

Physics Comment

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Table of Contents

Editor's Note	3
<i>News from South Africa.....</i>	4
Minister Pandor Officially Opens SAIP 2012 Conference	4
Minister Pandor's Speech at the 57 th SAIP conference	5
SAIP 2012 Gold Medallist - Prof Harm Moraal	7
Dr Jaynie Padhayachee Honoured as Honorary Member of SAIP	7
SAIP Recognises Previous Gold Medallists as Fellows of the Institute	8
Review of Undergraduate Physics Training in South Africa Update.....	8
New Ion Implantation Facility	9
A WiPiSA Member Dr Regina Maphanga Honoured for her Work in Physics.....	11
Obituary – Frank Brooks 1931 – 2012 Emeritus Prof UCT.....	12
2012 Message from SAIP President - Prof Simon Connell.....	15
SA Physics Graduates Database.....	20
<i>Articles</i>	21
South Africa Participates in the “Observation of a Particle Consistent with the Higgs Boson”	21
South Africa's First CubeSat Heads For Space	22
IUPESM WC 2012, Beijing, PRC	24
<i>Opportunities</i>	27
UNISA - Post Graduate Scholarships	27
MSc/PhD Project Available with the ALICE Team at iThemba LABS.....	27
WiPiSA Call for Demonstration/Experimental Equipment Competetions.....	27
<i>Upcoming Conferences & Schools</i>	28
Atmosphere Monitoring and Adaptive Optics Workshop.....	28
Training on Science Utilisation and Science Communication	29
6 th International Conference on the Frontiers of Plasma Physics And Technology	29
International Conference on Optics and Lasers Applications ICOLA2013.....	30
Physics Comment Editorial Policy	30

Editor's Note

On the 4th July the big news arrived: the particle that according to the "well-aged" Standard Model of particle physics by its interaction with other particles generates their mass - the elusive Higgs boson- might exist after all. A press conference at CERN announced that a particle which is "consistent with the Higgs" was detected at the Large Hadron Collider. It might give the mass to other particles but it surely adds new weight to the Standard Model. Prof Simon Connell from the University of Johannesburg reports about the South African participation in the search for the Higgs on page 21 of this issue of PC. More articles are planned for the next issue and I am particularly looking forward to one explaining the Higgs mechanism written by Prof Herbert Weigel from Stellenbosch University.

In July, many of us experienced a formidable annual SAIP conference at the University of Pretoria, as documented by Mr Brian Masara (p.4). We publish the conference address by the honourable Minister Naledi Pandor (p.5), which shows how closely and interested DST is following the development of the physics community in SA and the steps of SAIP. Remarkably, the file of the Minister's speech contained a link to the video with the best explanation of the discovery of the Higgs-like particle for a general audience which I have seen so far (cp. p.5).

The message of the SAIP president at the AGM in Pretoria (cp. p.15), in my opinion, aptly summarizes the current important challenges and opportunities for the Institute; its registration as professional body and the Review of Physics training in SA. The progress of the latter project is also described in a report on page 8. In addition this PC features contributions on various other subjects, such as a 1.3 kg "nano-satellite" (p.22) and on Medical Physics (p.24).

I hope you enjoy this issue!

With best wishes

Prof Thomas Konrad

Caption of cover page. First row: Minister Naledi Pandor, SAIP President Prof Simon Connell and Prof Cheryl de la Rey - Vice-Chancellor of the University of Pretoria at the opening ceremony of SAIP 2012. Second row: Prof Chris Theron - Chair of SAIP 2012. The SAIP 2012 Annual conference group photo (last row) and other photos can be found at <http://indico.saip.org.za/internalPage.py?pageId=10&confId=14>

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.

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Minister Pandor Officially Opens SAIP 2012 Conference

By Brian Masara (SAIP Office, Pretoria)

The Minister of Science and Technology Honourable Naledi Pandor officially opened the SAIP 2012 conference which was hosted by the Department of Physics at the University of Pretoria from 9. to 13. July 2012.

Speaking at the official opening the Minister acknowledged how the SAIP is creating mutually beneficial synergies with government by collaboration with DST to improve the physics discipline and innovation strategy through various projects. For example, Women in Physics in South Africa to address shortage of Women in Physics, Review of Physics Training in South Africa which aims to make sure undergraduates are more prepared for postgraduate studies and hence contribute to the 10 fold PhD increase. Moreover, the entrepreneurship for physicists which seeks to address the Innovation Chasm by encouraging researchers to use their research results to improve quality of life and move research results out of the lab.

All speakers at the official opening which included the Minister, SAIP President, and University of Pretoria Vice Chancellor alluded to the fact that this year 2012 has perhaps witnessed the most dramatic development in physics for South Africa following the site award decision of the Square Kilometer Array (SKA). This is an opportunity not only for physicists, but for the whole country. The conference was also held soon after the announcement of the discovery of the Higgs-Boson like particle.

The SAIP conference was attended by 560 delegates and 34 of these were international.

Winter Schools - Two winter school programmes were held on Monday, 9 July. One full day school programme on the use of neutrons as probes to study matter, organised in conjunction with the Applied Physics Division and NECSA. A second half-day school programme on the use of Easy Java Simulations (EJS) for physics teaching and learning was also hosted.

Captivation Plenaries and Presentations – Check these on the SAIP2012 website. You can also download the SAIP2012 book of abstracts here:

<http://indico.saip.org.za/getFile.py/access?resId=9&materialId=0&confId=14>

Physics Demonstration Competition and Date a Physicists - A student's outreach event was held on Wednesday 11 July 2013 for matric students from around Pretoria. They were involved in "Date a Physicist" , which meant meeting a physicist and asking questions, to encourage them to study Physics at University and pursue a Physics related career. In the afternoon the student were treated to a physics demonstration competition.

You can view the physics demonstration competition photos here:

<http://indico.saip.org.za/internalPage.py?pageId=10&confId=14>

Banquet and Awards Night – As per tradition the conference was capped by a Banquet hosted for delegates which was held at the Voortrekker Monument on the night of 13 July. During the Banquet SAIP awarded various student prizes, a gold medal and announced new fellows to the institute.

To access and view photos from the conference please visit the following link:

<http://indico.saip.org.za/internalPage.py?pageId=10&confId=14>

Minister Pandor's Speech at the 57th SAIP conference

Speech by Naledi Pandor MP, Minister of Science and Technology, at the 57th Annual Conference of the South African Institute of Physics, University of Pretoria, 9 July 2012

Distinguished guests;
Ladies and gentlemen:

Let me start by thanking you for the invitation to come and address this prestigious gathering, the 57th Annual Conference of the South African Institute of Physics.

It's a great time to be a physicist – what with the discovery of the [Higgs Boson particle](http://vimeo.com/41038445) [http://vimeo.com/41038445] and the award of SKA to South Africa. Some of you here will have been involved in either the one or the other.

The Large Hadron Collider at CERN in Geneva, Switzerland is the most complex scientific machine that has ever been built. Soon it will be rivaled by the SKA.

The Large Hadron Collider has a bank of more than 3,000 computers analyzing the events it puts into motion in that 26 kilometer-long tunnel. Soon a similar pantheon of computers will be analyzing the data that comes from SKA.

We have identified astronomy as one of our key strategic priorities and we have specifically emphasised the need to enhance our capacity to implement and realise the objectives of the [National Astrophysics and Space Science Programme](#).

It is in this context that we see South African Institute of Physics as the key partner in enabling us to develop more creative and sustainable ways of ensuring that the SKA does indeed provide the kind of benefits that we believe it should.

Furthermore, in view of the fact that this year marks the hundredth year of existence of the University of Pretoria's Physics Department, I think you could not have chosen a more appropriate venue to host this conference. May I therefore take this opportunity to offer my congratulations to Prof. Theron and his department on reaching its centenary.

The South African Institute of Physics played and plays a key role in our SKA African partnership, by helping us stimulate radio astronomy in SKA partner and associate countries. In our view this has put us in a much better position to develop the necessary capacity to host the SKA.

Government supports the Institute in the implementation of several projects. For instance, since 2004, SAIP and the National Research Foundation have reviewed the state of physics in South Africa. This has provided a platform to shape South African physics.

After this review process and acting on one of its recommendations, government was able to facilitate the establishment of the [National Institute of Theoretical Physics](#) in Stellenbosch. One beneficial development that flowed from this was the formation of a management office for the Institute. This office was incubated within the DST for three years, and thereafter we continued to support it.

The office enabled the Institute to establish projects geared to advancing South Africa's physics capacity. Some of the projects that government supported include the "Conferences and Schools Support" project, which contributes to human capital development in the field of physics by encouraging and facilitating students' attendance of conferences and physics workshops. The conferences also contribute to knowledge generation, as delegates share research results and collaborate to solve problems.

An important development is the review of physics training in South Africa. This addresses the challenges of human capital with an eye to producing more PhDs.

