Vol.9 | Issue 1 | November 2017 SAIP Webpage

Physics Comment

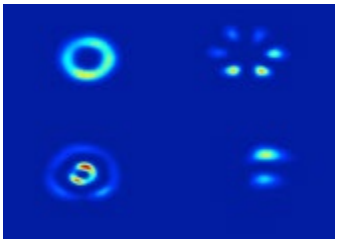
A Southern African Physics Magazine

Heavy weather from the sun

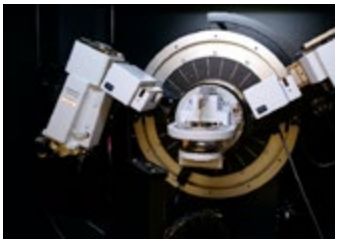
Second biggest Solar Flare in recorded history

A Quarterly Newsletter Vol.9 | Issue 1 | November 2017

Past SAIP President Simon Cornell gets an award for his great achievements for physics in South Africa. (page 14)



SA Physicists show that real-time error correction in quantum communications is possible. (page 30)



Materials Centre of Excellence at Wits. (page 6)

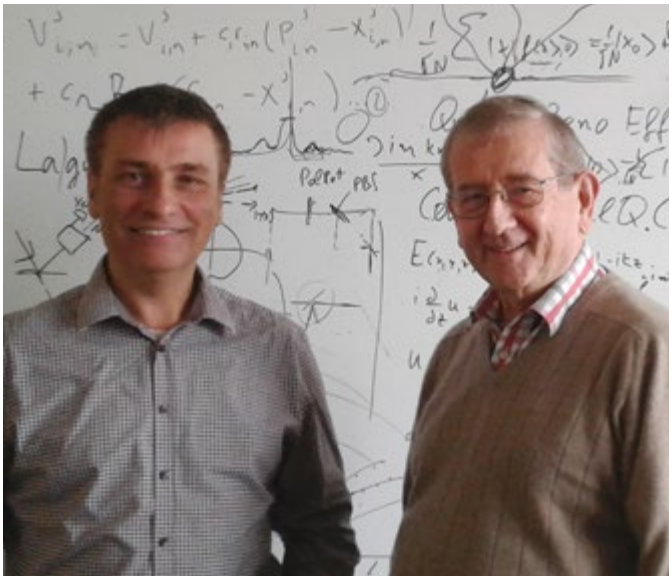
Contents

Editor's Note

During the seven years that I have been editor of Physics Comment, there has been a lot of exciting news in Physics and for the Physics Community in South Africa. We could report on the discovery of the Higgs Boson, Gravitational Waves and the new cosmological paradigm of multiple universes governed by different physical laws (chaotic inflationary theory). We accompanied the South African bid for the Square Kilometre Array, the biggest network of astronomical radio dishes on earth, which won the competition against its Australian counterpart, because it offered -- according to an international jury of experts -- the better infrastructure and technological advancement.

Physics Comment reported from a front seat, when under the leadership of Past President Simon Connell, the South African Institute of Physics (SAIP) became a professional body with a permanent Executive Office lead by dedicated professionals. As part of its mission the Institute introduced the title of a Professional Physicist with a full-fledged programme to protect the quality of the title and further the career of its bearers. Initiated by the SAIP, a review of the physics training in South Africa by a committee of local and international experts recommended to extend the length of the physics degree studies to four years. The review was based on a benchmark statement for physics training at South African universities, which had been created and agreed on by the broad community of Physicists teaching at these institutions. The review also identified a lack of skills of the incoming students which lead the SAIP to start a programme to train physics school teachers. All these activities were started under the leadership of Prof Simon Connell, who was recently honoured for his great vision and achievements for Physics in South Africa as we report on page 14 of this issue of PC.

From the December issue of PC in 2013 onwards, senior physicist Dave Walker joined the editorial board of PC and contributed to its quality with his wealth of experience as a leading academic (and A-rated scientist). The focus shifted to make PC a forum for debates and critical comment, for example, on the business-lead administration in academia, the future of university libraries, and the pros and cons of nuclear power plants for South Africa. Also the current issue of PC contains a piece on the nuclear deal (page 29).

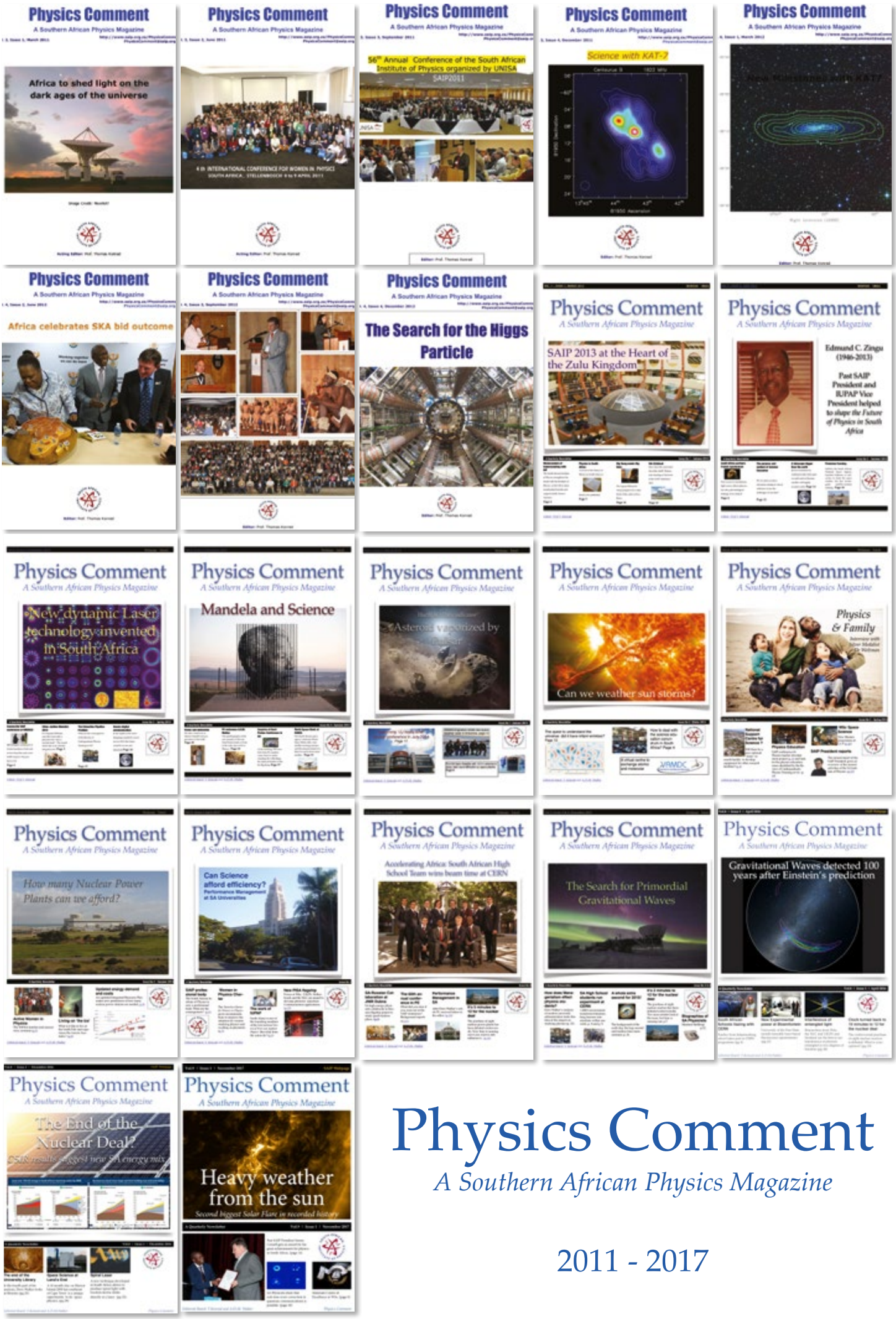


Seven years are a full cycle and deserve a sabbatical - traditionally a time to let the ploughed field rest and start cultivating it after a year anew. In our case Dave Walker and I leave Physics Comment to a new incoming board of editors to take the journal to new level. We wish PC all the best and hope that it continues to voice the critical and rational comments of physicists to the benefit of the profession and the country.

I would like to thank the readers for their continued support over the years.

Prof Thomas Konrad

Physics Comment is a journal published by the South African Institute of Physics (SAIP) and appears quarterly. The vision of the SAIP is to be the voice of Physics in South Africa.



Physics Comment

A Southern African Physics Magazine

2011 - 2017

News from South Africa

SA Physics Olympiad 2017

by Case Rijsdijk, SAPhO Convener, Pretoria

On Friday, 8 September, 2017 the South African Institute of Physics (SAIP) announced the South African Physics Olympiad (SAPhO) results to the media, the schools involved and the learners who excelled in the SAPhO exam.

Over 200 learners from 69 schools were selected from almost 30 000 learners who wrote the SA National Youth Science Olympiad (SANYSO) to write SAPhO 2017 exam.

"South Africa, like every other country in the world, has amongst its youth, a latent talent that needs to be identified, nurtured and monitored, to allow them to reach their full potential", says Case Rijsdijk, SAPhO Convener. "There are talent scouts for potential sports men and women, why not for maths and sciences? After all, our future lies in education and a technologically based economy. Identifying future scientists and engineers is essential and SAPhO is one pathway to success."

These results of the exams were most satisfactory with an average mark of 41% for SAPhO. The range of marks was from 86% to 14%. Learners, who do well in any other recognized science competition or Olympiad, can be invited to take part in SAPhO 2018 which will be held on Monday, 6 August, 2018. The organisers hope to increase the SAPhO footprint by attracting closer to over 300 learners to participate in the Olympiad next year; it might become an on-line Olympiad, in which case, more learners will get the

L to R: Mr Guy Pearson, Principal, Case Rijsdijk (SAPhO Convener), Angus Thring SAPhO winner 2017 and Prof. P Woudt, SAIP President and Head of Astronomy, UCT.

opportunity to write SAPhO. Angus Thring (above), a grade 12 learner from Bishops in Rondebosch, Cape Town, was the top scoring learner in this year's Olympiad with a score of 86%. He will receive a Gold Certificate, R1 500 and the SAIP Medal, which will be presented to him at the Annual SAIP Conference dinner in Bloemfontein in July 2018. His teacher, Mr Kevin Kruger said that "Angus has a very enquiring and challenging mind. He grasps concepts quickly and will then delve into the details thoroughly. He takes nothing for granted."

with 76% scooped third place, he will receive R500 cash and Bronze Certificate.

SAPhO will also award those who scored between 75% and 60% with Merit Certificates for their achievements and those who scored between 59% and 50% will receive Honourable Mention Certificates. The remaining learners will receive Participation Certificates to acknowledge their participation in the Olympiad.

The SAPhO Convener, Case Rijsdijk, has said that he is grateful to the Department of Science and Technology, DST,

will continue to study Physics at tertiary institutions and Universities within South Africa.

One of the goals of SAIP is raising the awareness of Physics and its importance to our daily lives; much of which can be achieved through education.

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"Physics avoids the subjectivism of the humanities, the arbitrariness of the life sciences and the immaterial abstraction of pure Maths. I love it because it is the discipline which most exemplifies the ruthless absolution of reality".

Angus added that "Physics avoids the subjectivism of the humanities, the arbitrariness of the life sciences and the immaterial abstraction of pure Maths. I love it because it is the discipline which most exemplifies the ruthless absolution of reality".

In second place was Thomas Hettasch, a grade 12 learner from the Deutsche Schule, Pretoria, Gauteng, with a score of 78%. He will receive a Silver Certificate and cash prize of R1 000. Graham Mitchel from, Pretoria Boys High School, who

and the South African Agency for Science and Technology Advancement, SAASTA, for their support and funding. In addition he also voiced his thanks to the SAIP Executive Officer, Mr Brian Masara, and the Projects Officer, Ms Ndanganeni Mahani for all their efforts in making SAPhO a success.

SAPhO is hosted by the South African Institute of Physics (SAIP) with the aim of identifying young southern Africans with ability in Physics, in the hope that these students

Materials communication for a world built with materials!

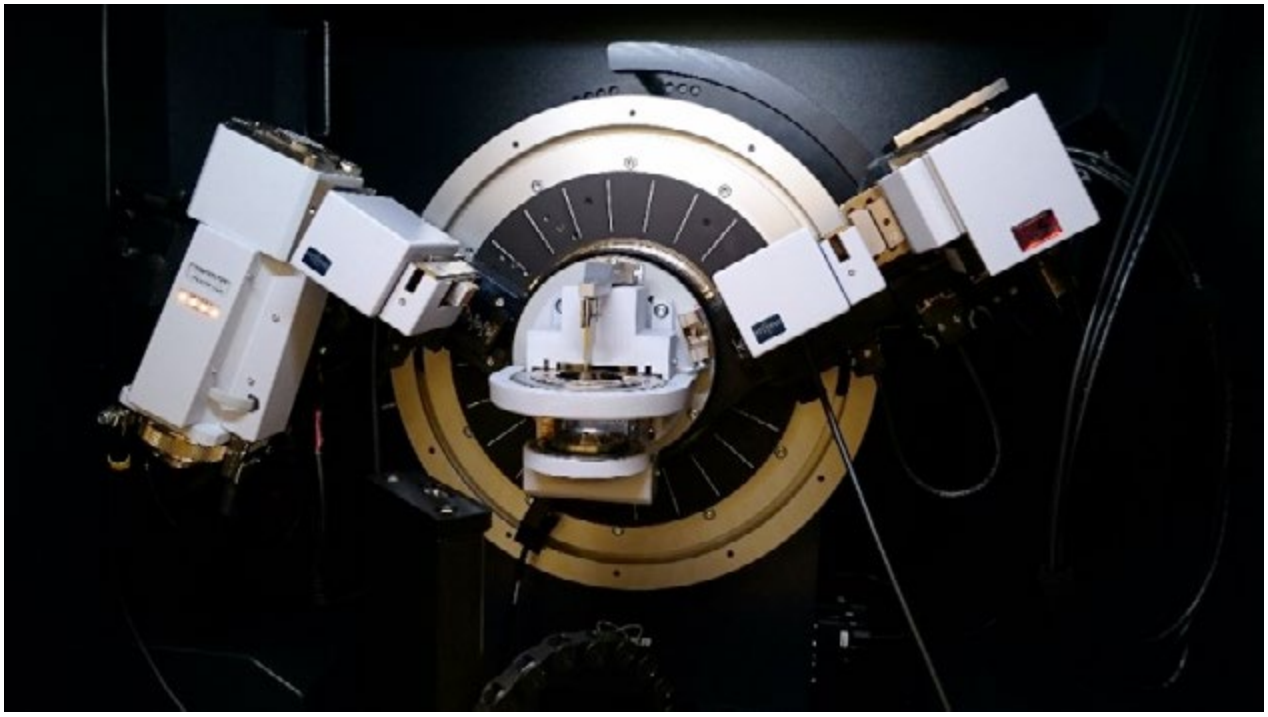
issued by the DST-NRF Centre of Excellence, Wits University, Johannesburg.

