



# 14085 - Circumgalactic gas at its extreme - the absorption properties of interacting galaxies

Cycle: 23, 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) SDSS-J124044.68+330349.8	COS/FUV	5	15-Jul-2015 21:11:12.0	yes
02	(2) 2MASS-J12421031+3214268	COS/FUV	5	15-Jul-2015 21:11:17.0	yes

10 Total Orbits Used

## ABSTRACT

We propose HST/COS observations of two background QSOs whose sightlines pass through the extended tidal gas filaments of the interacting galaxy NGC4631 at impact parameters of 40 and 80 kpc. The "whale galaxy" NGC4631 represents one of the most spectacular and best-studied example of a gas-rich interacting galaxy at  $z \sim 0$ . We recently obtained extremely deep HI 21-cm observations as part of the HALOGAS project and identified two QSOs that can be used to trace the same physical region in absorption. We will combine the UV absorption-line data from COS (covering important low and intermediate ions such as OI, SiII, SiIII) with the new 21-cm data from HALOGAS. The goal is to study the kinematics and chemical composition of the circumgalactic gas component of NGC4631 and to explore its origin and fate. We further want to characterize the absorption properties of the NGC4631 environment in the general context of quasar-absorption line systems and estimate the contribution of interacting galaxies to the cross section of intervening Lyman limit systems and Damped-Lyman-Alpha absorbers. Only HST/COS provides the necessary UV capabilities to combine these important aspects of galaxy evolution and QSO absorption-line statistics in the local universe.

## OBSERVING DESCRIPTION

To study the CGM around NGC 4631 we are planning to observe two background QSOs with COS using the G130M grating. Both targets (SDSS J124044.68+330349.8 and 2MASS J12421031+3214268) are faint; both QSOs have GALEX FUV magnitudes of  $m_{\text{FUV}}=18.78$ , from which for each target a FUV flux of  $1.45 \times 10^{-15}$  erg sec<sup>-1</sup> cm<sup>-2</sup> Å<sup>-1</sup> is estimated. We are planning for two 5-orbit visits. The accuracy for the target coordinates is 0.1-0.3 arcsecs; yet, to ensure exact pointing, we will take for each target an ACQ/SEARCH exposure with SCAN-SIZE=2 before the ACQ/PEAKXD and ACQ/PEAKD exposures are carried out. For the ACQ exposures the ETC (v.23.2) delivers integration times of 49 second to achieve a S/N of 40. For each of the two targets we will take 10 science exposures with integration times between 848 and 1500 seconds. For the science exposures we will use the TIME-TAG mode and the G130M (1291) configuration together with 4 different FP-POS positions. BUFFER-TIMES have been derived by adopting 2/3 of the buffer times calculated with the ETC.

