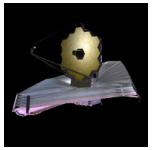

1335 - Q-3D: Imaging Spectroscopy of Quasar Hosts with JWST Analyzed with a Powerful New PSF Decomposition and Spectral Analysis Package

Cycle: 1, Proposal Category: ERS

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Dominika Wylezalek (PI) (ESA Member)	**European Southern Observatory - Germany**	**dominika.wylezalek@gmail.com**
Dr. Nadia L Zakamska (CoI) (US Admin CoI)	The Johns Hopkins University	zakamska@jhu.edu
Prof. Sylvain Veilleux (CoI)	University of Maryland	veilleux@astro.umd.edu
Dr. Jorge Karolt Barrera-Ballesteros (CoI)	Universidad Nacional Autonoma de Mexico (UNAM)	jkbarrerab@astro.unam.mx
Dr. Nora Luetzgendorf (CoI) (ESA Member)	Space Telescope Science Institute - ESA	nluetzge@cosmos.esa.int
Dr. Nicole Nesvadba (CoI) (ESA Member)	Institut d'Astrophysique Spatiale	nicole.nesvadba@ias.u-psud.fr
Prof. David Rupke (CoI)	Rhodes College	rupked@rhodes.edu
Dr. Ai-Lei Sun (CoI)	The Johns Hopkins University	asun27@jhu.edu

OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
F2M1106				
	1	NIRSpec_F2M1106	NIRSpec IFU Spectroscopy	(1) F2M1106-NIRSPEC
	2	MIRI_F2M1106_all	MIRI Medium Resolution Spectroscopy	(2) F2M1106-MIRI
	11	MIRI_F2M1106_all_bg	MIRI Medium Resolution Spectroscopy	(3) F2M1106-BG
XID2028				
	4	NIRSpec_XID2028	NIRSpec IFU Spectroscopy	(4) XID2028-NIRSPEC
	5	MIRI_XID2028_short	MIRI Medium Resolution Spectroscopy	(5) XID2028-MIRI
	12	MIRI_XID2028_short_bg	MIRI Medium Resolution Spectroscopy	(6) XID2028-BG
SDSSJ1652				

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
	8	NIRSpec_SDSSJ1652	NIRSpec IFU Spectroscopy	(7) SDSSJ1652-NIRSPEC
	9	MIRI_SDSSJ1652_short	MIRI Medium Resolution Spectroscopy	(8) SDSSJ1652-MIRI
	10	MIRI_SDSSJ1652_short_bg	MIRI Medium Resolution Spectroscopy	(9) SDSSJ1652-BG

ABSTRACT

In the last few years, optical and near-IR IFU observations from the ground have revolutionized extragalactic astronomy. The unprecedented infrared sensitivity, spatial resolution, and spectral coverage of the JWST IFUs will ensure high demand from the community. For a wide range of extragalactic phenomena (e.g. quasars, starbursts, supernovae, gamma ray bursts, tidal disruption events) and beyond (e.g. nebulae, debris disks around bright stars), PSF contamination will be an issue when studying the underlying extended emission. We propose to provide the community with a PSF decomposition and spectral analysis package for high dynamic range JWST IFU observations allowing the user to create science-ready maps of relevant spectral features. Luminous quasars, with their bright central source (quasar) and extended emission (host galaxy), are excellent test cases for this software. Quasars are also of high scientific interest in their own right as they are widely considered to be the main driver in regulating massive galaxy growth. JWST will revolutionize our understanding of black hole-galaxy co-evolution by allowing us to probe the stellar, gas, and dust components of nearby and distant galaxies, spatially and spectrally. We propose to use the IFU capabilities of NIRSpec and MIRI to study the impact of three carefully selected luminous quasars on their hosts. Our program will provide (1) a scientific dataset of broad interest that will serve as a pathfinder for JWST science investigations in IFU mode and (2) a powerful new data analysis tool that will enable frontier science for a wide swath of astrophysical research.

NOI 137, PI: D. Wylezalek, Co-PI: S. Veilleux, N. Zakamska

OBSERVING DESCRIPTION

We will be observing three powerful quasars at $0.4 < z < 3$ using a combination of the NIRSpec and MIRI IFUs.

