



Status Updates of Subaru Telescope

The First Year of Open Use

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Project Overview

Subaru Telescope

- is an 8.2-m optical/infrared telescope project that sits atop of Mauna Kea, Hawaii.
- is a 100% Japanese national project operated by National Astronomical Observatory of Japan (NAOJ).
- is also the name of institute under NAOJ. NAOJ is an inter-university national research institute under the Ministry of Education, Culture, Sports, Science, and Technology (文部科学省).
- is a 400 million dollar project.
- had an astronomical first light in January, 1999.
- was completed and handed over in 1999.
- “Risk-shared” open use started in December 2000.

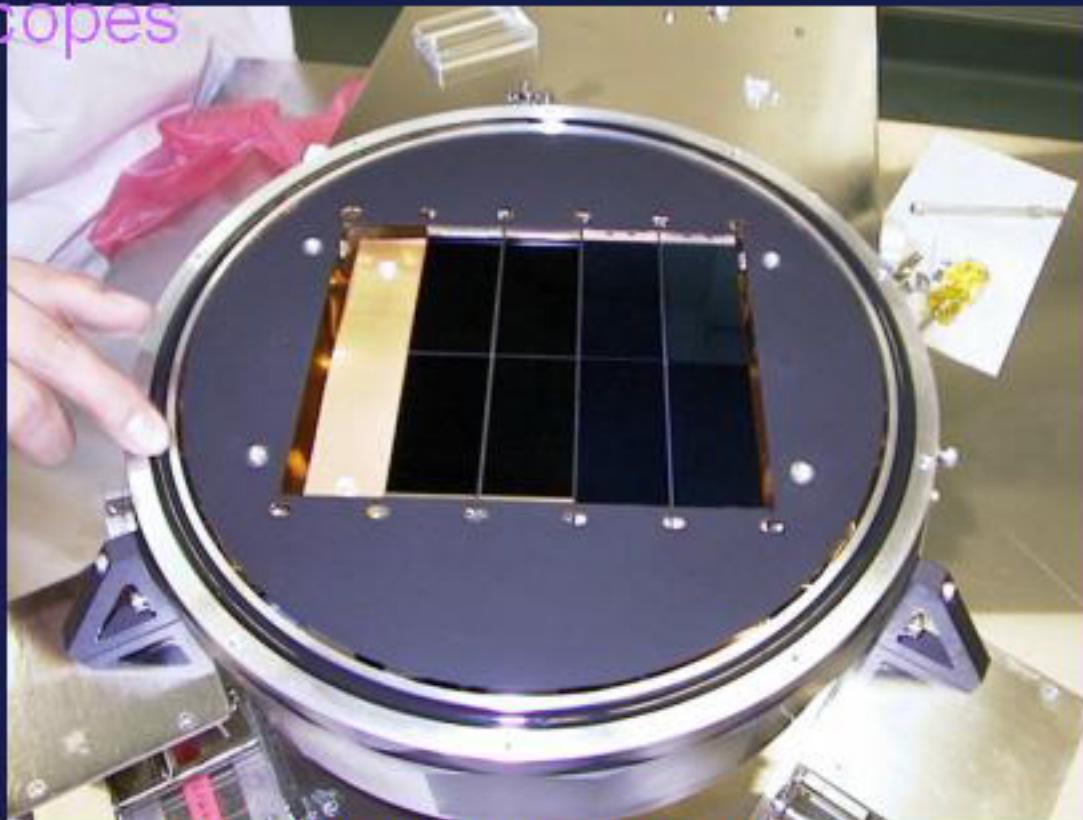


Instruments and Scientific Outputs



Suprime Cam

- An optical camera with the largest field of view (30 arcmin) among 8-m class telescopes





- Compact clusters, dark globules and fibrous features were newly found.
- Maximum angular resolution obtained by Suprime-Cam is 0.3 arcsec.



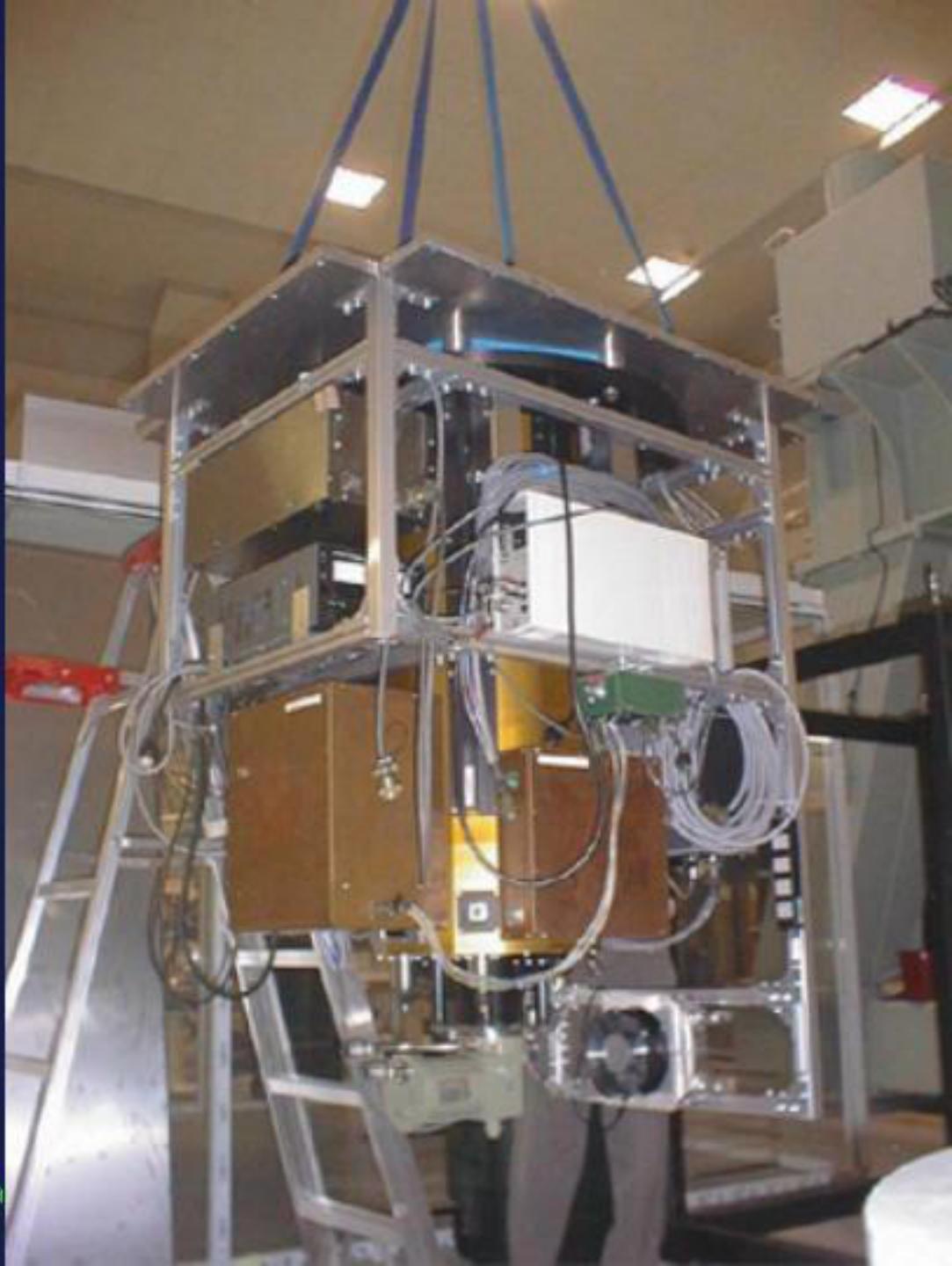
Close-up View of Andromeda Galaxy (M31)

Suprime-Cam (B, V, H α)

Subaru Telescope, National Astronomical Observatory of Japan September 7, 2001

CISCO/OHS

- * Very stable IR imager (CISCO) and OH-airglow suppression spectrograph (OHS)



- This image has revealed hundreds of faint young objects around IRS4 and throughout the surrounding nebula.
- The mass of these objects is less than 0.08 times that of our Sun.
- They are considered to be young brown dwarfs.



Star-forming Region S106 IRS4

Subaru Telescope, National Astronomical Observatory of Japan

CISCO (J, H, K')

February 13, 2001

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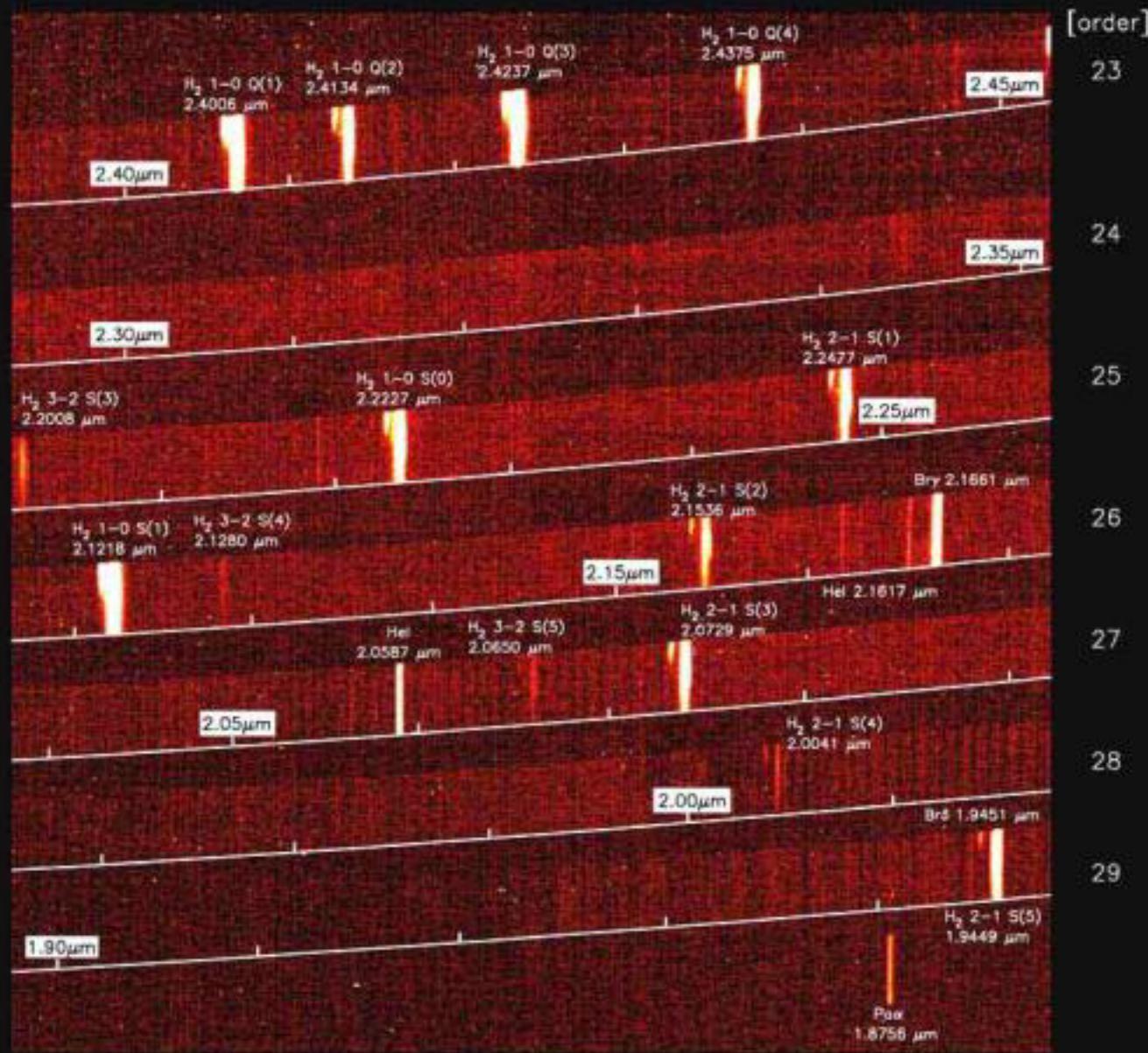
IRCS

- Camera and spectrograph for near infrared.
- Maximum spatial resolution in combination with AO.
- Covers low to high spectral resolutions.



IRCS mounted at the Cassegrain focus
(support scientist Hiroshi Terada in the foreground)

すばる望遠鏡のカセグレン焦点に搭載された IRCS
(サポートサイエンティストの寺田宏)

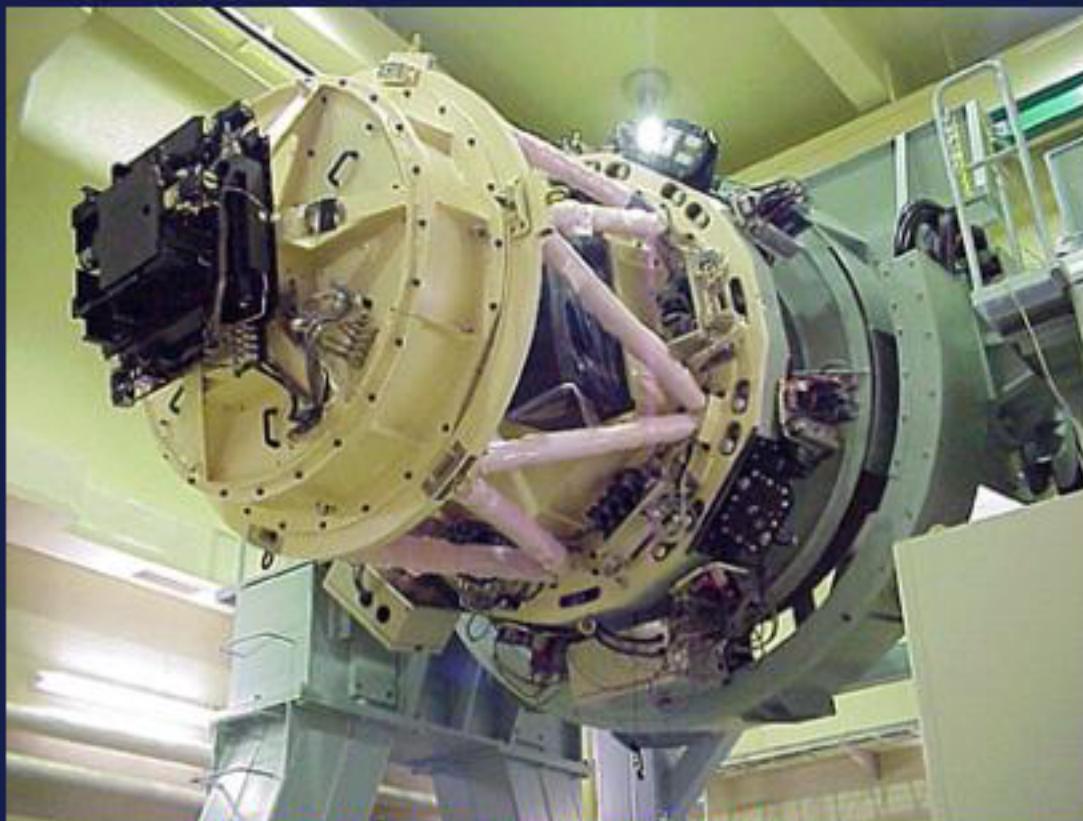


IRCS echelle spectrum of the Orion Nebula
IRCS のエッシェル分光器によるオリオン星雲のスペクトル



FOCAS

- * Diffractive optics make it high quantum efficiency.

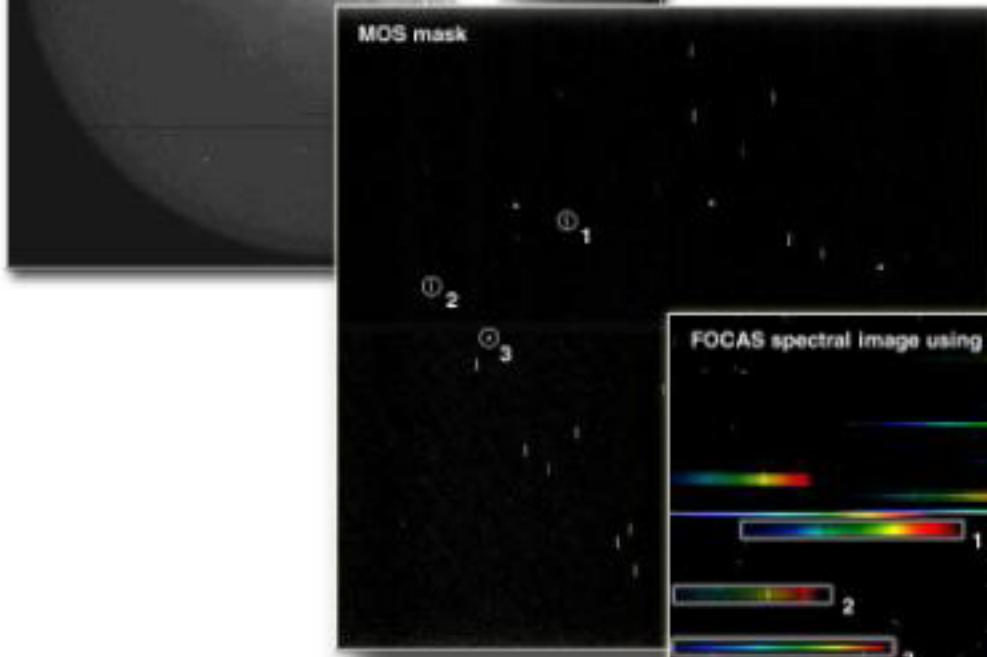


FOCAS direct image

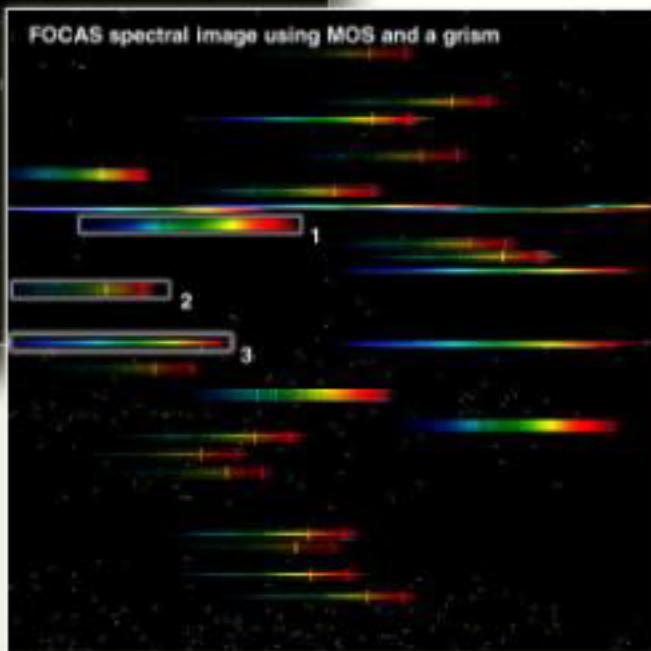


- ✿ MOS(Multi-object Spectroscopy) mode is now available.

MOS mask



FOCAS spectral image using MOS and a grism





AO

- Image quality improving from 0.33 arcsec in the left figure to 0.07 arcsec in the right figure.
- The fringe which can be seen around the star in the right figure indicates that we are very close to the diffraction-limited performance of Subaru.

IRCS only

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The Fifth East Asian Meeting on Astronomy -
Taipei

AO + IRCS



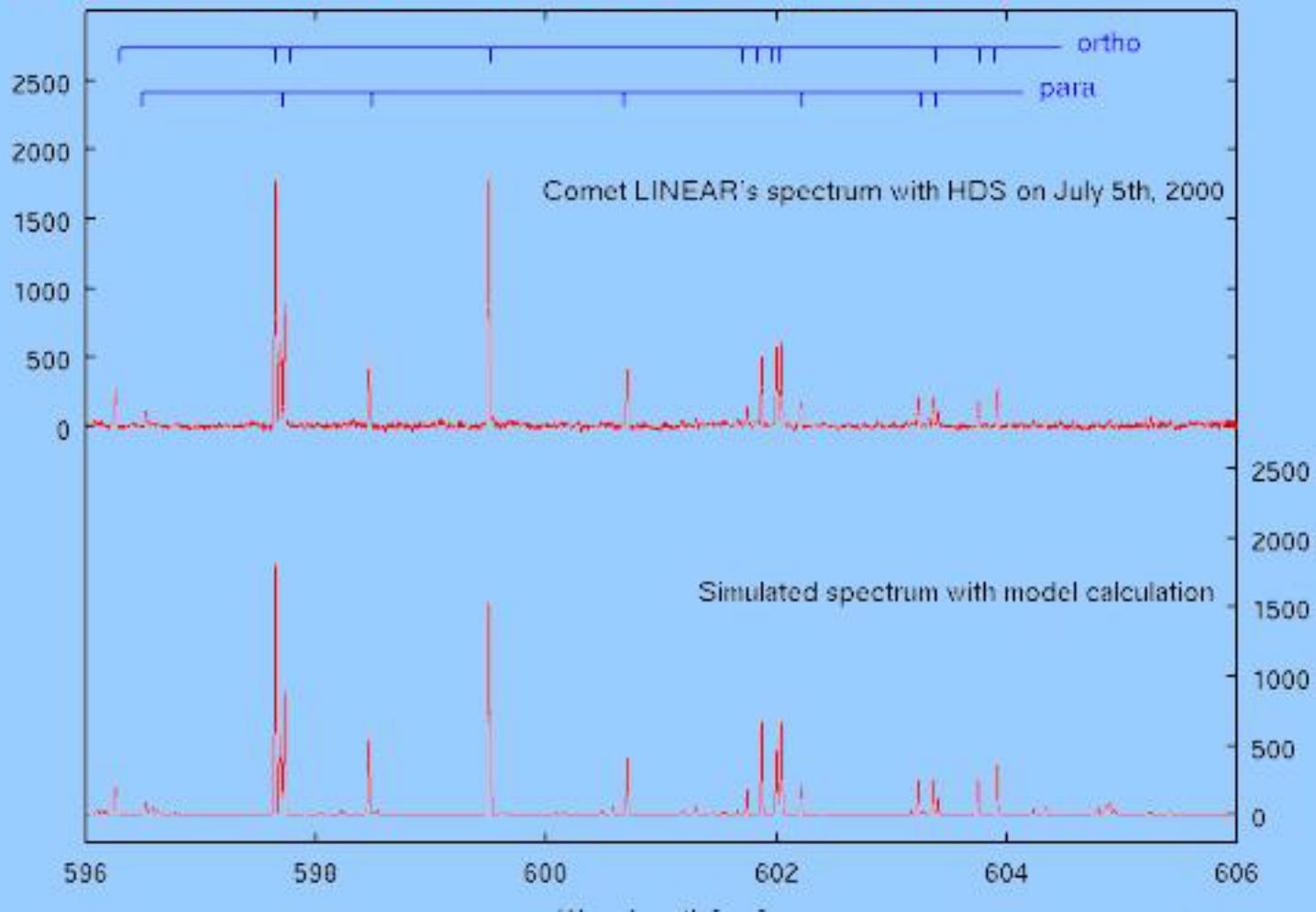
HDS

- ④ A combination with Subaru makes high-dispersion (up to 100,000) spectra possible to the faintest objects that have ever been made.





- The model fitting of ortho and para emission of NH₂ revealed the temperature when ice was formed in Comet C/1999 S4 (Linear).





Instrument Specifications

Spectroscopic Capabilities

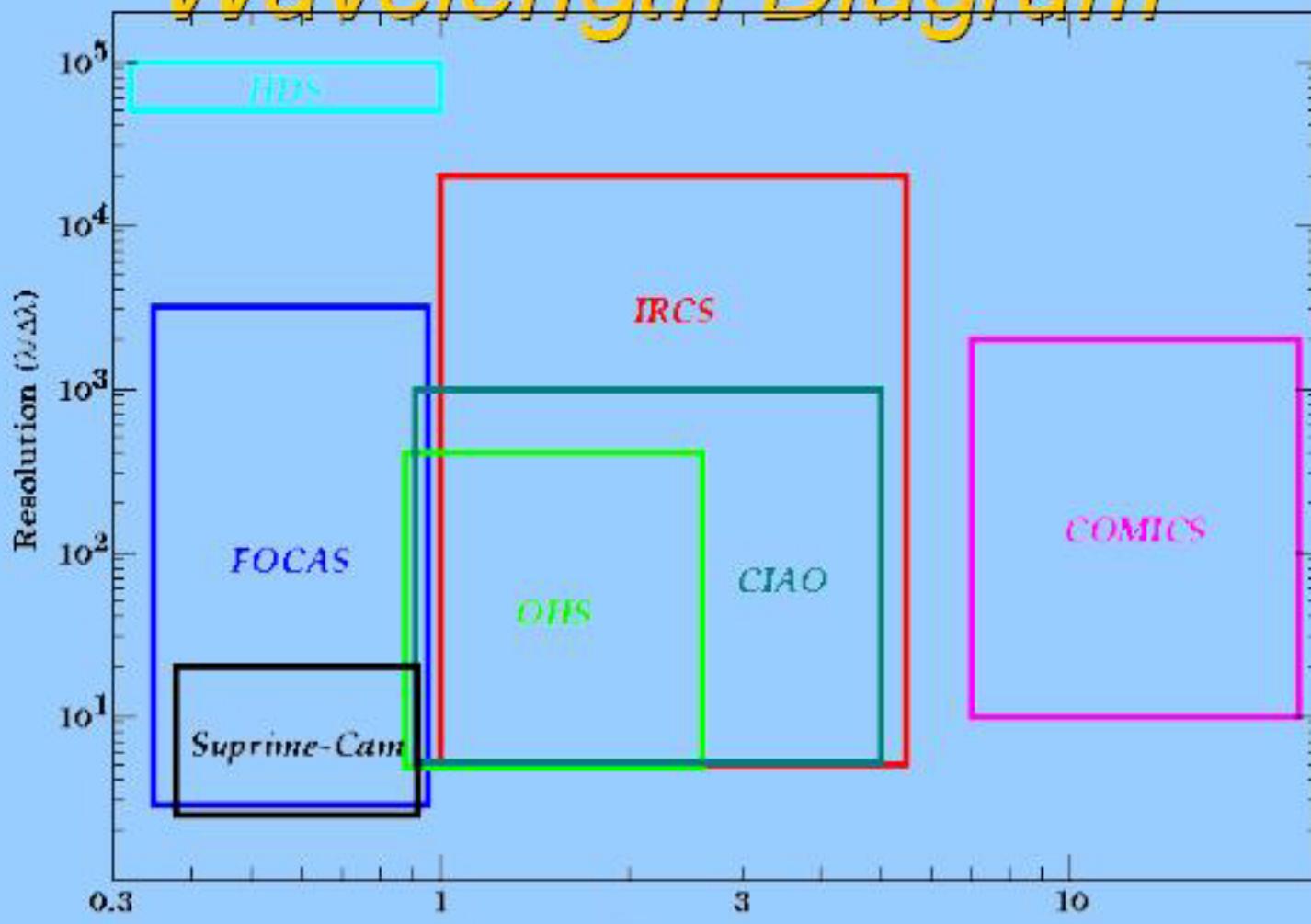
Instrument	Resolution	Slit length	Pixel scale
CIAO	300-1200 (0.06,1.0")	25"	0.024"
COMICS	2000 (0.33")	40"	0.165"
FOCAS	250-2000 (0.4")	6', multi	0.1"
HDS	100 000 (0.38")	10",60"	0.13"
IRCS (grism)	200-1400 (0.15-0.90")	24",60"	0.023",0.058"
IRCS (echelle)	5 000-20 000 (0.15-0.60")	4.8-9.6"	0.075"
OHS/CISCO	300-1000 (0.5-1.0")	20",60"	0.11"

Imaging Capabilities

Instrument	Field of view	Pixel scale	Filters
CIAO	12,25,30"	0.012,0.024"	20
CISCO	110"	0.11"	14
COMICS	42 x 32"	0.133"	12
FOCAS	6' diameter	0.1"	14
IRCS	23,60"	0.023",0.058"	18
Suprime-Cam	30' x 24'	0.20"	10



Instrument Resolution-Wavelength Diagram





Instruments used for open use

Instrument	S00b	S01a	S01b	S02a
IRCS	✓	✓	✓	✓
Suprime-Cam	✓		✓	✓
FOCAS		✓	✓	✓
HDS		✓	✓	✓
OHS/CISCO		✓	✓	✓
COMICS				✓
CIAO				✓
AO				✓



Science Production

- 19 Titles have been published to refereed magazines as of September 2001
- A number of technical publications



Technical Highlights

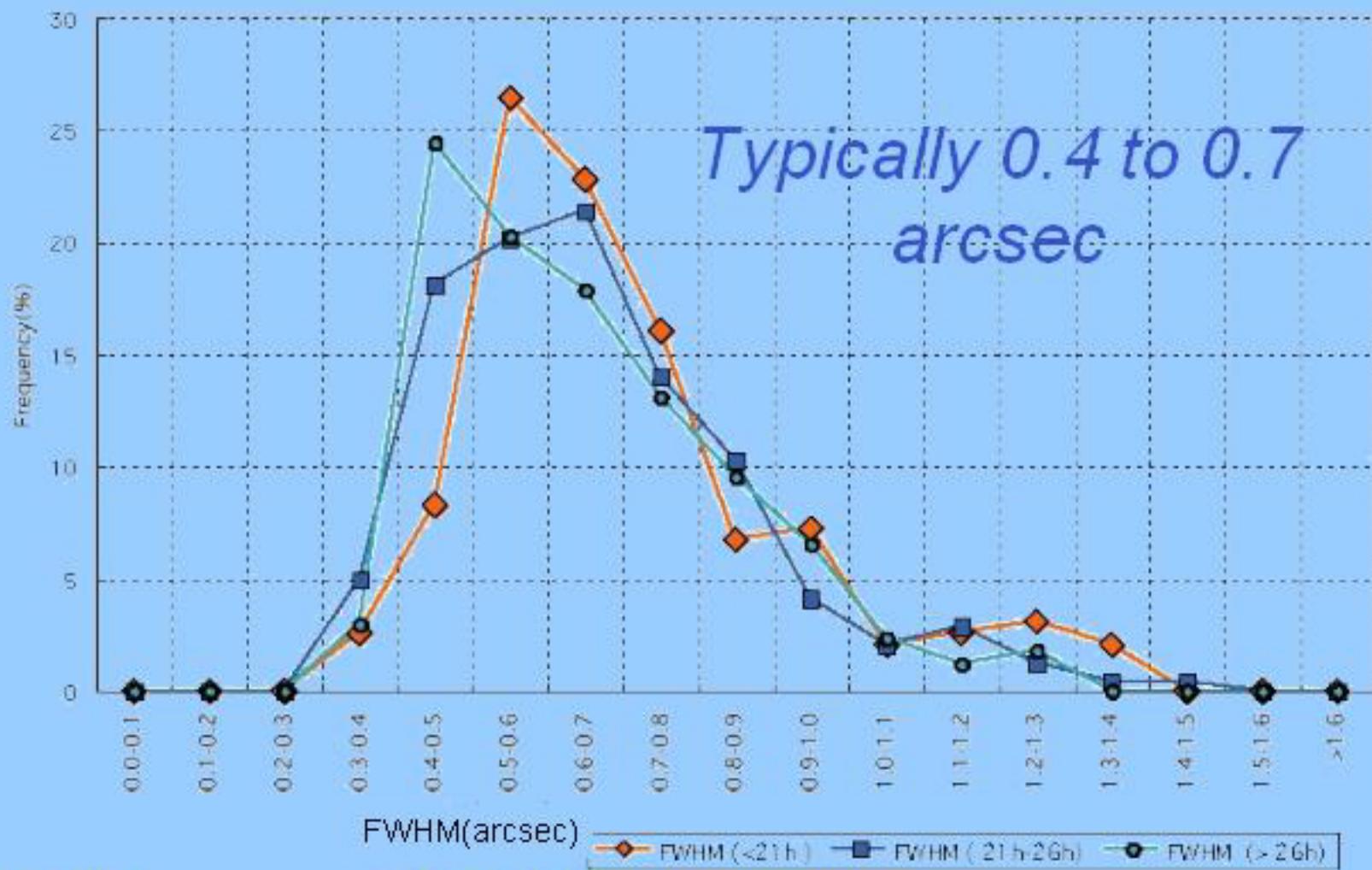
- Max pointing speed 0.5deg/sec for Az and El
- Pointing Accuracy <1"
- AG Tracking accuracy < 0.07" (guide star = 11.94mag)
- Magnitude of guide star vs. tracking accuracy
 - Cassegrain with ADC: 12mag:80-130mas 14mag:100-180 mas
18mag:100-190 mas
 - Cassegrain without ADC: 12mag:80-130mas 14mag:100-180 mas
18mag:100-190 mas
- Observable elevation $10^\circ < \text{El} < 89.5^\circ$
- Image resolution 0.18"





Seeing Size

Subaru Telescope Seeing Size Before 21h, 72h, >26h / after 26h May 2000 - June 2001





Approved Phase-2 Instruments and Visitor Instruments

Phase-2 Instruments

- FMOS
Fiber Multi-object
Spectrograph for Prime
Focus
- MOIRCS
Multi-Object Infrared
Camera and
Spectrograph
Multi-slit type



Visitor (Non-observatory) Instruments

- Kyoto 3-D spectrometer
Fabry-Perot, Integral Field,
Long-slit spectrograph
And Narrow-band filter
imaging
- CheSS
Cherenkov light detecting
System on SUBARU



Summary

- Subaru Telescope has started its open use since December 2000.
- Suprime-Cam, OHS/CISCO, FOCAS, HDS and IRCS are now available for open use.
- Both the telescope and the instruments are coming close to their initial performance specifications.