

PRIS²⁰²⁵

POSTGRADUATE RESEARCH & INNOVATION SYMPOSIUM

DATE:
28 & 29
October 2025
(Tuesday and
Wednesday)

VENUE:
**Coastlands
Hotel,**
Musgrave Durban

THEME:
**INTERNATIONAL
YEAR OF
QUANTUM
SCIENCE AND
TECHNOLOGY**

pris.ukzn.ac.za

INSPIRING GREATNESS

*The College of Agriculture, Engineering and Science
would like to express its appreciation to the following external partners who have supported
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Professor Vincent Nyamori, NanoChemistry Research Group, School of Agriculture and Science, Discipline of Chemistry

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We acknowledge the following donors for their generous support of our students and the research that drives innovation and progress.

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Dr Ntombifuthi Nzimande

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Dr Zikhona Rani-Kamwendo

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FLASH PRESENTATIONS

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Chair: Prof Nishani Harinarain

Assistant Chair: Prof Jules-Raymond Tapamo

Assistant Chair: Dr Joy Adu

Moodle Co-ordinator: Mrs Rosanne Els

Moodle Co-ordinator: Mr Shridhar Singh

Judges:

Dr Andronicus Akinyelu

Dr Nivaar Brijmohan

Mr Javhaid Hammujuddy

Prof Pradeep Kumar

Dr Cerene Rathilal

Dr Phuti Tsipa

Dr Kanagarathnam Arunakirinathar

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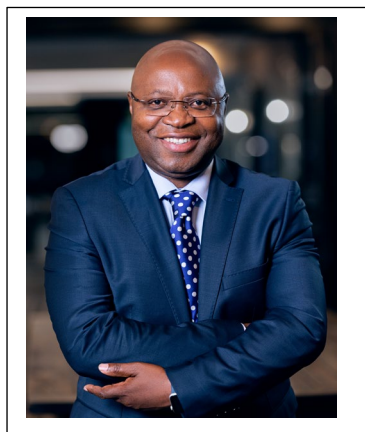
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MESSAGES OF SUPPORT



Welcome to PRIS 2025 – the fifteenth College of Agriculture, Engineering and Science Postgraduate Research and Innovation Symposium. We are striving to ensure that the research carried out by our postgraduate students is relevant to society and contributes to the wellbeing of South Africans. This event highlights the cutting-edge research conducted by our postgraduate students and provides them with an opportunity to present their work to peers, academic staff and research partners. I would like to thank and congratulate the large number of postgraduate students who have shown the courage and enthusiasm to present their work today. The standard of proceedings is very similar to what students can expect at national and international conferences. Many students have used occasions such as this to hone their presentation skills and have gone on to win awards at international conferences. Behind every postgraduate student is a supervisor or supervisory team, who challenges, encourages and today will be sharing in your success – we owe you a debt of gratitude. Finally, we are grateful to all the sponsors whose generous contributions made this day possible, and we continue actively to seek ongoing collaboration and partnerships with industry and with all relevant role players.

Professor Nana Poku, Vice-Chancellor and Principal, UKZN



One of the most influential scientists of modern times, Albert Einstein, stated, “If we knew what it was we were doing, it would not be called research, would it?” Given the pace at which our world is changing, it is no wonder that the human race is under increasing pressure to become “experts” – to know more and more about less and less. The big challenge for us is rapidly to discover, inform and implement our small and big discoveries to make real changes. We have economic, environmental, health and cultural questions to respond to, for the benefit of the present and future generations. The mission of UKZN is to be relevant to our local communities, South Africa and the world. Our postgraduate students have made it possible for UKZN to deliver on its mission. The College Postgraduate Research and Innovation Symposium is a significant moment for UKZN to highlight the efforts and successes of our students and their supervisors. Every presentation over these two days is valuable and I encourage that you should start working on publishing your work. We

are thankful to all the students who took time to share their knowledge with us. We also thank their supervisors who guided them to the point of being able to share their research with us. Without the support of our funders, partners and collaborators in research, we would not be celebrating the global recognition we currently enjoy and showcase through this special symposium.