Then there are the Institute initiatives relating to the mobile physics laboratories. In partnership with SAIP, we aim to promote access to physics for all. This will assist universities and colleges to choose candidates from a larger pool of students. This project will therefore contribute to societal transformation by expanding the numbers of scientists coming from previously disadvantaged communities.

I also wish to commend SAIP for the "Entrepreneurship for Physicists and Engineers" programme. This programme helps the physics community to address what we call the "innovation chasm" between research results and socioeconomic outcomes. This is accomplished by promoting innovation and commercialisation of the research undertaken by physicists. The programme is also geared to enable physics research and development to address challenges such as energy security and climate change, and also to stimulate economic growth.

I am most impressed by your deliberate focus on human capital development, and I also note your plan to identify and nurture talent through your two planned winter schools, namely, "Easy Java Simulation" and "Physics of Probing Matter". I believe that the focus on Java simulations will not just prepare students to connect with astronomical theories but it will also stimulate the students' innate curiosity and desire to understand the physical universe.

Equally impressive is your scheduling of a student's outreach programme for Grade 12 students. In this programme students will be involved in activities that will encourage them to pursue studies in the physics field at university and to pursue physics-related careers. This is indeed a noble exercise, as it supports our efforts to demystify science and attract young people into science disciplines.

Another important project is providing incentives to attract more women into science. Government supported SAIP's successful bid to host the 4th International Union of Pure and Applied Physics (IUPAP) women in physics conference last year in Stellenbosch.

In closing, the discipline of physics, in all its various facets, is absolutely crucial to enhancing our country's ability to engage in meaningful and competitive science and innovation. This is why I am particularly heartened by the fact that you view the notion of human capital development as having to address the issues of the development women scientists and attracting more and more young people into the sciences.

I have every faith that this conference will produce many exciting and innovative ideas on how you can strengthen the impact of your work.

I wish you a most fruitful conference.

SAIP 2012 Gold Medallist - Prof Harm Moraal

By Brian Masara (SAIP Office, Pretoria)

The 2012 de Beer's Gold Medal was awarded to Prof Harm Moraal from the University of North West for a career of quality research and service to the South African and international Physics communities.

Harm Moraal obtained his Ph.D. from the University of Potchefstroom in 1973 where he was also appointed as lecturer in 1971. Since the start of his research career in 1969 with SANAE, his research interest has been in atmospheric sciences and cosmic radiation. Since then he has published more than a 100 articles and conference proceedings and has gained international recognition as a leader in his field as reflected by an A rating from the NRF. His scientific contributions have also been recognised by the "Suid-Afrikaanse Akademie vir Wetenskap en kuns" when he was awarded the Havenga prize for Physics in 2004.

Apart from his distinguished research career, he has also gained a reputation as an outstanding teacher, supervisor and mentor of more than 25 M.Sc. and Ph.D. students.

Harm Moraal has also left his mark on the South African Physics community through a career of service rendering. From 1999-2008 he served the community as member of the SAIP council, Vice President and President. After the review on the status of Physics in 2004 this was an era that required strong leadership and many of the successes of today can be attributed to his devoted service to the community during this period. On the international front Harm Moraal has also been a true ambassador for South African Physics. He served as member of the Cosmic Ray Commission of IUPAP from 1984 to 1989, as secretary from 1990 to 1993 and as chair from 1994 to 1997. He was also a member of the national committee of IUPAP from 1987 to 2000. Apart from these activities he also served in many other capacities in his own institution and in the NRF.

By awarding the 2012 de Beer's Gold Medal to Harm Moraal the South African Institute of Physics wishes to recognize his role as academic, teacher and leader within our community.



Prof Harm Moraal

Dr Jaynie Padhayachee Honoured as Honorary Member of SAIP

By Brian Masara (SAIP Office, Pretoria)

The SAIP honoured Dr Jaynie Padhayachee as a honorary member of SAIP in recognition to her valuable contribution to shaping the administration systems within SAIP. Jaynie served as the SAIP honorary secretary for several years. Jaynie is principally responsible for setting the stage for modernizing the operations of the SAIP. Her contributions to all facets of the running of the organization are colossal. SAIP does things the way it does currently primarily because of ideas forged by Jaynie.

Jaynie has contributed to the re-write of the SAIP constitution and By-laws, and she has been



instrumental in setting up the SAIP webserver which she managed for several years. She was the inaugural editor of Physics Comment where she has set a very high standard for others to follow.

Ordinarily, it would be rather premature to award honorary status of any professional organization to a thirty something year old. But Jaynie is no ordinary person. Her contributions to the SAIP will benefit many generations to come.

Dr Jaynie Padhayachee before receiving her certificate from SAIP President Simon Connell at the Banquet.

SAIP Recognises Previous Gold Medallists as Fellows of the Institute

By Brian Masara (SAIP Office, Pretoria)

According to the new SAIP constitution all de Beers Gold Medal Award winners may be awarded the status of Fellow, subject to the individual accepting the status. Fellows are individuals whom the Institute honours in consideration of excellence in Physics or Science or Industry or the Governance of Science in South Africa. The following previous gold medal winners were awarded their Fellow membership certificates at the SAIP 2012 Banquet held at the Voortrekker Monument in Pretoria on 13 July 2013.

1. Prof. Johannes Hendrik van der Merwe
2. Prof. Richard Houzet Lemmer
3. Prof. Michael William Feast
4. Prof. Pieter Helenius Stoker
5. Prof. Friedrich Johannes Wilhelm Hahne
6. Prof. Anthony David Mortimer Walker
7. Prof. Paul de Villiers du Plessis
8. Prof. Dieter Heiss
9. Prof. Roger Edouard Raab
10. Prof. John Darrell Comins
11. Prof. Krish Bharuth-Ram
12. Prof. George F.R. Ellis
13. Prof. Philip Allan Charles
14. Prof. Harm Moraal

Review of Undergraduate Physics Training in South Africa Update

By Sam Ramaila (Chair of the SAIP Council Education Committee and member of Planning Committee of SAIP-CHE Review Project) and Edmund Zingu (SAIP Chairperson Management and Policy Committee - Review of Physics Training in SA)

Physics departments at universities (traditional universities and universities of technology) are currently engaged in the self-evaluation of their curricula, facilities and operations. This is an important phase of an

initiative of the Council of the South African Institute of Physics to review undergraduate physics training in South Africa. This initiative is a consequence of the fundamental concerns about undergraduate preparation and training, expressed by Heads of Physics Departments at various meetings held in 2008 and 2009.

The self-evaluation is being undertaken against a set of criteria and minimum standards which have been developed for undergraduate physics and endorsed by the heads of physics departments. The set of standards were informed by the Benchmark Statement for Physics which was drafted by a task team of physicists, and the CHE Programme Accreditation Criteria and Minimum Standards. The SAIP approached the Council on Higher Education (CHE) to undertake the review jointly, and the CHE has obliged by making its expertise, experience and infrastructure available.

The review of undergraduate physics teaching and learning is unique in many ways. The CHE through its Higher Education Quality Committee (HEQC) has previously undertaken national reviews of the MBA programme and a range of Education programmes. It has never undertaken a review of a discipline – always a programme (complete qualification). Furthermore, such national reviews are usually undertaken on the basis of portfolio's (self-evaluation reports) which are validated through on-site visits by a review panel. This review is undertaken on the basis of an online Self-Evaluation Report which each department is currently completing. No site visits are envisaged.

The Self-Evaluation Reports will provide an analytical and critical self-appraisal of the undergraduate physics curriculum in each department. The reports will be analyzed by a group of experts consisting of the following physicists:

Prof Craig Comrie	(Retired - University of Cape Town) Convenor;
Dr Lutz Ackermann	(Retired - University of Limpopo);
Dr Mmantsae Diale	(University of Pretoria);
Prof Harm Moraal	(North West University);
Prof Ramon Lopez	(University of Texas at Arlington);
Prof David Wolfe	(Emeritus - University of New Mexico).

The group of experts will evaluate the departmental reports and draft a national report which will present the status of undergraduate physics, identify best practices and challenges in undergraduate physics, and make recommendations which, if implemented, would enhance undergraduate physics teaching and learning. It is eagerly anticipated that the implementable recommendations will serve to shape the physics training landscape in South Africa in order to ensure that the training provided is effective and comparable to the best elsewhere in the world. A concomitant reality flowing from this phase of the project is the need for monitoring and evaluation to ensure that our objectives are met. All stakeholders are called upon to actively participate in this project.

Any questions and contributions on the project can be directed to zingu@iafrica.com

New Ion Implantation Facility

By Trevor Derry (University of Witwatersrand, Johannesburg)

Ion implantation will soon be available once again to the SA materials research community. In what promises to be a very fruitful collaboration, iThemba LABS (Gauteng) and Wits University School of Physics are setting up a new joint laboratory based on one of the three ion implanters left redundant by the closure of South African Microelectronics Systems (SAMES), who were based in Koedoespoort. It seems that SAMES were anxious to see this machine go to a good home, and they made us an offer we couldn't refuse.

