15092 - Testing Dust Models at Moderate Redshift: Is the z=0.437 DLA toward 3C 196 Rich in Carbonaceous Dust?

Cycle: 25, Proposal Category: GO

(UV Initiative, JWST Initative)

(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) 3C196	STIS/CCD STIS/NUV-MAMA	3	21-Jul-2017 13:01:38.0	yes
02	(1) 3C196	STIS/CCD STIS/NUV-MAMA	2	21-Jul-2017 13:01:40.0	yes
03	(1) 3C196	STIS/CCD	1	21-Jul-2017 13:01:41.0	yes

6 Total Orbits Used

ABSTRACT

Interstellar dust grains play a critical role in the formation of stars, and significantly impact the evolution and appearance of distant galaxies. High redshift studies must account for this dust. Dust grains in the Milky Way are predominately carbonaceous and silicate, each of which produces unique spectral signatures in the extinction curve. In distant galaxies, the composition of dust grains and the relative amount of silicate and carbonaceous

dust can be studied using the extinction curves along luminous background quasar sightlines produced by gas-rich foreground absorbers. Our previous work suggests that dust grains in distant galaxies are often more silicate-rich than in the Milky Way, but that the dust may be predominately silicate or carbonaceous along a sightline. We predict that silicate-poor, dusty DLAs should be rich in carbonaceous dust, and exhibit a relatively strong 2175 A bump. To test this hypothesis, we propose G230L/430L STIS spectra covering the 2175 A bump in the dusty z=0.437 DLA toward 3C 196, which is hosted in a barred spiral galaxy with (super-) solar metallicity. We expect to find a significant 2175 A bump in this system, like in the dusty but silicate-poor z=0.524 DLA toward AO 0235+164. Combining the proposed data with archival spectra will yield an extinction curve extending from the FUV to the IR, for comparison with local galaxies. The results of this test will significantly inform our models about the distribution of dust grain populations and the dichotomy between carbonaceous and silicate dust grains, and address whether moderate redshift dust in spiral galaxies does differ from the Milky Way, in preparation for planned JWST studies.

OBSERVING DESCRIPTION

We will obtain 5 orbits with the STIS/MAMA/G230L grating and 1 orbit with the STIS/G430L grating to span the spectral range from 1570-5700 Angstroms with a S/N per spectral resolution element of ~10 at the center of the (rest-frame) 2175 Angstrom feature. In the observed frame, this feature in the z=0.437 DLA will be centered at 3125.5 Angstroms. Due to the detrimental effects of CTE in the STIS CCD for the exposure times of 1000 seconds or less, and since we are observing a point source and the full slit length is not needed, we use the 52"x0.2"E1 pseudo-aperture for our G430L observation, to place the target closer to the readout amplifier. For the G230L science exposures, we have used 2-point dither patterns along the slit with step sizes of 1.0", 1.5", 2.0", 2.5", and 3.0", to prevent the spectra in different orbits from falling on the same part of the detector. We have used a 3-point dither pattern with smaller step sizes of 0.5" for the G430L observations, due to our proximity to the slit edge.

Visit

Proposal 15092, Visit 1 -G230L (01) Fri Jul 21 17:01:42 GMT 2017

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Comments: We have verified, using the BOT, that there are no bright objects (i.e. no objects flagged as health/safety concerns) in the field.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(2)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=1.5	Center Pattern=false		
	Line Spacing=			
(2)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(3)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=2.0	Center Pattern=false		
	Line Spacing=			
(3)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(4)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=2.5	Center Pattern=false		
	Line Spacing=			