The DST-NRF Centre of Excellence in Strong Materials (CoE-SM) and Materials for Energy Research Group (MERG) develop post-graduate students, using exciting, cutting-edge research, for the benefit of South Africa and its industry and economy. The CoE-SM invests in human capital development having graduated over 50 PhDs and 70 MScs, published in excess of 600 journal papers and registered a number of patents.

The CoE-SM is working with industry to solve problems, as well as developing new materials and processes, centred on strong materials. The research has guided various companies to use several materials, different processes, and also altered behaviour to avoid corrosion problems.

Since the research developments are ultimately aimed at a better life for everyone, they also need public support, and towards this end, both the CoESM and MERG have a Schools Outreach Programme.

MERG's outreach programme focuses energy technologies and includes lecture notes, demonstrations and group activities for learners from Grades 5 to 12. It is frequently run by postgraduate students from MERG and the CoE-SM. MERG and CoE-SM academics and students successfully implemented this programme for the first time in September 2016 at the Science Week at the Deutsche Internationale Schule (DSJ). Prior to this, there were interactions with various schools, under the joint auspices of the School of Physics, Wits and the CoE-SM.



XRD at the Microscopy and Microanalysis Unit (MMU) at Wits University

SM's Prof. Deena Naidoo and Mrs Casey Sparkes (middle) after receiving their Award from the Minister of Science and Technology Mrs Naledi Pandor (left) and CSIR's Group Executive for Research and Development Dr Molefi Motuku (right)

MERG also agreed to support the Deutsche Internationale Schule with their solar racer, and to supply them with solar cells and supercapacitor technologies.

The main CoE-SM outreach programme is aimed at the Materials Science Poster Competition toward Grade 10 learners. This is a competition to encourage learners to become interested in science and engineering. The competition has been a huge success and many teachers use it as part of their standardised assessments. The participants have been rewarded from both the experience and the exposure, and the major prize-winners have benefitted the schools in terms of investment towards science laboratory equipment and teaching aids. For more details:https://www.wits.ac.za/strongmaterials/news-and-events/

FameLab is one of the biggest science communication competitions in the world. The CoE-SM participated in this prestigious competition for the first time in 2016/2017! Postgraduate students and researchers in science, technology, engineering and mathematics are asked to convey a scientific concept of their choice in 3 minutes to a panel of judges. They were judged on the content, clarity and charisma of their presentations. They really did show off their excellent public speaking and science communication skills, where two of the CoE-SM postgraduate students, Phylis Makurunje and Michael Bodunrin reached the semi-finals of this competition.

This year, the CoE-SM team comprising Professors Lesley Cornish, Alex Quandt and Deena Naidoo and Ms Casey Sparkes were awarded The NSTF-South32 Award for Communication for Outreach and Creating Awareness of Science, Engineering and Technology (SET) and Innovation. A huge honour indeed! For more information: http://www.nstf.org.za/awards/nominees/current-winners/

Grace Naledi Mandisa Pandor Wins Science Diplomacy Award

by Stephen Waldron, Amercian Assocaition for the advancement of Science (reprint of AAAS news item)

Grace Naledi Mandisa Pandor, who has used science and technology to support development in South Africa and sub-Saharan Africa, was chosen by the American Association for the Advancement of Science (AAAS) to receive the 2016 Award for Science Diplomacy. The award was bestowed upon Pandor on Friday 17th February 2017 during the 183rd AAAS Annual Meeting in Boston in the US.

Minister Grace Naledi Mandisa Pandor

Pandor has been the Minister of Science and Technology for the Republic of South Africa since 2014, and previously held the role from 2009 to 2012. She has also served as a Member of Parliament since 1994, a member of the National Executive Committee of the African National Congress since 2002. A teacher by training, Pandor has also served as South Africa's Minister of Education from 2004 to 2009. She was honored by AAAS not only for integrating science in policymaking within her own country, but also for her advocacy for young scientists and women scientists by supporting initiatives that encourage international collaboration for both groups. "Science not only enables us to more decisively respond to major societal challenges," Pandor said, "but also plays a critical part in helping to foster international partnership, friendship and solidarity." She explained that the role of science diplomacy is more important than ever, and said she is humbled and honored to receive this award.

"Under her leadership, South Africa has made numerous contributions to building science structures in organizations such as the African Union and the Southern African Development Community, to strengthening the science granting councils of other African countries, and to expanding the role of the Global Research Council," wrote Tom Wang, AAAS' Chief International Officer and Director of the Center for Science Diplomacy, in a letter to the AAAS Board of Directors.

Pandor promoted and expanded the South African Research Chairs Initiative (SARChI). The program, established in 2006, is designed to attract and retain excellence in research and innovation at South African public universities through the establishment of research chairs at the institutions. In 2015, Pandor announced 20 new research chairs designated for women applicants, and

the percentage of women in SARChI chairs has increased from 23 percent to 39 percent. She also helped to initiate and host Science Forum South Africa in 2015. The event was the first of its kind on the continent, and drew over 1,300 participants in its first year. The Forum aims to provide a platform for debate on the role of science, technology and innovation in society, as well as to promote international science partnerships. Pandor returned to host the 2016 Forum, which built on the success of the inaugural meeting and drew over 2,000 participants from around the globe. . SFSA 2016 focused on how to strengthen scientific engagement and collaboration across the continent of Africa.

Pandor was nominated for the 2016 AAAS Award for Science Diplomacy by Jean Lebel, the president of Canada's International Development Research Center. In a letter of support, Lebel wrote that Pandor has worked tirelessly to connect research with sustainable development goals. Lebel also noted that Pandor is leading numerous efforts to promote research capacities of young and emerging scientists, particularly female scientists. "Under Minister Pandor's leadership, South Africa has become a catalyst for developing scientific capabilities across the African continent," Lebel wrote.

Klaus Streicher, the deputy head of mission of the German embassy in South Africa, also submitted a letter of support. Streicher wrote that Pandor received the Grand Cross of Merit with Star and Shoulder Ribbon of the Order of Merit of the Federal Republic of Germany, one of the highest possible recognitions in Germany. Streicher explained that Pandor received the award to honor her commitment to promoting German-South African relations, particularly through scientific and technological cooperation.

"Science not only enables us to more decisively respond to major societal challenges, but also plays a critical part in helping to foster international partnership, friendship and solidarity."

"Naledi Pandor is an outstanding woman committed to scientific advancement and cooperation not only in her own country, but with a global perspective," Streicher wrote.

Pandor was selected to receive the award by an advisory committee, comprising of experts in science, international cooperation and diplomacy. The committee noted that Pandor has worked to integrate science in policymaking within her own country, and that she has launched numerous initiatives to promote collaboration regionally and with other countries. Pandor also led the implementation of South Africa's Ten Year Innovation Plan and the National Research and Development Strategy. Pandor earned a bachelor degree and Certificate for Continuing Education from the University of Botswana and Swaziland, and a master's degree in education from the University of London. She also obtained a master's degree in General Linguistics from the University of Stellenbosch in 1997. Pandor taught English in London and Botswana before joining the University of Cape Town as a senior lecturer in 1989. In addition to her service as Minister of Science and Technology and Minister of Education for the Republic of South Africa, Pandor was the country's Minister of Home Affairs from 2012 to 2014.

The AAAS Award for Science Diplomacy was approved by the AAAS Board of Directors in 2010 (it was formerly the AAAS International Scientific Cooperation Award, established in 1992). It recognizes an individual or a limited number of individuals working together in the scientific and engineering or foreign affairs communities making an outstanding contribution to furthering science diplomacy. The Award consists of a plaque and an honorarium of $5,000.

University of Stellenbosch hosts SAIP2017

by Brian Masara, SAIP office, Pretoria.

The University of Stellenbosch hosted a great SAIP2017 Annual conference from 3 to 7 July 2017. Over 500 delegates attended the event including high raking government officials from the Department of Science and Technology who participated in the event the whole week.

These included Dr. Daniel Adams the Chief Director for Basic Sciences, Dr Sagren Moodley (Director basic Sciences) and Mr Thabo Hadebe (Deputy Director Basic Sciences), Dr Takalani Nemaungani (Director: SKA and AVN) and Mr Livhuwani Masevhe. There were over 450 papers presented at the conference. A Photonics workshop proceeded the SAIP annual conference.

The DST official interacted with the Physics Community in various meeting for example:

• Dr Danny Adams and the Basic Sciences Team held a meeting with physics stakeholders and director of the European Spallation Source (ESS) to explore areas of cooperation and how South African scientist can access this world calss research facility. The ESS is a multi-disciplinary research facility based on what will be the world's most powerful pulsed neutron source.

• Mr Masevhe made a presentation to the Physics HoDs and Heads of National Facilities on how academic institutions and the physics community can support the DST Science Engagement Programme.

• A tour of iThemba Labs
• The Physics Bowl Competition
• Wine Testing Event

Participants of the SAIP Photonics Workshop at Stellenbosch preceeding the annual conference

News from South Africa

Conference photos can be found here:

https://drive.google.com/drive/folders/0B9gcuGd4Fnz2TUs0M-190MTAzVjQ?usp=sharing

More details of the conference are available here: http://events.saip.org.za/event/saip2017

Prof Erich Rohwer, Dr Faïçal Azaiez, Prof Louise Warnich at the SAIP Gala Dinner

Below - some more guests at the Gala Dinner

SAPhO 2016 Winner became Best Matric Student for 2016 Class

by Brian Masara, SAIP Office, Pretoria

Mr. Conrad Strydom who won the SA Physics Olympiad, SAPhO2016 Gold Medal became the country's Top Achiever for Matric Class of 2016. He received his medal at the SAIP2017 banquet. He is currently Studying Physics at University of Stellenbosch.

It is interesting to also note that Mr. Hamandishe Mathivha (Silver Award winner) from Mbilwi Secondary School in Sibasa, Thohoyandou was named South Africa's top maths and physical science matric pupil of 2015. Mathivha was also Limpopo's second-best pupil for 2015.

http://www.iol.co.za/news/matric-results/conrad-is-class-of-2016s-top-achiever-7332489

http://saip.org.za/index.php/news-and-events/other-events/403-congratulations-to-mr-conrad-strydom-sa-s-overall-matric-top-achiever-sapho2016-gold-medallis

https://www.facebook.com/1660099704207118/photos/a.1663368073880281.1073741827.1660099704207118/1838276973056056/?type=3

At the presentation of Conrad Strydom's SAPhO Award, from left to right: his parents Johan and Ilse Strydom, Pieter Hoffman his Science Teacher, Case Rijsdijk (SAIP & Convener of SAPhO), Charlotte Rabie (Science Teacher) and Hermanus High School Headmaster Greg Hassenkamp.

SAIP Council 2017 – 2019

by Brian Masara, SAIP Office, Pretoria

A new SAIP council took office from July 2017 to July 2019. The incoming President Prof Patrick Woudt was handed over the SAIP reigns at the SAIP2017 by outgoing President Prof Azwinndini Muronga.

COUNCIL EXECUTIVE

NAME	PORTFOLIO / COMMITTEE CHAIR
1. Prof. P. A. Woudt (UCT)	President
2. Prof. D. Naidoo (Wits)	President - Elect
3. Prof. A. Venter (NMMU)	Treasurer
4. Prof. R. Maphanga (CSIR)	Secretary
5. Prof. A. Muronga (NMMU)	Past - President

OTHER COUNCIL MEMBERS

NAME	PORTFOLIO / COMMITTEE CHAIR
1. Dr. R. Nemutudi (iThemba)	Fundraising
2. Prof. M. Chithambo (RU)	Awards
3. Dr. B. Sondezi (UJ)	Marketing and WiPiSA
4. Dr. H. Chuma (Johnson Matthey)	Outreach & Public Understanding of Physics
5. Prof. M. Ntwaeaborwa (Wits)	Education
6. Dr. J.B. Habarulema (SANSA)	Conferences
7. Dr. I. Usman (Wits)	Industrial Liaison

Prof Simon Connell Awarded SAIP Honorary Membership at SAIP2017

by Brian Masara, SAIP Office, Pretoria

Prof Simon Connell was awarded the SAIP Honorary Membership of SAIP in view of his extensive contribution to the aims of the Institute.

When an initiative was started by the Department of Higher Education and Training to register Professional Bodies, and provide professional registrations, Prof Connell immediately saw that the registration could bring benefits to physicists and boost the professionalism of physics, and SAIP entered the pilot phase of the programme in a proactive fashion. Prof Connell initiated the time-consuming and complex process of registration, which included gaining the mandate from the members, the proposal of changes to the SAIP Constitution and By-Laws, and the proposal of a Continuing Professional Development structure which covers the broad spectrum of all physicists, from academics to physicists in industry.

