12508 - Constraining the evolutionary state of the hot, massive companion star and the wind-wind collision region in Eta Carinae

Cycle: 19, Proposal Category: GO

(Availability Mode: AVAILABLE)

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) ETA-CAR CCDFLAT WAVE	STIS/CCD	3	01-Jul-2011 21:20:30.0	yes

3 Total Orbits Used

ABSTRACT

Our primary goal is to constrain the physical properties of Eta Car's wind-wind collision region and the properties of Eta Car B, the hot, very massive secondary companion that is hidden from our view. We propose to do this by measuring the forbidden emission lines in the extended, interacting wind structures resolved in the inner 1.5 arcseconds region. As the mass-loss structures evolve across the 5.54-year orbital period, we will selectively map their spatial and velocity changes at critical phases using the spatial resolution of HST and moderate spectral resolving power of the STIS to generate spatial (2-D), velocity (1-D) data cubes of regions of critical collisional densities. We will use these spatial-velocity data cubes to drive ongoing 3-D models of the interacting winds, adding radiative transfer. We will (A) strongly constrain the 3-D mass loss from the system and (B) determine the properties of Eta Car B, the source of FUV radiation and the driving wind creating the X-ray emitting cavity out of the dominating wind of Eta Car A.

OBSERVING DESCRIPTION

These observations are planned to observe the extended winds of Eta Carinae at critical times to test current and developing 3D hydrodynamic models that eventually will incorporate radiative transfer. Each visit will map the 1.5" extended winds in forbidden emission lines of high and low ionization species including Fe++, Ar++, N+, Fe+ and Ni+. CVZ is requested to obtain complete mappings in each of these lines using one G430M grating setting (4706A) and two G750M grating settings (7354 abd 5734). The mapping is accomplished with a 52"X0.1" aperture at arbitrary position angles, sampled at 0.05" spacing.

The observations under this program will occur at apastron (phase 0.5) in fall 2011. Cycle 20 observations will be scheduled one year before periastron (phase 0.8) in summer 2013. Cycle 21 is intended to begin weeks before periastron (phase 0.98) in June 2014, and continue at critical phases just after periastron in fall 2015 (near phases 1.06 and 1.09). We anticipate a very asymmetric recovery structure in [Fe III] and [Ar III] near phase 1.06 with symmetry accomplished by 1.09. The reference phase for structure is at apastron and maximum structures should be between phase 0.8 and 0.98. Mappings already exist for phases 0.084, 0.163 and 0.323 from programs 11506 and 12013 and have been fitted by SPH modeling (in preparation).

Visit

Proposal 12508, Visit 01 Sat Jul 02 01:21:39 GMT 2011

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: PCS MODE FINE; GYRO MODE 3GOBAD; CVZ; BETWEEN 01-SEP-2011:00:00:00 AND 30-NOV-2011:00:00:00

Comments: Schedule around phase 12.5 Oct 19, 2011

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(6)	Pattern Type=STIS-PERP-TO-SLIT	Coordinate Frame=POS-TARG		(5), (8), (11)
	Purpose=MOSAIC	Pattern Orientation=0.0		
	Number Of Points=7	Angle Between Sides=		
	Point Spacing=0.05	Center Pattern=true		
	Line Spacing=			
(7)	Pattern Type=STIS-PERP-TO-SLIT	Coordinate Frame=POS-TARG		(3), (6), (9)
	Purpose=MOSAIC	Pattern Orientation=0.0		
	Number Of Points=41	Angle Between Sides=		
	Point Spacing=.05	Center Pattern=true		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	ETA-CAR	RA: 10 45 3.5910 (161.2649625d)		V=4.5+/-0.2	Reference Frame: GSC1
		Dec: -59 41 4.26 (-59.68452d)			
		Equinox: J2000			
		Plate Id: ZZZQ			

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

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	Acquisition exposure	(1) ETA-CAR	STIS/CCD, ACQ, F25ND3	MIRROR				0.5 Secs	
								[==>]	***[1]***
Comments: Peak=9290 e-, Total=15480 e-, S/N=123									
2	ACQ/Peak	(1) ETA-CAR	STIS/CCD, ACQ/PEAK, 52X0.1	G750M				0.5 Secs	
				7795 A				*[==>]*	***[1]***

