

JWST ETC Backgrounds

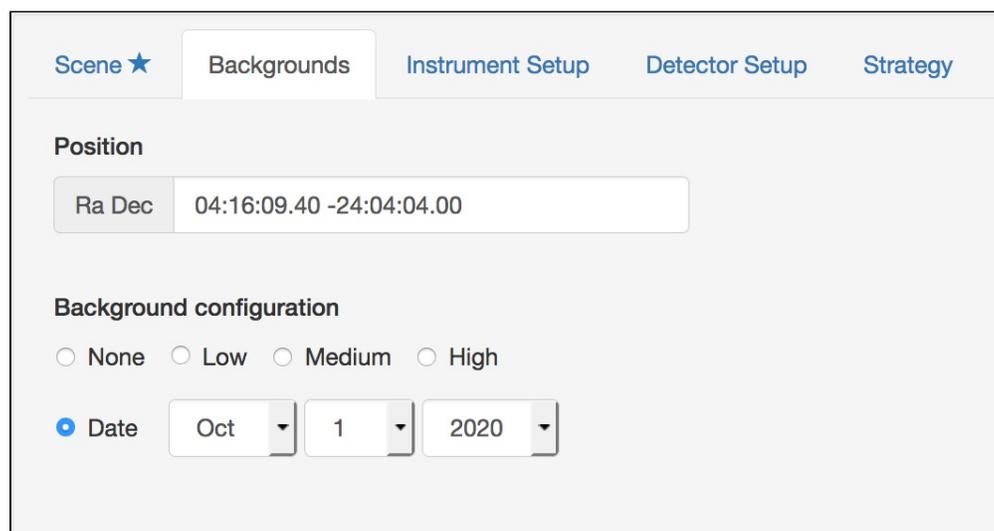
The JWST ETC incorporates the JWST backgrounds in the calculation of signal to noise for a specified exposure time. JWST backgrounds vary with position on the sky and time of the year. The user may use a dated or dateless background option for a given celestial position.

Introduction

Backgrounds in the [JWST Exposure Time Calculator \(ETC\)](#) are obtained using the Backgrounds Model Generator (BMG), and account for the various [components that contribute to the JWST background](#). This includes the in-field components from the zodiacal cloud and the Milky Way, out-of-field stray light, and thermal self-emission from the telescope (dominates the background at wavelengths $>15 \mu\text{m}$).

The JWST ETC calculates backgrounds for a given celestial position. The J2000 RA and Dec for the position in the sky can be provided in the following formats: "hh mm ss.s \pm dd mm ss.s" or "hh:mm:ss.s \pm dd:mm:ss"

Figure 1. The Backgrounds tab in the JWST ETC



The screenshot shows the 'Backgrounds' tab in the JWST ETC interface. At the top, there are five tabs: 'Scene ★', 'Backgrounds', 'Instrument Setup', 'Detector Setup', and 'Strategy'. The 'Backgrounds' tab is active. Below the tabs, there is a 'Position' section with a text input field labeled 'Ra Dec' containing the value '04:16:09.40 -24:04:04.00'. Underneath, there is a 'Background configuration' section with four radio button options: 'None', 'Low', 'Medium', and 'High'. The 'Date' option is selected, indicated by a blue dot. Below the 'Date' option, there are three dropdown menus for selecting the month ('Oct'), day ('1'), and year ('2020').

Layout of the Background tab where the celestial position and options for dated or dateless backgrounds are specified. The Position should be specified for whichever Background configuration option is selected.

If the user specifies a date, the ETC will give the best estimate for the background on that date for the given celestial position. Alternatively, the user can choose a low background (10th percentile), a medium background (50th percentile), or high background (90th percentile), all calculated for the selected celestial position over the period of visibility. Figure 1 shows the options in the **Backgrounds** tab in the ETC. When the dated background is chosen, the ETC will give an error if the specified celestial position is not observable on the selected date. Users are advised to use the [General Target Visibility Tool \(GTVT\)](#) to determine the dates when the specified celestial position is observable.

[JWST ETC Reports](#) provide the *Input Background Surface Brightness* (in Mjy/steradian), as well as the *Total Background Flux in Extraction Aperture* and *Total Sky Background Flux in Extraction Aperture* (both in units of e^-/s). The *Total Sky Background Flux in Extraction Aperture* can also be seen graphically in the *ApBackground* tab in the *Plots* pane (see [JWST ETC Images and Plots](#)). The computed background spectrum can be downloaded as a FITS table as described in the [JWST ETC Downloads](#) article.

The JWST ETC can be used to check whether the observations will be background limited, and whether background-limited special requirement should be specified in the APT. The procedure to determine whether the observations are background-limited is described in the article on [Background-Limited JWST Observations](#).

Example positions

The default background position is RA=00:00:00.00, Dec=00:00:00.0. A list of other potentially useful positions are included in Table 1. This table also includes visibility windows (valid for ETC v1.3) for each of the positions in 2020 to avoid receiving an error message in the ETC. These dates depend on the exact orbit of JWST about L2 and so are subject to change once on-orbit. Users are advised to use the [General Target Visibility Tool \(GTVT\)](#) to determine the dates when a specified celestial position is observable.

Table 1. List of background positions

Name	RA	Dec	Visibility (2020)
North Ecliptic Pole (NEP)	18:00:00.00	66:33:38.5	Year-round
South Ecliptic Pole (SEP)	06:00:00.00	-66:33:38.5	Year-round
Hubble Deep Field North (HDF-N)	12:36:49.50	62:12:58.0	11/12-5/29
Hubble Deep Field South (HDF-S)	22:32:56.00	-60:33:00.0	4/25-11/11
Hubble Ultra-Deep Field (HUDF)	03:32:39.00	-27:47:29.0	7/27-2/7
North Celestial Pole (NCP)	00:00:00.00	90:00:00.0	9/9-4/1
South Celestial Pole (SCP)	00:00:00.00	-90:00:00.0	3/8-10/7
Galactic Center	17:45:40.04	-29:00:28.1	3/12-5/2, 8/4-9/24
Kepler FOV Center (Primary mission)	19:22:40.00	44:30:00.0	4/15-11/11
Lockman Hole	10:45:00.00	58:00:00.0	11/1-5/13
Default	00:00:00.00	00:00:00.0	6/17-8/7, 11/8-12/27