He has pursued a number of large projects which bring benefit to Africa, among these being the African Light Source – a synchrotron in Africa for Africa. Such initiatives involve a great deal of lobbying and organising, and the Light Source initiative has recently received funding from ICSU. He worked tirelessly towards the founding of the African Society of Physicists. He made sure that South Africa expressed vigorous support for the location of the CTA, the Cerenkov Telescope Array, in Namibia, and made many moves to ensure that such support would involve African scientists and astronomers as well as international users.

The book "Physics in South Africa" was commissioned by the South African Institute of Physics in January 2011. PR (Runan) de Kok and Harm Moraal undertook the herculean effort of gathering and editing the material, and dealing with the numerous queries and quibbles of successive Councils. It was brought to fruition, with the assistance of Prof Connell,

Prof Azwinndini Muronga (left) hands over the Honorary Membership Certificate to Prof Simon Connell (right)

with the remorseless drive that such a sensitive and open-ended project needs if a book is to be published within a finite time, and stands as the archive of the organisations engaged in physics in the 20th Century in South Africa.

His aims have been clearly directed towards operating in the national interest and the interests of science.

International Relations

Prof Connell held the International Relations Portfolio on SAIP Council for several years. With a talent for being in constant contact with colleagues across the world, he succeeded in interesting a number of organisations, particularly the National Society of Black Physicists, USA, and The Institute of Physics, UK, in the community of physicists in South Africa and the goals of African physics.

His aims have been clearly directed towards operating in the national interest and the interests of science. A clear illustration is his advocacy for the in-service Training of Teachers by SAIP, which has been successfully undertaken at the Soweto Science Centre, and is now in the process of being rolled out to other provinces. His advocacy for physics has extended to the invitation of teachers to attend the SAIP Annual Conference and hold a workshop in conjunction with the conference, and to the start of the SA Physics Olympiad – which is now making news in science education. He has worked – again, hands-on – to involve teachers in physics research, and is notable for his contribution to Accelerating Africa, a team of school learners who won the right to conduct a beam-line experiment at CERN.

The Review of Undergraduate Physics Education in Public Higher Education Institutions, published by the Council on Higher Education and SAIP, was undertaken during his term of office as President, and many of the contacts, including with those on the Group of Experts, were made and fostered by him. Prof Connell has been one of the prime movers in fostering ongoing good governance for SAIP. This includes the registration of SAIP as a Non-Profit Organisation, and the investigation of the best management of VAT, both of which bring tax benefits to SAIP. He has fostered the growth and development of the Executive Office, which is a factor that differentiates SAIP from many of its sister organisations in having a full-time staff instead of depending solely on the efforts of volunteers. During his term as President of SAIP, Simon Connell drove and contributed to a sound budget, constitutional compliance, business plans, and foresighted strategy. He was involved in the initiation of the necessary SAIP Policy and Advisory Committee, the Standards Committee of the Professional Body, and the Editorial Committee. He has served on numerous working groups including the SAIP DHET Task Team, which has engaged actively with the problem of the deficits in formal recognition for papers authored by collaborations and by more than 100 authors. He has raised funds personally, and has been both successful and unflagging in his pursuit of funds for the SAIP de Beers (Real) Gold Medal.

He is known for bringing young physicists forward for responsible positions, and his support for Women in Physics

He has worked hands-on in the provision and protection of a server for SAIP and overseen the improvement of the INDICO conference system. He has stood firmly for the publication of the Proceedings of SAIP Annual Conferences, a service which has contributed to the publications which can be claimed by physics departments across the country. A necessary part of publication is the support he has drummed into place for the thankless task of paper reviewing, which is now

enabled by being electronically supported on INDICO.

He is known for bringing young physicists forward for responsible positions, and his support for Women in Physics is evidenced by his present election to serve on the committee of the Forum for Women in Physics in South Africa. He brings people together for concrete aims in workshops and conferences and has enabled other people to complete their volunteer contributions while they are also under the pressures of life as a professional physicist. While it is not assumed that a former President will be put forward for Honorary Membership, the diligent advocacy for physics and for South Africa that has taken place before, during and after his term, and which still continues, prompts this nomination. ■

Students Awards at SAIP2017

Nuclear Particle and Radiation Physics Division Awards at SAIP2017

• The prize for Nuclear & Radiation Physics PhD oral winner was awarded to Harshna Jivan (WITS) For the talk entitled: "Studies of the low-lying E1 'Pygmy resonance' modes in 154Sm using inelastic alpha-scattering"

• The prize for Nuclear & Radiation Physics PhD oral runner-up was awarded to Wasiu Yahya (SU) For the talk entitled: "Calculation of the nuclear optical potential and elastic scattering observables for unstable nuclei using a relativistic formalism"

• The prize for best Particle Physics PhD Oral was awarded to Stefan von Buddenbrock (WITS) For the talk entitled: "Production of the Madala boson in association with top quarks"

CATEGORY	NUMBER
Learners	3171
Educators	225
Students	526
Scientists/Researchers	34
Journalists	2
Traditional Leaders/ Parliamentary	2
Industry	5
Other	146
Facebook Posts (4 Posts)	3388 People Reach
General Public	±600 000

(Figure is too high because of Univen Radio Programme at Phala-Phala FM)

News from South Africa

• The prize for Nuclear & Radiation Physics MSc Oral winner was awarded to Linina Jurbandam (WITS) Dr. S.M.Mullins, Title: “Calculation of the Energy Produced from Radiative Capture in SAFARI-1 Nuclear Reactor”

• The prize for Nuclear & Radiation Physics MSc Oral runner-up was awarded to Khanyisa Sowazi (UWC/ iThemba LABS), Dr. S.M.Mullins Tilted: “Gamma-ray Strength Function in 74Ge from the Ratio Method"

• The joint prize for best Particle Physics MSc Oral: Raynette van Tonder (UCT) Title: “The impact of an extended Inner Detector tracker on the W±W± measurement in ppcollisions at the High-Luminosity LHC with the upgraded ATLAS detector”

• The joint prize for best Particle Physics MSc Oral was awarded to Joyful Mhdluli (WITS) For the talk entitled: “Composite scintillators - new type of radiation hard scintillator

• The prize for best Particle Physics PhD poster was awarded to Sibaliso Mhlanga (UCT/iThemba LABS) For the poster entitled: Measurement of the visible cross sections for proton-proton collisions at 13 TeV with ALICE at the LHC

• The prize for best Particle Physics MSc poster was awarded to Nathan Boyles (UCT/iThemba LABS) For the poster entitled: “Firmware development of the ALICE MID readout card at the LHC”

• The prize for Nuclear & Radiation Physics PhD Poster winner was awarded to Lumkile Msebi (UWC/iThemba LABS) For the poster entitled: “LaBr3 detector array for fast-timing measurements”

• The prize for Nuclear & Radiation Physics MSc Poster winner was awarded to Chané Moodley (WITS) For the poster entitled: “Fine structure of the Isoscalar Giant Monopole Resonance for 24Mg, 58Ni and 90Zr using 200 MeV α-particle inelastic scattering at zero degrees”

Pictured with some of the winners is Division Chair, Dr Simon Mullins (iThemba Labs) and Prof Azwinndini Muronga (SAIP former president, NMU).

Division for Physics of Condensed Matter and Materials Awards at SAIP2017

The following were recipients of the Condensed Matter and Materials Division Awards:

1. Goodfellow PhD Publication: S Mishra (UFS)
2. Vacutec MSc Publication:
   1 (Cond. Matter): EHH Hasalbeldaim (UFS)
3. Vacutec MSc Publication:
   2 (Semiconductor): TP Mokoena (UFS)
4. Hons Essay: No entries
5. Frank Nabarro PhD Oral: MO Ogunbunmi (UJ)
6. PhD Poster (Condensed Mat / Mat Sci)
   A Khaleed (UP)
7. PhD Poster (Semiconductor/Technology):
   M Chepkoech (Wits)
8. MSc Oral: R Djoumessi Fobasso /
   J Webster (UJ/Wits)
9. Wirsam MSc Poster (Condensed Matter):
   MLA Letswalo (UJ)
10. Wirsam MSc Poster (Semiconductor):
    SS Magubane / C van Niekerk (UWC/UJ)
11. Hons Poster: No entries

The winners, pictured below with Prof Japie Engelbrecht (Condensed Matter and Materials Division Head, Nelson Mandela University), Prof Azwinndini Muronga (SAIP past president, NMU) and Dr George Tshabalala (UFS).

Division for Theoretical and Computational Physics SAIP2017 Awards

In the Division for Theoretical and Computational Physics the following prizes were awarded:

- Best presentation or poster (PhD) Tsobgni, Pelerine (Stellenbosch University)
- Best presentation or poster (MSc) Adamiak, Daniel (University of Cape Town)
- Best presentation or poster (Hons) Barnard, Nadia (University of Cape Town)

Pictured with some of the winners is Division Chair for Theoretical and Computational Physics, Prof Kristian Müller-Nedebock (Stellenbosch University) and SAIP past president Prof Azwinndini Muronga.

Astrophysics & Space Science Division Student Awards at SAIP2017

The Astrophysics and Space Science Awards

1) Category: "Best PhD presentation" Note: Jointly awarded first prize
   1.1 Ms Amore Nel, North-West University (NWU) and South African Space Agency (SANSA)
   1.2 Mr Katlego Moloto, NWU
2) Category: "Rising star award" Note: For any student, at any level, that gave a presentation that really stood out, but could not be awarded a prize. Similar to the "encouragement" prize in other divisions.
   2.1 Mr Renier Hough, NWU

Astrophysics Division Student Awards

1) "Best PhD oral presentation" Notes: It was very close, so the judges decided to award a shared first prize to
   1.1 Ms Kerry Paterson from UCT
   1.2 Mr Jacques Pienaar from Purdue University
2) "Best MSc oral presentation"
   2.1 Mr Baibhaw Singh from the Indian Institute for Technology / NWU
   2.2 Mr Thembaloxolo Gqaza from UCT
3) "Rising star award" Notes: Prize awarded for an outstanding poster to
   2.1 Mr Victor Gueorguiev from UCT

The prizes were handed over by Division Chair Dr Christo Venter (NWU, Potch Campus). Seen in the photo second from left with the recipients and Prof Muronga.

Photonics Division, Student Awards SAIP2017

1. Bart Smit (SU) + Nancy Payne (SU): share one award for spectroscopy
2. Ruan Viljoen (SU): PhD poster award
3. Bienvenu Ndagano (Wits): PhD oral/quantum optics
4. Mitch Cox (Wits): PhD oral/classical optics
5. Hend Sroor (Wits): PhD oral/lasers
6. Isaac Nape (Wits): MSc poster
7. Bereneice Sephton (Wits): MSc oral
8. Charmaine Sibanda (SU): Hons

The awards were handed over by the Photonics Division Chair, Prof Andrew Forbes who is Distinguished Professor (Structured Light Laboratory School of Physics, WITS).

South African Institute of Physics National Science Week 2017 Activities

The Department of Science and Technology (DST) established a national campaign to promote public awareness of and engagement with science, technology and innovation (STI). The primary goal of this campaign is to promote science and technology literacy, as well as their pivotal role in addressing issues affecting people. Initiatives that are part of the DST's campaign include the flagship mass participation event called the National Science Week (NSW) that takes place in August.

NSW is an annual countrywide celebration of science, technology, engineering, mathematics and innovation (STEMI), where various stakeholders, role players and interested groups conduct activities that promote general awareness of the value of STEMI to people's daily lives. DST as the custodian of the NSW, annually selects a theme. The theme for a particular year is communicated to the stakeholders and the society in the build-up and during the focus week. For 2017, the NSW theme is "Advancing Science Tourism."

SAIP was part of the exhibitors at the launch which was held at 4 – 5 August 2017 Nelson Mandela University (NMU) Missionvale campus, Port Elizabeth (Eastern Cape province).

SAIP participated in NSW 2017 with various activities that include school visits, public lectures, teacher workshops and school visits to science centres and university campuses. This year we had 10 universities under our grant (see Table 2), covering 6 provinces. Each team had planned activities which included:

1. Design of the 'Tour de Physique' flyer that was distributed in soft copy, having contact details of the physics facilities that will be open to public visits and contact details of outreach coordinators who can facilitate visits

2. Explaining why study mathematics as a language of physics, e.g., talks were presented by various departments titled "Mathematics in Physics"

3. Explaining how physics contributes to socio-economic development

4. Demonstration of the practical applications of physics in real life and communities in which we live,

5. Explaining the various physics based companies and national facilities in South Africa

6. Showing the public the various developmental possibilities physics can bring to their communities

7. Helping teachers, learners and university students link the theories of physics they learn in class with practical applications, e.g., UIZULU

8. Popularize various career options in Science Engineering and Technology that are open to those who study physics, e.g., a talk by UNIZULU titled "The need of Physics in Science and Careers."

9. Organising stargazing and astronomy talks, use of Galileoscopes/telescopes to nurturing lifelong interest in Light, Optics & Astronomy.

Overall Statistics

In total, our NSW teams reached a total of 30 schools and over 3000 learners. We achieved a total reach of ±600 000 through different media platforms (see Table 1). Most of our activities were posted and advertised on SAIP Facebook Page and SABC radio. The Univen/Vuwani Science Centre Team also had an interview with SABC Phala-Phala FM Radio. For more info visit the following links https://www.facebook.com/South-African-Institute-of-Physics-1660099704207118/

NSW 2017 Team

INSTITUTION	REPS
1. UNISA	Dr Moloi Sabata
2. US	Dr Pieter Neethling
3. NWU-Potch	Prof Christo Venter
	Prof S Ilani Loubser
4. UWC	Dr Mark Herbert
5. UL	Mr Netsianda, Makonde
	MF Manamela
	M Maswanganyi
6. UNIVEN	Dr Eric Maluta
	Solomon Ravhengani
	David Tinarwo
	Thando T. Khedzi
7. WITS	Prof Andreas Faltenbacher
8. UNIZULU	Mr Thulani Jili
	Dr Steven Nkosi
	Betty Kibirige
	Amanda Percy Sefage
9. NMMU	Prof Andre Venter
	Mr Mpathi Collin
	Mr Nobom Hashe
10. TUT	Prof Joseph Asante

Dr Eric Maluta (Univen) addressing learners at Eskom Expo held at Mbilwi High.

