UNIVERSITY OF KWAZULU-NATAL ™
INYUVESI YAKWAZULU-NATALI



NEWSletter

COLLEGE OF AGRICULTURE, ENGINEERING AND SCIENCE

VOLUME No 5 ISSUE No 2 DECEMBER 2016

Message from the DVC and Head of College

Professor Deo Jaganyi

As it draws to a close, the 2016 academic year can be described as the most challenging since the merger. It has been tough to both students and staff. The 'FeesMustFall' movement almost caused the year to be deferred into next year. But, through the commitment and determination of all staff and students, exams have taken place this year. Personally, and on behalf of the College Management Committee, I say thank you to you ALL.

The second semester saw the College exceeding its overall enrolment target, both in undergraduate and postgraduate numbers. The total number for the year was 7 443 for undergraduate and 2 305 for postgraduates, against targets of 7 392 and 2 057 respectively. The biggest increase was the PhD enrolment of 858 against the expected figure of 673. The total number of Postdoctoral Scholars was 174.

The College, for the second year, celebrated its top teachers by awarding them the 'College Distinguished Teacher Award'. These were Profs Ross Robinson, Serban Proches, Shahidul Islam, Shaun Ramroop and Dr Gareth Lagerwall. To all of them we say well done. Another group of individuals who deserve congratulations are Drs David Lokhat, Angus Macdonald, Roshila Moodley, Sershen Naidoo, John Odindi, Tom Walingo and Nishani Harinarain, who were promoted to Senior Lecturer; and Drs Naven Chetty, Evariste Gueguin Kana, Stephen Ojwach, Ursula Scharler and Moganavelli Singh, who from 2017 will use the title 'Prof', having been promoted to Associate Professor. The three individuals who were promoted to Full Professor were Bice Martincigh, Ademola Olaniran and Serban Proches. Altogether some 80% of College applicants were successful.

In making sure that our curriculum remains relevant and fit for purpose, the School of Engineering underwent the QPA review. This brings an end to the review of Schools in the College. The next phase of reviews will be programme reviews, beginning with the M-Stream. The accreditation of two programmes (Electrical, Electronic and Computer Engineering; and Civil Engineering) in the School of Engineering, by the Engineering Council of South Africa (ECSA), took place in October. The outcome was full accreditation for the EECE programme and a revisit in 2017 for the Civil programme.

College support for research in 2016 included bursaries to the tune of R3.04 million, which supported a total of 74 postgraduate students (53 Masters and 21 PhD students), all from the designated group. The College also spent R1.2 million providing support to 74 postgraduate students and Postdoctoral Scholars; and 27 academic staff to attend both local and international conferences. The total amount spent to support Postdoctoral Scholars was R15.5 million. A number of our academics were also involved in big grant projects, some of which are multidisciplinary in nature, totalling approximately R30 million. The 2016 College Postgraduate Research Day was bigger and better than ever with a diverse number of external partners supporting the event. The number of students who presented was 217, which is a record. All thanks goes to the students and the supervisors for making the event memorable.

In promoting international collaboration, the College awarded nine Honorary Professorships to the Jiangsu Academy of Agricultural Sciences (JAAS) in Nanjing, China. These individuals are co-supervising eight Chinese PhD students who are JAAS staff but registered at UKZN. The College, working closely with the School of Chemistry and Physics, also hosted the inaugural South Africa-China Bilateral Conference on Astronomy and signed a MoU between UKZN and the National Astronomical Observatory China (NAOC), to create a Joint Centre for Computational Astrophysics.

To crown the year, on behalf of the DST and NRF the College organised and hosted the third National Conference on Global Change. This meeting brought together over 350 participants to engage on challenges and solutions relating to global change in South Africa and in the region.

One event on our calendar that we could not celebrate this year was the College Fun Run, owing to the student protests. But, what we did not miss was the opportunity to celebrate the contribution that our colleagues have made to the College and the University as a whole, by serving the institution for 15, 25 and 35 years. The long service awards were made up of 22 who had 15 years of service, eight for 25 years and six who have been with the University for 35 years. These 36 individuals' combined service to the University is 740 years. They certainly deserve a big THANK YOU! We also took the opportunity to recognise and thank our colleagues who are retiring at the end of the year and wish them all the best.

Through the efforts of Ms Shelley Barnsley and her team, CAES was accredited by the Health Professions Council of SA (HPCSA), as an internship training site for Counselling Psychologists. We look forward to welcoming the first intake of interns in 2017.

Finally, I would like to express my sincere thanks to every member of the College for the hard work and commitment that you have shown in 2016. I wish you and your loved ones a relaxing and enjoyable festive season.

Deo

COLLEGE NEWS

College Hosts 3rd National Conference on Global Change

Some of the brightest young 'green' minds in South Africa gathered in Durban from 5-8 December to share, discuss and debate ways of sustaining the planet.

Hosted by UKZN's College of Agriculture, Engineering and Science, some 350 postgraduate students, academics and researchers from multiple disciplines and universities across the country, as well as relevant government officials, attended the 3rd National Conference on Global Change. Their purpose was to explore innovative solutions for complicated global challenges facing southern Africa around climate, water, food security, pollution, the environment, transformation, health and similar topics.

The conference forms part of the ten-year Global Grand Challenge designed by the Department of Science and Technology as a project for global science, and was co-sponsored with the National Research Foundation.

'The Global Change Conference was very much about a transdisciplinary approach,' said College DVC, Professor Deo Jaganyi. 'The comprehensive and systemic approach taken demonstrates a commitment to understanding and managing our natural and social systems and preserving our heritage.'

UZKN PhD student Ms Nashipi Ntshanga won the award for the Best Oral Presentation at the 3rd National Conference on Global change.

A highlight of the programme was a presentation in the opening plenary by eminent climate change and sustainable development expert Dr Saleemul Huq, Director of the International Centre for Climate Change and Development (ICCCAD) in Bangladesh, who spoke on 'Reflecting on Climate Change Adaptation Science from a Developing Country Perspective'.

The four-day conference also included field trips to expose delegates to innovative programmes working to understand and mitigate any negative changes to the natural environment brought about by systematic global changes. Trips included exposure to KZN's oceans, human settlements, catchments and grasslands.

UZKN PhD student Ms Nashipi Ntshanga won the award for the best Oral presentation at the conference.

Science and Engineering on Show at KwaDabeka School

On a crisp and clear morning UKZN Science Centre Co-ordinator Dr Tanja Reinhardt (aka 'Dr T') loaded up her mobile science lab, Science4U and headed for the hills, or to be precise, to the grounds of Sithokozile Secondary School in KwaDabeka.

She joined forces with the Centre for the Advancement of Science and Mathematics Education (CASME), Engineering firm Mahle Behr SA and East Coast Radio for a fun morning of science and engineering.

