14271 - Mapping the Radiative and Kinetic History of Fading AGNs

Cycle: 23, 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-5972 (7) NGC-5972-OFFSET CCDFLAT	STIS/CCD	2	24-Jul-2015 23:22:22.0	yes
02	(2) 2MASX-J22014163+1151237 (6) 2MASX-J22014163+1151237-OFFSET	STIS/CCD	3	24-Jul-2015 23:22:24.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
03	(2) 2MASX-J22014163+1151237 (6) 2MASX-J22014163+1151237-OFFSET CCDFLAT	STIS/CCD	3	24-Jul-2015 23:22:25.0	yes
04	(3) UGC-7342 (8) UGC-7342-OFFSET-GAS CCDFLAT	STIS/CCD	4	24-Jul-2015 23:22:27.0	yes
05	(3) UGC-7342 (9) UGC-7342-OFFSET-DUST CCDFLAT	STIS/CCD	4	24-Jul-2015 23:22:29.0	yes

16 Total Orbits Used

ABSTRACT

We propose spectroscopic observations of extended emission line regions (EELRs) surrounding AGNs which appear to have faded by orders of magnitude over relatively short timescales (<100,000 years), transitioning from a bright QSO-like phase to a radiatively weak AGN phase. Recent HST images of galaxies selected by the Galaxy Zoo reveal complicated subarcsecond structures which can only be resolved with HST, including loops, filaments and misaligned ionization cones which provide important diagnostics the radiative history of these AGNs and their impact on the surrounding galactic medium.

With spatially resolved spectroscopy of the extended EELRs in these objects, we intend to probe QSO shutdown and AGN feedback on timescales shorter than possible through any other method. The emission line structure on spatial scales accessible only to HST provides evidence for recent transition from a radiative state to a kinematic, radio-dominated mode on timescales far shorter than would be expected from simple scaling of stellar-mass X-ray binaries (Done & Gierlinski, 2005). HST spectroscopy of this sample is therefore necessary, as it effectively provides the only known way to study the small-scale narrow-line features revealed by our HST imaging program.

OBSERVING DESCRIPTION

We are using STIS G430L and G750M/L (depending upon expected target brightness) to measure the strengths of extended narrow emission line structures in three fading AGN at low redshift (z~0.03-0.05) at good spatial resolution. In particular, we have chosen four sightlines which trace

likely expanding kinematic outflows, ionized cross sections of differentially precessing gas, and strong dust lanes. We will be examining a wide variety of emission lines as indicators of gas density, the ionization parameter, and gas kinematics.

Our sightlines (chosen based on pre-existing HST narrow-line images in H-alpha and [O III]) are as follows:

In NGC 5972 and SDSS J2201 (2MASX-J22014163+1151237), we are targeting sub-arcsecond bubbles or outflows perpendicular to the main ionization cones. Each of these targets has one sightline.

In UGC 7342, we have two sightlines. One is along the main filamentary extended [O III] structure. The other is along the perpendicular dust lane.

In all cases, we are using the STIS CCD with 52x0.2 arcsec slit.

We will acquire each target using the F28x50LP long-pass filter, with point-source acquisition on the HST continuum peak of the galactic nucleus.

From there, we will slew to an offset target, chosen for the ability to observe large cross-sections of the most interesting narrow-line spatial features at the widest possible range of orientation angles. The orientation angle constraints are therefore chosen to observe these emission line features (as chosen from HST imaging in H-alpha and [O III]). A 180-degree rotation is acceptable.

NGC 5972 is relatively bright and can be observed in one orbit per grating (G430L, G750M). Each grating for this target requires CR-SPLIT=3 to minimize cosmic ray contamination.

SDSS J2201 is faint, requiring 3 orbits per grating (each grating is used in a single exposure with each CR-SPLIT element covering one orbit). For ease of scheduling, we have broken this target into two visits, one each for G430L and G750L. Since we require spatial agreement between spectra, we require the same orientation angle. To prevent observations from having very large time separation, we request a two-month time grouping.

UGC 7342 has two sightlines, one along the main gas structure and one along the nuclear dust lane. The gas sightline is more difficult to schedule due to roll constraints but also more scientifically critical. We have relaxed the schedulability percentage of the gas sightline to allow greater schedulability at the cost of orbit length.

Each UGC 7342 sightline requires 2 orbits per G430L/G750L grating exposure, with CR-SPLIT=4 for each grating exposure (or 2 sub-exposures per orbit). We prefer not to break this visit into two visits if possible, since the acquisition time for this target is large.

For each G750L/M pointing, we have included 2 fringe flat exposures.

Visit

Proposal 14271, NGC 5972 - nucleus and bubbles (01), implementation Sat Jul 25 03:22:31 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: ORIENT 138.4D TO 148.4 D; ORIENT 318.4D TO 328.4 D

