



UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

69th Annual Conference of the South African Institute of Physics

7-11 July 2025



Conference Proceedings

PROCEEDINGS EDITOR-IN-CHIEF:

W.A. Horowitz, University of Cape Town

PUBLISHER:

The South African Institute of Physics (SAIP)

COPYRIGHT NOTICE:

© 2025 by the South African Institute of Physics
All rights reserved.

The conference was hosted by the University of the Witwatersrand, on 7—11 July 2025. The Proceedings of SAIP 2025, the 69th Annual Conference of the South African Institute of Physics, will be available electronically only on the SAIP website: www.saip.org.za.

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Abstracting with credit is permitted.

To copy otherwise, to republish, to post on servers, or to distribute to lists, requires specific permissions and/or a fee. Request permission from the SAIP Office:

phone: +27 (0)12 756 4900 / 4903

email: info@saip.org.za

ISBN: 978-1-0492-1907-3

South African Institute of Physics
CSIR Main Campus, Building 4W
Meiring Naude Rd, Pretoria.

TABLE OF CONTENTS

Copyright	ii
Table of Contents	iii
Editorial	xi
The Local Organisers	xiii
◦ Message from the Organisers	xiii
◦ Local Organising Committee	xiv
Divisions, Editorial Team, and Reviewers	xv
◦ Divisions and Division Chairs	xv
◦ Editorial Team	xvi
◦ List of Reviewers	xviii
Student Prizes	xxix
◦ Physics of Condensed Matter and Materials	xxix
◦ Nuclear, Particle, and Radiation Physics	xxx
◦ Photonics	xxxi
◦ Astrophysics and Space Science	xxxi
◦ Physics for Development, Education, and Outreach	xxxii
◦ Applied Physics	xxxii
◦ Theoretical and Computational Physics	xxxii
Group Photo of Delegates	xxxiii
A Physics of Condensed Matter and Materials	1
A.1 An anomaly in a formula to calculate the refractive index in $\text{Al}_x\text{Ga}_{1-x}\text{As}$	2
A.2 Structural and electrical transformations in Ag-implanted polyethylene terephthalate (PET) induced by swift heavy ion irradiation	6
A.3 Up-conversion and thermometric performance of $\text{CaF}_2:\text{Tb}^{3+},\text{Yb}$ material	12

A.4 Physiochemical, optical and magnetic properties of nickel-magnesium ferrite nanoparticles for various applications	18
A.5 Design and Characterization of Polymer-Coated Mg-Zn Ferrite Nanoparticles: A Glycol-Thermal Approach for Biomedical Application	24
A.6 Synthesis, structural, magnetic, and gas sensing properties of rare earth-substituted cobalt and zinc ferrites: A comparative study	30
A.7 Effect of Ce and Gd on the magnetic and mechanical properties of Nd ₂ Fe ₁₄ B permanent magnets	36
A.8 Investigation of Poly(2,5)-benzimidazole (ABPBI)-Carbon Nanotube Composites for Low Earth Orbit Applications: An Integrated Computational and Experimental Study	42
A.9 First principles study of the structural, mechanical and electronic properties of Mooihoeikite (Cu ₉ Fe ₉ S ₁₆)	48
A.10 Optimisation-Deposition and Conversion of Lead Halide Thin Films to 2D Metal Halide Perovskite Thin Films via Low-Pressure CVD	54
A.11 Investigating the effect of metal ions of different oxidation states (M ^{x+} , x = 1, 2, 3 & 4) on the PL emission of Zn ₄ B ₆ O ₁₃ :Eu ³⁺	60
A.12 Study on the impact of Pr ³⁺ , Ce ³⁺ , and Pb ²⁺ ions on luminescence properties of BaB ₈ O ₁₃ :Gd ³⁺ for potential applications in phototherapy.	66
A.13 Luminescence Study on the Impact of Alkaline Earth Metal Ions on Na ₃ PO ₄ :Ce ³⁺ Phosphors for Potential Colour Display Applications.	72
A.14 Understanding the influence of lithium polysulfides on boron oxide for an efficient lithium sulfur battery: A DFT study	78
A.15 ZnMn ₂ O ₄ -Based Anode Materials for Advanced Supercapacitor Batteries: A Study on the Impact of Co, Ni, and Cu Partial Substitution on Electrochemical Performance	84
A.16 Structural and Optical properties of rare-earth doped Magnesium ferrites	90
A.17 Thermodynamic Properties of (Gd,Pr)OsGa ₄ Intermetallic Compounds	96
A.18 Rare-Earth Perovskites in the Quantum Age: Bridging Materials Science and Technologies	102
A.19 Investigating the Photoluminescent Properties of Fe ³⁺ doped ZnAl ₂ O ₄ : A Multifunctional Material for Emerging Applications.	108
A.20 Structural and optical properties of rare earth (Sm ³⁺)-doped hematite nanostructures	114
A.21 Characterization of defects in neutron-irradiated SnO ₂ using positron annihilation technique	120
A.22 Structural and Morphological properties of a Novel Double Perovskite Sm ₂ MgRuO ₆	126
A.23 Ab initio studies of Pt-Cr alloys for jewellery applications: energetic stabilities and structural properties	132
A.24 The effect of Ir on the mechanical, thermodynamic, electronic and magnetic properties of FePt alloy: A DFT study	138
A.25 The effects of annealing temperature on physical properties of Ce ₂ Zr ₂ O ₇ materials	144
A.26 Predicting the magnetocaloric effect on perovskite oxides using Machine Learning	150
A.27 Synthesis and characterization of TiO ₂ : Evaluation for possible application as light trapping layer in thin film solar cells.	156
A.28 Effect of Temperature on Structural and Optical Properties of Sm ₂ O ₃	162

