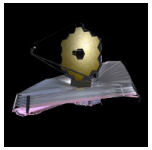

3843 - Resolving Star Formation At the Star Cluster Scale Down to ~30 pc at z=2.5

Cycle: 2, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	2	NRSIRS2-test	NIRSpec IFU Spectroscopy	(3) Group S1110TARGETGROUP
	4	NRSIRS2-test	NIRSpec IFU Spectroscopy	(3) Group S1110TARGETGROUP
	3	NIRCam for S1110	NIRCam Imaging	(1) SGAS1110-IFU-POS1

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
	5	NRSIRS2-reobservation	NIRSpec IFU Spectroscopy	(3) Group S1110TARGETGROUP

ABSTRACT

Understanding the modes and physical scale of star-formation in the distant universe requires resolved studies of individual star-forming regions and their stellar populations. This is a proposal to use one of the most spectacular strongly lensed galaxies known to spatially resolve the properties of dozens of individual compact, star-forming clumps with physical sizes ~<30 pc at z=2.5. The fortuitous strong lensing configuration of the target system provides a truly unique opportunity to perform a spatially resolved census of the diffuse and clumpy star formation and ionized nebular gas in a lensed starburst galaxy at Cosmic Noon. We will obtain broadband NIRCam imaging and NIRSpec IFU spectroscopy to measure the stellar continuum from 0.13-1.3 microns, and nebular emission lines between 0.3-0.9 microns. Spectroscopy will inform spectral diagnostics of the nebular gas (ionization state, metallicity, dust extinction) and map the velocity structure of the galaxy. The spectroscopy and broadband SEDs will be used to jointly constrain the star formation histories and stellar populations of individual clumps and diffuse star-formation across the galaxy. All of this will be done on spatially resolved scales down to ~<30 pc. These analyses will reveal whether the compact star forming regions are associated with the larger galaxy structure, or if they have different phase space and chemical properties that identify them as proto- or newly formed young globular clusters. This program will unpack the diversity of star-forming structures and star formation histories, including any "pure" single-burst star-forming regions, within a starburst galaxy at z=2.5.

OBSERVING DESCRIPTION

This proposal requests NIRSPec IFU spectroscopy and NIRCam imaging of a strongly lensed galaxy containing 26 resolved star-forming clumps with physical sizes of ~30-60 pc. The proposed observations (in combination with archival HST imaging) are designed to measure spatially resolved H-alpha nebular emission and broadband spectral energy distributions spanning 0.12-1.3 microns rest-frame. Nebular lines will inform spatially resolved diagnostics of the ionized gas, including the Balmer Decrement, N2/Ha and R23 metallicity proxies, and O3/O2 and O3/Hb ionization parameter measurements. The H-alpha emission line will also be measured with velocity precisions of <30 km/s, informing a high quality velocity map across the entire galaxy, including peculiar velocities of the dozens of individual compact star forming regions.

Proposal 3843 - Targets - Resolving Star Formation At the Star Cluster Scale Down to ~30 pc at z=2.5

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	SGAS1110-IFU-POS1	RA: 11 10 19.9376 (167.5830733d) Dec: +64 59 52.07 (64.99780d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[Emission line galaxies, High-redshift galaxies, Starburst galaxies]*				
(2)	SGAS1110-IFU-POS2	RA: 11 10 19.9952 (167.5833133d) Dec: +64 59 49.74 (64.99715d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[Emission line galaxies, Starburst galaxies]*				
(3)	Group S1110TARGETGROUP			
Comments: *Target Selection=[1 SGAS1110-IFU-POS1, 2 SGAS1110-IFU-POS2]*				

Observation

Proposal 3843, Observation 2: NRSIRS2-test

Wed Apr 03 22:00:33 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

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
(3)	Group S1110TARGETGROUP			

Comments:
Target Selection=[1 SGAS1110-IFU-POS1, 2 SGAS1110-IFU-POS2]

Template

TA Method
NONE

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	8	

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	12	1	false	true	NONE	8	8	7119.378	145142.32

Observation

Proposal 3843, Observation 4: NRSIRS2-test

Wed Apr 03 22:00:33 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	Group S1110TARGETGROUP			

Comments:
Target Selection=[1 SGAS1110-IFU-POS1, 2 SGAS1110-IFU-POS2]

Template

TA Method
NONE

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	8	

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	G140H/F100LP	NRSIRS2	9	2	false	true	NONE	8	16	10737.423	145142.36

Observation

Proposal 3843, Observation 3: NIRCam for S1110

Wed Apr 03 22:00:33 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

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
(1)	SGAS1110-IFU-POS1	RA: 11 10 19.9376 (167.5830733d) Dec: +64 59 52.07 (64.99780d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Emission line galaxies, High-redshift galaxies, Starburst galaxies]

Template

Module	Subarray	Target Placement
ALL	FULL	Module Gap

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	INTRAMODULE	4	STANDARD		1

Spectral Elements

#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F070W	F444W	MEDIUM8	6	1	4	4	2490.931	146901.6
2	F090W	F356W	SHALLOW4	7	1	4	4	1460.201	146901.4
3	F115W	F277W	SHALLOW4	6	1	4	4	1245.465	146901.3

Special Requirements

Aperture PA Range 145 to 205 Degrees (V3 145.07457694 to 205.07457694)
Offset 120.0 arcsec, 35.0 arcsec

Observation

Proposal 3843, Observation 5: NRSIRS2-reobservation Wed Apr 03 22:00:33 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	Group S1110TARGETGROUP			

Comments:
Target Selection=[1 SGAS1110-IFU-POS1, 2 SGAS1110-IFU-POS2]

Template

TA Method
NONE

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	8	

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	12	1	false	true	NONE	8	8	7119.378	145142.32