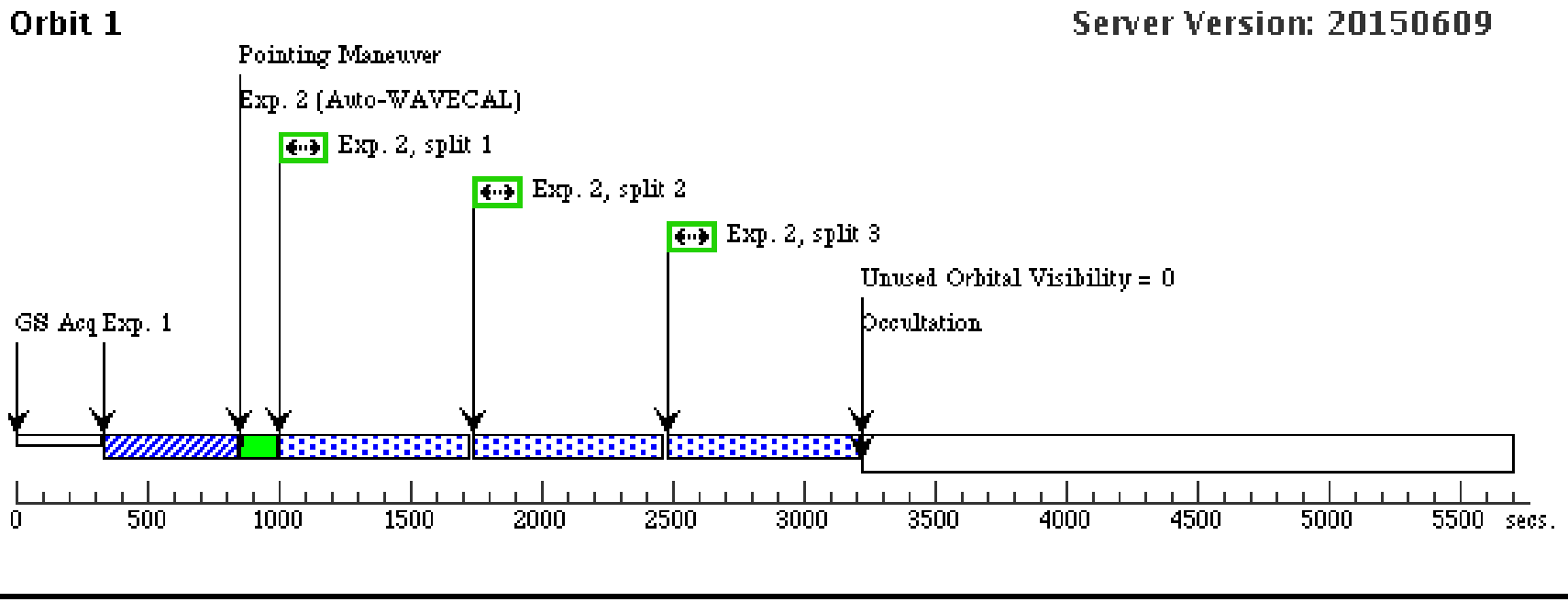
Fixed Targets

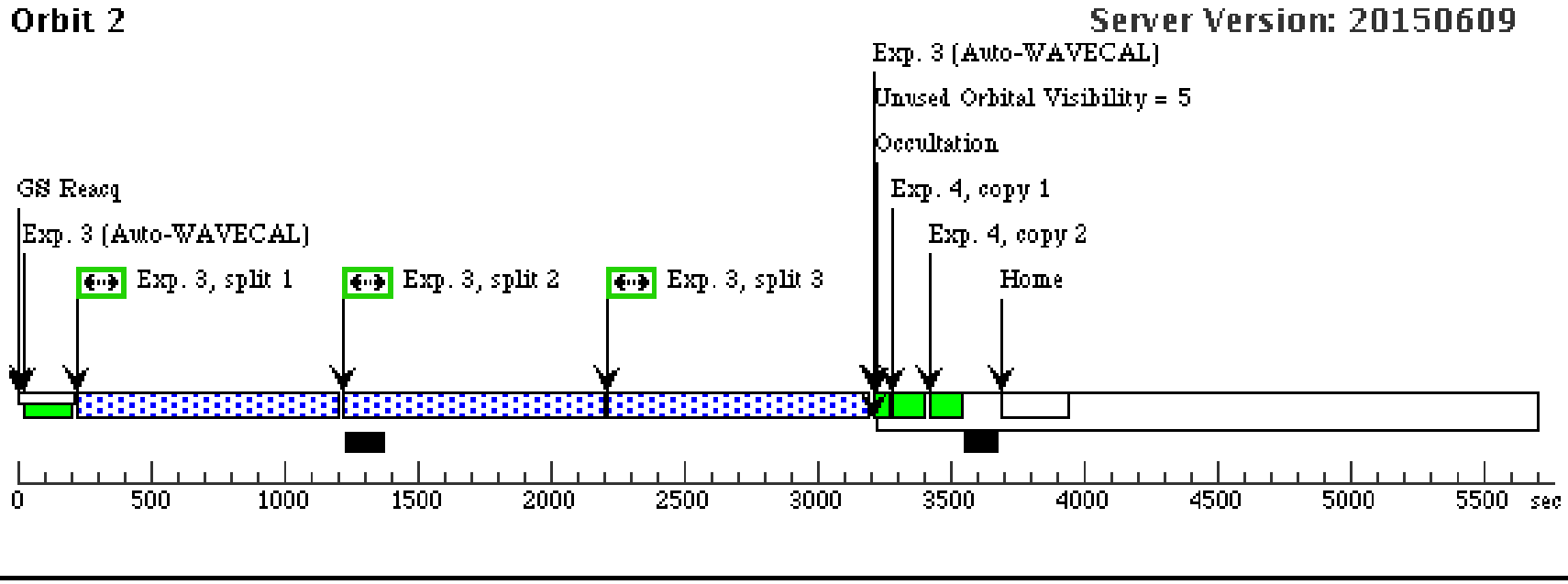
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-5972	RA: 15 38 54.1700 (234.7257083d) Dec: +17 01 34.40 (17.02622d) Equinox: J2000	Redshift: 0.030	V=14.27	Reference Frame: ICRS
Comments: This is the peak of optical emission as determined from previous HST imaging *Extended=YES*					
(7)	NGC-5972-OFFSET	RA: 15 38 54.0760 (234.7253167d) Dec: +17 01 34.59 (17.02628d) Equinox: J2000	Redshift: 0.030	V=14.27	Reference Frame: ICRS
Comments: This is the peak of optical emission as determined from previous HST imaging *Extended=YES*					

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Acquisition of NGC 5972	(1) NGC-5972	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			70 Secs (70 Secs) *[==>]*	***[1]***
2	NGC 5972 nucleus and bubbles - G430L	(7) NGC-5972-OFFSET	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A	CR-SPLIT=3			2000 Secs (2071.8 Secs) *[==>690.6 Secs (Split 1)]* *[==>690.6 Secs (Split 2)]* *[==>690.6 Secs (Split 3)]*	***[1]***
3	NGC 5972 nucleus and bubbles - G750M	(7) NGC-5972-OFFSET	STIS/CCD, ACCUM, 52X0.2	G750M 6768 A	CR-SPLIT=3			2000 Secs (2854.8 Secs) *[==>951.6 Secs (Split 1)]* *[==>951.6 Secs (Split 2)]* *[==>951.6 Secs (Split 3)]*	***[2]***
4	NGC 5972 - nucleus and bubble G750M fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.2	G750M 6768 A				*[==>(Copy 1)]* *[==>(Copy 2)]*	***[2]***

