



# State of the Observatory

Jennifer Lotz

*Gemini Science Meeting  
July 2022, Seoul*





Many thanks to KASI, Elliot Horch, and our organizing committees!



# Astronomy Landscape in 2020's

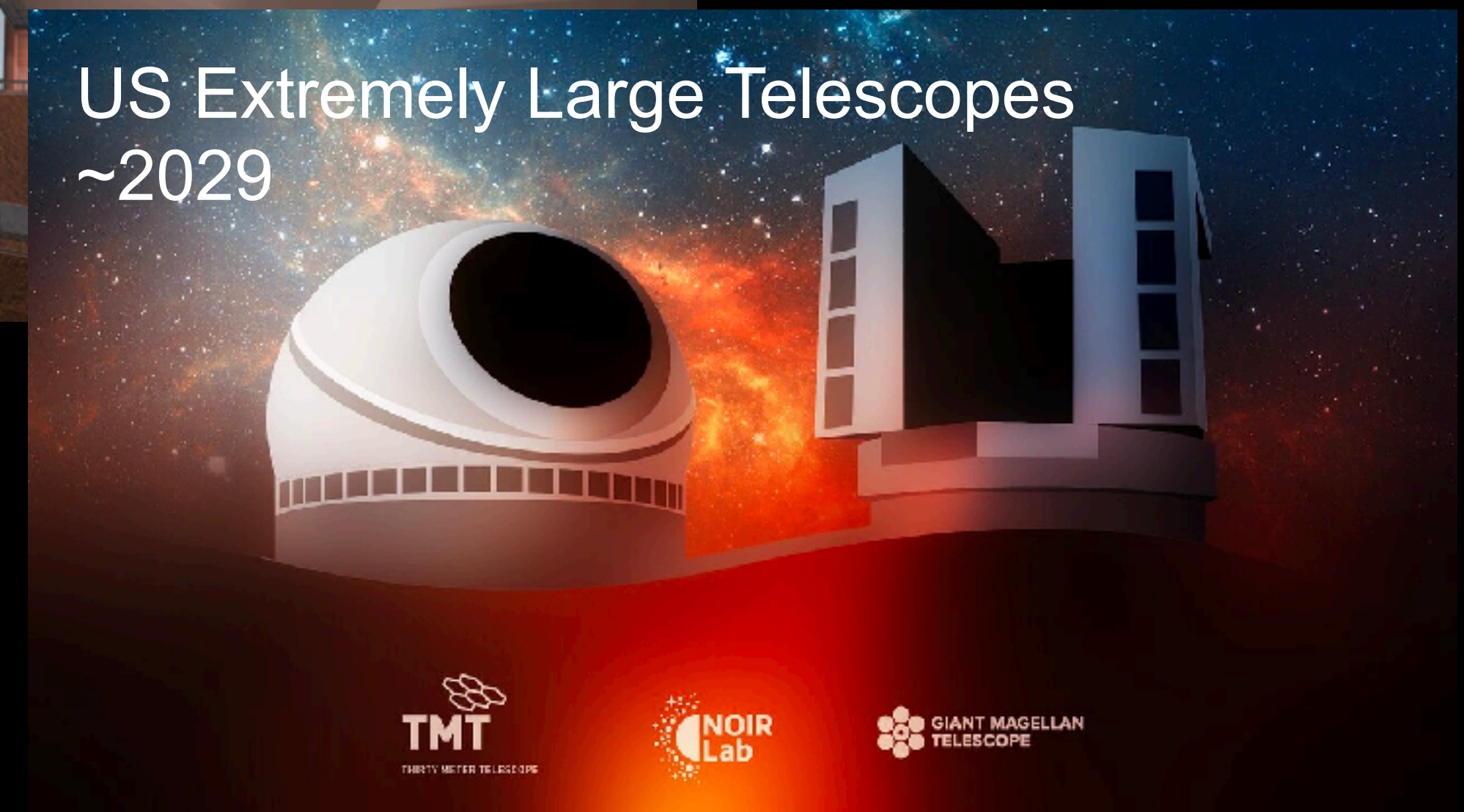


Webb Space Telescope  
Dec 2021

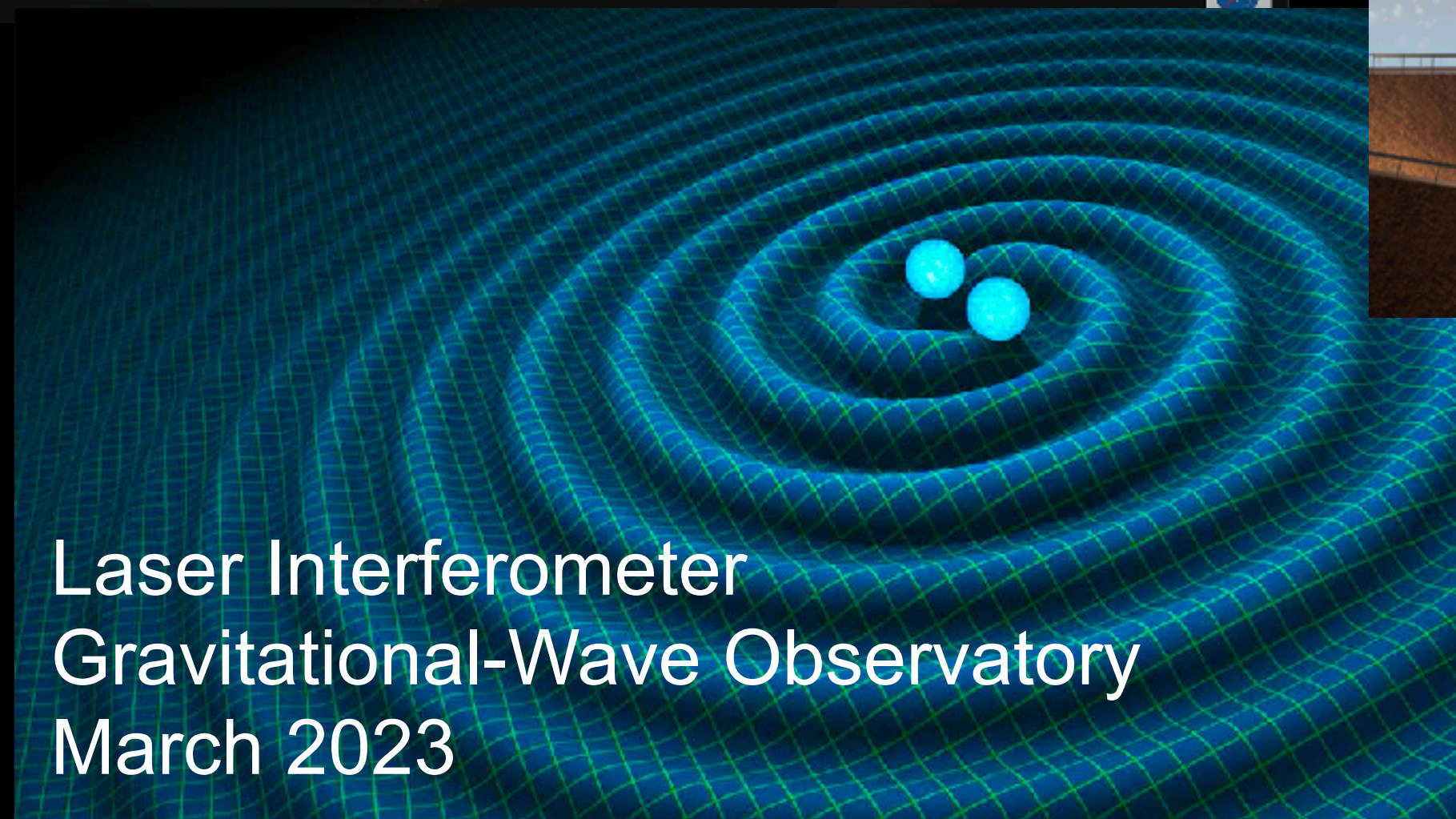
