



2659 - Beasts in the Bubbles: Characterizing ultra-luminous galaxies at Cosmic Dawn

Cycle: 1, Proposal Category: GO

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Prof. Georgios Magdis (CoI) (ESA Member)	Technical University of Denmark-DTU Space

OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
Observation Folder				
	1		NIRSpec IFU Spectroscopy	(1) COSMOS-441697
	2		NIRSpec IFU Spectroscopy	(2) COSMOS-564423
	3		NIRSpec IFU Spectroscopy	(3) COSMOS-978062
	4		NIRSpec IFU Spectroscopy	(4) COSMOS-852845
	5		NIRSpec IFU Spectroscopy	(5) COSMOS-1356755

ABSTRACT

We propose restframe UV and optical spectroscopy to confirm redshifts and measure star-formation rates, stellar masses, and dust extinction for the five most luminous galaxies at $9 < z < 10$ over two square degrees of the COSMOS survey. The unique combination of a wide-field near-infrared imaging coupled with new ultra-deep optical and infrared data makes this the most secure sample of $9 < z < 10$ galaxy candidates currently available. However, these objects are too rare to be found by very deep, but smaller surveys with JWST, and the serendipitous discovery of even one such galaxy outside of COSMOS is unlikely from the entirety of planned GTO and ERS programs. These massive, luminous galaxies, seen only 500 million years after the Big Bang, are ideal tracers of the primordial dark matter structures from which they formed and grew. However, their mere existence at these early times challenges the current paradigm of early galaxy formation and evolution. Thus, it is essential to confirm their high redshift nature and reveal the means by which these remarkable cosmic beasts so rapidly built up their stellar mass.

OBSERVING DESCRIPTION

This proposal focuses on a sample of five secure $9 < z < 10$ massive and UV luminous galaxies located in the COSMOS field (R.A., decl. = 10:00:28.600, +02:12:21.00). We utilize the spatially-resolved spectroscopic ability of the NIRSpec IFU to measure the UV and optical continuum and their associated emission lines. These sources are unresolved in ground-based imaging, and so in the case that these sources are actually multiple

JWST Proposal 2659 (Created: Monday, December 4, 2023 at 3:00:33 PM Eastern Standard Time) - Overview

galaxies the IFU can capture all sources and provide low-resolution imaging, simultaneously. To achieve our scientific goals, we require 08h07m with the NIRspec IFU instrument, with PRISM/CLEAR filter. We observe for a total of 29180 s, split into 500 groups, 20 integrations, and 20 exposures. We will use the NRSIRS2RAPID readout pattern with a LARGE SPARSE-CYCLE DITHER with positions 1-4. The total requested time, including overheads, is 48816 s or 13.6 hours.

Proposal 2659 - Targets - Beasts in the Bubbles: Characterizing ultra-luminous galaxies at Cosmic Dawn

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	COSMOS-441697	RA: 09 57 39.0144 (149.4125600d) Dec: +01 50 40.14 (1.84448d) Equinox: J2000 Comments: Category=Galaxy Description=[High-redshift galaxies, Lyman-break galaxies, Primordial galaxies] Extended=YES		
(2)	COSMOS-564423	RA: 10 00 31.8786 (150.1328275d) Dec: +01 57 50.08 (1.96391d) Equinox: J2000 Comments: Category=Galaxy Description=[High-redshift galaxies, Lyman-break galaxies, Primordial galaxies] Extended=YES		
(3)	COSMOS-978062	RA: 09 57 47.9060 (149.4496083d) Dec: +02 20 43.50 (2.34542d) Equinox: J2000 Comments: Category=Galaxy Description=[High-redshift galaxies, Lyman-break galaxies, Primordial galaxies] Extended=YES		
(4)	COSMOS-852845	RA: 09 58 50.9398 (149.7122492d) Dec: +02 13 55.11 (2.23198d) Equinox: J2000 Comments: Category=Galaxy Description=[High-redshift galaxies, Lyman-break galaxies, Primordial galaxies] Extended=YES		
(5)	COSMOS-1356755	RA: 09 57 25.4549 (149.3560621d) Dec: +02 42 41.29 (2.71147d) Equinox: J2000 Comments: Category=Galaxy Description=[High-redshift galaxies, Lyman-break galaxies, Primordial galaxies] Extended=YES		

Proposal 2659 - Observation 1 - Beasts in the Bubbles: Characterizing ultra-luminous galaxies at Cosmic Dawn

Observation	Proposal 2659, Observation 1 Mon Dec 04 20:00:33 GMT 2023											
	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)	COSMOS-441697	RA: 09 57 39.0144 (149.4125600d) Dec: +01 50 40.14 (1.84448d) Equinox: J2000									
Template	<i>Comments:</i> Category=Galaxy Description=[High-redshift galaxies, Lyman-break galaxies, Primordial galaxies] Extended=YES											
	TA Method NONE											
Dithers	#	Dither Type		Size		Starting Point		Number of Points		Points		
	1	SPARSE-CYCLING		LARGE						1, 2, 3, 4		
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	PRISM/CLEAR	NRSIRS2	10	2	false	true	NONE	4	8	5952.267	
	2	PRISM/CLEAR	NRSIRS2	10	1	true	false	NONE	1	1	744.033	

