14714 - An Extinction Probe Through the HD 107146 Debris Ring: Taking Unique Advantage of a Background Galaxy Transit

Cycle: 24, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Glenn Schneider (PI) (Contact)	**University of Arizona**	**gschneider@as.arizona.edu**
Dr. Matthew Kenworthy (CoI) (ESA Member)	Universiteit Leiden	kenworthy@strw.leidenuniv.nl
Dr. Benne Willem Holwerda (CoI) (ESA Member)	Sterrewacht Leiden	benne.holwerda@gmail.com
Dr. Dean C. Hines (CoI)	Space Telescope Science Institute	hines@stsci.edu
Dr. Christopher C. Stark (CoI)	Space Telescope Science Institute	cstark@stsci.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) HD-107146	STIS/CCD	1	09-Nov-2016 11:51:59.0	yes
02	(1) HD-107146	STIS/CCD	1	09-Nov-2016 11:52:00.0	yes
03	(2) HD-120066	STIS/CCD	1	09-Nov-2016 11:52:01.0	yes
04	(1) HD-107146	STIS/CCD	1	09-Nov-2016 11:52:01.0	yes
05	(1) HD-107146	STIS/CCD	1	09-Nov-2016 11:52:02.0	yes
11	(1) HD-107146	STIS/CCD	1	09-Nov-2016 11:52:03.0	yes
12	(1) HD-107146	STIS/CCD	1	09-Nov-2016 11:52:03.0	yes
13	(2) HD-120066	STIS/CCD	1	09-Nov-2016 11:52:04.0	yes
14	(1) HD-107146	STIS/CCD	1	09-Nov-2016 11:52:05.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
15	(1) HD-107146	STIS/CCD	1	09-Nov-2016 11:52:06.0	yes

10 Total Orbits Used

ABSTRACT

We propose a 3-cycle GO program utilizing a total of HST 30 orbits to directly measure and map the line-of-sight optical depth through the brightest sector of the HD 107146 solar-analog debris ring by ring-transit differential photometry of a bright (compared to the disk), spatially extended, background galaxy. We will advantageously exploit its serendipitously unique and experiment-enabling high proper motion reflex trajectory w.r.t. the galaxy back-lighting a sectional slice the exoplanetary debris system (EDS) with a 2D grid of multiple sight-lines through the nearly face-on disk over time. These measures (the only opportunity for such in remaining HST lifetime) will uniquely provide unambiguous extinction/optical depth constraints to better elucidate the physical properties of the debris particles in this otherwise well studied EDS. With these and prior data we will: (a) disambiguate inferred particle spatial, size, and mass density distributions otherwise conflated with debris material optical property dependencies, (b) better constrain the posited pathways for planetary debris dust production mechanisms in EDSs (e.g., catastrophic collisions of parent bodies, dust-production cascades, cratering events, etc.) and (c) search for and discriminated between "clumps ", "bumps ", and "clouds" of collisional debris of varying particle (and mass) densities. This investigation was enabled in forethought by mapping the galaxy surface brightness out-of-transit in a comprehensive 2011 precursor study (HST GO/12228) using exactly the same STIS instrumental configuration with multi-roll PSF template subtracted coronagraphy we propose for the upcoming ring transit opportunity.

OBSERVING DESCRIPTION

We are imaging the HD 107146 nearly face-on circumstellar debris ring over period of three years (HST Cycles 24 - 26) a it partially transits serendipitously in front of a bright background galaxy. Beginning in late 2016, part of the outer periphery of the debris ring will be back-lit by the galaxy. Debris dust orbiting HD 107146 will partially extinct the galaxy light with variable column depth with stellocentric distance. By appx. 2020, the galaxy will be behind the brightest part of the debris ring (and presumably of highest optical depth) closer to the host star. Baseline out-of-transit observations were obtained in 2011 with HST/STIS PSF-subtracted multi-roll coronagraphy of HD 107146 in GO 12228 and closely follow the same observing strategy here for the now, in-transit, observations.

Using a total of 30 HST orbits, we will re-visit and identically image the system six times over a three year period, roughly every six months consuming 5 orbits per transit-phase epoch. At each epoch we will image the HD 107146 debris system+background galaxy in four orbits, with also

a contemporaneously observed nearby and color-matched PSF temple calibration star, interleaved in a 5th orbit. Each visit-set of five orbit executes contiguously interrupted only by Earth occultation. Each of the four orbits on the disk+galaxy execute with small spacecraft roll offsets (a "roll dither" about HD 107146 of (-6, -2, +2, +6) deg appx. around nominal roll required to simultaneously better suppress and reject PSF-template subtraction (correlated) image residuals with roll discrimination and build image SNR.

The STIS coronagraphic image plane wedges obscure some circum-azimuthal regions around the occulted star, and some other regions along the field "diagonals" with respect to the location of the occulted star are degraded by the unapodized HST diffraction spikes. We therefor MUST place the galaxy on the detector only where it does not fall on any of these regions. These regions are rotationally invariant in the instrument free (SAIF) with a spacecraft rotation reorienting the celestial image. We thus must impose absolute orientation constraints for our roll dithers to image the galaxy only in unaffected annular sectors around the occulted star. There are four sufficiently large annular regions to accommodate the nears roll dithers of utility. These fall in annular
sectors to the "right and left" of Wedge A, and between the lower diffraction pikes and the edges of Wedge-A. We do not care which one(s) is/are scheduled for our observations, and we provide multiple absolute orientation angle range to ease schedulability.

ABSOLUTE ORIENTATION CONSTRAINTS - NOTES TO OUR PC

(1) We have computed the APT ORIENTATION constraints for the middle of each of the four acceptable imaging regions (azimuthal sectors) spoken to above on the basis of: (a) the galaxy Position Angle (PA_gal) w.r.t. the
occulted star (this will slowly change over the 3 years of the program), and (b) the angle between the STIS 50CCD U3 Reference that is +45 degrees CCW from the image +Y axis (this, in the SIAF frame, is in the direction of the upper left diffraction spike) and the middle of the annular sector to place the galaxy.

We BELIVE these orientations are computed to be used as visit level orientation constraints as:

ORIENTATION = PA_galaxy - SECTOR_n_Angle_from_U3_REF

(see email sent June 29, 2016 01:50:44 PM MST)

We measured and compute as follows with one minor differences for the first and second halves

of Cycle 24:

1st half CY 24 -- 10/2016 PA_galaxy = 212.5 deg EofN (r=5.0328")

	SECTOR_n_Angle_from_U3_REF		ORIENTATION CONSTRAINT	
SECTOR	min(deg)	max(dec)	min(deg)	max(dec)8 83
B	8	83	129.5	204.5
C	97	122	90.5	115.5
D	145	169	43.5	67.5
E	189	261	-48.5 (311.5)	23.5 (note zero angle crossing)

2nd half CY 24 -- 04/2017 PA_galaxy = 212.1 deg EofN (r=4.9233")

	SECTOR_n_Angle_from_U3_REF		ORIENTATION CONSTRAINT	
SECTOR	min(deg)	max(dec)	min(deg)	max(dec)8 83
B	9	83	129.1	203.1
C	98	122	90.1	114.1
D	146	169	66.1	43.1
E	189	261	-48.9 (311.1)	23.1 (note zero angle crossing)

We ask our PC to verify we have done this correctly so the galaxy is placed "in between" the diffraction spikes and A-wedge obscurations, not superimposed upon them.

We are also uncertain about the correctness of min/max orients when there is a zero-degree crossing between min and max as APT does not allow negative mins. We ask our PC to check this.

These absolute orientation constraints are placed on visits 04 and 14, and the relative orientation constraints within on visits 01,02,05 and 11,12,15.