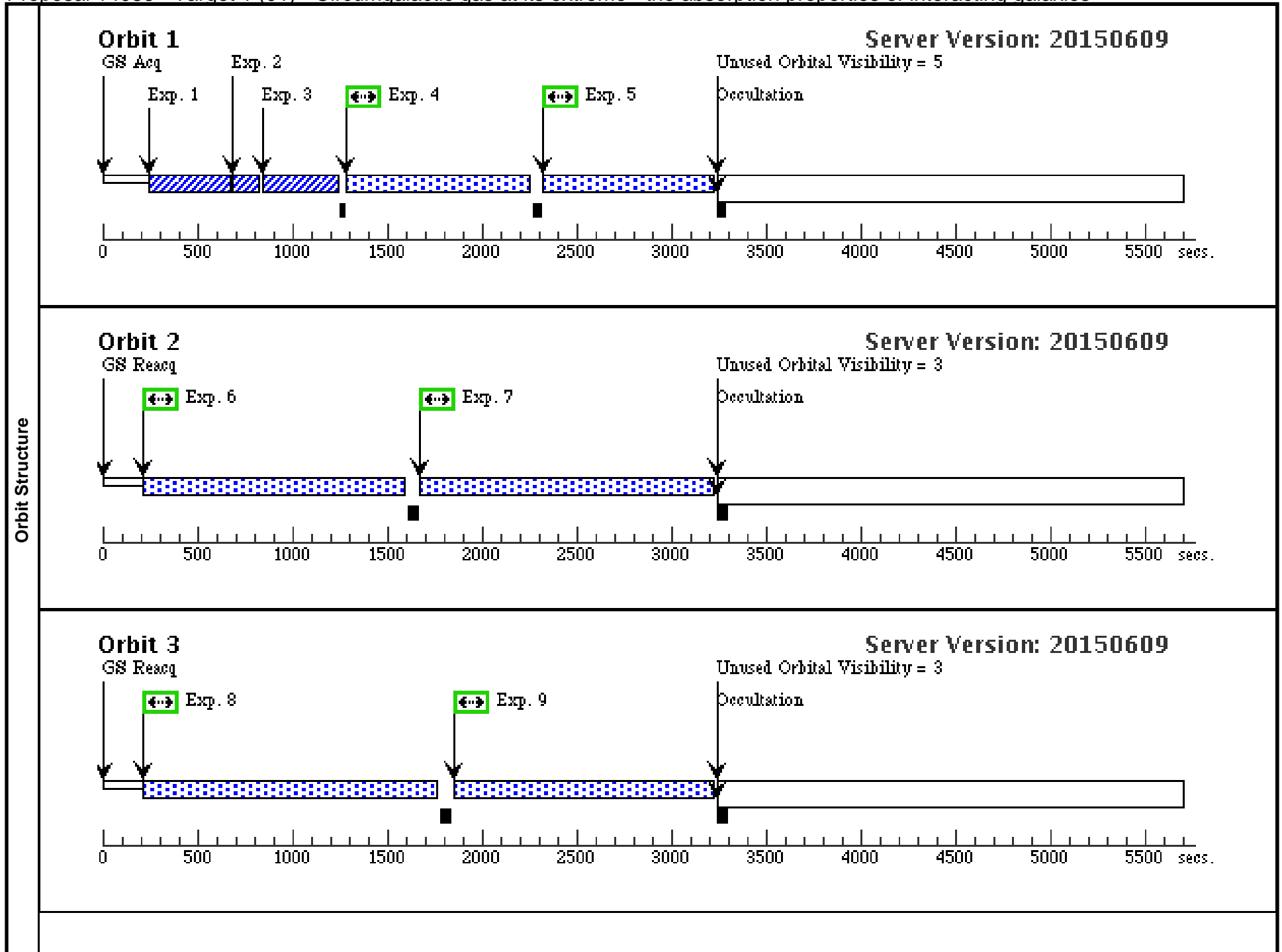
Proposal 14085 (STScI Edit Number: 0, Created: Wednesday, July 15, 2015 8:11:19 PM EST) - Overview

The total (science) integration time for each target is ~13,000 seconds, resulting in a S/N per resolution element of 11 at 1310 Å (according to the ETC) after combining all sub-exposures.

Proposal 14085 - Target 1 (01) - Circumgalactic gas at its extreme - the absorption properties of interacting galaxies

