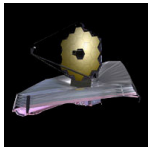

1206 - Extreme Debris Disks and Disk Variability

Cycle: 1, Proposal Category: GTO

INVESTIGATORS

Name	*Institution*
Dr. George Rieke (PI)	**University of Arizona**
Dr. Kate Y.L Su (CoI)	Space Science Institute

OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1	MRS-ID8	MIRI Medium Resolution Spectroscopy	(1) NGC2547-ID8
	8	MRS-ID8	MIRI Medium Resolution Spectroscopy	(1) NGC2547-ID8
	10	MRS-ID8	MIRI Medium Resolution Spectroscopy	(8) NGC2547-ID8-dr3
	2	MRS-V488PER	MIRI Medium Resolution Spectroscopy	(2) V-V488-PER
	11	MRS-V488PER Repeat of observation 2	MIRI Medium Resolution Spectroscopy	(7) V-V488-Per-dr3
	9	MRS-V488PER	MIRI Medium Resolution Spectroscopy	(2) V-V488-PER
	3	MRS-HD23514	MIRI Medium Resolution Spectroscopy	(3) HD-23514
	6	MRS-HD15407	MIRI Medium Resolution Spectroscopy	(6) HD-15407

ABSTRACT

"Extreme debris disks" refers to a class of the planetary debris disks with excesses at 24 microns by at least a factor of four over the photospheric outputs of their stars. Some extreme debris disks are known to have variable emission over timescales of order 1 year and shorter, even a month or less. In general, these systems have strong mineralogical features in their mid-infrared spectra, indicative of very finely divided dust that must be generated continuously to replace that lost by stellar radiation pressure. It is difficult to explain the very rapid variability of these sources and the transient dust lifetimes without invoking condensation of finely divided grains from silica gas. In fact, a sub-class of extreme debris systems shows

solid state features in mid-infrared spectra showing the presence of fine silica (not silicate) dust, evidence for condensation from the gas, and perhaps even for the silica gas itself. Such gas is expected to be a product of high-speed collisions between relatively large planetesimals. Where multi-epoch spectra are available, they usually do not show variability in the spectral features despite the dramatic photometric variations, but high signal to noise spectra are needed to probe this question by comparison with the archival Spitzer IRS spectra. In addition, the improved spectral resolution of the new observations will aid in diagnosing the mineralogy of the dust. The goal of our program (ID 1206) is to obtain high signal to noise MIRI spectra of seven selected objects showing signs of extreme collisions that may trace the progress of terrestrial planet building.

OBSERVING DESCRIPTION

The goal of our program is to obtain high signal to noise MIRI spectra of selected objects showing signs of extreme collisions that may trace the progress of terrestrial planet building. The sources are relatively bright and the spectra will be obtained quickly. To give an example, one of the highest priority targets, ID8 in NGC 2547, observed for half an hour in each of the three grating settings of the MRS, would be measured across its 10 micron spectral feature at a signal to noise ratio > 1000, and across its 16-20 micron feature at a SNR > 100 (or > 500 smoothed to the equivalent resolution of the Spitzer spectrum). These spectra will in general be the first since the cold Spitzer mission and can be used to search for even very low-level spectral variability. They also will provide much higher spectral resolution than the Spitzer IRS spectra so it may be possible to identify the compositions of the materials participating in the collisions around these stars more accurately. Together with our ongoing monitoring of the variations with warm Spitzer and the roughly 15 year baseline between mid-infrared spectra, we should be able to determine key parameters of these systems, including the rate of large collisions, the clearing time for the debris produced, and the mechanisms for producing the debris. A final set of seven targets has been selected for MIRI based on the results of our time-series observations with warm Spitzer and groundbased photometry and spectroscopy in the 10 micron atmospheric window using COMICS on the Subaru Telescope. They are: ID8 in NGC2547, HD 15407A, HD 23514, and V488 Per.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	NGC2547-ID8	RA: 08 09 2.5020 (122.2604250d) Dec: -48 58 17.26 (-48.97146d) Equinox: J2000		
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=Star* *Description=[Circumstellar disks, Circumstellar dust, Debris disks]* *Extended=NO*				
(2)	V-V488-PER	RA: 03 28 18.6800 (52.0778333d) Dec: +48 39 48.20 (48.66339d) Equinox: J2000		
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=Star* *Description=[Circumstellar disks, Circumstellar dust, Debris disks]* *Extended=NO*				
(3)	HD-23514	RA: 03 46 38.3922 (56.6599675d) Dec: +22 55 11.20 (22.91978d) Equinox: J2000	Proper Motion RA: 19.924 mas/yr Proper Motion Dec: -43.5489999517813 mas/yr Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=Star* *Description=[Circumstellar disks, Circumstellar dust, Debris disks]* *Extended=NO*				
(6)	HD-15407	RA: 02 30 50.6560 (37.7110667d) Dec: +55 32 54.26 (55.54841d) Equinox: J2000	Proper Motion RA: 81.433 mas/yr Proper Motion Dec: -95.58099995956582 mas/yr Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=Star* *Description=[Circumstellar disks, Circumstellar dust, Debris disks]* *Extended=NO*				
(7)	V-V488-Per-dr3	RA: 03 28 18.6830 (52.0778458d) Dec: +48 39 48.19 (48.66339d) Equinox: J2000	Proper Motion RA: 23.37 mas/yr Proper Motion Dec: -25.878999986161944 mas/yr Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=Star* *Description=[Circumstellar disks, Circumstellar dust, Debris disks]*				
(8)	NGC2547-ID8-dr3	RA: 08 09 2.5064 (122.2604433d) Dec: -48 58 17.29 (-48.97147d) Equinox: J2000	Proper Motion RA: -12.003 mas/yr Proper Motion Dec: 10.021 mas/yr Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=Star* *Description=[Circumstellar disks, Circumstellar dust, Debris disks]*				