The machine was moved to the Wits/iThemba site in Johannesburg a month ago – see picture. We were extremely fortunate in attracting as operator/technician Mr. Tony Miller, who worked with this machine at SAMES, and he has now completed most of the re-installation. The Wits University Research Committee has found additional funds for certain modifications which a research implanter needs.

A research-enabling facility

Solid-state physicists and materials scientists of many persuasions are already familiar with ion implantation as an exceptionally versatile technique for the precise electrical, mechanical, structural or chemical modification of surface regions – leaving the substrate intact. In fact, one of the world's major



biennial physics conferences, at which South Africa is always represented, is the IBMM (Ion Beam Modification of Materials) Conference, which took place this year from September 2nd to 7th in China; see <http://www.ibmm2012.org>

Several SA institutions made use of the older ion implanter run by Wits University, and it enabled many good papers to be published. Beam-time on the new one will be shared between iThemba LABS and Wits. Any ideas for projects at this stage could be discussed with Simon Mullins [iTLa(G)], Mervin Naidoo (Wits) or with me.

And there's more!

At the same time, the Physics Department of the University of Pretoria is refurbishing a similar ion implanter from their Carl and Emily Fuchs Institute, for use in a research environment. So South African physicists will be well catered for after an ion beam drought, and there will no longer be a need to send such work overseas!



Author Biography: Trevor Derry has been Reader in Ion-Crystal Interactions at Wits for many years, and since retirement holds an honorary appointment, giving him more time to pursue research and supervise research students. Diamond has often, but not always, been the substrate in which he has implanted ions or carried out surface analyses – often, but not always, using Rutherford Backscattering and Ion Channelling. E-mail Trevor.Derry@wits.ac.za

A WiPiSA Member Dr Regina Maphanga Honoured for her Work in Physics

By Dr Malebo Tibane – Chairperson WiPiSA



Picture: Dr Regina Maphanga (centre) [between Minister Pandor (left) and German Ambassador Horst Freitag (right)] receiving her award.

Women in Physics in South Africa (WiPiSA) would like to congratulate its executive member Dr Regina Rapela Maphanga who received a Women in Science award in the Physical and Engineering Sciences. The awards were hosted by the Department of Science and Technology (DST) in Pretoria on 24 August 2012 as part of the DST's celebration of National

Women's Month. The categories include fellowship for masters and doctorate students, distinguished women scientists and distinguished young women scientists. Dr Regina Maphanga won the Distinguished Young Women Scientist Award for her research on computer simulations of energy [- storage (the editor)] materials. Dr Maphanga served on WiPiSA forum from 2009 to date. She completed her PhD in Physics from the University of Limpopo in 2005. She is currently a senior researcher at the University of Limpopo, Turfloop Campus, Materials Modelling Center, which she joined in 2007, following her postdoctoral research on computer simulations of energy-storage device materials.

The Women in Science Awards seek to honour and acknowledge the country's women's achievements in various fields of science and research and the department has hosted the event since 2003. This year's theme for Women in Science Awards is "Using Science and Technology to Develop Rural Women and End Poverty". **The theme is in line with 2012 United Nations theme for women, i.e., "empower rural women and end hunger and poverty".**

Minister of Science and Technology, Mrs Pandor when speaking during the awards ceremony, indicated that the awards have become a feature of South Africa's celebration of Women's Month and the achievement made by women in the predominantly male-dominated field of science. "Many of us have a very esoteric view of science and really do not always make the link that it definitely has answers to many of the challenges that our societies have to address," Pandor said.

Dr Maphanga has published her research findings in high-profile scientific journals and is a junior associate at the Abdus Salam International Centre for Theoretical Physics in Italy. She has supervised honours, masters and PhD students. She has published 13 articles in peer reviewed journals. Dr Maphanga was a visiting researcher at University College London, UK, in 2010 and 2011. She represented South Africa during the World Economic Forum's annual meeting of the New Champions in China in 2011, and was selected as member of the Global Young Academy, including being a member of the academy's science education.

Obituary – Frank Brooks 1931 – 2012 Emeritus Prof UCT

Andy Buffler - Head of Department



Frank Brooks 1931-2012

Francis Dey Brooks, Emeritus Professor in the Department of Physics at the University of Cape Town, died in hospital on 30 August 2012, a few days after a fall in his home. Frank was a pioneer in the physics and applications of neutron detection and spectrometry.

Frank Brooks was born on 9 December 1931 in Pretoria, where he attended both primary and high school. He went on to study physics at Rhodes University and was attracted to undertake an MSc working in the group of J.B. Birks, who was a leading figure in the early development of scintillation detectors and author of the "Birks relation" describing the light yield per path length for a charged particle traversing a scintillator. Frank's MSc project was focused on the pulse height response of the organic crystal anthracene to low energy X-rays. When Birks returned to England, Frank completed his MSc under J.A. Gledhill and G.T. Wright, who were also well known for their work on scintillator materials. In particular, Wright developed the technique of pulse shape discrimination (PSD) which allows the identification of different types of charged particles in certain scintillator detectors by means of the characteristics of the scintillation decay. PSD is most often used to separate signals associated with neutrons or gamma-rays in mixed radiation fields, and this became a theme in Frank's research life.

In 1955 Frank moved to the Nuclear Physics Division of the Atomic Energy Research Establishment (AERE) at Harwell, England, to take up a Commonwealth Junior Research Fellowship. His work at Harwell extended the state of the art in the physics of scintillation mechanisms, including building the first practical PSD system. He was allowed to register a patent on his method of pulse shape discrimination, but was obliged to sell it back to the AERE for 1 Pound.

Frank moved back to South Africa in 1964 to take up the newly created Chair of Nuclear Physics in the Department of Physics at the University of Cape Town, a position he held until his formal retirement at the end of 1996. He immediately put his efforts into developing nuclear physics research at the university, building on the research-led legacy left by R.W. James, who died that same year. The Southern Universities Nuclear Institute (SUNI) was established at the same time at Faure, near Cape Town, which later expanded in the late 1980s with the newly built $k=200$ MeV cyclotron to become the National Accelerator Centre (now iThemba LABS). Much of Frank's early work with the newly commissioned 5.5 MV Van de Graaff accelerator at SUNI employed novel uses of organic crystal and liquid scintillators to explore fundamental properties of 2-

nucleon and 3-nucleon systems, a theme which emerged later in the 1990s. Frank's experimental prowess was well established in these early years. He brilliantly exploited the fundamental physics of detector materials, for example directional anisotropies and scintillation variations, as well as often using the scintillator both as a target and detector.

In the 1980s Frank's attention turned to the then topical subject of muon-catalyzed fusion. He played a leading role in experimental studies of the alpha-muon sticking coefficient in muon-catalysed d-t fusion, in which it became clear that neutron detectors having good PSD characteristics were essential to the success of these measurements. Many of these experiments were undertaken at the Rutherford Appleton Laboratory in collaboration with the University of Birmingham.

The commissioning of the $k=200$ MeV cyclotron at the newly formed National Accelerator Centre provided a new energy regime for fast neutron physics research in South Africa. In the early 1990s Frank designed experiments to measure differential cross sections of neutron-proton radiative capture and neutron induced cross sections relevant to cosmic ray studies. He also turned his attention to applications in medical physics, designing novel ways of measuring the energy spectra of both the neutron and proton therapy beams at the NAC. During this time he also established a very productive collaboration with the neutron metrology group at the Physikalisch-Technische Bundesanstalt, Germany, which remains strong with UCT Physics to this day. In 1996, just before retirement and remarkably after never having completed a PhD, Frank was awarded the degree of DSc by Rhodes University.

In the later years of his research career Frank turned his attention to more applied topics, often working within programmes managed by the International Atomic Energy Agency. In the 1990s Frank had begun to explore techniques using fast neutrons to detect hidden contraband and explosive materials. Later on he turned his attention to the humanitarian problem of locating hidden anti-personnel landmines, by detecting neutrons which had been slowed down through collisions in the hydrogen-rich explosive in the mine. In recent years, Frank also worked on new ideas to detect antineutrinos, showcasing his progress in a departmental seminar in April 2012.

