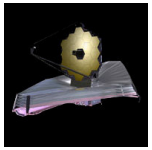

5974 - ORCHIDS: ORigin of the [C II] Halos In Distant Systems

Cycle: 3, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	***Observation***	***Label***	***Observing Template***	***Science Target***
NIRSPEC IFU				
	1	G935H Cristal-05	NIRSpec IFU Spectroscopy	(1) Cristal-05
	2	G935M Cristal-07c	NIRSpec IFU Spectroscopy	(2) Cristal-07c
	3	G935H Cristal-09	NIRSpec IFU Spectroscopy	(3) Cristal-09
	4	G935H Cristal-10	NIRSpec IFU Spectroscopy	(4) Cristal-10
	5	G935M Cristal-21	NIRSpec IFU Spectroscopy	(5) Cristal-21

ABSTRACT

One of the most interesting findings of recent [CII]158um galaxy surveys has been the clear presence of extended [CII] line emission among massive star-forming galaxies at z=4-6, beyond the rest-frame UV and dust continuum emission and extending out to ~10-kpc. Despite being key to understanding the interplay between star formation activity and feedback processes in the circumgalactic medium (CGM), the origin of such [CII] ``halos'' remains enigmatic.

In this proposal, we present a comprehensive program, titled “Origin of the [CII] Halos in Distant Systems” (ORCHIDS), aiming to unravel the nature of these extended [CII] features. Leveraging the capabilities of JWST/NIRSpec and Keck/KCRM IFU observations, we will scrutinize a carefully selected sample of eight massive star-forming galaxies at redshifts z~5-6. These targets have been recently confirmed to exhibit [CII] halos through high-resolution ALMA imaging.

Our observations are designed to rigorously test the most plausible scenarios predicting the nature of [CII] halos. These observations will yield a full characterization of the baryonic cycle in these systems, yielding a unique probe of (i) the kinematics and distribution of the star formation and ionized gas, enabling us to discern outflows, multiple component systems and extended dense atomic and ionized gas in the CGM as the origin for [CII] halos (JWST/NIRSpec + Keck/KCRM); (ii) test associations with Lyman-alpha halos/blobs; (iii) the galaxies’ gas excitation and shocks (JWST/NIRSpec); and (iv) provide resolved measurements of various star-forming tracers.

OBSERVING DESCRIPTION

This proposal will perform NIRSpec/IFU observations in five galaxies at redshifts between 5.1 and 5.7. We will use the combination of grating/filter G395H/F290LP for three of the targets and G395M/F290LP for the other two to detect Hbeta, [OIII], Halpha, and [NII]. We will integrate between 4.5 and 8.3 hours on source.

The JWST observations will be complemented with Keck+KCRM IFU observations to detect the Lyman-alpha emission in and around the galaxies.

In all cases, the goal is to detect the emission lines with high global signal-to-noise ratio in order to search for spatial and kinematical structures.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	Cristal-05	RA: 10 00 9.4222 (150.0392592d) Dec: +02 20 13.84 (2.33718d) Equinox: J2000	Epoch of Position: 2000	
Comments: *Category=Galaxy* *Description=[Lyman-break galaxies]* *Extended=YES*				
(2)	Cristal-07c	RA: 10 00 3.2221 (150.0134254d) Dec: +02 37 37.73 (2.62715d) Equinox: J2000	Epoch of Position: 2000	
Comments: *Category=Galaxy* *Description=[Lyman-break galaxies]* *Extended=YES*				
(3)	Cristal-09	RA: 09 59 0.8927 (149.7537196d) Dec: +02 05 27.57 (2.09099d) Equinox: J2000	Epoch of Position: 2000	
Comments: *Category=Galaxy* *Description=[Lyman-break galaxies]* *Extended=YES*				
(4)	Cristal-10	RA: 10 02 4.1324 (150.5172183d) Dec: +01 55 44.29 (1.92897d) Equinox: J2000	Epoch of Position: 2000	
Comments: *Category=Galaxy* *Description=[Lyman-break galaxies]* *Extended=YES*				
(5)	Cristal-21	RA: 09 59 30.4652 (149.8769383d) Dec: +02 08 2.64 (2.13407d) Equinox: J2000	Epoch of Position: 2000	
Comments: *Category=Galaxy* *Description=[Lyman-break galaxies]* *Extended=YES*				

Observation

Proposal 5974, Observation 1: G935H Cristal-05

Tue Mar 04 00:00:11 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(G935H Cristal-05 (Obs 1)) Warning (Form): A verification image of the target in the IFU using the TA broad-band filter will be acquired. Please note that an image of the target in the science filter can be constructed from the IFU data cube itself, so verification imaging may not be necessary. If neither MSA nor IFU verification imaging is needed, select TA Method = None to omit this imaging.

(G935H Cristal-05 (Obs 1)) Warning (Form): WATA may be a better choice for more accurate placement in the IFU for point-like acquisition targets with positional uncertainty of 0.1 arcsec or less.

(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)	Cristal-05	RA: 10 00 9.4222 (150.0392592d) Dec: +02 20 13.84 (2.33718d) Equinox: J2000	Epoch of Position: 2000	

Comments:
Category=Galaxy
Description=[Lyman-break galaxies]
Extended=YES

Template

TA Method	HFF Readout Mode
VERIFY_ONLY	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	12	

Pointing Verification

#	PV MSA Configuration	Filter	PV Readout Pattern	PV Groups/Int	PV Integrations/Exp	PV Total Dithers	PV Total Integrations	PV Total Exposure Time
1	ALLCLOSED	F140X	NRSIRS2RAPID	20	1	1	1	306.367

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2	20	1	false	true	NONE	12	12	17681.735	178058

Observation

Proposal 5974, Observation 2: G935M Cristal-07c

Tue Mar 04 00:00:11 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(G935M Cristal-07c (Obs 2)) Warning (Form): A verification image of the target in the IFU using the TA broad-band filter will be acquired. Please note that an image of the target in the science filter can be constructed from the IFU data cube itself, so verification imaging may not be necessary. If neither MSA nor IFU verification imaging is needed, select TA Method = None to omit this imaging.