A.29 Density functional theory study on the effect of pressure on structural, mechanical and electronic properties of A15 Mn ₃ Ru alloy	168
A.30 A First-Principles Study of the Structural, Mechanical, Dynamical and Electronic properties of HfSnPt: Half-Heusler Structure	176
A.31 Mechanical and electronic properties of LiTi ₂ (PO ₄) ₃ solid-state electrolyte material	182
A.32 Cooperative Energy Transfer and Upconversion Luminescence of Sr ₅ (PO ₄) ₃ OH:Eu ³⁺ , Yb ³⁺ phosphor powders	190
A.33 The influence of Ultraviolet-Ozone irradiation time on structural and optical properties of SnO ₂ thin films deposited using the slot-die method	198
A.34 Development of cellulose nanocrystal sheet embedded with carbon nanotubes for sensor application	206
A.35 DFT-based evaluation of Li ₂ MnO ₃ as a promising cathode coating material for lithium-ion batteries	214
A.36 Assessing the Freysoldt, Neugebauer & van de Walle (FNV) and Kumagai-Oba (KO) finite-size corrections for Ce-vacancy complexes in diamond	220
B Nuclear, Particle, and Radiation Physics	227
B.1 Probabilistic Risk Assessment for Calculating Health Effects Associated with a Potential Nuclear Accident in the Vicinity of a Nuclear Facility	228
B.2 Alpha and beta radiation effects on Re ₂ MnCoO ₆ (Re = La, Sm, Nd)	236
B.3 Fuzzy-based Groundwater Quality Index Model: A Case of Rural Areas in North-West Province, South Africa	244
B.4 Statistical discrimination of uranium ore concentrate using trace element signature: Developing nuclear forensic fingerprint	252
B.5 Enhancing Gamma-Ray Spectrometry Through Convolutional Neural Networks and Kolmogorov-Arnold Networks	258
B.6 Linear polarization measurement on gamma rays from non-oriented nuclear states	264
B.7 Analysis of Long-Term Stability Uncertainty in Luminosity Measurements Using the Tile Calorimeter of the ATLAS Detector for Run 3 Proton-Proton Collisions at $\sqrt{s} = 13.6$ TeV in 2023	272
B.8 Progress on test of the generalized Brink-Axel hypothesis in ⁶³ Ni	278
B.9 Characterization of instrumental background in (p,γ) reaction studies	284
B.10 Analysis of ⁶¹ Cu from the ⁶⁰ Ni(p,γ) Reaction at iThemba LABS	292
B.11 Burn-in Testing for Transformer-Coupled Buck Converters in the ATLAS Tile Calorimeter's Low Voltage Power Supplies	298
B.12 Triboson Excesses in light of a Real Higgs Triplet Model	304
B.13 The PANDORA Project: Investigating Photonuclear Reactions in Light Nuclei	310
B.14 Investigation of X-rays and Gamma-ray Shielding Properties of Heavy Metal Oxide Glass Materials	316
B.15 Ongoing validation of the High Granularity Timing Detector (HGTD) demonstrator for the ATLAS phase II upgrades	322
B.16 Particle Flow Algorithm (PFA) for forward region jet reconstruction with the ATLAS Inner Tracker (ITk) detector setup at the High Luminosity Large Hadron Collider (HL-LHC)	328
B.17 Detecting Anomalies in Measured Thermal Neutron Flux Profiles of SAFARI-1 Research Reactor	336
B.18 Investigating the Photon Shielding Properties of Silicate Glass Samples from 1–15 MeV Using Phys-X/PSD, X-COM, and GEANT4 Simulations	342

B.19	Parton Production Spectra and Energy Loss in High-Energy O+O-Collisions	350
B.20	Using Machine Learning in the search for dark photons in the $H \rightarrow Z + \gamma_D$ with the ATLAS detector at the LHC	354
B.21	Probing the pygmy states of ^{154}Sm with a quasi-monochromatic linearly-polarised photon beam	362
B.22	Quality Assurance for LVPS Boards in the Phase-II Tile Calorimeter Upgrade	368
B.23	The nuclear level density of $^{192}\text{Os}(\alpha, d\gamma)^{194}\text{Ir}$	374
B.24	Exploring toponium formation at the LHC	380
B.25	Progress on the Experimental test of the generalized Brink-Axel Hypothesis in ^{139}La nucleus	386
B.26	A search for tWZ production in the Tetralepton channel using ATLAS Run 2 data	392
B.27	Effect of Strontium Oxide on Radiation Attenuation Properties of Boro-tellurate Glass Systems at High Radiation Energies	398
B.28	Real-Time Anomaly Detection in High Energy Physics	406
B.29	Search for a new spin-0 scalar and a spin-1 boson using Run2 ATLAS detector data	412
B.30	Measurement of the top quark Yukawa coupling from $t\bar{t}$ kinematic distributions in the dilepton final state with the ATLAS experiment	418
B.31	Searches for scalar resonances with di-photon in association with leptons and taus using the easyjet analysis framework in ATLAS detector at the LHC	424
B.32	The use of Machine Learning techniques to analyse the $gg \rightarrow h \rightarrow Z\gamma$ process within the SMEFT framework at the Large Hadron Collider (LHC)	430
B.33	Monte Carlo Generation Involving Searches for Diphoton Resonances in Association with $\tau^+\tau^-$ or b -jets at the Electroweak Scale in the ATLAS Detector at the LHC	436
B.34	Analysing $gg \rightarrow h \rightarrow Z\gamma$ decay at the LHC using SMEFT	442
B.35	Preparing for Diphoton Resonance Searches in the Leptonic, 0- τ Final States: Event Selection and Background Characterization Using ATLAS Run 3 .	448
B.36	Study of Low-Medium Spin States in ^{156}Er	454
B.37	Orthogonality study for the $S \rightarrow Z_d Z_d \rightarrow 2\ell 2\nu/2\ell 2j$ with the ATLAS detector at the LHC	460
B.38	Simulation of X-ray and gamma radiation shielding properties of lithium-antimony-Lead-germanate glasses modified with chromium oxide using Phy-X/PSD software	466
B.39	Radiation contamination in gold mine tailings soil samples using HPGe spectrometry	472
B.40	Exciting the Hoyle state in ^{12}C selectively populated using the $^{10}\text{B}(\text{Li}, ^4\text{He})^{12}\text{C}$ reaction	480
C	Photonics	487
C.1	Comparative Theoretical Analysis of Entangled Quantum States for Enhanced Sensing Applications	488
C.2	Nanoformulation of Pheophorbide-a for Photodynamic Therapy in a Human Lung Cancer Spheroid Model	496
C.3	Photonic-biosensing towards drug-resistant Tuberculosis diagnosis	504
C.4	A comparison of two biosensing recognition elements using SPR for the detection of drug-resistant genes	510

C.5	Enhancing the Efficacy of Photodynamic Therapy: The Role of Hypocrellin B, Quercetin, and their combinations in a Human Breast Cancer Cell Line	516
C.6	Evaluation of Pheophorbide <i>a</i> Phototoxicity on Melanoma Cells Grown as Three-Dimensional Multicellular Tumour Spheroids	522
C.7	Evaluation of the Phototoxic effect of Chemically Synthesized Silver Nanoparticles on Breast Cancer Cells	528
C.8	Rate equations for the control of Yb-171 ions	534
C.9	<i>In vitro</i> effects of blue laser light as an antimicrobial agent on microbial-infected fibroblast cells	538
C.10	Photothermal Effects of Green-Synthesized Gold Nanoparticles using <i>Kniphofia porphyrantha</i> on MCF-7 Human Breast Cancer Cells	544
C.11	Riboflavin-mediated Photodynamic Therapy Induces Cytotoxic Effects in A549 Lung Cancer Cells	552
C.12	Numerical Modeling and Simulation of a Fabry-Perot Sensor for Refractive Index Measurement	560
C.13	Voltage-Based Wavelength Tuning of a DFB Laser using a Frequency-to-Voltage Converter for OPLL Applications	568
C.14	Synthesis and characterization of Cerium III ion doped zinc selenide thin films .	574
C.15	Label-free optical biosensing as an alternative for HIV-1 drug-resistant mutation detection	582
D	Astrophysics and Space Science	589
D.1	Developing a critical component of a fiber cable for the Affordable Multiple Aperture Spectroscopy Explorer Prototype (AMASE-P)	590
D.2	Characterisation and Calibration of the Kepler KL4040 sCMOS camera for Optical Observations at the UFS/Boyden Observatory	598
D.3	Multi-Wavelength Observations of AGN Activity in the Fornax Cluster	604
D.4	Exploring the properties of pulsars and their nebulae through observations and modelling	610
D.5	Searching for persistent radio emission towards selected Fast Radio Burst positions	616
D.6	Solar wind temperature anisotropy during Ulysses' first fast latitude scan	624
D.7	Understanding Interacting Dark Energy from a Dynamical Systems Analysis Approach	630
D.8	Constraining the Teleparallel Universe	636
D.9	Cosmic-Ray Neutron Detectors for Soil Moisture Monitoring	642
D.10	Identification of Cosmic Filaments using the Simba-C simulation and DisPerSE Filament Finder	650
D.11	Investigating the latitudinal-dependent solar differential rotation rate using SDO/HMI Dopplergrams	660
D.12	Tracing the origin of radio emission in galaxies with MIGHTEE	666
D.13	Wits Astronomical Plate Archive - preservation of a century of Southern Hemisphere astronomy at the Johannesburg Observatory	674
D.14	Trends of Thermal Structure in the MLT Region Using SABER Observations Over Sutherland, South Africa	680
E	Physics for Development, Education, and Outreach	687
E.1	Integrating modern technology into a selection of first-year physics experiments .	688
E.2	Transforming Physical Sciences teaching through targeted professional development	696
E.3	Reimagining Curriculum Renewal: A case study of Physics and Astronomy . . .	702

