December 2014 Faculty of Science University of Cape Town Vol. 3 Issue 2

Science Matters

Science Faculty Newsletter

Message from the Dean

Welcome to this second 2014 edition of "Science Matters". As usual, the year has passed surprisingly quickly and we are once again about to prepare for graduation. There have been numerous highlights during the course of the past semester, with staff and students receiving media recognition for their achievements. In addition, being in the midst of finalizing undergraduate results it is clear that many of our undergraduate students have completed the year with quite amazing results. We are extremely fortunate in the quality of student that we are able to attract to study Science at UCT. This is now the end of the second year of our new Extended Degree Programme, and like last year the results are encouraging. While too early to make proclamations, I remain confident that our new approach will pay dividends. Of particular importance is that it is already quite clear that the number of students being excluded has dropped remarkably in the past two years. Postgraduate numbers continue to rise, and by the look of it we will graduate more PhDs in 2014 than ever before (in excess of 70). The Faculty PhD Fellowship programme that was launched this year (25 PhD Fellowships offered) can only increase these numbers in the coming years. The PhD Workshop held a few months ago show-cased the amazing range of exciting projects that this cohort of students are embarking on. We look forward to their graduation in three years' time.

Over the past six months, our staff and students have continued to excel in a variety of ways – in research, in teaching and in outreach activities. The following pages high-light some of these accomplishments. The national NRF awards, international recognition of staff, and the truly excellent performances of some of our undergraduate and postgraduate students in international competitions has been truly satisfying. On the softer side, a major outreach event with which our Faculty was associated was the successful hosting of the International Mathematics Olympiad, held for the first time in Africa under the organisation of John Webb, with help from many in the Department of Maths & Applied Maths.

Research activities in the Faculty have continued to flourish. The breadth and depth of activities are too many to mention, but for interest a few examples of interesting topics being addressed are highlighted. With the increased pressures on funding and need to define competitive niches if we are to remain internationally competitive and increase our visibility, the Faculty adopted after debate at various levels a new five year Research Strategy. I look forward to seeing the strategy being rolled out over the coming years.

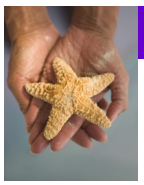
I hope you enjoy the stories in the following pages, and I wish you all a peaceful and enjoyable end-of-year break once graduation ceremonies are over.

Anton le Roex

UCT professor elected as next President of International Council for Science

The Science Faculty congratulates **Professor Daya Reddy** from the Department of Mathematics and Applied Mathematics on being named the next President of the International Council for Science (ICSU). Professor Reddy is presently the President of the Academy of Science in South Africa as well as the Director of the URC accredited Centre for Research in Computational and Applied Mechanics.

Congratulating Professor Reddy on this singular recognition by the ICSU, DVC Professor Danie Visser, said: "Professor Reddy's election is not only a feather in the cap of UCT, but of the South African science community as a whole for its achievements and contributions to science dialogue and exchanges, and for ultimately helping to address global challenges. This international leadership position will enable UCT and our country's science community to bring more African-born solutions to the table, when appropriate, and to accentuate the science breakthroughs made in the developing world."



Our Science Stars:

21 Icons SA Features "Queen of Rain" Jill Farrant

Professor Jill Farrant, from the Department of Molecular and Cell Biology recently featured on SABC3's 21 ICONS South Africa. 21 ICONS is a showcase for South African spirit; a tribute to the men and women who have helped to shape our country and our world. The series features unique narrative portraits and short films by Adrian Steirn, one of the continent's pre-eminent photographers and filmmakers. On her selection as an icon, Steirn comments, "Jill has gone through a voyage of discovery in both her professional and personal life. The resurrection of the plants that she devoted her work and research to is symbolic of the personal transformation that can be achieved through a spirit of courage, passion and conviction."

Jill's research has contributed to the understanding of mechanisms used by resurrection plants to tolerate desiccation. This knowledge has been fundamental to identifying characteristics (genes) that might be important for use in bioengineering of crops for improved drought tolerance.

First woman marine scientist wins Gilchrist Memorial medal

Associate Professor Coleen Moloney, from Biological Sciences and director of Ma-re, is the first woman marine scientist to win the Gilchrist medal, which recognises her research into the variability of marine food webs and ecosystems under global change and the influences of fishing and pollution on marine systems.

Her research areas relate to the development and use of computer models in marine systems, which cover a range of living marine organisms, from microbes to top predators. "These systems help us understand how energy and materials are packaged, distributed and transported in the ocean, including the interactions among the different factors that cause variability and change," explains Moloney.

The Gilchrist Memorial Medal was awarded to Moloney at the 15th South African Marine Science Symposium, held in July in conjunction with the African Marine Mammal Colloquium. Professor Mark Gibbons, head of biodiversity and conservation biology at UWC, was joint winner. The citation lauded her services to marine science: " … many of her activities are in the service of others, rather than promoting her own self-good. Large proportions of her research grants are devoted to bursaries and funding needed to support students, particularly those from a previously disadvantaged background. She is much in demand because of her efficiency and wise counsel. She truly is a team player, dedicated to the promotion of marine science."

