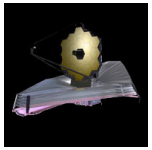

1414 - Integral Field Spectroscopy of the Benchmark Substellar Companion HD 19467 B

Cycle: 1, Proposal Category: GTO

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Marshall Perrin (PI)	**Space Telescope Science Institute**	**mperrin@stsci.edu**
Dr. Laurent Pueyo (CoI)	Space Telescope Science Institute	pueyo@stsci.edu
Dr. Chris Stark (CoI)	NASA Goddard Space Flight Center	christopher.c.stark@nasa.gov
Abhijith Rajan (CoI)	Space Telescope Science Institute	arajan@stsci.edu
Dr. Remi Soummer (CoI)	Space Telescope Science Institute	soummer@stsci.edu
Dr. Matt Mountain (CoI)	Space Telescope Science Institute	mmountain@stsci.edu

OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1	HD 18511 (PSF, offset outside IFU FOV)	NIRSpec IFU Spectroscopy	(4) HD-18511-PSF-CALIBRATOR
	2	HD 19467 (Roll1, star offset outside IFU FOV)	NIRSpec IFU Spectroscopy	(3) HD-19467
	3	HD 19467 NIRSpec IFU (Roll1)	NIRSpec IFU Spectroscopy	(3) HD-19467
	4	HD 19467 NIRSpec IFU (Roll2)	NIRSpec IFU Spectroscopy	(3) HD-19467
	5	HD 18511 (PSF Star)	NIRSpec IFU Spectroscopy	(4) HD-18511-PSF-CALIBRATOR
	11	HD 18511 (PSF, offset outside IFU FOV)	NIRSpec IFU Spectroscopy	(4) HD-18511-PSF-CALIBRATOR

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
	12	HD 19467 (Roll1, star offset outside IFU FOV)	NIRSpec IFU Spectroscopy	(3) HD-19467
	13	HD 19467 NIRSpec IF U (Roll1)	NIRSpec IFU Spectroscopy	(3) HD-19467
	14	HD 19467 NIRSpec IF U (Roll2)	NIRSpec IFU Spectroscopy	(3) HD-19467
	15	HD 18511 (PSF Star)	NIRSpec IFU Spectroscopy	(4) HD-18511-PSF-CALIBRATOR

ABSTRACT

Unlike most imaged companions for which masses are highly uncertain, the brown dwarf HD 19467 B has a mass dynamically constrained by radial velocity changes induced in its host star (Crepp et al. 2014, 2015). Meanwhile its age and metallicity are constrained from other studies of the sun-like host star (e.g. Wood et al. 2018). It is a critical benchmark object for studies of substellar object evolutionary and atmosphere models, and is a high priority target for mid-infrared characterization with JWST. Its apparent angular separation, 1.6 arcseconds, and relative contrast make this a feasible target for spectroscopy using the NIRSpec IFU plus PSF subtraction.

We will obtain R~2700 spectroscopy across the 3 – 5 micron region where the brown dwarf's thermal emission peaks. This will be a joint study in collaboration with the NIRCam team, who will be obtaining coronagraphy of HD 19467 B in multiple bands. A major secondary goal of this program is obtaining data to cross-compare several strategies for high contrast imaging with the NIRSpec IFU: observations are obtained to evaluate two forms of reference star differential imaging plus angular differential imaging (as well as the spectral differential imaging that is inherent in any IFU observations). This program will yield insights into the atmosphere of what is likely to become one of the most comprehensively studied substellar companions, and will help pioneer methods for studies of close companions with the NIRSpec IFU.

OBSERVING DESCRIPTION

SUMMARY AND OVERALL OBSERVING STRATEGY

Our goal is high resolution spectroscopy of this brown dwarf from 3-5 microns, therefore we observe with G395H+F290LP. The challenge is obtaining that spectroscopy within 1.5 arcsec of a 5th magnitude star. In general we follow a similar approach as for coronagraphic observations: observing the science target at two position angles with a relative roll of 10 deg, plus a PSF calibrator. But the NIRSpec IFU was not designed with high contrast in mind, and best practices are unclear. Therefore a strong secondary goal of this program is to evaluate and compare several strategies

for obtaining high contrast with the NIRSpec IFU through different forms of PSF subtraction.

