

Physics Comment

A Southern African Physics Magazine

Issue 4, December 2009

<http://www.saip.org.za/PhysicsComment/>
PhysicsComment@saip.org.za



Physics Comment – Issue 4 – December 2009

<i>Cover Photograph</i>	2
<i>Editor's Note</i>	3
<i>From the SAIP President</i>	3
<i>FROM Shaping the Future of Physics in South Africa TO Reviewing Physics Training in South Africa</i>	4
Edmund Zingu	
<i>The New SAIP Physics Server</i>	6
Simon Connell	
<i>IoP organises Meeting with African Physical Societies</i>	7
Brian Masara	
<i>Launch of the African Physical Society</i>	8
Simon Connell	
<i>Profile of SAIP Executive Office</i>	10
<i>Rugby and Physics</i>	13
Trevor Davis Lipscombe and Ida Bernstein	
<i>Discovery of a New Phenomenon Induced by Quantum Fluctuations in the Electromagnetic Vacuum</i>	14
Cesareo A. Dominguez	
<i>Feedback on Entrepreneurship Workshop for Scientists and Engineers from Developing Countries</i>	16
Roelf Botha	
<i>South African Physics Graduates Database – Progress</i>	17
Brian Masara	
<i>Letter to the Editor</i>	19
<i>Techtrack: X-ray advances improve patient care</i>	19
Kelvin Kemm	
<i>Physics 500</i>	20
<i>Obituary: Izak Jacobus (Ieks) van Heerden</i>	22
Runan de Kock	
<i>Global Survey of Physicists</i>	22
<i>ASSAf launches a TWOWS National Chapter</i>	23
<i>Prizes for Physicists</i>	23
TWOWS launches a new prize scheme for young women scientists.....	23
IUPAP Young Scientist Prize in COMPUTATIONAL PHYSICS	23
L'Oreal-Unesco Award for Women in Science for Africa	24
<i>Upcoming Conferences & Schools</i>	24
African School series on "Electronic Structure Methods and Applications" – a biennial workshop series from 2010 to 2020	24
2010 AFRICAN SCHOOL OF PHYSICS.....	25
SAIP2010: First Announcement	26
<i>Opportunities for Students</i>	26
MSc and PhD in Quantum Information Technology	26
<i>Physics Comment Editorial Policy</i>	27

Cover Photograph

Snapshots from the Entrepreneurship Workshop for Scientists and Engineers from Developing Countries in Africa

Photographs courtesy of SAIP Executive Office

The Entrepreneurship Workshop for Scientists and Engineers from Developing Countries in Africa was held from 9 to 13 November at iThemba Labs. The first of its kind in Africa, 48

participants from 14 African countries were in attendance. More pictures from the even can be downloaded from the Program page on <http://www.saip.org.za/events/entrepreneurship/>

Editor's Note

Jaynie Padayachee

As 2009 draws to a close, I would like to take this opportunity to thank all contributors to *Physics Comment* and you, Dear Reader. Without you, there would be nothing to publish. A special word of thanks goes to Dr. Kelvin Kemm for kindly granting us permission to re-print his Engineering Weekly column, Techtrack. *Physics Comment* took some time to get off the ground, but once it got going, it was easy to keep it afloat. After the bumper September edition, I was a bit

concerned that I would not have sufficient content for this issue, especially since most potential contributors were in the midst of marking around the time when the articles were due. However, I must say that I am impressed! We have 26 pages to keep you entertained over the holiday season. If you are going to be on the roads, take care. Have a wonderful holiday season and all the best for 2010, it can't be as bad as 2009;)

From the SAIP President

As the year draws to end, for a month or so, we have a brief respite from the frantic pace of activity during the year. This quiet time allows us to reflect on some things that we would like to accomplish in the year to come. There are two key developments that I would like to highlight. The first concerns the future of physics in South Africa, and the second concerns the future of physics on the continent.

Many of us are concerned about the state of preparedness (or otherwise!) of students entering undergraduate physics programmes in South Africa. Anecdotal evidence presented by Heads of Physics Departments at this year's SAIP Annual Conference in Durban in July revealed that students entering first-year physics courses are ill-prepared and are performing poorly. This comes at a time when the National Research Foundation and the national Department of Science and Technology have embarked on a new initiative to increase the PhD graduation rate five-fold by 2018. Clearly, something needs to be done to review the state and efficacy of physics training in South Africa.

Responding to calls by the Heads of Physics Departments at the 2008 SAIP conference in Polokwane and again in 2009 at the Durban conference, the SAIP Council has initiated a new project called "Review of Physics Training in South Africa". The long-term aim of this project is, briefly, to improve the quality of students entering physics departments, as well as the quality of students graduating from physics departments. Although the focus is on university-level training, the project recognizes that we cannot address the state of physics education in universities without consideration of school physics as an important boundary condition.

I am delighted to announce that Council has appointed Professor Edmund Zingu to lead this important project. The Review will be directed by an ad hoc Management and Policy Committee

under his leadership. Prof Zingu is a recent Past-President of the SAIP and has played a leading role in other high-level reviews, including the SAIP's own Shaping the Future of Physics, which he led in 2004-2005. Council has the greatest confidence in the successful outcome of this important Review under Edmund's able leadership. In his article, "From Shaping the Future of Physics in South Africa to Reviewing Physics Training in South Africa," Prof Zingu shares some preliminary reflections on this project that will be implemented from early 2010.

The second major development that I would like to refer to pertains to the establishment of an African Physical Society, due to be launched in Dakar, Senegal, on the 12th of January 2010. Members of the SAIP will have received an email circular from Professor Francis Allotey, informing them of this important development. The SAIP will be represented at this important meeting by SAIP President Elect, Prof. Simon Connell, and SAIP Executive Officer, Mr Brian Masara. Simon has written a short article on this development for the current issue of *Physics Comment*.

There are many other interesting developments that I could refer to, but I leave it to the reader to peruse this issue of *Physics Comment*. I would like to take this opportunity to thank the Editor of *Physics Comment*, Dr Jaynie Padayachee, for her sterling efforts to produce a very interesting publication for our membership and for anyone interested in physics in South Africa. I would also like to thank SAIP Executive Office staff, Mr Brian Masara and Ms Linette White, for their excellent work in support of the Institute during 2009. Thank you also to all the Members of the SAIP Council, who give up so much of their time and expertise to support physics in South Africa. Lastly, I wish all SAIP members and their families a safe and peaceful holiday season and a successful and prosperous New Year.

Peter Martinez (SAIP President)

FROM Shaping the Future of Physics in South Africa TO Reviewing Physics Training in South Africa

Edmund Zingu

Shaping the Future of Physics in South Africa (SFP) was born out of the concerns of physicists about the state in which physics found itself at the turn of the century. By and large the physics community was concerned about the dying species of physicists who did not seem to have successors amongst the dwindling number of physics students, and the low levels of support for physics, both financially and "politically". The morale of physicists was at an all time low. A major increase in funding was required. It was considered that such increases in financial support could only be achieved if it was motivated by a searching examination of the role of physics in society and an inspired re-invention of this role where necessary. This re-invention of the role of physics was considered to be best undertaken in the form of a wide-ranging and transparent review. It is obvious that while there was agreement that the physics community should "reflect" on its role and activities, there was also an expectation that physics would receive considerable support after the review. Notwithstanding the scepticism of a few, the majority was optimistic about the outcome and looked forward to increased support for physics in South Africa.

The project: Shaping the Future of Physics in South Africa had a number of major achievements:

- A number of initiatives were launched as outcomes in response to the recommendations of the project e.g. the SAIP Office, the Institute for Theoretical Physics and the Marketing programme, to name a few.
- Those who were confronted by the project facilitators or those who participated in the project were forced to reflect on their involvement in physics, and were sometimes challenged to respond to some hard questions. For many it was the first time that they critically questioned their own physics-related actions. We trust that this critical thought has had a positive impact on the practicing of physics in South Africa.

Is this what R500 000 bought for physics the sceptics were asking. This was to be the beginning of a new dawn for physics in South Africa. We are now out of the pessimistic period, and launched on a trajectory of exciting new growth (particularity expressed in the SAIP Office and its projects), evidence by increasing strength of the research capacity, and a wonderful new working relationship with the NRF and the DST.

The current vibrancy in the physics departments and at gatherings of physicists is an indication that it has been a worthwhile investment.

It is now 5 years later and we are about to embark on a similar project. This time the questions will be different, though related. Concerns have been expressed by the Heads of Physics Departments about the poor quality of the entering students and their inability to master physics of an appropriate standard. Council has responded by launching a project which will not only address these concerns, but also contribute to the achievement of the Human Capital Development targets which have been set by the Department of Science and Technology – increasing the number of PhD's fivefold by 2018. This new project will focus on the training in physics. The title of the project has been chosen to be sufficiently broad to cover various aspects of training and avoid pre-empting a particular solution to problems which have not been fully formulated, not ignoring the fact that the project should have a well defined focus.

Review of Physics Training in South Africa (RPT)

In the process of conceiving this new project it was tempting to formulate the problem and possible solutions to exist externally to the physicists. Students and their inadequate preparation at school can so easily be blamed for the poor results at university. A common approach to solving educational problems is a review of the curriculum. The revision of the Senior Certificate curriculum is still fresh in our minds – in fact we have not been able to assess the full impact of this new curriculum on our teaching at university. It is only ten months ago when the first cohort with the new Senior Certificate entered the physics departments.

Whereas the two projects are similar and related, there is one fundamental difference in the expected deliverables of these projects. The successful completion of the SFP project and the implementation of the recommendations have resulted in additional support for physics as an outcome – a quantitative outcome. The SFP report and the recommendations largely stressed the actions that could be taken externally e.g. more funding for research, better salaries, more bursaries, etc., with little specific (new) action to be taken by physicists themselves. The implementation of the SFP project recommendations have allowed physicists to do more things and to do different things. Of course it could be argued that the quality of what

physicists have been doing has now been improved as a result of the SFP project but that is hard to demonstrate at this stage.

The successful completion of the RPT project is intended to have a positive impact on the quality of the students entering and the quality of the graduates leaving the physics departments – a qualitative outcome. When the recommendations of the RPT project are implemented, it would hopefully result in physicists doing the same things differently – better.

The RPT project builds on the SFP project. It was evident that the brief to the SFP International Panel could not include all aspects of physics in South Africa at that time, nor did the panel have the time or expertise to assess all areas critically. The panel members were selected because of their particular expertise and experience which matched the areas which the physics community considered important to achieve the desired project outcomes. Nevertheless, the International Panel made various comments and recommendations in respect of physics teaching at school level as well as university level. Recommendation 4.1.1., Recommendation 4.1.2. and some Comments in respect of University Training have been extracted.