E.4 Physics Students' Epistemological Beliefs about Science	710
E.5 Pre-service student teachers' misconceptions about a simple electric circuit	718
E.6 Quantum computing education availability in South Africa	724
E.7 An Introduction to Quantum Computing - Teaching the Basics	732
E.8 Some roles of physics in climate science with examples in Southern Africa	738
F Applied Physics	745
F.1 Energy Balance Closure Analysis Based on Eddy Covariance Flux Tower Observations	746
F.2 What are the most suitable basic solar irradiance models for Southern Africa?	752
F.3 Monitoring of the performance of a small-scale PV system based on Power Law (PLM) approach	758
F.4 First-Principles Investigation of the Structural, Mechanical, and Optical Properties of CsPbI ₃ Perovskite for Solar Cell Applications	764
F.5 Listening with Light: Acoustic sensing over live fibre networks using Coherent Optical Transceivers	770
F.6 First-principles study of various sodium-oxide molecules on nitrogen-doped graphene for high-performance sodium-oxygen battery	776
F.7 A novel approach to quantifying electron densities of HiP-CT imaging	782
F.8 TGF- β Pathway Modulation: A Key Mechanism of Photobiomodulation Induced Tenogenesis	788
F.9 First-Principle Study of NaMnNbPO ₄ as a Cathode Material for Sodium-Ion Battery	794
F.10 TileCoM Firmware Developments for ATLAS Tile Calorimeter Phase-II Upgrades	800
F.11 DFT Study of the TiO ₂ Anatase (100) Surface Doped with Be for Application in DSSCs	806
F.12 Deep Learning for High Throughput Decision Making on Diamond Content of PET Activated Kimberlite Rocks	812
F.13 IoT-Based Environmental Conditions Monitoring of a Sawtooth Greenhouse: A Foundation for Anomaly Detection and Computational Fluid Dynamics	818
F.14 Extraction of Natural Dye from <i>Bidens pilosa</i> : Solvent Effects and Dye Adsorption on TiO ₂ Nanoparticles for Dye-sensitized Solar Cell Applications	824
F.15 The South African contribution based on the TileCoM and Tile GbE Switch to the Tile Pre-Processor Modules for the ATLAS Tile Calorimeter: Progress and Current Status.	832
F.16 Simulation and Image Reconstruction for a Low-Cost PET Detector Concept	838
F.17 Thermal analysis of Ampreg-21 Epoxy and Bi composite material using the Cone Calorimeter	844
F.18 Integration of grid-scale battery energy storage in solar microgrids for rural communities in Limpopo province	850
F.19 Preliminary Investigation of the Mechanical Properties of Tissue Biopsies	856
F.20 Synthesis and characterization of biomass-based graphitic carbon for sustainable energy storage	862
F.21 The detection of HIV using plasmonically active colloidal gold nanoparticles	868
F.22 Wind Energy Potential in Local Areas	874
F.23 A Python-Flask Application for Modelling Surface Plasmon Resonance in Biosensors for Educational and Research use	880
F.24 Development and Qualification of a Fiber Optic Sensor Package for ITk Environmental Monitoring	886

F.25	The development of the atmospheric monitoring system for a balloon-borne system	892
F.26	Automated photovoltaic module imaging for high throughput data capture and analysis	898
F.27	DFT studies of the photocatalytic properties of BaTiO_3 doped with V and W for hydrogen production	904
F.28	Reconfigurable Payload Power Management System for Rockets	910
F.29	Design of a slotted Invelox-based wind delivery system for domestic low wind speed operation	916
F.30	Optimizing the Geometry of an Empty Concentrator-Diffuser Augmented Wind Turbine Using Genetic Algorithm	922
F.31	Enhancing Rural Electrification: An In-depth Analysis and Optimization of PV/Hydrogen Fuel Cell/Battery-Powered Microgrids	928
G	Theoretical and Computational Physics	935
G.1	Computational Fluid Dynamics Study of Turbulence Effects in Heat Pipe Heat Exchangers for Power-Cell Micro-Reactors	936
G.2	Adiabatic elimination approach to the completely positive master equation for open quantum Brownian motion	942
G.3	Fluorinated Graphdiyne under Strain: A First-Principles Study of Electronic and Optical Properties	948
G.4	Laplacian eigenmodes in twisted periodic topologies for new physics models	954
G.5	Equilibrium and elastic properties of hexagonal molybdenum disulphide	960
G.6	Eigenvalue Determination for a Toy and Woods-Saxon Potentials using an Unsupervised PINN	968
G.7	Coherent State Path Integrals and Vacuum Structure in Thermal ϕ^4 Theory on a Finite Volume	974
G.8	Numeric exploration of Non-trivial emergent phenomena in Quark-Gluon Plasma	980
G.9	Parameterizing the Geometry of the QGP on an Event-by-Event Basis	986
G.10	Classical and Quantum Mechanics of Non-holonomic Constraints	992
G.11	Energy Loss as a Probe of Quark-Gluon Plasma Formation Across Collision System Size	998
G.12	Solving the one-dimensional Schrodinger equation using a set of Daubechies wavelet scaling functions	1004
G.13	Discriminating Multiprong Jet Substructure with right handed charged gauge boson and heavy right handed neutrino	1008
G.14	Probing the Dead Cone using the Lund Jet Plane	1014
G.15	Piston-Driven Shock Wave Test Problem for Validating Magnetohydrodynamic Models in Astrophysics	1020
G.16	Reservoir Computing for Predicting Chaotic Dynamical Systems	1026
G.17	Testing $f(Q)$ gravity as a solution for the H_0 and S_8 tensions	1032

This page intentionally left blank.

EDITORIAL

The University of the Witwatersrand (Wits University) hosted the annual South African Institute of Physics (SAIP) Conference during July 2025. The conference took place in the vibrant heart of Johannesburg, a city known for its energy, innovation, and spirit of transformation – qualities that resonated strongly with this year’s themes recognising the International Year of Quantum Science and Technology 2025 and the International Decade of Sciences for Sustainable Development 2024-2033. In parallel with the main conference, a Teacher Development Workshop for 110 Physical Sciences educators from the Gauteng region was held, strengthening links between the research and education communities and extending the reach of the conference’s impact. Certain papers from this meeting are collected in this peer-reviewed volume. Submissions for the proceedings of SAIP 2025 were handled by an Editorial Board headed by an Editor-in-Chief and Associate Editors responsible for submissions in the various divisions.

