UNIVERSITY OF ZULULAND

ANNUAL 2024 FACULTY OF SCIENCE, AGRICULTURE AND ENGINEERING SYMPOSIUM

THEMED:

Advancing Science Through Multidisciplinary and Afrocentric Approaches

CO-HOSTED BY:
DEPARTMENT OF CHEMISTRY
AND
DEPARTMENT OF PHYSICS

SUPPORTED BY:

UNIVERSITY OF ZULULAND
A NODE FOR AFRICAN THOUGHT

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UNIVERSITY OF ZULULAND

2024 Faculty of Science, Agriculture and Engineering Annual Postgraduate Symposium

MESSAGE FROM THE ORGANISING COMMITTEE:

The organising committee on behalf of the Faculty of Science, Agriculture and Engineering welcome all the postgraduate students and staff pursuing honours, MSc, or Doctoral degrees to the Annual 2024 Postgraduate Symposium. The event is co-hosted by the departments of Chemistry and Physics on the 18th of October 2024, at the UNIZULU main campus. The symposium theme is "Advancing Science Through Multidisciplinary and Afrocentric Approaches".

This postgraduate symposium aims to showcase how multidisciplinary scientific approaches have addressed or are addressing the current challenges faced by Africa and the world. Participants should demonstrate how we can tackle emerging challenges and issues, what the impacts of these global issues would be if left unaddressed, and what technologies or practices can be adopted to cope with these issues. Additionally, participants are encouraged to develop guidelines and recommendations regarding these global societal issues.

Albert Einstein : "The true sign of intelligence is not knowledge but imagination."

UNIVERSITY OF ZULULAND

2024 Faculty of Science Agriculture and Engineering Annual Postgraduate Symposium

KEYNOTE SPEAKER:

Prof. Francesco Petruccione, Director of National Institute for Theoretical and Computational Sciences and Stellenbosch University

Professor Francesco Petruccione **holds a PhD in Theoretical Physics from the University of Freiburg i. Br. (Germany). He was a South African Research Chair in Qunatum Information Processing and Communication at UKZN and became Professor of Quantum Computing in the School of Data Science and Computational Thinking of Stellenbosch University in 2022. Prof Petruccione is the Director of the National Institute for Theoretical and Computational Sciences (NITheCS) and co-leads the Africa Europe Cluster of Research Excellence in Addressing Global and African Challenges through Methods from Artificial Intelligence, Data Science and Theoretical and Computational Thinking (CoRE-AI). He is an elected member of the Academy of Sciences of South Africa and a Fellow of various esteemed institutions including the Royal Society of South Africa, the African Academy of Sciences, and UKZN. Prof. Petruccione's scholarly contributions are profound, with over 250 papers in peer-reviewed scientific journals. Among his publications, the monograph "The Theory of Open Quantum Systems" stands out, garnering more than 10,000 citations and seeing translations in Russian. Moreover, his collaborative work with Maria Schuld titled "Supervised Learning with Quantum Computers" (2018) has been translated into Japanese, with its second edition, "Machine Learning with Quantum Computers", released in 2021.He serves on the Editorial Board of several scientific journals including "Open Systems and Information Dynamics", "Scientific Reports", and "Quantum Machine Intelligence".**

UNIVERSITY OF ZULULAND

2024 Faculty of Science Agriculture and Engineering Annual Postgraduate Symposium

KEYNOTE SPEAKER:

Dr. Manfred Scriba, Director of the DSI Nano-Micro Manufacturing Facility, Research Group Leader, CeNAM, CSIR.

Dr. Manfred Scriba **holds a PhD in Experimental Physics from the University of Cape Town on the synthesis and characterization of doped silicon nanoparticles for applications in printed electronics and smart sensors. He was the chairman of the South African (SA) Nanotechnology Initiative that successfully drafted a nanotechnology strategy in 2006 for the Department of Science and Innovation (DSI) and which resulted in substantial investments in nanotechnology in SA. He successfully drafted a strategy for the establishment of a Nano-Micro Manufacturing Facility (NMMF) which is funded by the DSI, and as director manages the program comprising a technical node at CSIR and 4 nodes at universities. These facilities are tasked with assisting researchers to develop new, low-cost diagnostic devices and sensors for medical applications, as well as developing hybrid sensors and printed electronic devices. As leader of the CSIR NMMF node within the Centre for Nanostructures and Advanced Materials he oversees the development of low-cost medical diagnostics and sensors and the establishment of commercialization partnerships to realize their manufacture towards health impact. Dr Scriba started his career in product development based on electronic and mechatronic engineering and electro-optics and was also active in nano-materials development as well as business development, has published several papers and patented multiple technologies. This diverse background offers the ideal basis for the development of medical diagnostics and devices that rely on convergent technology integration. In this talk entitles: Nano-Micro Manufacturing towards future diagnostics, flexible devices and integrated sensors. A convergence opportunity for materials, electronics, biology and nanotechnology, Dr Scriba will give an overview of this exciting field and highlight what South Africa is doing in this technology field and where the opportunities lie.**