RECOMMENDATION 4.1.1

The state of teaching science in secondary schools

In many countries, elementary and secondary school teaching of mathematics and science is a considerable worry. In South Africa this situation is exacerbated in the historically black schools. Although beyond the scope of this inquiry, we must flag this very serious situation. We acknowledge that steps are being taken to address this matter, but urge the relevant authorities to pursue it with even more vigour, as it is a crisis situation. Individuals in the physics community are to be commended for their activity in this regard, but more involvement is needed, particularly at the structural

RECOMMENDATION 4.1.2

Attracting and Retaining Good Physics Teachers

It is our observation that those who have the ability to major in physics have a wide range of employment open to them, and few are encouraged to enter the teaching profession. In view of the shortage of suitably qualified science teachers to develop and sustain a science and technology-oriented economy, the Panel recommends that urgent steps be undertaken to attract more and better students into science teaching, and to retain them in that role.

Shaping the Future of Physics is therefore an adequate foundation on which to build the Review of Physics Training in South Africa. In planning the RPT project, it is quite tempting to replicate the SFP project, using the experience. However, the difference between the two

projects and their expected outcomes necessitate a very different approach to be taken in respect of the RPT project.

COMMENTS IN RESPECT OF UNIVERSITY TRAINING

3.2.2 University Throughput

A general concern in universities is the relatively high failure rate in subjects such as physics and mathematics, as opposed to, say sociology and history. This is something that certainly needs to be addressed. However, the simple answer, of dropping the standard, is certainly not desirable, and is, indeed, counter-productive. It has, however, been found in a number of departments that a concerted effort of regular tutorials, extra "open" tutorial sessions when necessary, personal contact between lecturer and students, and generally "tender loving care", does have a positive influence on the pass-rate, while not dropping the level of the examinations passed.

The RPT project is intended to pass judgment on the quality of physics training in South Africa, to identify areas which require improvement or change, and to recommend improvement strategies. Such an assessment cannot be done without an established benchmark. It would therefore be necessary to develop standards for physics training in South Africa as a first step before we attempt to assess the quality.

The project is therefore envisaged to consist of the following components:

1. Given that the problem statement is essentially the concerns expressed about the student preparedness and their success/failure at university, it is necessary to determine the scope of the project through various consultative workshops with practicing physicists and other stakeholders in South Africa.
2. A set of standards, to be known as the South African Physics Benchmark Statement, will be developed for physics training at tertiary level in South Africa. This task would be undertaken by a Task Team consisting of South African and foreign physicists. Such benchmarks are common in countries where a national curriculum does not exist or is not desired, but where excellence in training is valued. The Benchmark Statement should describe the nature and characteristics of the training programme and represent general expectations about the standards, including the skills and achievements that graduates of physics-based degrees should have. An assessment of the quality of training can then be made against the benchmark statement and any curriculum, teaching or learning reform would be in terms of the benchmark statement. The Physics Benchmark Statement should take into account the Senior

Certificate Curriculum Statement.

3. A review of the physics training programme will then be undertaken against the South African Benchmark for Physics Training, immediately after the statement has been accepted, or it could be delayed to allow departments some time to meet the South African benchmark standard. An immediate review will assist and guide departments in their development and improvement. The review is not intended to be an assessment of the curriculum but an assessment of the degree to which departments are succeeding in producing the graduates that the society expects. While it would be inappropriate to be prescriptive about the structure of a degree with Physics as a major, the challenge to the

various physics departments will be to implement strategies to develop the students successfully and contribute to the development of our society.

The success of this project and the achievement of its goals and objectives are dependent upon the active participation of the physics community and other stakeholders. The formulation of the "problem statement" should be preceded by discussions, debate and research. Towards this end a website has been set up (provisionally) at <http://www.ezi.co.za/physics> which includes a blogging area. It is hoped that physicists will participate in the public discussion through the blog. Information about the project will also be published regularly on the site.

The New SAIP Physics Server

Simon Connell

The SAIP has acquired a new high performance computer as a server to host its new suite of services and member benefits. This has become necessary as we have outgrown our previous IT facilities. Our new trajectory of growth and expansion is a result of the implementation, gradually, of the various recommendations arising from the Shaping the Future of Physics exercise. One of the very important developments has been the establishment of the SAIP Office (see Profile of SAIP Executive Office on Page 9).

The SAIP Office has attracted several new projects, as contracts, which advance the discipline and are services to policy makers and members alike. Several of these use advanced database and internet technology, to generate and manage data and produce reports. One such project is the South African Physics Graduates Database (see Page 17), which currently has more than 500 graduates registered. The South African Physics Graduates Database allows the career paths of our physics graduates to be tracked and studied. The SKA project is an example of a client that has requested reports generated from this database. Another project is Physics 500, which currently has about 100 registered physicists. Physics 500 promotes the networking between researchers and industrial research and innovation opportunities. Another example is an expanded conference organising service. This service has already handled several conferences. With the new SAIP server, the services of registration, finances, delegate liaison, abstract submission and report generation will be integrated with modern technology. The aim is to offer our members a partner in conference organisation in the context of an experienced awareness of the special requirements of physics conferences. This also includes assistance with

liaison with the DST and the NRF.

The new server is a rack mount 1U unit housed in the dedicated secure and serviced environment of the University of Johannesburg's ICS division. We can be sure, that when the lights go out in Johannesburg, the SAIP server will stay online! There is a single Intel Xeon E5504 2.0GHz Processor with 8GB of RAM. There are three 500MB SAS disks with RAID 5 redundancy provided in hardware by a PERC/6 controller to ensure 1TB of secure storage (RAID 5 configuration) and there is a redundant power supply. A 3 year support contract with on-site vendor intervention in 4 hours completes the package. The machine is secured by a strict firewall.

The services take inspiration from the web pages of several other Physics Institutes, as well as the collaboration tools as developed or deployed in the large CERN experiments. This includes: a web-server for normal static web pages and as a foundation for subsequent services, a Twiki server for rapidly changing pages which also allow collaborative editing, a content management system, as our primary service for high quality professional presentation and integration of member services. For example, the Physics Comment Online can be presented, archived and searched here. The Members Area will also be hosted here. The Database services will be supported by a professional modern hierarchical relational database server. Other services will require this, for example, the Indico Server which will handle the Event Scheduling as well as the Conference Server, Graduate Database and Physics 500 project system (as developed by Kevin Meyer). SAIP Documents will be hosted using CDS Invenio. The Trac ticketing system will be available for query logging. SAIP will make use of SANReN for the backup solution,

beyond the RAID capacity. A professional developer will perform the start-up configuration, integration and content arrangement.

The new SAIP server is already online and being configured and developed. We leave the suite of member services that will be developed and displayed for the next article in the series, to be

timed when the member services are launched.

Developers

Sergio Ballestrero, Bruce Becker, Roelf Botha, Simon Connell, Kevin Meyer, Jaynie Padyachee.

IoP organises Meeting with African Physical Societies

Brian Masara



Delegates at a meeting of African Physical Societies and Physics Institutes. (Seated from left to right) Dr Dipali Chauhan (IoP, United Kingdom), Sir John Enderby (IoP, United Kingdom), Ms Linette White (SAIP, South Africa), Dr Kgakgamatso Moloi (Botswana), Prof Aba Andam (AfPS, Ghana), Dr Beth Taylor (IoP, United Kingdom), Dr Xavier Carelse (Zimbabwe). (Standing from left to right) Prof Paul Wofo (CPS, Cameroon), Prof Nithaya Chetty (SAIP, South Africa), Prof Charles McGruder (NSPB, United States of America), Prof Samuel Mensah (GPS, Ghana), Prof Ahmadou Wague (Senegal), Prof Malik Maaza (NANOAFNET, South Africa), Dr Lawrence Norris (NSPB, United States of America), Prof Emeka Okwueze (NIP, Nigeria), Prof Simon Connell (SAIP, South Africa), Mr Brian Masara (SAIP, South Africa), Prof Mourad Telmini (TPS, Tunisia), Prof Akintayo Adedoyin (AfPS, Botswana), Dr Ntoi Rapapa (Lesotho), Prof Edmund Zingu (SAIP, South Africa), Prof John Fletcher (GPS, Ghana)

The Institute of Physics (IoP) and the American Physical Society (APS) jointly sponsored a meeting of African Physical Societies and Physics Institutes. The highly successful and historic event was held in the Western Cape at Villa Via Hotel in Gordon's Bay on 14 November 2009. The meeting provided a first opportunity for the heads of African physical societies to discuss the role of physics in Africa's development, and how they might work more efficiently with each other, with the IoP and with other physics organisations to strengthen physics in Africa.

The following organisations and countries were represented

1. Institute of Physics (IoP)
2. South African Institute of Physics (SAIP)
3. Nigerian Institute of Physics (NIP)
4. Cameroon Physical Society (CPS)
5. Tunisian Physical Society (TPS)

6. Ghana Physical Society (GPS)
7. African Physical Society (AfPS)
8. National Society of Black Physicists (NSBP)
9. Association of African Physics Students (AAPS)
10. NANOsciences AFrican NETwork (NANOAFNET)
11. Botswana
12. Lesotho
13. Zimbabwe
14. Senegal

This meeting emanated from the fact that learned societies have historically played a unique role in the developed world, in creating networks of specialists who can support one another, communicate their subject, and influence its development. Nurturing the formation and growth of national physical societies in developing countries offers an effective route to building their capacity to undertake, and benefit from, physics-related activity. IoP is one of the leading physics organisations around the world, with a sustainable capacity and experience in managing its worldwide membership of over 36,000 and communicating physics-related science to all audiences, from specialists through to government and the general public. Through this meeting IoP wanted to explore how best it can support physical societies in developing countries through hearing first hand their immediate concerns.

IoP is already involved with physics development in Africa, for example they now provide low cost membership or free IoP electronic membership to physicists from developing countries, they are running projects on low cost physics teaching equipment in Rwanda, Tanzania, Ethiopia & Malawi and supporting training of physicists in entrepreneurial education.

The participants viewed the African physics landscape to be currently characterised by the following

Positive Aspects

- There are pockets of excellence in various countries and networks
- There is increasing student interest in physics and astronomy

- A lot of goodwill exists in the African physics community, and in the global physics community towards Africa
- Involvement and acceptance of women in physics has been increasing
- There is a cohort of young, enthusiastic and engaged physics teachers.

