12551 - Imaging Disk-Planet Interactions in the Beta Pictoris Disk

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) BETA-PIC	STIS/CCD	1	07-Jul-2011 21:26:01.0	yes
02	(2) HD50241	STIS/CCD	1	07-Jul-2011 21:26:29.0	yes
03	(1) BETA-PIC	STIS/CCD	1	07-Jul-2011 21:26:52.0	yes

3 Total Orbits Used

ABSTRACT

Debris disks are readily detectable tracers of the embedded planetary systems, but we do not always know how to interpret them. Models of disk-planet interactions remain untested as most directly imaged debris disks do not harbor known exoplanets. The prototypical debris disk around Beta Pic and its newly discovered relatively short-period super-jupiter planet offer a unique laboratory for studying disk–planet interactions.
Models identified more than five mechanisms through which Beta Pic b may shape the complex disk structure and may perturb planetesimals to an inclined orbit, giving rise to the secondary disk discovered with HST. Structures shaped by the planet's resonances can introduce prominent azimuthal asymmetries in the disk that orbit on timescales similar to that of the planet (~18 yr).
With STIS images from 1997 a uniquely long baseline is available for identifying the temporal evolution of the disk. We propose to revisit and monitor the Beta Pic disk with STIS to characterize the temporal evolution of the disk. By repeating earlier STIS observations we will detect variations as small as 2-3% at 0.7". In comparison, models of radiation-pressure driven small grains freed from planetesimals trapped in resonance with the planet predict variations up 300% in this component. By monitoring Beta Pic we will identify disk structures and dust grain populations that trace the directly imaged planet, directly testing models explaining the Beta Pic disk's complex structure.
These observations will provide an entirely new set of constraints on the 3D structure and dynamics of the best-studied debris disk – the only disk/planet system where such measurements are possible.

OBSERVING DESCRIPTION

The proposed observations aim to obtain a STIS coronagraphic image of the Beta Pictoris debris disk with two goals: The primary goal is to compare the disk surface brightness distribution to 1997 STIS observations of the same disk, to identify or constrain changes in the disk structure.
The secondary goal is to image the disk at a smaller inner working angle (stellocentric angular distance 0.3") than imaged before to explore the inner disk structure.
The surface brightness variations and inner disk structure is particularly interesting in this system, where a giant planet has been directly imaged. The planet's projected separation is 2011/2012 is about 0.35-0.43" from the star.

The 1997 data was obtained with STIS using positions along both WedgeA and WedgeB.
We will observe the target star and a PSF star at four positions and different orientations. This data set will allow PSF subtraction both through roll (self)subtraction and through PSF subtraction, thus allowing two alternate reduction method. The combination of the data sets will provide an optimal spatial coverage and can correct for the field lost due to wedge obscuration and diffraction spike contamination.

Based on the preliminary reduction and analysis of the 1997 data and a set of PSF stars from other programs we identified that the following strategy provides the best quality data and best comparison to the earlier data set:

We will observe the two targets using three single-orbit visits (01, 02, 03) that are linked both in time and orientation angles.
The three visits must be scheduled "back-to-back" in sequential visibility periods, each uninterrupted by Earth occultation -- hence the AFTER scheduling requirements of 0.5 to 1.5 orbit (start-to-start) times on Visits 02 and 03.

In Visit 01 we observe our science target (Beta Pic). In Visit 02 we will observe our PSF calibration target (Alpha Pic).
The Alpha Pic visit (02) MUST be scheduled in time in between Visits 01 and 03. In Visit 03 we again observe Beta Pic, but at an orientation angle differing by +33.5 deg from the absolute orientation specified for Visit 01.

We begin each Visit with an on-board autonomous coronagraphic target acquisition. Target acquisition exposure times were chosen to provide SNR ~ 100 in the central pixel of the target acq images. In all cases we use the F25ND5 filter due to the brightness of our target stars.

