13840 - The Smith Cloud: Galactic or Extragalactic?

Cycle: 22, Proposal Category: GO

(UV Initiative)

(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) PG2112+059	COS/FUV	3	15-Sep-2014 21:03:57.0	yes
02	(2) RXJ2043.1+0324	COS/FUV	3	15-Sep-2014 21:03:59.0	yes
03	(3) RXJ2139.7+0246	COS/FUV	3	15-Sep-2014 21:04:01.0	yes

9 Total Orbits Used

ABSTRACT

The Milky Way is surrounded by a population of gaseous high-velocity clouds (HVCs), which play an important role in bringing fresh fuel for star formation into the disk. The Smith Cloud is an HVC in an advanced state of accretion, only ~30 Myr away from impacting the Galactic plane. It is unique among HVCs in having a known distance (12.4 kpc) and a well-constrained 3D velocity (300 km/s), but we do not yet know its metallicity, which would distinguish between Galactic (metal-enriched) and extragalactic (metal-poor) origins. Here we propose a program to measure the Smith Cloud's metallicity using HST/COS spectra of three AGN lying behind the Cloud and its wake. Combining the UV metal-line (O I and S II) column densities with existing H I column densities will lead to precise abundance measurements for the Smith Cloud, directly constraining its origin. In addition, the relative strength of depleted (Fe II, Si II) to undepleted (S II) UV absorption lines will be used to infer its dust content. Finally, we will search for variation in the ionization level and kinematics between the three sight lines, which would indicate a disruptive encounter with the hot Galactic corona.

OBSERVING DESCRIPTION

This is a nine-orbit COS/G130M spectroscopic program to study the chemical and physical properties of the Smith Cloud, a high-velocity cloud (HVC) falling onto the Galactic disk. The program observes three QSOs, with a single three-orbit visit on each QSO. Each target is fairly faint in the UV, with F_1300 between 0.5e-14 and 0.8e-14 erg/cm^2/s^-1/A^-1, so there are no bright-object concerns (all three fields pass BOT checks with both GSC II and GALEX catalogs). All four FP-POS positions are used within each visit with the 1291 CENWAVE setting.

Visit

Proposal 13840, PG2112+059 (01), implementation Tue Sep 16 01:04:02 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: (none)

Fixed Targets

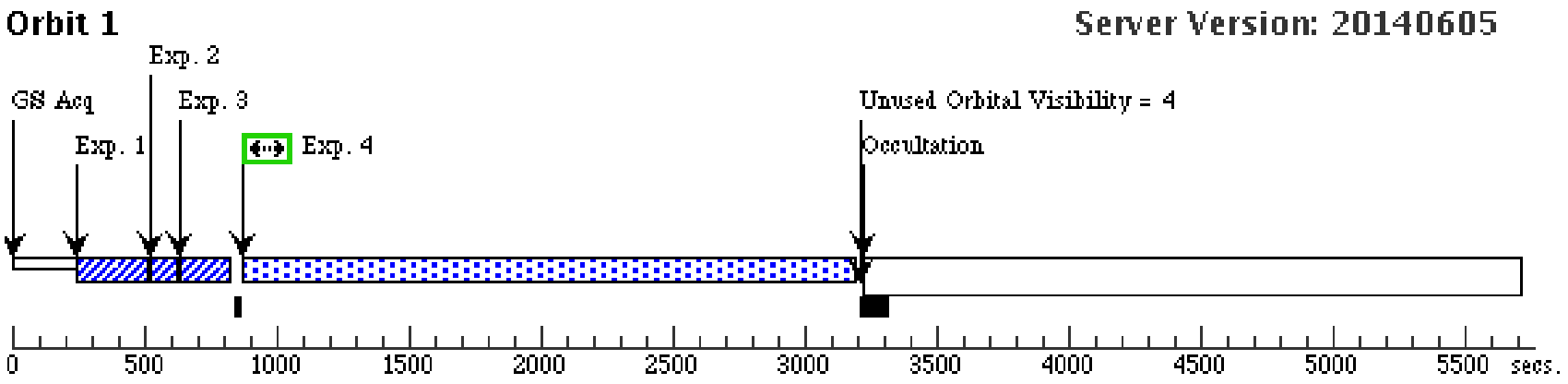
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PG2112+059	RA: 21 14 52.5871 (318.7191129d) Dec: +06 07 42.33 (6.12842d) Equinox: J2000		V=15.77 F_1300=0.75e-14 (cgs)	Reference Frame: ICRS

