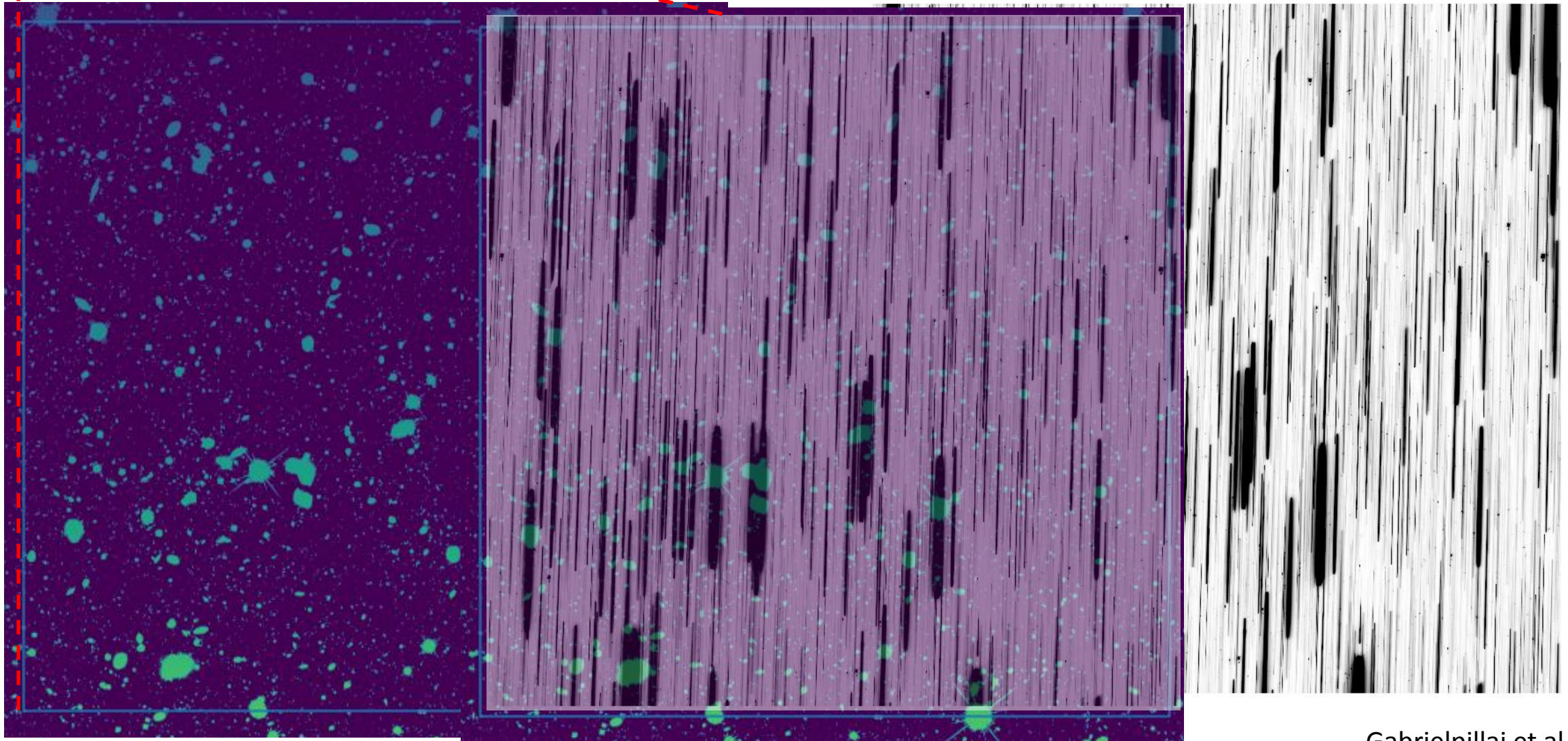
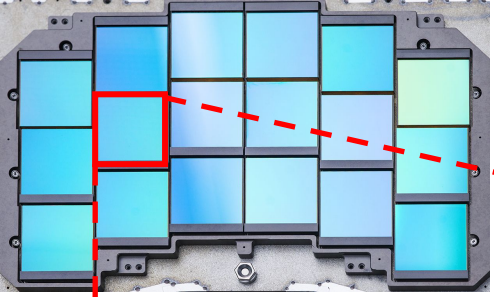


