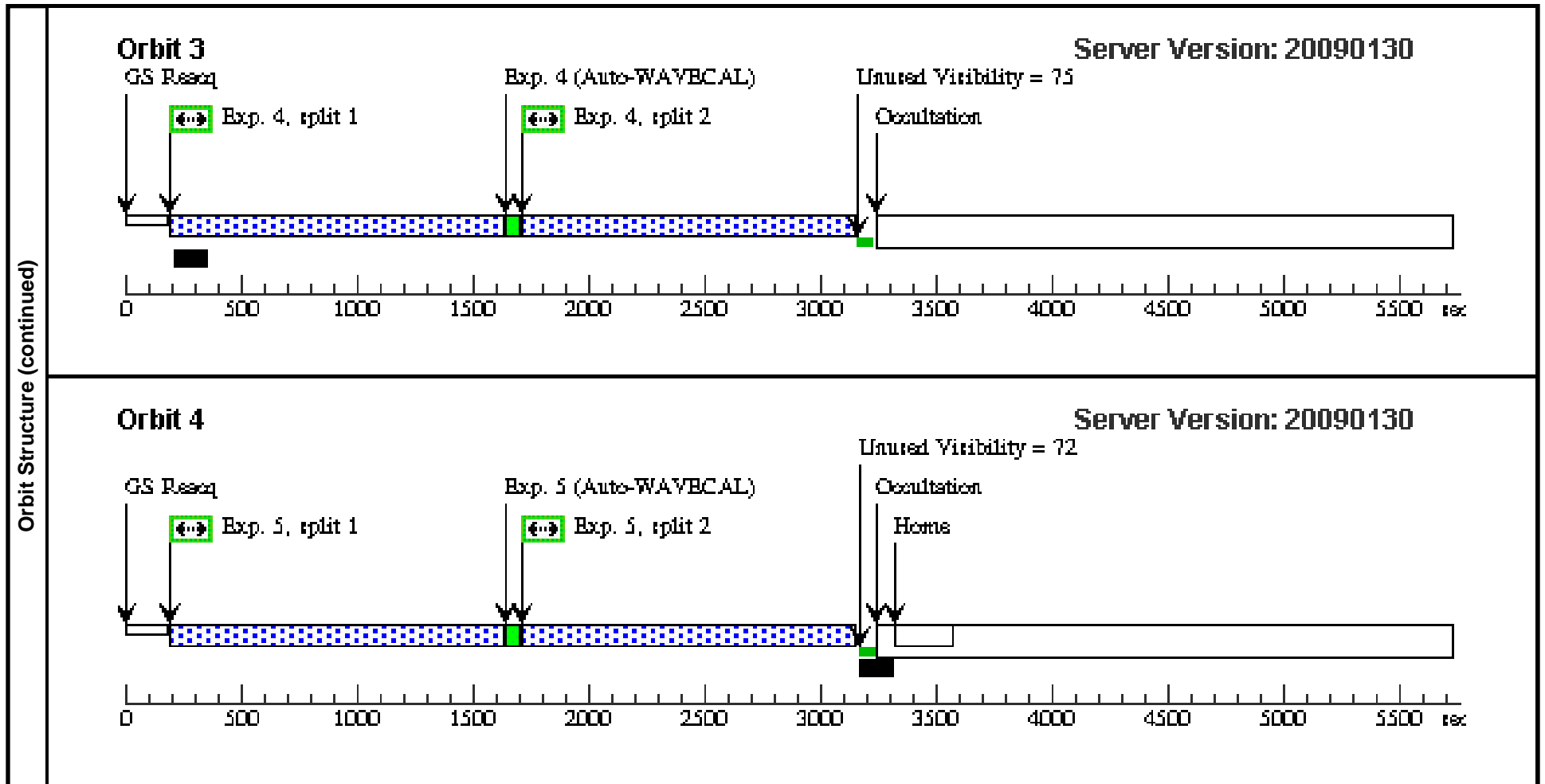
The primary goal of our proposal is to determine whether the observed broad [OIII] emission in the black-hole hosting globular cluster RZ2109 in NGC 4472 comes from spatially extended material driven across the globular cluster, corresponding to scale of a few tenths of an arcsecond, or if the large velocity width of the [OIII] is caused by material located very near the black hole, in which case it will be unresolved, even with HST. Distinguishing between these two requires the spatial resolution of HST, thus we will use STIS with the G430L grating and the 50x0.2 slit. We will specifically obtain spectra in four visits of four orbits each, with somewhat different position angles for each visit in order to constrain asymmetry in any spatially extended material.

