



# PROCEEDINGS

## of the 68th Annual Conference of the South African Institute of Physics

1-5 July 2024  
Rhodes University

To the next 100,  
The future of Physics in South Africa



**PROCEEDINGS EDITOR-IN-CHIEF:**

Prof Aletta Prinsloo, University of Johannesburg

**PUBLISHER:**

The South African Institute of Physics (SAIP)

**COPYRIGHT NOTICE:**

© 2024 by the South African Institute of Physics

All rights reserved.

The conference was hosted by Rhodes University on 1–5 July 2024. The Proceedings of SAIP 2024, the 68<sup>th</sup> Annual Conference of the South African Institute of Physics, will be available electronically only on the SAIP website: [www.saip.org.za](http://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 permissions from the SAIP Office:

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

email: [info@saip.org.za](mailto:info@saip.org.za)

ISBN: 978-1-0370-2645-4

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

# CONTENTS

<b>Editorial</b>	<b>9</b>
<b>Message from the Organisers</b>	<b>11</b>
• Local Organising Committee . . . . .	12
<b>Divisions, Editorial Team, and Reviewers</b>	<b>13</b>
• Divisions and Division Chairs . . . . .	13
• Editorial Team . . . . .	14
• List of Reviewers . . . . .	16
• Group Photo of Delegates . . . . .	21
<b>A Physics of Condensed Matter and Materials</b>	<b>23</b>
• Critical behaviour near the paramagnetic and ferromagnetic phase transition temperature in CrMnAl alloy . . . . .	24
• Effect of pH on the structural, morphology, and optical properties of hematite $\alpha$ -Fe <sub>2</sub> O <sub>3</sub> prepared via hydrothermal method . . . . .	32
• Ground-state structure, magnetic and elastic properties of Fe-Co-Nb soft magnetic alloys: Cluster expansion approach . . . . .	38
• Density Functional Theory Study on Properties of Fe and Ni Doped NaMnPO <sub>4</sub> as Cathode Material for Sodium-ion Batteries . . . . .	44
• Exploring beta-12 and chi-3 borophenes cathodes stability after exposure to oxygen in alkali-metal oxygen batteries: A first-principles study . . . . .	50
• The Influence of Mn doping on the Structure and Characteristics of Cr <sub>2</sub> O <sub>3</sub> Nanoparticles . . . . .	58
• Study of elastic modulus of Ti <sub>70</sub> -Nb <sub>10</sub> -Ta <sub>15</sub> -Zr <sub>5</sub> alloy using first principles calculations and experimental method . . . . .	64
• Structural properties of ion track etched micropores in polyethylen cated with aluminum through electronbeam deposition . . . . .	70
• TOF-SIMS and AES studies on the segregation of indium from polycrystalline copper . . . . .	78
• Machine learning-driven optimization of organic-inorganic perovskites for solar cells application . . . . .	84