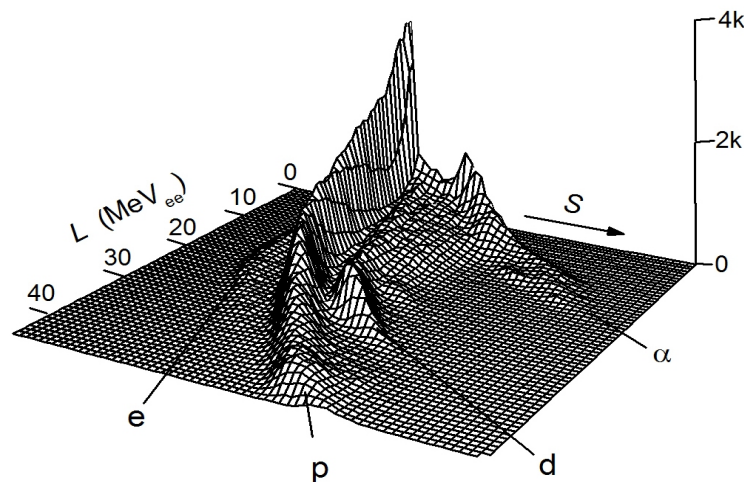
Frank's teaching mirrored the way he thought about research. His lectures were extremely well structured, often supported by carefully hand-written lecture notes which he always made available to students. He particularly enjoyed laboratory teaching at the senior levels and attracted many students for post graduate research by displaying passion and dedication to the task. Over the course of his career at UCT he supervised 19 MSc and 18 PhD students. Frank served as Head of Department between the years 1979 and 1981, and then for nearly two more years after the sudden death of W.E. Frahn in April 1982. Frahn was instrumental in developing theoretical physics at UCT, and Frank recognised the importance of continuing this trend. Although the next years were somewhat complicated for the department, Frank always provided a consistent voice of reason.

Frank Brooks will be remembered for his ground-breaking work in neutron detection and spectrometry using organic scintillator detectors. Although his research articles will remain as a formal testament to his academic authority, his legacy will be continued through the living testimony of his research students, many of whom remain active in research today. Frank was happiest in his laboratory at UCT, or tweaking racks of electronics before a night's run at iThemba LABS. The experiment was everything to him. He paid careful attention to detail; the sequence of the electronics modules in a rack, the number of cables needed, even the width of the columns to be ruled in the experimental journal. His beloved LINK 5010 PSD unit would nearly always command a central position. He was an eternal optimist and would see the beginnings of enhancements in data (where others would just stare) and smile contentedly when a signal began to appear. Frank was extremely supportive of his post graduate students and spent hours with them in the laboratory, never shying away from doing all-nighters at the lab. He never tired of correcting drafts of papers and theses, over and over again, making careful "suggestions" for improvement (he was always right). He was a meticulous writer and cared passionately about producing scientific prose which was both succinct and accurate. Frank

allowed his passion for scientific exactitude to be balanced somewhat by the state of his laboratory which could only very kindly be described as a creative space. He was a consummate collector of anything which could find future scientific use. Even small pieces of tin foil were carefully curated.

"FDB" will be remembered by those who knew him as a trusted and unassuming colleague, a loyal supervisor, a passionate educator, an innovative and intuitive researcher and, above all, a gentleman. He developed many deep friendships across the university, and the world of neutron physics. He was also dedicated to his family, and will be sorely missed by his wife, Kathleen, his children Louise, William, Peter and James, and eight grandchildren.

Frank Brooks understood the behaviour of neutrons like no other. It is my view that time will reveal his scholarly contributions to the Physics Department at UCT as the most substantive since the time of R.W. James.



A visualization of data demonstrating pulse shape discrimination, characteristic of Frank Brooks' research. Counts (vertical) versus pulse height L and pulse shape parameters for events in an NE213 liquid scintillator of cross-section $13 \times 13 \text{ cm}^2$ and thickness 7 cm, when irradiated by a neutron beam of energy 62.5 MeV. The labels indicate loci attributed to recoiling charged particles of different types: protons (p), deuterons (d) and alpha particles (α), as well as escaping protons (e). Adapted from Nuclear Instruments and Methods in Physics Research A476 (2002) 181–185.

UCT Physics will host an event to celebrate his life and achievements in a few weeks' time. Details will be posted on the UCT Physics website <http://www.phy.uct.ac.za>

2012 Message from SAIP President - Prof Simon Connell

given at the AGM of SAIP , University of Pretoria, Friday 13.July 2012

2012 HAS BEEN AN EXCITING YEAR

The first big news, long awaited, was the announcement of the award of the SKA on May 25th. The SKA has the capacity to address some of the most important and exciting major questions of astrophysics, which in fact have tremendous implications for a much wider area of physics. These questions relate to the nature of gravity, dark matter, dark energy, the physics of the early universe and the possibility of life elsewhere in the universe. There are overlaps elsewhere within our discipline, such as particle physics, materials science and high performance computing. We have come to see the importance of multi-wavelength astronomy, and the SKA will build on South Africa's already impressive capacity. Together with Namibia, and indeed, Africa, we are well positioned for excellence in research and capacity building – and significant growth. There are initiatives in the directions of neutrino telescopes, gravitational wave astronomy and also the next generation of gamma ray telescope. It is not hard to imagine that Southern Africa will become the world's astronomical "Mecca". The SAIP is committed to playing its part to making this programme a success. We are involved in the development of synergies within Physics and technology, the spin-off benefits to other fields, the outreach, the capacity development and the networks with Africa. The SAIP also played a role as the "Voice of Physics" in shaping the governance and management of Astronomy and Space Science over the last two years. Currently, Prof Nithaya Chetty, a former President of Council, is serving as the NRF Group Executive of Astronomy and Prof Ramesh Bharuthram, is serving as the Head of the DST Astronomy Desk, tasked with implementing the proposals for the governance and management of this area.

Soon after, two of the CERN experiments announced on the 4th July the exciting news of the discovery of a Higgs-like boson. South African scientists, students and computer experts have participated through the SA-CERN programme, which launched almost four years ago. This is expected to lead to further discoveries, which may also shed light on the primordial state of matter, shortly after the Big Bang, and on dark matter and dark energy.

These events are in the context of a period of optimism and growth in the health of the discipline, which can be traced back to the beginning of the implementation phase of most of the recommendations of the "Shaping the Future of Physics" Project in 2004. There has developed an increasingly effective partnership between the SAIP Council and the science policy makers, including the NRF and DST and DHET. This may be characterized by the role of the SAIP as the "Voice of Physics" and the developing capacity of the SAIP to offer real benefits to the membership. The NRF and DST have appreciated the role of the SAIP and have chosen to operate several major projects through the offices and capacity of the SAIP.

This brings me to comment on the primary importance of the SAIP Executive Office, which was the first recommendation to be implemented.

EXEC OFFICE

The SAIP Executive Office has added tremendous capacity for the SAIP. It has in fact exceeded our expectations. The office is led by Mr Brian Masara, as the Executive Officer, and it is further staffed by Ms Linnette White, the Office Secretary. The establishment of the Executive Office ushered in a period of massively enhanced capacity to operate a host of programs which have been very beneficial to the health of Physics.

I mention briefly several projects, some of which are developed further below in more detail.

The Office has developed an impressive conference organising capability. It includes the planning, the logistics, the arrangements, delegate liaison, special student treatment, assistance with fund raising, all IT aspects including the web-site, the INDICO Conference management system, support for all financial aspects, and assistance in evaluation and reporting. I want to recommend this service to you. If you use the SAIP Office as your Conference Organising partner, you will both enjoy a wonderful conference organising experience and be supporting the discipline. Recent success stories have been the Synchrotron Workshop in December, the Gravitational Wave Astronomy workshop in June and this Annual Conference.

The SAIP Office is supporting the Biophysics Project (workshops, outreach, proposals), The Entrepreneurship Programme (workshops), the Women in Physics Programme (support, workshops, outreach), the Marketing and Outreach Programmes (many projects), the Physics Teacher Support Project (educator development projects), the Physics Graduate Database Project (tracking and reporting), the Physics 500 project (industry networking), the Mobile Physics Laboratory (outreach), the SAIP Gift Shop, the interactions with various other international organisations, the interactions with the NRF, DST, and other departments, the support for the Review of Physics Training project and for the project to investigate Professional Body Registration and the Professional Designation. There are a host of other activities. None the least of these is a campaign to build the financial sustainability of the office based on developing the relationships with industry stakeholders in the health of physics. The DST support for the office will be scaled down to about 33% of the requirements over the next three years, and in this time, we intend to develop industry based funding as well as funding derived from our possible new role as a Professional Body. We welcome suggestions from the membership in this process.

The SAIP are indeed appreciative of the performance of the Office and indebted to the SAIP Executive Officer and the Office staff.

CONFERENCES

The Gravitational Wave Astronomy workshop in late May 2012 was co-organised by the SAIP Office. There were about 58 participants in addition to the six international speakers, with a significant student participation. The SA delegates hailed from about 25 institutions. The international speakers reviewed various aspects of GWA, and the SA speakers indicated the current footprint of GWA related activities in SA to be at Rhodes University, Stellenbosch University and NITHeP, the University of Cape Town, and the University of KwaZulu-Natal. The workshop resolved to build on the competence in numerical relativity. There will also be a drive to establish capacity more broadly in other areas. The broadening will target the LIGO's observational programs. Capacity building via joint mentorship programmes is envisaged.