The Editorial Board of the SAIP 2025 Proceedings received 180 manuscripts for consideration by the advertised deadline. All of these manuscripts met the relevant criteria and were submitted to a full peer-review process involving many individual reviewers, resulting in a total of 161 papers accepted for publication. The list of reviewer names appears elsewhere in this volume, and it is noted that several reviewers took responsibility for more than one manuscript. The style of these proceedings is inspired from the (British) Institute of Physics Conference Series and the Institute of Electrical and Electronics Engineers transactions, journals and conferences (IEEETran), similar to previous SAIP Proceedings. Authors were requested to ensure that the defined layout was adhered to in their submitted PDF documents. The Associate Editors conducted the layout review for each manuscript in parallel with the content review in order to expedite the review process. Manuscripts that deviated considerably from the specified layout requirements, while still broadly appropriate in their composition, were referred back to the authors for correction. This was done alongside the content reviews prepared by knowledgeable experts in each field, as well as consideration of Turnitin reports to ensure that all submissions were original and free of plagiarism. The Editorial Board again aimed to reduce the time between submission and publication, with authors informed of the outcome of their submissions before the December holiday closure and the final proceedings published online shortly thereafter.

In accordance with the South African Department of Higher Education and Training (DHET) Research Outputs Policy, the SAIP 2025 Proceedings meet all criteria required for recognition and subsidy. All published contributions are full papers presenting original research and new scholarly findings; no abstracts, extended abstracts, summaries, or poster-type submissions were accepted. Each manuscript underwent a rigorous peer-review process involving a minimum of two independent reviewers. The Proceedings carry a valid ISBN identifier and publication year, and the Editorial Board comprises subject matter experts drawn from multiple South African institutions, with full details listed in this volume. These Proceedings are intended for a specialist scholarly audience, consistent with DHET requirements for academic research dissemination, and include the complete set of published papers, author affiliations, reviewer acknowledgements, and the required publication metadata. All accepted submissions include author affiliations and contact information and the full text of the papers. The Editorial Board affirms that the published output meets all DHET criteria for accredited conference proceedings.

The publication of the SAIP Proceedings depends heavily on the efficiency of the Associate Editors and the goodwill of reviewers from the South African scientific community. The Editor-in-Chief wishes to acknowledge the hard work of the Associate Editors, who devoted significant time and care to evaluating papers and reviewer reports to ensure that acceptable academic standards were met and that the proceedings remain credible. The majority of the content reviews were completed with great diligence and professionalism. The Editorial Board expresses its sincere thanks to all participating Reviewers for their pro bono work, particularly those who reviewed more than one paper. The rigorous peer-review process described above has ensured that these proceedings contain thoroughly reviewed manuscripts of high professional quality, reporting on novel work that has not been published elsewhere.

This year, the Editorial Board once again benefited from the expertise of the Technical Associate Editor, Dr Bruno Letarte from North-West University (NWU). He took responsibility for finalising the complete document and ensuring that it met the highest technical standards. The Editor-in-Chief wishes to recognise Dr Letarte's significant contribution in preparing the final document. The Editorial Board deeply appreciates the many hours he dedicated to producing this exceptional publication.

The SAIP2025 Editorial Team
W. A. Horowitz, Editor-in-Chief

THE LOCAL ORGANISERS

It was a great pleasure for the School of Physics, Faculty of Science, University of the Witwatersrand to host the 69th Annual Conference of the South African Institute of Physics.

The conference recognized the “International Year of Quantum Science and Technology”, 2025 and the International Decade of Sciences for Sustainable Development, 2024–2033”. The conference scientific programme comprised of 300 and 204 oral and poster presentations, respectively, 7 invited plenary speakers, an Industry Day, Physics for Development and Industry Day, the Southern Africa Physics Network (SAPhysNet) Forum meeting, Women in Physics in South Africa (WiPiSA) 20th Anniversary Celebration Panel Discussion and 5 Winter Schools.

The conference served as an enriching experience for 600 delegates that included local and international experts, invited guests, academics, researchers, industry partners, postdoctoral fellows, and postgraduate students across all branches of physics. The conference was a platform that resulted in excellent scientific discussions, exchange of ideas, fostering of collaborations and was a forum to inspire our students and young researchers to continue with a career in Physics. The support of business and government are acknowledged including all the conference exhibitors and sponsors for their involvement in enhancing the success of the conference.

In terms of social events, our students organised an exciting PHYSICS QUIZZ CUP and further all delegates were invited to participate in immersive shows at the Wits Anglo American Digital Dome.

A special thanks to the Minister of DSTI, Professor Blade Nzimande who delivered the official Opening and Keynote Address at the Welcome Reception, the University of the Witwatersrand Vice-Chancellor and Principal, Professor Zeblon Vilakazi and the Dean of Faculty of Science, Professor Nithaya Chetty for their support in ensuring a successful conference. We also wish to congratulate Professor Philemon Mjwara who was elected as a Fellow of the South African Institute of Physics (FSAIP) in recognition of his outstanding contributions to physics education, research, and development in South Africa. The formal presentation of the award was bestowed to Professor Mjwara at the Conference Banquet.

Finally, I would like to express my sincere appreciation to all members of the local organising committee, in particular to Dr Robert Warmbier (Co-Chair), Professor Phil Ferrer (Chair: Scientific Programme), Ms Michelle Gallant (Wits Functions & Events / Advancement Division), Professor Rudolph Erasmus (ex-officio), Dr Angela Dudley, Dr Brian Masara and Mr Tebogo Mokhine (SAIP Office) for their tremendous efforts and time devoted in organising the conference.

LOC 2025

Local Organising Committee

- **Prof Deena Naidoo**, Co-Chair: Local Organising Committee
- **Dr Robert Warmbier**, Co-Chair: Local Organising Committee
- **Associate Professor Philippe Ferrer**, Chair: Scientific Programme
- **Associate Professor Rudolph Erasmus**, Ex-Officio
- **Dr Angela Dudley**, LOC Member
- **Professor Andrew Forbes**, LOC Member
- **Professor Matt Hilton**, LOC Member
- **Dr Isobel Kolbe**, LOC Member
- **Dr Mukesh Kumar**, LOC Member
- **Associate Professor Mervin Naidoo**, LOC Member
- **Ms Farah-Naaz Samuels**, LOC Member
- **Dr Brian Masara**, SAIP Office
- **Mr Tebogo Mokhine**, SAIP Office
- **Ms Michelle Gallant**, Wits Functions and Events/Advancement



DIVISIONS, EDITORIAL TEAM, AND REVIEWERS

Divisions and Division Chairs

- **Physics of Condensed Matter and Materials**
 - Prof Koos Terblans, University of the Free State
- **Nuclear, Particle, and Radiation Physics**
 - Prof Sifiso Ntshangase, University of Zululand
 - Dr Mukesh Kumar, University of the Witwatersrand
- **Photonics**
 - Dr Angela Dudley, University of the Witwatersrand
- **Astrophysics and Space Science**
 - Dr Geoff Beck, University of the Witwatersrand
 - Dr Katlego Moloto, North-West University
- **Physics for Development, Education, and Outreach**
 - Prof Sam Ramaila, University of Johannesburg
- **Applied Physics**
 - Prof Alan Matthews, University of KwaZulu-Natal
- **Theoretical and Computational Physics**
 - Prof Alan Cornell, University of Johannesburg
- **Women in Physics**
 - Dr Katekani Shingange, MINTEK

Editorial Team

Editor-in-chief:

– **W. A. Horowitz** is an Associate Professor of Physics at the University of Cape Town. Among other honours, Prof Horowitz has received the Claude Leon Merit Award for Early-Career Researchers and the Meiring Naudé Medal for Outstanding Early Career Contributions to Science from the Royal Society of South Africa. Prof Horowitz' research explores the non-trivial emergent many-body properties of the strong force using the methods of perturbative quantum field theory and the AdS/CFT correspondence.