Proposal 11703 - Visit 01 - The Nature of the Black Hole in a NGC 4472 Globular Cluster and the Origin of Its Broad [...]

Tue Jul 28 01:46:36 GMT 2009

Visit	Proposal 11703, Visit 01, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD Special Requirements: ORIENT 275D TO 305 D									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(1)	NGC4472BH-GC	RA: 12 29 39.6790 (187.4153292d) Dec: +07 53 32.80 (7.89244d) Equinox: J2000	Radial Velocity: 1470 km/sec	V=21	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) NGC4472BH-G C	STIS/CCD, ACQ, F28X50LP	MIRROR		GS ACQ SCENARI O BASE1B3		120 Secs [==>]	[1]
<i>Comments: Exposure time for ACQ is set by requiring S/N=40 for V=21 object spread out over a diameter of 0.4 arcseconds. This is true for all ACQ exposures in this program.</i>										
	2		(1) NGC4472BH-G C	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A				1900 Secs [==>(Split 1)] [==>(Split 2)]	[1]
	3		(1) NGC4472BH-G C	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A				2800 Secs [==>(Split 1)] [==>(Split 2)]	[2]
	4		(1) NGC4472BH-G C	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A				2800 Secs [==>(Split 1)] [==>(Split 2)]	[3]
	5		(1) NGC4472BH-G C	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A				2800 Secs [==>(Split 1)] [==>(Split 2)]	[4]

