United Kingdom Infrared Telescope

PROSPECTUS
The United Kingdom Infrared Telescope (UKIRT) is one of the world’s leading astronomical observatories. For more than three decades it has served the UK and international communities with unique and forefront capabilities that have led to remarkable discoveries, supporting the advance of astronomical science. In addition, UKIRT pioneered many operational innovations, including flexible scheduling and the provision of data reduction pipelines. It is an extremely efficient operation and is currently experiencing a peak in productivity, based largely on the very successful UKIDSS programme which has extended infrared survey imaging to unprecedented depth and area.

Despite these successes, the UK’s funding agency for astronomy, the Science and Technology Facilities Council (STFC), can no longer support UKIRT beyond 30th September 2013. This decision follows a review process and reflects the evolution of the UK’s suite of observational capabilities in a tightly-constrained financial environment. The observatory, its instrumentation and its support equipment are therefore being offered to the global astronomical community through this Announcement of Opportunity.

We encourage anyone who is interested in participating in UKIRT beyond 1st October 2013 to review this prospectus and consider submitting an Expression of Interest. There are no preconceptions or constraints: we welcome parties wishing to take over the entire observatory, parties interested in being minor partners, and any other permutation. We are willing to consider any and all possibilities. Details of the facilities being made available and the process for registering your interest are all described in this document.

This is the first time that a productive, world-leading observatory in the 4-m class has been offered to the global community. We invite you to consider this unprecedented opportunity.
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The United Kingdom Infrared Telescope (UKIRT) is the world’s most productive infrared-dedicated observatory. It has been renowned throughout its life for its high standard of excellence: in a strategic review in 2005 chaired by Professor Richard Ellis (Caltech), it was described as “the gold standard of 4-m telescopes.”

UKIRT is wholly owned by the UK funding agency for astronomy, the Science and Technology Facilities Council (STFC). Following a review process, and due to financial pressures, STFC decided in May 2012 that it could no longer provide operational support for UKIRT beyond 30th September 2013. The observatory and its instruments and associated support equipment are therefore being offered to the global astronomy community through this Announcement.

UKIRT’s elite status can be attributed to the following factors:

- **its location:** Mauna Kea is one of the best infrared observing sites in the world, and certainly the very best in the northern hemisphere;

- **its optical system:** for most of its 33 years in operation, UKIRT was the largest infrared-dedicated facility in the world. It has a well-controlled thermal environment, and recent upgrades include reduction of the emissivity through a number of measures and improvement of the seeing by active cooling of the primary mirror. The resulting image quality is superb, typically 0.5” at K throughout the night;
• **its instrumentation:** UKIRT has benefited from an aggressive programme of innovative instrumentation to produce leading-edge instruments with unique capabilities. WFCAM, UKIRT’s near-infrared panoramic camera, is the best current example of this;

• **its software:** UKIRT boasts a comprehensive suite of tools to optimise the observing programme and to provide users with publication-quality data products; and

• **its staff:** without whose talent and dedication none of the above would be possible.

All of these factors are discussed more fully in the following sections.
UKIRT is a 3.8-m classical Cassegrain telescope with a thin primary mirror. Originally commissioned in 1979, UKIRT benefited from a concerted programme of upgrades during the 1990s. It currently provides:

- sky access from +60° to −40°
- pointing accuracy to <0.5”
- image stabilisation to <0.1”
- tip-tilt control using a CCD fast guider
- active focus maintenance by a thermal-elastic model of the telescope
- active correction of the primary mirror figure and alignment via a lookup table
- active and passive dome ventilation and internal air circulation
- active cooling of the primary mirror
- emissivity of order 10%

The telescope is situated at an altitude of 4194 m, at the summit of Mauna Kea. Median seeing at the Cassegrain focus is approximately 0.5”, with values as good as 0.17” having been observed, the latter close to the diffraction limit of the telescope. Cooling of the primary mirror has recently been implemented which, together with the dome ventilation system and tip-tilt secondary control, has delivered consistent image quality throughout the night. Superb pointing accuracy allows for fast target acquisition, and accurate tracking allows the telescope to deliver good image quality even for unguided observations. A chopping secondary in Cassegrain mode enables mid-infrared imaging and spectroscopy up to a wavelength of almost 30 μm and, in combination with the low emissivity, provides excellent sensitivity in the thermal infrared.