**Professor Fhatuwani Mudau,
Deputy Vice-Chancellor and Head of College: Agriculture, Engineering and Science, UKZN**



The research community from the College of Agriculture, Engineering and Science continues to set the pace in terms of research outputs produced across the university. An important part of UKZN's Strategy is the emphasis it places on growing the impact of the research that is produced at UKZN. Impact is not only measured in terms of the influence our research has on the community in which we function and the manner in which it shapes the policy environment but also the citations our published research attracts from the broader research community. This requires a focus on high-impact journals and increasing the international collaborations we engage with. These two factors alone will significantly strengthen the research profile of UKZN. Please use the opportunity afforded by this event to encourage all our students and academics to build their research profiles and to focus on the quality of the research produced to ensure that UKZN becomes well-known for the transformative character of its research.

Professor Rituparno Goswami, Dean of Research: College of Agriculture, Engineering and Science, UKZN



Welcome to the fifteenth College of Agriculture, Engineering and Science Postgraduate Research and Innovation Symposium. This year, the newly formed School of Agriculture and Science is the proud host of this flagship College event and the two days we have lined up are aimed at showcasing our master's and PhD research across the College, under the banner: "International Year of Quantum Science and Technology". The scientific programme promises to be exciting with a good mix of fundamental and applied research presentations. Of particular importance is communicating this research to a wider audience, demonstrating the impact it has on communities and industry. It is my hope that the event will be a catalyst for interdisciplinary dialogue among academics and researchers, and for future collaborative projects with community, government and industry stakeholders.

Part of conducting scientific research is to improve the lives of mankind. These two days will provide a platform for our postgraduate students to demonstrate this to their peers, professors and to the public. I applaud all presenters who have come forward to present their research - This is not just a platform to present your research but also a stepping stone on your journey towards becoming thought leaders and change makers in science. Please enjoy the moment, embrace the feedback and let it inspire your pursuit of excellence. Hosting an in-person symposium at one of our premier hotels in Durban allows students to get the full experience of attending a conference similar to a national or international format. This is an experience every postgraduate student should have. The symposium will take place in two formats, the conventional oral presentations, and flash presentations, which are a shorter, more concise version of the oral presentation. This is a common practice at many international conferences on various continents. As such, our students will be exposed to this way of presenting their research that will allow them to make an impact to a large audience.

Finally, I would also like to take this opportunity to thank and congratulate the supervisors and mentors for their unwavering commitment to guiding and supporting the postgraduate students. To both the presenters and their supervisors, well done. I look forward to an interesting two days.

Professor Ademola Olaniran, Dean and Head of the School of Agriculture and Science, UKZN

PROGRAMME

Tuesday, 28 October and Wednesday, 29 October 2025

DAY ONE: Tuesday 29 October

- 09:00 – 09:15 **OPENING PLENARY** (*Sapphire Hall*)
Introduction – Professor Rituparno Goswami, *College Dean of Research*
Official Welcome – Professor Anil Chuturgoon, *Deputy Vice-Chancellor of Research, University of KwaZulu-Natal*
- 09:15 – 09:45 **Keynote Lecture** – **Professor Val Zwiller**, *Professor of Physics at the Royal Institute of Technology, Sweden & Chief Science Officer at Single Quantum*
- 09:45 – 9:50 **Programme overview - Professor Rituparno Goswami**
- 10:00 – 11:20 **Session 1 – ORAL PRESENTATIONS** (*Suite 1 – 4 & Ruby 1 – 2*)

Timeslot	AEES	CP	ENG	LS	MSCS
10:00 – 10:20	AEES-O-1-Cebiso-Zodidi	CP-O-1-Akano-Mary	ENG-O-1-Ahmad-Fazeel	LS-O-1-Magwaza-S'thandiwe	MSCS-O-1-Cele-Lindani
10:20 – 10:40	AEES-O-2-Chatara-Tinashe	CP-O-2-Gcabashe-Nontobeko	ENG-O-2-Ganapathie-Adheesh	LS-O-2-Maswanganye-Carol	MSCS-O-2-Dlamini-Nqobile
10:40 – 11:00	AEES-O-3-Mauyo-Lianda	CP-O-3-Hlapisi-Nthabeleng	ENG-O-3-Gasa-Siyabonga *(UW)	LS-O-3-Mgabhi-Nelisiwe	MSCS-O-3-Haroon-Ali
11:00 – 11:20	AEES-O-4-Mkhonta-Glen *(UW)	CP-O-4-Hlongwane-Michael	ENG-O-4-Joseph-Elijah	LS-O-4-Moeketsi-Bonolo	MSCS-O-4-Malope-Ben

11:20 – 11:40 **Tea and viewing of industry exhibits** (*Sapphire Hall*)

11:40 – 13:00 **Session 2 – ORAL PRESENTATIONS** (*Suite 1 – 4 & Ruby 1 – 2*)