(2) To ease scheduling opportunities, we then applied near-symmetrical tolerances to the mid-sector ORIENTATIONs, as (min,max) on each orientation that is non-intrusive on the "bad" areas. Each of these allowable absolute orientation ranges is larger than the full (+/-6 degrees at the extrema) extent of the 4-orbit "roll dithers". APT does not allow us to specify where within the (min/max) absolute orientation constraints the roll

dithers in relative offset angles would fall other than being constrained somewhere within. However, we VERY strongly prefer the roll-dithered visits to scheduled scheduled so thatat each epoch they are done are done as close to the center (mid point) of the selected allowable roll ranges as possible (i.e., placing the target in the middleof the min max range with roll dither offsets). We understand
the can be set up this way with manual scheduling by our PC though is not expressible by APT and we request this.

(3) We do not have a preference for which of the four allowable roll ranges are used at any epoch.

OTHER NOTES:

Each visit, whether disk+galaxy target or PSF template/calibration star begins with a Mode-2 target acquisition exposure, followed by a series of identical WedgeA-1.0 coronagraphic images to fill the visibility period. Exposure times were chosen to optimize the SNR in the region of the ring without image saturation due to incompletely suppressed stellar light as verified in GO 12228.

The two 5-orbit visit sets to be executed at different transit-track phases should be scheduled roughly six months apart, though this is a loose constraint +/- ~ 2 months. The additional four 5-orbit visit sets will be provided in separate APT files in Cycles 25 and 26.

Visit

Proposal 14714, EPOCH1A_HD107146_01 (01), implementation Wed Nov 09 16:52:07 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: PCS MODE FINE; GUID TOL 0.005"; GYRO MODE 3GOBAD; ORIENT -8D TO -8D FROM 04

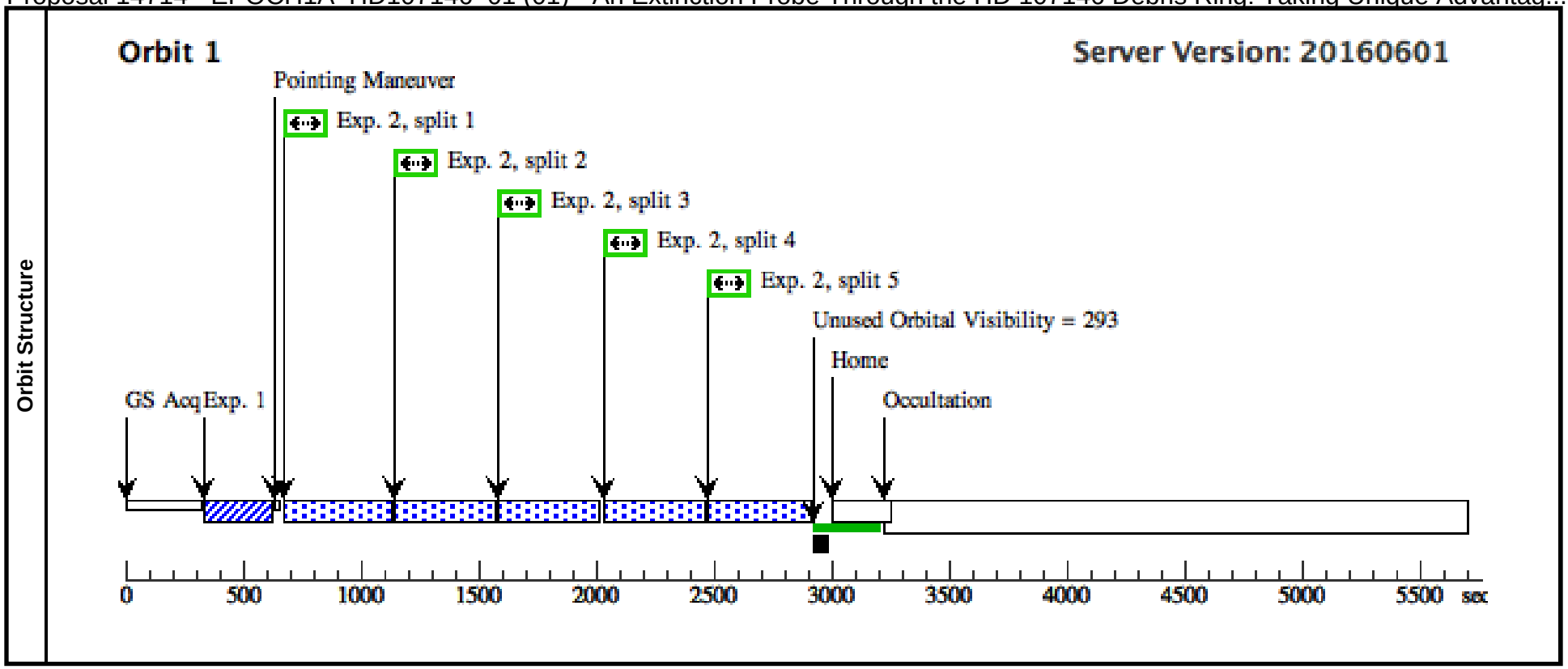
Comments: Visit 01. HD 107146 (V=7.07, B-V = +0.62). 1st epoch, 1st orbit
Absolute Orientation: Within any of the allowable orientation angle ranges specified
Relative Orientation: -6 deg ONR (-8 deg w.r.t. visit 04)
Relative Timing: This visit (01) should immediately precede visit (02) in back-to-back orbits.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-107146	RA: 12 19 6.5023 (184.7770929d) Dec: +16 32 53.86 (16.54829d) Equinox: J2000	Proper Motion RA: -174.16 mas/yr Proper Motion Dec: -148.90 mas/yr Parallax: 0.03642" Epoch of Position: 2000	V=7.01	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	HD107146_ ACQ	(1) HD-107146	STIS/CCD, ACQ, F25ND3	MIRROR		GS ACQ SCENARI O BASE1BN3		0.3 Secs (0.3 Secs) *[==>]*	 ***[1]***
Comments: SNR = 100, V = 7.07, sp = G2V, Exptime rounded to nearest 0.1 second									
2	HD107146_ LONG	(1) HD-107146	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=5; GAIN=4			2078.5 Secs (2078.5 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]*	 ***[1]***
Comments: Exposure time, detector gain, and subarray region identical to GO 12228 observations in 2011.									


Orbit Structure
Orbit 1
Server Version: 20160601
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 2, split 4
Exp. 2, split 5
Unused Orbital Visibility = 293
Home
Occultation
GS Acq
Exp. 1
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14714, EPOCH1A_HD107146_02 (02), implementation Wed Nov 09 16:52:07 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: PCS MODE FINE; GUID TOL 0.005"; GYRO MODE 3GOBAD; ORIENT -4D TO -4D FROM 04; AFTER 01 BY 0.8 Orbits TO 1.2 Orbits

