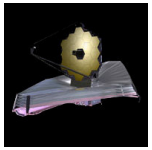

5427 - Feedback and quenching: separating neutral gas in outflows and galaxies at z~2

Cycle: 3, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1	BlueJay-NORTH-NEW	NIRSpec MultiObject Spectroscopy	(3) BLUEJAY-MASTER-NORTH-NEW
	2	BlueJay-SOUTH-NEW	NIRSpec MultiObject Spectroscopy	(4) BLUEJAY-MASTER-SOUTH-NEW

ABSTRACT

AGN activity is considered a key driver of quenching in massive galaxies, but it remains unclear whether this quenching is caused by powerful outflows (ejective feedback), or preventative feedback, or both. This proposal addresses two key questions: Do AGN-driven cool (neutral) outflows remove gas rapidly enough to quench star-formation? And do quenched galaxies truly lack cool gas? It was previously very difficult to detect cool gas in quenching galaxies at z~2, but JWST has driven a major breakthrough, revealing that NaD absorption tracing dusty neutral gas is widespread in massive galaxies at this epoch. Many quenching galaxies show powerful AGN-driven neutral outflows that appear to eject gas much faster than it is converted into stars, and these outflows may be a key mechanism for fast quenching at z~2. However, the R~1000 discovery spectra do not have sufficient resolution to separate neutral gas in the interstellar medium from that in outflows. This program will add R~2700 observations to the existing R~1000 data for a mass-selected sample of 141 galaxies at 1.7<z<3.5, using the G235H grating to spectrally resolve the gas kinematics in both the NaD and Halpha lines. We will investigate how neutral gas reservoirs vary with time since quenching, enabling us to differentiate between potential quenching scenarios. We will also perform the first direct comparison of neutral (NaD) and ionized (Halpha) outflow properties for a statistical sample of galaxies at z~2, providing crucial insights into multiphase outflow mass budgets. This program will significantly improve our understanding of outflows and the mechanisms driving galaxy quenching at cosmic noon.

OBSERVING DESCRIPTION

We plan to observe a sample of 141 galaxies at 1.7 < z < 3.5 with NIRSpec in the MOS mode, using the G235H/F170LP grating to cover the Na D absorption line and the Halpha emission line. The targeted galaxies are distributed across 2 pointings in the COSMOS field. These pointings have already been observed using medium resolution gratings, and we require that the new observations are conducted at identical PA to that of the existing observations so that 1) we are able to target exactly the same sample of galaxies, and 2) the medium- and high-resolution spectra of each galaxy probe the same physical location, minimising biases due to differences in slit location and/or orientation. We adopt a 2-shutter nodding which in most cases will be used as a dither, since most of the targets are large enough to contaminate adjacent shutters. Background subtraction will be performed using a master sky spectrum derived from empty shutters. NIRCam parallel imaging will also be obtained, adopting a 2-point compromise dither.

Proposal 5427 - Targets - Feedback and quenching: separating neutral gas in outflows and galaxies at z~2

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	BLUEJAY-MASTER-NORTH-NEW	RA: 10 00 27.5767 (150.1149029d) Dec: +02 22 53.42 (2.38151d) Equinox: J2000		
Comments: *Description=[]*				
(4)	BLUEJAY-MASTER-SOUTH-NEW	RA: 10 00 25.6356 (150.1068150d) Dec: +02 17 2.56 (2.28404d) Equinox: J2000		
Comments: *Description=[]*				

Observation

Proposal 5427, Observation 1: BlueJay-NORTH-NEW Thu Oct 24 22:00:32 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject Spectroscopy

Coordinated Parallel Template(s): NIRCam Imaging

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
(3)	BLUEJAY-MASTER-NORTH-NEW	RA: 10 00 27.5767 (150.1149029d) Dec: +02 22 53.42 (2.38151d) Equinox: J2000		

Comments:
Description=[]

Acquisition

NIRSpec MultiObject Spectroscopy	Reference Star Bin	Target	Filter	MSA Configuration	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	Filter: F140X; Readout: NRSRAPID; 8 sources in 4 quads; [Optimal TA Accuracy]	SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	

Template

NIRSpec MultiObject Spectroscopy	NIRCam Imaging
TA Method: MSATA	Module: ALL
Obtain Confirmation Images: After Target ACQ	Subarray: FULL
Science Aperture: MSA Center	
Primary Candidate List: North primary - NEW (63 sources)	
Filler Candidate List: BLUEJAY-MASTER-NORTH-NEW (6922 sources)	
Spectral Overlap Map: jwst-nirspec-g235h	
Spectral Overlap Threshold: 1.5	