First orbit: We will observe Beta Pic at four wedge-occulted locations: WedgeA06, WedgeA1.0, WedgeB1.0, and a position POSTARGETED (by -7.4", 0.0") to a narrow position on the mid-line of WedgeB. (This latter position is symmetrically equivalent to the WedgeA0.6 aperture position, but no such aperture is currently defined, therefore we POSTARG from a standard aperture position on WedgeB.)
We will obtain a series of short exposures for the 0.6" wedge locations to avoid the saturation close to the wedge.
We obtain a combination of short and long exposures at the 1.0" locations to probe the disk close to the wedge and also at large separations.
Absolute Orientation: 59.05 degree

Second Orbit: Carry out the same observing sequence as in Orbit 1 on the PSF star Alpha Pictoris.
This star is slightly brighter, so exposures are shorter to avoid saturation.
In this visit we observe our PSF template calibration star. In order to minimize variations in PSF structure from thermal driven changes in OTA wavefront errors, we constrain the ORIENTation of this calibration target which is nearby in the sky to our science target (similar spacecraft attitude and sun angle) to be in between the orientations of Visit 01 and 03.
NOTE TO OUR PC: Ideally, we would like this Visit scheduled with an Orientation of 75.8 deg if possible, but any orientation

within the specified range is acceptable.

Third Orbit: Repeat the observations of Beta Pic (1st orbit) but at a different spacecraft orientation.
Orientation: Visit 1 +33.5 degree.

EXPOSURE TIMES:
Individual coronagraphic exposure times (Ex. Time / # CR Splits) have been carefully chosen at all wedge positions based upon prior coronagraphic imaging so as not to saturate at the smallest IWA for each wedge position while also providing > appx 70% full well depth. NOTE TO OUR PC: Please do *NOT* allow "automatic" adjustment of any exposure times in our coronagraphic exposures to fill any (small) "dead time" in the orbits

WEDGE B POSITION:
At the end of each visibiliy period we image along the B wedge using a POSTARG offset from Wedge1.0B. In doing so we do NOT specify an "available" engineering mode parameter CENTERAXIS2 (though we use "supported" mode SIZEAXIS2 sub-array readout specifications here and elsewhere) on these POSTARGED exposures on the recommendation of our CS. We REQUEST that when an SMS (or precursor input product) is generated, this be verified that the subarray for this position is indeed centeed on the target in the Y axis direction.

ORIENTATIONS:
The observations are sensitive to the roll angles: the right angles will ensure that the disk is optimally placed between the wedges and the diffraction spikes at both orientations and minimize the spatial coverage lost due to obscuration.

DISK AND SPACECRAFT ORIENTATIONS:
The "northern" semi-major axis of the nearly-edge on Beta Pic disk is at a celestial position angle of appx 30.8 deg.
(The inner disk itself is warped and PAs varying by a few degrees appear in the literature, depending upon how and at what distances measures have been made. For our observation planning we adopt 30.8 deg). In Visit 01 we select an absolute ORIENTATION angle of 59.05 deg to rotate the disk 16.75 deg counter-clockwise with respect to the mid-line of the A-wedge. In Visit 03 we specify a +33.5 deg ORIENT FROM w.t.t. the absolute orientation of 59.05 deg (corresponding to an absolute orientation of 92.55 deg).
NOTE TO OUR PC: Our goal here is to simultaneously: (a) have the +/- roll offsets w.r.t nominal U3, so that in Visit 01 and 03 the disk major axis is equally rotated in opposite directions with symmetric displacements w.r.t. the

mid-line of the A wedge, while ALSO (b) providing the largest roll difference (+33.5 deg informed by the roll range report) for which the mid-range of the absolute orientations of Visits 01 and 03 would align the disk major axis with the mid-line of the A-wedge (conceptually, at 75.8 deg).
This is key to optimizing the science return for this program.

If a suitable GS pair cannot be found to enable this geometry, we would later suggest possible specific alternates depending upon schedualbility with more restrictive differential roll ranges with trades in science return.