In keeping with Women's Month, the aim of the outing was to increase the participation of girls in the fields of Science, Technology, Engineering and Mathematics (STEM).

An enthusiastic group of learners were at the school to join in the activities which included building radiators, launching rockets, a special science-themed East Coast Radio 'Grand Challenge', and a much anticipated science show from the renowned 'Dr T'.

Learners at the School and East Coast Radio listeners were treated to UKZN post-doctoral scientist Dr Adriana Marais, who

Dr Tanja Reinhardt wows the pupils of Sithokozile Secondary with assistance from Phume Mlaba of Mahle Behr SA and East Coast Radio.

shared her passion for science and her determination to travel to Mars. She is one of the 100 remaining candidates for the planned 2027 Mars One Mission.

'It is vital for school pupils to learn more about subject choices at an early age, and be exposed to post-school study opportunities in Science, Technology, Engineering and Mathematics,' said Dr T.

College Celebrates Distinguished Teachers

Distinguished Teachers (from left): Prof Shaun Ramroop, Prof Serban Proches, Prof Shahidul Islam, Dr Gareth Lagerwall and Prof Ross Robinson.

Academic staff from each School within the College were recognised at a Distinguished Teacher Awards Ceremony for their passion and dedication towards educating and inspiring greatness in students. At the award ceremony, Dean of Teaching and Learning within the College, Professor Bala Pillay, emphasised that teaching was just as important as research.

From the School of Agricultural, Earth and Environmental Sciences, Prof Serban Proches was commended for being both a prominent researcher who had won the Vice-Chancellor's research award as well as a teacher – someone whose research fed into and improved his teaching, especially at postgraduate level.

Prof Ross Robinson was recognized for keeping an active interest and involvement in hands-on teaching despite being Dean and Head of the School of Chemistry and Physics, and for his interest in harnessing the power of technology in his lectures.

Dr Gareth Lagerwall, 'a young lecturer brimming with enthusiasm and one who handles the large numbers of first-year students with great aplomb', was the Distinguished Teacher Award recipient from the School of Engineering.

Prof Shahidul Islam of the School of Life Sciences was praised for his 'knowledge-based, problem-based and student-centred teaching and learning style.'

Last but not least the Distinguished Teacher Award for the School of Mathematics, Statistics and Computer Science went to Prof Shaun Ramroop, whose teaching philosophy is guided by three imperatives: 'verbal instruction; feedback to and from students through the setting up of various processes to gain information about their classroom practices; and the monitoring of student progress with early intervention.'

Postgraduate Students Excel at College Research and Innovation Day

2016 witnessed an even bigger and better Postgraduate Research Day for the College of Agriculture, Engineering and Science, with 60 oral and 157 poster presentations being submitted for review by Masters and PhD students from the College's five Schools – almost double the numbers of last year.

In addition, a new component of the day was the introduction of an Innovation Stream. In partnership with UKZN InQubate and the Technology Innovation Agency (TIA), interested students were exposed to 'research to market' thinking and given the platform to pitch their innovative research ideas, with the best concepts being taken up for further market development and funding.

Conference chair Dr Michael Gebreslasie opened the day welcoming students, academics, exhibitors and judges and thanked all participants and contributing funders, both within and outside of the university.

The Keynote Lecture was delivered by Mr Jay Bhagwan, Executive Manager: Water Use and Wastewater Management at the Water Research Commission (WRC), who spoke on 'Water and Risks – a symbiotic relationship'.

The judging panel – comprised of UKZN academics as well as external participants from Eskom, Transnet, Toyota, Umgeni Water and other research institutions – then settled down to the main task of the day, namely, to provide a challenging and competitive environment for postgraduate students to present their scholarly work, to an academic but supportive audience, while at the same time disseminating knowledge.

Thanks to the generous funding from some 50 donors and partners, winners and runners-up of the various sessions received sponsorship to attend either an international or a national conference respectively.

Winners of the 2016 College Postgraduate Research and Innovation Day.

UKZN Farmer Support Group Hosts Sixth Annual Food and Nutrition Fair

More than 250 people attended the sixth annual Food and Nutrition Fair in Msinga hosted by UKZN's Farmer Support Group (FSG).

Participants included community members, FSG and UKZN staff members, representatives from the Department of Agriculture and Rural Development (KZN DARD), staff and students from the University of Zululand, and ward councillors for the area.

Small-scale farmers from Msinga and Bergville shared how they plant, tend their plots (using minimum tillage), save their seeds, cultivate their seedlings and market their produce, encouraging the use of organic produce, even in animal feed. The theme was 'From Seed to Plate', and featured displays of crops and crafts which were on sale.

The event included a visit to vegetable plots alongside the Mooi River, where two pumps, supplied by the FSG and by the Department of Social Development, and an irrigation system, have enabled farmers to continue producing crops despite the severe drought.

The group of 30 farmers grow vegetables using no fertilisers

From left: Ms Nokubonga Shezi of the UKZN Farmer Support Group; Ms Mugeliwe Mchunu of Machunwini; and Ms Sizakele Nkala, Ms Buyenani Ngubane and Ms Qhoshangani Ngubane, all of Msinga.

or chemicals, and use inter-cropping methods to control pests. The profit from the crops runs households and sends children to school.

The farmers lauded FSG for their assistance in enabling them to teach their children, make a profit and support themselves. They said that with the help of the FSG they have been able to work with unemployed youth, teaching them the value of agriculture.

Geography Students on Atlantic Research Cruise

Three Master's candidates from the discipline of Geography in UKZN's School of Agricultural, Earth and Environmental Sciences (SAEES) spent 10 days navigating the icy waters of the Atlantic on a research cruise.

Ms Camelot Radloff, Ms Amanda Khuzwayo and Ms Samiksha Singh are completing their Masters degrees in paleoecology and aquatic systems bio-monitoring.

The cruise, for which the trio was selected from students throughout the country, involved daily lectures, skills training and deck work, exposing the students to what life as an environmental researcher on these vessels is like. The three students were part of a larger group including students from other universities and institutes.

The cruise specifically involved investigating climate change and its effects on ocean temperatures and wildlife.

Radloff, whose research is focused on a Holocene record of climate and environmental change from Lake St Lucia, said: 'I was eager to learn new concepts and techniques better to understand the interconnected dynamics of the ocean and atmosphere, as these two driving forces shape global patterns across multiple scales.'

Singh, who is also an intern at the Institute for Natural Resources (INR), was happy to have broadened her skills from river bio-monitoring to encompass oceanographic research.

Just cruising (from left): UKZN Master's candidates Ms Camelot Radloff, Ms Samiksha Singh and Ms Amanda Khuzwayo.