Timeslot	AEES	CP	ENG	LS	MSCS
11:40 – 12:00	AEES-O-5-Mthiyane-Sfundo	CP-O-5-Madhunlall-Aavishkar	ENG-O-5-Mcwabe-Nolwazi	LS-O-5-Ndlangamandla-Valencia	MSCS-O-5-Ndebele-Lethukuthula
12:00 – 12:20	AEES-O-6-Buthelezi-Kwenama	CP-O-6-Khubone-Lungisani	ENG-O-6-Monyetsware-Dikeledi	LS-O-6-Ndlovu-Sphamandla	MSCS-O-6-Ogotu-Sarah
12:20 – 12:40	AEES-O-7-Mthembu-Thando	CP-O-7-Maluleka-Sizwe	ENG-O-7-Mupfiga-Elvis	LS-O-7-Nuse-Xolile	MSCS-O-7-Oliobi-Chidimma

12:40 – 13:00	AEES-O-8-Ncisana-Lusanda	CP-O-8-Mazibuko-Kwanele	ENG-O-8-Mutuku-Peter	LS-O-8-Radebe-Nkanyezi	MSCS-O-8-Revesai-Zvinodashe
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13:00 – 14:00 **Lunch** (*Sapphire Hall*)

14:00 – 15:20 **Session 3 – ORAL PRESENTATIONS** (*Suite 1 – 4 & Ruby 1 – 2*)

Timeslot	AEES	CP	ENG	LS	MSCS
14:00 – 14:20	AEES-O-9-Phelako-Andile	CP-O-9-Mthimkhulu-Sakhile	ENG-O-9-Netshirungulu-Wamashudu	LS-O-9-Ramklowan-Dhamini	MSCS-O-9-Sekhoasha-Tsepo
14:20 – 14:40	AEES-O-10-Tseku-Simphiwe	CP-O-10-Ngwenya-Asanda	ENG-O-10-Ramruthan-Caleb	LS-O-10-Sibiya-Mbalenhle	MSCS-O-10-Sola-Lutho
14:40 – 15:00	AEES-O-11-Valentine-Emmanuel	CP-O-11-Nkosi-S'busiso	ENG-O-11-Thabede-Mduduzi	LS-O-11-Tokota-Dineo	MSCS-O-11-Zengeya-Tsitsi
15:00 – 15:20	AEES-O-12-Zabuloni-Byamungu	CP-O-12-Ruwihizi-Ngonidzashe	ENG-O-12-Zenani-Khayelihle	LS-O-12-Tsalong-Sipho	MSCS-O-12-Zuma-Ntuthuko

16:00 – 16:30 **Guest Talk** (*Suite 1 – 4*)

Welcome: Professor Neil Koorbanally, *Acting Dean of Research, University of KwaZulu-Natal*

Speaker: Dr Ntsapokazi Deppa, *Executive: Scientific Services, uMngeni-uThukela Water (UW)*

16:30 – 18:00 **SCIENCE WITH JAZZ** (*Suite 1- 4*)

Speaker: Professor Thomas Konrad, *Director, CQCtec, University of KwaZulu-Natal*

Musicians: Linda Sikhakhane (*saxophone*) and Paras Dlamini (*vocals*)

18:00 – 22:00 **Gala Dinner** (*Sapphire Hall*)

Master of Ceremonies: Professor Alan Mathews

Welcome: Professor Ademola Olaniran, *Dean: School of Agriculture and Science, University of KwaZulu-Natal*

Keynote Speaker: Dr Happy Sithole, *Centre Manager: Council for Scientific and Industrial Research, Cyberinfrastructure*

Entertainment: Ms Jamie-Lee Simons

UKZN Foundation Presentation: Mr Steve Camp, *Executive Director, UKZN Foundation*

Acknowledgement of Donors: Mr Steve Camp and Professor Rituparno Gowami

Acknowledgement of PRIS Supporters: Professor Fhatuwani Mudau, *Deputy Vice-Chancellor and Head of College* and Professor Ademola Olaniran, *Dean, School of Agriculture and Science*

Entertainment: Ms Keamogetswe Magau

Closing Remarks

Dinner

Entertainment: Ms Jamie-Lee Simons

DAY TWO: Wednesday, 29 October

FLASH PRESENTATIONS (*Suite 1 – 4 & Ruby 1*)

