JWST Cycle 5: Changes to Proposals & Implications for Future Cycles

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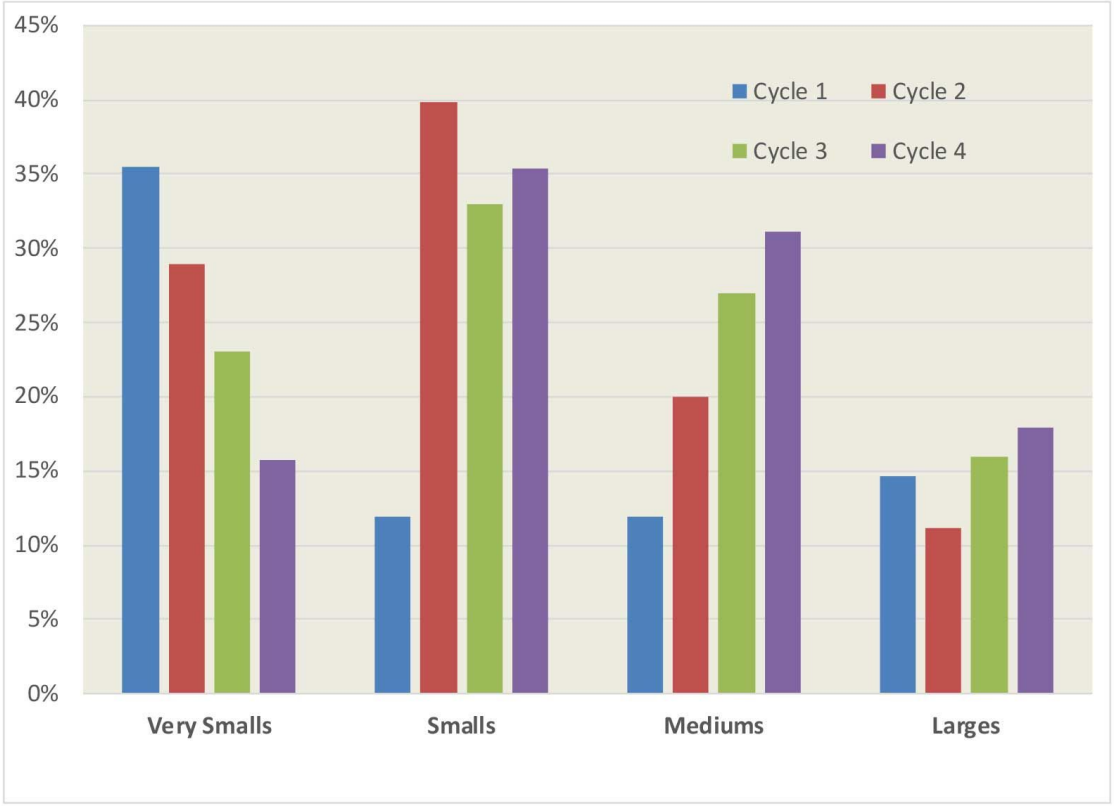
EURECA 9/19/25

Jackie Champagne & Callum Donnan

JWST Cycle 4 - Total Proposals

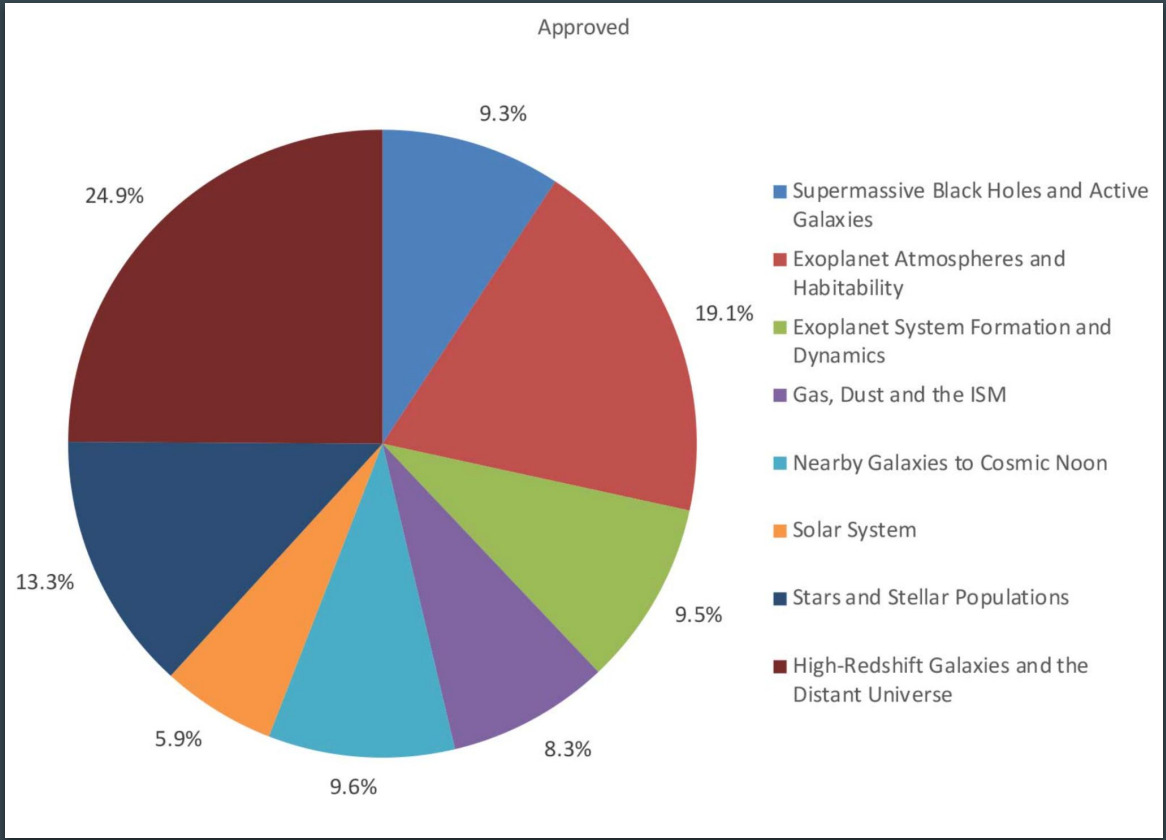


Records were broken in Cycles 2 and 3 with 1,601 and 1,931 proposals respectively...
Cycle 4 had 2,377 proposals submitted!!

More relative allocation to medium proposals compared to past years, while large allocations stayed about the same

JWST Cycle 4 TAC Results | STScI

JWST Cycle 4 - Science Category Breakdown



Quick info for JWST Cycle 5

- Deadline for all proposals: October 15, 2025 at 5pm Pacific
- Available joint proposals: ALMA, Chandra, HST, NASA, Keck, NOIRLab, NRAO, TESS, and/or XMM-Newton (double jeopardy)
- Expected allocations: ~1300 hours for Very Small, ~2800 for Small, ~2500 for Medium and ~1400 for Large/Treasury Programs (8000 total, down from 8500 in Cycle 4)
- Still dual-anonymous, careful not to reproduce too much text from previous accepted proposals as this technically violates DA
- **No changes** to 12-month exclusive access period, though this is under discussion

https://jwst-docs.stsci.edu/jwst-opportunities-and-policies/jwst-call-for-proposals-for-cycle-5/jwst-new-and-important-features#gsc.tab=0

Proposal Science Categories: “Galactic” and “Extragalactic”

- Solar System
- **Exoplanet Atmospheres and Habitability**
- **Planetary System Formation & Dynamics**
- **Stars & Stellar Populations** (Milky Way)
- **Gas, Dust & The ISM** (resolved studies)

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- **Nearby Galaxies to Cosmic Noon** ($z<3$)
- **High-Redshift Galaxies & The Distant Universe** ($z>3$)
- Supermassive Black Holes & Active Galaxies (all redshifts)

- **Solar System** (no change) — Studies of objects within the Solar System, including planets and their moons and rings, minor bodies, and the zodiacal dust.
- **Exoplanet Atmospheres and Habitability** — Studies of individual exoplanets, focusing on their atmosphere and/or surface properties. Studies may include host stars and isolated planetary-mass objects to better understand exoplanet atmospheres and habitability more generally.
- **Planetary System Formation and Dynamics** — Studies of exoplanetary systems including more than one exoplanet (e.g. comparative studies of more than one exoplanet orbiting the same host star) and isolated planetary-mass objects; protoplanetary, debris, and white dwarf disks.
- **Stars and Stellar Populations** — Studies of individual protostars, stars, and/or stellar remnants and clusters of these objects, focusing on the objects themselves.
- **Gas and Dust** — Studies of resolved gas and dust in the ISM and star formation in the Milky Way and nearby galaxies. Studies focusing on gas and dust diagnostics to understand host stars should be submitted to Stars and Stellar Populations. Those focusing on larger scale structure should be submitted to Gas and Dust.
- **High-Redshift Galaxies and the Distant Universe** — Studies of galaxies at redshifts beyond the peak of star formation through the end of the epoch of cosmic reionization to the early universe, including the first galaxies.
- **Nearby Galaxies to Cosmic Noon** — Studies of galaxy kinematics, star formation, ionized gases (including H II), etc. in nearby galaxies up to the peak of star formation at redshifts of $z \sim 2$-3.
- **Supermassive Black Holes** (no change) — Studies of supermassive black holes at the centers of galaxies, including understanding the impact of the black hole on the host galaxy's properties.

