13342 - WARM AND HOT GASES IN AND AROUND CLUSTER GALAXIES AT Z=0.1-0.2

Cycle: 21, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
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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) SDSS104741.75+151332.3	COS/FUV COS/NUV	6	06-Aug-2013 21:45:56.0	yes
03	(2) 2MASSIJ1431258+244220	COS/FUV COS/NUV	5	06-Aug-2013 21:46:08.0	yes

11 Total Orbits Used

ABSTRACT

We propose a joint HST/XMM-Newton observing program to study both warm and hot gases in two optically-selected galaxy clusters at z=0.117-0.2108. Each cluster has a UV-bright background QSO projected within the expected strong accretion shock (< 2r_200). We will observe UV absorption lines of the O VI doublet, HI Ly-alpha and Ly-beta, and other ion transitions in the rest frame of the clusters, using the HST/COS G130M grating. These absorption lines are sensitive to the thermal, kinetic, and chemical properties of warm (T < 10^6 K) gas, associated with the halos of individual galaxies and the intracluster medium. Chandra/ACIS observations will be used to measure the luminosity, temperature, and morphology of

the hot gas component of the clusters, especially in their core regions. This joint study will thus allow us for the first time to characterize the heating/cooling and dynamic processes of these multiple gas phases in the clusters. The understanding of these processes is essential for understanding cluster galaxy evolution, the correct interpretation of X-ray and Sunyaev-Zeldovich effect measurements, and the use of clusters as cosmology probes.

OBSERVING DESCRIPTION

To search for warm-hot cluster gas at log T = 5 - 7, and to generally constrain the thermal, kinetic, and chemical properties of the multiphase intracluster media (ICM), we will observe two QSOs behind the X-ray bright galaxy clusters Abell 1095 (z = 0.206) and Abell 1926 (z = 0.136) with the Cosmic Origins Spectrograph (COS) using the G130M grating. The wavelength range must cover strong resonance lines of species such as OVI, CIII, SiIII, and HI, so we will tilt the G130M grating to cover roughly 1150 to 1450 A. To fill in the chip gap, we will split the exposures (as equally as possible) between the central wavelength = 1309 A and 1327 A settings, and we will use multiple FP split positions to mitigate COS fixed-pattern noise. Both of the target QSOs have been imaged with GALEX, and we have used the GALEX ultraviolet fluxes to calculate exposure times for the target acquisitions and science exposures. In addition, both targets are point souces with accurate coordinates, so we will acquire the targets with the ACQ/IMAGE procedure. SDSS104741.75+151332.3 is marginally too bright to acquire with MIRRORA, so we will use MIRRORB for the target acquisition for this QSO to allow for possible quasar variability that could make the object too bright for MIRRORA.

Visit

Proposal 13342, Visit 01, implementation Wed Aug 07 01:46:16 GMT 2013

Diagnostic Status: Warning

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: (none)

Diagnostics

(Visit 01) Warning (Form): For the best data quality, it is strongly recommended that all four FP-POS positions be used when observing at a given COS CENWAVE setting.