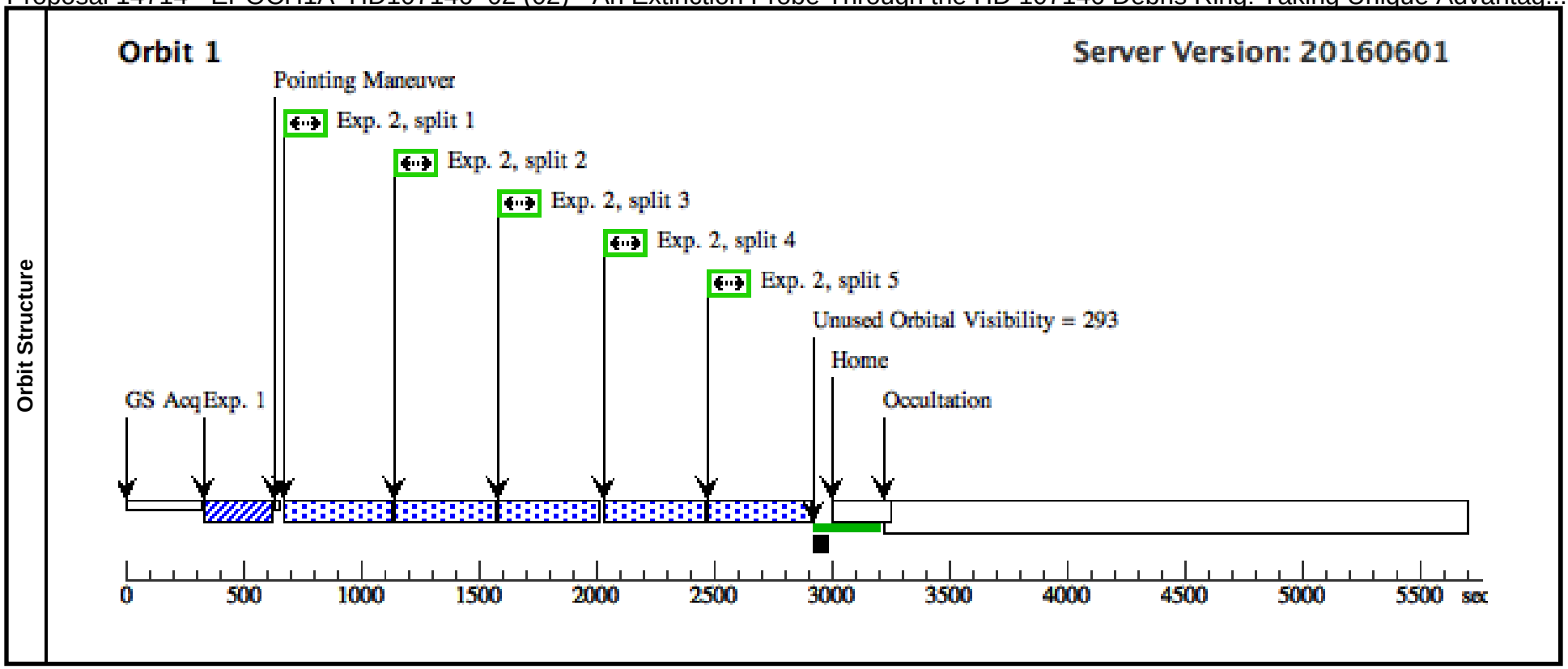
Comments: Visit 02. HD 107146 (V=7.07, B-V = +0.62). 1st epoch, 2nd orbit
Absolute Orientation: Within any of the allowable orientation angle ranges specified
Relative Orientation: -2 deg ONR
Relative Timing: This visit (02) should immediately follow visit (01) in back-to-back orbits.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-107146	RA: 12 19 6.5023 (184.7770929d) Dec: +16 32 53.86 (16.54829d) Equinox: J2000	Proper Motion RA: -174.16 mas/yr Proper Motion Dec: -148.90 mas/yr Parallax: 0.03642" Epoch of Position: 2000	V=7.01	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	HD107146_ ACQ	(1) HD-107146	STIS/CCD, ACQ, F25ND3	MIRROR		GS ACQ SCENARI O BASE1BN3		0.3 Secs (0.3 Secs) *[==>]*	 ***[1]***
Comments: SNR = 100, V = 7.07, sp = G2V, Exptime rounded to nearest 0.1 second									
2	HD107146_ LONG	(1) HD-107146	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=5; GAIN=4			2078.5 Secs (2078.5 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]*	 ***[1]***
Comments: Exposure time, detector gain, and subarray region identical to GO 12228 observations in 2011.									


Orbit Structure
Orbit 1
Server Version: 20160601
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 2, split 4
Exp. 2, split 5
Unused Orbital Visibility = 293
Home
Occultation
GS Acq
Exp. 1
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14714, EPOCH1A_HD120066_03 (03), implementation Wed Nov 09 16:52:07 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: PCS MODE FINE; GUID TOL 0.005"; GYRO MODE 3GOBAD; AFTER 02 BY 0.8 Orbits TO 1.2 Orbits

Comments: Visit 03 (HD120066 PSF; V= +6.3). 1st epoch, 3rd orbit
Absolute Orientation: Unconstraind
Relative Orientation: Unconstrained
Relative Timing: This visit (03) should immediately follow visit (02) in back-to-back orbits.

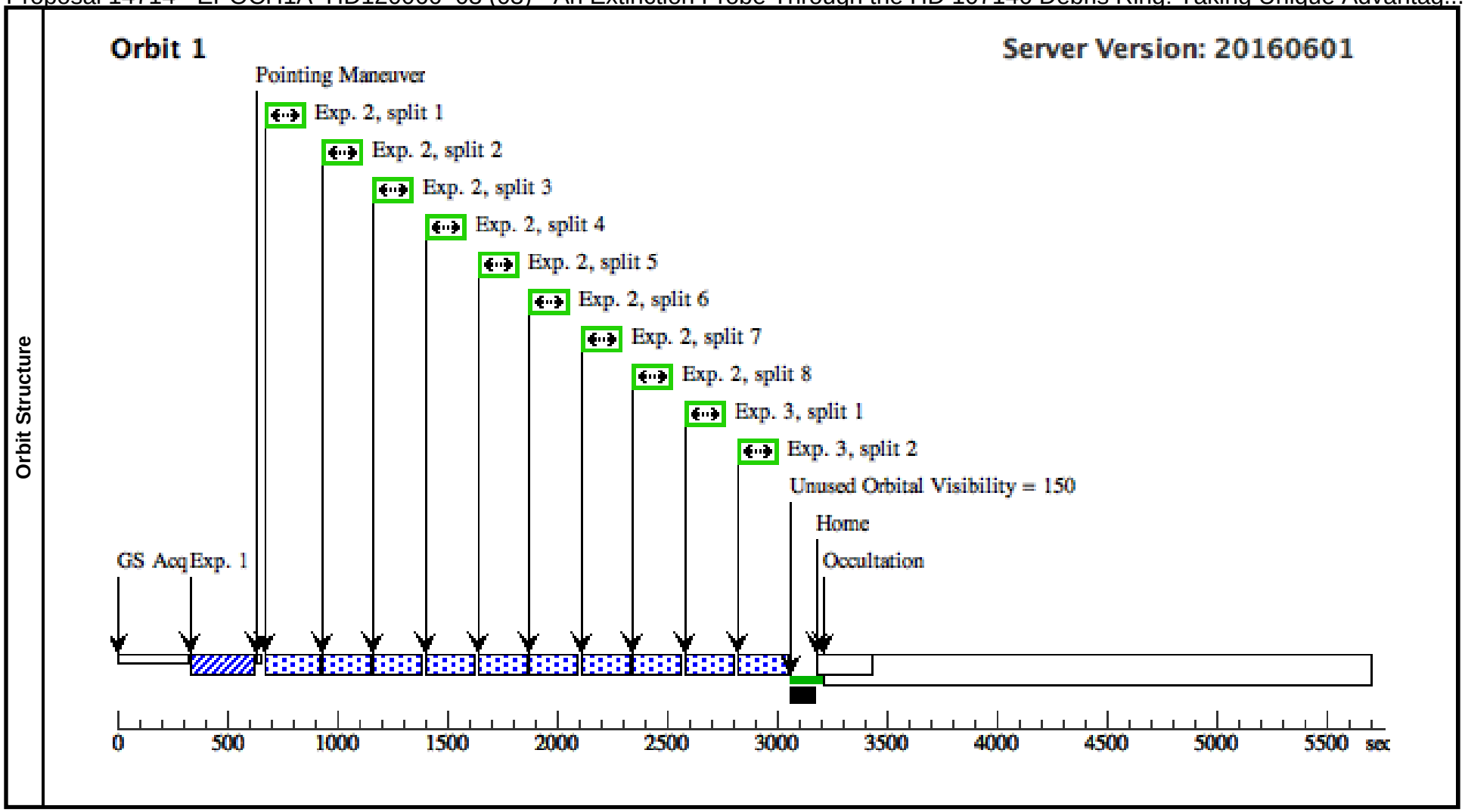
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HD-120066	RA: 13 46 57.1231 (206.7380129d)	Proper Motion RA: -509.71 mas/yr	V=6.3	Reference Frame: ICRS
		Dec: +06 21 1.34 (6.35037d)	Proper Motion Dec: -110.51 mas/yr		
		Equinox: J2000	Parallax: 0.03158"		
			Epoch of Position: 2000		