Proposal Size Delineations - Same as Cycle 4

Size Category	Cycles 1–3	Cycle 4
Very Small	≤15	≤20
Small	>15 and ≤25	>20 and ≤50
Medium	>25 and ≤75	>50 and ≤130
Large	>75	>130

Time Allocation Committee (TAC) Breakdown:

- Very Small & Archival are reviewed asynchronously by External Panelists (5)
- Small & Medium are reviewed by Discussion Panelists
- Large, Treasury & Archival Treasury are reviewed by the Executive Committee, which is now split into Galactic and Extragalactic committees
- Expert Reviewers are called in to review a subset of the above proposals

https://jwst-docs.stsci.edu/jwst-opportunities-and-policies/jwst-call-for-proposals-for-cycle-5/jwst-proposal-categories#gsc.tab=0

https://jwst-docs.stsci.edu/jwst-opportunities-and-policies/jwst-call-for-proposals-for-cycle-5/jwst-guidelines-and-checklist-for-proposal-preparation#JWSTGuidelinesandChecklistforProposalPreparation-pagelimits&gsc.tab=0

Changes to Proposal Format

- *Science Justification, Technical Justification*, and all figures must be contained in 4-6 pages (small→large)
- with +1 page for *Special Requirements*, *Justify Coordinated Parallels*, *Justify Duplications* and *Justify Coordinated Observations with Other Facilities*
- All must be in 12pt font within the TeX template, references do not count towards pgs
- These apply to all future DDT proposals as well
- Reuse of previously-accepted proposal text and/or multiple in-cycle submissions now subject to disqualification (e.g. submitting the same observations with slightly different science to two panels)
- There is now an official AI policy (eg ChatGPT): **Following NASA policy, any material contained in the proposal that is derived from Generative Artificial Intelligence (GAI) technology must be described and cited.**

Major Updates to the APT

- Minimum keywords=3, max=10
  From Cycle 4:
- **IMPORTANT:** *Observing Description* is no longer visible to TAC, only STScI, so you can't cheat and put extra text that didn't fit in Technical Justification in there
- New scientific categories and program size categories, multi-observatory flag
- NIRCam Grism Time Series Template available for SW and LW channels
- NIRCam Target Acquisitions updated for dithering and new hot pixels
- Optional target acquisition for MIRI slitless LRS
- Test scheduling now goes out to 5 years for multi-cycle proposals
- Reference star background observations are no longer proprietary
- Improvements to ICRS Coordinates and Fixed Target Resolver
- Proper motion must now be specified or listed as negligible for targets that need very accurate coordinates

https://stsci.service-now.com/jwst?id=kb_article&sysparm_article=KB0011960

Major Updates to the ETC

- Reduced count rate in MIRI imaging, coronagraphic imaging, and medium-resolution spectroscopy (mostly relevant for Channel 4)
- Improved user load handling (affected slow load times close to deadline)
- Updates to NIRCam, NIRISS and MIRI reference data
- New NIRSpec PSFs generated with STPSF
- Default values updated to match pipelines
- MIRI imaging can now use coronagraphic filters
- Share workbooks with collaborators with comma-separated emails
- **MIRI WFSS mode now available for calculations**

https://stsci.service-now.com/jwst?id=kb_article_view&sys_kb_id=8aac93c0470f2650a0d74e65d36d435d

Other Major Updates

- Long-Term Monitoring Special Initiative – encouraging proposers to provide later-epoch obs or new multi-epoch obs up to 5 cycles for variability studies
- Roman Preparatory Science Special Initiative – special box if JWST observations are critical to Roman science, EAP must be 0
- MIRI Wide Field Slitless Spectroscopy mode now available as prime
- NIRCam imaging may now be a coordinated parallel when NIRSpec IFU is the prime instrument

https://jwst-docs.stsci.edu/jwst-opportunities-and-policies/jwst-call-for-proposals-for-cycle-5/jwst-special-initiatives#gsc.tab=0

More Information

Call for Proposals

Release Notes for the ETC & APT

Example workbooks

Previously accepted proposal abstracts

Install APT & Download Tex Template

Cycle 4 TAC Report

High-Level Guide to Cycle 4 Changes (major updates last year)

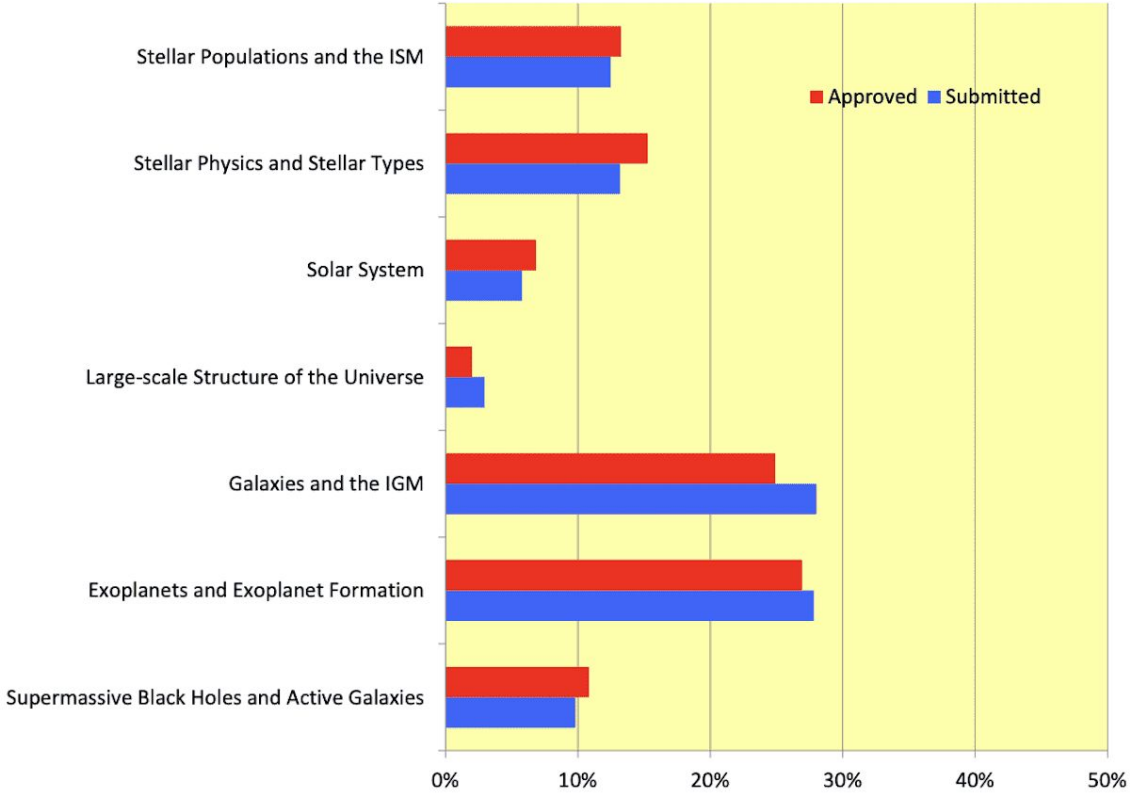
Discussion from Cycle 4

- Will the changes to the proposal format influence (decrease) the total number of submissions, since old proposals cannot simply be resubmitted? → *It did not decrease submissions.*
- Will the new science categories (esp. extragalactic changes) change the allocation percentages to nearby vs. distant proposals? → *High-redshift galaxies received 24% of the time compared to 9% for nearby galaxies.*
- Will the executive committee split between galactic/extragalactic improve the quality/content of proposal reviews? → *It might have helped, but the SMBH panel is still all redshifts so topics like LRDs remain in limbo.*
- Will the updated capabilities of e.g., NIRSpec IFU and declining use of MIRI influence the content of proposals or allocations towards specific science goals? → *Instrument allocations remained stable.*

Discussion

- Plans to use MIRI WFSS?
- What are the next big extragalactic survey designs?
- Take advantage of MIRI MRS while sensitivity is still good?
- Narrowband/medium band imaging with NIRCam?
- Plans to take advantage of special initiatives?