Associate Editors:

• Physics of Condensed Matter and Materials

– **Wendy Bonakele Mdlalose** is a physics lecturer at the University of KwaZulu-Natal, specializing in nanostructured magnetic materials for biomedical, agricultural, and electromagnetic applications. Her research focuses on polymer-coated ferrites for drug delivery, cancer therapy, nano-fertilizers, and microwave absorption. She is an active contributor to multidisciplinary research, supervises postgraduate students, and collaborates across sectors to advance nanotechnology solutions in health, food security, and energy.

– **Pankaj Mohanty** is a Lecturer in the Department of Physics at the University of Johannesburg, South Africa, specializing in experimental condensed matter physics and materials science. His work explores nanoparticles, thin films, magnetism, and ion irradiation. He has received multiple awards, including the University of Johannesburg Excellence Award for Research (2019) and several international best presentation awards. Dr. Mohanty has supervised numerous postgraduate students to distinction and collaborates with institutions such as NECSA (South Africa), Elettra (Italy), and IUAC (India).

• Nuclear, Particle, and Radiation Physics

– **Mukesh Kumar** Mukesh Kumar is the Deputy Director of the Institute for Collider Particle Physics, the National Coordinator of the SA–CERN Technology Transfer Pillar, and a Senior Lecturer in the School of Physics at the University of the Witwatersrand. He is an NRF Y-rated research physicist in the field of high-energy particle physics. His research focuses on Higgs boson, top quark, and dark matter physics at the Large Hadron Collider (CERN), as well as at future e^-p and e^+e^- colliders. He is a member of the TileCal Speakers Committee for the ATLAS detector at CERN and is involved in diphoton+lepton and dark-photon physics analyses within the ATLAS Collaboration.

– **Obed Shirinda** is a Senior Lecturer of Physics in the department of Physical and Earth Sciences at the Sol Plaatje University. He is an NRF C-rated research physicist in the field of nuclear physics. His research is focused on nuclear structure physics describing features of rotating nuclei by using nuclear physics models (such as Particle rotor models (PRM), Cranked shell model (CSM), Total Routhian surface (TRS), etc.) and experimental equipment.

• Photonics

– **Pieter Neethling** Pieter Neethling is an Associate Professor in the Physics Department at Stellenbosch University. He is currently the Director of the Stellenbosch Photonics Institute at Stellenbosch University and the Chairman of the Photonics Division of the SAIP. His research focus is applied laser spectroscopy with applications in chemical and biological systems.

- **Astrophysics and Space Science**
 - **Eugene Engelbrecht** is a Professor of Physics at North-West University, whose research covers topics relevant to the transport of charged particles in turbulent astrophysical plasmas, including both theoretical and observational aspects pertaining to cosmic ray modulation, non-linear diffusion theories, and plasma turbulence.
- **Physics for Development, Education, and Outreach**
 - **Dale Taylor** is an Associate Professor in the Physics Department at the University of Cape Town. Her current focus is co-curricular support towards science student success and early alert systems for targeted support. She supervises doctoral students in Physics Education Research and Astronomy Education Research. She has extensive reviewing experience, including 15 international education journals.
- **Applied Physics**
 - **Raesibe Sylvia Ledwaba** is an Associate Professor of Physics and Acting Deputy Director at the Materials Modelling Centre, University of Limpopo. Her current research focus is on All-Solid-State Battery Technology (ASSB), utilizing multiscale modelling and machine-learning approaches to identify suitable solid electrolyte materials to replace flammable liquid electrolytes in lithium-ion batteries. She is involved in several projects cathode and anode materials prediction and development for next-generation battery systems.
 - **Deon Marais** is a Chief Scientist at the South African Nuclear Energy Corporation (Necsa), where he is involved with the development of neutron beamline instrumentation, data acquisition and analysis tools. His work focuses on neutron diffraction and he is actively involved in national initiatives to expand South Africa's neutron-scattering capabilities and user community.
- **Theoretical and Computational Physics**
 - **Aniekhan Magnus Ukpong** is a Senior Lecturer in Physics at the University of KwaZulu-Natal and Principal Investigator for the Centre for High-Performance Computing Research Programme No. MATS0941. Dr. Ukpong is a 2019 recipient of the IOP's Outstanding Reviewer Award from the *Journal of Physics: Condensed Matter*. Dr. Ukpong's research leverages scientific computing to understand many-body physics in condensed matter systems using realistic materials as a modelling platform.
- **Technical**
 - **Bruno Letarte** is a Senior Lecturer at the Centre for Space Research of the North-West University. He specialises in observational astronomy, photometry as well as spectroscopy, with his main interest in stellar astrophysics. He manages the optical telescope at the Nooitgedacht observatory, used to train undergraduate and postgraduate students.

Proceedings Online Administration:

- **Tebogo Mokhine**, South African Institute of Physics

List of Reviewers

- **Dr Jalal Abdallah** – The University of Texas at Arlington, United States of America
- **Dr Ibrahim Abdallah Ali** – Sudan University of Science and Technology, Sudan
- **Dr Paul Adedeji** – University of Johannesburg, South Africa
- **Dr Alnadhief Alfedeeel** – North-West University, South Africa
- **Dr Fernando Carrio Argos** – CERN, Switzerland
- **Dr Bako Audu** – University of the Western Cape, South Africa
- **Dr Nadir Azhari** – University of the Free State, South Africa
- **Dr Joseph Bahder** – New Mexico State University, United States of America
- **Dr Avula Balakrishna** – Amity University, India
- **Dr Lunga Bam** – NECSA, South Africa
- **Dr Bharati Bamana** – University of Johannesburg, South Africa
- **Dr Kevin Barends** – University of Cape Town, South Africa
- **Dr Monica Barnard** – North-West University, South Africa
- **Dr Geoff Beck** – University of the Witwatersrand, South Africa
- **Prof Aroon Beesham** – University of Zululand, South Africa
- **Dr Mohamed Belfkir** – CERN, Switzerland
- **Dr Evans Benecha** – UNISA, South Africa
- **Prof Muaaz Bhamjee** – University of Pretoria, South Africa
- **Dr Srimoy Bhattacharya** – University of the Witwatersrand, South Africa
- **Dr Puleng Nontobeko Biyela** – University of Zululand, South Africa
- **Dr Marguerite Blignaut** – Stellenbosch University, South Africa
- **Prof Mark Blumenthal** – University of Cape Town, South Africa
- **Dr Christopher Bongani** – iThemba LABS, South Africa
- **Prof Moritz Braun** – University of South Africa, South Africa
- **Dr Felix Brutus Masok** – Plateau State University, Nigeria
- **Dr Daphney Bucher** – University of Cape Town, South Africa
- **Dr Calib Buckton** – Stellenbosch University, South Africa
- **Prof Andy Buffler** – University of Cape Town, South Africa

