anzska
Square Kilometre Array ▸ Australia ▸ New Zealand

Fact sheet

What is the SKA?

The Square Kilometre Array (SKA) will be a revolutionary radio telescope made of thousands of receptors linked together across an area the size of a continent. It will be vastly more sensitive than the best present-day instruments and give astronomers remarkable insights into the formation of the early Universe.

The SKA will require new technology and progress in fields such as information and communication technology, high performance computing and production manufacturing techniques.

It will comprise a vast array of antennas, arranged in clusters to be spread over 3,000 km or more. The antennas will be linked electronically to form one enormous telescope.

The combination of unprecedented collecting area, versatility and sensitivity will make the SKA the world's premier imaging and survey telescope over a wide range of radio frequencies, producing the sharpest pictures of the sky of any telescope.

The SKA will:

- be the next-generation radio telescope for the international scientific community
- revolutionise our understanding of the Universe by providing answers to questions about its complexity and the fundamental laws of physics
- have up to one square kilometre of effective collecting area and be the largest telescope in the world
- have up to 50 times the sensitivity and 10,000 times the survey speed of present radio telescopes
- use new technology antennas, signal transport, signal processing and computing provided by innovations in radio frequency and information communication technology.

Why build the SKA?

Because the speed of light is finite and the size of the Universe is so large, telescopes are effectively time machines, enabling astronomers to look into the past and study the Universe as it was billions of years ago. In order to answer fundamental questions about the origin and evolution of the Universe, a more sensitive radio telescope is needed that can detect the very weak signals coming from the edge of the cosmos. A telescope such as the SKA will be able to 'see' distant objects in the very young Universe and provide answers to questions about the emergence of the first stars, galaxies and other structures.

Five key science projects have been identified for the SKA:

- extreme tests of general relativity from the study of pulsars and black holes
- evolution of galaxies, cosmology, dark matter and energy
- probing the Dark Ages – the first black holes and stars
- the Cradle of Life – searching for life and planets
- the origin and evolution of cosmic magnetism.

Who is involved in the project?

The SKA is a collaboration between institutions in 20 countries (including Australia, New Zealand, countries in Europe, Asia, Africa, and North and South America), led by an international science and engineering committee and a jointly-funded SKA Program Development Office. The cost of the telescope (about A$2.5 billion) will be shared by the participating countries. Scientists are also collaborating with industry partners to develop the necessary technologies to design and build the telescope.

Artist's impression of dishes that will make up the Square Kilometre Array.
Credit: *Swinburne Astronomy Productions/SKA Program Development Office.*

What will the SKA look like?

The SKA will use 3,000 dishes, each about 15 metres wide. Two other types of receptor, known as aperture arrays, will also be used to observe very large areas of the sky simultaneously. The receptors will be arranged in groups or 'stations' along five spiral arms extending from a central 'core' out to a distance of at least 3,000 km. The addition of the remote stations means that the signals from the separate antennas can be digitally combined to simulate a single telescope with a diameter equal to the distance separating the two furthest antennas.

Where will the SKA be built?

The international astronomy community has identified two suitable locations for the SKA: Australia – New Zealand and southern Africa. Australia and New Zealand's candidate site for the core of the SKA is the Murchison Radio-astronomy Observatory (MRO) in the Mid West region of Western Australia. A final decision on the location of the SKA is expected to be made in 2012.

What does Australia – New Zealand offer the SKA?

Features of the Australia – New Zealand site proposal include:

- an exceptionally 'radio quiet' environment at the MRO, which has been protected for the future, and an extremely low local population density
- the opportunity to develop the SKA across the two countries, with a maximum baseline of around 5,500 km
- high bandwidth optic-fibre infrastructure
- a radio astronomy community with a strong history of scientific discovery and technological innovation
- a technologically sophisticated society with extensive engineering capabilities and wide experience in international partnerships.

For further information

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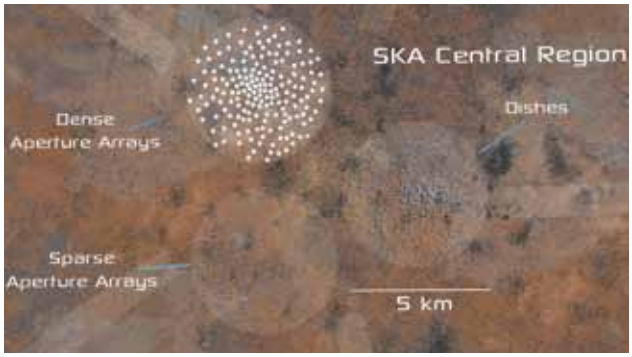
International SKA website:
www.skatelescope.org



Artist's impression of the central 'core' region of the SKA (top), and the dishes, dense aperture array and sparse aperture array receptors (bottom), that will make up the SKA. Credit: *Swinburne Astronomy Productions/SKA Program Development Office.*

Australian Government

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