Science Category Distribution for Proposals



A Brief Runthrough of the Cycle 5 APT: MIRI/LRS and NIRSpec/MSA

MIRI/LRS

Low resolution spectroscopy is one of four observing templates available with the the Mid-Infrared Instrument (MIRI). MIRI's low resolution spectrometer (LRS) offers both slit and slitless spectroscopy from 5 to 14 µm using a double prism mounted in the MIRI filter wheel, and is designed to provide a spectral resolving power of R = 40 at 5 µm, and R = 160 at 10 µm for compact sources (<2"). The slitless LRS mode is dedicated to time-series observations of time variable systems, such as eclipsing binaries or transiting exoplanets — APT parameters for slitless LRS are optimized for this type of observation. However, there may be science cases other than time-series where the slitless mode may be useful.

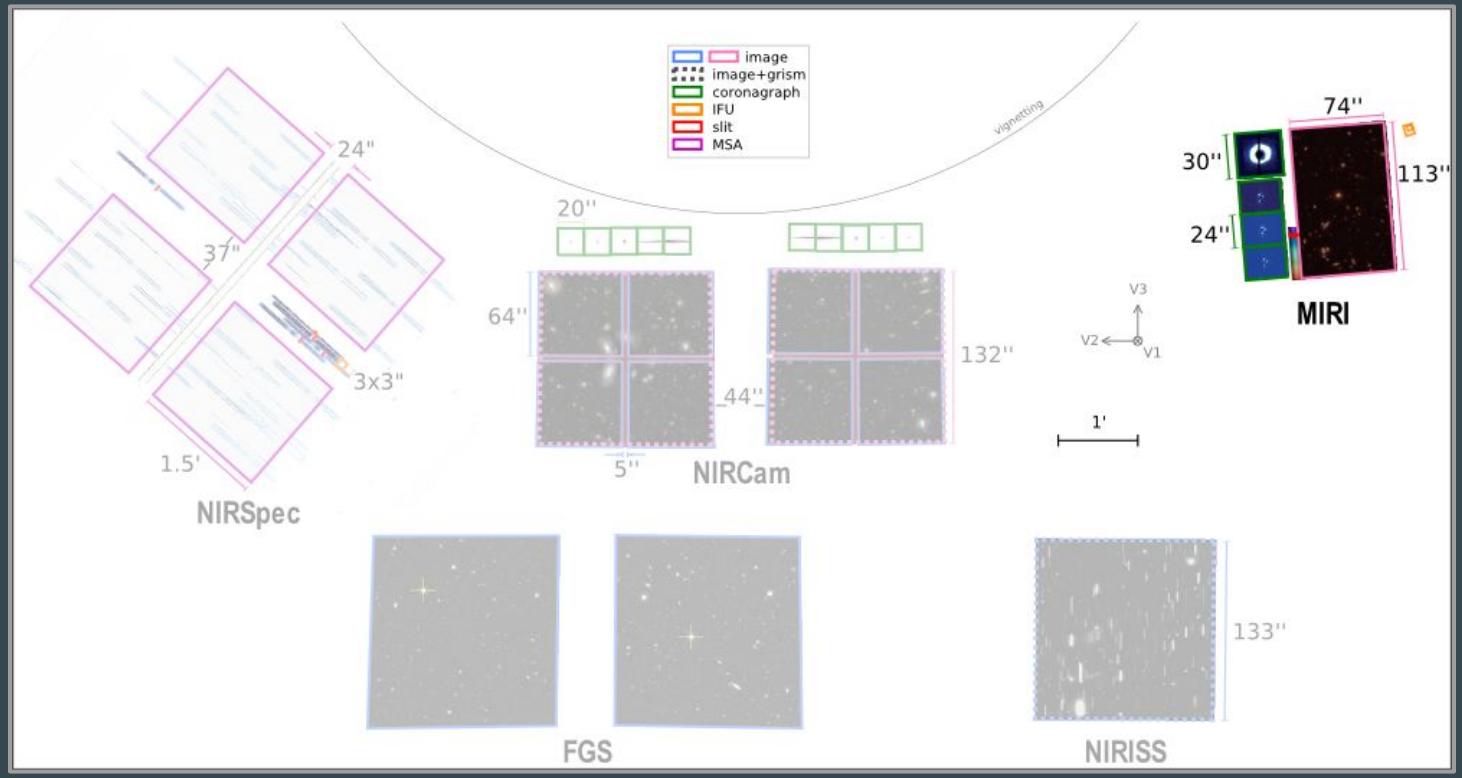
The APT template requires information on the following aspects of the observation:

1. Target acquisition
2. Subarray (which controls whether the observation will be slitless or with slit)
3. Dither or mapping pattern
4. Detector read mode and exposure settings
5. Mosaic settings
6. Pointing verification image settings and parameters

Allowed values are documented and maintained in MIRI LRS Template parameters (an article in the JWST Proposal Parameters documentation), but are also described below with Step-by-step APT instructions.

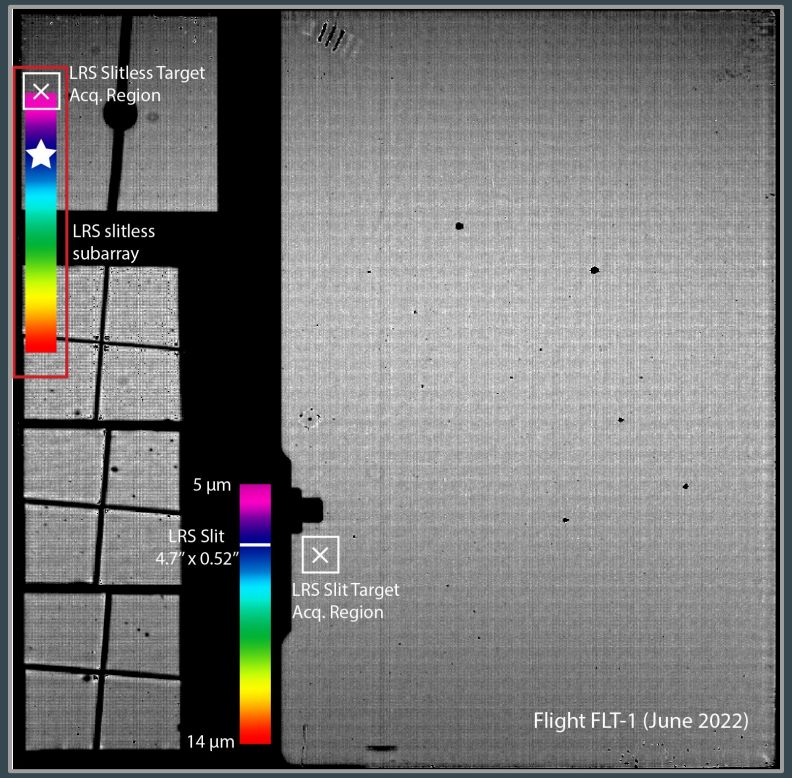
https://jwst-docs.stsci.edu/jwst-mid-infrared-instrument/miri-apt-templates/miri-lrs-apt-template

MIRI/LRS



https://jwst-docs.stsci.edu/jwst-mid-infrared-instrument/miri-instrumentation/miri-optics-and-focal-plane

MIRI/LRS



https://jwst-docs.stsci.edu/jwst-mid-infrared-instrument/miri-observing-modes/miri-low-resolution-spectroscopy

