



10653 - Phase Curve of an Earth-Sized Planet on the Brink of Tidal Disruption

Cycle: 5, Proposal Category: GO

INVESTIGATORS

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Prof. Joshua Winn (CoI)	Princeton University
Mr. Jonathan Daniel Gomez Barrientos (CoI)	California Institute of Technology
Dr. Michael Greklek-McKeon (CoI)	Carnegie Institution for Science

OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
MIRI Phase Curve				
	1		MIRI Low Resolution Spectroscopy	(1) G-264-17

ABSTRACT

We propose MIRI/LRS phase curve observations of the Earth-sized planet TOI-6324 b ($1.06 R_{\oplus}$, $1.17 M_{\oplus}$, $ESM=25$, $K=8.7$). Its 6.7-hour orbit lies it only $\sim 20\%$ outside the Roche limit. Extreme tides on a partially molten planet should yield detectable ellipsoidal deformation. $\{it\ TESS\}$ observations already hint at a strong tidal distortion and heat dissipation with an anomalous optical phase curve that peaks near quadratures. With 3 phase curves and 4 eclipses from MIRI (~ 21 hr), we will constrain the tidal Love number to ± 0.4 and the tidal heating rate to $\pm 10\%$ of the insolation, thus providing an important test of the rheology of an Earth-sized lava world.

OBSERVING DESCRIPTION

We propose to observe TOI-6255 b for 21 hours which is slightly longer than three consecutive phase curves. Our observation will start shortly before a secondary eclipse, and will end shortly after a secondary eclipse, allowing us to obtain 4 secondary eclipse in total. We will use 25 groups per integration. The resultant duty cycle is 96%. This ensures that no pixel is saturated.

The science target itself is suitable for target acquisition with F1500W filter is applied.

Proposal 10653 - Targets - Phase Curve of an Earth-Sized Planet on the Brink of Tidal Disruption

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(1)	G-264-17	RA: 22 03 21.2557 (330.8385654d) Dec: +67 29 59.83 (67.49995d) Equinox: J2000	Proper Motion RA: 531.31 mas/yr Proper Motion Dec: -296.3570000474647 mas/yr Parallax: 0.048641399999999994" Epoch of Position: 2000	
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>				
	<i>SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.</i>				
	<i>Category=Star</i>				
	<i>Description=[M dwarfs]</i>				
	<i>Extended=NO</i>				

Proposal 10653 - Observation 1 - Phase Curve of an Earth-Sized Planet on the Brink of Tidal Disruption

Fri Mar 13 19:10:48 GMT 2026

Observation	Proposal 10653, Observation 1 Diagnostic Status: Warning Observing Template: MIRI Low Resolution Spectroscopy																										
	(Observation 1) Warning (Form): Exposure Duration exceeds the limit of 10000.0 seconds. Above this limit it is possible that a High Gain Antenna move may occur during the exposure. (Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.																										
Diagnosics																											
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Special Requirements

Phase 0.05 to 0.1 with period 1.116884 Days and zero-phase 2458739.97928 HJD
Time Series Observation
No Parallel Attachments