A home-grown UCT scientist (she completed her undergrad and postgrad degrees here), Moloney has been director of the UCT Marine Research Institute since 2012 and has published some 90 peer-reviewed papers, including two in Science and one in Nature. She's visited five of the six continents and her passports have been stamped in 30 countries. And because of it's global nature, she has a wide network of colleagues and friends.

L'Oreal-UNESCO for Women in Science Sub-Saharan African Fellowship

Wunmi Isafiade, a PhD student and senior tutor in the Department of Computer Science, was recently honoured with a fellowship for her work and potential it will have in Africa. Wunmi is developing a situation-recognition system to increase public safety. Citizens all over the world share the same concerns about crime and as more people move towards creating smart cities, safety is a crucial aspect.

Women in Science Awards—2014

Two women from the Faculty of Science, namely **Associate Professor Michelle Kuttel** and PhD student **Maletsabisa Molapo,** both from the Department of Computer Science, this year were recognised by the Department of Science and Technology as part of their annual Women in Science Awards.

Associate Professor Michelle Kuttel's dual background in computer science and chemistry is important for her research in the area of computational science, where computers are used to investigate scientific questions. Specifically, Kuttel is interested in high-performance computing, where many computers are used simultaneously to do calculations more quickly, and visualisation, where graphical tools are designed to help researchers explore, to interpret and understand complex data. In her work into computational glycomics, Kuttel uses molecular simulations to investigate the structure and dynamics of carbohydrate molecules, which are difficult to establish experimentally. This is important information for the development of modern carbohydrate-based vaccines. Furthermore, her cross-disciplinary collaboration with astronomer Dr Sarah Blyth and others focuses on the development of computational solutions for South Africa's Square Kilometre Array radio telescope, such as new methods to identify, locate and remove radio interference, methods for finding new pulsars and for visualising large astronomical datasets.

UCT PhD student **Maletsabisa Molapo** specialises in the use of information and communication technologies (ICT) for development. Through her research she explores the ways in which ICTs can be used to empower communities, especially women and youth. She has led the team that founded the "Her Chance to Be Foundation", a non-profit organisation committed to improving the lives of women and girls in Lesotho. The organisation focuses on education, health, livelihood and access to technology. Molapo's PhD research explores how the training of community health workers and the health education of rural communities in Lesotho can be improved through a multimedia learning platform that supports the local creation, distribution and consumption of digital health content

Prof Luigi Nassimbeni, Prof Andreas Roodt (president of European Crystallographic Association & Prof Susan Bourne (Chem Dept)

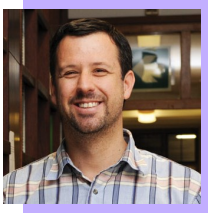
Honour accorded to Professor Luigi Nassimbeni for contribution to crystallography in SA

At the recent Pan African Conference and Summit in celebration of the International Year of Crystallography, emeritus Professor and Senior Research Scholar in the Department of Chemistry, **Luigi Nassimbeni** was presented with an award in recognition of his standing as "An outstanding scientist and inspiring teacher contributing to crystallography in South Africa for over 40 years". In her citation, Professor Susan Bourne noted that Prof Nassimbeni had played a leading role in developing the science of chemical crystallography in South Africa. When he began his career in the 1970s crystallography as a chemical tool was in its infancy, and today it plays a crucial role in understanding physical and biological processes. Prof Nassimbeni has trained more than 70 postgraduate students, many of whom have made significant scientific contributions in their own right.

Distinguished Teacher Award for 2014

The Distinguished Teacher Award is the highest accolade given to lecturing staff in acknowledgement of the value UCT attaches to teaching and learning. Two Science Faculty staff received the award for 2014:

Associate Professor James Gain from Computer Science: who is described as an amazing teacher who makes complex material enjoyable and understandable and is innovative in his use of learning devices. He engages students by incorporating interactive in-class exercises and encourages them to grapple with problems in different ways. He has been innovative in supporting in-class learning via the use of polling instead of costly clickers, to check understanding in class and gamification to improve student engagement and provide impetus for active learning.



Dr Spencer Wheaton from Physics: is described as an enthusiastic teacher, a "natural" who teaches with care and innovation. He promotes active engagement in class and makes a conscious effort to phrase questions in a way that promotes understanding with clear explanations of theoretical concepts. His reflective teaching practice is captured by his acknowledgement that he is always learning from students and is dedicated to understanding how to teach better.

LOVA Marline, PhD student in Tropical Bryology wins Green Talents Award

Breaking new scientific ground in her study of the bryophytes of Madagascar, **Lovanomenjanahary Marline** , from the Department of Biological Sciences, is committed to investigating these plants as sensitive bio indicators of climate chang**e.** Her outstanding academic record and PhD project on bryophytes as indicators of climate change were important in her being one of the 25 up-and-coming scientists selected (from more than 800 applications from 100 countries) as a winner of the Green Talents Award. The prize is a ticket to the "Green Talents International Forum for High Potentials in Sustainable Development" organized by the German Federal Ministry of Education and Research.