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 (Total)/[Actual Dur.]	Orbit
1	PSF03A_ACQ	(2) HD-120066	STIS/CCD, ACQ, F25ND3	MIRROR		GS ACQ SCENARIO BASE1BN3		0.2 Secs (0.2 Secs)	
								[==>]	***[1]***
	Comments: SNR = 100, V = 6.30, sp = G0V, Exptime rounded to nearest 0.1 second								
2	PSF03A_LONG	(2) HD-120066	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=8; GAIN=4			1652 Secs (1652 Secs)	
								[==>(Split 1)]	***[1]***
								[==>(Split 2)]	
								[==>(Split 3)]	
								[==>(Split 4)]	
								[==>(Split 5)]	
								[==>(Split 6)]	
								[==>(Split 7)]	
								[==>(Split 8)]	
	Comments: Exposure time, detector gain, and subarray region identical to GO 12228 observations in 2011.								
3	PSF03A_LONG	(2) HD-120066	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=2; GAIN=4			413 Secs (413 Secs)	
								[==>(Split 1)]	***[1]***
								[==>(Split 2)]	
	Comments: Exposure time, detector gain, and subarray region identical to GO 12228 observations in 2011.								


Orbit Structure
Orbit 1
Server Version: 20160601
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 2, split 4
Exp. 2, split 5
Exp. 2, split 6
Exp. 2, split 7
Exp. 2, split 8
Exp. 3, split 1
Exp. 3, split 2
Unused Orbital Visibility = 150
Home
Occultation
GS Acq
Exp. 1
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14714, EPOCH1A_HD107146_04 (04), implementation Wed Nov 09 16:52:07 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: PCS MODE FINE; GUID TOL 0.005"; GYRO MODE 3GOBAD; ORIENT 129.5D TO 204.5 D; ORIENT 90.5D TO 115.5 D; ORIENT 45.5D TO 67.5 D; ORIENT 311.5D TO 23.5 D; AFTER 03 BY 0.8 Orbits TO 1.2 Orbits

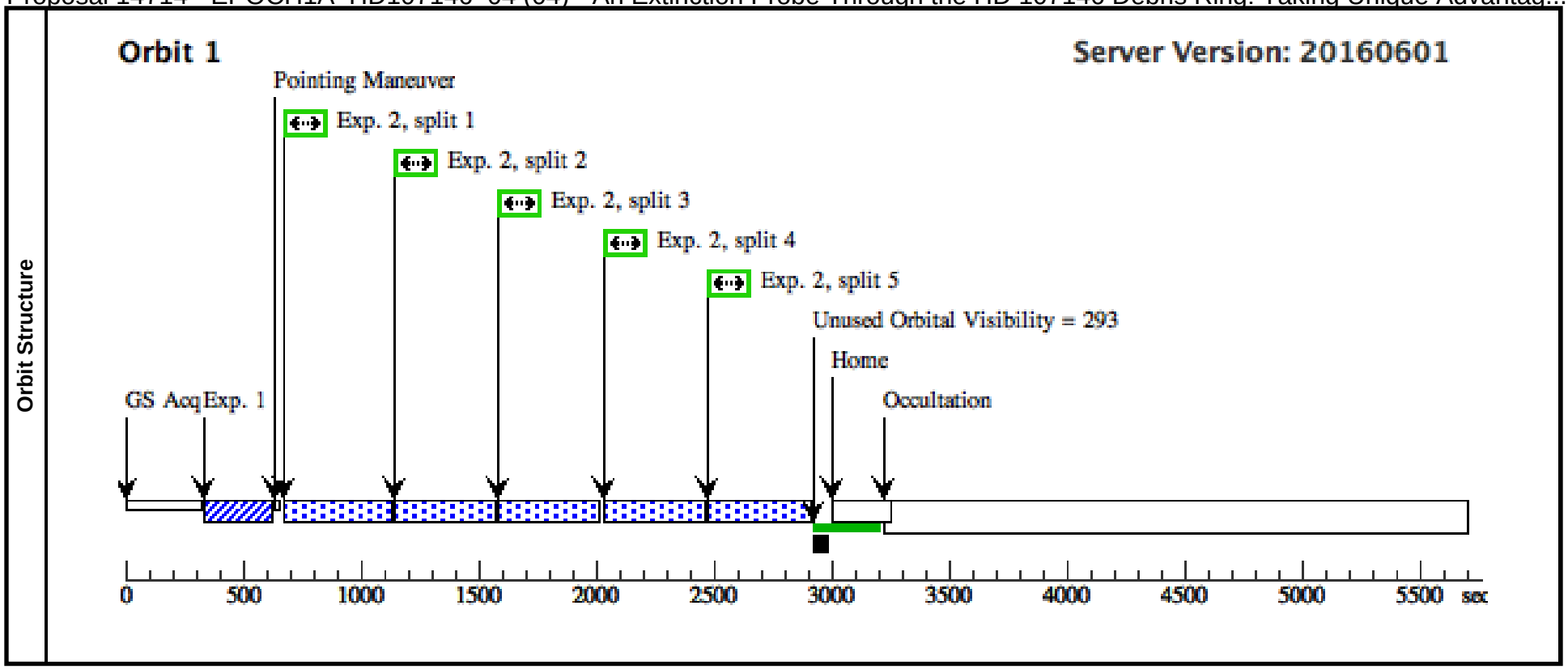
Comments: Visit 04. HD 107146 (V=7.07, B-V = +0.62). 1st epoch, 4th orbit
Absolute Orientation: Within any of the allowable orientation angle ranges specified
Relative Orientation: +2 deg ONR
Relative Timing: This visit (04) should immediately follow visit (03) in back-to-back orbits.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-107146	RA: 12 19 6.5023 (184.7770929d) Dec: +16 32 53.86 (16.54829d) Equinox: J2000	Proper Motion RA: -174.16 mas/yr Proper Motion Dec: -148.90 mas/yr Parallax: 0.03642" Epoch of Position: 2000	V=7.01	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	HD107146_ ACQ	(1) HD-107146	STIS/CCD, ACQ, F25ND3	MIRROR		GS ACQ SCENARI O BASE1BN3		0.3 Secs (0.3 Secs) *[==>]*	 ***[1]***
Comments: SNR = 100, V = 7.07, sp = G2V, Exptime rounded to nearest 0.1 second									
2	HD107146_ LONG	(1) HD-107146	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=5; GAIN=4			2078.5 Secs (2078.5 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]*	 ***[1]***
Comments: Exposure time, detector gain, and subarray region identical to GO 12228 observations in 2011.									