Rubin Observatory  
2024



US Extremely Large Telescopes  
~2029



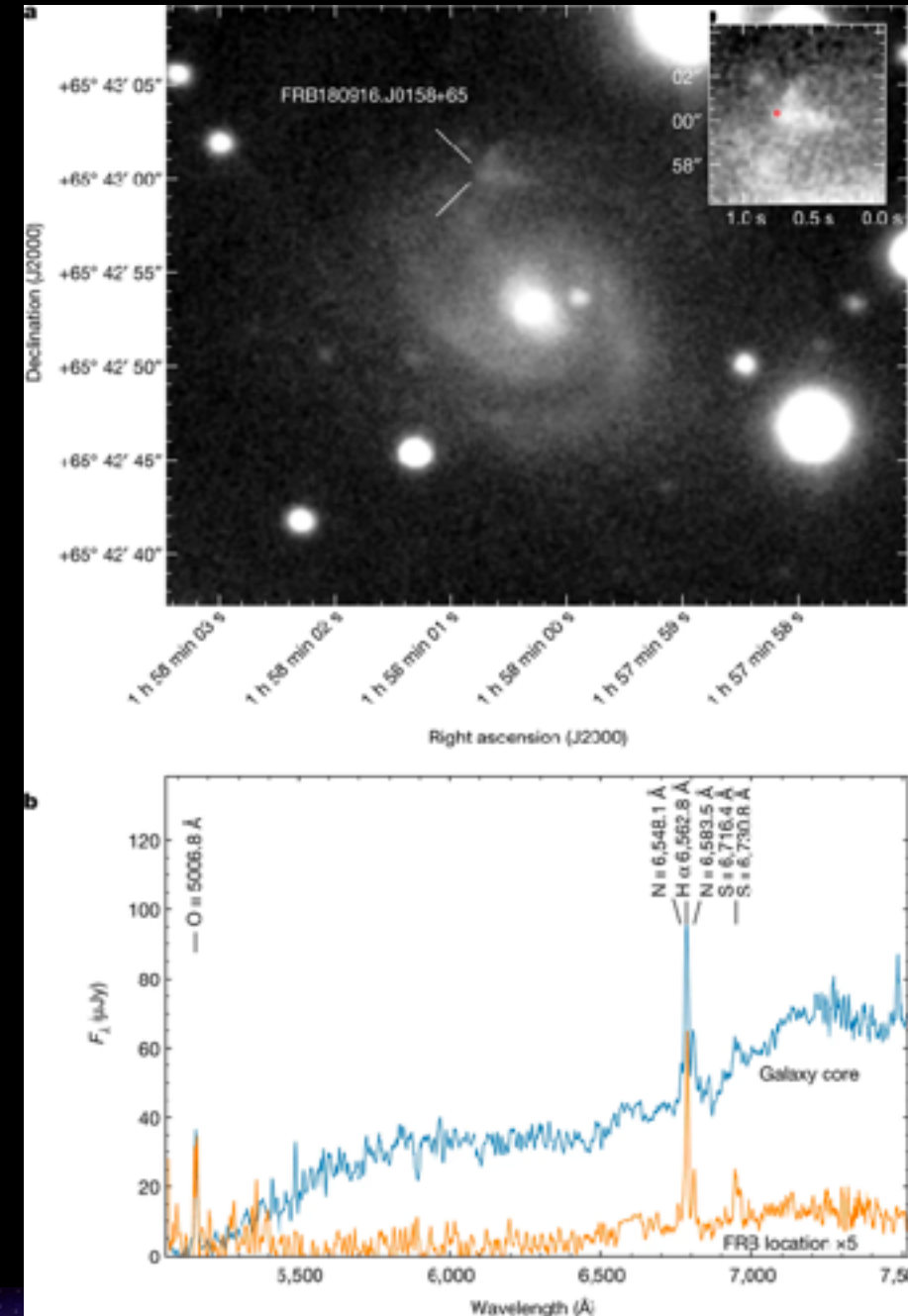
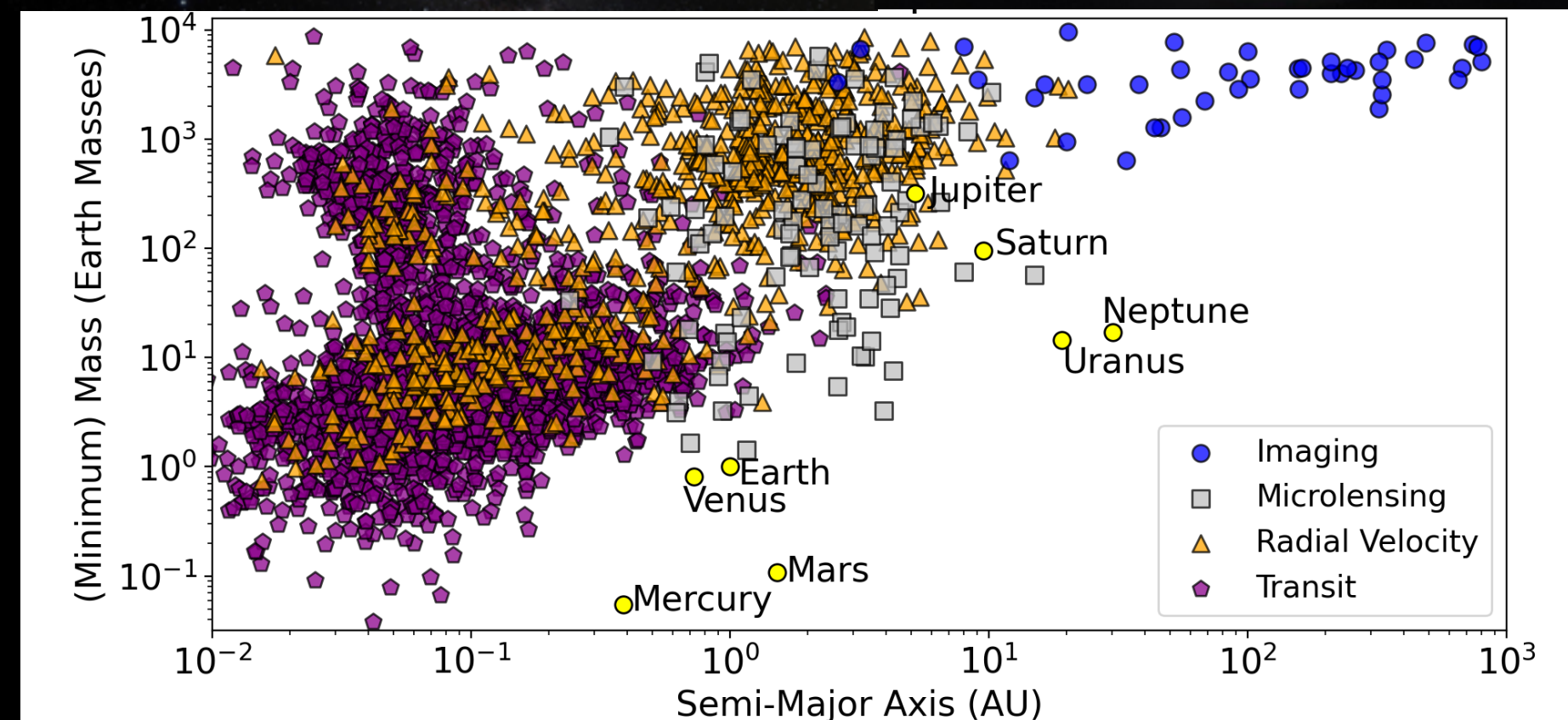
Laser Interferometer  
Gravitational-Wave Observatory  
March 2023



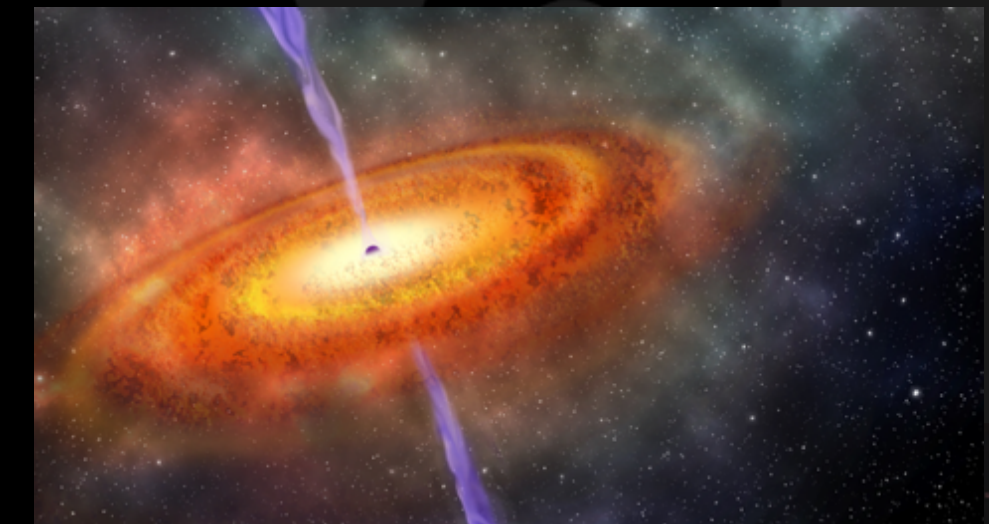
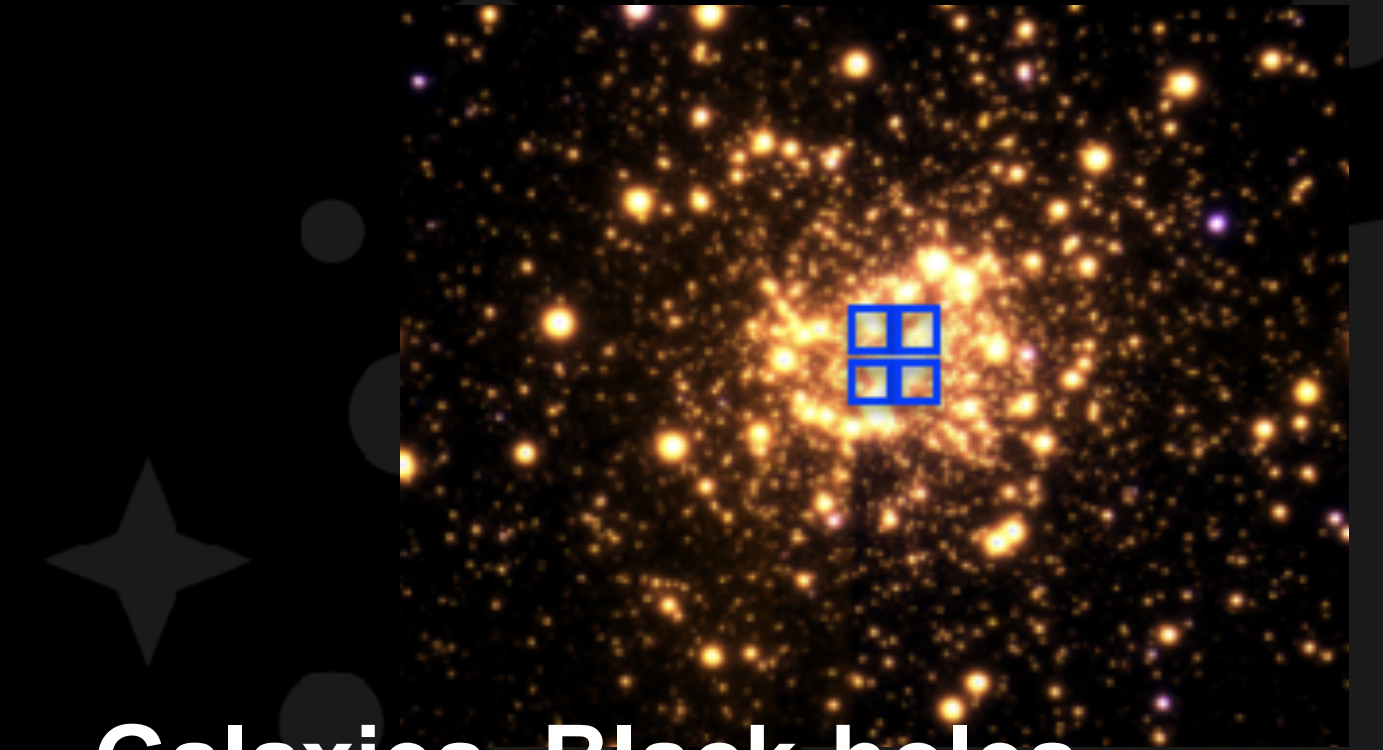