As one of the first scientists to make a comprehensive study of the bryophytes of Madagascar, Lovanomenjanahary, (Lova) is a pioneering botanist. Her native country, Madagascar, is considered one of the biodiversity hotspots of the world and is a priority area for conservation. Lova's PhD research project will not only significantly enhance the body of knowledge on tropical bryophytes but also explore innovative new uses for the study of these plants. An example of this, as she explains, is "the importance of bryophytes within the ecosystem as important bio indicators of climate change and their use as models in the design of new protected areas".

Her research has three concrete over-arching aims for guiding sustainable development, which Lova characterises using bryophytes in the following ways: "as a model to better understand the accumulation of species richness in a hotspot of biodiversity; as an indicator species to predict the migration of climatically sensitive ecosystems through the community's response to climate change; and as a basis for new approaches to conservation planning of tropical forest systems".

MCB Student wins Merck Millipore Prize

Michaella Hulley (left) receives her prize in August this year from Tamara Fedderke of Merck Millipore

Michaella Hulley, an MSc student with Dr O'Ryan in the Department of Molecular and Cell Biology, recently received the Merck Millipore prize. Tamara Fedderke from Merck Millipore said the following, "Each year Merck Millipore recognises young academic talent in key institutes around South Africa with top student prizes. It is Merck Millipore's way of giving back to such institutions and rewarding those promising young future academics of our society with a tangible reminder of their hard work and success".

Michaella is interested in genotype: phenotype associations of an autism candidate gene, the serotonin transporter gene.

Ma-Re Students win at Learn EO!

Students **Hayley Ever-King** and **Marie Smith** (pictured left) from Ma-Re were amongst the winners of the 2013/2014 LearnEO! Lesson writing competition and received their prizes at ESA in Frascati, Italy. Their lesson looked at the "Detection of Harmful Algal Blooms in Coastal Waters: examples using ocean colour radiometry from the southern Benguela upwelling system."

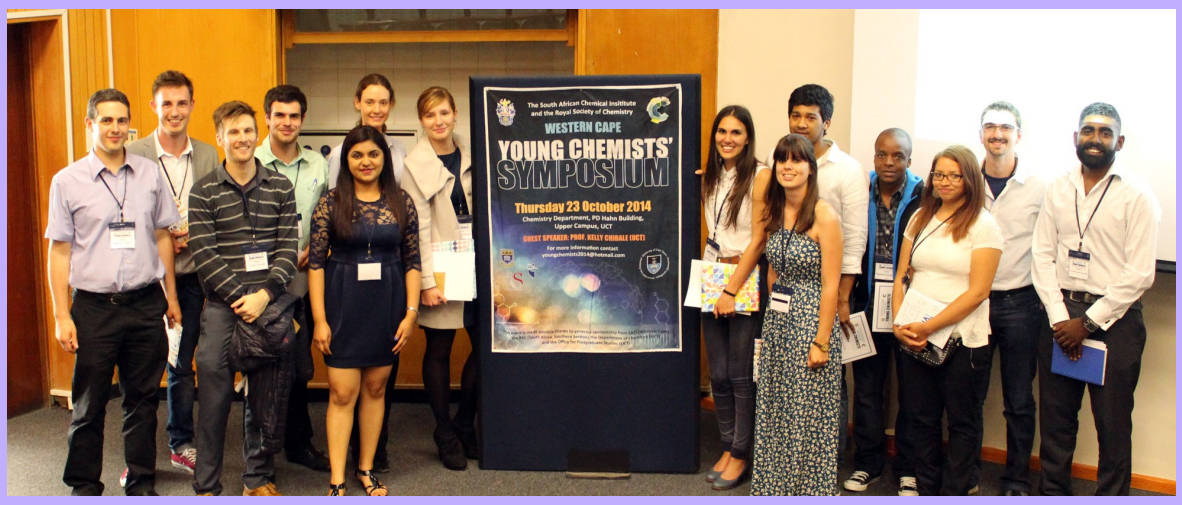
The jury said: "This is a great lesson with some good imagery and quite ambitious exercises. Probably more advanced than others in scope. As a result, the lesson takes a fair amount of time, but the results are well worth the effort". Well done Hayley and Marie!

Honorary Professor in Computer Science honoured with International award.

Professor Judith Bishop, (pictured right) Honorary Professor in the Department of Computer Science was awarded a Distinguished Educator award by the Association for Computing Machinery (ACM) —the world's largest educational and scientific computing society. The citation of her award was "For her impactful programming language books and her promotion of industry academia collaboration through innovative tools".

The ACM has designated 49 scientists, engineers and educators as Distinguished Members for their contributions and impact on the field of computing.