Khuzwayo, who plans to go on to PhD research, enjoyed exposure to a new field of research. Both her and Radloff's research has involved considerable laboratory work, which made the extended time on a practical research trip exciting.

The three enjoyed interacting with new people with similar interests as well as seeing first-hand how climate change is affecting vulnerable, isolated areas in the Atlantic.

Animal Scientist Advocates Indigenous Livestock for Enhanced Food Security

Livestock contribute up to 80 percent of agricultural GDP in developing countries with at least 600 million rural poor people relying on animals for their livelihoods.

This is according to animal scientist Professor Michael Chimonyo, who was delivering his Inaugural Lecture. Chimonyo's research focuses on the characterisation of indigenous livestock genetic resources with the goal of increasing their contribution to the welfare and livelihoods of the resource-poor.

'The breed you have forms the basis of the genetic material you have,' said Chimonyo. 'Indigenous genotypes, for example, Nguni cattle, are much better to use as they are adapted to local conditions.'

In his address, Chimonyo touched on several attributes enjoyed by indigenous breeds, which make them ideal for enhanced food security. These included resilience to gastro-intestinal parasites; resistance to ticks and tick-borne diseases; excellent fertility; the ability to withstand hydric stress (i.e being able to perform at low levels of water availability); the ability to survive feed shortages and to use locally available feeds; the ability to withstand temperature extremes; their excellent meat and milk quality; their superior grazing habits; as well as their cultural and aesthetic value.

'Understanding the characteristics of indigenous livestock enables us to use them optimally,' said Chimonyo. 'We need to make sure that indigenous livestock are conserved so as not to lose their unique genes. Characterisation of these breeds is essential in order to conserve them.

'If we are able to exploit the genes that these animals have, we will be able to make our livestock more productive.'

Chimonyo said the future lay in landscape genomics, which is the study of genes that underlie adaptation to varied environments. 'Matching genotypes with environment could improve the growth performance and production of animals,' he said.

Professor Michael Chimonyo with family members on the occasion of his Inaugural Lecture.

Mandela Rhodes Scholarship Recipient Works to See Women and Girls Thrive

UKZN Masters student, Ms Pilela Majokweni, plans to use the opportunities provided through her Mandela-Rhodes Scholarship to contribute to the empowerment and education of women in Africa, particularly female small-holder farmers and children.

Traditional and scientific knowledge combine in agricultural practice at Swayimane to increase the climate resilience and adaptive capacity of crops.

Majokweni, who is studying Agricultural Economics, is originally from the Eastern Cape. She received her undergraduate degree from the University of Fort Hare but chose UKZN for postgraduate studies because of its strong ratings in agricultural research.

Her Masters research, supervised by Dr Lloyd Baiyegunhi and Dr Stuart Ferrer, is an impact assessment of institutional support on household agricultural productivity with her research focused on small-scale growers in the rural Msinga area of KwaZulu-Natal.

Majokweni is among just 50 students – there were more than 5 000 applicants – from around Africa who received the prestigious Mandela-Rhodes scholarship in 2016. The application process is demanding and rewards those with proven exceptional leadership abilities and academic excellence, aiming to contribute towards the prosperity of their continent.

Majokweni views the accolade not only as an honour but also as a bestowal of a commitment to Africa.

She has not only been focusing on research but has also been working to establish a branch of the United Nations-affiliated Junior Chamber International (JCI) at UKZN, which is expected to launch soon. A pilot project of this group is to work with a Pietermaritzburg school to launch a Junior Apprentice Inspire Foundation Group in Africa – something which is already operating in the Eastern Cape and Gauteng – to help curb youth unemployment by exposing young people to investors and opportunities.

'I believe that agriculture and empowering women are very strong vehicles in developing Africa, and I want to use my life making a change in those areas,' said Majokweni.

SAEES is leading two components of the project: component 1.3 on seasonal weather forecasting and component 3 on agriculture. Professor Albert Modi said: 'Climate change is going to be a major challenge. Rural communities are extremely vulnerable and this project will help with our research in not only developing a model that works but perhaps more importantly one that can be used in other parts of southern Africa.'

Launch of UKZN-NAOC Astrophysics Partnership

UKZN and the National Astronomical Observatory China (NAOC) officially launched a new Joint Centre for Computational Astrophysics. The ground-breaking initiative is based on common research interests in astrophysics and cosmology, and in particular in radio astronomy and computational astrophysics.

The purpose of the centre is to facilitate the exchange of students to work on computational astrophysics that is related to new observational facilities in South Africa and China; to employ joint postdoctoral fellows to work on cutting edge astronomy supervised by scientists from South Africa and China; to open facilities (observational, technological and computational) in the two countries to maximize resource usage; to engage with the general public in terms of frontier scientific knowledge and expertise; and to attract funding from the public and private sectors.

The programme was originally proposed in 2015 and is the culmination of tireless efforts by UKZN's Dr Yin-Zhe Ma, who is based in the School of Chemistry and Physics and with the Astrophysics and Cosmology Research Unit (ACRU), and NAOC's Professor Xuelei Chen.

The Centre was officially opened on 21 November 2016 by Deputy Director-General for Research Development and Support, Department of Science and Technology, Dr Thomas Auf der Heyde, and the Consul General of the People's Republic of China in Durban, Mr Wang Jianzhou. The Memorandum of

A Joint Centre for Computational Astrophysics has been established between UKZN and the National Astronomical Observatory China (NAOC). Seen here are Prof Xuelei Chen, Head: Dark Matter and Dark Energy Group, NAOC and UKZN Vice-Chancellor, Dr Albert van Jaarsveld.

Understanding between UKZN and NAOC was signed at the opening ceremony by Dr Albert van Jaarsveld, Vice-Chancellor and Principal of UKZN and Professor Xuelei Chen on behalf of Professor Yun Yan , Director General of NAOC.

The opening of the Joint Centre for Computational Astrophysics coincided with the inaugural China-South Africa Bilateral Conference on 'Cosmology with Large Surveys'. An evening of public talks on current areas of interest in astronomy complemented the programme.

Chemistry Lecturer Receives Prestigious Young Academic Prize

Lecturer in the School of Chemistry and Physics, Dr Vineet Jeena, has received an award recognising his achievements and affording him the opportunity to initiate and establish a working relationship with a leading European researcher in his field.

Jeena was one of only five South African academics honoured with the NRF/ERC Young Academic award, the only recipient in the field of Chemistry, and the only UKZN academic selected.

This award recognises the Thuthuka grant-holding academic as promising for his efforts in his field of green chemistry, especially in the establishment of a research group consisting of four postgraduate students working on environmentally-themed synthetic chemistry. The group is particularly interested in investigating alternatives to toxic solvents and reagents used in synthetic processes in order to enable the more environmentally-friendly manufacture of, for example, medicines and drug therapies.