---

• Palladium decorated ZnO sensors for the detection of spoilage gases . . . . .	91
• Characterization of thin films of Cr/Si and Ni/Cr/Si using RBS for proton beam writing preparation . . . . .	98
• Characterisation of Ag-implanted PET using Time-of-Flight-Elastic recoil detection technique . . . . .	103
• Molecular dynamics simulations investigation of the structural and dynamical properties of pyrite-type (NiS <sub>2</sub> ) nanoparticles . . . . .	109
• Gas sensing properties of Cerium doped Magnesium Ferrite towards BTEX Gases .	116
• Luminescence properties of a Cr <sup>3+</sup> doped MgTa <sub>2</sub> O <sub>6</sub> /Mg <sub>4</sub> Ta <sub>2</sub> O <sub>9</sub> composite phosphor . . . . .	122
• Effect of pressure on structural, electronic, and mechanical properties of tP16 Cr <sub>3</sub> Ru intermetallic alloy: A first principles density functional theory study . . .	129
• The phase stability of the binary Mn-Al alloys using cluster expansion and first principle calculations . . . . .	135
• The effect of annealing temperature on SrY <sub>2</sub> O <sub>4</sub> particles prepared using combustion synthesis . . . . .	141
• Enhanced machine learning approaches for predicting formation energy and tolerance factor in perovskite oxide materials . . . . .	147
• Structural, optical and gas sensing properties of WO <sub>3</sub> and Ni-doped WO <sub>3</sub> towards LPG gas . . . . .	153
• Effect of polymer coating on the properties of magnesium-zinc ferrite (Mg <sub>x</sub> Zn <sub>1-x</sub> Fe <sub>2</sub> O <sub>4</sub> ) nanoparticles synthesized by glycol-thermal route . . . . .	159
• Enhanced surface characteristics and properties of PEG-coated zinc- and cobalt-nano ferrites through high-energy ball milling . . . . .	167
• The effect of annealing temperature on strontium zirconate (SrZrO <sub>3</sub> ) perovskites prepared by hydrothermal method . . . . .	174
• Fabrication and effects of polymer (chitosan) coating on Ni <sub>0.5</sub> Zn <sub>0.5</sub> Fe <sub>2</sub> O <sub>4</sub> ferrite nanoparticles . . . . .	180
• Further studies in phototransferred thermoluminescence of tanzanite . . . . .	188
• Impact of Cr Doping on Superconductivity in Mo-Re Alloys . . . . .	195
• Microstructure and mechanical properties study of Ti-12Mo alloy for biomedical applications . . . . .	203
• Thermoelectric Properties of Some Hexagonal Copper Sulphides Phases . . . . .	210
• Prediction of photovoltaic performance of CsSn(I <sub>1-x</sub> Br <sub>x</sub> ) <sub>3</sub> perovskite solar cells using a machine learning approach based on the SCAPS-1D simulator . . . . .	218
• Understanding the Zn doping effect on the fundamental properties of Co <sub>3</sub> O <sub>4</sub> . . . .	224
• Comparative study on the structural and photoluminescence properties of Zn <sub>4</sub> B <sub>6</sub> O <sub>13</sub> :xDy <sup>3+</sup> (where x = 1%) prepared by sol-gel, combustion, and solid-state reaction methods . . . . .	230
• Understanding electronic properties of CsSnBr <sub>3</sub> perovskite solar when exposed to various environmental factors: A first-principles approach . . . . .	236
• First-principle study of SiC(110)/Ti <sub>2</sub> AlV(110) surface and interface . . . . .	242
• Influence of the carbonization temperature on the structural and physicochemical characteristics of biochar derived from pinewood . . . . .	248
• First-principle study for structural, electronic, thermodynamic, and mechanical properties of LiVS <sub>2</sub> . . . . .	254
<b>B Nuclear, Particle, and Radiation Physics</b>	<b>261</b>
• Growing excess for a narrow resonance with a mass of 152 GeV . . . . .	262

---

• Angular correlation corrections for absolute activity measurements by $\gamma\gamma$ -coincidence . . . . .	268
• Simulation of photon shielding properties of $\text{Re}_2\text{MnCoO}_6$ ( $\text{Re} = \text{La, Sm}$ ) . . . . .	274
• Extraction of Giant Monopole Resonance Strength in $^{40,42,44,48}\text{Ca}$ with Multipole Decomposition Analysis . . . . .	279
• Migration of silver in silicon carbide coated with a silicon dioxide layer . . . . .	285
• Search for $tWZ$ production in $pp$ collisions at $\sqrt{s} = 13$ TeV with the ATLAS experiment . . . . .	291
• Investigations on the effect of Ni and Ta on the Ti-Pt shape memory alloys for high-temperature applications: First principle approach . . . . .	298
• Muography and the Paarl African Underground Laboratory . . . . .	304
• Radon concentration and radiological hazards in farm soil, Rustenburg, South Africa . . . . .	310
• A Burn-In Test Station for the Transformer Coupled Buck Converters within the Low Voltage Power Supplies of the ATLAS hadronic Tile Calorimeter . . . . .	315
• Exploring the spectroscopy of the low- and intermediate-spin states in $^{148}\text{Sm}$ . . . . .	321
• Fast neutron spectrometry with compact scintillator-based detectors . . . . .	329
• Exploring toponium formation at the LHC . . . . .	335
• 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) . . . . .	341
• Searches for scalar decaying into two photons produced in association with $b$ -jets with ATLAS detector at the LHC . . . . .	347
<b>C Photonics</b> . . . . .	<b>355</b>
• Co-delivery of gold nanoparticles and berberine in liposome formulation as a nanotheranostic agent for Computed Tomography image-guided Photodynamic therapy . . . . .	356
• Phototoxic effects of Hypocrellin B on the A375 metastatic melanoma cell line . . . . .	364
• Enhancing Photodynamic Therapy Efficiency in Human Lung Cancer Cells using Hypocrellin B . . . . .	372
• Evaluation of the anticancer potential of Berberine Chloride by combined Chemophototherapy . . . . .	379
<b>D Astrophysics and Space Science</b> . . . . .	<b>385</b>
• Constraining symmetric teleparallel gravity using SNIa, OHD, and RSD data . . . . .	386
• Searching for high redshift radio galaxies with the MeerKAT Galaxy Cluster Legacy Survey . . . . .	394
• Coastal and Inland Atmospheric Aerosol Properties (AOP) Using Cimel's Sun Photometer Data . . . . .	402
• Cataloguing Compact Sources for Star Formation Rate studies in MERGHERS Pilot Fields . . . . .	411
• Updating MOXHA: Improving mock X-ray analysis for Simba-C and beyond . . . . .	420
• Measuring exoplanet transit depths with the SAAO Lesedi telescope . . . . .	426
• Timing analysis of rotating radio transients discovered with MeerKAT . . . . .	433
• Study of dynamical systems and large-scale structure . . . . .	438
• Numerical simulations of the evolution of astrospheres in different interstellar conditions . . . . .	446
• Constraints of Cosmic Expansion Using a MSF . . . . .	454
• Interacting dark energy models . . . . .	462