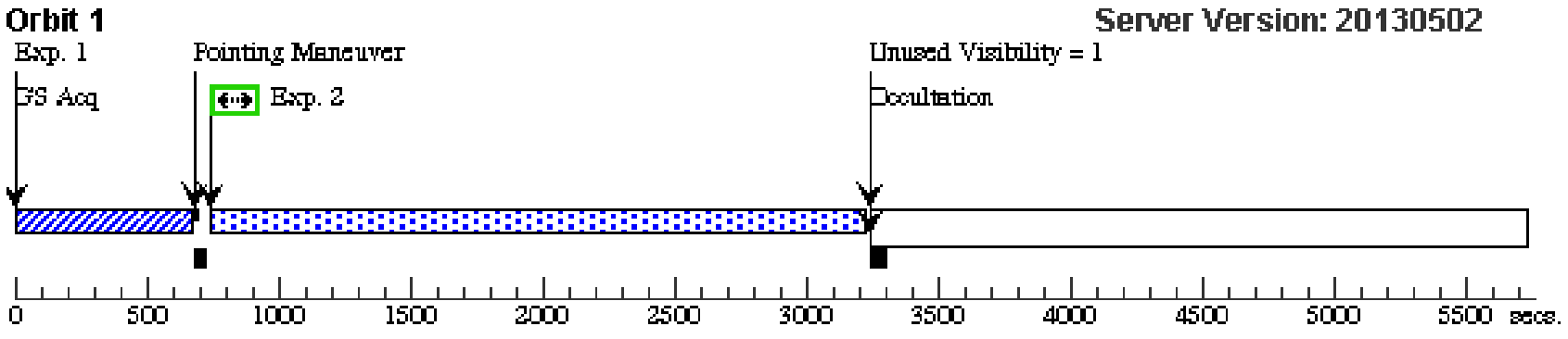
Fixed Targets

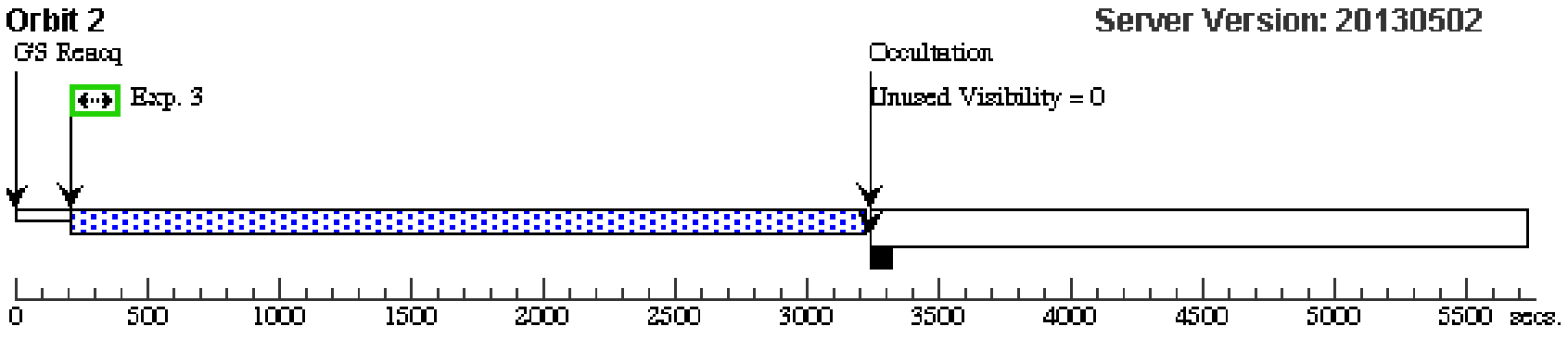
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SDSS104741.75+151332.3	RA: 10 47 41.7510 (161.9239625d) Dec: +15 13 32.30 (15.22564d) Equinox: J2000	Redshift: 0.3858	V=17.7+/-0.2 GALEX FUV = 18.20, GALEX NUV = 18.05	Reference Frame: ICRS