# Next Decade of Discovery

## Exo-planets and solar systems



## Galaxies, Black-holes and Dark Matter



## Compact Objects & Multi-messenger astronomy





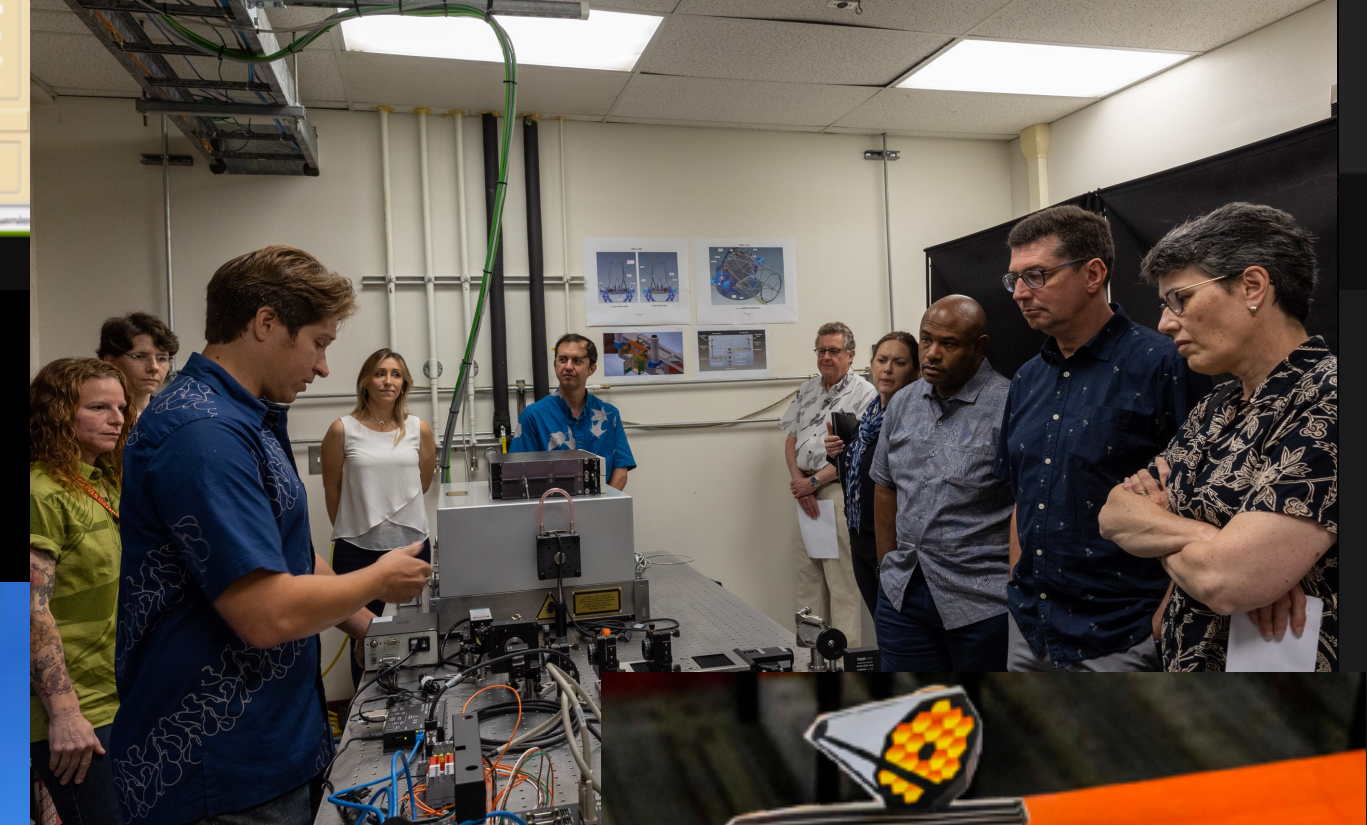
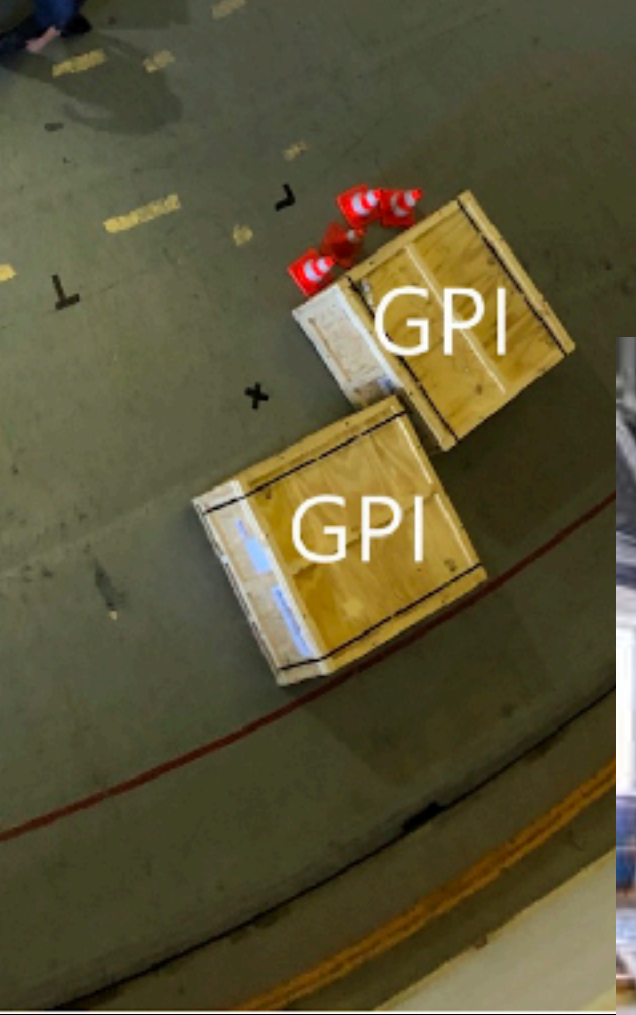
flexible, agile operations to make best use of time and sky conditions

"adaptive optics" to correct for distortions in atmosphere

many different instruments to support diverse science



# Momentum is building..



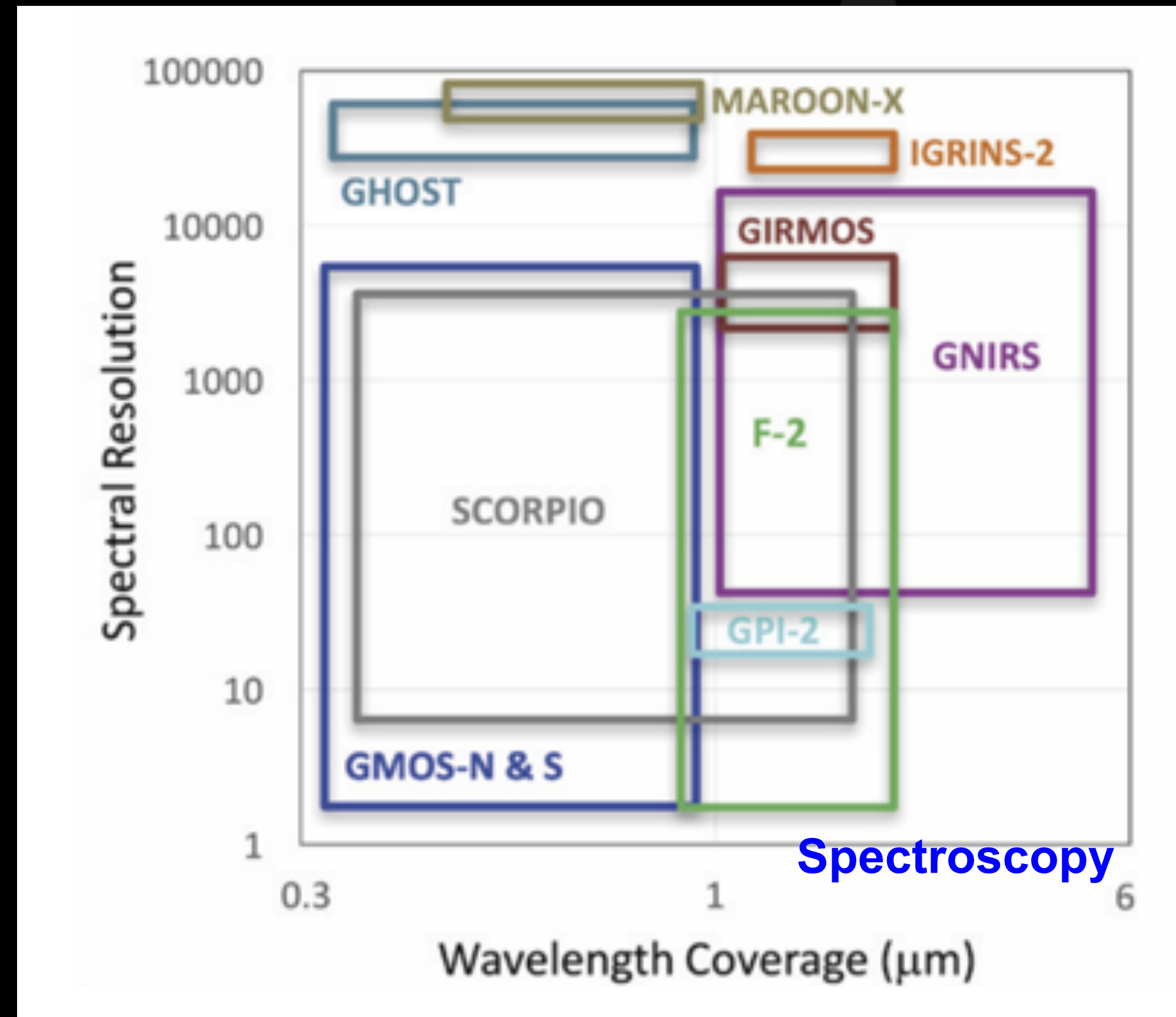
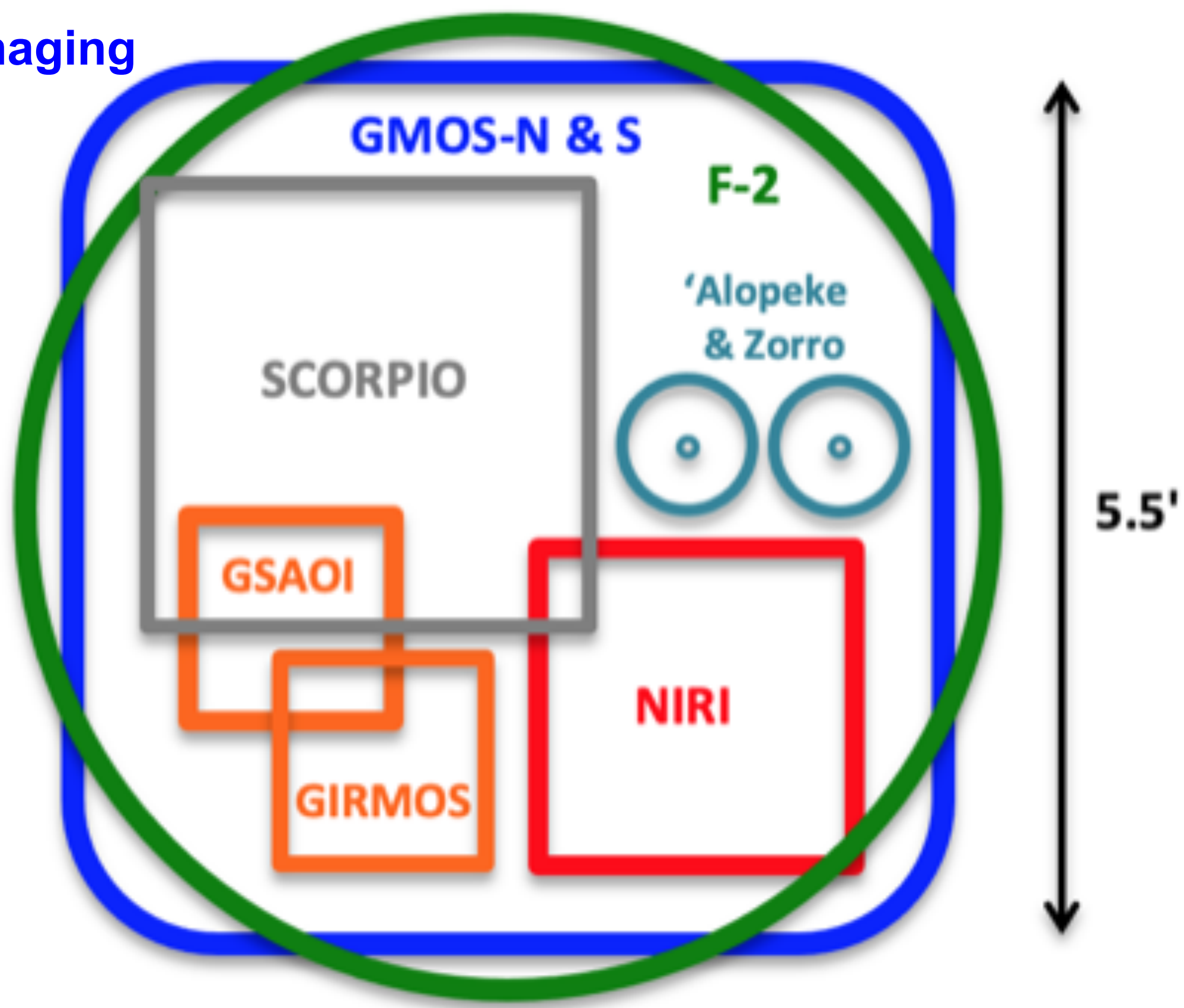




