The JWST Exposure Time Calculator: Questions & Answers

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- **Signal + background modelled in 3D:**
    - Pixel-based model of detector and noise
    - S/N based on source parameters, instrument configuration and detector set-up and analysis steps

- **Workbooks:** persistent and shareable

- **Scenes & sources:** reusable and allowing arbitrary complexity

- **Workflow:** reasonable defaults and easy copying/modifying

- **Auto-update:** changes made to scenes, sources and calculations are propagated automatically to all affected components

- **Batch expansion:** explore parameter space

JWST ETC - what does it NOT do? (...yet)

- No explicit support for dithers (workaround: treat Nexp as the number of dithers)

- Distortion is not considered in most instrument modes (NIRISS exception)
- Extinction calculation assumes a simple magnitude/column density relationship, not suitable for all sources
- Cosmic ray effect is underestimated for MIRI
- MIRI SLOW mode read noise is overestimated
- NIRSpec detector noise is underestimated in IRS2 readout patterns
- Coronographic mode support still has a number of bugs concerning noise calculation and PSF reference star subtraction
- Allows detector parameters not available in APT - check with APT

- **Remember:** The ETC approximates our current best knowledge and understanding of the performance of the JWST instruments. There are remaining uncertainties associated with system throughputs and detector noise properties which will not decrease until the observatory is in orbit. Users should exercise appropriate caution when interpreting results from the ETC.
- The ETC is not intended to be a complete observation simulator.

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fixed

ETC v1.1.1
(early July)

improved (but still not perfect)

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Useful links

- **JWST ETC (v1.1 - June 2017)**
  - https://jwst.etc.stsci.edu/

- **Documentation: ETC overview and usage**
  - https://jwst-docs.stsci.edu/display/JPP/JWST+Exposure+Time+Calculator,+ETC

- **ETC known issues (@ JWST Help Desk)**
  - https://jwsthelp.stsci.edu/?id=kb_category&kb_category=2ee97706db36764042685434ce961909

- **JWST Community Lecture Webcasts**
  - "Pandeia: The JWST Exposure Time Calculator" (general introduction)
    - Klaus Pontoppidan (17 Jan 2017)
    - https://webcast.stsci.edu/webcast/detail.xhtml?talkid=5387

  - "JWST ETC Demo" (interface demonstration)
    - Swara Ravindranath (21 Feb 2017)
    - https://webcast.stsci.edu/webcast/detail.xhtml?talkid=5418

JWST background model

- **Zodiacal + ISM (Galactic)**
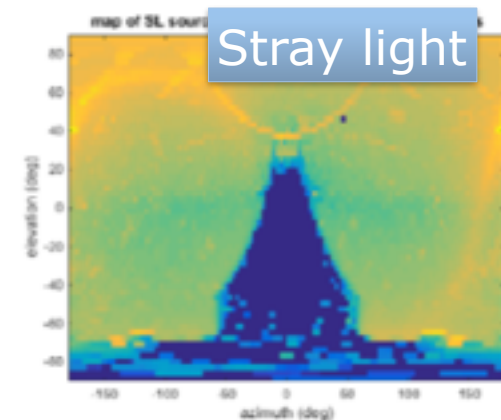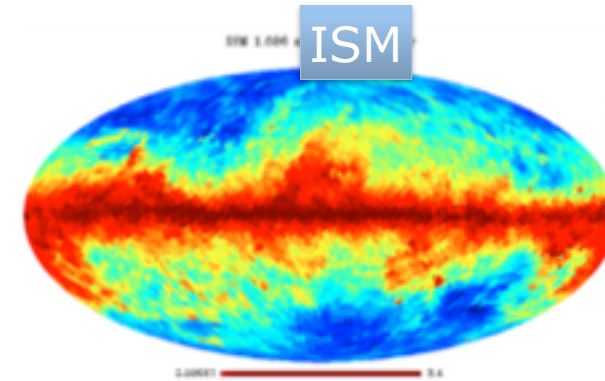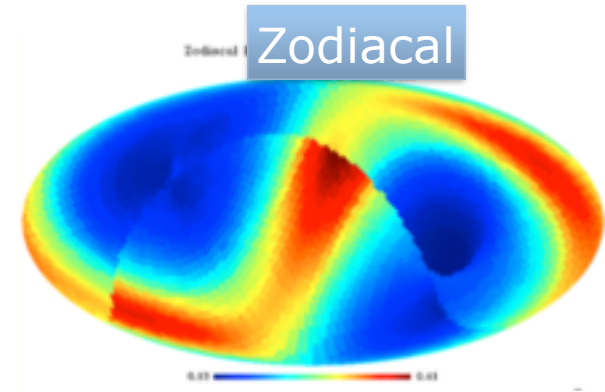 - Model heritage from Spitzer
  - Data from COBE/DIRBE

- **Stray light**
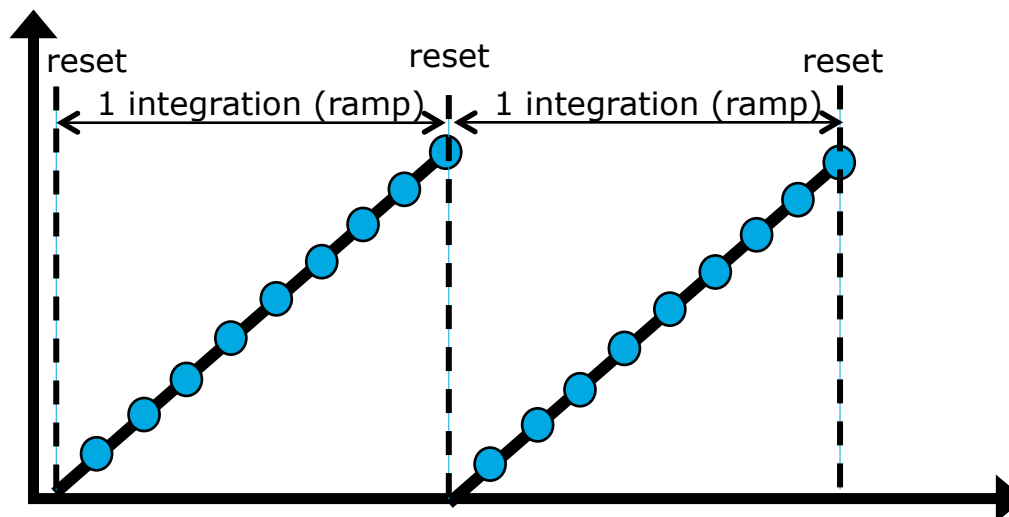 - Radiance Transfer Functions from Lightsey 2016 (SPIE)

- **Thermal self-emission**
  - Dominant background at >15μm
  - Sum of 20 blackbodies

Zodiacal

ISM

Stray light

❖ Detector usage: How long should a ramp be?

      ❖ NIR observations: mostly readnoise dominated.

      ❖ MIR observations: mostly background dominated.

Variety of readout modes that have to be considered and tested.