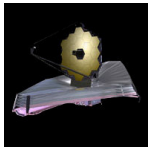

1283 - The MIRI HUDF Deep Imaging Survey

Cycle: 1, Proposal Category: GTO

INVESTIGATORS

Name	*Institution*
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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1	MIRI XDF NIRCam F115W+F277W-A	MIRI Imaging	(1) MDS.MIRI-DEEP-SURVEY-V5
	2	MIRI XDF NIRCam F115W+F277W-B	MIRI Imaging	(1) MDS.MIRI-DEEP-SURVEY-V5
	7	Dec 2023 MIRI XDF NIRCam F150W+F356W-A	MIRI Imaging	(1) MDS.MIRI-DEEP-SURVEY-V5
	4	MIRI XDF NIRCam F150W+F356W-B	MIRI Imaging	(1) MDS.MIRI-DEEP-SURVEY-V5
	5	MIRI XDF NIRISS JHK-R-bands	MIRI Imaging	(1) MDS.MIRI-DEEP-SURVEY-V5
	6	MIRI XDF NIRISS JHK-C-bands	MIRI Imaging	(1) MDS.MIRI-DEEP-SURVEY-V5

ABSTRACT

A key theme of JWST is to provide unique information about the formation and evolution of galaxies in the early universe. A lot of effort will be performed to examine the details of how the reionization of the Universe was evolving from the recombination phase at z ~ 1100 to z ~ 6 (Epoch of Reionization, EoR). One of the fundamental unknowns in this transition is the source of the ionizing photons during EoR.

EC-MIRI is participating in the multi-instrument NIRCam – NIRSpec - MIRI coordinated imaging and spectroscopic study of the HUDF and surrounding field. Following on the spirit of this setup, and with the goal of strengthening the primary objectives of MIRI GTO high-z science, the EC-MIRI team proposes coordinated parallel observations with NIRISS and NIRCam of a well selected field around HUDF, while executing the MIRI deep HUDF imaging survey for a total of 60 hours. The proposed coordinated parallels split the time into about 20 hours of NIRISS observations and about 40 hours of NIRCam imaging. The selected strategies complement those of NIRCam and NIRSpec in the same area of the sky in two very important aspects:

1) The proposed NIRCam coordinated parallels will supplement the NIRCam Survey by providing deeper images in an additional pointing with three filters selected to optimize the detection of z>10 candidates

2) The proposed NIRISS coordinated parallels will provide deep wide field slitless low resolution spectroscopy of all high-z sources in a field of 2.2 x 2.2 arcmin2 within the NIRSpec WIDE MOS survey

OBSERVING DESCRIPTION

The MIRI HUDF Deep Imaging Survey

Scientific Justification

The whole Universe exploded about 13.8 billion years ago in the Big Bang. The detailed physics of the evolution of the Universe from a tiny fraction of a second after Big Bang to the recombination of hydrogen, when the Universe was 380.000 years old, are well understood, mainly because of very detailed temperature and polarization maps of the Cosmic Microwave Background (CMB) radiation (the latest provided by the Planck Mission). Our understanding of the next period from the recombination to the epoch when the Universe has been fully ionized again is much more uncertain. The end of this transition is established by observations of significant fluxes short ward of Ly in QSOs with z ~ 6, when the Universe was about 1 billion years old (Fan et al. 2001, Fan et al. 2006).

The fundamental question for the reionization epoch is that the sources responsible for emitting the ionizing photons have not been identified. AGN's are known to emit a lot of UV photons, but their number density is peaking around z = 2 – 3 and is decreasing dramatically up z ~ 6. This means that they cannot provide a significant contribution to the reionization of the Universes. The most likely source is intrinsically faint star forming galaxies, so faint that they have been below the detection limits of the available instruments.

An important constrain on the reionization scenario is the optical depth of Thomson scattering of the electrons by the CMB photons. The Planck Mission (Planck Collaboration XX 2015) finds = 0.066±0.012, somewhat smaller than the value found by WMAP 9yr (Bennett et al. 2013), 0.089±0.014. Robertson et al. (2013, 2015) show that it is much easier to explain this lower value from the known UV luminosity function (MUV > -17) but it is still necessary to extrapolate the luminosity functions below MUV < -13 (Robertson et al. 2015).

Recently, three investigations of the total number of high redshifts sources detected by HST and UltraVISTA have been published (Bouwens et al.

