PAWSEY supercomputing centre

PARTNER INSTITUTION

CSIRO

ASKAP antennas under a starry sky at the Murchison Radio Observatory. Credit: Alex Cherney/terrastro.com

PROJECT LEADER
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Main collaborators
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SYSTEM
GALAXY

TIME ALLOCATED
1,000,000 hours

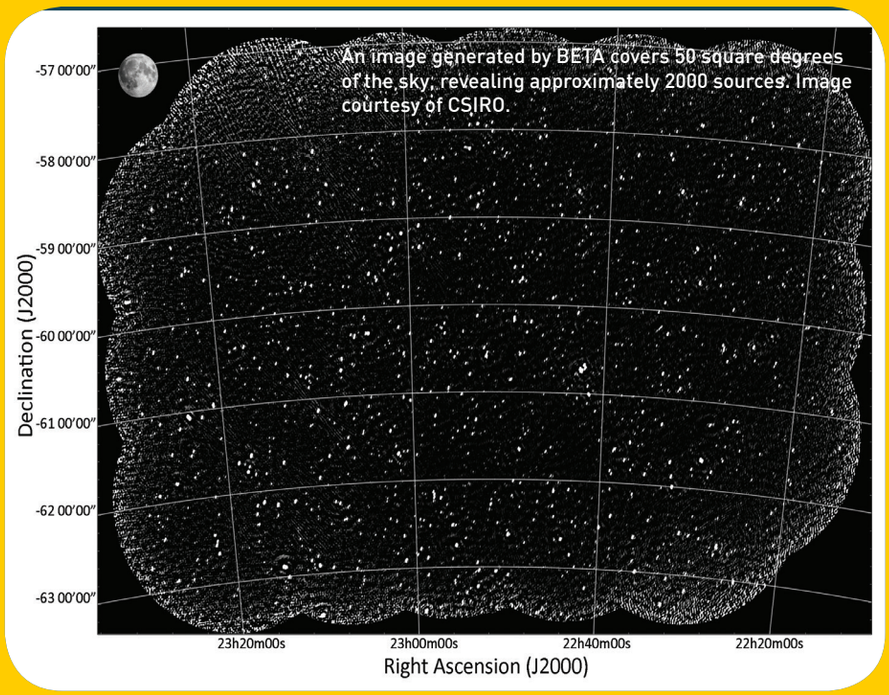
AREA OF SCIENCE
Radio Astronomy

THE AUSTRALIAN SQUARE KILOMETRE ARRAY PATHFINDER

CSIRO's newest radio telescope, the Australian SKA Pathfinder (ASKAP), is a next generation facility with novel receiver technologies and leading-edge ICT systems. ASKAP is serving as an important technological demonstrator for the SKA, the largest scientific project in human history. The Pawsey Supercomputing Centre is providing world-class tools and expertise to process and visualise ASKAP data.

2014

THE AUSTRALIAN SQUARE KILOMETRE ARRAY PATHFINDER



An image generated by BETA covers 50 square degrees of the sky, revealing approximately 2000 sources. Image courtesy of CSIRO.

THE CHALLENGE

The ASKAP project is made up of 36 identical antennas that will work together as a single instrument.

These antennas offer a wider field-of-view and higher survey speed than previously achievable using radio telescopes. This means the ASKAP antennas will be able to capture data around nine times faster than a conventional radio telescope, offering greater insight into the universe than was previously possible.

However, because of this, the ASKAP project generates enormous data rates - the equivalent of one DVD every two seconds. This data needs to be processed and archived synchronously with observations, requiring extremely high levels of computing power.

THE SOLUTION

'Galaxy', the real time supercomputer at the Pawsey Supercomputing Centre, is playing a crucial role in the ASKAP project.

With processing power in excess of 200 TeraFLOPS, Galaxy runs the Central Science Processor for ASKAP, allowing pseudo real-time processing of the data delivered to the Centre from the Murchison Radio Observatory (MRO) near Boolardy, in Western Australia.

By processing the data in pseudo real-time, CSIRO researchers are able to achieve immediate results from observations in the form of scientifically useful data products like images and archives.

This differs from previous, smaller radio telescopes such as the Australian Telescope Compact Array, which would produce data that would then be queued and processed in time.

These results would not be possible without the considerable supercomputing, visualisation and data storage tools and expertise provided by the Pawsey Supercomputing Centre.

OUTCOME

The Pawsey Supercomputing Centre, CSIRO and ASKAP are playing an integral role in the international SKA project.

ASKAP is helping researchers test the types of technologies and potential problems the SKA proper may face.

This near-unique advantage allows Australia to comment and advise on its experiences in a way that many other nations cannot.

As well as being an important precursor, ASKAP is also producing ground breaking science in its own right.

The first six antennas of ASKAP, dubbed the Boolardy Engineering Test Array (BETA), are already producing both real and simulated observations, which are then processed and stored at the Pawsey Supercomputing Centre.

These observations not only help to prepare for the installation of the full ASKAP telescope, but also provide new insight into the universe.