12510 - Quasar Ton 34 with steepest far-UV break known has entered new bal QSO phase

Cycle: 19, 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) QSO-J1019+2745	COS/FUV COS/NUV	2	11-Jul-2011 22:22:54.0	yes
02	(1) QSO-J1019+2745	STIS/CCD STIS/NUV-MAMA	1	11-Jul-2011 22:23:01.0	yes
03	(1) QSO-J1019+2745	STIS/CCD	1	11-Jul-2011 22:23:06.0	yes

4 Total Orbits Used

ABSTRACT

Using HST-COS/G140L and HST-STIS with G230L and G430L, we request 4 orbits to observe the QSO Ton34 (z=1.928). Among archive HST/FOS spectra, Ton34 shows an unusually steep FUV drop, equivalent to a powerlaw of index -5. At shorter wavelengths, only an extremely

noisy IUE spectra exists. The FUV observations would provide us with a unique window to test whether Ton34 remains EUV deficient at shorter wavelengths or shows instead the onset of a second peak in the extreme (E)UV, explaining how photoionization can still account for its high excitation emission lines of CIV, OVI… With the STIS MAMA-NUV spectrum, we will also study and confirm whether low excitation EUV BLR lines such as the permitted lines of OII + OIII (835Å) or NIII (686Å) are present and as strong as reported from an earlier but noisy IUE spectrum (this would possibly favor shock excitation). Using archive optical spectra near the CIV region (from years 1988 and 2006), we recently showed that Ton34 is currently undergoing a strong BalQSO phase, the first case reported among bright quasars. A priority of the proposed STIS NUV observations will be to look for the presence of blueshifted absorption troughs near Ly-alpha or OIV (as well as any change in the continuum's sharp break) using the STIS/G430L spectrum.

OBSERVING DESCRIPTION

Using earlier IUE (SWP+LWP) as well as FOS and 5m Palomar observations of TON34, we derived a SED for its continuum, which is used in ETC to determine integration times and properly evaluate (and rule out) possible risks for MAMA & COS. The strong emission line fluxes are manually added in the ETC form. The absolute flux calibration is provided by the FOS spectrum Y2IE0A04T obtained with grating G270H. http://archive.stsci.edu/cgi-bin/mastpreview?mission=hst&dataid=Y2IE0A04T

We requested 4 orbits in total:
-2 orbits with COS and grating G140L,
-1 orbit with STIS MAMA NUV grating G230L,
-1 orbit with STIS CCD grating G430L.
The 3 visits are described as follows:

--The two COS orbits will provide a S/Nresel >5 in the interval 1100 to 1500A. All four FP-POS will be covered. ACQ/SEARCH and ACQ/IMAGE will be used as it is a more efficient set-up. The resulting FUV spectrum will be used to check whether there is any flux recovery shortward of 1600A obsframe (600A restframe) and also to confirm the presence of (unusually) low excitation BLR lines (OIII, NIII...).

--G230L: quasar TON34 is unusually EUV deprived, showing a sharp decline in flux shortward of 1000A restframe (~2900A obsframe). The STIS-MAMA-G230L integration will be used to characterize this flux decline down to the NUV wavelengths covered by COS-G130L. The expected S/Nresel is ~10 at 2400A. We expect to confirm the presence of other low excitation BLR lines in that range as well. The narrow longslit 52x0.1 will

be used.

G430L: using a SDSS spectrum that covered the CIV line, the quasar TON34 was shown to be the first bright quasar known to have becomed a BALQSO. In order to study the Ly-alpha region down to OIV, a NUV spectrum will be obtained with STIS-CCD-G430L. To manage CR, four integrations will be performed. The narrow longslit 52x0.1E1 will be used. A global S/Nresel of ~30 will be attained at 3200A after combining the 4 exposures.

REAL TIME JUSTIFICATION

No real-time or special scheduling requirements.

CALIBRATION JUSTIFICATION

No special calibrations required.

ADDITIONAL COMMENTS

There are no objects brighter than V=21 within a radius of 1.1arcmin of TON34.

