MOS hands-on

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NIRSpec MOS hands-on

- **Multi-object spectroscopy of distant galaxies**

- In this hands-on session you will be asked to use
  - The Astronomer's Proposal Tool (APT)
  - More specifically, the MOS Planning Tool (MPT) which is part of the APT

Thinking about strategies - recap

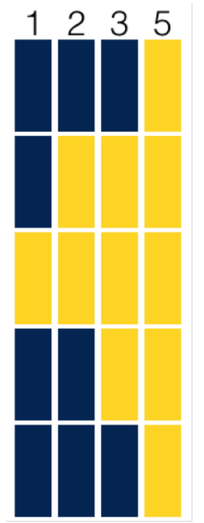
Shutter planning constraints

- Slit loss is a function of the relative location in the shutter
- MPT allows adjustment of the constraint on where sources can be placed in shutters

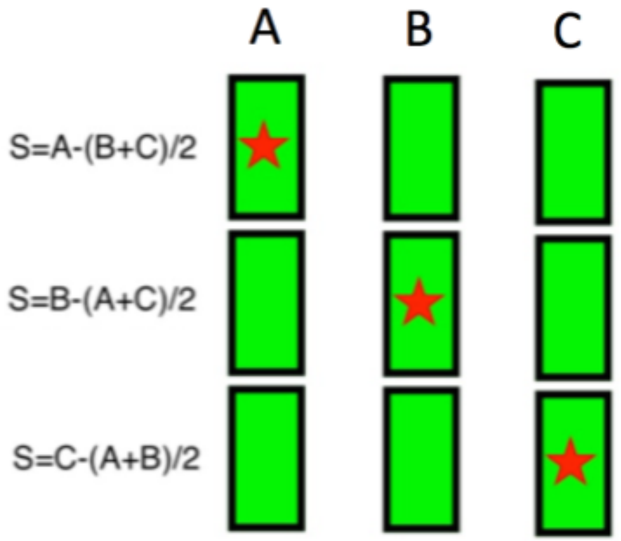
	Unconstrained (source may be behind the bar)	**Entire open shutter area** (default)	**Midpoint**	**Constrained**	**Tightly constrained**
					
Minimum relative flux transmission at 2.95μm	12%	30%	62%	75%	85%

Nodding

- Open **slitlets** in cross-dispersion direction
- There are four selectable slitlets in MPT: 1, 2, **3**, 5



- Telescope is repositioned slightly between exposures
  - No MSA re-configuration
  - Background subtraction between nodded exposures
  - Improves PSF sampling and bad pixel mitigation

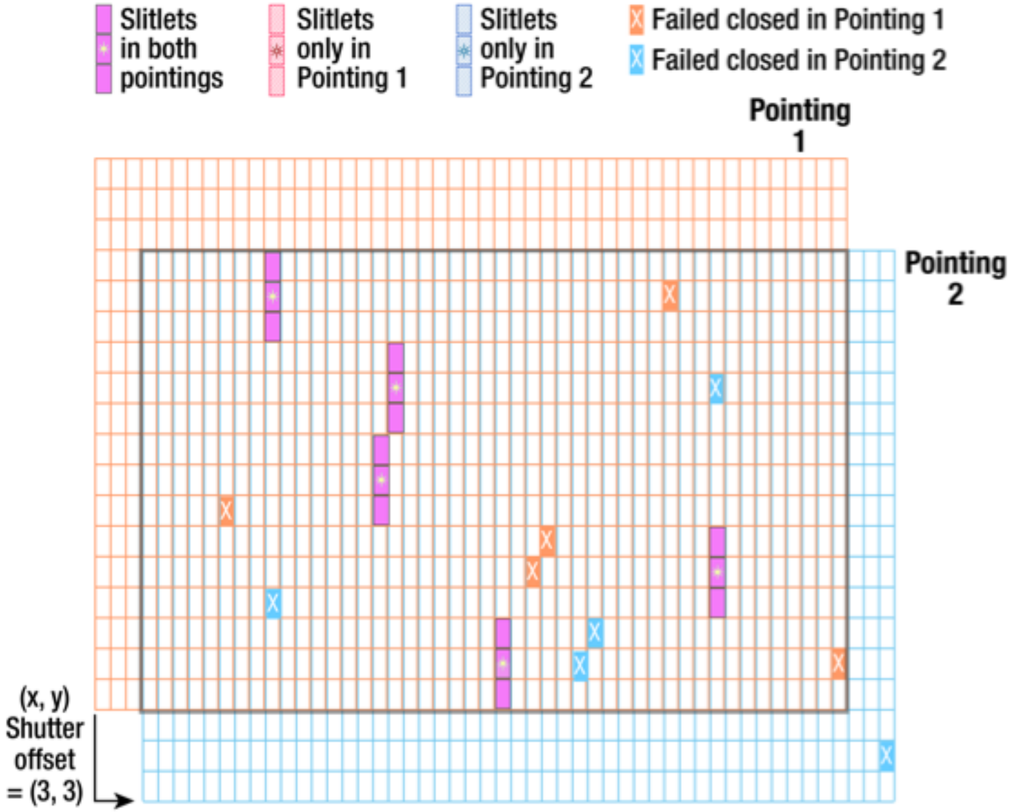


- The spectrum from a slitlet will be segmented, with bar shadows between the individual shutters

Dithering (fixed dither)

