



11371 - Mapping Reionisation in 3D in the COSMOS field

Cycle: 5, Proposal Category: GO

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OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
Observation Folder				
	1	BasicPlan-3slit-APA24 5-withFillers	NIRSpec MultiObject Spectroscopy	(2) spectro_cat_Ha_OIII_wfillers

ABSTRACT

How the diffuse hydrogen in the intergalactic medium was reionised in less than a billion years after the Big Bang is a major open question of extragalactic astrophysics. In particular, the nature of the sources responsible for reionisation remain unknown despite two decades of studies on the topic. The most promising way forward is to connect the 3D topology of reionisation to the galaxy density field to determine which sources drive the growth of early ionised bubbles. NIRCам WFSS is now revealing galaxy over- and under-densities in numerous legacy extragalactic fields: what is now missing is a systematic mapping of the IGM around these structures. IGM tomography is the holy grail of reionisation studies and was thought to be a distant goal for SKA - but JWST can already do it now.

We propose a sparse mosaic of 20 deep (13ks) NIRSpec/MSA PRISM pointings in COSMOS, targeting ~ 250 $z > 5$ spectroscopically-confirmed H-alpha/[OIII] emitters in the COSMOS-3D footprint. We will detect the Lyman-alpha forest at $\text{SNR} > 5-20$ in 47 individual UV-luminous galaxies spread over 0.33 deg^2 to reconstruct the IGM opacity field directly in 3D. At $z > 6.5$, the (non-)detections of Lyman- emission lines will reveal ionised bubbles and neutral islands. With ancillary imaging and NIRCам/WFSS data in COSMOS(-3D), we will directly correlate the galaxy large-scale structure, the transmission of the Lyman-alpha line and the IGM opacity in absorption to obtain a complete 3D picture of reionisation and its sources in COSMOS. Finally, this proposal will also obtain deep PRISM spectroscopy of > 1200 fillers at all redshifts in the COSMOS field, greatly contributing to the legacy of this iconic field.

OBSERVING DESCRIPTION

We will map COSMOS using a sparse mosaic of 20 pointings centered on spectroscopically confirmed UV-luminous sources detected in COSMOS-3D NIRCам/WFSS observations. The goal is to map the IGM by detecting their Lyman-forest at high signal-to-noise.

Each pointing consists of a deep NIRSspec MSA PRISM observation with 3-point nodding and 3-slitlet-wide slits. We use 30 groups, 2 exposures and NIRSIRS2 readout. Additionally, thousands of filler galaxies at all redshift will be observed with the prime targets, selected from public COSMOS(3D) catalogues. The final masks and fillers will be determined once the APA is known. The data will become immediately public to enable legacy science in the COSMOS field.

Proposal 11371 - Targets - Mapping Reionisation in 3D in the COSMOS field

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(2)	spectro_cat_Ha_OIII_wfillers	RA: 10 00 26.3574 (150.1098225d)		
			Dec: +02 11 13.31 (2.18703d)		
			Equinox: J2000		
		<i>Comments:</i>			
		<i>Description=[]</i>			

Proposal 11371 - Observation 1 - Mapping Reionisation in 3D in the COSMOS field

Thu Mar 26 21:00:55 GMT 2026

Observation	<p>Proposal 11371, Observation 1: BasicPlan-3slit-APA245-withFillers</p> <p>Diagnostic Status: Warning</p> <p>Observing Template: NIRSpec MultiObject Spectroscopy</p>				
Diagnostics	<p>(BasicPlan-3slit-APA245-withFillers (Obs 1)) Warning (Form): Config c1 (#1) has 1 filler slits affected by failed closed shutters.</p> <p>(BasicPlan-3slit-APA245-withFillers (Obs 1)) Warning (Form): Config c16 (#16) has 1 filler slits affected by failed closed shutters.</p> <p>(BasicPlan-3slit-APA245-withFillers (Obs 1)) Warning (Form): Config c19 (#19) has 1 filler slits affected by failed closed shutters.</p> <p>(BasicPlan-3slit-APA245-withFillers (Obs 1)) Warning (Form): Config c20 (#20) has 2 filler slits affected by failed closed shutters.</p> <p>(BasicPlan-3slit-APA245-withFillers (Obs 1)) Warning (Form): Config c6 (#6) has 1 filler slits affected by failed closed shutters.</p> <p>(BasicPlan-3slit-APA245-withFillers (Obs 1)) Warning (Form): Config c7 (#7) has 1 filler slits affected by failed closed shutters.</p> <p>(BasicPlan-3slit-APA245-withFillers (Obs 1)) Warning (Form): Config c9 (#9) has 1 filler slits affected by failed closed shutters.</p> <p>(BasicPlan-3slit-APA245-withFillers (Obs 1)) Warning (Form): Config c9 (#9) has 1 primary slits affected by failed closed shutters.</p> <p>(Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:3) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:4) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:5) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:6) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:7) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:8) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:9) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:10) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:11) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:12) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:13) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:14) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:15) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:16) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:17) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:18) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:19) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 1:20) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p>				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(2)	spectro_cat_Ha_OIII_wfillers	RA: 10 00 26.3574 (150.1098225d) Dec: +02 11 13.31 (2.18703d) Equinox: J2000		
	<i>Comments:</i> <i>Description=[]</i>				