In particular, one of the big questions for NIRSpec IFU observations of circumstellar companions is whether it is better to:
(a) place the bright star just outside the IFU entrance FOV so that it does not illuminate the detector directly, or
(b) place the star within the FOV and allow it to saturate the central few spaxels.

The benefits of placing the star outside of the FOV are potentially reduced detector systematics, including reduced persistence when moving between dither points, and potentially reduced diffuse scattered light or second-order diffraction effects from the slicer optics. The benefits of placing the star within the FOV are a better ability to determine the stellar position for accurate image registration in PSF subtractions, and potentially closer inner working angle. Furthermore, high contrast imaging benefits greatly when large shared libraries of PSF references can be developed; this is more straightforward with stars inside the FOV than if stars are offset outside the FOV, likely with many different choices for where to position them. We try both approaches here, and will use lessons learned to inform planning for Cycle 2 and beyond.

Ordering Of Observations

All observations are grouped in a non-interruptible sequence. We first execute the two observations that do *not* place a star directly within the IFU FOV, then the three that do. This avoids having image persistence affect the first two observations. To minimize slews we alternate between the science target and calibrator following "ABBA" ordering.

Choice of PSF star

HD 18511 is relatively nearby, is a good match in color (though this is less critical in spectrally-resolved observatons like this), and is about 3x brighter (1.3 mag) than the science target, which reduces the amount of time needed for the PSF calibration observations.

PA Special Requirements, and Implied Time Constraints

In mid 2022 the companion will be at ~ 1.55 arcsec separation and PA ~ 232 degrees. We use an Aperture PA Range to constrain where this falls in the IFU, specifically setting PA range ~ 208-213 in the "Roll 1" observation to place the companion in an darker area of the PSF between the brighter diffraction features from JWST's aperture. This orientation also has the benefit of making the companion/star offset be mostly in the "Y" direction for NIRSpec, so we can apply an offset along one axis only to move the star out of the field. We use the same PA for both Obs 2 (star outside the IFU FOV) and Obs 3 (Roll 1 with star inside IFU FOV). A 10 degree offset then places Obs 3 (Roll 2 with star inside FOV) at PA~198-213. The PSF calibrator is observed at the same PAs to minimize thermal disturbances to the observatory.

(The above PA values are all adjusted -5 deg relative to the prior submission of this program, to account for orbital motion of the companion over the launch delay period.)

There is a 10 day scheduling window in Jan-Feb that meets those constraints. If necessary to ease scheduling, the PA tolerances can be loosened some. There is also an second scheduling window available in August with the aperture PA rotated by 180 degrees. If we use that scheduling window then we have to flip the signs on all the Offset SRs.

Offset Pointing Special Requirements

For the "Star outside the IFU FOV" observations we apply an offset of -2 arcsec. This places the star 0.5" outside the FOV, such that even factoring in the 0.25" radius dither and 0.3" pointing uncertainty the PSF should remain outside the FOV. This pointing places the companion relatively centered within the IFU FOV.

For the "Star inside the FOV" observations we apply an offset of -0.6 arcsec. This places the companion at least 0.7" away from the edge of the FOV, providing good tolerance to pointing uncertainties.

We use the same offset SRs on the PSF star for consistent calibration.

Dithers

For good spatial sampling of the PSF, in each observation we use the CYCLING dither, size small, with 9 points; this is a 9-point pattern with 0.25” spatial extent optimized for subpixel sampling.

We omit any Leakcal observation. Leaks are likely not a substantial factor in our observations compared to the contrast limits set by the bright star. There are no bright stars in the immediate surrounding field that would be in the MSA field of view when the IFU is on the science target.

EXPOSURE TIMES

Exposure calculations are in ETC notebook #31873 (previously #25192 on etc v1.4) . For the science observations we use readout pattern NRSIRS2RAPID, groups=15, and 1 int per dither position (times the 9 dither positions), for a total of 2100 s. The ETC predicts an SNR per spectral channel on the companion alone of 30 to 54 (depending on astrophysical assumptions for atmospheric properties), leaving aside noise from PSF subtraction residuals which cannot easily be modeled in the NIRSpec modes of Pandeia.

