

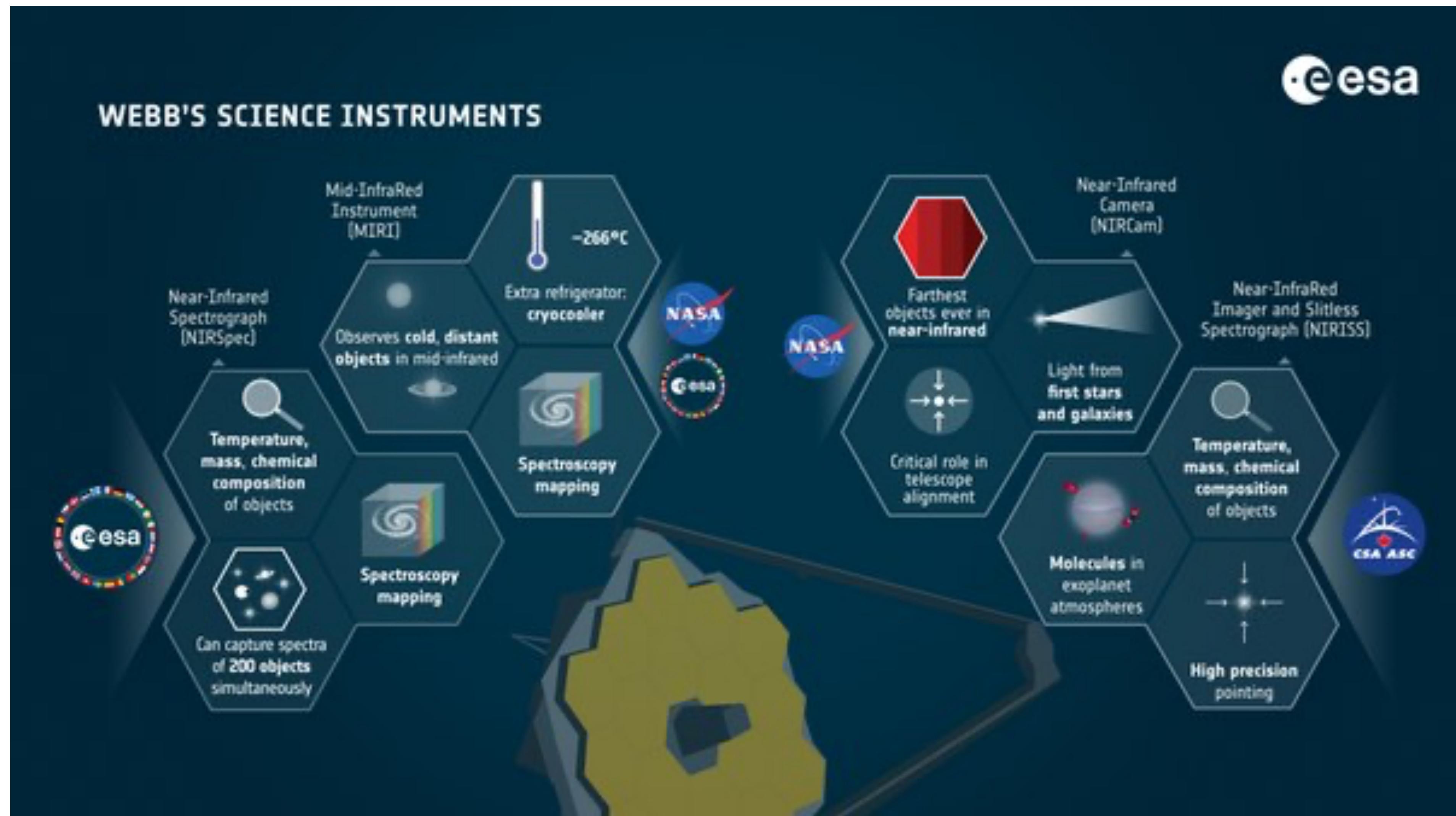
JWST Spectroscopic Modes

Nimisha Kumari
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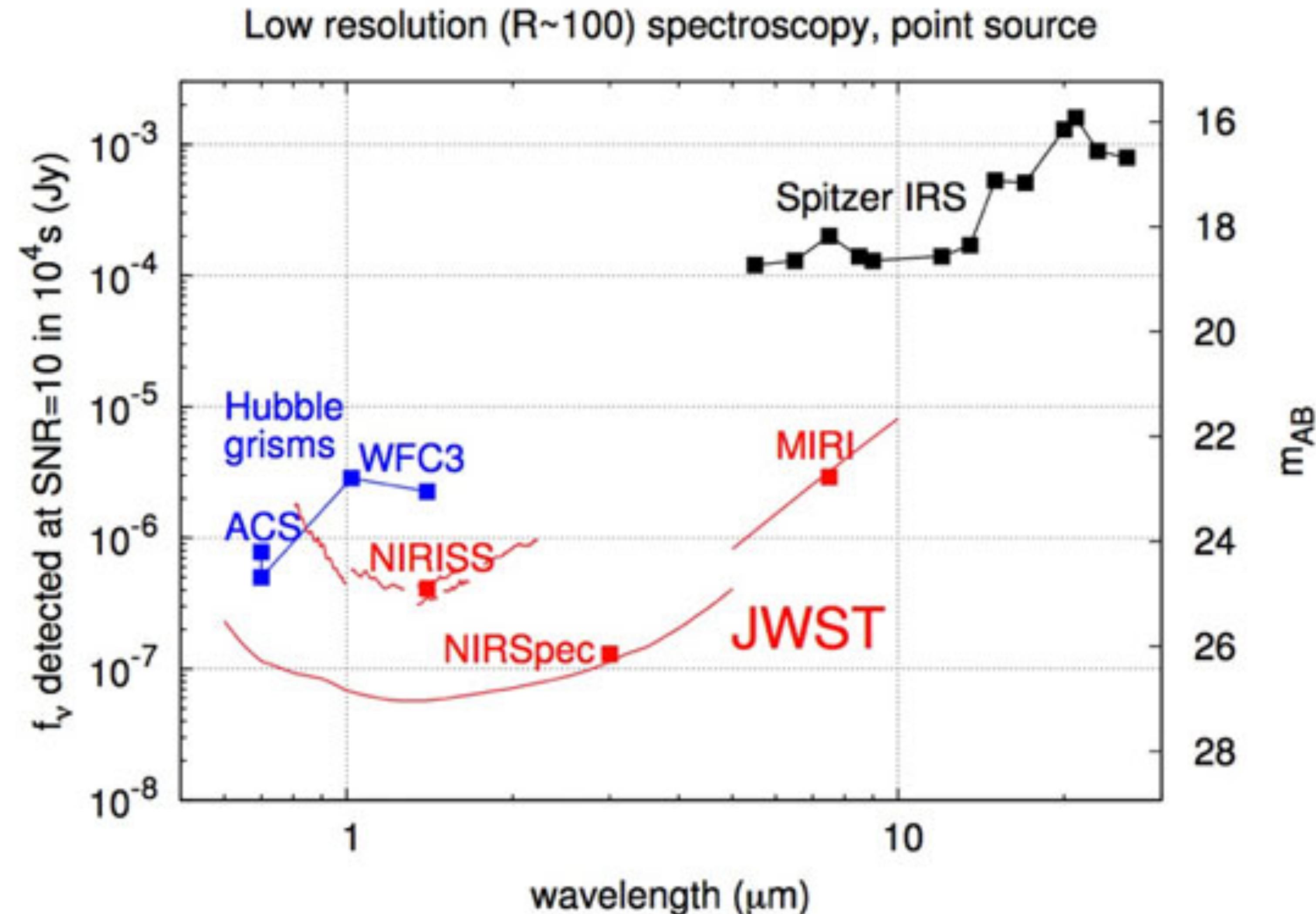


COSPAR 2025, Christ Deemed to be University, Bengaluru, India

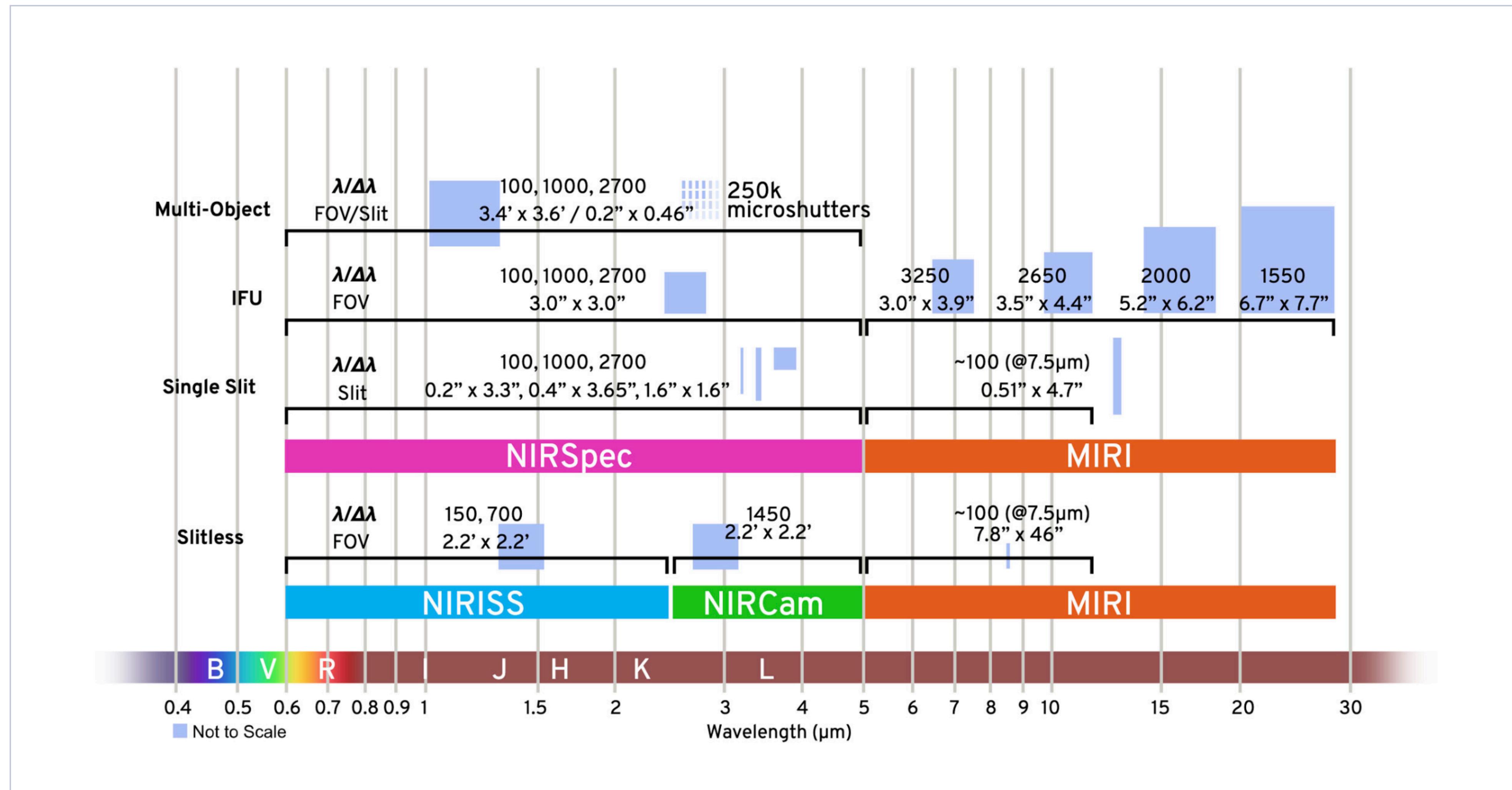
JWST Spectroscopy



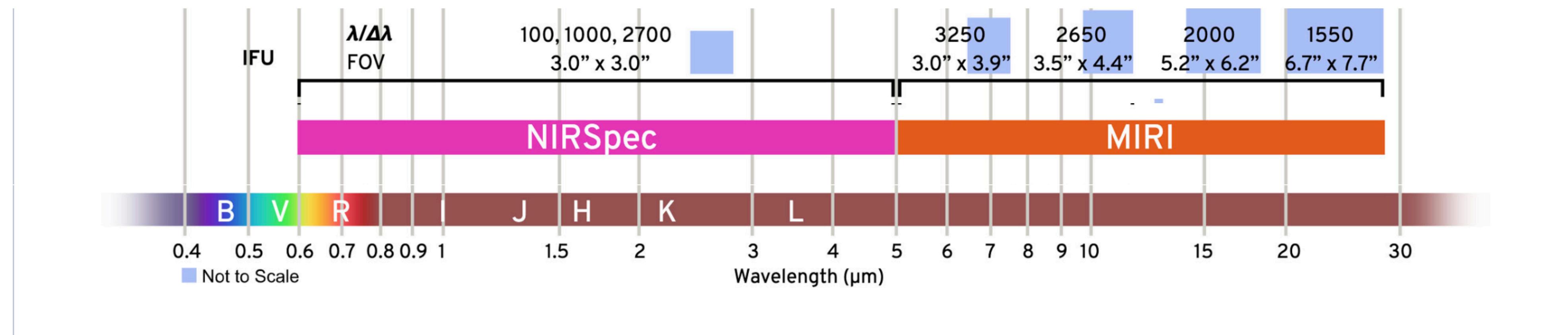
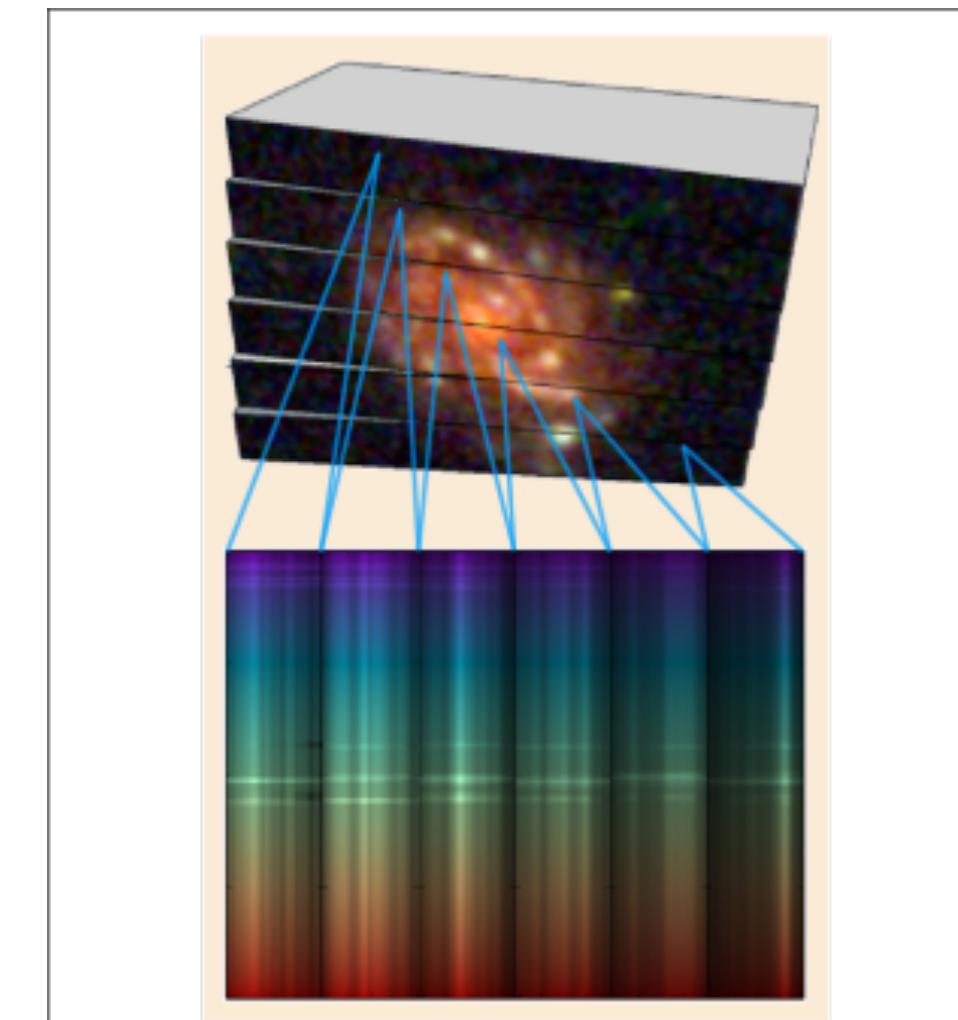
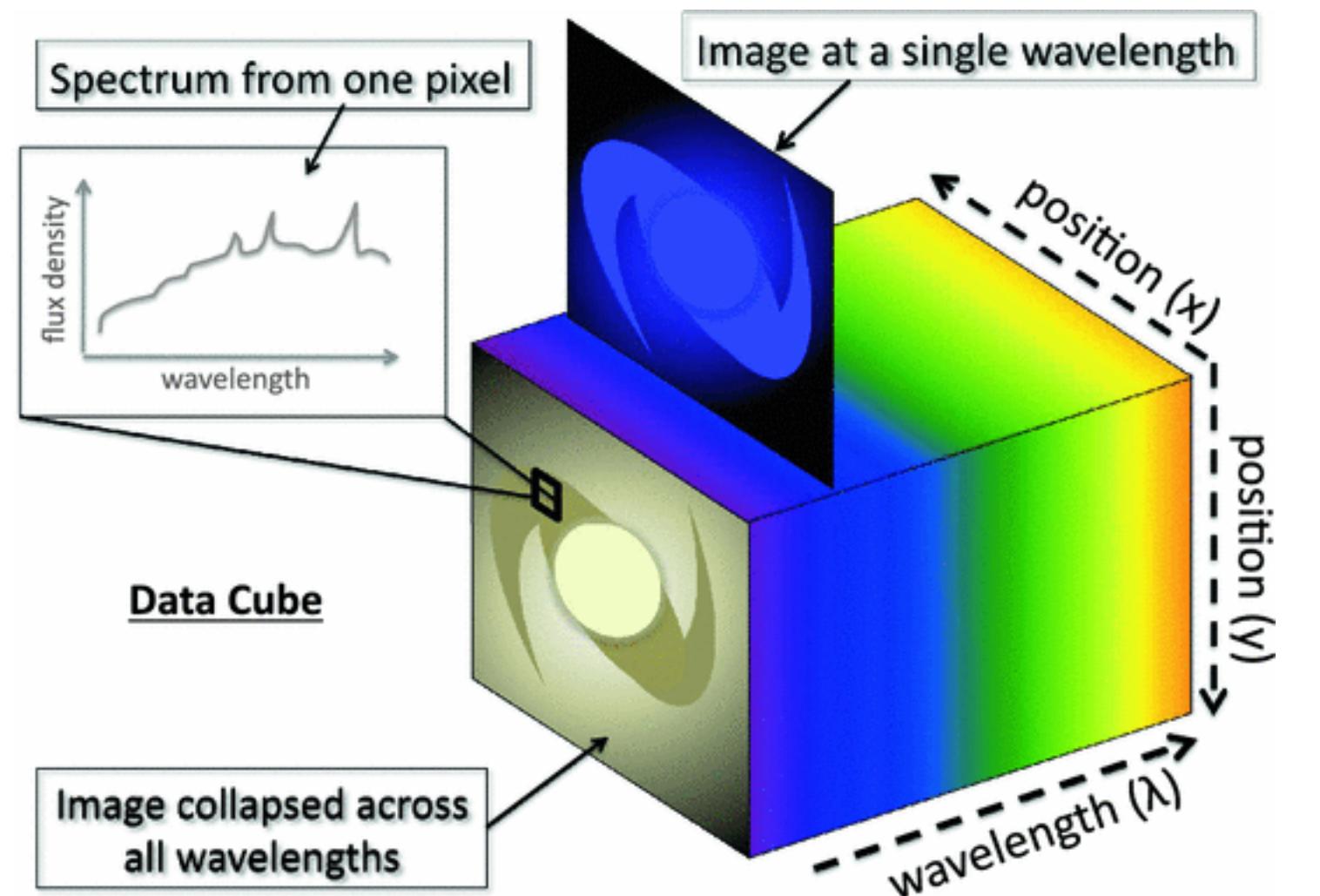
JWST Spectroscopy sensitivity - comparison