	3	Mapping [Fe III], [Fe II], Fe II	(1) ETA-CAR	STIS/CCD, ACCUM, 52X0.1	G430M 4706 A	CR-SPLIT=2; GAIN=4; SIZEAXIS2=128; WAVECAL=NO	Pattern 7, Exps 3-3 in Visit 01 (7)	26 Secs	

		[==>(Pattern 1, Split 1)] *[==>(Pattern 1, Split 2)]* *[==>(Pattern 2, Split 1)]* *[==>(Pattern 2, Split 2)]* *[==>(Pattern 3, Split 1)]* *[==>(Pattern 3, Split 2)]* *[==>(Pattern 4, Split 1)]* *[==>(Pattern 4, Split 2)]* *[==>(Pattern 5, Split 1)]* *[==>(Pattern 5, Split 2)]* *[==>(Pattern 6, Split 1)]* *[==>(Pattern 6, Split 2)]* *[==>(Pattern 7, Split 1)]* *[==>(Pattern 7, Split 2)]* *[==>(Pattern 8, Split 1)]* *[==>(Pattern 8, Split 2)]* *[==>(Pattern 9, Split 1)]* *[==>(Pattern 9, Split 2)]* *[==>(Pattern 10, Split 1)]* *[==>(Pattern 10, Split 2)]* *[==>(Pattern 11, Split 1)]* *[==>(Pattern 11, Split 2)]* *[==>(Pattern 12, Split 1)]* *[==>(Pattern 12, Split 2)]* *[==>(Pattern 13, Split 1)]* *[==>(Pattern 13, Split 2)]* *[==>(Pattern 14, Split 1)]* *[==>(Pattern 14, Split 2)]* *[==>(Pattern 15, Split 1)]* *[==>(Pattern 15, Split 2)]* *[==>(Pattern 16, Split 1)]* *[==>(Pattern 16, Split 2)]* *[==>(Pattern 17, Split 1)]* *[==>(Pattern 17, Split 2)]* *[==>(Pattern 18, Split 1)]* *[==>(Pattern 18, Split 2)]* *[==>(Pattern 19, Split 1)]* *[==>(Pattern 19, Split 2)]* *[==>(Pattern 20, Split 1)]* *[==>(Pattern 20, Split 2)]* *[==>(Pattern 21, Split 1)]* *[==>(Pattern 21, Split 2)]* *[==>(Pattern 22, Split 1)]* *[==>(Pattern 22, Split 2)]* *[==>(Pattern 23, Split 1)]*	***[1]***

					[==>(Pattern 23, Split 2)] *[==>(Pattern 24, Split 1)]* *[==>(Pattern 24, Split 2)]* *[==>(Pattern 25, Split 1)]* *[==>(Pattern 25, Split 2)]* *[==>(Pattern 26, Split 1)]* *[==>(Pattern 26, Split 2)]* *[==>(Pattern 27, Split 1)]* *[==>(Pattern 27, Split 2)]* *[==>(Pattern 28, Split 1)]* *[==>(Pattern 28, Split 2)]* *[==>(Pattern 29, Split 1)]* *[==>(Pattern 29, Split 2)]* *[==>(Pattern 30, Split 1)]* *[==>(Pattern 30, Split 2)]* *[==>(Pattern 31, Split 1)]* *[==>(Pattern 31, Split 2)]* *[==>(Pattern 32, Split 1)]* *[==>(Pattern 32, Split 2)]* *[==>(Pattern 33, Split 1)]* *[==>(Pattern 33, Split 2)]* *[==>(Pattern 34, Split 1)]* *[==>(Pattern 34, Split 2)]* *[==>(Pattern 35, Split 1)]* *[==>(Pattern 35, Split 2)]* *[==>(Pattern 36, Split 1)]* *[==>(Pattern 36, Split 2)]* *[==>(Pattern 37, Split 1)]* *[==>(Pattern 37, Split 2)]* *[==>(Pattern 38, Split 1)]* *[==>(Pattern 38, Split 2)]* *[==>(Pattern 39, Split 1)]* *[==>(Pattern 39, Split 2)]* *[==>(Pattern 40, Split 1)]* *[==>(Pattern 40, Split 2)]* *[==>(Pattern 41, Split 1)]* *[==>(Pattern 41, Split 2)]*	

Comments: two [Fe III] and one [Fe II] line within this grating coverage.