---

<b>E</b>	<b>Physics for Development, Education, and Outreach</b>	<b>469</b>
•	Physics in the next 100 years in South Africa: remarks on foresight . . . . .	470
•	The introduction and adaptation of the Investigative Science Learning Environment (ISLE) approach in a South African high school . . . . .	476
•	Helping science students learn how to learn: interventions with first-year science students at Rhodes University . . . . .	481
<b>F</b>	<b>Applied Physics</b>	<b>491</b>
•	An experimental evaluation of a PV DC cooker using different loads . . . . .	492
•	Performance of experimental solar trough receiver: data versus simulation . . . . .	499
•	Shock relations for an accelerating object in the transonic range . . . . .	506
•	Investigation of the Effects of the Accumulation of Debris and Deterioration on the Performance of CPV Modules . . . . .	512
•	Impact of various electrons transport layers (ETLs) on the electrical performance of a lead-free CsGeI <sub>3</sub> based perovskite solar cell . . . . .	519
•	Experimental comparison of a box solar cooker with and without heat storage . . . . .	525
•	Indoor characterization of monocrystalline half-cut cell solar photovoltaic module . . . . .	532
•	Electrochemical Characterization of Sodium-Ion Energy Storage Devices Using a Low- Cost Microcontroller-Based Instrument . . . . .	539
•	Exploring quantum machine learning for anomaly detection in particle physics . . . . .	545
•	Analysis of the behaviour of bypass diodes and power output of a photovoltaic (PV) module operating under partial shading conditions . . . . .	551
•	The Structural, Mechanical, Optical Properties of Rb <sub>2</sub> LiInF <sub>6</sub> Perovskite . . . . .	557
•	Sustainable Biogas Production from Cow Dung: The Role of Metal Oxide Nanoparticles . . . . .	563
•	An Analytical Model of the 2kW Photovoltaic System Performance at Tshwane University of Technology . . . . .	569
•	Comparative analysis of SPM and DFN model for sodium-ion batteries . . . . .	576
•	Principles and challenges of developing cost-effective single photon detector . . . . .	582
•	Computational study of electronic and optical properties of graphene/brookite (210) composite: for photocatalyst application . . . . .	589
•	Adsorption of Natural Dye (Porphyrin and Pheophytin) Molecules on TiO <sub>2</sub> (101) Anatase Surface for Improved Light Harvesting Efficiency in Dye-Sensitized Solar Cells . . . . .	596
•	Density functional theory study of Na(MnZn)O <sub>2</sub> as a cathode material . . . . .	603
•	Investigating the Optical and Electronic Properties of CsSnBr <sub>3</sub> Mixed Halide Perovskites: A First Principles Study . . . . .	610
<b>G</b>	<b>Theoretical and Computational Physics</b>	<b>617</b>
•	Modeling the Geometry of the Quark Gluon Plasma . . . . .	618
•	Results of Calculations for the Ground state Energy of the Hydrogen Molecular Ion obtained using Basis Functions related to the Sinc Function in Three Dimensions . . . . .	624
•	Energy Loss in Small Quark Gluon Plasmas . . . . .	629
•	Exact Symmetry Preservation in Discretized PDEs with String Theory . . . . .	635
•	Exploring compatibility and accuracy of functionals on structural and electronic properties of manganese oxide cathode materials: a dft and dft+u study . . . . .	640
•	Probing the Dead Cone using the Lund Jet Plane . . . . .	646
•	Improving the sensitivity to smuon production using neural networks . . . . .	651

