

CHIRON - A Fiber-fed High-resolution Echelle Spectrometer At CTIO 1.5m Telescope

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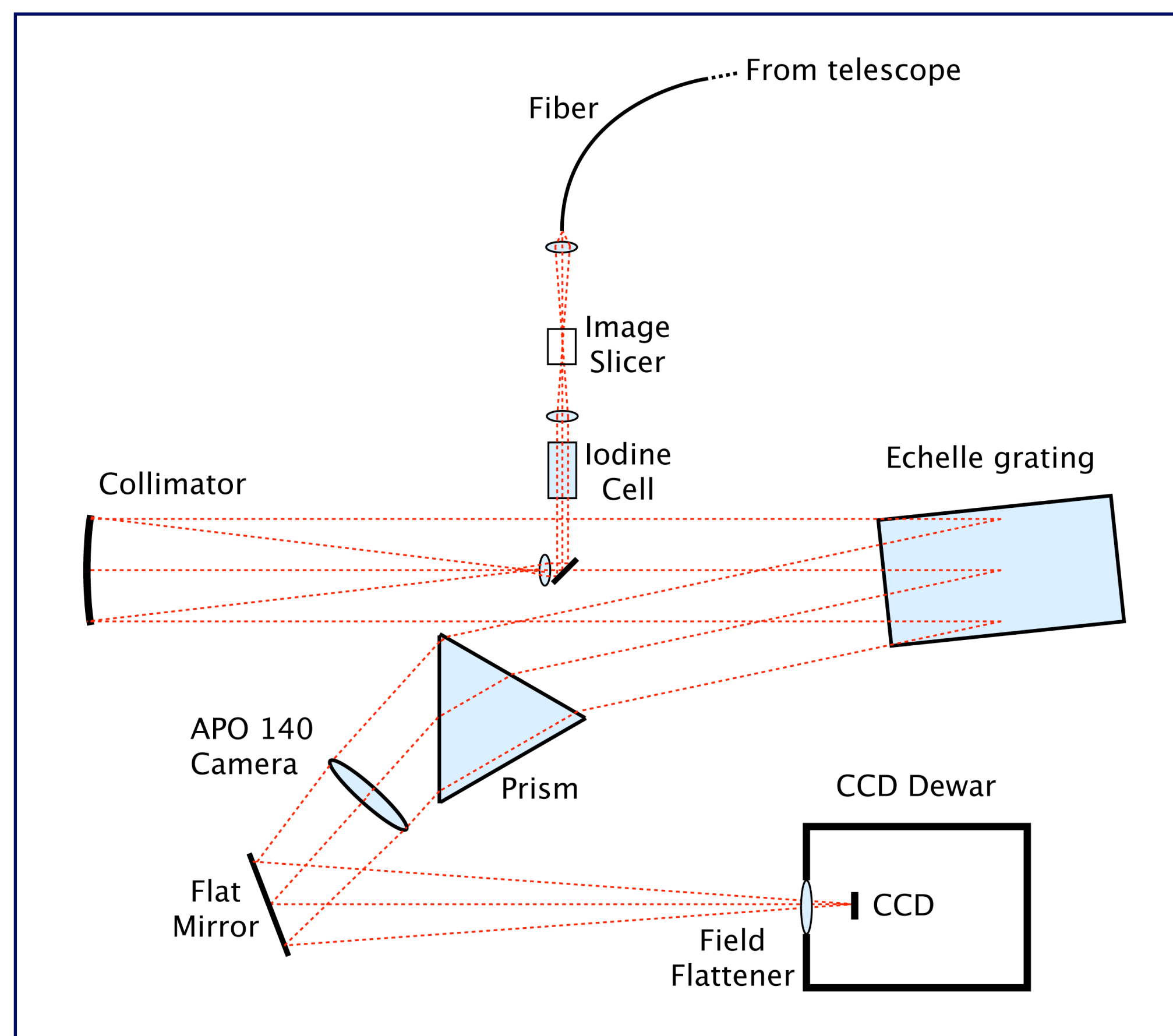
Abstract

Small telescopes can play an important role in the search for exoplanets because they offer an opportunity for high cadence observations that are not possible with large aperture telescopes.