EXTRA SHORT EXPOSURES AT THE END OF VISIT 02:
Based on our experience we expect the IWA to be determined by the slight positional difference between the PSF star and the target star. Our PSF star is brighter than the target star, thus requiring somewhat shorter exposures, leaving an extra 2.5 minutes at the end of Visit 02. We plan to use this time to obtain short exposures of the PSF at two additional positions along the Y axis - the combination of the three (total) positions will allow us to find the best positional match for the target star which should help providing a better PSF subtraction than possible with regular pointing technique. This is a new, experimental technique that will potentially further enhance the data and only uses some of the remaining visibility.
If really necessary, these exposures (02.012-02.013) can be removed.

The three orbits must be executed back-to-back to minimize the changes in the instrumental PSF and the spacecraft/instrument state.

Proposal 12551 - Visit 01 - Imaging Disk-Planet Interactions in the Beta Pictoris Disk

Visit

Proposal 12551, Visit 01 Fri Jul 08 01:27:01 GMT 2011

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: PCS MODE FINE; GUID TOL 0.005"; GYRO MODE 3GOBAD; ORIENT 59.05D TO 59.05 D

Comments: Timing: Must be executed in sequential orbit immediately prior to Visit 02 with only intervening inter-visit Earth occultation.
Orientation: Absolute Orientation 59.05 degrees only.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	BETA-PIC	RA: 05 47 17.0877 (86.8211988d)	Proper Motion RA: 4.65 mas/yr	V=3.861	Reference Frame: ICRS
		Dec: -51 03 59.45 (-51.06651d)	Proper Motion Dec: 83.10 mas/yr	B=4.029	
		Equinox: J2000	Parallax: 0.05144"		
			Epoch of Position: 2000		

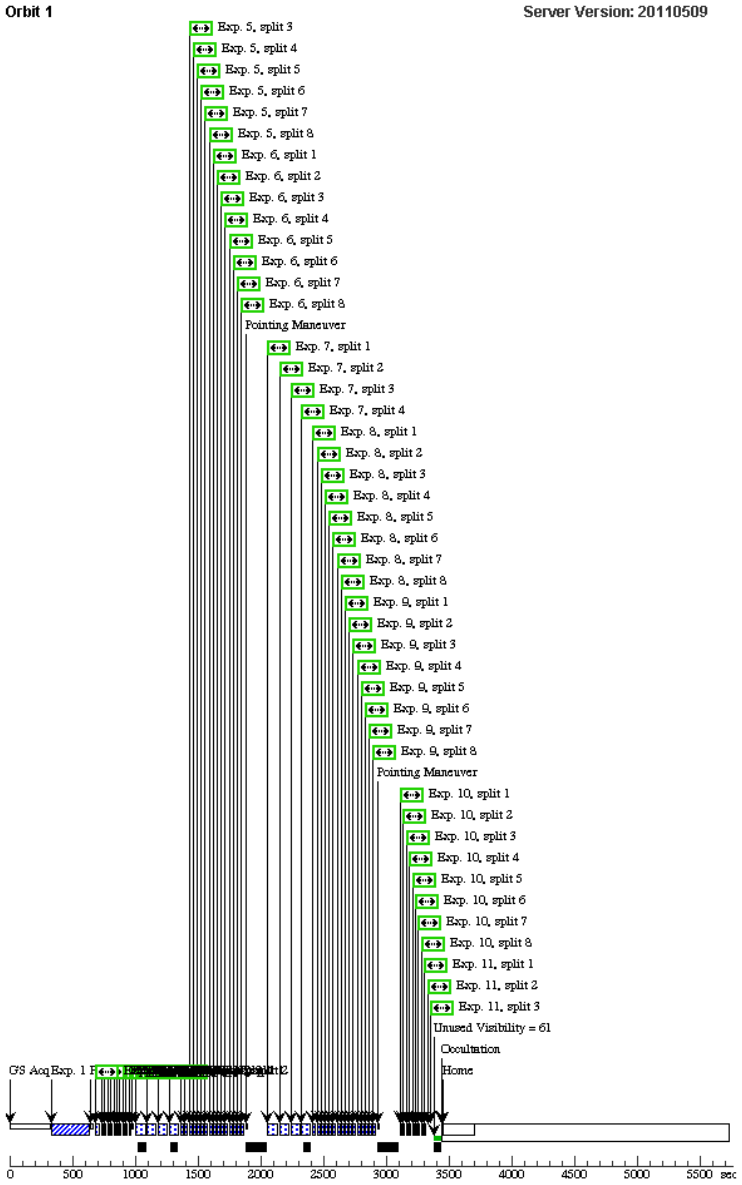
Comments: Beta Pictoris, debris disk: semi-major axis P.A.: +30.8 degree (E of N)
A6V

