

Physics Comment

A Southern African Physics Magazine

SAIP 2013 at the Heart of the Zulu Kingdom



A Quarterly Newsletter

Issue No 1 - Autumn 2013

Memorandum of Understanding with IOP

The South African Institute of Physics strengthens the bands with the Institute of Physics in the UK to share membership benefits and support jointly Science Teachers.

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Physics in South Africa

A record of the history of Physics in South Africa is



about to be published.

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Big Bang meets Big Data



The Square Kilometre Array prepares for a data flood of the order of Exa-Bytes.

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Uni-Zululand

How does this university describes itself? History and standing of the hosts of the SAIP conference 2013.



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Editor's Note

The first issue of *Physics Comment* in 2013 comes with a new face. The new dynamic style uses the medium of an online journal with hyperlinks to webpages and email applications. Try it yourself and click on all underlined words on the front page! Whether this is a case of *fine feathers make fine birds* or *the emperor's new clothes* can be decided by the readership because PC heavily relies on the contributions of its readers. Another innovation is the new section *Opinion and Discussion*, which invites personal viewpoints in the context of practising research or teaching in south Africa. This is the place for constructive criticism, praise or suggestions concerning the praxis of physics. Our first contributions deal with the proceedings of the SAIP conference (p. 8). Talking about the SAIP conference, the next one will take place in July on the beautiful Richards Bay campus of the University of Zululand for the first time (p. 19). It will see the release of a book on the history of *Physics in South Africa*. This first account has been collected from many experts from the universities, research facilities and industries of the country and is edited by Professors P.R. de Kock and H. Moraal (p. 5).



I hope you enjoy this issue of PC with its new format and look forward to your personal feedback - perhaps at the annual SAIP conference in July.

With best wishes
Prof Thomas Konrad

Caption of main picture on cover page: Library of University of Zululand on the KwaDlangezwa Campus

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



SAIP Council: Prof. S.H. Connell (President - U. Johannesburg), Dr. J. Nel (Honorary Secretary- University of Pretoria), Prof. J.A.A. Engelbrecht (Treasurer - Nelson Mandela Metropolitan U.), Dr. I.M.A. Gledhill (President Elect -CSIR), Dr. P. Martinez (SAAO), Dr. M.M. Diale (U.Pretoria), Z. Ngcobo (U.Zululand) , Prof. T. Konrad (UKZN), Prof. E. Rammutla (U. Limpopo), Prof. F. Scholtz (NITheP), Dr.S.Ramaila(U.Johannesburg), Prof. P. Woudt (UCT)

News from Africa

Memoranda of Understanding between SAIP and IOP

by Brian Masara (SAIP Office)

One of the main goals of the SAIP is to establish mutual beneficial relationships, networks and partnerships with international physics stakeholders. The SAIP and the Institute of Physics UK (IOP) have had a strong and long standing relationship in which the two societies collaborate to develop physics as well as provide benefits to their membership.

The 8th of March 2013 was another important day in the history of the relationship between SAIP and IOP where the two institutions signed two Memoranda of Understanding (MoU) at STIAS in Stellenbosch.

Joint Membership Services

The first MoU to be signed related to joint membership services for SAIP and IOP members. The MoUs' goal is to enhance scientific relations and improve communications between physicists in South Africa and physicists in the UK and Ireland, and to extend the benefits of electronic affiliate membership of the Institute of Physics (the "IOP") to members of the South African Institute of Physics (the "SAIP").

The IOP and SAIP first signed a joint membership MoU in 2002. The 8th of March saw IOP and SAIP renewing their joint membership MoU which now has improved benefits for members. The new agreement provides iMembership of IOP at preferential rates for SAIP members, including attendance at IOP conferences at member rates and access to member facilities in London as well as electronic access to all IOP's member benefits which are delivered electronically, including Physics World.

Members of the SAIP who wish to take up this offer will register as electronic affiliates through the Institute's [website](#), identifying themselves as members of SAIP;

The IOP will make the following facilities available to members of the SAIP who register as electronic affiliates:

- Online access to the digital version of Physics World, the monthly member magazine of the IOP;



Prof Simon Connel and Sir Peter Knight signing the MoU

- Attendance at IOP conferences in the UK and Ireland at member rates;
- Access to MyIOP, the online network for members of the IOP;
- Membership through MyIOP of any of the specialist groups of the IOP;
- A personal email address @physics.org;
- Professional help-sheets and other career resources available from the IOP's website or by email;
- Access to the members' room and facilities at the London headquarters of the IOP, on the same terms as other members of the IOP.

The IOP will charge each member of the SAIP who registers as an electronic affiliate an annual fee currently set at GBP 10.

Physical Science Teacher Development

The 8th of March 2013 also witnessed IOP and SAIP signing an MoU on Physical Science Teacher Development. South Africa hopes to gain from the valuable experience of IOP in implementing similar projects in Africa for example, the IOP already sponsors physics education projects in other African countries such as Ghana, Ethiopia, Malawi, Rwanda, Tanzania and Uganda.

In his remarks during the signing ceremony, the SAIP President Prof Simon Connell, highlighted how the future of physics was on a positive growth trajectory especially with the SKA coming to South Africa, he said that SAIP sees the SKA as a game changer in the science and technology landscape, it is a coup for our science system of a similar magnitude as the Large Hadron Collider at CERN. However

there is mounting concerns on whether we will be able to have enough skills in physics, astronomy and engineering for such a big project. For example the World Economic Forum's 2012 Annual Report on Financial Development placed South Africa last (with a score of 1.99 out of 7) in a ranking of 62 countries on the quality of science and maths education.

At university level, physical science is a prerequisite for enrolling in science,

engineering and technology disciplines. That means physics is a basic science that underpins development of both the human-skills and technologies fundamental to science, engineering and technology.

To address the above challenge, SAIP & IOP are therefore proposing a project to support physical science teachers in improving their competence in teaching the physics section of the physical science curriculum.

Aims & Objectives

- To develop and source physics educational support materials and support physical science teachers in teaching physics.
- To improve disadvantaged communities' access to quality physics educational resources for both teachers and pupils.
- To give disadvantaged students in townships, rural and farm schools an opportunity to perform science experiments required by the curriculum that they would have not performed from their disadvantaged communities.
- To stimulate an interest in physics amongst girls and encourage them to excel in the subject.
- To raise funding to expand the pilot project country wide in South Africa.



The Teacher Development project team from left: Mr Case Rijsdijk, Mr Brian Masara, Prof Simon Connell, Sir Peter Knight, Prof David Wolfe

Projected Outcomes

- Physical Science teachers in historically disadvantaged schools will receive additional training on teaching physics and improve their skills in delivering physical science.
- Physical Science teachers will develop improved confidence and competency hence they will be able to attract more students to study physics.
- Historically disadvantaged high schools will receive quality physics tuition and will perform laboratory investigations required by the national curriculum.
- Access to supplementary physics print and experimental resources that are not available at participating schools.
- Stimulation of interest in physics for both pupils and teachers
- More girls studying physics
- ULTIMATELY - Increased teacher competency and increase learner interest in physics will result in higher pass rate hence an increase in the pool of learners with physics background who can be trained in various Science Engineering and Technology disciplines

SAIP plans to roll out this project country wide. Those interested in helping implement the Physical Science Teacher Development Project can contact the SAIP office on info@saip.org.za.

Prof Jim Gates visits South Africa

by Brian Masara (SAIP Office)

The South African Institute of Physics SAIP, in collaboration with National Institute of Theoretical Physics (NITheP) and SciFest invited and hosted Prof Jim Gates to South Africa from 7 March to 16 March 2013.

Prof Gates is a renowned expert in supersymmetry, supergravity and string theory. He is currently based at the University of Maryland. He has been one of the earliest contributors to this field following his doctoral thesis, the first on supersymmetry at MIT. He also co-authored the first comprehensive book on the subject "Superspace" in 1984. He is a member of the Council of Advisors on Science and Technology to President Obama. President Obama recently bestowed on him the National Medal of Science, the premier award for scientific achievement given by the US government.

During his Gauteng visit Prof Gates delivered lectures at UNISA, University of Johannesburg and also interacted with school kids in Mamelodi at the Mae Jemission reading room. The next visit saw Prof Gates delivering a lecture at Nelson
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Mandela Metropolitan University and participating at the National Science Festival. The SciFest official opening ceremony lecture on 14 March will be delivered by Professor Jim Gates.



Prof Jim Gates (right) giving a lecture at Wits with Prof Simon Connell (second from right).

Prof Cesareo A. Dominguez of UCT is awarded the Humboldt Prize

by Brian Masara (SAIP Office)

The Alexander von Humboldt Foundation (Germany) has awarded the Humboldt Prize in memory of Neville Alexander to Emer. Prof. Cesareo A. Dominguez from the Department of Physics, UCT. The award was granted "in recognition of past accomplishments in research and teaching", and it carries a purse of Euro 60,000.