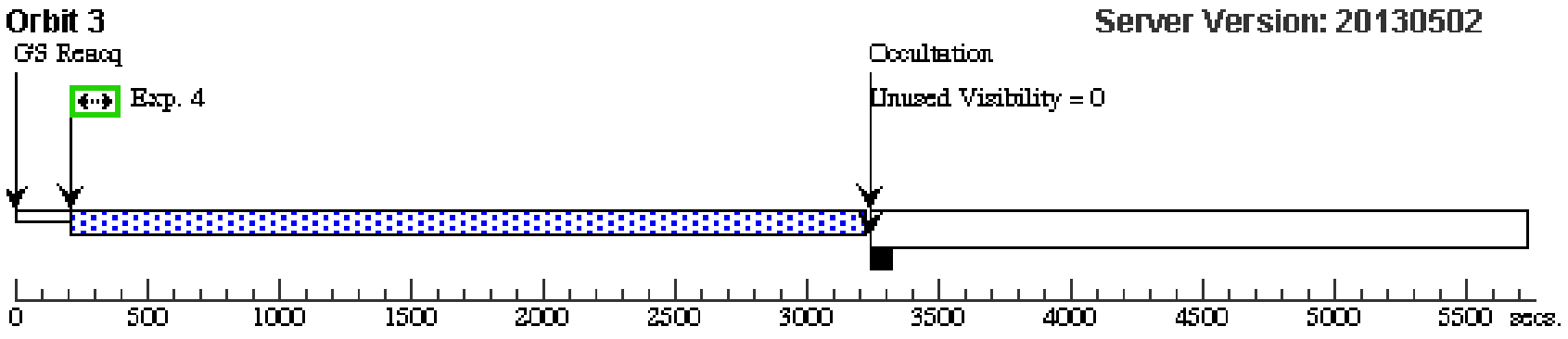
Exposures

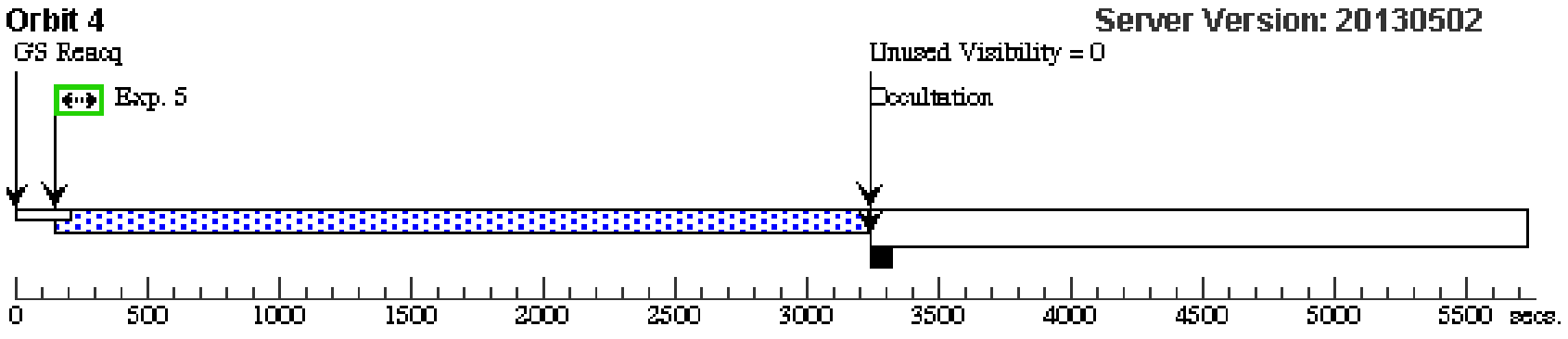
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.509008)	(1) SDSS104741.75+151332.3	COS/NUV, ACQ/IMAGE, PSA	MIRRORB		GS ACQ SCENARIO BASE1B3		120.2 Secs (120.2 Secs) *[==>]*	***[1]***
Comments: Exposure time provides S/N = 40 according to COS ETC COS.ta.509008									
2	(COS.sp.509013)	(1) SDSS104741.75+151332.3	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=4218; FP-POS=1			2302 Secs (2302 Secs) *[==>]*	***[1]***
3	(COS.sp.509013)	(1) SDSS104741.75+151332.3	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=4218; FP-POS=3			2958 Secs (2958 Secs) *[==>]*	***[2]***
4	(COS.sp.509013)	(1) SDSS104741.75+151332.3	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=4218; FP-POS=4			2958 Secs (2958 Secs) *[==>]*	***[3]***
5	(COS.sp.509022)	(1) SDSS104741.75+151332.3	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=4366; FP-POS=1			2958 Secs (2958 Secs) *[==>]*	***[4]***
6	(COS.sp.509022)	(1) SDSS104741.75+151332.3	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=4366; FP-POS=2			2958 Secs (2958 Secs) *[==>]*	***[5]***
7	(COS.sp.509022)	(1) SDSS104741.75+151332.3	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=4366; FP-POS=4			2958 Secs (2958 Secs) *[==>]*	***[6]***