---

- 
- Physical Constrained Machine Learning: An Introduction and Opportunities in  
Solid States Physics . . . . . 657
  - Numeric exploration of Non-trivial emergent phenomena in Quark-Gluon Plasma . 664
  - Electronic and optical properties of halogen co-doped graphdiyne . . . . . 671
  - Hyperparameter tuning of variational quantum algorithms . . . . . 677
  - Adiabatic elimination approach to the open quantum Brownian motion of a  
Brownian particle in a potential: a particular example . . . . . 684





# EDITORIAL

Rhodes University hosted the annual South African Institute of Physics (SAIP) conference during July 2024. The conference was held against the backdrop of Rhodes University's 120th anniversary celebration in 2024 under the theme: "To the next 100, South Africa's future in physics". In parallel to the conference a Teacher's Development Workshop for physical sciences teachers from the Sarah Baartman District was arranged – extending the reach of the conference. Certain papers from this meeting are collected in this peer-reviewed volume. Submissions for the proceedings of SAIP 2024 were handled by an Editorial Board headed by an Editor-in-Chief and Associate Editors responsible for submissions in different divisions.

The Editorial Board of the SAIP 2024 Proceedings received 113 manuscripts for consideration by the advertised deadline. A total of 100 of these manuscripts met the relevant criteria and were submitted to a full peer-review process involving many individual reviewers. The list of the reviewer names are reflected elsewhere in the document and it is noted that certain reviewers took responsibility for more than one manuscript. The style of these proceedings is that of the (British) Institute of Physics Conference Series, similar to the styling used in previous SAIP Proceedings. Authors were requested to ensure that the defined layout were adhered to in their submitted pdf documents. The Associate Editors conducted the layout review on each manuscript parallel with the content review in order to expedite the review process. Manuscripts that deviated considerably from the specified layout specifications, while still broadly appropriate in their composition, were referred back to the authors for layout corrections. This was done together with the content reviews prepared by knowledgeable experts in each field, as well as considering Turnitin reports in order to ensure that the work is unique and not plagiarized. This year the Editorial Board again aimed to reduce the time between the submissions and publication, with the authors being informed of the outcome of their submissions before the closure for the December holiday and the publication of the document online shortly after that.

The publication of the SAIP Proceedings is highly dependent on the efficiency of the Associate Editors and the goodwill of reviewers from the scientific community in South Africa. The Editor-in-Chief wishes to acknowledge the hard work of the Associate Editors who spent much time considering the papers and reviewer reports in order to ensure that acceptable academic standards were met during peer-review for the proceedings to be credible. The majority of

the content reviews received were done with great care and diligence, as well as to the highest standards. The Editorial Board wishes to voice their sincere thanks to the participating Reviewers for their pro bono work, specifically to those Reviewers that read more than one paper. The meticulous reviewing process described above has ensured that these proceedings contain thoroughly peer-reviewed manuscripts of a high professional standard, which report on novel work that has not been published elsewhere.

This year the Editorial Board again made use of the services of a Technical Associate Editor, Dr Bruno Letarte from NWU. He took responsibility for finalizing the complete document and ensured that it was of a high technical standard. The Editor-in-Chief wish to recognise Dr Letarte's enormous contribution in preparing the neat final document. The Editorial Board appreciate all the hours you dedicated into producing this exceptional document.