The following observing modes per object are:

F2M1106 -- acquisition: point & shoot for both NIRSpec and MIRI

- NIRSpec IFU with G235H/F170LP:
  - 9-point "small cycling" dither pattern
  - 15 groups and 1 integration per dither position

Readout mode: NRSIRS2RAPID

--> total exposure time on source: 35 min

1 leakage exposure at one dither position: 3.9 min

- NIRSpec IFU with G395H/F290LP:

9-point "small cycling" dither pattern

15 groups and 1 integration per dither position

Readout mode: NRSIRS2RAPID

--> total exposure time on source: 35 min

1 leakage exposure at one dither position: 3.9 min

- MIRI IFU with the SHORT, MEDIUM and LONG wavelength setting:

4-point dither pattern

80 groups and 1 integration per dither position

Readout mode: FAST

--> total exposure time on source: 3 x 15 min = 45 min

1 background image slightly offset from target position for every spectral setting: 3 x 3.7 min = 11 min

XID2028 -- acquisition: point & shoot for both NIRSpec and MIRI

- NIRSpec IFU with G140H/F100LP:

9-point "small cycling" dither pattern

80 groups and 1 integration per dither position

Readout mode: NRSIRS2RAPID

--> total exposure time on source: 2.95 hours

1 leakage exposure at one dither position: 0.33 hours

- MIRI IFU with the SHORT wavelength setting:

4-point dither pattern

325 groups and 3 integrations per dither position

Readout mode: FAST

--> total exposure time on source: 3.0 hours

1 background image slightly offset from target position for every spectral setting: 0.75 hours

SDSSJ1652 -- acquisition: point & shoot for both NIRSpec and MIRI

- NIRSpec IFU with G235H/F170LP:
  - 9-point "small cycling" dither pattern
  - 130 groups and 1 integration per dither position
  - Readout mode: NRSIRS2RAPID
  - --> total exposure time on source: 5.25 hours
  - 1 leakage exposure at one dither position: 0.6 hours
- MIRI IFU with the SHORT wavelength setting:
  - 4-point dither pattern
  - 329 groups and 3 integrations per dither position
  - Readout mode: FAST
  - --> total exposure time on source: 3.1 hours
  - 1 background image slightly offset from target position for every spectral setting: 0.78 hours

Total request: 18.2 hours science time, 9.4 hours overheads

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	F2M1106-NIRSPEC	RA: 11 06 48.3200 (166.7013333d) Dec: +48 07 12.30 (48.12008d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[Active galactic nuclei, Emission line galaxies, Quasars]* *Extended=NO*				
(2)	F2M1106-MIRI	RA: 11 06 48.3200 (166.7013333d) Dec: +48 07 12.30 (48.12008d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[Active galactic nuclei, Emission line galaxies, Quasars]* *Extended=NO*				
(3)	F2M1106-BG	RA: 11 06 49.6200 (166.7067500d) Dec: +48 07 19.20 (48.12200d) Equinox: J2000		
Comments: *Category=Unidentified* *Description=[Blank field]*				
(4)	XID2028-NIRSPEC	RA: 10 02 11.2700 (150.5469583d) Dec: +01 37 6.60 (1.61850d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[Active galactic nuclei, Emission line galaxies, Quasars]* *Extended=NO*				
(5)	XID2028-MIRI	RA: 10 02 11.2700 (150.5469583d) Dec: +01 37 6.60 (1.61850d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[Active galactic nuclei, Emission line galaxies, Quasars]* *Extended=NO*				
(6)	XID2028-BG	RA: 10 02 11.8344 (150.5493100d) Dec: +01 37 24.67 (1.62352d) Equinox: J2000		
Comments: *Category=Unidentified* *Description=[Blank field]*				
(7)	SDSSJ1652-NIRSPEC	RA: 16 52 2.6448 (253.0110200d) Dec: +17 28 52.39 (17.48122d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[Active galactic nuclei, Emission line galaxies, Quasars]* *Extended=NO*				

	(8)	SDSSJ1652-MIRI	RA: 16 52 2.6448 (253.0110200d) Dec: +17 28 52.39 (17.48122d) Equinox: J2000
	Comments: *Category=Galaxy* *Description=[Active galactic nuclei, Emission line galaxies, Quasars]* *Extended=NO*		
	(9)	SDSSJ1652-BG	RA: 16 52 2.6640 (253.0111000d) Dec: +17 28 53.98 (17.48166d) Equinox: J2000
	Comments: *Category=Unidentified* *Description=[Blank field]*		

Observation

Proposal 1335, Observation 1: NIRSpec_F2M1106 Tue Jun 25 17:05:15 GMT 2019

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)	F2M1106-NIRSPEC	RA: 11 06 48.3200 (166.7013333d) Dec: +48 07 12.30 (48.12008d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Active galactic nuclei, Emission line galaxies, Quasars]
Extended=NO

Template

TA Method
VERIFY_ONLY

Dithers

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

Pointing Verification

#	PV MSA Configuration	Filter	PV Readout Pattern	PV Groups/Int	PV Integrations/Exp	PV Total Dithers	PV Total Integrations	PV Total Exposure Time
1	ALLCLOSED	F140X	NRSIRS2RAPID	2	1	1	1	43.767