Using the BOT tool in APT, the GALEX test reports no stars in the vicinity of target while the GSC2 test shows green status for the MAMA slit exposure and the COS exposure with grating. A red safety status of level 1 appears only for the COS exposures using ACQ and ACQ/IMAGE of the target (because V=15.80 and the count rate would be 11,170cnt/s if it was an OV star, but IT IS NOT an OV star). Using ETC and the known UV SED of target, we find with ETC that the expected count rate (15cnts/s) ismuch lower than the maximum recommended of 50cnts/s)

Proposal 12510 - Visit 01 - Quasar Ton 34 with steepest far-UV break known has entered new bal QSO phase

Visit

Proposal 12510, Visit 01 Tue Jul 12 02:23:11 GMT 2011

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	QSO-J1019+2745	RA: 10 19 56.5980 (154.9858250d)	Epoch of Position: 2000	V=15.80	Reference Frame: ICRS
	Alt Name1: TON34	Dec: +27 44 1.76 (27.73382d)	Redshift: 1.928	1.4E-15 erg/s/cm2/Ang at 1100 A.; 0.1E-15 at 1750A; 0.3E-15 e rg/s/cm2/Ang at 2300A; 0.66e-1 5 erg/s/cm2/Ang at 2600A; 1.2E -15 erg/s/cm2/Ang at 3200A; 1.0 e-15 erg/s/cm2/Ang at 3800A	
	Alt Name2: Q1017+280	Equinox: J2000			

Comments: Position derived from 6th release of SDSS.

