

MAY 2022



SCIENCE

@UJ

NEWSLETTER OF THE
FACULTY OF SCIENCE
UNIVERSITY OF JOHANNESBURG

LEADING SCIENTISTS, INNOVATIVE TECHNOLOGISTS

FACULTY OF SCIENCE



A message from the Executive Dean



In the midst of a world still dealing with Covid-19 and now possibly facing the next pandemic given the reports on the spread of monkeypox, the Faculty of Science still had a good start to 2022 which this newsletter will try to convey. We have maintained our strong position in the QS subject rankings as shown below and have graduated 812 students (including 32 doctoral and 88 masters degrees) in 3 graduation ceremonies thus far this year. The front and back pages of the newsletter display some of the festive graduation photographs from the Autumn and Winter ceremonies. We also congratulate our staff members whose children successfully completed their studies in our faculty.

Like the quarterly Snippets, the newsletter provides highlights on departmental and individual achievements along with electronic links to detailed articles or other resources for the story. Most of the reports in here emphasizes our focus on global recognition. For example, we report on the 1st non-SARCHI research chair in the faculty and National Science Foundation (USA) recognition of one of South Africa's prominent geologists. In joint research by Geology and Physics, a 'forensic chemistry' analysis of the now famous Hypatia Stone reveals information about supernovas which reminds us of the gamma-ray burst from magnetars (remnants of supernovas) reported by the Centre for Astro-particle physics last year. The Computer Scientists used computer vision to distinguish different cricket batting styles and the botanists trained learners and kindergarteners on sustainability. We list some prestigious awards from late last year and early 2022, introduce our two newest research centers, one of which also focuses on sustainability.

This newsletter invites the reader to step out of the confines of their discipline or department to get a wider view of the wealth of research in the faculty, just as the executive leadership group did when reviewing divisional annual reports on 30 and 31 May. On the 30th I proudly shared our 2021 achievements (e.g. 486 publication units, 59 PhD graduates and 22 Nature group articles) and highlighted our focus areas for this year namely, external fundraising, increasing designated female academic appointees and international postgraduate student registrations, using our research equipment optimally and exceeding our publication unit target.

QS Subject Rankings University of Johannesburg	
QS Subject	2022
Agriculture and Forestry	351-400 #6 in SA
Environmental Sciences	401-450 #6 in SA
Chemistry	451-500 #2 in SA
Physics and Astronomy	451-500 #4 in SA

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PUBLICATION NEWS

NOTE WORTHY RESEARCH ON SUPERNOVAS & FUEL CELLS



Rare supernovas of the most energetic events in the universe have now been discovered by 'chemistry forensics', the **Hypatia Stone** from the Egyptian desert might be the first tangible evidence found on Earth of a supernova type *Ia* explosion. These results come from a new study that has been published in the [Icarus Journal](#) by Faculty of Science's very own **Professor Jan Kramers, Georgy Belyanin** and **Hartmut Winkler**.

Professors Belyanin and Kramers have been conducting this research since 2013 and have subsequently discovered a series of highly unusual chemistry clues in a small fragment of the Hypatia Stone.

New developments in their research have seen them eliminate 'cosmic suspects' for the origin of the stone in a painstaking process.

They have pieced together a timeline stretching back to the early stages of the formation of Earth, our sun, and the other planets in our solar system. Their timeline dissects various stages of their research including a cosmic timeline, the techniques used to analyse the stone, studies on the chemical pattern of the stone and ruling out what the stone is not but also investigating what it can potentially be. "In a sense we could say, we have 'caught' a supernova *Ia* explosion 'in the act', because the gas atoms from the explosion were caught in the surrounding dust cloud, which eventually formed Hypatia's parent body," - **Prof Kramers**

Find out more: [Extraterrestrial stone brings first supernova | EurekAlert!](#)



Professor Soebur Razzaque (Physics Department) director of the Centre for Astro-Particle Physics has, along with collaborators, defined a gamma-ray burst (GRB) of a magnetar. *GRB 200415A* erupted from a very rare, powerful exotic type neutron star called a magnetar. A magnetar's defining feature is that it has an ultra-powerful magnetic field which is about 1000 times stronger than a normal neutron star and about a trillion times stronger than the Earth's.