Orbit Structure
Orbit 1
Server Version: 20160601
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 2, split 4
Exp. 2, split 5
Unused Orbital Visibility = 293
Home
Occultation
GS Acq
Exp. 1
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14714, EPOCH1A_HD107146_04 (05), implementation Wed Nov 09 16:52:07 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: PCS MODE FINE; GUID TOL 0.005"; GYRO MODE 3GOBAD; ORIENT 4D TO 4D FROM 04; AFTER 04 BY 0.8 Orbits TO 1.2 Orbits

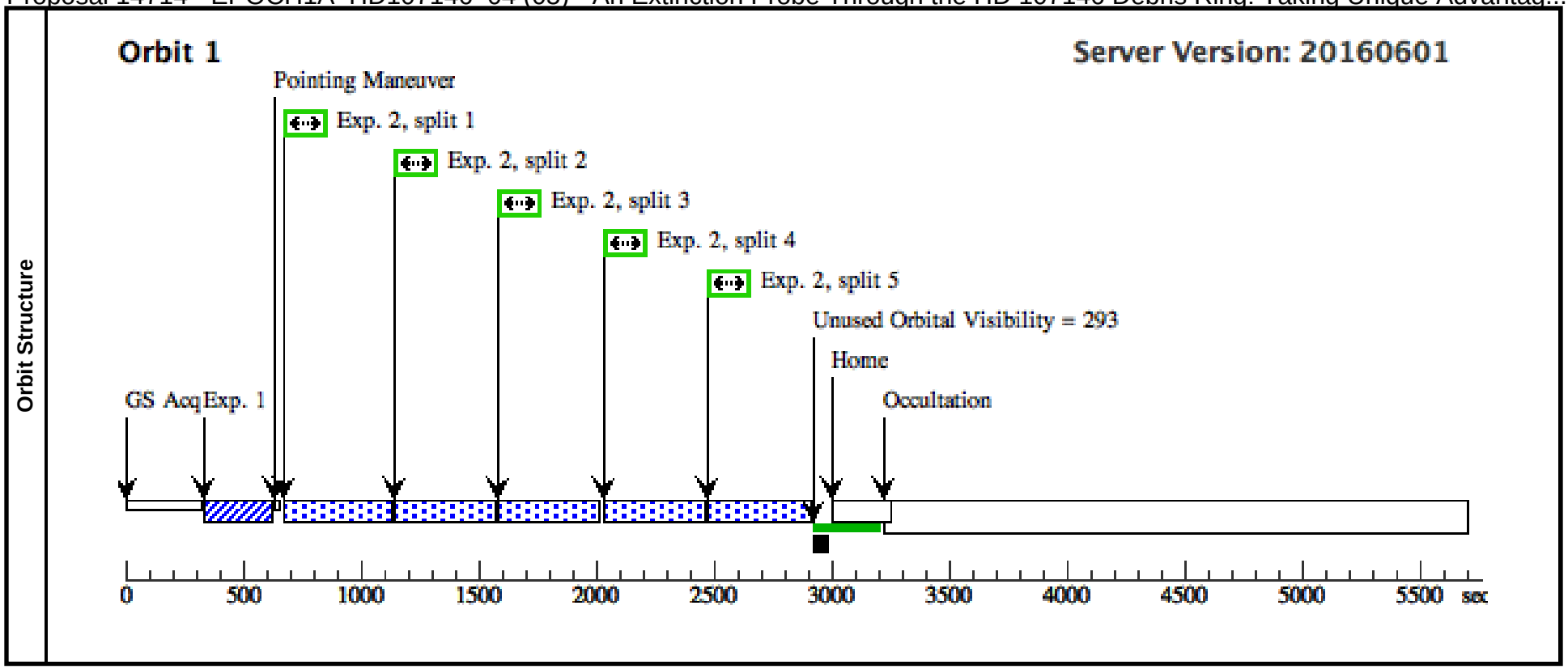
Comments: Visit 05. HD 107146 (V=7.07, B-V = +0.62). 1st epoch, 5th orbit
Absolute Orientation: Within any of the allowable orientation angle ranges specified
Relative Orientation: +6 deg ONR
Relative Timing: This visit (05) should immediately follow visit (04) in back-to-back orbits.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-107146	RA: 12 19 6.5023 (184.7770929d) Dec: +16 32 53.86 (16.54829d) Equinox: J2000	Proper Motion RA: -174.16 mas/yr Proper Motion Dec: -148.90 mas/yr Parallax: 0.03642" Epoch of Position: 2000	V=7.01	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	HD107146_ ACQ	(1) HD-107146	STIS/CCD, ACQ, F25ND3	MIRROR		GS ACQ SCENARI O BASE1BN3		0.3 Secs (0.3 Secs) *[==>]*	 ***[1]***
Comments: SNR = 100, V = 7.07, sp = G2V, Exptime rounded to nearest 0.1 second									
2	HD107146_ LONG	(1) HD-107146	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=5; GAIN=4			2078.5 Secs (2078.5 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]*	 ***[1]***
Comments: Exposure time, detector gain, and subarray region identical to GO 12228 observations in 2011.									


Orbit Structure
Orbit 1
Server Version: 20160601
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 2, split 4
Exp. 2, split 5
Unused Orbital Visibility = 293
Home
Occultation
GS Acq
Exp. 1
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14714, EPOCH1B_HD107146_11 (11), implementation Wed Nov 09 16:52:07 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: PCS MODE FINE; GUID TOL 0.005"; GYRO MODE 3GOBAD; ORIENT -6.4D TO -6.4D FROM 14; AFTER 01 BY 120 D TO 240 D

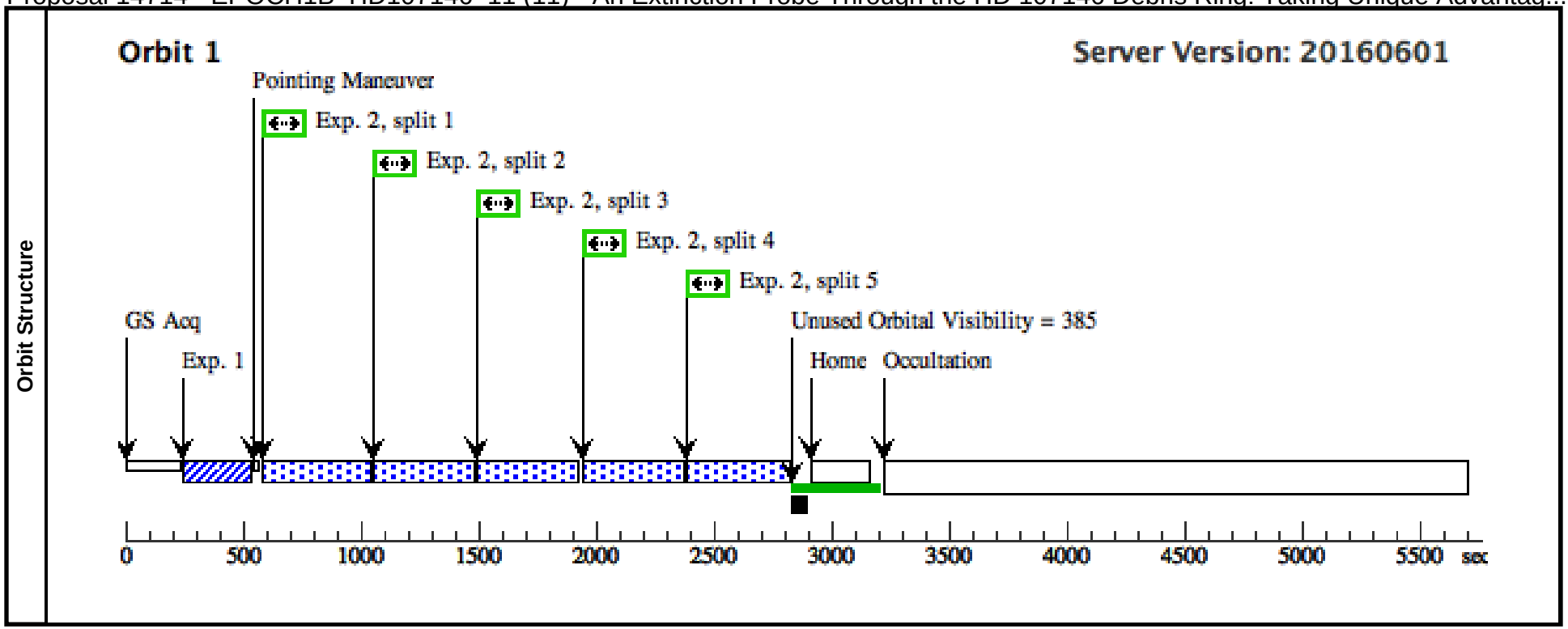
Comments: Visit 11. HD 107146 (V=7.07, B-V = +0.62). 2nd epoch, 1st orbit
Absolute Orientation: Within any of the allowable orientation angle ranges specified
Relative Orientation: -6 deg ONR (-8 deg w.r.t. visit 14)
Relative Timing: This visit (11) should immediately precede visit (12) in back-to-back orbits.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-107146	RA: 12 19 6.5023 (184.7770929d) Dec: +16 32 53.86 (16.54829d) Equinox: J2000	Proper Motion RA: -174.16 mas/yr Proper Motion Dec: -148.90 mas/yr Parallax: 0.03642" Epoch of Position: 2000	V=7.01	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	HD107146_ ACQ	(1) HD-107146	STIS/CCD, ACQ, F25ND3	MIRROR		GS ACQ SCENARI O ONEB1BN3		0.3 Secs (0.3 Secs) *[==>]*	 ***[1]***
Comments: SNR = 100, V = 7.07, sp = G2V, Exptime rounded to nearest 0.1 second									
2	HD107146_ LONG	(1) HD-107146	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=5; GAIN=4			2078.5 Secs (2078.5 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]*	 ***[1]***
Comments: Exposure time, detector gain, and subarray region identical to GO 12228 observations in 2011.									


