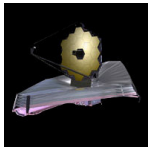

# 4536 - Constraining the SO2 Abundance of GJ 3470 b

Cycle: 3, Proposal Category: GTO

## INVESTIGATORS


| *Name* | *Institution* |
|---|---|
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| Dr. Luis Welbanks (CoI) | Arizona State University |


## OBSERVATIONS

| *Folder* | *Observation* | *Label* | *Observing Template* | *Science Target* |
|---|---|---|---|---|
| Observation Folder | | | | |
| | 1 | GJ 3470 b transit | NIRSpec Bright Object Time Series | (1) GJ-3470 |

## ABSTRACT

GJ 3470 b is a valuable Neptune mass planet showing significant water vapor as seen by HST. JWST NIRCam spectroscopy covers the infrared features of CO2, SO2, H2O, CO and CH4. However, it the potential offsets between the F322W2 and F444W filters create significant ambiguities about the SO2 feature. Here, we propose to use NIRSpec G395H to definitively measure the SO2 feature strength, which will strongly constrain the metallicity of GJ 3470 b and give insights about planet formation at the low mass end.

## OBSERVING DESCRIPTION

We will use NIRSpec G359H to evaluate the SO2 abundance in GJ 3470 b. This is a valuable component to the composition of GJ 3470 b, understanding its photochemical processes and overall composition.

GJ 3470 saturates the TA for 3 pixels in 3 groups so we elect to skip TA and use the blind pointing accuracy.

We selected 9 NRSRAPID groups per 9.04 s integration to give a max signal of 60,500 e- and 0.84 saturation per the ETC (workbook 157181.1). We note that this is 0.79 the full well of the SUB2048 subarray per Jdox.

We set the exposure dwell time to be 2T14 + 1 hr (timing window) + 0.5 hr (det settling) = 5.336 hr (19211 s). This corresponds to 2125 integrations of 9 NRSRAPID groups each.

We open the timing window for the exposure start at phase = 1.0 - (T_det + T_14)/P and keep it open for 1 hour after then.

**Fixed Targets**

| # | Name | Target Coordinates | Targ. Coord. Corrections | Miscellaneous |
|---|---|---|---|---|
| (1) | GJ-3470 | RA: 07 59 5.6341 (119.7734754d) | Proper Motion RA: -185.706 mas/yr | |
| | | Dec: +15 23 28.32 (15.39120d) | Proper Motion Dec: -56.994 mas/yr | |
| | | Equinox: J2000 | Parallax: 0.0340172" | |
| | | | Epoch of Position: 2016.0 | |

*Comments: This object was originally generated by the targetselector and retrieved from the SIMBAD database.*
*Updated with Gaia DR3 coordinates, PM and parallax; Epoch 2016.0*
*Category=Star*
*Description=[Exoplanet Systems, M dwarfs]*
*Extended=NO*

## Observation

**Proposal 4536, Observation 1: GJ 3470 b transit**

Wed Jun 28 06:00:51 GMT 2023

**Diagnostic Status: Warning**

Observing Template: NIRSpec Bright Object Time Series

## Diagnostics

(GJ 3470 b transit (Obs 1)) Warning (Form): Exposure Duration exceeds the limit of 10000.0 seconds. Above this limit it is possible that a High Gain Antenna move may occur during the exposure.

(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) | GJ-3470 | RA: 07 59 5.6341 (119.7734754d)<br>Dec: +15 23 28.32 (15.39120d)<br>Equinox: J2000 | Proper Motion RA: -185.706 mas/yr<br>Proper Motion Dec: -56.994 mas/yr<br>Parallax: 0.0340172"<br>Epoch of Position: 2016.0 | |

*Comments: This object was originally generated by the targetselector and retrieved from the SIMBAD database.*
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*Category=Star*
*Description=[Exoplanet Systems, M dwarfs]*
*Extended=NO*

## Template

| TA Method | Subarray |
|---|---|
| NONE | SUB2048 |

## Spectral Elements

| # | Grating/Filter | Readout Pattern | Groups/Int | Integrations/Exp | Exposures/Dith | Total Dithers | Total Integrations | Total Exposure Time | ETC Wkbk.Calc ID |
|---|---|---|---|---|---|---|---|---|---|
| 1 | G395H/F290LP | NRSRAPID | 9 | 2125 | 1 | 1 | 2125 | 19211.02 | 157181.1 |

## Special Requirements

Phase 0.95731 to 0.96981 with period 3.33667 Days and zero-phase 2459527.228800 HJD
Time Series Observation
No Parallel Attachments