Orbit Structure





Visit

Proposal 14271, SDSS J2201 nucleus and bubble G430L (02), implementation Sat Jul 25 03:22:31 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: ORIENT 112D TO 122 D; ORIENT 292D TO 302 D; GROUP 02,03 WITHIN 60D

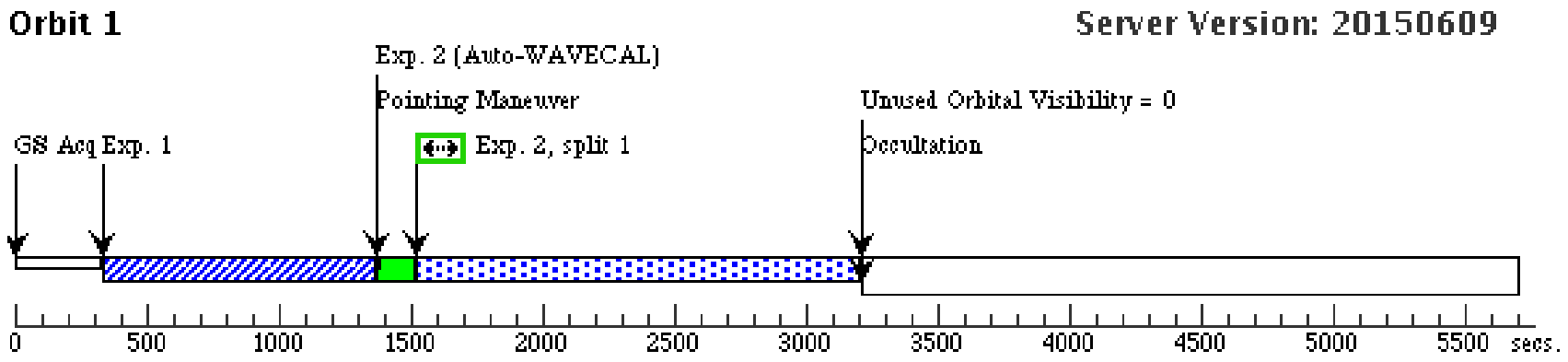
Fixed Targets

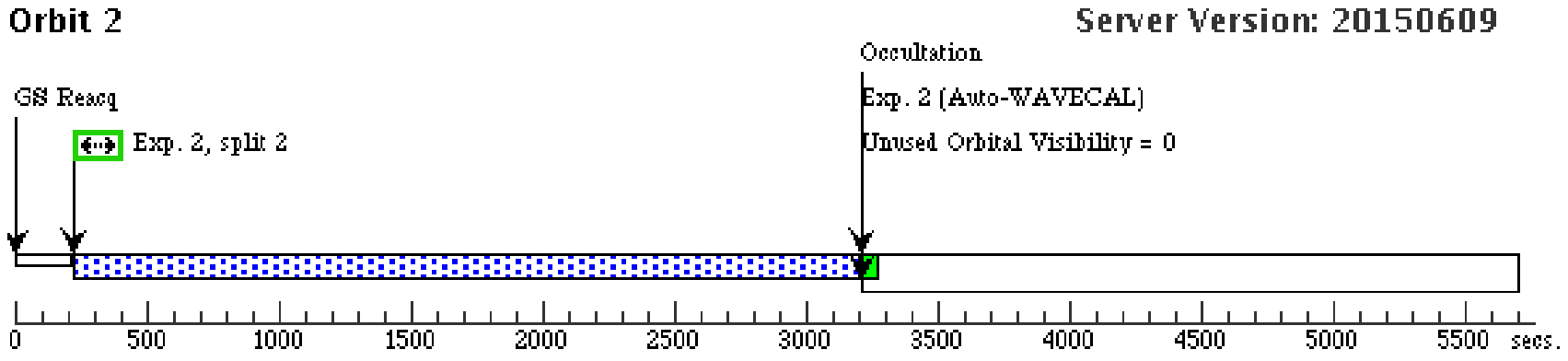
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	2MASX-J22014163+1151237	RA: 22 01 41.6050 (330.4233542d) Dec: +11 51 24.20 (11.85672d) Equinox: J2000	Redshift: 0.030	V=14.7	Reference Frame: ICRS
Comments: This is the peak of optical emission as determined from previous HST imaging Extended=YES					
(6)	2MASX-J22014163+1151237-OFFSET	RA: 22 01 41.6050 (330.4233542d) Dec: +11 51 24.10 (11.85669d) Equinox: J2000	Redshift: 0.030	V=14.7	Reference Frame: ICRS
Comments: This is the peak of optical emission as determined from previous HST imaging Extended=YES					

