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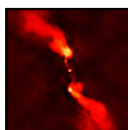
The SKA / KAT project office is inviting applications for two two-year postdoctoral fellowships, one each at Rhodes University in Grahamstown and the University of Cape Town.



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During October, Astronomy Month in South Africa, a radio advertisement on the basics of radio astronomy and the SKA and KAT projects was produced and broadcast in four languages.

In the media

Read these articles and more online by visiting www.ska.ac.za/media.html

- SA shortlisted for giant telescope, *SouthAfrica.info*
- The World Cup of science, *Mail & Guardian*
- SA and Australia in contest to host world's most powerful, billion-dollar telescope, *Cape Times*

South Africa shortlisted to host the SKA

At a press conference on 28 September 2006 Mr Mosibudi Mangena, Minister for Science and Technology, announced that South Africa is now one of only two countries in the contest to host the biggest radio telescope ever, the Square Kilometre Array. The Minister added that it was a "very proud moment" for the country and congratulated the entire SKA team on this remarkable achievement. The other country on the shortlist is Australia. Argentina and China, are now out of the race.

Minister Mangena pointed out that South Africa entered the race for the SKA site late and has done extremely well to be recognised as an excellent site in such a short time. The proposed core site for the telescope is in the Karoo in the Northern Cape. If the SKA is built in South Africa, the face of the Northern Cape will be transformed and it will have the opportunity to become a centre of high tech expertise.

The final decision on where to build the SKA will be taken by the major international science funding agencies by 2008. South Africa's site bid has been led by a Steering Committee chaired by Dr Rob Adam, previous Director General of the DST, Dr Khotso Mokhele, previous President of the National Research Foundation and the current Director General of the DST, Dr Phil Mjwara.

The Minister said that the SKA will be unique and that it will bring great prestige to the host country. It will be the biggest telescope ever built and will be the only one of its kind to be built in the world. It is probably the only instrument that can solve the most basic questions of the origin of the universe and the birth and evolution of stars and galaxies. It is expected to solve the problem of the dark energy that has



Minister Mosibudi Mangena interviewed by SABC television at the press announcement of South Africa's shortlisting to host the SKA.

recently been found to fill the universe and will test Einstein's theory of general relativity to greater precision than any other instrument can do. It will investigate the origin of magnetism in the universe and will be the most powerful instrument ever to search for extra-terrestrial intelligence.

According to Professor Justin Jonas, the project scientist for the SKA in South Africa, the technology to be used for the SKA is also at the cutting edge. It will have the fastest and largest data transport and computing capacity anywhere in the world and will use new and exciting wireless and digital signal processing technologies. It will therefore also generate very exciting opportunities for technology development and research and for new high tech industries in the host country.

South Africa initially intended only to be considered as a site for the SKA, but it soon became clear that we could play a key role in the development of the technology and science as well. South Africa has assembled an excellent team to build the Karoo Array Telescope (the KAT), which will be equivalent to approximately 1% of the SKA, and has in a short time been able to



The two astronomers, Dr George Nicholson and Prof Justin Jonas, who were instrumental to South Africa's decision to bid for the SKA.

play an important role in the global SKA development. The South African team has been recognised for its competence and is being called upon to assist and advise the International SKA Project Office on system engineering, costing and other technology areas. The KAT team, led by KAT Project Manager Anita Loots, is playing a leading role in collaboration with researchers in the UK, the Netherlands, Australia and the USA in the development of digital signal processing for the telescope, software development and the development (with industry) of innovative telescope antennas, using composites. During December 2006, the South African SKA / KAT office will host a major international workshop on wide-field imaging and calibration, which is a key technology for the SKA and which pushes the boundaries on high-speed computing and software.

Minister Mangena emphasized the importance of the SKA and KAT projects for the development of high-level skills and expertise in South Africa. In order to benefit as much as possible from the opportunities for exciting science and engineering

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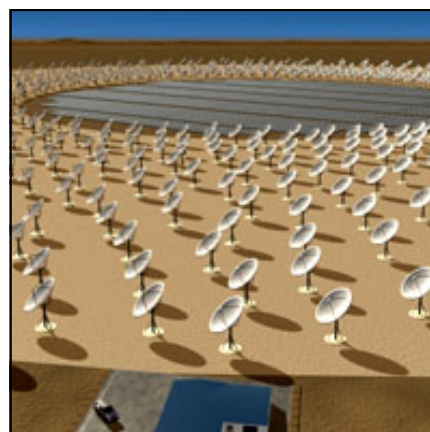
projects associated with the SKA and the KAT, the Department of Science and Technology has provided funding for graduate study associated with the KAT and SKA. There are already twenty students in this programme, carrying out research for PhD and MSc degrees at South African universities, as well as two post-doctoral fellows. Particular emphasis is being placed on bringing black students into astronomy and high tech engineering through this programme. Students and universities from Mozambique, Mauritius and Madagascar have also been included. Students are being given the opportunity to be co-supervised by leading researchers from some of the best universities in the world, such as Oxford, Cambridge, Manchester and Caltech.