Observation

Proposal 1206, Observation 1: MRS-ID8 Tue Sep 05 17:00:45 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Comments: We request three observations for ID8 taken as sequence through observation links: Obs 8 should be taken within 60-150 days from Obs 1, and Obs 10 should be taken within 365-400 days from Obs 1. The first observation need to be taken as soon as the object's visibility window opens.

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)	NGC2547-ID8	RA: 08 09 2.5020 (122.2604250d) Dec: -48 58 17.26 (-48.97146d) Equinox: J2000		

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

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
F560W	All MRS	NO	FULL	NEUTRAL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	LONG(C)	MRSLONG		FASTR1	80	1	1	Dither 1	4	4	888.013	
1	LONG(C)	MRSSHORT		FASTR1	80	1	1	Dither 1	4	4	888.013	
2	MEDIUM(B)	MRSLONG		FASTR1	80	1	1	Dither 1	4	4	888.013	
2	MEDIUM(B)	MRSSHORT		FASTR1	80	1	1	Dither 1	4	4	888.013	
3	SHORT(A)	MRSLONG		FASTR1	80	1	1	Dither 1	4	4	888.013	
3	SHORT(A)	MRSSHORT		FASTR1	80	1	1	Dither 1	4	4	888.013	

Special Requirements	
	8 After 1 by 60 Days to 150 Days 10 After 1 by 365 Days to 400 Days

Observation

Proposal 1206, Observation 8: MRS-ID8 Tue Sep 05 17:00:45 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Comments: second observation to be taken within 60-150 days of the first observation (MRS-ID8 Obs1)

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
(1)	NGC2547-ID8	RA: 08 09 2.5020 (122.2604250d) Dec: -48 58 17.26 (-48.97146d) Equinox: J2000		

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

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
F560W	All MRS	NO	FULL	NEUTRAL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	LONG(C)	MRSLONG		FASTR1	80	1	1	Dither 1	4	4	888.013	
1	LONG(C)	MRSSHORT		FASTR1	80	1	1	Dither 1	4	4	888.013	
2	MEDIUM(B)	MRSLONG		FASTR1	80	1	1	Dither 1	4	4	888.013	
2	MEDIUM(B)	MRSSHORT		FASTR1	80	1	1	Dither 1	4	4	888.013	
3	SHORT(A)	MRSLONG		FASTR1	80	1	1	Dither 1	4	4	888.013	
3	SHORT(A)	MRSSHORT		FASTR1	80	1	1	Dither 1	4	4	888.013	

Special Requirements	8 After 1 by 60 Days to 150 Days

Observation

Proposal 1206, Observation 10: MRS-ID8 Tue Sep 05 17:00:45 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Comments: third observation to be taken within 365 to 400 days from Obs 1.

Diagnostics

(Visit 10:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(8)	NGC2547-ID8-dr3	RA: 08 09 2.5064 (122.2604433d)	Proper Motion RA: -12.003 mas/yr	
		Dec: -48 58 17.29 (-48.97147d)	Proper Motion Dec: 10.021 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Circumstellar disks, Circumstellar dust, Debris disks]

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
F560W	All MRS	NO	FULL	NEUTRAL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SHORT(A)	MRSLONG		FASTR1	80	1	1	Dither 1	4	4	888.013	
1	SHORT(A)	MRSSHORT		FASTR1	80	1	1	Dither 1	4	4	888.013	
2	MEDIUM(B)	MRSLONG		FASTR1	80	1	1	Dither 1	4	4	888.013	
2	MEDIUM(B)	MRSSHORT		FASTR1	80	1	1	Dither 1	4	4	888.013	
3	LONG(C)	MRSLONG		FASTR1	80	1	1	Dither 1	4	4	888.013	
3	LONG(C)	MRSSHORT		FASTR1	80	1	1	Dither 1	4	4	888.013	

Special Requirements	10 After 1 by 365 Days to 400 Days

Observation

Proposal 1206, Observation 2: MRS-V488PER Tue Sep 05 17:00:45 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Comments: This observation need to be taken as soon as the object's visibility window opens.

