



Gemini Observatory Update

Subaru Users' Meeting

March 2021

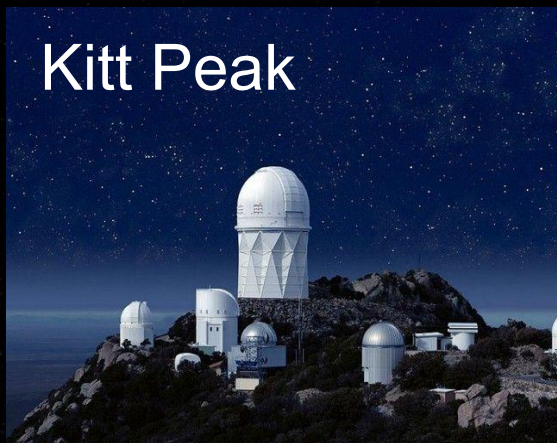


CONTENT

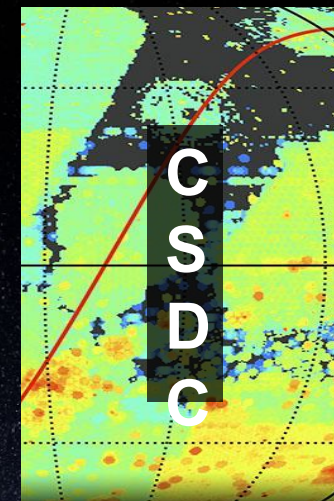
1. NOIRLab Update
2. The Subaru/Gemini Exchange
3. Impact of COVID-19
4. Operations News
5. Development projects
6. High-resolution spectroscopy
7. Time-domain: preparing for Rubin/LSST
8. DRAGONS - data reduction
9. Gemini Program Platform - complete rewrite of user tools
10. GNAO - New AO for Gemini North

NSF's NOIRLab

Kitt Peak



Gemini
With our international partners



Cerro Tololo



Rubin Observatory
Operations
An NSF-DOE Partnership





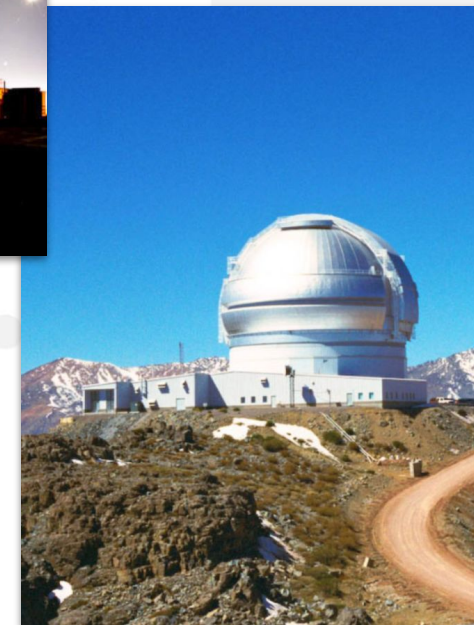
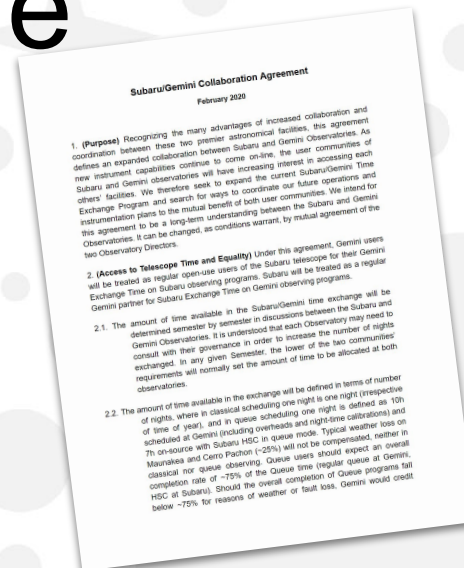
Subaru community = Gemini community members

Access to:

- All modes
 - fast turnaround,
 - regular queue,
 - large and long (one at a time)
 - poor weather
- All instruments

2020 Publications:

10 from Subaru community use of Gemini
(7 include Fast Turnaround data)



