



9637 - A definitive test of the Hubble tension - independent of the local distance ladder

Cycle: 5, Proposal Category: GO

INVESTIGATORS

<i>Name</i>	<i>Institution</i>
Prof. Tommaso L. Treu (PI)	University of California - Los Angeles
Dr. Anowar J Shajib (CoI)	University of Chicago
Prof. Frederic Courbin (CoI) (ESA Member)	Universitat de Barcelona
Dr. Veronica Motta (CoI)	Universidad de Valparaiso
Prof. Sherry H. Suyu (CoI) (ESA Member)	Technical University of Munich
Dr. Martin Millon (CoI) (ESA Member)	University of Geneva, Department of Theoretical Physics
Dr. Dominique Sluse (CoI) (ESA Member)	Universite de Liege
Thomas Schmidt (CoI)	University of California - Los Angeles
Prof. Michele Cappellari (CoI) (ESA Member)	University of Oxford
Prof. Simon Birrer (CoI)	State University of New York at Stony Brook
Mr. Shawn Knabel (CoI)	University of California - Los Angeles
Dr. Massimo Stiavelli (CoI)	Space Telescope Science Institute
Mr. William Sheu (CoI)	University of California - Los Angeles
Mr. Devon Williams (CoI)	University of California - Los Angeles
Dr. Pritom Mozumdar (CoI)	University of California - Los Angeles
Mr. Hadrien Pagnat (CoI)	University of California - Los Angeles
Han Wang (CoI) (ESA Member)	Max Planck Institute for Astrophysics
Dr. Takahiro Morishita (CoI)	Astronomical Institute, Tohoku University
Xiangyu Huang (CoI)	State University of New York at Stony Brook
Dr. Massimo Pascale (CoI)	University of California - Los Angeles
Dr. Daniel Gilman (CoI)	University of Chicago

JWST Proposal 9637 (Created: Wednesday, May 20, 2026, 9:00:13AM Eastern Standard Time) - Overview

Name	Institution
Prof. Anna Nierenberg (CoI)	University of California - Merced
Dr. Aymeric Galan (CoI) (ESA Member)	Technical University of Munich
Dr. Kenneth Wong (CoI)	University of Tokyo

OBSERVATIONS

Folder	Observation	Label	Observing Template	Science Target
PSJ0147				
	11		NIRSpec IFU Spectroscopy	(1) PSJ0147+4630
	201		NIRCam Imaging	(1) PSJ0147+4630
WG0214				
	21		NIRSpec IFU Spectroscopy	(2) WG0214-2105
DESJ0408				
	31		NIRSpec IFU Spectroscopy	(3) J0408-5354
	203		NIRCam Imaging	(3) J0408-5354
J0659				
	41		NIRSpec IFU Spectroscopy	(4) J0659+1629
J0924				
	51		NIRSpec IFU Spectroscopy	(5) J0924+0219
	52		NIRSpec IFU Spectroscopy	(5) J0924+0219
	205		NIRCam Imaging	(5) J0924+0219
GRAL1131				
	61		NIRSpec IFU Spectroscopy	(6) GRAL1131-4419
	206		NIRCam Imaging	(6) GRAL1131-4419
J1433				
	71		NIRSpec IFU Spectroscopy	(7) J1433+6077
	207		NIRCam Imaging	(7) J1433+6077
J1537				
	81		NIRSpec IFU Spectroscopy	(8) J1537-3010
	208		NIRCam Imaging	(8) J1537-3010
PSJ1606				
	91		NIRSpec IFU Spectroscopy	(9) PSJ1606-2333
WGD2100				

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
	101		NIRSpec IFU Spectroscopy	(10) WGD2100-4452
J2205				
	111		NIRSpec IFU Spectroscopy	(11) J2205-3727

ABSTRACT

The Hubble tension - the 8% difference between the Hubble constant (H_0) measured from the local distance ladder and that inferred from early universe probes - has reached a breaking point. Taken at face value, the high-statistical significance implies that new physics is needed, such as new particles or early dark energy. The alternative is that one or more methods are affected by unknown systematic errors. What is needed to break the deadlock is a completely independent measurement with sufficient precision to confirm or refute the tension.