This collaboration is made possible by the National Research Foundation (NRF) and the European Research Council (ERC), which are the implementing agencies of an agreement between the Department of Science and Technology (DST) and the European Commission (EC).

Dr Vineet Jeena (second left) with fellow recipients and NRF Executive Director: Human and Institutional Capacity Development, Dr Romilla Maharaj (fourth left); NRF Executive Director: International Relations and Cooperation Vice-President: European Research Council, Professor Maart Saarma (fifth left) and NRF Executive Director: International Relations and Co-operation, Dr Aldo Stroebel (far right).

Jeena was presented with the award in Cape Town where he took part in events commemorating 20 years of this partnership, with a commitment being made to maintain and advance academic collaborations between Europe and Africa.

Jeena's European collaboration will be with Professor Martin Albrecht of Bern University in Switzerland where he will spend several months next year. Jeena, who has been lecturing at his alma mater since 2013, spoke of the award as an excellent opportunity to enhance his research and build a lasting, mutually-beneficial relationship with Albrecht and his team.

LiDAR Calibration Lights up Durban Skies

Light Detection and Ranging (LiDAR) equipment on UKZN's Westville campus was recently calibrated as part of an experiment to operate all three LiDARs simultaneously and interpret their performance. The LiDARs were the fixed and portable UKZN ones as well as the Council for Scientific and Industrial Research (CSIR) National Laser Centre (NLC) mobile LiDAR.

According to Professor Sivakumar Venkataraman, the system was calibrated for the lower atmosphere up to a 30km-40km range. Initial results show all three LiDARs are in agreement in terms of their detection of atmospheric features and locations.

The equipment, one of only two LiDAR systems in the country, assists research into remote sensing techniques and atmospheric pollution measurements conducted by the Atmospheric Research Group in the School of Chemistry and Physics, and is calibrated when necessary. The latest calibration came after refurbishment of the equipment.

According to Venkataraman, calibration of this nature ideally takes place at night in a clear atmosphere to avoid external light interference to the laser backscattering. The calibration was conducted over five days in early September, with result accuracy varying according to signal-to-noise ratio.

UKZN's fixed LiDAR conducts daily observations for understanding the aerosol and cloud structure over Durban. Aerosol measurements indicate atmospheric pollution levels.

UKZN's portable LiDAR has scanning capability and is used for studying pollution dispersion and bio-mass burning evolutions in the atmosphere (eg farmers' burning of agricultural land for re-cultivation). The group is also involved in joint collaborative research with Algeria, which involves the building of a system for forest fire detection, with two Masters and three PhD students conducting research on this subject.

(Left) With a LiDAR system are (from left): UKZN's Mr Ameeth Sharma, Professor Sivakumar Venkataraman, Ms Priyanka Singh, Dr Barbara Duigan, Ms Constance Mphula, Ms Senamile Sithole, and Dr Ruchith R Devaki. (Right) the LiDAR laser beam in the process of calibration.

Double Scholarship Winner was a Sure Bet for Success

Earning Dean's commendations in every year of her undergraduate study and then graduating *summa cum laude* meant it was little surprise when Ms Zahra Essack was announced as the winner of the Zac Yacoob and Maryam Babangida Scholarships.

The Maryam Babangida Scholarship acknowledged Essack as the best accomplished undergraduate female student advancing into Honours study in the entire University, while the Zac Yacoob Scholarship identified her as the single best Honours student across the University.

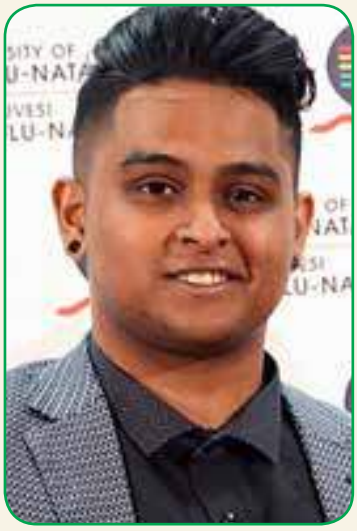
Ms Zahra Essack was UKZN's top Honours Student.

'I am honoured and humbled to have my hard work and achievements throughout my undergraduate degree acknowledged by the award of these scholarships,' said Essack. 'I also feel privileged to represent women in a highly competitive, largely male-dominated area of science and technology.'

Essack was grateful to have worked with academics from the Schools of Chemistry and Physics, and Mathematics, Statistics and Computer Science. 'The dedicated academic staff took a personal interest in my progress and helped to develop my theoretical and practical skills,' she said. 'My time at UKZN has not only helped me grow academically but has helped to shape me into a confident and well-rounded individual.'

Director of the Physics Honours Programme, Professor Mark Tame, commented: 'It is really great to hear that Zahra has received these prestigious scholarships which are well deserved. Zahra has been at the top of her class throughout her undergraduate studies and now also as an Honours student. She is talented and works hard and will flourish in her future studies at Masters level and beyond. The School of Chemistry and Physics is delighted to have the top Honours student at the University.'

College Student Achievers



Mr Sivashen Reddy received the Abe Bailey Travel Bursary.

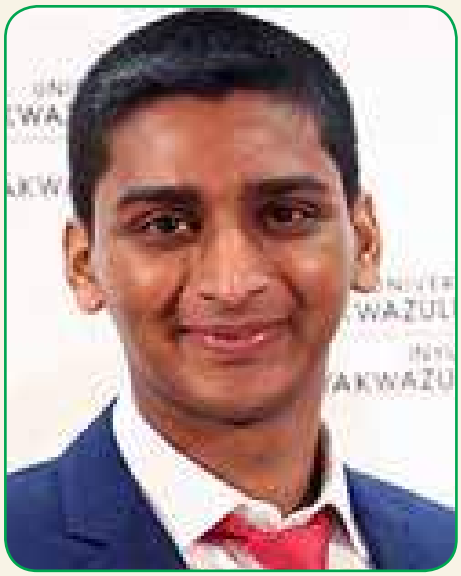
College Talent Equity Scholarship winners Ms Ntombifuthi Nzimande, Ms Sibusiswangaye Mdluli, Mr Mthokozisi Mdalose, Ms Wendy Geza and Mr Manqoba Zungu.

DVC Scholarship winner Mr Cebelihle Zwane.

Frene Ginwala Prestige Entry Equity Scholarship winner, Ms Reitshepetse Kgomotlokwa Mphahlele.

Mr Ben Sapo was awarded a College DVC Scholarship for his achievements in Computer Engineering.

Ms Lindelwa Gwala received a Prestige Sports Scholarship for her rugby prowess.



