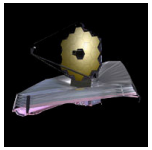

7953 - Exo-Geology: Surface Spectral Features from a Rocky Exoplanet

Cycle: 4, Proposal Category: GO

INVESTIGATORS

Name	*Institution*
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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
LHS 3844 b MIRI				
	1	MIRI	MIRI Low Resolution Spectroscopy	(1) LHS_3844
	2	MIRI	MIRI Low Resolution Spectroscopy	(1) LHS_3844
	3	MIRI	MIRI Low Resolution Spectroscopy	(1) LHS_3844
	4	MIRI	MIRI Low Resolution Spectroscopy	(1) LHS_3844
	5	MIRI	MIRI Low Resolution Spectroscopy	(1) LHS_3844
	6	MIRI	MIRI Low Resolution Spectroscopy	(1) LHS_3844
	7	MIRI	MIRI Low Resolution Spectroscopy	(1) LHS_3844
	8	MIRI	MIRI Low Resolution Spectroscopy	(1) LHS_3844
	9	NIRSpec	NIRSpec Bright Object Time Series	(1) LHS_3844

ABSTRACT

JWST offers the very first opportunity to spectroscopically characterize the surfaces of rocky exoplanets. Observations in previous cycles have constrained their surface albedos, but this is degenerate with a wide range of surface properties. Here we propose to observe the most promising

surface characterization target known, LHS 3844 b, to robustly (greater than 3 sigma) detect surface spectral features from an exoplanet for the first time. This will allow us to leverage the vast expertise developed for Solar System rocky bodies to establish a new field of ‘exo-geology’ whose goal is to explore the geological histories and mantle compositions of rocky exoplanets.

OBSERVING DESCRIPTION

Our observations consist of 8 MIRI LRS (slitless) eclipses and 1 NIRSpec G395H eclipse for our target, LHS 3844 b. We propose to use the same instrument settings as the previous programs (GO 1846 and 4008) on this target that maximize efficiency and avoid saturation. For the MIRI observations, we can use LHS 3844 as the TA star. For the NIRSpec observations, LHS 3844 is too bright for target acquisition, so we elect to use the same TA star as the previous GO program.

Proposal 7953 - Targets - Exo-Geology: Surface Spectral Features from a Rocky Exoplanet

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	LHS_3844	RA: 22 41 59.1203 (340.4963346d) Dec: -69 10 19.95 (-69.17221d) Equinox: J2000	Proper Motion RA: 334.41936695017966 mas/yr Proper Motion Dec: -726.9859085966832 mas/yr Parallax: 0.06721234716183032" Epoch of Position: 2016	
Comments: Copied from GO 4008 which had successful observations. *Category=Star* *Description=[Exoplanets]*				
(2)	LHS_3844_TA	RA: 22 41 52.4444 (340.4685183d) Dec: -69 10 36.15 (-69.17671d) Equinox: J2000	Proper Motion RA: 5.9576895133589876 mas/yr Proper Motion Dec: -10.176256860402493 mas/yr Parallax: 0.00044184563056068393" Epoch of Position: 2016	
Comments: From GO 4008: "Values taken from the Gaia archive. *This object is the closest point sorce to LHS3844 in the 2MASS All-Sky Point Source Catalog (PSC).* *2MASS J22415241-6910359* *Gaia DR3 6385548163541992576"* *Category=Unidentified* *Description=[Infrared sources]*				

Observation

Proposal 7953, Observation 1: MIRI Tue Aug 19 21:00:09 GMT 2025

Diagnostic Status: Warning

Observing Template: MIRI Low Resolution Spectroscopy

Diagnostics

(MIRI (Obs 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.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	LHS_3844	RA: 22 41 59.1203 (340.4963346d) Dec: -69 10 19.95 (-69.17221d) Equinox: J2000	Proper Motion RA: 334.41936695017966 mas/yr Proper Motion Dec: -726.9859085966832 mas/yr Parallax: 0.06721234716183032" Epoch of Position: 2016	

Comments: Copied from GO 4008 which had successful observations.
Category=Star
Description=[Exoplanets]

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F560W	FAST	4	1	1	0.636	225094

Template

Subarray	Obtain Verification Image?
SLITLESSPRISM	false

Dithers

#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset
1	NONE				

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	FASTR1	30	2225	2225	1	1	10969.625	225094

Special Requirements	
	Phase 0.27286865899 to 0.36287513452 with period 0.462929655 Days and zero-phase 2458325.72554 HJD Time Series Observation No Parallel Attachments Group Observations 1, 2, 3, 4, 5, 6, 7, 8, 9 within 365 Days

