



SDSS-V: Pioneering Panoptic Spectroscopy



MWM

LVM

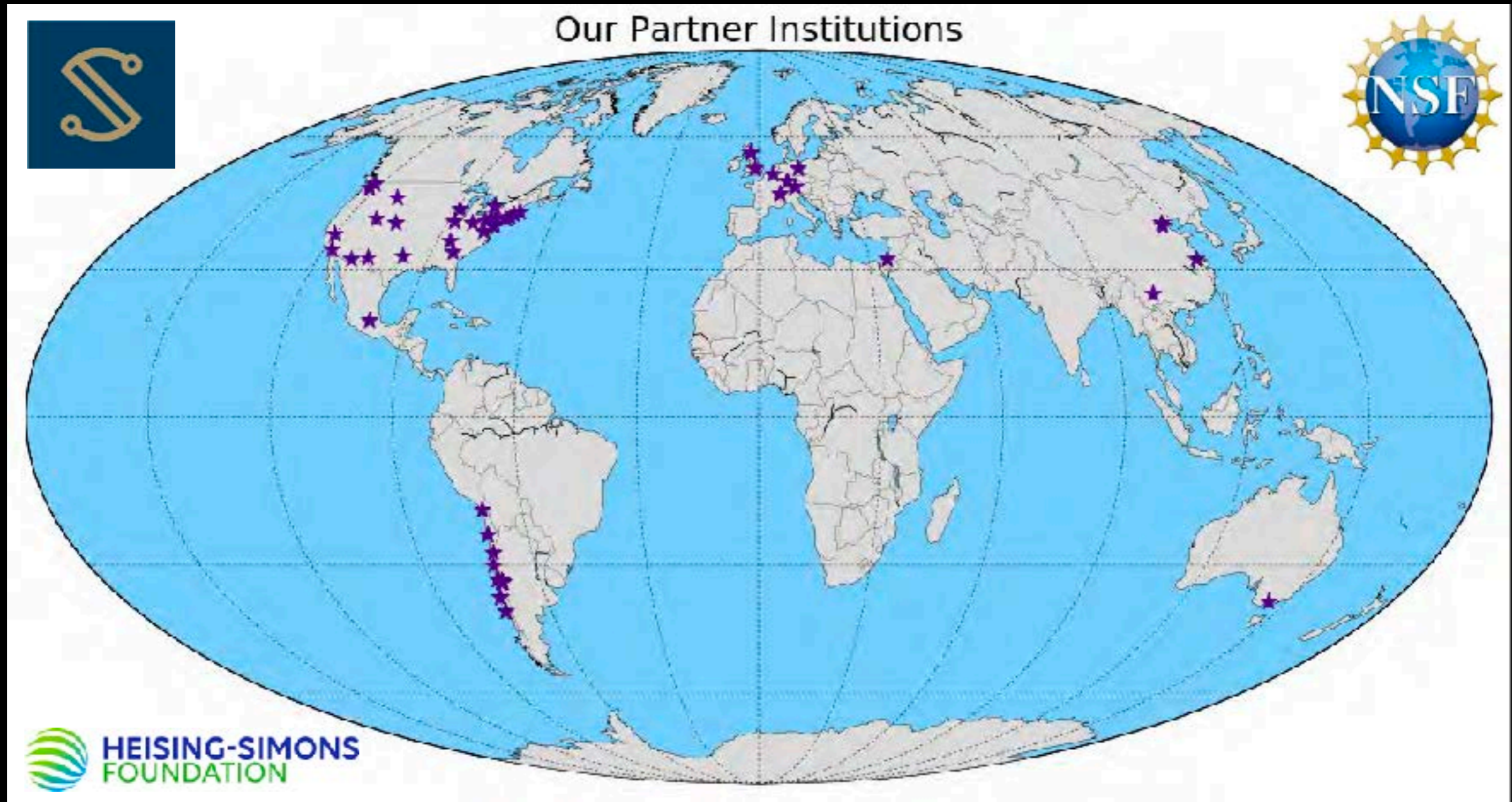
BHM



Guillermo A. Blanc
Carnegie Observatories / U. de Chile
SDSS-V LVM Survey Scientist / LVM-I Enclosure Lead

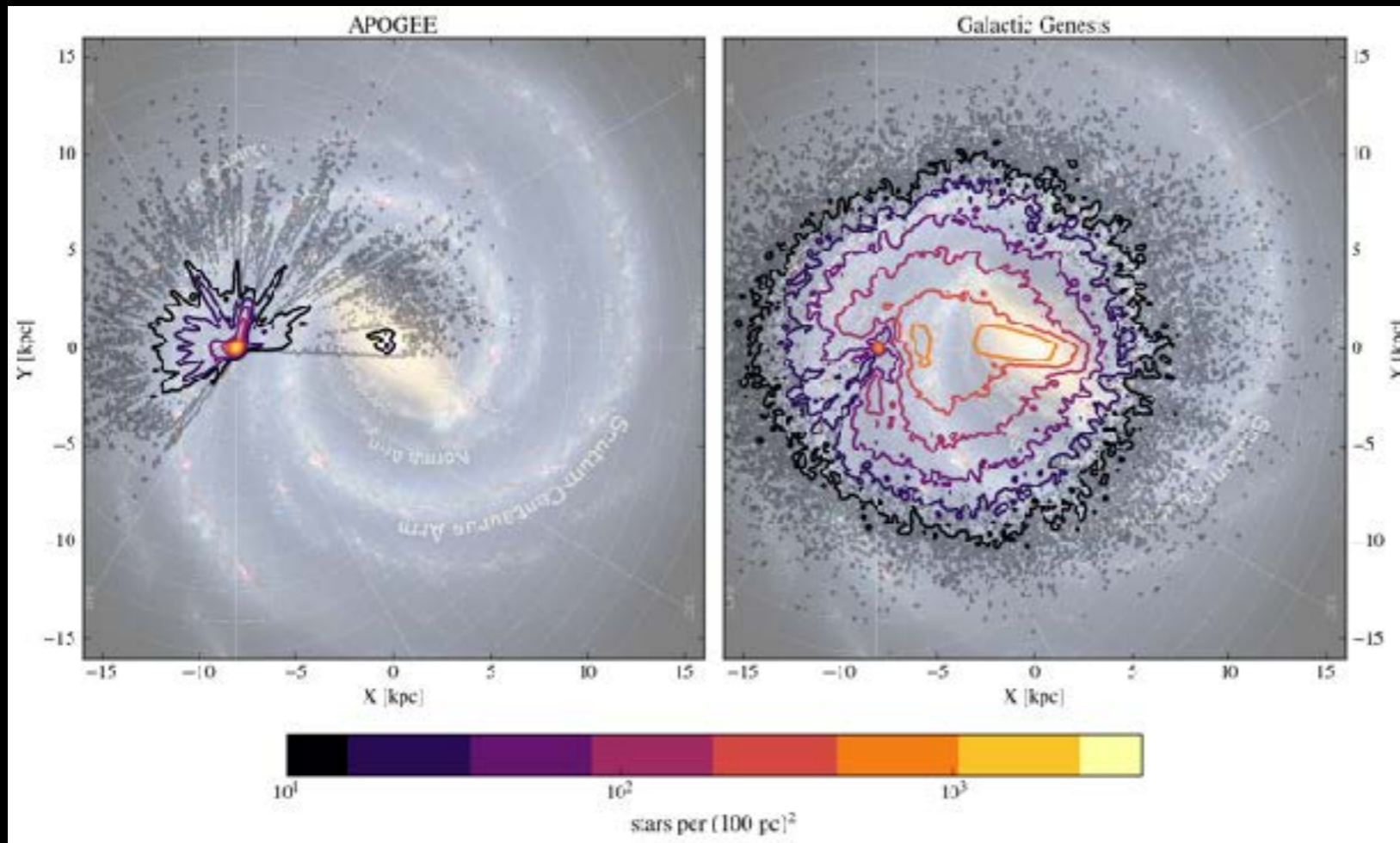


SDSS-V: Pioneering Panoptic Spectroscopy



Partnership of 66 academic institutions + support from the Sloan Foundation, the Heising-Simons Foundation, and the U.S. National Foundation for Science (NSF)

Milky Way Mapper (MWM)



High-res near-IR (APOGEE) and/or low-res optical (BOSS) for ~6 million stars:

- Milky Way evolution
- Stellar astrophysics
- Stellar systems architecture

Science Programs

[List of Programs](#)

[Galactic Genesis](#)

[White Dwarfs](#)

[Solar Neighborhood Census](#)

[Young Stellar Objects](#)

[OB Stars](#)

[Galactic eROSITA Sources](#)

[Massive Eclipsing Binaries](#)

[Binary Systems](#)

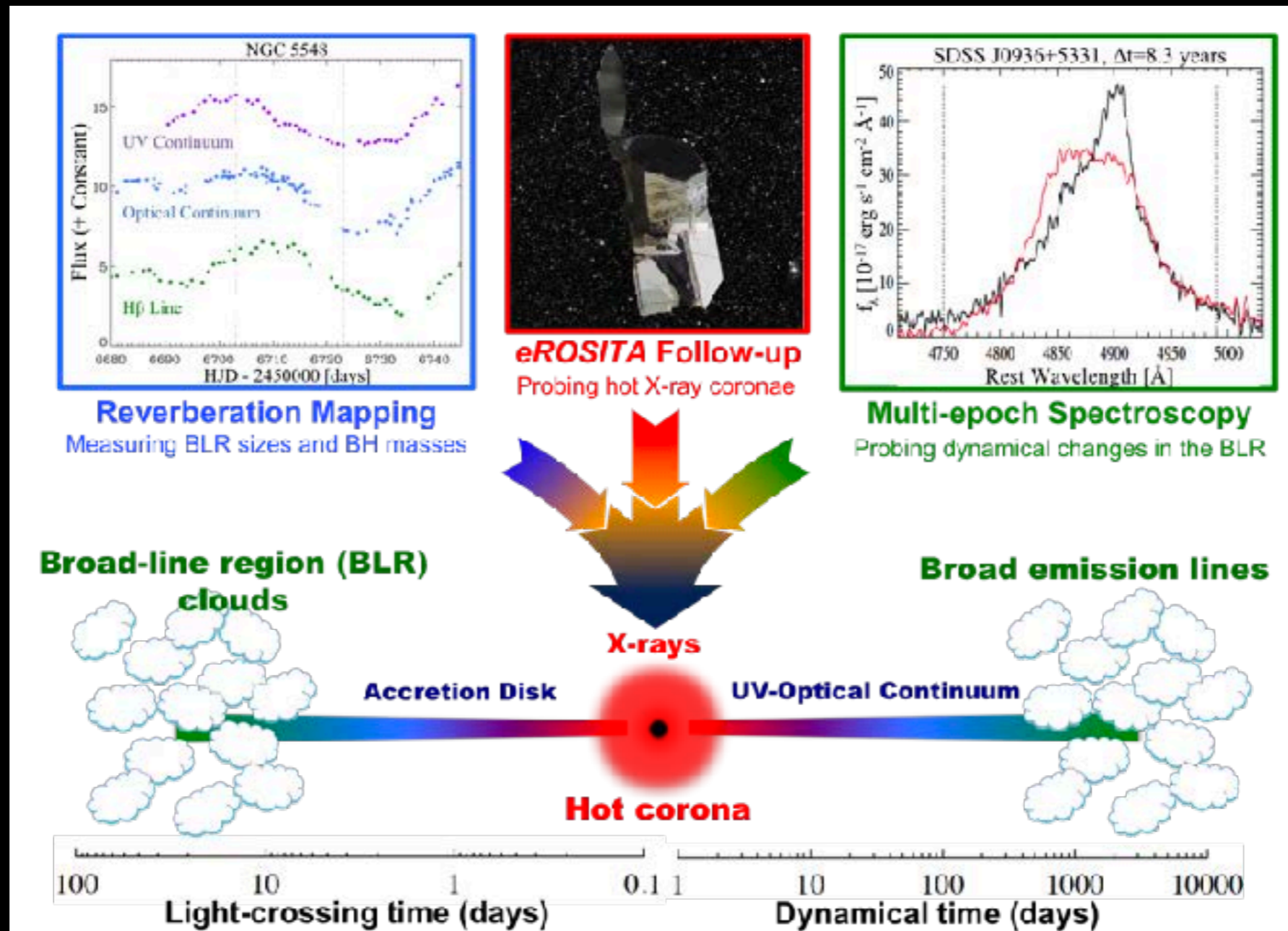
[Compact Binaries](#)