The award is granted in recognition of a researcher's entire achievements to date to academics whose fundamental discoveries, new theories, or insights have had a significant impact on their own discipline and who are expected to continue producing cutting-edge achievements in the future. Academics from abroad, regardless of their discipline or nationality, may be nominated for a Humboldt Research Award. The Alexander von Humboldt Foundation particularly encourages the nomination of qualified female academics.



The award ceremony at the German Embassy in CPT 7 February 2013. From left: Prof Cesareo A. Dominguez (UCT), Prof. Helmut Schwarz (President of the Humboldt Foundation), Prof. Joseph Lalah (Kenya), Prof. Soraya Seedat (SUN), Dr. Annette Schavan (Ex-Minister of Education & Science of Germany), and, Dr. Horst Freitag (German ambassador).

Book Release: Physics in South Africa

by Simon Connell

SAIP Council President

March 16, 2013

The Council is pleased to announce that the book "Physics in South Africa" will be released during the 2013 Annual Conference of the SAIP. This book is edited by Professors PR de Kock and H Moraal. It



was commissioned by the South African Institute of Physics.

The decision to commission this history reflects several milestones that have been reached in the development of Physics in South Africa. The book is the most complete archival record to date of formally practiced physics in South Africa. It is therefore of tremendous significance. It is a timeous activity considering our Institute is well over its fiftieth year, and the memories and documentary records were widely scattered. Another significant development is the increasing professionalization of the SAIP, which matches a tremendous growth in the health of the discipline, as well as the role of the SAIP in representing its membership to maintain the trajectory of relevance, capacity, health, excellence and influence.

The Council and the Editors were particularly concerned that the book should be as balanced and inclusive as possible. A tremendous effort to achieve this was launched. Professor de Kock collected contributions from widest possible consultation of our community. Invitations and exhortations to submit contributions, or develop contributions further, were repeated many times. As the finished document emerged, so that the various accounts could be seen in context, additional opportunities for authors and institutions to develop their contributions were provided. Prof Moraal also contributed as an editor and Dr Reitman as a copy editor. Our community does indeed owe a great debt of gratitude to these

gentlemen and thanks them for their excellent work. We also express our gratitude to all contributors. The book has been financed from our own funds and is endorsed by Council.

In Part A, the book begins with a discussion of its brief, context and intentions, and proceeds to record the history of the South African Institute of Physics. In Part B, the various Universities provide accounts of the development of physics and in Part C, National Physics Institutions and Physics in Industry do this as well. This section is categorized per subject. The Council has also recognized that there are untold stories. The political context within which Physics was carried out in a period of our history has made it difficult to fully record and acknowledge many contributions. Indeed there are instances where there were exclusions, difficulties, campaigns for broader participation or transformation, and the operation under adverse conditions. Accordingly, the book's release will be within the context of a web-site that will manage the collection of further material, including the untold stories. This will ultimately enable further work on the History of Physics in South Africa.

The Council hopes that this book will



record our past, further unite our community and inspire us on our path of building our discipline.

There will be a limited run of hard copies for the initial release, as well as a free electronic version available to SAIP members. Should you wish to purchase a hard copy at cost price please reserve this by writing to the SAIP Executive Office. Further details on the release are also available from the Executive Office.

Free SAIP Membership for 3rd Year and Honours Physics Students

by Brian Masara (SAIP Office)

The SAIP Council passed a resolution to extend free membership all 3rd Year Physics
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students and all Honours Physics Students. In order for 3rd year and honours students to be given free SAIP membership they must do the following.

- Approach their supervisor or physics head of department and ask them to send a request to SAIP
- The HoDs / Supervisors can choose to make their students free SAIP members
- The supervisor or HOD can send an email with the students' names and email address to SAIP on info@saip.org.za

The 3rd year and honours students will have the following benefits

- Receive all SAIP electronic communication such as the Physics Comment magazine and adverts for scholarships, conferences and jobs.
- Attend the SAIP annual conference as student membership rates

This subscription will be valid for 1 year from January to December only hence for honours students they can ask their supervisor/HoD to renew it every year in January.

Join SAIP Membership

By Brian Masara

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

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

Why Professional Membership is Important

Academic qualifications are only the beginning of a career in physics and its applications. The need for continuing professional development is widely recognised to be the mechanism by which professionals maintain their knowledge after the formal education process has been completed. By becoming a member of a

professional society you demonstrates your commitment to maintaining competence in your field through, continuing your professional development from activities such as conferences, schools and workshops and abiding by an acceptable code of conduct. Membership of a professional society is an important addition to a physicist's personal credentials for example when competing for a job, membership of a professional society will distinguish one from other applicants with similar qualifications but no professional affiliation.

What members say about SAIP membership



Dr Igle Gledhill - It's useful to have a professional home that is not an employer or an alma mater. I came back from four years in the USA and switched fields at the same time. Funnily enough, SAIP is home –

the banquet is a hoot, the conferences keep me up to date, the Institute is serious about science in South Africa and gets things done, and my colleagues keep me on my toes.



Dr Daniel Moeketsi - SAIP provide a platform to showcase physics research progress and direction in the country and expose students to many career

opportunities both in public and private sector. I encourage postgraduate students to subscribe for SAIP membership and actively participate in the organisation's annual activities.

Membership benefits

- I. **Stay informed** - News flashes and alerts are sent directly to your email. A quarterly magazine, Physics Comment, will keep you briefed on physics news, government policy and jobs in industry and academia.
- II. **Specialist Groups and Networking** - Through the various activities of SAIP, networks have been established with the African and International Physics communities, to benefit all our members. You'll make important new contacts and forge lifelong

- professional relationships by getting involved in a specialist group.
- III. **Save Money** - You'll receive discounted rates for SAIP conferences, and have the benefit of paying affiliate membership fees for IOP membership.
- IV. **Employment opportunity information** - Job advertisements will be displayed on our new website and mailed to members from time to time.
- V. **Access to current information on sources of funding grants and scholarships** - Exclusive service provided to our members via a direct email system.
- VI. **Scientific meetings** - The annual conferences and workshops provide learning opportunities for different specialisation areas and varying degrees of experience.
- VII. **Especially for the global physics community** - You'll have the opportunity to be partake in events organised by the SAIP for the Physics community in South Africa as well as Africa: developmental workshops, schools and conferences.
- VIII. **Additional resources** - Your membership privileges also include information and guidance when applying for and acquiring visas to study, participate in scientific meeting and research opportunities in South Africa and abroad. There is also an exclusive member-only area on our website.
- IX. **Career guidance and resources**- Career assistance is provided to all members to find their career path in industry or academia.
- X. **Opportunities to win awards for excellence** - SAIP recognises contributions to physics in SA by awarding two different medals and various student prizes at the annual conference.
- XI. **Teaching and Learning Resources for schools** - As part of our growing outreach programme we provide teachers and learners with the tools and opportunities to allow and motivate more learners to follow careers with physics as a background.

JOIN SAIP TODAY CLICK THE LINK BELOW FOR MORE INFORMATION ON HOW TO APPLY

<http://www.saip.org.za/index.php/members/membership-info>

SA Physics Graduates Database

By Brian Masara (SAIP office, Pretoria)

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

[Read more details](#) on confidentiality and great benefits of signing up and updating your details

To register click [here](#). For enquiries contact SAIP Office at info@saip.org.za

Opinion & Discussion

SAIP 2012 Conference Proceedings

by Prof A.E. Botha (University of South Africa)

If you contributed to the proceedings of the SAIP2012 conference, then you are probably reading this with great interest. Perhaps you are even hoping to discover what has become of your own contribution(s). Unfortunately, you will not find those answers here. This is a letter written in an attempt to improve the way in which the SAIP proceedings are reviewed and published in future years. After reading it I hope that you will make further suggestions of your own.

Concerning the 2012 proceedings; a number of lessons can be learnt. For one, I think that many members would have appreciated better communication concerning the progress (or lack of progress) of the review process. Although I am well aware of the numerous difficulties that the review of more than a hundred articles entails, I still feel that the lack of communication that we seem to have experienced is unpardonable. At the time of writing, which is now seven months after the conference of 9-13 July 2012, I am still waiting for the referee reports in connection with a submission that was made by one of my students. After several unsuccessful attempts at enquiring about my own submission, my co-authors decided to withdraw and publish elsewhere. Of course, this experience may just have been an extraordinary anomaly, but I somehow doubt it. I would thus like to invite other contributors to comment on this year's review process.

In my experience as an editor of the 2011 proceedings, I can also add that most people will not tolerate a wait of seven months without feedback. In most cases, they will start making enquiries after a very reasonable two to three months. Then, unless the editor(s) can supply a definite date by which the referee reports will be communicated, they will simply withdraw their work and submit it somewhere else for publication. So the editor(s) of the 2012 proceedings should consider seriously how many respectable submissions have not been withdrawn by this stage. It is not difficult to see how such a long delay, and more importantly, the inexcusable lack of communication, will affect the quality of this year's proceedings, if and when they are finally published.

