An Infrared Camera of One Degree Field

Wei Zheng
Johns Hopkins University

Observing Advantage at the Antarctica

- Low temperature
- Dry sky condition
- Stable and good image PSF
- Continuous monitoring

Importance of Infrared Surveys

- Finding quasars and other extremely rare objects at z>7
- Monitor SN at z>1
- Monitoring M-stars and cool objects

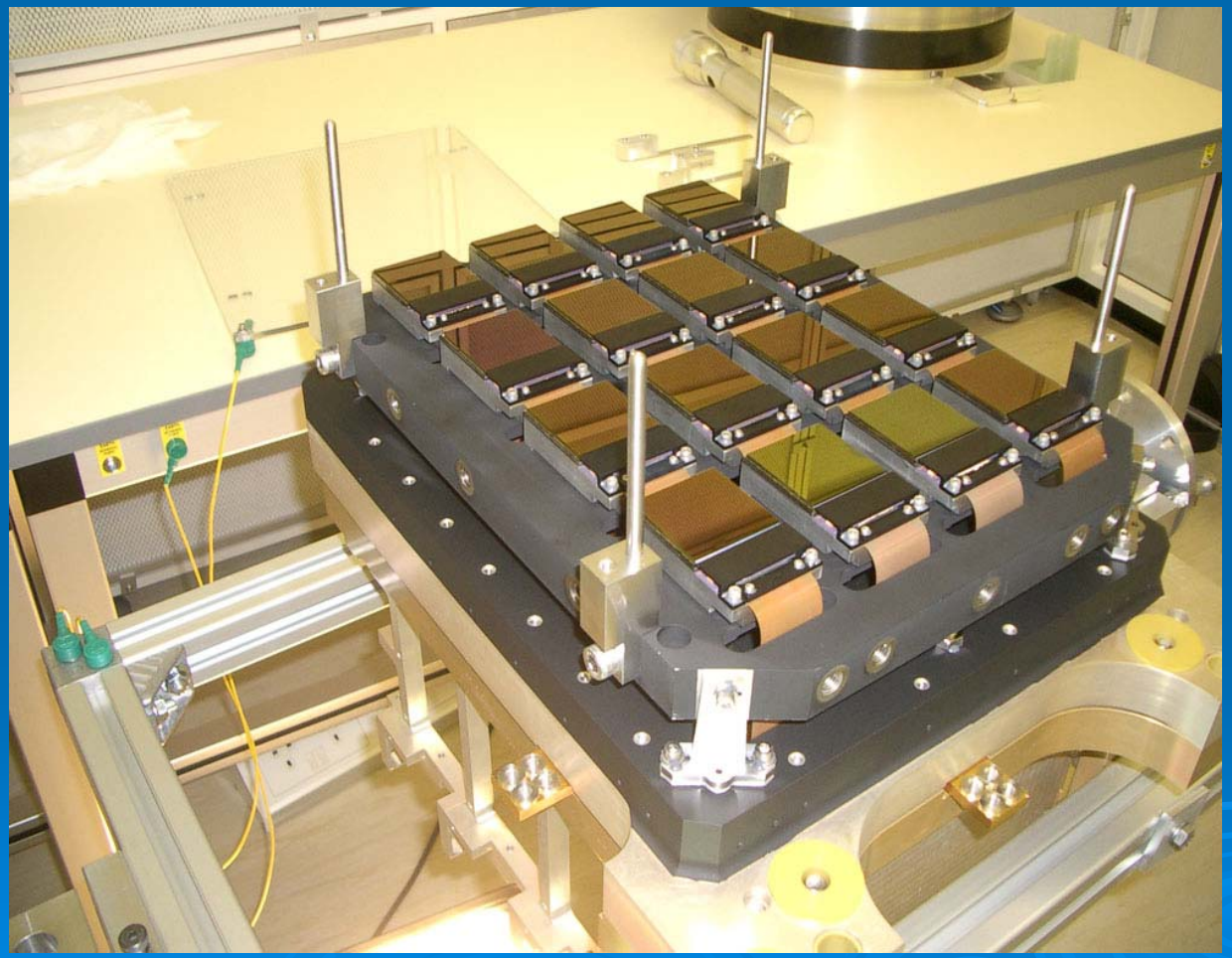
Kunlun Station at Dome A

Large-Format Infrared Detector

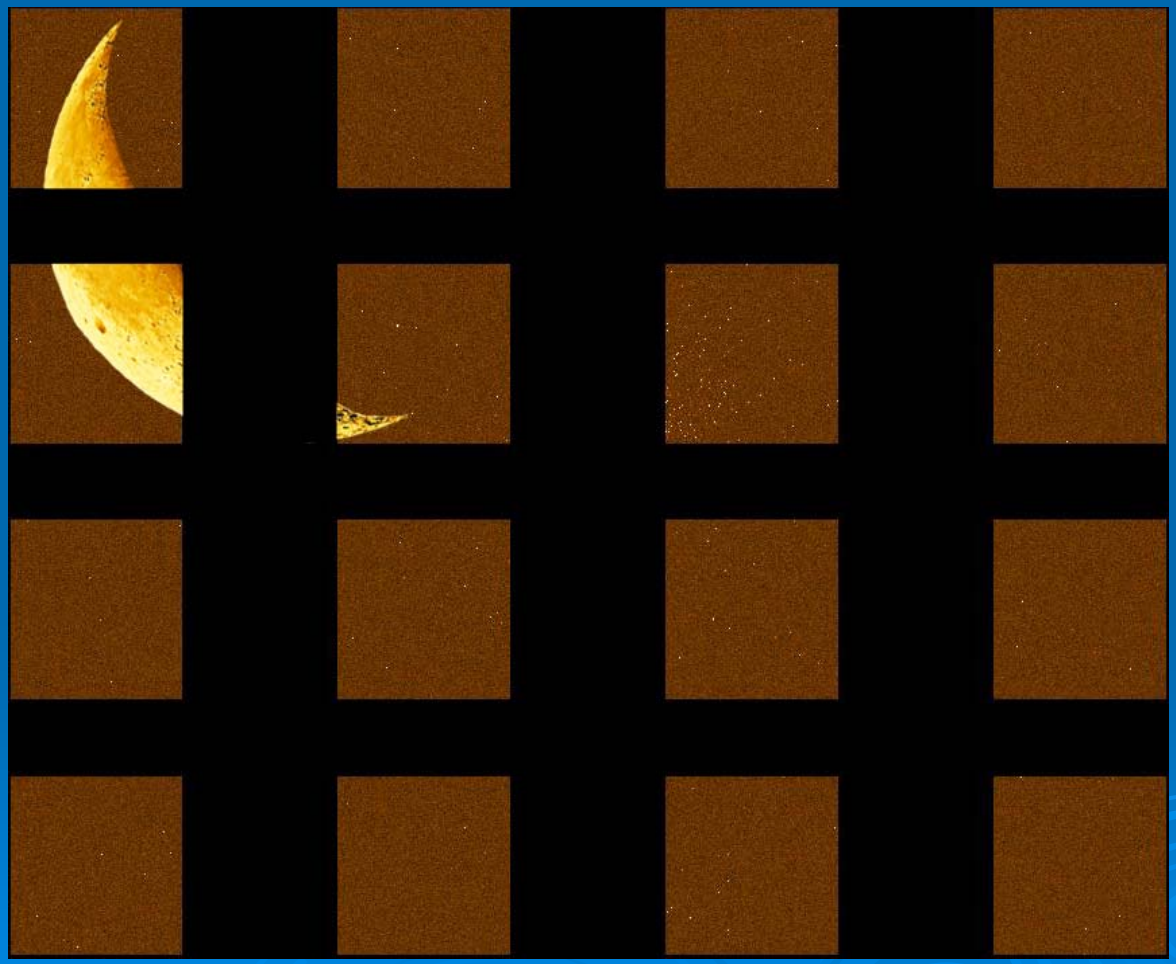
Key Characteristics

- 32 HAWAII-2RG detectors
- Pixel scale of 0.3 arcsecond
- 0.93 square degree of effective FOV
- Filters in J, H, K and 3.0 μm

