October 2014

UNIVERSITY OF JOHANNESBURG

Faculty of Science NEWSLETTER

CONTENTS

The Faculty of Science reflects with pride on the achievements of their staff and students.

THE Art OF ACCOMPLISHMENT

UJ Natural Sciences rank 4th in South Africa

The Faculty of Science is honoured with the outstanding achievement to be ranked fourth in South Africa, following UCT, WITS and Stellenbosch, according to the latest QS Quacquarelli Symonds rankings released on 16 September 2014.

This puts UJ Natural Sciences firmly in the league of international universities such as Université du Québec in Canada, Universität Ulm in Germany, University of Gothenburg in Sweden, Universidade Federal do Rio Grande Do Sul in Brazil and the Indian Institute of Technology Roorkee (IITR).

Natural Sciences subjects include Physics and Astronomy, Mathematics, Environmental Sciences, Earth and Marine Sciences, Chemistry and Materials Sciences and Geography, which are ranked by QS. Geography is ranked in the top 200 universities world-wide.

As an example, UJ researchers from the Department of Physics collaborate with researchers at Stanford University and University of Edinburgh, both ranked in the top 50 universities worldwide by QS. They regularly publish in academic journals covering Condensed Matter Physics and Nuclear and High Energy Physics.

Prof Basie von Solms allowed into PFIP as an Honorary Member

At the General Assembly meeting of IFIP, which took place in September in Vienna, Austria, Prof Basie von Solms, Director of the Centre for Cyber Security at the University of Johannesburg, was allowed into IFIP as an Honorary Member. He is only the tenth Honorary Member allowed into IFIP in its 55 year history.

IFIP, the International Federation for Information Processing, is an international body in the field of information Technology, and was established in 1960 under the auspices of UNESCO. Presently IFIP has 56 countries as members, and through its member countries and working groups it brings together more than a million experts in the field of Information Technology.

The IFIP statutes state that *'On rare occasions, Honorary Membership may be awarded to a person who has displayed exceptional merit in furthering the aims and interest of the Federation'*.

Prof Von Solms, who had been involved with IFIP for more than 30 years, was President of IFIP from 2007 to 2010. The citation submitted to the General Assembly includes the following: "He was a powerful and visionary president, always driven by the intention to make IFIP a powerful and well respected organization. As part of these reform activities he initiated streamlining the governance structure of IFIP. Making him an honorary member, IFIP will substantially benefit from his experience and his future-oriented dedication".

The consequence of being allowed as an Honorary Member is that Prof Von Solms will now join the rest of the Honorary Members in an exclusive group of advisors to IFIP till the end of their lives.

UJ's DIVERSITY WEEK2014

The Faculty of Science actively taking part in UJ's Diversity Day 2014












PUBLIC LECTURES FOR 2014

- **2 October: Prof Bruce Cairncross**
- **23 October: Prof Hartmut Winkler**

ACADEMY OF COMPUTER SCIENCE & SOFTWARE ENGINEERING

Martin Trollip, Lourens Badenhorst, Egbert van der Westhuizen and Michael Wright after their win at the Discovery Graduate Hackathon

UJ students won Discovery IT Graduate Hackathon

An innovative Android mobile application that is set to transform software development has won a four member student team from the Academy of Computer Science & Software Engineering first prize in the 2014 Discovery IT Graduate Hackathon.

The team Health Ninjas which comprises of Michael Wright, Egbert van der Westhuizen, Lourens Badenhorst and Martin Trollip, all UJ's Academy of Computer Science and Software Engineering students. The team has beat off the challenge of some of the top computer science, engineering and informatics students from across the country to win the first ever Discovery Graduate Hackathon, sponsored by Discovery Health, one of South Africa's largest medical aid schemes. The Discovery challenge explored innovative workable solutions for its trend-setting wellness Programme, Vitality.

The team's winning idea had nine elements embodied in an Android mobile application, which included track running distances; a QR scanner for food items; a hacked Arduino sensor used as a heart rate monitor that alerts the mobile application of erratic cardiac behaviour with escalating urgency depending on level and duration of the activity, allowing emergency services to be dispatched without the need for any physical interaction from the member, and social media integration.

Success story continues

Another successful IT winter school was held during the winter holidays for government schools and IEB schools.

The Academy for Computer Science and Software Engineering started the winter school in IT in 2009. The aim of the winter school is to support grade 12 learners with the programming component of the school curriculum and to assist learners who are working towards a distinction and want to fine-tune their programming skills in preparation for the final exam. In addition, the Academy recognises that the winter school can provide the Department with an opportunity to expose learners who are interested in IT as career to study possibilities and the operational environment of the Department. Lectures were also given by academics in the Department to the learners as part of the week.

The focus of this winter school for government schools is the Delphi programming language, and is presented in the June holiday period. The grade 12 learners left the winter school with new enthusiasm for IT as subject, and were impressed by the facilities of the Academy of UJ.

