NELSON MANDELA UNIVERSITY

December 2023

Faculty of Science

News

Message from Professor Azwinndini Muronga Executive Dean of the Faculty of Science

As the year grows to an end, I would like to take this opportunity to wish the staff and students a relaxing holiday season, to reflect on the year that has passed, and to have a look at what lies ahead for the Faculty of Science.

Our Faculty of Science students have worked very hard in studying for their qualification and attaining the maximum possible credits for the year. To those who are graduating in December, well done to you, we will meet at the graduation ceremony.

We would also like to thank our staff members for their hard work because the achievements of our students are also the achievements of our staff. Thank you for your guidance and mentorship to our students.

To those who were around from 27 November to 22 December, will be aware that the the Faculty of Science was abuzz with activities in Inkanyezi (Building 127). During this time the Faculty hosted the annual National Institute for Theoretical and Computational Sciences (NITheCS) Summer Study and Research Programme 2023/2024 with about 20 participating students and tutors from various universities in South Africa. During the second week the participants also received topical lectures during the SA-JINR Theory Worksop from 5 December to 8 December with participants from scientists from Russia and South Africa. During the remaining weeks, they participated in intensive training on subject matters related to their summer study and research programme.

Since 2016, the Faculty of Science has actively hosted over a hundred final-year BSc, BSc(Honours), MSc, and PhD students from various South African institutions to participate in NITheCS – Mandela Uni (formerly NITheP – NMU Internship Programme). Nelson Mandela University's Faculty of Science has reached a major milestone by becoming part of the National Institute for Theoretical and Computational Sciences (NITheCS) consortium, a platform granted by the Department of Science and Innovation (DSI) and the National Research Foundation (NRF). This consortium unites 25 esteemed South African universities and institutes into five regional nodes.

Congratulations to everyone whom has won awards throughout 2023 and at the Academic Achiever's Awards and Vice-Chancellor's Excellence Awards:

First-Year Undergraduate Degree Award: Hayley Britz
First Diploma Award: Eloise Krisch
First Degree Award: Keegan Perry
Honours award: Erich du Plessis
Master's Degree Award (Masters degree by coursework): Luzuko Funda
Master's Degree Award (Masters degree by Dissertation): Madri Kruger
Master's Degree Award (Masters degree in Technology by Dissertation): Thandekile Ncongwane
Southern Africa Association For The Advancement Of Science Award: Eleesha Annear
Emerging Innovation Excellence Award: Gaathier Mahed
Innovation Excellence Team Award: Carla Kampman and the InnoVenton Downstream Chemical Technology Station team
Faculty Excellent Teacher of the Year: Leizel Williams
Faculty Emerging Researcher Award: Rao Appadu
Faculty Researcher of the Year: Janine Adams
Nelson Mandela University Emerging Researcher of The Year Award: Zikhona Tywabi-Ngeva

Now, as we take a few days of rest, we need to remember the words of Nelson Mandela: "…I have discovered the secret that after climbing a great hill, one only finds that there are many more hills to climb. I have taken a moment here to rest …. but I can only rest for a moment, for with freedom comes responsibilities, and I dare not linger, for my long walk is not ended."

Those of you who are returning to campus next year, remember to pause, take stock, reflect and enjoy some well-deserved relaxation time to restore your energy so that you can return refreshed in 2024 to climb the next set of hills for 2024.

African School of Fundamental Physics and Applications Triumphs with ASP2022 and Sets the Stage for ACP2023

Building on the success of ASP2022, the Faculty of Science hosted the 3rd African Conference of Fundamental and Applied Physics (ACP2023) on 25—29 September 2023, this hybrid conference took place at Nelson Mandela University's George Campus in George, South Africa.

