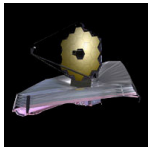

2321 - The first blind H-alpha narrow-band survey of star-formation at z>6

Cycle: 1, Proposal Category: GO

INVESTIGATORS

Name	*Institution*
Prof. Philip N. Best (PI) (ESA Member)	**University of Edinburgh, Institute for Astronomy**
Rachel Cochrane (CoI) (US Admin CoI) (Contact)	Flatiron Institute
Dr. Jorryt Matthee (CoI) (ESA Member)	Institute of Science and Technology Austria
Prof. Ian Smail (CoI) (ESA Member)	Durham Univ.
Dr. David Sobral (CoI) (ESA Member)	Lancaster University
Dr. Yordanka Apostolovski (CoI)	Universidad de Valparaiso
Dr. Kenneth James Duncan (CoI) (ESA Member)	University of Edinburgh, Institute for Astronomy
Prof. James S. Dunlop (CoI) (ESA Member)	University of Edinburgh, Institute for Astronomy
Dr. Jim Geach (CoI) (ESA Member)	University of Hertfordshire
Dr. Edo Ibar (CoI)	Universidad de Valparaiso
Dr. Ali Ahmad Khostovan (CoI)	Rochester Institute of Technology
Prof. Ross McLure (CoI) (ESA Member)	University of Edinburgh, Institute for Astronomy
Dr. John Philip Stott (CoI) (ESA Member)	Lancaster University
Dr. Mark Swinbank (CoI) (ESA Member)	Durham Univ.
Prof. Greg Bryan (CoI)	Columbia University in the City of New York

OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1		NIRCam Imaging	(1) COSMOS-CANDELS
	3		NIRCam Imaging	(1) COSMOS-CANDELS
	4		NIRCam Imaging	(1) COSMOS-CANDELS
	2		NIRCam Imaging	(1) COSMOS-CANDELS

ABSTRACT

We propose to use NIRCam's narrow-band filters to observe a 65 sq. arcmin mosaic in the well-studied COSMOS-CANDELS field, to identify and study ~1000 emission-line selected galaxies across cosmic time. Our primary science driver is the detection of ~40 H-alpha emitters at redshift z>6, using difference imaging between the closely-spaced F466N and F470N filters. The H-alpha emission line is the best-calibrated star-formation indicator in the nearby Universe, and narrow-band surveys have mapped the evolution of H-alpha emitters out to the peak star-formation epoch at z~2. At higher redshift, samples of star-forming galaxies and estimates of the cosmic star-formation rate density are almost ubiquitously based on rest-frame UV observations; this single approach carries a high risk of systematic effects, both in the populations of galaxies selected and in their derived properties. Our proposal will provide the first critical test of this, producing a clean, emission-line selected sample of galaxies in to the Epoch of Reionisation, whose properties will be characterised and compared against UV-selected samples. Simultaneous imaging with the F212N and F200W filters will detect ~200 faint H-alpha emitters at cosmic noon, z~2, probing a factor 5 deeper than any previous study. Using NIRCam's remarkable angular resolution we will measure the ionised gas structures of these galaxies (and hundreds of other line-emitters at z>1.5, including ~10 [OIII] emitters at z=8.3) at sub-kpc resolution and determine how the relationship between UV and ionised gas structures varies with host galaxy properties, in order to delineate the physical processes driving star formation at these reshifts.

OBSERVING DESCRIPTION

This project is concerned with narrow-band imaging of a ~65 square arcmin mosaic in the COSMOS-CANDELS field, using two filter combinations (for difference imaging to detect emission line galaxies). In the long-band, filters F466N and F470N are used. Simultaneously, F212N and F200W are used in the short-band.

The observations are built from a 3x3 mosaic, with 57% column overlaps and 5% row overlaps to ensure a compact contiguous coverage. At each location, 3-point intramodule dithering is used to fill intrachip gaps in the short-band and assist with removal of bad pixels and cosmic rays. The MEDIUM8 strategy (with 9 or 10 groups) is adopted, which gives a data rate well within limits. Overall, this results in an on-sky integration time of around 6000s over the full mosaic, and a factor ~2 longer in the central 40% of the mosaic. The programme is split into two separate observations (F470N with F212N, and F466N with F200W) in order to reduce the required number of filter changes (as requested for NIRCam - although this increases overheads by a few percent).

Matched coverage is essential, so the observations are constrained to the same on-sky position angle. COSMOS has two visibility windows during Cycle 1. Within each window, the telescope roll angle varies only slowly. It changes by around 180 degrees between the two windows. We limit the

on-sky position angle to lie between 105 and 293 degrees. In practice this limits the angle to between 105 and 115 degrees in the April-June 2022 visibility window, and to between 285 and 293 degrees in the Nov 2022 to Jan 2023 window. This restriction introduces no additional scheduling constraints, but ensures that in either case the mosaic remains within the existing ACS+WFC3 coverage.