Young Chemists Symposium by Roxanne Mohunlal & John Woodland, Department of Chemistry



Winners, Judges and Organisers of the symposium

Over 100 postgraduate students from across the Cape's four tertiary institutions – Stellenbosch University (SU), the University of the Western Cape (UWC), the Cape Peninsula University of Technology (CPUT) and the University of Cape Town (UCT) – descended on UCT's Chemistry Department for the SACI/RSC Western Cape Young Chemists' Symposium. The aim of the annual gathering is to provide an opportunity for postgraduates in the chemical sciences to meet one another, to present their research to their peers and to benefit from discussions with those from other institutions.

Given that we live in an age of science but in a country with poor scientific literacy, one of the themes of this year's symposium was the importance of science communication. In his opening address, Prof David Gammon, Assistant Dean in the Faculty of Science at UCT, highlighted key features of effective scientific communication by sharing a chapter from Peter Watson's fascinating book on important ideas from the twentieth century ("A Terrible Beauty").

The guest speaker for the day was Prof Kelly Chibale, Director of the UCT Drug Discovery and Development Centre (H3-D). Prof Chibale – a "young chemist" himself – took the audience on a *tour de force* as he shared some inspiring stories from his career as an organic chemist. He concluded his talk by sharing his "three most important lessons"; namely, turning challenges into opportunities ("Don't complain – think!"), the importance of consistency in one's work and, finally, acknowledging that there is no general formula for success but that one should capitalise on one's own unique talents.

The rest of the day comprised short research talks by MSc and PhD students which spanned all areas of physical, inorganic and organic chemistry and represented applications as diverse as health and disease, environmental sustainability and catalysis. The lunch hour, tea breaks and poster session provided delegates with opportunities to engage with one another and forge new connections.

After the lunch break, the organisers screened an entertaining TED Talk by Uri Alon, a systems biologist from the Weizmann Institute of Science in Israel, who discussed some of the practical difficulties of scientific research and spending time in "the cloud" – the unavoidable time before a profound scientific discovery when nothing seems to make sense. Many of the students could be seen nodding their heads in concurrence!

The talks and posters were adjudicated by a panel of post-doctoral students from UCT and SU. Congratulations to Varia Nikolayenko for her winning presentation on photochromic compounds and Johnel Giliomee for her poster on block copolymer vesicles on mammalian cell scaffolds. Both from SU, the winners received beautiful coffee table science books which were generously sponsored by the RSC. The runners-up in the oral presentation category were Kathryn Wicht (2nd) and Daniel Kusza (3rd) and, for the poster presentations, Marwaan Rylands (2nd) and Sheperd Siangwata (3rd). All the runners-up were from UCT and received certificates and cash prizes.

After the prize-giving, the day concluded with the RSC's 28th PD Hahn Inorganic Lecture by Prof Selwyn Mapolie from Stellenbosch University entitled "Functional Dendrimers: The Current Status and Future Prospects".

Delegates at the Poster Session

STAFF NEWS

WELCOME TO NEW STAFF

Department of Archaeology:
- **Dr Domingo Carlos Salazar Garcia**- Lecturer

Department of Biological Sciences
- **Dr Laura Blamey** — Lecturer
- **Ms Vuyiwe Bathaka**— Secretary

Department of Chemistry
- **Mr Gavin Harker**—Departmental Assistant

Drug Discovery & Development (H3-D)
- **Dr Grant Boyle**—Principal Scientific Officer
- **Dr Sandeep Ghorpade**—Chief Research Officer
- **Ms Alice Khoury**—Chief Technical Officer
- **Dr Suthananda Sunassee**—Lecturer

Department of Computer Science
- **Dr Melissa Densmore**—Senior Lecturer
- **Mr Stephan Jamieson**— Senior Scientific Officer

Department of Environmental & Geographical Science
- **Dr Serge Raemaekers**—Lecturer

Department of Geological Sciences
- **Mrs Lynn Evon**— Administrative Officer

Department of Mathematics & Applied Mathematics
- **Dr Filip Cools**—Senior Lecturer
- **Dr Francesco Russo** —Senior Lecturer
- **Ms Kim Peters**—Secretary

Department of Molecular & Cell Biology
- **Ms Lara Donaldson**—Lecturer
- **Mr Halford Dace**—Senior Scientific Officer

Department of Statistical Sciences
- **Mr Stefan Britz**—Lecturer
- **Mr Chun-Kai Huang**—Lecturer

African Climate & Development Initiative
- **Ms Karen Fosseus**—Administrative Manager
- **Dr Tali Hoffman**—Communications Officer
- **Mrs Rabia Karriem**—Administrative Assistant

Faculty Office
- **Ms Ayesha Shaik**—Postgraduate Admin Officer

FAREWELL TO STAFF

Department of Geological Sciences
- **Dr Ake Fagereng**– Lecturer
- **Ms Shirley Whitmore**– Administrative Officer

Department of Mathematics & Applied Mathematics
- **Ms Melissa King**– Administrative Assistant
- **Dr Deon Solomons**—Lecturer

Drug Discovery & Development (H3-D)
- **Dr Yassir Adam**—Research Officer
- **Dr Chitalu Musonda**—Research Officer

CONGRATULATIONS

Shakiera Sattar, Scientific Officer from MCB, recently gave birth to Abdul Qaadir.

