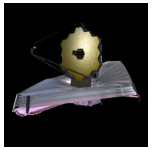

2110 - Ultra-deep continuum spectroscopy of quiescent galaxies at 1.0<z<2.5: chemical abundances and stellar kinematics

Cycle: 1, Proposal Category: GO

INVESTIGATORS

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Prof. Ivo Labbe (CoI)	Swinburne University of Technology
Prof. Alice E. Shapley (CoI)	University of California - Los Angeles
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Dr. Daniel R. Weisz (CoI) (US Admin CoI)	University of California - Berkeley

OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Deep continuum spectroscopy				
	1	SUSPENSE_v10_visit1	NIRSpec MultiObject Spectroscopy	(6) SUSPENSE_v10_correct_coords
	2	SUSPENSE_v10_visit2	NIRSpec MultiObject Spectroscopy	(6) SUSPENSE_v10_correct_coords

ABSTRACT

One of the most remarkable discoveries from the past two decades in extra-galactic astronomy is the finding of a large population of high-redshift galaxies with very low star formation rates. The existence of these quiescent galaxies has yet to be explained, largely due to the difficulty of obtaining high-quality spectra. Here we propose to remedy this situation by obtaining deep rest-frame optical spectra of a sample of quiescent galaxies at 1.0<z<2.5 with JWST/NIRSpec. Exploiting the large area of the UltraVISTA-COSMOS-DASH field we have identified an exceptional pointing for which we can observe 16 bright quiescent galaxies simultaneously. The resulting spectra will be of unparalleled quality, enabling accurate measurements of numerous Balmer and metal absorption lines. This program will yield the first statistical sample of 1.0<z<2.5 quiescent galaxies with robust stellar ages, metallicities, and chemical abundance patterns. Furthermore, the spatial resolution enables spatially resolved kinematics. These unprecedented measurements will (i) reveal when, how fast, and how efficient these galaxies formed their stars, (ii) constrain the importance of feedback in their star-forming phase, (iii) provide new insight into the physical mechanism responsible for quenching star formation, (iv) show if and how galaxies grow after becoming quiescent, and (v) constrain when and how early-type galaxies obtained their current dynamical structures. We will also observe faint quiescent and star-forming galaxies, enabling environmental studies and unique investigations relying on ultra-faint emission lines. Given the extraordinary nature of this dataset, we waive the proprietary time.

OBSERVING DESCRIPTION

We propose to obtain deep continuum, rest-frame optical, medium-resolution spectroscopy of bright, quiescent galaxies at 1.0<z<2.5, using NIRSpec-MSA and the G140M-F100LP dispersion-filter combination. Fainter quiescent galaxies and star-forming galaxies at similar and higher redshift are used as fillers. HST imaging (F160W and F814W) has been used for the astrometry, and thus no pre-imaging is needed.

We will use 3-shutter slits and a (custom) 2-position nodding pattern. For primary targets we extend the slits to 4 or 5 shutters, where possible. We will also apply a fixed dither of 1 shutter in the dispersion direction, to minimize impacts of detector defects. Our current mask design does not allow targets in areas affected by open shutters. Our field can be observed for a limited PA range (64-85 degrees and 234-254 degrees). Our most optimal mask has a PA of 250.02, and targets 16 bright quiescent galaxies. However, due to the high density of quiescent targets, nearly all PAs will target 14 or more quiescent galaxies.

We plan to observe this pointing/configuration for 16.21 hrs, consisting of 40 integrations of 1473.478 seconds each, with 20 groups per integration. We have two nod and two dither positions, and thus there are 10 integrations for each nod-dither combination. We will use the NRSIRS2 read-out mode. Total integration time is 22.92 hours.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(5)	SUSPENSE_v10	RA: 10 02 1.3320 (150.5055500d) Dec: +02 27 41.31 (2.46148d) Equinox: J2000		
Comments: *Description=[]*				
(6)	SUSPENSE_v10_correct_coords	RA: 10 02 1.3320 (150.5055500d) Dec: +02 27 41.31 (2.46148d) Equinox: J2000		
Comments: *Description=[]*				