# Current and Future Instruments



Imaging

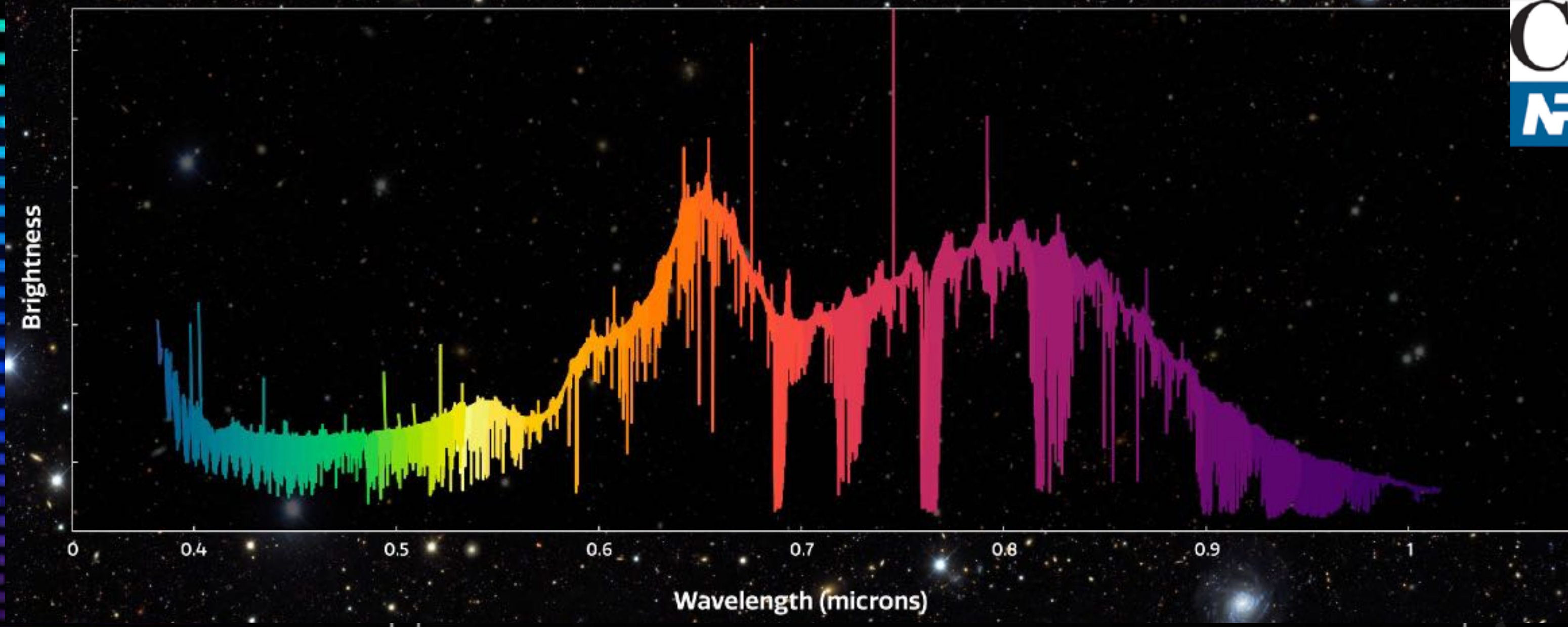
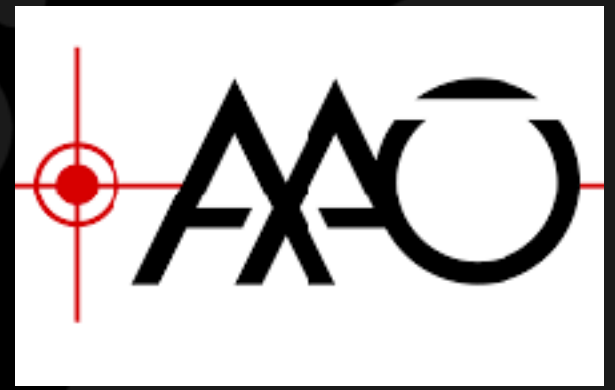


coming soon: GHOST, GNIRS upgrade, IGRINS-2, SCORPIO, GPI-2





# GHOST First Light!



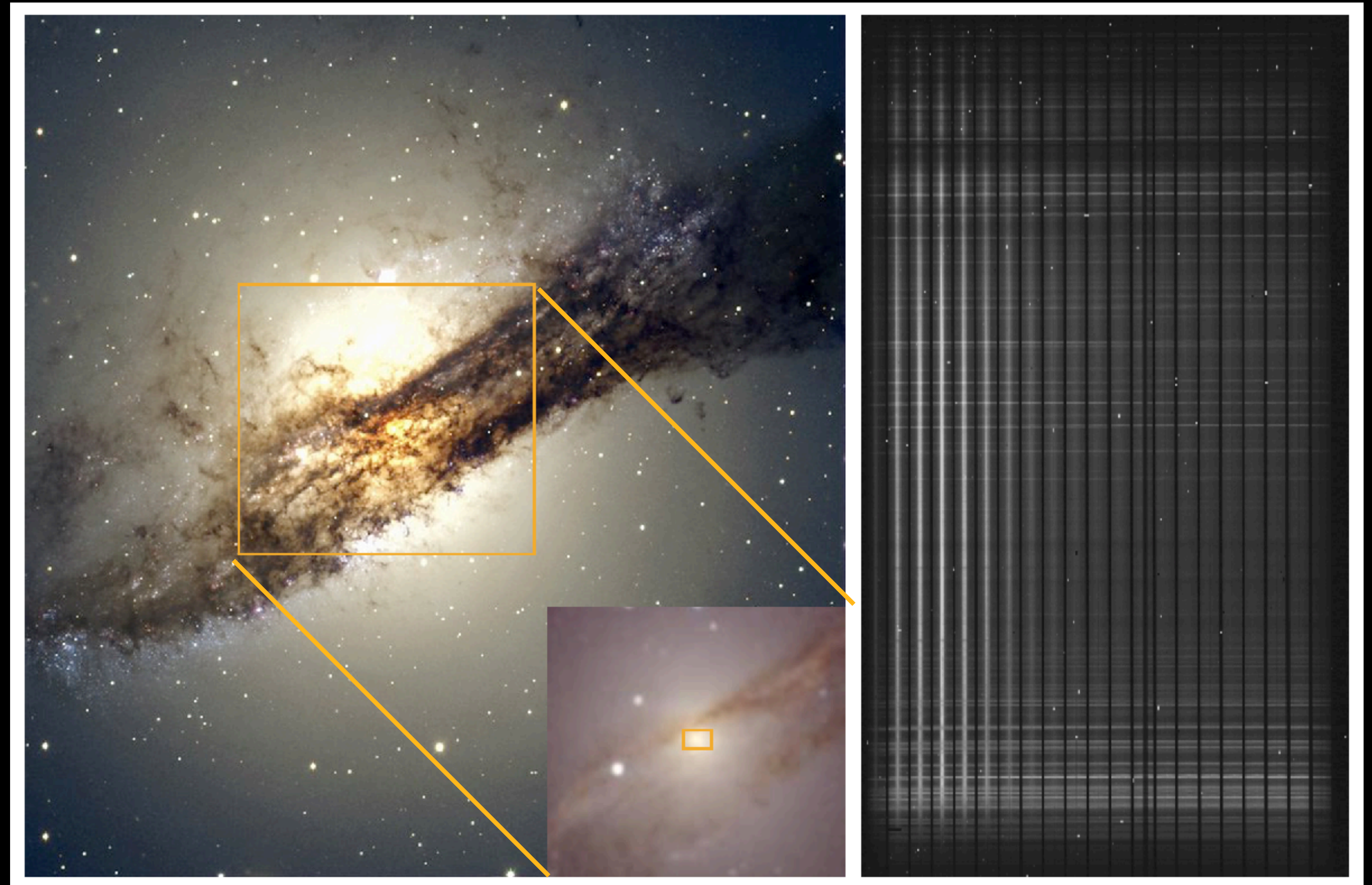


# Gemini Near-InfraRed Spectrograph

2 integral field  
units to be  
installed this year

'low res' -  $0.15'' \times$   
 $0.15''$  sampling

'high res' -  $0.05'' \times$   
 $0.05''$  sampling  
(with adaptive  
optics)