In conjunction with the winter school for government schools, a winter school for IEB schools is also held during their holiday using Java as programming language.

The winter school provides excellent support to grade 12 learners and their teachers who also attended the school in order to improve their skill set.

On the photo is Marina Myburgh, IT teacher at Crawford College in Sandton and Ian Jannasch from Hoërskool Pietersburg in Polokwane. A task was given to the group of eighty learners to solve and he was the best performer in the group.

APPLIED CHEMISTRY

Prof Mhlanga.

Researcher Received Top Award

Prof Sabelo Mhlanga from the Department of Applied Chemistry in the Faculty received the prize of upcoming researcher in the field of membrane technology at The *10th International Congress on Membranes and Membrane Processes* (ICOM2014) held in Suzhou, China. This was one of the top awards in the conference, recognized by an award certificate and a monetary value.

ICOM2014 covered all aspects in membrane science and engineering.

BIOCHEMISTRY

Outstanding student in Biochemistry

Lerato Matsaunyane, one of the PhD students of Prof Ian Dubery from the Department of Biochemistry, was awarded first prize for the best contribution based on her PhD dissertation at a recent awards ceremony of the Agriculture Research Council (ARC). The title of her contribution was *Analysis of unintended and unexpected effects of transgene insertion on the endogenous host genome.* Criteria used for the selection included contribution to the advancement of science, new knowledge generated, practical applications, relevance to South Africa and its people and promotion of the public understanding of science and technology.

Lerato Matsaunyane.

Prof Ian Duberry was elected as member of the Council of the South African Society of Biochemistry (SASBMB) at the last AGM held at Goudini.

BIOTECHNOLOGY & FOOD TECHNOLOGY

The Department of Biotechnology & Food Technology joins Resolution Circle

The Department of Biotechnology & Food Technology's application to the Resolution Circle has been accepted and a budget of R5m allocated.

The Resolution Circle is a hub for incubation of small businesses, service provision to industry as well as product and process development. They help their clients expand their business potential through expert advice, prototype development, high-level troubleshooting and skills development – through the full spectrum of the value chain: *from idea to barcode*.

They also have extensive knowledge within the management of intellectual property (e.g. patents), and assist clients in the protection and implementation of their novel technologies through their proven network of industry contacts and investors.

At present, two facilities are being established with the aim of being operational during the fourth quarter of 2014, namely a *Chemical Process Modelling Facility* and an *Applied Biotechnology Facility*.

The *Chemistry Facility* has the capability for conducting chemical research and development on a very high-level, focusing on reproducible and scalable reactions with using both software and laboratory modelling of chemical processes to address industry-relevant, client-specific requirements. Chemical process modelling for scale-up and scale-down applications, elimination of unit processes to streamline production, as well as new product development are all offered by this facility.

The *Biotechnology Facility* (with full genetic engineering capability) will provide a platform for solving holistic challenges within the food, water and environmental arenas. The focus is on turnkey solutions within these fields including: pollution and contamination testing and recommendations, bioremediation, product and process development, biomedical applications, and any microbiology-related challenges in order to streamline operations, mitigate critical operational risks.

GEOGRAPHY

The Department of Geography, Environmental Management & Energy Studies held its Prize Giving ceremony in the Department. At this prestigious event the top Honours, Masters and third year students as well as the student who won the prize for best paper at the SA student geographers' conference this year received their awards.

Terence Payne Floating Trophy **and Gold Medal were presented by Dr June Meeuwis on behalf of the Payne family to Linda Sheppard for the best Coursework Masters student in Environmental Management 2013. The trophy and medal was commissioned by the Payne family in memory of their late son, Terence, who was an outstanding student in this programme. Kurt Lossgott is the sculptor and the inscription on the trophy and medal reads:** ***The future belongs to those who believe in the beauty of their dreams,*** **which also was Terence's motto.**

The Cabanga Concepts Award for the best undergraduate student in Environmental Management 2013 was presented to Leani de Vries (cum laude) by Mr Ian Troskie from Cabana.

The Department of Geography, Environmental Management & Energy Studies Trophy for the best undergraduate student in Geography 2013 was presented to Leani de Vries (cum laude) by Prof Nico Kotze (HOD).

The Eskom Floating Trophy for the best Honours student in Energy Studies during 2013 presented by Mr Barry MacColl,(right) General Manager Eskom Sustainability Division to Francois Retief (cum laude).

Mr Warren Aken from Golder Associates gave a motivational talk to the students at the Department of Geography, Environmental Management & Energy Studies annual prize giving. Golder Associates Africa is a sponsor for the best Honours student in Geography 2013. The Golder Africa trophy and prize was awarded (in absentia) to Desire Greenberg (cum laude).