2024 Faculty of Science, Agriculture and Engineering Annual Postgraduate Symposium Programme

UNIVERSITY OF ZULULAND

A NODE FOR AFRICAN THOUGHT

"Advancing Science through Multidisciplinary and Afrocentric Approaches"

18 October 2024

UNIZULU LECTURER THEATERS (Zoom and YouTube streaming)

Time	Symposium activity		
07:00-08:00	Arrival		
08:30-08:30	Registration – registration desk		
	Opening plenary session: Programme Director (Symposium chairs) – Dr. S.M. Mohomane and Dr.C. Ndlagamandla		
09:00-09:15	Opening address by FSAE Deputy Dean – Prof. I. Moyo		
09:15-10:00	Keynote address - Dr. Manfred Scriba, Director of the DSI Nano-Micro Manufacturing Facility, Research Group Leader, CeNAM, CSIR		
10:00-10:15	**Tea/ coffee break (foyer)**		
Breakaway/ Parallel sessions			
	Breakaway Session 1A (venue: LT1-01 (4)) Chair: Prof. L. Vivier	**Breakaway Session 1B (venue: LT1-02 (5)) Chair: Prof. Ntuli**	**Breakaway Session 1C (venue: LT1-03 (6)) Chair: Prof. M. Sibanda**
10:15-10:30	The Need for Indigenous Games to Combat Noncommunicable Diseases in South Africa: A Narrative Review **Nduduzo Shandu**	Facilitated intracellular uptake of bioactive compound by cysteine-capped gold nanoparticles in PC 12 neural cells. **Michael Chukwuka Ojo**	Ag-H_2O nanofluids by pulsed laser liquid-solid interaction for heat removal in electronics devices **Presenter: Snenkosi Welcome Dlamini**
10:30-10:45	Evaluation of the Effect of Sugarcane Filter Cake on the Production of Bidens pilosa L. in	Assessing the impact of climatic factors on the trade performance of South African maize commodity	The physiological and biochemical impact on maize seedlings exposed to Fusarium sp. and drought stress combinations.

	KwaDlangezwa, Northern KwaZulu-Natal, South Africa. **Sbonelo Dlamini**	**Buhlebemvelo Dube**	**Sanele G.P Sibiya**
10:45-11:00	The analysis of the cosmological parameter using maximum likelihood estimator and chi-square **Sinenhlanhla Nxumalo**	The role of nitrate priming in modulating salt stress tolerance of Bambara groundnut (Vigna subterranea L.) strains. **Siyabonga Ntshalintshali**	Structure-function analysis of Mycobacterium tuberculosis drug target P450 CYP125A1 **Masinga Nompilo**
11:00-11:15	Metaheuristic Optimized Detection of Firmware Malware Using Audio Signal Features. **Mussa Phiri**	The Effect of Helium on the Migration Behavior of Selenium Implanted into Silicon Carbide. **Sifiso Mthalane**	Developing a mode identification formula for non-radially pulsating stars with convection. **Thembeka Ntombela**
11:15-11:30	An empirical assessment of discriminative deep learning models for multiclassification of COVID-19 X-ray. **Sunday Adeola Ajagbe**	Fabrication of ZnS nanoparticles through solventless approach for efficient dye photocatalytic degradation. **Francisco Lucas Olambo**	Adsorption of Methylene Blue from Contaminated Water Using Functionalized Cellulose-Based Silica Aerogels **Nduduzo Lungisani**
11:30-11:45	Assessing the performance of Wi-Fi student's networks at the University of Zululand's KwaDlangezwa campus **Penelope Gumede**	Genetic variation among Strychnos madagascariensis morphotypes assessed by Simple Sequence Repeat markers **Luyanda Mbongwe**	Evaluate the impact of augmentation techniques for audio firmware malware detection **Khethokuhle Mlambo**
11:45-12:00	Examining the Structural and Optical Properties of Co3O4 Nanostructures Prepared in Different Solvents **Thabo Nhlakanipho Nhlenyama**	Perceptions, Knowledge, and Consumption of Indigenous Fruits in selected students at the University of Zululand **Zandiswa Teti**	Evaluate the impact of augmentation techniques on audio-based firmware malware detection **Fanelesibonge Zondo**