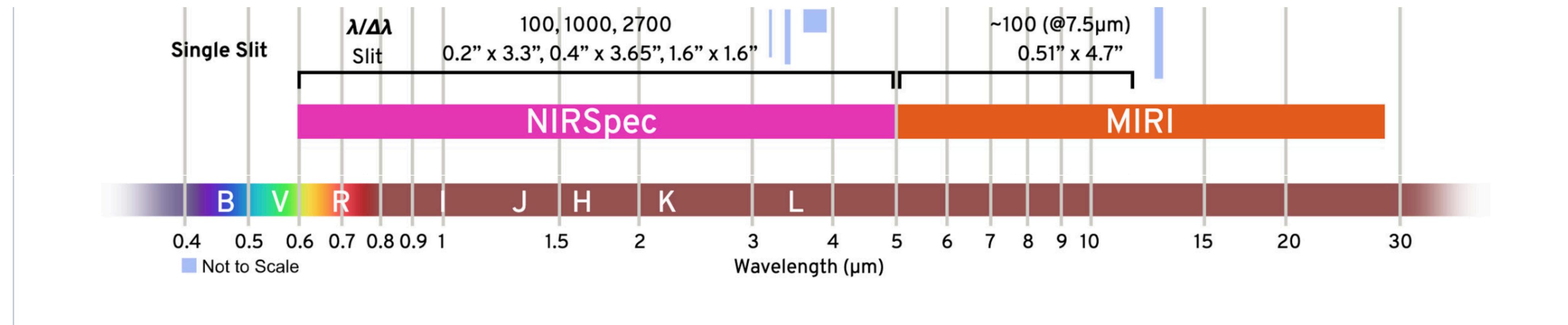
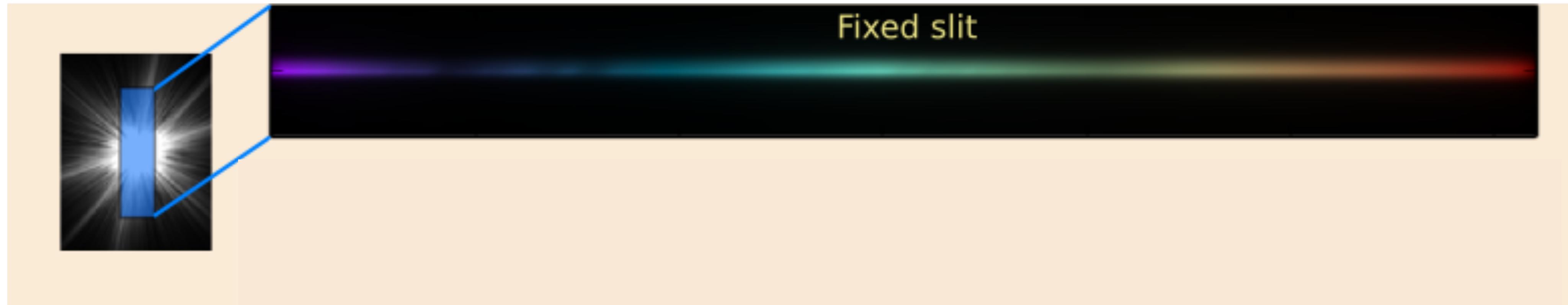
JWST Spectroscopic modes



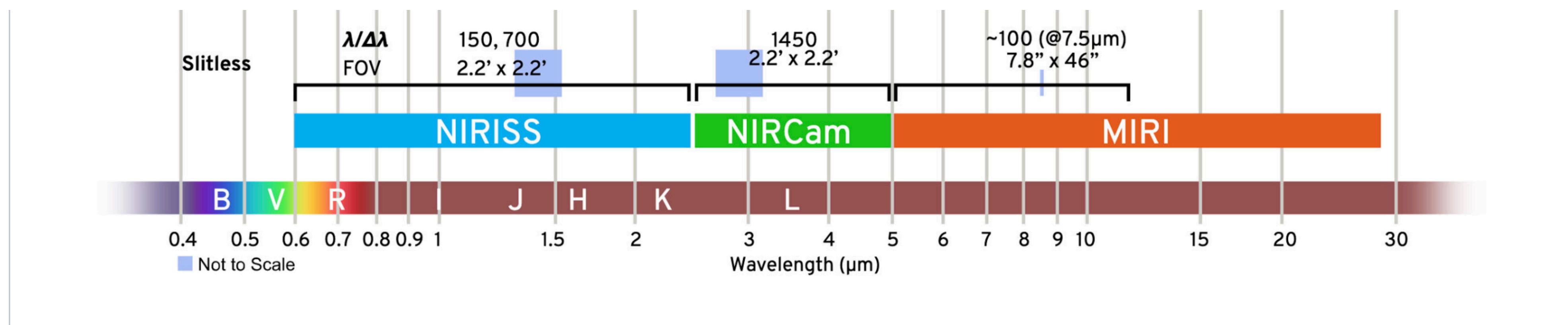
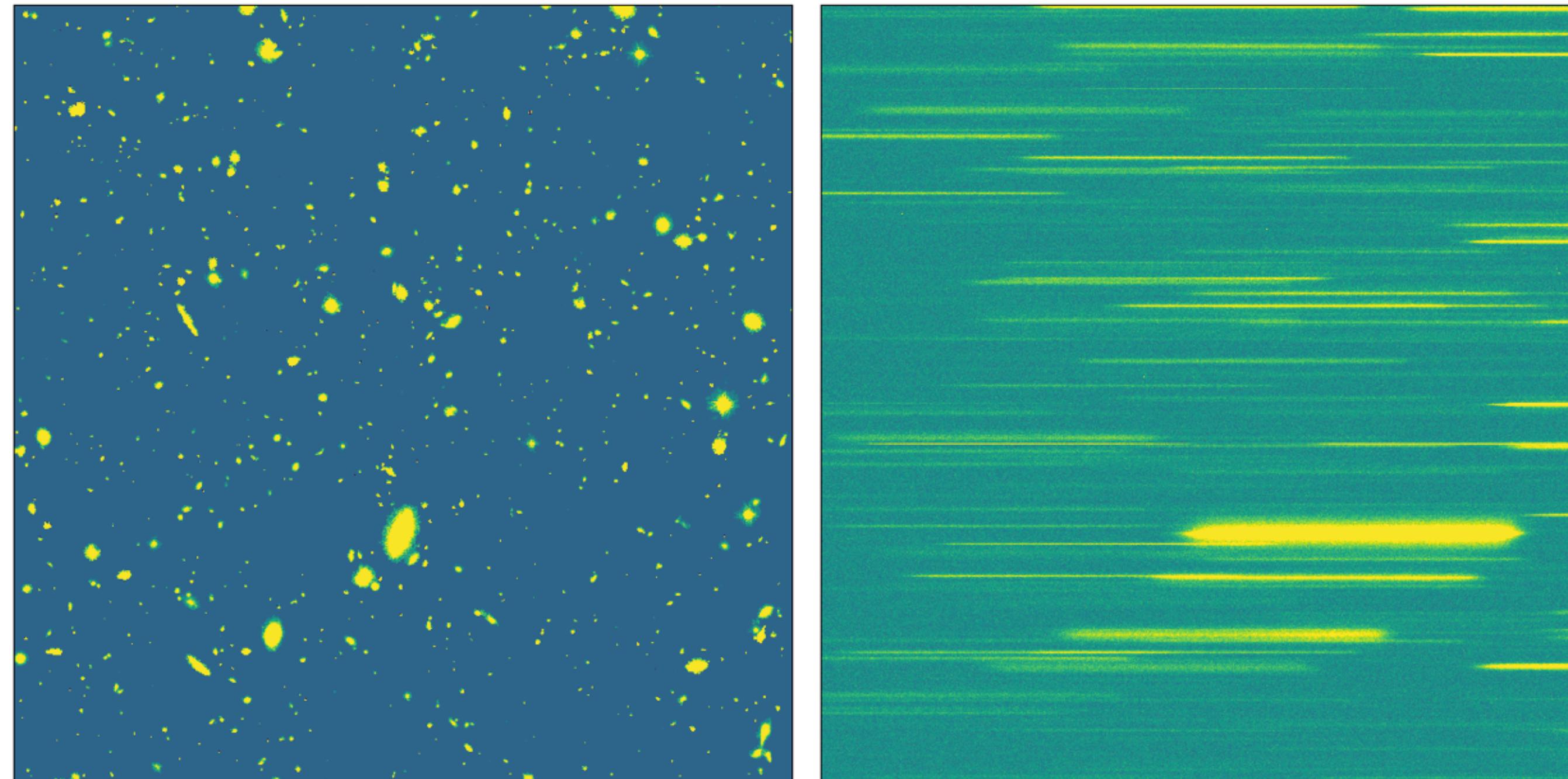
Integral Field Spectroscopy



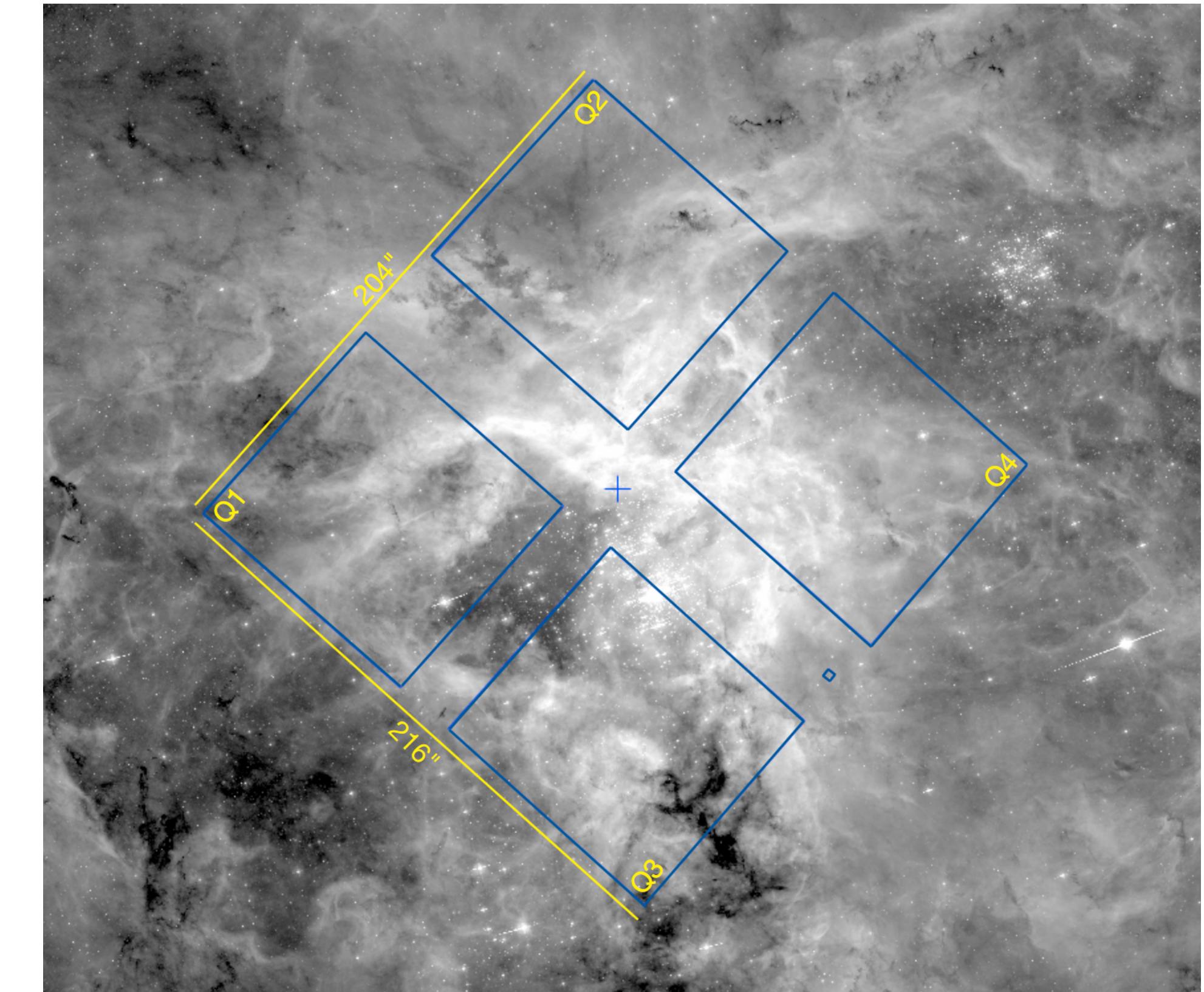
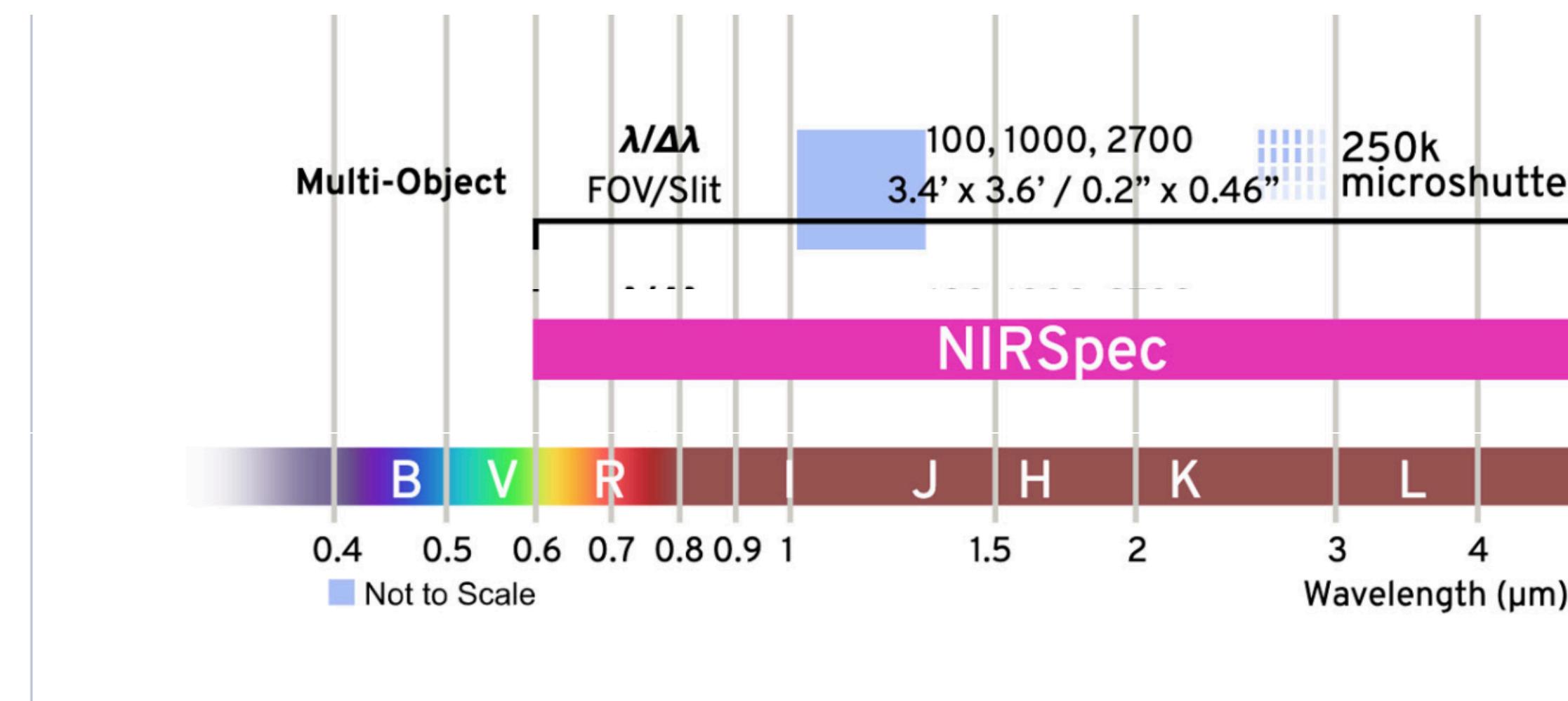
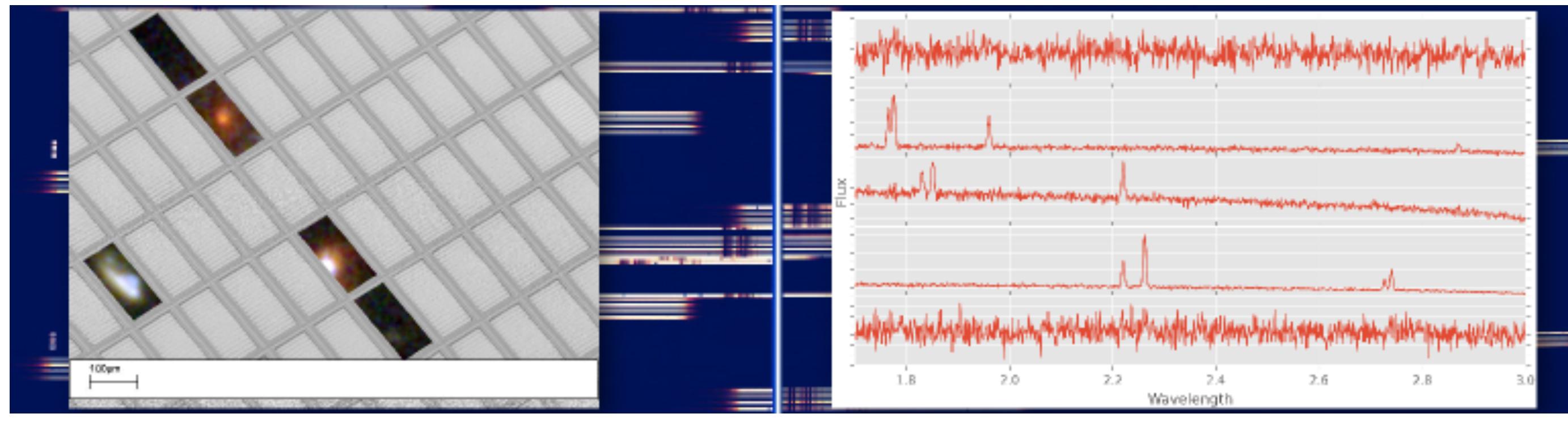
Single Slit