(Left) ASP female participants (Right) ACP2023 Logo

The seventh edition of the African School of Fundamental Physics and Applications (ASP2022) marked a significant triumph in its mission to advance physics education and research in Africa. Hosted at Nelson Mandela University (NMU) in Gqeberha, South Africa, this biennial event brought together a diverse group of participants, including 231 high school students, 76 high school teachers, and 191 university students. The program's comprehensive approach covered various aspects of physics, from fundamental to applied, addressing critical areas such as nuclear physics, particle physics, medical physics, astrophysics, and more.

ASP2022's adaptability to challenging circumstances was evident as it successfully navigated the ongoing COVID-19 pandemic, hosting a hybrid event that allowed both in-person and online participation. This flexibility ensured the program reached a broader audience, receiving positive feedback from participants who valued the diverse range of lectures, hands-on experiments, and the opportunity to engage with physicists from Africa and beyond.
A key highlight was the forum for discussions with policymakers, focusing on the sustainability of the African School of Physics and the retention of African physics graduates and faculties. The success of ASP2022 serves as a testament to the program's commitment to advancing physics education and research in Africa.

Looking ahead: ACP2023
ACP2023 is an international and professional conference open to physicists, physics teachers, and policymakers in education and research from all over Africa and beyond. The scientific program included invited plenary talks, contributed oral presentations, contributed poster presentations, and discussions covering a wide range of topics, from particles and related applications to light sources and applications, as well as physics engagements.

Highlights from ACP2023
The first day of the conference featured enlightening contributed oral presentations and an inspiring Early Career Panel Discussion themed 'Beauty of Physics.' Renowned speakers, including Prof Mu-Chun Chen and Ms. Haifa Rejeb Sfar, provided insights into the fascinating worlds of neutrinos and particle physics.

Subsequent days saw a lineup of mind-blowing sessions, covering topics such as the physics of a trillion degrees, the beauty of the Higgs Boson, and an inspiring address by Prof. Makondelele Tshivhase, Director of iThemba LABS. Parallel sessions on computing/nuclear physics, instrumentation/ physics education, and sessions on atomic, molecular & laser physics showcased the diverse and impactful research presented at the conference.
The program also included a session on atomic, molecular & laser physics, featuring talks on capturing a quantum image without a camera and the search for the Dark Vector Boson. Delegates enjoyed a conference dinner, capping off a week of innovation and collaboration at the ACP Conference in George.

The success of ACP2023 is attributed to the brilliant minds that contributed to its diverse and engaging program. As we bid farewell to this inspiring event, we express gratitude to all participants who made it a success and eagerly anticipate the next edition. Until next time, the journey to advance physics education and research in Africa continues.

Rural East Cape Embraces Tangible Coding

Originally published by The Herald (17 November 2023)

OR Tambo district schools are ensuring they close the digital divide and are not being left behind by the coding curve which has swept the continent.

A new partnership between Tangible Africa, the provincial education department and teachers' union SAOU saw 300 teachers from 100 schools being trained in tangible coding this week.

While Tangible Africa is also making inroads in Europe, its founder and Nelson Mandela University head of computing science, Prof Jean Greyling, said it remained vital not to neglect pupils in its home province.

"In one of the poorest provinces in SA, there is a grave danger that thousands of pupils are excluded from the benefits of the fourth Industrial Revolution," Greyling said.

"Our unplugged and tangible coding project aims to reach those learners, therefore training teachers is a high priority for Tangible Africa."

Training is taking place in Tsolo and Mthatha, ending in Qumbu and Mqanduli today.

The education department's coding and robotics district coordinator, Phindile Mjamba, said the OR Tambo district had a vision of becoming the coding and robotics hub of the Eastern Cape.

"Previously, we were focusing on plugged coding only. Tangible coding helps schools to start coding, even without having to worry about the availability of computers," Mjamba said.

Tangible Africa project coordinator Lizwi Gwaza said the workshops went well, with teachers showing great enthusiasm and excitement.

"The project is having a real impact on rural communities, helping to close the digital divide and providing new educational opportunities."

Greyling said this was not their first time delivering training in the rural communities.

