A new UK astronomy instrument is set for Mexico

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Credit: Manchester University

A new instrument to help astronomers understand how stars are born is bound for the Large Millimetre Telescope (LMT) in Mexico.

The Collaborative Heterodyne Astronomical Receiver for Mexico (CHARM) instrument, which was developed by a world leading team of experts in the UK including The University of Manchester, will be integrated onto the LMT, Mexico's largest ever investment in science infrastructure.

The CHARM instrument will be the first at the telescope to operate using wavelengths of light less than a millimetre in length. It will enhance the telescope's ability to see the molecules that make up interstellar clouds of dust and the role they play through the lifecycle of stars.

CHARM was developed by experts from the UK Science and Technology Facilities Council's RAL Space, in collaboration with astronomers at The University of Manchester and Mexico. For a telescope to remain at the forefront of discovery, its detector systems need to be continually improved. Currently, Mexico does not have the expertise to do this for the LMT. The CHARM project has provided the first steps in knowledge transfer and training to help Mexican students and staff develop the telescopes detectors.

Professor Brian Ellison, who leads the RAL Space Millimetre Wave Technology group and is the CHARM Co-Investigator, said: "We are delighted to be working with colleagues in Mexico and Manchester to deliver the CHARM instrument. The LMT was one of the observatories involved in imaging the black hole earlier in the year so we're all excited

to be contributing to this amazing science facility and CHARM represents an important step in developing a great international relationship, making new friends and new scientific discoveries!"

The team at RAL Space are world leaders in high frequency (Terahertz), short wavelength, heterodyne receivers and their instruments are used on board weather satellites as well as at the ALMA observatory in Chile.

"CHARM will provide the LMT with a brand new capability, giving astronomers in Mexico and the UK exciting new opportunities to understand how giant clouds of gas and dust in galaxies collapse to make new generations of stars. CHARM's success will, in the future, also help LMT make more precise measurements of black holes at the centres of galaxies," says Professor Gary Fuller

Once the instrument arrives at the summit of the dormant volcano Sierra Negra, the RAL Space team will install it onto the telescope. At around the same size as a suitcase, CHARM is very compact and self-contained. Unlike the other LMT instruments, it operates at room temperature, meaning that installation is expected to be relatively straightforward.

However, CHARM is a pathfinder mission. It will detect signals at far smaller wavelengths than the other instruments at the telescope. In order to provide the greatest sensitivity, CHARM needs to be aligned perfectly. As well as searching the skies, the instrument will help to show whether the LMT's optics and enormous 50m diameter primary dish can support instruments detecting at these sub millimetre wavelengths. If this is successful, an even more sensitive instrument could be developed for the LMT.

Fuller, CHARM Principal Investigator and Professor of Astrophysics at the Jodrell Bank Centre for Astrophysics, School of Physics & Astronomy, The University of Manchester said: "CHARM will provide

the LMT with a brand new capability, giving astronomers in Mexico and the UK exciting new opportunities to understand how giant clouds of gas and dust in galaxies collapse to make new generations of stars. CHARM's success will, in the future, also help LMT make more precise measurements of black holes at the centres of galaxies."

Provided by University of Manchester