Observation

Proposal 7953, Observation 2: MIRI Tue Aug 19 21:00:09 GMT 2025

Diagnostic Status: Warning

Observing Template: MIRI Low Resolution Spectroscopy

Diagnostics

(MIRI (Obs 2)) 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 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	LHS_3844	RA: 22 41 59.1203 (340.4963346d) Dec: -69 10 19.95 (-69.17221d) Equinox: J2000	Proper Motion RA: 334.41936695017966 mas/yr Proper Motion Dec: -726.9859085966832 mas/yr Parallax: 0.06721234716183032" Epoch of Position: 2016	

Comments: Copied from GO 4008 which had successful observations.
Category=Star
Description=[Exoplanets]

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F560W	FAST	4	1	1	0.636	225094

Template

Subarray	Obtain Verification Image?
SLITLESSPRISM	false

Dithers

#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset
1	NONE				

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	FASTR1	30	2225	2225	1	1	10969.625	225094

Special Requirements	
	Phase 0.27286865899 to 0.36287513452 with period 0.462929655 Days and zero-phase 2458325.72554 HJD Time Series Observation No Parallel Attachments Group Observations 1, 2, 3, 4, 5, 6, 7, 8, 9 within 365 Days

Observation

Proposal 7953, Observation 3: MIRI Tue Aug 19 21:00:09 GMT 2025

Diagnostic Status: Warning

Observing Template: MIRI Low Resolution Spectroscopy

Diagnostics

(MIRI (Obs 3)) 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 3:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	LHS_3844	RA: 22 41 59.1203 (340.4963346d) Dec: -69 10 19.95 (-69.17221d) Equinox: J2000	Proper Motion RA: 334.41936695017966 mas/yr Proper Motion Dec: -726.9859085966832 mas/yr Parallax: 0.06721234716183032" Epoch of Position: 2016	

Comments: Copied from GO 4008 which had successful observations.
Category=Star
Description=[Exoplanets]

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F560W	FAST	4	1	1	0.636	225094

Template

Subarray	Obtain Verification Image?
SLITLESSPRISM	false

Dithers

#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset
1	NONE				

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	FASTR1	30	2225	2225	1	1	10969.625	225094

Special Requirements	
	Phase 0.27286865899 to 0.36287513452 with period 0.462929655 Days and zero-phase 2458325.72554 HJD Time Series Observation No Parallel Attachments Group Observations 1, 2, 3, 4, 5, 6, 7, 8, 9 within 365 Days

Observation

Proposal 7953, Observation 4: MIRI Tue Aug 19 21:00:09 GMT 2025

Diagnostic Status: Warning

Observing Template: MIRI Low Resolution Spectroscopy

Diagnostics

(MIRI (Obs 4)) 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 4:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	LHS_3844	RA: 22 41 59.1203 (340.4963346d) Dec: -69 10 19.95 (-69.17221d) Equinox: J2000	Proper Motion RA: 334.41936695017966 mas/yr Proper Motion Dec: -726.9859085966832 mas/yr Parallax: 0.06721234716183032" Epoch of Position: 2016	

Comments: Copied from GO 4008 which had successful observations.
Category=Star
Description=[Exoplanets]

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F560W	FAST	4	1	1	0.636	225094

Template

Subarray	Obtain Verification Image?
SLITLESSPRISM	false

Dithers

#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset
1	NONE				

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	FASTR1	30	2225	2225	1	1	10969.625	225094

Special Requirements	
	Phase 0.27286865899 to 0.36287513452 with period 0.462929655 Days and zero-phase 2458325.72554 HJD Time Series Observation No Parallel Attachments Group Observations 1, 2, 3, 4, 5, 6, 7, 8, 9 within 365 Days

Observation

Proposal 7953, Observation 5: MIRI Tue Aug 19 21:00:09 GMT 2025

Diagnostic Status: Warning

Observing Template: MIRI Low Resolution Spectroscopy

Diagnostics

(MIRI (Obs 5)) 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 5:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	LHS_3844	RA: 22 41 59.1203 (340.4963346d) Dec: -69 10 19.95 (-69.17221d) Equinox: J2000	Proper Motion RA: 334.41936695017966 mas/yr Proper Motion Dec: -726.9859085966832 mas/yr Parallax: 0.06721234716183032" Epoch of Position: 2016	

Comments: Copied from GO 4008 which had successful observations.
Category=Star
Description=[Exoplanets]

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F560W	FAST	4	1	1	0.636	225094

Template

Subarray	Obtain Verification Image?
SLITLESSPRISM	false

Dithers

#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset
1	NONE				

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	FASTR1	30	2225	2225	1	1	10969.625	225094

Special Requirements	
	Phase 0.27286865899 to 0.36287513452 with period 0.462929655 Days and zero-phase 2458325.72554 HJD Time Series Observation No Parallel Attachments Group Observations 1, 2, 3, 4, 5, 6, 7, 8, 9 within 365 Days