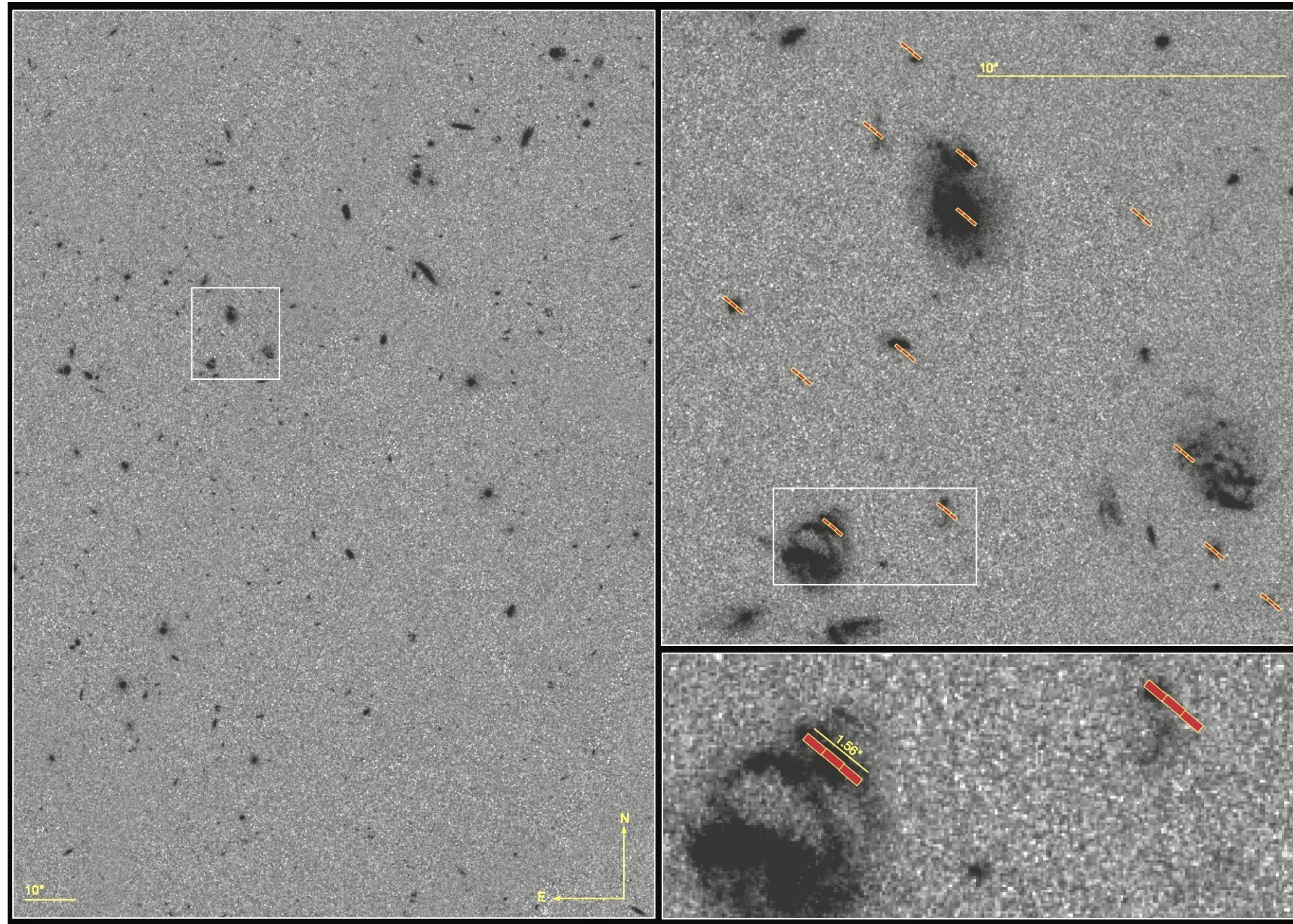
Wide-Field Slitless Spectroscopy



Multi-Object Spectroscopy - NIRSpec MSA

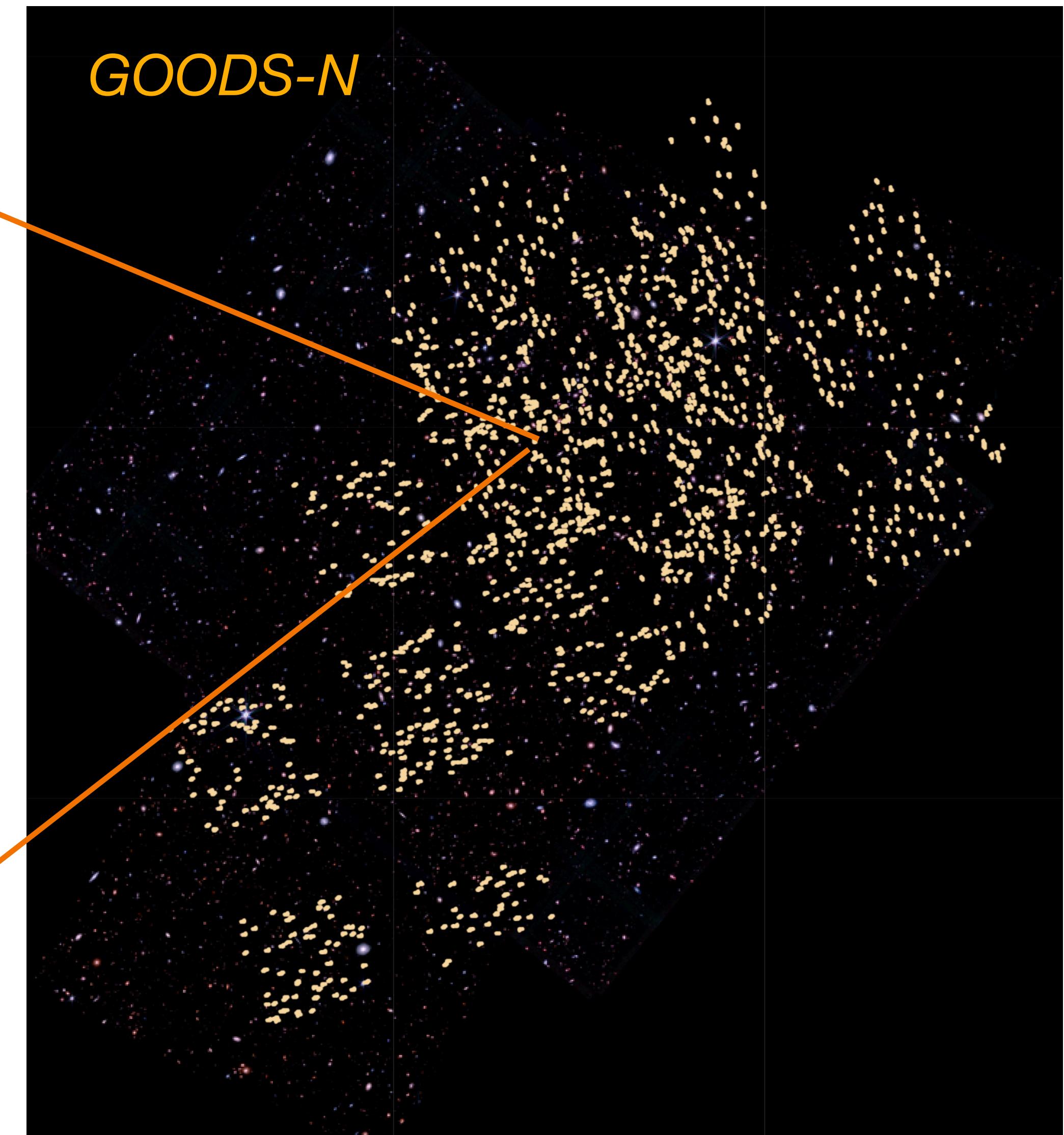
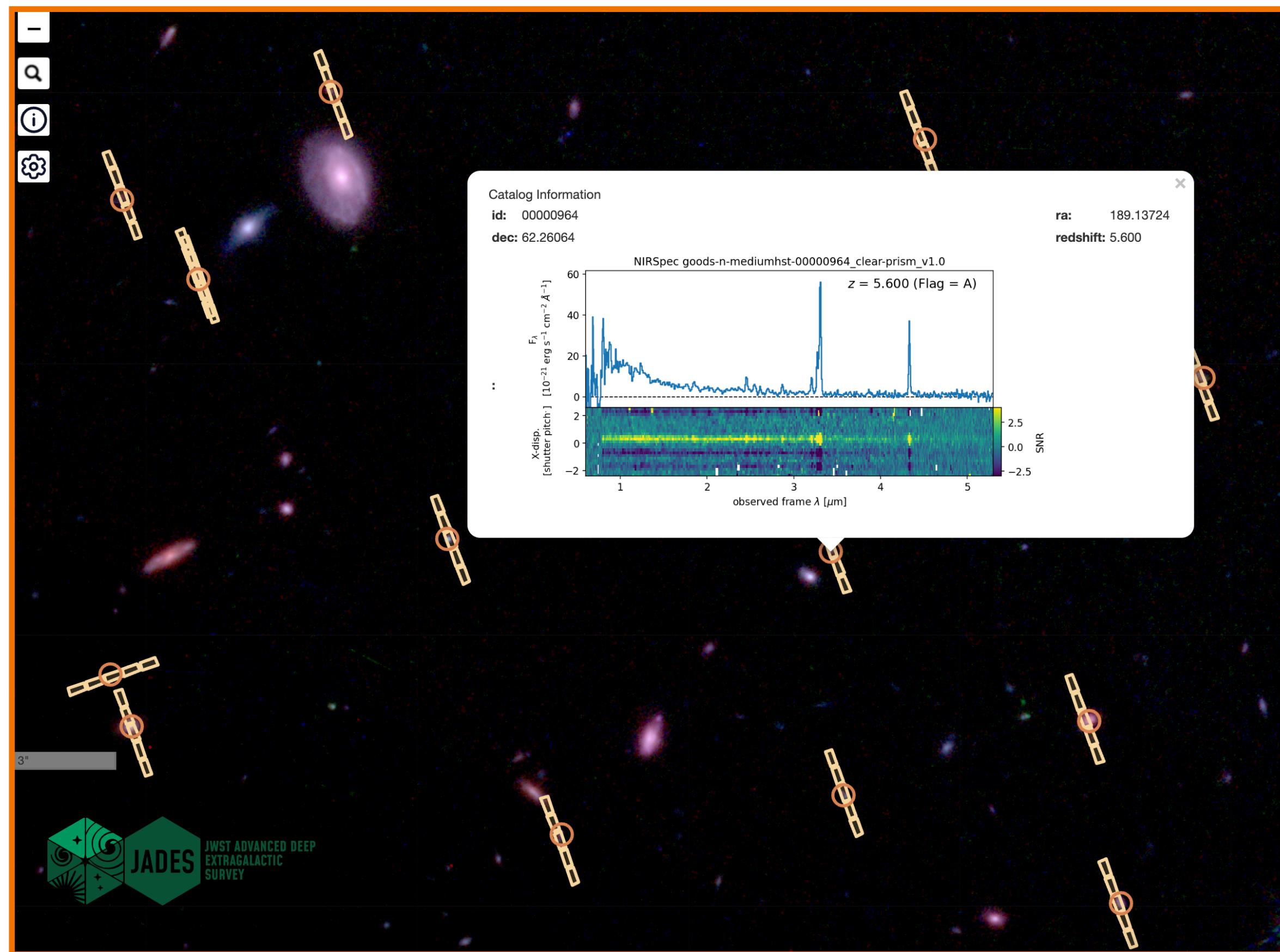