(G935M Cristal-07c (Obs 2)) Warning (Form): WATA may be a better choice for more accurate placement in the IFU for point-like acquisition targets with positional uncertainty of 0.1 arcsec or less.

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(2)	Cristal-07c	RA: 10 00 3.2221 (150.0134254d) Dec: +02 37 37.73 (2.62715d) Equinox: J2000	Epoch of Position: 2000	

Comments:
Category=Galaxy
Description=[Lyman-break galaxies]
Extended=YES

Template

TA Method	HFF Readout Mode
VERIFY_ONLY	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	17	

Pointing Verification

#	PV MSA Configuration	Filter	PV Readout Pattern	PV Groups/Int	PV Integrations/Exp	PV Total Dithers	PV Total Integrations	PV Total Exposure Time
1	ALLCLOSED	F140X	NRSIRS2RAPID	20	1	1	1	306.367

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395M/F290LP	NRSIRS2	20	1	false	true	NONE	17	17	25049.124	178058

Observation

Proposal 5974, Observation 3: G935H Cristal-09

Tue Mar 04 00:00:11 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(G935H Cristal-09 (Obs 3)) Warning (Form): A verification image of the target in the IFU using the TA broad-band filter will be acquired. Please note that an image of the target in the science filter can be constructed from the IFU data cube itself, so verification imaging may not be necessary. If neither MSA nor IFU verification imaging is needed, select TA Method = None to omit this imaging.

(G935H Cristal-09 (Obs 3)) Warning (Form): WATA may be a better choice for more accurate placement in the IFU for point-like acquisition targets with positional uncertainty of 0.1 arcsec or less.

(Visit 3:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	Cristal-09	RA: 09 59 0.8927 (149.7537196d) Dec: +02 05 27.57 (2.09099d) Equinox: J2000	Epoch of Position: 2000	

Comments:
Category=Galaxy
Description=[Lyman-break galaxies]
Extended=YES

Template

TA Method	HFF Readout Mode
VERIFY_ONLY	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	19	

Pointing Verification

#	PV MSA Configuration	Filter	PV Readout Pattern	PV Groups/Int	PV Integrations/Exp	PV Total Dithers	PV Total Integrations	PV Total Exposure Time
1	ALLCLOSED	F140X	NRSIRS2RAPID	20	1	1	1	306.367

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2	20	1	false	true	NONE	19	19	27996.08	178058

Observation

Proposal 5974, Observation 4: G935H Cristal-10

Tue Mar 04 00:00:11 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(G935H Cristal-10 (Obs 4)) Warning (Form): A verification image of the target in the IFU using the TA broad-band filter will be acquired. Please note that an image of the target in the science filter can be constructed from the IFU data cube itself, so verification imaging may not be necessary. If neither MSA nor IFU verification imaging is needed, select TA Method = None to omit this imaging.

(G935H Cristal-10 (Obs 4)) Warning (Form): WATA may be a better choice for more accurate placement in the IFU for point-like acquisition targets with positional uncertainty of 0.1 arcsec or less.

(Visit 4:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(4)	Cristal-10	RA: 10 02 4.1324 (150.5172183d) Dec: +01 55 44.29 (1.92897d) Equinox: J2000	Epoch of Position: 2000	

Comments:
Category=Galaxy
Description=[Lyman-break galaxies]
Extended=YES

Template

TA Method	HFF Readout Mode
VERIFY_ONLY	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	11	

Pointing Verification

#	PV MSA Configuration	Filter	PV Readout Pattern	PV Groups/Int	PV Integrations/Exp	PV Total Dithers	PV Total Integrations	PV Total Exposure Time
1	ALLCLOSED	F140X	NRSIRS2RAPID	20	1	1	1	306.367

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2	20	1	false	true	NONE	11	11	16208.257	178058

Observation

Proposal 5974, Observation 5: G935M Cristal-21 Tue Mar 04 00:00:11 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(G935M Cristal-21 (Obs 5)) Warning (Form): A verification image of the target in the IFU using the TA broad-band filter will be acquired. Please note that an image of the target in the science filter can be constructed from the IFU data cube itself, so verification imaging may not be necessary. If neither MSA nor IFU verification imaging is needed, select TA Method = None to omit this imaging.

(G935M Cristal-21 (Obs 5)) Warning (Form): WATA may be a better choice for more accurate placement in the IFU for point-like acquisition targets with positional uncertainty of 0.1 arcsec or less.

(Visit 5:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(5)	Cristal-21	RA: 09 59 30.4652 (149.8769383d) Dec: +02 08 2.64 (2.13407d) Equinox: J2000	Epoch of Position: 2000	

Comments:
Category=Galaxy
Description=[Lyman-break galaxies]
Extended=YES

Template

TA Method	HFF Readout Mode
VERIFY_ONLY	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	20	

Pointing Verification

#	PV MSA Configuration	Filter	PV Readout Pattern	PV Groups/Int	PV Integrations/Exp	PV Total Dithers	PV Total Integrations	PV Total Exposure Time
1	ALLCLOSED	F140X	NRSIRS2RAPID	20	1	1	1	306.367

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395M/F290LP	NRSIRS2	20	1	false	true	NONE	20	20	29469.558	178058