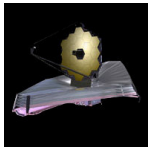

4573 - IFU Trio of ALMA, MUSE, JWST: Revealing Dynamical Interplay of Inflow/Outflow at z=6 with Strong Lensing Aid

Cycle: 2, Proposal Category: GO

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OBSERVATIONS

Folder	***Observation***	***Label***	***Observing Template***	***Science Target***
Observation Folder				
	1	NIRCam Imaging	NIRCam Imaging	(1) NIRCAM-CENTER

ABSTRACT

We propose deep [CII] 158um line observations, targeting a strongly lensed galaxy at z=6 discovered in the 100-hr ALMA Lensing Cluster Survey. Among normal star-forming galaxies at zspec>6, it is the brightest lensed source known ([CII] flux=25mJy, H=23.5mag), but intrinsically a faint z=6.07 sub-L* galaxy (Mstar=10^9Msun) due to its high (mu=30-160) magnification. JWST/NIRSpec IFU data show unambiguous ionized gas outflows, while a deep MUSE follow-up reveals a significantly extended (~6") Lya structure around the galaxy, redshifted by ~400km/s. Intriguingly, the current ALMA data also display an extended (~3") and redshifted (~150km/s) [CII] structure potentially associated with Lya. The simple goal of this proposal is to improve the [CII] sensitivity by factors of >2-4 and conclusively map out its 3D distribution relative to Lya. We also request 2.6-hour of JWST F466N imaging to map the Ha distribution which fortunately falls in the NIRcam narrow-band response to understand whether the extended Lya can be ascribed to an inflow or outflow scenario.

OBSERVING DESCRIPTION

To conclude whether ionized gas ouflow or cold gas inflow is the cause of the sinigicantly extended (~6") and red-shifted (~400 km/s) Lya structure (goal 3), we will also perform an additional 2.6-hrs narrow band imaging with JWST NIRCam/F466N.
As shown in Fig.4 in SJ, the wavelength of the H-alpha line from the target system is entirely covered, including the velocity offsets, fortunately, which allows us to answer which (inoized outflow vs. cold inflow) is the cause from the detection / non-detection of H-alpha line.

We use the standard subpixel (N=3) dithering.
One NIRCam pointing (2'x2') sufficiently covers the entire structure of the target system, where we have no restrictions for the roll angle.
The Ly-alpha fluxes with a 0."3-radius aperture at the several peak positions in the Lya structure are >~4e-18 erg/s/cm2. Assuming the Ly-alpha/H-alpha ratio from Case A recombination, we request the exposure time of 9566 sec (2.65hrs). Using the JWST ETC, this achieves the >~3sigma detection for the Ha emission from with the same size aperture. Note that this is a conservative estimate, because if the CGM gas is not fully ionized and the Ly-alpha escape fraction is < 1 in the outflow scenario, the H-alpha line will be more brightly detected than above assumptions.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	NIRCAM-CENTER	RA: 06 00 5.6632 (90.0235967d) Dec: -20 08 20.86 (-20.13913d) Equinox: J2000		

Comments: This is the pointing center of B module in NIRCam observations.
Category=Galaxy
Description=[High-redshift galaxies]
Extended=NO

Observation

Proposal 4573, Observation 1: NIRCam Imaging

Thu May 30 20:01:11 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Comments: Since our targets z6.1/6.2 and z6.3 are separated just by ~20", our targets are fitted in the 2'x2' Field-of-View (FoV) of NIRCam.
However, there is a bright star located east of source z6.3, and we have to ensure that its diffraction spikes do not overlap z6.3. Based on results from the JWST PSF simulation and general target visibility tools, we find that any position angle in the ranges of 29-60 will successfully avoid placing these spikes on the source and be schedulable.

We confirm that there is a preferable position for the FoV center of the module B where z6.1/6.2 and z6.3 (and even the other remaining multiple images z6.4, and z6.5 by chance) will be observed in any of the above position angles without falling in the ~5" detector gaps in the shorter wavelength image. We adopt this position for the FoV center in the NIRCam observation.

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)	NIRCAM-CENTER	RA: 06 00 5.6632 (90.0235967d) Dec: -20 08 20.86 (-20.13913d) Equinox: J2000		

Comments: This is the pointing center of B module in NIRCam observations.
Category=Galaxy
Description=[High-redshift galaxies]
Extended=NO

Template

Module	Subarray	Target Placement
ALL	FULL	Module Gap

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	INTRAMODULEBOX	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	F090W	F466N+F444W	DEEP2	7	1	4	4	5239.544	
2	F115W	F466N+F444W	MEDIUM8	6	1	4	4	2490.931	
3	F200W	F466N+F444W	MEDIUM8	5	1	4	4	2061.46	

Special Requirements

Aperture PA Range 35 to 41 Degrees (V3 35.07457694 to 41.07457694)
Offset 87.0 arcsec, 1.0 arcsec
Background Limited. Background no more than 40th percentile above minimum