Challenges Faced

- Poor governmental and university support for research and training in physics.
- Poor public understanding of physics, for example secondary school students & parents have only a monolithic idea of the career choices after majoring in physics
- Student-teacher ratio is very high
- To reduced brain drain, and replace it with brain-circulation. That is, increase intra-Africa mobility of physicists
- Poor ICT infrastructure not enough broadband hi-speed internet connectivity, and the pricing schemes make it hard to do large scale connectivity distributed computing and to move large amounts of data.
- Salaries in academia are generally low such that administrative jobs tend to take the best teachers/mentors out of teaching & research

Vision for physics in Africa

- Aspire to international quality in teaching and research while maintaining local relevance
- Impact teaching, research, innovation, sustainable development and social development. E.g. use physics to achieve MDGs
- Identify flagship intra-African project to build development in Africa and create intra-Africa

research groups around critical topics of common need. E.g. Solar Energy, SKA

- Foster a vibrant, dynamic, and diverse network of physicists in Africa
- Build a database of African physicists

After careful deliberations the following were some of the areas African physicists highlighted as requiring support;

1. Development of a regular forum where presidents of physical societies meet to discuss physics developmental needs in their respective countries and for Africa as a whole
2. Help with developing and starting physical societies in countries where they do not exist
3. Free or subsidized access to journals and low cost text book editions
4. Technical assistance through programmes such as exchange programs, ICT development, promotion of women into physics, supporting research clusters in topical areas in Africa such as Square Kilometre Array etc
5. Partnership in physics lobbying and outreach events development
6. Physics curriculum review and development
7. Expansion of the physics education equipment programme to other countries

The SAIP attaches great importance to promoting the development of physics in Africa. As such, we were delighted to partner with the IoP in organising this meeting. We look forward to engaging in ongoing discussions with African physical societies and the IoP to promote physics in Africa.

Launch of the African Physical Society

Simon Connell

In what will become a landmark historic event, the African Physical Society will be launched on Tuesday 12th January, 2010, in Dakar, Senegal on the campus of the University of Cheikh Anta Diop. The SAIP will send its President Elect, Simon Connell, and the Executive Officer of the SAIP Office, Brian Masara, to attend. This meeting will also be a meeting of the African Association of Physics Students.

The birth of a Pan-African physics professional society is an exciting development for the state of physics in Africa. The African Physical Society is envisioned to be an international society that unites the various national physics societies on the African continent, and to represent physicists, astronomers and physics students in governments across the continent, at the AU, in

the international community of physics professional societies, and in the world community at-large. It provides a forum to bring together for the purposes of networking, collaboration, and advocacy, all the existing national physical societies. In addition to supporting the existing societies, the African Physical Societies endeavours to support and represent physicists and physics students working and studying in countries that do not have a national physical society. It hopes to catalyse the creation of more national physical societies. As an advocate for physics across the continent, the African Physical Society endeavours to increase the resources for physics training and research in Africa, and the economic and social development that follows.

Messages of support are arriving from the international community. The Institute of Physics (IoP) has indicated that they will be sending an official letter recognising the new society, and wishing it well for its future developments as well as providing some support for attendance by delegates. The National Society of Black Physicists (NSBP) has also been closely associated with the progress towards the new society. It also hosts the web pages at <http://www.africanphysicalsociety.org/>. The launch meeting has been jointly organized the African Lasers, Atomics, Molecular and Optical Sciences Network (LAM Network), the Edward Bouchet Abdus-Salam Institute (EBASI) 7th international Conference on Science and Technology for Sustainable Development and the National Society of Black Physicists. All professional physics societies from around the world are invited to send a representative to Dakar on January 12, 2010, to attend the formal launch ceremony.

The African Physical Society incorporates the African Association of Physics Students as a subsidiary organization.

The African Physical Society may be seen as flowing from the Society of African Physicists and Mathematicians (SAPAM) which was inaugurated in 1984. Since its formation, it has organized over 40 workshops, in many countries in Africa, and has received support from ICTP, UNESCO, OPEC Fund, United Nations University, Africa Academy of Sciences, United Nations Environmental Programme (UNEP), International Development Research Programme (IDRC), TWAS and the Swedish Agency for Research Co-operation with Developing Countries (SAREC), amongst others. SAPAM has links with the American Physical Society, the European Physical Society and the U.K Institute of Physics and has been participating in IUPAP activities. It had observer status at the OAU since 1990. Over the last decade, the formation the African Physical Society was mooted and discussed in various meetings and using internet groups.

South Africa (iThemba LABS), on the last week of January 2007, was the venue for an important meeting during the 6th EBASI International Conference on Physics and Technology for

Sustainable Development in Africa. At this meeting, it was resolved that SAPAM should change its name and become known as African Physical Society. At the same time it was resolved to establish the African Physical Review as the official scholarly publication of the African Physical Society. This was separately accepted by the executive officers and members of SAPAM. All of SAPAM's reciprocal relationships and observer statuses, e.g, with the African Union and IUPAP, will be transferred to the African Physical Society.

South Africa was again the host country for an organisational meeting in Gordon's Bay on November 14, 2009. This meeting was motivated and funded by the Institute of Physics (UK), which is seeking to expand their support of physics in the developing world, with a particular focus on Africa. Further discussion of the pending launch of the African Physical Society formed a natural part of the day's discussions. Represented on that day were many of the existing national physics societies in Africa, (the SAIP, the Cameroonian Physical Society, the Ghanaian Institute of Physics, the Nigerian Institute of Physics, the Tunisian Physical Society, representatives from Senegal, Botswana, Algeria, Lesotho, Kenya, Zimbabwe and several others) were also in attendance.

These events have now lead to the scheduled launch of the African Physical Society in Dakar, early next year. The SAIP extends it best wishes to the African Physical Society in carrying out its mission.

Interested readers can find out more about the Dakar meeting, as well as the African Physical Society [1] and the African Association of the Physics Students [2] at the organizations' respective websites. Professor Francis K. A. Allotey, Interim President of the African Physical Society, can also be contacted at president@africanphysicalsociety.org.

Acknowledgements & References

With acknowledgements from documents at the web site of the African Physical Society.

1. <http://www.africanphysicalsociety.org/>
2. <http://www.africanphysicsstudents.org/>

Deadline for submission of articles for the next issue is 28 February 2010.

Details on <http://www.saip.org.za/PhysicsComment/>

Profile of SAIP Executive Office

In the last issue of Physics Comment we profiled the people behind the SAIP Council. In this issue we meet the people behind the SAIP Executive Office.

Executive Officer: Mr Brian Masara



Brian Masara has a Masters in Business Administration, a Master of Science in Applied Physics, a Bachelor of Science Honours in Physics and various certificates in metrology, laboratory management and quality assurance. Brian started his career as a research and projects officer in an electric cable manufacturing company, Central African Cables. He then moved to the Scientific and Industrial Research and Development Centre (SIRDC) in Zimbabwe where he worked as research scientist in electrical metrology. When he joined, SIRDC was in the process of setting up the National Metrology Institute and he was appointed the inaugural Director of the National Metrology Institute to spearhead establishment of the Institute. Brian then moved to SIRTECH where he was the inaugural General Manager of SIRMET Founders and Engineers where he was part of the team that set up a foundry and engineering factory. Brian joined the South African Institute of Physics in January 2008 as Executive Officer. Brian's research interests include entrepreneurship & business start-up since he has been involved in managing and steering start-up entities, for most of his career. He also enjoys electronic instrumentation and renewable energy research.

Brian relaxes by walking or fishing and also enjoys hobby electronics during his spare time.

Q What challenges do you see for the SAIP over the next 2, 5, 10 years?

A Increasing membership especially attracting physicists in industry and those in financial services sector

Q What challenges do you see for Physics in South Africa over the next 2, 5, 10 years?

A Convincing the public on the importance of physics as a career, most people think of it as

just an academic and theoretical discipline.

Secondly increasing the skills base and take up of physics at university level.

And of course the issue of attracting and keeping women in physics profession.

Q What successes would you like to see for the SAIP over the next 2, 5, 10 years?

A To see SAIP become a world class physics professional body and a self sustainable science charity organisation with a broad membership base

Q What successes would you like to see for Physics in South Africa over the next 2, 5, 10 years?

A To see the public, youth and industry appreciate the role that physics plays as a fundamental discipline in the country's technological development

- ♦ To see physics education and research contribute to government's grand challenges in science and technology e.g. contributing to energy security, climate change, bio-economy among other areas
- ♦ To see physics academic institutions produce enough and appropriate skills for the country's academic, research and industrial sectors. For example adequate skills for projects of national interest such as the Square Kilometre Array (SKA), Pebble Bed Modular Reactor (PBMR), Hydrogen Project among others.

Q List three things that you are going to accomplish in your portfolio in this term of office.

A In broad sense, working with various teams, I want us to effectively implement the SAIP office strategy and achieve our targets. In January 2009 we crafted a strategy for the SAIP office. This plan has three strategic areas which are,

- Membership and Services
- Education and Research
- Physics for development

I will be very happy to see us achieve our set targets in these areas

Q What strengths do you bring to this position?

A I bring a combination of technical skills and general leadership & business skills, plus strong strategic planning and implementation experience.

I also bring strong people management and team building skills. I believe to succeed in leadership, one should have people and team building abilities since these are the prime tasks of leadership. I will build cohesive teams where collaboration, cooperation and joint ownership of success are cherished.

I also bring project management skills, this is essential because most of SAIP activities are implemented and managed as projects. With these skills we will achieve set project goals as well as meet and exceed the expectations of our donors and grant providers.

Q Please comment on how your position is going to assist with Marketing, Specialist Groups and International Physics Societies.

a Marketing

A Build a strong SAIP brand in the eyes of physics community, science and technology stakeholder. We will help maintain SAIP in the public eye through various promotional initiatives and marketing & publicity tools, we also plan to create a network of physics outreach volunteers in South Africa and provide them with resources to market physics wherever they are.

b Specialist Groups

A My office will set-up conference management services so that annual SAIP conference, winter schools, workshops and conferences are well run and members have quality platforms on which to network, share ideas and scientific research findings. In addition we will help them in preparing funding applications for their projects and as well as bidding for international conference in their disciplines to come to South Africa.

We will also maintain links between members and relevant IUPAP commissions and keep members informed of opportunities that will be available. We also hope to revamp our website so that activities of various specialist groups are kept in the limelight.

c International Physics Societies

A We have already started working with international physics societies such as IoP and APS. For example on 14 November 2009 we held a meeting of African Physical Societies / Institute in Cape Town which was a historic event and attended by over 14 countries. Working with international partners we hope to establish a platform where presidents of African Physics

societies regularly meet and discuss how physics can address Africa's needs and challenges such as the need for skills and infrastructure to host the Square Kilometre Array and addressing the Millennium Development Goals (MDGs).

Marketing and Outreach Coordinator: Mr. Roelf Botha



Marketing and Outreach Co-ordinator, Roelf Botha obtained his B.Sc. (Cum Laude) in Physics, Mathematics and Applied Mathematics as well as a M.Sc. (Cum Laude) in Astrophysics from University of North West (former Potchefstroom University). Currently the Space Geodesy Programme of the Hartebeesthoek Radio Astronomy Observatory employs him part-time as a Research Assistant. As part of his research he is in the final stages of his PhD in Laser Physics, through the University of Stellenbosch. He joined the SAIP at the end of 2008 as the Marketing and Outreach Coordinator on a half-day basis. The focus of his activities during 2009 was mainly on outreach to secondary learners. During 2010 this will expand to tertiary level, and active marketing of the SAIP will also be implemented during next year. Roelf relaxes by spending weekends at previously unexplored spots / locations, music (across most genres) as well as reading both fiction and non-fiction.