2015, Finkelstein 2015, Bowler et al. 2015). For z ~ 7 and z ~8 they discuss many hundreds of sources. For z ~10, only 6 sources have been identified. HST is covering wavelengths 1.6 µm. This means that at these redshifts HST is observing rest – frame wavelengths in the UV, 2100Å, 1900Å and 1500Å, for these 3 redshift intervals. This implies that from HST photometry of high redshift objects, mainly information about the content, ages etc. of young stars can be extracted.

With the unique sensitivity above 5 µm, MIRI will play an important role in studying the different phases of EoR. With MIRI photometry, it will be possible for the first time to get:

1) an unbiased estimate of the total stellar masses in objects with z > 4,

2) determine masses and ages of the young and old stellar populations in objects with z > 8.5, exploiting clean measurements of the Balmer Break. From these masses and ages, information about the star formation rate can be derived, and thereby estimate how these populations have contributed with ionizing photons during the EoR.

Furthermore, with the 5.6 µm filter, MIRI will be the only instrument onboard JWST which will be able to study the H emission line for sources with z ~ 7.5 and the H + [OIII] lines for sources with z ~ 10.

Other high priority scientific areas, where this program will provide new insight, are ‘Mass assembly evolution’, ‘Morphology evolution ‘ and ‘Obscured AGN’.

The MIRI Deep Imaging Survey will be performed with the 5.6 µm filter on the HST UDF area covering both the ALMA and the MUSE Deep Surveys, spending about 60 h GTO time. With the estimated sensitivity of this filter given in ETC, the detection limit is 28.3 AB, S/N = 4.0. With this detection limit a small, but significant, number of sources will be detected with z > 9.

EC-MIRI is participating in the multi-instrument NIRCam – NIRSpec - MIRI coordinated imaging and spectroscopic study of the HUDF and surrounding field. Following on the spirit of this effort, and with the goal of strengthening the primary objectives of MIRI GTO high-z science, the EC-MIRI team proposes coordinated parallel observations with NIRISS and NIRCam of a well selected field around HUDF, while executing the MIRI deep HUDF imaging survey for a total of 60 hours. The proposed coordinated parallels split the time into about 20 hours of NIRISS observations and about 40 hours of NIRCam imaging. The selected strategies complement those of NIRCam and NIRSpec in the same area of the sky in two very important aspects:

1) As part of their cosmological survey, NIRCam will be getting a deep pointing on the HUDF to a (almost) uniform depth of AB ~30 mag over the full wavelength coverage of NIRCam. The proposed NIRCam coordinated parallels will built upon this set of data by providing deeper images in an additional pointing with three filters selected to optimize the detection of z>10 candidates using a Lyman break technique.

2) The proposed NIRISS coordinated parallels will provide deep wide field slitless low resolution spectroscopy of all high-z sources in a field of 2.2 x 2.2 arcmin2 around the HUDF with some of the deepest ancillary HST data. This set of data will be taken in a subsection of the planned NIRSpec

WIDE MOS survey, and therefore complement the NIRSpec survey by providing deeper spectroscopy without pre-selection of targets.

The MIRI EC Team is collaborating with the MIRI US, the NIRCam and the NIRSpec Teams on all the observations collected in HUDF within the JWST GTO program

Proposal 1283 - Targets - The MIRI HUDF Deep Imaging Survey

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	MDS.MIRI-DEEP-SURVEY-V5	RA: 03 32 39.0000 (53.1625000d) Dec: -27 47 5.00 (-27.78472d) Equinox: J2000		
Comments: *Category=Unidentified* *Description=[Blank field]*				

Observation

Proposal 1283, Observation 1: MIRI XDF NIRCam F115W+F277W-A Mon Oct 30 14:00:10 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Imaging

Coordinated Parallel Template(s): NIRCam Imaging

Comments: The V3 angles of this observing block have been constrained in order to maximize the scientific output of our multi-instrument survey, so the JWST data overlap with existing deep observations taken by telescopes such as HST and VLT. We remark that our top priority is getting all the JWST data in 2022, so if the V3 angle specifications cannot be met with that timing constraint, we would like to request the schedulers to contact us to find a solution. Please, consider the V3 angle ranges flexible in this regard.

We expect to update the APT once the overheads for parallel observations have been implemented in the APT software.