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	BPic-V1-ACQ	(1) BETA-PIC	STIS/CCD, ACQ, F25ND5	MIRROR		GS ACQ SCENARIO BASE1B3		3.1 Secs	
								[==>]	***[1]***
2	WEDGE0.6A_1.2sX8	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEA0.6	MIRROR	SIZEAXIS2=137; CR-SPLIT=8; GAIN=4			9.6 Secs	
								[==>(Split 1)] *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	***[1]***
3	WEDGE0.6A_1.2sX3	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEA0.6	MIRROR	SIZEAXIS2=137; CR-SPLIT=3; GAIN=4			3.6 Secs	
								[==>(Split 1)] *[==>(Split 2)]* *[==>(Split 3)]*	***[1]***
4	WEDGE1.0A_60Sx4	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=4; GAIN=4			240 Secs	
								[==>(Split 1)] *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[1]***
5	WEDGE1.0A_3Sx8	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=8; GAIN=4			24 Secs	
								[==>(Split 1)] *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	***[1]***
6	WEDGE1.0A_3Sx8	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=8; GAIN=4			24 Secs	
								[==>(Split 1)] *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	***[1]***
7	WEDGE1.0B_60Sx4	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=4; GAIN=4; SIZEAXIS2=427			240 Secs	
								[==>(Split 1)] *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[1]***

	8	WEDGE1.0B_3Sx8	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=8; GAIN=4; SIZEAXIS2=427		24 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	 ***[1]***
	9	WEDGE1.0B_3Sx8	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=8; GAIN=4; SIZEAXIS2=427		24 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	 ***[1]***
	10	WEDGE0.6B_1.2sX8	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=8; GAIN=4; SIZEAXIS2=137	POS TARG -7.4,null	9.6 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	 ***[1]***
	11	WEDGE0.6B_1.2Sx3	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=3; GAIN=4; SIZEAXIS2=137	POS TARG -7.4,null	3.6 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]*	 ***[1]***

Orbit Structure



Visit

Proposal 12551, Visit 02 Fri Jul 08 01:27:02 GMT 2011

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: PCS MODE FINE; GUID TOL 0.005"; GYRO MODE 3GOBAD; ORIENT 65.8D TO 85.8 D; AFTER 01 BY .5 Orbits TO 1.5 Orbits

Comments: Timing: Must be executed in sequential orbit immediately after Visit 01 with only intervening inter-visit Earth occultation.
Orientation: Absolute Orientation between 65.8 and 85.8 degrees; optimal absolute orientation: 75.8

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HD50241	RA: 06 48 11.4600 (102.0477500d)	Proper Motion RA: -66.07 mas/yr	V=3.30	Reference Frame: ICRS
	Alt Name1: ALPHA-PIC	Dec: -61 56 29.00 (-61.94139d)	Proper Motion Dec: 242.97 mas/yr	B=3.48	
		Equinox: J2000	Parallax: 0.03378"		
			Epoch of Position: 2000		