The average weather loss, due to prohibitive cloud cover and closure of the dome due to snow, is ~25%. This is subject to a distinct seasonal pattern on Mauna Kea, with the winter months being more vulnerable to losses. Flexible scheduling, described in §4, enables rapid switching between programmes to match the prevailing conditions, thereby reducing the susceptibility of the observatory’s science programme to weather.
Table 1

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Spectral Range (µm)</th>
<th>Spectral Resolution</th>
<th>FOV</th>
<th>Polarimetric Option?</th>
</tr>
</thead>
<tbody>
<tr>
<td>CGS4 (echelle spectroscopy)</td>
<td>0.8–5</td>
<td>37,000</td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Michelle (imaging)</td>
<td>8–25</td>
<td></td>
<td>67&quot; × 50&quot;</td>
<td>Y</td>
</tr>
<tr>
<td>Michelle (spectroscopy)</td>
<td>8–25</td>
<td>200 to 30,000</td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>UFTI</td>
<td>1–2.5</td>
<td></td>
<td>90&quot;</td>
<td>Y</td>
</tr>
<tr>
<td>UIST (imaging)</td>
<td>0.8–5</td>
<td></td>
<td>1’ or 2’</td>
<td>Y</td>
</tr>
<tr>
<td>UIST (slit spectroscopy)</td>
<td>0.8–5</td>
<td>500 to 6,000</td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>UIST (integral field spectroscopy)</td>
<td>0.8–5</td>
<td>500 to 6,000</td>
<td>3.5&quot; × 6.5&quot;</td>
<td>Y</td>
</tr>
<tr>
<td>WFCAM</td>
<td>1–2.5</td>
<td></td>
<td>4 × (13” × 13”)</td>
<td>N</td>
</tr>
</tbody>
</table>

UKIRT has two operating modes: Cassegrain mode, in which three instruments (CGS4, UFTI, UIST) share the folded Cassegrain foci (13’ accessible); and wide-field mode, in which the wide-field camera WFCAM resides at the forward Cassegrain focus (30’ accessible). These modes are mutually exclusive, depending on whether or not WFCAM is physically present. Until 1\textsuperscript{st} February 2009, the telescope time was split in the ratio 75% wide-field, 25% Cassegrain; from that date onwards, driven primarily by funding pressures, UKIRT has been operating exclusively in wide-field mode.
WFCAM resides at the forward Cassegrain focus and images >0.2 square degrees in a single exposure using four Hawaii-II arrays. Filters in ZYJHK are provided and slots are also available for additional narrow-band filters. More than six years after first light, WFCAM remains one of the fastest near-infrared survey instruments on the planet: its mapping speed, taking weather, overheads and quality control into account, is typically 55 sq deg per night, reaching a depth of $K=18.6$.

The Cassegrain instruments have not been retired and are available for reinstatement to active service. Their capabilities are compared in Figure 1. They are selectable via a dichroic tertiary mirror that can be switched between instruments in a minute or two. All three instruments are therefore permanently available when the telescope is in Cassegrain mode, a prerequisite for flexible scheduling.

The Michelle instrument is also listed in the table. Michelle was originally designed for use on UKIRT, but is currently on long-term loan at Gemini. There are no technical impediments to returning it to active service on UKIRT, and as an STFC asset it is also being made available in this call.

The instruments described here do not represent the limit of UKIRT’s capabilities. UKIRT makes an excellent front end for visiting instruments: the software interface is extremely well defined, and the Cassegrain focus is more accessible than on any other telescope of this aperture (approximately chest height and completely open). Three visiting instruments have been hosted in recent years:

- TIRGO, a submillimetre heterodyne receiver (Kent/RAL);
- TRISPEC, a visible/J/H/K imager/spectrometer/polarimeter (Nagoya); and
- Celeste, a mid-infrared spectrometer for planetary science (NASA GSFC).

For exactly the same reasons, UKIRT is also a fertile environment for the development of new instrumentation and new scientific capabilities.
If a new owner or a new partnership takes over the operation of UKIRT, the observing model will be entirely at the new entity’s discretion. Nevertheless, the merits of building on an existing, successful system should be carefully considered before any changes are introduced. In this section, the operational model currently in effect at UKIRT is described.

