



3859 - Full Characterization of Starlight from a $z=6.4$ Quasar Host Galaxy

Cycle: 2, Proposal Category: GO

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JWST Proposal 3859 (Created: Friday, September 29, 2023 at 6:00:59 PM Eastern Standard Time) - Overview

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OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
NIRCam_multiband				
	1	NIRCam_F115W_F25 0M_updated	NIRCam Imaging	(1) HSCJ2236+0032
	2	NIRCam_F115W_F30 0M_updated	NIRCam Imaging	(1) HSCJ2236+0032
	3	NIRCam_F200W_F44 4W_updated	NIRCam Imaging	(1) HSCJ2236+0032

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
	4	NIRCam_F200W_F480M_updated	NIRCam Imaging	(1) HSCJ2236+0032

ABSTRACT

We propose NIRCam multiband observations of a $z=6.4$ quasar, the host starlight of which was clearly detected in a pilot study with NIRCam F150W + F356W imaging and NIRSpec rest-optical spectroscopy. An eight-filter imaging spectrum of the high-redshift quasar host galaxy will cover from 1,400 to 6,730 angstrom in the rest frame. This rich photometric information enables us to robustly constrain the stellar mass and the stellar population for the first time at $z>6$. The newly proposed six broad+mediumband filters are carefully selected to capture the key features of a galaxy SED such as 4000 angstrom break. A 2D image-modeling technique will be used to subtract the glaring nuclear emission of the quasar from the images. The multiband detection of the quasar host will also be used to confirm a large quasar-galaxy spatial offset detected in the F150W image. We will also map out H-alpha emitting galaxies leveraging the F480M filter in order to characterize the large-scale environment around the billion-solar-mass black hole hosted by a massive galaxy.

OBSERVING DESCRIPTION

This program will carry out NIRCam imaging observations for HSC J2236+0032, a $z=6.4$ low-luminosity quasar, the host starlight of which was detected in Cycle 1 observations (GO #1967) with NIRCam (F150W + F356W) imaging and NIRSpec G395M spectroscopy. In this Cycle 2 program, we will detect the quasar host galaxy in additional three broadband (F115W, F200W, F444W) and three mediumband (F250M, F300M, F480M) filters, after carefully subtracting unresolved nuclear emission of the quasar from the images. We will use a 2D PSF+galaxy decomposition method already tested with the JWST images. This program, combined with the Cycle 1 observations, will provide an imaging spectrum of the host galaxy over rest-frame 1,400 - 6,730 angstrom. This rich photometric information will be used to robustly constrain the stellar mass and stellar populations of the host galaxy. With the F480M filter, we will also select surrounding H-alpha emitting galaxies at the same redshift as the target quasar in order to characterize the large-scale structure. We will detect star-forming galaxies down to an unobscured star-formation rate of 5 Msun/yr with the F480M's 1.1 hours exposure.

Proposal 3859 - Targets - Full Characterization of Starlight from a z=6.4 Quasar Host Galaxy

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(1)	HSCJ2236+0032	RA: 22 36 44.5806 (339.1857525d) Dec: +00 32 56.78 (.54911d) Equinox: J2000 Comments: z=6.40, M1450=-23.8, yAB=23.2, F356W=21.91 (0.04), F150W=22.67 (0.04) Category=Galaxy Description=[Active galactic nuclei, High-redshift galaxies, Quasars] Extended=NO		

Proposal 3859 - Observation 1 - Full Characterization of Starlight from a z=6.4 Quasar Host Galaxy

Fri Sep 29 23:00:59 GMT 2023

Observation	<p>Proposal 3859, Observation 1: NIRCam_F115W_F250M_updated</p> <p>Diagnostic Status: Warning</p> <p>Observing Template: NIRCam Imaging</p>									
Diagnostics	(Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.									
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections			Miscellaneous		
	(1)	HSCJ2236+0032	RA: 22 36 44.5806 (339.1857525d) Dec: +00 32 56.78 (.54911d) Equinox: J2000							
	<p><i>Comments: z=6.40, M1450=-23.8, yAB=23.2, F356W=21.91 (0.04), F150W=22.67 (0.04)</i></p> <p><i>Category=Galaxy</i></p> <p><i>Description=[Active galactic nuclei, High-redshift galaxies, Quasars]</i></p> <p><i>Extended=NO</i></p>									
Template	Module		Subarray			Target Placement				
	ALL		FULL			B Short (on B4)				
Dithers	#	Primary Dither Type		Primary Dithers	Subpixel Dither Type		Dither Size	Subpixel Positions		
	1	INTRAMODULEBOX		4	STANDARD			4		
Spectral Elements	#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
	1	F115W	F250M	MEDIUM8	5	1	16	16	8245.839	146403
Special Requirements	<p>Offset 20.0 arcsec, 30.0 arcsec</p> <p>Fiducial Point Override NRCBS_FULL</p>									