But other than insisting on better communication skills in future years, another suggestion that I would like to make is for the proceedings to be published on a bi-annual basis. This measure could perhaps lead to an improvement in the overall standard of articles that can be accepted. Again, my suggestion here is based purely only on anecdotal evidence, but I encourage other members to voice their opinions on this matter too. I am certain that people who have been involved in hosting the conference in the past two years – a huge undertaking, given that in 2011 a total of 185 articles were considered for publication – might even argue that the whole conference should rather be held bi-annually, but that is another matter.

In any event, as paying members of the SAIP we all have the privilege of contributing our ideas and opinions on this matter, and I therefore hope that this letter will serve to encourage other members to consider how their own contributions were processed in the past. They can then possibly make further helpful suggestions to the SAIP management which could lead to improvements in future years.

Ultimately I believe that the establishment of an annual (or bi-annual) subsidy-earning proceedings will provide an excellent forum for the communication of Physics research in South Africa, but it should not become a dumping ground for old, rehashed ideas. Thus I hope that in future years this project of establishing subsidy-earning proceedings tied to the SAIP conference will be taken more seriously by everyone, especially the conference organisers. In the future I hope that contributors can not only receive the appropriate recognition in the form of a subsidy, but that they can also feel proud of the quality of all the articles that do finally appear.

Author Biography: A.E. Botha is an Associate Professor in Physics at the University of South Africa. He was also an editor of the SAIP 2011 conference proceedings

The Proceedings of the SAIP Annual Conference

by Prof Simon Connel (SAIP Council President)

The SAIP Annual Conference is the premier scientific calendar event for South African Physics. We may regard the first such conference as having occurred in July 1954. At this time, amongst the agenda of academic deliberations, the idea of the formation of the SAIP was also generally discussed, and in fact took place, the next year. The question of a regular sustainable Proceedings to record the scholarly contributions has surely a history that is almost as long as this. In more recent times, the physics community regularly voiced their wish for the SAIP Annual Conference to develop a Proceedings. This can be seen for example in the HSRC survey leading to the report "The State of Physics in South Africa" of 2002 and in the consultation process leading to the new SAIP Constitution of 2011. Conferences which do publish a peer-reviewed proceedings compete with the SAIP Annual Conference for delegate attendance.

Very significantly, in 2005, the DHET policy for the Measurement of the Research Output of Public Higher Education Institutions came into effect. This legislation has led to the increasing dominance of a new metric for performance, in terms of DHET "publication units". An incentive scheme has also resulted, which financially rewards the authorship of accredited articles. The incentive is a government subsidy to the South African institutions to which the South African authors are affiliated. Both the new metric and incentive are becoming significant factors affecting decision-making at Universities. As the SAIP did not previously produce a peer-reviewed proceedings, this has an impact of the ability of potential delegates, especially students, but also faculty, to attract support for attendance of the SAIP Annual Conference. It should be mentioned in this paragraph, that many SAIP members feel that the DHET "publication unit" is far too simplistic and inaccurate a measure for the quality and impact of outputs in our discipline. It could in fact have an adverse affect ultimately on the discipline. This, however, is the subject of another debate.

The SAIP Annual Conference has gradually become both more expensive and more arduous to organize. This is mostly a result of increasing delegate

numbers, but the general increase in prices and the requirement that a wider range of services at the host University be fully budgeted for are also significant. The South African Journal of Physics would have been a logical vehicle for a Proceedings, but this had ceased publication in 1993. The financial costs, the lack of an obvious target journal, the multi-subject nature of the conference deliberations, the enormous effort that would be involved to ensure quality and the attraction of alternative international publication options, were some of the hurdles to the development of a regular Proceedings.

In 2007 the SAIP Annual Conference was held at Wits. The Local Organising Committee (LOC) instituted a Proceedings for this Conference, which was published in the SA Journal of Science. This was a very commendable effort, and served as an additional inspiration for the road to a regular Proceedings. However, it highlighted shortcomings, which included the enormous effort involved, much of which had to be shouldered by the SA Journal of Science itself. This form for the Proceedings was considered not sustainable, and it was discontinued. It was clear that without considerable cost, we would not access an international DHET accredited journal which would provide its own referees and guarantee quality. The burden of refereeing must properly reside, for at least most of the submitted manuscripts, within the expertise of our own community. It was finally the 2011 Conference at UNISA, where their LOC were able to implement the first South African refereeing plan and also make use of the expertise of their Universities publishing house.

Clearly it is very important that the Proceedings exhibit an international standard of scholarly quality, and that the articles therein should qualify for the government subsidy based on the DHET criteria. The DHET has documentation on its website which sets out these criteria. In the discussion that follows, familiarity with these [documents](#)¹ is assumed. The SAIP LOC of 2011 and the associated Conference Proceedings Committee (CPC) ensured that all the requirements of the DHET were met so that the Proceedings of the 2011 Conference would be recognised for subsidy purposes. The practice is that the Research Office of the Institution of each author should make an application for "recognition" for subsidy purposes on a per article basis. The information required for this resulted from several steps taken in the planning and management of the production of the Proceedings. This

included evidence for the quality of the refereeing process. The Proceedings itself contained this information which could then be used to substantiate the application. The Proceedings were published electronically (CD and website) in late 2011, the year of the Conference. To my knowledge, it has been possible for the articles to be accorded the merited DHET recognition.

A point of clarification is that within the DHET's scheme, "journals" and "books and proceedings" are two different categories. Journals can be "accredited" as a series of publications. Proceedings are not "accredited", but articles within could be "recognised", if the Proceedings meets the requirements based on the consideration of submissions from institutions. Journals contain papers that can attract a maximum of one "publication unit", while proceedings contain articles that can attract a maximum of a half "publication unit". A Proceedings paper differs from a full publication in that it may have early announcements and preliminary analysis. It is consistent with the intention of a conference to engage in scientific debate with expert peers. Subsequent publication of a full journal paper once the research is complete remains highly recommended.

Council has taken representation from the membership and applied its mind extensively to this issue. It was decided that from 2011 onwards, the SAIP Annual Conference would always result in a Proceedings. Council could not find any journal which is already DHET accredited which is appropriate for our Proceedings, and therefore we have proceeded with the UNISA model. Eventually, the SAIP will apply to be on the DHET list of "Reputable Conference Proceedings". This will take place when a track record of capacity to produce the Proceedings at the required quality and sustainably into the future has been built up. Several features to ensure the sustainable quality are now implemented. The Reviewer Reports will be electronic only and structured via a form. Only PhD holders can serve as Reviewers. The Division and Forum Chairs will appoint the Reviewers, and they must maintain a List of Reviewers. Conference announcements will mention the Proceedings and the deadlines for the manuscript submission process which will be strictly adhered to. The SAIP Office and a member of Council will be the continuity link between different years of LOCs and CPCs. In fields with fewer members, where we cannot find a referee outside of the author list of the submission, we will use international colleagues. However, it is the general default that any

appropriate referee could be approached either inside or outside the country. The Track Editor (usually the Division or Forum Chair or his/her appointee) will scrutinise all referee reports for adherence to the common standard. An Editorial Office has been instituted as follows:

- The Council Conference Portfolio person,
- The Council Executive Officer,
- The Chair of the LoC,
- The Editor of the CPC,
- The Editor of the previous CPC.

The proceedings editor(s) must keep all the reports as evidence until such time that DHET has recognized the proceedings, as these could possibly be required by DHET as evidence that the review process was in order. These documents will be archived for this purpose at the SAIP Office.

The next SAIP Annual Conference of 2012 took place at Pretoria University. The proceedings is not yet out at the time of writing, though Council is assured it is on track to be released before the SAIP Annual Conference for 2013 at the University of Zululand takes place. Council is aware of the frustrations of certain members in respect of the delay. One should keep in mind that we are dealing with voluntary work in the service of the discipline, in a context where those with more experience and capacity are also those with a heavier schedule. The capacity problems experienced by the 2012 CPC have highlighted fact that the Proceedings have now become one of the major tasks of the Conference.

This has indicated the need for additional resourcing. Accordingly, the Council has instituted a change, which will manifest for the 2013 Conference onwards. The Editorial Office Committee mentioned above will henceforth also include a Senior Editor, appointed on a part time contract, with a three year term. The incumbent will be drawn from an esteemed member of our community who has the available capacity, and the position will be supported from the Conference funds.

The advent of the Proceedings has been a long awaited and complex issue. It is a significant burden for the hosts of the SAIP Annual Conference. Recently, the capacity of the SAIP has increased due to the establishment of the Executive Office. The resourcing of the SAIP, its professionalism and its capacity to serve the discipline is increasing due to the well founded trend of increasing health of the discipline. We are finally able to implement a Proceedings of sustainable quality, and we trust that we can all support this and that it will in turn also build our discipline further.