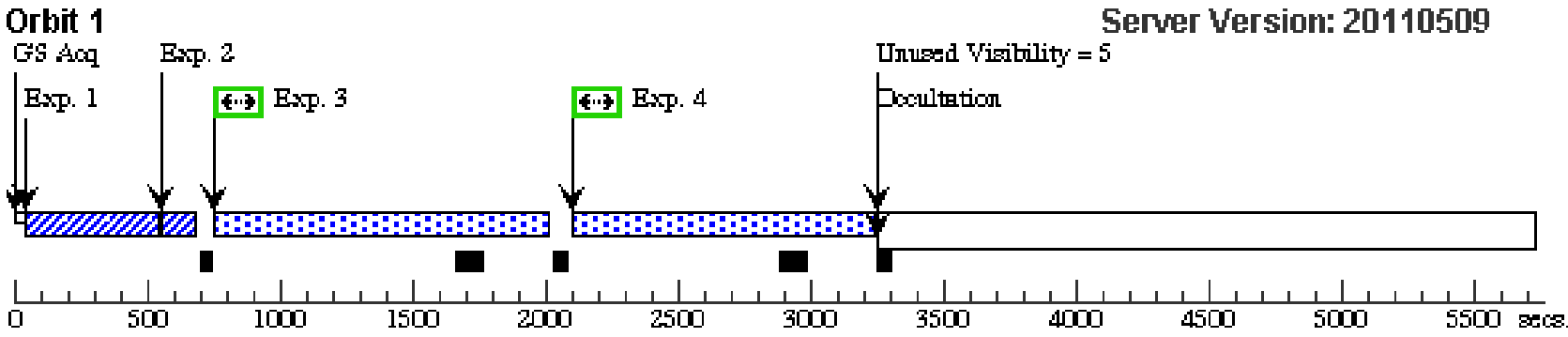
Exposures

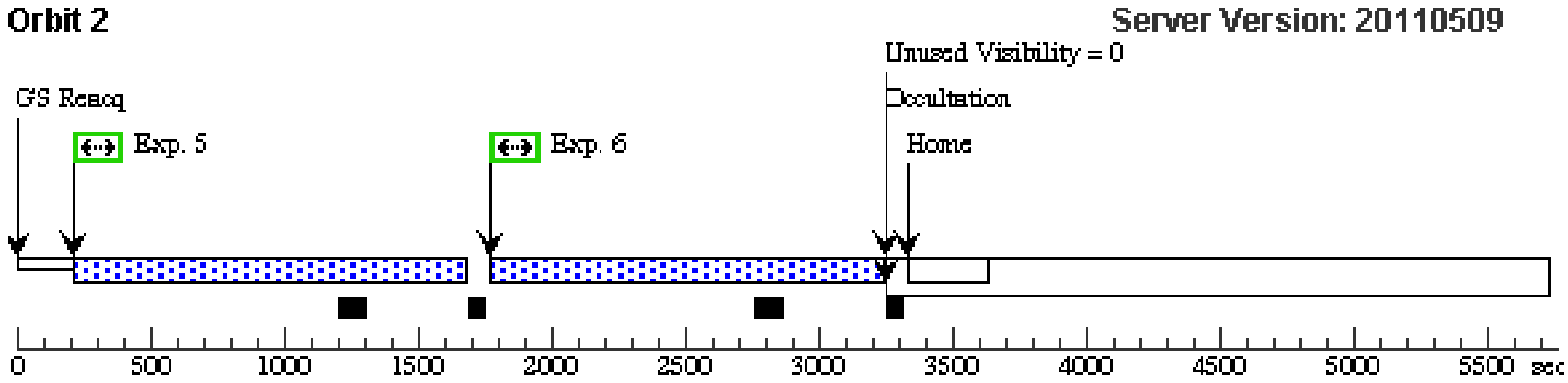
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	COS-ACQ/ Search (198646)	(1) QSO-J1019+2745	COS/NUV, ACQ/SEARCH, PSA	MIRRORA	CENTER=FLUX-WT; SCAN-SIZE=2; STEP-SIZE=1.767			14.6 Secs *[==>]*	***[1]***
	Comments: MIRROR A; NUV limits *Brightest pixel has 15.2cnts/s (limit of 50cnts/s for irregular objects).* *The total count rate in selected region is 109cnts/s (limit is 68000/s for irregular objects)*								
2	ACQ/IM (198646)	(1) QSO-J1019+2745	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				14.6 Secs *[==>]*	***[1]***
	Comments: With MIRROR A; NUV limits as follows: *Brightest pixel has 15.2cnts/s (recommended limit is 50cnts/s for irregular objects).* *The total count rate in selected region is 109cnts/s (recommended limit is 68000/s for irregular objects)*								
3	Ton34-G140L-P1 (198999)	(1) QSO-J1019+2745	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FP-POS=1; BUFFER-TIME=750; FLASH=YES; EXTENDED=NO; SEGMENT=BOTH			1083 Secs *[==>]*	***[1]***
	Comments: Count rate Segment A : 63 *Count rate Segment B : 44* *S/N=5.8 at 1150A* *buffer-time set at 2/3 of integration time*								
4	Ton34-G140L-P2 (198999)	(1) QSO-J1019+2745	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FP-POS=2; BUFFER-TIME=750; FLASH=YES; EXTENDED=NO; SEGMENT=BOTH			1083 Secs *[==>]*	***[1]***
	Comments: Count rate Segment A : 63 *Count rate Segment B : 44* *S/N=5.8 at 1150A* *buffer-time set at 2/3 of integration time*								
5	Ton34-G140L-P3 (199000)	(1) QSO-J1019+2745	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FP-POS=3; BUFFER-TIME=950; FLASH=YES; EXTENDED=NO; SEGMENT=BOTH			1412 Secs *[==>]*	***[2]***
	Comments: Count rate Segment A : 63 *Count rate Segment B : 44* *S/N=6.6 at 1150A* *buffer-time set at 2/3 of integration time*								

6	Ton34-G140 L-P4 (199000)	(1) QSO-J1019+274 5	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FP-POS=4; BUFFER-TIME=950; FLASH=YES; EXTENDED=NO; SEGMENT=BOTH	1412 Secs [==>]	*[2]*

Comments: Count rate Segment A : 63
Count rate Segment B : 44
S/N=6.6 at 1150A
buffer-time set at 2/3 of integration time

Orbit Structure





Visit

Proposal 12510, Visit 02 Tue Jul 12 02:23:12 GMT 2011

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/NUV-MAMA

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(3)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=4	Angle Between Sides=		
	Point Spacing=0.55	Center Pattern=false		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	QSO-J1019+2745	RA: 10 19 56.5980 (154.9858250d)	Epoch of Position: 2000	V=15.80	Reference Frame: ICRS
	Alt Name1: TON34	Dec: +27 44 1.76 (27.73382d)	Redshift: 1.928	1.4E-15 erg/s/cm2/Ang at 1100 A.; 0.1E-15 at 1750A; 0.3E-15 erg/s/cm2/Ang at 2300A; 0.66e-15 erg/s/cm2/Ang at 2600A; 1.2E-15 erg/s/cm2/Ang at 3200A; 1.0e-15 erg/s/cm2/Ang at 3800A	
	Alt Name2: Q1017+280	Equinox: J2000			

