

SCIENCE @UJ

NEWSLETTER OF THE
FACULTY OF SCIENCE
UNIVERSITY OF JOHANNESBURG
LEADING SCIENTISTS, INNOVATIVE TECHNOLOGISTS



FACULTY OF
SCIENCE

A message from the Executive Dean



As the year draws to a close, it's a fitting time to reflect on the remarkable journey we have had in the Faculty of Science. Together, we have navigated challenges, celebrated triumphs, and continued to uphold the spirit of inquiry and discovery that defines our academic community.

Our Faculty has not only adapted to the changing landscape of education but has thrived in the face of adversity. The resilience and dedication of our faculty members, researchers, staff, and students have been truly inspiring. I want to express my heartfelt gratitude to each of you for your unwavering commitment to excellence. Throughout the year, we have witnessed groundbreaking research, innovative teaching methodologies, and collaborative efforts that have strengthened our position as a hub for scientific exploration. Your passion for advancing knowledge and fostering an environment of intellectual curiosity is the driving force behind our success.

As we approach the holiday season, I encourage each of you to take a well-deserved break, spend quality time with loved ones, and recharge for the exciting opportunities that await us in the coming year. Our collective efforts have laid a strong foundation, and I am confident that 2024 holds even greater promise for the Faculty of Science.

May this festive season bring joy, peace, and a renewed sense of purpose. I look forward to continuing our shared journey of academic excellence in the new year.

Wishing you and your families a joyous holiday season and a Happy New Year!

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NOTE WORTHY STORY

“**The 2023 L’Oréal - UNESCO For Women in Science National Awards ceremony** (FWIS) programme in South Africa is now in its fifth year and provides funding to women scientists in support of the research they are conducting in their respective fields of study. We congratulate the L’Oréal - UNESCO For Women in Science recipients of 2023, and eagerly look forward to their achievements in the future”- **L’Oreal-UNESCO For Women in Science | Press Release**

Responses from **Anna Chrysostomou** regarding the **L’Oréal-UNESCO FWIS** award

1. Tell us more about yourself.

“I am a 26-year-old woman, born to a **Cypriot** father and **Romanian** mother that immigrated to South Africa in 1992. I was raised right here in Johannesburg. Since 2021, I have been pursuing a joint-Ph.D. between Johannesburg and Lyon (France).

Academic background:

- **BSc. in Astronomy & Astrophysics** at the **University of the Witwatersrand** [graduated in 2018]
- **BSc. Hons. in Physics (specialising in gravitational theory and particle physics)** at the **University of the Witwatersrand** [graduated in 2019]
- **MSc. in Physics (specialising in theoretical gravitational physics)** at the **University of Johannesburg** [graduated in 2021]

Currently studying at:

- Physics Department (APK), University of Johannesburg
- Institute of Physics of the 2 Infinities (IP2I) of Lyon, Claude Bernard University of Lyon-1

My Ph.D. research explores the applications of gravitational theory and black hole physics in the search for evidence of phenomena whose description is not contained within the Standard Model of particle physics. In particular, my collaborators and I are interested in determining the feasibility of detecting evidence of new physics - such as extra dimensions - through the burgeoning field of gravitational-wave astronomy (where the first ever detection of gravitational waves was only in 2015!). My first of several projects for my Ph.D. was to determine how the presence of extra dimensions might influence the gravitational-wave spectra following a black hole collision. The objectives thereof were to determine an effective 4D description for the problem, to calculate the resultant equation(s) of motion, and to determine how the extra-dimensional spectrum deviated from the one predicted by Einstein’s theory of general relativity. This parametric deviation in the post-merger signal could then be compared against tests of general relativity performed by the **LIGO-Virgo-KAGRA** consortium on gravitational-wave data. From this comparison, a constraint on the sensitivity of post-merger gravitational waves to extra dimensions was extracted”.

2. How did you get into physics? Was this something you have always wanted to do?



“I have wanted to be a researcher for as long as I can remember. I developed a love for the written word at a young age, and quickly became enthralled with learning everything I possibly could from every piece of writing within reach. As voracious readers themselves, my parents always encouraged my sister and me to read, to study, to educate ourselves to the very best of our ability – in part because their own education empowered them to escape the poverty of their childhood villages and to build a life for themselves in South Africa.