The research was published in [Nature Astronomy](#) on January 13, 2021 and was featured in many acclaimed publications, including [Physic Org](#), [Forbes](#) and [SciTech Daily](#). When these massive stars die, they explode into a supernova. What's left after that is a very small compact star, small enough to fit in a valley about 12 miles (20km) across. According to Prof Razzaque this star is so dense that just a spoonful of it would weigh tons on earth.

Full article available at: [Rare star's giant gamma-ray burst GRB 200415A | EurekAlert!](#)



Professor Nobanathi Wendy Maxakato from the **Department of Chemical Sciences**, focuses her research on energy-related materials, mainly fuel cells. Under her guidance, **Postdoctoral Fellow, Dr. Kayode Adesina Adegoke** and a 2nd-year Ph.D. student **Mr. Thabo Matthews**, published in a high impact journal **Coordination Chemistry Reviews** recently (IF 22). The article initiated invitations for collaborative work with researchers from Asia, Europe, United Arab Emirates, and Africa.

The article can be found at: <https://doi.org/10.1016/j.ccr.2021.214389>. An additional article on ways to reduce greenhouse gasses was published by the group. Visit <https://doi.org/10.1016/j.ccr.2022.214600> for the full article.

BAT you did not think artificial intelligence (AI) can predict your swing

Professor Justin Van der Haar and Mr Tevin Moodley from the **Academy of Computer Science and Software Engineering** formed part of the team that built the first deep learning computer vision AI model technology that can now tell straight backlift batters from lateral ones by using video footage only. A lateral backlift can be a significant advantage at international Test level cricket. Despite this, the batting style is not recognized as part of standard training. **Prof van der Haar** is a pattern recognition researcher within the Academy and uses computer vision techniques to analyse athlete performance and medical imaging. He is the corresponding author of research published in [Nature Scientific Reports](#): “UJ researchers built the first deep learning AI model to spot which backlift style cricket batters use – straight or lateral. It automates the process of analysing players’ batting style, using video only. The greatest cricket batsman Sir Donald Bradman was a lateral backlift player.”



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Mr Tevin Moodley practices cricket batting in his backyard and does AI research by day. He builds deep learning AI models to analyse batting strokes and identify backlift from video alone. Playing cricket since childhood, he has always had a passion for the sport. Moodley is a lecturer and PhD candidate at the University of Johannesburg. He too, is a co-author of the research published in [Nature Scientific Reports](#). **Find out more:**



[Computer vision and deep learn \[IMAGE\] | EurekAlert! Science News Releases](#)

ISSET CAREERS FEATURE



Our economy requires a flexible and competent workforce today and, in the future, to adapt to areas of technology and opportunity, as well as the Fourth Industrial Revolution (4IR). Career education and guidance of the highest quality is an important aspect of schooling in preparing young South African learners for careers in the new knowledge economy. **ISSET Careers SA**, is a South African online education and information platform, that aims to encourage more learners to pursue viable career opportunities to address the country's skills need. In support of this vision, two of the Faculty's very own were featured in the 2022 edition, **Dr Cerene Rathilal** from the **Department of Mathematics and Applied Mathematics** and **Dr Nomali Ngobese** from the **Department of Botany and Plant Biotechnology**.



Both interviewees were asked various questions including the **factors that influenced them in choosing their career path, what part of their job they are most passionate about, whether their industry or profession will remain relevant in the 21st century and what advice they would give learners considering careers in their disciplines. Find out what their responses were at:** <https://online.fliphtml5.com/chhem/atch/>

We believe that by using this platform to promote the **Faculty of Science**, we contribute to learners understanding of **Science** careers, as well as contribute to the social and economic development of our country. As a nation, we can improve the quality of life in our communities and have a positive impact on society by navigating the appropriate education for our learners' careers.