For the ~3.5x brighter PSF calibrator star, we simply reduce the number of groups from 15 to 5 to reduce the integration time by 3x, leaving all other settings the same. We considered switching this to NRSRAPID rather than NRSIRS2RAPID, which would allow additional samples in this relatively short ramp, but we prefer to minimize potential systematics between PSF calibrator and science data by taking all in the same read mode. We note that in the PSF calibrator observations it is the _wings_ not the core of the PSF that we care most about the SNR on.

IMPORTANT NOTE: The central PSF core will saturate, out to a radius of 0.1-0.2", in Observations 3 through 5. Part of this will be hard saturation in the first group so that those pixels will be lost to the slope fitting. This is intentional in order to get the desired SNR on the faint companion.

When scheduling, we suggest not placing other NIRSpec observations right after this program. A gap of at least a few hours running some other instrument will allow persistence to decay away such that our bright object science doesn't adversely affect someone else's fainter source

spectroscopy.

ETC calculations:
31873.11 = SNR on companion assuming atmosphere model from Saumon et al.; using NRSIRS2RAPID
31873.12 = SNR on companion using scaled photometry / low res spectrum from a field brown dwarf; NRSIRS2RAPID
31873.13 = "SNR" on the central star; this is saturated on central few spaxels
31873.14 = "SNR" on PSF star; this is saturated on central spaxels also.

For comparison - earlier ETC calculations using NRS or NRSRAPID, which result in lower SNR.
25192.3 = SNR on companion assuming atmosphere model from Saumon et al.; version using NRS readout
25192.4 = SNR on companion using scaled photometry / low res spectrum from a field brown dwarf; version using NRS readout
25192.6 = "SNR" on the central star; this is saturated.
25192.8, .10 = same as .3, but using NRSRAPID, see notes above.

TARGET ACQUISITION

We have opted to omit TA, not even any "Verify Only" exposures for post-facto pointing calibration.

Given that we're dithering the star by ~0.25" we do not need absolute target positioning better than that. The stated baseline pointing accuracy after FGS guide star acq is given as 0.1" 1 sigma (JDox 'JWST Pointing Performance'). Based on this we do not need a TA. (This is good, because the target stars are themselves far too bright for WATA type TAs.)

Further, by not including any TA we avoid any need to move the NIRSpec grating wheel during this set of observations. This avoids the small nonrepeatability in the grating wheel mechanism, therefore achieving the highest possible consistency in instrument alignment state between our science target and calibrator observations.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	HD-19467	RA: 03 07 18.5748 (46.8273950d) Dec: -13 45 42.42 (-13.76178d) Equinox: J2000	Proper Motion RA: -8.433 mas/yr Proper Motion Dec: -260.580 mas/yr Parallax: 0.0315" Epoch of Position: 2000.0	
Comments: Simbad SpType G3V. *High proper motion star. Astrometry and proper motion updated from Gaia DR1.* *V=7.00, I=8.82, G=6.76, J=5.80, K=5.401* *W1 = 5.359, W2 = 5.182* *Category=Star* *Description=[G stars]* *Extended=NO*				
(4)	HD-18511-PSF-CALIBRATOR	RA: 02 58 12.5490 (44.5522875d) Dec: -12 00 20.96 (-12.00582d) Equinox: J2000	Proper Motion RA: 11.044 mas/yr Proper Motion Dec: -11.199 mas/yr Parallax: 0.00709" Epoch of Position: 2000.0	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Simbad SpType = K0III.* *Astrometry and proper motion updated from Gaia DR1.* *V=6.5, G=6.15, J=5.041, H=4.318, K=4.253* *W1= 3.995, W2 = 3.827* *Relative to science target: Delta K = -1.148, Delta W1 = -1.364, Delta W2 = -1.355* *So this is ~ 3.5x brighter in the relevant wavelengths for G395.* *Category=Calibration* *Description=[G stars]* *Extended=NO*				

Observation

Proposal 1414, Observation 1: HD 18511 (PSF, offset outside IFU FOV) Tue Feb 14 19:00:28 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Comments: Offset of -1.9 arcsec should place the PSF star just outside the FOV. This offset matches that of Observation 2.

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
(4)	HD-18511-PSF-CALIBRATOR	RA: 02 58 12.5490 (44.5522875d) Dec: -12 00 20.96 (-12.00582d) Equinox: J2000	Proper Motion RA: 11.044 mas/yr Proper Motion Dec: -11.199 mas/yr Parallax: 0.00709" Epoch of Position: 2000.0	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Simbad SpType = K0III.
Astrometry and proper motion updated from Gaia DR1.

