UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

DECEMBER
2019

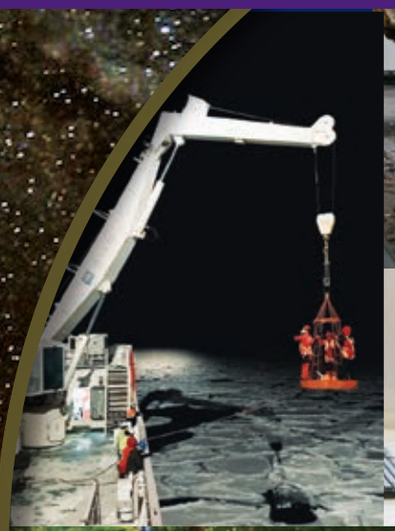
GIVE US FEEDBACK

CONTACT

Newsletter for Faculty of Science











CONTENTS

Message from the Dean	2.
Staff Achievement & Awards	3.
Distinguished Teacher Award	8.
Student Awards and Achievement	8.
Alumni in the News	12.
Research in the Faculty	14.
Firsts for the Faculty	17.
Events in the Faculty	21.
Distinguished Visitor to the Faculty	23.
Travels Across the Globe	24.
New Book in the Faculty	28.
Outreach	29.

DISCOVER A WORLD OF OPPORTUNITIES

Message from the Dean

Welcome to the 2019 edition of "Contact", the Science Faculty Newsletter which aims to maintain contact with you our alumni and to update you about the activities and developments over the last year. As the new Dean of Science, I am encouraged by the dedication of the academic and PASS staff to the Faculty. Being the Dean of one of the best Science Faculties on the continent is a privilege and honour but also requires more thought on how we sustain our excellence into the future.

It has been a busy year in the Faculty, and we are proud of our staff and students who attained prestigious accolades and recognition at national and international levels. We are delighted to once again have the UCT Distinguished Teacher award go to two staff in the Department of Mathematics & Applied Mathematics – which is clearly home to some of the best teachers at UCT!

Research continues to flourish in the Faculty and it is encouraging to see that research excellence takes places across generations and addresses issues pertinent to our continent. Two of UCT's six leading scientists selected for the Future Leaders – African Independent Research programme are from the Faculty of Science. The faculty also hosts the majority of young researchers selected for the UCT 's 2030 Future Leaders Programme.

This cohort of outstanding young scientists will ensure that the faculty maintains its excellent research record. At the top end of the research spectrum we are proud of the awards received by Professors George Ellis, Ed Rybicki and Shadreck Chirikure. Research in the Science Faculty contributes to cutting-edge policy as is evident in the accolades given to Prof Mark New and Emeritus Prof Doug Butterworth.

It has been encouraging to see so many of our female students receiving awards for their excellent work and we congratulate Emma Platts and Regina Abotsi on winning L'Oreal-UNESCO Women in Science awards. We take this as an important step towards diversifying the profile of our researchers.

UCT is among the top 100 universities worldwide in the 2020 QuacauarelliSymonds Gradaute Employability Rankings. In the 2020 Times Higher Education World University Rankings, we rose to 136th position. This newsletter celebrates our staff, students and alumni who keep the Science Faculty and their alma mater in the news.

I hope that you enjoy this 2019 edition of Contact and reading about some of the highlights of this year in the Science Faculty. Please stay in contact with us. Wishing you everything of the best for 2020.

Maano Ramutsindela
DEAN OF SCIENCE

Back to contents page

STAFF ACHIEVEMENTS AND AWARDS/ IN THE NEWS

Professor Susan Bourne wins INTERNATIONAL DISTINGUISHED WOMEN IN CHEMISTRY AWARD

The International Union of Pure and Applied Chemistry (IUPAC) announced the awardees of the IUPAC 2019 Distinguished Women in Chemistry or Chemical Engineering. **Professor Susan Bourne**, from the Department of Chemistry at UCT was one of twelve women in the world awarded of this prestigious award.

The awards programme was created to acknowledge and promote the work of women chemists/ chemical engineers worldwide. The 12 awardees were selected based on excellence in basic or applied research, distinguished accomplishments in teaching or education, or demonstrated leadership or managerial excellence in the chemical sciences. The Awards Committee was particularly interested in nominees with a history of leadership and/ or community service during their careers.

Emeritus Professor Jennifer Thomson wins INTERNATIONAL PRIZE FOR PROTECTION OF HUMAN RIGHTS

Emeritus Professor Jennifer Thomson, President of the Organization for Women in Science for the Developing World (www.owsd.net) received the 2019 International Tartufari Prize for the Protections of Human Rights presented by Accademia dei Lincei of Italy.

The award was made to her for her contribution to the development of human rights by promoting the contribution that women scientists give in the fields of health, education, agriculture and food, with the use of appropriate policies and techniques in the poorest and most vulnerable areas of the world. The citation notes how she herself has made important contributions to the production of genetically modified maize for use in Africa. This affirms how women are contributing to making human solidarity concrete and in line with the UN Agenda 2030.

UCT Leading Scientists selected to be part of £25M FLAIR SCHEME

Six UCT scientists have been selected as FLAIR research fellows. The FLAIR (Future Leaders—African Independent Research) is a programme of the African Academy of Science (AAS) and Royal Society, with support from the UK's Global Challenges Research Fund (GCRF), designed to help talented early-career researchers, whose science is focused on the needs of the continent, establish independent careers in African institutions and ultimately, their own research groups. Two of the six recipients are from the Faculty of Science:

Dr Sarah Fawcett, Department of Oceanography. For every benefit provided by urbanised, coastal regions — fishing, seafood harvesting, tourism — is a suite of damaging corollaries including sewage and pesticide run-off. Dr Fawcett will track the sources of pollution by using an immense model system: False Bay, South Africa's largest natural bay, with the aims of informing government on where to place Marine Protected areas.

Dr Wade Petersen, Department of Chemistry. A recurring and chemically useful structure 'spirocyclic oxindoles' can be used as the backbone for many, potentially disease-quashing drugs, however when it is produced, its mirrored, less functional form is often the result. Dr Petersen aims to use new chemistry, including the manipulation of light, to selectively produce the desirable version of the molecule. His research will be applied to drugs treating malaria, TB and HIV.

Back to contents page

George Ellis honoured with INTERNATIONAL AWARD

Emeritus Professor George Ellis was recently awarded the Georges Lemaître International Prize in Louvain-la-Neuve, Belgium. Created in 1995 at the initiative of the alumni and friends of Université catholique de Louvain (UCLouvain), the prize is awarded every two years to a scientist who has made a major contribution to the development and dissemination of knowledge in the fields of astronomy, astrophysics, geophysics or space research.

Internationally recognised as a leader in cosmology and complex dynamic systems, Ellis is an outstanding scientist with interests in many fields: philosophy, the relationship between science and faith, and issues of social engagement. A collaborator with Stephen Hawking, he clarified the notion of singularity in space-time physics, in relation to the geometric properties of cosmological solutions in general relativity. He is a pioneer in the study of the Einstein-Boltzmann equations and contributed significantly to the development of Friedmann-Lemaître cosmology.

Award for OUTSTANDING LIFETIME CONTRIBUTIONS TO ORNITHOLOGY IN SOUTHERN AFRICA

Professor Claire Spottiswoode, FitzPatrick Institute of African Ornithology, was awarded the Gill Memorial Award for outstanding lifetime contributions to ornithology in southern Africa. The citation says that although she is still in her thirties, she has already contributed more to African ornithology than most ornithologists manage in a lifetime of research. She is the youngest person to receive this prestigious award to date.

Claire's fascination with birds was evident from an early age and she was active in the Cape birding scene as a teenager and together with Callan Cohen, she co-founded the eco-tourism company Birding Africa while still at school. Together with Callan, she produced the acclaimed guide to birding in western South Africa, *Essential Birding* while an undergraduate student. Her burgeoning research career has seen her raising substantial research funding and she is described as extremely generous in sharing her ideas and is popular with students and peers alike.

Prof Ed Rybicki, UCT's most prolific inventor wins TOP INTELLECTUAL PROPERTY CREATOR AWARD

Professor Ed Rybicki, Department of Molecular & Cell Biology, was identified as the Top Intellectual Property Creator for UCT. He received the award from NIPMO/DST for disclosures / applications made between 2011 and 2018—which covers work on plant-made vaccines against human papillomaviruses, bluetongue and African horse sickness viruses, HIV Env protein as a vaccine, and horse radish peroxidase as a reagent. This award comes with a R605 000 grant to RC&I to assist in driving our IP towards products.

Prof Rybicki says, "I have to credit all my co-inventors and RC&I, and in particular Inga Hitzeroth and Ann Meyers, and Piet Barnard and Andrew Bailey, for aiding and abetting our efforts."

What does the recognition mean in the scheme of things?

According to Rybicki it is, "Acknowledgement of our long history in creating IP at UCT, and especially for plant-made recombinant proteins, and more visibility in the South African and wider biotech space."

How will the grant assist in the IP work they are doing?

The RC&I Office as UCT will administer the grant: it will make it possible to go and visit prospective industrial partners - in the US and Canada and elsewhere - as well as to maintain patents, and possibly even to add to work necessary to show the viability of certain patent applications.

Back to contents page

UCT professor honoured by EMPEROR OF JAPAN

Applied mathematician and fisheries scientist **Professor Emeritus Doug Butterworth** has been awarded the Order of the Rising Sun, Gold Rays with Neck Ribbon by the Emperor of Japan for his contribution to the sustainable management of the country's fisheries. The Order, established in 1875, is given for distinguished achievements in the advancement of one's field. Previous recipients include the American actor and film maker Clint Eastwood and French civil engineer Gustave Eiffel. Butterworth was awarded the Order for his contribution to ensuring sustainable use of marine living resources by Japan, in particular southern bluefin tuna, one of the world's most valuable fisheries.

Butterworth, who also previously received South Africa's highest National Order of Mapungubwe (Silver), has been responsible for developing the scientific methods underlying the management of nearly all South Africa's major fisheries. He has made major contributions internationally to the analysis and management of bluefin tuna and various whale populations, as well as Antarctic krill and fisheries in Canada and the USA.

In the two decades that Butterworth has served on Japan's delegation to the Scientific Committee of the Commission for the Conservation of Southern Bluefin Tuna, he played a leading role in developing a management approach that saw the highly threatened resource under international litigation move to a situation where it is well on the route to recovery.

CLIMATE 100 honour for Mark New

Professor Mark New, director of the African Climate and Development Initiative (ACDI), has been listed among the world's 100 most influential people in climate policy for 2019.

