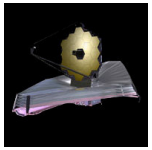

5279 - PAHSPECS: An Unbiased Study of PAHs at Cosmic Noon

Cycle: 3, Proposal Category: GO

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
ASPECS z~1.1				
	1	ASPECS-G1	MIRI Medium Resolution Spectroscopy	(1) Group PAHSPECSG1
	5	ASPECS-11	MIRI Medium Resolution Spectroscopy	(4) ASPECS-11
	2	ASPECS-6-BKG	MIRI Medium Resolution Spectroscopy	(8) ASPECS-6-BKG

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
	3	ASPECS-G2	MIRI Medium Resolution Spectroscopy	(2) Group PAHSPECSG2
	4	ASPECS-C20	MIRI Medium Resolution Spectroscopy	(7) ASPECS-C20

ABSTRACT

The physical conditions of the interstellar medium (ISM), out of which stars form in galaxies, are thought to differ greatly in high-redshift environments compared to those in the local universe. As the majority of stars seen in today's universe were formed at redshifts z~1-2, it is crucial to fully characterize the prevalent ISM conditions at those redshifts ('cosmic noon'). Recently, ALMA has made significant progress by providing a first unbiased census of the cold molecular gas and dust continuum emission in galaxies in the Hubble Ultra-Deep Field. These galaxies have the deepest observations available from the X-ray (traced by Chandra) through the rest-frame UV (traced by HST) and near- and mid-IR (traced by JWST), to the millimter regime (traced by ALMA). Currently unexplored are the PAHs in these galaxies, a crucial component and key diagnostic of the ISM, in particular regarding its thermal and chemical balance. Using the unparalleled capabilities of JWST, we propose to quantify this missing component (i.e., the PAH features at 3.3, 7.7 and 11.3 micron) with the MIRI MRS in an ALMA-selected galaxy sample at z~1 to measure how the PAH band ratios and mass fractions differ from those found in the local universe. Complementing tremendous JWST GTO efforts in the HUDF (that do not include MIRI MRS observations), the proposed data will provide a legacy dataset of star-forming galaxies at the peak of cosmic star formation.

OBSERVING DESCRIPTION

We request MIRI MRS observations in all wavelength bands (all three sub-bands in the four channels, 5-28 micron). The goal of the program is to measure the intensity of multiple PAH features and their underlying continuum emission for an unbiased sample of 5 galaxies at z~1 with IR luminosities in the range of log(L(IR)/Lsun)~11.0-11.7. The sample is selected from deep ALMA maps of the ASPECS survey in HUDF.

To make the most efficient use of the telescope time, we decided that only the gratings that include the 3.3 and 11.3micron PAH features (gratings C and B, respectively) require long exposures, as these two PAH features have low equivalent width. Therefore, grating A, which contains the 6.3micron feature only, has 1/4th of the exposure time of gratings B and C. All sources have the same exposure times as they are similar in surface brightness, except for source 3mm.11, which is the faintest one and has 1.4 times longer exposures.

Due to data volume and rate issues, observations will be done in SLOWR1 readout mode. Simultaneous MIRI imaging is set up to improve the astrometric solution of individual MRS exposures. Our observations require dedicated background observations to ensure proper background subtraction. To make the observations most efficient while not compromizing the success of data reduction, we matched the backgorund observations

in number of groups and integration, but with 2 dithers. All of our targets are within 1-1.5 arcmin of each other, so after coordination with the HelpDesk, we made one Target Group consisting of 2 objects and 3 stand-alone target (because observations are long we could not fit all the targets in the Groups) and we requested a Special Requirement to observe all of these within 1 day of each other so that a single background observation can be used for all. This is approved with the HelpDesk as the best strategy for this setup.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	Group PAHSPECSG1			
Comments: *Target Selection=[3 ASPECS-6]*				
(2)	Group PAHSPECSG2			
Comments: *Target Selection=[5 ASPECS-14, 6 ASPECS-15]*				
(3)	ASPECS-6	RA: 03 32 39.8700 (53.1661250d) Dec: -27 47 15.20 (-27.78756d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[Infrared galaxies, Starburst galaxies]*				
(4)	ASPECS-11	RA: 03 32 39.8100 (53.1658750d) Dec: -27 46 53.50 (-27.78153d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[Infrared galaxies, Starburst galaxies]*				
(5)	ASPECS-14	RA: 03 32 34.8500 (53.1452083d) Dec: -27 46 40.60 (-27.77794d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[Infrared galaxies, Starburst galaxies]*				
(6)	ASPECS-15	RA: 03 32 36.4800 (53.1520000d) Dec: -27 46 31.80 (-27.77550d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[Infrared galaxies, Starburst galaxies]*				
(7)	ASPECS-C20	RA: 03 32 35.7700 (53.1490417d) Dec: -27 46 27.60 (-27.77433d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[Infrared galaxies, Starburst galaxies]*				
(8)	ASPECS-6-BKG	RA: 03 32 32.6953 (53.1362304d) Dec: -27 46 19.19 (-27.77200d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[Infrared galaxies, Starburst galaxies]*				

Observation

Proposal 5279, Observation 1: ASPECS-G1 Mon Sep 16 17:00:36 GMT 2024

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observations:[ASPECS-6-BKG (Obs 2)]

Diagnostics

(ASPECS-G1 (Obs 1)) Warning (Form): Imager Filter overlap.

