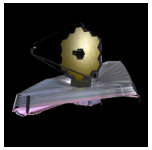

1758 - Confirming a Potential Ultra-Massive Galaxy at z=10.57

Cycle: 1, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1		NIRSpec Fixed Slit Spectroscopy	(1) UDS-Z910-18697
	51		NIRSpec Fixed Slit Spectroscopy	(1) UDS-Z910-18697

ABSTRACT

Massive galaxies are excellent laboratories to test models of galaxy formation, as they represent where the key physical processes regulating galaxy growth collide as cosmic filaments intersect. Models with different physical prescriptions for galaxy growth via star-formation and negative stellar and black hole feedback make different predictions for the abundance of massive galaxies at early times (z >6). While these models likely need very wide-field infrared surveys to come from Euclid and the Nancy Grace Roman Space Telescope to constrain their abundances, we have fortuitously uncovered an extremely massive candidate galaxy at z>10.

This galaxy, UDS_z910_18697, resides in the CANDELS UDS field. Its photometric signature and size is consistent with a galaxy at z > 10, with a stellar mass of log (M/Msol) > 11. Such massive galaxies at these early times should be exceedingly rare in the entire observable universe, and highly unexpected to be found in the CANDELS search volume. Followup ALMA spectroscopy has uncovered a significant emission line at 293.3 GHz, consistent with [OIII] 88um at z=10.57. While this could also be other emission lines at lower redshifts, an examination of all existing data in this field and a concerted followup effort with Keck and HST continue to find z > 10 as the most plausible solution. We propose for a quick 1 hr JWST/NIRSpec prism observation, which will conclusively measure the redshift of this source and, if it is truly at z=10.57, allow the measurement of a robust stellar mass free from the blending which plagues the current IRAC observations.

OBSERVING DESCRIPTION

We propose for NIRSpec fixed slit spectroscopy with the PRISM/CLEAR grating for a H=25.3 z~10.5 galaxy candidate. We aim to spectroscopically confirm this high-redshift galaxy which has multiple plausible redshift solutions, thus the 0.7-5.3um coverage is optimal to cover spectral breaks and strong emission lines at multiple redshifts. We select the fixed slit to minimize slitlosses and improve background subtraction. We find that a 3422 sec (NRS readout with 15 groups and 12 exposures, with 3 integrations per exposure in the SUBS200A1 subarray) allows us to achieve a signal-to-noise per pixel of >~5 for all plausible spectral energy distriubtions for this source, assuming a resolved morphology consistent with the HST imaging. Our target galaxy is bright enough (H=25.3) to serve as its own acquisition target, as we find that using the FULL subarray with NRSRAPIDD6 readout, a 3 group acquisition exposure (t=172 sec) yields SNR=52. These observations have no special requirements.

Proposal 1758 - Targets - Confirming a Potential Ultra-Massive Galaxy at z=10.57

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	UDS-Z910-18697	RA: 02 17 1.3526 (34.2556358d) Dec: -05 09 59.78 (-5.16661d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[High-redshift galaxies]*				
(2)	TA_GALAXY	RA: 02 17 1.8727 (34.2578029d) Dec: -05 09 54.23 (-5.16506d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[Field galaxies]*				

Observation

Proposal 1758, Observation 1

Tue Jun 20 22:01:55 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec Fixed Slit 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)	UDS-Z910-18697	RA: 02 17 1.3526 (34.2556358d) Dec: -05 09 59.78 (-5.16661d) Equinox: J2000		

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

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	WATA	FULL	CLEAR	NRSRAPIDD6	3	1	1	171.788	60411.2

Template

Slit	Subarray
S200A1	SUBS200A1

Dithers

#	Primary Dither Positions	Sub-Pixel Pattern
1	3	BOTH

Spectral Elements

#	Grating/Filter	Slit	Readout Pattern	Groups/Int	Integrations/Exp	#	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	PRISM/CLEAR	S200A1	NRSRAPID	60	3	1	NONE	12	36	3422.105	60411.1

Observation

Proposal 1758, Observation 51

Tue Jun 20 22:01:55 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec Fixed Slit Spectroscopy

Diagnostics

(Visit 51:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	UDS-Z910-18697	RA: 02 17 1.3526 (34.2556358d) Dec: -05 09 59.78 (-5.16661d) Equinox: J2000		

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

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	2 TA_GALAXY	WATA	FULL	CLEAR	NRSRAPIDD6	3	1	1	171.788	60411.2

Template

Slit	Subarray
S200A1	SUBS200A1

Dithers

#	Primary Dither Positions	Sub-Pixel Pattern
1	3	BOTH

Spectral Elements

#	Grating/Filter	Slit	Readout Pattern	Groups/Int	Integrations/Exp	#	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	PRISM/CLEAR	S200A1	NRSRAPID	60	3	1	NONE	12	36	3422.105	60411.1