The SAIP Office also assisted in the strategic design, organization and finally the development of the outputs of the Strategic Workshop on 1-2 December 2011 of the South African Synchrotron Research Roadmap Implementation Committee (SRRIC). The overall goal of the workshop was to obtain a consensus from that community as to the basic features of a strategic plan for synchrotron science in South Africa. The key outcomes of the workshop included a mobility plan for access to a range of synchrotrons with a focus on the ESRF, SOLEIL, Elletra, Diamond and DESY. Furthermore, the Scientific Association with the ESRF was strongly recommended. There was a clear, long-term vision for a third generation light source to be built in South Africa and hosted as a regional African facility. As an initial step, the government should commission a feasibility study in the near future. This Annual Conference of the SAIP in 2012 has attracted 560 delegates of which 34 are international delegates. Colleagues from Africa represent 50% of the international participation. The student participation is at the 56% level. There has been an exceptionally large cohort of invited plenary speakers, who have delivered outstanding lectures. The Division and Forum heads have in general reported a growth in the participation. The

Applied Physics Forum reported an especially dramatic increase in participation of more than 20%. We all look forward to the banquet, where the top performing students will be recognised, and indeed, the premier award of the Institute, the DeBeers Gold Medal, will be bestowed on one of our colleagues. Also at the banquet, we will honour certain of our colleagues with Fellowship status and also Honorary membership, in terms of our new constitution, in recognition of their achievements and contributions to the Institute respectively.

Our thanks go out once again to the organisers, Prof Chris Theron and his team, the hosts, the Department of Physics at the University of Pretoria and the Executive Office staff, Mr Brian Masara and Mrs Linette White.

We also thank all delegates and sponsors for contributing to the success of this conference.

I can now announce to you that hosts for SAIP 2013 will be the University of Zululand. I have been informed of an innovation they will institute, to found a tradition that we will uphold from conference to conference, and I look forward to the realisation of this, though I will not steal their thunder by mentioning it now. This will be the first time that the conference is in this very beautiful area of our country, and I hope that we will all support this event very strongly and I look forward to meeting you all there next year. There will be an address from Prof Erasmus Rammutla, holding the Council Conference Portfolio, in this regard.

REVIEW OF PHYSICS TRAINING

This very important project was born during the Heads of Physics Departments meeting at the Polokwane SAIP Annual Conference on July 2008 out of the concerns for the poor quality of the entering students and their inability to master physics of an appropriate standard. The meeting adopted a proposal with three phases: Firstly, the development of the Benchmark Statement, secondly, a Review leading to recommendations and thirdly, the implementation of the recommendations. A widely accepted very mature draft Benchmark Statement has been available since late last year. The Review component is now underway as a partnership between the SAIP and the Council on Higher Education (CHE). A Planning Committee consisting of both CHE and SAIP members has been working on developing the procedures and documents for the Review. The Planning Committee consists of Rehana Vally (CHE, Director of National Reviews), Edmund Zingu (SAIP, Leader of the Review of Physics training project), Sam Ramaila (SAIP, Chair of the Division for Education and Chair of the Council Education Committee) and Tom Netshisaulu (SAIP, Member of the Council Education Committee). At a meeting on the 18 June 2012, attended by nearly all the Heads of Physics Departments from Universities and Universities of Technology, the draft document "Criteria for Physics Review" document was presented and subjected to discussion. Together with the CHE, we are essentially co-pioneering the capacity to review fundamental disciplines, which do not lead directly to a profession (like, for example, medicine). As such we are in a phase of wide consultation as the Heads of Department take the draft document back to their Universities. Once finalized, these criteria will be used in a generating Departmental Self Evaluation Reports. Successive regional and national meetings will transform these to Regional Reports and then to a National Report, which has to be ready by March 2013. A Panel of experts will analyze the Reports – leading to the generation of the Recommendations. The entire community will also be able to be involved in the analysis stage. The SAIP will then drive the implementation of the Recommendations. We have every expectation that this process will ultimately have the same very positive impact on the health of Physics, as the Shaping the Future of Physics project had nearly a decade ago.

On behalf of Council, I would like to express our sincere gratitude to Prof Edmund Zingu for leading the process with deep dedication and a lifetime of wisdom. I would also like to thank the full team mentioned in this section, led by Mr Sam Ramaila, also including the sterling input of Dr Igle Gledhill and Mr Brian Masara.

A NEW ROLE FOR PROFESSIONAL BODIES

As described in the March issue of Physics Comment, the SAIP is engaged with the issue of the application for recognition as a Professional Body and the Development of a Professional Designation. This follows its participation in a new national process launched by the Department of Higher Education (DHET) and the South African Qualifications Authority (SAQA) since May 2011. This presents a possible new partnership with the DHET to

- promote an enhancement of the development of skills without compromising quality,
- form a vital part of the data gathering on the supply / demand for skills,
- play a role at broadening both access to and sites of training, and
- acquire / develop their role in standard setting, programme accreditation and professional registration.

The SAIP would have an enhanced role in contributing to delivery with regard to the National Skills Development Strategy III – we would have more powers, responsibilities and relevance. Funding would be provided to support the additional capacity needed for this expanded role, and we would need formal recognition and this would imply regulation. Council determined that there was enormous overlap between the mission and programmes of SAIP and that the new Constitution and associated documents already provided the basis for the SAIP to match the criteria for recognition. Would regulation limit our Academic Freedom? We propose to address this by making sure our funding base is diverse. However, the SAIP would acquire a massively increased capacity to be relevant and sustainable. We would avoid the risk of marginalization associated with not participating. Following our selection as a pilot body for consideration for recognition, the SAIP was recommended for recognition as a Professional Body in the Government Gazette number 34950 of the 20th January 2012 on page 12 as Notice 41. It then emerged in February this year that our membership categories did not constitute a Professional Designation, and if we wanted to continue towards final recognition, we would need to develop a Professional Designation. The feedback from our sister organization (SACI) and those of our membership who have commented as well as SACNASP was that we should continue and not lose our advanced place in the process. We therefore provisionally developed a document describing our Professional Designation and our system for Continuous Professional Development (CPD). This document is acceptable to SAQA, and we are informed that we would qualify for recognition based on our submitted application documents, including the provisional Professional Designation and CPD system. Council therefore would like to take the matter to the membership, and to have a conversation on this matter leading to a vote at the 2013 Annual Conference AGM on a modification to the Constitution to reflect the proposed Professional Designation and the CPD process. All material related to this issue is placed in the Forum Discussion area within the closed membership section of the SAIP web site. The process of consultation has begun. With this item of my report I am bringing it once more to your attention. We are all urged to participate in the debate around this issue.

GRADUATES DATABASE

The SA Physics Graduates Database has once again continued to grow during the past year, and we are now well over 1125 graduates registered. The database is used and valued by the DST and NRF, who mine it (without compromising privacy) for reports on the demographics and trends which are useful in determining interventions and formulating programs. Furthermore, we all believe that Physics is an excellent training for careers beyond academia, and that our graduates do well in areas such as finance, business, industry, teaching, government and so on. The Graduate Database is our opportunity to promote our discipline to the DST, the NRF and society at large, and to really evidence the value of a physics training. It will only be successful if we all co-operate to encourage our departments and students to keep it up-to-date. Please contact the SAIP Executive Office for further information.

HISTORY OF PHYSICS IN SOUTH AFRICA

Council has commissioned a History of Physics in South Africa, and this has been compiled by Profs Harm Moraal and Runan de Kok. The manuscript book has now been completed after a lengthy process where all physics Departments had sufficient opportunity to contribute. Council have scheduled the October Council session this year as the date for the final sign-off of the book. It will then be published both electronically and in print. We trust we can all enjoy this excellent record of the more recent recorded development of our discipline, and that it will play a role in building our cohesion and coherent efforts to grow physics in our country.

PHYSICS COMMENT

Physics Comment is a premier communication tool of the SAIP, and it is steadily developing in its profile. The editor is Prof Thomas Konrad, and he is assisted by the SAIP Executive office in the compilation and layout. We express our appreciation to them for their work. We are all urged to submit articles regularly.

INTERNATIONAL PARTNERSHIPS

The Institute continues to build on its partnerships with similar professional bodies elsewhere, such as the NSBP and the AIP in the US, the IOP in the UK, IUPAP, the AfPS and the AfAS. There are others, but those listed see regular activities and common programmes. As South Africa we are very proud that Dr Rudzani Nemutudi was elected as the Secretary General of IUPAP, and we hosted the IUPAP Council and Commission Chairs Meeting in February 2012 at iThemba LABS in the Cape. As usual we participate strongly in the various Commissions of IUPAP. We sent Mr Zipho Ncgobo to the General Assembly as the capacity building delegate and Dr Igle Gledhill as voting delegate in London in October 2011.