Brief Introduction to Roman Grism Observations



Intro: Slitless Spectroscopic Observations

Good

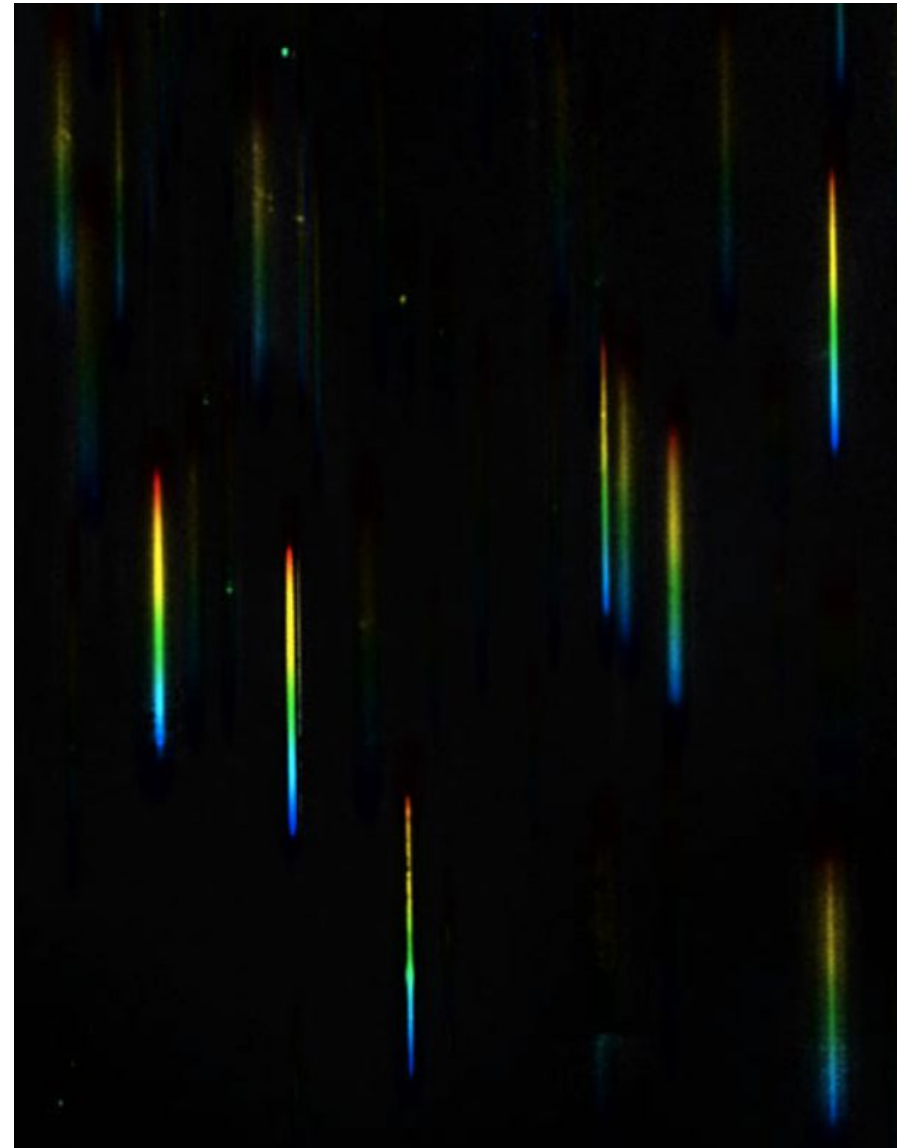
- All sources become a spectrum – multiplexing capability
- Potential cost and space savings of an all-in-one imager-plus-spectrograph.
- No built-in slit-losses

Bad

- Sky background falls on all of the detector.
- Overlapping spectra
- Spectral resolution is set by spatial extent and instrument.

