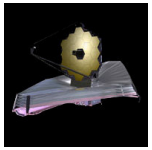

8018 - DIVER: Deep Insights into UV Spectroscopy at the Epoch of Reionization

Cycle: 4, Proposal Category: GO

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	2	prism_2mask_v5_c1_fine_new, prism_2mask_v5_c2_coarse_new	NIRSpec MultiObject Spectroscopy	(4) DIVER_targets_prism_2mask_v5
	1	grating_v6_c1_fine, grating_v6_c2_fine	NIRSpec MultiObject Spectroscopy	(6) DIVER_targets_grating_v6
	3	prism_3mask_v6_new_c1_coarse, prism_3mask_v6_new_c2_fine, prism_3mask_v6_new_c3_fine	NIRSpec MultiObject Spectroscopy	(9) DIVER_targets_prism_3mask_v6new

ABSTRACT

JWST has ushered in a new era for spectroscopic studies of galaxies at the Epoch of Reionization (EoR). Early observations have revealed hard radiation fields and bursty star formation, sometimes accompanied by extreme interstellar medium (ISM) conditions and unusual chemical abundance. High-quality rest-frame UV spectroscopy of EoR galaxies is urgently needed to address the knowledge gap in young stellar populations and nucleosynthesis history in the early Universe, paving the way for future studies on first galaxies. However, such data are very limited even after three cycles, restricting studies to individual cases or stacking analyses.

DIVER will conduct a deep G140M/F070LP spectroscopic survey with unparalleled efficiency in the GOODS-N field, targeting more than 140 galaxies at z=5-9. Complementary PRISM observations will place the observed UV features in a broader context of ISM conditions. Covering key UV lines (e.g., CIV, HeII, CIII], OIII]), DIVER will establish the largest and deepest UV spectral database for EoR galaxies. DIVER will directly (1) clock the star formation history by determining the distribution and redshift evolution of carbon abundance, and (2) probe the prevalence of extremely high electron density and its connection to bursty star formation and chemical peculiarity. DIVER will also lead to various high-profile science including the UV demographics of AGNs and massive stellar populations, and constraining the reionization history through LyA. With great legacy values, DIVER will advance our understanding of star formation and chemical enrichment history in the early Universe, providing a crucial

foundation for studies of z>10 galaxies.

OBSERVING DESCRIPTION

We will conduct NIRSpec multi-object spectroscopy with the G140M/F070LP and PRISM/CLEAR configurations, targeting rest-frame UV spectra of >140 galaxies at z=5-9 in the GOODS-N field.

We chose F070LP over F100LP for its extended blue-end coverage (0.7-1 μm), providing spectra from 0.7 to 1.84 um. The effect of second-order dispersion at >1.27um can be well modeled and removed. The G140M/F070LP observations from the JADES GTO program have demonstrated the feasibility of this approach (Eisenstein et al. 2023). Compared to F100LP, F070LP additionally captures the LyA of galaxies z=4.8-7.0, allowing us to track the reionization history through LyA.

All the targets are spectroscopically confirmed by their [OIII] and Ha through NIRCam/WFSS (GO-1895, 3577). We propose two configurations of G140M/F070LP, allowing spectral overlap to maximize the number of targets. Setting a PA of 45 deg, we will obtain >60 galaxies per mask and at least 130 in total. Among them, 68 targets have high priorities, either at redshift > 6 with predicted CIII] fluxes greater than the detection threshold or with high Hb+OIII EWs (>1000A). We also request five PRISM configurations to maximize the number of targets that have both grating and prism spectra.

We adopt 3-shutter nodding and the NRSIRS2 readout mode for readout noise performance. For G140M/F070LP, we request 21 groups x 2 integrations per exposure and 8 exposures per mask. The on-source time per mask is 21 x 2 x 3 groups (9278.5s) x 8 exposures = 20.6h. For PRISM/CLEAR, we ask for 19 groups x 2 integrations. The on-source time per mask is 8403.2s. The total exposure time would be 41.2h for the two G140M/F070LP masks and 11.7h for the five PRISM/CLEAR.

The requested G140M/F070LP time will achieve 5sigma detection of 3e-19 erg s^-1 cm^-2 for CIII] lines. We opt G140M rather than G140H to ensure the detection rate for weak UV lines while keeping sufficient resolving power. The G140M can resolve CIII] doublets at z>6 (lambda>1.3um) with S/N > 10 (flux > 6e-19 erg s^-1 cm^-2), and identify high electron density scenarios (n_e>1e3 cm^-3). The prism exposure time is set to match that of GO-3215, which has proven adequate for high-quality spectra at z > 5.