The Climate 100 list of politicians, civil servants, academics and activists comes courtesy of global network Apolitical, and is drawn from hundreds of nominations from experts and leading organisations. The aim is to recognise high-profile advocates whose work is indispensable to raising awareness and demanding change in respect of climate policy. The citation credits his research career that spans over 20 years, with a focus on detecting climate trends, climate modelling and assessing the impact of failed climate mitigation policy.

Science Faculty researcher awarded GLOBAL PROFESSORSHIP

Professor Shadreck Chirikure, head of the UCT Archaeological Materials Laboratory, has won a Global Professorship from the British Academy for his work dating historical artefacts and the study of pre-colonial urban societies in Africa. The award provides the opportunity for internationally recognised scholars working in the social sciences and humanities to relocate to the United Kingdom (UK) for four years and continue their research at a British university. Chirikure will soon take up his place at the University of Oxford's School of Archaeology. "When I heard the news, I was ecstatic," says Chirikure. "It is wonderful recognition of my work. But beyond this, I believe it also comes with a great deal of responsibility. My hope is that this award will mean we can really focus on the development of students working in the field, especially in previously disadvantaged institutions such as the University of Venda, the University of Limpopo and institutions in Mozambique, for example."

The Global Professorships, which aim to demonstrate the UK's commitment to international research partnerships, have been awarded to scholars from seven countries: Australia, Chile, France, Ghana, South Africa, Spain and the United States.

DOUBLE PUBLICATION PRIZE for archaeologist Chirikure

Professor Shadreck Chirikure, HOD of Archaeology and director of the Archaeological Materials Laboratory, has won the *Antiquity* journal of archaeology's Antiquity Prize 2019, for best paper of 2018. This is the second time Chirikure has won this award.

He is the first African and perhaps the first archaeologist to have won the prize twice.

Antiquity is based in the Department of Archaeology at Durham University in the UK. Founded by OGS Crawford in 1927, it is a peer-reviewed journal owned by the Antiquity Trust. It awards two prizes annually for outstanding work in the field of archaeology: The Antiquity Prize and the Ben Cullen Antiquity Prize.

Chirikure's winning paper is titled "Elites and commoners at Great Zimbabwe: Archaeological and ethnographic insights on social power". It appeared in the August 2018 issue of *Antiquity*, a journal to which he has contributed since 2008 when his first submission won him his initial Antiquity Prize.

Monique Muller, Chemical safety officer in the UCT Departments of Chemistry and Chemical Engineering, won the Vice-Chancellor's Award for Service Excellence.

Monique describes herself as a big picture person. Of necessity, she must be. On the floors above and below her upper campus office is a repository of 5 500 chemicals – many toxic, explosive or flammable. There are also 14 permanent chemical waste streams just in the chemistry department that must be managed. Muller spends most of her time here; a 'people' complement that currently includes 16 professional, administrative and service staff, 25 academic staff and a whopping cohort of 81 postgraduates.

It's her job to ensure the chemicals are safely housed and used, to reduce the risk of accidents and threats to people and expensive infrastructure. Health and safety are her watchwords. And her diligence, meticulousness and dedication to her job have now been recognised via a Vice-Chancellor's Award for Service Excellence. This annual award acknowledges "outstanding service by staff who have contributed to the delivery of exceptional and significantly improved services to UCT's staff and students".

Vice-Chancellor's Award for SERVICE EXCELLENCE

YOUNG Researcher Awards

At the annual Fellows dinner, the Young Researcher Awards, which honours the significant contributions that UCT's young researchers have made to scholarship in their fields, were presented. **Dr Alastair Sloan**, from the Department of Geological Sciences was one of this year's recipients.

Professor Luigi Nassimbeni receives award from

EUROPEAN CRYSTALLO-GRAPHIC ASSOCIATION

The European Crystallographic Association awarded **Prof Luigi Nassimbeni**, Department of Chemistry, the 1st International Alajos Kálmán Prize in recognition for his outstanding scientific contributions in the field of structural sciences within the last 5-10 years; for his outstanding activity in supramolecular chemistry, revealing aspects of thermodynamics, kinetics and separation of inclusion compounds, and discovering the relevance of certain weak bonds in significant industrial processes.

Prof Nassimbeni presented a 30 minute scientific lecture in Vienna, where his prize was awarded. This took place in August during the European Crystallographic Meeting in Vienna. The prize will be awarded every 3 years.

Professor Rebecca Ackermann named one of

M&G'S WOMEN CHANGING SOUTH AFRICA

Every year for Women's Month, the *Mail & Guardian* has profiled the transformative work done by women – a celebration of excellence, and a testimony to the tireless work done by South African women. **Professor Rebecca Ackermann**, from the Department of Archaeology at UCT, was named as one of their Women Changing South Africa.

"Openness might not completely eradicate prejudice, but it's a damn good place to start." 'Diversity leads to better science," is part of Rebecca Ackermann's ethos and approach to science. As a professor in the Department of Archaeology, and deputy dean of transformation in the faculty of science at the University of Cape Town (UCT), Ackermann has been instrumental in creating policies and spaces to eradicate the barriers that women — especially black women — face in science, education and research.

Accolade for archaeologist

PROFESSOR SHADRECK CHIRIKURE

Professor Shadreck Chirikure recently had his research "Archaeometry and urbanism at Great Zimbabwe" selected for the 2019 Shanghai Archaeology Forum. This award recognises individuals who have achieved distinction through innovative, creative and rigorous works relating to our human past, and have generated new knowledge that has particular relevance to the contemporary world and our common future.

DISTINGUISHED TEACHER AWARD

UCT's annual Distinguished Teacher Award recognizes outstanding teaching at UCT and acknowledges the recipient's contribution to the promotion of teaching and learning excellence at our university. The 2018 awardees are **Associate Professor Jeff Murugan and Dr Annelise Schauerte,** both from the Department of Mathematics & Applied Mathematics:

Associate Professor Jeff Murugan has taught from first-year to master's level at UCT. His lectures are described as beautifully choreographed performances that generate awe and mutual respect between him and his students. In addition to his passion for his subject, easy-going rapport with students, humour, heartfelt encouragement and clear impact on student's lived experiences of applied mathematics, Associate Professor Murugan's students attest to him being able to draw in all of his students, changing the teaching environment to accommodate diverse groups of students.

Dr Anneliese Schauerte's methodology of teaching mathematics at UCT is attested to by her students, as being designed to develop a deep understanding of the content and ensure that the content is understood in a way that enables students to use it and move forward with it on their own. She shows strength in preparation, materials development, organisation and course administration. She stands out in a field dominated by males and is a role model to female students.

STUDENT AWARDS AND ACHIEVEMENT

2019 Women in Science winner

A UCT professor and two postgraduate researchers were among the winners at this year's South African Women in Science Awards (SAWiSA). Department of Astronomy postgraduate researcher Julia Healy received a TATA Scholarship.

Julia received her award at a gala dinner hosted by the Minister of Higher Education, Science and Innovation, Dr Blade Nzimande. 2019. Healy is enrolled for a joint PhD degree at UCT and the University of Groningen. She is investigating the neutral hydrogen gas content of galaxies in galaxy clusters to understand the processes that drive galaxy evolution. Her research can be viewed as a pilot project for the studies that will be conducted as part of the upcoming large surveys using the MeerKAT radio telescope.

Back to contents page

UCT researcher excels at L'Oréal-UNESCO awards

Four women researchers from UCT were among the seven recognised by the L'Oréal-UNESCO For Women in Science South African National Programme for their excellent contributions to science. **Emma Platts** from the Department of Mathematics & Applied Mathematics was given an award for her work on *Machine learning and data clustering techniques to probe fast radio bursts and constrain cosmological parameters.*

"I've always been fascinated by physics and the universe. They feel so far removed from our everyday reality and yet govern our existence," Platts says. "I was led here by curiosity, existentialism and a desire to contribute to our understanding of the universe."
She adds that being a recipient of this award seems almost surreal and that she sees it as a testament to her supervisor, Professor Amanda Weltman, "who saw something in me (even when I didn't) and has continuously supported and encouraged me."

I'm interested in astrophysics and cosmology, and how we can use data science and machine learning to advance our understanding in these fields. I find maths and coding to be a great escape from everyday life, and that I can apply these skills to study some of life's biggest questions is a privilege.

PhD Candidate Regina Abotsi wins L'Oreal-UNESCO for WOMEN IN SCIENCE SUB-SAHARAN AFRICA YOUNG TALENTS AWARD

Regina Esinam Abotsi, a PhD candidate in the Department of Molecular and Cell Biology, and the Institute of Infectious Disease and Molecular Medicine, was awarded a grant of EUR10 000 (about ZAR162 350) to further her research. Abotsi was among 20 women scientists (15 PhD candidates and five post-doctoral researchers) from 15 countries chosen for the 10th edition of the L'Oréal-UNESCO For Women in Science Sub-Saharan Africa Young Talents Awards.

Through her PhD, she seeks to investigate antibiotic resistance in HIV-infected children with chronic lung disease (CLD). Some of her team's recent research in sub-Saharan Africa has shown that a novel type of chronic lung disease, known as obliterative bronchiolitis, is present in 30% of all HIV-infected children. Chronic lung disease is responsible for about 50% of all death and illness in HIV-infected children. One of the aims of her research is to establish whether administering an antibiotic called azithromycin promotes resistant pathogens in the same way many other antibiotics do. The findings from her research will influence the recommendation of azithromycin as treatment for CLD in HIV-infected children.

"My ultimate goal as a researcher is to contribute to solving the global problem of antibiotic resistance, and my current research helps to achieve this goal."

Young UCT scientist selected for INTERNATIONAL LEADERSHIP INITIATIVE

After contracting malaria himself as a child, **Dickson Mambwe** is determined to make an impact in the fight against the disease.

"Who knew a boy from rural Mansa, Zambia could come this far, stand a chance and become successful at opportunities like this?" These are the words of Dickson Mambwe, a Science Faculty PhD student working in the field of drug discovery, after recently being selected for the 2019 CAS Future Leaders Program.

An initiative of the American Chemical Society (ACS), it's one of the most prestigious and fiercely contested leadership programmes in the world. Mambwe is one of only thirty early-career scientists selected from across the globe to participate this year. Since its inception 10 years ago, there have only been two other participants selected from the African continent (both also from UCT). Each successful applicant receives a paid trip to the CAS (Chemical Abstract Services) headquarters in Columbus, Ohio as well as the ACS Fall National Meeting & Exposition in San Diego, California. These two events will be taking place over a period of two weeks in August this year. Participants are also awarded a three-year prepaid ACS membership, a certificate of distinction and USD$ 1 000.

