



Opportunities with the Subaru-Gemini Time Exchange Program

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The Gemini Observatory



Operating two twin 8.1m telescopes
on Mauna Kea and Cerro Pachon:
providing access to the entire sky



Hilo, Hawaii



Mauna Kea
since 1999



Also home of Subaru

Also home of ALMA and ASTR



Cerro Pachon
since 2000



La Serena, Chile

Gemini is managed by **AURA** on behalf of



The Time Exchange agreement

Subaru and Gemini have extended their formal agreement to exchange time

The amount of time exchanged is decided on a semester by semester basis: in 2013A the proposal was for 4 to 10 nights

How? Through the regular SUBARU application process



The Telescopes

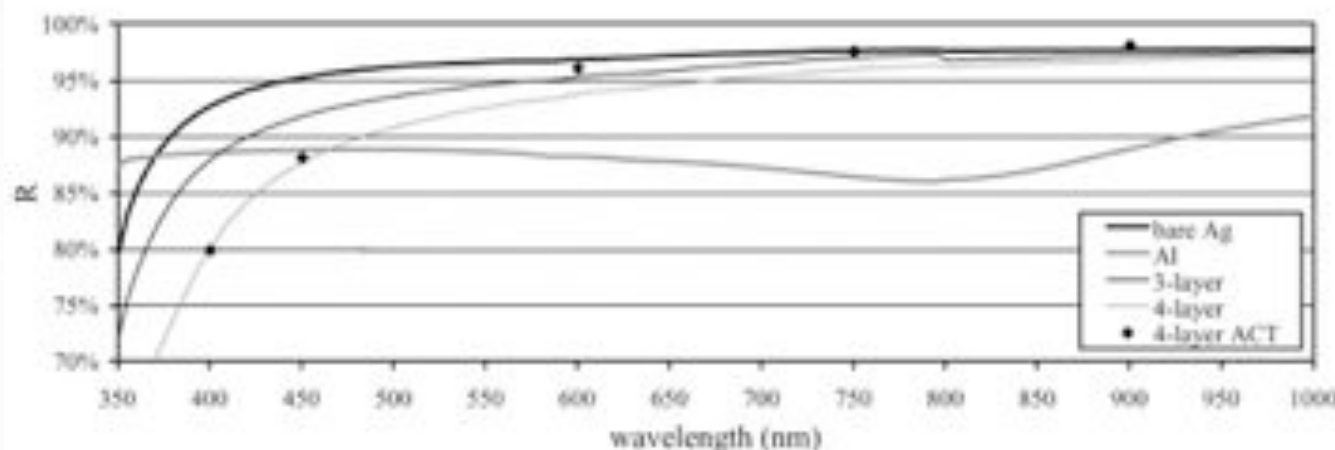
Optical configuration:
Ritchey-Chrétien Cassegrain

Primary Mirror:
f/1.8, 8.1 m diameter, 20cm thick, 22 tons
ULE glass by Corning's Canton and REOSC

Secondary Mirror:
1.0 diameter, Zerodur by Schott and Zeiss
Tip-tilt corrections up to 200Hz