We have several Memoranda of Understanding (MOU) with sister organisations. I want to particularly mention now that we signed a MoU with the National Society of Black Physicists (NSBP) on September 20, 2011, the document is witnessed by the signature of the Honorable Minister of Science and technology. Several projects are operated together. You will be familiar with Waves and Packets, the weekly e-newsletter, containing the latest news in physics, astronomy, related sciences, education and policy which are of joint interest. We are all invited to contribute a proposed abstract via the Executive Office. Some of the projects include the joint advocacy and development related to the Square Kilometer Array and Cerenkov Telescope Array. We hope to soon establish the *Virtual Journal of African Physics Research* and the *Virtual Journal of African Astronomy Research*. Both of these journals will capture the published work of African physicists and astronomers via the bibliographic meta-data, which will be rendered through an electronic scholarly journal platform. We have already mentioned the Synchrotron Workshop in December 2011 and the gravitational Wave Astronomy Workshop in May 2012, which are also projects where we collaborate to promote these fields in Africa. This represents just a part of our joint activities, and a future Physics Comment article will archive full details in due course. I am especially pleased that we are hosting to Prof Charles McGruder (former NSBP President) and Dr Nia Imara (NSBP) at this Annual Conference. We trust that this will found a custom of attendance at each others meetings to cement and develop the work together.

FINANCIAL and LEGAL

The growth of the SAIP has lead to a budget bottom line of almost four million rand, where the vattable income exceeded the one million rand threshold since 2010. We engaged Deloitte to assist with the regularization of our financial and legal position. On their advice we made an

application to SARS for a special ruling. We recently learned we were successful and that our government grant income can be zero-rated. This effectively contributes additional tax income to the SAIP activities. This process is ongoing, and the Executive Office as well as Deloitte are involved in further applications and regulations. We advise our members that all transactions with the Institute in future will respect the VAT procedures. From 2013, we will require substantial additional financial management capacity, and this will ultimately be supplied via expansion of the Executive Office.

CONCLUDING REMARKS

Finally, I wish to thank the President Elect, Dr Igle Gledhill and all members of Council for their service. All portfolios of Council are becoming more onerous, and some days, there can be literally a full days worth of e-mails to tend to, and these mails often involve considerable application and effort. Prof Japie Engelbrecht has seen the treasurer portfolio grow to resemble the responsibilities of a fully trained accountant in a large company. The SAIP has since 2010 crossed the thresholds for registration for Income tax and VAT, and entered the realm of a company with a substantial fiduciary responsibility. He has nonetheless shouldered the burden of running the SAIP finances with his customary attention to detail, his accuracy and his humour. He has agreed to continue to serve as Treasurer for another year. Special mention is also deserved by Dr Jackie Nel, who is the executive secretary of our Institute, and manages our documentation and institutional memory. Once again, I have to single out Mr Brian Masara, Linette White, who have run the Executive Office and enabled the SAIP to remain on its very positive upward growth trajectory. The role of the Division and Forum Chairs has expanded, with both the growth of the Institute and the implementation of the new Constitution. Special thanks to these Chairs, their committees and the members who give substance to the Institute through their voluntary work in service of our discipline. May our reward be the health of the discipline, and the continued growth of Physics in research, capacity building, innovation and in building the culture of a scholarly society.

Thank you very much.

Prof Simon Connell - SAIP President

SA Physics Graduates Database

By Brian Masara (SAIP office, Pretoria)

If you have a degree in physics and you are currently working, studying or unemployed and resident in South Africa, or have studied physics in South Africa we kindly request you to sign up and give us your personal statistics. We need you! The statistics we collect, with your help, will be used to influence legislation, decision-making and all matters related to physics funding required for training more physicists.

Read more details on confidentiality and great benefits of signing up and updating your details

<http://graduates.saip.org.za/background.php>

To register click here <http://graduates.saip.org.za/register.php?action=new>

For enquiries contact SAIP Office at info@saip.org.za

Articles

South Africa Participates in the "Observation of a Particle Consistent with the Higgs Boson"

By Simon Connell (University of Johannesburg)

2012 has been a wonderful year so far for Physics in South Africa. Hot on the heels of the announcement of the SKA award, where most of the telescopes will be placed in Africa, especially South Africa, it was announced, on the 4th July, that a particle consistent with the long-sought Higgs boson has been discovered – and South Africa was again present.

This is less than four years after the SA-CERN programme was formerly initiated as a new programme of the DST and the NRF. "It's a global experiment, and we have six of our Universities participating at CERN" according to Prof Jean Cleymans who leads the SA-CERN programme. This means that South Africans scientists, students and computer experts have participated in these exciting developments. The Large Hadron Collider (LHC) at CERN has been heralded as the most important new physics Discovery Machine of all time, and this news is expected to be just the beginning of a host of new discoveries, related to physics beyond the Standard Model, Higgs physics, dark matter, dark energy, higher dimensions, the primordial state of matter amongst other things.



The Honorable Minister (DST) visits CERN. In the background is the LHC Control Room. Several of the SA-Team are there too. John Ellis – former CERN lead theorist is on the extreme left, and next to him is Peter Jenni - ATLAS Experiment Deputy Spokesperson. The DST have enabled the SA-CERN programme.

The details of the new discovery and also those of the SA-CERN programme will be presented in other articles in the next issue of Physics comment. Here, we emphasise that this development is a beneficiary of the "Shaping the future of Physics" program initiated by the SAIP. Just some of the results of this programme improved the communication between our discipline and the DST and NRF, contributed to the motivation for SANReN (enabling infrastructure), lead to the formation of improved collaborative networks within the country and motivated for several new large scale projects. The South African involvement at CERN enables the highest quality scientific research, manpower development, technology transfer and innovation. One of the early spin-offs has been the establishment of the South African computing Grid. This is a combination of fast networks and high performance computing clusters and it is now available to all researchers. Another spin-off will be in accelerator beam development. iThemba LABS and the LHC use the same (very new) heavy-ion source, and iThemba LABS has partnered with CERN to develop the lead beams to be used next year in the heavy-ion programme of the LHC. Basically, each lead nucleus would have a "developed in SA" flag on it. Thus, apart from excellence in global science and human capacity development, there is technology transfer and innovation - and the spin-offs mentioned are only the first two of several. In addition, we have seen that opportunities are being created for the returning diaspora and some significant new hires to faculty positions have been achieved.

The recent "Astronomy Town Meeting" which preceded the SAIP Annual Conference in Pretoria this year devoted a session to exploring the synergies between astronomy and particle physics leading to astroparticle physics. This year is the centenary of this field, which dates from the discovery of cosmic rays in the Hess balloon flight. We therefore look forward to the next discoveries where South Africa can participate from the dual platforms of its High Energy Physics programme as well as the synergies that will come through its Astronomy Programmes.

South Africa's First CubeSat Heads For Space

By The South African National Space Agency

What fits in the palm of your hand, weighs 1.3 kg and uses less power than a 5watt light bulb? If you guessed ZACUBE-1, South Africa's first nanosatellite, then you are right.

ZACUBE-1 was designed and built mainly by postgraduate students at the Cape Peninsula University of Technology (CPUT) in conjunction with the South African National Space Agency (SANSA) as part of the CubeSat programme. A CubeSat is a cube-shaped low-cost satellite measuring 10cmx10cmx10cm. These tiny satellites have come a long way since Sputnik, the first satellite that was launched in 1957, weighing 83 kg. The success of the CubeSat programme has revolutionised space technology.

Satellites carry different payloads, which essentially provide all the equipment needed by a satellite to perform its various functions. One of the payloads on-board ZACUBE-1 is a High Frequency (HF) radio beacon, developed in collaboration with the Space Science Directorate of SANSA, located in Hermanus. The Space Science Directorate is part of the worldwide network of magnetic observatories and is responsible for research, infrastructure and data for monitoring the near-Earth space environment. This includes monitoring space weather - the changing environmental conditions in near-Earth space or the interaction of the Sun's atmosphere with the Earth's atmosphere. Adverse space weather can have a negative impact on our navigation and communication systems such as GPS, cell phones and internet connections as well as our electrical power grids. Space weather monitoring has become a necessity due to the increasing

dependence of society on communication technology.

One of the instruments SANSA uses to study space weather is the HF SHARE Radar, located at the South African research base in Antarctica. The HF Radar monitors irregularities in the ionosphere, an area of the Earth's upper atmosphere which reflects radio waves in the HF band, making HF radio communications possible.

When ZACUBE-1 orbits over the HF radar, the on-board HF beacon will transmit a signal to calibrate the radar. The radar was last calibrated in 2007 by flying an HF beacon aboard a helicopter directly above it. If you know anything about the weather conditions in Antarctica you will know this is not an easy task and is extremely expensive.