Mr Dhaneshwar Dalian Sunder was one of the top ranked undergraduates in the College.

Ms Andile Mnguni received a Frene Ginwala Scholarship to study Chemical Engineering.

College Student Achievers

Ms Nicolette Ramshaw won a UKZN Sports Scholarship for her fencing skills.

Mr Sanav Singh was amongst the top five students in the College proceeding from first to second year.

Mr Rudi Fokkens (left) won a Prestige Sport Scholarship in response to him receiving KwaZulu-Natal colours for sailing.

Ms Neliswa Mbatha is studying Applied Chemistry thanks to a Frene Ginwala Scholarship.

First-year Engineering students and Pius Langa Scholarship winners, Mr Nikyle Bisseru (left) and Mr Thesan Appalsamy.

Ms Carrie Jacobs was nominated for the UKZN Distinguished Student Award.

Mr Devin Pelser was one of the top five undergraduates proceeding from first to second year.

Mr Semeshan Naidoo received a TB Davis Scholarship for postgraduate study in Engineering.

Mr Daniel Kirkman was ranked among the top five first-year students in the College of AES

Ms Ziphokuhle Manqele received a Frene Ginwala Scholarship to study Chemical Engineering.

Mr Nicol Naidoo received a UKZN Doctoral Research Scholarship.

Mr Stuart Demmer was amongst the top students proceeding from second to third year in the College.

TB Davis scholarship winner, Mr Suleiman Patel.

Top UKZN Scientist Measures Fine Scale Changes in Sodwana Bay Waters

The AUV Glider in action taking fine scale measurements in Sodwana.

Prof Derek Stretch, who occupies the eThekwini-sponsored Chair in Civil Engineering at UKZN and is Director of the Centre for Research in Environmental, Coastal and Hydrological Engineering (CRECHE), is collaborating with two international scientists on a project investigating turbulence and mixing in the coastal ocean near Sodwana Bay. The two internationals are Dr Louis St Laurent of Woods Hole Oceanographic Institute and Prof Karan Venayagamoorthy of Colorado State University in the United States.

Funded by an Office of Naval Research (ONR) Global grant, and supported by the iSimangaliso Wetland Park Authority, the project will improve understanding of outwelling effects of the St Lucia system and other aspects of the coral hydro-ecosystems in the area.

The project, which will continue until mid-2017, is the first to conduct microstructure measurements in the region using an autonomous underwater vehicle (AUV) glider equipped with microstructure instrumentation. Stretch and his research associates were responsible for organising and undertaking the actual deployment and recovery of the glider to collect the first data for the project.

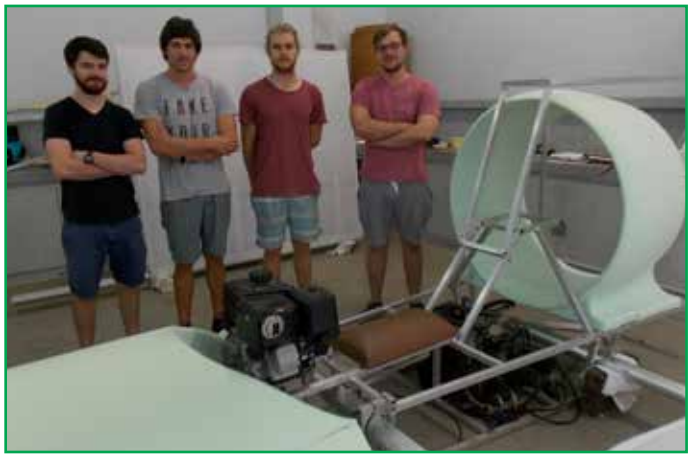
'This project will foster technological research and development and engineering innovation in South Africa by advancing South Africa's expertise in ocean robotics and increasing capacity and capability in high resolution numerical modelling and remote sensing applications,' said Stretch.

'This has implications for understanding and quantifying the impact of climate change on the migratory ecology of threatened species, and for the preservation of biodiversity. The research outputs will also inform a wide range of commercial users such as oil and gas, shipping, and fisheries, and will help assess the energy potential of the Agulhas Current.

Stretch said the project will also provide essential observations needed for a fully integrated marine and coastal monitoring and forecasting system, which is a national priority.

'This is a fantastic achievement,' said Dean and Head of School, Professor Cristina Trois.

Mechanical Engineering Group Manufactures SA's First WIG Hovercraft



The WIG hovercraft team, Mr Kai Broughton, Mr Duran Martin, Mr Dylan Williams and Mr Nino Wunderlin, with their prototype.

An undergraduate final year project group in Mechanical Engineering has built South Africa's first Wing-In-Ground Effect (WIG) Flying Hovercraft – the Typhoon.

The group, comprising Mr Kai Broughton, Mr Nino Wunderlin, Mr Duran Martin and Mr Dylan Williams, worked all year on the proof-of-concept, full scale prototype in order to demonstrate it at UKZN's Mechanical Engineering Open Day on 28 October.

Group supervisor, Prof Glen Bright initiated the project as a flying off-road vehicle. 'After some research, the students then convinced me to adjust the project slightly to make it a WIG Flying Hovercraft,' he said.

The vehicle makes use of a hovercraft base for amphibious surface operation and utilises the ground effect phenomenon for low altitude flight.

Broughton explained: 'A WIG craft is a combination of a marine craft and aircraft, which takes advantage of the ground effect phenomenon experienced by an aircraft when it flies in close proximity to the ground. The effect is the enhanced lift and reduced drag a wing experiences when it is travelling within one wing span of the ground, resulting in an enhanced lift-to-drag ratio and a greater flight efficiency.'

The students' research led them to investigate flying hovercraft created overseas by the addition of wings and a tail onto a conventional hovercraft to achieve ground effect flight. The group attempted to improve on the ground effect flight technology in the full-scale prototype they then designed and manufactured.

Said Bright: 'The creation of such a vehicle in South Africa could have niche applications in several fields including recreation, commercial and transport, and could also be used to reach otherwise inaccessible areas for purposes of search and rescue, exploration or conservation.'

Power Line Inspection Robot Runner-up in Newton Fund Competition

The Power Line Inspection robot developed by engineers in UKZN's discipline of Electrical Engineering is a runner-up in the Newton Fund Video Competition, thanks in part to a video created by one of the developers of the robot, Mr Trevor Lorimer. Using footage gathered over four years, Lorimer created a video that showcases the robot's development and design.

The robot was developed by the University in collaboration with Eskom, with Lorimer and Mr Timothy Rowell completing Masters' research on the project under the guidance of Prof Ed Boje. Since Boje's departure to UCT, UKZN lecturer Dr Andrew Swanson has performed a direct role in managing the project, with Boje contributing expertise. Lorimer is now spearheading the third prototype robot.