Observation

Proposal 7953, Observation 6: MIRI Tue Aug 19 21:00:09 GMT 2025

Diagnostic Status: Warning

Observing Template: MIRI Low Resolution Spectroscopy

Diagnostics

(MIRI (Obs 6)) 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 6:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	LHS_3844	RA: 22 41 59.1203 (340.4963346d) Dec: -69 10 19.95 (-69.17221d) Equinox: J2000	Proper Motion RA: 334.41936695017966 mas/yr Proper Motion Dec: -726.9859085966832 mas/yr Parallax: 0.06721234716183032" Epoch of Position: 2016	

Comments: Copied from GO 4008 which had successful observations.
Category=Star
Description=[Exoplanets]

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F560W	FAST	4	1	1	0.636	225094

Template

Subarray	Obtain Verification Image?
SLITLESSPRISM	false

Dithers

#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset
1	NONE				

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	FASTR1	30	2225	2225	1	1	10969.625	225094

Special Requirements	
	Phase 0.27286865899 to 0.36287513452 with period 0.462929655 Days and zero-phase 2458325.72554 HJD Time Series Observation No Parallel Attachments Group Observations 1, 2, 3, 4, 5, 6, 7, 8, 9 within 365 Days

Observation

Proposal 7953, Observation 7: MIRI Tue Aug 19 21:00:09 GMT 2025

Diagnostic Status: Warning

Observing Template: MIRI Low Resolution Spectroscopy

Diagnostics

(MIRI (Obs 7)) 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 7:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	LHS_3844	RA: 22 41 59.1203 (340.4963346d) Dec: -69 10 19.95 (-69.17221d) Equinox: J2000	Proper Motion RA: 334.41936695017966 mas/yr Proper Motion Dec: -726.9859085966832 mas/yr Parallax: 0.06721234716183032" Epoch of Position: 2016	

Comments: Copied from GO 4008 which had successful observations.
Category=Star
Description=[Exoplanets]

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F560W	FAST	4	1	1	0.636	225094

Template

Subarray	Obtain Verification Image?
SLITLESSPRISM	false

Dithers

#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset
1	NONE				

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	FASTR1	30	2225	2225	1	1	10969.625	225094

Special Requirements	
	Phase 0.27286865899 to 0.36287513452 with period 0.462929655 Days and zero-phase 2458325.72554 HJD Time Series Observation No Parallel Attachments Group Observations 1, 2, 3, 4, 5, 6, 7, 8, 9 within 365 Days

Observation

Proposal 7953, Observation 8: MIRI Tue Aug 19 21:00:09 GMT 2025

Diagnostic Status: Warning

Observing Template: MIRI Low Resolution Spectroscopy

Diagnostics

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	LHS_3844	RA: 22 41 59.1203 (340.4963346d) Dec: -69 10 19.95 (-69.17221d) Equinox: J2000	Proper Motion RA: 334.41936695017966 mas/yr Proper Motion Dec: -726.9859085966832 mas/yr Parallax: 0.06721234716183032" Epoch of Position: 2016	

Comments: Copied from GO 4008 which had successful observations.
Category=Star
Description=[Exoplanets]

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F560W	FAST	4	1	1	0.636	225094

Template

Subarray	Obtain Verification Image?
SLITLESSPRISM	false

Dithers

#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset
1	NONE				

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	FASTR1	30	2225	2225	1	1	10969.625	225094

Special Requirements	
	Phase 0.27286865899 to 0.36287513452 with period 0.462929655 Days and zero-phase 2458325.72554 HJD Time Series Observation No Parallel Attachments Group Observations 1, 2, 3, 4, 5, 6, 7, 8, 9 within 365 Days

Observation

Proposal 7953, Observation 9: NIRSpec Tue Aug 19 21:00:09 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(NIRSpec (Obs 9)) 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 9:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	LHS_3844	RA: 22 41 59.1203 (340.4963346d) Dec: -69 10 19.95 (-69.17221d) Equinox: J2000	Proper Motion RA: 334.41936695017966 mas/yr Proper Motion Dec: -726.9859085966832 mas/yr Parallax: 0.06721234716183032" Epoch of Position: 2016	

Comments: Copied from GO 4008 which had successful observations.
Category=Star
Description=[Exoplanets]

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	2 LHS_3844_TA	WATA	SUB32	F140X	NRSRAPID	3	1	1	0.08	225094

Template

Subarray
SUB2048

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSRAPID	15	765	1	1	765	11056.147	225094

Special Requirements

Phase 0.27231061884 to 0.36231709437 with period 0.462929655 Days and zero-phase 2458325.72554 HJD
Time Series Observation
No Parallel Attachments

Group Observations 1, 2, 3, 4, 5, 6, 7, 8, 9 within 365 Days