Multi-Object Spectroscopy - slits on sky

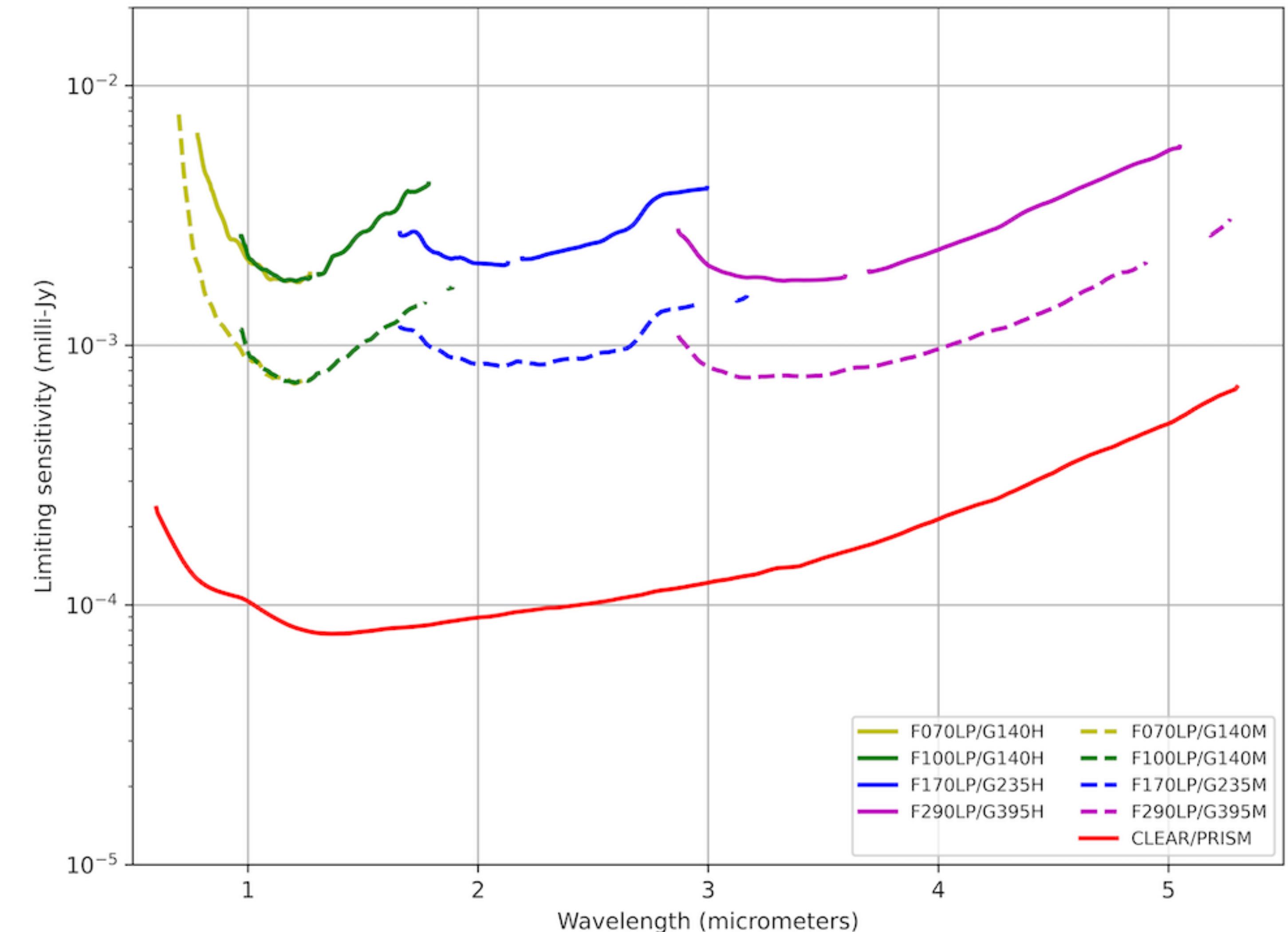
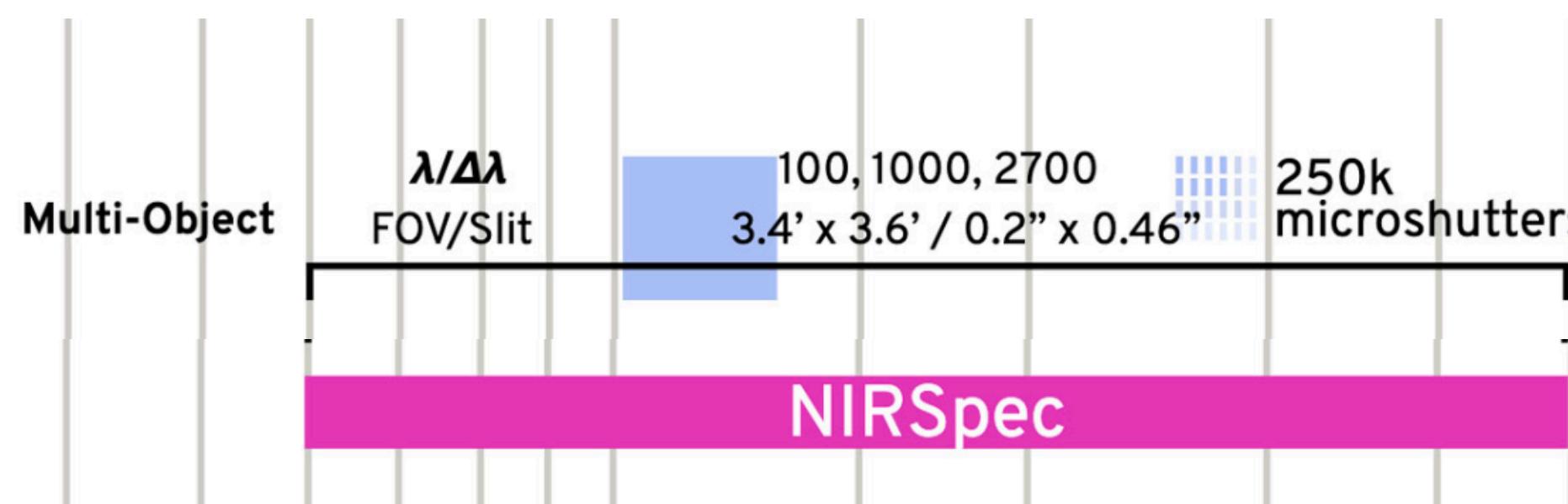


Notebook
Tutorial

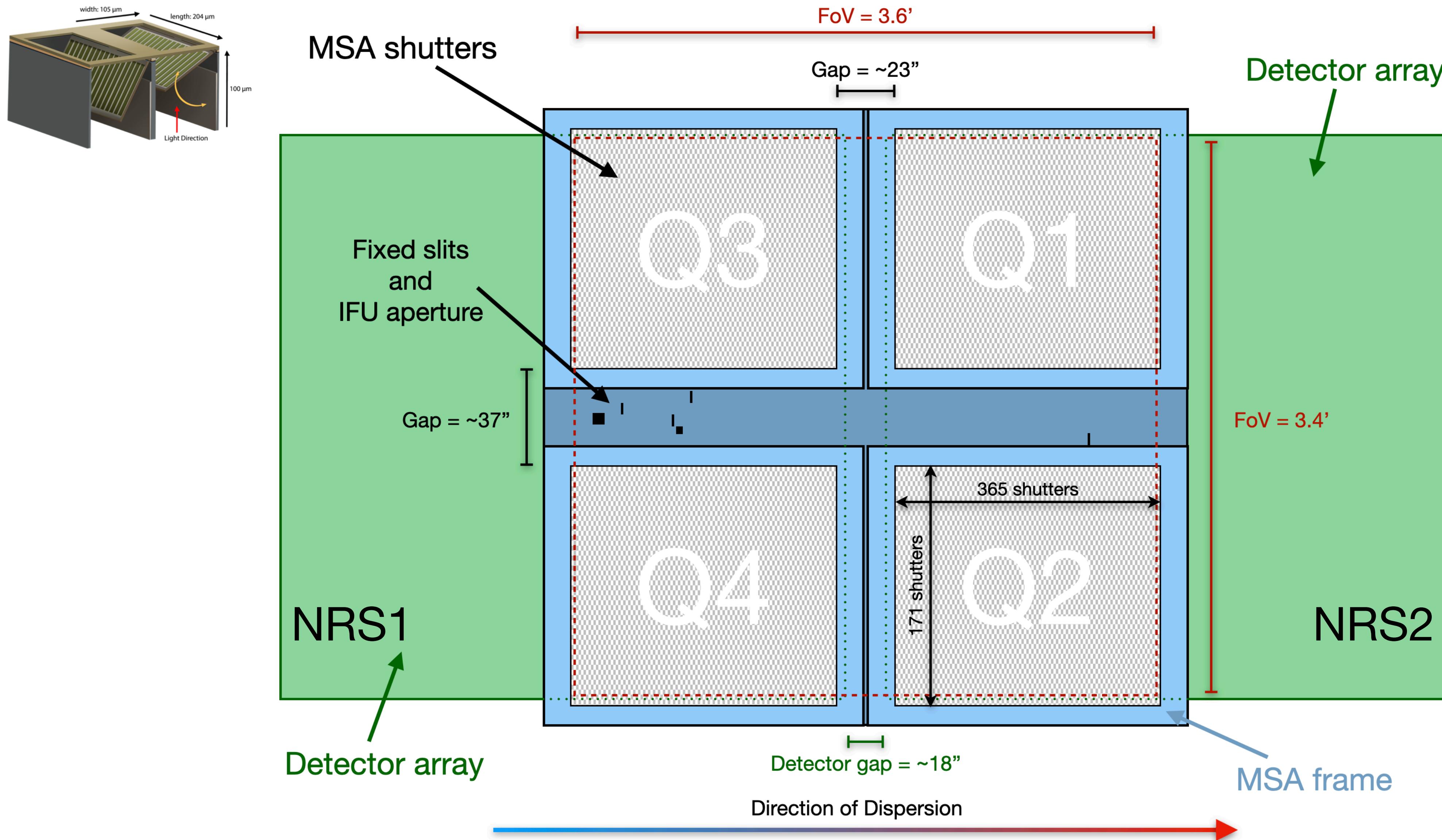
Multi-object spectroscopy - Galaxies populations