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	G235H/F170LP	NRSIRS2RAPID	15	1	false	true	NONE	9	9	2100.8	
2	G235H/F170LP	NRSIRS2RAPID	15	1	true	false	NONE	1	1	233.422	
3	G395H/F290LP	NRSIRS2RAPID	15	1	false	true	NONE	9	9	2100.8	
4	G395H/F290LP	NRSIRS2RAPID	15	1	true	false	NONE	1	1	233.422	

Observation

Proposal 1335, Observation 2: MIRI_F2M1106_all Tue Jun 25 17:05:15 GMT 2019

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observations:[MIRI_F2M1106_all_bg (Obs 11)]

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)	F2M1106-MIRI	RA: 11 06 48.3200 (166.7013333d) Dec: +48 07 12.30 (48.12008d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Active galactic nuclei, Emission line galaxies, Quasars]
Extended=NO

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray
F1000W	ALL	YES	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1		IMAGER	F770W	FAST	80	1	1	Dither 1	4	4	888.013	
1	SHORT(A)	MRSLONG		FAST	80	1	1	Dither 1	4	4	888.013	
1	SHORT(A)	MRSSHORT		FAST	80	1	1	Dither 1	4	4	888.013	
2		IMAGER	F770W	FAST	80	1	1	Dither 1	4	4	888.013	
2	MEDIUM(B)	MRSLONG		FAST	80	1	1	Dither 1	4	4	888.013	
2	MEDIUM(B)	MRSSHORT		FAST	80	1	1	Dither 1	4	4	888.013	
3		IMAGER	F770W	FAST	80	1	1	Dither 1	4	4	888.013	
3	LONG(C)	MRSLONG		FAST	80	1	1	Dither 1	4	4	888.013	
3	LONG(C)	MRSSHORT		FAST	80	1	1	Dither 1	4	4	888.013	

Special Requirements	Sequence Observations 2, 11, Non-interruptible

Observation

Proposal 1335, Observation 11: MIRI_F2M1106_all_bg Tue Jun 25 17:05:15 GMT 2019

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observation For: [MIRI_F2M1106_all (Obs 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
(3)	F2M1106-BG	RA: 11 06 49.6200 (166.7067500d) Dec: +48 07 19.20 (48.12200d) Equinox: J2000		

Comments:
Category=Unidentified
Description=[Blank field]

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray
F1000W	ALL	YES	FULL

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1		IMAGER	F770W	FAST	80	1	1	None	1	1	222.003	
1	SHORT(A)	MRSLONG		FAST	80	1	1	None	1	1	222.003	
1	SHORT(A)	MRSSHORT		FAST	80	1	1	None	1	1	222.003	
2		IMAGER	F770W	FAST	80	1	1	None	1	1	222.003	
2	MEDIUM(B)	MRSLONG		FAST	80	1	1	None	1	1	222.003	
2	MEDIUM(B)	MRSSHORT		FAST	80	1	1	None	1	1	222.003	
3		IMAGER	F770W	FAST	80	1	1	None	1	1	222.003	
3	LONG(C)	MRSLONG		FAST	80	1	1	None	1	1	222.003	
3	LONG(C)	MRSSHORT		FAST	80	1	1	None	1	1	222.003	

Special Requirements	Sequence Observations 2, 11, Non-interruptible

Observation

Proposal 1335, Observation 4: NIRSpec_XID2028 Tue Jun 25 17:05:15 GMT 2019

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)	XID2028-NIRSPEC	RA: 10 02 11.2700 (150.5469583d) Dec: +01 37 6.60 (1.61850d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Active galactic nuclei, Emission line galaxies, Quasars]
Extended=NO

Template

TA Method
VERIFY_ONLY

Dithers

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

Pointing Verification

#	PV MSA Configuration	Filter	PV Readout Pattern	PV Groups/Int	PV Integrations/Exp	PV Total Dithers	PV Total Integrations	PV Total Exposure Time
1	ALLCLOSED	F140X	NRSIRS2RAPID	2	1	1	1	43.767

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	G140H/F100LP	NRSIRS2RAPID	80	1	false	true	NONE	9	9	10635.301	
2	G140H/F100LP	NRSIRS2RAPID	80	1	true	false	NONE	1	1	1181.7	

Observation

Proposal 1335, Observation 5: MIRI_XID2028_short Tue Jun 25 17:05:15 GMT 2019

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observations:[MIRI_XID2028_short_bg (Obs 12)]

Diagnostics

(Visit 5:1) Warning (Form): Data volume for this visit 31758.3 MB exceeds half the maximum allowed of 58000.0 MB.