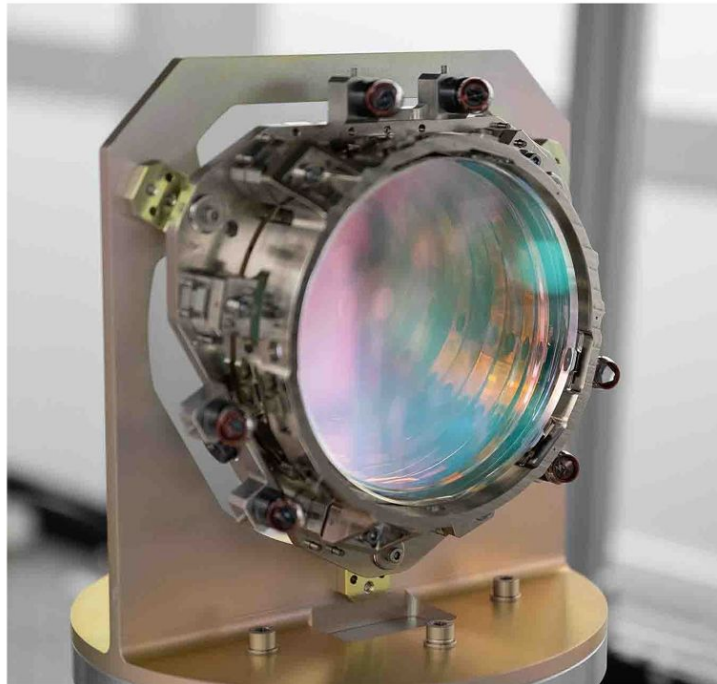
Bad -> Not so Bad

- NIR background in space is low
- Multiple observations with different position angles can be used to disentangle overlapping spectra

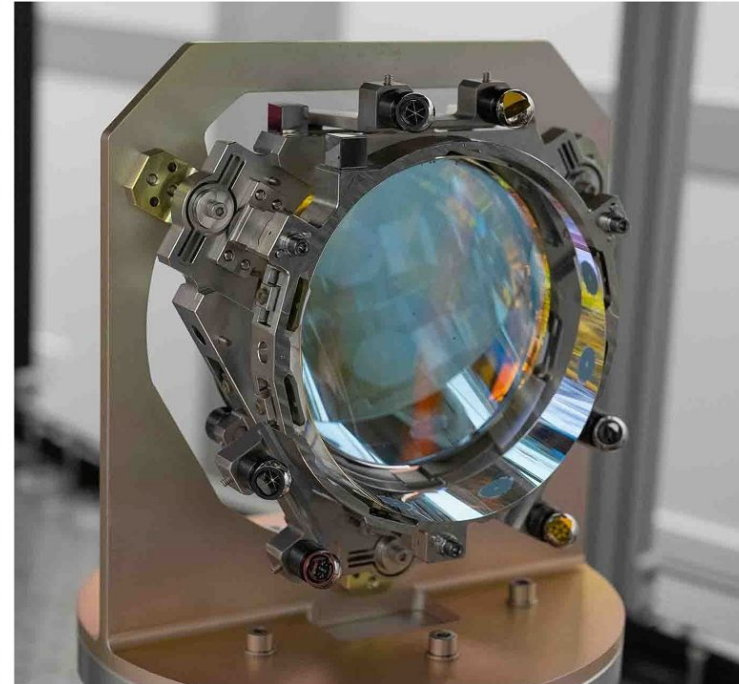


Intro: Roman WFI Slitless Elements

| Assembly | Bandpass (nm) | Approximate resolving power (2-pixel resolution element) | Notes |
|----------|---------------|--|---|
| Grism | 1000–1910 | 475–900 | Diffraction-limited across FOV lower throughput ($\sim 65\%$) |
| Prism | 760–1800 | 100–180 | PSF optimized for the 800–1600 nm region higher throughput ($\approx 91\%$) |

