



4568 - Pioneering Precision: Advancing Cosmology with the First Statistical Sample of Gravitationally Lensed Supernovae

Cycle: 2, Proposal Category: GO

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JWST Proposal 4568 (Created: Wednesday, July 1, 2026, 11:00:56AM Eastern Standard Time) - Overview

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OBSERVATIONS

Folder	Observation	Label	Observing Template	Science Target
Observation Folder				
	1	MSA_A370_ObsPlan	NIRSpec MultiObject Spectroscopy	(12) A370_MSA_catalog_20250106
	4	MSA_A370_ObsPlan_final_final	NIRSpec MultiObject Spectroscopy	(12) A370_MSA_catalog_20250106
	8	MSA_MJ0308_final_cleaned_final_06	NIRSpec MultiObject Spectroscopy	(18) combined_msa_catalog
	9	mj0417_msa_mask	NIRSpec MultiObject Spectroscopy	(19) mj0417_v1

ABSTRACT

There is a 5-sigma tension between local measurements of the Hubble constant (H_0) from Type Ia supernovae (SNe Ia), and the value inferred using late universe constraints from the cosmic microwave background (CMB). Independent measurements of H_0 can help resolve the tension by agreeing with one method or the other, but a $\sim 2.7\%$ uncertainty is needed to distinguish between the values. The first H_0 measurement from observing the multiple images of a gravitationally lensed SN (gLSN) was recently made using SN Refsdal (6% precision), paving the way for gLSNe to realize their promise as precise and single-step cosmological probes. This program will pursue complete follow-up campaigns for up to three gLSNe using target of opportunity (ToO) observations over Cycles 31 & 32, which combined with the current sample (two gLSNe) will enable a $\sim 2.7\%$ measurement of

H0. GLSNe also have unique leverage on dark energy properties, such that this program alone will increase our best dark energy constraints by 40%. The total request for this proposal is 45 HST imaging orbits (15 per glSN) and 8.1 JWST NIRSpec hours (2.7 per glSN, with all overheads), which includes all observations necessary to deliver our cosmological measurements.

OBSERVING DESCRIPTION

As this is a ToO program and the primary observations are taken with HST (program 17474), this APT is relatively bare. Without a target location we cannot create an MSA catalog, so generic targets are used for the three triggers. It is also plausible that exposure times will be varied slightly for each target (with the same total sum) to account for different redshifts and SN types. One of these triggers is disruptive, we arbitrarily have assigned it to the GLSN-3 target.

Proposal 4568 - Targets - Pioneering Precision: Advancing Cosmology with the First Statistical Sample of Gravitationally Lensed Supe...

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(4)	ABELL-370-MSA	RA: 02 39 53.6321 (39.9734671d) Dec: -01 34 15.37 (-1.57094d) Equinox: J2000		
	Comments: Category=Star Description=[Supernovae]				
	(12)	A370_MSA_catalog_20250106	RA: 02 39 55.8398 (39.9826658d) Dec: -01 35 23.79 (-1.58994d) Equinox: J2000		
	Comments: Description=[]				
	(13)	mj0308_msa_final	RA: 03 08 54.6798 (47.2278325d) Dec: +26 46 28.43 (26.77456d) Equinox: J2000		
	Comments: Description=[]				
	(14)	athena	RA: 04 17 35.1368 (64.3964033d) Dec: -11 54 25.36 (-11.90704d) Equinox: J2000		
	Comments: Category=Star Description=[Supernovae]				
	(16)	mj0308_msa_final_clean	RA: 03 08 54.6931 (47.2278879d) Dec: +26 46 28.49 (26.77458d) Equinox: J2000		
	Comments: Description=[]				
	(17)	mj0308_msa_combined	RA: 03 08 54.6825 (47.2278438d) Dec: +26 46 28.76 (26.77466d) Equinox: J2000		
	Comments: Description=[]				
	(18)	combined_msa_catalog	RA: 03 08 54.6825 (47.2278438d) Dec: +26 46 28.76 (26.77466d) Equinox: J2000		
	Comments: Description=[]				
	(19)	mj0417_v1	RA: 04 17 34.9396 (64.3955817d) Dec: -11 51 7.29 (-11.85203d) Equinox: J2000		
	Comments: Description=[]				

Proposal 4568 - Targets - Pioneering Precision: Advancing Cosmology with the First Statistical Sample of Gravitationally Lensed Supe...