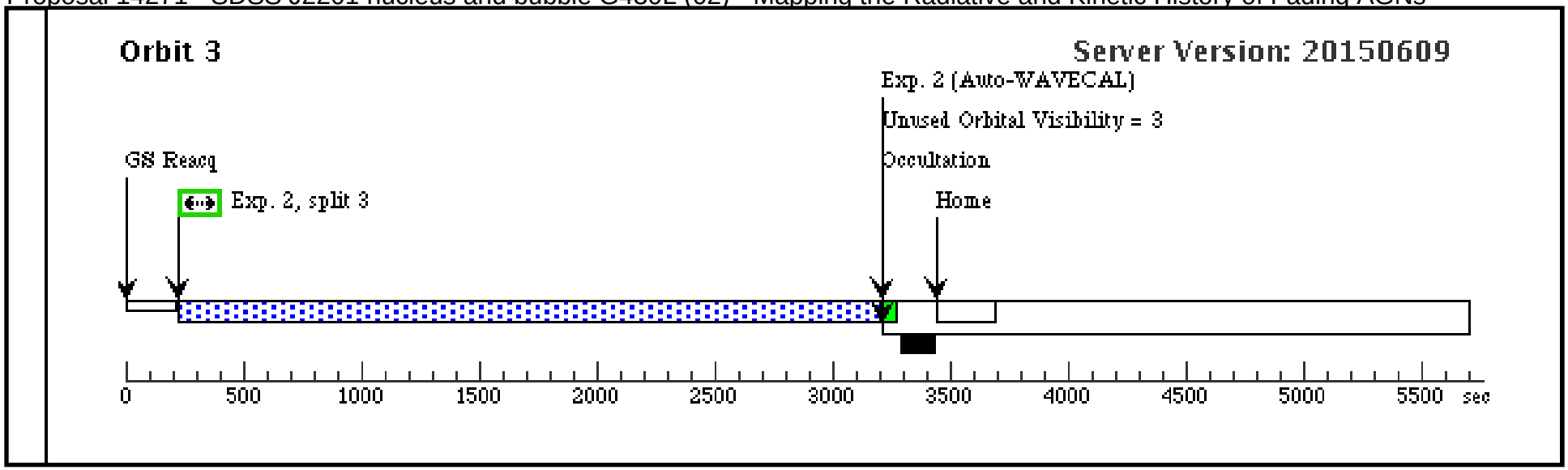
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Acquisition of SDSS J2201 for G430L	(2) 2MASX-J22014163+1151237	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	GS ACQ SCENARIO BASE1B3		200 Secs (200 Secs)	
								[==>]	***[1]***
2	SDSS J2201 nucleus and bubbles - G430L	(6) 2MASX-J22014163+1151237-OFFSET	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A	CR-SPLIT=3			4500 Secs (7530 Secs)	
								[==>1641.0 Secs (Split 1)]	***[1]***
								[==>2946.0 Secs (Split 2)]	***[2]***
								[==>2943.0 Secs (Split 3)]	***[3]***

Orbit Structure






Orbit 3
Server Version: 20150609
Exp. 2 (Auto-WAVECAL)
Unused Orbital Visibility = 3
Occultation
GS Reacq
Exp. 2, split 3
Home
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5500
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Visit

Proposal 14271, SDSS J2201 nucleus and bubble G750L (03), implementation Sat Jul 25 03:22:32 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: SAME ORIENT AS 02; GROUP 03,02 WITHIN 60D

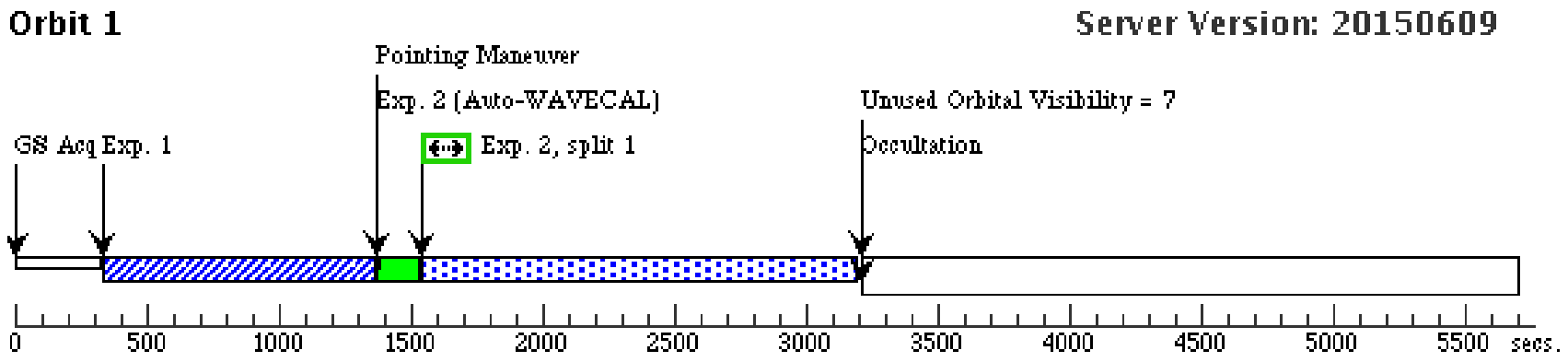
Fixed Targets

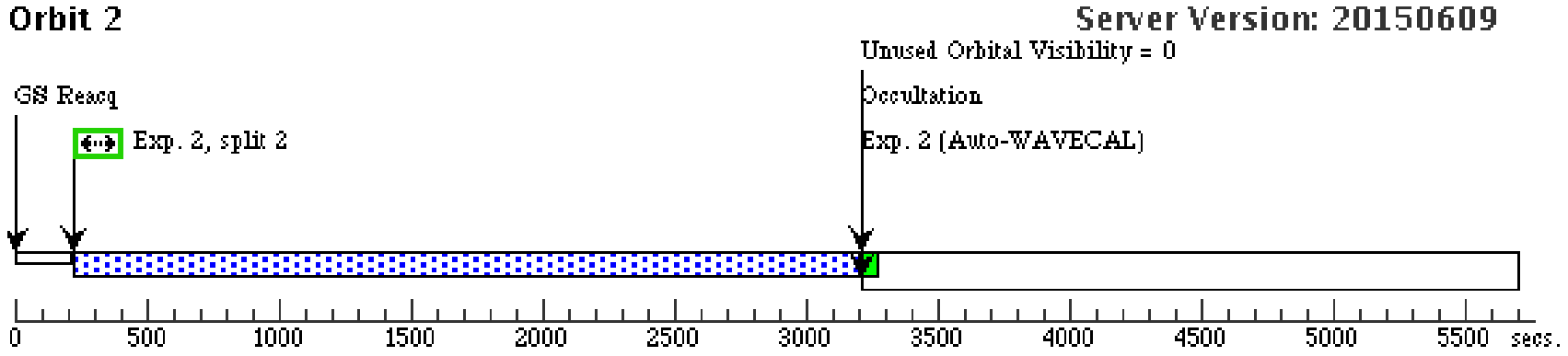
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	2MASX-J22014163+1151237	RA: 22 01 41.6050 (330.4233542d) Dec: +11 51 24.20 (11.85672d) Equinox: J2000	Redshift: 0.030	V=14.7	Reference Frame: ICRS
Comments: This is the peak of optical emission as determined from previous HST imaging Extended=YES					
(6)	2MASX-J22014163+1151237-OFFSET	RA: 22 01 41.6050 (330.4233542d) Dec: +11 51 24.10 (11.85669d) Equinox: J2000	Redshift: 0.030	V=14.7	Reference Frame: ICRS
Comments: This is the peak of optical emission as determined from previous HST imaging Extended=YES					

