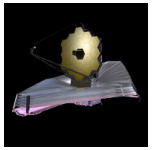

5545 - Dead or alive? Unveiling the nature of massive galaxies in the early Universe

Cycle: 3, Proposal Category: GO

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1	P1TOTALcatv2_v18c2NODMC, P1TOTALcatv2_v19c1NODMC	NIRSpec MultiObject Spectroscopy	(1) APT_TOTALcat_v4
	2	P2TOTALcatv2_v13c2NODMC, P2TOTALcatv2_v14c1NODMC	NIRSpec MultiObject Spectroscopy	(1) APT_TOTALcat_v4
	3	P3TOTALcatv4_v9c2NODMC, P3TOTALcatv4_v9c1NODMV	NIRSpec MultiObject Spectroscopy	(1) APT_TOTALcat_v4

ABSTRACT

JWST's NIRCam images have unveiled an enigmatic new population of massive red galaxies in the first 1-2 Gyr. Their nature is not clear: are they dusty, quiescent or even AGN? They differ in physical properties but share the common trait of large stellar masses. Given the current challenges posed by early massive galaxies, it is crucial to gain insights from a large unbiased sample. They are red enough and disparate enough that they cannot be well-characterized just from imaging surveys. We use a novel approach to selecting galaxies for a NIRSpec study at z>3 based on their stellar mass from the PRIMER NIRCam survey of the COSMOS field, providing a more complete, unbiased sample of high-mass galaxies.

We propose a high-return, very efficient low-resolution NIRSpec study to unveil the nature of red massive galaxies through spectral analysis and redshifts for ~100 massive galaxies, including three robust quiescent candidates at z>4.5. If confirmed, the identification of these quiescent candidates could mark a significant breakthrough in the detection of passive galaxies, potentially setting a new record for the highest redshift quiescent galaxy.

The NIRSpec spectra of these massive red galaxies will yield redshifts using emission lines for dusty star-forming galaxies and continuum features for quiescent ones, enabling an exploration of the dusty/quiescent/AGN breakdown, the mass-metallicity relationship, mass-size relation, obscured star formation, obscured star-formation rate density and shed light on the high-mass end of the stellar mass function. Our program provides unique and sorely needed insights into the nature of massive red galaxies at very early times.

OBSERVING DESCRIPTION

The primary goal of this program is to obtain 0.86hr deep NIRSpec/PRISM observations of a sample of massive galaxies split over 3 MSA pointings, where we will take 2 configurations each.

NIRSpec exposures:
The observing strategy for the MSA consists of 3 nods in slits exposures. We are taking a series of 70 groups of integrations with the NRSIRS2RAPID readout mode, resulting in a total exposure time of 3107s. By repeating this for a second configuration at the same pointing, we reach a sample of ~100 galaxies. The MSA mask design can only be finalized once the V3 angle of JWST will be assigned.

Background Limited Special Requirement:
One of the requirements of our program is to measure faint Halpha emission lines, which are expected to lie at ~4.5 microns. The peak S/N at this wavelength changes by >10% between the lowest and highest background conditions. Similarly, our F444W images are affected. We, therefore, request ``Background Limited" observations. We set the requirement to "Background no more than 40% above for the spectra to ensure a sufficiently large scheduling window of 2.5 months.

Proposal 5545 - Targets - Dead or alive? Unveiling the nature of massive galaxies in the early Universe

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	APT_TOTALcat_v4	RA: 10 00 29.8167 (150.1242362d) Dec: +02 19 32.04 (2.32557d) Equinox: J2000		

Comments:
Description=[]

Observation

Proposal 5545, Observation 1: P1TOTALcatv2_v18c2NODMC, P1TOTALcatv2_v19c1NODMC Mon Mar 10 21:00:27 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject Spectroscopy

Diagnostics

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

(Visit 1:1) Warning (Form): The recommended value is 8 Reference Stars for this template.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	APT_TOTALcat_v4	RA: 10 00 29.8167 (150.1242362d) Dec: +02 19 32.04 (2.32557d) Equinox: J2000		

Comments:
Description=[]

Acquisition

#	Reference Star Bin	Target	Filter	MSA Configuration	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	Filter: CLEAR; Readout: NRSRAPIDD2; 7 sources in 3 quads; [Optimal TA Accuracy]	SAME	CLEAR	Auto Acq MSA Config	NRSRAPIDD2	3	1	4	343.577	