# MESSAGE FROM THE ORGANISERS

It was an absolute to host the 68<sup>th</sup> Annual Conference of the South African Institute of Physics (SAIP 2024) at Rhodes University this July. This year has been a particularly significant time for Rhodes University, as it celebrates 120 years of its existence. Ours is a historic institution and one which has had a significant impact on South Africa throughout the last century.

As the 120<sup>th</sup> celebration reflect on where we have come from, the theme for the 68<sup>th</sup> SAIP conference invited us to look forward to where we might head. The SAIP annual series of conferences provides a forum for exchange of the latest ideas in physics and, this year's one did just that. The measure of a conference is how well the featured presentations can challenge our thinking, surprise our intuition, excite our curiosity and whether any can awake our quiescent interests. I leave it to delegates to judge how well we did on that front. We had 360 odd presentations over 8 parallel sessions. The conference proper was preceded by a Winter school on defects in solids whose aim is to contend with the reality that perfection in solids does not exist.

A key component of physics is the task of distributing the knowledge and ensuring the next generation are prepared to pick up the mantle of scientific exploration. In contribution to this endeavour, the programme included a teacher training workshop. I had the pleasure of visiting one session and I was touched by the enthusiasm of the participants.

I would like to thank my colleagues on the local organising committee who worked tirelessly and selflessly to see to the success of SAIP 2024. My colleagues from the Rhodes University conference office were impeccable in their management of the finances and logistics. Our invited speakers came with interesting contemporary topics that drew our attention and helped the academic case of the conference. I cannot close this piece without a word of thanks to the SAIP Office and Council for the support we received at all stages of preparation of the conference. To everyone else, thank you for attending the conference, your presence, patience and good humour made it memorable.

## Local Organising Committee

- **Prof. M L Chithambo**, Chairman  
– Professor of Physics and Head of the Physics Department, Rhodes University.
- **Ms Noluvuyo Matiwane**  
– Science Extended Studies Lecturer, Centre for Higher Education Research in Teaching and Learning (CHERTL), Rhodes University
- **Dr John Bosco Habarurema**  
– Research scientist at the South African National Space Agency and the scientific, Principal Investigator of the South African ionosonde network
- **Dr Kate Bryan**  
– Educator, St Andrew’s College, Makhanda
- **Prof Sam Chikweembani**  
– Professor of Physics, Walter Sisulu University (retired)
- **Dr Marcelline Atemkeng**  
– Senior Lecturer, Mathematics Department, Rhodes University
- **Dr Zama Katamzi-Joseph**  
– Space physics researcher at the South African National Space Agency
- **Dr Brian Masara** – SAIP representative.



### 68th Annual Conference of the South African Institute of Physics

1 - 5 July 2024 • Rhodes University • Grahamstown / Makhanda



# DIVISIONS, EDITORIAL TEAM, AND REVIEWERS

## Divisions and Division Chairs

- **Physics of Condensed Matter and Materials**
  - Prof Rudolph Erasmus, University of the Witwatersrand
- **Nuclear, Particle, and Radiation Physics**
  - Outgoing:
    - Dr Edward Khomotso Nkadimeng, University of the Witwatersrand
    - Dr Lindsay Donaldson, iThemba LABS
  - Newly elected:
    - Prof Sifiso Ntshangase, University of Zululand
    - Dr Mukesh Kumar, University of the Witwatersrand
- **Photonics**
  - Prof Pieter Neethling, Stellenbosch University
- **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
- **Biophysics**
  - Prof Tjaart Krüger, University of Pretoria
- **Women in Physics**
  - Dr Katekani Shingange, CSIR

## Editorial Team

### Editor-in-chief:

– **Aletta Prinsloo** is a Professor of Physics in the Department of Physics at the University of Johannesburg. She is an NRF rated research physicist in the field of experimental solid state physics. Her research is focused on the magnetism of chromium-based bulk alloys, thin films and nanomaterials.

### Associate Editors:

- **Physics of Condensed Matter and Materials**

– **Charles Sheppard** is an Associate Professor and a member of the Cr Research Group in the Physics Department at the University of Johannesburg. His current research interest focuses on the various physical properties observed in bulk Cr alloys, Cr thin films, and chrome oxide magnetic nano-materials.

