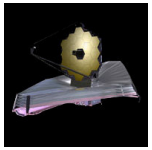

9412 - Uncovering the mechanim to form a gas-rich, super spiral at z=3

Cycle: 4, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1	A1	NIRSpec IFU Spectroscopy	(1) ADF22.A1

ABSTRACT

Models and simulations predict that streams of cool gas flowing along intergalactic medium filaments supply the bulk of the material required for the growth of galaxies and SMBHs. A key question is how galaxies acquire fuel and angular momentum from the cosmic web and transport them to their centers to trigger nuclear activity. However, in most cases, detailed observations of gas kinematics remain limited, hindering our ability to fully address this fundamental process.

Here we propose a joint ALMA and JWST observation of ADF22.A1 at z = 3.09, a giant spiral starburst galaxy hosting an X-ray AGN. We will

measure the metallicity gradient using JWST/NIRSpec-IFU to test whether a significant supply of pristine gas is being funneled from the cosmic web. We will also carry out [CII] 158um mapping at 500-pc resolution with ALMA Band-8 to trace the gas distribution and kinematics on the scale of the bar and the growing bulge. Combined with a dynamical estimate of bulge mass and a black hole mass measurement based on the H-alpha broad wing, these observations will offer novel insights into how the most active phases of galaxy and SMBH growth proceed within the cosmic web filaments.

OBSERVING DESCRIPTION

We propose NIRspec IFU spectroscopy of 6 dusty star-forming galaxies (DSFGs) at the core of the SSA22 proto-cluster. We will use the G235H grism and F170LP filter to map H-alpha and other key diagnostics lines.

This configuration enable us to observe a wavelength range of 1.66–3.07 m with nominal resolving power R=2700, and hence suitable to detect the H-alpha, H-beta, [OIII]4959, 5007, [NII]6548, 6584 lines simultaneously, with sufficient spectral resolution. We do not request target acquisition observation and adopt TA method=“VERIFY ONLY” since the original pointing accuracy for guide stars (about 0.1arcsec) is good enough for us. The verified image will be used to check the achieved astrometry for comparison with multi-wavelength data. We select 4-point CYCLING dither type with MEDIUM size to achieve good spatial sampling and cosmic-ray rejection. The exposures are configured with NRSIRS2 readout pattern, 23 groups, 1 integrations. This results in total exposure time of 6800s per field. We request 6 observations in total since we have 6 targets. We use a 2-point mosaic for one source which has a large disk.

Proposal 9412 - Targets - Uncovering the mechanim to form a gas-rich, super spiral at z=3

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	ADF22.A1	RA: 22 17 32.4100 (334.3850417d) Dec: +00 17 43.80 (.29550d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Starburst galaxies]

Observation

Proposal 9412, Observation 1: A1 Fri Aug 01 17:00:42 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Comments: The pointing coordinates have been slightly modified with respect to the brightest region/galaxy, to account for the whole morphology of the system.

Diagnostics

(A1 (Obs 1)) Warning (Form): Verification imaging with an ALLOPEN MSA configuration may cause persistence from bright sources in the field of view.

(A1 (Obs 1)) Warning (Form): WATA may be a better choice for more accurate placement in the IFU for point-like acquisition targets with positional uncertainty of 0.1 arcsec or less.

(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)	ADF22.A1	RA: 22 17 32.4100 (334.3850417d) Dec: +00 17 43.80 (.29550d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Starburst galaxies]

Template

TA Method	HFF Readout Mode
VERIFY_ONLY	false

Mosaic

Rows	Columns	Row Overlap %	Column Overlap %	Row shift (deg)	Column shift (deg)	Tile Order
1	2	26.316	57.895	-7.895	0.3	DEFAULT

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	MEDIUM	1	4	

Pointing Verification

#	PV MSA Configuration	Filter	PV Readout Pattern	PV Groups/Int	PV Integrations/Exp	PV Total Dithers	PV Total Integrations	PV Total Exposure Time
1	ALLOPEN	F140X	NRS	10	1	1	1	440.208

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	G235H/F170LP	NRSIRS2	23	1	false	true	NONE	4	4	6769.245	

Special Requirements	
	Aperture PA Range 15 to 25 Degrees (V3 236.02835083 to 246.02835083) Aperture PA Range 203 to 213 Degrees (V3 64.02835083 to 74.02835083)