SKA South Africa manages the MeerKAT, C-BASS, PAPER and KAT-7 projects - and they’re looking for bright young stars to make them happen.

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Ambitious road ahead for South African radio astronomy

While looking forward to the outcome of the SKA site bid, we are also working on several other exciting and challenging radio astronomy projects, says Dr Bernie Fanaroff, Director of SKA South Africa. These include the ground-breaking MeerKAT and the establishment of an African VLBI Network. At the same time, several world-class science instruments are already operating within South Africa’s Radio Astronomy Reserve in the Northern Cape. The success of the “PAPER” and “C-BASS” telescopes shows that the science infrastructure that have been created in the Karoo - including roads, buildings, electricity, optic fibre and more - are attracting investments and top scientists from around the globe to do cutting-edge work in South Africa.

An artist’s impression of 64-dish MeerKAT array. Construction on MeerKAT will start later in 2012 and the instrument should be ready to do science by 2016.

SKA South Africa trainees in Cape Town working on hardware for the African VLBI Network - Raphael van Rensburg, Mande Manzini and Ruvano Capser are assisted by Obert Tanwanda, a member of the MeerKAT engineering team.
International Astronomical Union Symposium on Cosmic Masers (IAU S287), Stellenbosch from 29 January - 3 February

By Ray Booth and Sharmila Goedhart, SKA South Africa

“IAU S287 Cosmic Masers: from OH to Hø” was a great success bringing astronomers from all corners of the world to South Africa to discuss the tantalizing properties of astrophysical masers and their use in astrometry, astrophysics and cosmology.

Dr Bernie Fanaroff, Director of SKA South Africa, welcomed delegates ‘home’ by reminding everyone that their origins lie in South Africa.

Delegates were treated to some excellent talks and reviews, including maser theory (Vladimir Strelnitski); polarization and magnetic fields (Wouter Vlemmings); masers associated with star formation (Anna Bartkiewicz and Huib van Langevelde); evolved stars (Anita Richards), cosmology (Christian Henkel), AGN and mega masers (Andrea Tarchi), astrometry (Mark Reid) and developments in maser physics (Karl Menten), as well as a talk on new instruments and their use for maser research (Al Wooten).

The first cosmic maser, intense, narrow spectral line emission from the hydroxyl radical (OH) was discovered in 1965 and since that time many more maser species have been discovered including water, methanol, formaldehyde and silicon monoxide. They are observed in interstellar clouds and regions where stars are forming, as well as evolved stars, supernova remnants, comets and extra-galactic nuclei. Their narrow-band, beamed emission allows astronomers to derive precise information on their velocity and position and this can be used to measure the detailed dynamics of the Milky Way, its structure and even our distance from its centre. In other galaxies, masers are especially used to investigate nuclear phenomena and can even be used as cosmological probes to measure the Hubble constant, H0, with great precision.

Exploring space in partnership with IBM

Big data analytics may help MeerKAT telescope tackle vast data volumes for enhanced images of the sky

SKA South Africa will be working with IBM towards developing a next-generation big data analytics platform with self-tuning and self-learning capabilities to better analyze large volumes of radio astronomy data. The proposed software may help automate the process of analyzing antenna-collected data allowing astronomers to more effectively observe objects in space.

South Africa’s MeerKAT array will require expert data analysis to make high quality maps of the sky. The telescope will have 64 dish antennas (each 13.5 m in diameter) that is sensitive to emission from cosmic sources at centimeter wavelengths. Huge volumes of data need to be combined to make detailed images of radio emission from distant objects like black holes, spinning neutron stars, planets, and galaxies. It will also map primeval gas before the galaxies formed, as observed at the edge of the visible universe.

The analysis of MeerKAT data is a major challenge.

“...The goal of the proposed project is to teach a computer to make perfect images on its own,” says Dr Alain Biem, an IBM Researcher who specializes in exploratory stream analytics. “A software platform like this may assist in enabling large survey instruments like MeerKAT to process the trillions of bits of data per second they receive and make it available to astronomers around the world.”

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European Parliament calls for radio astronomy partnerships with Africa
by Pilar Gomez, ISC Intelligence in Science, Brussels

The European Parliament has called for greater collaboration with Africa in the field of radio astronomy, following its adoption of Written Declaration 45 on science capacity building in Africa. Highlighting the value of research infrastructures in promoting human capital development, addressing societal challenges and facilitating inter-regional cooperation, the declaration draws attention to Africa’s exceptional competitive advantages in the study of radio astronomy, reflected in the continent’s extensive array of cutting edge astronomy projects.

The declaration aims to harness the scientific and economic benefits of increasing science capacity in Africa and seeks to promote this through closer European-African partnerships in radio astronomy, as this is an area where Africa holds advantages that are not available in Europe and where there is considerable scope for further growth.

“This means that radio astronomy in Africa has enormous potential for growth and offers opportunities to European researchers and industry that they will not find in Europe” explained Fiona Hall, a member of the Industry, Research and Energy Committee.

“The importance of science for socio-economic development in Africa has already been recognised in the Millennium Development Goals and European involvement in African radio astronomy represents a possible driver of socio-economic change,” added Miguel Angel Martinez Martinez, Vice-president of the EP and a member of the Committee on Development.

Judith Sargentini, a Vice-Chair for Delegation for relations with South Africa, stated that “In adopting this Written Declaration, Europe’s elected representatives have sent a strong message to their fellow policymakers about the future of European cooperation with Africa. They have recognised that radio astronomy has a bright future in Africa and that Europe can play a valuable role in it. High level science in Africa changes our perception of the continent. This is possible in Africa, and only in Africa.”

“This means that radio astronomy in Africa has enormous potential for growth and offers opportunities to European researchers and industry that they will not find in Europe” explained Fiona Hall

Attention will now turn to how Europe can put this message to action. Written Declaration 45/2011 specifically highlights the potential role of Horizon 2020 and the Development Cooperation Instrument (DCI). Many MEPs who have signed the Written Declaration are sympathetic to the inclusion of new chapters in these programmes which will be relevant to radio astronomy partnerships. Horizon 2020 is the name given to the EU’s primary instrument for funding scientific research and development between 2014 and 2020. The European Commission proposals for Horizon 2020 were published in November 2011. This marked the beginning of a negotiation process that will last into 2013.

“Following the adoption of the declaration, a potential addition to Horizon 2020 could emphasise the role of capacity building with a particular focus on astronomy” added Teresa Riera Madurell, MEP and a member of the Committee on Industry, Research and Energy. This would draw on elements of the declaration with a view to establishing collaboration with Africa as a programme theme.

The Development Cooperation Instrument (DCI) is the EU’s main instrument for providing development assistance through the general EU budget. It operates under a separate legislative instrument from Horizon 2020. “Following the adoption of WD 45/2011, MEPs are now well positioned to propose a chapter for the DCI introducing science as a driver for implementing the instrument’s objectives” explained Filip Kaczmarek, a member of Committee on Development.

• More information on Africa Europe Astronomy Partnership initiative can be found at www.astroafricaeu.com
• The Written Declaration on Science Capacity Building in Africa: promoting European African radio astronomy partnerships can be found at tinyurl.com/WD45-2011

KAT-7 moving towards operational baseline milestone
by Richard Lord, SKA South Africa

The KAT-7 team is preparing for the operations and maintenance stage of the telescope’s lifecycle. The milestone that marks the threshold between project acquisition and steady state operations is often referred to as the operational baseline (OBL). At this point, all the physical as-built, operations, logistic support and maintenance documentation for the system is delivered, checked and entered into the configuration management system, after which the lead system engineer signs off that the system is complete.

In addition a physical configuration audit is required. This is a check to ensure that the system described in all the OBL documentation is a correct and true representation of the system in its current configuration and as deployed operationally in the field. The OBL forms the baseline for configuration control of the system during the operational phase.

To date the majority of the KAT-7 as-built documentation is complete, as are the physical configuration audits of the receptor assembly, ASC container assembly, CC container assembly and CMC container assembly. The target set for final sign off of the KAT-7 OBL is end of 2012.
In the first half of 2012, a number of tenders for the MeerKAT telescope and associated infrastructure will be awarded.

The first of the tenders is for the expansion of the current road network, and the construction of an all-weather landing airstrip at the MeerKAT site.

By the end of March 2012 the tender for the supply, delivery and installation of the rotary uninterrupted power supply (UPS), the medium-voltage indoor switchgear and power transformers at the MeerKAT site will be awarded.

The third tender is for the construction of the various new buildings including buildings for the pedestal integration, the heating, ventilation and air conditioning (HVAC) system, and the power building, which will house the rotary UPS, etc. This tender also includes the extension of the existing dish manufacturing shed, which was used for the manufacturing of the KAT-7 dishes. The extension is required to cater for the increased scope of the MeerKAT antennas. An office building and workshops will also be constructed at SKA SA support base at Klerefontein.

April 2012 will see the award of the tender for the Gregorian offset antenna positioners. (Each antenna consists of the antenna positioner, the digitiser - which is the responsibility of the digital back-end or DBE team, and the receiver - which is being built by EMSS). The tender for the antenna positioner includes the design, procurement, manufacturing, qualification for performance and reliability, as well as the integration and performance qualification of the integrated system, the establishment of the maintenance plan and life cycle costs for the longer term.

Additional tenders for the first half of 2012 are:

1. The building management system required to monitor aspects of the building that houses the Karoo Array Processor for MeerKAT, including security access control, HVAC, smoke and fire, as well as the electrical power system and the back-up diesel generator.
2. The supply and installation of an RFI shielding system in the Karoo Array Processor building to protect the MeerKAT from possible RFI generated by the correlator and other electronic devices inside the building.
3. The ICT network - local area network (LAN) at the various sites (Losberg, Klerefontein, Carnarvon, Pinelands and Rosebank in Johannesburg).
4. The supply and installation of the optic fibre cable
5. The construction of the antenna foundations, and the surfacing of gravel platforms around each antenna.
Exciting first images and data from KAT-7
By Jasper Horrell and Simon Ratcliffe, SKA SA project office, Cape Town

The KAT-7 telescope array in the Karoo has produced its first datasets and images of the flares of a binary star system (Circinus X-1). This star system has been observed by astronomers for a long time, but continues to be of great scientific interest. The KAT-7 data can provide scientists with additional information, and may result in the first scientific publication from the 7-dish array.

Circinus X-1 is an X-ray binary (or microquasar), where one of the companion stars is a high-density, compact neutron star. The other star type is unknown. The two stars orbit each other, and every 16-and-a-half days they move close together in part of their orbit, which is an elliptical orbit. When the two stars are at their closest the strong gravitational force of the neutron star pulls material from the other star. Scientists believe that the process of accretion of this material causes the flares (which have been detected at various wavelengths over time).

The bright region in the middle of the KAT-7 radio images, observed at 1822 MHz (with 256 MHz bandwidth), shows Circinus X-1. Also shown are several supernova remnants - the large loop mid bottom, and the smaller loop mid left, as well as several other radio sources.

Roll-out of the SKA SA logistic support and maintenance system
By Frank Curtolo – SKA South Africa

A key activity of the operations and maintenance of KAT-7 is the roll-out of an integrated logistic support and maintenance system. The KAT-7 team will use system software known as RAMLog.

RAMLog can provide work instructions, maintenance task schedules, inventory control and ordering systems. These are all important tasks to ensure that KAT-7 will operate reliably and efficiently. The system will be expanded for MeerKAT, and any other telescopes deployed on the SKA Karoo Astronomy Reserve.

A feature of the RAMLog software is that the server stores both the logistic engineering data, generated during the acquisition phase, and real time operations data. This means that values used during simulations can be verified and updated by actual data collected during operations and maintenance. To ensure that these data are current and applicable to the current configuration of the system, RAMLog has a direct interface to the software of the SKA SA configuration management system. Currently, this system consists of the KAT-7 and MeerKAT arrays, but will be expanded to include PAPER, C-BASS, the African VLBI Network, and the Square Kilometre Array, if RSA wins the SKA bid.

RAMLog will also eventually interface with the business, finance and procurement systems of the project.
The KAT-7 array has proven to be a valuable engineering development instrument on the path towards MeerKAT. KAT-7 has been fitted with seven cooled feeds, the wideband ("continuum") correlator mode and the associated RF, electronics and software.

With the basic engineering, and single-dish commissioning work complete, the next step is to conduct science verification testing with the array, and to build up the necessary expertise, hardware and software systems in preparation for MeerKAT. This will include the development of an online processing system (to perform real-time radio frequency interference (RFI) detection and flagging, amongst other tasks), spectral line imaging, single dish pulsar timing and transients, as well as tied-array pulsar timing and transients. Linear polarization observations are also planned in order to verify the polarimetric performance of the system.

The engineering and early science related tasks have been consolidated in the KAT-7 Science Verification Programme (SVP) by the MeerKAT science, commissioning and engineering teams. The SVP tasks will be led by MeerKAT project members, but with the involvement of the MeerKAT Large Survey Project team, who have expressed a great deal of interest in using KAT-7 for research. Some of the more scientifically interesting tasks being tackled in 2012 by KAT-7 (identified according to the criteria of feasibility and scientific value) are:

1. **Variable:** Monitoring of seven hydroxyl (OH) masers with known periodic methanol masers with periods ranging from 29 days to 400 days. (The masers would be observed once a week every week for the year.) This would allow testing of maser theories, potentially finding a link between the pumping mechanisms of hydroxyl and methanol masers. The telescope commissioning objective would be the testing of narrow band spectral line modes as well as of the tied-array mode.

2. **Variable:** Monitoring at L-band of the X-ray binary system known as Circinus X-1. This exhibits a periodic flare every 16.5 days. The radio source is still of considerable interest to scientists and the commissioning goal is to determine efficient, consistent and accurate ways of measuring radio brightness over an extended time series of observations.

3. **Deep:** Continuum observations of clusters of galaxies to follow up observations at other wavelengths and potentially detect halos and relics of diffuse radio emission around galaxies. The commissioning goals are to verify mosaicing, wide field-of-view (FOV) calibration, and source extraction algorithms.

4. **Wide:** A rotation measure survey of polarized point sources in the southern sky to study the 3-D structure of magnetic fields of local objects and the Galactic plane. The goals of this are to verify polarization calibration over the entire FOV and to implement Rotation Measure Synthesis. **Variable:** Pulsars are amongst the most enigmatic phenomena in our universe. These ultra stable systems act as cosmic clocks, allowing us to probe remote environments that have extreme local gravitational conditions. Since we can predict the arrival time of a particular pulse with great precision, pulsars allow us thoroughly to test and debug the timing performance of a telescope.

5. **Variable:** Monitoring of seven hydroxyl (OH) masers with known periodic methanol masers with periods ranging from 29 days to 400 days. (The masers would be observed once a week every week for the year.) This would allow testing of maser theories, potentially finding a link between the pumping mechanisms of hydroxyl and methanol masers. The telescope commissioning objective would be the testing of narrow band spectral line modes as well as of the tied-array mode.

*Images and results are available from the new SKA SA science/engineering focused public website: http://public.ska.ac.za*
RadioNET is an EU-funded cooperation network in radio astronomy that fosters collaboration among radio astronomy observatories and relevant technical facilities in Europe, but with some “in kind” collaboration with observatories in other parts of the world, such as the USA and South Africa.

Its mission is to facilitate access for researchers to European facilities, to pool skills, resources and expertise, to improve the capabilities of these facilities and to stimulate new activities in research and development, both for existing and upcoming observatories. These include ALMA (Atacama Large Millimeter/submillimeter Array in Chile), LOFAR (Low Frequency Array in the Netherlands), eMERLIN (the extended Multi-Element Radio Linked Interferometer Network in the UK), and the new-generation SKA precursor projects that are currently being built by Australia and South Africa, namely ASKAP (the Australian Square Kilometre Array Pathfinder) and MeerKAT respectively.

There are currently various committees looking at different projects, including interference management, millimetre arrays, single dish spectroscopy, and VLBI, as well as multi-pixel feeds across the wavelength range, down to millimetre/sub-millimetre wavelengths.

The activities supported by RadioNET include collaborative working groups on, for example, spectrum management; joint research activities to develop and improve observing systems and extend radio techniques into the millimetre/sub-millimetre wavelength bands; and training of young radio astronomers.

Sharing scientific ideas and results at special workshops and conferences is an important aspect of the network. Engineers are also encouraged to workshop ideas and compare approaches to new developments, especially with regard to identifying best practices in respect of the equipment used for observations.

RadioNET FP7 is reaching the end of its mandate and will be succeeded by RadioNET3, led by Anton Zenzus of the Max-Planck Institute for Radio Astronomy in Germany, which has recently been granted funding of 9.5 million Euros by the European Commission. This programme will run from 2012 to 2015.

South Africa is a partner in RadioNET, having initially joined the group as an observer. HartRAO already forms part of this network, and KAT-7 and the MeerKAT array will join too once they come online.
Student conference showcases South Africa’s SKA talent

Kristian Zarb Adami of Oxford University, one of the seven invited conference speakers on this year’s programme, said that he was most impressed by the quality and level of student participation.

Claude Carignan, SKA SA Research Chair in Multi-wavelength Extragalactic Astronomy at the University of Cape Town, believes that many research groups in Europe would be very envious of such a wealth of students.

Huub Röttgering of the Leiden Observatory in the Netherlands said that because the SKA is the future of astronomy, the conference gave him an opportunity to stay in touch with what is happening on the ground, and to scout for ideas for possible exchange programmes.

Hideyuki Kobayashi of the National Astronomical Observatory in Japan hopes that the advertising of his institution’s research during the conference will lead to collaborative projects with African colleagues.

David Davidson, SKA SA Research Chair recipient in electromagnetics, at Stellenbosch University, believes the quality and quantity of work presented annually showcases how successful the SKA project has been in attracting top young minds into science and engineering. “It has definitely put physics back on the agenda as a career option for scientifically minded students,” he believes. He expects that a number of spin-off companies will be established thanks to the technology being developed by engineers who are part of the SKA SA project. “This ‘mission-driven innovation’ will benefit the economy in the long run,” he says.

“I look forward to seeing exceptional research outcomes from the work that all of you will do in your Master’s and Doctoral programmes. We expect nothing less from you than excellence in all the science and engineering programmes that we have to develop for the SKA.” - Minister Naledi Pandor

For Roy Maartens, who returned to South Africa after 16 years abroad to take up the new position of the SKA SA Research Chair at the University of the Western Cape, the value of the conference lies in the inter-university sense of community that it helps to build between students, supervisors and researchers. “Young students get to realise that engineering, computations, astronomy and model building are all connected, and that they are part of a bigger group,” he explains.

Sergio Colafrancesco, the recently appointed SKA SA Research Chair in Radio Astronomy at the University of the Witwatersrand, points out that conferences such as these help to shape students’ ability as researchers, and also their ability to successfully communicate their research ideas.

Total number of bursaries, grants and fellowships awarded by the South African SKA Project (2005 to 2012)
Fifty-five participants from around the globe attended the first stakeholder workshop of the IAU Office of Astronomy for Development (OAD), held from 12 to 14 December 2011 at the South African Astronomical Observatory (SAAO) in Cape Town. Attendees included representatives of relevant IAU Commission 46 Program Groups, Commission 55, other IAU-endorsed activities and external organisations interested in contributing to implementation of the IAU Strategic Plan “Astronomy for the Developing World”.

In his welcome address, OAD Director Kevin Govender announced that more than 340 potential volunteers had already registered in reply to the call issued to IAU members. Workshop discussions focused on such matters as governance of the envisaged task forces; the nature of regional nodes; fund raising campaigns; institute twinning and capacity building programmes.

Participants were also invited to suggest “unconference” topics that they wanted to discuss. Following a vote, five topics were chosen for in-depth discussions: citizen science; mobile planetaria; distance education; managing volunteers and evidence for economic development resulting from astronomy.

“My thoughts about the workshop are positive, but we should focus more on the issue of economic development via astronomy,” writes Dr Jarita Holbrook from Arizona University on the blog of the National Society of Black Physicists. “It brought together stakeholders who were primarily interested in educating the public about astronomy; attracting young people to become astronomers, and increasing the number of university level astronomy classes and programs worldwide. As a result, most of the attendees were astronomers. For the next workshop, I would like to see stakeholders from the towns nearest observatories, from government offices responsible for development, from the United Nations Development Program, and perhaps indigenous rights groups.”

Among the actions planned for the OAD during 2012 are:
- Issuing a call for proposals for the IAU regional nodes
- Establishing the three task forces (Universities & Research, Schools and Children and Outreach to the Public)
- Setting up study groups to investigate some relevant topics, such as distance learning.

Find out more about the OAD at http://www.astronomyfordevelopment.org/. The workshop was streamed via the web and can be viewed at http://www.ustream.tv/channel/oad-workshop-2011.
South Africa’s KAT-7 telescope, a seven-dish array which is a precursor to the much larger Square Kilometre Array, has reached another major milestone by observing the radio emission from the neutral hydrogen gas (HI) in a nearby galaxy. Hydrogen gas emits radio emission in a spectral line at a very specific frequency of 1420 MHz.

The astronomers pointed the telescope towards a galaxy called NGC 3109 – a small spiral galaxy, about 4.3 million light-years away from Earth, located in the constellation of Hydra. The observation allowed them to see the HI radio emission of this galaxy as well as to see how this galaxy is moving. Where the gas is moving towards us, the frequency of the spectral line is Doppler-shifted upwards; where the gas is moving away, the frequency is shifted down. In this way, astronomers can map the way in which all of the gas in the galaxy is moving.

“This exciting result achieved by KAT-7 have given us confidence that we know how to build a cutting-edge radio telescope in Africa to answer some of the fundamental questions in radio astronomy”, says Dr Bernie Fanaroff, director of SKA South Africa. “Our team in the SKA South Africa Project and universities has again shown that they can deliver cutting-edge technology and do excellent science on a very tight schedule.”

“A large proportion of the science planned for the SKA – and MeerKAT – involves mapping of the universe using neutral hydrogen. Because of the ongoing expansion of the universe, distant galaxies are moving away from us. Measuring the frequency of the spectral line from neutral hydrogen in those galaxies allows us to work out how far away they are. By finding billions of distant galaxies, astronomers will be able to map the structure of the universe and how it has changed over time. This cosmic census of the neutral hydrogen in galaxies – far and near – is essential in understanding the deeper physics of the universe, by answering fundamental questions such as the nature of dark matter and dark energy.”

“Observations of the neutral hydrogen content of galaxies also help to form a picture of how galaxies have evolved over cosmic time and show how our own galaxy, the spiral galaxy called the Milky Way, has developed,” Fanaroff adds.

The radio waves which KAT-7 picks up from the galaxy were processed in the correlator, the first stage of computing. The correlator currently allows measurement of the gas velocity to an accuracy of 10 km/s. Further upgrades during 2012 will enable astronomers to study this galaxy with a velocity resolution of 1 km/s.

“Such a high velocity resolution will allow us to distinguish between the conventional models which suppose the presence of an important quantity of dark matter (matter that cannot be seen but that is detected by its gravitational influence) and the Modified Newtonian Dynamics (MOND) models which suppose that no dark matter is present but that it is instead the laws of gravity that change on galaxy scales,” explains Prof Claude Carignan, South African SKA Research Chair in Multi-Wavelength Astronomy at the University of Cape Town (UCT).

“We also speculate that an unusual warp in the disk of this galaxy could be caused by a tidal interaction with its dwarf companion galaxy known as Andia,” Carignan adds. “Future KAT-7 observations should reveal more information on this possible interaction.”

“It is particularly exciting that we will soon be able to derive new scientific results with a relatively small precursor array,” says Bradley Frank, PhD student at UCT and lead researcher for the HI imaging of nearby galaxies with KAT-7.

Spectroscopy is one of the most important tools in astronomy. A spectral line is shifted in wavelength – by the Doppler Effect – by an amount which is proportional to the velocity of the emitting object. It shifts to a longer wavelength (lower frequency) if the emitting material is moving away from the observer and to a shorter wavelength if it is moving towards the observer. (Remember the change of pitch of a railway train hooter as it passes by? It increases in pitch or frequency as it approaches and decreases as the train recedes.)

Radio astronomers use a spectral line of atomic hydrogen, the simplest and most abundant element in the universe, to measure the rotation of galaxies and velocities. This line – with its rest wavelength at 21 cm – has given us important information on the expansion of the universe and on the motion of matter in some galaxies. This has led to the hypothesis that galaxies contain more matter than we can actually ‘see’ – termed ‘dark matter’.

The spiral galaxy NGC 3109 was discovered by the English scientist John Herschel on March 24, 1835 while he was doing astronomical research in South Africa.
Towards Real-Time Global VLBI and an African VLBI network

By Michael Bietenholz, HartRAO

The theme of the 10th International e-VLBI Workshop, hosted by Hartebeesthoek Radio Astronomy Observatory, was “Towards Real-Time Global VLBI”.

A special feature of the meeting was a session dedicated to the African VLBI network (AVN) – the project of converting large, redundant telecommunications dishes across Africa for radio astronomy. Participants from Ghana (Bernard Asabere), Kenya (John Buers Awour) and Nigeria (Augustine Chukwude and Fidelix Opara), gave presentations on the status and prospects of radio astronomy in their respective countries. Michael Gaylard (HartRAO) and TL Venkatasubramani (SKA SA) gave overviews of the proposed AVN. The worldwide VLBI community were favourably impressed with the potential of, and enthusiasm for, this project.

The workshop brought together scientists from around the world who use the technique of e-VLBI. Of the 55 participants, 13 were from South Africa, while the remainder were from every continent except Antarctica. The workshop was supported by the European NeXPRES Project and the International Centre for Radio Astronomy Research in Australia. SKA SA provided travel support for the AVN delegates.

About e-VLBI

E-VLBI is process of doing VLBI (very long baseline interferometry) in real time with the antennas connected to the data processing computer through high-speed internet connections. HartRAO regularly takes part in e-VLBI observations with transfer rates up to 1 gigabit/second to Europe. VLBI allows observations of radio sources with very high angular resolution, and due to light-travel-time arguments, such high resolution is almost always required for rapidly variable sources. The process of e-VLBI, unlike traditional disk-based VLBI, allows for results in almost real-time, and is therefore particularly suited to observations of transient sources. The global VLBI community is working towards being able to respond to transient astronomical events, such as supernovae, gamma-ray bursters and micro-quasars, as rapidly as possible. In the radio, our capability of detecting transient events will increasing dramatically in the near future with the coming on-line of MeerKAT, LOFAR and ASKAP among others. E-VLBI follow-up observations of the many transients these new instruments will detect will be essential to understanding them.