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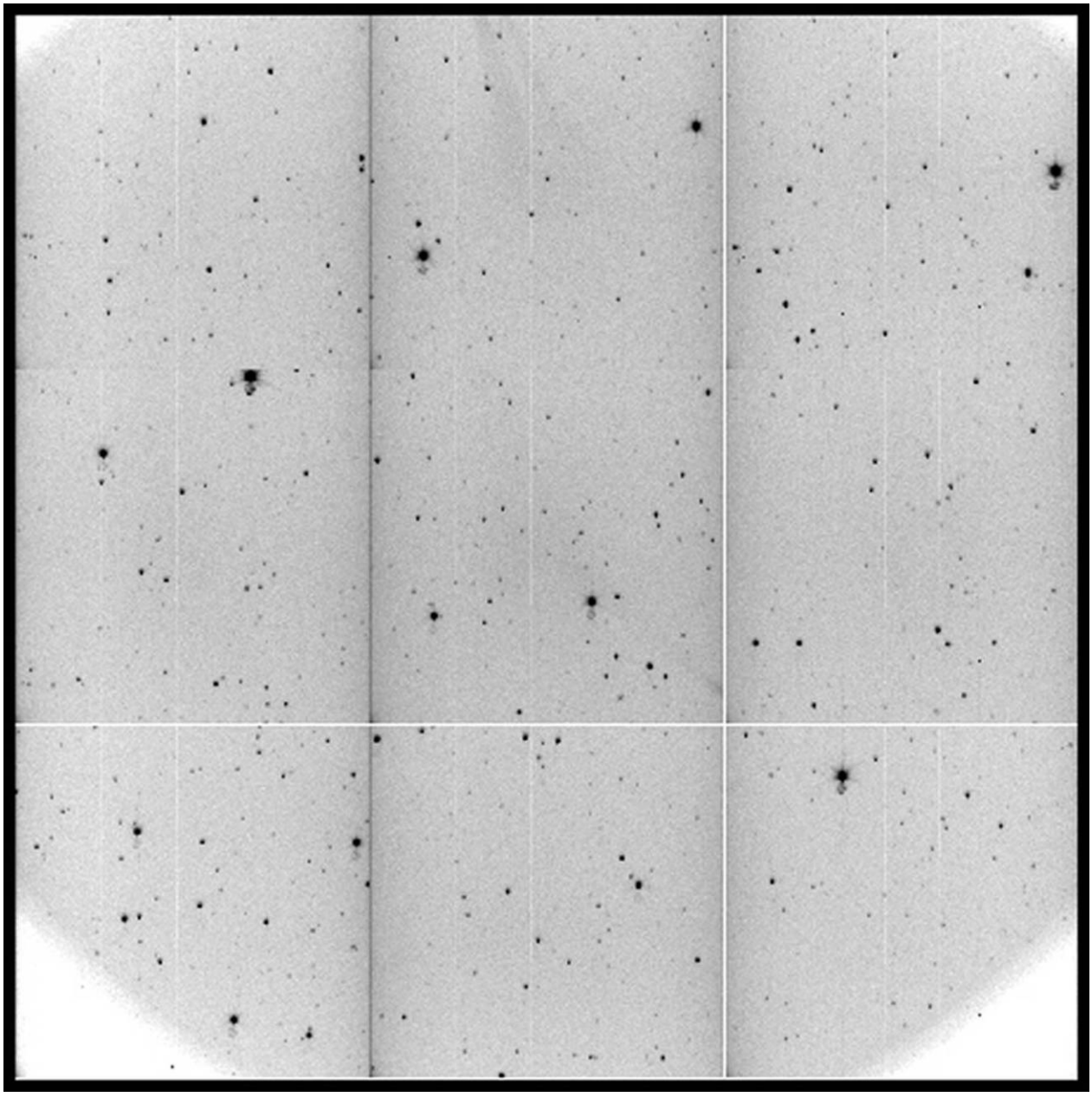


Special Issue

Astronomy in South Africa

Editor: Jaynie Padayachee

Physics Comment – Vol. 2, Issue 3 – September 2010

Cover Image

Courtesy of the SALT Image Quality Team, led by Darragh O'Donoghue

SALT image of a star-field on the night of August 28/29 which shows good (1.1 arcsec) star images uniformly across the entire field of view. This is clear demonstration of the success of the repair to SALT's SAC (the Spherical Aberration Corrector), which has been carried out over the last 18 months by a team led by SAAO's Dr. Darragh O'Donoghue. Their herculean efforts were performed entirely in the telescope building at Sutherland, and exploited state-of-the-art optical testing and alignment techniques that included computer-generated holograms. The field shown here is 8 arcmins across, and so this result is also a demonstration of the potential of the SALT paradigm for large telescope design, as SALT now substantially out-performs its Texas-based cousin (and prototype), the Hobby-Eberly Telescope, which has a much cruder SAC that gives only a 4 arcmin field with inferior image quality. SALT will now enter into a period of re-commissioning that will soon include its multi-function spectrograph, RSS (the Robert Stobie Spectrograph), and then science operations can begin again.

Editor's Note

Jaynie Padayachee

This special issue of *Physics Comment* commemorates the 5-year anniversary of SALT's inauguration. We present one of SALT's first images since it has come back online after an 18 month repair, progress on SKA and MeerKAT and news of the HartRAO 26 m telescope's recommissioning after being off-line since October 2008.

This issue has had a fantastic response from the South Africa Astronomy community and I would like to especially thank Phil Charles, Bernie Fanaroff, Justin Jonas, Mike Gaylard and Michael Poll for their contributions. Thanks also to Marina Joubert who was instrumental in pulling together the SKA article.

Apologies to those whose submissions for the cover were not used.

Repair of SALT's Optics

Phil Charles (on behalf of the SALT Image Quality Team, led by Darragh O'Donoghue)

To appreciate the significance of the cover image just obtained with the Southern African Large Telescope (SALT), it is necessary to understand how the project has evolved over the last decade.

Brief History of SALT

The SALT project began in the late 1990s as a southern counterpart to the 10m Hobby-Eberly Telescope (HET) at McDonald Observatory of the University of Texas at Austin. The initial construction was completed in 2005, and the telescope was inaugurated by President Mbeki in November 2005, following which SALT entered the testing, commissioning and verification phase.

How does SALT work?

SALT was costed at only approx $20M, which was achieved through the use of a 10m spherical primary mirror array. This consists of 91 1m segments, at a fixed elevation angle of 53º, thereby providing access to 70% of the sky via a 12º wide annulus centered on the zenith and 37º in radius (which represents ~15% of the instantaneously visible sky). A 4-element spherical aberration corrector (SAC) near the prime focus feeds the accumulated starlight into an imager (SALTICAM), or a multi-purpose spectrograph (the Robert Stobie Spectrograph, RSS) or a Fibre Instrument Feed (FIF) that conveys light to a High Resolution Spectrograph (HRS, still under construction).

During an observation the primary mirror is stationary, and the instruments move across the accessible field of view on a tracker which follows the Earth's rotation. Such tracks are typically an hour or so in duration. Observations can be integrated over multiple tracks where necessary, or long-term (days, weeks, even months) variability studies easily scheduled.

Whilst obviously based on HET, SALT has major design changes intended to take its performance to a much higher level. The most significant of these was a completely different SAC design produced by Darragh O'Donoghue, which gives much improved optical imaging over a field of view more than 4 times larger than HET. It also allows for a much larger instrument volume on the tracker.

The Problems

During commissioning in 2006, two serious problems were identified:

(a) SALT's image quality, or IQ, exhibited a severe focus gradient and additional aberrations across the field of view, thereby preventing the telescope from exploiting more than a small fraction (~5%) of its intended 8 arcminute field;

(b) the efficiency of RSS was greatly reduced compared to what had been expected, particularly in the UV/blue (wavelengths < 400 nm).

Fixing RSS

Tests during 2006 revealed that the RSS efficiency problem was in the optical components of the spectrograph's collimator and camera. Consequently, in late 2006, the RSS was dismounted from the telescope, and then the optical components (lens multiplets) were extracted and returned to their (California-based) manufacturers for further investigation.

A lesser problem with efficiency in the yellow-green region (~550 nm) was found to be due to a failed anti-reflection coating on a lens associated with the CCD camera. This coating was removed and a new one applied.

The UV/blue loss was found to be due to subtle material incompatibilities in the lens multiplets. A chemical reaction between the lens-coupling fluid (used in all the multiplets) and other materials the fluid came in contact with, particularly the

polyurethane expansion bladders, led to radical changes in the fluid's optical properties. Remarkably this reaction only caused detectable losses below wavelengths of 400nm and was completely invisible to the naked eye. New materials were chosen to prevent this happening.