- **Prof Zinhle Buthelezi** – University of the Witwatersrand, South Africa
- **Prof Roland Cristoper Caballar** – University of Santo Tomas, Philippines
- **Dr Philippe Calfayan** – CERN, Switzerland
- **Prof Turgay Celik** – University of the Witwatersrand, South Africa
- **Prof Nhamo Chaukura** – Sol Plaatje University, South Africa
- **Prof Simon Connell** – University of Johannesburg, South Africa
- **Prof Lesley Cornish** – University of the Witwatersrand, South Africa
- **Prof Mitchell Cox** – University of the Witwatersrand, South Africa
- **Prof Romeel Dave** – University of Edinburgh, United Kingdom
- **Prof Marelie Davel** – North-West University, South Africa
- **Prof Trevor Derry** – University of the Witwatersrand, South Africa
- **Dr U.M. Dhanalekshmi** – National University of Science and Technology, Oman
- **Prof Sathish Dhilip Kumar** – University of Johannesburg, South Africa
- **Prof Mantsae Diale** – University of Pretoria, South Africa
- **Dr Redrisse Djoumessa** – University of Johannesburg, South Africa
- **Dr Mpilo Dlamini** – North-West University, South Africa
- **Dr Sanele Dlamini** – University of Mpumalanga, South Africa
- **Dr Anton Dmytriiev** – North-West University, South Africa
- **Dr Kwadwo Dompreh** – University of Cape Coast, Ghana
- **Dr Lindsay Donaldson** – iThemba LABS, South Africa
- **Dr Cathryn Driver** – NECSA, South Africa
- **Mr Jean du Plessis** – MIT, United States of America
- **Dr Angela Dudley** – University of the Witwatersrand, South Africa
- **Dr Adams Duniya** – Botswana University of Science and Technology, Botswana
- **Prof Rocco Duvenhage** – University of Pretoria, South Africa
- **Prof Thomas Ebenhan** – North-West University, South Africa
- **Dr Abdualazem Ebrahim** – Nanjing University, China
- **Dr Raymond Ehlers** – University of California Berkeley; Lawrence Berkeley National Laboratory; CERN, United States of America; Switzerland
- **Dr Ernest Ejeh** – iThemba LABS, South Africa

- **Dr Huzifa Elnour** – Stellenbosch University, South Africa
- **Prof N. Eugene Engelbrecht** – North-West University, South Africa
- **Dr Nicolas Erasmus** – SAAO; Stellenbosch University, South Africa
- **Prof Rudolph Erasmus** – University of the Witwatersrand, South Africa
- **Prof Fabian Ezema** – University of Nigeria, Nigeria
- **Mr Coleridge Faraday** – University of Cape Town, South Africa
- **Dr Jeff Fearon** – Seabridge School, South Africa
- **Prof Stefan Ferreira** – North-West University, South Africa
- **Prof Phil Ferrer** – University of the Witwatersrand, South Africa
- **Dr Luca Fiorini** – CERN, Switzerland
- **Dr Siege Fortsch** – iThemba LABS, South Africa
- **Mr Eugene Fouche** – Stellenbosch University, South Africa
- **Prof Thomas Franz** – University of Cape Town, South Africa
- **Prof Manjunath Gandhi** – University of Pretoria, South Africa
- **Dr Animik Ghosh** – Huzhou University, China
- **Dr Mpho Gift Doctor Gololo** – University of Johannesburg, South Africa
- **Prof Irvy (Igle) Gledhill** – University of the Witwatersrand, South Africa
- **Dr Julia Lynn Gonski** – CERN, Switzerland
- **Dr Mmusi Gopane** – Sol Plaatje University, South Africa
- **Prof Anthony Hechanova** – Abu Dhabi Polytechnic University, United Arab Emirates
- **Prof Albert Helberg** – North-West University, South Africa
- **Dr Mark Herbert** – University of the Western Cape, South Africa
- **Prof Thulani Hlatshwayo** – University of Pretoria, South Africa
- **Dr Mark Hodgkinson** – University of Sheffield, United Kingdom
- **Prof W. A. Horowitz** – University of Cape Town, South Africa
- **Prof Nicolette Houreld** – University of Johannesburg, South Africa
- **Dr Ammar Ibraheem** – University of Hafr Al Batin, Saudi Arabia
- **Mr Gregory Ireland** – University of Cape Town, South Africa
- **Dr Yaseera Ismail** – Stellenbosch University, South Africa
- **Prof Moshawe Jack Madito** – UNISA, South Africa

- **Dr Greg Jackson** – Subatech (Subatomic Physics and Associated Technologies), France
- **Dr Susan Jacobs** – University of Johannesburg, South Africa
- **Dr Hassnae El Jarrari** – CERN, Switzerland
- **Dr Thulani Jili** – University of Zululand, South Africa
- **Dr Danzil Joseph** – Stellenbosch University, South Africa
- **Dr Jitcy Joseph** – National Institute of Health, South Africa
- **Dr Abraham Dimitri Kapimkenfack** – Tshwane University of Technology, South Africa
- **Dr James Keaveney** – University of Cape Town, South Africa
- **Dr Gareth Kemp** – University of Johannesburg, South Africa
- **Dr Thuthukile Khumalo** – iThemba LABS, South Africa
- **Mr Mphiriseni Khwanda** – University of Johannesburg, South Africa
- **Dr Duncan Kiboi Boiyo** – Moi University, Kenya
- **Mr Amos Kiyumbi** – Stellenbosch University, South Africa
- **Dr Lehlohonolo Koao** – University of Free State, South Africa
- **Dr Isobel Kolbé** – University of the Witwatersrand, South Africa
- **Dr Győző Kovács** – University of Wroclaw, Hungary
- **Dr Hannes Kriel** – Stellenbosch University, South Africa
- **Prof Ted Kroon** – University of the Free State, South Africa
- **Dr Tjaart Krüger** – University of Pretoria, South Africa
- **Dr Martin Kudinha** – Cape Peninsula University of Technology, South Africa
- **Dr Satendra Kuma** – Indian Institute of Information Technology, India
- **Dr Mukesh Kumar** – University of the Witwatersrand, South Africa
- **Dr Elena Lawrie** – iThemba LABS, South Africa
- **Prof Derik Le Roux** – University of Pretoria, South Africa
- **Dr Katlego Lentswe** – North-West University, South Africa
- **Dr Bruno Letarte** – North-West University, South Africa
- **Dr Ndanduleni Lethole** – University of Fort Hare, South Africa
- **Dr Juandre Light** – North-West University, South Africa
- **Dr Bo Liu** – CERN, Switzerland

- **Prof Ilani Loubser** – North-West University, South Africa
- **Dr George Lowani Zimba** – Facility for Rare Isotope Beams Michigan State University, United States of America
- **Dr Daniela Macina** – CERN, Switzerland
- **Dr Molepo Mahlanga** – University of the Witwatersrand, South Africa
- **Dr Lucky Makhathini** – University of Western Cape, South Africa
- **Dr Kemeridge Malatji** – University of Limpopo, South Africa
- **Dr Fairouz Malek** – French National Centre for Scientific Research (CNRS), France
- **Dr Peane Maleka** – iThemba LABS, South Africa
- **Prof Thembinkosi Malevu** – North-West University, South Africa
- **Dr Vernon Maluba Chisapi** – University of Zambia, Zambia
- **Prof Eric Maluta** – University of Venda, South Africa
- **Dr Grant Manuel** – NECSA, South Africa
- **Dr Refilwe (Edwin) Mapasha** – University of Pretoria, South Africa
- **Dr Bongani Maqabula** – University of Johannesburg, South Africa
- **Prof Delia Marshall** – University of the Western Cape, South Africa
- **Dr Filipe Martins** – Laboratório de Instrumentação e Física Experimental de Partículas - LIP, Portugal
- **Dr Mamogo Masenya** – iThemba LABS, South Africa
- **Dr Mpho Maswanganye** – University of Limpopo, South Africa
- **Prof Manny Mathuthu** – North-West University, South Africa
- **Mr Marome Bester Matseba** – Central University of Technology, South Africa
- **Prof Alan Matthews** – University of KwaZulu-Natal, South Africa
- **Dr Rachid Mazini** – University of the Witwatersrand, South Africa
- **Dr Jean Jules Mboukam** – Tshwane University of Technology/iThemba LABS, South Africa
- **Prof Pontsho Mbule** – University of South Africa, South Africa
- **Dr Kim McAlpine** – South African Radio Astronomy Observatory, South Africa
- **Dr Jacqueline McCleland** – Nelson Mandela University, South Africa
- **Dr Wendy Mdlalose** – University of KwaZulu-Natal, South Africa
- **Prof Pieter Meintjes** – University of the Free State, South Africa