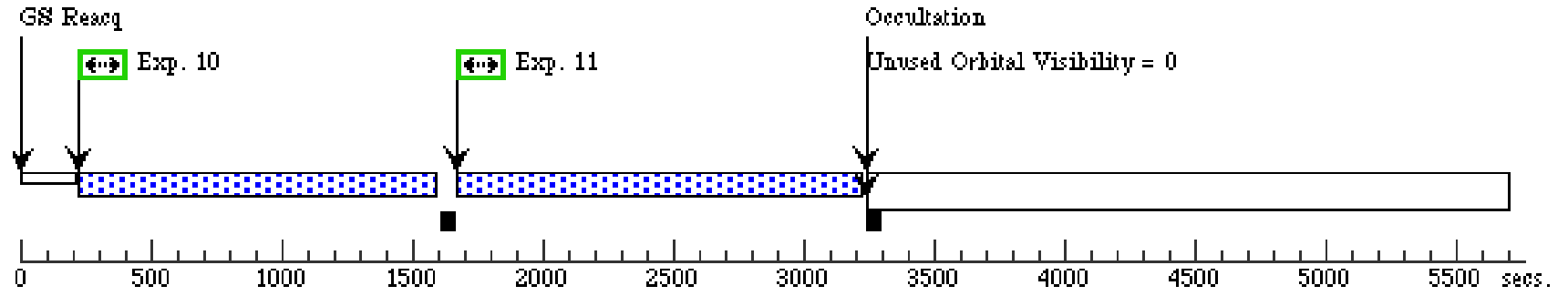
Thu Jul 16 01:11:20 GMT 2015

Visit	<b>Proposal 14085, Target 1 (01)</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: COS/FUV Special Requirements: (none)																											
	Fixed Targets	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>SDSS-J124044.68+330349.8</td> <td>RA: 12 40 44.6850 (190.1861875d) Dec: +33 03 49.85 (33.06385d) Equinox: J2000</td> <td></td> <td>V=17.66</td> <td>Reference Frame: ICRS</td> </tr> <tr> <td colspan="6"> <i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>                      Extended=NO                 </td> </tr> </tbody> </table>										#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	SDSS-J124044.68+330349.8	RA: 12 40 44.6850 (190.1861875d) Dec: +33 03 49.85 (33.06385d) Equinox: J2000		V=17.66	Reference Frame: ICRS	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=NO				
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(1)	SDSS-J124044.68+330349.8	RA: 12 40 44.6850 (190.1861875d) Dec: +33 03 49.85 (33.06385d) Equinox: J2000		V=17.66	Reference Frame: ICRS																							
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Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit																		
	1	(COS.sa.717 153)	(1) SDSS-J124044.68+330349.8	COS/FUV, ACQ/SEARCH, PSA	G130M 1291 A	SCAN-SIZE=2; CENTER=FLUX-W T			49 Secs (49 Secs) [==>]	[1]																		
	2	(COS.sa.717 153)	(1) SDSS-J124044.68+330349.8	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A				49 Secs (49 Secs) [==>]	[1]																		
	3	(COS.sa.717 153)	(1) SDSS-J124044.68+330349.8	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	NUM-POS=5.0; STEP-SIZE=0.9			49 Secs (49 Secs) [==>]	[1]																		
	4	(COS.sp.717 158)	(1) SDSS-J124044.68+330349.8	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=38 07			848 Secs (848 Secs) [==>]	[1]																		
	5	(COS.sp.717 158)	(1) SDSS-J124044.68+330349.8	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=38 07			848 Secs (848 Secs) [==>]	[1]																		
	6	(COS.sp.717 164)	(1) SDSS-J124044.68+330349.8	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=2; BUFFER-TIME=38 07			1325 Secs (1325 Secs) [==>]	[2]																		
	7	(COS.sp.717 165)	(1) SDSS-J124044.68+330349.8	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=2; BUFFER-TIME=38 07			1500 Secs (1500 Secs) [==>]	[2]																		
	8	(COS.sp.717 165)	(1) SDSS-J124044.68+330349.8	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=38 07			1500 Secs (1500 Secs) [==>]	[3]																		
	9	(COS.sp.717 164)	(1) SDSS-J124044.68+330349.8	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=38 07			1325 Secs (1325 Secs) [==>]	[3]																		
	10	(COS.sp.717 164)	(1) SDSS-J124044.68+330349.8	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=38 07			1325 Secs (1325 Secs) [==>]	[4]																		
	11	(COS.sp.717 165)	(1) SDSS-J124044.68+330349.8	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=38 07			1500 Secs (1500 Secs) [==>]	[4]																		
	12	(COS.sp.717 165)	(1) SDSS-J124044.68+330349.8	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=38 07			1500 Secs (1500 Secs) [==>]	[5]																		
	13	(COS.sp.717 164)	(1) SDSS-J124044.68+330349.8	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=38 07			1325 Secs (1325 Secs) [==>]	[5]																		