Timeslot	AEES	CP	MSCSENG	LS
09:00 – 11:20 TEA: 11:25 – 11:45 <i>Cont.</i> 11:50 – 13:00	AEES-F-1-Bixa-Aluvuyo	CP-F-1-Adegoke-Oyeladun *(UUW)	MSCSENG-F-1-Abejide-Kolawole	LS-F-1-Alabi-Mercy
	AEES-F-3-Curtis-Tanisha *(UUW)	CP-F-2-Afolabi-Olumide	MSCSENG-F-2-Dladla-Thembelihle	LS-F-2-Ally-Muhammad
	AEES-F-4-Dlamini-Siyabonga	CP-F-3-Ally-Numeerah *(UUW)	MSCSENG-F-3-Dladla-Sandile *(UUW)	LS-F-3-APO-KAYODE
	AEES-F-5-Gule-Melisa	CP-F-4-Ayo-Ojo-Oluwatumininu	MSCSENG-F-4-Dlamini-Ayanda	LS-F-4-Buthelezi-Khanyisile
	AEES-F-6-Gumbi-Sikhulile	CP-F-5-Badu-Godfred	MSCSENG-F-5-Dlamini-Welcome	LS-F-5-Buthelezi-Lindiswa
	AEES-F-7-Gwala-Sinethemba	CP-F-6-Bala-Sandisiwe	MSCSENG-F-6-Govender-Dylan	LS-F-6-Chabalala-Vunene
	AEES-F-8-Hadebe-Nombuso	CP-F-7-Bauchoo-Yastheer	MSCSENG-F-7-Govender-Cherise	LS-F-7-Dayanand-Shreya
	AEES-F-9-Khaba-Nkanyezi	CP-F-8-Diplal-Amisha	MSCSENG-F-8-Ibrahim-Amna	LS-F-8-Dlamini-Sthembile
	AEES-F-10-Khumalo-Phindile	CP-F-9-Dlangalala-Celiwe	MSCSENG-F-9-Joosab-Zaakirah	LS-F-9-Dlamini-Khanyisani
	AEES-F-11-Khumalo-Thalente	CP-F-10-Doncabe-Mandisa	MSCSENG-F-10-Kajola-Shamsudeen	LS-F-10-Doyisa-Sinenhlanhla
	AEES-F-12-Luthuli-Ayanda	CP-F-11-Ghumran-Safiyah	MSCSENG-F-11-Kariga-Progress	LS-F-11-Dube-Alwande
	AEES-F-13-Maereka-Enock	CP-F-12-Gobind-Dipika	MSCSENG-F-12-Khumalo-Phangisile	LS-F-12-Fayomi-Samuel
	AEES-F-14-Mahlanya-Reneilwe	CP-F-13-Goge-Mangaliso	MSCSENG-F-13-Magoma-Promise	LS-F-13-Govender-Kyle
	AEES-F-15-Majija-Yolisa	CP-F-14-Hadebe-Lungile	MSCSENG-F-14-Manyathi-Snothile	LS-F-14-Govender-Kuyurie
	AEES-F-16-Makhanya-Siphiwe	CP-F-15-Hajee-Mariam	MSCSENG-F-15-Mayise-Yamkela	LS-F-15-Gumenku-Lemohang
	AEES-F-17-Mkhize-Nonkululeko	CP-F-16-Ijimdiya-Racheal	MSCSENG-F-16-Mchunu-Bongekile	LS-F-16-Gwayi-Yamkela
	AEES-F-18-Mkhwenkwana-Anela	CP-F-17-Jili-Ncedo	MSCSENG-F-17-Mngadi-Siyamthanda	LS-F-17-Harpal-Saiesha