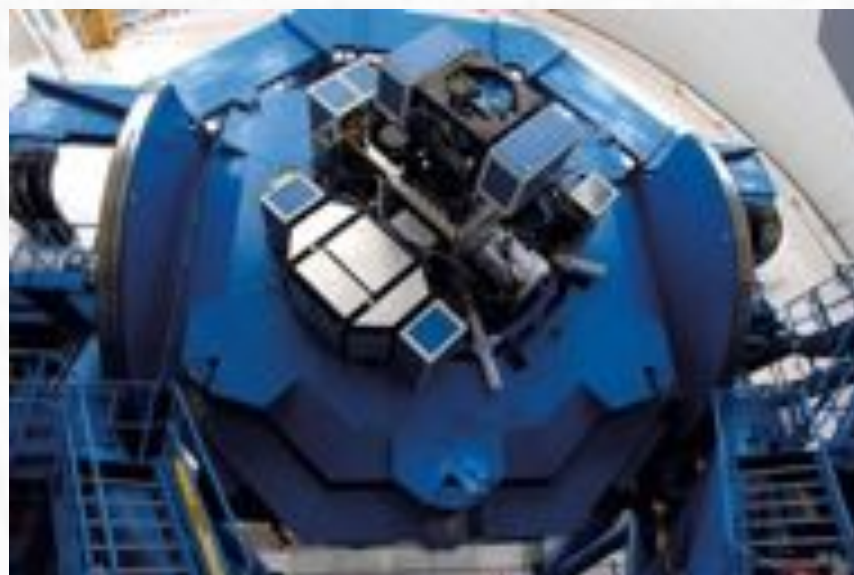
At Cassegrain:
f/16, 1.610mm/arcsec

Coating:
Four-layer protected Silver



Current Instrumentation

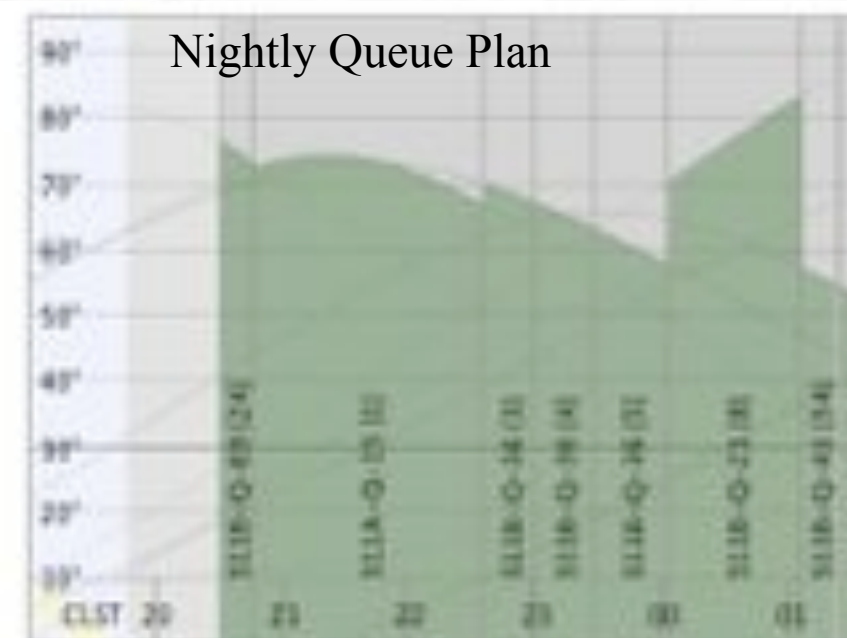
SITE	Instrument	Wavelength range	FoV, Mode, Resolution	AO Support
Gemini-N	GMOS-N	360-940 nm	5.5'x5.5' LS, MOS, IFS (5"x7") R:600-4,000	(ALTAIR)
	NIRI	1-5 μ m	20"x20" - 120"x120" LS R:500-1,000	ALTAIR
	NIFS	950-2400 nm	IFS (3"x3") R:5000	ALTAIR
	GNIRS	1-5 μ m	LS R:1,800-18,000	ALTAIR
Gemini-S	GMOS-S	360-940 nm	5.5'x5.5' MOS, IFS (5"x7") R:600-4,000	NICI AO
	NICI	1-3 μ m	18"x18" imaging, coronagraph	GeMS
	GSAOI	950-2400 nm	85"x85" imaging with MCAO	GeMS
	2013 (<i>FLAMINGOS-2</i>)	950-2400 nm	6.1' \varnothing LS, MOS (2'x6') R: 1,200-3,000	(GeMS)
	2013 (<i>GPI</i>)	900-2400 nm	IFU 2.8"x2.8" contrast: 10^7 at 0.4"	(XAO)
	2016 (<i>GHOS</i>)	360-1000 nm	2 IFUs in 7' \varnothing R: 50,000 + 75,000	(None)



Gemini Operations

80-90% Queue mode:

- Opening the time domain:
Targets can be spread in RA
- Flexible observing:
The weather condition can be specified
- Rapid response:
Triggers result in observations within 24h



Data available in the  **Gemini Science Archive** by 

Observing modes

- Queue mode (80-90%)
- Classical mode (10-20%)

Queue support - being deployed:

- Eavesdropping



Classical support - coming soon:

- Base Facility operations \Rightarrow
- Remote observing

Of interest to the Subaru users



- Flexibility in the time domain
- Observing the Southern Sky
- Using Gemini's unique instruments

Flexibility in the time domain

Flexibility in the time domain

Allows you:

- to request (multiple) time-critical observations
(transiting exo-planets; multiple epochs of variables; ...)
- to request targets of opportunities and trigger observations to be performed within 24h
(GRBs; supernovae; follow-up of space-based observations; ...)
- to spread targets in RA over the semester

Observing the Southern Sky

Southern Sky



Subaru latitude $+19^\circ$



ALMA latitude -23°

Gemini-South latitude -30°



Gemini South is better suited for:

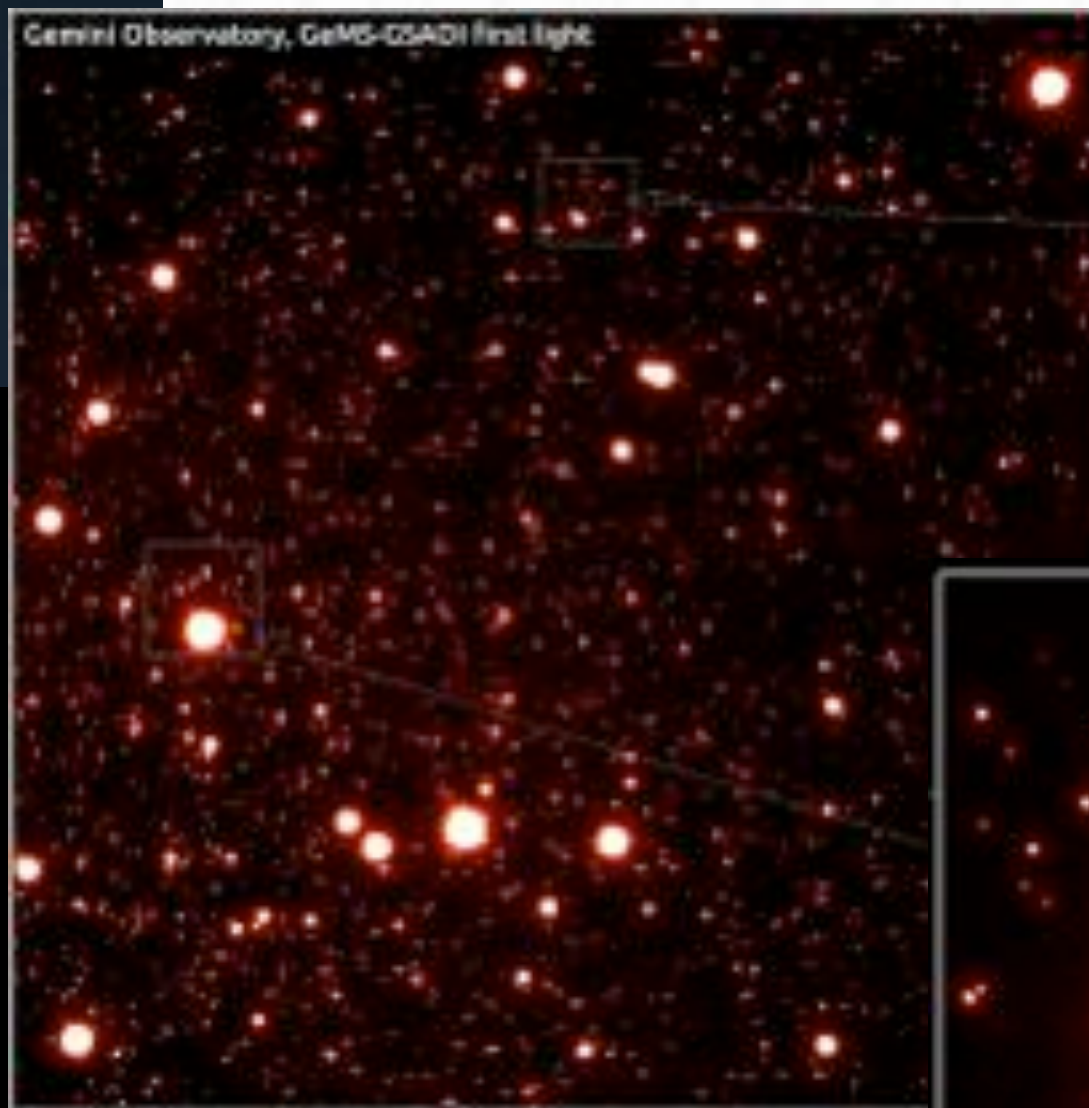
- ALMA follow-up programs
- but also ASTE, VLT, Magellan, DES, LSST, ...

