15094 - Stellar Occultation by Saturn's Rings in the UV

Cycle: 25, Proposal Category: GO

(UV Initiative)

(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) HD-168233	COS/NUV	1	27-Jun-2018 19:01:02.0	yes
02	(1) HD-168233	COS/NUV	1	27-Jun-2018 19:01:02.0	yes
03	(1) HD-168233	COS/NUV	1	27-Jun-2018 19:01:03.0	yes
04	(1) HD-168233	COS/NUV	1	27-Jun-2018 19:01:04.0	yes
05	(1) HD-168233	COS/NUV	1	27-Jun-2018 19:01:05.0	yes

5 Total Orbits Used

ABSTRACT

We propose to capitalize on the unique opportunity to observe the July 2018 stellar occultation of the star HD 168233 by Saturn's rings using the COS G230L mode on HST. Our program will characterize the particle size distribution of the rings through analyses of the starlight diffracted by the ring particles. It will also define the shape and structure of the rings through measurements of the optical depth of the variable F ring, the characterization of the self-gravity wakes, and by constraining the A ring edge dynamics six months after the radial swap of the co-orbital moons Janus and Epimetheus, which maintain the ring's outer edge. Saturn's rings are very dark at UV wavelengths; therefore, stellar occultations in the UV have a significantly lower background signal from the ring-reflected sunlight than at longer wavelengths. Furthermore, occultations at UV wavelengths are sensitive to the smallest particles in the rings. The geometry and wavelengths of the stellar occultation from HST COS will complement and extend the science return from the Cassini spacecraft nearly one year after the mission's end.

OBSERVING DESCRIPTION

We propose to observe the stellar occultation of HD 168233 by Saturns rings with one visit consisting of five HST orbits to ensure we encompass the entire occultation. Each orbit will remain fixed on the star as Saturn and its rings pass through the instrument field of view (FOV). We will use the COS G320 L mode centered on 300 nm in Time-Tag mode to obtain spectral information with a high SNR for short integration periods. We will implement the COS observation technique described by Cunningham et al. (2015), which offsets the primary signal source (in our case, the star) by 0.35 arcseconds in the cross-dispersion (COS +y) direction. We can then use the signal observed in the lower half of the COS aperture as an estimate of the background flux, the majority of which will emanate from the ring-reflected sunlight and terrestrial airglow.

Visit

Proposal 15094, Orbit1 (01), implementation Wed Jun 27 23:01:06 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: COS/NUV

Special Requirements: BETWEEN 11-JUL-2018:23:40:00 AND 12-JUL-2018:05:20:00

Comments: All orbits will be the same setup.

Diagnostics

(Orbit1 (01)) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

(Orbit1 (01)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(Orbit1 (01)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