AEES-F-19-Mncwabe-Ntuthuko	CP-F-18-Jimoh-Saheed	MSCSENG-F-18-Moleele-Surprise	LS-F-18-Hlamaphi-Luyanda
AEES-F-20-Mngoma-Mlungisi	CP-F-19-Khubone-Lungisani	MSCSENG-F-19-Morake-Relebogile *(Uuw)	LS-F-19-Hussan-Ayesha
AEES-F-21-Mofurutsi-Tholoana	CP-F-20-Kontile-Lelethu *(Uuw)	MSCSENG-F-20-Mothiba-Koena	LS-F-20-Ismail-Huda
AEES-F-22-Mpungose-Thobeka	CP-F-21-Kumar-Gobind	MSCSENG-F-21-Mthethwa-Sbongiseni	LS-F-21-Ismail-Nuhaa
AEES-F-23-Mthethwa-Zimbili	CP-F-22-Machakaire-Tatenda	MSCSENG-F-22-Mthethwa-Sbahle	LS-F-22-Khuzwayo-Thandeka
AEES-F-25-Nasimiyu-Lydia	CP-F-23-Madlala-Ayanda	MSCSENG-F-23-Mukansi-Demian *(Uuw)	LS-F-23-Khwela-Thembeka
AEES-F-26-Nemukula-Lufuno	CP-F-24-Magqira-Bavuyile	MSCSENG-F-24-Ncama-Samkelo	LS-F-24-Kola-Elizabeth
AEES-F-27-Ngcobo-Noluthando	CP-F-25-Maharaj-Shamik	MSCSENG-F-25-Ndlovu-Disang	LS-F-25-Kumalo-Gcinile
AEES-F-28-Ngwazi-Thobani (Uuw)	CP-F-26-Maphalala-Aphiwe	MSCSENG-F-26-Ngcobo-Ndumiso	LS-F-26-Madikizela-Snothile
AEES-F-29-Njomi-Ongeziwe	CP-F-27-Maphanga-Nsindiso	MSCSENG-F-27-Ntombela-Onesipho	LS-F-27-Madlala-Thabile
AEES-F-30-Oyebamiji-Emmanuel	CP-F-28-Mbatha-Thandeka	MSCSENG-F-28-Nxumalo-Luthando	LS-F-28-Maduna-Nolufefe
AEES-F-31-Poswa-Nonkululeko	CP-F-29-Mbhele-Amanda	MSCSENG-F-29-Nyakujipa-Evangelista	LS-F-29-Maharaj-Arvish
AEES-F-32-Shangase-Mxolisi	CP-F-30-Mbuyazi-Thandi	MSCSENG-F-30-Okem-Eche	LS-F-30-Mathonsi-Shilombe
AEES-F-33-Sibanyoni-Mphoentle	CP-F-31-MedieFah-Helarie	MSCSENG-F-31-Onifade-Olayinka	LS-F-32-Mdluli-Njabulo
AEES-F-34-Sibiya-Faith *(Uuw)	CP-F-32-Migwi-Francis	MSCSENG-F-32-Pather-Yashlen *(Uuw)	LS-F-33-Mdluli-S'phosakhe
	CP-F-33-Mjwara-Pinky	MSCSENG-F-33-Qhoboshiyane-Isibabale	LS-F-34-Misra-Ashish
	CP-F-34-Mthembu-Thalente	MSCSENG-F-35-Rampersad-Kirthi *(Uuw)	LS-F-35-Mlondo-Silindokuhle
	CP-F-35-Mthethwa-Tshengisile	MSCSENG-F-36-Seodi-Lehlohonolo	LS-F-36-Moodley-Eden
	CP-F-36-Muritala-Abubakar	MSCSENG-F-37-Ssengonzi-Charles	LS-F-37-Moshobane-Moleseng
	CP-F-37-NA-Ankit	MSCSENG-F-38-Subramoney-Mickalan	LS-F-38-Msele-Kwanele
	CP-F-38-Ndlovu-Nkanyiso	MSCSENG-F-39-Tshibase-Slungile	LS-F-39-Mudau-Ndivhuwo
	CP-F-39-Ndlovu-Fathima	MSCSENG-F-40-VanWyk-JoAnne	LS-F-40-Naicker-Diveshni
	CP-F-40-Ngcobo-Nkosinathi	MSCSENG-F-41-Zakwe-Siboniso	LS-F-41-Ndou-Petunia

		CP-F-41-Ngubane-Ntombenhle	MSCSENG-F-43-Zviuya-Colleen	LS-F-42-Ngcongobahle
		CP-F-42-Nkosi-Nonhlanhla		LS-F-43-Ngozi-Lwandile
		CP-F-43-Norton-Peter		LS-F-44-Nomnganga-Busisiwe
		CP-F-44-Nxumalo-Sifiso		LS-F-45-Nomsuka-Babalwa
		CP-F-45-Nyanda-Frank		LS-F-47-Ramasar-Reshika
		CP-F-46-Pillay-Keleish		LS-F-48-Ramdass-Sristhi
		CP-F-47-Rajkumar-Nerissa		LS-F-49-Sahadeo-Adhir
		CP-F-48-Shange-Namisa		LS-F-50-Sancho-Rebekah
		CP-F-49-Sibiya-Simpiwe		LS-F-51-Sebothoma-Surprise
		CP-F-50-Singh-Bianca		LS-F-52-Sibuta-Apiwe
		CP-F-51-Sishi-Aphiwe		LS-F-53-Singh-Savarna
		CP-F-52-Soorni-Yugendhar		LS-F-54-Thekiso-Keneilwe
		CP-F-53-Uwumubyeyi-Valentine		
		CP-F-54-Wahab-Tasmia <i>*(UW)</i>		
		CP-F-55-Zulu-Delisile		