Jade Loader presented her Honours research paper at the annual conference of the Society for South African Geographers at the University of Fort Hare. Her paper was titled ***Migration or Diffusion at GIS approach.*** **Jade won the prize for best GIS and Remote Sensing Paper at Honours level.**

From left to right: Dr John Ledger, Lecturer Honours Energy Studies, Mr Barry MacColl General Manager Sustainability Division, Eskom; Mr Francois Retief with the Eskom Trophy for the best Honours Energy Studies student 2013 (cum laude), Mr Dave Lukas Eskom.

GEOLOGY

Prof Beukes.

Prestigious Havenga Prize for Physical Sciences to Geologist

The South African Academy for Science and Arts awarded the prestigious 2013 Havenga Prize for Physical Sciences to Prof Nic Beukes in the Department of Geology. Prof Beukes received this award for his standing in the geological community and his research on iron ore.

The Havenga Prize is awarded annually since 1947 for original research in the area of natural science and/or technology. The required criteria used in the evaluation of candidates are research publications. Other achievements in science are also taken into consideration. A person receives this award only once.

Prof Beukes is essentially a field geologist, specialising in sedimentology and stratigraphy, with emphasis on understanding the origin of iron and manganese ore deposits and the nature of surface environments on early earth, which includes the history of atmospheric oxygen and climatic change in the middle Archean to early Paleoproterozoic. He has worked extensively on iron and manganese formations all over the world and also studied the genetic and sequence stratigraphy of siliciclastic strata of the Witwatersrand and Pongola basins, depofacies in early Precambrian carbonate platform successions, early Precambrian laterite profiles and paleosols and the nature of post-Gondwana land surfaces and associated soil profiles. He is rated an A1 scientist by the National Research Foundation of South Africa since 2001 and received the Draper Medal, the highest award from the Geological Society of South Africa, in 2002 for scientific contributions in geology. Prof Beukes serves on various National and International Geological Research Committees. Some 35 MSc and 12 PhD students completed their theses under his guidance. He has authored or co-authored more than 100 full length research papers in International and National Journals in addition to publishing about 115 scientific research abstracts and 98 confidential research reports.

cimera

CIMERA – DST-NRF Centre of Excellence for Integrated Mineral and Energy Resource Analysis

What the future holds…

The mandate of the newly-launched DST-NRF Centre of Excellence for Integrated Mineral and Energy Resource Analysis (CIMERA), hosted by the University of Johannesburg with the University of the Witwatersrand as co-host, is to harness and focus the world-class applied geosciences expertise available in South African institutions towards understanding Africa's superlative mineral and energy resources and to train the next generation of geoscientists who will be responsible for locating and managing these resources. CIMERA provides the platform for independent academic research and high-level training in projects of relevance to the nation and the minerals exploration, mining and energy industries. Researchers at Fort Hare University, Rhodes University, Stellenbosch University, University of Pretoria and the University of Venda represent collaborating partners of CIMERA.

The research plan of CIMERA involves several focus areas targeting some of the mineral and fossil energy resources considered most important for sustaining economic and human capital growth in South Africa. One of these focus areas is designed to undertake research into the fossil energy resources of Karoo-aged basins in southern Africa. The Karoo name refers to the sedimentary successions that were deposited on the ancient supercontinent of Gondwanaland some 300 to 170 million years ago in the area now represented by the southern part of the African continent. These Karoo-aged basins contain all of the important coal deposits of southern Africa extending from Malawi in the north into Mozambique, Zimbabwe, Namibia and Botswana southwards to the coal fields of South Africa. In addition, these basins contain thick successions of black carbon-bearing

shales that are a potential source of shale gas if they can be fractured at great depth. CIMERA aims to expand research into the character and quality of coals in these basins, especially those north of our current major coal fields for which the information required to ensure their optimum utilization as energy resources is lacking.

Similarly, under the leadership of Prof Annette Götz of Rhodes University, and following three fact-finding start-up meetings, the conclusion was reached that South Africa's geoscientists know very little about the possibility of shale gas deposits in the Karoo basins, and that much of the existing geological data is of insufficient quality to address the current research questions. Furthermore, it was realized that South Africa has an almost complete lack of highly trained scientists in the field of natural gas and petroleum resource analysis and estimation. This led to development the Karoo Research Initiative (KARIN) under the umbrella of CIMERA.

Under the leadership of Prof Annette Götz from Rhodes University the Karoo Research Initiative (KARIN) aims to explore all aspects of the 'hydrocarbon cycle' within the southern Karoo Basin by:

- Determining the primary source potential for shale gas by investigating the sedimentary environments in which the potential source rocks formed
- Determining the likely current potential for retention of shale gas by investigating the structural and thermal history of the basin
- Determining the large-scale and deep structure of the shale layers and the dolerite intrusions.

