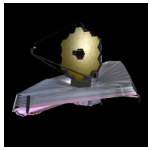

1271 - ToO TNOs: 'Unveiling the Kuiper belt by stellar occultations'

Cycle: 1, Proposal Category: GTO

INVESTIGATORS

Name	*Institution*	*E-Mail*
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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
OCCULTATION				
	8	Chariklo Occ NIRCam Engineering Imaging	NIRCam Engineering Imaging	(3) STAR

ABSTRACT

Observation IDs: HAMMEL_1000

The stellar occultation technique is a powerful tool to determine sizes and shapes of Solar System bodies with accuracies 0.1%. The size determination allows estimating geometric albedos and, for binary/multiple objects, even the bulk density can be obtained. Satellites, atmospheres and rings can also be detected/characterized. Observing stellar occultations by Kuiper Belt Objects (KBOs) and Centaurs with JWST is a unique possibility to expand our knowledge of these bodies by providing key information on e.g. the capacity of the body to retain volatiles, the thermal properties of the surface, roughness and porosity.

This ToO is dedicated to observe stellar occultations by trans-Neptunian Objects (TNOs) or specially interesting Centaurs (e.g. like the ringed centaurs objects Chariklo or Chiron). Predictions of such events can only be made after JWST launch and initial mid-course correction maneuvers have been executed. Statistically we expect approximately a 50% chance that there will be one such occultation of a star brighter than K=19 by a numbered TNO, that will be observable from JWST in Cycle 1. Once JWST is on-station a list of possible stellar occultation events by numbered

TNOs (those with orbital uncertainties <0.5") will be generated to identify candidates for occultations in Cycle 1. As station keeping maneuvers are executed, the list of possible occultations and their uncertainties will be revised. Very precise relative astrometry using GAIA catalog will be carried out for particularly promising star-TNO pairs via established ground-based programs. If a stellar occultation event is confirmed via such an astrometric revision having a predicted impact parameter smaller than 3x the estimated target radius, and having a 1-sigma uncertainty on the prediction less than 2x the target radius, the ToO observation will be triggered. JWST station-keeping and trajectory-prediction operations have been studied in the context of stellar occultations by solar system bodies (see Santos-Sanz et al. 2016). The accuracy of the trajectory predictions is adequate to support this triggering mechanism up to roughly 30 days prior to an occultation event, and so will not require this ToO observation to be “disruptive".

OBSERVING DESCRIPTION

These are target of opportunity (ToO) observations of an as-yet undetermined star (the target in this proposal is a placeholder). A star will be chosen if it falls within the field of regard of JWST and is expected to have a foreground TNO or Centaur pass in front of it on a particular date (i.e. The TNO/Centaur is predicted to occult the star). This is a non-disruptive ToO because the stellar occultation by a TNO/Centaur will be predicted weeks to months in advance. The observations will be made with NIRCam and the F070W and F277W filters. These filters were chosen to maximize the flux from the star while minimzing the reflected flux from the TNO or Centaur. This filter combination could change based on the properties of the occulted star and the occulting TNO/Centaur. The smallest subarray (SUB64P) will be used with the RAPID readout mode to increase the frequency of the observations in order to track the decrease in the star's light over time. The observations are planned to start a few minutes prior to the occultation and end a few minutes after the occultation in order to obtain observations of the star by itself for a baseline. It is also important to note that the exposure parameters selected in this file are only illustrative, and that will be adjusted to achieve the optimal balance for the chosen event in terms of the magnitude of the occulted star and the apparent velocity of the occulting target.

The ToO response time is set to 14 days, the minimum value for a non-disruptive ToO.

Proposal 1271 - Targets - ToO TNOs: 'Unveiling the Kuiper belt by stellar occultations'

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	STAR	RA: 20 21 45.6799 (305.4403329d)	Proper Motion RA: 4.4805362468920205 mas/yr	
		Dec: -16 26 21.77 (-16.43938d)	Proper Motion Dec: -10.147506225874872 mas/yr	
		Equinox: J2000	Epoch of Position: 2016.0	

Comments:
Category=Calibration
Description=[Photometric]
Extended=NO

Observation

Proposal 1271, Observation 8: Chariklo Occ NIRCam Engineering Imaging Wed Oct 05 20:00:48 GMT 2022

Diagnostic Status: Warning

Observing Template: NIRCam Engineering Imaging

Diagnostics

(Visit 8:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	STAR	RA: 20 21 45.6799 (305.4403329d) Dec: -16 26 21.77 (-16.43938d) Equinox: J2000	Proper Motion RA: 4.4805362468920205 mas/yr Proper Motion Dec: -10.147506225874872 mas/yr Epoch of Position: 2016.0	

Comments:
Category=Calibration
Description=[Photometric]
Extended=NO

Template

Module	Subarray
B	SUB64P

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	NONE		STANDARD		1

Spectral Elements

#	Short Pupil	Long Pupil	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	CLEAR	CLEAR	F150W2	F322W2	RAPID	5	14827	14827	1	4500.291	

Special Requirements

Between Dates 18-OCT-2022:12:31:00 and 18-OCT-2022:13:31:00
No Parallel
Required