Q What challenges do you see for the SAIP over the next 2, 5, 10 years?

A Generally our greatest challenge will be expansion of the services of the SAIP to its members, relevant institutions, government, industry, the media and individuals to provide a full-encompassing and integrated information system. Through this income must also be generated (selling of advertisement space) to help sustain the SAIP office. During the next 2 years specifically we must render the new SAIP web server and website functional, as well as implement streamlined advertisement channels. From this basis we'll be able to build up services and products for the relevant market segments.

Q What challenges do you see for Physics in South Africa over the next 2, 5, 10 years?

A Funding processes should be streamlined, integrated and aligned with international

projects and research trends. As a physics community we should also identify certain niche areas in which South Africa can become world leaders. One such project, the 'Biophysics Initiative' is currently underway. Specialising in such relatively unpopulated fields will lead to numerous opportunities in terms of funding, innovation and commercialisation.

Q What successes would you like to see for the SAIP over the next 2, 5, 10 years?

A The SAIP must become a fully-functional player in the international physics arena (with journals etc.), specifically to address the challenges, as listed above, successfully.

Q What successes would you like to see for Physics in South Africa over the next 2, 5, 10 years?

A To continue with relevant research, develop new areas of research and to have innovation spin-offs from basic research being conducted in SA.

Q List three things that you are going to accomplish in your portfolio in this term of office.

A Expand, unify and coordinate the outreach activities from various physics and related entities, to provide secondary learners with a better overview of the physics-based sciences as well as syllabus-aligned information. Establish a network of support groups for tertiary level (pre-grad) physics learners. Actively engage with all role players relevant to the field of physics - create and maintain links between them and provide networking opportunities.

Q What strengths do you bring to this position?

A A good and diverse background in physics, knowledge of the different players involved on both the research and governmental level, and good integration skills.

Q Please comment on how your position is going to assist with Marketing, Specialist Groups, Physics Education initiatives and International Physics Societies.

A Marketing: The whole aspect of marketing is new in the SAIP, so the development of such marketing tools and channels will be one of my major tasks. This will effectively help ensure the advancement of physics on various levels through the services that the SAIP provides and will start providing in the near future.

Specialist Groups: Networking between the specialist groups will help to establish marketing opportunities, as well as provide the resources

needed in developing educational material, as addressed next.

Physics Education initiatives: Physics education is the basis of the livelihood of the physics community and therefore requires a very high level of involvement from the SAIP. Creating educational resources (information, equipment, career guidance etc.) that will provide learners with an integrated information system is one of our primary objectives.

International Physics Societies: Cooperation with international physics societies is important for the SAIP- the opportunities created and knowledge shared through such joint activities is immensely valuable for the advancement of physics on various levels. As an example, the Entrepreneurship Workshop at iThemba Labs involved numerous physics societies from Africa and beyond, and provided invaluable information and motivation to move towards innovation, patenting, entrepreneurship and commercialisation.

Private Assistant to the Executive Officer: Ms Linette White



Private Assistant to the Executive Officer, Linette White matriculated in November 1978 and subsequently obtained a Typing Diploma II & Executive Secretary Certificate. Linette started work at the Department of Education in Pretoria as a Junior Secretary in 1979 and then moved onto MEDUNSA where she was a Executive Secretary/Personal Assistant from 1980 to 1987. Linette held similar positions at Telkom (1987 – 2001), Huurkoradmin [Pty] Ltd in Pretoria (2001 – 2004), Department of National Treasury (2004 – 2006) and Metrorail (2006 – 2007). Linette joined the SAIP in November 2008.

Linette relaxes by cooking, creating different documents on computer, knitting, crochet and braid working, creating clothes and making them, playing TV games against her son, watching DVD's [action please !!!] and working in the garden. Linette also enjoys woodcarving, but lately can't seem to find the time for it. She is currently helping a friend format and edit a book.

Linette says "I do not have the Physicists/Scientist knowledge one should have, but I am learning every day about the Physics world !!! What tickles my fancy: Lasers, Nuclear Physics an Plasma Physics."

Rugby and Physics

Trevor Davis Lipscombe and Ida Bernstein

Sad to say, physics can be a real conversation stopper. No matter how much we discuss the Big Bang, or quarks, nor how excited we get, our favourite subject can result in blank stares or hurried apologies from those we meet. The reason is that many people's experience of physics is not of vigorous enquiry into the curvature of space-time, or into the fundamental building blocks of matter. Instead, we give them building blocks all right, but place these blocks on an inclined plane and see when they first begin to move. It's hard to get students, or even teachers, excited about friction. But let's try to think beyond the classroom window. Real physics is about the construction of simple models that explain the world around us. And examples can be found everywhere, not just in the cosmos or inside the atom. We can find fascinating examples of our craft in the most unlikely places, including the rugby pitch [1].

Boots, not blocks

South Africa, as many of your students know, is the reigning world champions of the men's 15-a-side game. Oddly enough, your students are probably far more interested in the outcome of a Springboks game than in the truly tedious block-on-inclined plane experiment. Let's heel one against the head, and use sports as a means to reach out to children who can't quite see the purpose of friction or physics. When Brian Cabana runs with the ball, he exerts a force on the ground. If the force is too large, his boot overcomes the frictional force between boot and turf and he slips. To prevent this embarrassment, the rugby world has come up with an ingenious device, the stud. Studs anchor the foot into the ground, allowing the player to exert more force without slipping, as Shane Williams showed when he masterfully danced his way through four Springboks, Brian included, on a recent Welsh trip to South Africa [2].

Wingers, not pendulums

Backs fear they'll be outrun. But who, exactly, are the fastest players on the pitch? The simple physical model here is that running is roughly the same as swinging your leg back and forth like a pendulum. And, as students soon learn, the time it takes for a pendulum to make the round trip goes like the square root of its length. But the distance your foot moves forward, your stride length, depends on your leg length. This means your speed, distance over time, which now is stride length over time, goes like the square root of your leg length. Put in plain English, tall people run faster. Jonah Lomu, at top speed, has a pretty good chance of outrunning someone shorter. As a check – something all good physicists should do – the world 100 and 200 m

record holder is Usain Bolt, who measures in at 1.96m.

There's another piece of physics that can explain who goes where in the backs. If your leg can be modelled as a column of "stuff", then materials science tells us that the column can take a maximum stress before it fails. If you run so hard that your leg is close to this maximum threshold, there's a force that is the stress multiplied by the area of the leg. But this force creates acceleration, as Newton tells us, and the mass of the leg is related to the volume of the leg. The acceleration is force over mass, which goes like the leg area divided by the leg volume, so that acceleration is inversely proportional to leg length: short players can generate higher accelerations. Again, as a check, think of Shane Williams.

A scrum half has to move swiftly into the gaps to score from the 5 meter scrum, or plug the holes in the defence. A fly half has to react immediately to catch the ball and then move into a spot where he can kick for touch. It's no surprise, based on physics, that both halves tend to be at the shorter end of the stature spectrum. But if you have the ball and are hurling it down the line, you give it to players who have had some time to accelerate: what you expect from them is great amounts of speed. So, the centres and the fullback, if he deigns to join in, are probably going to be tall. But in a subtle chip of the ball beyond the enemy lines, where there's a foot race for the ball, be careful. The shorter backs can accelerate more quickly, even though their top-end speed might be less than the larger backs. Whether the ball is touched down for the score or for a drop out on the 22m line depends on how far the ball was kicked. At last, for rugby fans in the high-school audience, you can answer the "So what?" question when demonstrating the simple pendulum.

Running hot and cold

Backs have a habit of dropping the ball in cold weather. It's often best to keep the ball in the pack on those cold days and trust to ruck and maul to move the ball down field. But a quick look at conduction, convection, and radiation can help explain the response to weather conditions. Different emissivities of cotton suggest you should wear dark jerseys in winter and white jerseys for sevens. Heat loss through skin surface area, compared to energy intake related to volume, predicts that a roughly spherical prop will suffer in sevens, and a gangly back will have a tough time in the cold. And your body keeps your core warm by refusing to pump blood to the skin surface when you are cold, to prevent loss through radiation. That's why cold people tend to

be pale – there’s no blood going to their extremities. In terms of strategy, on a cold day you might want to keep the ball in the pack and, when your backs get the ball, thump it downfield. The almost numb hands of the fullback might cause him to knock the ball on, giving you the put in at a well deserved scrum. At the other end of the temperature spectrum, sticking your head in a bucket of cold water during the Dubai Sevens (as one of us knows from personal experience) is a great example of convection, similar to the standard experiment of Newton’s law of cooling, where a heated metal ball in room-temperature air loses heat energy rapidly. Keep a towel handy!

In the classroom

The pedagogical advantage of drawing examples from rugby is clear. You can show video highlights of recent games to illustrate the point you wish to get across, such as the roar of the crowd or the referee’s whistle for a unit on sound; wheeling the scrum when discussing torque; penalty kicks when describing projectile motion; or savage tackling when introducing momentum. The process takes us from the rugby pitch to a simple model of physics (a rugby ball as a point particle, for the case of penalty kicks). Solving the model then results in predictions for rugby players: punt the ball at an angle of 45 degrees to clear your lines most effectively.

A Sport for All

One possible objection to including rugby in a physics class is that it may appeal only to male students. That, though, is increasingly not the case. Women’s (sevens) rugby has just been added to the Olympics and will be hotly contested in London and beyond. (If you want an example

of momentum in action, few players could be a better model than legendary U.S. women’s flanker Phaidra Knight, twice elected to the “All World” team, and whose 85 kg can cover 40m in about 5.5 seconds). Women’s rugby clubs are growing in number rapidly throughout the World, and the women’s rugby world cup has an ever larger number of countries competing in it. By including rugby in a physics class, you may get more interest in physics and more women entering into the sport. Perhaps South Africa can dominate in both men’s and women’s competition!

References

1. See Trevor Davis Lipscombe *The Physics of Rugby* (Nottingham: Nottingham University Press, 2009).
2. A youtube search for Shane Williams and South Africa will bring up the try.



Trevor Lipscombe and Ida Bernstein

Author Biography: Trevor Lipscombe(tcl@press.jhu.edu) has a doctorate in theoretical physics from Oxford University. He played for Magdalen College RFC until a scrum collapsed and his neck was broken. Now based at Johns Hopkins University, he is the author of *Physics of Rugby* (Nottingham: Nottingham University Press, 2009) and coauthor of *Albert Einstein: A Biography* (Westport, CT: Greenwood, 2005). Ida Bernstein (ida1@umbc.edu) is a physics Ph.D. student at the University of Maryland, Baltimore County and plays rugby for the United States women’s team. She has taught physics undergraduates at Syracuse University and high-school students in Johns Hopkins Center for Talented Youth.