V=6.5, G=6.15, J=5.041, H=4.318, K=4.253
W1= 3.995, W2 = 3.827

Relative to science target: Delta K = -1.148, Delta W1 = -1.364, Delta W2 = -1.355
So this is ~ 3.5x brighter in the relevant wavelengths for G395.
Category=Calibration
Description=[G stars]
Extended=NO

Template

TA Method
NONE

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	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2RAPID	5	1	false	true	NONE	9	9	787.8	31873.14

Special Requirements	
	Offset 0.0 arcsec, -2.0 arcsec Sequence Observations 1, 2, 3, 4, 5, Non-interruptible Same Aperture PA 1, 2, 3

Observation

Proposal 1414, Observation 2: HD 19467 (Roll1, star offset outside IFU FOV) Tue Feb 14 19:00:28 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Comments: With the Aperture PA constrained to 213-218 deg, the companion will fall near the center of the FOV.

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
(3)	HD-19467	RA: 03 07 18.5748 (46.8273950d)	Proper Motion RA: -8.433 mas/yr	
		Dec: -13 45 42.42 (-13.76178d)	Proper Motion Dec: -260.580 mas/yr	
		Equinox: J2000	Parallax: 0.0315"	
			Epoch of Position: 2000.0	

Comments: Simbad SpType G3V.
High proper motion star. Astrometry and proper motion updated from Gaia DR1.

V=7.00, I=8.82, G=6.76, J=5.80, K=5.401
W1 = 5.359, W2 = 5.182
Category=Star
Description=[G stars]
Extended=NO

Template

TA Method
NONE

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	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2RAPID	15	1	false	true	NONE	9	9	2100.8	31873.11

Special Requirements	
	Aperture PA Range 208 to 213 Degrees (V3 69.02746582 to 74.02746582) Offset 0.0 arcsec, -2.0 arcsec Sequence Observations 1, 2, 3, 4, 5, Non-interruptible Same Aperture PA 1, 2, 3

Observation

Proposal 1414, Observation 3: HD 19467 NIRSpec IFU (Roll1) Tue Feb 14 19:00:28 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(HD 19467 NIRSpec IFU (Roll1) (Obs 3)) Warning (Form): The order of link [PA Offset 4 from 3] combined with the order of the SEQ NON-INT reduces scheduling flexibility.

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	HD-19467	RA: 03 07 18.5748 (46.8273950d) Dec: -13 45 42.42 (-13.76178d) Equinox: J2000	Proper Motion RA: -8.433 mas/yr Proper Motion Dec: -260.580 mas/yr Parallax: 0.0315" Epoch of Position: 2000.0	

Comments: Simbad SpType G3V.
High proper motion star. Astrometry and proper motion updated from Gaia DR1.

V=7.00, I=8.82, G=6.76, J=5.80, K=5.401
W1 = 5.359, W2 = 5.182
Category=Star
Description=[G stars]
Extended=NO

Template

TA Method
NONE

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	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2RAPID	15	1	false	true	NONE	9	9	2100.8	31873.11

Special Requirements	
	Offset 0.0 arcsec, -0.6 arcsec Sequence Observations 1, 2, 3, 4, 5, Non-interruptible Aperture PA Offset 4 from 3 by -14 to -9 Degrees (Same offsets in V3) Same Aperture PA 1, 2, 3

Observation

Proposal 1414, Observation 4: HD 19467 NIRSpec IFU (Roll2) Tue Feb 14 19:00:28 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(HD 19467 NIRSpec IFU (Roll2) (Obs 4)) Warning (Form): The order of link [PA Offset 4 from 3] combined with the order of the SEQ NON-INT reduces scheduling flexibility.

(Visit 4:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	HD-19467	RA: 03 07 18.5748 (46.8273950d) Dec: -13 45 42.42 (-13.76178d) Equinox: J2000	Proper Motion RA: -8.433 mas/yr Proper Motion Dec: -260.580 mas/yr Parallax: 0.0315" Epoch of Position: 2000.0	

Comments: Simbad SpType G3V.
High proper motion star. Astrometry and proper motion updated from Gaia DR1.