CIMERA has committed approximately R2 million as start-up funding and studentships for KARIN, concentrating mainly on surface outcrop studies, existing drill core and seismic information. Research proposals are well advanced to raise further funding from government and private enterprises to allow the extraction of deep drill cores for reconstructing the depositional history of the basin, determining the physical and petrochemical character of the rock succession, and to perform a seismic survey for unravelling the deep structure of the basin and dolerite intrusions.

KARIN recognises that parallel geological and environmental initiatives into other aspects of the Karoo region are being proposed by Government, professional groups and other geoscientists, and that additional future projects may evolve. It welcomes any further suggestions and applications for participants, and the opportunity to advance our collective understanding of this important region of South Africa.

CIMERA held its first scientific planning meeting. Twenty geoscientists attended who reported on their current research activities and their plans for further research under the CIMERA umbrella. Of particular significance is the Karoo Research Initiative (KARIN) that has already attracted interest from energy companies. The successful one-day meeting has fast-tracked CIMERA's research focus as required of the CoEs.

Attendees at the first CIMERA scientific planning meeting. Prof Nic Beukes, Director of CIMERA, and Prof Judith Kinnaird, Co-Director, are third and twelfth from left, respectively.

GEOLOGY

Esteemed Academic Researcher presents *Memorial Lecture – 2014*

Prof Nic Beukes of the Department of Geology has been invited by the Fellows Committee of the Geological Society of South Africa (GSSA) to present the Alex du Toit Memorial Lecture for 2014.

Every two years the Fellows Committee of the GSSA invites an esteemed academic researcher to present the Alex du Toit Memorial Lecture to Branches and Divisions of the GSSA, and to associate societies in neighbouring countries. Traditionally, the lectureship cycles between southern African and international researchers from outside Africa. The objective of the lecture series is to assist researchers of international repute to travel to branches and divisions to deliver a lecture in their specific field of research that will be of interest to most geologists, in honour of the life work of Alex du Toit.

Prof Beukes will be travelling to twelve locations throughout southern Africa to deliver the lecture.

Geology Professor winner of Dux Award

Prof Hassina Mouri from the Department of Geology has successfully completed the UJ's Vice-Chancellor's Executive Leadership Group (ELG) Development Program with a *Dux Award*. She was one of the few non executive academics who was nominated to participate in this program, which is uniquely developed for UJ by the Gordon Institute of Business Science (GIBS).

Prof Mouri is an expert in metamorphic geology, however more recently she started developing *Medical Geology* and founded the South African Medical Geology division of the International Medical Geology Association (IMGA). In August 2013, she was elected Councilor for the International Medical Geology Association (IMGA) for a period of four years.

Prof Mouri with, to the left, Mr TJ Dikgole, member of the UJ Council and to the right, Prof Ihron Rensburg, UJ's Vice-Chancellor and Principal.

Geology Student Wins Best Fourth Year Student Award

Daren Tiddy from the Department of Geology has received the *Best 4th year student award of the Geological Society of South Africa* (GSSA) for 2013.

The Fellows Committee and the Council of the GSSA conferred the *Best 4th Year Student Award* for the year 2013 upon Daren for his final year marks at the University of Johannesburg. He has passed his final year with distinction.

The Award recognizes a student who has made outstanding marks in his fourth year at a South African university, in the year prior to the award.

While the prize may be awarded to a student who produced a formal research based Honours thesis, the award also recognizes individuals in universities that do not require a thesis, as in Darren's case.

Daren Tiddy.

Prof Tom Andersen and Prof Marlina Elburg.

Geology collaborates with internationally recognized scientists

Prof Tom Andersen from Oslo University visited the Department of Geology to work on several collaborative projects with UJ staff member Prof Marlina Elburg. Prof Andersen is an eminent petrologist/geochemist/geochronologist, well known for his work on alkaline rocks from Greenland, Scandinavia and southern Africa. He leads an internationally renowned laboratory for laser-ablation ICP-MS analyses at Oslo University. An important research focus is the isotopic analysis and interpretation of U-Pb ages and Lu-Hf isotopic data of detrital zircons from sedimentary rocks. While at UJ, he delivered a talk titled *How clear is the message from detrital zircon?* After the visit to the Department, Prof Elburg and Prof Andersen carried out two weeks of field work in the Northern Cape Province, examining rocks of the Nama and Gariep Groups. The collaboration with internationally recognized scientists such as Prof Andersen is part of the Department of Geology's strategy and commitment to increase UJ's Global excellence and Stature.

Dr Michiel de Kock with Ashley Gumsley and Emilie Larsson from Lund University in Sweden.

International student visiting UJ

Ashley Gumsley, a former student of UJ now at Lund University (Sweden), and Emilie Larsson (Lund University) visited the Department. In collaboration with Dr Michiel de Kock at the Department of Geology, they are studying the mafic dykes and sills on the Kaapvaal Craton using geochronology and paleomagnetism. The aim is to further understand the volcanic history of the craton, and what its nearest neighbours were between the Mesoarchean and Paleoproterozoic. One such connection is with the Pilbara Craton in Western Australia. The exact timing of breakup still remains to be resolved.