¹ <http://www.dhet.gov.za/Structure/Universities/PolicyandDevelopmentSupport/tabid/416/ItemId/3136/Default.aspx>

Articles

Properties of swift heavy ions induced tracks structureby A.B. Demchyshyn¹, P. O. Selyshchev²¹Taras Shevchenko National University of Kyiv, Faculty of Physics, 03187, Ukraine, Kyiv dem_and@i.ua²University of Pretoria, Department of Physics, Private bag X20 Hatfield 0028, South Africa, Pretoria selyshchev@gmail.com

Many experiments on defect formation in insulators, metals, alloys, and amorphous semiconductors have shown that these materials are sensitive to track formation when they are bombarded by swift heavy ions (SHI). They can occur at different depths and have different shapes: continuous and discontinuous cylindrical, spherical, in chain of «pearls» form.

Detail understanding of the basic processes of materials modification by SHI will help to construct materials with specified properties. For example, we study how shape and length of the structures that are created by overlapping single tracks depends on the number of single tracks and their distribution in depth. Thus, we can find what minimum irradiation dose necessary for structure of tracks disturbed areas to percolate through thin sample.

We do not model the formation of single tracks, but are more interested what structures will be created as a result of multiple overlapping of individual tracks. Tracks were examined like a chain of deal spherical regions; one such chain corresponds to each incident ion. As the number of tracks (corresponds to certain irradiation dose) continue to grow, areas of the single tracks modified substance will continue to overlap, creating branched structure. Some part of this branched structure is bordered on one surface of the sample, while others lie on the boundary with the opposite. When these parts connect one to another, they will create so-called «percolation cluster». Percolation clusters belong to the class of random "deterministic" physical fractals. Therefore, scaling hypothesis was used in study of overlapping ion tracks structure. Based on this hypothesis large-scale curve were constructed: power-law dependence of the relative volume of the percolation cluster on the size of the sample. Degree of this dependence - the relationship of rational numbers, so-called critical exponents, were evaluated. Several such curves were constructed in the cases of different distribution of tracks regions in volume of the sample. The obtained value of critical exponents for the uniform distribution of tracks in the bulk of the sample corresponds to the value of critical exponents in the literature.

Also, the power law describes the dependence of percolation threshold on the size of the sample. According to this percolation dose depends on the size of the sample in the power law. [The] degree of this dependence, inversely proportional to the critical exponent, was evaluated. Critical exponent itself depends on the shape of the track and track the distribution of the depth of the sample.

INTRODUCTION

Swift heavy ions (SHI) deposit a large energy in the nanometric vicinity of their trajectories in solids. The most part of this energy is attributed to electronic excitations while the ionic subsystem of a target stays practically undisturbed initially.

As a result of irradiation with Xe with $E = 250$ MeV in InP at room temperature [1] defects, similar to the "chain of pearls", which are placed along the trajectory of the ions at depths ranging from 35 to 100 nm and from 7 to 10 microns have been identified.

Also discrete tracks point-shaped and oblong dark spots with a diameter equal to an average of about 3-10 nm along the trajectories of incoming ions in the form of a "chain of pearls" with a number of "pearls" in the track of two to five pieces were observed on the bright-field pictures of single-crystalline Si_{0.5}Ge_{0.5} alloy layers irradiated with 1.3-GeV U ions [2].

Such defects are called tracks. Many experiments on defect formation in insulators, metals, alloys, and amorphous semiconductors have shown that these materials are sensitive to track formation when they are bombarded by swift heavy ions (SHI). They can occur at different depths and have different shapes: continuous and discontinuous cylindrical, spherical, in chain of «pearls» form.

Discontinuous track (for instance, chain of «pearls») is formed randomly in that place of the ion path, where the value of missing energy per unit of ion path [length] is above a certain threshold. Due to experimental data

average distance between these «pearls» averages of 25 to 40 nm, the length of the «chain» is in the range from 50 nm to 150 nm.

Tracks of various shapes and lengths are formed in solids along ions [trajectories]. Diffraction pattern of tracks differ from diffraction pattern of the whole sample. They are generated as a result of the strong relaxation of electronic excitations. Tracks are beginning both from the irradiated surface and at some distance from it.

The main idea of this work is to understand what is the morphology of surface of the SHI induced and afterward etched material, for example, such as irradiated by Bi with energy 710 MeV and etched by 1,2% (Fig. 1) [3]. We want to investigate either porosity of structure or condition of percolation throughout the sample.

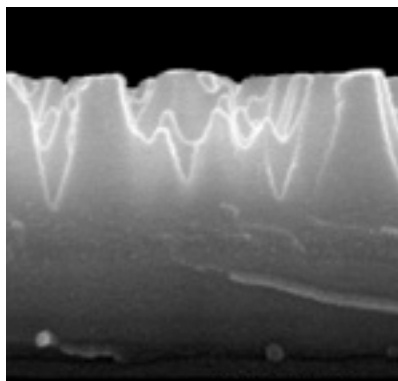


Fig.1. irradiated by Bi with energy 710 MeV and etched by 1,2%

Detail understanding of the basic processes of materials modification by SHI will help to construct materials with specified properties. For example, we study how shape and length of the structures that are created by overlapping single tracks depends on the number of single tracks and their distribution in depth. Thus, we can find what minimum irradiation dose necessary for structure of tracks disturbed areas to percolate through thin sample.

BACKGROUND, FORMULATION OF PROBLEM

Physical mechanisms of single tracks formation, probability distribution of their formation along the trajectory have not been yet fully clarified. There are models that describe some of these mechanisms, but they work only under certain conditions for specific materials. Therefore, we do not model the formation of single tracks. We are more interested in what structures will be created as a result of multiple overlapping of individual tracks with increasing dose, if tracks are already present in the sample.

A sample in the form of plane-parallel plate with a thickness of 50 to 300 nm was simulated. Tracks were examined like a chain of deal spherical regions; it was assumed that each incident ion creates one such chain. The diameter of all "pearls" as in one "chain" and in different "chains" is equal 9 nm. The number of "pearls" in the "chain" varied from one to five. The distance between the irradiation surface (point of ion penetration into the sample) to the place where 1st sphere appears is randomly chosen from 0 to 80 nm. The distance from the first sphere to the second is also chosen randomly from a range of values between 0 and 80 nm, it means, that the form of distribution doesn't depend on the «history» (it is the same as for the preliminary scope, only shifted along the ion path in the appearance point of the previous sphere). Chains of spheres were modeled consecutively from two surfaces of the sample (corresponds to consecutive two surfaces irradiation).

As the number of tracks (corresponds to certain irradiation dose) continue to grow, areas of the single tracks modified substance will continue to overlap, the form of modified matter will become more complicated, creating branched structure. Some part of this branched structure is bordered on one surface of the sample, while others lie on the boundary with the opposite surface. When these parts connect one to another, they will create so-called «percolation cluster» (Fig.2). The volume of all spherical track regions in the sample [is] at this moment called percolation threshold (corresponds to certain irradiation dose of percolation). Those areas that don't overlap with percolation cluster formed other clusters that are called non-percolation clusters.

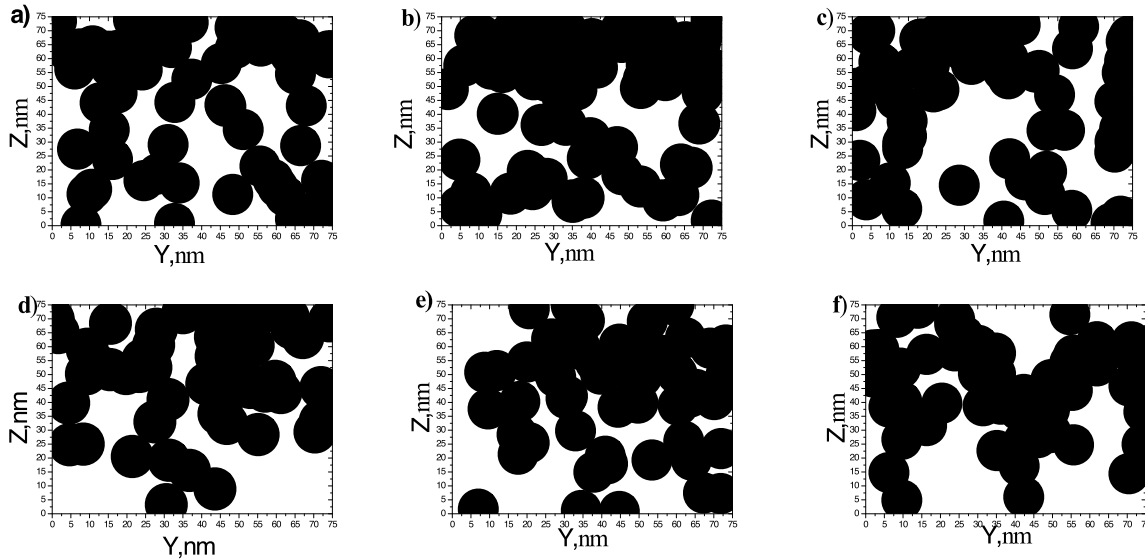


Fig.2 Percolation clusters simulated by overlapping single chains of pearls with certain angle to the surface (corresponds to certain irradiation angle): a) 25°, b) 30°, c) 45° d) 60° e) 70° f) 90°[4]