VISTA Detector Array



Sky Coverage



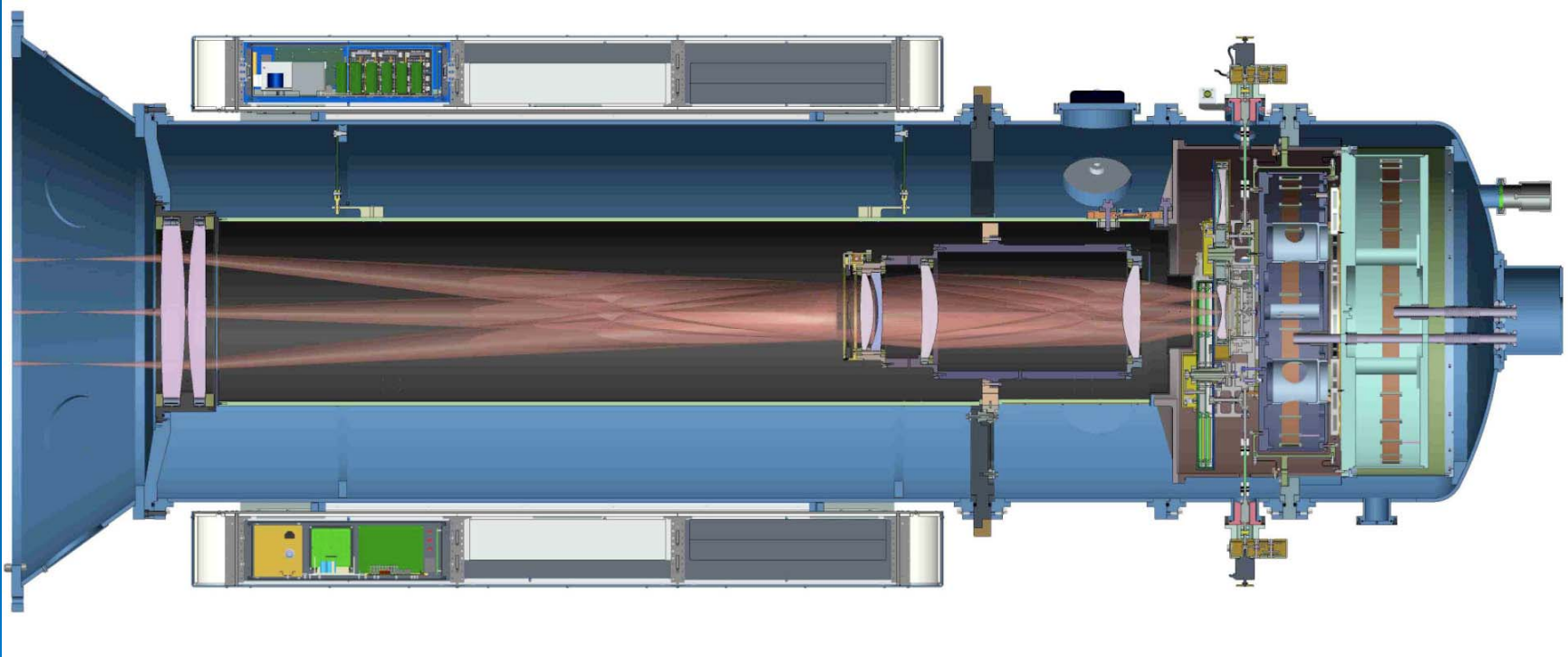
JHU Heritage

JWST testing and participation

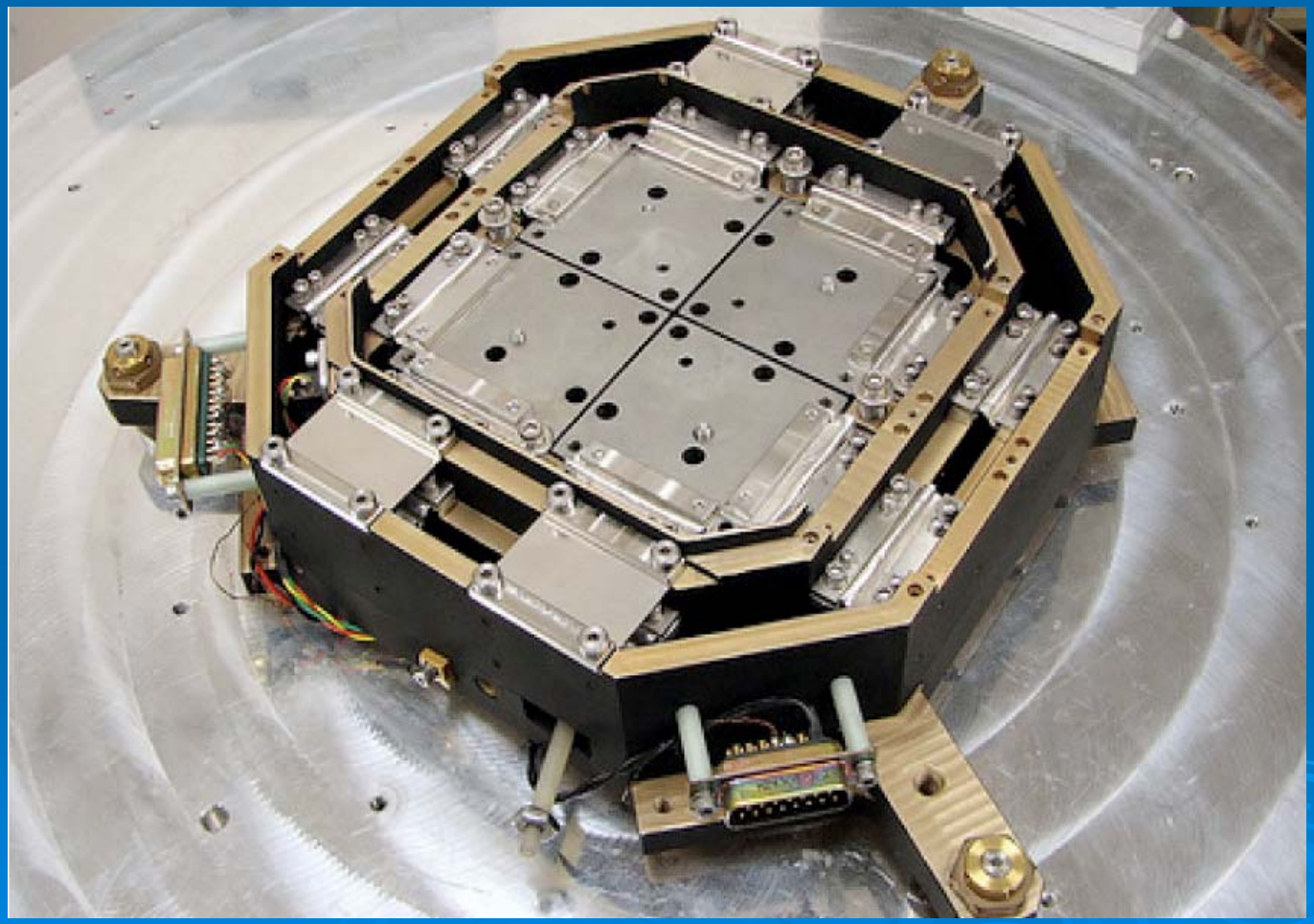
Existing designs from *PRIME*

“FourStars” camera for Magellan

Design of FourStars



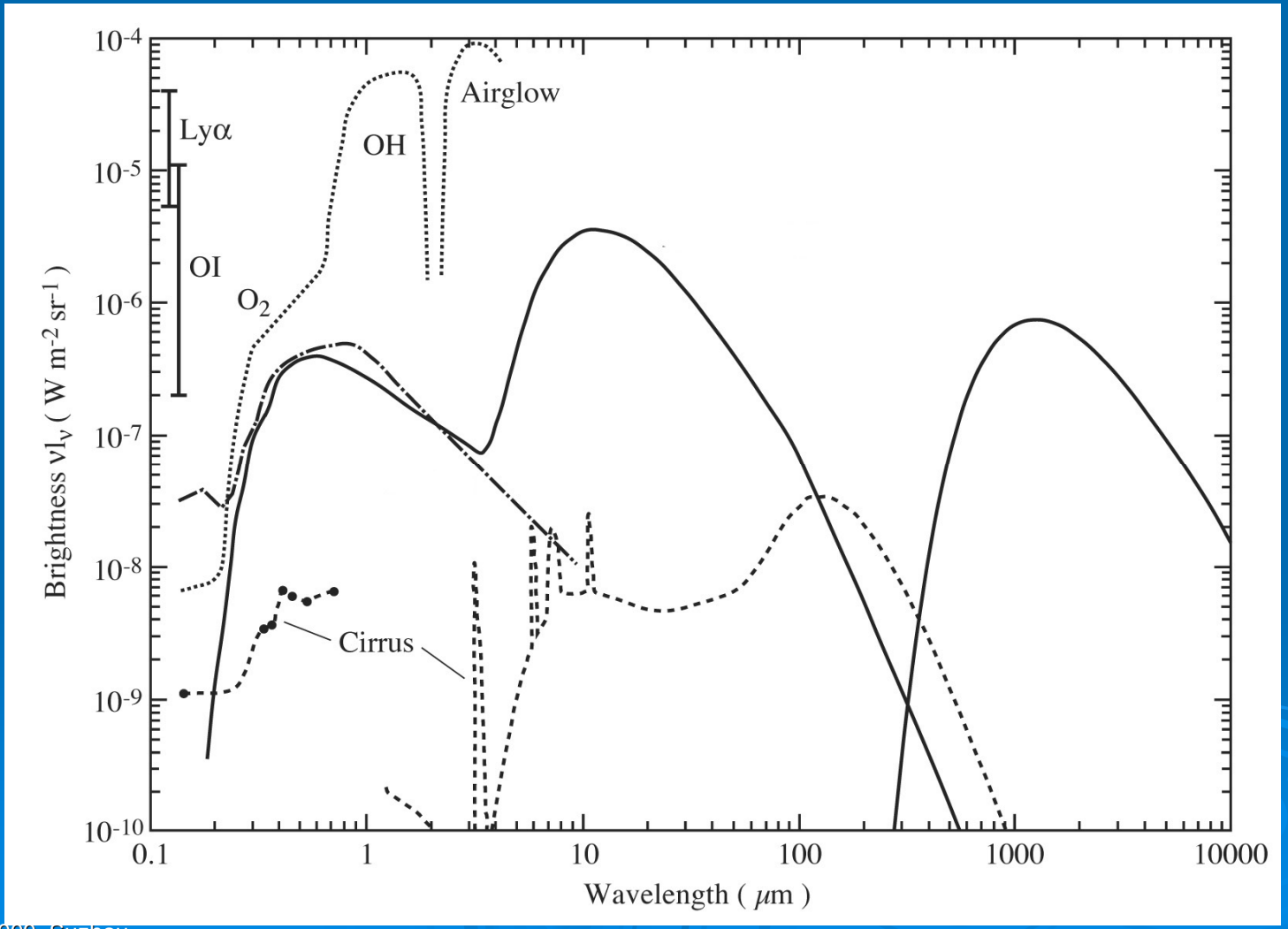
FourStars Camera



JWST Technology

- Frequent readout and CR rejection
- ASIC built-in electronics
- Mechanical cooler to avoid the need for cryogen

Sky Background



Survey Capability

- Search power of 50× VISTA in the K-band
- Covering 20 square degrees in one night (24 hrs), to AB=24.5

Comparison with VISTA

	VISTA	Kunlun
Number of 2K detectors	16	32
Telescope size (m)	4	4
K-band limit In hour (5σ)	22.7	24.5
Search Power	1	50

Comparison with JDEM and JWST

- JDEM reaches deep in J and H-bands (AB=25 in hour)
- No current JDEM design in K-band
- Kunlun will be complimentary to JDEM in JHK deep surveys.
- Kunlun can find valuable candidates for JWST followups

Sensitivity

Telescope	Band	AB Magnitude
LSST	R	27.2
	Y	26.2
JDEM	J,H	25
Kunlun	K	24.5
JWST (R~100)	JHK	26.4

Current Participants

Johns Hopkins University

Teledyne Imaging

University of Science and Technology of China

Your participation welcome!

Challenges

- Schedule matching with JWST and JDEM
- Sensitivity in other near-infrared bands

Summary

- Infrared camera will be a key instrument for Kunlun
- Great performance will be unique in survey power
- International collaboration is essential