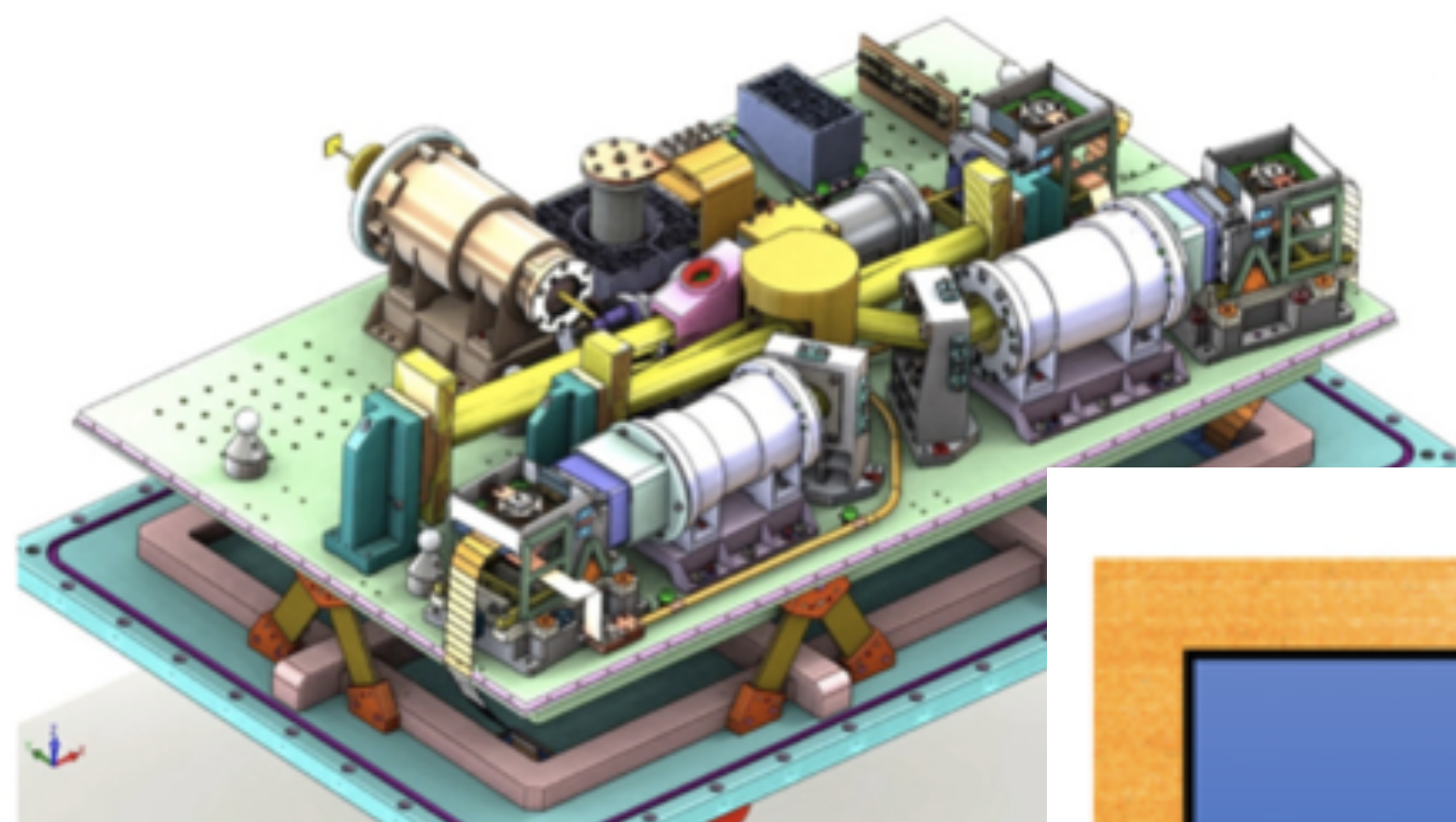




# IGRINS-2



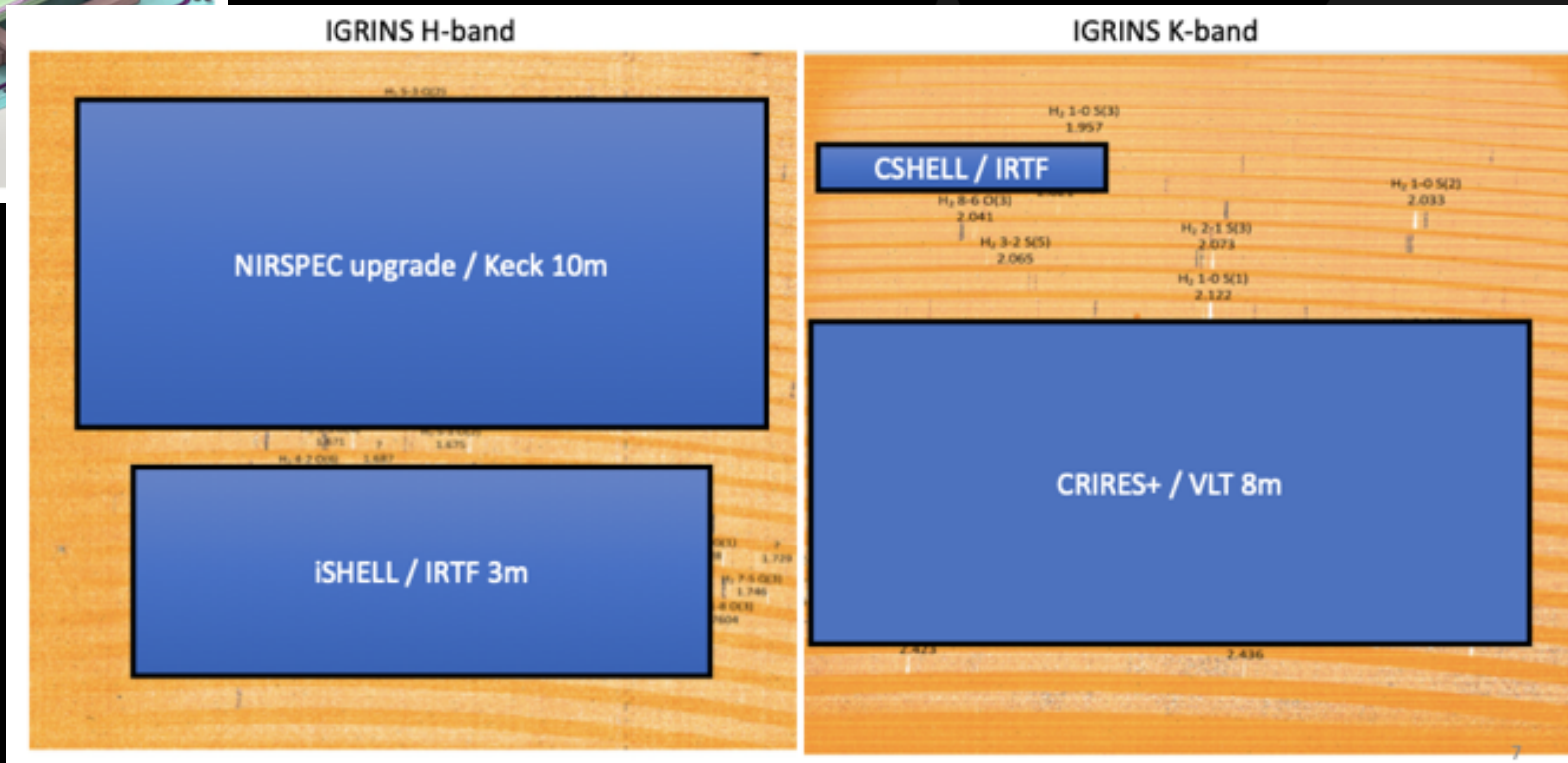
- Si and VPH gratings
- H2RG Arrays
  - ASIC + JADE2
- 1.45-2.5  $\mu\text{m}$
- R~45,000
- KASI + UT Austin