SCALING HYPOTHESIS APPROACH

Percolation clusters belong to the class of random "deterministic" physical fractals. Unlike deterministic fractals, percolation clusters are not exactly, but only statistically, self-similar. Therefore, scaling hypothesis was used in study of overlapping ion tracks structure. In scaling hypothesis we operate with such concepts as critical exponents. On the Table 1 you can see some values of critical exponents in scaling hypothesis application in percolation and magnetics

Quantity	Dependence	CriticalExponent	d=2	d=3
Percolation				
Orderparameter	$P_{\infty} \sim (p - p_c)^{\beta}$	β	5/36	0,4
Average size of a finite cluster	$S(p) \sim (p - p_c)^{-\gamma}$	γ	43/18	1,8
Correlation length	$\xi(p) \sim (p - p_c)^{-\vartheta}$	ϑ	4/3	0,9
Quantityofclusters	$n_s \sim s^{-\tau}$	τ	187/91	2,2
Magnetics				
Orderparameter	$M(T) \sim (T - T_c)^{\beta}$	β	1/8	0,32
Susceptibility	$\chi(p) \sim (T - T_c)^{-\gamma}$	γ	7/4	1,24
Correlationlength	$\xi(T) \sim (T - T_c)^{-\vartheta}$	ϑ	1	0,63

Table 1. Critical exponents in percolation and magnetic [5]

Based on this scaling hypothesis large-scale curve[s] were constructed (Fig.4a): power-law dependence of the relative volume of the percolation cluster P_{∞} (also called as order parameter) on the size of the sample L (1).

Degree of this dependence - the relationship of rational numbers, so-called critical exponents mentioned above β/θ .

$$P_{\infty}(p = p_c) \sim L^{-\beta/\theta} (L \rightarrow \infty) \quad (1)$$

where p – is the concentration (volume share) of modified matter and p_c – is the concentration (volume share) of modified matter in the moment when percolation appears.

- critical exponent, that describes power-law behavior of the relative volume of the percolation cluster (order parameter P_{∞} on Fig.3a) at percolation threshold p_c (2)

$$P_{\infty} \sim (p - p_c)^{\beta} \quad (2)$$

- critical exponent, that describes power-law behavior of the maximum distance between two points in the greatest non-percolation cluster (correlation length $\epsilon(p)$ on Fig.3b) at percolation threshold (3)

$$\epsilon(p) \sim (p - p_c)^{-\theta} \quad (3)$$

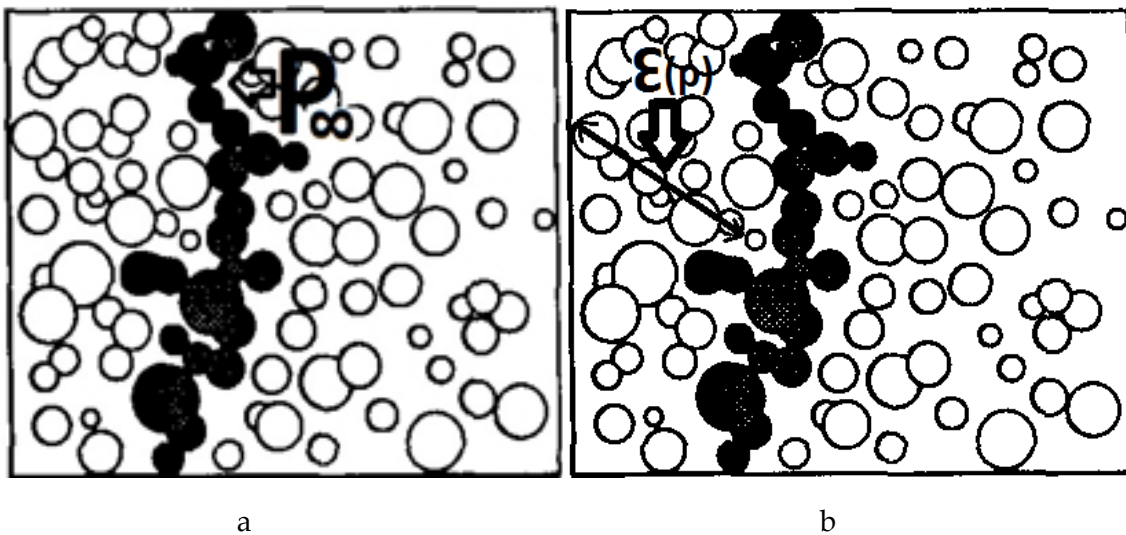


Fig.3. Order parameter (a) and correlation length $\epsilon(p)$ (b)

Also another large-scale curve was constructed (Fig.4b): power-law dependence of the average size of a non-percolation cluster $S(p)$ on the size of the sample L (4). Degree of this dependence - the relationship of critical exponents γ/θ .

$$S(p = p_c) \sim L^{\gamma/\theta} (L \rightarrow \infty) \quad (4)$$

γ - critical exponent, that describes power-law behavior of the average size of a non-percolation cluster at percolation threshold (5).

$$S(p) \sim (p - p_c)^{-\gamma} \quad (5)$$

Several such curves were evaluated in the cases of different distribution of tracks regions in volume of the sample. From large-scale curves in the case with «our» non-uniform distribution we found out that

$$\beta / \vartheta = 0,68 \pm 0,14 \text{ and } \gamma / \vartheta = 1,68 \pm 0,44 .$$

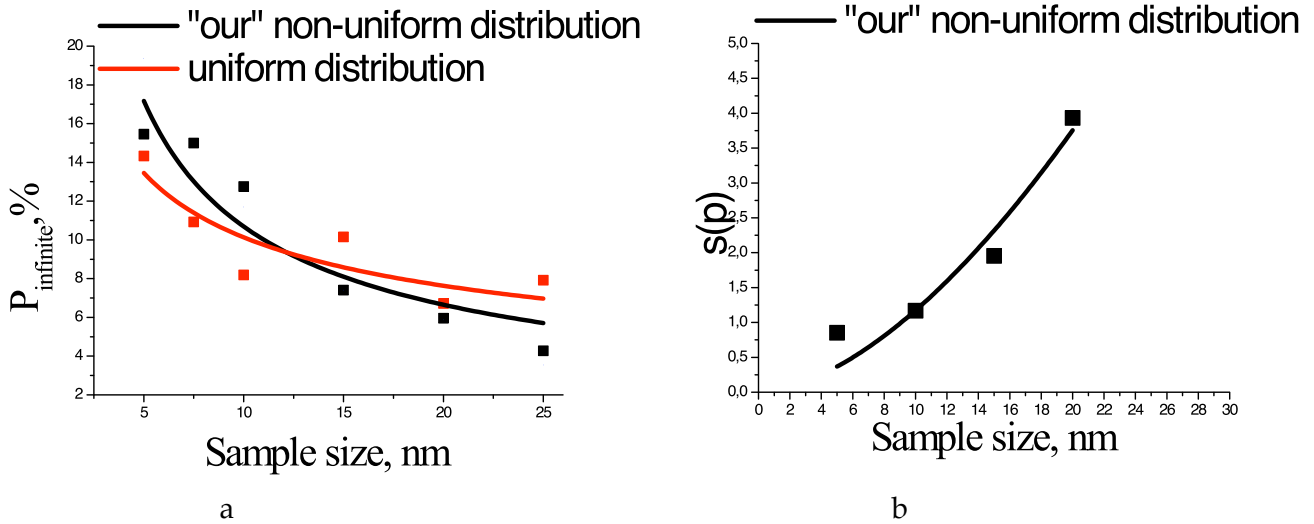


Fig.4 Large-scale curves: power-law dependence of the relative volume of the percolation cluster (a) and average size of a non-percolation cluster (b) on the size of the sample.

The obtained value of critical exponents for the uniform distribution of tracks in the bulk of the sample, corresponds to the value of critical exponents in the literature [6].

SCALING VERIFICATION AND FRACTAL DIMENSION

To be sure that "our" non-uniform distribution model has scaling property, we have to do scaling verification.

$$d = 2 \cdot \beta / \vartheta + \gamma / \vartheta \quad (6)$$

$$3 \approx 2 * 0,68 + 1,68 = 3,04 \quad (7)$$

where d – space dimension in the model, $d = 3$ in "our" model. When we put all our obtained data in (6) we could see that equality is true (7). Percolation model of track regions with "our" non-uniform distribution in depth is scales-invariant.

Due to that fact, fractal dimension of percolation clusters were measured in both cases of uniform, $D_f^{un} \approx 2,59$, and "our" non-uniform distribution, $D_f^{our} \approx 2,32$. The fractal dimension D_f^{our} is less than D_f^{un} , it means that connectivity of track regions in the percolation model with "our" non-uniform distribution in-depth is bigger than the connectivity of track regions in the percolation model with uniform distribution in bulk. It could bring us to different interesting and useful effects. For instance, dependence of area of overlapping ions tracks structure on single "chains of pearls" angle to the surface (corresponds to certain irradiation angle) were evaluated. It was found out that surface area of overlapping ions tracks structure reaches its maximum value at certain "critical" single "chains of pearls" angle to the surface (corresponds to "critical" angle of ions incidence) (Fig.5).