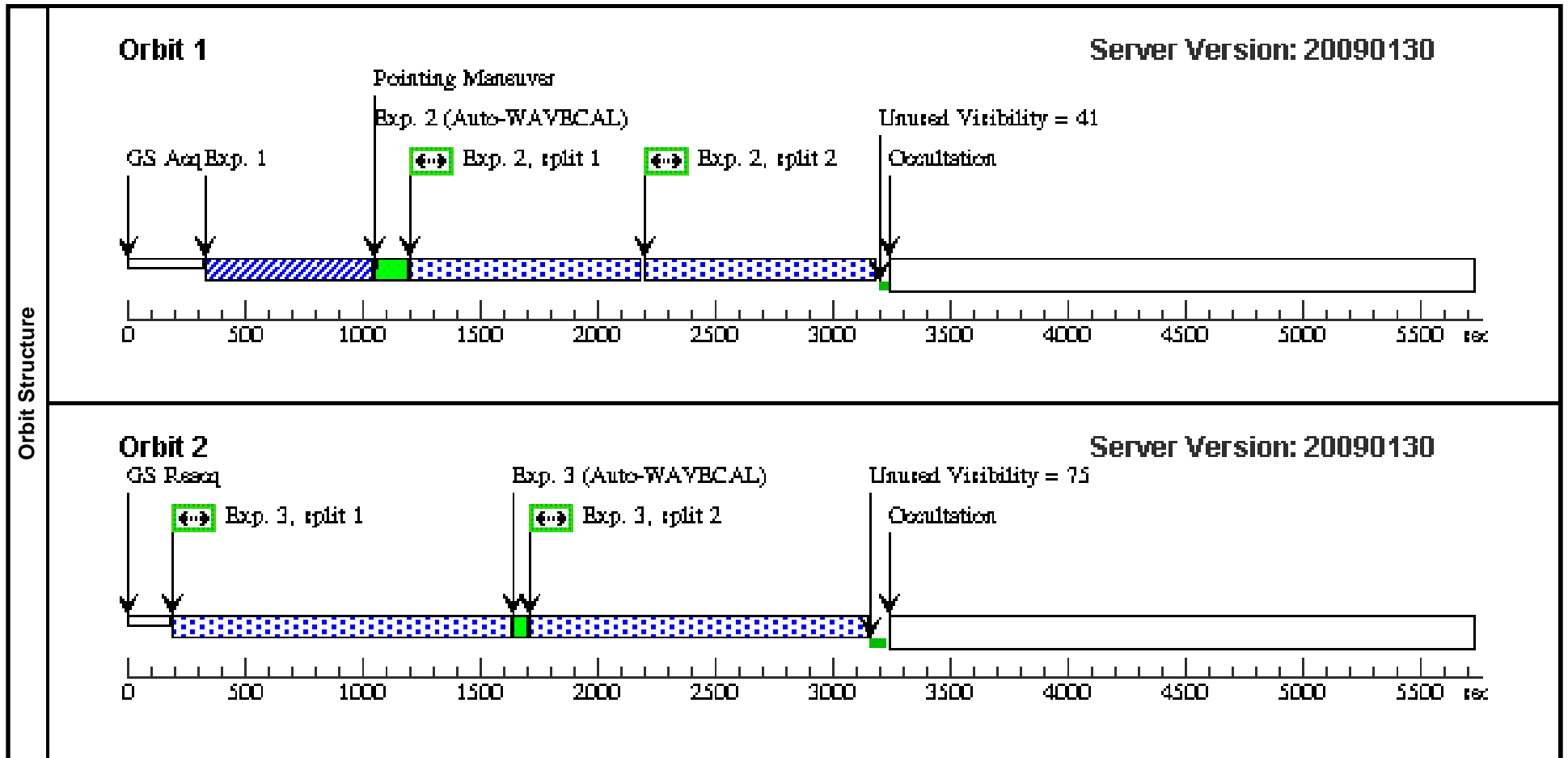


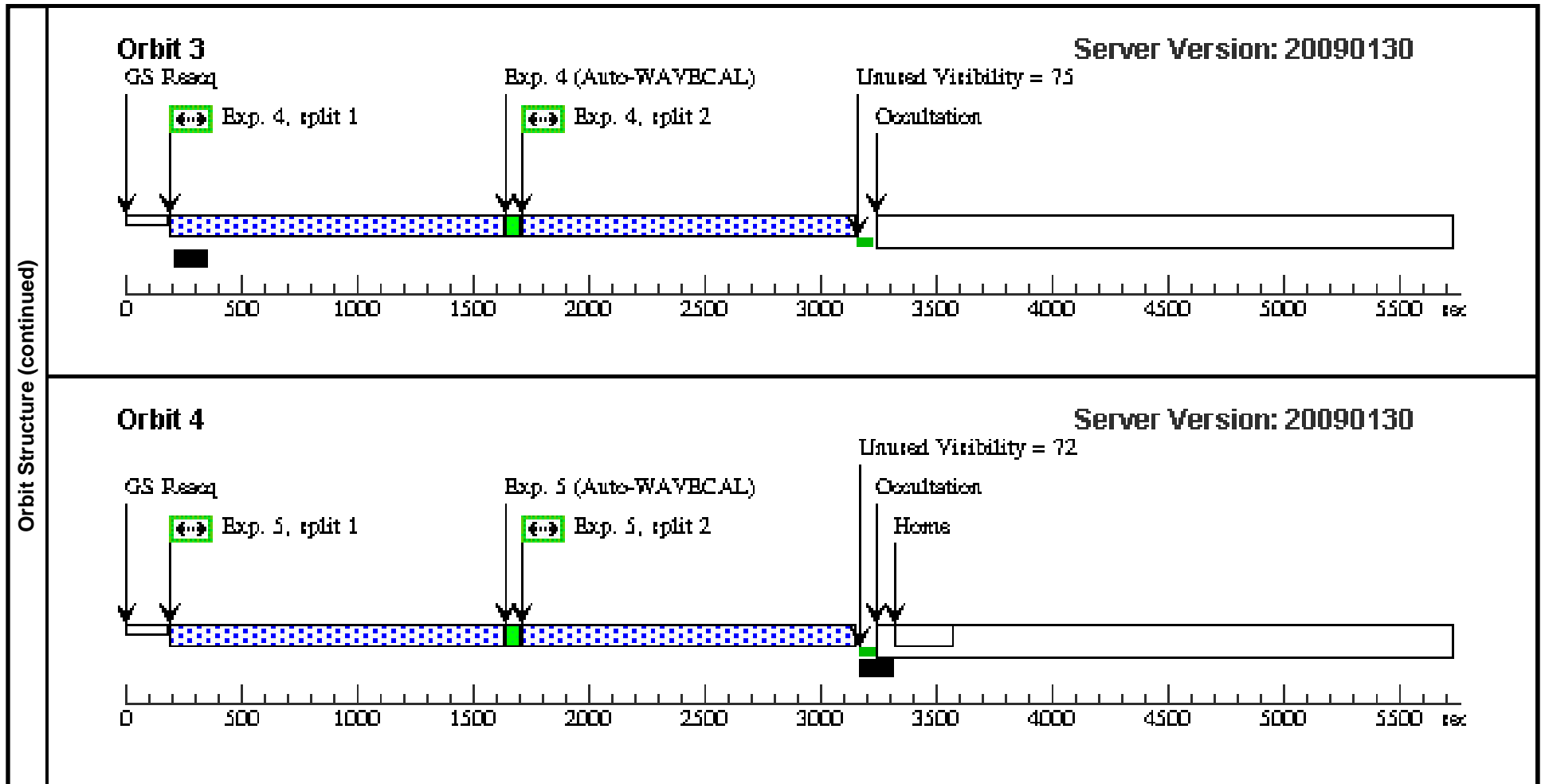


Proposal 11703 - Visit 02 - The Nature of the Black Hole in a NGC 4472 Globular Cluster and the Origin of Its Broad [...]

Tue Jul 28 01:46:37 GMT 2009

Visit	Proposal 11703, Visit 02, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD Special Requirements: ORIENT 130D TO 170 D									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(1)	NGC4472BH-GC	RA: 12 29 39.6790 (187.4153292d) Dec: +07 53 32.80 (7.89244d) Equinox: J2000	Radial Velocity: 1470 km/sec	V=21	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) NGC4472BH-G C	STIS/CCD, ACQ, F28X50LP	MIRROR				120 Secs [==>]	[1]
	2		(1) NGC4472BH-G C	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A				1900 Secs [==>(Split 1)] [==>(Split 2)]	[1]
	3		(1) NGC4472BH-G C	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A				2800 Secs [==>(Split 1)] [==>(Split 2)]	[2]
	4		(1) NGC4472BH-G C	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A				2800 Secs [==>(Split 1)] [==>(Split 2)]	[3]
	5		(1) NGC4472BH-G C	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A				2800 Secs [==>(Split 1)] [==>(Split 2)]	[4]