Comments: Position derived from 6th release of SDSS.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	ACQ-CCD-M1 (198990)	(1) QSO-J1019+2745	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			2.9 Secs *[==>]*	 ***[1]***

Comments: ACQ with a S/N=50 is achieved with an integration time of 2.9s with an APERTURE=F28X50LP. Total counts in selected region = 2986 cnts. TheTime to Saturation (for a single exposure) = 360.24 seconds

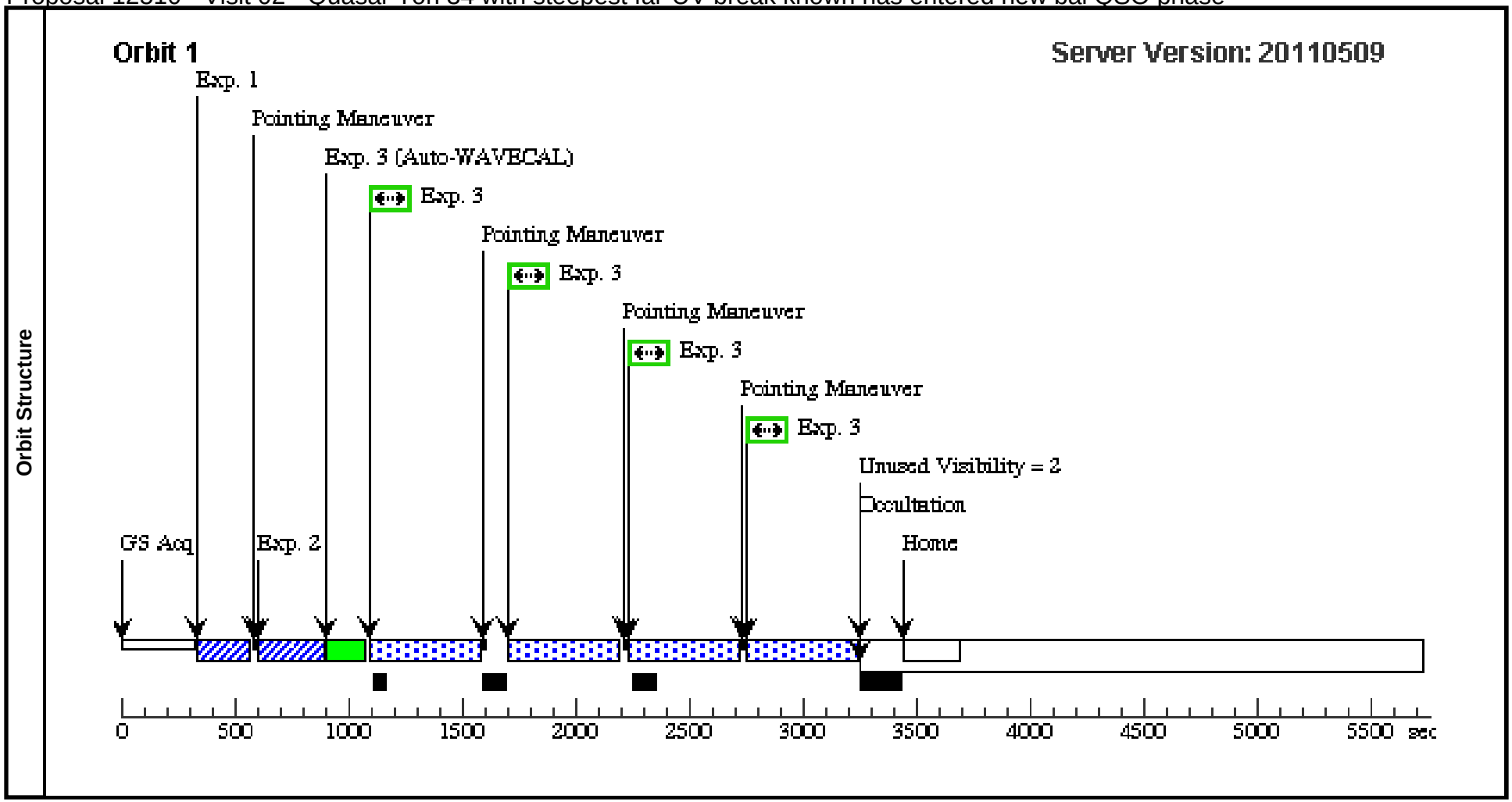
2	ACQ/PEAK-CCD-1 (198725)	(1) QSO-J1019+2745	STIS/CCD, ACQ/PEAK, 52X0.1	MIRROR				6.5 Secs *[==>]*	 ***[1]***