Strong lensing gravitational time delays offer the way forward. Recent work has demonstrated the power of JWST NIRSpec stellar kinematics to break the mass-sheet degeneracy (MSD), measuring H_0 with a conservative 4.5% precision, by relaxing the common assumptions on the mass density profiles of the lens galaxy. The measurement is in excellent agreement with SH0Es, but still consistent with the early universe value at 2-3sigma, given the uncertainties.

In order to achieve 1.5% precision, sufficient to distinguish SH0ES and Planck at 5-sigma, NIRSpec IFU data for 18 lenses are needed. Data for 7 are available in the archive. We will obtain NIRSpec-IFU for additional 11 lenses (and NIRcam imaging for 6 of them) for which time delays and other ancillary data are in hand. Only JWST has sufficient angular resolution, PSF stability, and sensitivity to deliver the stellar kinematic maps needed to break the MSD and the mass-anisotropy degeneracy and get a definitive answer.

The data will also enable studies of massive galaxy evolution, of the lensed black hole and host galaxy correlation, and of the nature of dark matter.

OBSERVING DESCRIPTION

We will obtain deep spectroscopic observations with the NIRSpec IFU of 11 galaxies lensing quasars with measured time delays. The spectra will be used to measure spatially resolved kinematics, and, in combination with existing data, measure the Hubble constant to 1.5% precision. We will employ the G140M/F100LP disperser/filter set-up to target the Ca II triplet features, which are shifted into the near-infrared given the redshifts of the lens galaxies. For some of the lens galaxies, effective radii and lensed QSO images fit within one single IFU field of view. For others we need a four point mosaic to expand the fov. For each position, we apply a standard four-point dither pattern to eliminate defects and cosmic ray hits. In any case we will obtain at least 16 separate pointings in order to properly sample the PSF and remove defects. The NRSIRS2 readout pattern is adopted, as

recommended for long integrations on faint objects. The exposure time is calculated to reach S/N of 20/AA rest frame out to the effective radius, which is necessary to measure stellar velocity dispersion with 5% precision, keep covariance between spatial bins and systematic errors below 1%, and meet our target precision on H0. For the 3 systems with longer integrations the observations have been split into two visits to improve scheduling.

For 6 of the systems, we request deep images with NIRCcam in the F150W and F356W filters. The choice of filter results from the best compromise between image resolution and the brightness of the high-redshift host galaxy. We will use the requested images to improve the lens models and the tracing of the surface brightness for dynamical model.

We apply a standard four-point dither pattern to mitigate detector defects and improve the final resolution of the images. We will use a combination of short exposures with fast readout on the SUB640 subarray and longer exposures on the full array. This strategy will allow us to mitigate the saturation of the bright quasar images while having enough stars in the large field-of-view exposures to reconstruct the PSF.

The NIRCcam exposure time is calculated to reach an SNR of at least 40 per pixel in the Einstein rings, which contain most of the lensing signal.

Proposal 9637 - Targets - A definitive test of the Hubble tension - independent of the local distance ladder

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(1)	PSJ0147+4630	RA: 01 47 10.1647 (26.7923529d) Dec: +46 30 42.51 (46.51181d) Equinox: J2000		
	Comments: Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]				
	(2)	WG0214-2105	RA: 02 14 16.3590 (33.5681625d) Dec: -21 05 35.15 (-21.09310d) Equinox: J2000		
	Comments: Coordinates from Gaia Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]				
	(3)	J0408-5354	RA: 04 08 21.7036 (62.0904317d) Dec: -53 53 59.57 (-53.89988d) Equinox: J2000		
	Comments: Category=Galaxy Description=[Elliptical galaxies]				
	(4)	J0659+1629	RA: 06 59 3.9911 (104.7666296d) Dec: +16 29 9.18 (16.48588d) Equinox: J2000		
	Comments: Coordinates from Gaia Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]				
	(5)	J0924+0219	RA: 09 24 55.8575 (141.2327396d) Dec: +02 19 24.69 (2.32352d) Equinox: J2000		
	Comments: Coordinates from Gaia Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]				
	(6)	GRAL1131-4419	RA: 11 31 0.0054 (172.7500225d) Dec: -44 20 0.05 (-44.33335d) Equinox: J2000		
	Comments: Coordinates from Gaia Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]				
	(7)	J1433+6077	RA: 14 33 22.8429 (218.3451788d) Dec: +60 07 14.94 (60.12082d) Equinox: J2000		
	Comments: Coordinates from Gaia Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]				
	(8)	J1537-3010	RA: 15 37 25.3403 (234.3555846d) Dec: -30 10 16.66 (-30.17129d) Equinox: J2000		
	Comments: Coordinates from Gaia Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]				

