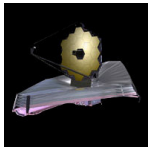

6751 - Resolving the early phase of co-evolution of galaxies and supermassive black holes within cosmic web filaments

Cycle: 3, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1	MIRI F770W (a)	MIRI Imaging	(1) ADF22a
	2	MIRI F770W (b)	MIRI Imaging	(2) ADF22b

ABSTRACT

The cosmic web filaments are thought to fuel galaxies and SMBHs and thus growing galaxies within a remarkable gas filament provides a unique laboratory. In this regard, invaluable targets have been discovered at a z=3.1 proto-cluster core. Numerous bright dusty star-forming galaxies (DSFGs), often hosting X-ray AGNs, are situated within Mpc-scale Lyman-alpha filaments. These findings reinforce the idea that the cosmic web plays a key role in fueling the high level activity. To delve deeper into the mechanisms driving the rapid concurrent growth of galaxies and SMBHs, two critical aspects remain unexplored: (a) detailed views on the gas kinematics within the host galaxy and (b) precise evaluations of the (obscured) AGN activity. Building on a successful pilot survey that revealed spiral arms, bar flows, and a bright dusty core in the brightest DSFG, we now propose (i) [CII] mapping at 0.15" resolution and (ii) JWST/MIRI imaging for the six brightest DSFGs. Leveraging extensive existing JWST/ALMA data, we aim to uncover the drivers behind intense starburst activity and elucidate how the co-evolution of galaxies and SMBHs unfolds during these early, obscured stages. (ALMA Cy11 ID: 2024.1.00335.S)

OBSERVING DESCRIPTION

We will observe 6 DSFGs with MIRI in the imaging mode. Our aim is to detect hot dust emission associated with AGN activity. For this, two MIRI filter bands are proposed - F770W and F2100W. For each, two fields are requested to cover the 6 targets in total. The highest spatial resolution F770W filter (0.25 arcsec or 2kpc) is key to measure the spatial transition between the rest-frame near-IR emission from stars and that from heated dust at high redshift. The 2100W filter is vital to detect or put a constraint on the hot dust associated with a various levels of AGN luminosity. The fiducial 4-point dither pattern is adopted to ensure optimal PSF reconstruction. On the FULL array, the FAST readout mode is used for the detector, with 43 groups and 4 integrations per dither point for the F770W exposures, and 25 groups and 8 integrations for the F2100W exposures, yielding 1900s and 2300s per pointing for F770W and F2100W, respectively. Here the reduced count rate is considered for F2100W observation. According to the JWST ETC, we will achieve a 5sigma point source limit of 25.0, and 22.4 for F770W and F2100W (AB mag). These are >1dex improvement compared to Spizter, and allows us to detect AGN component at mid-IR wavelengths above 5 sigma for the bright DSFGs (for a various range of AGN activity. cf: Scientific Justification).

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	ADF22a	RA: 22 17 33.7000 (334.3904167d) Dec: +00 17 48.80 (.29689d) Equinox: J2000		
Comments: *Category=Clusters of Galaxies* *Description=[High-redshift clusters]*				
(2)	ADF22b	RA: 22 17 33.7267 (334.3905279d) Dec: +00 15 58.20 (.26617d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[Active galactic nuclei, Starburst galaxies]*				

Observation

Proposal 6751, Observation 1: MIRI F770W (a)

Tue Sep 17 16:01:32 GMT 2024

Diagnostic Status: Warning

Observing Template: MIRI Imaging

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)	ADF22a	RA: 22 17 33.7000 (334.3904167d) Dec: +00 17 48.80 (.29689d) Equinox: J2000		

Comments:
Category=Clusters of Galaxies
Description=[High-redshift clusters]

Template

Subarray
FULL

Dithers

#	Dither Type	Starting Point	Number of Points	Points	Starting Set	Number of Sets	Optimized For	Direction	Pattern Size
1	4-Point-Sets				1	1	POINT SOURCE	POSITIVE	DEFAULT

Spectral Elements

#	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F770W	FASTR1	43	4	1	Dither 1	4	16	1942.528	
2	F2100W	FASTR1	25	8	1	Dither 1	4	32	2297.733	

Special Requirements

Aperture PA Range 70 to 85 Degrees (V3 65.16455103 to 80.16455103)
Aperture PA Range 240 to 250 Degrees (V3 235.16455103 to 245.16455103)

Observation

Proposal 6751, Observation 2: MIRI F770W (b)

Tue Sep 17 16:01:32 GMT 2024

Diagnostic Status: Warning

Observing Template: MIRI Imaging

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)	ADF22b	RA: 22 17 33.7267 (334.3905279d) Dec: +00 15 58.20 (.26617d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Active galactic nuclei, Starburst galaxies]

Template

Subarray
FULL

Dithers

#	Dither Type	Starting Point	Number of Points	Points	Starting Set	Number of Sets	Optimized For	Direction	Pattern Size
1	4-Point-Sets				1	1	POINT SOURCE	POSITIVE	DEFAULT

Spectral Elements

#	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F770W	FASTR1	43	4	1	Dither 1	4	16	1942.528	
2	F2100W	FASTR1	25	8	1	Dither 1	4	32	2297.733	

Special Requirements

Aperture PA Range 70 to 85 Degrees (V3 65.16455103 to 80.16455103)
Aperture PA Range 240 to 250 Degrees (V3 235.16455103 to 245.16455103)