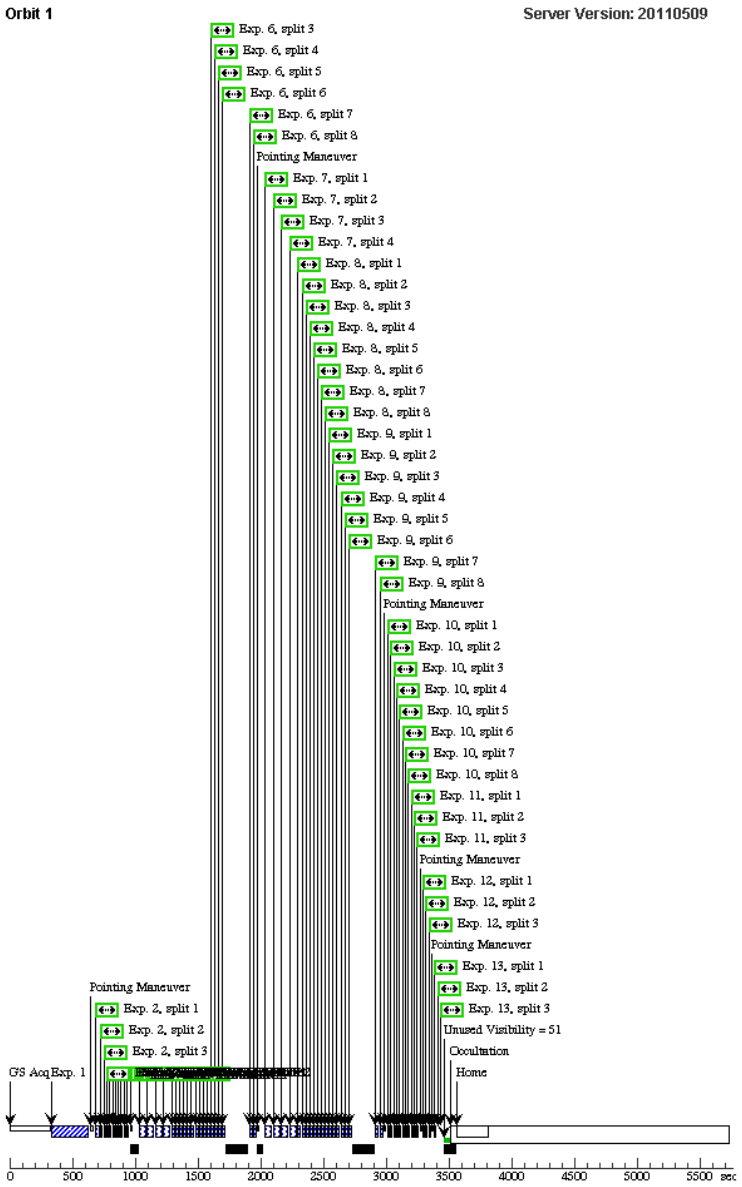
Comments: PSF calibrator for Beta Pictoris

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	APic-V1-ACQ	(2) HD50241	STIS/CCD, ACQ, F25ND5	MIRROR		GS ACQ SCENARIO BASE1B3		1.9 Secs *[==>]*	*[1]*
2	WEDGE0.6A_0.7x8	(2) HD50241	STIS/CCD, ACCUM, WEDGEA0.6	MIRROR	SIZEAXIS2=137; CR-SPLIT=8; GAIN=4			5.6 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	*[1]*
3	WEDGE0.6A_0.7x3	(2) HD50241	STIS/CCD, ACCUM, WEDGEA0.6	MIRROR	SIZEAXIS2=137; CR-SPLIT=3; GAIN=4			2.1 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]*	*[1]*
4	WEDGE1.0A_36Sx4	(2) HD50241	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=4; GAIN=4			144 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[1]*
5	WEDGE1.0A_1.9Sx8	(2) HD50241	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=8; GAIN=4			15.2 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	*[1]*
6	WEDGE1.0A_1.9Sx8	(2) HD50241	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=8; GAIN=4			15.2 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	*[1]*
7	WEDGE1.0B_36Sx4	(2) HD50241	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=4; GAIN=4; SIZEAXIS2=427			144 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[1]*