4	4706 WAV ECAL	WAVE	STIS/CCD, ACCUM, 52X0.1	G430M 4706 A	*[==>]*	***[1]***

Comments: Placed in earth occultation

5	Submapping [Fe III], [Fe II]	(1) ETA-CAR	STIS/CCD, ACCUM, 52X0.1	G430M 4706 A	CR-SPLIT=2; GAIN=4; SIZEAXIS2=64	Pattern 6, Exps 5-5 in Visit 01 (6)	5.0 Secs	
							[==>(Pattern 1, Split 1)] *[==>(Pattern 1, Split 2)]* *[==>(Pattern 2, Split 1)]* *[==>(Pattern 2, Split 2)]* *[==>(Pattern 3, Split 1)]* *[==>(Pattern 3, Split 2)]* *[==>(Pattern 4, Split 1)]* *[==>(Pattern 4, Split 2)]* *[==>(Pattern 5, Split 1)]* *[==>(Pattern 5, Split 2)]* *[==>(Pattern 6, Split 1)]* *[==>(Pattern 6, Split 2)]*	***[1]***
							[==>(Pattern 7, Split 1)] *[==>(Pattern 7, Split 2)]*	***[2]***

Comments: Submapping on bright stellar positions.

	6	Submapping [N II]	(1) ETA-CAR	STIS/CCD, ACCUM, 52X0.1	G750M 5734 A	CR-SPLIT=2; GAIN=4; SIZEAXIS2=128	Pattern 7, Exps 6-6 in Visit 01 (7)	34.0 Secs	

		[==>(Pattern 1, Split 1)] *[==>(Pattern 1, Split 2)]* *[==>(Pattern 2, Split 1)]* *[==>(Pattern 2, Split 2)]* *[==>(Pattern 3, Split 1)]* *[==>(Pattern 3, Split 2)]* *[==>(Pattern 4, Split 1)]* *[==>(Pattern 4, Split 2)]* *[==>(Pattern 5, Split 1)]* *[==>(Pattern 5, Split 2)]* *[==>(Pattern 6, Split 1)]* *[==>(Pattern 6, Split 2)]* *[==>(Pattern 7, Split 1)]* *[==>(Pattern 7, Split 2)]* *[==>(Pattern 8, Split 1)]* *[==>(Pattern 8, Split 2)]* *[==>(Pattern 9, Split 1)]* *[==>(Pattern 9, Split 2)]* *[==>(Pattern 10, Split 1)]* *[==>(Pattern 10, Split 2)]* *[==>(Pattern 11, Split 1)]* *[==>(Pattern 11, Split 2)]* *[==>(Pattern 12, Split 1)]* *[==>(Pattern 12, Split 2)]* *[==>(Pattern 13, Split 1)]* *[==>(Pattern 13, Split 2)]* *[==>(Pattern 14, Split 1)]* *[==>(Pattern 14, Split 2)]* *[==>(Pattern 15, Split 1)]* *[==>(Pattern 15, Split 2)]* *[==>(Pattern 16, Split 1)]* *[==>(Pattern 16, Split 2)]* *[==>(Pattern 17, Split 1)]* *[==>(Pattern 17, Split 2)]* *[==>(Pattern 18, Split 1)]* *[==>(Pattern 18, Split 2)]* *[==>(Pattern 19, Split 1)]* *[==>(Pattern 19, Split 2)]* *[==>(Pattern 20, Split 1)]* *[==>(Pattern 20, Split 2)]* *[==>(Pattern 21, Split 1)]* *[==>(Pattern 21, Split 2)]* *[==>(Pattern 22, Split 1)]* *[==>(Pattern 22, Split 2)]* *[==>(Pattern 23, Split 1)]*	***[2]***