[Planet Hosts](#)

[Asteroseismic Red Giants](#)

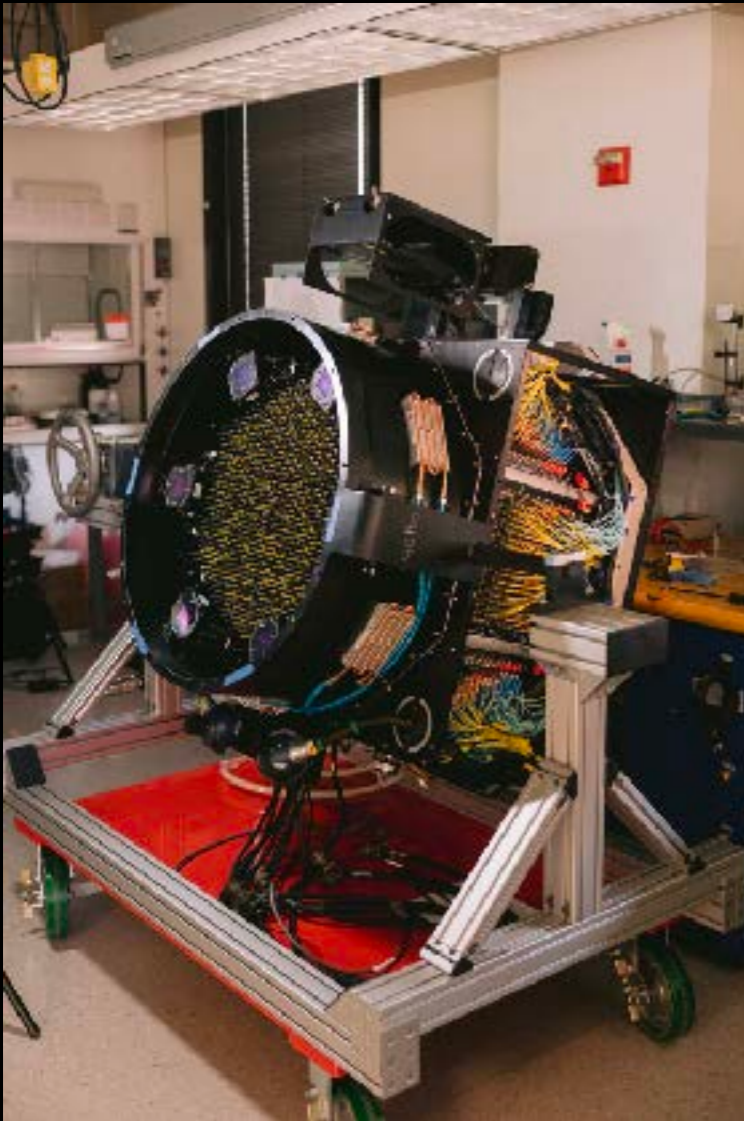
[Dust](#)

Black Hole Mapper (BHM)



Optical low-res (BOSS) spectroscopy: Reverberation mapping for $\sim 1,000$ SMBHs, variability studies of $>20,000$ QSOs, and spectroscopic follow-up of $>300,000$ eROSITA sources

Robotic Focal Plane Systems (FPS)



Twin robotic fiber positioning systems with 500 BOSS and 300 APOGEE fibers each, on 2.5m SDSS telescopes at APO (NM, USA) and 2.5m DuPont telescope at LCO (Chile).



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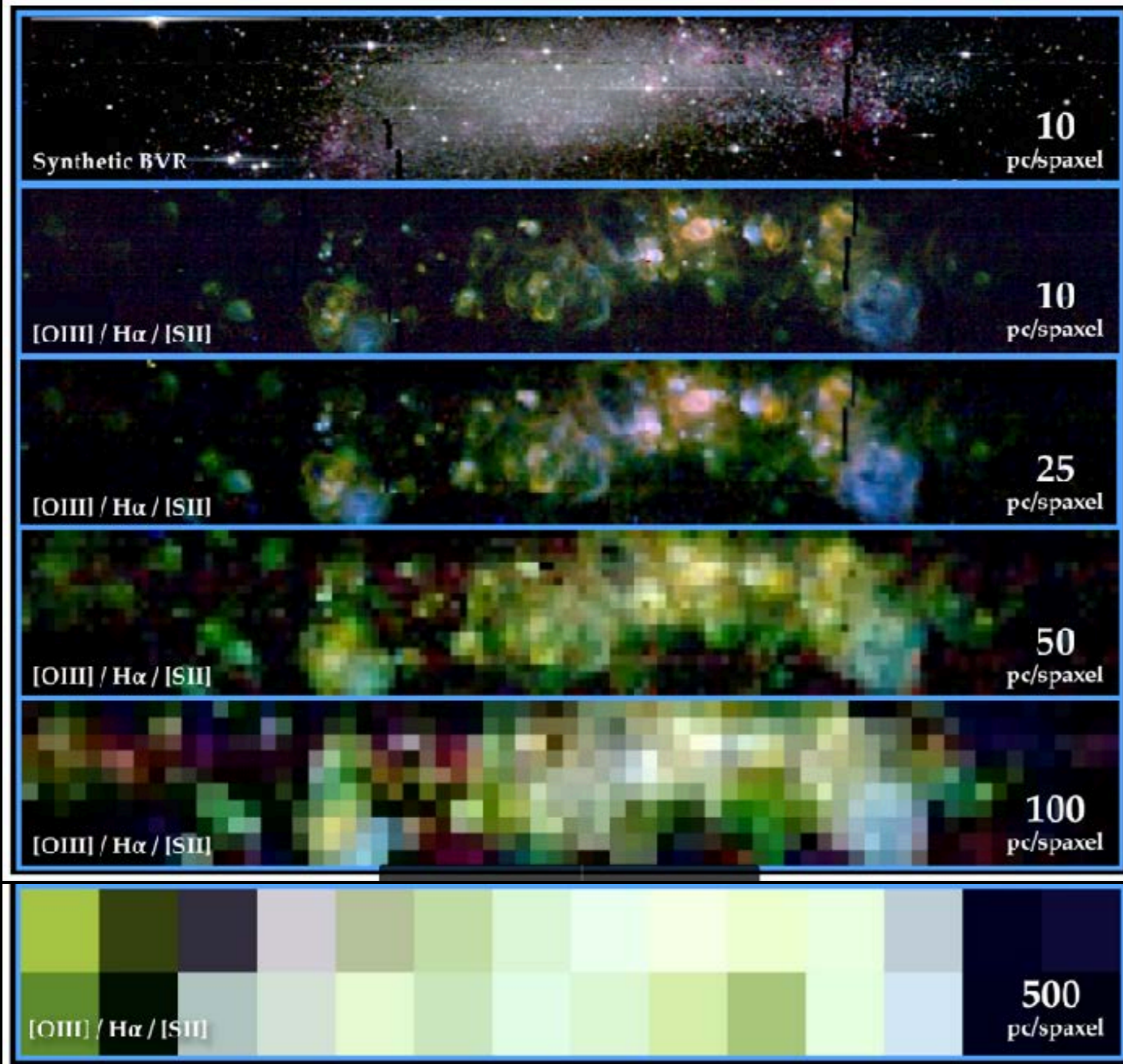
LVM

BHM



LOCAL VOLUME MAPPER
Resolving the Physics Driving Galaxy Formation

NGC 3109 Spectral Cube (1.4 x 6.9 kpc)



**SDSS-V
LVM**

**PHANGS
50-150 pc**

**VENGA ~ 300 pc
CALIFA ~ 800 pc
MaNGA ~ 1 kpc
SAMI ~ 2 kpc**

Credit: M. Seibert, PRISM / TYPHOON

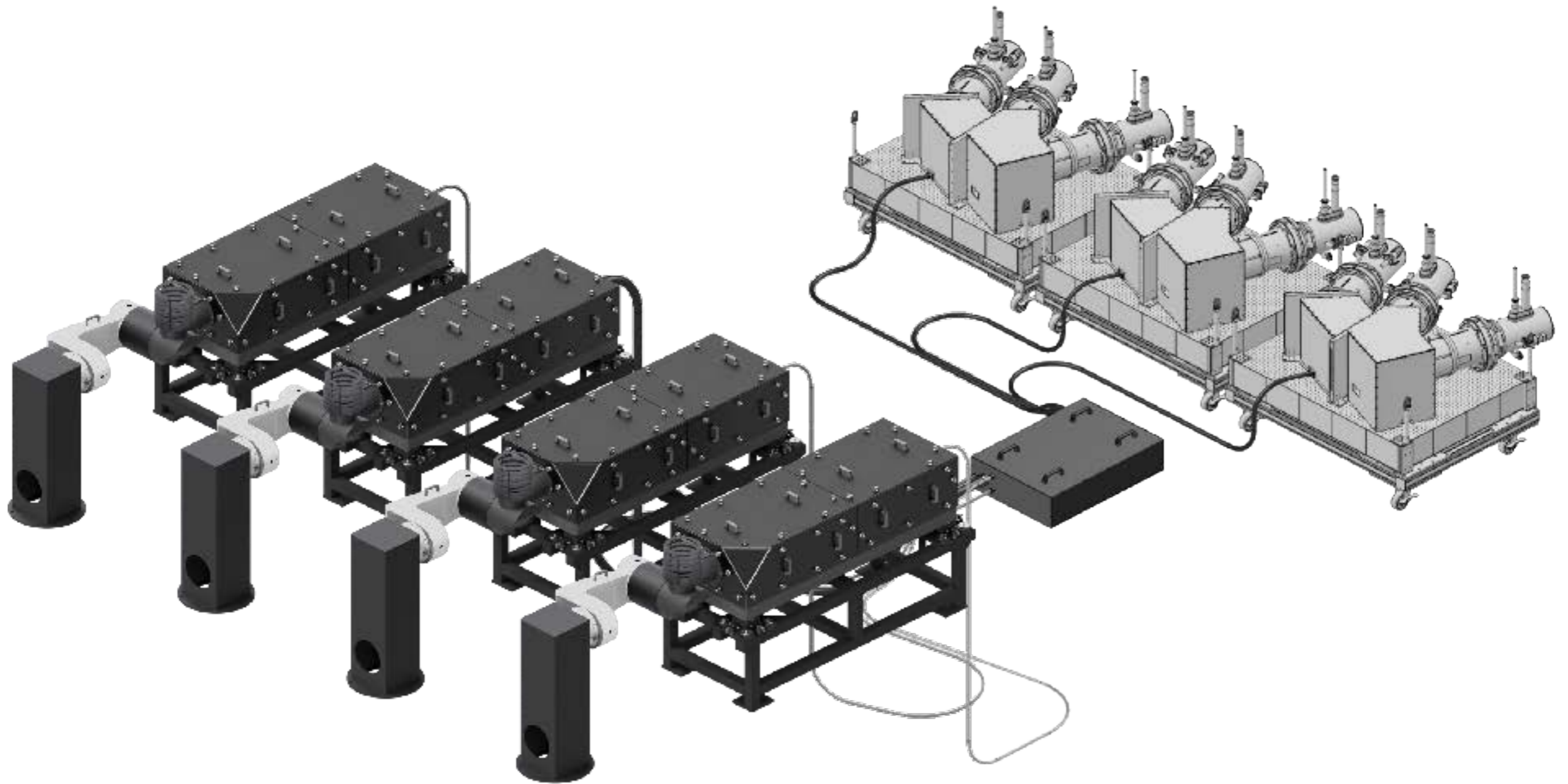
SDSS-V Local Volume Mapper (LVM)