Fixed Targets

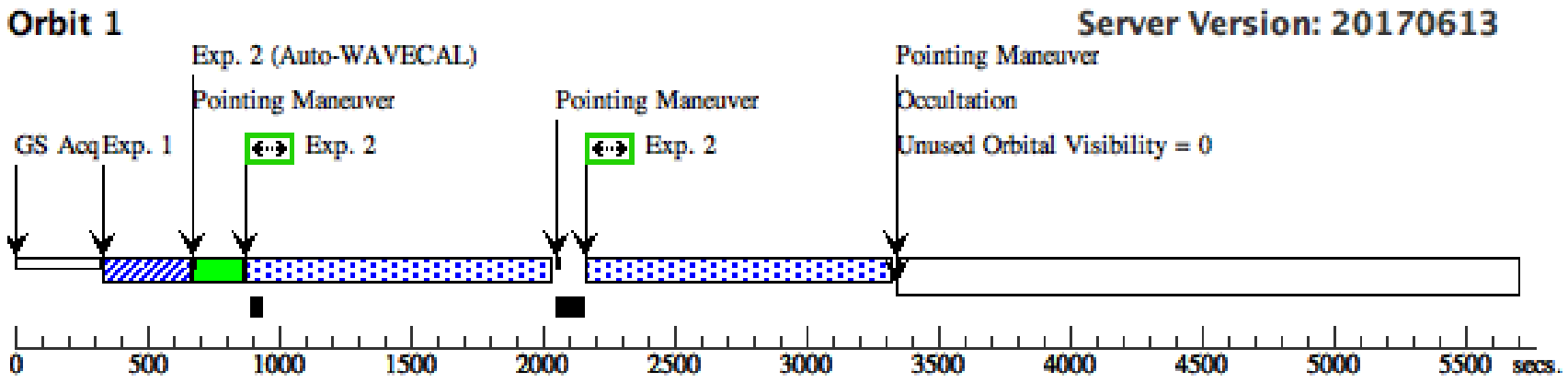
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	3C196	RA: 08 13 36.0677 (123.4002821d)	Redshift: 0.87	V=17.79	Reference Frame: ICRS
		Dec: +48 13 2.75 (48.21743d)		SDSS uAB=18.941	
		Equinox: J2000			

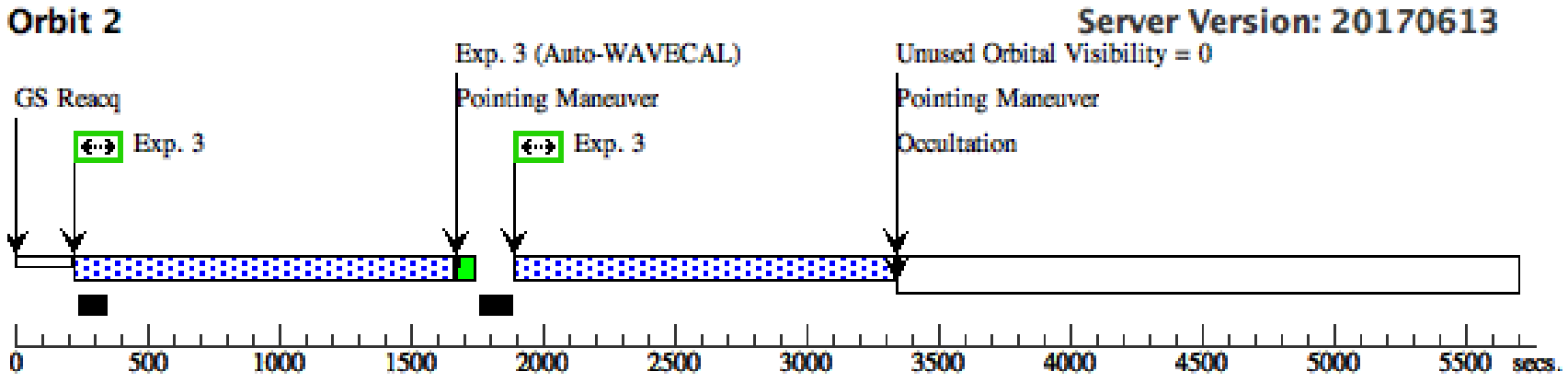
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. The coordinates were updated using the 2MASS All-Sky Point Source Catalog (PSC). The redshift of the QSO was taken from NED.