- **Dr Motlalepula Rebecca Mhlongo** – Sefako Makgatho Health Sciences University, South Africa
- **Prof Gugu Mhlongo** – University of South Africa, South Africa
- **Mr Prince S Mkwaе** – University of Zululand, South Africa
- **Ms Loesa Mntuyedwa** – Central University of Technology, South Africa
- **Dr Kwena Modibane** – University of Limpopo, South Africa
- **Dr Pankaj Mohanty** – University of Johannesburg, South Africa
- **Dr Paul Molefe** – University of Johannesburg, South Africa
- **Prof Sabata Moloi** – UNISA, South Africa
- **Dr Katlego Moloto** – North-West University, South Africa
- **Dr Mervlyn Moodley** – University of KwaZulu-Natal, South Africa
- **Prof Mathew Moodley** – University of KwaZulu-Natal, South Africa
- **Dr Leotlela Mosebetsi** – University of the Witwatersrand, South Africa
- **Dr Thuto Mosuang** – University of Limpopo, South Africa
- **Dr Vinny Motjoadi** – University of Johannesburg, South Africa
- **Dr Rapelang Motsoeneng** – University of the Free State, South Africa
- **Dr Lumkile Msebi** – University of Western Cape, South Africa
- **Prof Mandla Msimanga** – Tshwane University of Technology, South Africa
- **Prof Justice Msomi** – Walter Sisulu University of Technology, South Africa
- **Dr. Busiso Mtunzi** – NUST Zimbabwe, Zimbabwe
- **Dr Yagoub Mubarak** – University of Johannesburg, South Africa
- **Prof Sophy Mulaudzi** – University of Venda, South Africa
- **Prof Kirstian Müller-Nedebock** – Stellenbosch University, South Africa
- **Dr Bharati Naik** – University of the Witwatersrand, South Africa
- **Dr Isaac Nape** – University of the Witwatersrand, South Africa
- **Dr Frank Ndjomatchoua** – University of Cambridge, United Kingdom
- **Prof Ceboliyozakha Ndlangamandla** – University of Zululand, South Africa
- **Prof Pieter Neethling** – Stellenbosch University, South Africa
- **Dr Amore Nel** – SANSA, South Africa
- **Dr Fhulufhelo Nemangwele** – University of Venda, South Africa

- **Dr Stanislav Nemecek** – Institute of Physics of the Czech Academy of Sciences, Czech Republic
- **Dr Henri Neser** – North-West University, South Africa
- **Dr Retief Neveling** – iThemba LABS, South Africa
- **Dr Mkhuleni Ngxande** – Stellenbosch University, South Africa
- **Dr Amos Nhlapo** – Sefako Makgatho Health Sciences University, South Africa
- **Dr Eric Njoroge** – University of Pretoria, South Africa
- **Dr Edward Nkadieng** – CERN, Switzerland
- **Dr Solethu Nkosi** – University of Limpopo, South Africa
- **Dr Sibusiso Nqayi** – University of Johannesburg, South Africa
- **Dr Robert Nshimirimana** – NECSA, South Africa
- **Prof Petros Ntoahae** – University of Limpopo, South Africa
- **Dr NN Nyangiwe** – Tshwane University of Technology, South Africa
- **Dr Hlanganani Nyembe** – Nelson Mandela University, South Africa
- **Dr David Obada** – Ahmadu Bello University - Zaria, Nigeria
- **Prof Kingsley Obodo** – University of KwaZulu-Natal, South Africa
- **Dr Samuel Ogana** – North-West University, South Africa
- **Dr Ituen Okon** – University of Uyo, Nigeria
- **Dr Saturnin Ombinda-Lemboumba** – CSIR, South Africa
- **Prof Nico Orce** – University of the Western Cape, South Africa
- **Dr Nadir Osman** – Sudan University of Science and Technology, Sudan
- **Dr Suzan P Bvumbi** – University of Venda, South Africa
- **Dr Aviv Padawer-Blatt** – University of Victoria, Canada
- **Dr Andronikos Paliathanasis** – Durban University of Technology, South Africa
- **Prof Luna Pellegrini** – University of the Witwatersrand, South Africa
- **Dr. Rory Pentz** – Cape Peninsula University of Technology, South Africa
- **Dr Itumeleng Phage** – Central University of Technology, South Africa
- **Dr Jennifer Pienaar** – De Montfort University, United Kingdom
- **Dr Graeme Pleasance** – Stellenbosch University, South Africa
- **Dr Nakka Praveenkumar** – University of KwaZulu-Natal, South Africa

- **Dr Mkwae Prince** – University of Zululand, South Africa
- **Dr Jan-Louis Raath** – SANSA, South Africa
- **Prof Krishna Rajagopal** – MIT, United States of America
- **Prof Sergei Rakitianski** – University of Pretoria, South Africa
- **Prof Sam Ramaila** – University of Johannesburg, South Africa
- **Prof Gaotsiwe Rampho** – University of South Africa, South Africa
- **Dr Ntsoko Phuti Rapheeha** – University of the Witwatersrand; CERN, South Africa; Switzerland
- **Prof Vaibhav Rawoot** – Jaypee Institute of Information Technology, India
- **Dr Nawahl Razak** – University of Cape Town, South Africa
- **Prof Leelakrishna Reddy** – University of Johannesburg, South Africa
- **Prof Quinn Reynolds** – MINTEK, South Africa
- **Dr Ramachandran Samivel** – King Saud University, Kingdom of Saudi Arabia
- **Dr Bruno Scheihing** – Kavli Institute for Theoretical Physics; University of California - Santa Barbara, United States of America
- **Dr Chandreyee Sengupta** – North-West University, South Africa
- **Prof Sifiso Senzo Ntshangase** – University of Zululand, South Africa
- **Prof Dawid Serfontein** – North-West University, South Africa
- **Dr Haifa Rejeb Sfar** – CERN, Switzerland
- **Dr Rajan Sheeja** – University of South Africa, South Africa
- **Prof Charles Sheppard** – University of Johannesburg, South Africa
- **Dr Obed Shirinda** – Sol Plaatje University, South Africa
- **Dr Chipo Shonhiwa** – University of Science Education Bindura, Zimbabwe
- **Prof Elias Sideras-Hadad** – University of the Witwatersrand, South Africa
- **Prof Ilya Sinayskiy** – University of KwaZulu-Natal, South Africa
- **Prof Buyisiwe Sondezi** – University of Johannesburg, South Africa
- **Mr Chrey Sookha** – SALT, South Africa
- **Dr Matthew Spangler-Bickell** – GE HealthCare, United States of America
- **Prof Lynndle Square** – North-West University, South Africa
- **Dr Christine Steenkamp** – Stellenbosch University, South Africa