Proposal 9637 - Targets - A definitive test of the Hubble tension - independent of the local distance ladder

(9)	PSJ1606-2333	RA: 16 06 0.2334 (241.5009725d) Dec: -23 33 21.79 (-23.55605d) Equinox: J2000
Comments: Coordinates from Gaia Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]		
(10)	WGD2100-4452	RA: 21 00 14.8909 (315.0620454d) Dec: -44 52 6.47 (-44.86846d) Equinox: J2000
Comments: Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]		
(11)	J2205-3727	RA: 22 05 44.2827 (331.4345113d) Dec: -37 27 1.45 (-37.45040d) Equinox: J2000
Comments: Coordinates from Gaia Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]		

Proposal 9637 - Observation 11 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 11											Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning											
	Observing Template: NIRSpec IFU Spectroscopy											
Diagnostics	(Visit 11:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.											
Fixed Targets	#	Name	Target Coordinates				Targ. Coord. Corrections			Miscellaneous		
	(1)	PSJ0147+4630	RA: 01 47 10.1647 (26.7923529d) Dec: +46 30 42.51 (46.51181d) Equinox: J2000									
	Comments: Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]											
Template	TA Method						HFF Readout Mode					
	NONE						false					
Mosaic	Rows	Columns	Row Overlap %		Column Overlap %		Row shift (deg)		Column shift (deg)		Tile Order	
	2	2	50.0		60.0		-10.0		0.0		DEFAULT	
Dithers	#	Dither Type		Size		Starting Point		Number of Points		Points		
	1	4-POINT-DITHER										
Spectral Elements	#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
	1	G140M/F100LP	NRSIRS2RAPID	20	1	false	true	NONE	4	4	1225.467	
Special Requirements	Aperture PA Range 198.97164917 to 238.97164917 Degrees (V3 60.0 to 100.0)											

Proposal 9637 - Observation 201 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 201 Diagnostic Status: Warning Observing Template: NIRCam Imaging										Wed May 20 14:00:13 GMT 2026
Diagnostics	(Visit 201:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous		
	(1)	PSJ0147+4630	RA: 01 47 10.1647 (26.7923529d) Dec: +46 30 42.51 (46.51181d) Equinox: J2000								
	Comments: Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]										
Template	Module		Subarray				Target Placement				
	ALL		FULL				Detector B1 (compact source)				
Dithers	#	Primary Dither Type		Primary Dithers		Subpixel Dither Type		Dither Size		Subpixel Positions	
	1	NONE				STANDARD				4	
Spectral Elements	#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	Optional ETC ID	
	1	F150W	F356W	RAPID	2	2	8	4	214.735		
	2	F150W	F356W	SHALLOW2	6	3	12	4	3564.608		
Special Requirements	Fiducial Point Override NRCB1_FULL										

Proposal 9637 - Observation 21 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 21											Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning											
	Observing Template: NIRSpec IFU Spectroscopy											
Diagnostics	(Visit 21:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.											
Fixed Targets	#	Name	Target Coordinates				Targ. Coord. Corrections			Miscellaneous		
	(2)	WG0214-2105	RA: 02 14 16.3590 (33.5681625d) Dec: -21 05 35.15 (-21.09310d) Equinox: J2000									
	Comments: Coordinates from Gaia Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]											
Template	TA Method						HFF Readout Mode					
	NONE						false					
Mosaic	Rows	Columns	Row Overlap %		Column Overlap %		Row shift (deg)		Column shift (deg)		Tile Order	
	2	2	60.0		60.0		0.0		0.0		DEFAULT	
Dithers	#	Dither Type		Size		Starting Point		Number of Points		Points		
	1	4-POINT-DITHER										
Spectral Elements	#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
	1	G140M/F100LP	NRSIRS2	16	2	false	true	NONE	4	8	9453.601	
Special Requirements	Aperture PA Range 163.97164917 to 213.97164917 Degrees (V3 25.0 to 75.0)											