Global Recognition

Geology

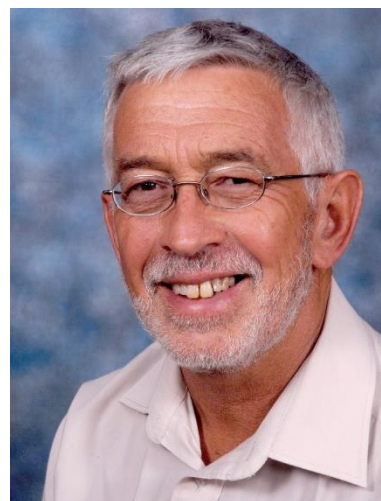
Professor Hassina Mouri from the **Geology Department** has been awarded the **UNESCO Chair on Medical Geology in Africa**. For the first time in the history of the UNESCO Chairs programme a chair in **Medical Geology** with a focus on **Africa** has been awarded, recognizing Prof Mouri, the **first African female** elected as the Vice President (2020-2024) for the [International Union of Geological Sciences \(IUGS\)](#), as being involved in ground breaking research. The UNESCO Chairs Programme involves over **850 institutions** in **117 countries** and promotes international inter-university cooperation and networking to enhance institutional capacities through knowledge sharing and collaborative work.



The programme supports the establishment of UNESCO Chairs in key priority areas related to UNESCO's fields of competence. Prof Mouri has since been featured in the [Sunday World](#). "I am sincerely grateful for the support of UJ as well as that of the national and international organisations for my application. I am honoured and proud, not just because I am awarded such a prestigious position, but more importantly, this is the first time in the history of the UNESCO Chairs programme that a chair in Medical Geology with a focus on Africa, has been established and it

is awarded to my institution, UJ!"- Prof Mouri

Professor Nicolas J Beukes has been associated with the University of Johannesburg for more than **50 years**. During his tenure, he has garnered numerous awards and accolades. He is a three-time winner of the **GSSA's Jubilee Medal** for the best publication in the **South African Journal of Geology**, the **Draper Medal**, the **UJ's Vice-Chancellor's Medal for Research Achievement**, the **Centenary and the Havenga Medals of the "Suid Afrikaanse Akademie vir Wetenskap en Kuns"**, and the **NSTF-South 32 Lifetime Award**. The most recent recognition of his prestige is his election as an **International Member to the US National Academy of Sciences**. This comes from an electorate that consists of some of the highest rated geologists in the United States of America, working on Precambrian geology. There are currently only three other South Africa scientists on the list of members of the Academy. These are two specialists in environmental Sciences and Ecology, and one other in human environmental sciences, making Professor Beukes the **only South African Geoscientist** to become a member of the Academy.



Faculty Public Lectures

In 2022, the Faculty's Marketing Office has **26 public lectures** scheduled. During the first semester, **10 of the 26 public lectures were hosted both online and in person**. Online sessions made use of Microsoft Teams Live Streaming and contact sessions were hosted in the APK Library. The aim of public lectures is to promote Pan-African public scholarship for critical intellectual inquiry and to promote science to a wider audience. Subsequently, the public lectures attract stakeholders such as undergraduate and postgraduate students, staff members and members of the public. During the lectures, speakers also inform and educate attendees about research activities within the Faculty.

The public lectures present exceptional research contributions within the Faculty and highlight the involvement of academics in addressing real and material problems in society and the environment. The topics of the public lectures in 2022 will cover a wide variety of topics, including *Boosting Metabolite Annotation Rates in BioAnalytical Chemistry Studies by 4IR Computational Metabolomics*, *Microplastics in the aquatic environment*, *Vaccination and COVID-19* and many more.

There are 16 public lectures scheduled for the second semester **representative attendance by all departments is compulsory**.

New Research Centers



Prof Derek Tantoh Ndinteh from the **Department of Chemical Science** has been appointed as the **Director of the Centre for Natural Products Research** at the University of Johannesburg.

The Centre is mandated to develop natural product medicines based on South African and other African ethnopharmacology, and to provide expertise in this domain.

The centre envisages bridging the gap between 4IR technologies and African traditional knowledge systems. The Centre is newly formed but has two start-up projects running. The first involves selling specialty chemicals via **UJINNV**, and the second deals with the Active Pharmaceutical Ingredient market.

Future plans along with student training, includes specialized schools, commercialization, and many more start-up projects.

A **Joint Research Centre for Smart Mobility and Climate Change (JRC-SMCC)** has been established at UJ to support the transition of the transport sector in South Africa to more sustainable and efficient modes of transport and operating models. The Centre was launched at the Smarter Mobility Africa Summit in October 2021 and is a multi-disciplinary collaboration between the **Department of Geography, Environmental Management and Energy Studies** the **Process, Energy and Environment Technology Station** in the **Faculty of Engineering and the Built Environment**, and the **Department of Transport and Supply Chain Management** in the **College of Business and Economics**.