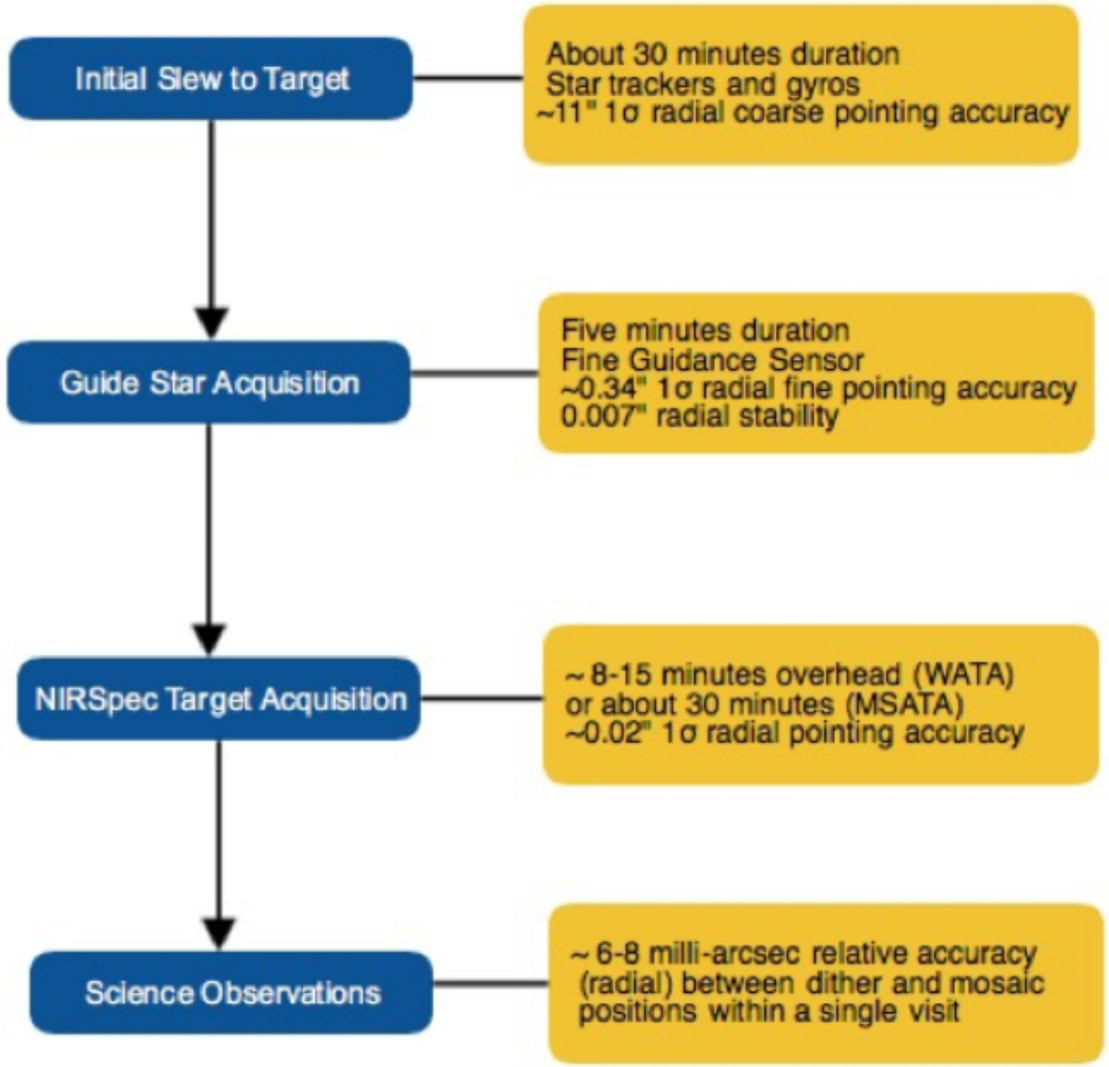
- Telescope repointed and MSA re-configured so many of the same sources fall in different shutters
  - Can be used to cover the wavelength gap
  - Improves PSF sampling and mitigates bad pixels
  - Allows observation of additional sources e.g. those behind shutter bars or the MSA mounting plate
  - Can mitigate effects of light leakage through MSA

- During optimisation, MPT will attempt to observe as many sources as possible at all dithers
- **Nodding and dithering can be used alone or together**



Target acquisition

- **MSATA** is expected to be the usual TA method for the MOS
  - uses 5-**8** reference stars over the entire MSA FoV
  - 8 chosen as a trade-off between TA accuracy and overheads
- MPT used to select reference stars at the assigned APA that will not be behind MSA bars or in failed shutters. This vetting is done at the Visit level at the first pointing in the Visit



Pre-imaging with NIRCam

- Is imaging available with
  - deep enough to identify sources?
  - wide enough to fill the MSA and plan reference stars?
  - accurate enough astrometry to plan MOS?

- If not, request **NIRCam pre-imaging** in your proposal
  - accurate enough astrometry to plan MOS?
  - NIRCam image should be large enough to allow for any NIRSpec APA
    - Ideally 5x5 arcmin
    - typically a 2x1 mosaic + dithers to cover gaps
  - NIRCam observations must be flight ready at proposal submission

Getting started

Getting started

- Open a terminal and go to a folder dedicated for the workshop:
- > git clone - -branch handson https://github.com/themiyan/IHOW2024_JWST_Thailand.git
  - Open APT
  - Load the catalogue
  - Set-up the MPT Planner
  - Generate the plan
  - Create the observation

Further reading

MOS/MPT Help and JDox

- **JWST Help Desk:** https://jwsthelp.stsci.edu

- **JDox Home page:** https://jwst-docs.stsci.edu/
  - Updated for the new version of APT/MPT

- Specific MOS/MPT materials:
  - MOS Roadmap
  - Multi-Object Spectroscopy
  - NIRSpec MOS Observing Process
  - NIRSpec MOS Operations
    - Catalogues and Images
    - Pre-Imaging Using NIRCam
    - Confirmation Images
    - Slit Losses
  - **NIRSpec MOS Recommended Strategies**
  - MOS APT Template