Proposal 9637 - Observation 31 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 31											Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning											
	Observing Template: NIRSpec IFU Spectroscopy											
Diagnostics	(Visit 31:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.											
Fixed Targets	#	Name	Target Coordinates				Targ. Coord. Corrections			Miscellaneous		
	(3)	J0408-5354	RA: 04 08 21.7036 (62.0904317d) Dec: -53 53 59.57 (-53.89988d) Equinox: J2000 Comments: Category=Galaxy Description=[Elliptical galaxies]									
Template	TA Method						HFF Readout Mode					
	NONE						false					
Mosaic	Rows	Columns	Row Overlap %		Column Overlap %		Row shift (deg)		Column shift (deg)		Tile Order	
	2	2	35.0		50.0		-10.0		-30.0		DEFAULT	
Dithers	#	Dither Type		Size		Starting Point		Number of Points		Points		
	1	4-POINT-DITHER										
Spectral Elements	#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
	1	G140M/F100LP	NRSIRS2	25	2	false	true	NONE	4	8	14705.601	
Special Requirements	Aperture PA Range 123 to 145 Degrees (V3 344.02835083 to 6.02835083)											

Proposal 9637 - Observation 203 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 203									Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning									
	Observing Template: NIRCam Imaging									
Diagnostics	(Visit 203:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.									
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous	
	(3)	J0408-5354	RA: 04 08 21.7036 (62.0904317d) Dec: -53 53 59.57 (-53.89988d) Equinox: J2000							
	Comments: Category=Galaxy Description=[Elliptical galaxies]									
Template	Module		Subarray				Target Placement			
	ALL		FULL				Detector B1 (compact source)			
Dithers	#	Primary Dither Type		Primary Dithers		Subpixel Dither Type		Dither Size		Subpixel Positions
	1	NONE				STANDARD				4
Spectral Elements	#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	Optional ETC ID
	1	F150W	F356W	RAPID	2	2	8	4	214.735	
	2	F150W	F356W	SHALLOW2	6	3	12	4	3564.608	
Special Requirements	Fiducial Point Override NRCB1_FULL									

Proposal 9637 - Observation 41 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 41											Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning											
	Observing Template: NIRSpec IFU Spectroscopy											
Diagnostics	(Visit 41:1) Warning (Form): Data Excess over lower threshold											
	(Visit 41:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.											
Fixed Targets	#	Name	Target Coordinates				Targ. Coord. Corrections			Miscellaneous		
	(4)	J0659+1629	RA: 06 59 3.9911 (104.7666296d) Dec: +16 29 9.18 (16.48588d) Equinox: J2000									
	Comments: Coordinates from Gaia											
	Category=Galaxy											
Template	Description=[Einstein rings, Elliptical galaxies, Quasars]											
	TA Method						HFF Readout Mode					
	NONE						false					
Mosaic	Rows	Columns	Row Overlap %		Column Overlap %		Row shift (deg)		Column shift (deg)		Tile Order	
	3	2	50.0		55.0		25.0		-25.0		ROW_ORDER	
Dithers	#	Dither Type			Size		Starting Point		Number of Points		Points	
	1	4-POINT-DITHER										
Spectral Elements	#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
	1	G140M/F100LP	NRSIRS2RAPID	40	1	false	true	NONE	4	4	2392.578	
Special Requirements	Aperture PA Range 218.97164917 to 238.97164917 Degrees (V3 80.0 to 100.0)											

Proposal 9637 - Observation 51 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 51												Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning												
	Observing Template: NIRSpec IFU Spectroscopy												
Diagnostics	(Visit 51:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.												
Fixed Targets	#	Name	Target Coordinates				Targ. Coord. Corrections				Miscellaneous		
	(5)	J0924+0219	RA: 09 24 55.8575 (141.2327396d)										
			Dec: +02 19 24.69 (2.32352d)										
			Equinox: J2000										
Template	Comments: Coordinates from Gaia												
	Category=Galaxy												
	Description=[Einstein rings, Elliptical galaxies, Quasars]												
Mosaic	TA Method												
	HFF Readout Mode												
	NONE												
	false												
Mosaic	Rows	Columns	Row Overlap %		Column Overlap %		Row shift (deg)		Column shift (deg)		Tile Order		
	2	2	90.0		90.0		0.0		0.0		DEFAULT		
Dithers	#	Dither Type		Size		Starting Point		Number of Points		Points			
	1	4-POINT-DITHER											
Spectral Elements	#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID	
	1	G140M/F100LP	NRSIRS2	20	2	false	true	NONE	4	8	11787.823		
Special Requirements	Aperture PA Range 228.97164917 to 253.97164917 Degrees (V3 90.0 to 115.0)												