- LVM is an optical **integral-field spectroscopic** survey of the **Milky Way** and the **Magellanic Clouds**.
- LVM is the first IFU survey of **complete galactic systems at sub-pc to ~ 10 pc resolution**.
- LVM is the first IFU survey to **cover a significant fraction of the night sky (~ 1 sterad)**.
- First step towards the **Spectral Panopticon!!**

LVM-I: The Instrument

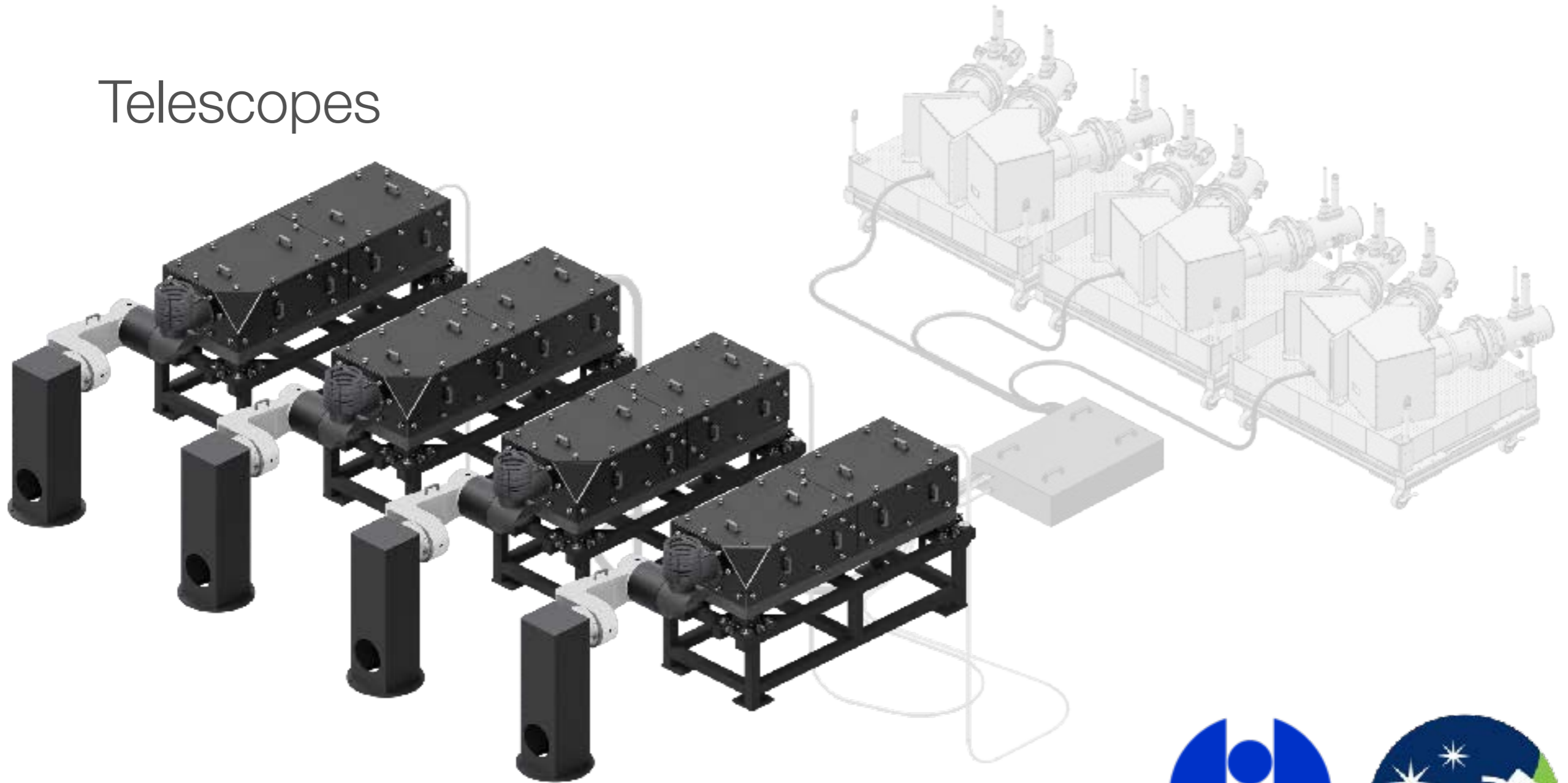
- **One Facility:** Robotic Facility at Las Campanas Observatory (LCO) in Chile.
- **Four Telescopes:** 16 cm siderostat-fed telescopes. One for science, two for sky, and one for spectrophotometric calibration.
- **Three Spectrographs:** fed by 1944 fibers, 3600-9800 Å coverage, R=2300-6400 hosted in environmentally controlled instrument lab.
- **Four IFUs :** Micro-lens array coupled fiber-fed IFUs with 35"/spaxels. Science IFU has 25' diameter FOV.

