What is the SKA?

- The SKA will be a mega radio telescope, about 100 times more sensitive than any other existing radio telescope.
- It will consist of about 3000 dish-shaped antennas that will be spread over a vast area of more that 3000 km from the core site in the Northern Cape Karoo to the furthest telescope antenna. Each antenna will be approximately 15-metres in diameter. (A radio telescope antenna looks like a very large DSTV dish. The antenna can be rotated and tilted up and down to point at different parts of the sky)
- The SKA will be a multi functional radio telescope operating from 100 Megahertz to >25 Gigahertz frequency range.

This SKA will:

- Collect the very weak cosmic radio signals from the edges of our Universe from a time just before the first stars and galaxies formed, about 500 000 years after the Big Bang.
- Search the MilkyWay for Earth-like planets and life elsewhere.
  Test Einstein's theory of gravity and investigate the nature of dark energy and dark matter.
- The scientific discoveries will be vital to answer key questions in modern astronomy and cosmology that explain the evolution of the universe.

Where will the SKA be built?

- The SKA should be built in a remote area, as far away as possible from high radio frequency interference. Man-made electronic devices, such as television broadcast transmitters and air traffic navigation systems, produce strong signals that interfere with the detection of weak radio waves coming from the distant Universe. This interference on radio telescopes by signals coming from man-made devices is called Radio Frequency Interference (RFI).
- The site where the SKA will be built must be dry (experience very low rainfall) because the water droplets in the atmosphere absorb the cosmic radio waves.
- If Africa wins the SKA bid, the core of the telescope will be constructed in the Karoo region of the Northern Cape Province with outlying telescope stations throughout South Africa, Botswana, Ghana, Kenya, Madagascar, Mozambique, Mauritius, Namibia and Zambia.

What is MeerKat?

- It's a world class radio telescope designed to do ground-breaking science.
- South Africa is building its very own radio telescope near the site identified for the SKA. The Karoo Array Telescope (MeerKAT) will be the most sensitive radio telescope in the Southern Hemisphere and will consist of 64 dish antennas similar to those of the SKA. The first seven dishes of the MeerKAT known as KAT-7, were completed in December 2010. KAT-7 was an engineering prototype for the 64-dish MeerKAT and it is the world's first radio telescope with dishes made of fibre glass.

Careers in Radio Astronomy, engineering and high performance computing

- There are many exciting careers in radio astronomy. Radio astronomy facilities and university research groups need astronomers and astrophysicists, engineers and technicians.
- A matric exemption in both mathematics and science will allow you to enroll for a degree in mathematics and physics or engineering at a university.
- At university you must first complete an undergraduate degree in either physics or engineering before going on to more specialised postgraduate research studies.
- Many South African universities offer postgraduate degrees in radio astronomy and the engineering fields relevant to radio astronomy.

Employment Opportunities

There are many exciting things you can do if you are interested to work with radio astronomers, or perhaps be involved in designing one of the telescopes of the future.

- Astronomers and astrophysicists study physics for several years and then go on to advanced training in astrophysics. They are the people who interpret the meaning of the signals. It's a bit like rocket science, but just think of having the universe as the lab where you work! They write the computer programs to run the telescopes and to get information from the data coming from the telescopes.
- Engineers help to design and build components for existing and new telescopes. They also develop the sophisticated software and computer systems needed to operate the telescope.
- Technicians are important members of a telescope team. They help to make new components and make sure everything on the telescope is working well.

Entry Form (High School)

All learners from Grades 8 to Grade 11 are invited to enter the South African SKA Project's schools competition. Just answer the multiple choice questions below. Fill in your name and other required details.

The competition closes on 31 March 2012

Mail entries to:
The MeerKAT-SKA SCHOOLS COMPETITION
C/O SAASTA, PO Box 1758,
PRETORIA, 0001

OR

Hand deliver to:
SAASTA, DIDACTA BUILDING,
211 SKINNER STREET,
PRETORIA

Questions:

1. South Africa is building pathfinder telecopes called?
   a. SALT
   b. MeerKAT
   c. Array of South Africa

2. The MeerKAT telescope will consist of:
   a. 64 antennas
   b. 40 antennas
   c. 1 antenna

3. Which speed of the internet will SKA require?
   a. An excess of 100 Megabytes per seconds
   b. At most 10 Gigabytes per second
   c. An excess of 100 Gigabytes per second

4. The first seven dishes of MeerKAT known as KAT-7 were completed in:
   a. August 2006
   b. December 2010
   c. January 2005

5. Why must the SKA be built at a dry site?
   a. The water droplets in the atmosphere absorb the cosmic radio waves
   b. To avoid the SKA being damaged
   c. A dry area has a high density population

Your name:..... Cell:.....

Name of School:.....

Province:.....

In which Grade are you?.....

Postal Address:.....

Parents/Guardian Name:..... Cell:.....

Teachers Name:..... Cell:.....

School Telephone Number:.....

School Fax Number:.....

Competition Rules:

- Send one entry per person.
- You may make photocopies of the entry form, or download copies from the website: www.saasta.ac.za.
- Your entry must reach us by **31 March 2012**.
- The panel of judges appointed by the Organiser will choose the winners.
  Their decision on all matters relating to the competition is final, and no correspondence will be entered into concerning the competition's judgeing and organisations.
- Winners will be notified during April 2012.
- Employees of DST and NRF/SAASTA and their families are not eligible to enter.

Entry Form (Primary School)

All learners from Grades 4 to Grade 7 are invited to enter the South African SKA Project's schools competition. Answer the multiple-choice questions below by putting a circle around the correct answer. Fill in your name and other required details in the table.

The competition closes on 31 March 2012

Mail entries to:
The MeerKAT-SKA SCHOOLS COMPETITION
C/O SAASTA, PO Box 1758,
PRETORIA, 0001

OR

Hand deliver to:
SAASTA, DIDACTABUILDING,
211 SKINNER STREET,
PRETORIA

Questions:

1. What does SKA stands for?
   a. Square Kilometre Array
   b. Skewed Kilometre Array
   c. Square Knowledge Advantage

2. SKA will consist of about:
   a. 3000 dish-shaped antennas
   b. 500 dish-shaped antennas
   c. 150 dish-shaped antennas

3. KAT-7 is an engineering prototype for the:
   a. Australian Radio Telescope
   b. MeerKAT
   c. Square Kilometre Array

4. Each MeerKAT antenna will be:
   a. Approximately 17m in diameter
   b. Approximately 15m in diameter
   c. Approximately 13.5m in diameter

5. If South Africa wins the bid, the SKA will be built in:
   a. Northern Cape
   b. Gauteng
   c. Free State

Your name:..... Cell:.....

Name of School:.....

Province:.....

In which Grade are you?.....

Postal Address:.....

Parents/Guardian Name:..... Cell:.....

Teachers Name:..... Cell:.....

School Telephone Number:.....

School Fax Number:.....

Competition Rules:

- Send one entry per person.
- You may make photocopies of the entry form, or download copies from the website: www.saasta.ac.za.
- Your entry must reach us by **31 March 2012**.
- The panel of judges appointed by the Organiser will choose the winners. Their decision on all matters relating to the competition is final, and no correspondence will be entered into concerning the competition's judgeing and organisations.
- Winners will be notified during April 2012.
- Employees of DST and NRF/SAASTA and their families are not eligible to enter.

Destined for world-CLASS astronomy

In 2005 five bids were submitted to host the Square Kilometre Array. The African and Australasian sites are the only remaining regions in the bid to host the SKA. The choice between the two sites will be made in the first half of 2012 by an international panel of astronomers, scientists and engineers.

Both Africa and Australasia are building pathfinder /demonstrator telescopes, the Karoo Array Telescope (referred to as MeerKAT) in South Africa and the Australian SKA Pathfinder (ASKAP) in Western Australia. These facilities are being constructed to test possible technologies to be used in the ultimate design of the SKA telescope.

The SKA is one of the exciting engineering and research projects that Africa is bidding to host and it includes:

- The design, construction and operation of the Karoo Array Telescope (MeerKAT).
- A Youth into Science and Engineering Programme which supports students who wish to become the scientists or engineers to work with the MeerKAT and SKA radio telescopes.
- Electricity and broadband infrastructure layout.

The SKA will be a radio telescope. Radio telescopes are receivers that detect specific type of signals called radio waves from outer space. The SKA will be a powerful time machine that scientists will use to go back in time to explore the origins of the first galaxies, stars and planets. If there is life somewhere else in the Universe, the SKA will help us find it. This is in contrast to Optical telescopes, which directly observe stars, planets and galaxies.

More information can be sourced from the following website:

www.ska.ac.za
www.skatelescope.org

The MeerKAT - SKA schools competition

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REPUBLIC OF SOUTH AFRICA

SKA AFRICA
SQUARE KILOMETRE ARRAY

NRF National Research Foundation