JWST IAC Workshop-GO1 Proposal Planning

Time-Series Observations:
Obtaining the Atmospheric Transmission
Spectrum of a Transiting Exoplanet

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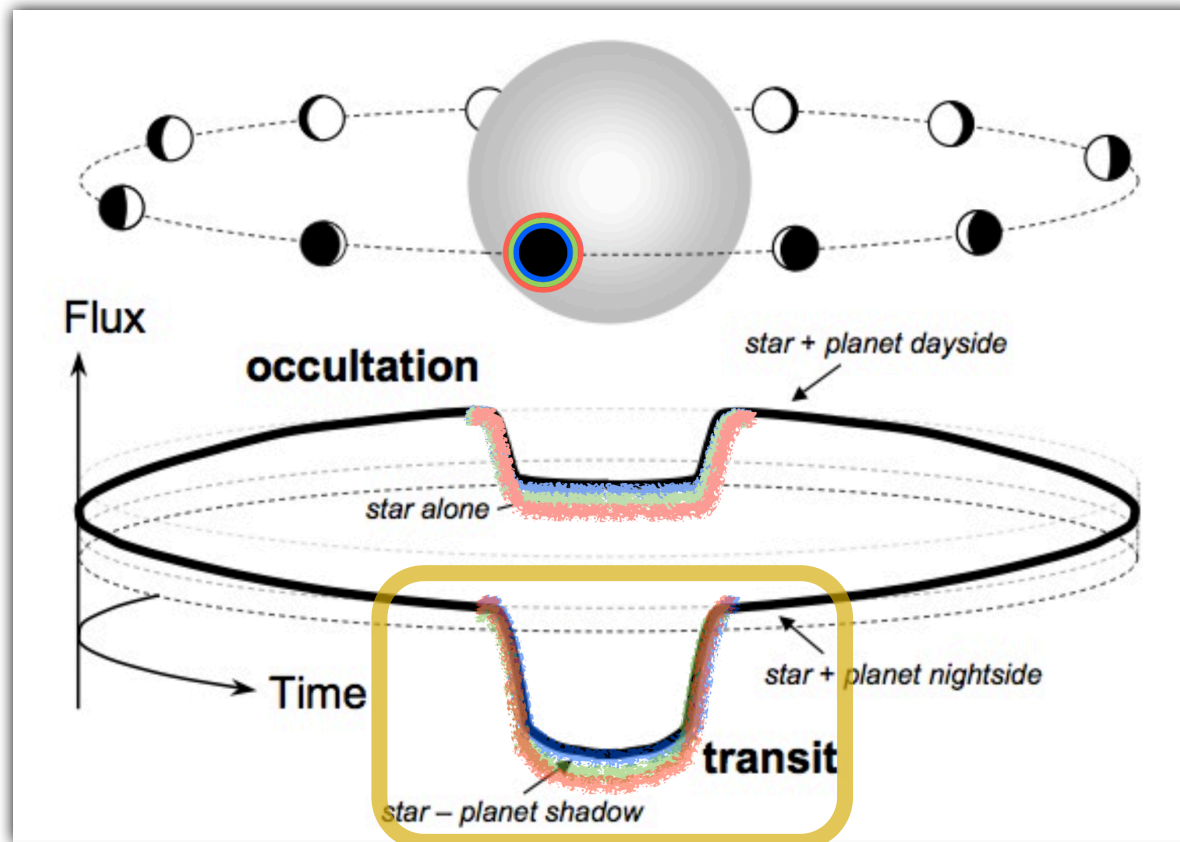ASOCIADO AL NASA ASTROBIOLOGY INSTITUTE