In December 2010, in response to funding pressures in the UK, UKIRT adopted a minimalist mode of operation. This includes, *inter alia*:

- a streamlined scientific programme in which the bulk of the time is committed to one large survey programme (see §6); and
- remote operation of the telescope.

For many years, UKIRT was operated each night with two people in the observatory control room: a staff member to operate the telescope (called a Telescope System Specialist, TSS) and a visiting astronomer to carry out the observing. (Two personnel at the summit is the minimum permissible for safety reasons.) Since the adoption of minimalist mode, however, the telescope has been unattended at night and is operated remotely by the TSS from the base facility in Hilo. We no longer routinely host visiting observers, although exceptions are possible on an occasional basis.
UKIRT operates a novel flexible-scheduling system that was designed to enhance the completion of the highest-ranked projects within the constraint posed by the variable observing conditions on Mauna Kea. Indeed, UKIRT was amongst the first telescopes in the world to adopt flexible scheduling and it has been an unqualified success with our user community. A number of software tools have been created to support this operating mode:

- an observation preparation tool (OT);
- standard libraries of observing sequences;
- real-time, automatic matching of observing programmes to weather conditions;
- fast switching between instruments and modes;
- data-driven reduction pipelines (§5) for all modes of all instruments;
- OT and data reduction pipeline available off-island;
- automatic, comprehensive feedback to and from remote PIs; and
- fast, web-based access to raw data and reduced data products.

Supported by these tools, flexible scheduling has been an enormous success for UKIRT and has been a major contributing factor to the escalating productivity in recent years (§7). The system is nevertheless sufficiently flexible that it can also operate in classical PI mode if that is preferable.
All UKIRT instruments (Cassegrain and WFCAM) are accommodated by the same Starlink-based pipeline infrastructure. The pipeline runs continually during the observing night and allows the observer to monitor S/N in spectroscopy, image FWHM and depth in imaging, and otherwise assess data quality. This pipeline was a prerequisite for the implementation of flexible scheduling.

The pipeline is also designed to run off-line at a PI’s university to generate near-publication quality products for all instruments without human intervention. The acquisition system is designed such that all the information needed to reduce the data is stored in the data headers, including the PI’s scientific intent and the observing mode defined for the telescope.

All WFCAM data are currently processed in the UK by two university groups: the data reduction takes place at the Cambridge Astronomical Survey Unit, and the VO-compatible WFCAM Science Archive (WSA) is provided by the Wide-Field Astronomy Unit at the University of Edinburgh. Our users download publication-quality, reduced, calibrated and stacked images directly from the WSA. These entities provide essential services for observing with WFCAM, and as such they comprise integral elements of the UKIRT operational ecosystem. These services can continue to be provided to a new operator of the observatory, in return for a contribution to the operational costs in Cambridge and Edinburgh.
For most of its 33 years, UKIRT was operated as a general-purpose observatory, providing its users with a wide range of capabilities (imaging, spectroscopy, polarimetry). A strategic review of the observatory was carried out in 2005 by an international panel chaired by Professor Richard Ellis (Caltech). The primary recommendation arising from this review was that the role of UKIRT, as a world-class 4-m telescope on an excellent site in the 8-m era, should be to focus on campaign-style science: projects that require large amounts of telescope time, that would be prohibitive to obtain on larger apertures.

The recently-completed UKIRT Infrared Deep Sky Survey (UKIDSS) is a classic example of this. Taking advantage of the unique capabilities of WFCAM, UKIDSS has achieved both significant depth and area for the first time in near-infrared astronomy (Lawrence et al., 2007). The survey was more than three magnitudes deeper than its predecessor, 2MASS, over 7,500 square degrees of the northern sky, extending over both high and low galactic latitudes, in JHK. UKIDSS comprised five individual sub-surveys, as summarised in Table 2; their sky coverage is depicted in Figure 2.