						[==>(Pattern 23, Split 2)] *[==>(Pattern 24, Split 1)]* *[==>(Pattern 24, Split 2)]* *[==>(Pattern 25, Split 1)]* *[==>(Pattern 25, Split 2)]* *[==>(Pattern 26, Split 1)]* *[==>(Pattern 26, Split 2)]* *[==>(Pattern 27, Split 1)]* *[==>(Pattern 27, Split 2)]* *[==>(Pattern 28, Split 1)]* *[==>(Pattern 28, Split 2)]* *[==>(Pattern 29, Split 1)]* *[==>(Pattern 29, Split 2)]* *[==>(Pattern 30, Split 1)]* *[==>(Pattern 30, Split 2)]* *[==>(Pattern 31, Split 1)]* *[==>(Pattern 31, Split 2)]* *[==>(Pattern 32, Split 1)]* *[==>(Pattern 32, Split 2)]* *[==>(Pattern 33, Split 1)]* *[==>(Pattern 33, Split 2)]* *[==>(Pattern 34, Split 1)]* *[==>(Pattern 34, Split 2)]* *[==>(Pattern 35, Split 1)]* *[==>(Pattern 35, Split 2)]* *[==>(Pattern 36, Split 1)]* *[==>(Pattern 36, Split 2)]* *[==>(Pattern 37, Split 1)]* *[==>(Pattern 37, Split 2)]* *[==>(Pattern 38, Split 1)]* *[==>(Pattern 38, Split 2)]* *[==>(Pattern 39, Split 1)]* *[==>(Pattern 39, Split 2)]* *[==>(Pattern 40, Split 1)]* *[==>(Pattern 40, Split 2)]* *[==>(Pattern 41, Split 1)]* *[==>(Pattern 41, Split 2)]*	
Comments: Mapping [N II] 5755							
7	5734 WAV ECAL	WAVE	STIS/CCD, ACCUM, 52X0.1	G750M 5734 A		*[==>]*	***[2]***
Comments: WAVECAL inserted in earth occultation or after exposure 7-7 completed							

8	Mapping [N II], He I	(1) ETA-CAR	STIS/CCD, ACCUM, 52X0.1	G750M 5734 A	CR-SPLIT=2; GAIN=4; SIZEAXIS2=64	Pattern 6, Exps 8-8 in Visit 01 (6)	5 Secs *[==>(Pattern 1, Split 1)]* *[==>(Pattern 1, Split 2)]* *[==>(Pattern 2, Split 1)]* *[==>(Pattern 2, Split 2)]* *[==>(Pattern 3, Split 1)]* *[==>(Pattern 3, Split 2)]* *[==>(Pattern 4, Split 1)]* *[==>(Pattern 4, Split 2)]* *[==>(Pattern 5, Split 1)]* *[==>(Pattern 5, Split 2)]* *[==>(Pattern 6, Split 1)]* *[==>(Pattern 6, Split 2)]* *[==>(Pattern 7, Split 1)]* *[==>(Pattern 7, Split 2)]*	***[2]***