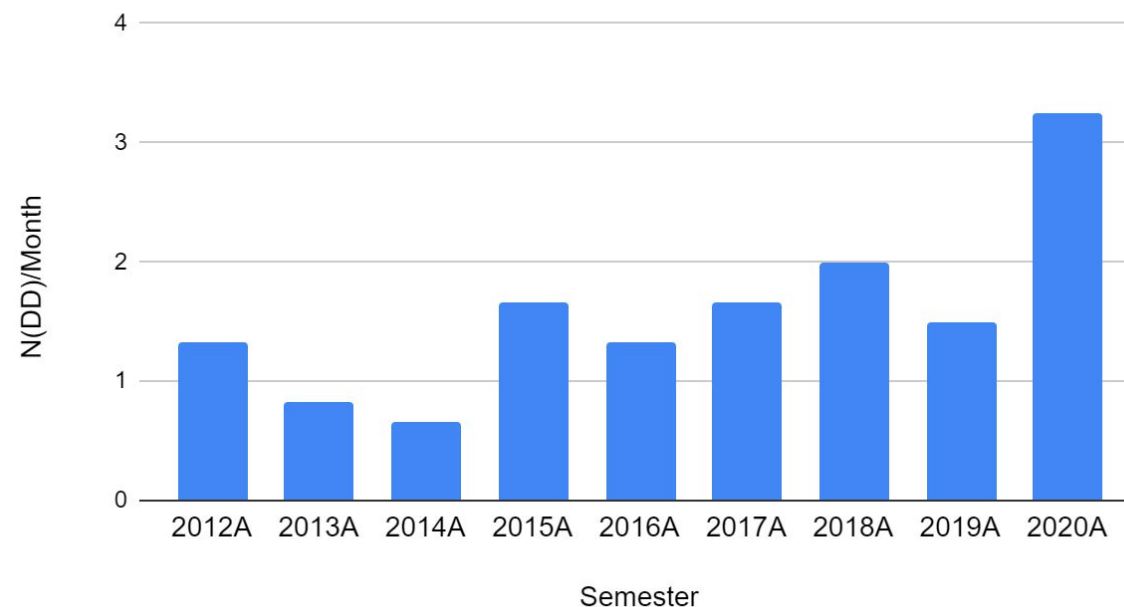
Impact of COVID-19



Impact of COVID-19

- All NOIRLab sites were closed on March 16, 2020
- Gemini North returned to operations in mid-May
- All other NOIRLab sites, including Gemini South, returned to operation in late September

N(DD)/Month vs. Semester





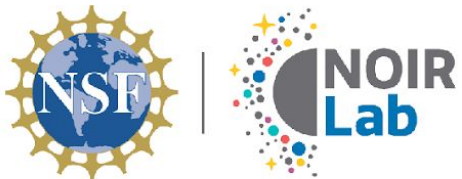
From Last Year...



Coming Year

South	North
• IGRINS returns ✓ • F-2 MOS mode ✕ • GHOST ✕	• MAROON-X ✓
Both • Gemini 20th anniversary science meeting, Korea! ✕	

Operations Updates



Operations news

Gemini North

1. Altair is back (and soon the laser)
2. MAROON-X is up and running at Gemini North

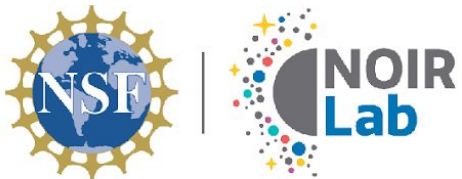
Gemini South

1. FLAMINGOS-2 is back
2. GPI is off the telescope. Next stop: upgrade, then Gemini North
3. IGRINS is on Gemini South for an extended period

Both

- There will be no Visiting Instruments in 2021B (other than the “residents” - `Alopeke, Zorro and MAROON-X)

Instrument Development



Development

1. New Facility-Class Instruments

- GHOST→GS
- SCORPIO→GS
- IGRINS2→GN
- GPI(2)→GN
- GIRMOS→GN

2. Instrument Upgrade Program

- Community-driven: GNIRS IFUs (2021B)

3. GeMS: Improving operational efficiency

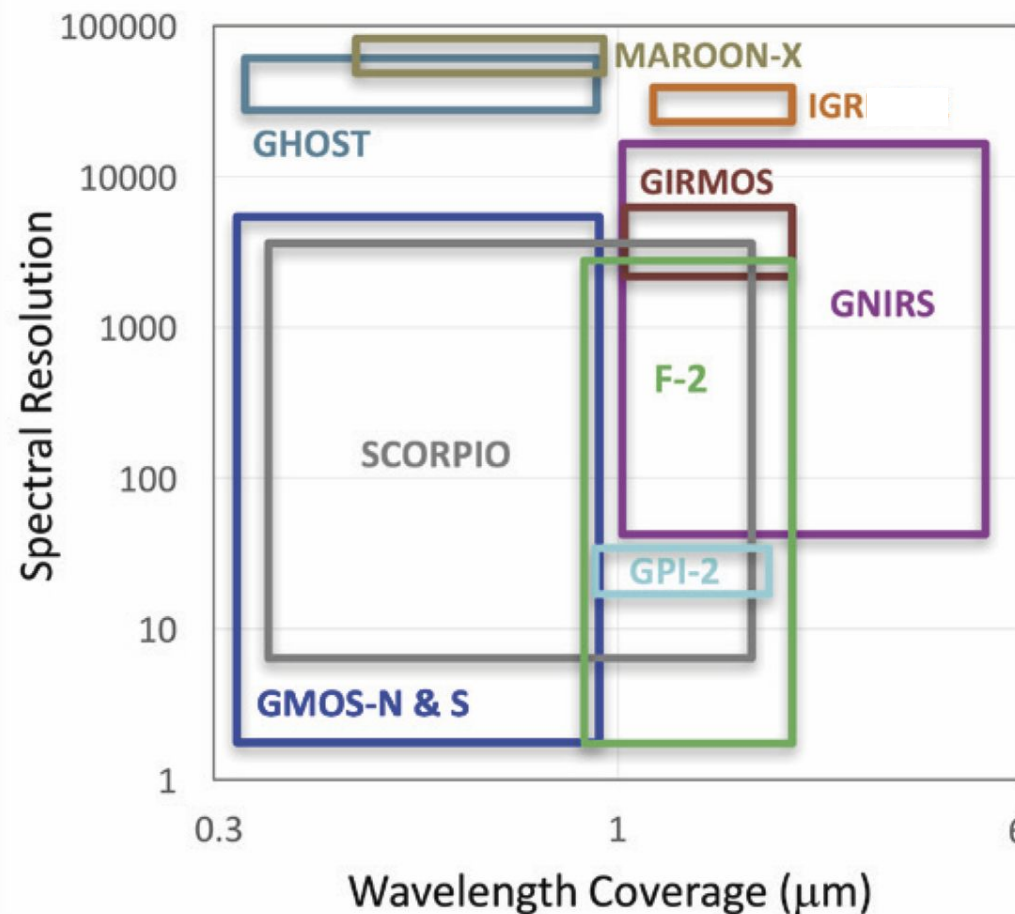
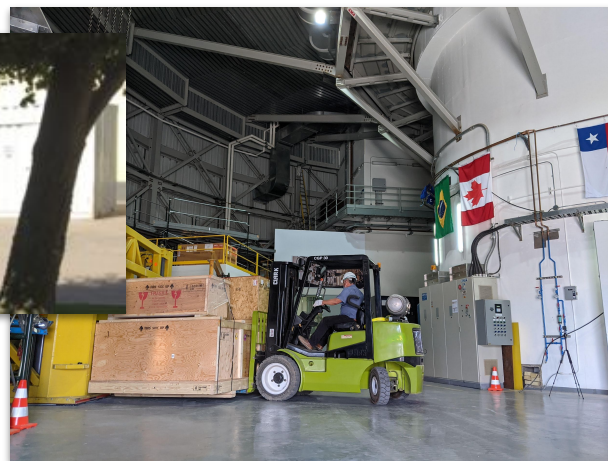
4. Continued AO Development: GNAO (GLAO, LTAO)