As is the usual case, when asking questions about observable natural phenomena, the fundamental answer conventionally leads to classical physics. My interest in the physics of the early universe, however, began unconventionally: in books on ancient mythology, where I was taken by the cosmologies of ancient **Greece, Mesopotamia, North Africa, and Mesoamerica**. However, in my early adolescence, I stumbled across the terms “dark matter” and “dark energy” and was stunned by the unbelievable statistic that over 95% of the universe is composed of these completely unknown constituents. The more I read, the more obsessed I became by the fact that we have actual evidence-based models for the formation and evolution of the universe! What was once explained by celestial magic can now be encapsulated by theory and quantified by measurement! I was understandably overjoyed when **Wits University** started their **Astronomy and Astrophysics** programme in the mid-2010s and leapt at the opportunity to begin pursuing a career exploring the same profound moments of creation that mankind has been contemplating since the dawn of civilisation”.

3. Women in STEM face unique challenges. What have been some of the challenges you've faced on your journey?

“Women in STEM are faced with an extensive list of obstacles: socio-economic barriers; cultural bias and imposter syndrome; prejudice, discrimination, and harassment. It is well known that these are exacerbated by entrenched historical inequalities, most notably within physics and mathematics.

Women in physics regularly feel isolated. For most of my childhood, I could count the number of women physicists that I knew on one hand; as a university student, I have been taught a physics module by one woman lecturer. To this day, I have never met another physically disabled woman in physics. Disability, of course, comes with its own set of challenges – logistical, professional, and personal.

However, these obstacles have become far more tolerable thanks to the examples of resilience I have encountered and the community that I am building. Since my postgrad days, I have had the pleasure of meeting and working with a variety of women in STEM, and each time I marvel at the innate sense of camaraderie between us”.

4. If you could encourage other young women to explore STEM as potential paths, what would you say?

“Each young woman brings a completely unique perspective to science. There was, is, and will never be another scientist who has lived her experiences or seen the world through her eyes. With thousands of years of scientific progress and a technological boom carrying us to experimental frontiers beyond the imaginations of the greatest recorded thinkers of the previous century, we need unique perspectives like hers to find solutions to the increasingly challenging problems of modern science.

Any young woman who wants to pursue science must cultivate a belief in herself and her unique perspective. She must practise diligence and resilience while nurturing her passion, and must be

prepared to take initiative for her own training. There are far more opportunities out there than we realise, but we have to be proactive and tenacious in seeking them out. “Science” is a broad and beautiful discipline, and I encourage all young women to explore the full spectrum of what science can be. Finally, I urge women to search for a mentor(s) in the field(s) of their choosing, to form friendships with their fellow women, and to recognise that true sustainable growth happens not through competition but rather through collaboration”.

5. Why was UJ your choice to do your PhD?

“I moved from **Wits University** to **UJ** in 2020. It is well understood that early career researchers must change institutions regularly. This is necessary to expose us to different research cultures, methods, and perspectives, in order to enhance our creativity, innovation, and problem-solving capabilities. Furthermore, this exercises skills like adaptability and flexibility, which are essential for a researcher, and gives us the chance to expand our network.

UJ is known for its excellent research opportunities and multicultural, stimulating academic environment. The **Department of Physics** in particular offers a very warm welcome to newcomers, and boasts renowned faculty, international collaborations, and regular seminars and workshops.

However, one of my main motivations for moving to **UJ** was to work with **Prof. Alan Cornell**. He is a brilliant physicist and a passionate educator, with a multinational team exploring black holes, particle physics, machine learning, and andragogy. Beyond this, **Prof. Cornell** is a dedicated mentor who consistently prioritises the training, ambitions, and well-being of his students. It has been a pleasure to collaborate with him and my co-supervisor in **France**.

I have been thoroughly enjoying my adventures at **UJ** and I strongly encourage those of us already here (or considering the institution) to take full advantage of the numerous benefits and career opportunities that **UJ** provides.

I am deeply honoured to join, alongside my impressive colleagues, the ranks of esteemed alumnae who have won this award before me. The **L’Oréal-UNESCO For Women in Science** programme acknowledges our contributions not only as scientists, but also as members of a broader society; it highlights the potential of the women in our country and seeks to inspire younger generations to nurture their own passion for science. **South Africa** is home to world-class research in a variety of disciplines. To be recognised for my work within the field of theoretical physics is particularly exciting to me, as I hope it showcases the stimulating research avenues open to young women the world over, as well as the personal and professional opportunities a career in academia presents. I have always been fascinated by the fundamental questions and principles that govern the nature of the universe, and I aspire to empower others to see this same kind of complex beauty in the world around them. Finally, as a disabled woman, I hope that this recognition serves as a reminder to my community that our resilience and ambition can take us farther than our younger selves would have dared to believe. I am exceedingly grateful to the intricate network of people who support me, and I hope to be able to continue to contribute to the scientific community and beyond to the very best of my ability”.