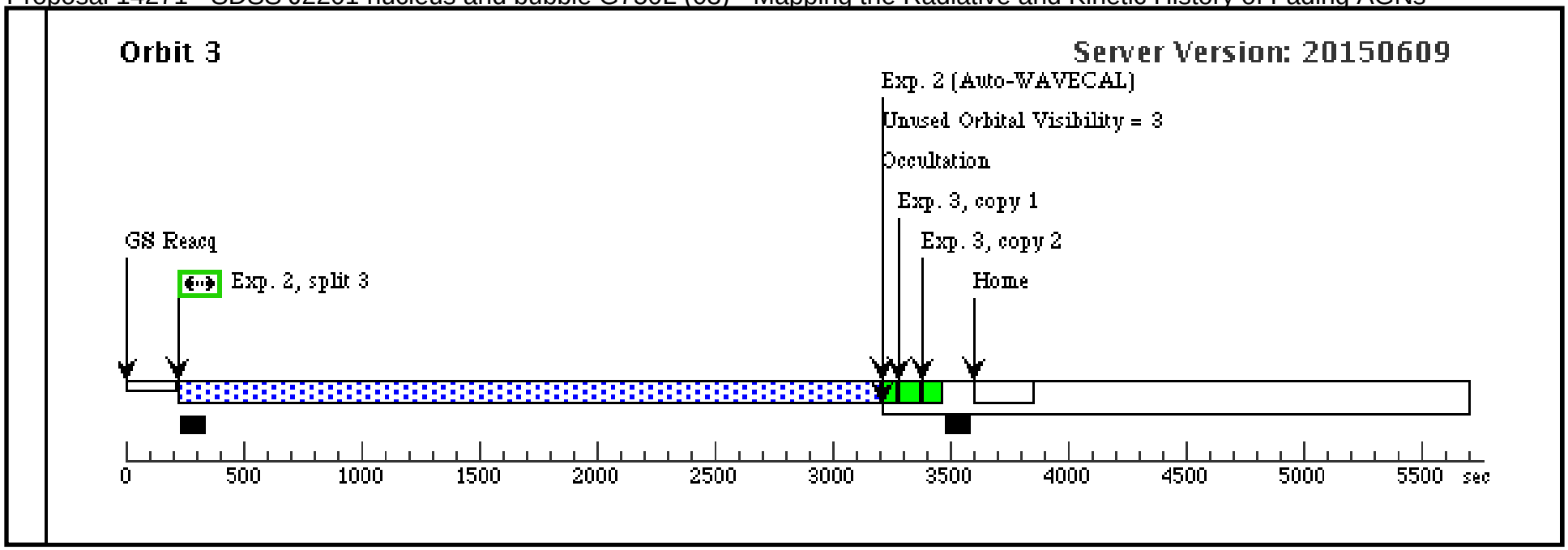
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Acquisition of SDSS J2201 for G750L	(2) 2MASX-J22014163+1151237	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	GS ACQ SCENARIO BASE1B3		200 Secs (200 Secs)	
								[==>]	***[1]***
2	SDSS J2201 nucleus and bubbles - G750L	(6) 2MASX-J22014163+1151237-OFFSET	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A	CR-SPLIT=3			4500 Secs (7503 Secs)	
								[==>1614.0 Secs (Split 1)]	***[1]***
								[==>2946.0 Secs (Split 2)]	***[2]***
								[==>2943.0 Secs (Split 3)]	***[3]***
3	SDSS J2201 nucleus and bubbles - G750L fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A				*[==>(Copy 1)]* *[==>(Copy 2)]*	***[3]***

Orbit Structure



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Exp. 3, copy 2
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GS Reacq
Exp. 2, split 3
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Visit

Proposal 14271, UGC 7342 - Gas Sightline (04), implementation Sat Jul 25 03:22:32 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: SCHED 50%; ORIENT 1.5D TO 24.7 D; ORIENT 181.5D TO 204.7 D