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(5)	XID2028-MIRI	RA: 10 02 11.2700 (150.5469583d) Dec: +01 37 6.60 (1.61850d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Active galactic nuclei, Emission line galaxies, Quasars]
Extended=NO

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray
F1000W	ALL	YES	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1		IMAGER	F1130W	FAST	325	3	1	Dither 1	4	12	10822.656	
1	SHORT(A)	MRSLONG		FAST	325	3	1	Dither 1	4	12	10822.656	
1	SHORT(A)	MRSSHORT		FAST	325	3	1	Dither 1	4	12	10822.656	

Special Requirements	Sequence Observations 5, 12, Non-interruptible

Observation

Proposal 1335, Observation 12: MIRI_XID2028_short_bg Tue Jun 25 17:05:15 GMT 2019

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observation For: [MIRI_XID2028_short (Obs 5)]

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
(6)	XID2028-BG	RA: 10 02 11.8344 (150.5493100d) Dec: +01 37 24.67 (1.62352d) Equinox: J2000		

Comments:
Category=Unidentified
Description=[Blank field]

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray
F1000W	ALL	YES	FULL

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1		IMAGER	F1130W	FAST	325	3	1	None	1	3	2705.664	
1	SHORT(A)	MRSLONG		FAST	325	3	1	None	1	3	2705.664	
1	SHORT(A)	MRSSHORT		FAST	325	3	1	None	1	3	2705.664	

Special Requirements

Sequence Observations 5, 12, Non-interruptible

Observation

Proposal 1335, Observation 8: NIRSpec_SDSSJ1652 Tue Jun 25 17:05:15 GMT 2019

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(Visit 8:1) Warning (Form): Data volume for this visit 35198.37 MB exceeds half the maximum allowed of 58000.0 MB.

(Visit 8:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(7)	SDSSJ1652-NIRSPEC	RA: 16 52 2.6448 (253.0110200d) Dec: +17 28 52.39 (17.48122d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Active galactic nuclei, Emission line galaxies, Quasars]
Extended=NO

Template

TA Method
VERIFY_ONLY

Dithers

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

Pointing Verification

#	PV MSA Configuration	Filter	PV Readout Pattern	PV Groups/Int	PV Integrations/Exp	PV Total Dithers	PV Total Integrations	PV Total Exposure Time
1	ALLCLOSED	F140X	NRSIRS2RAPID	2	1	1	1	43.767

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	G235H/F170LP	NRSIRS2RAPID	130	1	false	true	NONE	9	9	17200.301	
2	G235H/F170LP	NRSIRS2RAPID	130	1	true	false	NONE	1	1	1911.145	

Observation

Proposal 1335, Observation 9: MIRI_SDSSJ1652_short Tue Jun 25 17:05:15 GMT 2019

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observations:[MIRI_SDSSJ1652_short_bg (Obs 10)]

Diagnostics

(Visit 9:1) Warning (Form): Data volume for this visit 32148.5 MB exceeds half the maximum allowed of 58000.0 MB.

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(8)	SDSSJ1652-MIRI	RA: 16 52 2.6448 (253.0110200d) Dec: +17 28 52.39 (17.48122d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Active galactic nuclei, Emission line galaxies, Quasars]
Extended=NO

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray
F560W	ALL	YES	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1		IMAGER	F1000W	FAST	329	3	1	Dither 1	4	12	10955.858	
1	SHORT(A)	MRSLONG		FAST	329	3	1	Dither 1	4	12	10955.858	
1	SHORT(A)	MRSSHORT		FAST	329	3	1	Dither 1	4	12	10955.858	

Special Requirements	Sequence Observations 9, 10, Non-interruptible

Observation

Proposal 1335, Observation 10: MIRI_SDSSJ1652_short_bg Tue Jun 25 17:05:15 GMT 2019

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observation For: [MIRI_SDSSJ1652_short (Obs 9)]

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
(9)	SDSSJ1652-BG	RA: 16 52 2.6640 (253.0111000d) Dec: +17 28 53.98 (17.48166d) Equinox: J2000		

Comments:
Category=Unidentified
Description=[Blank field]

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray
F560W	ALL	YES	FULL

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1		IMAGER	F1000W	FAST	329	3	1	None	1	3	2738.964	
1	SHORT(A)	MRSLONG		FAST	329	3	1	None	1	3	2738.964	
1	SHORT(A)	MRSSHORT		FAST	329	3	1	None	1	3	2738.964	

Special Requirements

Sequence Observations 9, 10, Non-interruptible