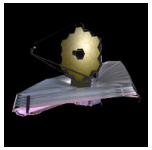

# 1248 - Uranus

Cycle: 1, Proposal Category: GTO


**INVESTIGATORS**

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|---|---|---|
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**OBSERVATIONS**

| *Folder* | *Observation* | *Label* | *Observing Template* | *Science Target* |
|---|---|---|---|---|
| Uranus Spectral Map | | | | |
| | 1 | MIRI-Lon1 | MIRI Medium Resolution Spectroscopy | (1) URANUS |
| | 2 | NIRSPEC-Lon1 | NIRSpec IFU Spectroscopy | (1) URANUS |
| | 3 | MIRI-Lon2 | MIRI Medium Resolution Spectroscopy | (1) URANUS |
| | 4 | NIRSPEC-Lon2 | NIRSpec IFU Spectroscopy | (1) URANUS |
| | 5 | MIRI-Lon3 | MIRI Medium Resolution Spectroscopy | (1) URANUS |
| | 6 | NIRSPEC-Lon3 | NIRSpec IFU Spectroscopy | (1) URANUS |
| | 7 | MIRI Background | MIRI Medium Resolution Spectroscopy | (7) URANUS-BACKGROUND |
| | 8 | NIRSPEC Background | NIRSpec IFU Spectroscopy | (7) URANUS-BACKGROUND |


**ABSTRACT**

We will investigate the influence of Uranus' extreme seasonal tilt on the circulation and chemistry of this ice giant. Spatially-resolved global spectroscopic maps will reveal contrasts in atmospheric temperatures and chemical tracers (e.g., the myriad hydrocarbons produced via methane photochemistry), as well as a full chemical inventory of this ice giant. MIRI observations will be executed near-simultaneously with NIRSpec observations of uranian H3+, allowing us to understand the coupling between the upper, middle and lower atmospheric regimes for the first time. Each instrument will sample thtee longitudes to generate a global map.

**OBSERVING DESCRIPTION**

Uranus global spatial-spectral map using NIRSpec and MIRI, sampling three longitudes with each instrument to span 360 degrees.
Uranus rotates in 17 hours, 14 minutes. The time between adjacent sets (MIRI or NIRSPEC) should therefore be 5.7hours.

Notes:

1. SCHEDULING: Each longitude has been defined seperately to allow the visits to be seperated if necessary, but it makes most sense to execute all observations during one 17-hour rotation of Uranus, reducing the need for major slews. If time is unused between the targetted observations, we would welcome extended integration times for these low-signal observations.

2. PRECISE LONGITUDES ARE FLEXIBLE: As long as there is 120 degrees between each MIRI frame, and 120 degrees between each NIRSPEC frame, then we still sample all 360 degrees of longitude. Indeed, science would be optimised if MIRI and NIRSPEC observations were executed consecutively for a particular longitude. Instead of using longitude constraints, we therefore use a "time after" grouping to capture the three different longitudes.

3. DITHERING: MIRI assumes a 4-point dither pattern to optimise the imaging of this 3.7" diameter disc. Large 1" dither offsets should be avoided, as the purpose is to improve spatial sampling for ALL of the MIRI channels. If a 2-point dither pattern appears provide adequate imaging but with a better overall exposure time, then we would consider changing the dithering technique prior to execution. NIRSPEC assumed a 4-point dither pattern for the same purpose.

4. BACKGROUND: Both MIRI and NIRSPEC observations assume a single offset to a background region of sky (20" is acceptable, provided no Uranian satellites are in the field of view). This would be best scheduled immediately before or after one of the science exposures.

5. SATURATION: Comparison to the MIRI sensitivity model and the ETC suggest Uranus Channels 1-4 will not saturate even with 100 groups, so this was split into multiple integrations of 10 groups to achieve ~5 minute exposure per observation. If there is a way to further optimise this, please let us know.