CHIRON is a highly stable cross-dispersed echelle spectrometer deployed at CTIO 1.5m telescope. It is fed by fiber and intended primarily for precise radial velocities. It is currently mainly used to search for low mass planets around alpha Centauri A and B. An iodine cell is used for wavelength calibration.

Design

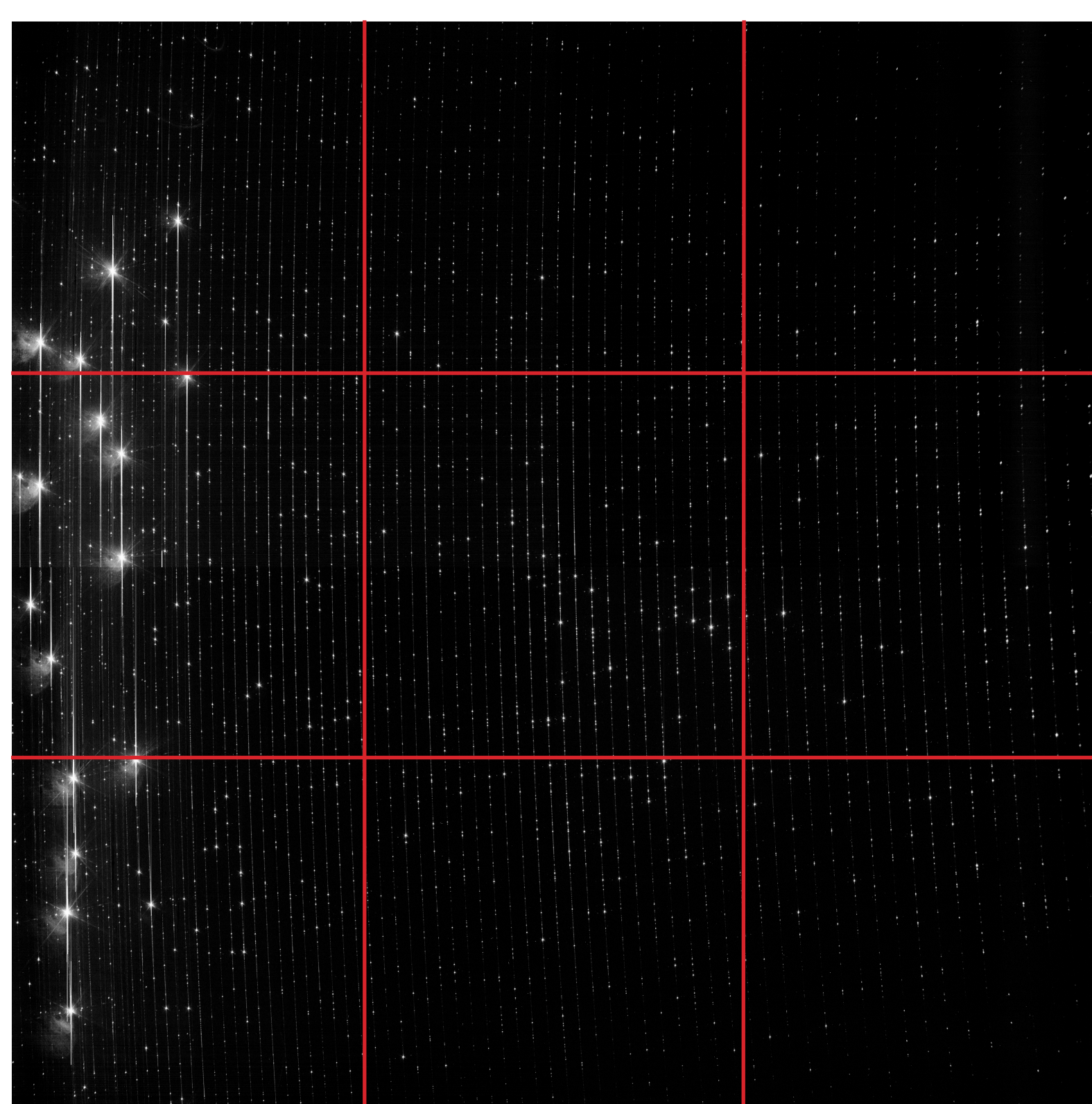
- 420-870 nm
- 100-micron fiber (2.7" on sky)
- Image Slicer (3 slices)
- 140-mm beam
- R2 grating
- Cross-disperser prism
- Commercial apochromatic telescope as camera