Proposal 11371 - Observation 1 - Mapping Reionisation in 3D in the COSMOS field

	#	Reference Star Bin	Target	Filter	MSA Configuration	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
Acquisition	1		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	2		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	3		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	4		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	5		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	6		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	7		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	8		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	9		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	10		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	11		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	12		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	13		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	14		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	15		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	16		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	17		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	18		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	19		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
	20		SAME	F140X	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
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	No	MSA Center	forest_targets (68 sources)	spectro_cat_Ha_OIII_wfilters (45442 sources)	mwst-nirspec-prism	1.5			

Reference Stars

Proposal 11371 - Observation 1 - Mapping Reionisation in 3D in the COSMOS field

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	3 Shutter Slitlet	150.03510054166 665 Degrees 2.2106841666666 67 Degrees	244.99713088716 25			3	6	13217.534
	2	1 (PRISM/CLEAR)	c2	3 Shutter Slitlet	150.107683625 Degrees 2.3180625 Degrees	244.99969883633 023			3	6	13217.534
	3	1 (PRISM/CLEAR)	c3	3 Shutter Slitlet	149.999197125 Degrees 2.3533347222222 223 Degrees	244.99552283916 532			3	6	13217.534
	4	1 (PRISM/CLEAR)	c4	3 Shutter Slitlet	149.90611054166 664 Degrees 2.1321863888888 89 Degrees	244.99237943586 326			3	6	13217.534
	5	1 (PRISM/CLEAR)	c5	3 Shutter Slitlet	150.267162 Degrees 2.1471830555555 553 Degrees	245.00592786793 578			3	6	13217.534
	6	1 (PRISM/CLEAR)	c6	3 Shutter Slitlet	149.98735816666 667 Degrees 2.0106669444444 445 Degrees	244.99581805827 924			3	6	13217.534
	7	1 (PRISM/CLEAR)	c7	3 Shutter Slitlet	150.04256491666 666 Degrees 2.4838794444444 443 Degrees	244.99705144071 748			3	6	13217.534
	8	1 (PRISM/CLEAR)	c8	3 Shutter Slitlet	150.10799395833 334 Degrees 2.2385194444444 445 Degrees	244.99983486243 568			3	6	13217.534
	9	1 (PRISM/CLEAR)	c9	3 Shutter Slitlet	149.98405808333 33 Degrees 2.2543302777777 776 Degrees	244.99510189327 324			3	6	13217.534
	10	1 (PRISM/CLEAR)	c10	3 Shutter Slitlet	149.97463683333 33 Degrees 2.1825097222222 22 Degrees	244.99488714573 462			3	6	13217.534
	11	1 (PRISM/CLEAR)	c11	3 Shutter Slitlet	150.07410737499 998 Degrees 2.3637169444444 446 Degrees	244.99836809501 343			3	6	13217.534
	12	1 (PRISM/CLEAR)	c12	3 Shutter Slitlet	150.15430133333 33 Degrees 2.1129827777777 78 Degrees	245.00182251704 024			3	6	13217.534
	13	1 (PRISM/CLEAR)	c13	3 Shutter Slitlet	150.176464625 Degrees 2.1049213888888 89 Degrees	245.00266547577 627			3	6	13217.534
14	1 (PRISM/CLEAR)	c14	3 Shutter Slitlet	149.91353358333 333 Degrees 2.3134208333333 333 Degrees	244.99228483941 363			3	6	13217.534	

Proposal 11371 - Observation 1 - Mapping Reionisation in 3D in the COSMOS field

#	Exposure Specification	MSA Configuration	Nod Pattern	Pointing	Aperture PA	Dispersion Offset (Shutters)	Cross-Dispersion Offset (Shutters)	Total Dithers	Total Integrations	Total Exposure Time
15	1 (PRISM/CLEAR)	c15	3 Shutter Slitlet	150.14790225 Degrees 2.0609630555555 554 Degrees	245.00170949471 456			3	6	13217.534
16	1 (PRISM/CLEAR)	c16	3 Shutter Slitlet	149.87657224999 998 Degrees 2.2348958333333 333 Degrees	244.99100158471 072			3	6	13217.534
17	1 (PRISM/CLEAR)	c17	3 Shutter Slitlet	150.00315029166 669 Degrees 2.0425463888888 89 Degrees	244.99632366047 854			3	6	13217.534
18	1 (PRISM/CLEAR)	c18	3 Shutter Slitlet	149.88159529166 666 Degrees 2.1452830555555 553 Degrees	244.99140187431 505			3	6	13217.534
19	1 (PRISM/CLEAR)	c19	3 Shutter Slitlet	149.92927175 Degrees 2.0694180555555 56 Degrees	244.99343543860 71			3	6	13217.534
20	1 (PRISM/CLEAR)	c20	3 Shutter Slitlet	150.30076862500 002 Degrees 2.1934891666666 663 Degrees	245.00707751292 336			3	6	13217.534
Special Requirements	Group Visits within 53.0 Days Aperture PA Range 235 to 250 Degrees (V3 96.4254303 to 111.4254303) Visits Same PA Background Limited. Background no more than 30th percentile above minimum MSA Planned Aperture PA 245.0000 to 245.0000 Degrees (V3 106.4254303 to 106.4254303)									