(ASPECS-G1 (Obs 1)) Warning (Form): Imager Filter overlap.

(ASPECS-G1 (Obs 1)) Warning (Form): Imager Filter overlap.

(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)	Group PAHSPECSG1			

Comments:
Target Selection=[3 ASPECS-6]

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
F560W	All MRS	YES	FULL	Allow Auto Reorder

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	EXTENDED 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		IMAGER	F1500W	SLOWR1	15	2	1	Dither 1	4	8	2962.35	
1	SHORT(A)	MRSLONG		SLOWR1	15	2	1	Dither 1	4	8	2962.35	
1	SHORT(A)	MRSSHORT		SLOWR1	15	2	1	Dither 1	4	8	2962.35	
2		IMAGER	F1500W	SLOWR1	20	6	1	Dither 1	4	24	11944.96	
2	MEDIUM(B)	MRSLONG		SLOWR1	20	6	1	Dither 1	4	24	11944.96	
2	MEDIUM(B)	MRSSHORT		SLOWR1	20	6	1	Dither 1	4	24	11944.96	
3		IMAGER	F1500W	SLOWR1	20	5	1	Dither 1	4	20	9938.207	
3	LONG(C)	MRSLONG		SLOWR1	20	5	1	Dither 1	4	20	9938.207	
3	LONG(C)	MRSSHORT		SLOWR1	20	5	1	Dither 1	4	20	9938.207	

Special Requirements	
	Aperture PA Range 307.0 to 8.0 Degrees (V3 307.0 to 8.0) Sequence Observations 1, 2, Non-interruptible

Observation

Proposal 5279, Observation 5: ASPECS-11 Mon Sep 16 17:00:36 GMT 2024

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Diagnostics

(ASPECS-11 (Obs 5)) Warning (Form): Imager Filter overlap.

(ASPECS-11 (Obs 5)) Warning (Form): Imager Filter overlap.

(ASPECS-11 (Obs 5)) Warning (Form): Imager Filter overlap.

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(4)	ASPECS-11	RA: 03 32 39.8100 (53.1658750d) Dec: -27 46 53.50 (-27.78153d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Infrared galaxies, Starburst galaxies]

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
F560W	All MRS	YES	FULL	Allow Auto Reorder

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	EXTENDED 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		IMAGER	F1500W	SLOWR1	15	2	1	Dither 1	4	8	2962.35	
1	SHORT(A)	MRSLONG		SLOWR1	15	2	1	Dither 1	4	8	2962.35	
1	SHORT(A)	MRSSHORT		SLOWR1	15	2	1	Dither 1	4	8	2962.35	
2		IMAGER	F1500W	SLOWR1	20	6	1	Dither 1	4	24	11944.96	
2	MEDIUM(B)	MRSLONG		SLOWR1	20	6	1	Dither 1	4	24	11944.96	
2	MEDIUM(B)	MRSSHORT		SLOWR1	20	6	1	Dither 1	4	24	11944.96	
3		IMAGER	F1500W	SLOWR1	20	9	1	Dither 1	4	36	17965.22	
3	LONG(C)	MRSLONG		SLOWR1	20	9	1	Dither 1	4	36	17965.22	
3	LONG(C)	MRSSHORT		SLOWR1	20	9	1	Dither 1	4	36	17965.22	

Special Requirements	
	Aperture PA Range 307.0 to 8.0 Degrees (V3 307.0 to 8.0) Group Observations 2, 5 within 1 Days

Observation

Proposal 5279, Observation 2: ASPECS-6-BKG Mon Sep 16 17:00:36 GMT 2024

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observation For: []

Diagnostics

(ASPECS-6-BKG (Obs 2)) Warning (Form): Imager Filter overlap.

(ASPECS-6-BKG (Obs 2)) Warning (Form): Imager Filter overlap.

(ASPECS-6-BKG (Obs 2)) Warning (Form): Imager Filter overlap.