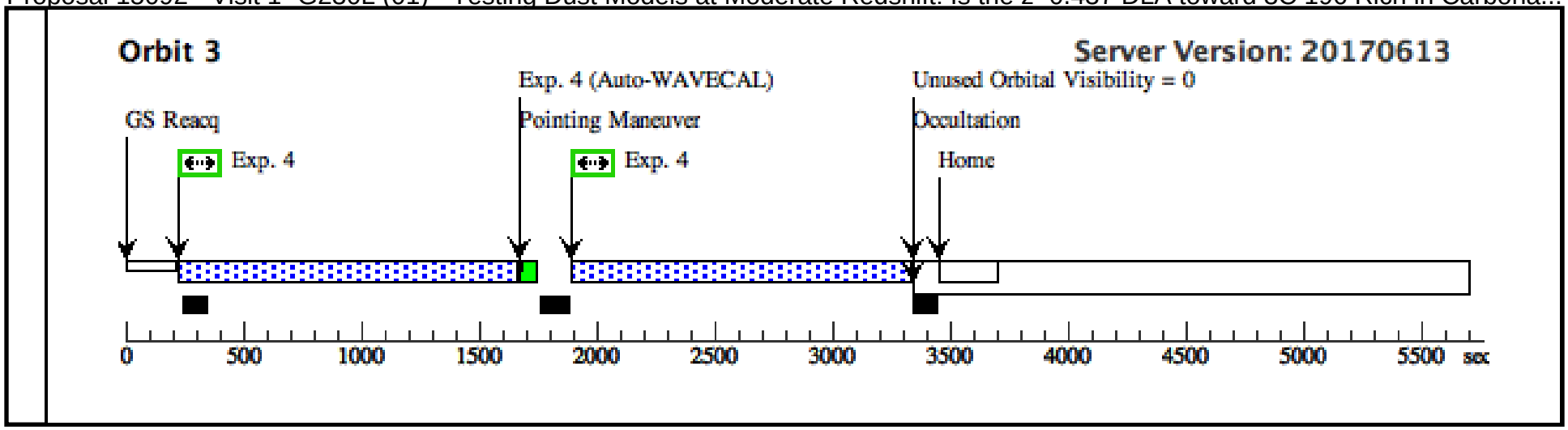
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	G230L-Acquisition1 (STIS.ta.1011770)	(1) 3C196	STIS/CCD, ACQ, F28X50LP	MIRROR				25 Secs (25 Secs)	
								[==>]	***[1]***
2	(STIS.sp.1011771)	(1) 3C196	STIS/NUV-MAMA, ACCUM, 52X0.2	G230L 2376 A			Pattern 1, Exps 2-2 in Visit 1 -G230L (01) (1)	1100 Secs (2302 Secs)	
								[==>1151.0 Secs (Pattern 1)] *[==>1151.0 Secs (Pattern 2)]*	***[1]***
3	(STIS.sp.1011772)	(1) 3C196	STIS/NUV-MAMA, ACCUM, 52X0.2	G230L 2376 A			Pattern 2, Exps 3-3 in Visit 1 -G230L (01) (2)	1200 Secs (2850 Secs)	
								[==>1425.0 Secs (Pattern 1)] *[==>1425.0 Secs (Pattern 2)]*	***[2]***
4	(STIS.sp.1011772)	(1) 3C196	STIS/NUV-MAMA, ACCUM, 52X0.2	G230L 2376 A			Pattern 3, Exps 4-4 in Visit 1 -G230L (01) (3)	1100 Secs (2850 Secs)	
								[==>1425.0 Secs (Pattern 1)] *[==>1425.0 Secs (Pattern 2)]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20170613
GS Reacq
Exp. 4
Exp. 4 (Auto-WAVECAL)
Pointing Maneuver
Exp. 4
Unused Orbital Visibility = 0
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15092, Visit 2 -G230L (02) Fri Jul 21 17:01:42 GMT 2017