We will redesign MSA configurations after the program acceptance to account for changes in the bad-shutter mask.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(4)	DIVER_targets_prism_2mask_v5	RA: 12 36 48.7526 (189.2031358d) Dec: +62 14 0.44 (62.23346d) Equinox: J2000		
Comments: *Description=[]*				
(5)	DIVER_targets_prism_3mask_v5	RA: 12 36 48.7558 (189.2031492d) Dec: +62 14 0.41 (62.23345d) Equinox: J2000		
Comments: *Description=[]*				
(6)	DIVER_targets_grating_v6	RA: 12 36 45.6466 (189.1901942d) Dec: +62 14 28.97 (62.24138d) Equinox: J2000		
Comments: *Description=[]*				
(7)	lrd_1020210	RA: 12 36 49.5360 (189.2064000d) Dec: +62 17 29.54 (62.29154d) Equinox: J2000		
Comments: *Description=[]*				
(8)	DIVER_targets_prism_3mask_v6	RA: 12 36 48.7815 (189.2032562d) Dec: +62 14 0.64 (62.23351d) Equinox: J2000		
Comments: *Description=[]*				
(9)	DIVER_targets_prism_3mask_v6new	RA: 12 36 48.7815 (189.2032562d) Dec: +62 14 0.64 (62.23351d) Equinox: J2000		
Comments: *Description=[]*				

Observation

Proposal 8018, Observation 2: prism_2mask_v5_c1_fine_new, prism_2mask_v5_c2_coarse_new Tue Mar 31 20:02:14 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject Spectroscopy

Diagnostics

(prism_2mask_v5_c1_fine_new, prism_2mask_v5_c2_coarse_new (Obs 2)) Warning (Form): Config c1 : prism_2mask_v5_c2_coarse_new (#2) has 3 filler slits affected by failed closed shutters.

(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.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(4)	DIVER_targets_prism_2mask_v5	RA: 12 36 48.7526 (189.2031358d) Dec: +62 14 0.44 (62.23346d) Equinox: J2000		

Comments:
Description=[]

Acquisition

#	Reference Star Bin	Target	Filter	MSA Configuration	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
1	Filter: CLEAR; Readout: NRSRAPIDD6; 8 sources in 3 quads; [Optimal TA Accuracy]	SAME	CLEAR	Auto Acq MSA Config	NRSRAPIDD6	3	1	4	687.153	
2	Filter: F140X; Readout: NRSRAPIDD6; 8 sources in 4 quads; [Optimal TA Accuracy]	SAME	F140X	Auto Acq MSA Config	NRSRAPIDD6	3	1	4	687.153	

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	c2_prime (88 sources)	c2 (15526 sources)	jwst-nirspec-prism	1.5

Reference Stars

Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude
1	1006654	189.235209	62.245163	24.13	1	1060912	189.191517	62.213986	23.66
1	1025511	189.182535	62.232005	24.89	1	1076208	189.234541	62.191174	24.1
1	1027427	189.230831	62.246837	25.1	1	1083201	189.251277	62.242275	24.83
1	1057200	189.230677	62.203701	23.48	1	1083288	189.267410	62.247804	24.1
Visit	**ID**	**RA**	**Dec**	**Magnitude**	**Visit**	**ID**	**RA**	**Dec**	**Magnitude**
2	1005363	189.130315	62.241334	23.49	2	1031618	189.219760	62.277074	24.32
2	1006059	189.133418	62.243516	24.33	2	1032642	189.091539	62.283910	24.26
2	1014389	189.207296	62.273445	24.29	2	1034922	189.172187	62.298816	23.65
2	1015677	189.099744	62.277419	24.39	2	1035118	189.179376	62.301170	23.78

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 : prism_2mask_v5_c1_fine_new	3 Shutter Slitlet	189.24368441666667 Degrees 62.21805833333333 Degrees	62.32395692521164			3	6	8403.201
2	1 (PRISM/CLEAR)	c1 : prism_2mask_v5_c2_coarse_new	3 Shutter Slitlet	189.15796425 Degrees 62.27293972222222 Degrees	62.24820020100741			3	6	8403.201

Special Requirements

Group Visits within 53.0 Days
Visits Same PA
MSA Scheduled Aperture PA 62.2881 to 62.2881 Degrees (V3 283.71353 to 283.71353)

Observation

Proposal 8018, Observation 1: grating_v6_c1_fine, grating_v6_c2_fine Tue Mar 31 20:02:14 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject Spectroscopy

Diagnostics

(grating_v6_c1_fine, grating_v6_c2_fine (Obs 1)) Warning (Form): Config c1 : grating_v6_c1_fine (#1) has 1 filler slits affected by failed closed shutters.