Fixed Targets

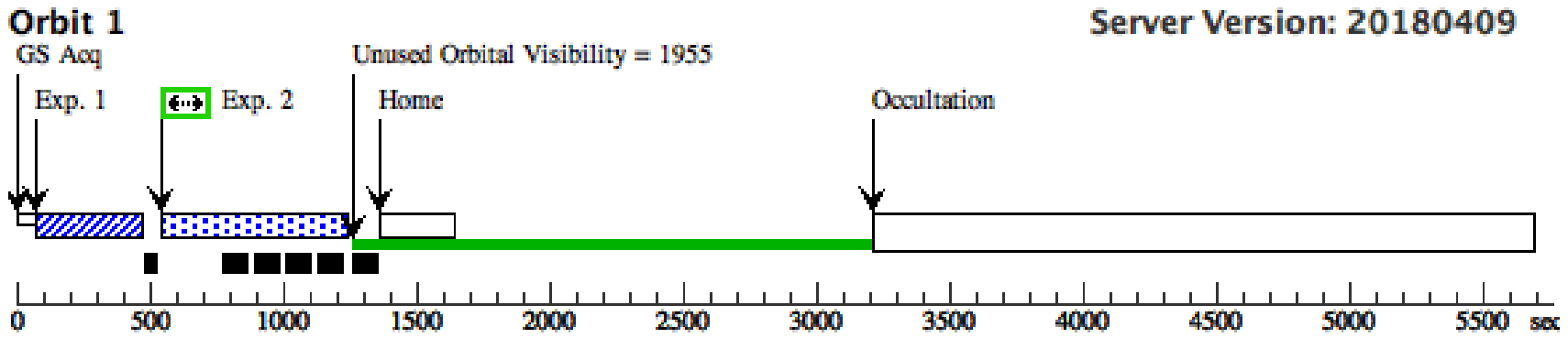
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-168233	RA: 18 19 39.7480 (274.9156167d) Dec: -22 31 43.94 (-22.52887d) Equinox: J2000	Proper Motion RA: 5.8 mas/yr Proper Motion Dec: -8.6 mas/yr Epoch of Position: 2000 Radial Velocity: -45.6 km/sec	V=9.24	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[A4-A9 V-IV]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (COS.ta.1008741)	(1) HD-168233	COS/NUV, ACQ/IMAGE, BOA	MIRRORB				42 Secs (42 Secs) *[==>]*	*[1]*
2	(COS.sp.1009256)	(1) HD-168233	COS/NUV, TIME-TAG, PSA	G230L 3000 A	FP-POS=3; BUFFER-TIME=120			1937 Secs (585 Secs) *[==>585 Secs]*	*[1]*

Orbit Structure



Visit

Proposal 15094, Orbit2 (02), implementation Wed Jun 27 23:01:06 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: COS/NUV

Special Requirements: AFTER 01 BY 0 Orbits TO 1.8 Orbits; BETWEEN 11-JUL-2018:23:40:00 AND 12-JUL-2018:05:20:00

Comments: All orbits will be the same setup.

Diagnostics

(Orbit2 (02)) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

(Orbit2 (02)) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

(Orbit2 (02)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

Fixed Targets

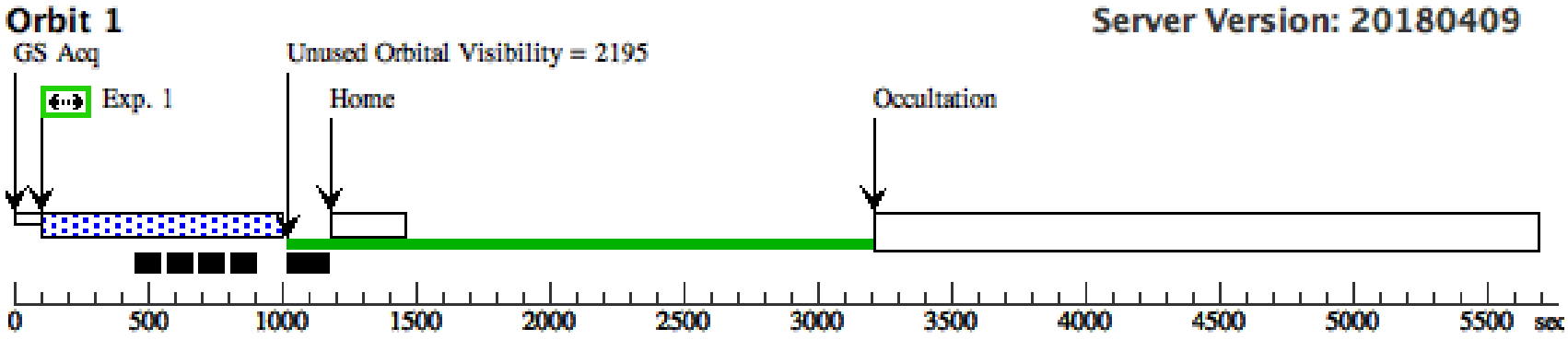
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-168233	RA: 18 19 39.7480 (274.9156167d) Dec: -22 31 43.94 (-22.52887d) Equinox: J2000	Proper Motion RA: 5.8 mas/yr Proper Motion Dec: -8.6 mas/yr Epoch of Position: 2000 Radial Velocity: -45.6 km/sec	V=9.24	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[A4-A9 V-IV]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sp.1009256)	(1) HD-168233	COS/NUV, TIME-TAG, PSA	G230L 3000 A	FP-POS=3; BUFFER-TIME=120			1937 Secs (660 Secs) *[==>660 Secs]*	*[1]*