Generic Targets	#	Name	Criteria	Description
	(1)	GLSN-1	First glSN discovered that is deemed cosmologically useful.	
	(2)	GLSN-2	Second glSN discovered that is deemed cosmologically useful.	
	(3)	GLSN-3	Third glSN discovered that is deemed cosmologically useful.	

Proposal 4568 - Observation 1 - Pioneering Precision: Advancing Cosmology with the First Statistical Sample of Gravitationally Lense...

Observation	Proposal 4568, Observation 1: MSA_A370_ObsPlan										Wed Jul 01 16:00:56 GMT 2026
	Diagnostic Status: Warning										
	Observing Template: NIRSpec MultiObject Spectroscopy										
Diagnostics	(MSA_A370_ObsPlan (Obs 1)) Warning (Form): This MSA selected angle change is likely to impact scheduling and requires TTRB approval. (Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous		
	(12)	A370_MSA_catalog_20250106	RA: 02 39 55.8398 (39.9826658d) Dec: -01 35 23.79 (-1.58994d) 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 2 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	High (97 sources)	Low (14864 sources)	jwst-nirspec-prism		1.5	
Reference Stars	Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude	
	1	14997	39.977730	-1.627297	24.8	1	15012	39.988506	-1.613033	23.99	
	1	14998	39.973228	-1.627035	25.45	1	15037	39.966679	-1.583045	24.2	
	1	15000	39.973059	-1.626220	24.56	1	15042	39.980666	-1.571148	25.12	
	1	15006	39.978280	-1.619036	25.27	1	15068	39.977531	-1.574532	24.98	
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	3 Shutter Slitlet	39.978306666666 67 Degrees - 1.598614166666 64 Degrees	208.66573473093 928			3	9	1575.6
	2	1 (PRISM/CLEAR)	c2	3 Shutter Slitlet	39.97850225 Degrees - 1.598721111111 037 Degrees	208.66572963897 448			3	9	1575.6

Proposal 4568 - Observation 1 - Pioneering Precision: Advancing Cosmology with the First Statistical Sample of Gravitationally Lense...

Special Requirements	Before Date 02-FEB-2025:00:00:00 Aperture PA Range 208.6656 to 208.6656 Degrees (V3 70.0910303 to 70.0910303) [MSA Selected] MSA Scheduled Aperture PA 208.6656 to 208.6656 Degrees (V3 70.0910303 to 70.0910303)
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Proposal 4568 - Observation 4 - Pioneering Precision: Advancing Cosmology with the First Statistical Sample of Gravitationally Lense...

Observation	Proposal 4568, Observation 4: MSA_A370_ObsPlan_final_final										Wed Jul 01 16:00:56 GMT 2026
	Diagnostic Status: Warning										
	Observing Template: NIRSpect MultiObject Spectroscopy										
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		
	(12)	A370_MSA_catalog_20250106	RA: 02 39 55.8398 (39.9826658d) Dec: -01 35 23.79 (-1.58994d) 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	
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	High (97 sources)	Low (14864 sources)	jwst-nirspec-prism	1.5			
Reference Stars	Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude	
	1	14980	39.982258	-1.640374	24.98	1	15001	39.991111	-1.622550	24.58	
	1	14985	39.984434	-1.636045	23.51	1	15023	39.994530	-1.601920	24.71	
	1	14997	39.977730	-1.627297	24.8	1	15037	39.966679	-1.583045	24.2	
	1	14998	39.973228	-1.627035	25.45	1	15060	39.993500	-1.624297	24.29	
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	3 Shutter Slitlet	39.975872333333 33 Degrees - 1.602744722222 122 Degrees	36.841674887591 76			3	9	1575.6
	2	1 (PRISM/CLEAR)	c2	3 Shutter Slitlet	39.975693958333 33 Degrees - 1.602610833333 582 Degrees	36.841680195550 985			3	9	1575.6