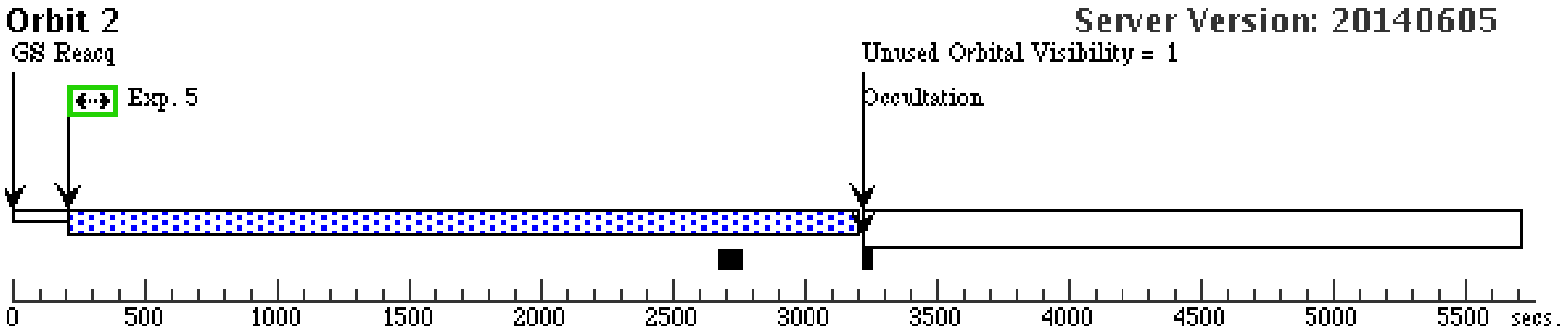
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

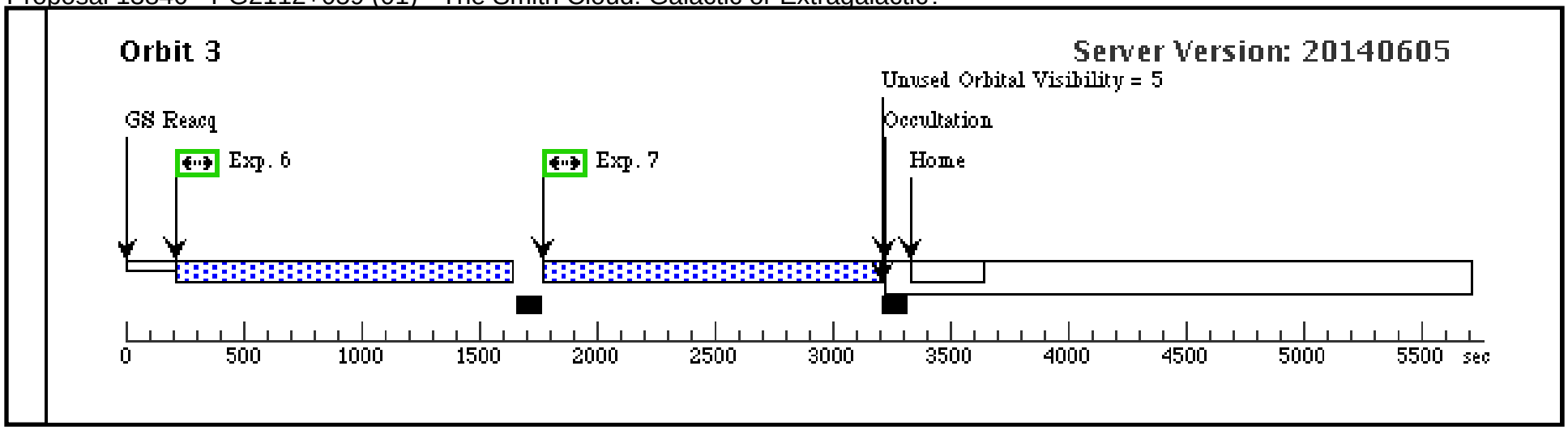
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/SEARCH (615809)	(1) PG2112+059	COS/FUV, ACQ/SEARCH, PSA	G130M 1291 A	SCAN-SIZE=2; CENTER=FLUX-WT; STEP-SIZE=1.767			8 Secs (8 Secs) *[==>]*	*[1]*
2	ACQ/PEAKXD (615809)	(1) PG2112+059	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A				8 Secs (8 Secs) *[==>]*	*[1]*
3	ACQ/PEAKD (615809)	(1) PG2112+059	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	NUM-POS=5.0; STEP-SIZE=0.9; CENTER=FLUX-WT-FLR			8 Secs (8 Secs) *[==>]*	*[1]*
4	PG2112+059-FPPOS1 (615812)	(1) PG2112+059	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=2205			2205 Secs (2205 Secs) *[==>]*	*[1]*
5	PG2112+059-FPPOS2 (615812)	(1) PG2112+059	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=2; BUFFER-TIME=2424			2935 Secs (2935 Secs) *[==>]*	*[2]*
6	PG2112+059-FPPOS3 (615812)	(1) PG2112+059	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=1375			1375 Secs (1375 Secs) *[==>]*	*[3]*
7	PG2112+059-FPPOS4 (615812)	(1) PG2112+059	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=1375			1375 Secs (1375 Secs) *[==>]*	*[3]*