Lisa Bretschneider from the University of Bonn in Germany is undertaking a two months internship in the Department of Geology as part of the DAAD-sponsored RISE project. Lisa works with Prof Axel Hofmann on aspects of early life as recorded in drill core of 3.4-billion-years-old sedimentary rocks from the Barberton greenstone belt. During her stay she is researching the very ancient, but well preserved rocks that host traces of microbial life, networks with researchers that undertake Early Earth studies, and participates in field excursions in South Africa.

GEOLOGY

Geology Honours Field Schools

The Honours students of the Department of Geology recently undertook two major field schools that form part of their course. The first field school formed part of the Basin Analysis and Sedimentology module on the Portuguese and KaNyaka (previously known as Inhaca) Islands off the coast of Mozambique and the second field school part of their Advanced Field Mapping module, a traverse across South Africa, all the way from Johannesburg to the west coast and back again.

This year the *KaNyaka Field School* took place under guidance of Dr Herman van Niekerk and Dr Clarisa Vorster. Based on the reaction of the students, it was once again a huge success. This is mainly so as the students were hiking with all their equipment, food and water and camping on the beach for most of the time. In this process they learn a lot about the sedimentological processes in different types of environments, like tidal-, open ocean beach-, and aeolian dominated environments and how all of these are related to each other and influence the evolution of this particular island system.

Although this field school is a fantastic experience, it is not all fun as the students have to compile a report on the different sedimentological environments encountered and how they fit in with the continuous evolution of this island system. The importance in this field school lies in the fact that sedimentological processes can be observed and students can see how sedimentary structures are formed, how these structures relate to the sedimentological processes and environments and how sedimentological facies can vary laterally in close proximity to each other. The students also start to understand grain size distribution in sedimentary rocks and how clastic and carbonate dominated sedimentary environments relate to each other. This allows the students to relate ancient sedimentary rocks to modern sedimentological processes that enhance their overall understanding of sedimentology. Another interesting spin-off is that the students suddenly start to realise how structural data should be acquired in the field as they begin to understand the importance of identifying sedimentary structures in fieldwork. A field school like this also has tremendous potential for training geologists for the petroleum industry, fitting in very well with the objectives of CIMERA, the National Centre of Excellence in Mineral and Resource Analysis hosted at the University of Johannesburg.

Honours students hiking from KaNyaka village to the Marine Biology Research Station (Photo: Darren Tiddy)

Honours students auguring a profile across a tidal flat (Photo: Darren Tiddy)

Honours students being dropped off on Portuguese Island (Photo: Fabian Humbert)

The group hiking from one campsite to the next (Photo: Steward Fitzpatrick)

On top of the remobilised sand dunes of KaNyaka Island (Photo: Fabian Humbert)

Dr Van Niekerk explaining tidal forces to the students (Photo: Fabian Humbert)

Long hikes over tidal flats (Photo: Steward Fitzpatrick)

Mandela Day 2014

67 MINUTES OF YOUR TIME

Staff and students of the Faculty flocked together to take responsibility for changing the world into a better place.

We set the goal of packing at least 100 food parcels and challenged all staff members within the Faculty of Science to participate. Due to the great response and generous support within the Faculty, as well as outside of the Faculty, we were able to pack 200 food parcels. Each parcel consisted of:

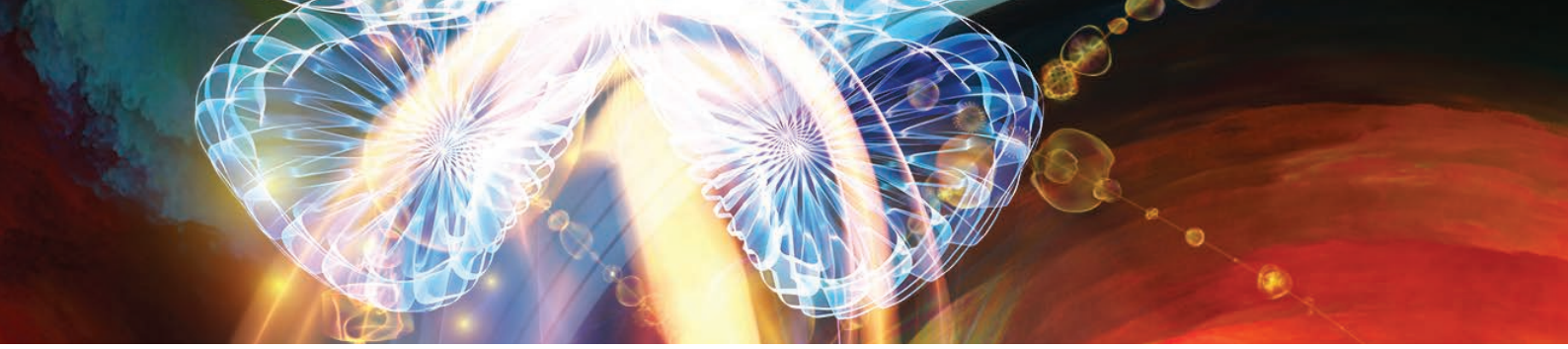
1 packet sugar (500 gr)
1 packet rice (500 gr)
3 tins canned food
1 small packet pasta sauce
1 small tube toothpaste or bar of soap
1 packet maize meal (1 kg)
1 packet pasta (500 gr)
1 box long life milk (500 ml or 1litre)
2 packets soup
A small chocolate or packet of sweets or biscuits

Zoology at work for their 67 minutes.....