The LVM Instrument



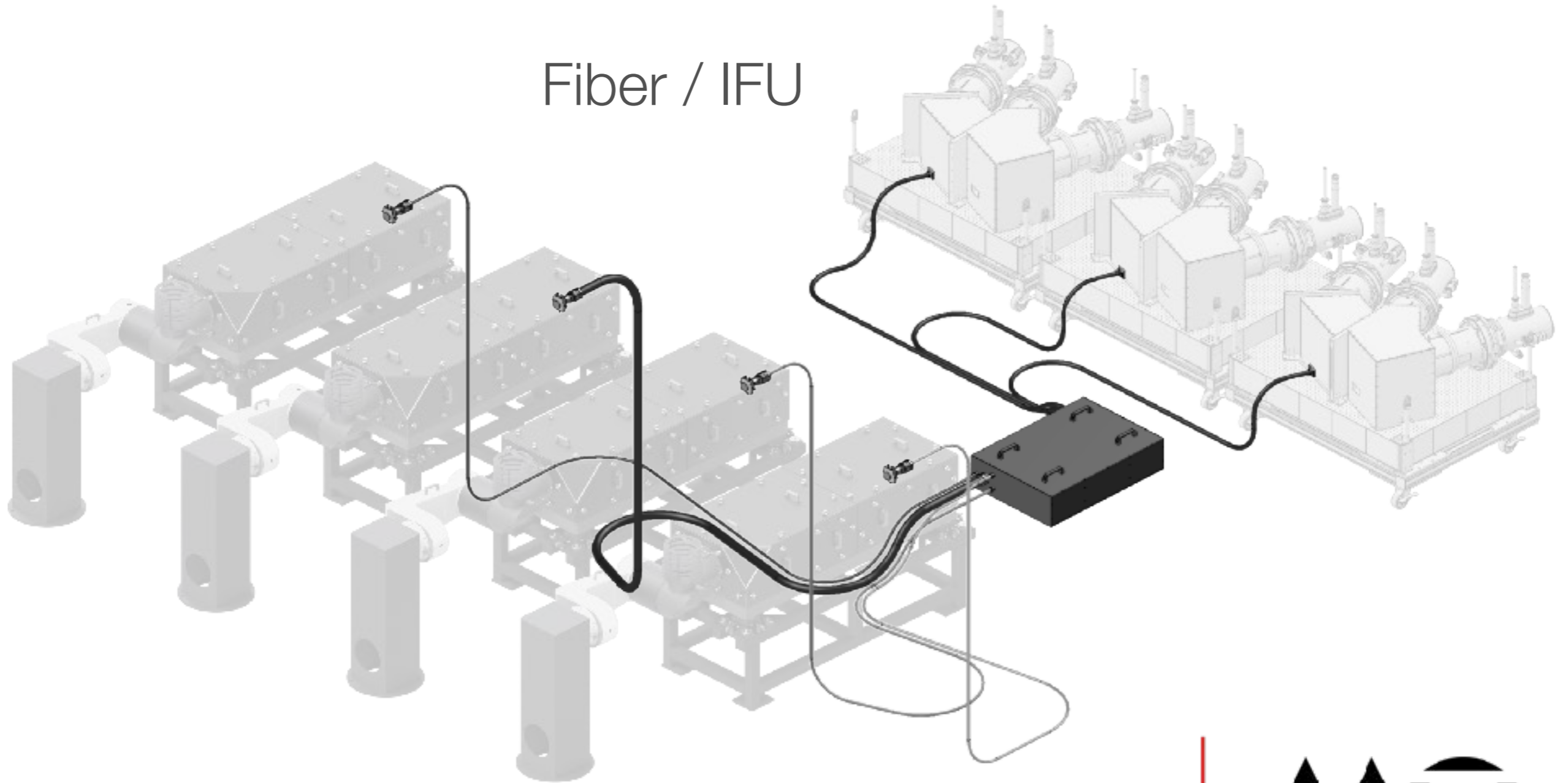
The LVM Instrument

Telescopes



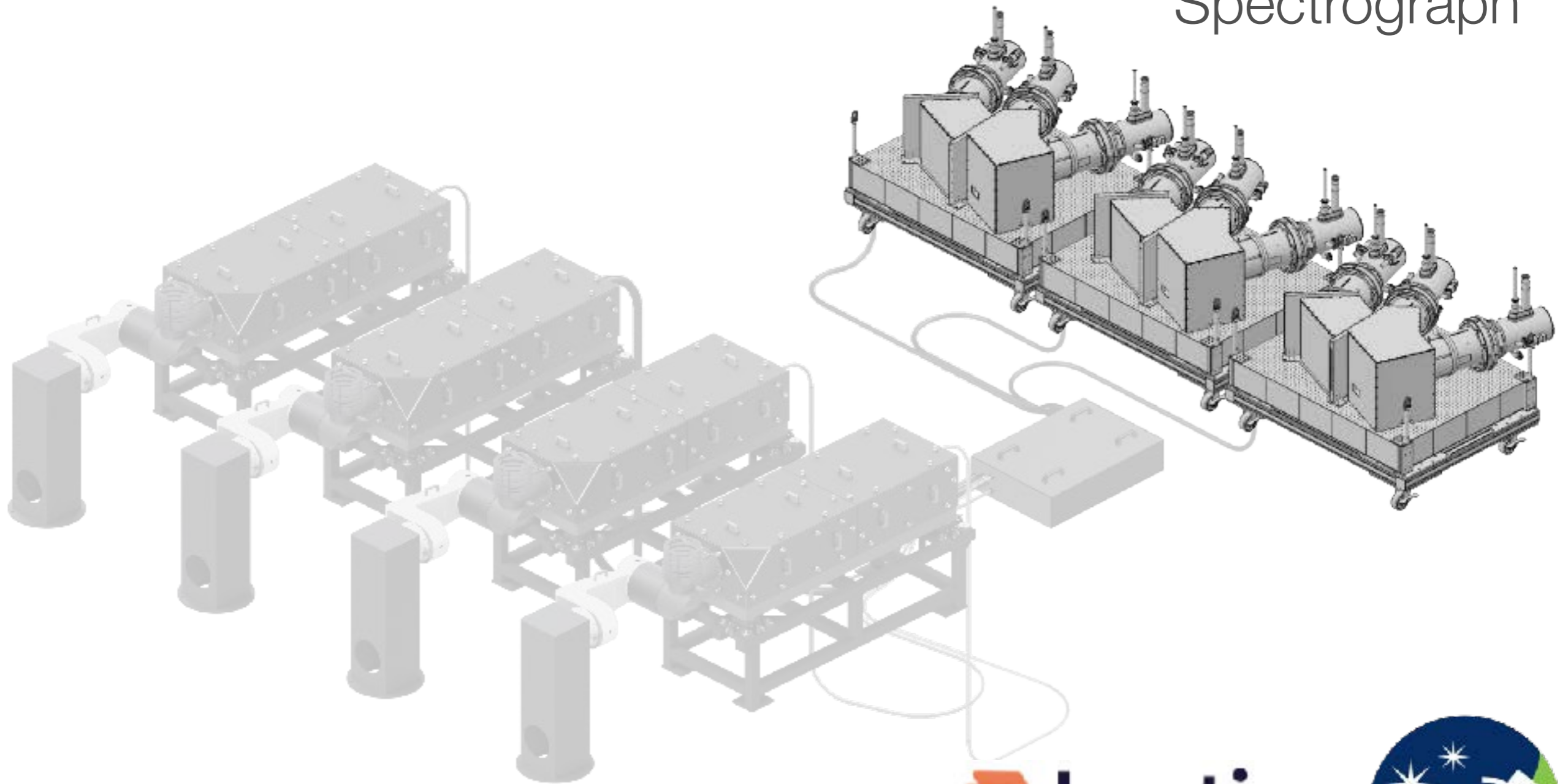
The LVM Instrument

Fiber / IFU



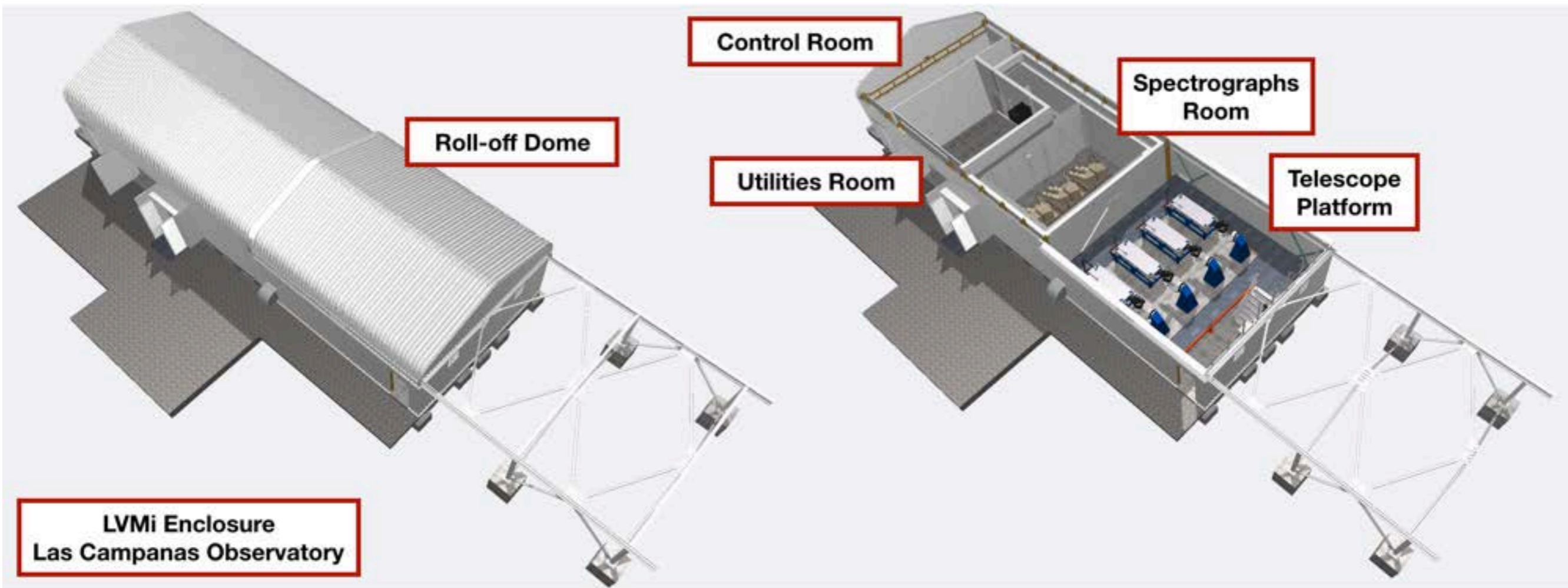
The LVM Instrument

Spectrograph



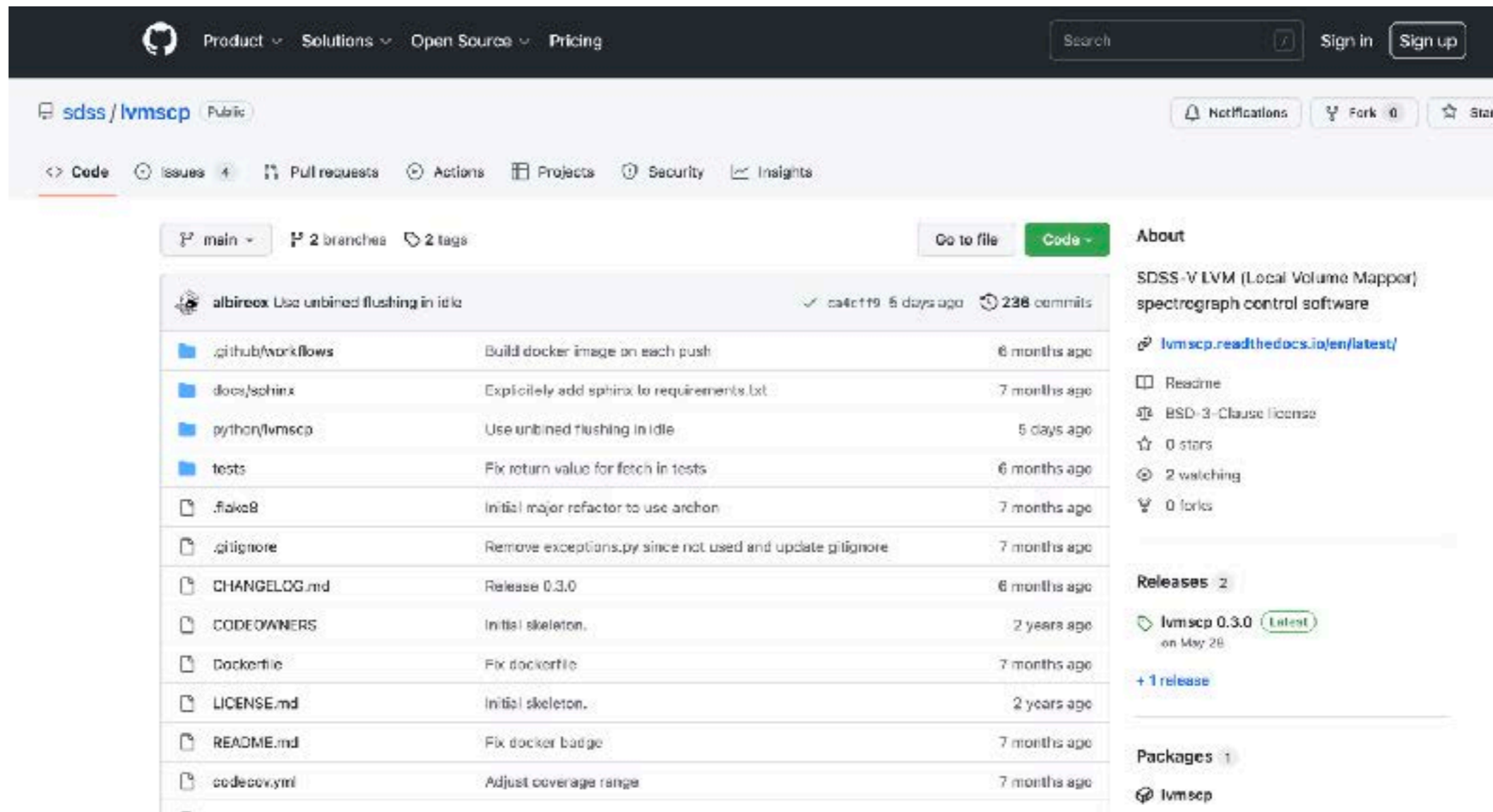
The LVM Instrument

Enclosure



The LVM Instrument

Software



sdss / lvmscp Public

Code Issues Pull requests Actions Projects Security Insights

main 2 branches 2 tags

Go to file Code

albinex Use unbind flushing in idle ✓ catct19 5 days ago 238 commits

.github/workflows	Build docker image on each push	6 months ago
docs/sphinx	Explicitely add sphinx to requirements.txt	7 months ago
python/lvmscp	Use unbind flushing in idle	5 days ago
tests	Fix return value for fetch in tests	6 months ago
.flake8	Initial major refactor to use archon	7 months ago
.gitignore	Remove exceptions.py since not used and update gitignore	7 months ago
CHANGELOG.md	Release 0.3.0	6 months ago
CODEOWNERS	Initial skeleton.	2 years ago
Dockertile	Fix dockertile	7 months ago
LICENSE.md	Initial skeleton.	2 years ago
README.md	Fix docker badge	7 months ago
codecov.yml	Adjust coverage range	7 months ago

About

SDSS-V LVM (Local Volume Mapper) spectrograph control software

[lvmscp.readthedocs.io/en/latest/](#)