Diagnostics

(Visit 1:1) Warning (Form): Data Excess over lower threshold

(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)	MDS.MIRI-DEEP-SURVEY-V5	RA: 03 32 39.0000 (53.1625000d) Dec: -27 47 5.00 (-27.78472d) Equinox: J2000		

Comments:
Category=Unidentified
Description=[Blank field]

Template

MIRI Imaging	NIRCam Imaging
Subarray: FULL	Module: ALL Subarray: FULL Target Placement: Module Gap

Dithers

#	Dither Type	Starting Point	Number of Points	Points	Starting Set	Number of Sets	Optimized For	Direction	Pattern Size
1	CYCLING	1	10		1	1			MEDIUM

Spectral Elements

MIRI Imaging	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F560W	FASTR1	100	10	1	Dither 1	10	100	28000.154	

Spectral Elements

NIRCam Imaging	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F115W	F277W	DEEP8	7	2	20	10	27593.499	

Special Requirements	
	Aperture PA Range 23.83425324 to 29.83425324 Degrees (V3 18.99880427 to 24.99880427) No Parallel Attachments Background Limited. Background no more than 10th percentile above minimum

Observation

Proposal 1283, Observation 2: MIRI XDF NIRCam F115W+F277W-B Mon Oct 30 14:00:10 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Imaging

Coordinated Parallel Template(s): NIRCam Imaging

Comments: The V3 angles of this observing block have been constrained in order to maximize the scientific output of our multi-instrument survey, so the JWST data overlap with existing deep observations taken by telescopes such as HST and VLT. We remark that our top priority is getting all the JWST data in 2022, so if the V3 angle specifications cannot be met with that timing constraint, we would like to request the schedulers to contact us to find a solution. Please, consider the V3 angle ranges flexible in this regard.

We expect to update the APT once the overheads for parallel observations have been implemented in the APT software.

Diagnostics

(Visit 2:1) Warning (Form): Data Excess over lower threshold

(Visit 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	MDS.MIRI-DEEP-SURVEY-V5	RA: 03 32 39.0000 (53.1625000d) Dec: -27 47 5.00 (-27.78472d) Equinox: J2000		

Comments:
Category=Unidentified
Description=[Blank field]

Template

MIRI Imaging	NIRCam Imaging
Subarray: FULL	Module: ALL Subarray: FULL Target Placement: Module Gap

Dithers

#	Dither Type	Starting Point	Number of Points	Points	Starting Set	Number of Sets	Optimized For	Direction	Pattern Size
1	CYCLING	11	10		1	1			MEDIUM

Spectral Elements

MIRI Imaging	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F560W	FASTR1	100	10	1	Dither 1	10	100	28000.154	

Spectral Elements

NIRCam Imaging	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F115W	F277W	DEEP8	7	2	20	10	27593.499	

Special Requirements	
	Aperture PA Range 23.83425324 to 29.83425324 Degrees (V3 18.99880427 to 24.99880427) Offset 0.0275 arcsec, 0.03663 arcsec No Parallel Attachments Background Limited. Background no more than 10th percentile above minimum

Observation

Proposal 1283, Observation 7: Dec 2023 MIRI XDF NIRCam F150W+F356W-A Mon Oct 30 14:00:10 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Imaging

Coordinated Parallel Template(s): NIRCam Imaging

Comments: The V3 angles of this observing block have been constrained in order to maximize the scientific output of our multi-instrument survey, so the JWST data overlap with existing deep observations taken by telescopes such as HST and VLT. We remark that our top priority is getting all the JWST data in 2022, so if the V3 angle specifications cannot be met with that timing constraint, we would like to request the schedulers to contact us to find a solution. Please, consider the V3 angle ranges flexible in this regard.

We expect to update the APT once the overheads for parallel observations have been implemented in the APT software.

Diagnostics

(Visit 7:1) Warning (Form): Data Excess over middle threshold

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	MDS.MIRI-DEEP-SURVEY-V5	RA: 03 32 39.0000 (53.1625000d) Dec: -27 47 5.00 (-27.78472d) Equinox: J2000		

Comments:
Category=Unidentified
Description=[Blank field]

Template

MIRI Imaging	NIRCam Imaging
Subarray: FULL	Module: ALL Subarray: FULL Target Placement: Module Gap

Dithers

#	Dither Type	Starting Point	Number of Points	Points	Starting Set	Number of Sets	Optimized For	Direction	Pattern Size
1	CYCLING	1	11						LARGE

Spectral Elements

MIRI Imaging	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F1000W	FASTR1	100	10	1	Dither 1	11	110	30800.169	

Spectral Elements

NIRCam Imaging	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F150W	F356W	DEEP8	7	2	22	11	30352.849	