Orbit Structure



Visit

Proposal 15094, Orbit3 (03), implementation Wed Jun 27 23:01:06 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: COS/NUV

Special Requirements: AFTER 02 BY 0 Orbits TO 1.8 Orbits; BETWEEN 11-JUL-2018:23:40:00 AND 12-JUL-2018:05:20:00

Comments: All orbits will be the same setup.

Diagnostics

(Orbit3 (03)) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

(Orbit3 (03)) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

(Orbit3 (03)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

Fixed Targets

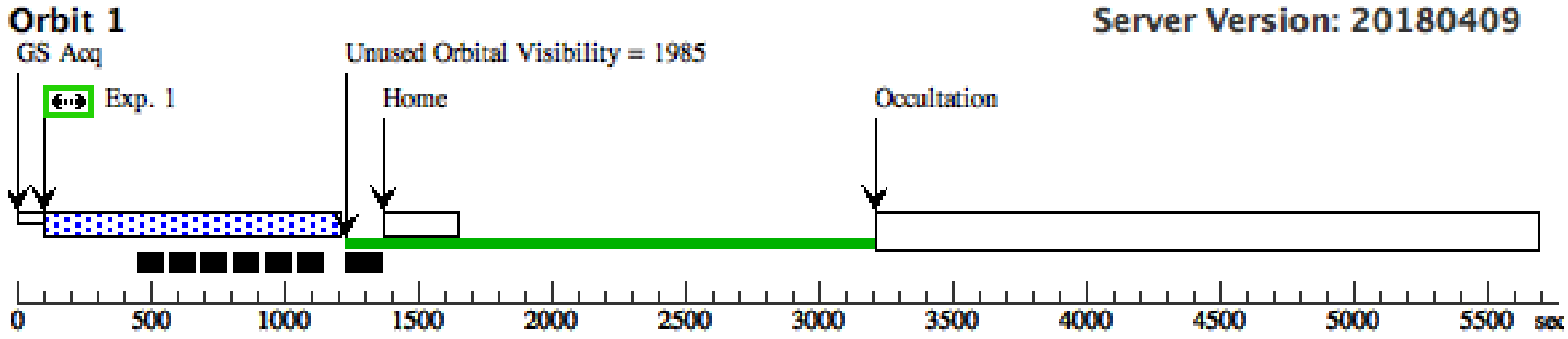
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-168233	RA: 18 19 39.7480 (274.9156167d) Dec: -22 31 43.94 (-22.52887d) Equinox: J2000	Proper Motion RA: 5.8 mas/yr Proper Motion Dec: -8.6 mas/yr Epoch of Position: 2000 Radial Velocity: -45.6 km/sec	V=9.24	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[A4-A9 V-IV]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sp.1009256)	(1) HD-168233	COS/NUV, TIME-TAG, PSA	G230L 3000 A	FP-POS=3; BUFFER-TIME=120			1937 Secs (870 Secs) *[==>870 Secs]*	*[1]*

Orbit Structure



Visit

Proposal 15094, Orbit4 (04), implementation Wed Jun 27 23:01:06 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: COS/NUV

Special Requirements: AFTER 03 BY 0 Orbits TO 1.8 Orbits; BETWEEN 11-JUL-2018:23:40:00 AND 12-JUL-2018:05:20:00

Comments: All orbits will be the same setup.