- **Dr Ruhann Steyn** – North-West University, South Africa
- **Dr Rasidi Sule** – Covenant University, Nigeria
- **Dr Taariq GH Surtee** – University of the Witwatersrand, South Africa
- **Prof Hendrik Swart** – University of Free the State, South Africa
- **Dr Adam Takacs** – Heidelberg University, Germany
- **Prof Mark Tame** – Stellenbosch University, South Africa
- **Prof Dale Taylor** – University of Cape Town, South Africa
- **Dr. Henerica Tazvinga** – South African Weather Service, South Africa
- **Dr Nicolas Thantsha** – Tshwane University of Technology, South Africa
- **Dr Charles T Thethwayo** – University of Zululand, South Africa
- **Dr Wasitha Thilakanatne** – Dalhousie University, Canada
- **Dr David Tinarwo** – University of Venda, South Africa
- **Dr Kamohelo Tshabalala** – University of Free State, South Africa
- **Dr David Tshwane** – CSIR/NiTheCS, South Africa
- **Dr Luke Ugwuoke** – Stellenbosch University, South Africa
- **Dr Aniekan Ukpong** – University of KwaZulu-Natal, South Africa
- **Dr Theresa Urban** – University College London, South Africa
- **Prof Kenny Uren** – North-West University, South Africa
- **Dr Zelalem Urgessa** – Nelson Mandela University, South Africa
- **Prof Iyabo Usman** – University of the Witwatersrand, South Africa
- **Dr Paul Vaandrager** – University of Pretoria, South Africa
- **Dr Fanie van den Heever** – North-West University, South Africa
- **Prof Ernest Van Dyk** – Nelson Mandela University, South Africa
- **Dr Hendrik Jacobus Van Heerden** – University of the Free State, South Africa
- **Dr Sam van Leuven** – University of the Witwatersrand, South Africa
- **Dr J.J. van Zyl** – Stellenbosch University, South Africa
- **Prof Christo Venter** – North-West University, South Africa
- **Dr Robert Warmbier** – University of the Witwatersrand, South Africa
- **Dr David Waswa** – Nelson Mandela University, South Africa
- **Dr Ingrid Webster** – Stellenbosch University, South Africa

- **Dr Jennifer Williams** – Rhodes University, South Africa
- **Prof Hartmut Winkler** – University of Johannesburg, South Africa
- **Dr Dawit Worku** – Cape Peninsula University of Technology, South Africa
- **Prof Shaun Wyngaardt** – Stellenbosch University, South Africa
- **Dr Tawanda Zininga** – Stellenbosch University, South Africa
- **Prof Konstantinos Zoubos** – University of Pretoria, South Africa

This page intentionally left blank.

STUDENT PRIZES

The Annual Conference of the South African Institute of Physics provides an important platform for emerging researchers to share their work with the broader physics community. The student prizes awarded at the conference recognise outstanding student contributions and celebrate excellence in research and presentation. This section is dedicated to and celebrates our students, whose achievements point to the vitality and future of physics in South Africa. We are extremely proud of the following prizewinners.

Note that there are several instances of two equal runners up among the prizewinners, both labelled as #2.

A Physics of Condensed Matter and Materials

Honours Poster:

Nicholas Snijman (North-West University)

Wirsam MSc Poster Award (Condensed Matter Physics):

M.S.L. Mthimkulu (University of Johannesburg)

Wirsam MSc Poster Award (Materials Physics):

M.C. Matlala (University of Limpopo)

Busch Vacuum MSc Oral Award (Condensed Matter Physics):

Arthur van der Spuy (University of the Witwatersrand)

Busch Vacuum MSc Oral Award (Materials Physics):

Dineo Motjope (University of Zululand)

Busch Vacuum PhD Poster Award (Condensed Matter Physics):

Irénée Mouadje (University of Johannesburg)

Busch Vacuum PhD Poster Award (Materials Physics):

Arnold Mutubuki (Nelson Mandela University)

Frank Nabarro PhD Oral Award (Condensed Matter Physics & Material Physics):

Murei Mulibana (University of Johannesburg)

Frank Nabarro PhD Oral Award (Semiconductor Physics):

Andi Isni Pujirana (Nelson Mandela University)

Wirsam MSc Publication Award (Condensed Matter Physics & Material Physics):

Arthur van der Spuy (University of the Witwatersrand)

Wirsam MSc Publication Award (Semiconductor Physics):

Katlego L. Morulane (University of the Free State)

PhD Publication Award (Semiconductor Physics):

Vhahangwele Makumbane (University of the Free State)

B Nuclear, Particle, and Radiation Physics

NPRP-1 MSc Poster Award

1. Nosihle Msabala (University of Zululand)
2. Tshegofatso Bokhutlo (Botswana International University of Science and Technology)

NPRP-2 MSc Poster Award

Joshua Browne (University of Cape Town)

NPRP-1 MSc Oral Award

1. Lilian Moremi (Tshwane University of Technology)
2. N.N. Khanyeza (University of Pretoria)

NPRP-2 MSc Oral Award

1. Kutlwano Makgetha (University of the Witwatersrand)
2. Njokweni Mbuyiswa (University of the Witwatersrand)
2. Stephan Potgieter (University of Cape Town)

NPRP-1 PhD Poster Award

Mbulelo Dondolo (University of the Witwatersrand)

NPRP-2 PhD Poster Award

1. Nidhi Tripathi (University of the Witwatersrand)
2. Vongani Chabalala (University of the Witwatersrand)

NPRP-1 PhD Oral Award

1. Sebenzile Magagula (University of the Witwatersrand)
2. Refilwe Emil Molaeng (University of the Witwatersrand)
2. Ayabulela Tsewu (University of Johannesburg)

NPRP-2 PhD Oral Award

1. Cameron Garvey (University of Cape Town)
2. Thabo James Lepota (University of the Witwatersrand)
2. Xola Mapekula (University of Johannesburg)

C Photonics

MSc Poster Award

Jacques Buys (University of Stellenbosch)

MSc Oral Award

Christopher Rawlings (University of the Witwatersrand)

Calvin Groenewald (University of the Witwatersrand)

MSc (Quantum Tech) Oral Award

Fazilah Nothlawala (University of the Witwatersrand)

PhD Poster Award

Cade Peters (University of the Witwatersrand)

PhD Oral Award

Cade Peters (University of the Witwatersrand)

Eugene Fouche (University of Stellenbosch)

PhD (Quantum Tech) Oral Award

Pedro Dinis Ornelas (University of the Witwatersrand)

D Astrophysics and Space Science

Honours (Astrophysics) Poster Award

Christo Pretorius (North-West University)

Honours (Space Science) Encouragement Prize

Thembalethu Zulu (North-West University)

MSc (Astrophysics) Poster Award

Lobone Dire (North-West University)

MSc (Astrophysics) Oral Award

Trevor Nyambe (North-West University)

MSc (Space Science) Oral Award

1. Fanelesibonge Khoza (University of KwaZulu-Natal)

2. Kenny Monontsi (North-West University)

PhD (Astrophysics) Poster Award

Thando Kekana (University of Johannesburg)

PhD (Astrophysics) Oral Award

Tamador Aldowma (University of Johannesburg)

PhD (Space Science) Oral Award

1. Jonathan Stephanus Troskie (North-West University)

2. Sanele Lionel Khanyile (Rhodes University)