13294 - Characterizing the formation of the primordial red sequence

Cycle: 21, 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) J1000+0234 ANY	ACS/WFC WFC3/IR	2	13-Dec-2013 21:23:43.0	yes
02	(2) VD-17871 ANY	ACS/WFC WFC3/IR	2	13-Dec-2013 21:23:57.0	yes
03	(3) AZTEC-1 ANY	ACS/WFC WFC3/IR	2	13-Dec-2013 21:24:10.0	yes

6 Total Orbits Used

ABSTRACT

We request six orbits of HST/WFC3-IR to complement existing CANDELS imaging for a detailed and direct study of the formation properties of the very first massive red sequence galaxies.

Our unique sample of millimeter-identified starbursts with spectroscopically confirmed redshifts z>4 is the prime testbed to probe the formation process of massive galaxies in the very early Universe.

Given the complicated selection methods to reveal such sources, only recently the vast multi-wavelength coverage of the COSMOS field has allowed to establish this uniquely representative sample of the earliest population of massive starbursts. Their number density has been shown to match that of the very early (z~2) red sequence of massive and intriguingly compact galaxies, hinting to a direct evolutionary link of both populations. In order to establish this link -- particularly that our starbursts are prone to produce a compact remnant -- we need to thoroughly probe both, the heavily obscured regions within these generally dust-rich sources as well as the relatively unobscured patches. Scheduled high-resolution ALMA observations will yield detailed dynamics and direct views of the dust distribution within our targets. However, the high resolution WFC3-IR reaches at rest-frame (near) ultraviolet wavelengths is the only way to allow for a full view of the star formation activity and, for determining the detailed dust extinction processes across our targets.

The combined data will yield a unique opportunity to understand massive galaxy formation and dust accumulation within 1.5 Billion years after the Big Bang.

OBSERVING DESCRIPTION

We have been granted six orbits for continuum imaging of three redshift z>4 starburst galaxies within the COSMOS field using WFC3's IR channel. One orbit per target will be used for each F125W and F160W filters. Hence, we are planning three visits, one per target, within which each of the two

orbits is assigned one particular filter. We use the IR dither-blob pattern with default shifts of a few arcseconds combined with the dither-line IR sub-pattern to allow for sub-pixel shifts, which should be sufficient to move detector defects and persistence from bright sources around the chip by enough to allow them to be dealt with when combining the images. This way, we can split the observations into four exposures per orbit -- matching for both filters -- whereby each exposure takes about 600s. Using the SPARS50 read out sequence we can incorporate 14-15 samples to make the best use of our visibility coverage. We checked the DSS images for nearby bright stars and constrain the rolling range in order to avoid detector saturation. We checked that this constraint does not affect our overall target visibility. We use the IR-fix aperture, centered on the location of our targets, allowing for best coverage of our objects of interest and also obtain a representative sampling of their environment. The absolute astrometric frame in the COSMOS field is tied to the VLA radio observations so that we are not worried about incompatibilities with respect to the global ICRS standard.

Visit

Proposal 13294, Visit 01, implementation Sat Dec 14 02:24:21 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, ACS/WFC

Special Requirements: BEFORE 03-JUN-2014:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=WFC3-IR-DITHER-BLOB Purpose=DITHER Number Of Points=2 Point Spacing=5.183 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.859 Angle Between Sides= Center Pattern=false	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.636 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false	(1-3)