The project received seed funding from the Technology Innovation Agency through UKZN InQubate, the University's Technology Transfer Office which manages the project's intellectual property (co-owned by the University and Eskom). Inventors are entitled to benefit-sharing from the profits of successful commercialisation of the technology.

The team hopes to begin the final phase of primary development by testing the third generation prototype, preceding the start of limited commercial inspections targeted at niche applications where other methods are too expensive or dangerous to be conducted regularly.

The power line inspection robot in action.

'If you distil the problem of power line maintenance, the value here is in the inspection data itself, and the challenge is to deliver this data to the inspector efficiently,' explained Lorimer. 'Instead of transporting tons of equipment across thousands of kilometres, we'll send out robotic vehicles to transport the cameras.'

The robot performs detailed power line inspections at reduced costs to contribute to properly informed maintenance decisions, in order to ensure the quality of electrical supply.

Lorimer hopes that the video will generate more publicity for innovations in Engineering at UKZN, and also gather more support for entrepreneurial activities, especially at the University.

Focus on Thermodynamics

The Thermodynamics Research Unit (TRU) in the School of Engineering's discipline of Chemical Engineering has set itself apart in its field on the continent when it comes to excellence in research and teaching.

In the School of Engineering alone, which was recently ranked the best in the country for Engineering and Physical Sciences, the TRU produces 40% of research outputs. The Unit produced 36 publications in 2015 alone, and has produced 150 since 2012.

The Unit is led by Prof Deresh Ramjugernath, the DST/NRF South African Research Chair for Fluorine Process Engineering and Separation Technology. The Unit benefits from Ramjugernath's collaborative approach to research capacity development, which has led to the formation of bi-lateral research partnerships in several countries including Germany, France, Sweden, Poland and Italy. The large team comprises researchers, postdoctoral fellows, PhD students, Masters students and research assistants.

The vision of the TRU is to be the premier research centre for chemical thermodynamics in the Southern Hemisphere, specialising in high pressure phase equilibria, thermo-physical property measurements and separation technology.

The Unit has won worldwide renown and is the only group of its kind in South Africa. It is home to some of the best research equipment available, from gas chromatograph calibration apparatus to fractometers to Cottrell pumps to liquid samplers

Thermodynamic Research Unit students and staff members.

to jet mixers and more. Under Ramjugernath's leadership, research has extended into several new areas, including ionic liquids, hydrates, plasma reactor technology and predictive methods for both solvent and mixture properties.

Going forward, the Unit aims to continue its training of Masters and PhD students, particularly for the petro-chemical industry and the maintenance of its world-class facilities to act as a first port of call for industry seeking phase equilibria, separation technology and general chemical thermodynamics data. It also aims to promote and expand expertise in chemical thermodynamics and separation technology in South Africa and on the African continent through national and international collaboration.

Genetics Honours Programme Meeting need for Scarce Skills

UKZN's Genetics Honours programme, established in 2013 in the School of Life Sciences on the Westville campus, fills an important role in the training of geneticists for numerous industries in South Africa.

Genetics skills have been highlighted as scarce in the country, leading to the promotion of such skills and genetics research at UKZN. Programme Director Dr Meenu Ghai said concepts of genetics were relevant to many scientific and industrial fields including biotechnology, medicine, veterinary science, forensics and agriculture.

The programme, structured to offer both course work and research, is in great demand but can only accept a limited number of students. Course work comprises modules including advanced population and quantitative genetics, advanced human genetics and molecular diagnostics, DNA typing in forensic investigation and forensic genetics.

The programme is structured to promote excellence in these and other fields, including human epigenomics and veterinary microbial genetics. Academics in the programme include Ghai, and colleagues Dr Oliver Zishiri and Dr Matthew Adeleke.

'Students are trained to work on a research project in fields of host-pathogen genetics, veterinary microbial genetics, population genetics, parasitology, epigenetics and molecular diagnostics, and they submit a dissertation at the end of the programme,' said Ghai.

Genetics honours students (from left) Ms Yevette Gounden, Mr Dhireshan Singh, Mr Kiresen Moodley, Ms Jananee Padayachee, Ms Nongcebo Malinga and Ms Ria Rassool.

'State-of-the-art facilities enable advanced molecular genetics research to take place, with available equipment including a genetic analyser, real-time thermal cyclers, and gel analysis systems.'

Many students in the programme go on to pursue Masters and PhD studies, and their sought-after skills result in employment at organisations such as the Agricultural Research Council (ARC), the Council for Scientific and Industrial Research (CSIR), the South African Sugarcane Research Institute (SASRI), as well as biotechnology industries and medical laboratories.

UKZN Academic Contributes to Feature in Prestigious International Journal

Prof Kevin Kirkman of the School of Life Sciences has contributed to a feature on grassland diversity in the journal *Nature*. The feature deals with niche dimensionality - a theory concerned with accounting for biodiversity - examining how resources in a niche can affect productivity of that area of grassland and its resultant biodiversity or lack thereof.

This research is a result of collaborations between researchers working on a number of sites around the world, including at UKZN's Ukulinga long-term mowing and burning trials, one of the longest-running ecological experiments in the world.

Prof Kevin Kirkman at the NutNet site at the Ukulinga Research Farm.

The connected sites are a part of the Nutrient Network (NutNet), which involves ecologists replicating the same experiments on sites across nine countries to observe the results produced in various systems. In this particular study, researchers added limiting nutrients such as nitrogen (N), phosphorus (P) and potassium (K), which produced a decline in plant diversity at all 45 sites in North America, Europe, South Africa and Australia.

Kirkman explained that each niche, defined by the resources in that space, has species or a number thereof that can occupy that space. All the plants, for example grasses and forbs, compete for the same resources, some of which are limiting to plant growth, such as NPK. 'Most natural ecosystems have multiple limiting resources – in South Africa our grasslands are largely limited by nitrogen and phosphorus,' said Kirkman.

Grasslands, the dominant vegetation covering South Africa, provide resources for agriculture and wildlife, stabilise soil and ensure constant supply of good-quality water, and facilitate tourism. 'We all rely on grass to survive,' said Kirkman. 'South African grasslands are among the most diverse in the world and the ecosystem services provided by these grasslands are dependent on this biodiversity, therefore an understanding of dimensionality in grassland ecosystems is critical to understanding and modelling diversity loss.'

Latest Freshwater Fish Conservation Status in Southern Africa Revealed

The conservation status of existing and new fish species in KwaZulu-Natal was updated during an International Union for Conservation of Nature and Natural Resources (IUCN) red list assessment workshop for freshwater fish in southern Africa.

The workshop, hosted by the South African National Biodiversity Institute (SANBI) at the South African Institute of Aquatic Biodiversity (SAIAB) in Grahamstown, was attended by the leader of the Aquatic Ecosystem Research Programme at UKZN, Dr Gordon O'Brien.