Proposal 9637 - Observation 52 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 52											Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning											
	Observing Template: NIRSpec IFU Spectroscopy											
Diagnostics	(Visit 52:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.											
Fixed Targets	#	Name	Target Coordinates				Targ. Coord. Corrections			Miscellaneous		
	(5)	J0924+0219	RA: 09 24 55.8575 (141.2327396d) Dec: +02 19 24.69 (2.32352d) Equinox: J2000 <i>Comments: Coordinates from Gaia</i> <i>Category=Galaxy</i> <i>Description=[Einstein rings, Elliptical galaxies, Quasars]</i>									
Template	TA Method						HFF Readout Mode					
	NONE						false					
Mosaic	Rows	Columns	Row Overlap %		Column Overlap %		Row shift (deg)		Column shift (deg)		Tile Order	
	2	2	90.0		90.0		0.0		0.0		DEFAULT	
Dithers	#	Dither Type		Size		Starting Point			Number of Points		Points	
	1	4-POINT-DITHER										
Spectral Elements	#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
	1	G140M/F100LP	NRSIRS2	20	2	false	true	NONE	4	8	11787.823	
Special Requirements	Aperture PA Range 228.97164917 to 253.97164917 Degrees (V3 90.0 to 115.0)											

Proposal 9637 - Observation 205 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 205										Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning										
	Observing Template: NIRCam Imaging										
Diagnostics	(Visit 205:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous		
	(5)	J0924+0219	RA: 09 24 55.8575 (141.2327396d) Dec: +02 19 24.69 (2.32352d) Equinox: J2000								
	Comments: Coordinates from Gaia Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]										
Template	Module			Subarray			Target Placement				
	ALL			FULL			Detector B1 (compact source)				
Dithers	#	Primary Dither Type		Primary Dithers		Subpixel Dither Type		Dither Size		Subpixel Positions	
	1	NONE				STANDARD				4	
Spectral Elements	#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	Optional ETC ID	
	1	F150W	F356W	RAPID	2	2	8	4	214.735		
	2	F150W	F356W	SHALLOW2	6	3	12	4	3564.608		
Special Requirements	Fiducial Point Override NRCB1_FULL										

Proposal 9637 - Observation 61 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 61											Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning											
	Observing Template: NIRSpec IFU Spectroscopy											
Diagnostics	(Visit 61:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.											
Fixed Targets	#	Name	Target Coordinates				Targ. Coord. Corrections			Miscellaneous		
	(6)	GRAL1131-4419	RA: 11 31 0.0054 (172.7500225d)									
			Dec: -44 20 0.05 (-44.33335d)									
			Equinox: J2000									
Template	Comments: Coordinates from Gaia											
	Category=Galaxy											
	Description=[Einstein rings, Elliptical galaxies, Quasars]											
Mosaic	TA Method				HFF Readout Mode							
	NONE				false							
Dithers	Rows	Columns	Row Overlap %		Column Overlap %		Row shift (deg)		Column shift (deg)		Tile Order	
	2	2	90.0		90.0		0.0		0.0		DEFAULT	
Spectral Elements	#	Dither Type		Size		Starting Point		Number of Points		Points		
	1	4-POINT-DITHER										
Special Requirements	#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
	1	G140M/F100LP	NRSIRS2RAPID	20	1	false	true	NONE	4	4	1225.467	
	Aperture PA Range 198.97164917 to 268.97164917 Degrees (V3 60.0 to 130.0)											

Proposal 9637 - Observation 206 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 206										Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning										
	Observing Template: NIRCcam Imaging										
Diagnostics	(Visit 206:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous		
	(6)	GRAL1131-4419	RA: 11 31 0.0054 (172.7500225d) Dec: -44 20 0.05 (-44.33335d) Equinox: J2000								
	Comments: Coordinates from Gaia Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]										
Template	Module		Subarray				Target Placement				
	ALL		FULL				Detector B1 (compact source)				
Dithers	#	Primary Dither Type		Primary Dithers		Subpixel Dither Type		Dither Size		Subpixel Positions	
	1	NONE				STANDARD				4	
Spectral Elements	#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	Optional ETC ID	
	1	F150W	F356W	RAPID	2	2	8	4	214.735		
	2	F150W	F356W	SHALLOW2	6	3	12	4	3564.608		
Special Requirements	Fiducial Point Override NRCB1_FULL										