Both RSS problems have been completely solved as of 2009, and the RSS will be remounted once the IQ work and associated testing is completed, later this year.

Image Quality

Following exhaustive tests throughout 2007, Darragh O'Donoghue showed that the IQ problem could not be caused by either misalignments of the multi-segmented primary mirror, or the optics of SALTICAM or RSS. The problem had to lie with the SAC. Further tests of the SAC's mechanical structure showed that a major fault lay with its simplistic mounting interface onto the telescope tracker, which led to large thermally and mechanically driven stresses being propagated into the relatively weak SAC, thereby distorting and misaligning its sensitive optical components.

During 2008/9 Darragh's team produced a completely redesigned mechanical mounting concept for the SAC which would isolate it from any stresses occurring in the tracker. In April 2009, the SAC was removed from SALT and the telescope was stood down (it is inoperable without a SAC) in order to put this redesign into effect. The SAC was placed in the clean, mirror-aluminising room in the SALT Building.

Over the next 15 months Darragh's team at Sutherland carefully dismantled and tested all the SAC optical components, verifying their optical condition (all are excellent) and cleaning them where necessary. The SAC mirrors were all carefully realigned and finally tested with a computer generated hologram (CGH) which simulates the spherical aberration introduced by the 10m spherical primary mirror.

In early August 2010, the remounting of the SAC onto SALT began, this time using its new mechanically-isolating steel collar, and Darragh's team realigned the SAC and primary mirror. The first on-sky images under good conditions were obtained on August 28 and demonstrated clearly that the IQ problem was solved. Furthermore, the image shown on the cover is a major step forward in demonstrating the potential of the large spherical mirror HET/SALT design.

HET itself is building a new, wide-field instrument (HETDEX) which incorporates a modified SAC closely based on the SALT design.

SALT Science

Despite the problems with SALT's image quality, some limited scientific work was achieved in the commissioning and testing period up to April 2009, when the telescope was stood down for the SAC repair. This has resulted in 19 publications to date in refereed journals. With the advent of telescope and instrument re-commissioning shortly, it is anticipated that new scientific discoveries with SALT will very soon be following.

Concluding remarks

This is without doubt the most radical surgery and intervention that SALT has undergone since its completion. That it took place entirely in our own facilities in Sutherland is a dramatic event worthy of note in its own right, as it takes SALT technical operations to a potentially new level. Ten years ago the SAC repair project would only have been possible in high-tech facilities in either Europe or the US. However, advances in modern optics (such as the CGH) and the acquisition of some specialised, though affordable, equipment (such as an alignment telescope, wavefront camera and portable coordinate measuring machine) meant that all this work could be undertaken at Sutherland by SAAO staff. Thus the adjustment, maintenance and repair of SALT's opto-mechanics are now within the capability of the SALT team. This is a far better situation than that envisaged at the beginning of the SALT project, and bodes well for future developments and new instrumentation projects. The outstanding efforts of Darragh O'Donoghue in leading his IQ team to this result should be recognised and loudly applauded by the South African scientific community.

IQ team (left to right) Darragh O'Donoghue (senior astronomer and head of instrumentation), James O'Connor (mechanical engineer), Lisa Crause (research fellow), Ockert Strydom (mechanical engineer) and Francois Strumpfer (optical scientist) [Photo: Lisa Crause].

South Africa's Future in Radio Astronomy

Bernard Fanaroff and Justin Jonas

Working towards the SKA

The Square Kilometre Array (SKA) radio telescope will be nearly two orders of magnitude more sensitive than existing instruments. Sixteen countries and 55 institutions are collaborating in the development of this mega science instrument. South Africa's participation is coordinated by the South African SKA Project Office, which is administered by the National Research Foundation on behalf of the Department of Science and Technology.

Southern Africa and Western Australia have been short-listed as suitable sites for the array. A decision on the site is expected early in 2012. If it is built in Africa, the array will extend over nine countries. In July 2010 the African Union Heads of State passed a resolution supporting the bid to bring the SKA to Africa.

The construction of the first phase of the SKA is expected to begin in 2016 and the telescope is scheduled for completion by about 2025. The SKA will push the boundaries of both science and technology. Key science projects for the SKA include the exploration of dark energy and dark matter, the study of the formation and evolution of galaxies, the detection of gravitational waves, the understanding of the creation and influence of cosmic magnetic fields, and the investigation of how life developed in other stellar systems. Technologies required for the implementation of the SKA range from novel materials for building radio telescope antennas to ultra-fast computing and data transport.

Building the MeerKAT in South Africa

South Africa is building a precursor telescope for the SKA, the MeerKAT, which will develop technologies required by the SKA and perform preparatory science that will guide the science programme for the SKA. Australia is constructing a complementary precursor, called ASKAP (Australian SKA Pathfinder), and other countries around the world are involved in diverse SKA pathfinder activities.

The South African SKA project office is responsible for the design, development and construction of the MeerKAT radio telescope array. MeerKAT will be the largest and most sensitive radio telescope in the Southern Hemisphere prior to the construction of the SKA itself. The design and development headquarters is located in Cape Town, and various South African university groups and commercial subcontractors contribute to the design effort. The design team collaborates with a wide range of international partners, including Oxford University, Cambridge University, the University of California at Berkeley, Caltech, the National Radio Astronomy Observatory (NRAO) of the USA, ASTRON (the Netherlands National Radio Astronomy Facility), the National Centre for Radio Astronomy (India), and many others. The telescope is being constructed within the protected radio astronomy reserve in the Karoo, near the small towns of Carnarvon and Williston. A prototype seven-dish array, KAT-7, has been constructed on this site and is currently being commissioned. This prototype array was completed ahead of schedule and the first interferometric image of a distant radio galaxy was observed in March 2010.

Figure 1: Seven-dish MeerKAT prototype array (KAT-7) on site in the Karoo

The MeerKAT will consist of 64 x 13.5 metre diameter offset dishes, with the receivers located at the Gregorian focus. It is expected to produce early science results in 2014. An offset dish configuration has been chosen because its unblocked aperture provides the best optical performance, maximum sensitivity, excellent imaging quality, and good rejection of unwanted radio frequency interference (RFI) from satellites and terrestrial transmitters. The offset optical configuration also allows the installation of multiple receiver systems in the primary and secondary focal areas, and is the reference design for the SKA itself. The MeerKAT dishes and receiver systems employ a number of novel technologies that will be used by the SKA. For instance, MeerKAT is pioneering the use of composite materials for the dish reflector surfaces and structural components.

The MeerKAT offers many technology challenges, including the development of very wide bandwidth feed antennas and receiver systems, low-cost cryogenic systems for cooling the

receiver components to reduce thermal noise, high speed digital signal processing systems, new algorithms for astronomy data processing, high performance computing platforms that match the algorithms, and very fast data transport networks.

Future science with the MeerKAT and other Karoo-based telescopes

Twenty-one proposals have been submitted for large science projects using the MeerKAT, in response to an open request to the local and international astronomy community. They have been submitted by multi-national teams, including nearly 500 international astronomers and 58 based in Africa. The proposals cover large and deep surveys of neutral hydrogen, the continuum sky, pulsars and molecular lines. A decision on the prioritisation of these proposals will be made in September 2010 by an advisory committee that includes South African and international astronomers. All of the proposals are linked to SKA science topics, and the science goals include tests of general relativity, the evolution of galaxies, and the nature of cosmic magnetic fields.

Two other experiments have been constructed on the Karoo site. They are the C-BASS Telescope and the PAPER Telescope. C-BASS is an experiment being conducted in collaboration with the universities of Oxford, Manchester and Caltech to survey the polarized Galactic continuum emission so that it can be removed from the surveys of the Cosmic Microwave Background, specifically the survey being conducted by the Planck satellite. The PAPER telescope is a low frequency array designed and built in collaboration with the University of California at Berkeley, the NRAO and the University of Pennsylvania. It hopes to find the signature of the reionisation of the hydrogen in the Universe when the first stars and quasars turned on, a few hundred million years after the Big Bang.

Developing skills for the future

The South African SKA Project's Human Capital Development Programme provides support for the development of both the scientific and engineering aspirations of the Project. It has awarded grants to 215 postgraduate and undergraduate students at South African universities and selected institutions in other African countries, for study in astronomy and engineering relevant to the MeerKAT and the SKA. This includes 38 PhDs, 63 MScs and 15 postdoctoral fellowships. Grants have been made to 72 women and 39 students from other African countries. In addition, six research chairs have been established at South African universities.