Numerous regional scientists and conservationists representing hundreds of years of experience were present. Key outcomes included the revision of a range of new fish for KwaZulu-Natal and the listing of many species as threatened owing to multiple stressors.

'KwaZulu-Natal had fewer than three freshwater fish listed as threatened in the early 2000s but this may now have tripled with some species possibly endangered or critically endangered,' said O'Brien. 'KZN has close to 100 species of freshwater fish, many endemic and many new species of barbs (*Enteromius spp.*) have recently been discovered and described.'

UKZN has worked closely with Ezemvelo over the past three years to look for these barbs in KZN rivers, especially in threatened systems. They have also had support from Umgeni Water, the Department of Water and Sanitation and the National Research Foundation.

In the field searching for barbs are (from left) Mr Lungelo Madiya, Dr Gordon O'Brien and Mr Mahomed Desai.

O'Brien referred to several important outcomes such as reminders about the extinction of local species and the listing of species as threatened for the first time. He also noted the discovery and listing of new species, the increase in migration barriers throughout the province that reduce distribution (especially of eels), and the need to revisit the status of several species in coming years.

Ecotourists Contribute to Elephant Conservation

While elephant populations are declining at unprecedented rates in Africa owing to their illegal slaughter, many populations of the animal on the continent are stable or increasing, research by a UKZN team has revealed.

According to a new paper by the researchers (https://peerj.com/articles/2581), this could be due partly to the benefits local people generate from nature-based tourism.

Ecotourists as well as community-based nature tourism contribute to elephant conservation, according to new research released by UKZN scientists.

The team of researchers from UKZN's Amarula Elephant Research Programme, led by Dr Jeanetta Selier of the South African National Biodiversity Institute, analysed which factors affected elephant numbers in the Greater Mapungubwe Transfrontier Conservation Area – spanning South Africa, Zimbabwe and Botswana – between 2007 and 2014.

The researchers found that elephant numbers were limited by the increasing human population and expanding agricultural land but were positively correlated with the increasing number of tourists visiting the country.

'Our results highlight that an increase in human population, coupled with the need to produce more food, will affect elephant numbers even more negatively in the future,' said Selier. 'If this happens in southern Africa, where elephant populations are currently doing much better compared to the rest of the continent, then the picture is grim.'

'With the increasing demand for land for human settlement and agriculture, co-ordinated legislation and policies across national boundaries are needed to improve long-term land use planning,' said Director of the Amarula Elephant Research Programme, Prof Rob Slotow. 'This will ensure the survival of the elephant.'

'Local communities often pay the costs of elephant conservation without tangible benefits,' said co-author of the paper, Dr Enrico Di Minin. 'Making sure the benefits generated from nature-based tourism, such as ecotourism safaris, are shared with communities who co-exist with elephants remains crucial to ensure the long-term persistence of this iconic species.'

SCHOOL OF MATHEMATICS, STATISTICS AND COMPUTER SCIENCE

From the Mongolian Plains to the Professoriate

Newly-inaugurated Professor of Mathematics, Prof Sheng Bau, has travelled a long way both geographically and academically in his illustrious career.

Born in Inner Mongolia in 1959 as the eldest son of a herdsman, he received a BSc with distinction from the Inner Mongolia University of Nationalities in Tongliao, China, in 1982. Bau then moved to New Zealand to pursue a MSc, which he received with distinction in 1988 from the University of Otago, Dunedin. Exactly three years later, he was awarded his PhD in Mathematics from the same university.

Bau's inaugural lecture focused on problems and results in graph theory and geometry. 'A brief look at a few problems and results in graph theory and elementary geometry shows the beauty, simplicity and unity of mathematics,' said Bau. 'I will speak in praise of this beautiful and immortal subject, and in praise of the fine society in which our work is conducted.'

In a highly accessible presentation, Bau reviewed some of the major open problems in graph theory and elementary geometry and reported on progress made on these problems and on closely related topics. He described mathematics as directly relevant and freshly vibrant – a subject that was accessible, open and always available. 'This humble and young subject of pure mathematics has direct, powerful and precise applications in many fields of Science and Technology including modern computer core technology, Information Technology and Genetics,' said Bau.

Bau's research areas include graph morphisms, reductions, cycles in graphs, Toeplitz graphs, separability, analytic methods, dimensions and discrete geometry.

Prof Sheng Bau with his family on the occasion of his Inaugural Lecture at UKZN.

Doctoral Research Scholarship for Fluid Dynamics

Mr Nageeb Abdallah Hamed Haroun explaining his research.

Not that many students focus on fluid dynamics – but this is the subject which Sudanese citizen Mr Nageeb Abdallah Hamed Haroun has chosen for his PhD research. And, most important, it has won him a Doctoral Research Scholarship from UKZN.

Based in the discipline of Mathematics, Haroun joined UKZN as a Masters candidate in 2013, completing the degree in 2014. His PhD research is concerned with convective heat and mass transfer in boundary layer flow through a porous medium saturated with nanofluids. He started research into fluid dynamics because of its offering of the combination of mathematics and physics, and its range of applications.

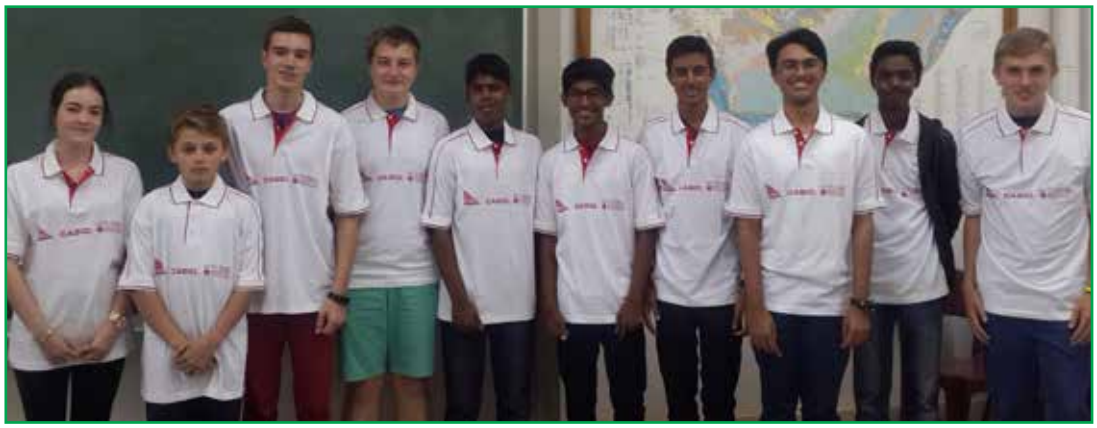
'Fluid dynamics provides methods for studying ocean currents, weather patterns, plate tectonics, evolution of stars, water flow and even blood circulation, as well as some important technological applications in industrial revolutions, including rocket engines, wind turbines, oil pipelines and air conditioning systems,' said Haroun.