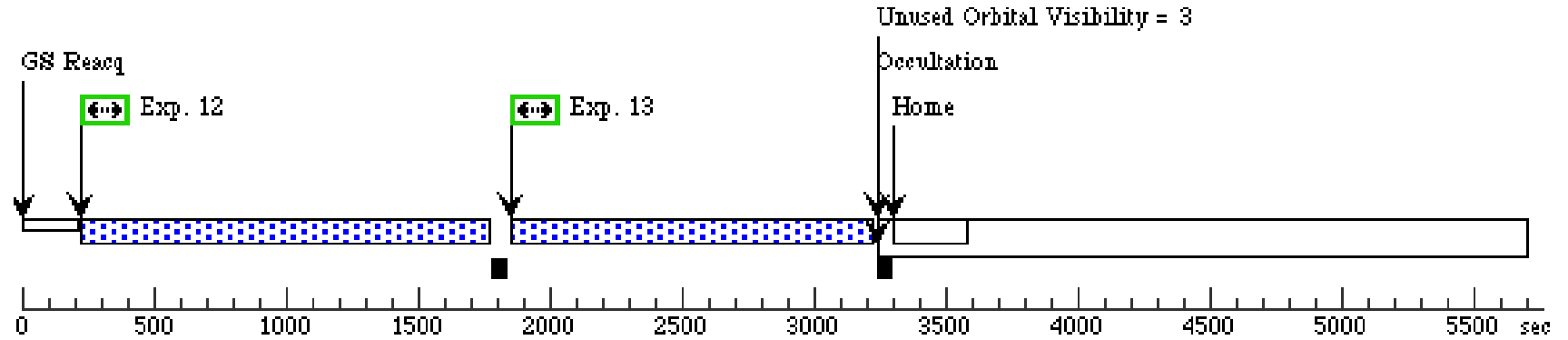
### Orbit 4

Server Version: 20150609



### Orbit 5

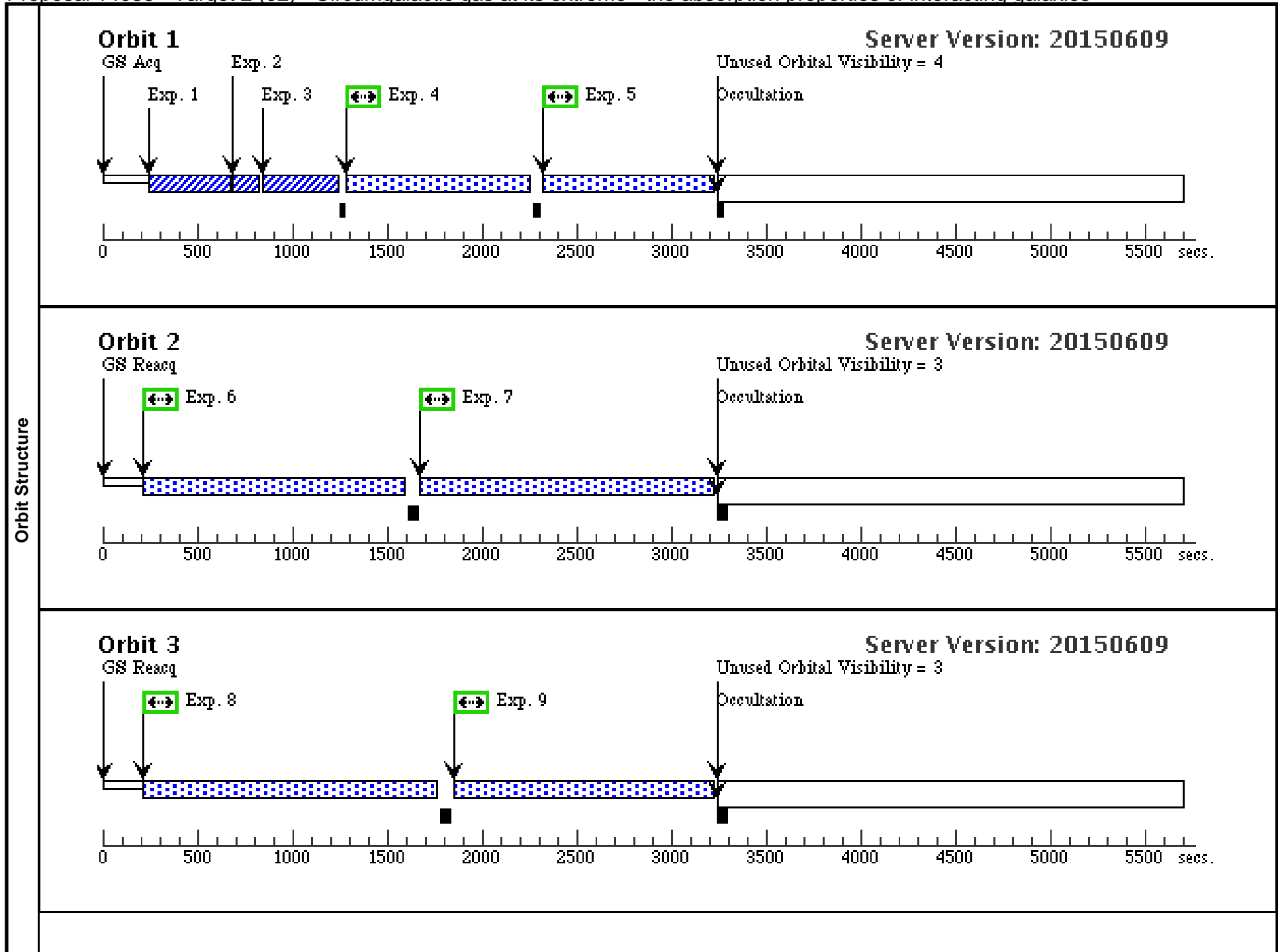
Server Version: 20150609



Proposal 14085 - Target 2 (02) - Circumgalactic gas at its extreme - the absorption properties of interacting galaxies