highly efficient, high resolution (R~45,000)  
infrared (H+K) spectrographs

IGRINS: visiting instrument at  
GS now

IGRINS-2 ; GN ~ end of 2023  
built by KASI



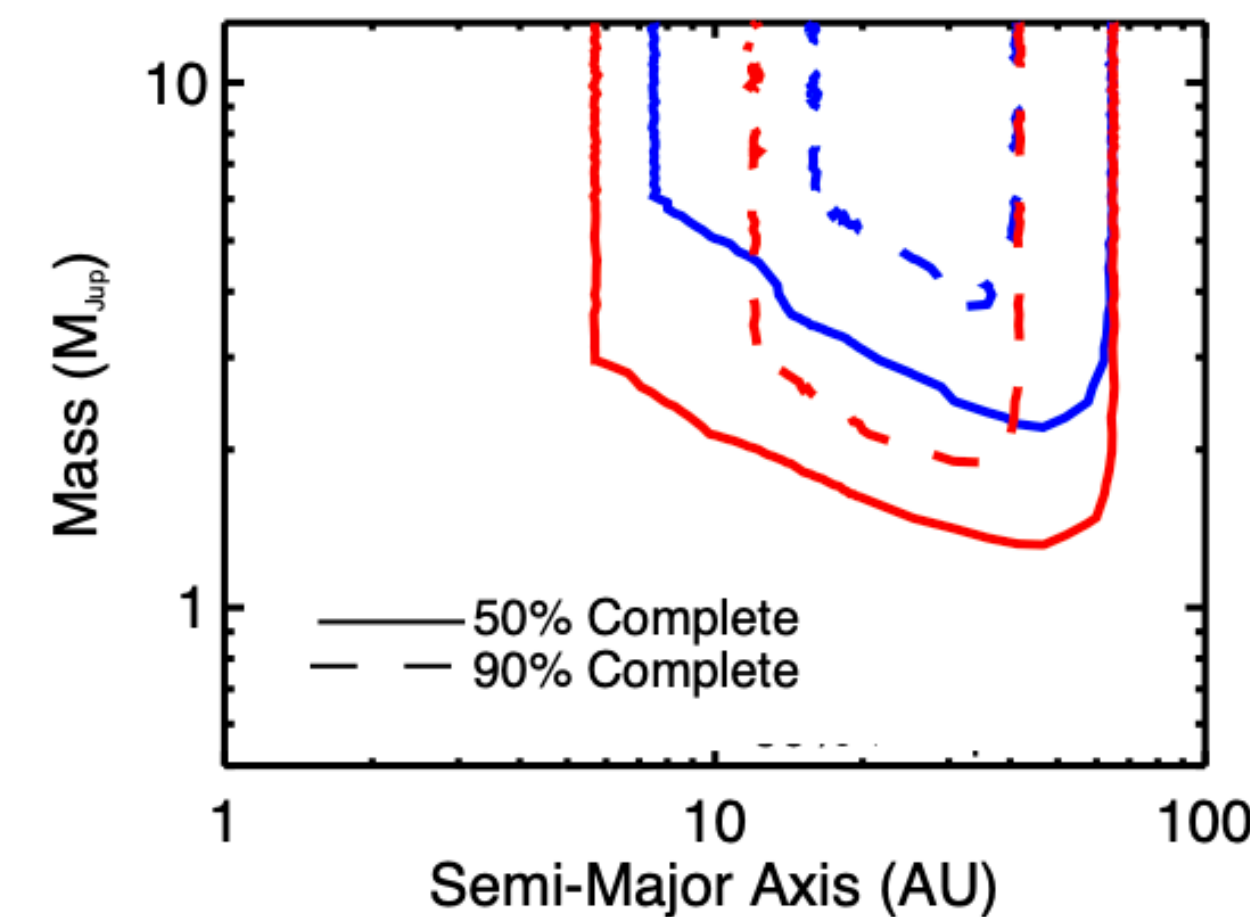
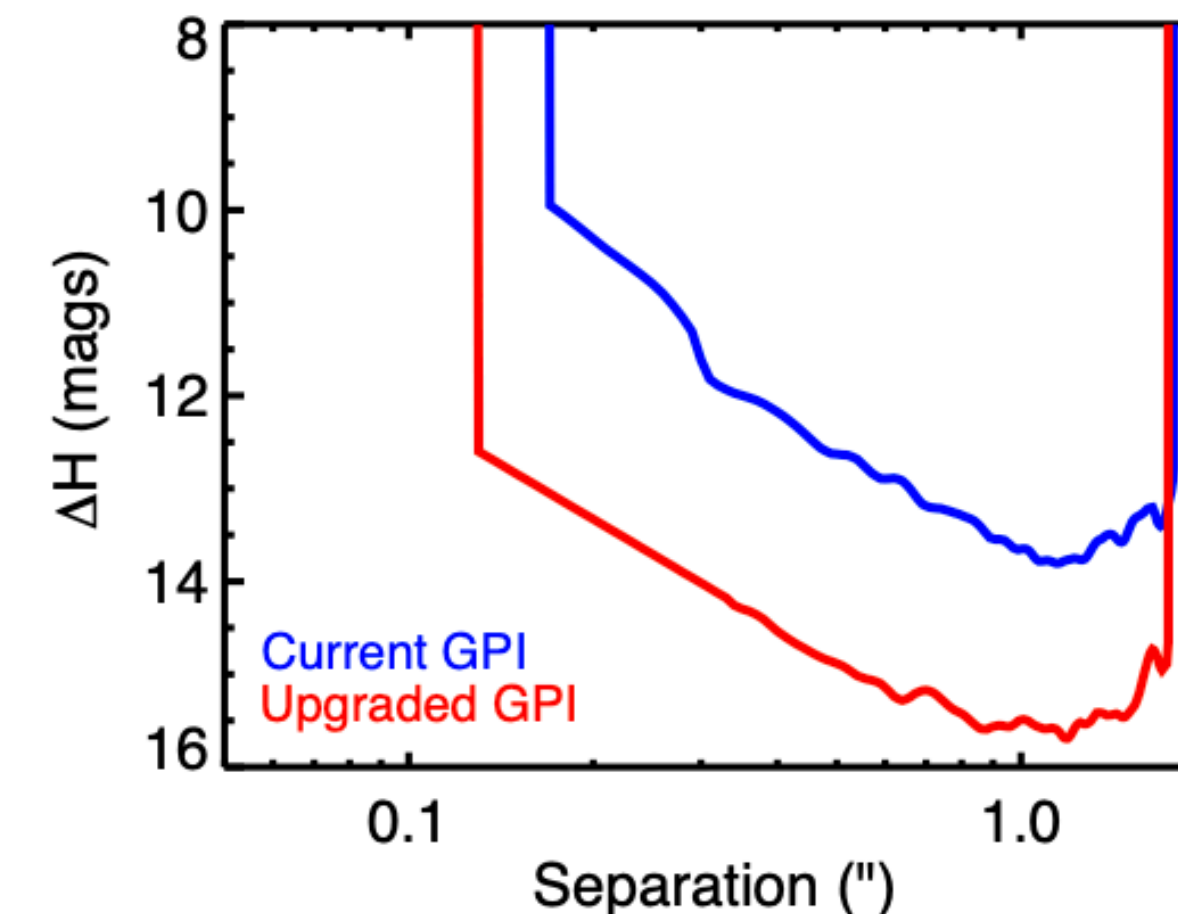
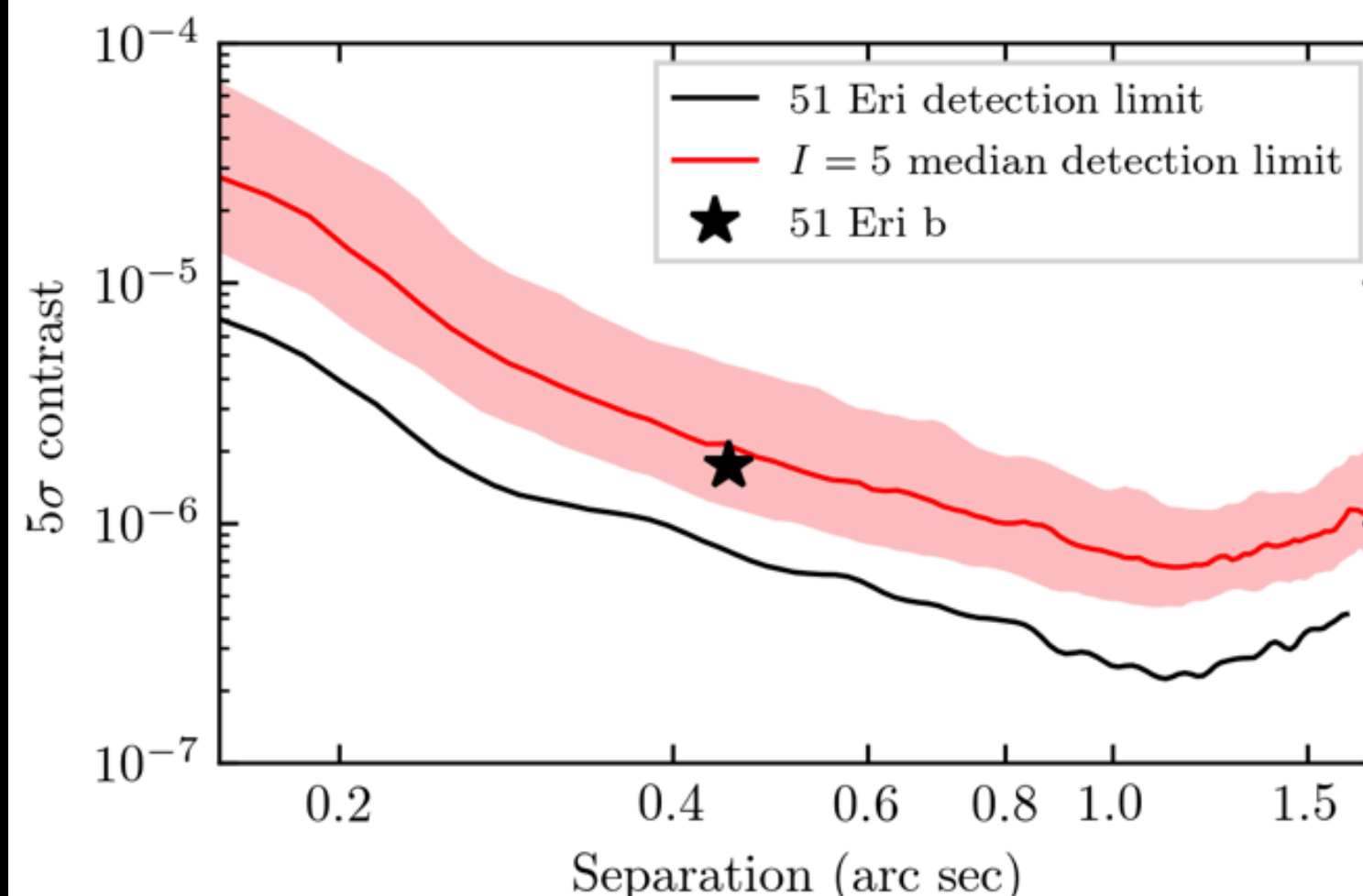
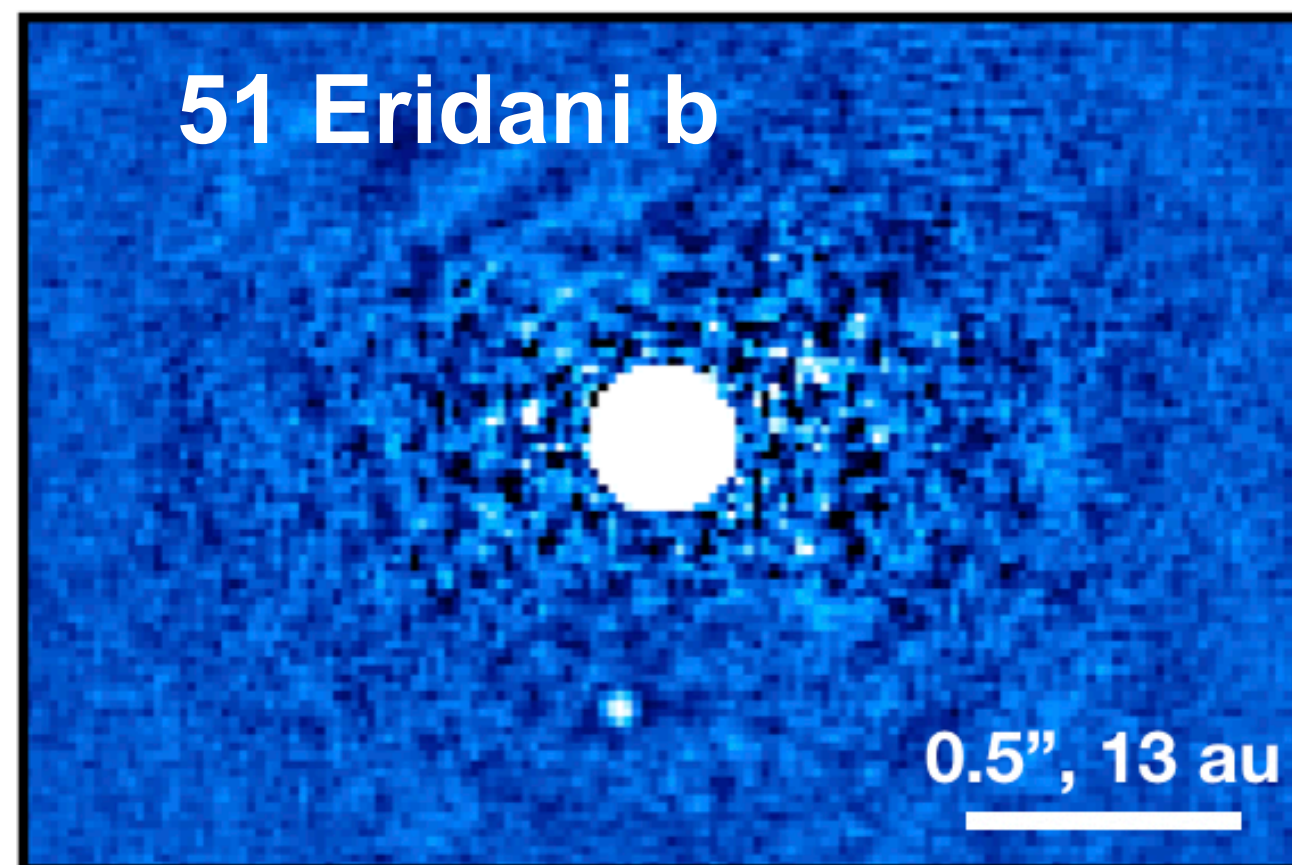


