

Radio Astronomy

Western Australia is home to world-leading radio telescopes at the Murchison Radio-astronomy Observatory and will co-host the international Square Kilometre Array (SKA) project. The State's significant radio astronomy and associated data science capabilities place it in a good position to maximise the economic and social benefits of the SKA project. A range of radio astronomy activities are being delivered in Western Australia by Government, research institutes, universities and industry.

Preparing to host the SKA in Western Australia

Western Australia is working with State, national and international partners to prepare the Australian SKA site and finalise detailed SKA design work in advance of construction, scheduled to commence in 2018.



Credit: CSIRO

▲ The State Government is helping prepare Australia's SKA site in the Murchison region, facilitating land approvals and supporting infrastructure.

The International Centre for Radio Astronomy Research (ICRAR), Pawsey Centre

and industry partners are delivering a number of SKA design work packages.

The State Government is working with the Commonwealth Government to put in place national and international SKA contractual and governance arrangements.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is working to complete the **Australian SKA Pathfinder (ASKAP) telescope** and achieve the first full scientific results.



Credit: CSIRO

▲ The ASKAP telescope at the Murchison Radio-astronomy Observatory will be able to survey the sky faster than any other radio telescope in the world.

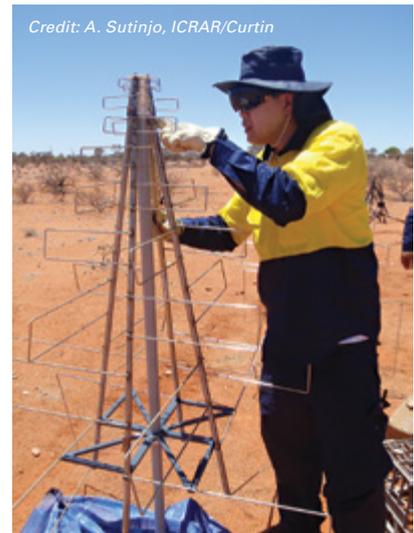
Building Western Australian capacity and capability in radio astronomy

Western Australia is building and maintaining its radio astronomy capacity and capability to position itself to gain the maximum benefit from the SKA.

The State Government has invested \$46 million for the operations of ICRAR from 2009-19. ICRAR is leading Western Australia's effort in the SKA project and will maximise the benefits of the project to the State.

ICRAR is building collaborations between researchers and industry at the State, national and international level, including collaborating with scientists from China, India and Japan, and working closely with Amazon, Intel and other global information and communications technology companies.

The University of Western Australia (UWA) and Curtin University are training undergraduate and graduate students in radio astronomy.



Credit: A. Sutinjo, ICRAR/Curtin

▲ ICRAR and local industry partners are playing a lead role in designing and testing the low frequency antennas for the SKA.

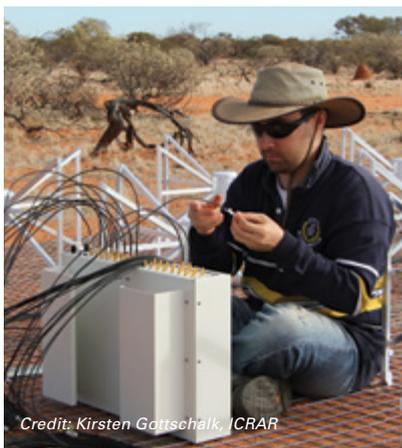
ICRAR is attracting new national and international researchers, PhD students and visitors to Western Australia.

UWA and the National Astronomical Observatories of the Chinese Academy of Sciences are offering up to ten scholarships each year for Chinese students to undertake a PhD degree in radio astronomy science at ICRAR.

The Pawsey Supercomputing Centre is providing supercomputing capacity for the Western Australian radio astronomy community.

Western Australian based companies are participating in the SKA design effort, with local companies developing unique technology for the low frequency SKA telescope and the Western Australian branch of Cisco Systems supporting the development of data signal processing technologies.

SNAPSHOTS OF SCIENCE IN WESTERN AUSTRALIA



Credit: Kirsten Gottschalk, ICRAR

▲ The new technology for the Murchison Widefield Array antenna was developed in partnership with Fremantle company Poseidon Scientific Instruments, now owned by Raytheon.

ICRAR is working collaboratively with industry to identify and promote opportunities for Western Australian companies and organisations to participate in SKA constructions and operations.

Increasing interest and awareness in radio astronomy

Western Australia is increasing community engagement with radio astronomy and building awareness and appreciation of its significance in the State.

Astronomy WA and partners are delivering astronomy-themed community events and activities including Astrofest, an annual community astronomy festival attracting over 4,300 attendees.

Credit: Astronomy WA Astrofest



ASTROFEST

▲ Thousands of Western Australians enjoy interactive activities and viewing the night sky at Astrofest 2015.

Astronomy WA and partners are reviewing the Astrofest model and developing a strategic plan for future Astrofest events in the State.

Scitech and ICRAR are delivering educational activities for primary and secondary school students to share the excitement of radio astronomy and inspire broader interest and participation in science, technology, engineering and maths.

Scitech, ICRAR, the Western Australian Museum and the State Government are promoting the State's strengths in radio astronomy and its participation in the global SKA project through various outreach programs.



Credit: ICRAR

▲ ICRAR's outreach program includes opportunities for school students in the Mid West region to get hands on building a radio telescope.

The Western Australian Museum – Geraldton is pursuing a redevelopment proposal to enable a series of new exhibition and public spaces including a dedicated SKA gallery.

Benefits to Western Australia from the SKA

The SKA is a global mega science project that is enhancing the State's science reputation, providing Western Australian scientists and industry with a unique opportunity to collaborate on a world-wide scale and inspiring Western Australia's next generation of scientists.

As well as revolutionising our understanding of the universe, the international project has the potential to add more than \$100 million to Western Australia's economy over the next 20 years through locally supplied goods and services.

More broadly, history shows that radio astronomy has driven innovation in a variety of areas now fundamental to our way of life, including GPS navigation, medical imaging and Wi-Fi technology.

Similarly, the unparalleled technical requirements of the SKA are expected to catalyse new technologies that will benefit other areas of the economy, from processing enormous data sets in real time, to developing sensors for remote operations.

In particular, the SKA will need new methods to store and analyse the unprecedented amounts of data it will collect, expected to be greater than the entire global internet traffic.

These methods are expected to have applications across a range of industries, such as mining, oil and gas, environmental monitoring, health and communications.

Hosting the SKA will place Western Australia in a position of advantage in relation to the global big data industry, estimated to be worth more than \$58 billion by 2018.

Western Australian scientists, engineers and industry partners will play a key role in the development a range of new technologies, positioning the State to take advantage of new research and industry opportunities over the coming decades.