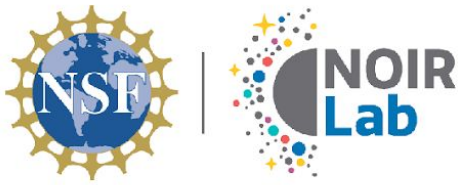


High-Resolution Spectroscopy

Available Now: IGRINS (south) MAROON-X, GRACES (north)

Coming Soon: GHOST (south)





MAROON-X

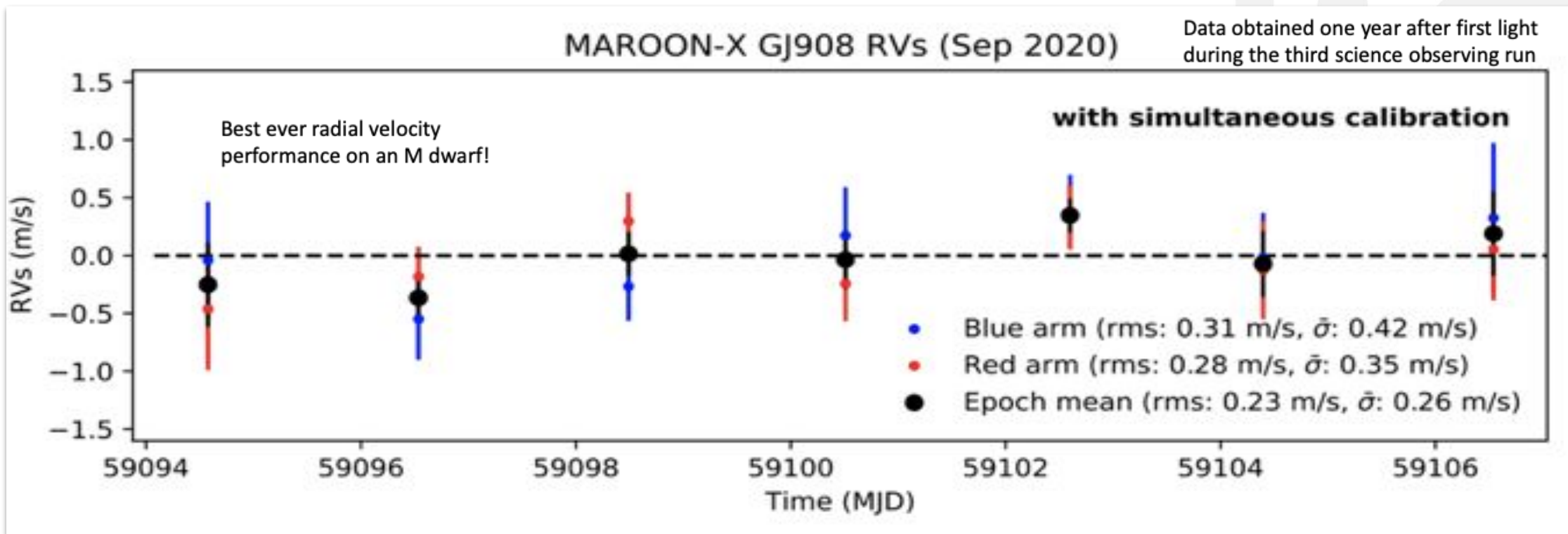
New Radial Velocity Instrument for M Dwarfs at Gemini-N

PI. Jacob Bean, U. Chicago

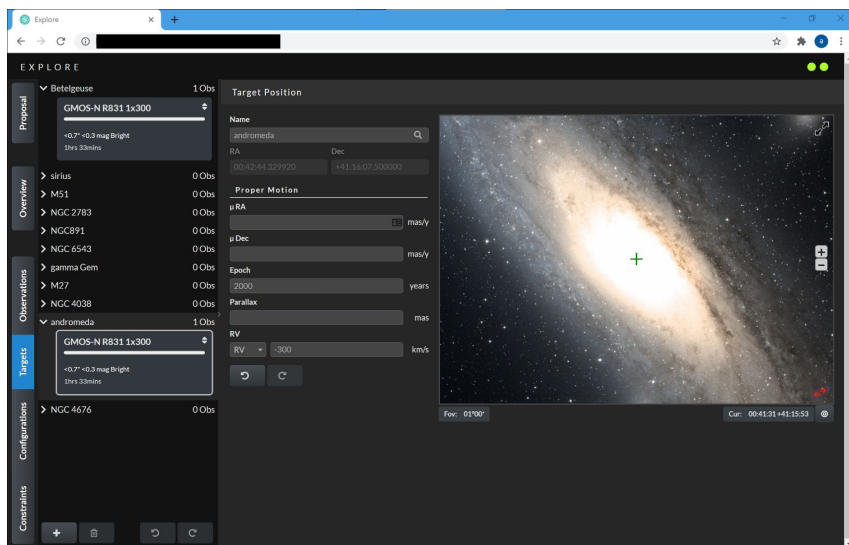
- **Goal:** Sub-m.s⁻¹ precision, reaching late M dwarfs out to 30 pc (V=17).
- **Approach:** highly-stabilized, fiber-fed spectrograph covering 500–900nm at R=85k with simultaneous calibration and pupil slicing.
- **Status:** The instrument is fully operational, first science data have been submitted for publication, open community use began in 2020B.
- **Usage:** Block-scheduled “Resident Visitor” (the MAROON-X team supports observations remotely).