- **Nuclear, Particle, and Radiation Physics**

– **Mukesh Kumar** is a Senior Lecturer of Physics 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 is focused on Higgs boson, top quark, and dark matter physics at the Large Hadron Collider (CERN) including the future  $e^-p$  and  $e^+e^-$  colliders. He is a member of TileCal Speaker committee for ATLAS detector at CERN.

- **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**

– **Hartmut Winkler** is a Professor of Physics and former Head of the Department of Physics at the University of Johannesburg. He was a past recipient of the Vice-Chancellor Distinguished Teacher Award with an extensive teaching portfolio. His background is in astrophysics, where he has maintained an active interest in the study of the variability of Active Galactic Nuclei. More recently he has also diversified to solar energy research. He is a frequent media commentator on topics pertaining to energy and electricity.

- **Applied Physics**

- **Thulani Hlatshwayo** is an associate Professor in the Department of Physics in the Faculty of Natural & Agricultural Sciences. His research is focussed on the understanding of the release of radioactive fission products from fuel in the modern nuclear reactors, where chemical vapour deposited (CVD)-SiC is the main barrier to fission products, and on finding alternative materials for nuclear waste storage. Professor Hlatshwayo recently received the Exceptional Young Researchers Award by the University of Pretoria. He is a PIs coordinator for SA-JINR projects in material research and nanoscience and is C2 NRF rated.

- **Hartmut Winkler** (see section: Physics for Development, Education, and Outreach)

- **Theoretical and Computational Physics**

- **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.

- **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. He is also the physics subject group leader, what other universities call head of department, on the Potchefstroom campus.

## Proceedings Online Administration:

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

---

## List of Reviewers

- **Dr Zaki Abdalla** – University of Pretoria, South Africa
- **Dr Hesham Abdelbagi** – University of Zululand, South Africa
- **Prof Joseph Asante** – Tshwane University of Technology, South Africa
- **Dr Geoff Beck** – University of the Witwatersrand, South Africa
- **Dr Abongile Bele** – Sefako Makgatho Health Sciences University, South Africa
- **Dr Abdulhakeem Bello** – African University of Science and Technology, Nigeria
- **Prof Mustapha Bghour** – Université Ibn Zohr - Agadir, Morocco
- **Dr Muaaz Bhamjee** – IBM Research - Africa; University of Johannesburg, South Africa
- **Dr Srimoy Bhattacharya** – University of the Witwatersrand, South Africa
- **Dr Marguerite Blignaut** – Stellenbosch University, South Africa
- **Dr Richard Britto** – University of the Free State, South Africa
- **Prof Zinhle Buthelezi** – iThemba LABS, South Africa
- **Prof Naven Chetty** – University of KwaZulu-Natal, South Africa
- **Prof James Chibueze** – UNISA, South Africa
- **Dr Anna Chrysostomou** – Sorbonne Université, France
- **Dr Hellen Chuma** – Johnson Matthey, South Africa
- **Prof Liza Coetzee-Hugo** – University of the Free State, South Africa
- **Dr Graham Daniels** – NECSA, South Africa
- **Dr Ramogohlo Diale** – Mintek, South Africa
- **Dr Redrisse Djoumessi-Fobasso** – University of Johannesburg, South Africa
- **Dr Wendy Dlamini** – University of KwaZulu-Natal, South Africa
- **Dr Hector Dlamini** – University of Pretoria, South Africa
- **Dr Lindsay Donaldson** – iThemba LABS, South Africa
- **Dr Wesley Doorsamy** – University of Leeds, United Kingdom
- **Prof Bryan Doyle** – University of Johannesburg, South Africa
- **Dr Adams Duniya** – Botswana University of Science and Technology, Botswana
- **Prof N. Eugene Engelbrecht** – North-West University, South Africa
- **Dr Nicolas Erasmus** – South African Radio Astronomy Observatory, South Africa