Comments: Bright stellar core mapping

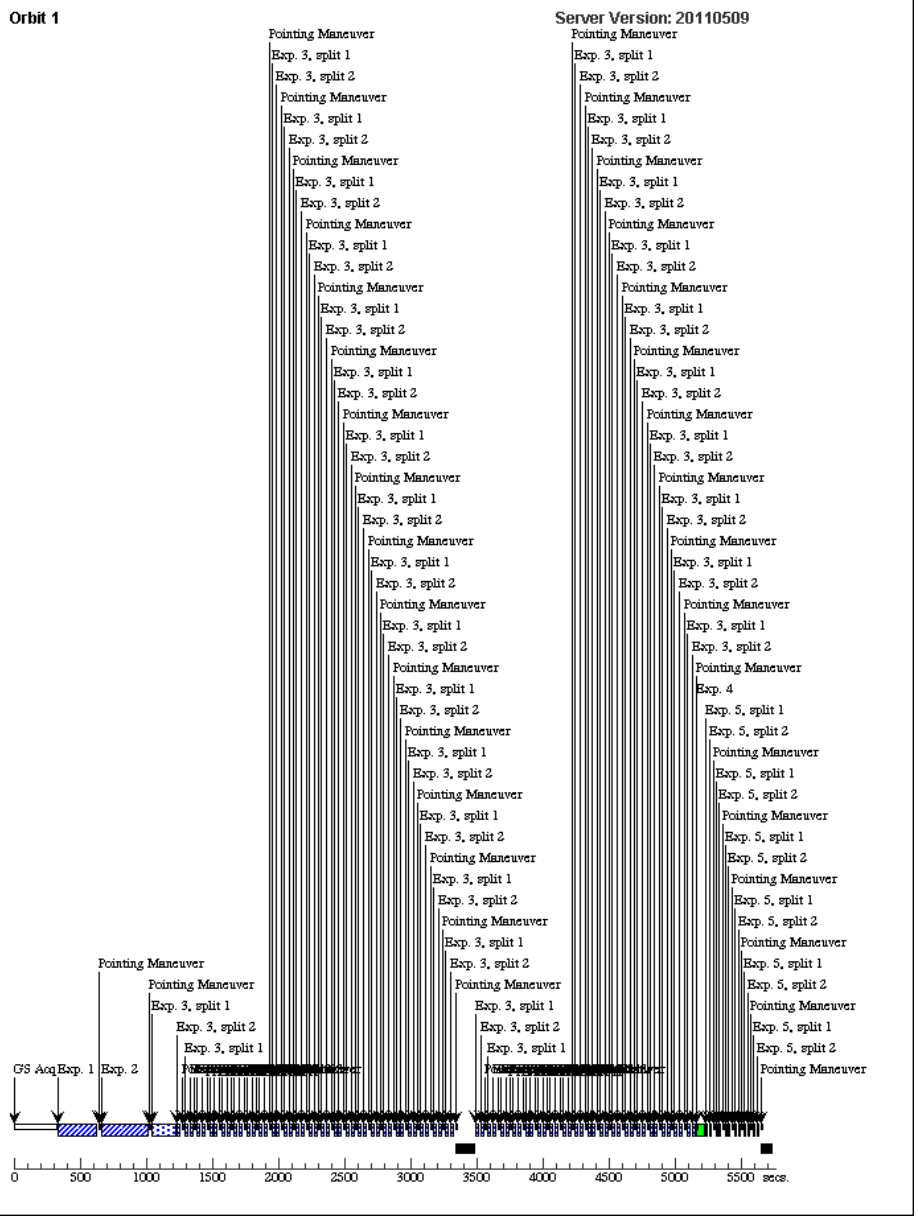
	9	Mapping [Ar III], [Fe II], [Ni II]	(1) ETA-CAR	STIS/CCD, ACCUM, 52X0.1	G750M 7283 A	CR-SPLIT=2; GAIN=4; SIZEAXIS2=128	Pattern 7, Exps 9-9 in Visit 01 (7)	33 Secs *[==>(Pattern 1, Split 1)]* *[==>(Pattern 1, Split 2)]* *[==>(Pattern 2, Split 1)]* *[==>(Pattern 2, Split 2)]* *[==>(Pattern 3, Split 1)]* *[==>(Pattern 3, Split 2)]* *[==>(Pattern 4, Split 1)]*	***[2]***

