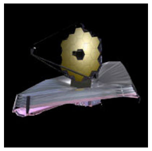

6362 - Breaking the degeneracy: substellar anchors for evolutionary models

Cycle: 3, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	***Observation***	***Label***	***Observing Template***	***Science Target***
Observation Folder				
	1	HD13724	NIRSpec IFU Spectroscopy	(1) HD-13724
	2	HIP99770	NIRSpec IFU Spectroscopy	(2) HIP-99770
	3	GJ758	NIRSpec IFU Spectroscopy	(13) GJ-758-B

Folder	Observation	Label	Observing Template	Science Target
	4	HD33632	NIRSpec IFU Spectroscopy	(4) HD-33632
	5	HD47127	NIRSpec IFU Spectroscopy	(11) HD-47127-B
	6	HIP21152	NIRSpec IFU Spectroscopy	(6) HIP-21152
	7	HD72946	NIRSpec IFU Spectroscopy	(7) HD-72946
	8	HR7672	NIRSpec IFU Spectroscopy	(12) HR-7672-B
	9	HD4747	NIRSpec IFU Spectroscopy	(9) HD-4747
	10	HD984	NIRSpec IFU Spectroscopy	(10) HD-984
	11	HIP-99770-2	NIRSpec IFU Spectroscopy	(2) HIP-99770

ABSTRACT

We propose to build the gold standard of calibrators for brown dwarf and exoplanet models with JWST. By definition, brown dwarfs have insufficient masses to sustain hydrogen fusion in their cores, which causes them to cool down over time since they never reach thermodynamical equilibrium. This age-mass-luminosity degeneracy is the principal challenge to the characterization of brown dwarfs and exoplanets alike. Brown dwarf evolutionary and spectral models are routinely used to compare with exoplanet data, which intrinsically suffer from lower SNR due to their proximity to their host star. In order to anchor evolutionary models in measured physical parameters and chemical abundances, we request NIRSpec/IFU spectroscopy on a sample of brown dwarf companions to solar-type stars with measured dynamical masses from previous direct imaging in age-calibrated benchmark systems. This carefully mass- and age-calibrated sample will set the basis for testing, calibrating, and identifying physical processes missing in evolutionary and spectral models.

OBSERVING DESCRIPTION

Our goal is to obtain F290LP/G395H spectra of a sample of directly-imaged brown dwarf companions to solar-type stars.

All observations have been simulated with the ETC, on notebook #177465.

The spatially-resolved IFU cubes will allow modeling and subtraction of the stellar PSF halo to obtain high SNR spectra. The higher contrast companions will utilize the observing and data analyses strategy following Ruffio et al. 2023. We will use the 9-pt small size CYCLING dithering pattern to improve the spatial sampling for all IFU obs. Detector settings are chosen to ensure uniform SNR of all the companions while also minimizing saturation of the host star, which often requires using as few groups as possible.

Dithers

As recommended, for good spatial sampling of the PSF halo, in each observation we use the CYCLING dither, size small, with 9 points to prevent the companions from being too close to the edges.

Offset Pointing Special Requirements

We apply an offset for each of our targets. This places the companion as central in the FOV as possible and at least a few hundreds of milliarcecs away from the edge of the FOV, providing good tolerance to pointing uncertainties, while keeping the host PSF in a corner of the field of view.

PA special requirement

PA range is required to avoid placing the science target along the spiders.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	HD-13724	RA: 02 12 20.6773 (33.0861554d) Dec: -46 48 58.95 (-46.81637d) Equinox: J2000	Proper Motion RA: -30.624 mas/yr Proper Motion Dec: -69.08799998655013 mas/yr Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Star Description=[G stars] Extended=NO				
(2)	HIP-99770	RA: 20 14 32.0324 (303.6334683d) Dec: +36 48 22.70 (36.80631d) Equinox: J2000	Proper Motion RA: 68.09 mas/yr Proper Motion Dec: 69.404 mas/yr Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Star Description=[A stars] Extended=NO				
(3)	GJ-758	RA: 19 23 34.0132 (290.8917217d) Dec: +33 13 19.08 (33.22197d) Equinox: J2000	Proper Motion RA: 81.966 mas/yr Proper Motion Dec: 160.158 mas/yr Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Star Description=[K stars] Extended=NO				
(4)	HD-33632	RA: 05 13 17.4478 (78.3226992d) Dec: +37 20 14.32 (37.33731d) Equinox: J2000	Proper Motion RA: -144.922 mas/yr Proper Motion Dec: -136.77200008714863 mas/yr Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Star Description=[F stars] Extended=NO				
(5)	HD-47127	RA: 06 37 33.9005 (99.3912521d) Dec: +12 10 50.00 (12.18056d) Equinox: J2000	Proper Motion RA: -74.864 mas/yr Proper Motion Dec: -283.98199995081086 mas/yr Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Star Description=[G stars] Extended=NO				
(6)	HIP-21152	RA: 04 32 4.8086 (68.0200358d) Dec: +05 24 36.15 (5.41004d) Equinox: J2000	Proper Motion RA: 112.174 mas/yr Proper Motion Dec: 7.756 mas/yr Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Star Description=[F stars] Extended=NO				
(7)	HD-72946	RA: 08 35 51.2667 (128.9636113d) Dec: +06 37 21.95 (6.62276d) Equinox: J2000	Proper Motion RA: -136.593 mas/yr Proper Motion Dec: -137.14800006709993 mas/yr Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Star Description=[G stars] Extended=NO				