Gemini's Unique Instruments

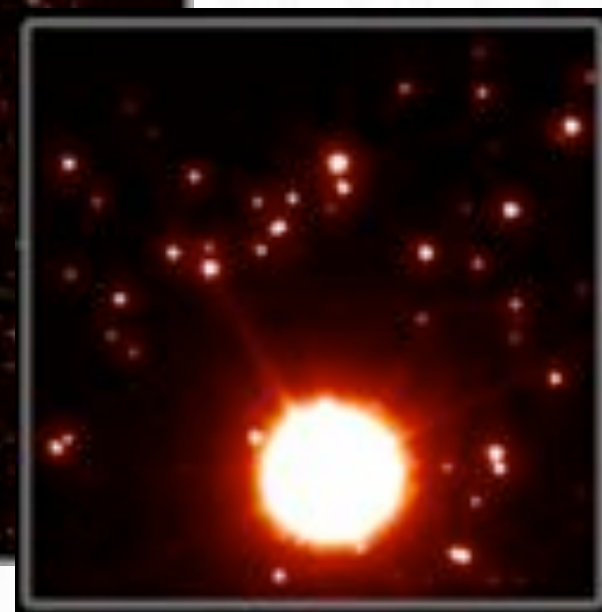
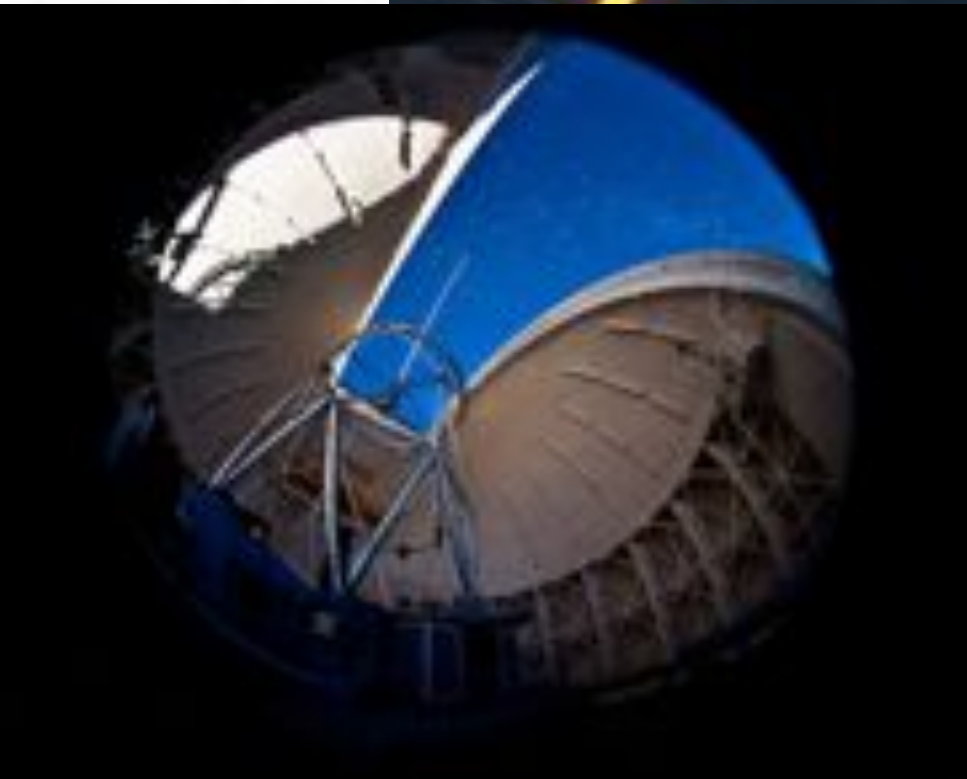