- Readme
- BSD-3-Clause license
- 0 stars
- 2 watching
- 0 forks

Releases 2

lvmscp 0.3.0 **Latest** on May 28

+ 1 release

Packages 1

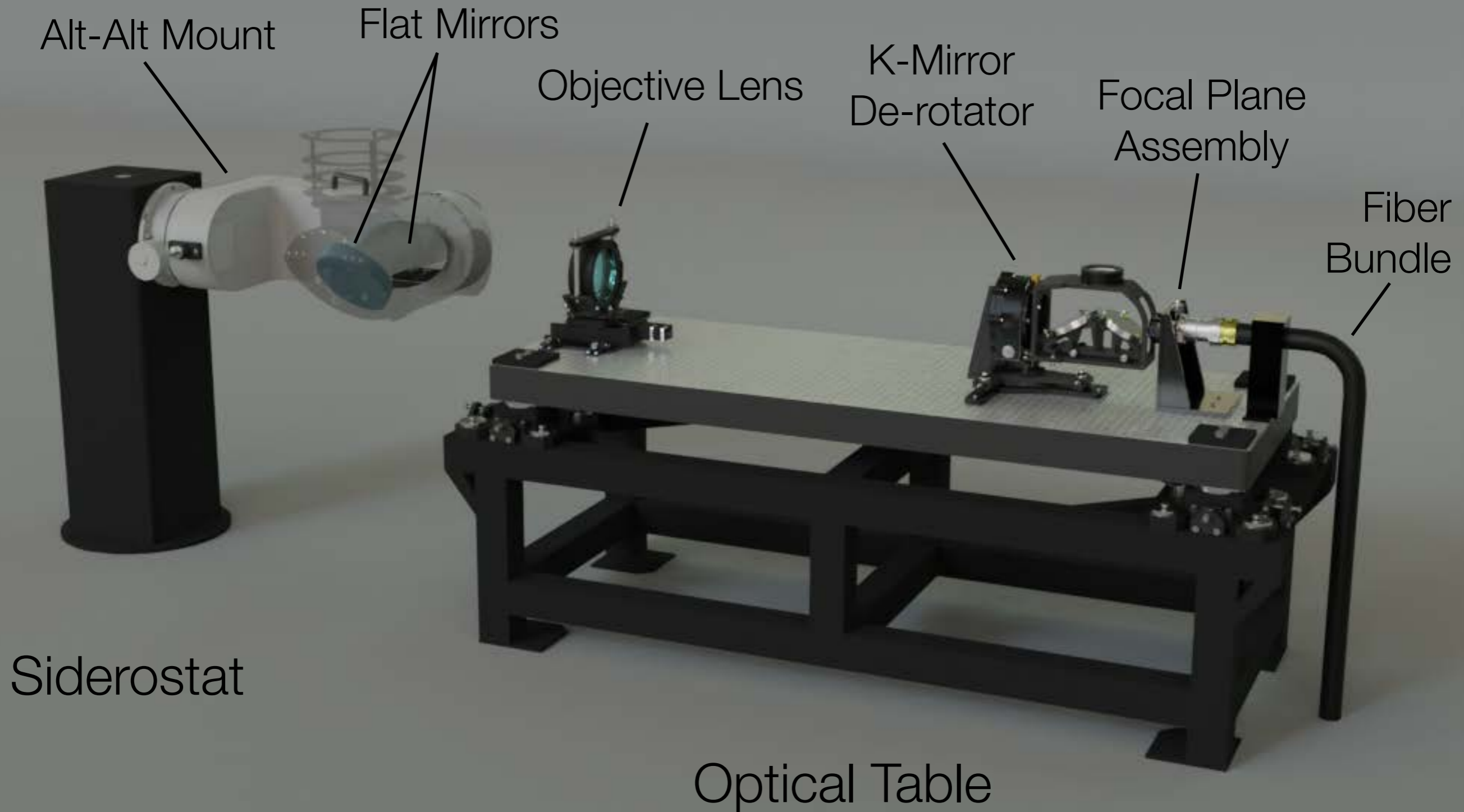
lvmscp



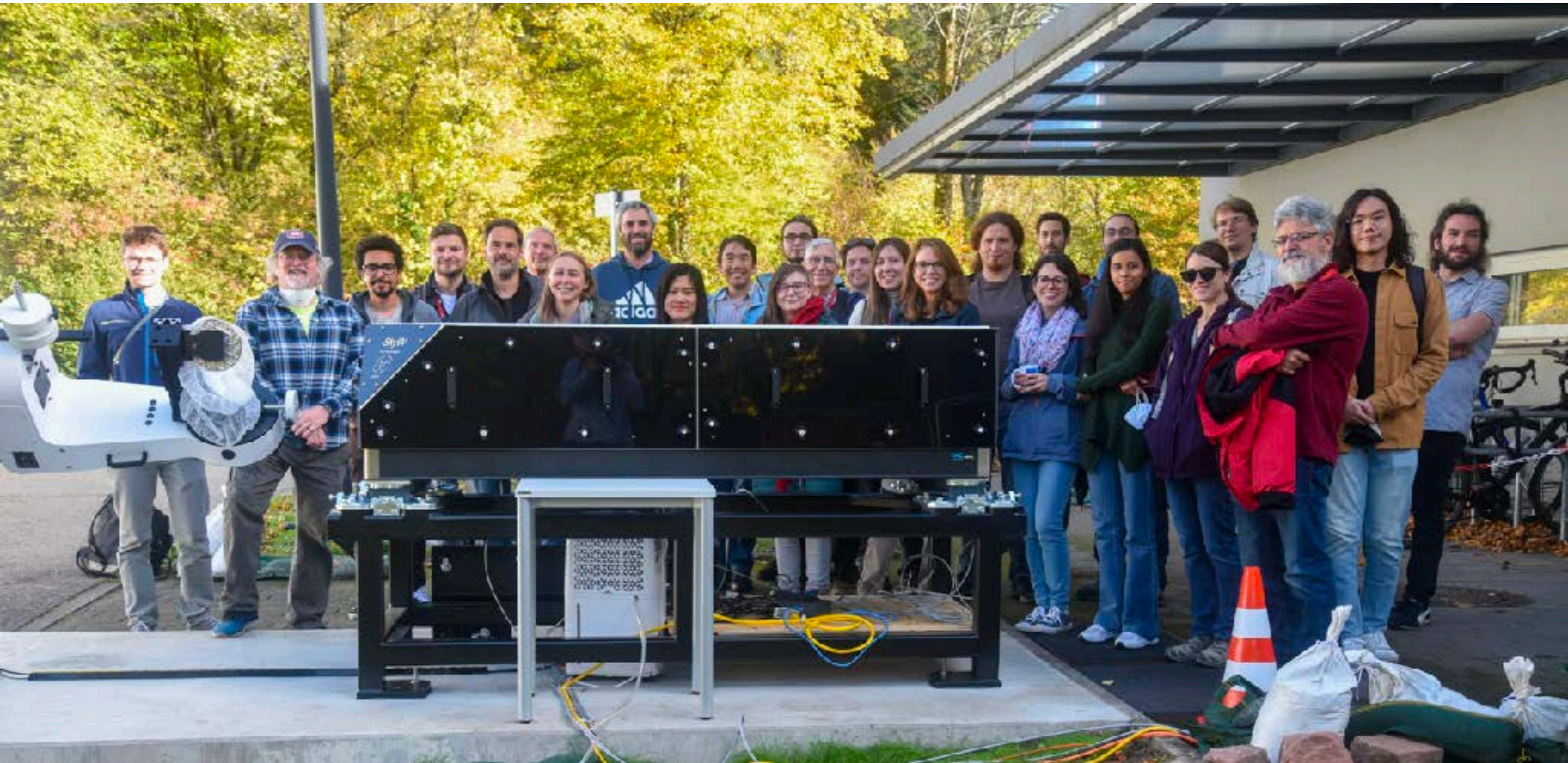
LVM Telescope



LVM Telescope

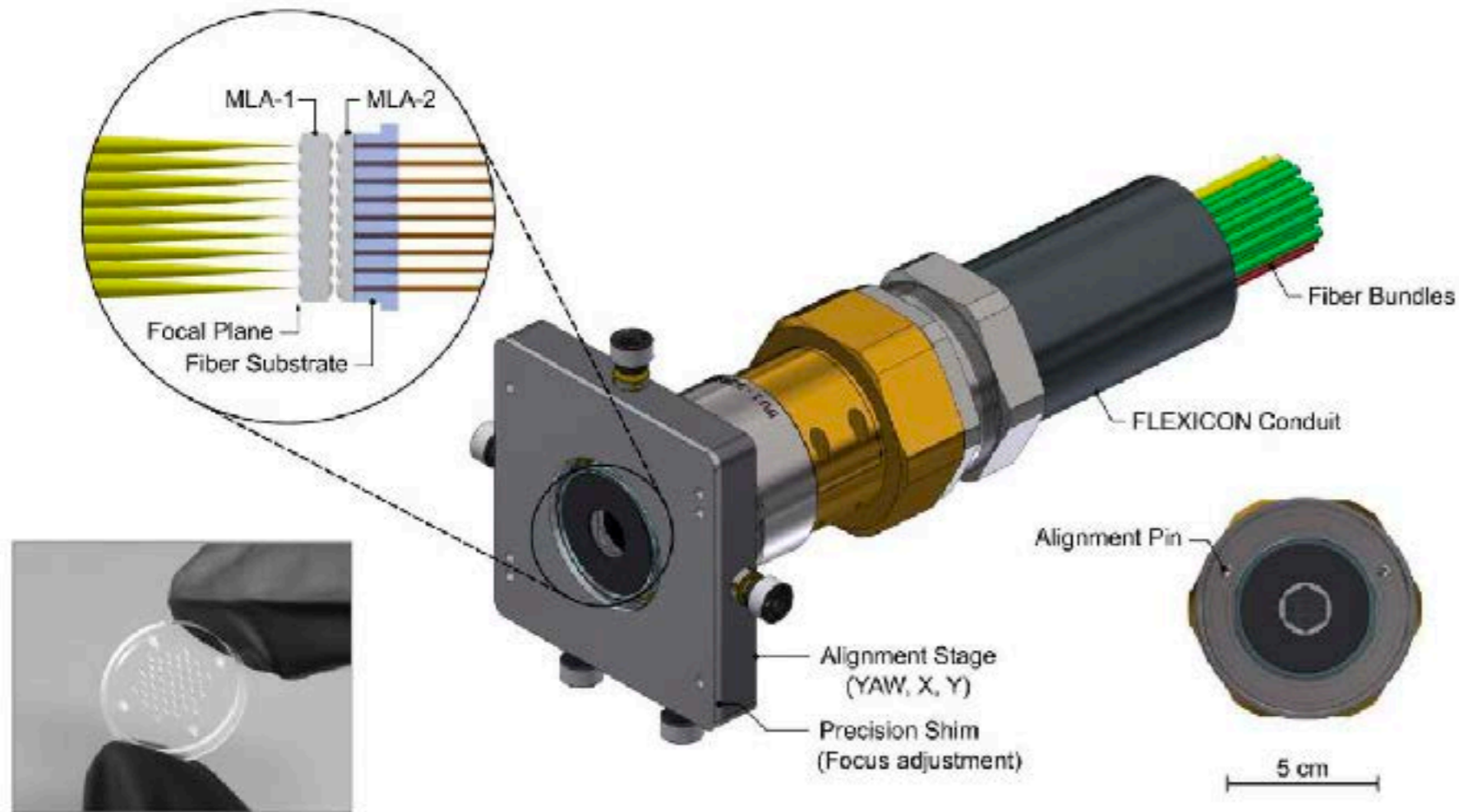


LVM-I: The Instrument



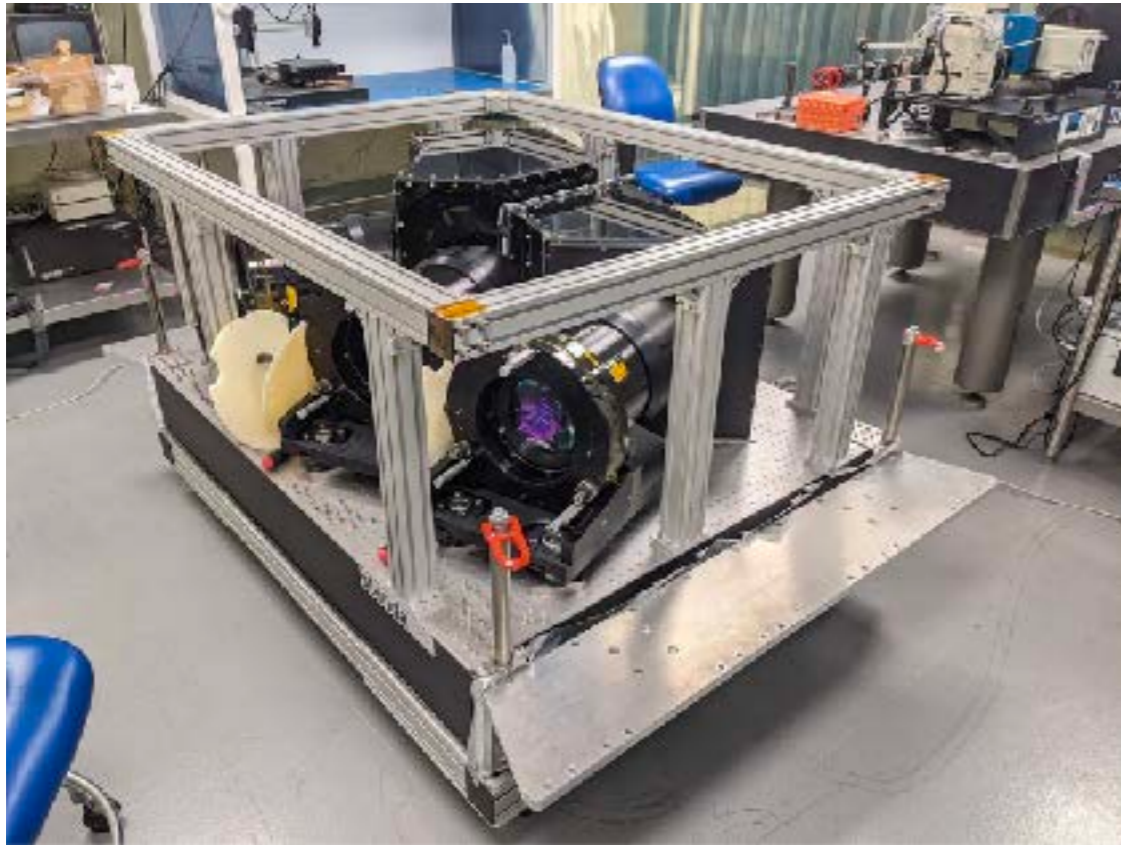
Fully assembled telescope at MPIA, Heidelberg (October 2022)

LVM-I: The Instrument



LVM-I Fiber System (lead by Scott Case and Tobias Feger, AAO)