They did so earlier this year with schools from the Chris Hani East and Amathole districts.

"This year we trained over 1,000 learners in the rural Eastern Cape because of partnerships with unions, local companies and other entities.

"We hope to have a much bigger footprint next year."

Academy of Science Gold Medal for Mandela University's Professor Richard Cowling

Originally published in Staff Bulletin

Distinguished Professor in Botany Richard Cowling has received a Gold Medal from the ASSAf Academy of Science, the apex awards of the Academy and the South African science system in recognition of outstanding achievements by individuals.

Up to two gold medals are awarded per annum for outstanding achievement in scientific thinking for the benefit of society. The other medal this year was awarded to Prof Glenda Gray, the first female President of the South African Medical Research Council (SAMRC) and an NRF A-rated scientist.

Prof Richard Cowling is a respected academic par excellence, an exemplary champion of biodiversity conservation, a phenomenal mentor and an inspiration and friend to many.

Prof Cowling's internationally recognised research in the fields of plant diversity and evolution, conservation science, restoration ecology and paleoecology, has been ground-breaking and significant, not only contributing to theory, but firmly embedded in practice.

His well-recognised body of work, that includes over 400 peer-reviewed contributions, including many in top journals and a feature on ISI's 250 most highly cited researchers in Ecology & Environment (2005) has led to global recognition.

Amongst other accolades, he has an NRF A-rating spanning five evaluation periods from 1998 to 2021 and he was elected as a Foreign Member to the USA National Academy of Sciences – of only nine South Africans to receive such an honour.

Such impact, while globally relevant, has remained true to its core purpose – having had a profound influence on the protection of South Africa's exceptionally rich biological diversity.

Throughout his career, Prof Cowling has competently reached out beyond academia to influence conservation practice and policy, with tangible and long-term benefits to our society.

Prof Jonathan Jansen and Prof Richard Cowling

In the realms of sustainable land use planning and protected area expansion, he was influential in the establishment of numerous protected areas, and he has played a fundamental role in several large-scale landscape initiatives.

His concern over degraded landscapes and work on Restoration Ecology helped the formation of the EPWP Working for Water programme, in 1995 – resulting in the protection of increasingly threatened & scarce water supplies across our biodiversity rich landscapes.

Prof Cowling is a respected and beloved leader with a cause; his dedication and integrity will continue to inspire hope for our South African landscapes and its people well into the future.

Top ICT Awards for Mandela University and its tangible coding partner

Originally published in Staff Bulletin

Nelson Mandela University and its tangible coding partner took top honours at a recent prestigious national ICT Awards ceremony.

The Institute of Information Technology Professionals South Africa (IITPSA) – the professional body for ICT Practitioners in South Africa - hosted their Annual President's Awards ceremony recently. The awards highlight the talent and commitment of individuals within the ICT industry in South Africa and nominees are received from various spheres of the industry.

Professor Janet Wesson from the Department of Computing Sciences at Nelson Mandela University was announced the winner of the Distinguished Service in ICT Award. The award, by EngineerIT and the IITPSA, recognises a significant, career-length contribution to the ICT profession and/or the ICT Industry.

Earlier this year Prof Wesson also received an international award, the IFIP TC13 Pioneer in Human-Computer Interaction Award and was the only 2023 awardee from Africa. Prof Wesson has been one of the pioneers of Human-Computer Interaction (HCI) in South Africa, with most of her research focused on Interaction Design, Information Visualization, Smart Homes, and Usability Engineering.

Prof Wesson, who is retiring at the end of this year, has enjoyed a long and exciting teaching and research career in the Department of Computing Sciences, spanning more than 40 years.

She has taught virtually every course in the department - from first year to Honours - including programming, data structures, database systems, software engineering, mobile computing, HCI, and usability engineering, inter alia. Some of her career highlights include serving as Head of the Department of Computing Sciences (2005 to 2009), and Director of the School of Computing Sciences, Mathematics, Physics and Statistics from 2017 to 2021.