GPI: extreme-AO high-contrast ratio coronagraph with imaging polarimeter/integral-field spectrometer (Gemini-S)

~\$7M upgrade Heising-Simons, NSF, NRC to probe fainter host stars, better contrast ratio, inner working angle  
(Probe cold-start mode of planet formation)

Move to Gemini-N by 2023/2024

(UC San Diego; Notre Dame, NRC/HAA, Stanford)







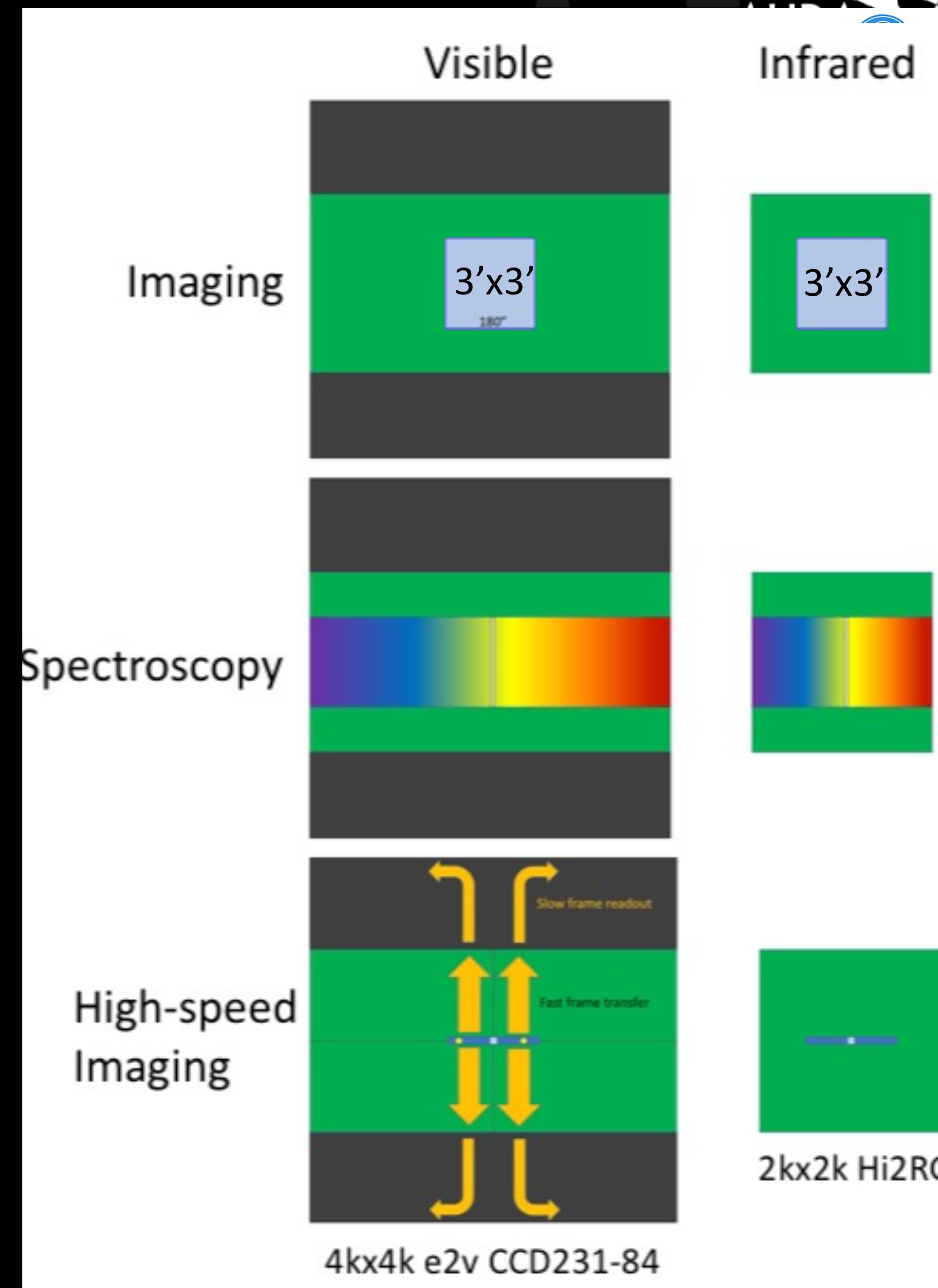
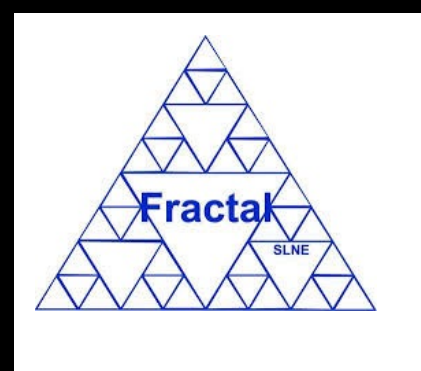
# SCORPIO

Workhorse capability for time-domain astronomy

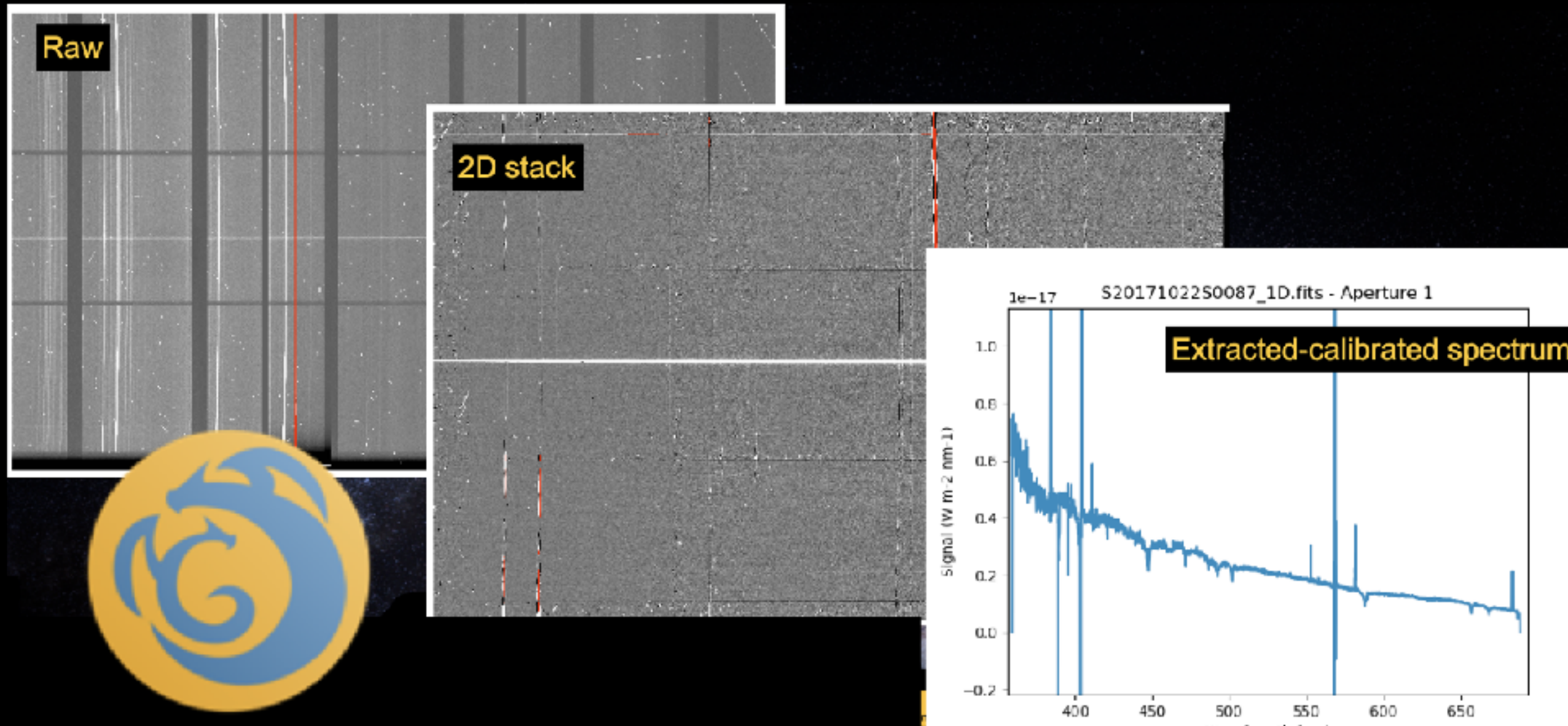
8 band optical/IR imager and spectrograph  
simultaneous coverage 0.37 - 2.3 $\mu$ m  
 grizYJHK 3'x3' imaging or R~4000, 3' long slit