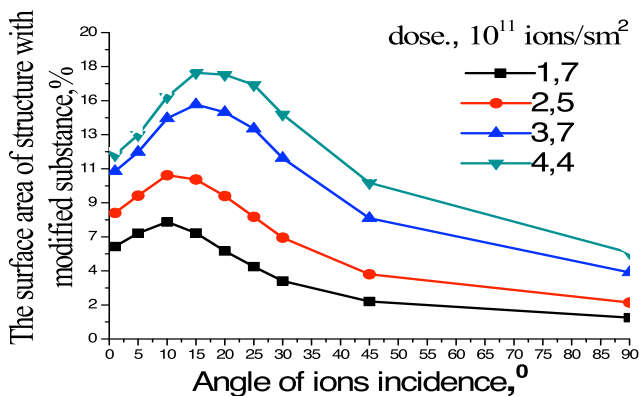


Fig.5 Dependence of surface area of overlapping ions tracks structure on angle of ions incidence

PERCOLATION THRESHOLD

Dependence of percolation threshold on the size of the sample describes by power law:.

$$p_c(\infty) - p_c(L) \sim L^{-1/\theta} \quad (8)$$

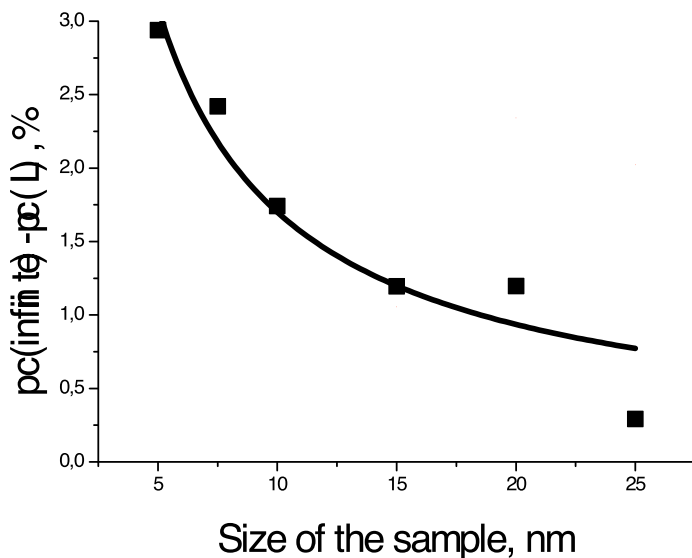
where $p_c(\infty)$ - percolation threshold in the case when sample size tends to infinity ("infinite" sample),

$p_c(L)$ - percolation threshold when sample size equals L.

According to this percolation dose depends on the size of the sample in the power law also:.

$$Dp_c(L) = Dp_c(\infty) - A \cdot L^{-\frac{3}{\theta}} \quad (9)$$

where $Dp_c(\infty)$ - percolation dose in the case when sample size tend to infinity, $Dp_c(L)$ - percolation dose when samle size equals L, A – constant by which we could use equation sign.



Degree of this dependence is inversely proportional to the rational-number, the critical exponent, which itself depends on the shape of the track and distribution of track regions in volume of the sample. Such dependence in the case of model with "our" non-uniform distribution in-depth were constructed (Fig.6), inverse critical exponents $1/\theta = 0,86 \pm 0,15$ and percolation threshold of "infinite" sample $p_c(\infty) = 22,6 \%$ were calculated. The obtained value of percolation threshold for the uniform distribution of tracks in the bulk of the sample, $p_c(\infty) = 28,6 \%$ corresponds to the value of percolation threshold in the literature [6].

Fig.6 Dependence of percolation threshold on the size of the sample.

CONCLUSION

Due to scaling hypothesis scaling properties of our model were verified. Fractal dimension is less than, it means that connectivity of track regions in percolation model with "our" non-uniform distribution in-depth is bigger than connectivity of track regions in percolation model with uniform distribution in bulk. surface area of overlapping ions tracks structure reaches its maximum value at certain "critical" single "chains of pearls" angle to the surface (corresponds to "critical" angle of ions incidence) Percolation threshold dose is scale-invariant.

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Big Bang Meets Big Data

South Africa Joins ASTRON and IBM to Build the Foundation for a New Era of Computing

SKA Press Release

South African scientists to develop rugged microservers to handle the harsh desert conditions, explore new computer architectures and develop advanced algorithms for radio astronomy imaging

Pretoria, South Africa, March 11, 2013:

Square Kilometer Array (SKA) South Africa, a business unit of the country's National Research Foundation is joining ASTRON, the Netherlands Institute for Radio Astronomy, and IBM in a four-year collaboration to research extremely fast, but low-power exascale computer systems aimed at developing advanced technologies for handling the massive amount of data that will be produced by the SKA, which is one of the most ambitious science projects ever undertaken.

The SKA is an international effort to build the world's largest and most sensitive radio telescope, which is to be located in Southern Africa and Australia to help better understand the history of the universe. The project constitutes the ultimate Big Data challenge, and scientists must produce major advances in computing to deal with it. The impact of those advances will be felt far beyond the SKA project—helping to usher in a new era of computing, which IBM calls the era of cognitive systems.

[FLICKR IMAGES](#) and [VIDEO](#)

When the SKA is completed, it will collect Big Data from deep space containing information dating back to the Big Bang more than 13 billion years ago. The aperture arrays and dishes of the SKA will produce 10 times the global internet [traffic](#)*, but the power to process all of this data as it is collected far exceeds the capabilities of the current state-of-the-art technology.

As part of the global effort to solve this unprecedented challenge, last year, ASTRON and IBM launched a public-private partnership called DOME, to develop a fundamental IT roadmap for the SKA. The collaboration includes a user platform where organizations from around the world can jointly investigate emerging technologies in high-performance, energy-efficient computing, nanophotonics, and data streaming. Through its SKA South Africa unit, the National Research Foundation is now a user platform partner in DOME.

"The DOME collaboration brings together a dream team of scientists and engineers in an exciting partnership of public and private institutions. This project lays the foundation to help the scientific community solve other data challenges such as climate change, genetic information and personal medical data," said Simon Ratcliffe, Technical Coordinator, DOME-South Africa.

Scientists from all three organizations will collaborate remotely and at the newly established ASTRON & IBM Center for Exascale Technology in Drenthe, the Netherlands. More specifically, scientists from SKA South Africa will focus on the following research themes:

- Visualizing the challenge -- fundamental research will be conducted into signal processing and advanced computing algorithms for the capture, processing, and analysis of the SKA data so clear images can be produced for astronomers to study;
- Desert-proof technology -- the DOME team is researching and prototyping microserver architectures based on liquid-cooled 3D stacked chips. The team in South Africa will extend this research to make the microservers rugged or “desert proof” to handle the extreme environmental conditions where the SKA will be located; and
- Software analytics -- the 64 dishes of the MeerKat telescope in South Africa will be used for the testing and development of a sophisticated software program that will aid in the design of the entire computing system holistically and optimally—taking into account all of the cost and performance trade-offs for the eventual 3,000 SKA dishes.

“The DOME research has implications far beyond astronomy. These scientific advances will help build the foundation for a new era of computing, providing technologies that learn and reason. Ultimately, these cognitive technologies will help to transform entire industries, including healthcare and finance,” said Dr. Ton Engbersen, DOME project leader, IBM Research. “For example, we are designing a system for storing information that learns from its interactions with the data and parcels it out in real time to the storage medium that’s most appropriate for each bit, which can also be applied to medical images.”

“DOME is not only innovating in the laboratory, but our user platform is setting a new standard in open collaboration,” said Dr. Albert-Jan Boonstra, DOME project leader, ASTRON. “In addition to SKA South Africa, four additional organizations are expected to join in the coming weeks including universities and small and medium-sized businesses located in the Netherlands.”

The initial five-year DOME collaboration is realized with financial support of the Dutch Ministry of Economic Affairs, Agriculture and Innovation (EL&I) and from the Province of Drenthe.

Virtual Recruiting Event IBM and ASTRON scientists will be hosting a SmartCloud virtual recruiting event on 26 March for several open positions within the DOME project. For details visit www.zurich.ibm.com/astron/

Introducing the SKA

The Square Kilometre Array project is a global science and engineering project to build the world’s largest radio telescope. The SKA will see back to a time before the first stars lit up. Optical telescopes see the light from stars. Before stars existed there was only gas; a radio telescope with the sensitivity of the SKA can see back in time to the gas that existed before stars were even born.

The SKA will address a wide range of fundamental questions in physics, astrophysics, cosmology and astrobiology. It will be able to investigate previously unexplored parts of the distant Universe.