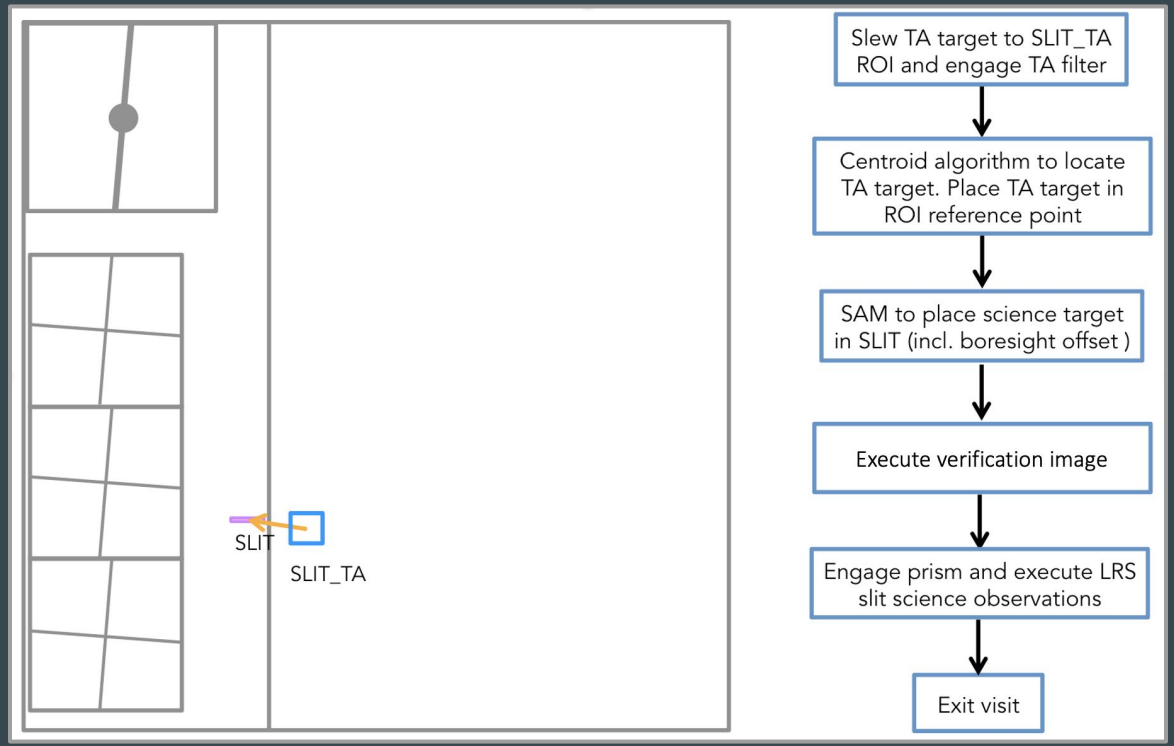
MIRI/LRS

Table 1. Comparison between LRS slit and slitless modes

SLIT	SLITLESS
Not available for time series observations	time series observation setting is mandatory
FULL array only	***SLITLESSPRISM*** subarray only
Better sensitivity, fainter saturation limit	Worse sensitivity, brighter saturation limit
Exposures limited to 10,000 s	Allows > 10,000 s exposures
Dithering mandatory	No dithering allowed
No spectral foldover below ~4.5 μm	Affected by spectral foldover <4.5 μm
Sensitive to pointing uncertainty, drift	No slit losses
Time Series Observations special requirement not permitted	***Time Series Observation*** special requirement is mandatory
Target acquisition recommended	Target acquisition recommended
Pointing verification image recommended	Pointing verification image recommended

https://jwst-docs.stsci.edu/jwst-mid-infrared-instrument/miri-observing-modes/miri-low-resolution-spectroscopy

MIRI/LRS



https://jwst-docs.stsci.edu/jwst-mid-infrared-instrument/miri-operations/miri-target-acquisition/miri-lrs-slit-target-acquisition

MIRI/LRS

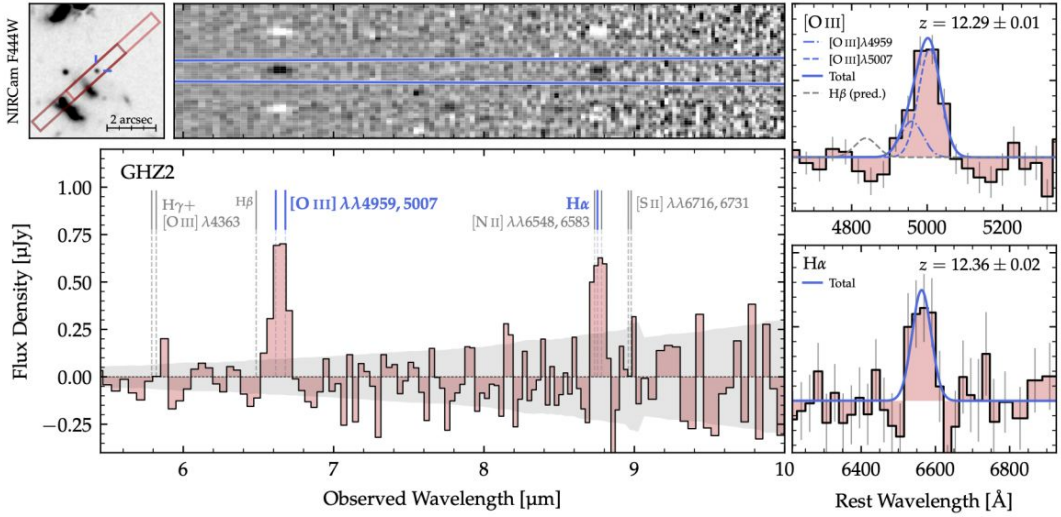


Figure 1: **JWST/MIRI spectrum of GHZ2 at** $z = 12.3$**. Top left:** NIRCam F444W cutout image ($5'' \times 5''$) centered at the position of GHZ2, with the MIRI/LRS slit illustrated with the red rectangle (at the two different dither positions). The combined 2D spectrum and the used aperture for the 1D extraction are also plotted (see details in the Section Methods). **Bottom left:** 1D extracted spectrum at the position of GHZ2 across the most sensitive wavelength range, $\lambda_{\rm obs} \approx 5.7 - 10\,\mu$m and the associated 1σ uncertainty (gray region). The redshifted wavelengths of typically bright rest-frame optical emission lines are indicated with the vertical lines, with the blue text highlighting the robust detections. **Right:** Zoom-in on the $> 5\sigma$ detected spectral features identified as the [OIII]4959,5007Å doublet (*top*) and the Hα emission line (*bottom*) along with the best-fit Gaussian functions and the implied redshifts. In the top panel, the predicted Hβ line from the Hα detection assuming a dust-free environment is also indicated.

Zavala et al. (2024; arXiv:2403.10491)

MIRI/LRS

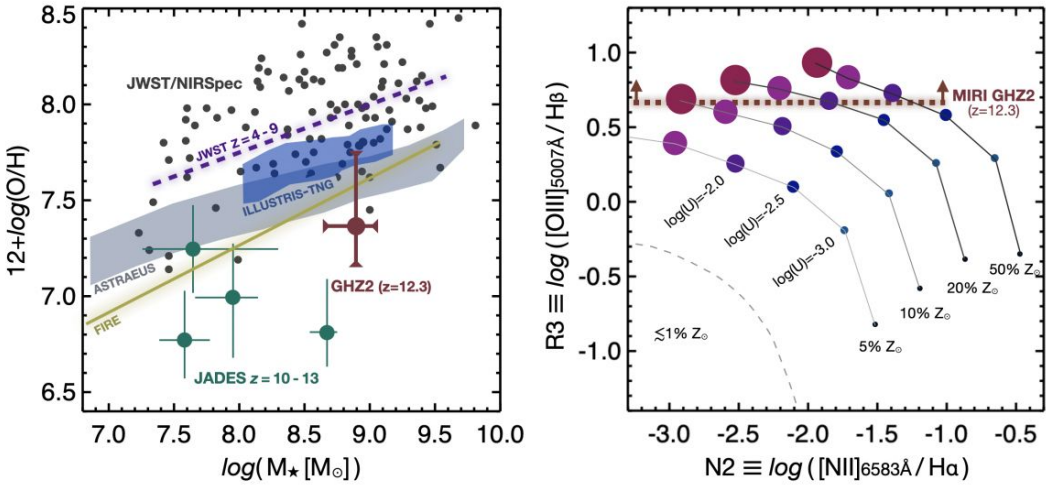


Figure 2: **The stellar mass-metallicity relation and the ionization diagnostic diagram. Left:** Position of GHZ2 in the stellar mass-metallicity plane in comparison to lower redshift galaxies at $z \approx 4-9$ (black dots for individual galaxies and purple line for best-fit relationship[30]) and with the $z = 10-13$ galaxies from the JADES survey[17] (green points; metallicity estimated from SED fitting). All the $z > 10$ galaxies, including GHZ2, are off from the lower-redshift relationship[30], suggesting an evolution towards lower metallicity values at earlier epochs (by around ~ 0.5 dex). The predictions from the FIRE[31] (golden line) and ASTRAEUS[32] (gray region) simulations at $z \sim 10$ show a broad agreement with the current constraints, while the ILLUSTRIS-TNG[33] simulations (blue region) predict slightly higher metallicities, although still consistent within the error bars. Despite the early epochs, none of these galaxies show pristine (close-to-zero) metallicities, implying a rapid metal enrichment in the early Universe. **Right:** The [NII]/Hα vs [OIII]/Hβ diagram along with the predictions from a stellar photoionization model[22] assuming four different metallicities and six ionization parameters in steps of 0.5dex (models with $Z \lesssim 0.01\,Z_\odot$ would lie below the dashed line). The observational constraints on the R3 value (formally an upper limit) implies high ionizing conditions, with $\log(U) > -2.0$.