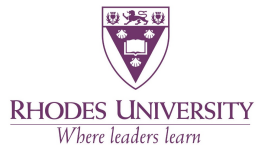
- **Dr Abdualazem Fadol** – IHEP, China
- **Mr Cole Faraday** – University of Cape Town, South Africa
- **Prof Stefan Ferreira** – North-West University, South Africa
- **Prof Philippe Ferrer** – University of the Witwatersrand, South Africa
- **Prof Igle Gledhill** – University of the Witwatersrand, South Africa
- **Prof Kevin Goldstein** – University of the Witwatersrand, South Africa
- **Dr Mmusi Gopane** – Sol Plaatje University, South Africa
- **Dr Daniele Gregoris** – Jiangsu University of Science and Technology, China
- **Dr Sheldon R Herbst** – University of Johannesburg, South Africa
- **Dr Donald Hile** – University of KwaZulu-Natal, South Africa
- **Prof Matt Hilton** – University of the Witwatersrand, South Africa
- **Dr Susan Jacobs** – University of Johannesburg, South Africa
- **Dr Jitcy Joseph** – National Institute for Occupational Health, South Africa
- **Dr Abraham Kapimkenfack** – Tshwane University of Technology, South Africa
- **Dr Garreth Kemp** – University of Johannesburg, South Africa
- **Dr Bonginkosi V Kheswa** – University of Johannesburg, South Africa
- **Dr Zakhele Khumalo** – iThemba LABS, South Africa
- **Dr Kenda Knowles** – South African Radio Astronomy Observatory, South Africa
- **Dr Isobel Kolbe** – University of the Witwatersrand, South Africa
- **Prof Thomas Konrad** – University of KwaZulu-Natal, South Africa
- **Prof Sylvia Ledwaba** – University of Limpopo, South Africa
- **Dr Bruno Letarte** – North-West University, South Africa
- **Dr Ndanduleni Lesley Lethole** – University of Fort Hare, South Africa
- **Dr Machaba Letswalo** – University of Johannesburg, South Africa
- **Dr Juandre Light** – North-West University, South Africa
- **Prof Ilani Loubser** – North-West University, South Africa
- **Dr Mawande Lushozi** – University of Cape Town, South Africa
- **Dr Kelebogile Maabog-Tau** – University of Botswana, Botswana
- **Prof Khomotso Maenetja** – University of Limpopo, South Africa
- **Prof Farvah Mahmoudi** – Université Claude Bernard Lyon 1; CNRS/IN2P3, France

- 
- **Dr Siyabonga NT Majola** – University of Johannesburg, South Africa
  - **Prof Eric Maluta** – University of Venda, South Africa
  - **Dr George Manyali** – Kaimosi Friends University, Kenya
  - **Dr Edwin Mapasha** – University of Pretoria, South Africa
  - **Dr Regina Maphanga** – Council for Scientific and Industrial Research, South Africa
  - **Dr Mordecai Mashamaite** – University of Limpopo, South Africa
  - **Prof Alan Matthews** – University of KwaZulu-Natal, South Africa
  - **Dr Nkanyiso Mbatha** – Council for Scientific and Industrial Research, South Africa
  - **Dr Jean Mboukam** – Tshwane University of Technology, South Africa
  - **Prof Pontsho Mbule** – UNISA, South Africa
  - **Dr Kim McAlpine** – South African Radio Astronomy Observatory, South Africa
  - **Dr Wendy Mdlalose** – University of KwaZulu-Natal, South Africa
  - **Dr Mofuti Mehlape** – University of Limpopo, South Africa
  - **Dr Mbuso Mlambo** – Vaal University of Technology, South Africa
  - **Dr Rosinah Modiba** – Council for Scientific and Industrial Research, South Africa
  - **Dr Sefako Mofokeng** – Tshwane University of Technology, South Africa
  - **Dr Puseletso Mokoena** – Sol Plaatje University, South Africa
  - **Dr Victor Molefe** – University of Pretoria, South Africa
  - **Dr Mahlaga Molepo** – University of the Witwatersrand, South Africa
  - **Dr Hanieh Montaseri** – Imperial College London, United Kingdom
  - **Prof David Motaung** – University of the Free State, South Africa
  - **Dr Selepe Motloung** – University of the Free State, South Africa
  - **Prof Abdelilah Moussa** – European Organization for Nuclear Research (CERN), Switzerland
  - **Prof Thomas Moyo** – University of KwaZulu-Natal, South Africa
  - **Prof Mandla Msimanga** – Tshwane University of Technology, South Africa
  - **Dr C Mtshali** – iThemba Labs, South Africa
  - **Dr Blessed Muchono** – University of Eswatini, Eswatini
  - **Dr Sophie Mulaudzi** – University of Venda, South Africa
  - **Dr Khuliso Murulane** – University of Johannesburg, South Africa