News from South Africa

Pof Venter welcoming learners at Nelson Mandela University.

Learners taking part in rocket building competition at NMU Lab.

Ruan Viljoen (University of Stellenbosch) demonstrating Physics experiments at Manyano High School.

Learners performing one of their prescribed practicals in the US department's laboratories.

Stargazing event at UNIZULU Main Campus.

University of Limpopo seminar.

SAIP OUTREACH REPORT: Scifest Africa Festival 2017

Ndanga Mahani anga, Rhodes University Physics Department Teama

Scifest Africa, South Africa's National Science Festival is a project of the Grahamstown Foundation supported by DST. It is an annual event established in 1996 to promote the public awareness, understanding and appreciation of science, technology, engineering, mathematics and innovation.

The theme for Scifest
2017 is "Tour de Science" with reference to the UN declared International Year for Sustainable Tourism for Development. We encourage you to embark on a journey that explores the milestones, accomplishments, mysteries, discoveries, and the historic and exciting wonders of your field of science.

Further focus might also include scientific facilities across the continent, the aspects of "edutourism" which is travel for the purpose of learning, or "scientific tourism" including focus on Space tourism and other hot topics. At the same time, Scifest Africa would welcome contributors that take people on practical, learning "tours" of their scientific disciplines.

Role at Event
Our role was to address the learners, teachers, undergraduates and the general public about SAIP membership and its activities. We were marketing and improving public understanding of physics thus increasing the impact, visibility, awareness and footprint of SAIP. We also did demos on Newton's First Law, Angular Momentum, Sound Waves and Light (reflection, refraction and dispersion). We handed out careers in physics booklets, SAIP pamphlets, science cartoon pamphlets and SAIP branded materials. The opportunity also allowed us to provide career guidance and network with other organisations having the same vision as us.

We also did awareness for Biophysics as Biophysics Week was from 6-10 March 2017.

The Rhodes Physics Department Team under supervision of Prof Makaiko Chithambo helped with physics demonstrations, our deepest gratitude to them.

Comments and Feedback
The learners ranged from primary level to grade 12, they were mostly excited and eager to learn about the plasma globe. The undergraduates were excited to know about the existence of SAIP and our conferences. The educators were excited as their learners engaged with demonstrations relating to their physical science syllabus. The learners also took the opportunity to ask physics questions relating to challenges they face in understanding some aspects of physics. Educators were also intrigued by hearing that Teacher Development Programme model will soon be at their proximity, as SAIP engaged with the Eastern Cape Education Department to start teacher training in the province. Most of foundation and intermediate phase learners showed interest in taking Physical Science and pure Maths as subjects.

The general public also engaged in our fun interactive exhibition.

Statistics
Still waiting for official 2017 statistics.

2016 Scifest had 56,425 visitors, an interactive programme consisting of 65 exhibitions and 706 events including 33 lectures, 477 workshops, and 196 other events presented by 328 contributors from 84 organisations in South Africa and five other countries, and received media coverage to the value of ZAR 5,6 million from 1 January - 31 March 2016.

We came back with more than 250 E-members ranging from general public, learners, educators to undergraduates.

Physics and Society

IUPAP Statement on Xenophobia

by Thomas Konrad, editor of PC, Durban

The International Union of Pure and Applied Physics (IUPAP) reacted sharply earlier this year to policies introduced by US President Donald Trump banning citizens of seven countries in the Near East and Africa.

In two statements the council of IUPAP points out that such bans are against IUPAP principles, may negatively impact on scientific advancement and requests that they are revoked. In the first statememt IUPAP indicates that it will not support any US conferences in 2018, should there be travel bans in place in October 2017. Recently, the US government issued new travel restrictions, this time for citizens of eight countries including North Korea which will partly took effect on the 18th Oct 2017. The IUPAP statements read:

Statement 1: Conferences
The Council of International Union of Pure and Applied Physics (IUPAP), which represents physicists from 60 countries, is concerned that the continued application of the ban on entry of citizens of Iraq, Syria, Iran, Sudan, Libya, Somalia and Yemen, or indeed a ban on entry of citizens of any country to the US, will require IUPAP to refrain from supporting any conferences in the US until any such ban is lifted.

Noting that physics is inherently an international discipline, and that the success of physics in all countries depends on the ability of physicists to freely collaborate and work with scientists from all other countries, at its 27th General Assembly in 2011 the International Union of Pure and Applied Physics adopted the IUPAP Policy on Free circulation of Scientists.

To quote the relevant part of this policy:
"In pursuing its objectives with respect to the rights and responsibilities of scientists, the International Union of Pure and Applied Physics (IUPAP) actively upholds this principle, and, in so doing, opposes any discrimination on the basis of such factors as ethnic origin, religion, citizenship, language, political stance, gender, gender identity, sex, sexual orientation, age or disability. IUPAP should only sponsor conferences and events at institutions and in countries that uphold this principle. If scientists are excluded from attending IUPAP-sponsored international conferences by a host institution or country on the basis of any of these factors, IUPAP should register its concern at the highest level of that institution or country, and should not sponsor any future events in that country until such exclusions have been eliminated." Should any bans on entry to the US of citizens of any country be in place in October 2017 when IUPAP determines which conferences it will support in 2018, the IUPAP Policy on Free circulation of Scientists will require IUPAP to refrain from supporting any conferences in the US.
Bruce H J McKellar
President, International Union of Pure and Applied Physics
For the Executive Council of the International Union of Pure and Applied Physics

Statement 2: Free Circulation of Scientists
The Council of International Union of Pure and Applied Physics (IUPAP), which represents physicists from 60 countries, is concerned that bans on movement of people based on nationality will have adverse effects on physics in the US and worldwide.

The Executive Order: Border Security and Immigration Enforcement Improvements has negative consequences for physics in the US and around the world. Graduate students and post doctoral fellows are the workers in scientific research, and they are a very mobile group, going to the countries where their research is best supported and where they can lead productive lives. Physics research around the world relies on their dedicated work to fuel its progress. The

"the free and responsible practice of science is fundamental to scientific advancement and human and environmental well-being."

restrictions placed on the free circulation of scientists by this Executive Order will have unintended consequences on the quantity and quality of physics research done in the US. And because many of the students when they graduate, work in US industry, the quality of industrial innovation, especially in high-tech industries will also be adversely affected. It is not in the interests of the US to impose a ban on movement of scientists on nationality or other very broad criteria. The free movement of scientists around the world has been an important driver in the progress of science and technology for the last two millennia, and has always been to the great benefit of the nations with the strongest science at the time. Continuation of the immigration bans based on nationality is both an assault on theIUPAP Policy on Free circulation of Scientists, and the policy of our "mother organisation", the International Council of Science (ICSU) expressed in its Statute 5 — The Principle of Universality (freedom and responsibility) of Science "the free and responsible practice of science is fundamental to scientific advancement and human and environmental well-being."

Such practice, in all its aspects, requires freedom of movement, association, expression and communication for scientists, as well as equitable access to data, information, and other resources for research. It requires responsibility at all levels to carry out and communicate scientific work with integrity, respect, fairness, trustworthiness, and transparency, recognising its benefits and possible harms. And it is an assault on the progress of physics in the US and around the world. For these reasons, the IUPAP Council respectfully requests that the Executive Order be revoked, that no similar bans on the movement of people based on nationality be implemented, and that the legitimate concerns about the access of terrorists to the US be addressed through more focussed and thus more effective measures. ■

Bruce H J McKellar
President, International Union of Pure and Applied Physics
For the Executive Council of the International Union of Pure and Applied Physics

The following article first appeared in the 'Independent on Saturday' in Durban on the 25th February and subsequently in several newspapers nationwide. It has not lost its relevance since the newly appointed Energy Minister, David Mahlobo, recently confirmed his intention to go ahead with the procurement of nuclear power plants https://www.news24.com/SouthAfrica/News/mahlobo-rushes-nuclear-deal-20171105-2. He was quoted to say that electric power from the nuclear plants is cheaper than from any renewable source: "It is actually less than 35c per kilowatt hour, which is very cheap. The renewables are on average around 80c per kilowatt hour, and some are around R1". It seems that the minister here compared the running and fuel costs of nuclear power plants to the price of running renewable plants and building them from several years ago. According to studies of the Energy Centre at the CSIR in Pretoria the costs of solar and wind energy production is actually 60 percent of that of nuclear energy as described below. Thomas Konrad (Editor)

The End of the Nuclear Deal

Prof Thomas Konrad, Dr Alan Matthews, Dr Peter Krumm and Prof Francesco Petruccione, Durban.

It is difficult to imagine the modern world without electricity grids that distribute energy to industry and private households. This energy is used to drive machines that wash our clothes, brew tea and coffee, control our security and con-nect us to the world.

The possibility of getting electricity from power points gives us the opportunity to manage our electricity production on a national level in order to find the cheapest and most sustainable combination of resources to generate electrical power. It is important for the welfare of any country that electricity can be obtained at the lowest price possible in order to keep the costs low of products and services that consume energy. Sustainable energy generation simply means that we must not saw off the branch on which we sit in the process, for example, by degrading our environment or using up resources.

What resources should South Africa use to deliver electricity to its citizens and companies? An expert might point out

Koeberg nuclear station Photo: Eskom

that South Africa is blessed with lots of sunshine, wind, coal, uranium (to gain nuclear energy), and has access to gas from neighboring countries. While sunlight and wind are free and never run out, the other fuels cost money and can be used up. However, we have to use other fuels when the sun does not shine and the wind does not blow. Knowing enough about the weather we can calculate the best mix from the costs of a kilowatt-hour of energy generated from each of the resources.

The Energy Centre of the Council for Scientific and Industrial Research (CSIR) in Pretoria carried out a study to determine the least-cost electricity mix for South Africa. It used a software package called Plexos with which many countries optimise their electricity generation. The computer program simulates electric power systems based on models for electricity demand, weather and cost development. It takes into account the power generation costs including installing power plants, maintaining and running them, and fuel costs. From all the available resources it calculates which is the most economic mix.

The CSIR study simulated the future of electric power supply in SA until the year 2050 and found that the most economic mix for the country consists of solar energy (from photo-voltaic panels), wind energy, and the existing coal power stations, as well as gas and diesel turbines. Gas and diesel turbines are like back-up generators that are expensive to run but can within minutes add electric power to the grid and compensate for power variations with the cheap but fluctuating resources of sunlight and wind. Together with ramping up the power production from coal stations on a time scale of hours, these flexible sources can balance the fluctuations of sunlight and wind completely without the need for energy storage which would add energy losses and is expensive. The reason why the most economic mix does

Arnot Power Station, Middelburg, South Africa (coal plant)

not contain additional nuclear and coal resources is simple. Electric power generation from solar and wind currently cost only 60% of the price of electricity from coal and nuclear and the relative prices are expected to drop further.

With the cautious estimate that the relative solar and wind prices will not decrease in the next 35 years the CSIR study found that the solution with large contributions from wind and solar would save the country 25 billion rand per year in 2030 increasing to 80 billion rand per year in 2050 compared to the energy mix proposed by the Department of Energy in its Integrated Resource Plan (IRP) 2016 Draft.

Opposite to the CSIR findings, the master plan of the Department of Energy (DoE) claims that the most economic power generation requires adding mainly nuclear and coal power stations instead of solar and wind farms.

Although the IRP 2016 is based on simulations carried out by a DoE team with the same software, Plexos, as used by the CSIR study, the results are different because the DoE team used old pricing and constrained the solar and wind power that can be added to the grid per year by approximately 1 gigawatt (a million kilowatts) without explanation. This limitation is unjustified, which can be seen by comparing the wind power supplies other countries added (for example in 2015, China added 30 GW, Germany 6 GW, and Brazil 3 GW). The optimal solution of the CSIR study would require to build 2 GW of solar and 3 GW of wind power per year, which is feasible .

Upon request from the Ministerial Advisory Council on Energy (MACE) the IRP team of DoE released a second study without the restrictions on the building capacity of wind and solar plants. Its results are similar to those from the CSIR Energy Centre: the least-cost mix does not contain any new nuclear power and relies mainly on wind, solar and coal power. However, like the IRP 2016 study, it uses old pricing for wind and solar power generation. After analysis of the information given, MACE recommended on 31 October 2016 to the Minister of Energy, Mrs Tina Joemat Petterson, to rerun the study without limits for new-build wind and solar farms, but with their actual costing in order to correct the least-cost scenario in the IRP 2016 draft. However, the IRP 2016 draft was published on 22 November 2016 ignoring the recommendations of MACE. Now the public can and should comment on the IRP 2016 draft until 31 March 2017. The necessary information is given on the website of the DoE.

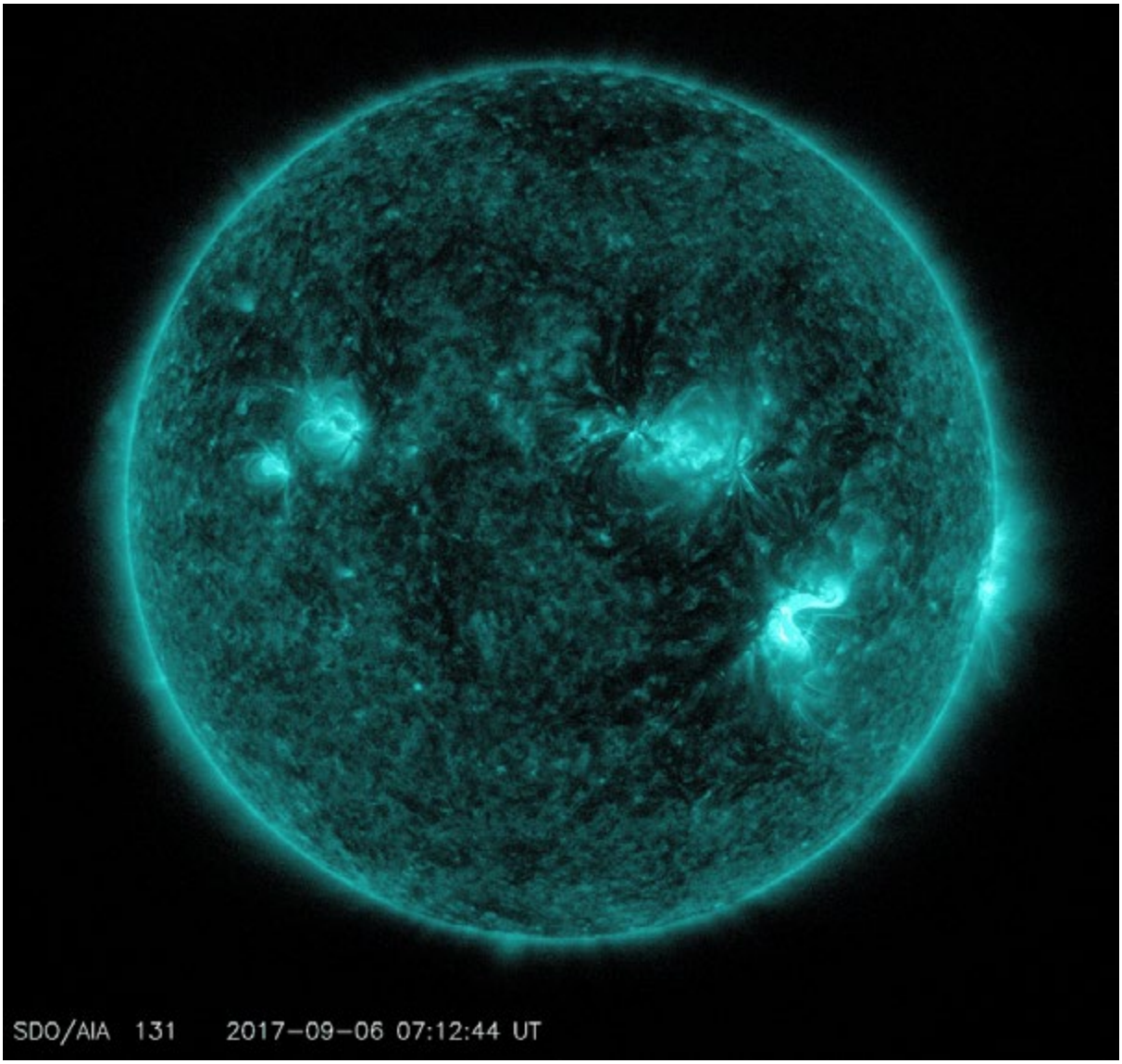
We feel , the fact that both the CSIR study, and the second DoE study without artificial constraints, identify optimal energy mixes without the new-build nuclear component, strongly suggests scrapping the nuclear deal – the purchase of nuclear power stations costing the country an estimated one trillion rand (including interest rates). We support the MACE recommendations and look forward to a future in which the country can spend up to 80 billion rand more per year on worthy goals such as education or poverty eradication.

The authors, Prof Thomas Konrad, Dr Alan Matthews, Dr Peter Krumm and Prof Francesco Petruccione, are Physicists from Durban.

Articles

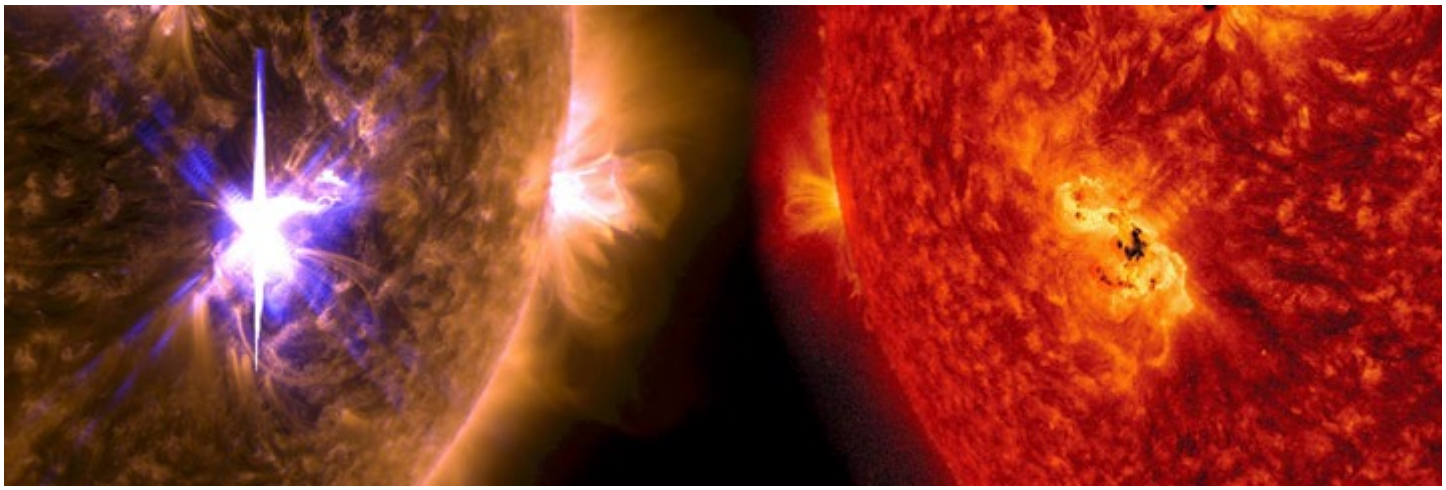
Biggest solar flare in a decade threatens communication

South African National Space Agency (SANSA), Hermanus



This gif shows both the X2.2 and the X9.3 flares that the Sun emitted on Sept. 6, 2017. The imagery was captured by NASA's Solar Dynamics Observatory and shows light in the 131 angstrom wavelength.
Credit: NASA/GSFC/SDO

Our life-giving star, the Sun, put on an unforgettable show this September when it erupted in two massive flares, the second of which was the strongest in over a decade. Keeping a close eye on the Sun's activity, SANSA sent out warnings about the coming geomagnetic storm that threatened high frequency (HF) radio and satellite communication such as satellite TV and GPS across large parts of Africa.



Different views of the X9.3 flare from Sept. 6, 2017. On the left, it flashes in a blend of 131 and 171 angstrom light. On the right it shows light in both visible and 304 angstrom extreme ultraviolet wavelengths, revealing both sunspots visible on the Sun's surface and the flare in the solar atmosphere.>Credit: NASA/GSFC/SDO

On the 6th of September, the Sun emitted a solar flare weighing in at X2.2, from active region 2673. Just as sungazers were getting excited, the same region erupted 3 hours later with a whopping X9.3 flare, so powerful that space scientists at the South African National Space Agency (SANSA), and the rest of the world scrambled to put the word out about this powerful disturbance. The intensity of the radiation caused HF radio blackouts across the daytime side of the Earth that affected communications over Africa, Europe and the Atlantic Ocean.

Communications at risk

Solar flares are giant explosions on the surface of the Sun that occur when twisted magnetic field lines suddenly snap, releasing massive amounts of electromagnetic energy into the solar system. This energy can wreak havoc on the electronic systems the world has become dependent on for global communications and navigation, from the simple phone call to the life-saving Global Positioning System (GPS). This poses a particular threat to commercial aircraft navigation systems.

Both flares on the day clocked in at the highest of five categories (A, B, C, M, and X) used to rank solar flares, based on their intensity as measured on a logarithmic scale. In this way, the X2.2 being closely followed by the X9.3 was a major event in this cycle of the Sun, which has an 11-year cycle with periods of low and high solar activity.

Similar to the Richter scale for earthquakes, each class letter, A, B, C, M, and X, represents a 10-fold increase in energy output. The strength of an event within a class is noted by a numerical suffix ranging from 1 to 9, which is also the factor for that event within the class. Hence, an X2 flare is double the strength an X1 flare, and is four times more powerful than an M5 flare" (M10 would be the same as X1).

This would make the recent (Sep 2017) X9 class flare 20% as strong as the largest Halloween storm flare, which is the most powerful flare measured with modern methods. The flare sensors cut out at X28 during the Halloween storm, but the extrapolated storm intensity was X45.

Beautiful as these events can be (see video below) they carry a sting – high energy charged particles that are spewed out into space are also associated with solar flare events. These are called Coronal Mass Ejections (CMEs), named after the hot region on the surface of the Sun that they are ejected from.

When CMEs erupt, charged particles travel at breakneck

speeds (around 1200 km per second, or 100 times faster than the speed of a bullet), but not as fast as the X-rays from a solar flare which take just 8 minutes to reach us on Earth. The CME particles left the Sun on 6 September 2017 and reached the Earth on 8 September, where they sparked a strong geomagnetic storm as they hit the Earth's magnetic field.

Geomagnetic storm

A coronagraph from SOHO LASCO C3 before (left) and during (right) the September 10th proton event.

A geomagnetic storm is a disturbance caused by the charged particles' interfering with the Earth's magnetic field, which can affect high frequency (HF) radio communications, power grids, navigation systems such as GPS, and communication systems such as DStv and internet connectivity. As expected, this geomagnetic storm —measured at G4— caused moderate disturbances on the Earth's systems over a 48 hour period.

SANSA chief scientist Prof Michael Kosch explains the effects of the geomagnetic storm on Earth: "Radio communications such as satellite communication have to travel from the satellite to the ground and they have to travel through the upper part of the atmosphere called the ionosphere," he said. "When the ionosphere becomes disturbed, radio communication can black out or become erratic."

Thanks to the Earth's protective magnetic field, known as the magnetosphere, space weather luckily cannot harm humans and other life forms on Earth.
Proton event
Just when space weather experts thought the Sun had eased up on its explosive behaviour, solar activity persisted with a solar proton event in the same region on 10 September.

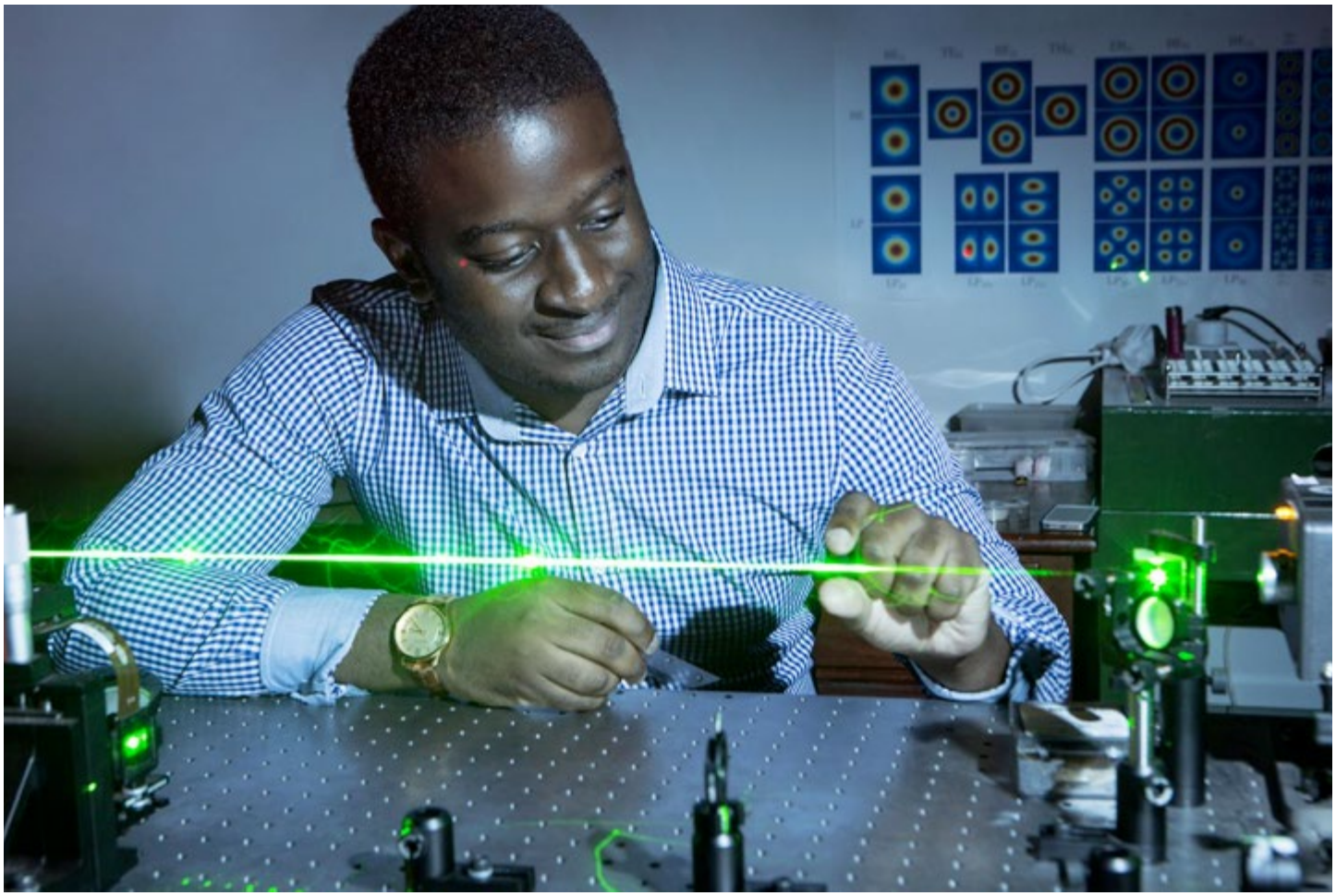
"A 'proton storm' occurs when particles (mostly protons) emitted by the Sun are accelerated by CME shock waves" said Mpho Tshisaphungo, SANSA Space Weather Centre Manager. "Protons can have very high energies due to their speed and can pose a radiation threat to astronauts, particularly during space walks. Proton storms also increase radiation dose of the crew and passengers on transpolar flights and cause communication disruptions over the polar areas."
These particles can also affect satellites electronics, as well as reduce their solar panel efficiency and increase the noise in star-tracking systems.
"SANSA kept a close eye on these solar storms and issued warnings and alerts to key stakeholders such as Eskom and SANDF," said Tshisaphungo. "We also talked to the media to keep the public updated on solar events."

SANSA is host to the only Space Weather Regional Warning Centre for Africa which operates as part of the International Space Environment Service. The Space Weather Centre conducts real-time monitoring using data from NASA and ESA space weather satellites, as well as SANSA's ground based instruments located across Southern Africa. The centre forecasts space weather and provides a range of services to national power facilities, the South African National Defence Force and other clients.

Physicists show that real-time error correction in quantum communications is possible

by Andrew Forbes, University of Witwatersrand, Johannesburg.

https://m.phys.org/news/2017-01-physicists-real-time-error-quantum.html



First author and PhD student, Bienvenu Ndagano, in the Structured Lab at Wits University in Johannesburg. Credit: Wits University

A team led by physicists from the School of Physics at Wits University published in Jan 2017 in Nature Physics research that might lead to a big step forward towards tele communication that is secure against eavesdropping. In their paper titled: Characterising quantum channels with non-separable states of classical light the researchers demonstrate the startling result that sometimes Nature cannot tell the difference between particular types of laser beams and quantum entangled photons.

In essence, the research shows that sometimes Nature cannot tell the difference between the quantum and the classical (or real) worlds, and that a grey area does exist between the two worlds called classical entanglement.

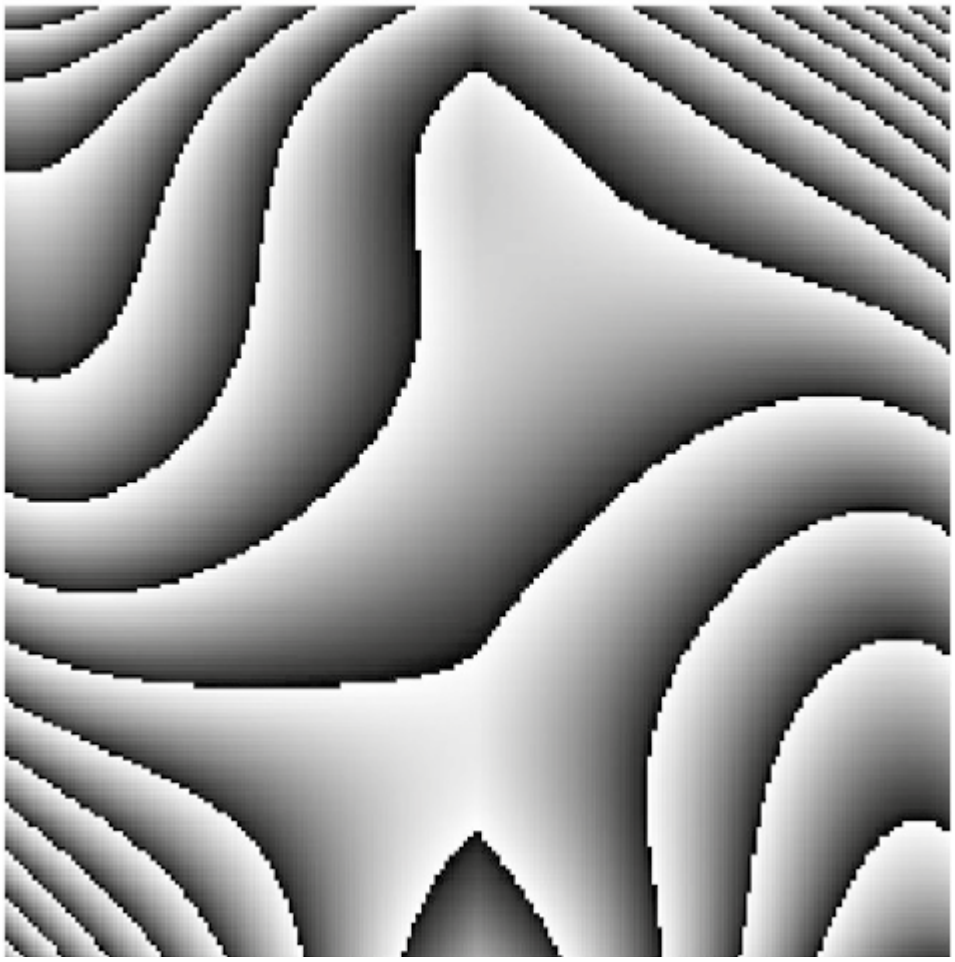
Classical and quantum worlds

Present communication systems are very fast, but not fundamentally secure. To make them secure researchers use the laws of Nature for encoding by exploiting the quirky

properties of the quantum world, such as in the case of the use of Quantum Key Distribution (QKD) for secure communication.

"Quantum" refers to the small, and in the photonics world this means one photon - a single particle of light. The rules of the quantum world are vastly different from that of the classical world, and experiments are traditionally much harder due to the difficulty in handling just a few photons.

"In the classical world our intuition holds true. There are no surprises and experiments can be done with many photons (billions and billions of them), such as laser light," explains Professor Andrew Forbes, team leader of the collaboration and Distinguished Professor in the School of Physics where he heads up the Wits Structured Light Laboratory. "But not so in the quantum world, where things are never quite as they seem. Here waves sometimes look like particles, particles like waves, and measurements change the properties of the very thing you are trying to measure."



Atmospheric turbulence is displayed here as a grayscale image for simulation on a spatial light modulator. Credit: Wits University

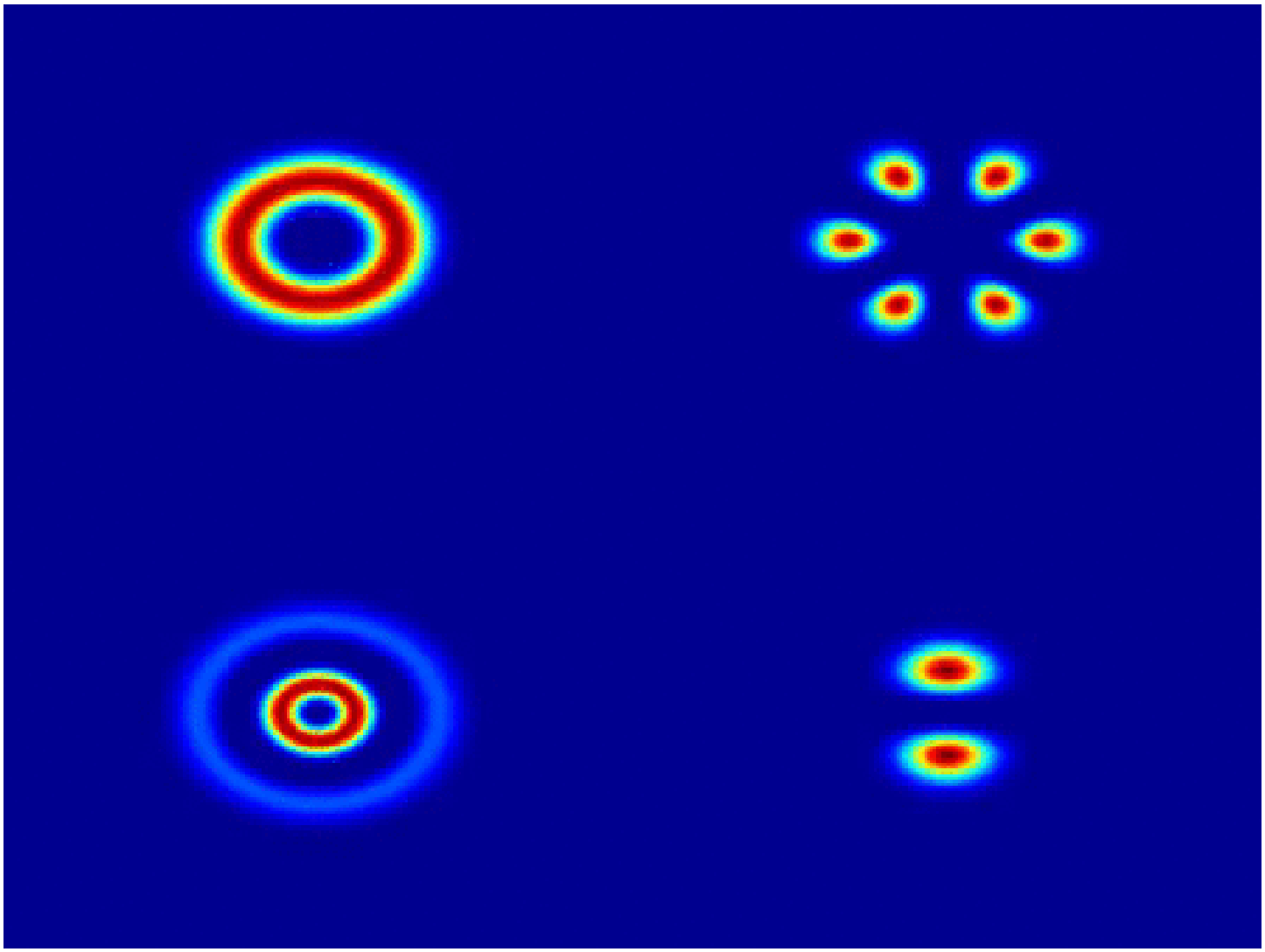
Real-time quantum error correction is possible

Now researchers have shown that there is a grey area where Nature cannot tell the difference between the classical and the quantum. This opens the possibility of first performing quantum experiments with a type of classical light called "classically entangled" light. For example, establishing a secure quantum communication link over long distance is very challenging: "Quantum links (as in fibre optics) using patterns of light languish at short distances precisely because there is no way to protect the link against noise (interference from, for instance, fog or a bend in a cable) without detecting the photons. Yet, once they are detected their usefulness is destroyed," says Forbes. Ndagano explains that the quintessential property of quantum entanglement is the non-separability of the state, meaning that one part of the system cannot be separated from the other. "But non-separability is not unique to the quantum world: you can find it in weather maps where the locations on the map and the temperatures at those locations can't be separated."

Classically entangled light

More intriguingly, classical vector beams have this property too, which the team calls "classically entangled" light.

Says Forbes, "What we asked was: does this mean that



Animation of the effects of turbulence on various patterns of light. Credit: Wits University

classical light can be used in quantum systems - a grey area between the two worlds that we call classical entanglement?".

This catch 22 situation has been a seemingly insurmountable obstacle. Now the team has shown that this can be overcome using classical (many photon) light fields, enabling real-time quantum error correction.

By preparing and sending a so-called "classically entangled" beam the team could show that this was identical to sending a quantum state. This means that the observed quantum entanglement decay due to noise in the link can be reversed, paving the way for major advances in secure quantum links in fibre and free-space.

"We showed for the first time that classical light can be used to analyse a quantum link, acting as a direct equivalent to the behavior of the quantum state," says Bienvenu Ndagano, lead author and PhD student at Wits University.

"Not similar, or mimicking, but equivalent. To show this, we exploited a particular type of laser beam, called vector beams, that have the property of being non-separable and sometimes called 'classically entangled'."

"The notion of classical entanglement is hotly contested in the physics community with some arguing that it is merely a mathematical construct," says Thomas Konrad (UKZN), co-author on the paper. "This work shows that there is physical meaning to it too, and we offer the first side-by-side data of

the equivalence of classical and quantum entanglement".

Previously, to fix an error in the quantum state used for secure communication would mean measuring the photon sent, which in turn would mean losing the information that one was trying to send.

This work allows for long distance quantum links to be established and tested with classically entangled light: as there is no shortage of photons in the classical light, all the measurements needed to fix the errors in the quantum state can be done in real-time without destroying the quantum information.

Thus, real-time error correction is possible as you can run experiments in the classical world that will tell you how to fix the error in the quantum world.

Fast and secure data transfer over real-world link

The team are working on packing as much information into photons using patterns of light as a means to encode the information. Since there are an unlimited number of patterns, the amount of information that can be sent securely is also in principle at least, unlimited.

While all patterns are equivalent in terms of information capacity, this work suggests that the choice of pattern also plays an important role in analysing and correcting the errors experienced by passing over the link.

"By working in this grey area between the classical and the quantum we can show fast and secure data transfer over real-world links," says Forbes.

https://m.phys.org/news/2017-01-physicists-real-time-error-quantum.html

Physics in Africa Project: Phase One Report

Steering Committee:
Prof. George Amolo, Technical University of Kenya, Kenya
Dr. Ketevi Assamagan, Brookhaven National Laboratory, USA
Dr. Amy Flatten, American Physical Society, USA
Prof. Collince Fouokeng, Institut Universitaire de la Côte, Cameroon
Prof. Eric Garfunkel, Rutgers University, USA
Dr. James E. Gubernatis, Los Alamos National Laboratory, USA
Prof. Oumar Ka, Université Cheikh Anta Diop de Dakar, Senegal
Dr. David Lee, European Physical Society
Mr. Brian Masara, South African Institute for Physics, South Africa
Dr. Joe Niemela, International Center for Theoretical Physics, Italy
Mr. Tajinder Panesor, Institute of Physics, UK
Dr. Hery Tiana Rakotondramanana, University of Antananarivo, Madagascar
Dr. Sandro Scandolo, International Center for Theoretical Physics, Italy
Prof. Adel Trabelsi, Tunis University, Tunisia

Background

This report summarizes and records the results of the first phase of the Physics in Africa Project, a joint effort by members of the American Physical Society, the European Physical Society, the Institute of Physics, the South African Institute of Physics, the International Center for Theoretical Physics, and the Materials Research Society, aimed at promoting physics in Africa. Additionally, the report proposes action items for the second phase. The first phase was surveying the state of physics in various African nations. In the second phase, the project's steering committee and physics leaders from Africa will use these results to refine the actions items and identify specific initiatives that will help African nations to promote and advance physics in their countries. The third phase of the project is identifying and exploring ways to implement some of these initiatives. The white paper proposing the Physics in Africa Project is in Appendix I.

The survey has been completed and was based on a questionnaire constructed by the Physics in Africa steering committee. It asked 10 questions about the existence of physics societies and physics meetings, in-nation opportunities for graduate and post-doctoral studies and in-nation employment opportunities in academic and non-academic research centers. Respondents were also given the opportunity to state additional information they felt help would convey the state of physics in their country and provide any supplementary documentation that gives similar information.

The steering committee was able to identify at least one person in 32 of the 58 African nations and territories who was invited, with the help of colleagues if appropriate, to complete the questionnaire. The South Africa Institute of Physics hosted a website (http://www.saip.org.za/index.php/physics-in-africa-survey) that described the Physics in Africa project, gave instructions on completing and submitting the questionnaire, and provided links for downloading either an English or French version of the questionnaire. Also available from the website was the completed questionnaire from Kenya as an example of the type and detail of the information being sought. There were 21 respondents. Eight (Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Kenya, Madagascar, South Africa and Tanzania) provided the extra statement; three (Kenya, Malawi and South Africa) provided supplemental documents. All the responses are in Appendix II. The supplemental documents are not included in this report.

Summary

Africa is a continent of 58 nations and territories with a wide diversity in population sizes, age, wealth and geographical areas, accompanied by similar wide diversity in historical, religious, cultural, economic and political institutions. One expects the state of physics in this continent to reflect a similar diversity with respect to local organization, areas of strength, number of physicists, etc. Indeed, the results of the survey underscore these points. Accordingly, there will be exceptions to any statements we make in trying to summarize the situation.

The nations invited to participate are listed in the table below. Those nations in gray are the non-respondents. Of the invitees, 27 were among the 31 countries with populations of at least 10 million. Of the respondents, 18 were among these 31 countries.

The 21 responses told a lot. The responding countries range from small to large in their physics activity and are scattered across the continent geographically. The degree of precision and detail in the answers to the questions varies considerably. The answers to several questions however were simply a yes or no response. We will begin our summary by recording the response of each country to these questions.

Algeria	Côte d'Ivoire	Mauritius	South Africa
Benin	DR Congo	Morocco	Sudan
Burundi	Egypt	Mozambique	Tanzania
Botswana	Ethiopia	Namibia	Togo
Burkina Faso	Ghana	Niger	Tunisia
Cameroon	Kenya	Nigeria	Uganda
Chad	Madagascar	Rwanda	Zambia
Congo	Malawi	Senegal	Zimbabwe

The question headings in this table are:

3. Does your country have a physical society?

3b. If not, are there plans to establish one?

4a. Upon receiving a bachelor's degree in physics, does the student typically seek an advanced degree in physics?

4d. Do post-doctoral opportunities exist within the country?

8a. Are there any physics courses taught online?

From the table, we see that out of the 21 responding nations only 8 have physical societies. (Of the non-respondents, only Egypt is known to have a physical society.) If we examine other information in the questionnaire, we would find that the size of the South African Institute for Physics (SAIP) is larger than the combined sizes of the seven others. The SAIP is also the only one with a full portfolio of subject areas with divisions promoting the physics in these areas. The other societies range in size from 30 to 400, mostly meeting once a year, generally lack divisions but have concentrations in one or two subject areas that may be nuclear physics, condensed matter physics, optics and laser physics, etc. The situation in South Africa is so different in scale that to avoid constantly noting contrasts we will exclude it from our summary until a few paragraphs later.

When asked if there were plans to establish such physical society, nine of the remaining 13 stated yes. From the other information in the questionnaire we find that in about half the cases the planning is sufficiently advanced where such a society could exist within the next one to three years. For the others, the planning is at a very preliminary stage. The reason for countries currently not planning to establish a physical society is mainly the physics

Country	Question 3	Question 3B	Question 4A	Question 4D	Question 8A
Benin	No	Yes	Yes	Yes	No
Botswana	Yes		No	No	No
Burkina Faso	No	Yes	Yes	No	No
Cameroon	Yes		No	No	No
Chad	No	Yes	Yes	No	No
Congo	No	Yes	Yes	No	No
Côte d'Ivoire	No	Yes	Yes	No	No
Ethiopia	Yes		Yes	No	No
Ghana	Yes		No	No	No
Kenya	Yes		Yes	No	No
Madagascar	No	Yes	Yes	No	Yes
Malawi	No	Yes	Yes	Yes	No
Morocco	No	No	Yes	No	No
Namibia	No	No	No	No	No
Nigeria	Yes		No	No	No
Senegal	No	No	Yes	No	Yes
South Africa	Yes		Yes	Yes	Yes
Tunisia	Yes				
Tanzania	No	No	Yes	No	No
Uganda	No	Yes	Yes	Yes	Yes
Zambia	No	Yes	Yes	Yes	Yes

activity in these countries does not warrant creating one at this time.

Multiple universities in each country grant Bachelor degrees in physics. In a few countries, there are no universities granting degrees in physics beyond the Bachelor degree. As we can see from the table, except for five counties, students typically seek a more advanced degree in physics. From the responses to other questions, we find that about 20-40% of the students seek these degrees in-nation. Burkina Faso and Nigeria were exceptions with most of its Bachelor degree students seeking their advanced degree in-nation. A university in a given nation may graduate one to around five Doctoral students per year. Common international destinations for those seeking advanced degrees outside of their country include South Africa and Europe where France, Germany and Italy are popular destinations, followed by the United States or Canada and then by a half-dozen or so countries scattered about the rest of the word. Most often post-doctoral opportunities do not exist in-nation. These opportunities are sought in

roughly the same ordered set of countries where a Master or Doctoral degree is sought.

The final question in the table sought information about the extent to which the Internet was influencing physics education. From the table, we see that the influence has been at best modest. From other information in the questionnaire, we find only a few online courses are offered in a given country and these have only been offered recently.

The questionnaire also returned important information about post-graduate employment in and outside of universities and about other scientific activities in each nation. Each was asked to list institutes and centers at universities and the approximate number of physicists engaged. Some had none, but most could list several. Typically these employed a couple to 10 physicists. Each was also asked to list government and industrial centers that employ physicists and to approximate the number employed. For about half the nations, these types of institutions do not exist. When they do, the number of physicists involved are several to a few tens. There were very few industrial centers and institutes. With respect to the size of non-universities research centers, Ghana, Madagascar and Senegal were exceptions, listing institutes employing 50 to 300 physicists.

"there is a degradation or even absence of equipments for practical works. Physics remains purely theoretical."

The questionnaire also asked about the number of scientific conferences and meetings held in the past five years. Five

Ewesit, teaching under a tree in a mobile school in Turkana, Kenya. Photo credit:UNESCO/Karel Prinsloo

countries had none. For the others the numbers ranged from one to 10, with four being typical. Some were nationally sponsored but most had sponsors such as UNESCO, IUPAP, IAEA, etc.

We now briefly summarize the state of physics in South Africa. Its physics society has 3,500 members and nine divisions, including a division for physics education and women in physics. South Africa has 20 Ph.D. granting physics departments; the other countries responding to the survey combined have about 40. As we already noted, South Africa is an in-continent destination for advanced degrees for students from many other African nations. Each year it hosts many pan-African conferences and workshops and is a frequent host of international conferences spanning diverse areas of physics.

Educational activities have several special roles. One is their being an important source of employment; another is their preparing students so opportunities exist for them elsewhere.

With respect to the supplementary documentation, from Kenya we received reports on the biennial pan-African school on Electronic Structure Methods and Applications it hosted in 2012, on a mentorship program in computational science and on a National Physics Forum held in 2012. The report on the pan-African school noted how it and the previous schools helped generate collaborations within Kenya and between physicists from different African countries. The forum report roadmaps the development of science in Kenya through 2030. From Malawi was received the most recent bi-monthly newsletter of the Faculty of Science of the University of Malawi and the report on the activities of the Science and Astronomy Week hosted by the Physics Department in 2017. The Science and Astronomy Week programs sought to interest secondary school students in the sciences, engineering and astronomy. South Africa provided links to a recent document reviewing physics education and training, coupled with a link to a draft strategy for improving these needs.

The optional written information about the state of physics that eight respondents provided was interesting reading. Comments that caught the attention of one or more members of the steering committee include: From Burkina Faso: "… there is a degradation or even absence of equipments for practical works. Physics remains purely theoretical."

From Cameroon: With respect to the traditional curriculum "… all attention is geared towards theoretical condensed matter physics and some little theoretical work as well on electronics and Mechanics. Experimental Physics, applied Physics, Biophysics, Medical Physics etc., are completely absent. There is also very little integration of physics research with research in other areas of science such as medical sciences and chemistry."

Also from Cameroon: "… most of the research being done is not relevant to the local industries. Most research being done is not aimed at solving local problems, rather the research domains just depend on the area of expertise of the lecturers at a particular university." From Kenya: "In the last couple of years physics has been seen as a difficult subject and relegated as an option …"

Because experimental facilities and instruments are often expensive, physics tends to be theoretical.

Also from Kenya: "Strengthening existing initiatives is likely to have a bigger impact since their models of operation can be

replicated to other African regions as practical and successful examples."

From Tanzania: "Majority of people in Tanzania see Physics as subject that when you study it in higher learning institutions do prepare you to become a teacher. This is because, there are so much limited places to work as physicists after studies after teaching."

Observations

With several exceptions, physics in each African nation is conducted on a relatively small scale. The nations with advanced degree programs do not span the continent geographically. Physics in Africa is growing, but the scales of the activities are unlikely to change significantly in the foreseeable future.

Again with several exceptions, a common growth limiting issue is the lack of in-nation employment opportunities in government-sponsored and industrial-connected research centers for those earning advanced degrees. In a number of cases, the national economies are likely unable to support these centers; in others, industrial and government leaders might not appreciate the value of doing so.

Educational activities have several special roles. One is their being an important source of employment; another is their preparing students so opportunities exist for them elsewhere. Here, educational quality matters. Still another role, likely less appreciated and practiced, is educating the general population and students in particular about the importance of science and technology and the special role that physics plays in their development. Here, curriculum content and outreach programs matter. We note the outreach activities conducted by the Cameroon Physical Society. Because experimental facilities and instruments are often expensive, physics tends to be theoretical. What is a bit surprising is that little of this theoretical work tends to be computational. It would seem that experimental research would be a prime area for intra-national and intra-continental co-operation for sharing facilities and equipment.

The follow-up to the question asking if there were plans to establish a physical society was "Is assistance needed in doing so?" This question was invariably answered yes, with guidance and financial assistance often cited as needs. We note Zambia's use of social media in mobilizing its physics community.

One-third of the nations reported a high level of interest in astronomy and either already have an astronomy society or are planning to start one. Several already have observatories or approved plans to build one.

Action Items

Gathered from the questionnaires are five topics for further discussion. For each, multiple courses of action are possible. Further refining these actions constitutes the impending second phase of the project.

Communication

Presently, there is no central mechanism for those outside of Africa to learn what is happening inside of it, for those inside to learn what resources are available from the outside, and for those inside to learn what is happening inside of Africa. Creating a Physics in Africa website to address these issues seems natural and timely. Are there other means of communication, such as email newsletters, Facebook, Whatsapp, etc., that should also be used? If a website is constructed, who hosts and maintains it? The more difficult question is likely how does one make the existence of these communication mechanisms known and used?

Physical Societies

Physical societies in Africa are a multi-faceted issue. First, with respect to existing societies, what programs would strengthen them? The establishment of reciprocal relations between African and non-African societies? The establishment of such relations

among the African societies themselves? Intra- and inter-continental travel grants to facilitate collaborative research, etc.? With respect to nations in the process of establishing a society, what type of technical assistance is needed? Do these different nations want to model their society on a specific non-African nation? Should new models be considered? With respect to those nations unlikely to establish a physical society soon, how can its physics be strengthened? Educational and outreach programs?

The existence of the inactive African Physical Society complicates the discussion of physical societies in Africa. The creation of this society was well intended, but in retrospect, was it the society Africa wanted and needed? Instead of a pan-African society, would regional societies, with existing African societies at their cores, be more natural, sustainable and effective? Would a grouping of heads of physics departments within each country or across Africa who network, share ideas, and collaborate as needed be a natural, sustainable and effective alternative or supplement?

Experimental Physics

Increasing activity in experimental physics involves increasing its teaching and its use in research. In part, the issues here are curriculum design and faculty hiring. The lack of equipment however is a common impediment at both the teaching and research levels. What specific equipment is needed? Donated equipment is what is most possible. How are donors and recipients linked? Especially for research caliber equipment, how does one train the users and how does one maintain the equipment? Can research-caliber equipment be shared nationally? Internationally?

Physics Education

The non-African physical societies participating in this survey have components dedicated to physics education. Would these components be interested and able to work with those interested in improving physics education in Africa? In a given nation is the primary interest in K-12, undergraduate or graduate education? Are the issues mainly curriculum design? Should career development be part of higher education? Should the use of the Internet have an increased role in this education?

Physics and Society

The issues here involve communicating to the population and students in particular why is physics important and what can one do with a physics degree. The non-African physics societies participating in this survey have outreach (public affairs) activities. Are these programs available and adaptable to a given African nation? An important fraction of the membership of these societies works in various industries. Is it possible for this membership to advise efforts on how to link African physics with industry more closely. We note we distinguish promoting from lobbying, that is, developing an appreciation of physics from explicitly advocating government funding of physics. For most participating physical societies lobbying, particularly lobbying foreign governments, is illegal.

Critical Skills Visa Letter

The South African Institute of Physics is now a SAQA registered professional body, hence it can provide critical skills letters required for the application of a Critical Skills VISA and Permanent Residence Permits to Registered Professional Physicist.

An application for a Critical Skills Work Visa has to be accompanied by proof that the applicant falls within the critical skills category and the following;

1. A confirmation, in writing, from the professional body, council or board recognised by the South African Qualifications Association (SAQA), in terms of Section 13(1)(i) of the National Qualifications Framework Act, or any relevant government department confirming the skills or qualifications of the applicant and appropriate post qualification experience.

2. If required by law, proof of application for a certificate of registration with the professional body, Council or board recognised by SAQA in terms of Section 13(1)(i) of the National Qualifications Framework Act.

3. Proof of evaluation of the foreign qualification by SAQA and translated by a sworn translator into one of the official languages of the Republic.

SAIP is recognised by SAQA and can provide you with the confirmations you require to comply with requirements 1 and 2 above.

Register as a Professional Physicist with SAIP

The SAIP is inviting its members to register as Professional Physicists (Pr. Phys) with SAIP.

- The short abbreviation for the designation will be Pr. Phys.
- A member registered with SAIP as a Professional Physicist can use the letters Pr.Phys after their name e.g. George Brown Pr.Phys

DOWNLOAD THE Pr.Phys APPLICATION FORM HERE

Who can apply?

Physics is a basic science that is a basis for all science and technology disciplines. This results in its graduates working in every sector imaginable. Therefore we must cater for a wide range of industries and economic sectors. Hence any physicists who graduated with at least Physics Honours Degree working in either; industry, commerce, government, academia, research, theoretical physics, experimental physics, and uses physics skills and thought processes in their job/career.

A person first has to qualify to be an SAIP Ordinary member before they can be registered as a professional physicist. Check the SAIP constitution regarding the criteria here **SAIP Constitution**

This designation will represent the highest standard of professionalism, competence and commitment to keep pace with advancing knowledge in the field of physics. It is hoped this designation will give a professional standing and recognition of physics by the South African society.

Justification

Academic qualifications are only the beginning of a career in physics and its applications. The need for continuing professional development is widely recognised to be the mechanism by which professionals maintain their knowledge after the formal education process has been completed. P.Phys demonstrates a commitment to maintaining competence, continuing your professional development and abiding by an acceptable code of conduct.

Benefits to physicist

- The certification as a Professional Physicists will be an important addition to a physicist's personal credentials.
- When competing for a job the designation will distinguish one from other applicants with similar qualifications but no professional designation

Benefits for employers

- Supports the recruitment process many recruiters these days want to know if one has a professional designation
- Can be used as criteria for promotion, skills and salary benchmarking
- Demonstrates to someone who possesses this designation believes in professionalism, continuous skills development, belonging to a professional body and acceptable ethical standards.

Join SAIP Membership

Physics is a basic science that is a basis for all science and technology disciplines. This results in physics graduates working in every sector imaginable. Therefore SAIP caters for a wide range of industries and economic sectors.

SAIP membership includes any physicists who graduated with at least physics related degree working in either; industry, commerce, government, academia, research, theoretical physics, experimental physics, and uses physics skills and thought processes in their job/career.

Why Professional Membership is Important
Academic qualifications are only the beginning of a career in physics and its applications. The need for continu-ing professional development is widely recognised to be the mechanism by which professionals maintain their knowledge after the formal education process has been completed. By becoming a member of a professional society one demonstrates their commitment to maintaining competence in their field through continuing your professional development from activi-ties such as conferences, schools and workshops and abiding by an accept-able code of conduct.

Membership of a professional society is an important addition to a physicist's personal credentials for example when competing for a job membership of professional society will distinguish one from other applicants with similar qualifications but no professional affiliation.

Stay informed - News flashes and alerts to are sent directly to your email. A quarterly magazine, Physics Comment, will keep you briefed on physics news, government policy and jobs in industry and academia.

Specialist Groups and Networking Through the various activities of SAIP, networks have been established with the African and International Physics communities, to benefit all our mem-bers. You'll make important new contacts and forge lifelong professional relationships by getting involved in a specialist group.

Save Money - You'll receive discounted rates for SIAPconferences, and have the benefit of paying affiliate membership fees for IOP membership.

Employment opportunity information- Job advertisements will be displayed on our new website and mailed to members from time to time.

Access to current information on sources of funding grants and scholarships - Exclusive service provided to our members via a direct email system.

Scientific meetings - The annual conferences and workshops provide learning opportunities for different specialisation areas and varying degrees of experience.

Especially for the global physics community - You'll have the opportunity to partake in events organised by the SAIP for the Physics community in South Africa as well as Africa: devel-opmental workshops, schools, and conferences.

Additional resources - Your membership privileges also include information and guidance when applying for and acquiring visas to study, participate in the scientific meeting and research opportunities in South Africa and abroad. There is also an exclusive member-only area on our website.

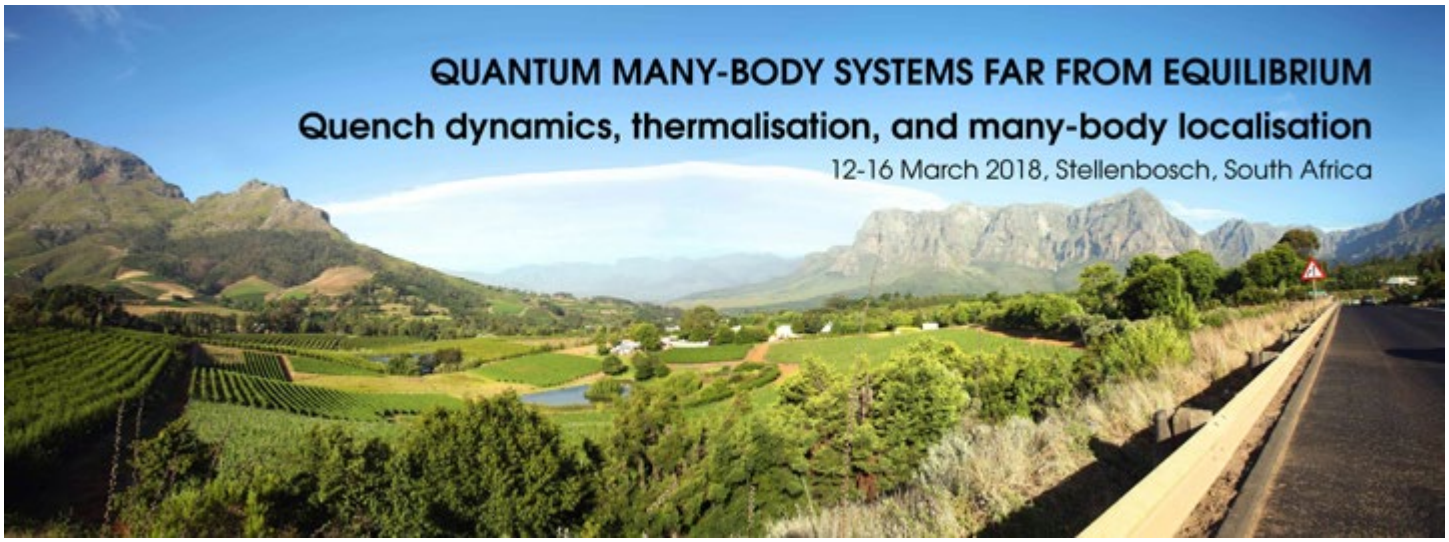
Career guidance and resources- Career assistance is provided to all members to find their career path in industry or academia. Opportunities to win awards for ex-cellence - SAIP recognises contribu-tions to physics in SA by awarding two different medals and various student prizes at the annual conference.

Teaching and Learning Resources for schools - As part of our grow-ing outreach programme we provide teachers and learners with the tools and opportunities to allow and moti-vate more learners to follow careers with physics as a background.

JOIN SAIP TODAY CLICK THE LINK BELOW FOR MORE INFORMATION ON HOW TO APPLY http://www.saip.org.za/index.php/members/membership-info

Like the SAIP Facebook Page

Like the SAIP Face book page to stay in touch with latest news, events and job opportunities within the South African & International Physics Communities.If you have interesting physics related activities, events and opportunities you want posted please let us know and share those great moments with the community.
https://www.facebook.com/pg/South-African-Institute-of-Physics-1660099704207118/about/?ref=page_internal



Winelands view. Photo courtesy of 123rf.

Registration
To register, please fill the on-line registration form.

Workshop fee
5000 ZAR, payable once the organization committee has formally accepted the application.

The fee covers
workshop participation, coffee breaks, lunches, social dinner, transport from the airport and back.

Abstract submission
If you would like to apply for contributing an oral or poster presentation, please submit title and abstract of your planned presentation when filling in the registration form. Please point out if the contribution is intended as a talk or poster.

Student support
Limited funds are available for the support of students and postdocs. Part of the funds are earmarked for participants from African countries. One of the travel grants for young scientists is kindly sponsored by the open access journal Entropy.

In order to apply for any of these grants, please contact the organising committee by 30 November at the latest, providing a CV, a list of publications, and a brief motivation for attending this event.

Important dates

Registration opens:

01 June 2017

Student support application:

30 November 2017

Registration deadline:

31 January 2018

Abstract submission deadline:

31 January 2018

Sponsors

NITheP
National Institute for Theoretical Physics

entropy
an open access journal by MDPI

Upcoming Conferences & Workshops

IAU S339 - Southern Horizons in Time-Domain Astronomy
13 – 17 Nov 2017

Studies of variability constitute immensely important sources of information about how objects in the cosmos form and evolve. Variability can involve times-scales from a millisecond to a century and beyond, and it can embrace the whole electromagnetic spectrum or just one portion of it. New techniques, new technology, new data-mining skills or just more persistence are extending the realms of time-domain astronomy (TDA) and our capacity to capture information in novel and exciting ways, driving theory and inspiring searches for new kinds of phenomena.

Like its predecessor (S285) in Oxford 6 years ago, this Symposium (S339) will tackle a broad spectrum of topics by seeking commonalities among quite different kinds of objects that display similar types of variability, rather than examining in turn groups of objects that have already been classed as 'similar'.

S285 presented appraisals of the many new projects then being developed, or only recently on-line, significant new surveys have since commenced and new milestones have been reached. SKA, ALMA and SALT are also bringing southern-hemisphere astronomy into dominance in this context.

S339 therefore needs to examine critically the efficiency and scientific achievements from the new outlays of technology and equipment since 2011.

Is communication adequate?
Are follow-ups optimal?
Are data-mining tools sufficient?

Here is where the audience will supply the meeting with ideas, experiences, examples and caveats that can furnish a 'Charter for Improvement'.
For more information and registration visit: http://iaus339.ast.uct.ac.za/

MSc & PhD Opportunities at UKZN

QUANTUM INFORMATION PROCESSING AND COMMUNICATION

The research group of Prof Thomas Konrad at UKZN offers Postgraduate scholarships in MSc and PhD positions in the fields of Quantum Computing and Quantum Communiction with photons as well as in Quantum Measurement and Control of ions.

Contact Prof Thomas Konrad
UKZN School of Chemistry and Physics
konradt@ukzn.ac.za

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

Upcoming Conferences & Workshops

International Conference on Physics Education (ICPE) 2018

This conference will be co-hosted by the South African Institute of Physics (SAIP) and the School of Physics, University of the Witwatersrand (WITS) jointly with The International Commission on Physics Education (C14) of the International Union of Pure and Applied Physics (IUPAP).

The conference will be held at the Misty Hills Hotel and Conference Centre, Johannesburg located close to the Cradle of Humankind, a World Heritage Site and from the famous Pilanesberg National Park.

The main objective of the International Conference on Physics Education is to attract physics educators, postgraduate students, teachers, researchers and policy makers working in physics educational research and in physics education. Participants are expected from schools, colleges, universities and governments from all parts of the world. Teacher development and postgraduate students will be key areas of the conference. The conference will enable participants to share and exchange scientific information views and experiences on important issues in Physics Education.

The main theme of the conference is:

"Physics Education for Development: a focus on context".

A number of subthemes will be finalised in due course. The scientific program will comprise of a diverse range of international high-level presentations consisting of plenary talks, parallel oral and poster sessions, teacher workshops/symposia and sessions for Women in Physics.

More details: http://events.saip.org.za/event/ICPE-SAIP-WITS-2018

Summer School on Bayesian Inference:
Foundations and Applications 17 – 27 Jan 2018

First announcement
http://www.physics.sun.ac.za/~bayes/18/

This summer school, the 29th in the "Chris Engelbrecht Summer School" series, will be held in Bettys Bay, South Africa, during 17 to 27 January 2018

The school is aimed both at established researchers and postgraduate students. While the Chris Engelbrecht series is traditionally focused on physics, the wide applicability of Bayesian inference should make it attractive to students and scientists from many fields. Depending on time, research presentations and interactive research group hacks will be set up during the last days of the school. The course component will offer both an introductory course and advanced topics. Confirmed invited speakers and their tentative course titles are:

Allen Caldwell (Max Planck Insitute for Physics):
"Introduction to Bayesian concepts and methods"

Kevin Knuth (SUNY at Albany)
"Information Physics and Foundations"

John Skilling (Maximum Entropy Data Consultants, UK)
"Computing Probabilities in Big Spaces"

Udo von Toussaint (Max Planck Institute for Plasma Physics and University of Graz)
"Advanced Bayesian concepts and techniques"

One or two speakers may be added to the list later.

A small number of bursaries may be available for postgraduate students resident in South Africa. Details will be provided later.

The school website is at http://www.physics.sun.ac.za/~bayes/18/
Currently, it contains only basic information but will be populated in time.
Enquiries can be sent to bayes@physics.sun.ac.za

To unsubscribe from this list, please follow the instructions at the bottom or email bayes@physics.sun.ac.za
Interested parties can subscribe to the email list server at
https://sympa.sun.ac.za/sympa/info/bayes

Details, updates and registration facilities will be provided on the website and communicated via the sympa email list. We look forward to spending an exciting and highly productive ten days with you in the lap of nature and science.

ORGANISING COMMITTEE: Hans Eggers (Stellenbosch University, Dept of Physics, Chair), Michiel de Kock (Stellenbosch University, Dept of Physics), Hugo Touchette (SA National Institute for Theoretical Physics), Yabebal Fantaye (African Institute for Mathematical Sciences)

Deadline for submissions for the March 2018 issue of Physics Comment is 28 February 2018

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

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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:

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