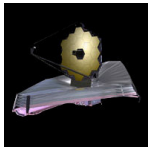

2511 - How Do the Small Survive: PAH's in Low Metallicity Starburst II Zw 40

Cycle: 1, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
II Zw 40 NIRSpec IFU				
	1	II Zw 40 NIRSpec IFU	NIRSpec IFU Spectroscopy	(1) UGCA-116-NIRSPEC
II Zw 40 MIRI IFU				
	2	II Zw 40 MIRI Sci	MIRI Medium Resolution Spectroscopy	(2) UGCA-116-MIRI-SCI
	3	II Zw 40 MIRI bkg	MIRI Medium Resolution Spectroscopy	(3) UGCA-116-MIRI-BACKGROUND

ABSTRACT

We propose to explore the properties of small dust grains in a prototypical blue compact dwarf II Zw 40 using a single pointing of the NIRSpec and MIRI IFUs. II Zw 40 has been found to exhibit strong 3.3 micron emission powered by the smallest polycyclic aromatic hydrocarbons. This

challenges the prevailing theory that small and fragile grains are to be suppressed in low-metallicity galaxies due to the penetrating UV radiation. We will directly investigate how PAH size distribution and ionization state connect with the hardness of the radiation field in a compact starbursting region in II Zw 40, with a spatial resolution of 5 pc offered by the IFU. To study the life cycle of dust in metal-poor galaxies, we will measure the relative abundance of the dust in aromatic and aliphatic forms to understand the formation and destruction process of dust near the star-formation site. Further, the gas-to-dust ratio varies substantially in low-metallicity environments. With the mid-infrared H2 rotational lines, the total molecular gas mass can be estimated independently, without using CO line emission. Comparing our results with the available ALMA CO observations can provide insights into the variation of the H2-to-CO conversion factor in II Zw 40.

OBSERVING DESCRIPTION

We propose NIRSpec and MIRI IFU single pointing observations in the center of II Zw 40, including both star clusters - SSC-N and SSC-S.

For NIRSpec IFU, we propose to use both the G235M/F170LP and G395M/F290LP gratings to cover the wavelength of 1.66-5.1 um. 4-point-dither is used to achieve a better sampling. Since the background is low, we do not propose “off” observation, but we will obtain “leakcals” for both gratings with only the first dither position to correct the MSA leakage.

We match MIRI's coverage to NIRSpec with a 4-point dither in all four channels. An off-galaxy observation with the same depth and dither pattern has been proposed. During the acquisition of background, we will simultaneously obtain MIRI Imager observations using F770W, F1130W, and F2100W filters. While observing with MIRI Imager, to avoid bright sources in the MRS field of view, it requires constraining the Imager aperture PA range 0-292 degree. The background observation and the primary science target has also been grouped to ensure the two observations are uninterruptible.

The total time requested is 4.19 hours with 1.09 in science time.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	UGCA-116-NIRSPEC	RA: 05 55 42.6375 (88.9276562d) Dec: +03 23 30.99 (3.39194d) Equinox: J2000	Epoch of Position: 2015.5	
Comments: This object was generated by the target selector and retrieved from the SIMBAD database. *Category=Galaxy* *Description=[Blue compact dwarf galaxies]* *Extended=YES*				
(2)	UGCA-116-MIRI-SCI	RA: 05 55 42.6375 (88.9276562d) Dec: +03 23 30.99 (3.39194d) Equinox: J2000	Epoch of Position: 2015.5	
Comments: This object was generated by the target selector and retrieved from the SIMBAD database. *Category=Galaxy* *Description=[Blue compact dwarf galaxies]* *Extended=YES*				
(3)	UGCA-116-MIRI-BACKGROUND	RA: 05 55 40.2915 (88.9178813d) Dec: +03 22 15.82 (3.37106d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[Compact dwarf galaxy]*				

Observation

Proposal 2511, Observation 1: II Zw 40 NIRSpec IFU

Thu Apr 20 00:00:28 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec IFU 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)	UGCA-116-NIRSPEC	RA: 05 55 42.6375 (88.9276562d) Dec: +03 23 30.99 (3.39194d) Equinox: J2000	Epoch of Position: 2015.5	