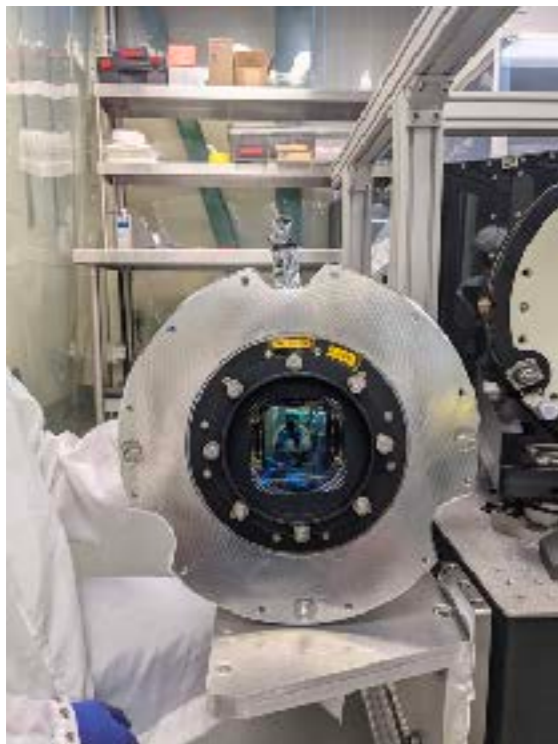
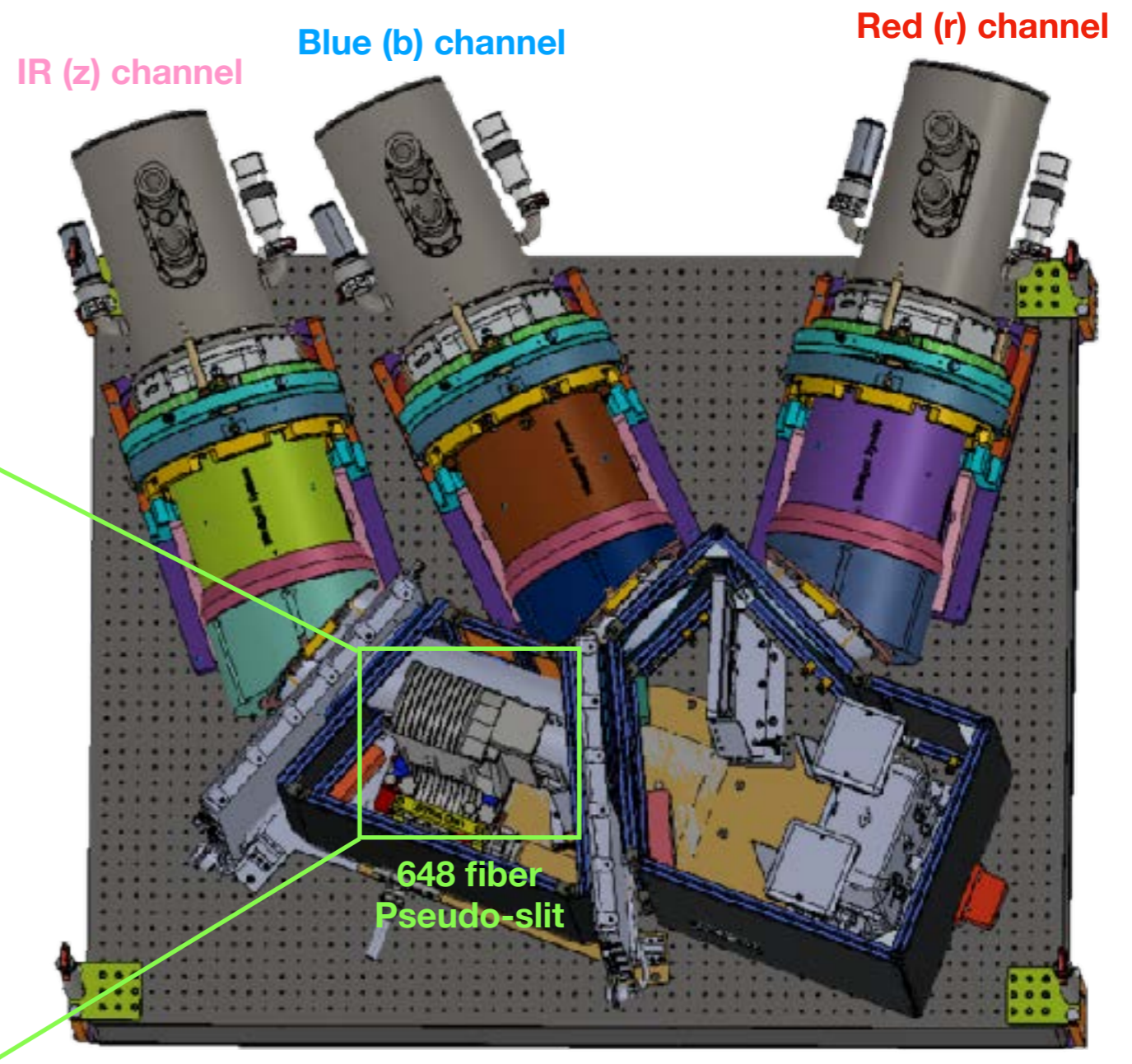
LVM-I: The Instrument



DESI spectrograph design fabricated by Winlight Systems (France)

LVM-I Spectrographs (lead by Nick Konidaris, Carnegie)

LVM-I Cryostats (lead by Mike Lesser, ITL, U. of Arizona)



LVM-I: The Instrument



LVM-I Enclosure (lead by Guillermo Blanc, Carnegie/LCO)

LVM-I: The Instrument

April 2022



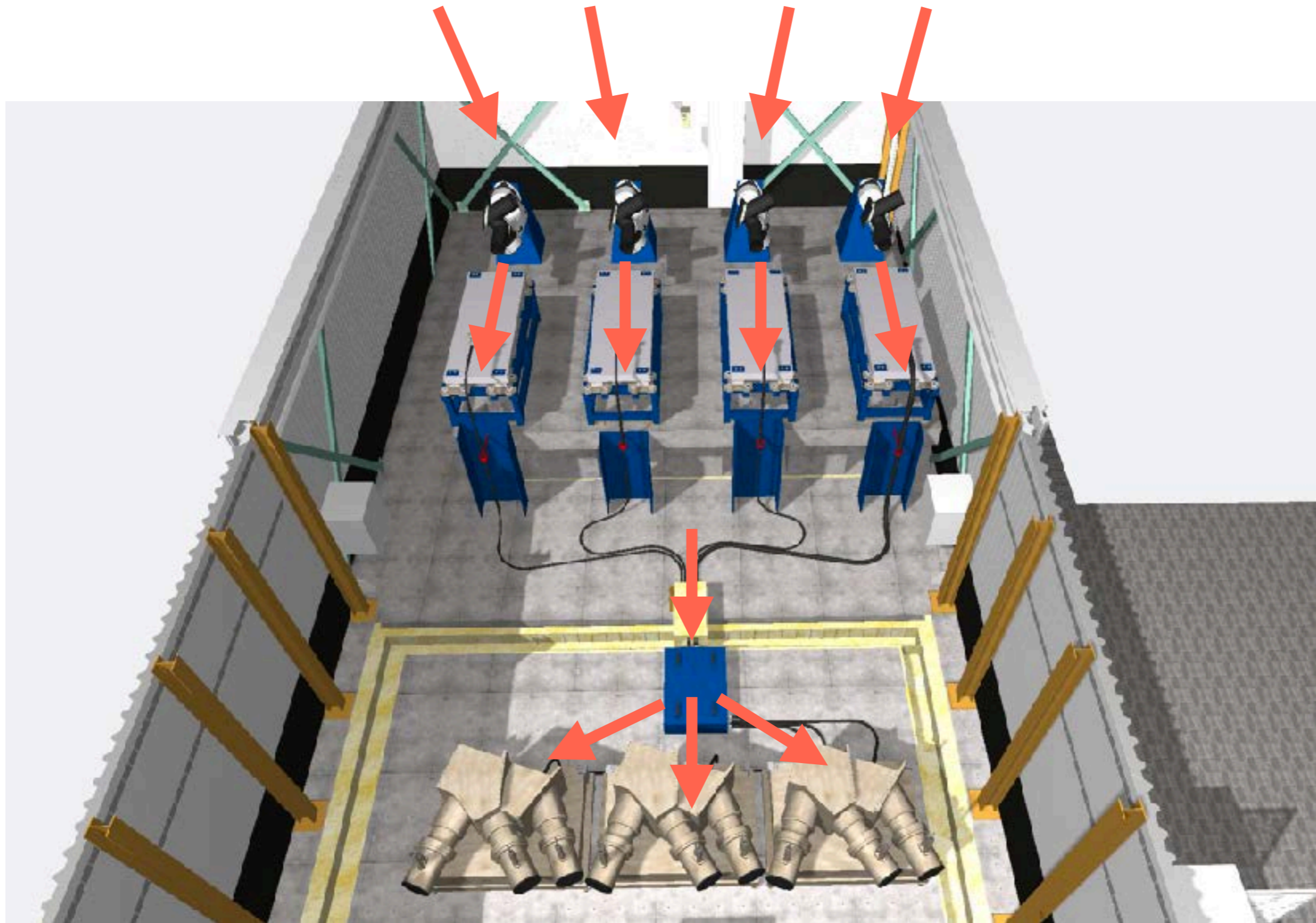
LVM-I Enclosure (lead by Guillermo Blanc, Carnegie/LCO)