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)	V-V488-PER	RA: 03 28 18.6800 (52.0778333d) Dec: +48 39 48.20 (48.66339d) Equinox: J2000		

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

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
FND	All MRS	NO	FULL	NEUTRAL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	LONG(C)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
1	LONG(C)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	
2	MEDIUM(B)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
2	MEDIUM(B)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	
3	SHORT(A)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
3	SHORT(A)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	

Special Requirements	9 After 2 by 180 Days to 400 Days

Observation

Proposal 1206, Observation 11: MRS-V488PER Repeat of observation 2 Tue Sep 05 17:00:45 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Comments: This observation need to be taken as soon as the object's visibility window opens.

Diagnostics

(Visit 11:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 11:1) Informational (Form): Visit schedulable, but most scheduling windows are when JWST is pointed in direction of greatest micrometeoroid impact risk. This is likely due to scheduling special requirements.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(7)	V-V488-Per-dr3	RA: 03 28 18.6830 (52.0778458d)	Proper Motion RA: 23.37 mas/yr	
		Dec: +48 39 48.19 (48.66339d)	Proper Motion Dec: -25.878999986161944 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Circumstellar disks, Circumstellar dust, Debris disks]

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
FND	All MRS	NO	FULL	NEUTRAL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	LONG(C)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
1	LONG(C)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	
2	MEDIUM(B)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
2	MEDIUM(B)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	
3	SHORT(A)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
3	SHORT(A)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	

Special Requirements	Between Dates 17-FEB-2024:00:00:00 and 24-SEP-2024:00:00:00

Observation

Proposal 1206, Observation 9: MRS-V488PER Tue Sep 05 17:00:45 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Comments: 2nd observation taken within 180-400 days from Obs 2.

Diagnostics

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(2)	V-V488-PER	RA: 03 28 18.6800 (52.0778333d) Dec: +48 39 48.20 (48.66339d) Equinox: J2000		

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

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
FND	All MRS	NO	FULL	NEUTRAL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	LONG(C)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
1	LONG(C)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	
2	MEDIUM(B)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
2	MEDIUM(B)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	
3	SHORT(A)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
3	SHORT(A)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	

Special Requirements	9 After 2 by 180 Days to 400 Days

Observation

Proposal 1206, Observation 3: MRS-HD23514 Tue Sep 05 17:00:45 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Comments: This observation need to be taken as soon as the object's visibility window opens.

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-23514	RA: 03 46 38.3922 (56.6599675d)	Proper Motion RA: 19.924 mas/yr	
		Dec: +22 55 11.20 (22.91978d)	Proper Motion Dec: -43.5489999517813 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

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

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
FND	All MRS	NO	FULL	NEUTRAL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	LONG(C)	MRSLONG		FASTR1	12	1	1	Dither 1	4	4	133.202	
1	LONG(C)	MRSSHORT		FASTR1	12	1	1	Dither 1	4	4	133.202	
2	MEDIUM(B)	MRSLONG		FASTR1	12	1	1	Dither 1	4	4	133.202	
2	MEDIUM(B)	MRSSHORT		FASTR1	12	1	1	Dither 1	4	4	133.202	
3	SHORT(A)	MRSLONG		FASTR1	12	1	1	Dither 1	4	4	133.202	
3	SHORT(A)	MRSSHORT		FASTR1	12	1	1	Dither 1	4	4	133.202	

Observation

Proposal 1206, Observation 6: MRS-HD15407 Tue Sep 05 17:00:45 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Comments: This observation need to be taken as soon as the object's visibility window opens.

Diagnostics

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(6)	HD-15407	RA: 02 30 50.6560 (37.7110667d)	Proper Motion RA: 81.433 mas/yr	
		Dec: +55 32 54.26 (55.54841d)	Proper Motion Dec: -95.58099995956582 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

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

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
FND	All MRS	NO	FULL	NEUTRAL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	LONG(C)	MRSLONG		FASTR1	10	1	1	Dither 1	4	4	111.002	
1	LONG(C)	MRSSHORT		FASTR1	10	1	1	Dither 1	4	4	111.002	
2	MEDIUM(B)	MRSLONG		FASTR1	10	1	1	Dither 1	4	4	111.002	
2	MEDIUM(B)	MRSSHORT		FASTR1	10	1	1	Dither 1	4	4	111.002	
3	SHORT(A)	MRSLONG		FASTR1	10	1	1	Dither 1	4	4	111.002	
3	SHORT(A)	MRSSHORT		FASTR1	10	1	1	Dither 1	4	4	111.002	