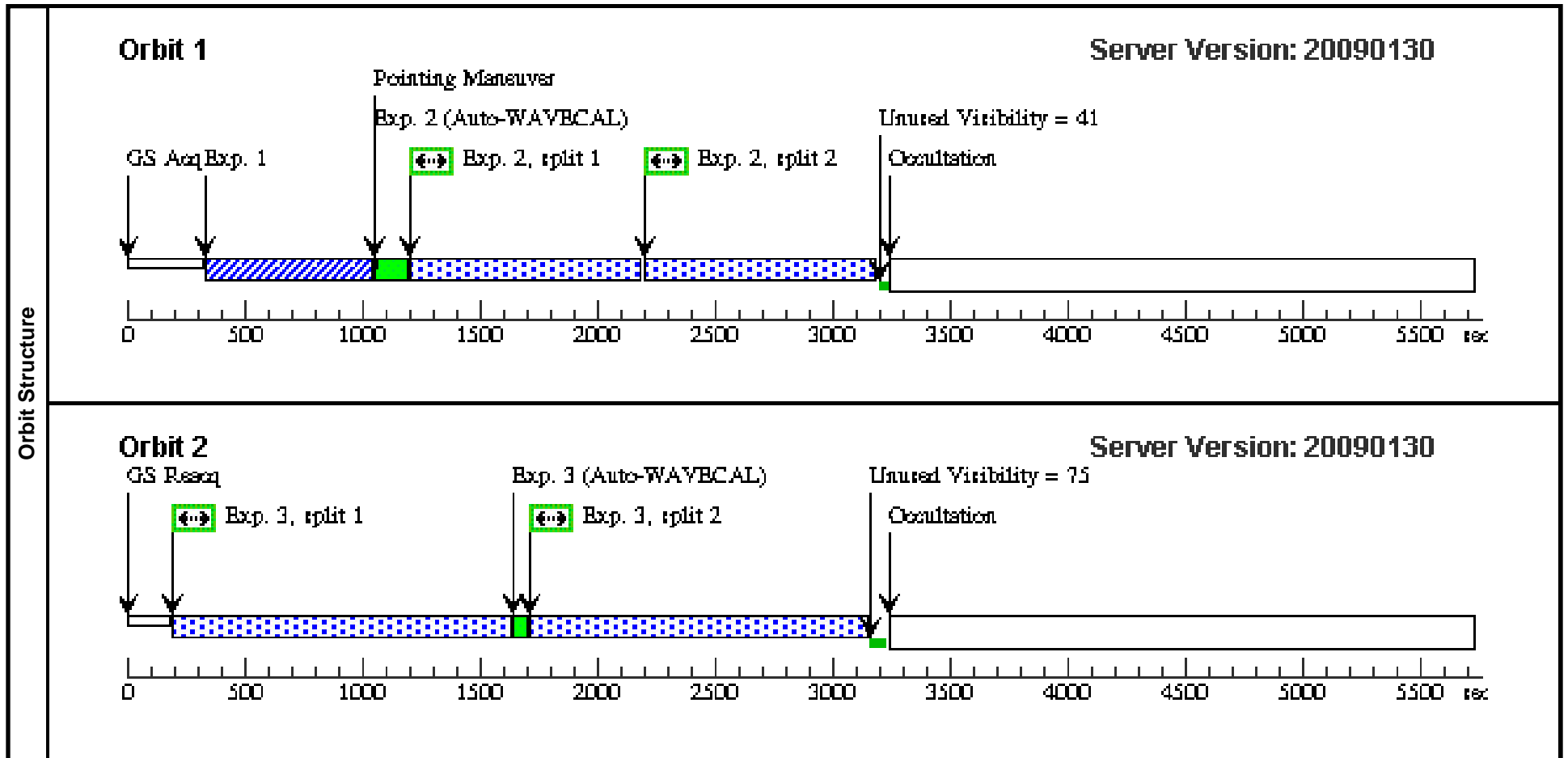


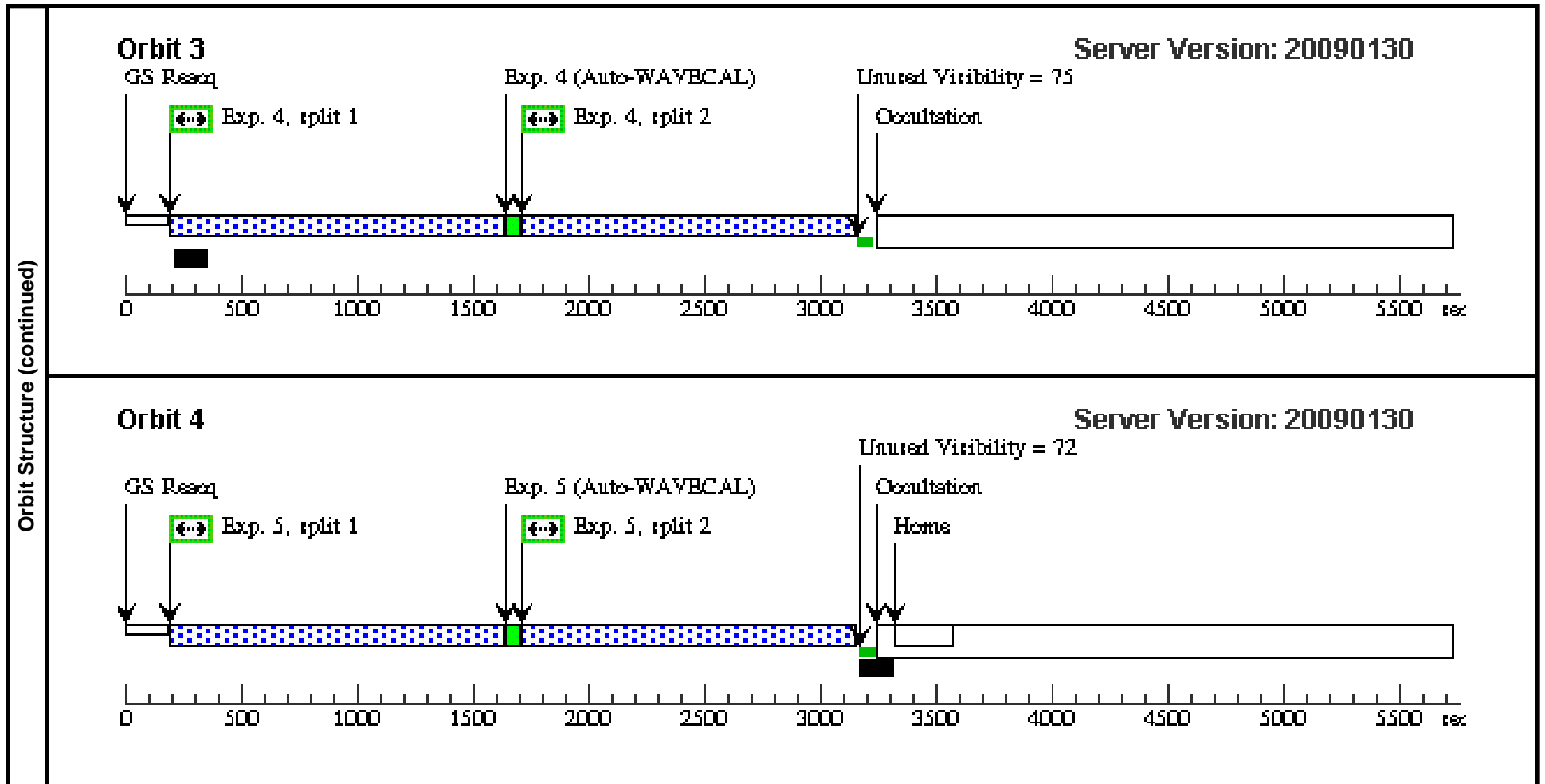


Proposal 11703 - Visit 03 - The Nature of the Black Hole in a NGC 4472 Globular Cluster and the Origin of Its Broad [...]

Tue Jul 28 01:46:39 GMT 2009

Visit	Proposal 11703, Visit 03, implementation Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD Special Requirements: ORIENT 190D TO 255 D									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(1)	NGC4472BH-GC	RA: 12 29 39.6790 (187.4153292d) Dec: +07 53 32.80 (7.89244d) Equinox: J2000	Radial Velocity: 1470 km/sec	V=21	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) NGC4472BH-G C	STIS/CCD, ACQ, F28X50LP	MIRROR		GS ACQ SCENARI O BASE1B3		120 Secs [==>]	[1]
	2		(1) NGC4472BH-G C	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A				1900 Secs [==>(Split 1)] [==>(Split 2)]	[1]
	3		(1) NGC4472BH-G C	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A				2800 Secs [==>(Split 1)] [==>(Split 2)]	[2]
	4		(1) NGC4472BH-G C	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A				2800 Secs [==>(Split 1)] [==>(Split 2)]	[3]
	5		(1) NGC4472BH-G C	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A				2800 Secs [==>(Split 1)] [==>(Split 2)]	[4]





Visit	Proposal 11703, Visit 04, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD Special Requirements: ORIENT 260D TO 280 D									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(1)	NGC4472BH-GC	RA: 12 29 39.6790 (187.4153292d) Dec: +07 53 32.80 (7.89244d) Equinox: J2000	Radial Velocity: 1470 km/sec	V=21	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) NGC4472BH-G C	STIS/CCD, ACQ, F28X50LP	MIRROR				120 Secs [==>]	[1]
	2		(1) NGC4472BH-G C	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A				1900 Secs [==>(Split 1)] [==>(Split 2)]	[1]
	3		(1) NGC4472BH-G C	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A				2800 Secs [==>(Split 1)] [==>(Split 2)]	[2]
	4		(1) NGC4472BH-G C	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A				2800 Secs [==>(Split 1)] [==>(Split 2)]	[3]
	5		(1) NGC4472BH-G C	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A				2800 Secs [==>(Split 1)] [==>(Split 2)]	[4]