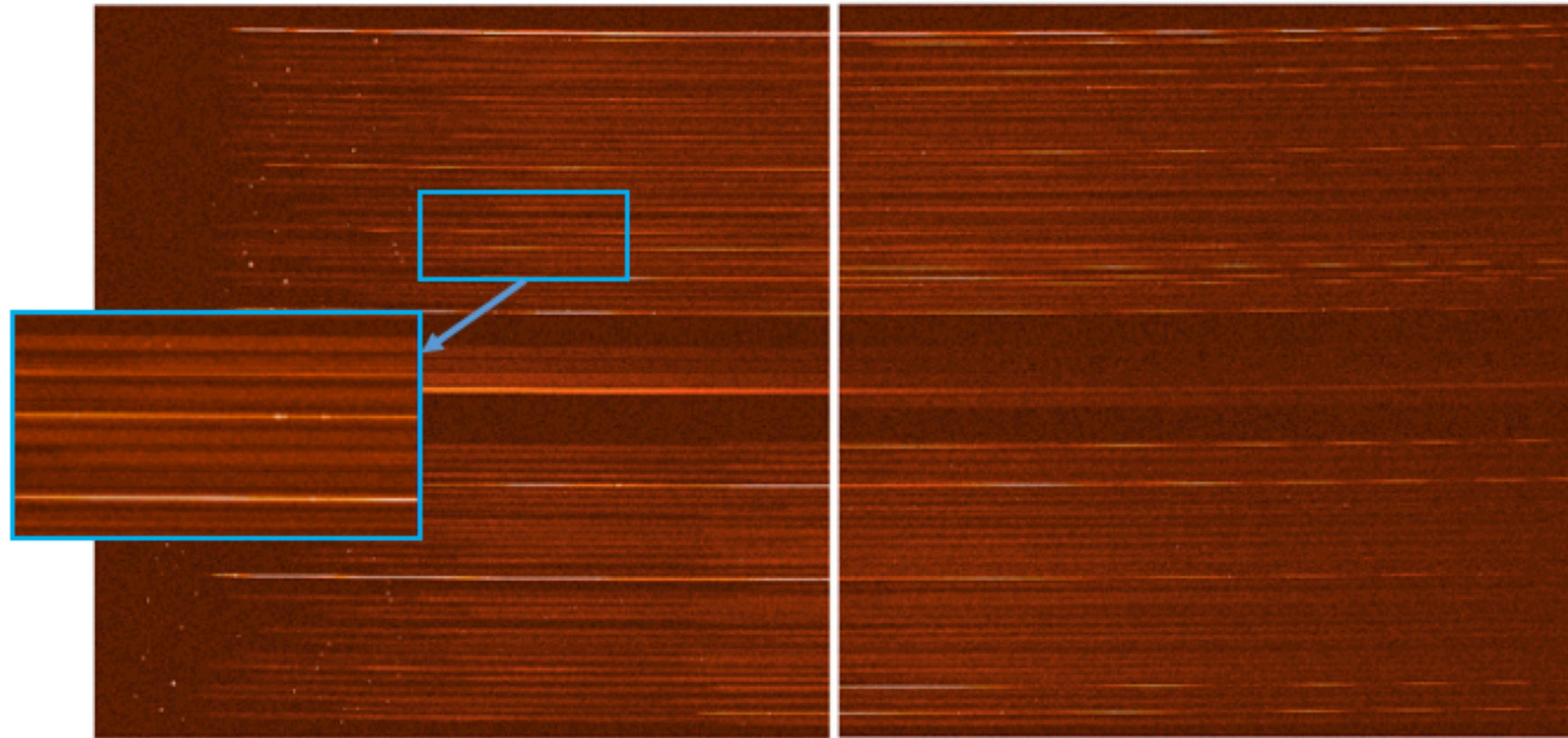
NIRSpec MSA - Sensitivity



NIRSpec MSA layout

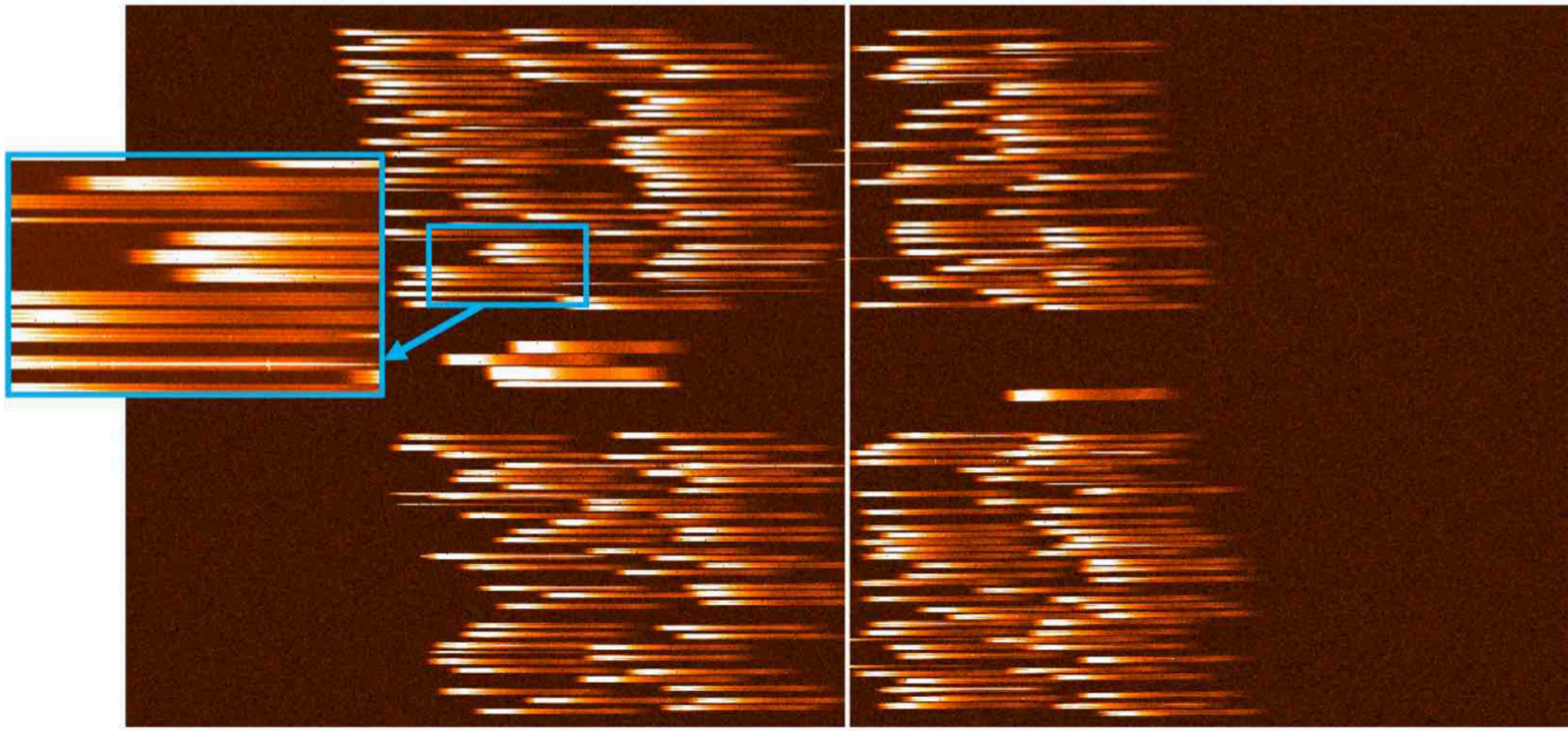


NIRSpec Multi-Object Spectroscopy



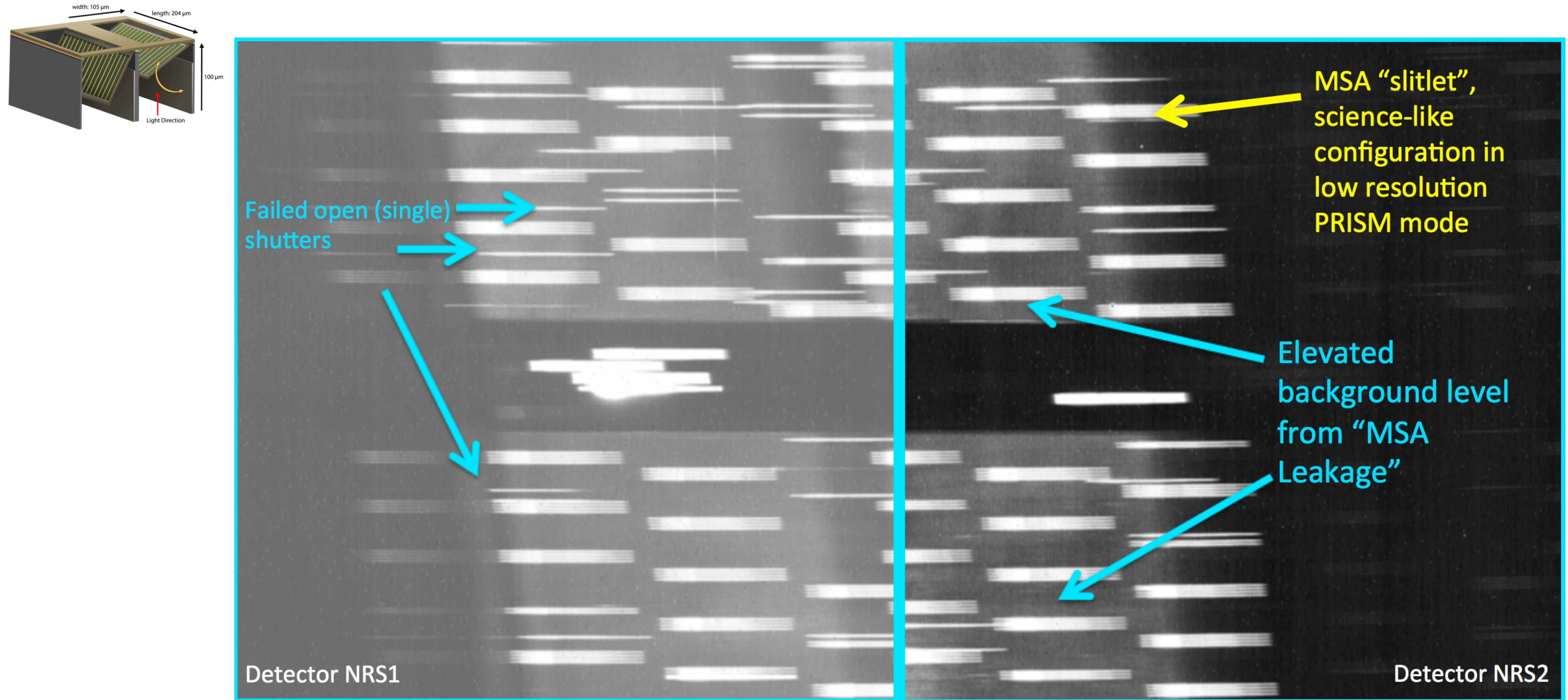
R~1000

NIRSpec Multi-Object Spectroscopy

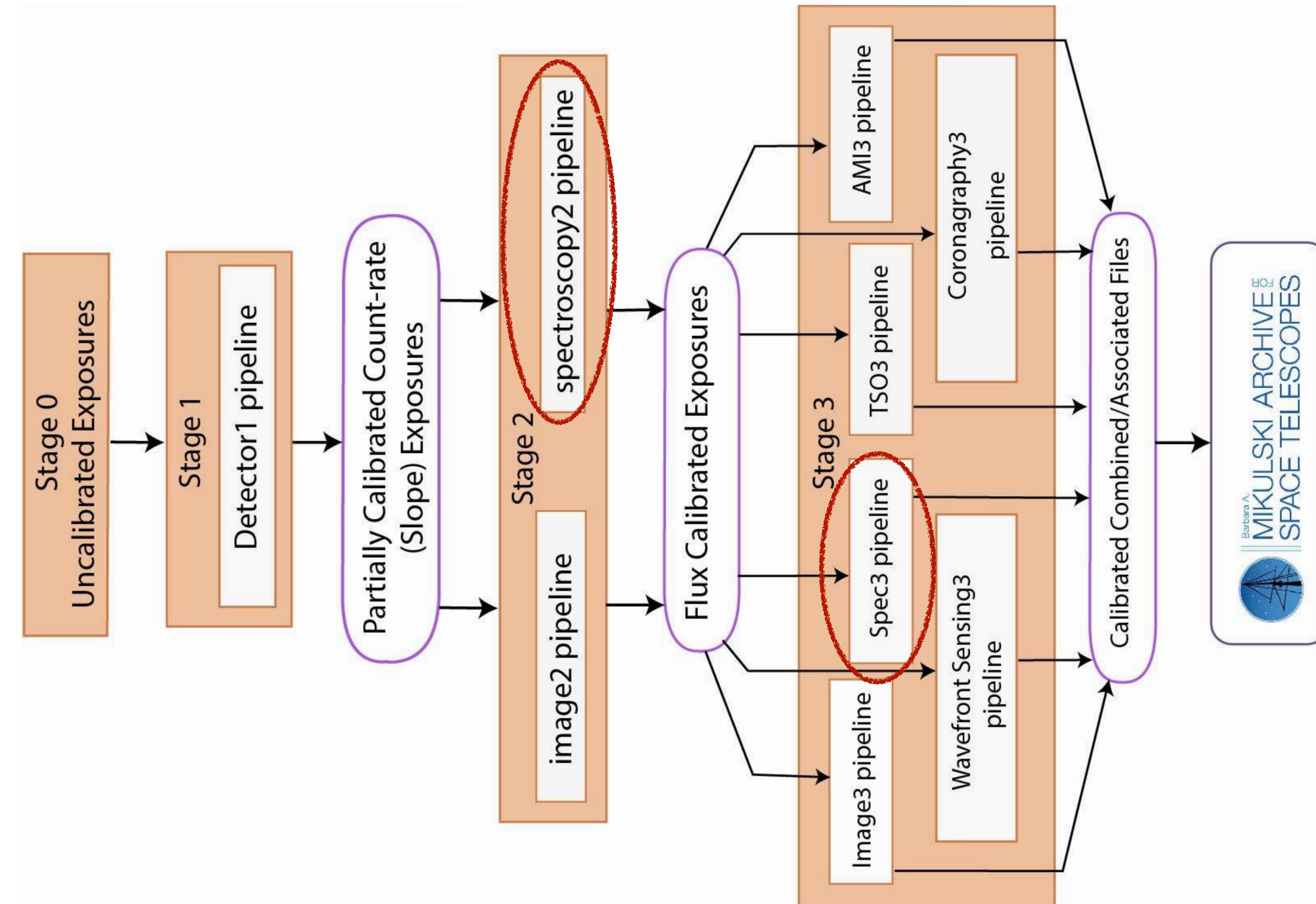


R~100

Multi-Object Spectroscopy

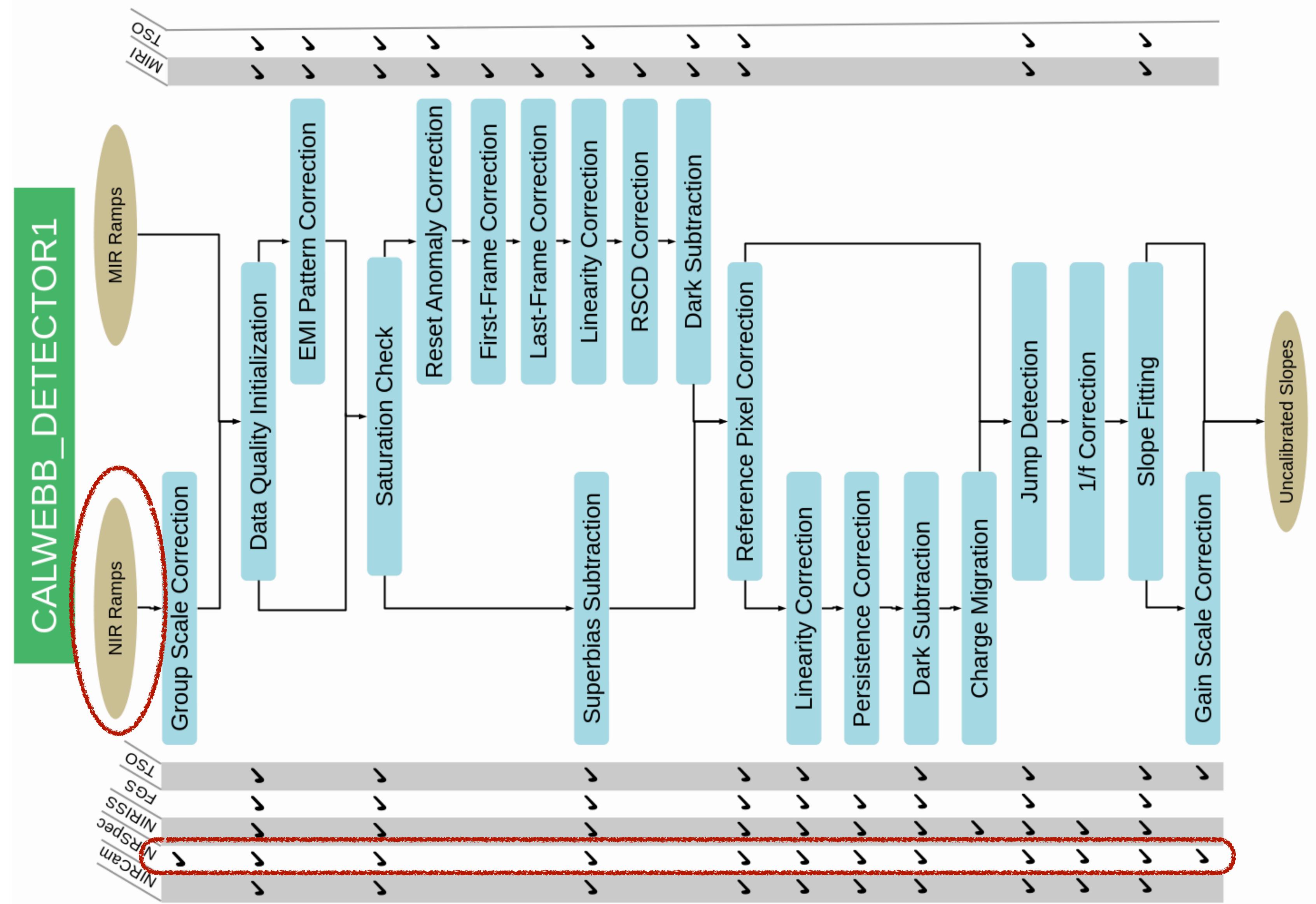