New Radial Velocity Instrument for M Dwarfs at Gemini-N

PI. Jacob Bean, U. Chicago



Preparing for Rubin/LSST



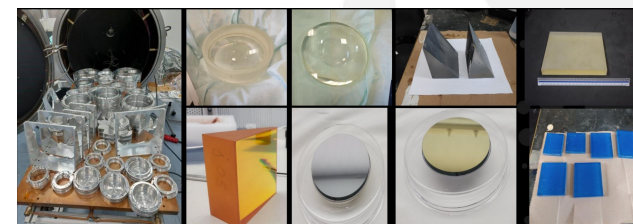
New end-to-end Software for Users



New data reduction software, including pipeline DR for rapid-response modes



Scorpio - wide-band transient follow-up imager and spectrometer (in build phase)





Preparing for Rubin/LSST

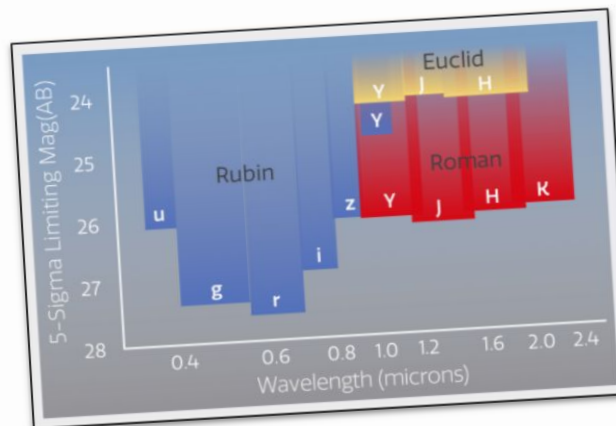
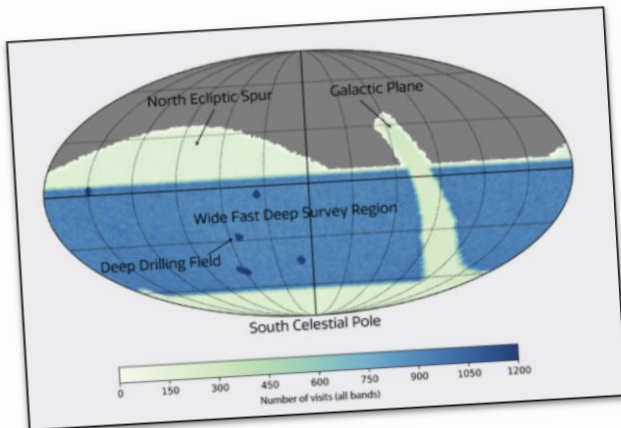


Vera C. Rubin Observatory

The Vera C. Rubin Observatory mission is to create a vast astronomical dataset and web-based analysis environment for unprecedented discovery of the deep and dynamic universe.

Lead the world in Wide-field Survey Astronomy from the Ground

Deploy Rubin as the world's most powerful engine for Time Domain Astronomy



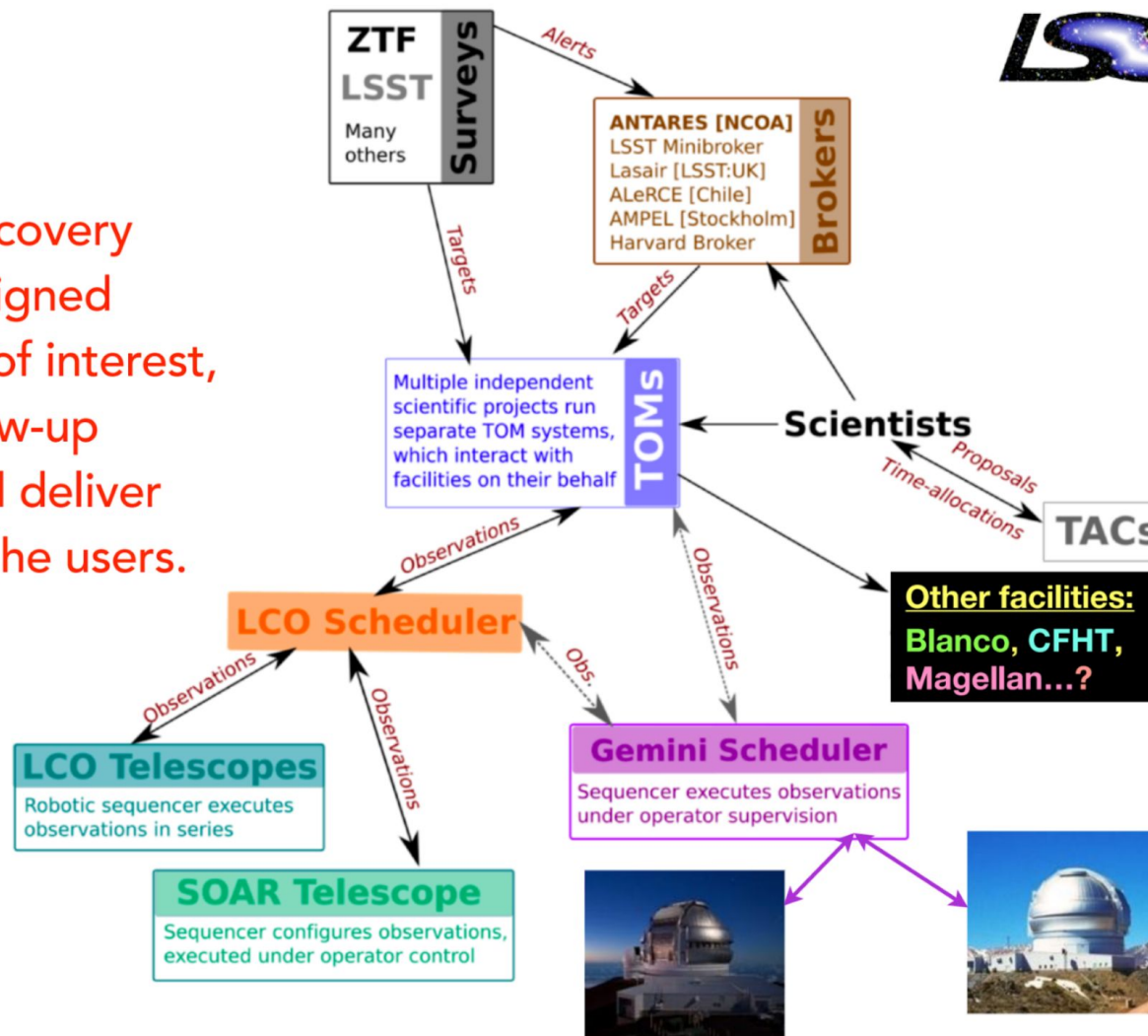
Discovering Our Universe Together
Great Universe together



