



UNITED KINGDOM SCHMIDT TELESCOPE ANNOUNCEMENT OF OPPORTUNITY

Opens: 1 January 2009

Closes: 30 June 2009

1 BACKGROUND

The Anglo-Australian Observatory (AAO) operates the UK 1.2-metre Schmidt Telescope (UKST) as a spectroscopic telescope for large-scale surveys. Built in 1973, the UKST still delivers the widest field of view of any telescope in the southern hemisphere.

The telescope's original photographic imaging function was discontinued in 2005, and it is currently instrumented with the 6dF fibre spectrograph, completed in 2001. 6dF deploys up to 150 fibres over a 6-degree diameter field of view and feeds an efficient, highly stable, intermediate-dispersion spectrograph equipped with volume-phase holographic gratings.

The UKST was used from 2001 to 2005 to carry out the 6dF Galaxy Survey, which resulted in redshifts for more than 120,000 galaxies over the whole southern sky, and velocity dispersions, ages and metallicities for the brightest 10,000 of them.

At present, the UKST is being run by the AAO on a user-pays basis solely for the RAVE project, which aims to measure radial velocities (at ~ 1 km/s) and physical parameters for up to a million stars in our Galaxy. Some 300,000 high-quality spectra (with $R \sim 7500$) have been obtained to date in this project, which is expected to be completed no later than 2011.

Under the arrangements for the RAVE survey, the UKST is scheduled for 25 nights per month; 20 of these nights are serviced by AAO staff observers and the remaining 5 nights are covered by visiting observers from the RAVE team. The AAO also provides 1 FTE of technical support to maintain the telescope and instrument. Together with fixed costs for power, water, vehicle, etc., this operating model requires a budget of approximately AU \$0.55M per annum.

2 FUTURE OPPORTUNITIES

The AAO is now making a public announcement of opportunity for the utilisation of the UKST after the completion of the RAVE survey.

The wide field (6 degrees square), good spatial resolution (1 arcsec), broad waveband coverage (340 nm to 1000 nm) and high optical efficiency (1 reflective and 2 transmissive surfaces) render the UKST an attractive instrument for broad classes of astronomical survey work. The site allows coverage of almost two-thirds of the entire sky, remains one of the darkest

observatory sites in the world, and offers 66% spectroscopic conditions. With sufficient resources, the instrumentation could be optimised for future tasks in such a way as to capitalise on the telescope's unique attributes.

For example, a wide-field CCD camera would allow the UKST to make a highly effective contribution to NEO surveys at the lower end of the mass spectrum, while an Echidna-type fibre positioner could allow the telescope to work at much higher level of efficiency for spectroscopic surveys (~30 times 6dF in the case of a 2000-fibre positioner). Such instruments would themselves require significant investments (several million dollars in the latter case), but there is clearly the potential for excellent science to ensue.

Various operational models for the telescope are possible, ranging from the present labour-intensive model to more automated (and possibly fully robotic) modes. It is also possible to envisage several projects operating concurrently on the telescope, so long as their instrumentation requirements and operations models are mutually compatible.

3 REQUIREMENTS AND ENHANCEMENTS

Although current operations are reasonably efficient, the UKST's infrastructure is in need of refurbishment. The telescope and building are now 35 years old, and 6dF is 7 years old. A recent assessment of the status of the UKST concluded that while the telescope and its mounting, building and dome are sound, some of the related infrastructure is obsolete or beyond its service life, and becoming unsupportable. Continued operation of the UKST beyond the end of the RAVE survey will therefore require investment in the telescope and instrument.

Any project seeking to use the UKST will therefore need to carry out a suitable level of refurbishment of the telescope itself. The essential requirements include a new control system with automatic dome control, refurbishment or replacement of critical electronic and mechanical systems, and some infrastructure investment. The limitations of the UKST's drives and mounting will ultimately limit the telescope's tracking performance and capability for complex modes of operation.

In order to allow the telescope to continue in its current 6dF mode of operation beyond 2011, the AAO estimates that a minimum investment of at least AU \$0.6M would be required. This would cover an essential upgrade to the telescope control system, refurbishment of the field-plate elevator and dome drive, and some building and dome maintenance. Any new project utilising the telescope would have to include funding for this work within the budget package. Some AAO matching funds might be contributed to assist in raising grant funding.

Exploiting the telescope for more than a few years beyond the end of the RAVE survey, or significant changes in the mode of use of the telescope (e.g. the introduction of new instrumentation), would require more substantial work on the telescope itself. A full refurbishment of the telescope, allowing it to operate efficiently and reliably for another decade, is estimated to cost approximately AU \$2.7M.

4 PROPOSAL SUBMISSIONS

The AAO welcomes proposals for the future use of the UKST, with the conditions that such use (a) leads to significant benefit to Australian science, and (b) remains cost-neutral to the AAO.

The AAO envisages that such projects would be relatively long-term, and would use its best efforts to facilitate them and ensure the most successful outcomes. Proposals for highly innovative uses of the telescope are especially welcomed. Further information on the UKST, the 6dF instrument, and the recent surveys using these facilities, can be obtained from the references given below.

Proposals will be accepted from 1 January 2009 until 30 June 2009 and may have any format, although they should at least address the following questions:

1. What are the scientific goals of the proposed project? How will they be achieved?
2. Who are the collaborators on this project? What Australian participation is there on this project?
3. What is the proposed strategy for observations, for data reductions and analysis, and for publication of the data and the scientific results?
4. What is the timeframe of interest, and how long would the project be expected to run? What fraction of UKST time would the project use while running?
5. How would the essential telescope refurbishments be funded?
6. Is there a need to upgrade (as well as refurbish) the telescope hardware or control system beyond its current level? How would this be funded?
7. What instrumentation does the project require? If new instrumentation is required, how would this be funded?
8. What is the proposed operational model for the UKST, and how would this be funded?

Interested parties are invited to contact the AAO Director before submitting a proposal in order to discuss the intended science, instrumentation, time-scale and funding sources.

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Reference information

- [1] UKST: <http://www.aao.gov.au/ukst/>
- [2] 6dF instrument: http://www.aao.gov.au/AAO/ukst/6dF_instrument.html
- [3] 6dF Galaxy Survey <http://www.aao.gov.au/local/www/6df>
- [4] RAVE: <http://www.rave-survey.aip.de/rave/>