Proposal 9637 - Observation 71 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 71											Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning											
	Observing Template: NIRSpec IFU Spectroscopy											
Diagnostics	(Visit 71:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.											
Fixed Targets	#	Name	Target Coordinates				Targ. Coord. Corrections			Miscellaneous		
	(7)	J1433+6077	RA: 14 33 22.8429 (218.3451788d)									
			Dec: +60 07 14.94 (60.12082d)									
			Equinox: J2000									
Template	Comments: Coordinates from Gaia											
	Category=Galaxy											
	Description=[Einstein rings, Elliptical galaxies, Quasars]											
Template	TA Method						HFF Readout Mode					
	NONE						false					
Mosaic	Rows	Columns	Row Overlap %		Column Overlap %		Row shift (deg)		Column shift (deg)		Tile Order	
	2	2	40.0		40.0		0.0		0.0		DEFAULT	
Dithers	#	Dither Type			Size		Starting Point		Number of Points		Points	
	1	4-POINT-DITHER										
Spectral Elements	#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
	1	G140M/F100LP	NRSIRS2RAPID	35	1	false	true	NONE	4	4	2100.8	
Special Requirements	Aperture PA Range 263.97164917 to 53.97164917 Degrees (V3 125.0 to 275.0)											

Proposal 9637 - Observation 207 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 207										Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning										
	Observing Template: NIRCam Imaging										
Diagnostics	(Visit 207:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous		
	(7)	J1433+6077	RA: 14 33 22.8429 (218.3451788d) Dec: +60 07 14.94 (60.12082d) Equinox: J2000								
	Comments: Coordinates from Gaia Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]										
Template	Module		Subarray				Target Placement				
	ALL		FULL				Detector B1 (compact source)				
Dithers	#	Primary Dither Type		Primary Dithers		Subpixel Dither Type		Dither Size		Subpixel Positions	
	1	NONE				STANDARD				4	
Spectral Elements	#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	Optional ETC ID	
	1	F150W	F356W	RAPID	2	2	8	4	214.735		
	2	F150W	F356W	SHALLOW2	6	3	12	4	3564.608		
Special Requirements	Fiducial Point Override NRCB1_FULL										

Proposal 9637 - Observation 81 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 81											Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning											
	Observing Template: NIRSpec IFU Spectroscopy											
Diagnostics	(Visit 81:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.											
Fixed Targets	#	Name	Target Coordinates				Targ. Coord. Corrections			Miscellaneous		
	(8)	J1537-3010	RA: 15 37 25.3403 (234.3555846d)									
			Dec: -30 10 16.66 (-30.17129d)									
			Equinox: J2000									
Template	Comments: Coordinates from Gaia											
	Category=Galaxy											
	Description=[Einstein rings, Elliptical galaxies, Quasars]											
Template	TA Method						HFF Readout Mode					
	NONE						false					
Mosaic	Rows	Columns	Row Overlap %		Column Overlap %		Row shift (deg)		Column shift (deg)		Tile Order	
	2	2	40.0		50.0		0.0		-20.0		DEFAULT	
Dithers	#	Dither Type			Size		Starting Point		Number of Points		Points	
	1	4-POINT-DITHER										
Spectral Elements	#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
	1	G140M/F100LP	NRSIRS2	20	2	false	true	NONE	4	8	11787.823	
Special Requirements	Aperture PA Range 223.97164917 to 248.97164917 Degrees (V3 85.0 to 110.0)											

