Australian Government
Department of Industry, Innovation and Science

Science

CASE STUDY

Next generation radio telescope to uncover more about the origins of the universe

In the remote shire of Murchison in central Western Australia, a next-generation radio telescope, **the Murchison Widefield Array (MWA), is helping scientists to 'go back in time' and discover more about the origins of our universe**. The telescope hunts for explosive and variable objects in the Milky Way, such as black holes and exploding stars, and makes new measurements of solar bursts throughout their journey from the surface of the Sun to the Earth and on to the outer solar system.

Image: A tile of MWA sensors

Australia-India Strategic Research Fund

The MWA project is a multi-national effort involving hundreds of scientists working in 17 organisations throughout Australia, India, the United States, New Zealand and Canada. The MWA project has already delivered a highly versatile telescope that went from initial construction to full operation in just 18 months and the Australia-India Strategic Research Fund helped to support a critical part of that: the collaboration between Professor Steven Tingay's Curtin University team and Professor Avinash Deshpande's team at the Raman Research Institute (RRI) in India.

Professor Deshpande's group designed the digital receivers that feature the broad frequency coverage and agile frequency switching capabilities that have allowed scientists to observe astrophysical sources at entirely new frequencies. "The technologies developed by RRI have been essential to the success of the MWA," said MWA Director Dr Randall Wayth. Detecting such faint radio waves, the MWA can collect up to 20 terabytes of data every day.

The receivers form the first part of the MWA's digital signal path, which ends in a digital correlator developed by the radio astronomy group at Curtin University. Here the MWA operations and engineering teams manage the deployment, integration and commissioning of the MWA.

Unlike traditional dish telescopes, the MWA is made up of 128 small array 'tiles' spread over nine square kilometres, a unique design that provides an extremely wide field of view and enables large parts of the sky to be surveyed quickly. This design allows the MWA to track space debris and help to prevent collisions with valuable satellites. The MWA's success was also instrumental in Australia being chosen as one of the sites for the multi-billion dollar Square Kilometre Array project.

Building on this successful collaboration, the Australian and international teams are now embarking on a program to double the size of the MWA to 256 tiles and to develop the next generation of MWA hardware driving the development of new technologies. The future looks bright for the MWA.

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To find out more

For more information on the Australia-India Strategic Research Fund, visit www.science.gov.au/aisrf.