NIRSpec MOS Data reduction

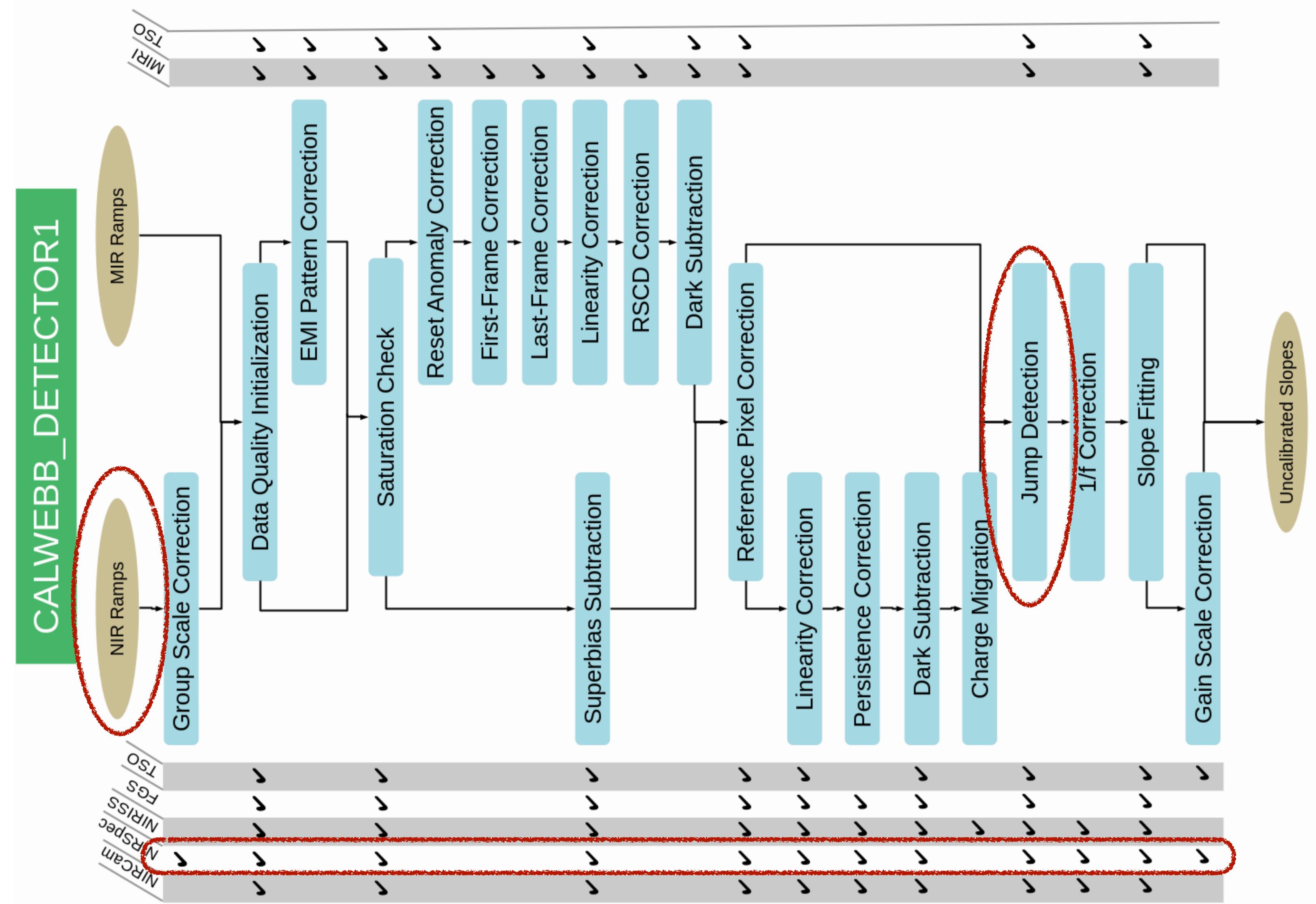


Notebook
Tutorial

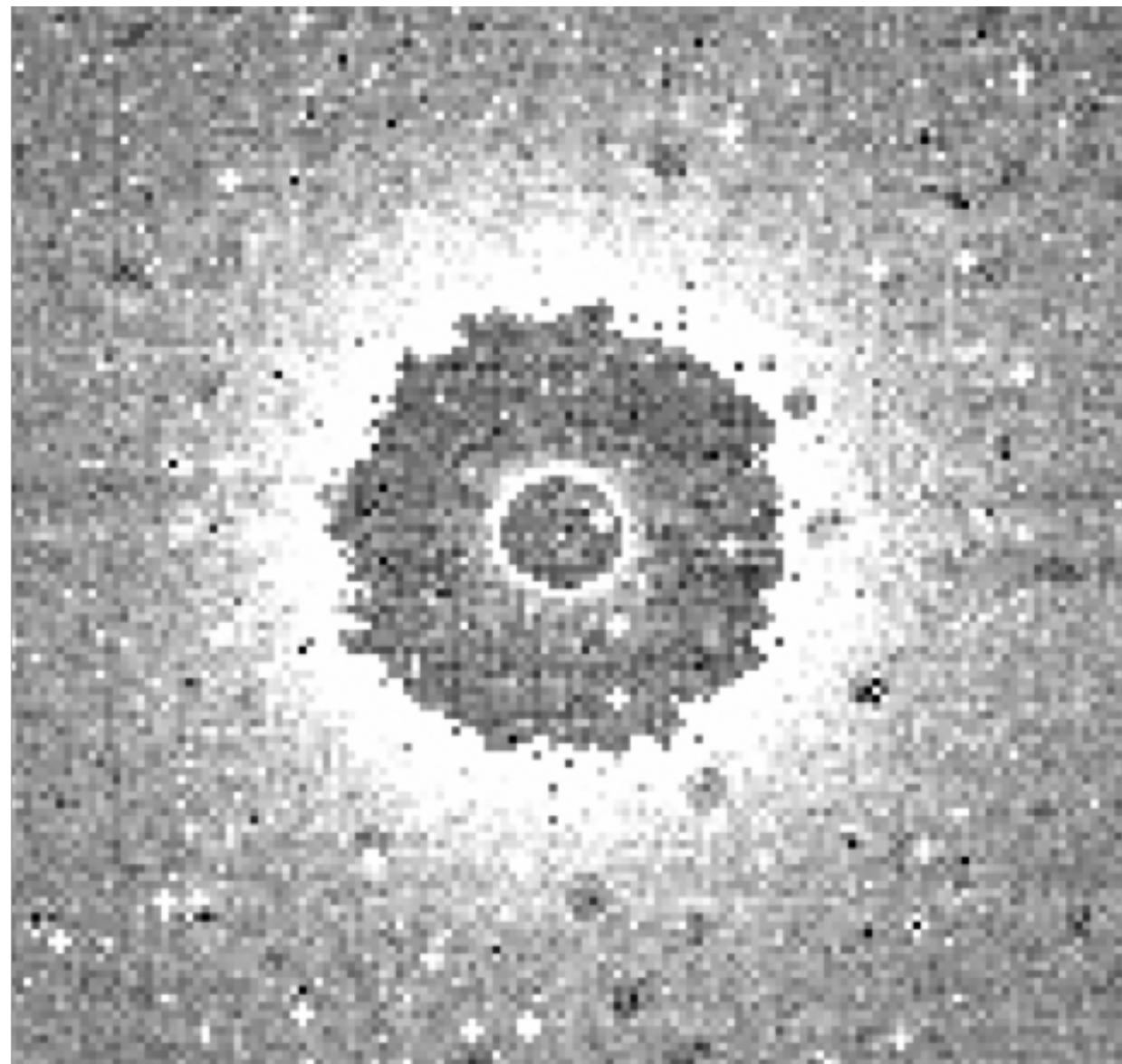
NIRSpec MOS Stage 1



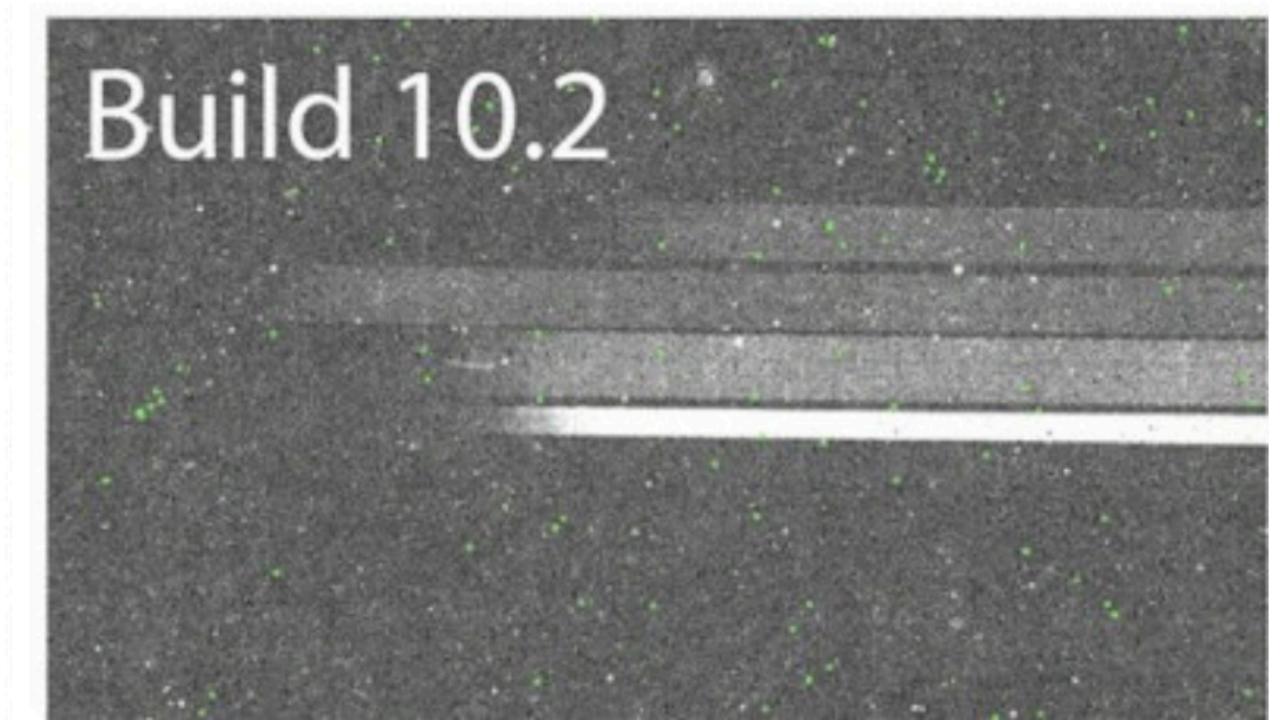
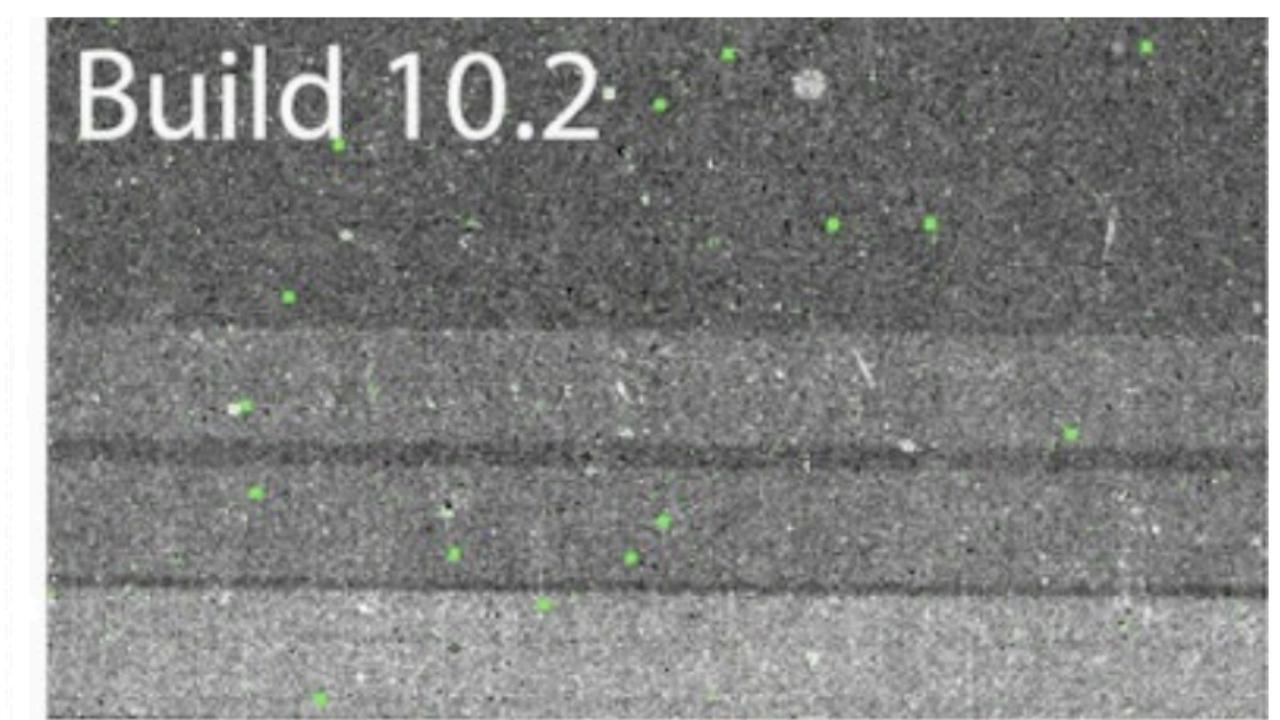
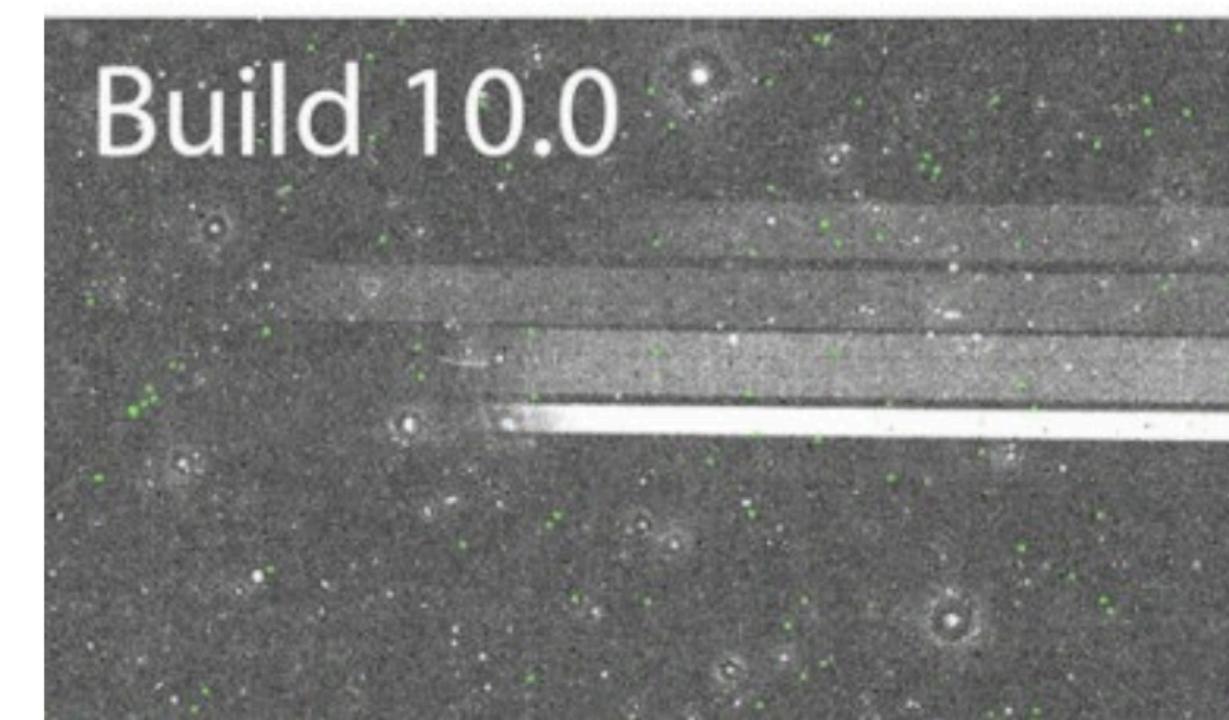
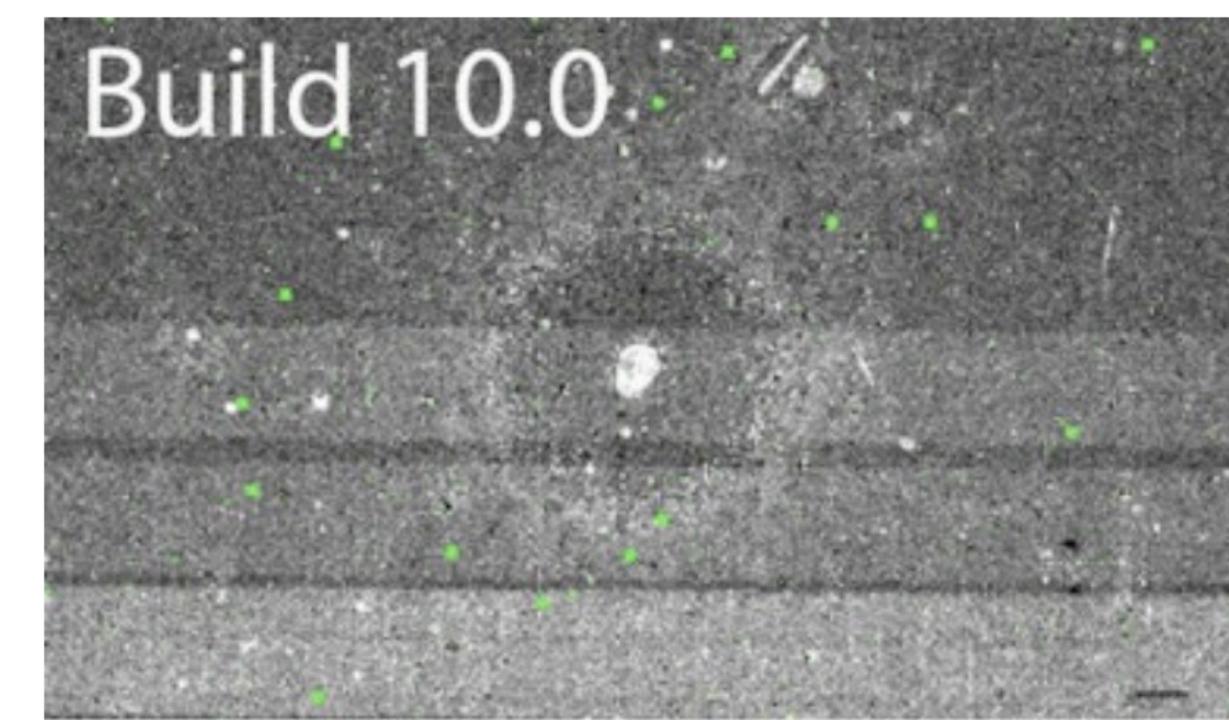
NIRSpec MOS Stage 1