Retiring after 280 year of service to the Science Faculty:

- Associate Professor Roger Fearick—Physics
- Associate Professor Christopher Gilmour— Maths & Applied Maths
- Associate Professor John Hoffman—Biological Sciences
- Mr George Smith—Geological Sciences
- Mr Patrick Sias –Geological Sciences
- Mr Ernest Stout—Geological Sciences
- Mrs Gilly Smith—Biological Sciences
- Mr Chris Tobler—Biological Sciences
- Professor Mino Cairo—Chemistry
- Associate Professor Val Abratt—MCB

Promotions in the Faculty

Congratulations to the following staff who have been promoted with effect from 2015:

To **Senior Lecturer:**
- Dr Vanessa Mc Bride (Astronomy)
- Dr Jacqueline Bishop (Biological Sciences)
- Dr Deena Pillay (Biological Sciences)
- Dr Will Horowitz (Physics)

To **Associate Professor:**
- Dr Shadreck Chirikure (Archaeology)
- Dr Jeff Murugan (Maths & Applied Maths)
- Dr Isabelle Ansorge (Oceanography)

To **Professor**
- Associate Professor Maano Ramutsindela

To **Senior Research Officer**
- Dr Dionne Shepherd (MCB)

Adfin team goes line-dancing to end off the year…

Room 202 in the Maths building was recently transformed as Faculty Finance team member Louen Kleinsmidt puts administrators through their paces at the Adfin Year End event. Louen had the challenging task of getting the staff to step in time, listen to the music and remember the moves …. And the staff (even those with two left feet!) proved up for the task at hand….

A quieter moment (and a welcome break from the action!) as departmental administrators pose in a more conventional manner after showing off their prowess on the dance floor with their line dancing moves...

Science Student's Grad Ball : A royal event for majestic scientists….by Ellen Madikgaodi

In October the 2014 Science Students Council hosted the Science Faculty graduation ball. A ball of this scale hadn't been seen in the Science Faculty for the last few years, which made it all the more special. The event aimed to acknowledge the potential graduates for their hard work and resilience. The function was held at the Nico Malan hall in Observatory, which featured a lovely hall which led to a large balcony overlooking a petit garden. The hard work that went into the planning was totally worth it, when the "graduates to be" gathered to celebrate with us - it was certainly a night to remember. Students had an opportunity to have fun with some of the closest friends they have made over their journey before they part ways. They danced, sung, dined and received guidance. Guest speakers at the event were the Dean, Professor Anton Le Roex and the Assistant Dean Associate Professor David Gammon who gave inspiring yet sobering speeches. We hope that the speeches did not fall on barren ground but on fertile soil. To the "graduates to be" who attended, the council really appreciates your support and wishes you well. All of you made it the night of festivity it turned out to be, dressed like the royals you are.

Outgoing SSC (left) and Graduates having a ball (above)

Research Bytes

Trio of Monster Black Holes Discovered

When galaxies merge, the supermassive black holes at their core can get close enough to affect each other, sometimes eventually merging. However a team at UCT have found something special—three black holes at the heart of a colliding galaxy pair. Three years ago it was discovered that SDSS J150243.1 +111557 contains two black holes, separated by a distance of 24 000 light years. Even on galactic scales that isn't all that close—slightly less than the sun is to the centre of our galaxy. This suggests that the two galaxies still have a fair way to go to complete their merger. Now however, **Dr Roger Deane** from the Department of Astronomy at UCT has discovered that SDSS J150243.1 +111557 is actually a lot more interesting than its name. In *Nature* Deane reports that one of these black holes is actually a pair, 450 light years apart.

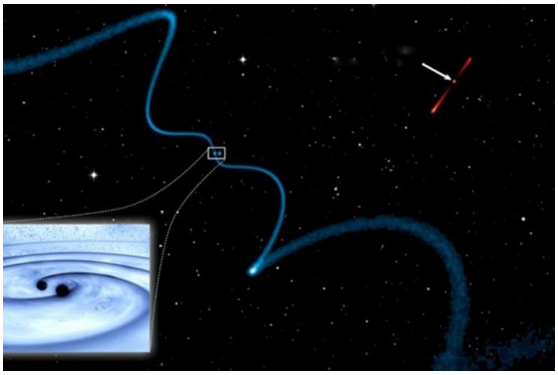


Photo credit: R. DEANE, NASA GODDARD. The interaction of two black holes 450 light years apart has created the helical jet seen in this artist's impression, while jets from the more distant black hole run straight

From a stellar point of view 450 light years is a long way, we can't even see most stars at that distance with the naked eye. Black holes are a different matter, with gravity so powerful that the pair are not only orbiting each other, but that one is altering the path of the jet of electrons the other is putting out. Black holes emit jets of high speed particles, and in some cases these jets have been seen to be spiraling, under what is thought to be the gravitational influence of another black hole. However, this is the first time this black hole's presence has been confirmed with other evidence. Observing the black holes was a challenge, since J150243.1+111557 is almost 5 billion light years away. Deane used the European Very Long Baseline Interferometry Network, which combines 18 telescopes around the world to act as if it was a single antenna almost the size of the Earth.