Discovery of a New Phenomenon Induced by Quantum Fluctuations in the Electromagnetic Vacuum

Cesareo A. Dominguez, FRSSAF

Abstract

According to Quantum Electrodynamics, fluctuations in the vacuum have been known for a long time to induce nonlinear peculiar effects. Most of these effects are time-dependent and are being discussed with growing frequency in the current literature. A static phenomenon due to nonlinearity induced by the quantum vacuum has been predicted very recently. A neutron placed in an external constant electric field develops an induced electric dipole moment. This discovery is as much unexpected as it is spectacular. In addition, there is a very good chance of observing this effect in experiments being planned for the near future. This phenomenon is described here having in mind the layperson interested in Physics. First, a brief description is

given of Classical Electrodynamics and the classical Cartesian vacuum, followed by Quantum Electrodynamics and the characteristics of the quantum vacuum. Finally an explanation of the discovery in non technical language is given.

Classical Electrodynamics

Classical Electrodynamics, the theory describing electric and magnetic phenomena, is a linear theory so that the *Superposition Principle* holds. This means that the electromagnetic field produced by a collection of sources is obtained by adding linearly, one by one, the field produced by each source. One important consequence of this linearity is that two light rays crossing each other would never interact; they would be oblivious to each other. Another property of the classical theory, true also for any other theory at the

classical level, is that the vacuum is a perfect void without any dynamical properties. In particular, the vacuum would have no electrical or magnetic properties. This picture of the vacuum led René Descartes (1596-1650) to coin the famous phrase: *Nature abhors the vacuum*. As explained next, none of this actually holds in the quantum world.

Quantum Electrodynamics

In Physics, a theory is usually characterized by a function called the Lagrangian density, basically an energy density involving a set of functions of space and time called fields. These fields satisfy a set of mathematical equations which eventually lead to definite predictions that can be tested in experiments. The Lagrangian density of Classical Electrodynamics is such that it leads to linear equations for the electromagnetic fields, and thus to the *Superposition Principle*. The quantum version of this theory, called Quantum Electrodynamics, is also defined by a Lagrangian density involving now quantum fields, which again lead to linear equations. The excitations of these quantum fields manifest themselves as what we call particles, e.g. electrons, photons, etc. However, the nature of the quantum vacuum could not be more different than its classical counterpart.

Like the fluctuations, or bubbles, on the surface of a boiling soup, there are fluctuations in the quantum vacuum in the form of pairs of particles and antiparticles being created, to be reabsorbed in an extremely short time. For instance, a pair of an electron and its antiparticle, the positron are being constantly created and reabsorbed by the vacuum in a time shorter than 10^{-21} seconds, a pair of proton and antiproton in 10^{-24} seconds. The larger the rest mass of the particles the shorter the ephemeral existence of the pair. And this vacuum is actually everywhere in the Universe. One way to understand this phenomenon is to consider together two fundamental principles of Nature: the conservation of energy (first law of thermodynamics) and Heisenberg's uncertainty principle involving energy and time. The latter principle allows for a violation of the former provided the time involved in this process is inversely proportional to the amount of energy being created. The proportionality constant is none other than Planck's constant, which is queen in the quantum world. This constant is extremely small if expressed in macroscopic units, hence the smallness of the time interval involved in the appearance and disappearance of particle-antiparticle pairs. If one were to set Planck's constant to zero, thus returning to the classical world, then there would be no violation whatsoever of the principle of conservation of energy, and no pair production out of the vacuum. To provide an analogy of this process in

ordinary life, a bank client with no overdraft facilities could go overdraft provided he pays back the bank fast enough for the manager not to realize it. In the spontaneous production of a particle-antiparticle pair the bank is the vacuum and the manager is Nature! These particle-antiparticle pairs are a consequence of fluctuations in the quantum fields describing these particles.

These quantum vacuum fluctuations lead to several observable consequences which have been confirmed experimentally with high precision. The most dramatic is the theoretical prediction of the magnetic moment of the electron with a precision at the level of one in a billion, which has been measured experimentally at the same level of accuracy. This is perhaps the most accurate theoretical prediction as well as experimental measurement in Physics.

But there are other, no less dramatic consequences of the nature of the quantum vacuum which are still to be observed in the laboratory. First and foremost is the fact that vacuum fluctuations render Quantum Electrodynamics a nonlinear theory, in spite of it being linear at the Lagrangian level. An immediate and spectacular consequence of this is that two light beams do actually interact with each other, with this interaction being mediated by an electron-positron pair coming out and going back to the vacuum. This process was already known to Werner Heisenberg back in 1936 [1], but so far it remains unobserved, basically due to the tiny probability of this happening. This is expected to change in the medium term with the advent of high intensity laser beams [2]. Another consequence of quantum fluctuations is that the vacuum itself possesses nontrivial electric and magnetic properties rendering it a birefringent medium, like a crystal. While this was also known to Heisenberg, it still awaits experimental observation. The enormous progress achieved in building ultra high intensity lasers has triggered a flurry of theoretical research on potential signatures of nonlinear phenomena in Quantum Electrodynamics [3]. With few exceptions, most of this work has dealt with time dependent phenomena, as lasers involve time dependent fields.

The Discovery: An Induced Electric Dipole Moment of the Neutron

There is one static (time independent) consequence of the nonlinearity of Quantum Electrodynamics which is as much unexpected as it is spectacular, and it has to do with the neutron. This particle, a component of atomic nuclei, is electrically neutral but possesses a magnetic dipole moment; it is like a tiny magnet. If placed in an external constant electric field, the neutron would be oblivious to its presence if the

vacuum would be Cartesian. However, quantum vacuum fluctuations induce an electric dipole moment in the neutron, as discovered in [4]. It must be stressed that this is an induced effect, as opposed to an intrinsic property of the neutron such as its mass, magnetic dipole moment, and zero electric charge. If the external electric field is removed, the induced electric dipole moment disappears.

An electric dipole can be visualized as a pair of electric charges of the same strength but opposite signs some distance apart. This produces an electric field, the electric dipole field, with a well known dependence on the distance to the point of observation and on the angle between the axis of the dipole and the direction to the point of observation. Except, of course, that the neutron is not such a system. It is, rather, a bound state of three quarks, their individual electric charges adding up to zero.

Furthermore, in the framework of the standard model of particle physics, the presence of an intrinsic electric dipole moment of the neutron violates the combined symmetries of charge conjugation and parity transformations (CP). A tiny amount of CP violation is expected, though, in the weak interaction sector of the standard model. This leads to a precise prediction for the size of a possible electric dipole moment of the neutron. If it would exist, it would be easy to distinguish it from the one induced by quantum vacuum fluctuations, as it would be independent of the external electric field while the latter is proportional to it. Extensions of the standard model of particle physics, e.g. supersymmetric models, lead to a non-vanishing electric dipole moment of the neutron. But then again, this would be independent of the external electric field, and therefore different from the induced effect discovered in [4]. An additional feature that will help in this differentiation is the angular dependence of the induced electric dipole field, which is markedly different from a hypothetical intrinsic one.

There is a very good chance of observing this

new effect in the near future, as several experiments are being planned at the Institut Laue-Langevin (ILL) in Grenoble, France [5], at the Los Alamos National Laboratory in New Mexico, USA [6], and at the Paul Scherer Institute in Switzerland [7]. While the current experiments at ILL are sensitive to the expected size of the induced electric dipole moment of the neutron, the external electric field being used is not strong enough to see the effect. A much stronger field, such as that prevalent in certain crystals is required. Such a setup has already been proposed [8] so that it should be feasible to have confirmation of this new effect in the near future.

References

- [1] W. Heisenberg and H. Euler, *Z. Phys.* 98, 714 (1936), English translation in W. Korolevski and H. Kleinert, arXiv: physics/0605038; V. Weisskopf, *K. Dan. Vidensk. Selsk. Mat. Fys. Medd.* 14, 6 (1936), English translation in: *Early Quantum Electrodynamics: A Source Book*, A.I. Miller ed., (Cambridge University Press, 1994); J. Schwinger, *Phys. Rev.* 82, 664 (1951).
 - [2] Y.I. Salamin, S.X. Hu, K.Z. Hatsagortysan, and C.H. Keitel, *Phys. Rep.* 427, 41 (2006).
 - [3] T. Heinzl and O. Schroeder, *J. Phys. A* 39, 11623 (2006); T. Heinzl, B. Liesfeld, K.U. Amthor, H. Schwöerer, R. Sauerbrey, and A. Wipf, *Opt. Commun.* 267, 318 (2006); T. Heinzl, and A. Ilderton, arXiv: 0809.3348; arXiv: 0811.1960; S. L. Adler, *J. Phys. A* 40, F143 (2007); S.-W. Hu and B.-B. Liu, *J. Phys. A* 40, 13859 (2007); A. Di Piazza, K. Z. Hatsagortysan, and C. H. Keitel, *Phys. Rev. Lett.* 100, 010403 (2008).
 - [4] C.A. Dominguez, H. Falomir, M. Ipinza, S. Kohler, M. Loewe, and J.C. Rojas, *Phys. Rev. D* 80, 033008 (2009).
 - [5] See <http://www.neutroneidm.org/cryo/cryo1.htm>.
 - [6] M.D. Cooper, *American Institute of Physics Conf. Proc.* 947, 196 (2007); T.M. Ito, *J. Phys. Conf. Ser.* 69, 012037 (2007).
 - [7] See <http://nedm.web.psi.ch/>.
 - [8] V.V. Fedorov and V.V. Voronin, *Nucl. Instr. Meth. B* 201 (2003) 230;
- V. V. Fedorov *et al.* arXiv: 0907.1153;

Author Biography: C.A. Dominguez Emeritus Professor of Theoretical Physics, Centre for Theoretical Physics & Astrophysics, University of Cape Town, Rondebosch 7700, South Africa, & Professor Extraordinary, Department of Physics, Stellenbosch University, Stellenbosch 7600, South Africa. Tel. +(27)(21)650 3353 Fax.+(27)(21)650 3352, Cesareo.Dominguez@uct.ac.za

Feedback on Entrepreneurship Workshop for Scientists and Engineers from Developing Countries

Roelf Botha

The Entrepreneurship Workshop for Scientists and Engineers from Developing countries in Africa was held from 9 to 13 November at iThemba Labs, South Africa. This workshop was the first of its kind in Africa. 48 participants from 14 countries in Africa attended. A panel of 12 distinguished international speakers were present. They also guided and judged the exercises the delegate teams had to complete. The South

African Institute of Physics partnered with the Institute of Physics UK and the Abdus Salam ICTP who have already facilitated several similar workshops on entrepreneurship for scientists and engineers from developing countries. iThemba Labs and the American Physical Society also provided support for this workshop.