AWARDS & ACHIEVEMENTS

Dr. Botha (Zoology) was elected as the Vice-President of SETAC AFRICA from 2024.

Prof. Serepa-Dlamini (Biotechnology and Food Technology) and Ph.D. student **Sephokoane Makuwa** discovered a novel bacterial species which has been described by **Prof. MH Serepa-Dlamini, Sephokoane Makuwa, Prof Motadi and Dr Choene**, and named **Bacillus dicomae sp. nov.** published in the **International Journal of Systematic and Evolutionary Microbiology**. Read more [here](#).

Prof. Maina (Zoology) published a single author book entitled “Current perspectives on the functional design of the avian respiratory system”.

Mr. Moodley (ACSSE) received external funding worth R50 000 from SACAIR conference.

SEMINARS, TRAINING & ENGAGEMENTS

The University of Venda in Thohoyandou (Limpopo) held the **National Science Week 2023 Launch**. This serves as one of the key community service engagement endeavors for the **Department of Chemical Sciences** and is important in marketing and highlighting the Department’s Teaching and Learning, as well as Research activities. The target audience were high school learners, with a focus on Grades 10 to 12.

The Department of Chemical Sciences and Physics staff members at the National Science Week Launch (Left to Right): **Dr Nokalika Zwane, Mr. Patrick Monama, Dr Duduzile Nkosi, Mrs Khathutshelo Carol MqheNedzivhe, Mr Themba Mathe, Dr Mathapelo Seopela, Dr Thabang Lebepe, Dr Marthe Fotsing, Dr Mogolodi Dimpe.**



Prof. Vadapalli (ACSSE) gave a keynote address at the Innovation forum organized by KEAS and the **University of Swaziland**.

Prof. Nyabadza (DMAM) visited **Emirates Aviation University** for the accreditation process of their Ph.D. programme in **Applied Mathematics**.

Emeritus Prof. Cairncross (Geology) visited the **Mineralientage München 2023** (Munich Mineral Show). This is the largest event of its kind held annually in Europe. During his time in Munich, he met with geology and mineral museum curators to discuss the issues facing museums globally. **Prof. Cairncross** also met with various co-authors from Europe and the USA, and they are collectively working on a new book on the history and minerals of Tsumeb.

Prof. Kondiah (Biotechnology and Food Technology) presented an invited keynote titled, “Current and future trends in nanodiagnosics for low-income settings”, at the Nanotechnology Day 2023, **North-Eastern Hill University (India)**. She was also a chair for the **Ph.D. GES/4IR** oral session at the **UJ PG and PDRF** conference.



The first year **Botany** students had a wonderful excursion to **Melville Koppies** where they learnt about everything from the Stone and Iron Age to biological controls for invasive plant species. The students enjoyed hiking through the natural grassland and engaging with **Wendy Carstens** and her team. The **Melville Koppies** team is actively and passionately protecting the nature reserve that recently won the 'Preferred Destination' award at the **National Heritage Council's**

GOSHA awards. **Dr. Welcome** was very proud when Wendy's team indicated that the Botany students were some of the most enthusiastic visitors that they have had.

As part of the Botany Plant diversity course, students learn all about the different characters of plants, from their root types and leaf shapes to their diverse flower characters. Instead of just learning about the different plants during practical periods, a trip to Melville koppies provided a unique opportunity for students to see the value of their knowledge in protecting the beautiful diversity that we have all around us.



Prof. Mouri (Geology) was invited to give a plenary talk at the **29 Colloquium of African Geology** held in **Namibia** and travelled to **Florence, Italy** to receive her **Hypatia International Award**.

Prof. Chirove (DMAM) participated as a Chair for the **Ph.D. Oral presentation at the UJ postgraduate/PDRF Annual research conference** hosted by the Postgraduate School's Research capacity development unit.



Dr Dimpe and Mr. Monama (Chemical Sciences) attended the **Annual Blouberg Mayoral Careers Expo** to offer cutting edge activities for Grade 11 & 12 learners + Teachers in **Limpopo-Bochum at Eldorado Sports Complex- Eldorado Village**.

Dr. Craig (DMAM) visited **Prof. Peter Jipsen** at **Chapman University** in **California** for three weeks. He gave two research seminars at Chapman, and also gave a popular mathematics talk at nearby **Soka University**.

Prof. Nyabadza (DMAM) visited **Masinde Muliro University of Science and Technology (MMUST)** and gave a public lecture. **MMUST** has an existing MOU with **UJ**. He also visited the **Deputy Vice-Chancellor (Planning, Research, and Innovation)**, **Prof. Charles Mutai**.