Deane aims to use the presence of spiraling jets as a clue to finding other closely interacting black hole pairs. He notes that J150243.1+111557 was only the sixth galaxy his team examined. "Either we got incredibly lucky and won the lottery," Deane says, "or they're more common than previously anticipated." Among the reasons to seek out close supermassive black hole pairs is that they represent one of our best chances to detect gravitational waves. Such enormously large objects experiencing powerful acceleration from each other's gravity should distort space-time in ways we may be able to observe. In the light of the continuing uncertainty about whether a gravitational wave from immediately after the Big Bang has been found, picking up smaller gravitational waves from nearer sources becomes more desirable than ever. Triple black holes have been seen before, but the paper points out that the closest pair in any of the four previously identified triads is more than 7000 light years apart.

Characterizing the evolutionary path(s) to early Homo by Rebecca Ackermann

Lauren Schroeder, a PhD student from the Department of Archaeology recently had her first-authored paper published in PLoS ONE, together with her supervisor **Associate Professor Rebecca Ackermann**, who is the lead author on the paper.

Numerous studies suggest that the transition from Australopithecus to Homo was characterized by evolutionary innovation, resulting in the emergence and coexistence of a diversity of forms. However, the evolutionary processes necessary to drive such a transition have not been examined. Schroeder and Ackermann apply statistical tests developed from quantitative evolutionary theory to assess whether morphological differences among late australopith and early Homo species in Africa have been shaped by natural selection. Where selection is demonstrated, they identify aspects of morphology that were most likely under selective pressure, and determine the nature (type, rate) of that selection. Results demonstrate that selection must be invoked to explain an Au. africanus—Au. sediba—Homo transition, while transitions from late australopiths to various early Homo species that exclude Au. sediba can be achieved through drift alone. Rate tests indicate that selection is largely directional, acting to rapidly differentiate these taxa. Reconstructions of patterns of directional selection needed to drive the Au. africanus—Au. sediba—Homo transition suggest that selection would have affected all regions of the skull. These results may indicate that an evolutionary path to Homo without Au. sediba is the simpler path and/or provide evidence that this pathway involved more reliance on cultural adaptations to cope with environmental change.

Lauren Schroeder and Rebecca Ackermann

Earliest Modern Human Sequenced

Dr DC Garcia at work in the lab

A research team led by a team from the Max Planck Institute for Evolutionary Anthropology (Leipzig, Germany), with participation of newly appointed UCT lecturer **Dr Domingo Carlos Salazar García**, from the Department of Archaeology (pictured right) has sequenced the genome of a 45,000-year-old modern human male from western Siberia. The comparison of his genome to the genomes of people who lived later in Europe and Asia show that he lived close in time to when the ancestors of present-day people in Europe and eastern Asia went different ways. Like all present-day people outside Africa the Ust'-Ishim man carried segments of Neandertal DNA in his genome. But these segments were much longer than the ones found in present-day humans and indicate that the admixture with Neanderthals took place between 50,000 and 60,000 years ago.

Stable isotope analysis of this early modern human suggest that he consumed freshwater resources on a regular basis, something yet to be directly observed on Neanderthals. "These results are important, since the consumption of aquatic resources portraits a wide-spectrum dietary pattern for these Eurasian pioneer early modern human populations not observed yet for Neanderthals of the region", says Domingo Carlos Salazar García. "Probably the ability to have this dietary plasticity helped them to adapt to extreme northern environments, helping them in their Eurasian 'enterprise' compared to Neanderthals, which eventually disappeared", he adds. Stable isotope analyses are useful to find out information about regular consumption of different types of dietary protein resources, differently to faunal and plant studies that, although show what types of foods were consumed by past populations, can't define their overall proportion in the diet of the individuals.

Field trip to Namibia to do extractions from Dessication Tolerant Resurrection Plants by Joanne Bentley

In plants, oxidative stress is one of the major causes of damage as a result of environmental stress, such as drought. One suggestion for the successful radiation of vascular plants on land has been attributed to the evolution of desiccation tolerance in seeds. While the seeds of most plants can survive as much as 95% water loss and remain dormant for extended periods of time, a group of diverse arid-adapted angiosperms known as 'resurrection plants' have evolved the same degree of desiccation tolerance in their vegetative tissues. *Myrothamnus flabellifolius* is a 'resurrection plant' distributed in southern Africa where it inhabits rocky outcrops and koppies. It is believed from field observation that it may survive in its dehydrated state for two years or more. In Namibia, it is commonly known as 'bushmans tea', and locals drink it for its purported benefits such as soothing chest and stomach ailments, treating breast diseases, gingivitis and bad breath, amongst others. The leaves are highly aromatic when crushed.