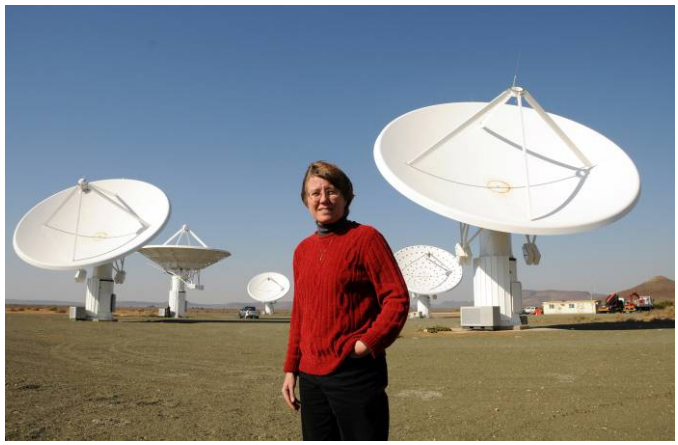


Figure 2: Dr Debra Shepherd is on a two-year secondment from the National Radio Astronomy Observatory in the USA to assist with the commissioning of KAT-7, a prototype of the MeerKAT radio telescope. [Photo: John Yeld, The Argus]

Figure 3: (left) 3 dishes in position. (middle) Fifth dish going up. (right) KAT-7 crane and dish.

***Author Biographies**: Bernard Fanaroff (left) received a PhD in radio astronomy from Cambridge University in 1974; Project Director of the SA SKA Project; Visiting Professor in Physics at Oxford University.*

Justin Jonas (right) has a PhD in radio Astronomy from Rhodes University. He is a Professor of Physics & Electronics at Rhodes University and Associate Director for Science & Engineering in the SA SKA Project. He represents South Africa on the SKA Science & Engineering Committee.

HartRAO 26m Telescope Recommissioned

Michael Gaylard

Background

The 26m diameter antenna at what is now the Hartebeesthoek Radio Astronomy Observatory (HartRAO) was built in 1961 by NASA to send commands to, and receive data from, spacecraft going beyond Earth orbit. HartRAO was then NASA Deep Space Station 51, and was involved in the Ranger, Surveyor and Lunar Orbiter unmanned lunar missions and the Apollo manned Moon landings. In 1965 it received the first close-up pictures of Mars, taken by Mariner 4. The 26m antenna was originally built with a mesh surface and operating at 960MHz. In the late 1960's it received major upgrades to enable it to operate at 2 300 MHz. These upgrades roughly doubled the mass of the moving structure, from 100 to 200 tonnes, a factor that was later to prove important.

In 1974 NASA decommissioned DSS 51 and it was handed over to the CSIR for use as a radio telescope. A programme of continuous development began to add new receivers in different wavebands and new signal processing backends in order to increase the range of scientific experiments it could undertake. Particularly important was its ability to take part in Very Long Baseline Interferometry (VLBI) in which the radio-emitting objects are observed simultaneously with radio telescopes on different continents. This provides high angular resolution imaging of the emitter, precise determination of its position in the sky, and simultaneously precise location of the antenna on the ground. These capabilities were exploited in using these telescopes to set up the International Celestial Reference Frame (ICRF) and International Terrestrial Reference Frame (ITRF).

Bearing Failure 2008 October 03

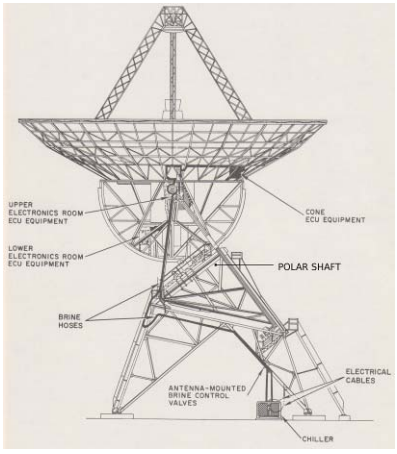


Figure 1: Schematic diagram of an antenna similar to the HartRAO 26m telescope, showing the polar shaft (NASA). The failed bearing was at the upper end of the polar shaft.

The working of the heavily used telescope came to an abrupt halt on 3 October 2008, when cracking noises were heard coming from the structure. Investigation showed that the 0.7m diameter spherical roller bearing at the south end of the polar shaft had failed. In the NASA upgrades the extra load on this bearing had been evaluated, and it was regarded that it would still have sufficient useful life for NASA's purposes. However after 47 years, the bearing's lifetime had clearly been reached. Options for repair, rebuild and replacement were considered, and opinions were obtained from key international partners. On 22 July 2009 the President of the National Research Foundation (NRF) took the decision to the replace the bearing, following the receipt of a proposal from US company General Dynamics Satcom Technologies, that was evaluated as technically feasible and at an acceptable cost. Approval by the Minister of Science and Technology followed. Funding was obtained in late October 2009, whereupon detail design commenced.

The Repair

The critical design review of the GD Satcom proposal was held in March 2010, by GD, local partner Stratosat Datacom and HartRAO. The repair proposal required the construction of an A-frame to support the polar shaft just behind the failed bearing, and this heavy steelwork was subcontracted to Tass Engineering in Johannesburg. Three reinforced concrete bases were built to take the 200 tonne load. In June the steelwork started arriving, as well as engineers and technicians from GD, and assembly of the A-frame began. On 30 June the antenna was lifted slightly by hydraulic jacks in the base of the A-frame to return it to its correct position so the failed bearing could be removed. On 01 July the polar shaft end cap came loose with the help of 200 tonnes of force from a jack. The next day the bearing was exposed and the extent of the damage became clear as chunks of inner race and damaged rollers fell out. Oxidation on damaged parts showed the failure had actually been progressive over a period of time. On 15 July the new bearing was successfully installed. On 20 July the antenna was driven East-West for the first time on the new bearing. On 22 July, one year exactly from the repair go-ahead, the first test observation was carried. Photographs of the repair process can be seen at www.hartrao.ac.za/news/100906_26m_repair/index.html.

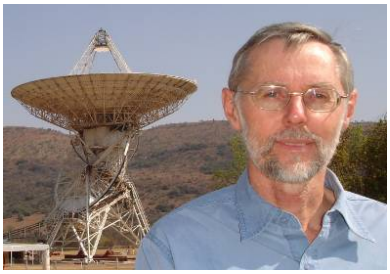
Recommissioning

Following the repair go-ahead, receiver systems were taken through repair and upgrade

processes and most are now available. Post-repair observing capability was re-established in radiometry, pulsar timing, spectroscopy and then VLBI. Pulsar observing tests began just in time that the 15 m XDM KAT prototype telescope and the 26 m telescope were able to catch the recovery from a large glitch in the Vela pulsar on 31 July [1]. The first operational VLBI was carried out on 28 July, this being a 24-hour astrometric experiment with antennas in Australia. The dual frequency (2.3+8.4 GHz) astrometric and geodetic VLBI's have resumed their normal schedule, which is typically one per week. On 26 August the first post-repair astronomical e-VLBI was carried out with telescopes in the European VLBI Network (EVN), with data from the 26 m telescope streaming to the European correlator at up to 896 Mbps.

References

1. Buchner, S. J., 2010, Glitch observed in Vela pulsar (PSR J0835-4510) ATel #2768



***Author Biography**: Michael Gaylard first visited HartRAO as an MSC student at Rhodes University in the 1970's. He later joined the observatory staff, specialising in spectroscopy. He is now Acting Managing Director of the National Facility.*

The International Astronomical Union's Office for Astronomy Development in South Africa

Kevin Govender

The development of astronomy and the contributions of astronomy to global development have been high on the agenda of the International Astronomy Union (IAU), as emphasized in the last IAU General Assembly in Brazil in 2009 where the decadal plan entitled "Astronomy for the Developing World" was launched. A key component of this visionary plan was the establishment of an Office for Astronomy Development (OAD) which would oversee and coordinate its implementation. At the 88th meeting of the IAU Executive, after the assessment of 20 proposals, South Africa was selected as the host country of the OAD, with the South African Astronomical Observatory (SAAO), a facility of the National Research Foundation (NRF), being selected as the host institution.

At the outset it must be pointed out that the SAAO and all relevant reporting levels have publicly expressed great enthusiasm and excitement about this selection, from the SAAO director, to the NRF president, to the South African Minister of Science and Technology. There has also been a large amount of congratulatory correspondence from all over the world, especially from institutions across Africa.

Why South Africa?