Reference Stars

Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude
1	16640	150.114545	2.350083	21.729548144107987	1	19926	150.090080	2.383029	21.756290328289243
1	18071	150.135268	2.363612	21.80868089277582	1	19966	150.092536	2.382754	22.15626395778063
1	18952	150.130239	2.372168	22.238546723780278	1	21622	150.115263	2.399714	21.905795620291784
1	19313	150.139969	2.375971	22.939628896608188	1	22591	150.118102	2.409826	22.740060852310258

Dithers

#	Dither Type
1	2-POINT-WITH-NIRCam-SIZE1

Confirmation

NIRSpec MultiObject Spectroscopy	Confirmation Type	Conf. Readout Pattern	Conf. Groups/Int	Conf. Integrations/Exp	Conf. Total Integrations	Conf. Total Exposure Time
1	After Target Acq	NRSIRS2RAPID	2	1	2	87.533

Spectral Elements

NIRSpec MultiObject Spectroscopy	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 (G235H/F170LP)	c1	2 Shutter Slitlet	150.11458333333334 Degrees 2.37815 Degrees	69.61718000558633			4	16	23575.646

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	F182M	F410M	DEEP8	5	6	24	4	22890.794	

Special Requirements

Aperture PA Range 69.6171697 to 69.6171697 Degrees (V3 291.0426 to 291.0426)
No Parallel Attachments
MSA Scheduled Aperture PA 69.6172 to 69.6172 Degrees (V3 291.0426 to 291.0426)

Observation

Proposal 5427, Observation 2: BlueJay-SOUTH-NEW Thu Oct 24 22:00:32 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject Spectroscopy

Coordinated Parallel Template(s): NIRCam Imaging

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
(4)	BLUEJAY-MASTER-SOUTH-NEW	RA: 10 00 25.6356 (150.1068150d) Dec: +02 17 2.56 (2.28404d) Equinox: J2000		

Comments:
Description=[]

Acquisition

NIRSpec MultiObject Spectroscopy	Reference Star Bin	Target	Filter	MSA Configuration	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	Filter: F110W; Readout: NRSRAPIDD6; 8 sources in 4 quads; [Optimal TA Accuracy]	SAME	F110W	Auto Acq MSA Config	NRSRAPIDD6	3	1	4	687.153	

Template

NIRSpec MultiObject Spectroscopy	NIRCam Imaging
TA Method: MSATA	Module: ALL
Obtain Confirmation Images: After Target ACQ	Subarray: FULL
Science Aperture: MSA Center	
Primary Candidate List: South primary - NEW (68 sources)	
Filler Candidate List: BLUEJAY-MASTER-SOUTH-NEW (6926 sources)	
Spectral Overlap Map: jwst-nirspec-g235h	
Spectral Overlap Threshold: 1.5	

Reference Stars

Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude
1	7595	150.090620	2.256560	22.964615117620923	1	10730	150.084255	2.289811	22.815116229883103
1	7748	150.091392	2.259068	21.684834091902623	1	11369	150.109662	2.295685	22.702959223765408
1	8481	150.085048	2.266171	22.566671493828835	1	12145	150.091093	2.302832	23.16559726911002
1	9788	150.125810	2.279917	22.947129555081233	1	12655	150.102583	2.308164	22.07862185502426

Dithers

#	Dither Type
1	2-POINT-WITH-NIRCam-SIZE1

Confirmation

NIRSpec MultiObject Spectroscopy	Confirmation Type	Conf. Readout Pattern	Conf. Groups/Int	Conf. Integrations/Exp	Conf. Total Integrations	Conf. Total Exposure Time
1	After Target Acq	NRSIRS2RAPID	2	1	2	87.533

Spectral Elements

NIRSpec MultiObject Spectroscopy	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 (G235H/F170LP)	c1	2 Shutter Slitlet	150.10364166666668 Degrees 2.2815027777777 78 Degrees	74.702565913384 5			4	16	23575.646

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	F182M	F410M	DEEP8	5	6	24	4	22890.794	

Special Requirements

Aperture PA Range 74.7026 to 74.7028 Degrees (V3 296.1280303 to 296.1282303)
No Parallel Attachments
MSA Scheduled Aperture PA 74.7027 to 74.7027 Degrees (V3 296.12814 to 296.12814)