Observation

Proposal 2110, Observation 1: SUSPENSE_v10_visit1 Wed Sep 27 20:00:49 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject Spectroscopy

Diagnostics

(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c1 (#1) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c1 (#1) has 6 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c1 (#2) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c1 (#2) has 8 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c1 (#3) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c1 (#3) has 6 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c1 (#4) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c1 (#4) has 8 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c1 (#5) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c1 (#5) has 6 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c2 (#10) has 3 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c2 (#10) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c2 (#6) has 3 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c2 (#6) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c2 (#7) has 4 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c2 (#7) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c2 (#8) has 3 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c2 (#8) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c2 (#9) has 4 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit1 (Obs 1)) Warning (Form): Config c2 (#9) has 4 primary slit traces affected by failed open shutters.
(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
(6)	SUSPENSE_v10_correct_coords	RA: 10 02 1.3320 (150.5055500d) Dec: +02 27 41.31 (2.46148d) 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: F110W; Readout: NRSRAPIDD6; 6 sources in 4 quads; [Optimal TA Accuracy]	SAME	F110W	ALLOPEN	NRSRAPIDD6	3	1	4	687.153	

Template

TA Method	Obtain Confirmation Images	Science Aperture	Primary Candidate List	Filler Candidate List	Spectral Overlap Map	Spectral Overlap Threshold
MSATA	After Target ACQ	MSA Center	Pimary_Q (34 sources)		jwst-nirspec-g140m	1.5

Reference Stars

Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude
1	127964	150.488012	2.445004	21.4	1	129280	150.480720	2.466934	23.5
1	128805	150.523397	2.459312	22.7	1	129529	150.490780	2.470936	22.8
1	128987	150.524573	2.462062	22.5	1	130339	150.527452	2.483750	23.5

Confirmation

#	Confirmation Type	Conf. Readout Pattern	Conf. Groups/Int	Conf. Integrations/Exp	Conf. Total Integrations	Conf. Total Exposure Time
1	After Target Acq	NRSIRS2	5	1	1	379.311

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 (G140M/F100LP)	c1		150.5078445 Degrees 2.4636411111111 114 Degrees	71.6175045603196	0.0	0.0	1	2	2946.956
2	1 (G140M/F100LP)	c1		150.5078445 Degrees 2.4636411111111 114 Degrees	71.6174921558633	0.0	-2.0	1	2	2946.956
3	1 (G140M/F100LP)	c1		150.5078445 Degrees 2.4636411111111 114 Degrees	71.6175045603196	0.0	0.0	1	2	2946.956
4	1 (G140M/F100LP)	c1		150.5078445 Degrees 2.4636411111111 114 Degrees	71.6174921558633	0.0	-2.0	1	2	2946.956
5	1 (G140M/F100LP)	c1		150.5078445 Degrees 2.4636411111111 114 Degrees	71.6175045603196	0.0	0.0	1	2	2946.956
6	1 (G140M/F100LP)	c2		150.507657125 Degrees 2.4642052777777 78 Degrees	71.6174974524461	0.0	0.0	1	2	2946.956
7	1 (G140M/F100LP)	c2		150.507657125 Degrees 2.4642052777777 78 Degrees	71.6174850452321	0.0	-2.0	1	2	2946.956
8	1 (G140M/F100LP)	c2		150.507657125 Degrees 2.4642052777777 78 Degrees	71.6174974524461	0.0	0.0	1	2	2946.956
9	1 (G140M/F100LP)	c2		150.507657125 Degrees 2.4642052777777 78 Degrees	71.6174850452321	0.0	-2.0	1	2	2946.956
10	1 (G140M/F100LP)	c2		150.507657125 Degrees 2.4642052777777 78 Degrees	71.6174974524461	0.0	0.0	1	2	2946.956

Special Requirements	
	MSA Scheduled Aperture PA 71.6174 to 71.6174 Degrees (V3 293.04288 to 293.04288) Same Aperture PA 1, 2

Observation

Proposal 2110, Observation 2: SUSPENSE_v10_visit2 Wed Sep 27 20:00:49 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject Spectroscopy