Department of Computing Sciences Head of Department, Prof Jean Greyling, said the department was very proud of the latest accolade Prof Wesson has received. "This is well deserved, since Janet has applied her expertise in HCI over many years in teaching and research supervision, equipping literally hundreds of graduates who are now making an impact across the world."

Prof Greyling also congratulated Tangible Africa Regional Coordinator in Mpumalanga, Nomusa Keninda, for being announced the winner in the category Social Responsibility Community Award at the IITPSA Annual President's Awards today.

Mandela University alumnus Byron Batteson, Computing Sciences' Prof Janet Wesson and Tangible Africa Regional Coordinator in Mpumalanga, Nomusa Keninda.

The award is for a "person/ team /project delivering the benefits of IT on a not-for-profit basis into the community / or bringing the community into the IT space (addressing the digital divide)".

Tangible Africa is an engagement project of Mandela University's Computing Sciences Department and its implementation partner, the Leva Foundation.

Another finalist for the Social Responsibility Award was the developer of the TANKS and RANGERS coding applications, Byron Batteson. TANKS and RANGERS have become the flagship apps played at schools and coding tournaments, and due to its offline capabilities, it has been introduced to some of the most remote areas in the continent and world by Tangible Africa.

The TANKS app formed part of Batteson's 2017 Honours in Computing Sciences research at Mandela University. In partnership with his supervisor, Prof Greyling, the concept was rolled out since 2018, using tangible coding to introduce coding concepts without the need of computers, electricity, internet, nor teachers with official training in coding.

Since 2017 Tangible Africa has reached over 100 000 learners, trained 25 000 teachers, and received various local, national, and international accolades.

In November 2022 the project was the first runner up in the African Union Innovating Education in Africa Awards. The annual Mandela Day coding tournament has developed into the biggest Mandela Day event in the country, and possible the world, with over 10 000 learners participating in over 70 sites on 18 July 2023.

A major project in 2023 had been adapting the app to be accessible to the visually impaired, by making its interface work in high contrast. This is in partnership with Bona Ubuntu, who are now introducing tangible coding to visually impaired and blind learners. Batteson is currently also working towards a "tournament app" which will allow for virtual coding tournaments across different countries and continents.

Keninda is an e-Learning Specialist for the Mpumalanga Department of Education and the Founder of the Mpumalanga ICT Club. She was acknowledged for DigiGirlz, an initiative aimed at empowering and mentoring young girls from rural villages to pursue STEM-related careers.

She is no stranger to receiving awards, including the Inspiring Fifty 2020, a Trailblazer award winner 2021 by the Centre for Public Service Innovation (CPSI) and she recently participated in a 5-week mentorship programme in the United States as a Techwomen Emerging Leader 2023. She is a Microsoft Innovative Educator Expert and Fellow since 2016.

Keninda will graduate next year with her MEd degree in ICT in Education (CW) from the University of Johannesburg. The title of her thesis is "Grade 8 and 9 girls' perceptions of coding and robotics in a DigiGirlz workshop in the Nkangala District." She used Tangible Africa's flagship coding game, TANKS, as a coding environment to assess and observe the girls' coding interests and skills.

Second SA-JINR workshop on Theory and Computation at Mandela University

Originally published in Staff Bulletin

Scores of theoreticians and experimentalists from the Joint Institute of Nuclear Research (JINR) based in Dubna, Russia, and researchers based at South African universities and iThemba LABS, have convened for the second SA-JINR workshop on Theory and Computation in Gqeberha.

The workshop was held at Inkanyezi Building (Auditorium), at Mandela University's South Campus, from 5 to 8 December 2023.

The collaboration contributes to human capacity development initiatives to grow the next generation of researchers in areas identified as critical skills in South Africa.

In line with Mandela University's ethos of being 'A University in service of society', the workshop is about capacity development in science, for the benefit of society.