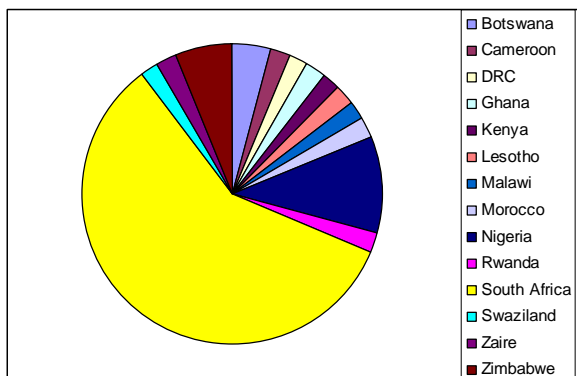


Figure 1: The number of participants by country.

Background and Purpose

Physics can solve many of our basic needs such as provision of sustainable energy, health related matters and prevention of natural and human induced environmental hazards through early warning systems. If physics knowledge and skills are blended with entrepreneurial thinking we can easily solve the enormous socio-economic challenges Africa faces today and help our continent attain the millennium development goals (MDGs). Recent developments in physics such as advanced materials and nanotechnology can produce high-tech businesses helping us shift Africa's economy away from a non-competitive commodity based economy, to the main stream high-tech global competitive economy, over and above this creating employment, reducing poverty and reducing brain drain.

This workshop had the following objectives:

1. To build capacity in sustainable development through training the trainers in

entrepreneurship and innovation management skills

2. To encourage universities in Africa to introduce entrepreneurship and business skills in the science and engineering curricular
3. To ultimately reduce brain drain by encouraging a culture of entrepreneurship among African scientists
4. To encourage interdisciplinary and multi-stakeholder dialogue through bringing the following groups together during the workshop:
 - a. Physicists, chemists, life scientists, engineers and social scientists
 - b. North - South cooperation: scientists from Europe working with African scientists
 - c. South - South cooperation: scientists from India & China working with African scientists.

In Conclusion

The workshop was attended with high levels of enthusiasm from both the sides of the panel as well as the participants and both parties indicated that they experienced the workshop as a success. We all eagerly anticipate growth for both innovation and entrepreneurship in physics and related fields in Africa.

For more information as well as the final workshop report, please browse to

<http://www.saip.org.za/events/entrepreneurship/>

Author Biography: Roelf Botha is the Marketing and Outreach Coordinator for the SAIP. He formed part of the organising committee of the workshop but also attended the workshop due to his personal interest in the topic.

South African Physics Graduates Database – Progress

Brian Masara

<https://www.saip.org.za/graduates/>

The current project started in May 2009 and emanated from the need to do a skills audit in physics and create a single body of information tracking the statistics on the extent of the skills shortage in physics. These statistics are required by SAIP in order to effectively:

1. Liaise with government and to make an input to relevant legislation and decision-making affecting physics.
2. Advise the NRF and other funding agents on matters related to physics funding required for training more physicists.
3. Keeping track of skills available to staffing national physics based projects such as Square Kilometre Array (SKA), Pebble Bed Modular Reactor among others.

Invitation to Register

If you have not yet registered we invite you to visit the website and register, hence contribute to development of the physics profession in South Africa.

Confidentiality

Individuals' information on the database will be treated confidentially at all times and will be made available only to selected people, the link used to submit information is also secure. For example, one may choose whether they want their details available for further study, consultancy and employment opportunities or not.

Benefits of registering and updating your details:

1. Further Study - The DST and NRF have a

vision of a five-fold increase in the number of graduating PhDs. Once you are on the database and you answer YES for further study, your contact details will be passed to universities and funding agents looking for post graduate students. There is a huge shortage of students to train for post graduate studies, and we definitely do not want to lose you!

2. Consultancy Opportunities - If you answer YES to consultancy, your information will be made available to organizations and people requiring your services. Hence free advertising of your services!
3. Employment Opportunities - Many companies approach SAIP looking for physicists to employ. Once you register and indicate that you are available for employment, the SAIP will refer you to these employers.

Preliminary Statistics

The database currently has 588 graduates, 491 of these users have submitted complete qualifications records. The 491 is composed of 115 graduates who did online self registration and 376 who were batch registered by 4 universities.

Below we give preliminary data based on the registered graduates. This maybe biased because 19 physics departments are still to submit their historical data.

Figure 1 shows the distribution of graduates' highest qualifications. It can be seen that most BSc graduates with a major in Physics are not proceeding further with physics.

Figure 2 shows a gradual increase in the number of graduates at all levels.

Figure 3 shows graduates who are available to pursue further studies and their respective current highest qualifications.

Figure 4 shows that 75% of graduates are male.

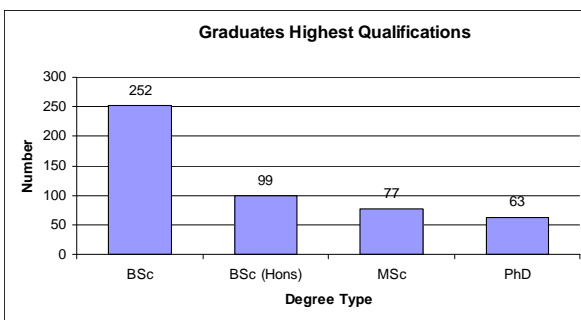


Figure 1: Qualifications for registered graduates

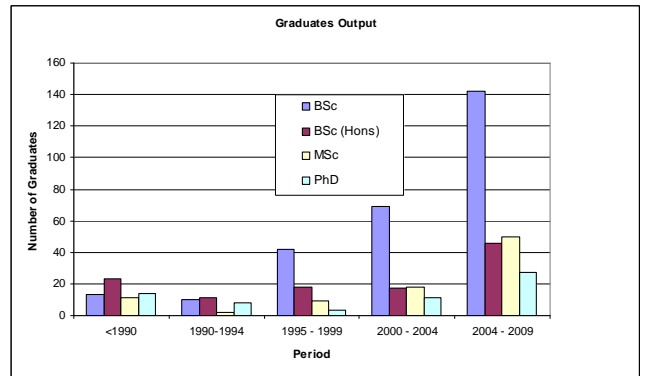


Figure 2: Physics graduates output over the years

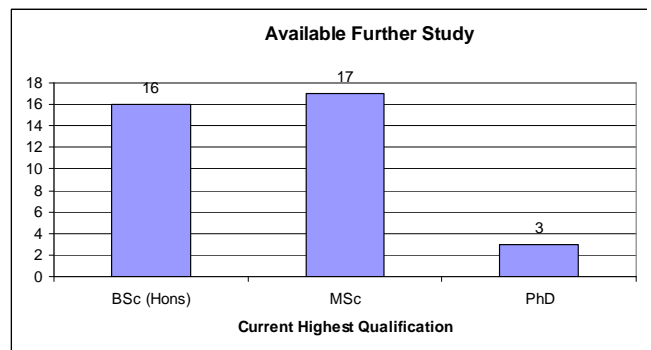


Figure 3: Graduates available for further study

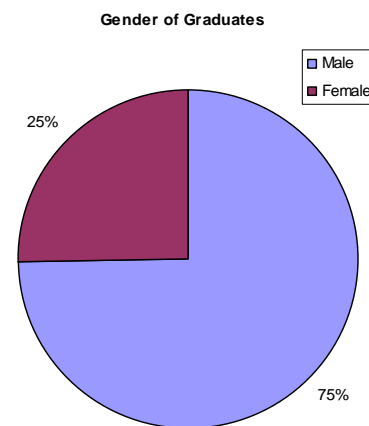


Figure 4: Graduates by gender

Letter to the Editor

THE CORRECT PRONUNCIATION OF 'KILOMETRE'

I much enjoyed your most recent editorial, "What's in a Name?" (Physics Comment, No.3). May I add to your examples the case of the pronunciation of one of the most important and widely used SI terms, namely the kilometre. Although this is of course not derived from the name of a person, it is so widely mispronounced that I believe that it should also enjoy our earnest attention!

When South Africa metricated many years ago it was universally agreed by all relevant bodies (from memory these included amongst others the SABC, the S A Bureau of Standards and the English Academy of Southern Africa) that the correct pronunciation of 'kilometre' was "KILO-metre", rather than "ki-LOM-etre, which regrettably now enjoys widespread popular usage - even amongst some scientists. The reason for the recommended pronunciation was that this would be consistent with other SI units, where the prefix always takes the emphasis. For example, people would look at you rather strangely if you started talking about "cen-TIM-etres" rather than "CENTI-metres", "mil-LIM-etres" rather than "MILLI- metres, and ki-LOSS-sickles rather than KILO- cycles! Major dictionaries are also agreed on this point.

It is also interesting to note that, apart from the dictionaries' verdict on the matter, the great English scholar Robert Burchfield, Editor-in-Chief of the *Oxford English Dictionary* and author of *The Spoken Word - A BBC Guide*, under 'Preferred Pronunciation - A Select List' includes kilometre amongst 'words which give the most offence'. His conclusion: the stress must be on

the first syllable. So there we have it - a verdict that must surely stand as the final word on the subject!

An added point in favour of KILOmetres is that the SI prefixes have entered English from the Greek, a language in which the first syllable almost invariably takes the emphasis. (To check this point I have consulted two Greek scholars and they both agree with this interpretation: "Yes, you are right of course. Whether one is using archea, demotic or katherinevousa the rule is the same: the emphasis is usually on the first syllable.")

I am of course only too aware that in seeking to promote the use of KILOmetre as against kiLOMetre, one feels that one is fighting against a numerous, well-entrenched and frequently unrepentant army of what I have christened kiLOMetrists. Nevertheless, as professional scientists I believe that it behoves us to use the correct pronunciation for this proud and important word and do all in our power to strengthen the forces of KILOmetrism not only throughout our profession but indeed throughout our land!

On a lighter note perhaps one may recall that lovely sentence from 'My Fair Lady': "Actually, the French don't care what they say, as long as they pronounce it correctly!"

Peter Spargo (A. Prof. Emer. P E Spargo)

Department of Physics, University of Cape Town

Techtrack: X-ray advances improve patient care

Kelvin Kemm

X-ray advances improve patient care

I was invited to be guest speaker at a function at Groote Schuur hospital in Cape Town .

The organisation was SORSA, the Society of Radiographers of SA, and the chairperson is Susan Tovey who also performed a great job of being hostess to me, and making me feel very welcome. All the other folks there too were very friendly and sparkling with enthusiasm for their areas of expertise.

These folks represented all areas of radiography, and some of the more experienced amongst them could tell stories of the old days of what is now primitive x-ray machines and out dated x-ray film processing.

This was interesting, because the topic has been constantly changing, and so one can now view it in the context of the new changes taking place. A radiologist from Tygerberg Hospital gave an interesting presentation concerning their current change over to digital x-ray imaging, storage and so on.