Being selected for the CAS Leadership Program comes hot on the heels of his participation in the Next Generation Scientist Program by Novartis and University of Basel in Switzerland last year. With such a strong 'why' underpinning his research, however, it's hardly surprising that Mambwe has established himself as a promising leader among young scientists around the globe.

International Award for CRYSTALLOGRAPHY STUDENT

Alexios Vicatos was awarded the prestigious international Ludo Frevel Scholarship. He was one of 6 selected candidates world wide out of 90 applications (and the only recipient in Africa). This scholarship is given as an award to support the education and research program of promising graduate students in crystallography-related fields. Alexios is currently registered for my PhD in the field of X-ray crystallography under the supervision of Professor Mino Caira and he hopes to follow an academic career in this field in the future.

UCT students meet NOBEL LAUREATES

UCT Astronomy PhD student **Julia Healy** was selected as one of 20 top young scientists selected for the prestigious 69th Lindau Nobel Laureate Meeting, which this year is dedicated to physics, and met in Germany in June. Julia's PhD is focused on the SKA science theme of galaxy evolution; this is a joint degree between UCT and the University of Groningen in the Netherlands.

The South African delegation includes 5 other UCT Astronomy alumni, namely **Dr Itumeleng Monageng** (who obtained his PhD from the Astronomy department in 2018), **Jake Gordin, Kimeel Sooknunan, Tariq Blecher** and **Nicole Thomas**. Four of the people selected are alumni of the National Astrophysics and Space Science Program (NASSP). Congratulations Julia, Itumeleng, Jake, Kimeel, Tariq and Nicole!

Award for NOVEL APPROACH TO EXTRACTING DNA FROM EAGLE

Post-doc **Dr Petra Sumasgutner** of the FitzPatrick Institute of African Ornithology, Department of Biological Sciences, received an award of the Theodor Körner Fund in the Hofburg, Vienna, Austria during May, in recognition of scientific advances in Austria, for her novel approach of extracting DNA from the feathers of falconry Golden Eagles.

Back to contents page

UCT'S 2020 MANDELA RHODES SCHOLARS

Seven UCT students have been honoured among the Mandela Rhodes Foundation (MRF) Class of 2020, joining another 47 inspirational young leaders from across Africa. The year-long programme offers postgraduates from across the African continent the opportunity to further their tertiary studies at any South African university. Successful candidates are given financial assistance as well as an opportunity to attend three residential workshops through the year. To qualify for the programme, applicants need to demonstrate strong leadership qualities and reflect in their character a commitment to the four principles of education, reconciliation, leadership and entrepreneurship.

Joshua Mirkin, from the Department of Oceanography was selected for this esteemed programme. Mirkin is studying towards a master's degree in oceanography at UCT. He was an orientation leader through both the Faculty of Science and the International Academic Programmes Office. Through his studies, he wishes to gain a rounded, in-depth understanding of the physical world, and has an interest in examining the way humans interact with, adapt to, influence and change their environment. In addition to his studies, Mirkin is a peer mediator, student support officer, tutor and radio talk-show host. He previously held positions such as content manager at UCT Radio and logistics coordinator for the Thethani Debating League.

Klaus-Jurgen Bathe Leadership Scholarship awarded TO CHEMISTRY UNDERGRAD STUDENT

Mustapha Singlee, an undergraduate student in Chemistry and Human Anatomy & Physiology, is one of ten talented UCT undergraduate students who have been awarded Klaus-Jürgen Bathe Leadership Scholarships for 2020. The primary goal of the Klaus-Jürgen Bathe Leadership Programme is to produce graduates with outstanding leadership qualities and with a strong sense of social justice, who will go on to play leading roles in business, government and civil society in South Africa and the African continent. The scholarships are of duration 2 years and worth R140,000 per year, meant to cover tuition fees, books, accommodation and living expenses. The students will be afforded the opportunity of a 6-week leadership internship in South Africa, Germany or the USA.

STUDENT'S 3D-PRINTER PLAN to change education

Experts have spoken of the need for a new kind of learning, of future-proofing children and of the benefits of design thinking. You've probably heard about 3D printing, blockchain technology, artificial intelligence, augmented and virtual reality. Student **Denislav Marinov**, a third-year BSc physics and chemistry student is combining these conversations, ideas and technologies to try to build a better education system.

Marinov (21), plans on using 3D printers in South Africa's schools to level the education playing fields. His plan is to put one 3D educational printer into every school in South Africa, which he believes will drive solution-based, collaborative and cross-disciplinary thinking among learners. The goal is to democratise quality education while also demystifying the technology.

He designed a large-scale industrial 3D printer and began crowdfunding. A major vote of confidence came from the KJB Leadership Programme which helped him raise nearly R70 000 in the first round of fundraising. This funding will allow Marinov to build a larger 3D printer, which will eventually produce the smaller, entry-level printers destined for schools.

ALUMNI IN THE NEWS

DR JACKIE KING WINS PRESTIGIOUS 'OSCAR' WATER PRIZE

Dr Jackie King of Cape Town became the first South African woman to win the prestigious Stockholm Water Prize – regarded as the water community's equivalent of an Oscar or Nobel.

King, a graduate of the University of Cape Town and adviser to several governments in Africa, Asia and South America, has been honoured for helping to ensure a more balanced approach to the development of dams and river water extraction schemes – helping to ensure that the natural environment and vulnerable people continue to receive a fair share of the precious liquid that sustains all life.

She was co-founder and principal researcher at the Freshwater Research Unit, UCT, for almost four decades and is now Extraordinary Professor at the Institute for Water Studies, University of the Western Cape and an independent consultant.

Her work has also been recognised with both Gold and Silver Medals from the Southern African Society of Aquatic Scientists and South Africa's "Women in Water" Award in the research category.

But King's success story had humble beginnings, according to an article published by the University of Cape Town.

"When she enrolled at UCT in 1971, she did so without a matric and, in her 20s, on a 'late starter' ticket. After emerging with her doctorate in 1983 (with two babies in between), and while raising her children, King embarked on part-time research."

She has also been hailed as a determined, creative leader who helped to train and inspire a whole new generation of river ecologists to follow in her footsteps, many of them are now leading scientists in the country and other parts of the world.

"I find it humbling, energizing and very rewarding. I have never sought high-profile jobs but was happy to be a working scientist, free to say what I felt needed to be said. I am delighted that the silent voices of river systems and their dependent people are increasingly being acknowledged. We all lose if rivers become severely degraded due to poorly-informed development and management. It does not have to be like that."

– Dr Jackie King

Science Alumni receives HONORARY DOCTORATE FROM UCT

At the UCT Graduation Ceremony in December, **Dr Marlene Belfort,** Distinguished Professor of Molecular Genetics, Biomedical Sciences, School of Public Health, State University of New York (SUNY) at Albany in New York, received an honorary doctorate: **Doctor of Science** ***(honoris causa)*** in recognition of her significant contribution to society in her field.

Professor Marlene Belfort graduated from UCT with a BSc in 1965, followed by doctoral and postdoctoral work at the University of California, Irvine, and the Hebrew University of Jerusalem. She is currently a distinguished professor in the departments of Biological Sciences and Biomedical Sciences at the State University of New York at Albany, and is a world-renowned scientist in the field of molecular genetics and biochemistry.

Her leading achievements include the self-splicing of introns in bacteriophage T4 and a detailed analysis of the splicing mechanism. Her demonstration that the introns are mobile, and later comparison of the endonuclease encoded by and involved in intron movement, has stimulated debate over evolutionary origins. More recently her work has led to the development of a model for the mechanism of intron evolution that is not only applicable to prokaryotes but may shed light on vertebrate genes as well.

The importance of Professor Belfort's work has been recognised with numerous awards and honours. She has also chaired committees for a number of leading scientific organisations, published over 190 scientific papers and co-edited two books. For the past 25 years she has enjoyed continuous grant funding from the National Institutes of Health.

In addition to her research undertakings, Professor Belfort has proven exceptionally committed to teaching, training and professional service. Her dedication to mentorship – of younger scientists, technicians, undergraduates and postgraduates, and even high school pupils – has resulted in her working with dozens of PhD students who have gone on to fill top placements at leading scientific organisations around the world. Within the global scientific community, she is particularly well known for her support of women in science, winning the American Society for Microbiology Alice C Evans Award, which recognises contributions towards the participation and advancement of women in microbiology.

Beyond her hugely influential discoveries relating to introns, Professor Belfort's prolific publication record, impeccable grant history and long-standing reputation for mentorship make her a worthy candidate for an honorary doctorate from UCT.

RESEARCH IN THE FACULTY

THE HIGHEST ENERGY LIGHT FROM A GAMMA-RAY BURST DETECTED

Professor Patrick Woudt and MSc student **Reikantseone Diretse**, (pictured left), from the Department of Astronomy are part of an international team of more than 300 researchers that has gained further insight into the physical processes at work during gamma-ray bursts (GRB). The team accomplished this through the observation of a GRB with an afterglow featuring the highest energy photons ever detected in these events: photons a trillion times more energetic than visible light. GRBs are the most luminous explosions in the cosmos. These explosive events last several seconds and during that time they emit the same amount of gamma-rays as all the stars in the universe combined. Such extreme amounts of energy can only be released during catastrophic events like the death of a massive star, or the merging of two compact stars, and are accompanied by an afterglow of light over a broad range of wavelengths (or equivalently energies), that fades with time.

On 14 January 2019 researchers detected GRB 190114C. It is unique in that researchers were able to observe for the first time in its afterglow emission photons with teraelectronvolt (TeV) energies, using the Major Atmospheric Gamma Imaging Cherenkov (MAGIC) telescope in the Canary Islands. This emission of TeV photons was 100 times more intense than the brightest known steady source at TeV energies, the Crab Nebula. As expected, the very high energy emission faded quickly – in about half an hour after the event onset – while the afterglow emission in other parts of the spectrum persisted for much longer. The discovery triggered an extensive campaign of observations across the electromagnetic spectrum, mobilising more than 20 observatories and instruments around the world. This collaborative effort allowed researchers to gather the most information ever collected about a GRB, capturing the evolution of the GRB afterglow emission across 17 orders of magnitude in energy. Woudt and Diretse were part of a team responsible for tracking the emission of radio waves in the afterglow of GRB 190114C. The team used the new MeerKAT radio telescope in South Africa to record the emission. While gamma rays are very high energy photons, radio waves are found at the other energy end of the electromagnetic spectrum. "The rapid response of the MeerKAT telescope to observe this extreme stellar explosion, combined with its excellent sensitivity, has allowed us to detect the radio afterglow within 24 hours of the explosion," Woudt explained. Diretse continues to monitor the radio afterglow of this event using MeerKAT. "The recording of TeV energies for GRB190114C and its continued monitoring with radio telescopes such as MeerKAT helps us to untangle the high energy astrophysics of these exciting transient events. Being part of such a discovery was ecstatic and highly motivating," he said.