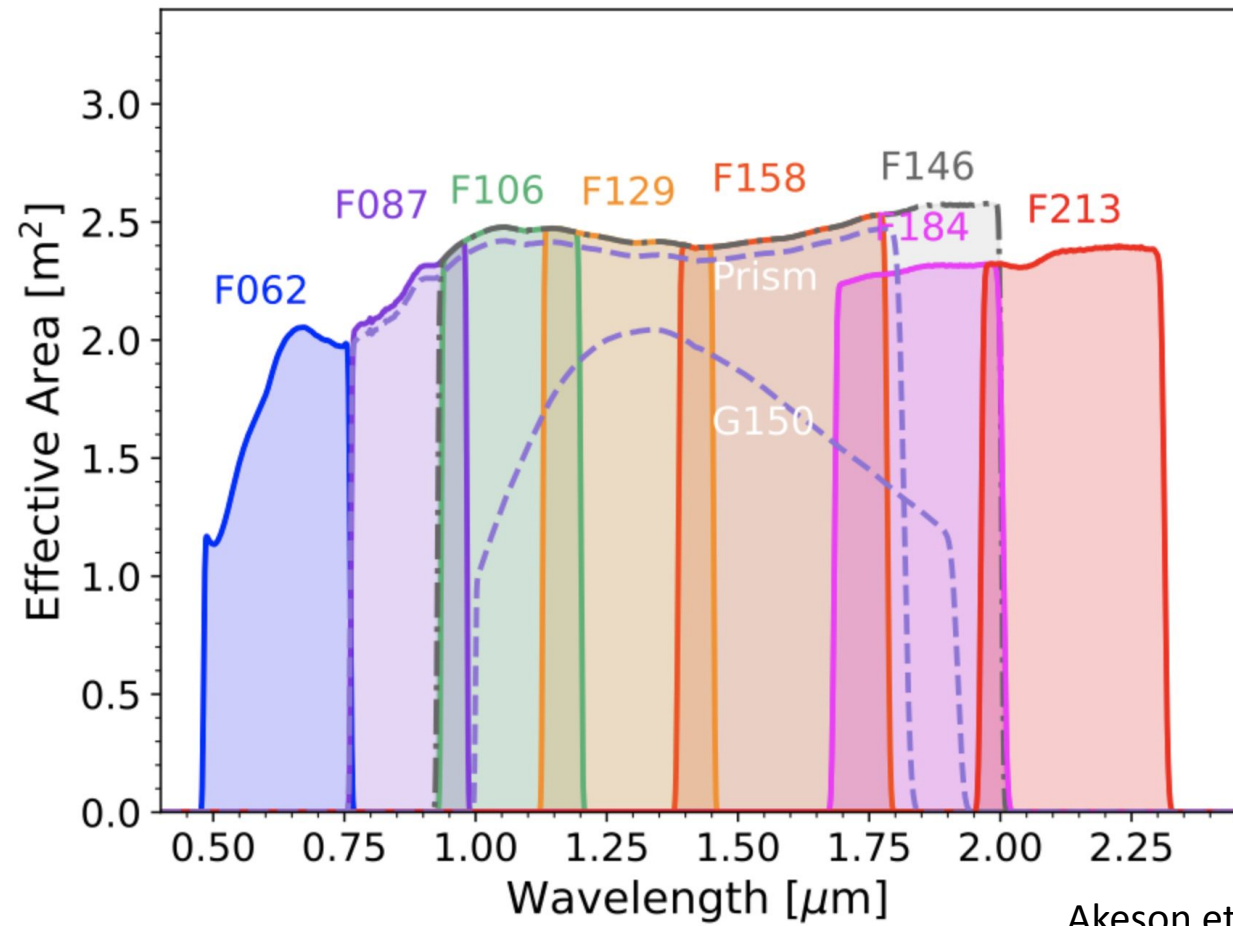


Grism

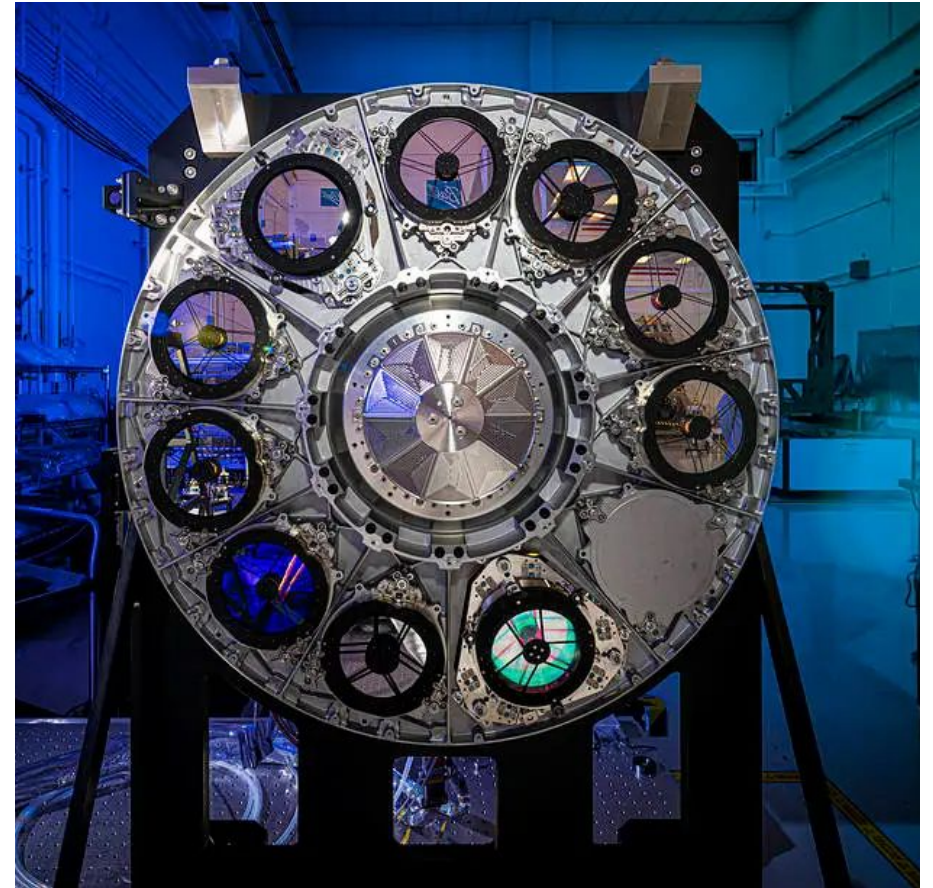


Prism

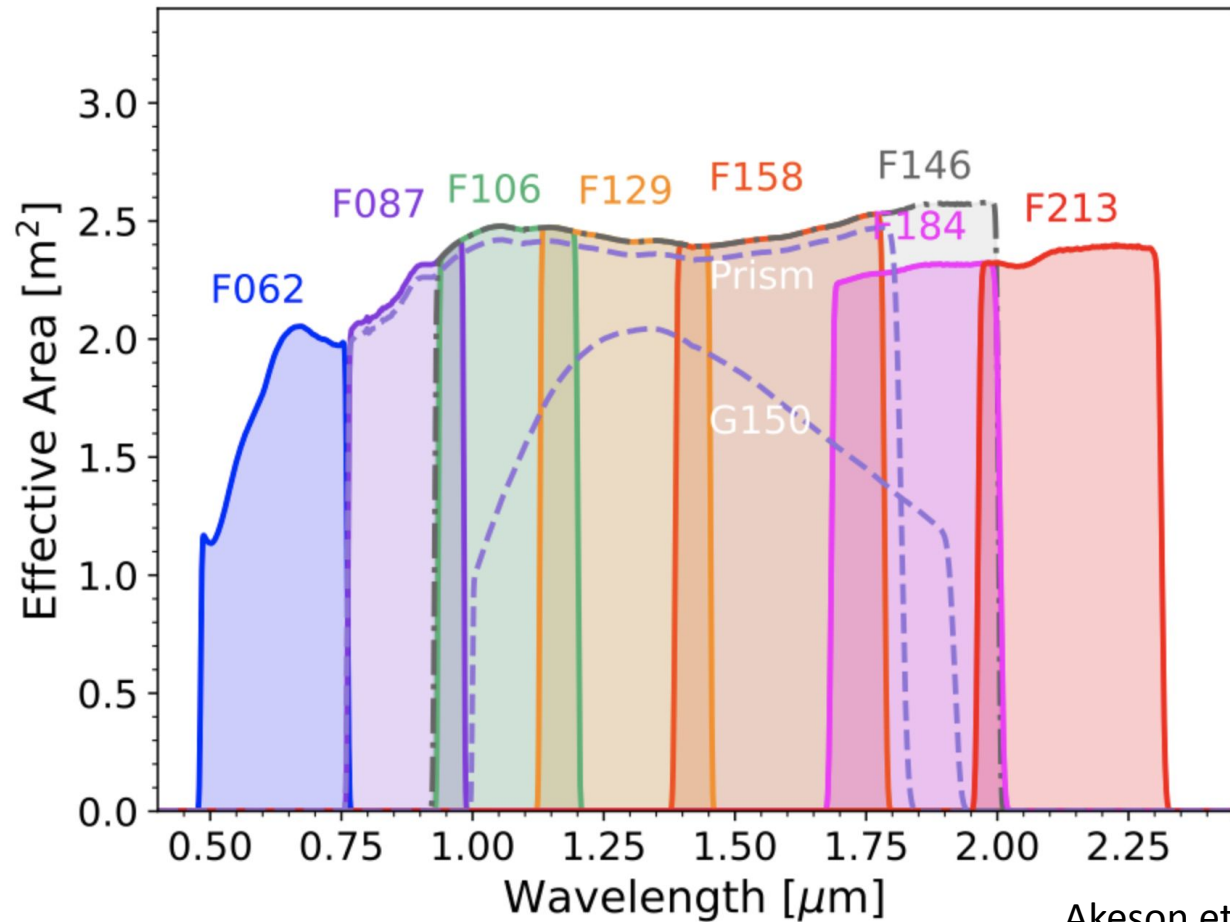
Intro: Roman WFI Slitless Elements



Akeson et al 2019



Intro: Roman WFI Slitless Elements



Akeson et al 2019

Grisim:

- higher spectral resolution
 - 11Å/pix vs prism's 20-95Å/pix
- lower throughput
 - Diffraction losses
- redder wavelength range
 - $\lambda=1.00\text{-}1.93\mu\text{m}$

