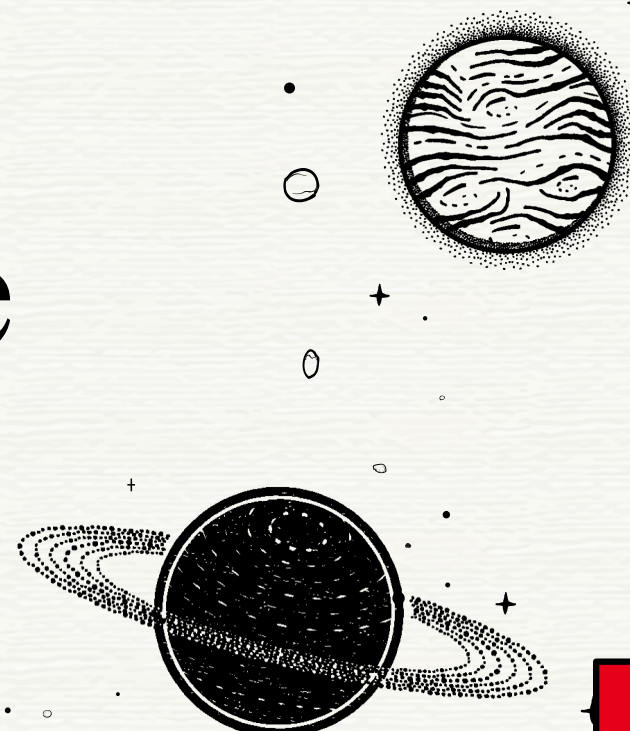


# Exposure Time Calculator

This is where the fun begins



# Exposure Calculator

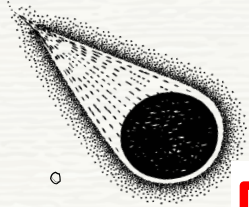
This is where the fun begins



# Exposure Time Calculator

This is where the fun begins





## Accuracy of ETC Calculations

This version of the ETC is intended to help users plan observations for General Observer (GO) programs. The ETC approximates our current best knowledge and understanding of the performance of the JWST instruments, based on inflight measurements and calibrations. It has been validated against inflight observations analyzed by the instrument teams. Users should exercise appropriate caution when interpreting results from the ETC. A number of known issues remain, which may affect predicted sensitivities.

See [Known Issues](#) for additional details.

The ETC is not intended to be a complete observation simulator, and some higher-order effects are not accounted for, such as field distortion.



Category: James Webb Help Desk

- James Webb Help Desk 32
- Proposal Planning 4

### James Webb Help Desk

Select a category to ask a question or report a problem. Please submit only one ticket per issue.

- APT Support**  
Request assistance with
- Constraints & Schedulability**  
Ask questions about
- Coronagraphy**  
Ask about NIRCam or

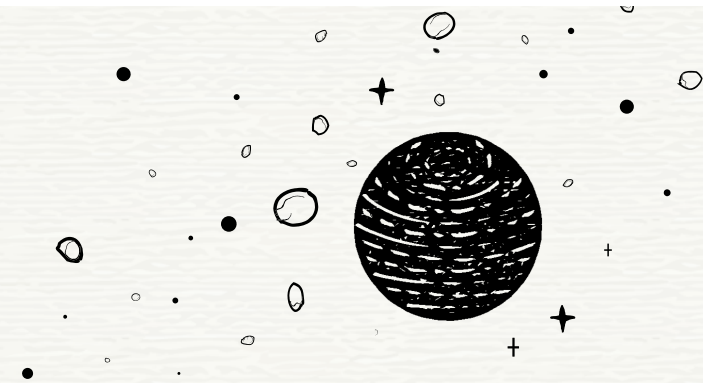
# jwsthelp.stsci.edu

- MIRI Support**  
Request assistance with the Mid-Infrared Instrument (MIRI)
- NIRCam Support**  
Request assistance with the Near-Infrared Camera (NIRCam)
- NIRISS Support**  
Request assistance with the Near-Infrared Imager and Slitless Spectrograph (NIRISS)

View Details

- NIRSpec Support**
- Pipeline Support**
- Post-Pipeline Data Analysis**

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01

## What is the ETC ?

Framework of the simulator

02

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Feasibility check & technical implementation

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Main panels & buttons



# 01 - What is the ETC ?

## Exposure Time Calculator

- Main end-product is the **detector configuration** you will use

## Choosing the instrument :

- Depends on your science case...  
And the instrument capability (sensitivity, etc)

For example :

- You need 7 – 18 microns spectroscopy
- go to : <https://jwst-docs.stsci.edu/> (or remember last presentation)
- MIRI time !