DSI-NRF CIMERA

DSI-NRF CIMERA successfully organized the **8th SGA-IUGS-SEG-UNESCO Short Course on African Metallogeny** from October 8 to October 13, 2023. A breakdown of the event is provided below:

October 8, 2023: The event commenced with a welcome function. **Prof. Wagner** shared an overview of the **8th SGA-IUGS-SEG-UNESCO Short Course on African Metallurgy**. The evening featured an energetic Zulu traditional dance performance by the **Diphala Tsa Borwa** dance group, enjoyed by academia, students, and industry professionals.

October 9-11, 2023: The event's core consisted of lectures from various speakers representing academia, industry, and government. They shared diverse perspectives and research on African Metallurgy. In the evening, delegates came together for a course dinner, allowing for networking and enjoyment.

October 10, 2023: Participants engaged in a Geo-Quiz game night, putting their geological knowledge to the test and enhancing their understanding of African geology.

October 11, 2023: Participants had a remarkable experience at the **Wits Mining Institute (WMI)**, hosted by **Prof. Nwaila (WMI Director)**, where they explored a mining tunnel and gained a realistic understanding of being underground in a mine.

October 12-13, 2023: The event concluded with a field trip to the **Brits Vametco Mine**, Bushveld Minerals, and Elikhulu Operation at Pan Africa Resources.



DSI-NRF Cimera attended the **29th Colloquium of African Geology** hosted in **Windhoek, Namibia**. The colloquium is an international geology event that was well attended by over 200 delegates from various countries. **DSI-NRF Cimera** was an exhibitor and networked with the delegates in the pursuit of meaningful partnerships with industry and academia. **DSI-NRF Cimera** affiliated students, **Matthew Hales - University of the Witwatersrand**, **Robyn Ormond - University of Johannesburg**, **Welhemina Mamokhobo Langa (Pr.Sci.Nat)- University of Johannesburg**, **Phumudzo Munyai - University of Venda**, **Casper Soul Karadzandima - University of Johannesburg** and **Prof. Kinnard (CIMERA Acting Co-Director)** presented their research to the Colloquium delegates.

DSI-NRF CIMERA joined the **MENAR Academy's 5th Annual Mining Training Journalism** seminar's first day, which covered essential mining topics in Mining journalism and its importance to the industry, how it affects the country's economy, society, and environment and ensuring transparency, accountability, and responsible mining, which leads to sustainable economic growth. **Dr. Nogxina** talked about the history of the **Mineral and Petroleum Resources Development Act**, which addresses past injustices and ensures secure land rights. **Mzila Mthenjane**, CEO of the **Minerals Council South Africa**, stressed the importance of involving stakeholders in mining. **Styles Lucas Ledwaba**, an award-winning journalist from **Mukurukuru Media**, shared his experiences covering the **Marikana Massacre** in 2012. **Gideon Du Plessis** discussed wage negotiations and media statements' complexities, and geologist **Kgothatso Nhlengetwa** explained policy gaps that contribute to illegal mining in South Africa.

DSI-NRF CIMERA's Director, **Prof. Wagner**, highlighted the significance of critical minerals in today's mining discussions. **George Kahn**, Director at **Richard Spoor Attorneys**, talked about health and safety in South African mining.



CIMERA joined the MENAR Academy's 5th Annual Mining Training Journalism seminar (right).



DSI-NRF Cimera-affiliated students and staff joined the global coal industry discussions at the **2nd FFF Carbon Conference** in **Middelburg, South Africa**. **Prof Wagner** chaired the event (left)

STUDENT AWARDS & ENGAGEMENTS

Ms. Refilwe Chilo (right), supervised by **Dr. Bird (Zoology)** won first prize for the **Best Oral Presentation (General)** at the **UJ Postgraduate Conference**.



Ms. Mpho Maduenyane (left) (Ph.D.), supervised by **Prof. Oldewage (Zoology)**, won **Best Student Presenter** at the **9th International Symposium on Monogenea** in **Lucknow, India**.

Ms. Mpho Maduenyane (Ph.D.) and **Ms. Nonny Masango** (MSc) supervised by **Prof. Oldewage** won second place for the **Senior Oral Presentation** and **First Time Oral Presentation** respectively at the **PARSA** conference.

Ph.D. students **Phetoho Rasebechele** and **Bopaki Phogole** from the **Department of GEMES** were 2 of 10 students selected from 39 abstracts to present their research at the student track of the **Gauteng Environmental Research Conference**. They were then voted as 2 of the top 5 presentations and have been invited to present their research at the **Fifth Annual Gauteng Environmental Research Symposium**.