- **Prof Amidu Mustapha** – Federal University of Agriculture (Abeokuta), Nigeria
- **Dr Yannick Mvondo-She** – University of the Witwatersrand, South Africa
- **Prof Deena Naidoo** – University of the Witwatersrand, South Africa
- **Dr Partha Nandi** – Stellenbosch University, South Africa
- **Dr Wade Naylor** – Australian Catholic University, Australia
- **Prof Pieter Neethling** – Stellenbosch University, South Africa
- **Dr Stanislav Nemecek** – CERN, Switzerland
- **Prof Eric Njoroge** – University of Pretoria, South Africa
- **Dr Edward Nkadimeng** – iThemba LABS, South Africa
- **Prof Steven Nkosi** – University of Limpopo, South Africa
- **Prof Luyanda Noto** – UNISA, South Africa
- **Dr Sibusiso Nqayi** – University of Johannesburg, South Africa
- **Dr Schadrack Nsengiyumva** – Rhodes University, South Africa
- **Dr Petros Ntoahae** – University of Limpopo, South Africa
- **Prof SS Ntshangase** – University of Zululand, South Africa
- **Prof Cloud Nyamhere** – Botswana University of Agriculture and Natural Resources, Botswana
- **Dr Nangamso Nyangiwe** – Tshwane University of Technology, South Africa
- **Dr Hlanganani Nyembe** – Nelson Mandela University, South Africa
- **Dr David Oeba** – Egerton University, Kenya
- **Dr Saturnin Ombinda-Lemboumba** – Council for Scientific and Industrial Research, South Africa
- **Dr Kabir Otun** – University of Pretoria, South Africa
- **Dr Andronikos Paliathanasis** – Durban University of Technology, South Africa
- **Prof Paratheepan Paratheepan** – Eastern University, Sri Lanka
- **Prof Clement Penny** – University of the Witwatersrand, South Africa
- **Dr Maje Phasha** – Mintek, South Africa
- **Prof Olawale Popoola** – Tshwane University of Technology, South Africa
- **Prof Aletta Prinsloo** – University of Johannesburg, South Africa
- **Dr Jan-Louis Raath** – SANSA, South Africa

- **Prof Gaotsiwe Rampho** – UNISA, South Africa
- **Dr Gift Rutavi** – University of Pretoria, South Africa
- **Dr Sarr Samba** – University of Pretoria, South Africa
- **Prof Charles Sheppard** – University of Johannesburg, South Africa
- **Dr Obed Shrinda** – Sol Plaatje University, South Africa
- **Prof Ilya Sinayskiy** – University of KwaZulu-Natal, South Africa
- **Prof Buyisiwe M Sondezi** – University of Johannesburg, South Africa
- **Dr Christine Steenkamp** – Stellenbosch University, South Africa
- **Dr Ruhann Steyn** – North-West University, South Africa
- **Prof Du Toit Strauss** – North-West University, South Africa
- **Prof Mark Tame** – Stellenbosch University, South Africa
- **Prof Moise Tchokonte** – University of the Western Cape, South Africa
- **Dr Kamohelo Tsabalala** – University of the Free State, South Africa
- **Dr David Tshwane** – Council for Scientific and Industrial Research, South Africa
- **Prof Iyabo Usman** – University of the Witwatersrand, South Africa
- **Prof Johan van der Walt** – North-West University, South Africa
- **Prof Ernest E van Dyk** – Nelson Mandela University, South Africa
- **Dr Chani van Niekerk** – University of Johannesburg, South Africa
- **Dr JJ Van Zyl** – Stellenbosch University, South Africa
- **Prof Christo Venter** – North-West University, South Africa
- **Dr Andrew Venter** – NECSA, South Africa
- **Dr Frederik Vorster** – Nelson Mandela University, South Africa
- **Dr Robert Warmbier** – University of the Witwatersrand, South Africa
- **Prof Patricia Whitelock** – University of Cape Town, South Africa
- **Prof Hartmut Winkler** – University of Johannesburg, South Africa

# Group Photo of Delegates



**68TH ANNUAL  
CONFERENCE  
OF THE SA INSTITUTE OF  
PHYSICS**