Diagnostics

(Orbit4 (04)) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

(Orbit4 (04)) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

(Orbit4 (04)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

(Orbit4 (04)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

Fixed Targets

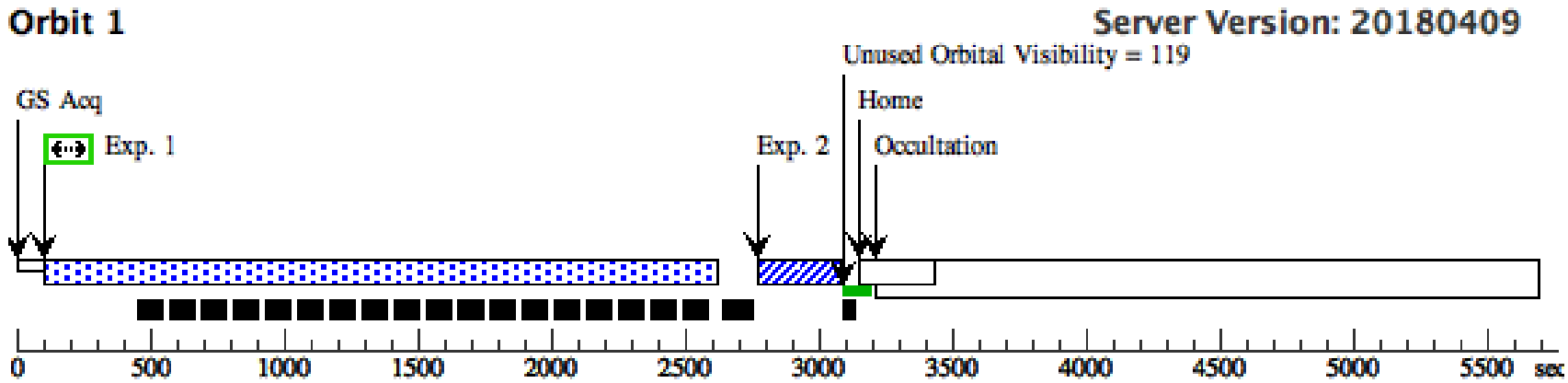
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-168233	RA: 18 19 39.7480 (274.9156167d)	Proper Motion RA: 5.8 mas/yr	V=9.24	Reference Frame: SIMBAD
		Dec: -22 31 43.94 (-22.52887d)	Proper Motion Dec: -8.6 mas/yr		
		Equinox: J2000	Epoch of Position: 2000		
			Radial Velocity: -45.6 km/sec		

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[A4-A9 V-IV]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sp.1009256)	(1) HD-168233	COS/NUV, TIME-TAG, PSA	G230L 3000 A	FP-POS=3; BUFFER-TIME=120			1937 Secs (2285 Secs) *[==>2285 Secs]*	*[1]*
2	ACQ (COS.ta.1008741)	(1) HD-168233	COS/NUV, ACQ/IMAGE, BOA	MIRRORB				42 Secs (42 Secs) *[==>]*	*[1]*

Orbit Structure



Visit

Proposal 15094, Orbit5 (05), implementation Wed Jun 27 23:01:06 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: COS/NUV

Special Requirements: AFTER 04 BY 0 Orbits TO 1.8 Orbits; BETWEEN 11-JUL-2018:23:40:00 AND 12-JUL-2018:05:20:00

Comments: All orbits will be the same setup.

Diagnostics

(Orbit5 (05)) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

(Orbit5 (05)) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

(Orbit5 (05)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-168233	RA: 18 19 39.7480 (274.9156167d) Dec: -22 31 43.94 (-22.52887d) Equinox: J2000	Proper Motion RA: 5.8 mas/yr Proper Motion Dec: -8.6 mas/yr Epoch of Position: 2000 Radial Velocity: -45.6 km/sec	V=9.24	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[A4-A9 V-IV]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sp.1009256)	(1) HD-168233	COS/NUV, TIME-TAG, PSA	G230L 3000 A	FP-POS=3; BUFFER-TIME=120			1937 Secs (2792 Secs) *[==>2792 Secs]*	*[1]*

Orbit Structure