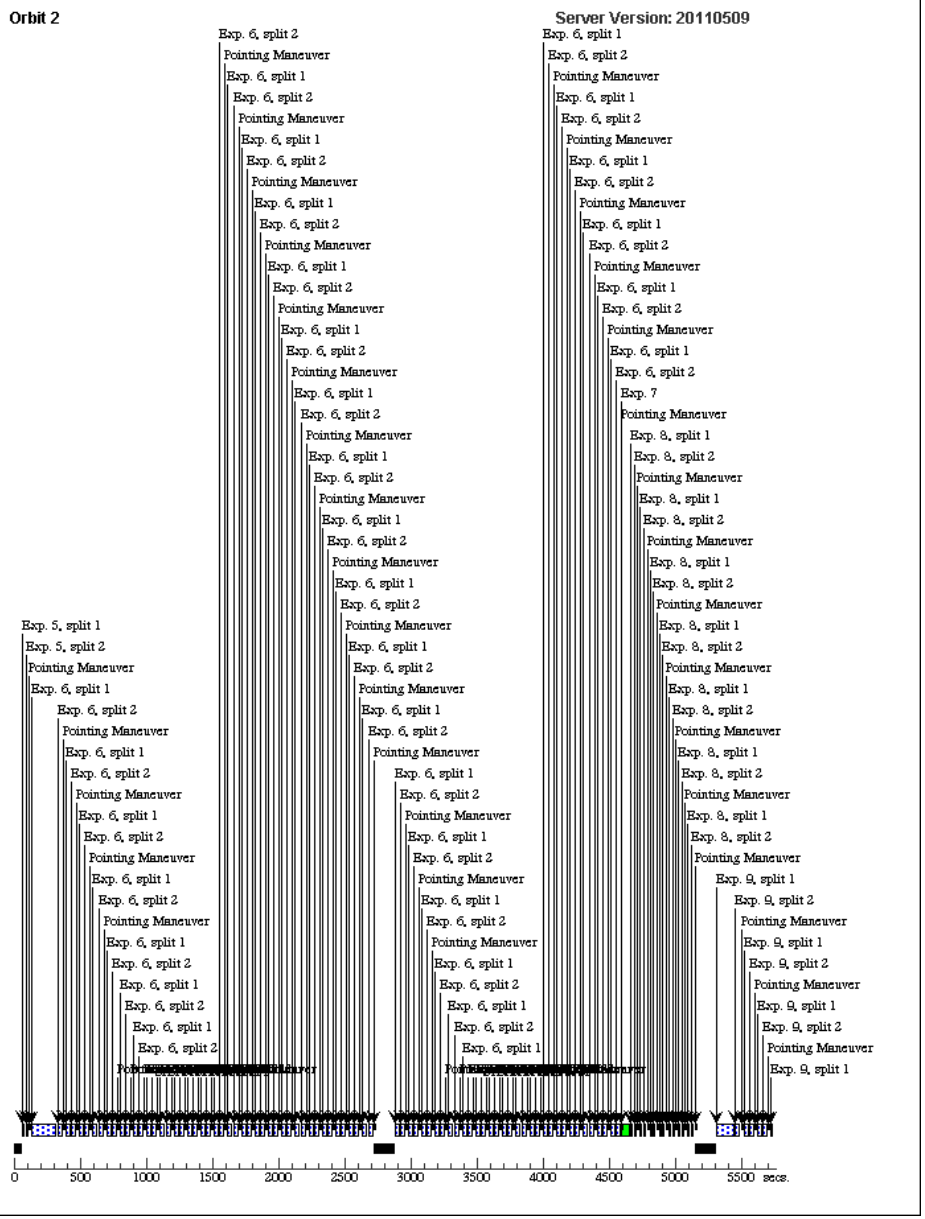
		[==>(Pattern 4, Split 2)] *[==>(Pattern 5, Split 1)]* *[==>(Pattern 5, Split 2)]* *[==>(Pattern 6, Split 1)]* *[==>(Pattern 6, Split 2)]* *[==>(Pattern 7, Split 1)]* *[==>(Pattern 7, Split 2)]* *[==>(Pattern 8, Split 1)]* *[==>(Pattern 8, Split 2)]* *[==>(Pattern 9, Split 1)]* *[==>(Pattern 9, Split 2)]* *[==>(Pattern 10, Split 1)]* *[==>(Pattern 10, Split 2)]* *[==>(Pattern 11, Split 1)]* *[==>(Pattern 11, Split 2)]* *[==>(Pattern 12, Split 1)]* *[==>(Pattern 12, Split 2)]* *[==>(Pattern 13, Split 1)]* *[==>(Pattern 13, Split 2)]* *[==>(Pattern 14, Split 1)]* *[==>(Pattern 14, Split 2)]* *[==>(Pattern 15, Split 1)]* *[==>(Pattern 15, Split 2)]* *[==>(Pattern 16, Split 1)]* *[==>(Pattern 16, Split 2)]* *[==>(Pattern 17, Split 1)]* *[==>(Pattern 17, Split 2)]* *[==>(Pattern 18, Split 1)]* *[==>(Pattern 18, Split 2)]* *[==>(Pattern 19, Split 1)]* *[==>(Pattern 19, Split 2)]* *[==>(Pattern 20, Split 1)]* *[==>(Pattern 20, Split 2)]* *[==>(Pattern 21, Split 1)]* *[==>(Pattern 21, Split 2)]* *[==>(Pattern 22, Split 1)]* *[==>(Pattern 22, Split 2)]* *[==>(Pattern 23, Split 1)]* *[==>(Pattern 23, Split 2)]* *[==>(Pattern 24, Split 1)]* *[==>(Pattern 24, Split 2)]* *[==>(Pattern 25, Split 1)]* *[==>(Pattern 25, Split 2)]* *[==>(Pattern 26, Split 1)]* *[==>(Pattern 26, Split 2)]*	***[3]***