09:00 – 11:20 **CONCURRENT INDUSTRY SESSION** (*Ruby 2*)

Session 1: **uMngeni-uThukela Water:** Ms Nelisiwe Mbatha

Session 2: **First National Bank:** Ms Candace Naidoo

Session 3: **Standard Bank:** Ms Vanessa Oger

Session 4: **National Research Foundation:** Ms Kgaugelo Molepo

Session 5: **Feenix Trust:** Ms Yanga Totyi

11:25 – 11:45 **Tea and viewing of industry exhibits** (*Sapphire Hall*)

11:50 – 14:30 **CONCURRENT INDUSTRY SESSION** (*Ruby 2*)

Session 1: **KZNDOT:** Ms Nasiphi Ntengo

Session 2: **Department of Agriculture:** Ms Votelwa Ndana

Session 3: **Eskom:** Ms Thuto Manthoko

Session 4: **SACNASP:** Mr Phuti Seanego

Session 5: **CSIR:** Mr Justice Komane

Session 6: **SANRAL**: Ms Rhona Erasmus

Session 7: **Agricultural Research Council**: Ms Pearl Ndalasi

13:00 – 14:00 **Lunch** (*Sapphire Hall*)

14:30 – 16:00 **Networking Session:** Tea and Coffee (*Suite 1 – 4*)

16:00 – 17:00 **Closing, Prize-Giving, and Lucky Draws** (*Sapphire Hall*)

Professor Rituparno Goswami, *College Dean of Research*

Professor Ademola Olaniran, *Dean, School of Agriculture and Science*

Professor Glen Bright, *Dean, School of Engineering*

Professor Fhatuwani Mudau, *Deputy Vice-Chancellor and Head of College*

Dr Sally Frost, *College Public Relations Manager*

**** (UW) denotes presentations by students funded through the uMngeni-uThukela Water Chair of Water Resources Research and Innovation***

Keynote Lecture

“Detecting light at the single photon level: quantum devices and applications”

by

PROFESSOR VAL ZWILLER

Professor of Physics at the Royal Institute of Technology, Sweden, & Chief Science Officer at Single Quantum

Quantum devices can control light at the single photon level and enable novel instrumentation. Future quantum communication and sensing will require high-performance devices able to generate and detect light one photon at a time. The ability to detect single photons is crucial for quantum optics as well as for a wide number of applications. Several technologies have been developed for efficient single photon detection in the visible and near infrared. The invention of the superconducting nanowire single photon detector in 2001 enabled the development of a new class of detectors that can operate close to physical limits. Different aspects will be discussed, including wavelength detection range, time resolution, dark counts, saturation rates and photon number resolution, along with various applications such as Lidar, quantum communication, deep space communication, microscopy and bio-medical measurements.

Multipixel single photon detectors based on superconducting nanowires will also be discussed, including a quantum spectrometer based on an array of high-performance single photons. By time stamping single photon detection events at the output of a spectrometer, we generate data that can yield spectra as well as photon correlations and cross correlations among different spectral lines, under pulsed excitation, transition lifetimes can also be extracted. This instrument therefore replaces a spectrometer, a streak camera, and a Hanbury-Brown Twiss interferometer and operates with a far higher signal-to-noise ratio than is possible with existing detectors that are commonly used in the infrared.

The generation of single photons on demand, as well as pairs of entangled photons, can be realised with semiconductor quantum dots to enable the implementation of long-distance quantum communication. We operate a quantum network made of deployed optical fibres in the Stockholm area and demonstrate single photon transmission and quantum key generation over 34 km.

