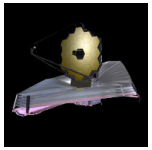

5266 - A sharp view on the small-scale star formation in a remarkable redshift 2.58 spiral galaxy

Cycle: 3, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
NIRSPEC_IFU				
	1		NIRSpec IFU Spectroscopy	(1) Sp_A2744

ABSTRACT

During cosmic noon, galaxies experience intense star formation phases that double the galaxy stellar mass over short time scales. Their morphologies are dominated by compact stellar clumps which are trust to be a major mode of star formation and mass growth during this period. In contrast to HST based studies, JWST observations have revealed that spiral galaxies are already in place at redshift higher than 1.5, with higher than expected incidence of bulges and even bars structures.

To capture this rapid evolution phase, we propose NIRSpec/IFU observations of the optical rest-frame of Sp-a2744, a remarkable face-on spiral at z=2.58, detected in the UNCOVER data of the lensing cluster Abell 2744. Homogenous 2D magnification preserves the morphological appearance of this target that shows ~40 clumps, an asymmetric disk, a potential bar and proto-bulge in the making. This galaxy represents a unique laboratory to study the rapid morphological evolution and the star formation cycle close to the peak of star formation history. Recently, ALMA has mapped the giant molecular clouds (GMCs) at resolution comparable to the here requested NIRSPEC/IFU observations.

The combination of ALMA, NIRCam, and NIRSpec/IFU will enable us to derive key physical properties (age, SFR, dynamical mass, extinction, electron density, gas pressure, metallicity, ionisation parameters) down to 10s of parsec scales. We will evaluate the effect of stellar feedback on the disruption of their parent GMCs, in setting the integrated star formation efficiency, power the ionised ISM, as well as probe bulge formation in a representative MS galaxy at cosmic noon.

OBSERVING DESCRIPTION

We select the grating G235H/F170LP which allows us to cover all the emission lines of interest for the science. We expect to detect Hb, [OIII], [NII], Ha, and [SII]. The latter line emission is close to the detector gap, but it will be detected (galaxy redshift known from spectroscopy). The R=2700 will enable us to resolve FWHM down to 100 km/s, which correspond to velocity dispersions of 40 km/s. The high spectral resolution will also enable us to resolve the doublets ([OIII] and [SII]) and to resolve the brightest [NII] line from Ha.
The S/N ratios are estimated using circular apertures of 0.15". The detector setup consists of the readout mode NRSIRS2, 20 Ngroups, 2 exposures, 15 dithers. We select as dither type CYCLING and small size step. Target acquisition is done in WATA with CLEAR filter on a point-source which is within the FoV. NRSRAPIDD6 is used as readout mode for acquisition. An offset is required after acquisition to centre the NIRSPec FoV on the science target. In total we request 15.83h of which 12.16h are on target (78% efficiency). Following JDox recommendations and tests performed on the public ERS data, no separate sky exposures are required as there will be a significant empty areas within the field of view.

No orientation constraints are necessary.

Proposal 5266 - Targets - A sharp view on the small-scale star formation in a remarkable redshift 2.58 spiral galaxy

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	Sp_A2744	RA: 00 14 9.6803 (3.5403346d) Dec: -30 22 30.19 (-30.37505d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Disk galaxies, Spiral galaxies]
Extended=YES

Observation

Proposal 5266, Observation 1

Mon Apr 07 23:00:56 GMT 2025

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)	Sp_A2744	RA: 00 14 9.6803 (3.5403346d) Dec: -30 22 30.19 (-30.37505d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Disk galaxies, Spiral galaxies]
Extended=YES

Template

TA Method	HFF Readout Mode
NONE	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	3	15	

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	20	2	false	true	NONE	15	30	44204.337	174748