Joanne Bently and Millie Milgart from the Department of Molecular & Cell Biology did a field trip to Namibia where they scouted koppies in the central and northern regions for populations of *M. flabellifolius.* They found several large, healthy populations from which to sample for metabolomic analyses. Their aim was to examine the metabolic profiles, and map the differences in secondary metabolites between different populations of *M. flabellifolius*. They were also interested in the potential use of chemotaxonomic markers in biological classification. As plant metabolism is perturbed by various abiotic stresses resulting in changes in metabolic pathways (for example, by researchers picking leaves), they opted for a direct field extraction technique which involved grinding leaves on-site and placing them in the solvent mixture immediately, thereby quenching metabolism.

Field sampling near Grootberg, Namibia

Field sampling near Karibib, Namibia

Students from EGS build shacks for World Design Capital Project by Dr Kevin Winter

Students from EGS helped to build three shacks on upper campus which are being used in an experiment to test materials that could reduce temperatures inside shack structures by as much as 12 °C. The material is made from recycled plastic that is woven into a fine mesh. The experiment is in its second phase and is a World Design Capital Project. The material will also be tested as a fire retardant and its ability to rain-proof informally built structures. The recently built structures use the same materials typically found in informal settlements. Once the 2nd phase is complete, it will be tested further in a small informal settlement. The social acceptance of the cover material, durability and cost will all be explored in the final phase.

Women in Physics in South Africa—a first…

Sponsored by the South African Institute of Physics, the Department of Astronomy hosted its first ever 'Women in in Physics in South Africa (WiPiSA) lunch. Students in Astrophysics from undergrads through to PhD, postdoctoral fellows and female faculty turned out in great numbers - 36 women could make it, even though not quite all at the same time!

Renee Kraan-Korteweg (HOD) kicked off the lunch with a welcome and various faculty members shared some of their experiences of being women researchers and their various and differing career paths.

Prof Kraan-Korteweg and Dr Amanda Weltman

The attendees were treated to an excellent guest speech by Dr Carolina Ödman-Govender who provided insights into life for physical scientists outside of academia. This is something that is often neglected in academia since faculty members are not fully aware of the opportunities that exist to scientists outside of pure research careers and therefore it is often difficult for students to find out about them.

The feedback from the students who attended was that these insights were very valuable as they weigh up their futures. There was also discussion of work/life balance and the importance of mentors. A highlight of the lunch was the award to Dr Amanda Weltman of the 2013 Jubilee Silver medal by Prof Kraan-Korteweg on behalf of the SAIP.

The physics department were very encouraged by the success of the lunch and the interaction at all levels, and plan to make this an annual event.

Keeping Science in the Family

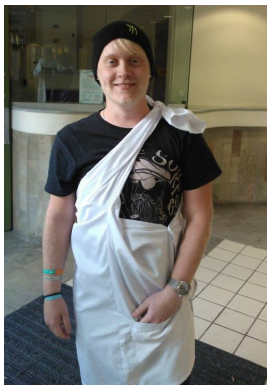
Penny Driver with her Mom, Professor Kathy Driver

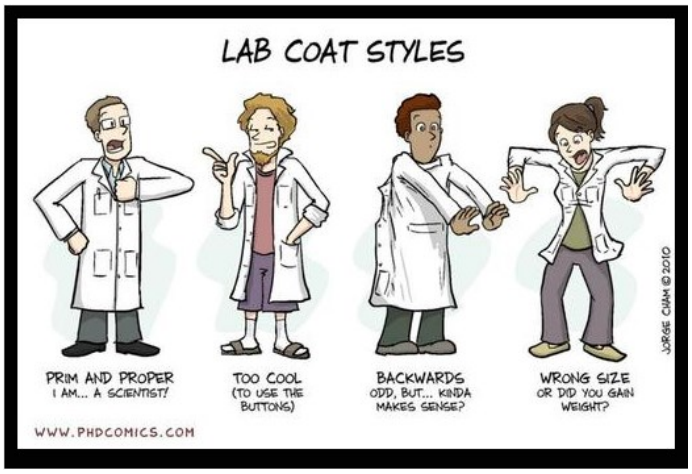
Penny Driver, daughter of **Professor Kathy Driver**, previous Dean of Science, has just completed her PhD in Oceanography at UCT, and will graduate in December. Penny, who has an Honours and Masters in Mathematics, had been working in the bank, but wanted to make a contribution to our world and after attending a workshop by George Philander on Climate Change, decided to go back to being a student. For six years she has been working with Professor Chris Reason as her supervisor, on building numerical models in risk management and rainfall variability.

When not studying, Penny reads voraciously –especially fantasy and Science fiction. Kathy Driver spent many hours proof reading her daughter's thesis, finding only 2 typos on 386 pages!

Lab Coat Day

The Science Student's Council recently hosted a Lab Coat Day where they encouraged Science students to wear their lab coats with some style and make a statement. The resulting outfits revealed creativity and inspiration from our students...