LVM-I: The Instrument

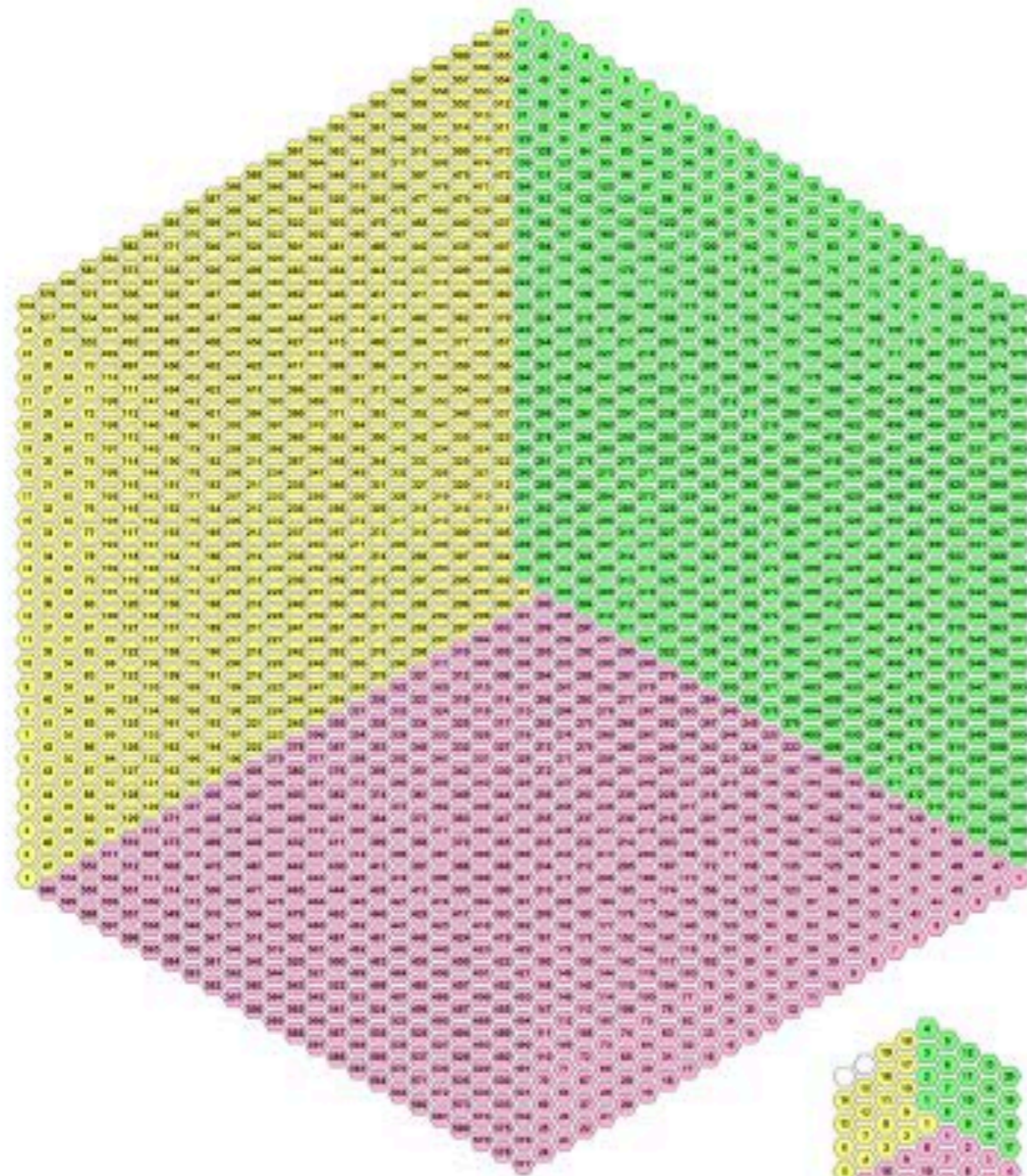


LVM-I Enclosure (lead by Guillermo Blanc, Carnegie/LCO)