### Table 2

<table>
<thead>
<tr>
<th>Survey</th>
<th>ID</th>
<th>Filters</th>
<th>Limiting Magnitude (K)</th>
<th>Area (sq. deg.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Area Survey</td>
<td>LAS</td>
<td>YJHK</td>
<td>18.4</td>
<td>4000</td>
</tr>
<tr>
<td>Galactic Plane Survey</td>
<td>GPS</td>
<td>JHK</td>
<td>19.0</td>
<td>1800</td>
</tr>
<tr>
<td>Galactic Clusters Survey</td>
<td>GCS</td>
<td>ZYJHK</td>
<td>18.7</td>
<td>1600</td>
</tr>
<tr>
<td>Deep Extragalactic Survey</td>
<td>DXS</td>
<td>JK</td>
<td>21.0</td>
<td>35</td>
</tr>
<tr>
<td>Ultra-Deep Survey</td>
<td>UDS</td>
<td>JHK</td>
<td>23.0</td>
<td>0.77</td>
</tr>
</tbody>
</table>

![Figure 2 Sky coverage of the five surveys comprising UKIDSS.](image)
In 2007, the UKIRT Board approved three further campaign-style projects to run concurrently with UKIDSS:

- the WFCAM Transit Survey, to search for Earth-mass planets around low-mass stars using the transit technique;
- the Hi-Z Emission Line Survey, a multi-narrow-band survey in the best-studied, degree-scale extragalactic fields; and
- a continuing programme of GRB follow-up.

Some selected highlights from UKIDSS and these campaigns are summarised in the following pages.
Brown dwarfs

At the turn of the century, UKIRT played a key role in defining the new T dwarf spectral type via spectroscopy of sources from Sloan Digital Sky Survey (SDSS) at 1–4 µm. The UKIDSS survey has built on this by surveying the SDSS area in greater depth to detect even cooler brown dwarfs and to measure the Initial Mass Function (IMF) and formation history of brown dwarfs in the local field. This effort has led to a wealth of discoveries, including several T dwarfs with surface temperatures of 500–700 K and numerous benchmark binary brown dwarfs in systems where the age and metallicity of the primary are known. The coolest UKIDSS discovery is also the nearest isolated brown dwarf known, at a distance of only 4.1 parsecs (Figures 3a and 3b).

One of the more surprising discoveries was that the mass function declines towards lower masses, contrasting with previous research in young clusters. Confirmation has come from the UKIDSS Galactic Clusters Survey, which has measured the IMF in 10 young nearby clusters and shown that it declines at substellar masses with an approximately log-normal form. While the WISE mid-IR satellite has recently surpassed UKIDSS in the detection of the coolest objects (Y dwarfs), UKIRT remains more sensitive at spectral types up to T6, where much research on brown dwarf atmospheres is continuing.

The excellent astrometric precision of the telescope is also playing a vital role: UKIRT parallax measurements have determined the distances of mid-late T dwarfs and are now determining the distribution of their space motions, which will reveal the age distribution and formation history.
**Searching for planets around M dwarfs**

The majority of transit surveys do not go faint enough to include a statistically-significant sample of low-mass stars (M dwarfs account for 70% of the stars in the Milky Way). The WFCAM Transit Survey was designed to monitor 6000 M dwarfs in the J band (the peak of a cool star’s spectral energy distribution) with a large aperture telescope. UKIRT+WFCAM offered a unique opportunity thanks to the highly-efficient, queue-scheduled operational mode of the telescope. After 5 years of observation, painstakingly building up millimagnitude precision lightcurves for 1000 epochs in one of our survey regions, we have found two transiting extra-solar planets, neither of which are around M stars. Nicknamed WTS-1b (Cappetta et al., in press) and WTS-2b (Birkby et al., in prep; Figure 4), around G and K stars respectively, both show unusual properties. Both are inflated, and WTS-2b is one of the shortest period planets yet discovered (with a period of only 1.0187 days). WTS-2b joins a small, unexpected, but growing population of giant planets in very close orbits (<0.02 AU) around their host stars. The short orbital period of WTS-2b, coupled with the measured rotation period and low mass of its host star, provides an important observational constraint on the theory of tidal evolution and the in-spiral timescale for hot Jupiters, in a sparsely populated parameter space.
UKIRT is playing a leading role in reshaping our understanding of the high-redshift Universe. In particular, the UKIDSS Ultra-Deep Survey (UDS) is the deepest near-infrared survey ever conducted over such a wide field (0.8 sq degrees), more than a magnitude deeper than any comparable survey to date (Figure 5). The aim of the project is to study the formation and evolution of the most distant galaxies, with the unique wide field allowing large samples to be studied for the first time. Among the key discoveries so far, the UDS has produced the largest sample of galaxies detected at z>6, revealing the rapid build-up of galaxies less than 1 billion years after the Big Bang (McLure et al., 2009; Curtis-Lake et al., 2012; Figure 6). The survey volume has also allowed a detailed assessment of the growth of galaxy clustering and structure, revealing that star formation in the most massive galaxies may terminate once their dark matter halos grow to a critical mass (Williams et al., 2009; Hartley et al., 2010).