His study is supported by a postgraduate scholarship from the Inter-University Institute for Data Intensive Astronomy (IDIA), a partnership between UCT, the University of the Western Cape and the University of Pretoria. The research cloud computing infrastructure of IDIA has contributed towards the fast analysis of the MeerKAT observations of GRB190114C.

"This amazing scientific achievement underscores the importance of the ability of South African researchers to rapidly analyse large MeerKAT data sets with the data-intensive research cloud developed at IDIA," said **Professor Russ Taylor**, director of IDIA.

NEW DINOSAUR DISCOVERED in Mongolia

A new species of dinosaur – a type of oviraptorosaur – has been discovered in Mongolia by a team of researchers from South Korea and their colleagues, including UCT's Professor Anusuya Chinsamy-Turan.

Oviraptorosaurs were a diverse group of bird-like dinosaurs from the Cretaceous of Asia and North America. They are characterised by their short snouts that feature parrot-like beaks, and their commonly feathered hides. The diet and feeding strategies of these toothless dinosaurs are unclear despite the abundance of nearly complete oviraptorosaur skeletons that have been found in southern China and Mongolia. In this study, the team describes an incomplete skeleton of an oviraptorosaur from the Late Cretaceous – around 100.5 to 66 million years ago – found in the Nemegt Formation of the Gobi Desert of Mongolia in 2008 during the Korea–Mongolia International Dinosaur Expedition.

The unusual, thickened jaws of the new species *(Gobiraptor minutus)* distinguish it from other oviraptorosaurs and indicate that it may have used a crushing feeding strategy. This supports previous suggestions that oviraptorosaurs fed on hard foods, such as eggs, seeds or hard-shelled molluscs. Chinsamy-Turan contributed histological analyses of the skeleton's femur, which revealed that the specimen was likely from a very young individual. "The microscopic structure of the thigh bone of this Cretaceous-aged, baby dinosaur showed that it was richly inundated with blood vessels and that it was rapidly growing at the time of its death," says Chinsamy-Turan.

The location of the *G. minutus* skeleton in the Nemegt Formation – which consists mostly of river and lake deposits – confirms that oviraptorosaurs were well adapted to wet environments. The research team proposes that different dietary strategies may explain the wide diversity and evolutionary success of this group in the region.

Eliminating malaria in the Asia-Pacific COULD SAVE 400 000 LIVES

Increased funding is needed to eliminate malaria across 22 Asia-Pacific countries and save an estimated 400,000 lives, according to research published in a new collection of studies on Wellcome Open Research.

Dr Sheetal Silal, from the Department of Statistical Sciences at UCT, a lead author on a recently published paper says that, "While the Asia-Pacific region has made significant progress in combatting malaria, external malaria financing has recently plateaued. With competing health risks, countries near elimination face the risk of withdrawal of funding as malaria is perceived as less of a threat. Mathematical modelling was used to compute the economic benefits and costs of elimination, and the resultant investment case can be used to advocate for sustained financing to realise the goal of malaria elimination in Asia-Pacific by 2030."

Although Asia-Pacific countries have made significant progress towards their goal of eliminating malaria by 2030, collection researchers warn that stagnating donor funding puts at risk national malaria control efforts and access to lifesaving drugs and other tools, and could, under one potential scenario, result in as many as **845 million more malaria cases and 3.5 million deaths.** "In the current climate of decreasing global malaria funding, countries with a lower malaria burden are becoming a lesser priority for donors, but sustained financing needs to be secured to realise this goal of *P. falciparum* and *P. vivax* elimination in the Asia-Pacific by 2030," said study author Dr Sheetal Silal.

SNOBBISH BIRDS

prefer to live in luxury

A unique study of birdlife in South African cities has found that birds prefer wealthy areas to poorer ones but will move out if things get too cramped. The study was conducted by a team of scientists from the University of Turin, Italy and UCT and WITS. Their findings were published earlier this year in the international journal of *Global Change Biology*. Co-author on the study, **Associate Professor Arjun Amar** from the Department of Biological Sciences at UCT, said: "This work is of particular importance because it is one of the few studies conducted in a developing country, and the only study of its kind in Africa, where urbanisation is predicted to occur at a faster rate than any other region on the planet." City soundscapes may not be famous for their birdsong, but the new study has revealed that the richer the neighbourhood, the more bird species are found there – as long as there is still enough good habitat for them to spread their wings. The researchers studied birdlife in 22 urban areas across South Africa and found that species richness increased according to the income level of the neighbourhood, but not in highly urbanised areas where vegetation has all but disappeared.

The so-called 'luxury effect' – well-documented in the developed world – also applies to relatively low-density urban areas in South Africa, where rich areas have a greater diversity of bird species than poor areas. This is probably because in wealthier neighbourhoods there is more investment in gardens, parks and other green spaces – hotspots of urban biodiversity. However, birds have no appetite for heavily built-up areas, even when they have wealthy inhabitants. This is the first time the 'luxury effect' in birds has been documented in Africa. In wealthier neighbourhoods there is more investment in gardens, parks and other green spaces – hotspots of urban biodiversity. The researchers believe such findings could help shape future urban planning in the interests of both biodiversity and environmental justice, particularly in the rapidly urbanising developing world. "This work is of particular importance because it is one of the few studies conducted in a developing country," said co-author UCT Associate Professor Arjun Amar. "Also it's the only study of its kind in Africa, which is predicted to urbanise in the future at a faster rate than any other region on the planet."

UCT'S DRUG DISCOVERY CENTRE RECEIVES R18M DONATION

from former Coca-Cola chairman to drive crucial research

UCT alumnus and former chairman and CEO of Coca-Cola, Neville Isdell, has donated about R18 million towards research into the discovery of new medicines for infectious diseases at the UCT Drug Discovery and Development Centre, H3D. The generous donation will be used to establish an initial five-year Neville Isdell Chair in African-centric Drug Discovery and Development at H3D. H3D's director and founder, **Professor Kelly Chibale,** will hold the Chair, which includes the directorship of H3D. Through the donation, Isdell will support solution-orientated research to create life-saving health innovations.

"I am excited about playing a part in helping to achieve African solutions to public health challenges on the continent and across the world. I hope this support will help Professor Chibale to drive and lead innovative research and development (R&D) of new malaria medicines, as well as new tuberculosis and antimicrobial resistance treatments, and train a new generation of African scientists with key modern pharmaceutical skills required to discover modern medicines," said Isdell.

The donation will be used partly to lead efforts in establishing the H3D African Drug Metabolism and Disposition Project, also known as the H3D 'African Liver Project'. This project will focus on addressing the issue of variability in drug response across African populations, mostly driven by genetic differences in the expression and activity of drug metabolizing enzymes. Chibale said the aim was to develop and validate a preclinical discovery tool that can be used to prioritise drug candidates during their chemical lead optimisation phase based on the predicted pharmacological profile in African patients.

FIRSTS FOR THE FACULTY

UCT invests in WOMEN ACADEMICS

The University of Cape Town has kept to its commitment to create more opportunities for women by offering a total of R22.5 million in individual grants over five years. Five substantial grants have been awarded to women researchers to make space for more women's voices to be heard – both for their own advancement and for the advancement of others. These are aimed at postgraduate students and postdoctoral research fellows. The winning research projects are:

Dr Katye Altieri: enabling South Africa's black oceanographers

Along with three co-investigators, Altieri from the Department of Oceanography aims to enable a cohort of postgraduate black women and transgender oceanographers to become the leaders of oceanography in South Africa – and the global south. Through her project, Boonzaier – from the Department of Psychology – aims to shift the ways of thinking about and doing research on gender-based violence.

Professor Janet Hapgood: informed choices for women's contraception

Women in sub-Saharan Africa are at high risk of being infected with HIV. They also need access to effective, safe and affordable contraception. However, the hormonal contraceptive that's most widely used in the region has a potential side-effect: it may increase the risk of HIV infection by about 40%. Sub-Saharan Africa is also the region with the highest use of this injectable contraceptive – called depo-medroxyprogesterone acetate or Depo-Provera – and the highest prevalence of HIV.

Dr Robyn Pickering: transforming the field of paleoanthropology

South Africa has a rich record of human evolution spanning fossils of our early ancestors through to more recent evidence for the emergence of modern humans and their complex behaviours. Research into human evolution in South Africa has been substantial and has received international attention for nearly 100 years. However, the leading researchers in South Africa have always been men: women are under-represented and black women are virtually absent. Pickering and her co-investigators, Professor Rebecca Ackermann and Dr Jayne Wilkins, want to take the first step towards transforming the field of paleoanthropology. They plan to build up the Human Evolution Research Institute (HERI) at UCT to make it a world-class and enabling research environment where excellence shines and the next generation of great South African black women palaeoanthropologists can thrive.

Launch of THE SCHOOL OF IT

The Fourth Industrial Revolution (4IR) is not coming, it is already here, and UCT's new School of Information Technology is already well positioned to prepare students, says its director **Professor Ulrike Rivett**, who was speaking at the official launch of the school, which merges the innovative technological and multidisciplinary capacities and knowledge of the faculties of Science, Commerce and Humanities. The launch was accompanied by the annual School of IT showcase, a "show and tell" involving senior student projects and innovations, as well as the award of annual certificates and class medals.

Guest speaker at the launch, UCT's chief operating officer **Dr Reno Morar,** said the students' showcase and awards provided a more concrete picture of the relationship between UCT and technology, and especially the university's commitment to excellence. He added that the School of IT embodies one of UCT's strongest principles: the importance of multidisciplinary partnerships in approaching today's complex problems. "Because it is a virtual school, based not in a building but in a data cloud, it's reach can encompass many different disciplines." Everyone who uses a smartphone is part of that growth. We don't have to wait for innovative apps to trickle down to South Africa," Morar said. Already UCT students are leading the way by developing and driving those apps and their growth. Others have developed apps as solutions to food waste, water savings, language barriers, and many more. UCT student entrepreneurs are also putting their technology learning to good use in new businesses that serve South Africans. **Mvelo Hlope** and **Denislav Marinov** won prizes from the national Entrepreneurship Intervarsity Competition in September for technology applications they developed during their studies. "These students are examples of UCT's response to 4IR: We're not going to wait for the changes it will bring, but we're going to lead the change," said Morar. "The School of IT is the latest example of UCT's mission to create positive change to serve our society."