V=7.00, I=8.82, G=6.76, J=5.80, K=5.401
W1 = 5.359, W2 = 5.182
Category=Star
Description=[G stars]
Extended=NO

Template

TA Method
NONE

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	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2RAPID	15	1	false	true	NONE	9	9	2100.8	31873.11

Special Requirements	
	Offset 0.0 arcsec, -0.6 arcsec Sequence Observations 1, 2, 3, 4, 5, Non-interruptible Aperture PA Offset 4 from 3 by -14 to -9 Degrees (Same offsets in V3) Same Aperture PA 4, 5

Observation

Proposal 1414, Observation 5: HD 18511 (PSF Star)

Tue Feb 14 19:00:28 GMT 2023

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
(4)	HD-18511-PSF-CALIBRATOR	RA: 02 58 12.5490 (44.5522875d) Dec: -12 00 20.96 (-12.00582d) Equinox: J2000	Proper Motion RA: 11.044 mas/yr Proper Motion Dec: -11.199 mas/yr Parallax: 0.00709" Epoch of Position: 2000.0	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Simbad SpType = K0III.
Astrometry and proper motion updated from Gaia DR1.

V=6.5, G=6.15, J=5.041, H=4.318, K=4.253
W1= 3.995, W2 = 3.827

Relative to science target: Delta K = -1.148, Delta W1 = -1.364, Delta W2 = -1.355
So this is ~ 3.5x brighter in the relevant wavelengths for G395.
Category=Calibration
Description=[G stars]
Extended=NO

Template

TA Method
NONE

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	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2RAPID	5	1	false	true	NONE	9	9	787.8	31873.14

Special Requirements	
	Offset 0.0 arcsec, -0.6 arcsec Sequence Observations 1, 2, 3, 4, 5, Non-interruptible Same Aperture PA 4, 5

Observation

Proposal 1414, Observation 11: HD 18511 (PSF, offset outside IFU FOV) Tue Feb 14 19:00:28 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Comments: Offset of -1.9 arcsec should place the PSF star just outside the FOV. This offset matches that of Observation 2.

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
(4)	HD-18511-PSF-CALIBRATOR	RA: 02 58 12.5490 (44.5522875d) Dec: -12 00 20.96 (-12.00582d) Equinox: J2000	Proper Motion RA: 11.044 mas/yr Proper Motion Dec: -11.199 mas/yr Parallax: 0.00709" Epoch of Position: 2000.0	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Simbad SpType = K0III.
Astrometry and proper motion updated from Gaia DR1.

V=6.5, G=6.15, J=5.041, H=4.318, K=4.253
W1= 3.995, W2 = 3.827

Relative to science target: Delta K = -1.148, Delta W1 = -1.364, Delta W2 = -1.355
So this is ~ 3.5x brighter in the relevant wavelengths for G395.
Category=Calibration
Description=[G stars]
Extended=NO

Template

TA Method
NONE

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	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2RAPID	5	1	false	true	NONE	9	9	787.8	31873.14

Special Requirements	
	Offset 0.0 arcsec, -2.0 arcsec Sequence Observations 11, 12, 13, 14, 15, Non-interruptible Same Aperture PA 11, 12, 13

Observation

Proposal 1414, Observation 12: HD 19467 (Roll1, star offset outside IFU FOV) Tue Feb 14 19:00:28 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Comments: With the Aperture PA constrained to 213-218 deg, the companion will fall near the center of the FOV.

Diagnostics

(Visit 12:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	HD-19467	RA: 03 07 18.5748 (46.8273950d)	Proper Motion RA: -8.433 mas/yr	
		Dec: -13 45 42.42 (-13.76178d)	Proper Motion Dec: -260.580 mas/yr	
		Equinox: J2000	Parallax: 0.0315"	
			Epoch of Position: 2000.0	

Comments: Simbad SpType G3V.
High proper motion star. Astrometry and proper motion updated from Gaia DR1.