Guest Talk

“Inspiring u-Mngeni-uThukela Water’s Research and Innovation through: Research and Innovation Chairs”

by

DR NTSAPOKAZI DEPPA

Executive: Scientific Services, uMngeni-uThukela Water (UUW)

Gala Dinner Keynote Address

“What will happen if all Classical Computers are swept from our feet today? Are you ready for Quantum Computers?”

by

Dr Happy Sithole

Centre Manager: Council for Scientific and Industrial Research, Cyberinfrastructure

There is increased demand for computational power due to success in modelling and simulation to accurately predict the physical processes. These areas emanating from medical sciences, engineering designs, climate change and the like, has pushed the need for computing power to trillions of Floating-Point Operations (FLOPs). This has also put significant strain on classical computer development due to the size of the processors and the need for cooling. The developments in computing have seen a slight transition from X-86 systems to accelerated computing architectures, which have provided significant demand for Graphical Processing Units (GPUs) in mainstream scientific computing. However, this has also demonstrated that increasing power also comes at the cost of operations with power requirements for computing, storage and cooling. Quantum computing seems to be an alternative, but the main question is, how ready are we, from the technology to build the quantum computers to their utilisation, in terms of application algorithms. This talk will take us through the advancements in Quantum Computing and the research that is still required to make it a viable solution to classical computers' limitations.

SCIENCE WITH JAZZ SEMINAR SERIES

"Where Science and Jazz combine"



28 OCT 2025
Tuesday



16h30



Coastlands Hotel Musgrave,
Suite 1-3

SPEAKER:

Professor Thomas Konrad,
Director: CQCtec, UKZN

TOPIC:

The Present and Future of Quantum Technology

MUSICIANS

Linda Sikhakhane
(saxophone)

Paras Dlamini
(vocal)

SYNOPSIS: When Paul Dirac received the Nobel Prize for his contribution to Quantum Physics in 1933, he claimed when asked that the new theory would never have a technological application. Subsequently, it essentially contributed to the development of computers, lasers and electron microscopes, nuclear weapons, power plants, atomic clocks and X-rays, MRI and PET scans, among other inventions, in what is known as the first quantum revolution. What can we expect from the second quantum revolution, which is still in its infancy? This talk presents the new paradigm of Quantum Information, and its potential impact on computation, communication and sensing/imaging technologies. How do we understand it? What should we do with it at UKZN? What may we hope for in Africa? The talk is combined with music to give a holistic picture of the subject.



PROFESSOR THOMAS KONRAD holds a Master of Science from the Eberhard-Karls University in Tübingen (Germany) with a dissertation in celestial mechanics, a Master of Science of the University of London (Imperial College) in quantum field theory and a doctorate in theoretical physics from the University of Konstanz. He joined UKZN in 2006, served on the Council of the South African Institute of Physics (SAIP), on Senate of UKZN, as editor of the SAIP online journal Physics Comment from 2012 to 2017 and as editor of the New Journal of Physics (IOP) since 2023. He is a Research Professor in the School of Agriculture and Science at UKZN and Director of the UKZN Centre for Quantum Computing and Technology (CQCtec). Thomas Konrad pioneers research in quantum information processing and communication. He is an internationally recognised researcher with a NRF B-rating. Konrad promotes the interplay between science and arts.



LINDA SIKHAKHANE IS a South African Composer and Saxophonist, who began his musical journey at the Siyakhula Music Centre under the gentle guidance of the late Dr Brian Thusi. His determination led to a relentless work schedule performing live and also in the studio with Nduduzo Makhathini and the H3 horn ensemble. Emerging victorious at the SAMRO Overseas Scholarship competition, he utilized the prize money to fund his degree programme at The New School in New York. Here, he was mentored by greats such as Billy Harper, Reggie Workman, David Schnitter and Charles Tolliver. Linda Sikhakhane has worked with a broad array of artists: Sibongile Khumalo, Khaya Mahlangu, Nduduzo Makhathini, Gregory Porter, Rodney Kendrick, Rhonda Ross Kendrick, Logan Richardson, Derrick Hodge, Ted Daniel, Thandiswa Mazwai, Herbie Tsoaeli and more. His 2022 release under Ropeadope is titled Isambulo, which translates from Zulu to revelation.



PARAS "SIBALUKHULU" DLAMINI is an internationally acclaimed South African singer and songwriter. His discography spans a plethora of musical genres but majors in Jazz and world music. He draws inspiration from his African paradigm and his personal spiritual journey. His debut album, "Ingoma Busuku" has received widespread media coverage and critical praise. Born and raised in KwaMashu and Ulundi he discovered his musical talent through Church, where he learnt how to play the drums. His sound he calls "Ubuntu Music" (world music). He has made an appearance on several platforms including TV and radio and has toured internationally and collaborated on stage. Singing in his native isiZulu, his voice carries an authenticity and emotional resonance, with soulful melodies and rhythmic improvisations, offering a fresh, globally relevant perspective on South African jazz.