Orbit Structure





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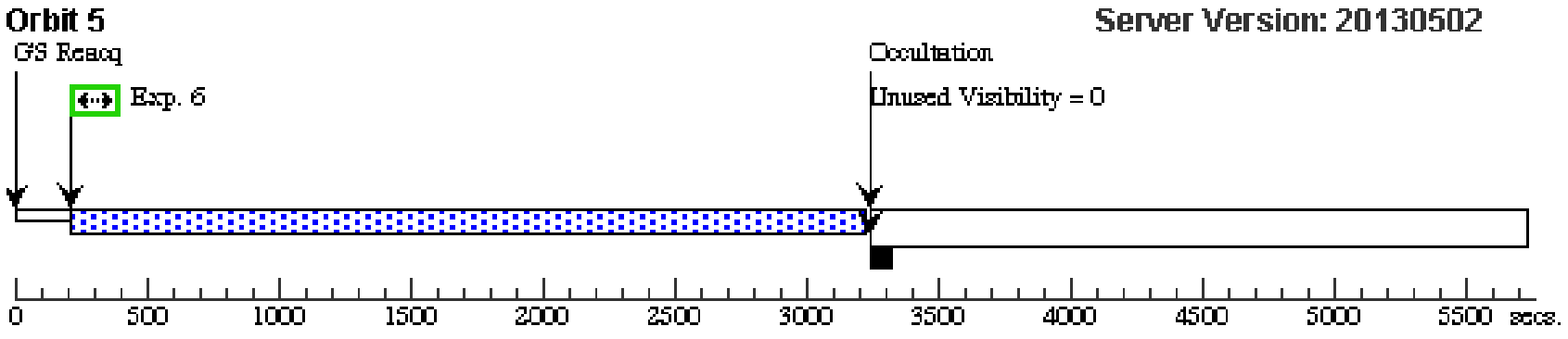
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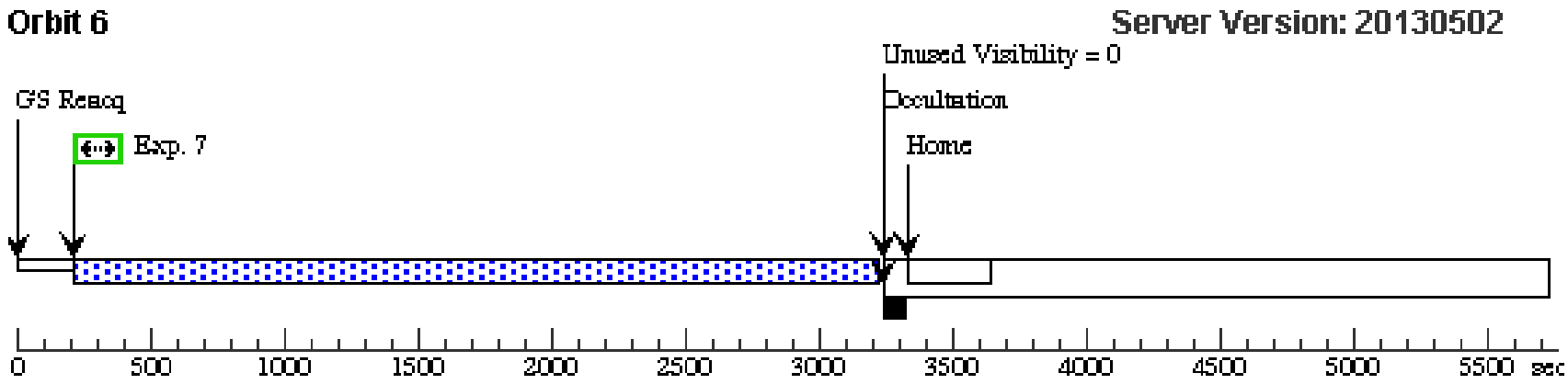
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Visit

Proposal 13342, Visit 03, implementation Wed Aug 07 01:46:20 GMT 2013

Diagnostic Status: Warning

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: (none)

Diagnostics

(Visit 03) Warning (Form): For the best data quality, it is strongly recommended that all four FP-POS positions be used when observing at a given COS CENWAVE setting.