Goal: Obtain the atmospheric transmission spectrum of the hot Jupiter WASP-79b
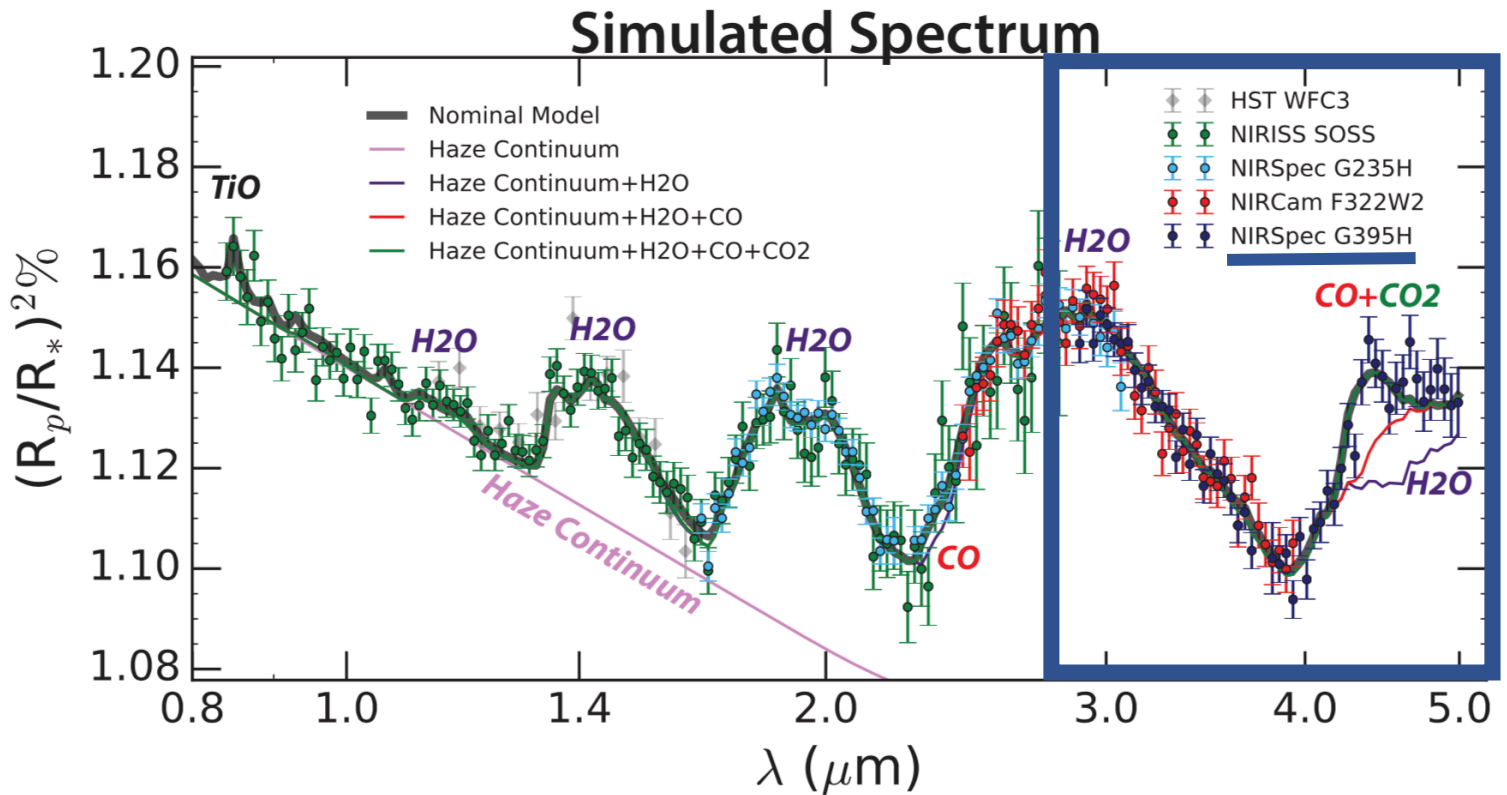
Observation: 1 transit: 4 hour transit + 4 hour baseline — Total: ~8 hours

Observation Setup

Instrument and Wavelength range

Observation Setup

For this exercise we will use:

- Instrument: **NIRSpec**

- Mode: **Bright Object Time-series Spectroscopy** (**BOTS**)

- Grism/Filter: **G395H/F290LP** $(2.87 - 5.27\ \mu m, R \sim 2700)$

JDox: [Overview of Time-Series Observation (TSO) Modes](#)

[NIRSpec Bright Object Time-Series Spectroscopy](#)

Step 1: Design your observation with the Exposure Time Calculator (ETC)

- Log into your ETC workspace at https://jwst.etc.stsci.edu/

- Create a New Workbook

- Create a Scene and a Source

- Set up and run Calculations to design your observation

If time permits: Set up the Target Acquisition

JDox: JWST Exposure Time Calculator – ETC

JWST Detector MULTIACCUM Integration

NIRSpec Target Acquisition

NIRSpec Wide Aperture Target Acquisition - WATA

Step 2: Implement your proposal with the Astronomer Proposal Tool (APT)

- Open APT and Create a JWST proposal

- Edit basic information, PI, Co-Is, etc… and **Upload your proposal file!**

- Create a Fixed Target

- Create an Observation **as designed in the ETC** (Science & Target Acquisition)

- Edit the **Special Requirements**

- Run the Visit Planner

- Optionally: View in Aladin, Target Confirmation charts, PDF Preview

- Check Errors and Warnings, and **Submit!!**

JDox: JWST Astronomers Proposal Tool, APT

NIRSpec Bright Object Time Series Template APT Guide

The WASP-79 system:

- Coordinates: 04:25:29.02 -30:36:01.6
- Star: F5V, Johnson J mag $= 9.3$ (Vega system)
- Planet: $R = 2.09$ R$_{Jup}$, $M = 0.90$ M$_{Jup}$, $\rho = 0.13$ g/cm^3, $T_{eq} = 1900$ K
- Orbital period: $P = 3.6623866$ days
- Mid-transit point: $T_0 = 2455545.23530$
- Transit duration: $\tau = 3.9864$ hours

Observation and Instrument Parameters:

- 1 scene, 1 source
- NIRSpec (BOTS), Slit: S1600 A1
- Grism/Filter: G395H/F290LP, Detector: SUB2048, NRS RAPID
- Medium background
- Integrate up to 2/3 of saturation
- Observe twice the transit duration + 15 mn settling time