So either Low-Resolution or Mid-Resolution

- The **higher** the resolution the **more** photons needed

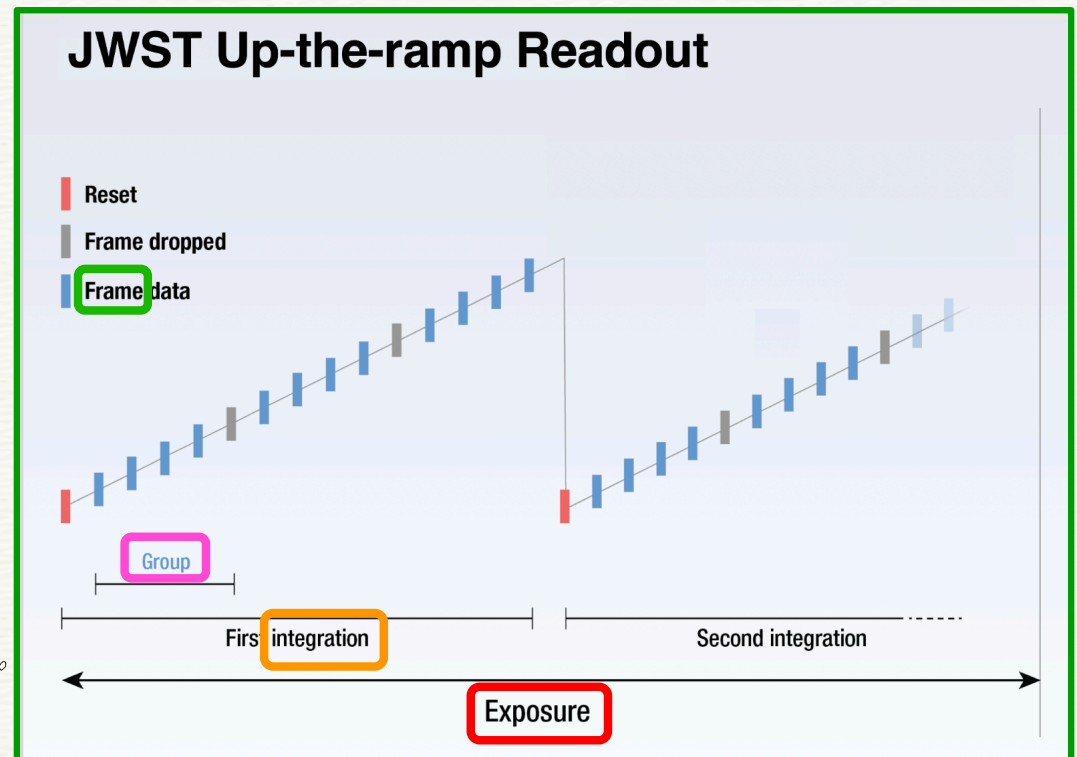
# 01 - What is the ETC ?

## Exposure Time Calculator

- Main end-product is the **detector configuration** you will use

Detector configuration i.e. the number of :

- **Frame** per **group**
- **Groups** per **integration**
- **Integration** per **exposure**
- **Exposures**





# 01 - What is the ETC ?

## Under the hood: The ETC engine

The JWST ETC engine uses a pixel-based 3-dimensional approach to perform calculations on small (typically a few arcseconds) 2-dimensional user-created astronomical scenes. It models both the spatial and the wavelength dimensions, using realistic point spread functions (produced using [WebbPSF](#)) for each instrument mode. It natively handles correlated read noise, inter-pixel capacitance, and saturation. Since the signal and noise are modeled for individual detector pixels, the ETC is able to replicate many of the steps that observers will perform when calibrating and reducing their JWST data. This simplifies interpretation of the extracted signal-to-noise ratio (SNR) calculated by the ETC.