LVM-I: The Instrument



1944 optical fibers



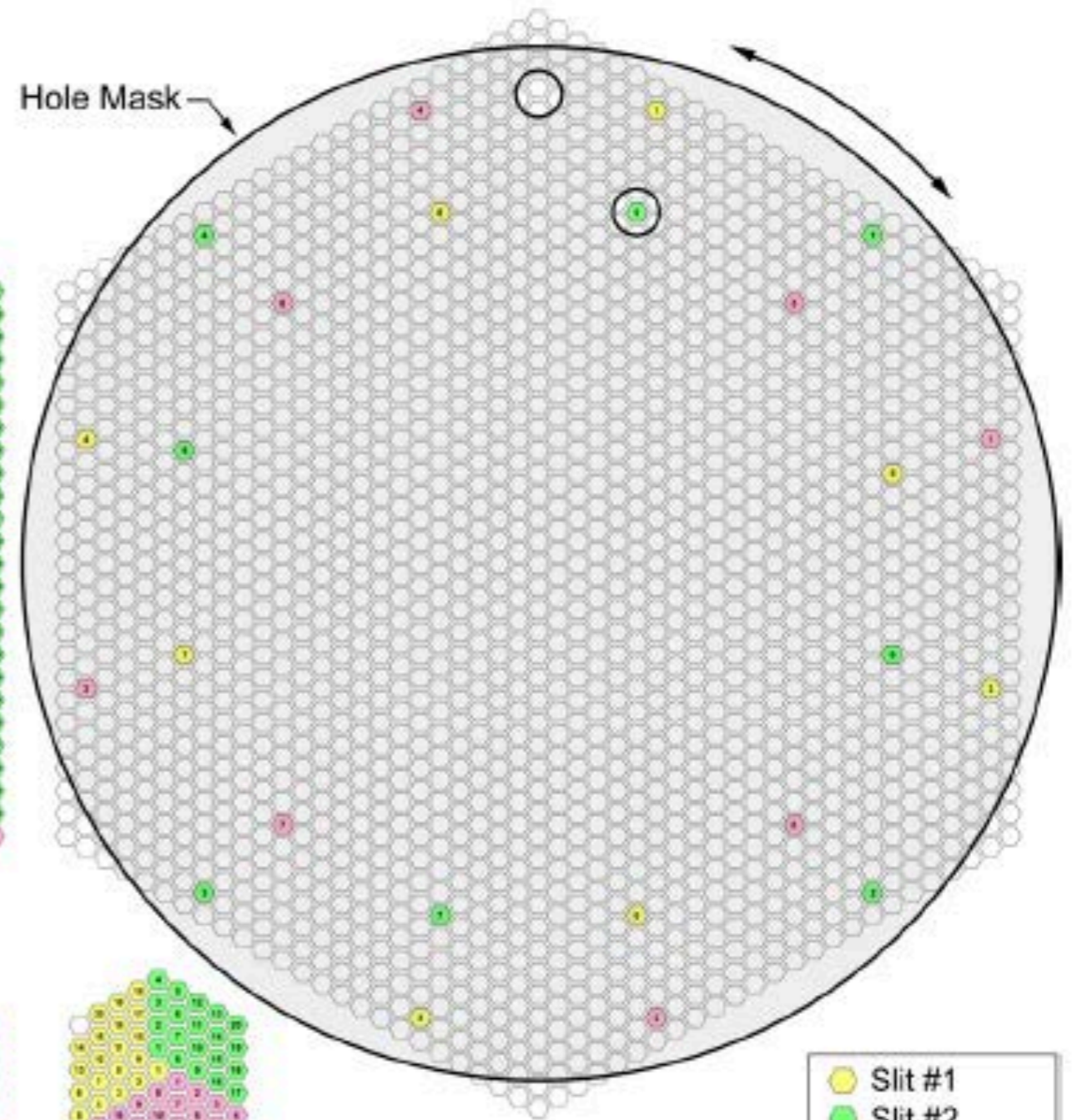
Sci



SkyW



SkyE



Spec

- Slit #1
- Slit #2
- Slit #3
- unallocated



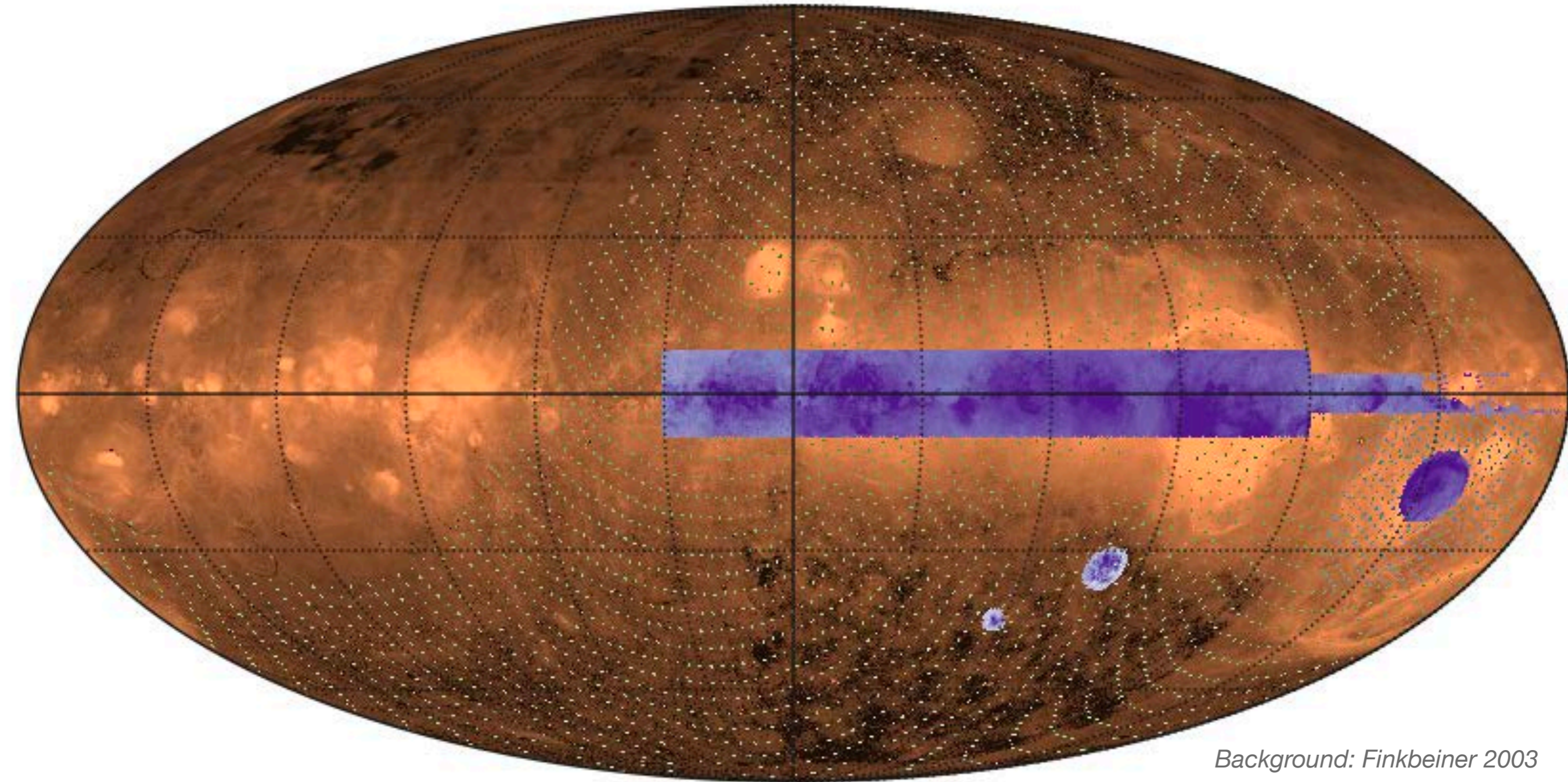
Background image by PETER HERGESHEIMER



Background image by PETER HERGESHEIMER

LVM: The Survey

MW H α

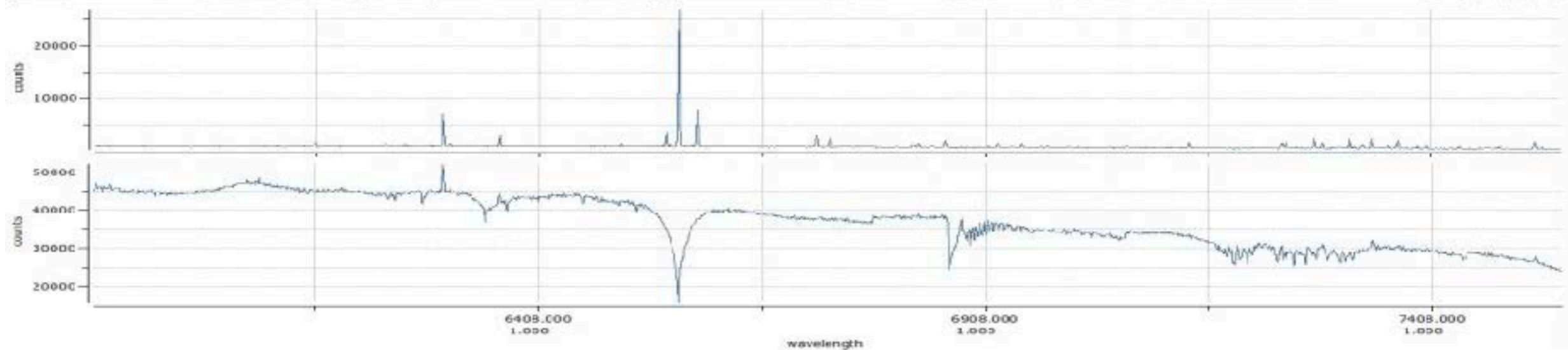
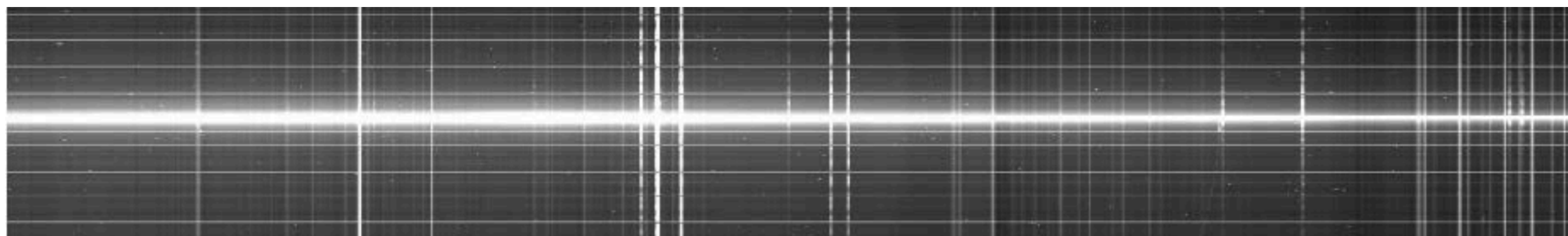
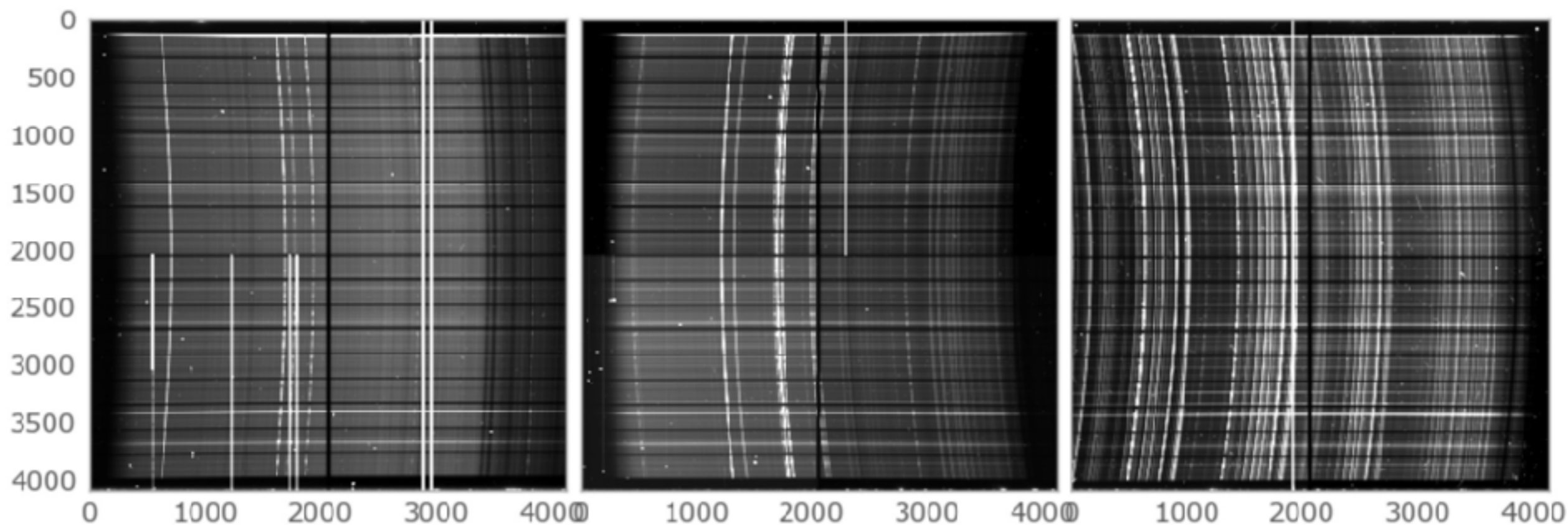


*LVM Survey Program Head: Niv Drory (UT Austin)
LVM Survey Scientists: Kathryn Kreckel (Heidelberg) and Guillermo Blanc (LCO)
LVM Data Scientist: Sebastián Sanchez (UNAM)
LVM Operations Lead: Evelyn Johnston (UDP)*

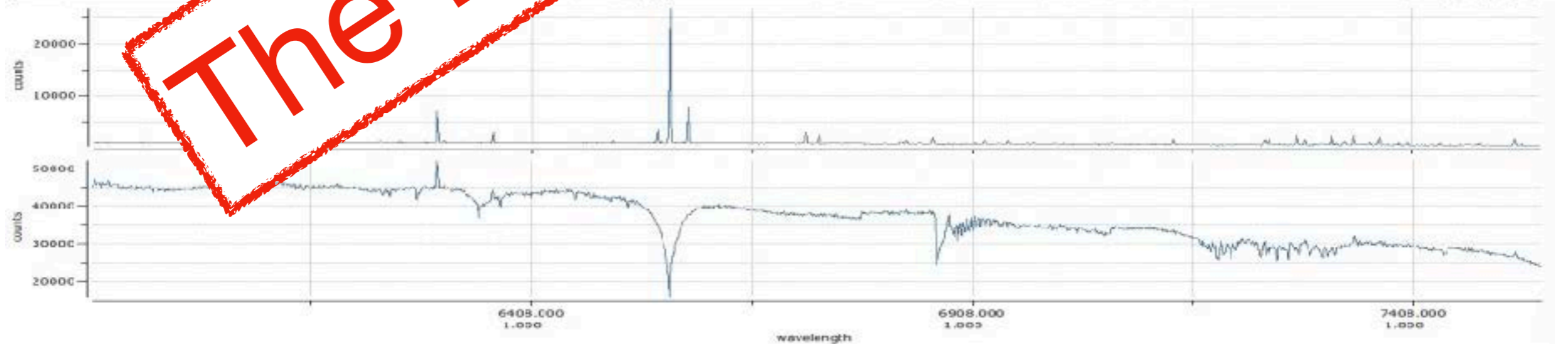
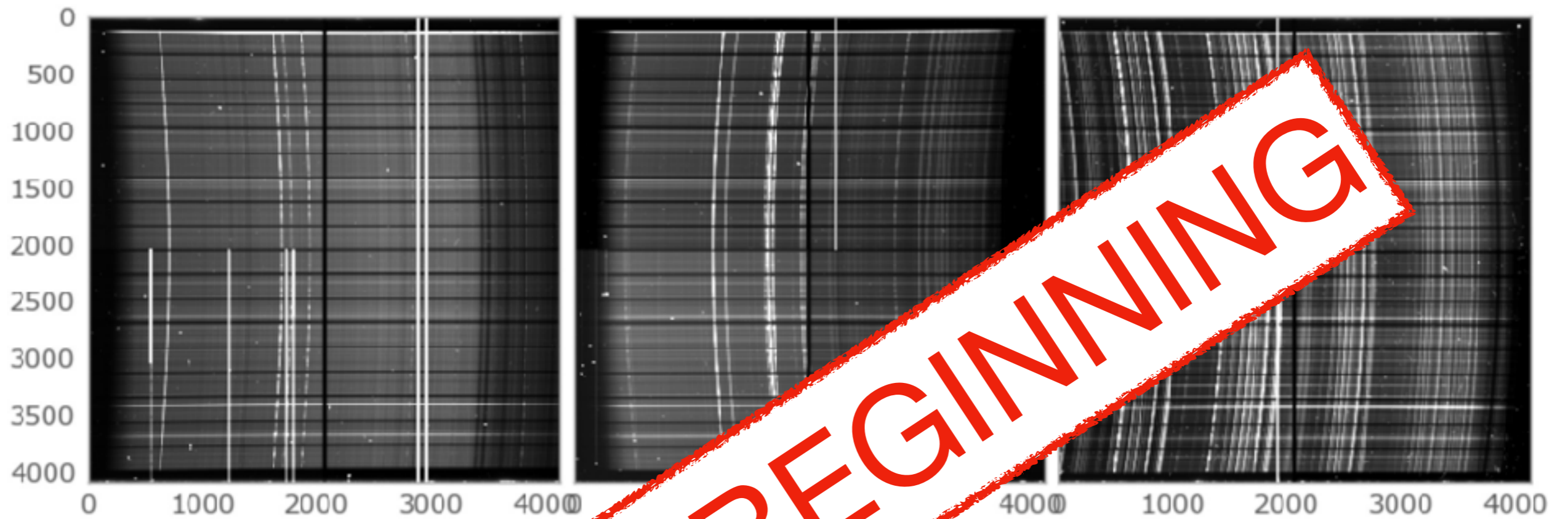
SAIT completed in July 2023 followed by start of science commissioning.



LVM-I SAIT raw and extracted spectra!!!



LVM-I SAIT raw and extracted spectra!!!



The END BEGINNING