Rapid acquisition and readout

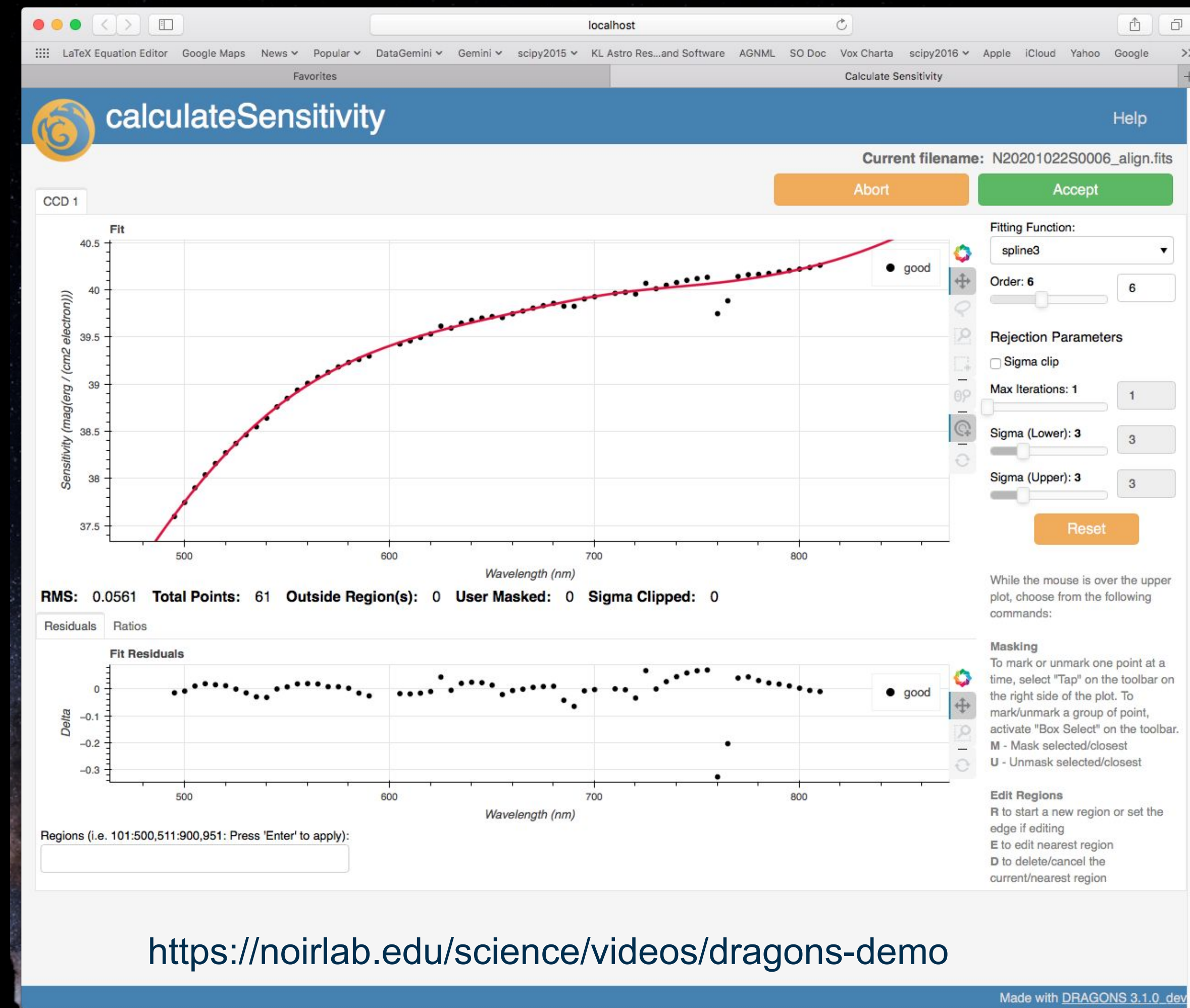
Delivery to Gemini South ~End 2024  
 (in time for Rubin/LSST alerts)







building sustainable data reduction  
 new instrument support  
 quick-look, calibrations, interactive  
 modes

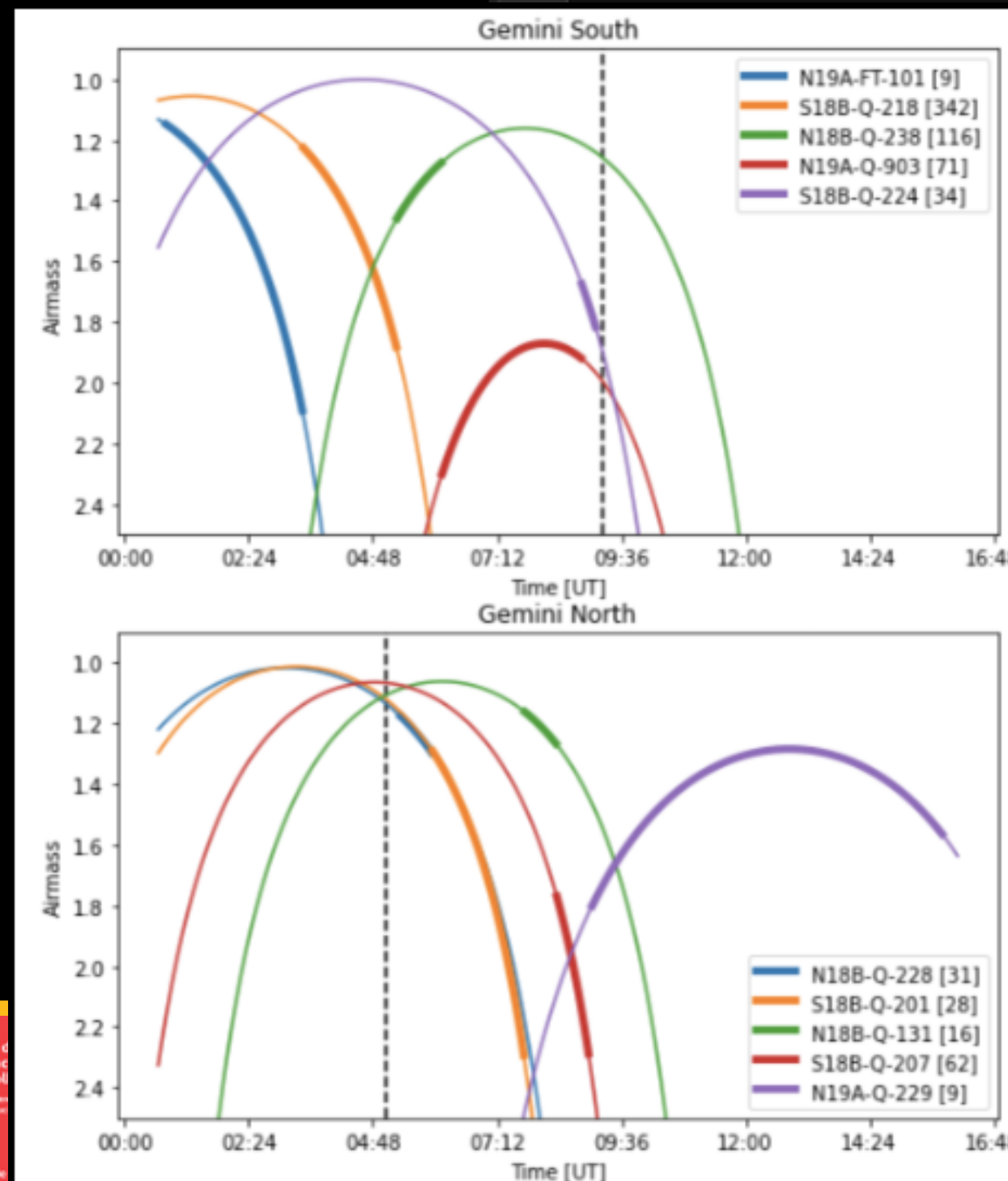




2023-2025 - implementation of new GPP Explore/Observe tools

updated TOM toolkit release  
~end of 2023

automated scheduler in operation ~2024







# User Engagement

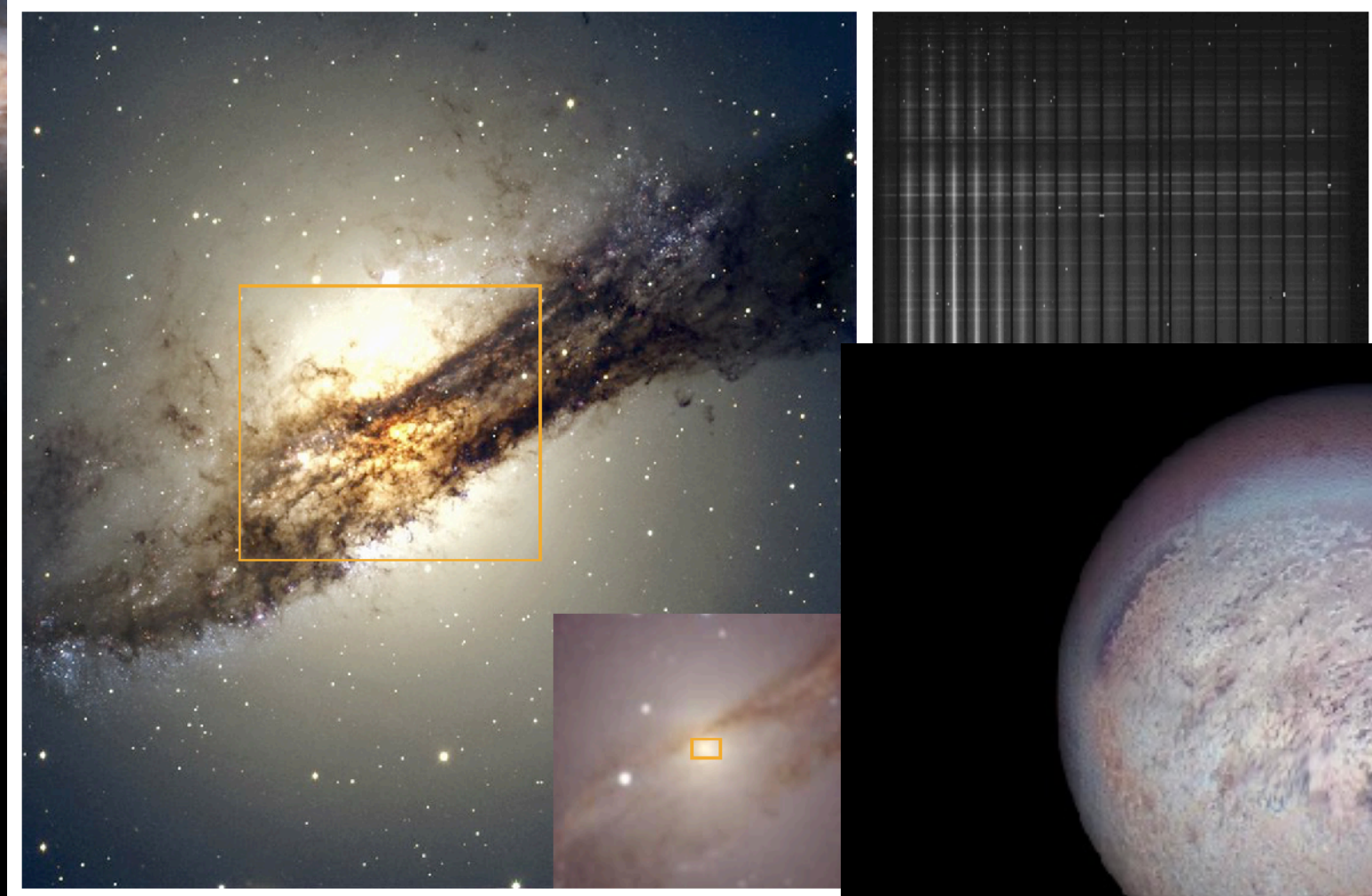


The next 3 years will be transformative for Gemini Observatory.

We need to

- inform Gemini users of the new science capabilities on the horizon
- train our users to make best use of the instrumentation and software
- excite and engage the community, in a dynamic astronomy landscape





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