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## 02 - Usefulness?

**Quick and dirty way to check feasibility & estimate time**

- 10 min time :
- Idea of the spectra
  - Some flux estimate

**Thorough proposal preparation**

- Much more time :
- Detailed parameters
  - Check and re-check
  - Complementary to the APT

# 03 – Short walkthrough

Exposure Time Calculator Copy/Delete Expand Mael Voyer Help

Workbook ID: 220496 EES 24 An Empty Workbook

Calculations Scenes and Sources Upload Spectra Caveats and Limitations

MIRI NIRCam NIRISS NIRSpec

ID	Mode	$\lambda$	Scn (s)	SNR	!
----	------	-----------	---------	-----	---

Scene Backgrounds Instrument Setup Detector Setup Strategy

Select a calculation to modify. Reset Calculate

Images 2D SNR Detector Saturation Groups Before Saturation

Plots ApFlux ApBackground SNR ( $\lambda$ ) SNR (time) Contrast

Reports Results Warnings Errors Downloads

Signal to Noise

SNR

microns

Bounds/Scale:

# 03 – Short walkthrough

The screenshot shows the 'Exposure Time Calculator' web application. At the top, there are fields for 'Workbook ID: 220496', 'EES 24', and 'An Empty Workbook'. Below these are navigation tabs: 'Calculations', 'Scenes and Sources', 'Upload Spectra', and 'Caveats and Limitations'. The 'Calculations' tab is highlighted with a red box. Below the tabs is a table with columns: 'ID', 'Mode', 'λ', 'Scn', '(s)', 'SNR', and '!'. To the right of the table are tabs for 'Backgrounds', 'Instrument Setup', 'Detector Setup', and 'Strategy'. Below the table is a yellow button '← Select a calculation to modify.' and a blue button 'Calculate'. At the bottom, there are three main sections: 'Images' (with sub-tabs '2D SNR', 'Detector', 'Saturation', 'Groups Before Saturation'), 'Plots' (with sub-tabs 'ApFlux', 'ApBackground', 'SNR (λ)', 'SNR (time)', 'Contrast'), and 'Reports' (with sub-tabs 'Results', 'Warnings', 'Errors', 'Downloads'). A 'Signal to Noise' plot is visible in the 'Plots' section, showing SNR on the y-axis (ranging from -1 to 4) and microns on the x-axis (ranging from -1 to 6). The plot area is currently empty.

Calculations

Scenes and Sources

Upload Spectra

Caveats and Limitations



# 03 – Short walkthrough

The screenshot shows the 'Exposure Time Calculator' web application. At the top, there is a header with the title 'Exposure Time Calculator', user information 'Mael Voyer', and a 'Help' link. Below the header, there are input fields for 'Workbook ID: 220496', 'EES 24', and 'An Empty Workbook'. A navigation bar contains tabs for 'Calculations', 'Scenes and Sources', 'Upload Spectra', and 'Caveats and Limitations'. The main content area is divided into several sections: a table for instrument modes, an 'Images' section, a 'Plots' section, and a 'Reports' section. A red box highlights the instrument mode table, and a red callout box points to it with the text 'Instrument modes for calculation'. The 'Plots' section contains a 'Signal to Noise' graph with 'SNR' on the y-axis (ranging from -1 to 4) and 'microns' on the x-axis (ranging from -1 to 6). The 'Reports' section has links for 'Results', 'Warnings', 'Errors', and 'Downloads'. At the bottom right of the main content area, there are 'Reset' and 'Calculate' buttons.

ID	Mode	$\lambda$	Scn	(s)	SNR	!
← Select calculation to modify.						