V=7.00, I=8.82, G=6.76, J=5.80, K=5.401
W1 = 5.359, W2 = 5.182
Category=Star
Description=[G stars]
Extended=NO

Template

TA Method
NONE

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	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2RAPID	15	1	false	true	NONE	9	9	2100.8	31873.11

Special Requirements	
	Aperture PA Range 208 to 213 Degrees (V3 69.02746582 to 74.02746582) Offset 0.0 arcsec, -2.0 arcsec Sequence Observations 11, 12, 13, 14, 15, Non-interruptible Same Aperture PA 11, 12, 13

Observation

Proposal 1414, Observation 13: HD 19467 NIRSpec IFU (Roll1) Tue Feb 14 19:00:28 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(HD 19467 NIRSpec IFU (Roll1) (Obs 13)) Warning (Form): The order of link [PA Offset 14 from 13] combined with the order of the SEQ NON-INT reduces scheduling flexibility.

(Visit 13:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	HD-19467	RA: 03 07 18.5748 (46.8273950d) Dec: -13 45 42.42 (-13.76178d) Equinox: J2000	Proper Motion RA: -8.433 mas/yr Proper Motion Dec: -260.580 mas/yr Parallax: 0.0315" Epoch of Position: 2000.0	

Comments: Simbad SpType G3V.
High proper motion star. Astrometry and proper motion updated from Gaia DR1.

V=7.00, I=8.82, G=6.76, J=5.80, K=5.401
W1 = 5.359, W2 = 5.182
Category=Star
Description=[G stars]
Extended=NO

Template

TA Method
NONE

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	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2RAPID	15	1	false	true	NONE	9	9	2100.8	31873.11

Special Requirements	
	Offset 0.0 arcsec, -0.6 arcsec Sequence Observations 11, 12, 13, 14, 15, Non-interruptible Aperture PA Offset 14 from 13 by -14 to -9 Degrees (Same offsets in V3) Same Aperture PA 11, 12, 13

Observation

Proposal 1414, Observation 14: HD 19467 NIRSpec IFU (Roll2) Tue Feb 14 19:00:28 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(HD 19467 NIRSpec IFU (Roll2) (Obs 14)) Warning (Form): The order of link [PA Offset 14 from 13] combined with the order of the SEQ NON-INT reduces scheduling flexibility.

(Visit 14:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	HD-19467	RA: 03 07 18.5748 (46.8273950d)	Proper Motion RA: -8.433 mas/yr	
		Dec: -13 45 42.42 (-13.76178d)	Proper Motion Dec: -260.580 mas/yr	
		Equinox: J2000	Parallax: 0.0315"	
			Epoch of Position: 2000.0	

Comments: Simbad SpType G3V.
High proper motion star. Astrometry and proper motion updated from Gaia DR1.

V=7.00, I=8.82, G=6.76, J=5.80, K=5.401
W1 = 5.359, W2 = 5.182
Category=Star
Description=[G stars]
Extended=NO

Template

TA Method
NONE

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	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2RAPID	15	1	false	true	NONE	9	9	2100.8	31873.11

Special Requirements	
	Offset 0.0 arcsec, -0.6 arcsec Sequence Observations 11, 12, 13, 14, 15, Non-interruptible Aperture PA Offset 14 from 13 by -14 to -9 Degrees (Same offsets in V3) Same Aperture PA 14, 15

Observation

Proposal 1414, Observation 15: HD 18511 (PSF Star)

Tue Feb 14 19:00:28 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(Visit 15:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(4)	HD-18511-PSF-CALIBRATOR	RA: 02 58 12.5490 (44.5522875d) Dec: -12 00 20.96 (-12.00582d) Equinox: J2000	Proper Motion RA: 11.044 mas/yr Proper Motion Dec: -11.199 mas/yr Parallax: 0.00709" Epoch of Position: 2000.0	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Simbad SpType = K0III.
Astrometry and proper motion updated from Gaia DR1.

V=6.5, G=6.15, J=5.041, H=4.318, K=4.253
W1= 3.995, W2 = 3.827

Relative to science target: Delta K = -1.148, Delta W1 = -1.364, Delta W2 = -1.355
So this is ~ 3.5x brighter in the relevant wavelengths for G395.
Category=Calibration
Description=[G stars]
Extended=NO

Template

TA Method
NONE

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	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2RAPID	5	1	false	true	NONE	9	9	787.8	31873.14

Special Requirements	
	Offset 0.0 arcsec, -0.6 arcsec Sequence Observations 11, 12, 13, 14, 15, Non-interruptible Same Aperture PA 14, 15