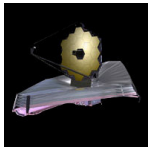

3767 - Characterizing the Sources of Ionizing Photons in the Epoch of Reionization

Cycle: 2, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1	COLA1-IFU	NIRSpec IFU Spectroscopy	(2) COLA1
	2	NEPLA4-IFU	NIRSpec IFU Spectroscopy	(3) NEPLA4
	3	AerithB-IFU	NIRSpec IFU Spectroscopy	(4) AERITHB
	4	A370-IFU	NIRSpec IFU Spectroscopy	(1) A370PZ1

ABSTRACT

The nature of the sources emitting sufficient Lyman continuum photons to conclude cosmic reionization by z~6 remains elusive. Models of the reionization process governed by either abundant faint galaxies or rare luminous ones can each account for the evolving neutrality of the intergalactic medium. Here we aim to characterize the physical properties of the only four z>5.8 galaxies whose Lyman continuum leakage can be inferred from the double-peaked profile of their Lyman alpha emission. This sample represents an unique laboratory to determine if these sources are solely capable of reionizing their local environment or whether additional fainter sources are required, as well as to compare their properties with those of lower redshift Lyman Continuum leakers. In this NIRSpec IFU proposal, we will detect and spatially map for the first time the rest-frame optical

lines of the only reionization-era galaxies with measured escape fractions. We will measure the integrated and spatially resolved rest-frame optical line fluxes and line ratios, the systemic redshift, star-formation rates and history, metallicity, ionizing photon production rates, dust properties and kinematics. This dataset will provide important constraints on their role in reonizing their associated HII bubbles, the physics of ionizing photon leakage in reionization-era galaxies and their evolution with respect to low-redshift Lyman Continuum leakers.

OBSERVING DESCRIPTION

The goal of this program is characterize the properties of the only four z>5.8 galaxies with inferred escape fractions. Each target will be observed with NIRSpec IFU at medium resolution (G235M + G395M, R=1000) to detect and spatially map their rest-frame optical lines. The medium resolution is needed to resolve individual lines necessary to compute key line ratios characterizing their properties and derive kinematics from the bright Halpha line. One galaxy at z=6.804 is only observed with the G395M/F290LP grism as all the lines of interest all fall into the grism wavelength range. These unprecedented observationsof the rest-frame optical of reionization-era galaxies with known escape fraction will enable us to characterize the sources emitting enough hydrogen-ionizing photons to drive cosmic reionization.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	A370PZ1	RA: 02 40 14.0550 (40.0585625d) Dec: -01 37 14.27 (-1.62063d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[High-redshift galaxies]* *Extended=YES*				
(2)	COLA1	RA: 10 02 35.3800 (150.6474167d) Dec: +02 12 13.93 (2.20387d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[High-redshift galaxies]* *Extended=YES*				
(3)	NEPLA4	RA: 17 53 10.1064 (268.2921100d) Dec: +65 06 34.49 (65.10958d) Equinox: J2000		
Comments: RADEC: 268.29211 +65.109581 *Category=Galaxy* *Description=[High-redshift galaxies]* *Extended=YES*				
(4)	AERITHB	RA: 08 36 46.2800 (129.1928333d) Dec: +00 54 10.55 (.90293d) Equinox: J2000		
Comments: 08:36:46.28 00:54:10.55 *Category=Galaxy* *Description=[High-redshift galaxies]* *Extended=YES*				

Observation

Proposal 3767, Observation 1: COLA1-IFU

Sat Feb 03 00:00:28 GMT 2024

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
(2)	COLA1	RA: 10 02 35.3800 (150.6474167d) Dec: +02 12 13.93 (2.20387d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[High-redshift galaxies]
Extended=YES

Template

TA Method
NONE

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	4-POINT-DITHER				

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	G235M/F170LP	NRSIRS2RAPID	40	1	false	true	NONE	4	4	2392.578	
2	G395M/F290LP	NRSIRS2RAPID	40	1	false	true	NONE	4	4	2392.578	

Observation

Proposal 3767, Observation 2: NEPLA4-IFU

Sat Feb 03 00:00:28 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)	NEPLA4	RA: 17 53 10.1064 (268.2921100d) Dec: +65 06 34.49 (65.10958d) Equinox: J2000		

Comments: RADEC: 268.29211 +65.109581
Category=Galaxy
Description=[High-redshift galaxies]
Extended=YES

Template

TA Method
NONE

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	4-POINT-DITHER				

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	G235M/F170LP	NRSIRS2RAPID	40	1	false	true	NONE	4	4	2392.578	
2	G395M/F290LP	NRSIRS2RAPID	40	1	false	true	NONE	4	4	2392.578	

Observation

Proposal 3767, Observation 3: AerithB-IFU

Sat Feb 03 00:00:28 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

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
(4)	AERITHB	RA: 08 36 46.2800 (129.1928333d) Dec: +00 54 10.55 (.90293d) Equinox: J2000		

Comments: 08:36:46.28 00:54:10.55
Category=Galaxy
Description=[High-redshift galaxies]
Extended=YES

Template

TA Method
NONE

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	4-POINT-DITHER				

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	G235M/F170LP	NRSIRS2RAPID	40	1	false	true	NONE	4	4	2392.578	
2	G395M/F290LP	NRSIRS2RAPID	40	1	false	true	NONE	4	4	2392.578	

Observation

Proposal 3767, Observation 4: A370-IFU

Sat Feb 03 00:00:28 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
(1)	A370PZ1	RA: 02 40 14.0550 (40.0585625d) Dec: -01 37 14.27 (-1.62063d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[High-redshift galaxies]
Extended=YES

Template

TA Method
NONE

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	4-POINT-DITHER				

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	G395M/F290LP	NRSIRS2RAPID	81	1	false	true	NONE	4	4	4785.156	