	8	WEDGE1.0B_1.9x8	(2) HD50241	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=8; GAIN=4; SIZEAXIS2=427		15.2 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	***[1]***
	9	WEDGE1.0B_1.9Sx8	(2) HD50241	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=8; GAIN=4; SIZEAXIS2=427		15.2 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	***[1]***
	10	WEDGE0.6B_0.7x8	(2) HD50241	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=8; GAIN=4; SIZEAXIS2=137	POS TARG -7.4,null	5.6 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	***[1]***
	11	WEDGE0.6B_0.7x3	(2) HD50241	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=3; GAIN=4; SIZEAXIS2=137	POS TARG -7.4,null	2.1 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]*	***[1]***
	12	WEDGE0.6B_0.7x4	(2) HD50241	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=3; GAIN=4; SIZEAXIS2=137	POS TARG -7.4,0.0125	2.1 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]*	***[1]***
	13	WEDGE0.6B_0.7x3	(2) HD50241	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=3; GAIN=4; SIZEAXIS2=137	POS TARG -7.4,-0.0125	2.1 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]*	***[1]***

Orbit Structure



Proposal 12551 - Visit 03 - Imaging Disk-Planet Interactions in the Beta Pictoris Disk

Visit

Proposal 12551, Visit 03 Fri Jul 08 01:27:03 GMT 2011

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: PCS MODE FINE; GUID TOL 0.005"; GYRO MODE 3GOBAD; ORIENT 33.5D TO 33.5D FROM 01; AFTER 02 BY 0.5 Orbits TO 1.5 Orbits

Comments: Timing: Must be executed in sequential orbit immediately after Visit 03 with only intervening inter-visit Earth occultation.
Orientation: Relative Orientation 33.5 degrees from Visit 1 orientation.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	BETA-PIC	RA: 05 47 17.0877 (86.8211988d)	Proper Motion RA: 4.65 mas/yr	V=3.861	Reference Frame: ICRS
		Dec: -51 03 59.45 (-51.06651d)	Proper Motion Dec: 83.10 mas/yr	B=4.029	
		Equinox: J2000	Parallax: 0.05144"		
			Epoch of Position: 2000		

Comments: Beta Pictoris, debris disk: semi-major axis P.A.: +30.8 degree (E of N)
A6V

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	BPic-V1-ACQ	(1) BETA-PIC	STIS/CCD, ACQ, F25ND5	MIRROR		GS ACQ SCENARIO BASE1B3		3.1 Secs *[==>]*	 ***[1]***
2	WEDGE0.6A_1.2x8	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEA0.6	MIRROR	SIZEAXIS2=137; CR-SPLIT=8; GAIN=4			9.6 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	 ***[1]***
3	WEDGE0.6A_1.2x3	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEA0.6	MIRROR	SIZEAXIS2=137; CR-SPLIT=3; GAIN=4			3.6 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]*	 ***[1]***
4	WEDGE1.0A_60Sx4	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=4; GAIN=4			240 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	 ***[1]***
5	WEDGE1.0A_3Sx8	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=8; GAIN=4			24 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	 ***[1]***
6	WEDGE1.0A_3Sx8	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=8; GAIN=4			24 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	 ***[1]***
7	WEDGE1.0B_60Sx4	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=4; GAIN=4; SIZEAXIS2=427			240 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	 ***[1]***

	8	WEDGE1.0B_3Sx8	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=8; GAIN=4; SIZEAXIS2=427		24 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	 ***[1]***
	9	WEDGE1.0B_3Sx8	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=8; GAIN=4; SIZEAXIS2=427		24 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	 ***[1]***
	10	WEDGE0.6B_1.2x8	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=8; GAIN=4; SIZEAXIS2=137	POS TARG -7.4,null	9.6 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	 ***[1]***
	11	WEDGE0.6B_1.2x3	(1) BETA-PIC	STIS/CCD, ACCUM, WEDGEB1.0	MIRROR	CR-SPLIT=3; GAIN=4; SIZEAXIS2=137	POS TARG -7.4,null	3.6 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]*	 ***[1]***

Orbit Structure