Special Requirements	
	Aperture PA Range 26.8 to 28.8 Degrees (V3 21.96455103 to 23.96455103) Offset 1.0 arcsec, -3.0 arcsec No Parallel Attachments Background Limited. Background no more than 10th percentile above minimum

Observation

Proposal 1283, Observation 4: MIRI XDF NIRCam F150W+F356W-B Mon Oct 30 14:00:10 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Imaging

Coordinated Parallel Template(s): NIRCam Imaging

Comments: The V3 angles of this observing block have been constrained in order to maximize the scientific output of our multi-instrument survey, so the JWST data overlap with existing deep observations taken by telescopes such as HST and VLT. We remark that our top priority is getting all the JWST data in 2022, so if the V3 angle specifications cannot be met with that timing constraint, we would like to request the schedulers to contact us to find a solution. Please, consider the V3 angle ranges flexible in this regard.

We expect to update the APT once the overheads for parallel observations have been implemented in the APT software.

Diagnostics

(Visit 4:1) Warning (Form): Data Excess over lower threshold

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	MDS.MIRI-DEEP-SURVEY-V5	RA: 03 32 39.0000 (53.1625000d) Dec: -27 47 5.00 (-27.78472d) Equinox: J2000		

Comments:
Category=Unidentified
Description=[Blank field]

Template

MIRI Imaging	NIRCam Imaging
Subarray: FULL	Module: ALL Subarray: FULL Target Placement: Module Gap

Dithers

#	Dither Type	Starting Point	Number of Points	Points	Starting Set	Number of Sets	Optimized For	Direction	Pattern Size
1	CYCLING	31	10						MEDIUM

Spectral Elements

MIRI Imaging	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F560W	FASTR1	100	10	1	Dither 1	10	100	28000.154	

Spectral Elements

NIRCam Imaging	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F150W	F356W	DEEP8	7	2	20	10	27593.499	

Special Requirements	
	Aperture PA Range 35.33544897 to 36.83544897 Degrees (V3 30.5 to 32.0) Offset 10.03663 arcsec, -32.96337 arcsec No Parallel Attachments Background Limited. Background no more than 10th percentile above minimum Same Aperture PA 4

Observation

Proposal 1283, Observation 5: MIRI XDF NIRISS JHK-R-bands Mon Oct 30 14:00:10 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Imaging

Coordinated Parallel Template(s): NIRISS Wide Field Slitless Spectroscopy

Comments: The V3 angles of this observing block have been constrained in order to maximize the scientific output of our multi-instrument survey, so the JWST data overlap with existing deep observations taken by telescopes such as HST and VLT. We remark that our top priority is getting all the JWST data in 2022, so if the V3 angle specifications cannot be met with that timing constraint, we would like to request the schedulers to contact us to find a solution. Please, consider the V3 angle ranges flexible in this regard.

We expect to update the APT once the overheads for parallel observations have been implemented in the APT software.

Diagnostics

(MIRI XDF NIRISS JHK-R-bands (Obs 5)) Warning (Form): Use of only one of GR150R or GR150C may result in spectral overlap from multiple sources that can't be corrected. Users should address this issue in their proposal text.

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	MDS.MIRI-DEEP-SURVEY-V5	RA: 03 32 39.0000 (53.1625000d) Dec: -27 47 5.00 (-27.78472d) Equinox: J2000		

Comments:
Category=Unidentified
Description=[Blank field]

Template

MIRI Imaging **NIRISS Wide Field Slitless Spectroscopy**

Subarray: FULL

Dither Direct Images Primes: NO_DITHERING

Dithers

#	Dither Type	Starting Point	Number of Points	Points	Starting Set	Number of Sets	Optimized For	Direction	Pattern Size
1	CYCLING	41	9		1	1			MEDIUM

Spectral Elements

MIRI Imaging	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F560W	FASTR1	100	1	1	None	1	1	277.504	
2	F560W	FASTR1	100	4	1	Dither 1	9	36	10065.07	
3	F560W	FASTR1	100	1	1	None	1	1	277.504	
4	F560W	FASTR1	100	1	1	None	1	1	277.504	
5	F560W	FASTR1	100	4	1	Dither 1	9	36	10065.07	
6	F560W	FASTR1	100	1	1	None	1	1	277.504	
7	F560W	FASTR1	100	2	1	None	1	2	557.783	
8	F560W	FASTR1	100	4	1	Dither 1	9	36	10065.07	
9	F560W	FASTR1	100	2	1	None	1	2	557.783	