The project is led by the SKA Organization, a not-for-profit company with its headquarters at Jodrell Bank Observatory, near Manchester, UK. The organization was established in December 2011 to formalize relationships between the international partners and centralize the leadership of the project.

The SKA will be built in Southern Africa and Australia. There will be 3 000 dish antennas, each about 15 m in diameter as well as two other types of radio wave receptor, know as low- and mid-frequency aperture array antennas. The mid-frequency aperture arrays will be built in South Africa and are envisaged to be a major component of the SKA Phase 2. The antennas will be arranged in five spiral arms and the dishes in Southern Africa will extend to distances of at least 3,000 km from the centre of the core region. Construction of the SKA is expected to begin in 2017 and conclude in 2024.

About SKA South Africa and NRF

SKA SA was established by the Department of Science and Technology of South Africa and is administered as a business unit of the National Research Foundation (NRF).

The main programs falling under SKA SA are the hosting of the SKA, the construction of the 64-dish SKA precursor telescope known as MeerKAT, the establishment and protection of the Radio Astronomy Reserve in the Karoo region in South Africa, the development of a substantial human capital development program, and the development of the African VLBI Network.

As an independent government agency, the NRF promotes and supports research in all fields of knowledge. It also conducts research and provides access to National Research Facilities. The NRF provides services to the research community especially at Higher Education Institutions (HEIs) and Science Councils with a view to promote high-level human capital development. The NRF aims to uphold excellence in all its investments in knowledge, people and infrastructure.

About ASTRON

ASTRON is the Netherlands Institute for Radio Astronomy, part of the Netherlands Organisation for Scientific Research (NWO). Its mission is to make discoveries in radio astronomy happen, via the development of novel and innovative technologies, the operation of world-class radio astronomy facilities, and the pursuit of fundamental astronomical research. See also: www.astron.nl.

About IBM

For more information visit www.research.ibm.com

Read this whitepaper on the DOME project: www.scribd.com/doc/125147649/Ultimate-Big-Data-Challenge

* <http://www.skatelescope.org/media-outreach/fun-stuff/facts-figures/>

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UNIZULU Hosts 2013 SAIP Conference

by Karishma Ganpat, University of Zululand

University of Zululand (UNIZULU) will host the 2013 South African Institute of Physics (SAIP) Conference at its Richards Bay Campus, in KwaZulu-Natal from the 8-12 July. The international conference is expected to draw more than 500 scientists, academics and members of the private and corporate sector. This year's conference promises to be exciting with an interactive approach to cutting edge technology and leading research.



Richard Bay Campus of the University of Zululand

As a leading comprehensive University in South Africa, UNIZULU is focused on providing a platform for the exchange of information, establishment of academic and corporate partnerships, discourse regarding the latest scientific developments and promoting positive global impact through new innovations. Papers presented at the conference will cover areas including nanotechnology, nuclear and applied physics, photonics, biosciences, space science, applied, theoretical, computational particle and radiation physics.

Profile

Established in 1960, UNIZULU has rapidly grown, servicing more than 15 000 students annually in the heart of Zululand. Known for its contribution towards the development of local communities north of Tugela, the institution continues to found community projects that foster socio-economic development. Industry partnerships have enabled long term sustainable projects that contribute to UNIZULU's academic curriculum, student industry placement, and community and industry engagements.

The University's KwaDlangezwa and Richards Bay Campuses are based within the uMhlatuze Municipality, the smallest of six local municipalities and the fastest growing industrial hub under Uthungulu District Municipality.

UNIZULU's former ceremonial heads include Chief Mangosuthu Buthelezi, President Jacob Zuma with Minister of Correction Service, Dr Sbu Ndebele as the present Chancellor. Prof Fikile Mazibuko is currently at the helm of the institution and is focused on rolling out an infrastructure and development plan estimated at R500 million. Our illustrious alumni include Chief Justice, Mogoeng Mogoeng; Minister of Justice and Constitutional Development, Jeff Radebe; singer, Sibongile Khumalo; Chairperson African Union Commission, Dr Nkosazana Dlamini-Zuma, Judge Connie Mocumie, former Chief Justice, Sandile Ngcobo; Minister of Higher Education and Training, Dr Blade Nzimande and Vice-Chancellor, Prof Mazibuko.

Richards Bay Campus

The Richards Bay Campus, established in 2009, is in the process of founding a faculty of engineering. Its entrepreneurial partnerships and vocational programmes are geared to enhance the Richards Bay maritime sector and the paper, timber, engineering, sugar, construction and mining industries, among others.

The campus's approach ensures programmes and facilities are relevant, underpinned by new technologies, cutting edge knowledge and skills which are appropriate for the local labour market and development of the country and continent.



Richards Bay Campus facilities

Richards Bay is also home to UNIZULU's Science Centre. A multifaceted Science, Engineering and Technology centre that hosts more than 130 interactive exhibitions and programmes. The facility is supported by local industry, international private organisations. It hosts 30 000 learners annually and has received numerous accolades and international recognition for its efforts.

Key partnership are currently being established with major economic role players in the district, including Richards Bay Coal Terminal (RBCT), Transnet, Foskor, BHP Billiton, Bell Equipment, Richards Bay Minerals, Mondi, Zululand Chamber of Commerce, SA Sugar Association, Department of Agriculture and Environmental Affairs, Department of Tourism and KZN Ezemvelo Wildlife.

Green Infrastructure

The design concept behind Richards Bay Campus's modern contemporary architecture centred around the impact on the world's environment. The sustainable green building inspired design embraces space, light and air whilst incorporating all aspects of minimal maintenance and cost, reduction in the carbon footprint with maximised utilisation. Materials used were considered for their recyclable properties. The design includes a well-ventilated covered courtyard with ample light for multi-purpose use. The corridors feature a low maintenance rough face-brick which contrasts the buildings modern finish.

The campus is located in the CBD and its facilities are also outsourced to generate third stream income. It is also within close proximity to local B&Bs, the Road Lodge, Protea and F1 Hotels, Boardwalk Inkwazi Shopping Centre and the atmospheric Tuzi Gazi Waterfront, which is known for its array of water sports and is surrounded by lush vegetation and flourishing birdlife. The campus is also en route to the wildlife destinations of Cape Vidal, Hluhluwe and St Lucia.



KwaDlangezwa Campus facilities

KwaDlangezwa Campus

KwaDlangezwa Campus is UNIZULU's main campus, which boasts a new residence and a lecture theatre with a seating capacity of 2000. These infrastructural projects, based on green sustainable design, were completed in 2012. The lecture theatre has WIFI connectivity, modern technology and an external environmentally friendly cooling system.

The campus's geographical location provides the opportunity for niche research areas which include tribal law, indigenous languages, culture, medicine and agriculture. UNIZULU's Coastal Research Unit, marine biology, zoology and agronomy research is based on different species of fauna and flora at the iSimangaliso Wetland Park which consists of approximately 3 280 km² natural ecosystems. It is the third-largest protected conservancy in South Africa which runs from the Mozambican border to Mapelane. The park includes Lake St Lucia, St Lucia Game Reserve, False Bay Park, Kosi Bay, Lake Etrza Nature Reserve, Lake Sibhayi, St Lucia Marine Reserve, St Lucia Marine Sanctuary, Sodwana Bay National Park, Mapelane Nature Reserve, Maputaland Marine Reserve, Cape Vidal, Ozabeni, Mfabeni, Tewater Wilderness Area and Mkuze Game Reserve.

KwaDlangezwa Campus is also home to a weather station which is used to conduct daily tests and provide data on weather patterns and rainfall in the region to the South African Weather Service.

Students at the main campus



Historical Environmental Perspective

UNIZULU was established in 1960, on land donated by the Mkhwanazi Tribal Council, with a student population of 41 students. Despite heightened tensions under the apartheid regime and education restrictions, the university continued with its academic trajectory. Zululand is rich in culture and political history, with English and isiZulu being the two predominant languages of the region. It is also the birthplace of political activist and founder of the ANC, Dr Pixley ka Isaka Seme the first Black lawyer in South Africa; founding president of the ANC, John Langalibalele Dube; founder of the Inkatha Freedom Party, Chief Mangosuthu Buthelezi, ANC president and Nobel Peace Prize winner, Chief Albert Luthuli; President Jacob Zuma and Chief of the amaZondi Clan, Mbata Bhambatha kaMancinza Zondi, who played an integral role in the Bambatha rebellion of 1906.

The Fort Nongqayi in Eshowe provides a historic local perspective on the beginnings of the regions mixed community, the battles of our forefathers and their early livelihood. The Fort is home to the Zululand Historical Museum, Mission Chapel Museum, Vukani Zulu Cultural Museum, Phoenix Prison Art Gallery, KZN Papermakers, Ian Garland Arboretum, Adam's Outpost Restaurant and Crafts of Africa curio shop. The tourist site also boasts a geodesic butterfly house, a large ethnological collection and indigenous gardens that are used for dyeing, weaving, and indigenous medicine.