The day before my presentation, Tygerberg had processed its last x-ray film. The hospital is now totally digital. There is one set of illuminating figures that the radiologist showed, that forcefully indicates the changing times.

In February, when the hospital was still on x-ray film, there were 2 000 viewings of x-ray images in the hospital. This means that doctors, radiographers and who ever else needed to, had

to take an x-ray film, and put it up against a light box, or maybe the nearest window pane to study it.

In March, as the digital switch over took place, the number of x-ray viewings went up to 8 000, in April it was 12 000, and in May it was heading for 15 000. They expected the figure to break the 20 000 mark by June or July.

Note that essentially no more x-rays were taken, it just means that the medics were looking at x-rays about ten times more often than they used to. The reason for this, is that now a doctor, on another floor, or maybe in another building can call up an x-ray on a computer screen. It is no longer necessary for somebody to actually walk carrying the x-ray film plate in a brown envelope.

This development can only be good for the patients and of course good for the overall efficiency of the hospital. They are now looking at the x-rays much more frequently, and so can more effectively plan treatment. The medical staff at Tygerberg are aware of the fact that now it is very feasible to transmit x-rays electronically to another hospital. It is also much easier to view a patient's records over time. If somebody comes in half a dozen times in a year for x-rays, then one can call up all six x-rays to see if any changes are evident.

I was told stories of how x-rays went missing when for example, a patient would have to take an x-ray to another hospital only to never bring it back. Now duplicates can easily be made, so the original will never leave the records of Tygerberg. Of course a number of the hospital staff are worried about the advance of this technology.

There will no longer be jobs for people in photographic darkrooms, processing film. But of course there will be new jobs, for people in the digital world. Over tea, I talked to the radiologist and I mentioned all the spacecraft and astronomical image processing that exists right now. It is now technologically possible to take an x-ray of a person, and say, make all the bones blue and the blood vessels red, or whatever.

One can digitally rotate images, and so on. So I have no doubt that Tygerberg, in only a few years, will look back at the time before 2010 and say: "Gee remember the days when our digital imaging was all new and primitive compared to now."

Those film-processing people will get new jobs as imaging processing analysers, and whatever other jobs the new system finds that it needs. They already need much more stringent quality assurance because of the instantaneous nature of the digital world. The radiographer cannot just dump a bad x-ray film in the bin and do another, because in the digital world maybe the first image has already been electronically stored or transmitted.

This move to a digital world has certainly ushered in a new way of life for the Tygerberg people. Their future is going to be exciting.

Techtrack appears each week in Engineering News (www.engineeringnews.co.za). It has been reprinted here by permission of K. Kemm. This Techtrack appeared in Engineering News, Vol 29 No 23, 19-25 June 2009).

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

Physics 500

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

- Identify industries in South Africa that employ physicists,
- Identify physicists working in South Africa,

Jeetesh Keshaw, from Centurion



Qualifications

In 2008, M.Sc., from Department of Nuclear Science and Engineering at UNW, "GETTER - A

- Use this information to promote physics,
- Promote collaboration between the SAIP and industry.

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

Fission Product Release Code for PBMR"

In 2004, M.Sc., from Nuclear Physics at WITS, "Design, Construction and Testing of a position sensitive neutron detector"

Career

Started 2005 at Pebble Bed Modular Reactor in Nuclear Engineering Analysis - RDFM as "Senior Fission Product Release Analyst"

Started 1999 at South African Nuclear Energy Corporation in Radiation Utilisation - Nuclear Technology as "Scientist - Small Angle Neutron Scattering"

Survey

Why did you originally choose to study physics at university?

I've loved physics (more specifically science) and the answers it provided to many questions people often ponder about, since the age of six. Also, I felt that such a basic understanding of nature would be incredibly useful at solving many problems of the world, making life all the more interesting and fun.

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

I did not enjoy physics at university. Most of it was taught in an unstructured manner and was often not very stimulating. Physics inspired me as it could answer many questions about the universe from basic postulates or models.

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

I started work in industry, Atomic Energy Corporation (now NECSA) to do applied nuclear science work.

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

I chose a career in industry because of the ability to solve problems that would yield immediate application to the world, and the bonus of a greater salary.

When did your industrial career really take off?

It is still busy taking off, it has been taking off ever since I left university.

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

I am especially proud of my position sensitive neutron detector built from machined components, which is still in use today.

How does your physics training help with your career?

My physics training helps mainly from a problem solving perspective. Much of the concepts and ideas currently being developed by myself have long surpassed the scope of studies presented during my training.

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

Try to remain in the technical domain and focus on experimental work, as this is where an ever-growing shortage of physicists is taking place. It is also great fun (for me at least).

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

I would advise universities and industry to get together and derive a core syllabus for physics, and then to have nationwide examinations based on this syllabus. This would greatly improve the structure of the courses, and also the overall standard of physics training in South Africa. Also physics lecturers should inspire students to pursue careers beyond academic interest.

I have seen that many companies could greatly improve their products and services using just basic physics.

Internship programmes could be set up on a national basis, where young graduates do research and development work co-sponsored by companies. Alternatively, young graduates could do civil service (at state laboratories) as part of the internship programme before being allowed to work in industry.

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

In general, people feel that knowledge of physics bears little importance in their lives. It is highly discouraged as a career option, partially because of the effort vs. salary paradigm that exists with most technical careers. However, I feel that this could be reversed if the culture amongst physicists could become less hypocritical, to one, which we take more control of our future. Older physicists often preach that physics should be "done for the love", which is clearly not enough, and should go without saying for anyone interested in pursuing a career in physics. Physicists can easily spend half their valuable time motivating for research grants which often fail, and never really get to do the work they "love doing".

Physicists need to empower themselves by creating products and services to subsidize their research efforts throughout their career. I often see good research projects fail to obtain funding due to poor research proposals and motivations. Funders are usually politicians who deal with hundreds of funding applications, and are unable to derive the importance of each one, unless this is spelt out clearly in a good research proposal. Funders do not weigh your research proposal on how much you love physics; they mainly want to know why, when, and how the research (and/or development) will benefit society and humankind.

In summary, I believe that physics plays a vital role in present-day society, and must play an even larger role in future if we are to succeed as a country, however, it is up to us as physicists to do this! If we fail, it will be at least our fault.

Obituary: Izak Jacobus (Ieks) van Heerden

14 June 1926 – 23 August 2009

Runan de Kock



Ieks van Heerden was born and grew up in East London, and was educated at Selbourne College. When he was 12 years old, his family moved to Cape Town where he went to Jan Van Riebeeck High School, finishing first in matric in the Cape Province.

Attending Stellenbosch University, Ieks first completed a BA in Philosophy and Greek (Admission for Theology). He then switched to science and obtained his BSc and MSc; all three degrees cum laude. During that time he also obtained his Performance Licentiate in violin. After this he went to Manchester University with various scholarships, where he received his PhD in 1955 with a thesis on 'Time variations of cosmic ray intensities'. In between he also attended London University for a year.

On his return to South Africa at the end of 1955, Ieks got a position at the Nuclear Research Division of the CSIR at the Pretoria Cyclotron, and he succeeded Dr SJ (Stefaan) du Toit as head in 1959, after being post-doctoral fellow at the Canadian NRC in 1958/9. In 1962 he was appointed as Chief Scientist of the newly formed Southern Universities Nuclear Institute (SUNI) at Faure in the Cape Province. While the facilities for the institute were being erected, he returned to the United Kingdom where he did further research at Harwell. At the end of 1963 he returned to

South Africa again, where the SUNI Van de Graaff accelerator had become operative. Ieks held the leading position at SUNI until 1982, when he was appointed Professor in Physics at the University of the Western Cape, a position which he held until his retirement in 1991.

The SUNI accelerator of only 5,5 MV gradually became insufficient for proper nuclear physics, and the new 200 MV cyclotron of NAC would only be completed by the late 1980s. Therefore Ieks soon arranged personal research collaborations with some foreign nuclear physics labs. The first was with Edmonton University in Canada from 1969, where he spent a total of five research periods of one year each. He similarly collaborated with the Indiana University Cyclotron Facility (IUCF) in the USA, and from 1984 until 1997, when he was already 71, he often joined their research team for a period of six months.

His research largely centered on neutron time-of-flight measurements, and covered elastic and inelastic scattering of neutrons, the gamma-ray spectra of heavy nuclei from neutron-induced fission, and certain charged particle nuclear reactions. In 1976 he was awarded a senior DSc degree from the University of Stellenbosch on a thesis titled "Nuclear Structure Studies", covering the span of 48 refereed articles; then a substantial achievement for a scientist of only 50.

Ieks met and married Pauline in 1955, while studying in Manchester. They enjoyed 54 years of marriage and had three children, Anthony, Belinda and Michael. To Pauline he was always "Darling" and she accompanied him on all his long research visits overseas. In Somerset West he was committee chairman of a Scout Group and he served the St Paul's Catholic Church as a warden and on the Pastoral Council. He also joined Rotary in 1965, and was Club President in 1971/72.

Global Survey of Physicists

<http://www.aipsurveys.org/global/>

The Global Survey of Physicists aims to develop a broader picture of the status of physicists across the globe. The survey was developed by the American Institute of Physics in conjunction with the International Union of Pure and Applied Physics Conferences on Women in Physics and was partially funded by a grant from the Luce

Foundation. This is the third in a series of studies of physicists across the globe and the first to target both male and female physicists. Responses to the survey are anonymous and the results will only be released in aggregated statistical form. Individual level information will not be shared or made available.

ASSAf launches a TWOWS National Chapter

The Academy of Science of South Africa (ASSAf) hosted an International Conference of the Academy of Sciences for the Developing World (TWAS) from 19 – 23 October 2009 at the Durban International Convention Centre. The hosting of this conference provided the ideal platform to announce the establishment of a National Chapter of the Third World Organisation for Women in Science (TWOWS).

There are currently 76 full members of TWOWS in South Africa, some of whom are also Members of ASSAf. These TWOWS members are currently inactive in the international organisation and do not reap the benefits of networking or of strengthening links due to the absence of an in-country coordinating structure. With the establishment of a TWOWS National Chapter, it is planned to initiate activities that will accord strongly with South Africa's S&T policy of increasing the participation of women in science. An executive committee comprising the members listed below held its first meeting in August 2009

and is in the process of compiling a strategic plan.

SA TWOWS National Chapter Executive Committee Members

Name	Affiliation
Prof. Roseanne Diab (Chair)	University of KwaZulu-Natal
Prof. Maureen Coetzee	University of the Witwatersrand
Prof. Sibusiso Moyo	Durban University of Technology
Prof. Jill Farrant	University of Cape Town
Prof. Jennifer Thomson	University of Cape Town
Prof. Linda Richter	Human Sciences Research Council

TWOWS members that reside in South Africa can contact Mutheu Ngila (mutheu@assaf.org.za) for further information.