He says the award will have a significant impact on his studies, giving him what he called a glimmer of hope as he believes it will open doors for him. 'An award like this is about much more than financial aid,' said Haroun. 'It enables me to continue pursuing my academic goals and demonstrates trust and confidence in the ability of the recipient.'

Haroun aims to continue working towards being a respected researcher and hopes to make a considerable impact in his field. He thanked UKZN and staff in the Mathematics discipline for giving him the opportunity to study and realise his goals and dreams, and advised other students to keep focused on their studies, and not to give up doing their best.

Siyanqoba UKZN Maths Stars Shine

UKZN's Siyanqoba Maths teams held a highly successful competition event recently with the Junior A team finishing third out of 45 teams nationally.



UKZN's Siyanqoba Junior Maths A Team was placed third out of 45 teams in the national South African Mathematics Foundation (SAMF) competition.

The competition was run under the auspices of the South African Mathematics Foundation (SAMF).

Since 2011, the Siyanqoba programme, the brainchild of UKZN Emeritus Professor Poobhalan Pillay, has assisted high school students in achieving success in the South African Mathematics Olympiads (SAMO). 'Hundreds of learners have benefited from the programme,' said Pillay.

This year, the programme placed two junior learners among the top 10 in the country.

During the competition, top UKZN student and former Siyanqoba participant, Mr Dalian Sunder, gave an interesting talk on geometrical constructions; whilst fellow student Mr Nashlen Govindasamy put on a brilliant display of simultaneous chess, playing 10 learners at once (some of whom represent KwaZulu-Natal), and beating them all. Govindasamy is currently ranked sixth nationally in chess.

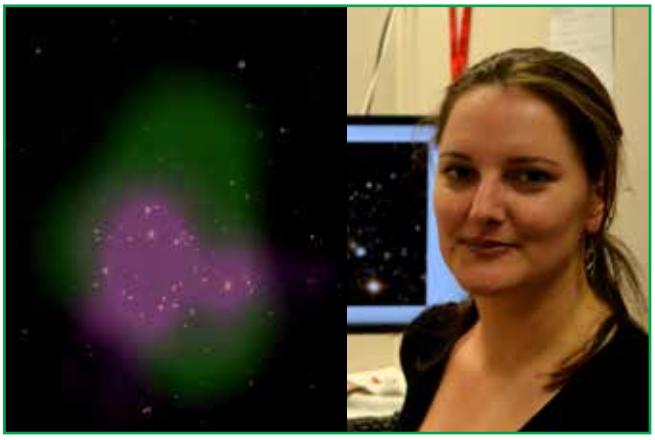
Pillay thanked the various people involved in making the competition a success, including the College of Agriculture, Engineering and Science, the Actuarial Society of South Africa, Casio, SAMF, and lecturers and coaches from the School of Mathematics, Statistics and Computer Science.

Dean and Head of the School, Professor Delia North, said Pillay deserved the most thanks for his tireless efforts to promote excellence in Mathematics among school goers, describing him as 'a legend in our midst'.

Pillay was the 2016 recipient of the SAMF Honorary Award which was presented to him for his efforts in developing, promoting and strengthening the SAMF Olympiad programmes in South Africa over many years.

UKZN PhD Astronomer Finds New Radio Halo

Dr Kenda Knowles, a Claude Leon post-doctoral researcher at UKZN's Astrophysics and Cosmology Research Unit, has found evidence for a new radio halo in a low-mass galaxy cluster. Her paper on the detection, based on her PhD thesis work, was recently published in *Monthly Notices of the Royal Astronomical Society*, an international peer-reviewed astronomy journal.



Composite image of the cluster region showing data from three different wavelengths. By combining the information from these datasets, Dr Kenda Knowles was able to estimate for how long the cluster has been merging, and at what stage of its evolution the radio halo is being observed.

Radio halos are large regions in clusters of galaxies which emit radio waves. To date, they are only found in a small fraction of merging galaxy clusters and are transient objects, with the radio emission brightening during the merger and then fading away on timescales of a few billion years. Owing to the radio emission being very faint, detection requires sophisticated data processing techniques.

Knowles, who received her PhD from UKZN earlier this year said: 'Radio halos are fascinating objects to study as they probe the non-thermal components of galaxy clusters, such as magnetic fields, which are difficult to study at other astronomical wavelengths. Their link to merging activity of the host galaxy cluster makes them a powerful tool to investigate the physical processes that occur during these energetic events.'

Knowles and her collaborators used data from the Giant Metrewave Radio Telescope in India to detect a region of very faint, diffuse radio emission in one of their target galaxy clusters. The emission was classified as a radio halo based on its physical properties, making this galaxy cluster one of the lowest-mass systems known to host a radio halo.

Knowles, who won a DST Women in Science Doctoral Fellowship in 2015, said the new aspect of their paper was the estimation of a timescale for the radio emission. Using multiwavelength data from X-ray and optical telescopes, they created a model of the cluster merger and used it to estimate the duration of the merger. Comparing this to computer simulations they were able to estimate at what point in its lifetime the radio halo was being observed.

2016 in Review

Christmas time is here at last
We've made it with a final gasp
2016 has not been pretty
Buildings burnt, which is a pity

But despite all the doom and gloom
We've managed to whistle a marching tune
Students must be educated
Research done, discoveries aided

Our teachers continue to do us proud
Postgrad research is equally sound
Global change we tackle with aplomb
Community outreach is our song

Whilst Geography students go on an Atlantic cruise
Prof Chimonyo does not snooze
The genetics of indigenous livestock
Ensure his sheep make a healthy flock

With LiDAR research we light up the sky
Our Chemistry academics continue to fly
UKZN's Top Honours student we managed to bag
Computational astrophysics has a new flag

Electricity and thermodynamics
Keep our Engineers mentally ecstatic
Alternate modes of transport they have found
Gliding underwater and above the ground

Elephants and fish maintain their charm
Studying grass saves the planet from harm
A new Honours programme in Genetics
Gives the School of Life Sciences a competitive mix

Prof Bau is studying the beauty of Math
Our Olympiads separate the wheat from the chaff
Add fluid dynamics to this happy equation
Along with radio halos to mark the occasion

So, whilst we may feel battered and bruised
There is proof to show we have not snoozed
And as we bravely gather our strength for 2017
We trust UKZN will avoid the academic guillotine!

With best wishes for the Festive Season from the
College of Agriculture, Engineering and Science