Orbit Structure



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Exp. 7
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Home
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3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 13840, RXJ2043.1+0324 (02), implementation Tue Sep 16 01:04:03 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: (none)

Fixed Targets

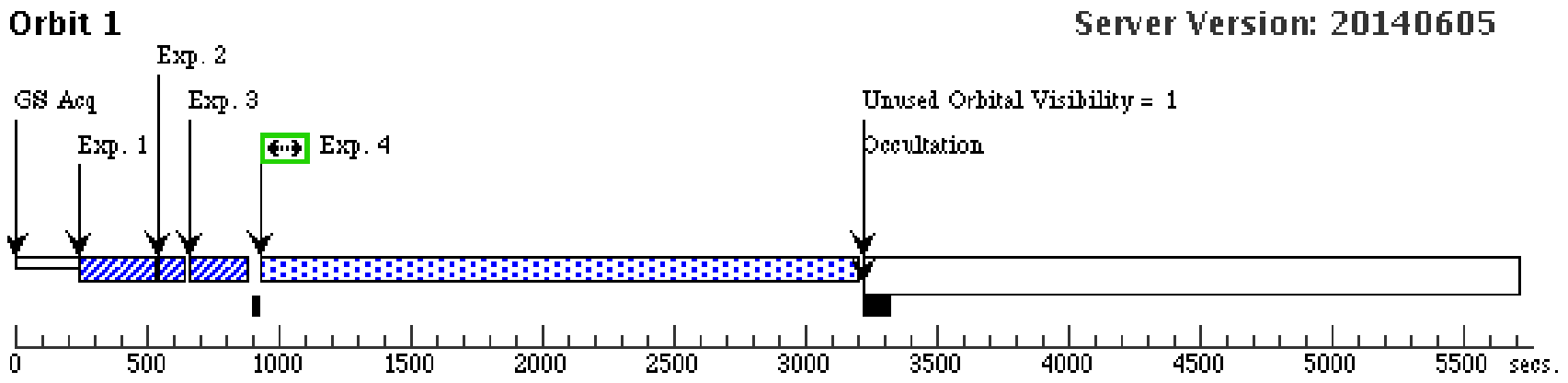
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	RXJ2043.1+0324	RA: 20 43 6.2800 (310.7761667d) Dec: +03 24 51.50 (3.41431d) Equinox: J2000		V=17.0 F_1300=0.55e-14 (cgs)	Reference Frame: ICRS