**Figure 5**
Zooming in to illustrate the depth of the UDS survey. This image combines optical data from the Subaru telescope with infrared data from UKIRT. Over 200,000 galaxies have been detected to date, including several hundred observed at redshift z>6, less than 1 billion years after the Big Bang.

**Figure 6**
The evolution of the galaxy luminosity function at z > 5 (McLure, 2009). The UDS has produced the most accurate determination of the bright end of the galaxy luminosity function at these early epochs (solid symbols), revealing the very rapid assembly of massive galaxies. The data show good agreement with faint-end measurements from ultra-deep HST imaging.
The most distant known quasar

In late 2010 astronomers searching through UKIDSS data discovered the most distant quasar yet found, the first with a redshift greater than 7 (Mortlock et al., 2011). The quasar is seen only 800 million years after the Big Bang, when the Universe was only 6% of its present age. The source is interesting and valuable for two main reasons. First, measurements indicate that it is powered by matter falling onto a supermassive black hole, of mass 2 billion times the mass of the Sun, and it is difficult to explain how such a massive black hole could have formed so early in the age of the Universe. Second, the source is hundreds of times brighter than any other sources known at such an early time, and because of this its light may be easily analysed. Detailed measurement of the spectrum indicates that we have now reached back in time to the point when much of the gas in the Universe was neutral. This is a key moment in the evolution of the Universe, before galaxies and quasars had ionised the surrounding gas. Figure 7 is an artist’s impression of the quasar, illustrating how the ultraviolet light from the source is ionising the surrounding gas, within this ‘epoch of reionisation’.
Gamma-ray bursts (GRBs) are amongst the most remarkable events known in astrophysics. They are thought to be produced during the explosive deaths of certain very massive stars and, although short-lived, at peak luminosity can be orders of magnitude brighter than any other known sources. One consequence of this is that bright GRB afterglows can be detected at very high redshifts, and thus offer a route to exploring star-formation and galaxy evolution within and preceding the era of reionisation. To date, the most distant burst with a spectroscopic redshift was GRB 090423 at a record-breaking $z=8.2$ (Tanvir et al., 2009). The infrared counterpart of this event was first discovered in UKIRT K-band imaging, beginning only 20 minutes post-trigger (Figure 8). Combined with the non-detection in optical bands, this provided the first indication of its extreme distance, and motivated a major campaign of follow-up imaging and spectroscopy over subsequent days.

These highlights only scratch the surface of the science that has been done with WFCAM on UKIRT over the past few years. For more information, please see the website from a science workshop held in Edinburgh in May/June 2012:

http://www.roe.ac.uk/ifa/Meetings/UKIDSS12/programme.html

Science highlights involving the Cassegrain suite of instruments may be obtained from UKIRT’s Annual Reports at this page:

http://www.jach.hawaii.edu/UKIRT/publications/
Community demand

No recent subscription data are available for UKIRT since open time is no longer offered and there is therefore no competition for telescope time. UK time on UKIRT has been committed almost exclusively to the UKIDSS project. Community participation in the UKIRT science programme is therefore more accurately characterised by the number of scientists who are making active use of UKIDSS data. Analysis of UKIDSS data downloads from the WSA leads to the following conclusions:

- UK usage of UKIDSS data is both abundant and widespread. There are 423 registered users of the archive, spread across 29 institutions;
- UKIDSS is an ESO public survey, and international usage of UKIDSS data has also been significant. There are 579 registered users from outside the UK spread over a wide range of countries; the UK nevertheless dominates the statistics in terms of both users and data downloads; and
- downloads of UKIDSS data continue to increase year by year and this trend will likely continue well beyond the completion of UKIDSS observing, providing the astronomy community with a valuable legacy dataset.

These statistics clearly indicate the widespread use of, and demand for, UKIDSS data by the UK and international communities.