Spectral Elements

NIRISS Wide Field Slitless Spectroscopy	Exposure Type	Filter	Grism	Readout Pattern	Groups/Int	Integrations/Exp	Two Extra Dithers	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	DIRECT	F115W		NIS	6	1	NO	1	1	268.419	
2	GRISM	F115W	GR150R	NIS	8	3	9	27	9566.462		3
DIRECT	F115W		NIS	6	1	NO	1	1	268.419		4
DIRECT	F150W		NIS	6	1	NO	1	1	268.419		5
GRISM	F150W	GR150R	NIS	8	3	9	27	9566.462		6	DIRECT
F150W		NIS	6	1	NO	1	1	268.419		7	DIRECT
F200W		NIS	6	2	NO	1	2	536.838		8	GRISM
F200W	GR150R	NIS	8	3	9	27	9566.462		9	DIRECT	F200W

Special Requirements

Aperture PA Range 25.83425324 to 31.83425324 Degrees (V3 20.99880427 to 26.99880427)
No Parallel Attachments
Background Limited. Background no more than 10th percentile above minimum

Same Aperture PA 5, 6

Observation

Proposal 1283, Observation 6: MIRI XDF NIRISS JHK-C-bands Mon Oct 30 14:00:10 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Imaging

Coordinated Parallel Template(s): NIRISS Wide Field Slitless Spectroscopy

Comments: The V3 angles of this observing block have been constrained in order to maximize the scientific output of our multi-instrument survey, so the JWST data overlap with existing deep observations taken by telescopes such as HST and VLT. We remark that our top priority is getting all the JWST data in 2022, so if the V3 angle specifications cannot be met with that timing constraint, we would like to request the schedulers to contact us to find a solution. Please, consider the V3 angle ranges flexible in this regard.

We expect to update the APT once the overheads for parallel observations have been implemented in the APT software.

Diagnostics

(MIRI XDF NIRISS JHK-C-bands (Obs 6)) Warning (Form): Use of only one of GR150R or GR150C may result in spectral overlap from multiple sources that can't be corrected. Users should address this issue in their proposal text.

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	MDS.MIRI-DEEP-SURVEY-V5	RA: 03 32 39.0000 (53.1625000d) Dec: -27 47 5.00 (-27.78472d) Equinox: J2000		

Comments:
Category=Unidentified
Description=[Blank field]

Template

MIRI Imaging **NIRISS Wide Field Slitless Spectroscopy**

Subarray: FULL

Dither Direct Images Primes: NO_DITHERING

Dithers

#	Dither Type	Starting Point	Number of Points	Points	Starting Set	Number of Sets	Optimized For	Direction	Pattern Size
1	CYCLING	50	9		1	1			MEDIUM
2	2-Point								DEFAULT

Spectral Elements

MIRI Imaging	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F560W	FASTR1	100	1	1	None	1	1	277.504	
2	F560W	FASTR1	100	4	1	Dither 1	9	36	10065.07	
3	F560W	FASTR1	100	1	1	None	1	1	277.504	
4	F560W	FASTR1	100	1	1	None	1	1	277.504	
5	F560W	FASTR1	100	4	1	Dither 1	9	36	10065.07	
6	F560W	FASTR1	100	1	1	None	1	1	277.504	
7	F560W	FASTR1	100	2	1	None	1	2	557.783	
8	F560W	FASTR1	100	4	1	Dither 1	9	36	10065.07	
9	F560W	FASTR1	100	2	1	None	1	2	557.783	

Spectral Elements

NIRISS Wide Field Slitless Spectroscopy	Exposure Type	Filter	Grism	Readout Pattern	Groups/Int	Integrations/Exp	Two Extra Dithers	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	DIRECT	F115W		NIS	6	1	NO	1	1	268.419	
2	GRISM	F115W	GR150C	NIS	8	3	9	27	9566.462		3
DIRECT	F115W		NIS	6	1	NO	1	1	268.419		4
DIRECT	F150W		NIS	6	1	NO	1	1	268.419		5
GRISM	F150W	GR150C	NIS	8	3	9	27	9566.462		6	DIRECT
F150W		NIS	6	1	NO	1	1	268.419		7	DIRECT
F200W		NIS	6	2	NO	1	2	536.838		8	GRISM
F200W	GR150C	NIS	8	3	9	27	9566.462		9	DIRECT	F200W

Special Requirements

Offset 0.0328 arcsec, 0.0328 arcsec
No Parallel Attachments
Background Limited. Background no more than 10th percentile above minimum

Same Aperture PA 5, 6