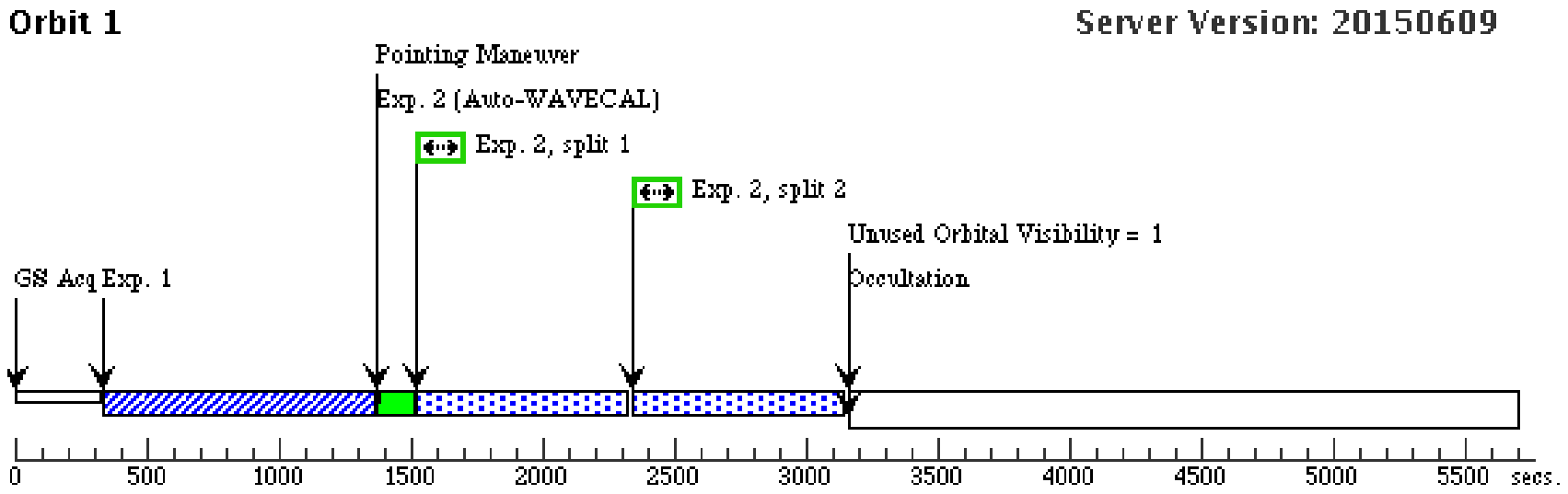
Fixed Targets

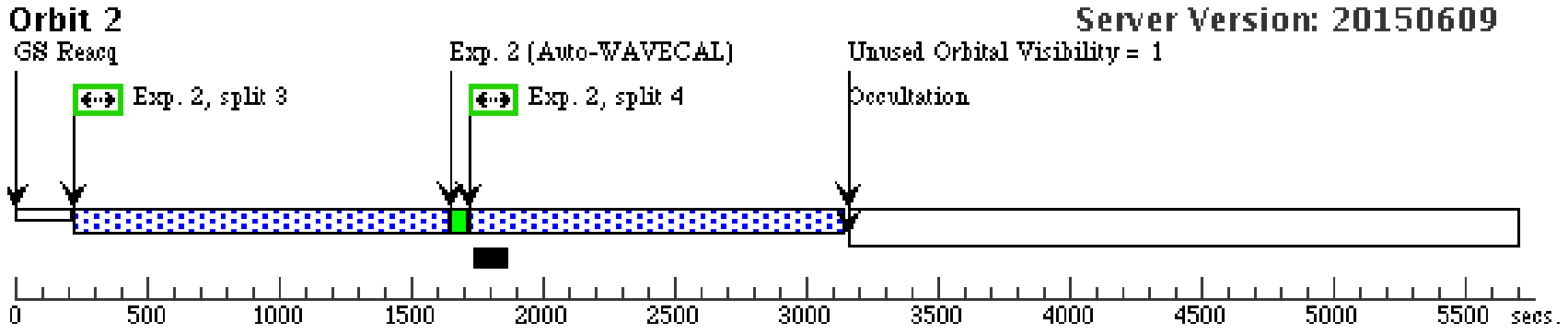
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	UGC-7342	RA: 12 18 19.3710 (184.5807125d) Dec: +29 15 12.80 (29.25356d) Equinox: J2000	Redshift: 0.0477	V=15.09	Reference Frame: ICRS
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Extended=YES					
(8)	UGC-7342-OFFSET-GAS	RA: 12 18 19.4460 (184.5810250d) Dec: +29 15 11.21 (29.25311d) Equinox: J2000	Redshift: 0.0477	V=15.09	Reference Frame: ICRS
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Extended=YES					

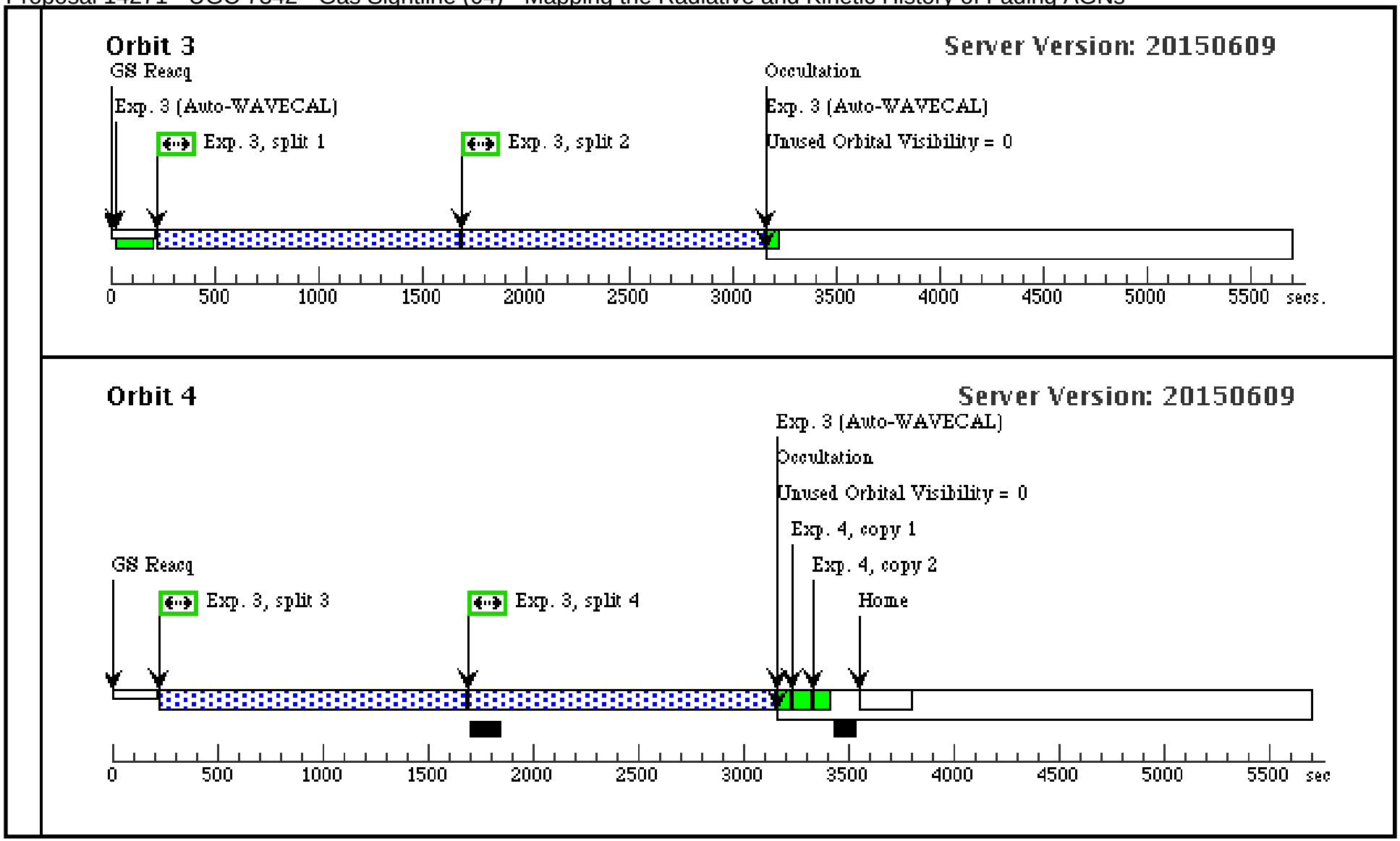
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	UGC 7342 for Gas Sightline	(3) UGC-7342	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	GS ACQ SCENARIO BASE1B3		200 Secs (200 Secs) *[==>]*	***[1]***
2	UGC 7342 for Gas Sightline - G430L	(8) UGC-7342-OFFSET-GAS	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A	CR-SPLIT=4			3000 Secs (4308 Secs) *[==>771.0 Secs (Split 1)]* *[==>771.0 Secs (Split 2)]* *[==>1383.0 Secs (Split 3)]* *[==>1383.0 Secs (Split 4)]*	***[1]*** ***[2]***
3	UGC 7342 for Gas Sightline - G750L	(8) UGC-7342-OFFSET-GAS	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A	CR-SPLIT=4			3000 Secs (5696 Secs) *[==>1424.0 Secs (Split 1)]* *[==>1424.0 Secs (Split 2)]* *[==>1424.0 Secs (Split 3)]* *[==>1424.0 Secs (Split 4)]*	***[3]*** ***[4]***
4	UGC 7342 for Gas Sightline - G750L fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A				*[==>(Copy 1)]* *[==>(Copy 2)]*	***[4]***