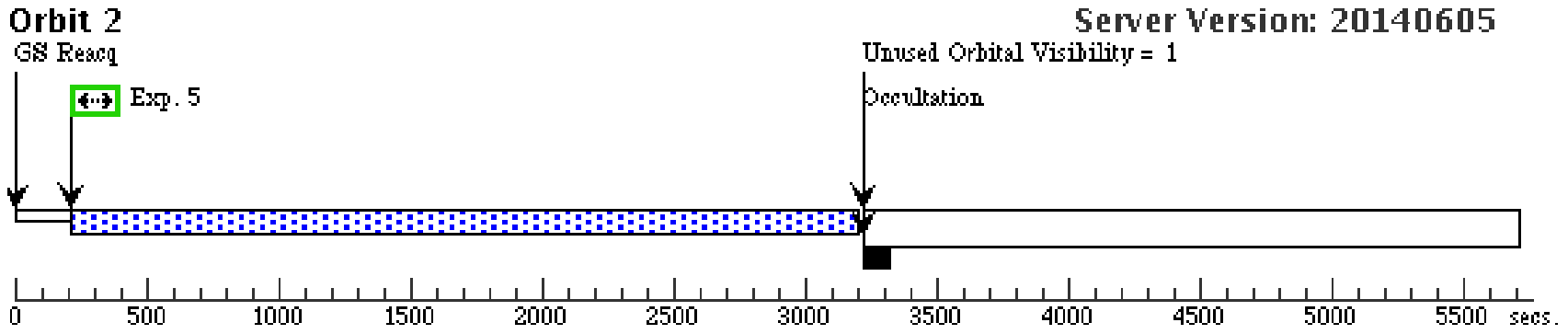
Comments: SIMBAD coordinates did not match position of target on finder charts. DEC changed by +1.5", RA changed by +0.08s to match target.

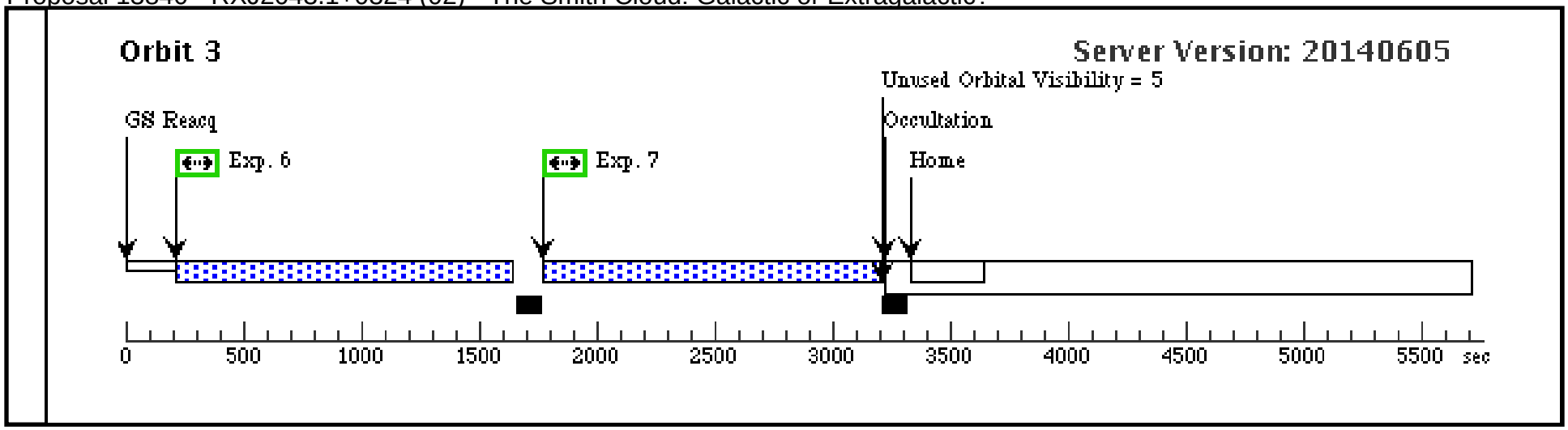
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/SEARCH (615810)	(2) RXJ2043.1+0324	COS/FUV, ACQ/SEARCH, PSA	G130M 1291 A	SCAN-SIZE=2; CENTER=FLUX-WT; STEP-SIZE=1.767			14 Secs (14 Secs) *[==>]*	*[1]*
2	ACQ/PEAKXD (615810)	(2) RXJ2043.1+0324	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A				14 Secs (14 Secs) *[==>]*	*[1]*
3	ACQ/PEAKD (615810)	(2) RXJ2043.1+0324	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	NUM-POS=5.0; STEP-SIZE=0.9; CENTER=FLUX-WT-FLR			14 Secs (14 Secs) *[==>]*	*[1]*
4	RXJ2043.1+0324-FPPOS1 (615813)	(2) RXJ2043.1+0324	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=2148			2148 Secs (2148 Secs) *[==>]*	*[1]*
5	RXJ2043.1+0324-FPPOS2 (615813)	(2) RXJ2043.1+0324	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=2; BUFFER-TIME=2935			2935 Secs (2935 Secs) *[==>]*	*[2]*
6	RXJ2043.1+0324-FPPOS3 (615813)	(2) RXJ2043.1+0324	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=1375			1375 Secs (1375 Secs) *[==>]*	*[3]*
7	RXJ2043.1+0324-FPPOS4 (615813)	(2) RXJ2043.1+0324	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=1375			1375 Secs (1375 Secs) *[==>]*	*[3]*