The Department of Zoology donated 110 scarves for needy students. Approximately ten scarves were knitted by some of the crafty staff members but when the staff realized that some/most were better with manuscript writing than knitting everyone pitched in on 18 July to make the rest of the scarves from a fleecy material as the Departmental contribution to 67 minutes for Mandela.

Staff in the Department of Zoology hard at work

The end result as exhibited by the talented models



Prof Alet Prinsloo.

PHYSICS

UJ hosted SAIP annual conference

The University of Johannesburg hosted the 2014 South African Institute of Physics (SAIP) annual conference at the SANLAM Auditorium at its Kingsway campus.

The conference, officially opened by the Minister of Science and Technology, Naledi Pandor, attracted 491 physicists from around the country, as well as several prominent guest speakers from the Americas, Europe and Asia.

The conference happened at a time when several major developments in the field science occurred, generating excitement not only in the South African physics community, but in broader society as well. Scientific discussions focused on these developments, and explored the potential of new discoveries with them.

Examples of these discussions include the lecture regarding the latest progress with the construction of the Square Kilometer Array (SKA) by Prof Justin Jonas (SKA Associate Director: Science and Engineering); discussions on the possible selection of Namibia as host for the Cherenkov Telescope Array, another international project to establish a massive astrophysical gamma ray facility. Prof Emmanuel Tsesmelis, of the European Organisation for Nuclear Research (CERN) and Oxford University, briefed the delegates of the dramatic discoveries made at CERN in recent years, including the long anticipated finding of the Higgs boson, which resulted in the awarding of the Physics Nobel Prize to the discovery team (which included South African participation). Prof Eric Fullerton (UCSD, USA) introduced the delegates to the latest developments in the field of data recording media, leading to lively discussions afterwards. Local innovation also came into the spotlight during the talk of Prof Andrew Forbes of the CSIR, on their advances in Laser physics.

Other plenary speakers include theoretical physicist Prof Toshimi Suda of Tohoku University, Japan; photovoltaics expert Prof Vladimir Djakanov, based in Germany; photonics specialist Prof Miles Padgett of Glasgow University; astrophysicist Megan Donahue of Michigan University, USA. Prof Cedric Linder (Uppsala, Sweden) and Prof Marcia Barbosa (Brasil) challenged the delegated with talks on Physics Education and Women in Physics respectively.

Prof Alet Prinsloo from the Department of Physics is the newly elected Chairperson of WiPiSA (Women in Physics in South Africa.)

WiPiSA is a working group of the South African Institute of Physics (SAIP) aiming to attract more women into physics.

The WiPiSA project aims to understand the incentives and barriers experienced by women who choose this career path; helping women to further their careers in this field through scholarships and mentorship programmes.

Inaugural lecture: Prof Steven Karataglidis

Steven Karataglidis, a Professor in the Department of Physics delivered his inaugural address with the theme: *A retrospective of nuclear physics, in theory*

Abstract of the inaugural address by Steven Karataglidis:

The underlying problem of all Nuclear Physics, apart from the stigma it sometimes attracts, is that it is impossible to understand in its entirety. At its base lies the many-body problem, which is the study of the dynamics of a bound system of more than two particles.

The study of the solar system, strictly speaking, is an example of this, but the dominance of the mass of the sun significantly over the masses of all the planets combined reduces that complexity. For Nuclear Physics, however, all particles of the nucleus, protons and neutrons, collectively known as nucleons, are almost equal in mass, and so no such simplification exists. The problem is also a Catch-22, of sorts. To study the structure of nuclei, one needs to observe the effects of their reactions with either particles (protons, electrons, neutrons, etc.) or other nuclei and infer the structure.

However, that relies on knowing the dynamics of those reactions. And the dynamics of the reactions relies fundamentally on the knowledge of the structure of the nuclei themselves. Models are required for both, and the development of the models for both structure and reactions, and how they combine to describe phenomena, is the purview of Nuclear Theory.

This is especially true of the study of exotic nuclei. These are unstable, but still bound, nuclei, whose knowledge is critical in the understanding of the synthesis of the elements in stars. They exhibit some odd structures: skins, where the excess of one form of nucleon over the other forms a skin of that nucleon around the core, and halos, where the binding is much looser and one or two of the excess nucleons appear in orbit around the core, much like an atom within the atom.