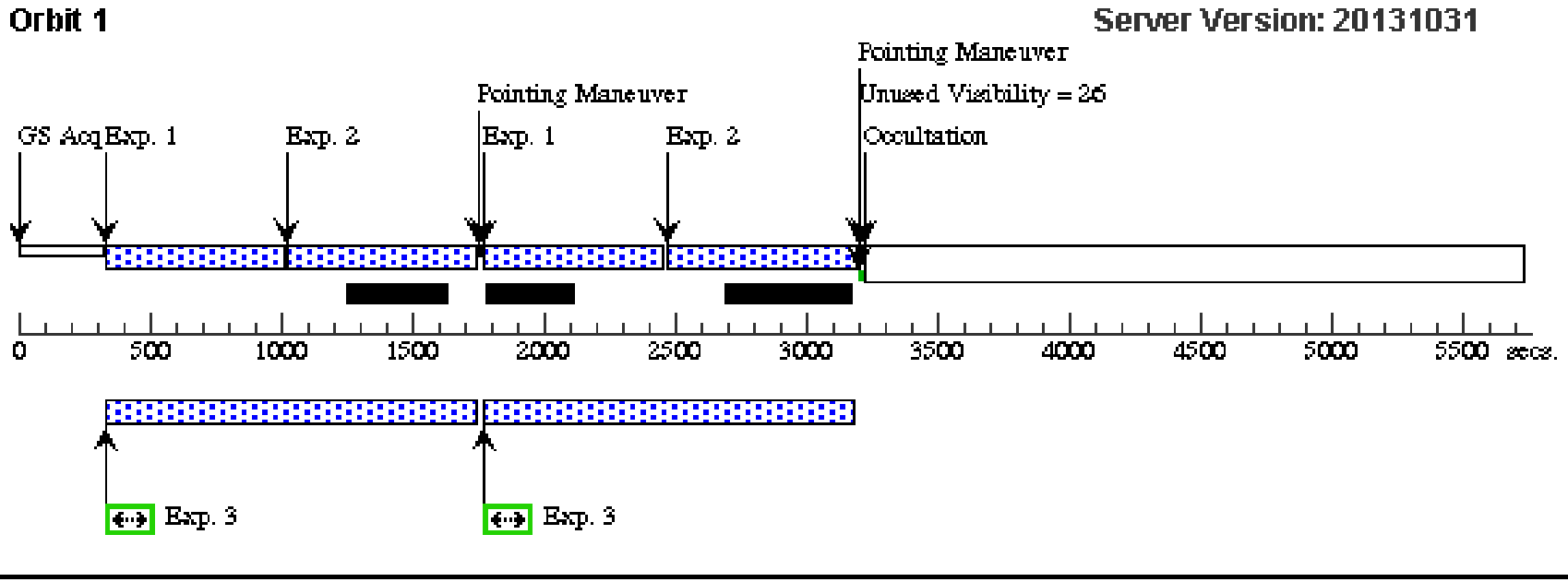
Fixed Targets

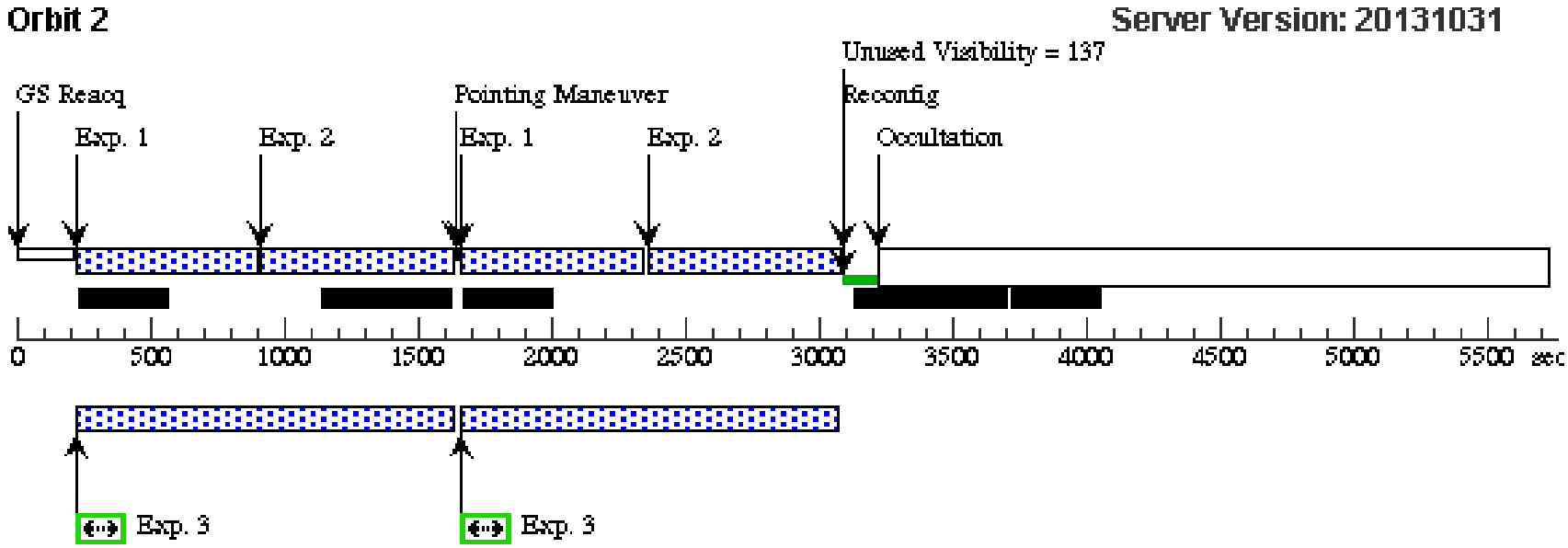
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	J1000+0234	RA: 10 00 54.5160 (150.2271500d) Dec: +02 34 35.17 (2.57644d) Equinox: J2000		V=(?) H=23.6	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) J1000+0234	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=14; SAMP-SEQ=SPARS50		Pattern 1, Exps 1-3 in Visit 01 (1) Prime + Parallel Group 1-3 in Pattern 1, Exps 1-3 in Visit 01	652.938154 Secs (2611.753 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	 ***[1]*** ***[2]***
2		(1) J1000+0234	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=8; SAMP-SEQ=SPARS100		Pattern 1, Exps 1-3 in Visit 01 (1) Prime + Parallel Group 1-3 in Pattern 1, Exps 1-3 in Visit 01	702.934552 Secs (2811.738 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	 ***[1]*** ***[2]***
3		ANY	ACS/WFC, ACCUM, WFC	F814W			Pattern 1, Exps 1-3 in Visit 01 (1) Prime + Parallel Group 1-3 in Pattern 1, Exps 1-3 in Visit 01	1000 Secs (5066 Secs) *[==>1205.0 Secs (Pattern 1,1)]* *[==>1287.0 Secs (Pattern 1,2)]* *[==>1287.0 Secs (Pattern 2,1)]* *[==>1287.0 Secs (Pattern 2,2)]*	 ***[1]*** ***[2]***

Orbit Structure





Visit

Proposal 13294, Visit 02, implementation Sat Dec 14 02:24:24 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=WFC3-IR-DITHER-BLOB Purpose=DITHER Number Of Points=2 Point Spacing=5.183 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.859 Angle Between Sides= Center Pattern=false	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.636 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false	(1-3)