Comments: MIRROR mode on 52x0.1 slit; Integration time of 6.5s, gives SNR = 70 AND a Time to Saturation (for a single exposure) = 180 second; Total count in selected region of 21,286 cnts

3	TON34-MAMA-G230L (198995)	(1) QSO-J1019+2745	STIS/NUV-MAMA, ACCUM, 52X0.1	G230L 2376 A			Pattern 2, Exps 3-3 in Visit 02 (2)	474 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	 ***[1]***

Comments: Using the BOT tool in APT, the GALEX test reports no stars in the vicinity of target while the GSC2 test shows green status for this MAMA exposure.
S/Nresel=6.0 at 2500A expected on each of the 4 dithered exposure on MAMA.
Count rate entire detector = 3,723.739cnts.
Background (sky+dark) = 3,670nts/s

BUFFER_TIME should be 2e6/3723=537s; but 300 would be better in case source varied
max integration time is 16,116s


Orbit Structure
Orbit 1
Server Version: 20110509
Exp. 1
Pointing Maneuver
Exp. 3 (Auto-WAVECAL)
Exp. 3
Pointing Maneuver
Exp. 3
Pointing Maneuver
Exp. 3
Pointing Maneuver
Exp. 3
Unused Visibility = 2
Occultation
GS Acq
Exp. 2
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 12510, Visit 03 Tue Jul 12 02:23:13 GMT 2011

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(3)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=4	Angle Between Sides=		
	Point Spacing=0.35	Center Pattern=false		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	QSO-J1019+2745	RA: 10 19 56.5980 (154.9858250d)	Epoch of Position: 2000	V=15.80	Reference Frame: ICRS
	Alt Name1: TON34	Dec: +27 44 1.76 (27.73382d)	Redshift: 1.928	1.4E-15 erg/s/cm2/Ang at 1100 A.; 0.1E-15 at 1750A; 0.3E-15 erg/s/cm2/Ang at 2300A; 0.66e-15 erg/s/cm2/Ang at 2600A; 1.2E-15 erg/s/cm2/Ang at 3200A; 1.0e-15 erg/s/cm2/Ang at 3800A	
	Alt Name2: Q1017+280	Equinox: J2000			

Comments: Position derived from 6th release of SDSS.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	ACQ-CCD-M2 (198990)	(1) QSO-J1019+2745	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			2.9 Secs *[==>]*	 ***[1]***