The Minister said that South Africa stands to gain tremendously if it is chosen as the site for the SKA. The telescope itself is currently budgeted to cost €1.5 billion to build and about €150 million per year to



An artist's impression of the dishes of the Karoo Array Telescope on site near Carnarvon in the Northern Cape. Each of the 20 dishes will be 15 m in diameter and about 19 m high. Photograph: Xilostudios

operate. A significant part of both the capital and operating cost is likely to be spent in South and Southern Africa, and particularly in the Northern Cape. Equally important, however, is that the SKA will be unique, and so South Africa would become one of the major centres in the world for fundamental physics, astronomy and high tech engineering (such as very fast



An artist's impressions of part of the core of the SKA. Tile-shaped antennas making up the central focal plane array is surrounded by dish-shaped antennas. The SKA will consist of thousands of antennas, spread over 3 000 kilometres. Photograph: Xilostudios

computing, radio frequency engineering etc.) and would attract some of the best scientists and engineers in the world. The SKA would therefore provide a tremendous boost to South Africa's development of very high-level skills and expertise and would strengthen its ability to compete effectively in the global knowledge economy.

World class logistics for a world class radio telescope

By Carel van der Merwe

The focus of the KAT logistics engineering team is to ensure cost-effective supply chain and support infrastructure 24 hours a day, seven days a week so that the Karoo Array Telescope will be able to do science around the clock.

The fact that the telescope is going to be in a remote, rural part of the country, means that extra attention must be given to the reliability of all equipment, ease of monitoring of the status of all elements (even from remote locations), and trouble-free maintenance.

In addition to preparing for availability and reliable equipment that will be easy to maintain, the KAT logistics en-



Prof Justin Jonas and Dr Bernie Fanaroff at the KAT site.

gineering effort is also focusing on skills development and collateral benefit from this project.

Two Postdoc radio astronomy opportunities

The SKA / KAT project office is inviting applications for two two-year postdoctoral fellowships, one each at Rhodes University in Grahamstown and the University of Cape Town.

The research area for the fellowship at Rhodes University is observational radio astronomy and instrumentation, while the opportunity in Cape Town will focus on extragalactic radio astronomy.

In addition to a tuition grant of maximum R230 000 per year, fellowship holders can also qualify for a R15 000 travel grant and R7 000 equipment grant.

Applications close at 17:00 Central African Time on 15 November 2006. Applications forms available at www.ska.ac.za.

KAT antenna structure passes critical design review with flying colours

By Willem Esterhuysen, KAT project office

The critical design review of the Karoo Array Telescope (KAT) antenna structure took place on 12 September 2006 at the IST offices in Pretoria. The participation of Dr Peter Hall, the Project Engineer for the international Square Kilometre Array (SKA) project, highlights the support of the International SKA steering committee for the South African SKA effort.

The KAT project team provided Dr Hall with comprehensive information on the composite dish (reflector), as it is an approach which has not been used before. A visit to MMS Technologies in Centurion on 11 September focused on the composite dish and showcased the experience and capabilities of MMS Technologies. The MMS team demonstrated the chosen manufacturing method for the KAT dish on smaller components. A low-bed truck trailer (15m long by 3.5m wide) that was manufactured in this fashion could be seen as an example of components that have been

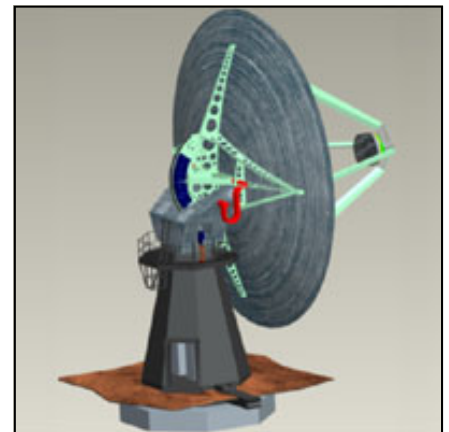
manufactured by MMS. It was an excellent visit and the enthusiasm, experience and technical knowledge of Heinrich Bauermeister (co-founder of MMS Technologies) resulted in a high level of confidence that the dish can be manufactured successfully using composite materials.

The critical design review included a detailed analysis of antenna performance that predicted that the desired specification of the antenna structure will be achieved. This gave the participants the confidence to agree that the manufacturing of the antenna structure could proceed. The process is now under way and the KAT team plans to have all the components ready by the end of January 2007. The antenna must be installed by March 2007 and final acceptance tests must be completed by July 2007.

Dr Hall commented that the KAT's antenna structure development was highly relevant to the SKA and that it would stand a good chance of meeting the cost targets set for the antenna structures.



Dr Peter Hall of the international SKA project.



A CAD model of the KAT antenna structure.

Bursaries for 2007 - apply now!

Postgraduate students at South African universities (local and foreign students) have until 12:00 (Central African Time) on 15 November 2006 to apply for SKA and KAT bursaries for 2007. Students at universities in SKA partner countries (i.e. not resident in South Africa) can also apply for support from the South African SKA and KAT Human Capital Development Programme if they will be able to work on a KAT or SKA related projects.

Visit www.ska.ac.za to access a list of possible research topics and supervisors, as well as the relevant applications forms.

KAT launch preview

The Karoo Array Telescope (KAT) antenna prototype will be officially launched on 2 November 2006 at an event at the Hartebeesthoek Radio Astronomy Observatory.

As part of a ceremonial launch of the KAT prototype site, Mr. Mosibudi Mangena, South Africa's minister for science and technology, will unveil a 1:50 model of the prototype dish.

KAT stakeholders, partners and members of the media will join



Making KAT Models: Kim de Boer, Assistant SKA Project Manager visits MMS in Centurion where Johan van Niekerk demonstrates a 1:50 scale model of a Karoo Array Telescope antenna.

him to celebrate this milestone in making South Africa a truly world-class astronomy hub.

SKA and KAT exhibits at major science show

From 24 - 27 September 2006, South Africa's SKA project participated in INSITE, an international showcase of South Africa's science and technology that was held in the Sandton convention centre and hosted by the Department of Science and Technology. INSITE was open to the general public, and two days were specifically designed to attract scholars, students and educators.

SKA South Africa project scientist, Justin Jonas, and KAT project manager, Anita Loots, presented during the INSITE public lecture series.

The SKA stand focused on South Africa's bid to host the Square Kilometre Array (SKA), as well as the progress on the Karoo Array Telescope (KAT). A range of posters, banners and models were specially made for the show, while a digital video brought to the KAT project to life.

Educational give-aways were very popular with the many educators, learners and members of the general public who visited the stand. Even high-level government officials made sure they visited the SKA stand to collect a do-it-yourself planisphere (or star wheel) kit, and a solar system poster. Following the breaking news of Pluto's reclassification as a dwarf planet and the new classification of Ceres and Eris also as dwarf planets, the SKA produced a poster of the "new" solar system. The poster shows a high quality depiction of the Sun and its planets with up-to-date information according to the new classification system. The Deputy Minister for Science and Technology, Mr Derek Hanekom, was so impressed with the solar system poster that he expressed a wish that it should be distributed to every school in the country. The SKA team is currently investigating the printing and distribution costs and options, while also working on two more posters: one illustrating our place in the universe and another one of the electromagnetic spectrum.

Immediately after INSITE, Kim de Boer and Adrian Tiplady of the SKA office also presented the KAT project at the 2006 symposium of the Astronomical Society of Southern Africa (ASSA), held at Boyden Observatory near Bloemfontein.

Visit www.assabfn.co.za/symposium2006 for detailed feedback on this event.



Gerrit Penning of the Astronomical Society of Southern Africa (right) thanks Dr Adrian Tiplady of South Africa's SKA project (left) for his presentation on the Karoo Array Telescope at the 7th ASSA symposium at Boyden Observatory. In the middle is Prof. Phil Charles, Director of the South African Astronomical Observatory.



Download a solar system poster at www.ska.ac.za/docs.html

Radio astronomy campaign on SA radio

During October, Astronomy Month in South Africa, a radio advertisement on the basics of radio astronomy and the SKA and KAT projects was produced and broadcast in four languages. The advertisement was broadcast six or more times on each of the following radio stations: Radio 702 (English), Ukhozi FM (Zulu), Motswedding FM (Setswana) and RSG (Afrikaans).

Funding for this radio campaign came from the Department of Science and Technology and the grant was administered by the South African Agency for Science and Technology Advancement. The radio campaign was conceptualised and implemented by a local science communication agency, Southern Science.

The same grant also made it possible to develop a section on the SKA web site specifically aimed at providing information to learners and educators.

Listen to the radio advertisements and view the education information at www.ska.ac.za

THE AD ...

[Recording of Vela pulsar in the background, fades away ...]

You are listening to the radio beams from a collapsed star, called a pulsar. This one is about a thousand light years away from earth -- 66 million times further away than the sun!

Just like you tune to your favourite radio station, astronomers tune their telescopes to listen to signals from pulsars, quasars, masers and other mysterious objects in the universe. They study the birth and death of stars and the violent lives of galaxies.

Over the next three years South Africa will be building a world-class radio telescope near Carnarvon in the Northern Cape. The KAT -- or Karoo Array Telescope - will have twenty dishes, each fifteen metres wide.

But this is just a lead-in to the world's biggest radio telescope ever - the SKA, or Square Kilometre Array, that will have thousands of dishes.

Astronomers and engineers around the world are working together on this megatelescope that will be sensitive enough to trace the origins of the universe and search for extra-terrestrial life.

South Africa is in the race to get the SKA built here, also in the Northern Cape.

The Department of Science and Technology supports the SKA project and celebrates October as Astronomy Month.

KAT visit voted tops by physics students on tour

By Dr Lee-Anne McKinnell, Space Physics Group, Hermanus Magnetic Observatory and Department of Physics and Electronics, Rhodes University

The Karoo Array Telescope (KAT) project office in Cape Town was voted the favourite stop on a recent physics field trip by ten students from Rhodes University. Between 10 - 15 September 2006 the group visited places where physicists work and investigated a range of career possibilities. The trip was co-sponsored by the KAT project.



Future physicists: The students and lecturers from Rhodes University who participated in the physics field trip during September 2006.

At the KAT offices in Cape Town, the team explained different aspects of the KAT project, including the costing of such a telescope, the computing power required, and the electronic technology that is envisaged as being available in a few years' time when KAT is implemented. They demonstrated a powerful simulation programme of the movement of an array of telescopes. An interesting discussion on the state of the art electronics required for the signal processing in KAT was also held. The students found it amazing that the KAT team is designing and manufacturing multi-layer boards using surface mount components and even circuit designs that make use of chips that have not been manufactured yet! Other highlights of the trip:

At the Southern African Large Telescope (SALT) just outside Sutherland the students experienced the night time working life of astronomers and helped with spectral measurements of binary stars. Their SALT visit also included a behind the scenes look at the SALT spectrometer laboratory, and some time to explore the SALT visitors' centre.

At the Institute for Maritime Technology in Simonstown, the students got acquainted with the only space weather centre in South Africa.

The visit to the Koeberg Nuclear Power Station just outside Cape Town included discussions on a currently "hot" physics topic, the Pebble Bed Modular Reactor system.

The group spent a whole day at the Hermanus Magnetic Observatory and enjoyed an afternoon of "geocaching", an activity that involves using a GPS receiver to locate a hidden object.

At iThemba LABS near Stellenbosch, the students got to know how this cyclotron is used for medical radiation therapy, as well as high level physics research.

Students getting to know KAT

The KAT project is generating increasing interest amongst university students and computing groups. "It is natural that the development of a next generation radio telescope array will arouse the scientific and technical interest of young scientists and engineers, and we are delighted to engage with visiting groups says Jasper Horrell of the KAT office in Cape Town.

Students in physics, applied mathematics, astronomy and astrophysics from various universities have visited the KAT offices recently. During such a visit, the KAT team presents an overview of the project, as well as short demonstrations of various aspects of the modeling and development of the telescope. Some students have also benefited from a tutorial session where they can engage in some hands-on design challenges.

Some comments:

"It was highly inspiring to see the energy being put into an incredibly large scale project that will certainly change the way the world sees South Africa from a technological point of view. It was also motivating to see how skills learnt thus far at university can be directly applied, hence showing the possibility to work on these types of projects in the future."

Roger Dean, Engineering students, University of Cape Town

"As a final year undergraduate student, it was a really exciting opportunity to add an experimental flavour to a largely theoretical education in astrophysics thus far. I really appreciate getting in touch with engineers and astronomers who are building new avenues for experimental research in South Africa. The tour of the KAT offices and the question-answer sessions with the current KAT experts was an inspiration to keep studying and, hopefully, work on (or use data from) the PED and KAT telescope arrays. The array configuration tutorial for PED really helped to get us researching and thinking about the important requirements of a telescope array in order to achieve good science. Thanks for the time and effort of the engineers and astrophysicists at the KAT offices. *Christina Blom, astronomy student, University of Cape Town*

"The Rhodes students were particularly impressed by an environment that made use of all the skills a Rhodes physics degree promotes, namely physics, electronics and computer programming. There was much debate afterwards about the electronic advances that the PED prototype and KAT will be using. Visiting the KAT office made a distinct impression on our students, and we will be including this visit in future field trip programs." *Dr Lee-Anne McKinnell of the Rhodes Department of Physics and Electronics*