Back to contents page

UCT awarded funding to host

BIOGEOCHEMISTRY RESEARCH INFRASTRUCTURE PLATFORM (BIOGRIP)

"Biogeochemistry" is the study of how biological, geological, chemical, and physical processes interact to shape natural environments over time and space. It covers a range of interdisciplinary research foci, from the origin and diversification of life, to how anthropogenic drivers alter modern environments, to the response of natural systems to environmental change. Biogeochemistry was identified by the Department of Science & Innovation's South African Research Infrastructure Roadmap document as an emerging interdisciplinary field of strategic importance. While some South African research groups currently undertake research that can be defined as biogeochemical, their efforts to-date have largely been isolated and/or fragmented. Moreover, biogeochemistry requires high precision data and measurements of a vast range of inorganic and organic chemical components, some of which cannot currently be made in South Africa.

From 2020, UCT will host the Biogeochemistry Research Infrastructure Platform ("BIOGRIP"). Funded by the Department of Science & Innovation, BIOGRIP was conceived by a team of researchers in the Faculty of Science, along with collaborators at Stellenbosch University, North-West University and the University of the Free State. **Dr Sarah Fawcett**, Department of Oceanography and Professor Jodie Miller (Stellenbosch University) are the co-champions of BIOGRIP, who led the development and writing of the proposal, as well as presenting it and defending it to the DSI's scientific steering committee. The UCT team that assisted includes: **Dr Katye Altieri** (Oceanography), **Prof Judy Sealy** and **Dr Vincent Hare** (Archaeology), **Dr Robyn Pickering, Prof Chris Harris** and **Dr Petrus le Roux** (Geological Sciences). Professor Sealy is currently the acting Director of BIOGRIP.

The central goal of BIOGRIP is to enhance South Africa's existing biogeochemistry research capabilities by modernizing, integrating, and optimizing extant facilities, developing new infrastructure where essential measurement capacity is lacking, and driving knowledge creation through investment in training, capacity building, and scientific leadership. BIOGRIP will consist of a network of new and existing research laboratories housed in one of four Nodes, each hosted by a different South African university. Each Node will specialize in an aspect of biogeochemical research, with a central Hub based at UCT that manages and coordinates the platform. The Nodes will support both discipline-specific research and larger-scale integrated and interdisciplinary efforts, and will be accessible to all researchers across the country.

Shuttleworth Postgraduate SCHOLARSHIP PROGRAMME

The Department of Mathematics & Applied Mathematics has set up a programme on offer to highly motivated black South African students, who aspire to become academics. The Shuttleworth Postgraduate Scholarship aims to train the next generation of black South African pure and applied mathematicians by providing a unique learning programme at one of the leading Centres of Mathematics in Africa. Mark Shuttleworth graciously donated R6 million and if the scholarship programme goes well, potentially another R6 million will be donated later—this is the largest donation Mark has made to the university and is a significant step. The current students on the programme are **Yanga Bavuma** and **Simon Chili**. Read their reflections below.

Simon says: " I always had an interest in Mathematics and this has provided me with a solid support to pursue my interests and continue to deepen my understanding of the subject. It is a privilege to have the best teachers and mentors in the department who continuously inspire and contribute to our understanding. The scholarship also provides opportunities to travel and meet other Mathematicians, which is not only good for my growth but also to inspire other younger students. I hope to see a strong developing South African Mathematical culture in the future - a culture in which Mathematics is not merely seen as a subject to be studied for an exam but for its beauty and elegance - this is amongst the reasons I love sharing the little I know with younger students.

Yanga: The Scholarship support means that I can live somewhat comfortably and am even able to help out at home, which is the sort of thing you worry about when you're studying and black. Being part of the programme has also given me a chance to form a relationship with my fellow scholarship programme student, the very talented Mr Simon Chilli. I'm sure his influence alone will help greatly with my development. Also on this scholarship I have been given opportunities for international exposure in the form of a conference I'm going to attend and present at in Johannesburg as well as going to Italy for a couple of weeks in September.

New initiatives in Chemistry: INGXOXO

Ingxoxo (isiXhosa for conversation, discussion) is a first year physical chemistry discussion platform and textbook. It is a web-based forum, powered by Discourse which provides a platform for student discussions around first year physical chemistry in any South African language. Here they can share their ideas, understandings and opinions of physical chemical concepts. Video and audio explanations of some of the more difficult concepts encountered in first year chemistry will be available. The content creation will be primarily driven by discussions with first year chemistry students and the Ingxoxo community. An emphasis will be on understanding how students are explaining concepts to their peers. These new ideas and explanations of chemical concepts that are relevant to the South African student will be compiled into an openly licensed, online, mixed-media e-book, co-authored by the students themselves to allow for a fully inclusive look into first year physical chemistry.

This new initiative is led by **Cesarina Edmonds-Smith** and **Chris Barnett** who are early career academics interested in improving first year physical chemistry education.

Science code tackles DISCRIMINATION, HARASSMENT

The Faculty of Science's new code of conduct promotes safety and well-being among staff and students, by tackling discrimination and harassment in classrooms, laboratories, during field camps and in other settings. The newly minted code is aligned to UCT's policy on discrimination and harassment, and linked to the university's Office for Inclusivity and Change's online reporting **tool**. It also includes broader links to UCT's transformation plans and policies. The development comes in the wake of growing rates of gender-based violence, and issues of equity and transformation at national and university levels.

Part behaviour guide, part action guide, the code of conduct was drawn up by **Professor Rebecca Ackermann**, the faculty's new deputy dean for transformation, a post created by **Dean Professor Maano Ramutsindela** after he took office. Transformation, he said, is more than equity appointments; it needs clear policy guidelines on how the faculty conducts itself.

The code includes an agreement on behaviour and attitudes for all members of the faculty – staff, students and visitors alike. It takes two forms: There is a general code for all situations, as well as templates for more specific laboratory/research groups, and field contexts.

The various forms of the code cover issues related to safety, inclusivity and collegiality, including respect and etiquette; cultural sensitivity; promoting a discrimination- and harassment-free environment; undergoing prescribed safety training; defining inappropriate relationships; and handling work assignments.

Soapbox Science: WOMEN TAKING SCIENCE TO THE STREETS

During September, visitors to the V&A Waterfront passing through the Pier Head square were treated to a truly intriguing sight: a diverse array of dynamic women in white lab coats sharing their scientific research with passers-by. **Dr Kerryn Ashleigh Warren** from the Department of Archaeology and **Dr Natasha Karenyi** from the Department of Biological Sciences represented the Science Faculty from UCT.

The very first event of its kind in South Africa, Soapbox Science does exactly what its name suggests – it offers scientific researchers a platform to connect with and educate the general public about their work. Inspired by the historical Speakers' Corner in Hyde Park, the movement first started in 2011 with a single London event and has since grown to include chapters all over the world. What makes Soapbox Science even more noteworthy is the fact that it focuses specifically on the work of women in science.

The inaugural South African edition of Soapbox Science was spearheaded by Dr Lucia Marchetti, a joint National Research Foundation/SKA South Africa South African Research Chairs Initiative postdoctoral fellow working in the Department of Astronomy at UCT, as well as in the Department of Physics and Astronomy at UWC. She was supported by a local organising team of enthusiastic women scientists from UCT, UWC, iThemba LABS and the South African Astronomical Observatory (SAAO).

While events like these may be instrumental in spreading awareness of the amazing work being done by women in science, Marchetti believes that it goes even deeper than this: even though institutions are becoming more accommodating and supportive of women scientists who juggle their work with raising families, etc, we still have a long way to go.

Back to contents page

EVENTS IN THE FACULTY

INAUGURAL LECTURE:

Professor Shadreck Chirikure:

Making Africa's past 'usable' for the present

Why does success continue to elude Africa? It was a bold question at the start of Africa Month and archaeologist **Professor Shadreck Chirikure** provided some answers in his May inaugural lecture, sharing insights from deep history and archaeology.

Archaeological research in Africa has created a vast record of the continent's dynamic social systems, mobilities and knowledge, revealing sustainable, technologically innovative and resilient African communities across the ages. One example is Great Zimbabwe, a vast multi-building settlement built of granite dry-stone walls, constructed by indigenous people who lived there between AD 1000 and AD 1700 with "varying degrees of intensity".As an archaeologist, Chirikure's research interweaves techniques from hard sciences, humanities and the social sciences to explore ancient African technologies and the political economies of pre-colonial state and non-state systems on the continent and beyond. His record reflects a career of excellence in his field. Director of the Archaeological Materials Laboratory, he has a multitude of distinctions and awards, which charted by the Dean of Science, Professor Maano Ramutsindela, in his introduction to Chirikure's lecture.

A former Mandela-Harvard Fellow and a past recipient of the Association of Commonwealth Universities Fellowship at Linacre College, Oxford, Chirikure is one of only 10 inaugural recipients of the British Academy's highly competitive British Academy Global Professorships. As a mark of the esteem in which he is held, Chirikure will give the 31st MacDonald Institute of Archaeology's Annual Lecture later this year, one of the highlights at Cambridge University.

Beginning his lecture with a blessing on Africa, Chirikure said that the people of Great Zimbabwe were master builders, craftsmen and workers of precious metals. They were networked and integrated, and traded widely. "But there's a great Shona proverb that says we can't eat past glory," he said. Africa remains beset by the perennial challenges of poverty, inequality, malnutrition, disease and unemployment. "As archaeologists, perhaps we should use our discipline to empower the present and future communities," he said. While archaeologists dealt with the past, Chirikure said they had to go beyond "business as usual" to produce locally centred knowledge that is problem-solving and globally competitive.

"Perhaps it is time to think about relevant education that solves societal problems and improves people's lives." In a call to action, Chirikure said Africans must be "thinkers and doers". "Now is the time. There is no substitute for fundamental research, it's all hands on deck." The focus on external aid had to change. "What can we do for Africa, not what can others do for Africa. We are all African citizens so let's use our knowledge from our past to try to ensure that we improve the lives of others."