Orbit Structure
Orbit 1
Server Version: 20160601
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 2, split 4
Exp. 2, split 5
GS Acq
Exp. 1
Unused Orbital Visibility = 385
Home
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14714, EPOCH1B_HD107146_12 (12), implementation Wed Nov 09 16:52:07 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: PCS MODE FINE; GUID TOL 0.005"; GYRO MODE 3GOBAD; ORIENT -3.2D TO -3.2D FROM 14; AFTER 11 BY 0.8 Orbits TO 1.2 Orbits

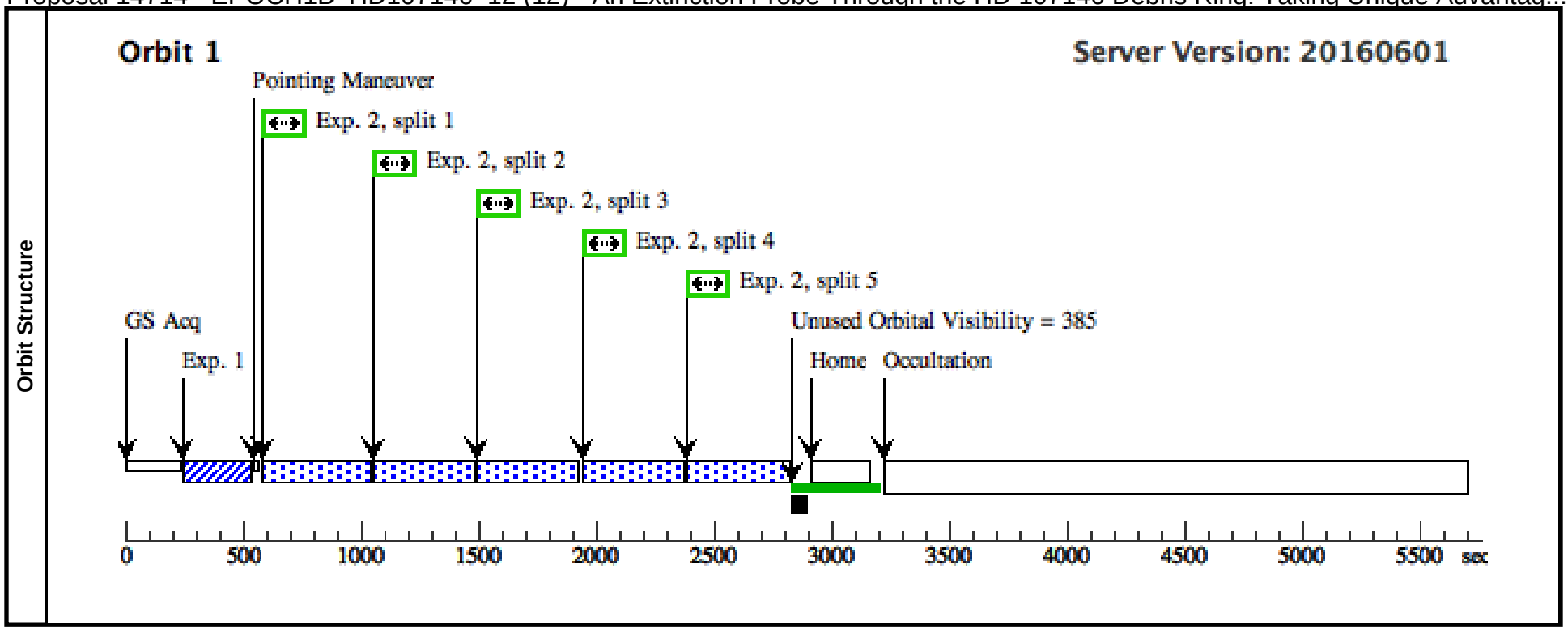
Comments: Visit 12. HD 107146 (V=7.07, B-V = +0.62). 2nd epoch, 2nd orbit
Absolute Orientation: Within any of the allowable orientation angle ranges specified
Relative Orientation: -2 deg ONR
Relative Timing: This visit (12) should immediately follow visit (11) in back-to-back orbits.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-107146	RA: 12 19 6.5023 (184.7770929d) Dec: +16 32 53.86 (16.54829d) Equinox: J2000	Proper Motion RA: -174.16 mas/yr Proper Motion Dec: -148.90 mas/yr Parallax: 0.03642" Epoch of Position: 2000	V=7.01	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	HD107146_ ACQ	(1) HD-107146	STIS/CCD, ACQ, F25ND3	MIRROR		GS ACQ SCENARI O ONEB1BN3		0.3 Secs (0.3 Secs) *[==>]*	 ***[1]***
Comments: SNR = 100, V = 7.07, sp = G2V, Exptime rounded to nearest 0.1 second									
2	HD107146_ LONG	(1) HD-107146	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=5; GAIN=4			2078.5 Secs (2078.5 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]*	 ***[1]***
Comments: Exposure time, detector gain, and subarray region identical to GO 12228 observations in 2011.									


Orbit Structure
Orbit 1
Server Version: 20160601
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 2, split 4
Exp. 2, split 5
GS Acq
Exp. 1
Unused Orbital Visibility = 385
Home
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14714, EPOCH1B_HD120066_13 (13), implementation Wed Nov 09 16:52:07 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: PCS MODE FINE; GUID TOL 0.005"; GYRO MODE 3GOBAD; AFTER 12 BY 0.8 Orbits TO 1.2 Orbits

Comments: Visit 03 (HD120066 PSF; V= +6.3). 2nd epoch, 3rd orbit
Absolute Orientation: Unconstraind
Relative Orientation: Unconstrained
Relative Timing: This visit (13) should immediately follow visit (12) in back-to-back orbits.