Comments: This object was generated by the target selector and retrieved from the SIMBAD database.
Category=Galaxy
Description=[Blue compact dwarf galaxies]
Extended=YES

Template

TA Method
NONE

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	4-POINT-DITHER				

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G235M/F170LP	NRSIRS2RAPID	18	1	false	true	NONE	4	4	1108.756	
2	G235M/F170LP	NRSIRS2RAPID	18	1	true	false	NONE	1	1	277.189	
3	G395M/F290LP	NRSIRS2RAPID	15	1	false	true	NONE	4	4	933.689	
4	G395M/F290LP	NRSIRS2RAPID	15	1	true	false	NONE	1	1	233.422	

Observation

Proposal 2511, Observation 2: II Zw 40 MIRI Sci Thu Apr 20 00:00:28 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observations:[II Zw 40 MIRI bkg (Obs 3)]

Diagnostics

(II Zw 40 MIRI Sci (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
(2)	UGCA-116-MIRI-SCI	RA: 05 55 42.6375 (88.9276562d) Dec: +03 23 30.99 (3.39194d) Equinox: J2000	Epoch of Position: 2015.5	

Comments: This object was generated by the target selector and retrieved from the SIMBAD database.
Category=Galaxy
Description=[Blue compact dwarf galaxies]
Extended=YES

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray
F560W	ALL	YES	FULL

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	F770W	FASTR1	25	1	1	Dither 1	4	4	277.504	
1	SHORT(A)	MRSLONG		FASTR1	25	1	1	Dither 1	4	4	277.504	53338
1	SHORT(A)	MRSSHORT		FASTR1	25	1	1	Dither 1	4	4	277.504	53338
2		IMAGER	F1130W	FASTR1	24	1	1	Dither 1	4	4	266.404	
2	MEDIUM(B)	MRSLONG		FASTR1	24	1	1	Dither 1	4	4	266.404	53338
2	MEDIUM(B)	MRSSHORT		FASTR1	24	1	1	Dither 1	4	4	266.404	53338
3		IMAGER	F2100W	FASTR1	20	1	1	Dither 1	4	4	222.003	
3	LONG(C)	MRSLONG		FASTR1	20	1	1	Dither 1	4	4	222.003	53338
3	LONG(C)	MRSSHORT		FASTR1	20	1	1	Dither 1	4	4	222.003	53338

Special Requirements	Sequence Observations 2, 3, Non-interruptible

Observation

Proposal 2511, Observation 3: II Zw 40 MIRI bkg Thu Apr 20 00:00:28 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observation For: [II Zw 40 MIRI Sci (Obs 2)]

Diagnostics

(II Zw 40 MIRI bkg (Obs 3)) Warning (Form): Imager Filter overlap.

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

(Visit 3:1) 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
(3)	UGCA-116-MIRI-BACKGROUND	RA: 05 55 40.2915 (88.9178813d) Dec: +03 22 15.82 (3.37106d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Compact dwarf galaxy]

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray
F560W	ALL	YES	FULL

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	F770W	FASTR1	25	1	1	Dither 1	4	4	277.504	
1	SHORT(A)	MRSLONG		FASTR1	25	1	1	Dither 1	4	4	277.504	53338
1	SHORT(A)	MRSSHORT		FASTR1	25	1	1	Dither 1	4	4	277.504	53338
2		IMAGER	F1130W	FASTR1	24	1	1	Dither 1	4	4	266.404	
2	MEDIUM(B)	MRSLONG		FASTR1	24	1	1	Dither 1	4	4	266.404	53338
2	MEDIUM(B)	MRSSHORT		FASTR1	24	1	1	Dither 1	4	4	266.404	53338
3		IMAGER	F2100W	FASTR1	20	1	1	Dither 1	4	4	222.003	
3	LONG(C)	MRSLONG		FASTR1	20	1	1	Dither 1	4	4	222.003	53338
3	LONG(C)	MRSSHORT		FASTR1	20	1	1	Dither 1	4	4	222.003	53338

Special Requirements	
	Aperture PA Range 243.7 to 269.7 Degrees (V3 243.7 to 269.7) Sequence Observations 2, 3, Non-interruptible