(grating_v6_c1_fine, grating_v6_c2_fine (Obs 1)) Warning (Form): Config c1 : grating_v6_c1_fine (#2) has 1 filler slits affected by failed closed shutters.

(grating_v6_c1_fine, grating_v6_c2_fine (Obs 1)) Warning (Form): Config c1 : grating_v6_c1_fine (#3) has 1 filler slits affected by failed closed shutters.

(grating_v6_c1_fine, grating_v6_c2_fine (Obs 1)) Warning (Form): Config c1 : grating_v6_c1_fine (#4) has 1 filler slits affected by failed closed shutters.

(grating_v6_c1_fine, grating_v6_c2_fine (Obs 1)) Warning (Form): Line 2 (G140M/F100LP) is currently unused in any Configuration/Pointing.

(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.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(6)	DIVER_targets_grating_v6	RA: 12 36 45.6466 (189.1901942d) Dec: +62 14 28.97 (62.24138d) Equinox: J2000		

Comments:
Description=[]

Acquisition

#	Reference Star Bin	Target	Filter	MSA Configuration	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
1	Filter: CLEAR; Readout: NRSRAPIDD6; 8 sources in 3 quads; [Optimal TA Accuracy]	SAME	CLEAR	Auto Acq MSA Config	NRSRAPIDD6	3	1	4	687.153	
2	Filter: CLEAR; Readout: NRSRAPIDD6; 8 sources in 4 quads; [Optimal TA Accuracy]	SAME	CLEAR	Auto Acq MSA Config	NRSRAPIDD6	3	1	4	687.153	

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	c2_high (93 sources)	c2_filler (572 sources)	jwst-nirspec-mr	1.5

Reference Stars

Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude
1	1012324	189.117722	62.265430	24.3	1	1034856	189.155785	62.298524	24.94
1	1018335	189.181812	62.286015	25.31	1	1088201	189.104780	62.256469	24.21
1	1020220	189.202877	62.291585	25.47	1	1090544	189.204107	62.285435	24.88
1	1029428	189.165730	62.264190	23.93	1	1091470	189.203736	62.307094	25.11
Visit	**ID**	**RA**	**Dec**	**Magnitude**	**Visit**	**ID**	**RA**	**Dec**	**Magnitude**
2	1006654	189.235209	62.245163	24.13	2	1078887	189.274715	62.204193	23.73
2	1057200	189.230677	62.203701	23.48	2	1079691	189.266731	62.209439	24.37
2	1060912	189.191517	62.213986	23.66	2	1083054	189.261374	62.240498	23.63
2	1078108	189.278436	62.206648	24.49	2	1083288	189.267415	62.247801	24.1

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/F070LP)	c1 : grating_v6_c1_fine	3 Shutter Slitlet	189.14080570833335 Degrees 62.27912361111111 Degrees	0.5429204858411601			3	12	18557.068
2	1 (G140M/F070LP)	c1 : grating_v6_c1_fine	3 Shutter Slitlet	189.14080570833335 Degrees 62.27912361111111 Degrees	0.5429204858411601			3	12	18557.068
3	1 (G140M/F070LP)	c1 : grating_v6_c1_fine	3 Shutter Slitlet	189.14080570833335 Degrees 62.27912361111111 Degrees	0.5429204858411601			3	12	18557.068
4	1 (G140M/F070LP)	c1 : grating_v6_c1_fine	3 Shutter Slitlet	189.14080570833335 Degrees 62.27912361111111 Degrees	0.5429204858411601			3	12	18557.068
5	1 (G140M/F070LP)	c1 : grating_v6_c2_fine	3 Shutter Slitlet	189.24727083333332 Degrees 62.223380555555556 Degrees	0.6369886790798555			3	12	18557.068
6	1 (G140M/F070LP)	c1 : grating_v6_c2_fine	3 Shutter Slitlet	189.24727083333332 Degrees 62.223380555555556 Degrees	0.6369886790798555			3	12	18557.068
7	1 (G140M/F070LP)	c1 : grating_v6_c2_fine	3 Shutter Slitlet	189.24727083333332 Degrees 62.223380555555556 Degrees	0.6369886790798555			3	12	18557.068
8	1 (G140M/F070LP)	c1 : grating_v6_c2_fine	3 Shutter Slitlet	189.24727083333332 Degrees 62.223380555555556 Degrees	0.6369886790798555			3	12	18557.068