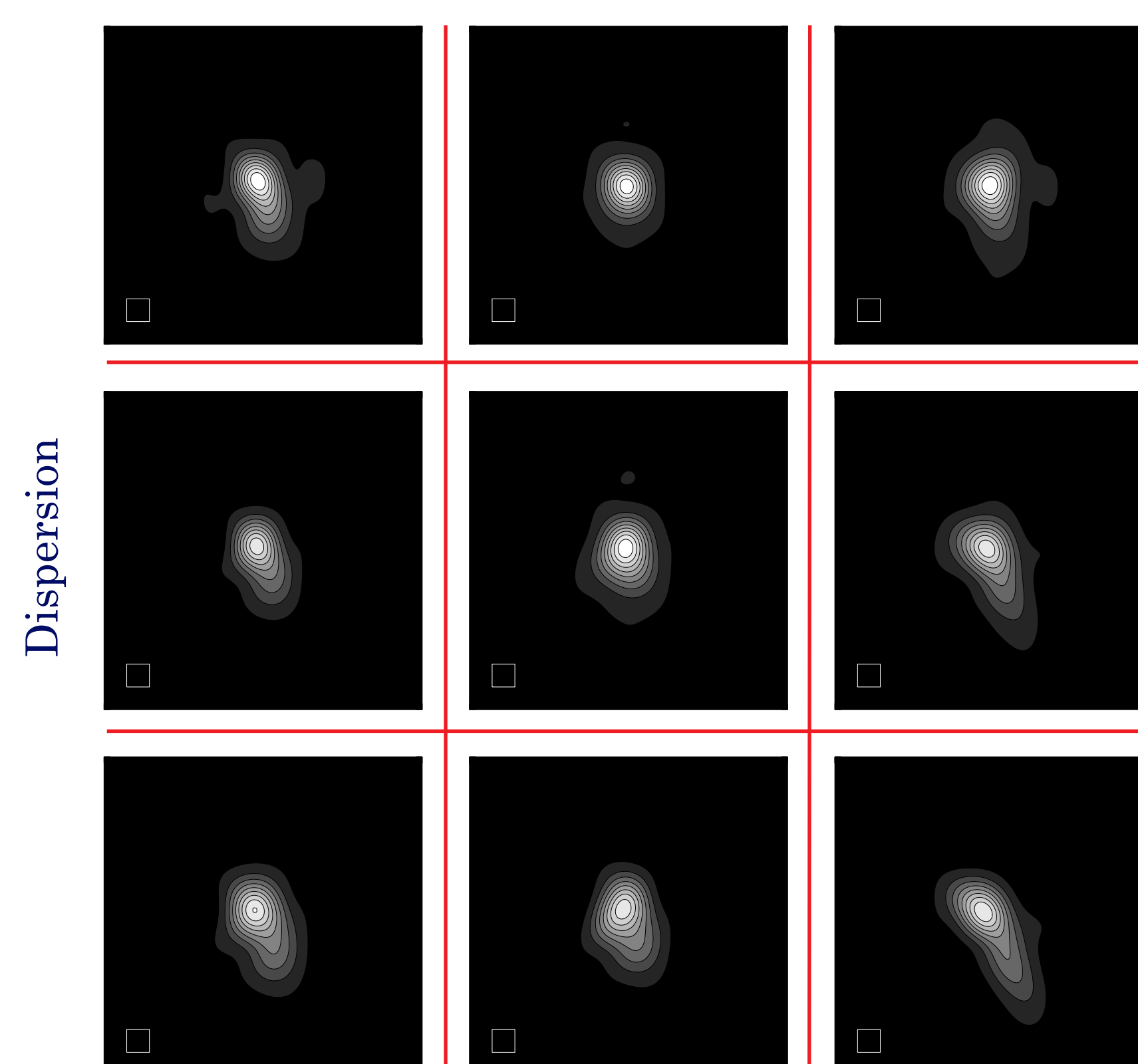
Observing modes

- Fiber only - $R = 26,000$
- Image slicer - $R = 80,000$
- Wide slit - $R = 80,000$
- Narrow slit - $R = 120,000$