Multi-conjugated Adaptive Optics

GeMS feeds **GSAOI**: 0.9-2.4 μm , 87"x87" FoV, 20 mas pixels

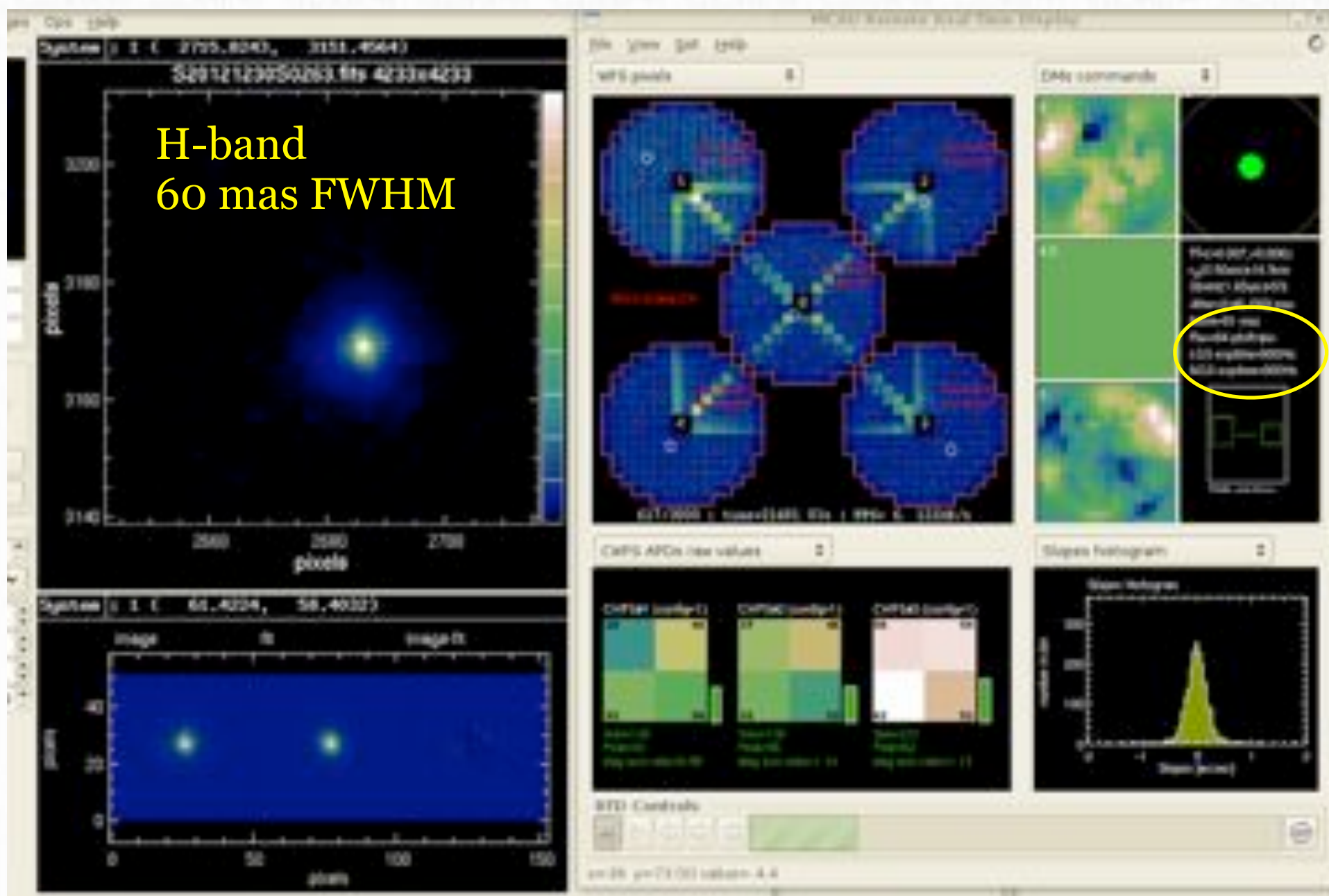


Field of view 87"x 87"
H band
FWHM = 0.080"
FWHM rms = 0.002"