International Mathematics Olympiad

IMO Top 3 Champions: Alexander Gunning (Australia), Jiyand Gao (China) and Po-Sheng Wu (Taiwan) tied for top place

Emeritus Professor **John Webb** from the Department of Mathematics and Applied Mathematics was instrumental in bringing the International Mathematics Olympiad to Cape Town and South Africa. After a great deal of logistical challenges including sponsorship, visas and accommodation the event was attended by 101 countries and 560 contestants. Since this was the first IMO under African skies, special efforts were made to increase African participation.

The Opening Ceremony took place in Jameson Hall and guests were greeted on the plaza by stilt walkers and a marimba band. The IMO contest the following two days took place in the (breezily cold) UCT Sports Centre. The IMO papers are a marathon 4 1/2 hours long, but all ran smoothly. The participants then enjoyed three days of excursions to Cape Point, Boulders beach and the Waterfront. A special programme of lectures by world-renowned mathematicians such as Professor Gunther Ziegler (Free University of Berlin); Professor John Barrow (University of Cambridge) and Professor Peter Sarnak (Princeton University) was presented. This was followed by an afternoon of African games, music and dance with the three celebrity lecturers joining in the fun.

Science Faculty Winter School by David Gammon

The second annual Science Faculty Winter School for first year science students was held in the last week of the July vacation, in the form of a residential school, based on the campus of Bishops Diocesan College in Rondebosch. Around 50 students attended, most of whom had completed just one semester in the Science Faculty at UCT.

The Assistant Dean, Associate Professor David Gammon, initiator and organizer of the Winter School, explained that the concept of a Winter School was developed with the aim of addressing a few interconnected factors common to the first year experience in the Sciences. These include the fact that students often have limited knowledge or experience of the range of options open to them and have encountered relatively few role-models of working scientists, and that they consequently struggle to find inspiration and motivation in their studies – which adds to the challenges they already face in coping with demanding subjects. The idea was to put together an interesting and inspiring programme, drawing on the wealth of expertise in the Faculty of Science and a range of scientifically interesting projects and initiatives both at UCT and in the greater Cape Town region.

A series of talks, excursions, discussions and debates, interspersed with eating, drinking coffee, playing soccer and billiards, and chilling in rare moments of free time, was arranged. The students visited some of the Big Instruments at UCT, like the Scanning Electron Microscope, and the new 600MHz nuclear magnetic resonance spectrometer, to gain insight into how scientists look below the threshold of vision. The excursions were a highlight for many and these included a morning spent on South Africa's research ship, Agulhas II, moored at the Waterfront, under expert guidance of UCT oceanographer Dr Isabelle Ansorge; a visit to the Fossil Park at Langebaan to see the active stone-age dig and fossil evidence for existence of bears and short-necked giraffes. Interspersed between all of this were sessions where students worked on mathematics, physics, chemistry and statistics that they would encounter in the first two weeks of the new semester – to try to get ahead of the game, and also an evening session on "thinking about thinking" and how to re-evaluate their approach to their own studies. The week finished with an excellent gala dinner, addressed by an inspiring UCT BSc (Hons) graduate, Lerato Thakoli, who came through the GEPS (extended) degree programme in the Science Faculty, and described her journey through struggle and then success in her BSc degree, and on to following her passions in a research MSc in Environmental and Geographical Science, looking at land tenure and community issues in trans-frontier parks. The students appreciated her sparkling warmth, passion for science, and the role model she provides of succeeding against considerable odds.

<u>Some of the comments from students on their experience of the Winter School:</u>

- "I sense a shift in my confidence and more importantly, an increasing passion for science. Thank you once again, this week has definitely added tremendous value to my studies."
- "I've actually realized that science is not as dry as I thought but it is actually filled with endless interesting opportunities."
- "Winter School has made me feel less helpless and alone by showing me that other people just like me have/ are experiencing the same conflicts I am. It has sharpened my resolve to improve this semester and to actually get gritty and work hard."

- "Throughout the experience I found great respect for science and the people who are doing amazing work in their respective fields within science."

OUTREACH IN THE FACULTY

Phenomenal Physics

Hundreds of Grade 11 Physical Science pupils from a wide variety of local schools were entertained, amazed, challenged and amused by a team of Physics staff during three hours of Phenomenal Physics on Tuesday 21 October. The Physics Department's annual flagship schools outreach event, organised by Dr Spencer Wheaton with the assistance of Ms Tazneem Davids, once again succeeded admirably in provoking thought, eliciting enthusiastic participation and convincing many pupils of the benefits of a science degree, specifically at the University of Cape Town. Objects (and occasionally the pupils themselves!) were made to swing, sing, rotate, and inflate; jump, bump, chill and sit still; glow, flow, stop and drop. And then there were things that balanced, disappeared, floated on air, burst into flame, or took off over the roof outside. Careful thought went into each presentation, and the learners were encouraged to participate by predicting outcomes and explaining unexpected results.
Feedback from teachers (many of whom having been bringing their charges to the event for years), an enthusiastic mother, and the pupils themselves attested to the value of the public relations exercise.

Last laugh...