Orbit Structure



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Occultation
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5500
secs.
Orbit 4
Server Version: 20150609
Exp. 3 (Auto-WAVECAL)
Occultation
Unused Orbital Visibility = 0
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Exp. 4, copy 2
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GS Reacq
Exp. 3, split 3
Exp. 3, split 4
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4500
5000
5500
sec

Visit

Proposal 14271, UGC 7342 - Dust Sightline (05), implementation Sat Jul 25 03:22:32 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: ORIENT 70D TO 126.7 D; ORIENT 250D TO 306.7 D

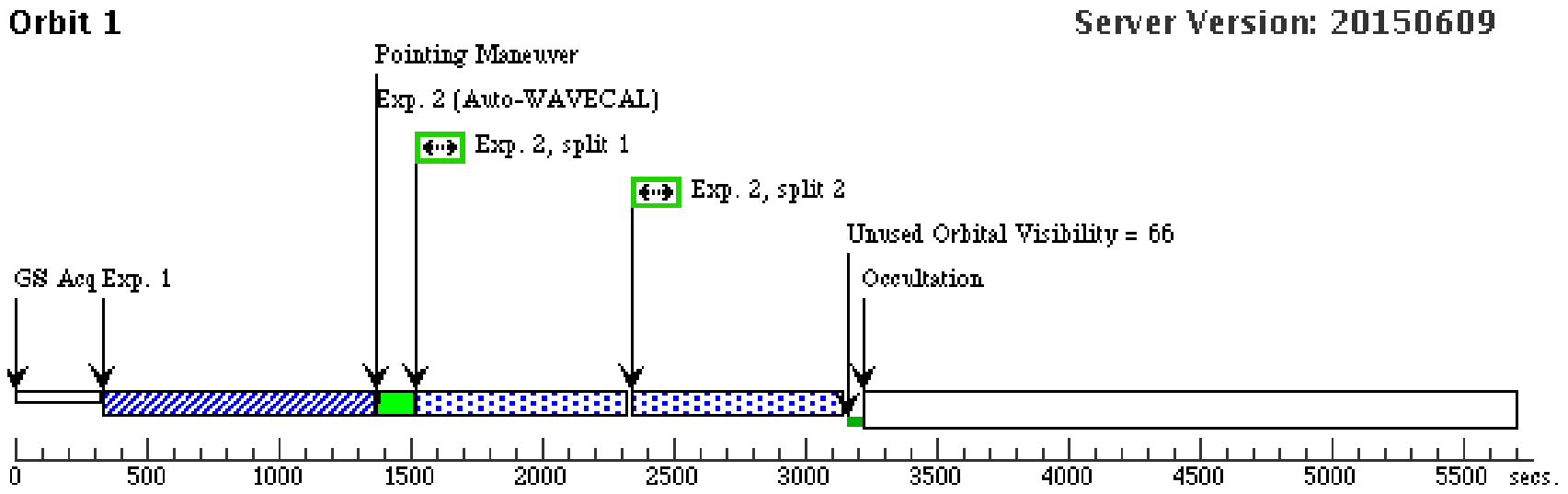
Fixed Targets

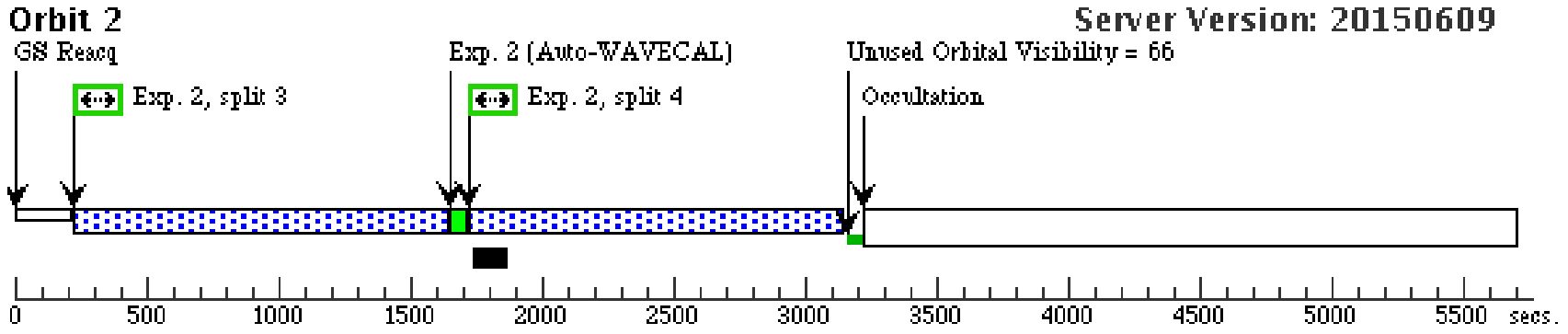
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	UGC-7342	RA: 12 18 19.3710 (184.5807125d) Dec: +29 15 12.80 (29.25356d) Equinox: J2000	Redshift: 0.0477	V=15.09	Reference Frame: ICRS
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Extended=YES					
(9)	UGC-7342-OFFSET-DUST	RA: 12 18 19.3700 (184.5807083d) Dec: +29 15 13.27 (29.25369d) Equinox: J2000	Redshift: 0.0477	V=15.09	Reference Frame: ICRS
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Extended=YES					

