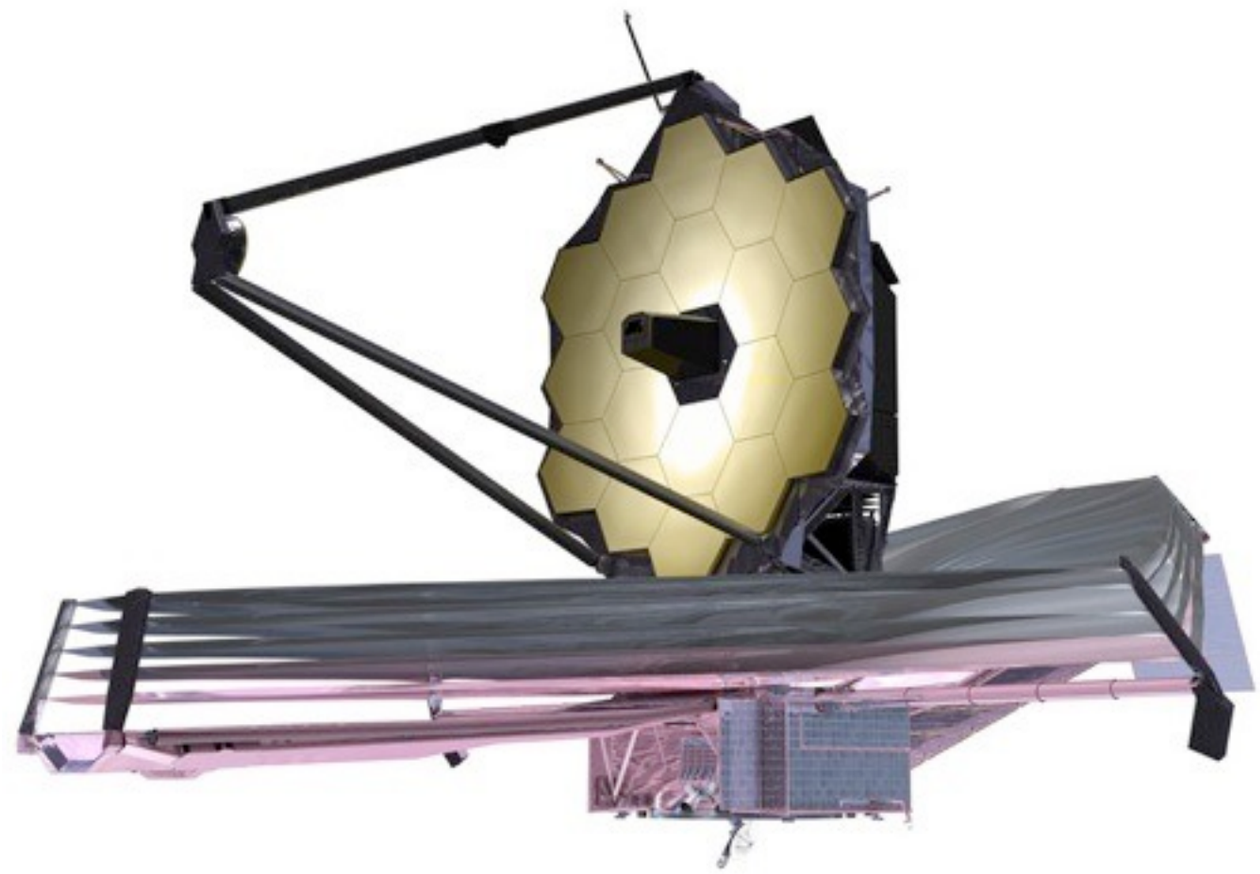
すばる次世代AO:
スペースプロジェクトとの比較

岩田生 (国立天文台 ハワイ観測所)

Space Missions in Near-Future

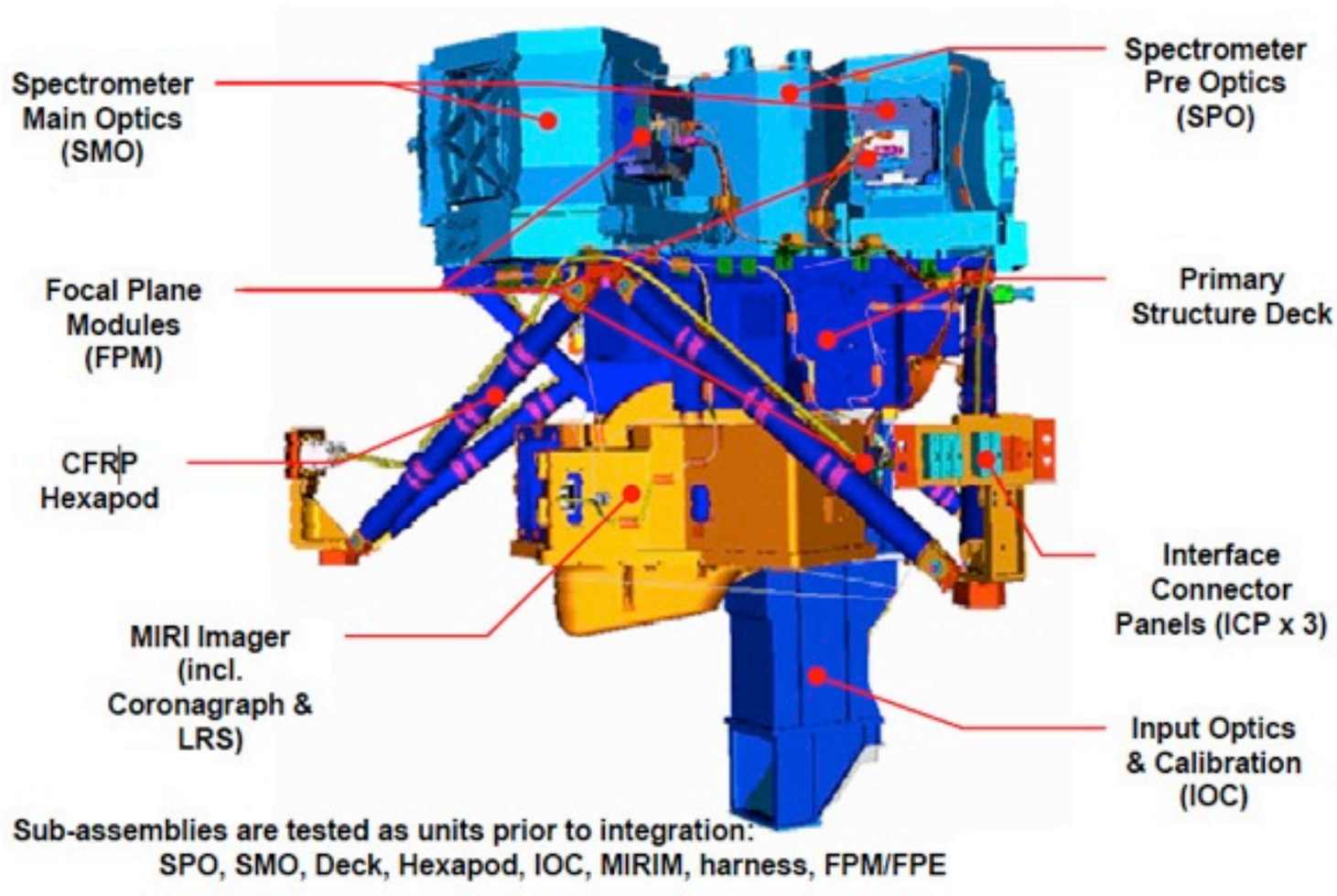
JWST

- 6.5m Deployable Mirror, Passive Cooling at S-E L2
- Four Science Instruments:
  - MIRI: Mid-IR (5 - 28μm)
  - NIRSpec
  - NIRCam
  - TFI: Tunable Filter Imager



JWST MIRI

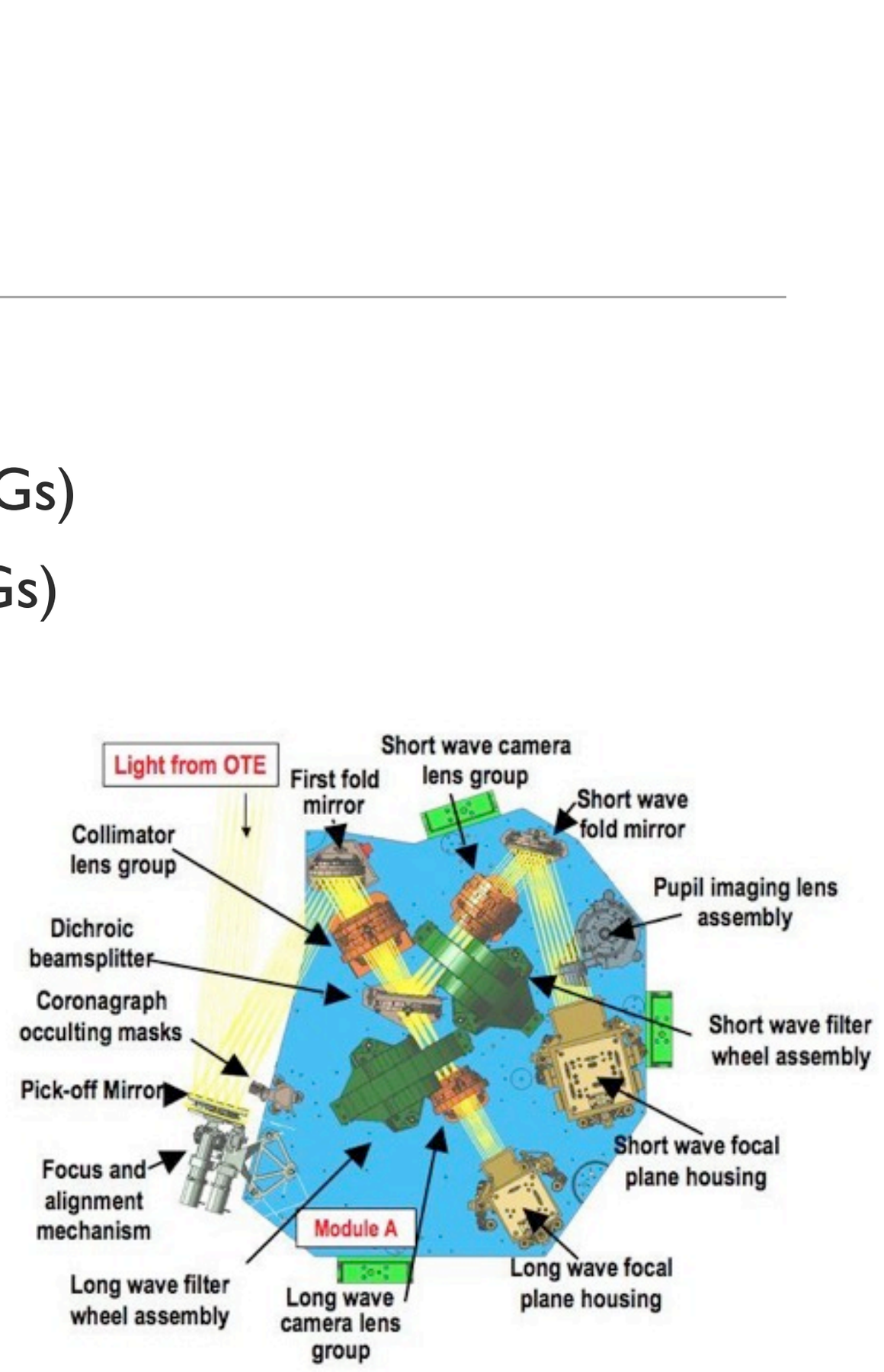
- Imaging 5 - 28.3µm, FoV 1.25’ x 1.88’
- Coronagraph
- R=1,000 - 3,000 Spectrc



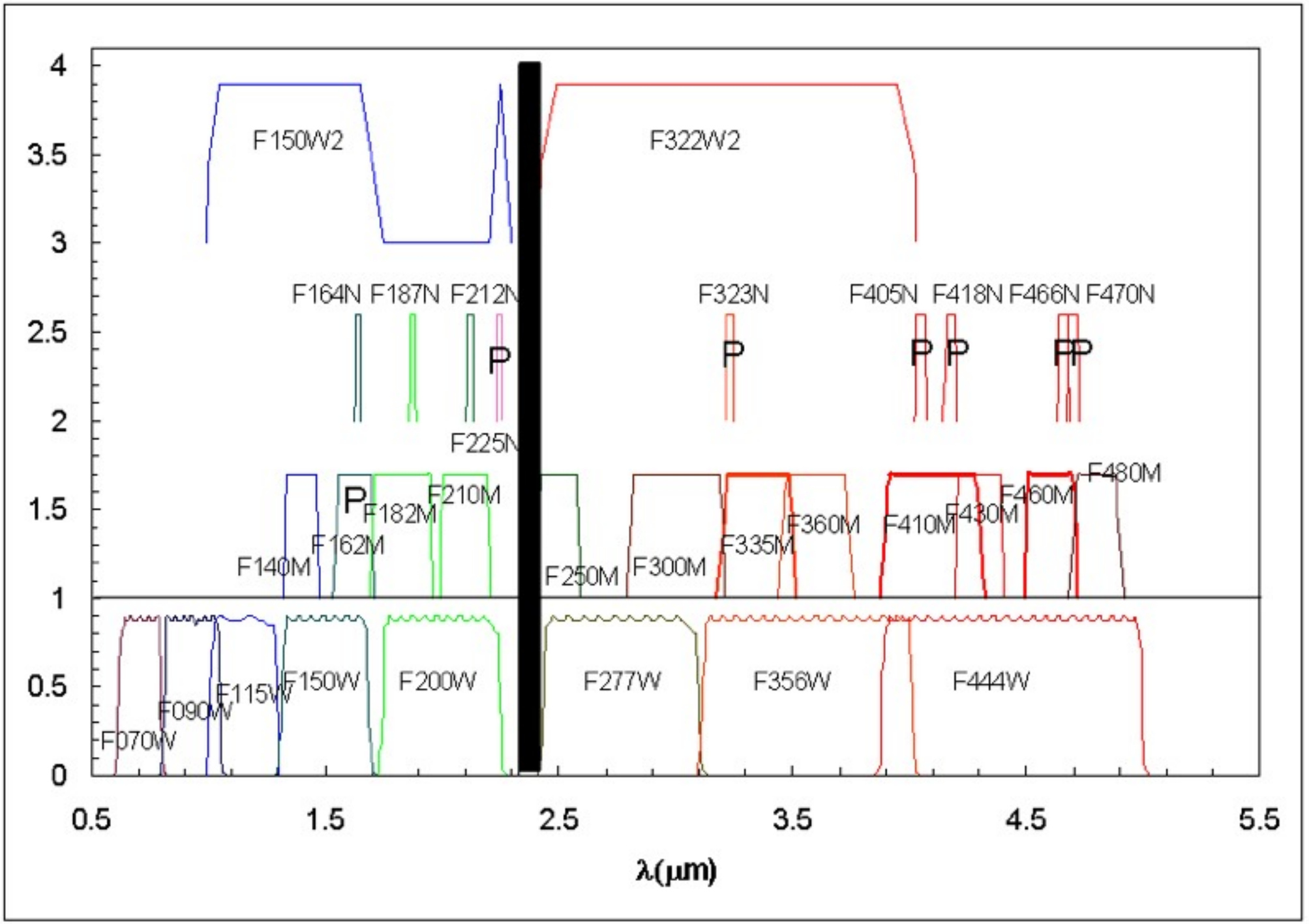
Sub-assemblies are tested as units prior to integration:
SPO, SMO, Deck, Hexapod, IOC, MIRIM, harness, FPM/FPE

JWST NIRCam

- Two Channels, both 2.2’ x 4.4’
  - Short: 0.5 - 2.3 μm, 32 mas (8 H2RGs)
  - Long: 2.5 - 5.0 μm, 64 mas (2 H2RGs)
- Coronagraphic High Contrast Imaging
- Slitless Grism Spectroscopy R~1800

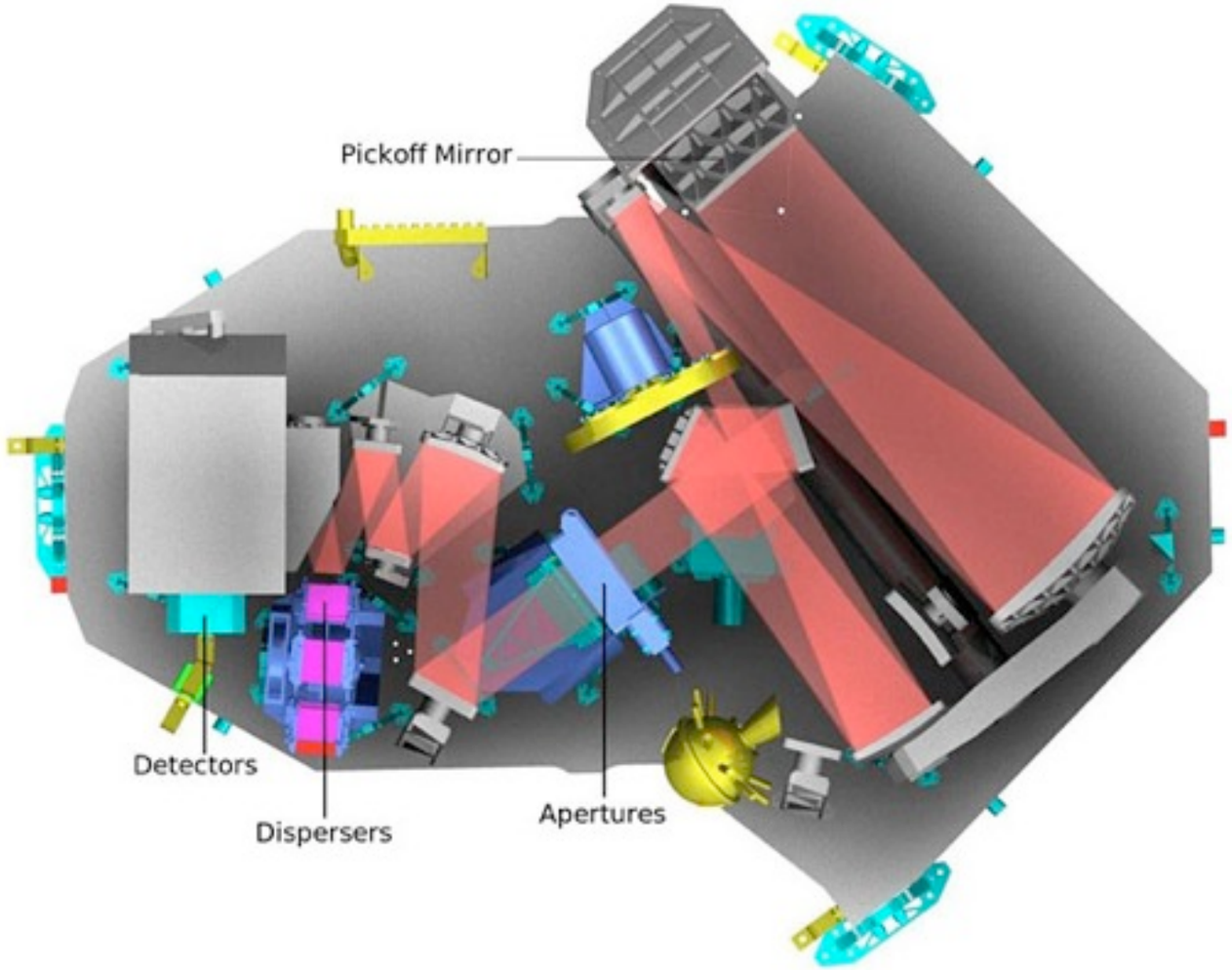


NIRCam Filters



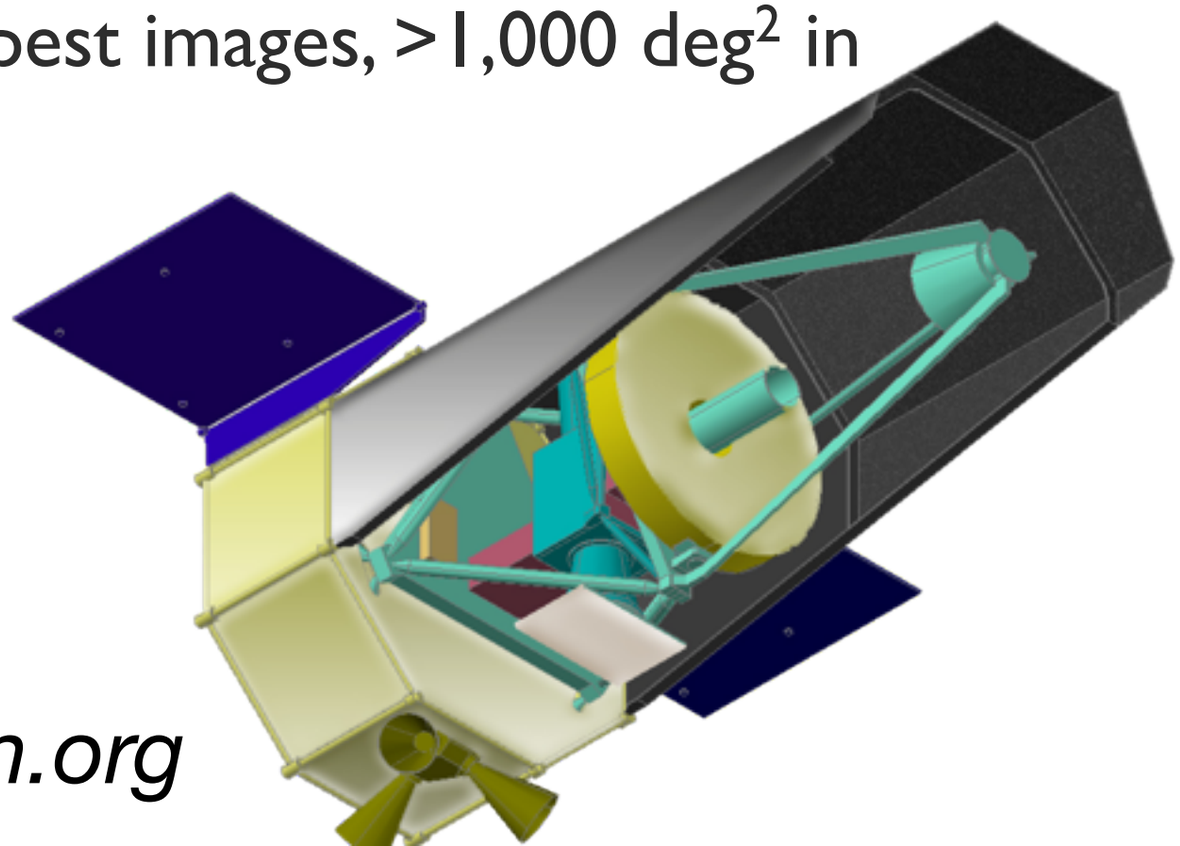
JWST NIRSpec

- 3.6’ x 3.4’ FOV
- Micro-Shutter Assembly: 0.2” x 0.46” Micro-Shutters
- Fixed Slits: 0.4”x3.8”, 0.2”x3.3”, 1.6”x1.6”
- IFU: 3”x3” FOV, 30 Slices, 0.1”(dispersion) x 3” (spatial)
- R = 100, 1000, 2700
- 2 x H2RG



WISH: Wide-field Imaging Surveyor for High-redshift

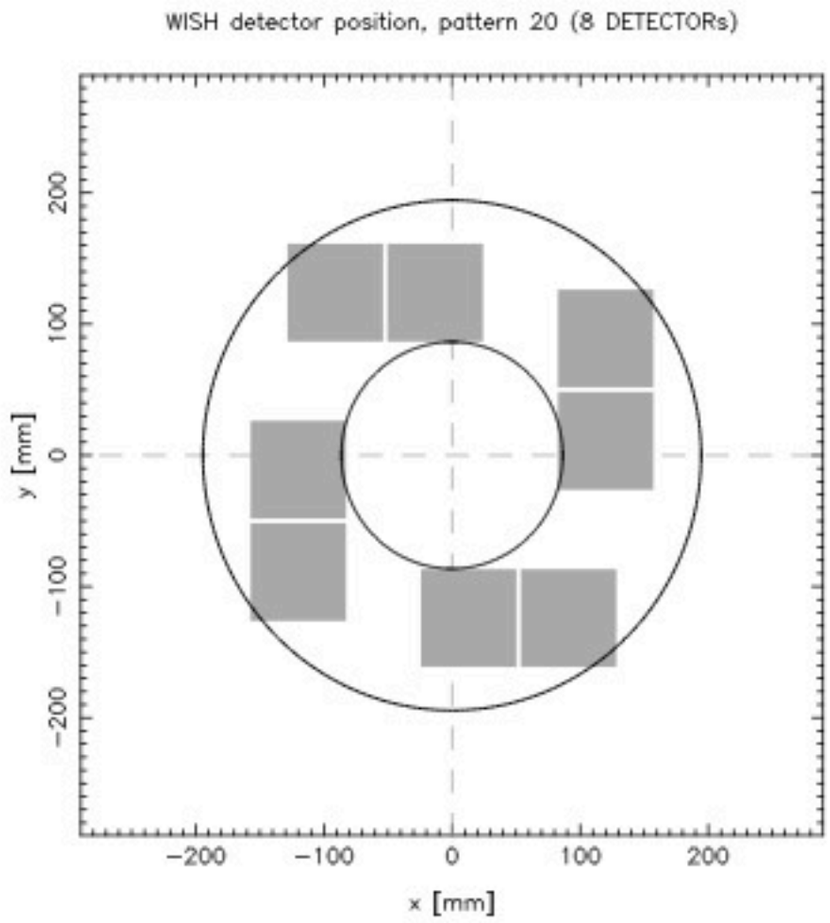
- Space Telescope Mission with 1.5m Diameter Aperture
- Wide-Field Near-Infrared Camera (0.9 - 5 μm)
- (Passively) Cooled Mission with Sun - Earth L2 Orbit
- Depth - deeper than images with any ground-based telescopes
- Width - 100 square degrees in deepest images, >1,000 deg^2 in shallower surveys



http://wishmission.org

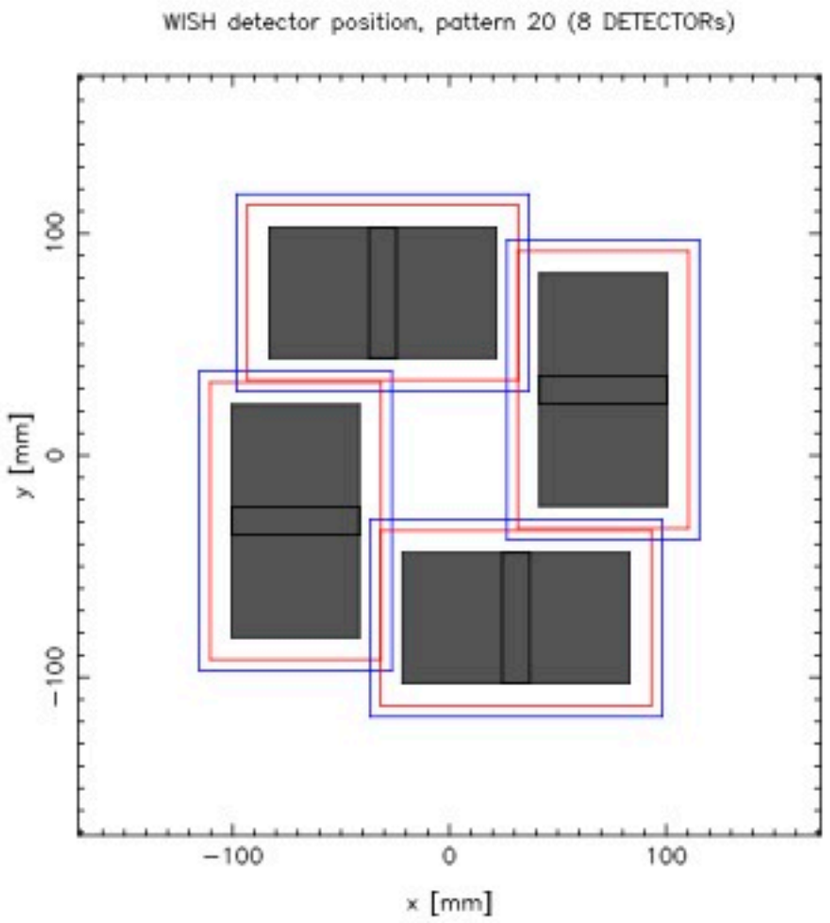
WISH: Focal Plane and Detector Arrangement

840 arcmin^2, 0.15”/pixel

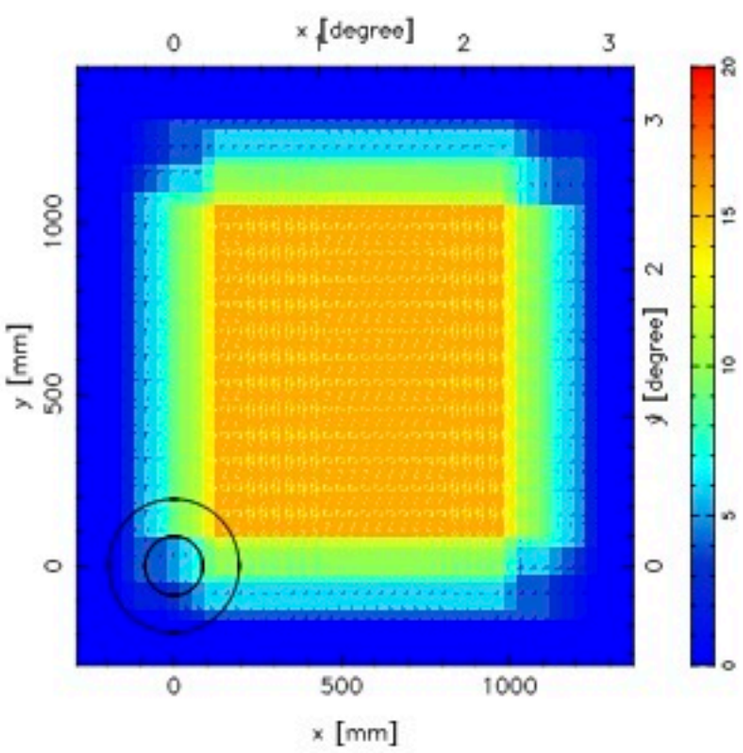


Focal Plane

8x 4x H2RG



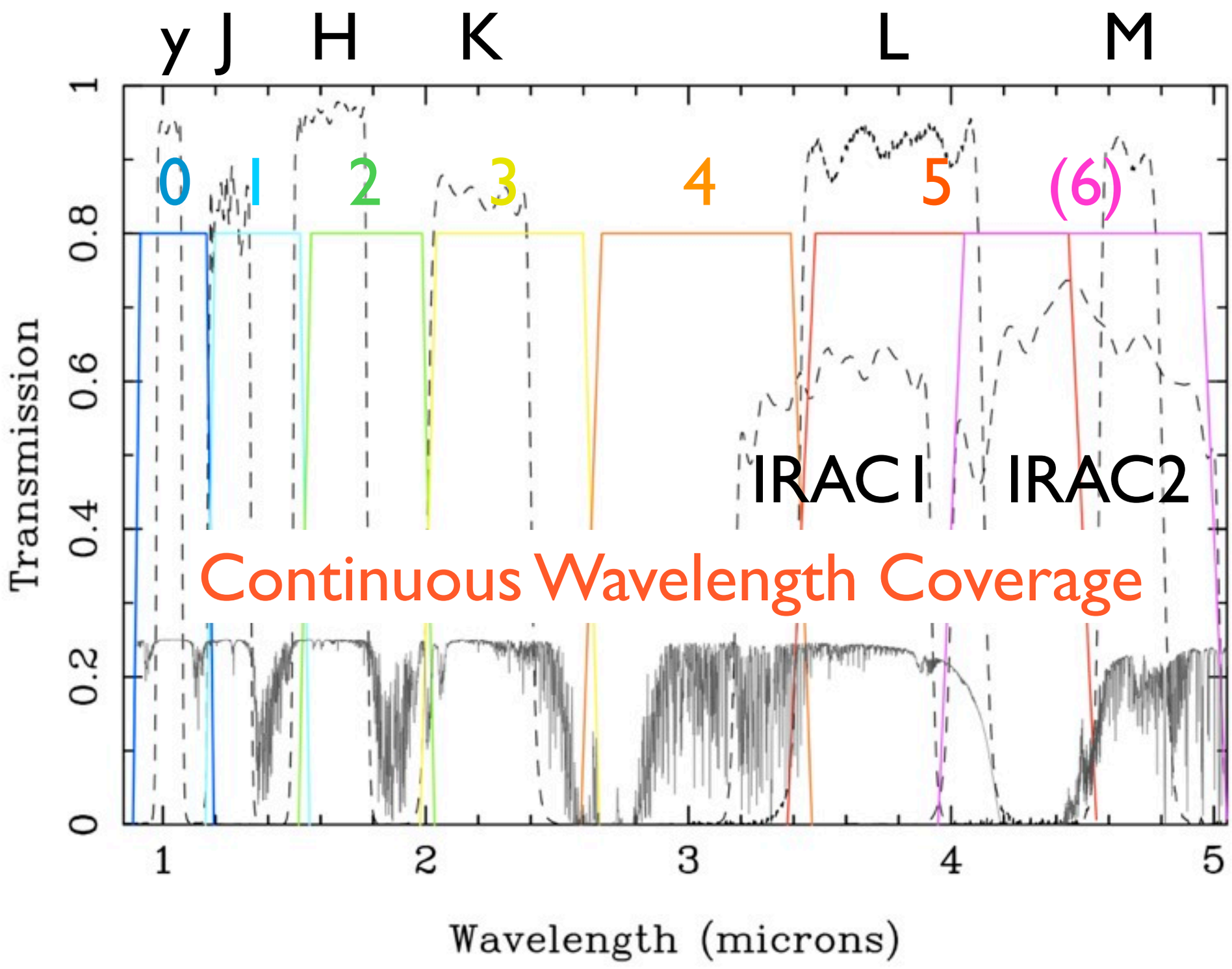
Filters



Survey Uniformity

by T. Morokuma

WISH Broad-band Filter Set

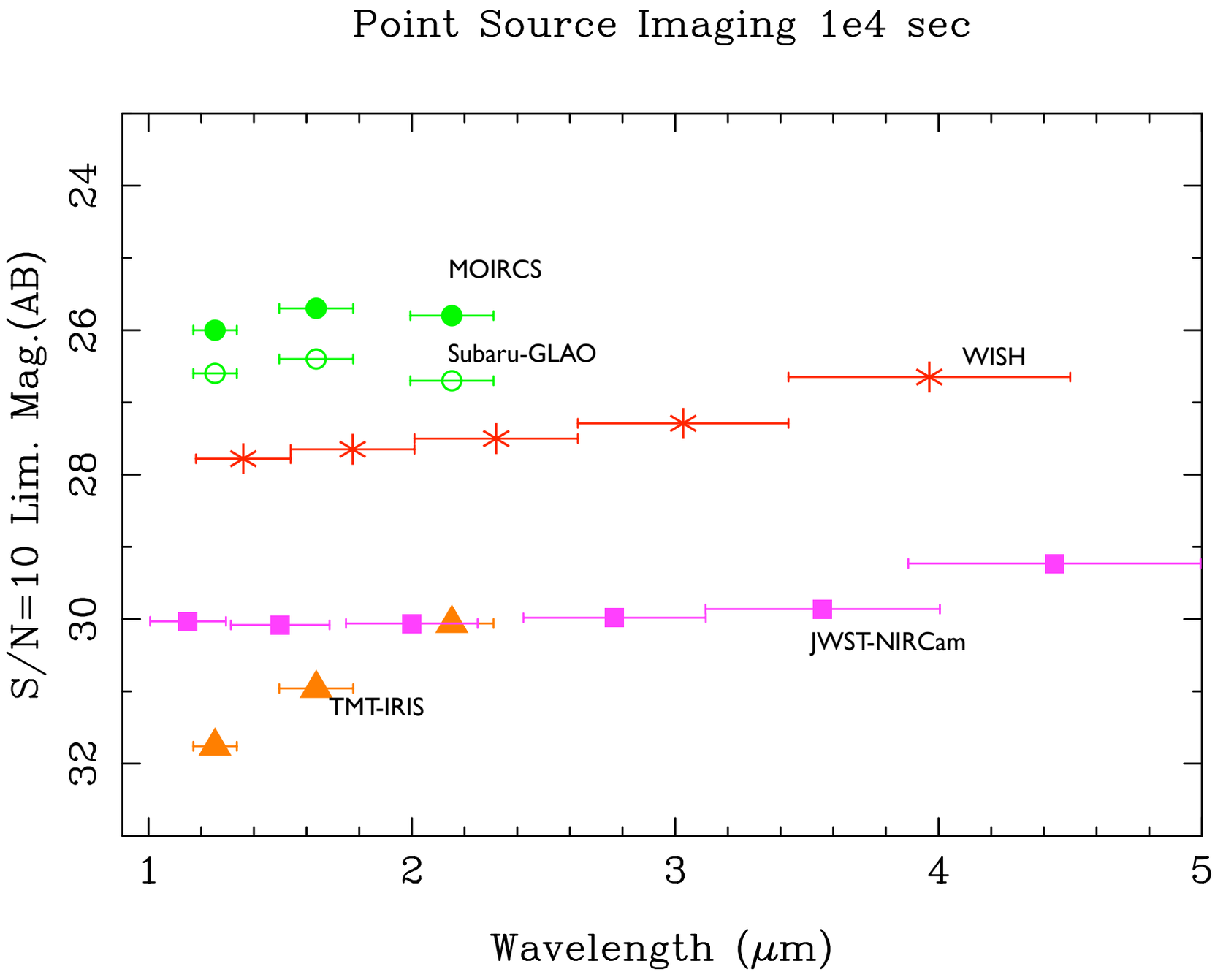


Euclid, WFIRST, and WISH

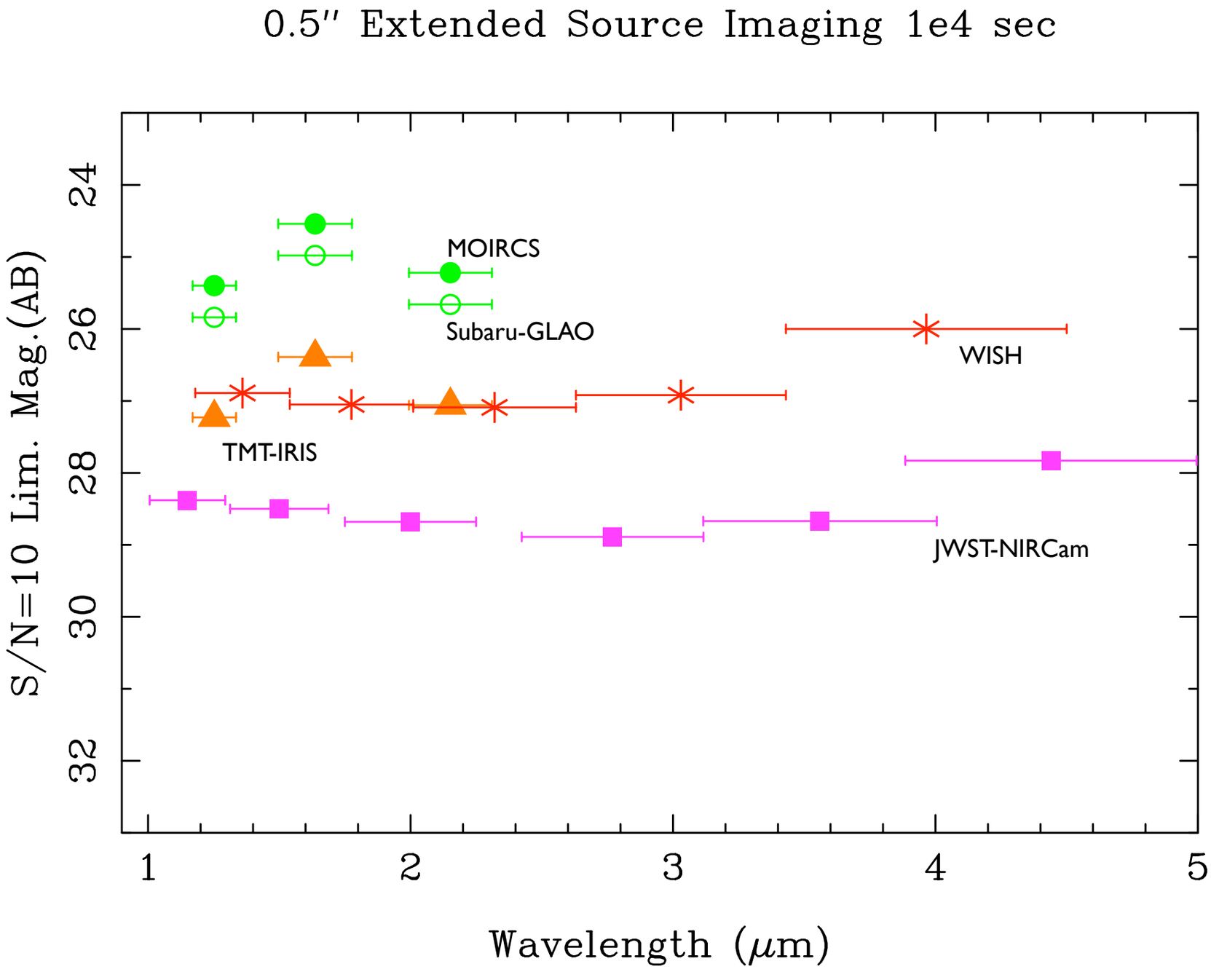
	Euclid	WFIRST	WISH
Mirror	1.2m	1.3m	1.5m
FoV	0.5 deg^2	0.3deg^2	0.23deg^2
Visual Imager	RIz	↓	--
NIR Imager	YJH	0.6-2.0μm	0.9-5.0μm
Lim. Mag.	24AB	25.9AB	28AB
Survey Area	20,000 deg^2	>11,000 deg^2	100 deg^2
Primary Science	Dark Energy	DE, Exoplanet, QSO	First Galaxies

Imaging Sensitivity

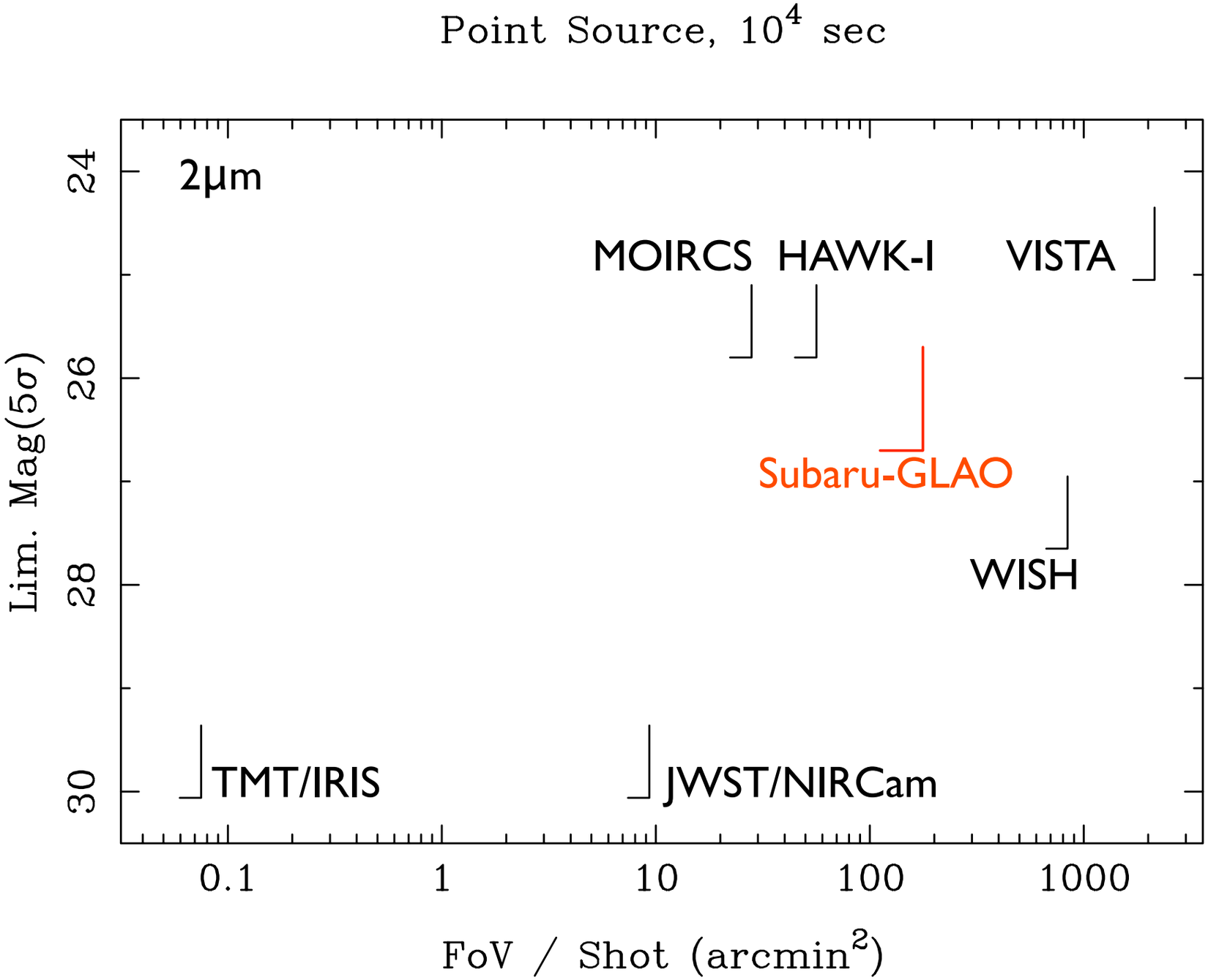
Imaging: 点源に対する感度



Imaging: 遠方銀河に対する感度



Imaging: 感度と視野



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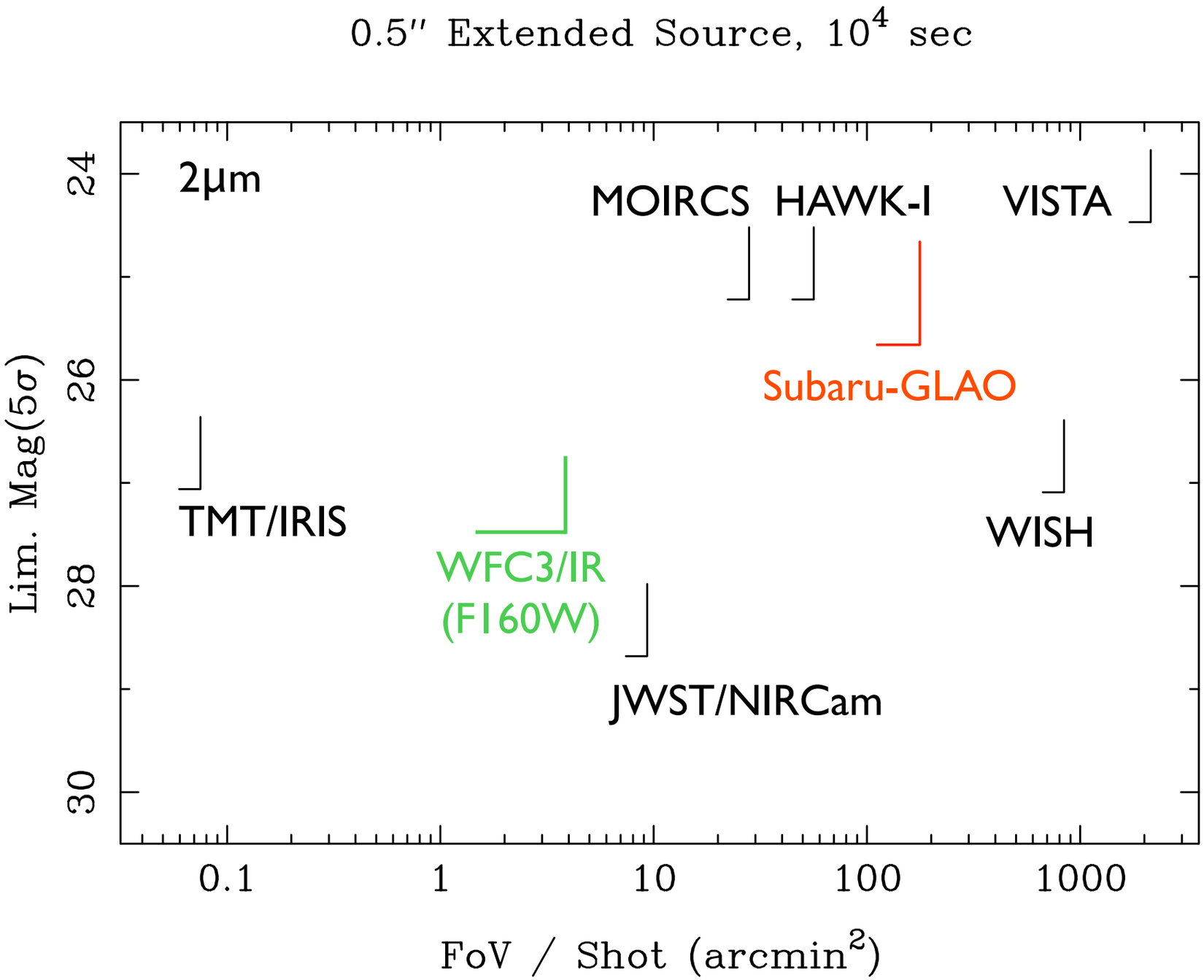
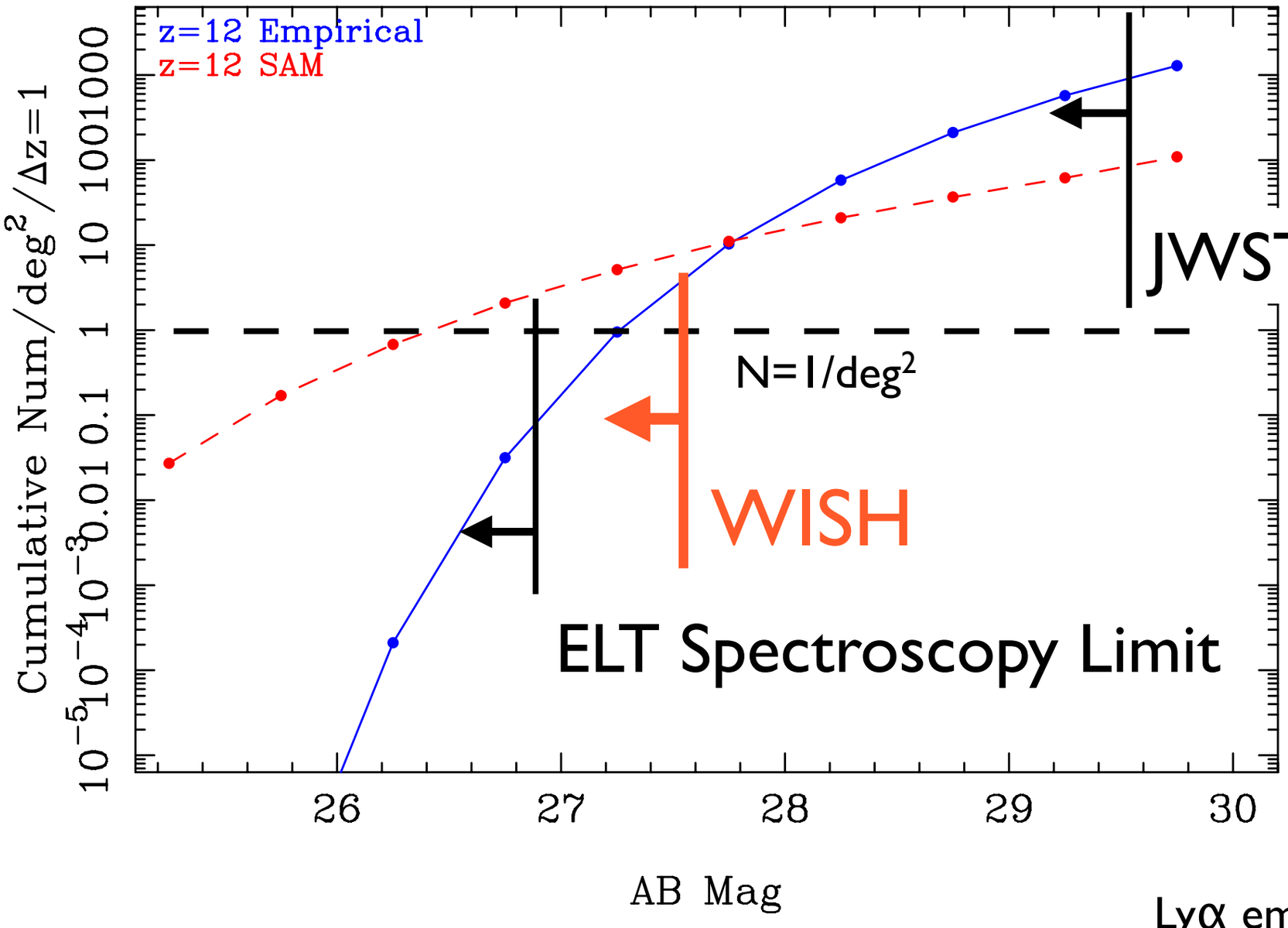


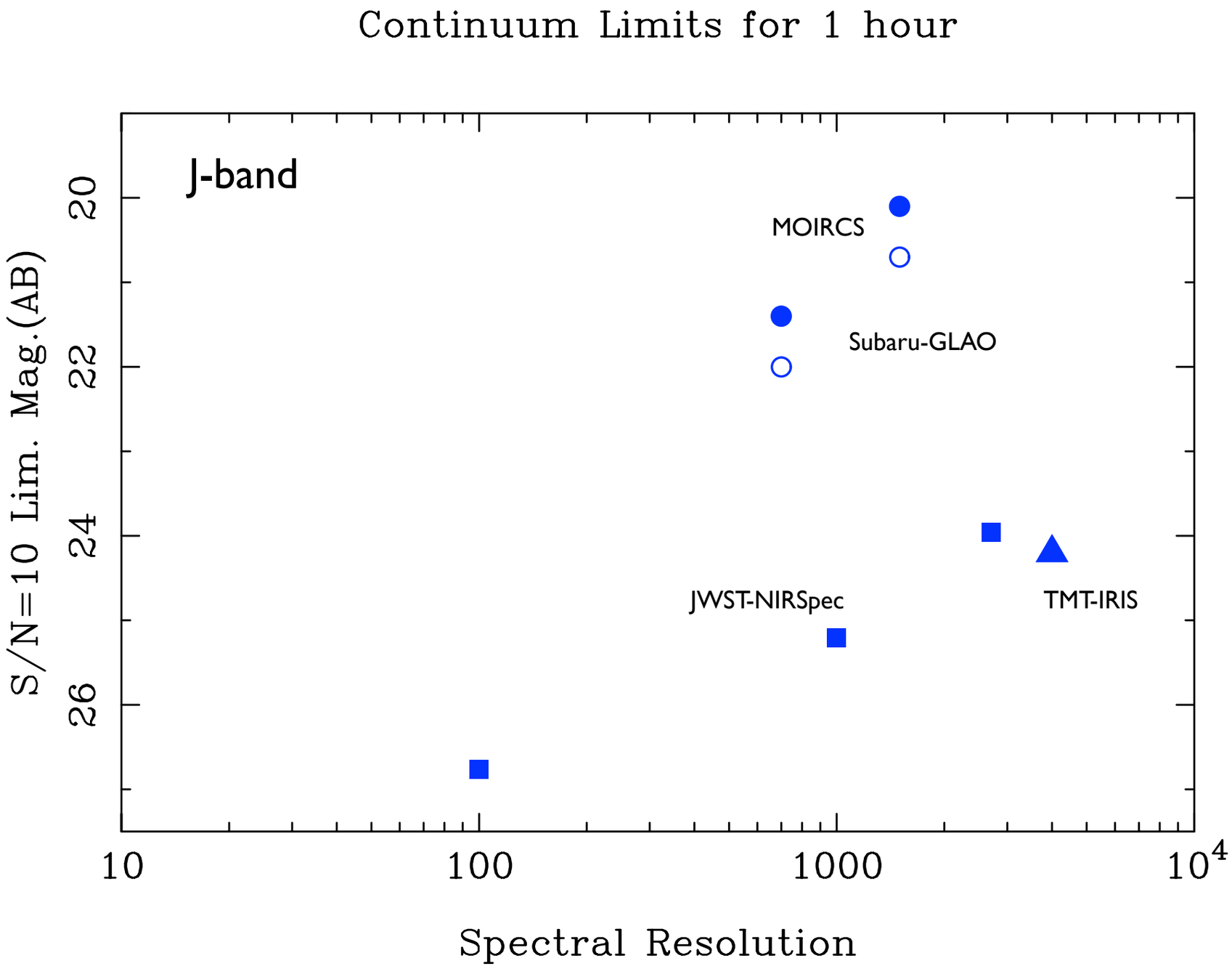
Number Density of z=12 Galaxies



Lyα emission would not help improving the detection limit with ELTs for extended sources

Spectroscopic Sensitivity

Spectroscopy: 連続光に対する感度 (点源)



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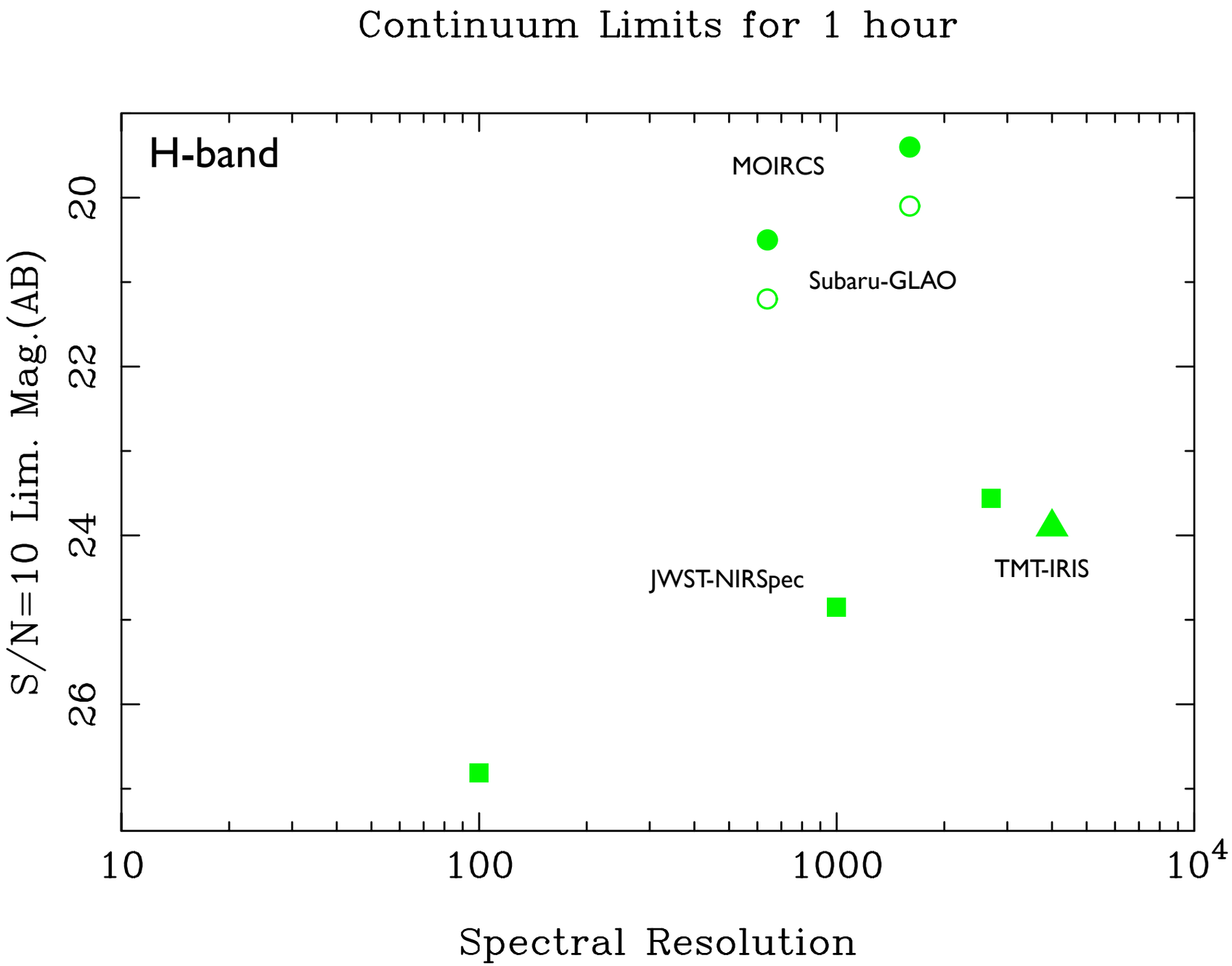

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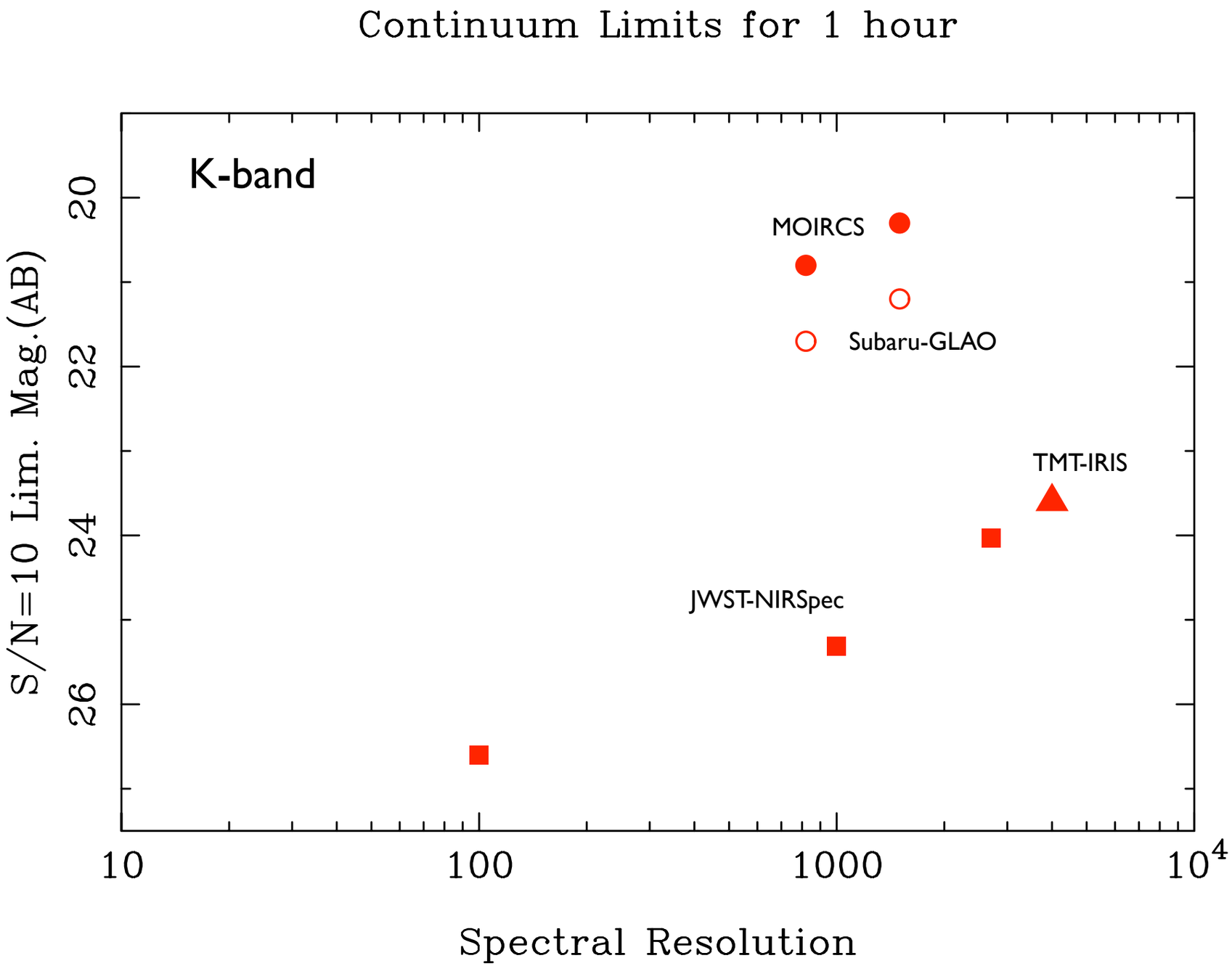
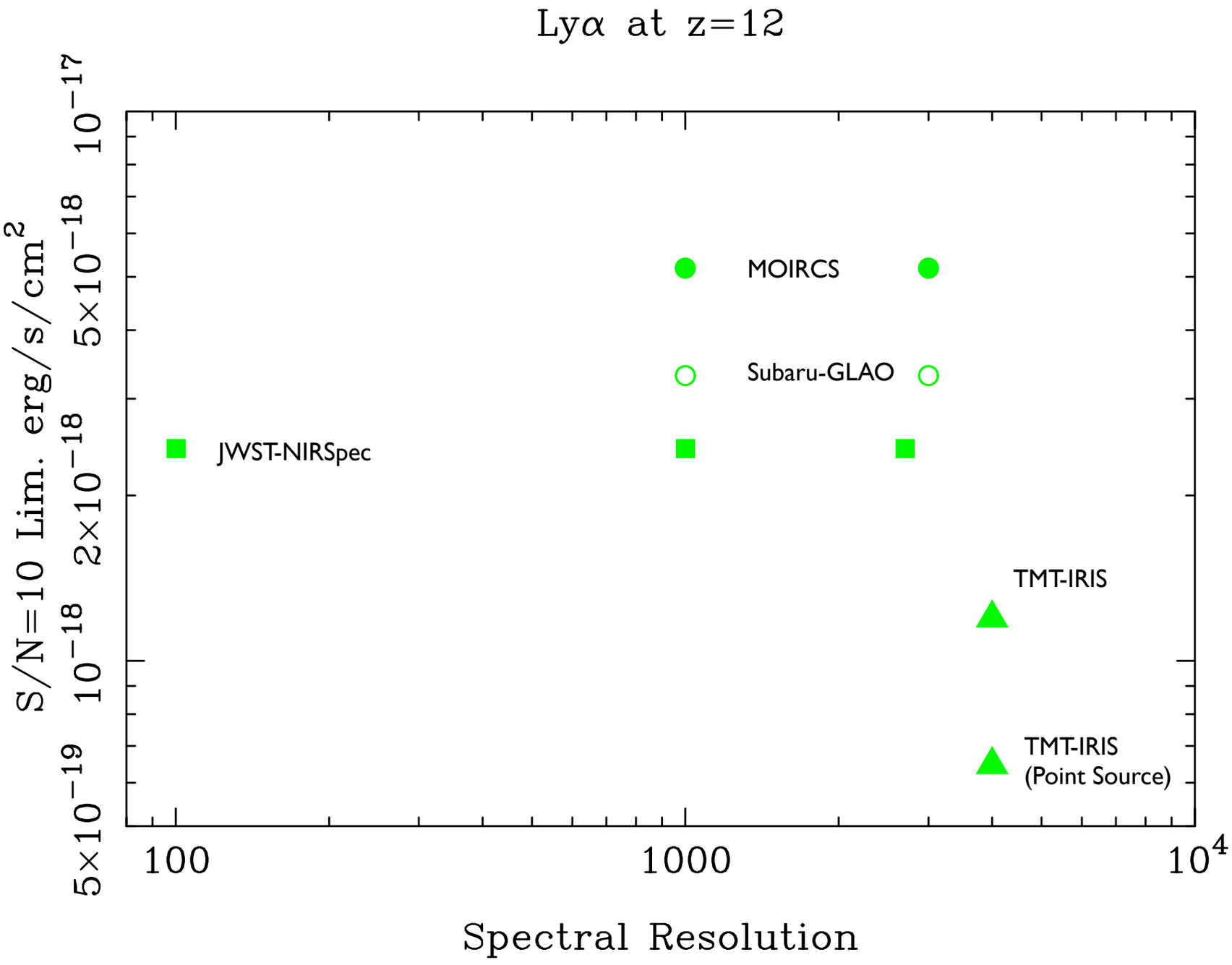


Spectroscopy: 輝線に対する感度

0.25”程度にひろがった天体の場合 (1hour)



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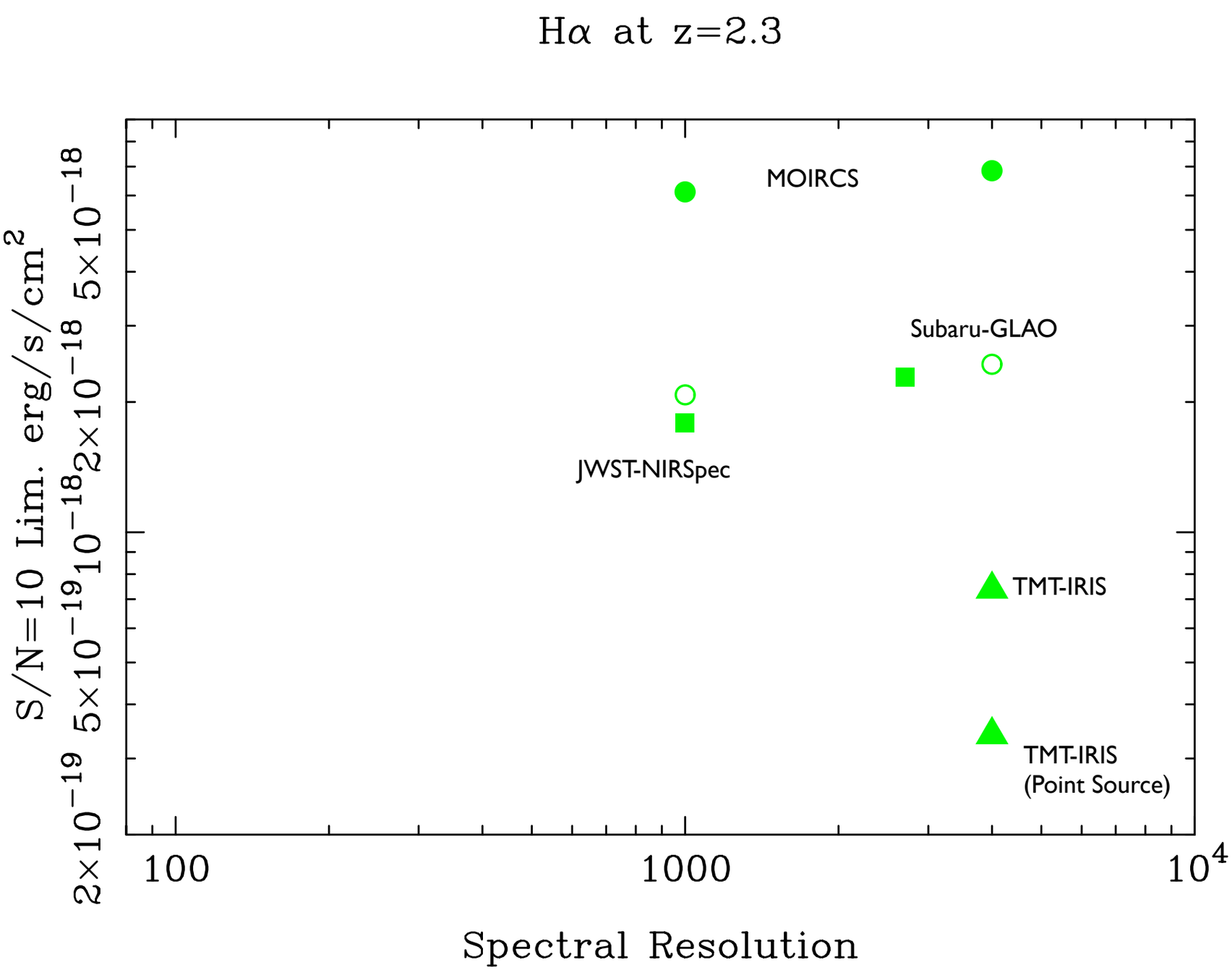

Summary

- Imaging: スペースミッションが有利
- Spectroscopy:
  - GLAOによって検出限界は最大1/2に
  - 少しひろがった天体の場合スペースに対し優位性を持ち得る
  - 広視野を活かした多天体分光サーベイ
  - 感度を桁で変えるのはELT
  - Read-out Noiseの低減は重要