Signal to Noise

SNR

microns

Results Warnings Errors Downloads

Reset Calculate

# 03 – Short walkthrough

The screenshot shows the 'Exposure Time Calculator' web application. At the top, there are input fields for 'Workbook ID: 220496', 'EES 24', and 'An Empty Workbook'. Below these are navigation tabs: 'Calculations', 'Scenes and Sources', 'Upload Spectra', and 'Caveats and Limitations'. The 'Scenes and Sources' tab is active, showing a table with columns for 'ID', 'Mode', 'λ', 'Scn', '(s)', and 'SNR'. A red box highlights the table area, and a red callout box points to it with the text 'Scene, source and detector setup'. To the right of the table are tabs for 'Scene', 'Backgrounds', 'Instrument Setup', 'Detector Setup', and 'Strategy'. A 'Calculate' button is highlighted with a green box. Below the main workspace are three panels: 'Images' (with sub-tabs '2D SNR', 'Detector', 'Saturation', 'Groups Before Saturation'), 'Plots' (with sub-tabs 'ApFlux', 'ApBackground', 'SNR (λ)', 'SNR (time)', 'Contrast'), and 'Reports' (with sub-tabs 'Results', 'Warnings', 'Errors', 'Downloads'). The 'Plots' panel shows a 'Signal to Noise' graph with 'SNR' on the y-axis (ranging from -1 to 4) and 'microns' on the x-axis (ranging from -1 to 6).

# 03 – Short walkthrough

The screenshot shows the 'Exposure Time Calculator' web application. At the top, there is a header with the title 'Exposure Time Calculator', user information 'Mael Voyer', and a 'Help' link. Below the header, there are input fields for 'Workbook ID: 220496', 'EES 24', and 'An Empty Workbook'. A navigation bar includes 'Calculations', 'Scenes and Sources', 'Upload Spectra', and 'Caveats and Limitations'. The main interface is divided into several panels: a left sidebar with instrument selection (MIRI, NIRCam, NIRISS, NIRSpec), a central workspace with tabs for 'Scene', 'Backgrounds', 'Instrument Setup', 'Detector Setup', and 'Strategy', and a bottom section with 'Images', 'Plots', and 'Reports' panels. A red box highlights the 'Images' panel, and another red box highlights the 'Image product from simulator' area in the central workspace. A red line connects these two boxes. The 'Plots' panel shows a 'Signal to Noise' graph with 'SNR' on the y-axis (ranging from -1 to 4) and 'microns' on the x-axis (ranging from -1 to 6). The 'Reports' panel includes links for 'Results', 'Warnings', 'Errors', and 'Downloads'. Buttons for 'Reset' and 'Calculate' are visible in the bottom right of the central workspace.

# 03 – Short walkthrough

Exposure Time Calculator Copy/Delete Expand Mael Voyer Help

Workbook ID: 220496 EES 24 An Empty Workbook

Calculations Scenes and Sources Upload Spectra Caveats and Limitations

MIRI NIRCam NIRISS NIRSpec

ID	Mode	$\lambda$	Scn	(s)	SNR	!
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Scene Backgrounds Instrument Setup Detector Setup Strategy

Select a calculation to modify. Reset Calculate

Images 2D SNR Detector Saturation Groups Before Saturation

Plots ApFlux ApBackground SNR ( $\lambda$ ) SNR (time) Contrast

Results Warnings Errors Downloads

Signal to Noise

SNR

microns



# 03 – Short walkthrough

The screenshot displays the 'Exposure Time Calculator' web application. The interface includes a top navigation bar with 'Copy/Delete' and 'Expand' options, and a user profile 'Mael Voyer' with a 'Help' link. Below the navigation bar, there are input fields for 'Workbook ID: 220496', 'EES 24', and 'An Empty Workbook'. The main content area is divided into several sections: 'Calculations' (with sub-tabs for 'Scenes and Sources', 'Upload Spectra', and 'Caveats and Limitations'), 'Images', 'Plots', and 'Reports'. The 'Calculations' section features a table with columns for 'ID', 'Mode', 'λ', 'Scn', '(s)', and 'SNR'. The 'Plots' section contains a 'Signal to Noise' graph with 'SNR' on the y-axis (ranging from -1 to 4) and 'microns' on the x-axis (ranging from -1 to 6). The 'Reports' section has sub-tabs for 'Results', 'Warnings', 'Errors', and 'Downloads'. A red callout box labeled 'Analysis of the simulation & errors' points to the 'Warnings' and 'Errors' sub-tabs. Another red callout box labeled 'Reports' points to the 'Results' sub-tab.

Thank you

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