Template

TA Method	HFF Readout Mode	Obtain Confirmation Images	Science Aperture	Primary Candidate List	Filler Candidate List	Spectral Overlap Map	Spectral Overlap Threshold
MSATA	false	After Target ACQ and New MSA Config	MSA Center	Main (477 sources)	Fillers (1566 sources)	jwst-nirspec-prism	1.5

Reference Stars

Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude
1	73178	150.104618	2.380139	24.815610589963978	1	79543	150.121853	2.398256	24.509690386770597
1	73868	150.098406	2.382215	23.67250809230966	1	89247	150.106975	2.429154	22.6974919371183
1	74269	150.112465	2.383016	24.577029466512975	1	92318	150.116586	2.440316	24.029541613517853
1	79002	150.092449	2.396811	23.663920998078638					

Confirmation

#	Confirmation Type	Conf. Readout Pattern	Conf. Groups/Int	Conf. Integrations/Exp	Conf. Total Integrations	Conf. Total Exposure Time
1	c1 : P1TOTALcatv2_v18c2NODMC	NRSIRS2RAPID	2	1	1	43.767
2	c1 : P1TOTALcatv2_v19c1NODMC	NRSIRS2RAPID	2	1	1	43.767

Spectral Elements

#	Exposure Specification	MSA Configuration	Nod Pattern	Pointing	Aperture PA	Dispersion Offset (Shutters)	Cross-Dispersion Offset (Shutters)	Total Dithers	Total Integrations	Total Exposure Time
1	1 (PRISM/CLEAR)	c1 : P1TOTALcatv2_ v18c2NODMC	3 Shutter Slitlet	150.10746695833333 Degrees 2.4115227777777 78 Degrees	243.72307024536946			3	3	2801.067
2	1 (PRISM/CLEAR)	c1 : P1TOTALcatv2_ v19c1NODMC	3 Shutter Slitlet	150.10771562500003 Degrees 2.4116463888888 89 Degrees	243.72308004105224			3	3	2801.067

Special Requirements

Background Limited. Background no more than 40th percentile above minimum
MSA Scheduled Aperture PA 243.7239 to 243.7239 Degrees (V3 105.149376 to 105.149376)

Observation

Proposal 5545, Observation 2: P2TOTALcatv2_v13c2NODMC, P2TOTALcatv2_v14c1NODMC Mon Mar 10 21:00:27 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject Spectroscopy

Diagnostics

(Visit 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:2) Warning (Form): The recommended value is 8 Reference Stars for this template.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	APT_TOTALcat_v4	RA: 10 00 29.8167 (150.1242362d) Dec: +02 19 32.04 (2.32557d) Equinox: J2000		

Comments:
Description=[]

Acquisition

#	Reference Star Bin	Target	Filter	MSA Configuration	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	Filter: CLEAR; Readout: NRSRAPIDD2; 8 sources in 4 quads; [Optimal TA Accuracy]	SAME	CLEAR	Auto Acq MSA Config	NRSRAPIDD2	3	1	4	343.577	
2	Filter: CLEAR; Readout: NRSRAPIDD2; 7 sources in 3 quads; [Optimal TA Accuracy]	SAME	CLEAR	Auto Acq MSA Config	NRSRAPIDD2	3	1	4	343.577	

Template

TA Method	HFF Readout Mode	Obtain Confirmation Images	Science Aperture	Primary Candidate List	Filler Candidate List	Spectral Overlap Map	Spectral Overlap Threshold
MSATA	false	After Target ACQ and New MSA Config	MSA Center	Main (477 sources)	Fillers (1566 sources)	jwst-nirspec-prism	1.5

Reference Stars

Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude
1	18716	150.108955	2.236936	22.635945925253225	1	27621	150.089605	2.263471	23.224935143654882
1	22683	150.109589	2.248499	24.428694102764908	1	28265	150.089279	2.265093	24.734271891129165
1	25036	150.135861	2.256124	24.490969012532517	1	31138	150.083452	2.272649	24.24782920588621
1	26991	150.141052	2.261776	23.044809787119256	1	38325	150.109482	2.291557	23.714669156676997
Visit	**ID**	**RA**	**Dec**	**Magnitude**	**Visit**	**ID**	**RA**	**Dec**	**Magnitude**
2	61245	150.090893	2.350861	23.580694864930067	2	79315	150.112068	2.397474	24.882310373334363
2	65624	150.108237	2.361098	24.438645956886738	2	79543	150.121853	2.398256	24.509690386770597
2	66183	150.135211	2.362569	24.69273246375969	2	80813	150.110239	2.402213	24.664192581429795
2	67902	150.140063	2.367430	22.8638440302938					