With his characteristic humour, Chirikure left his audience with a challenge, framed in a very African context:

> **"If you think you are too small to make a difference, you haven't spent a night with a mosquito!"**

Rattling conventional

THINKING ON EVOLUTION

Professor Rebecca Rogers Ackermann, professor in the Department of Archaeology and deputy dean for transformation in the Faculty of Science at the University of Cape Town, presented the fourth Vice-Chancellor's Inaugural Lecture of 2019 on 14 August. Her lecture was titled: "The evolution of human diversity: The relative roles of chance, adaptation and ancient sex".

She started by asking the audience to "Look at the people around you. Notice their hair, eye shape and colour, their skin tone, body shape, foot size, nose shape. Why is it that although humans share common traits, we are also individual and diverse?" She explained that this diversity is represented everywhere: in classrooms, office spaces, book clubs, stokvels and study groups. Each is a small subset of diversity, just like the audience at her inaugural lecture.

A biological anthropologist and palaeoanthropologist in the Department of Archaeology, Ackermann was appointed as a professor in 2018. Her inaugural lecture examined evidence in the fossil record to provide perspective on these and other issues. The wide range of physical variation seen across humans is unusual for primates. The study of this diversity has been at the heart of Ackermann's work for more than 20 years. She studies the circular system: how evolution creates variation, and how variation fuels evolution.

Unusual diversity

Human evolution has traditionally been represented in a linear fashion, or as a single line that can be traced through a branching tree, ultimately tracking the evolution of our species from an ape-like creature to Homo sapiens in Africa a few hundred thousand years ago.

One of only a handful of woman professors in the science faculty, Ackermann also used the platform to talk about another issue close to her heart: the transformation of her discipline and the need for diversity.

Scientific racism

"My discipline has a terrible, terrible history of scientific racism, linked to the colonial search for primitive people. In the late 1800s and early 1900s in particular, people of colour were examined, and their bodies collected after death, specifically to find ways to support well-established Western societal beliefs that they were inferior … especially in their intelligence. It's vital to include diversity in the field by nurturing young women scholars to change the patriarchal, colonial narratives in palaeoanthropological research, she said.

> **"Diverse teams make for better science. A wider range of viewpoints, a wider range of questions being asked and answered, gives us more scientific certainty that the answers we come up with… the narratives we create… accurately reflect what happened."**

DISTINGUISHED VISITOR TO THE FACULTY

DR MALIKA JEFFRIES-EL

from the Department of Chemistry and Division of Materials Science and Engineering, Boston University was invited as a guest of the Chemistry Department's Transformation Committee.

As well as attending a Science Faculty transformation committee meeting and contributing to discussions around teaching and research in the Department of Chemsity, she presented a lecture entitled,

"Taking the Road Less Travelled: My journey to the Ivory Tower"

– where she detailed the struggles of diversity in academia.

Dr Jeffries-EL is the winner of several awards advancing diversity in the chemical sciences in the USA. She grew up in Brooklyn, New York – which is really a Tale of Two cities – the haves and the have nots and she said that it was unusual for someone like her, a poor girl, to dream big. Reading was her inspiration, which allowed her to dream of what she could do with her life. Her early inspiration was Dr Mae Jenison – who was the first black female astronaut. As a child, she was always curious about the world around her – wondering what would happen if….She had always dabbled in plants but when she went on a summer science programme for girls, she fell in love with Chemistry .

She attended a specialist school for Maths and Science – Brooklyn Technical High School. Her Mom and Dad only had a high school education and no tertiary education -so she was a ground-breaker in this regard. She took advanced classes in chemistry and engineering and her parents encouraged her to study further. She went on to Wellesley College on a full scholarship, where she was the only African American student to graduate with a degree in Chemistry (one out of 622 students) and went on to graduate school at George Washing University where she started off as a forensic chemist and finished with a degree in Polymer chemistry.

After completing her PhD, Malika took a tenure position at Iowa State University – which she describes as being in the middle of nowhere and is one of the whitest places in the USA. She described how in one day you might not see another single black person. However, she did say the people were welcoming and supportive. From there, she finally came full circle and moved back to Boston University – where she was delighted to be back in a city college again.

In her talk, Dr Jeffries highlighted how some of the issues that women have to constantly deal with are: increased hypervisibility, tokenism, increased isolation and exclusion, imposter syndrome, traditional gender roles unique to culture and fewer role models. In terms of how we can move forward, she suggested that "we need Equality, Equity and Justice and we need to think long term. This problem was not created quickly, nor will it be solved quickly". With regard to strategies on how to deal with this, Dr Jeffries suggested that "incremental advances will add up over time; we need to mitigate biases and micro-agressions. Recruitment efforts are futile if retention is poor – so we need to focus on retention. Lastly, representation matters – if you can diversify the faculty, you will diversify the students." In terms of how to encourage women to go into academia – Dr Jeffries expressed the view that we need to lead by example. She said we need to be inspirational so that women can see that there is a place for them in academia and that there are a variety of opportunities available to them.

TRAVELS ACROSS THE GLOBE

POLAR CYCLONES, Antarctic sea ice and a cruise to understand it all

On 15 July, the South African research vessel *SA Agulhas II* departed from Cape Town bound for the Southern Ocean and Antarctica's winter sea ice. Onboard were 25 researchers from the University of Cape Town (UCT), joining 70 participants from South Africa and the rest of the world.

The expedition – which is part of a large collaborative project sponsored by the South African National Antarctic Project (Southern oCean seAsonaL Experiment, SCALE) – studied winter conditions in the Southern Ocean and Antarctica's sea ice. This was something scientists realised they knew very little about after they unexpectedly saw extreme changes to Antarctic sea ice during 2016. In addition to **Associate Professor Marcello Vichi** from the Department of Oceanography, the cruise's chief scientist, there were two principal investigators from oceanography – **Dr Katye Altieri** and **Dr Sarah Fawcett** – and three from the Faculty of Engineering & the Built Environment.

The team was also the first to use a new mobile polar laboratory they've installed on the *SA Agulhas II* – a joint effort between UCT engineering and oceanography.

During 2016, the natural, seasonal melting of sea ice in Antarctica happened in less than a month between October and November – something that had never happened before. It usually takes three to four months to melt. During 2016, the extent of the ice also reached a record low. As Vichi describes it, the 2016 melt "had an interesting statistical consequence: it wiped out the apparent increasing trend that has been reported for Southern Hemisphere sea ice previously." A trend that had, up to then, been in stark contrast to the dramatically declining sea ice in the Arctic. Vichi says that there are a few hypotheses on how or why this happened, but without better understanding, they won't be able to predict how the Southern Ocean and its ice will respond to climate change.

"Winter cruises to the Antarctic are essential to bridge this gap in our knowledge." "South Africa – and UCT – have contributed considerably to collecting more winter data over the past few years." says Vichi. Antarctic sea ice is usually measured throughout the year using satellites. However, the reliability of remote sensing relies on direct measurements taken by scientists on the ice – and only very few of those measurements have been taken during winter.

Back to contents page

UCT HOSTS IDEASLAB

at World Economic Forum meeting in China

Three researchers from the UCT led this year's discussions on innovative research into infectious diseases at the World Economic Forum's (WEF) IdeasLab in China. The IdeasLab is on the programme of the WEF 13th Annual Meeting of the New Champions (AMNC) 2019. And because the three presenters are from UCT, the university is regarded as "hosting" this year's talk. **Dr Sheetal Silal**, from the Department of Statistical Science presented mathematical modelling of infectious diseases research at the meeting, with a focus on her App development for Policy in Africa. The research was presented to industry leaders, chief executives of top-ranked multinational corporations, heads of government and ministers and leaders from media, academia and civil society.

Dr Silal commented "The AMNC is a high profile exhibition of scientific and political thinking in the world where one gets a glimpse of the future, in terms of technological and scientific advancement in the context of global political strategy, and it also serves as benchmark to judge one's own progress. Our IdeasLab session was well received, and special recognition was given to the all-female panel. The IdeasLab format lends itself particularly well to teams from academic institutions, allowing stimulating discussion around the innovations presented. My personal experience at the meeting was uplifting - engaging with high profile individuals. While we were the only African university at the meeting, there was a significant South African presence from industry. I spent some time engaging with Patrice Motsepe and members of his delegation discussing the key ideas of the meeting in the South African developmental context. The South African banking industry were also part of crucial discussions on China's continued investment in Africa. Personally, there was considerable interest in my disease modelling research, with follow-up discussions with the World Health Organisation and the Ministry of Botswana.

The AMNC is an incredible opportunity for networking globally, reinforcing the university's standing in Africa and the world and provides a conducive environment for procuring funding for the university. My attendance at the meeting has helped me to expand my vision for my newly formed research unit. I am honoured to have been selected to represent the university at this event."

Documenting nature's 'DANGEROUS DECLINE'

Dr Lynne Shannon, a senior researcher at UCT's Marine Research Institute (MA-RE), is part of a team of expert authors who collaborated to compile an exhaustive report on a global study which warns that humans' devastating impact on nature leaves one million species at risk of extinction. Dr Shannon is one of 145 expert authors from 50 countries who joined forces with 310 contributing authors to compile the report. "Over the past three years, I have had the pleasure and privilege of working with an incredible, hand-picked team of 13 leading scientists," said Shannon. These scientists, she said, have expertise in natural, social, economic and indigenous local knowledge fields, spanning the terrestrial, freshwater and the marine environments.

Recently, the United Nations Environment Programme's Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) released the findings of the study, the *IPBES Global Assessment Report on Biodiversity and Ecosystem Services.* It issues a critical and urgent warning: Nature is declining globally at rates unprecedented in human history. The rate of species extinction is accelerating, with grave impacts on people around the world now likely. Among its many shocking findings, the report warns that around one million animal and plant species are threatened with extinction – many within decades, and more than ever before in human history.

On the importance of the report, Shannon said it includes

"novel and insightful approaches and ways of summarising the current and likely future status and trends of biodiversity and ecosystem services that can be of practical use in taking action to curb the alarming degradation of our natural world".

While the findings are damning, there is a silver lining: It's not too late to make a difference. If at every level, from local to global, immediate work begins for "transformative change", nature can still be conserved, restored and used sustainably. This is also key to meeting most other global goals.

SEAmester 4 years on and THRIVING ON THE OCEANS...

- by Professor Isabelle Ansorge

DST's Global Change Grand Challenge programme calls for platforms that will ***"attract young researchers and retain them by exciting their interest in aspects of global change, while developing their capacity and professional skills in the relevant fields of investigation"***. To meet these challenges in marine science SEAmester– South Africa's Floating University and a UCT Oceanography initiative was started by **Professor Isabelle Ansorge** in July 2016. Now into its 4th year and with 176 students from 23 universities all over South Africa having participated in these cruises, we take a look at how successful this programme has been and what has become of some of the students.