(8)	HR-7672	RA: 20 04 6.2208 (301.0259200d) Dec: +17 04 12.68 (17.07019d) Equinox: J2000	Proper Motion RA: -387.472 mas/yr Proper Motion Dec: -419.4970000298781 mas/yr Epoch of Position: 2000
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Star Description=[G stars] Extended=NO			
(9)	HD-4747	RA: 00 49 26.7605 (12.3615021d) Dec: -23 12 44.87 (-23.21246d) Equinox: J2000	Proper Motion RA: 519.049 mas/yr Proper Motion Dec: 124.04099999999998 mas/yr Epoch of Position: 2000
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Star Description=[G stars] Extended=NO			
(10)	HD-984	RA: 00 14 10.2528 (3.5427200d) Dec: -07 11 56.81 (-7.19911d) Equinox: J2000	Proper Motion RA: 104.775 mas/yr Proper Motion Dec: -68.0160000001706 mas/yr Epoch of Position: 2000
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Star Description=[F stars] Extended=NO			
(11)	HD-47127-B	RA: 06 37 33.9201 (99.3913338d) Dec: +12 10 51.88 (12.18108d) Equinox: J2000	Proper Motion RA: -74.864 mas/yr Proper Motion Dec: -283.98199995081086 mas/yr Epoch of Position: 2000
Comments: Category=Star Description=[Brown dwarfs, Exoplanet Systems] Extended=NO			
(12)	HR-7672-B	RA: 20 04 6.1899 (301.0257912d) Dec: +17 04 13.40 (17.07039d) Equinox: J2000	Proper Motion RA: -387.472 mas/yr Proper Motion Dec: -419.4970000298781 mas/yr Epoch of Position: 2000
Comments: Category=Star Description=[Brown dwarfs, Exoplanet Systems] Extended=NO			
(13)	GJ-758-B	RA: 19 23 33.9327 (290.8913862d) Dec: +33 13 18.31 (33.22175d) Equinox: J2000	Proper Motion RA: 81.966 mas/yr Proper Motion Dec: 160.158 mas/yr Epoch of Position: 2000
Comments: Category=Star Description=[Brown dwarfs, Exoplanet Systems] Extended=NO			

Observation

Proposal 6362, Observation 1: HD13724

Tue Nov 25 17:00:27 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

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)	HD-13724	RA: 02 12 20.6773 (33.0861554d)	Proper Motion RA: -30.624 mas/yr	
		Dec: -46 48 58.95 (-46.81637d)	Proper Motion Dec: -69.08799998655013 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[G stars]
Extended=NO

Template

TA Method	HFF Readout Mode
NONE	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	9	

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSIRS2RAPID	4	18	false	true	NONE	9	162	11817.001	177465

Special Requirements

Aperture PA Range 66.97164917 to 86.97164917 Degrees (V3 288.0 to 308.0)
Offset -0.147 arcsec, 0.239 arcsec

Observation

Proposal 6362, Observation 2: HIP99770

Tue Nov 25 17:00:27 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec IFU 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
(2)	HIP-99770	RA: 20 14 32.0324 (303.6334683d)	Proper Motion RA: 68.09 mas/yr	
		Dec: +36 48 22.70 (36.80631d)	Proper Motion Dec: 69.404 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[A stars]
Extended=NO

Template

TA Method	HFF Readout Mode
NONE	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	9	

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSIRS2RAPID	5	6	false	true	NONE	9	54	4726.8	177465

Special Requirements

Aperture PA Range 296.97164917 to 316.97164917 Degrees (V3 158.0 to 178.0)

Observation

Proposal 6362, Observation 3: GJ758

Tue Nov 25 17:00:27 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec IFU 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
(13)	GJ-758-B	RA: 19 23 33.9327 (290.8913862d)	Proper Motion RA: 81.966 mas/yr	
		Dec: +33 13 18.31 (33.22175d)	Proper Motion Dec: 160.158 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

Comments:
Category=Star
Description=[Brown dwarfs, Exoplanet Systems]
Extended=NO

Template

TA Method	HFF Readout Mode
NONE	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	9	

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSIRS2RAPID	4	19	false	true	NONE	9	171	12473.501	177465

Special Requirements

Aperture PA Range 328.97164917 to 348.97164917 Degrees (V3 190.0 to 210.0)

Observation

Proposal 6362, Observation 4: HD33632

Tue Nov 25 17:00:27 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec IFU 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
(4)	HD-33632	RA: 05 13 17.4478 (78.3226992d) Dec: +37 20 14.32 (37.33731d) Equinox: J2000	Proper Motion RA: -144.922 mas/yr Proper Motion Dec: -136.77200008714863 mas/yr Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[F stars]
Extended=NO

Template

TA Method	HFF Readout Mode
NONE	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	9	