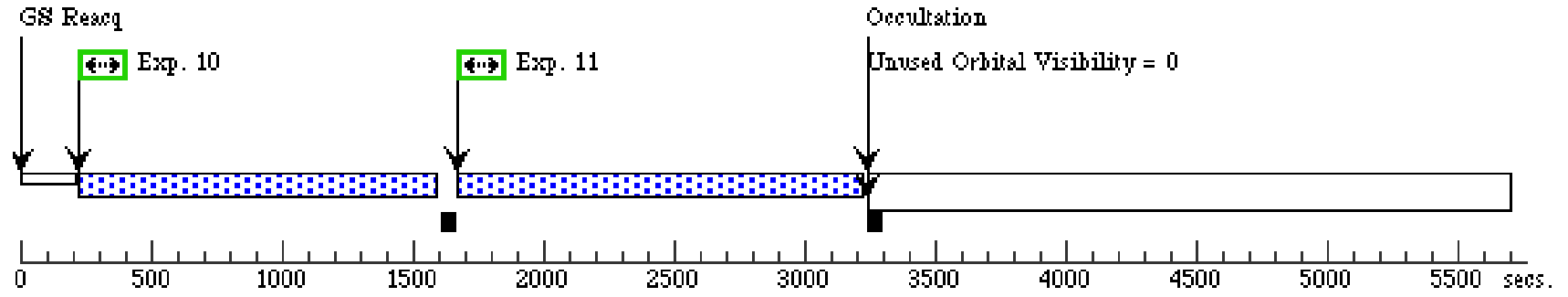
Thu Jul 16 01:11:20 GMT 2015

Visit	<b>Proposal 14085, Target 2 (02)</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: COS/FUV Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(2)	2MASS-J12421031+3214268	RA: 12 42 10.3200 (190.5430000d) Dec: +32 14 26.80 (32.24078d) Equinox: J2000		V=18.0	Reference Frame: ICRS				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Extended=NO									
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(COS.sa.717 153)	(2) 2MASS-J12421031+3214268	COS/FUV, ACQ/SEARCH, PSA	G130M 1291 A	SCAN-SIZE=2; CENTER=FLUX-W T			49 Secs (49 Secs) [==>]	[1]
	2	(COS.sa.717 153)	(2) 2MASS-J12421031+3214268	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A				49 Secs (49 Secs) [==>]	[1]
	3	(COS.sa.717 153)	(2) 2MASS-J12421031+3214268	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	NUM-POS=5.0; STEP-SIZE=0.9			49 Secs (49 Secs) [==>]	[1]
	4	(COS.sp.717 174)	(2) 2MASS-J12421031+3214268	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=38 43			853 Secs (853 Secs) [==>]	[1]
	5	(COS.sp.717 174)	(2) 2MASS-J12421031+3214268	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=38 43			853 Secs (853 Secs) [==>]	[1]
	6	(COS.sp.717 181)	(2) 2MASS-J12421031+3214268	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=2; BUFFER-TIME=38 43			1325 Secs (1325 Secs) [==>]	[2]
	7	(COS.sp.717 182)	(2) 2MASS-J12421031+3214268	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=2; BUFFER-TIME=38 43			1500 Secs (1500 Secs) [==>]	[2]
	8	(COS.sp.717 182)	(2) 2MASS-J12421031+3214268	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=38 43			1500 Secs (1500 Secs) [==>]	[3]
	9	(COS.sp.717 181)	(2) 2MASS-J12421031+3214268	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=38 43			1325 Secs (1325 Secs) [==>]	[3]
	10	(COS.sp.717 181)	(2) 2MASS-J12421031+3214268	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=38 43			1325 Secs (1325 Secs) [==>]	[4]
	11	(COS.sp.717 182)	(2) 2MASS-J12421031+3214268	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=38 43			1500 Secs (1500 Secs) [==>]	[4]
	12	(COS.sp.717 182)	(2) 2MASS-J12421031+3214268	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=38 43			1500 Secs (1500 Secs) [==>]	[5]
13	(COS.sp.717 181)	(2) 2MASS-J12421031+3214268	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=38 43			1325 Secs (1325 Secs) [==>]	[5]	



### Orbit 4

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### Orbit 5

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