The need for a Floating University

"In the past access onto the SA Agulhas II was only through the SA National Antarctic Programme (SANAP). So traditionally, this meant that Universities such as UCT, SUN, Wits, Pretoria could go to sea on this vessel through their various Antarctic and Southern Ocean research projects. But South Africa is bigger than these handful of Universities – and the problem has always been how do students at the Universities of Venda, Limpopo, Walter Sisulu, Free State and many more get onboard?" asks Isabelle "The SA Agulhas II is South Africa's pride and joy polar research vessel and a National Facility and therefore must be open to all students and researchers wishing to get involved and experience a research cruise. SEAmester is about breaking these boundaries and allowing everyone access to the ship. So SEAmester is a fair and open process that anyone studying an Earth systems related subject from any University across South Africa can apply to. It allows both students and researchers to get involved, gain hands-on training and establish new collaborations". The strength of SEAmester is that postgraduate students from all over South Africa combine theoretical classroom learning with the application of this knowledge through ship-based hands-on research. The course outline is intense throughout the cruise and would not have been possible without the dedication and commitment of the 25 lecturers from UKZN, NMU, UCT, UP, Wits, CPUT, RU, UJ, Bayworld Museum, SANSA, SAIAB, SAEON, DEA, Varsity College and many more. "The state-of-the-art SA Agulhas II provides an ideal teaching and research platform for this programme, its size, comfort and shipboard facilities including two auditoriums allow large groups of students and lecturers to productively interact over a period of 10 days" says Isabelle.

What do the students say?

Mr Gerhard de Jager a SEAmester student in parasitology from UFS in 2017, became a SEAmester lecturer in 2018 and will now be participating on the end of the year cruise to Antarctica as a researcher to collect parasites across the Southern Ocean. He says… ***"SEAmester opened incredible doors for me to study how parasite communities respond to differing ocean regions – from the sub-tropics off South Africa to the harsh Antarctic continent. If it had not been for SEAmester and meeting so many scientists none of this exciting and novel research would have been possible"***

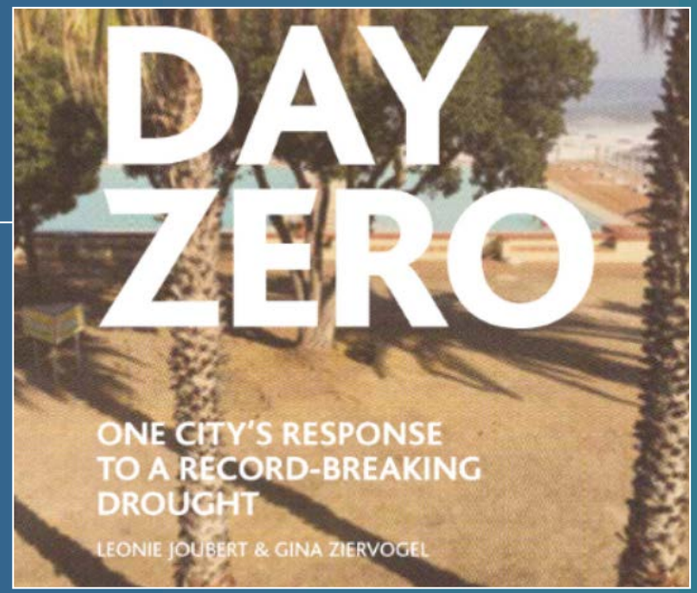
Miss Gracious Ncube from UFH who joined SEAmester in 2019 is now studying at the Ocean University in Qingdao in China, her travels to China were funded through SEAmester; while **Miss Sizewaki Yapi** a SEAmester 2017 student from UKZN is now a recipient of the VCs Womxn in Science grant under the leadership of Dr Katye Altieri at UCT. Other students have gone onto international cruises including **Miss Rudzani Silima** an MSc student at NMU who will be participating in the Antarctic city youth cruise to the Antarctic Peninsula in February 2020. **Miss Thobile Dlamini** a SEAmester 2018 student studying for an MSc in Nature Conservation at TUT, spent 2019

SEAMESTER 4 YEARS ON AND THRIVING..CONTINUED

working with a number of research groups at UP, TUT and UCT and also joined the 2019 Marion Island expedition as an oceanographer. **Mr Sean Evans** a joint UP/UCT MSc student who joined SEAmester in 2017 is now living on Marion Island as a sealer collecting seal foraging data for his MSc in Oceanography. A Btech student at CPUT in 2017, **Miss Jordan van Stavel** is working at SAEON and heads up the science arm of the SEAmester cruises. During SEAmester 2019, Jordan was in charge of all science planning as co-chief scientist.

NEW BOOK in the Faculty

DAY ZERO: One city's response to a record-breaking drought



Associate Professor Gina Ziervogel, a geographer and climate change adaptation expert in the Department of Environmental & Geographical Science, has spent the past 18 months examining what cities around the world can learn from Cape Town's response to a once-in-a-century drought. What she uncovered is the subject of her new book, ***DAY ZERO.***

In 2017, after three years of drought, Cape Town – the oldest city in South Africa – faced the possibility that it might run out of water. The following year, Day Zero – the day the city's taps were predicted to run dry – was narrowly averted and the drought ended. During this time, Ziervogel began researching how the city's government had responded to the crisis. "I felt that the citizens of Cape Town deserved to have more insight into what happened behind the scenes and that it was essential to examine how Cape Town's municipal government responded to the crisis so as to share the lessons we have learned with other cities."

Day Zero: One city's response to a record-breaking drought, written with environmental journalist Leonie Joubert, is the result. The book examines the water crisis from five key perspectives – those of the water manager, politician, researcher, spokesperson and knowledge broker – to answer the question:

What can we learn from the way Cape Town responded to the water crisis?

OUTREACH

MATHEMATICS TEACHER'S WORKSHOP: Taking the sting out of Numbers

The Science Faculty Marketing Committee hosted a workshop for Mathematics teachers across the Cape Flats and invited lecturers from the Department of Mathematics & Applied Mathematics and the Department of Statistical Sciences to give a window glimpse into Mathematics and Statistical Sciences research and education at UCT. The workshop received an overwhelming response of 70 teachers from a wide range of schools, who enjoyed the opportunity.

Presenters provided stimulating food for thought with topics such as "A very short introduction to public key cryptography: How to send me a secret message if you've never met me before"; The Art of Gallery theorem"; **"How statistics helps answering pressing ecological questions" and "Scientific Superpowers: Mathematical modelling and simulation to the rescue".**

COMPUTER SCIENCE grooms young tech innovators

It's no secret that Generation Z are already attuned to the demands of a modern, tech-savvy world. But possibilities became reality when a group of high school learners from Ocean View Secondary School were introduced to developments such as 3D printing, antenna Wifi networks and cantennas during a computer science information day at the UCT. The Department of Computer Science organised a jam-packed one-day programme of demonstrations, discussions on computer hardware and a campus tour which enthralled the learners.

Dr Melissa Densmore, senior lecturer in the department, said the event aimed to introduce the grade 8 to 12 learners to the numerous possibilities offered by a career in computer science. "We really wanted them to learn what is required to be admitted to the science faculty, and to be motivated to get the marks to pursue a career in computer science. I especially want to ensure that girls in Ocean View are part of this opportunity," she said.

How did this initiative come into being?

Dr Densmore explained that they have been partnering with people in Ocean View for the past two years to develop skills to support a community-based wireless network and to develop the iNethi platform, which facilitates local content creation and sharing with an objective of strengthening the community. A key partner in Ocean View is Cloud Classroom, which operates out of Ocean View Secondary School, where learners can go after school to use tablets to access educational content and games in addition to homework assistance.