Operational performance

The operational fault rate is defined as the ratio of time lost to technical faults to the available clear time (which is total time less weather losses and closures for engineering work). Each fault at UKIRT is filed at the time of occurrence and has an associated time loss, which is automatically logged by the observation management system. Table 3 indicates that the fault rate has been consistently in the range 2–3% for the past five years. This
exceptionally low value is a direct consequence of the determination to ensure that every last second of on-sky time is used efficiently, and places UKIRT amongst the most efficient observatories in the world, as befits a mature and well-supported telescope.

More generally, there are no known issues that would constrain the continued operation of UKIRT for several years.

**Productivity**

In common with other observatories, we use the number of refereed papers in the scientific literature to characterise UKIRT’s productivity. The historical record of this metric is shown in Figure 9. The dramatic increase in productivity since 2009 is a direct consequence of a comprehensive, public survey: a wide range of astrophysical science goals can be explored with the same data set, and the data are made immediately public (within the ESO countries; each data release becomes world-public 18 months later). This combination of publicly-available data covering widely disparate areas of astronomical science has resulted in enormous productivity: UKIRT is currently the most productive telescope in the world.

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### Table 3

<table>
<thead>
<tr>
<th>Year</th>
<th>Fault Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>2.2%</td>
</tr>
<tr>
<td>2008</td>
<td>2.0%</td>
</tr>
<tr>
<td>2009</td>
<td>3.1%</td>
</tr>
<tr>
<td>2010</td>
<td>2.2%</td>
</tr>
<tr>
<td>2011</td>
<td>3.1%</td>
</tr>
</tbody>
</table>
There are well-equipped mechanical and electronics workshops within the UKIRT building (welding, drill press, lathe, vertical mill; oscilloscopes, signal analysers, signal generators, etc.). These facilities are primarily for emergency repairs and trouble-shooting. Any fabrication work is undertaken at the JAC in Hilo (see §9), which has a more comprehensive range of workshop facilities.

UKIRT is part of an observatory community on Mauna Kea, and many shared services are provided through the UH Institute for Astronomy in return for an annual fee. These include: maintenance of the summit access road; snow clearing in winter; operation of the mid-level facility at Hale Pohaku (food, lodging, library); the Mauna Kea Weather Center; and provision of utilities and a data communications network. There are a number of avenues for high-speed connections to the US mainland and elsewhere; the Southern Cross Network, for example, provides 1 Gb/s service to Seattle and thence to the rest of the world.
The cost of operating UKIRT is strongly dependent on the choice of operating model, and any new owner or operating partnership will have to decide for itself how it wants to operate the telescope. At one extreme, it could be fitted with an entirely new suite of instruments and the staff numbers could be ramped up to support users and projects from a range of communities; at the other, it could be operated in minimalist mode as at present, with WFCAM as the only instrument carrying out one wide-field survey programme. The operational cost is completely different in these two scenarios. In this section, the cost of operating UKIRT in the present minimalist mode is presented as a reference point.

UKIRT and the James Clerk Maxwell Telescope (JCMT) are both operated by the Joint Astronomy Centre (JAC) in Hilo, Hawaii. The provision of operational support for two telescopes using common engineering and software groups confers a number of advantages: financial savings through the economy of scale; technical advantages, for example through the use of a common code base and identical operating systems; and the ability to dynamically deploy staff to one telescope or the other on the basis of need. This has resulted in a highly-agile and cost-effective arrangement in which both telescopes are individually inexpensive to operate in comparison with other high-altitude, world-class facilities.
The JAC has 5 staff members who are dedicated exclusively to UKIRT: a Head of Operations, a Support Astronomer, and 3 TSSs. The three TSSs work shifts of 5 nights on, 10 nights off, to provide complete coverage. The two science staff oversee the operation on a daily basis, provide science support for the telescope and instruments, and liaise with the project PIs. In FY11/12, the cost of these five staff (including salaries and benefits) was US$513k.

The JAC has a number of staff whose primary responsibility is to provide technical support for the JCMT, but who also provide occasional support for UKIRT as needs warrant. This work is spread across a large number of individuals, each of whom commits a small fraction of their time to UKIRT – 13% on average. The cost of this technical support in FY11/12 was US$305k.

The cash costs associated with operating UKIRT in FY11/12 amounted to US$420k. The primary contributions to this total were electricity (52%) and contributions to common services on Mauna Kea (14%); the remainder is spread over a range of smaller items.

The sum of these costs represents the operating cost of UKIRT in the present, minimalist operating mode:

- UKIRT-dedicated staff: $513k
- Joint support staff effort: $305k
- UKIRT-dedicated requisitions: $420k
- TOTAL: $1,238k
The observatory site on Mauna Kea is leased from the University of Hawaii (UH), in return for which UH is entitled to 15% of the telescope time. The lease with UH requires that, when operations cease, the telescope be decommissioned and the site restored. At present, STFC holds this liability.

Any new owner of the observatory would be expected to take over both the lease and the accompanying liability. In order to encourage potential bidders, STFC is prepared to transfer funds to the new owner to cover this obligation in full.
All STFC assets associated with UKIRT are being offered to the global astronomy community through this Announcement. These include:

- the telescope, dome and associated support equipment;
- all of the instruments and associated support equipment; and
- all of the control, data acquisition and data reduction software.

Any combination or subset of the above is possible. For example, a group that wants to continue operating UKIRT exclusively in wide-field imaging mode using WFCAM would not be expected to also operate the Cassegrain instruments. Another group might wish to take one of the Cassegrain instruments for spectroscopy on a different telescope. We are open to any and all possibilities.

As noted in §9, UKIRT is operated by the Joint Astronomy Centre, an STFC organisational unit based in Hilo. The JAC building and its facilities are also being made available through this Announcement, and any parties bidding to take over the observatory may wish to consider also acquiring the JAC or leasing some space in it. UKIRT’s talented and dedicated staff are, in principle, available to be employed by a new operating organisation, and their continued participation would be an enormous asset.

Parties interested in taking ownership of the observatory, or in taking a share in the observatory as part of a partnership, or in acquiring some subset of UKIRT’s assets, are invited to submit Expressions of Interest (EoIs). Such EoIs should describe what is being proposed, what legal entities are involved and whether your interest is contingent on obtaining funds, with appropriate details. The deadline for submission of EoIs is 30th November 2012.

The next steps beyond that date depend on the level of response to this Announcement.
To learn more about UKIRT or this opportunity, please contact the Director of the observatory:

Professor Gary Davis  
Director, Joint Astronomy Centre  
tel +1 (808) 969-6504  
email director@jach.hawaii.edu

More information is also available at the following URLs:

Home page  http://www.jach.hawaii.edu/UKIRT/  
WFCAM  http://www.jach.hawaii.edu/UKIRT/instruments/wfcam/  
Cassegrain instruments  http://www.jach.hawaii.edu/UKIRT/instruments/  
WFCAM data reduction  http://casu.ast.cam.ac.uk/surveys-projects/wfcam  
WFCAM Science Archive  http://surveys.roe.ac.uk/wsa  
Cassegrain data reduction  http://www.jach.hawaii.edu/UKIRT/data_reduction  
Publication lists  http://www.jach.hawaii.edu/UKIRT/reference/pub.html  
Newsletter  http://www.jach.hawaii.edu/UKIRT/publications/newsletter/  
Annual reports  http://www.jach.hawaii.edu/UKIRT/publications/  
Public outreach  http://outreach.jach.hawaii.edu/
**Abbreviations and Acronyms**

- 2MASS: 2-Micron All Sky Survey
- CGS4: Cooled Grating Spectrometer 4
- DXS: UKIDSS Deep Extragalactic Survey
- GCS: UKIDSS Galactic Clusters Survey
- GPS: UKIDSS Galactic Plane Survey
- JAC: Joint Astronomy Centre
- JCMT: James Clerk Maxwell Telescope
- LAS: UKIDSS Large-Area Survey
- SDSS: Sloan Digital Sky Survey
- STFC: Science and Technology Facilities Council
- TSS: Telescope Systems Specialist
- UDS: UKIDSS Ultra-Deep Survey
- UH: University of Hawaii
- UFTI: UKIRT Fast-Track Imager
- UIST: UKIRT Imager-Spectrometer
- UKIDSS: UKIRT Infrared Deep Sky Survey
- UKIRT: United Kingdom Infrared Telescope
- WFCAM: Wide-Field Camera
- WSA: WFCAM Science Archive
- WTS: WFCAM Transit Survey

**References**


