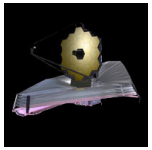

2053 - Search for NIR gas in debris disks. Is there a water delivery mechanism?

Cycle: 1, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
HD 110058				
	1	HD 110058 - 1	NIRSpec Fixed Slit Spectroscopy	(1) HD-110058
HD 156623				
	2	HD 156623 - 1	NIRSpec Fixed Slit Spectroscopy	(2) HD-156623
	102	HD 156623 - 1	NIRSpec Fixed Slit Spectroscopy	(2) HD-156623
HD 131488				
	3	HD 131488 - 1	NIRSpec Fixed Slit Spectroscopy	(3) HD-131488
HD 131835				
	4	HD 131835 - 1	NIRSpec Fixed Slit Spectroscopy	(4) HD-131835
HD 36546				
	5	HD 36546 - 1	NIRSpec Fixed Slit Spectroscopy	(5) HD-36546

ABSTRACT

Observations in far-infrared and (sub-)mm wavelengths have found evidence for a non-negligible amount of gas around ~20 nearby main-sequence stars with debris disks. This gas, located in the outer regions of the systems, is likely to have originated via collisions or evaporation of planetesimals due to dynamical instabilities. Gas detected in the optical range with spectroscopy, located much closer to the star, and attributed to the presence of evaporating bodies, has also been found in these systems, pointing towards these objects, also known as exocomets, as a possible transportation mechanism for volatiles from the outer regions of planetary systems, beyond the snowline, to the inner regions where rocky planets are located. However, observations thus far have not been able to identify warm gas in intermediate regions, or the presence of water, and therefore we don't yet understand how the transportation mechanisms might compare to those observed in the solar system.

We propose to use NIRSpec fixed slit mid-resolution observations in the 3 to 5 micron range to look for volatiles in a sample of 5 debris disk stars with known millimetric and optical gas, in particular targeting the 4.5-5 micron water features that is not observable from the ground. The detection of CO and water could not only help constrain the amount and temperature of gas, key in planet formation studies, but also shed light into the dynamics and architecture of planetary systems, and have implications in astrobiological studies, such as water delivery theories.

OBSERVING DESCRIPTION

We propose observations using NIRSpec fixed slit mode, using the grating and filter G395H/F290LP to allow high-resolution (R 2700) spectroscopy across the 3 to 5 micron wavelength range to observe gas volatiles in the gaseous disk of 5 main-sequence stars. Due to the brightness of the objects, we are requesting the 1.6"x1.6" slit, and the subarray SUB2048 as to minimize the wavelength gap.

We will perform WATA in order to improve the pointing, and avoid any light dispersion that could affect the wavlength calibration.

The targets have been selected based on: 1) Presence of a debris disk, indicative of dust and planetesimals in the system; 2) Sub-mm gas detection, located at tens to hundreds AU from the star; 3) Optical gas detection, located in the inner regions of the system at few stellar radii; 4) K band magnitudes below saturation. Two of the selected targets also have detections in optical spectroscopy of exocomet-like features.

We apply for a total of 5.91 hours of observation, after the Smart Accounting has been applied. This will allow us to reach high SNR (~500), necessary to avoid blending of the narrow features originated in the disk.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	HD-110058	RA: 12 39 46.1491 (189.9422879d) Dec: -49 11 55.78 (-49.19883d) Equinox: J2000	Proper Motion RA: -0.0030244223220439246 sec of time/yr Proper Motion Dec: -0.014889999965816969 arcsec/yr Epoch of Position: 2015.5	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=Star* *Description=[A stars, Circumstellar disks, Circumstellar dust, Circumstellar gas]* *Extended=NO*				
(2)	HD-156623	RA: 17 20 50.5958 (260.2108158d) Dec: -45 25 15.62 (-45.42101d) Equinox: J2000	Proper Motion RA: -0.0013550993226748161 sec of time/yr Proper Motion Dec: -0.040128999899025075 arcsec/yr Epoch of Position: 2015.5	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=Star* *Description=[A stars, Circumstellar disks, Circumstellar dust, Circumstellar gas]* *Extended=NO*				
(3)	HD-131488	RA: 14 55 8.0036 (223.7833483d) Dec: -41 07 13.75 (-41.12049d) Equinox: J2000	Proper Motion RA: -0.0016065593845063372 sec of time/yr Proper Motion Dec: -0.022292999983619666 arcsec/yr Epoch of Position: 2015.5	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=Star* *Description=[A stars, Circumstellar disks, Circumstellar dust, Circumstellar gas]* *Extended=NO*				
(4)	HD-131835	RA: 14 56 54.4380 (224.2268250d) Dec: -35 41 44.05 (-35.69557d) Equinox: J2000	Proper Motion RA: -0.001916527199376664 sec of time/yr Proper Motion Dec: -0.024943000062194187 arcsec/yr Epoch of Position: 2015.5	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=Star* *Description=[A stars, Circumstellar disks, Circumstellar dust, Circumstellar gas]* *Extended=NO*				
(5)	HD-36546	RA: 05 33 30.7672 (83.3781967d) Dec: +24 37 43.09 (24.62864d) Equinox: J2000	Proper Motion RA: 5.427775933555078E-4 sec of time/yr Proper Motion Dec: -0.04151099994942342 arcsec/yr Epoch of Position: 2015.5	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=Star* *Description=[A stars, Circumstellar disks, Circumstellar dust, Circumstellar gas]* *Extended=NO*				
(6)	TAHD36546	RA: 05 33 29.5596 (83.3731650d) Dec: +24 37 35.87 (24.62663d) Equinox: J2000	Proper Motion RA: -1.191060549 mas/yr Proper Motion Dec: -2.769346817 mas/yr Epoch of Position: 2015.5	
Comments: Target acquisition for HD 36546 *Category=Star* *Description=[K stars]* *Extended=NO*				