Zavala et al. (2024; arXiv:2403.10491)

~~MIRI/LRS~~ MIRI/MRS

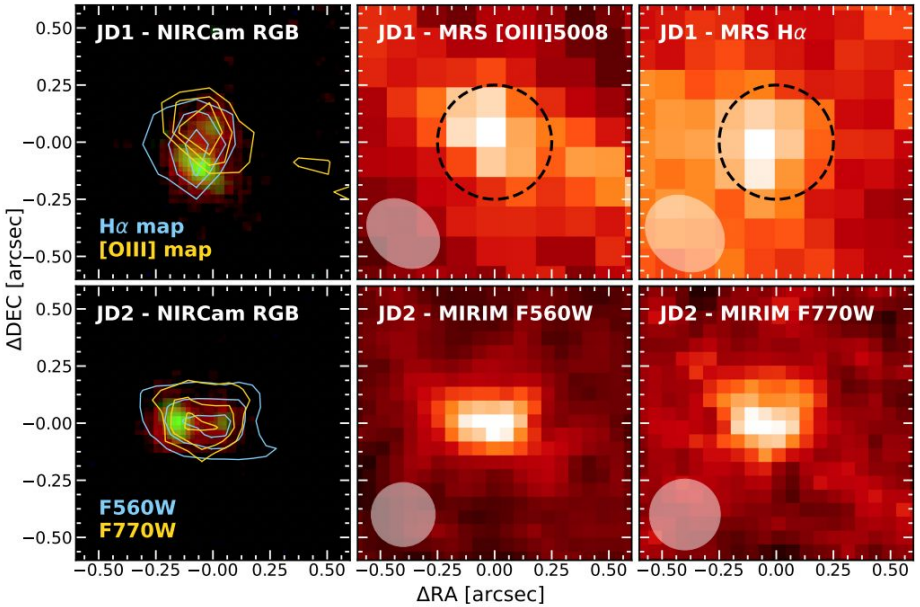


Figure 2. *Top row:* JD1 NIRCam F200W image (drizzled to 0.03″ pixels) and MIRI MRS line maps of [O III] λ5008 and Hα (0.13″ pixels) integrated within ±100 km s^{-1} of the line peaks. Contours from these [O III] (yellow) and Hα (blue) line maps are overlaid on the NIRCam image of JD1. The dashed circle is used to measure flux shown in Figure 3. *Bottom row:* JD2 NIRCam F200W image and MIRIM F560W and F770W images (0.06″ pixels). Contours from F560W (blue) and F770W (yellow) line maps are overlaid on the NIRCam image of JD2. All data in each row are aligned and shown within an area 1.25″ × 1.25″. The center coordinates (RA, Dec) in degrees are (101.98225, 70.243302) for JD1 and (101.97128, 70.239721) for JD2. The JD1 centroid is also used for the aperture. PSF sizes are shown in the lower-left corners.

Hsiao et al. (2024; arXiv:2404.16200)

~~MIRI/LRS~~ MIRI/MRS

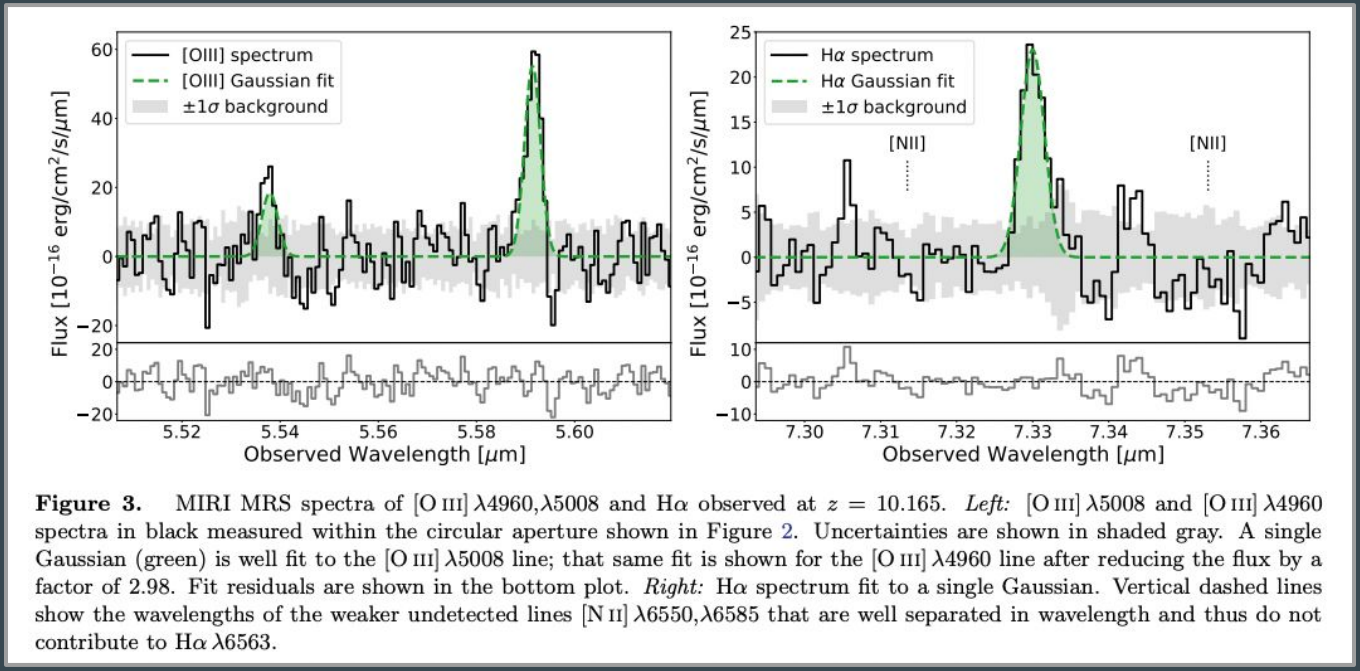
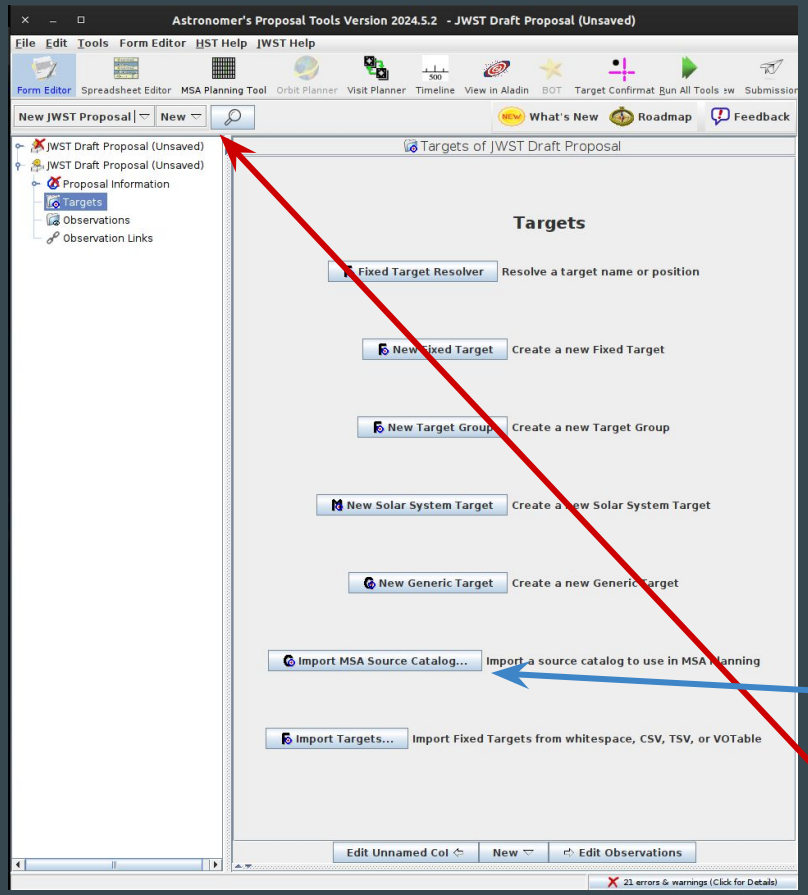


Figure 3. MIRI MRS spectra of [O III] λ4960,λ5008 and Hα observed at $z = 10.165$. *Left:* [O III] λ5008 and [O III] λ4960 spectra in black measured within the circular aperture shown in Figure 2. Uncertainties are shown in shaded gray. A single Gaussian (green) is well fit to the [O III] λ5008 line; that same fit is shown for the [O III] λ4960 line after reducing the flux by a factor of 2.98. Fit residuals are shown in the bottom plot. *Right:* Hα spectrum fit to a single Gaussian. Vertical dashed lines show the wavelengths of the weaker undetected lines [N II] λ6550,λ6585 that are well separated in wavelength and thus do not contribute to Hα λ6563.

