



# 10518 - CEDAR: Characterizing Electron Densities At Reionization

Cycle: 5, Proposal Category: GO

## INVESTIGATORS

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**OBSERVATIONS**

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
Observation Folder				
	9	cy5_allsources_pa5_allowing_overlap_mid_zp_hotfiller	NIRSpec MultiObject Spectroscopy	(12) Full_EGS_MPT_Catalog_cy5

**ABSTRACT**

Understanding the interstellar medium (ISM) of galaxies in the epoch of Reionization is a fundamental, yet incomplete, goal of the JWST mission. Physical conditions of the ISM such as temperature and gas-phase metallicity are dependent on density; given the hundreds of hours in Cycles 1-4 allotted to studies of "direct" temperature-based metallicities, the need for a survey of electron density at  $z>6$  is urgent. We propose 2.5 hr x 4 pointings each of NIRSpec G395H/F290LP and G140H/F100LP spectroscopy of 200 galaxies in the Extended Groth Strip (EGS) to target critical rest-frame UV/optical diagnostic emission lines. In only 29.2 total hours including overheads, we will provide the first statistical sample of multi-phase densities at  $z>6$  by resolving [O II] 3727,3730 and [C III] 1907,1909 with simultaneous tracers of ionization parameter, temperature, and metallicity.

**OBSERVING DESCRIPTION**

We utilize the NIRSpec G395H/F290LP and G140H/F100LP modes to target rest-frame optical and UV spectroscopy at  $z>6$ . We choose an integration of 9234s (~2.5 hours) by 4 MSA configurations for each grating/filter combination across the EGS. We determine our required integration time using the JWST ETC (Calc ID: 221394.9), which corresponds to a minimum 5sigma flux limit of  $5 \times 10^{-19}$  erg s<sup>-1</sup> cm<sup>-2</sup> for both [O II] lines for a  $m_{F356W} = 27.5$  continuum (reasonable given similar setups in other fields, e.g., ID 4246). The 3 shutter slitlets are motivated by the high source density. This setup corresponds to 14 groups/integration with three integration/exposure with a three-nod dither pattern to enable background subtraction. We optimize our MSA configuration to maximize confirmed  $6.7 < z_{\text{spec}} < 8.9$  sources where [O II] and [C III] are

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simultaneously accessible in G395H and G140H, respectively. We select these targets from existing PRISM and M-grating spectroscopic redshifts in the EGS. Our second priority  $z_{\text{spec}} > 9$  and  $4.1 < z_{\text{spec}} < 6.7$  targets will yield at least one density measurement from [O II] or [C III], and we fill remaining shutters with  $z_{\text{phot}} > 6.5$  sources. We maximize our targets even further by allowing multiple sources per row, which is best employed for H-grating observations without continuum detection (i.e., our observations). With no fine tune optimization, a minimum separation of 50 shutters with spectra overlap gives a conservative 160  $z_{\text{spec}}$  and 90  $z_{\text{phot}} > 6.5$  targets. We remain fully flexible in aperture PA and are open to further optimizations in Phase II.

Proposal 10518 - Targets - CEDAR: Characterizing Electron Densities At Reionization

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(12)	Full_EGS_MPT_Catalog_cy5	RA: 14 19 44.8781 (214.9369921d) Dec: +52 53 15.31 (52.88759d) Equinox: J2000		
	<i>Comments:</i> Description=[]				

Proposal 10518 - Observation 9 - CEDAR: Characterizing Electron Densities At Reionization

Fri Mar 13 19:09:25 GMT 2026

<b>Observation</b>	<p><b>Proposal 10518, Observation 9: cy5_allsources_pa5_allowing_overlap_mid_zphotfiller</b></p> <p><b>Diagnostic Status: Warning</b></p> <p>Observing Template: NIRSpec MultiObject Spectroscopy</p>																																																																	
<b>Diagnostics</b>	<p>(cy5_allsources_pa5_allowing_overlap_mid_zphotfiller (Obs 9)) Warning (Form): Config c4 (#7) has 1 filler slits affected by failed closed shutters.</p> <p>(cy5_allsources_pa5_allowing_overlap_mid_zphotfiller (Obs 9)) Warning (Form): Config c4 (#8) has 1 filler slits affected by failed closed shutters.</p> <p>(Visit 9:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 9:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 9:3) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 9:4) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p>																																																																	
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<b>Reference Stars</b>																																																																		

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	#	Exposure Specification	MSA Configuration	Nod Pattern	Pointing	Aperture PA	Dispersion Offset (Shutters)	Cross-Dispersion Offset (Shutters)	Total Dithers	Total Integrations	Total Exposure Time
<b>Spectral Elements</b>	1	1 (G140H/F100LP)	c1	3 Shutter Slitlet	214.861442625 Degrees 52.859733333333 34 Degrees	4.9397925554941 144			3	9	9322.301
	2	2 (G395H/F290LP)	c1	3 Shutter Slitlet	214.861442625 Degrees 52.859733333333 34 Degrees	4.9397925554941 144			3	9	9322.301
	3	1 (G140H/F100LP)	c2	3 Shutter Slitlet	214.97799291666 666 Degrees 52.9469875 Degrees	5.0327498031703 755			3	9	9322.301
	4	2 (G395H/F290LP)	c2	3 Shutter Slitlet	214.97799291666 666 Degrees 52.9469875 Degrees	5.0327498031703 755			3	9	9322.301
	5	1 (G140H/F100LP)	c3	3 Shutter Slitlet	214.81408433333 33 Degrees 52.802296111111 11 Degrees	4.9020098670302 51			3	9	9322.301
	6	2 (G395H/F290LP)	c3	3 Shutter Slitlet	214.81408433333 33 Degrees 52.802296111111 11 Degrees	4.9020098670302 51			3	9	9322.301
	7	1 (G140H/F100LP)	c4	3 Shutter Slitlet	214.968678625 Degrees 52.8986825 Degrees	5.0252607543572 91			3	9	9322.301
	8	2 (G395H/F290LP)	c4	3 Shutter Slitlet	214.968678625 Degrees 52.8986825 Degrees	5.0252607543572 91			3	9	9322.301
<b>Special Requirements</b>	Group Visits within 53.0 Days Visits Same PA MSA Planned Aperture PA 5.0000 to 5.0000 Degrees (V3 226.4254303 to 226.4254303)										