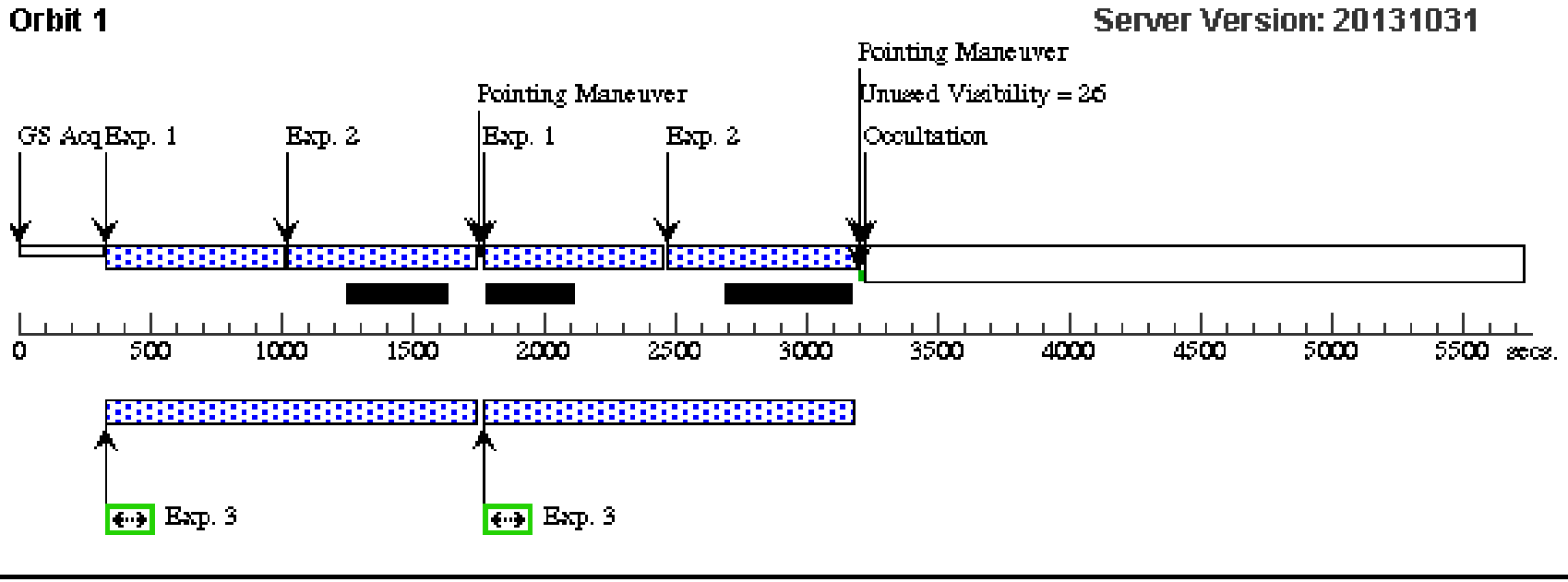
Fixed Targets

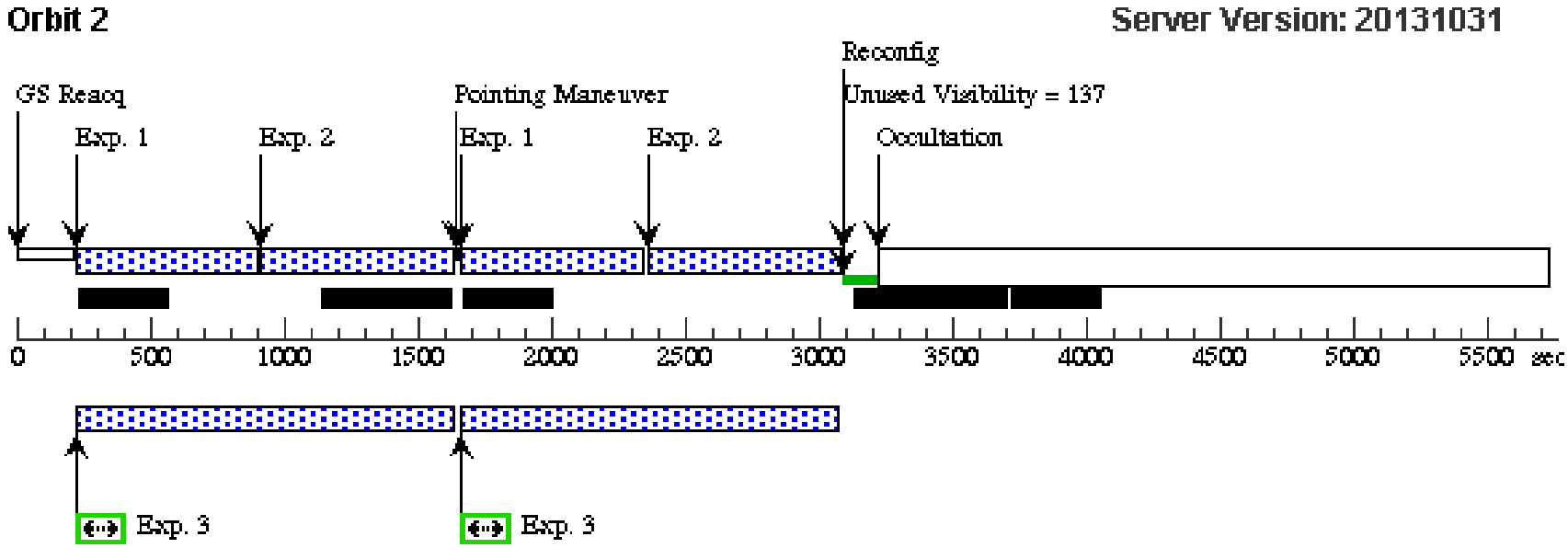
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	VD-17871	RA: 10 01 27.0790 (150.3628292d) Dec: +02 08 55.80 (2.14883d) Equinox: J2000		V=(?) H=25.2	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) VD-17871	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=14; SAMP-SEQ=SPARS50		Pattern 1, Exps 1-3 in Visit 02 (1) Prime + Parallel Group 1-3 in Pattern 1, Exps 1-3 in Visit 02	652.938154 Secs (2611.753 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	 ***[1]*** ***[2]***
2		(2) VD-17871	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=8; SAMP-SEQ=SPARS100		Pattern 1, Exps 1-3 in Visit 02 (1) Prime + Parallel Group 1-3 in Pattern 1, Exps 1-3 in Visit 02	702.934552 Secs (2811.738 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	 ***[1]*** ***[2]***
3		ANY	ACS/WFC, ACCUM, WFC	F814W			Pattern 1, Exps 1-3 in Visit 02 (1) Prime + Parallel Group 1-3 in Pattern 1, Exps 1-3 in Visit 02	1000 Secs (5066 Secs) *[==>1205.0 Secs (Pattern 1,1)]* *[==>1287.0 Secs (Pattern 1,2)]* *[==>1287.0 Secs (Pattern 2,1)]* *[==>1287.0 Secs (Pattern 2,2)]*	 ***[1]*** ***[2]***

Orbit Structure





Visit