Hsiao et al. (2024; arXiv:2404.16200)

NIRSpec/MSA – the source catalog



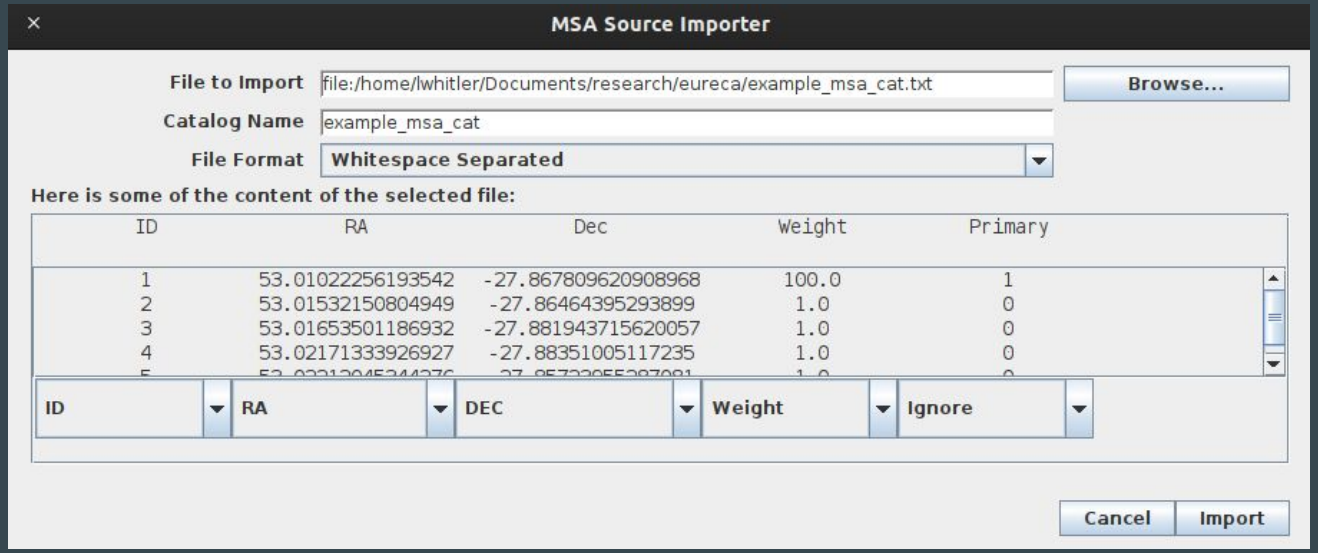
At minimum, the source catalog must include RA and Dec. Everything else (ID, magnitude, stellarity, etc.) is helpful but not required. The MPT will prioritize objects in the order they appear in the catalog.

Weights are helpful if you really want some particular object(s) on the MSA, but note that weighting your must-have objects as 10 will not guarantee a shutter gets opened on them so be excessive. The maximum recommended weight is 10^9, so really, I promise. Be excessive.

Targets > Import MSA Source Catalog (make sure you're in the Form Editor)

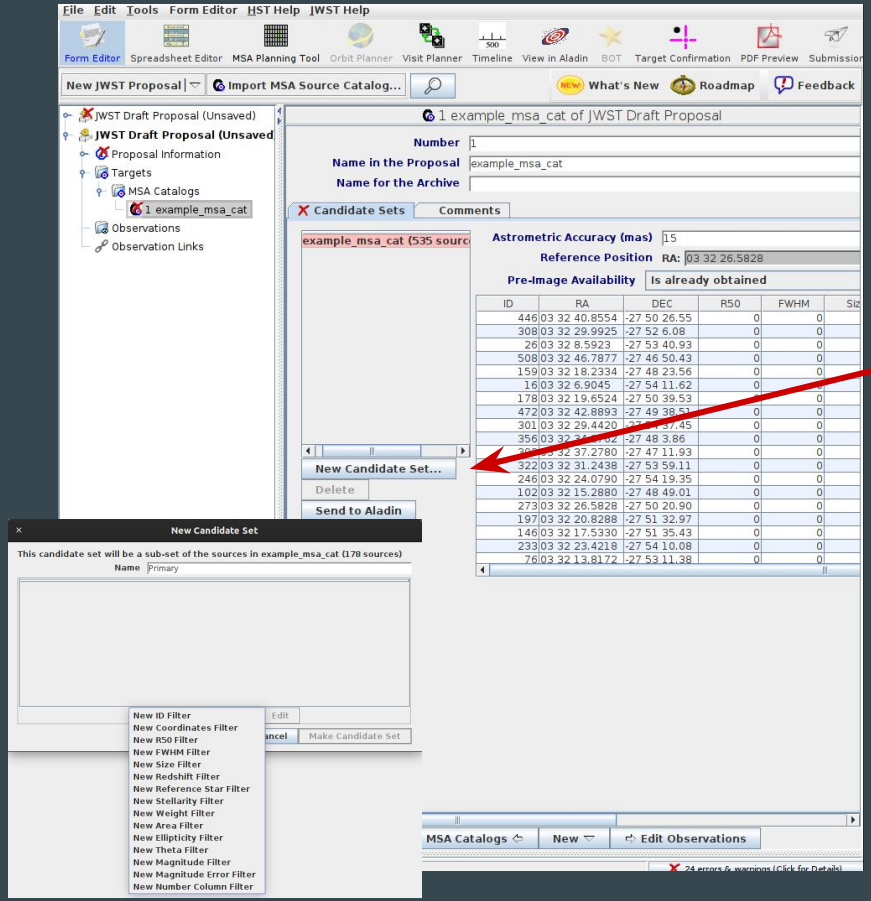
Or if you're on the Targets page, the New button in the upper left corner also works

NIRSpec/MSA – the source catalog



If your catalog has a commented header, the APT will try to match your column names to the names it recognizes. If it doesn't, fill in the column names with the drop down menu. If you "Ignore" a column, it won't even be loaded into the APT.

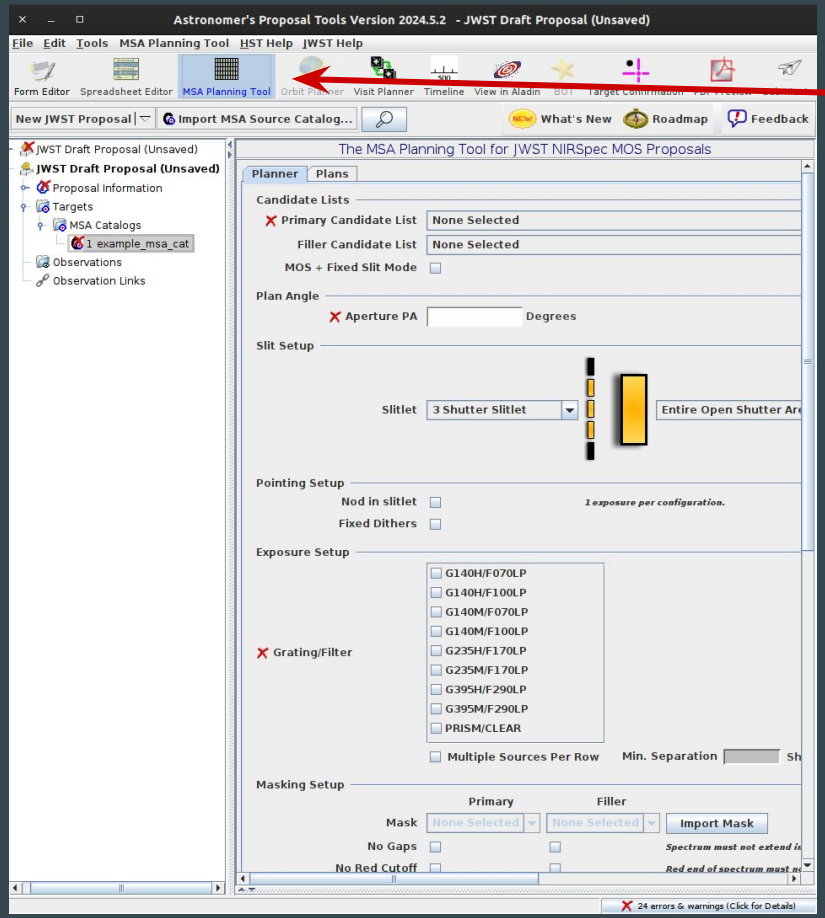
NIRSpec/MSA – the source catalog



New Candidate Set lets you filter your parent catalog (helpful for testing different configurations, defining primary and filler target lists, etc.)