(7)	TAHD110058	RA: 12 39 41.4121 (189.9225504d) Dec: -49 12 1.81 (-49.20050d) Equinox: J2000	Proper Motion RA: 1.142923652 mas/yr Proper Motion Dec: 0.74208692 mas/yr Epoch of Position: 2015.5	
Comments: Target acquisition for HD 110058 *Category=Star* *Description=[G stars]* *Extended=NO*				
(8)	TAHD131488	RA: 14 55 7.1658 (223.7798575d) Dec: -41 07 53.42 (-41.13151d) Equinox: J2000	Proper Motion RA: -6.126033842 mas/yr Proper Motion Dec: -1.040490401 mas/yr Epoch of Position: 2015.5	
Comments: Target acquisition for HD 131488 *Category=Star* *Description=[G stars]*				
(9)	TAHD131835	RA: 14 56 52.4321 (224.2184671d) Dec: -35 42 2.79 (-35.70078d) Equinox: J2000	Proper Motion RA: -1.624449227 mas/yr Proper Motion Dec: 1.701577592 mas/yr Epoch of Position: 2015.5	
Comments: Target acquisition for HD 131835 *Category=Star* *Description=[G stars]*				
(10)	TAHD156623	RA: 17 20 47.4192 (260.1975800d) Dec: -45 25 45.35 (-45.42926d) Equinox: J2000	Proper Motion RA: -15.30427815 mas/yr Proper Motion Dec: -6.362928375 mas/yr Epoch of Position: 2015.5	
Comments: Target acquisition for HD 156623 *Category=Star* *Description=[G stars]*				

Observation

Proposal 2053, Observation 1: HD 110058 - 1

Fri Mar 03 01:00:30 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec Fixed Slit Spectroscopy

Diagnostics

(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)	HD-110058	RA: 12 39 46.1491 (189.9422879d) Dec: -49 11 55.78 (-49.19883d) Equinox: J2000	Proper Motion RA: -0.0030244223220439246 sec of time/yr Proper Motion Dec: -0.014889999965816969 arcsec/yr Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[A stars, Circumstellar disks, Circumstellar dust, Circumstellar gas]
Extended=NO

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	7 TAHD110058	WATA	SUB32	CLEAR	NRSRAPID	3	1	1	0.08	55453.22

Template

Slit	Subarray
S200A1	SUBS200A1

Dithers

#	Primary Dither Positions	Sub-Pixel Pattern
1	3	SPECTRAL

Spectral Elements

#	Grating/Filter	Slit	Readout Pattern	Groups/Int	Integrations/Exp	#	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395H/F290LP	S200A1	NRSRAPID	4	2	1	NONE	9	18	140.589	81792.30

Observation

Proposal 2053, Observation 2: HD 156623 - 1

Fri Mar 03 01:00:30 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec Fixed Slit Spectroscopy

Diagnostics

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(2)	HD-156623	RA: 17 20 50.5958 (260.2108158d) Dec: -45 25 15.62 (-45.42101d) Equinox: J2000	Proper Motion RA: -0.0013550993226748161 sec of time/yr Proper Motion Dec: -0.040128999899025075 arcsec/yr Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[A stars, Circumstellar disks, Circumstellar dust, Circumstellar gas]
Extended=NO

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	10 TAHD156623	WATA	SUB32	F110W	NRSRAPID	3	1	1	0.08	55453.25