Diagnostics

(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c1 (#1) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c1 (#1) has 6 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c1 (#2) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c1 (#2) has 8 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c1 (#3) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c1 (#3) has 6 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c1 (#4) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c1 (#4) has 8 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c1 (#5) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c1 (#5) has 6 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c2 (#10) has 3 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c2 (#10) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c2 (#6) has 3 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c2 (#6) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c2 (#7) has 4 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c2 (#7) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c2 (#8) has 3 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c2 (#8) has 4 primary slit traces affected by failed open shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c2 (#9) has 4 master background shutters affected by failed open or closed shutters.
(SUSPENSE_v10_visit2 (Obs 2)) Warning (Form): Config c2 (#9) has 4 primary slit traces affected by failed open shutters.
(Visit 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 2:1) Warning (Form): The recommended value is 8 Reference Stars for this template.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(6)	SUSPENSE_v10_correct_coords	RA: 10 02 1.3320 (150.5055500d) Dec: +02 27 41.31 (2.46148d) 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: F110W; Readout: NRSRAPIDD6; 6 sources in 4 quads; [Optimal TA Accuracy]	SAME	F110W	ALLOPEN	NRSRAPIDD6	3	1	4	687.153	

Template

TA Method	Obtain Confirmation Images	Science Aperture	Primary Candidate List	Filler Candidate List	Spectral Overlap Map	Spectral Overlap Threshold
MSATA	After Target ACQ	MSA Center	Pimary_Q (34 sources)		jwst-nirspec-g140m	1.5

Reference Stars

Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude
1	127964	150.488012	2.445004	21.4	1	129280	150.480720	2.466934	23.5
1	128805	150.523397	2.459312	22.7	1	129529	150.490780	2.470936	22.8
1	128987	150.524573	2.462062	22.5	1	130339	150.527452	2.483750	23.5

Confirmation

#	Confirmation Type	Conf. Readout Pattern	Conf. Groups/Int	Conf. Integrations/Exp	Conf. Total Integrations	Conf. Total Exposure Time
1	After Target Acq	NRSIRS2	5	1	1	379.311

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 (G140M/F100LP)	c1		150.5078445 Degrees 2.4636411111111 114 Degrees	71.617504560319 6	0.0	0.0	1	2	2946.956
2	1 (G140M/F100LP)	c1		150.5078445 Degrees 2.4636411111111 114 Degrees	71.617492155856 33	0.0	-2.0	1	2	2946.956
3	1 (G140M/F100LP)	c1		150.5078445 Degrees 2.4636411111111 114 Degrees	71.617504560319 6	0.0	0.0	1	2	2946.956
4	1 (G140M/F100LP)	c1		150.5078445 Degrees 2.4636411111111 114 Degrees	71.617492155856 33	0.0	-2.0	1	2	2946.956
5	1 (G140M/F100LP)	c1		150.5078445 Degrees 2.4636411111111 114 Degrees	71.617504560319 6	0.0	0.0	1	2	2946.956
6	1 (G140M/F100LP)	c2		150.507657125 Degrees 2.4642052777777 78 Degrees	71.617497452446 41	0.0	0.0	1	2	2946.956
7	1 (G140M/F100LP)	c2		150.507657125 Degrees 2.4642052777777 78 Degrees	71.617485045232 14	0.0	-2.0	1	2	2946.956
8	1 (G140M/F100LP)	c2		150.507657125 Degrees 2.4642052777777 78 Degrees	71.617497452446 41	0.0	0.0	1	2	2946.956
9	1 (G140M/F100LP)	c2		150.507657125 Degrees 2.4642052777777 78 Degrees	71.617485045232 14	0.0	-2.0	1	2	2946.956
10	1 (G140M/F100LP)	c2		150.507657125 Degrees 2.4642052777777 78 Degrees	71.617497452446 41	0.0	0.0	1	2	2946.956

Special Requirements	
	MSA Scheduled Aperture PA 71.6174 to 71.6174 Degrees (V3 293.04288 to 293.04288) Same Aperture PA 1, 2