Astrometric Accuracy and
Pre-Image Availability are required

NIRSpec/MSA – the MPT



The MSA Planning Tool (MPT; navigate to it in the top toolbar) is both your best friend and your worst enemy

Primary Candidate List = drives the pointings

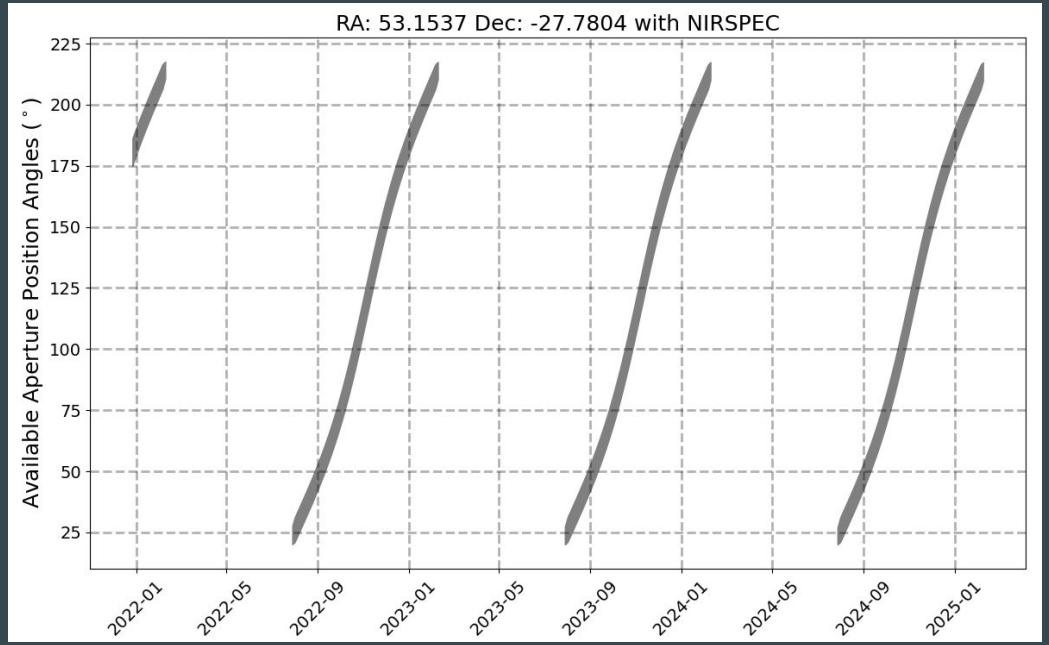
Filler Candidate List = the MPT will check if any shutters can be opened on these targets after the pointings are set by the Primary Candidate List but these are just bonus objects and don't set the pointings

Aperture PA = a large reason of why the MPT is your worst enemy. You cannot search for solutions over multiple PAs. Which is great when your program is actually being observed and a PA has been assigned, less great when you're trying to figure out what you can do for a proposal.

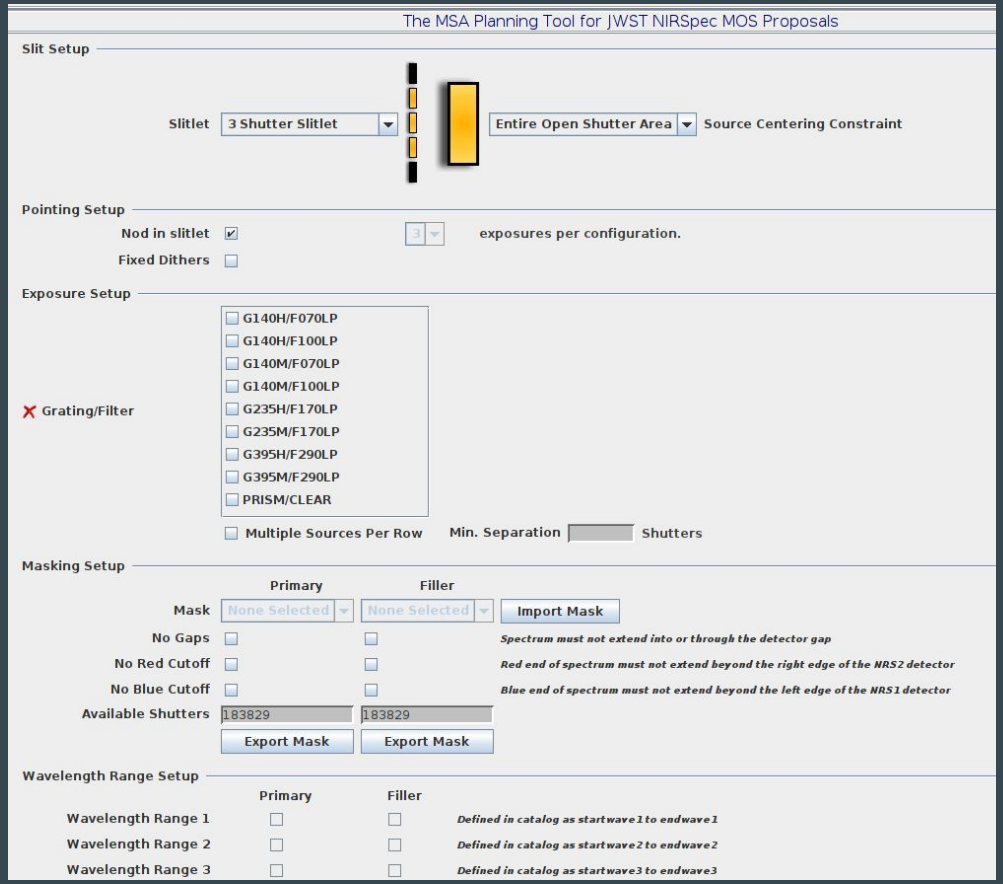
NIRSpec/MSA – the JWST GTVT

The APT won't even let you try a PA that's genuinely impossible, but the JWST General Target Visibility Tool may be helpful if you don't want to have to guess what *is* possible: https://github.com/spacetelescope/jwst_gtvt

```
jwst_gtvt --ra=03:32:36.89 --dec=-27:46:49.33 --instrument nirspec
```



NIRSpec/MSA – back to the MPT



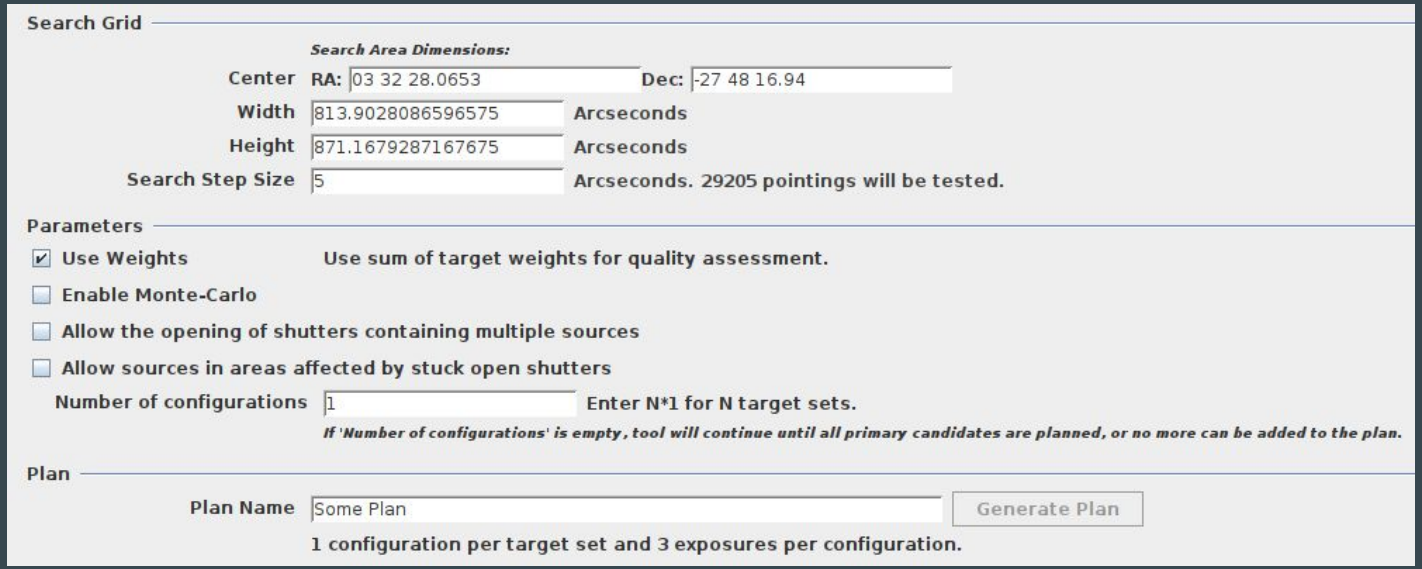
3 Shutter Slitlet is pretty standard and you probably want to nod in the slitlet