Template

Slit	Subarray
S200A1	SUBS200A1

Dithers

#	Primary Dither Positions	Sub-Pixel Pattern
1	3	SPECTRAL

Spectral Elements

#	Grating/Filter	Slit	Readout Pattern	Groups/Int	Integrations/Exp	#	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395H/F290LP	S200A1	NRSRAPID	3	2	1	NONE	9	18	112.545	81792.31

Observation

Proposal 2053, Observation 102: HD 156623 - 1

Fri Mar 03 01:00:30 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec Fixed Slit Spectroscopy

Diagnostics

(Visit 102:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(2)	HD-156623	RA: 17 20 50.5958 (260.2108158d) Dec: -45 25 15.62 (-45.42101d) Equinox: J2000	Proper Motion RA: -0.0013550993226748161 sec of time/yr Proper Motion Dec: -0.040128999899025075 arcsec/yr Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[A stars, Circumstellar disks, Circumstellar dust, Circumstellar gas]
Extended=NO

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	10 TAHD156623	WATA	SUB32	F110W	NRSRAPID	3	1	1	0.08	55453.25

Template

Slit	Subarray
S200A1	SUBS200A1

Dithers

#	Primary Dither Positions	Sub-Pixel Pattern
1	3	SPECTRAL

Spectral Elements

#	Grating/Filter	Slit	Readout Pattern	Groups/Int	Integrations/Exp	#	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395H/F290LP	S200A1	NRSRAPID	3	2	1	NONE	9	18	112.545	81792.31

Observation

Proposal 2053, Observation 3: HD 131488 - 1

Fri Mar 03 01:00:30 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec Fixed Slit Spectroscopy

Diagnostics

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	HD-131488	RA: 14 55 8.0036 (223.7833483d) Dec: -41 07 13.75 (-41.12049d) Equinox: J2000	Proper Motion RA: -0.0016065593845063372 sec of time/yr Proper Motion Dec: -0.022292999983619666 arcsec/yr Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[A stars, Circumstellar disks, Circumstellar dust, Circumstellar gas]
Extended=NO

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	8 TAHD131488	WATA	SUB32	F110W	NRSRAPID	3	1	1	0.08	55453.23

Template

Slit	Subarray
S200A1	SUBS200A1

Dithers

#	Primary Dither Positions	Sub-Pixel Pattern
1	3	SPECTRAL

Spectral Elements

#	Grating/Filter	Slit	Readout Pattern	Groups/Int	Integrations/Exp	#	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395H/F290LP	S200A1	NRSRAPID	8	2	1	NONE	9	18	252.765	81792.32

Observation

Proposal 2053, Observation 4: HD 131835 - 1

Fri Mar 03 01:00:30 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec Fixed Slit Spectroscopy

Diagnostics

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(4)	HD-131835	RA: 14 56 54.4380 (224.2268250d) Dec: -35 41 44.05 (-35.69557d) Equinox: J2000	Proper Motion RA: -0.001916527199376664 sec of time/yr Proper Motion Dec: -0.024943000062194187 arcsec/yr Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[A stars, Circumstellar disks, Circumstellar dust, Circumstellar gas]
Extended=NO

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	9 TAHD131835	WATA	SUB32	CLEAR	NRSRAPID	3	1	1	0.08	55453.24

Template

Slit	Subarray
S200A1	SUBS200A1

Dithers

#	Primary Dither Positions	Sub-Pixel Pattern
1	3	SPECTRAL

Spectral Elements

#	Grating/Filter	Slit	Readout Pattern	Groups/Int	Integrations/Exp	#	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395H/F290LP	S200A1	NRSRAPID	6	2	1	NONE	9	18	196.677	81792.33

Observation

Proposal 2053, Observation 5: HD 36546 - 1

Fri Mar 03 01:00:30 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec Fixed Slit Spectroscopy

Diagnostics

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(5)	HD-36546	RA: 05 33 30.7672 (83.3781967d) Dec: +24 37 43.09 (24.62864d) Equinox: J2000	Proper Motion RA: 5.427775933555078E-4 sec of time/yr Proper Motion Dec: -0.04151099994942342 arcsec/yr Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[A stars, Circumstellar disks, Circumstellar dust, Circumstellar gas]
Extended=NO

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	6 TAHD36546	WATA	SUB32	F110W	NRSRAPID	3	1	1	0.08	55453.21

Template

Slit	Subarray
S200A1	SUBS200A1

Dithers

#	Primary Dither Positions	Sub-Pixel Pattern
1	3	SPECTRAL

Spectral Elements

#	Grating/Filter	Slit	Readout Pattern	Groups/Int	Integrations/Exp	#	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395H/F290LP	S200A1	NRSRAPID	3	2	1	NONE	9	18	112.545	81792.34