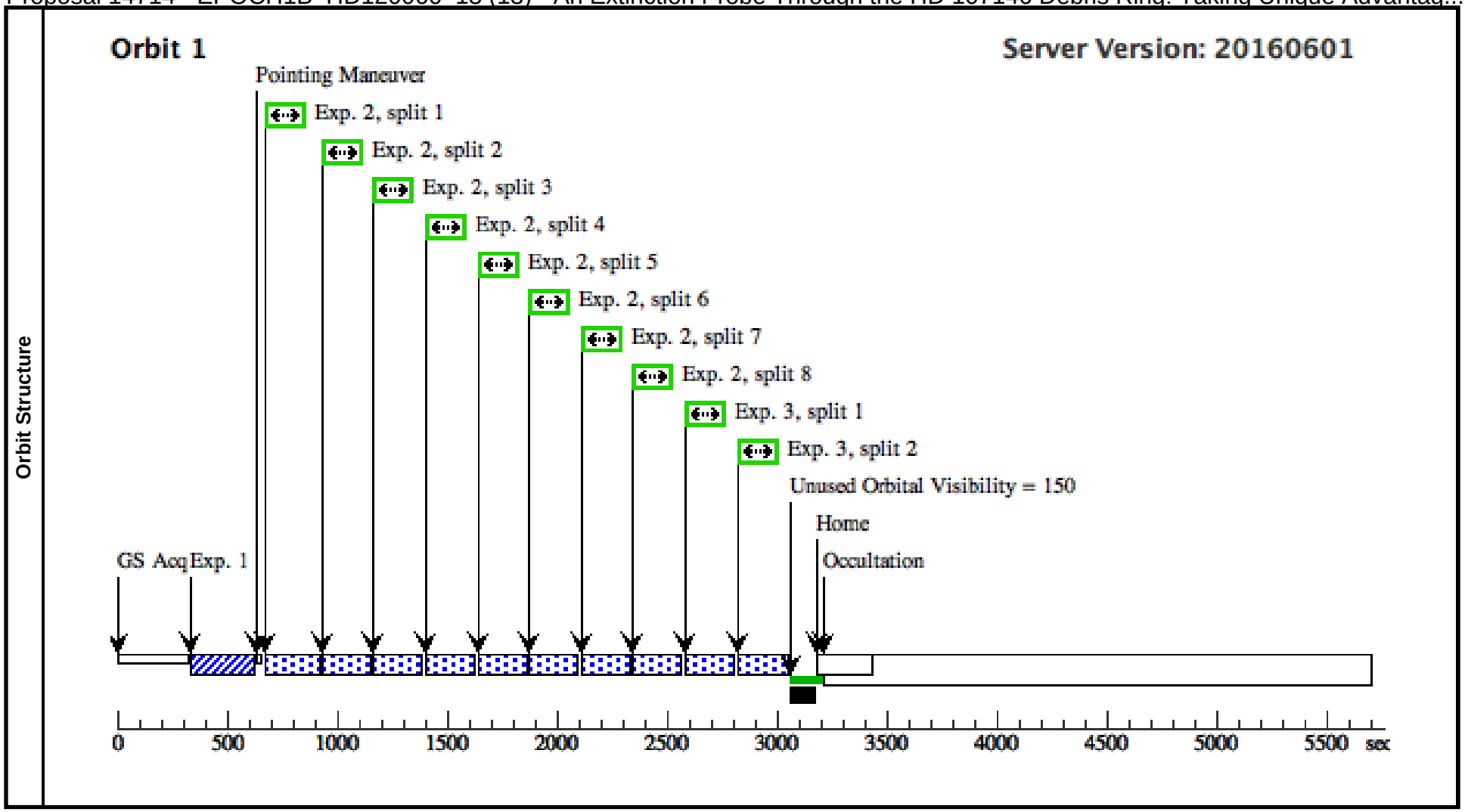
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HD-120066	RA: 13 46 57.1231 (206.7380129d)	Proper Motion RA: -509.71 mas/yr	V=6.3	Reference Frame: ICRS
		Dec: +06 21 1.34 (6.35037d)	Proper Motion Dec: -110.51 mas/yr		
		Equinox: J2000	Parallax: 0.03158"		
			Epoch of Position: 2000		

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 (Total)/[Actual Dur.]	Orbit
1	PSF03A_ACQ	(2) HD-120066	STIS/CCD, ACQ, F25ND3	MIRROR		GS ACQ SCENARIO BASE1BN3		0.2 Secs (0.2 Secs)	
								[==>]	***[1]***
	Comments: SNR = 100, V = 6.30, sp = G0V, Exptime rounded to nearest 0.1 second								
2	PSF03A_LONG	(2) HD-120066	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=8; GAIN=4			1652 Secs (1652 Secs)	
								[==>(Split 1)]	***[1]***
								[==>(Split 2)]	
								[==>(Split 3)]	
								[==>(Split 4)]	
								[==>(Split 5)]	
								[==>(Split 6)]	
								[==>(Split 7)]	
								[==>(Split 8)]	
	Comments: Exposure time, detector gain, and subarray region identical to GO 12228 observations in 2011.								
3	PSF03A_LONG	(2) HD-120066	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=2; GAIN=4			413 Secs (413 Secs)	
								[==>(Split 1)]	***[1]***
								[==>(Split 2)]	
	Comments: Exposure time, detector gain, and subarray region identical to GO 12228 observations in 2011.								


Orbit 1
Server Version: 20160601
Orbit Structure
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 2, split 4
Exp. 2, split 5
Exp. 2, split 6
Exp. 2, split 7
Exp. 2, split 8
Exp. 3, split 1
Exp. 3, split 2
Unused Orbital Visibility = 150
Home
Occultation
GS Acq
Exp. 1
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14714, EPOCH1B_HD107146_14 (14), implementation Wed Nov 09 16:52:07 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: PCS MODE FINE; GUID TOL 0.005"; GYRO MODE 3GOBAD; ORIENT 129.1D TO 203.1 D; ORIENT 90.1D TO 114.1 D; ORIENT 43.1D TO 66.1 D; ORIENT 311.1D TO 23.1 D; AFTER 13 BY 0.8 Orbits TO 1.2 Orbits