Those nuclei present challenges to nuclear theory: detailed descriptions in terms of nucleons still eludes, and has formed the basis of my research for almost twenty years. This research continues, and finds relevance in the flagship programme of *iThemba Labs*, which is building a radioactive beam facility. Prof Karataglidis' talk described facets of his research, and how various aspects relate in order to answer the underlying question of the many-body problem.

Professor Karataglidis received his PhD in Theoretical Nuclear Physics at the University of Melbourne, Australia, in 1995, with a thesis entitled L*arge scale shell model analyses of complementary nuclear reactions*, concentrating on the area of overlap between nuclear structure and reaction theory, in particular, developing what has become known as the Melbourne g-folding model of nucleon-nucleus interactions. He did his undergraduate and Master's degrees at the University of Melbourne, the latter in Experimental Nuclear Physics. During his PhD, he also completed an Associate Diploma in Piano from the Australian Music Examinations Board, and was co-host and physics reporter for a popular science radio show in Melbourne.

After he completed his PhD, Prof Karataglidis went to the National Superconducting Cyclotron Laboratory at Michigan State University in the USA for his first postdoctoral fellowship. It was here that his interest in exotic nuclei began, and, in particular, the many-body descriptions of halo nuclei. Postdoctoral fellowships at TRIUMF, Canada, and the Los Alamos National Laboratory, USA, followed. After LANL, Prof Karataglidis spent a year as a Visiting Staff Member in the Nuclear Theory Group at the CEA/Bruyeres-le-Chatel, France. Following that year, Prof Karataglidis moved back to Melbourne, as a Research Fellow of the School of Physics, University of Melbourne, for two and a half years.

In mid-2006, Prof Karataglidis joined the Faculty at the Department of Physics and Electronics at Rhodes University, as a Senior Lecturer. He was promoted to Associate Lecturer in 2008, and became Head of the Department in 2009. In April 2010, he joined the Faculty of Science's Department of Physics at the University of Johannesburg.

From 2006, Prof Karataglidis has been the Head of the Theory Division of the South Africa-CERN Programme, which is dedicated to Nuclear and Particle Physics research, both experimental and theoretical, at CERN, and is one of the Programme's founding members. He also served on the Programme Advisory Committee of iThemba Labs (Faure) from 2007 to 2011, serving as Chair of that Committee from 2008. He has served, and continues to serve, on many panels, at the highest level, at the National Research Foundation.

With almost 80 research articles to his name, Prof Karataglidis' work continues on the interplay between nuclear structure and nuclear reaction theory, with particular emphasis on the structures of exotic nuclei, and how one may obtain information on such at the microscopic level from nuclear reactions. He is involved in research collaborations, both experimental and theoretical, from the world over, particularly from Australia (The University of Melbourne), Japan (RIKEN and Tohoku University), and France (CEA/Saclay). Most importantly, he is part of the MCAS collaboration, which has representatives from Australia, Canada, and Italy.

SCIENCE CENTRE

Today's science, tomorrow's world

National Science Week

Learners of Miriyavhavha Technical High School from Ha-Khakhu village visited the University during Science Week

UJ Soweto Science Centre participated in National Science Week (NSW) 2014. The theme of NSW 2014 is *Today's science, tomorrow's world*, with International Year of Crystallography as sub-theme.

National Science Week, an initiative of the Department of Science and Technology (DST), was a countrywide celebration of science involving various stakeholders and/or role players conducting science-based activities during the week of 4 - 9 August 2014.

NSW is one of the many ways in which the DST seeks to reach out to the South African public to raise awareness of science and technology.

The theme, *Today's science, tomorrow's world*, encapsulated the following objectives that were embedded in the intent of the NSW:

- That science enables us to improve our county and our world
- That science is relevant today and that scientific endeavour, interest and literacy are for everyone
- That the youth should choose science as it is the key to the future
- That there are many new frontiers of science today that are worth celebrating and enable us to build our future.

As part of the National Science Week the UJ Science Centre hosted various activities within Soweto, the North West Province's Khayakulu Community hall in the Bojanala District along with the Mirijavahavaha Technical School and Mukula Senior School in the Limpopo Province.

Professors and lecturers from the Faculties of Science, Health Science and Engineering and the Built Environment assested with the running of interactive events that were shown at all three provinces. Some of the events included scientific experimentation and Expo's, public lectures, science and mathematics shows, teaching workshops, astronomy quizzes and career festivals in the Faculties of Science, Health Sciences, Engineering and the Built Environment. This year, for the first time, the activities included a virtual tour of ATLAS. The virtual was preceded by public lectures on High Energy Physics at ATLAS.