Opportunities

HartRAO Doctoral Student and Post-Doctoral Fellow

The Department of Science and Technology (DST), and the National Research Foundation (NRF) have introduced the Professional Development Programme (PDP) aimed at training South African Doctoral students and Post-doctoral Research Fellows. The PDP is part of a suite of DST- NRF human capital development funding instruments aimed at increasing the number of skilled personnel in science, engineering and technology.

The available projects are:

A PhD position with the objective to develop, implement and assess the performance of a single photon counter receiver package for a Lunar Laser Ranger system.

A Post-doctoral position, which will involve the development and implementation of a number of subsystems involving 1 picosecond timing accuracy, electronic interfacing, remote monitoring of subsystems and integration of these subsystems into a Lunar Laser Ranger system.

These projects form part of a collaborative project between HartRAO, NASA and the Observatoire de la Côte d'Azur.

Click here for more information and how to apply

http://www.saip.org.za/images/stories/documents/opportunities/PDP_Geodesy.pdf

MSc and Doctoral Bursaries UCT Scientific Computing Unit

Graduate students with a strong interest in acceleration, informatics and reaction dynamics as applied to computational biology and biophysics are encouraged to apply to the following programmes:

- Masters degrees for those candidates in possession of a B.Sc. (Hons) degree in Physics or Applied Mathematics.
- Doctoral degrees for those candidates in possession of an M.Sc in Computational Physics or Scientific Computing.

Successful candidates are guaranteed bursaries that have a minimum value of at least;

- R50 000 per annum for a Masters Degree and
- R80 000 per annum for a Doctoral Degree

Applicants are invited to visit the Scientific Computing Research Unit Website: <http://www.scientificcomputing.com> for further information and to complete an online application.

There is no closing date for these applications, however registration is in compliance with the University of Cape Town's postgraduate policies.

For enquiries or further information about the above positions; Please contact Louise Bezuidenhout at the Scientific Computing Research Unit Tel: +27 21 650-2568; fax +27 21 686-4333, email:

louise.bezuidenhout@uct.ac.za

MSc & PhD Opportunities at UJ

The University of Johannesburg has positions for MSc and PhD studies in the following areas;

- 1) High Energy Physics (ATLAS Experiment)
- 2) Applied Nuclear Physics (Mineral-PET Diamond locator)
- 3) Materials Science (Diamond based gamma-ray undulator)

For more information and how to apply please contact Prof Simon H Connell shconnell@uj.ac.za phone +27 11 559-4380

PhD Opportunity SALT

A PhD studentship, supported through the NRF's Professional Development Program (PDP), is available for a qualified South African national to work with a research group based at SAAO and UCT. PhD bursaries of R200,000 per annum for the 3 years of study are offered, plus additional research funding.

The overall program hinges primarily on optical observations of accretion powered sources, and where appropriate, supported by multi-wavelength (e.g. radio, X-ray and gamma ray) observations from other facilities. [Click here for more information and how to apply](#)

Join the Worldwide GLOBE at Night 2013 Campaign

What would it be like without stars at night? What is it we lose? Starry night skies have given us poetry, art, music and the wonder to explore. A bright night sky (aka light pollution) affects energy consumption, health and wildlife too. Spend a few minutes to help scientists by measuring the brightness of your night sky. Join the GLOBE at Night citizen-science campaign www.globeatnight.org. The third campaign started March 3 and runs through March 12.

More information:

GLOBE at Night is a worldwide, hands-on science and education program to encourage citizen-scientists worldwide to record the brightness of their night sky. During five select sets of dates in 2013, children and adults match the appearance of a constellation (Orion or Leo in the northern hemisphere, and Orion and Crux in the southern hemisphere) with seven star charts of progressively fainter stars (www.globeatnight.org/observe_magnitude_orion.html). Participants then submit their choice of star chart at www.globeatnight.org/webapp/ with their date, time and location. This can be done by computer (after the measurement) or by smart phone or pad (during the measurement). From these data an interactive map of all worldwide observations is created (www.globeatnight.org/map/). Over the past 7 years of 10-day campaigns, people in 115 countries have contributed over 83,000 measurements, making GLOBE at Night the most popular, light pollution citizen-science campaign to date (www.globeatnight.org/analyze.html). The GLOBE at Night website is easy to use, comprehensive, and holds an abundance of background information (www.globeatnight.org/learn.html and www.globeatnight.org/observe.html). Guides, activities, one-page flyers and postcards advertising the campaign are available at www.globeatnight.org/pdf. Through GLOBE at Night, students, teachers, parents and community members are amassing a data set from which they can explore the nature of light pollution locally and across the globe. The remaining GLOBE at Night campaigns in 2013 are: March 3 - 12, March 31 - April 9, and April 29 - May 8. Make a difference and join the GLOBE at Night campaign.

Constance E. Walker, Ph.D. associate scientist & senior science education specialist, NOAO director, GLOBE at Night campaign (www.globeatnight.org) National Optical Astronomy Observatory (NOAO) 950 N. Cherry Avenue, Tucson, AZ 85719 USA

Upcoming Conferences & Workshops

Entrepreneurship for Scientists and Engineers 20 – 24 May 2013

Registration is now open for this workshop so register now places are limited

Do you want to improve your skills in commercialising your research findings or help your students and research group develop technology-based start-up companies, produce more patents and licenses, if yes then you are invited to participate in the next entrepreneurship for scientists and engineers workshop to be held in South Africa from 20 to 24 May 2013 at Protea Hotel Karridene Beach, Durban South Coast.

[Download the workshop poster here](#)

[Please visit the workshop website for more information here](#)

SAIP 2013 Annual Conference

The South African Institute of Physics Annual Conference for 2013 (SAIP 2013) will be held *at the University of Zululand in Rirchads Bay from 8 to 12 July 2013*

Please diarise these dates for information to follow.

SAIP 2013 Abstract submission and Registration are now open. For more information, to register or submit an abstract visit the links below

1st Call for Abstracts:

<http://indico.saip.org.za/getFile.py/access?resId=0&materialId=1&confId=32>

SAIP2013 website: <http://indico.saip.org.za/event/saip2013>

9th International Workshop on Adaptive Optics for Industry and Medicine 2 – 6 Sept 2013

ABSTRACT SUBMISSION & REGISTRATION NOW OPEN

To register or submit an abstract visit www.saip.org.za/aoim2013/

The aim of the workshop is to discuss the use of novel adaptive optical elements, concepts and systems as they apply to high power lasers, medical devices, imaging, industrial lasers and microscopy. The International Workshop on Adaptive Optics for Industry and Medicine (AOIM) provides scientists and engineers from both industry and academia with opportunities to explore recent developments, current practices and future trends in adaptive optics and related fields. A key feature of this single-session meeting is the relaxed atmosphere with all participants encouraged to present and discuss their work either as a talk or a poster.

Topics will include:

- Adaptive optical (AO) devices,
- Wavefront sensing and measurement,
- Aberration correction,
- AO in imaging systems,
- Digital holography in AOs,
- Spatial light modulators,
- Applications of AOs.

International Conference on Optics and Lasers Applications ICOLA2013

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

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

6th International Conference Hard Probes 2013 on Hard and Electromagnetic Probes of High-Energy Nuclear Collisions

By W A Horowitz and Heribert Weigert for the LOC

It is with great pleasure that we announce that the "6th International Conference on Hard and Electromagnetic Probes of High-Energy Nuclear Collisions (Hard Probes 2013)" will take place from Nov 4 to Nov 8, 2013 at the Stellenbosch Institute for Advanced Studies in Stellenbosch, South Africa, a delightful 30 minute drive into the wine country surrounding Cape Town.

We anticipate topics for the conference will include Jet quenching and observables; High transverse momentum light and heavy flavor hadrons; Initial state and proton-nucleus collision phenomena; Heavy flavor production and quarkonia; and Hard and thermal electroweak probes. A student summer school will be held prior to the conference.

We plan to construct a website, set registration dates, etc. soon. In the meantime, please mark your calendars, forward this notice to any potentially interested parties, and if you have any questions feel free to send them to this address, hp2013@flabs.ac.za

Physics Comment Editorial Policy

Deadline for submissions for the March 2013 issue of Physics Comment is 28 February 2013

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:

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).

The author allows PC to edit the work for clarity, presentation, including making appropriate hypermedia links within the work.

The author gives PC permission to publish the work and make it accessible in the Magazine's archives indefinitely after publication. The author may retain all other rights by requesting a copyright statement be placed on the work.

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

Publication Deadlines

Physics Comment is published four times a year.

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

Specification and Submission of Content

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

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

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

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

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

PhysicsComment@saip.org.za

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

Photography and Illustration. All solicited photography and illustration should be part of an article and will be judged first for technical quality and editorial appropriateness.

The editor and art director reserve the right to request revision or reject any material that does not meet their criteria. The publisher reserves full rights to all solicited photography and illustration, including the right to reprint or reuse graphic material in other publications.

Categories of Content Contributions

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

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

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

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

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

Submission of Articles

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