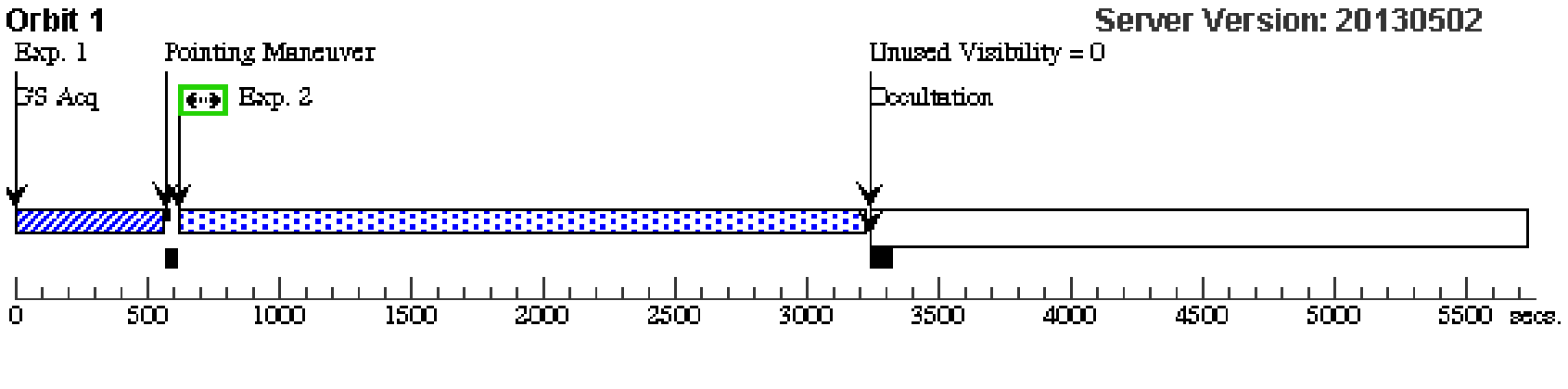
Fixed Targets

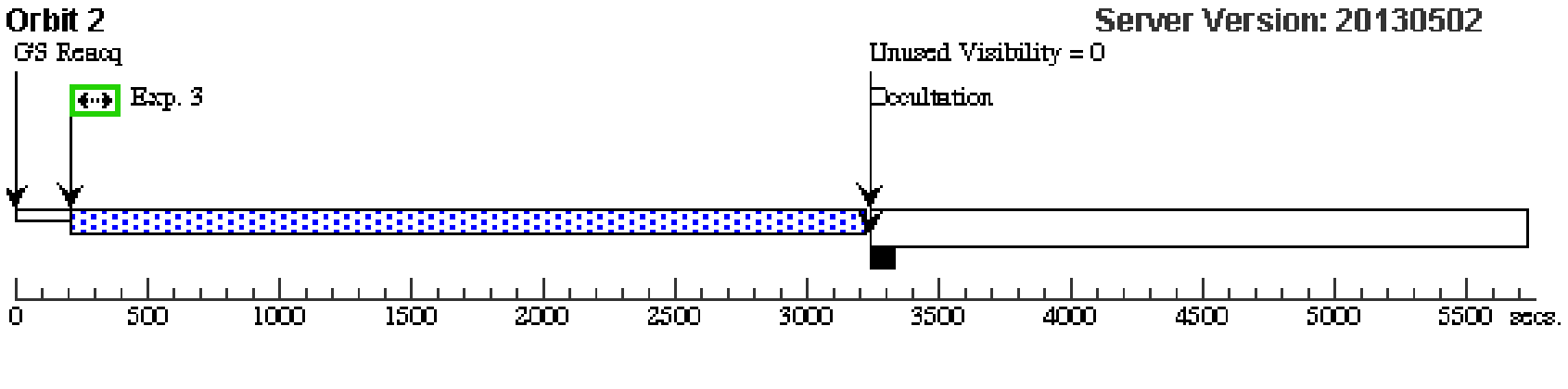
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	2MASSIJ1431258+244220	RA: 14 31 25.8800 (217.8578333d) Dec: +24 42 20.68 (24.70574d) Equinox: J2000	Redshift: 0.4069	V=17.3+/-0.2 GALEX FUV = 17.59, GALEX NUV = 17.28	Reference Frame: ICRS