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Comments: We have verified, using the BOT, that there are no bright objects (i.e. no objects flagged as health/safety concerns) in the field.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(4)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(3)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=3.0	Center Pattern=false		
	Line Spacing=			
(5)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(2)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=1.0	Center Pattern=false		
	Line Spacing=			

Fixed Targets

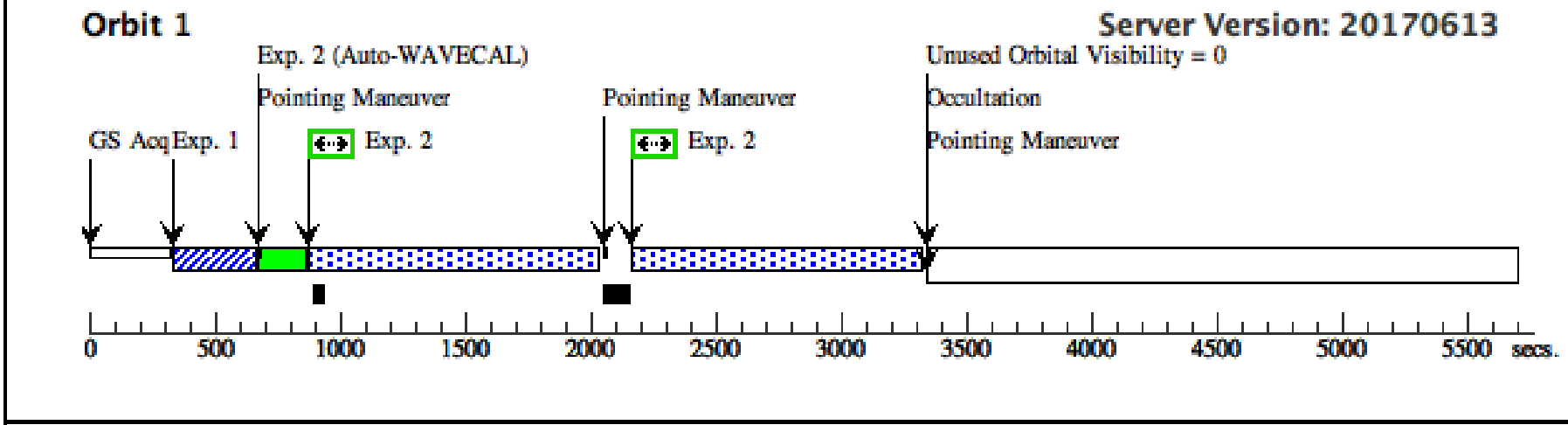
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	3C196	RA: 08 13 36.0677 (123.4002821d)	Redshift: 0.87	V=17.79	Reference Frame: ICRS
		Dec: +48 13 2.75 (48.21743d)		SDSS uAB=18.941	
		Equinox: J2000			