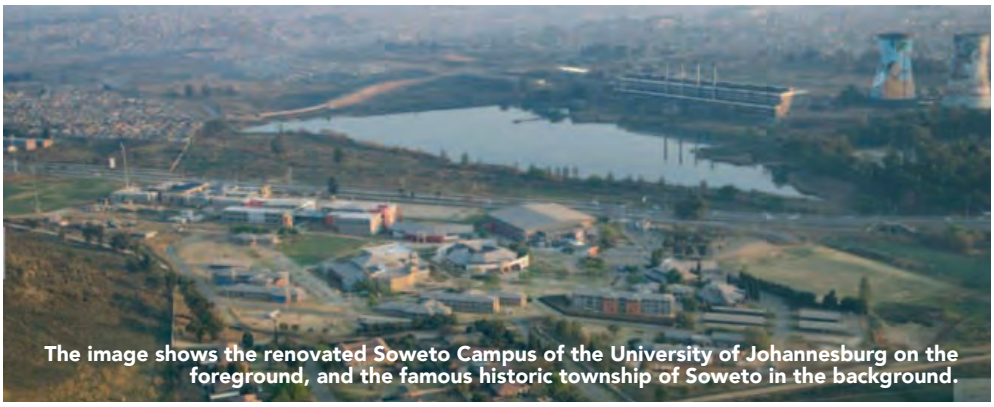
SCIENCE CENTRE

The International Year of Crystallography 2014 (IYCr2014) commemorates not only the centennial of X-ray diffraction, which allowed the detailed study of crystalline material, but also the 400th anniversary of Kepler's observation in 1611 of the symmetrical form of ice crystals, which began the wider study of the role of symmetry in matter.

The major objectives of the International Year of Crystallography 2014 are:

- to increase public awareness of the science of crystallography and how it underpins most technological developments in our modern society
- to inspire young people through public exhibitions, conferences and hands-on demonstrations in schools
- to illustrate the universality of science
- to intensify the programme Crystallography across South Africa
- to foster international collaboration between scientists worldwide, especially North–South contributions
- to promote education and research in crystallography and its links to other sciences
- to involve the large synchrotron and neutron radiation facilities worldwide in the celebrations of IYCr2014, including the SESAME project set up under UNESCO auspices.

The UJ Soweto Science Centre in the Faculty of Science hosted the Eskom Expo (Gauteng South Region) 2014.



The image shows the renovated Soweto Campus of the University of Johannesburg on the foreground, and the famous historic township of Soweto in the background.

The Soweto Science Centre has made a measurable impact in the academic performance of schools in its feeder region, and it is an increasingly a successful vehicle for science communication.

Soweto Science Centre is headed by Prof Azwinndini Muronga, who was recently honoured by NSTF, BHP Billiton Award for cultivating a culture of science, especially in Soweto and the surrounding areas.

Dr S Malinga and Ms S Khunoana from the Department of Applied Chemistry assisting learners during Science Week on the Soweto Campus. Interesting chemistry demonstrations were done to show the visitors that *Chemistry is Fun*. The school learners that visited the stall really enjoyed the demonstrations and hopefully it inspired them to study science.

Me H du Plessis-Fischer and Dr W Maxakato of the Department of Applied Chemistry

Winners of the 2013/14 NSTF-BHP Billiton Awards

Today's research ... tomorrow's innovation

Outstanding contributions to scientific research, technological innovation, management, capacity building and science communication were celebrated at the 16th Annual NSTF-BHP Billiton Awards Gala Dinner.

Prof Azwinndini Muronga *(Associate Professor of Physics and Director of the University of Johannesburg Soweto Science Centre)* received the award for an individual or a team for an outstanding contribution to science, engineering, technology and innovation (SETI) through communication for outreach and creating awareness over the last five years (sponsored by the South African Agency for Science and Technology Advancement [SAASTA]).

The awards were presented by the Honourable Minister of Science and Technology, Ms Naledi Pandor, who is also the patron of the event, and celebrated along with almost 600 guests from the broader science community.

ZOOLOGY

Students of the Department of Zoology attended *The Southern African Society of Aquatic Scientists(SASAqS)* conference held at Thaba N'chu.

Two of the seven students that presented papers received special mentions by the student prize adjudication committee.

SASAqS is a learned society concerned with the research, management and conservation of inland waters throughout southern Africa.

Lizaan De Necker received a special mention for her presentation entitled *An Ecological Assessment of Endorheic Pans in the Free State, North West and Mpumalanga Provinces.*

Simone' Dahms received a special mention in the Digital Data Display (DDD) category for her paper entitled *A Baseline Study of metal Contamination along the Namibian Coastline for Perna perna and Choromytilus meridionalis.*

First prize for Honours project

Kelly Dyamond, an honours student in Zoology presented the results from her Honours project during the International Parasitology of Wildlife conference recently. She received the first prize in the category *First time presenter Poster*. Prof Annemarie Oldewage was her supervisor.

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