AEON



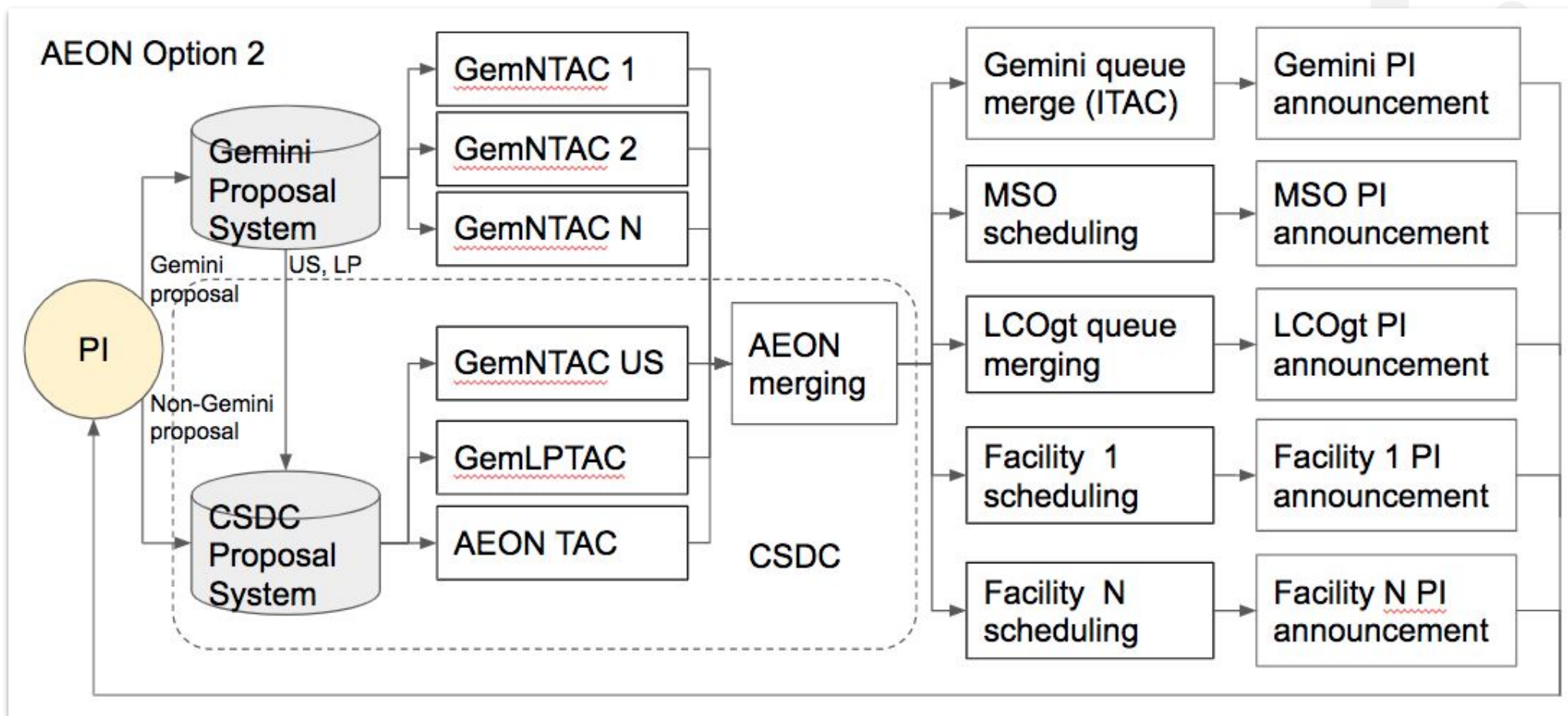
AEON: a new discovery
"ecosystem" designed
to identify alerts of interest,
obtain rapid follow-up
observations, and deliver
reduced data to the users.