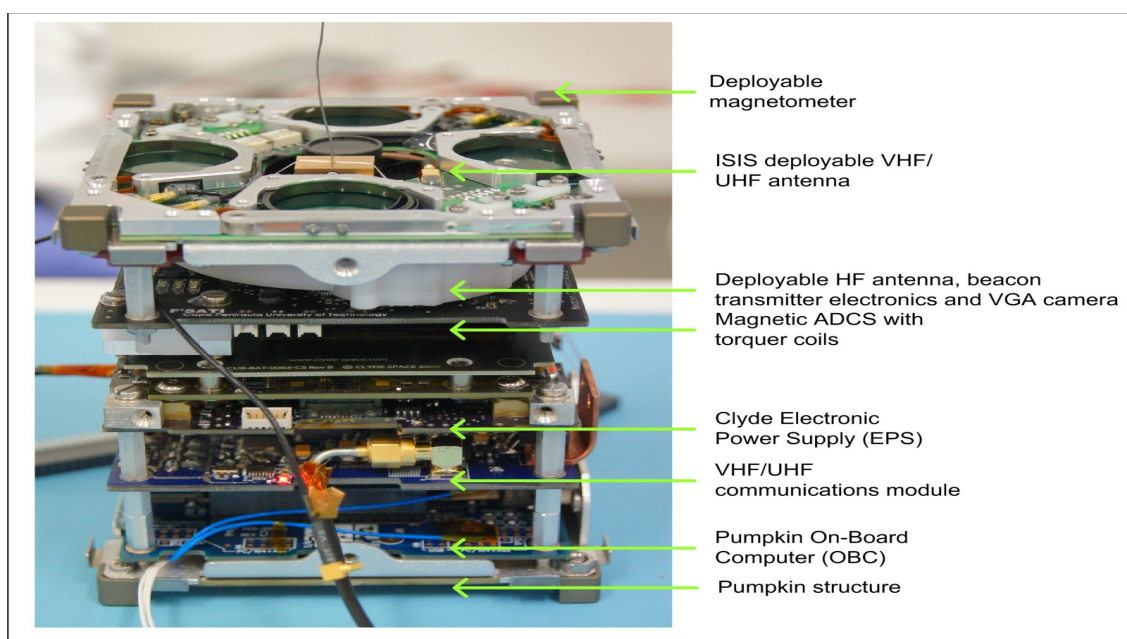
The satellite transmits an HF radio signal which is received by ground stations at SANSA and CPUT. These signals assist scientists in modelling the ionosphere. Ionospheric models are crucial towards gaining an understanding of space weather and its impact on communication technology.

ZACUBE-1 will be integrated with other CubeSats from around the world at a Dutch institute for Innovative Solutions In Space (ISIS). The cluster of CubeSats will then be sent to Yasny Launch Base in Russia where they will be launched into space in mid-November 2012.

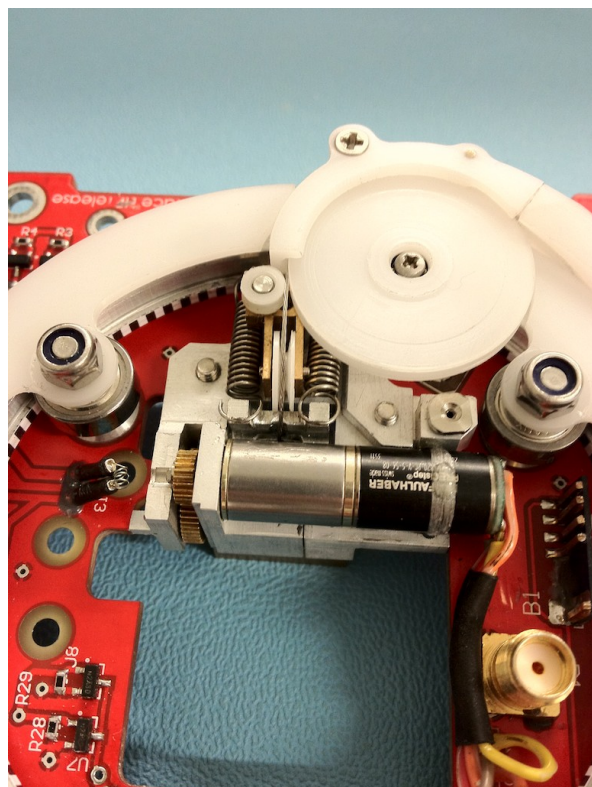
The CubeSat programme provides a number of useful applications such as education and training, technology demonstration, Earth observation and space weather research. It is an ideal programme for students as they can be involved in all the phases of the development of a satellite. CubeSats are becoming increasingly popular with universities and technological institutes around the world, because of their considerable educational benefits.

The South African government has identified satellite production as an area for human capacity development and a way to increase investment in science and technology. ZACUBE-1 was funded by the Department of Science and Technology which encourages the training of satellite engineers in South Africa.

The design and construction of CubeSats provide hands-on experience for engineers and technologists. The opportunity for human capacity development, technology innovation and scientific advancement provided by ZACUBE-1 far surpass its tiny size and will motivate and inspire future generations to reach for the stars.



The components of ZACUBE-1



Left: The antenna release mechanism of the HF Beacon on-board ZACUBE-1



ZACUBE-1 is placed into a pod for its journey to Russia from where it will be launched in November 2012

IUPESM WC 2012, Beijing, PRC

By William Rae (University of the Free State)

Introduction The International Organisation of Medical Physics (IOMP) and the International Federation of Biomedical Engineers (IFMBE) hold a World Congress every three years under the joint banner of the International Union of Physical and Engineering Sciences in Medicine (IUPESM). This year the congress, entitled WC2012, was held from 26 to 31 May 2012 in the International Convention Centre in Beijing and about 2000 scientists from around the globe met to consider "Promoting Health through Technology" which was the theme of the Congress. The IOMP represents the majority of Medical Physicists from around the globe and Physicists from at least 82 different countries were present. South Africa was represented by only two Medical Physicists, a small number of Biomedical Engineers and a commercial representative. The profession of Medical Physics is undergoing a phase of growth worldwide and many issues were raised and discussed, several of which have relevance to the profession in South Africa.

The academic content of the congress was of a high standard. The opening ceremony was done in great style with a dragon dance as a starter (figure below). The opening lecture was delivered by Dr Erwin Neher, Nobel Laureate in Physiology or Medicine, and he described signals and signalling mechanisms in the central nervous system. A fascinating lecture on how our nerves send signals to allow us to think.

Current Status of the IOMP

One of the major aspects of the Congress was the administrative business of representing Medical Physicists and Bioengineers from around the World. The election of the new IOMP President, Prof Kin Yin Cheung, and new Vice President, Dr Slavic Tabakov took place, as did all other administrative aspects of the two organisations represented (IOMP and IFMBE). The IOMP is currently in a healthy position and is actively promoting the profession at many levels, both locally and at an International Organisational level.

Collaboration with international organisations such as the WHO, IAEA and IRPA has been formalised and significant coordination of effort is already established. Wider recognition of the

profession is being stimulated with support for developing countries a priority. Libraries have been established in 43 countries around the World and efforts are being made to assist countries where Medical Physics is not able to successfully educate and train their own professionals.

Recognition of Medical Physics as a Profession

The International Labour Organisation (ILO) published the classification of the profession of Medical Physics in the latest International Standard Classification of Occupations (ICSO-08). This is a huge step toward better recognition of the profession where it is not yet seen as a specific profession with specific roles and responsibilities, which are now also well defined by the IOMP². This classification can now allow lobbying to enable Physicists working in Medicine to get proper recognition and to be properly utilised in their work environment.

The IOMP accepted the Federation of African Medical Physics Organisations (FAMPO) as the Africa regional representative organisation for Medical Physicists. This organisation is currently in the process of being established and organising their first formal meetings. Their report to the IOMP at the World Congress outlines their progress and plans for supporting the profession in this region³.

Perspectives on Medical Physics Education and Training

Several sessions of the 19 themes that ran for the duration of the Congress were devoted to sharing experiences in Education, Training and Certification, of Medical Physicists Worldwide. It was an excellent opportunity to share experiences with others in the various fields of interest in our field. In South Africa we have an established and regulated profession, and although our training does not require an MSc before commencement of Internship, our standards seem to otherwise largely follow international trends. We could certainly contribute more actively toward development of the profession in our region.

The IOMP has recently established an International Medical Physics Certification Board in an attempt to set standards for certification of Medical Physicists that would then be readily recognised around the World thus ensuring that standards are maintained in our profession irrespective of where the training was done. This has been embraced with some enthusiasm, although some countries are a little reluctant to buy into the Board at this stage.



The Dragon dance performed at the Opening Ceremony of the 2012 World Congress on Medical Physics and Biomedical Engineering¹

Continued Professional Development (CPD)

Several countries now have follow up audits of registered professional requiring CPD activities to be completed. A significant work was done to compare all published systems, and several presenters shared the status of these activities in their own countries. Most systems differ in one way or another. South Africa seems to have a reasonable system which is adequate for our needs. We are unique in requiring ethics points for compliance with CPD.

