NEWS FROM THE UNIVERSITY OF TASMANIA, AUSTRALIA

Media Release

Chiefs of Staff, News Directors

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Measuring Earth and mapping the Galaxy: New tool a game-changer for astrophysics

Scientists from the University of Tasmania have completed a series of ground-breaking tests on a revolutionary telescopic instrument, which will enable astronomers to measure the Earth and the effects of climate change with millimetre precision, and to map the Galaxy.

The new telescope receiver - manufactured by French company Callisto - has been tested using a radio telescope at the University's Mount Pleasant Observatory near Hobart for the past few months.

The critical component is the instrument at the focus of the radio telescope that receives light from distant quasars.

Astronomers were able to observe a quasar – a remote celestial object powered by a supermassive black hole – and the light it emitted, which had left the quasar nearly 5 billion years ago.

The University's testing has culminated in observations with a similar telescope at Ishioka in Japan.

School of Physical Sciences astronomer Dr Jim Lovell is chair of an international committee charged with developing next-generation observing strategies that will enable millimetre-level measurements.

Dr Lovell said during the testing, astronomers were able to combine the signals from the telescopes and measure the difference in arrival time to an accuracy needed to locate them to one millimetre.

"It's really exciting because it tells us that the instrument is working," Dr Lovell said.

"Measuring positions on the Earth is difficult because everything is moving and there's no fixed reference point.

“To measure where we are, we need to compare to things far away from the Earth that don't move. Those things are called quasars and are located at the edge of the Universe.”

With two radio telescopes, astronomers can measure how long it takes for the quasar signal to reach one telescope compared to the other. This difference in time indicates how far apart the telescopes are. At the moment, these measurements can only be made to centimetre precision.

“A frame of reference accurate on millimetre scales is needed to study important geophysical and climate processes, such as the effects of the melting of glaciers on sea level rise,” said Dr Lovell.

This is the first time this new technology has been used to measure distances across the Pacific and also the first time a telescope in the Southern Hemisphere has been used.

Australia’s contribution to the global network of telescopes includes three radio telescopes across the continent at Yarragadee (WA), Katherine (NT) and Hobart. The network is operated by the University as part of AuScope, which provides infrastructure for research in geological, geochemical, geophysical, and geospatial subjects.

The University of Tasmania is the only university in the world to operate a continent-wide array of radio telescopes.

The new receivers, which will be installed at the three AuScope telescopes early next year, will also allow astronomers to map our Galaxy.

School of Physical Sciences Professor Simon Ellingsen is leading a team that will use the developments to look through the gas and dust between the stars in our Galaxy to map the spiral arms (regions of stars that extend from the centre of spiral and barred spiral galaxies).

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