Proposal 1248 - Targets - Uranus

**Solar System Targets**

| # | Name | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| (1) | URANUS | STD=URANUS | | |
| *Comments: Extended=YES* | | | | |
| (7) | URANUS-BACKGROUND | STD=URANUS | TYPE=POS_ANGLE,RAD=20,ANG=0,REF=NORTH | |
| *Comments: Extended=YES* | | | | |

## Observation

**Proposal 1248, Observation 1: MIRI-Lon1**

Wed Aug 25 13:00:11 GMT 2021

**Diagnostic Status: Warning**

Observing Template: MIRI Medium Resolution Spectroscopy

## Diagnostics

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

## Solar System Targets

| # | Name | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| (1) | URANUS | STD=URANUS | | |

*Comments: Extended=YES*

## Acquisition

| # | Target |
|---|---|
| 1 | NONE |

## Template

| AcqFilter | Primary Channel | Simultaneous Imaging | Imager Subarray |
|---|---|---|---|
| F1500W | ALL | YES | FULL |

## Dithers

| # | Dither Type | Optimized For | Direction |
|---|---|---|---|
| 1 | 4-Point | EXTENDED 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 | F560W | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 1 | SHORT(A) | MRSLONG | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 1 | SHORT(A) | MRSSHORT | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 2 | | IMAGER | F560W | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 2 | MEDIUM(B) | MRSLONG | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 2 | MEDIUM(B) | MRSSHORT | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 3 | | IMAGER | F560W | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 3 | LONG(C) | MRSLONG | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 3 | LONG(C) | MRSSHORT | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |

| Special Requirements | |
|---|---|
| | 3 After 1 by 5.2 Hours to 6.2 Hours<br>5 After 1 by 11 Hours to 12 Hours<br>Group Observations 1, 2, Non-interruptible<br>Sequence Observations 1, 2, 3, 4, 5, 6, 7, 8 within 1 Days<br><br>DEFAULT WINDOW: ANGULAR RATE URANUS FROM JWST LESS THAN 0.03 |

## Observation

**Proposal 1248, Observation 2: NIRSPEC-Lon1** Wed Aug 25 13:00:11 GMT 2021

**Diagnostic Status: Warning**

Observing Template: NIRSpec IFU Spectroscopy

## Diagnostics

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

## Solar System Targets

| # | Name | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| (1) | URANUS | STD=URANUS | | |

*Comments: Extended=YES*

## Template

| TA Method |
|---|
| NONE |

## Dithers

| # | Dither Type | Size | Starting Point | Number of Points | Points |
|---|---|---|---|---|---|
| 1 | 4-POINT-DITHER | | | | |

## 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 | NRSRAPID | 10 | 4 | false | true | NONE | 4 | 16 | 1889.672 | |
| 2 | G235H/F170LP | NRSRAPID | 10 | 4 | false | true | NONE | 4 | 16 | 1889.672 | |

## Special Requirements

Group Observations 1, 2, Non-interruptible
Sequence Observations 1, 2, 3, 4, 5, 6, 7, 8 within 1 Days

DEFAULT WINDOW: ANGULAR RATE URANUS FROM JWST LESS THAN 0.03

## Observation

**Proposal 1248, Observation 3: MIRI-Lon2** Wed Aug 25 13:00:11 GMT 2021

**Diagnostic Status: Warning**

Observing Template: MIRI Medium Resolution Spectroscopy

## Diagnostics

(MIRI-Lon2 (Obs 3)) Warning (Form): Imager Filter overlap.
(MIRI-Lon2 (Obs 3)) Warning (Form): Imager Filter overlap.
(MIRI-Lon2 (Obs 3)) Warning (Form): Imager Filter overlap.
(Visit 3:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

## Solar System Targets

| # | Name | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| (1) | URANUS | STD=URANUS | | |

*Comments: Extended=YES*

## Acquisition

| # | Target |
|---|---|
| 1 | NONE |

## Template

| AcqFilter | Primary Channel | Simultaneous Imaging | Imager Subarray |
|---|---|---|---|
| F1500W | ALL | YES | FULL |