Proposal 13294, Visit 03, implementation Sat Dec 14 02:24:25 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=WFC3-IR-DITHER-BLOB Purpose=DITHER Number Of Points=2 Point Spacing=5.183 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.859 Angle Between Sides= Center Pattern=false	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.636 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false	(1-3)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	AZTEC-1	RA: 09 59 42.8590 (149.9285792d) Dec: +02 29 38.20 (2.49394d) Equinox: J2000		V=(?) H=24.4	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(3) AZTEC-1	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=14; SAMP-SEQ=SPARS50		Pattern 1, Exps 1-3 in Visit 03 (1) Prime + Parallel Group 1-3 in Pattern 1, Exps 1-3 in Visit 03	652.938154 Secs (2611.753 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	 ***[1]*** ***[2]***
2		(3) AZTEC-1	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=8; SAMP-SEQ=SPARS100		Pattern 1, Exps 1-3 in Visit 03 (1) Prime + Parallel Group 1-3 in Pattern 1, Exps 1-3 in Visit 03	702.934552 Secs (2811.738 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	 ***[1]*** ***[2]***
3		ANY	ACS/WFC, ACCUM, WFC	F814W			Pattern 1, Exps 1-3 in Visit 03 (1) Prime + Parallel Group 1-3 in Pattern 1, Exps 1-3 in Visit 03	1000 Secs (5066 Secs) *[==>1205.0 Secs (Pattern 1,1)]* *[==>1287.0 Secs (Pattern 1,2)]* *[==>1287.0 Secs (Pattern 2,1)]* *[==>1287.0 Secs (Pattern 2,2)]*	 ***[1]*** ***[2]***

Orbit Structure