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSIRS2RAPID	5	5	false	true	NONE	9	45	3939.0	177465

Special Requirements

Aperture PA Range 15.97164917 to 35.97164917 Degrees (V3 237.0 to 257.0)

Observation

Proposal 6362, Observation 5: HD47127

Tue Nov 25 17:00:27 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(Visit 5:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(11)	HD-47127-B	RA: 06 37 33.9201 (99.3913338d)	Proper Motion RA: -74.864 mas/yr	
		Dec: +12 10 51.88 (12.18108d)	Proper Motion Dec: -283.98199995081086 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

Comments:
Category=Star
Description=[Brown dwarfs, Exoplanet Systems]
Extended=NO

Template

TA Method	HFF Readout Mode
NONE	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	9	

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSIRS2RAPID	5	4	false	true	NONE	9	36	3151.2	177465

Special Requirements

Aperture PA Range 208.97164917 to 228.97164917 Degrees (V3 70.0 to 90.0)

Observation

Proposal 6362, Observation 6: HIP21152

Tue Nov 25 17:00:27 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(Visit 6:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(6)	HIP-21152	RA: 04 32 4.8086 (68.0200358d)	Proper Motion RA: 112.174 mas/yr	
		Dec: +05 24 36.15 (5.41004d)	Proper Motion Dec: 7.756 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[F stars]
Extended=NO

Template

TA Method	HFF Readout Mode
NONE	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	9	

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSIRS2RAPID	5	12	false	true	NONE	9	108	9453.601	177465

Special Requirements

Aperture PA Range 58.97164917 to 68.97164917 Degrees (V3 280.0 to 290.0)

Observation

Proposal 6362, Observation 7: HD72946

Tue Nov 25 17:00:27 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(Visit 7:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(7)	HD-72946	RA: 08 35 51.2667 (128.9636113d)	Proper Motion RA: -136.593 mas/yr	
		Dec: +06 37 21.95 (6.62276d)	Proper Motion Dec: -137.14800006709993 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[G stars]
Extended=NO

Template

TA Method	HFF Readout Mode
NONE	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	9	

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSIRS2RAPID	5	2	false	true	NONE	9	18	1575.6	177465

Special Requirements

Aperture PA Range 223.97164917 to 243.97164917 Degrees (V3 85.0 to 105.0)
Offset 0.153 arcsec, -0.107 arcsec

Observation

Proposal 6362, Observation 8: HR7672

Tue Nov 25 17:00:27 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec IFU 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
(12)	HR-7672-B	RA: 20 04 6.1899 (301.0257912d)	Proper Motion RA: -387.472 mas/yr	
		Dec: +17 04 13.40 (17.07039d)	Proper Motion Dec: -419.4970000298781 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

Comments:
Category=Star
Description=[Brown dwarfs, Exoplanet Systems]
Extended=NO

Template

TA Method	HFF Readout Mode
NONE	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	9	

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSIRS2RAPID	5	2	false	true	NONE	9	18	1575.6	177465

Special Requirements

Aperture PA Range 358.97164917 to 18.97164917 Degrees (V3 220.0 to 240.0)

Observation

Proposal 6362, Observation 9: HD4747

Tue Nov 25 17:00:27 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(Visit 9:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(9)	HD-4747	RA: 00 49 26.7605 (12.3615021d)	Proper Motion RA: 519.049 mas/yr	
		Dec: -23 12 44.87 (-23.21246d)	Proper Motion Dec: 124.04099999999998 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[G stars]
Extended=NO

Template

TA Method	HFF Readout Mode
NONE	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	9	

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSIRS2RAPID	5	6	false	true	NONE	9	54	4726.8	177465

Special Requirements

Aperture PA Range 21.97164917 to 41.97164917 Degrees (V3 243.0 to 263.0)

Observation

Proposal 6362, Observation 10: HD984

Tue Nov 25 17:00:27 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(Visit 10:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(10)	HD-984	RA: 00 14 10.2528 (3.5427200d)	Proper Motion RA: 104.775 mas/yr	
		Dec: -07 11 56.81 (-7.19911d)	Proper Motion Dec: -68.0160000001706 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[F stars]
Extended=NO

Template

TA Method	HFF Readout Mode
NONE	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	9	

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSIRS2RAPID	5	6	false	true	NONE	9	54	4726.8	177465

Special Requirements

Aperture PA Range 188.97164917 to 197.97164917 Degrees (V3 50.0 to 59.0)
Offset 0.124 arcsec, 0.217 arcsec

Observation

Proposal 6362, Observation 11: HIP-99770-2

Tue Nov 25 17:00:27 GMT 2025

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
(2)	HIP-99770	RA: 20 14 32.0324 (303.6334683d)	Proper Motion RA: 68.09 mas/yr	
		Dec: +36 48 22.70 (36.80631d)	Proper Motion Dec: 69.404 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[A stars]
Extended=NO

Template

TA Method	HFF Readout Mode
NONE	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	9	

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSIRS2RAPID	5	6	false	true	NONE	9	54	4726.8	

Special Requirements

Aperture PA Range 236.97164917 to 246.97164917 Degrees (V3 98.0 to 108.0)