Proposal 2321 - Targets - The first blind H-alpha narrow-band survey of star-formation at z>6

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	COSMOS-CANDELS	RA: 10 00 30.0000 (150.1250000d) Dec: +02 20 0.00 (2.33333d) Equinox: J2000		

Comments:
Category=Unidentified
Description=[Blank field]
Extended=NO

Observation

Proposal 2321, Observation 1

Mon Dec 04 19:00:20 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Diagnostics

(Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 1:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 1:3) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 1:4) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 1:5) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 1:6) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 1:7) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 1:8) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 1:9) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	COSMOS-CANDELS	RA: 10 00 30.0000 (150.1250000d) Dec: +02 20 0.00 (2.33333d) Equinox: J2000		

Comments:
Category=Unidentified
Description=[Blank field]
Extended=NO

Template

Module	Subarray	Target Placement
ALL	FULL	Module Gap

Mosaic

Rows	Columns	Row Overlap %	Column Overlap %	Row shift (deg)	Column shift (deg)	Tile Order
3	3	5.0	57.0	0.0	0.0	DEFAULT

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	INTRAMODULEX	3	STANDARD		2

Spectral Elements

#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F212N	F470N+F444W	MEDIUM8	10	1	6	6	6313.221	

Special Requirements	
	Group Visits within 53.0 Days Aperture PA Range 105 to 293 Degrees (V3 105.0713531 to 293.0713531) Visits Same PA Same Aperture PA 1, 2 Same Aperture PA 1, 2, 3

Observation

Proposal 2321, Observation 3 Mon Dec 04 19:00:20 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Comments: Observation 3 is a re-submission to pick up missing tiles from the Observation 1 mosaic, which have been approved for re-observation by the TTRB following the original observations being skipped y a JFrame Corruption. Observation 3 has been set to have the same PA as Observations 1 and 2, to ensure it correctly repeats the missing parts of the mosaic. Tiles 5 to 9 are removed as these do not need to be repeated.

Diagnostics

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

(Visit 3:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.

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

(Visit 3:4) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	COSMOS-CANDELS	RA: 10 00 30.0000 (150.1250000d) Dec: +02 20 0.00 (2.33333d) Equinox: J2000		

Comments:
Category=Unidentified
Description=[Blank field]
Extended=NO

Template

Module	Subarray	Target Placement
ALL	FULL	Module Gap

Mosaic

Rows	Columns	Row Overlap %	Column Overlap %	Row shift (deg)	Column shift (deg)	Tile Order
3	3	5.0	57.0	0.0	0.0	HILBERT_CURVE

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	INTRAMODULEX	3	STANDARD		2

Spectral Elements

#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F212N	F470N+F444W	MEDIUM8	10	1	6	6	6313.221	

Special Requirements	
	Group Visits within 53.0 Days Aperture PA Range 105 to 293 Degrees (V3 105.0713531 to 293.0713531) Visits Same PA Same Aperture PA 1, 2, 3

Observation

Proposal 2321, Observation 4 Mon Dec 04 19:00:20 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Comments: Observation 4 is a re-submission to pick up missing tiles from the Observation 1 mosaic, which have been approved for re-observation by the TTRB following the original observations being affected by scattered light. Observation 4 has been set to have the PA 180 degrees rotated from Observation 3 (and hence Obs 1), to ensure it correctly repeats the missing parts of the mosaic. Only 4 tiles are retained as the ones that need to be repeated; numbering is different to Obs 3 due to different PA.

Diagnostics

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

(Visit 4:1) Warning (Form): Visit schedulable, but most scheduling windows are when JWST is pointed in direction of greatest micrometeoroid impact risk. This is likely due to scheduling special requirements.

(Visit 4:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 4:2) Warning (Form): Visit schedulable, but most scheduling windows are when JWST is pointed in direction of greatest micrometeoroid impact risk. This is likely due to scheduling special requirements.

(Visit 4:3) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 4:3) Warning (Form): Visit schedulable, but most scheduling windows are when JWST is pointed in direction of greatest micrometeoroid impact risk. This is likely due to scheduling special requirements.

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

(Visit 4:4) Warning (Form): Visit schedulable, but most scheduling windows are when JWST is pointed in direction of greatest micrometeoroid impact risk. This is likely due to scheduling special requirements.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	COSMOS-CANDELS	RA: 10 00 30.0000 (150.1250000d) Dec: +02 20 0.00 (2.33333d) Equinox: J2000		

Comments:
Category=Unidentified
Description=[Blank field]
Extended=NO

Template

Module	Subarray	Target Placement
ALL	FULL	Module Gap

Mosaic

Rows	Columns	Row Overlap %	Column Overlap %	Row shift (deg)	Column shift (deg)	Tile Order
3	3	5.0	57.0	0.0	0.0	HILBERT_CURVE

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	INTRAMODULEX	3	STANDARD		2

Spectral Elements

#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F212N	F470N+F444W	MEDIUM8	10	1	6	6	6313.221	

Special Requirements	
	Group Visits within 53.0 Days Aperture PA Range 288 to 288 Degrees (V3 288.0713531 to 288.0713531) Visits Same PA

Observation

Proposal 2321, Observation 2

Mon Dec 04 19:00:20 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

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 2:3) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 2:4) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 2:5) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 2:6) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 2:7) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 2:8) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 2:9) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	COSMOS-CANDELS	RA: 10 00 30.0000 (150.1250000d) Dec: +02 20 0.00 (2.33333d) Equinox: J2000		

Comments:
Category=Unidentified
Description=[Blank field]
Extended=NO

Template

Module	Subarray	Target Placement
ALL	FULL	Module Gap

Mosaic

Rows	Columns	Row Overlap %	Column Overlap %	Row shift (deg)	Column shift (deg)	Tile Order
3	3	5.0	57.0	0.0	0.0	DEFAULT

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	INTRAMODULEX	3	STANDARD		2

Spectral Elements

#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F200W	F466N+F444W	MEDIUM8	9	1	6	6	5669.015	

Special Requirements	
	Group Visits within 53.0 Days Aperture PA Range 105 to 293 Degrees (V3 105.0713531 to 293.0713531) Visits Same PA Same Aperture PA 1, 2 Same Aperture PA 1, 2, 3