Proposal 9637 - Observation 208 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 208										Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning										
	Observing Template: NIRCам Imaging										
Diagnostics	(Visit 208:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous		
	(8)	J1537-3010	RA: 15 37 25.3403 (234.3555846d) Dec: -30 10 16.66 (-30.17129d) Equinox: J2000								
	Comments: Coordinates from Gaia Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]										
Template	Module		Subarray				Target Placement				
	ALL		FULL				Detector B1 (compact source)				
Dithers	#	Primary Dither Type		Primary Dithers		Subpixel Dither Type		Dither Size		Subpixel Positions	
	1	NONE				STANDARD				4	
Spectral Elements	#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	Optional ETC ID	
	1	F150W	F356W	RAPID	2	2	8	4	214.735		
	2	F150W	F356W	SHALLOW2	6	3	12	4	3564.608		
Special Requirements	Fiducial Point Override NRCB1_FULL										

Proposal 9637 - Observation 91 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 91											Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning											
	Observing Template: NIRSpec IFU Spectroscopy											
Diagnostics	(Visit 91:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.											
Fixed Targets	#	Name	Target Coordinates				Targ. Coord. Corrections			Miscellaneous		
	(9)	PSJ1606-2333	RA: 16 06 0.2334 (241.5009725d)									
			Dec: -23 33 21.79 (-23.55605d)									
			Equinox: J2000									
Template	Comments: Coordinates from Gaia											
	Category=Galaxy											
	Description=[Einstein rings, Elliptical galaxies, Quasars]											
Mosaic	TA Method											
	HFF Readout Mode											
	NONE											
	false											
Mosaic	Rows	Columns	Row Overlap %		Column Overlap %		Row shift (deg)		Column shift (deg)		Tile Order	
	2	2	80.0		50.0		0.0		0.0		DEFAULT	
Dithers	#	Dither Type		Size		Starting Point		Number of Points		Points		
	1	4-POINT-DITHER										
Spectral Elements	#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
	1	G140M/F100LP	NRSIRS2	25	2	false	true	NONE	4	8	14705.601	
Special Requirements	Aperture PA Range 228.97164917 to 243.97164917 Degrees (V3 90.0 to 105.0)											

Proposal 9637 - Observation 101 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 101											Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning											
	Observing Template: NIRSpec IFU Spectroscopy											
Diagnostics	(Visit 101:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.											
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous			
	(10)	WGD2100-4452	RA: 21 00 14.8909 (315.0620454d) Dec: -44 52 6.47 (-44.86846d) Equinox: J2000									
	Comments: Category=Galaxy Description=[Einstein rings, Elliptical galaxies, Quasars]											
Template	TA Method						HFF Readout Mode					
	NONE						false					
Mosaic	Rows	Columns	Row Overlap %		Column Overlap %		Row shift (deg)		Column shift (deg)		Tile Order	
	2	2	70.0		70.0		0.0		0.0		DEFAULT	
Dithers	#	Dither Type		Size		Starting Point		Number of Points		Points		
	1	4-POINT-DITHER										
Spectral Elements	#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
	1	G140M/F100LP	NRSIRS2RAPID	20	1	false	true	NONE	4	4	1225.467	
Special Requirements	Aperture PA Range 173.97164917 to 218.97164917 Degrees (V3 35.0 to 80.0)											

Proposal 9637 - Observation 111 - A definitive test of the Hubble tension - independent of the local distance ladder

Observation	Proposal 9637, Observation 111											Wed May 20 14:00:13 GMT 2026
	Diagnostic Status: Warning Observing Template: NIRSpec IFU Spectroscopy											
Diagnostics	(Visit 111:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.											
Fixed Targets	#	Name	Target Coordinates				Targ. Coord. Corrections			Miscellaneous		
	(11)	J2205-3727	RA: 22 05 44.2827 (331.4345113d) Dec: -37 27 1.45 (-37.45040d) Equinox: J2000 <i>Comments: Coordinates from Gaia</i> <i>Category=Galaxy</i> <i>Description=[Einstein rings, Elliptical galaxies, Quasars]</i>									
Template	TA Method						HFF Readout Mode					
	NONE						false					
Mosaic	Rows	Columns	Row Overlap %		Column Overlap %		Row shift (deg)		Column shift (deg)		Tile Order	
	2	2	90.0		90.0		0.0		0.0		DEFAULT	
Dithers	#	Dither Type		Size		Starting Point			Number of Points		Points	
	1	4-POINT-DITHER										
Spectral Elements	#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
	1	G140M/F100LP	NRSIRS2	15	1	false	true	NONE	4	4	4435.023	
Special Requirements	Aperture PA Range 173.97164917 to 213.97164917 Degrees (V3 35.0 to 75.0)											