Proposal 2659 - Observation 2 - Beasts in the Bubbles: Characterizing ultra-luminous galaxies at Cosmic Dawn

Observation	Proposal 2659, Observation 2											Mon Dec 04 20:00:33 GMT 2023
	Diagnostic Status: Warning											
	Observing Template: NIRSpec IFU Spectroscopy											
Diagnos	(Visit 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.											
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous			
	(2)	COSMOS-564423	RA: 10 00 31.8786 (150.1328275d) Dec: +01 57 50.08 (1.96391d) Equinox: J2000									
	Comments: Category=Galaxy Description=[High-redshift galaxies, Lyman-break galaxies, Primordial galaxies] Extended=YES											
Template	TA Method											
	NONE											
Dithers	#	Dither Type		Size		Starting Point		Number of Points		Points		
	1	SPARSE-CYCLING		LARGE						1, 2, 3, 4		
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	PRISM/CLEAR	NRSIRS2	10	2	false	true	NONE	4	8	5952.267	
	2	PRISM/CLEAR	NRSIRS2	10	1	true	false	NONE	1	1	744.033	

Proposal 2659 - Observation 3 - Beasts in the Bubbles: Characterizing ultra-luminous galaxies at Cosmic Dawn

Observation	Proposal 2659, Observation 3											Mon Dec 04 20:00:33 GMT 2023	
	Diagnostic Status: Warning												
	Observing Template: NIRSspec 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			
	(3)	COSMOS-978062	RA: 09 57 47.9060 (149.4496083d) Dec: +02 20 43.50 (2.34542d) Equinox: J2000										
	Comments: Category=Galaxy Description=[High-redshift galaxies, Lyman-break galaxies, Primordial galaxies] Extended=YES												
Template	TA Method												
	NONE												
Dithers	#	Dither Type			Size		Starting Point		Number of Points		Points		
	1	SPARSE-CYCLING			LARGE						1, 2, 3, 4		
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	PRISM/CLEAR	NRSIRS2	10	2	false	true	NONE	4	8	5952.267		
	2	PRISM/CLEAR	NRSIRS2	10	1	true	false	NONE	1	1	744.033		

Proposal 2659 - Observation 4 - Beasts in the Bubbles: Characterizing ultra-luminous galaxies at Cosmic Dawn

Observation	Proposal 2659, Observation 4 Mon Dec 04 20:00:33 GMT 2023 Diagnostic Status: Warning Observing Template: NIRSspec IFU Spectroscopy																																														
Diagnostics	(Visit 4:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.																																														
Fixed Targets	<table border="1"> <thead> <tr> <th>#</th><th>Name</th><th>Target Coordinates</th><th>Targ. Coord. Corrections</th><th>Miscellaneous</th></tr> </thead> <tbody> <tr> <td>(4)</td><td>COSMOS-852845</td><td> RA: 09 58 50.9398 (149.7122492d) Dec: +02 13 55.11 (2.23198d) Equinox: J2000 </td><td></td><td></td></tr> </tbody> </table> Comments: Category=Galaxy Description=[High-redshift galaxies, Lyman-break galaxies, Primordial galaxies] Extended=YES											#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous	(4)	COSMOS-852845	RA: 09 58 50.9398 (149.7122492d) Dec: +02 13 55.11 (2.23198d) Equinox: J2000																												
#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous																																											
(4)	COSMOS-852845	RA: 09 58 50.9398 (149.7122492d) Dec: +02 13 55.11 (2.23198d) Equinox: J2000																																													
Template	TA Method NONE																																														
Dithers	<table border="1"> <thead> <tr> <th>#</th><th>Dither Type</th><th>Size</th><th>Starting Point</th><th>Number of Points</th><th>Points</th></tr> </thead> <tbody> <tr> <td>1</td><td>SPARSE-CYCLING</td><td>LARGE</td><td></td><td></td><td>1, 2, 3, 4</td></tr> </tbody> </table>											#	Dither Type	Size	Starting Point	Number of Points	Points	1	SPARSE-CYCLING	LARGE			1, 2, 3, 4																								
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2	PRISM/CLEAR	NRSIRS2	10	1	true	false	NONE	1	1	744.033																																					

Proposal 2659 - Observation 5 - Beasts in the Bubbles: Characterizing ultra-luminous galaxies at Cosmic Dawn

Observation	Proposal 2659, Observation 5											Mon Dec 04 20:00:33 GMT 2023	
	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			
	(5)	COSMOS-1356755	RA: 09 57 25.4549 (149.3560621d) Dec: +02 42 41.29 (2.71147d) Equinox: J2000										
	Comments: Category=Galaxy Description=[High-redshift galaxies, Lyman-break galaxies, Primordial galaxies] Extended=YES												
Template	TA Method												
	NONE												
Dithers	#	Dither Type			Size	Starting Point			Number of Points		Points		
	1	SPARSE-CYCLING			LARGE						1, 2, 3, 4		
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	PRISM/CLEAR	NRSIRS2	10	2	false	true	NONE	4	8	5952.267		
	2	PRISM/CLEAR	NRSIRS2	10	1	true	false	NONE	1	1	744.033		