Orbit Structure



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Exp. 7
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Visit

Proposal 13840, RXJ2139.7+0246 (03), implementation Tue Sep 16 01:04:03 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	RXJ2139.7+0246	RA: 21 39 44.1873 (324.9341138d) Dec: +02 46 5.40 (2.76817d) Equinox: J2000		V=16.1 F_1300=0.79e-14 (cgs)	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/SEARCH (615811)	(3) RXJ2139.7+0246	COS/FUV, ACQ/SEARCH, PSA	G130M 1291 A	SCAN-SIZE=2; CENTER=FLUX-WT; STEP-SIZE=1.767			12 Secs (12 Secs) *[==>]*	*[1]*
2	ACQ/PEAKXD (615811)	(3) RXJ2139.7+0246	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A				12 Secs (12 Secs) *[==>]*	*[1]*
3	ACQ/PEAKD (615811)	(3) RXJ2139.7+0246	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	NUM-POS=5.0; STEP-SIZE=0.9; CENTER=FLUX-WT-FLR			12 Secs (12 Secs) *[==>]*	*[1]*
4	RXJ2139.7+0246-FPPOS1 (615814)	(3) RXJ2139.7+0246	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=2168			2168 Secs (2168 Secs) *[==>]*	*[1]*
5	RXJ2139.7+0246-FPPOS2 (615814)	(3) RXJ2139.7+0246	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=2; BUFFER-TIME=2791			2935 Secs (2935 Secs) *[==>]*	*[2]*
6	RXJ2139.7+0246-FPPOS3 (615814)	(3) RXJ2139.7+0246	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=1375			1375 Secs (1375 Secs) *[==>]*	*[3]*
7	RXJ2139.7+0246-FPPOS4 (615814)	(3) RXJ2139.7+0246	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=1375			1375 Secs (1375 Secs) *[==>]*	*[3]*

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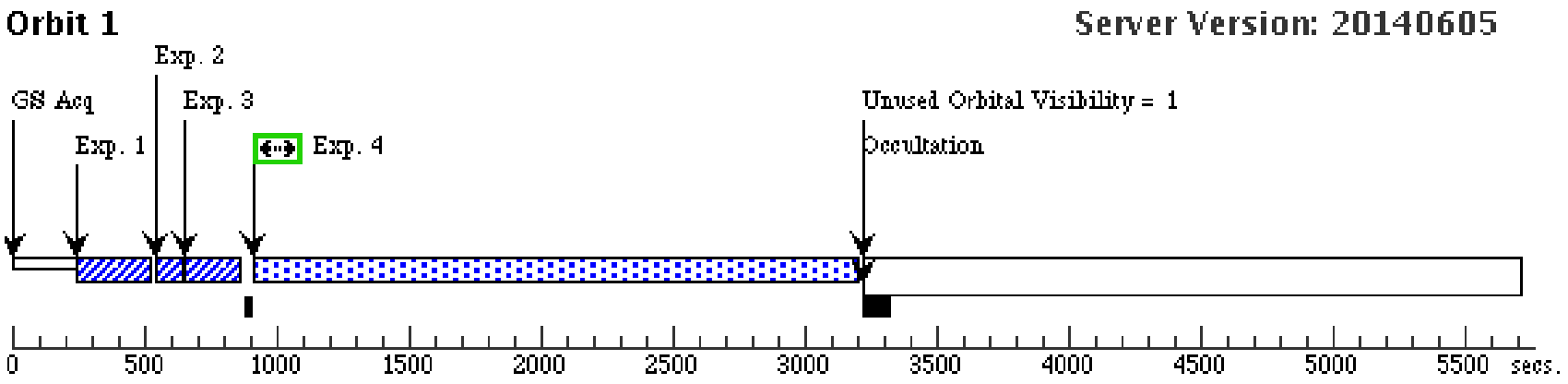