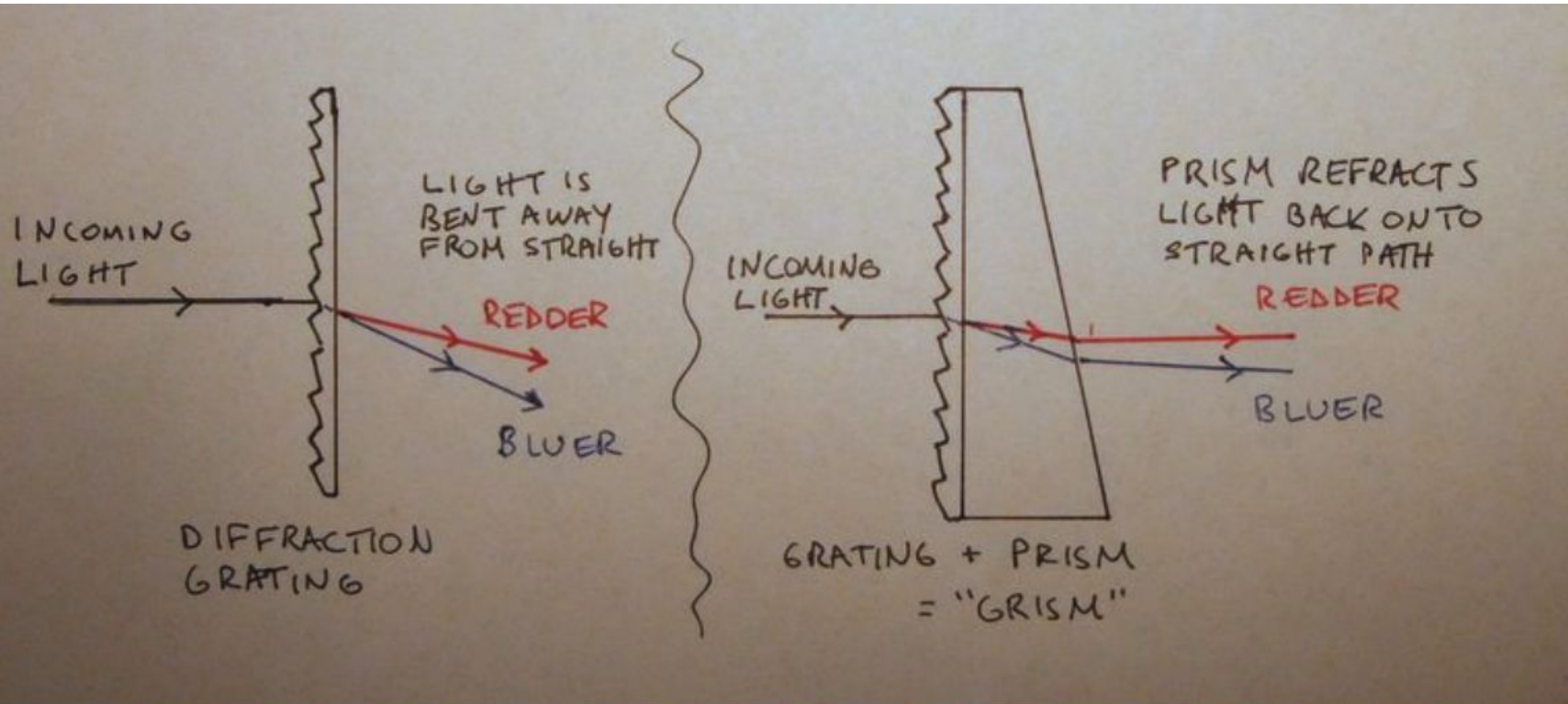
Summary

1. Roman slitless spectroscopy has exceptional multiplexing capabilities at the expense of a more complicated background with overlapping sources
2. Low-background, multiple-position angle observations help to overcome disadvantages
3. Grism vs Prism: Grism has higher resolution out to longer wavelengths but has off-orders and slightly less throughput

Grism Optics: Grating + Prism = Grism

Two diffractive
surfaces

Two prisms



A GRISM COMBINES THE EFFECTS OF A PRISM AND DIFFRACTION GRATING. CREDIT: BENJAMIN WEINER

Grism Spectral Orders

11 100.0%



Grism Spectral Orders

11 97.5%

00

22



SCA1 continuum source
Credit: Scott Rohrbach

Grism Spectral Orders

11 100.0%



Roman Grism off-order spectra