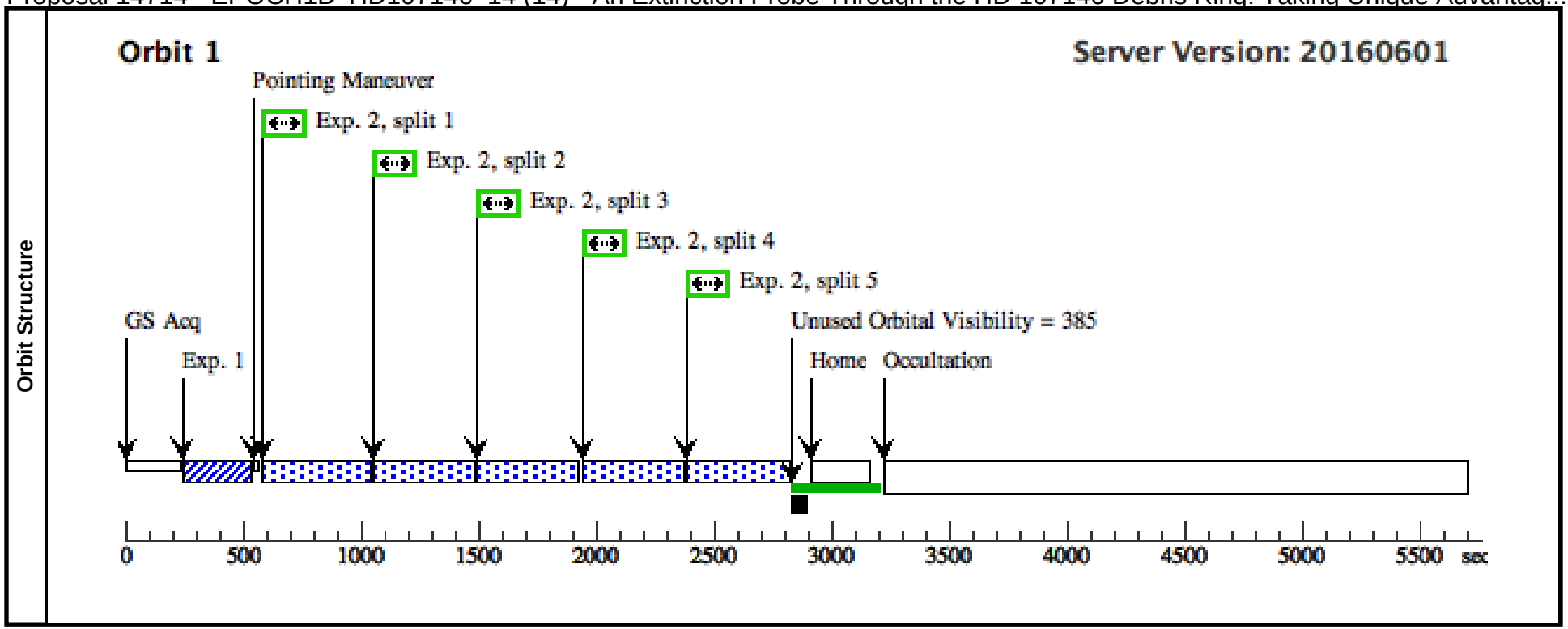
Comments: Visit 14. HD 107146 (V=7.07, B-V = +0.62). 2nd epoch, 4th orbit
Absolute Orientation: Within any of the allowable orientation angle ranges specified
Relative Orientation: +2 deg ONR
Relative Timing: This visit (14) should immediately follow visit (13) in back-to-back orbits.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-107146	RA: 12 19 6.5023 (184.7770929d) Dec: +16 32 53.86 (16.54829d) Equinox: J2000	Proper Motion RA: -174.16 mas/yr Proper Motion Dec: -148.90 mas/yr Parallax: 0.03642" Epoch of Position: 2000	V=7.01	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	HD107146_ ACQ	(1) HD-107146	STIS/CCD, ACQ, F25ND3	MIRROR		GS ACQ SCENARI O ONEB1BN3		0.3 Secs (0.3 Secs) *[==>]*	 ***[1]***
Comments: SNR = 100, V = 7.07, sp = G2V, Exptime rounded to nearest 0.1 second									
2	HD107146_ LONG	(1) HD-107146	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=5; GAIN=4			2078.5 Secs (2078.5 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]*	 ***[1]***
Comments: Exposure time, detector gain, and subarray region identical to GO 12228 observations in 2011.									


Orbit Structure
Orbit 1
Server Version: 20160601
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 2, split 4
Exp. 2, split 5
GS Acq
Exp. 1
Unused Orbital Visibility = 385
Home
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14714, EPOCH1B_HD107146_15 (15), implementation Wed Nov 09 16:52:07 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: PCS MODE FINE; GUID TOL 0.005"; GYRO MODE 3GOBAD; ORIENT 3.2D TO 3.2D FROM 14; AFTER 14 BY 0.8 Orbits TO 1.2 Orbits

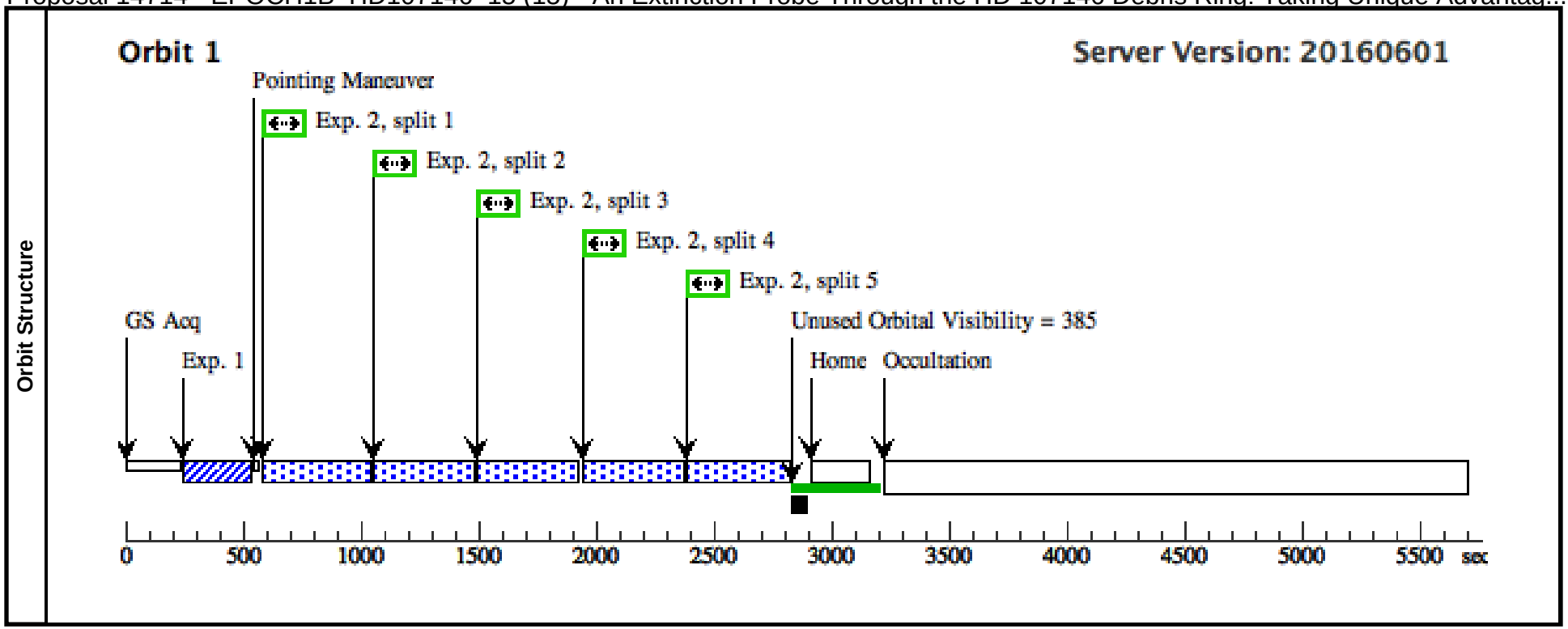
Comments: Visit 15. HD 107146 (V=7.07, B-V = +0.62). 1st epoch, 5th orbit
Absolute Orientation: Within any of the allowable orientation angle ranges specified
Relative Orientation: +6 deg ONR
Relative Timing: This visit (15) should immediately follow visit (14) in back-to-back orbits.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-107146	RA: 12 19 6.5023 (184.7770929d) Dec: +16 32 53.86 (16.54829d) Equinox: J2000	Proper Motion RA: -174.16 mas/yr Proper Motion Dec: -148.90 mas/yr Parallax: 0.03642" Epoch of Position: 2000	V=7.01	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	HD107146_ ACQ	(1) HD-107146	STIS/CCD, ACQ, F25ND3	MIRROR		GS ACQ SCENARI O ONEB1BN3		0.3 Secs (0.3 Secs) *[==>]*	 ***[1]***
Comments: SNR = 100, V = 7.07, sp = G2V, Exptime rounded to nearest 0.1 second									
2	HD107146_ LONG	(1) HD-107146	STIS/CCD, ACCUM, WEDGEA1.0	MIRROR	SIZEAXIS2=427; CR-SPLIT=5; GAIN=4			2078.5 Secs (2078.5 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]*	 ***[1]***
Comments: Exposure time, detector gain, and subarray region identical to GO 12228 observations in 2011.									


Orbit Structure
Orbit 1
Server Version: 20160601
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 2, split 4
Exp. 2, split 5
GS Acq
Exp. 1
Unused Orbital Visibility = 385
Home
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec