The UKIRT Opportunity

CFHT Users Meeting

8th May 2013

Professor Gary Davis, Director

The UKIRT Opportunity

1 UKIRT and its capabilities

2 Science highlights

3 Facility performance

4 An opportunity for CFHT

Introduction to UKIRT

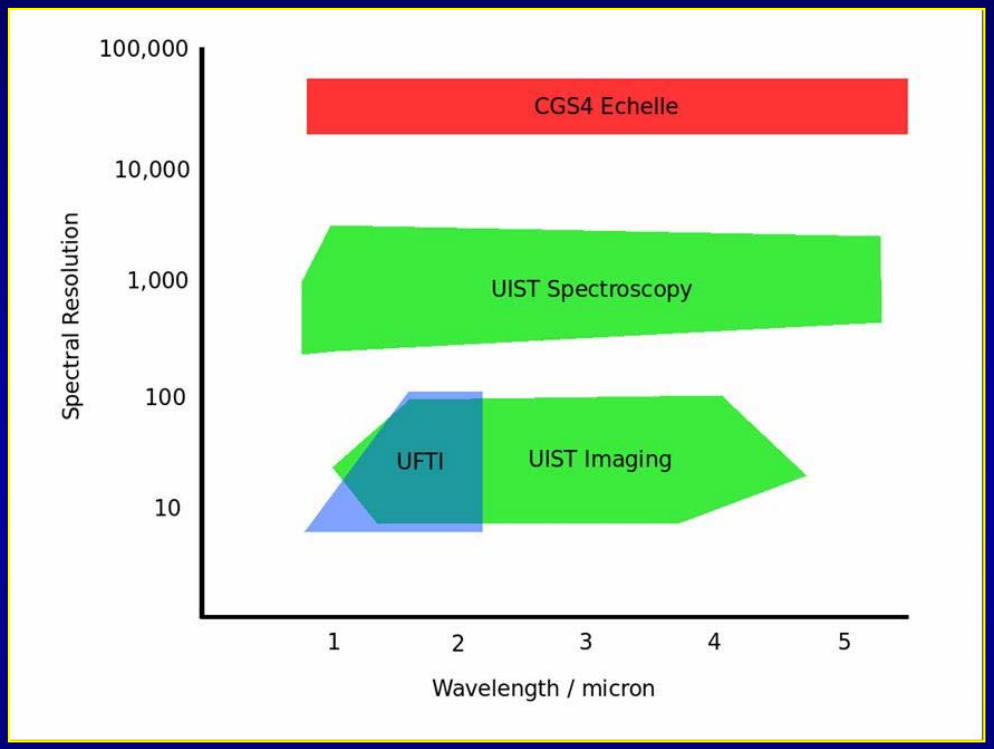
Vital Statistics:

- first light 1979
- primary diameter 3.8m
- operates exclusively in the infrared
- funded 100% by the United Kingdom
- ongoing collaborations with SNU and KASI

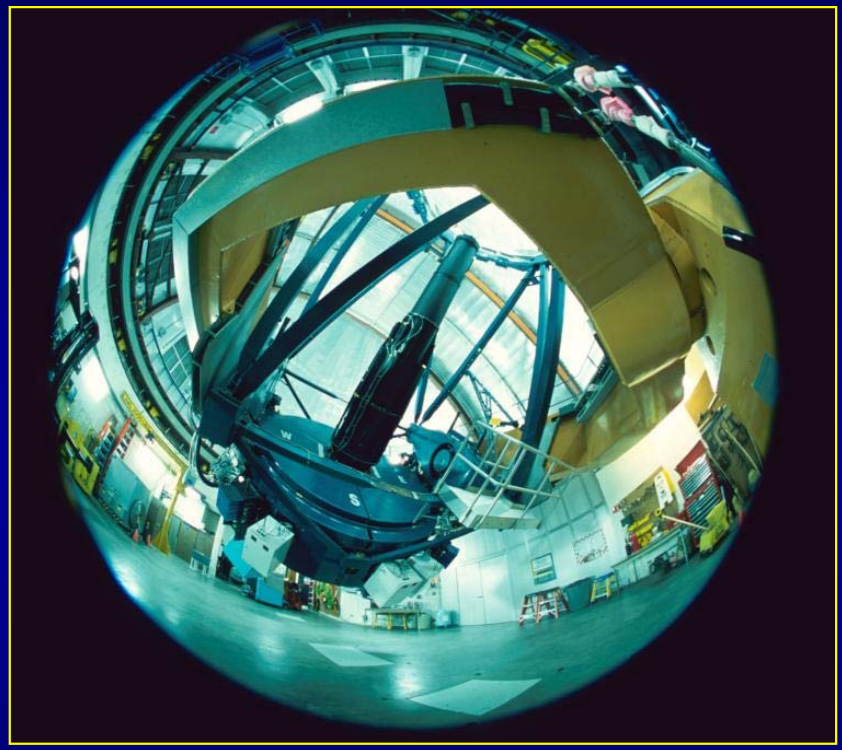
Korea Astronomy and Space Science Institute

Instrumentation

Previously on UKIRT:



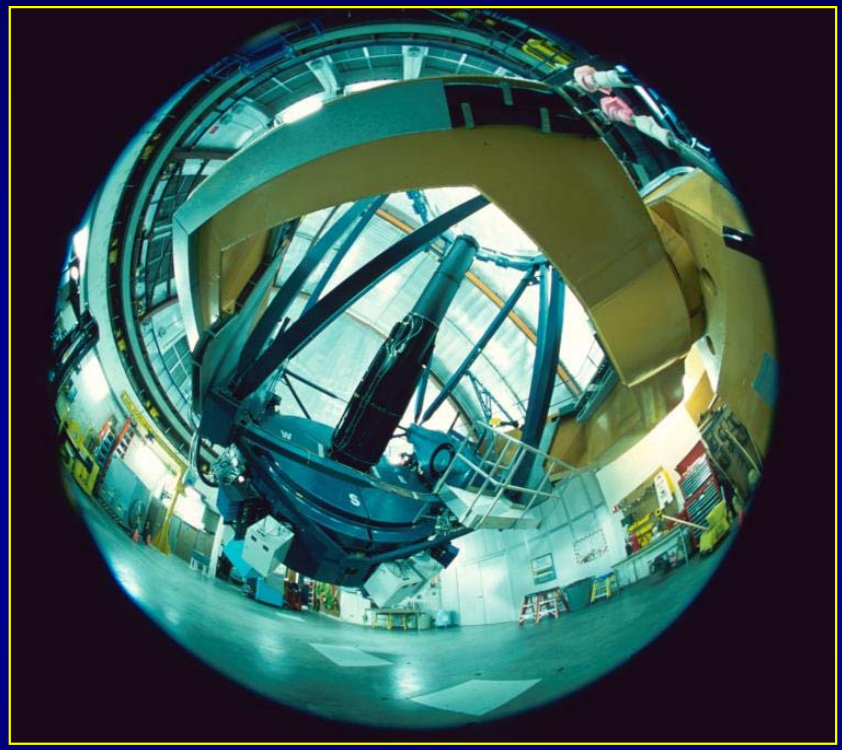
Cassegrain 25%



Wide-Field 75%

Instrumentation

From 1st February 2009:

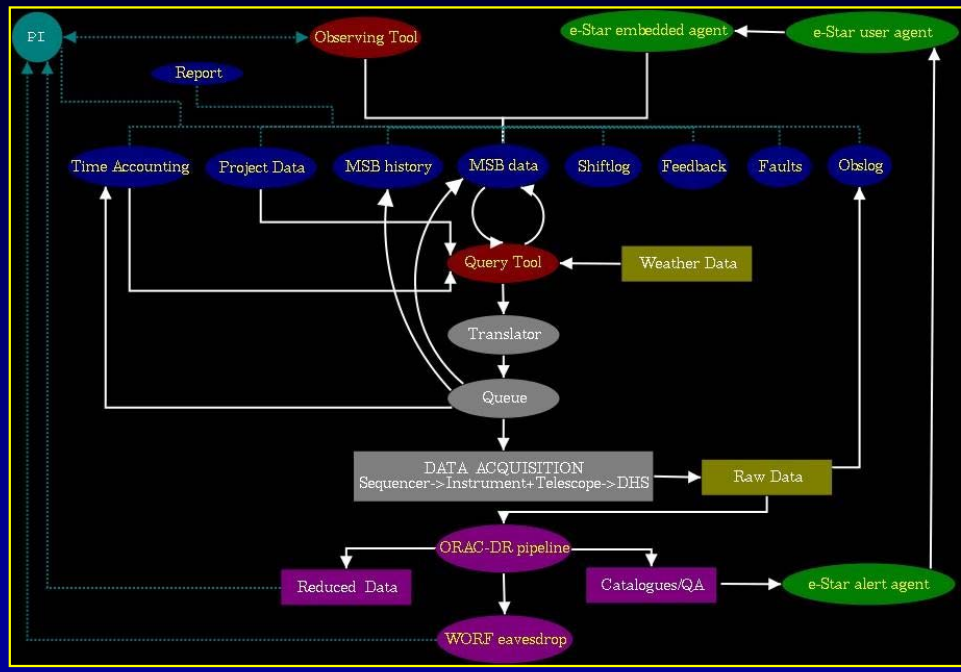


Wide-Field
100%

Telescope Operations

Operational model:

- queue-based, multi-instrument, flexible scheduling
- suite of software tools including data reduction pipelines
- all WFCAM data reduced and archived at CASU (Cambridge) and WFAU (Edinburgh)



Since 2010:

- streamlined science programme
- single instrument
- remote operation from JAC

Cassegrain Science

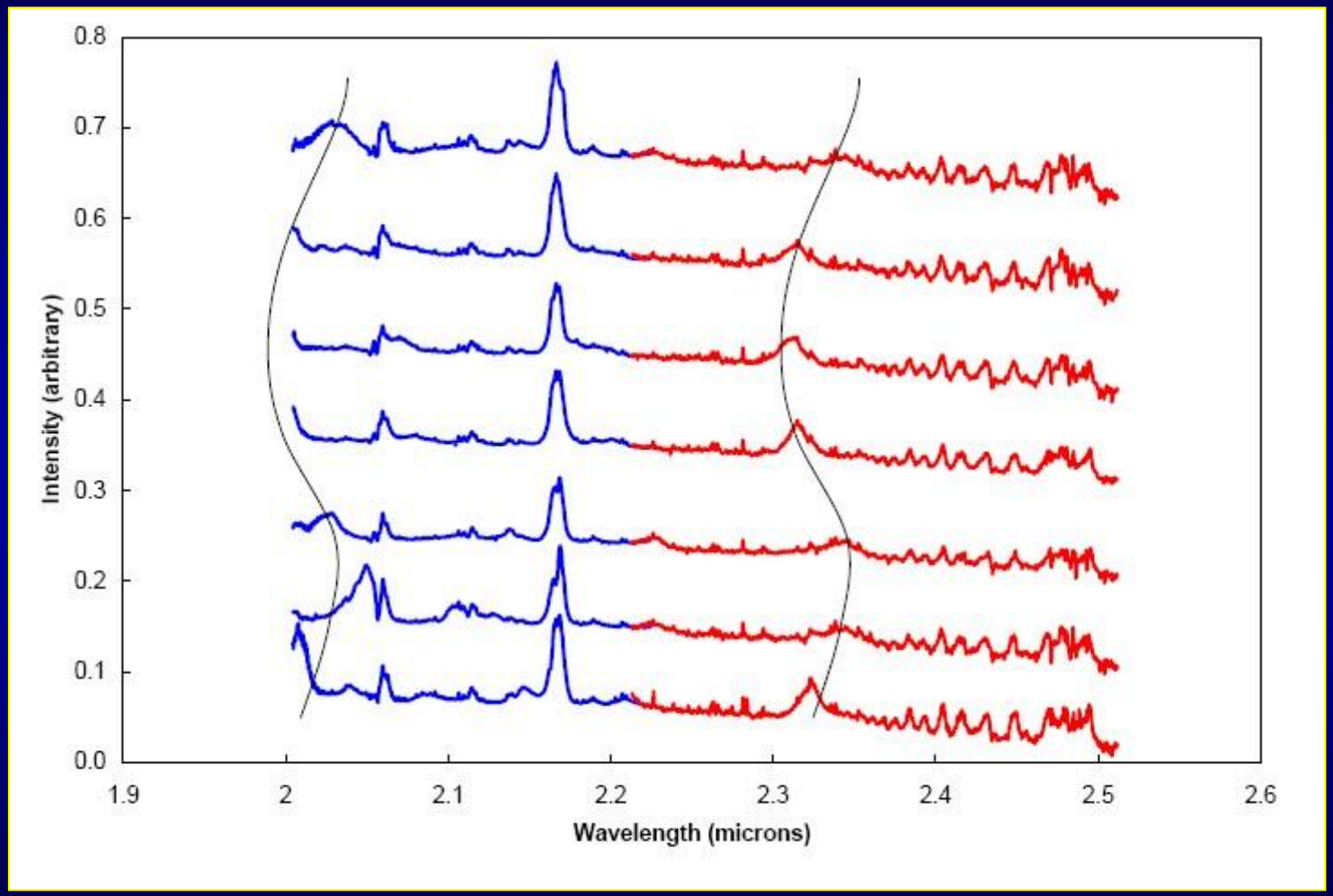
Imaging

Mars at closest approach

Bailey et al. (2004)

Cassegrain Science

Slit Spectroscopy



SS433 time series

Perez & Blundell (2009)

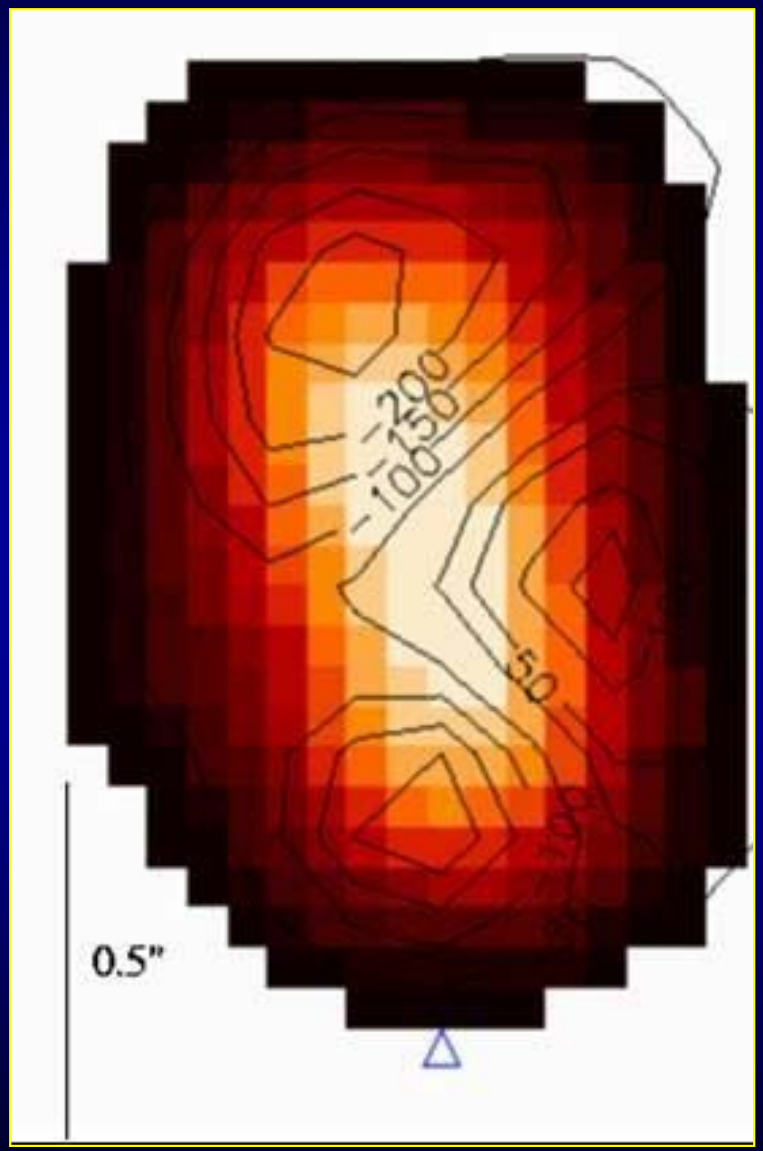
Cassegrain Science

Integral Field Spectroscopy

ELAIS N2 850.4

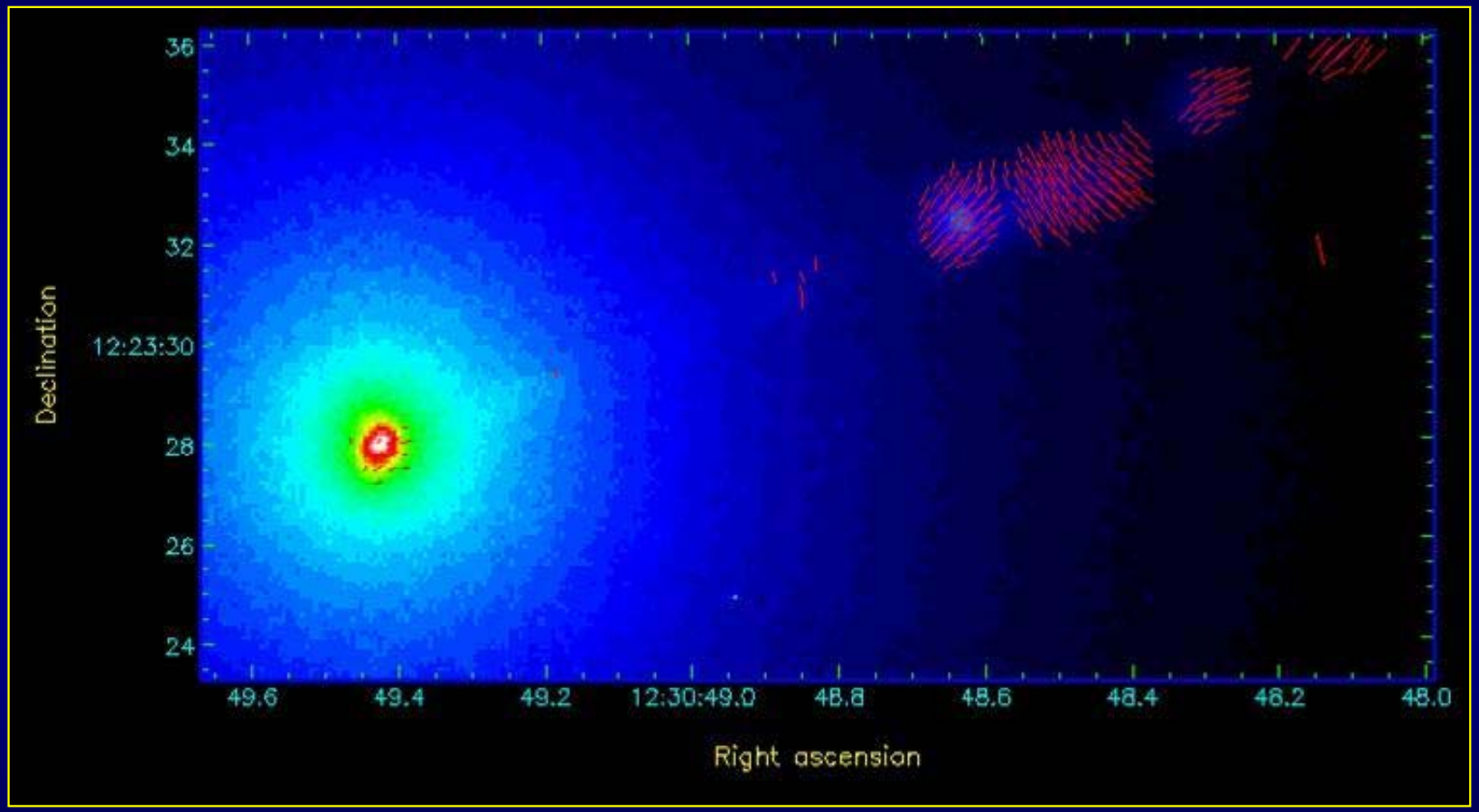
Hα mapping at z=1–2

Swinbank et al. (2005)



Cassegrain Science

Polarimetry

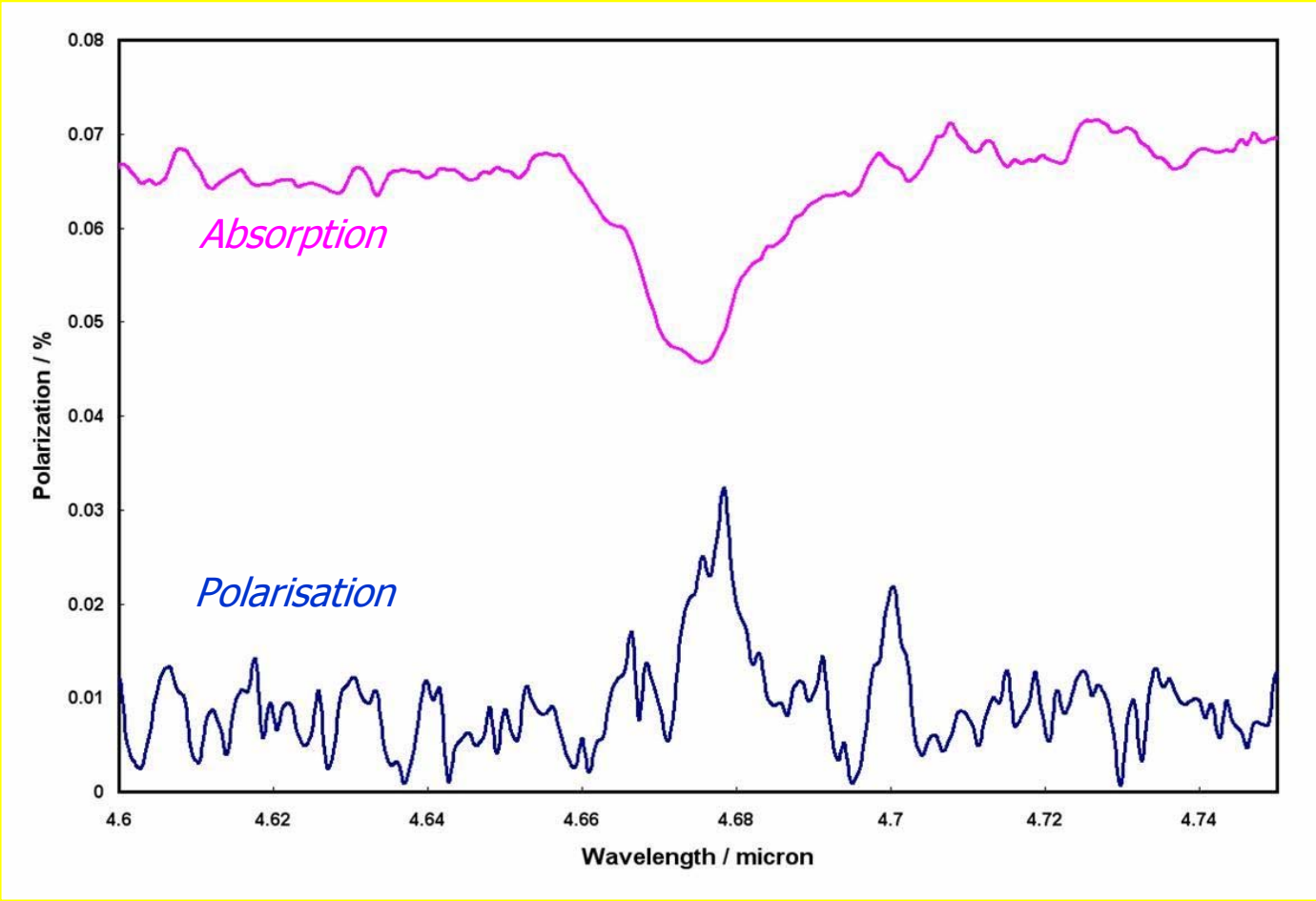


M87 relativistic jet

Cawthorne et al. (unpublished)

Cassegrain Science

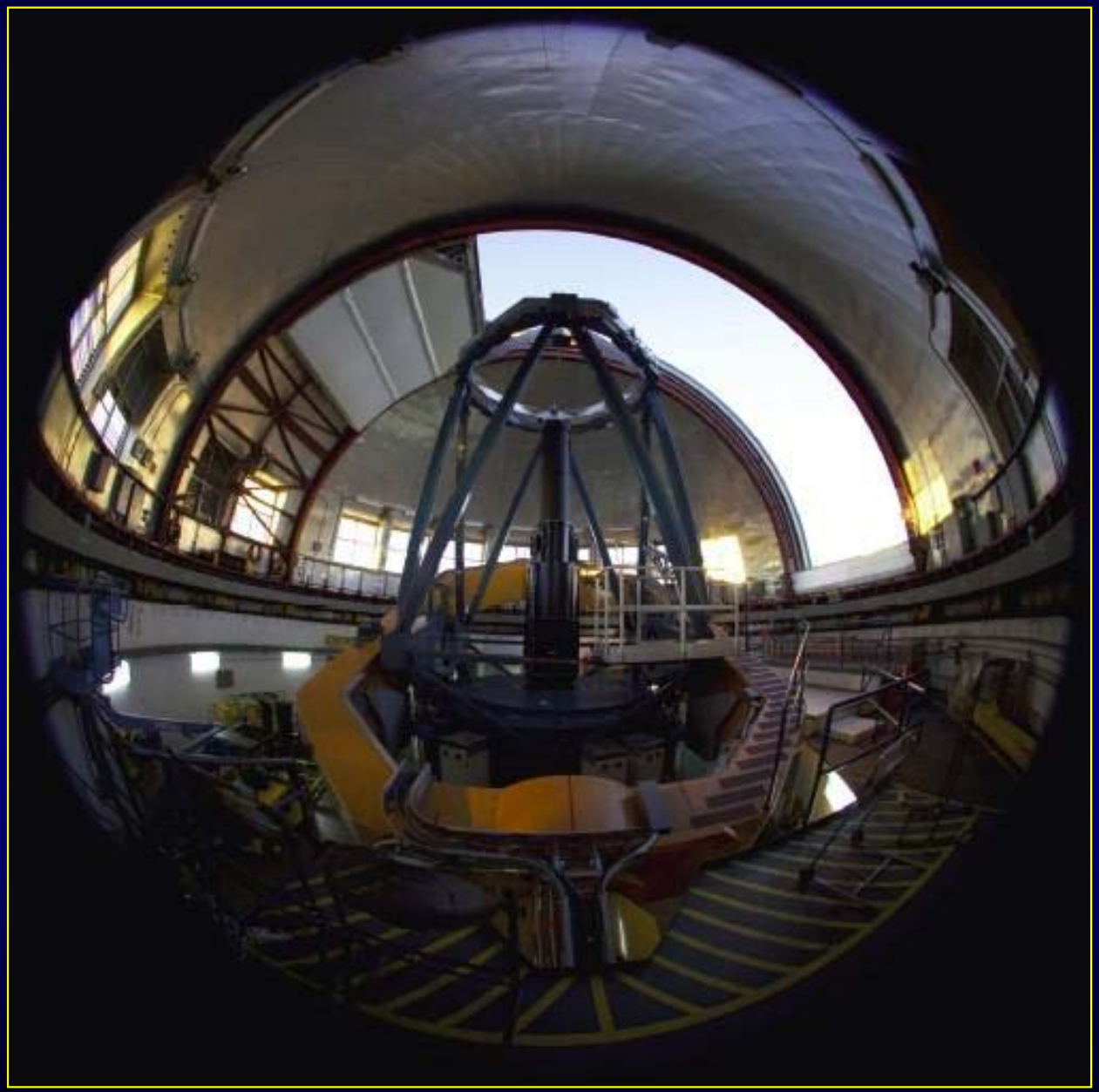
Spectropolarimetry



ELIAS 16

Hough et al. (2008)

Wide-Field Imaging



WFCAM

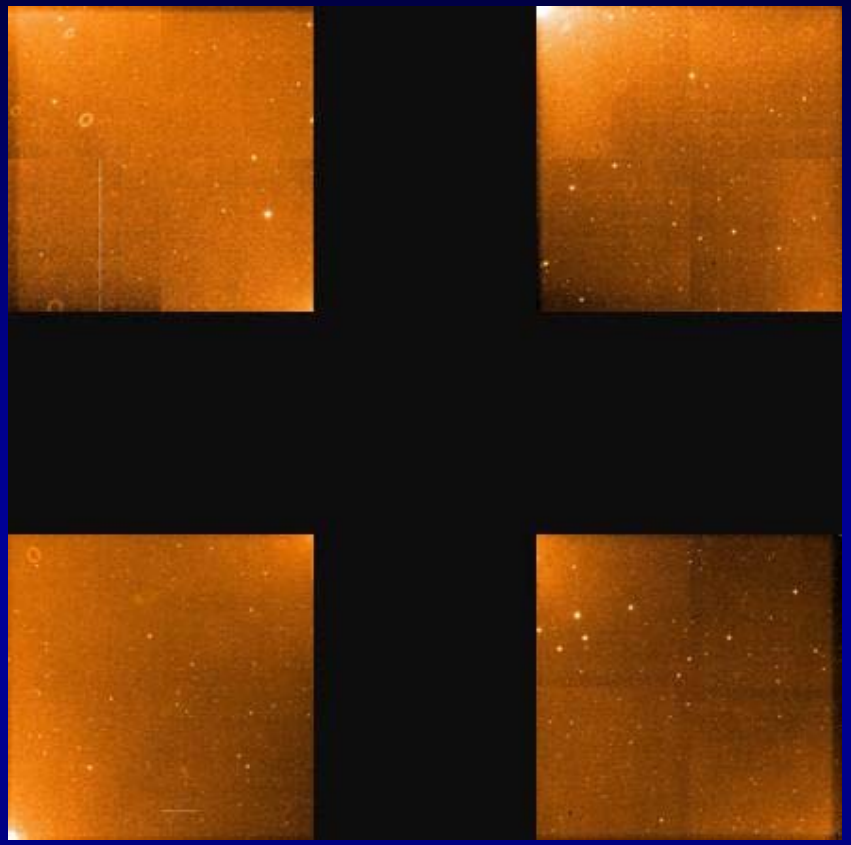
4 Hawaii-II arrays

Filters:

ZYJHK, H_2, Brγ

FeII, nbJ, nbH, nbK

Wide-Field Imaging



UFTI

1k x 1k

2.25 sq arcmin

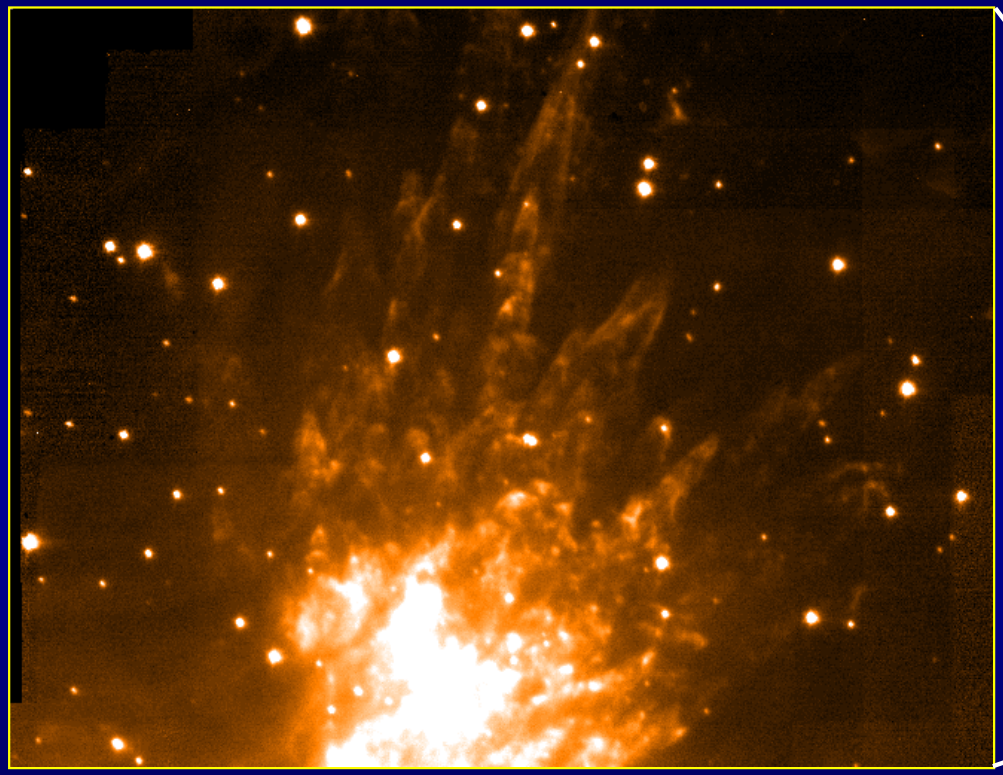
WFCAM

4 x 2k x 2k

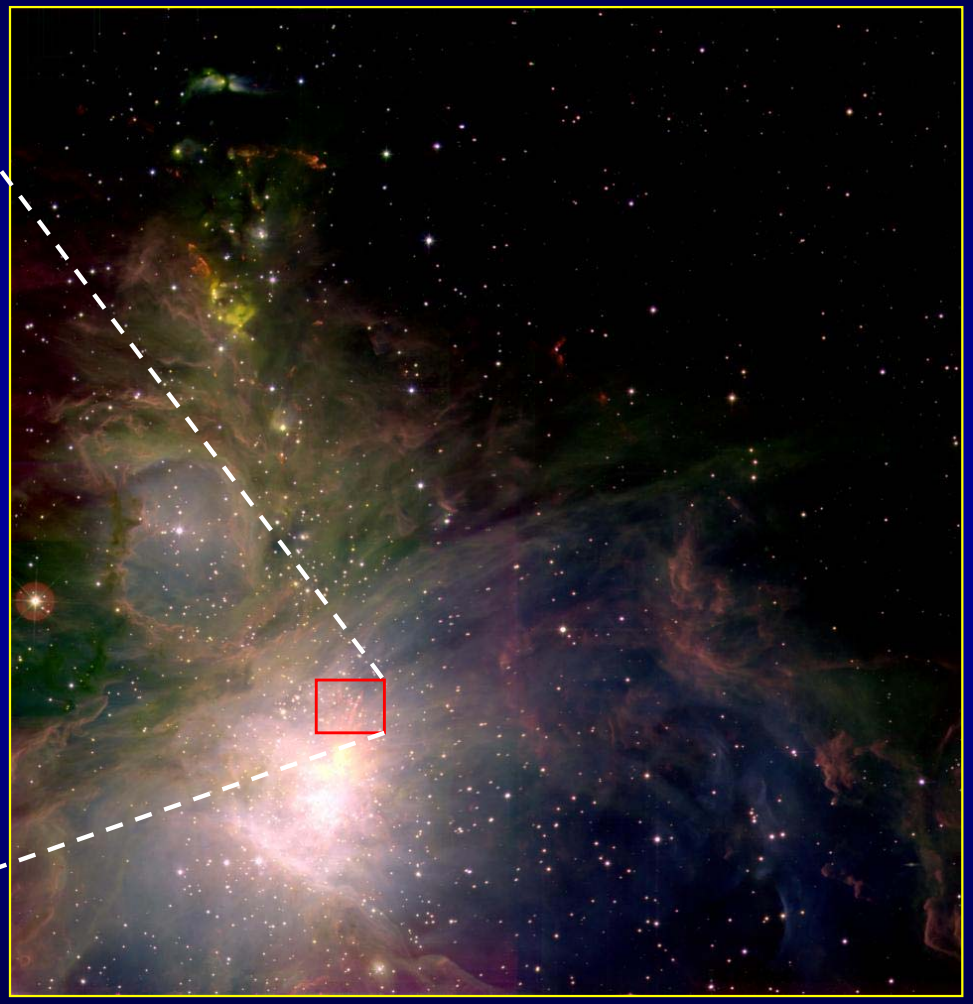
745 sq arcmin

Wide-Field Imaging

Orion:



UFTI H2 S(1)



WFCAM J, H, H2 S(1)
central portion of one tile

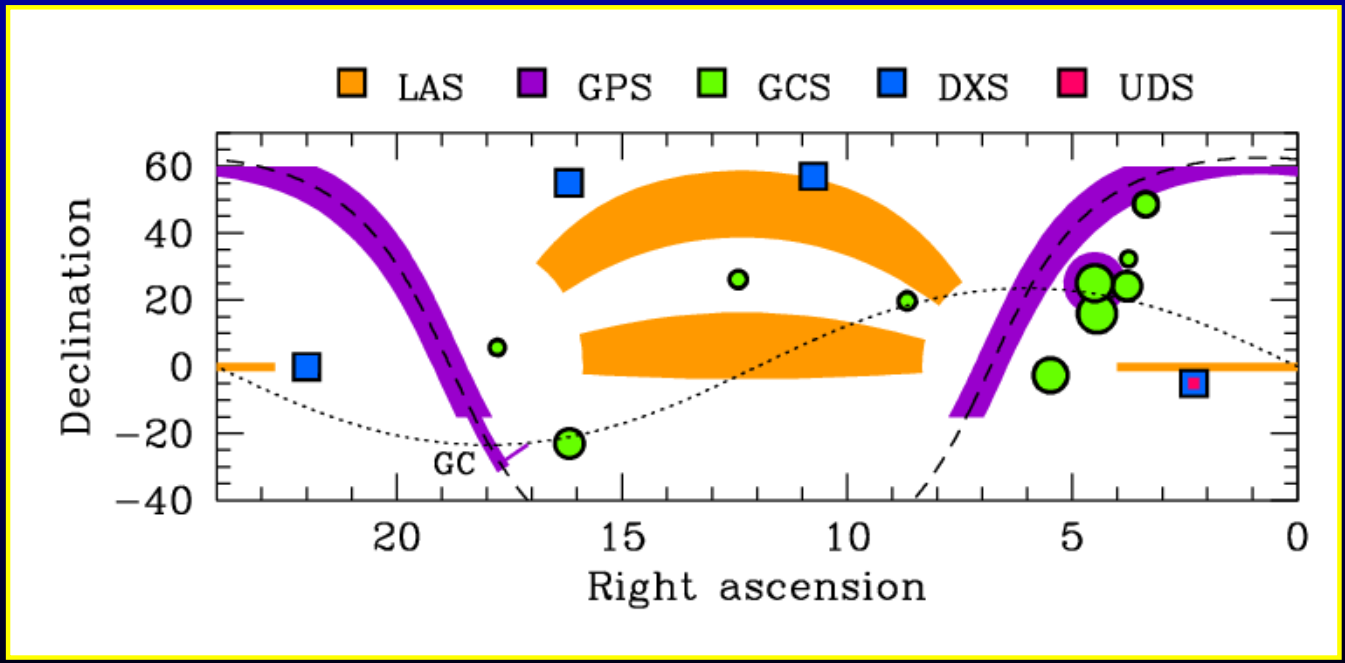
UKIDSS

UKIRT Infrared Deep Sky Survey:

- 7,500 square degrees to minimum depth K=18.3
- >3 magnitudes deeper than 2MASS
- originally planned for 1,000 nights over 7 years
- commenced May 2005, last observations Dec 2012
- ESO public survey: data releases every 9mo
- world releases 18mo later

UKIDSS Survey Design

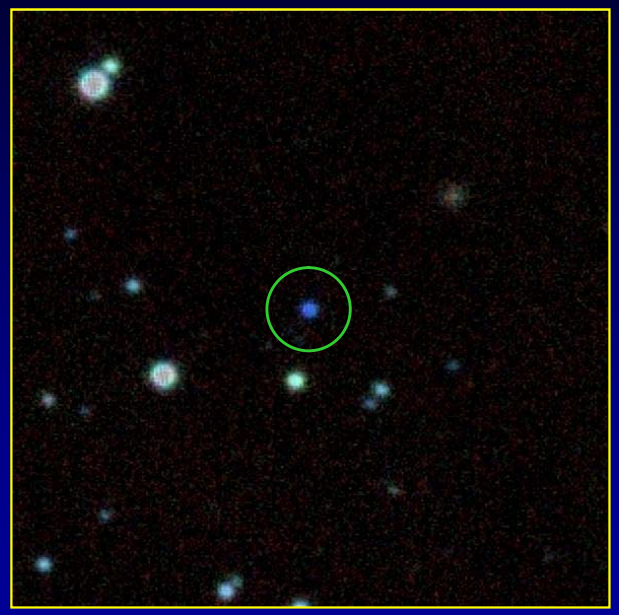
Survey Name	ID	Filters	K limit	Area (sq deg)	Type
Large Area Survey	LAS	YJHK	18.4	4000	both
Galactic Plane Survey	GPS	JHK	19.0	1800	Gal
Galactic Clusters Survey	GCS	ZYJHK	18.7	1600	Gal
Deep Extragalactic Survey	DXS	JK	21.0	35	ExGal
Ultra Deep Survey	UDS	JHK	23.0	0.77	ExGal



UKIDSS Science Goals

LAS	• coolest T dwarfs and nearest low-mass dwarfs • search for z>6 quasars • multi-wavelength photometry of SDSS galaxies • detection of cool stars with high proper motions
GPS	• creation of a legacy database • study of star formation and the ISM • search for variables, AGB stars, BDs, PPN, X-ray counterparts • complement to Spitzer GLIMPSE
GCS	• stellar mass function in the sub-stellar regime • establish universality of the IMF
DXS	• galaxy clustering at z=1–1.5 to constrain cosmological parameters • galaxy clustering at z>1 and evolution of bias • multi-wavelength census of luminosity density
UDS	• first large-volume map of Universe at z>3 • growth of structure and bias since z=3 • determine epoch of spheroid formation

UKIDSS Highlights

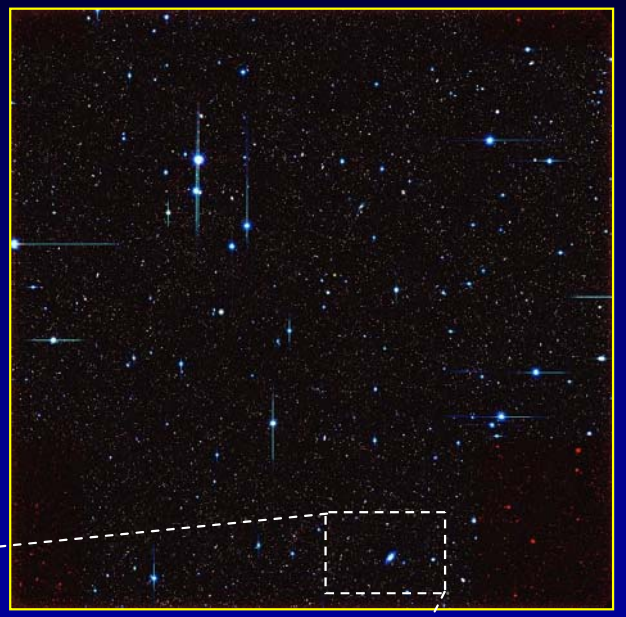


Brown dwarf 520K 4.1pc

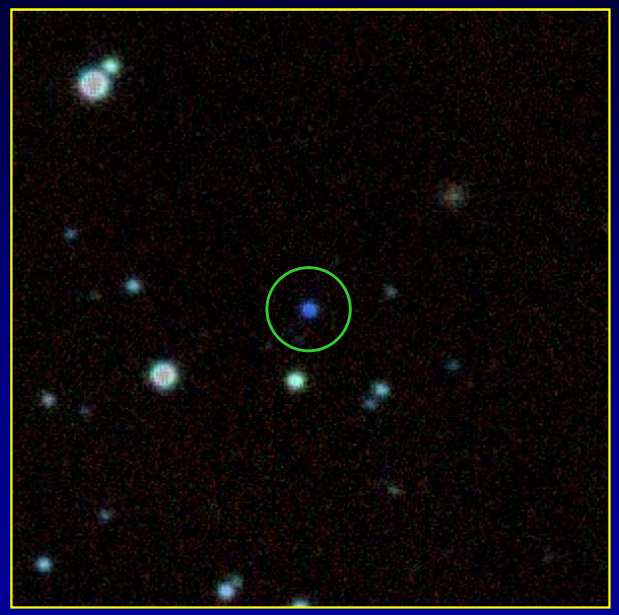
Lucas et al. (2010)

Galaxies at z > 6

PI Almaini



UKIDSS Highlights



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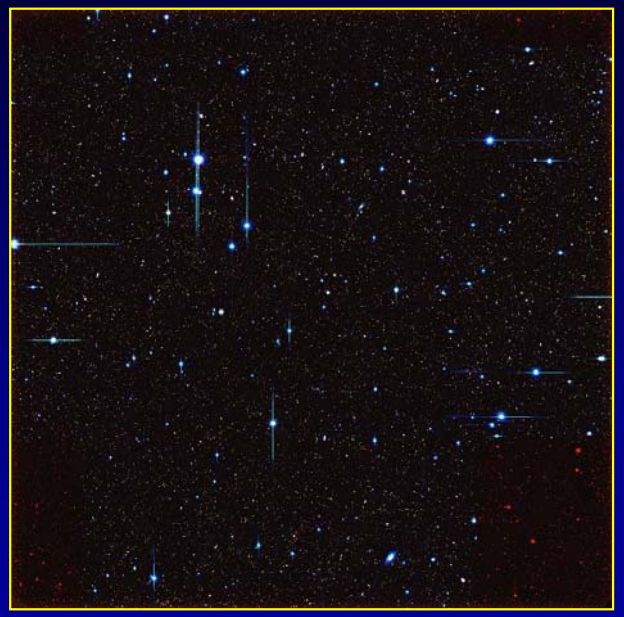
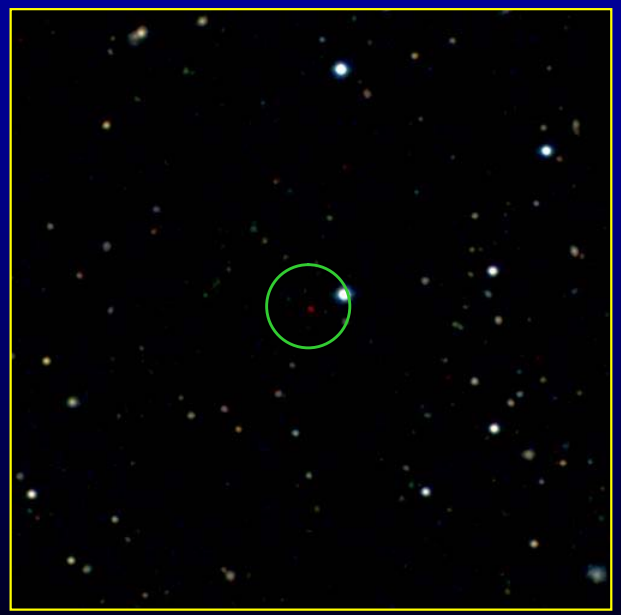




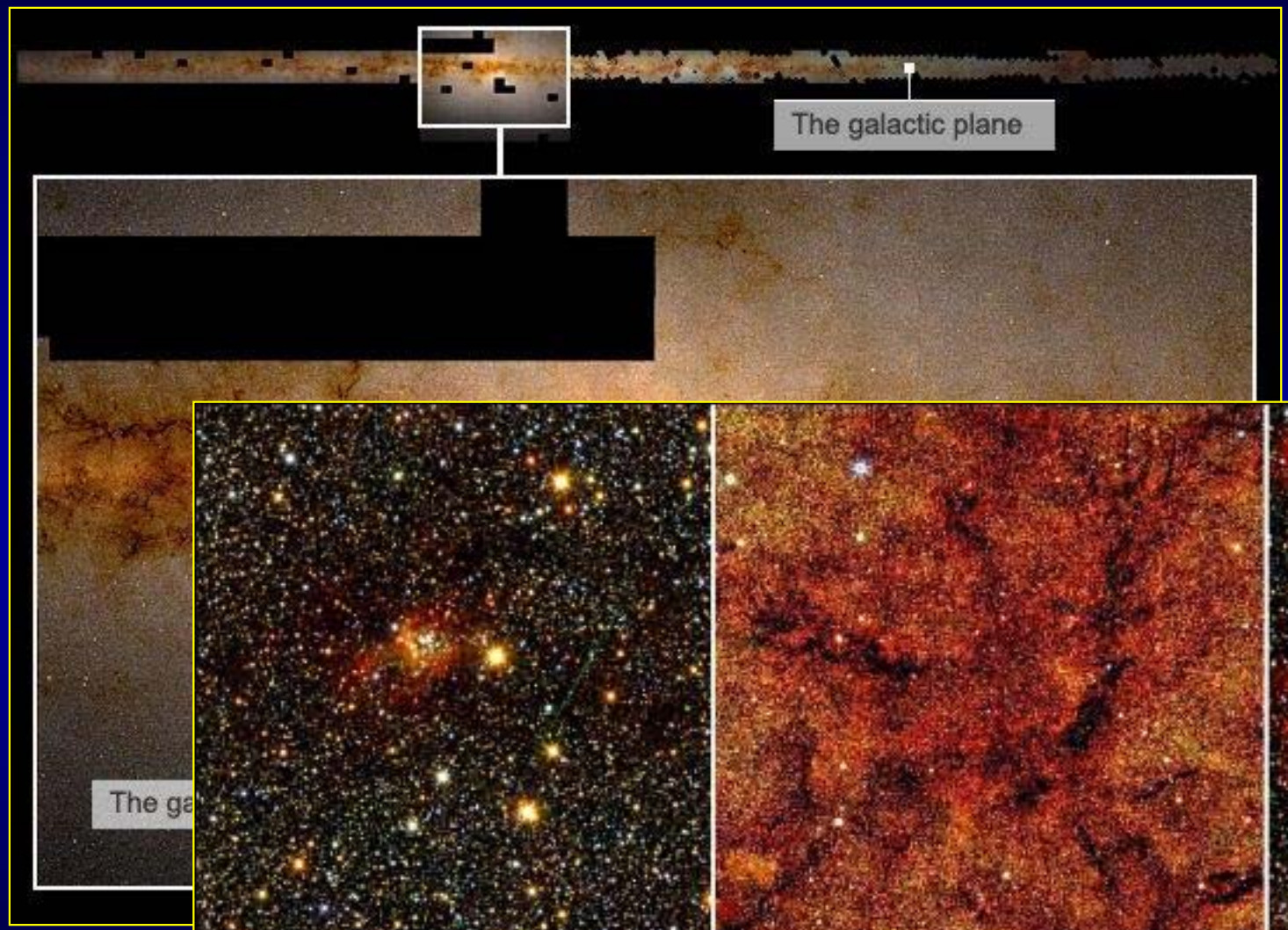
First quasar beyond z = 6.4

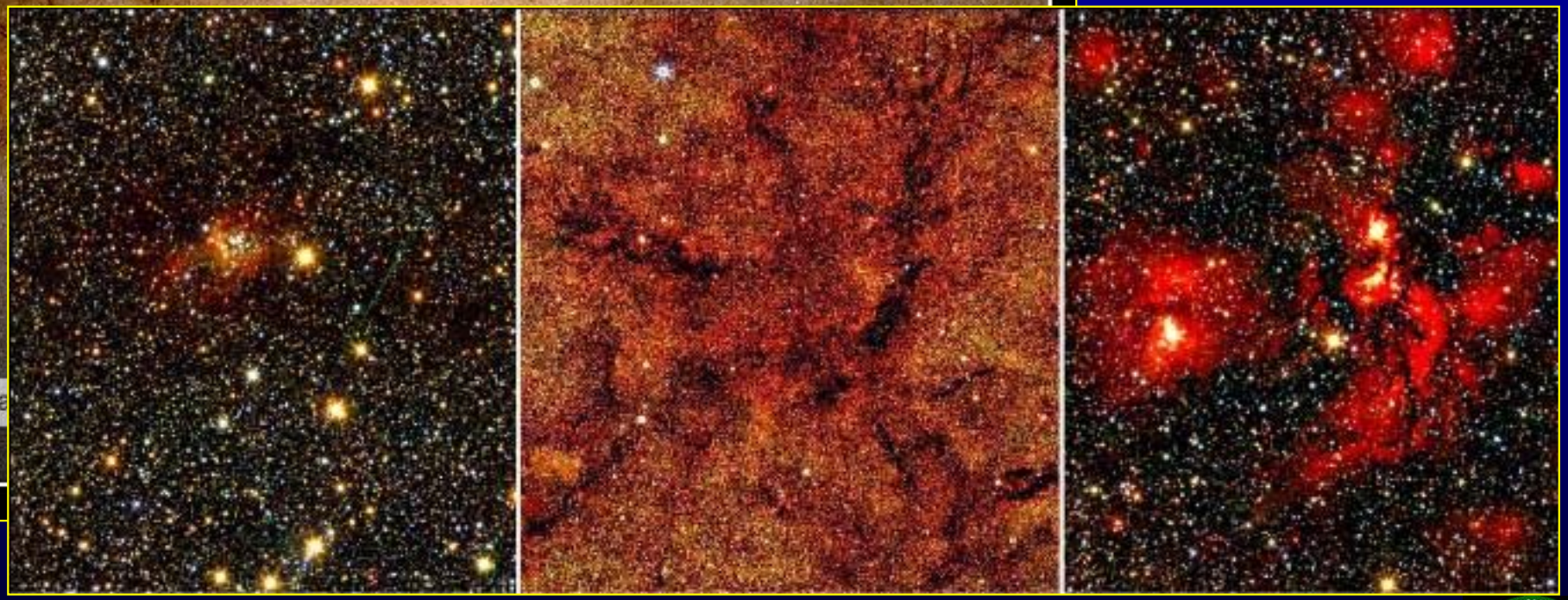
Mortlock et al. (2011)

GRB at z = 8.2

Tanvir et al. (2009)

A Billion Stars



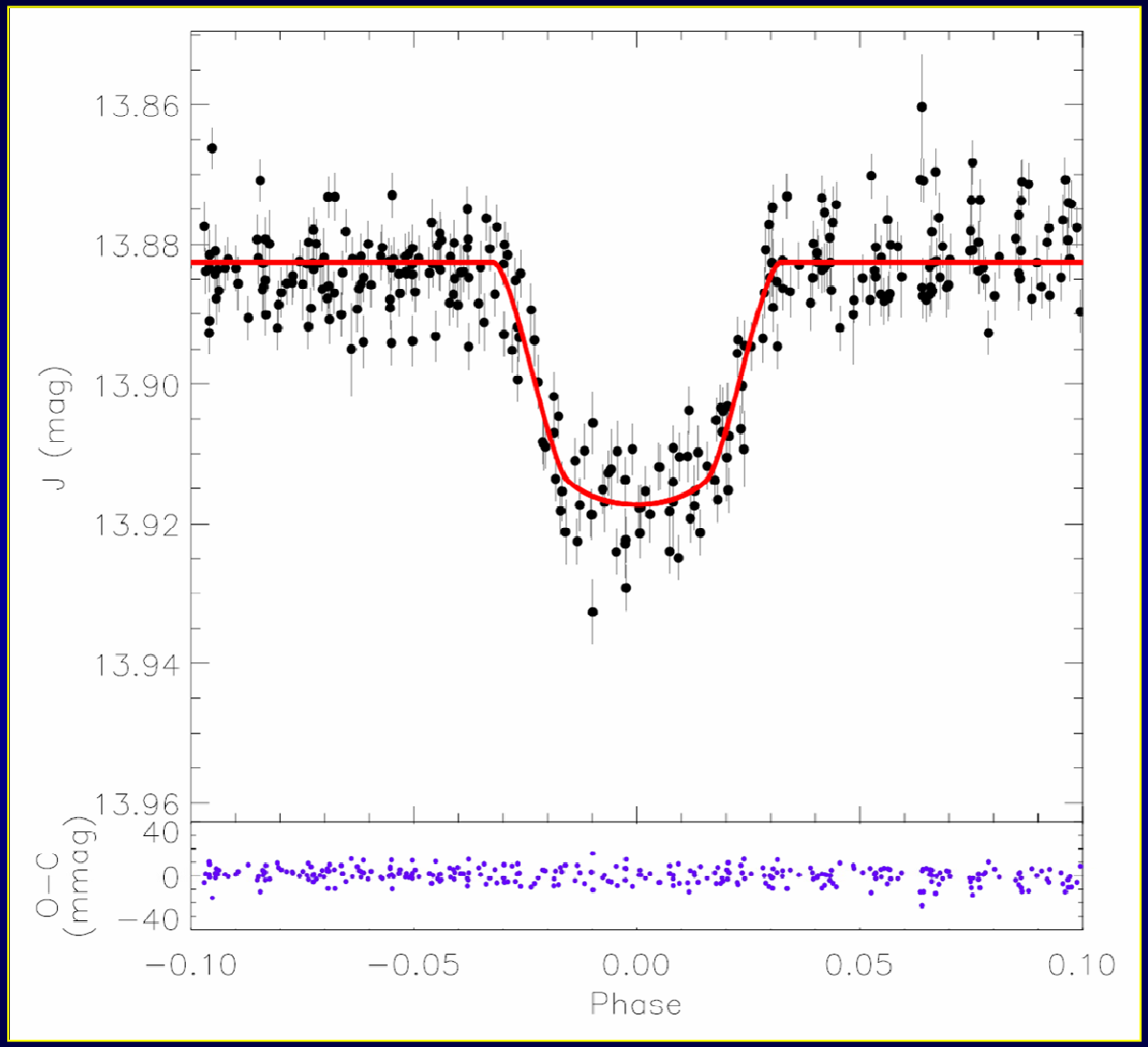


Data from UKIDSS GPS & VISTA VVV

Data processing at CASU

Science archive at WFAU

UKIRT's First Planet



Cappetta et al. (2012)

WFCAM Transit Survey

6000 M dwarfs in J band

1000 epochs acquired over 5 years

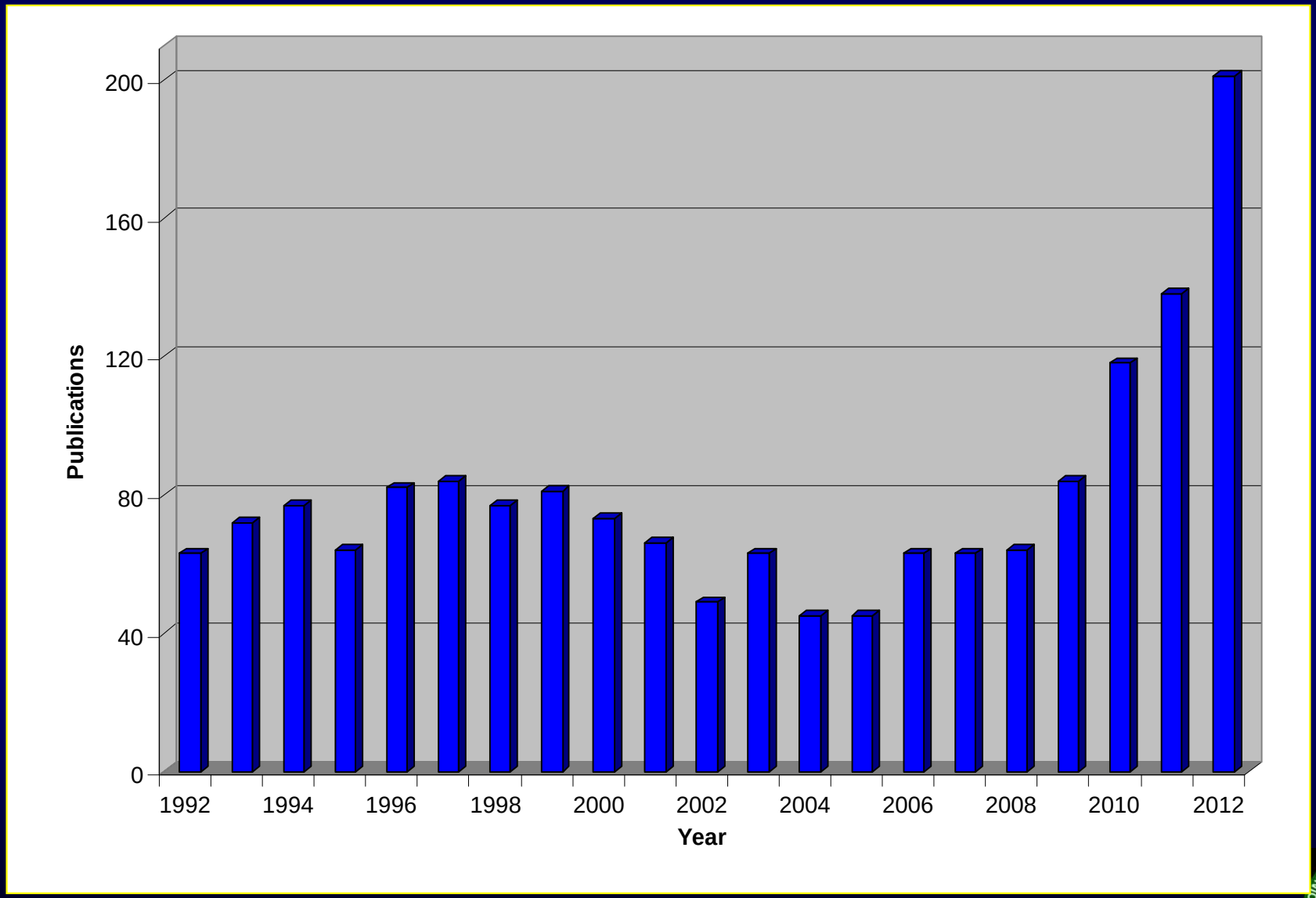
WTS-2b: K star, period 1.02d

RV spectroscopy ⇒ 1.08 M_J

Operational Metrics

Operational Metrics

Publications:



Reasons for UKIRT's Success

- its location: Mauna Kea
- its optical system: mirror and thermal cleanliness
- its instrumentation: aggressive programme to produce leading-edge instruments with unique capabilities
- its software: tools to optimise the observing programme and to produce publication-quality data products
- its staff

Reasons for UKIRT's Success

Funding Announcement

Decision:

- operational support for UKIRT will cease on 30th September 2013
- operational support for JCMT will cease on 30th September 2014

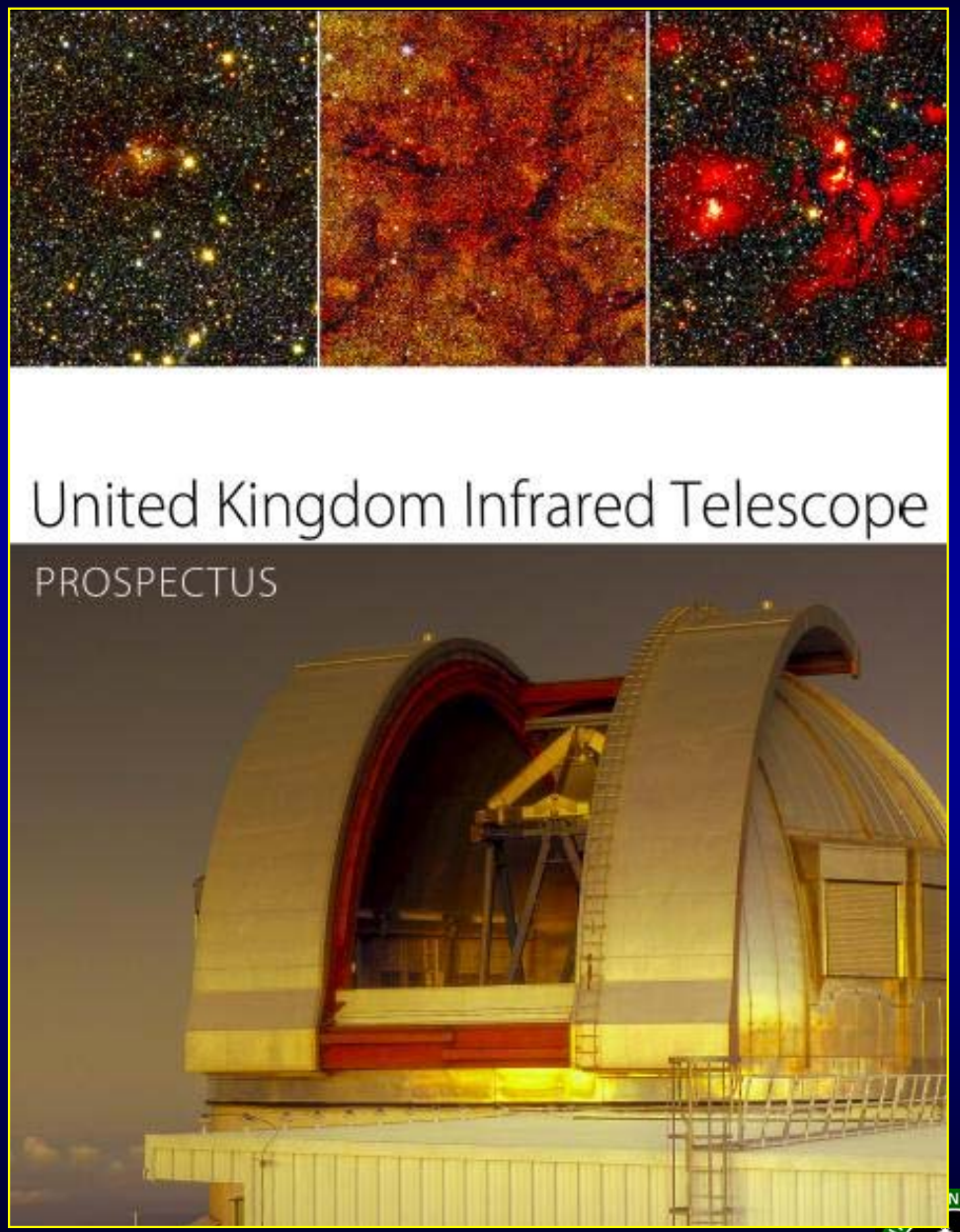
Options:

- transfer to UH
- transfer to third party
- decommission the facility and restore the site

The Offer

Details:

- telescope, instruments, support equipment, software, staff
- no acquisition cost
- decommissioning liability



Legal Framework

Termination of Sublease

Facilities Use Agreement

Operational Handover

This could be you

Who Wins?

- CFHT community ✓
- CFHT Corporation ✓
- Chinese community ✓
- University of Hawaii ✓
- STFC ✓

Who Loses?

- UKIRT community ✗
- Other bidders ✗

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