Multi-conjugated Adaptive Optics

GSAOI status:
available in 2013A, currently doing system verification



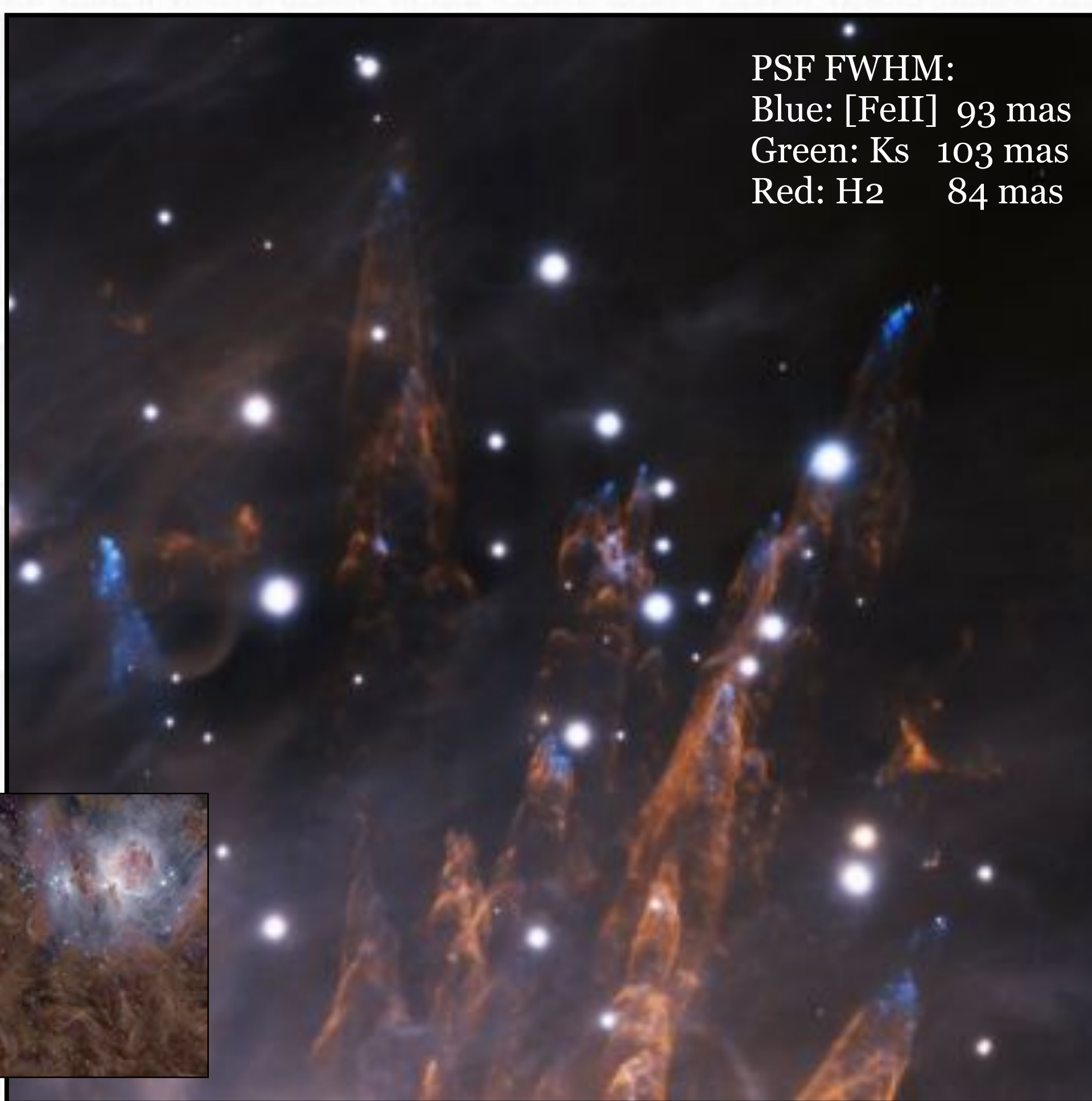
Orion bullet region

GeMS+GSAOI

seeing 0.8"-1.1"

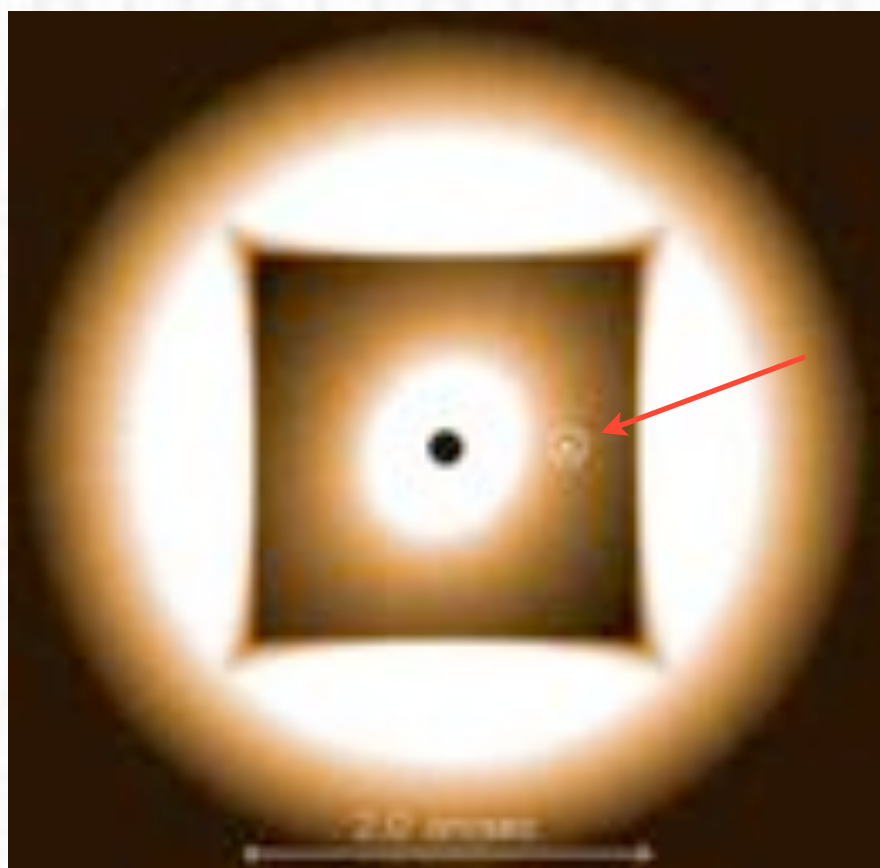
From 1.0" to 0.1"