Point-Spread Function

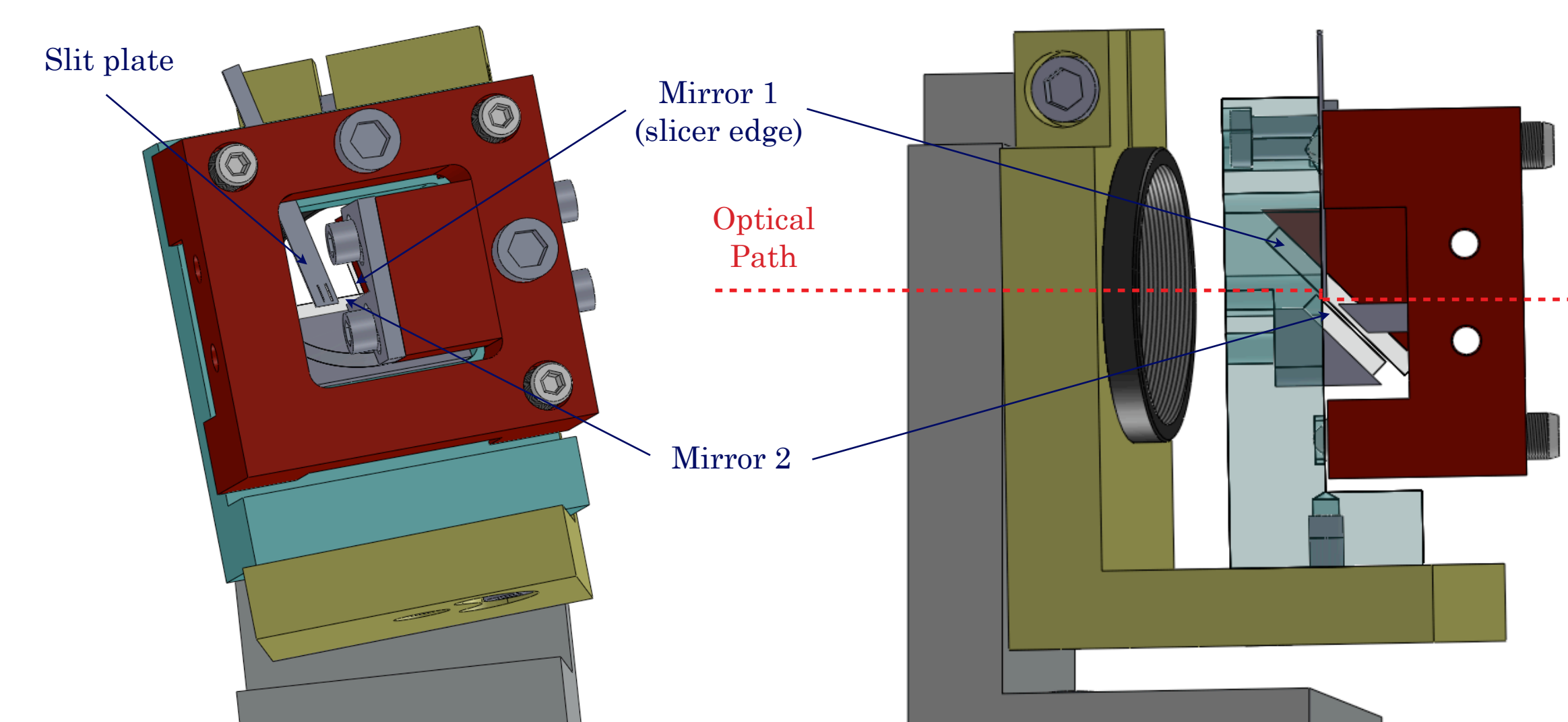
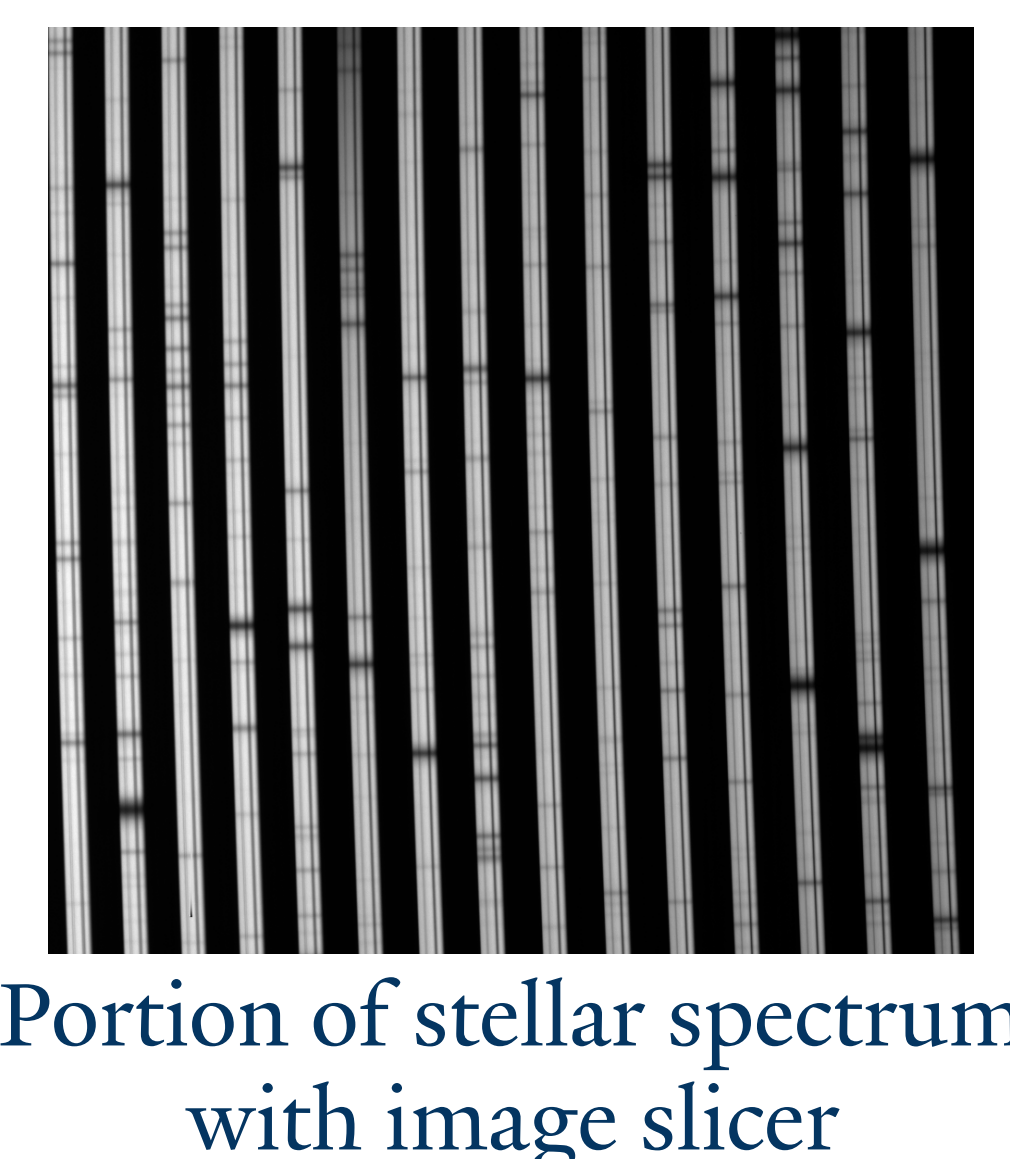
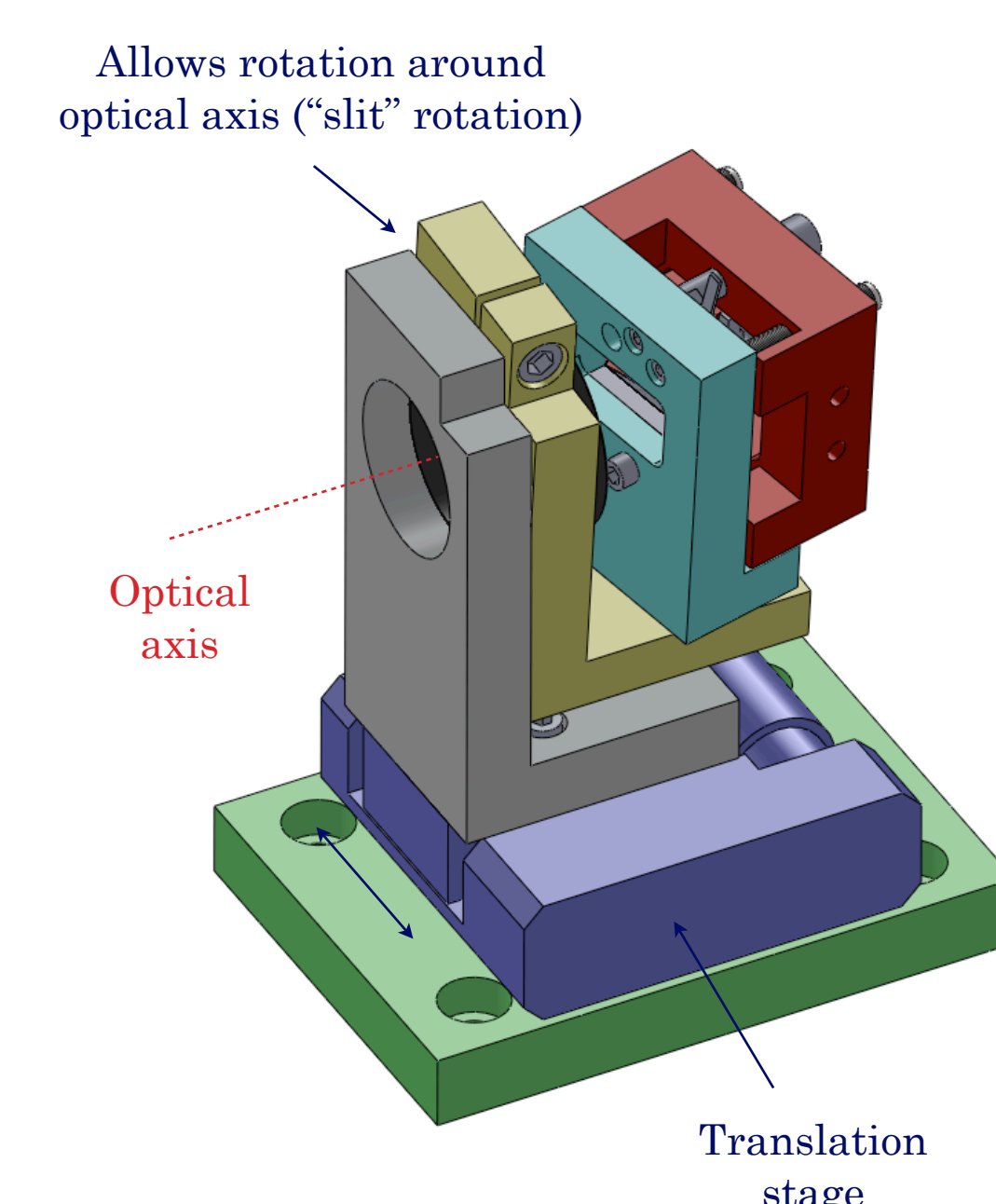


Th-Ar spectrum through a single-mode fiber



Cross-Dispersion
PSF averaged per "tile"

Image Slicer



Conclusions

We have designed, built and commissioned a high-resolution spectrograph for CTIO 1.5m telescope.

It has continuous coverage from 420 to 870 nm, with resolutions ranging from $R = 26,000$ to 120,000.