Dr Kristy Langerman (GEMES) has been appointed as Director of the Research Centre, the JRC-SMCC has already partnered with the Gauteng Department of Agriculture and Rural Development (GDARD) to investigate how transport patterns and related emissions were affected by COVID-19 in Gauteng.



(JRC-SMCC) will shortly be launching two Short Learning Programmes (SLP) on **sustainable transport**, to build capacity to implement the **Green Transport Strategy in South Africa**. The Centre is also coordinating the construction of a URC-funded atmospheric monitoring station at the top of the **Bunting Road campus**, where vehicle emissions will be measured and Centre has recently partnered with the City of Johannesburg and the International Council for Clean Transportation to conduct research to support the greening of the Metrobus fleet.

The Academy for Computer Science and Software Engineering advertise new SLP



The Faculty of Science will now offer a SLP that introduces students to the field of **Digital Forensics**. It will empower students with knowledge of the process of digital investigations, acquiring digital evidence and preparing such evidence to stand up in court. This Certificate is on NQF Level 5, and successful students will get an official Certificate from the University of Johannesburg.

Classes will begin in July and the last module will end in October
<https://adam.uj.ac.za/csi/Courses.html#forensics>

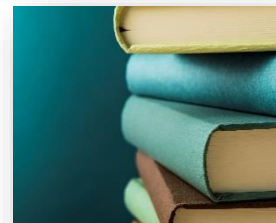
Awards & Achievements



Prof Adebo received the VC's Award for promising Young researcher of the year and NRF Emerging Researcher.

Prof Arotiba received the VC's award for Outstanding

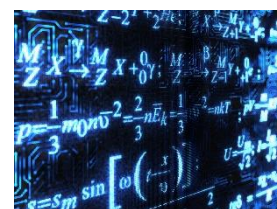
Dr Msomi received the VC's teaching award.



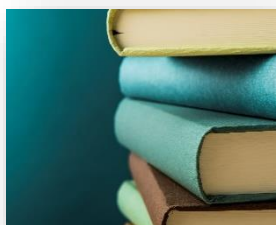
Dr Fidele Tugizimana (Biochemistry) received the 2022 silver medal from The South African Society of Biochemistry and Molecular Biology



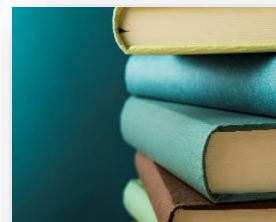
The **BSc Actuarial Science** program is now accredited at **Level 2** with the **Actuarial Society of South Africa**. **Mr Soshan Soobramoney** joined **Mrs Leila Lederman** as the second full-time Fellow Member of the Actuarial Society of South Africa in the **Department of Statistics**. The accreditation status now recognises all undergraduate modules in our Actuarial Science qualification, and the number of students graduating is rapidly increasing.



Professor Samuel Oluwatobi Oluwafemi (Chemical Sciences) was being ranked as the number 1 scientist by [AD Scientific Index](#), in Nanoscience and Nanotechnology Research within the University of Johannesburg and South Africa.



Dr Sue Canney Davison (research associate of the SARChI Chair in Indigenous Plant Use at UJ), was the first author of an **influential semi-popular article on Frankincense** (*Boswellia* species). The review was published in [Herbalgram](#), the official Journal of the American Botanical Council.



Student Top Achievers

Ms Humairaa Yacoob Bhaiyat was the recipient of the **Top Honours Student Award for the Faculty of Science**. Her



research was in **Information Technology**. She developed a web application that provides students with recommendations on undergraduate degree programmes based on their personal and career interests. The recommender system was a content-based system that also considered if the student's marks would meet the minimum requirements of a degree programme. She was supervised by **Professor Marijke Coetzee** from the **Academy of Computer Science and Software Engineering**.