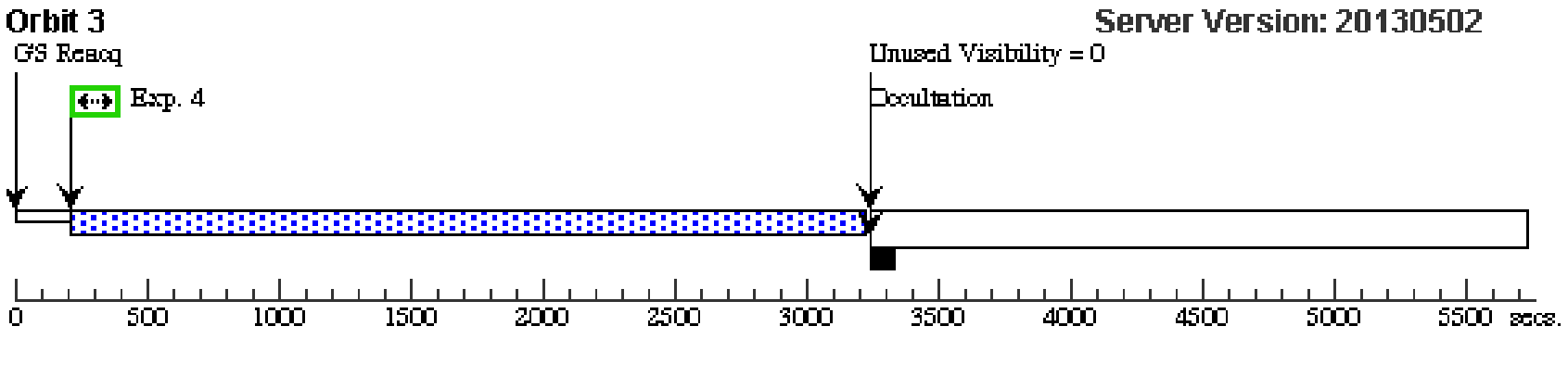
Exposures

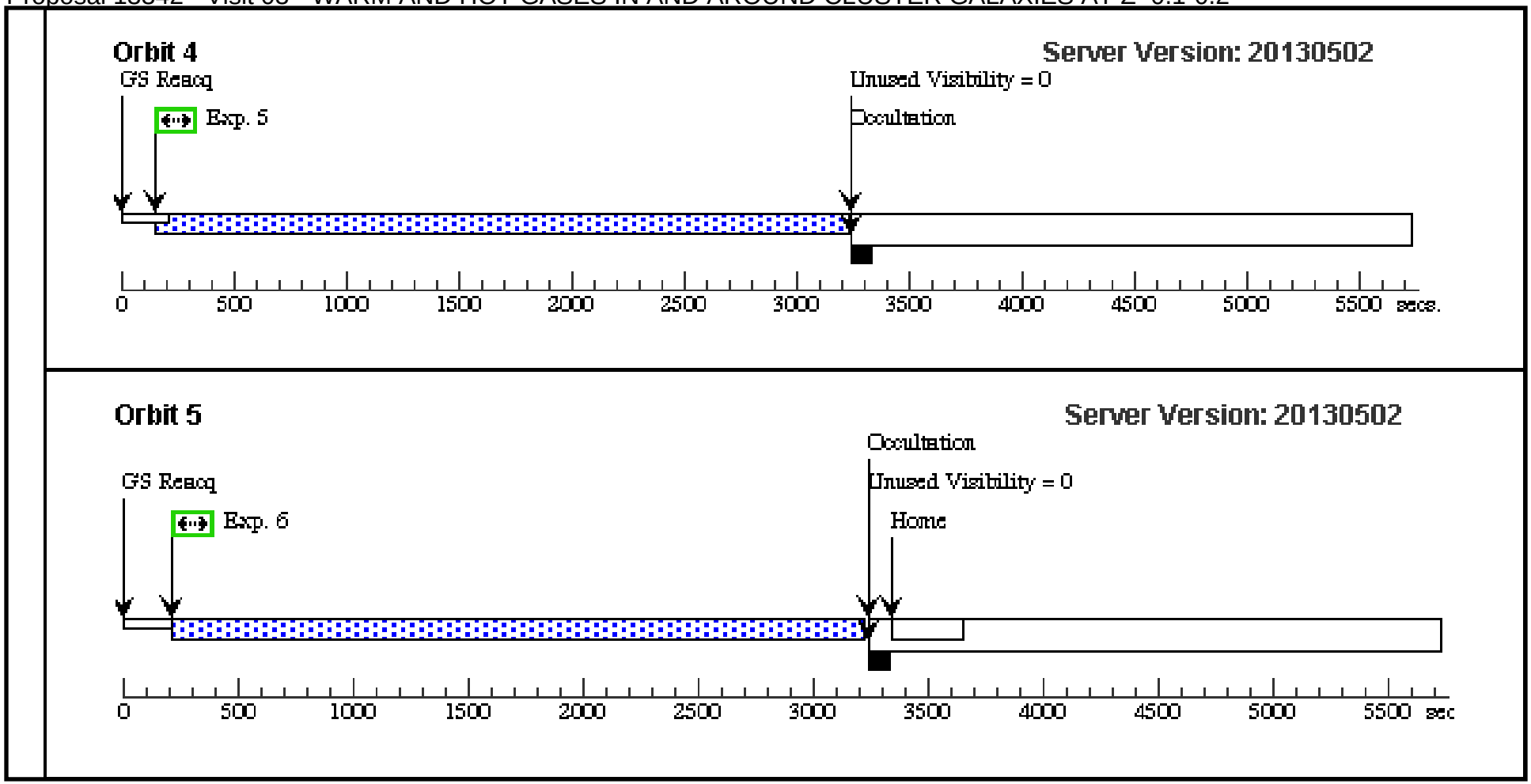
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.509718)	(2) 2MASSIJ1431258+244220	COS/NUV, ACQ/IMAGE, PSA	MIRRORB		GS ACQ SCENARIO BASE1B3		62.0 Secs (62 Secs) *[==>]*	***[1]***
Comments: Exposure time provides S/N = 40 according to COS ETC COS.ta.509718									
2	(COS.sp.509723)	(2) 2MASSIJ1431258+244220	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=3548; FP-POS=1			2421 Secs (2421 Secs) *[==>]*	***[1]***
3	(COS.sp.509723)	(2) 2MASSIJ1431258+244220	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=3548; FP-POS=3			2958 Secs (2958 Secs) *[==>]*	***[2]***
4	(COS.sp.509723)	(2) 2MASSIJ1431258+244220	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=3548; FP-POS=4			2958 Secs (2958 Secs) *[==>]*	***[3]***
5	(COS.sp.509723)	(2) 2MASSIJ1431258+244220	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=3645; FP-POS=2			2958 Secs (2958 Secs) *[==>]*	***[4]***
6	(COS.sp.509723)	(2) 2MASSIJ1431258+244220	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=3645; FP-POS=4			2958 Secs (2958 Secs) *[==>]*	***[5]***

Orbit Structure





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