Choose your disperser and filter combination
https://jwst-docs.stsci.edu/jwst-near-infrared-spectrograph/nirspec-instrumentation/nirspec-dispersers-and-filters#gsc.tab=0

You can apply various masks if you want to make sure the entire spectrum ends up on the detector (n.b. higher resolution = more pixels, prism and medium resolution grating spectra can fit all on one detector in a limited number of shutters, high resolution cannot and the detector gap is unavoidable)

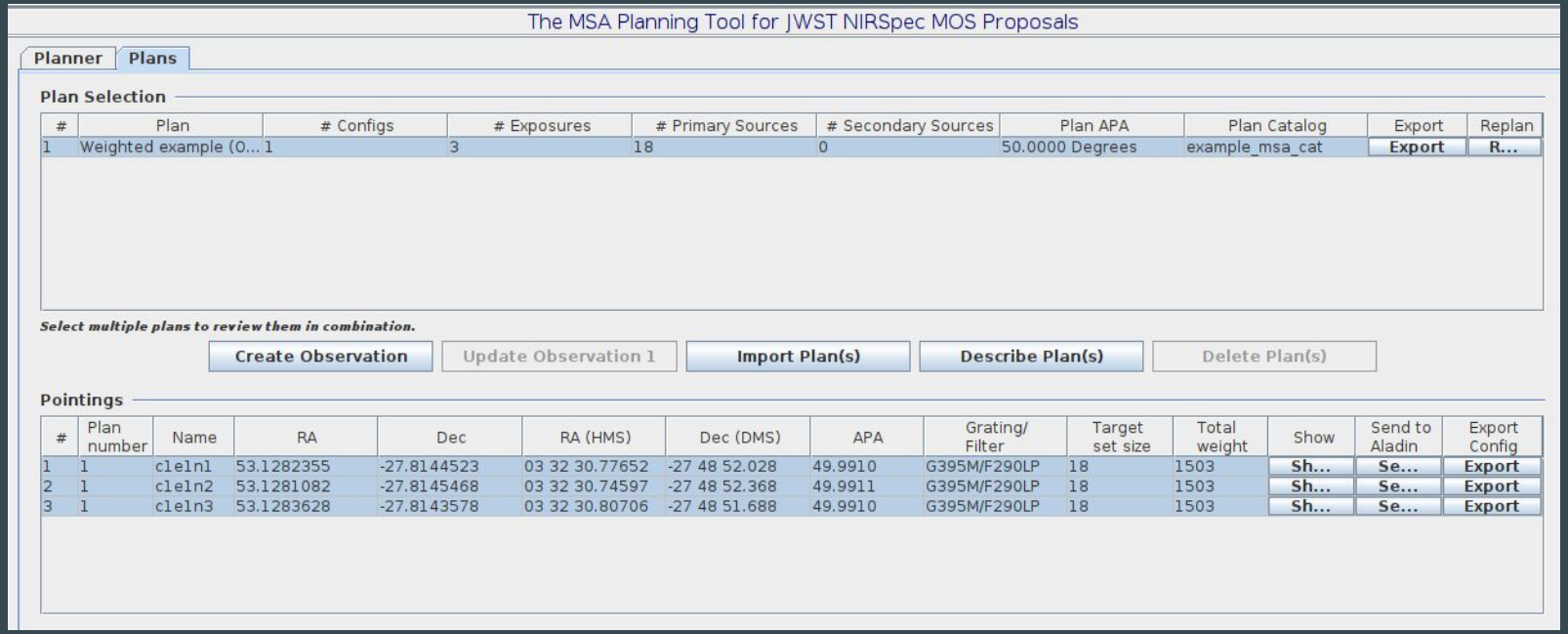
This restricts the available shutters and the APT gives you an MSA Target Info file with information about where a spectrum has been cut off, so perhaps better to check wavelength coverage manually for the sources you care the most about.

NIRSpec/MSA – the MPT



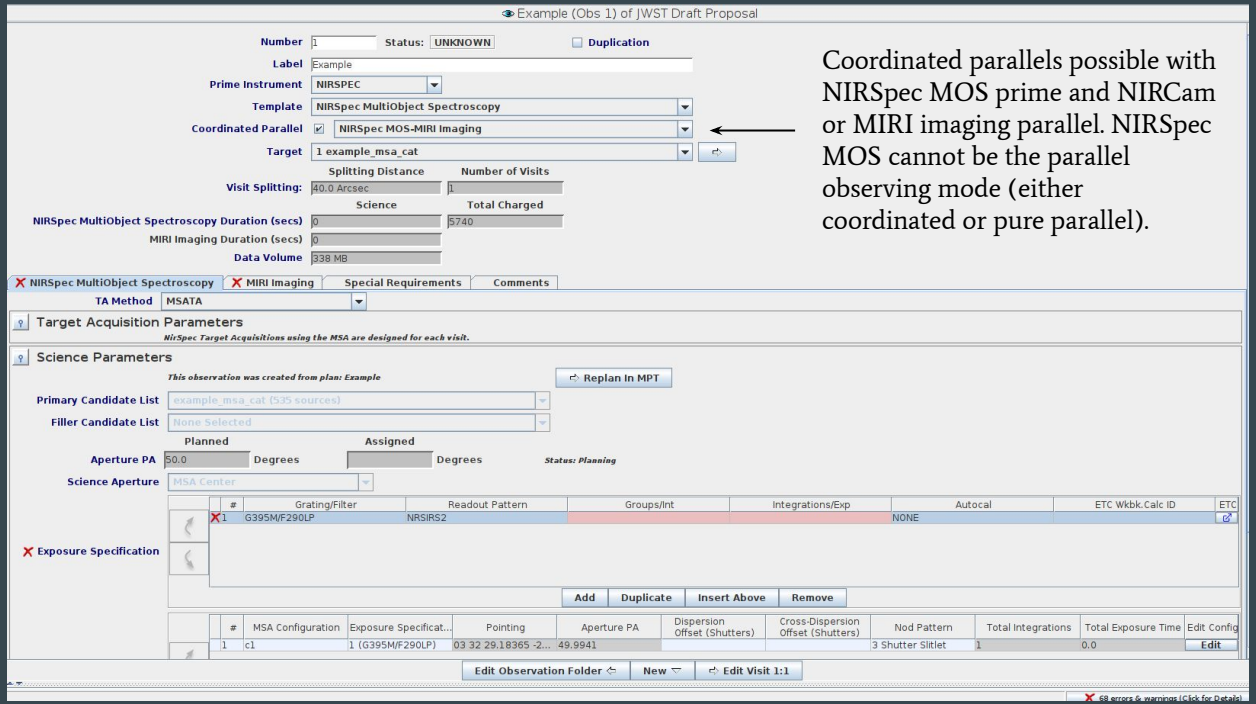
Set your parameters for how you want the MPT to search. It's parallelized but huge numbers of pointings will still take forever to check.

NIRSpec/MSA – the MPT



There is a separate tab for plans that the MPT has found. Once you have one you're satisfied with, you can "Create Observation" and choose your readout pattern, etc.

NIRSpec/MSA – creating the observation



Coordinated parallels possible with NIRSpec MOS prime and NIRCam or MIRI imaging parallel. NIRSpec MOS cannot be the parallel observing mode (either coordinated or pure parallel).

NRSIRS2 is the readout pattern I most commonly see used and the IRS^2 readouts (NRSIRS2 or NRSIRS2RAPID) are recommended in general. NRSIRS2 reads out four frames per group, RAPID reads out one frame per group and is a much higher data volume. You choose the number of groups per integration and the total number of integrations.