



The UK Astronomy Technology Centre



The Royal Observatory by night (Credit: ROE)



The UK Astronomy Technology Centre (UK ATC) is a national centre of excellence for the development of scientific instrumentation and facilities for ground- and space-based astronomy. Based at the Royal Observatory in Edinburgh, and operated by STFC it has a world class reputation for delivering innovative and capable cameras, spectrometers and even turnkey telescope systems.

The UK ATC works with leading organisations, such as the European Southern Observatory (ESO) the European Space Agency (ESA) and NASA, to answer fundamental questions about the origins and evolution of planets and galaxies.

It does this by:

- designing and building state-of-the-art instruments for many of the world's major telescopes
- managing UK and international collaborations with universities, research centres, national institutes and industry and
- conducting observational and theoretical astronomical research.

The UK ATC manages the Royal Observatory Edinburgh Visitor Centre, whose inspirational programmes include the UK Dark Sky Discovery initiative to engage schools and communities across the UK.

The Observatory site is shared with the Institute for Astronomy of the University of Edinburgh, creating a vibrant mix of astronomers, students and engineers.

UK ATC and technology delivers a range of practical benefits outside its traditional field of astronomy.

Expertise in optics and imaging systems is being used for:

- ophthalmology
- biomedical imaging to detect diseases
- developing the next generation backlighting for flat screen televisions and
- instruments for monitoring the Earth's environment from ground and space.

UK ATC's cutting edge scientific projects include SCUBA-2, MIRI, KMOS and in the future, E-ELT.

The Science and Technology Facilities Council

SCUBA-2 is an unprecedented imaging and survey instrument for the James Clerk Maxwell Telescope (JCMT) – the largest telescope in the world specifically designed to operate at submillimetre wavelengths at the summit of Mauna Kea in Hawaii.

It is the next generation submillimetre Common-User Bolometer Array with 10,000 pixels incorporating the world's first 'submillimetre ccd' technology and is now undertaking its scientific programme of legacy surveys for the community. It was built by an international consortium led by the UK ATC, and including the University of Edinburgh, Cardiff University, the Joint Astronomy Centre in Hawaii, the US National

Institute of Standards and Technology, and a consortium of Canadian universities.

The UK ATC is developing the mid-infrared instrument (MIRI) hardware for the James Webb Space Telescope, a flagship NASA/European Space Agency mission.

The Webb telescope will complement and extend the discoveries of the Hubble Space Telescope. It will study every phase of the history of the Universe and will be the largest and most sensitive infrared space telescope ever flown.

The MIRI camera and spectrometer will be thousands of times more sensitive than the best instruments currently available on Earth-based observatories. The European Principal Investigator for MIRI is UK ATC staff astronomer Professor Gillian Wright MBE, the Director of the UK ATC.

KMOS is a second-generation, multi-object infrared spectrometer for ESO's VLT in Paranal, Chile. The UK ATC are the prime contractors and assembly centre for this major instrument.

Its scientific thrust is to study the evolution of galaxies and the stellar populations of current epoch galaxies. KMOS was delivered to Chile during summer 2012.

The UK ATC is participating in design studies for the instruments required by the European Extremely Large Telescope (E-ELT). The E-ELT will be the largest optical and near-infrared telescope in the world, giving us a much more detailed and deeper view of the Universe from Earth than ever before. Current major ground-based telescopes have mirrors ranging between 8 and 10 metres in diameter. The mirror for the proposed E-ELT will have a diameter of 39 metres – the length of five classic London buses.

The E-ELT will tackle some of the most important and exciting scientific challenges of our time: tracking Earth-like planets where life could exist, understanding the earliest galaxies in the Universe, and probing the nature of dark matter and dark energy.

The UK ATC is co-ordinating UK activities towards the E-ELT, including encouraging and facilitating participation by industry. Helped by strategic support from the UK ATC, the Innovation Centre, OpTIC Technium in North Wales is building prototype E-ELT primary mirror segments. This precision polishing technology has applications ranging from longer lasting artificial knee-joints to laser fusion.

The expertise built-up over many years of designing and building such world class astronomy instruments is now being exploited in other areas of scientific research including particle physics and synchrotrons. Furthermore, the UK ATC is also performing cutting-edge industrial work for both UK and international customers.

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