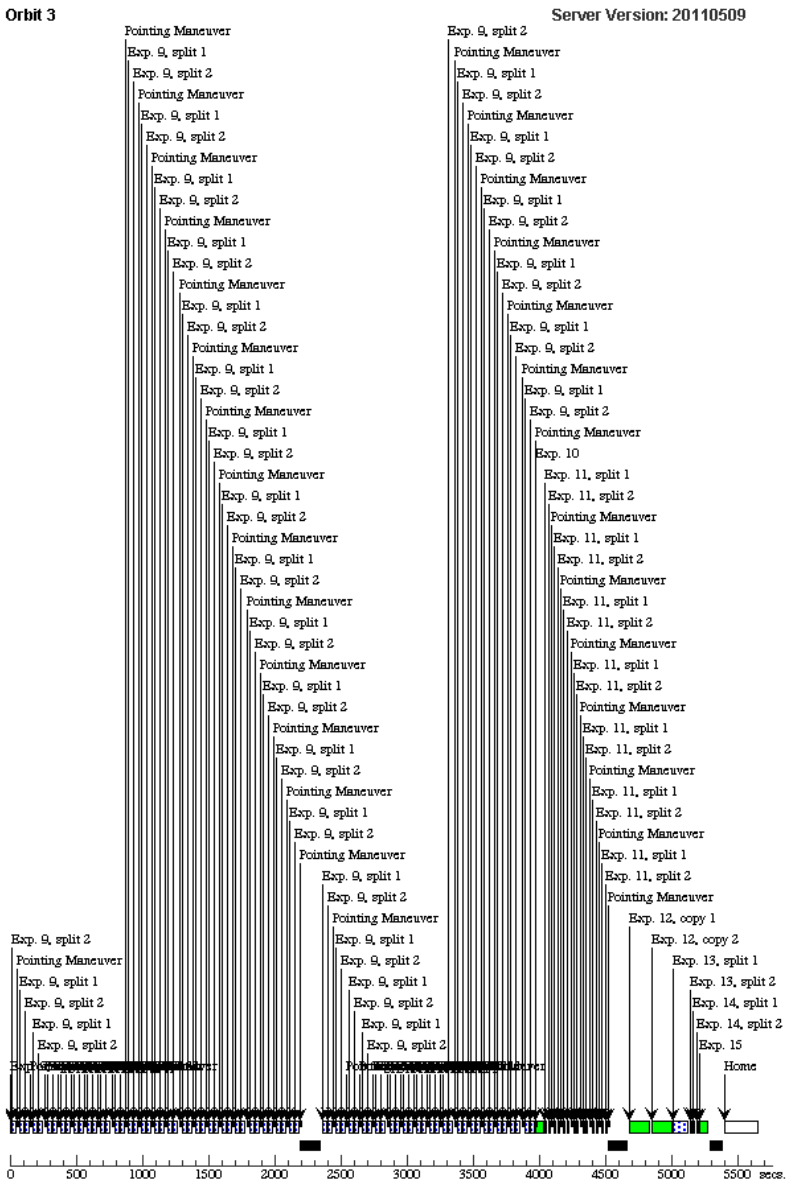
					[==>(Pattern 27, Split 1)] *[==>(Pattern 27, Split 2)]* *[==>(Pattern 28, Split 1)]* *[==>(Pattern 28, Split 2)]* *[==>(Pattern 29, Split 1)]* *[==>(Pattern 29, Split 2)]* *[==>(Pattern 30, Split 1)]* *[==>(Pattern 30, Split 2)]* *[==>(Pattern 31, Split 1)]* *[==>(Pattern 31, Split 2)]* *[==>(Pattern 32, Split 1)]* *[==>(Pattern 32, Split 2)]* *[==>(Pattern 33, Split 1)]* *[==>(Pattern 33, Split 2)]* *[==>(Pattern 34, Split 1)]* *[==>(Pattern 34, Split 2)]* *[==>(Pattern 35, Split 1)]* *[==>(Pattern 35, Split 2)]* *[==>(Pattern 36, Split 1)]* *[==>(Pattern 36, Split 2)]* *[==>(Pattern 37, Split 1)]* *[==>(Pattern 37, Split 2)]* *[==>(Pattern 38, Split 1)]* *[==>(Pattern 38, Split 2)]* *[==>(Pattern 39, Split 1)]* *[==>(Pattern 39, Split 2)]* *[==>(Pattern 40, Split 1)]* *[==>(Pattern 40, Split 2)]* *[==>(Pattern 41, Split 1)]* *[==>(Pattern 41, Split 2)]*	
10	7283 Wavecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750M 7283 A	*[==>]*	***[3]***