Proposal 3859 - Observation 2 - Full Characterization of Starlight from a z=6.4 Quasar Host Galaxy

Fri Sep 29 23:00:59 GMT 2023

Observation	<p>Proposal 3859, Observation 2: NIRCam_F115W_F300M_updated</p> <p>Diagnostic Status: Warning</p> <p>Observing Template: NIRCam Imaging</p>									
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)	HSCJ2236+0032	RA: 22 36 44.5806 (339.1857525d) Dec: +00 32 56.78 (.54911d) Equinox: J2000							
	<p><i>Comments: z=6.40, M1450=-23.8, yAB=23.2, F356W=21.91 (0.04), F150W=22.67 (0.04)</i></p> <p><i>Category=Galaxy</i></p> <p><i>Description=[Active galactic nuclei, High-redshift galaxies, Quasars]</i></p> <p><i>Extended=NO</i></p>									
Template	Module		Subarray			Target Placement				
	ALL		FULL			B Short (on B4)				
Dithers	#	Primary Dither Type		Primary Dithers	Subpixel Dither Type		Dither Size	Subpixel Positions		
	1	INTRAMODULEBOX		4	STANDARD			4		
Spectral Elements	#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
	1	F115W	F300M	SHALLOW4	5	1	16	16	4122.92	146403
Special Requirements	<p>Offset 20.0 arcsec, 30.0 arcsec</p> <p>Fiducial Point Override NRCBS_FULL</p>									

Proposal 3859 - Observation 3 - Full Characterization of Starlight from a z=6.4 Quasar Host Galaxy

Fri Sep 29 23:00:59 GMT 2023

Observation	<p>Proposal 3859, Observation 3: NIRCam_F200W_F444W_updated</p> <p>Diagnostic Status: Warning</p> <p>Observing Template: NIRCam Imaging</p>									
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		
	(1)	HSCJ2236+0032	RA: 22 36 44.5806 (339.1857525d) Dec: +00 32 56.78 (.54911d) Equinox: J2000							
	<p><i>Comments: z=6.40, M1450=-23.8, yAB=23.2, F356W=21.91 (0.04), F150W=22.67 (0.04)</i></p> <p><i>Category=Galaxy</i></p> <p><i>Description=[Active galactic nuclei, High-redshift galaxies, Quasars]</i></p> <p><i>Extended=NO</i></p>									
Template	Module		Subarray			Target Placement				
	ALL		FULL			B Short (on B4)				
Dithers	#	Primary Dither Type		Primary Dithers		Subpixel Dither Type		Dither Size		Subpixel Positions
	1	INTRAMODULEBOX		4		STANDARD				4
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	F444W	SHALLOW4	7	1	16	16	5840.803	146403
Special Requirements	<p>Offset 20.0 arcsec, 30.0 arcsec</p> <p>Fiducial Point Override NRCBS_FULL</p>									

Proposal 3859 - Observation 4 - Full Characterization of Starlight from a z=6.4 Quasar Host Galaxy

Fri Sep 29 23:00:59 GMT 2023

Observation	<p>Proposal 3859, Observation 4: NIRCam_F200W_F480M_updated</p> <p>Diagnostic Status: Warning</p> <p>Observing Template: NIRCam Imaging</p>									
Diagnostics	(Visit 4:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.									
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections			Miscellaneous		
	(1)	HSCJ2236+0032	RA: 22 36 44.5806 (339.1857525d) Dec: +00 32 56.78 (.54911d) Equinox: J2000							
	<p><i>Comments: z=6.40, M1450=-23.8, yAB=23.2, F356W=21.91 (0.04), F150W=22.67 (0.04)</i></p> <p><i>Category=Galaxy</i></p> <p><i>Description=[Active galactic nuclei, High-redshift galaxies, Quasars]</i></p> <p><i>Extended=NO</i></p>									
Template	Module		Subarray			Target Placement				
	ALL		FULL			B Short (on B4)				
Dithers	#	Primary Dither Type		Primary Dithers	Subpixel Dither Type		Dither Size	Subpixel Positions		
	1	INTRAMODULEBOX		4	STANDARD			4		
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	F480M	SHALLOW4	5	1	16	16	4122.92	146403
Special Requirements	<p>Offset 20.0 arcsec, 30.0 arcsec</p> <p>Fiducial Point Override NRCBS_FULL</p>									