

Time for the world's largest radio telescope

February 13 2015, by David Hindley



A steerable 15 m dish of the Australian SKA Pathfinder (ASKAP) being tested in the Australian outback by CSIRO

On a recent trip to Australia, the National Physical Laboratory (NPL) visited one of the two sites of the Square Kilometre Array (SKA) - a global science and engineering project to build the worlds largest radio telescope.

NPL is part of an international consortium working to design and build the SKA. More than 100 companies and research institutions from 20 countries are taking part in this global effort, led by the SKA Organisation from Jodrell Bank Observatory. Using hundreds of thousands of interconnected radio telescopes spread across vast areas of Australia and Africa, the SKA will enable astronomers to monitor the sky in unprecedented detail and survey the entire sky thousands of times faster than any system currently in existence. The project takes its name from the total collecting area of the radio antennas, set to be around 1 km^2 .

NPL's contribution to the project is the design of the SKA time scale. The most demanding part of the specification relates to the timing of pulsars - rotating neutron stars - over periods up to 10 years. For this, the SKA time scale will need to be capable of tracking Coordinated Universal Time (UTC) with an offset known to within 10 nanoseconds over at least 10 years. These measurements will allow the most challenging tests yet of general relativity in strong gravitational fields, together with the further study of gravitational waves.

The great sensitivity of the SKA will also enable mapping of new galaxies at the edge of the known Universe. The Universe is expanding at an increasing rate and it's believed this acceleration could be due to dark energy. The SKA will study this phenomenon in greater detail than previously possible, along with the dark matter which is thought to make up most of the Universe.

The scale of the SKA represents a huge leap forward in both research and engineering and preparation is now well under way, with the project in the design phase and prototype antennas currently being tested at sites in the Australian outback and South Africa. Construction of Phase 1 is scheduled to begin in 2018, providing an operational array capable of carrying out initial observations from 2020. Phase 2 will then follow,

with the SKA expected to become fully operational in the late 2020s.

More information: Find out more about the Square Kilometre Array:
www.skatelescope.org/

Find out more about NPL's work on Electromagnetics:
www.npl.co.uk/electromagnetics/

Provided by National Physical Laboratory

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