Savannalee Hodgkinson (GEMES) won the first prize for the masters oral presentation category at the **Annual Research Conference** of the **University of Johannesburg's Postgraduate School**. The conference is hosted by the Research Capacity Development division of the post-graduate school, for the post-graduate students and the post-doctoral research fellows. Her presentation was derived from her masters research and was entitled "**Environmental motivations for the adoption of plant-based diets: A study of Johannesburg, South Africa.**" **Savannalee** is currently completing her research in the Department of **GEMES** under the supervision of **Prof. Kelso** and with the external supervision of **Prof. Wagner** in the **Department of Psychology** at the **University of Pretoria**.



Prof. Kondiah's (Biotechnology and Food Technology) masters student, **Ms Mercy Shibalabala** presented a talk titled "Uptake of lead (Pb) by E. coli BL21 (DE3) cells genetically engineered with a pbrD gene" in the Masters GES/4IR category at the **UJ PG and PDRF** conference.

Thabo Stephen Kgarabjang, Ph.D. candidate in **Geology** from the **University of Limpopo** and **DSI-NRF Cimera**-affiliated, attended the **17th Biennial SGA Meeting conference** held at **ETH Zurich, Switzerland** and presented his MSc work under the title: Quantification of hydrothermal alteration associated with gold-antimony mineralization along the Antimony Line in the Murchison greenstone belt, South Africa.



Ph.D. candidate **Itumeleng Matlala (Geology)** presented part of her research at the **International Joint 74th ICCP and 39th TSOP Meeting** hosted at the **University of Patras, Greece**. Symposium theme: Organic petrology in the energy transition era: challenges ahead.

Prof. Mpekoa's (ACSSE) students took part in the Sunrun hackathon, and went through to the final round, which will be held in December 2023.

Ms. Ntlangula a Ph.D. student under the supervision of **Prof. Leung (ACSSE)** has a paper accepted for the digiTal2K in Cape Town.



The **Department of GEMES** postgraduate students presented their research at the **South African Society for Geographers Student Conference**, which was held at the **University of Free State**, Qwaqwa campus. Two of their students, one Honours (**Ms Nthabiseng Tsimo**) and one Masters (**Mr. Ngcebo Masilela**), both won 2nd prize in their



respective sections, for top paper. The students were accompanied by **Dr. Kganyago** and **Mrs. Block**. Students received positive feedback and great compliments from the academics in attendance and fellow students from other universities. As part of the conference students also visited the **Basotho village** with the **Golden gate Nature Reserve**.



GEMES students took the top 3 places in the student track of the **Gauteng Environmental Research Symposium**. First place went to **Tebogo Maleka**, second place to **Phetoho Rasebechele** and third place to **Bopaki Phogole**.

ACDB

The African Centre for DNA Barcoding is a division of the **University of Johannesburg** and an academic unit within the department of **Botany & Plant Biotechnology**.



Dr. Sethusa (left) has been appointed as the Director of Research and Scientific Services at **SANBI**. **Dr. Sethusa** is a distinguished alumnus of ACDB.

A huge congratulations to **Khanyi, Ross** and **Kamogelo** (right) on their award-winning presentations at the **2023 UJ Botany Symposium**.



Representing **ACDB** at the **PG & PDRF Annual Research Conference 2023**, **Ross** achieved 3rd place for his Ph.D. presentation titled: Leveraging machine learning to unveil phenological flowering patterns in **South African National Botanical Gardens** through public databases.

Dive into a groundbreaking taxonomic revision of the *Gnidia linearifolia* group in the Cape Floristic Region by **Dr. Olaniyan**. This study identifies 5 distinct species with unique characteristics. Read more [here](#).

Khuthadzo Tshishonga (captain), **Madimetja Mathobela**, **Siya Zwane**, **Siyamcela Mngqingo** & **Witness Qaku** (mentor) from the **Department of Biotechnology and Food Technology** participated in the **InterVarsityBrew 2023**.



The Academy of Computer Science & Software Engineering hosted its **37th annual Projects Day** organized by the academy and was a resounding success. Students showcased their year-long projects, emphasizing principles of software engineering and the use of cutting-edge software tools in collaboration with industry sponsors. The event featured not only final year projects but also research projects by Honors students, highlighting innovative technologies. It drew a diverse crowd of over 500 attendees, including primary and high school students, parents, and industry members. The event fostered a sense of community, excitement, and collaboration, showcasing the dedication, talent, and passion of the students and the academy's commitment to excellence and innovation.



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