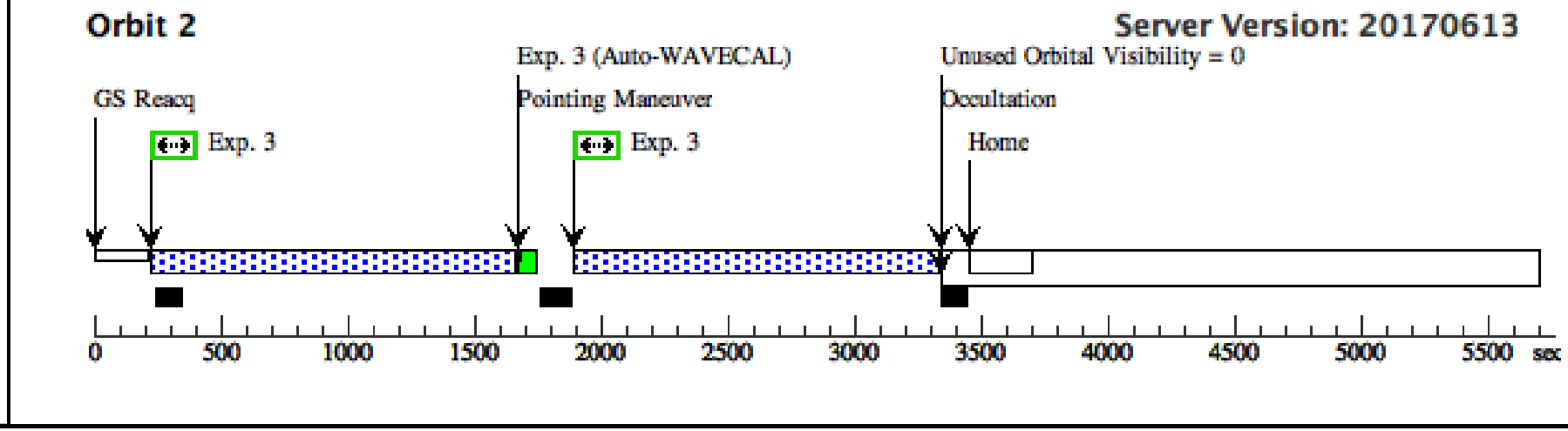
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. The coordinates were updated using the 2MASS All-Sky Point Source Catalog (PSC). The redshift of the QSO was taken from NED.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	G230L-Acquisition1 (STIS.ta.1011770)	(1) 3C196	STIS/CCD, ACQ, F28X50LP	MIRROR				25 Secs (25 Secs)	
								[==>]	***[1]***
2	(STIS.sp.1011771)	(1) 3C196	STIS/NUV-MAMA, ACCUM, 52X0.2	G230L 2376 A			Pattern 5, Exps 2-2 in Visit 2 -G230L (02) (5)	1100 Secs (2302 Secs)	
								[==>1151.0 Secs (Pattern 1)] *[==>1151.0 Secs (Pattern 2)]*	***[1]***
3	(STIS.sp.1011772)	(1) 3C196	STIS/NUV-MAMA, ACCUM, 52X0.2	G230L 2376 A			Pattern 4, Exps 3-3 in Visit 2 -G230L (02) (4)	1200 Secs (2850 Secs)	
								[==>1425.0 Secs (Pattern 1)] *[==>1425.0 Secs (Pattern 2)]*	***[2]***

Orbit Structure





Visit

Proposal 15092, Visit3-G430L (03) Fri Jul 21 17:01:42 GMT 2017

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: (none)

Comments: We have verified, using the BOT, that there are no bright objects (i.e. no objects flagged as health/safety concerns) in the field.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(6)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(2)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=3	Angle Between Sides=		
	Point Spacing=0.5	Center Pattern=false		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	3C196	RA: 08 13 36.0677 (123.4002821d)	Redshift: 0.87	V=17.79	Reference Frame: ICRS
		Dec: +48 13 2.75 (48.21743d)		SDSS uAB=18.941	
		Equinox: J2000			

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. The coordinates were updated using the 2MASS All-Sky Point Source Catalog (PSC). The redshift of the QSO was taken from NED.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.101 1770)	(1) 3C196	STIS/CCD, ACQ, F28X50LP	MIRROR				25 Secs (25 Secs)	
								[==>]	***[1]***
2	(STIS.sp.10 11730)	(1) 3C196	STIS/CCD, ACCUM, 52X0.2E1	G430L 4300 A	CR-SPLIT=NO		Pattern 6, Exps 2-2 in Visit3-G430L (03) (6)	700 Secs (2325 Secs)	
								[==>775.0 Secs (Pattern 1)]	
								[==>775.0 Secs (Pattern 2)]	***[1]***
								[==>775.0 Secs (Pattern 3)]	

Orbit Structure