## Dithers

| # | Dither Type | Optimized For | Direction |
|---|---|---|---|
| 1 | 4-Point | EXTENDED 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 | F1800W | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 1 | SHORT(A) | MRSLONG | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 1 | SHORT(A) | MRSSHORT | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 2 | | IMAGER | F1800W | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 2 | MEDIUM(B) | MRSLONG | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 2 | MEDIUM(B) | MRSSHORT | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 3 | | IMAGER | F1800W | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 3 | LONG(C) | MRSLONG | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 3 | LONG(C) | MRSSHORT | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |

| Special Requirements | |
|---|---|
| | 3 After 1 by 5.2 Hours to 6.2 Hours<br>Group Observations 3, 4, Non-interruptible<br>Sequence Observations 1, 2, 3, 4, 5, 6, 7, 8 within 1 Days<br><br>DEFAULT WINDOW: ANGULAR RATE URANUS FROM JWST LESS THAN 0.03 |

## Observation

**Proposal 1248, Observation 4: NIRSPEC-Lon2** Wed Aug 25 13:00:11 GMT 2021

**Diagnostic Status: Warning**

Observing Template: NIRSpec IFU Spectroscopy

## Diagnostics

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

## Solar System Targets

| # | Name | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| (1) | URANUS | STD=URANUS | | |

*Comments: Extended=YES*

## Template

| TA Method |
|---|
| NONE |

## Dithers

| # | Dither Type | Size | Starting Point | Number of Points | Points |
|---|---|---|---|---|---|
| 1 | 4-POINT-DITHER | | | | |

## 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 | NRSRAPID | 10 | 4 | false | true | NONE | 4 | 16 | 1889.672 | |
| 2 | G235H/F170LP | NRSRAPID | 10 | 4 | false | true | NONE | 4 | 16 | 1889.672 | |

## Special Requirements

Group Observations 3, 4, Non-interruptible
Sequence Observations 1, 2, 3, 4, 5, 6, 7, 8 within 1 Days

DEFAULT WINDOW: ANGULAR RATE URANUS FROM JWST LESS THAN 0.03

## Observation

**Proposal 1248, Observation 5: MIRI-Lon3**

Wed Aug 25 13:00:11 GMT 2021

**Diagnostic Status: Warning**

Observing Template: MIRI Medium Resolution Spectroscopy

## Diagnostics

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

## Solar System Targets

| # | Name | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| (1) | URANUS | STD=URANUS | | |

*Comments: Extended=YES*

## Acquisition

| # | Target |
|---|---|
| 1 | NONE |

## Template

| AcqFilter | Primary Channel | Simultaneous Imaging | Imager Subarray |
|---|---|---|---|
| F1500W | ALL | YES | FULL |

## Dithers

| # | Dither Type | Optimized For | Direction |
|---|---|---|---|
| 1 | 4-Point | EXTENDED 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 | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 1 | SHORT(A) | MRSLONG | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 1 | SHORT(A) | MRSSHORT | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 2 | | IMAGER | F1000W | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 2 | MEDIUM(B) | MRSLONG | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 2 | MEDIUM(B) | MRSSHORT | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 3 | | IMAGER | F1000W | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 3 | LONG(C) | MRSLONG | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |
| 3 | LONG(C) | MRSSHORT | | FASTR1 | 10 | 5 | 1 | Dither 1 | 4 | 20 | 599.409 | |

| Special Requirements | |
|---|---|
| | 5 After 1 by 11 Hours to 12 Hours<br>Group Observations 5, 6, 7, 8, Non-interruptible<br>Sequence Observations 1, 2, 3, 4, 5, 6, 7, 8 within 1 Days<br><br>DEFAULT WINDOW: ANGULAR RATE URANUS FROM JWST LESS THAN 0.03 |

## Observation

**Proposal 1248, Observation 6: NIRSPEC-Lon3** Wed Aug 25 13:00:11 GMT 2021

**Diagnostic Status: Warning**

Observing Template: NIRSpec IFU Spectroscopy

## Diagnostics

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

## Solar System Targets

| # | Name | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| (1) | URANUS | STD=URANUS | | |