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(8)	ASPECS-6-BKG	RA: 03 32 32.6953 (53.1362304d) Dec: -27 46 19.19 (-27.77200d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Infrared galaxies, Starburst galaxies]

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
F560W	All MRS	YES	FULL	Allow Auto Reorder

Dithers

#	Dither Type	Optimized For	Direction
1	2-Point	EXTENDED 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		IMAGER	F1500W	SLOWR1	15	2	1	Dither 1	2	4	1481.175	
1	SHORT(A)	MRSLONG		SLOWR1	15	2	1	Dither 1	2	4	1481.175	
1	SHORT(A)	MRSSHORT		SLOWR1	15	2	1	Dither 1	2	4	1481.175	
2		IMAGER	F1500W	SLOWR1	20	6	1	Dither 1	2	12	5972.48	
2	MEDIUM(B)	MRSLONG		SLOWR1	20	6	1	Dither 1	2	12	5972.48	
2	MEDIUM(B)	MRSSHORT		SLOWR1	20	6	1	Dither 1	2	12	5972.48	
3		IMAGER	F1500W	SLOWR1	20	9	1	Dither 1	2	18	8982.61	
3	LONG(C)	MRSLONG		SLOWR1	20	9	1	Dither 1	2	18	8982.61	
3	LONG(C)	MRSSHORT		SLOWR1	20	9	1	Dither 1	2	18	8982.61	

Special Requirements	
	Sequence Observations 1, 2, Non-interruptible Group Observations 2, 3 within 1 Days Group Observations 2, 4 within 1 Days Group Observations 2, 5 within 1 Days

Observation

Proposal 5279, Observation 3: ASPECS-G2 Mon Sep 16 17:00:36 GMT 2024

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Diagnostics

(ASPECS-G2 (Obs 3)) Warning (Form): Imager Filter overlap.

(ASPECS-G2 (Obs 3)) Warning (Form): Imager Filter overlap.

(ASPECS-G2 (Obs 3)) Warning (Form): Imager Filter overlap.

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(2)	Group PAHSPECSG2			

Comments:
Target Selection=[5 ASPECS-14, 6 ASPECS-15]

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
F560W	All MRS	YES	FULL	Allow Auto Reorder

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	EXTENDED 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		IMAGER	F1500W	SLOWR1	15	2	1	Dither 1	4	8	2962.35	
1	SHORT(A)	MRSLONG		SLOWR1	15	2	1	Dither 1	4	8	2962.35	
1	SHORT(A)	MRSSHORT		SLOWR1	15	2	1	Dither 1	4	8	2962.35	
2		IMAGER	F1500W	SLOWR1	20	6	1	Dither 1	4	24	11944.96	
2	MEDIUM(B)	MRSLONG		SLOWR1	20	6	1	Dither 1	4	24	11944.96	
2	MEDIUM(B)	MRSSHORT		SLOWR1	20	6	1	Dither 1	4	24	11944.96	
3		IMAGER	F1500W	SLOWR1	20	5	1	Dither 1	4	20	9938.207	
3	LONG(C)	MRSLONG		SLOWR1	20	5	1	Dither 1	4	20	9938.207	
3	LONG(C)	MRSSHORT		SLOWR1	20	5	1	Dither 1	4	20	9938.207	

Special Requirements	
	Aperture PA Range 307.0 to 8.0 Degrees (V3 307.0 to 8.0) Group Observations 2, 3 within 1 Days

Observation

Proposal 5279, Observation 4: ASPECS-C20 Mon Sep 16 17:00:36 GMT 2024

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Diagnostics

(ASPECS-C20 (Obs 4)) Warning (Form): Imager Filter overlap.

(ASPECS-C20 (Obs 4)) Warning (Form): Imager Filter overlap.

(ASPECS-C20 (Obs 4)) Warning (Form): Imager Filter overlap.

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(7)	ASPECS-C20	RA: 03 32 35.7700 (53.1490417d) Dec: -27 46 27.60 (-27.77433d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Infrared galaxies, Starburst galaxies]

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
F560W	All MRS	YES	FULL	Allow Auto Reorder

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	EXTENDED 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		IMAGER	F1500W	SLOWR1	15	2	1	Dither 1	4	8	2962.35	
1	SHORT(A)	MRSLONG		SLOWR1	15	2	1	Dither 1	4	8	2962.35	
1	SHORT(A)	MRSSHORT		SLOWR1	15	2	1	Dither 1	4	8	2962.35	
2		IMAGER	F1500W	SLOWR1	20	6	1	Dither 1	4	24	11944.96	
2	MEDIUM(B)	MRSLONG		SLOWR1	20	6	1	Dither 1	4	24	11944.96	
2	MEDIUM(B)	MRSSHORT		SLOWR1	20	6	1	Dither 1	4	24	11944.96	
3		IMAGER	F1500W	SLOWR1	20	5	1	Dither 1	4	20	9938.207	
3	LONG(C)	MRSLONG		SLOWR1	20	5	1	Dither 1	4	20	9938.207	
3	LONG(C)	MRSSHORT		SLOWR1	20	5	1	Dither 1	4	20	9938.207	

Special Requirements	
	Aperture PA Range 307.0 to 8.0 Degrees (V3 307.0 to 8.0) Group Observations 2, 4 within 1 Days