



1963 - UDF medium band survey: Using H-alpha emission to reconstruct Ly-alpha escape during the Epoch of Reionization

Cycle: 1, Proposal Category: GO

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OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
Observation Folder				
	1	UDF	NIRCam Imaging	(1) UDF

ABSTRACT

The driver and timeline of the reionization of hydrogen in the early Universe remains a major uncertainty in galaxy formation. As redshift increases, one of the primary observational tracers of ionizing photons, Lyman-alpha (Ly α), is attenuated by the increasingly neutral intergalactic medium. In order to circumvent this and understand the production and escape of ionizing photons at the highest redshifts, we propose a novel and efficient JWST imaging survey in the UDF to target H-alpha (Ha) and the UV continuum at $z=5.4-6.6$ (the tail end of reionization epoch). These medium-band observations (NIRCam F182M, F210M, F430M, F460M, F480M; and NIRISS F430M & F480M in parallel) build on the deepest HST and MUSE data publicly available anywhere. The existing data provide Ly α and some UV information at high spatial resolution, but lack the critical constraints on the intrinsic ionizing photon production and dust geometry within such galaxies. Our joint Ly α -UV-Ha analysis will provide this information on global and spatially resolved (kpc) scales for the first time in individual, normal star forming galaxies during reionization. This program enables the first unbiased accounting of the ionizing photon production budget via Ha, pinpointing where Ly α is initially created, and resolving the uncertainties in current data from galaxy orientation and dust geometry. The proposed data also enable multiple additional science objectives, including the discovery of [OIII]+H-beta emitters at $z=7.6-9.3$. These data will be public immediately, enabling numerous rapid follow-up studies with JWST, and will enhance the legacy value of past and future surveys in this popular field.

OBSERVING DESCRIPTION

We propose for a single NIRCam pointing in the Ultra Deep Field (UDF; 03 32 38, -27 47 00) to perform a medium-band search from 4.16 to 4.94 microns to trace H-alpha with kpc spatial resolution at redshift 5.4-6.6, a critical regime to understand the decline of Ly-alpha emission in the epoch of reionization. With a single pointing in the UDF, we are able to match the coverage of the deepest MUSE and HST pointings. A single module with an orient of ~ 310 deg covers the whole UDF, while the second module lies in the surrounding region, which also has MUSE and HST coverage. The

JWST Proposal 1963 (Created: Friday, May 27, 2022 at 1:02:29 AM Eastern Standard Time) - Overview

observations consist of a single visit with three filter pairs: F210M-F430M (13915 sec), F210M-F460M (13915 sec), and F182M-F480M (27830 sec). We employ the DEEP8 readout pattern for all exposures. We perform a coordinated parallel with NIRISS imaging (F430M and F480M) to increase the survey area by 50%, which can be performed without additional overhead. These parallel observations lie also in GOODS-South with HST and partial MUSE coverage. We use the filters F430M (28087 sec) and F480M (28087 sec) with the NIS readout pattern. The dithering pattern is fixed to INTRAMODULEBOX with 4 primary dither positions and a 3-POINT-MEDIUM-WITH-NIRISS for the subpixel dither type. We choose the INTRAMODULEBOX pattern since it is more compact than INTRAMODULE or INTRAMODULEX, thereby yielding more area at full depth. The science exposure time is 15.47 hrs, and the total charged time is 20.42 hrs.

Proposal 1963 - Targets - UDF medium band survey: Using H-alpha emission to reconstruct Ly-alpha escape during the Epoch of Rei...

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(1)	UDF	RA: 03 32 34.4395 (53.1434979d) Dec: -27 48 7.05 (-27.80196d) Equinox: J2000		
<i>Comments:</i> Category=Galaxy Description=[High-redshift galaxies, Lyman-alpha galaxies, Lyman-break galaxies, Starburst galaxies]					

Proposal 1963 - Observation 1 - UDF medium band survey: Using H-alpha emission to reconstruct Ly-alpha escape during the Epoch ...

Fri May 27 06:02:29 GMT 2022

Observation	Proposal 1963, Observation 1: UDF Diagnostic Status: Warning Observing Template: NIRCam Imaging Coordinated Parallel Template(s): NIRISS Imaging									
	(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)	UDF	RA: 03 32 34.4395 (53.1434979d) Dec: -27 48 7.05 (-27.80196d) Equinox: J2000							
<i>Comments:</i> Category=Galaxy Description=[High-redshift galaxies, Lyman-alpha galaxies, Lyman-break galaxies, Starburst galaxies]										
Template	NIRCam Imaging					NIRISS Imaging				
	Module: ALL Subarray: FULL									
Dithers	#	Primary Dither Type		Primary Dithers	Dither Size	Subpixel Positions		Coordinated Parallel Subpixel Selector	Dither Direct Images Primes	
	1	INTRAMODULEBOX		4		1		3-POINT-MEDIUM-WITH-NIRISS	NO_DITHERING	
Spectral Elements	NIRCam Imaging	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
	1	F210M	F430M	DEEP8	6	1	12	12	13914.854	52673
	2	F210M	F460M	DEEP8	6	1	12	12	13914.854	52673
	3	F182M	F480M	DEEP8	6	1	12	12	13914.854	52673
	4	F182M	F480M	DEEP8	6	1	12	12	13914.854	52673
Spectral Elements	NIRISS Imaging	Filter	Grism	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
	1	F430M		NIS	26	1	12	12	13528.33	52673
	2	F430M		NIS	26	1	12	12	13528.33	52673
	3	F480M		NIS	26	1	12	12	13528.33	52673
	4	F480M		NIS	26	1	12	12	13528.33	52673

Proposal 1963 - Observation 1 - UDF medium band survey: Using H-alpha emission to reconstruct Ly-alpha escape during the Epoch ...

Special Requirements

Aperture PA Range 304.88744876 to 314.88744876 Degrees (V3 304.98680919 to 314.98680919)
No Parallel