Special Requirements

Group Visits within 53.0 Days
Visits Same PA
MSA Scheduled Aperture PA 0.5865 to 0.5865 Degrees (V3 222.01198 to 222.01198)

Observation

Proposal 8018, Observation 3: prism_3mask_v6_new_c1_coarse, prism_3mask_v6_new_c2_fine, prism_3mask_v6_new_c3_fine

Tue Mar 31 20:02:14 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject Spectroscopy

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.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(9)	DIVER_targets_prism_3mask_v6new	RA: 12 36 48.7815 (189.2032562d) Dec: +62 14 0.64 (62.23351d) Equinox: J2000		

Comments:
Description=[]

Acquisition

#	Reference Star Bin	Target	Filter	MSA Configuration	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
1	Filter: CLEAR; Readout: NRSRAPIDD6; 8 sources in 4 quads; [Optimal TA Accuracy]	SAME	CLEAR	Auto Acq MSA Config	NRSRAPIDD6	3	1	4	687.153	
2	Filter: F140X; Readout: NRSRAPIDD6; 8 sources in 4 quads; [Optimal TA Accuracy]	SAME	F140X	Auto Acq MSA Config	NRSRAPIDD6	3	1	4	687.153	
3	Filter: CLEAR; Readout: NRSRAPIDD6; 8 sources in 4 quads; [Optimal TA Accuracy]	SAME	CLEAR	Auto Acq MSA Config	NRSRAPIDD6	3	1	4	687.153	

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	c3_super (51 sources)	c3 (17281 sources)	jwst-nirspec-prism	1.5

Reference Stars

Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude
1	1007117	189.214497	62.246516	24.51	1	1078887	189.274715	62.204193	23.73
1	1062573	189.170084	62.219213	24.34	1	1079186	189.256792	62.205869	23.92
1	1064824	189.299071	62.227455	25.16	1	1081871	189.273325	62.223404	24.68
1	1076208	189.234541	62.191174	24.1	1	1083288	189.267410	62.247804	24.1
Visit	**ID**	**RA**	**Dec**	**Magnitude**	**Visit**	**ID**	**RA**	**Dec**	**Magnitude**
2	1012234	189.219751	62.265075	24.53	2	1030779	189.215178	62.273744	23.94
2	1012324	189.117722	62.265430	24.3	2	1032730	189.196899	62.284106	24.61
2	1026265	189.139577	62.238365	24.58	2	1034856	189.155786	62.298521	24.94
2	1028281	189.101549	62.252419	23.63	2	1089674	189.195607	62.273823	24.45
Visit	**ID**	**RA**	**Dec**	**Magnitude**	**Visit**	**ID**	**RA**	**Dec**	**Magnitude**
3	1007117	189.214497	62.246516	24.51	3	1081823	189.234669	62.222705	25.41
3	1030779	189.215178	62.273744	23.94	3	1083054	189.261374	62.240498	23.63
3	1062573	189.170084	62.219213	24.34	3	1083288	189.267410	62.247804	24.1
3	1064009	189.235508	62.224295	24.82	3	1088466	189.251927	62.259376	25.08

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 : prism_3mask_v6_new_c1_coarse	3 Shutter Slitlet	189.24000483333333 Degrees 62.221350833333 33 Degrees	307.5606529029258			3	6	8403.201
2	1 (PRISM/CLEAR)	c1 : prism_3mask_v6_new_c2_fine	3 Shutter Slitlet	189.15080916666665 Degrees 62.268833333333 33 Degrees	307.4817838651127 3			3	6	8403.201
3	1 (PRISM/CLEAR)	c1 : prism_3mask_v6_new_c3_fine	3 Shutter Slitlet	189.22805 Degrees 62.234608333333 334 Degrees	307.5500844539120 6			3	6	8403.201

Special Requirements

After Date 2026.096:20:35:00
Group Visits within 53.0 Days
Visits Same PA
MSA Scheduled Aperture PA 307.5282 to 307.5282 Degrees (V3 168.9536 to 168.9536)