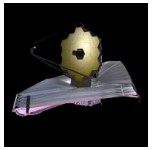

5507 - Deep Spectroscopy of Galaxies at z=4-14: Uncovering Drivers of Early Galaxy Formation and Black Hole Growth

Cycle: 3, Proposal Category: GO

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	2	P1_both	NIRSpec MultiObject Spectroscopy	(1) 5507_MPT_Catalog
	3	P2_both	NIRSpec MultiObject Spectroscopy	(4) 5507_MPT_Catalog_2b

ABSTRACT

The first year of JWST observations has led to many exciting discoveries, with key results challenging previous expectations of the formation and evolution of the early Universe. Such fascinating discoveries include a much higher than anticipated abundance of $z > 9$ galaxies, the presence of

small accreting supermassive black holes in otherwise "ordinary" galaxies, and unpredicted massive galaxies at early times. JWST's spectroscopic capabilities can provide immediate insight into the physical cause behind these surprising results. We propose deep (~8 hr integrations over two pointings) NIRSpec G395M spectroscopy (to restframe EW ~ 10 angstroms) to i) probe high ionization features indicative of top-heavy initial mass functions or accreting supermassive black holes at z > 9; ii) search for accreting supermassive black holes in typical galaxies at z ~ 4-9 detectable via broad Balmer line emission, and iii) probe the stellar-mass growth histories of massive galaxies via absorption line measurements. We can achieve all three goals via this single grating with a 23.3 hr total program, obtaining spectra for a sample of at least 135 galaxies discovered in the CEERS survey.

OBSERVING DESCRIPTION

We will take deep ~8hr NIRSpec G395M/F290LP spectroscopy using the Micro-shutter Array (MSA) for two pointings in the Early Release Science CEERS field. We chose the medium resolution grating/filter pairing over the high resolution option in order to boost our S/N in the same exposure time. To enable more science, we will reconfigure both pointings halfway through their full ~8hr observations to change out sources from our science goals 2 and 3. In the MSA, we use three-shutter slitlets, and use a three-nod dither pattern. The full observation for each pointing is made up of 21 groups/integration, 1 integration/exposure, and three nods, each repeated six times to get to our total integration. We explicitly chose an exposure number that was divisible by 6 such that we can account for the three dithers and our reconfiguration halfway through the full time. We have confirmed in the JWST ETC that this exposure time achieves our desired signal-to-noise for all of our science goals, specifically SNR ~ 5 for an EW~10 A line at m=27.5.

The sample is taken from the CEERS NIRCam imaging, which has an astrometric rms of 10 mas, and is suitable for MSA design. Our initial MSA configurations were derived using the MSA Planning Tool. Our final PAs adhere to the micrometeroid avoidance zone. We do have a special requirement that we observe wihtin +/- 2 degrees of our specifically chosen PAs for each of our two pointings, as minor changes in PA do result in a smaller yield of high priority targets.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	5507_MPT_Catalog	RA: 14 19 44.8781 (214.9369921d) Dec: +52 53 15.31 (52.88759d) Equinox: J2000		
Comments: *Description=[]*				
(2)	5507_MPT_Catalog_1bv2	RA: 14 19 44.8728 (214.9369700d) Dec: +52 53 15.15 (52.88754d) Equinox: J2000		
Comments: *Description=[]*				
(3)	5507_MPT_Catalog_2a	RA: 14 19 44.8781 (214.9369921d) Dec: +52 53 15.31 (52.88759d) Equinox: J2000		
Comments: *Description=[]*				
(4)	5507_MPT_Catalog_2b	RA: 14 19 44.8934 (214.9370558d) Dec: +52 53 15.39 (52.88761d) Equinox: J2000		
Comments: *Description=[]*				

Observation

Proposal 5507, Observation 2: P1_both Mon Feb 10 21:02:13 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject Spectroscopy

Diagnostics

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	5507_MPT_Catalog	RA: 14 19 44.8781 (214.9369921d) Dec: +52 53 15.31 (52.88759d) Equinox: J2000		

Comments:
Description=[]

Acquisition

#	Reference Star Bin	Target	Filter	MSA Configuration	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	Filter: F110W; Readout: NRSRAPIDD6; 8 sources in 4 quads; [Optimal TA Accuracy]	SAME	F110W	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	priority-sources-1av2 (1960 sources)	filler-1av2 (166377 sources)	jwst-nirspec-g395m	1.5

Reference Stars

Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude
1	10785	214.979152	52.894789	22.104	1	22429	214.916720	52.911235	23.879
1	17396	214.943680	52.905060	23.885	1	24685	214.950404	52.946649	22.842
1	19013	214.975481	52.935404	23.790	1	27063	214.910166	52.930536	23.291
1	20891	214.920360	52.905241	22.976	1	31351	214.913295	52.940741	21.508

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 (G395M/F290LP)	c1	3 Shutter Slitlet	214.95784133333333 Degrees 52.9193425 Degrees	3.963954700193484			3	12	15931.068
2	1 (G395M/F290LP)	c2-v2.2	3 Shutter Slitlet	214.95784133333333 Degrees 52.9193425 Degrees	3.963954700193484			3	12	15931.068

Special Requirements	MSA Scheduled Aperture PA 3.9473 to 3.9473 Degrees (V3 225.3727 to 225.3727)

Observation

Proposal 5507, Observation 3: P2_both Mon Feb 10 21:02:13 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject Spectroscopy

Diagnostics

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(4)	5507_MPT_Catalog_2b	RA: 14 19 44.8934 (214.9370558d) Dec: +52 53 15.39 (52.88761d) Equinox: J2000		

Comments:
Description=[]

Acquisition

#	Reference Star Bin	Target	Filter	MSA Configuration	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	Filter: F110W; Readout: NRSRAPIDD6; 8 sources in 3 quads; [Optimal TA Accuracy]	SAME	F110W	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	priority-sources-2bv2 (1960 sources)	fillers-2bv2 (166334 sources)	jwst-nirspec-g395m	1.5

Reference Stars

Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude
1	10983	214.914770	52.849444	22.404	1	26989	214.856741	52.891276	22.812
1	11760	214.908337	52.849239	23.527	1	28987	214.824752	52.888216	22.261
1	15675	214.899696	52.863394	21.925	1	30617	214.843537	52.892474	22.635
1	20834	214.890315	52.882947	23.069	1	30648	214.830040	52.883304	22.876

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 (G395M/F290LP)	c1	3 Shutter Slitlet	214.869935875 Degrees 52.872497222222 22 Degrees	3.958022959383548			3	12	15055.734
2	1 (G395M/F290LP)	c2-v2	3 Shutter Slitlet	214.869935875 Degrees 52.872497222222 22 Degrees	3.958022959383548			3	12	15055.734

Special Requirements	MSA Scheduled Aperture PA 4.0115 to 4.0115 Degrees (V3 225.43698 to 225.43698)