Deputy Vice-Chancellor of Learning and Teaching, Dr Muki Moeng, says that "hosting this workshop at Mandela University is a demonstration of our Science faculty to live its philosophy of 'strength in diversity and inclusion in science'. Also, living its vision of becoming a 21st century African faculty, that responds to socio-economic and environmental changes facing our society and communities across our African continent".

"The students from across South African universities, the majority of them coming from rural universities, will benefit from this workshop" Dr Moeng added.

Mandela University alumnus, Simamkele Kalipa, who has recently completely her undergraduate qualification in Computer Science and Applied Mathematics, is such an example. "I am looking to get into Computational Mathematics, and I think I am going to enjoy this workshop, because it is from a physics background, and I am not necessarily in that field, but I realise the need for collaboration" Simamkele said.

"So, I am excited to listen to, and learn about nuclear physics, and where I can contribute from a Computational and Mathematical background. I also look forward to meeting the scientists and learning about their work" said Simamkele, who hopes to pursue her postgraduate studies at Mandela University.

Nuclear physicist, Prof Shaun Wyngaardt, from Stellenbosch University added that the first workshop was mainly on supporting theoretical physics and natural sciences in South Africa through the collaboration with JINR. The second workshop would now add computational sciences to it because of the opportunities it stands to create for young people.

"Mine is an opportunity in the Western Cape, where we want to develop a new research facility under the Huguenot Mountain called the Paarl Africa Underground Laboratory (PAUL)," said Prof Wyngaardt.

He then added the big drive behind this, is that it is in the Southern Hemisphere. So, it is going to be one of two facilities in the Southern Hemisphere which he hopes will be unique to our region of the globe.

Prof Wyngaardt then closed by saying "what is important for me, is for young people to put their footprint into these projects and I hope this collaboration will open up new opportunities".



First Place in Young Science Communicator's Competition

Itumeleng Zosela Young Science Communicator's Competition

Itumeleng Zosela, a dedicated PhD candidate in Physiology, secured the top position in the Audio Category of the Young Science Communicator's Competition 2022 edition. This accomplishment not only underscores Zosela's passion for science communication but also highlights the groundbreaking research in plant-based treatments for colon cancer.

Zosela's research is centered around the utilisation of plant materials for colon cancer treatment, a critical area in the medical research landscape.

The Young Science Communicator's Competition offers a platform for emerging scientists to convey their scientific narratives effectively. Zosela's success in the Audio Category showcases not only her commitment to research but also her exceptional ability to communicate complex scientific concepts to a broader audience. The award ceremony took place at the SACNASP Gala Banquet event in Pretoria on 9 November 2023, adding a celebratory note to the occasion. The event not only recognized Zosela's achievement but also underscored the profound impact of SACNASP's two decades of commitment to Advancing Professionalisation, Scientific Integrity, and Inclusivity in the scientific community.

This year's competition, held under the theme of the "International Year of Basic Sciences for Sustainable Development," challenged participants to convey their science stories in a captivating, informative, and interesting manner, aligning with the principles of sustainable development. The initiative, a collaboration between the National Research Foundation (NRF) and the South African Council for Natural Scientific Professions (SACNASP), aims to nurture effective science communication among emerging scientists.

Lüneberg farmer bags 2023 Kwanalu young farmer title

Written by Mr Gevers

Lüneberg timber, maize, soy bean and free range cattle farmer, Heiko Gevers is the 2023 KwaZulu-Natal Agricultural Union (Kwanalu) Young Farmer of the Year. Gevers' remarkable precision, keen eye for maximizing profitability, and unwavering commitment to community development captured the judges' attention.

"Each year, we're inspired by the fresh approach of a new generation of farmers who blend innovation with tried-and-true farming practices to create resilient businesses in the face of industry challenges," said Kwanalu CEO, Sandy La Marque.

Gevers (28) stood out for his organised, systematic and detail-oriented approach to farming. As the farm manager on his parents' farm, he has implemented precise farming practices, ensuring economic sustainability and optimal yields.