South Africa is undeniably among the leading nations in the developing world, especially in terms of its leadership role in Africa, nurtured and built upon since the presidency of Nelson Mandela. The country's ability to stimulate science and technology on the African continent (through programmes such as NEPAD, New Partnership for Africa's Development, for example) is unique and effective. South Africa's status as a G20 country, combined with its ethnic diversity (African, Asian, European), places it in an ideal position not only to enhance "South-South" but also "North-South" relations, thus "bridging the gap" between developed and developing countries. Above all South Africa is a country of hope, vision and passion. The spirit of the country, as articulated in its world-renowned constitution, provides for the perfect environment to house and drive the objectives of the OAD. In a world where there is a global need to "devolve" science initiatives beyond the traditional centres (viz. in the developed world), South Africa stands ready to embrace the responsibility of the OAD, and to inspire the world as it has done so many times before.

It is no secret amongst the international scientific community that South Africa is driven in the field of astronomy, demonstrating our ambition through visionary projects such as SALT (Southern African Large Telescope), MeerKAT (Karoo Array Telescope) and the bid to host the SKA (Square Kilometre Array). We are also closely involved in HESS in Namibia. The foundation of our science policies and cross-cutting strategies within the DST are based firmly on the famous white paper on Science and Technology of 1996 which states "Scientific endeavour is not purely utilitarian in its objectives and has important associated cultural and social values … Not to offer 'flagship' sciences (such as physics and astronomy) would be to take a negative view of our future - the view that we are a second class nation, chained forever to the treadmill of feeding and clothing ourselves."

In South Africa, people involved in the astronomy field, from those working on the ground to the

highest levels of government, are driven by the vision that astronomy will play a significant role in the development of society, and our commitment to this vision has been demonstrated by our actions. The development activities that we have been involved in over the last few years are driven, through no coincidence, in alignment with the IAU's strategic plan. We have set out to stimulate astronomy development in as many countries as possible, and we have led, by example, the incorporation of astronomy into school curricula, as well as public outreach events. South Africa's vision for astronomy development is one with the IAU's, and we have, through our actions, built ourselves up to this point where hosting the OAD is the most natural thing for us to take on.

Benefits to Africa

Placing the global coordinating office of a high-profile international project in Africa immediately raises the status of the continent and brings attention to Africa's ability to play a leadership role in global development, as well highlights Africa's commitment to education. African scientists and astronomers would have access to the knowledge and resources of the OAD, with geographical closeness enabling greater consultation and coordination of activities in the region – especially with the realisation of envisaged sub-regional offices across Africa. Development of astronomy would result in enhancement of the fundamental sciences of physics, mathematics and chemistry, as well as engineering and computer science. South Africa will be hosting the 2nd IAU Middle East and Africa Regional Meeting (MEARIM2) in 2011. Having the OAD in the host country would raise the profile of the conference and help to raise funds and grants for this and future important regional meetings.

Benefits to the IAU and the International Community

South Africa is rich in development projects and expertise, an invaluable resource to the OAD. It is also a good testing ground for pilot projects, due to the diversity of its population. Africa remains an area of global focus for development funding and aid. Funding from development organisations could thus be sought much easier from an office in Africa. The IAU would also have direct access to one of its development focus areas viz. sub-Saharan Africa, whilst still enjoying the benefits of being associated with a world-class observatory with good internet connectivity. South Africa is easily accessible with flights from most major cities around the world. Cape Town is a particularly modern city with all the amenities that first world citizens are accustomed to. This enables the OAD to be used as a base for the dissemination of skills and projects across Africa. The investment in astronomy by the South African government, supported by high level policies and legislation, provides an excellent example for other developing countries to follow. The SALT Collateral Benefits Programme within the SAAO is a model of deriving tangible societal benefits from astronomy and astronomical observatories. Other developmental experiences of the SAAO would be readily available and at the disposal of the IAU for the enhancement of the effectiveness of the OAD.

In conclusion

The locating of the OAD in Africa, and in particular South Africa, will have a direct impact on one of the most underdeveloped regions of the world - yet it will be situated in a country which has modern world-class infrastructure and services (recently demonstrated with the FIFA World Cup) necessary to fulfil the purpose of the OAD. The experience gained by the officers of the OAD, by being situated in this region, will be translated and expanded to developing regions across the world. South Africa has already positioned itself, through activities such as the coordination of the "Developing Astronomy Globally" IYA2009 Cornerstone Project, as an ideal venue out of which astronomy development can be coordinated. We are extremely excited about the IAU selection and remain ready, as ever, to collaborate closely with partners across South Africa and the rest of the world and to serve the international astronomy community, as well as society at large, as the host for the IAU's OAD.

The Astronomical Society of Southern Africa

Michael Poll

The Astronomical Society of Southern Africa originated in 1922 when the Cape Astronomical Association and the Johannesburg Astronomical Association merged. The Cape Astronomical Association was formed in 1912, with S S Hough, His Majesty's Astronomer at the Cape, as President. The Johannesburg Astronomical Association was formed in 1918 with R T A Innes, Union Astronomer, as President. The merger in 1922 created the "Astronomical Society of South Africa", but in 1956 the Society altered its name to become the "Astronomical Society of Southern Africa" (ASSA). The URL for the ASSA is http://www.assa.saao.ac.za and general enquiries can be addressed to the Secretary, ASSA, PO Box 9, Observatory, 7935 or via e-mail

to president@assa.saao.ac.za or secretary@assa.saao.ac.za.

The Society is a body whose membership consists of both amateur and professional astronomers. Membership is open to all interested persons, regardless of knowledge or experience. ASSA publishes *Sky Guide Africa South*, an annual Handbook, and the *Monthly Notes of the Astronomical Society of Southern Africa ("MNASSA")*. Both of these publications are included in the annual subscription. The Editorial contacts are [skyguide@assa.saao.ac.za] and [mnassa@assa.saao.ac.za].

Sections exist within the Society to co-ordinate the activities of interest groups and including the running of constructive observing programmes. In most cases these sections are associated with the relevant international group, and submit local observations where appropriate. The sections are Comet Asteroid and Meteor; Cosmology; Dark Sky; Deep Sky; Double Star; Occultation; Solar; Variable Star; Education and Public Communication; and Historical sections.

The Society awards Scholarships to persons studying astronomy at tertiary institutions in South Africa. The **ASSA Scholarship** was established in 2000 to encourage the study of Astronomy at any Southern African university at the 2nd and 3rd year level. The Scholarship is funded by ASSA with significant financial support from the ASSA Endowment Trust. The **South African Astronomical Observatory - Astronomical Society of Southern Africa Scholarships** are financed by the SAAO and are administered by ASSA. The purpose of the SAAO - ASSA Scholarships is to encourage current or intending undergraduates (i.e. 1st, 2nd or 3rd year) studying for a B.Sc. degree at any university in South Africa, who have a stated interest in astronomy, to prepare for furthering their interest.

The Society holds a two or three day Symposium every two years, where a variety of astronomy related papers are presented, both by invited guest speakers and from the Membership. The Society recently held its second National Stargazing Party near Britstown, in the Northern Cape. The event was attended by more than 40 people.

ASSA Centres

There are Autonomous local Centres of ASSA which hold regular meetings and to which visitors are welcome and may, if they wish, join without becoming full members of the National Society. The ASSA Centres are:

Bloemfontein Centre

General meetings are held once every quarter at Boyden Observatory with regular additional activities in the form of workshops, courses, tours, observing evenings, public outreach programs and social events. Activities include: telescope making, deep sky observing, observation of meteor showers, astrophotography, solar observations and historical research. The Centre is also involved in educational outreach activities together with Boyden Observatory and the Friends of Boyden. The website address is [www.assabfn.co.za].

Cape Centre

Formal meetings with guest speakers on astronomy related topics are held monthly on the second Wednesday of the month, except in December and January. On the remaining Wednesdays of the month, talks and demonstrations are presented by members. The venue is at the Auditorium, SAAO, Observatory Rd, Observatory, at 20h00. Dark sky outings and public outreach projects are arranged. The website address is [www.capecentre.org.za].

Durban Centre

Monthly general meetings are held at 19h30 on the second Wednesday of each month at Marist Brothers College, South Ridge Road, Durban. Regular viewing evenings are also held at the on-site observatory. The Centre holds workshops and lectures, and organises presentations and open viewing evenings for the public. In co-operation with the Botanical Gardens, the yearly Star Party is a favourite with children and parents alike. The website address is [www.astronomydurban.co.za].