Confirmation

#	Confirmation Type	Conf. Readout Pattern	Conf. Groups/Int	Conf. Integrations/Exp	Conf. Total Integrations	Conf. Total Exposure Time
1	c1 : P2TOTALcatv2_v13c2NODMC	NRSIRS2RAPID	2	1	1	43.767
2	c1 : P2TOTALcatv2_v14c1NODMC	NRSIRS2RAPID	2	1	1	43.767

Spectral Elements

#	Exposure Specification	MSA Configuration	Nod Pattern	Pointing	Aperture PA	Dispersion Offset (Shutters)	Cross-Dispersion Offset (Shutters)	Total Dithers	Total Integrations	Total Exposure Time
1	1 (PRISM/CLEAR)	c1 : P2TOTALcatv2_v13c2NODMC	3 Shutter Slitlet	150.11168008333334 Degrees 2.2682661111111 Degrees	243.81441996493285			3	3	2713.534
2	1 (PRISM/CLEAR)	c1 : P2TOTALcatv2_v14c1NODMC	3 Shutter Slitlet	150.110281625 Degrees 2.3723266666666 67 Degrees	243.81415128969786			3	3	2713.534

Special Requirements

Group Visits within 53.0 Days
Visits Same PA
Background Limited. Background no more than 40th percentile above minimum
MSA Scheduled Aperture PA 243.8148 to 243.8148 Degrees (V3 105.24023 to 105.24023)

Observation

Proposal 5545, Observation 3: P3TOTALcatv4_v9c2NODMC, P3TOTALcatv4_v9c1NODMV Mon Mar 10 21:00:27 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject 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
(1)	APT_TOTALcat_v4	RA: 10 00 29.8167 (150.1242362d) Dec: +02 19 32.04 (2.32557d) Equinox: J2000		

Comments:
Description=[]

Acquisition

#	Reference Star Bin	Target	Filter	MSA Configuration	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	Filter: CLEAR; Readout: NRSRAPIDD2; 8 sources in 4 quads; [Optimal TA Accuracy]	SAME	CLEAR	Auto Acq MSA Config	NRSRAPIDD2	3	1	4	343.577	

Template

TA Method	HFF Readout Mode	Obtain Confirmation Images	Science Aperture	Primary Candidate List	Filler Candidate List	Spectral Overlap Map	Spectral Overlap Threshold
MSATA	false	After Target ACQ and New MSA Config	MSA Center	Main (477 sources)	Fillers (1566 sources)	jwst-nirspec-prism	1.5

Reference Stars

Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude
1	13817	150.061617	2.219851	22.72014773736364	1	21898	150.066040	2.246145	23.706121811611112
1	18716	150.108955	2.236936	22.635945925253225	1	27621	150.089605	2.263471	23.224935143654882
1	18934	150.074433	2.237137	23.72612964028412	1	28265	150.089279	2.265093	24.734271891129165
1	20505	150.060971	2.241975	23.376600819347093	1	31138	150.083452	2.272649	24.24782920588621

Confirmation

#	Confirmation Type	Conf. Readout Pattern	Conf. Groups/Int	Conf. Integrations/Exp	Conf. Total Integrations	Conf. Total Exposure Time
1	c1 : P3TOTALcatv4_v9c2NODMC	NRSIRS2RAPID	2	1	1	43.767
2	c1 : P3TOTALcatv4_v9c1NODMV	NRSIRS2RAPID	2	1	1	43.767

Spectral Elements

#	Exposure Specification	MSA Configuration	Nod Pattern	Pointing	Aperture PA	Dispersion Offset (Shutters)	Cross-Dispersion Offset (Shutters)	Total Dithers	Total Integrations	Total Exposure Time
1	1 (PRISM/CLEAR)	c1 : P3TOTALcatv4_ v9c2NODMC	3 Shutter Slitlet	150.0782375 Degrees 2.2436555555555 557 Degrees	243.47993675893 096			3	3	2757.3
2	1 (PRISM/CLEAR)	c1 : P3TOTALcatv4_ v9c1NODMV	3 Shutter Slitlet	150.07581175 Degrees 2.2416725 Degrees	243.47984415987 779			3	3	2757.3

Special Requirements

Background Limited. Background no more than 40th percentile above minimum
MSA Scheduled Aperture PA 243.4816 to 243.4816 Degrees (V3 104.90701 to 104.90701)