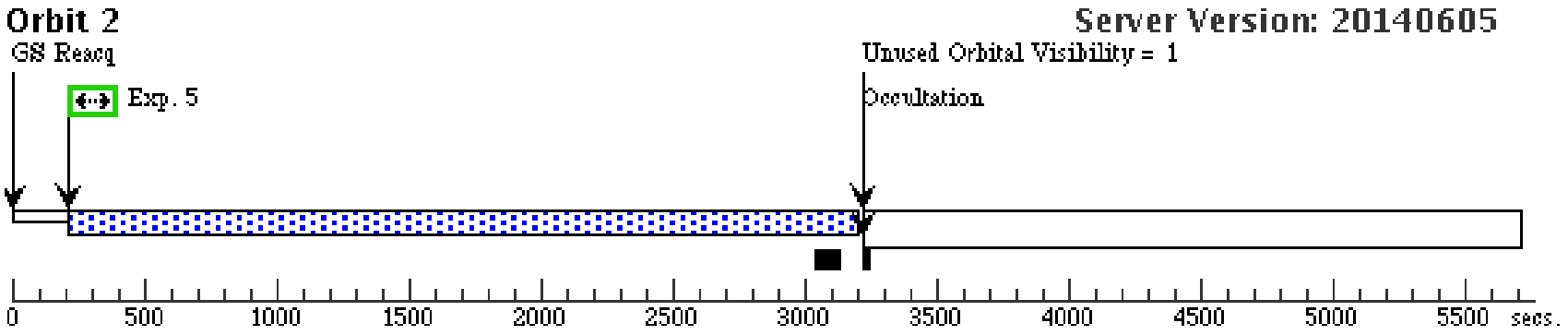

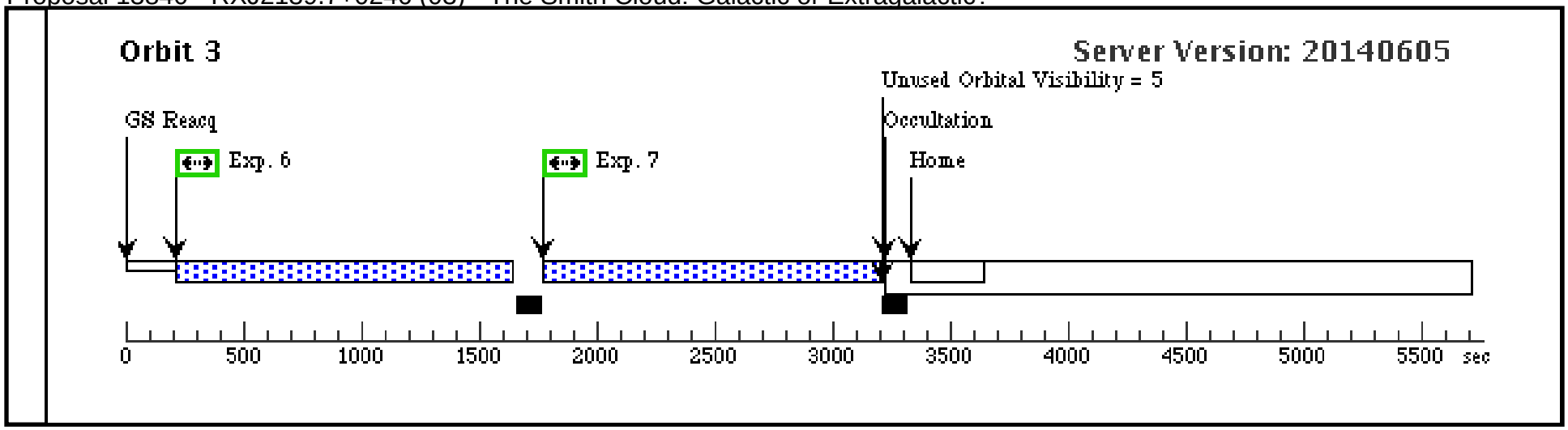
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