Discovering Our Universe Together



AEON Implementation: Time Allocation



Reducing the Data: DRAGONS



DRAGONS - data reduction



Since last year:

- Quicklook spectrum extraction for long-slit spectroscopy @night
- DRAGONS imaging released - all instruments
- IRAF package continues for all spectroscopy

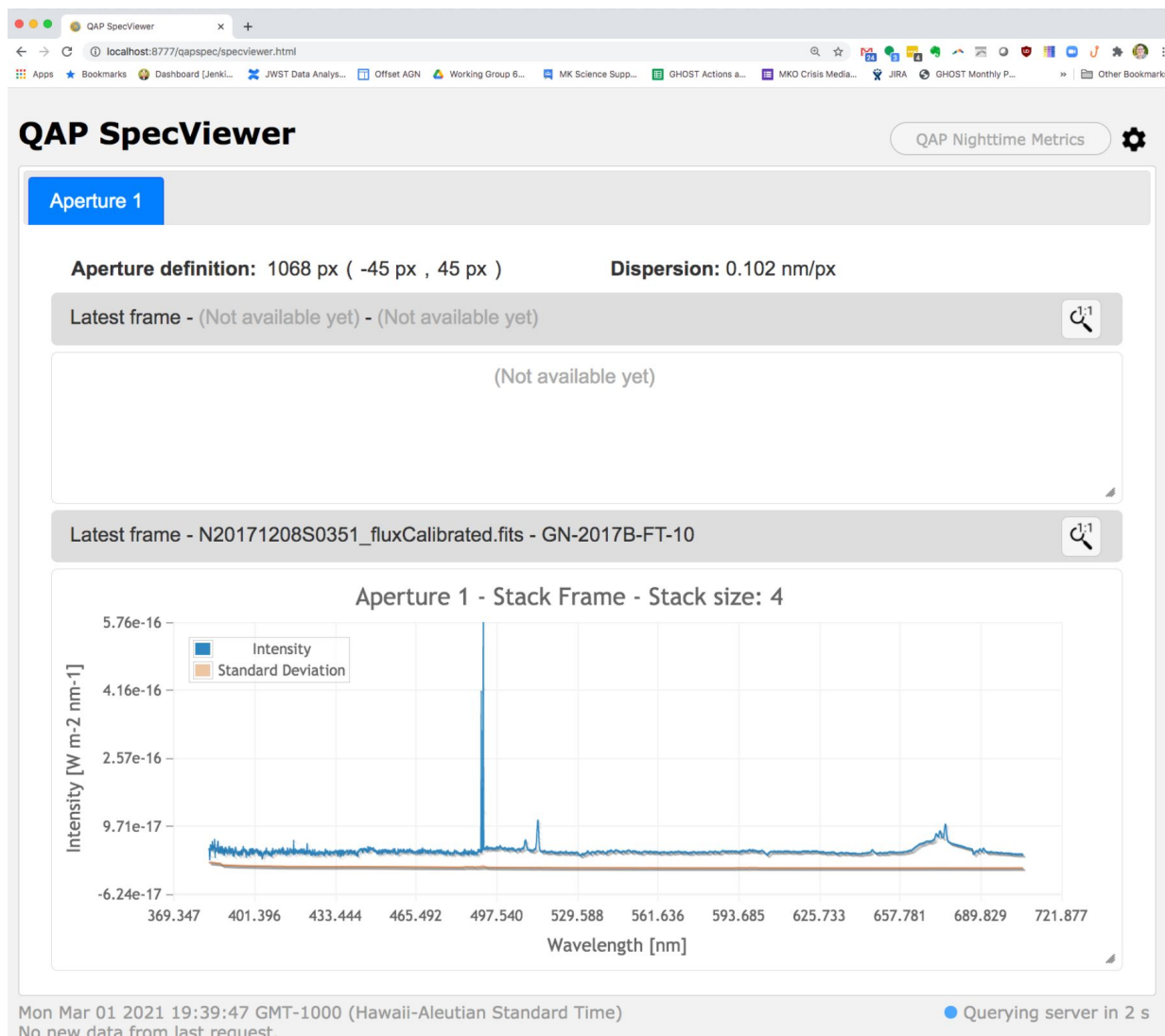
Coming up:

- Near-IR Longslit
- Near-IFU (NIFS, GNIRS)
- GMOS IFU, MOS
- GHOST (DR delivered)
- SCORPIO (DR delivered)



QA Pipeline

1. Web-based specviewer tool now does long-slit extractions in real time at night - useful for ToOs.
2. Equivalent functionality will be added in the distributed DRAGONS tools, but using Python, not JS; release in 2022.





DRAGONS



DRAGONS Documentation

<https://dragons.readthedocs.io/>

Typical Sequence

1. Download data from archive.gemini.edu
2. Create file lists and inspect data.
3. Reduce calibrations (bias, darks, flats) and add to calibration database.
4. Reduce the science data

Docs » DRAGONS Documentation [Edit on GitHub](#)

DRAGONS Documentation

Document ID: PIPE-USER-103_DRAGONSMannual

This document is a collection of links and document IDs making up the DRAGONS documentation.