Prizes for Physicists

TWOWS launches a new prize scheme for young women scientists

The Third World Organisation for Women in Science (TWOWS) is now accepting nominations of excellent young women scientists from throughout the developing world.

A prize of US\$5,000 will be awarded to the best young female natural scientist from each of the four regions of the developing world (Africa, Arab region, Asia and the Pacific, Latin America and the Caribbean).

The first awards will be presented during the TWOWS General Assembly in Beijing, China, in June 2010.

Additional information and nomination forms can be downloaded from the TWOWS web site: <http://www.twows.org/>.

Deadline for nominations: 15 January 2010.

IUPAP Young Scientist Prize in COMPUTATIONAL PHYSICS

The Commission on Computational Physics (C20) of IUPAP seeks nominations for its 2010 Young Scientist Prize. Nominees should have a maximum of 8 years of research experience following their PhD and should be the principal performer of original work in Computational Physics of outstanding scientific quality. The award will be 1000 euros, a medal, and a certificate. The award will be presented at the Conference on Computational Physics CCP2010 to be held in Trondheim, Norway on June 23-26, 2010 (<http://www.ccp2010.no>). The winner will

also be invited to present a paper at this meeting. Procedures for making a nomination are at <http://phycomp.technion.ac.il/~C20/prizes.html>. Nominations should be emailed to J. E. Gubernatis (jg@lanl.gov) by January 08, 2010. Please direct questions to J. E. Gubernatis (jg@lanl.gov).

Nithaya Chetty (Nithaya.Chetty@up.ac.za, Elected member C20 - IUPAP Commission on Computational Physics)

L'Oreal-Unesco Award for Women in Science for Africa

For the first time in 2009 the For Women in Science Programme is launching of the L'Oréal-UNESCO Regional fellowships "For Women in Science" in Sub-Sahara Africa to assist women scientists in Sub-Saharan to realize important scientific research in all fields of science, engineering and technology. This fellowship is open to all women citizens and permanent residents from Sub-Saharan African countries.

About the Fellowships

1. Fellowships will be awarded to women scientists in Sub-Saharan African to realize important scientific research in all fields of science, engineering and technology.
2. Fellowships will be awarded for PhD research projects that will result in a Doctorate degree
3. The research is to be conducted in any country in Sub-Saharan Africa.

4. Fellowships up to the maximum value of US\$20,000 will be awarded.

5. The age limits for the candidate is 40 years

6. The selected beneficiaries will be awarded their fellowships at a public ceremony.

Applications shall be submitted before 15 January, 2010 to The Coordinator Africa Network of Scientific and Technological Institutions (ANSTI) P.O Box 30592, 00100 GPO, Nairobi, Kenya or send the package to unesco-loreal@ansti.org. This e-mail address is being protected from spam bots, you need JavaScript enabled to view it. Incomplete or time barred applications shall not be considered. More details may be obtained from:

http://www.ansti.org/index.php?option=com_content&task=view&id=519&Itemid=1

Upcoming Conferences & Schools

African School series on "Electronic Structure Methods and Applications" – a biennial workshop series from 2010 to 2020

Nithaya Chetty

An African School series on Electronic Structure Methods and Applications is planned on a biennial basis from 2010 to 2020. This follows on the very successful School by the same name that was held at the African Institute for Mathematical Sciences (AIMS) in Muizenberg, South Africa in July 2008. The IUPAP Commission on Physics for Development (C13) has been approached as the primary sponsor in collaboration with the IUPAP Commission on Computational Physics (C20), and with the endorsements of the IUPAP Commissions on Physics Education (C14) and Structure and Dynamics of Condensed Matter (C10). Further sponsors and potential sponsors include the International Centre for Theoretical Physics (ICTP), the International Centre for Materials Research (ICMR), the International School for Advanced Studies (SISSA), Democratis, the National Institute of Theoretical Physics (NITheP), the National Research Foundation (NRF), the Department of Science and Technology (DST), the Centre for High Performance Computing (CHPC), the Centre of Excellence in Strong Materials (CoESM) as well as a number of other international organizations.

The plan is for the workshops to be hosted every

two years by successive African countries. The format will include pedagogical presentations of the theoretical underpinnings of density functional theory and associated algorithms as well as general solid state physics - and especially current challenges in solid state physics - followed by hands-on computational sessions.

The workshop series is designed to ensure continuity over the next ten years, to build critical mass and to create a legacy of computational materials science in Africa. A major objective of this workshop series is to enhance scientific collaboration and networking in Africa. We will make a special effort to seek African women participants.

The workshop series will be managed by an International Advisory Panel chaired by Prof Richard Martin (Univ. Illinois). The first workshop will be held in 2010 in South Africa, and will be organized by the Local Organising Committee chaired by Prof Daniel Joubert (Univ. Witwatersrand).

See <http://www.nithec.ac.za/general/10.php> for further details.

2010 AFRICAN SCHOOL OF PHYSICS

What is it?

It is a Biennial School of Fundamental Physics and its Applications in Sub-Saharan Africa. In short it is called ASP2010, for the African School of Physics that will start in 2010.

We invite some lecturers and tutors, mainly from Western Europe and from the USA, but also from South Africa, we invite students mainly from sub-Saharan Africa and we organise three weeks of lectures, discussion sessions and labs.

The school is free of charge for the students from sub-Saharan Africa: we'll pay for the travel, accommodation and food expenses.

We expect to have about 50 students from the following geographical locations: about 25 from South Africa, 15 from other sub-Saharan African countries, 5 from northern Africa, 3 from the USA and 2 from Europe.

This school is meant to give students interested in fundamental physics the opportunity to:

- benefit from high-quality lectures in this field
- be exposed to cutting-edge technologies utilized in large experiments of subatomic physics (i.e.: GRID computing, fast and rad-hard electronics, high precision mechanics, laser physics, cryogenics, medical imaging, hadron therapy,...)
- develop contacts with lecturers, tutors and other students at ASP2010 as a first step in their way towards big international science networks

Who is organising it?

John Ellis, a famous particle physics theorist from CERN, first proposed me to develop this project. After a few sub-critical years, it became obvious that we needed more people directly involved in this project for it to take off.

Since late 2007 we have set an International Organising Committee formed of researchers from the following laboratories: the CERN in Switzerland, the CNRS-IN2P3 and the CEA-IRFU in France, the ICTP in Italy, the FNAL and JLAB in the USA and the universities of Louvain in Belgium and Santiago de Compostela in Spain.

Since early 2008 we also have a Local Organising Committee mainly formed of physicists from the universities of Cape Town, Johannesburg, Witwatersrand and the iThemba Laboratory for Accelerator Based Science (iThemba Labs).

These two committees have worked out the school program and all the organisation details.

Who is financing it?

The laboratories cited above are the main

contributors to the school budget, but we also benefit from a contribution by the host institute, NITheP at Stellenbosch and from the SA-CERN consortium.

We are still in a dynamics of raising a budget of about 140k€, by increasing the funds from scientific institutions. But we are also in the process of enlarging the financial support sources by including some governmental agencies as well as private sponsors.

Where and when will it be held?

The first series of the school will be held during august 1st-21st 2010 at the NITheP in Stellenbosch, South Africa.

What is the Scientific Program?

The school program has three main parts:

- Theoretical aspects of Particle, Nuclear, and Astroparticle Physics
- Experimental aspects of the above-cited disciplines
- Computational aspects of the above-cited disciplines, including an introduction to GRID computing
- Accelerator Physics and Technological Applications of the accelerators and detectors instrumentation, including Medical and Laser applications.

The total number of lecture hours will be of the order of 68.

Besides the plenary lectures, there will be:

- Discussion sessions: where the students, in groups of 15 or so, can ask questions about the lectures. The tutor may propose them to solve a couple of short problems to illustrate the lectures. These sessions will occur in the proportion of about 1h for 4h of plenary lectures.
- Computer labs: where the students, working by pairs on a PC, will run some softwares illustrating the lectures (particle event generators, data analysis framework, GRID jobs submission,...).
- Instrumentation labs: besides a visit of the iThemba Labs facility, interested students, in small groups, will run very small scale experiments at this lab which is located nearby Stellenbosch.

Who can apply?

The school is designed for physics students who have at least completed and passed 3 year at university (typically BSc) and up-to students involved in a PhD thesis. Depending on our budget we might also accept applications of

young post-doctoral fellows.

All the lectures and pedagogical material will be exclusively taught and written in English. It is obviously indispensable that the students have a good knowledge of fundamentals physics (classical physics as well as basic notions of special relativity and quantum mechanics) and solid foundations in mathematics (algebra, geometry, calculus, statistics & probabilities). Having additional knowledge in computer programming (typically in C or even better in C++, Linux OS, shell or Python scripting) will constitute valuable assets for the accepted applicants even though these are not explicit prerequisites to apply.

SAIP2010: First Announcement

The 55th Annual Conference of the South African Institute of Physics (SAIP), organised by the CSIR National Laser Centre, will be held 6 - 10 September 2010 at the CSIR International Convention Centre in Pretoria. The theme of the conference will be the 50 year celebration of the laser. Student workshops, which include workshops on the theme of lasers, will be held during the conference. For the first time, the host intends to solicit extended (one-page) abstracts,

Where to find detailed and up-to-date information?

The school website is the place to look for detailed and up-to-date information. The URL is <http://cern.ch/AfricanSchoolofPhysics/>

Registration

Send a CV and a letter of motivation (PDF format) to ASP2010-Registration@cern.ch. You may add a letter of recommendation, but this is not mandatory.

Please visit the school website to get the full list of requested information for the applications.

which are to be published in a proceedings with an ISBN number. The proceedings will be made available in electronic format.

Contact Information:

Email: saip2010@saip.org.za

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

Opportunities for Students

MSc and PhD in Quantum Information Technology



The Centre for Quantum Technology, a research Group of UKZN, is the forerunner in QIPC in Southern Africa. The Centre is working theoretically and experimentally in Quantum Information Processing and Communication. One of its flagship projects is the QuantumCity project, a quantum communication network for the eThekweni Municipality.

MSc and PhD positions are available for 2010 in the field of theoretical and experimental aspects of Quantum Information Processing and Communication.

For more details visit our website: <http://quantum.ukzn.ac.za> or contact Professor Francesco Petruccione

School of Physics

University of KwaZulu-Natal

Westville Campus

Private Bag X54001

Durban, 4000

South Africa

Tel: +27 31 260 2770

Fax: +27 31 260 8090

e-mail: petruccione@ukzn.ac.za

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.
4. 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

1. **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.
2. **Article types.** The magazine is devoted to articles, reports, interesting facts, announcements and recent developments in several areas related to physics:
3. **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.
4. **Re-use.** The publisher reserves the right to reuse the printed piece in full or in part in other publications.
5. **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.

6. **Style.** AP style is followed for punctuation, capitalization, italics and quotations.
7. **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 its credibility could be enhanced by publishing a 40 word resume of the author. 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/>