ABOUT THE SCIENCE WITH JAZZ SEMINAR SERIES:

2025 is the UNESCO year of Quantum Science and Quantum Technology. In this context the Centre for Quantum Computing and Technology at UKZN presents a series of science seminars combined with Jazz concerts, that informs about relevant concepts in science and technology and their societal impacts. This monthly series intends to inspire interdisciplinary discussions and synergies, in particular between the sciences and the arts.

Professor Thomas Konrad, Director: Centre for Quantum Computing and Technology, UKZN



INTERNATIONAL YEAR OF
Quantum Science
and Technology

Refreshments will be available

ENQUIRIES: Sally Frost / frosts@ukzn.ac.za / 073 160 1409

INSPIRING GREATNESS

PROFESSOR VAL ZWILLER

Biography:



Professor Val Zwiller is a Professor of Physics at Sweden's Royal Institute of Technology (KTH), where he heads the Quantum Nano Photonics research group. His work sits at the crossroads of quantum optics and nanoscale physics, pushing the boundaries of how we control and measure light at the single-photon level.

Beyond academia, he is a scientific entrepreneur, serving as Chief Science Officer at Single Quantum a company he co-founded to develop cutting-edge single-photon detectors. His career spans leading institutions across Europe, including faculty positions at ETH Zurich, EPFL, and TU Delft, before joining KTH with a dual affiliation at the Karolinska Institute to explore quantum technologies for life sciences.

Recognized as a key figure in the quantum community, he advises major research initiatives as Sweden's deputy representative to the European Quantum Flagship. He also shapes the field as Chief Editor for Quantum Optics at *Frontiers in Photonics* and

as a frequent reviewer for *Nature*, *Science*, and premier physics journals.

In the lab, his team combines nanofabrication, cryogenics, and quantum optics to build devices that harness quantum light. Their work—from fundamental discoveries to applied systems—relies on custom-built tools that probe the quantum world with unprecedented precision.

DR NTSAPOKAZI DEPPA

Biography:



Dr Ntsapokazi Deppa is the Executive: Scientific Services for uMngeni-uThukela Water (UW) and holds a PhD in Chemistry from the University of Cape Town, focusing on research in medicinal, physical and analytical chemistry. She graduated with her MBA *cum laude* from the University of KwaZulu-Natal and began her career as a contract chemistry lecturer at the Vaal University of Technology. She proceeded to work as a chemist and later as an Analytical Manager at Tongaat Hulett for nine years. She joined UW as the Laboratory Manager in 2016.

In her role at UW, she provides strategic leadership in:

- Ensuring compliance with water and wastewater quality standards and regulations, which includes appropriate planning, sampling, monitoring, analysis, auditing, and treatment process rectification functions throughout the water management cycle.
- The organisation's environmental sustainability initiatives include the development and implementation of appropriate sustainability plans and ensuring that all the organisation's operations function per its environmental values.
- Research and innovation programs of the organisation that are in line with the organisation's strategic direction

PROFESSOR THOMAS KONRAD

Biography:



Professor Thomas Konrad is an internationally recognised researcher within the Physics discipline at UKZN's College of Agriculture, Engineering and Science. Prof Konrad joined UKZN in 2006, served on the Council of the South African Institute of Physics (SAIP), on the Senate of UKZN, as editor of the SAIP online journal Physics Comment from 2012 to 2017 and as editor of the New Journal of Physics (IOP) since 2023. He pioneers research in quantum information and communication. He also holds an NRF B-rating and is currently setting up the Centre for Quantum Computing and Technology.

DR HAPPY SITHOLE

Biography:



Dr Happy Sithole is the Centre Manager for the South African cyberinfrastructure (CI) system, NICIS since 2019. This involves the three main entities of the CI, CHPC, SANReN and DIRISA.

Dr Sithole spent 12 years as the Director of CHPC. He completed his PhD in materials science. He has applied high-performance computing to solve problems in mining industries and nuclear power plant designs, such as at his time at the PBMR. Sithole also sits on the steering committees of HPC meetings in Germany, Russia, Singapore and Poland. He was the Chairperson of the ICT Committee of the National Library Board and is currently a board member at the Centre for Nuclear Safety (CNSS) at the National Nuclear Regulator. Dr Sithole also chairs NITheCS.

PRIS²⁰²⁵

POSTGRADUATE RESEARCH & INNOVATION SYMPOSIUM

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