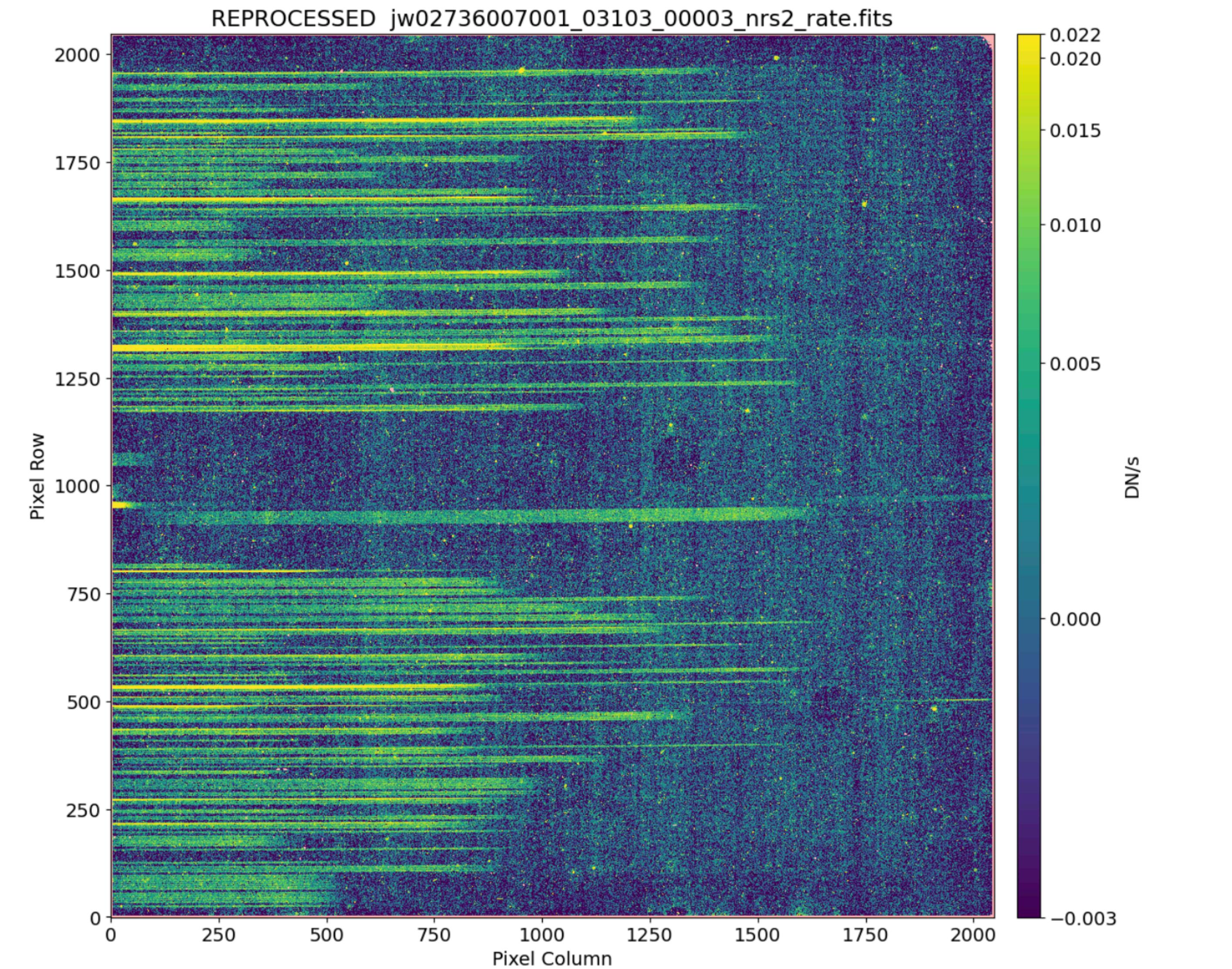
NIRSpec MOS Stage 1 - Snowballs



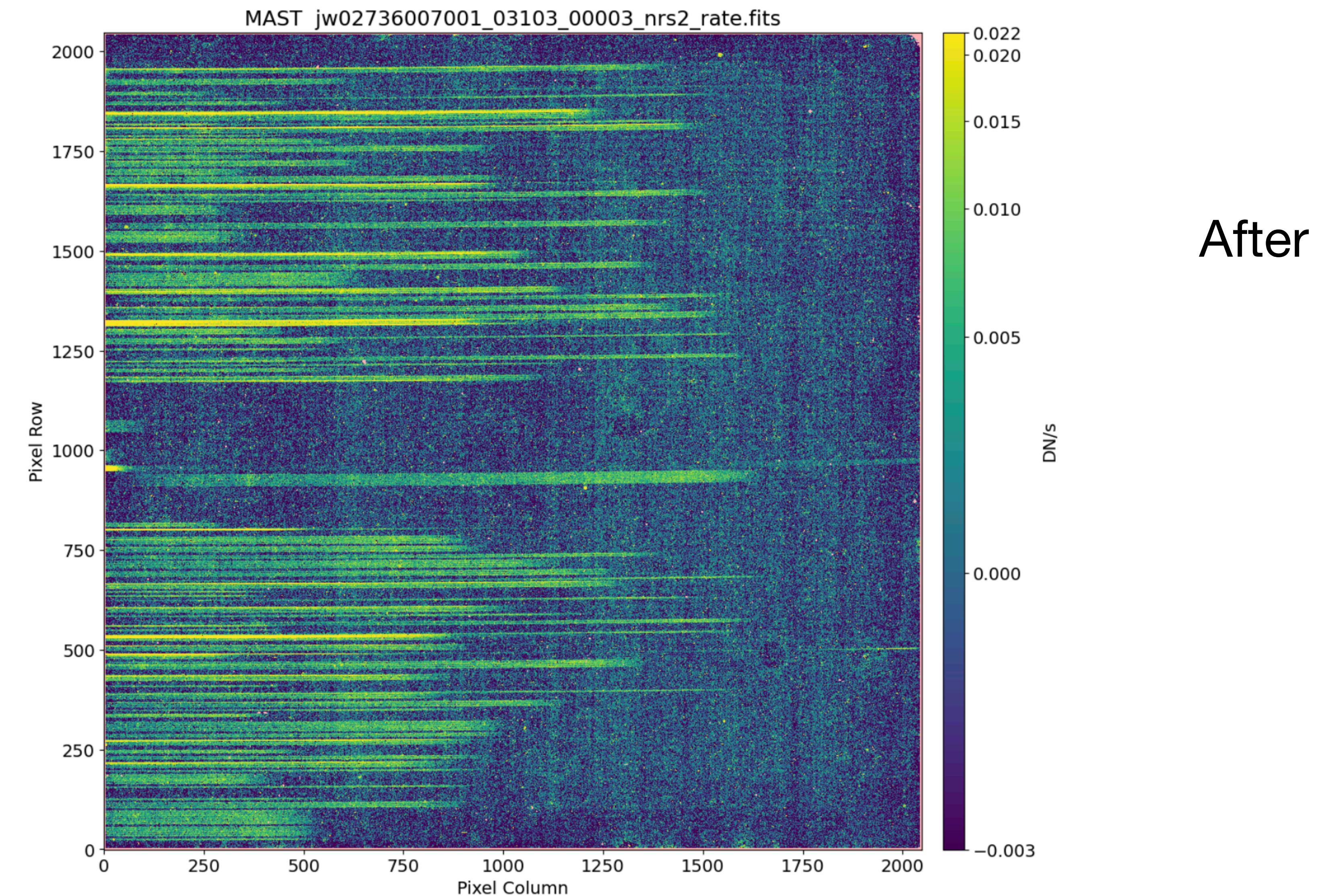
Cosmic ray impact ~100s pixels
Deep Observations
Persistence