"This award is testament that hard work will pay off. I am so happy to receive this award because it has made my parents extremely proud. I am proud to be from the University of Johannesburg an institute that provides students with quality education. Thank you so much to the University of Johannesburg, Faculty of Science for acknowledging and rewarding students for their hard work and the Academy of Computer Science and Software Engineering for excellent teaching and learning"-
Ms Bhaiyat

The S2A3 Medal (for most meritorious Master study in science) was awarded to **Mr Lungele Steve Kitoga** who



completed his MSc in Geology. "Learning that my MSc research was judged excellent is a strong motivation to me and proof that hard work never fails when joined by strong mentorship. My MSc studies were conducted in the "**Deep and Early Earth Processes**" research group, under the rigorous and caring supervision of Professor Sebastian Tappe During the MSc research, we produced new data on the petrography, mineral chemistry and geochemistry of the Dando-Kwanza kimberlitic occurrences in central Angola. Reflecting on my progress in this scientific journey, I must express here my sincere gratitude towards the **BEBUC** (Bourse d'Etudes Bringmann aux Universités Congolaises) for the continued support since my bachelor studies, also towards **Professor Tappe**, the co-supervisors **Professors Moyen, Stevens, Boyet** and **Johanna**. I hope that my achievements will inspire a young student from modest background to follow his dreams with the hope that we all can achieve great things if we don't lose hope" – **Mr Kitoga**

The 2022 Chancellor's Medal was awarded to **Ms Anna Chrysostomou** who completed her MSc in Physics.

Staff Celebrate Achievements

Dr Rina Durandt's (DMAM) son obtained his BSc degree.

Mr Mpherisini Khwanda's (Physics) daughter obtained her 2nd BSc degree in Actuarial Science.

Professor Boitumelo Diale's (Education- Chair of UJ's Convocation) son received his BSc degree.

Dr Abayneh Ambushe's (Chemical Sciences) daughter obtained her BSc degree in Actuarial Science.



Outreach & Community Engagement



The Department of Botany and Plant Biotechnology, as part of the community outreach programme, invited the **Sunbeam Playgroup** (nursery school) children, ages 4-5 to participate in creating a hanging garden for their schoolyard. In this project, the children planted different types of lettuce. **Dr E Pretorius, Mr T Fourie** and life sciences students from the Department of Botany and Plant Biotechnology provided planting materials and assisted children in starting their garden. The vegetables are grown in upcycled 2L bottles that were converted into a three-layer hanging container making up a vegetable-hanging garden. These hanging gardens were constructed with the help of Mr Stanley Khumalo. The project aims to teach the children about sustainable living through growing a vegetable garden and harvesting for their use. The children will not just learn to appreciate all the effort going into growing vegetables but also to reuse items such as 2L bottles as upcycled planting containers.

The Department of Botany and Plant Biotechnology invited the grade 10/11 Life Sciences learners of the **UJ Metropolitan Academy** to participate in a vegetable garden project at their school. This project is aligned with the National sustainable development goals in that the project aims to ensure inclusive and equitable quality education and to promote lifelong learning opportunities for the learners and educators specifically focused on the setup and growing of seasonal vegetables. In addition, the project aims to work towards the goal of achieving food security and improved nutrition, by teaching the learners and educators about growing vegetables. The botany department supplied the upcycled palette crates, soil mixture, and vegetable seedlings to help the UJMA learners grow beautiful vegetables. This is a wonderful learning opportunity to show how easy and cost-effective it is to grow your vegetables in an extremely small area (home garden, balcony of flat or other units).



The staff from the **Faculty's Dean's Office**, have successfully collected a sizeable amount of bottle caps as part of the **PsyCad Disability Unit's** initiative to donate a wheelchair to a student in need. Below is a picture of the Faculty Staff (**Faculty Assistants, Faculty Officers, Senior Faculty Officers, Faculty Coordinator and Head Faculty Administrator**) together with the **Director of the Disability Unit** and a member of her staff.



In 2021 the **FCEC** ran a fundraising campaign (**Science X Art**) that was aimed at raising funds to help schools with laboratory equipment. Please read more about the fundraising campaign on the FCEC's webpage: <https://rb.gy/kka7ix> and watch the fundraising video on **YouTube**: <https://rb.gy/kihuv> The Science X Art project involved postgraduate students and academics from 5 departments, pooling their talents to raise over R 60 000 for faculty approved CE projects.



Graduation 2022