Special Requirements	MSA Scheduled Aperture PA 36.8415 to 36.8415 Degrees (V3 258.26694 to 258.26694)
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Proposal 4568 - Observation 8 - Pioneering Precision: Advancing Cosmology with the First Statistical Sample of Gravitationally Lense...

Observation	Proposal 4568, Observation 8: MSA_MJ0308_final_cleaned_final_06										Wed Jul 01 16:00:56 GMT 2026
	Diagnostic Status: Warning										
	Observing Template: NIRSpect MultiObject Spectroscopy										
Diagnostics	(Visit 8:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous		
	(18)	combined_msa_catalog	RA: 03 08 54.6825 (47.2278438d) Dec: +26 46 28.76 (26.77466d) 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: NRSRAPIDD2; 8 sources in 3 quads; [Optimal TA Accuracy]	SAME	CLEAR	Auto Acq MSA Config	NRSRAPIDD2	3	1	4	343.577	
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	Primary (145 sources)	Filler (12983 sources)	jwst-nirspec-prism	1.5			
Reference Stars	Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude	
	1	1180	47.251948	26.749173	24.21771010353892	1	5842	47.217340	26.767872	23.89858160673692	
	1	1519	47.248680	26.750776	22.41122023985383	1	9133	47.230204	26.795622	22.56161776935791	
	1	3901	47.229554	26.760722	24.27652930101590	1	10838	47.232906	26.804489	23.09310934566112	
	1	5752	47.214008	26.767523	23.98028881029383	1	11166	47.223855	26.806026	23.80361646652140	
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)	eMPT_shutter_ma sk**	3 Shutter Slitlet	47.2377479999999 996 Degrees 26.778793055555 553 Degrees	215.24112751143 957			3	6	3151.2

Special Requirements	MSA Scheduled Aperture PA 215.2367 to 215.2367 Degrees (V3 76.6621 to 76.6621)
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Proposal 4568 - Observation 9 - Pioneering Precision: Advancing Cosmology with the First Statistical Sample of Gravitationally Lense...

Observation	Proposal 4568, Observation 9: mj0417_msa_mask										Wed Jul 01 16:00:56 GMT 2026
	Diagnostic Status: Warning										
	Observing Template: NIRSpect MultiObject Spectroscopy										
Diagnostics	(Visit 9:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
	(Visit 9:1) Warning (Form): The recommended value is 8 Reference Stars for this template.										
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous		
	(19)	mj0417_v1	RA: 04 17 34.9396 (64.3955817d) Dec: -11 51 7.29 (-11.85203d) 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: F110W; Readout: NRSRAPID; 7 sources in 2 quads; [Optimal TA Accuracy]	SAME	F110W	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
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	Primary (18 sources)	mj0417_v1 (15140 sources)	jwst-nirspec-prism		1.5		
Reference Stars	Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude	
	1	5846	64.393524	-11.906323	19.788	1	12988	64.417272	-11.863605	20.206	
	1	7391	64.379123	-11.900700	21.88	1	15039	64.419261	-11.854979	20.963	
	1	8341	64.390848	-11.894156	21.477	1	15890	64.415999	-11.853067	20.95	
	1	8705	64.387397	-11.891534	20.518						
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)	vMPT_v0.1	3 Shutter Slitlet	64.399095 Degrees - 11.879414999999 995 Degrees	75.099232955440 64			3	6	3151.2

Special Requirements	MSA Planned Aperture PA 75.1000 to 75.1000 Degrees (V3 296.5254303 to 296.5254303)
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