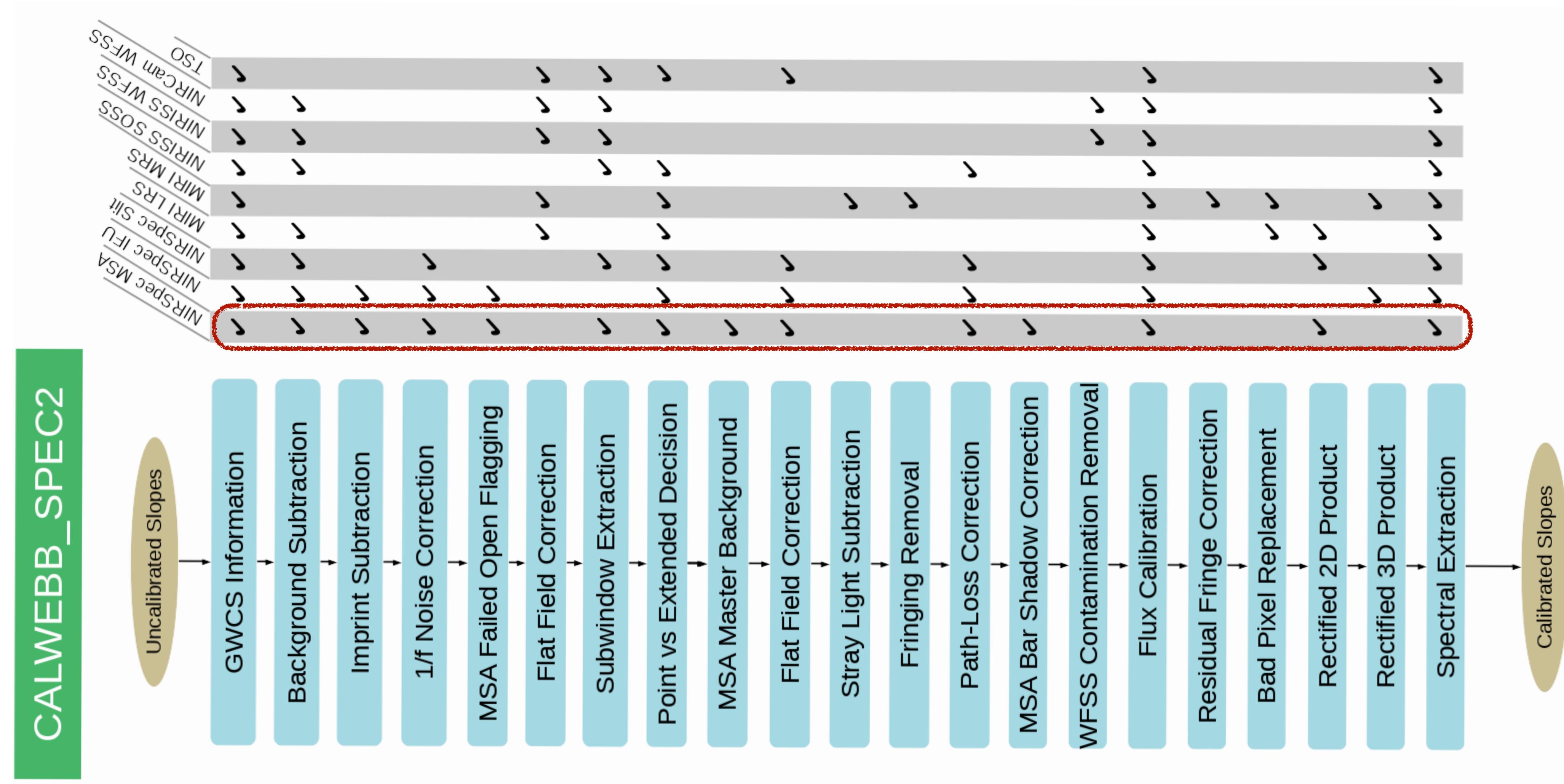
NIRSpec MOS Stage 1 - Jump detection



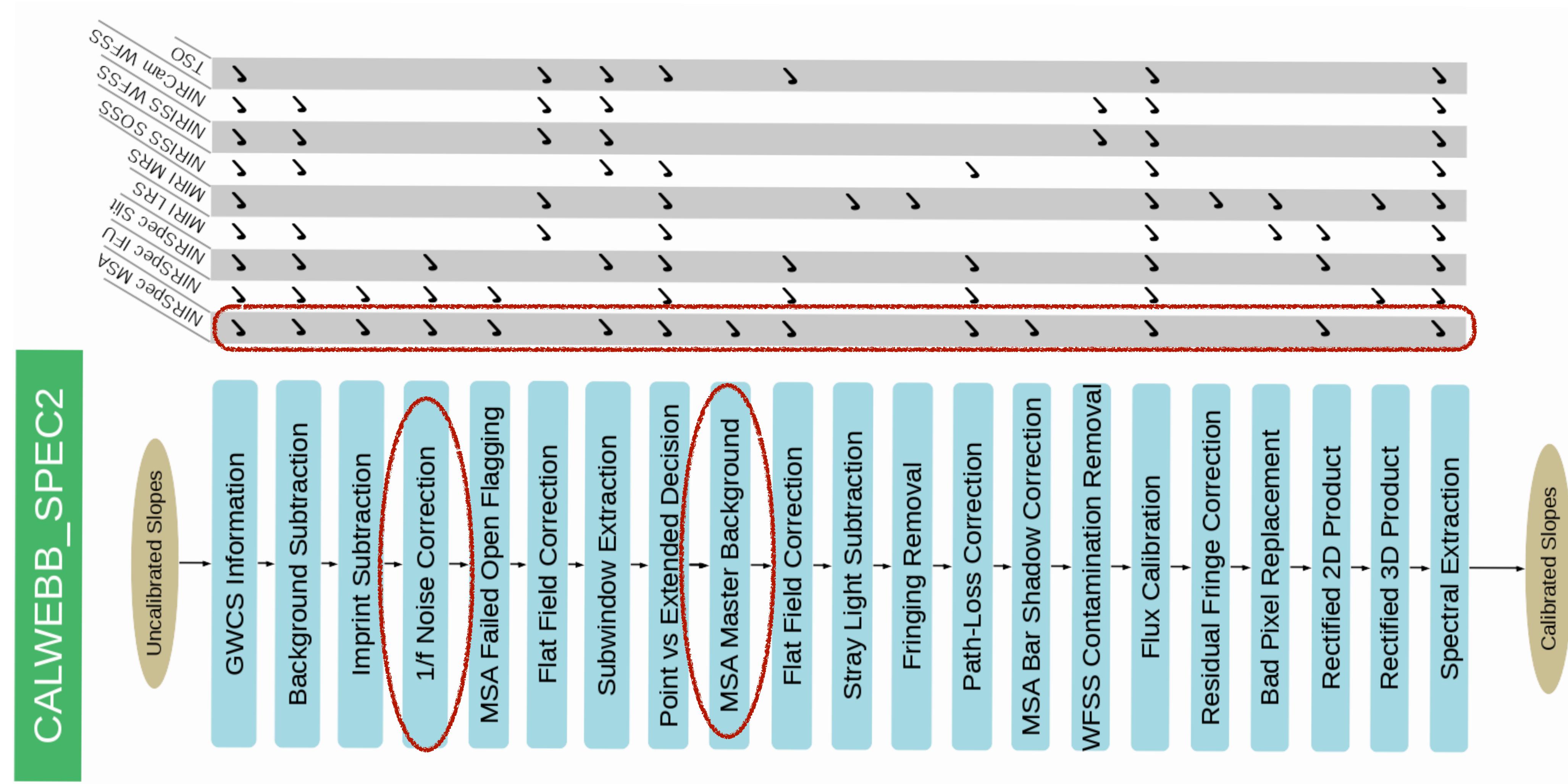
NIRSpec MOS Stage 1 - Jump detection



NIRSpec MOS Stage 2

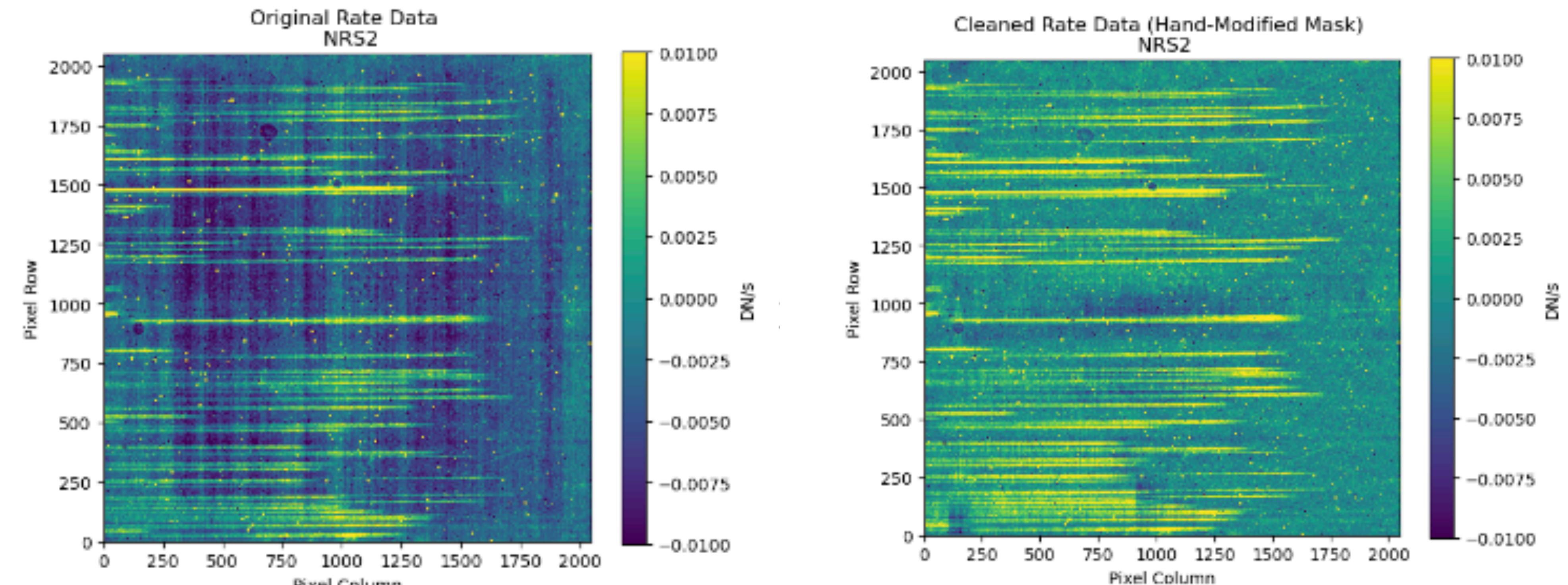


NIRSpec MOS Stage 2



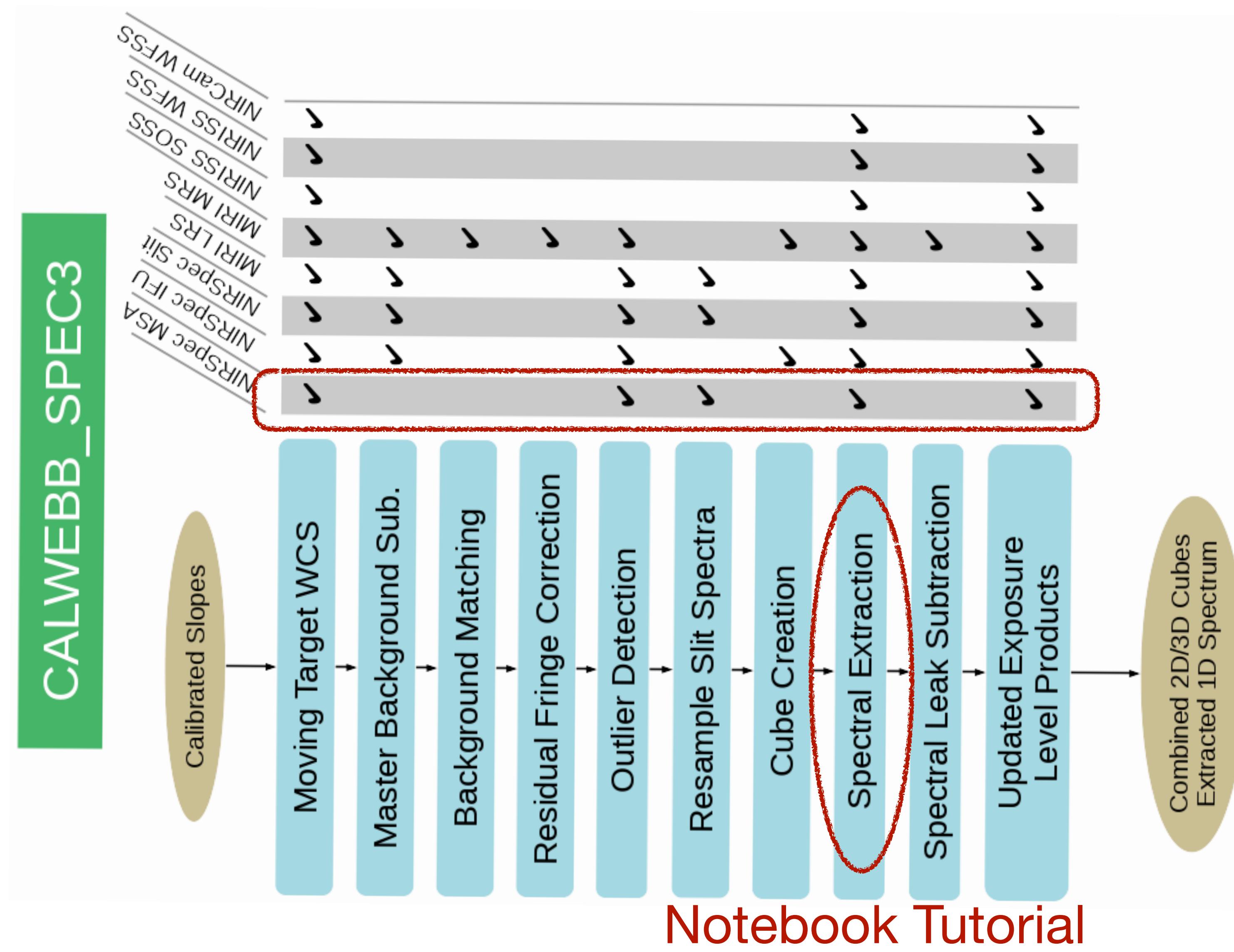
Notebook Tutorial

NIRSpec MOS Stage 2 - 1/f noise

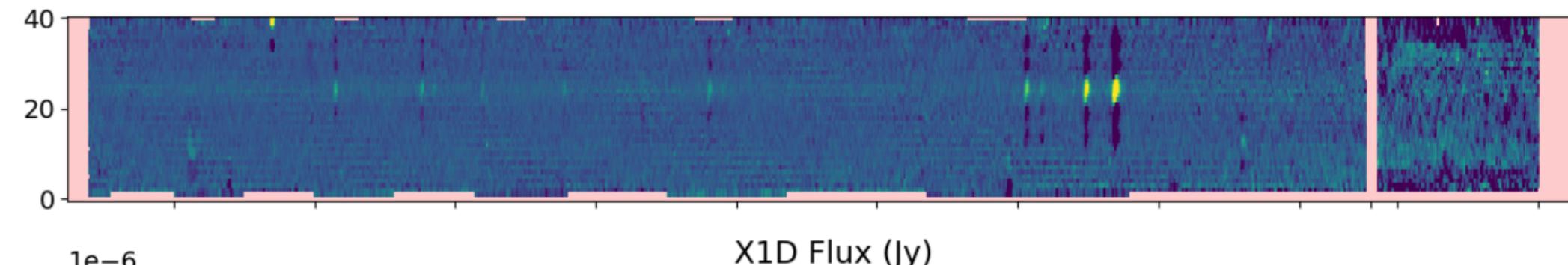


Thermal instabilities
-> Correlated Noise

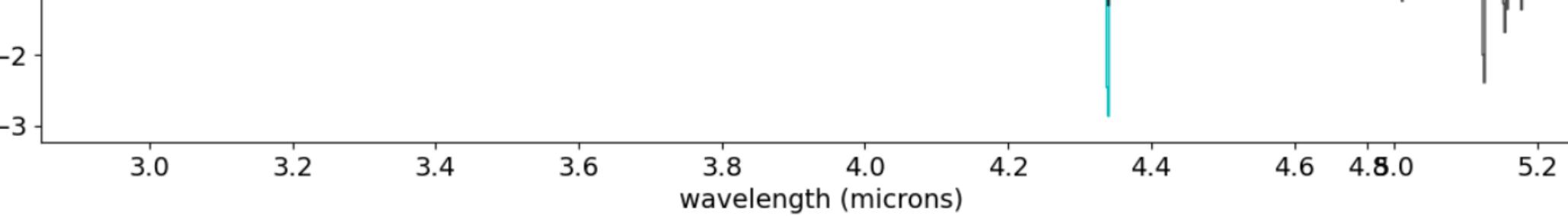
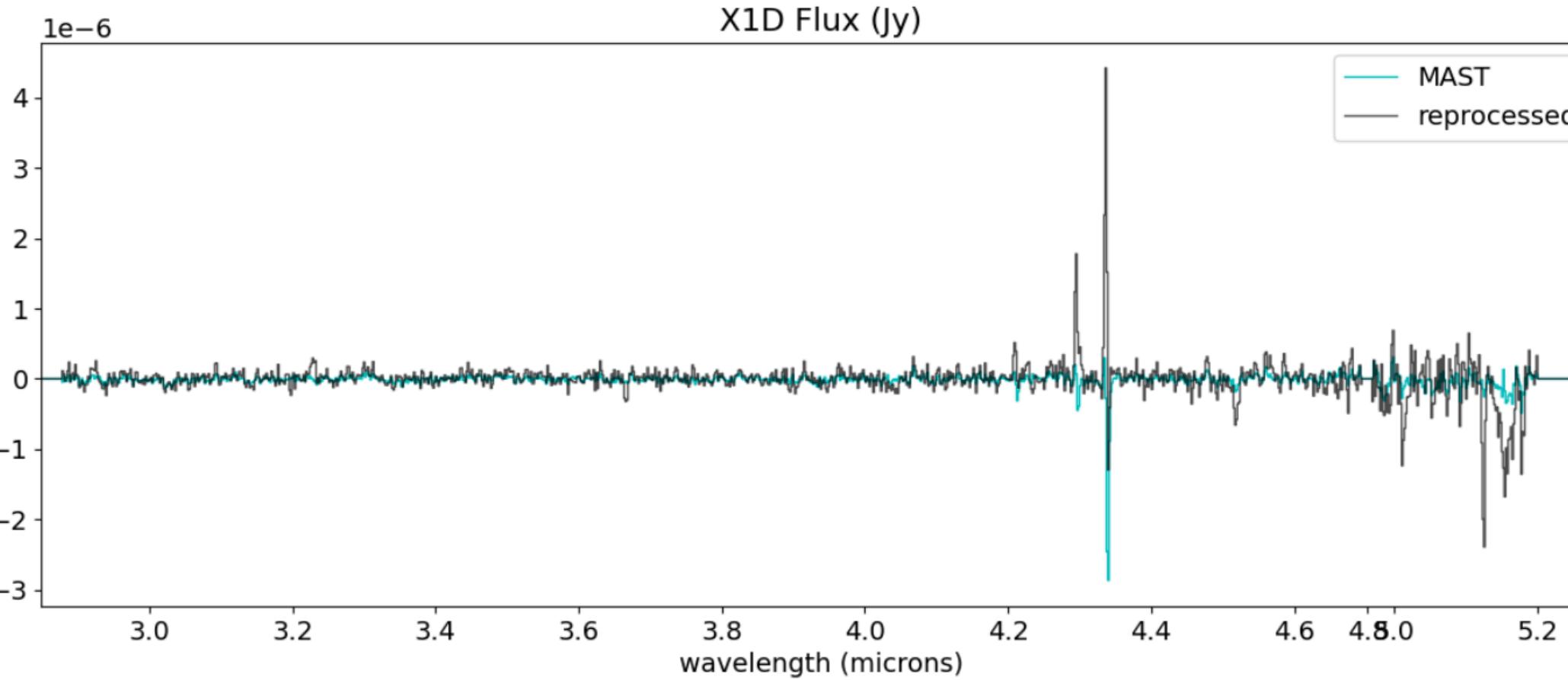
NIRSpec MOS Stage 3



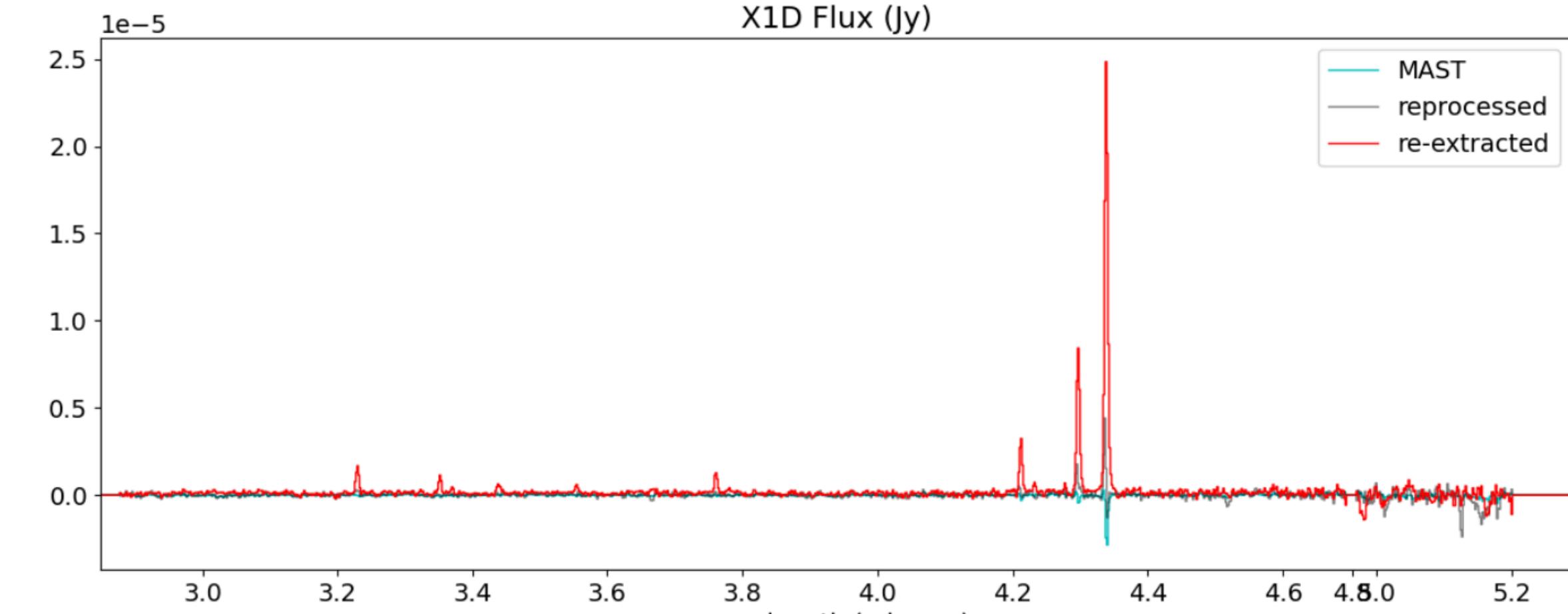
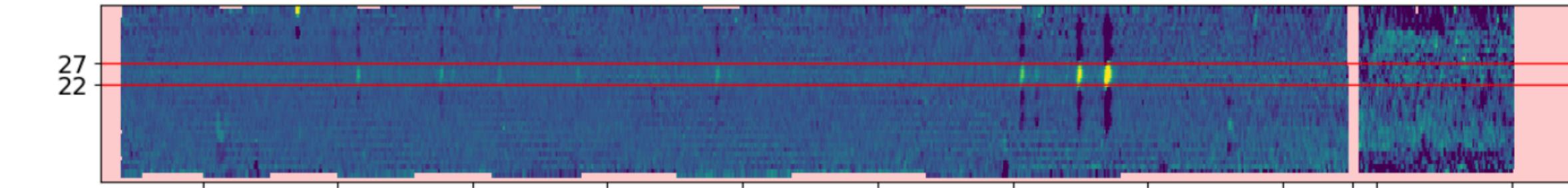
NIRSpec MOS Stage 3



Before

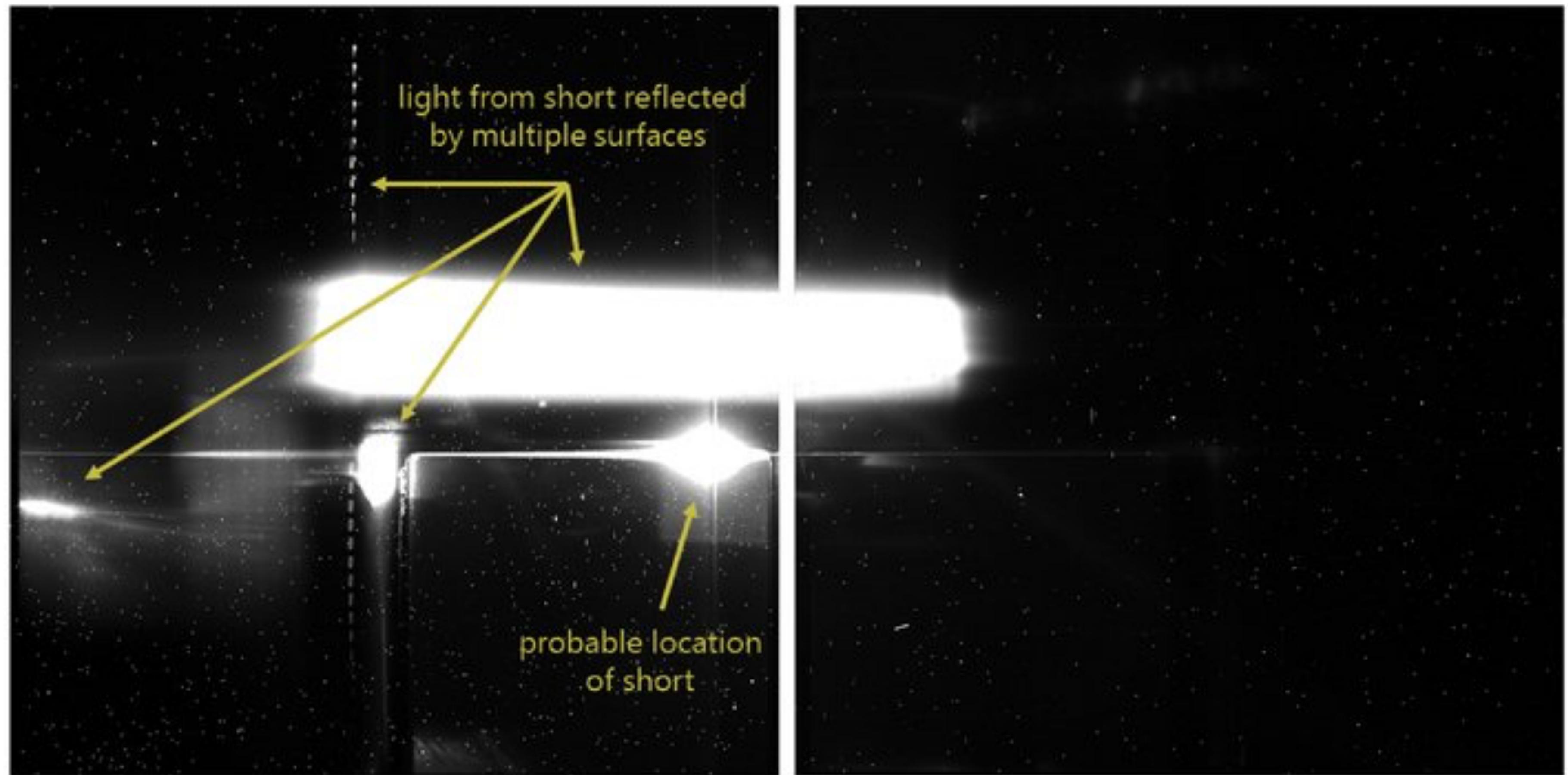


After



NIRSpec MSA shorts

Particulate
contamination->
Unsafe currents->
Bright thermal
emission



Resources

Jdocs: <https://jwst-docs.stsci.edu/>

Pipeline: <https://jwst-pipeline.readthedocs.io/>

Jwebbinars: <https://www.stsci.edu/jwst/science-execution/jwebbinars>

STScI notebooks: <https://github.com/spacetelescope/jwst-pipeline-notebooks/tree/main/notebooks>

Subscribe to JWST observer: <https://www.stsci.edu/contents/news/jwst/2021/jwst-observer-news-in-your-inbox>

JWST helpdesk: <https://stsci.service-now.com/jwst>

Materials
adapted from these
resources

Tutorial
time :)