

# The Square Kilometre Array

## fact sheet for journalists



Exploring the Universe with the world's largest radio telescope

### What is the SKA?

The SKA will be a revolutionary radio telescope made of thousands of receptors linked together across an area the size of a continent. The total collecting area of all the receptors combined will be approximately one square kilometre, making the SKA the largest and most sensitive radio telescope ever built.

### How much will it cost?

The target cost for the SKA is €1,500 million.

### Where will it be built?

The SKA will be built in either Southern Africa or Australia – New Zealand.

The final site decision will be made in 2012. It will be based on several factors including:

- Operating and infrastructure costs.
- Levels of interference from mobile phone, TV and radio transmitters and other electrical devices.
- The characteristics of the ionosphere (the upper part of the Earth's atmosphere) and the troposphere (the lower part of the atmosphere).

### Who is planning and designing the SKA?

Astronomers and engineers from more than 70 institutes in 20 countries are designing the SKA that will be 50 times more sensitive, and will survey the sky 10,000 times faster, than any other telescope. The SKA will be a global telescope and the data will be processed in centres around the world.

### How will it work?

Radio telescopes detect radio-frequency signals from space. They provide alternative views of the Universe than those seen with an optical telescope and can reveal areas of space that may be obscured with cosmic dust.

Signals received by the SKA will be transferred to a central high performance supercomputer by optical fibres. The rate at which the vast quantities of data will be transferred to the supercomputer will far exceed the data rates of current internet traffic.



### What will the SKA do and how will it do it?

The SKA will address five fundamental unanswered questions about the Universe we live in:

#### How do galaxies evolve and what is dark energy?

The expansion of the Universe has been attributed to a mysterious dark energy. The SKA will investigate the expansion of the Universe after the Big Bang by mapping the cosmic distribution of hydrogen. The map will track young galaxies and help identify the nature of dark energy.

#### Are we alone?

The SKA will be able to detect very weak extraterrestrial signals and will search for complex molecules, the building blocks of life, in space.

#### How were the first black holes and stars formed?

The SKA will look back to the Dark Ages, a time before the Universe lit up, to discover how the earliest black holes and stars were formed.

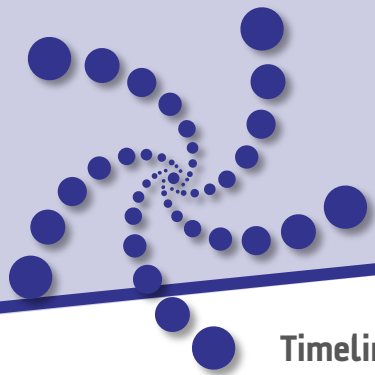
#### What generates the giant magnetic fields in space?

The SKA will create three-dimensional maps of cosmic magnets to understand how they stabilise galaxies, influence the formation of stars and planets, and regulate solar and stellar activity.

#### Was Einstein right?

The SKA will investigate the nature of gravity and challenge the theory of general relativity.

The SKA will explore the unknown and, if history is any guide, it will make many more discoveries than we can imagine today.



## Timeline

Five stages of development of the SKA are planned:

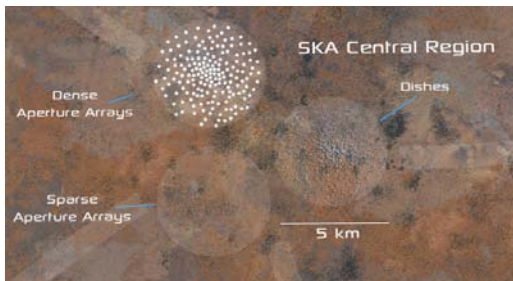
<b>2008-2012</b>	System design and costing.
<b>2012</b>	Site decision.
<b>2013-2015</b>	Detailed design and production engineering.
<b>2016</b>	Initial construction.
<b>2019</b>	First science.
<b>2023</b>	Completion of construction and commissioning.
<b>2024</b>	Full operation.

## What will it look like?

The SKA will use 3,000 dishes, each about 15 m 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 five spiral arms extending from a central core to at least 3,000 km. In Australia the SKA would stretch all the way to New Zealand and in Southern Africa it would stretch to the Indian Ocean islands.

## Artist's impression of the SKA layout and receptors



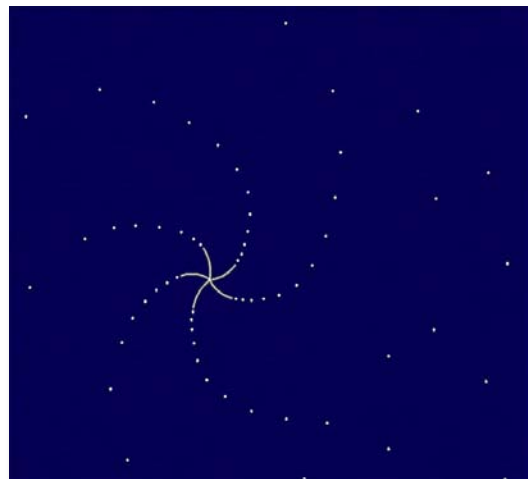
Sparse aperture array



Dishes



Dense aperture array



The spiral arms of the SKA will extend more than 3,000 km from the centre of the array.

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