Garden Route Centre

This Centre covers the coastal area between Mossel Bay and Plettenberg Bay, and holds meetings on the first Saturday of every month, except December, at 15h00 in the hall of St Francis Church, Swallow Drive, Sedgefield. The contact person is Case Rijsdijk [particles@mweb.co.za].

Hermanus Centre

The Hermanus Astronomy Centre holds monthly meetings at the Hermanus Magnetic Observatory at 19h00 on the first Thursday after New Moon. The centre owns two telescopes that are for the use of members and but which are also used at public outreach events such as sky viewing for schools and side walk observing. The website is [www.hermanusastronomy.co.za].

Johannesburg Centre

Meetings are held on the second Wednesday of each month, excluding December, usually at the former Republic Observatory, 18A Gill St, Observatory, Johannesburg, at 20h00. There are two small observatories on the site housing four telescopes. The website is:[www.assajhb.co.za].

Pretoria Centre

Meetings are held on the fourth Wednesday of each month (except December) at 19h15 in the Auditorium at the Christian Brothers' College, Pretoria Road, Silverton, Pretoria, where the Centre's observatory, which has a 30-cm reflecting telescope, is located. Informal observing evenings are held at the telescope site on the Friday before the monthly meeting. The Centre is involved with outreach activities to interested groups, and schools. The Centre has an ongoing relationship with the Science Club at a local primary school. The website is: [www.pretoria-astronomy.co.za]

References

1. Sky Guide Africa South (2010 Edition). Published by the Astronomical Society of Southern Africa.

Author Biography: Michael Poll is a retired medical technologist, who has been an amateur astronomer since the 1950s. He has been a member and committee member of astronomy societies since 1960, in England, Zimbabwe and Pretoria (since 1984) and also a member of the Astronomical Society of Southern Africa (ASSA) since 1975. He was Chairman of the Pretoria Centre of ASSA from 1990 – 1993 and again from 2006 -2009. In July 2009 he became President of ASSA, and was re-elected for 2010-2011. He was a commentator on three SAA Halley Comet flights and was the facilitator for an overseas tour group at the 2002 total solar eclipse. He is involved in giving presentations to schools and interest groups behalf of the Pretoria Centre of ASSA, and is also involved in events for Astronomy Africa, which includes outreach projects for the general public, and the presentation of viewing evenings for corporate groups.

Re-write of the SAIP Constitution and By-laws

Nithaya Chetty, Jaynie Padayachee and Manfred Hellberg

In 2001, the SAIP Council embarked on a formal transformation process, during which time the SAIP Constitution and By-laws were changed through formal processes defined by the Constitution itself. In 2006, the SAIP Council decided to re-write the entire SAIP Constitution and By-laws for greater consistency and to bring the organisation in line with its modern practices. The Council Constitutional Committee was set up comprising Jaynie Padayachee, Manfred Hellberg and Nithaya Chetty (chair). This committee made use of the professional services of the academic and constitutional expert, Ann Strode of the UKZN. The constitutions of the following similar organisations were studied: The Academy of Sciences of South Africa, the Royal Society of South Africa, and the South African Chemical Institute. Structures of the Institute of Physics and the American Physical Society were considered in the deliberations. A draft set of documents was first presented to the Council in October 2008. Since then, there have been several iterations based on feedback from the Council. In July 2009, the draft documents were presented to the heads of the Specialist Groups, and the current version of the documents result from the extensive deliberations that followed from the July 2009 meeting.

The next step in the agreed process was to interact with the Constitutional Reference Group which comprises the following cross-section of the South African physics community: Andrew Forbes, Bouke Spoelstra, Brian Masara, Chris Engelbrecht, Dave Walker, David Britton, Diane Grayson, Dieter Heiss, Dirk Knoesen, Edmund Zingu, Erasmus Rammutla, Erich Rohwer, Frikkie Scholtz, Gillian Arendse, Gurtwin Bosman, Harm Moraal, Hendrik Geyer, Igle Gledhill, Jackie Nel, Japie Engelbrecht, Johan Malherbe, Matie Hoffman, Mmantsae Diale, Patricia Whitelock, Peter Martinez, Ramotholo Sefako, Simon Connell, Simon Mullins, Trevor Derry, Zeblon Vilakazi and Zinhle Buthelezi.

Substantial inputs from the reference group have resulted in the current set of documents that are now available for input by the membership at http://www.saip.org.za/DraftConstitution.html

The updated draft Constitution and By-laws will be presented to the SAIP Annual General Meeting scheduled for Friday 01 October 2010, and will be put to a postal vote by the membership soon thereafter. The draft Guidelines to the SAIP Constitution is not a formal document, and only concerns itself with matters related to the interpretation of the Constitution. Only the Constitution and the By-laws - and NOT the Guidelines - are formal documents that require a vote for adoption.

Techtrack: Hunt for extraterrestrial life continues

Kelvin Kemm

The year 2010 heralds the start of a new decade, and for the exploration of space this decade should be most exciting. It has started with the discovery of five new planets.

These planets are known as exoplanets because they do not orbit our Sun, they orbit other stars in the galaxy.

The discovery was made by the Kepler space telescope of NASA. This telescope has been specifically designed to find 'earth-like' planets, and it was launched in March 2009.

The telescope continuously and simultaneously observes more than 150 000 stars, looking for signs of planets orbiting them. The five new planets found have the names; Kepler 4b, 5b, 6b and 7b. It is expected that the eventual number is going to be much higher than 7.

The planets found are much larger than the Earth, being close is size to our solar system planets of Uranus and Jupiter. Also the planets are rather hot, being something like the temperature of molten lava. But Kepler is busy learning its job, or rather its operators are the ones learning how to use the satellite telescope to its design capability.

The objective is to find planets about the size of our Earth, and also ideally planets in a Goldilocks Zone. In the Goldilocks fairytale the porridge was 'not too hot and not too cold.' Our Earth falls into what has been termed the Goldilocks Zone of our star, the Sun.

By good fortune our planet is in an orbit that causes the planet to get enough heat from the Sun to sustain life, but not so much heat that the planet gets fried.

All stars will have a 'Goldilocks Zone' in which an orbit will be exposed to just the right amount of heat to allow life to exist. Of course we are talking about our own understanding of what life is. In addition, if a planet in a star's Goldilocks Zone is about the same size as Earth then the gravity will be about the same as ours.

Of course that assumes that the planet is made of rock and not condensed gas or something odd.

The whole point is that if we look for planets something like Earth, then we figure that we have the best chance of finding life that could be something like life on Earth.

That does not mean that there are little green men running around, it means that there could be cellular life forms that we could recognise. Of course there could be little green men, or possibly some life form smarter than us.

Kepler will continue looking until at least November 2012, and if it finds a planet something like ours it means that liquid water could exist there which is a major factor in there possibly being life there. But it will take about three years to find and verify an earth-type planet.

This is because once a candidate is found, Kepler will have to watch it as it orbits on its 'year-long' cycle, to figure out its detailed nature.

A few years ago no planets outside our solar system had been found, so at that stage it was philosophically possible that only our star, the Sun, had planets. But as soon as one exoplanet was found it instantly meant that there were millions out there, because there was then no scientific reason why planets would only exist around our Sun.

We are now in the same position with respect to potential life on other planets. We have never found any life anywhere outside of our planet so, in principle, it is possible that our Earth is the only place in the entire Universe that has life. But bearing in mind the huge number of planets that exist, and the huge number that must exist in Goldilocks Zones it is very unlikely that life only evolved here.

In fact my comment is that if we find even some small cellular life form, or maybe even something as primitive as a virus on some other planet, then it probably means that there are higher life forms like animals, or even people, on some planets somewhere.

The numbers of planets are just so huge that, statistically speaking, there should be millions of planets with life, so why not ones as developed as us.

It is going to be most intriguing to monitor this hunt for extraterrestrial life as it unfolds.

Techtrack appears each week in Engineering News (www.engineeringnews.co.za). It has been reprinted here by permission of K. Kemm. This Techtrack appeared in Engineering News, Vol 30 No 3, 29 January-5 February 2010).

Dr. Kelvin Kemm is a business consultant and can be emailed at stratek@pixie.co.za.

Physics 500

The Physics 500 Project aims to identify and track physicists in Industry. The purposes of the project are to:

- Identify industries in South Africa that employ physicists,
- Identify physicists working in South Africa,
- Use this information to promote physics,
- Promote collaboration between the SAIP and industry.

For more information, visit the project website at: http://www.saip.org.za/physics500/login.php

Daniel Mojalefa Moeketsi, from Cape Town

Qualifications

In 2008, Ph.D., from Department of Physics and Electronics at Rhodes, "Solar Cycle Effects on GNSS-derived Ionospheric Total Electron Content observed over southern Africa"

In 2004, MSc., from Unit for Space Physics at Northwest University (Potchefstroom Campus), “Modelling of Galactic and Jovian electrons in the Heliosphere”

Career

Started 2008 at CSIR in CHPC, Meraka Institute as "Research Scientist".

Survey

Why did you originally choose to study physics at university?

My interest in Physics started when I was still at primary school. I used to be puzzled by bar magnets. How did the magnet operate? Why did one pole attract and the other repel? I used to play with this toy (bar magnet) to try to understand its secret. The other question I used to ask myself is what is the Sun, and how it affect life on Earth? I used to be worried that one day the Sun may fall on Earth and what would happen to life on Earth? Through my effort to consult with my father, educators, and doing extensive reading in the libraries during my secondary school concerning the above mentioned questions, I was advised to consider a career in physical sciences. This is how I chose physics as a career at University after completion of my secondary school education.

Did you enjoy your university physics? What inspired you about physics?

Physics at University is challenging. It is completely different from all natural science courses. It was difficult, but I had to work very hard spending sleepless nights! It also depends on who teaches it. It is interesting to be taught by experienced professors who are active researchers! They instil a good foundation for further career in physics. Physics is about discovering the hidden laws of nature, in order to explain the behaviour of physical systems using mathematical models and is applied in all fields in everyday life. The thing that inspired me about physics is that it is challenging and fascinating.

What did you do after graduating from university with your highest physics degree?

I joined the Centre for High Performance Computing (CHPC) at CSIR's Meraka Institute as a Research Scientist in 2008 and now am a Senior Research Scientist. My responsibility is to manage physics, space science and astrophysics projects funded by the CHPC; promote high performance computing among the physics community, facilitate development of computational physics in south Africa and to do research in space physics. I am also responsible to establish and implement CHPC education and outreach programme aimed at promoting computational science among the schools and tertiary institutions.

What made you choose a career in industry rather than a career in academia?

The CHPC provides the same opportunity as a University to grow as a researcher. I work very closely with researchers from both industry and academia. This is exciting to learn about the vast physics research activities undertaken in South

Africa and how it is applied in other disciplines. In a nutshell, my career bounces between industry and academia, which I find very interesting!

When did your industrial career really take off?

I joined the CHPC on 02 January 2008. During my PhD studies, I spent three years at HartRAO on the Space Geodesy Division as a research assistant student.

If you consider yourself no longer a physicist, what made you give up physics to pursue your career?

I am still a Physicist! I believe it will be so for many more years to come. As a physicist bouncing between industry and academia, I believe that physicists need to acquire other skills during their early training such as project management, business entrepreneurship etc. Physicists will be more marketable if this is integrated into the SA curriculum.

Is there a particular contribution in industry that you are especially proud of and that you attribute to your training in physics?

I am currently in a process of establishing a space weather research group. I am confident that my research experience and contributions during my training in physics will play an exponential role in this initiative. Furthermore, the intensive knowledge and understanding of Physics I have acquired during my training in physics helps me a lot to manage the highly specialised space science and astrophysics projects supported by CHPC. A person would not easily manage this project without a sound background in related physics.

How does your physics training help with your career?

It made me a "critical thinker" and truth seeker about nature! It opened windows to many local and international career opportunities. In fact, it has provided me with unique spectacles, to look into the future with passion, honesty, beauty and curiosity.

What advice do you have for physics students thinking of embarking on a similar career?

A career in Physics is challenging and rewarding. It requires hard work, passion and curiosity. There are so many career opportunities to choose after successful completion of your Physics training. Physicists are found working in all different disciplines. Remember, that a high level training in Physics is very important for both local and international society. Physics plays a crucial role in new discoveries and technology innovations which are fundamental pillars of economic growth of the country. If you like challenges or you like to be intellectually challenged! Do not delay, choose Physics as career now, you will never regret in the next 10 years to come!

What advice would you give to university departments to make their physics teaching and research programmes more useful for industry?

In my case, as it is evident that we live in an information and technology era, The you of computers in training of physics cannot be ruled out. I will highly recommend that University physics departments consider the inclusion of computational physics at the early stage of physics training in their curriculum. The course should equip students with scientific programming languages skills used in industry and research institutions (e.g. C++, Python, Fortran, Matlab etc.) to solve real problems. Teaching basic computer hardware is also essential and can easily be integrated as part of physics undergraduate laboratory work. This could cover topic from assembling to a computer, installation of operating systems towards building small computer clusters to perform simple calculations. There is also a need to contemplate about inclusion of modules on aspects of scientific communication and writing; and introduction to project management.

What are your perceptions about the importance of physics in present-day society?

Physics plays a leading role in everyday life. Everything technological we use (e.g. transport, lights, computers, communication, navigation, etc.) is based on the principles of physics. In a way, physics plays a very important role in creation of wealth for the society. The society that practices and supports physics will forever embrace its power!

Deadline for submissions for the December 2010 issue of Physics Comment is 30 November 2010.

Revised Physical Sciences Curriculum for Public Comment

The revised Physical Sciences curriculum has been released for public comment. Comments can be sent to Prof. Diane Grayson (Diane.Grayson@up.ac.za) before 20 September 2010, who has offered to compile them and submit them to the Department of Education. The document may be downloaded from http://www.education.gov.za/CAPS.asp.

The Role of Science Centres in South Africa

Mike Bruton and Derek Fish

We live in an advanced Science and technology culture, yet there are still vast educational imbalances in our society. Our economy is driven by innovation, yet many South Africans are stuck in poverty. While the lives of the more affluent are dominated by the latest technological toys, others still scramble for existence. Yet, no matter what profession or trade we follow, if we are not techno-savvy we are unlikely to succeed. Many people, though, young and old, have a poor understanding of science and technology and few have opportunities to remedy this shortcoming.

It is recognized internationally that formal education cannot address this in isolation, but needs to work with non-formal educational institutions such as Science Centres and museums, to bridge the digital divide and help strengthen our science and technology culture. This is most true for multilingual developing countries, like South Africa, with vast educational imbalances. Science centres are scientific laboratories in the public domain that build a pool of resources and intellectual capital to support science, technology and mathematics teaching. No single school can offer the wide range of interactive teaching equipment and programmes that a science centre offers. Science centres increase public awareness of science and engage them in technology.

Research of teaching methods by India's Agastya Foundation found that much more content is retained:-70 to 80 percent- when learners are involved in direct, hands-on group learning experiences, compared with top-down teaching in classrooms:- 20 to 30 percent. Of course, many of our top schools use efficient, interactive methods; but not the vast majority of urban and rural schools, many of which do not have laboratories or even libraries. Science centres are designed to serve these disadvantaged schools.

We should not forget just how desperately poor our Science Education is in South Africa. In the internationally recognized TIMSS tests, we came last of the 50 or so participating countries in 1995, 1999 and 2003. The only reason we didn't come last in 2007 was because we didn't enter. It will be instructive to see how we fare in the 2011 TIMSS test. There has been confusion around curricula with the disastrous OBE experiment now seemingly being laid to rest. Last year, 60 % of the matriculants who wrote failed to pass Science. That is especially sobering when the pass mark is now a dismal 30 %! Imagine a future generation of engineers, doctors and dentists, the majority of whom know less than 30 % of their subject matter! A chilling prospect . . .

Even for those who do pass matric, the majority do all their science studies in theory, and never perform experiments themselves. How can we ever inspire the innovation and creativity that our economy demands, when all studies are done in theory? The ancient Chinese proverb applies here:

> "Tell me, I forget. Show me, I remember. Involve me, I understand."

In this vacuum that exists in formal education, Science Centres are ideally suited to show pupils practical science (through science shows and other activities) and to involve them through the interactive exhibits which are the special feature of Science Centres.

The first interactive science centers in the world were established in San Francisco (Exploratorium) and Toronto (Ontario Science Centre) in the late-1960s. Since then, the success of science centres in supporting formal education and raising awareness of science has stimulated their growth-today, they serve more than 290 million people a year.

It is impressive how they are valued in different countries. Thailand recently spent $130m (R94.9m) creating a new national science, centre north of Bangkok. More than R1 billion was spent upgrading the CosmoCaixa centre in Barcelona recently. The Chinese are completing a new science centre in Beijing that will be about the size of the Canal Walk shopping mall in Cape Town. There are thriving centres in Cairo and Alexandria in Egypt, Tunis City in Tunisia and even tiny Port Louis in Mauritius. The Toronto Declaration, released after the Fifth Science Centre World Congress in Toronto in 2008, summarised research on the impact and value of science centres as places that stimulate curiosity

and develop enquiring minds, change people's lives and influence their attitudes and thinking, demystify science, demonstrate its necessity and make it accessible to the general public, foster positive attitudes towards science, help people to appreciate the context of scientific advances, and understand how science affects their lives.

They also encourage young people to follow careers in science and technology. Today, science literacy is as important as other forms of literacy and numeracy. It is also a powerful tool for social inclusion. Science centres are relevant to everyone and have become important interfaces between science and society operating across geographical, economic, political religious and cultural boundaries, and impacting on the well-being, education, achievement and skills of current and future generations. They are safe places for dangerous ideas.

In September 2011, Cape Town will host the 6th Science Centre World Congress. More than 400 delegates from 80 countries will focus on the themes "Science across cultures", "Science as part of Culture", "Building Communities through Science", 'Multi-cultural Roots of Science" and the "Value of Indigenous Knowledge Systems". Furthermore, the World Congress will include capacity-building workshops that promote the development of science centres in Africa.

Even before next year, Southern Africa's Science Centres will meet for their annual Conference in Vredenburg at the Arcelor-Mittal Science Centre in the last week of November 2010. This is a wonderful chance to meet everyone involved in this vibrant endeavour and to share ideas and experiences. Information on this Conference is available on the website of SAASTEC (The Southern African Association of Science and Technology Centres. Website: www.saastec.co.za)

Authors Derek Fish (left) and Mike Bruton (right) with Tengku Nasariah Ibrahim, Director of Petrosains (Science Centre) in Kuala Lumpur, Malaysia.

***Author Biographies**: Professor Mike Bruton, who trained and practised as a research scientist in ichthyology, established the MTN ScienCentre in Cape Town and serves on the board. 'He is director. Of imagineering with MTE Studios, a specialist consultancy which designs museums and science centres. He chairs the organising committee for next year's 6th Science Centre World Congress.*

Derek Fish has directed Unizul Science Centre in Richards Bay for almost 20 years. He is a Council member for SAASTEC and has served on the organizing committee for previous World Congresses.

SAIP Office Relocated

The new contact details for the SAIP office are:

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0001

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SAIP Office Secretary / Personal Assistant - Linette White

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Email: linette.white(at)saip(dot)org(dot)za

Upcoming Conferences & Schools

2010

55th Annual South African Institute of Physics Conference, Pretoria, September 2010

The 55th Annual Conference of the South African Institute of Physics (SAIP), organised by the CSIR National Laser Centre, will be held from 27 September to 1 October 2010 at the CSIR International Convention Centre in Pretoria. The theme of the conference will be the 50-year celebration of the laser. Schools that will be hosted as part of this event: Nuclear Physics, 50 years of the LASER. For the first time, the host intends to solicit one-page abstracts, which will be published in proceedings with an ISBN number. The proceedings will be made available in electronic format.

Contact Information:

Email: saip2010@saip.org.za

URL: http://www.saip.org.za/events/saip2010/

22nd International CODATA Conference, 24 to 27 October 2010, Stellenbosch

CODATA, the Committee on Data for Science and Technology, an interdisciplinary Scientific Committee of the International Council for Science (ICSU) is holding their 2010 Conference at the Spier Estate in Stellenbosch, Western Cape, from 24 to 27 October. CODATA works to improve the quality, reliability, management and accessibility of data of importance to all fields of science and technology and provides scientists and engineers with access to international data activities for increased awareness, direct cooperation and new knowledge. More details about the conference and how to register may be found on the official conference website: http://www.codata2010.com

9TH World Conference on Neutron Radiography and Radiography and Tomography School, October 2010

Frikkie de Beer

The International Society for Neutron Radiology (ISNR) with the support of the South African Nuclear Energy Corporation (NECSA) are pleased to announce that the 9th World Conference on Neutron Radiography will be hosted in South Africa at Kwa-Maritane from Sunday 3 October 2010 to Friday 8 October 2010. The conference theme will be: “Big 5 on Neutron Radiography”.

Held once every four years, this prestigious international event will provide the ideal platform from which to target a focused audience and reach all the major role players in the international neutron radiography community. Through joining this event, an excellent opportunity for South African researchers to gain knowledge on the details of the technique and its unique scientific areas of application is being created. If you would like more information on the Conference please visit the conference website: http://www.wcnr-9.co.za/ or the ISNR website: http://www.isnr.de/

48th Annual MSSA Conference, 24 to 29 October 2010, Bela-Bela, South Africa

The Annual Conference of the Microscopy Society of Southern Africa will be held from 24 to 29 October 2010 at the Forever Resorts Warmbaths (Bela-Bela). This 48th Annual Conference is hosted by the University of Limpopo.

The 2010 conference will consist of 3 parts: Workshops, a Technical Forum and the scientific parallel sessions. The workshops are planned to run from 24 to 25 October 2010 and those interested in organizing workshops should please contact the Conference Convener.

Conference Convener

Dr Chantélle Baker

Electron Microscope Unit

University of Limpopo: Medunsa Campus

PO Box 84 Tel: +27 12 521 4334

MEDUNSA Fax: +27 86 621 7740

0204 E-mail: mssa2010@ul.ac.za

International Conference on Magnetic Materials (ICMM-2010), Kolkata, India, 25 to 29 October 2010

The International Conference on Magnetic Materials (ICMM-2010), organized by Experimental Condensed Matter Physics (ECMP) Division, Saha Institute of Nuclear Physics (SINP), Kolkata, India, will be the third in the series, the earlier two being held in 2000 and 2007. The meeting is intended to provide a forum for presentation and discussion in the recent developments in magnetic materials.

Website:
http://www.saha.ac.in/cs/icmm.2010/web/Home_Page.htm

Workshop on the Physics of Exceptional Points, 2-5 November 2010

The National Institute for Theoretical Physics will host a 4-day workshop on the Physics of Exceptional Points at the Stellenbosch Institute for Advanced Study (STIAS), Stellenbosch, South Africa from 2 to 5 November 2010.

Different types of spectral singularities occur generically in open quantum and classical systems. The coalescence of two or more eigenvalues (in contrast to degeneracies) give rise to surprising and often dramatic physical effects in atomic and molecular physics, in optics, in mechanics, to name a few; quantum phase transitions and chaotic behaviour can be understood by these singularities called exceptional points. A host of literature in recent years dealt with these effects, directly and indirectly. The workshop brings together some of the experimental and theoretical researchers active in the field.

Four-day workshop, There will be between 25-30 participants, up to ten invited speakers, long (3-hour) lunch breaks, evenings free. To allow abundant time for individual discussions, six talks (40 + 5 minutes) are planned for each day.

Postgraduate students of all fields are encouraged to participate. It is intended to present introductory lectures. There will be limited financial support for postgraduate students.

More information can be found at:

http://www.saip.org.za/documents/opportunities/20100531_ExceptionalPoints.pdf or contact Dieter Heiss (dieter@physics.sun.ac.za, tel: +27 (0)21 808 3383).

Workshop on Active materials, Stellenbosch, 17-19 November 2010

A major direction in materials research is the study of soft biological matter. Interesting physics questions on aspects of cell organization and dynamics arise. This workshop will focus on the effects of molecular motors and associated proteins on the dynamics and mechanics of systems of cytoskeletal filaments. Highlights of recent experimental and theoretical insights and questions concerning such active materials will be discussed.

This three-day workshop will have about 25 participants and will allow ample time for discussion.

In particular we encourage students from South Africa (and neighbouring countries) to attend, as the workshop will comprise both research talks as well as tutorial sessions by distinguished experts in the field with the specific aim of introducing aspects of the subject matter to students. Students from the Southern African region may also apply for funding towards attending."

Details at:
http://www.physics.sun.ac.za/theory/activeworkshop/

Workshop on Discovery Physics at the LHC, 5 to 10 December 2010, South Africa

A workshop on Discovery Physics at the LHC will be held from 5 to 10 December in the Kruger National Park. Please refer to the conference website for more information: http://www.saip.org.za/events/kruger2010/

2011

40th South African Chemical Institute Convention, January 2011, South Africa

SACI 2011, the 40th South African Chemical Institute (SACI) Convention incorporating the 3rd Federation of African Societies of Chemistry (FASC) Congress will be held from 16 to 21 January 2011 at the University of the Witwatersrand in Johannesburg, South Africa. The biannual SACI Convention will be organised by the Gauteng Coordination Committee of SACI. The local organising committee is putting together a full, multi-session programme that will address the conference theme: Chemistry – the key to Africa's future. The event will celebrate the UNESCO International Year of Chemistry, IYC 2011 (an IUPAC event)

The event will showcase research activities in all traditional branches of chemistry (Organic, Inorganic, Physical, Analytical, Environmental) as well as interdisciplinary areas (such as Materials chemistry, Bio-organic chemistry etc.). The programme will provide a platform for presenting work going on in the African continent, as well as in the rest of the world.

The 3rd FASC Congress will be hosted at the Convention on Friday 21st January 2011. The day will be set aside for a FASC Programme on Green Chemistry

23rd International Workshop on Weak Interactions and Neutrinos (WIN'11), January 2011, Cape Town

WIN'11 will take place from 31 January to 5 February 2011, at the Graduate School of Business of the University of Cape Town, co-chaired by Kai Zuber (Dresden) and Raoul Viollier (Cape Town). The goal of WIN'11 is to initiate new international research collaborations.

The topics of the four parallel workshops, are similar to those of WIN'09 in Perugia, where 129 participants attended, in spite of the fact that WIN'09 overlapped largely in time with the 31st International School of Nuclear Physics in Erice on "Neutrinos in Cosmolo-lgy, Astro-, Particle and Nuclear Physics", with 148 participants. Thus these hot topics of WIN'11 are:

- Electroweak Symmetry Breaking
- Weak Decays, CP-violation, and CKM Mixing Matrix
- Neutrino Physics and PMNS Mixing Matrix
- Astroparticle Physics.

In this context, it is important to note that WIN'11 will be the first of the WIN workshops, at which the LHC data from CERN will be discussed and interpreted.

This range of activities should be adequate for an expected attendance of between 100 and 150 participants. We are planning to publish the proceedings of WIN'11 in World Scientific.

There will be in total 4.5 workshop days, or 3.5 workshop days, if one excludes the eight theoretical and experimental introductory plenary lectures, setting the stage on the first day.

However, what makes this WIN'11 workshop particularly attractive and unique, is that just ahead of WIN'11, the 22nd Chris Engelbrecht Summer School 2010 on the Standard Model of Particle Physics and Beyond takes place at the Stellenbosch Institute of Advanced Studies from 20 to 29 of January 2011. This is an excellent opportunity to prepare our graduate students for an active participation at WIN'11.

The 8 tutorials, lasting about two hours each, will be given by local postdoctoral fellows and senior graduate students. There will be also a class test and a final exam of two hours each, marked by postdoctoral fellows under the supervision of local academic staff.

For those who have never heard about field theory and the standard model, it is suggested that they arrive at Stellenbosch one day earlier, so that they can attend the one-day preparatory course, consisting of 5 lectures and a two-hour tutorial, based on the lecture notes "From simple field theories to the standard model" by Richard C. Slansky. This preparatory course will be taught by local academic staff and postdoctoral fellows on Wednesday, 19. January 2011.

4th IUPAP International Conference on Women in Physics, Stellenbosch, South Africa, 5 to 8 April 2011

The 4th IUPAP International Conference on Women in Physics (ICWIP 2011) will be held in April 2011 in Stellenbosch. This triennial meeting is organized under the auspices of the International Union of Pure and Applied Physics and will be hosted by the South African Institute of Physics and Women in Physics in South Africa.

ICWIP 2011 will provide a forum for both scientific presentations and for discussion of issues related to attracting, retaining and improving the status of women in physics. More information is available from the conference website: http://www.acitravel.co.za/icwip2011/

6th Science Centre World Congress

4 - 8 SEPTEMBER 2011
CAPE TOWN, SOUTH AFRICA

Science Across Cultures

Namkelekile e Afrika
You are welcome in Africa

Science Across Cultures

The 6th Science Centre World Congress will be held in Cape Town, South Africa, 4-8 September 2011. Enjoy stimulating congress sessions, challenging workshops and lively debates. And enjoy all that Cape Town and South Africa have to offer - whale watching, wine tasting, a unique floral kingdom, big game safaris, beautiful beaches, unparalleled scenic beauty, and a friendly and diverse culture.

Your hosts the Cape Town Science Centre, the Southern African Association of Science and Technology Centres, and the North Africa and Middle East Science Centers Network look forward to welcoming you to Cape Town.

Taking place at the Cape Town International Convention Centre, with the theme "Science Across Cultures", the 6th Science Centre World Congress will encourage reconciliation between different cultures and a greater appreciation of the role that science centres can play in highlighting each culture's unique contributions to science, technology and science education.

Contact info@6scwc.org with any questions.
Visit the congress website at www.6scwc.org

Physics Comment Editorial Policy

Physics Comment is an electronic magazine for the Physics community of South Africa, providing objective coverage of the activities of people and associations active in the physics arena. It also covers physics-related ideas, issues, developments and controversies, serving as a forum for discussion. It is not a peer review journal.

Physics Comment publishes innovative reports, features, news, reviews, and other material, which explore and promote the many facets of physics. Physics Comment endeavours to:

- support and inform the physics community
- promote membership of the South African Institute of Physics
- promote the understanding of physics to interested parties and the general public
- represent the readers' point of view
- focus on issues and topics of importance and of interest to the physics community

We accept submissions on any physics-related subject, which endeavours to inform readers and to encourage writers in their own researches. We aim to be politically, socially and geographically inclusive in the articles, which we commission and receive. Therefore we shall not discriminate according to political or religious views. Physics Comment does not support or endorse any individual politician or political party. However, contributions, which are being published, may contain personal opinions of the authors.

It is our desire to present unfettered the opinions and research of our readers and contributors. All articles submitted for publication are subject to editorial revision. Such revisions, if necessary, will be made in cooperation with the author.

The views expressed in published articles are those of the authors and are not attributed to the Editorial

The Editor will make the final determination of the suitability of the articles for publication.

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Publication Deadlines

Physics Comment is published four times a year.

Issue	Closing Date	Publication Date
Issue 1	28 February	15 March
Issue 2	31 May	15 June
Issue 3	31 August	15 September
Issue 4	30 November	15 December

Specification and Submission of Content

Editorial Tone. As the voice of the physics community, the magazine will create a provocative, stimulating, and thoughtful dialogue with the readers; and provide a variety of perspectives that reflects the dynamism of the physics community.

Article types. The magazine is devoted to articles, reports, interesting facts, announcements and recent developments in several areas related to physics:

Manuscripts. Solicited manuscripts will be judged first for reader interest, accuracy and writing quality. The editor reserves the right to request rewrite, reject, and/or edit for length, organization, sense, grammar, and punctuation.

Re-use. The publisher reserves the right to reuse the printed piece in full or in part in other publications.

Submission and Format. Manuscripts must be submitted to the editor on or before the designated due date Manuscripts must be submitted electronically, on the prescribed Microsoft Word template available for download from http://www.saip.org.za/PhysicsComment/. Manuscripts are to be submitted directly to the editor: PhysicsComment@saip.org.za.

Style. AP style is followed for punctuation, capitalization, italics and quotations.

Photography and Illustration. All solicited photography and illustration should be part of an article and will be judged first for technical quality and editorial appropriateness. The editor and art director reserve the right to request revision or reject any material that does not meet their criteria. The publisher reserves full rights to all solicited photography and illustration, including the right to reprint or reuse graphic material in other publications.

Categories of Content Contributions

Technical articles and reports: These are generic articles of about 1 500 words plus diagrams and pictures. A technical article covers a relevant feature topic. Articles are authored by the writer and publishing a 40-word resume of the author could enhance its credibility. By submitting an article that has been previously published the author confirms that he/she has the right to do so, and that all the necessary permissions have been received. Acknowledgement must be made within the article.

News: These are short editorial items usually not more than 250 words. Full colour pictures must be clearly referenced on the editorial submission and on the picture or picture file.

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Letters to the Editor: Letters to the Editor are encouraged. The Editor reserves the right to edit for length and format. The Editor will not change the political position of the initial letter. Physics Comment does not publish anonymous letters.

Advertising Policy: The Editorial Board will determine advertising prices for Physics Comment, subject to approval by SAIP Council. The objective will be to obtain revenue to maintain and develop the magazine. Physics Comment offers classified advertising to subscribers of the magazine for free. The advertisements must be a maximum of 60 words including the telephone number, and there is a limit of three free classifieds per subscriber, per issue. Advertisements may include a photo, which may be reduced in size or resolution by the editor to optimize loading time. All items or opportunities, which are being advertised for free, should be physics-related. The Editor reserves the right to refuse any advertising, which does not conform to the objectives of the magazine.

Submission of Articles

All articles must be submitted on the prescribed template available for download from http://www.saip.org.za/PhysicsComment/