"Proper attention and meticulous record-keeping are paramount in our business. Spreadsheets are my trusted companions, used for everything from grazing schedules to rotation planning and chemical usage," said Gevers, sharing his approach.

The Toyota/Kwanalu Young Farmer of the Year 2023 competition is open to farmers under the age of 40, male or female who are full members of their provinces agricultural unions.

Judges evaluate applicants at the provincial level, assessing various aspects of their business, including their vision for the farm's future and their practical application of management philosophy.

Using his business acumen and innovative mindset, Gevers is continuously exploring ways to adapt operations to enhance profit margins and ensure long-term economic sustainability.

"I'm always on the lookout for innovative ways to refine our product for the market and exploring new crops that could be a lucrative commodity. If we expand the business, we can create more job opportunities for our local community," said Gevers.

Heiko Gevers the 2023 KwaZulu-Natal Agricultural Union (Kwanalu) Young Farmer of the Year

Gevers' deep compassion shines through his commitment to the people reliant on the farm. He consistently initiates community upliftment projects, assists local residents in planting maize, and supports the local school with various needs, including levelling of the soccer field and constructing goalposts.

"Heiko's genuine care for people and the farm is evident in everything he does. He embodies the spirit of innovation, community support, and sustainable farming that the KZN Kwanalu Young Farmer of the Year represents, making him a true champion for the agricultural industry," says La Marque.

"As farmers, we are constantly surviving new challenges; whether environmental, economic or political. But we are united in that we are aligned to a common goal, providing for the nation. It is of the utmost importance to have good working relationships with neighbours and the community to ensure a long-term farming future. At the end of the day, we have to look after one another," said Gevers.

The KwaZulu-Natal Agricultural Union, Kwanalu, is a representative organization voice of the rural and agricultural sectors in the province. It's viewpoints are based on submissions from its members and it is committed to a sustainable and profitable future for Agriculture within KwaZulu-Natal and the greater South Africa.

For more information on Kwanalu, visit www.kwanalu.co.za or call 033 342 9393.

GRADUATION: PhD Class of 2023

THE DEGREE OF DOCTOR OF PHILOSOPHY (CHEMISTRY)
PHUTI CEDRIC TSIPA

THE DEGREE OF DOCTOR OF PHILOSOPHY (APPLIED MATHEMATICS)
YUSUF OLATUNJI TIJANI

THE DEGREE OF DOCTOR OF PHILOSOPHY (PHYSICS)
ASSANE TALLA

THE DEGREE OF DOCTOR OF PHILOSOPHY (BIOCHEMISTRY)
BRESLER SWANEPOEL

THE DEGREE OF DOCTOR OF PHILOSOPHY (NATURE CONSERVATION)
ZANRI STRYDOM

THE DEGREE OF DOCTOR OF PHILOSOPHY (NATURE CONSERVATION)
TIAAN STRYDOM

THE DEGREE OF DOCTOR OF PHILOSOPHY (BIOCHEMISTRY)
SHANIKA REDDY

THE DEGREE OF DOCTOR OF PHILOSOPHY (CHEMISTRY)
BOTHWELL NYONI

THE DEGREE OF DOCTOR OF PHILOSOPHY (OCEANOGRAPHY)
ATHI NKOSIBONILE MFIKILI

THE DEGREE OF DOCTOR OF PHILOSOPHY (GEOLOGY)
JADE CANDICE GREVE

THE DEGREE OF DOCTOR OF PHILOSOPHY (ZOOLOGY)
ZOLEKA NONTLANTLA PATRICIA FILANDER

THE DEGREE OF DOCTOR OF PHILOSOPHY (BOTANY)
PHUMLILE LEON COTIYANE-PONDO

THE DEGREE OF DOCTOR OF PHILOSOPHY (CHEMISTRY)
IRENE ADZO AGBO

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