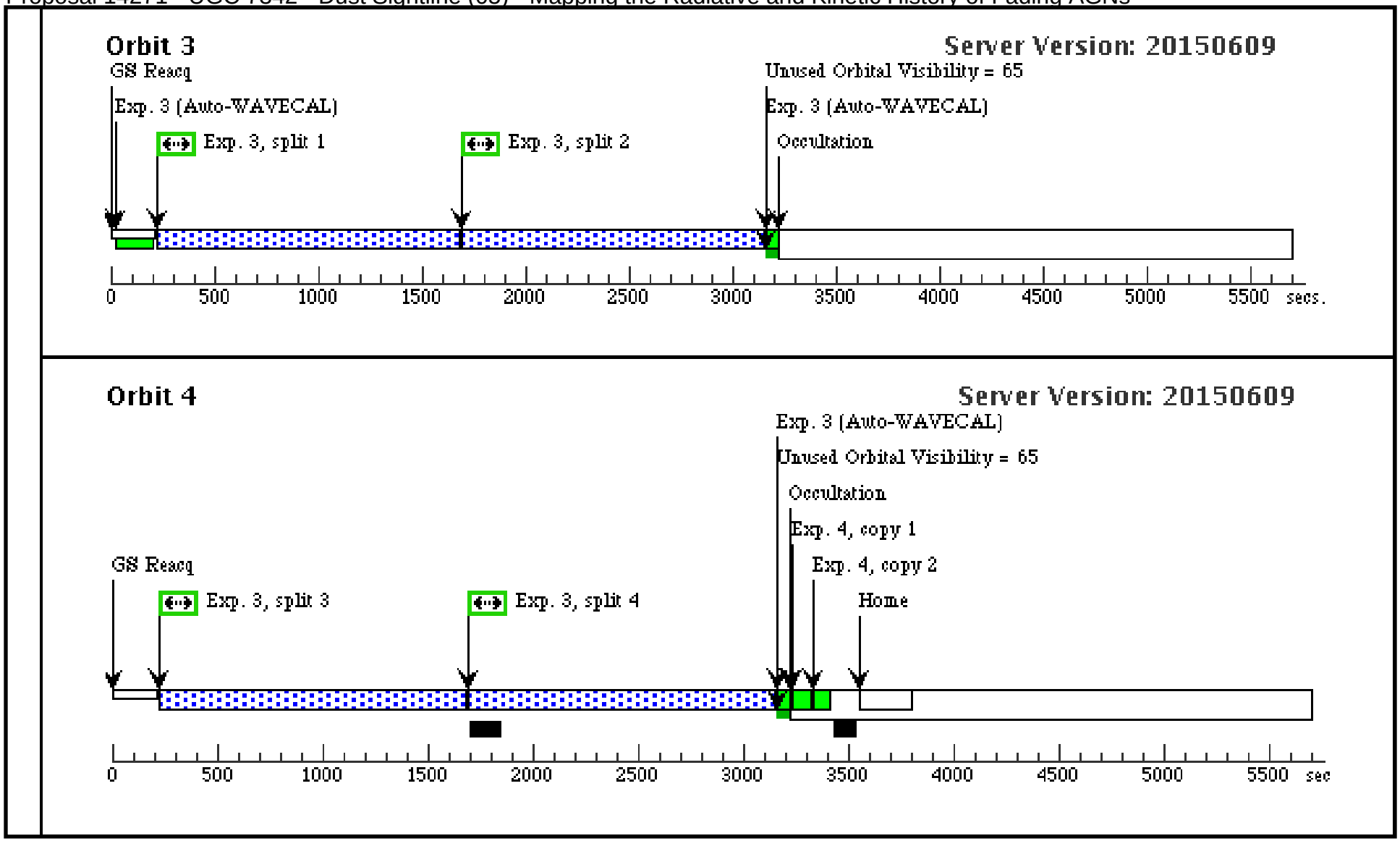
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	UGC 7342 for Dust Sightline	(3) UGC-7342	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			200 Secs (200 Secs)	
								[==>]	***[1]***
2	UGC 7342 for Dust Sightline - G430L	(9) UGC-7342-OFFSET-DUST	STIS/CCD, ACCUM, 52X0.2	G430L 4300 A	CR-SPLIT=4			3000 Secs (4308 Secs)	
								[==>771.0 Secs (Split 1)] *[==>771.0 Secs (Split 2)]*	***[1]***
								[==>1383.0 Secs (Split 3)] *[==>1383.0 Secs (Split 4)]*	***[2]***
3	UGC 7342 for Dust Sightline - G750L	(9) UGC-7342-OFFSET-DUST	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A	CR-SPLIT=4			3000 Secs (5696 Secs)	
								[==>1424.0 Secs (Split 1)] *[==>1424.0 Secs (Split 2)]*	***[3]***
								[==>1424.0 Secs (Split 3)] *[==>1424.0 Secs (Split 4)]*	***[4]***
4	UGC 7342 for Dust Sightline - G750L fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A				*[==>(Copy 1)]* *[==>(Copy 2)]*	***[4]***

Orbit Structure



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Exp. 3, split 1
Exp. 3, split 2
Unused Orbital Visibility = 65
Exp. 3 (Auto-WAVECAL)
Occultation
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1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.
Orbit 4
Server Version: 20150609
Exp. 3 (Auto-WAVECAL)
Unused Orbital Visibility = 65
Occultation
Exp. 4, copy 1
Exp. 4, copy 2
GS Reacq
Exp. 3, split 3
Exp. 3, split 4
Home
0
500
1000
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2000
2500
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3500
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4500
5000
5500
sec