11	Sub-mapping [Ar III], [Fe II], [Ni II]	(1) ETA-CAR	STIS/CCD, ACCUM, 52X0.1	G750M 7283 A	CR-SPLIT=2; GAIN=4; SIZEAXIS2=64	Pattern 6, Exps 11-11 in Visit 01 (6)	6 Secs *[==>(Pattern 1, Split 1)]* *[==>(Pattern 1, Split 2)]* *[==>(Pattern 2, Split 1)]* *[==>(Pattern 2, Split 2)]* *[==>(Pattern 3, Split 1)]* *[==>(Pattern 3, Split 2)]* *[==>(Pattern 4, Split 1)]* *[==>(Pattern 4, Split 2)]* *[==>(Pattern 5, Split 1)]* *[==>(Pattern 5, Split 2)]* *[==>(Pattern 6, Split 1)]* *[==>(Pattern 6, Split 2)]* *[==>(Pattern 7, Split 1)]* *[==>(Pattern 7, Split 2)]*	***[3]***
Comments: Bright stellar core mapping								
12	7283 Flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750M 7283 A			*[==>(Copy 1)]* *[==>(Copy 2)]*	***[3]***
13	H alpha short	(1) ETA-CAR	STIS/CCD, ACCUM, 52X0.1	G750M 6768 A	CR-SPLIT=2; GAIN=4; SIZEAXIS2=128		0.2 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[3]***
14	H alpha long	(1) ETA-CAR	STIS/CCD, ACCUM, 52X0.1	G750M 6768 A	SIZEAXIS2=128; GAIN=4; CR-SPLIT=2		1 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[3]***
15	6768 WAV ECAL	WAVE	STIS/CCD, ACCUM, 52X0.1	G750M 6768 A			*[==>]*	***[3]***

Orbit Structure




Orbit 2
Server Version: 20110509
Exp. 5, split 1
Exp. 5, split 2
Pointing Maneuver
Exp. 6, split 1
Exp. 6, split 2
Exp. 7
Exp. 8, split 1
Exp. 8, split 2
Exp. 9, split 1
Exp. 9, split 2
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 3
Server Version: 20110509
Pointing Maneuver
Exp. 9, split 1
Exp. 9, split 2
Exp. 10
Exp. 11, split 1
Exp. 11, split 2
Exp. 12, copy 1
Exp. 12, copy 2
Exp. 13, split 1
Exp. 13, split 2
Exp. 14, split 1
Exp. 14, split 2
Exp. 15
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.