Conclusion

The profession of Medical Physics is developing and becoming more widely recognised worldwide. The more uniform definition of the profession and standardisation of training and education are helping this change. At this time of fast technological development the role of the Medical Physicist is becoming more important and is being recognised as such. Congresses such as WC2012 are helpful in benchmarking and exchanging ideas and it was good to see that our profession in South Africa enjoys recognition and regulation that is lacking in many other parts of the World. There are significant pressures, but Medical Physics is currently in a fairly healthy position in South Africa with real possibilities for future growth.

The next World Congress will be the 2015 World Congress on Medical Physics and Biomedical Engineering which will be taking place in Toronto, Ontario, Canada from 7 – 12 June, 2015. Details should be available soon on the IOMP web page at www.IOMP.org.

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Author Biography: William Rae is the Head of Medical Physics in the Faculty of Health Sciences at the UFS and went to Beijing as a representative of the South African Medical Physics Society to attend the Council Meetings of the IOMP. He has worked in all areas of Medical Physics during his career and has a particular interest in Mammographic Image analysis. He presented two papers on Medical Physics Certification in SA, and another on biological optimisation of cervical cancer radiotherapy. Email: raewid@ufs.ac.za

Opportunities

UNISA - Post Graduate Scholarships

Fully funded research scholarships at the University of South Africa (UNISA); as part of its goals to increase research capacity, UNISA Research and Innovation Portfolio, under its Research Chairs Programme, is pleased to offer for **each** of the disciplines stated below:

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[Please click here for more information and how to apply](#)

WiPiSA Call for Demonstration/Experimental Equipment Competitions

WiPiSA would like to invite interested individuals to enter a competition to design low cost fascinating physics experiment gifts/kits that can be given as Physics Gifts to pupils during physics outreach events.

[Click here for more details](#)

Upcoming Conferences & Schools

Atmosphere Monitoring and Adaptive Optics Workshop

To be held 3-7 December 2012 in Sutherland, South Africa provides an introduction into the principles of atmospheric turbulence, the methods for measuring and monitoring the atmospheric conditions, and advance technology to correct degraded astronomical observations. <http://amao.saa0.ac.za/>



**ATMOSPHERIC CHARACTERIZATION
AND ADAPTIVE OPTICS IN ASTRONOMY**
- a workshop in Sutherland (SAAO), South Africa -

Sutherland, South Africa
Dec 1 – 8, 2012

Registration prior to:
Oct 15, 2012
<http://amao.saa0.ac.za>

Program:

- Imaging through turbulence
- Theory of atmospheric turbulence
- Site testing instruments
- Seeing and Meteorology
- Introduction to Adaptive Optics
- Adaptive Optics modeling

INVITED SPEAKERS :

- Dr. Jean-Marc Conan
- Dr. Eddy Graham (t.b.c)
- Dr. Matthew Kenworthy (t.b.c)

Organizers:

- Dr. Steven Crawford
- Dr. Timothy Pickering
- Dr. David Buckley
- Prof. Aziz Ziad
- Dr. Marcel Carbillet
- Ms. Laure Catala

<http://amao.saa0.ac.za>



Training on Science Utilisation and Science Communication

The Centre for Research on Evaluation, Science and Technology (CREST) at Stellenbosch University, will over the next five years offer a number of short courses on Research Uptake and Utilisation. The first two short courses offered are:

SCIENCE UTILISATION AND IMPACT

Scientific utilisation is part of the broader notion of knowledge utilisation. In this short course the focus is on how to successfully plan for and facilitate knowledge utilisation in order to impact upon the lives and activities of a project's intended beneficiaries. Participants will be introduced to knowledge utilisation in its various disciplinary forms as well as to current models and approaches to knowledge utilisation. After completion of the short course participants will have a good overview of the field of knowledge utilisation and will be in a position to guide knowledge utilisation activities at their own institution.

SCIENCE COMMUNICATION

The purpose of this short course is to empower researchers to translate their science for lay-audiences. Science communication involves a variety of approaches of which publications remain central (e.g. brochures, reports, web content, newspaper clippings) together with more "entertaining" approaches such as exhibitions, public demonstrations, science theatre and television documentaries.

The short courses run over four days, two days per short course, and will be presented in Stellenbosch from 25 to 28 September 2012. The courses cost USD 350 for both (4 days) or USD 200 for one (2 days). For more information and online registration, please visit: www.sun.ac.za/CREST/DRUSSA

6th International Conference on the Frontiers of Plasma Physics And Technology

4-8 March 2013, Gaborone, Botswana

We are pleased to organize the "6th International Conference on the Frontiers of Plasma Physics and Technology" in Gaborone, Botswana during 4-8 March 2013. This is the sixth conference in the series and the earlier conferences were held in India (Bangalore-2002 and Goa-2005), Thailand (Bangkok-2007), Nepal (Kathmandu-2009) and Singapore (2011). Success of the preceding conferences has given us a deeper satisfaction and encouraged us to move beyond the borders of Asia and establish an alliance with African countries.

Emphasis of the conference will be on all the frontier topics of plasma physics and technologies, and classified in the following three categories but not limited to.

1. Fundamental plasmas: Advances in plasma sources, plasma diagnostics, astrophysical, cosmic and space plasmas, condensed and extreme state matter, high energy density matter, laboratory astrophysical, planetary, supernova, turbulent plasmas, etc.
2. Innovative trends in Applications and Technologies: Advances in particle /photon acceleration, Lasers, Nanotechnologies, Novel radiation sources and applications in Biology, Chemistry, Environment, Health, Industries, Safety, etc.
3. Advances in Nuclear Energy: Development of ultra-laser pulses, Laser-plasma interaction, Magnetically confined plasmas, Inertial fusion plasmas, Nuclear physics under transient state, Recent progress in Fusion studies, Target and reactor physics, Unconventional energy sources, Z pinch, Hybrid (fission plus fusion) reactors etc.

Some of the confirmed speakers include; Beg F. (USA), Borghesi M. (UK), Cvelbar U. (Slovenia), Deutsch C. (France), Fedosejevs R. (Canada), Fortov V. (Russia), Fryxell B. (USA), Gericke D. (UK), Hoffmann D. (Germany), Jain P.K.(Botswana), Jaroszynski D. (UK), Jean Paul-Perin (France), Kong H.J. (Korea), Malka V. (France), McKenna P. (UK), Mendonca J.T. (Portugal), Mulser P. (Germany), Murakami M. (Japan), Neely D. (UK), Ozaki. T. (Canada), Patel P. (USA), Pegoraro F. (Italy), Perlado M. (Spain), Riconda C. (France), Sakagami H. (Japan), Sharkov B. (Germany), Soto L. (Chile), Stehle C. (France), Ulrich A. (Germany), Oost V. G. (Belgium), Varandas C. (Portugal), Walter R. (USA), Wintner E.(Austria), Zvorykin V. (Russia) etc.

We cordially invite all the researchers working in the above and related topics to participate in the conference. For scientific information please contact Tara Desai on: fppt@fppt-series.com or P.K.Jain jainpk@mopipi.ub.bw

International Conference on Optics and Lasers Applications ICOLA2013

Optics and laser technology is a fast growing technology, which has wide range of applications in all the branches of science and engineering. Optics and laser applications are used in medicine, agriculture, energy and mines, defense, computers, industries, and entertainments. Recently the University of Namibia started the Faculty of Engineering and Information Technology at the northern campus in Ongwediva with the blessings of the Government of Namibia. The faculty is equipped with latest available equipment and technology in the world. The faculty has several departments and all the departments have highly specialized experts hired from all over the world. We wish to share the excellent existing facilities and expertise of UNAM with rest of the world to further advance the knowledge in the relevant fields of lasers. Therefore, we will organize an international conference on optics and laser applications (ICOLA2013) in 2013 from July 9 to 12, 2013, during the best climatic conditions of Namibia in Windhoek.

For more information and how to register click here <http://www.unam.na/icola2012/index.html>

Deadline for submissions for the December 2012 issue of Physics Comment is 30 November 2012

Physics Comment Editorial Policy

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

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

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

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

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

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

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

Declaration by Author

When an author submits material for publication, this means:

1. The author(s) assures the material is original, his/her own work and is not under any legal restriction for publication online (e.g., previous copyright ownership).
2. The author allows PC to edit the work for clarity, presentation, including making appropriate hypermedia links within the work.
3. The author gives PC permission to publish the work and make it accessible in the Magazine's archives indefinitely after publication. The author may retain all other rights by requesting a copyright statement be placed on the work.

Authors should respect intellectual integrity by accrediting the author of any published work, which is being quoted.

Publication Deadlines

Physics Comment is published four times a year.

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

Specification and Submission of Content

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

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

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

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

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

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

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

Categories of Content Contributions

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

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

Advertorials: Advertorials could be published when supplied by the client. We recommend a maximum of 500 words plus one or two pictures for maximum impact. A PDF file of the laid out advertorial should be emailed by the client along with an MS Word file of the text and separate image files of the pictures. It is the client's responsibility to ensure that the advertorial is correct as it is in fact a paid for advert page.

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

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

Submission of Articles

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