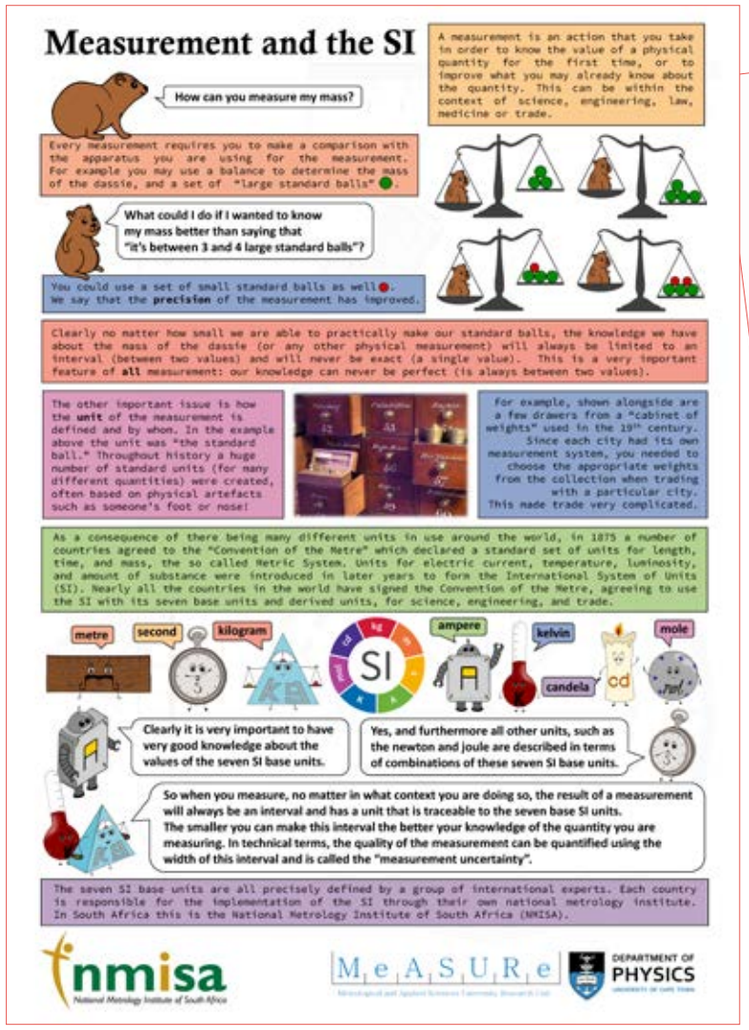
PHYSICS GETS CREATIVE

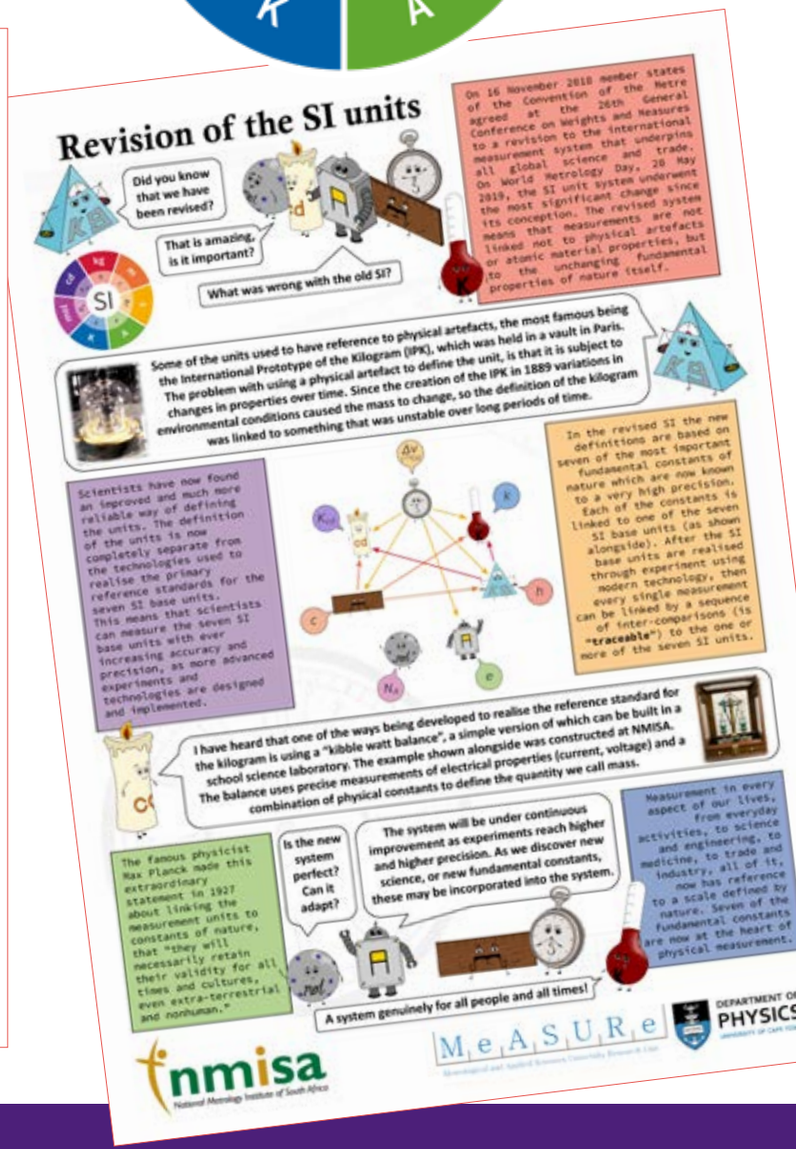
designing new set of posters to herald revised SI units

In November 2018 member states of the Convention of the Metre agreed at their General Conference on Weights and Measures to revise the international measurement system that underpins all of science and trade globally. On World Metrology Day, 20 May 2019, the SI unit system underwent the most significant change since its conception. The revised system means that measurements are no longer linked to physical artefacts or atomic material properties, but to the unchanging fundamental properties of nature itself.

Scientists have now found an improved and much more reliable way of defining the seven SI base units: the second, the metre, the kilogram, the ampere, the kelvin, the candela and the mole. The definition of the units is now separate from the technologies used to realise the primary reference standards for the seven SI base units. This means that scientists can measure the seven SI base units with ever increasing accuracy and precision, as more advanced experiments and technologies are designed and implemented.

The Metrological and Applied Sciences University Research Unit (MeASURe) within the Department of Physics had its first birthday this year, and as part of the celebrations a set of posters were designed to herald the revised SI units and explain the fundamentals of modern measurement. The Director of MeASURe, **Professor Andy Buffler**, explains that "the 4 posters were designed to reach a wide audience and it is our goal for them to be distributed to all high schools in South Africa, and then beyond." The posters were finalised in collaboration with the National Metrology Institute of South Africa and may be downloaded and distributed freely from here:
http://www.measure.uct.ac.za/msr/education





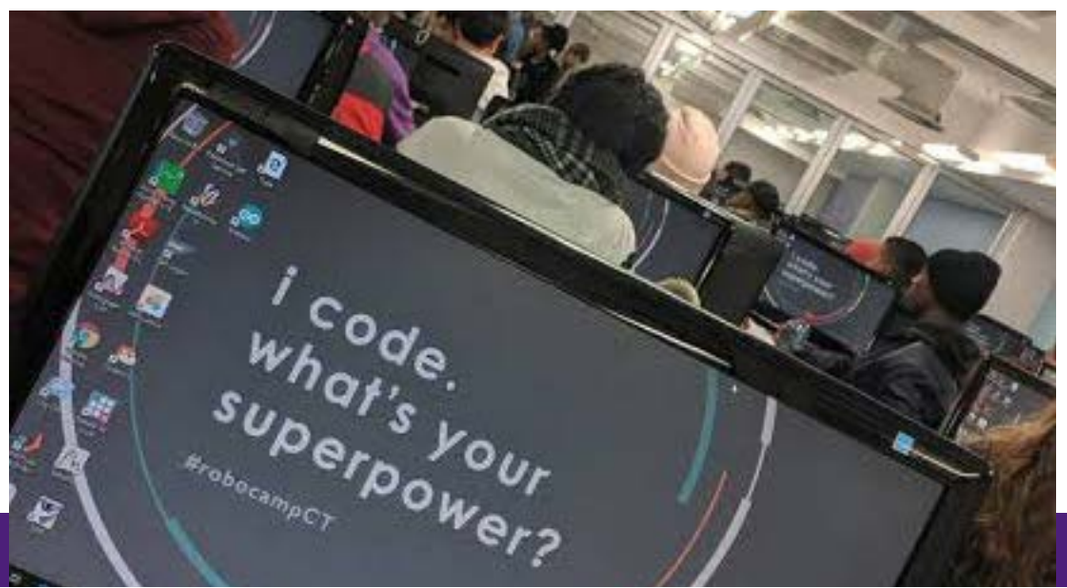
Back to contents page

UCT and CodeSpace

EXPOSE HIGH SCHOOL LEARNERS TO THE WORLD OF CODING

High school learners were given a chance to tackle coding and robotics during the winter school holiday in a one-week intensive programme run jointly by the **UCT's School of Information Technology** and **CodeSpace**, a software training institute in Cape Town. The six-day **#RoboCampCT** was a resounding success with 65 Grade 10-12 learners building a strong foundation to further their technology skills and being prepared for more advanced coding courses, including web development and robotics.

"As the School of IT, we see this as a fantastic opportunity to get more learners exposed to coding. A key challenge for many schools remains the missing infrastructure to create coding classes and make it part of the core curriculum. Availing our labs during the university holidays is a good use of the facilities but even more so, it allows students to come to campus and get inspired about what is possible!" said Professor Ulrike Rivett, Director of the School of IT.



IN MEMORIUM

Emeritus Professor Michael William Feast died peacefully early on the morning of 1 April 2019, aged 92. He is survived by his wife Connie, three children and eight grand-children.

Michael was an honorary professor in the Department of Astronomy at the University of Cape Town from 1992, and he was awarded a DSc (honoris causa) by UCT in 1993. He was a former director of the South African Astronomical Observatory (SAAO), a founding member of the Academy of Science of South Africa, a member of the International Astronomical Union, an honorary fellow of the Royal Astronomical Society and a fellow of the Royal Society of South Africa and the South African Institute of Physics (SAIP).

Emeritus Professor John Gurney passed away in October 2019. He was associated with UCT for over 60 years, starting as a student in Chemistry in 1959, and working his way up to being an NRF A-rated researcher and Professor (first in the Dept. of Geochemistry, then in the Dept. of Geological Sciences after the amalgamation of the Mineralogy & Geology and Geochemistry departments in 1990) at his retirement in the early 2000s. John supervised 20 BSc (Honours), 17 MSc and 16 PhD students at UCT, many of whom went on to become important figures in research and the mineral exploration industry.

He was one of the best known and most highly respected researchers in the field of the petrology and geochemistry of the Earth's mantle, as well as diamond geology, in the world. He was one major reason why Geological Sciences at UCT enjoys a reputation for excellence, particularly in geochemistry. He organised the first International Kimberlite Conference at UCT in 1973 (which oddly enough came about partly because John was also working on analysing lunar samples from the Apollo moon landings with Prof Louis Ahrens), and this conference has continued to be held every 4 or 5 years, most recently being held in Gaborone in 2017 (and will be held in 2021 in Yellowknife, NWT, Canada), where leaders in academic research in mantle petrology and diamond geology, and industry leaders in diamond exploration and mining, get together to share research results and insights.

Dr Alissa Myrick was an infectious disease molecular biologist and Chief Investigator at UCT's Drug Discovery and Development Centre (H3D). She had over a decade of experience studying the molecular mechanisms of drug resistance in both malaria and tuberculosis, with a particular interest in the basic biology of efflux pumps and defining their role in modulating resistance. She joined H3D from Harvard University (USA) in January 2016 and used her wealth of biological expertise to establish and grow TB biology drug discovery efforts at H3D.

Most unfortunately, Dr Myrick was diagnosed with cancer in April 2019, received successful treatment thereafter, but very unexpectedly and suddenly died in November 2019 from resulting complications.

Mr Zamikaya Jikumlambo (58), a laboratory assistant in the Department of Biological Sciences passed away very suddenly during August 2019. Zama started working at the University of Cape Town in 1996 as a departmental assistant in the Department of Botany. In 2012 he was appointed as a laboratory assistant in the Department of Zoology, now known as the Department of Biological Sciences.

Colleagues describe him as a kind-hearted, gentle, humble and loyal person who carried out his duties with diligence and much dedication to the department, and who often inconvenienced himself to accommodate others. He was loved and respected by his colleagues and students alike, especially the postgraduates who he willingly assisted even at very short notice.

Keep Connected - Stay in Touch - Keep Connected

We value regular contact with our alumni, so please emails us on **katherine.wilson@uct.ac.za** We would like to hear about what you are doing with your Science degree in order for us to inspire a young generation of potential scientists and build career profiles of opportunities for Science graduates.

We would also like to cover interesting initiatives you are involved in, in future *Contact* newsletters.

Contact is published by the Faculty of Science at UCT.
www.science.uct.ac.za

Editor: Katherine Wilson +27 (0) 21 650 2574

Design: Pixeltrees. tc@pixeltrees.co.za

Back to contents page