PSF FWHM:
Blue: [FeII] 93 mas
Green: Ks 103 mas
Red: H2 84 mas

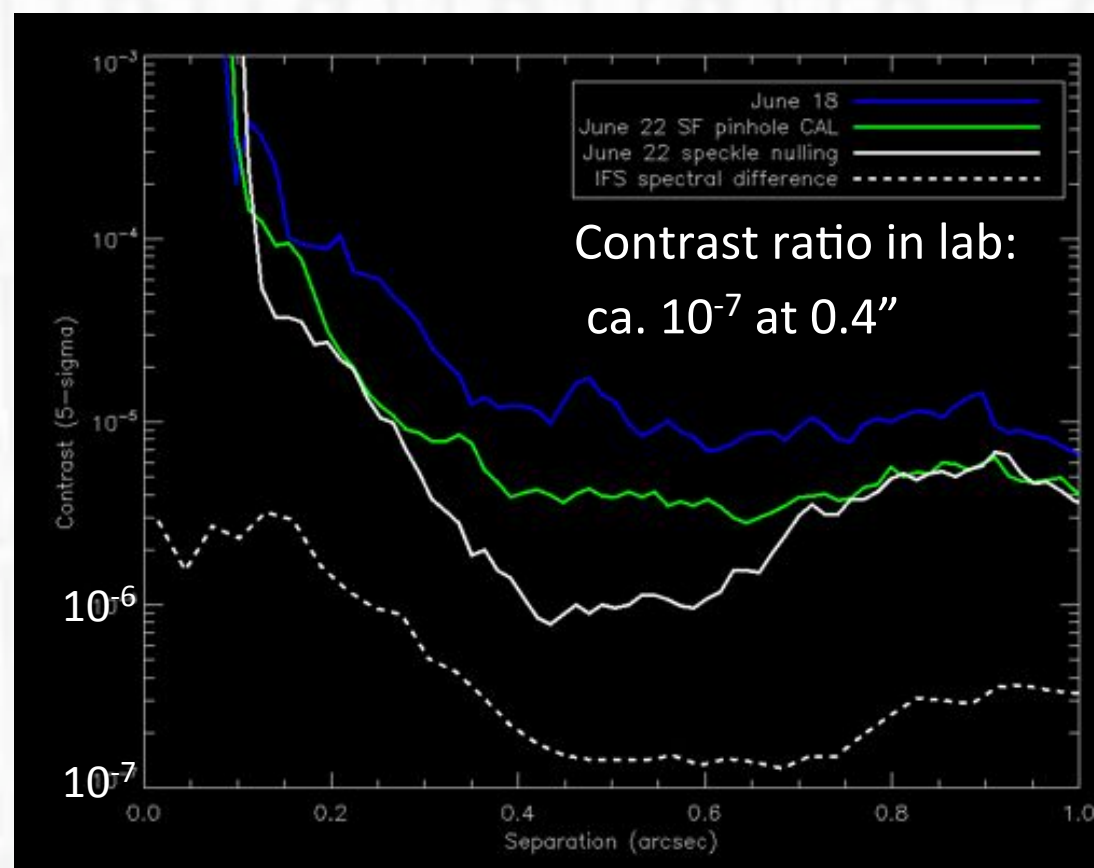


Gemini Planet Imager

Status: passed readiness review in December; acceptance in May; shipping in June; commissioning in July; offered end of 2013



GPI simulation



GPI lab measurement



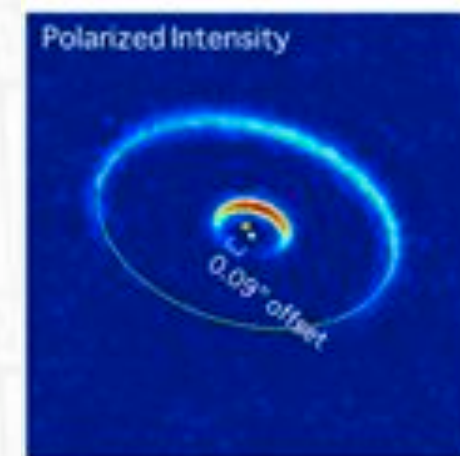
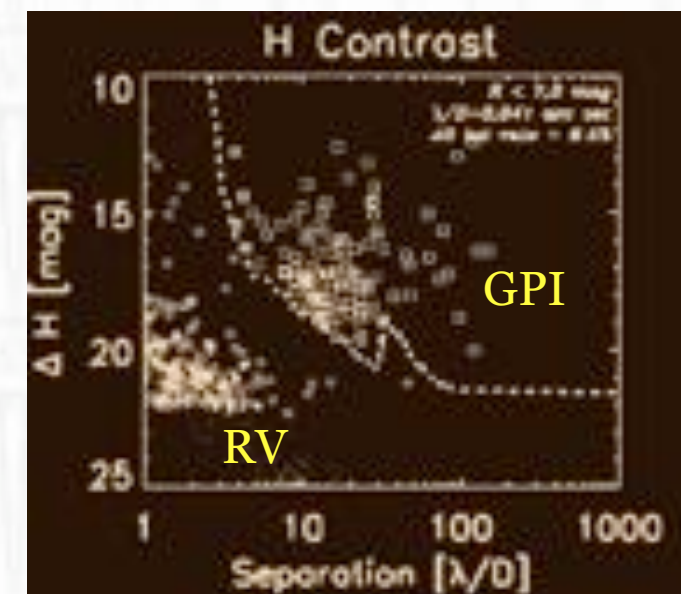
Gemini Planet Imager

Science with GPI:

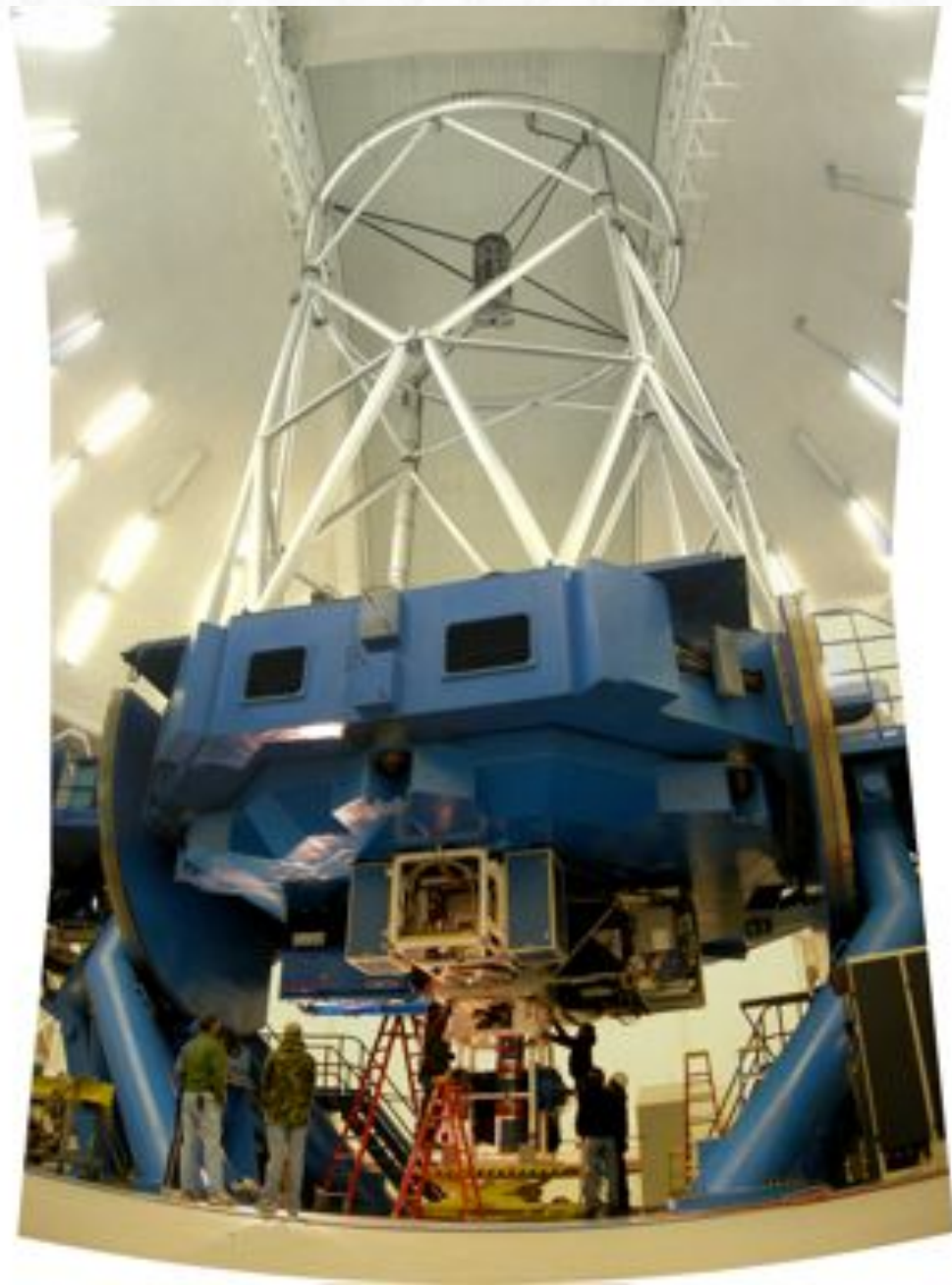
Exoplanets: detect planets in the outer regions (>5 AU) of planetary system around main-sequence stars

Circumstellar disks: study of polarized light from debris disks

Solar system: surface of Gas giant moons; shape and composition of asteroids; atmospheric activity of Uranus and Neptune



Texes returns to Gemini-North



High spectral and spatial resolution, MIR grating spectrograph

On IRTF since 2000; On Gemini in 2006 and 2007;
Offered for collaborative projects to the Gemini Community in 2013B

Operates between 4.5 and 25 μm

0.5% spectral coverage

$R = 80,000$ (4 km/s) with 2"- 5" long slit

$R=10,000-15,000$ with 20" long slit

Team helps with proposals and interpretation,
makes observations, and reduces data

John Lacy (PI), UT Austin

Matt Richter (Galactic and extragalactic), UC Davis

Tommy Greathouse (Solar System), SWRI

Dan Jaffe, UT Austin

Summary



The **Subaru - Gemini time exchange** offers a unique opportunity to join the forces of the two observatories

Of special interest to the Japanese community:

- Flexibility in the time domain
- Observing the Southern Sky
- Using Gemini's unique instruments



どうもありがとう