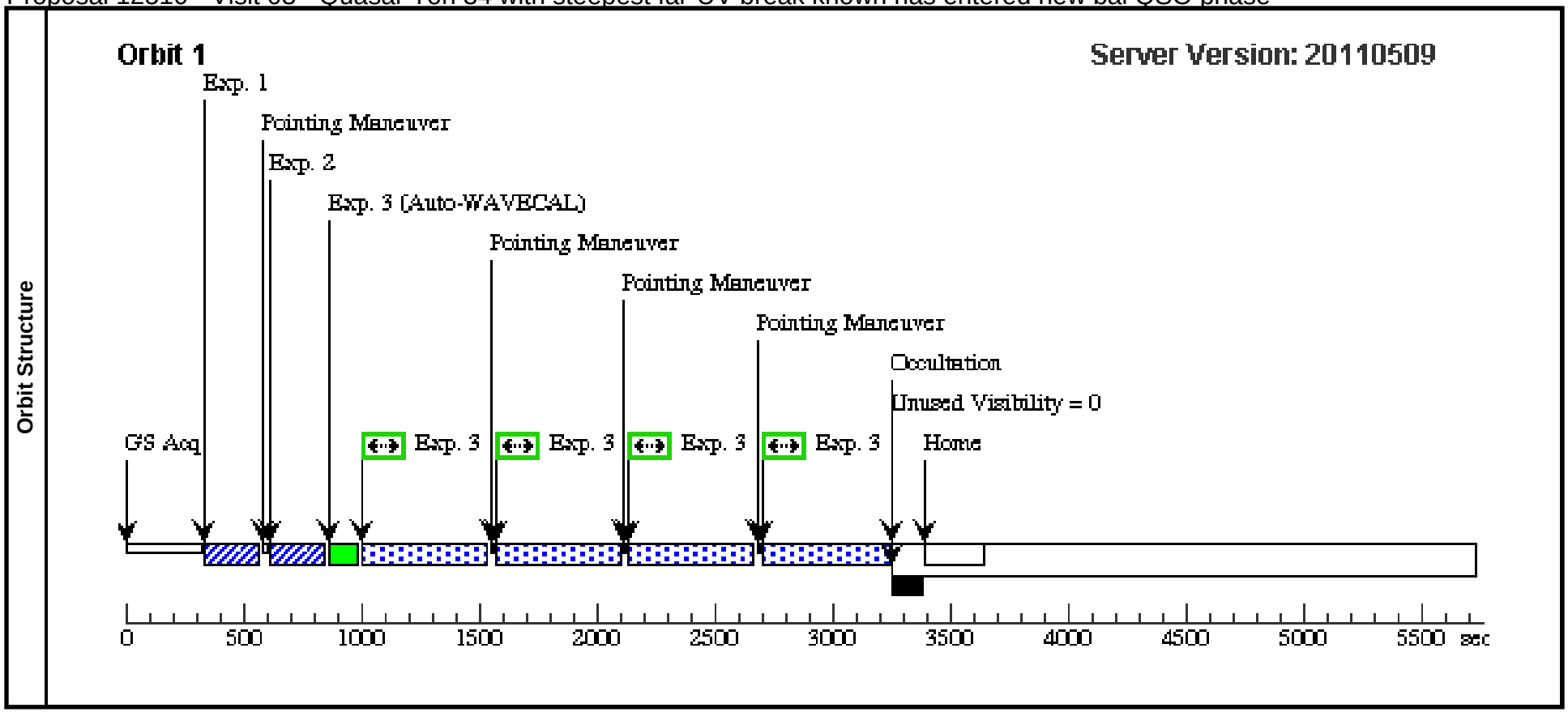
Comments: ACQ with a S/N=50 is achieved with an integration time of 2.9s with an APERTURE=F28X50LP. Total counts in selected region = 2986 cnts. TheTime to Saturation (for a single exposure) = 360.24 seconds

2	ACQ/PEAK-CCD-1 (198725)	(1) QSO-J1019+2745	STIS/CCD, ACQ/PEAK, 52X0.1E1	MIRROR				1.6 Secs *[==>]*	 ***[1]***

Comments: MIRROR mode on 52x0.1 slit; Integration time of 6.5s, gives SNR = 70 AND a Time to Saturation (for a single exposure) = 180 second; Total count in selected region of 21,286 cnts

3	TON34-CCD-G430L (198984)	(1) QSO-J1019+2745	STIS/CCD, ACCUM, 52X0.1E1	G430L 4300 A	CR-SPLIT=NO; GAIN=1		Pattern 1, Exps 3-3 in Visit 03 (1)	498 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	 ***[1]***

Comments: To manage CR and hot pixels, dithering is performed over 4 positions along the slit. A S/Nresel of 15 is expected at 3200A for each exposure dithered. The narrow longslit 52x0.1E1 is used. The Total count in selected region is 608.72cnt/2pix_resel AND the Time to Saturation (for a single exposure) = 30,122 seconds, justifying GAIN=1


Orbit Structure
Orbit 1
Server Version: 20110509
Exp. 1
Pointing Maneuver
Exp. 2
Exp. 3 (Auto-WAVECAL)
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Occultation
Unused Visibility = 0
GS Acq
Exp. 3
Exp. 3
Exp. 3
Exp. 3
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec