



SOUTH AFRICAN INSTITUTE OF PHYSICS
ANNUAL GENERAL MEETING – 11 JULY 2014
PRESIDENT'S REPORT

Abdus Salam, the Pakistani Nobel Laureate in Physics in 1979, observed: "*In the final analysis it is the mastery and utilisation of modern science and technology that distinguishes the South from the North.*"

In time, I think this statement is even more relevant now than it was 35 years ago; and in space, I've always been concerned about what constitutes "the South", since in relative terms it could include the whole earth or none of the earth. That aside, I find Prof Salam's words useful in moving from the past to the future.

During the year before the 2014 SAIP Conference, considerable activity has taken place in the physics community. I will summarise the major points briefly. However, I wish first to thank and congratulate our generous hosts, Prof Hartmut Winkler, Prof Steven Karataglidis, Dr Emanuela Carleschi, Prof Aletta Prinsloo, Prof Charles Sheppard, and *all* the members of the Department of Physics at the University of Johannesburg, and the hard-working, dedicated, tireless Local Organising Committee. Unlike a pulsar, this conference is virtually glitch-free; like a pulsar, it shines like a beacon.

A significant event during this last year, conducted far from electromagnetic interference, was the launch of the first Meerkat antenna in the Northern Cape. While SKA is constantly used as a major indicator of the growth of South African science, the placement of the bulk of the array in our geographic region has already had big implications for the way that science will be conducted in future in South Africa. Billion dollar projects are noticeable, and require good governance, excellent organisation, and funding beyond anything our community has dealt with before. With these come interdisciplinary collaborations between physics and finance, between burgeoning science and bureaucracy, and between political interest and the pursuit of proof. It is essential for the science community to cohere under these circumstances. In physics and astronomy, an overriding drive to accomplish good science has served the community well during the last year.

The astronomers, cosmologists, and particle physicists have followed their respective fields of interest and found that they need the same field of view. The great questions of physics of the 20th and 21st centuries will need attention by minds trained in widely divergent fields, in which even the nature of evidence may seem to differ. It is therefore more essential than ever that scientific infrastructure in South Africa provides a space in which rational debate can be held, in which well-informed debate can be fostered, and in which the fundamental nature of science is respected.

The South African Institute of Physics provides such a space at every meeting. It is not only the Voice of Physics in South Africa but must truly represent the members as scientists, and therefore be the ears and eyes of Physics, and it must engage the brains of physics.



Membership

Membership is free for 3rd year and Honours students, and is considerably reduced for post-graduate students. Teachers are being enthusiastically welcomed as Associate Members. Retired members receive reduced rates at the Annual Conference. I encourage students to join and to participate in the national science infrastructure.

Undergraduate teaching and learning in Physics

The Institute's strategy during the past year has centred on a consideration of the future and the past. In terms of the future, it has been apparent from a multitude of sources that physics education is in crisis in South Africa. The Review of Undergraduate Physics Teaching and Learning was delivered in 2013 and confirms, in particular, that a substantial majority of students entering physics are under-prepared to cope with the concepts, work ethic, and basic tools required in their first year. The tasks posed by the recommendations are daunting and it is the success of the physics community in the past, in Shaping its own Future in a very successful way, that provides a strong intent to succeed again.

I'm delighted that every member of the Group of Experts has affirmed the willingness to continue into Phase 2, to take action. Prof Johan Malherbe has taken up the chair of this group, which includes Prof Craig Comrie, Dr Joseph Asante, Prof Makaiko Chitambo, Dr Mmantsae Diale, Prof Harm Moraal, Prof David Wolfe, Prof Ramon Lopez, and Prof Carl Weiman. As chair of the Division of Physics Education, Dr Sam Ramaila has taken up the valuable and central challenge of moving the implementation phase forward. Dr Ramiala has formed an able Planning Committee.

I have undertaken to visit every physics department between 2014 and 2015, and with the invaluable support of Prof David Wolfe have started with UWC, UCT, Stellenbosch, and UKZN (the last more informally). These visits will continue and the agenda is the implementation of the Review recommendations.

Here is a brief summary of the recommendations and progress:

1. SAIP coordinates the initiative: taking place. A plan of action (Recommendation 11) has been put in place and by Sam Ramaila, for which the SAIP owes him and the Physics Education Committee considerable thanks.
2. A 4-year physics undergraduate programme should be adopted: this has been strengthened by the independent report of our partner, the Council on Higher Education.
3. Research-based innovation must be strengthened in underpinning undergrad physics teaching and learning: departments that have been visited so far each have physics education specialists, and in at least two very innovative teaching and learning methods have been piloted and are in use; one of these is the use of "whiteboard sessions" as student-driven tutorials.



4. More appropriate and rigorous techniques of monitoring and evaluating physics teaching should be employed: we may be lagging in real innovation here so far. I am open to correction.
5. Departments should guard against adjusting the standard of their degrees to accommodate students' lack of preparedness: observations so far indicate that departments are attempting to rigorous in this respect and are aware of the problem.
6. Student work ethic: I hereby challenge the Physics Education researchers to provide all the departments in the country with their findings on the subject before July 2015.
7. Interaction between Education and Science faculties: this will be taken up at higher levels within universities.
8. The support of women in the physics community: is progressing well under the guidance of Women in Physics in South Africa. I encourage applications for projects from all regions, and ask for rigorous reporting.
9. Regional and national meetings have not yet taken place, and form part of the Plan of Action.
10. The tracking of graduate experience: occurs in some departments and is being actively put forward in others. The SAIP server overhaul, which is very necessary, has meant that the graduate database has been offline since January, and I sincerely hope to see it up and running soon.

Schools

The complementary part of the physics education strategy is the Development of Teachers. In 2013, the IOP London partnership in development workshops was very successfully piloted, and resulted in a substantial grant from the British High Commission and Institute of Physics (IOP), London, for a tremendous impetus to the programme: the Workshops have been scaled up from 30 teacher participants to 600, and physicists will recognise that any scaling of effort may be very non-linear. An enormous debt of gratitude is owed to Prof David Wolfe for his perseverance, courage, and passion for science in Africa in getting this moving. I would like to thank Dr Sam Ramaila, Case Rijdsdijk, Prof Azwinndini Muronga, Brian Masara, and the partnership of the Gauteng Department of Education, the University of Johannesburg and the Soweto Science Centre, and IOP with SAIP. On July 1st this year, 600 teachers willingly gave up their leave and their script-marking to attend the workshop in order to improve their skills in physics teaching and their understanding of physics concepts. This is no mean sacrifice; the vibe at the workshop was tangible. The guest speakers, Ms Phuti Mahanyele, CEO of Shanduka Group, and Ms Tshepo Seate, Director of GDE Johannesburg Central, both held the attention of their audience effortlessly and with inspiration.

Over the last year it has become apparent that the crisis in education in maths and science is no longer the elephant in the classroom, but is acknowledged. It is also becoming apparent that engagement with the Provincial Departments of Education has been considerably more fruitful than engagement at a national level.



Professional Physicist Registration

Moving forward to the space of the practising Physicist, the structures needed for the Professional Physicist registration, prompted by the Minister of Higher Education and Training, have been put in place: Chapter 7 of the By-Laws have been amended to take account of the registration requirements, amendments to the Code of Conduct have been made, and both the Standards Committee and the Disciplinary Committee have been set up. Prof Johan Malherbe, who has deep experience across many years as a member of the SA Council for Natural Scientific Professions, has joined forces to help provide robust structures to support Pr. Phys. as a registration of physicists who adhere to a Code of Conduct, protect the interests of the public, and are desirable and ethical professionals on company and institute staff.

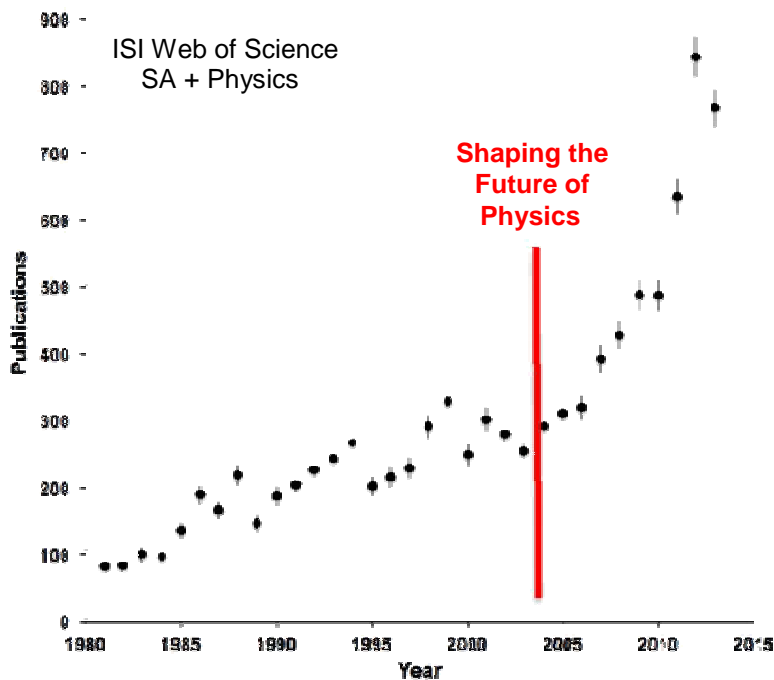
I'm delighted to announce that pilot registration has opened at the 2014 Annual Conference.

Physicists have been early adopters and are good at testing new processes. The piloting phase is intended to expose any unintended consequences and membership should contact the Executive Office to register and to comment on improvements.

Growth and Enablement

The SA community in physics is experiencing unprecedented growth. The SA Institute of Physics is concomitantly bulging at the seams with projects. The help that the Department of Science and Technology has given is beyond price, and included the personal support of both Minister Hanekom and Minister Pandor during the past year. Minister Pandor generously opened the 2014 Conference and issued several very direct challenges to the community, including the expansion of the Teacher Development Programme to the whole country.

I am often asked by other scientists how the physicists managed to do this - it is a completely different scale of operations from most of our sibling institutes. SAIP is driven by the initiatives that come from membership and through the Heads of Departments and Schools, through the Members, and through the Divisions and Forums. Without this vigorous proactive striving to test solutions, we would not have had the 2003-2004 Review "Shaping the Future of Physics", which was instrumental in establishing NITheP, WiPiSA, and other initiatives, but which also provided our community with a permanent full-time Executive Office. This is an enabling factor of unique significance. I would like to thank Brian Masara and his staff, Linette White, Roelf Botha, and Jan Meybergh. They run at far more than full capacity, and much effort is being directed towards enabling the expansion of the Office. Without them, we would accomplish very few of the actions that are taking us ahead more rapidly than ever before. I offer the following data, courtesy of Simon Connell, for consideration.



The Gold Medal

I'm delighted to announce that the de Beers Gold medal will continue to be sponsored through the generosity of de Beers. This is the highest award in Physics in South Africa, and is indeed "precious and rare".

Proceedings

The decision to publish Proceedings of the Annual Conference is founded on the need to provide an opportunity to both students and practicing physicists to have a published record of their Conference contributions. It is an opportunity for South Africa to take another step upwards in providing local scientific infrastructure. The road is not easy and Roelf Botha, Brian Masara and Prof Ilsa Basson have been formally thanked by Council for going well beyond the call of duty to assist in moving forward. The current status for the years is as follows: 2011, published, 145 papers accepted, 40 withdrawn or rejected; 2012, Council now providing editorial support , 39 papers accepted, 25 papers rejected, 109 papers still in review; 2013, 8 papers accepted, 6 papers withdrawn or rejected, 96 papers with authors for corrections, 2 papers in review: the expected publication date is August 2013.

More Highlights of the past year

- On 10 July 2014, Rhodes University and SAIP won the bid for the 15th International Conference on Luminescence and Electron Spin Resonance Dating.
- South Africa has been chosen to host the Conference on Computational Physics in 2017 and an LOC has been formed under the leadership of Prof Nithaya Chetty.



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- The “Physics Teacher Development Project” moved from 30 to 600 participants (see above).
 - A Mobile Physics Laboratory is operated in partnership with the CSIR Nanoscience and National Laser Centre.
 - The SA Physics Olympiad project has been initiated, and with contributions of questions and liaison from departments, will start in 2015.
 - A Policy Advisory Committee has been formed. A position paper on Secondary Education in SA has been drawn up and sent to the Chair of the SA ICSU Board, Prof Saths Cooper.
 - Mr Brian Masara has become SAIP’s scarce skills representative.

 - The Marketing and Outreach programme reaches schools and publishes career brochures, information leaflets, and addresses Public Understanding of Science, particularly in order to assist aspirant physicists to convince their families that physics is a respectable and attractive profession. Many thanks to Prof Thomas Konrad and his team.
 - Physics Comment is published quarterly. Prof Dave Walker has lent his very considerable experience to the Editing Desk of PC, and Prof Thomas Konrad has become a relentless newshound.
 - The book “Physics in South Africa”, edited by Runan de Kok and Harm Moraal, is completed and on sale through the Gift Shop.
 - An increased number of press releases has been generated and SAIP’s profile has been raised.

 - A fully-fledged conference organising system is now available and has a sterling track record of international conferences.
 - The SAIP INDICO system is fully up and running for conference management. Abstract and paper submission is running smoothly in 2014.
 - A reviewer database has been gathered and is being grown. Please volunteer if you have not done so already. SAIP needs you.
 - The Gift Shop is providing income to assist in sustaining the EO operations.

 - The National Committee for IUPAP has participated in two ICSU Workshops.
 - Dr Sahaal Yacoob has been accepted as a member of IPPOG, the International Particle Physics Outreach Group.
 - Nominations have been made by the NC for: Chair of the NC of the International Astronomical Union, a member of the ICSU Executive Board, and eleven IUPAP positions.
 - A substantial website upgrade has been undertaken.
 - The Council has drafted a Strategy Review, including a situational analysis, benchmarking, self-evaluation, a strategic plan dealing with both intended and emergent strategy, and a 10 year plan to guide financial sustainability. Key



environmental elements at present are the Human Capital pipeline, public understanding of physics, the increasingly multi-disciplinary aspects of physics, SAIP, Physics and the SKA, and government strategy.

International developments

SAIP supports and coordinates the National Committee for IUPAP, the International Union of Pure and Applied Physics, which emerged from the Solvay Conferences and was formally founded in 1922. South Africa was one of 13 founder members. Dr Rudzani Nemetudi has continued to serve as Associate Secretary General of IUPAP. Prof Adri Burger, Prof Deena Naidoo, Prof Patrick Woudt, and Prof Nithaya Chetty have served on Commissions C4, C14, C19 and C20 respectively. I have had the honour as serving as Vice-Chair of Working Group 5 on Women in Physics. For the new term of office, 11 nominations for Commissions were made. South Africa holds two votes in IUPAP.

Very strong ties with the Institute of Physics, London, the National Society of Black Physicists, USA, the African Physical Society, and the African Academy of Sciences continue. Through these links, SAIP has been able to assist in positioning South Africa for the projects of the future as well as the major projects moving forward today.

Governance and Council

SAIP is VAT registered. It has successfully registered with the Department of Social Welfare as a Non-Profit Organisation. Prof Alan Matthews has agreed to join Council as Treasurer, with oversight of the financial strategy of the Institute, and is heartily welcomed.

During 2014, Prof Japie Engelbrecht retires as outgoing Treasurer. He was elected to Council in 2001, and has served as Treasurer since that year. In this capacity, he has taken SAIP through over 12 years of extraordinary change. As Head of the Department of Physics at NMMU and an extremely active and eminent physicist, he has chosen to work for the benefit of the whole community of established and young researchers. He fortunately continues his ties with SAIP through his able Chairmanship of the Condensed Matter Division.

I wish to thank the tireless and determined Executive Members of Council, Prof Frikkie Scholz, Prof Simon Connell, Dr Malebo Tibane, both treasures of Treasurers, Prof Japie Engelbrecht and Prof Alan Matthews, as well as the members of Council Prof Ilsa Basson, Prof Thomas Konrad, Prof Kristian Müller-Nedebock, Prof Azwinndini Muronga, Dr Sam Ramaila, Prof Patrick Woudt, Dr Mmantsae Diale and student representative Zipho Ngcobo.

I.M.A. Gledhill

President, South African Institute of Physics



SAIP Main Objectives

1. To promote study and research in physics and related subjects and to encourage the applications thereof;
 2. To further the exchange of knowledge among physicists by means of conferences and publications;
 3. To uphold the status of, and ensure a high standard of, professional conduct among physicists;
 4. To promote physics for socio-economic development in South Africa;
 5. To co-operate with other institutes or societies, to the benefit of both;
 6. To make a difference by offering a wide range of services and projects addressing various community and developmental needs in the physics community and related stakeholders.
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Strategic Focus Areas for 2015 and onwards

1. Membership
 2. Services
 3. Physics Education and Research
 4. Physics for Sustainable Development
 5. Organisational Excellence
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