12:00-12:15	Enhancing performance and reducing injury risk: integrating resistance and flexibility training for hamstring injury prevention in rural-based soccer players. **Nduduzo Shandu**	Enhancing Water Security through Roof-Rainwater Harvesting in Esikhawini Township for Domestic Water Use and Supply. **Lindokuhle Mncwango**	Hate Speech Detection in Social Media using Deep Learning and Generated Synthetic Data **Nontokozo Manukuza**
12:15-12:30	Evaluation of model compression technique for edge AI **Mondli Zungu**	A systematic review:Assessing the challenges and opportunities of indigenous crop towards market participation in South Africa. **Mduduzi Ngubane**	Bee Swarming Detection using Machine Learning Techniques **Kwizera Rwarinda**
12:30-13:30	**Lunch poster mounting in the foyer commences**		
	Breakaway Session 2A (venue: LT1-01 (4)) Chair: Dr. Breucklman	**Breakaway Session 2B (venue: LT-01 (5)) Chair: Dr G Mengistie**	**Breakaway Session 2C (venue: LT-01(6)) Chair: Prof. Pullabhotla**
13:30-13:45	A Desktop Review of Perceptions and Factors Influencing Land Reform Progress in South Africa: Implications for Food Security **Buhlebemvelo Dube**	Structure-Function Analysis of the biotechnologically important Cytochrome P450 109 (CYP109) enzyme family **Siphesihle Mooi Msweli**	A Machine Learning-Based Dropout Prediction Model for Rural and Township Schools in South Africa **Njabulo Ndlela**
13:45-14:00	Analysis and monitoring of various heavy metals and microplastics contamination on surface water - uMhlathuze River, Kwazulu-Natal , South Africa **Lukusa Cimanga**	Synthesis and characterization of Sm doped hematite nanostructure **Ntokozo Cebekhulu**	Radiation-induced Decrease in Structural and Optical Parameters of Cobalt Ferrite Nanoparticles **Sunday Ogundipe**
14:00-14:15	Radiometric Analysis of Organic and Inorganic fertilisers **Busisiwe Pertunia Mbatha**	Motives and Barriers to Physical Activity Participation Among Semi-Rural University Students: A Mixed-Methods Study. **Silindokuhle S Radebe**	Motives and Barriers to Physical Activity Participation Among Semi-Rural University Students: A Mixed-Methods Study. **Silindokuhle Sanele Radebe**

14:15-14:30	Simulation Rare Earth Ion Effects On radiation shielding parameters in the X-ray region using Phy-X/PSD,XCOM, and Geant4 softwares **Sgananda Shezi**	Audio-Based Firmware Malware Detection Using Deep Learning. **Simphiwe Ngubane**	Evaluation of Data Compression Methods for IoT-based Surveillance System **Mluleki Ngcobo**
14:30-14:45	Harnessing indigenous agricultural practices as sustainable climate change adaptation for small-scale farmers **Halala Mpontshane**	Efficiency of Machine Learning Algorithms for Real-Time Credit Card Fraud Detection **Luyanda Nqobani Mpanza**	Assessing the implications of indigenous farming practices adopted by crop smallholder farmers to improve their wellbeing: secondery data analysis. **Yolanda Myeni**
14:34-15:00	The potential of indigenous food preservation techniques to extend shelf life within rural households: a systematic review **Gumede N**	An indigenous fruit tree (Monkey orange *Strychnos madagascariansis*) on sorghum porridge to enhance food and nutrition security status of people living with dysphagia: A review Presenter & principal author: **Sphelele Nzimakwe**	
	Closing plenary session: Programme director chair – **Ms Ijeoma Noella Ezeji**		
15:00-15:40	Keynote Address – Prof. Francesco Petruccione, National Institute for Theoretical and Compuational Sciences and Stellenbosch University		
15:40-16:00	Awarding of prizes – Overall winner & 2 runners up (2nd & 3rd places) (Honours, MSc & Doctoral paper and poster categories) by the FSAE Dean – **Prof K.C. Lehloenya**		
16:00-16:05	Closure and vote of thanks – **Prof. F Fon**		
	Day Complete/ departure		

Note of thanks

Dear delegates and attendees

On behalf of the UNIZULU, Department of Physics, Departmet Chemistry, and the Faculty of Science, Agriculture and Engineering, we extend our heartfelt gratitude for your active participation in the 2024 Faculty of Science, Agriculture and Engineering Annual Postgraduate Symposium hosted on **18 October 2024** at UNIZULU, Kwa Dlangezwa Campus

2024 Faculty of Science, Agriculture and Engineering Annual Postgraduate Symposium Organizing Committee