Tutorials - Reducing data with DRAGONS

- [GMOS Imaging Data Reduction Tutorial](#)
- [NIRC2 Imaging Data Reduction Tutorial](#)
- [Flamingos-2 Imaging Data Reduction Tutorial](#)
- [GSAOI Imaging Data Reduction Tutorial](#)
- [GNIRS Keyhole Imaging Data Reduction Tutorial](#)

DRAGONS Manuals

- [AstroData Cheat Sheet](#) (Document ID: PIPE-USER-105_AstrodataCheatSheet)
- [Astrodata User Manual](#) (Document ID: PIPE-USER-106_AstrodataUserManual)
- [Astrodata Programmer Manual](#) (Document ID: PIPE-USER-104_AstrodataProgManual)
- [Recipe System Programmers Manual](#) (Document ID: PIPE-USER-108_RSProgManual)
- [Recipe System Users Manual](#) (Document ID: PIPE-USER-109_RSUserManual)

Releases

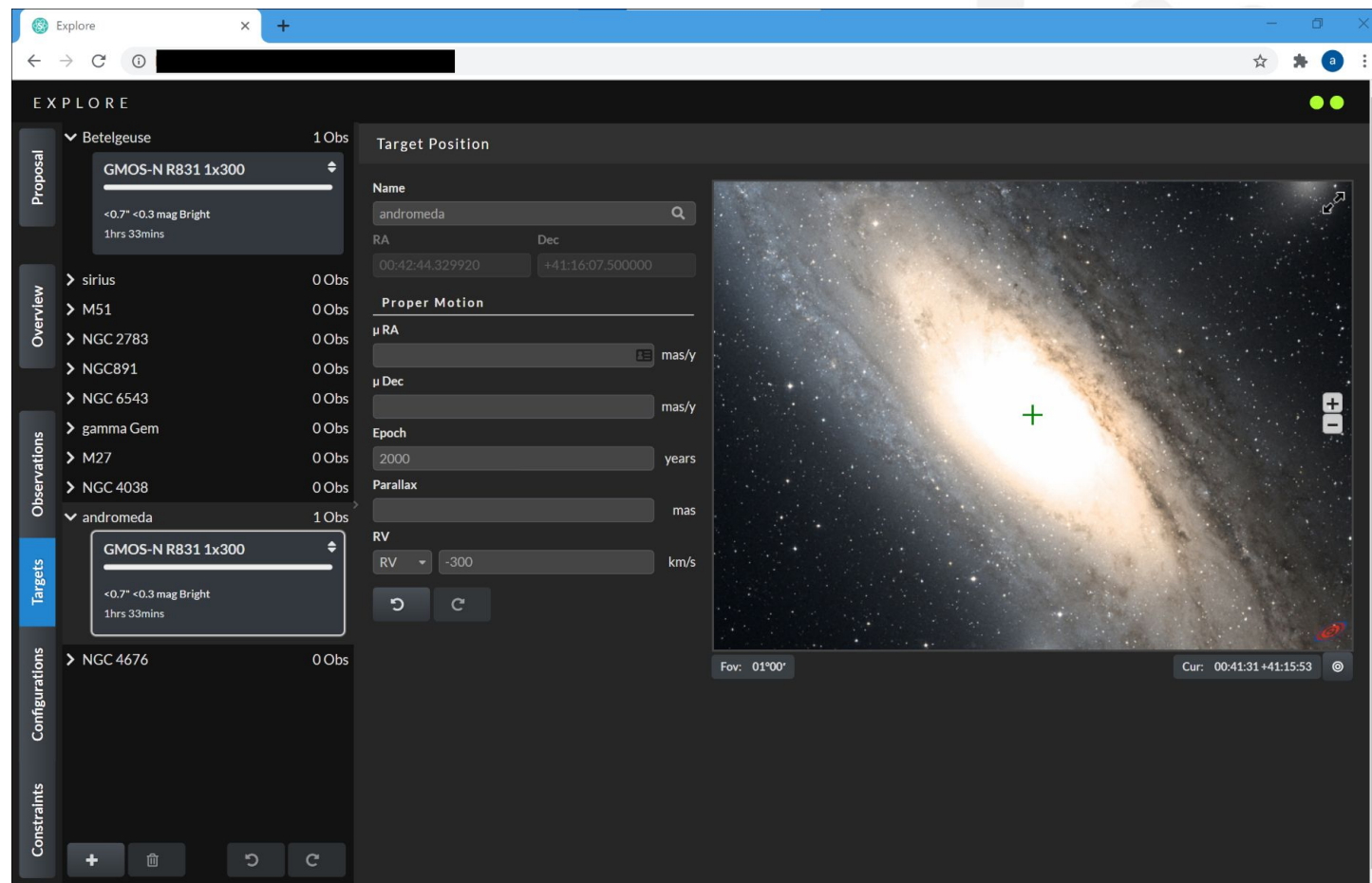
- [Release Notes](#)
- [Change Logs](#)

New User Tools: The GPP

GPP (Gemini Program Platform)

Work progressing on:

1. User tools
2. “Phase 0”
3. Proposal system
4. Central database
5. Automatic scheduler



Gemini North AO Development

GNAO+GIRMOS

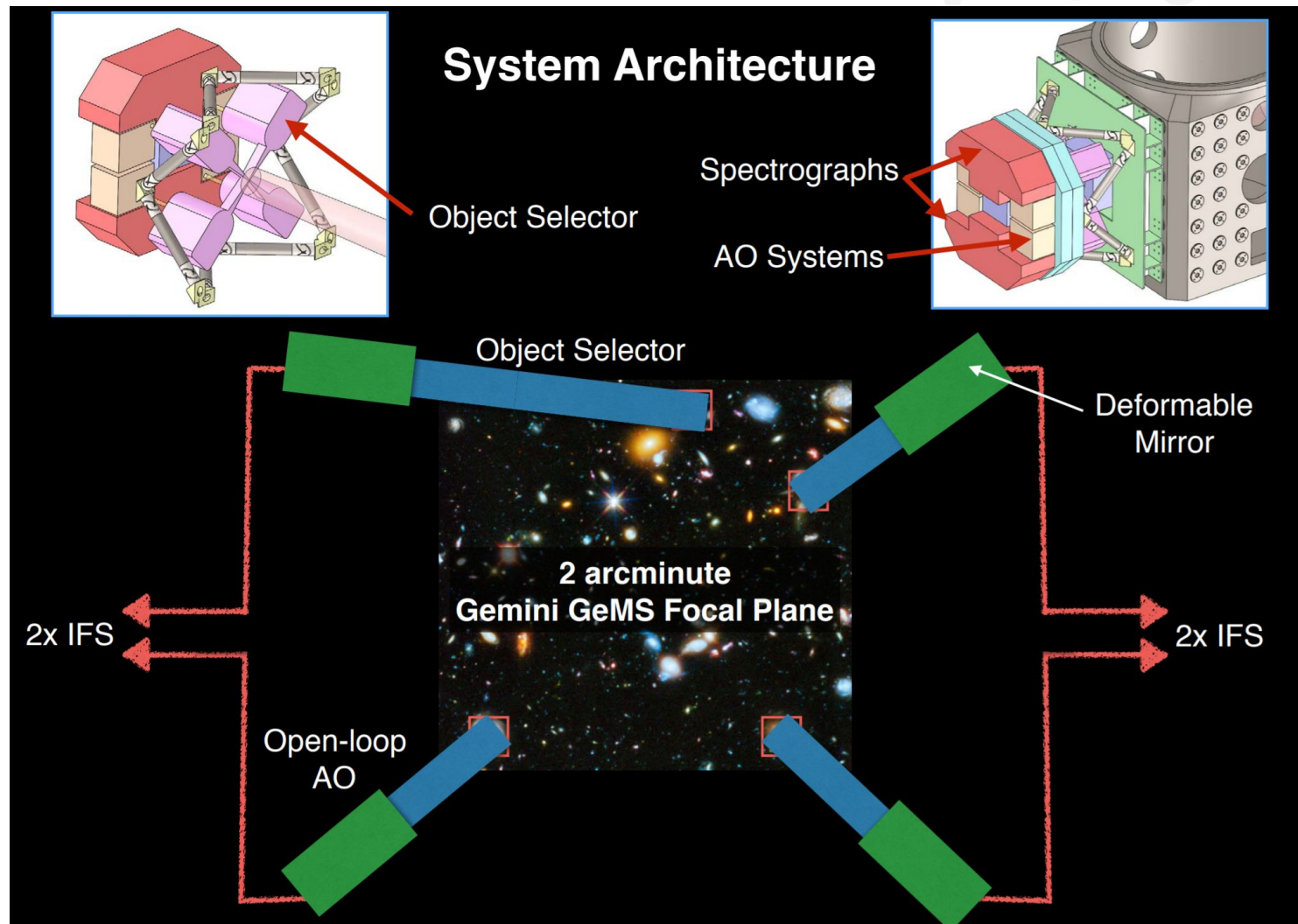
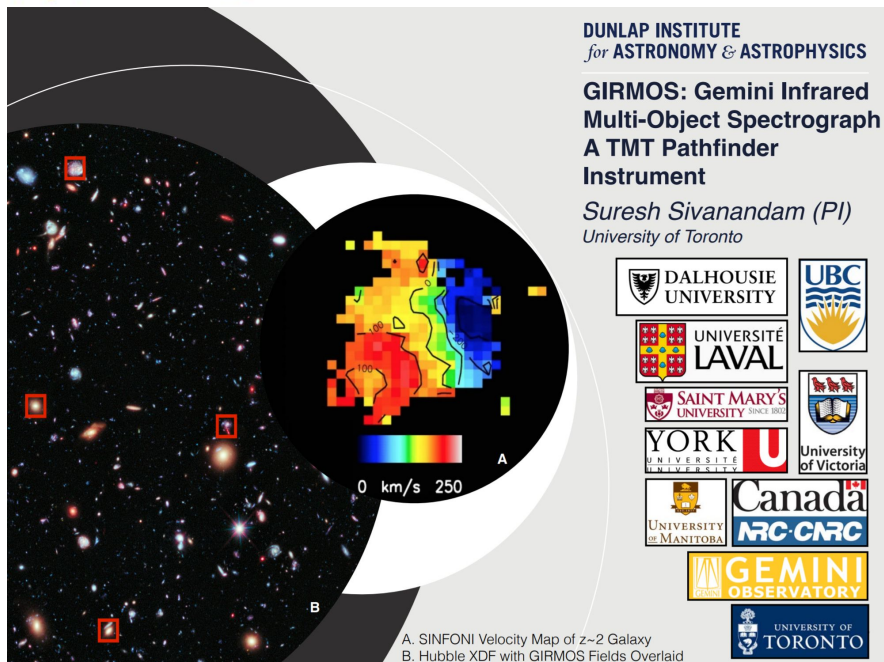


GNAO

- State-of-the-art Adaptive Optics (AO) facility for Gemini North
 - Wide field ground layer AO (GLAO) correction over a 2' circular FOV
 - Laser tomography AO (AO) correction over ~20"x20"
- Provides corrected wavefront to GIRMOS for spectroscopy and imaging science operating in the nightly queue.
- Additional facility upgrade that will ultimately be needed for an Adaptive Secondary Mirror (ASM) GLAO system (independent of GNAO) to any instrument.
- Some work packages are well advanced, such as the new Laser Guidestar Facility that includes four new laser launch telescopes and a second Toptica laser.
- An RfP for the design and build of the Adaptive Optics Bench at the core of GNAO will be released in the second half of 2021. (or "mid 2021").
- First light is anticipated in 2027-2028.



GIRMOS





THANK YOU!

Credit: International Gemini Observatory/NOIRLab/NSF/AURA. Acknowledgment: PI: Patrick Hartigan (Rice University). Image processing: Patrick Hartigan (Rice University), Travis Rector (University of Alaska Anchorage), Mahdi Zamani & Davide de Martin