*Comments: Extended=YES*

## Template

| TA Method |
|---|
| NONE |

## Dithers

| # | Dither Type | Size | Starting Point | Number of Points | Points |
|---|---|---|---|---|---|
| 1 | 4-POINT-DITHER | | | | |

## 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 | NRSRAPID | 10 | 4 | false | true | NONE | 4 | 16 | 1889.672 | |
| 2 | G235H/F170LP | NRSRAPID | 10 | 4 | false | true | NONE | 4 | 16 | 1889.672 | |

## Special Requirements

Group Observations 5, 6, 7, 8, Non-interruptible
Sequence Observations 1, 2, 3, 4, 5, 6, 7, 8 within 1 Days

DEFAULT WINDOW: ANGULAR RATE URANUS FROM JWST LESS THAN 0.03

## Observation

**Proposal 1248, Observation 7: MIRI Background**

Wed Aug 25 13:00:11 GMT 2021

**Diagnostic Status: Warning**

Observing Template: MIRI Medium Resolution Spectroscopy

## Diagnostics

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

## Solar System Targets

| # | Name | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| (7) | URANUS-BACKGROUND | STD=URANUS | TYPE=POS_ANGLE,RAD=20,ANG=0,REF=NORTH | |

*Comments: Extended=YES*

## Acquisition

| # | Target |
|---|---|
| 1 | NONE |

## Template

| AcqFilter | Primary Channel | Simultaneous Imaging | Imager Subarray |
|---|---|---|---|
| F1500W | ALL | NO | 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 | SHORT(A) | MRSLONG | | FASTR1 | 10 | 5 | 1 | None | 1 | 5 | 149.852 | |
| 1 | SHORT(A) | MRSSHORT | | FASTR1 | 10 | 5 | 1 | None | 1 | 5 | 149.852 | |
| 2 | MEDIUM(B) | MRSLONG | | FASTR1 | 10 | 5 | 1 | None | 1 | 5 | 149.852 | |
| 2 | MEDIUM(B) | MRSSHORT | | FASTR1 | 10 | 5 | 1 | None | 1 | 5 | 149.852 | |
| 3 | LONG(C) | MRSLONG | | FASTR1 | 10 | 5 | 1 | None | 1 | 5 | 149.852 | |
| 3 | LONG(C) | MRSSHORT | | FASTR1 | 10 | 5 | 1 | None | 1 | 5 | 149.852 | |

| Special Requirements | |
|---|---|
| | Group Observations 5, 6, 7, 8, Non-interruptible<br>Sequence Observations 1, 2, 3, 4, 5, 6, 7, 8 within 1 Days<br><br>DEFAULT WINDOW: ANGULAR RATE URANUS-BACKGROUND FROM JWST LESS THAN 0.03 |

## Observation

**Proposal 1248, Observation 8: NIRSPEC Background** Wed Aug 25 13:00:11 GMT 2021

**Diagnostic Status: Warning**

Observing Template: NIRSpec IFU Spectroscopy

## Diagnostics

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

## Solar System Targets

| # | Name | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| (7) | URANUS-BACKGROUND | STD=URANUS | TYPE=POS_ANGLE,RAD=20,ANG=0,REF=NORTH | |

*Comments: Extended=YES*

## Template

| TA Method |
|---|
| NONE |

## Dithers

| # | Dither Type | Size | Starting Point | Number of Points | Points |
|---|---|---|---|---|---|
| 1 | NONE | | | | |

## 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 | NRSRAPID | 10 | 4 | false | false | NONE | 1 | 4 | 472.418 | |
| 2 | G235H/F170LP | NRSRAPID | 10 | 4 | false | false | NONE | 1 | 4 | 472.418 | |

## Special Requirements

Group Observations 5, 6, 7, 8, Non-interruptible
Sequence Observations 1, 2, 3, 4, 5, 6, 7, 8 within 1 Days

DEFAULT WINDOW: ANGULAR RATE URANUS-BACKGROUND FROM JWST LESS THAN 0.03